DRIVE SHAFT AND COUPLING MAINTENANCE

ENGINE NOSE GEARBOX MAINTENANCE

MAIN TRANSMISSION MAINTENANCE

INTERMEDIATE GEARBOX MAINTENANCE

TAIL ROTOR GEARBOX MAINTENANCE

PRIMARY HYDRAULIC SYSTEM MAINTENANCE

UTILITY HYDRAULIC SYSTEM MAINTENANCE

PRESSURIZED AIR SYSTEM MAINTENANCE

TECHNICAL MANUAL

AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL

VOLUME 4 OF 9

HELICOPTER, ATTACK, AH-64A APACHE (NSN 1520-01-106-9519) (EIC: RHA)

CHAPTER 6
DRIVE SYSTEM

CHAPTER 7
HYDRAULIC AND PNEUMATIC SYSTEMS

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HEADQUARTERS, DEPARTMENT OF THE ARMY
16 MAY 1994

CHANGE
NO. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 July 2001

Aviation Unit and Intermediate Maintenance Manual

HELICOPTER, ATTACK,
AH–64A APACHE
(NSN 1520–01–106–9519)
(EIC:RHA)

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Remove pages	Insert pages
A through D	A through D
6–147 and 6–148	6–147 and 6–148
7–5 and 7–6	7–5 and 7–6
7–119 through 7–124	7–119 through 7–124
7–163 through 7–166	7–163 through 7–166
7–185 and 7–186	7–185 and 7–186
7–189 and 7–190	7–189 and 7–190
7–209 through 7–212	7–209 through 7–212
———	7–502.1 through 7–502.7/(7–502.8 blank)

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Remove pages	Insert pages
- - - -	A through D
6-9 through 6-12	6-9 through 6-12
6-91 and 6-92	6-91 and 6-92
6-269 through 6-278	6-269 through 6-278
6-296.1 through 6-296.4	6-296.1 through 6-296.4
6-296.11 through 6-296.16	6-296.11 through 6-296.16
(6-297 blank) /6-298	(6-297 blank) /6-298
6-304.1 through 6-304.4	6-304.1 through 6-304.4
6-305 and 6-306	6-305 and 6-306
6-309 and 6-310	6-309 and 6-310
6-313 through 6-316	6-313 through 6-316
6-323 and 6-324	6-323 and 6-324
6-411 and 6-412	6-411 and 6-412
6-603 and 6-604	6-603 and 6-604
7-155 through 7-158	7-155 through 7-158
7-241 through 7-248	7-241 through 7-248

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Remove pages	Insert pages
6-3 and 6-4	6-3 and 6-4
6-7 and 6-8	6-7 and 6-8
6-11 through 6-14	6-11 through 6-14
6-73 and 6-74	6-73 and 6-74
6-93 and 6-94	6-93 and 6-94
6-147 and 6-148	6-147 and 6-148
6-151 and 6-152	6-151 and 6-152
6-157 through 6-160	6-157 through 6-160
6-200.1 and 6-200.2	6-200.1 and 6-200.2
(6-201 blank)/ 6-202 through 6-208	6-201 through 6-208
6-281 through 6-286	6-281 through 6-286
6-296.1 through 6-296.4	6-296.1 through 6-296.4
6-296.11 through 6-296.16	6-296.11 through 6-296.16
(6-297 blank)/6-298	(6-297 blank)/6-298
6-299 through 6-304	6-299 through 6-304
- - - -	6-304.1 through 6-304.4
6-305 and 6-306	6-305 and 6-306
6-309 and 6-310	6-309 and 6-310
6-315 and 6-316	6-315 and 6-316
6-319 through 6-322	6-319 through 6-322
- - - -	6-322.1/(6-322.2 blank)
6-327 through 6-334	6-327 through 6-333/(6-334 blank)
6-459 and 6-460	6-459 and 6-460
6-463 through 6-466	6-463 through 6-466
6-501 through 6-504	6-501 through 6-504
6-507 and 6-508	6-507 and 6-508
6-513 and 6-514	6-513 and 6-514
6-521 and 6-522	6-521 and 6-522
6-541 and 6-542	6-541 and 6-542
6-545 through 6-548	6-545 through 6-548
6-559 and 6-560	6-559 and 6-560
6-597 through 6-600	6-597 through 6-600
6-603 through 6-607/(6-608 blank)	6-603 through 6-607/(6-608 blank)
7-1 and 7-2	7-1 and 7-2
7-71 through 7-76	7-71 through 7-76

TM 1-1520-238-234
C5

Remove pages	Insert pages
- - - -	7-76.1/(7-76.2 blank)
7-77 and 7-78	7-77 and 7-78
- - - -	7-78.1 through 7-78.10
7-79 through 7-82	7-79 through 7-82
7-140.1 and 7-140.2	7-140.1 and 7-140.2
7-145 through 7-150	7-145 through 7-150
7-153 and 7-154	7-153 and 7-154
7-159 through 7-162	7-159 through 7-162
7-165 and 7-166	7-165 and 7-166
7-171 through 7-174	7-171 through 7-174
7-177 and 7-178	7-177 and 7-178
7-183 through 7-190	7-183 through 7-190
7-193 through 7-202	7-193 through 7-202
7-205 through 7-208	7-205 through 7-208
7-211 and 7-212	7-211 and 7-212
7-231 through 7-234	7-231 through 7-234
7-389 and 7-390	7-389 and 7-390

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AH-64A APACHE
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Remove pages	Insert pages
6-1 and 6-2	6-1 and 6-2
6-7 through 6-20	6-7 through 6-20
6-23 and 6-24	6-23 and 6-24
6-27 and 6-28	6-27 and 6-28
6-31 and 6-32	6-31 and 6-32
6-35 and 6-36	6-35 and 6-36
6-41 through 6-48	6-41 through 6-48
6-51 and 6-52	6-51 and 6-52
6-55 through 6-58	6-55 through 6-58
6-63 and 6-64	6-63 and 6-64
6-67 through 6-72	6-67 through 6-72
6-75 through 6-90	6-75 through 6-90
6-93 and 6-94	6-93 and 6-94
6-97 and 6-98	6-97 and 6-98
6-113 and 6-114	6-113 and 6-114
6-133 through 6-136	6-133 through 6-136
6-147 and 6-148	6-147 and 6-148
6-151 through 6-162	6-151 through 6-162
6-175 and 6-176	6-175 and 6-176
6-181 through 6-188	6-181 through 6-188
6-191 through 6-194	6-191 through 6-194
6-203 through 6-206	6-203 through 6-206
6-269 and 6-270	6-269 and 6-270
6-273 and 6-274	6-273 and 6-274
6-277 and 6-278	6-277 and 6-278
6-291 through 6-294	6-291 through 6-294
6-313 through 6-316	6-313 through 6-316
6-319 and 6-320	6-319 and 6-320
6-331 and 6-332	6-331 and 6-332
6-363 through 6-366	6-363 through 6-366
6-373 through 6-376	6-373 through 6-376
6-399 and 6-400	6-399 and 6-400
6-415 through 6-418	6-415 through 6-418
6-433 through 6-440	6-433 through 6-440
6-483 through 6-486	6-483 through 6-486

TM 1-1520-238-23-4
C 4

Remove pages	Insert pages
6-486.1/(6-486.2 blank)	6-486.1/(6-486.2 blank)¼
6-501 through 6-504	6-501 through 6-504
6-509 through 6-512	6-509 through 6-512
6-515 through 6-520	6-515 through 6-520
6-523 through 6-526	6-523 through 6-526
6-539 through 6-550	6-539 through 6-550
6-555 through 6-558	6-555 through 6-558
6-561 through 6-564	6-561 through 6-564
6-575 through 6-596	6-575 through 6-596
7-5 and 7-6	7-5 and 7-6
7-111 and 7-112	7-111 and 7-112
7-147 and 7-148	7-147 and 7-148
7-163 and 7-164	7-163 and 7-164
7-173 and 7-174	7-173 and 7-174
7-195 and 7-196	7-195 and 7-196
7-203 and 7-204	7-203 and 7-204
7-311 and 7-312	7-311 and 7-312
7-357 and 7-358	7-357 and 7-358
7-383 through 7-392	7-383 through 7-392
7-527 and 7-528	7-527 and 7-528
7-533 and 7-534	7-533 and 7-534
7-547 and 7-548	7-547 and 7-548
7-551 and 7-552	7-551 and 7-552
7-569 and 7-570	7-569 and 7-570
- - - - -	E-mail instruction page

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TM 1-1520-238-23-4
C 3

CHANGE

NO. 3

HEADQUARTERS
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WASHINGTON, D. C., 20 February 1996

Aviation Unit and Intermediate Maintenance Manual

HELICOPTER, ATTACK,
AH-64A APACHE
(NSN 1520-01-106-9519)
(EIC: RHA)

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7-111 and 7-112	7-111 and 7-112
7-147 and 7-148	7-147 and 7-148
7-173 and 7-174	7-173 and 7-174
7-195 and 7-196	7-195 and 7-196

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TM 1-1520-238-23-4
C 3

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CHANGE

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Aviation Unit and Intermediate Maintenance Manual

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Remove pages	Insert pages
6-3 and 6-4	6-3 and 6-4
6-9 and 6-10	6-9 and 6-10
6-41 and 6-42	6-41 and 6-42
6-51 and 6-52	6-51 and 6-52
6-55 and 6-56	6-55 and 6-56
6-61 through 6-64	6-61 through 6-64
6-181 through 6-194	6-181 through 6-194
6-200.1 and 6-200.2	6-200.1 and 6-200.2
6-221 and 6-222	6-221 and 6-222
6-271 through 6-278	6-271 through 6-278
- - - -	6-296.1 through 6-296.16
6-297 and 6-298	(6-297 blank)/6-298
6-423 and 6-424	6-423 and 6-424
6-439 through 6-442	6-439 through 6-442
6-503 and 6-504	6-503 and 6-504
6-509 through 6-514	6-509 through 6-514
6-517 through 5-522	6-517 through 5-522
6-525 and 6-526	6-525 and 6-526
6-541 and 6-542	6-541 and 6-542
6-571 and 6-572	6-571 and 6-572
6-595 through 6-600	6-595 through 6-600
7-3 and 7-4	7-3 and 7-4
7-13 and 7-14	7-13 and 7-14
7-111 and 7-112	7-111 and 7-112
- - - -	7-140.1 and 7-140.2
7-359 and 7-360	7-359 and 7-360

Remove pages	Insert pages
7-509 and 7-510	7-509 and 7-510
7-513 and 7-514	7-513 and 7-514
7-541 through 7-544	7-541 through 7-544

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Remove pages	Insert pages
6-3 through 6-12	6-3 through 6-12
6-31 through 6-36	6-31 through 6-36
6-39 through 6-42	6-39 through 6-42
6-51 through 6-56	6-51 through 6-56
6-67 and 6-68	6-67 and 6-68
6-91 and 6-92	6-91 and 6-92
6-95 and 6-96	6-95 and 6-96
6-133 through 136	6-133 through 6-136
6-141 and 6-142	6-141 and 6-142
6-181 through 6-194	6-181 through 6-194
6-199 and 6-200	6-199 and 6-200
-----	6-200.1 and 6-200.2
6-201 through 206	(6-201 blank)/6-202 through 6-206
6-215 and 6-216	6-215 and 6-216
6-221 and 6-222	6-221 and 6-222
6-249 through 6-254	6-249 through 6-254
6-273 and 6-274	6-273 and 6-274
6-277 and 6-278	6-277 and 6-278
6-281 through 6-290	6-281 through 6-289/(290 blank)
6-307 and 6-308	6-307 and 6-308
6-325 and 6-326	6-325 and 6-326
6-339 and 6-340	6-339 and 6-340
6-365 and 6-366	6-365 and 6-366
6-369 and 6-370	6-369 and 6-370
6-389 and 6-390	6-389 and 6-390
-----	6-390.1/(6-390.2 blank)
6-391 through 6-396	6-391 through 6-396
6-415 through 6-432	6-415 through 6-432
-----	6-432.1/(6-432.2 blank)
6-439 and 6-440	6-439 and 6-440
-----	6-460.1 through 6-460.7/(6-460.8 blank)
6-467 and 6-468	6-467 and 6-468
6-479 through 6-486	6-479 through 6-486
-----	6-486.1/(6-486.2 blank)
6-487 and 6-488	6-487 and 6-488

Remove pages	Insert pages
6-497 through 6-502	6-497 through 6-502
6-509 through 6-526	6-509 through 6-526
6-549 and 6-550	6-549 and 6-550
6-555 through 6-564	6-555 through 6-564
7-9 and 7-10	7-9 and 7-10
7-15 through 7-20	7-15 through 7-20
- - - - -	7-20.1/(7-20.2 blank)
7-37 and 7-38	7-37 and 7-38
7-101 through 7-106	7-101 through 7-106
- - - - -	7-106.1 and 7-106.2
7-111 and 7-112	7-111 and 7-112
7-231 through 7-234	7-231through 7-234
7-239 through 7-24.4	7-239 through 7-24.4
7-263 and 7-264	7-263 and 7-264
7-357 through 7-360	7-357 through 7-360
- - - - -	7-360.1/(7-360.2blank)
7-457 through 7-460	7-457 through 7-460
- - - - -	7-460.1/(7-460.2blank)
7-463 through 7-466	7-463 through 7-466
7-489 through 7-492	7-489 through 7-492
7-551 through 7-554	7-551 through 7-554
7-567 through 7-570	7-567 through 7-570
7-573 and 7-574	7-573 and 7-574

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NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Date of issue for original and change pages are:

Original . . . . . 0 . . . . . 16 May 1994
Change . . . . . 1 . . . . . 17 May 1995
Change . . . . . 2 . . . . . 16 February 1996
Change . . . . . 3 . . . . . 20 February 1996
Change . . . . . 4 . . . 30 September 1996
Change . . . . . 5 . . . . 19 December 1997
Change . . . . . 6 . . . . . 10 May 2000
Change . . . . . 7 . . . . . 31 July 2001

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 1,272, CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.
Cover	0	6-67	4
Blank	0	6-68 – 6-69	0
A – D Added	7	6-70 – 6-72	4
6-1	0	6-73	5
6-2	4	6-74	0
6-3	1	6-75	4
6-4	5	6-76	0
6-5	0	6-77	4
6-6	1	6-78 – 6-79	0
6-7	4	6-80 – 6-81	4
6-8	5	6-82 – 6-83	0
6-9	0	6-84 – 6-85	4
6-10	6	6-86 – 6-87	0
6-11	4	6-88 – 6-89	4
6-12	6	6-90	0
6-13	5	6-91	1
6-14 – 6-15	0	6-92	6
6-16	4	6-93	4
6-17	0	6-94	5
6-18 – 6-20	4	6-95	0
6-21 – 6-22	0	6-96	1
6-23 – 6-24	4	6-97 – 6-98	4
6-25 – 6-26	0	6-99 – 6-113	0
6-27 – 6-28	4	6-114	4
6-29 – 6-30	0	6-115 – 6-132	0
6-31	4	6-133 – 6-135	4
6-32	1	6-136 – 6-140	0
6-33	0	6-141	1
6-34 – 6-36	4	6-142	0
6-37 – 6-39	0	6-143 – 6-147	0
6-40	1	6-148	7
6-41 – 6-44	4	6-149 – 6-151	0
6-45	0	6-152	5
6-46 – 6-48	4	6-153 – 6-157	4
6-49 – 6-50	0	6-158 – 6-159	5
6-51 – 6-52	4	6-160 – 6-161	4
6-53 – 6-54	1	6-162 – 6-175	0
6-55 – 6-57	4	6-176	4
6-58 – 6-61	0	6-177 – 6-180	0
6-62 – 6-63	2	6-181	4
6-64	4	6-182 – 6-183	2
6-65 – 6-66	0	6-184 – 6-188	4

***Zero in this column indicates an original page.**

INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

Page No.	*Change No.
6-189 – 6-190	2
6-191 – 6-193	4
6-194	2
6-195 – 6-199	0
6-200	1
6-200.1 Added	1
6-200.2 Added	5
6-201 – 6-208	5
6-209 – 6-215	0
6-216	1
6-217 – 6-220	0
6-221	1
6-222	2
6-223 – 6-249	0
6-250 – 6-253	1
6-254 – 6-268	0
6-269	4
6-270 – 6-271	6
6-272	0
6-273 – 6-277	6
6-278 – 6-280	0
6-281 – 6-285	5
6-286 – 6-289	1
6-290 Blank	1
6-291 – 6-294	4
6-295 – 6-296	0
6-296.1 Added	2
6-296.2 – 6-2596.3	6
6-296.4 – 6-296.13 Added	2
6-296.14 – 6-296.16	6
6-297 Blank	6
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6-299 – 6-304	5
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CHAPTER 6
DRIVE SYSTEM

CHAPTER OVERVIEW

Chapter 6 contains the maintenance instructions for the drive system. Drive system description, operation, and troubleshooting information is contained in TM 1-1520-238-T.

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SECTION I. DRIVE SHAFT AND COUPLING MAINTENANCE

6.1. DRIVE SHAFT INSPECTION

6.1.1. Description

This task covers: Inspection.

6.1.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Fluorescent inspection kit (item 138, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 - 100 inch-ounce 1/4-inch hexagon drive click type torque wrench (item 437, App H)

Materials/Parts:

Brush (item 34, App F)
Methyl ethyl ketone (item 124, App F)

Personnel Required:

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23
TM 55-1500-335-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; cover L540 removed; fairings R410, R475, L510, R510, and L530 removed

6.1.3. Inspection

a. **Check components for damage and loose mounting.**

b. **Check for loose, missing, or damaged mounting hardware.**



c. **Check drive shaft for cracks.** Use magnifier where needed.

(1) Clean suspected areas. Use brush (item 34, App F) and methyl ethyl ketone (item 124, App F). Discard brush in suitable container after use.

(2) Check for cracks. None allowed. Use fluorescent inspection kit (TM 55-1500-335-23).

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6.1. DRIVE SHAFT INSPECTION – continued

d. **Check shaft tubes for dents.**

(1) Dents are considered “negative” material displacement, material moved below surrounding surface. Use depth gage for dent check on straight surfaces.

(2) Sharp dents are not acceptable.

(a) Sharp dents are defined as those depressions that initiate or terminate in a discernible discontinuity or interruption in smooth flow of metal.

(b) Sharp dents are considered to be **0.250 INCH** or less deep.

(c) A sharp dent can be detected by tracing a nonmetallic pointed instrument across surface of tube and noting abrupt change in direction of instrument tip.

(3) Non-sharp dents are acceptable, provided they meet following dimensional criteria.

(a) The width dimensions signify shortest distance across dent.

(b) The length dimensions signify longest distance across dent.

DENT WIDTH	DENT LENGTH	DENT DEPTH	DISPOSITION
Less than **0.250 INCH**	Not Applicable	Not Applicable	Reject Tube
0.250 - 0.375 INCH	**2.0 INCH** Maximum	**0.024 INCH** Maximum	Accept Tube
0.375 - 0.500 INCH	**2.5 INCH** Maximum	**0.036 INCH** Maximum	Accept Tube
0.500- 0.875 INCH	**3.0 INCH** Maximum	**0.048 INCH** Maximum	Accept Tube
More than **0.875 INCH**	Not Applicable	Not Applicable	Reject Tube

(4) Drive shaft tubes may show circumferential lines indicating a slight change in cylindrical surface (a smooth step).

(a) These lines have been referred to as “ripples”. Ripples are a result of manufacturing process.

1 Ripples are considered a “positive” material displacement condition, material raised above surrounding surface.

2 Ripples are acceptable, provided they do not exceed **0.024 INCHES** in step height or **7.50 INCH** in circumferential arc length (190 degrees).

e. **Check shaft tube circumference for scratches.** Use magnifier.

(1) Longitudinal scratches deeper than **0.006 INCH**, radial scratches deeper than **0.004 INCH**, 45-degree longitudinal/radial scratches deeper than **0.002 INCH**, and scratches within 15 degrees of lengthwise axis deeper than **0.005 INCH** are not acceptable.

(2) The following criteria apply only to raised diameters (**4.655/4.750 INCH**) at extreme ends of tubes. All scratches deeper than **0.015 INCH** are not acceptable.

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6.1. DRIVE SHAFT INSPECTION – continued

f. **Check No. 4 and No. 5 tail rotor drive shaft with nickel plated wear sleeves for movement and broken paint stripe.**

(1) Perform both initial and recurring inspection after aircraft has been in coolest possible ambient temperature for **30 MINUTES** or more.

(2) Check for broken paint stripe on all four wear sleeves. If broken paint stripe is detected check wear sleeves for damage or movement per the following steps. If no damage or movement is found, reapply paint stripe.

(3) Locate two wear sleeves attached to No. 4 and No. 5 tail rotor drive shaft. Wear sleeves are located within damper and anti-flail supports. For wear sleeves located within anti-flail supports, remove anti-flail supports and support brackets from tailboom and slide anti-flail supports forward far enough to obtain an unobstructed view of wear sleeve (para 6.8 and para 6.11).

(4) While preventing drive shaft movement, attempt to move all four wear sleeves attached to drive shaft in both axial and radial direction. One person holds drive shaft and other attempts to move wear sleeves. If any of wear sleeves rotate with respect to shaft or have horizontally displaced down shaft, replace tail rotor drive shaft(s) (para 6.8 and/or para 6.11).

(5) Wear sleeve distress, which does not penetrate the nickel plating (**0.001-0.002 INCH** thick), is acceptable. Check wear sleeves for rust or exposed base metal (missing nickel plating). If detected, replace tail rotor drive shaft(s) (para 6.8 and/or para 6.11).

(6) Deleted.

(7) Install anti-flail supports on tailboom (para 6.8 and para 6.11).

(8) Check for scratches through nickel. None allowed.

g. **Check No. 4 and No. 5 tail rotor drive shafts with black hard coat aluminum wear sleeves.**

(1) Wear sleeve surface distress such as scratches, pits, nicks, etc. are acceptable up to a maximum depth of **0.010 INCH**. If surface distress exceeds this limit, replace tail rotor drive shaft(s) (para 6.8 and/or para 6.11).

(2) Check diameter of wear sleeves. If wear sleeve outer diameter measures **4.750 INCHES** or less at any location, replace tail rotor drive shaft(s) (para 6.8 and/or para 6.11).

h. **Check couplings, flanges, and diaphragms for cracks.**

(1) Use magnifier where needed. Clean suspected areas with brush (item 34, App F) and methyl ethyl ketone (item 124, App F). Check with fluorescent inspection kit (TM 55-1500-335-23).

(2) Check for elongated bolt holes, bends or abrasions. None allowed. Use brush (item 34, App F) and methyl ethyl ketone (item 124, App F). Discard brush in suitable container.

i. **Check diaphragms for nicks, scratches, dents, flaking paint, or distortion.** None allowed.

j. **Check coupling flanges for peeling or other failure of aluminum bronze (plasma) coating.**

(1) Scratches or gouges through the aluminum-bronze (plasma) coating to base metal can not exceed **20 PERCENT** of surface area.

(2) Check for peeling of aluminum-bronze (plasma) coating. None allowed.

(3) Discoloration due to oxidation or minor chipping around bolt holes is acceptable.

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6.1. DRIVE SHAFT INSPECTION – continued

k. **Check coupling faces for nicks or scratches.**

(1) Nicks or scratches, excluding diaphragms, are acceptable to a maximum depth of **0.005 INCH** without repair except for touch up of exterior.

(2) Nicks or scratches, excluding diaphragms, are acceptable to a maximum depth of **0.015 INCH** without repair when polished out with a fine abrasive cloth.

l. **Check couplings for compression or stretching.**

(1) Not less than **3.338 INCH** or greater than **3.350 INCH** flange to flange dimension at any point.

m. **Check nutplates for wear.**

(1) Starting torque less than **54 INCH-OUNCES**. Replace. Use torque wrench.

n. **Check coupling for stripped nutplates or loose rivets.** None allowed.

(1) Repair by replacing nutplate (TM 1-1500-204-23).

o. **Check drive shaft dampers for cracks.**

(1) Check visibly or with fluorescent inspection kit (TM 55-1500-335-23). None allowed.

(2) Check inside diameter for wear or nicks deeper than **0.040 INCH**.

NOTE

Do not use wire brush on damper inside diameter while on aircraft or near the drive shaft.

(3) Check inside diameter for accumulation of dirt or debris.

(a) Remove dirt or debris with wire brush to a maximum of **0.020 INCH**.

p. **Check drive shaft dampers and for inside diameter wear or nicks deeper than 0.125 INCH.**

q. **Check drive shaft for stripped nutplates or rivets.**

(1) Repair by replacing nutplate (TM 1-1500-204-23). Use solid rivets when replacing nutplate.

r. **Check hanger bearings for cracks, dents, bearing looseness, rough rotation, nicks, grease seal leakage, overheated bearings.**

(1) Check for cracks detected visibly or with fluorescent inspection kit (TM 55-1500-335-23). None allowed.

(2) Non-sharp dents are acceptable to a maximum depth of **0.040 INCH**.

(3) Non-sharp dents on edges and mounting flanges are not acceptable.

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6.1. DRIVE SHAFT INSPECTION – continued

(4) Check hanger assembly bearing for smooth rotation. Replace hanger bearing assembly if rotation is not smooth.

(5) Check for nicks deeper than **0.020 INCH**.

(6) Check for grease seal leakage. None allowed.

(7) Check bearings for evidence of overheating (discoloration of bearing area seals or housing paint). None allowed. Replace bearings (para 6.7 or 6.10).

s. **Check all anti-flail and intermediate gearbox diffuser for cracks.**

(1) Check visibly or with fluorescent inspection kit. None allowed.

(2) Check for deformation (out of round). None allowed.

(3) Check for nicks deeper than **0.020 INCH**. None allowed.

t. **Check APU anti-flail for wear on its inside diameter.**

(1) Radial wear is acceptable to **0.040 INCH** maximum depth measured at any point.

(2) Check for scratches or gouges in aluminum-bronze coating. Can not exceed **20 PERCENT** of surface area.

(3) Check for flaking or peeling of aluminium-bronze coating. None allowed.

u. **Check aft hanger support.**

(1) Dents and scratches up to **0.032 INCH** deep are allowable but must be blended out.

(2) Triple bolt/bearing arrangement must prevent all radial play.

(3) Replace individual loose bushings and bearings to eliminate play.

v. **Inspect all mounting flange bolt holes.**

(1) Using plug gauges **0.2505 INCH** and **0.2517 INCH**, inspect all mounting bolt holes for proper size. Replace units with bolt holes that exceed **0.2517 INCH** diameter.

(2) Inspect couplings/shafts for elongated or damaged bolt holes. None allowed.

w. **Check drive shafts and components for corrosion** (para 1.49)**.**

x. **Check outside diameter of No. 7 (APU) drive shaft.**

(1) Check for evidence of rubbing in the area of the anti-flail support. None allowed.

y. **Secure access doors T250L, T250R, T290L, and T290R; install fairings L325, R410, R475, L510, R510, and R530; install cover R540** (para 2.2)**.**

END OF TASK

6.2. ENGINE INPUT DRIVE SHAFT AND OUTER DIFFUSER (ONE-PIECE) REMOVAL/INSTALLATION

6.2.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.2.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed
6.32	Engine nose gearbox two-section outer diffuser removed (if a two-section outer diffuser is installed in place of a one-piece outer diffuser)

WARNING

FLIGHT SAFETY PART

The input drive shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

- Do not intermix outer diffusers (one-piece or two-section), inlet diffusers, or vaneaxial fans. Intermixing or swapping these components will result in damage to components.
- Exercise care and undertake protective measures when handling or performing any type of maintenance on the engine input drive shaft. All surface areas are critical. Accidental dents or scratches caused by improper handling may render part unserviceable.
- To prevent damage to engine input drive shaft, ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

NOTE

This task is typical for either No. 1 or No. 2 engine input drive shaft.

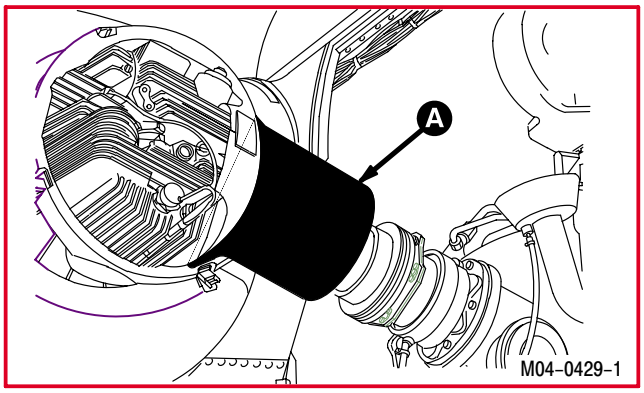
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6.2. ENGINE INPUT DRIVE SHAFT AND OUTER DIFFUSER (ONE-PIECE) REMOVAL/INSTALLATION – continued

6.2.3. Removal

NOTE

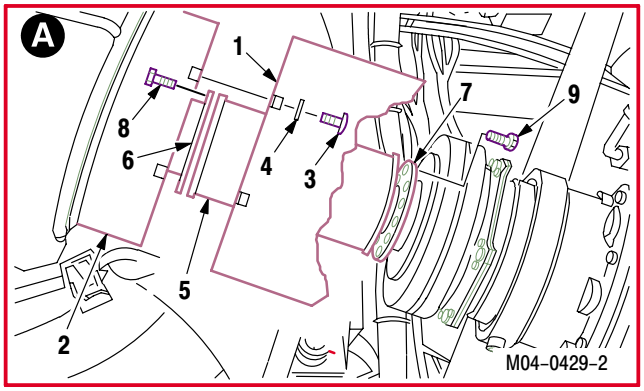
If a two-section engine nose gearbox outer diffuser is installed in place of a one-piece outer diffuser, skip step a. and remove two-section outer diffuser (para 6.32).



a. **Remove outer diffuser (1) from inlet diffuser (2).**

(1) Remove four screws (3) and washers (4) from diffuser (1).

(2) Detach and slide diffuser (1) free from diffuser (2).



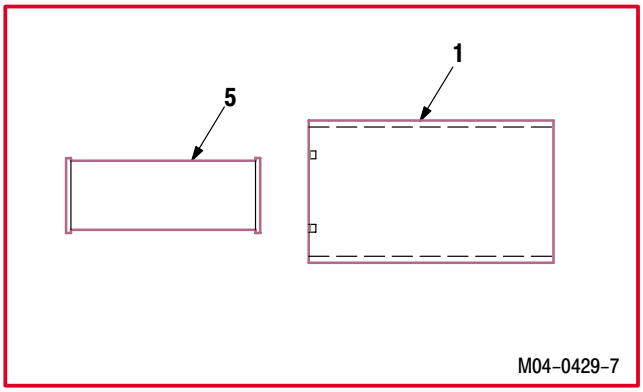
b. **Remove engine input drive shaft (5) from coupling flanges (6) and (7).**

(1) Remove five bolts (8) from flange (6).

(2) Remove five bolts (9) from flange (7).

(3) Remove shaft (5) with diffuser (1).

(4) Slide shaft (5) out of diffuser (1).



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6.2. ENGINE INPUT DRIVE SHAFT AND OUTER DIFFUSER (ONE-PIECE) REMOVAL/INSTALLATION

6.2.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.2.5. Inspection

NOTE

Unless otherwise specified, following inspection procedures apply to engine input drive shaft, outer diffuser, couplings, and coupling flanges.

a. **Check for cracks** (para 6.1)**.**

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks, scratches, and dents** (para 6.1)**.**

d. **Check couplings for compression or stretching** (para 6.1)**.**

e. **Check coupling flanges for elongated bolt holes** (para 6.1)**.**

f. **Check diffuser for loose or missing dowel pins.** None allowed.

(1) Replace diffuser.

g. **Check diaphragms for cracks, nicks, scratches, dents, and distortion.** None allowed.

h. **Check coupling flanges for peeling or erosion of aluminum bronze coating** (para 6.1)**.**

i. **Check drive shaft and coupling nutplates for stripped, crossed, or flattened threads** (para 6.1)**.**

j. **Check drive shaft and coupling for loose rivets and for any other evidence of damage** (para 6.1)**.**

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6.2. ENGINE INPUT DRIVE SHAFT AND OUTER DIFFUSER (ONE-PIECE) REMOVAL/INSTALLATION – continued

6.2.6. Installation



CAUTION

When installing drive shaft to coupling flanges, ensure that bolts are installed through **0.250 INCH** coupling flange holes and not through **0.500 INCH** holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or couplings.

a. **Install drive shaft (5) on flanges (6) and (7).** Torque bolts (8) and (9) to **125 INCH-POUNDS**.

(1) Slide drive shaft (5) in diffuser (1).

(2) Position drive shaft (5) with diffuser (1) between flanges (6) and (7).

(3) Aline mounting holes.

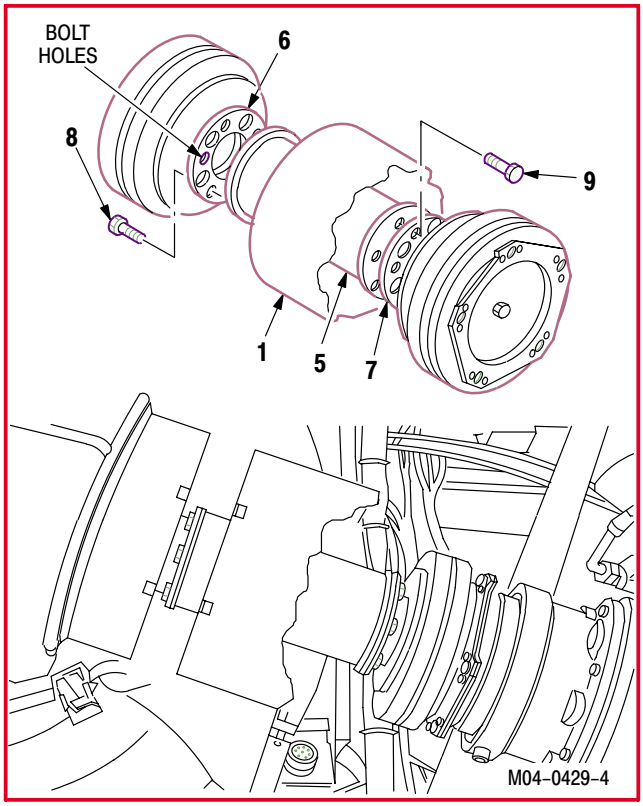
(4) Install five bolts (9) through flange (7) and shaft (5).

(5) Install five bolts (8) through flange (6) and shaft (5).

(6) Torque bolts (8) and (9) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(7) Apply corrosion preventive compound to bolts (8) and (9). Use corrosion preventive compound (item 62A, App F).

b. **Inspect (QA).**



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6.2. ENGINE INPUT DRIVE SHAFT AND OUTER DIFFUSER (ONE-PIECE) REMOVAL/INSTALLATION – continued

CAUTION

Ensure that outer diffuser being installed is same outer diffuser that was removed. Do not intermix or swap diffuser components or damage to diffuser will occur.

NOTE

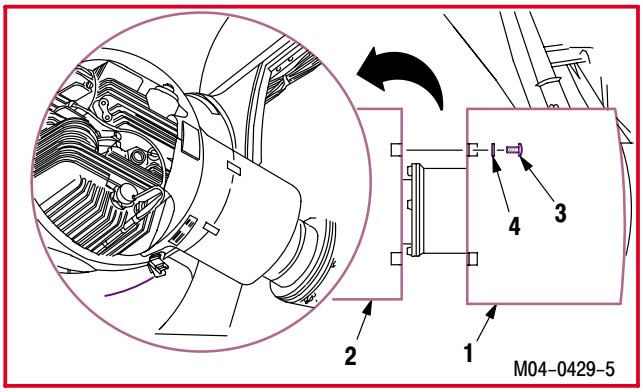
Skip step c. if installing a two-section outer diffuser in place of a one-piece outer diffuser. Install two-section outer diffuser (para 6.32).

c. **Install diffuser (1) on diffuser (2).**

(1) Position diffuser (1) on diffuser (2).

(2) Aline mounting holes.

(3) Install four screws (3) and washers (4) through diffusers (1) and diffuser (2).



d. **Inspect (QA).**

e. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

f. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

END OF TASK

6.3. MAIN TRANSMISSION INPUT COUPLING REMOVAL/INSTALLATION

6.3.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.3.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.2	No. 1 and/or No. 2 engine input drive shaft removed

WARNING

FLIGHT SAFETY PART

The input coupling is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.3.3. Removal

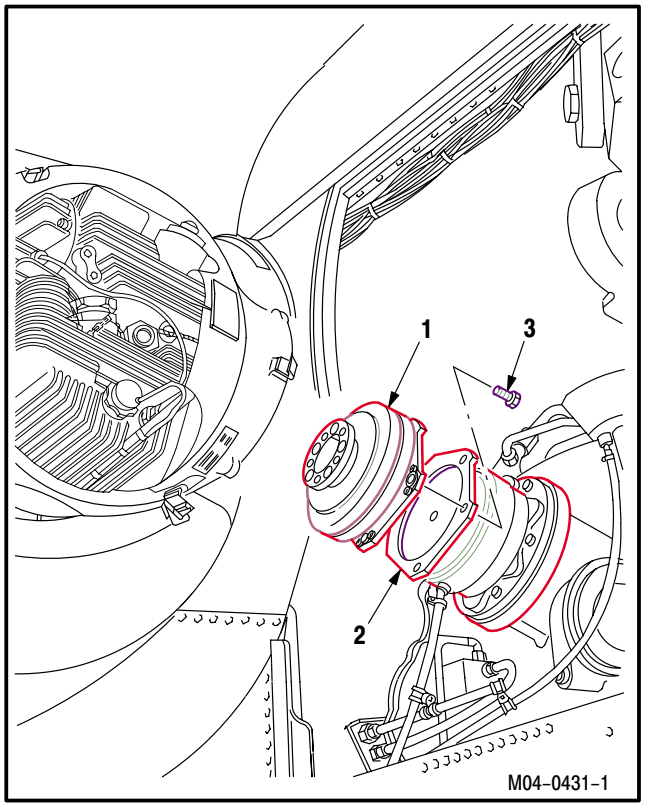
a. **Remove input coupling (1) from transmission flange (2).**

(1) Remove five bolts (3) from flange (2).

(2) Remove coupling (1) from flange (2).

6.3.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**



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6.3. MAIN TRANSMISSION INPUT COUPLING REMOVAL/INSTALLATION – continued

6.3.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to both main transmission input coupling and transmission flange.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks, scratches, and gouges** (para 6.1)**.**

d. **Check transmission flange for elongated bolt holes** (para 6.1)**.**

e. **Check input coupling for loose or damaged nutplates** (para 6.1)**.**

6.3.6. Installation



a. **Install coupling (1) on flange (2).** Torque bolts (3) to **125 INCH-POUNDS**.

(1) Position coupling (1) on flange (2) and aline bolt holes.

(2) Install five bolts (3) through flange (2) and coupling (1).

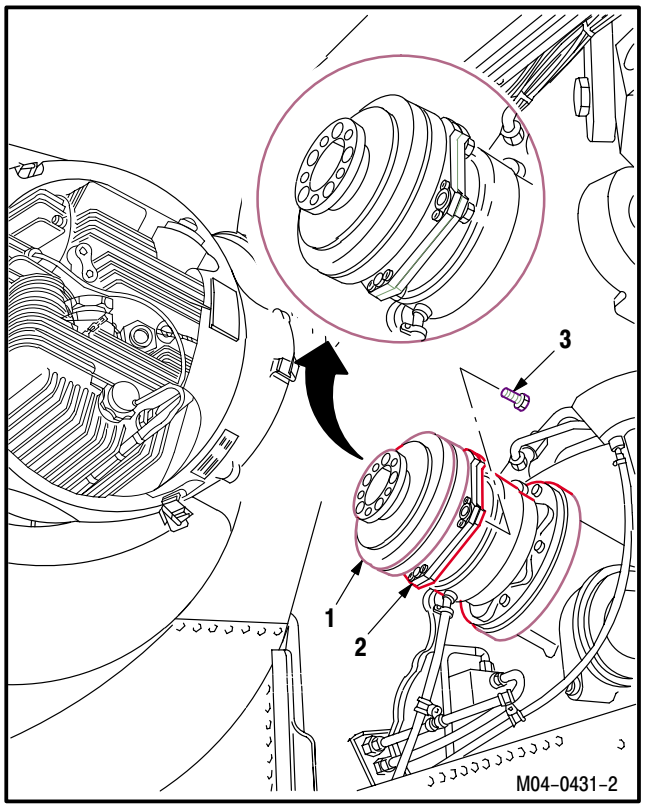
(3) Torque five bolts (3) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(4) Apply corrosion preventive compound to five bolts (3). Use corrosion preventive compound (item 62A, App F).

b. **Inspect (QA).**

c. **Install No. 1 and/or No. 2 engine input drive shaft** (para 6.2)**.**

END OF TASK



6.4. MAIN TRANSMISSION TAIL ROTOR COUPLING REMOVAL/INSTALLATION

6.4.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.4.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.84	Forward catwalk folded back

WARNING

FLIGHT SAFETY PART

The tail rotor output coupling is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

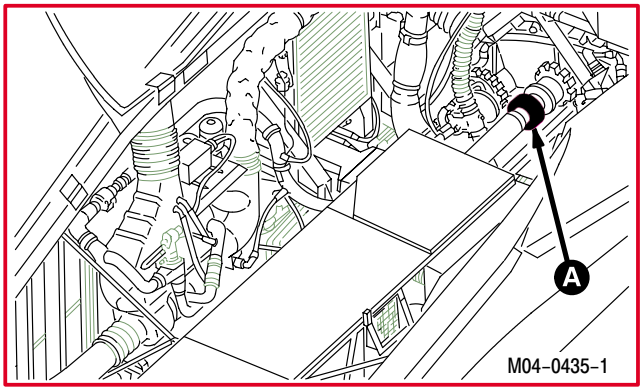
NOTE

For purposes of identification and applicable to this task only, coupling flange with attached nutplates is coupling forward flange.

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6.4. MAIN TRANSMISSION TAIL ROTOR COUPLING REMOVAL/INSTALLATION – continued

6.4.3. Removal



CAUTION

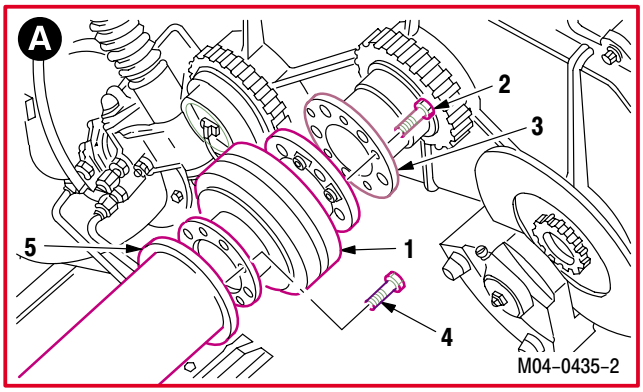
Do not allow entire weight of No. 3 tail rotor drive shaft to be supported by forward hanger bearing assembly. Support forward end of drive shaft while tail rotor coupling is removed. If coupling is to remain out, remove drive shaft and secure tail rotor to prevent turning. Failure to support drive shaft may result in damage to drive shaft and/or forward hanger bearing assembly.

a. **Remove tail rotor coupling (1).**

(1) Remove five bolts (2) attaching main transmission output flange (3) to coupling (1) forward flange.

(2) Remove five bolts (4) attaching coupling (1) aft flange to No. 3 tail rotor drive shaft (5).

(3) Remove coupling (1).

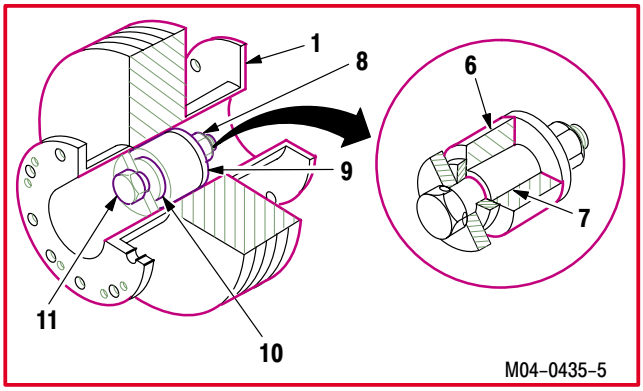


b. **Remove antiflail bearing sleeves (6) and (7) from coupling (1).**

(1) Remove nut (8).

(2) Remove washer (9), bearing sleeves (6) and (7), and washer (10) from bolt (11).

(3) Remove bolt (11) from coupling (1).



6.4.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

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6.4. MAIN TRANSMISSION TAIL ROTOR COUPLING REMOVAL/INSTALLATION – continued

6.4.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to tail rotor coupling, antiflail bearing sleeves, main transmission output flange, and forward end of No. 3 tail rotor drive shaft.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

d. **Check forward end of No. 3 tail rotor drive shaft for dents** (para 6.1)**.**

e. **Check tail rotor coupling flanges and main transmission output flange for elongated bolt holes** (para 6.1)**.**

f. **Check tail rotor coupling flange and forward end of No. 3 tail rotor drive shaft for loose or damaged nutplates** (para 6.1)**.**

6.4.6. Installation

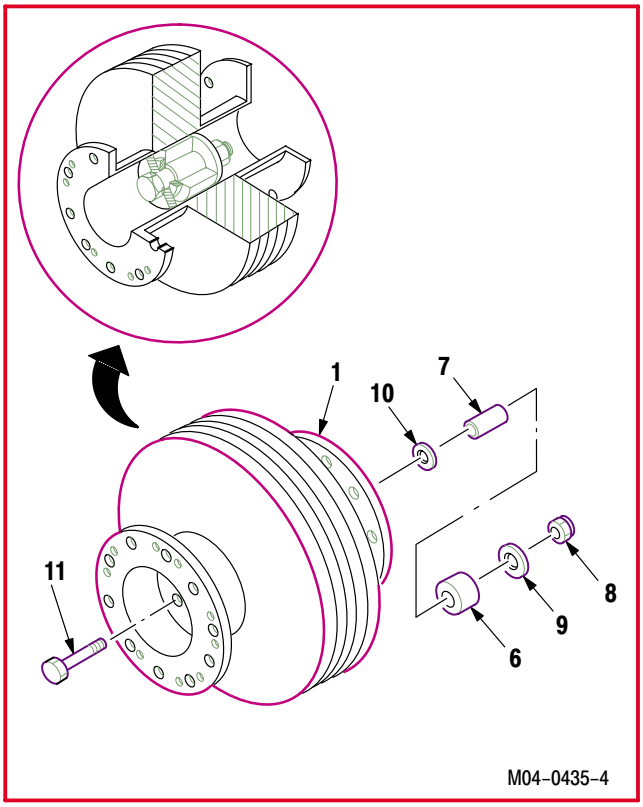
a. **Install bearing sleeves (7) and (6) in coupling (1).** Torque nut (8) to **35 INCH-POUNDS**.

(1) Install bolt (11) in coupling (1).

(2) Install washer (10), bearing sleeves (7) and (6), and washer (9) on bolt (11)

(3) Install nut (8) on bolt (11).

(4) Torque nut (8) to **35 INCH-POUNDS**. Use torque wrench.



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6.4. MAIN TRANSMISSION TAIL ROTOR COUPLING REMOVAL/INSTALLATION – continued



CAUTION

When installing tail rotor coupling, ensure that bolts are installed through **0.250 INCH** bolt holes on main transmission output flange and on coupling aft flange. Do not install bolts through any of **0.500 INCH** lightning holes. Installation of bolts through lightning holes will result in failure of drive shaft and/or coupling.

b. **Install coupling (1).** Torque bolts (2) and (4) to **125 INCH-POUNDS**.

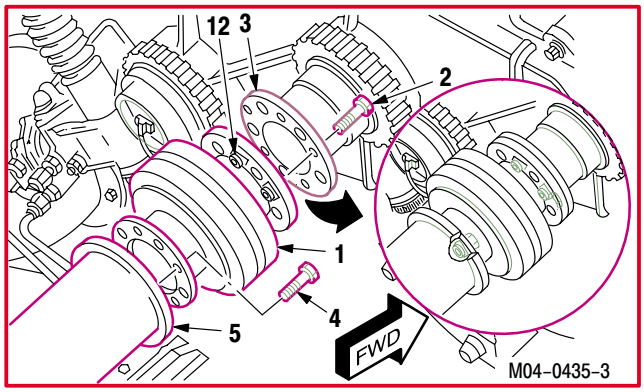
(1) Position coupling (1) between flange (3) and shaft (5) with nutplates (12) facing forward.

(2) Install five bolts (4) through coupling (1) aft flange and shaft (5).

(3) Install five bolts (2) through flange (3) and coupling (1) forward flange.

(4) Torque bolts (2) and (4) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(5) Apply corrosion preventive compound to bolts (2) and (4). Use corrosion preventive compound (item 62A, App F).



c. **Inspect (QA).**

d. **Secure forward catwalk** (para 2.84)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

f. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.5. NO. 3 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION

6.5.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.5.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.84	Forward catwalk folded back

WARNING

FLIGHT SAFETY PART

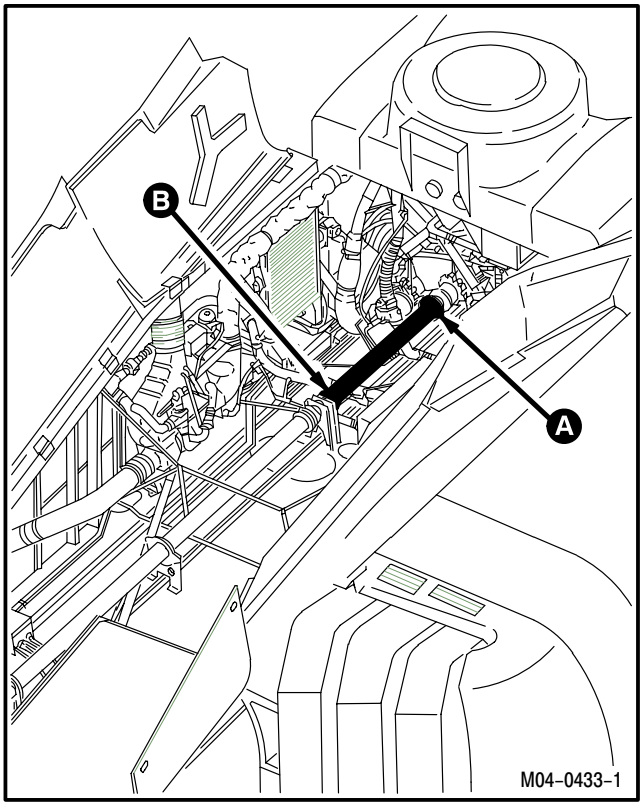
The tail rotor drive shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

- Exercise care and undertake protective measures when handling or performing any type of maintenance on the tail rotor drive shafts. All surface areas are critical. Accidental dents or scratches caused by improper handling may render part unserviceable.
- To prevent damage to tail rotor drive shaft, ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

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6.5. NO. 3 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION – continued



6.5.3. Removal

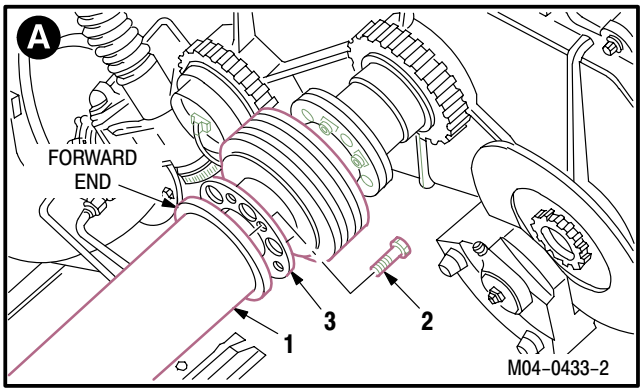
CAUTION

Forward end of drive shaft will drop after removing bolts attaching drive shaft to main transmission output coupling flange. Support forward end of drive shaft prior to removing attachment bolts. Failure to support drive shaft may result in damage to drive shaft and/or forward hanger bearing assembly.

a. **Remove No. 3 tail rotor drive shaft (1).**

(1) Support forward end of shaft (1).

(2) Remove five bolts (2) attaching forward end of shaft (1) to main transmission output coupling flange (3).

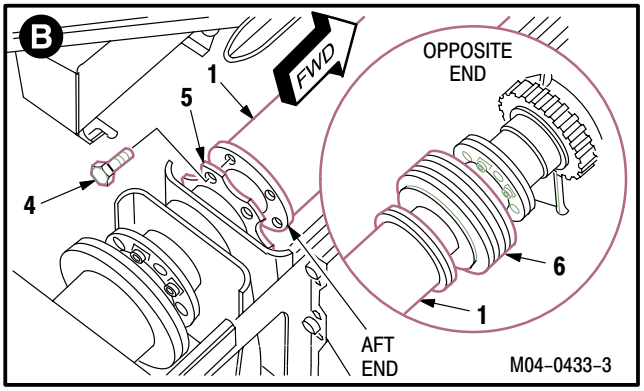


(3) Support aft end of shaft (1).

(4) Remove five bolts (4) attaching aft end of shaft (1) to forward hanger bearing flange (5).

(5) Push shaft (1) in on coupling (6).

(6) Remove shaft (1).



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6.5. NO. 3 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION – continued

6.5.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.5.5. Inspection

NOTE

Unless otherwise specified, following inspection procedures apply to No. 3 tail rotor drive shaft, main transmission output coupling flange, and forward hanger bearing flange.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

d. **Check drive shaft for dents** (para 6.1)**.**

e. **Check drive shaft for loose or damaged nutplates** (para 6.1)**.**

f. **Check forward hanger bearing flange for grease leakage** (para 6.1)**.**

g. **Check main transmission output coupling flange and forward hanger bearing flange for elongated bolt holes** (para 6.1)**.**

GO TO NEXT PAGE

6.5. NO. 3 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION – continued

6.5.6. Installation



CAUTION

When installing No. 3 tail rotor drive shaft to output coupling flange, ensure that bolts are installed through **0.250 INCH** bolt holes on output coupling flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or tail rotor coupling.

a. **Install drive shaft (1).** Torque bolts (4) and (2) to **125 INCH-POUNDS**.

(1) Position and support shaft (1) between flanges (3) and (5). Aline holes.

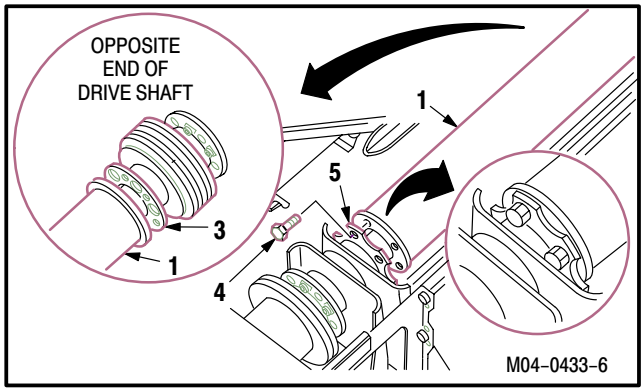
(2) Install five bolts (4) through flange (5) and shaft (1).

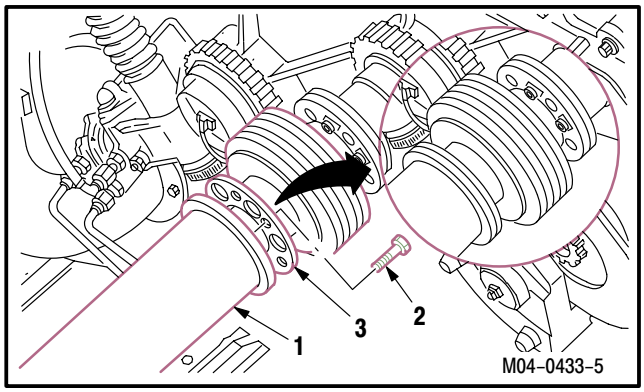
(3) Torque five bolts (4) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(4) Install five bolts (2) through flange (3) and shaft (1).

(5) Torque five bolts (2) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(6) Apply corrosion preventive compound to bolts (4) and (2). Use corrosion preventive compound (item 62A, App F).





b. **Inspect (QA).**

c. **Secure forward catwalk** (para 2.84)**.**

d. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

e. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.6. FORWARD HANGER BEARING COUPLING REMOVAL/INSTALLATION

6.6.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.6.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.84	Forward catwalk folded back

WARNING

FLIGHT SAFETY PART

The forward hanger bearing coupling is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

For purposes of identification and applicable to this task only, coupling flange with attached nutplates is considered coupling forward flange.

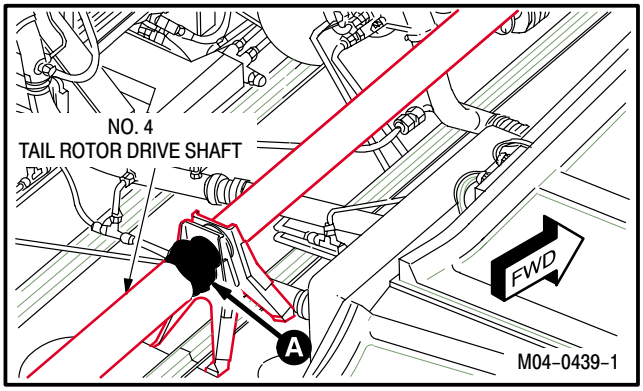
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6.6. FORWARD HANGER BEARING COUPLING REMOVAL/INSTALLATION – continued

6.6.3. Removal

CAUTION

Do not allow entire weight of No. 4 tail rotor drive shaft to be supported by aft hanger bearing assembly. Support forward end of drive shaft while forward hanger bearing coupling is removed. If coupling is to remain out, remove drive shaft and secure tail rotor to prevent turning. Failure to support drive shaft may result in damage to drive shaft and/or forward hanger bearing assembly.

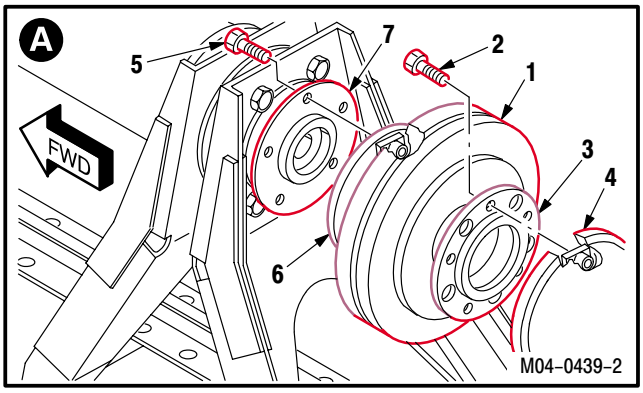


a. **Remove forward hanger bearing coupling (1).**

(1) Remove five bolts (2) attaching coupling (1) aft flange (3) to No. 4 tail rotor drive shaft (4).

(2) Remove five bolts (5) attaching coupling (1) forward flange (6) to hanger bearing output flange (7).

(3) Remove coupling (1).

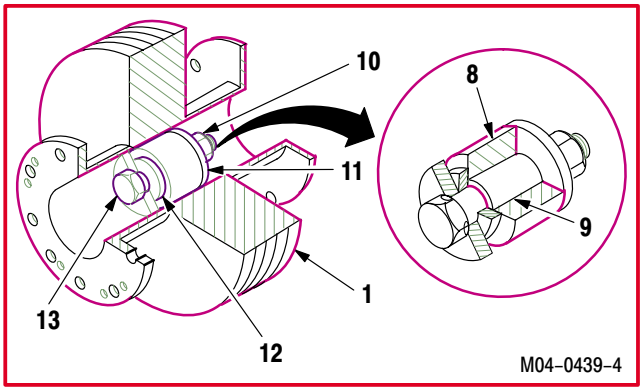


b. **Remove two antiflail bearing sleeves (8) and (9) from coupling (1).**

(1) Remove nut (10).

(2) Remove washer (11), bearing sleeves (8) and (9), and washer (12) from bolt (13).

(3) Remove bolt (13) from coupling (1).



6.6.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

GO TO NEXT PAGE

6.6. FORWARD HANGER BEARING COUPLING REMOVAL/INSTALLATION – continued

6.6.5. Inspection

NOTE

Unless otherwise specified, following inspection procedures apply to hanger bearing coupling, antiflail bearing sleeves, hanger bearing output flange, and forward end of No. 4 tail rotor drive shaft.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

d. **Check forward end of No. 4 tail rotor drive shaft for dents** (para 6.1)**.**

e. **Check hanger bearing coupling and hanger bearing output flange for elongated bolt holes** (para 6.1)**.**

f. **Check hanger bearing output flange for grease leakage** (para 6.1)**.**

g. **Check hanger bearing coupling and forward end of No. 4 tail rotor drive shaft for loose or damaged nutplates** (para 6.1)**.**

6.6.6. Installation

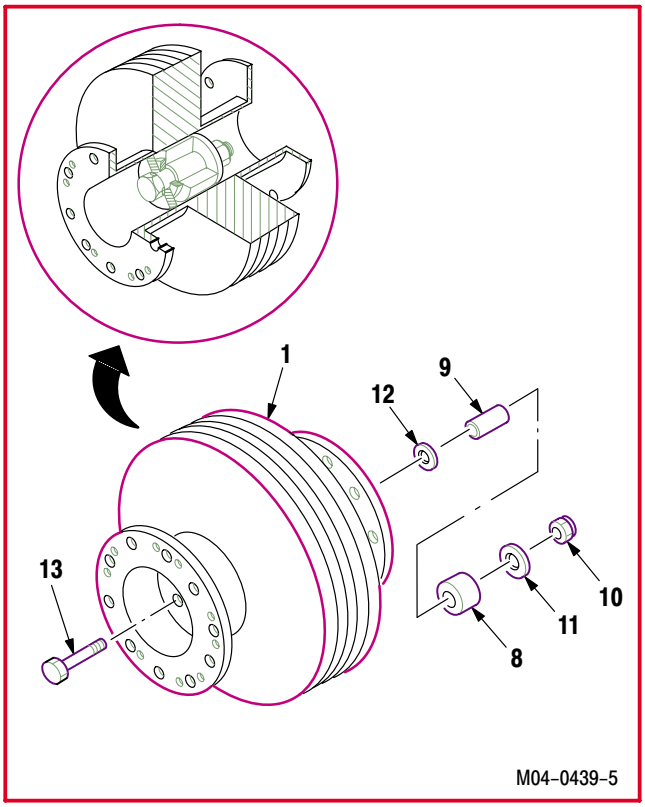
a. **Install bearing sleeves (9) and (8) in coupling (1).** Torque nut (10) to **35 INCH-POUNDS**.

(1) Install bolt (13) in coupling (1).

(2) Install washer (12), bearing sleeves (9) and (8), and washer (11) on bolt (13).

(3) Hand tighten nut (10) on bolt (13).

(4) Torque nut (10) to **35 INCH-POUNDS**. Use torque wrench.



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6.6. FORWARD HANGER BEARING COUPLING REMOVAL/INSTALLATION – continued

CAUTION

When installing forward hanger bearing coupling, ensure that bolts are installed through **0.250 INCH** bolt holes on coupling aft flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or coupling.

b. **Install coupling (1).** Torque bolts (2) and (5) to **125 INCH-POUNDS**.

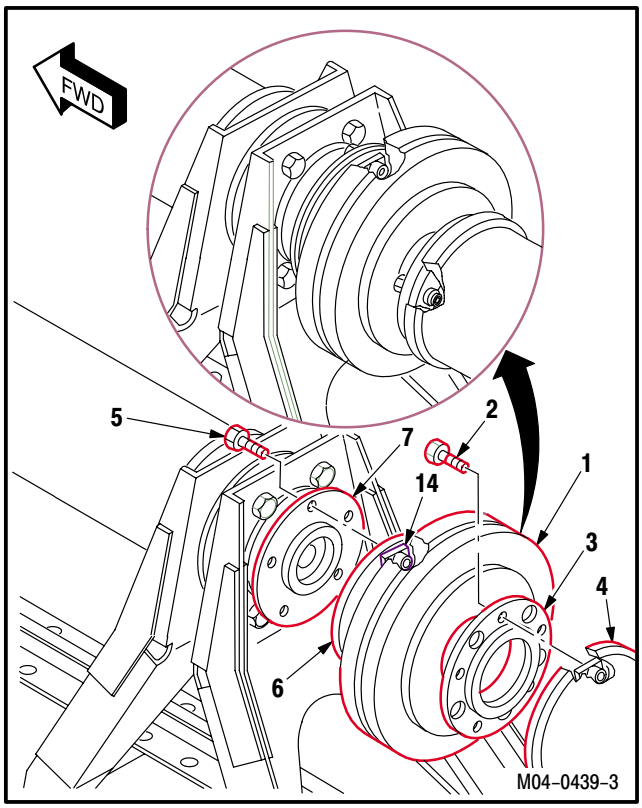
(1) Position coupling (1) between flange (7) and shaft (4) with nutplates (14) facing forward. Aline bolt holes.

(2) Install five bolts (5) through flange (7) and coupling (1) forward flange (6).

(3) Install five bolts (2) through coupling (1) aft flange (3) and shaft (4).

(4) Torque bolts (2) and (5) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(5) Apply corrosion preventive compound to bolts (2) and (5). Use corrosion preventive compound (item 62A, App F).



c. **Inspect (QA).**

d. **Secure forward catwalk** (para 2.84)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

f. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.7. FORWARD HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION

6.7.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.7.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)
Epoxy primer coating kit (item 78, App F)
Sealing compound (item 175, App F)
Sealing compound (item 178, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

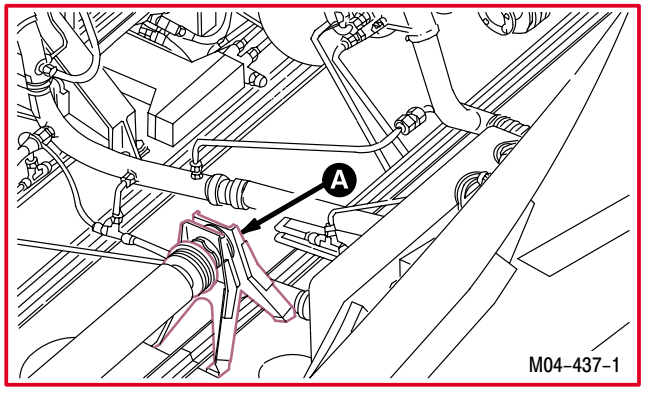
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.5	No. 3 tail rotor drive shaft removed

WARNING

FLIGHT SAFETY PART

The forward hanger bearing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.7. FORWARD HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION – continued

6.7.3. Removal

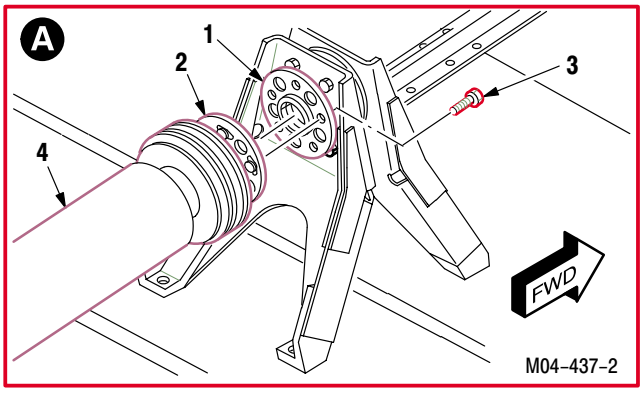
CAUTION

Do not allow entire weight of No. 4 tail rotor drive shaft and hanger bearing coupling to be supported by aft hanger bearing assembly. Support forward end of drive shaft and coupling while hanger bearing and support is removed. If hanger bearing and support are to remain out, remove drive shaft and secure tail rotor to prevent turning. Failure to support drive shaft and coupling may result in damage to drive shaft and/or aft hanger bearing.

a. **Remove forward hanger bearing (1) from coupling (2).**

(1) Remove five bolts (3) attaching bearing (1) aft flange to coupling (2).

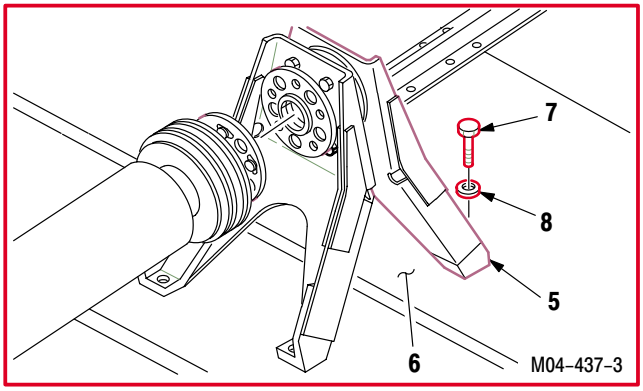
(2) Support forward end of drive shaft (4).



b. **Remove support (5) from deck (6).**

(1) Remove four bolts (7) and washers (8) attaching support (5) to deck (6).

(2) Remove support (5) from deck (6).



6.7.4. Cleaning

a. **Clean removed and attaching parts and surfaces** (para 1.47)**.**

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6.7. FORWARD HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION – continued

6.7.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to forward hanger bearing and support and forward hanger bearing coupling.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

NOTE

The following inspection procedures apply to forward hanger bearing coupling only.

d. **Check for erosion of plasma coating, clogged vent holes in diaphragm, and deep bends in diaphragm guard** (para 6.1)**.**

e. **Check for loose or damaged nutplates** (para 6.1)**.**

6.7.6. Installation

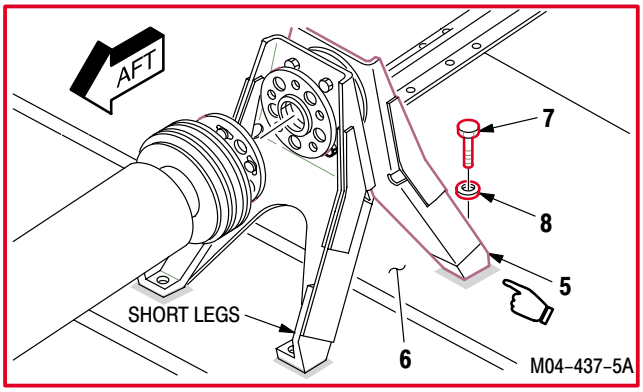


NOTE

Sealing compound must be applied prior to and within 20 minutes of installation. Mating surfaces shall be coated with MIL-P-23377 T1C1. Use epoxy primer coating kit (item 78, App F).

a. **Install support (5) on deck (6).** Torque bolts (7) with washer (8) to **60 INCH-POUNDS**.

(1) Apply sealing compound to mating surfaces of support (5) and deck (6). Use sealing compound (item 175, App F).



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6.7. FORWARD HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION – continued

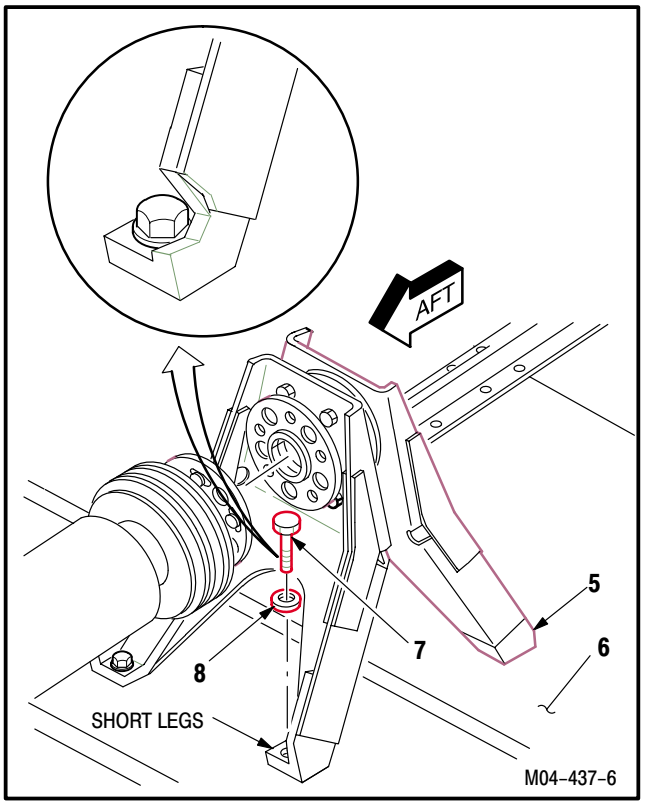
(2) Position support (5) on deck (6) with short legs of support (5) facing aft.

(3) Install four bolts (7) and washers (8) through support (5) and in deck (6).

(4) Torque four bolts (7) to **60 INCH-POUNDS**. Use torque wrench.

(5) Apply corrosion preventative compound to attaching hardware. Use corrosion preventive compound (item 62A, App F).

(6) Apply fillet of sealing compound around mating surfaces of support. Use sealing compound (item 178, App F).



CAUTION

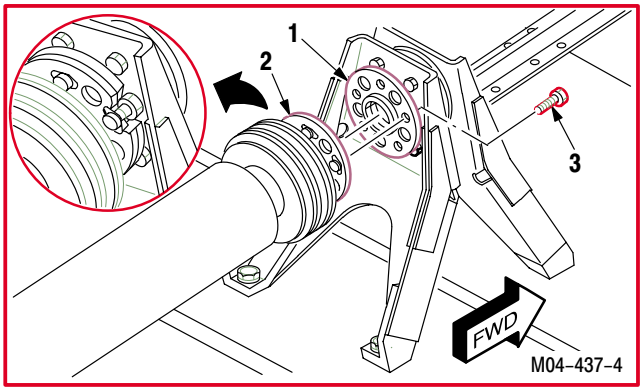
When installing hanger bearing to hanger bearing coupling, ensure that bolts are installed through **0.250 INCH** bolt holes on hanger bearing aft flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of hanger bearing, coupling and drive shaft.

b. **Install bearing (1) on coupling (2).** Torque bolts (3) to **125 INCH-POUNDS**.

(1) Install five bolts (3) through bearing (1) aft flange in coupling (2).

(2) Torque five bolts (3) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(3) Apply corrosion preventive compound to bolts (3). Use corrosion preventive compound (item 62A, App F).



c. **Inspect (QA).**

d. **Install No. 3 tail rotor drive shaft** (para 6.5)**.**

END OF TASK

6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION

6.8.1. Description

This task covers: Removal. Cleaning. Inspection. Adjustment. Repair. Installation.

6.8.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
#2 phillips screwdriver bit (item 33, App H)
Chemical protective gloves (item 154, App H)
1/4-inch drive screwdriver bit holder (item 175, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)
0.0 - 50.0-pound weighing scale (item 273, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Adhesive (item 3, App F)
Cloth (item 51, App F)
Corrosion preventive compound (item 62A, App F)
Methyl ethyl ketone (item 124, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.6	Forward hanger bearing coupling removed
2.2	Access fairings R410 and T325 removed
2.84	Catwalk removed

WARNING

FLIGHT SAFETY PART

The No. 4 tail rotor drive shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

- Exercise care and undertake protective measures when handling or forming any type of maintenance on tail rotor drive shafts. All surface areas are critical. Accidental dents or scratches caused by improper handling may render part unserviceable.
- To prevent damage to tail rotor drive shaft ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

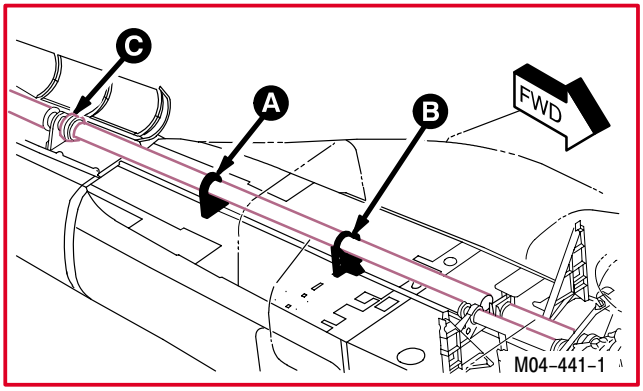
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6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

6.8.3. Removal

CAUTION

Before removing anti-flail and damper supports ensure that forward end of No. 4 tail rotor drive shaft is adequately supported. Do not allow forward end of drive shaft to drop or hang down freely. Failure to support drive shaft may result in damage to drive shaft and/or aft hanger bearing.

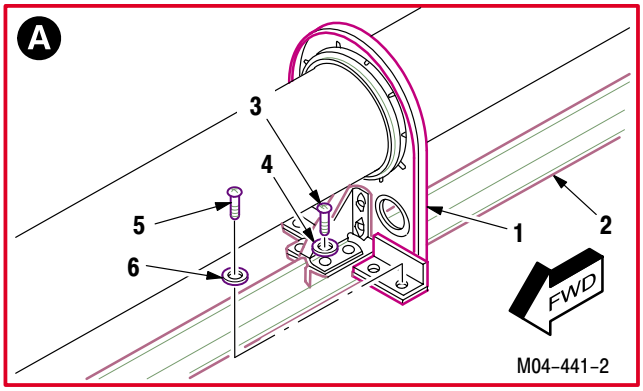


a. **Remove anti-flail support (1) from deck (2).**

(1) Remove four screws (3) and washers (4) from support (1).

(2) Remove four screws (5) and washers (6) from support (1).

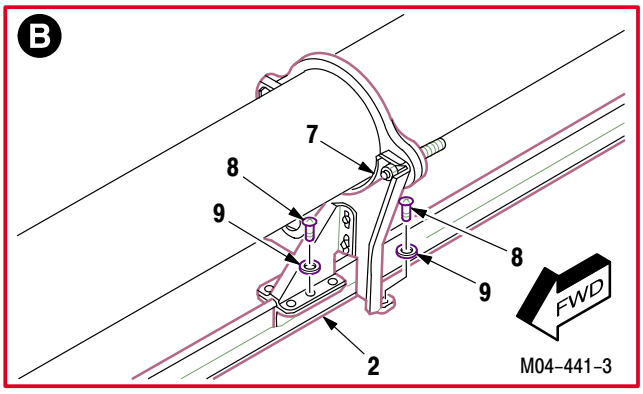
(3) Slide support (1) off mounting area.



b. **Remove damper support (7) from deck (2).**

(1) Remove nine screws (8) and washers (9) from support (7).

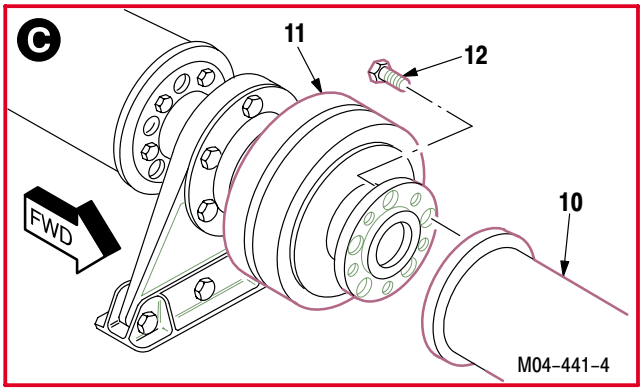
(2) Slide support (7) off deck (2).



c. **Remove No. 4 tail rotor drive shaft (10) from aft hanger bearing coupling (11).**

(1) Support aft end of shaft (10).

(2) Remove five bolts (12) attaching shaft (10) to coupling (11).



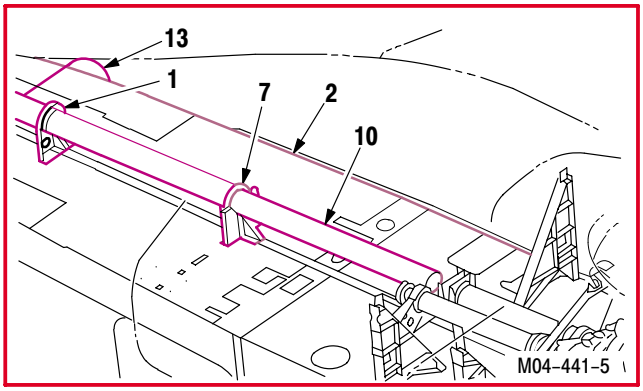
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6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

d. **Remove shaft (10) with supports (1) and (7) from deck (2).**

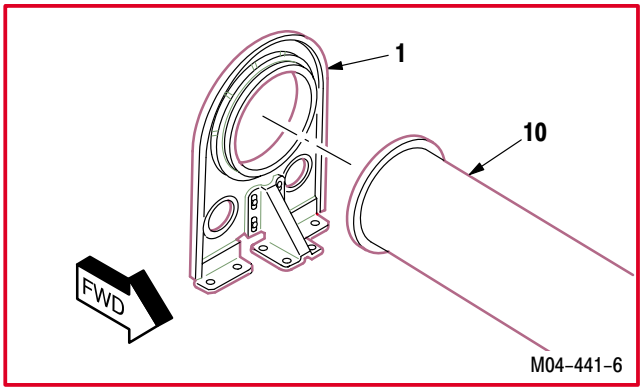
(1) Slide shaft (10) aft until clear of fairing brace (13).

(2) Remove shaft (10) with support (1) and (7) from deck (2).



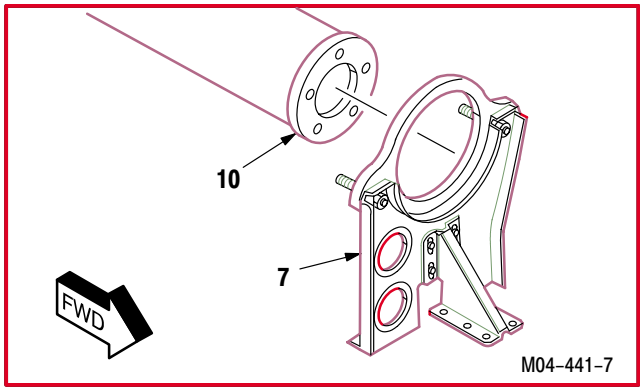
e. **Remove support (1) from shaft (10).**

(1) Slide support (1) from aft end of shaft (10).



f. **Remove support (7) from shaft (10).**

(1) Slide support (7) from forward end of shaft (10).



6.8.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.8.5. Inspection

a. **Check components for corrosion** (para 1.49)**.**

b. **Check drive shaft for cracks.** None allowed.

GO TO NEXT PAGE

6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

c. **Check drive shaft for nicks, dents, or scratches** (para 6.1)**.**

d. **Check drive shaft for loose or damaged nutplates** (para 6.1)**.**

NOTE

The following inspection procedures apply to aft hanger bearing coupling flange.

e. **Check for cracks.** None allowed.

f. **Check for nicks or scratches** (para 6.1)**.**

g. **Check for elongated bolt holes, bends, or abrasions** (para 6.1)**.**

NOTE

Unless otherwise specified, the following inspection procedures apply to both damper and anti-flail support.

h. **Check for nicks, dents, or scratches** (para 6.1)**.**

i. **Check for loose or damaged nutplates** (para 6.1)**.**

j. **Check damper support for cracks.**

(1) Cracks or tears more than 25 percent of shortest dimension are not acceptable.

(2) Cracks on holes more than **3.0 INCHES** diameter with cleanup more than **2.0 INCHES** from supporting structure and affecting more than 5 percent of skin area are not acceptable.

(3) Check damper support bracket for cracks. None allowed. Replace bracket(s) (para 6.8.7).

k. **Check anti-flail support for cracks.**

(1) Check anti-flail support sleeve for cracks. None allowed. Replace sleeve (para 6.8.7).

(2) Check anti-flail support doublers for cracks. None allowed. Replace doubler (para 6.8.7).

(3) Check anti-flail support bracket for cracks. None allowed. Replace bracket(s) (para 6.8.7).

l. **Check for cracks elsewhere on damper and anti-flail support.**

(1) Refer to paragraph 6.8.7 to determine if location and/or size of crack is acceptable, and appropriate repair procedures.

m. **Check anti-flail support sleeves for other evidence of damage.** Replace sleeve (para 6.8.7).

n. **Check anti-flail support doublers for debonding and elongated bolt holes.** Replace doubler (para 6.8.7).

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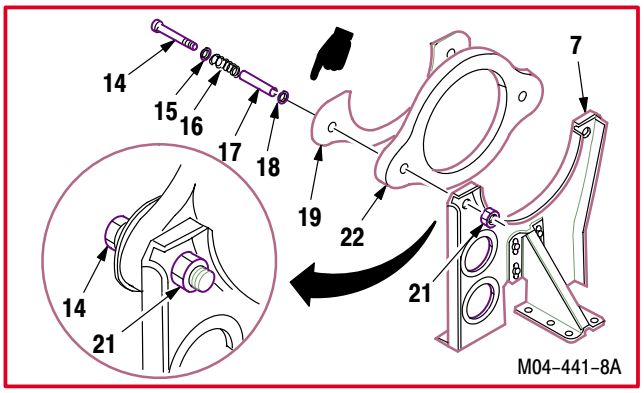
6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

NOTE

Tension washer(s) may be missing due to damper tension adjustment.

o. **Check both sides of support (7) for presence of screw (14), washer (15), spring (16), spacer (17), tension washer (18), plate (19), and nut (21).**

p. **Check both sides of support (7) and ensure that at least one screw thread of screw (14) extends through nut (21).**

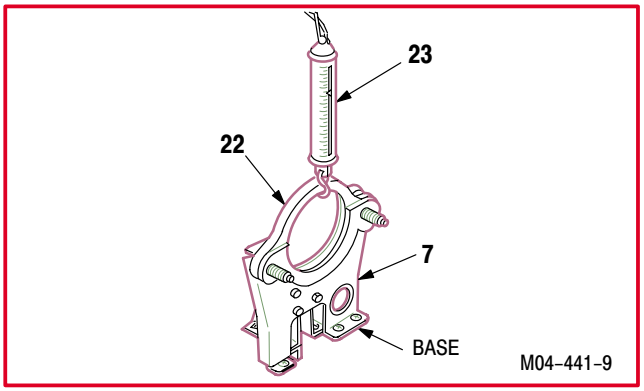


q. **Check tension of damper (22).**

(1) Position scale (23) in center of damper (22). Use scale.

(2) Hold base of support (7) and pull on scale (23) until damper (22) moves. Note reading on scale (23) dial indicator at instance damper (22) moves.

(3) If scale (23) dial indicator shows that damper (22) requires less than 9 or more than 11 pounds of tension to move, adjust damper (22) tension (para 6.8.6).



6.8.6. Adjustment

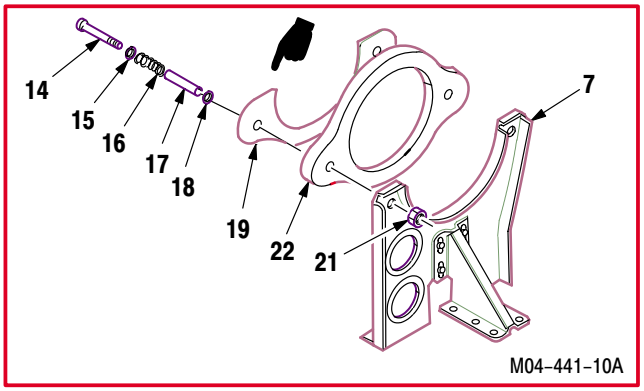
a. **Adjust damper (22) tension.** Torque nut (21) to **13 INCH-POUNDS**.

(1) Remove nut (21).

NOTE

More than one tension washer may be installed between spring and plate.

(2) Remove screw (14), washer (15), spring (16), spacer (17), and tension washer (18) (if installed) from both sides of plate (19), damper (22), and support (7).



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6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

(3) If reading on scale (23) dial indicator was less than 9 pounds, increase tension of damper by adding tension washers (18) one at a time on each side of support (7) until correct tension reading on scale (23) is obtained.

(4) If reading on scale (23) dial indicator was more than 11 pounds, decrease tension of damper by removing tension washers (18) one at a time on each side of support (7) until correct tension reading on scale (23) is obtained.

NOTE

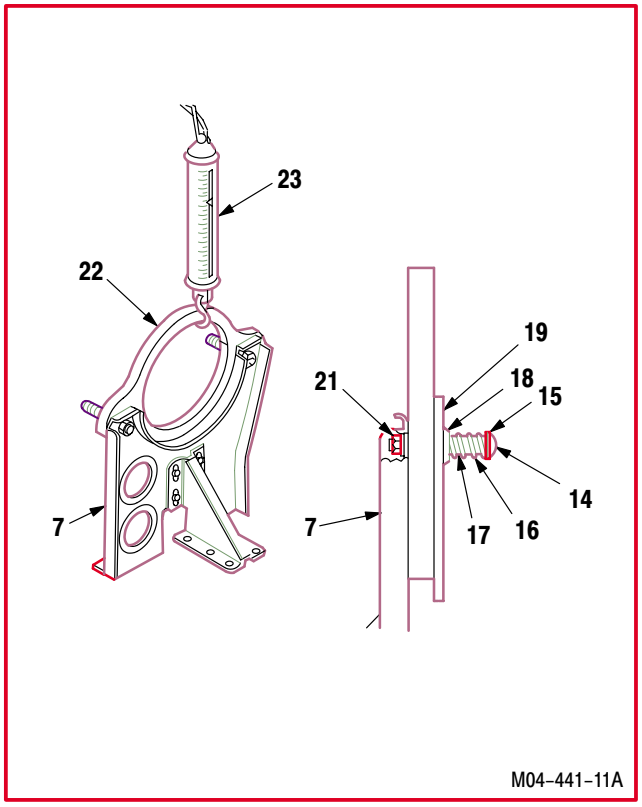
Replace one or both springs if minimum length is less than **0.40 INCH**. Do not stretch spring in order to increase length.

(5) If correct tension reading on scale (23) is not obtained when only one tension washer (18) remains on each side of support (7), replace spring (16).

(6) Install screw (14) through washer (15), spring (16), spacer (17), and tension washer(s) (18) on both sides of plate (19), damper (22), and support (7).

(7) Hand tighten nut (21) on screw (14).

(8) Torque nut (21) to **13 INCH-POUNDS**. Use torque wrench.



6.8.7. Repair

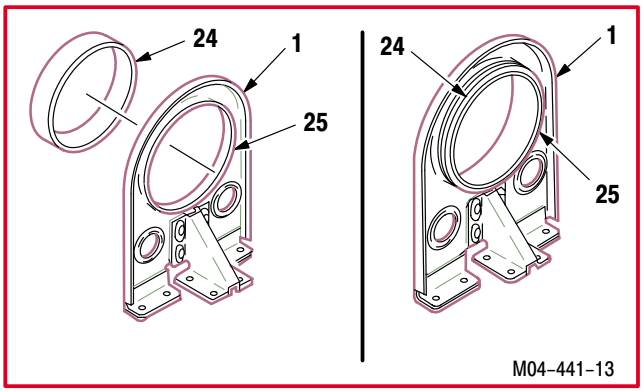
a. **Repair support (1) by replacing sleeve (24).**

(1) Remove bends in support lip of ring (25).

(2) Remove and discard sleeve (24).

(3) Install new sleeve (24).

(4) Crimp lip of ring (25) between bends to secure sleeve (24).



GO TO NEXT PAGE

6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued



b. **Repair support (1) by replacing damaged doubler (26).**

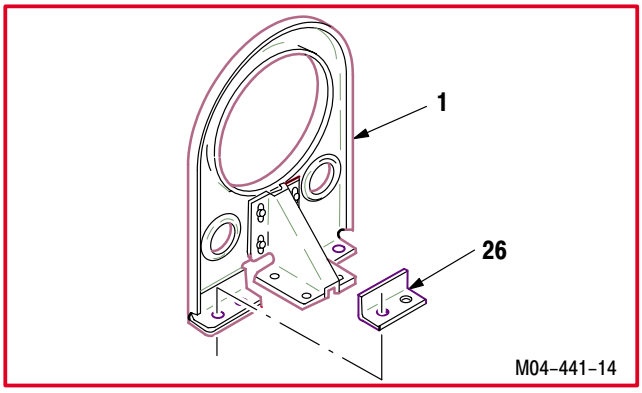
(1) Remove doubler (26) from support (1). Use putty knife.

(2) Clean doubler (26) mating surface on support (1). Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

(3) Apply a thin uniform coat of adhesive to doubler (26) mating surface on support (1). Use adhesive (item 3, App F).

(4) Install new doubler (26) on support (1) and press firmly.

(5) Allow adhesive to cure for a minimum of **24 HOURS** at room temperature or **1 HOUR** at 190 to 200 °F (88 to 99 °C).





c. **Repair support (1) by replacing bracket (27).**

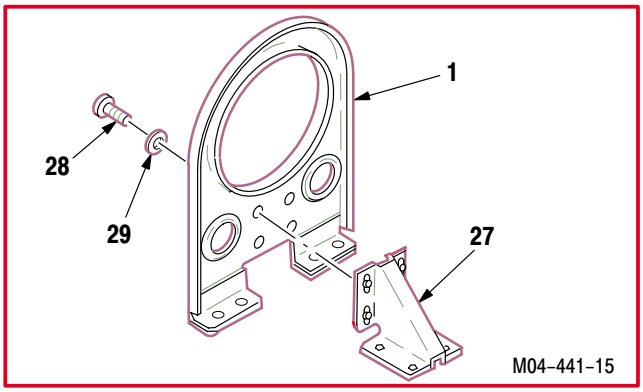
(1) Remove four screws (28) and washers (29) attaching bracket (27) to support (1).

(2) Remove and discard bracket (27) from support (1).

(3) Position new bracket (27) on support (1) and hold.

(4) Install four screws (28) through washers (29), support (1), and bracket (27).

(5) Apply corrosion preventive compound to four screws (28). Use corrosion preventive compound (item 62A, App F).



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6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

d. **Repair support (1) by replacing nutplates (30) on bracket (27).**

(1) Remove four screws (28) and washers (29) attaching bracket (27) to support (1).

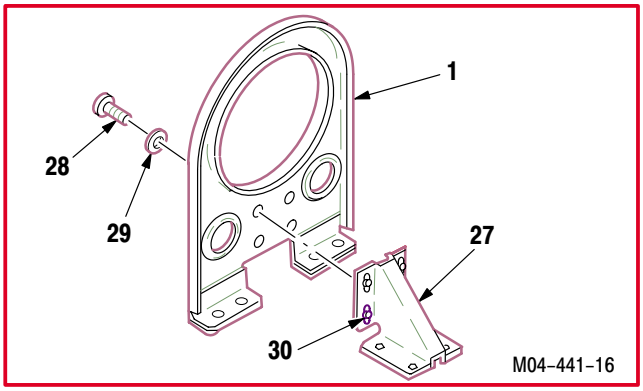
(2) Remove bracket (27) from support (1).

(3) Replace nutplates (30) on bracket (27) (TM 1-1500-204-23).

(4) Position bracket (27) on support (1) and hold.

(5) Install four screws (28) through washers (29), support (1), and bracket (27).

(6) Apply corrosion preventive compound to four screws (28). Use corrosion preventive compound (item 62A, App F).



e. **Repair support (7) by replacing bracket (31).**

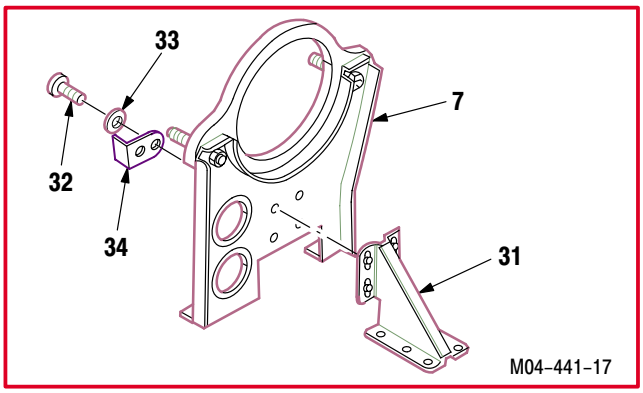
(1) Remove four screws (32), washers (33), and angle bracket (34) from support (7) and bracket (31).

(2) Remove and discard bracket (31) from support (7).

(3) Position new bracket (31) and angle bracket (34) on support (7).

(4) Install four screws (32) through washers (33), bracket (34), support (7), and bracket (31).

(5) Apply corrosion preventive compound to four screws (32). Use corrosion preventive compound (item 62A, App F).



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6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

f. **Repair support (7) by replacing nutplates (35) on bracket (31).**

(1) Remove four screws (32), washers (33), and angle bracket (34) from support (7) and bracket (31).

(2) Remove bracket (31) from support (7).

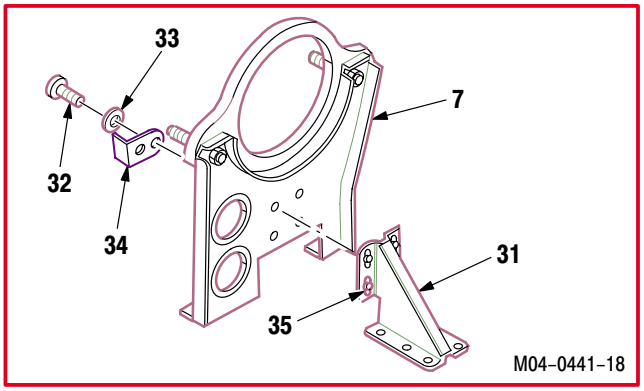
(3) Replace nutplates (35) on bracket (31) (TM 1-1500-204-23).

(4) Position bracket (31) and angle brackets (34) on support (7).

(5) Install four screws (32) through washers (33), bracket (34), support (7), and bracket (31).

(6) Apply corrosion preventive compound to four screws (32). Use corrosion preventive compound (item 62A, App F).





g. **Repair cracks on support and damper support by stop drilling and applying an overlay patch.**

NOTE

- Cracks on attached support brackets are not repairable. Replace bracket on support.
- Cracks greater than **2.50 INCHES** in length on bend lines are not repairable. Replace support.
- Cracks in flange holes greater than 1/2 of flange width in length and extending more than **0.25 INCH** into web are not repairable. Replace support.

(1) Stop drill, trim, and dress to 45 degrees V shaped cracks found in flange holes that are less than 1/2 of flange width in length (TM 1-1500-204-23).

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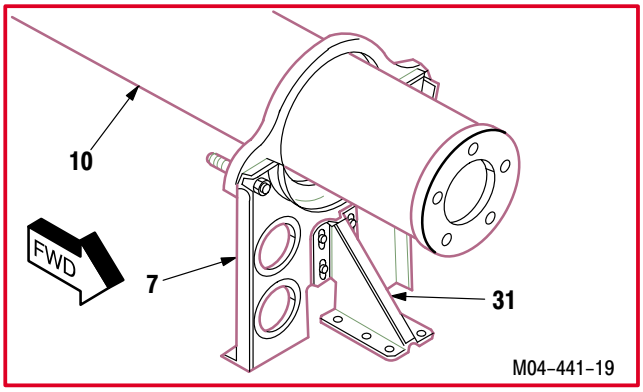
6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

(2) Apply an overlay patch if cracks in flanged holes are greater than 1/2 flange width but extend less than **0.25 INCH** into web (TM 1-1500-204-23).

6.8.8. Installation

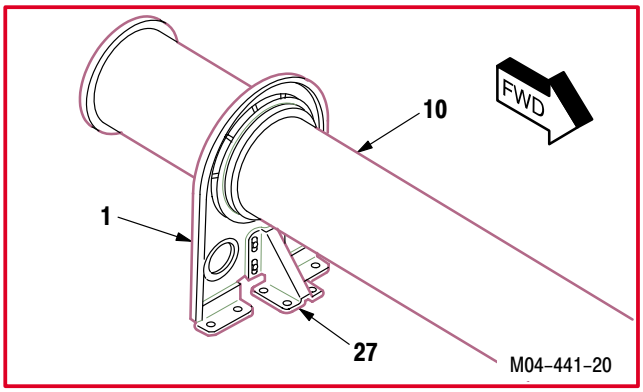
a. **Install support (7) on shaft (10).**

(1) Slide support (7) on forward end of shaft (10) with support bracket (31) facing forward.



b. **Install support (1) on shaft (10).**

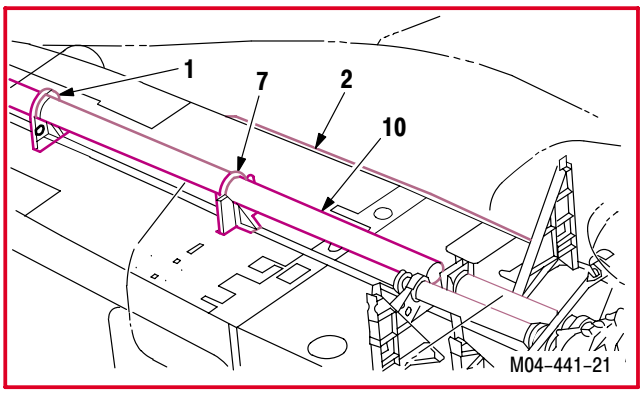
(1) Slide support (1) on aft end of shaft (10) with support bracket (27) facing forward.



c. **Install shaft (10) with supports (1) and (7) on deck (2).**

(1) Slide and position shaft (10) with supports (1) and (7) on deck (2).

(2) Support both ends of shaft (10).



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6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

CAUTION

When installing No. 4 tail rotor drive shaft to aft hanger bearing coupling flange ensure that bolts are installed through **0.250 INCH** bolt holes on the aft hanger bearing coupling flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or tail rotor coupling.

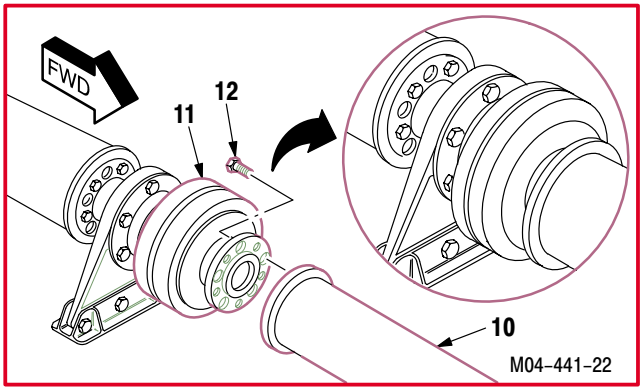
d. **Install shaft (10) on coupling (11).** Torque five bolts (12) to **125 INCH-POUNDS**.

(1) Aline bolt holes on aft end of shaft (10) with bolt holes on coupling (11) flange.

(2) Install five bolts (12) through coupling (11) flange and shaft (10).

(3) Torque five bolts (12) to **125 INCH-POUNDS**. Use torque wrench.

(4) Apply corrosion preventive compound to five bolts (12). Use corrosion preventive compound (item 62A, App F).



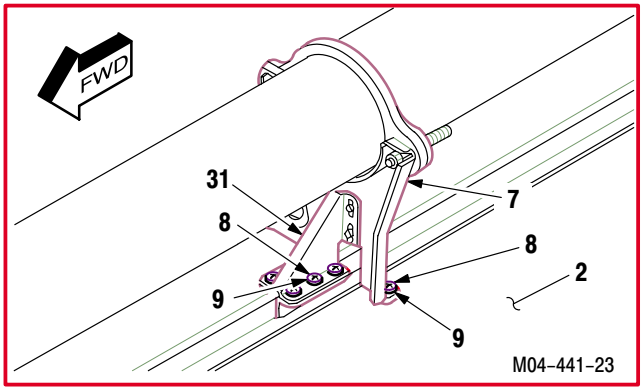
e. **Install support (7) on deck (2).** Torque nine screws (8) to **20 INCH-POUNDS**.

(1) Aline mounting holes on support (7) and bracket (31) with mating holes on deck (2).

(2) Install nine screws (8) through washers (9), support (7), bracket (31), and deck (2).

(3) Torque nine screws (8) to **20 INCH-POUNDS**. Use torque wrench, screwdriver bit holder, and screwdriver bit.

(4) Apply corrosion preventive compound to nine screws (8). Use corrosion preventive compound (item 62A, App F).



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6.8. NO. 4 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

f. **Install support (1) on deck (2).** Torque screws (3) and (5) to **20 INCH-POUNDS**.

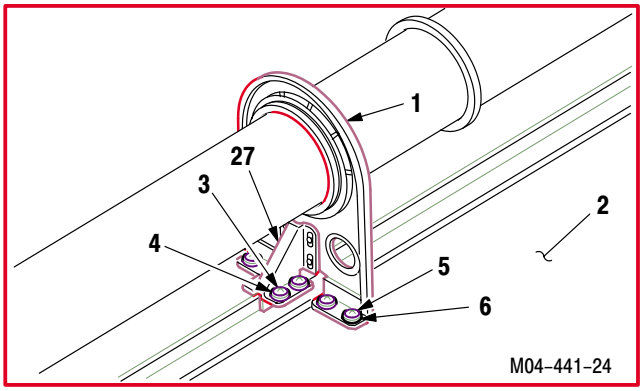
(1) Aline mounting holes on support (1) and bracket (27) with mating holes on deck (2).

(2) Install four screws (5) through washers (6), support (1), and deck (2).

(3) Install four screws (3) through washers (4), bracket (27), and deck (2).

(4) Torque four screws (3) and (5) to **20 INCH-POUNDS**. Use torque wrench, screwdriver bit holder, and screwdriver bit.

(5) Apply corrosion preventive compound to screws (3) and (5). Use corrosion preventive compound (item 62A, App F).



g. **Inspect (QA).**

h. **Install catwalk** (para 2.84)**.**

i. **Install access fairings R410 and T325** (para 2.2)**.**

j. **Install forward hanger bearing coupling** (para 6.6)**.**

k. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.9. AFT HANGER BEARING COUPLING REMOVAL/INSTALLATION

6.9.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.9.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing R410 opened

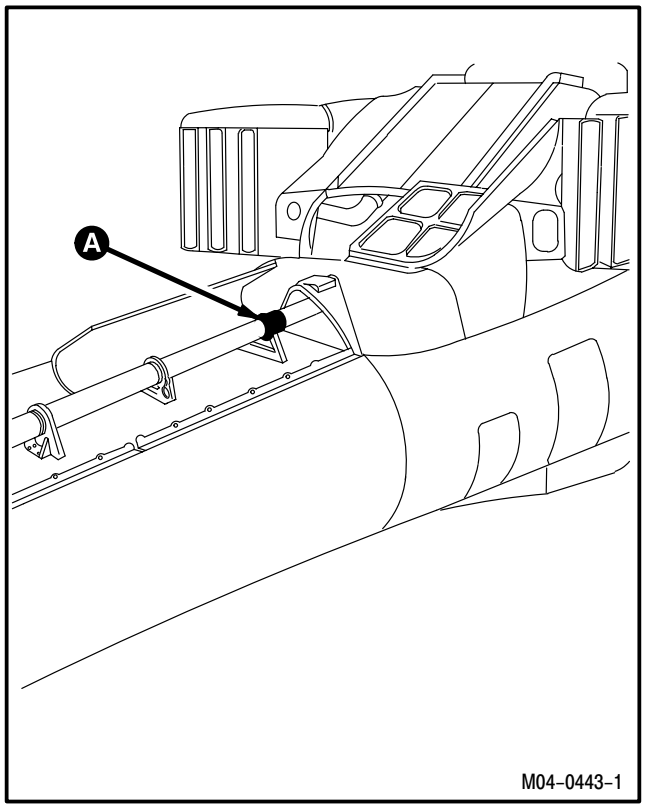
WARNING

FLIGHT SAFETY PART

The aft hanger bearing coupling is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

For purposes of identification and applicable to this task only, coupling flange with attached nutplates is considered coupling aft flange.



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6.9. AFT HANGER BEARING COUPLING REMOVAL/INSTALLATION – continued

6.9.3. Removal

CAUTION

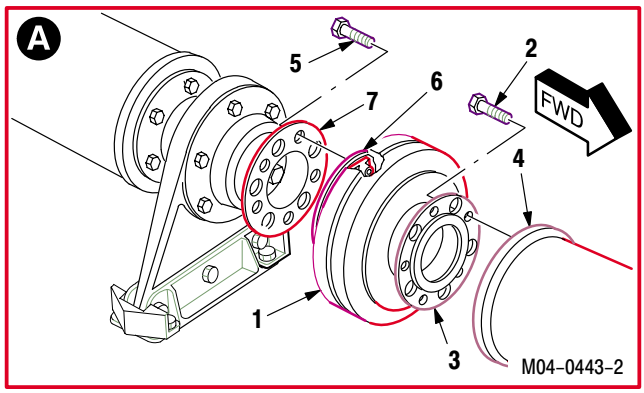
Do not allow entire weight of No. 4 tail rotor drive shaft to be supported by forward hanger bearing assembly. Support aft end of drive shaft while aft hanger bearing coupling is removed. If coupling is to remain out, remove drive shaft and secure tail rotor to prevent turning. Failure to support drive shaft may result in damage to drive shaft and/or forward hanger bearing assembly.

a. **Remove aft hanger bearing coupling (1).**

(1) Remove five bolts (2) attaching coupling (1) forward flange (3) to No. 4 tail rotor drive shaft (4).

(2) Remove five bolts (5) attaching coupling (1) aft flange (6) to aft hanger bearing input flange (7).

(3) Remove coupling (1).

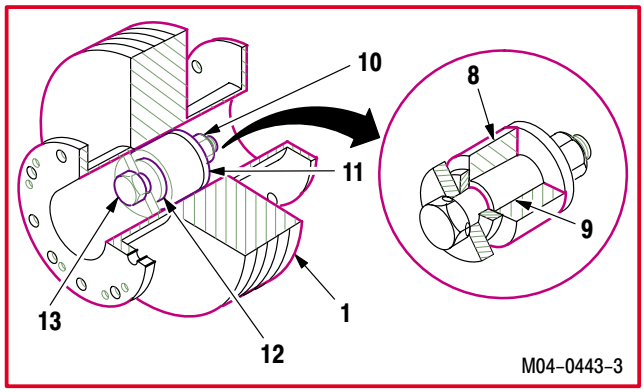


b. **Remove antiflail bearing sleeves (8) and (9) from coupling (1).**

(1) Remove nut (10).

(2) Remove washer (11), bearing sleeves (8) and (9), and washer (12) from bolt (13).

(3) Remove bolt (13) from coupling (1).



6.9.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

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6.9. AFT HANGER BEARING COUPLING REMOVAL/INSTALLATION – continued

6.9.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to hanger bearing coupling, antiflail bearing sleeves, aft hanger bearing input flange, and aft end of No. 4 tail rotor drive shaft.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

d. **Check aft end of No. 4 tail rotor drive shaft for dents** (para 6.1)**.**

e. **Check hanger bearing coupling and aft hanger bearing input flange for elongated bolt holes** (para 6.1)**.**

f. **Check aft hanger bearing input flange for grease leakage** (para 6.1)**.**

g. **Check hanger bearing coupling and aft end of No. 4 tail rotor drive shaft for loose or damaged nutplates** (para 6.1)**.**

6.9.6. Installation

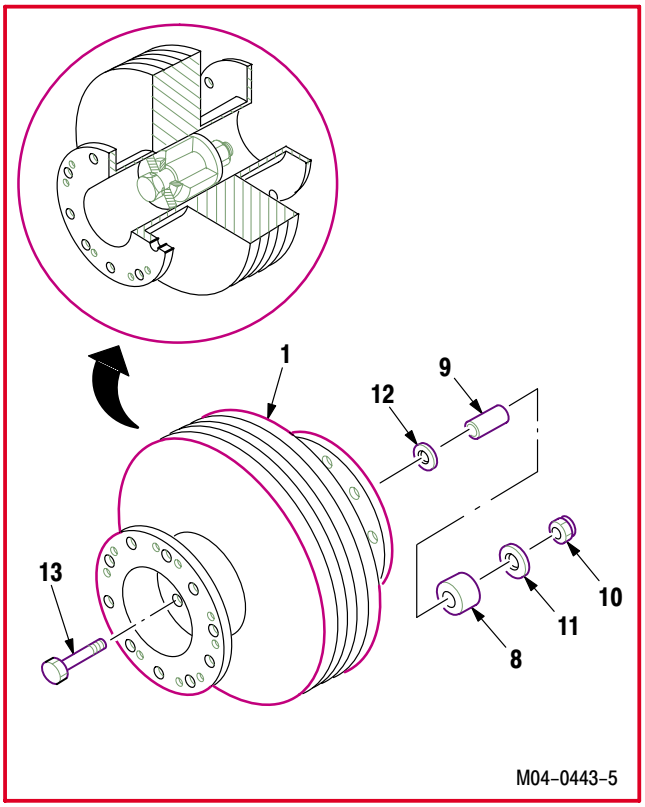
a. **Install bearing sleeves (9) and (8) in coupling (1).** Torque nut (10) to **35 INCH-POUNDS**.

(1) Install bolt (13) in coupling (1).

(2) Install washer (12), bearing sleeves (9) and (8), and washer (11) on bolt (13).

(3) Hand tighten nut (10) on bolt (13).

(4) Torque nut (10) to **35 INCH-POUNDS**. Use torque wrench.



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6.9. AFT HANGER BEARING COUPLING REMOVAL/INSTALLATION – continued



CAUTION

When installing hanger bearing coupling, ensure that bolts are installed through **0.250 INCH** bolt holes on coupling forward flange and on aft hanger bearing input flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or coupling.

b. **Install coupling (1).** Torque bolts (2) and (5) to **125 INCH-POUNDS**.

(1) Position coupling (1) between flange (7) and shaft (4) with nutplates (14) facing aft. Aline bolt holes.

(2) Install five bolts (5) through flange (7) and coupling (1) aft flange (6).

(3) Install five bolts (2) through coupling (1) forward flange (3) and shaft (4).

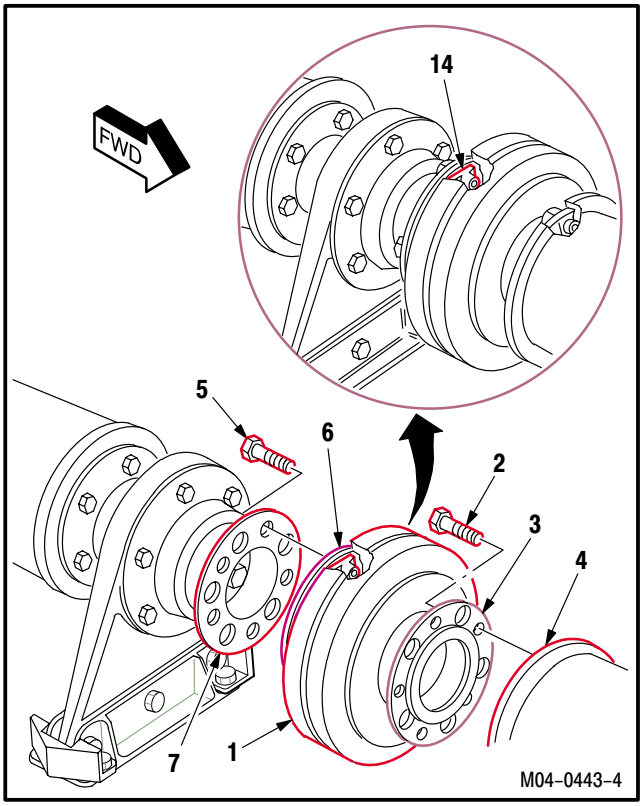
(4) Torque bolts (2) and (5) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(5) Apply corrosion preventive compound to bolts (2) and (5). Use corrosion preventive compound (item 62A, App F).

c. **Inspect (QA).**

d. **Install access fairing R410** (para 2.2)**.**

e. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.10. AFT HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION

6.10.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.10.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
#2 phillips screwdriver bit (item 33, App H)
Chemical protective gloves (item 154, App H)
1/4-inch drive screwdriver bit holder (item 175, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)
Epoxy primer coating kit (item 78, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.9	Aft hanger bearing coupling removed

WARNING

FLIGHT SAFETY PART

The aft hanger bearing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.10. AFT HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION – continued

6.10.3. Removal

CAUTION

Do not allow entire weight of No. 5 tail rotor drive shaft to be supported by the intermediate gearbox input coupling and flange. Support forward end of drive shaft while hanger bearing and support are removed. If hanger bearing and support are to remain out, remove drive shaft and secure tail rotor to prevent turning. Failure to support drive shaft may result in damage to drive shaft and/or intermediate gearbox input coupling and flange.

a. **Remove aft hanger bearing flange (1) from No. 5 tail rotor drive shaft (2).**

(1) Remove five bolts (3) attaching flange (1) to shaft (2).

(2) Support forward end of shaft (2).

b. **Remove support (4) from bracket (5).**

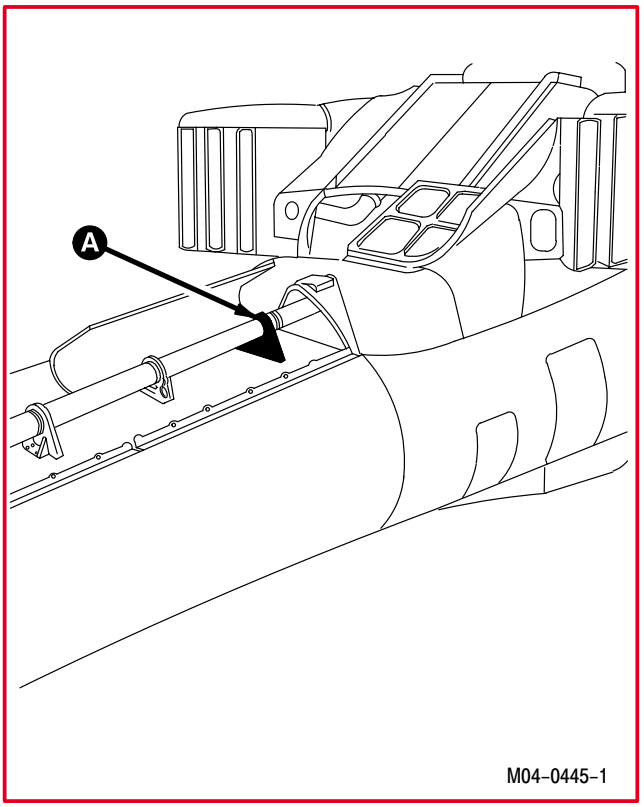
(1) Remove four screws (6) and washers (7) attaching two deflectors (8) to bracket (5).

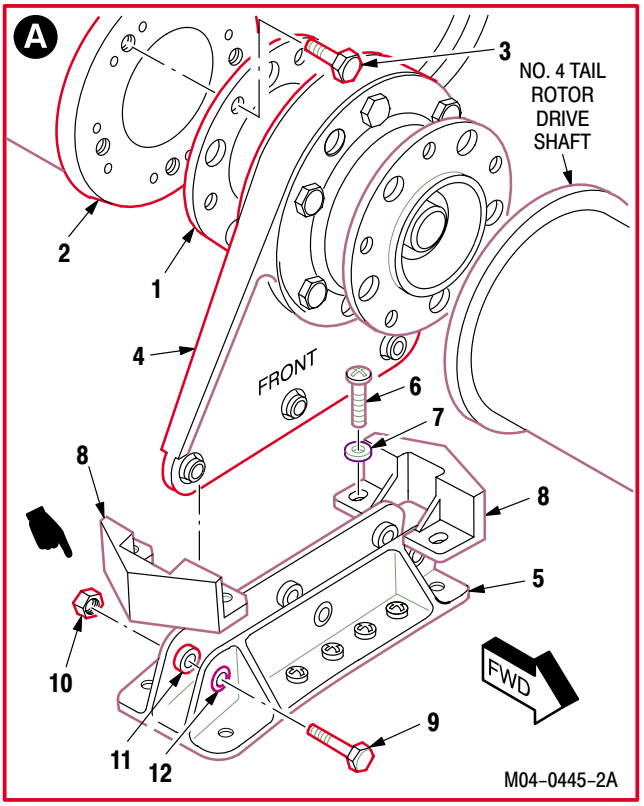
(2) Remove deflectors (8) from bracket (5).

(3) Remove three bolts (9) and nuts (10) from bushings (11) and (12) and bracket (5).

(4) Rock support (4) forward and aft to loosen three bushings (11).

(5) Remove support (4) from bracket (5).





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6.10. AFT HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION – continued

6.10.4. Cleaning

a. **Clean removed and attaching parts and surfaces** (para 1.47)**.**

6.10.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to aft hanger bearing and support and forward end of No. 5 tail rotor drive shaft.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

NOTE

The following inspection procedures apply to forward end of No. 5 tail rotor drive shaft only.

d. **Check for dents** (para 6.1)**.**

e. **Check for loose or damaged nutplates** (para 6.1)**.**

GO TO NEXT PAGE

6.10. AFT HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION – continued

6.10.6. Installation



a. **Install support (4) in bracket (5).** Torque three nuts (10) to **60 INCH-POUNDS**. Torque four screws (6) to **25 INCH-POUNDS**.

NOTE

Epoxy primer must be applied to and within 20 minutes of installation.

(1) Apply epoxy primer to mating surfaces of support (4) and bracket (5). Use epoxy primer coating kit (item 78, App F).

(2) Position support (4) in bracket (5) with word **FRONT** facing forward. Aline bolt holes.

NOTE

- Install bolts with bolt heads facing forward.
- Ensure that aft bushing does not bottom out against the backside of bracket. Maintain clearance between bushing flange and bracket.

(3) Install three bolts (9) through bushings (12), bracket (5), support (4), and bushings (11).

(4) Install three nuts (10) on bolts (9).

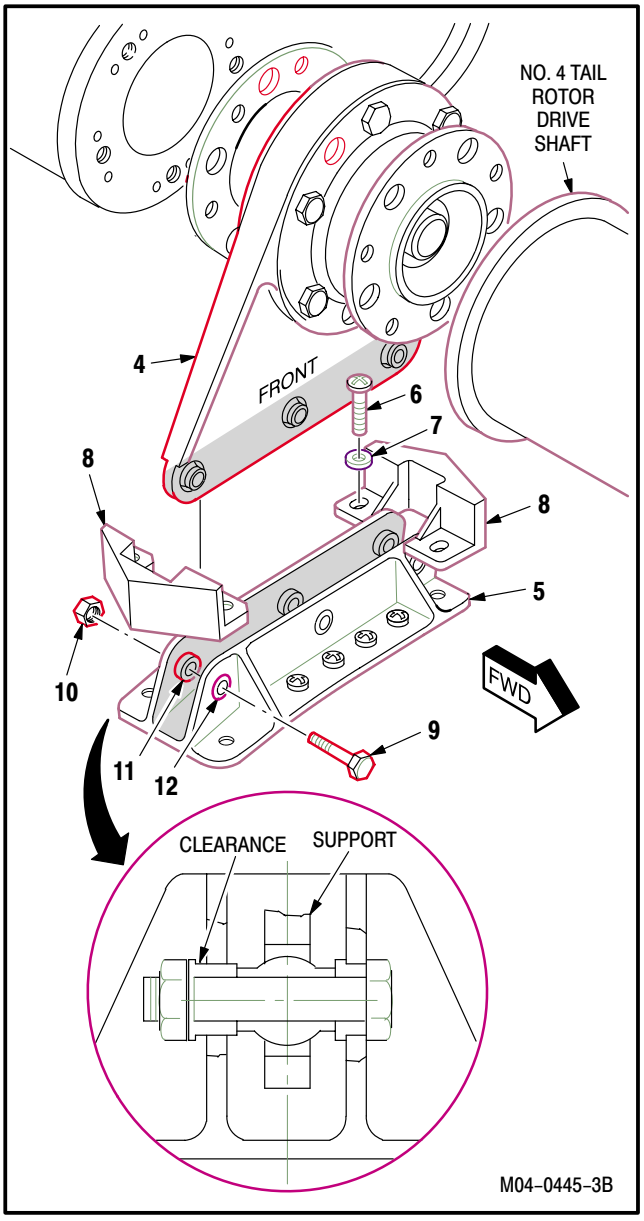
(5) Torque three nuts (10) to **60 INCH-POUNDS**. Use torque wrench.

(6) Position two deflectors (8) on bracket (5). Aline bolt holes.

(7) Install four screws (6) and washers (7) through deflectors (8) and bracket (5).

(8) Torque four screws (6) to **25 INCH-POUNDS**. Use torque wrench, screwdriver bit holder, and screwdriver bit.

(9) Apply corrosion preventive compound to four screws (6), three bolts (9), and three nuts (10). Use corrosion preventive compound (item 62A, App F).



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6.10. AFT HANGER BEARING AND SUPPORT REMOVAL/INSTALLATION – continued

CAUTION

When installing hanger bearing to No. 5 tail rotor drive shaft, ensure that bolts are installed through **0.250 INCH** bolt holes on hanger bearing flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of hanger bearing and drive shaft.

b. **Install shaft (2) on flange (1).** Torque five bolts (3) to **125 INCH-POUNDS**.

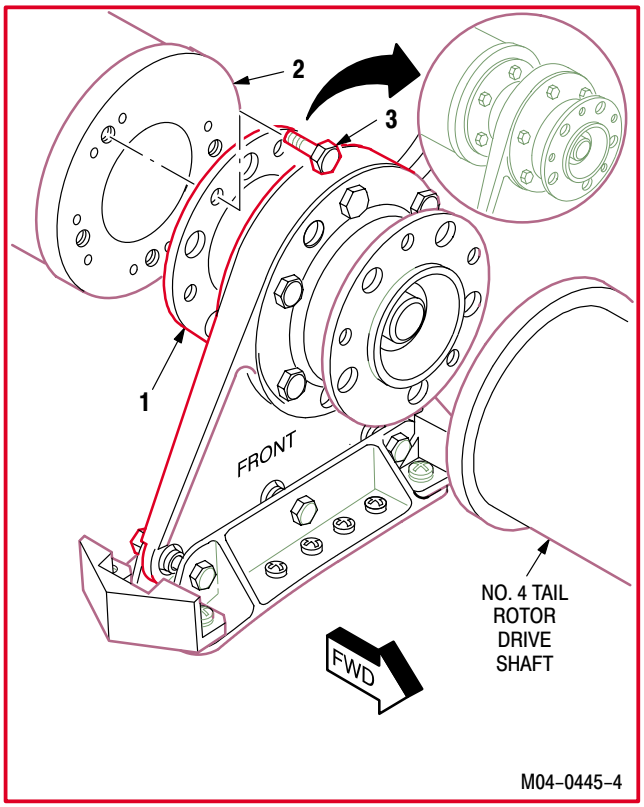
(1) Install five bolts (3) through flange (1) and shaft (2).

(2) Torque five bolts (3) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(3) Apply corrosion preventive compound to five bolts (3). Use corrosion preventive compound (item 62A, App F).

c. **Inspect (QA).**

d. **Install aft hanger bearing coupling** (para 6.9)**.**



END OF TASK

6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION

6.11.1. Description

This task covers: Removal. Cleaning. Inspection. Adjustment. Repair. Installation.

6.11.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
#2 phillips screwdriver bit (item 33, App H)
Tail rotor antiflail inspection gage (item 150, App H)
Chemical protective gloves (item 154, App H)
1/4-inch drive screwdriver bit holder (item 175, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)
0.0 - 50.0-pound weighing scale (item 273, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 1-1500-204-23

Materials/Parts:

Shim (as required)
Adhesive (item 3, App F)
Cloth (item 51, App F)
Corrosion preventive compound (item 62A, App F)
Methyl ethyl ketone (item 124, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings R410, R475, L510, and R510 removed

WARNING

FLIGHT SAFETY PART

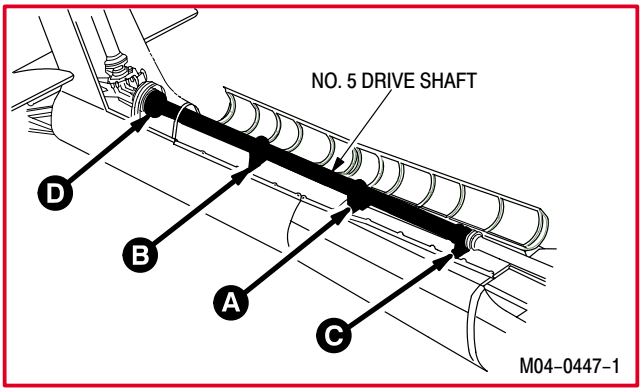
The No. 5 tail rotor drive shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

CAUTION

- Exercise care and undertake protective measures when handling or performing any type of maintenance on tail rotor drive shafts. All surface areas are critical. Accidental dents or scratches caused by improper handling may render part unserviceable.
- To prevent damage to tail rotor drive shaft, ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

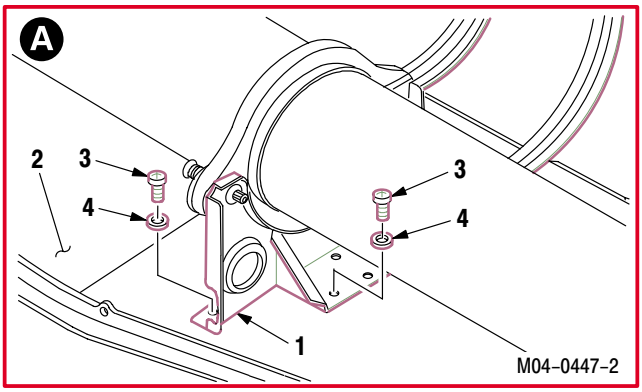


6.11.3. Removal

a. **Remove damper support (1) from deck (2).**

(1) Remove seven screws (3) and washers (4) from support (1).

(2) Slide support (1) off deck (2).



b. **Remove anti-flail support (5) from deck (2).**

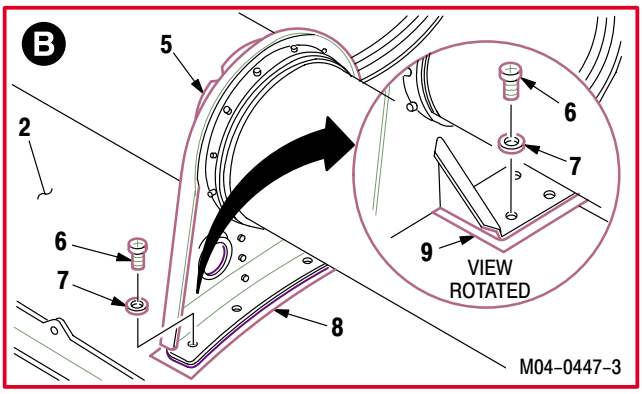
(1) Remove seven screws (6) and washers (7) from support (5).

(2) Slide support (5) off deck (2).

NOTE

Anti-flail support may contain more than one forward or aft shim. If multiple shims are found installed under anti-flail support, remove and discard all shims.

(3) Remove and discard forward shim(s) (8) and aft shim(s) (9).



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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

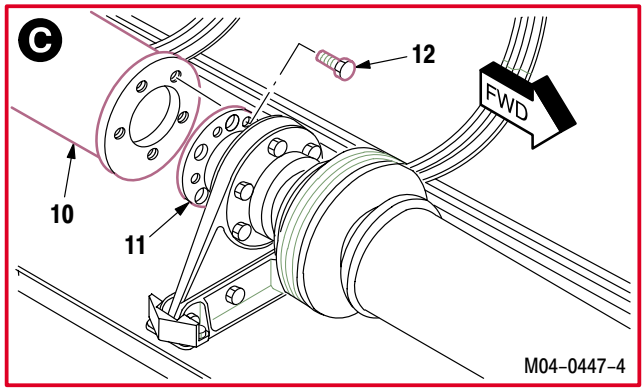
CAUTION

Before removing forward end of No. 5 tail rotor drive shaft from aft hanger bearing flange ensure that forward end of drive shaft is adequately supported. Do not allow forward end of drive shaft to drop or hang down freely. Failure to support drive shaft may result in damage to drive shaft and/or intermediate gearbox input coupling.

c. **Remove No. 5 tail rotor drive shaft (10) from aft hanger bearing flange (11).**

(1) Support forward end of shaft (10).

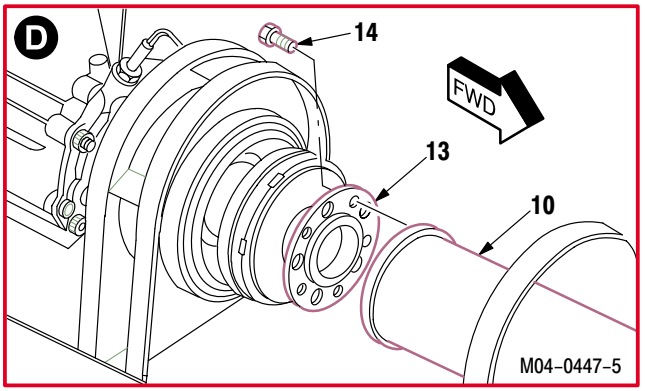
(2) Remove five bolts (12) attaching shaft (10) to flange (11).



d. **Remove shaft (10) from intermediate gearbox input coupling flange (13).**

(1) Support aft end of shaft (10).

(2) Remove five bolts (14) attaching shaft (10) to flange (13).

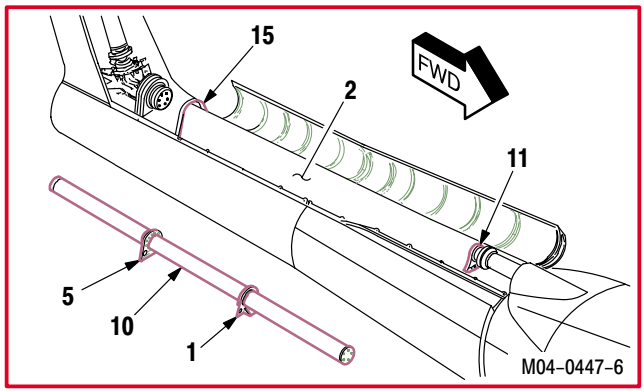


e. **Remove shaft (10) with supports (1) and (5) from deck (2).**

(1) Push shaft (10) aft to clear flange (11).

(2) Lift forward end of shaft (10) and move forward until clear of brace (15).

(3) Remove shaft (10) with supports (1) and (5) from deck (2).



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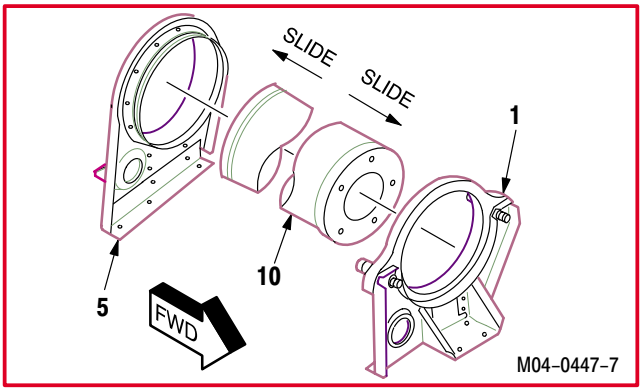
6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

f. **Remove support (1) from shaft (10).**

(1) Slide support (1) off from forward end of shaft (10).

g. **Remove support (5) from shaft (10).**

(1) Slide support (5) off from aft end of shaft (10).



6.11.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.11.5. Inspection

a. **Check components for corrosion** (para 1.49)**.**

b. **Check aft hanger bearing for grease leakage** (para 6.1)**.**

c. **Check drive shaft for cracks.** None allowed.

d. **Check drive shaft for nicks, scratches, and dents** (para 6.1)**.**

e. **Check drive shaft for loose or damaged nut-plates** (para 6.1)**.**

NOTE

The following inspection procedures apply to the aft hanger bearing output flange.

f. **Check for cracks.** None allowed.

g. **Check for nicks and scratches** (para 6.1)**.**

h. **Check for elongated bolt holes, bends, or abrasions** (para 6.1)**.**

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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

NOTE

Unless otherwise specified, the following inspection procedures apply to both damper and anti-flail support.

i. **Check for nicks, dents, or scratches** (para 6.1)**.**

j. **Check for loose or missing rivets** (para 6.1)**.**

k. **Check damper support for cracks.**

(1) Cracks or tears more than 25 percent of shortest dimension are not acceptable.

(2) Cracks on holes more than **3.0 INCHES** diameter with cleanup more than **2.0 INCHES** from supporting structure, and affecting more than 5 percent of skin area are not acceptable.

l. **Check anti-flail support for cracks.**

(1) Check anti-flail support sleeve for cracks. None allowed. Replace sleeve (para 6.8.7).

(2) Check anti-flail support doublers for cracks. None allowed. Replace doubler (para 6.8.7).

(3) Check anti-flail support brackets for cracks. None allowed. Replace bracket(s) (para 6.8.7).

m. **Check for cracks elsewhere on damper and anti-flail support.**

(1) Refer to paragraph 6.8.7 to determine if location and/or size of crack is acceptable, and appropriate repair procedures.

n. **Check anti-flail support sleeves for other evidence of damage.** Replace sleeve (para 6.8.7).

o. **Check anti-flail support doublers for debonding and elongated bolt holes.** Replace doubler (para 6.8.7).

NOTE

The following inspection procedures apply to the intermediate gearbox coupling.

p. **Check for cracks** (para 6.1)**.**

q. **Check for nicks and scratches** (para 6.1)**.**

r. **Check for erosion of aluminum bronze coating** (para 6.1)**.**

s. **Check for elongated bolt holes and clogged vent holes** (para 6.1)**.**

t. **Check for dents in diaphragm and deep bends in diaphragm guard** (para 6.1)**.**

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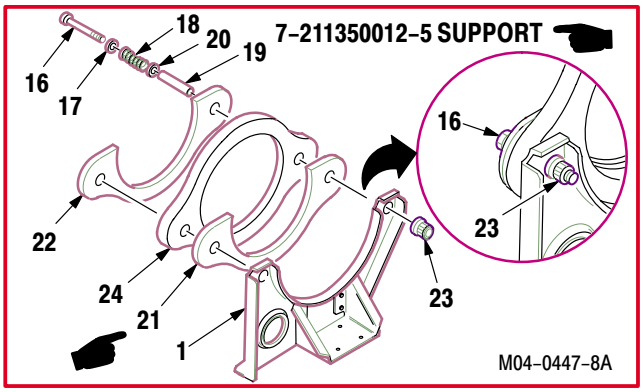
6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

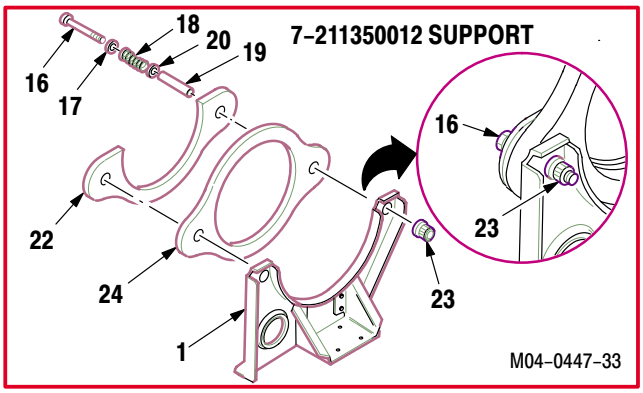
NOTE

- Tension washer(s) may be missing due to damper tension adjustment.
- Two plates are used on 7-211350012-5 supports and one plate is used on 7-211350012 supports.

u. **Check both sides of support (1) for presence of screw (16), washer (17), spring (18), spacer (19), tension washer (20) (if installed), plate(s) (21) and (22), and nut (23).**

v. **Check both sides of support (1) and ensure that at least one screw thread of screw (16) extends through nut (23).**



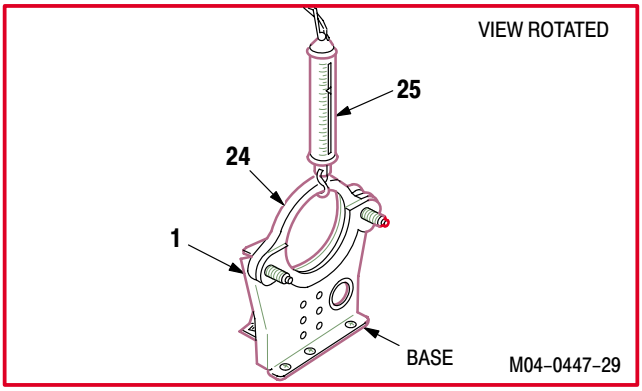


w. **Check tension of damper (24).**

(1) Position scale (25) in center of damper (24). Use scale.

(2) Hold base of support (1) and pull on scale (25) until damper (24) moves. Note reading on scale (25) dial indicator at instance damper (24) moves.

(3) If scale (25) dial indicator shows that damper (24) requires less than 9 or more than 11 pounds of tension to move, adjust damper (24) tension (para 6.11.6).



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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

6.11.6. Adjustment

a. **Adjust damper (24) tension.** Torque nut (23) to **13 INCH-POUNDS**.

(1) Remove nut (23).

NOTE

More than one tension washer may be installed between spring and plate.

(2) Remove screw (16), washer (17), spring (18), spacer (19), and tension washer (20) (if installed) from both sides of plate(s) (21) and (22), damper (24), and support (1).

(3) If reading on scale (25) was less than 9 pounds, add tension washers (20) one at a time on each side of support (1) until correct tension reading on scale (25) is obtained.

(4) If reading on scale (25) was more than 11 pounds, remove tension washers (20) one at a time on each side of support (1) until correct tension reading on scale (25) is obtained.

NOTE

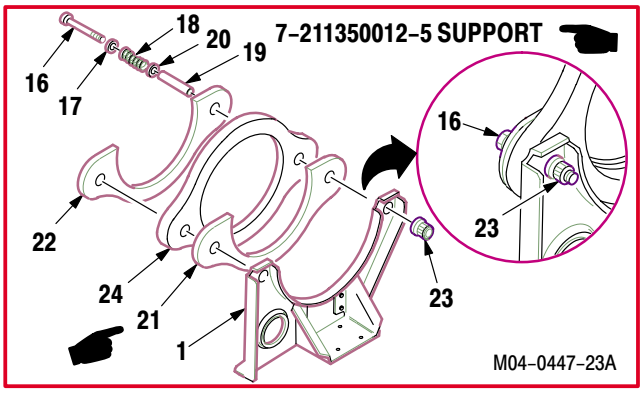
- Replace one or both springs if minimum length is less than **0.40 INCH**. Do not stretch spring in order to increase length.
- Two plates are used on 7-211350012-5 supports and one plate is used on 7-211350012 supports.

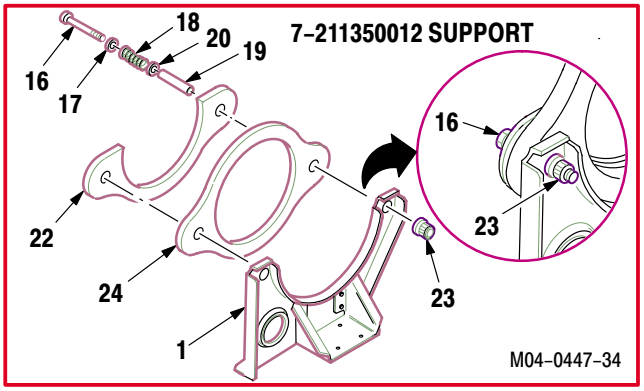
(5) If correct tension reading on scale (25) is not obtained when only one tension washer (20) remains on each side of support (1), replace spring (18).

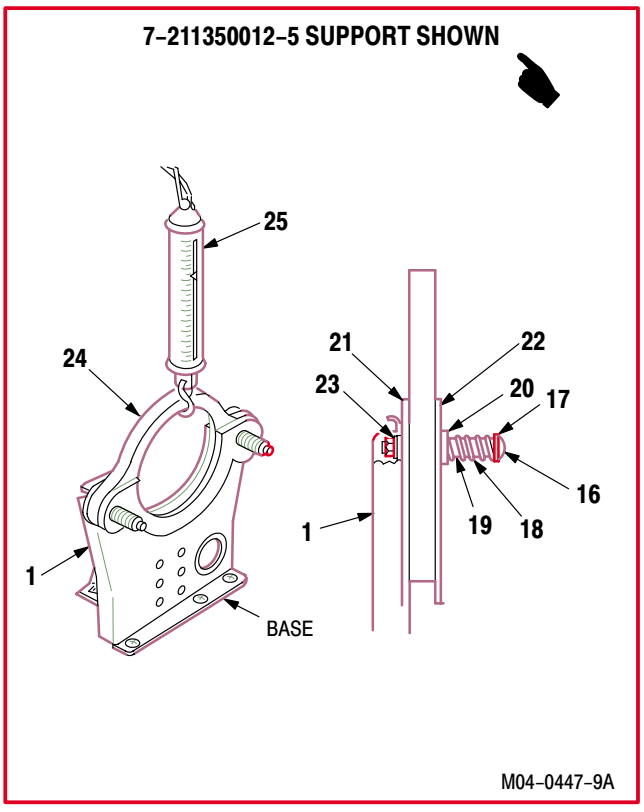
(6) Install screw (16) through washer (17), spring (18), spacer (19), and tension washer(s) (20) on both sides of plate(s) (21) and (22), damper (24), and support (1).

(7) Hand tighten nut (23) on screw (16).

(8) Torque nut (23) to **13 INCH-POUNDS**. Use torque wrench.







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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

6.11.7. Repair

a. **Repair support (5) by replacing sleeve (26).**

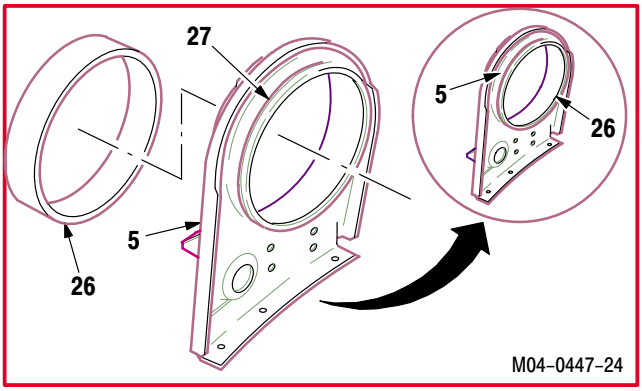
(1) Remove bends in lip ring (27).

(2) Remove and discard sleeve (26).

(3) Install new sleeve (26).

(4) Crimp lip of ring (27) between bends to secure sleeve (26).





b. **Repair support (5) by replacing doubler (28).**

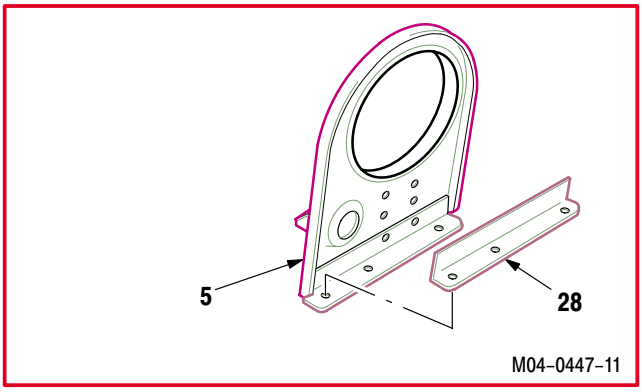
(1) Remove doubler (28) from support (5). Use putty knife.

(2) Clean doubler (28) mating surface on support (5). Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

(3) Apply a thin, uniform coat of adhesive to doubler (28) mating surface on support (5). Use adhesive (item 3, App F).

(4) Install new doubler (28) on support (1) and press firmly.

(5) Allow adhesive to cure for a minimum of **24 HOURS** at room temperature.



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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

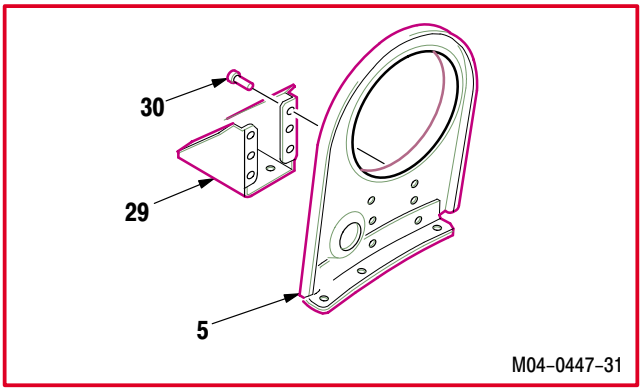
c. **Repair support (5) by replacing support bracket (29).**

(1) Remove six rivets (30) attaching bracket (29) to support (5) (TM 1-1500-204-23).

(2) Remove bracket (29) from support (5).

(3) Position bracket (29) on support (5).

(4) Install six rivets (30) through bracket (29) and support (5) (TM 1-1500-204-23).



d. **Repair cracks on anti-flail support and damper support by stop drilling and applying an overlay patch.**

NOTE

- Cracks on support brackets are not repairable. On anti-flail support, replace bracket. On damper support, replace entire support.
- Cracks greater than **2.50 INCH** in length on bend lines are not repairable. Replace support.
- Cracks in flange holes greater than 1/2 of flange width in length and extend more than **0.25 INCH** into web are not repairable. Replace support.

(1) Stop drill, trim, and dress to 45 degrees V shaped cracks found in flange holes that are less than 1/2 of flange width in length (TM 1-1500-204-23).

(2) Apply an overlay patch if cracks in flanged holes are greater than 1/2 flange width but extend less than **0.25 INCH** into web (TM 1-1500-204-23).

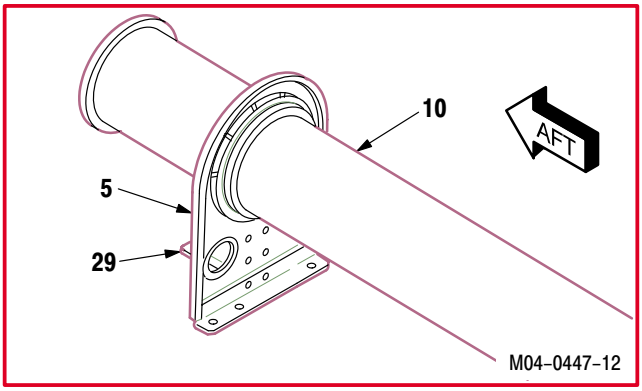
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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

6.11.8. Installation

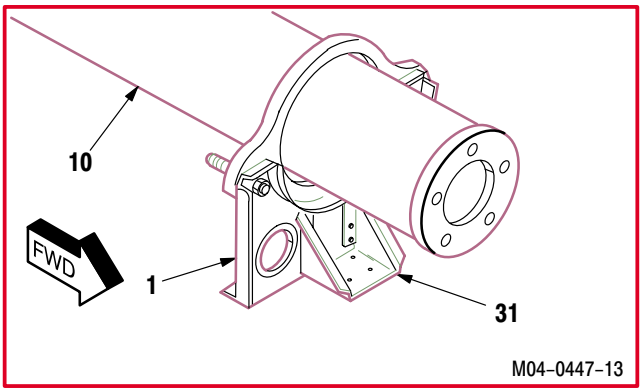
a. **Install support (5) on shaft (10).**

(1) Slide support (5) on shaft (10) with bracket (29) facing aft.



b. **Install support (1) on shaft (10).**

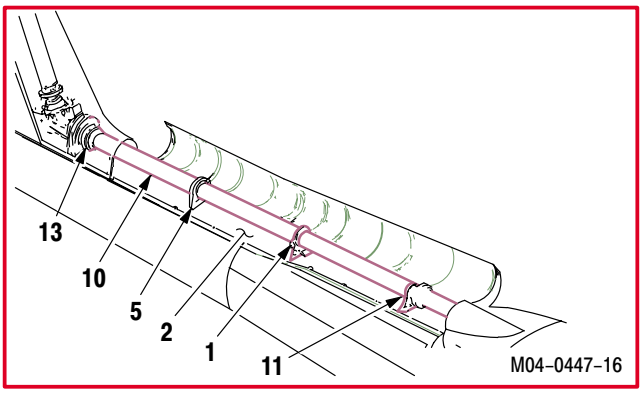
(1) Slide support (1) on shaft (10) with bracket (31) facing forward.



c. **Install shaft (10) with supports (1) and (5) on deck (2).**

(1) Slide and position shaft (10) with support (1) and (5) on deck (2) between flange (11) and (13).

(2) Support both ends of shaft (10).



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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

CAUTION

When installing No. 5 tail rotor drive shaft to intermediate gearbox input coupling flange and aft hanger bearing flange, ensure that bolts are installed through **0.250 INCH** bolt holes on intermediate gearbox input coupling flange and aft hanger bearing flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or intermediate gearbox input coupling.

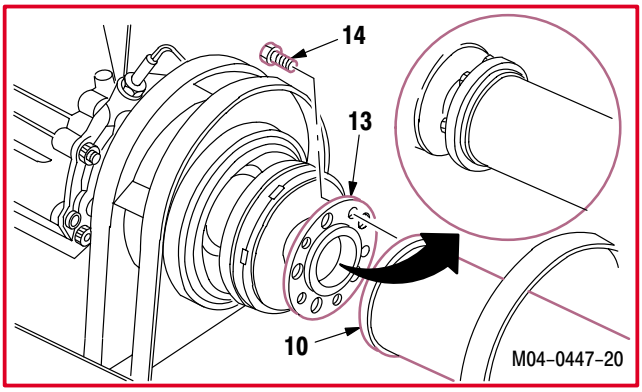
d. **Install shaft (10) on coupling flange (13).** Torque five bolts (14) to **125 INCH-POUNDS**.

(1) Aline bolt holes on aft end of shaft (10) with bolt holes on coupling flange (13).

(2) Install five bolts (14) through coupling flange (13) and shaft (10).

(3) Torque five bolts (14) to **125 INCH-POUNDS**. Use torque wrench.

(4) Apply corrosion preventive compound to five bolts (14). Use corrosion preventive compound (item 62A, App F).



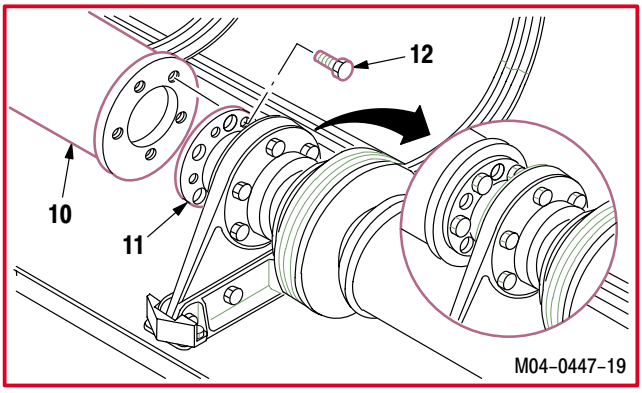
e. **Install shaft (10) on bearing flange (11).** Torque five bolts (12) to **125 INCH-POUNDS**.

(1) Aline bolt holes on forward end of shaft (10) with bolt holes on bearing flange (11).

(2) Install five bolts (12) through bearing flange (11) and shaft (10).

(3) Torque five bolts (12) to **125 INCH-POUNDS**. Use torque wrench.

(4) Apply corrosion preventive compound to five bolts (12). Use corrosion preventive compound (item 62A, App F).



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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

f. **Install support (5) on deck (2).**

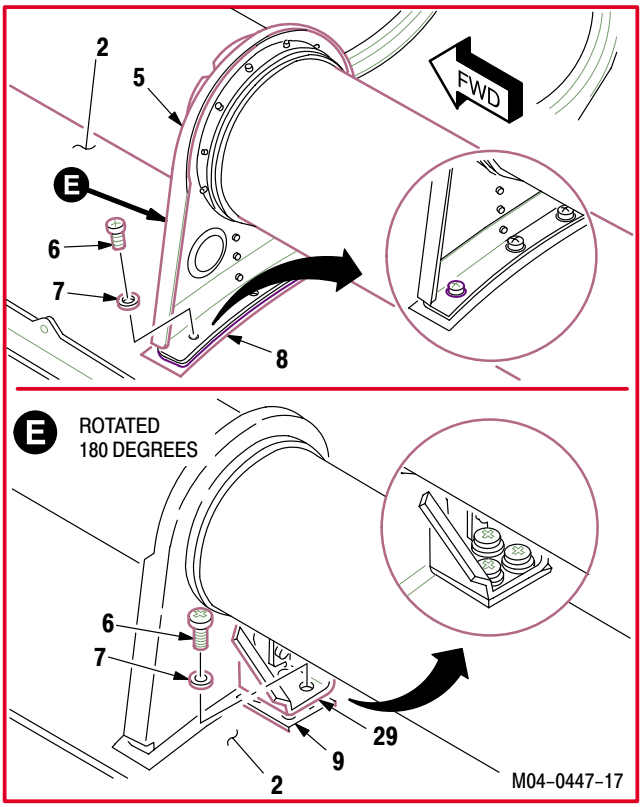
(1) Aline mounting holes on support (5) and bracket (29) with mating holes on deck (2).

(2) Install new forward shim (8) between support (5) and deck (2).

(3) Install new aft shim (9) between bracket (29) and deck (2).

(4) Hand tighten three screws (6) through washers (7), support (5), shim (8), and in deck (2).

(5) Hand tighten four screws (6) through washers (7), bracket (29), shim (9), and in deck (2).



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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

g. **Adjust support (5) to achieve minimum clearances of 0.150 INCH at 6, 9, and 12 o'clock positions and 0.220 INCH at 3 o'clock position between shaft (10) and support sleeve (26).** Torque seven screws (6) to **20 INCH-POUNDS**.

NOTE

Minimum clearance shall be measured between outside diameter of drive shaft and inside diameter of anti-flail support bearing sleeve.

(1) Adjust support (5) and obtain minimum clearance of **0.150 INCH** at 6 and 12 o'clock positions between shaft (10) and sleeve (26).

(a) Measure and record existing clearance at 6 and 12 o'clock positions between shaft (10) and sleeve (26). Use inspection gage.

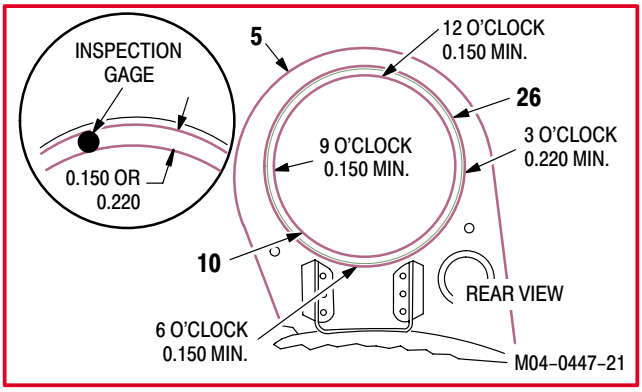
(b) Remove screws (6) and washers (7).

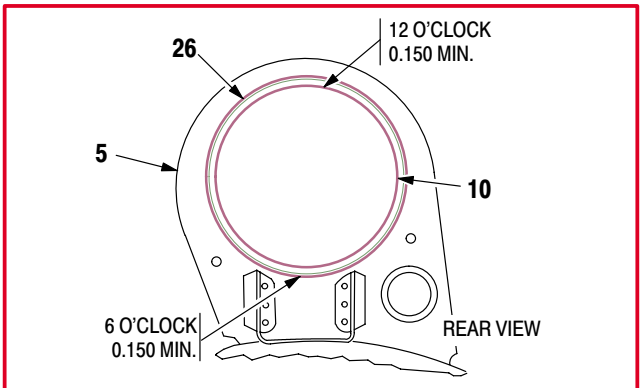
(c) Remove or add shims (8) and (9) equally to obtain minimum clearance of **0.150 INCH** at 6 and 12 o'clock positions between shaft (10) and sleeve (26). Use inspection gage.

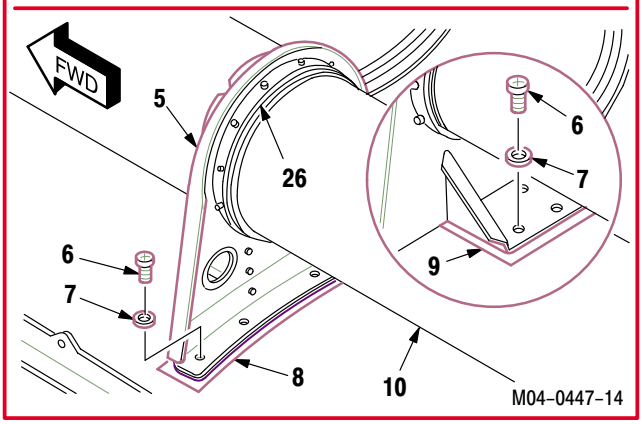
(d) Hand tighten screws (6) and washers (7).

(e) Slowly rotate shaft (10).

(f) Measure and verify minimum clearance of **0.150 INCH** at 6 and 12 o'clock positions between shaft (10) and sleeve (26) while shaft (10) is rotating. Use inspection gage.







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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

(2) Adjust support (5) to obtain minimum clearance of **0.150 INCH** at 9 o'clock position and **0.220 INCH** at 3 o'clock position between shaft (10) and sleeve (26).

(a) Measure and record existing clearance at 9 and 3 o'clock positions between shaft (10) and sleeve (26). Use inspection gage.

(b) Loosen seven screws (6).

(c) Shift support (5) left or right to obtain minimum clearance of **0.150 INCH** at 9 o'clock position and **0.220 INCH** at 3 o'clock position between shaft (10) and sleeve (26). Use inspection gage.

(d) Hand tighten seven screws (6).

(e) Slowly rotate shaft (10).

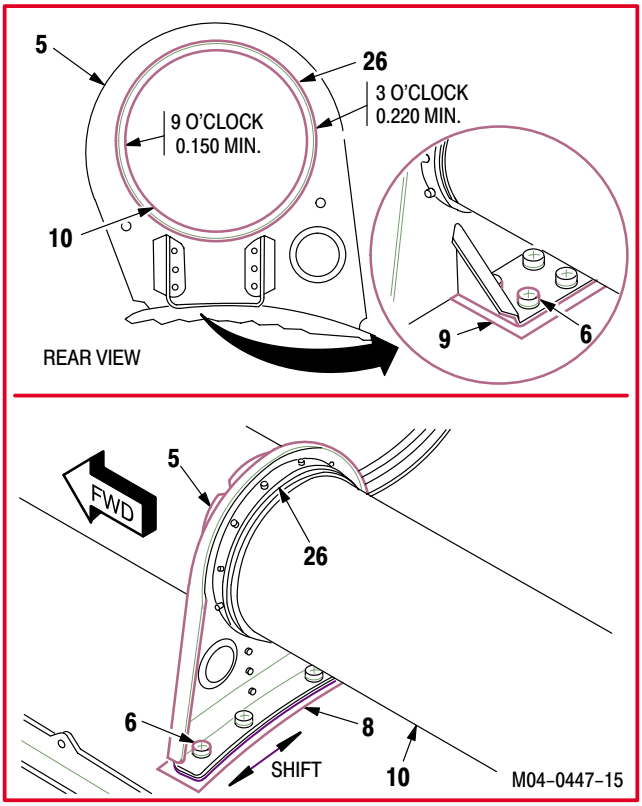
(f) Measure and verify minimum clearance of **0.150 INCH** at 9 o'clock position and **0.220 INCH** at 3 o'clock position between shaft (10) and sleeve (26) while shaft (10) is rotating. Use inspection gage.

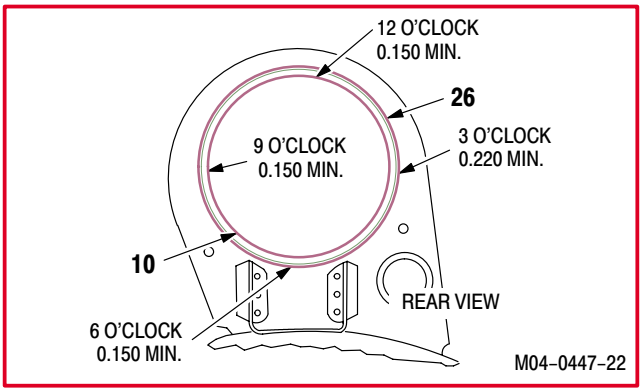
(3) Torque seven screws (6) to **20 INCH-POUNDS**. Use torque wrench, screwdriver bit holder, and screwdriver bit.

(4) Apply corrosion preventive compound to seven screws (6). Use corrosion preventive compound (item 62A, App F).

(5) Slowly rotate shaft (10).

(6) Measure and verify that all minimum clearances between shaft (10) and sleeve (26) remained undisturbed or within minimum limitations. Use inspection gage.





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6.11. NO. 5 TAIL ROTOR DRIVE SHAFT, DAMPER, AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

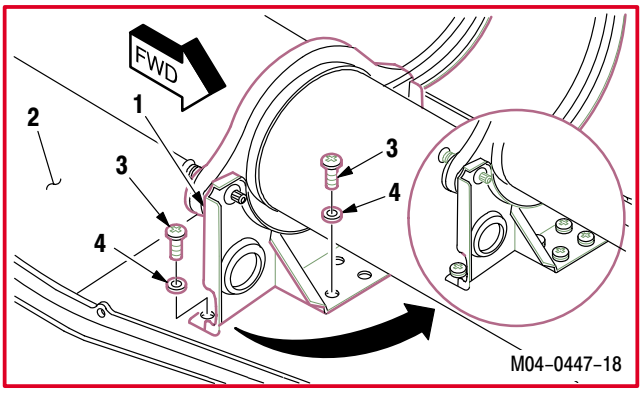
h. **Install support (1) on deck (2).** Torque seven screws (3) to **20 INCH-POUNDS**.

(1) Aline mounting holes on support (1) with mating holes on deck (2).

(2) Install seven screws (3) through washers (4), support (1), and deck (2).

(3) Torque seven screws (3) to **20 INCH-POUNDS**. Use torque wrench, screwdriver bit holder, and screwdriver bit.

(4) Apply corrosion preventive compound to seven screws (3). Use corrosion preventive compound (item 62A, App F).



i. **Inspect (QA).**

j. **Install access fairings R410, R475, L510, and R510** (para 2.2)**.**

k. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.12. INTERMEDIATE GEARBOX CENTRIFUGAL FAN, INPUT COUPLING, AND FLANGE REMOVAL/INSTALLATION

6.12.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.12.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Thin wall socket wrench socket (item 303, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing
Corrosion preventive compound (item 62A, App F)
Grease (item 88, App F)

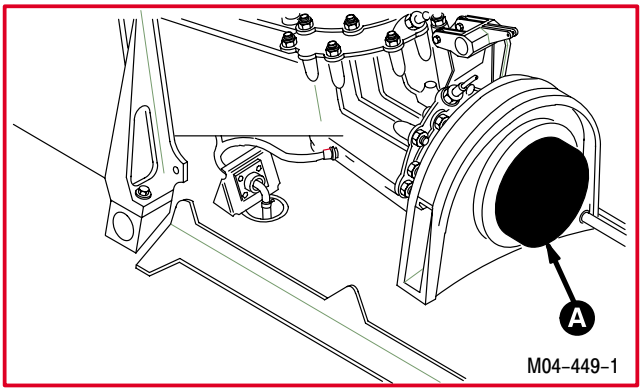
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.11	No. 5 tail rotor drive shaft removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

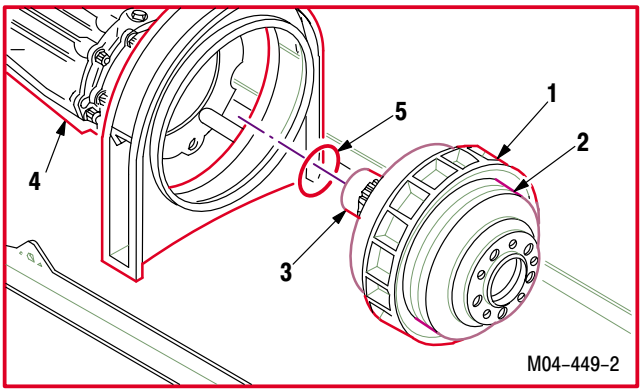


6.12.3. Removal

a. **Remove centrifugal fan (1) with attached input coupling (2) and flange (3) from intermediate gearbox (4).**

(1) Pull fan (1) with attached coupling (2) and flange (3) out from gearbox (4).

(2) Remove and discard packing (5) from flange (3) shaft.



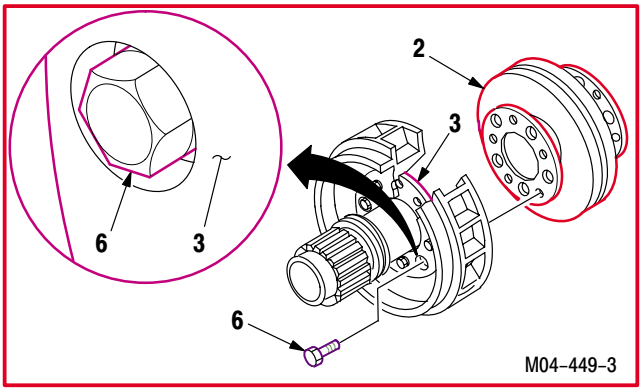
GO TO NEXT PAGE

6.12. INTERMEDIATE GEARBOX CENTRIFUGAL FAN, INPUT COUPLING, AND FLANGE REMOVAL/INSTALLATION – continued

b. **Remove coupling (2) from flange (3).**

(1) Remove five bolts (6) attaching flange (3) to coupling (2). Use socket.

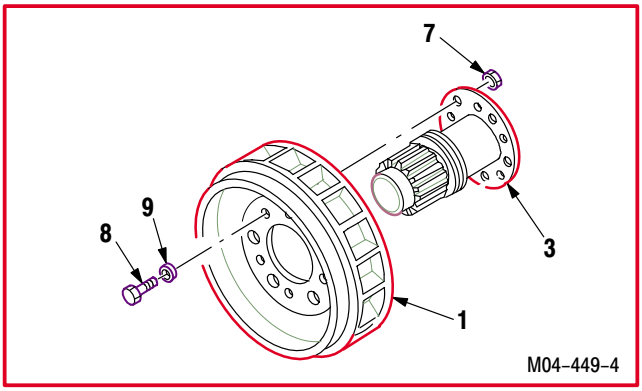
(2) Remove coupling (2) from flange (3).



c. **Remove flange (3) from fan (1).**

(1) Remove five nuts (7), bolts (8), and washers (9) attaching fan (1) to flange (3).

(2) Remove flange (3) from fan (1).



6.12.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.12.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to the centrifugal fan, input coupling, and flange.

a. **Check intermediate gearbox** (para 6.121)**.**

b. **Check for cracks.** None allowed.

c. **Check for corrosion** (para 1.49)**.**

d. **Check for elongated bolt holes.** None allowed.

e. **Check flange for serviceability** (para 6.121)**.**

GO TO NEXT PAGE

6.12. INTERMEDIATE GEARBOX CENTRIFUGAL FAN, INPUT COUPLING, AND FLANGE REMOVAL/INSTALLATION – continued

NOTE

The following inspection procedures apply to the flange.

d. **Check for corrosion, nicks, gouges, and burrs.**

(1) Except for drive flange packing groove and external splines, nicks, gouges, and burrs **0.020 INCH** in depth or less may be repaired by blending.

e. **Check packing groove for corrosion, nicks, gouges, and burrs.**

(1) Repair damage **0.004 INCH** in depth or less by blending at a 30:1 to 50:1 transition ratio if before blending, damage does not exceed 20 percent of surface area. Do not exceed the depth of the original damage.

f. **Check external splines for pitting, scuffing, scoring, or spalling.** None allowed.

g. **Check expansion plug inside flange shaft.** No looseness allowed.

h. **Check identification markings.** Must be legible.

NOTE

The following inspection procedures apply to the centrifugal fan.

i. **Check for nicks, gouges, and burrs.**

(1) Damage is limited to a total of four blades which must be spaced 90 degrees apart, or three blades which must be spaced 120 degrees apart, or two blades which must be spaced 180 degrees apart.

(2) Damage must not exceed 15 percent of material thickness or **0.050 INCH** depth (whichever is less).

NOTE

The following inspection procedures apply to the input coupling.

j. **Check for scratches, nicks, gouges, and burrs** (para 6.1)**.**

k. **Check for loose or damaged nutplates** (para 6.1)**.**

GO TO NEXT PAGE

6.12. INTERMEDIATE GEARBOX CENTRIFUGAL FAN, INPUT COUPLING, AND FLANGE REMOVAL/INSTALLATION – continued

6.12.6. Installation



a. **Install flange (3) on fan (1).** Torque five nuts (7) to **60 INCH-POUNDS**.

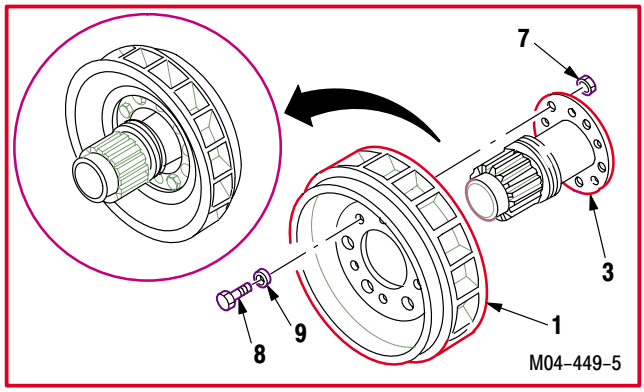
(1) Position flange (3) on fan (1). Aline bolt holes.

(2) Install five bolts (8) through washers (9), fan (1), and flange (3).

(3) Install five nuts (7) on bolts (8).

(4) Torque five nuts (7) to **60 INCH-POUNDS**. Use torque wrench.

(5) Apply corrosion preventive compound to five bolts (8) and nuts (7). Use corrosion preventive compound (item 62A, App F).



b. **Install coupling (2) on flange (3).** Torque five bolts (6) to **125 INCH-POUNDS**.

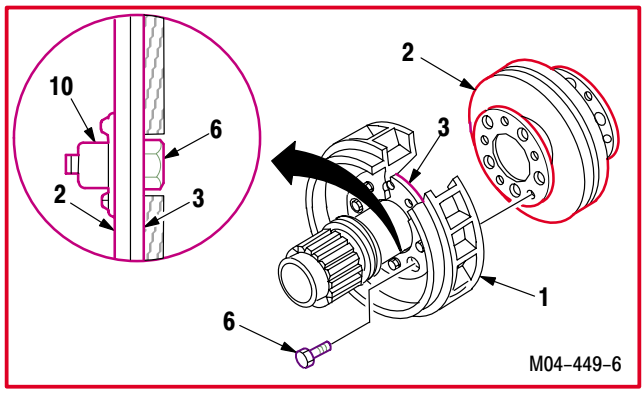
(1) Position coupling (2) on flange (3).

(2) Aline bolt holes of flange (3) with coupling flange nutplates (10).

(3) Install five bolts (6) through fan (1), flange (3), and coupling flange nutplates (10).

(4) Torque five bolts (6) to **125 INCH-POUNDS**. Use torque wrench and socket.

(5) Apply corrosion preventive compound to five bolts (6). Use corrosion preventive compound (item 62A, App F).



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6.12. INTERMEDIATE GEARBOX CENTRIFUGAL FAN, INPUT COUPLING, AND FLANGE REMOVAL/INSTALLATION – continued



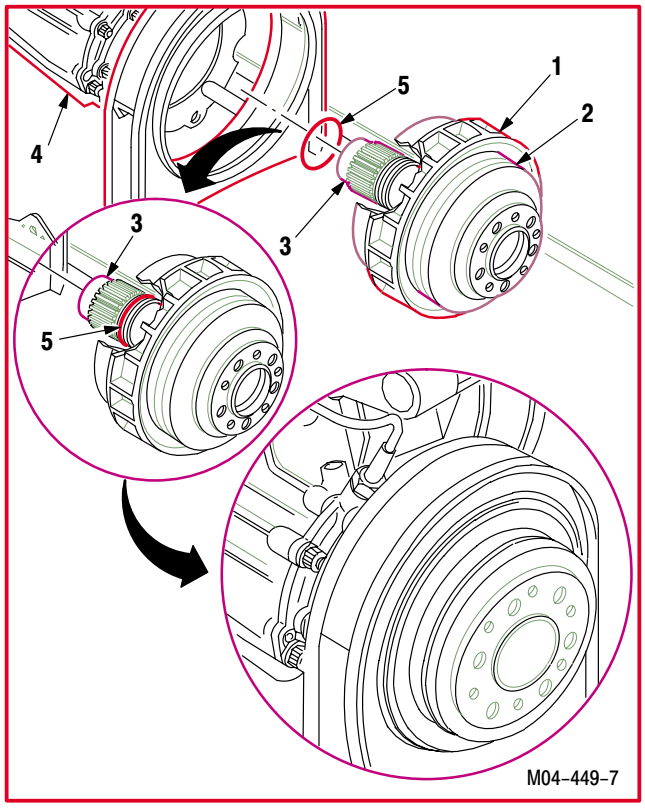
c. **Install fan (1) with attached coupling (2) and flange (3) in gearbox (4).**

(1) Lubricate new packing (5).

(2) Install packing (5) on flange (3) shaft. Use grease (item 88, App F).

(3) Lubricate splines and teeth of flange (3) shaft. Use grease (item 88, App F).

(4) Install fan (1) with attached coupling (2) and flange (3) in gearbox (4).



d. **Inspect (QA).**

e. **Install No. 5 tail rotor drive shaft** (para 6.11)**.**

END OF TASK

6.13. INTERMEDIATE GEARBOX OUTPUT COUPLING REMOVAL/INSTALLATION

6.13.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.13.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings R475, L510, and R510 removed

WARNING

FLIGHT SAFETY PART

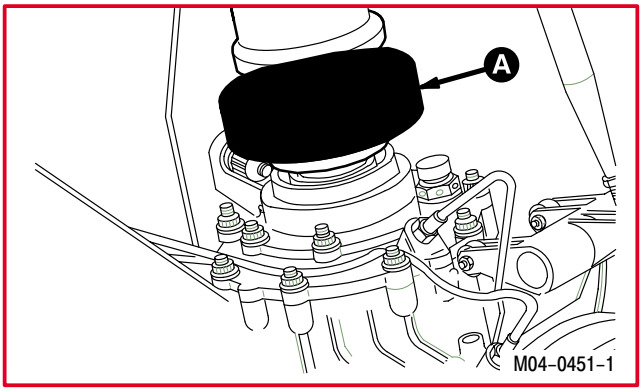
The intermediate gearbox output coupling is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

For purposes of identification and applicable to this task only, coupling flange with attached nutplates is considered coupling lower flange.

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6.13. INTERMEDIATE GEARBOX OUTPUT COUPLING REMOVAL/INSTALLATION – continued



6.13.3. Removal

CAUTION

To prevent damage to the tail rotor drive shaft, secure tail rotor before removing intermediate gearbox output coupling.

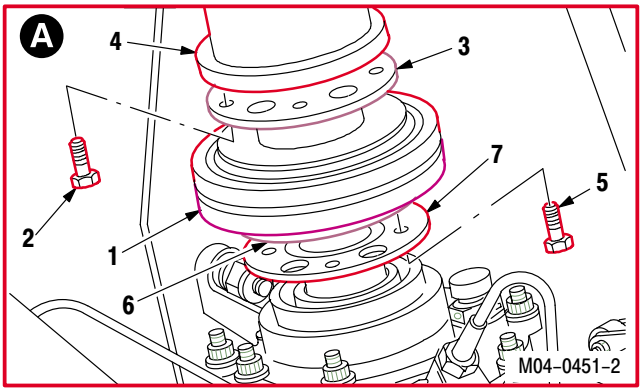
a. **Remove intermediate gearbox output coupling (1).**

(1) Remove five bolts (2) attaching coupling (1) upper flange (3) to No. 6 tail rotor drive shaft (4).

(2) Remove five bolts (5) attaching coupling (1) lower flange (6) to intermediate gearbox output flange (7).

(3) Push coupling (1) down on flange (7).

(4) Remove coupling (1).

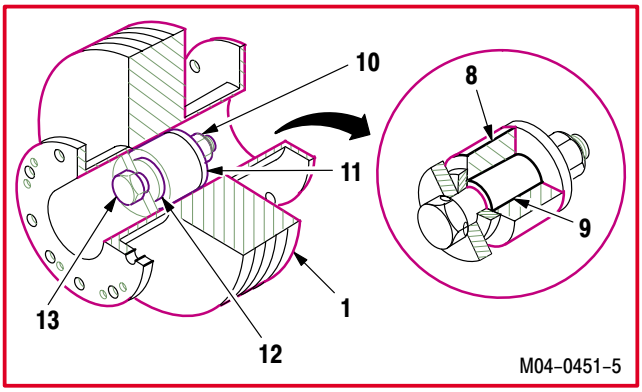


b. **Remove antiflail bearing sleeves (8) and (9) from coupling (1).**

(1) Remove nut (10).

(2) Remove washer (11), bearing sleeves (8) and (9), and washer (12) from bolt (13).

(3) Remove bolt (13) from coupling (1).



6.13.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

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6.13. INTERMEDIATE GEARBOX OUTPUT COUPLING REMOVAL/INSTALLATION – continued

6.13.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to the intermediate gearbox output coupling, antiflail bearing sleeves, intermediate gearbox output flange, and lower end of No. 6 tail rotor drive shaft.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

d. **Check lower end of No. 6 tail rotor drive shaft for dents** (para 6.1)**.**

e. **Check intermediate gearbox output coupling and intermediate gearbox output flange for elongated bolt holes** (para 6.1)**.**

f. **Check intermediate gearbox output coupling and lower end of No. 6 tail rotor drive shaft for loose or damaged nutplates** (para 6.1)**.**

6.13.6. Installation

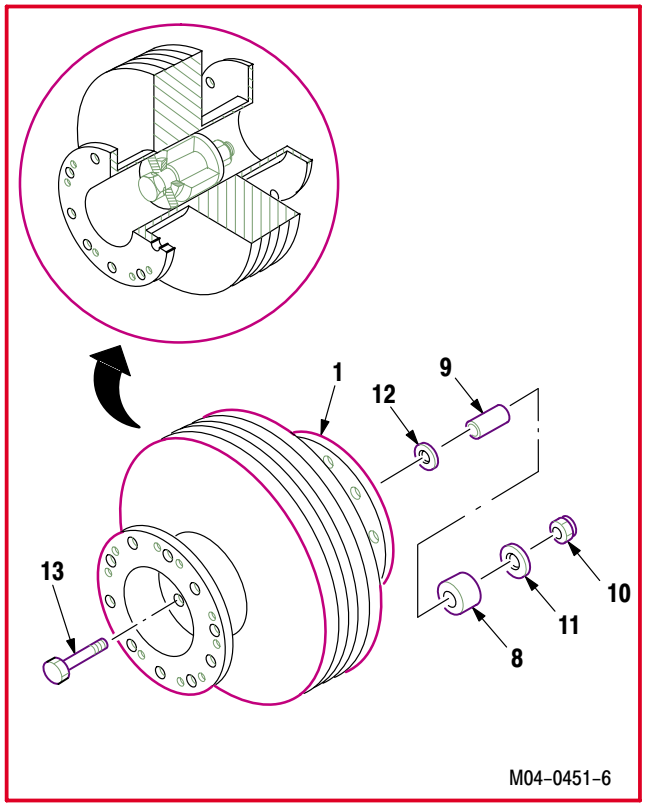
a. **Install bearing sleeves (9) and (8) in coupling (1).** Torque nut (10) to **35 INCH-POUNDS**.

(1) Install bolt (13) in coupling (1).

(2) Install washer (12), bearing sleeves (9) and (8), and washer (11) on bolt (13).

(3) Hand tighten nut (10) on bolt (13).

(4) Torque nut (10) to **35 INCH-POUNDS**. Use torque wrench.



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6.13. INTERMEDIATE GEARBOX OUTPUT COUPLING REMOVAL/INSTALLATION – continued

CAUTION

When installing intermediate gearbox output coupling ensure that bolts are installed through **0.250 INCH** bolt holes on the coupling upper flange and on the intermediate gearbox output flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or coupling.

b. **Install coupling (1).** Torque bolts (5) and (2) to **125 INCH-POUNDS**.

(1) Push down on flange (7).

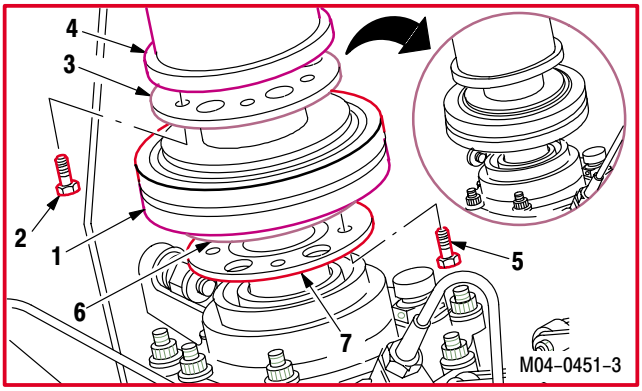
(2) Position coupling (1) between flange (7) and shaft (4) with lower flange (6) facing flange (7). Aline bolt holes.

(3) Install five bolts (5) through flange (7) and coupling (1) lower flange (6).

(4) Install five bolts (2) through coupling (1) upper flange (3) and shaft (4).

(5) Torque bolts (5) and (2) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(6) Apply corrosion preventive compound to bolts (5) and (2). Use corrosion preventive compound (item 62A, App F).



c. **Inspect (QA).**

d. **Install access fairings R475, L510, and R510** (para 2.2)**.**

e. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.14. NO. 6 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION

6.14.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.14.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI (2)
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L510, R510, L530, and L540 removed

WARNING

FLIGHT SAFETY PART

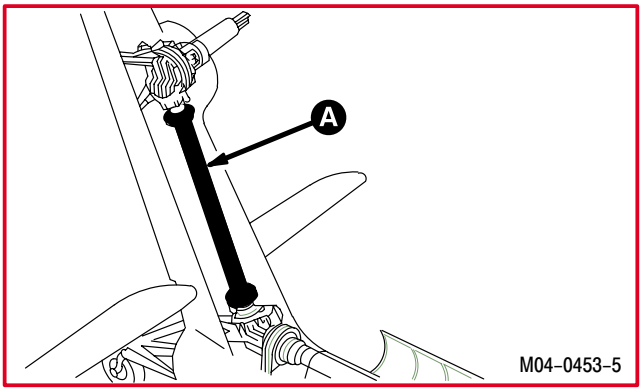
The tail rotor drive shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

- Exercise care and undertake protective measures when handling or performing any type of maintenance on the tail rotor drive shafts. All surface areas are critical. Accidental dents or scratches caused by improper handling may render part unserviceable.
- To prevent damage to tail rotor drive shaft, ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

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6.14. NO. 6 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION – continued



6.14.3. Removal

CAUTION

To prevent damage to tail rotor drive shaft, secure tail rotor before removing drive shaft.

a. **Remove No. 6 tail rotor drive shaft (1).**

(1) Remove five bolts (2) attaching shaft (1) to tail rotor gearbox input coupling flange (3).

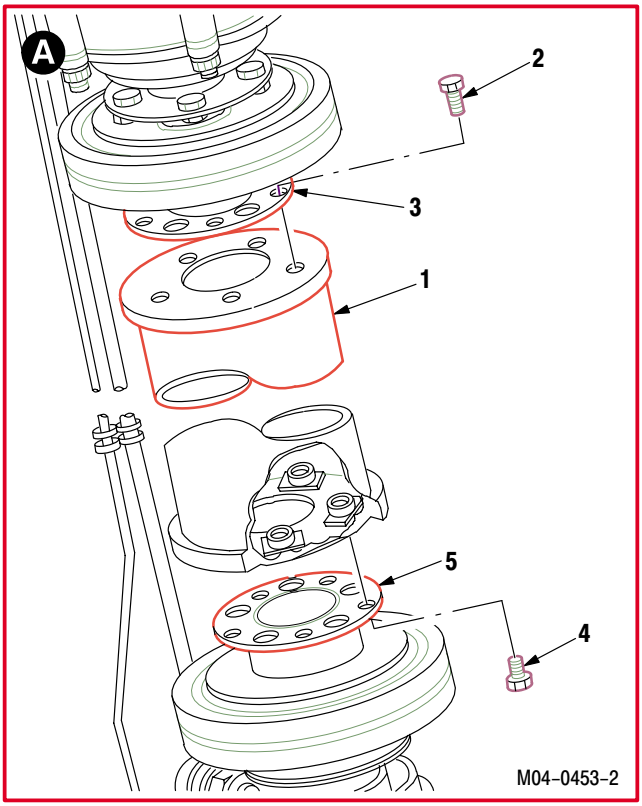
(2) Support upper end of shaft (1).

(3) Remove five bolts (4) attaching shaft (1) to intermediate gearbox output coupling flange (5).

(4) Support lower end of shaft (1).

(5) Push shaft (1) down on flange (5).

(6) Remove shaft (1).



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6.14. NO. 6 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION – continued

6.14.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.14.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to No. 6 tail rotor drive shaft, intermediate gearbox output coupling flange, and tail rotor gearbox input coupling flange.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

d. **Check drive shaft for dents** (para 6.1)**.**

e. **Check drive shaft for loose or damaged nutplates** (para 6.1)**.**

f. **Check intermediate gearbox output coupling flange and tail rotor gearbox input coupling flange for elongated bolt holes and erosion of aluminum bronze coating** (para 6.1)**.**

g. **Check intermediate gearbox output coupling and tail rotor gearbox input coupling for clogged diaphragm vents, and sharp bends, nicks, or scratches in diaphragm or diaphragm guard** (para 6.1)**.**

GO TO NEXT PAGE

6.14. NO. 6 TAIL ROTOR DRIVE SHAFT REMOVAL/INSTALLATION – continued

6.14.6. Installation



CAUTION

When installing No. 6 tail rotor drive shaft, ensure that bolts are installed through **0.250 INCH** bolt holes on the intermediate gearbox output coupling flange and on the tail rotor gearbox input coupling flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or couplings.

a. **Install drive shaft (1).** Torque bolts (2) and (4) to **125 INCH-POUNDS**.

(1) Push down on flange (5).

(2) Position shaft (1) between flanges (3) and (5).

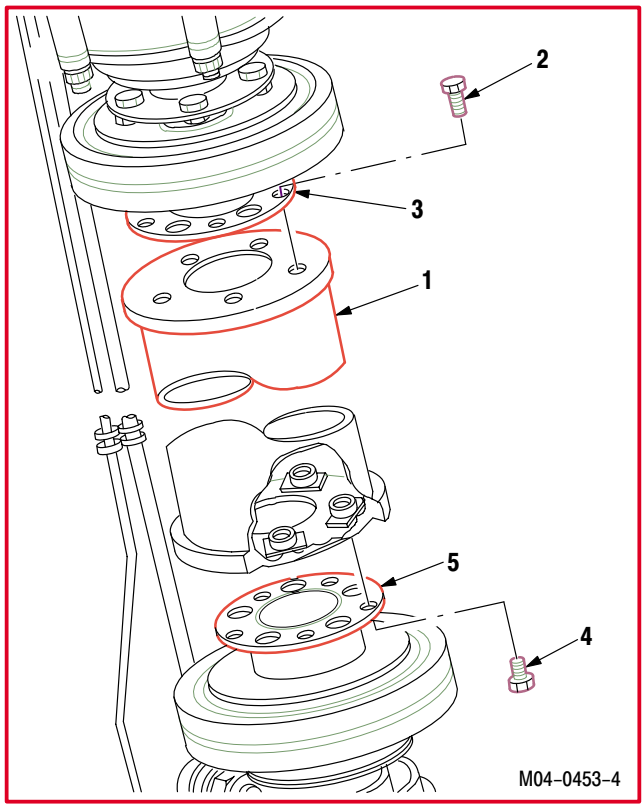
(3) Aline bolt holes in flanges (3) and (5) with bolt holes in shaft (1).

(4) Install five bolts (4) through flange (5) and shaft (1).

(5) Install five bolts (2) through flange (3) and shaft (1).

(6) Torque bolts (2) and (4) to **125 INCH-POUNDS**. Use torque wrench and torque wrench adapter.

(7) Apply corrosion preventive compound to bolts (2) and (4). Use corrosion preventive compound (item 62A, App F).



b. **Inspect (QA).**

c. **Install access fairings L510, R510, L530, and L540** (para 2.2)**.**

d. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.15. TAIL ROTOR GEARBOX INPUT COUPLING REMOVAL/INSTALLATION

6.15.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.15.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L530 and L540 removed

WARNING

FLIGHT SAFETY PART

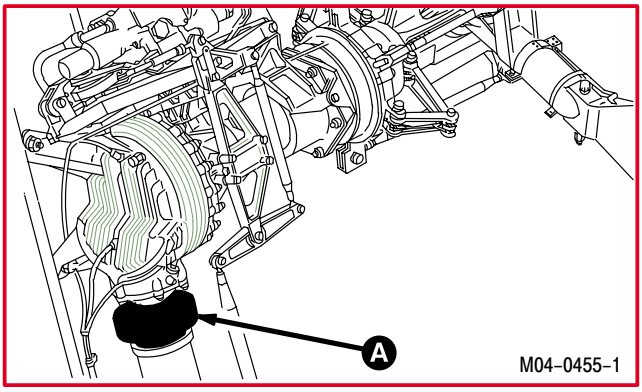
The tail rotor gearbox coupling is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

For purposes of identification and applicable to this task only, coupling flange with attached nutplates is considered coupling upper flange.

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6.15. TAIL ROTOR GEARBOX INPUT COUPLING REMOVAL/INSTALLATION – continued



6.15.3. Removal

CAUTION

To prevent damage to the tail rotor drive shaft, secure tail rotor before removing tail rotor gearbox input coupling.

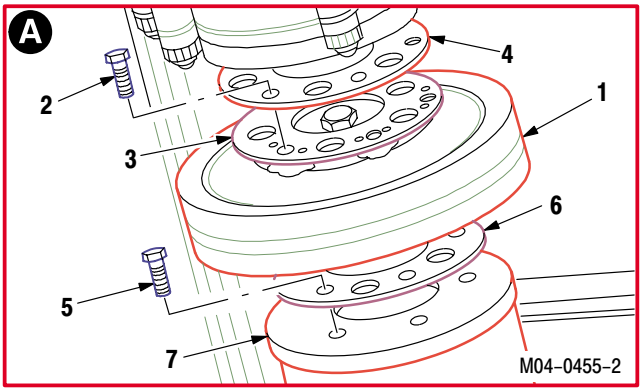
a. **Remove tail rotor gearbox input coupling (1).**

(1) Remove five bolts (2) attaching coupling (1) upper flange (3) to tail rotor gearbox input flange (4).

(2) Remove five bolts (5) attaching coupling (1) lower flange (6) to No. 6 tail rotor drive shaft (7).

(3) Push coupling (1) down on shaft (7).

(4) Remove coupling (1).

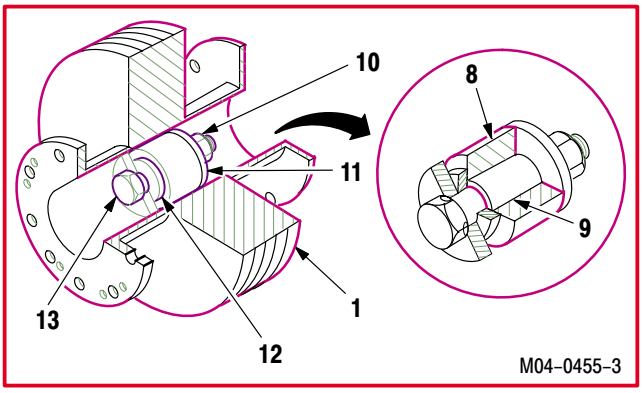


b. **Remove anti-flail bearing sleeves (8) and (9) from coupling (1).**

(1) Remove nut (10).

(2) Remove washer (11), sleeves (8) and (9), and washer (12) from bolt (13).

(3) Remove bolt (13) from coupling (1).



6.15.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

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6.15. TAIL ROTOR GEARBOX INPUT COUPLING REMOVAL/INSTALLATION – continued

6.15.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to the tail rotor gearbox input coupling, anti-flail bearing sleeves, tail rotor gearbox input flange, and upper end of No. 6 tail rotor drive shaft.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks and scratches** (para 6.1)**.**

d. **Check upper end of No. 6 tail rotor drive shaft for dents** (para 6.1)**.**

e. **Check tail rotor gearbox input coupling and tail rotor gearbox input flange for elongated bolt holes** (para 6.1)**.**

f. **Check tail rotor gearbox input coupling and upper end of No. 6 tail rotor drive shaft for loose or damaged nutplates** (para 6.1)**.**

6.15.6. Installation

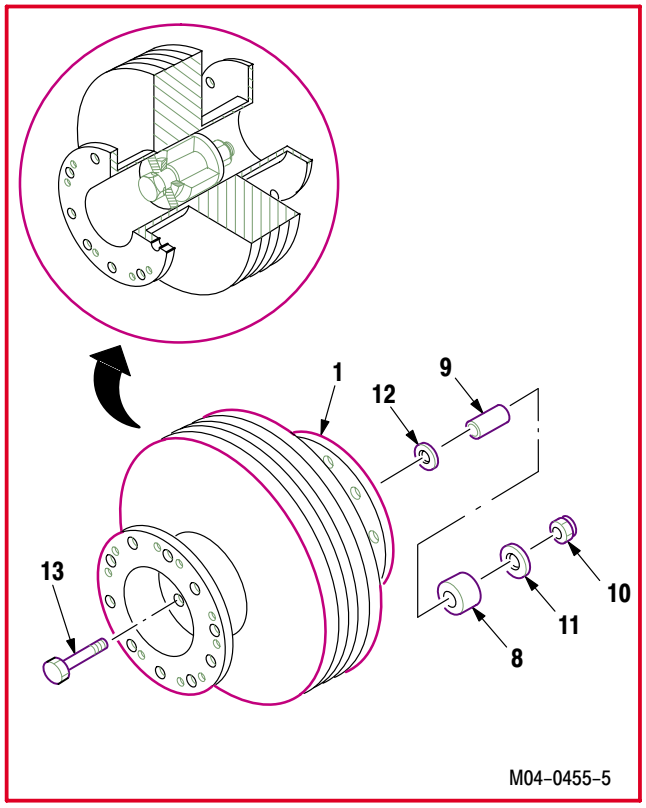
a. **Install sleeves (9) and (8) in coupling (1).** Torque nut (10) to **35 INCH-POUNDS**.

(1) Install bolt (13) in coupling (1).

(2) Install washer (12), sleeves (9) and (8), and washer (11) on bolt (13).

(3) Hand tighten nut (10) on bolt (13).

(4) Torque nut (10) to **35 INCH-POUNDS**. Use torque wrench.



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6.15. TAIL ROTOR GEARBOX INPUT COUPLING REMOVAL/INSTALLATION – continued



CAUTION

When installing tail rotor gearbox input coupling, ensure that bolts are installed through **0.250 INCH** bolt holes on the coupling lower flange and on the tail rotor gearbox input flange. Do not install bolts through any of **0.500 INCH** lightening holes. Installation of bolts through lightening holes will result in failure of drive shaft and/or coupling.

b. **Install coupling (1).** Torque bolts (2) and (5) to **125 INCH-POUNDS**.

(1) Push down on shaft (7).

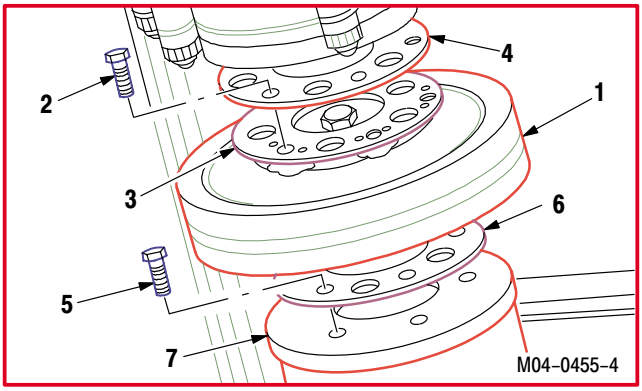
(2) Position coupling (1) between flange (4) and shaft (7) with upper flange (3) facing flange (4). Aline bolt holes.

(3) Install five bolts (5) through coupling (1) lower flange (6) and shaft (7).

(4) Install five bolts (2) through flange (4) and coupling (1) upper flange (3).

(5) Torque bolts (2) and (5) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(6) Apply corrosion preventive compound to bolts (2) and (5). Use corrosion preventive compound (item 62A, App F).



c. **Inspect (QA).**

d. **Install access fairings L530 and L540** (para 2.2)**.**

e. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION

6.16.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.16.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
1/4 x 3/8-inch drive box end torque wrench adapter (item 11, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Corrosion preventive compound (item 62A, App F)
Sealing compound primer (item 146, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
15.41	APU upper center and top panels removed

WARNING

FLIGHT SAFETY PART

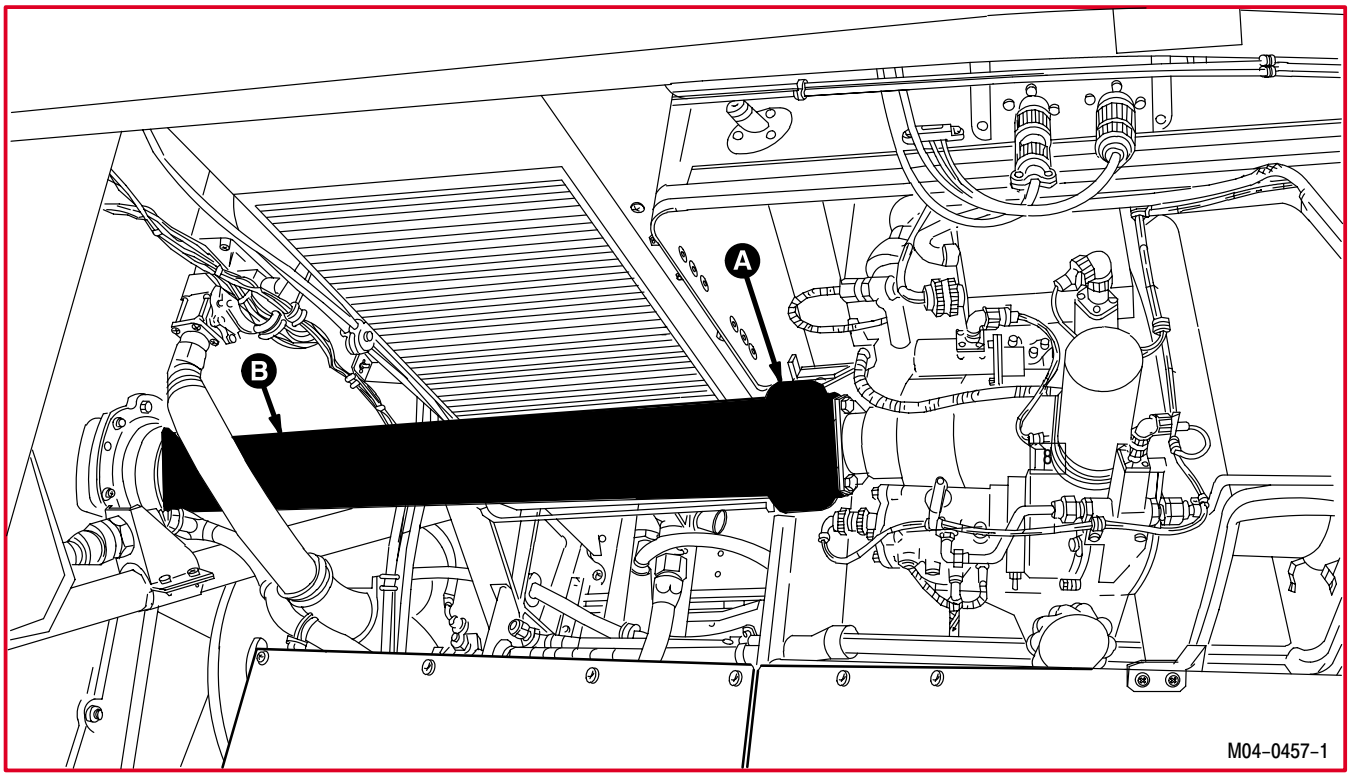
The No. 7 (APU) drive shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

- Exercise care and undertake protective measures when handling or performing any type of maintenance on drive shafts. All surface areas are critical. Accidental dents or scratches caused by improper handling may render part unserviceable.
- To prevent damage to drive shaft, ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

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6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued



GO TO NEXT PAGE

6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

6.16.3. Removal

a. **Remove anti-flail support (1) from engine mount (2).**

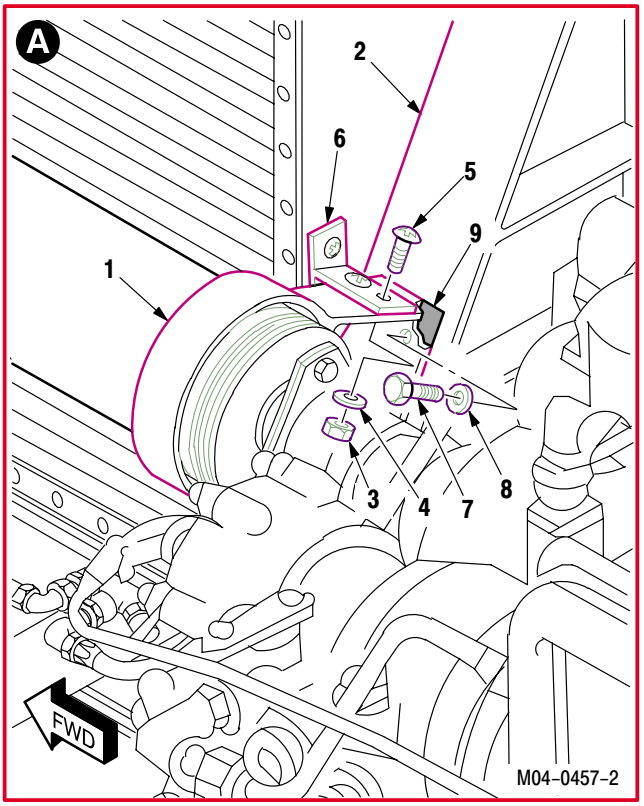
(1) Remove two nuts (3), washers (4), and screws (5) attaching support (1) to bracket (6).

(2) Remove four bolts (7) and washers (8) attaching support (1) to mount (2).

(3) Remove shim(s) (9) if installed.

CAUTION

Before removing No. 7 (APU) drive shaft, ensure that both ends of drive shaft are adequately supported. Do not allow either end of drive shaft to drop or hang down freely. Failure to support drive shaft may result in damage to drive shaft.



b. **Remove No. 7 (APU) drive shaft (10) with support (1) from deck (11).**

(1) Support both ends of shaft (10).

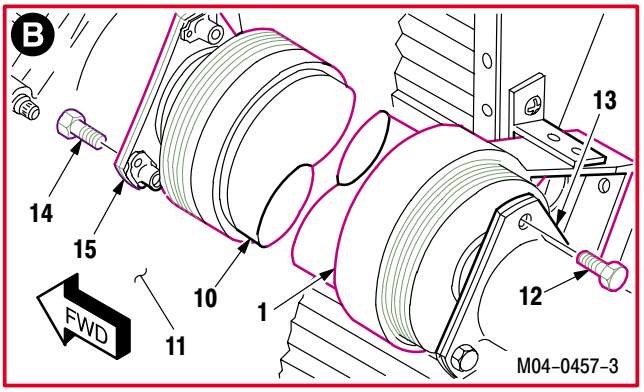
(2) Remove three bolts (12) attaching shaft (10) to APU output flange (13).

(3) Remove three bolts (14) attaching shaft (10) to main transmission input flange (15).

(4) Mark drive shaft if it is not to be replaced.

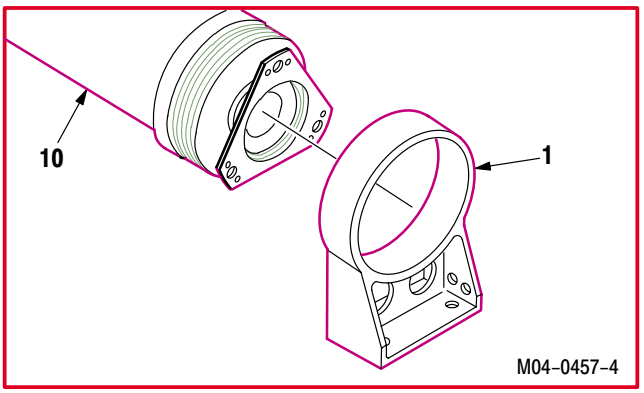
(5) Push shaft (10) forward.

(6) Remove shaft (10) with support (1) from deck (11).



c. **Remove support (1) from shaft (10).**

(1) Slide support (1) from end of shaft (10).



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6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

6.16.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.16.5. Inspection

NOTE

The following inspection procedures apply to the No. 7 (APU) drive shaft, anti-flail support, APU output flange, and main transmission APU input flange.

a. **Check for cracks** (para 6.1)**.**

b. **Check for corrosion** (para 1.49)**.**

c. **Check for interference between drive shaft and anti-flail support** (para 6.1)**.**

NOTE

The following inspection procedures apply to the No. 7 (APU) drive shaft, including drive shaft flanges, and diaphragms.

d. **Check for nicks, scratches, dents, and distortion** (para 6.1)**.**

e. **Check flanges for elongated bolt holes** (para 6.1)**.**

f. **Check for loose or damaged nutplates** (para 6.1)**.**

NOTE

The following inspection procedures apply to the APU output flange and main transmission APU input flange.

g. **Check for nicks and scratches** (para 6.1)**.**

h. **Check for elongated bolt holes** (para 6.1)**.**

i. **Check for erosion of aluminum bronze coating** (para 6.1)**.**

NOTE

The following inspection procedures apply to the anti-flail support.

j. **Check for nicks and scratches** (para 6.1)**.**

k. **Check for elongated bolt and screw holes** (para 6.1)**.**

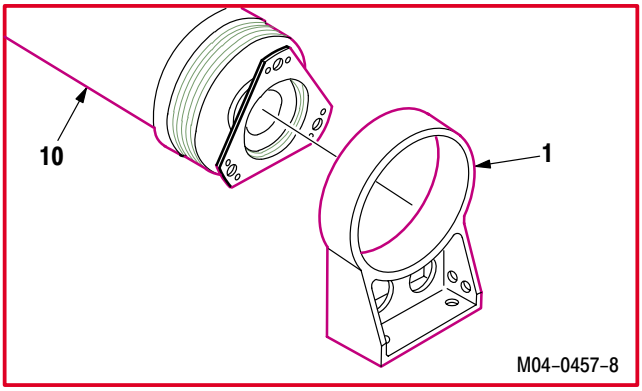
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6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

6.16.6. Installation

a. **Install support (1) on shaft (10).**

(1) Slide support (1) on shaft (10) with flat side facing forward.





b. **Install shaft (10) with support (1) on deck (11).** Torque bolts (12) and (14) to **125 INCH-POUNDS**.

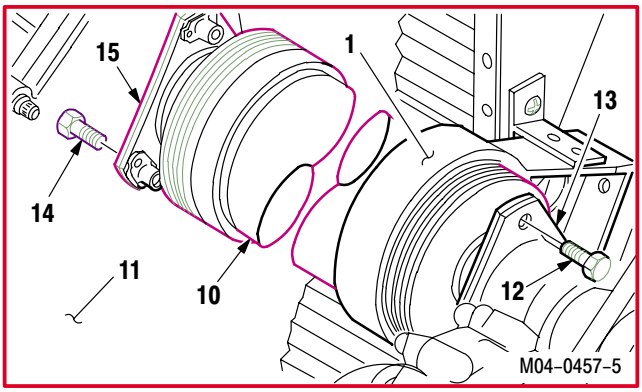
(1) Position shaft between flanges (13) and (15). Aline bolt holes.

(2) Install three bolts (14) through flange (15) and shaft (10) flange.

(3) Install three bolts (12) through flange (13) and shaft (10) flange.

(4) Torque bolts (12) and (14) to **125 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(5) Apply corrosion preventive compound to bolts (12) and (14). Use corrosion preventive compound (item 62A, App F).

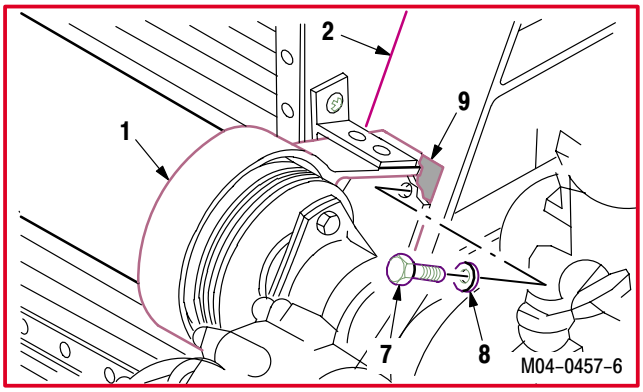


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6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued



c. **Install support (1) on engine mount (2).** Torque four bolts (7) to **20 INCH-POUNDS**.



(1) Apply a coat of primer to four bolts (7). Use sealing compound primer (item 146, App F).

(2) Position support (1) on engine mount (2). Aline bolt holes.

NOTE

Install shims between anti-flail support and engine mount only if originally removed.

(3) Install shim(s) (9) between support (1) and engine mount (2).

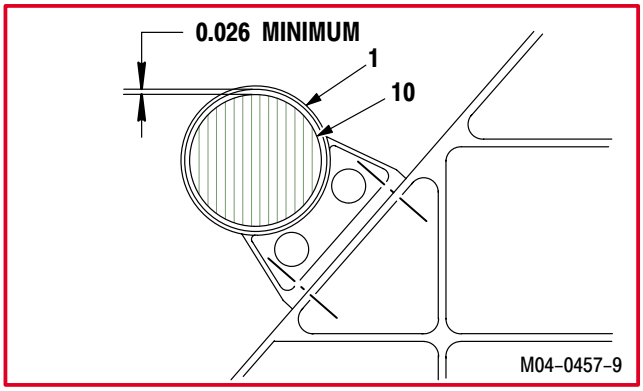
(4) Install four bolts (7) through washers (8), support (1), shims(s) (9) if installed, and engine mount (2).

(5) Torque four bolts (7) to **20 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

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6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

d. **Check clearance between support (1) and shaft (10) and adjust support (1) if necessary to achieve minimum clearance of 0.026 INCH.**



NOTE

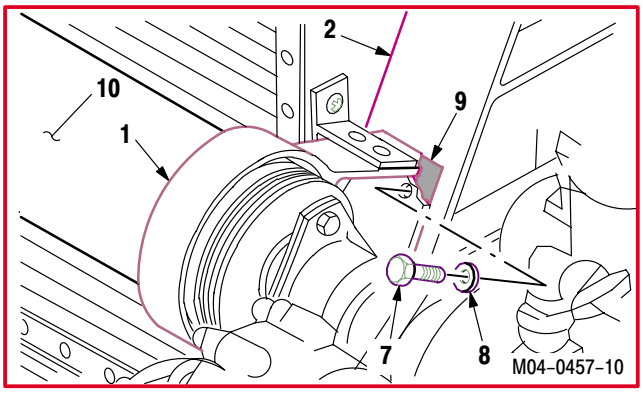
- Minimum clearance shall be measured between outside diameter of drive shaft and inside diameter of anti-flail support.
- Minimum clearance of **0.026 INCH** must exist completely around drive shaft.

(1) Insert gage between shaft (10) and support (1). Check that clearance of **0.026 INCH** or greater exists completely around shaft (10). Use gap setting gage.

NOTE

If minimum clearance of **0.026 INCH** between anti-flail support and drive shaft exists, skip step d.(2) and go to step e.

(2) Adjust support (1) to obtain clearance of **0.026 INCH** or greater completely around shaft (10).



(a) Remove bolts (7) and washers (8).

(b) Remove or add shim(s) (9) between support (1) and engine mount (2) until clearance of **0.026 INCH** or greater completely around shaft (10). Use gap setting gage.

(c) Install four bolts (7) and washers (8).

(d) Torque four bolts (7) to **20 INCH-POUNDS**. Use torque wrench adapter and torque wrench.

(e) Repeat step d.(1).

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6.16. NO. 7 (APU) DRIVE SHAFT AND ANTI-FLAIL SUPPORT REMOVAL/INSTALLATION – continued

e. **Install support (1) on bracket (6).**

(1) Install two screws (5) through bracket (6) and support (1).

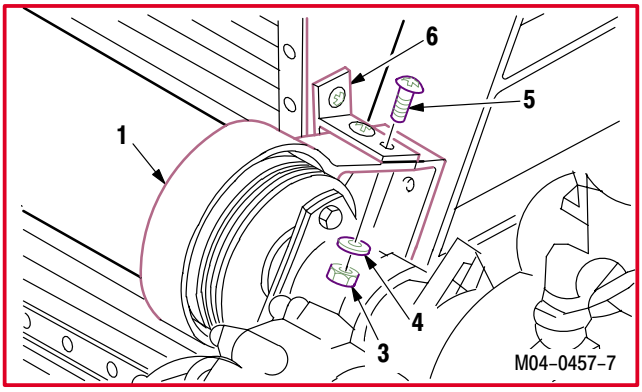
(2) Install two washers (4) and nuts (3) on screws (5).

f. **Inspect (QA).**

g. **Install APU upper center and top panels** (para 15.42)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

i. **Perform drive system vibration maintenance operational check only if drive shaft has been replaced** (TM 1-1520-238-T)**.**



END OF TASK

SECTION II. ENGINE NOSE GEARBOX MAINTENANCE

6.17. ENGINE NOSE GEARBOX INSPECTION

6.17.1. Description

This task covers: Inspection.

6.17.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Fluorescent inspection kit (item 138, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Brush (item 34, App F)
Methyl ethyl ketone (item 124, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-335-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

6.17.3. Inspection

a. **Check components for damage and loose mounting.**

b. **Check for loose, missing, or damaged mounting hardware.**

c. **Check differential pressure indicator.**

(1) If indicator button is extended, perform drive system dynamic maintenance operational check (TM 1-1520-238-T).

d. **Check lube oil leakage from gearbox housing or lube oil pump.**

(1) Remove gearbox shroud for access (para 2.123).

(2) Replace seal if leakage rate exceeds one drop per minute (para 6.37 and 6.38).

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6.17. ENGINE NOSE GEARBOX INSPECTION – continued



e. **Check gearbox and lube oil pump housings for cracks.** None allowed.

(1) Clean suspected areas. Use brush (item 34, App F) and methyl ethyl ketone (item 124, App F).

(2) Fluorescent penetrant inspect for fractures and/or cracks (TM 55-1500-335-23). Use fluorescent inspection kit.

f. **Check gearbox cooling fins for broken or damaged cooling fins.**

(1) 10 degree maximum allowable bend in fins.

(2) Damage to fins less than **0.250 INCH** or less deep, by blending. Use depth gage.

(3) Check for broken or cracked fins. None allowed.

g. **Check gearbox electrical components (low oil pressure switch, pressure transducer, temperature probe, and chip detector) for cracked, broken, or burned insulation.**

(1) Check for secure splices to gearbox harness.

h. **Check wiring for cracked, burned, or worn insulation.**

i. **Check wire bundles for chafing, loose mounting, and broken or missing wire ties.**

j. **Check gearbox input fan for cracks, broken blades, or deformation.** None allowed.

(1) Remove fan shroud for access.

k. **Check diffuser for cracks or deformation.** None allowed.

l. **Check gearbox for serviceability.**

(1) Check for fractures and/or cracks. None allowed. Use fluorescent inspection kit.

(2) Check for nicks, gouges, burrs, and corrosion.

(a) Repair damaged areas **0.060 INCH** or less deep, by blending. Use depth gage.

(b) Blended areas shall be **0.50 INCH** long maximum and at least **1 INCH** apart.

(c) Total repaired area shall be no more than 10 percent of housing surface area. 10 percent of total fix area may be missing.

(3) Check studs for fractures or cracks. None allowed.

(4) Check studs for crossed, flattened, or stripped threads. None allowed.

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6.17. ENGINE NOSE GEARBOX INSPECTION – continued

(5) Check for pulled or missing studs. None allowed.

(6) Check threaded inserts for looseness. None allowed.

(7) Check packing groove in filter bowl area for nicks, gouges, or burrs.

(a) Repair damaged areas **0.004 INCH** or less deep by blending. Use depth gage.

m. **Check gearbox mounting flanges for damage.**

(1) Maximum dent depth, **0.060 INCH**. Use depth gage.

(2) Scratches, nicks, gouges, and pits must be blended out (minimum blending radius of **0.400 INCH**), using largest blend radius practical.

(a) After blending, repaired surfaces must be inspected with a 10X lens to ensure that no cracks have been started in base material.

n. **Check quill shaft for serviceability.**

(1) Check for corrosion, scratches, nicks, gouges, and burrs.

(a) Damage not to exceed **0.020 INCH**. Repair by blending. Use depth gage.

(2) Check for damage in packing grooves (four places). None allowed.

(3) Measure spline teeth wear by traversing a dial indicator over wear step. Use depth gage.

(a) Acceptable wear step is **0.030 INCH** maximum.

(b) Check surface radii for damage. None allowed.

o. **Check output shaft for serviceability.**

(1) Check crossed, flattened, or stripped threads. None allowed.

(2) Check for external spline wear.

(a) Measure spline teeth wear by traversing a dial indicator over wear step. Use depth gage.

(b) Acceptable wear step is **0.030 INCH** maximum.

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6.17. ENGINE NOSE GEARBOX INSPECTION – continued

p. **Check oil filter element.**

NOTE

Use permanent magnet to separate steel particles.

(1) Check oil filter element and filter bowl for metal chips, flakes, splinters, granular steel, or other contamination.

(a) **REPLACE GEARBOX** if granular steel is present (looks like sand).

(2) Check oil filter element and filter bowl for steel splinters or flakes greater than **1/16 to 3/16 INCH**.

(a) **REPLACE GEARBOX** if present.

(3) Check oil filter element and filter bowl for 20 or more steel particles or flakes **1/16 to 3/16 INCH**.

(a) **REPLACE GEARBOX** if present.

END OF TASK

6.18. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION

6.18.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.18.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Materials/Parts:

Packing (2)
Assembly fluid (item 30, App F)
Brush (item 34, App F)
Sealing compound (item 175, App F)
Wire (item 226, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

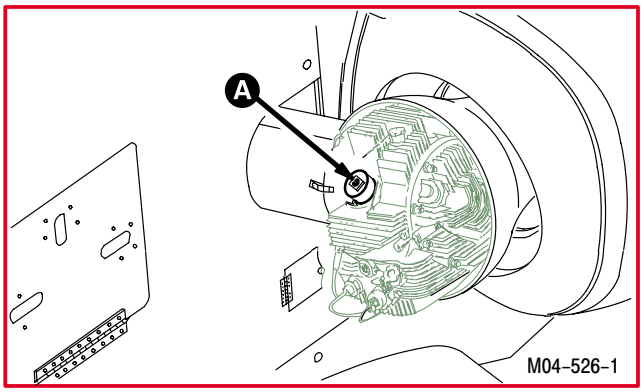
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox oil filter bowl, strainer element, and differential pressure switch.



GO TO NEXT PAGE

6.18. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION – continued

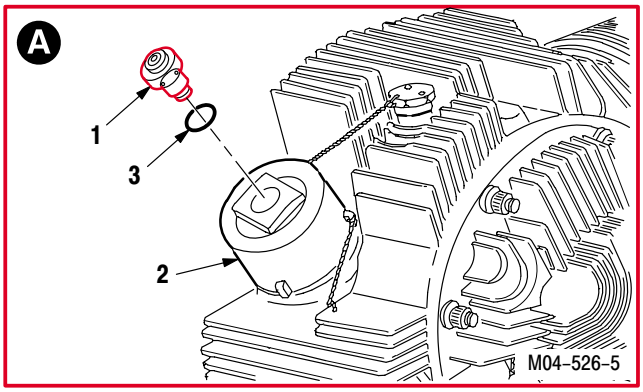
6.18.3. Removal

a. **Remove pressure switch (1) from filter bowl (2).**

(1) Remove lockwire from switch (1).

(2) Remove switch (1) from bowl (2).

(3) Remove and discard packing (3) from switch (1).



b. **Remove bowl (2) from gearbox housing (4).**

(1) Remove lockwire from bowl (2).

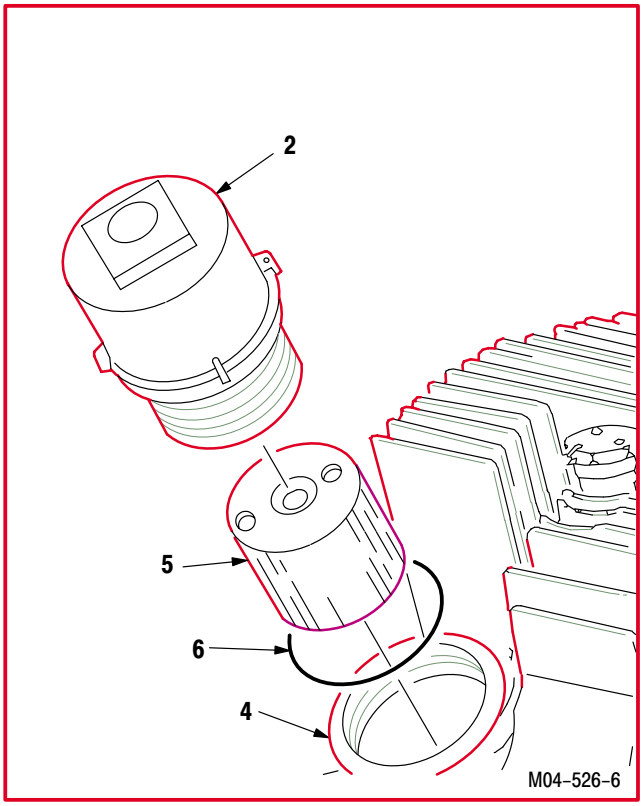
(2) Remove bowl (2) from housing (4). Use crowfoot.

c. **Remove strainer element (5) and packing (6) from housing (4).**

(1) Remove and discard packing (6).

(2) Remove and inspect element (5) (para 6.17).

(3) Discard element (5).



6.18.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

GO TO NEXT PAGE

6.18. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION – continued

6.18.5. Inspection

a. **Check pressure switch and bowl for cracks.** None allowed.

b. **Check pressure switch and bowl for corrosion** (para 1.49)**.**

c. **Check bowl for nicks, gouges, and burrs.**

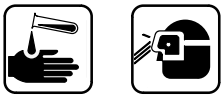
(1) Repair damage **0.030 INCH** or less deep by blending. Use depth gage.

d. **Examine orifices inside bowl for obstructions or foreign matter.**

(1) If obstructions or foreign matter cannot be removed by cleaning, replace bowl.

e. **Check pressure switch, bowl, and gearbox housing for stripped, crossed, or flattened threads.** None allowed.

6.18.6. Installation



a. **Install new packing (6) in housing (4).**

(1) Lubricate packing (6). Use assembly fluid (item 30, App F).

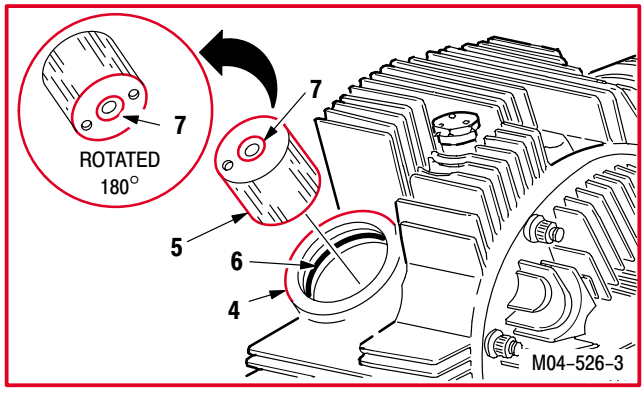
(2) Install packing (6) in housing (4).

b. **Install new element (5) in housing (4).**

(1) Lubricate two new packings (7). Use assembly fluid (item 30, App F).

(2) Install two packings (7) on element (5).

(3) Install element (5) in housing (4).



GO TO NEXT PAGE

6.18. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION – continued

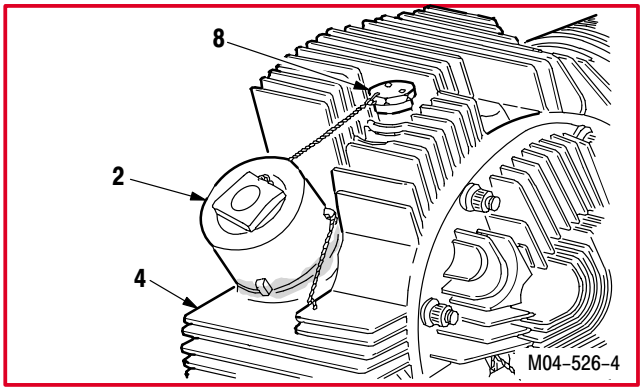
c. **Install bowl (2) on housing (4).** Torque bowl (2) to **85 INCH-POUNDS**.

(1) Install bowl (2) on housing (4).

(2) Torque bowl (2) to **85 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Lockwire bowl (2) to breather (8) and fin of housing (4). Use wire (item 226, App F).





d. **Apply sealant around mating surface of bowl (2) and housing (4).** Use brush (item 34, App F) and sealing compound (item 175, App F).

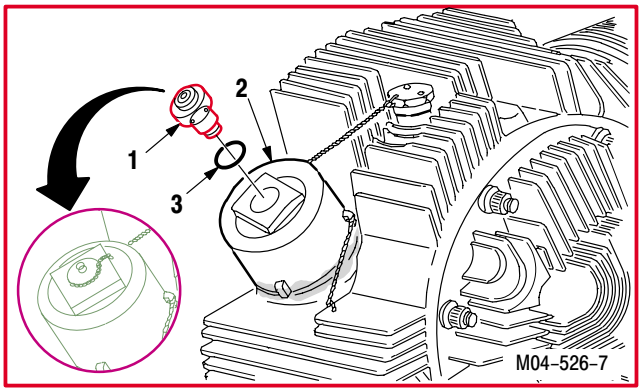
e. **Install switch (1) on bowl (2).**

(1) Lubricate new packing (3). Use assembly fluid (item 30, App F).

(2) Install packing (3) on switch (1).

(3) Install switch (1) on bowl (2).

(4) Lockwire switch (1) to bowl (2). Use wire (item 226, App F).



f. **Inspect (QA).**

g. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

h. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.19. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER, RINGED TYPE) REMOVAL/INSTALLATION

6.19.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.19.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Retaining ring pliers (item 227, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Materials/Parts:

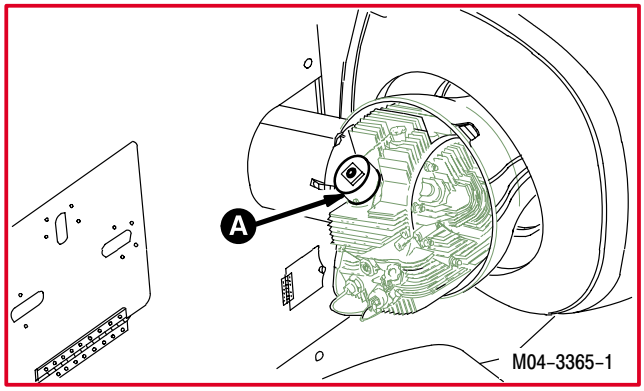
Packing (2)
Packing retainer
Assembly fluid (item 30, App F)
Brush (item 34, App F)
Sealing compound (item 175, App F)
Wire (item 226, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox oil filter bowl, strainer element, and differential pressure switch.



GO TO NEXT PAGE

6.19. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER, RINGED TYPE) REMOVAL/INSTALLATION – continued

6.19.3. Removal

a. **Remove filter bowl (1) from gearbox housing (2).**

(1) Remove lockwire from bowl (1).

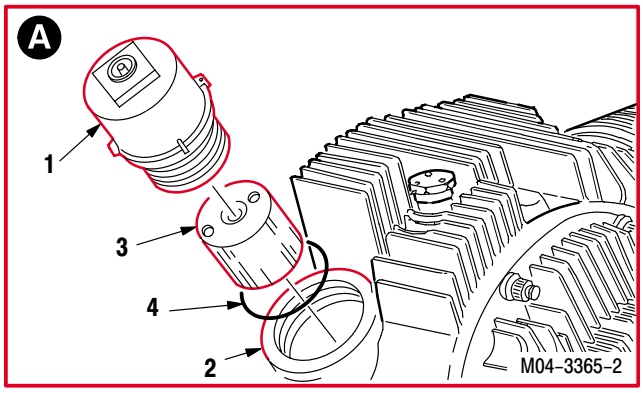
(2) Remove bowl (1) from housing (2). Use crowfoot.

b. **Remove strainer element (3) and packing (4) from housing (2).**

(1) Remove and discard packing (4).

(2) Remove and inspect element (3) (para 6.17).

(3) Discard element (3).



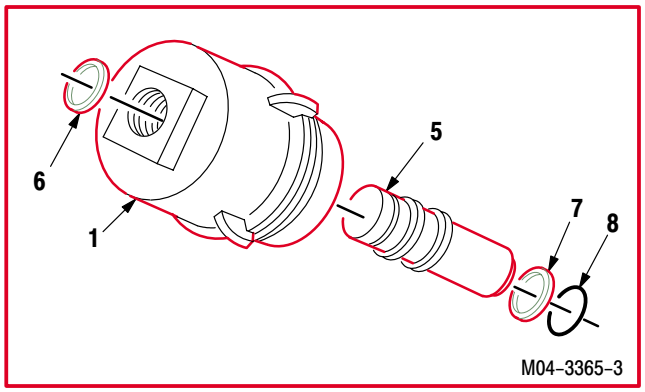
c. **Remove pressure switch (5) from bowl (1).**

(1) Remove spirolox (6) from switch (5). Use retaining ring pliers.

(2) Remove switch (5) from bowl (1).

(3) Remove switch (5), packing retainer (7), and packing (8).

(4) Remove and discard packing retainer (7) and packing (8).



6.19.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.19.5. Inspection

a. **Check pressure switch and bowl for cracks.** None allowed.

b. **Check pressure switch and bowl for corrosion** (para 1.49)**.**

c. **Check bowl for nicks, gouges, and burrs.**

(1) Repair damage **0.030 INCH** or less deep by blending. Use depth gage.

GO TO NEXT PAGE

6.19. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER, RINGED TYPE) REMOVAL/INSTALLATION – continued

d. **Examine orifices inside bowl for obstructions or foreign matter.**

(1) If obstructions or foreign matter cannot be removed by cleaning, replace bowl.

e. **Check pressure switch, bowl, and gearbox housing for stripped, crossed, or flattened threads.** None allowed.

6.19.6. Installation



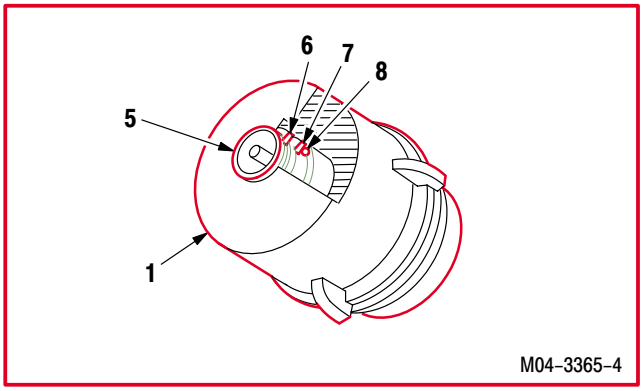
a. **Install switch (5) in bowl (1).**

(1) Lubricate new packing retainer (7), new packing (8), and mating surface of bowl (1). Use assembly fluid (item 30, App F).

(2) Install packing retainer (7) and packing (8) on switch (5).

(3) Install switch (5) in bowl (1).

(4) Install spirolox (6) on switch (5). Use retaining ring pliers.



b. **Install new packing (4) in housing (2).**

(1) Lubricate packing (4). Use assembly fluid (item 30, App F).

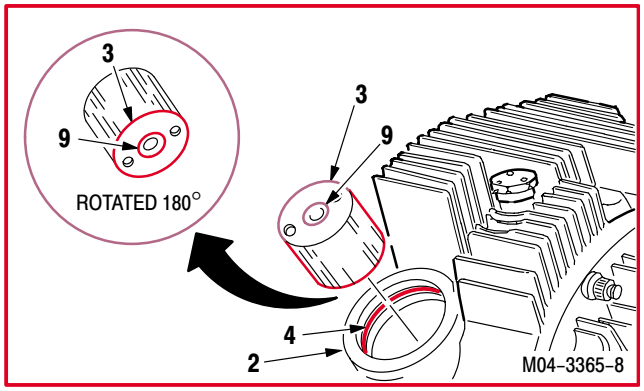
(2) Install packing (4) in housing (2).

c. **Install new element (3) in housing (2).**

(1) Lubricate two packings (9). Use assembly fluid (item 30, App F).

(2) Install two packings (9) on element (3).

(3) Install element (3) in housing (2).



GO TO NEXT PAGE

6.19. ENGINE NOSE GEARBOX OIL FILTER BOWL, STRAINER ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER, RINGED TYPE) REMOVAL/INSTALLATION – continued

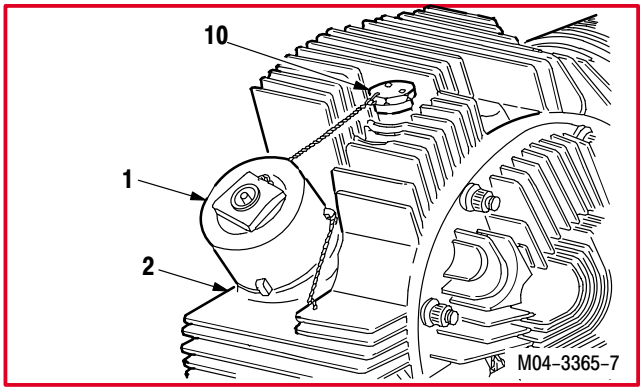
d. **Install bowl (1) on housing (2).** Torque bowl (1) to **85 INCH-POUNDS**.

(1) Install bowl (1) on housing (2).

(2) Torque bowl (1) to **85 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Lockwire bowl (1) to breather (10) and fin of housing (2). Use wire (item 226, App F).





e. **Apply sealant around mating surface of bowl (1) and housing (2).** Use brush (item 34, App F) and sealing compound (item 175, App F).

f. **Inspect (QA).**

g. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

h. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.20. ENGINE NOSE GEARBOX OIL FILTER SAFETY RELIEF VALVE REPLACEMENT

6.20.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.20.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

Packing
Assembly fluid (item 30, App F)

Personnel Required:

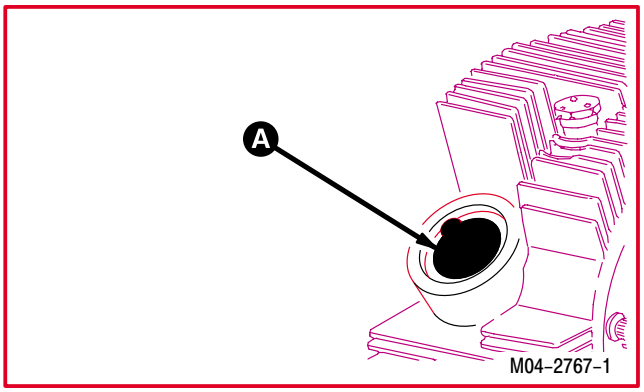
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed
6.18	Engine nose gearbox oil filter bowl, strainer element, and differential pressure switch (lockwired type) removed
	or
6.19	Engine nose gearbox oil filter bowl, strainer element, and differential pressure switch (retainer ringed type) removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox oil filter safety relief valve.



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6.20. ENGINE NOSE GEARBOX OIL FILTER SAFETY RELIEF VALVE REPLACEMENT – continued

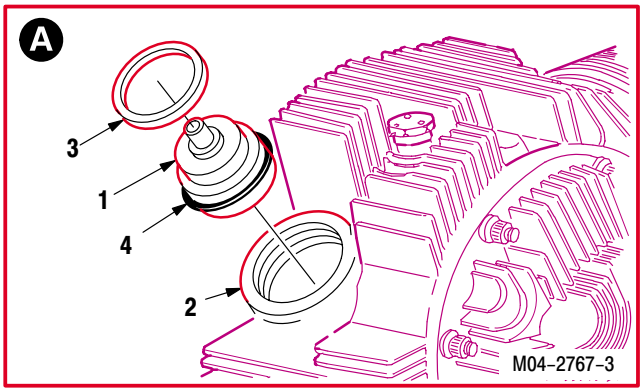
6.20.3. Removal

a. **Remove oil filter safety relief valve (1) from engine nose gearbox (2).**

(1) Remove retaining ring (3) from gearbox (2).

(2) Remove relief valve (1) from gearbox (2).

(3) Discard relief valve (1) and packing (4).



6.20.4. Cleaning

a. **Clean relief valve mounting area on engine nose gearbox** (para 1.47)**.**

6.20.5. Inspection

a. **Check relief valve mounting area for cracks.** None allowed.

b. **Check relief valve mounting area for crossed, flattened, or stripped threads.** None allowed.

c. **Check relief valve mounting area for nicks, gouges, and burrs** (para 6.17)**.**

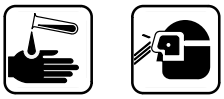
d. **Check relief valve mounting area for erosion of surface finish and corrosion** (para 1.49)**.**

e. **Check retaining ring for cracks, bends, distortion, corrosion, and excessive wear.** None allowed.

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6.20. ENGINE NOSE GEARBOX OIL FILTER SAFETY RELIEF VALVE REPLACEMENT – continued

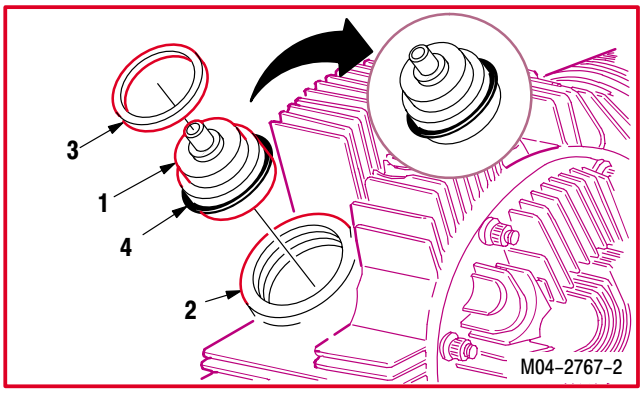
6.20.6. Installation



a. **Install new relief valve (1) in gearbox (2).**

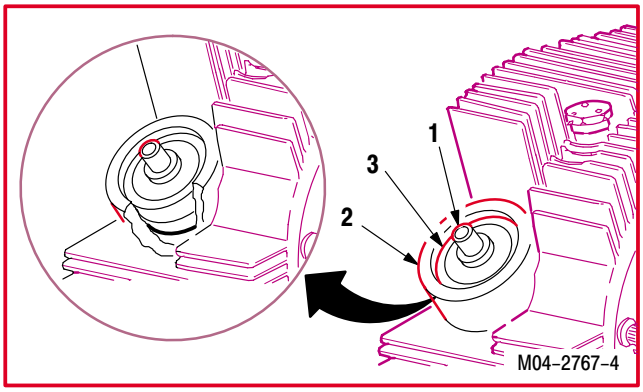
(1) Lubricate new packing (4). Use assembly fluid (item 30, App F).

(2) Install packing (4) on relief valve (1).



(3) Position relief valve (1) in gearbox (2).

(4) Install retaining ring (3).



b. **Inspect (QA).**

c. **Install engine nose gearbox oil filter bowl, strainer element, and differential pressure switch** (para 6.18 or 6.19)**.**

d. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

END OF TASK

6.21. ENGINE NOSE GEARBOX LOW OIL PRESSURE SWITCH REMOVAL/INSTALLATION

6.21.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.21.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
3/8 x 1/4-inch drive socket wrench adapter (item 7, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 97, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

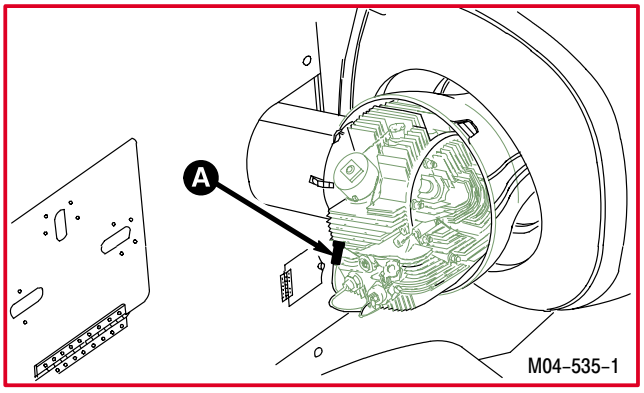
TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox low oil pressure switch.



6.21.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

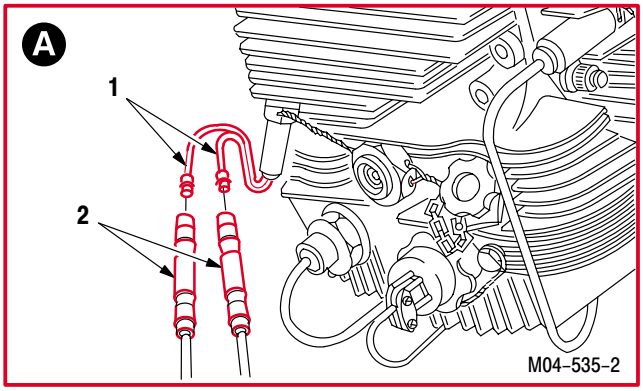
c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open EMER BATT CAUT circuit breaker.**

GO TO NEXT PAGE

6.21. ENGINE NOSE GEARBOX LOW OIL PRESSURE SWITCH REMOVAL/INSTALLATION – continued

e. **Identify and depin electrical wires (1) from splice S25/S26 SP1 and SP2 (2)** (TM 55-1500-323-24)**.**

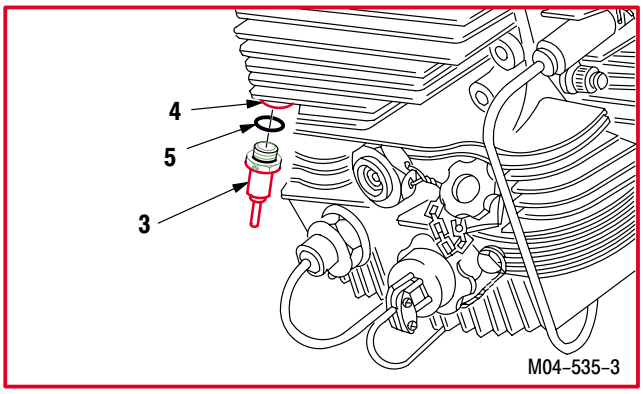


f. **Remove gearbox low oil pressure switch (3).**

(1) Remove lockwire from switch (3).

(2) Remove switch (3) from gearbox (4).

(3) Remove and discard packing (5).



6.21.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.21.5. Inspection

a. **Check boss of gearbox for gouges or stripped threads.** None allowed.

b. **Check boss of gearbox for corrosion** (para 1.49)**.**

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6.21. ENGINE NOSE GEARBOX LOW OIL PRESSURE SWITCH REMOVAL/INSTALLATION – continued

6.21.6. Installation



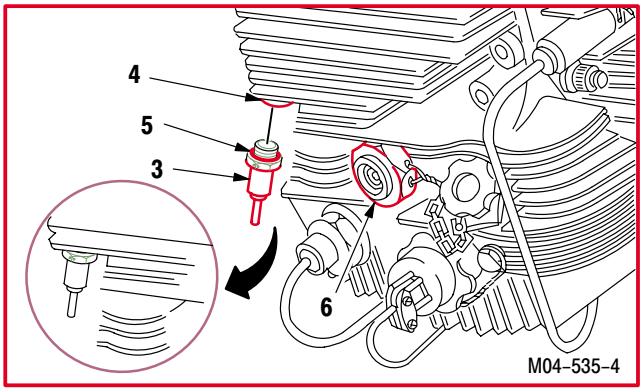
a. **Install switch (3) on gearbox (4).** Torque switch (3) to **30 INCH-POUNDS**.

(1) Lubricate new packing (5). Use petrolatum (item 138, App F).

(2) Install packing (5) on switch (3).

(3) Torque switch (3) to **30 INCH-POUNDS**. Use crowfoot and torque wrench.

(4) Lockwire switch (3) to sight plug (6). Use wire (item 226, App F).



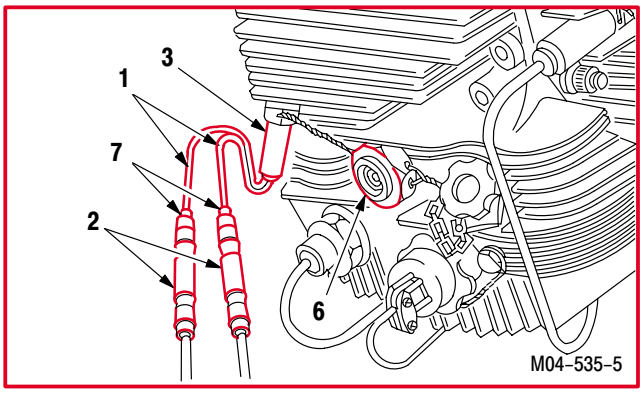
b. **Install contacts (7) (if necessary) on switch wires (1)** (TM 55-1500-323-24)**.**

(1) Cut wires (1) to proper length.

(2) Install contacts (7) on wires (1).

NOTE

Pin red lead to SP1 and white lead to SP2.



c. **Pin identified wires (1) in splice S25/S26 SP1 and SP2 (2)** (TM 55-1500-323-24)**.**

d. **Inspect (QA).**

e. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

f. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.22. ENGINE NOSE GEARBOX SIGHT INDICATOR REMOVAL/INSTALLATION

6.22.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.22.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

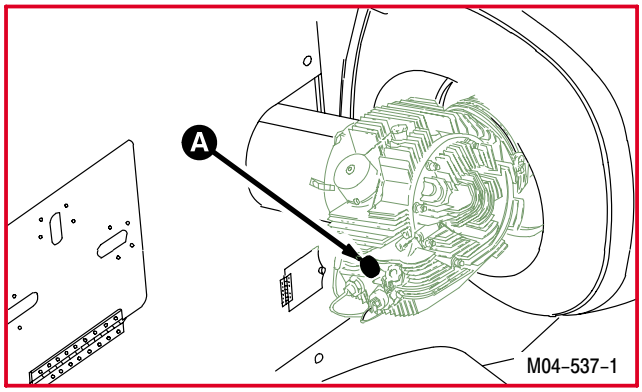
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed
1.27	Engine nose gearbox oil sump drained

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox sight indicator.



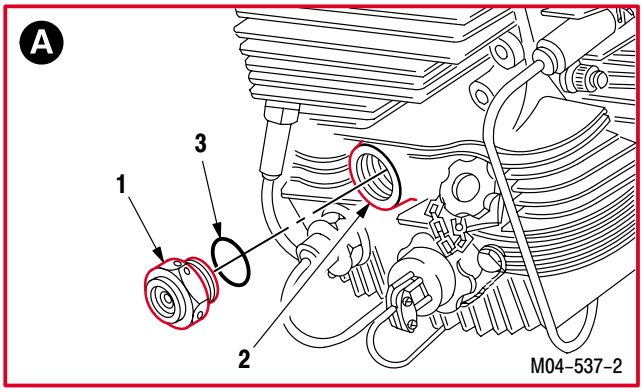
6.22.3. Removal

a. **Remove gearbox sight indicator (1) from gearbox (2).**

(1) Remove lockwire from indicator (1).

(2) Remove indicator (1) from gearbox (2).

(3) Remove and discard packing (3).



GO TO NEXT PAGE

6.22. ENGINE NOSE GEARBOX SIGHT INDICATOR REMOVAL/INSTALLATION – continued

6.22.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.22.5. Inspection

a. **Check gearbox for stripped threads.** None allowed.

b. **Replace gearbox sight indicator for glazed, cracked, or discolored lens.** None allowed.

c. **Check for crossed, flattened, or stripped threads.** None allowed.

d. **Check for nicks, gouges, burrs, and corrosion** (para 1.49)**.**

(1) Repair all damage **0.030 INCH** or less deep by blending.

6.22.6. Installation



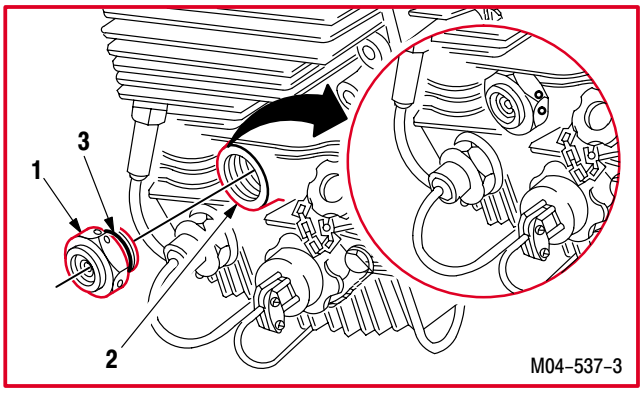
a. **Install indicator (1) on gearbox (2).**

(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on indicator (1).

(3) Install indicator (1) on gearbox (2).

(4) Torque indicator (1) to **40 INCH-POUNDS**. Use torque wrench.



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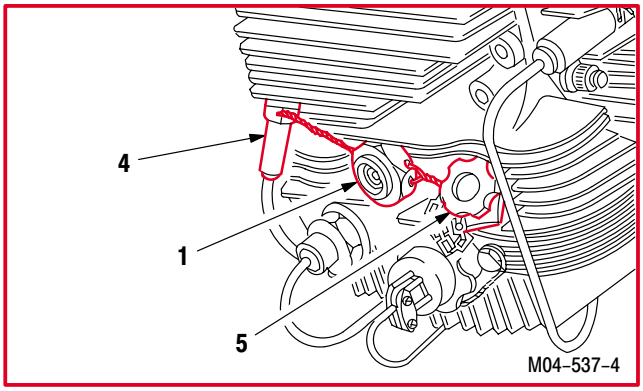
6.22. ENGINE NOSE GEARBOX SIGHT INDICATOR REMOVAL/INSTALLATION – continued

(5) Lockwire indicator (1) to pressure switch (4) and indicator (5). Use wire (item 226, App F).

b. **Inspect (QA).**

c. **Service engine nose gearbox** (para 1.28)**.**

d. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**



END OF TASK

6.23. ENGINE NOSE GEARBOX FILLER CAP REMOVAL/INSTALLATION

6.23.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.23.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 3/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 94, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

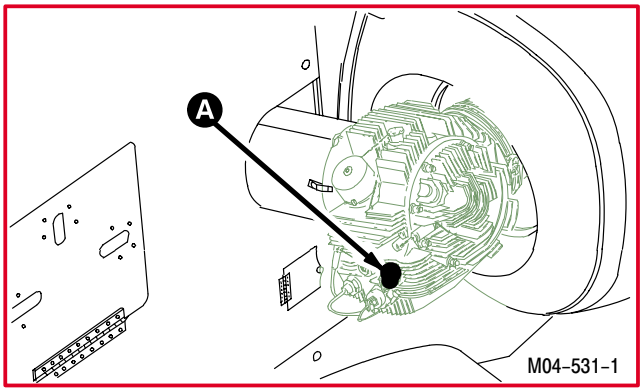
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox filler cap.



GO TO NEXT PAGE

6.23. ENGINE NOSE GEARBOX FILLER CAP REMOVAL/INSTALLATION – continued

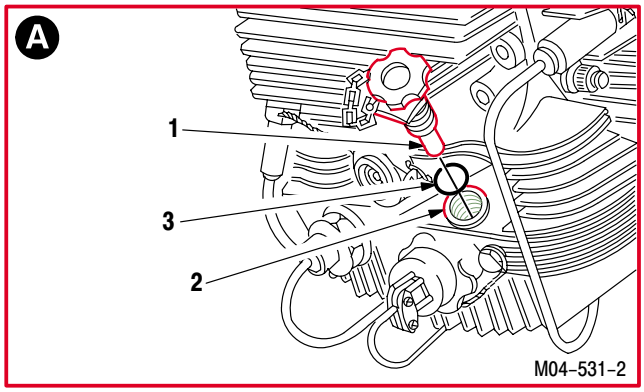
6.23.3. Removal

a. **Remove gearbox filler cap (1) from gearbox (2).**

(1) Remove lockwire from cap (1).

(2) Remove cap (1) from gearbox (2).

(3) Remove and discard packing (3).



6.23.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.23.5. Inspection

a. **Check for nicks, gouges, burrs, and corrosion** (para 6.17)**.**

(1) Repair damaged area **0.030 INCH** or less deep by blending.

b. **Check for cracks.** None allowed.

c. **Check for clogged or damaged screen.**

(1) No rips, tears, or holes allowed.

d. **Check lanyard.** Must not be frayed or broken.

e. **Check for crossed, flattened, or stripped threads.** None allowed.

f. **Check packing grooves for damage.** None allowed.

GO TO NEXT PAGE

6.23. ENGINE NOSE GEARBOX FILLER CAP REMOVAL/INSTALLATION – continued

6.23.6. Installation



a. **Install cap (1) in gearbox (2).** Torque cap (1) to **175 INCH-POUNDS**.

(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on cap (1).

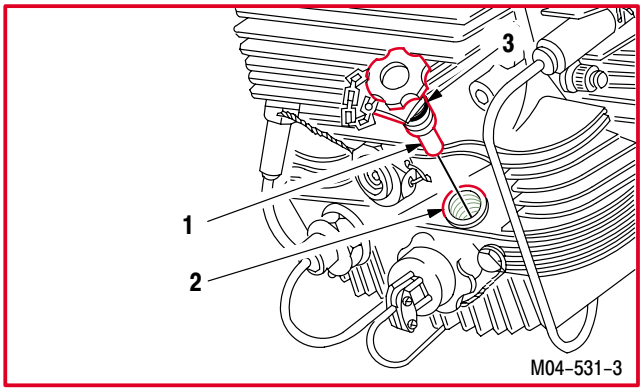
(3) Install cap (1) in gearbox (2).

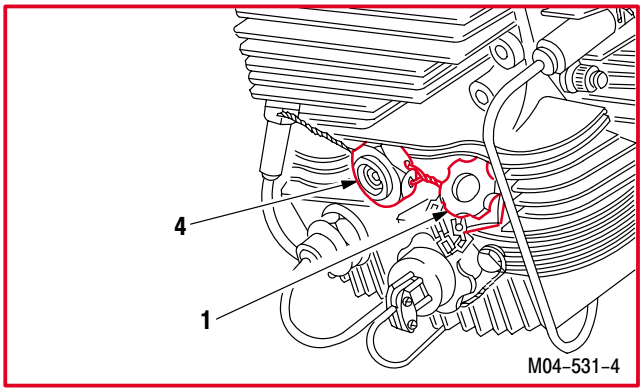
(4) Torque cap (1) to **175 INCH-POUNDS**. Use crowfoot and torque wrench.

(5) Lockwire cap (1) to indicator (4). Use wire (item 226, App F).

b. **Inspect (QA).**

c. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**





END OF TASK

6.24. ENGINE NOSE GEARBOX BREATHER REPLACEMENT

6.24.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.24.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
1/2 x 3/8-inch drive socket wrench adapter (item 3, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 x 1/2-inch drive deep socket wrench socket (item 293, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

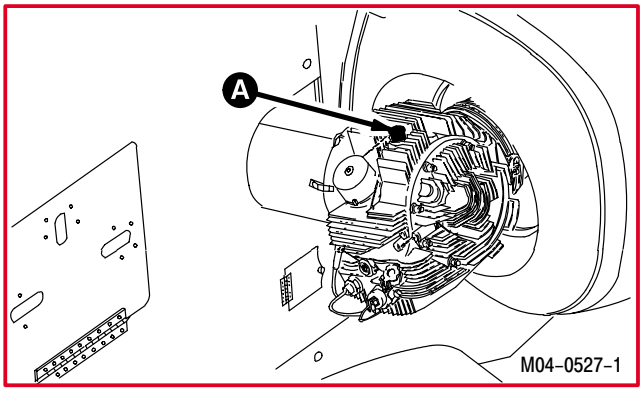
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox breather.



GO TO NEXT PAGE

6.24. ENGINE NOSE GEARBOX BREATHER REPLACEMENT – continued

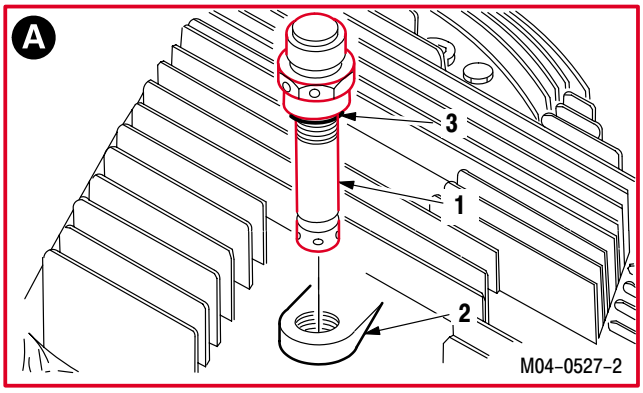
6.24.3. Removal

a. **Remove breather (1) from engine nose gearbox (2).**

(1) Remove lockwire from breather (1).

(2) Remove breather (1) from gearbox (2). Use socket.

(3) Discard breather (1) and packing (3).



6.24.4. Cleaning

a. **Clean breather mounting area on engine nose gearbox housing** (para 1.47)**.**

6.24.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to the breather mounting area on the engine nose gearbox housing.

a. **Check for cracks.** None allowed.

b. **Check scratches, nicks, gouges, and burrs** (para 6.17)**.**

c. **Check for broken or damaged cooling fins** (para 6.17)**.**

d. **Check stripped, crossed, or flattened threads.** None allowed.

e. **Check for corrosion and erosion of surface finish** (para 1.49)**.**

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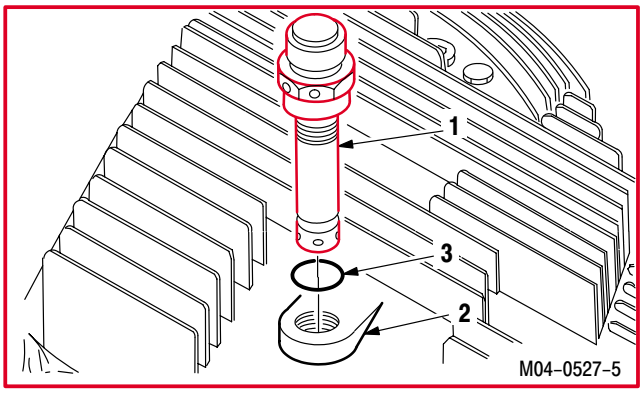
6.24. ENGINE NOSE GEARBOX BREATHER REPLACEMENT – continued

6.24.6. Installation



a. **Install new breather (1) in gearbox (2).** Torque breather (1) to **175 INCH-POUNDS**.

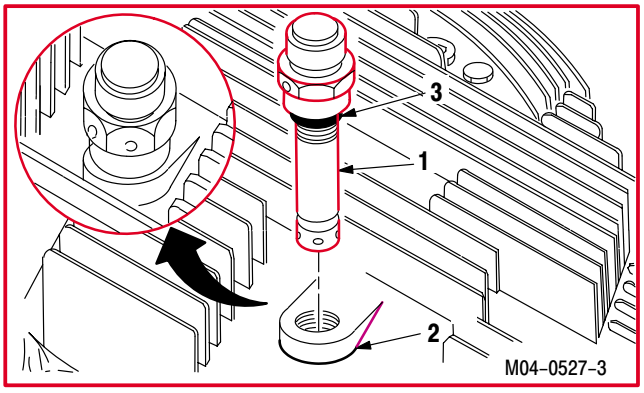
(1) Lubricate new packing (3). Use petrolatum (item 138, App F).



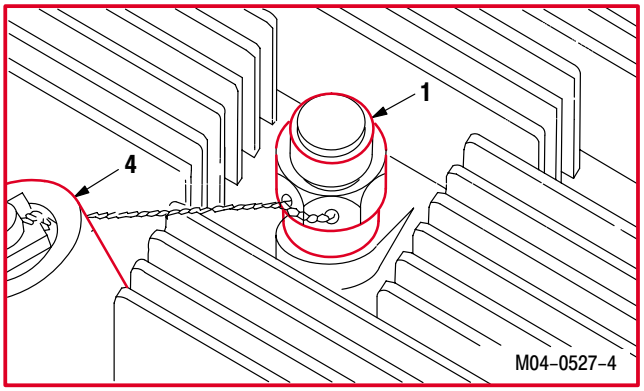
(2) Install packing (3) on breather (1).

(3) Install breather (1) in gearbox (2).

(4) Torque breather (1) to **175 INCH-POUNDS**. Use torque wrench, adapter, and socket.



(5) Lockwire breather (1) to engine nose gearbox oil filter bowl (4). Use wire (item 226, App F).



b. **Inspect (QA).**

c. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

END OF TASK

6.25. ENGINE NOSE GEARBOX METALLIC CHIP DETECTOR INSPECTION

6.25.1. Description

This task covers: Inspection.

6.25.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Brush (item 34, App F)
Dry cleaning solvent (item 74, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

6.25.3. Inspection

a. **Check chip detector magnetic plug for metal chips, granular steel, metal flakes, or splinters.**

(1) If no metal chips, flakes, or splinters are present, continue flight operations.

(2) **REPLACE GEARBOX** if granular steel is present (looks like sand).

(3) **REPLACE GEARBOX** if steel splinters or flakes greater than **1/16 (0.062) by 3/16 (0.187) INCH** are present. Go to step a(4) if splinters or flakes are smaller.

(4) **REPLACE GEARBOX** if more than 10 **1/16 (0.062) by 1/16 (0.062) INCH** steel flakes or particles are present. Go to step b if flakes or particles are smaller or fewer.



b. **Clean chip detector probe.** Use brush (item 34, App F) and dry cleaning solvent (item 74, App F).

c. **Reinstall chip detector and perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

GO TO NEXT PAGE

6.25. ENGINE NOSE GEARBOX METALLIC CHIP DETECTOR INSPECTION – continued

d. **Check chip detector magnetic plug for metal chips, granular steel, metal flakes, or splinters.**

(1) If no metal chips, flakes, or splinters are present, continue flight operations.

(2) **REPLACE GEARBOX** if granular steel is present (looks like sand).

(3) **REPLACE GEARBOX** if steel splinters or flakes greater than **1/16 (0.062) by 3/16 (0.187) INCH** are present. Go to step d(4) if splinters or flakes are smaller.

(4) **REPLACE GEARBOX** if more than 10 **1/16 (0.062) by 1/16 (0.062) INCH** steel flakes or particles are present. Go to step e if flakes or particles are smaller or fewer.

e. **If metal chips, flakes, or splinters are still present on chip detector probe:**

(1) Clean chip detector probe area. Use brush (item 34, App F) and dry cleaning solvent (item 74, App F).

(2) Drain system (para 1.26).

(3) Replace filter (para 6.18) or (para 6.19).

(4) Install chip detector (para 6.26).

(5) Service system (para 1.26).

(6) Perform drive system dynamic maintenance operational check (TM 1-1520-238-T).

(7) Go to step d.

f. **REPEAT INSPECTION steps a thru e if caution light goes on again (second time).**

g. **REPEAT INSPECTION steps a thru e if caution light goes on again (third time).**

h. **REPLACE GEARBOX if caution light goes on again (fourth time).**

END OF TASK

6.26. ENGINE NOSE GEARBOX METALLIC CHIP DETECTOR REMOVAL/INSTALLATION

6.26.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.26.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing (2)
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

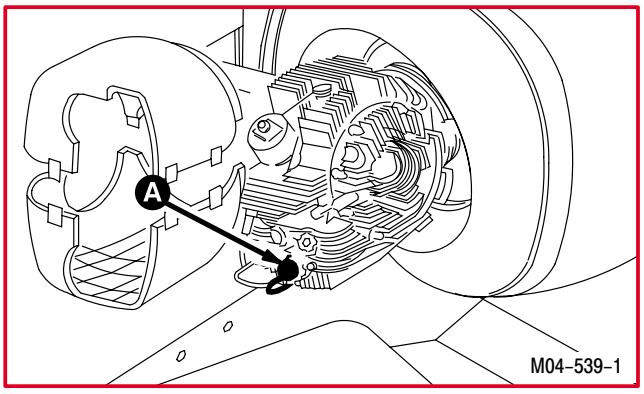
TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.27	Engine nose gearbox oil sump drained
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox metallic chip detector.



6.26.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open EMER BATT CAUT circuit breaker.**

GO TO NEXT PAGE

6.26. ENGINE NOSE GEARBOX METALLIC CHIP DETECTOR REMOVAL/INSTALLATION – continued

e. **Remove metallic chip detector (1) from gearbox housing (2).**

(1) Remove detector (3) from base (4).

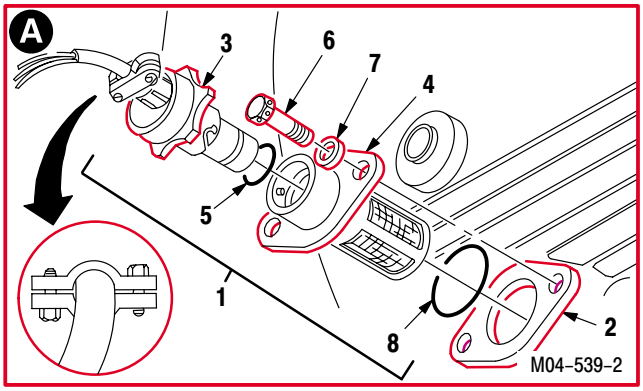
(2) Discard packing (5).

(3) Remove lockwire from two bolts (6).

(4) Remove two bolts (6) and washers (7).

(5) Remove base (4) from gearbox (2).

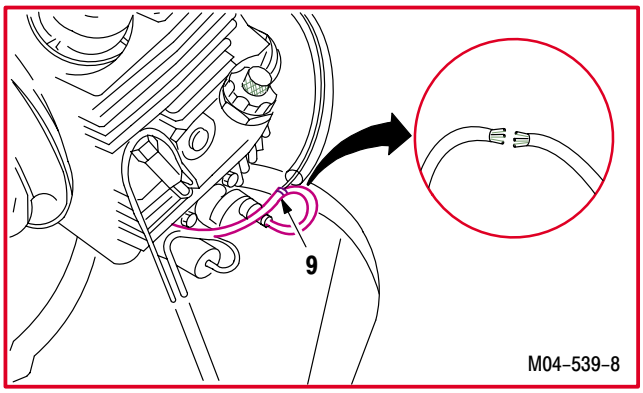
(6) Remove and discard packing (8).



NOTE

Cut wires for nose gearbox chip detector from P61 (No. 1 nose gearbox) and P60 (No. 2 nose gearbox).

f. **Identify and cut electrical wires from wire harness (9) or detach wires from splice area** (TM 55-1500-323-24)**.**



6.26.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.26.5. Inspection

a. **Check chip detector for clogged strainer and cracks in flange.** None allowed.

b. **Check boss and probe of chip detector for nicks, gouges, and burrs.**

(1) Repair damaged areas **0.30 INCH** or less deep by blending.

c. **Check chip detector for corrosion** (para 1.49)**.**

d. **Check connector backshell screws for proper reverse installation and security.**

e. **Check packing groove for nicks, gouges, and burrs.** None allowed.

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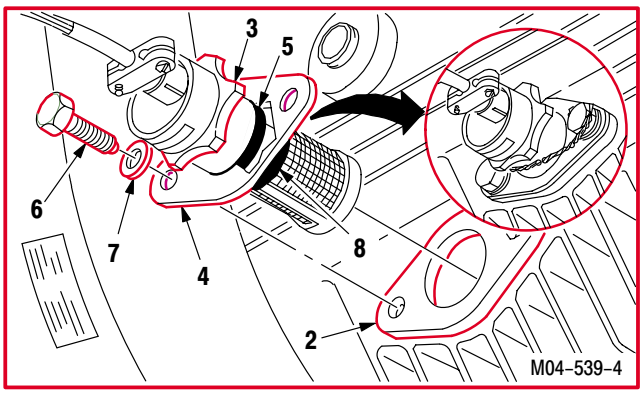
6.26. ENGINE NOSE GEARBOX METALLIC CHIP DETECTOR REMOVAL/INSTALLATION – continued

f. **Examine attached cable for damaged insulation, frayed, or broken wires.** None allowed.

6.26.6. Installation



a. **Install base (4) in gearbox (2).** Torque two bolts (6) to **30 INCH-POUNDS**.



(1) Lubricate new packing (8). Use petrolatum (item 138, App F).

(2) Install packing (8) on base (4).

(3) Install base (4) into gearbox (2).

(4) Install two bolts (6) and washers (7).

(5) Torque two bolts (6) to **30 INCH-POUNDS**. Use torque wrench.

(6) Lubricate new packing (5). Use petrolatum (item 138, App F).

(7) Install packing (5) on detector (3).

(8) Install detector (3) in base (4).

(9) Lockwire two bolts (6) and detector (3) together. Use wire (item 226, App F).

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6.26. ENGINE NOSE GEARBOX METALLIC CHIP DETECTOR REMOVAL/INSTALLATION – continued

b. **Cut wire harness (9) to length.**

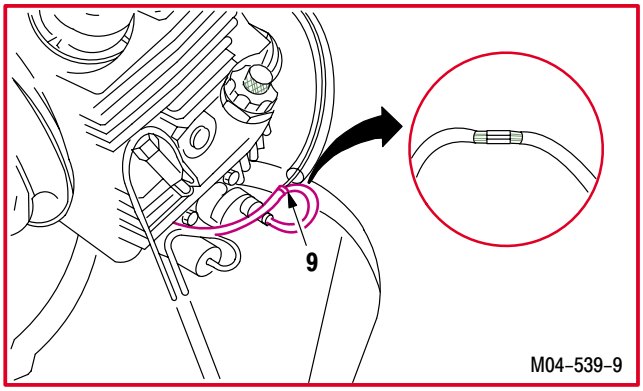
c. **Splice electrical wires in wire harness (9)** (TM 55-1500-323-24)**.**

d. **Inspect (QA).**

e. **Service engine nose gearbox oil sump** (para 1.27)**.**

f. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

g. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.27. ENGINE NOSE GEARBOX IDENTIFICATION PLATE REPLACEMENT

6.27.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.27.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

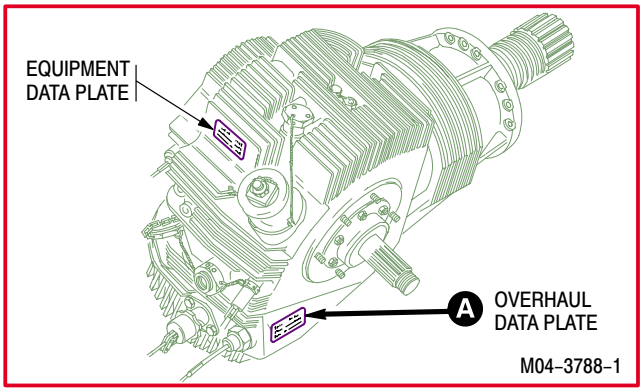
Adhesive (item 13, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Isopropyl alcohol (item 106, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox equipment data plate or overhaul data plate.



GO TO NEXT PAGE

6.27. ENGINE NOSE GEARBOX IDENTIFICATION PLATE REPLACEMENT – continued

6.27.3. Removal

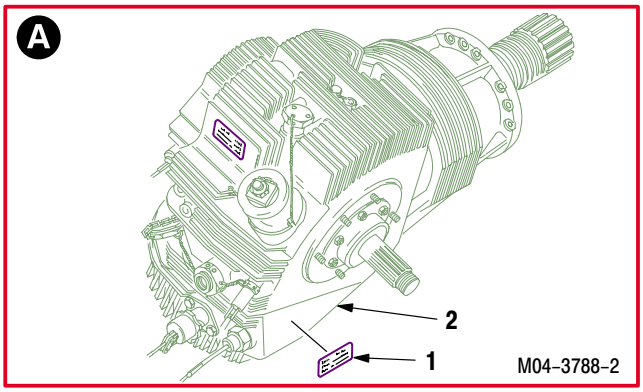
a. **Record all data found on existing identification plate (1).**

b. **Remove plate (1) from engine nose gearbox housing (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from gearbox (2).

(3) Discard plate (1).



6.27.4. Cleaning



CAUTION

Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in name, for cleaning titanium, magnesium, aluminium, or galvanized metals. Products with “chlor” in name are corrosive to these metals.

NOTE

Do not allow alcohol to evaporate from surface. Discoloration will occur.

a. **Clean plate mounting area on gearbox housing.**

(1) Remove all cured compound from gearbox housing. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F).

GO TO NEXT PAGE

6.27. ENGINE NOSE GEARBOX IDENTIFICATION PLATE REPLACEMENT – continued

6.27.5. Inspection

NOTE

The following inspection procedures apply to identification plate mounting area on engine nose gearbox housing.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for scratches, nicks, and gouges** (para 6.17)**.**

6.27.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.



b. **Install plate (1) on gearbox (2).**

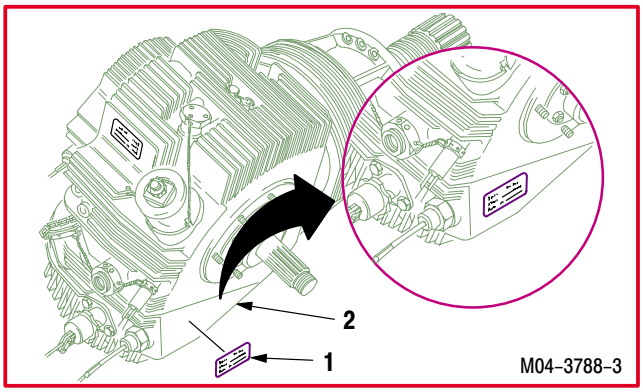
(1) Remove lining from mounting surface of plate (1).

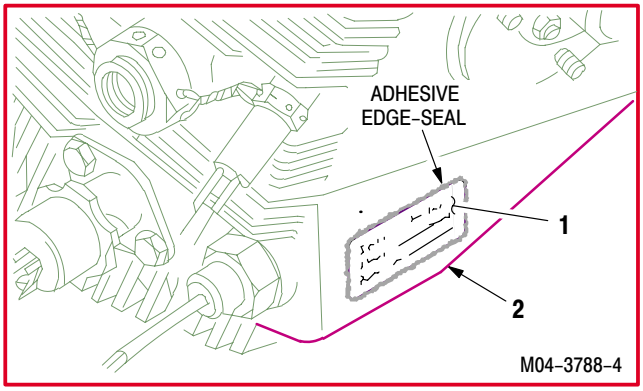
(2) Lightly abrade mounting surface of plate (1). Use cloth (item 48, App F).

(3) Apply a thin, uniform coat of adhesive to mounting surface of plate (1). Use brush (item 34, App F) and adhesive (item 13, App F).

(4) Position and install plate (1) on gearbox (2) in same location as old plate.

(5) Seal edges of plate (1). Use adhesive (item 13, App F).





c. **Inspect (QA).**

d. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

END OF TASK

6.28. ENGINE NOSE GEARBOX OIL TEMPERATURE TRANSDUCER REMOVAL/INSTALLATION

6.28.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.28.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
3/8 x 1/4-inch drive socket wrench adapter (item 7, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 90, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed
1.28	Engine nose gearbox oil sump drained

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox oil temperature transducer.

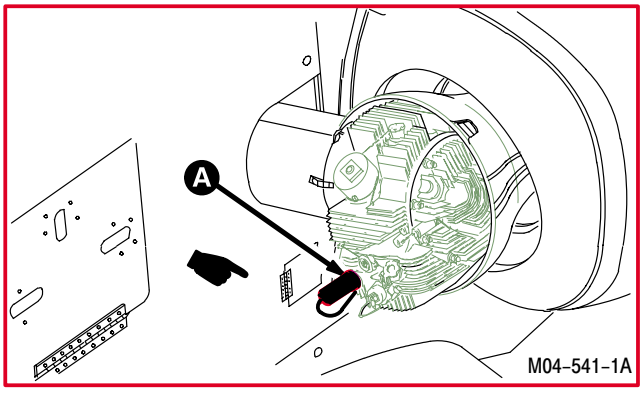
6.28.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open EMER BATT CAUT circuit breaker.**



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6.28. ENGINE NOSE GEARBOX OIL TEMPERATURE TRANSDUCER REMOVAL/INSTALLATION – continued

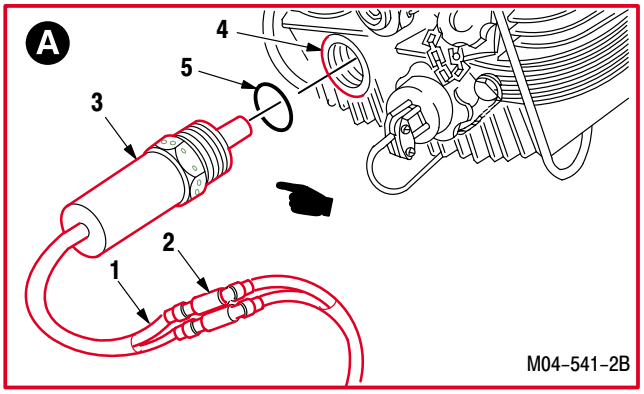
e. **Identify and depin electrical wires (1) from P61 (NGB 1) or P60 (NGB 2) or detach wires (1) from soft splices (2)** (TM 55-1500-323-24)**.**

f. **Remove oil temperature transducer (3) from gearbox housing (4).**

(1) Remove lockwire from transducer (3).

(2) Remove transducer (3) from gearbox (4).

(3) Remove and discard packing (5).



6.28.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.28.5. Inspection

a. **Check boss of gearbox housing for cracks.** None allowed.

b. **Check boss of gearbox housing for corrosion** (para 1.49)**.**

c. **Check boss of gearbox housing for gouges and stripped threads.** None allowed.

6.28.6. Installation



a. **Install transducer (3) in gearbox (4).** Torque transducer (3) to **112 INCH-POUNDS**.

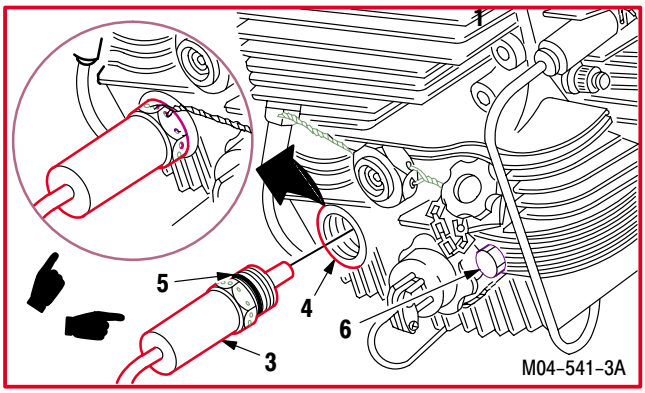
(1) Lubricate new packing (5). Use petrolatum (item 138, App F).

(2) Install packing (5) on transducer (3).

(3) Install transducer (3) in gearbox (4).

(4) Torque transducer (3) to **112 INCH-POUNDS**. Use crowfoot, adapter, and torque wrench.

b. **Lockwire transducer (3) to bolt (6).** Use wire (item 226, App F).



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6.28. ENGINE NOSE GEARBOX OIL TEMPERATURE TRANSDUCER REMOVAL/INSTALLATION – continued

c. **Cut wires (1) to length.**

d. **Pin wires (1) to P61 (NGB 1) or P60 (NGB 2) or attach wires (1) to soft splices (2)** (TM 55-1500-323-24)**.**

(1) For No. 1 engine nose gearbox oil temperature transducer (3), pin wires as follows:

(a) Red wire to P61-F.

(b) Blue (unshielded) wire to P61-G.

(c) Yellow wire to P61-H.

(d) Blue (shielded) wire to P61-J.

(2) For No. 2 engine nose gearbox oil temperature transducer (3), pin wires as follows:

(a) Red wire to P60-F.

(b) Blue (unshielded) wire to P60-G.

(c) Yellow wire to P60-H.

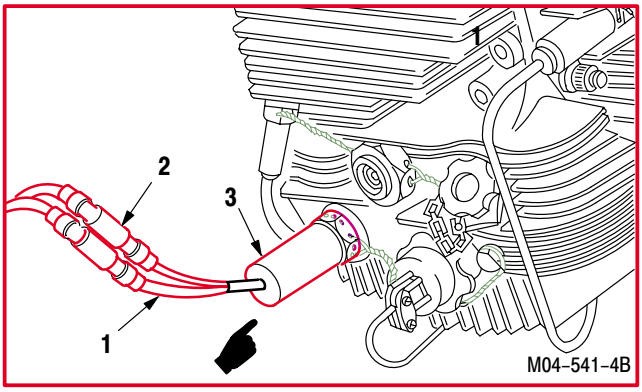
(d) Blue (shielded) wire to P60-J.

e. **Inspect (QA).**

f. **Service engine nose gearbox** (para 1.28)**.**

g. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

h. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.29. ENGINE NOSE GEARBOX OIL PRESSURE TRANSDUCER REMOVAL/INSTALLATION

6.29.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.29.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
3/8 x 1/4-inch drive socket wrench adapter (item 7, App H)
Light duty laboratory apron (item 27, App H)
11/16 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 70, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
5/8 & 11/16-inch open end wrench (item 423, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox oil pressure transducer.

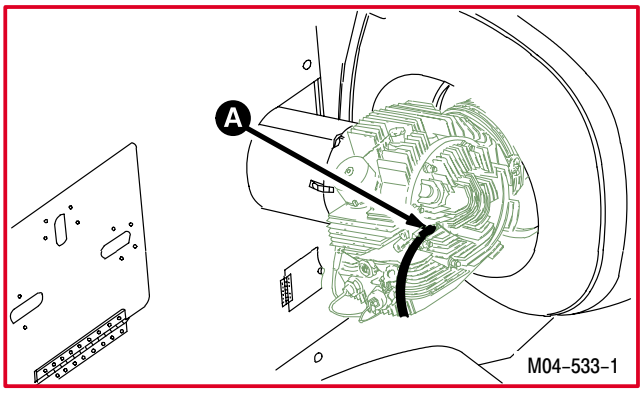
6.29.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open EMERG BATT CAUT circuit breaker.**



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6.29. ENGINE NOSE GEARBOX OIL PRESSURE TRANSDUCER REMOVAL/INSTALLATION – continued

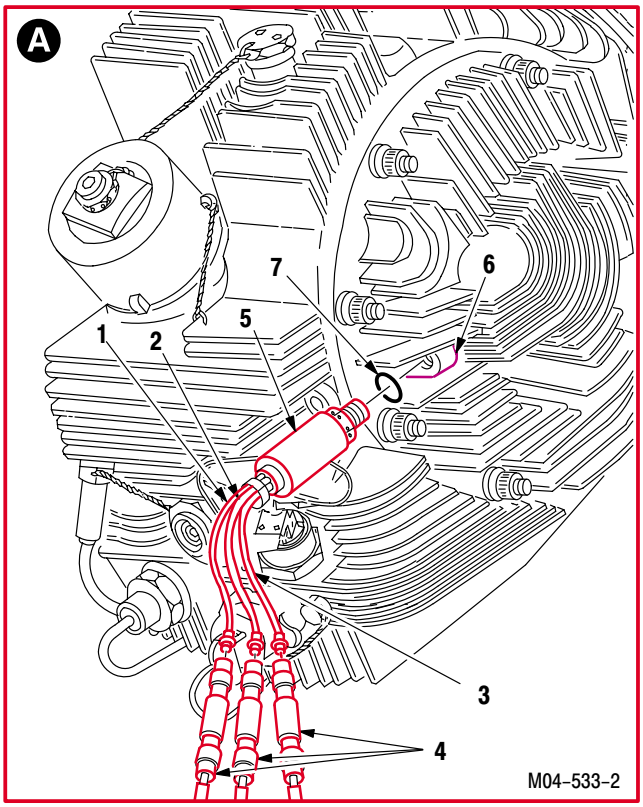
e. **Identify and depin wires (1), (2), and (3) from splices MT11 SP1, SP2, and SP3 or MT12 SP1, SP2, and SP3 (4)** (TM 55-1500-323-24)**.**

f. **Remove transducer (5) from gearbox (6).** Use open end wrench.

(1) Remove lockwire from transducer (5).

(2) Remove transducer (5) from gearbox (6).

(3) Remove and discard packing (7).



6.29.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.29.5. Inspection

a. **Check boss of transducer for gouges, nicks, and stripped threads.**

6.29.6. Installation



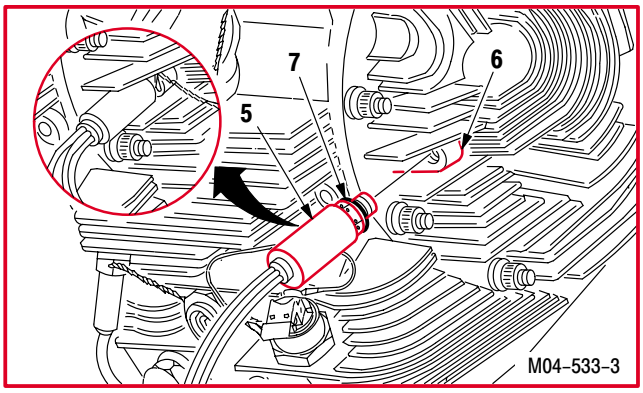
a. **Install transducer (5) in gearbox (6).** Torque transducer (5) to **30 INCH-POUNDS**.

(1) Lubricate new packing (7). Use petrolatum (item 138, App F).

(2) Install packing (7) on transducer (5).

(3) Install transducer (5) in gearbox (6).

(4) Torque transducer (5) to **30 INCH-POUNDS**. Use crowfoot, adapter, and torque wrench.



b. **Lockwire transducer (5) to fin of gearbox (6).** Use wire (item 226, App F).

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6.29. ENGINE NOSE GEARBOX OIL PRESSURE TRANSDUCER REMOVAL/INSTALLATION – continued

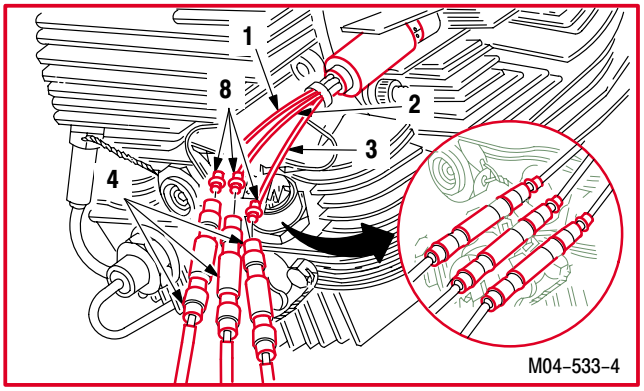
c. **Install three contacts (8) on electrical wires (1), (2), and (3)** (TM 55-1500-323-24)**.**

(1) Cut three wires (1), (2), and (3) to proper length.

(2) Install three contacts (8) on wires (1), (2), and (3).

NOTE

Pin red lead to SP1, black lead to SP2, and white lead to SP3.



d. **Pin identified wires (1), (2), and (3) in splices MT11 SP1, SP2, and SP3 or MT12 SP1, SP2, and SP3 (4)** (TM 55-1500-323-24)**.**

e. **Inspect (QA).**

f. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

g. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.30. ENGINE NOSE GEARBOX LUBE PUMP REMOVAL/INSTALLATION

6.30.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.30.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

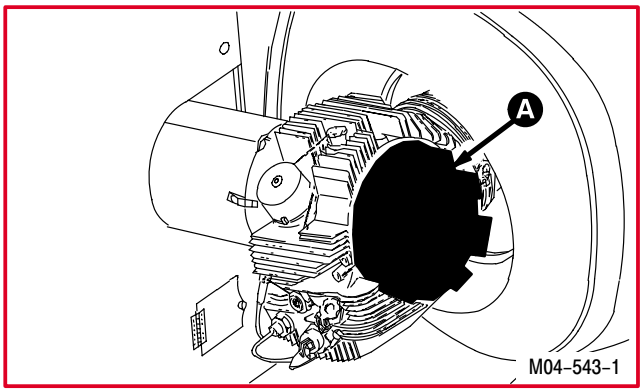
Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed
1.28	Engine nose gearbox oil sump drained
6.29	Engine nose gearbox oil pressure transducer removed

Materials/Parts:

Packing (5)
Bolt (2) (MS9490-02 for removal)
Petrolatum (item 138, App F)

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox lube pump.

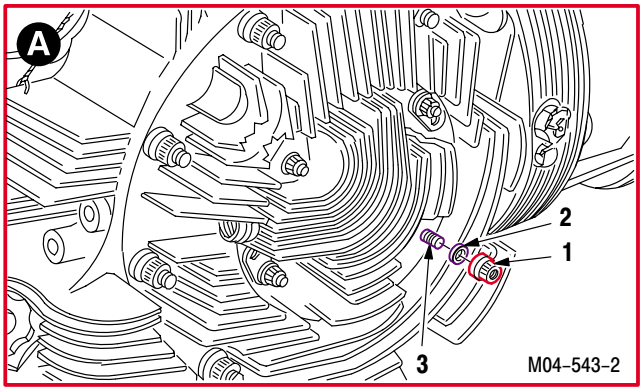


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6.30. ENGINE NOSE GEARBOX LUBE PUMP REMOVAL/INSTALLATION – continued

6.30.3. Removal

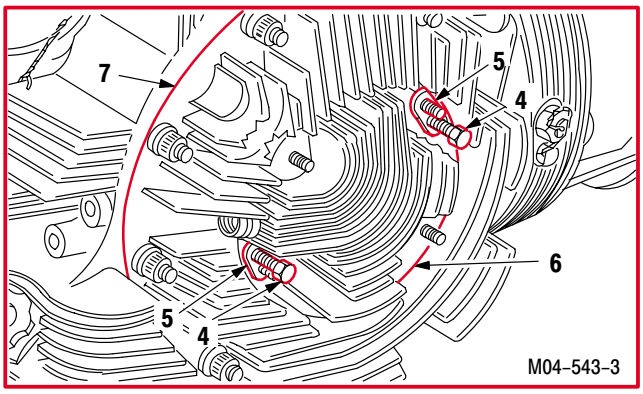
a. **Remove four nuts (1) and washers (2) from lube pump mounting studs (3).**



b. **Install two MS9490-02 bolts (4) in lube pump threaded inserts (5).**

CAUTION

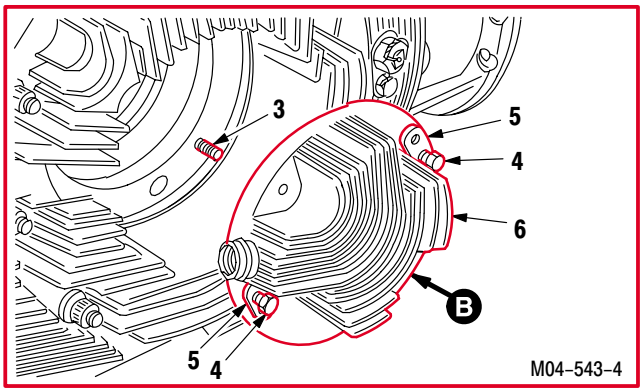
To prevent possible damage to pump and gearbox housing, install two MS9490-02 bolts evenly in inserts.



c. **Install and tighten bolts (4) evenly in inserts (5) until pump (6) separates from gearbox (7).**

d. **Pull two bolts (4) straight out until pump (6) is clear of mounting studs (3).**

e. **Remove bolts (4) from inserts (5).**



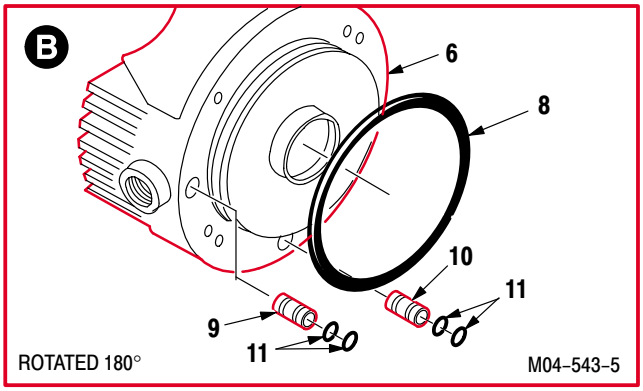
f. **Remove and discard pump packing (8).**

NOTE

The oil tube packings will hold tubes in gearbox or pump.

g. **Remove oil transfer tubes (9) and (10) from pump (6).**

h. **Remove and discard four tube packings (11).**



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6.30. ENGINE NOSE GEARBOX LUBE PUMP REMOVAL/INSTALLATION – continued

6.30.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.30.5. Inspection

a. **Check exposed bearing for discoloration, metal chips, or flakes.**

(1) Replace gearbox if damaged.

b. **Check inside housing pump packing seats for nicks, scratches, dents, and grooves.**

c. **Check pump for nicks, scratches, gouges, and burrs.**

(1) Repair damage **0.030 INCH** or less deep by blending. Blended areas shall not exceed **1 INCH** in diameter, must be at least **1 INCH** apart, and must not total more than 30 percent of lube pump surface area.

d. **Check pump packing grooves for damage.** None allowed.

e. **Check that holes are clean and clear of obstructions.**

f. **Check pump for chipped, broken, and cracked housing.** None allowed.

g. **Check pump for missing or damaged hardware.** None allowed.

h. **Check pump for corrosion** (para 1.49)**.**

i. **Check pump for damaged threaded inserts.** None allowed.

j. **Check pump for evidence of overheating.** None allowed.

k. **Check pump for chipped or broken gear teeth.** None allowed.

GO TO NEXT PAGE

6.30. ENGINE NOSE GEARBOX LUBE PUMP REMOVAL/INSTALLATION – continued

6.30.6. Installation



a. **Lubricate four new packings (11).** Use petrolatum (item 138, App F).

b. **Install two packings (11) on tube (9) and two packings (11) on tube (10).**

c. **Install transfer tubes (9) and (10) in ports (14) and (15) of pump (6).**

d. **Lubricate new packing (8).** Use petrolatum (item 138, App F).

e. **Install packing (8) in groove (16) of pump (6).**

f. **Install pump (6) on gearbox (7).** Torque four nuts (1) to **60 INCH-POUNDS**.

(1) Position pump (6) on four studs (3) so that transfer tubes (9) and (10) aline with tube seats (13) in gearbox (7).

(2) Install four washers (2) and nuts (1) on studs (3).

(3) Torque four nuts (1) to **60 INCH-POUNDS**. Use torque wrench.

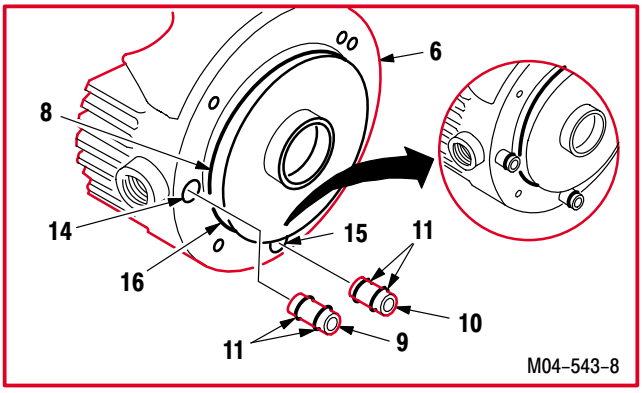
g. **Inspect (QA).**

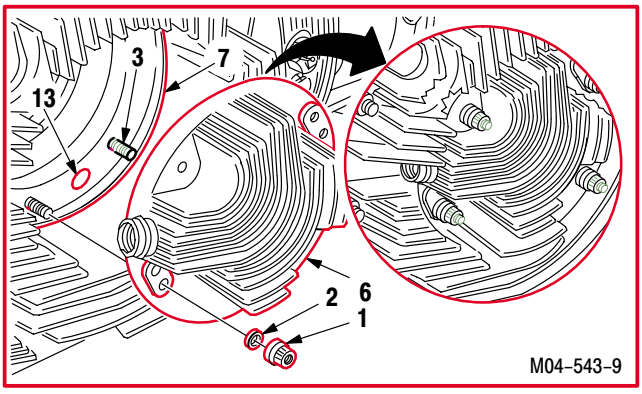
h. **Install engine nose gearbox oil pressure transducer** (para 6.29)**.**

i. **Service engine nose gearbox** (para 1.28)**.**

j. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

k. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**





END OF TASK

6.31. ENGINE NOSE GEARBOX OIL JET FILTERS REMOVAL/INSTALLATION

6.31.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.31.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

References:

TM 1-1520-238-T

Materials/Parts:

Packing (one per filter)
Protective bolt (AN5-60)
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

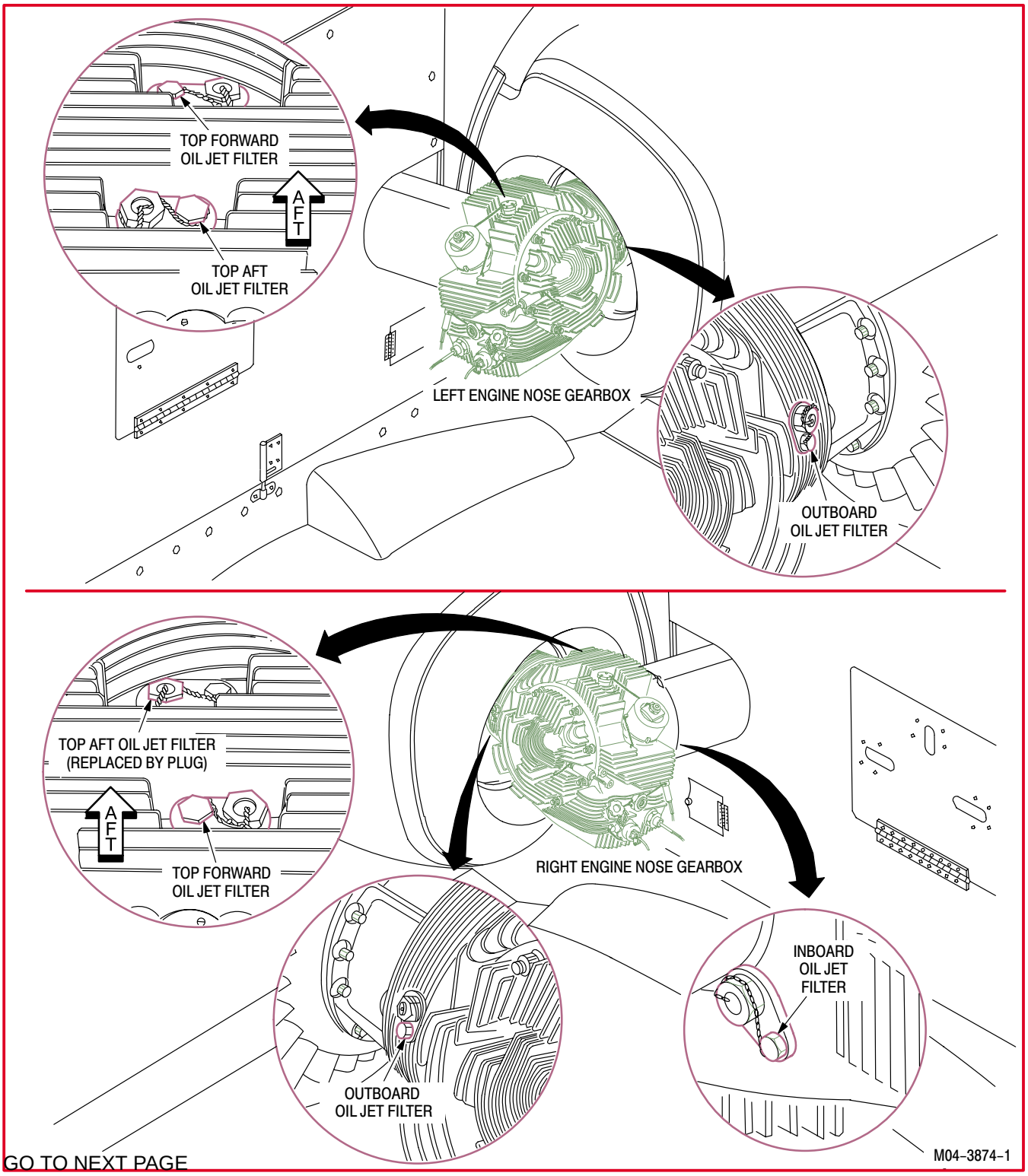
Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed
6.33	Engine nose gearbox flexible coupling, fan impeller, and inlet diffuser removed (only if removing inboard oil jet filter on right engine nose gearbox)

NOTE

- This task is typical for all No. 1 or No. 2 engine nose gearbox oil jet filters.
- Top aft oil jet on right engine nose gearbox has been replaced with a gear mesh plug due to addition of an inboard oil jet. Do not remove gear mesh plug.

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6.31. ENGINE NOSE GEARBOX OIL JET FILTERS REMOVAL/INSTALLATION – continued



GO TO NEXT PAGE

6.31. ENGINE NOSE GEARBOX OIL JET FILTERS REMOVAL/INSTALLATION – continued

6.31.3. Removal

CAUTION

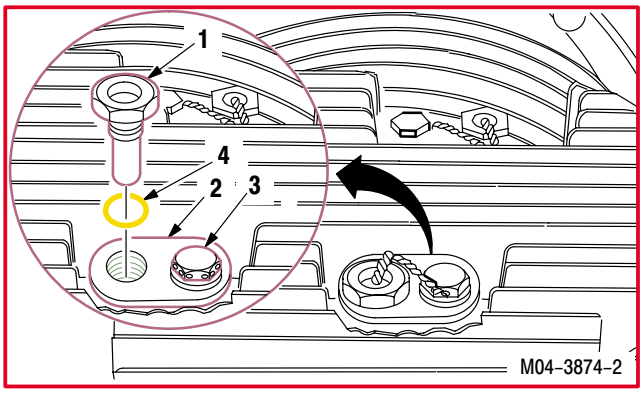
To prevent foreign objects from falling inside oil jet, install protective bolt in oil jet filter port as soon as possible.

a. **Remove oil jet filter (1) from oil jet (2).**

(1) Remove lockwire securing filter (1) to bolt (3).

(2) Remove filter (1) from jet (2).

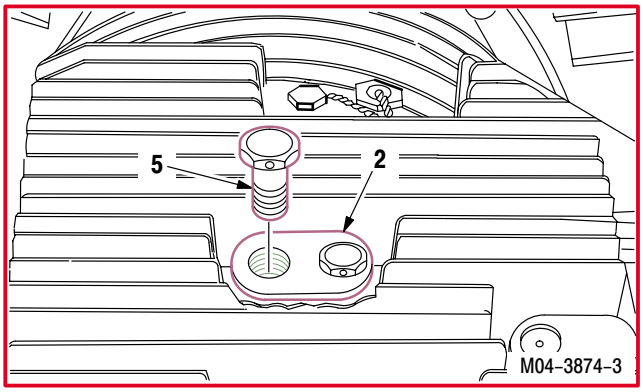
(3) Remove and discard packing (4) from filter (1).



b. **Install protective bolt (5) in jet (2).**

6.31.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**



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6.31. ENGINE NOSE GEARBOX OIL JET FILTERS REMOVAL/INSTALLATION – continued

6.31.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to oil jet filter.

a. **Check for cracks.** None allowed.

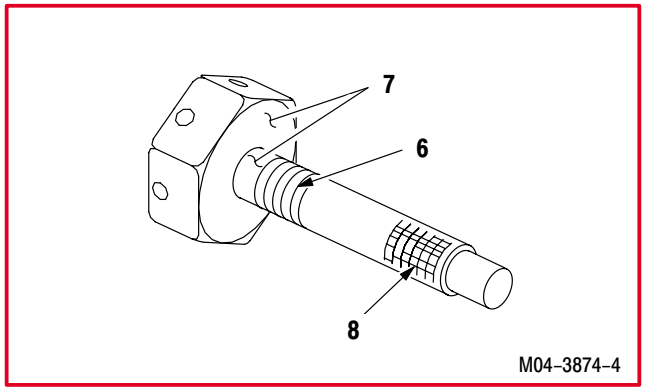
b. **Check hex head for torn lockwire holes.** None allowed.

NOTE

Oil jet filter sealing surface consists of bottom of hex head and adjacent diameter.

c. **Check packing grooves (6), sealing surface (7), and screen (8) for any evidence of damage.**

(1) Repair minor surface imperfections measuring **0.004 INCH** or less deep and not exceeding 20 percent of surface area by blending at a 30:1 to 50:1 transition ratio. Do not exceed depth of original damage.



d. **Check for corrosion, scratches, nicks, and gouges.**

(1) Except for packing grooves and sealing surface, repair minor damage measuring **0.030 INCH** or less deep by blending.

e. **Check filter port on oil jet for stripped, crossed, or flattened threads.**

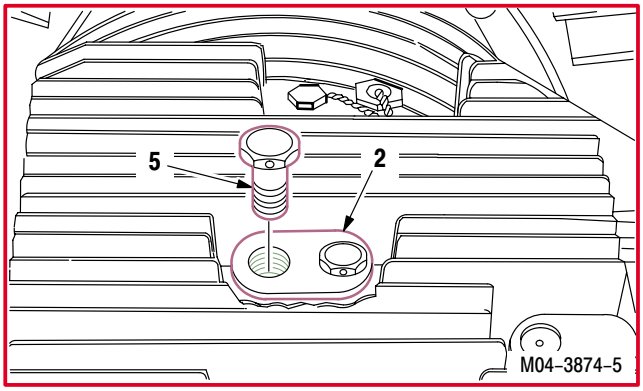
(1) Minor damage is acceptable as long as it does not exceed two threads and provided that damage on thread does not exceed 1/3 of thread depth and 1/4 of thread circumference. Yielded threads not allowed.

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6.31. ENGINE NOSE GEARBOX OIL JET FILTERS REMOVAL/INSTALLATION – continued

6.31.6. Installation

a. **Remove bolt (5) from jet (2).**





b. **Install filter (1) in jet (2).** Torque filter (1) to **30 INCH-POUNDS**.

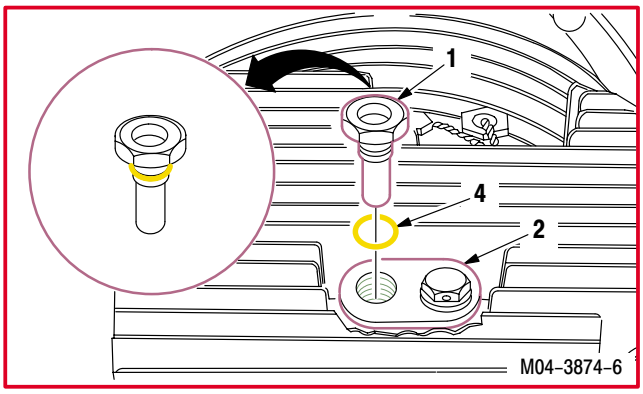
(1) Lubricate new packing (4). Use petrolatum (item 138, App F).

(2) Install packing (4) on filter (1).

(3) Install filter (1) in jet (2).

(4) Torque filter (1) to **30 INCH-POUNDS**. Use torque wrench.

(5) Lockwire filter (1) to bolt (3). Use wire (item 226, App F).

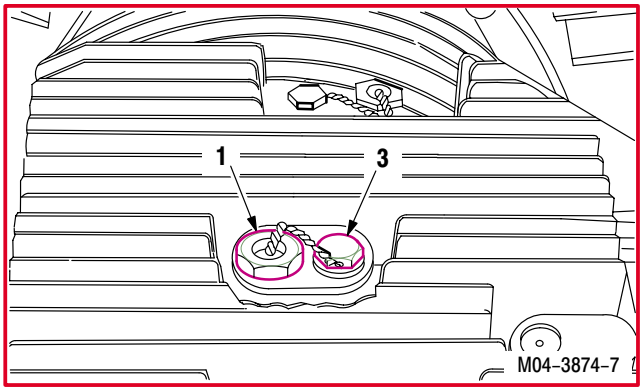


c. **Inspect (QA).**

d. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

NOTE

Perform steps e and f only if inboard oil jet filter on right engine nose gearbox was removed.



e. **Install engine nose gearbox flexible coupling, fan impeller, and inlet diffuser** (para 6.33)**.**

f. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.32. ENGINE NOSE GEARBOX OUTER DIFFUSER (TWO-SECTION) REMOVAL/INSTALLATION

6.32.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.32.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed

WARNING

FLIGHT SAFETY PART

The input drive shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

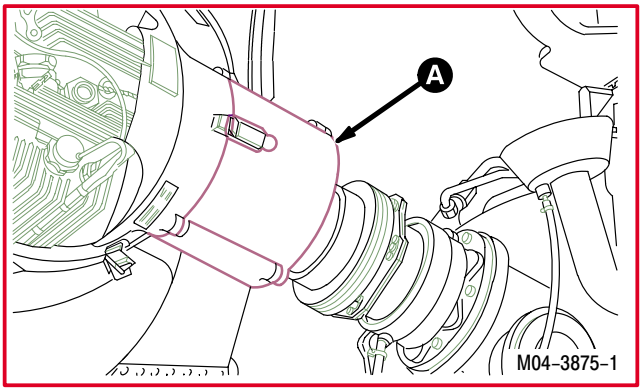
- Components of diffuser assembly are serialized matched sets. All parts of diffuser must be kept together as a matched set or damage to diffuser will occur.
- Do not intermix outer diffusers (one-piece or two-section), inlet diffusers, or vaneaxial fans. Intermixing or swapping these components will result in damage to components(one-piece or two-section), inlet diffusers, or vaneaxial fans. Intermixing or swapping these components will result in damage to components.
- Exercise care and undertake protective measures when handling or performing any type of maintenance on the engine input drive shaft. All surface areas are critical. Accidental dents or scratches caused by improper handling may render part unserviceable.
- To prevent damage to engine input drive shaft, ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox outer diffuser.

GO TO NEXT PAGE

6.32. ENGINE NOSE GEARBOX OUTER DIFFUSER (TWO-SECTION) REMOVAL/INSTALLATION – continued

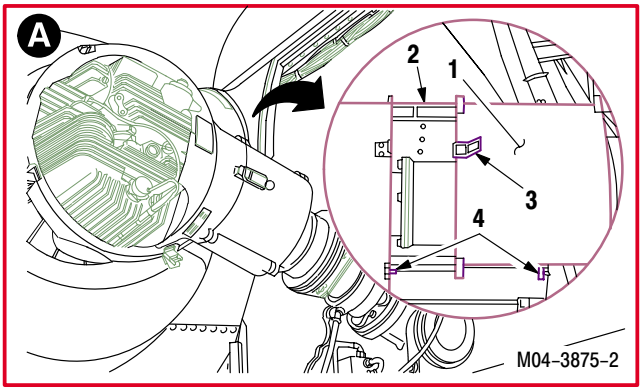


6.32.3. Removal

a. **Remove 120 degree diffuser section (1) from 240 degree diffuser section (2).**

(1) Open diffuser section latch (3).

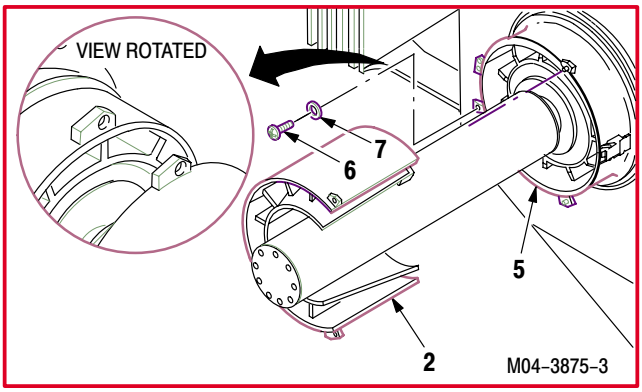
(2) Slide diffuser section (1) off four guide pins (4).



b. **Remove diffuser section (2) from inlet diffuser (5).**

(1) Remove two screws (6) and washers (7) from diffuser section (2).

(2) Remove diffuser section (2) from diffuser (5).



6.32.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

GO TO NEXT PAGE

6.32. ENGINE NOSE GEARBOX OUTER DIFFUSER (TWO-SECTION) REMOVAL/INSTALLATION – continued

6.32.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to the inlet diffuser section and to the 120 degree and 240 degree diffuser section.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for scratches, nicks, dents, and gouges.**

(1) Damage not to exceed 15 percent of material thickness or **0.050 INCH** (whichever is less). Repair allowable damaged areas by blending.

d. **Check for loose or missing dowel pins.** None allowed.

e. **Check for elongated screw or dowel pin guide holes.**

(1) Damage not to exceed 15 percent of material thickness or **0.050 INCH** (whichever is less).

f. **Check mounting tabs on inlet diffuser for stripped, crossed, or flattened threads.** None allowed.

g. **Check diffuser section latch for evidence of damage and loose rivets** (para 6.17)**.**

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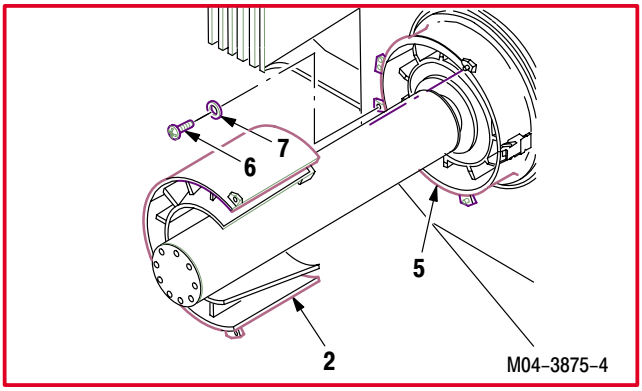
6.32. ENGINE NOSE GEARBOX OUTER DIFFUSER (TWO-SECTION) REMOVAL/INSTALLATION – continued

6.32.6. Installation

a. **Install diffuser section (2) on diffuser (5).**

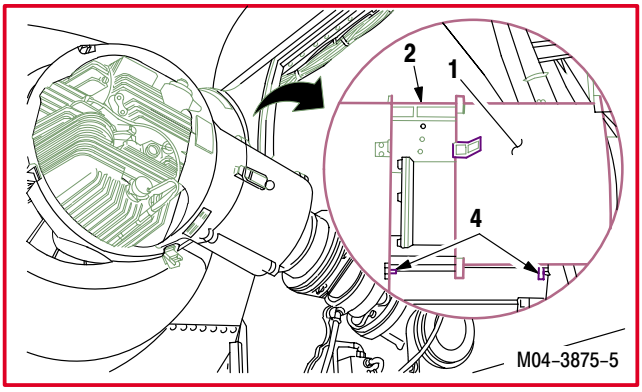
(1) Position diffuser section (2) on diffuser (5).

(2) Install two screws (6) and washers (7).



b. **Install diffuser section (1) on diffuser section (2).**

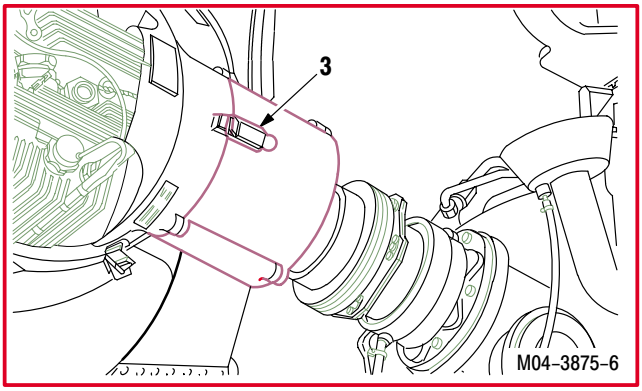
(1) Slide diffuser section (1) on four guide pins (4).



(2) Close latch (3).

c. **Inspect (QA).**

d. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**



END OF TASK

6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION

6.33.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

6.33.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Nose gearbox shaft locknut face spanner wrench socket (item 317, App H)
Engine nose gearbox bearing nut wrench (item 407, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Locknut (6)
Washer (6)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.2	No. 1 and/or No. 2 engine input drive shaft and outer diffuser removed

WARNING

FLIGHT SAFETY PART

The nose gearbox flexible coupling is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

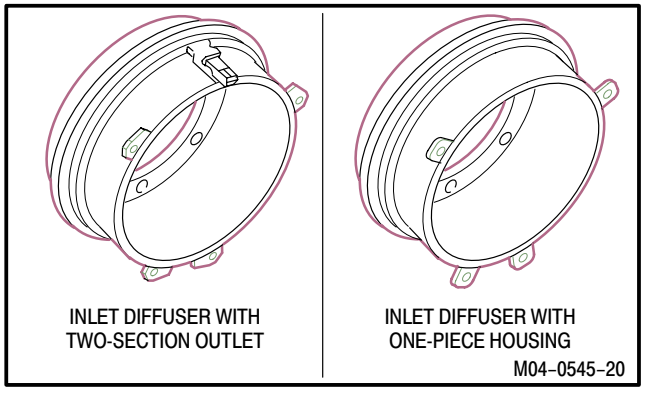
- Do not intermix outer diffusers (one-piece or two-section), inlet diffusers, or vaneaxial fans. Intermixing or swapping these components will result in damage to components.
- Flexible couplings are made of thin metal and are fragile. Exercise caution and undertake protective measures when working on or around flexible coupling in order to prevent scratching or denting.

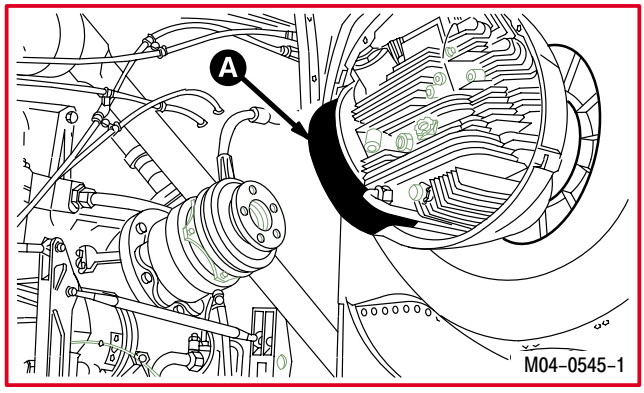
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6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

NOTE

- This task is typical for either No. 1 or No. 2 engine nose gearbox flexible coupling, vaneaxial fan, and inlet diffuser.
- This task is typical for both types of diffuser assemblies. One has an inlet diffuser and a two-section outlet diffuser and the other has an inlet diffuser and a one-piece housing.



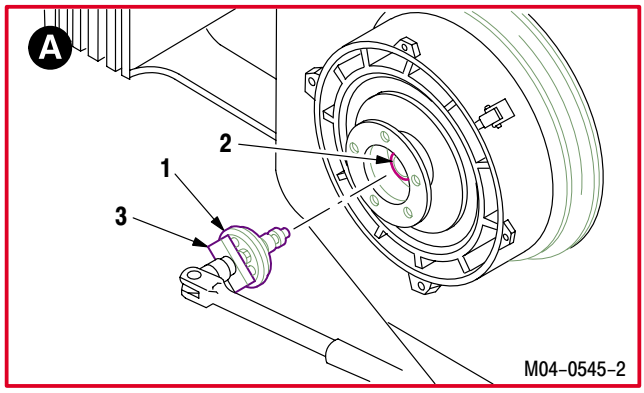


6.33.3. Removal

a. **Remove anti-flail bearing nut (1) from engine nose gearbox output shaft (2).**

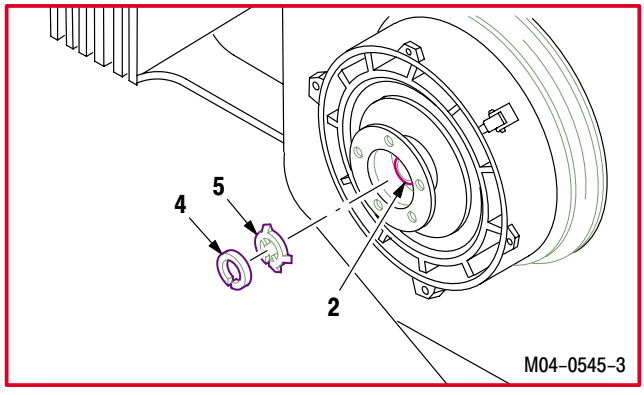
(1) Aline prongs of bearing nut wrench (3) with holes in bearing nut (1). Use bearing nut wrench.

(2) Remove bearing nut (1) from shaft (2).



(3) Remove retaining ring (4) from shaft (2).

(4) Remove lockring (5) from shaft (2).



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6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

b. **Remove fan (6) and flexible coupling (7) from shaft (2).**

(1) Insert 1/2-inch drive 10-inch extension (8) in shaft (2).

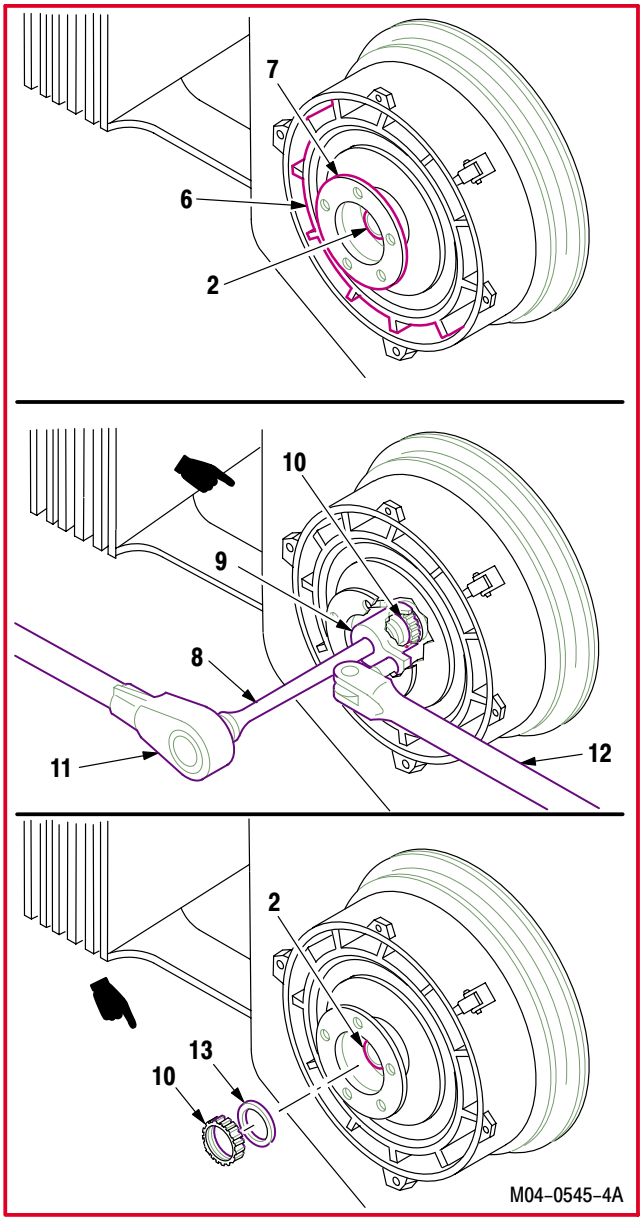
(2) Slide socket (9) down extension (8) until locknut (10) is engaged. Use spanner wrench socket.

(3) Install 1/2-inch drive ratchet handle (11) on extension (8) and hold.

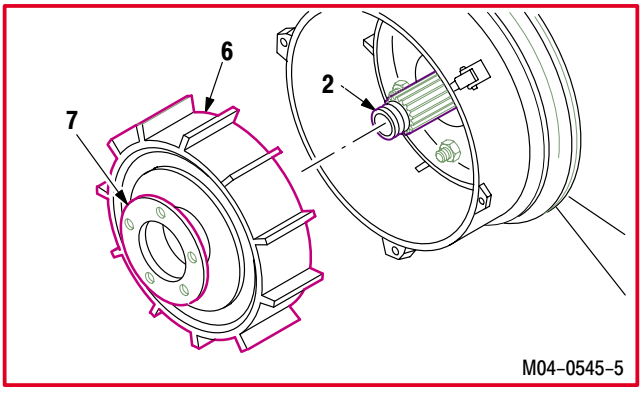
(4) Insert 1/2-inch drive wrench handle (12) in outer offset hole of socket (9).

(5) Remove locknut (10) from shaft (2) by simultaneously turning both ratchet handle (11) and wrench handle (12).

(6) Remove washer (13) from shaft (2).



(7) Remove fan (6) and coupling (7) from shaft (2).



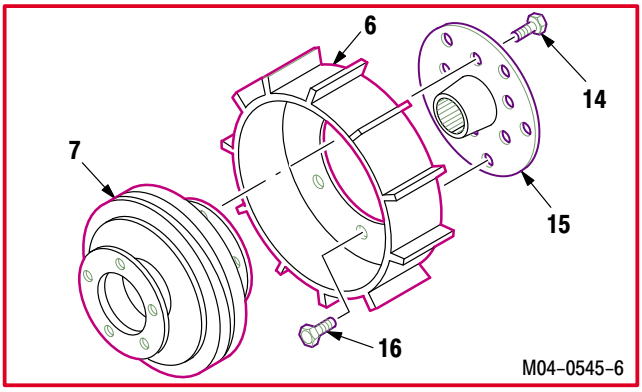
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6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

c. **Remove coupling (7) from fan (6).**

(1) Remove five bolts (14) from coupling (7) and adapter (15).

(2) Remove coupling (7) from fan (6).



d. **Remove adapter (15) from fan (6).**

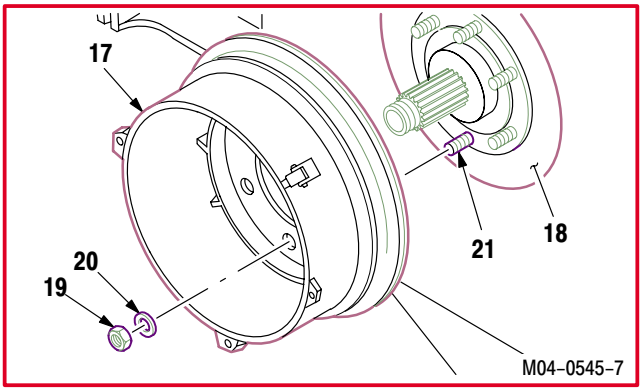
(1) Remove five bolts (16) from adapter (15) and fan (6).

(2) Remove adapter (15) from fan (6).

e. **Remove inlet diffuser (17) from engine nose gearbox (18).**

(1) Remove and discard six locknuts (19) and washers (20) from gearbox studs (21).

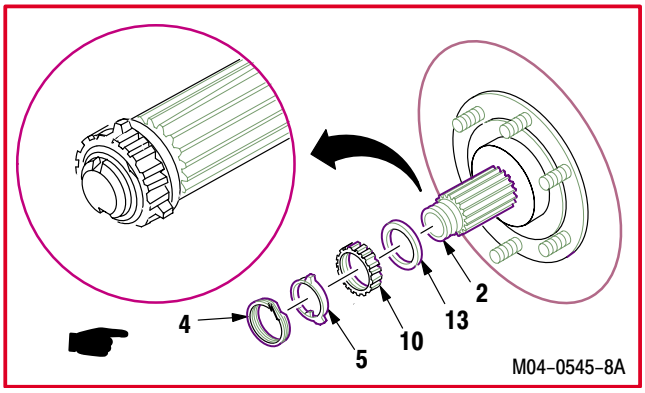
(2) Remove diffuser (17) from gearbox studs (21).



NOTE

Go to step f. only if engine nose gearbox is being replaced.

f. **Install washer (13), locknut (10), lockring (5), and retaining ring (4) on shaft (2).**



6.33.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

GO TO NEXT PAGE

6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

6.33.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to flexible coupling, vaneaxial fan, and inlet diffuser (regardless of diffuser design type).

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for elongated bolt holes (where applicable), scratches, nicks, dents, and gouges.**

(1) Damage not to exceed 15 percent of material thickness or **0.050 INCH** (whichever is less). Use depth gage.

d. **Check threaded holes (where applicable) for stripped, crossed, or flattened threads.** None allowed.

e. **Check for rubbing between fan and inlet diffuser.** Rubbing is acceptable within following limits:

(1) Rub marks on inner diffuser shall not exceed **0.005 INCH** in depth and shall not exceed 120 degrees of inner circumference. Use depth gage.

(2) The fan shall rotate freely within inlet diffuser when turned by hand.

f. **Check output shaft for serviceability** (para 6.17)**.**

g. **Check coupling for loose or damaged nutplates** (para 6.17)**.**

h. **Check inlet diffuser mounting flanges for damaged inserts.** None allowed. Repair in accordance with paragraph 6.33.6.

NOTE

The following inspection procedures apply to inlet diffuser only if it is of type designed to be used with a two section outer diffuser.

i. **Check clamping catches for damage and looseness.** None allowed. Repair in accordance with paragraph 6.33.6.

j. **Check mounting flanges for loose or missing dowel pins.** None allowed.

6.33.6. Repair

a. **Repair inlet diffuser by replacing clamp catches and inserts** (TM 1-1500-204-23)**.**

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6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

6.33.7. Installation

NOTE

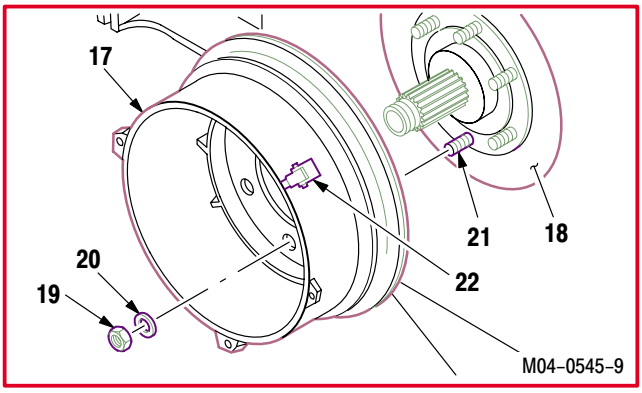
Do not torque locknuts on gearbox studs until step e. has been completed.

a. **Install diffuser (17) on gearbox (18).**

(1) Position diffuser (17) on gearbox studs (21) with clamping catch (22) facing forward.

(2) Install six new locknuts (19) and washers (20) on gearbox studs (21).

(3) Hand tighten locknuts (19).



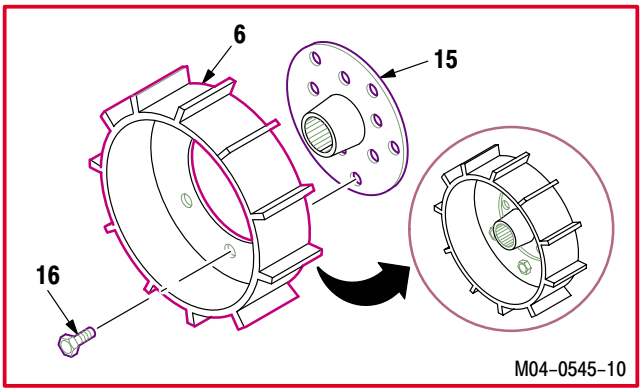
b. **Install adapter (15) on fan (6).** Torque five bolts (16) to **60 INCH-POUNDS**.

(1) Position adapter (15) on fan (6).

(2) Aline bolt holes on adapter (15) with bolt holes on fan (6).

(3) Install five bolts (16) through fan (6) and adapter (15).

(4) Torque five bolts (16) to **60 INCH-POUNDS**. Use torque wrench.



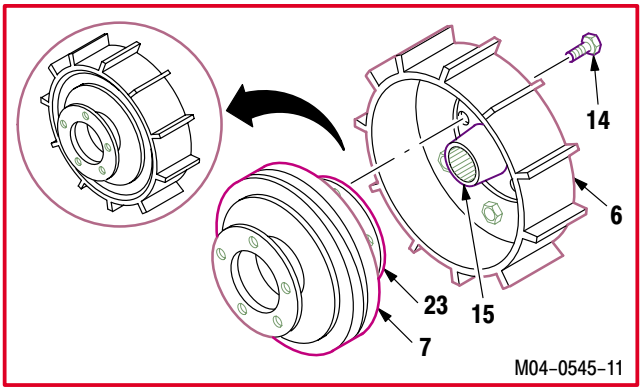
c. **Install coupling (7) in fan (6).** Torque five bolts (14) to **120 INCH-POUNDS**.

(1) Position coupling (7) in fan (6).

(2) Aline bolt holes on coupling flange (23) with bolt holes on installed adapter (15).

(3) Install five bolts (14) through rear of fan (6) and coupling flange (23).

(4) Torque five bolts (14) to **120 INCH-POUNDS**. Use torque wrench.



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6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

CAUTION

- Adapter must have a slip fit with engine nose gearbox shaft. If adapter cannot be installed on gearbox shaft until it contacts end of rotor seal using light hand force only, replace adapter with another adapter having an acceptable slip fit on gearbox shaft. The application of additional installation force to adapter can reduce life of gearbox shaft ball bearing.
- To prevent damage to inlet diffuser and fan, ensure that fins of fan do not rub against inner surface of diffuser when fan is installed and hand rotated in diffuser.

d. **Install fan (6) with coupling (7) on gearbox shaft (2).**

(1) Install fan (6) with coupling (7) on shaft (2).

(2) Check for rubbing between fan (6) and diffuser (17).

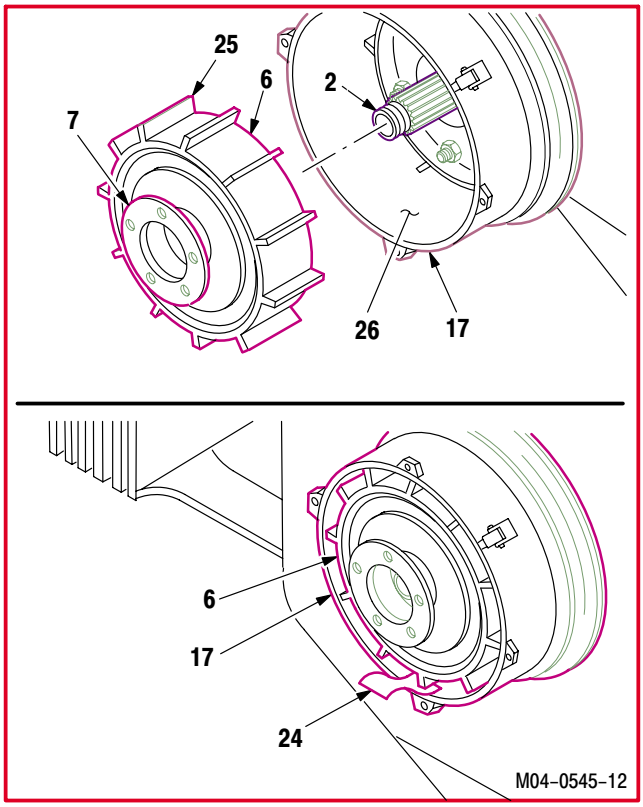
(a) Insert piece of paper (24) between fins (25) of fan (6) and inner surface (26) of diffuser (17).

(b) Rotate fan (6) by hand.

(c) Check for rubbing between fins (25) of fan (6) and inner surface (26) of diffuser (17).

(3) Remove fan (6) with coupling (7) from shaft (2).

(4) If rubbing between fins (25) of fan (6) and inner surface (26) of diffuser (17) exists, go to step e.; otherwise go to step e.(5).



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6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

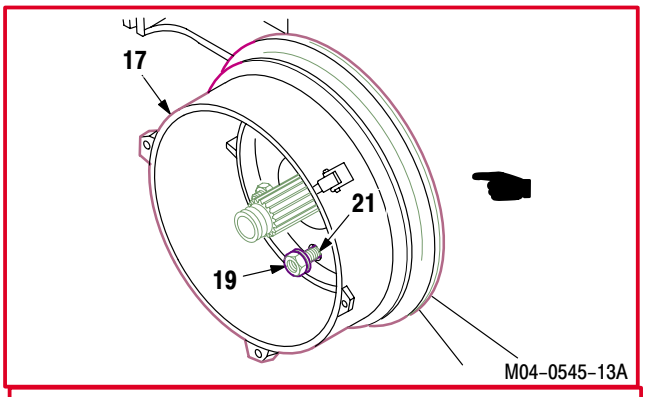
NOTE

Go to step e. only if fins of fan rub against inner surface of inlet diffuser, otherwise, go to step e.(5)

e. **Realine diffuser (17) until drag eliminated.** Torque six locknuts (19) to **50 INCH-POUNDS**.

(1) Loosen six locknuts (19) on gearbox studs (21).

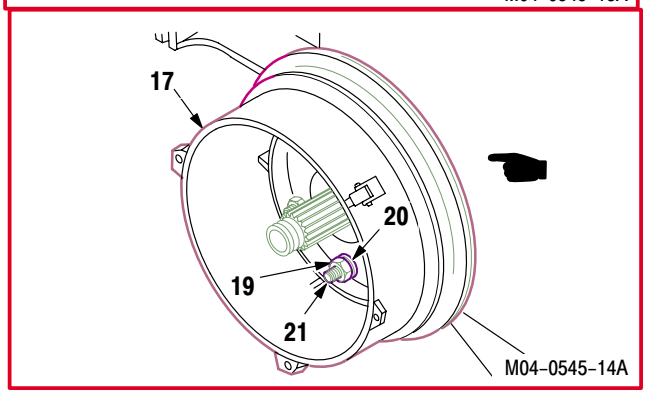
(2) Realine diffuser (17) by moving around on studs (21). Do not remove diffuser to accomplish this procedure.



(3) Hand tighten six locknuts (19) and washers (20) on gearbox studs (21).

(4) Go to step d.

(5) Torque six locknuts (19) to **50 INCH-POUNDS**. Use torque wrench.

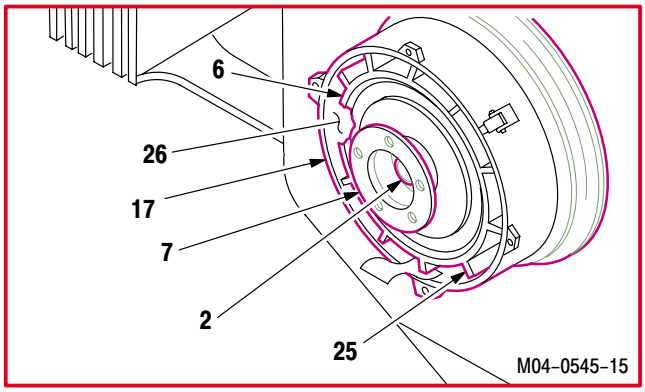


f. **Install fan (6) with coupling (7) on shaft (2).**

(1) Recheck for rubbing between fins (25) of fan (6) and inner surface (26) of diffuser (17); go to step d.(2).

(2) Install fan (6) with coupling (7) on shaft (2).

(3) Go to step d.(2), and if rubbing between fins (25) of fan (6) and inner surface (26) of diffuser (17) exists, go to step d.(3) and step e.; otherwise go to step g.



GO TO NEXT PAGE

6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

g. **Install locknut (10) and washer (13) on shaft (2).** Torque locknut (10) to **1050 INCH-POUNDS**.

(1) Hand tighten locknut (10) with washer (13) on shaft (2).

(2) Insert a 1/2-inch drive 10-inch extension (8) in shaft (2).

(3) Slide socket (9) down extension (8) until locknut (10) is engaged. Use spanner wrench socket.

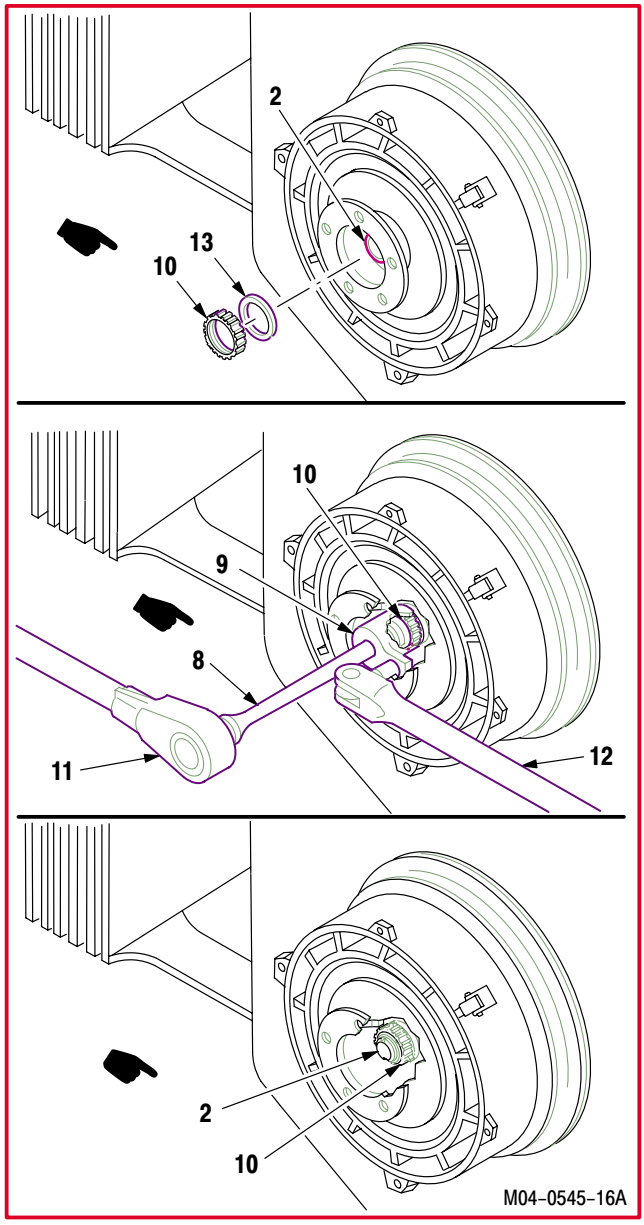
(4) Install a 1/2-inch drive ratchet handle (11) on extension (8) and hold.

(5) Insert a 1/2-inch drive wrench handle (12) in outer offset hole of socket (9).

(6) Simultaneously turn both ratchet handle (11) and wrench handle (12) to tighten locknut (10) until completely seated on shaft (2).

(7) Remove ratchet handle (11).

(8) Hold wrench handle (12). Torque locknut (10) to **1050 INCH-POUNDS**. Use torque wrench.



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6.33. ENGINE NOSE GEARBOX FLEXIBLE COUPLING, VANEAXIAL FAN, AND INLET DIFFUSER REMOVAL/INSTALLATION – continued

CAUTION

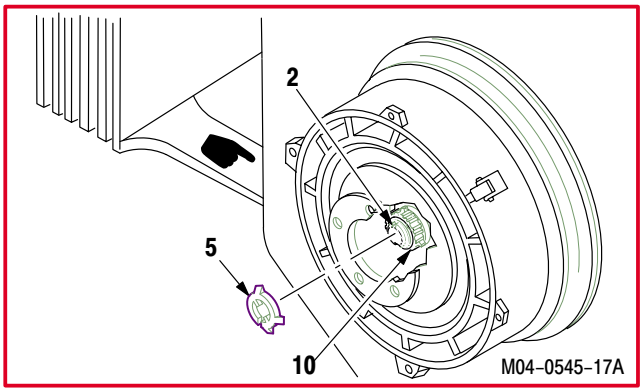
To prevent damage to engine nose gearbox output shaft, do not torque locknut over **1200 INCH-POUNDS**.

h. **Install lockring (5) on shaft (2).**

(1) Check alinement of inner and outer tabs of lockring ring (5) with slots in locknut (10) and shaft (2).

(2) If lockring ring (5) cannot be installed on shaft (2) due to tab misalinement, go to step h.(3); otherwise, install lockring ring (5) on shaft (2) and go to step i.

(3) Continue to torque locknut (10) to **1200 INCH-POUNDS** maximum in order to aline inner and outer tabs of lockring (5) with slots of locknut (10) and shaft (2) so that lockring ring (5) can be installed on shaft (2). Use torque wrench.



i. **Install bearing nut (1) on shaft (2).** Torque bearing nut (1) to **40 INCH-POUNDS**.

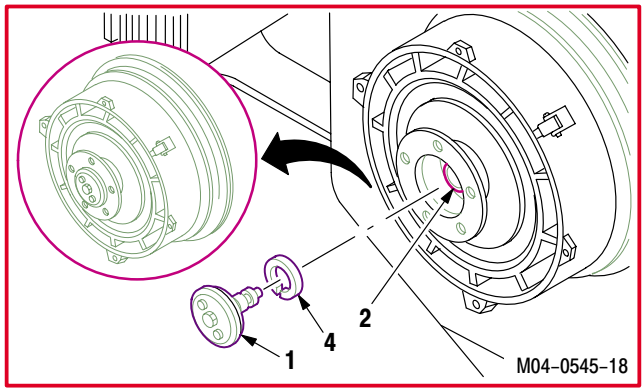
(1) Install retaining ring (4) on shaft (2).

(2) Hand tighten bearing nut (1) on shaft (2).

(3) Aline prongs of bearing nut wrench (3) with holes in bearing nut (1). Use bearing nut wrench.

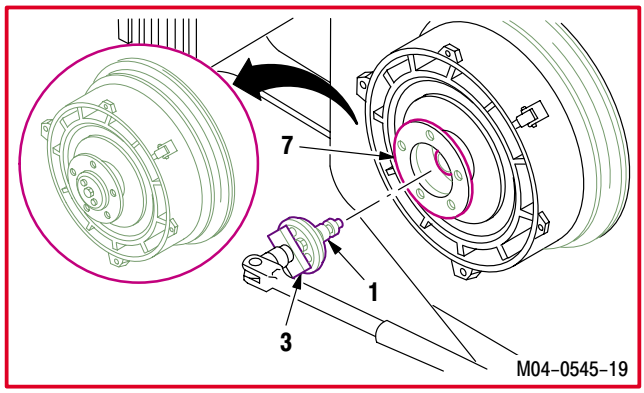
(4) Tighten bearing nut (1) until completely seated in coupling (7).

(5) Torque bearing nut (1) to **40 INCH-POUNDS**. Use torque wrench.



j. **Inspect (QA).**

k. **Install No. 1 and/or No. 2 engine input drive shaft and outer diffuser** (para 6.2)**.**



END OF TASK

6.34. ENGINE NOSE GEARBOX ANTI-FLAIL BEARING NUT DISASSEMBLY/ASSEMBLY

6.34.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

6.34.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Equipment Conditions:

Ref	Condition
6.33	Anti-flail bearing nut assembly removed

Personnel Required:

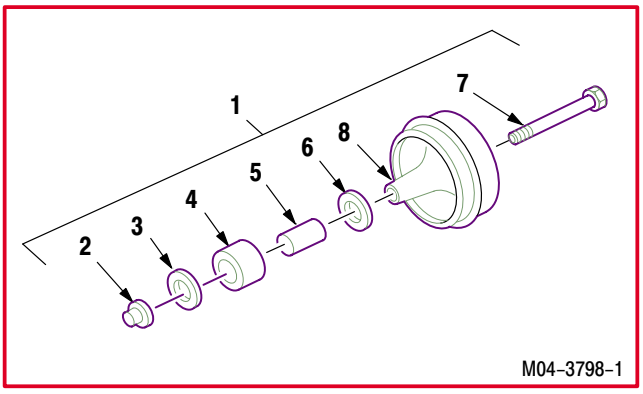
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

6.34.3. Disassembly

a. **Disassemble anti-flail bearing nut (1).**

(1) Remove nut (2), washer (3), bearings (4) and (5), and washer (6) from bolt (7).

(2) Remove bolt (7) from nut (8).



6.34.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.34.5. Inspection

a. **Check components for cracks.** None allowed.

b. **Check components for nicks and scratches** (para 6.1)**.**

c. **Check components for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.34. ENGINE NOSE GEARBOX ANTI-FLAIL BEARING NUT DISASSEMBLY/ASSEMBLY – continued

6.34.6. Assembly

a. **Assemble nut (1).** Torque nut (2) to **28 INCH-POUNDS**.

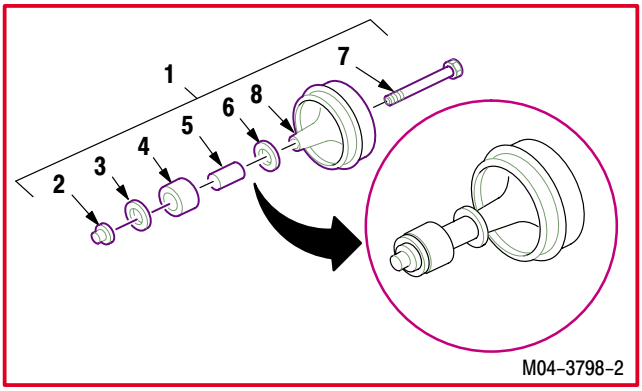
(1) Install bolt (7) through nut (8).

(2) Install washer (6), bearings (5) and (4), washer (3), and nut (2) on bolt (7).

(3) Torque nut (2) to **28 INCH-POUNDS**. Use torque wrench.

b. **Inspect (QA).**

c. **Install anti-flail bearing nut assembly** (para 6.33)**.**



END OF TASK

6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION

6.35.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.35.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Packing (2 per oil jet)
Removal bolt (AN5-60)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.31	Engine nose gearbox oil jet filter(s) removed

CAUTION

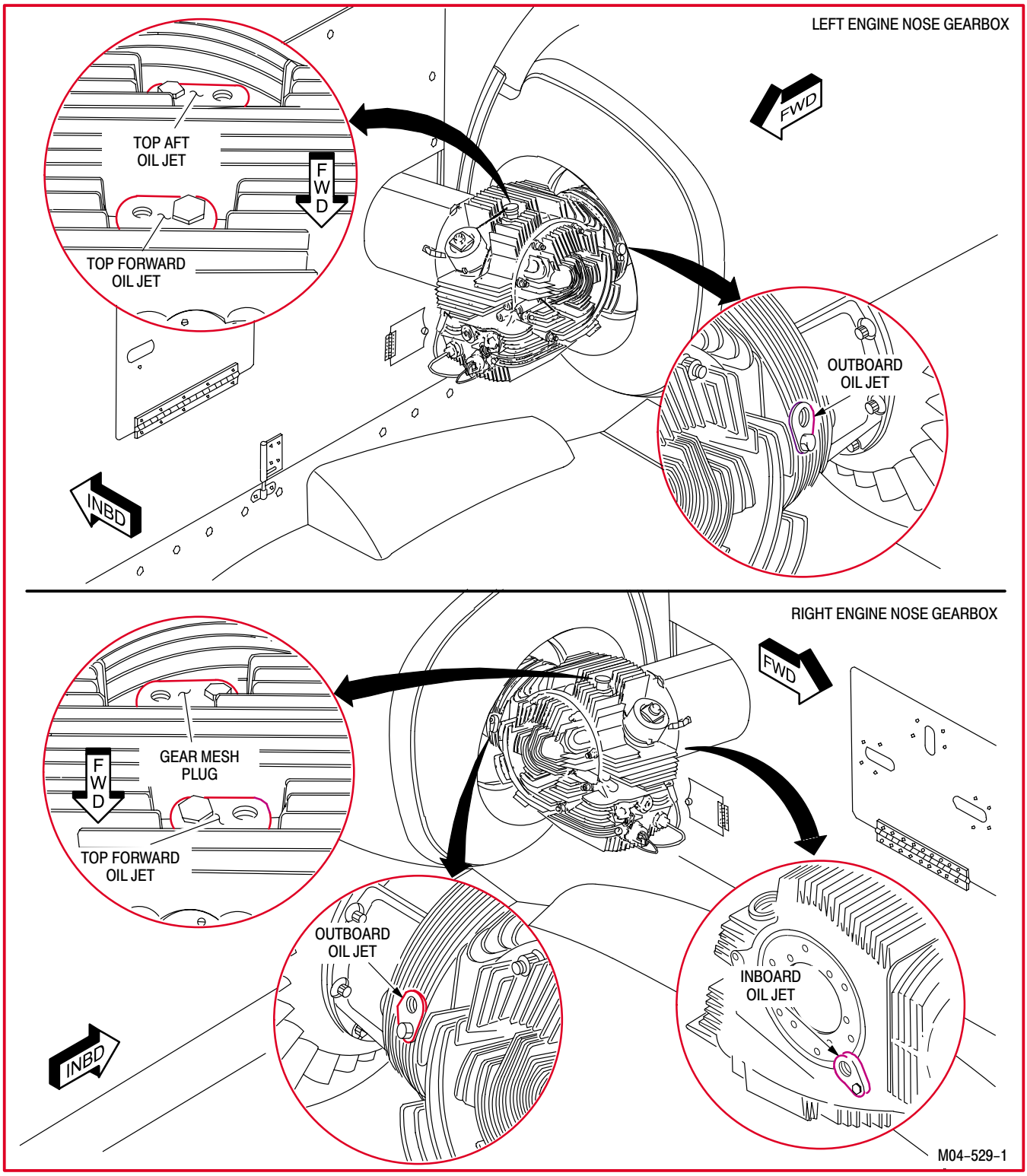
Oil jets on engine nose gearbox are not interchangeable with each other. To prevent damage to engine nose gearbox, do not intermix or swap oil jets.

NOTE

- This task is applicable to outboard, top aft, and top forward oil jet on left engine nose gearbox and inboard, outboard, and top forward oil jet on right engine nose gearbox.
- Removal and installation procedures for outboard and top forward oil jet are typical for either No. 1 or No. 2 engine nose gearbox.
- The top aft oil jet on right engine nose gearbox has been replaced with a gear mesh plug due to addition of an inboard oil jet. Do not remove gear mesh plug.

GO TO NEXT PAGE

6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION – continued



GO TO NEXT PAGE

6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION – continued

6.35.3. Removal

NOTE

Perform step a to remove left or right engine nose gearbox outboard oil jet. Left engine nose gearbox shown.

a. **Remove outboard oil jet (1) from engine nose gearbox (2).**

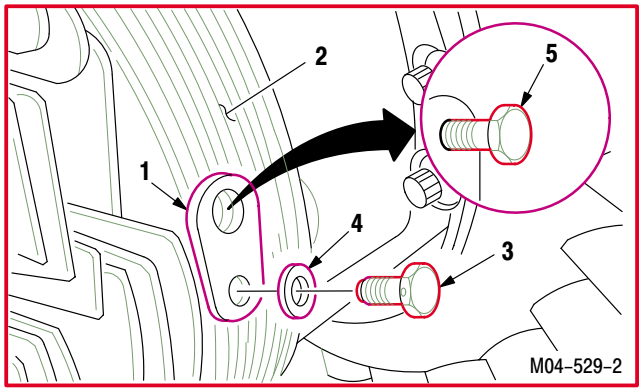
(1) Remove bolt (3) and washer (4) from gearbox (2).

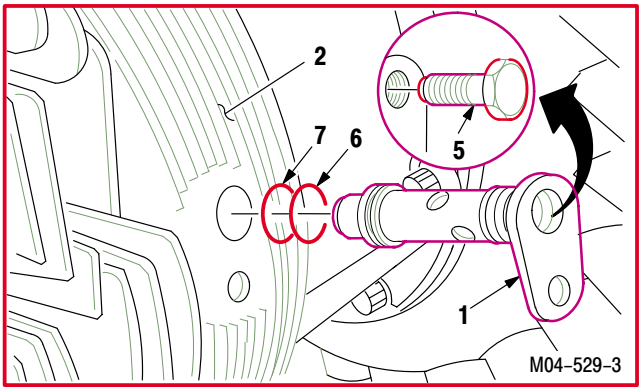
(2) Install removal bolt (5) five turns in oil jet (1).

(3) Pull removal bolt (5) with hand and remove jet (1) from gearbox (2).

(4) Remove removal bolt (5) from jet (1).

(5) Remove and discard packings (6) and (7) from jet (1).





NOTE

Perform step b to remove left or right engine nose gearbox top forward oil jet. Left engine nose gearbox shown.

b. **Remove top forward jet (8) from gearbox (2).**

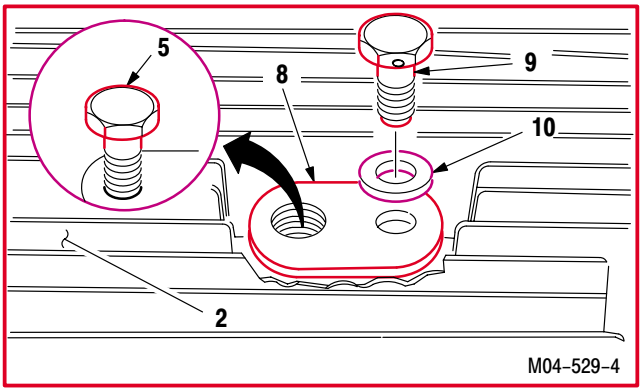
(1) Remove bolt (9) and washer (10) from gearbox (2).

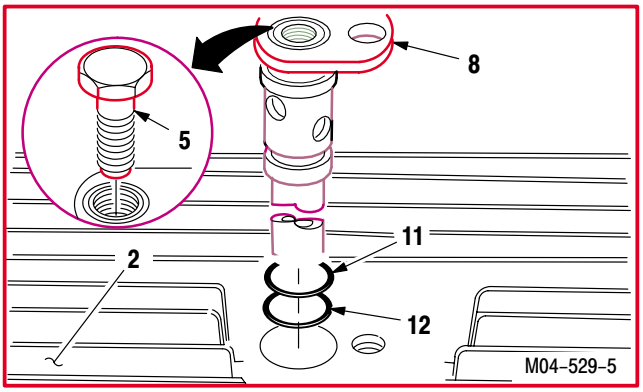
(2) Install removal bolt (5) five turns in jet (8).

(3) Pull removal bolt (5) with hand to remove jet (8) from gearbox (2).

(4) Remove removal bolt (5) from jet (8).

(5) Remove and discard packings (11) and (12) from jet (8).





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6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION – continued

NOTE

Perform step c to remove left engine nose gearbox top aft oil jet.

c. **Remove top aft oil jet (13) from gearbox (2).**

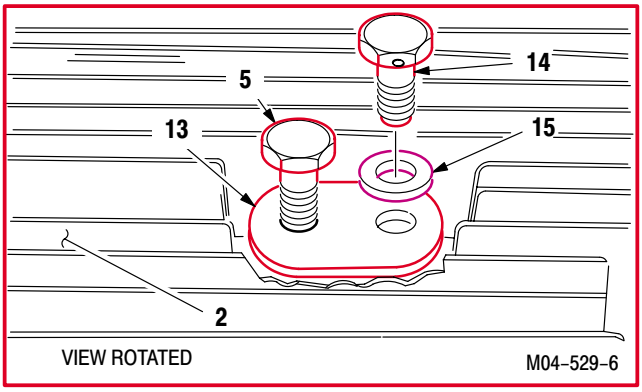
(1) Remove bolt (14) and washer (15) from gearbox (2).

(2) Install removal bolt (5) five turns in jet (13).

(3) Pull removal bolt (5) with hand to remove jet (13) from gearbox (2).

(4) Remove removal bolt (5) from jet (13).

(5) Remove and discard packings (16) and (17) from jet (13).



NOTE

Perform step d to remove right engine nose gearbox inboard oil jet.

d. **Remove inboard oil jet (18) from right engine nose gearbox (19).**

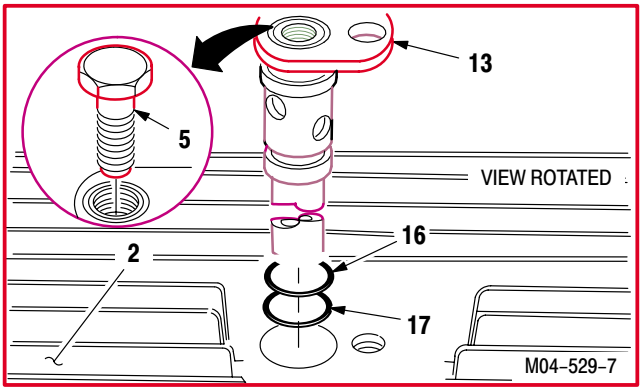
(1) Remove bolt (20) and washer (21) from gearbox (19).

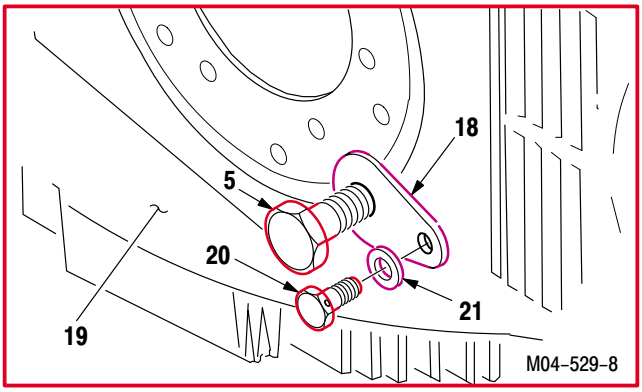
(2) Install removal bolt (5) five turns in jet (18).

(3) Pull removal bolt (5) with hand to remove jet (18) from gearbox (19).

(4) Remove removal bolt (5) from jet (18).

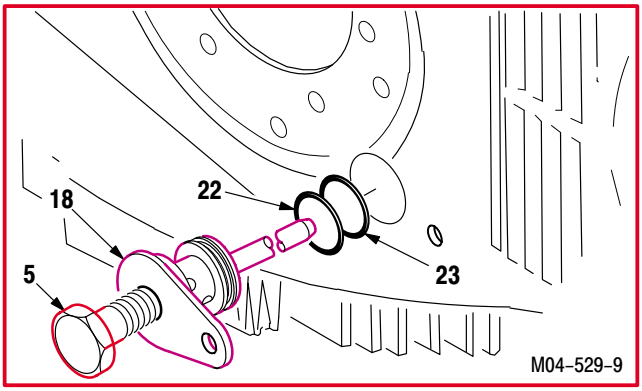
(5) Remove and discard packings (22) and (23) from jet (18).





6.35.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**



GO TO NEXT PAGE

6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION – continued

6.35.5. Inspection

NOTE

The following inspection procedures apply to oil jet mounting surfaces and recesses on both engine nose gearboxes.

a. **Check for cracks.** None allowed.

b. **Check for scratches, nicks, gouges, and other evidence of damage** (para 6.41)**.**

c. **Check for corrosion** (para 1.49)**.**

NOTE

The following inspection procedures apply to all oil jets on left and right engine nose gearboxes.

d. **Check for cracks.** None allowed.

e. **Check threaded filter hole (24) for stripped, crossed, or flattened threads.** None allowed.

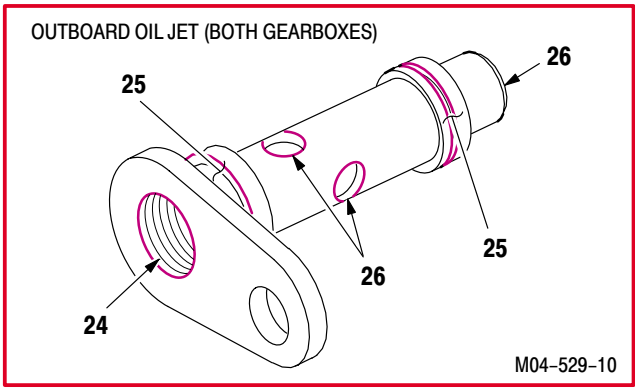
f. **Check for scratches, nicks, gouges, burrs, and corrosion.**

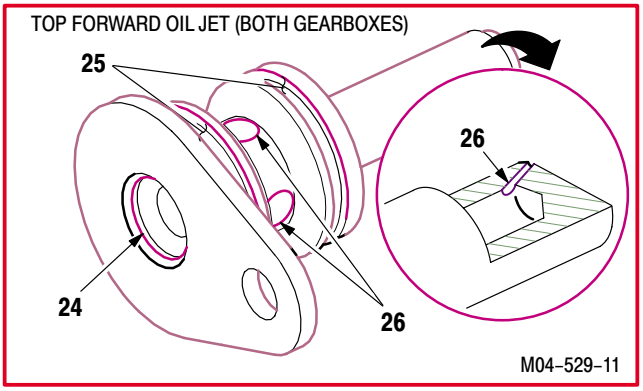
(1) Except for packing grooves (25), repair damaged areas **0.030 INCH** or less deep blending. Use depth gage.

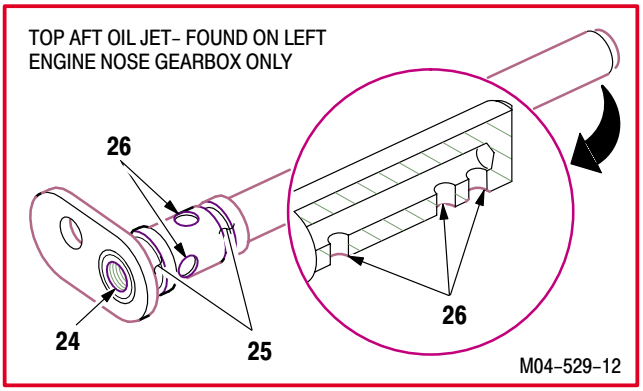
g. **Check packing grooves (25) for scratches, nicks, gouges, burrs, and corrosion.**

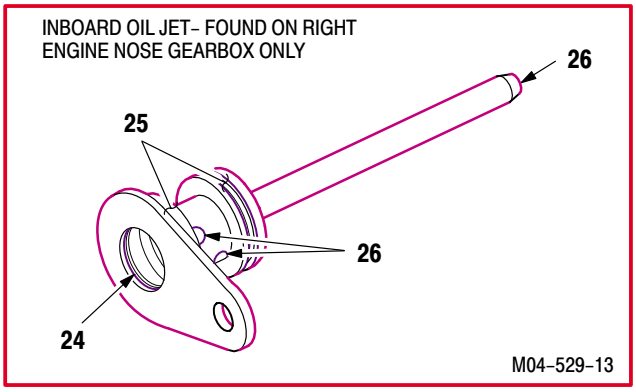
(1) Minor surface imperfections measuring **0.004 INCH** or less deep before blending and not covering over 20 percent of surface area may be repaired by blending at a 30:1 to 50:1 transition ratio. Repair not to exceed depth of original damage. Use depth gage.

h. **Check vent holes (26) for blockage or obstructions.** None allowed.









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6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION – continued

6.35.6. Installation



NOTE

Perform step a if right engine nose gearbox inboard oil jet was removed.

a. **Install inboard oil jet (18) on gearbox (19).** Torque bolt (20) to **65 INCH-POUNDS**.

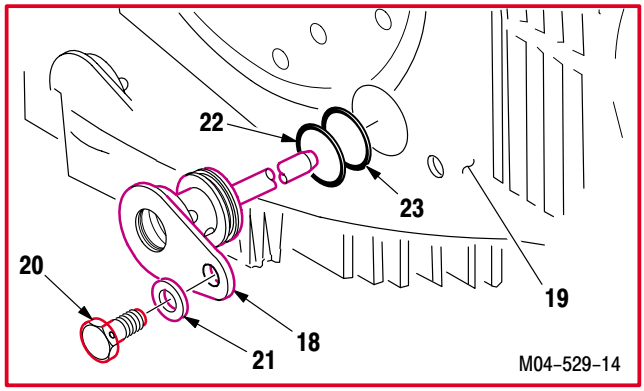
(1) Lubricate new packings (22) and (23). Use petrolatum (item 138, App F).

(2) Install packings (22) and (23).

(3) Install jet (18) in gearbox (19).

(4) Install bolt (20) and washer (21) in gearbox (19).

(5) Torque bolt (20) to **65 INCH-POUNDS**. Use torque wrench.



NOTE

Perform step b if left engine nose gearbox top aft oil jet was removed.

b. **Install top aft oil jet (13) on gearbox (2).** Torque bolt (14) to **65 INCH-POUNDS**.

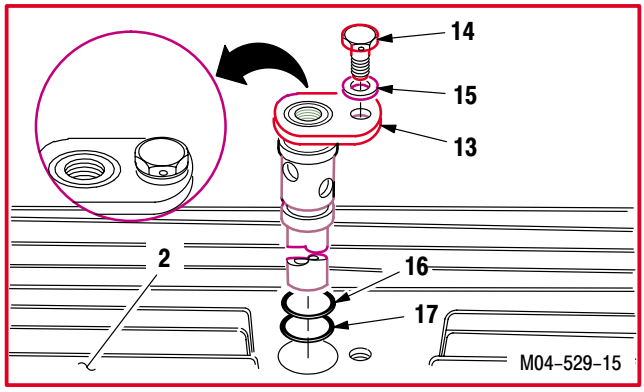
(1) Lubricate new packings (16) and (17). Use petrolatum (item 138, App F).

(2) Install packings (16) and (17) on jet (13).

(3) Install jet (13) in gearbox (2).

(4) Install bolt (14) and washer (15) in gearbox (2).

(5) Torque bolt (14) to **65 INCH-POUNDS**. Use torque wrench.



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6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION – continued

NOTE

Perform step c if left or right engine nose gearbox top forward oil jet was removed. Left engine nose gearbox shown.

c. **Install top forward jet (8) on gearbox (2).** Torque bolt (9) to **65 INCH-POUNDS**.

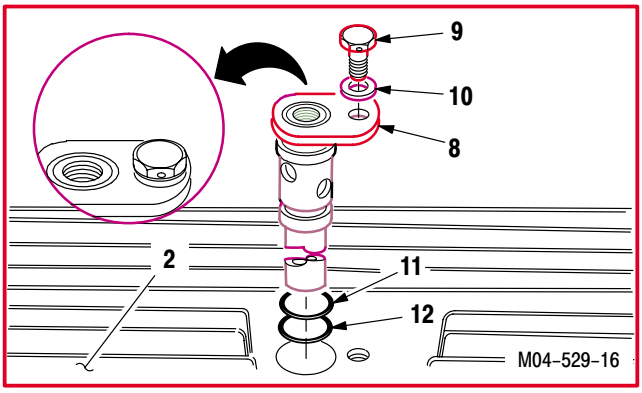
(1) Lubricate new packings (11) and (12). Use petrolatum (item 138, App F).

(2) Install packings (11) and (12) on jet (8).

(3) Install jet (8) in gearbox (2).

(4) Install bolt (9) and washer (10) in gearbox (2).

(5) Torque bolt (9) to **65 INCH-POUNDS**. Use torque wrench.



NOTE

Perform step d if left or right engine nose gearbox outboard oil jet was removed. Left engine nose gearbox shown.

d. **Install outboard jet (1) on gearbox (2).** Torque bolt (3) to **65 INCH-POUNDS**.

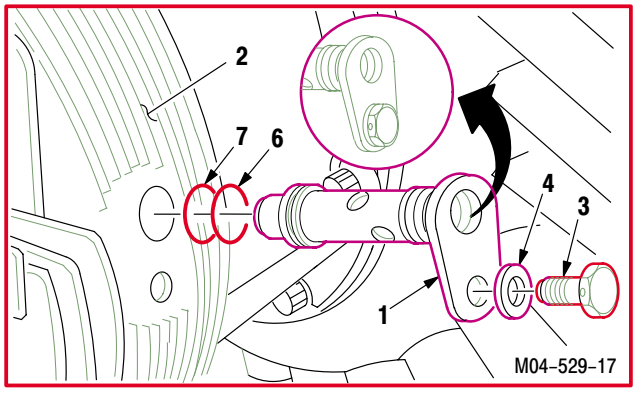
(1) Lubricate new packings (6) and (7). Use petrolatum (item 138, App F).

(2) Install packings (6) and (7) on jet (1).

(3) Install jet (1) in gearbox (2).

(4) Install bolt (3) and washer (4) in gearbox (2).

(5) Torque bolt (3) to **65 INCH-POUNDS**. Use torque wrench.



GO TO NEXT PAGE

6.35. ENGINE NOSE GEARBOX OIL JET REMOVAL/INSTALLATION – continued

NOTE

The following steps apply to all oil jets on left and right engine nose gearboxes.

e. **Inspect (QA).**

f. **Install oil jet filter(s)** (para 6.31)**.**

g. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION

6.36.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.36.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
5/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 83, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing (4)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
68X Armament/Electrical System Repairer
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.123	Engine nose gearbox fairings and shrouds removed
1.28	Engine nose gearbox oil drained
6.2	No. 1 or No. 2 drive shaft removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox.

6.36.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

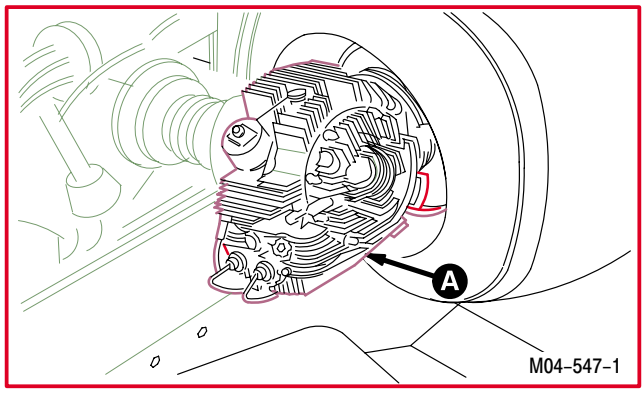
d. **On CPG left console circuit breaker panel No. 1, open EMER BATT CAUT circuit breaker.**

GO TO NEXT PAGE

6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued

NOTE

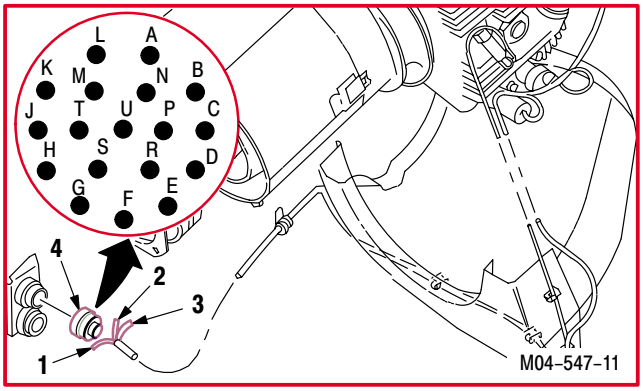
Depin wires for nose gearbox chip detector from P61 (No. 1 nose gearbox) or P60 (No. 2 nose gearbox). Do not remove chip detector from gearbox.



e. **Identify and depin nose gearbox chip detector electrical wires (1), (2), and (3) from connector P61/P60 (4) pins A, B, and C** (TM 55-1500-323-24)**.**

NOTE

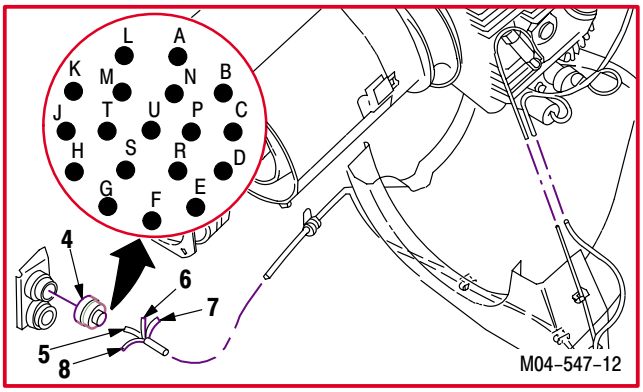
Depin wires for nose gearbox oil temperature probe from P61 (No. 1 nose gearbox 1) or P60 (nose gearbox 2). Do not remove temperature probe from gearbox.



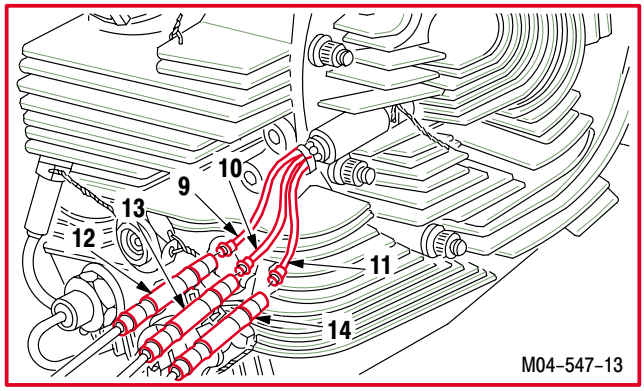
f. **Identify and depin nose gearbox oil temperature probe electrical wires (5), (6), (7), and (8) from connector P61/P60 (4) pins F, G, H, and J** (TM 55-1500-323-24)**.**

NOTE

Depin wires for nose gearbox oil pressure transducer from MT11 splices (No. 1 nose gearbox) or MT12 splices (No. 2 nose gearbox). Do not remove transducer from gearbox.



g. **Identify and depin nose gearbox oil pressure transducer electrical wires (9), (10), and (11) from MT11/M12 splices (12), (13), and (14)** (TM 55-1500-323-24)**.**



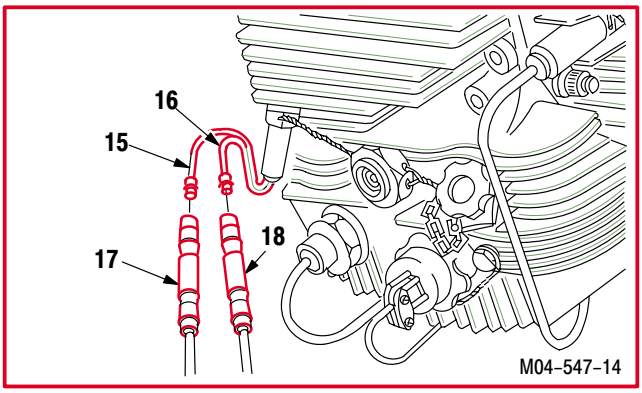
GO TO NEXT PAGE

6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued

NOTE

Depin wires for nose gearbox low oil pressure switch from S25 splices (No. 1 nose gearbox) or S26 splices (No. 2 nose gearbox). Do not remove switch from gearbox.

h. **Identify and depin nose gearbox low oil pressure switch electrical wires (15) and (16) from S25/S26 splices (17) and (18)** (TM 55-1500-323-24)**.**



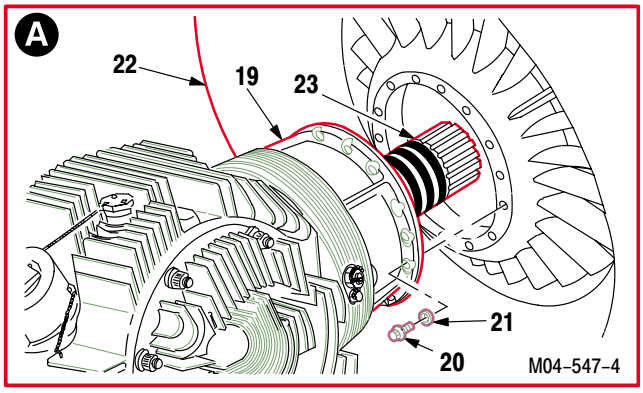
WARNING

The engine nose gearbox weighs approximately 40 pounds. To prevent possible injury to personnel or damage to gearbox, two persons support gearbox while third person removes attaching hardware.

i. **With two persons supporting gearbox (19), third person remove 15 bolts (20) and washers (21).**

j. **Remove gearbox (19) from engine (22).**

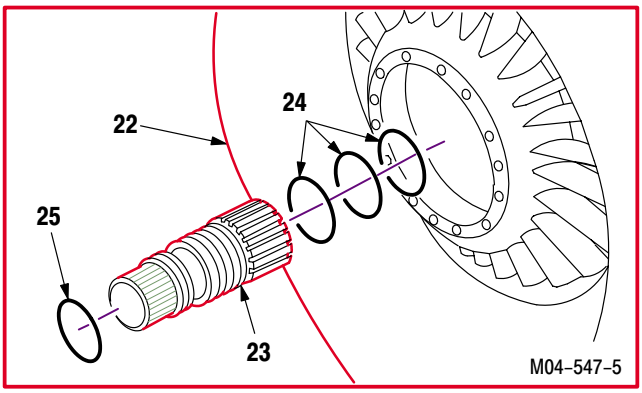
(1) Pull gearbox (19) straight out to prevent binding of quill shaft (23).



k. **Remove quill shaft (23) from engine (22).**

(1) Pull shaft (23) straight out to remove from engine (22).

(2) Remove and discard three packings (24) and packing (25) from shaft (23).



l. **Perform steps m. thru o. if engine nose gearbox is being replaced.**

GO TO NEXT PAGE

6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued

m. **Remove three fairing standoffs (26), (27), and (28) from gearbox (19).**

(1) Remove four screws (29), washers (30), two fairing standoffs (26), and shims (31).

(2) Remove two screws (32), washers (33), standoff (27), and shim (34).

(3) Remove screw (35), washer (36), standoff (28), and shim (37).

n. **Remove engine nose gearbox flexible coupling, diffuser, and fan impeller** (para 6.33)**.**

o. **Attach quill shaft (23) to gearbox (19) for disposition.**

6.36.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.36.5. Inspection

a. **Check gearbox retainer for cracks, gouges, and evidence of leaks.**

b. **Check coupling for nicks, dents, cracks, and elongated holes** (para 6.1)**.**

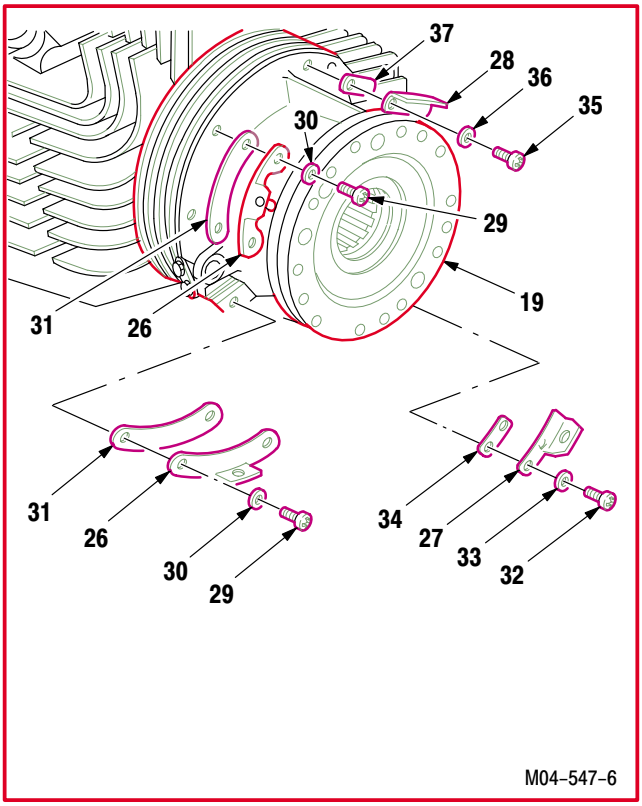
c. **Check transmission input shaft for nicks, dents, cracks, and loose or missing nut plates.** None allowed.

d. **Check diffuser, fan impeller and adapter for cracks, dents, and loose or missing bolts.**

(1) Foreign object damage not to exceed 15 percent of material thickness or **0.050 INCH** (whichever is less).

e. **Check coupling, input shaft, fan impeller, and adapter for corrosion** (para 1.49)**.**

f. **Check quill shaft for serviceability** (para 6.17)**.**



GO TO NEXT PAGE

6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued

6.36.6. Installation

CAUTION

To prevent foreign object damage to engine, cooling fan diffuser, or impeller, ensure all bolts, screws, or plugs are removed from all jackscrew holes.

NOTE

- Perform steps a. and b. if replacement gearbox is being installed. Go to step c. if gearbox is not being replaced.
- If replacement gearbox is being installed, ensure shipping plug is removed from bottom section of gearbox housing.

a. **Install engine nose gearbox flexible coupling, diffuser, and fan impeller** (para 6.33)**.**

b. **Install three fairing standoffs (26), (27), and (28) on gearbox (19).**

(1) Position two shims (31) and standoffs (26) on gearbox (19).

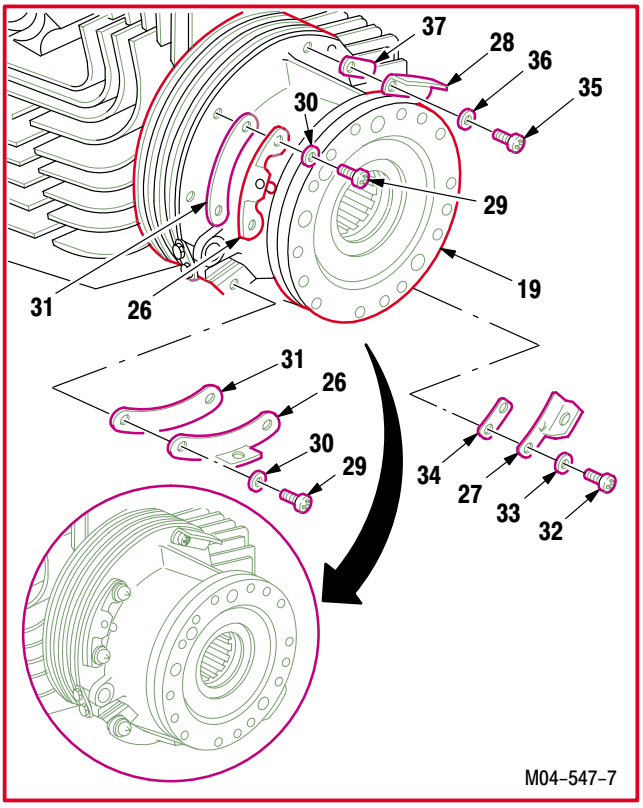
(2) Install four screws (29) through washers (30), two standoffs (26), shims (31), and gearbox (19).

(3) Position shim (34) and standoff (27) on gearbox (19).

(4) Install two screws (32) through washers (33), standoff (27), shim (34), and gearbox (19).

(5) Position shim (37) and standoff (28) on gearbox (19).

(6) Install screw (35) through washer (36), standoff (28), shim (37), and gearbox (19).



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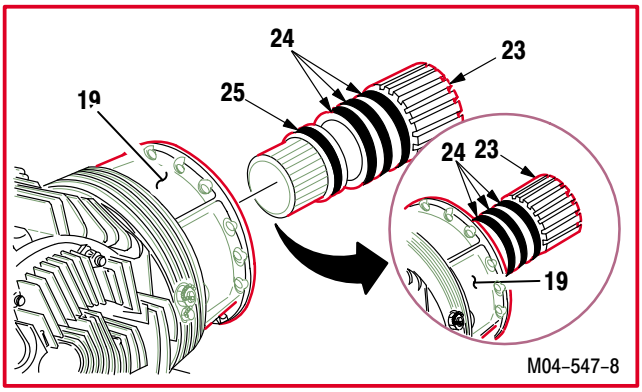
6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued



c. **Lubricate three new packings (24) and packing (25).** Use petrolatum (item 138, App F).

d. **Install three packings (24) and new packing (25) on quill shaft (23).**

e. **Install small end of quill shaft (23) in input shaft of gearbox (19).**



WARNING

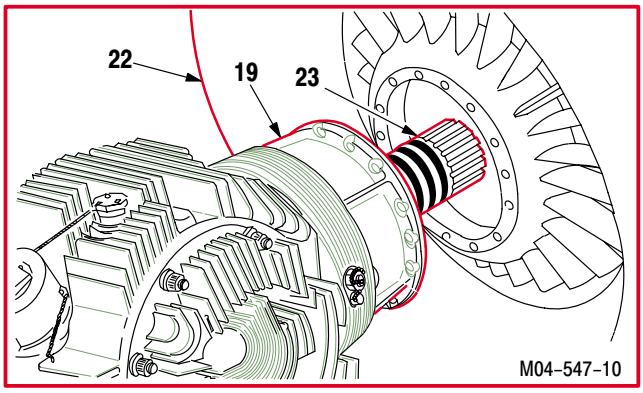
The engine nose gearbox weighs approximately 40 pounds. To prevent possible injury to personnel or damage to gearbox, two persons support gearbox while third person installs attaching hardware.

f. **With two persons supporting gearbox (19), position gearbox (19) on engine (22) with gearbox output shaft toward transmission input coupling.**

(1) With two persons supporting gearbox (19), third person guide quill shaft (23) in engine output shaft.

(2) Rotate quill shaft (23) as required to aline splines with engine output shaft splines.

(3) Rotate gearbox (19) on quill shaft (23) as required to aline gearbox output shaft with transmission input coupling.



g. **Aline bolt holes in flange of gearbox (19) with holes in engine (22).**

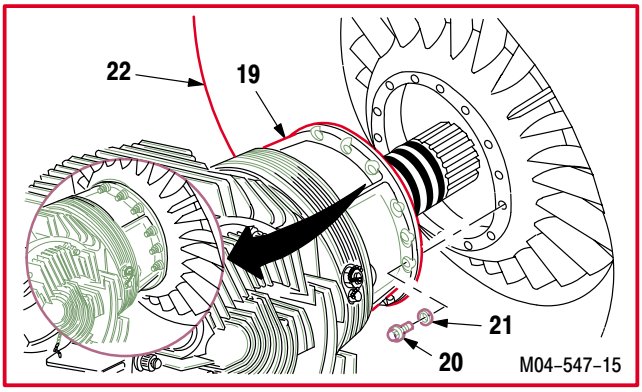
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6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued

h. **Install 15 bolts (20) and washers (21).** Torque 15 bolts (20) to **60 INCH-POUNDS**.

(1) With two persons supporting gearbox (19), third person install 15 bolts (20) and washers (21) evenly until seated on flange of gearbox (19).

(2) Torque 15 bolts (20) to **60 INCH-POUNDS**. Use torque wrench and crowfoot.



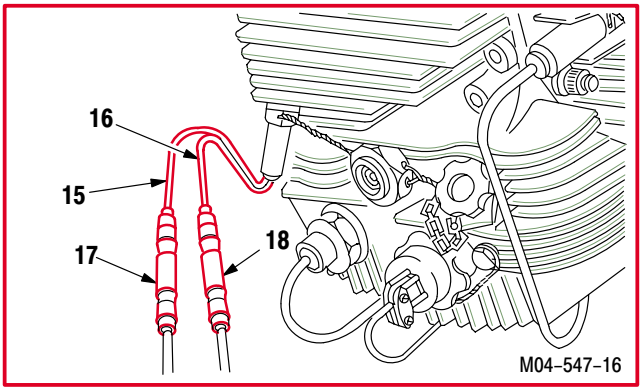
NOTE

Pin wires for nose gearbox low oil pressure switch to S25 splices (No. 1 nose gearbox) or S26 splices (No. 2 nose gearbox).

i. **Pin identified wires (15) and (16) in splices S25/S26 SP1 (17) and S25/S26 SP2 (18).**

(1) Pin red wire (15) in splice S25/S26 SP1 (17) (TM 55-1500-323-24).

(2) Pin white wire (16) in splice S25/S26 SP2 (18) (TM 55-1500-323-24).



NOTE

Pin wires for nose gearbox oil pressure transducer to MT11 splices (No. 1 nose gearbox) or MT12 splices (No. 2 nose gearbox).

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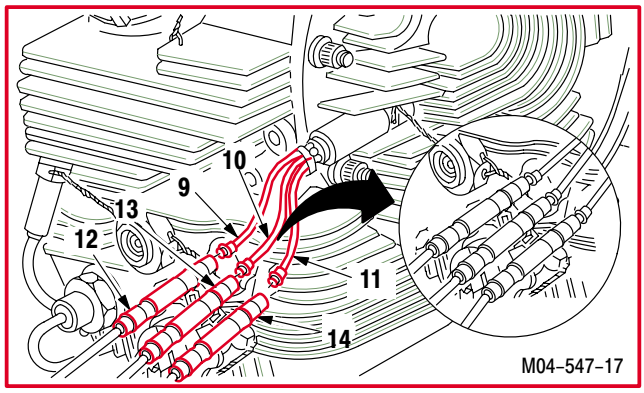
6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued

j. **Pin identified wires (9), (10), and (11) in splices MT11/MT12 SP1 (12), MT11/MT12 SP2 (13), and MT11/MT12 SP3 (14).**

(1) Pin red wire (9) in splice MT11/MT12 SP1 (12) (TM 55-1500-323-24).

(2) Pin black wire (10) in splice MT11/MT12 SP2 (13) (TM 55-1500-323-24).

(3) Pin white wire (11) in splice MT11/MT12 SP3 (14) (TM 55-1500-323-24).



NOTE

Pin wires for nose gearbox oil temperature probe to P61 (No. 1 nose gearbox) or P60 (No. 2 nose gearbox).

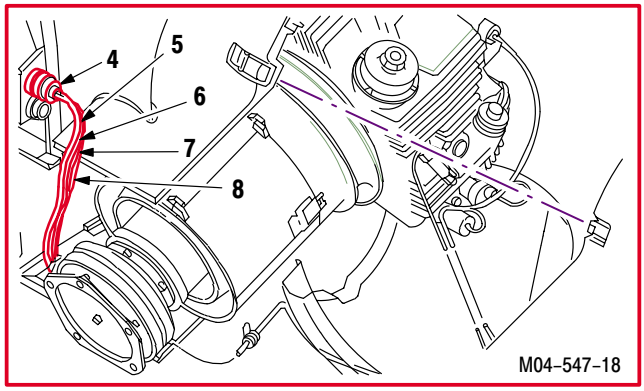
k. **Pin identified wires (5), (6), (7), and (8) in connector P61/P60 (4).**

(1) Pin unshielded red wire (5) in pin F of connector P61/P60 (4) (TM 55-1500-323-24).

(2) Pin unshielded red wire (6) in pin G of connector P61/P60 (4) (TM 55-1500-323-24).

(3) Pin shielded yellow wire (7) in pin H of connector P61/P60 (4) (TM 55-1500-323-24).

(4) Pin shielded blue wire (8) in pin J of connector P61/P60 (4) (TM 55-1500-323-24).



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6.36. ENGINE NOSE GEARBOX AND QUILL SHAFT REMOVAL/INSTALLATION – continued

NOTE

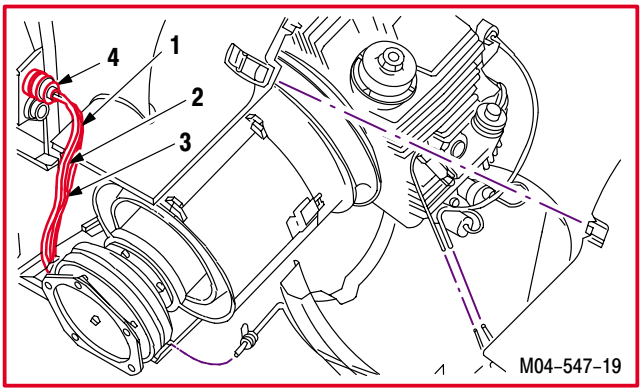
Pin wires for nose gearbox chip detector to P61 (No. 1 nose gearbox) or P60 (No. 2 nose gearbox).

l. **Pin identified wires (1), (2), and (3) in connector P61/P60 (4).**

(1) Pin white wire (1) in pin A of connector P60/P61 (4) (TM 55-1500-323-24).

(2) Pin red wire (2) in pin B of connector P61/P60 (4) (TM 55-1500-323-24).

(3) Pin black wire (3) in pin C of connector P61/P60 (4) (TM 55-1500-323-24).



m. **Inspect (QA).**

n. **Service engine nose gearbox with oil** (para 1.28)**.**

o. **Install No. 1 and/or No. 2 drive shaft** (para 6.2)**.**

p. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

q. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.37. ENGINE NOSE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION

6.37.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.37.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Jackscrew set (item 281, App H)

Materials/Parts:

Packing (3)
Assembly fluid (item 30, App F)
Cloth (item 52, App F)
Lubricating oil (item 119, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

Equipment Conditions:

Ref	Condition
6.36	Engine nose gearbox quill shaft removed

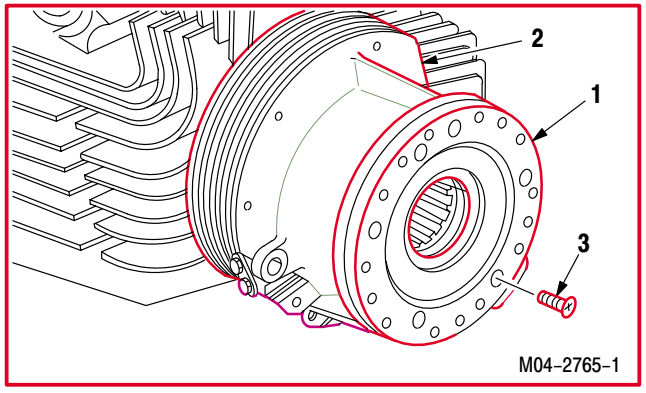
NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox input seal assembly.

6.37.3. Removal

a. **Remove retainer (1) from engine nose gearbox (2).**

(1) Remove three screws (3) from retainer (1).



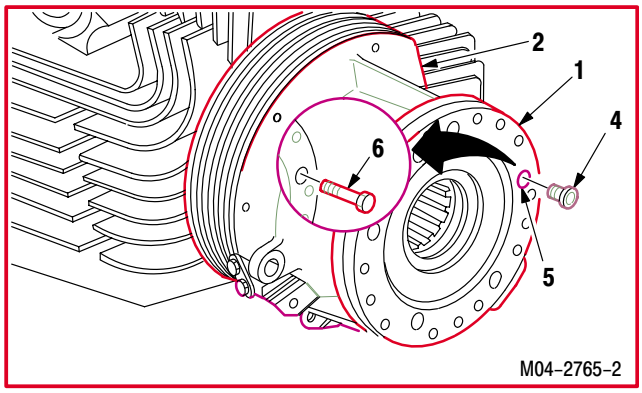
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6.37. ENGINE NOSE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(2) Remove sealing compound from three nylon setscrews (4).

(3) Remove three nylon setscrews (4) from inserts (5).

(4) Install three jackscrews (6) in inserts (5). Use jackscrew set.



CAUTION

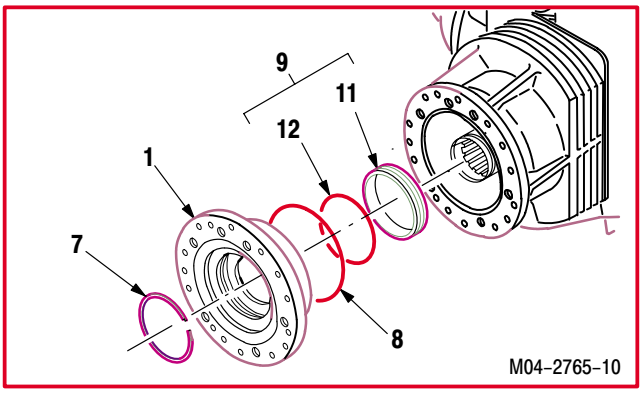
Jackscrews must be tightened evenly to avoid damage to gearbox.

(5) Tighten three jackscrews (6) evenly until retainer (1) separates from gearbox (2).

(6) Remove retainer (1) from gearbox (2).

(7) Remove three jackscrews (6) from retainer (1).

(8) Remove retaining ring (7) and packing (8) from retainer (1). Discard packing (8).



CAUTION

Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.

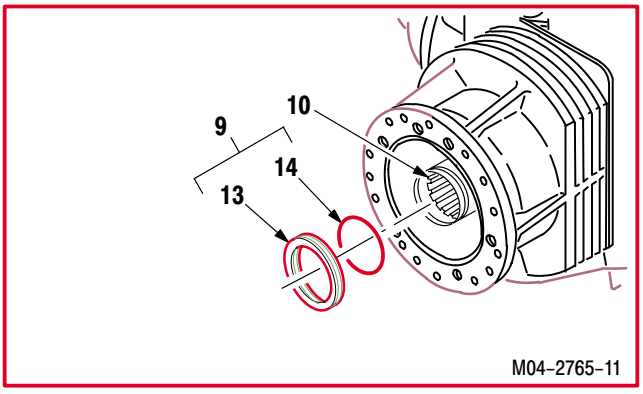
NOTE

The seal assembly is a two-piece magnetic seal that shall be kept as a matched set. Ensure both halves of seal assembly are removed.

b. **Remove input seal assembly (9) from retainer (1) and input gear (10).**

(1) Remove seal magnet (11) and packing (12) from retainer (1) by hand. Discard packing (12).

(2) Remove seal case (13) and packing (14) from input gear (10). Discard packing (14).



GO TO NEXT PAGE

6.37. ENGINE NOSE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.37.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.37.5. Inspection

a. **Check retainer for nicks, gouges, and burrs.**

(1) Repair damage **0.030 INCH** or less deep by blending. Use depth gage.

b. **Check retainer screw thread inserts for damaged threads and looseness** (TM 1-1500-204-23)**.**

c. **Check retainer and gearbox housing for elongated bolt holes.** None allowed.

d. **Check retainer and seal assembly for cracks.** None allowed.

e. **Check retainer and seal assembly for corrosion** (para 1.49)**.**

f. **Check seal assembly for scratches, nicks, and gouges.** Casting defects on non-mating surfaces are permissible.

g. **Check seal assembly carbon seal air gap measurement.**

(1) With seal halves together, measure the gap between magnet and seal case. Measure gap four places at 90 degrees. Use gap setting gage.

(2) If less than **0.007 INCH**, replace seal.

h. **Check seal assembly for wear step on carbon seal mating surface (highly polished surface).** None allowed.

6.37.6. Installation



CAUTION

- Do not use paper type material to clean parts.
- Work area is to be clean and free from any metal chips to prevent damage to seal.
- Retainer surface must be free of preservatives and oils. MIL-L-23699 oil will cause packing lubricant to break down or packing to twist causing seal to fail.
- The seal assembly is a magnetic seal. Hold case firmly to prevent faces from slamming together. Care must be used when mating seal assembly or damage to mating surfaces may result.
- New seal assemblies are to remain in packaging until ready for installation or damage to magnetic seal will occur.

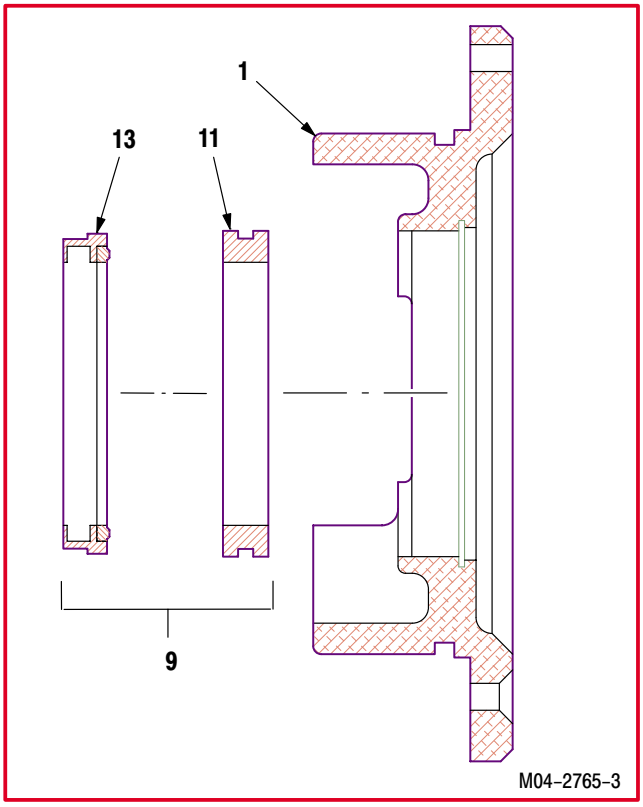
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6.37. ENGINE NOSE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

a. **Install seal assembly (9) in retainer (1).**

(1) Clean magnet (11) and retainer (1) mating surface (para 1.47).

(2) Apply a film of assembly fluid to mating of retainer (1). Use assembly fluid (item 30, App F).



CAUTION

- Substituting or mixing other lubricants with assembly fluid will cause assembly fluid to break down and not perform as required. This can also cause packing to twist at installation and ultimately cause seal to fail.
- Ensure mating surfaces of seal, retainer, and packings, are completely covered with assembly fluid or damage will occur.
- Damage to packings will occur if a pointed or sharp edged tool is used to remove packings from magnetic seal assembly.
- Do not allow seal halves to slide across each other or damage to mating faces may occur.

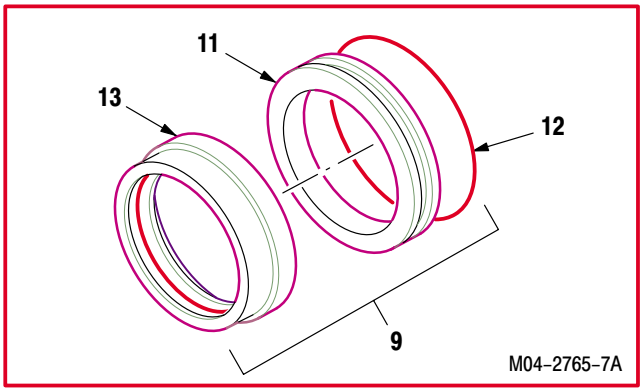
NOTE

If installing new seal assembly, go to step (3). If reinstalling seal assembly, go to step (6).

(3) Remove seal assembly (9) from packaging and separate case seal (13) and magnet (11) axially, without sliding. Discard paper separator.

(4) Check mating surfaces of seal assembly (9) for contamination and damage during shipping and handling.

(5) Remove packing (12) from magnet (11).



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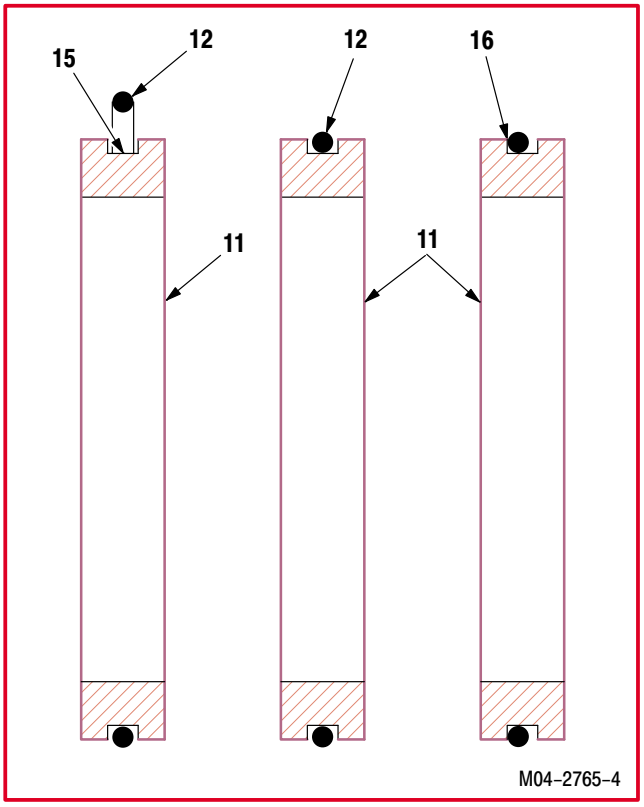
6.37. ENGINE NOSE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(6) Apply a film of assembly fluid to new packing (12). Ensure packing (12) is completely covered. Use assembly fluid (item 30, App F).

(7) Install packing (12) in magnet groove (15).

(a) Slightly stretch packing (12) over magnet (11) to allow packing to contact magnet groove (15). Failure to stretch packing (12) will cause seal to fail.

(b) Position packing (12) against shoulder of groove (16), opposite direction of installation.



CAUTION

- Apply even pressure on magnet during installation to prevent cocking or twisting of packing.
- Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.

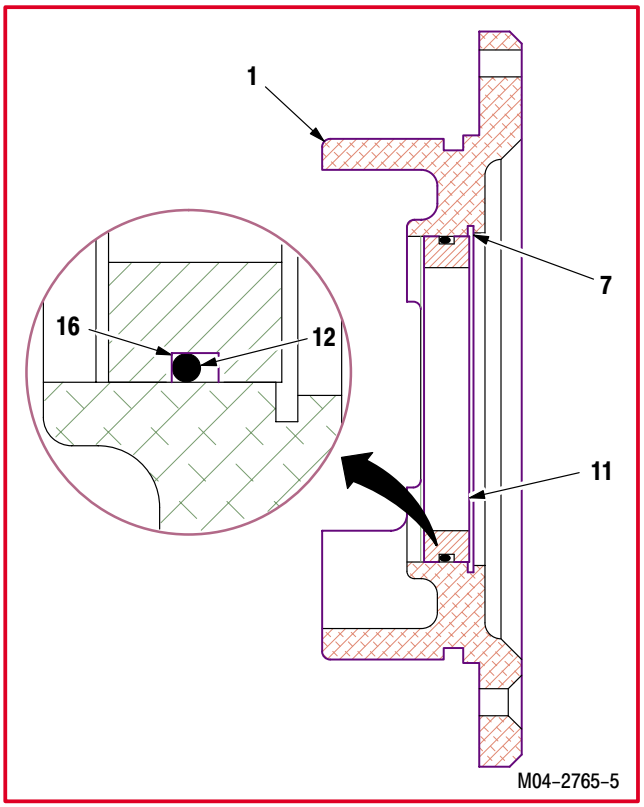
(8) Ensuring magnet (11) part number is facing front side of retainer (1) and highly polished surface is facing aft side of retainer (1), position magnet (11) in retainer (1).

(9) Cover magnet (11) with lint-free cloth and hand press magnet (11) with packing (12) in retainer (1) far enough to allow installation of retaining ring (7). Use cloth (item 52, App F).

(10) Install retaining ring (7) in retainer (1) against magnet (11).

NOTE

If installing new seal assembly, go to step (11). If reinstalling seal assembly, go to step (12).



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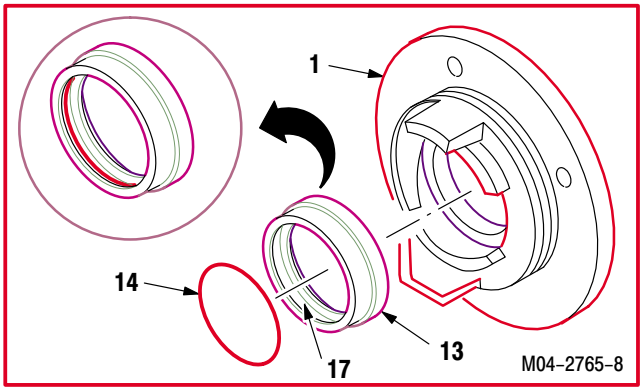
6.37. ENGINE NOSE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(11) Remove packing (14) from seal case (13).

(12) Apply a film of assembly fluid on new packing (14). Ensure that packing (14) is completely covered. Use assembly fluid (item 30, App F).

(13) Install packing (14) in seal case (13).

(a) Position packing (14) against shoulder of groove (17), opposite direction of installation.



CAUTION

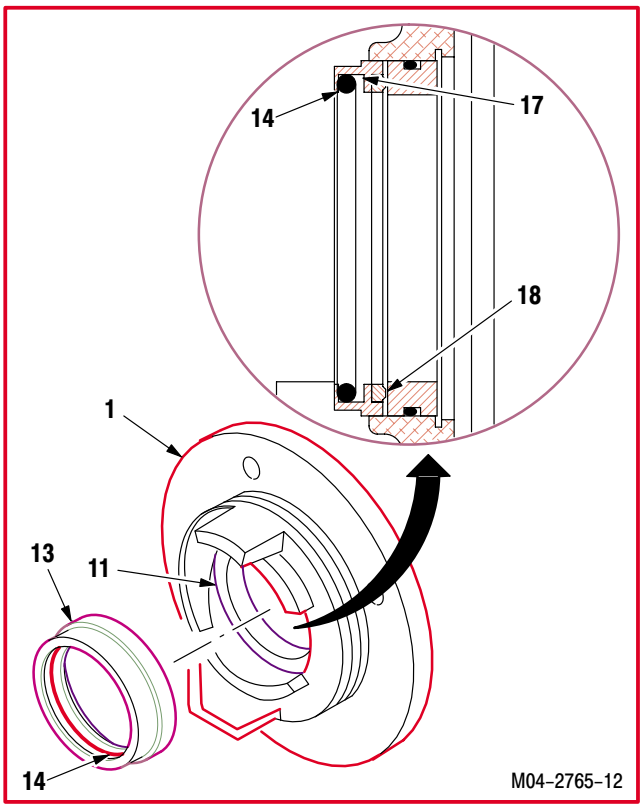
- Mating surfaces between magnet and seal case, must be clean and free of assembly fluid or damage will occur.
- Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.
- The seal assembly is a magnetic seal. Hold seal assembly firmly to prevent faces from slamming together. Care must be used when mating seal assembly or damage to mating surfaces may result.

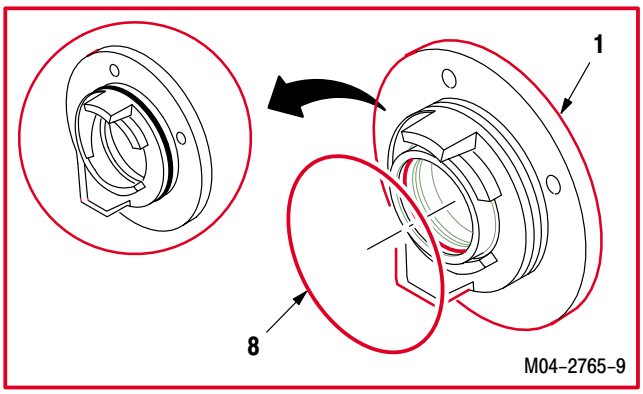
(14) Clean mating surfaces of magnet (11) and seal case (13) (para 1.47).

(15) Apply a film of lubricating oil to mating surfaces of magnet (11) and seal case (13). Use lubricating oil (item 119, App F).

(16) Firmly hold seal case (13) with carbon ring (18) towards magnet (11) and install on magnet (11).

(17) Lubricate new packing (8) and install on retainer (1). Use assembly fluid (item 30, App F).





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6.37. ENGINE NOSE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued



CAUTION

Do not move retainer axially away from gearbox before securing, as seal leakage may result and seal must be completely removed from retainer and reinstalled.

b. **Install retainer (1) on gearbox (2).**

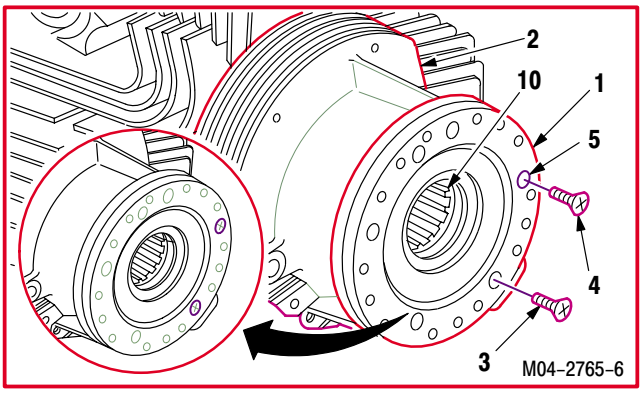
(1) Lubricate gear (10) diameter. Use assembly fluid (item 30, App F).

(2) Position retainer (1) on gearbox (2).

(3) Install three screws (3).

(4) Install three nylon setscrews (4) in inserts (5).

(5) Apply sealing compound to nylon setscrews (4). Use sealing compound (item 177, App F).



c. **Inspect (QA).**

d. **Install engine nose gearbox quill shaft** (para 6.36)**.**

END OF TASK

6.38. ENGINE NOSE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION

6.38.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.38.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Bolt (NAS 564-33) (2)
Packing (4)
Self-locking nut (6)
Assembly fluid (item 30, App F)
Cloth (item 52, App F)
Lubricating oil (item 119, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

Equipment Conditions:

Ref	Condition
2.123	Engine nose gearbox fairings and shrouds removed
6.2	No. 1 or No. 2 drive shaft removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox output seal assembly.

6.38.3. Removal

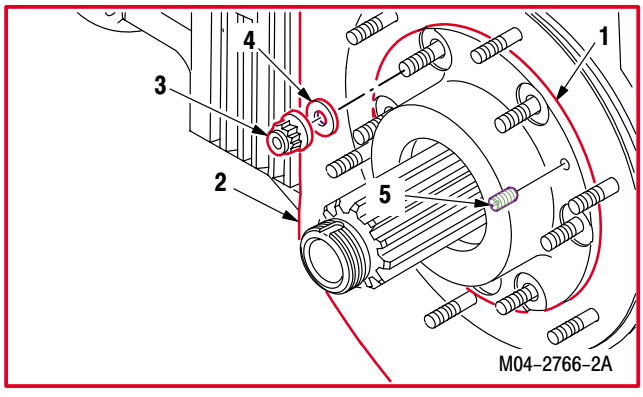
Remove retainer (1) from engine nose gearbox (2).

(1) Remove six self-locking nuts (3) and washers (4) from gearbox (2) studs.

(2) Discard nuts (3).

(3) Remove sealing compound from two nylon setscrews (5).

(4) Remove two nylon setscrews (5) from retainer (1).



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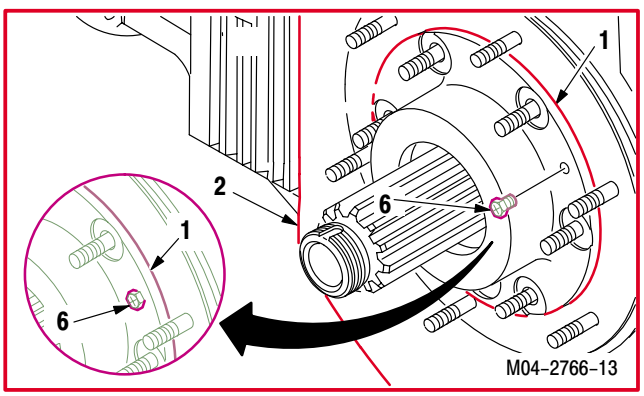
6.38. ENGINE NOSE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

Install two NAS bolts (5) and (6) on retainer (1). Use bolt NAS 564-33.

CAUTION

NAS bolts must be tightened evenly to avoid damage to gearbox.

Tighten two NAS bolts (5) and (6) evenly until retainer (1) separates from gearbox (2).

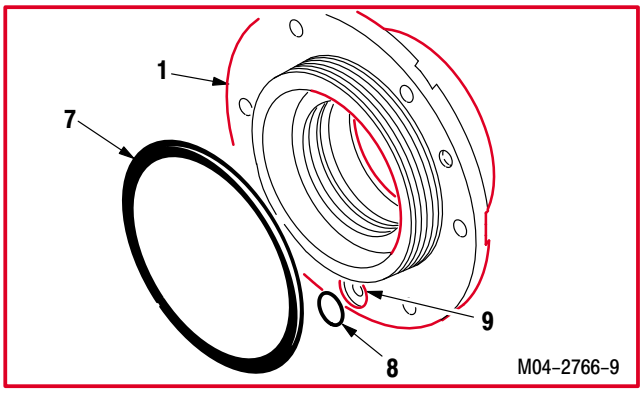


(7) Remove retainer (1) from gearbox (2).

(8) Remove two NAS bolts (6) from retainer (1).

Remove and discard packing (7) from retainer (1).

Remove and discard packing (8) from oil port recess (9).



CAUTION

Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.

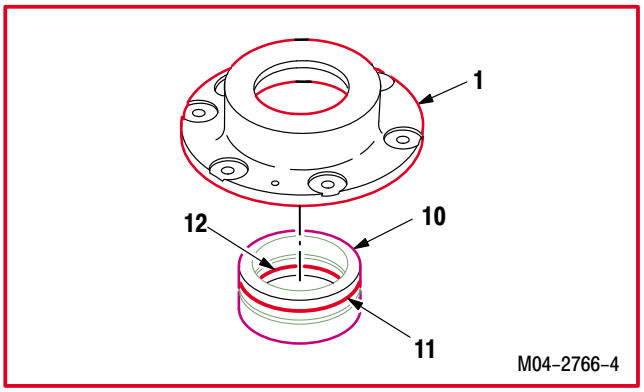
NOTE

The seal assembly is a two-piece magnetic seal that should be kept as a matched set. Ensure both halves of seal assembly are removed.

Remove output seal assembly (10) from retainer (1).

(1) Remove seal assembly (10) by hand.

(2) Remove and discard packings (11) and (12).



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6.38. ENGINE NOSE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION

6.38.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.38.5. Inspection

a. **Check retainer for nicks, gouges, and burrs.**

(1) Repair damage **0.040 INCH** or less deep by blending. Use depth gage.

b. **Check retainer for loose or damaged clinch nuts** (TM 1-1500-204-23)**.**

c. **Check retainer for elongated bolt holes.** None allowed.

d. **Check retainer and seal assembly for cracks.** None allowed.

e. **Check retainer and seal assembly for corrosion** (para 1.49)**.**

f. **Check seal assembly for scratches, nicks, and gouges.** Casting defects on non-mating surfaces are permissible.

g. **Check seal assembly carbon seal air gap measurement.**

(1) With the seal halves together, measure gap between magnet and seal case. Measure gap four places at 90 degrees. Use gap setting gage.

(2) If less than **0.007 INCH**, replace seal assembly.

h. **Check seal assembly for wear step on carbon seal mating surface (highly polished surface).** None allowed.

6.38.6. Installation



CAUTION

- Do not use paper type material to clean parts.
- Work area is to be clean and free from any metal chips to prevent damage to seal.
- Retainer surface must be free of preservatives and oils. MIL-L-23699 oil will cause packing lubricant to break down or packing to twist causing seal to fail.
- The seal assembly is a magnetic seal. Hold case firmly to prevent faces from slamming together. Care must be used when mating seal assembly or damage to mating surfaces may result.
- New seal assemblies are to remain in packaging until ready for installation or damage to magnetic seal will occur.

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6.38. ENGINE NOSE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

a. **Install seal assembly (10) in retainer (1).**

(1) Clean magnet (13) and retainer (1) mating surface (para 1.47).

(2) Apply a film of assembly fluid to mating surface of retainer (1). Use assembly fluid (item 30, App F).

CAUTION

- Substituting or mixing other lubricants with assembly fluid will cause assembly fluid to break down and not perform as required. This can also cause packing to twist at installation and ultimately cause seal to fail.
- Ensure mating surfaces of seal, retainer, and packings, are completely covered with assembly fluid or damage will occur.
- Damage to packings will occur if a pointed or sharp edged tool is used to remove packings from magnetic seal assembly.
- Do not allow seal halves to slide across each other or damage to mating faces may occur.

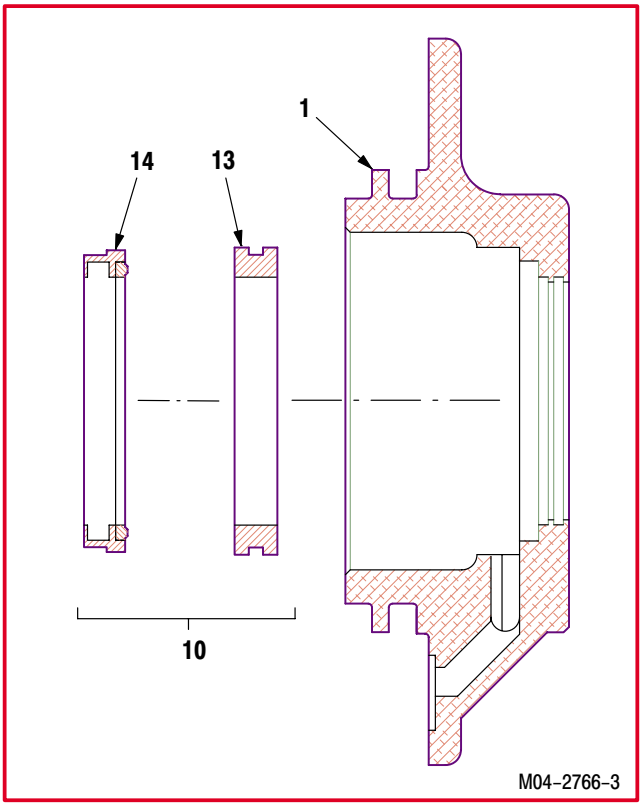
NOTE

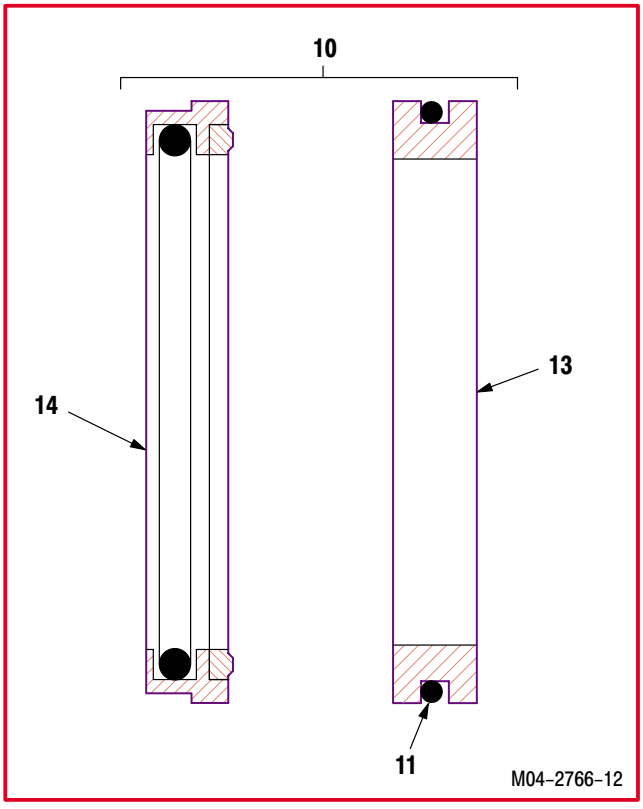
If installing new seal assembly, go to step (3). If reinstalling seal assembly, go to step (6).

(3) Remove seal assembly (10) from packaging and separate case seal (14) and magnet (13) axially, without sliding. Discard paper separator.

(4) Check mating surfaces of seal assembly (10) for contamination and damage during shipping and handling.

(5) Remove packing (11) from magnet (13).





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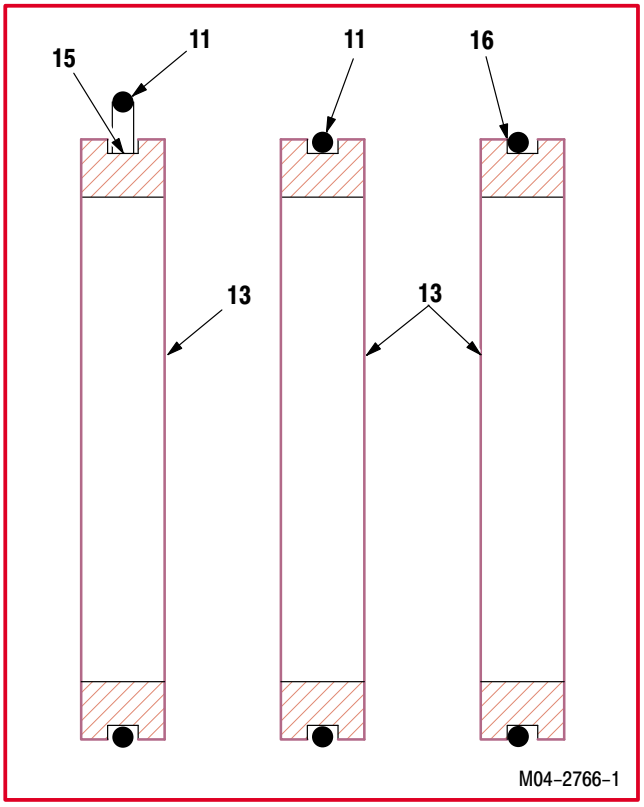
6.38. ENGINE NOSE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(6) Apply a film of assembly fluid to new packing (11). Ensure packing (11) is completely covered. Use assembly fluid (item 30, App F).

(7) Install packing (11) in magnet groove (15).

(a) Slightly stretch packing (11) over magnet (13) to allow packing to contact magnet groove (15). Failure to stretch packing (11) will cause seal to fail.

(b) Position packing (11) against shoulder of groove (16), opposite direction of installation.

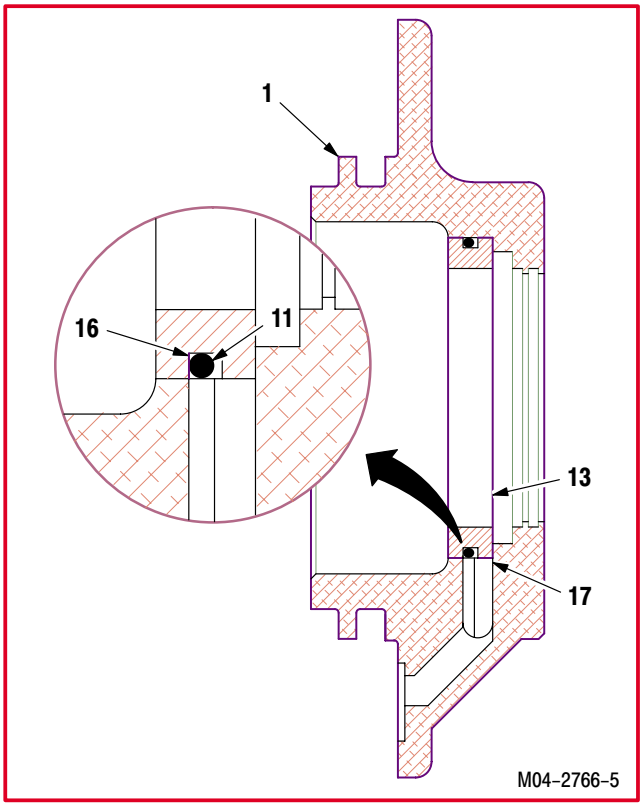


CAUTION

- Apply even pressure on magnet during installation to prevent cocking or twisting of packing.
- Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.

(8) Ensuring magnet (13) part number is facing front side of retainer (1) and highly polished surface is facing aft side of retainer (1), position magnet (13) in retainer (1).

(9) Cover magnet (13) with lint-free cloth and hand press magnet (13) with packing (11) in retainer (1) until squarely seated against retainer shoulder (17). Use cloth (item 52, App F).



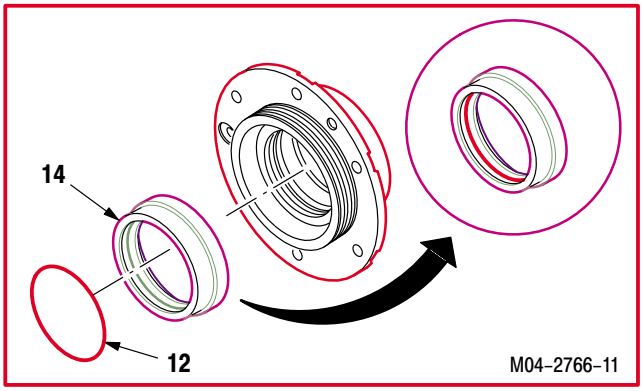
NOTE

If installing new seal assembly, go to step (10). If reinstalling seal assembly, go to step (11).

GO TO NEXT PAGE

6.38. ENGINE NOSE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

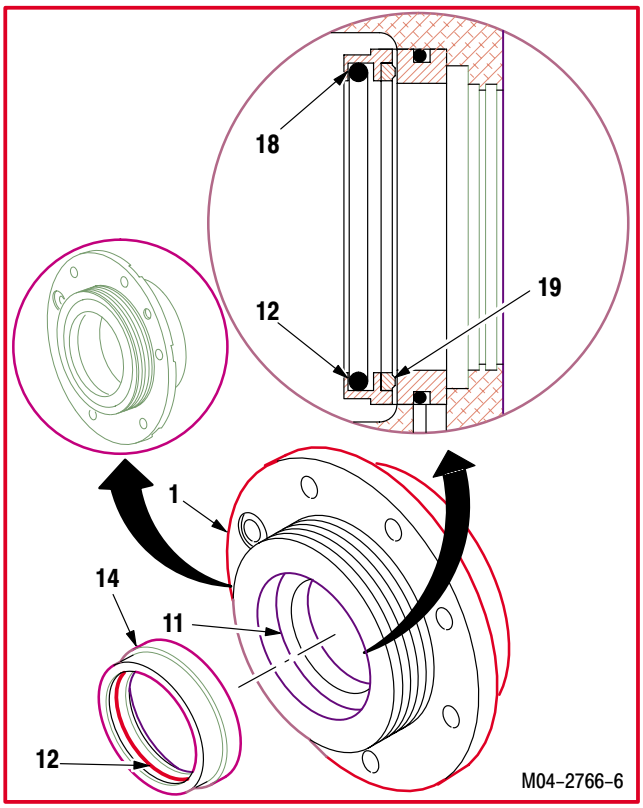
(10) Remove packing (12) from seal case (14).



(11) Apply a film of assembly fluid on new packing (12). Ensure that packing (12) is completely covered. Use assembly fluid (item 30, App F).

(12) Install packing (12) in seal case (14).

(13) Position packing (12) against shoulder of groove (18), opposite direction of installation.



CAUTION

- Mating surfaces between magnet and seal case, must be clean and free of assembly fluid or damage may occur.
- Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.
- The seal assembly is a magnetic seal. Hold seal assembly firmly to prevent faces from slamming together. Care must be used when mating seal assembly or damage to mating surfaces may result.

(14) Clean mating surfaces of magnet (13) and seal case (14) (para 1.47).

(15) Apply a film of lubricating oil to mating surfaces of magnet (13) and seal case (14). Use lubricating oil (item 119, App F).

(16) Firmly hold seal case (14) with carbon ring (19) towards magnet (13) and install on magnet (13).

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6.38. ENGINE NOSE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not move retainer axially away from gearbox before securing, as seal leakage may result and seal must be completely removed from retainer and reinstalled.

Install retainer (1) on gearbox (2). Torque six nuts (3) to **60 INCH-POUNDS**.

(1) Lubricate new packings (7) and (8). Use assembly fluid (item 30, App F).

(2) Install packing (7) on retainer (1).

(3) Lubricate oil port recess (9) diameter. Use assembly fluid (item 30, App F).

(4) Install packing (8) in oil port recess (9).

(5) Lubricate shaft (20) diameter. Use assembly fluid (item 30, App F).

(6) Aline oil port recess (9) on retainer (1) with port (21) on gearbox (2).

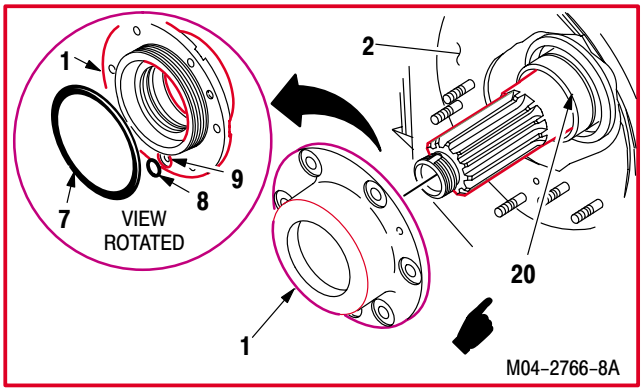
(7) Position retainer (1) on gearbox (2).

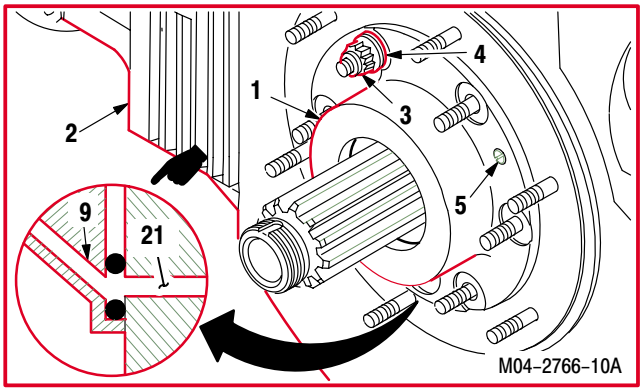
(8) Install six washers (4) and new self-locking nuts (3) on gearbox (2) studs.

(9) Torque six nuts (3) to **60 INCH-POUNDS**. Use torque wrench.

(10) Install two nylon setscrews (5) in retainer (1).

(11) Apply sealing compound to setscrews (5). Use sealing compound (item 177, App F).





c. **Inspect (QA).**

Install No. 1 and/or No. 2 drive shaft (para 6.2)**.**

Install engine nose gearbox fairings and shrouds (para 2.123)**.**

END OF TASK

6.39. ENGINE NOSE GEARBOX ROTOR OUTPUT SHAFT SEAL REMOVAL/INSTALLATION (AVIM)

6.39.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.39.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.300 - 24/0 - 24-inch inside/outside vernier caliper (item 54, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

Packing
Assembly fluid (item 30, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
6.38	Engine nose gearbox output seal assembly removed

NOTE

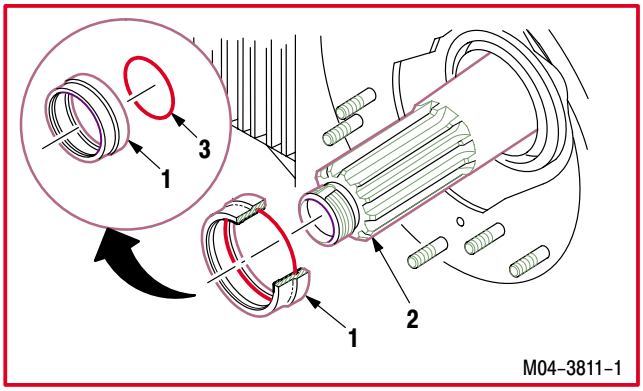
This task is typical for either No. 1 or No. 2 engine nose gearbox rotor output shaft seal.

6.39.3. Removal

a. **Remove rotor output shaft seal (1) from engine nose gearbox output shaft (2).**

(1) Remove seal (1) from shaft (2).

(2) Remove and discard packing (3) from seal (1).



6.39.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

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6.39. ENGINE NOSE GEARBOX ROTOR OUTPUT SHAFT SEAL REMOVAL/INSTALLATION (AVIM) – continued

6.39.5. Inspection

NOTE

The following inspection procedures apply to the rotor output shaft seal.

a. **Check cracks and distortion.** None allowed.

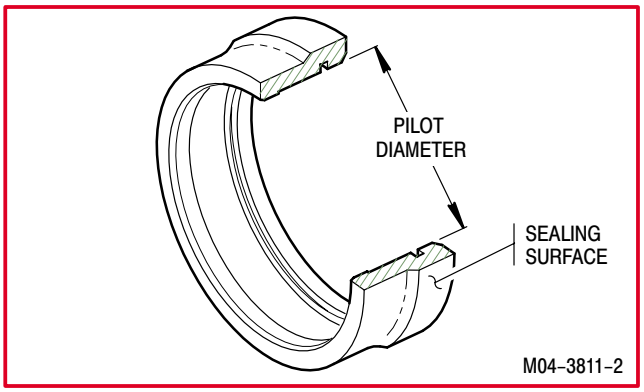
b. **Check for damage on sealing surface.** None allowed.

c. **Check pilot diameter.**

(1) Diameter not to exceed **1.560 INCHES**. Use caliper.

d. **Check for corrosion, scratches, nicks, and gouges.**

(1) Except for pilot diameter and sealing surface, repair damaged areas measuring **0.030 INCH** or less deep by blending. Use depth gage.



6.39.6. Installation



a. **Install seal (1) on shaft (2).**

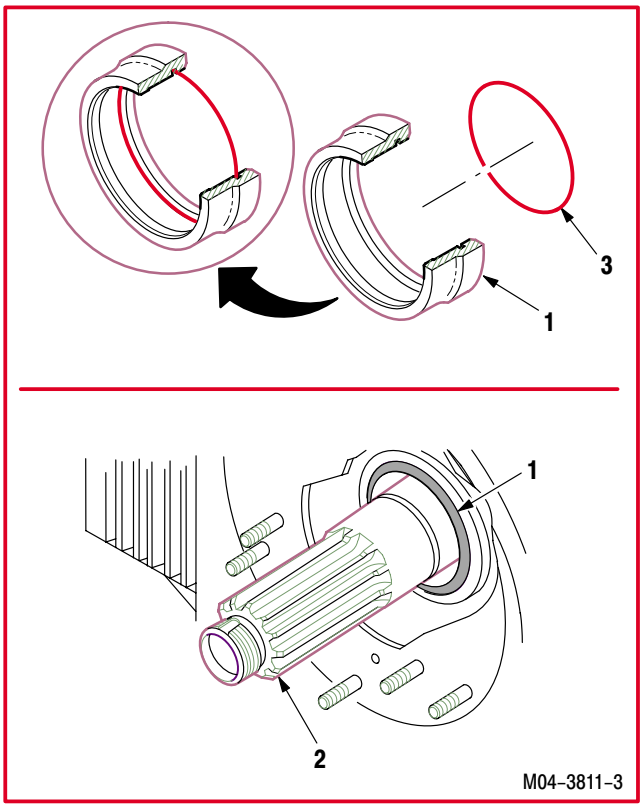
(1) Lubricate new packing (3). Use assembly fluid (item 30, App F).

(2) Install packing (3) in seal (1).

(3) Install seal (1) on shaft (2).

b. **Inspect (QA).**

c. **Install engine nose gearbox output seal assembly** (para 6.38)**.**



END OF TASK

6.40. ENGINE NOSE GEARBOX PRELOAD SHIM REMOVAL/INSTALLATION (AVIM)

6.40.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.40.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Cloth (item 52, App F)
Dry cleaning solvent (item 74, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

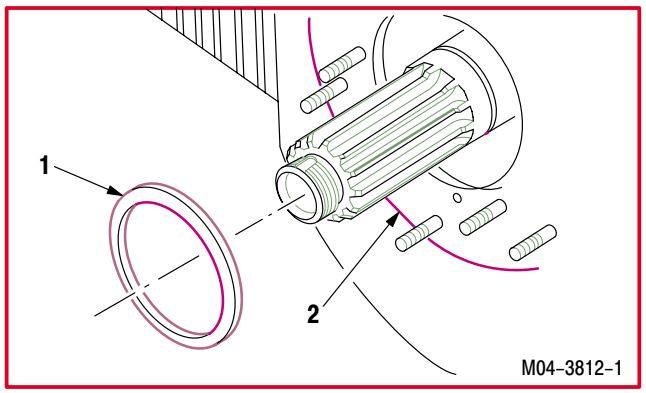
Ref	Condition
6.39	Engine nose gearbox rotor output shaft seal removed

NOTE

This task is typical for either No. 1 or No. 2 engine nose gearbox preload shim.

6.40.3. Removal

a. **Remove preload shim (1) from engine nose gearbox (2).**



6.40.4. Cleaning



a. **Clean removed preload shim.** Use dry cleaning solvent (item 74, App F) and cloth (item 52, App F).

6.40.5. Inspection

a. **Check preload shim for cracks and distortion.** None allowed.

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6.40. ENGINE NOSE GEARBOX PRELOAD SHIM REMOVAL/INSTALLATION (AVIM) – continued

b. **Check preload shim for scratches, nicks, gouges, burrs, and corrosion.**

(1) Repair damaged areas measuring **0.030 INCH** deep or less by blending. Use depth gage.

CAUTION

- Exercise extreme care and accuracy when taking measurements to determine if removed preload shim is within tolerance limitations. Correct thickness of preload shim is critical to proper operation of engine nose gearbox.
- Do not reuse removed preload shim if thickness does not fall within tolerance limitations. Damage to engine nose gearbox may result.

c. **Determine if thickness of removed preload shim is within tolerance.**

(1) Measure and record thickness of removed preload shim. Use caliper set.

(2) Measure depth from outer face of gearbox housing (3) to outer race of installed duplex bearing (4). Use depth gage.

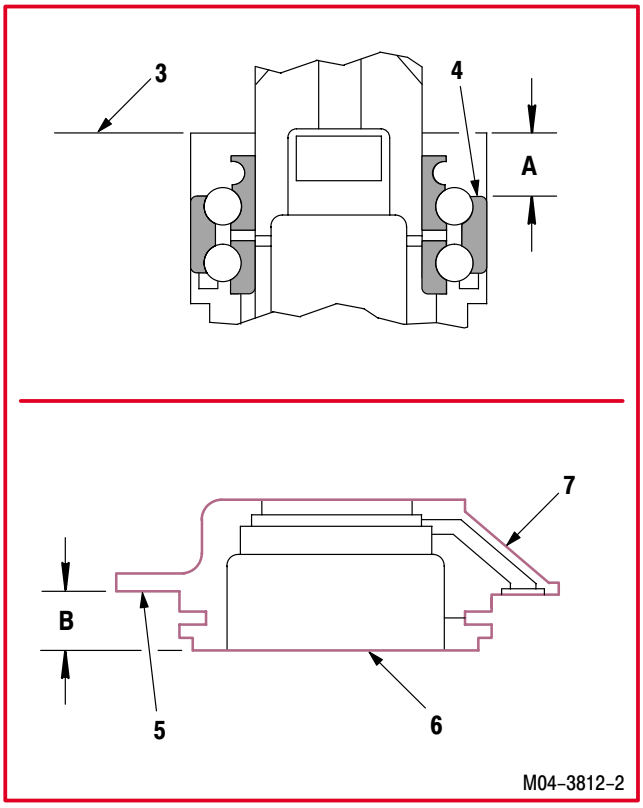
(a) Record as dimension A.

(3) Measure height from flange mating surface (5) to bottom surface (6) of retainer (7). Use caliper set.

(a) Record as dimension B.

(4) Subtract dimension B from dimension A and add **0.004 INCH** to answer.

(a) Record as dimension C.



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6.40. ENGINE NOSE GEARBOX PRELOAD SHIM REMOVAL/INSTALLATION (AVIM) – continued

(5) Compare thickness of removed preload shim against calculated dimension C.

(a) If thickness of removed preload shim is within ±**0.001 INCH** of dimension C, re-use preload shim. Use caliper set.

(b) If thickness of removed preload shim is not within ±**0.001 INCH** of dimension C, discard removed preload shim and obtain new preload shim. Use caliper set.

(c) Surface grind new preload shim to meet tolerance requirements and clean prior to installation (para 6.40.4).

CALCULATION OF PRE-LOAD SHIM THICKNESS

DIM. A	_____	
MINUS DIM. B	_____	
EQUALS	_____	
PLUS	+ 0.004 INCH	
EQUALS DIM. C	_____	± 0.001 INCH

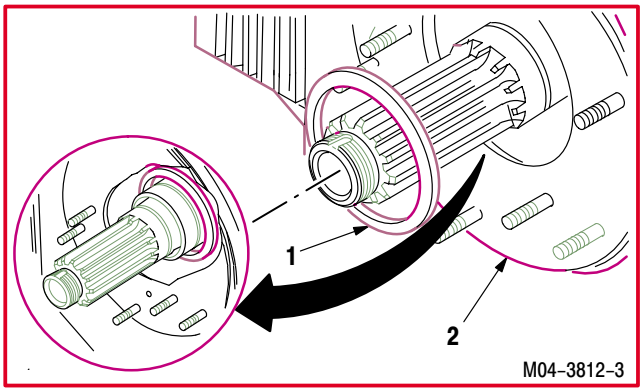
M04-3812-4

6.40.6. Installation

a. **Install preload shim (1) in gearbox (2).**

b. **Inspect (QA).**

c. **Install engine nose gearbox rotor output shaft seal** (para 6.39)**.**



M04-3812-3

END OF TASK

SECTION III. MAIN TRANSMISSION MAINTENANCE

6.41. MAIN TRANSMISSION INSPECTION

6.41.1. Description

This task covers: Inspection.

6.41.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Fluorescent inspection kit (item 138, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-335-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; fairings L230 and R230 removed; panels L200 and R200 removed

6.41.3. Inspection

a. **Check for corrosion** (para 1.49)**.**

b. **Check for scratches, nicks and gouges.**

(1) Scratches, nicks and gouges which do not develop into cracks or leaks are acceptable provided that there are no sharp edges and that damage does not interfere with operational characteristics of affected components.

(2) Replace component if scratch, nick, or gouge develops into a crack or leak.

c. **Check for sharp edges.**

(1) Remove minimal material required to blend sharp edges if blending is required.

(2) Use approved nondestructive testing methods to determine if cracks exist.

(3) If acceptable, provide component with a protective finish to reworked area.

(4) Ensure that protective coat is maintained if no rework is involved.

d. **Check upper case nuts.**

(1) Torque check upper case nuts to **190 INCH-POUNDS**. Use torque wrench.

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6.41. MAIN TRANSMISSION INSPECTION – continued

e. **Check for leakage from input clutch.**

(1) Check compressor drive adapter and seal for leakage.

(2) Leakage requiring more than 4 ounces at refill is not acceptable.

f. **Check for leakage from output seal.**

(1) Leakage requiring more than 4 ounces at refill is not acceptable.

g. **Check for lube oil leakage from transmission housings.**

(1) Replace seal if leakage rate exceeds one drop per minute (para 6.89, 6.74, and 6.75).

h. **Check differential pressure indicators.**

(1) If indicator button is extended, perform drive system dynamic maintenance operational check (TM 1-1520-238-T).

i. **Check for evidence of oil leakage between transmission cover and support and between support and main housing.**

CAUTION

Under no circumstances shall the cover or support be disassembled, except during depot level maintenance, or damage to transmission may occur.

(1) If leakage is evident; allow transmission to cool to ambient temperature and retorque cover nuts (32 places), in such a sequence that nut being torqued is furthest from previously torqued nut, to **195 INCH-POUNDS**.

(2) Perform drive system dynamic maintenance operational check (TM 1-1520-238-T).

(3) Recheck for evidence of oil leakage. If leakage is evident, replace transmission (para 6.101).

j. **Check transmission cover, especially around oil jet areas, for cracks and oil leaks.**

(1) No cracks allowed.

(2) If oil leakage is present, but no evidence of cracks can be found, fluorescent penetrant inspect suspect areas (TM 55-1500-335-23). Use fluorescent inspection kit.

k. **Recheck suspected areas on cover, flange bolt hole bosses, or flange web area using a 5 power magnifier.**

(1) If cracking or oil leakage is evident, replace transmission.

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6.41. MAIN TRANSMISSION INSPECTION – continued

l. **Check magnesium cast transmission housing for damage, depth not to exceed 15 percent of material thickness.**

(1) Where material thickness cannot be determined, maximum allowable depth is **0.050 INCH** in a **1 SQUARE-INCH** area. Use depth gage.

(2) After blending, magnesium must be corrosion protected. Touch up (para 6.43).

m. **Check generator seal on spline adapter for leakage.**

(1) Replace seal if leakage exceeds **ONE DROP PER MINUTE** (para 6.43).

n. **Check tail rotor drive flange for serviceability.**

(1) Check for nicks, burrs, gouges, and corrosion. Except for surfaces identified below, depths less than **0.020 INCH** before blending are acceptable. Use depth gage.

(2) Check packing groove for scratches, nicks, gouges, and corrosion. Damage of **0.004 INCH** or less may be blended out at a 30:1 transition ratio. Use depth gage.

(3) Check for fractures and/or cracks. None allowed.

(4) Check identification marking. Must be readable.

(5) Check coupling mounting diameter. Minimum diameter **2.1236 INCH**. Use caliper set.

(6) Check diameter of pilot between shaft and gear. Minimum diameter **1.6215 INCH**. Use caliper set.

(7) Check diameter of pilot between gear and plug. Minimum diameter **1.3150 INCH**. Use caliper set.

(8) Check shaft runout. Total indicated runout relative to pilots **0.004 INCH**. Use caliper set.

(9) Check spline teeth.

(a) No scuffing, scoring, or spalling allowed.

(b) Maximum pitting depth before blending **0.008 INCH**. Use depth gage.

(c) Maximum wear step **0.008 INCH**. Use depth gage.

(d) Measure “Over Balls” diameter with two **0.1920 INCH** diameter gage balls placed in tooth spaces approximately 180 degrees apart. Take three “Over Balls” measurements at locations approximately 120 degrees apart. Minimum “Over Balls” diameter **1.7794 INCH**. Use caliper set.

(10) Check five **0.2500 INCH** hole diameters. Maximum diameter **0.2585 INCH**. Use caliper set.

(11) Check cadmium plating. Damaged and missing cadmium plating is acceptable.

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6.41 MAIN TRANSMISSION INSPECTION – continued

o. **In event of erratic rotor bar readings, clean magnetic pickup** (para 6.44)**.**

(1) If problem persists, replace magnetic pickup (para 6.44).

p. **Secure access doors T250L, T250R, T290L, T290R, and L325; install fairings L230 and R230; install panels L200 and R200** (para 2.2)**.**

END OF TASK

6.42. MAIN TRANSMISSION TEMPERATURE TRANSDUCER REPLACEMENT

6.42.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.42.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 90, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Personnel Required:

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Materials/Parts:

Packing
Cloth (item 52, App F)
Petrolatum (item 138, App F)
Wire (item 222, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.32	Main transmission oil system drained

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for left or right temperature transducer.

GO TO NEXT PAGE

6.42. MAIN TRANSMISSION TEMPERATURE TRANSDUCER REPLACEMENT – continued

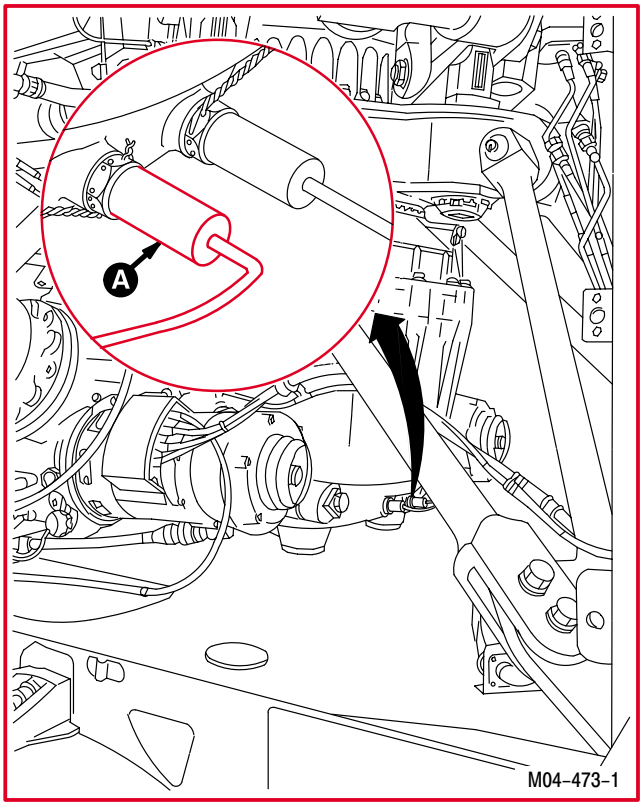
6.42.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel, open EMER BATT CAUT circuit breaker.**

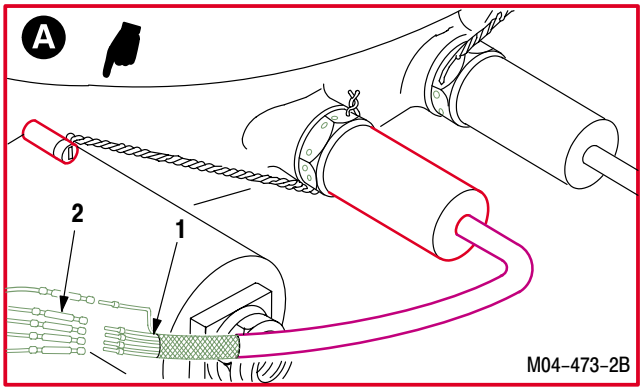


NOTE

If transducer is spliced, go to step e. If transducer has to be depinned, go to step f.

e. **Depin five wires (1) from soft splices (2)** (TM 55-1500-323-24).

(1) Depin five wires (1) from soft splices (2).

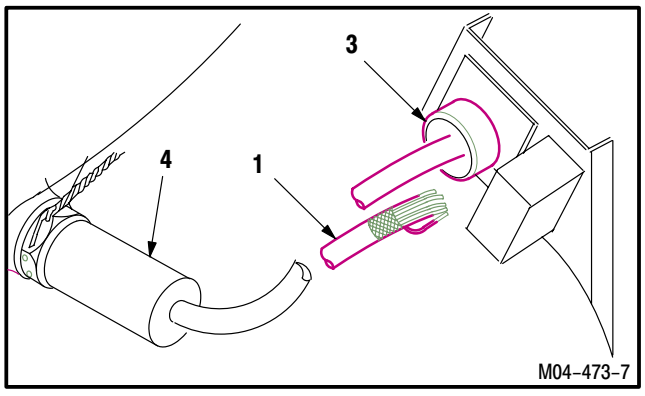


f. **Depin four wires and shield (1) from receptacle J755 (3)** (TM 55-1500-323-24).

(1) Depin transducer (4) (MT13) pins 2, 6, 10, 11, and 12 from receptacle J755 (3).

or

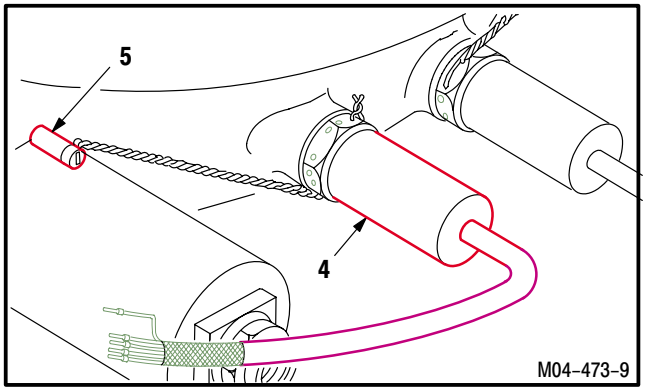
(2) Depin transducer (4) (MT14) pins 3, 5, 7, 8, and 9 from receptacle J755 (3).



GO TO NEXT PAGE

6.42. MAIN TRANSMISSION TEMPERATURE TRANSDUCER REPLACEMENT – continued

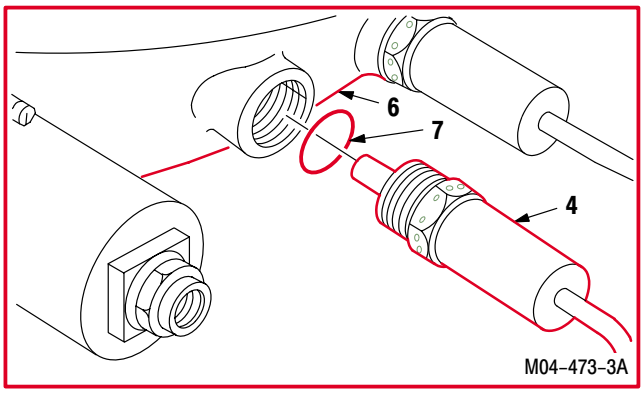
g. **Remove lockwire from transducer (4) and filter bowl tab (5).**



h. **Remove transducer (4).**

(1) Remove transducer (4) from transmission (6). Use crowfoot.

(2) Remove and discard packing (7) from transducer (3).



6.42.4. Cleaning

a. **Clean temperature transducer cavity in transmission.** Use cloth (item 52, App F).

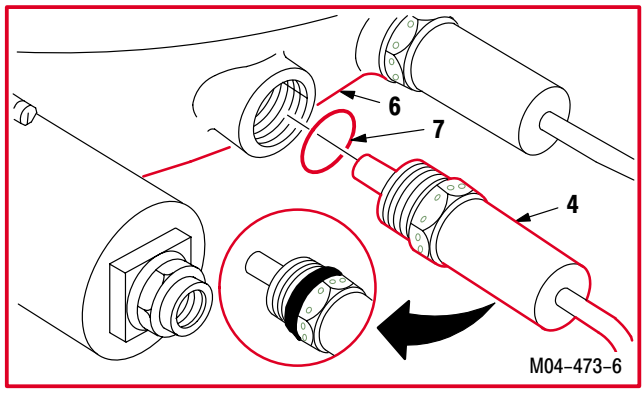
6.42.5. Inspection

a. **Check temperature transducer cavity in transmission for damaged threads.** None allowed.

6.42.6. Installation



a. **Install new transducer (4).** Torque transducer (4) to **112 INCH-POUNDS**.

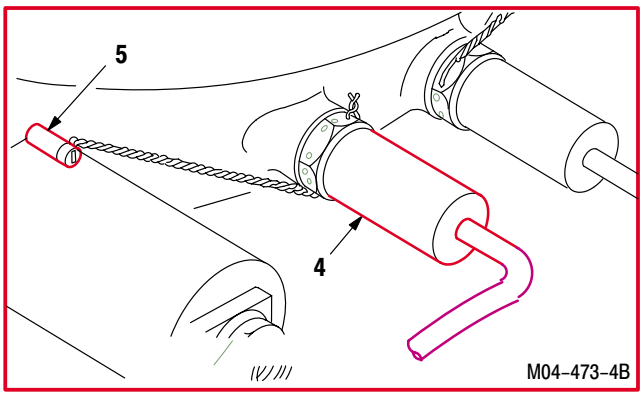


(1) Lubricate new packing (7). Use petrolatum (item 138, App F).

(2) Install packing (7) on transducer (4).

(3) Install transducer (4) on transmission (6). Use crowfoot.

(4) Torque transducer (4) to **112 INCH-POUNDS**. Use crowfoot and torque wrench.



(5) Lockwire transducer (4) to filter bowl tab (5). Use wire (item 222, App F).

GO TO NEXT PAGE

6.42. MAIN TRANSMISSION TEMPERATURE TRANSDUCER REPLACEMENT – continued

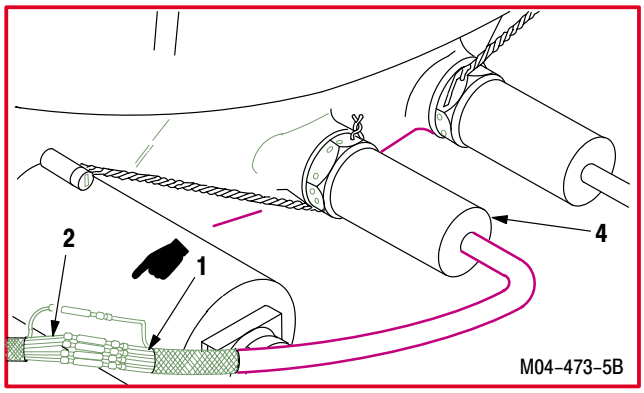
NOTE

If transducer is spliced, go to step b. If transducer has be depinned, go to step c.

b. **Attach five wires (1) to soft splices (2).**

(1) Cut five wires (1) from transducer (3) to proper length.

(2) Pin five wires (1) from transducer (3) to soft splices (2) by matching colors of wires (TM 55-1500-323-24).



c. **Pin four wires and shield (1) in connector J755 (3)** (TM 55-1500-323-24)**.**

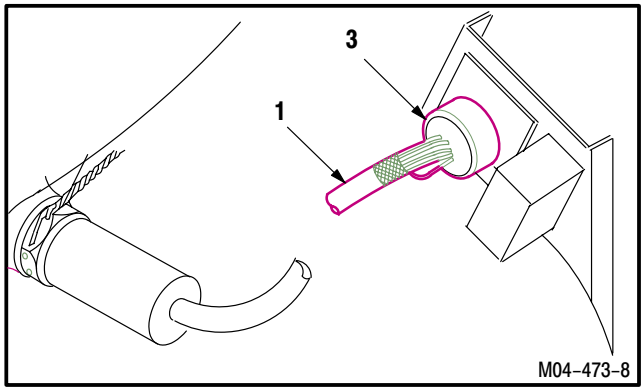
(1) Red (unshielded) wire to J755-2 (MT13) or J755-3 (MT14).

(2) Blue (unshielded) wire to J755-6 (MT13) or J755-5 (MT14).

(3) White (shielded) wire to J755-10 (MT13) or J755-7 (MT14).

(4) Blue (shielded) wire to J755-11 (MT13) or J755-8 (MT14).

(5) Shield to J755-12 (MT13) or J755-9 (MT14).



d. **Inspect (QA).**

e. **Service main transmission oil system** (para 1.32)**.**

f. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.43. MAIN TRANSMISSION GENERATOR SEAL REPLACEMENT

6.43.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.43.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Helicopter rotor head balance and blade tracking test equipment (item 354, App H)
Expansion plug (item 230, App H)
Hand operated arbor press (item 234, App H)
Oil seal puller set (item 247, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Seals (2)
Packing
Brush (item 34, App F)
Petrolatum (item 138, App F)
Sealing compound (item 174, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panels L200 and/or R200 removed
1.32	Main transmission oil system drained
9.26	AC generator No. 1 removed (for replacement of No. 1 generator seal)
9.27	AC generator No. 2 removed (for replacement of No. 2 generator seal)

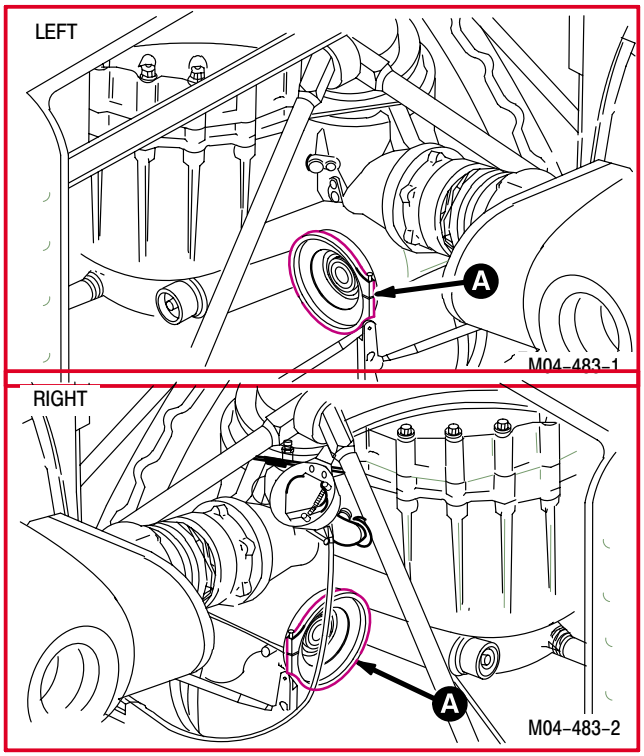
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either No. 1 or No. 2 generator seal.



GO TO NEXT PAGE

6.43. MAIN TRANSMISSION GENERATOR SEAL REPLACEMENT – continued

6.43.3. Removal

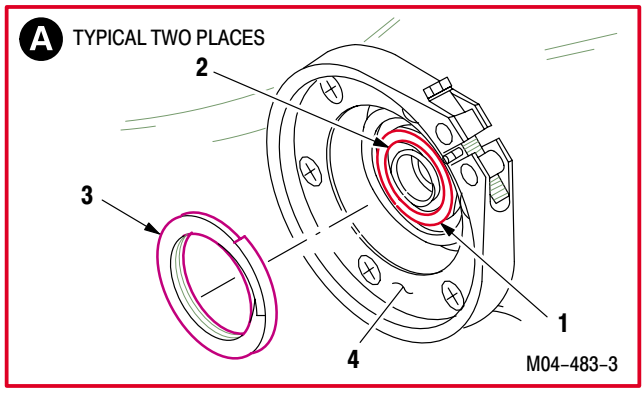
NOTE

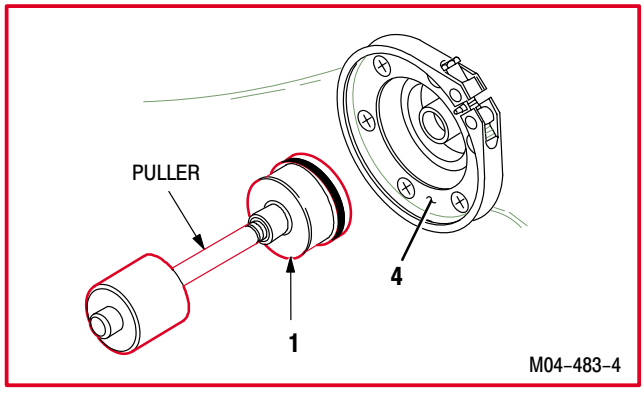
The roller bearing retainer may have one or two seals installed.

a. **Remove roller bearing retainer (1) with seal(s) (2).**

(1) Remove retaining ring (3).

(2) Remove retainer (1) with seal(s) (2) from generator (4). Use puller set.



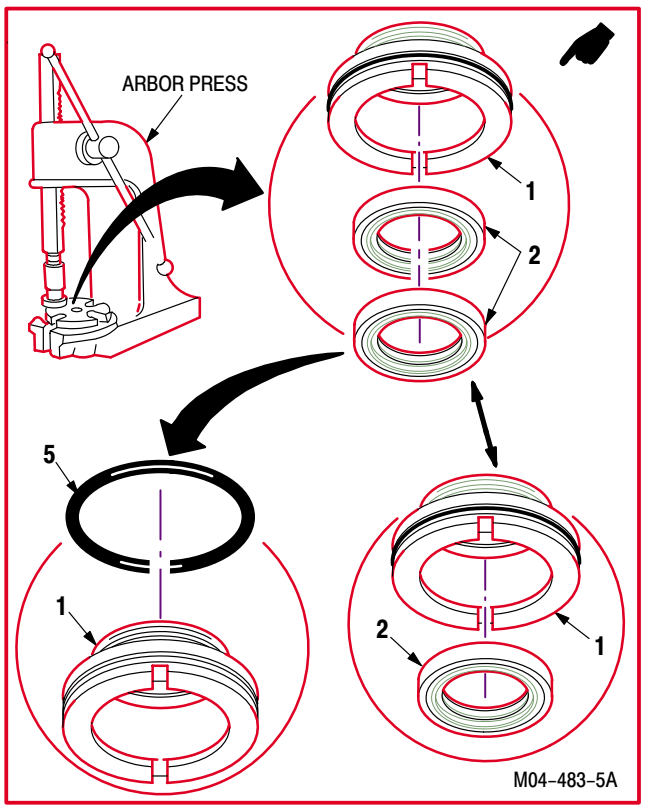


b. **Remove seal(s) (2) from retainer (1).**

(1) Position retainer (1) in arbor press with threaded end up. Use arbor press.

(2) Remove seal(s) (2).

(3) Remove and discard packing (5).



6.43.4. Cleaning

a. **Wipe retainer and generator mounting pad with a clean rag.**

6.43.5. Inspection

a. **Check retainer and generator mounting pad for cracks.** None allowed.

b. **Check retainer and generator mounting pad for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.43. MAIN TRANSMISSION GENERATOR SEAL REPLACEMENT – continued

6.43.6. Installation



a. **Install two seals (2) in retainer (1).**

(1) Position retainer (1) in arbor press with threaded end down.

(2) Coat outer edge of seals (2) with sealing compound. Use sealing compound (item 174, App F) and brush (item 34, App F)

(3) Position seals (2) in retainer (1) with lip facing up.

(4) Install seals (2) in retainer (1). Use arbor press.



b. **Install retainer (1) in generator (4).** Use expansion plug.

(1) Lubricate new packing and seals (5). Use petrolatum (item 138, App F).

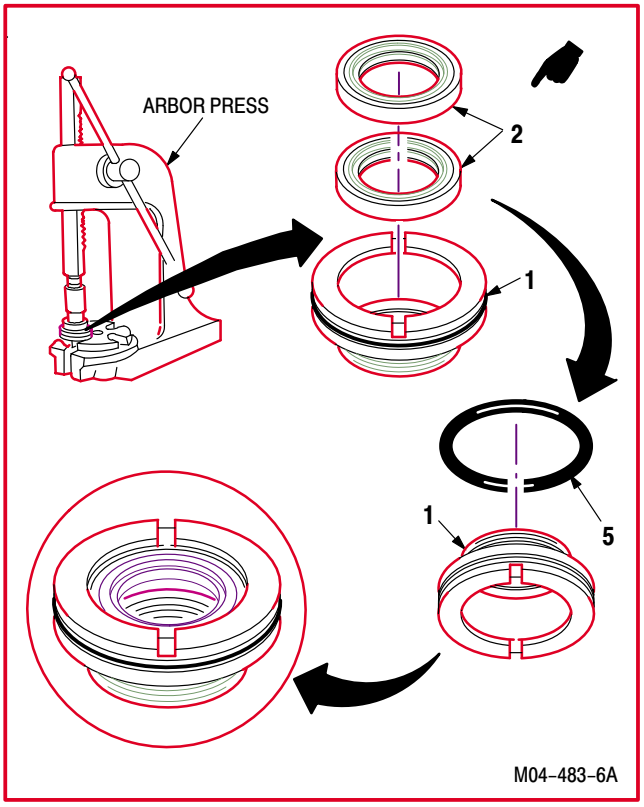
(2) Install packing (5) on retainer (1).

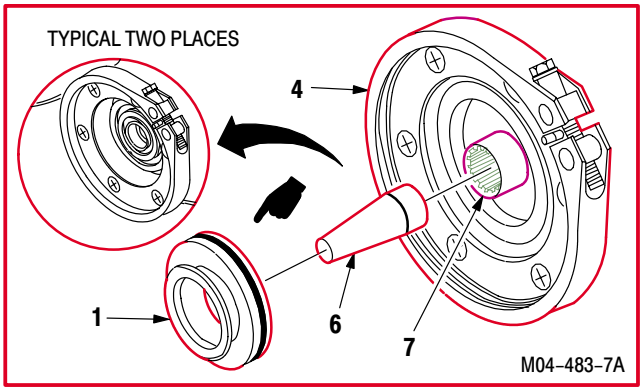
(3) Insert expansion plug (6) in generator gearshaft (7).

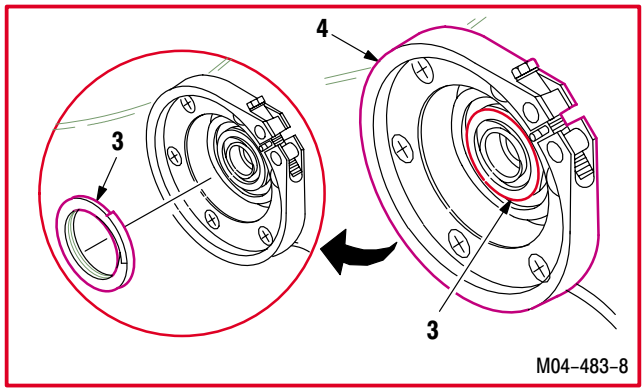
(4) Install retainer (1) with seal on expansion plug (6) and push in generator (4) with fingers.

(5) Remove expansion plug (6) from gearshaft (7).

c. **Install retaining ring (3) in groove.**







GO TO NEXT PAGE

6.43. MAIN TRANSMISSION GENERATOR SEAL REPLACEMENT – continued

d. **Inspect (QA).**

e. **Install AC generator No. 1** (para 9.26) **or AC generator No. 2** (para 9.27)**.**

f. **Service main transmission** (para 1.32)**.**

g. **Install access panels L200 and/or R200** (para 2.2)**.**

END OF TASK

6.44. MAIN TRANSMISSION MAGNETIC PICKUP REPLACEMENT

6.44.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.44.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Jackscrew set (item 281, App H)

References:

TM 1-1520-238-T
TM 55-1500-323-24

Materials/Parts:

Packing
Petrolatum (item 138, App F)

Personnel Required:

68X	Armament/Electrical System Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel L200 removed

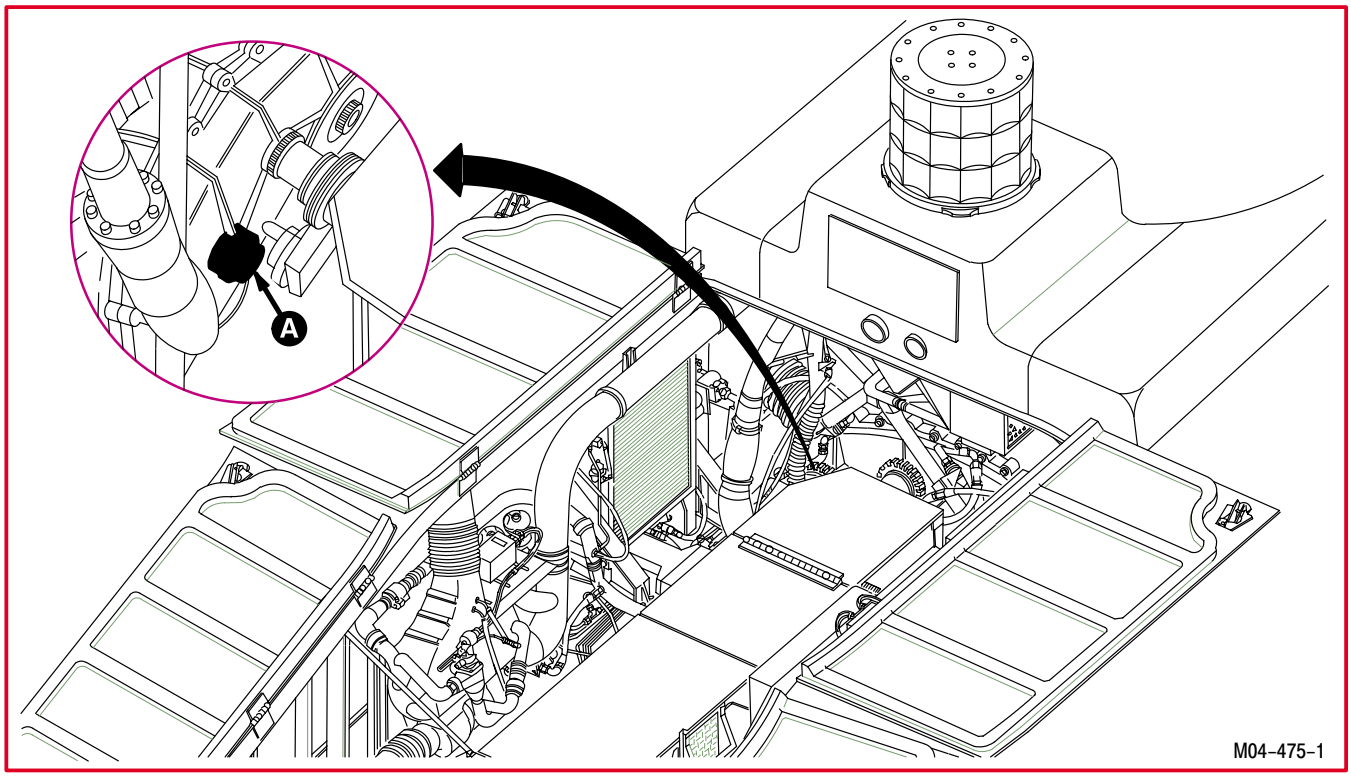
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.44. MAIN TRANSMISSION MAGNETIC PICKUP REPLACEMENT – continued



6.44.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

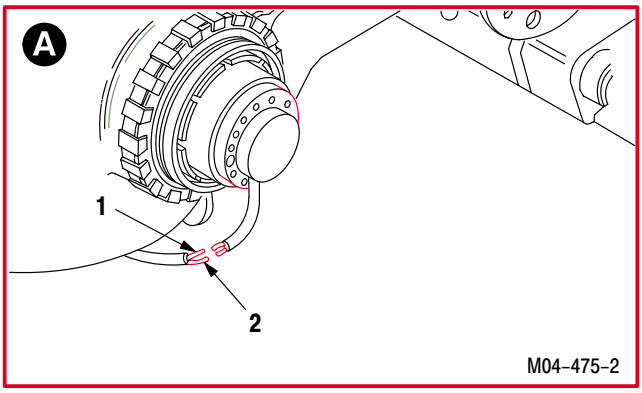
c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel, open EMER BATT CAUT circuit breaker.**

GO TO NEXT PAGE

6.44. MAIN TRANSMISSION MAGNETIC PICKUP REPLACEMENT – continued

e. **Identify and cut electrical wires (1) and (2)** (TM 55-1500-323-24)**.**



CAUTION

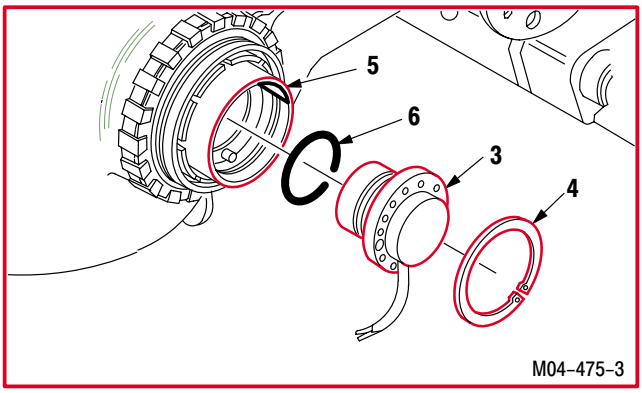
To prevent damage to magnetic pickup alinement pin, do not rotate magnetic pickup during removal. Twisting of magnetic pickup will damage alinement pin and magnetic pickup.

f. **Remove magnetic pickup (3).**

(1) Remove retaining ring (4).

(2) Remove magnetic pickup (3) from nut (5). Use jackscrew set.

(3) Remove and discard packing (6) from magnetic pickup (3).



6.44.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.44.5. Inspection

a. **Check magnetic pickup cavity in transmission for corrosion** (para 1.49)**.**

b. **Check magnetic pickup post for looseness.** None allowed.

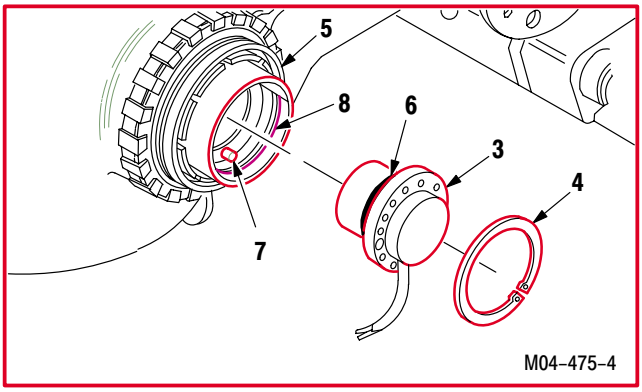
GO TO NEXT PAGE

6.44. MAIN TRANSMISSION MAGNETIC PICKUP REPLACEMENT – continued

6.44.6. Installation



a. **Install magnetic pickup (3).**



(1) Lubricate new packing (6). Use petrolatum (item 138, App F).

(2) Install packing (6) on magnetic pickup (3).

(3) Aline magnetic pickup (3) with alinement pin (7).

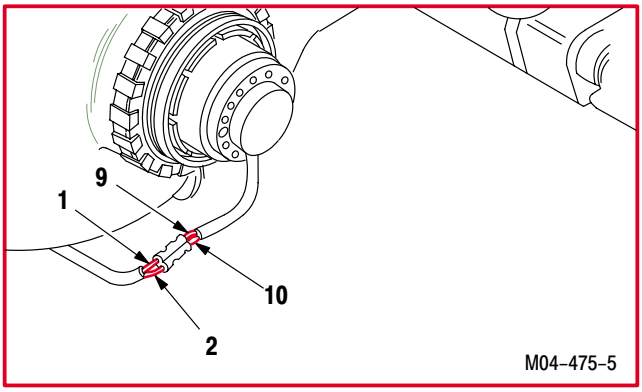
CAUTION

To prevent damage to magnetic pickup alinement pin, do not rotate magnetic pickup during installation. Twisting magnetic pickup will damage alinement pin and magnetic pickup.

(4) Push magnetic pickup (3) straight into nut (5) until it seats.

(5) Install retaining ring (4) in ring groove (8).

b. **Attach wires (1) and (2)** (TM 55-1500-323-24)**.**



(1) Cut wires (9) and (10) to proper length.

(2) Attach wires (9) and (10) to wires (1) and (2).

c. **Inspect (QA).**

d. **Perform pilot/CPG caution and warning system maintenance operational check** (TM 1-1520-238-T)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel L200** (para 2.2)**.**

END OF TASK

6.45. MAIN TRANSMISSION CHIP DETECTOR INSPECTION

6.45.1. Description

This task covers: Inspection.

6.45.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)

References:

TM 1-1500-204-23
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panels L200 and R200 removed

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

6.45.3. Inspection

a. **Check chip detector magnetic plug for metal chips, flakes, or splinters.**

(1) Identify steel particles. Use a permanent magnet to isolate steel particles.

b. **Perform steps f. thru h. if more than five steel splinters or flakes greater than 1/16 (0.062) INCH by 3/16 (0.187) INCH are present.**

(1) Go to step c if flakes are smaller.

c. **Perform steps f. thru h. if more than 10 steel flakes or particles greater than 1/16 (0.062) INCH by 1/16 (0.062) INCH are present.**

(1) Go to steps d. and e. if fewer than 10 flakes are present.

d. **Clean chip detector probe.**

e. **Reinstall chip detector and perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

(1) If metal chips, flakes, or splinters are still present on chip detector probe:

(a) Clean chip detector probe.

(b) Drain and flush transmission oil system (para 1.32).

(c) Replace transmission filter elements (para 6.61) or (para 6.62), transmission accessory pump filter element (para 6.70), and shaft driven compressor filter element (para 7.124).

GO TO NEXT PAGE

6.45. MAIN TRANSMISSION CHIP DETECTOR INSPECTION – continued

(d) Install chip detector (para 6.46).

(e) Service oil system (para 1.32).

(f) Perform drive system dynamic maintenance operational check (TM 1-1520-238-T).

(g) Repeat inspection step e if metal chips are still present.

1 If metal chips are present after repeating step e, go to step f.

2 If no metal chips are present, go to step i.

f. **Remove transmission** (para 6.101)**, shaft driven compressor** (para 7.120)**, and left and right heat exchangers** (para 6.85)**.**

g. **Drain and flush oil lines** (TM 1-1500-204-23)**.**

h. **Install serviceable transmission** (para 6.107)**, shaft driven compressor** (para 7.121)**, and left and right heat exchangers** (para 6.86)**.**

i. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panels L200 and R200** (para 2.2)**.**

END OF TASK

6.46. MAIN TRANSMISSION CHIP DETECTOR REPLACEMENT

6.46.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.46.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

67R Attack Helicopter Repairer
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Materials/Parts:

Packing (4)
Petrolatum (item 138, App F)
Wire (item 222, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.32	Main transmission oil system drained

WARNING

FLIGHT SAFETY PART

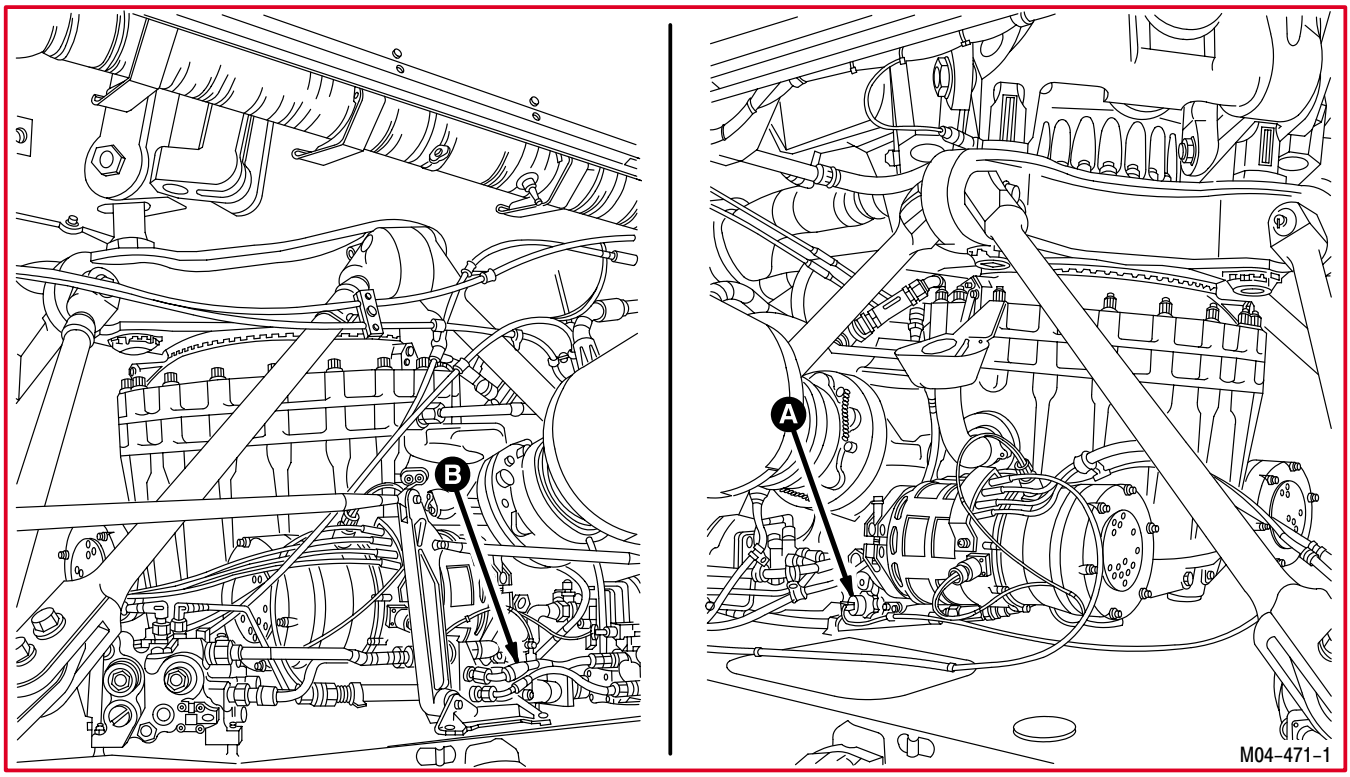
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

The over temperature switch portion of detector is located in detector base.

GO TO NEXT PAGE

6.46. MAIN TRANSMISSION CHIP DETECTOR REPLACEMENT – continued



6.46.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel, open EMER BATT CAUT circuit breaker.**

GO TO NEXT PAGE

6.46. MAIN TRANSMISSION CHIP DETECTOR REPLACEMENT – continued

e. **Identify and depin right chip detector probe wires (1) from splices (2)** (TM 55-1500-323-24)**.**

f. **Remove screw (3) and washer (4) from clamp (5) and bracket (6).**

g. **Remove clamp (5) from probe wires (1).**

h. **Identify and depin left chip detector probe wires (7) from receptacle (8)** (TM 55-1500-323-24)**.**

(1) Detach connector P755 (9) from receptacle W110J755 (8).

(2) Depin probe wires (7) from receptacle W110J755 (8).

i. **Remove two clamps (10) from probe wires (7).**

(1) Remove two screws (11) and washers (12) from clamps (10).

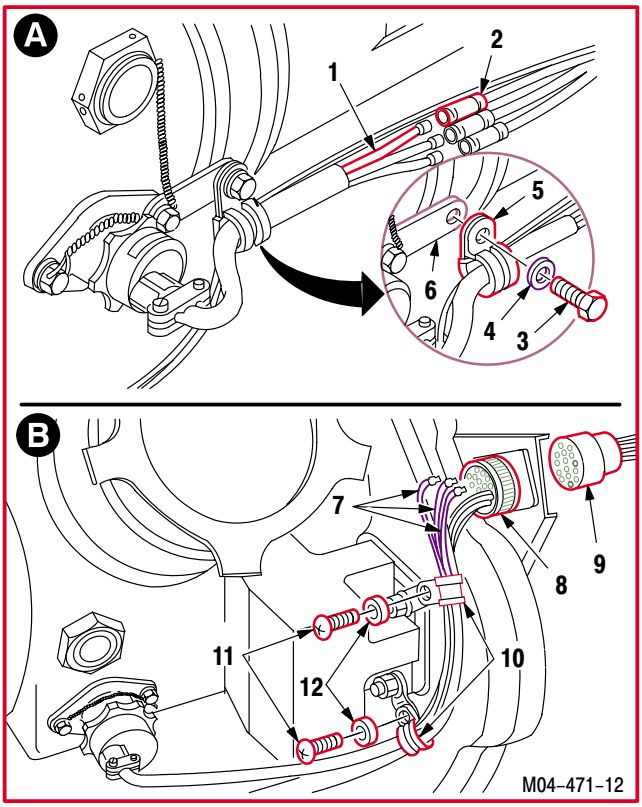
(2) Remove two clamps (10) from wires (7).

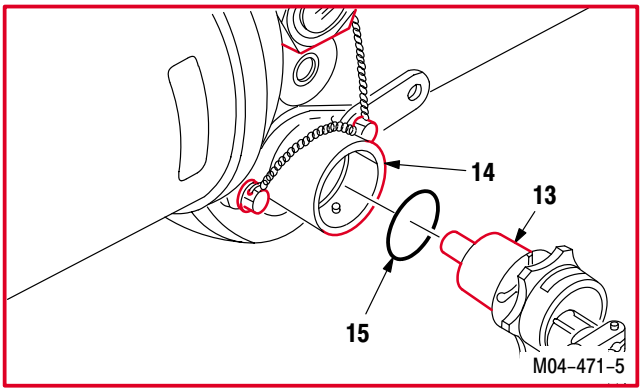
j. **Remove chip detector probe (13).**

(1) Push in and turn probe (13) 90 degrees counterclockwise to unlock.

(2) Remove probe (13) from base (14).

(3) Remove and discard packing (15).





GO TO NEXT PAGE

6.46. MAIN TRANSMISSION CHIP DETECTOR REPLACEMENT – continued

k. **Remove right chip detector base (14).**

(1) Remove lockwire from bolts (16) and (17) and sight plug (18).

(2) Remove bolts (16) and (17), washers (19) and (20), and bracket (6).

(3) Remove base (14) from transmission (21).

(4) Remove and discard packing (22) from base (14).

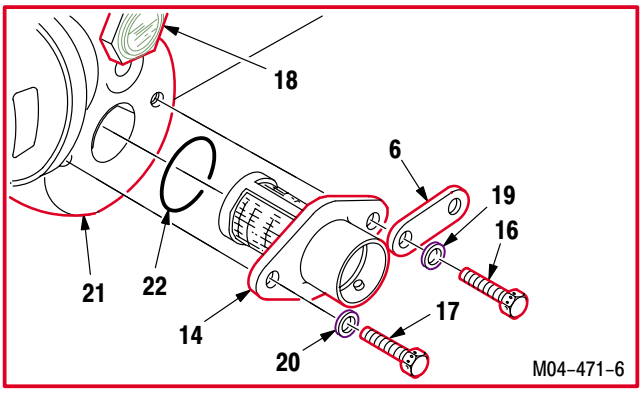
l. **Remove left chip detector base (14).**

(1) Remove lockwire from bolts (16) and (17).

(2) Remove bolts (16) and (17) and washers (19) and (20).

(3) Remove base (14) from transmission (21).

(4) Remove and discard packing (22) from base (14).



6.46.4. Cleaning

a. **Clean cavity of chip detector base with a clean rag.**

6.46.5. Inspection

a. **Check cavity of chip detector base for cracks.** None allowed.

b. **Check bolt holes for stripped threads.** None allowed.

c. **Check cavity of chip detector base for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.46. MAIN TRANSMISSION CHIP DETECTOR REPLACEMENT – continued

6.46.6. Installation



a. **Install right chip detector base (14).**

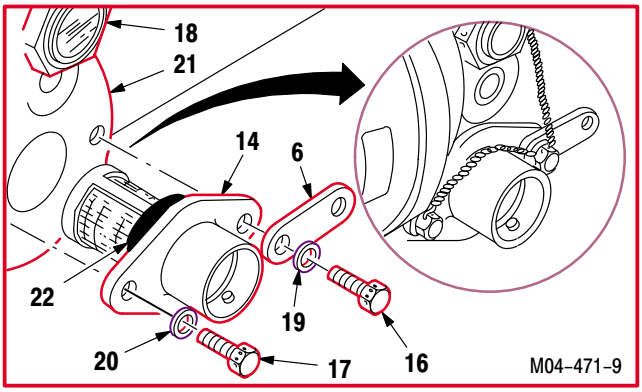
(1) Lubricate new packing (22). Use petrolatum (item 138, App F).

(2) Install packing (22) on base (14).

(3) Install bolt (16) through washer (19), bracket (6), and base (14) in transmission (21).

(4) Install bolt (17) through washer (20) and base (14) in transmission (21).

(5) Lockwire bolts (16) and (17) together and bolt (16) to sight plug (18). Use wire (item 222, App F).



b. **Install left chip detector base (14).**

(1) Lubricate new packing (22). Use petrolatum (item 138, App F).

(2) Install packing (22) on base (14).

(3) Install bolt (16) through washer (19) and base (14) in transmission (21).

(4) Install bolt (17) through washer (20) and base (14) in transmission (21).

(5) Lockwire bolts (16) and (17) together. Use wire (item 222, App F).

GO TO NEXT PAGE

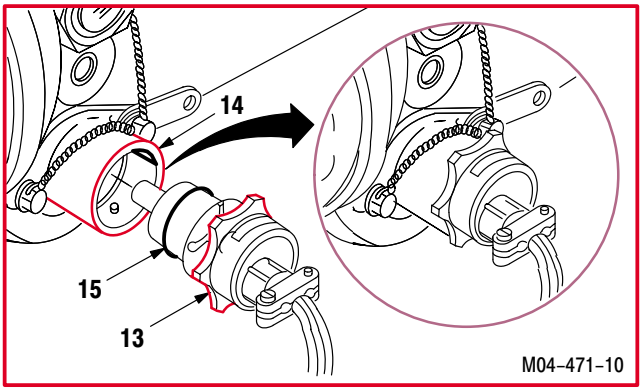
6.46. MAIN TRANSMISSION CHIP DETECTOR REPLACEMENT – continued

c. **Install probe (13).**

(1) Lubricate and install new packing (15) on probe (13). Use petrolatum (item 138, App F).

(2) Install probe (13) in base (14).

(3) Push probe (13) in and turn 90 degrees clockwise to lock.



d. **Pin three right detector wires (1) in splices (2)** (TM 55-1500-323-24)**.**

(1) Cut three probe wires (1) to proper length.

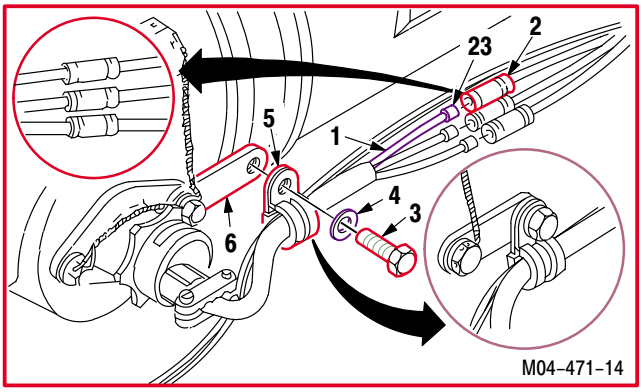
(2) Install three contacts (23) on wires (1).

(3) Identify and attach three probe wires (1) in splices (2).

(a) Insert white wire into S-17 SP1 (lead for J755-17).

(b) Insert red wire into S-17 SP2 (lead for J755-18).

(c) Insert black wire into S-17 SP3 (lead for J755-19).



e. **Install clamp (5) on wires (1).**

(1) Position clamp (5) on wires (1).

(2) Install screw (3) through washer (4), clamp (5), and bracket (6).

GO TO NEXT PAGE

6.46. MAIN TRANSMISSION CHIP DETECTOR REPLACEMENT – continued

f. **Pin three left detector wires (7) in receptacle (8)** (TM 55-1500-323-24)**.**

(1) Cut three probe wires (7) to proper length.

(2) Install three contacts (24) on wires (7).

(3) Connect probe wires (7) to receptacle (8).

(a) Insert black wire into J755-27.

(b) Insert red wire into J755-28.

(c) Insert white wire into J755-29.

g. **Install two clamps (10) on wires (7).**

(1) Position two clamps (10) on wires (7).

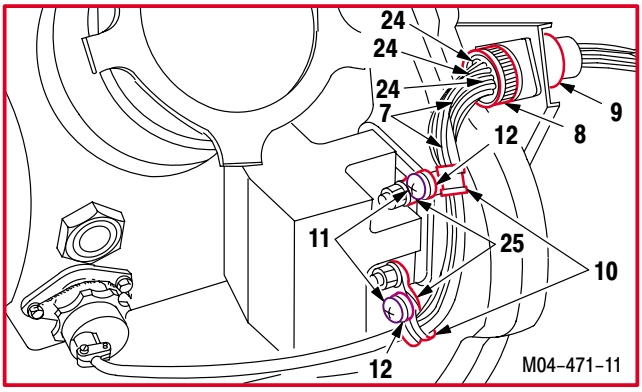
(2) Install two screws (11) through washers (12), clamps (10), and lugs (25).

h. **Attach connector P755 (9) to receptacle W110J755 (8).**

i. **Inspect (QA).**

j. **Service main transmission oil system** (para 1.32)**.**

k. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.47. MAIN TRANSMISSION OIL FILLER CAP SCREEN REMOVAL/INSTALLATION

6.47.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.47.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Packing
Dry cleaning solvent (item 74, App F)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

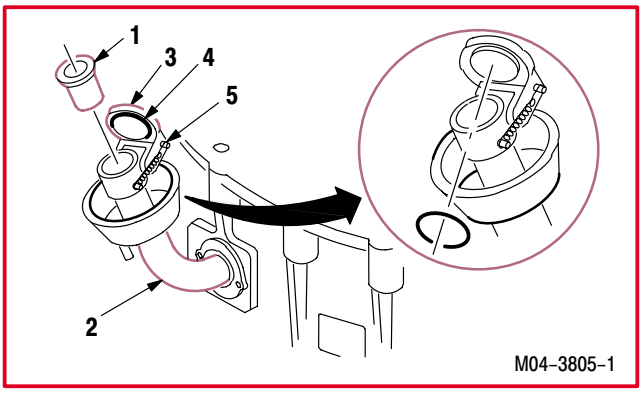
6.47.3. Removal

a. **Remove oil filler cap screen (1) from oil filler cap (2).**

(1) Lift cap (3) and remove and discard packing (4).

(2) Remove screen (1) from cap (3).

b. **If necessary, remove extension spring (5) from filler cap (2).**



GO TO NEXT PAGE

6.47. MAIN TRANSMISSION OIL FILLER CAP SCREEN REMOVAL/INSTALLATION – continued

6.47.4. Cleaning



a. **Clean screen and screen mounting area.** Use dry cleaning solvent (item 74, App F).

6.47.5. Inspection

a. **Check screen for cracks.** None allowed.

b. **Check extension spring for looseness and cracks.** None allowed.

c. **Check screen and extension spring for corrosion** (para 1.49)**.**

6.47.6. Installation

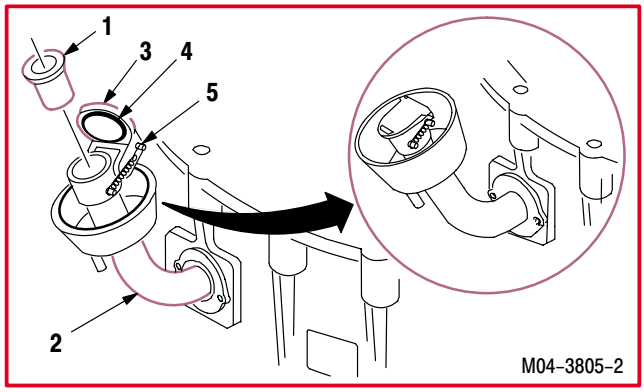


a. **Install screen (1) on filler cap (2).**

(1) Lift cap (3) and install screen (1) in filler cap (2).

(2) Lubricate packing (4). Use petrolatum (item 138, App F).

(3) Install packing (4) on cap (3).



b. **If removed, install spring (5) on filler cap (2).**

c. **Inspect (QA).**

d. **Install access panel R200** (para 2.2)**.**

END OF TASK

6.48. MAIN TRANSMISSION OIL FILLER REMOVAL/INSTALLATION

6.48.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.48.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

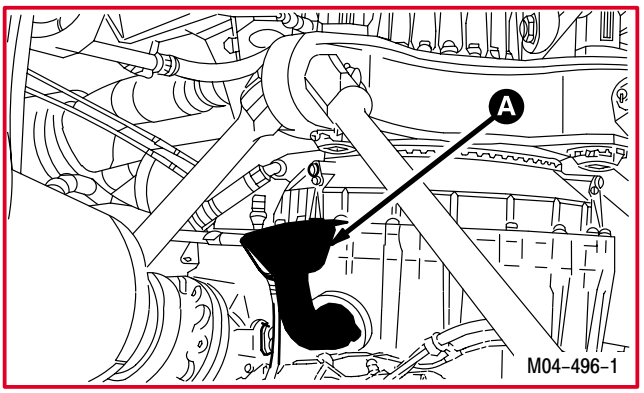
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



GO TO NEXT PAGE

6.48. MAIN TRANSMISSION OIL FILLER REMOVAL/INSTALLATION – continued

6.48.3. Removal

a. **Remove drain hose (1) from oil filler (2).**

(1) Loosen clamp (3).

(2) Pull drain hose (1) from tube (4).

b. **Remove oil filler (2) from transmission (5).**

(1) Remove lockwire from two bolts (6).

(2) Remove two bolts (6) and washers (7).

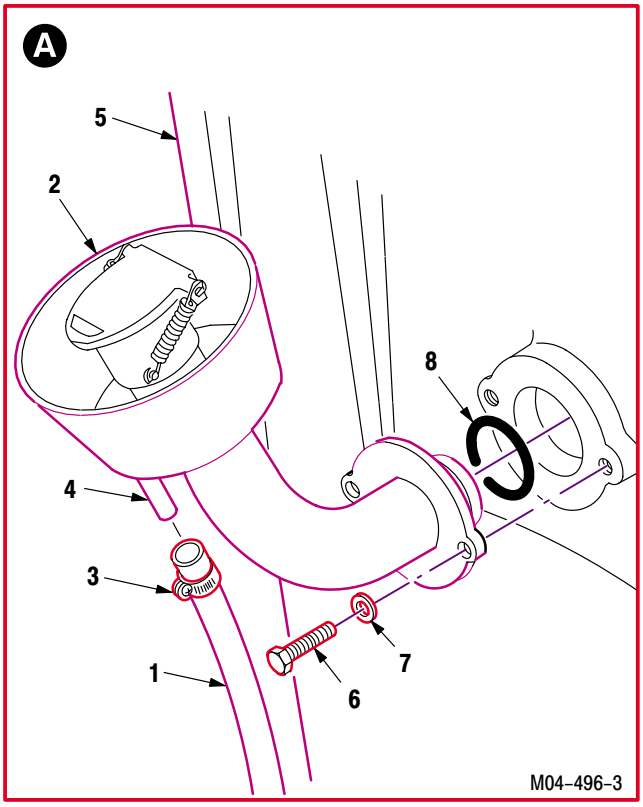
(3) Remove and discard packing (8).

6.48.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.48.5. Inspection

a. **Check area of oil filler attachment for cracks.** None allowed.



GO TO NEXT PAGE

6.48. MAIN TRANSMISSION OIL FILLER REMOVAL/INSTALLATION – continued

6.48.6. Installation



a. **Install oil filler (2) on transmission (5).** Torque two bolts (6) to **65 INCH-POUNDS**.

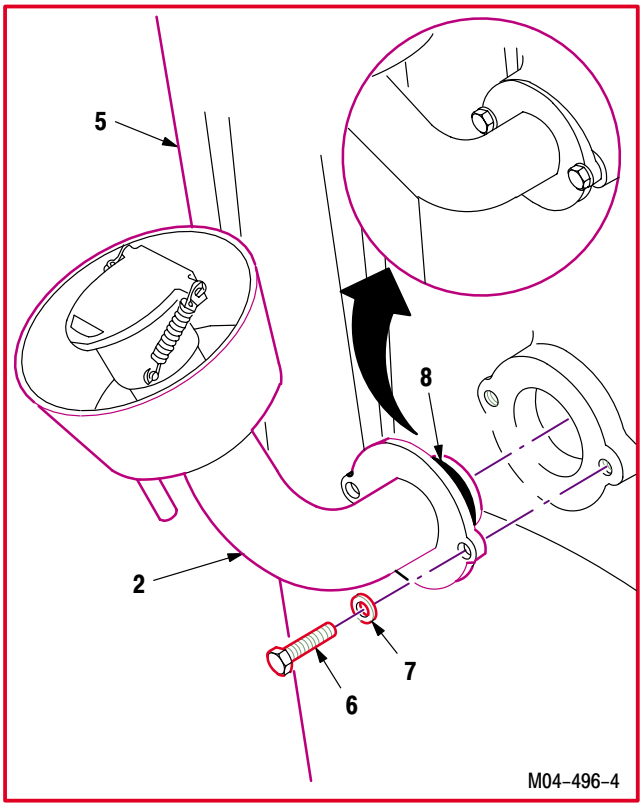
(1) Lubricate new packing (8). Use petrolatum (item 138, App F).

(2) Install packing (8) on oil filler (2).

(3) Position oil filler (2) on transmission (5).

(4) Install two bolts (6) through washers (7), oil filler (2), and transmission (5).

(5) Torque two bolts (6) to **65 INCH-POUNDS**. Use torque wrench.



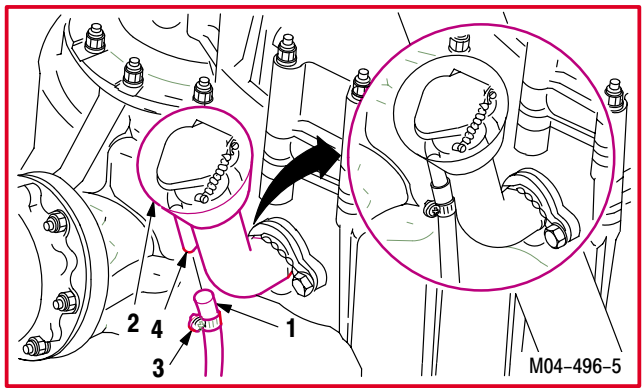
b. **Inspect (QA).**

c. **Lockwire two bolts (6) together.** Use wire (item 222, App F).

d. **Install drain hose (1) on oil filler (2).**

(1) Slide hose (1) on tube (4).

(2) Tighten clamp (3).



e. **Inspect (QA).**

f. **Install access panel R200** (para 2.2)**.**

END OF TASK

6.49. MAIN TRANSMISSION GENERATOR QUICK-ATTACH ASSEMBLY REMOVAL/INSTALLATION

6.49.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.49.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
#4 torque set cross screwdriver bit (item 34, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panels L200 and/or R200 removed
9.26	AC generator No. 1 removed
	or
9.27	AC generator No. 2 removed

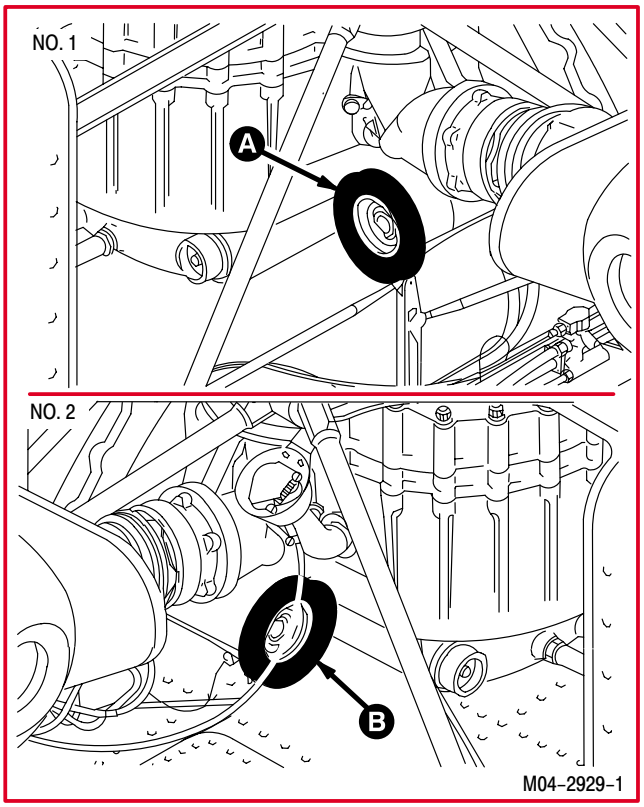
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

Except where specified, this task is typical for either No. 1 or No. 2 quick-attach assembly.



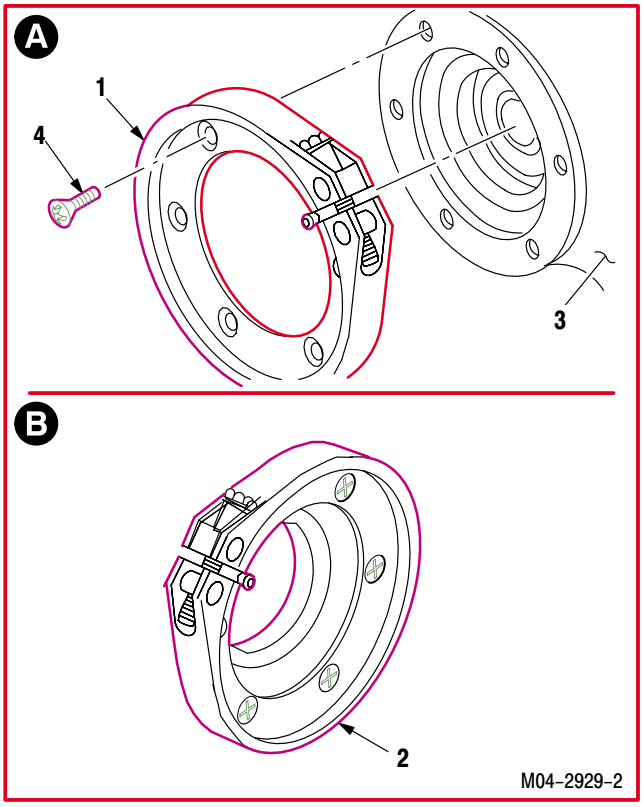
GO TO NEXT PAGE

6.49. MAIN TRANSMISSION GENERATOR QUICK-ATTACH ASSEMBLY REMOVAL/INSTALLATION – continued

6.49.3. Removal

a. **Remove No. 1 quick–attach assembly (1) or No. 2 quick-attach assembly (2) from main transmission (3).**

(1) Remove six screws (4). Use screwdriver bit.



6.49.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.49.5. Inspection

a. **Check transmission mounting pad for cracks and damaged threads.** None allowed.

b. **Check quick-attach assembly for security of locating pin.** No looseness allowed.

c. **Check bolt and barrel nut for damage** None allowed.

6.49.6. Installation

NOTE

To install quick-attach No. 1, go to step a.
To install quick-attach No. 2, go to step b.

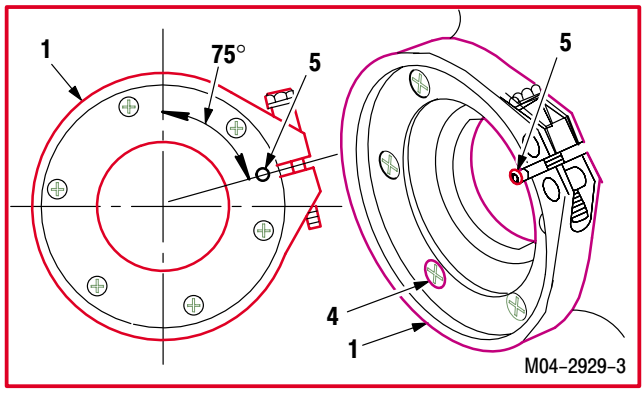
a. **Install No. 1 quick-attach (1).** Torque six screws (4) to **220 INCH-POUNDS**.

(1) Position quick-attach (1) with locating pin (5) 75 degrees outboard of vertical.

(2) Install six screws (4).

(3) Torque six screws (4) to **220 INCH-POUNDS**. Use screwdriver bit and torque wrench.

(4) Go to step c.



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6.49. MAIN TRANSMISSION GENERATOR QUICK-ATTACH ASSEMBLY REMOVAL/INSTALLATION – continued

b. **Install No. 2 quick-attach (2).** Torque six screws (4) to **220 INCH-POUNDS**.

(1) Position quick-attach (2) with locating pin (5) 45 degrees outboard of vertical.

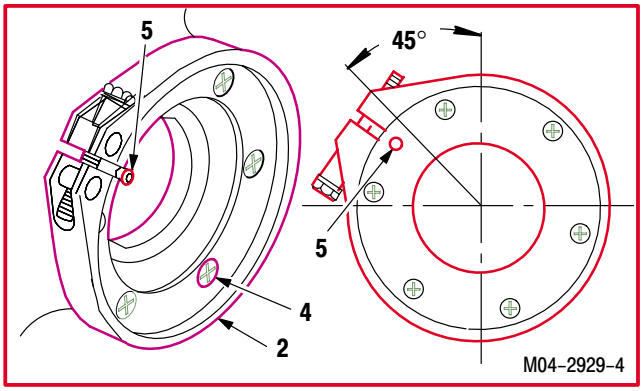
(2) Install six screws (4).

(3) Torque six screws (4) to **220 INCH-POUNDS**. Use screwdriver bit and torque wrench.

c. **Inspect (QA).**

d. **Install AC generator No. 1** (para 9.26) **or AC generator No. 2** (para 9.27)**.**

e. **Install access panels L200 and/or R200** (para 2.2)**.**



END OF TASK

6.50. MAIN TRANSMISSION OIL JET FILTER REMOVAL/INSTALLATION

6.50.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.50.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed for right aft upper jet, right forward jet, and right 29/65 gear jet filter removal
2.2	Access panel L200 removed for left forward jet, left forward upper jet, upper cover left jet, and left 29/65 gear jet filter removal
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened for aft jet filter removal

WARNING

FLIGHT SAFETY PART

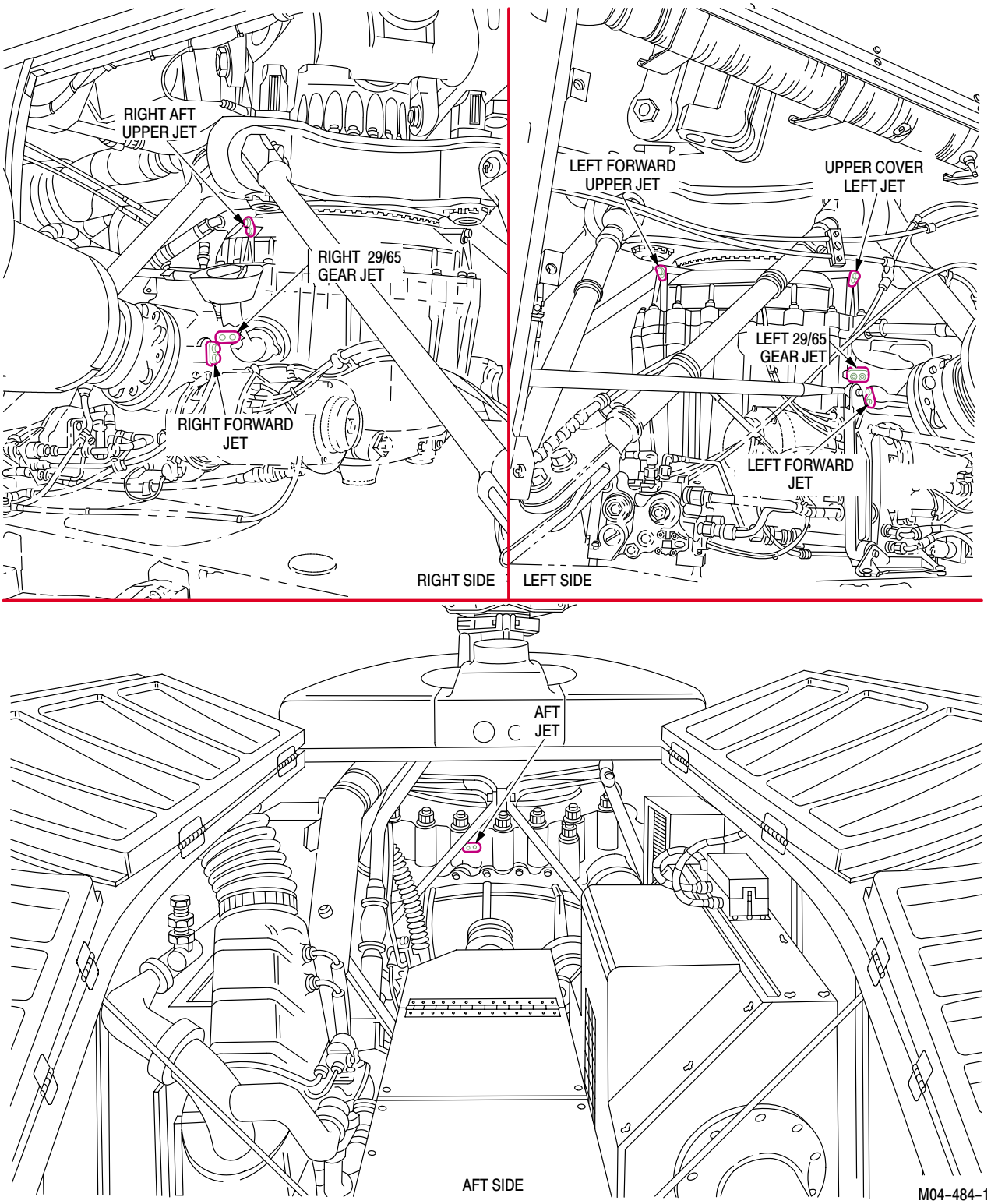
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for all oil jets.

GO TO NEXT PAGE

6.50. MAIN TRANSMISSION OIL JET FILTER REMOVAL/INSTALLATION – continued



GO TO NEXT PAGE

6.50. MAIN TRANSMISSION OIL JET FILTER REMOVAL/INSTALLATION – continued

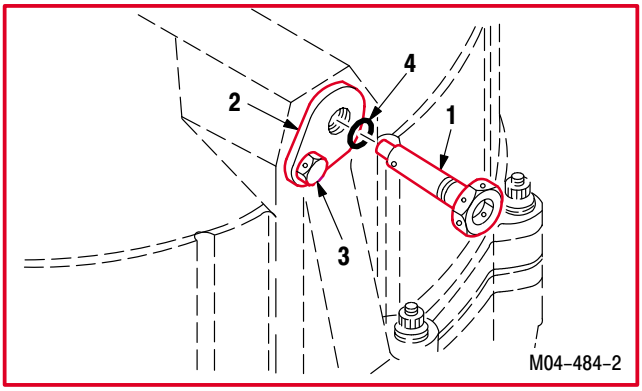
6.50.3. Removal

a. **Remove filter (1) from oil jet (2).**

(1) Remove lockwire from filter (1) and bolt (3).

(2) Remove filter (1).

(3) Remove and discard packing (4) from filter (1).



6.50.4. Cleaning

a. **Clean removed and attaching parts and surfaces** (para 1.47)**.**

6.50.5. Inspection

a. **Check for cracks.** None allowed.

b. **Check hex head for torn lockwire holes.** None allowed.

NOTE

Oil jet filter sealing surface consists of bottom of hex head and adjacent diameter.

c. **Check packing grooves, sealing surface, and screen for any evidence of damage.**

(1) Repair minor surface imperfections measuring **0.004 INCH** deep or less and not exceeding 20 percent of surface area by blending at a 30:1 to 50:1 transition ratio. Do not exceed depth of original damage.

d. **Check for corrosion, scratches, nicks, and gouges.**

(1) Except for packing grooves and sealing surface, repair minor damage measuring **0.030 INCH** deep or less by blending.

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6.50. MAIN TRANSMISSION OIL JET FILTER REMOVAL/INSTALLATION – continued

e. **Check filter port on oil jet for stripped, crossed or flattened threads.**

(1) Minor damage is acceptable as long as it does not exceed two threads and provided that damage on thread does not exceed 1/3 of thread depth and 1/4 of thread circumference. Stripped threads not allowed.

6.50.6. Installation



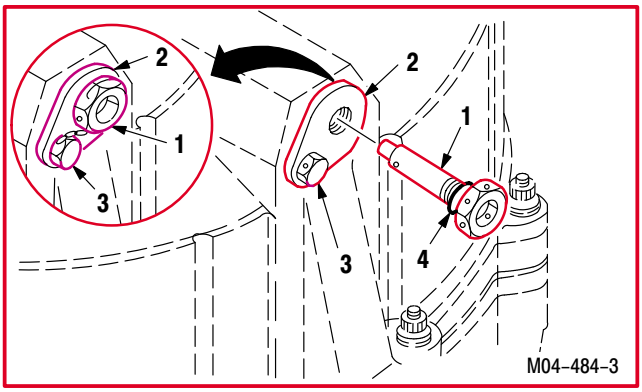
a. **Install filter (1) in oil jet (2).** Torque filter to **30 INCH-POUNDS**.

(1) Lubricate new packing (4). Use petrolatum (item 138, App F).

(2) Install packing (4) on filter (1).

(3) Install filter (1) in oil jet (2).

(4) Torque filter (1) to **30 INCH-POUNDS**. Use torque wrench.



b. **Inspect (QA).**

c. **Lockwire filter (1) to bolt (3).** Use wire (item 222, App F).

d. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panels L200 and R200** (para 2.2)**.**

END OF TASK

6.51. MAIN TRANSMISSION FORWARD OIL JET AND NOZZLE REMOVAL/INSTALLATION

6.51.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.51.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing (2 per oil jet)
Removal bolt (NAS 464-9)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.50	Forward oil jet filter and/or nozzle filter removed

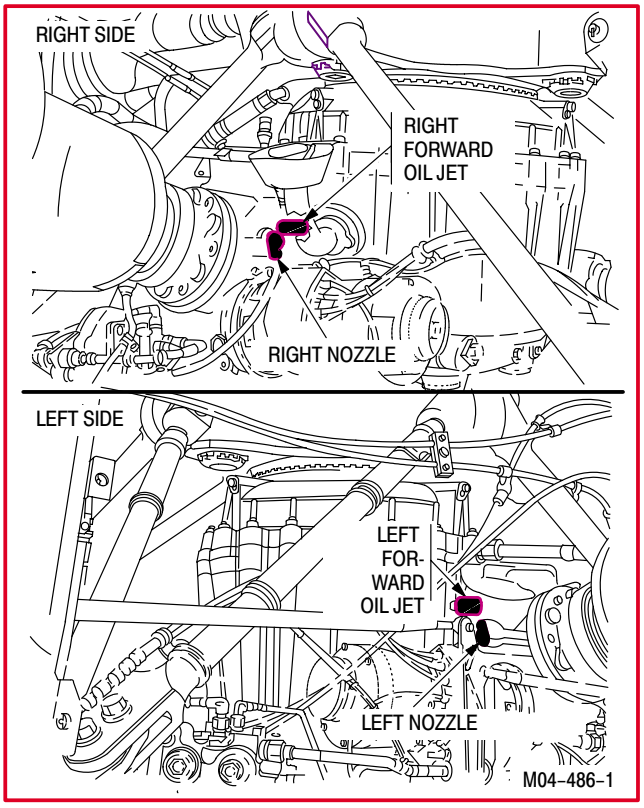
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

The main transmission forward oil jet and nozzle are not interchangeable with each other. To prevent damage to the main transmission, do not intermix or swap oil jets.



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6.51. MAIN TRANSMISSION FORWARD OIL JET AND NOZZLE REMOVAL/INSTALLATION – continued

NOTE

This task is typical for either the left or right forward oil jet and for either the left or right main transmission nozzle.

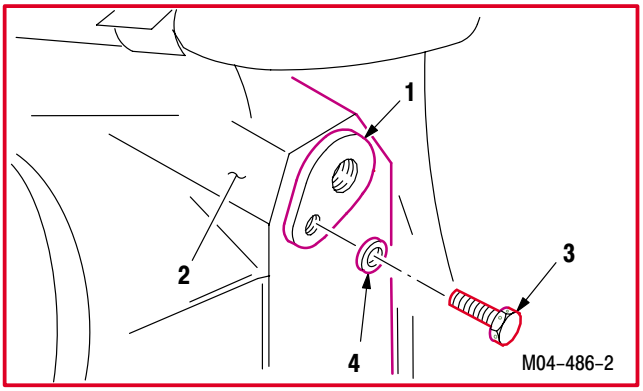
6.51.3. Removal

NOTE

- If removing only the left and/or right forward oil jet, perform step a and go to paragraph 6.51.4.
- If removing only the left and/or right nozzle, skip step a and go to step b.

a. **Remove forward oil jet (1) from main transmission (2).**

(1) Remove bolt (3) and washer (4) from transmission (2).

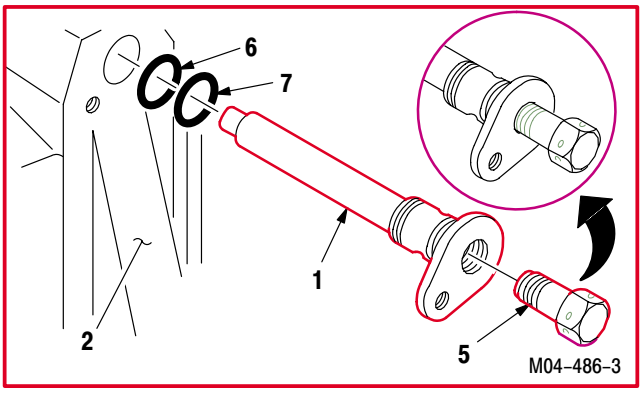


(2) Install removal bolt (5) five turns in oil jet (1).

(3) Pull removal bolt (5) to remove oil jet (1) from transmission (2).

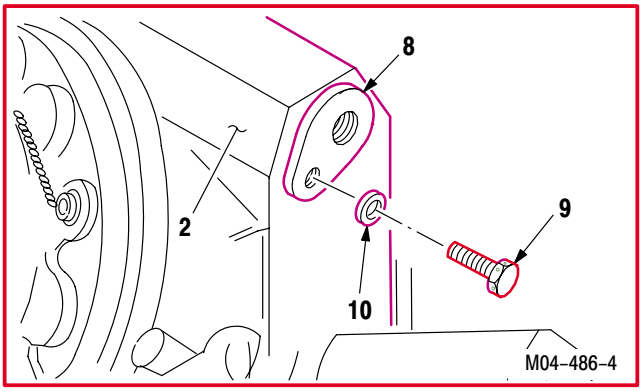
(4) Remove removal bolt (5) from oil jet (1).

(5) Remove and discard packings (6) and (7) from oil jet (1).



b. **Remove nozzle (8) from transmission (2).**

(1) Remove bolt (9) and washer (10) from transmission (2).



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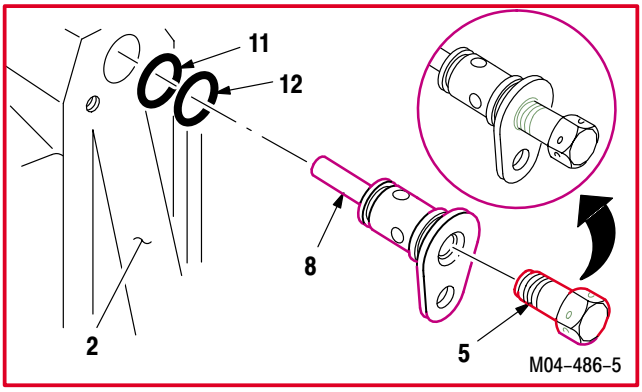
6.51. MAIN TRANSMISSION FORWARD OIL JET AND NOZZLE REMOVAL/INSTALLATION – continued

(2) Install removal bolt (5) five turns in nozzle (8).

(3) Pull removal bolt (5) to remove nozzle (8) from transmission (2).

(4) Remove removal bolt (5) from nozzle (8).

(5) Remove and discard packings (11) and (12) from nozzle (8).



6.51.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.51.5. Inspection

NOTE

The following inspection procedures apply to the forward oil jet and nozzle mounting surface and recess on main transmission.

a. **Check for cracks.** None allowed.

b. **Check for scratches, nicks, gouges, and other evidence of damage** (para 6.41)**.**

c. **Check for corrosion** (para 1.49)**.**

NOTE

The following inspection procedures apply to the forward oil jet and nozzle.

d. **Check for cracks.** None allowed.

GO TO NEXT PAGE

6.51. MAIN TRANSMISSION FORWARD OIL JET AND NOZZLE REMOVAL/INSTALLATION – continued

e. **Check threaded filter hole (13) for stripped, crossed, or flattened threads.** None allowed.

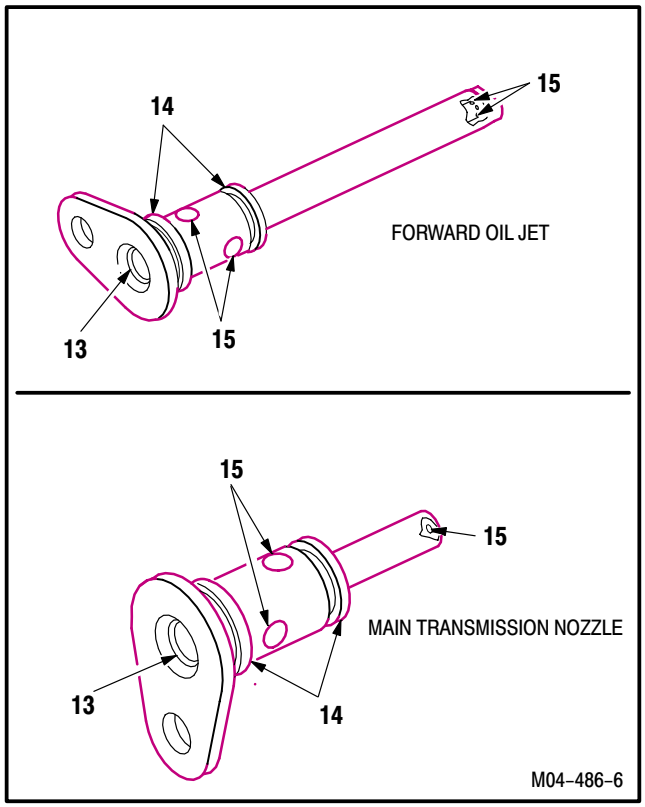
f. **Check for scratches, nicks, gouges, burrs, and corrosion.**

(1) Except for the packing grooves (14), repair damaged areas **0.030 INCH** deep or less by blending. Use depth gage.

g. **Check packing grooves (14) for scratches, nicks, gouges, burrs, and corrosion.**

(1) Minor surface imperfections measuring **0.004 INCH** deep or less before blending and not covering over 20 percent of the surface area may be repaired by blending at a 30:1 to 50:1 transition ratio. Repair not to exceed the depth of the original damage. Use depth gage.

h. **Check oil holes (15) for blockage or obstructions.** None allowed.



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6.51. MAIN TRANSMISSION FORWARD OIL JET AND NOZZLE REMOVAL/INSTALLATION – continued

6.51.6. Installation



NOTE

Perform step a only if the left and/or right forward oil jet was removed.

a. **Install oil jet (1) in transmission (2).** Torque bolt (3) to **65 INCH-POUNDS**.

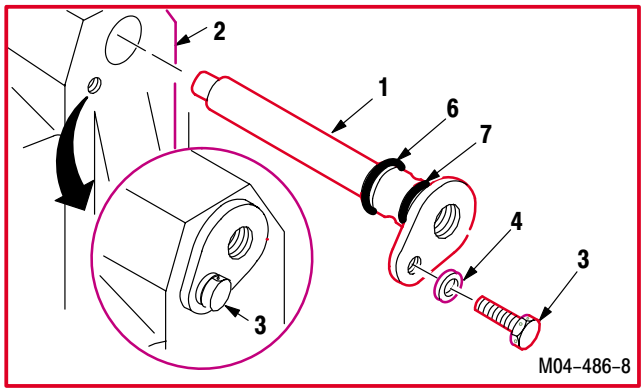
(1) Lubricate new packings (6) and (7). Use petrolatum (item 138, App F).

(2) Install packings (6) and (7) on oil jet (1).

(3) Install oil jet (1) in transmission (2).

(4) Install bolt (3) and washer (4) in transmission (2).

(5) Torque bolt (3) to **65 INCH-POUNDS**. Use torque wrench.



GO TO NEXT PAGE

6.51. MAIN TRANSMISSION FORWARD OIL JET AND NOZZLE REMOVAL/INSTALLATION – continued

NOTE

Perform step b only if the left and/or right main transmission nozzle was removed.

b. **Install nozzle (8) in transmission (2).** Torque bolt (9) to **65 INCH-POUNDS**.

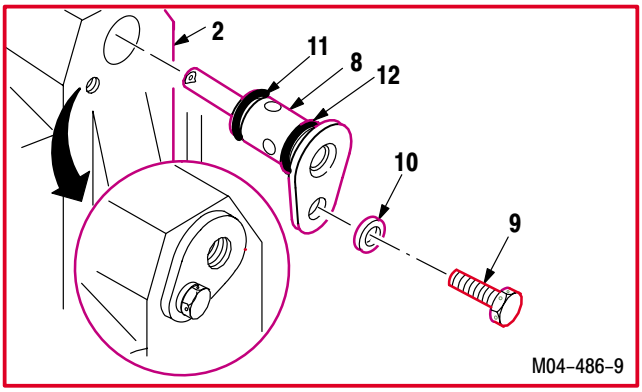
(1) Lubricate new packings (11) and (12). Use petrolatum (item 138, App F).

(2) Install packings (11) and (12) on nozzle (8).

(3) Install nozzle (8) in transmission (2).

(4) Install bolt (9) and washer (10) in transmission (2).

(5) Torque bolt (9) to **65 INCH-POUNDS**. Use torque wrench.



c. **Install forward oil jet filter(s) and/or nozzle filter(s)** (para 6.50)**.**

END OF TASK

6.52. MAIN TRANSMISSION AFT OIL JET REMOVAL/INSTALLATION

6.52.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.52.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Bolt (NAS 464-9)
Packing (2)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.50	Aft oil jet filter removed

WARNING

FLIGHT SAFETY PART

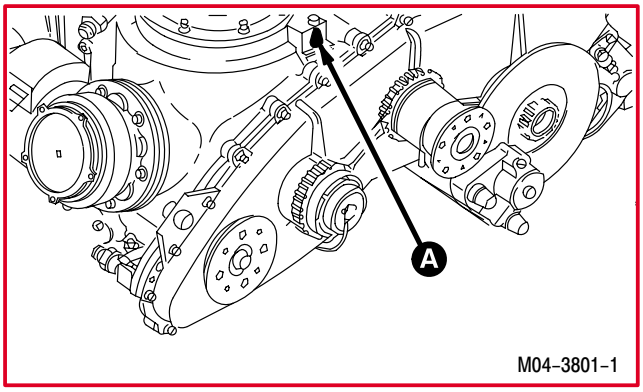
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

The aft oil jet is not interchangeable with any other oil jet found on main transmission. To prevent damage to main transmission, do not intermix or swap oil jets.

GO TO NEXT PAGE

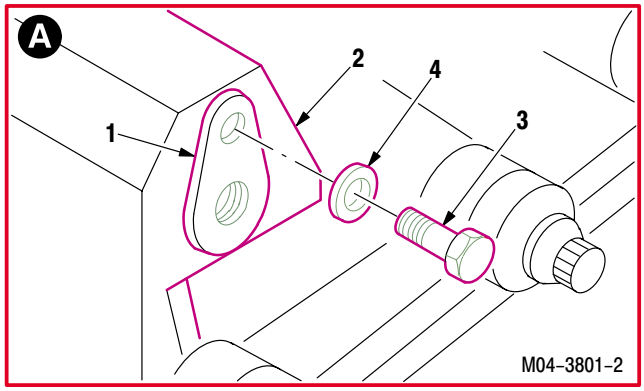
6.52. MAIN TRANSMISSION AFT OIL JET REMOVAL/INSTALLATION – continued



6.52.3. Removal

a. **Remove aft oil jet (1) from main transmission (2).**

(1) Remove bolt (3) and washer (4) from transmission (2).

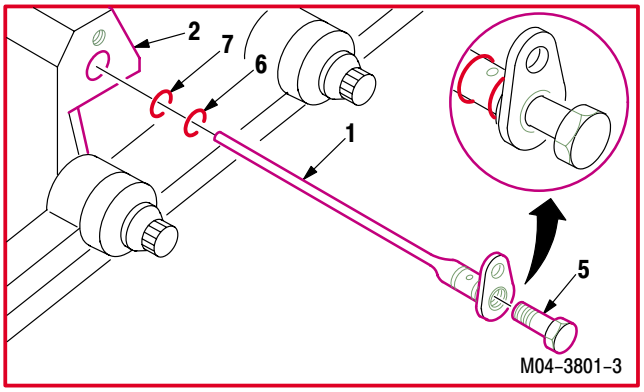


(2) Install removal bolt (5) five turns in jet (1).

(3) Pull removal bolt (5) to remove jet (1) from transmission (2).

(4) Remove removal bolt (5) from jet (1).

(5) Remove and discard packings (6) and (7) from jet (1).



6.52.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

GO TO NEXT PAGE

6.52. MAIN TRANSMISSION AFT OIL JET REMOVAL/INSTALLATION – continued

6.52.5. Inspection

NOTE

The following inspection procedures apply to aft oil jet mounting surface and recess on main transmission housing.

a. **Check for cracks.** None allowed.

b. **Check for scratches, nicks, gouges, and other evidence of damage** (para 6.41)**.**

c. **Check for corrosion** (para 1.49)**.**

NOTE

The following inspection procedures apply to aft oil jet only.

d. **Check for cracks.** None allowed.

e. **Check threaded filter hole (8) for stripped, crossed, or flattened threads.** None allowed.

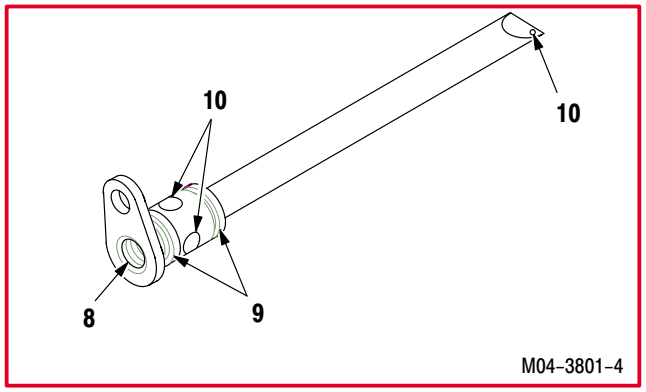
f. **Check aft oil jet for scratches, nicks, gouges, burrs, and corrosion.**

(1) Except for packing grooves, repair damaged areas **0.030 INCH** deep or less by blending. Use depth gage.

g. **Check packing grooves (9) for scratches, nicks, gouges, burrs, and corrosion.**

(1) Minor surface imperfections measuring **0.004 INCH** deep or less before blending and not covering over 20 percent of surface area may be repaired by blending at a 30:1 to 50:1 transition ratio. Repair not to exceed depth of original damage. Use depth gage.

h. **Check oil holes (10) for blockage or obstructions.** None allowed.



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6.52. MAIN TRANSMISSION AFT OIL JET REMOVAL/INSTALLATION – continued

6.52.6. Installation



a. **Install jet (1) in transmission (2).** Torque bolt (3) to **65 INCH-POUNDS**.

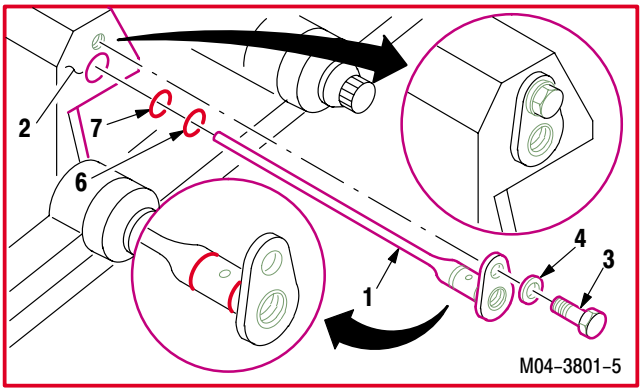
(1) Lubricate new packings (6) and (7). Use petrolatum (item 138, App F).

(2) Install packings (6) and (7) on jet (1).

(3) Install jet (1) in transmission (2).

(4) Install bolt (3) through washer (4), jet (1) flange, and transmission (2).

(5) Torque bolt (3) to **65 INCH-POUNDS**. Use torque wrench.



b. **Inspect (QA).**

c. **Install aft oil jet filter** (para 6.50)**.**

END OF TASK

6.53. MAIN TRANSMISSION UPPER COVER OIL JET REMOVAL/INSTALLATION

6.53.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.53.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Bolt (NAS 464-9)
Packing (2 per oil jet)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.50	Left, left forward, or right aft upper cover oil jet filter removed

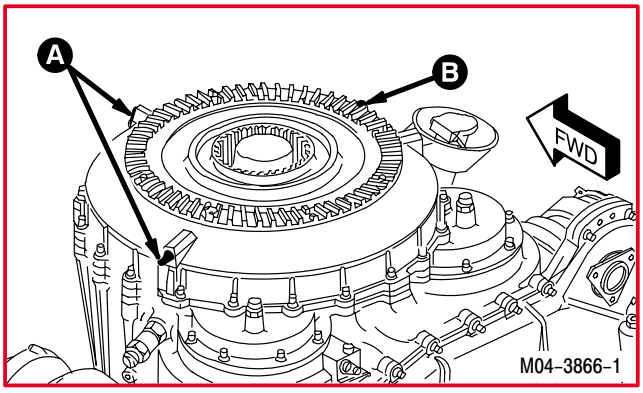
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

The main transmission right aft upper cover oil jet is not interchangeable with other upper cover oil jets. To prevent damage to main transmission, do not intermix or swap oil jets.



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6.53. MAIN TRANSMISSION UPPER COVER OIL JET REMOVAL/INSTALLATION – continued

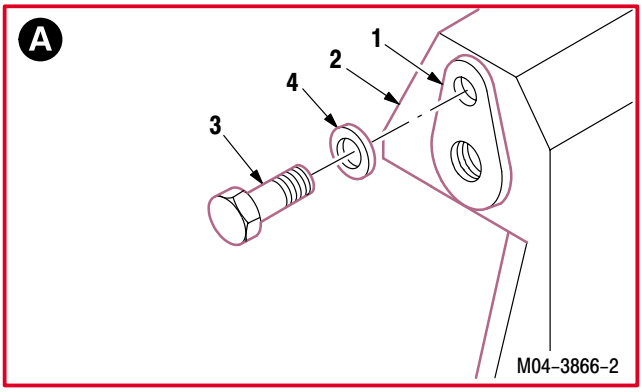
6.53.3. Removal

NOTE

- If removing only left and/or left forward upper cover oil jet, perform step a. and go to paragraph 6.53.4.
- If removing only right aft upper cover oil jet, skip step a. and go to step b.

a. **Remove left and/or left forward upper cover oil jet (1) from main transmission (2).**

(1) Remove bolt (3) and washer (4) from transmission (2).

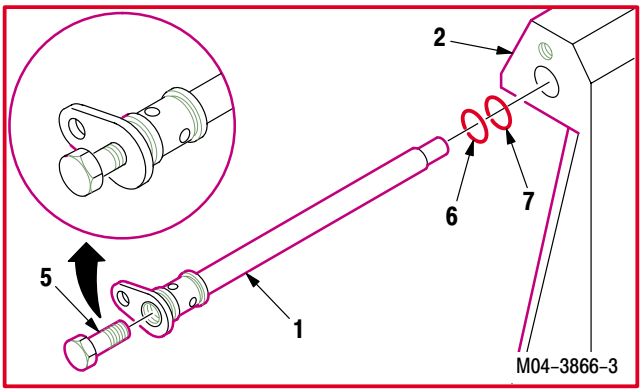


(2) Install removal bolt (5) five turns in jet (1).

(3) Pull removal bolt (5) to remove jet (1) from transmission (2).

(4) Remove removal bolt (5) from jet (1).

(5) Remove and discard packings (6) and (7) from jet (1).

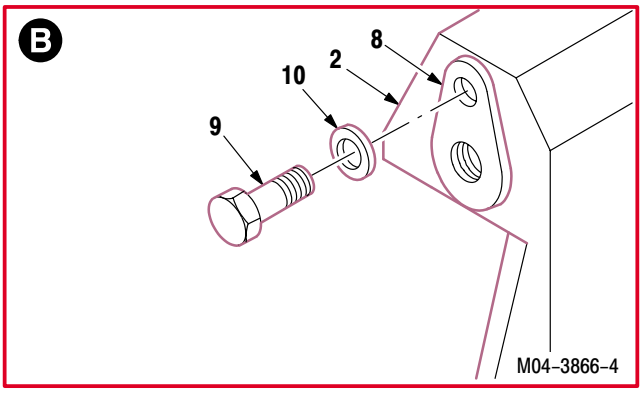


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6.53. MAIN TRANSMISSION UPPER COVER OIL JET REMOVAL/INSTALLATION – continued

b. **Remove right aft upper cover oil jet (8) from transmission (2).**

(1) Remove bolt (9) and washer (10) from transmission (2).

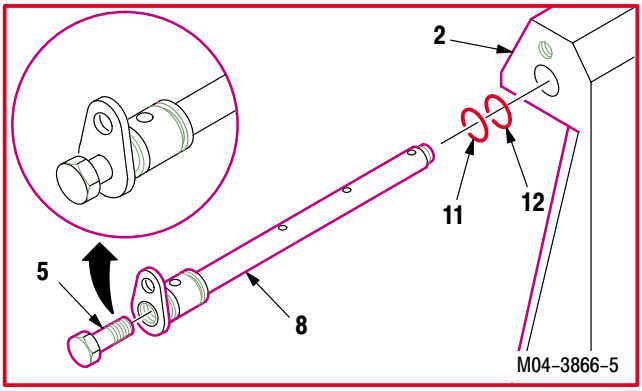


(2) Install removal bolt (5) five turns in jet (8).

(3) Pull removal bolt (5) to remove jet (8) from transmission (2).

(4) Remove removal bolt (5) from jet (8).

(5) Remove and discard packings (11) and (12) from jet (8).



6.53.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.53.5. Inspection

NOTE

The following inspection procedures apply to all upper cover oil jet mounting surfaces and recesses on main transmission.

a. **Check for cracks.** None allowed.

b. **Check for scratches, nicks, gouges, and other evidence of damage** (para 6.41)**.**

c. **Check for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.53. MAIN TRANSMISSION UPPER COVER OIL JET REMOVAL/INSTALLATION – continued

NOTE

The following inspection procedures apply to all upper cover oil jets.

d. **Check for cracks.** None allowed.

e. **Check threaded filter hole (13) for stripped, crossed, or flattened threads.** None allowed.

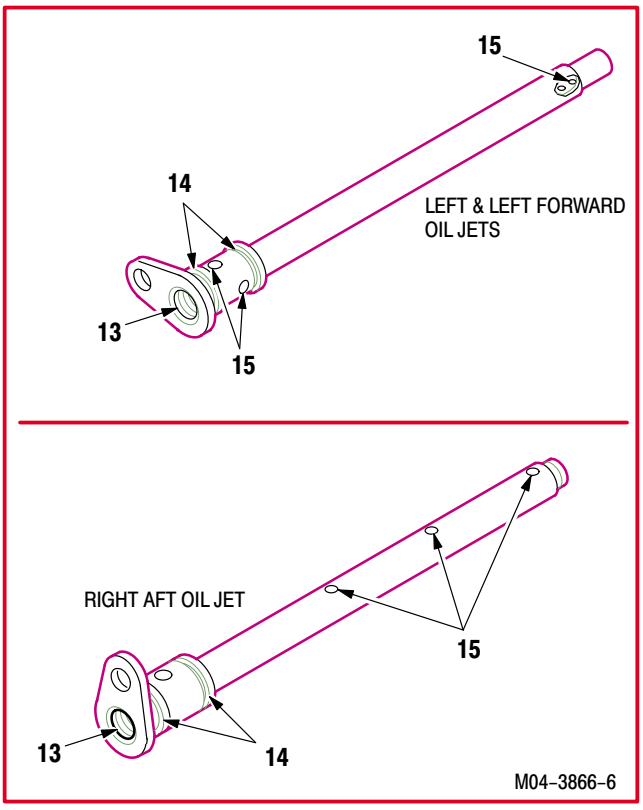
f. **Check for scratches, nicks, gouges, burrs, and corrosion.**

(1) Except for packing grooves, repair damaged areas **0.030 INCH** deep or less by blending. Use depth gage.

g. **Check packing grooves (14) for scratches, nicks, gouges, burrs, and corrosion.**

(1) Minor surface imperfections measuring **0.004 INCH** deep or less before blending and not covering over 20 percent of surface area may be repaired by blending at a 30:1 to 50:1 transition ratio. Repair not to exceed depth of original damage. Use depth gage.

h. **Check oil holes (15) for blockage or obstructions.** None allowed.



GO TO NEXT PAGE

6.53. MAIN TRANSMISSION UPPER COVER OIL JET REMOVAL/INSTALLATION – continued

6.53.6. Installation



NOTE

Perform step a. only if left and/or left forward oil jet was removed. Perform step b. only if right aft oil jet was removed.

a. **Install jet (1) in transmission (2).** Torque bolt (3) to **65 INCH-POUNDS**.

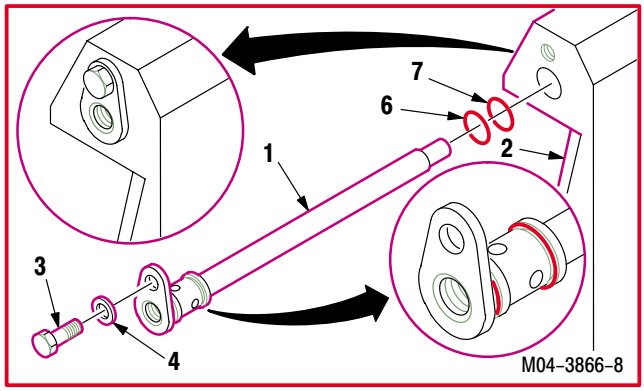
(1) Lubricate new packings (6) and (7). Use petrolatum (item 138, App F).

(2) Install packings (6) and (7) on jet (1).

(3) Install jet (1) in transmission (2).

(4) Install bolt (3) through washer (4), jet (1) flange, and transmission (2).

(5) Torque bolt (3) to **65 INCH-POUNDS**. Use torque wrench.



b. **Install jet (8) in transmission (2).** Torque bolt (9) to **65 INCH-POUNDS**.

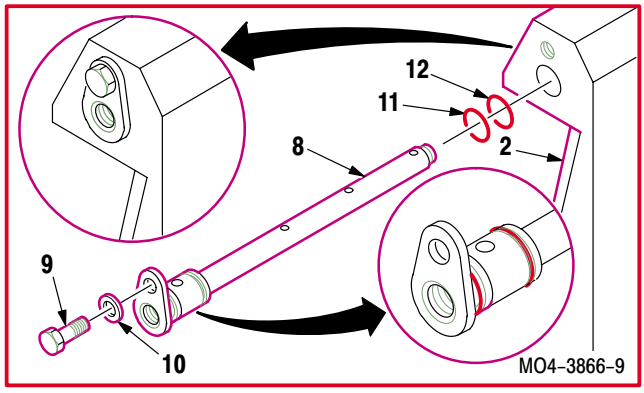
(1) Lubricate new packings (11) and (12). Use petrolatum (item 138, App F).

(2) Install packings (11) and (12) on jet (8).

(3) Install jet (8) in transmission (2).

(4) Install bolt (9) through washer (10), jet (8) flange, and housing (2).

(5) Torque bolt (9) to **65 INCH-POUNDS**. Use torque wrench.



c. **Install left, left forward, or right aft upper cover oil jet filter** (para 6.50)**.**

END OF TASK

6.54. MAIN TRANSMISSION COMPRESSOR DRIVE ADAPTER AND SEAL REMOVAL/INSTALLATION

6.54.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.54.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Main transmission seal removal/installation tool (Figure D-461, App D)
Adjustable air filtering respirator (item 262, App H)
7/16 x 3/8-inch drive deep socket wrench socket (item 302A, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packings (3)
Petrolatum (item 138, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

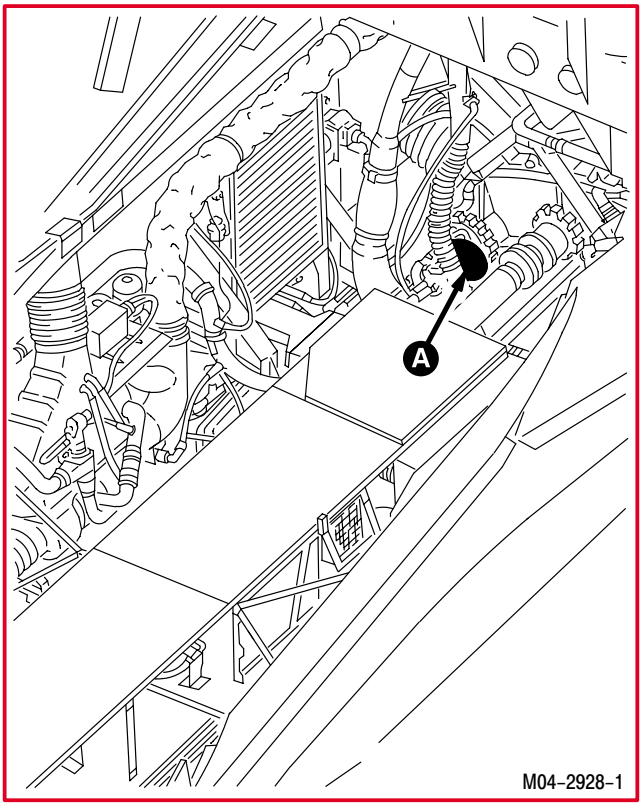
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.32	Main transmission oil drained
7.120	Shaft driven compressor removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



GO TO NEXT PAGE

6.54. MAIN TRANSMISSION COMPRESSOR DRIVE ADAPTER AND SEAL REMOVAL/INSTALLATION – continued

6.54.3. Removal

a. **Remove adapter (1) from transmission housing (2).**

(1) Remove four bolts (3) and washers (4) attaching adapter (1) to transmission (2). Use socket.

(2) Remove adapter (1) from transmission (2).

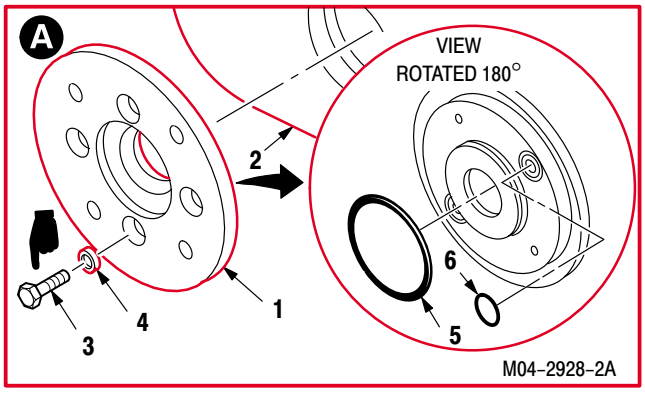
(3) Remove and discard packing (5) and two packings (6) from adapter (1).

(4) Insert removal tool in seal (7). Use seal removal/installation tool (Figure D-461, App D).

(5) Insert slide hammer in removal tool. Use seal removal/installation tool (Figure D-461, App D).

(6) Slide hammer aft contacting bolt head removing seal (7).

(7) Discard seal (7).



6.54.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.54.5. Inspection

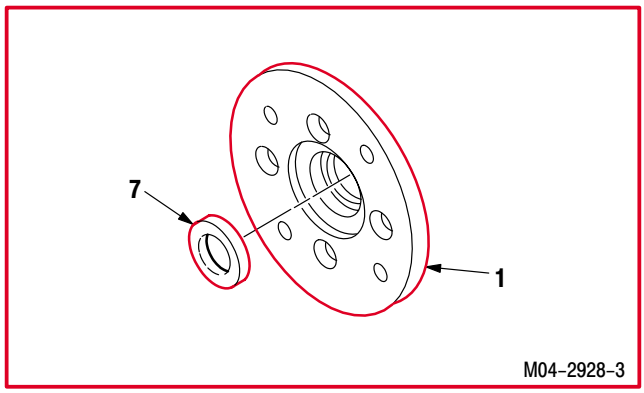
NOTE

The following inspection procedures apply to the compressor drive adapter and mating surface on the main transmission.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check drive plate and inserts for looseness.** None allowed.



GO TO NEXT PAGE

6.54. MAIN TRANSMISSION COMPRESSOR DRIVE ADAPTER AND SEAL REMOVAL/INSTALLATION – continued

6.54.6. Installation



NOTE

- The -3 seal is two-way interchangeable with the basic seal; the -3 is the preferred part.
- The -3 seal with brown elastomer and -5 seal with black elastomer (used on the APU input shaft) are rotational dependent seals which are not interchangeable.

a. **Install seal (7) in adapter (1).**

(1) Place adapter (1) on flat surface with compressor side (8) up.

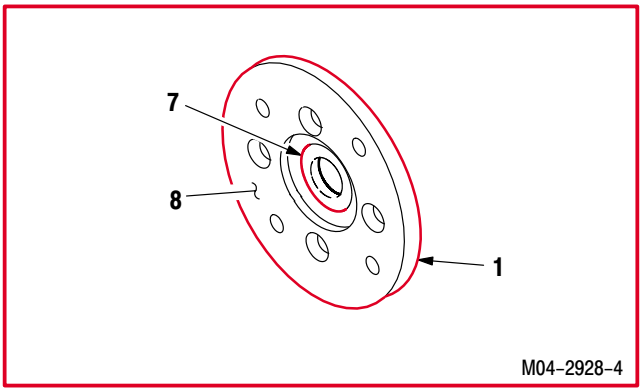
(2) Ensure new seal (7) has brown elastomer and not black elastomer (-5 seal).

(3) Apply sealant to outer edge of seal (7). Use sealing compound (item 177, App F).

(4) Insert guide in adapter (1). Use seal removal/installation tool (Figure D-461, App D).

(5) Install new seal (7) on guide with lip of seal facing down and position firmly against adapter (1).

(6) Install pusher on guide and tap to install new seal (7). Use seal removal/installation tool (Figure D-461, App D).



GO TO NEXT PAGE

6.54. MAIN TRANSMISSION COMPRESSOR DRIVE ADAPTER AND SEAL REMOVAL/INSTALLATION – continued



b. **Install adapter (1) on transmission (2).** Torque bolts (3) to **65 INCH-POUNDS**.

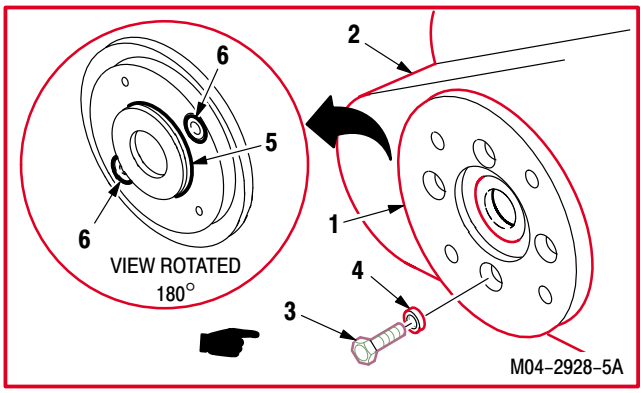
(1) Lubricate three new packings (5) and (6). Use petrolatum (item 138, App F).

(2) Install packing (5) and two packings (6) on adapter (1).

(3) Position adapter (1) on transmission (2).

(4) Install four bolts (3) and washers (4). Use socket.

(5) Torque bolts (3) to **65 INCH-POUNDS**. Use torque wrench and socket.



c. **Inspect (QA).**

d. **Install shaft driven compressor** (para 7.121)**.**

e. **Service main transmission oil system** (para 1.32)**.**

END OF TASK

6.55. MAIN TRANSMISSION INPUT SHAFT OIL JET AND SCREEN REMOVAL/INSTALLATION

6.55.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.55.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Bolt (AN5-60 for removal)
Packing (4)
Petrolatum (item 138, App F)
Wire (item 226, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

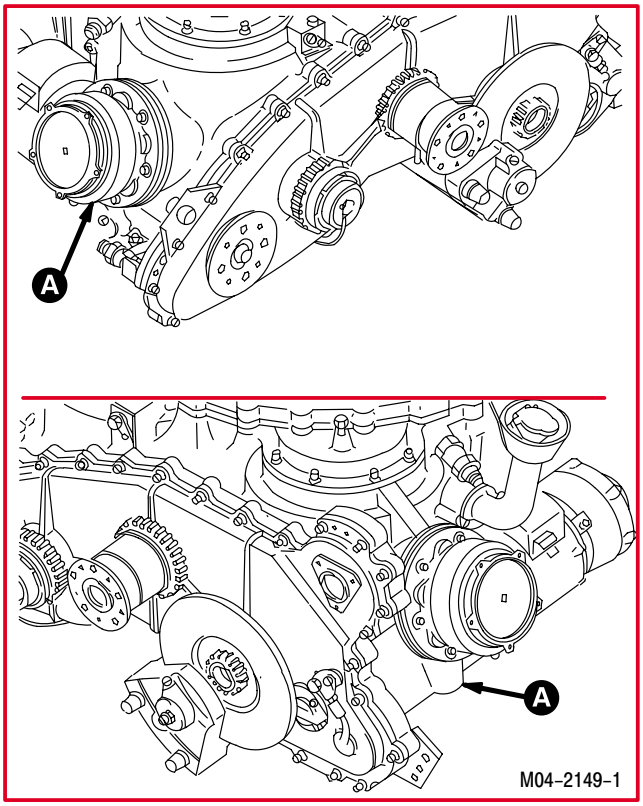
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right side. This task will show right side only.



GO TO NEXT PAGE

6.55. MAIN TRANSMISSION INPUT SHAFT OIL JET AND SCREEN REMOVAL/INSTALLATION – continued

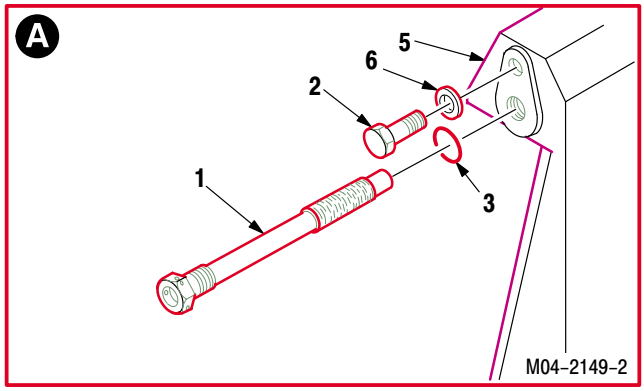
6.55.3. Removal

a. **Remove input shaft jet screen (1).**

(1) Remove lockwire from screen (1) and bolt (2).

(2) Remove screen (1).

(3) Remove and discard packing (3) from screen (1).



b. **Remove input shaft jet (4) from transmission (5).**

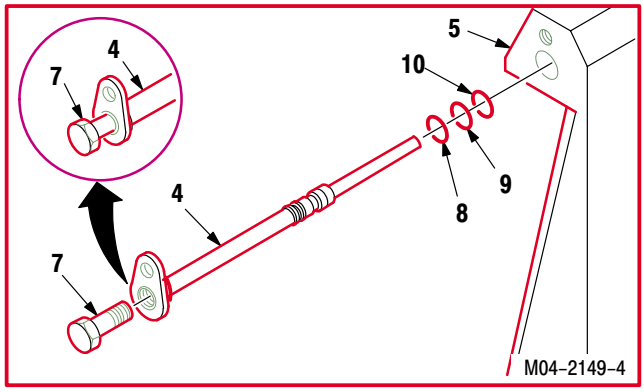
(1) Remove bolt (2) and washer (6) from transmission (5).

(2) Install removal bolt (7) five turns in jet (4).

(3) Pull removal bolt (7) to remove jet (4).

(4) Remove removal bolt (7) from jet (4).

(5) Remove and discard packings (8), (9), and (10) from jet (4).



6.55.4. Cleaning

a. **Wipe attachment area of input shaft jet with a clean rag.**

b. **Clean input shaft jet screen** (para 1.47)**.**

GO TO NEXT PAGE

6.55. MAIN TRANSMISSION INPUT SHAFT OIL JET AND SCREEN REMOVAL/INSTALLATION – continued

6.55.5. Inspection

a. **Check attachment area of input shaft jet for cracks.** None allowed.

b. **Check input shaft jet screen for debris.** None allowed.

c. **Check for nicks, gouges, burrs, and corrosion.**

(1) Repair damage **0.030 INCH** deep or less by blending. Use depth gage.

d. **Check for cracks.** None allowed.

e. **Check for damage to packing grooves.** None allowed.

f. **Check for stripped or crossed threads.** None allowed.

g. **Check all through holes for obstructions.**

(1) If obstructions cannot be removed by cleaning, replace jet.

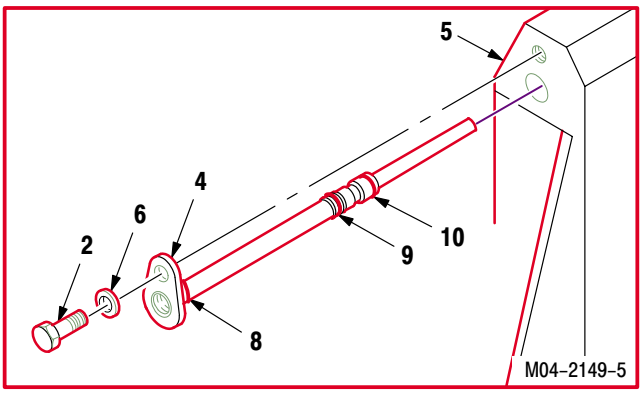
6.55.6. Installation



a. **Install new packings (8), (9), and (10) on jet (4).**

(1) Lubricate packings (8), (9), and (10). Use petrolatum (item 138, App F).

(2) Install packings (8), (9), and (10) on jet (4).



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6.55. MAIN TRANSMISSION INPUT SHAFT OIL JET AND SCREEN REMOVAL/INSTALLATION – continued

b. **Install jet (4) in transmission (5).** Torque bolt (2) to **65 INCH-POUNDS**.

(1) Install bolt (2) through washer (6), jet (4), and transmission (5).

(2) Torque bolt (2) to **65 INCH-POUNDS**. Use torque wrench.

c. **Install screen (1) in jet (4).** Torque screen (1) to **30 INCH-POUNDS**.

(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

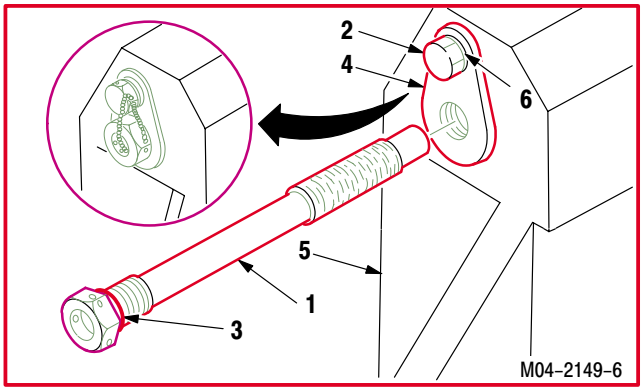
(2) Install packing (3) on screen (1).

(3) Install screen (1) in jet (4).

(4) Torque screen (1) to **30 INCH-POUNDS**. Use torque wrench.

(5) Lockwire screen (1) to bolt (2). Use wire (item 226, App F).

d. **Inspect (QA).**



END OF TASK

6.56. MAIN TRANSMISSION PRESSURE RELIEF VALVE REMOVAL/INSTALLATION

6.56.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.56.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)

References:

TM 1-1520-238-T

Materials/Parts:

Bolt (1-inch long 10-32 for removal)
Packing (2)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

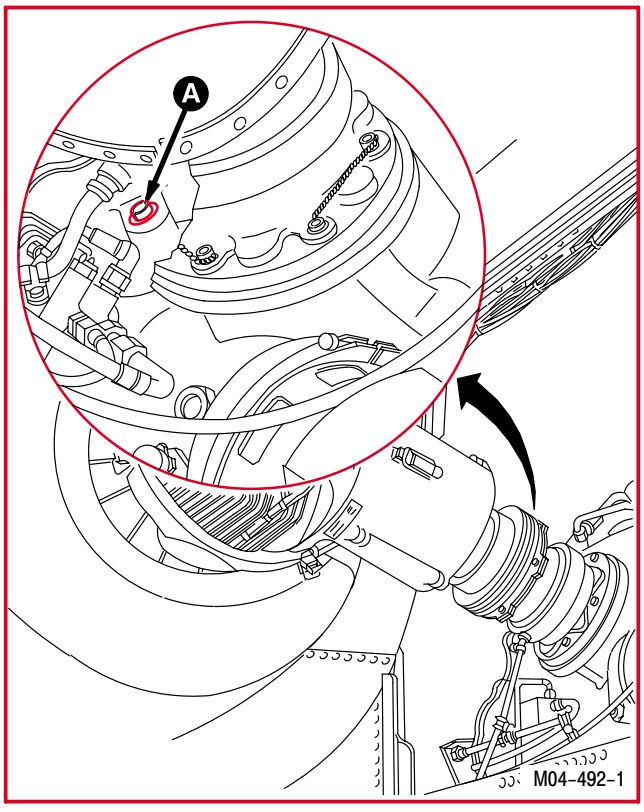
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



GO TO NEXT PAGE

6.56. MAIN TRANSMISSION PRESSURE RELIEF VALVE REMOVAL/INSTALLATION – continued

6.56.3. Removal

a. **Remove relief valve (1) from transmission (2).**

(1) Remove retaining ring (3) from transmission (2).

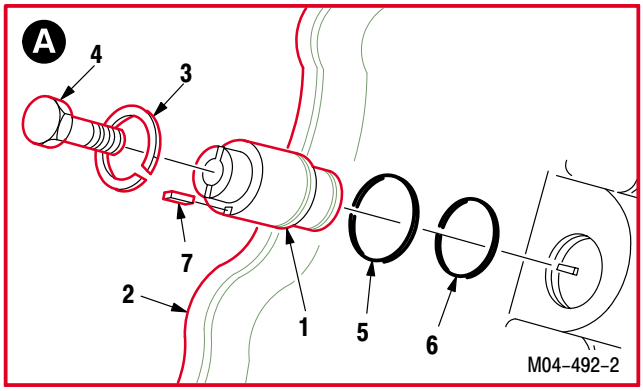
(2) Install 10-32 bolt (4) in valve (1).

(3) Pull valve (1) from transmission (2).

(4) Remove and discard packings (5) and (6) from valve (1).

(5) Remove bolt (4) from valve (1).

b. **Remove key (7) from valve (1).**



6.56.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.56.5. Inspection

a. **Check valve attachment area for cracks.** None allowed.

GO TO NEXT PAGE

6.56. MAIN TRANSMISSION PRESSURE RELIEF VALVE REMOVAL/INSTALLATION – continued

6.56.6. Installation



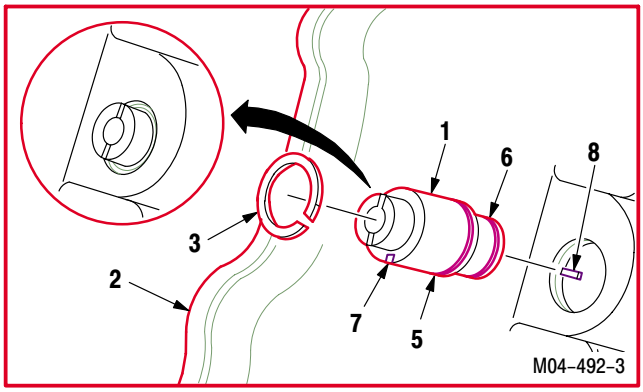
a. **Install packings (5), (6), and key (7) on valve (1).**

(1) Lubricate new packings (5) and (6). Use petrolatum (item 138, App F).

(2) Install larger packing (5) on body of valve (1).

(3) Install smaller packing (6) on end of valve (1).

(4) Install key (7) in slot on valve (1).



b. **Install valve (1) in transmission (2).**

(1) Aline key (7) with slot (8) in transmission (2).

(2) Push valve (1) in transmission (2).

(3) Install retaining ring (3).

c. **Inspect (QA).**

d. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

e. **Install access panel R200** (para 2.2)**.**

END OF TASK

6.57. MAIN TRANSMISSION IDENTIFICATION PLATE REPLACEMENT

6.57.1. Description

This task covers: Removal. Cleaning. Installation.

6.57.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 55-1500-344-23

Materials/Parts:

Adhesive (item 13, App F)
Brush (item 34, App F)
Isopropyl alcohol (item 106, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

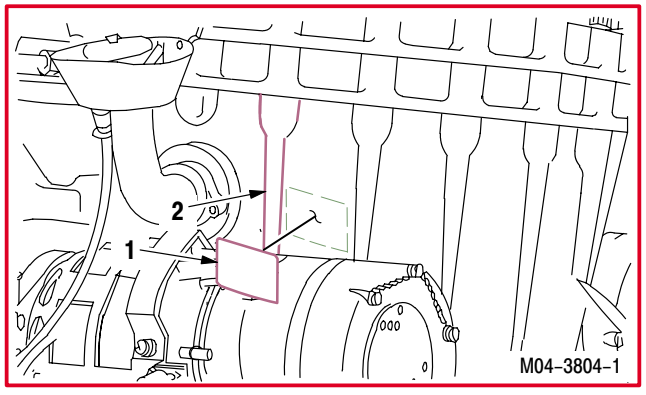
6.57.3. Removal

a. **Record all identification data found on identification plate (1).**

b. **Remove plate (1) from main transmission (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove and discard plate (1) from transmission (2).



GO TO NEXT PAGE

6.57. MAIN TRANSMISSION IDENTIFICATION PLATE REPLACEMENT – continued

6.57.4. Cleaning

a. **Remove paint and primer from identification plate mounting area** (TM 55-1500-344-23)**.**



b. **Clean identification plate mounting area.** Use isopropyl alcohol (item 106, App F).

6.57.5. Inspection

a. **Check mounting area for corrosion** (para 1.49)**.**

6.57.6. Installation

a. **Prime and paint identification plate mounting area** (TM 55-1500-344-23)**.**

b. **Transcribe all identification data on new identification plate (1).** Use die set.

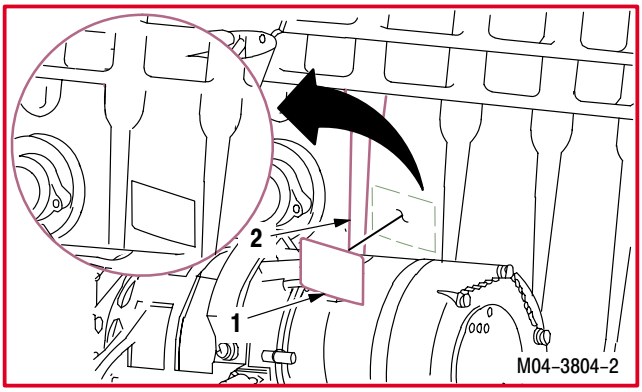


c. **Install identification plate (1) on transmission (2).**

(1) Remove lining from back side of plate (1).

(2) Apply adhesive to surface of plate (1). Use brush (item 34, App F) and adhesive (item 13, App F).

(3) Install plate (1) in same location as old plate on transmission (2).



d. **Inspect (QA).**

e. **Install access panel R200** (para 2.2)**.**

END OF TASK

6.58. MAIN TRANSMISSION BREATHER REMOVAL/INSTALLATION

6.58.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.58.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 or R200 removed

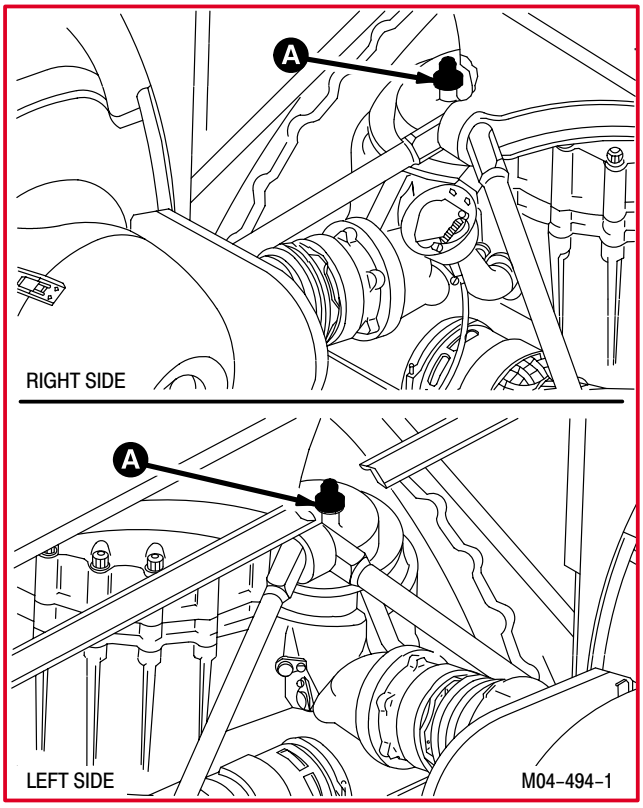
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right main transmission breather.



GO TO NEXT PAGE

6.58. MAIN TRANSMISSION BREATHER REMOVAL/INSTALLATION – continued

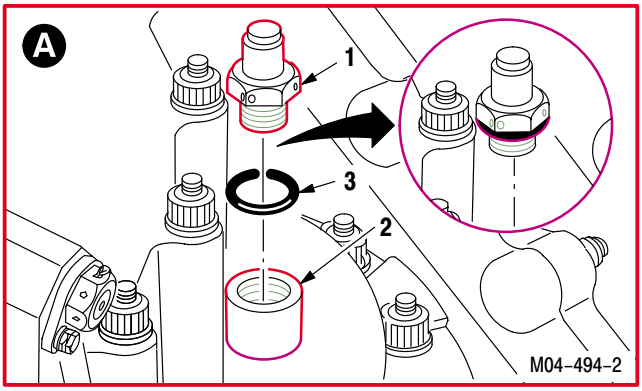
6.58.3. Removal

a. **Remove breather (1) from transmission (2).**

(1) Remove lockwire from breather (1).

(2) Remove breather (1).

(3) Remove and discard packing (3).



6.58.4. Cleaning

a. **Wipe breather and attachment area with a clean rag.**

6.58.5. Inspection

a. **Check attachment area for cracks.** None allowed.

6.58.6. Installation



a. **Install breather (1) in transmission (2).** Torque breather (1) to **30 INCH-POUNDS**.

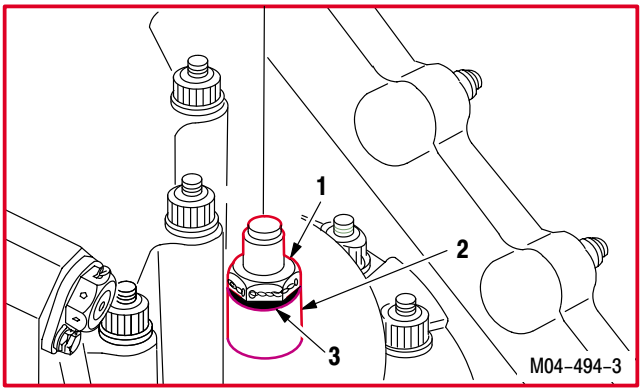
(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on breather (1).

(3) Install breather (1) in transmission (2).

(4) Torque breather (1) to **30 INCH-POUNDS**. Use torque wrench.

(5) Lockwire breather (1) to transmission (2). Use wire (item 222, App F).



b. **Inspect (QA).**

c. **Install access panel L200 or R200** (para 2.2)**.**

END OF TASK

6.59. MAIN TRANSMISSION SIGHT INDICATOR REMOVAL/INSTALLATION

6.59.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.59.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Face spanner socket wrench (item 319, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 or R200 removed
1.32	Main transmission oil system drained

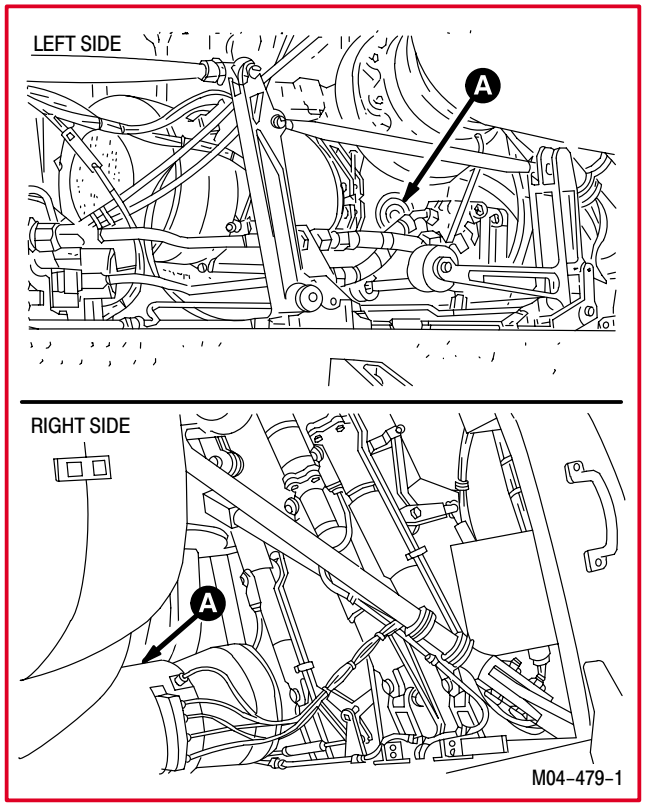
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right sight indicator.



GO TO NEXT PAGE

6.59. MAIN TRANSMISSION SIGHT INDICATOR REMOVAL/INSTALLATION – continued

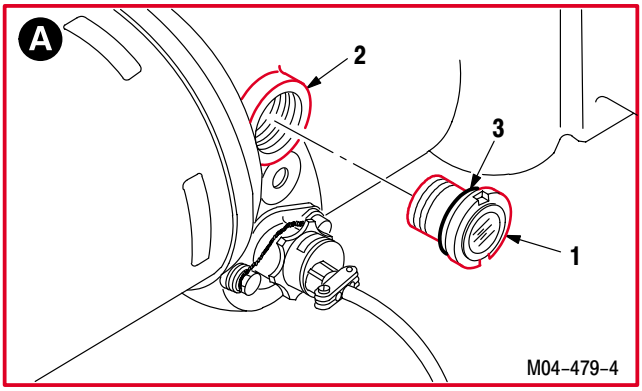
6.59.3. Removal

a. **Remove sight indicator (1) from transmission (2).**

(1) Remove lockwire from indicator (1).

(2) Remove indicator (1). Use spanner socket wrench.

(3) Remove and discard packing (3).



6.59.4. Cleaning

a. **Wipe attachment area of sight indicator with a clean rag.**

6.59.5. Inspection

a. **Check attachment area of sight indicator for cracks or damaged threads.** None allowed.

GO TO NEXT PAGE

6.59. MAIN TRANSMISSION SIGHT INDICATOR REMOVAL/INSTALLATION – continued

6.59.6. Installation



a. **Install indicator (1) on transmission (2).** Torque indicator (1) to **65 INCH-POUNDS**.

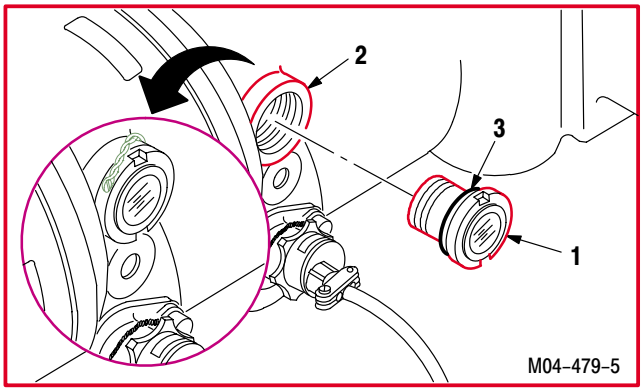
(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on indicator (1).

(3) Install indicator (1) on transmission (2).

(4) Torque indicator (1) to **65 INCH-POUNDS**. Use torque wrench and spanner socket wrench.

(5) Lockwire indicator (1) to transmission (2). Use wire (item 222, App F).



b. **Inspect (QA).**

c. **Service main transmission oil system** (para 1.32)**.**

d. **Install access panel L200 or R200** (para 2.2)**.**

END OF TASK

6.60. MAIN TRANSMISSION FILTER INSPECTION

6.60.1. Description

This task covers: Inspection.

6.60.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)

References:

TM 1-1500-204-23
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panels L200 and R200 removed

Personnel Required:

68D	Aircraft Powertrain Repairer/NDI
67R3F	Attack Helicopter Repairer/Technical Inspector

6.60.3. Inspection

NOTE

This inspection covers main transmission filter elements, nose gearbox filter elements, shaft driven compressor filter elements, and main transmission accessory pump filter.

a. **Check filter or filter bowl for metal chips, flakes, splinters, or other contamination.**

(1) Identify contaminants. Use permanent magnet to separate steel particles.

(2) Perform steps b. thru d. if five or more steel splinters or flakes greater than **1/16 (0.062) INCH by 3/16 (0.187) INCH** are present. Go to step a.(3) if smaller.

(3) Perform steps b. thru d. if 10 or more steel flakes or particles greater than **1/16 (0.062) INCH by 1/16 (0.062) INCH** are present. Go to step a.(4) if fewer.

(4) If smaller or fewer metal chips, flakes, or splinters than given in steps a.(2) or a.(3):

(a) Drain and flush main transmission (para 1.32).

(b) Replace main transmission filter elements (para 6.61) or (para 6.62), shaft driven compressor filter element (para 7.124), and main transmission accessory pump filter (para 6.70).

(c) Perform drive system dynamic maintenance operational check (TM 1-1520-238-T).

(d) Check main transmission filter elements, shaft driven compressor filter element, and main transmission accessory pump filter.

GO TO NEXT PAGE

6.60. MAIN TRANSMISSION FILTER INSPECTION – continued

(e) If metal chips are still present, repeat step a.(4). If metal chips are not present, go to step e.

NOTE

- Perform steps b. thru d. if metal chips are present after repeating step a.(4) three times.
- Replace SDC only if SDC filter is contaminated with metal particles and/or the accessory pump filter is bypassed and metal contamination of the transmission lubricant exists.
- Replace left and right heat exchangers only if the main transmission filter element is bypassed and metal contamination of the transmission lubricant exists.

b. **Remove transmission** (para 6.101)**, shaft driven compressor** (para 7.120)**, and left and right heat exchangers** (para 6.85)**.**

c. **Drain and flush oil lines** (TM 1-1500-204-23)**.**

d. **Install serviceable transmission** (para 6.107)**, shaft driven compressor** (para 7.121)**, and left and right heat exchangers** (para 6.86)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panels L200 and R200** (para 2.2)**.**

END OF TASK

6.61. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION

6.61.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.61.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Materials/Parts:

Packing (2) or (4)
Assembly fluid (item 30, App F)
Sealing compound (item 175, App F)
Wire (item 222, App F)
Wire (item 226, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 or R200 removed
1.32	Main transmission oil system drained

WARNING

FLIGHT SAFETY PART

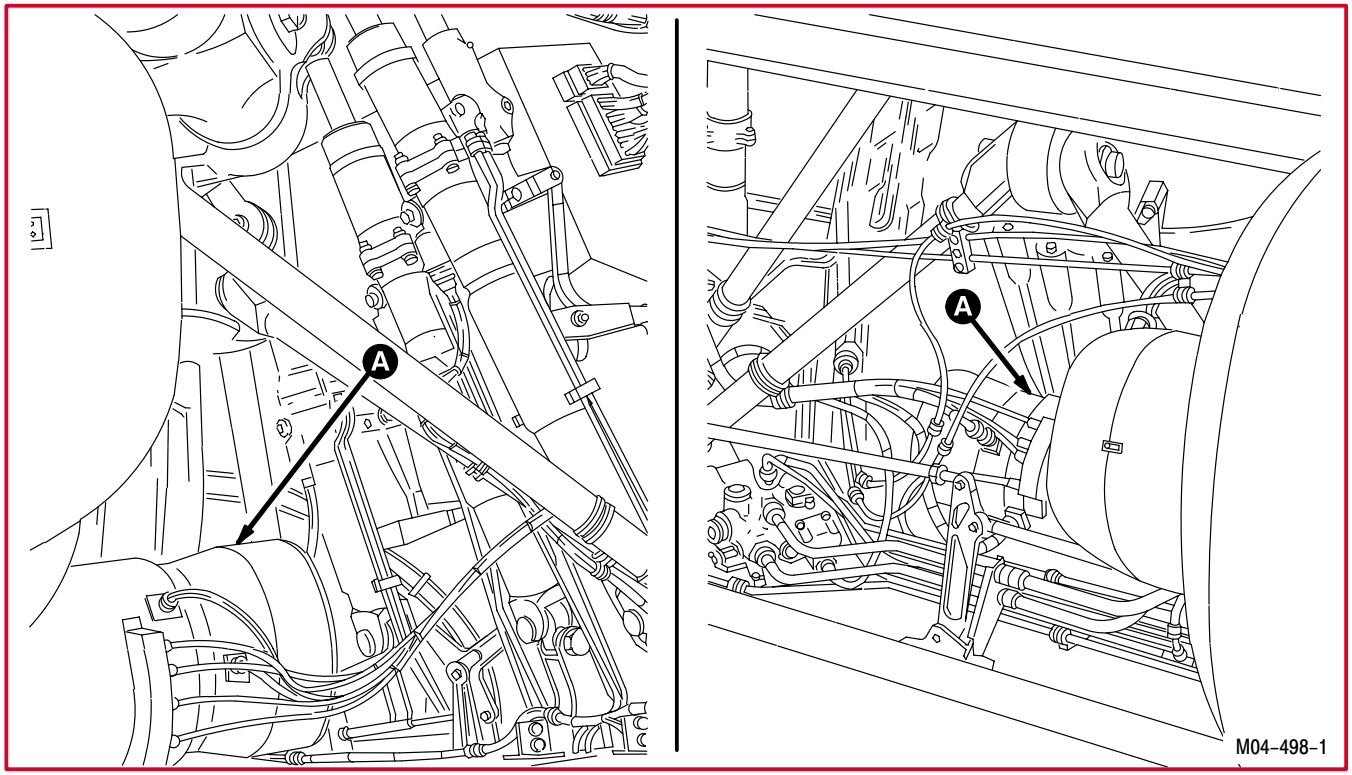
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

- This task is typical for either right or left main transmission oil filter bowl, element, and differential pressure switch.
- The 7-311310001-41/43 main transmissions have a chamfer cutout on the housing to allow for a second packing to be used in the installation of the main transmission oil filter bowls.

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6.61. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION – continued



6.61.3. Removal

a. **Remove filter bowl (1) from main transmission (2).**

(1) Remove lockwire between bowl (1) and probe (3).

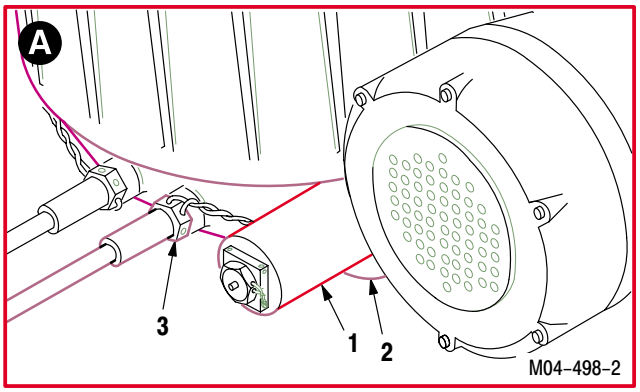
(2) Remove bowl (1) from transmission (2). Use crowfoot.

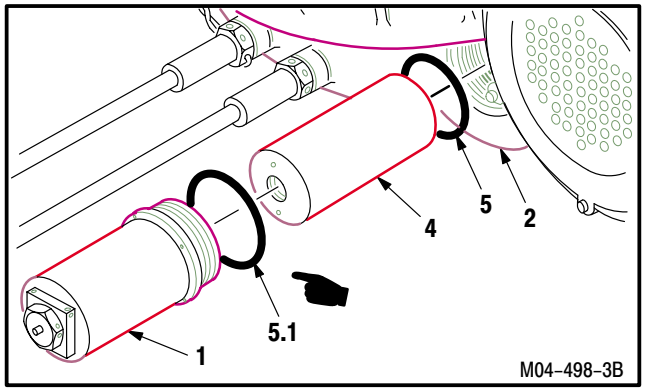
(3) Remove and inspect element (4) (para 6.60).

(4) Discard element (4).

(5) Remove and discard packing (5) from transmission (2) housing.

(6) If installed, remove and discard second packing (5.1) from groove of bowl (1).





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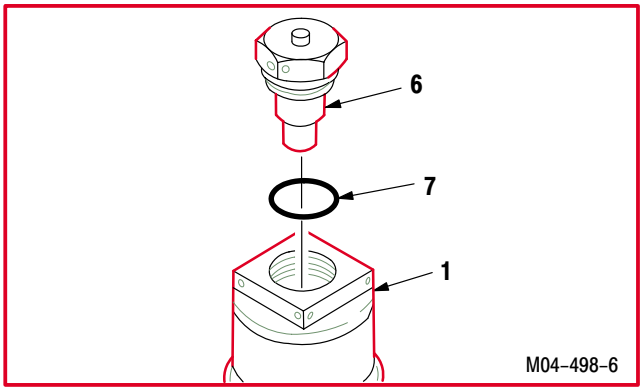
6.61. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION – continued

b. **Remove pressure switch (6) from bowl (1).**

(1) Remove lockwire from switch (6).

(2) Remove switch (6).

(3) Remove and discard packing (7).



6.61.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

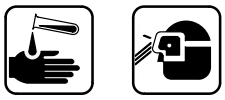
6.61.5. Inspection

a. **Check removed and attaching parts for cracks.** None allowed.

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Check removed and attaching parts for crossed, stripped, or flattened threads.** None allowed.

6.61.6. Installation



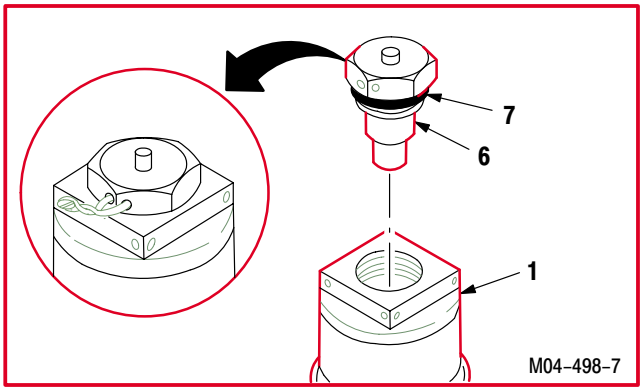
a. **Install switch (6) on bowl (1).**

(1) Lubricate new packing (7), switch (6), and mating surface of bowl (1). Use assembly fluid (item 30, App F).

(2) Install packing (7) on switch (6).

(3) Install switch (6) on bowl (1).

(4) Lockwire switch (6) to bowl (1). Use wire (item 226, App F).



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6.61. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (LOCKWIRED TYPE) REMOVAL/INSTALLATION – continued



b. **Install bowl (1) and new element (4) in transmission (2).** Torque bowl (1) to **100 INCH-POUNDS**.

(1) Lubricate new packing (5). Use assembly fluid (item 30, App F).

(2) Install packing (5) in second groove of transmission (2) housing.

NOTE

Steps (3) and (4) apply to transmissions with chamfer for second packing only.

(3) Ensure transmission has chamfer for second packing, lubricate new packing (5.1). Use assembly fluid (item 30, App F).

(4) Install packing (5.1) in groove of bowl (1).

(5) Install element (4) in bowl (1).

NOTE

To prevent contamination of new packings, ensure sealant does not get into chamfer area when appling sealant.

(6) Apply a thin coat of sealing compound to transmission where bowl (1) flange face and transmission (2) mate. Use sealing compound (item 175, App F).

(7) Install bowl (1) and element (4) in transmission (2).

(8) Torque bowl (1) to **100 INCH-POUNDS**. Use crowfoot and torque wrench.

(9) Remove excess sealant squeeze out.

(10) Lockwire bowl (1) to probe (3). Use wire (item 222, App F).

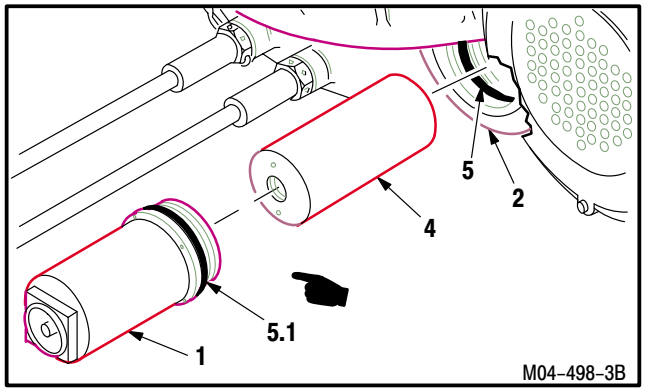
c. **Inspect (QA).**

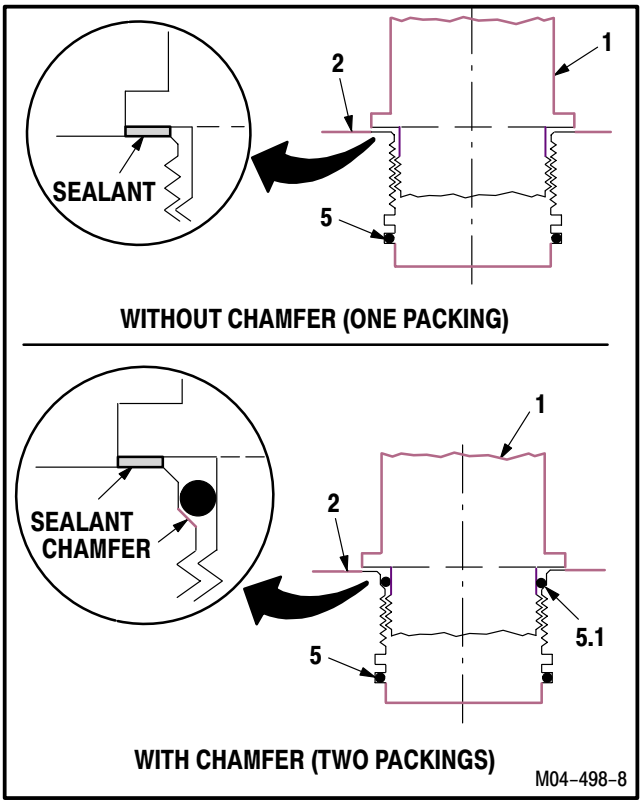
d. **Service main transmission oil system** (para 1.32)**.**

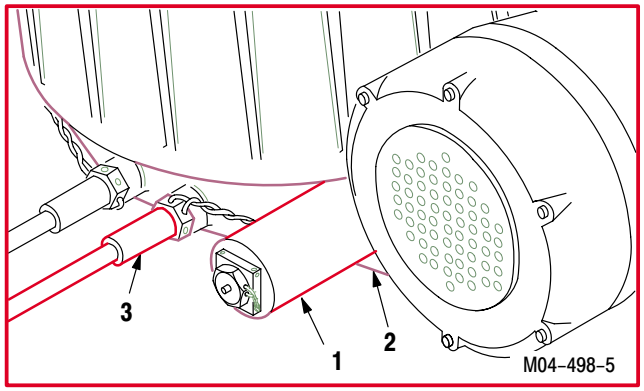
e. **Install access panel L200 or R200** (para 2.2)**.**

f. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK







6.62. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER RINGED TYPE) REMOVAL/INSTALLATION

6.62.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.62.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Retaining ring pliers (item 227, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Materials/Parts:

Packing (2) or (4)
Packing retainer
Assembly fluid (item 30, App F)
Sealing compound (item 175, App F)
Wire (item 222, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 or R200 removed
1.32	Main transmission oil system drained

WARNING

FLIGHT SAFETY PART

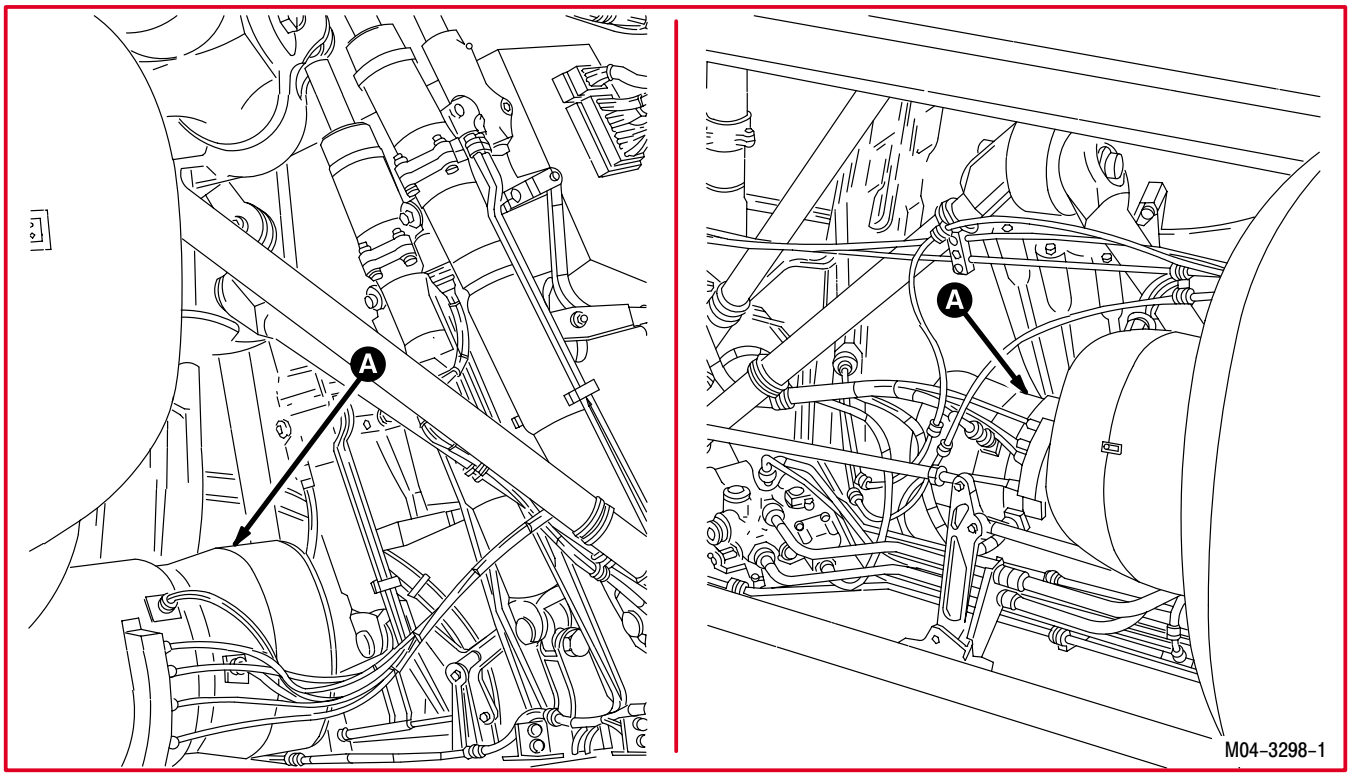
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

- This task is typical for either right or left main transmission oil filter bowl, element, and differential pressure switch.
- The 7-311310001-41/43 main transmissions have a chamfer cutout on the housing to allow for a second packing to be used in the installation of the main transmission oil filter bowls.

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6.62. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER RINGED TYPE) REMOVAL/INSTALLATION – continued



6.62.3. Removal

a. **Remove filter bowl (1) from main transmission (2).**

(1) Remove lockwire between bowl (1) and probe (3).

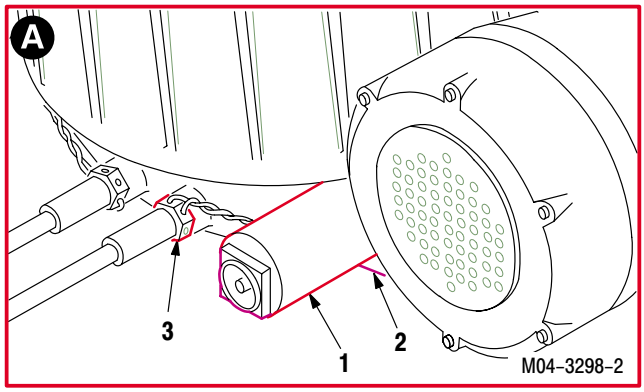
(2) Remove bowl (1) from transmission (2). Use crowfoot.

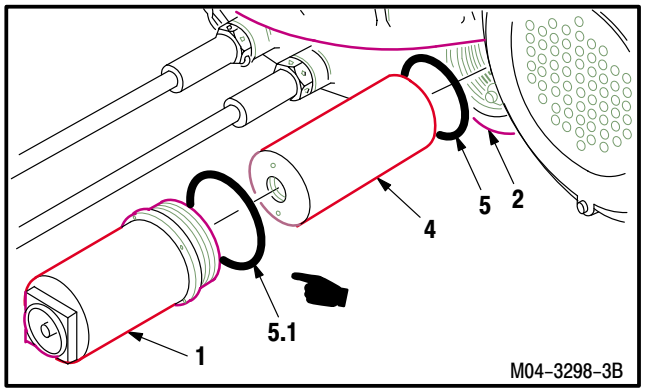
(3) Remove and inspect element (4) (para 6.60).

(4) Discard element (4).

(5) Remove and discard packing (5) from transmission (2) housing.

(6) If installed, remove and discard second packing (5.1) from groove of bowl (1).





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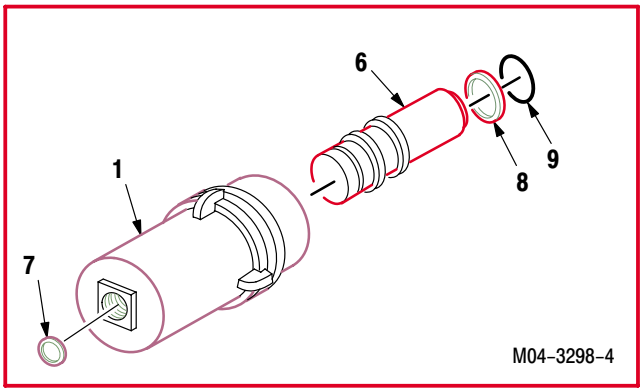
6.62. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER RINGED TYPE) REMOVAL/INSTALLATION – continued

b. **Remove pressure switch (6) from bowl (1).**

(1) Remove spirolox (7) from switch (6). Use retaining ring pliers.

(2) Remove switch (6) from bowl (1).

(3) Remove and discard packing retainer (8), and packing (9) from switch (6).



6.62.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.62.5. Inspection

a. **Check removed and attaching parts for cracks.** None allowed.

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Check removed and attaching parts for crossed, stripped, or flattened threads.** None allowed.

6.62.6. Installation



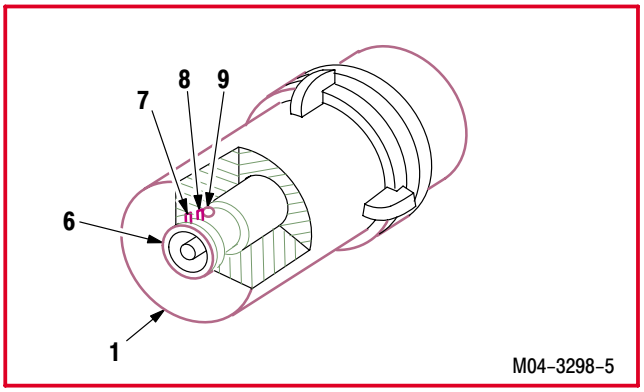
a. **Install switch (6) on bowl (1).**

(1) Lubricate new packing retainer (8), new packing (9), and mating surface of bowl (1). Use assembly fluid (item 30, App F).

(2) Install packing retainer (8) and packing (9) on switch (6).

(3) Install switch (6) in bowl (1).

(4) Install spirolox (7) on switch (6). Use retaining ring pliers.



GO TO NEXT PAGE

6.62. MAIN TRANSMISSION FILTER BOWL, ELEMENT, AND DIFFERENTIAL PRESSURE SWITCH (RETAINER RINGED TYPE) REMOVAL/INSTALLATION – continued



b. **Install bowl (1) and new element (4) in transmission (2).** Torque bowl (1) to **100 INCH-POUNDS**.

(1) Lubricate new packing (5). Use assembly fluid (item 30, App F).

(2) Install packing (5) in second groove of transmission (2) housing.

NOTE

Steps (3) and (4) apply to transmissions with chamfer for second packing only.

(3) Ensure transmission has chamfer for second packing, lubricate new packing (5.1). Use assembly fluid (item 30, App F).

(4) Install packing (5.1) in groove of bowl (1).

(5) Install element (4) in bowl (1).

NOTE

To prevent contamination of new packings, ensure sealant does not get into chamfer area when appling sealant.

(6) Apply a thin coat of sealing compound to transmission where bowl (1) flange face and transmission (2) mate. Use sealing compound (item 175, App F).

(7) Install bowl (1) and element (4) in transmission (2).

(8) Torque bowl (1) to **100 INCH-POUNDS**. Use crowfoot and torque wrench.

(9) Remove excess sealant squeeze out.

(10) Lockwire bowl (1) to probe (3). Use wire (item 222, App F).

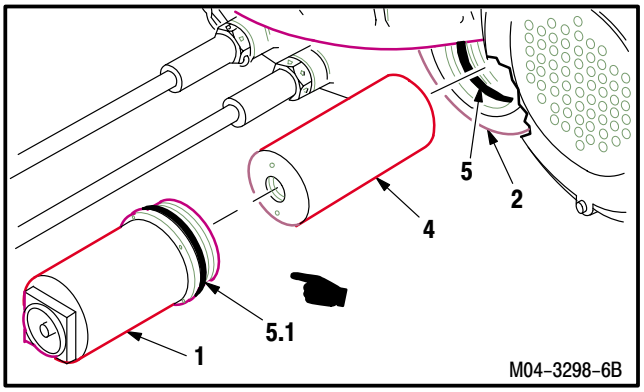
c. **Inspect (QA).**

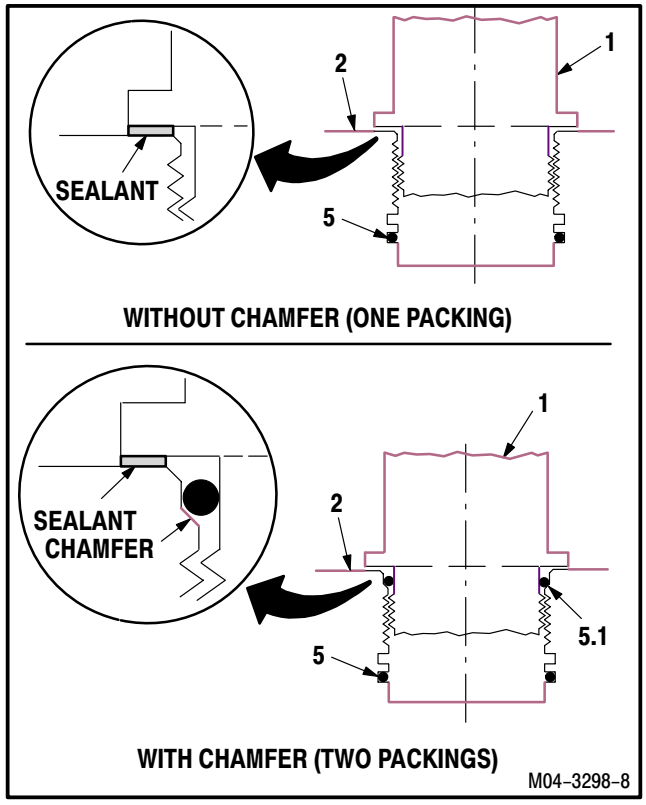
d. **Service main transmission oil system** (para 1.32)**.**

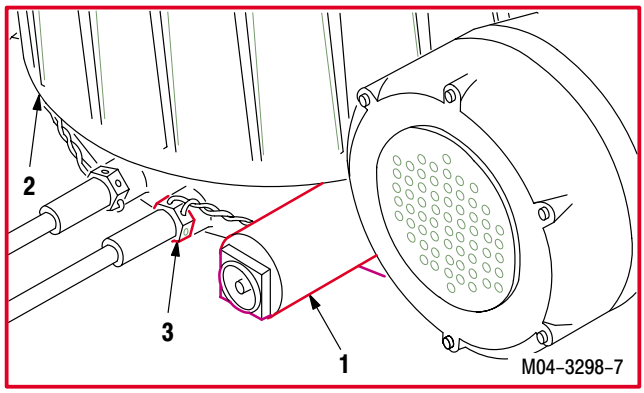
e. **Install access panel L200 or R200** (para 2.2)**.**

f. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK







6.63. MAIN TRANSMISSION OIL FILTER SAFETY RELIEF VALVE REMOVAL/INSTALLATION

6.63.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.63.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 or R200 removed
1.32	Main transmission oil system drained
6.61	Main transmission filter bowl and element removed
6.62	Main transmission filter bowl and element removed

WARNING

FLIGHT SAFETY PART

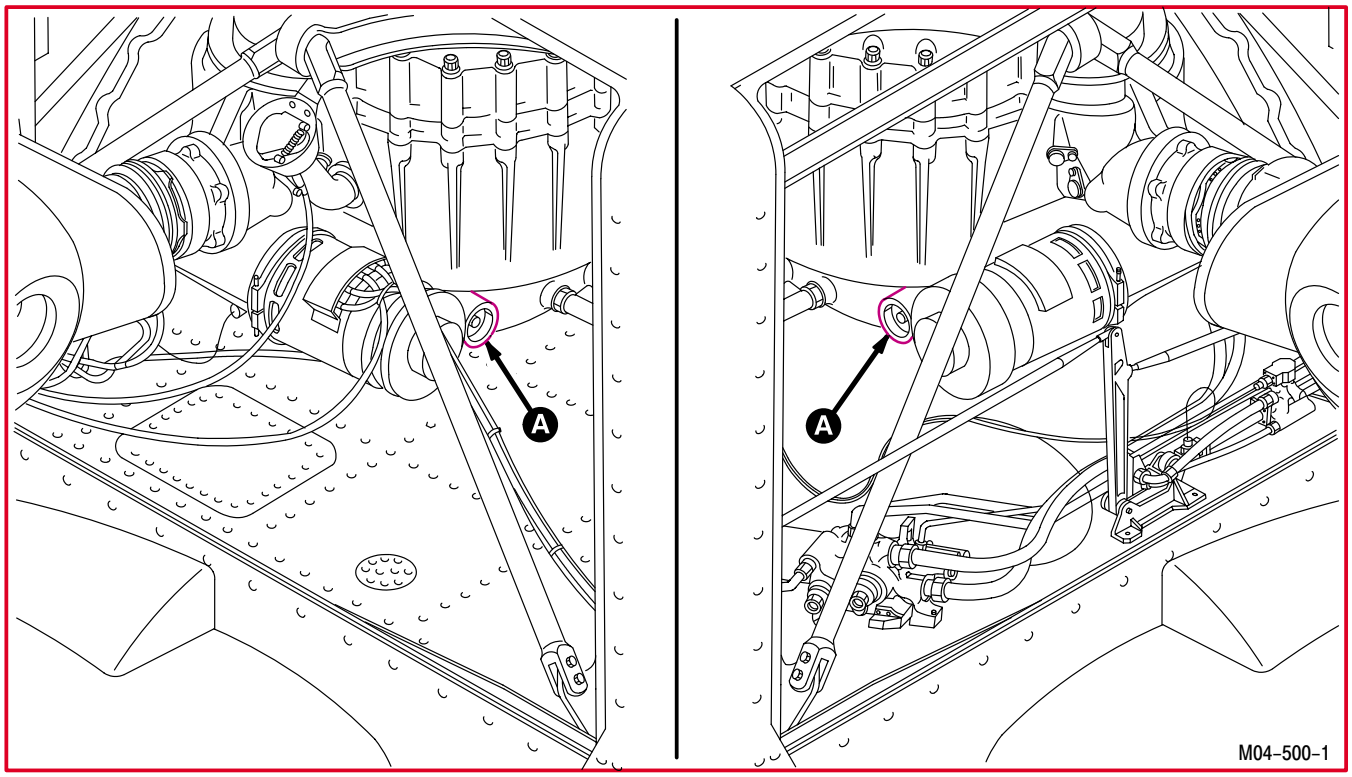
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either right or left oil filter safety relief valve.

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6.63. MAIN TRANSMISSION OIL FILTER SAFETY RELIEF VALVE REMOVAL/INSTALLATION – continued



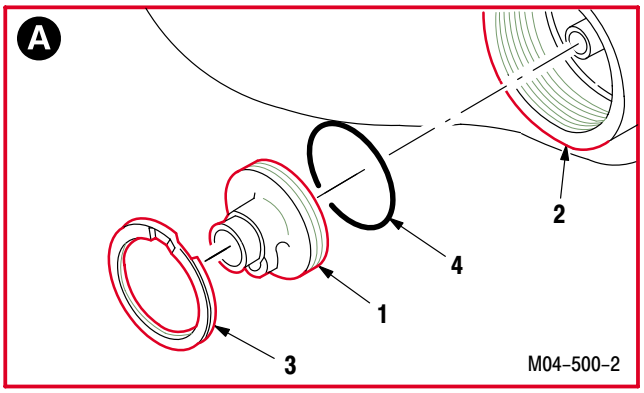
6.63.3. Removal

a. **Remove relief valve (1) from transmission (2).**

(1) Remove retaining ring (3).

(2) Remove valve (1).

(3) Remove and discard packing (4) from valve (1).



6.63.4. Cleaning

a. **Wipe cavity of valve on transmission with a clean rag.**

6.63.5. Inspection

a. **Check removed and attaching parts for cracks.** None allowed.

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.63. MAIN TRANSMISSION OIL FILTER SAFETY RELIEF VALVE REMOVAL/INSTALLATION – continued

6.63.6. Installation



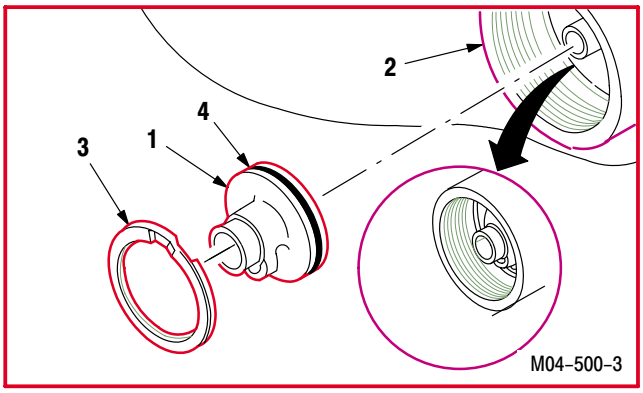
a. **Install valve (1) in transmission (2).**

(1) Lubricate new packing (4). Use petrolatum (item 138, App F).

(2) Install packing (4) on valve (1).

(3) Install valve (1) in transmission (2).

(4) Install ring (3) in transmission (2).



b. **Install main transmission filter bowl and element** (para 6.61) **or** (para 6.62)**.**

c. **Service main transmission oil system** (para 1.32)**.**

d. **Inspect (QA).**

e. **Install access panel L200 or R200** (para 2.2)**.**

END OF TASK

6.64. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) REMOVAL/INSTALLATION

6.64.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.64.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1/2-inch hexagon x 1/2-inch drive screwdriver socket wrench attachment (item 321, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
30 - 200 inch-pound 1/4-inch drive click type torque wrench (item 436, App H)

Materials/Parts:

Packing (2)
Plug
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
9.40	Helicopter battery connected

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

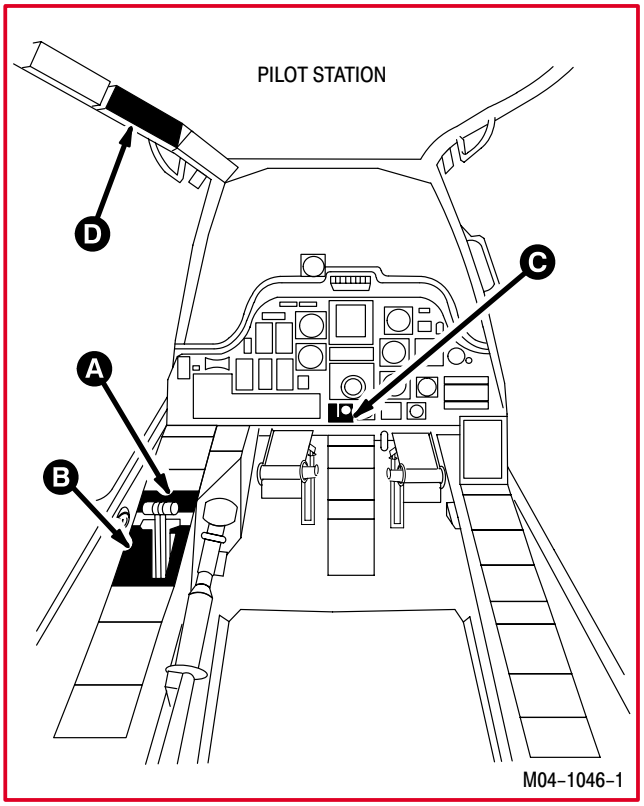
Do not intermix manufacturers' disks and actuators in one assembly. Damage to helicopter will result if disks and actuators from different manufacturers are intermixed in one assembly.

GO TO NEXT PAGE

6.64. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) REMOVAL/INSTALLATION – continued

6.64.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**



b. **On ELEC PWR panel (1), set BATT/EXT PWR switch (2) to BATT.**

c. **On power quadrant (3), set RTR BK switch (4) to OFF.**

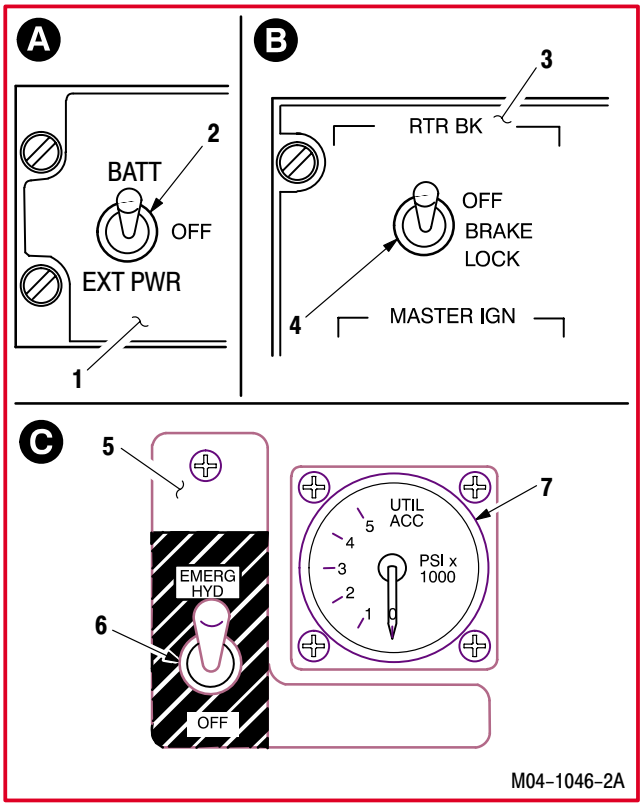
d. **On EMERG HYD panel (5), set EMERG HYD switch (6) to EMERG HYD.**

CAUTION

To prevent damage to shear pin activated decoupler (SPAD) shear pin in BUCS activated aircraft, do not force directional pedals and cyclic or collective sticks against any resistance.

e. **Cycle flight controls until UTIL ACC pressure gage (7) reads ZERO PSI.**

f. **On ELEC PWR panel (1), set BATT/EXT PWR switch (2) to OFF.**

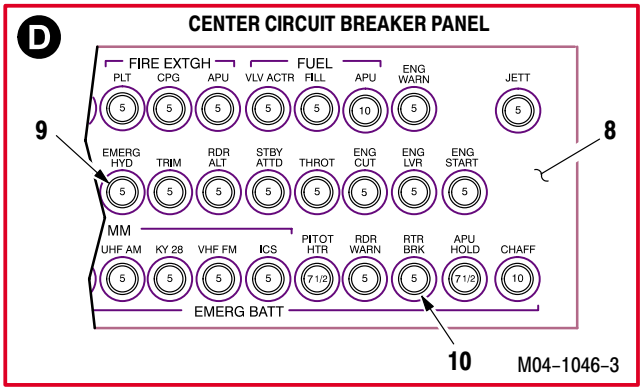


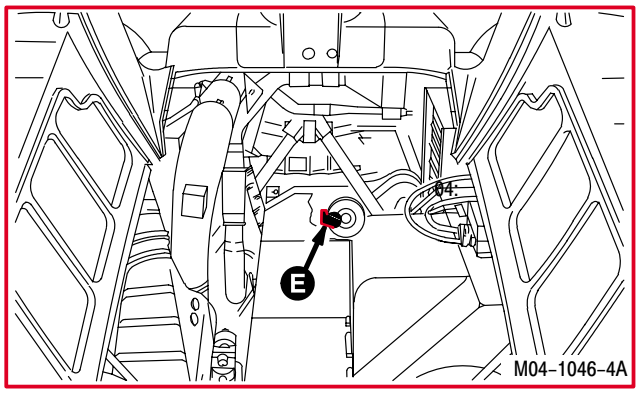
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6.64. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) REMOVAL/INSTALLATION – continued

g. **On pilot center circuit breaker panel (8), open EMERG HYD (9) and RTR BRK (10) circuit breakers.**

h. **Disconnect battery** (para 9.40)**.**





i. **Remove hose (11) from union (12).**

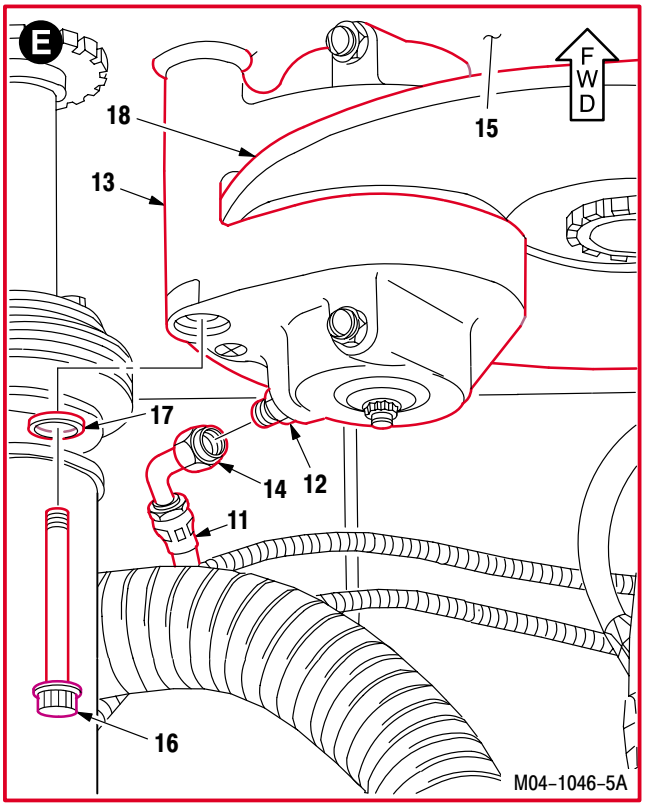
(1) Place rags under rotor brake actuator (13) to catch hydraulic fluid spills.

(2) Hold union (12). Remove nut (14).

j. **Remove actuator (13) from main transmission (15).**

(1) Remove two bolts (16) and washers (17) from actuator (13).

(2) Slide actuator (13) from brake disk (18).



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6.64. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) REMOVAL/INSTALLATION – continued

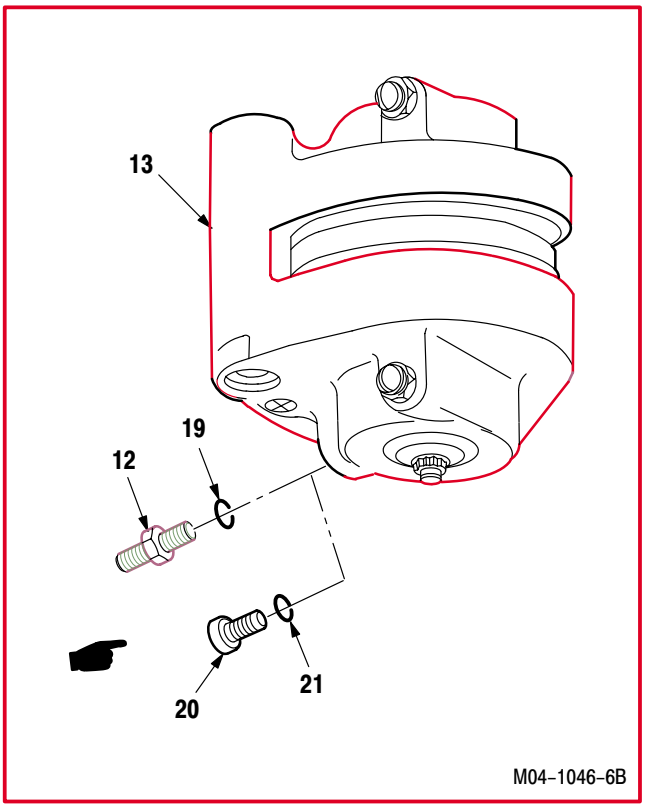
k. **Remove union (12) from actuator (13).**

(1) Remove and discard packing (19).

l. **If available, install protective plug (20).**

(1) Lubricate new packing (21). Use hydraulic fluid (item 92, App F).

(2) Install plug (20) and packing (21) on actuator (13).



6.64.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.64.5. Inspection

NOTE

The following inspection procedures apply to rotor brake actuator and actuator mounting area on main transmission.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks, scratches, and gouges** (para 6.41)**.**

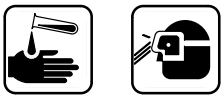
d. **Check rotor brake actuator bolt holes on main transmission for stripped, crossed, or flattened threads.** None allowed.

e. **Check union for stripped or damaged threads** (TM 1-1500-204-23)**.**

GO TO NEXT PAGE

6.64. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) REMOVAL/INSTALLATION – continued

6.64.6. Installation



a. **Install union (12) on actuator (13).** Torque union (12) to **135 INCH-POUNDS**.

(1) If installed, remove protective plug (20) and packing (21), from actuator (13).

(2) Lubricate new packing (19) and threads of union (12). Use hydraulic fluid (item 92, App F).

(3) Install packing (19) on union (12).

(4) Install union (12) on actuator (13).

(5) Torque union (12) to **135 INCH-POUNDS**. Use torque wrench and crowfoot.

b. **Install actuator (13) on transmission (15).** Torque two bolts (16) to **1175 INCH-POUNDS**.

(1) Slide actuator (13) over disk (18) and aline bolt holes with transmission (15).

(2) Install two bolts (16) through washers (17) and actuator (13) into transmission (15).

(3) Torque two bolts (16) to **1175 INCH-POUNDS**. Use torque wrench and hexagon screwdriver.

c. **Install hose (11) on union (12).**

(1) Lubricate threads of nut (14) and union (12). Use hydraulic fluid (item 92, App F).

(2) Hold union (12). Install nut (14).

d. **Inspect (QA).**

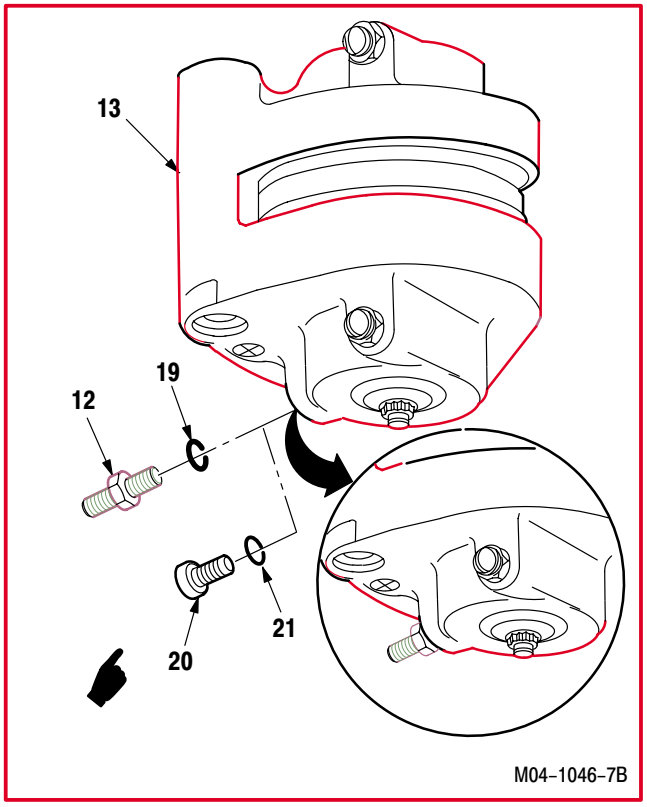
e. **Bleed utility hydraulic system** (para 1.35)**.**

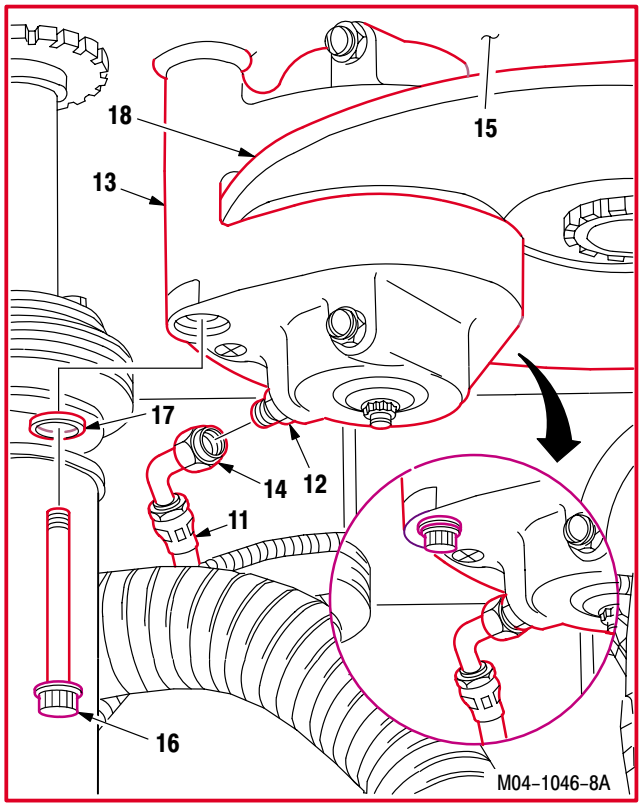
f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK





6.65. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER HANNIFIN) REMOVAL/INSTALLATION

6.65.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.65.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1/2-inch hexagon x 1/2-inch drive screwdriver socket wrench attachment (item 321, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)

Materials/Parts:

Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
9.40	Helicopter battery connected

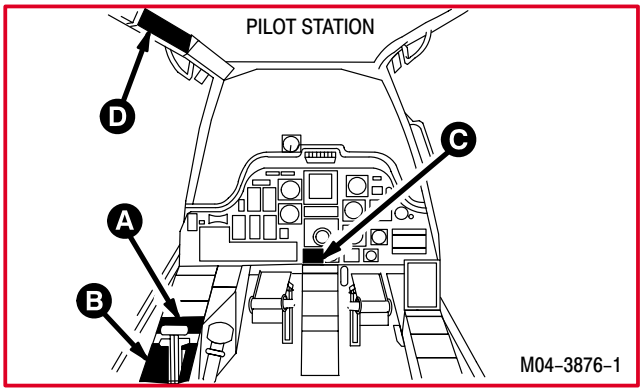
WARNING

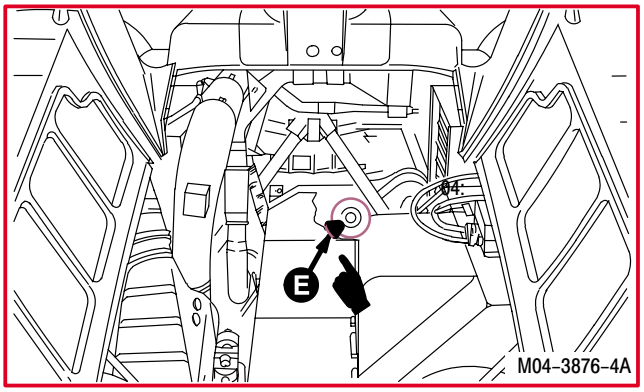
FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

Do not intermix manufacturers' disks and actuators in one assembly. Damage to helicopter will result if disks and actuators from different manufacturers are intermixed in one assembly.





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6.65. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER HANNIFIN) REMOVAL/INSTALLATION – continued

6.65.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On ELEC PWR panel (1), set BATT/EXT PWR switch (2) to BATT.**

c. **On power quadrant (3), set RTR BK switch (4) to OFF.**

d. **On EMERG HYD panel (5), set EMERG HYD switch (6) to EMERG HYD.**

CAUTION

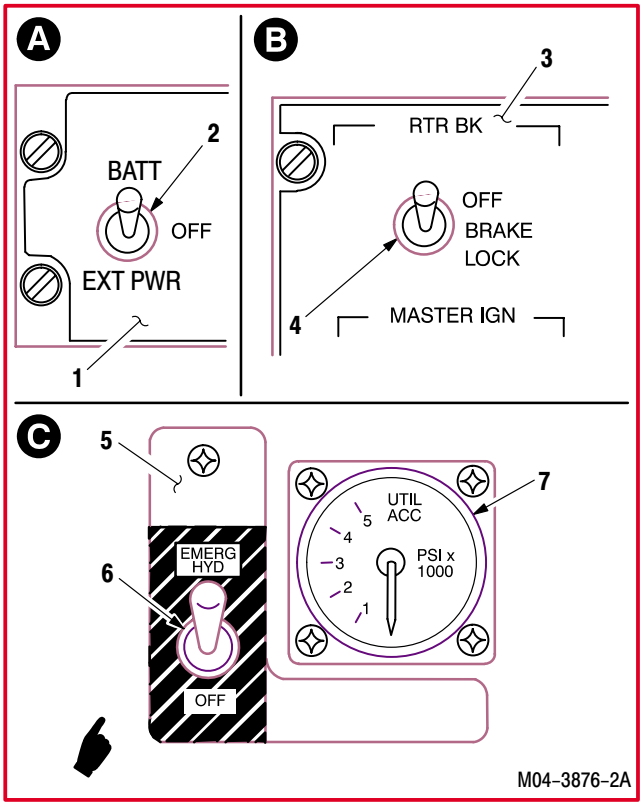
To prevent damage to shear pin activated decoupler (SPAD) shear pin in BUCS activated aircraft, do not force directional pedals and cyclic or collective sticks against any resistance.

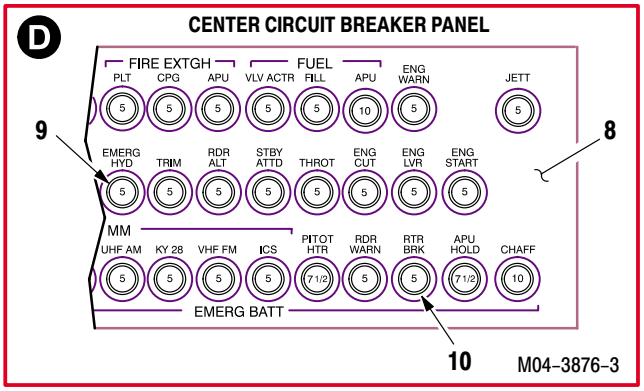
e. **Cycle flight controls until UTIL ACC pressure gage (7) reads ZERO PSI.**

f. **On ELEC PWR panel (1), set BATT/EXT PWR switch (2) to OFF.**

g. **On pilot center circuit breaker panel (8), open EMERG HYD (9) and RTR BRK (10) circuit breakers.**

h. **Disconnect battery** (para 9.40)**.**





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6.65. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER HANNIFIN) REMOVAL/INSTALLATION – continued

i. **Remove hose (11) from union (12).**

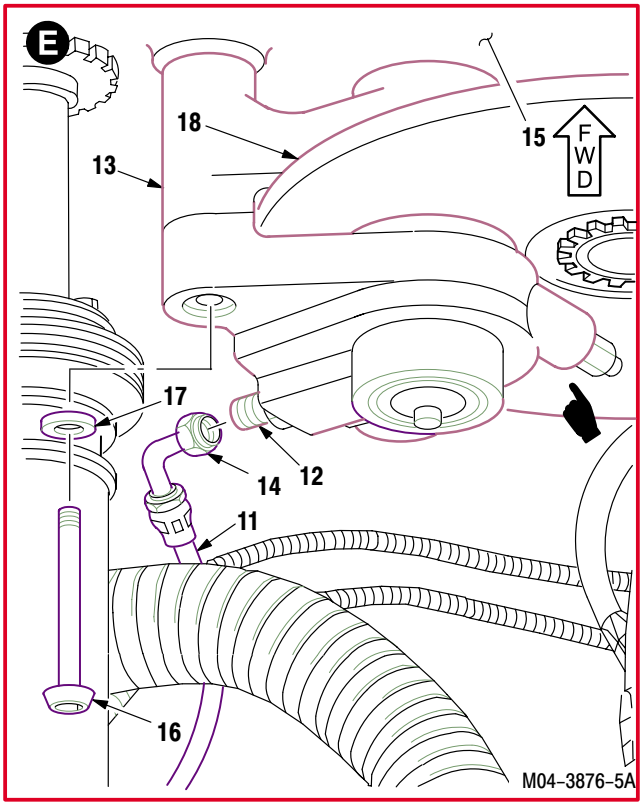
(1) Place rags under rotor brake actuator (13) to catch hydraulic fluid spills.

(2) Hold union (12). Remove nut (14).

j. **Remove actuator (13) from main transmission (15).**

(1) Remove two bolts (16) and washers (17) from actuator (13).

(2) Slide actuator (13) from brake disk (18).



6.65.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.65.5. Inspection

NOTE

The following inspection procedures apply to rotor brake actuator and actuator mounting area on main transmission.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for nicks, scratches, and gouges** (para 6.41)**.**

d. **Check rotor brake actuator bolt holes on main transmission for stripped, crossed, or flattened threads.** None allowed.

e. **Check union for stripped or damaged threads** (TM 1-1500-204-23)**.**

f. **Check friction lining.**

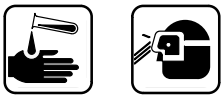
(1) Edge chipping not to exceed **0.70 SQUARE-INCH** or **15 PERCENT** of surface area.

(2) Outside diameter not to exceed **2.00 INCHES**.

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6.65. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER HANNIFIN) REMOVAL/INSTALLATION – continued

6.65.6. Installation



a. **Install actuator (13) on transmission (15).** Torque two bolts (16) to **1175 INCH-POUNDS**.

(1) Slide actuator (13) over disk (18) and aline bolt holes with transmission (15).

(2) Install two bolts (16) through washers (17) and actuator (13) into transmission (15).

(3) Torque two bolts (16) to **1175 INCH-POUNDS**. Use torque wrench and hexagon screwdriver.

b. **Install hose (11) on union (12).**

(1) Lubricate threads of nut (14) and union (12). Use hydraulic fluid (item 92, App F).

(2) Hold union (12). Install nut (14).

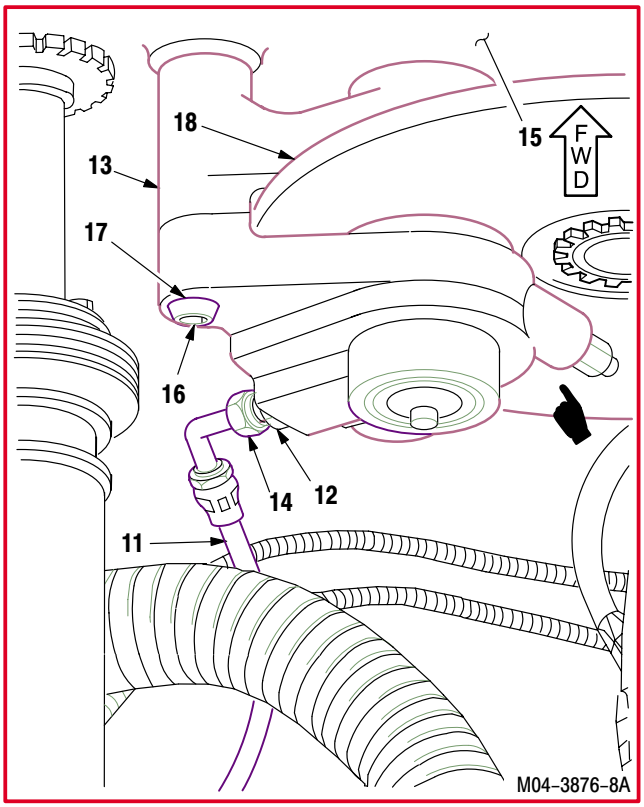
c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

6.66. MAIN TRANSMISSION ROTOR BRAKE DISK REMOVAL/INSTALLATION

6.66.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.66.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
0.000 - 0.100-inch outside micrometer caliper (item 51, App H)
Aircraft maintenance fixture (item 133, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
1/2-inch hexagon x 1/2-inch drive screwdriver socket wrench attachment (item 321, App H)
Rotor brake socket spanner wrench (item 432, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.62	Lock rotor brake (if transmission is installed)
6.114	Right primary lube oil rotary pump removed (if transmission is removed)
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened

WARNING

FLIGHT SAFETY PART

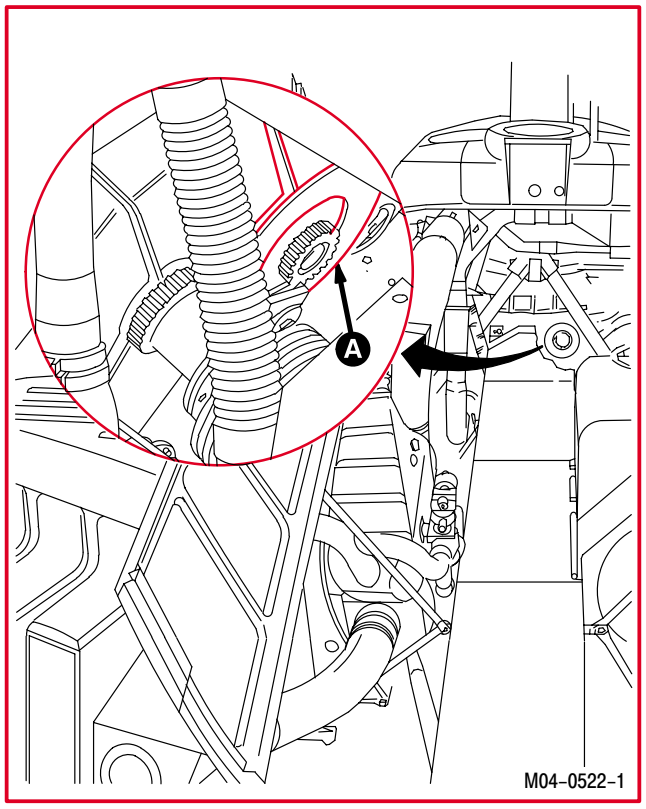
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

Do not mix manufacturers' disks and actuators in one assembly. Damage to helicopter will result if disks and actuators from different manufacturers are mixed in one assembly.

NOTE

If main transmission is installed in aircraft, ensure rotor brake is in **LOCKED** position; this will prevent main transmission rotor brake disk from turning.



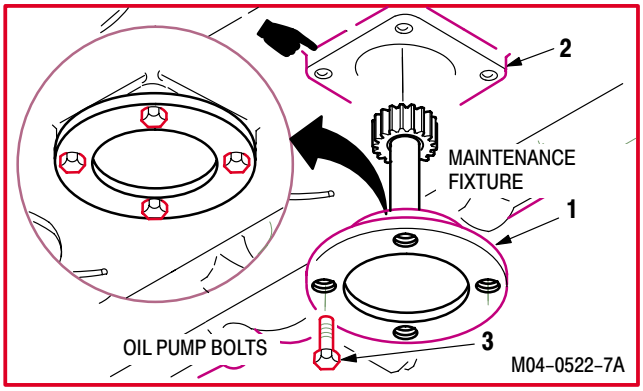
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6.66. MAIN TRANSMISSION ROTOR BRAKE DISK REMOVAL/INSTALLATION – continued

6.66.3. Removal

a. **Install maintenance fixture (1) in transmission (2) (if transmission is removed).** Use maintenance fixture.

(1) Install four primary oil pump bolts (3) through fixture (1) and transmission (2).

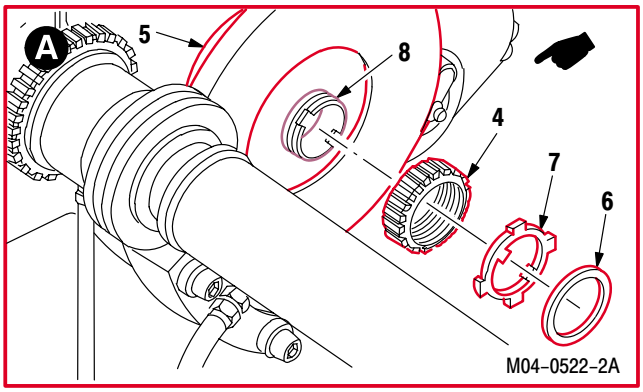


b. **Remove locknut (4) from brake disk (5).**

(1) Remove ring (6) from locknut (4).

(2) Remove lockwasher (7) from locknut (4).

(3) Remove locknut (4) from transmission shaft (8). Use spanner wrench.

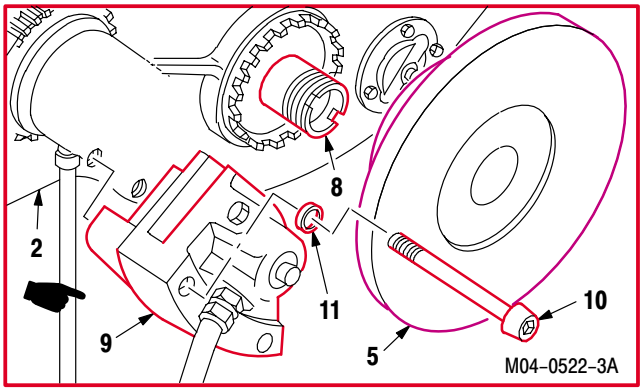


c. **Unlock rotor brake** (para 1.62)**.**

d. **Remove brake actuator (9) from transmission (2).**

(1) Remove two bolts (10) and washers (11).

(2) Remove actuator (9).



e. **Remove disk (5) from shaft (8).**

6.66.4. Cleaning

a. **Wipe rotor brake disk attachment area with a clean rag.**

6.66.5. Inspection

a. **Check rotor brake disk attachment area for cracks.** None allowed.

b. **Check rotor brake disk thickness in brake pad contact area.**

(1) Replace disk if thickness is less than **0.324 INCH** for Goodyear, **0.350 INCH** for Parker Hannifin. Use caliper.

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6.66. MAIN TRANSMISSION ROTOR BRAKE DISK REMOVAL/INSTALLATION – continued

c. **Check rotor brake disk for pitting and corrosion in non-contact areas** (para 1.49)**.**

(1) Replace disk if pitting exceeds **0.010 INCH** deep. Use depth gage.

d. **Check rotor brake disk for grooves in brake pad contact area.**

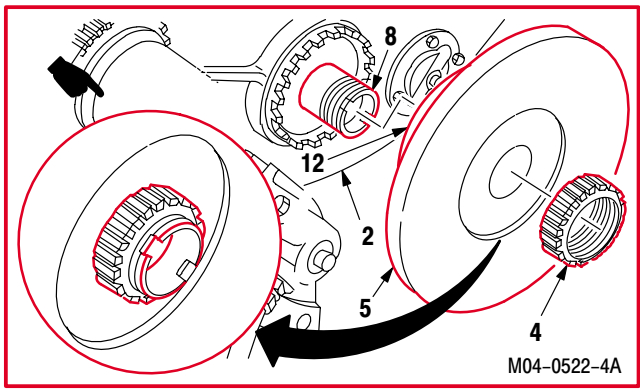
(1) Replace disk if grooves exceed **0.007 INCH** deep or have sharp edges. Use depth gage.

6.66.6. Installation

a. **Install disk (5) on shaft (8).**

(1) Slide disk (5) on shaft (8) with hub (12) toward transmission (2).

(2) Hand tighten locknut (4) on shaft (8).

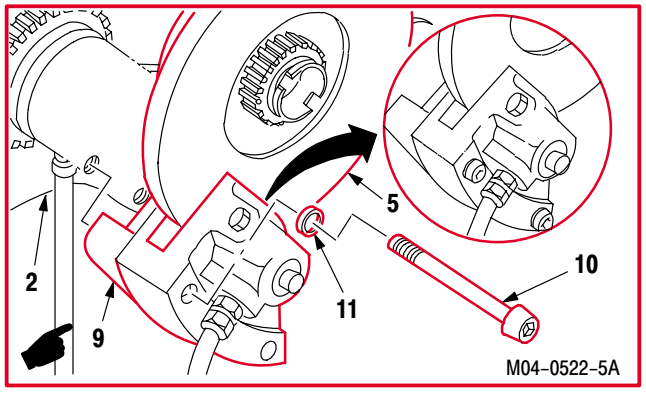


b. **Install actuator (9) on transmission (2).** Torque two bolts (10) to **1175 INCH-POUNDS**.

(1) Position actuator (9) on transmission (2) and disk (5).

(2) Install two bolts (10) through washers (11) and actuator (9).

(3) Torque two bolts (10) to **1175 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



c. **Inspect (QA).**

NOTE

Ensure maintenance fixture is installed (if transmission is removed), before torquing locknut.

d. **Lock rotor brake (if transmission is installed)** (para 1.62)**.**

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6.66. MAIN TRANSMISSION ROTOR BRAKE DISK REMOVAL/INSTALLATION – continued

e. **Torque locknut (4) 1350 to 1570 INCH-POUNDS and install lockwasher (7) and ring (6) on locknut (4).**

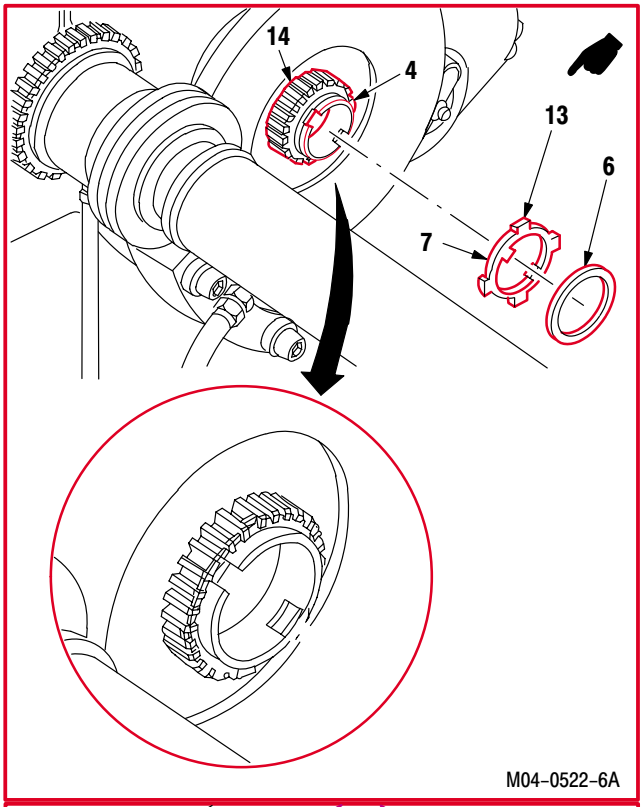
(1) Torque locknut (4) to **1350 INCH-POUNDS**. Use spanner wrench and torque wrench.

(2) Increase torque to aline lockwasher (7) tabs (13) with locknut (4) slots (14), but do not exceed **1570 INCH-POUNDS**.

(3) Install lockwasher (7) in locknut (4).

(4) Install ring (6) on locknut (4).

f. **Unlock rotor brake** (para 1.62)**.**



g. **Remove maintenance fixture (1) from transmission (2) (if transmission is removed).**

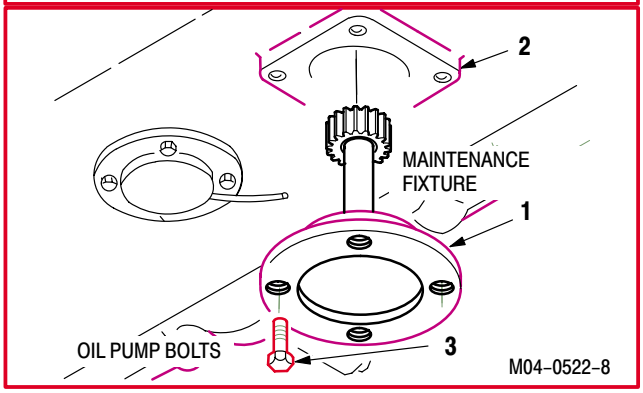
(1) Remove four bolts (3).

(2) Remove maintenance fixture (1) from transmission (2).

h. **Inspect (QA).**

i. **Install right primary lube oil rotary pump (if transmission is removed)** (para 6.114)**.**

j. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

6.67. MAIN TRANSMISSION ROTOR BRAKE SEAL REPLACEMENT

6.67.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.67.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
1/2 x 3/4-inch drive socket wrench adapter (item 2, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
14-inch x 1/2-inch drive hinged socket wrench handle (item 170, App H)
Adjustable air filtering respirator (item 262, App H)
Bushing driver set (item 280, App H)
Locknut socket set (item 318, App H)
0 - 600 foot-pound 3/4-inch drive deflecting frame torque wrench (item 443, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Sealing compound (item 177, App F)
Wire (item 222, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.84	Front catwalk folded back
6.66	Main transmission rotor brake disk removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.67. MAIN TRANSMISSION ROTOR BRAKE SEAL REPLACEMENT – continued

6.67.3. Removal

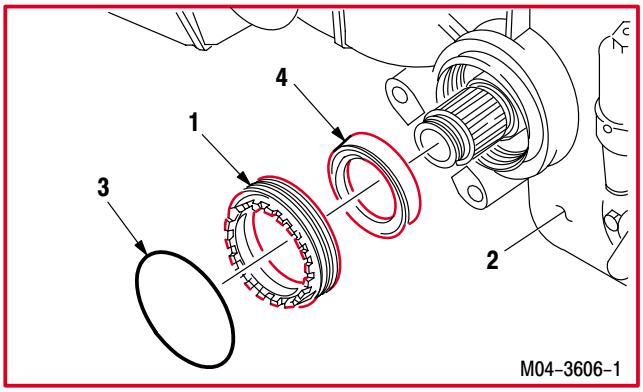
a. **Remove ring (1) from transmission (2).**

(1) Remove and discard lockwire from ring (1).

(2) Remove ring (1). Use socket set and hinged handle.

(3) Remove and discard packing (3) from ring (1).

b. **Remove and discard seal (4).** Use bushing driver set.



6.67.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.67.5. Inspection

a. **Check ring for damaged threads.** None allowed.

b. **Check removed components for corrosion** (para 1.49)**.**

6.67.6. Installation

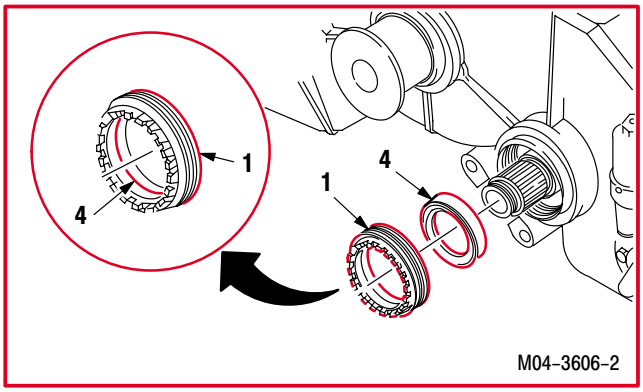


a. **Install seal (4) in ring (1).**

(1) Apply sealant to seal (4). Use sealing compound (item 177, App F).

(2) Press seal (4) in ring (1). Use bushing driver set.

(3) Allow sealant to become tack free, **10 MINUTES** minimum.



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6.67. MAIN TRANSMISSION ROTOR BRAKE SEAL REPLACEMENT – continued



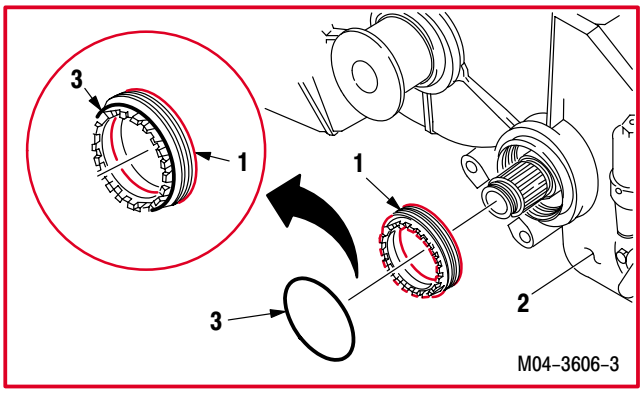
b. **Install ring in transmission (2).** Torque ring (1) to **190 FOOT-POUNDS**.

(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on ring (1).

(3) Install ring (1) in transmission (2).

(4) Torque ring (1) to **190 FOOT-POUNDS**. Use socket set, adapter, and torque wrench.



c. **Inspect (QA).**

d. **Lockwire ring (1) to transmission (2).** Use wire (item 222, App F).

e. **Install transmission rotor brake disk** (para 6.66)**.**

f. **Secure forward catwalk** (para 2.84)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM)

6.67A.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly. Testing.

6.67A.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
2 - 12-inch inside micrometer caliper (item 56, App H)
4-inch vise jaw caps (item 59, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
0.0015 - 0.0250-inch thickness gage (item 152, App H)
Chemical protective gloves (item 154, App H)
Hand operated arbor press (item 234, App H)
Tube reducer (item 254, App H)
Adjustable air filtering respirator (item 262, App H)
Hydraulic test stand (item 357, App H)
Rotor brake tool set (item 369, App H)
Pin-plug removal tool kit (item 387A, App H)
4-inch machinist's vise (item 402, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)
Brake Disk Test Segment (Figure D-473, App D)

Materials/Parts:

Bolt (NAS 149-68 for testing) (2)
Nut (HS 4143-7 for testing) (2)
Packing (6) per cylinder
Plug (3)
Seal (2)
Washer (MS20002C9 for testing) (4)
Antiseize compound (item 27, App F)
Grease (item 85, App F)
Hydraulic fluid (item 92, App F)
Sealing compound (item 168, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The rotor brake actuator is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

Disassembly, cleaning, inspection, and assembly procedures in this task are typical for both rotor brake actuator cylinder halves.

GO TO NEXT PAGE

6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

6.67A.3. Disassembly

a. **Separate rotor brake actuator cylinder (1) from cylinder (2).**

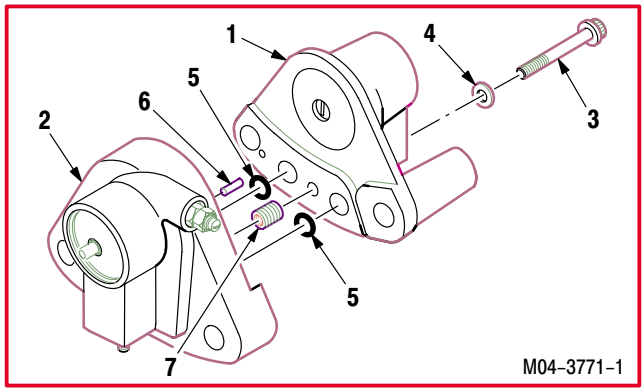
(1) Remove bolt (3) and washer (4).

(2) Separate cylinder (1) from cylinder (2).

(3) Remove and discard two packings (5) from cylinder (2).

(4) Remove pin (6) from cylinder (2).

(5) Remove threaded insert (7) from cylinder (2).



b. **Remove nipple (8) from cylinder (2).**

(1) Remove nipple (8) and packing (9) from cylinder (2).

(2) Remove and discard packing (9).

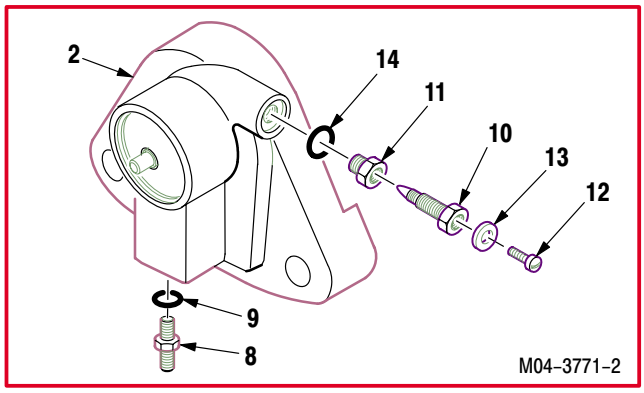
c. **Remove bleed valve (10) and valve seat (11) from cylinder (2).**

(1) Remove screw (12) and washer (13) from valve (10).

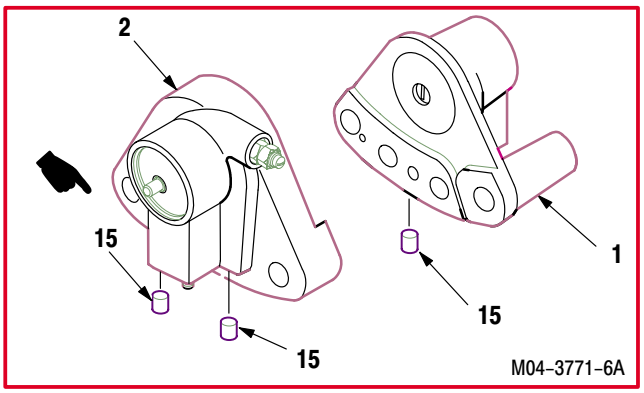
(2) Remove valve (10) from valve seat (11).

(3) Remove valve seat (11) from cylinder (2).

(4) Remove and discard packing (14) from valve seat (11).



d. **If required remove three plugs (15) from cylinders (1) and (2).** Use pin-plug removal tool kit.



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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(1) Drill and tap pin (16) in plug (15) of cylinder (1).

(2) Install bolt (17) with striker (18) in pin (16).

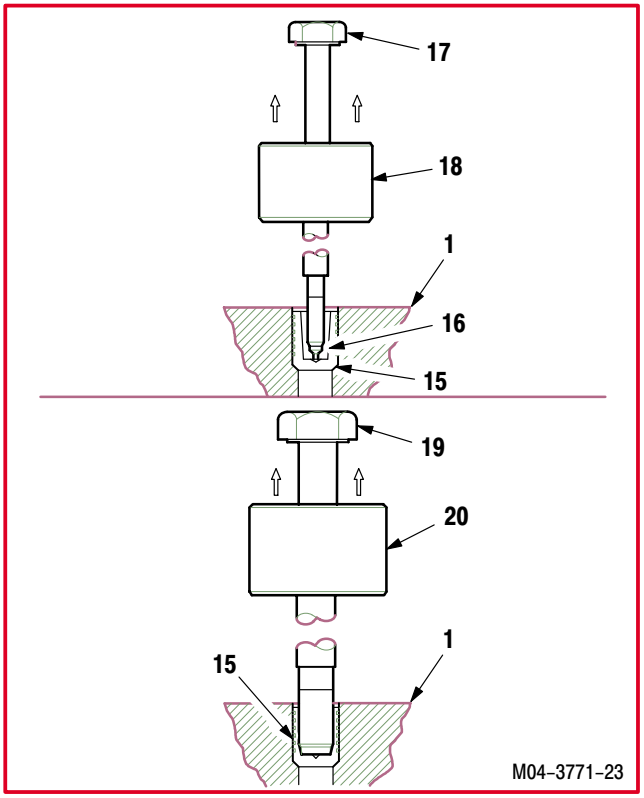
(3) Remove and discard pin (16) from cylinder (1).

(4) Drill and tap plug (15) in cylinder (1).

(5) Install bolt (19) with striker (20) in plug (15).

(6) Remove and discard plug (15) from cylinder (1).

(7) Repeat steps d.(1) thru d.(6) for cylinder (2).



CAUTION

Do not use uncontrolled or excessive force on piston. Piston damage can occur.

e. **Remove retaining ring (21) and seal (22) from cylinder (1).**

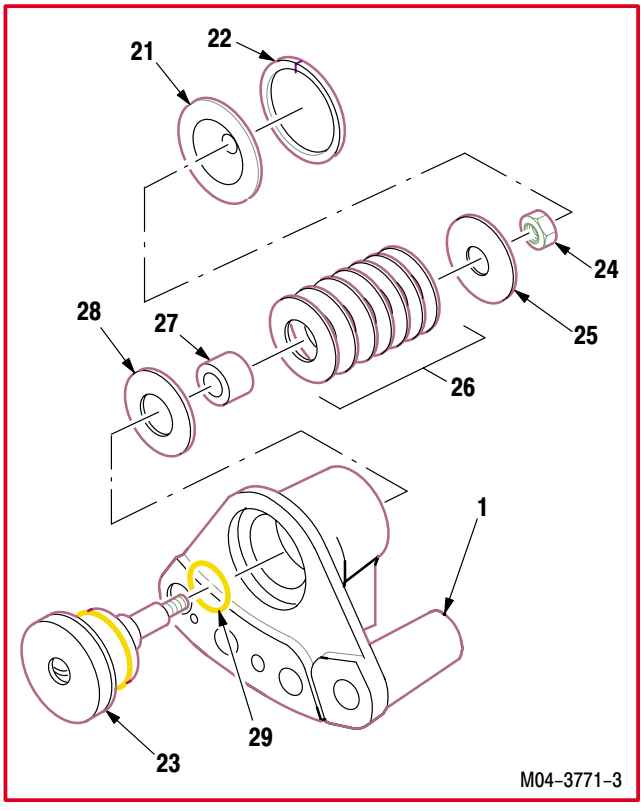
f. **Remove piston (23) from cylinder (1).**

(1) Remove nut (24) from piston (23). Use brake tool set.

(2) Push piston (23) from cylinder (1).

(3) Remove thrust bearing washer (25), spring tension washers (26), sleeve (27), and thrust bearing washer (28) from cylinder (1).

(4) Remove and discard packing (29) from cylinder (1).



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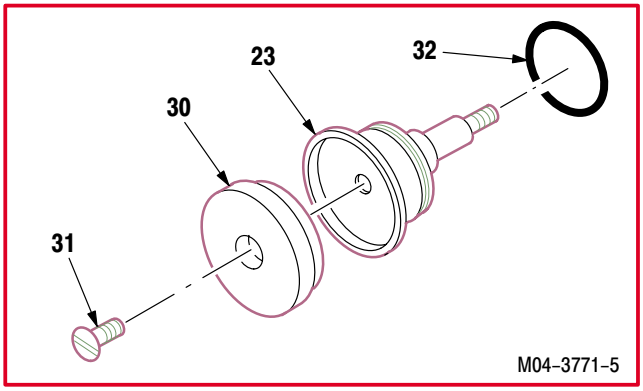
6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

g. **Remove friction lining (30) from piston (23).**

(1) Remove screw (31) attaching lining (30) to piston (23).

(2) Remove lining (30) from piston (23).

(3) Remove and discard packing (32) from piston (23).



6.67A.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.67A.5. Inspection

a. **Check thrust bearing washers, spring tension washers, piston sleeve, right hand cylinder, left hand cylinder, bleeder seat, and bleeder washer.**

(1) Check for cracks. None allowed.

(2) Check for corrosion (para 1.49).

b. **Check all liquid passages for debris and other obstructions.** None allowed.

c. **Check nipple for stripped or damaged threads.** None allowed.

d. **Check threaded holes for stripped, crossed, or flattened threads.** None allowed.

e. **Check friction lining for excessive wear.**

(1) Check for edge chipping not to exceed **0.70 SQUARE-INCH** or 15 percent of surface area.

(2) Check outside diameter **2.88 INCHES** maximum.

(3) Check screw hole diameter.

(a) Large, **0.550 INCH** maximum.

(b) Small, **0.275 INCH** maximum.

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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(4) Check for thickness, **0.150 INCH** minimum.

f. **Check packing grooves in each cylinder for burrs, sharp edges, and debris.** None allowed.

g. **Check surfaces of cylinder bores and all packing grooves for scratches, nicks, and gouges.**

(1) Minor surface imperfections measuring **0.004 INCH** deep or less before blending and not covering over 20 percent of surface area may be repaired by blending at a 30:1 to 50:1 transition ratio. Repair not to exceed depth of original damage. Use depth gage.

h. **Check bleeder valve and bleeder seat for grooves or pits.** None allowed.

i. **Check bleeder screw for screw slot and thread damage.** None allowed.

j. **Check bleed valve washer.**

(1) Check for brittleness. None allowed.

(2) Check for distortion. None allowed.

k. **Check spring tension washers.**

(1) Check for thickness, **0.0305 INCH** minimum.

(2) Check for preformed width, **0.0758 INCH** minimum.

l. **Check sleeves.**

(1) Check for outside diameter, **0.619 INCH** minimum.

(2) Check for inside diameter, **0.375 INCH** maximum.

(3) Check for width, **0.529 INCH** minimum.

m. **Check pistons.**

(1) Check for chipped packing grooves. None allowed.

(2) Check shaft and friction lining mounting screw hole threads for damage. None allowed.

(3) Check for diameter, **2.100 INCHES** minimum.

(4) Check for shoulder diameter, **0.621 INCHES** minimum.

(5) Check for large packing groove diameter, **1.370 INCHES** minimum.

n. **Check left hand and right hand cylinder.**

(1) Check packing seats and piston assembly cavity groove for burrs and sharp edges. None allowed.

(2) Check for piston cavity diameter, **1.622 INCHES** maximum.

o. **Check seal plug bores.**

(1) Check bores for burrs and sharp edges. None allowed.

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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

6.67A.6. Assembly



CAUTION

Do not roll packing into piston packing groove during installation. Rolling will result in pinching of packing when piston is installed in cylinder. A pinched packing will result in hydraulic fluid leakage.

a. **Install lining (30) in piston (23).** Torque screw (31) to **73 INCH-POUNDS**.

NOTE

The friction lining is designed for an interference fit with piston. As a result, a mechanical press or vice may be required to install friction lining in piston.

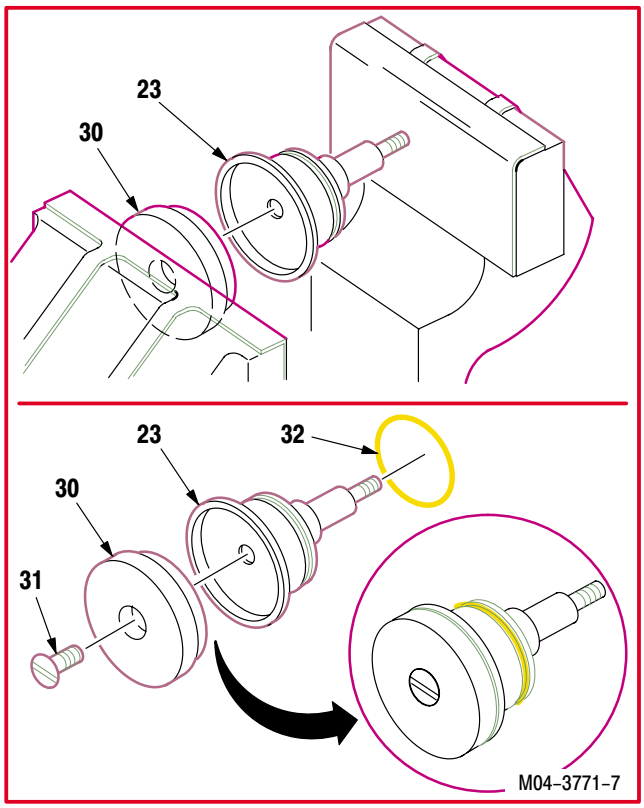
(1) Install lining (30) in piston (23). Use vise with vise jaw caps or arbor press if necessary.

(2) Coat screw (31) threads with sealing compound. Use sealing compound (item 168, App F).

(3) Install screw (31) in piston (23).

(4) Torque screw (31) to **73 INCH-POUNDS**. Use torque wrench.

(5) Lubricate and install new packing (32). Use grease (item 85, App F).



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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

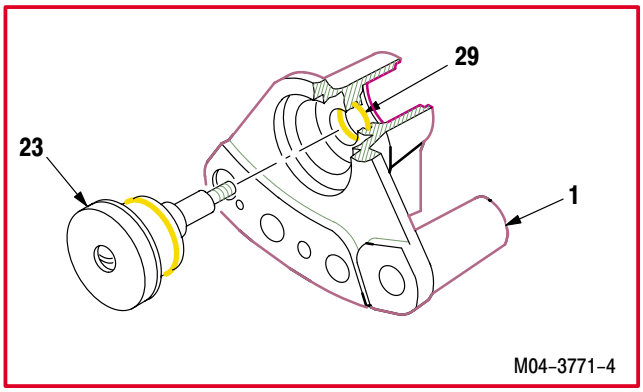


CAUTION

- Do not roll packing into cylinder packing groove during installation. Rolling will result in pinching of packing when piston is installed in cylinder. Pinched packing will result in hydraulic fluid leakage.
- Do not use uncontrolled or excessive force on piston. Piston damage can result.
- To prevent damage to rotor brake actuator, ensure that tension washers are installed in stacked pairs so that only outer concave surfaces of each washer pair will contact each other.

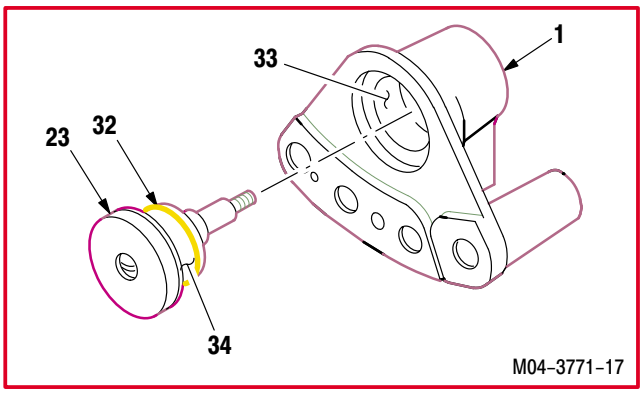
b. **Install piston (23) in cylinder (1).**

(1) Lubricate and install new packing (29) in cylinder (1) groove. Use grease (item 85, App F).



(2) Apply a liberal amount of hydraulic fluid to piston bore (33) in cylinder (1). Use hydraulic fluid (item 92, App F).

(3) Apply a liberal amount of hydraulic fluid to packing (32) and to large diameter (34) on piston (23). Use hydraulic fluid (item 92, App F).

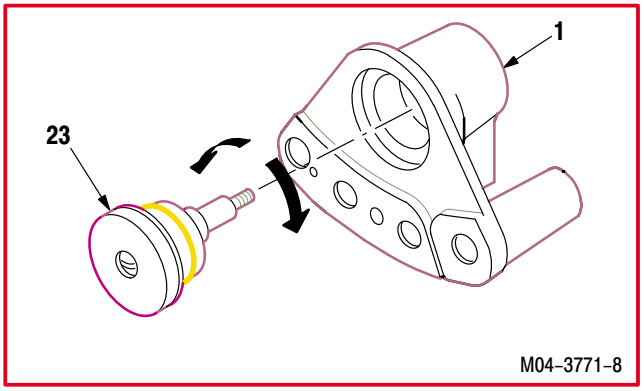


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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(4) Insert piston (23) stem in mating hole of cylinder (1) and slowly twist piston (23) left and right during insertion.

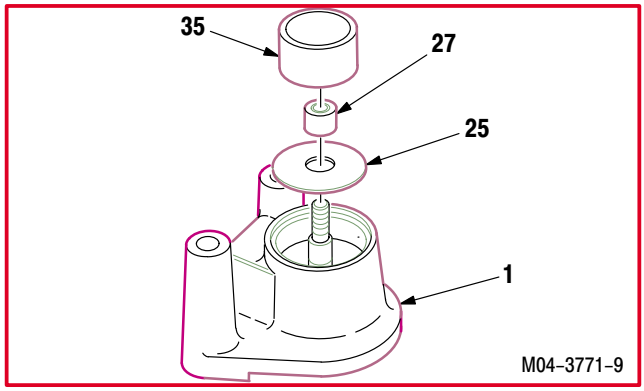
(5) Apply hand pressure to piston (23) face and seat piston (23) in cylinder (1).



(6) Install thrust bearing washer (25) in cylinder (1).

(7) Install sleeve (27) in cylinder (1).

(8) Install spring guide (35) in cylinder (1) bore until bottomed against installed thrust bearing washer (25). Use brake tool set.

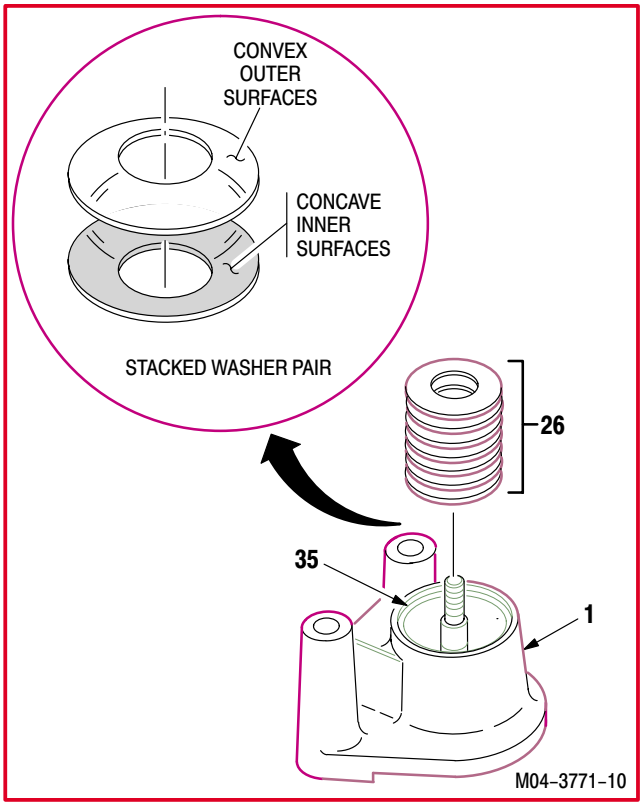


NOTE

One stacked pair of tension washers consists of two washers stacked together so that both inner concave surfaces face each other.

(9) Assemble fourteen spring tension washers (26) in seven stacked pairs.

(10) Install seven stacked pairs of spring tension washers (26) in cylinder (1), one pair at a time, ensuring that each washer pair is nested inside spring guide (35) for proper washer alinement. Use brake tool set.



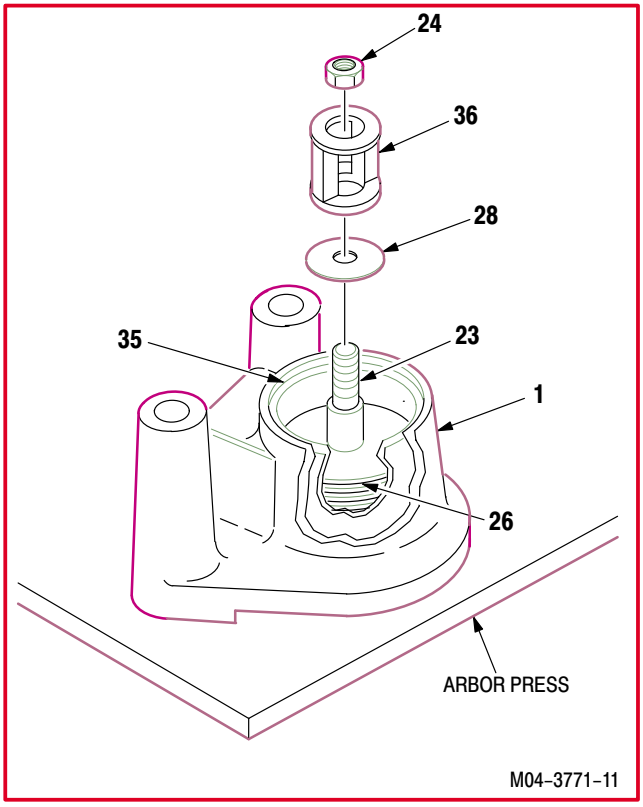
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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(11) Install thrust bearing washer (28) on top of tension washers (26).

(12) Position brake tool (36) on top of thrust bearing washer (28). Use brake tool set.

(13) Compress spring tension washers (26) until nut (24) can be started on threads of piston (23) stem. Use arbor press.



CAUTION

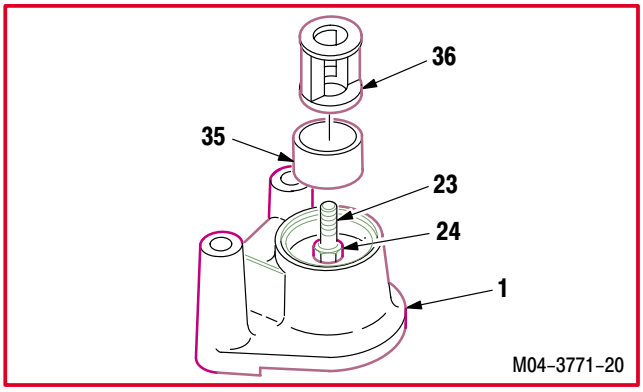
To prevent damage to rotor brake actuator, do not compress tension washers with nut.

(14) Apply additional pressure on arbor press and continue to install nut (24) until threads of piston (23) stem are visible above nut (24).

(15) Release pressure on arbor press.

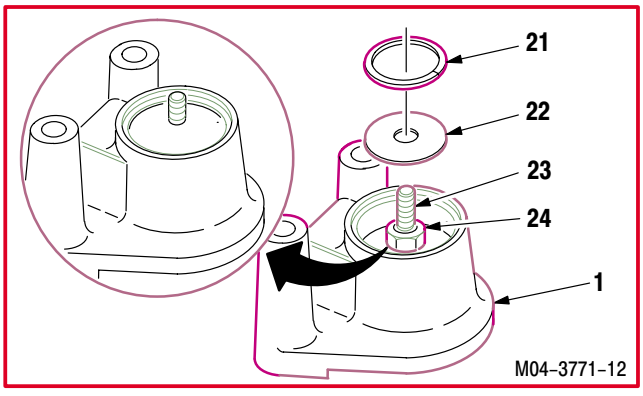
(16) Remove brake tool (36) from piston (23) stem.

(17) Remove spring guide (35) from cylinder (1).



c. **Torque nut (24) to 65 INCH-POUNDS.** Use torque wrench.

d. **Install seal (22) and retaining ring (21) in cylinder (1).**



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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

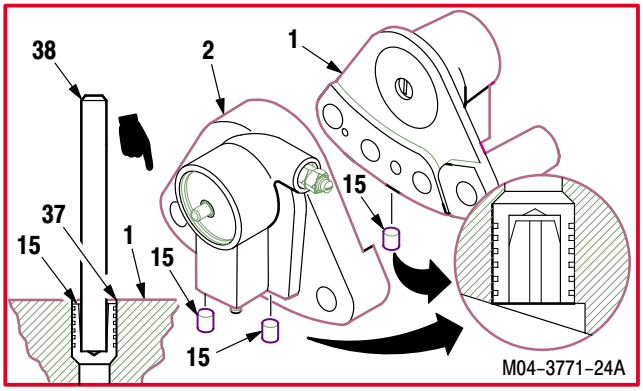
e. **If removed, install three plugs (15) in cylinders (1) and (2).** Use pin-plug removal tool kit.

(1) Measure bore (37) diameter in cylinders (1) and (2). Use caliper.

(2) Obtain correct diameter plugs (15).

(3) Insert plug (15) into hole (37) in cylinders (1).

(4) Tap driver (38) to seat plug (15) in cylinder (1).



NOTE

If installing short series plug, exposed end of pin can be **0.003 INCH** into plug or, **0.005 INCH** out of plug.

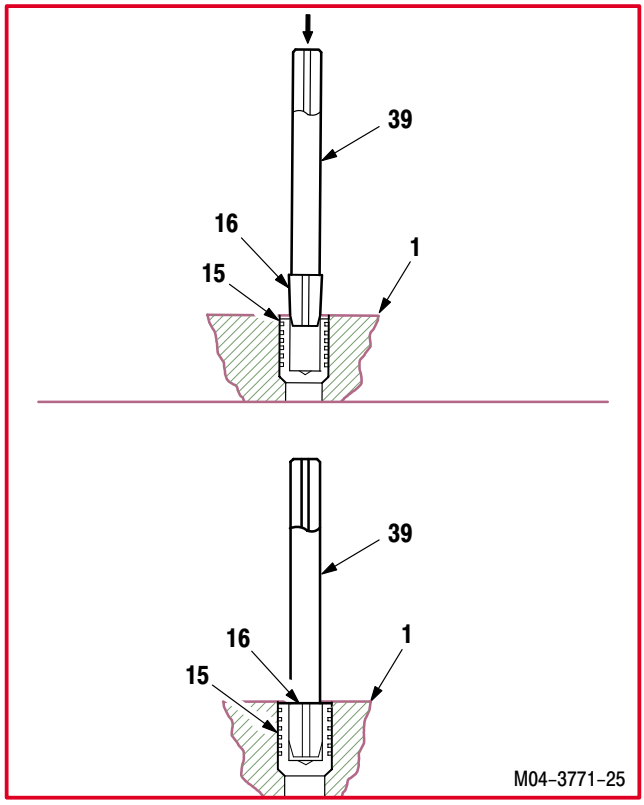
(5) Press pin (16) into plug (15). Use arbor press.

(a) Insert tapered end of pin (16) into plug (15) of cylinder (1).

(b) Tap driver (39) to seat pin (16) in plug (15).

(c) Press driver (39), installing pin (16) in plug (15) until flush.

(6) Repeat steps e.(1) thru e.(5) for cylinder (2).

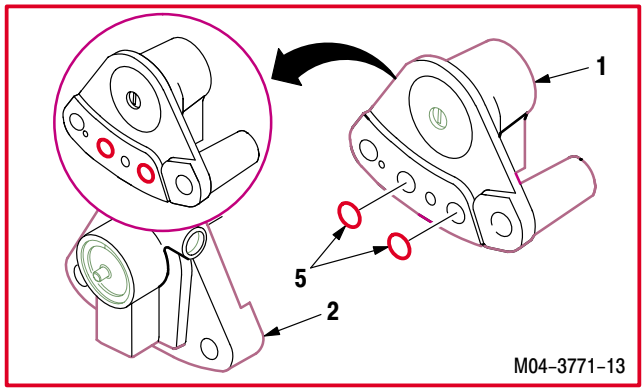




f. **Assemble actuator right cylinder (1) and left cylinder (2).**

(1) Lubricate two new packings (5). Use grease (item 85, App F).

(2) Install packings (5) in cylinder (1).



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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(3) Apply a small amount of antiseize lubricant to shank fillet radius of bolt (3) and to washer (4) recess. Use antiseize compound (item 27, App F).

(4) Install washer (4) on bolt (3) with recessed surface of washer (4) facing toward bolt (3) head.

(5) Install pin (6) in cylinder (2).

(6) Install threaded insert (7) in cylinder (2).

(7) Install bolt (3) with washer (4) through cylinder (1).

(8) Apply a small amount of sealing compound to bolt (3) threads. Use sealing compound (item 168, App F).

(9) Aline cylinder (1) and cylinder (2) and join together.

(10) Install bolt (3) in cylinder (2).

(11) Torque bolt (3) to **90 INCH-POUNDS**. Use torque wrench.

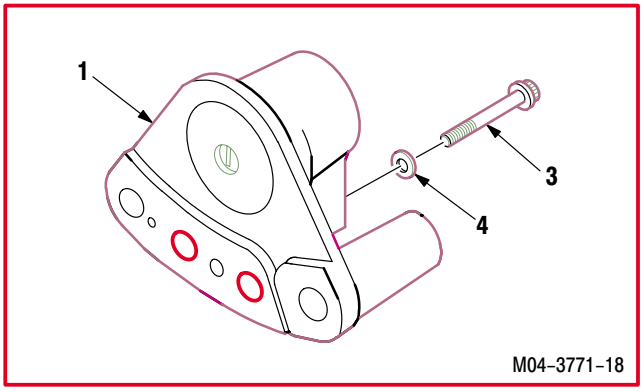


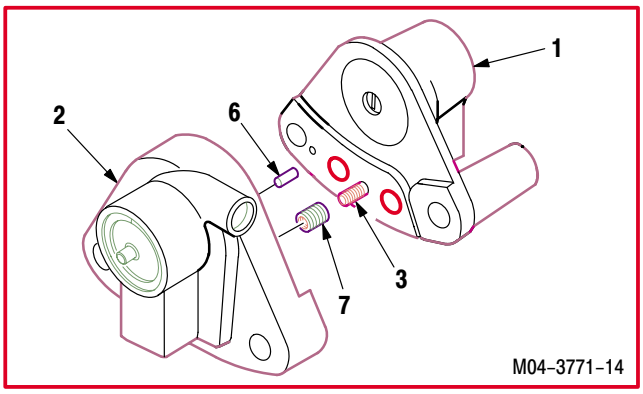
g. **Install valve seat (11) in cylinder (2).** Torque valve seat (11) to **100 INCH-POUNDS**.

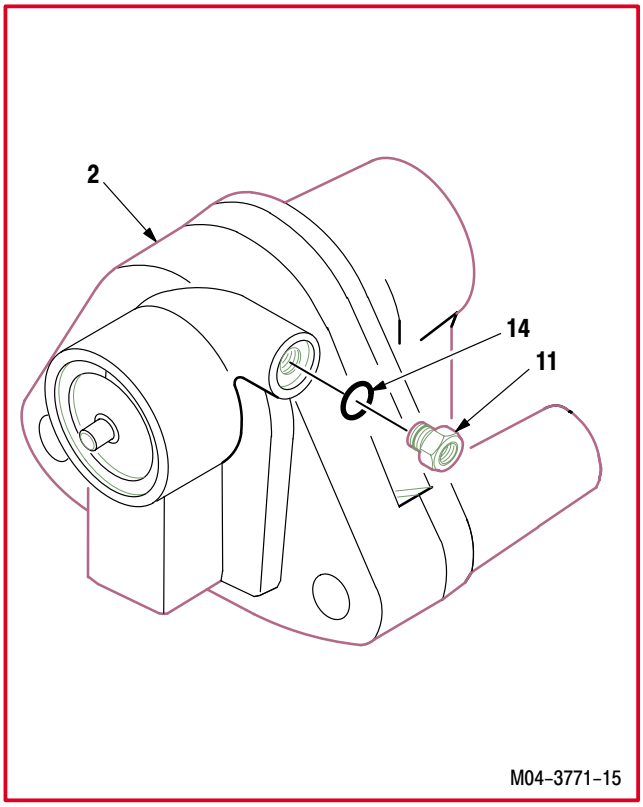
(1) Lubricate and install new packing (14) on valve seat (11). Use hydraulic fluid (item 92, App F).

(2) Install valve seat (11) in cylinder (2).

(3) Torque valve seat (11) to **100 INCH-POUNDS**. Use torque wrench.







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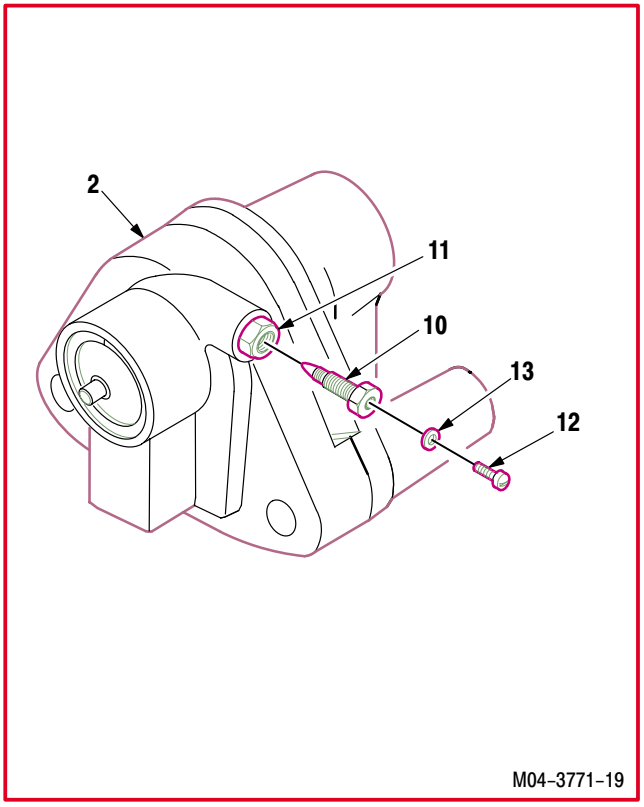
6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

h. **Install bleed valve (10) in valve seat (11).** Torque valve (10) to **40 INCH-POUNDS**.

(1) Install valve (10) in valve seat (11).

(2) Torque valve (10) to **40 INCH-POUNDS**. Use torque wrench.

(3) Install screw (12) and washer (13) in valve (10).



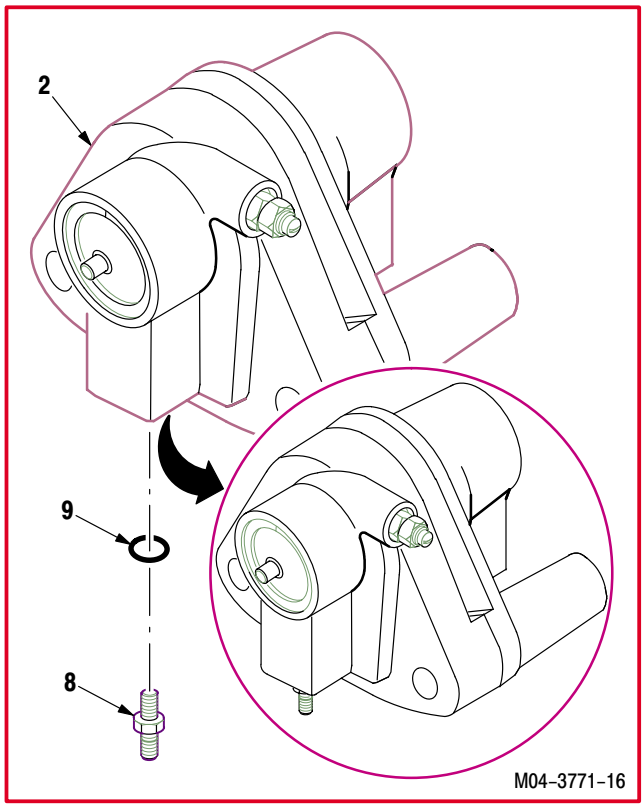
i. **Install nipple (8) in cylinder (2).** Torque nipple (8) to **100 INCH-POUNDS**.

(1) Lubricate and install new packing (9) on nipple (8). Use hydraulic fluid (item 92, App F).

(2) Install nipple (8) in cylinder (2).

(3) Torque nipple (8) to **100 INCH-POUNDS**. Use torque wrench.

j. **Inspect (QA).**



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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

6.67A.7. Testing

CAUTION

Do not pressurize actuator on test bench without first securing the actuator to the test bench.

a Install brake actuator (40) on test bench. Use hydraulic test stand.

(1) Install pressure hose (41) to nipple (8).

(a) Lubricate threads of nipple (8). Use hydraulic fluid (item 92, App F).

(b) Hold nipple (8). Install nut (42).

(2) Remove screw (12) and washer (13) from bleed valve (10).

(3) Install bleeder hose (43) to bleed valve (10).

(a) Lubricate threads of tube reducer (44). Use hydraulic fluid (item 92, App F).

(b) Hold valve (10). Install tube reducer (44).

(c) Hold tube reducer (44). Install nut (45).

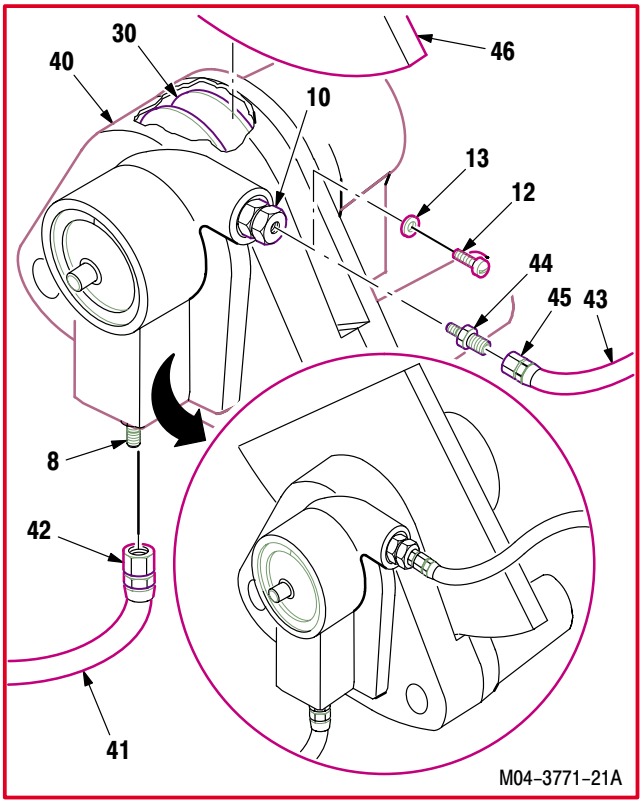
(4) Insert brake disk test segment (46) (Figure D-473, App D) between friction lining (30).

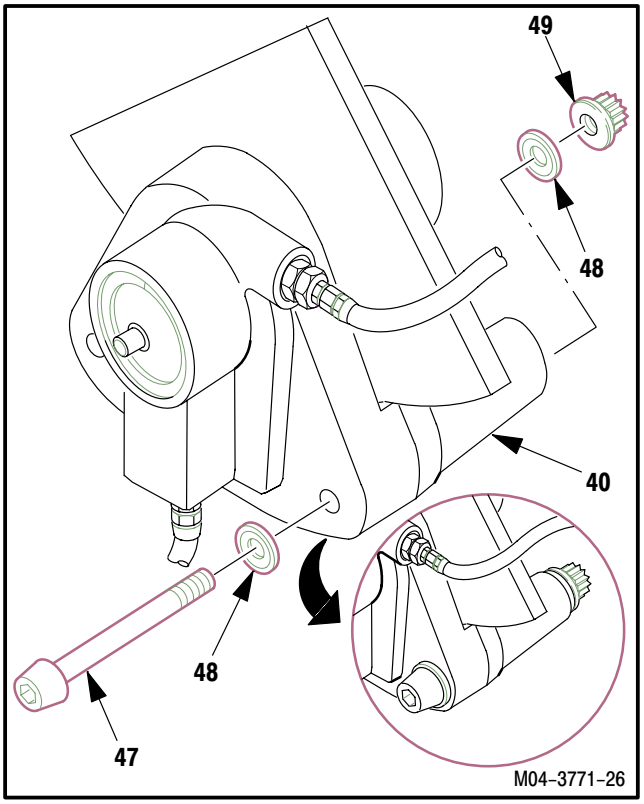
(5) Install two NAS 149-68 bolts (47), four MS20002C9 washers (48), and two HS 4143-7 nuts (49) to hold brake actuator (40) together while testing.

b. **Perform static leak/brake return pressure test.**

(1) Increase test bench hydraulic pressure to **300 PSI** maximum and open bleed valve. Bleed actuator until fluid flow displays no air is present in bleeder outlet fluid. No flow is reason for rejection.

(2) Decrease test bench hydraulic pressure to **0 PSI**. Close and torque bleed valve to **40 INCH-POUNDS**. Use torque wrench.





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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(3) Increase pressure to **337 ±25 PSI**. Hold pressure to actuator for a period of five minutes. Any binding of pistons is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(4) Increase applied pressure to **4500 PSI**. Hold pressure to actuator for a period of two minutes. Actuator pistons shall show no signs of distortion or permanent set. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(5) Decrease pressure to **0 PSI**. Open bleed valve slowly to bleed off remaining pressure. Brake disk test segment should move freely between actuator assembly. Failure of disk segment to move freely is reason for rejection.

(6) Close bleed valve. Torque valve to **40 INCH-POUNDS**. Use torque wrench.

(7) Increase pressure to **80 +10/-0 PSI**. Hold pressure to actuator for a period of five minutes.

(8) After two minutes, check for disk/lining clearance with thickness gage. Disk should have **0.060 ±0.030 INCH** clearance each side. Remove disk segment from actuator. Failure of disk segment to move freely is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(9) Decrease pressure to **0 PSI**. Open bleed valve slowly to bleed off residual pressure remaining in actuator.

c. **Perform dynamic leakage test.**

(1) Insert brake disk test segment between friction lining of pistons.

(2) Close bleed valve. Torque valve to **40 INCH-POUNDS**. Use torque wrench.

(3) Increase pressure to **337 ±25 PSI**. Perform 25 cycles of application and release of pressure. Cycle rate should not exceed two cycles per minute. Leakage at moving seals, other than a slight wetting at seals insufficient to form a drop, is reason for rejection. Any binding of pistons is reason for rejection.

NOTE

Due to cylinder design, one piston normally leads in retraction. To confirm the opposing piston is not mechanically binding, go to step (4). The relief of residual pressure through the bleed valve will permit the piston to move to its upper limit and show that it is not mechanically binding.

(4) Decrease pressure to **0 PSI**. Open bleed valve to bleed off residual pressure remaining in actuator.

d. **Perform parked and locked/brake return pressure test.**

(1) Close bleed valve. Torque valve to **40 INCH-POUNDS**. Use torque wrench.

(2) Increase pressure to **3000 PSI**. Hold pressure to actuator for a period of two minutes. Any binding of pistons is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

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6.67A. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (PARKER-HANNIFIN) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(3) Decrease pressure to **0 PSI**. Then slowly increase pressure to **80 ±0 PSI** for a period of five minutes. After pressure is stabilized at **80 PSI**, check for disk/lining clearance. Use thickness gage. Disk should have **0.06 ±0.030 INCH** clearance each side. Remove disk segment from actuator. Failure of disk segment to move freely is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(4) Decrease pressure to **0 PSI**. Open bleed valve slowly to bleed off residual pressure remaining in actuator.

e. **Remove brake actuator (40) from test bench.**

(1) Remove hose (41) from nipple (8).

(a) Hold nipple (8). Remove nut (42).

(2) Remove hose (43) from valve (10).

(a) Hold tube reducer (44). Remove nut (45).

(b) Hold valve (10). Remove tube reducer (44).

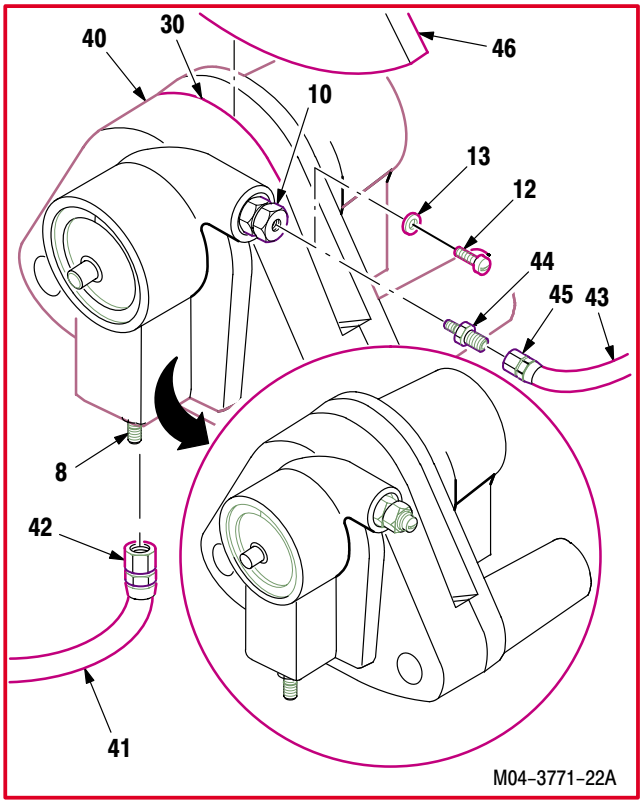
(3) Close bleed valve (10). Torque to **40 INCH-POUNDS**. Use torque wrench.

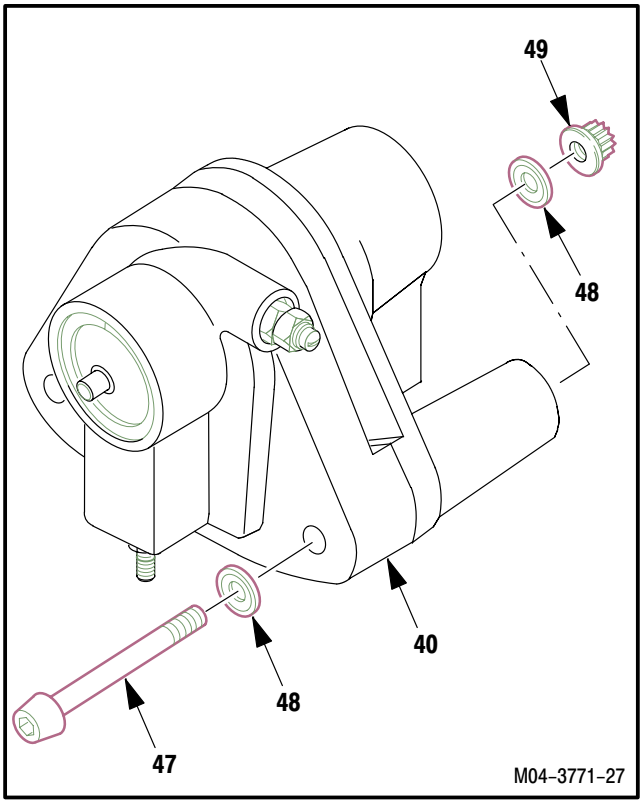
(4) Install screw (12) and washer (13) in valve (10).

(5) Remove brake disk test segment (46) from friction lining (30).

(6) Remove two NAS 149-68 bolts (47), four MS20002C9 washers (48), and two HS 4143-7 nuts (49) from actuator (40).

f. **Inspect (QA).**





END OF TASK

6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM)

6.68.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly. Testing.

6.68.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
#16 spline x 3/8-inch drive torque wrench adapter (item 17, App H)
Light duty laboratory apron (item 27, App H)
4-inch vise jaw caps (item 59, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
Industrial faceshield (item 129, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
0.0015 - 0.0250-inch thickness gage (item 152, App H)
Chemical protective gloves (item 154, App H)
3/16 x 3 1/2 inch long drift pin punch (item 249, App H)
Tube reducer (item 254, App H)
Adjustable air filtering respirator (item 262, App H)
Hydraulic test stand (item 357, App H)
#5 & #6 stud installing tool kit (item 387, App H)
4-inch machinist's vise (item 402, App H)
Rotor brake socket spanner wrench (item 432, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)
Brake Disk Test Segment (Figure D-473, App D)

Materials/Parts:

Bolt (NAS 149-68 for testing) (2)
Friction lining screen
Nipple
Nut (HS 4143-7 for testing) (2)
Packing (5)
Washer (MS20002C9 for testing) (4)
Cotton gloves (item 82, App F)
Hydraulic fluid (item 92, App F)
Sealing compound (item 168, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The rotor brake actuator is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

Disassembly, cleaning, inspection, and assembly procedures in this task are typical for both rotor brake actuator cylinder halves.

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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

6.68.3. Disassembly

a. **Separate rotor brake actuator housing (1).**

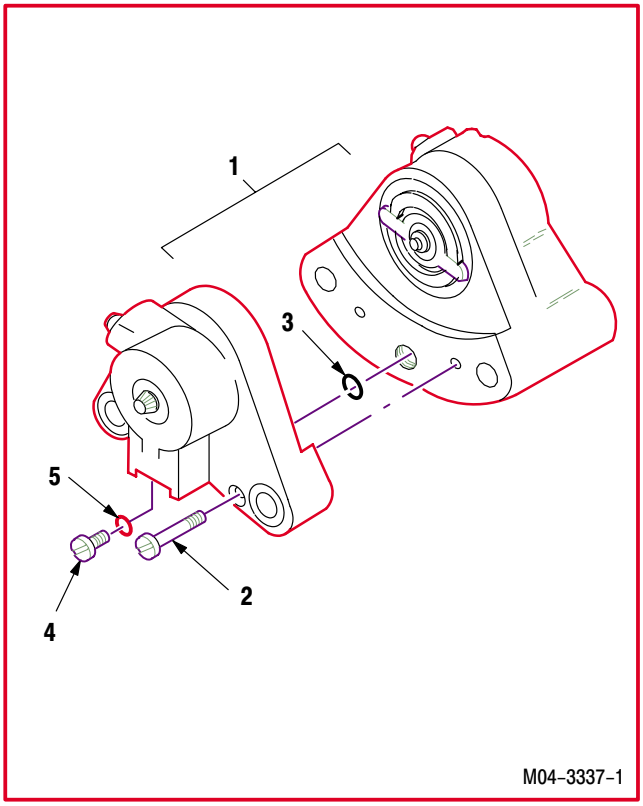
(1) Remove two screws (2).

(2) Separate housing (1).

(3) Remove and discard packing (3).

(4) Remove protective plug (4) and packing (5) from housing (1).

(5) Discard packing (5).



b. **Remove bleeder valve (6) from housing (1).**

(1) Remove screw (7) and washer (8) from valve (6).

(2) Remove valve (6).

c. **Remove piston (9) from housing (1).**

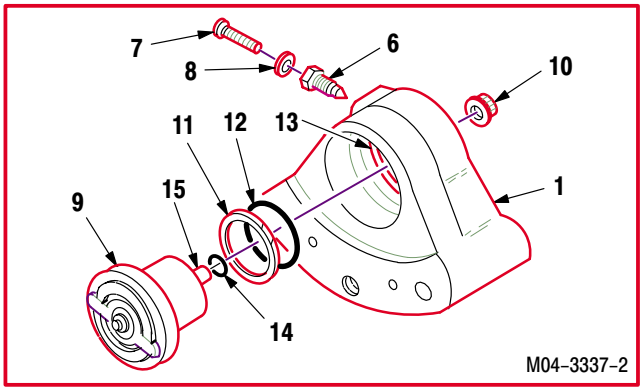
(1) Remove nut (10).

(2) Remove piston (9).

(3) Remove backup ring (11) and packing (12) from groove (13) in housing (1).

(4) Discard packing (12).

(5) Remove and discard packing (14) from end of brake return pin (15).



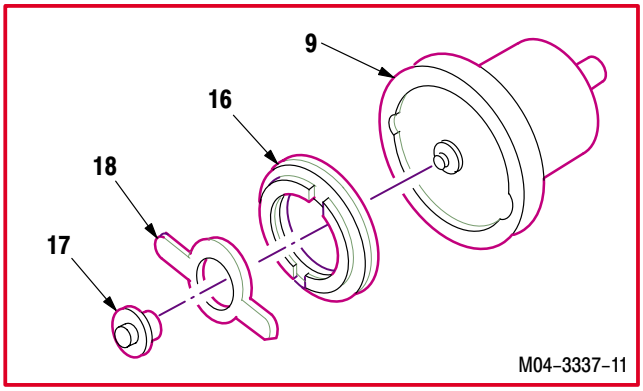
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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

d. **Remove friction lining screen (16) from piston (9).**

(1) Remove fastener (17) and antirotation key (18) from piston (9).

(2) Remove and discard screen (16).



WARNING

Threaded retaining ring and spring retaining cap are under a compressed spring load. Protect eyes and hands while disassembling piston.

e. **Disassemble piston (9).**

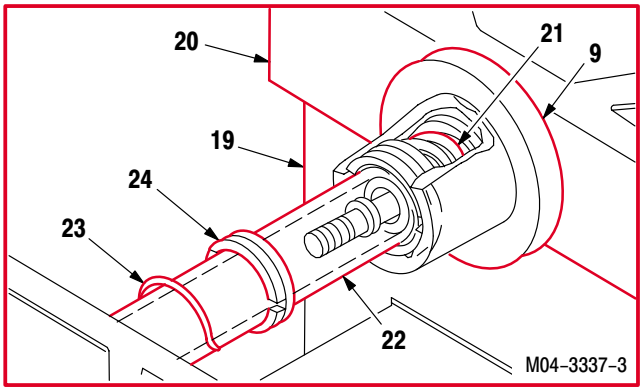
(1) Position piston (9) in vise. Use vise (19) and vise jaw caps (20).

(2) Compress spring (21) by tightening vise until spring is compressed. Use stud installing tool kit (22).

(3) Remove retaining ring (23) from piston (9).

(4) Remove threaded retaining ring (24) from piston (9). Use gloves (item 82, App F), faceshield, and spanner wrench.

(5) Carefully release spring (21) by loosening vise.



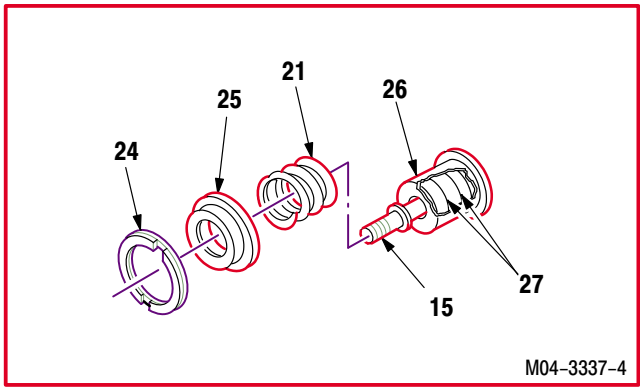
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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

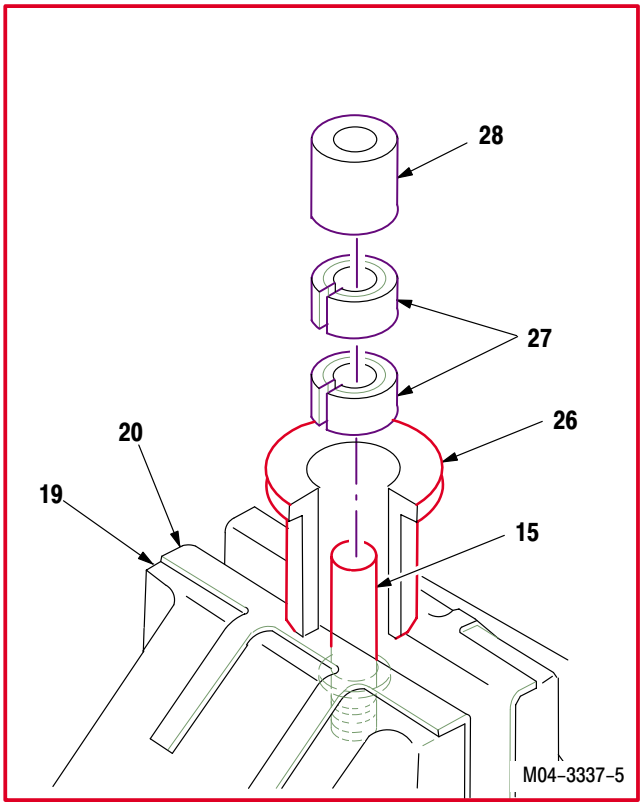
(6) Remove ring (24), spring retaining cap (25), and spring (21) from spring guide (26).

f. **Remove two grips (27) from pin (15) and guide (26).**

(1) Position guide (26) and pin (15) in vise (19) and jaw caps (20).



(2) Drive pin (15) out of spacer (28), two grips (27) and guide (26). Use punch.



6.68.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.68.5. Inspection

a. **Check components for cracks.** None allowed.

b. **Check components for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

6.68.6. Assembly

a. **Install two grips (27) on pin (15) and guide (26).**

(1) Clamp pin (15) in vise. Use vise (19) and vise jaw caps (20).

(2) Install guide (26) on pin (15).

(3) Install one grip (27) on pin (15).

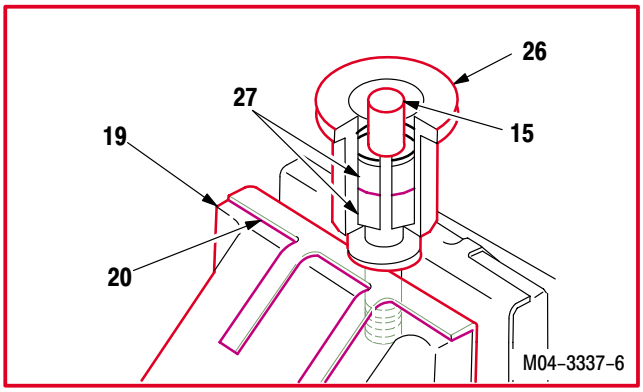
NOTE

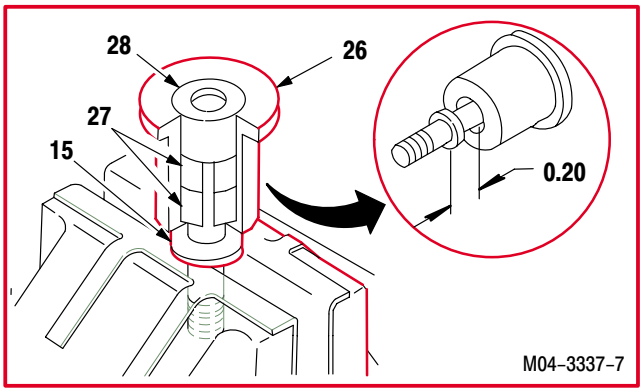
Ensure slot of second grip alines with slot of installed grip.

(4) Install second grip (27) on pin (15).

(5) Install spacer (28) on pin (15) flush with surface of guide (26).

(6) Allow **0.20 INCH** gap between return pin mounting boss and spring guide surface. Use gap setting gage.





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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

WARNING

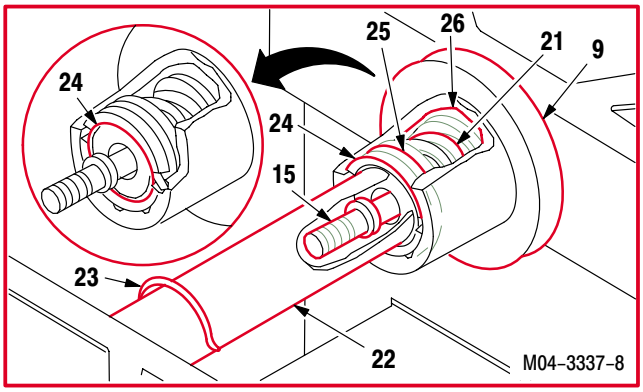
Threaded retaining ring and spring retaining cap are under a compressed spring load. Protect eyes and hands while assembling piston.

b. **Assemble piston (9).**

(1) Aline ring (24), cap (25), spring (21), pin (15), and guide (26) in vise and compress spring (21). Use stud installing tool kit (22).

(2) Install ring (24) in piston (9) until outer surface is flush with piston edge surface.

(3) Install retaining ring (23) in piston (9).

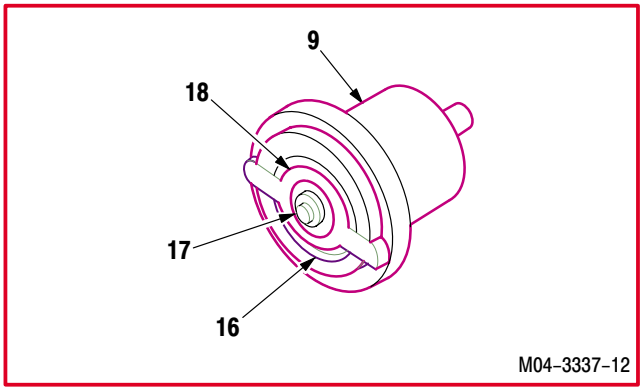


c. **Install screen (16) on piston (9).** Torque fastener (17) to **75 INCH-POUNDS**.

(1) Install screen (16) on piston (9).

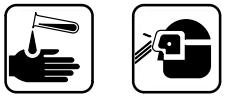
(2) Install key (18) and fastener (17) on piston (9).

(3) Torque fastener (17) to **75 INCH-POUNDS**. Use torque wrench.



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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued



d. **Install piston (9) in housing (1).** Torque nut (10) to **110 INCH-POUNDS**.

(1) Lubricate new packing (12). Use hydraulic fluid (item 92, App F).

(2) Install packing (12) and backup ring (11) in groove (13) of housing (1).

(3) Lubricate new packing (14). Use hydraulic fluid (item 92, App F).

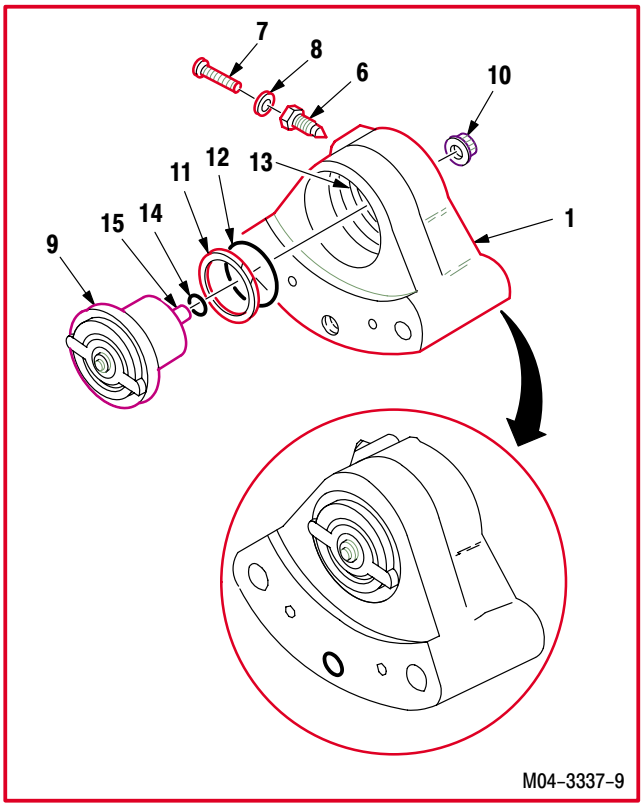
(4) Install packing (14) on pin (15).

(5) Lubricate mating surfaces of piston (9) and housing (1) cavity. Use hydraulic fluid (item 92, App F).

(6) Install piston (9) in housing (1).

(7) Install nut (10) on pin (15).

(8) Torque nut (10) to **110 INCH-POUNDS**. Use torque wrench and torque wrench adapter.



e. **Install valve (6) in housing (1).**

(1) Install valve (6).

(2) Install screw (7) and washer (8) in valve (6).

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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued



f. **Assemble halves of housing (1).** Torque two screws to **30 INCH-POUNDS**.

(1) Lubricate new packing (3). Use hydraulic fluid (item 92, App F).

(2) Install packing (3) on housing (1).

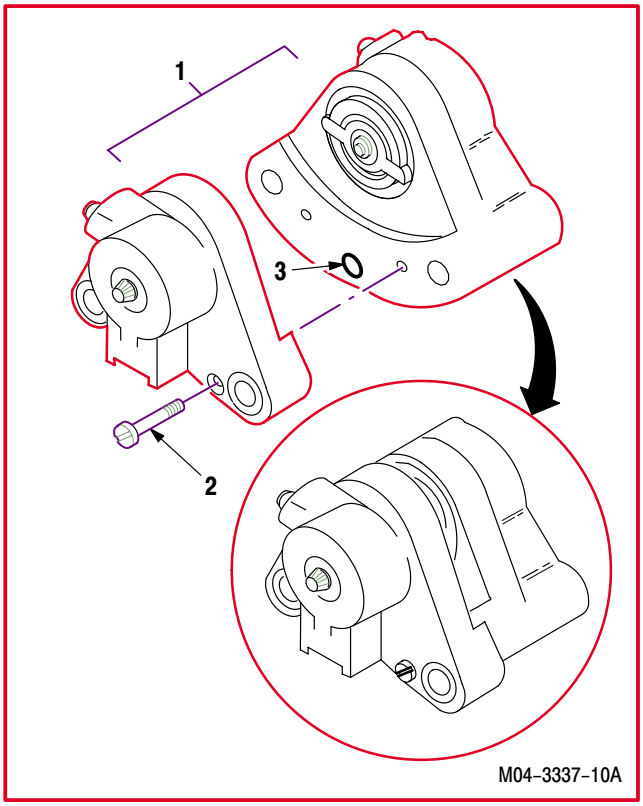
(3) Aline halves of housing (1).

(4) Apply sealing compound to threads of two screws (2). Use sealing compound (item 168, App F).

(5) Install two screws (2).

(6) Torque two screws (2) to **30 INCH-POUNDS**. Use torque wrench.

g. **Inspect (QA).**



6.68.7. Testing

CAUTION

Do not pressurize actuator on test bench without first securing the actuator to the test bench.

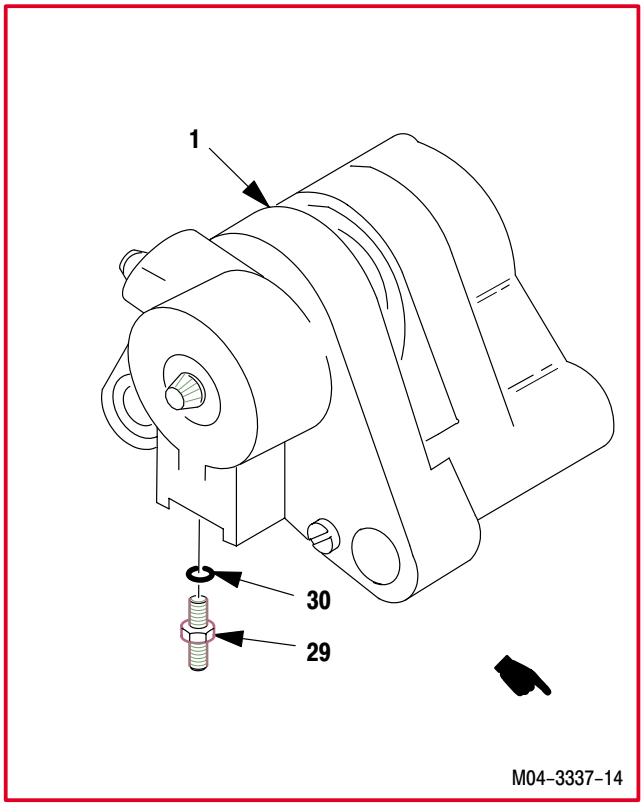
a. **Install nipple (29) on housing (1).** Torque nipple (29) to **135 INCH-POUNDS**.

(1) Lubricate new packing (30) and threads of nipple (29). Use hydraulic fluid (item 92, App F).

(2) Install packing (30) on nipple (29).

(3) Install nipple (29) on housing (1).

(4) Torque nipple (29) to **135 INCH-POUNDS**. Use torque wrench and crowfoot.



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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

b. **Install brake housing (1) on test bench.** Use hydraulic test stand.

(1) Install pressure hose (31) to nipple (29).

(a) Lubricate threads of nipple (29). Use hydraulic fluid (item 92, App F).

(b) Hold nipple (29). Install nut (32).

(2) Remove screw (7) and washer (8) from bleed valve (6).

(3) Install bleeder hose (33) to bleed valve (6).

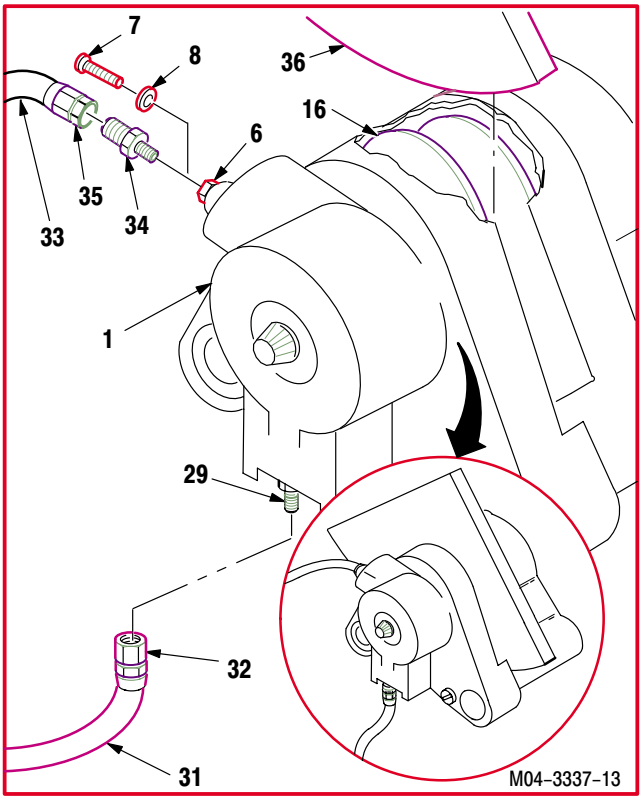
(a) Lubricate threads of tube reducer (34). Use hydraulic fluid (item 92, App F) and tube reducer.

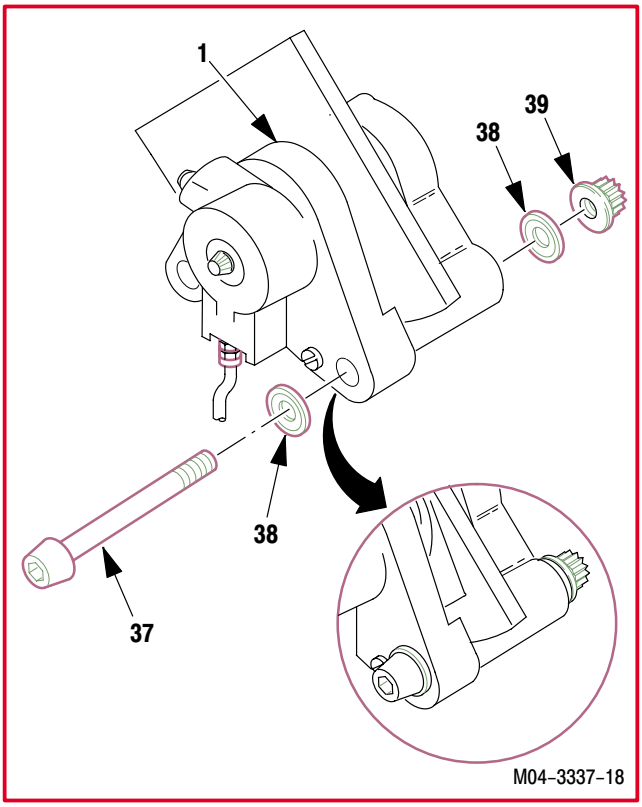
(b) Hold valve (6). Install tube reducer (34).

(c) Hold tube reducer (34). Install nut (35).

(4) Insert brake disk test segment (36) (Figure D-473, App D) between friction lining (16).

(5) Install two NAS 149-68 bolts (37), four MS20002C9 washers (38), and two HS 4143-7 nuts (39) to hold brake actuator housing (1) together while testing.





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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

c. **Perform static leak/brake return pressure test.**

(1) Increase test bench hydraulic pressure to **300 PSI** maximum and open bleed valve. Bleed actuator until fluid flow displays no air is present in bleeder outlet fluid. No flow is reason for rejection.

(2) Decrease test bench hydraulic pressure to **0 PSI**. Close and torque bleed valve to **40 INCH-POUNDS**. Use torque wrench.

(3) Increase pressure to **337 ±25 PSI**. Hold pressure to actuator for a period of five minutes. Any binding of pistons is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(4) Increase applied pressure to **4500 PSI**. Hold pressure to actuator for a period of two minutes. Actuator pistons shall show no signs of distortion or permanent set. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(5) Decrease pressure to **0 PSI**. Open bleed valve slowly to bleed off remaining pressure. Brake disk test segment should move freely between actuator assembly. Failure of disk segment to move freely is reason for rejection.

(6) Close bleed valve. Torque valve to **40 INCH-POUNDS**. Use torque wrench.

(7) Increase pressure to **80 +10/-0 PSI**. Hold pressure to actuator for a period of five minutes.

(8) After two minutes, check for disk/lining clearance with thickness gage. Disk should have **0.060 ±0.030 INCH** clearance each side. Remove disk segment from actuator. Failure of disk segment to move freely is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(9) Decrease pressure to **0 PSI**. Open bleed valve slowly to bleed off residual pressure remaining in actuator.

d. **Perform dynamic leakage test.**

(1) Insert brake disk test segment between friction lining of pistons.

(2) Close bleed valve. Torque valve to **40 INCH-POUNDS**. Use torque wrench.

(3) Increase pressure to **337 ±25 PSI**. Perform 25 cycles of application and release of pressure. Cycle rate should not exceed two cycles per minute. Leakage at moving seals, other than a slight wetting at seals insufficient to form a drop, is reason for rejection. Any binding of pistons is reason for rejection.

NOTE

Due to cylinder design, one piston normally leads in retraction. To confirm the opposing piston is not mechanically binding, go to step (4). The relief of residual pressure through the bleed valve will permit the piston to move to its upper limit and show that it is not mechanically binding.

(4) Decrease pressure to **0 PSI**. Open bleed valve to bleed off residual pressure remaining in actuator.

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6.68. MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

e. **Perform parked and locked/brake return pressure test.**

(1) Close bleed valve. Torque valve to **40 INCH-POUNDS**. Use torque wrench.

(2) Increase pressure to **3000 PSI**. Hold pressure to actuator for a period of two minutes. Any binding of pistons is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(3) Decrease pressure to **0 PSI**. Then slowly increase pressure to **80 ±0 PSI** for a period of five minutes. After pressure is stabilized at **80 PSI**, check for disk/lining clearance. Use thickness gage. Disk should have **0.06 ±0.030 INCH** clearance each side. Remove disk segment from actuator. Failure of disk segment to move freely is reason for rejection. Leakage, other than a slight wetting at seals insufficient to form a drop, is reason for rejection.

(4) Decrease pressure to **0 PSI**. Open bleed valve slowly to bleed off residual pressure remaining in actuator.

f. **Remove brake housing (1) from test bench.**

(1) Remove hose (31) from nipple (29).

(a) Hold nipple (29). Remove nut (32).

(2) Remove hose (33) from valve (6).

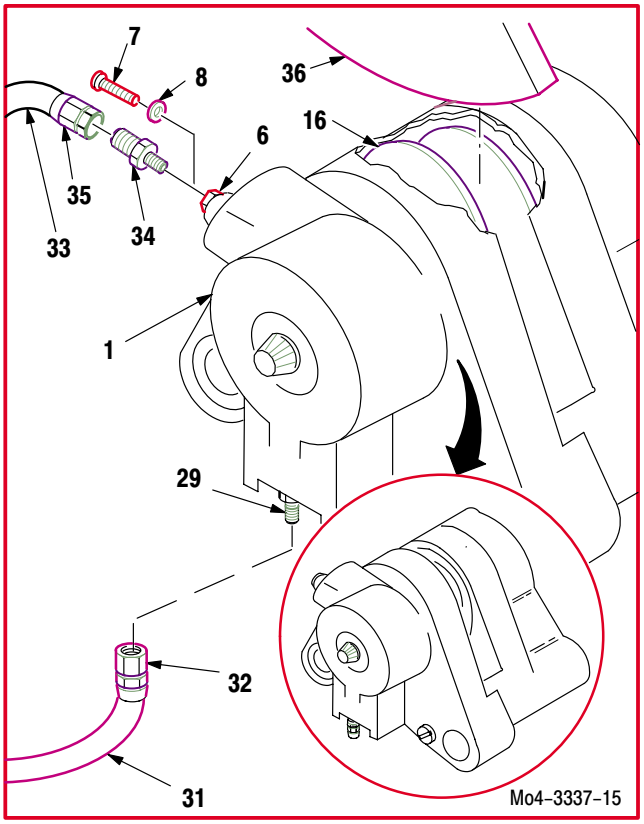
(a) Hold tube reducer (34). Remove nut (35).

(b) Hold valve (6). Remove tube reducer (34).

(3) Close bleed valve (6). Torque to **40 INCH-POUNDS**. Use torque wrench.

(4) Install screw (7) and washer (8) in valve (6).

(5) Remove brake disk test segment (36) from friction lining (16).



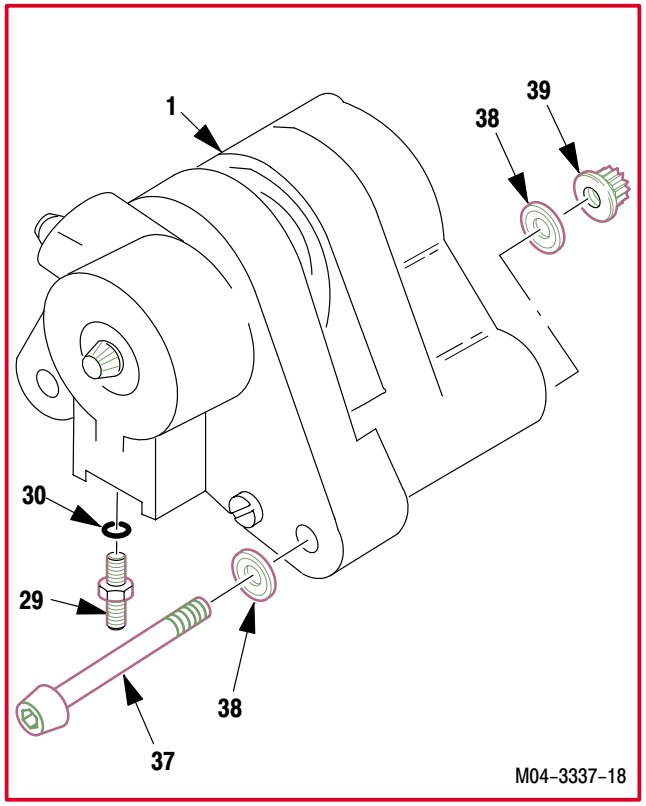
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6.68 MAIN TRANSMISSION ROTOR BRAKE ACTUATOR (GOODYEAR/ABSC) DISASSEMBLY/ASSEMBLY (AVIM) – continued

(6) Remove two NAS 149-68 bolts (37), four MS20002C9 washers (38), and two HS 4143-7 nuts (39) from brake actuator housing (1).

g. **Remove nipple (29) from housing (1).**

(1) Remove and discard packing (30).



h. **Install plug (4) and new packing (5) in housing (1).**

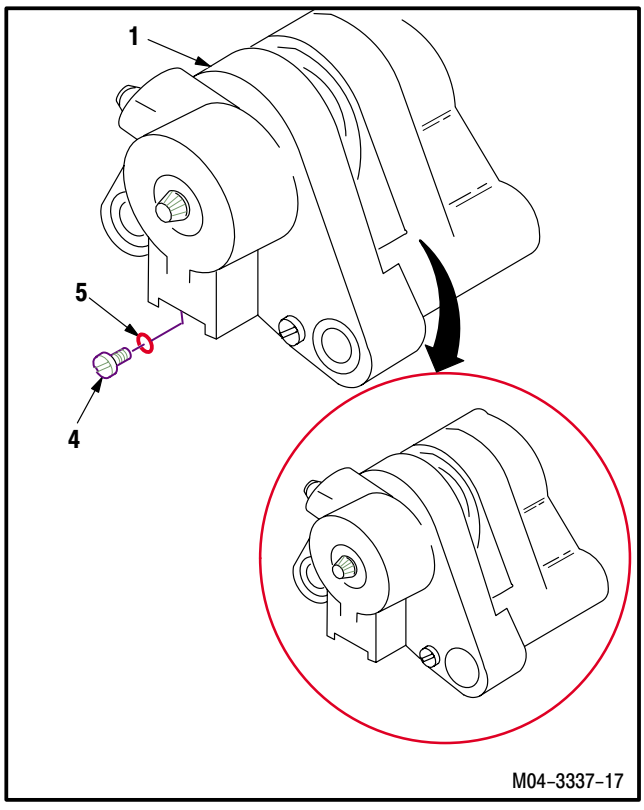
(1) Lubricate new packing (5). Use hydraulic fluid (item 92, App F).

(2) Install packing (5) on plug (4).

(3) Install plug (4) on housing (1).

(4) Torque plug (4). Use torque wrench.

i. **Inspect (QA).**



END OF TASK

6.69. MAIN TRANSMISSION ACCESSORY PUMP OIL PRESSURE SWITCH REMOVAL/INSTALLATION

6.69.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.69.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

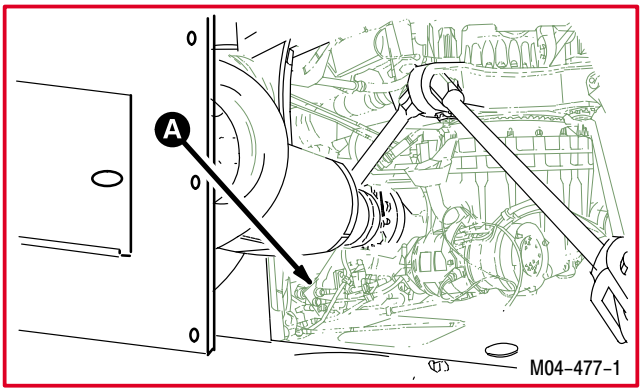
6.69.3. Removal

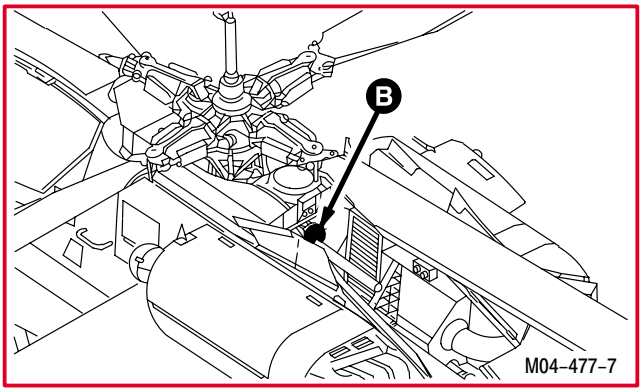
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open EMER BATT CAUT circuit breaker.**





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6.69. MAIN TRANSMISSION ACCESSORY PUMP OIL PRESSURE SWITCH REMOVAL/INSTALLATION – continued

e. **Depin switch wires (1) and (2) from splices (3) and (4).**

(1) Remove tie string (5) two places from wire harness (6).

(2) Identify wires (1) and (2).

(3) Depin wires (1) and (2) from splices (3) and (4) (TM 55-1500-323-24).

f. **Remove bolt (7), washer (8), and clamps (9) and (10) from bracket (11).**

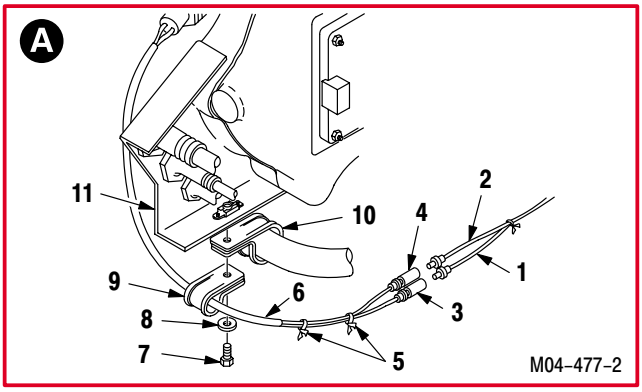
(1) Remove clamp (9) from harness (6).

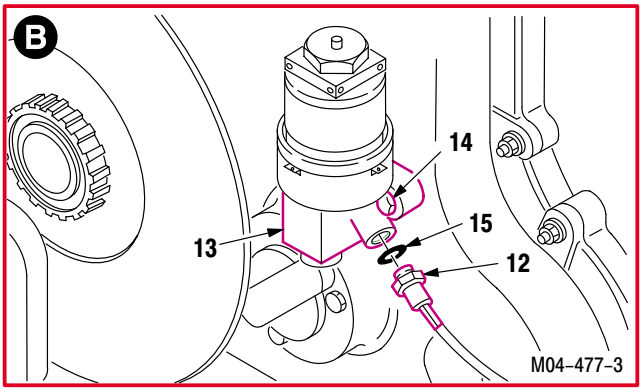
g. **Remove pressure switch (12) from accessory pump housing (13).**

(1) Remove lockwire from switch (12) and bolt (14).

(2) Remove switch (12) from housing (13).

(3) Remove and discard packing (15) from switch (12).





6.69.4. Cleaning

a. **Wipe pressure switch housing with a clean rag.**

6.69.5. Inspection

a. **Check pressure switch housing for cracks.** None allowed.

b. **Check pressure switch housing for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.69. MAIN TRANSMISSION ACCESSORY PUMP OIL PRESSURE SWITCH REMOVAL/INSTALLATION – continued

6.69.6. Installation



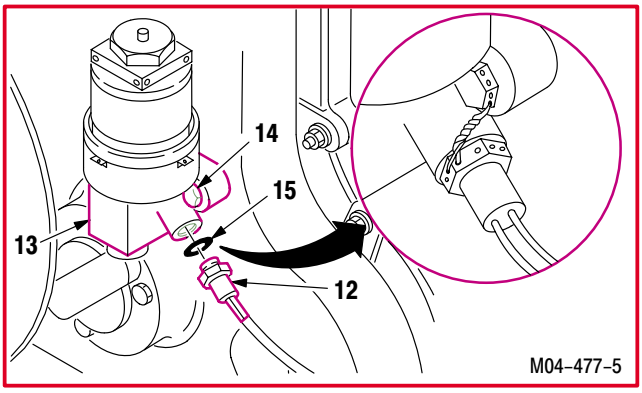
a. **Install switch (12) on housing (13).** Torque switch (12) to **30 INCH-POUNDS**.

(1) Lubricate new packing (15). Use petrolatum (item 138, App F).

(2) Install packing (15) on switch (12).

(3) Install switch (12) on housing (13).

(4) Torque switch (12) to **30 INCH-POUNDS**. Use torque wrench.



b. **Lockwire switch (12) to bolt (14).** Use wire (item 222, App F).

c. **Pin identified switch wires (1) and (2) in splices (3) and (4)** (TM 55-1500-323-24)**.**

(1) Insert red wire into S20 SP1 (to J755-20).

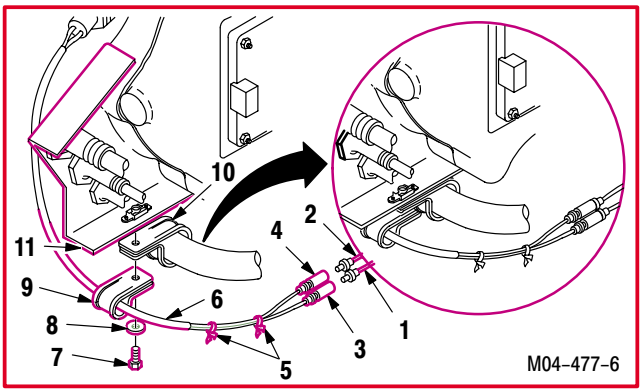
(2) Insert white wire into S20 SP2 (to J755-21).

(3) Install tie string (5) two places.

d. **Install washer (8) and bolt (7) to bracket (11).**

(1) Install clamp (9) on harness (6).

(2) Install bolt (7) through washer (8), clamps (9) and (10), and bracket (11).



e. **Inspect (QA).**

f. **Perform pilot caution/warning system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Install access panel R200** (para 2.2)**.**

END OF TASK

6.70. MAIN TRANSMISSION ACCESSORY PUMP FILTER BOWL, ELEMENT, AND PRESSURE INDICATOR REMOVAL/INSTALLATION

6.70.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.70.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
Bypass filter removal tool (Figure D-460, App D)

Materials/Parts:

Packing (9)
Dry cleaning solvent (item 74, App F)
Petrolatum (item 138, App F)
Wire (item 227, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel R200 removed
6.69	Accessory pump oil pressure switch removed

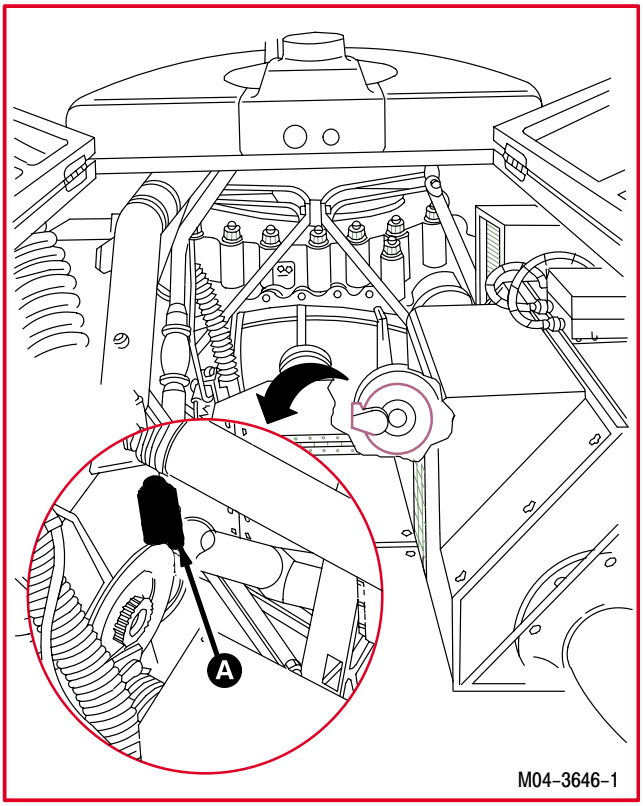
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.70. MAIN TRANSMISSION ACCESSORY PUMP FILTER BOWL, ELEMENT, AND PRESSURE INDICATOR REMOVAL/INSTALLATION – continued



6.70.3. Removal

a. **Remove accessory oil filter (1) from main transmission (2).**

(1) Remove bolt (3) and washer (3.1) from filter (1).

(2) Remove filter (1) from transmission (2).

b. **Remove outer adapter (4) from filter head (5).**

(1) Remove and discard three packings (6), (7), and (8) from adapter (4).

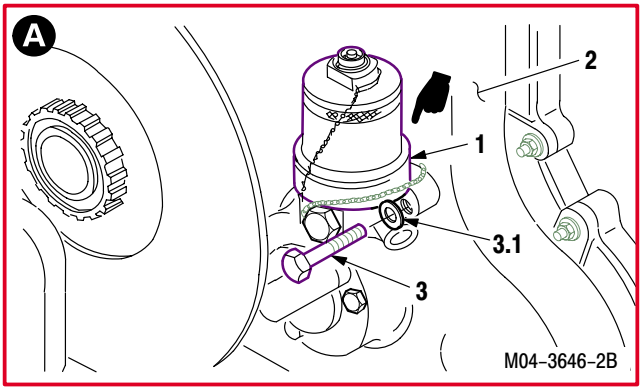
(2) Remove adapter (4) from head (5).

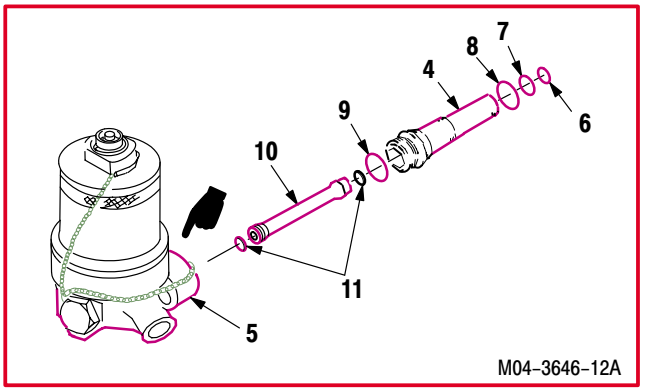
(3) Remove and discard packing (9) from adapter (4).

c. **Remove inner adapter (10) from adapter (4).**

(1) Slide adapter (10) out from adapter (4).

(2) Remove and discard two packings (11) from adapter (10).





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6.70. MAIN TRANSMISSION ACCESSORY PUMP FILTER BOWL, ELEMENT, AND PRESSURE INDICATOR REMOVAL/INSTALLATION – continued

d. **Remove filter element (12) and bowl (13) from head (5).**

(1) Remove lockwire from filter bowl (13).

(2) Unscrew and remove bowl (13) from head (5).

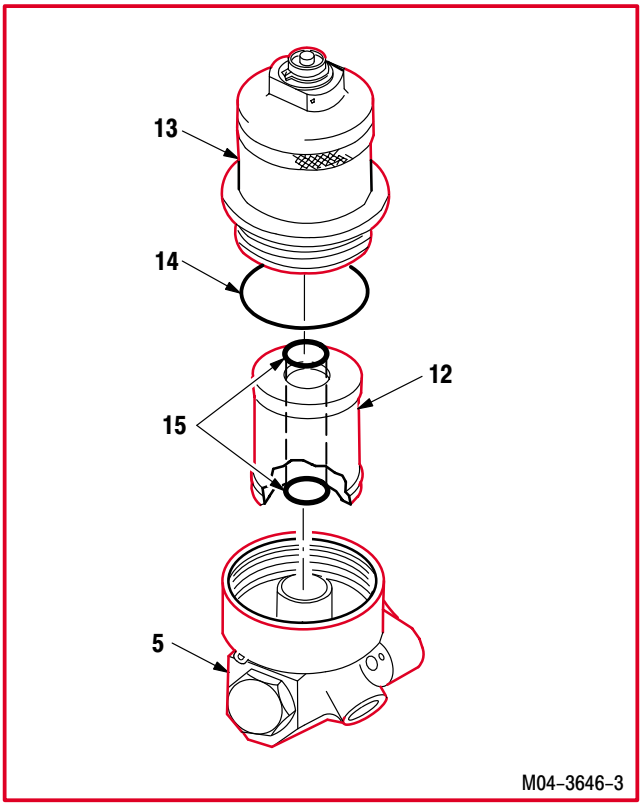
(3) Remove and discard packing (14) from bowl (13).

(4) Remove element (12) from bowl (13).

(5) Remove and discard two packings (15) from element (12).

(6) Cut open element (12) and inspect contents (para 6.60).

(7) Discard element (12).

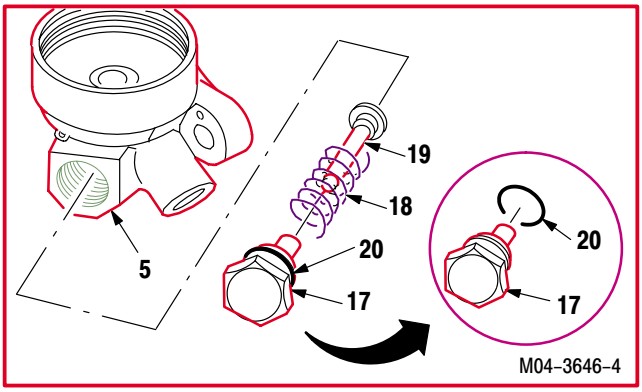


e. **Remove internal bypass screen (16) from filter head (5).**

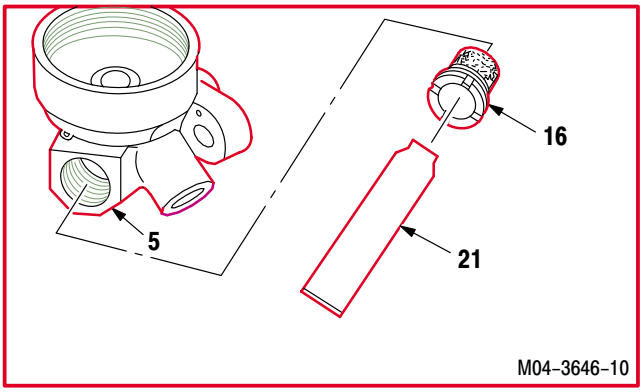
(1) Remove lockwire from plug (17).

(2) Remove plug (17), spring (18), and poppet (19) from head (5).

(3) Remove and discard packing (20) from plug (17).



(4) Remove bypass screen (16) from head (5). Use bypass filter removal tool (21) (figure D-460, App D).



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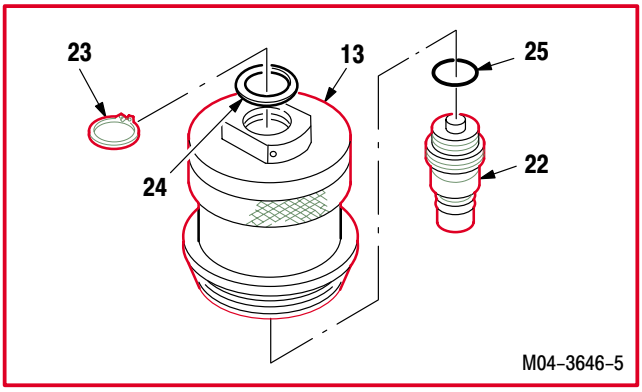
6.70. MAIN TRANSMISSION ACCESSORY PUMP FILTER BOWL, ELEMENT, AND PRESSURE INDICATOR REMOVAL/INSTALLATION – continued

f. **Remove indicator (22) from bowl (13).**

(1) Remove snap ring (23) and wafer ring (24) from bowl (13).

(2) Remove indicator (22) from bowl (13).

(3) Remove and discard packing (25) from indicator (22).



6.70.4. Cleaning



a. **Flush bypass screen** (para 1.47)**.** Use dry cleaning solvent (item 74, App F).

(1) Dry bypass screen using compressed air.

b. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.70.5. Inspection

a. **Check components for cracks.** None allowed.

b. **Check components for corrosion** (para 1.49)**.**

c. **Check filter bowl, filter head, bypass screen and plug for crossed, stripped or flattened threads.** None allowed.

d. **Check bypass screen for contaminants** (para 6.60)**.**

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6.70. MAIN TRANSMISSION ACCESSORY PUMP FILTER BOWL, ELEMENT, AND PRESSURE INDICATOR REMOVAL/INSTALLATION – continued

6.70.6. Installation



a. **Install indicator (22) in bowl (13).**

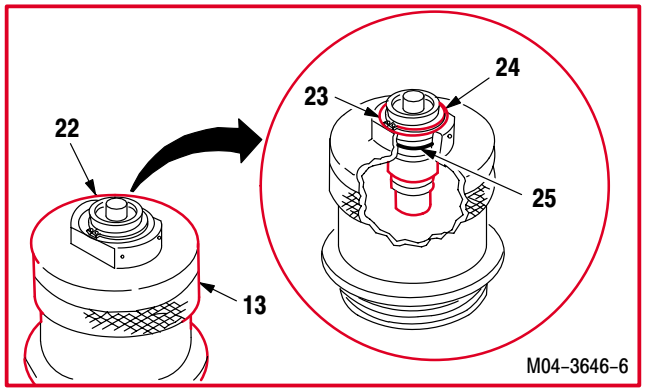
(1) Lubricate new packing (25). Use petrolatum (item 138, App F).

(2) Install packing (25) on indicator (22).

(3) Install indicator (22) in bowl (13).

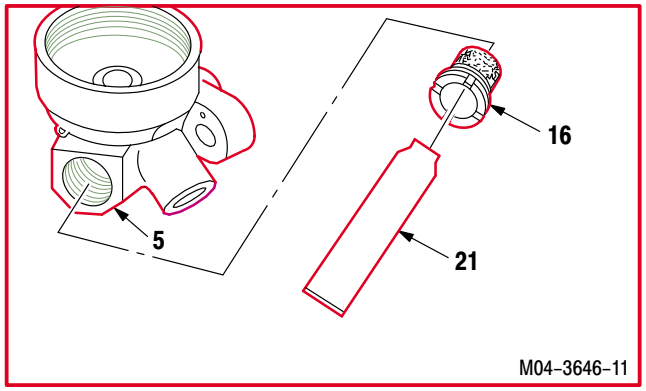
(4) Install wafer ring (24) on bowl (13).

(5) Install snap ring (23) on bowl (13).



b. **Install bypass screen (16) in filter head (5).** Torque plug (17) to **100 INCH-POUNDS**.

(1) Install bypass screen (16) in head (5) until filter is seated. Use bypass filter removal tool (21) (figure D-460, App D).



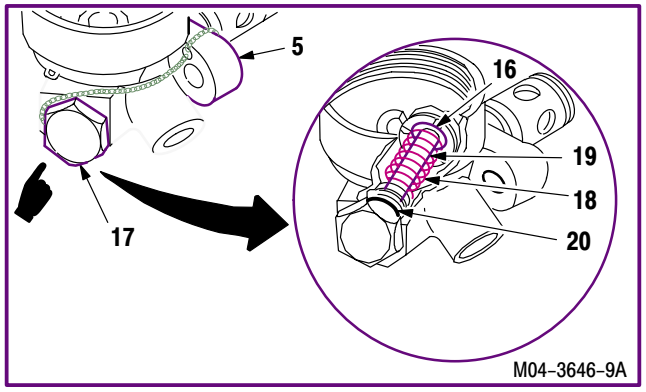
(2) Lubricate new packing (20). Use petrolatum (item 138, App F).

(3) Install packing (20) on plug (17).

(4) Install poppet (19), spring (18), and plug (17) in head (5).

(5) Torque plug (17) to **100 INCH-POUNDS**. Use torque wrench.

(6) Lockwire plug (17) to head (5). Use wire (item 227, App F).



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6.70. MAIN TRANSMISSION ACCESSORY PUMP FILTER BOWL, ELEMENT, AND PRESSURE INDICATOR REMOVAL/INSTALLATION – continued

c. **Install new filter element (12) and bowl (13) on head (5).** Torque bowl (13) to **65 INCH-POUNDS**.

(1) Lubricate new packing (14). Use petrolatum (item 138, App F).

(2) Remove and lubricate two new packings (15) from new element (12). Use petrolatum (item 138, App F).

(3) Install two packings (15) on element (12).

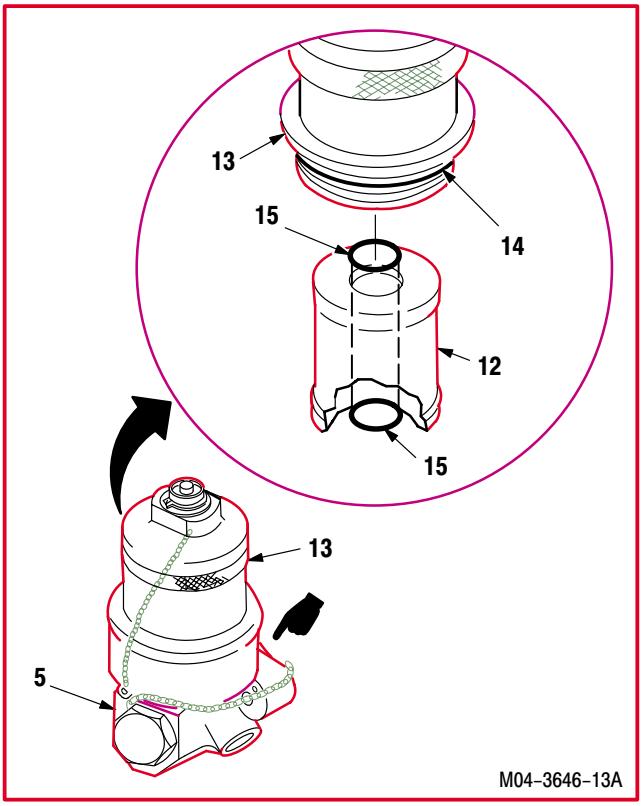
(4) Install element (12) in bowl (13).

(5) Install packing (14) on bowl (13).

(6) Install bowl (13) on head (5).

(7) Torque bowl (13) to **65 INCH-POUNDS**. Use torque wrench.

(8) Lockwire bowl (13) to head (5). Use wire (item 227, App F).



d. **Install adapter (10) in adapter (4).**

(1) Lubricate new packings (11). Use petrolatum (item 138, App F).

(2) Install two packings (11) on adapter (10).

(3) Slide adapter (10) in adapter (4).

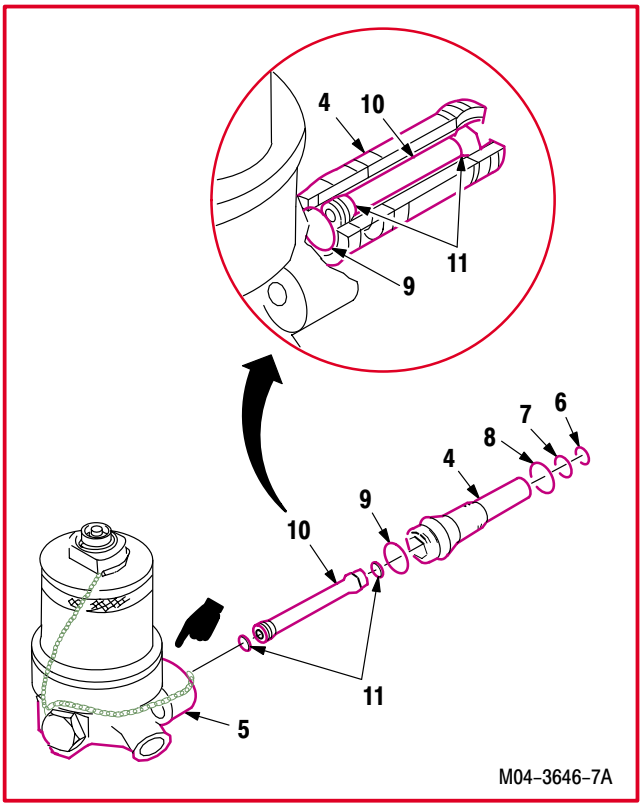
e. **Install adapter (4) with adapter (10) on head (5).**

(1) Lubricate new packings (6), (7), (8), and (9). Use petrolatum (item 138, App F).

(2) Install packing (9) on adapter (4).

(3) Install adapter (4) with adapter (10) on head (5).

(4) Install packings (6), (7), and (8) on adapter (4).



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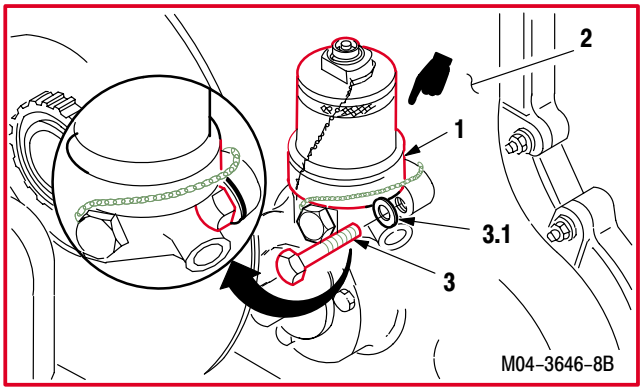
6.70. MAIN TRANSMISSION ACCESSORY PUMP FILTER BOWL, ELEMENT, AND PRESSURE INDICATOR REMOVAL/INSTALLATION – continued

f. **Install filter (1) on transmission (2).** Torque bolt (3) to **65 INCH-POUNDS**.

(1) Position filter (1) on transmission (2).

(2) Install bolt (3) through washer (3.1), filter (1), and into transmission (2).

(3) Torque bolt (3) to **65 INCH-POUNDS**. Use torque wrench.



g. **Inspect (QA).**

h. **Install accessory pump pressure switch** (para 6.69)**.**

i. **Secure doors T250L, T250R, T290L, T290R, and L325; install panel R200** (para 2.2)**.**

j. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.71. MAIN TRANSMISSION ACCESSORY DRIVE LUBE PUMP REMOVAL/INSTALLATION (AVIM)

6.71.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.71.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/16 x 3/8-inch drive torque wrench adapter (item 22, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Bolt (AN104736 used for removal)
Packing (5)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
1.32	Main transmission oil sumps drained
6.66	Main transmission rotor brake disk removed

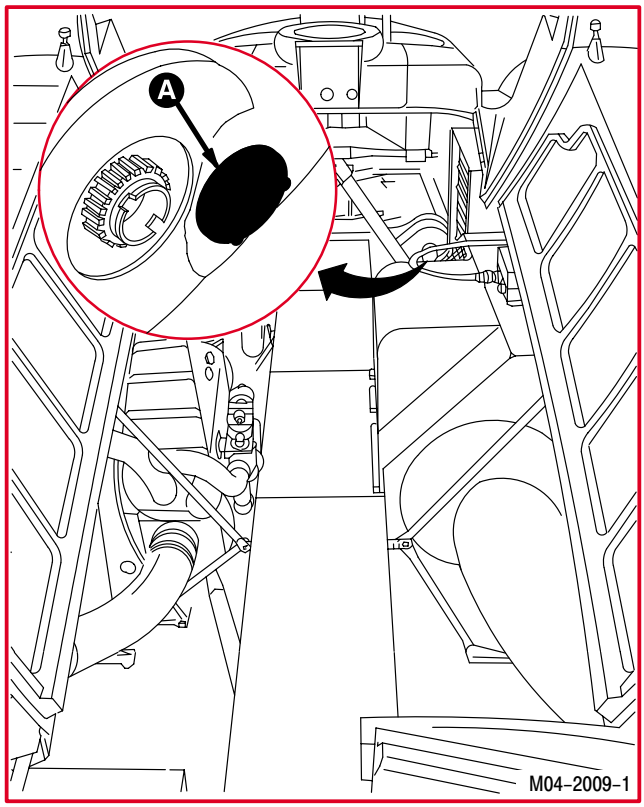
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.71. MAIN TRANSMISSION ACCESSORY DRIVE LUBE PUMP REMOVAL/INSTALLATION (AVIM) – continued



6.71.3. Removal

a. **Remove lube pump (1) from accessory drive cover (2).**

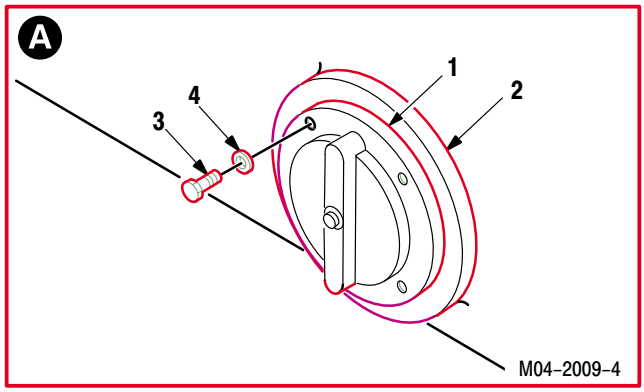
(1) Remove four bolts (3) and washers (4).

(2) Install AN104736 bolt (5) three turns in center of pump (1).

(3) Pull bolt (5) to remove pump (1) from cover (2).

(4) Remove bolt (5) from pump (1).

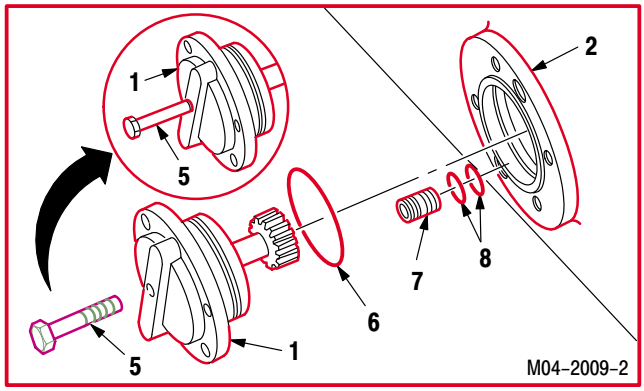
(5) Remove and discard packing (6).



b. **Remove two oil transfer tubes (7) from cover (2).**

(1) Pull two tubes (7) out of cover (2).

(2) Remove and discard four packings (8).



GO TO NEXT PAGE

6.71. MAIN TRANSMISSION ACCESSORY DRIVE LUBE PUMP REMOVAL/INSTALLATION (AVIM) – continued

6.71.4. Cleaning

a. **Wipe attachment area of accessory drive lube pump with a clean rag.**

6.71.5. Inspection

a. **Check attachment area of accessory drive lube pump for cracks.** None allowed.

6.71.6. Installation



a. **Install two tubes (7) in cover (2).**

(1) Lubricate four new packings (8). Use petrolatum (item 138, App F).

(2) Install four packings (8) on two tubes (7).

(3) Install two tubes (7) in cover (2) until fully seated.

b. **Install pump (1) on cover (2).** Torque four bolts (3) to **65 INCH-POUNDS**.

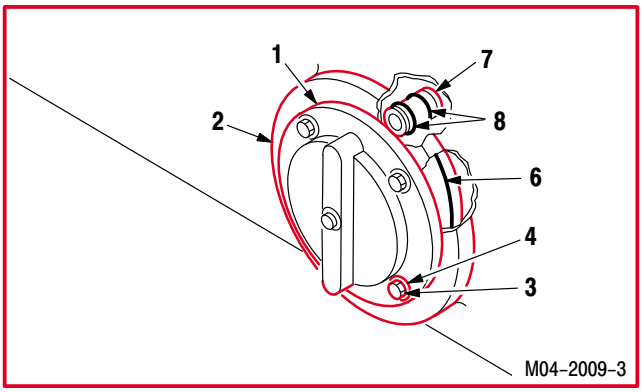
(1) Lubricate new packing (6). Use petrolatum (item 138, App F).

(2) Install packing (6) on pump (1).

(3) Position pump (1) on cover (2) and aline with two tubes (7).

(4) Install four bolts (3) and washers (4) in pump (1).

(5) Torque four bolts (3) to **65 INCH-POUNDS**. Use torque wrench adapter and torque wrench.



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6.71. MAIN TRANSMISSION ACCESSORY DRIVE LUBE PUMP REMOVAL/INSTALLATION (AVIM) – continued

c. **Inspect (QA).**

d. **Service main transmission oil sumps** (para 1.32)**.**

e. **Install main transmission rotor brake disk** (para 6.66)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

6.72. MAIN TRANSMISSION GENERATOR SPLINE ADAPTER AND CORK STOPPER REPLACEMENT

6.72.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.72.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Tube wire brush (item 45, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Mechanical puller (item 239, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Spline adapter
Cork stopper
Alcohol (item 25, App F)
Corkscrew (item 60B, App F)
Lubricating oil (item 118, App F)
Lubricating oil (item 119, App F)
Sealing compound (item 163, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 or R200 removed
9.26	AC generator No. 1 removed
	or
9.27	AC generator No. 2 removed
6.43	Roller bearing retainer removed

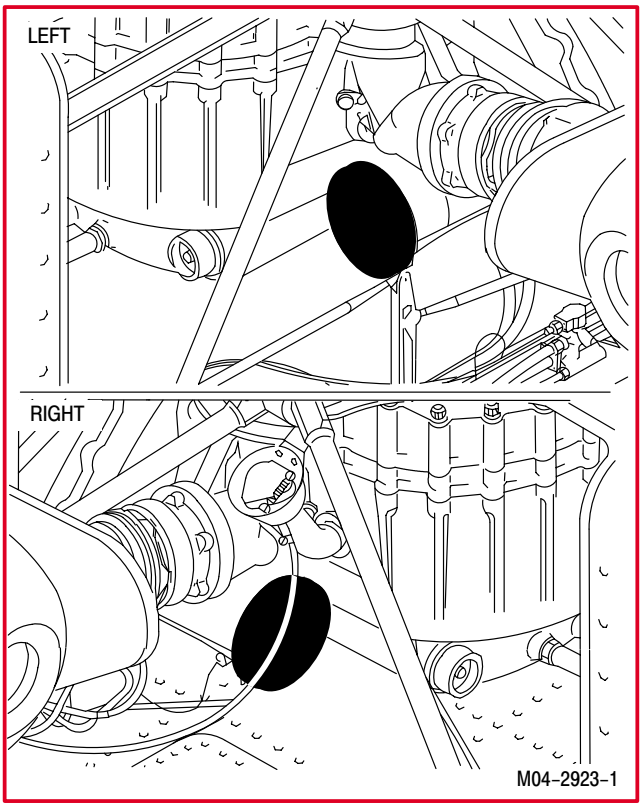
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either No. 1 and/or No. 2 main transmission generator spline adapter.



GO TO NEXT PAGE

6.72. MAIN TRANSMISSION GENERATOR SPLINE ADAPTER AND CORK STOPPER REPLACEMENT – continued

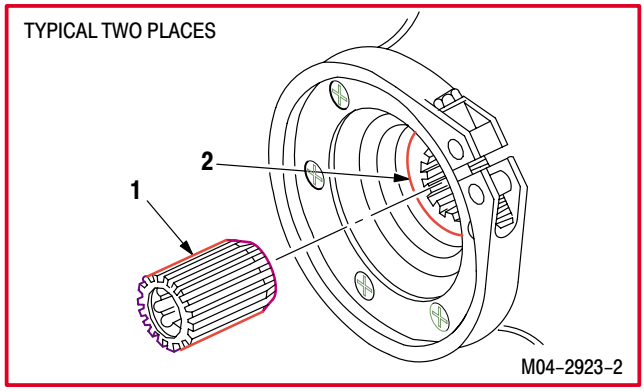
6.72.3. Removal

a. **Remove spline adapter (1) from gearshaft (2).** Use mechanical puller.



CAUTION

Gently pull cork stopper out of gearshaft to prevent damage to shaft interior surface.

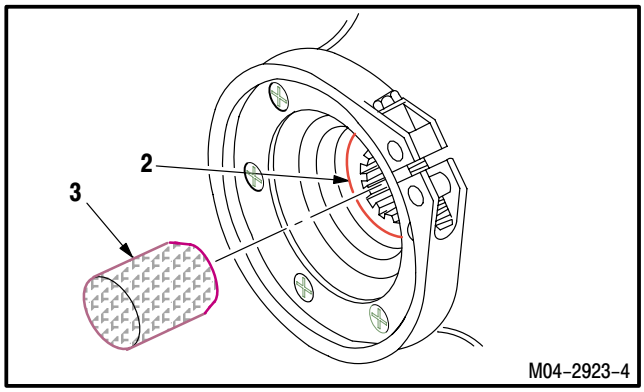


b. **Remove cork stopper (3) from gearshaft (2).** Use corkscrew (item 60B, App F).

(1) Remove cork and sealant residue from interior of gearshaft (2). Use brush.

(2) Flush shaft with clean transmission oil. Use lubricating oil (item 119, App F).

(3) Clean shaft with alcohol to remove oil. Use alcohol (item 25, App F).



6.72.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.72.5. Inspection

a. **Check splines of spline adapter and gearshaft for cracks.** None allowed.

b. **Check spline of adapter and gearshaft for damage.**

(1) Tooth chipping or flaking not greater than 3 percent of gear tooth area, with chip boundary after hand stoning to break sharp edges not extending into pattern area, is acceptable.

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6.72. MAIN TRANSMISSION GENERATOR SPLINE ADAPTER AND CORK STOPPER REPLACEMENT – continued

6.72.6. Installation



CAUTION

Do not allow sealing compound to contact splines.

a. **Install cork stopper (3) in gearshaft (2).**

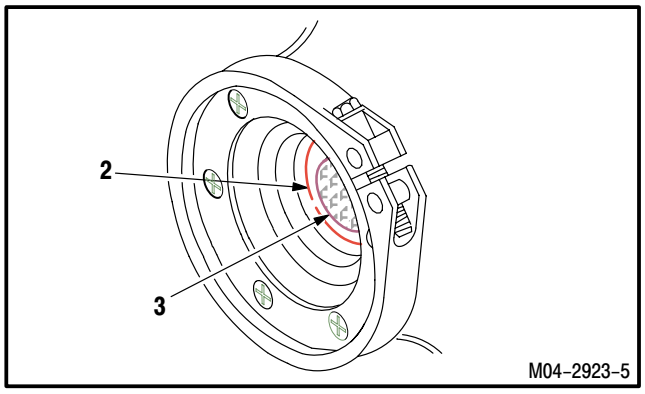
(3) Apply sealing compound to perimeter mating surface of cork stopper (3) and gearshaft at the generator end (2). Use sealing compound (item 163, App F).

(1) Ensuring tapered end of cork stopper is inserted first, install cork stopper (3) in gearshaft (2).

(2) Install cork stopper (3) **2.12 – 2.38 INCHES** deep from outer face of gearshaft (2).

(3) Apply sealing compound to exposed surface of the cork (3). and fillet. Use sealing compound (item 163, App F).

(4) Allow sealing compound to cure **24 HOURS** at a minimum temperature of 65 °F (18 °C).



GO TO NEXT PAGE

6.72. MAIN TRANSMISSION GENERATOR SPLINE ADAPTER AND CORK STOPPER REPLACEMENT – continued

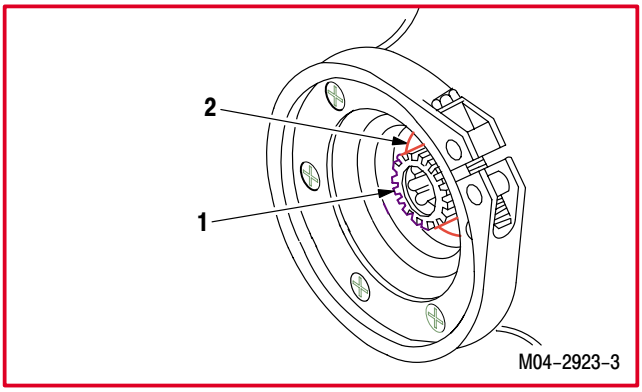
CAUTION

Do not use more than 75 pounds of force to install the spline adapter. Failure to observe this caution could damage the part.

b. **Install spline adapter (1) in gearshaft (2).**

(1) Lubricate external surface of adapter (1) splines. Use lubricating oil (item 118, App F).

(2) Install adapter (1) in gearshaft (2) bevel end first.



c. **Install roller bearing retainer** (para 6.43**).**

d. **Inspect (QA).**

e. **Install AC generator No. 1** (para 9.26) **or AC generator No. 2** (para 9.27)**.**

f. **Drain and flush transmission** (para 1.32)**.**

g. **Replace two main transmission filter elements** (para 6.61) **and main transmission accessory pump filter element** (para 6.70)**.**

h. **Inspect (QA).**

i. **Ground run aircraft for 30 minutes and check for oil leaks.**

j. **Drain and flush transmission** (para 1.32)**.**

k. **Replace two main transmission filter elements** (para 6.61) **and main transmission accessory pump filter element** (para 6.70)**.**

l. **Inspect (QA).**

m. **Install access panel L200 or R200** (para 2.2)**.**

END OF TASK

6.73. MAIN TRANSMISSION APU DRIVE FLANGE REMOVAL/INSTALLATION

6.73.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.73.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
6.16	No. 7 drive shaft and anti-flail support removed

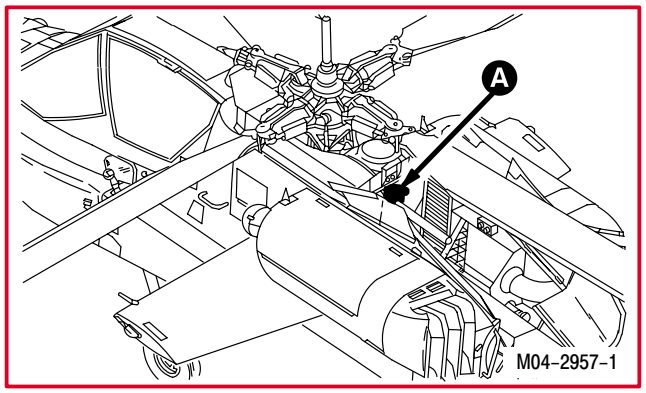
Materials/Parts:

Packing
Grease (item 87, App F)
Lubricating oil (item 119, App F)

WARNING

FLIGHT SAFETY PART

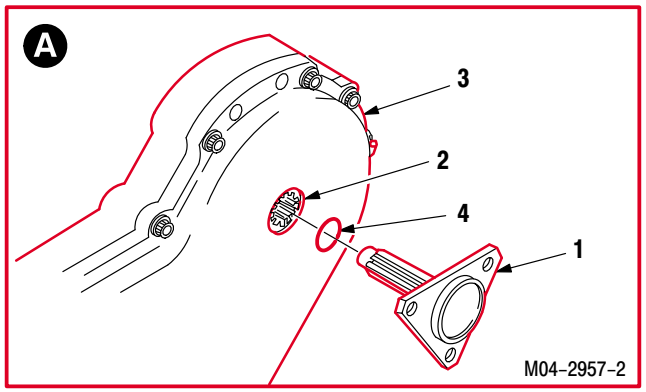
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



6.73.3. Removal

a. **Remove APU drive flange (1) from spur gear (2) in transmission housing (3).**

(1) Remove and discard packing (4).



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6.73. MAIN TRANSMISSION APU DRIVE FLANGE REMOVAL/INSTALLATION – continued

6.73.4. Cleaning

a. **Wipe APU drive flange and attaching surfaces of transmission housing with a clean rag.**

6.73.5. Inspection

a. **Check APU drive flange for nicks, cracks, gouges, and chipped splines.** None allowed.

b. **Check APU drive flange for corrosion** (para 1.49)**.**

c. **Check transmission accessory gearbox input splines for cracks, dents, distortion, or uneven wear pattern.** None allowed.

6.73.6. Installation



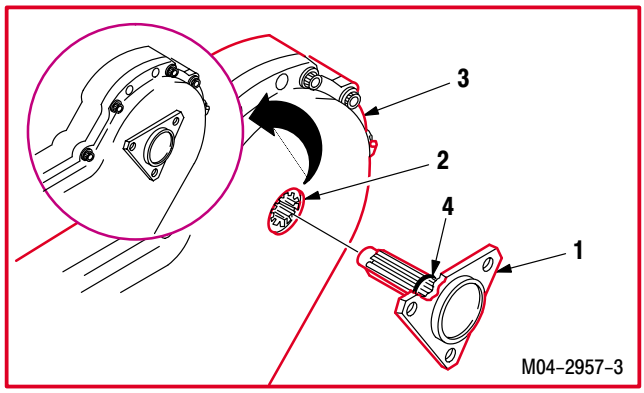
a. **Install flange (1) in housing (3).**

(1) Lubricate new packing (4). Use lubricating oil (item 119, App F).

(2) Install packing (4) on flange (1).

(3) Coat splines of flange (1). Use grease (item 87, App F).

(4) Engage splines of flange (1) with splines of spur gear (2) and push flange (1) until bottomed out in housing (3).



b. **Inspect (QA).**

c. **Install No. 7 drive shaft and anti-flail support** (para 6.16)**.**

d. **Secure access doors T250L, T250R, R290L, T290R, and L325** (para 2.2)**.**

END OF TASK

6.74. MAIN TRANSMISSION APU INPUT SEAL REMOVAL/INSTALLATION

6.74.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.74.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Main transmission seal removal/installation tool (Figure D-461, App D)

Materials/Parts:

Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

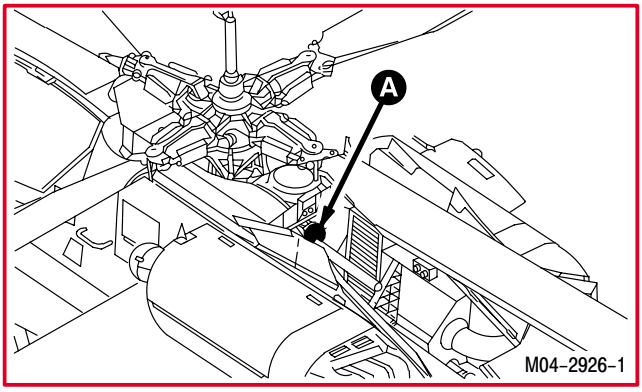
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.73	Main transmission APU drive flange removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



6.74.3. Removal

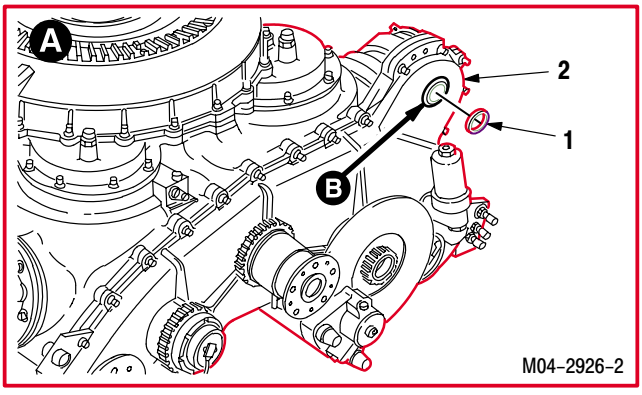
a. **Remove and discard APU seal (1) from main transmission housing (2).** Use seal removal/installation tool (Figure D-461, App D).

(1) Insert removal tool in seal (1). Use seal removal/installation tool (Figure D-461, App D).

(2) Insert slide hammer in removal tool. Use seal removal/installation tool (Figure D-461, App D).

(3) Slide hammer aft contacting bolt head removing seal (1).

(4) Discard seal (1).



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6.74. MAIN TRANSMISSION APU INPUT SEAL REMOVAL/INSTALLATION – continued

6.74.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.74.5. Inspection

a. **Check transmission housing to seal mating surface for corrosion** (para 1.49)**.**

6.74.6. Installation



a NOTE

a The –5 seal is two-way interchangeable with the basic seal; the –5 is the preferred part.

a The –3 seal (brown elastomer) and –5 seal (black elastomer) are rotational dependent seals which are not interchangeable.

a. **Install new seal (1) in transmission (2).** Use seal removal/installation tool (Figure D-461, App D).

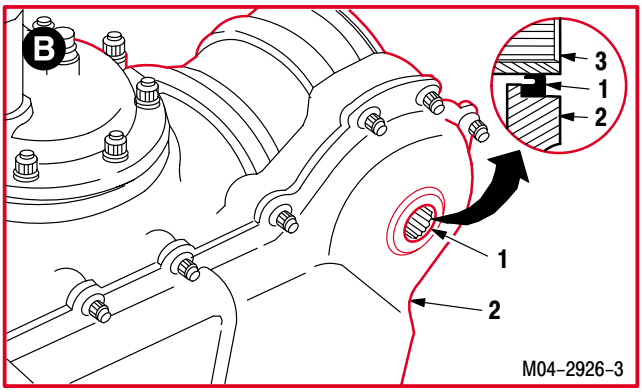
(1) Ensure new seal (1) has black elastomer (–5 seal) or if seal used has brown elastomer verify part number of seal is not –3.

(2) Coat outer surface of seal (1). Use sealing compound (item 177, App F).

(3) Insert guide in gearshaft (3). Use seal removal/installation tool (Figure D-461, App D).

(4) Install new seal (1) on guide with lip of seal facing in.

(5) Install pusher on guide and tap to install new seal (1). Use seal removal/installation tool (Figure D-461, App D).



b. **Inspect (QA).**

c. **Install main transmission APU drive flange** (para 6.73)**.**

END OF TASK

6.75. MAIN TRANSMISSION TAIL ROTOR DRIVE SEAL REPLACEMENT

6.75.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.75.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 6-inch long driftpin (item 113, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Packing (2)
Wicking (10)
Grease (item 88, App F)
Petrolatum (item 138, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

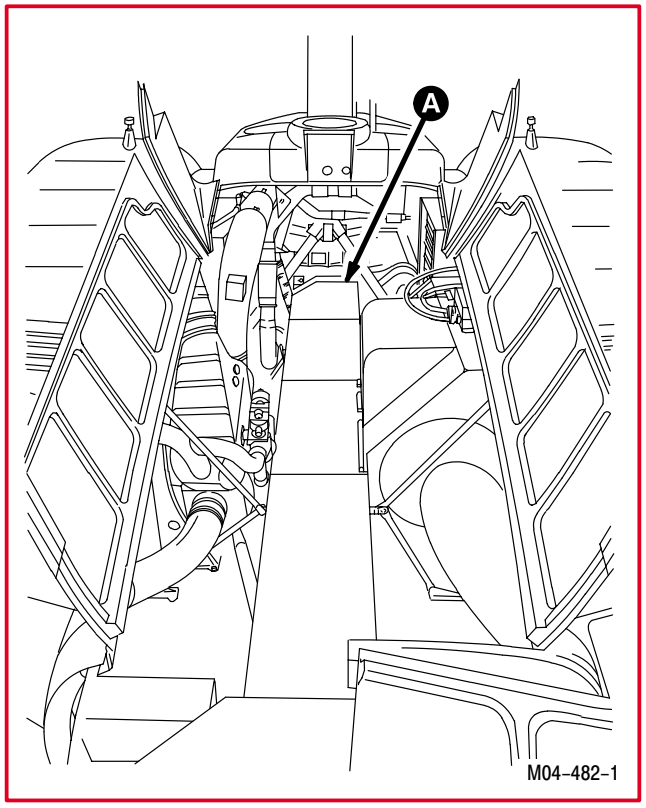
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel L200 or R200 removed
1.32	Main transmission oil system drained
2.84	Forward catwalk removed
6.5	No. 3 tail rotor drive shaft removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.75. MAIN TRANSMISSION TAIL ROTOR DRIVE SEAL REPLACEMENT – continued

6.75.3. Removal

a. **Remove drive flange (1) from transmission (2).**

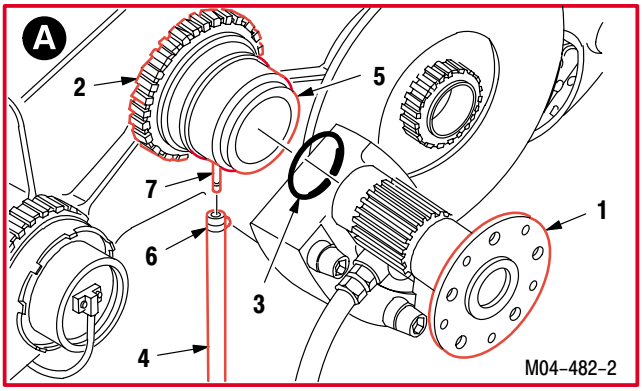
(1) Pull flange (1) from transmission (2).

(2) Remove and discard packing (3).

b. **Remove drain tube (4) from seal retainer (5).**

(1) Loosen clamp (6).

(2) Pull tube (4) from fitting (7).

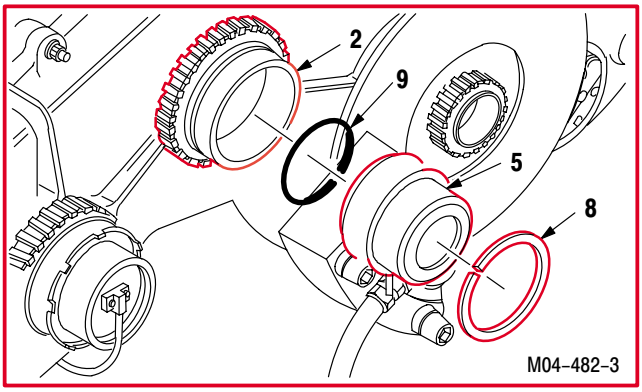


c. **Remove retainer (5) from transmission (2).**

(1) Remove retaining ring (8) from groove in transmission (2).

(2) Pull retainer (5) from transmission (2).

(3) Remove and discard packing (9).

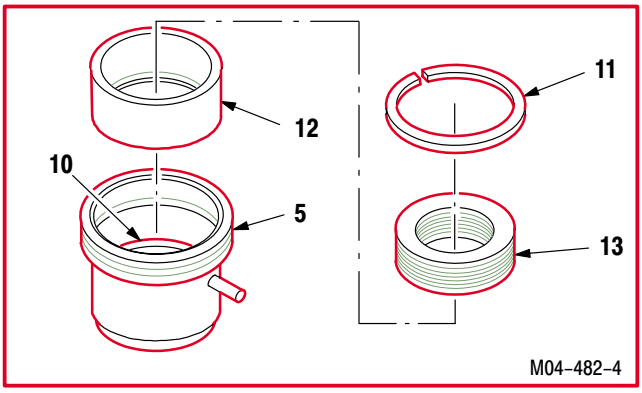


d. **Remove seal (10) from retainer (5).**

(1) Remove ring (11) from retainer (5).

(2) Remove sleeve (12) from retainer (5).

(3) Remove and discard 10 layers of wicking (13) from sleeve (12).

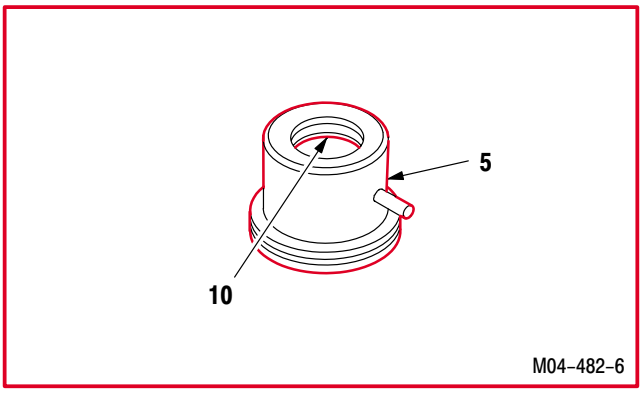


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6.75. MAIN TRANSMISSION TAIL ROTOR DRIVE SEAL REPLACEMENT – continued

(4) Place retainer (5) with large end down.

(5) Remove seal (10) from retainer (5). Use drift-pin and hammer.



6.75.4. Cleaning

a. **Wipe retainer and sleeve with a clean rag.**

6.75.5. Inspection

a. **Visually check retainer, sleeve, and retaining ring for cracks.** None allowed.

b. **Check retainer, sleeve, and retaining ring for corrosion** (para 1.49)**.**

6.75.6. Installation

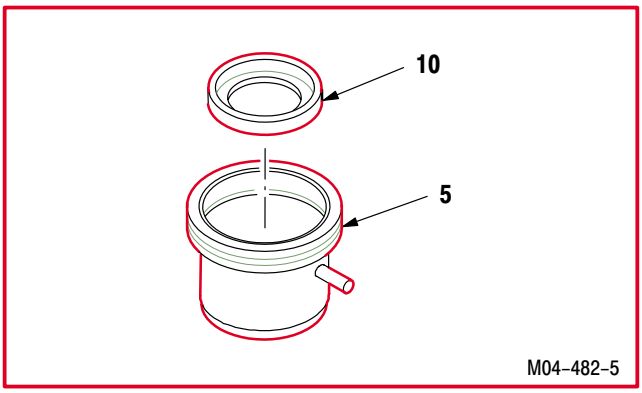


a. **Install seal (10) in retainer (5).**

(1) Apply sealing compound to outside surface of seal (10). Use sealing compound (item 177, App F).

(2) Place retainer (5) with large end up.

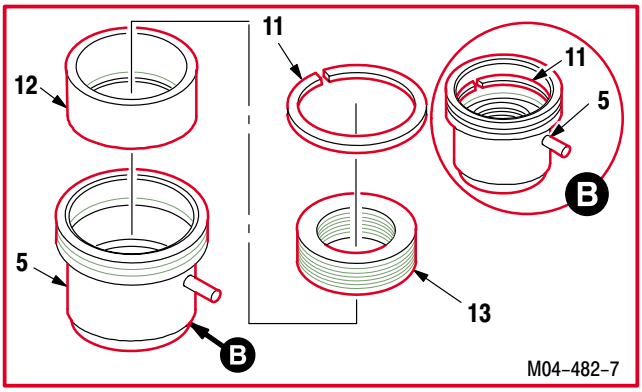
(3) Install seal (10) in retainer (5). Use driftpin and hammer.



(4) Install 10 layers of new wicking (13) in sleeve (12).

(5) Install sleeve (12) in retainer (5).

(6) Install ring (11) in retainer (5).



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6.75. MAIN TRANSMISSION TAIL ROTOR DRIVE SEAL REPLACEMENT – continued



b. **Install retainer (5) on transmission (2).**

(1) Lubricate new packing (9). Use petrolatum (item 138, App F).

(2) Install packing (9) on retainer (5).

(3) Install retainer (5) on transmission (2) with fitting (7) pointing down.

(4) Install ring (8) in groove in transmission (2).

c. **Install tube (4) on retainer (5).**

(1) Install tube (4) on fitting (7).

(2) Tighten clamp (6).

d. **Install flange (1) in transmission (2).**

(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on flange (1).

(3) Lightly coat splines of flange (1) with grease. Use grease (item 88, App F).

(4) Install flange (1) in transmission (2).

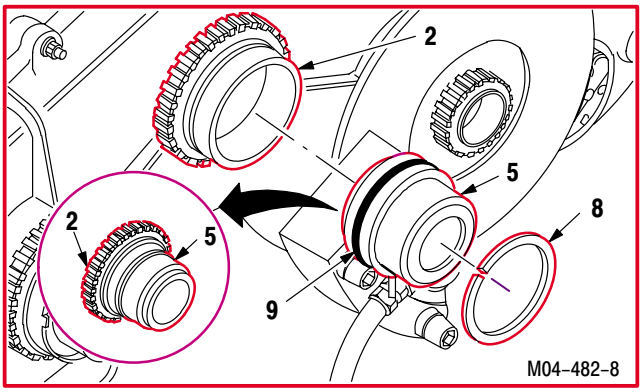
e. **Install No. 3 tail rotor drive shaft** (para 6.5)**.**

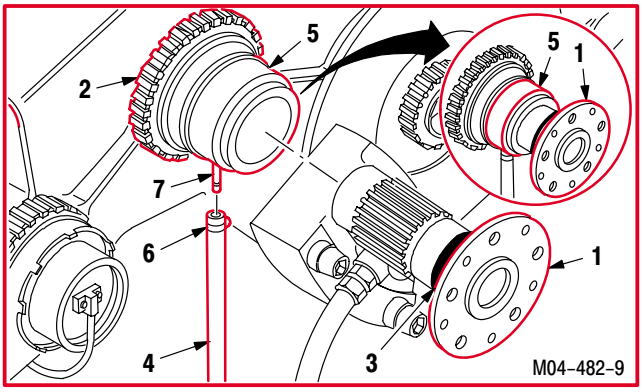
f. **Service main transmission oil system** (para 1.32)**.**

g. **Inspect (QA).**

h. **Secure forward catwalk** (para 2.84)**.**

i. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel L200 or R200** (para 2.2)**.**





END OF TASK

6.76. MAIN TRANSMISSION TAIL ROTOR FLANGE CORK STOPPER REPLACEMENT

6.76.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.76.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
7/8 x 7 3/4-inch long brass driftpin (item 114, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Rawhide mallet (item 212, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Cloth (item 51, App F)
Methyl ethyl ketone (item 124, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
6.75	Main transmission tail rotor drive flange removed

WARNING

FLIGHT SAFETY PART

The main transmission tail rotor flange assembly is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

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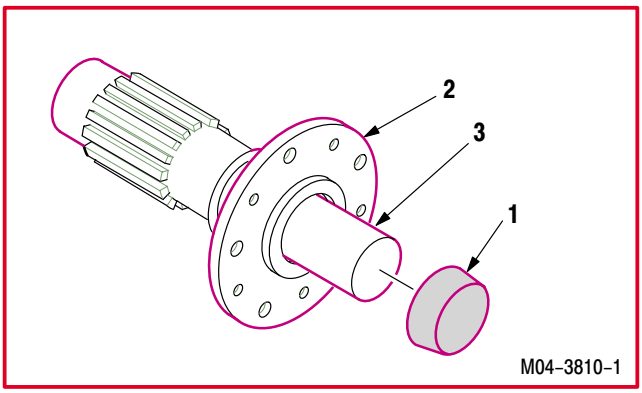
6.76. MAIN TRANSMISSION TAIL ROTOR FLANGE CORK STOPPER REPLACEMENT – continued

6.76.3. Removal

a. **Remove cork stopper (1) from tail rotor drive flange (2).**

(1) Insert driftpin (3) into flange (2) from gear tooth end. Use driftpin.

(2) Remove drive stopper (1) from flange (2) by gently tapping on driftpin (3). Use mallet.



6.76.4. Cleaning



a. **Clean tail rotor drive flange.**

(1) Remove all cured sealant and cork debris from drive flange (para 1.47). Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

6.76.5. Inspection

NOTE

The following inspection procedures apply to tail rotor drive flange.

a. **Check flange for serviceability** (para 6.41.3)**.**

GO TO NEXT PAGE

6.76 MAIN TRANSMISSION TAIL ROTOR FLANGE CORK STOPPER REPLACEMENT – continued

6.76.6. Installation



a. **Install new stopper (1) in flange (2).**

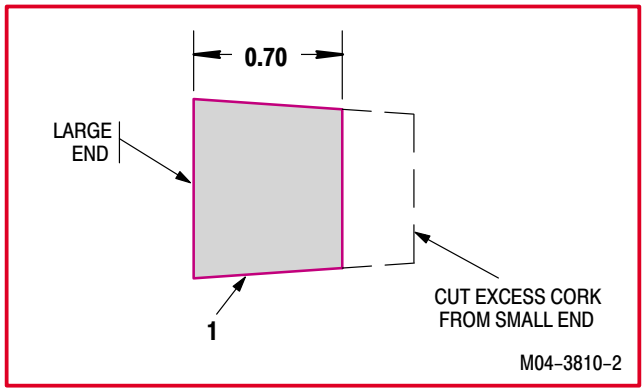
(1) Cut portion of stopper (1) from small end so that it measures **0.70 INCH** from large end.

(2) Apply sealant to small end of cork stopper (1). Use sealing compound (item 177, App F).

NOTE

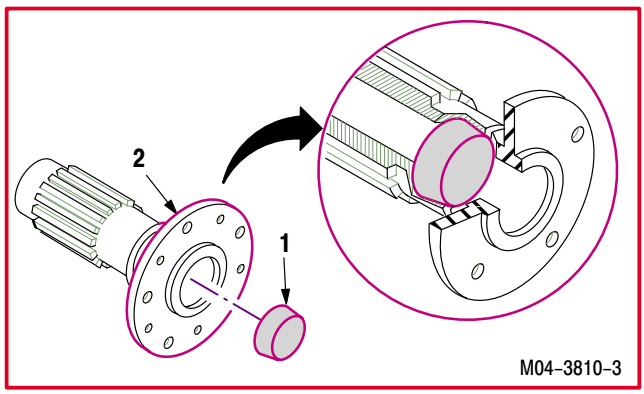
Cork stopper must be installed through flanged end of tail rotor drive flange and large end of cork stopper in first.

(3) Install stopper (1) in flange (2) until seated.



b. **Inspect (QA).**

c. **Install main transmission tail rotor drive flange** (para 6.75)**.**



END OF TASK

6.77. MAIN TRANSMISSION COUPLING HALVES REPLACEMENT

6.77.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.77.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 90, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.32	Main transmission oil system drained

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.77. MAIN TRANSMISSION COUPLING HALVES REPLACEMENT – continued

6.77.3. Removal

a. **Disconnect main transmission inlet hose (1) from quick disconnect (2).**

(1) Hold disconnect (2). Remove nut (3).

b. **Remove coupling half (4) from coupling half (5).**

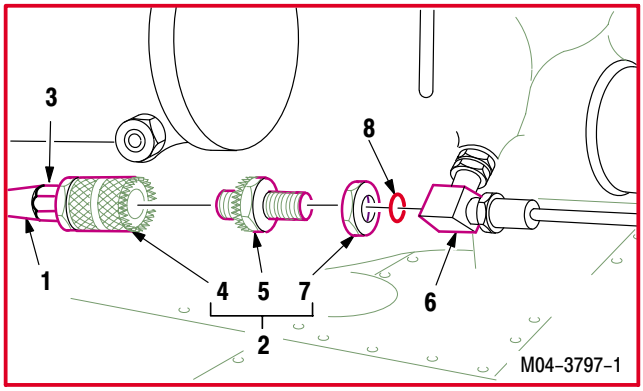
(1) Hold half (4). Remove half (5).

c. **Remove half (5) from tee (6).**

(1) Hold tee (6). Loosen nut (7).

(2) Remove half (5) from tee (6).

(3) Remove and discard packing (8).



6.77.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.77.5. Inspection

a. **Check main transmission inlet hose and tee for cracks and thread damage.** None allowed.

b. **Check main transmission inlet hose, tee, and attaching hardware for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.77. MAIN TRANSMISSION COUPLING HALVES REPLACEMENT – continued

6.77.6. Installation



a. **Install half (5) in tee (6).** Torque nut (7) to **245 INCH-POUNDS**.

(1) Lubricate new packing (8). Use petrolatum (item 138, App F).

(2) Install packing (8) on groove of half (5).

(3) Torque nut (7) to **245 INCH-POUNDS**. Use torque wrench and crowfoot.

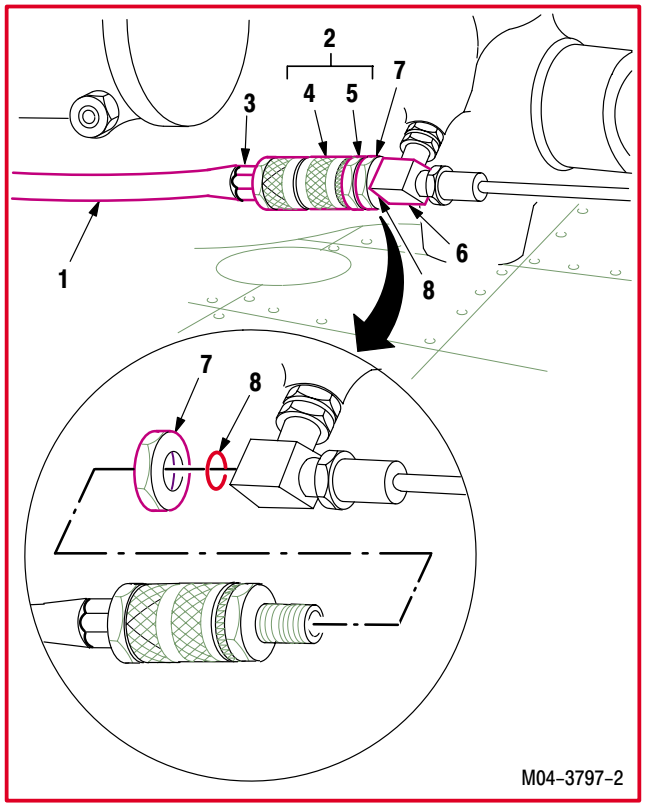
b. **Install half (4) in half (5).**

c. **Connect hose (1) to disconnect (2).** Torque nut (3) to **245 INCH-POUNDS**.

(1) Hold disconnect (2). Torque nut (3) to **245 INCH-POUNDS**. Use torque wrench and crowfoot.

d. **Inspect (QA).**

e. **Service main transmission** (para 1.32)**.**



END OF TASK

6.78. MAIN TRANSMISSION LOW OIL PRESSURE SWITCH REMOVAL/INSTALLATION

6.78.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.78.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 97, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 or R200 removed

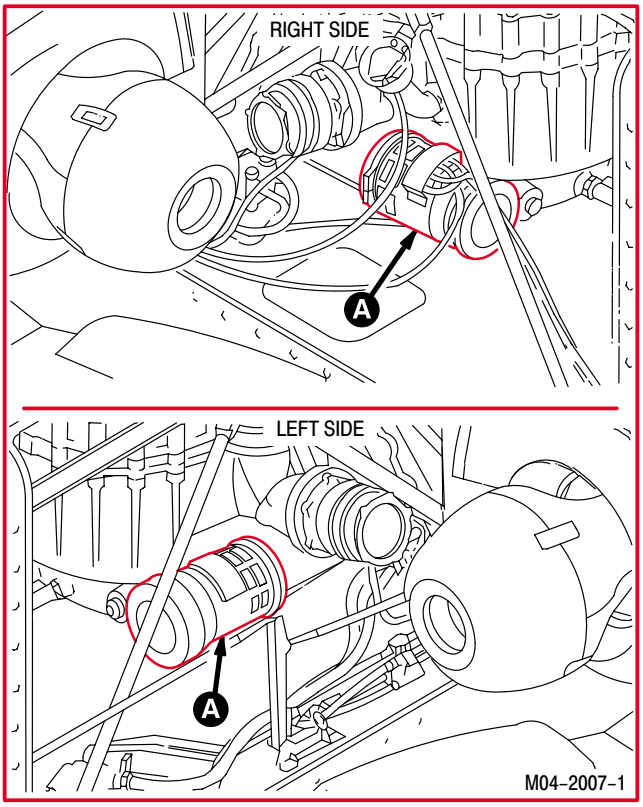
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either No. 1 and/or No. 2 oil pressure switch. No. 1 switch is shown except where noted.



GO TO NEXT PAGE

6.78. MAIN TRANSMISSION LOW OIL PRESSURE SWITCH REMOVAL/INSTALLATION – continued

6.78.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel, open EMER BATT CAUT circuit breaker.**

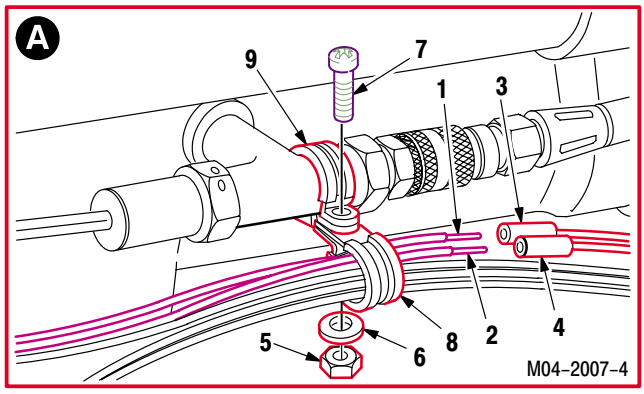
e. **Detach switch wires (1) and (2) from leads (3) and (4).**

(1) Remove nut (5), washer (6), and screw (7) from clamps (8) and (9).

(2) Remove clamp (8).

(3) Identify wires (1) and (2) and leads (3) and (4).

(4) Disconnect wires (1) and (2) from leads (3) and (4) (TM 55-1500-323-24).

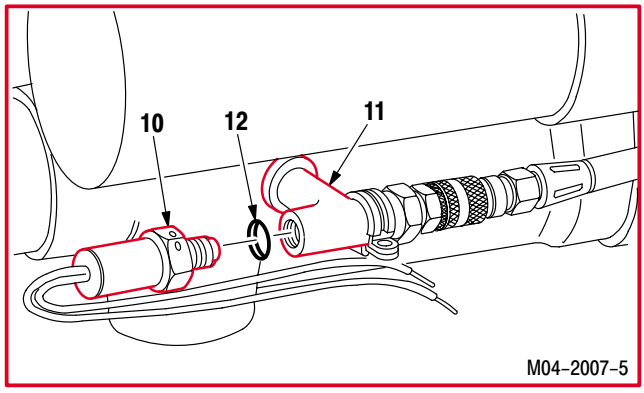


f. **Remove low oil pressure switch (10) from tee fitting (11).**

(1) Remove lockwire from switch (10).

(2) Hold fitting (11). Remove switch (10).

(3) Remove and discard packing (12) from switch (10).



6.78.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.78.5. Inspection

a. **Check tee fitting for nicks, gouges, and stripped threads.** None allowed.

GO TO NEXT PAGE

6.78. MAIN TRANSMISSION LOW OIL PRESSURE SWITCH REMOVAL/INSTALLATION – continued

6.78.6. Installation



a. **Install switch (10) in fitting (11).** Torque switch (10) to **30 INCH-POUNDS**.

(1) Lubricate new packing (12). Use petrolatum (item 138, App F).

(2) Install packing (12) on switch (10).

(3) Install switch (10) in fitting (11).

(4) Hold fitting (11). Torque switch (10) to **30 INCH-POUNDS**. Use torque wrench and crowfoot.

b. **Inspect (QA).**

c. **Lockwire switch (10) to fitting (11).** Use wire (item 226, App F).

d. **Attach switch wires (1) and (2) to leads (3) and (4)** (TM 55-1500-323-24)**.**

(1) For transmission No. 1 oil pressure switch (S15) (10) attach wires as follows:

(a) Insert red wire into S15 SP1 (to J755-25).

(b) Insert white wire to S15 SP2 (to J755-26).

(2) For transmission No. 2 oil pressure switch (S18) (10) attach wires as follows:

(a) Insert red wire into S18 SP1 (to J755-15).

(b) Insert white wire to S18 SP2 (to J755-16).

e. **Install clamps (8) and (9).**

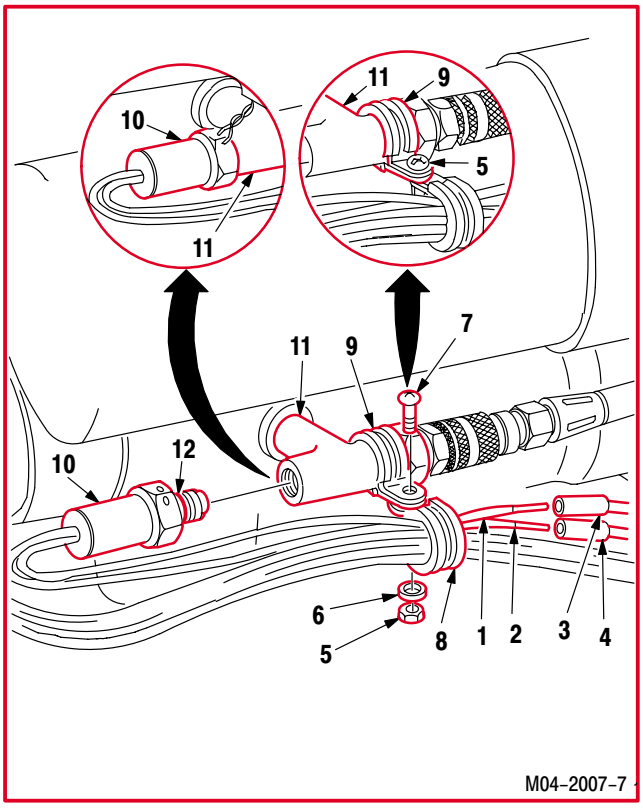
(1) Install screw (7) through clamps (9) and (8).

(2) Install nut (5) and washer (6) on screw (7).

f. **Inspect (QA).**

g. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

h. **Install access panel L200 or R200** (para 2.2)**.**



END OF TASK

6.79. MAIN TRANSMISSION OIL PRESSURE SWITCH TEE REMOVAL/INSTALLATION

6.79.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.79.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 x 3/8-inch drive open end socket wrench crowfoot attachment (item 93, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.78	Main transmission No. 1 or No. 2 low oil pressure switch removed
6.77	Main transmission coupling half removed
9.26	AC generator No. 1 removed
	or
9.27	AC generator No. 2 removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either No. 1 or No. 2 oil pressure switch tee.

GO TO NEXT PAGE

6.79. MAIN TRANSMISSION OIL PRESSURE SWITCH TEE REMOVAL/INSTALLATION – continued

6.79.3. Removal

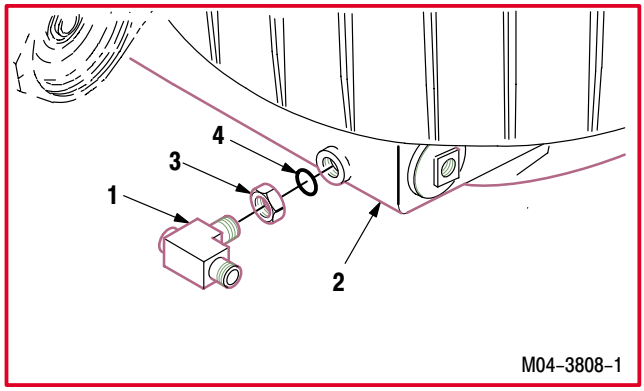
a. **Remove oil pressure switch tee (1) from main transmission (2).**

(1) Hold tee (1). Loosen nut (3). Use crowfoot.

(2) Remove tee (1) from transmission (2).

(3) Remove and discard packing (4) from tee (1).

(4) Remove nut (3) from tee (1).



6.79.4. Cleaning

a. **Clean tee attachment area** (para 1.47)**.**

6.79.5. Inspection

a. **Check tee for cracks and thread damage.** None allowed.

b. **Check main transmission and attaching hardware for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.79. MAIN TRANSMISSION OIL PRESSURE SWITCH TEE REMOVAL/INSTALLATION – continued

6.79.6. Installation



a. **Install tee (1) in transmission (2).** Torque nut (3) to **245 INCH-POUNDS**.

(1) Install nut (3) on tee (1)

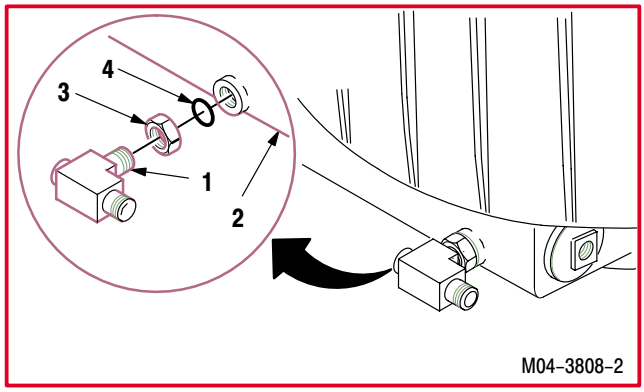
(2) Lubricate new packing (4). Use petrolatum (item 138, App F).

(3) Install new packing (4) on tee (1).

(4) Install tee (1) in transmission (2).

(5) Turn tee (1) until facing fore and aft.

(6) Hold tee (1). Torque nut (3) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.



b. **Inspect (QA).**

c. **Install main transmission No. 1 or No. 2 low oil pressure switch** (para 6.78)**.**

d. **Install main transmission coupling half** (para 6.77)**.**

e. **Install AC generator No. 1** (para 9.26) **or AC generator No. 2** (para 9.27)**.**

END OF TASK

6.80. MAIN TRANSMISSION CHECK VALVE REMOVAL/INSTALLATION

6.80.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.80.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 3/16 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 79, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 3/16 & 1 1/4-inch open end wrench (item 420, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)
Wire (item 224, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel L200 or R200 removed

WARNING

FLIGHT SAFETY PART

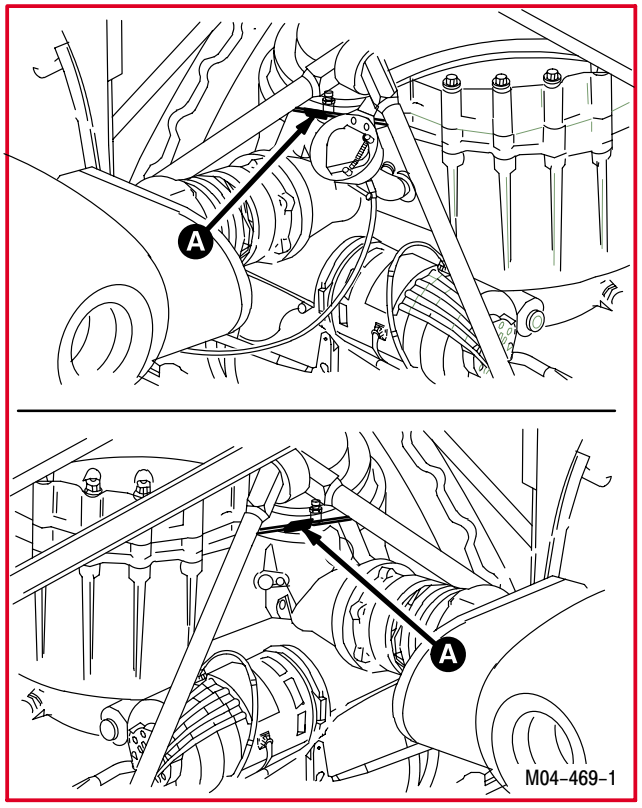
The main transmission check valve is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right check valve.

GO TO NEXT PAGE

6.80. MAIN TRANSMISSION CHECK VALVE REMOVAL/INSTALLATION – continued



6.80.3. Removal

a. **Remove hose (1) from check valve (2).**

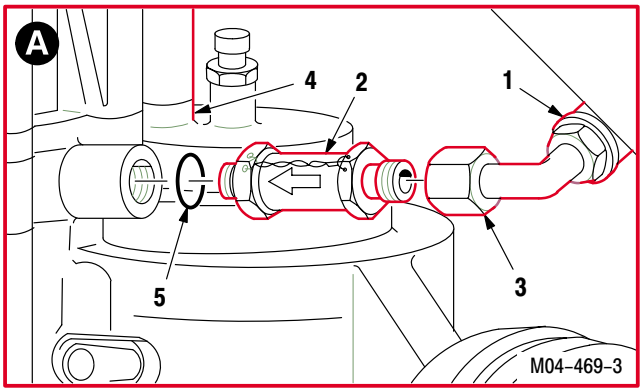
(1) Hold valve (2). Use open end wrench.

(2) Remove nut (3). Use crowfoot.

b. **Remove valve (2) from main transmission (4).**

(1) Remove valve (2).

(2) Remove and discard packing (5) from valve (2).



6.80.4. Cleaning

a. **Clean check valve, boss, and hose** (para 1.47)**.**

6.80.5. Inspection

a. **Check check valve for cracks or stripped threads.** None allowed.

b. **Check boss for gouges, nicks, and stripped threads.** None allowed.

c. **Check hose assembly for gouges, nicks, and stripped threads.** None allowed.

GO TO NEXT PAGE

6.80. MAIN TRANSMISSION CHECK VALVE REMOVAL/INSTALLATION – continued

6.80.6. Installation

NOTE

If check valve has provisions for lockwire, install lockwire before installing valve. Use wire (item 224, App F).

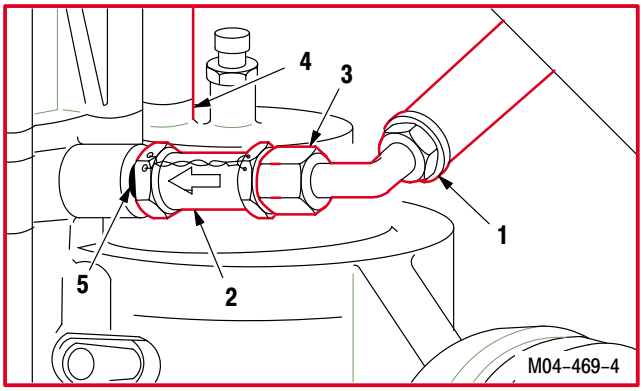
a. **Install valve (2) on transmission (4).** Torque valve (2) to **345 INCH-POUNDS**.

(1) Lubricate new packing (5). Use petrolatum (item 138, App F).

(2) Install packing (5) on valve (2).

(3) Install valve (2) with arrow pointing towards transmission (4). Use open end wrench.

(4) Torque valve (2) to **345 INCH-POUNDS**. Use crowfoot and torque wrench.



b. **Install hose (1) on valve (2).** Torque nut (3) to **345 INCH-POUNDS**.

(1) Hold valve (2). Use open end wrench.

(2) Torque nut (3) to **345 INCH-POUNDS**. Use crowfoot and torque wrench.

c. **Inspect (QA).**

d. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel L200 or R200** (para 2.2)**.**

END OF TASK

6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT

6.81.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.81.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
3/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 97, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel L200 removed
1.32	Main transmission oil system drained

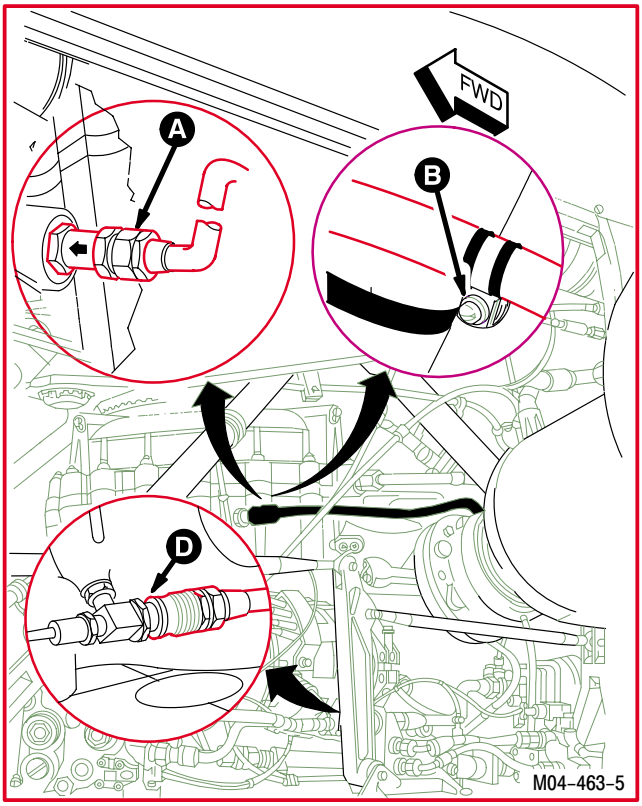
WARNING

FLIGHT SAFETY PART

The main transmission and heat exchanger are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

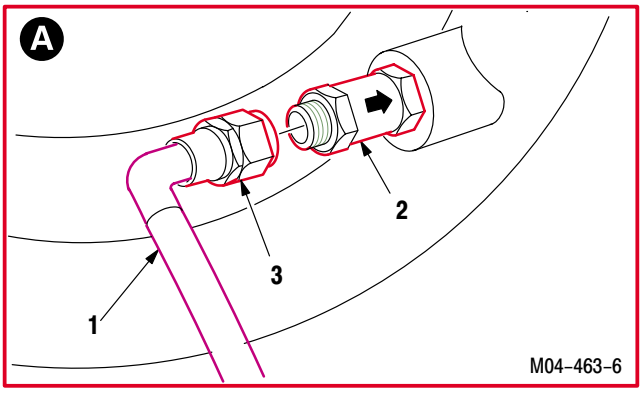
6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued



6.81.3. Removal

a. **Remove oil hose (1) from main transmission oil inlet check valve (2).**

(1) Hold check valve (2). Remove nut (3).

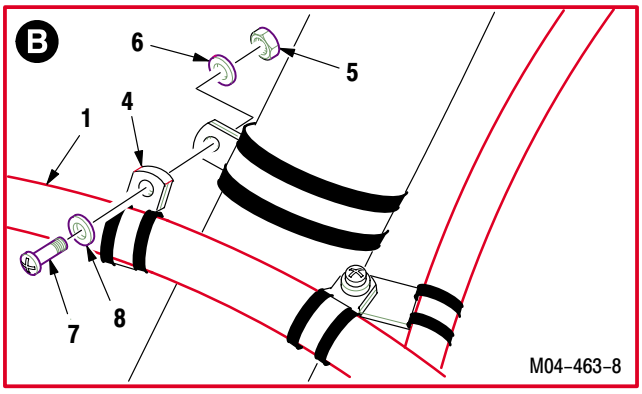


b. **Remove forward support clamp (4) from hose (1).**

(1) Remove nut (5) and washer (6).

(2) Remove screw (7) and washer (8).

(3) Remove clamp (4).



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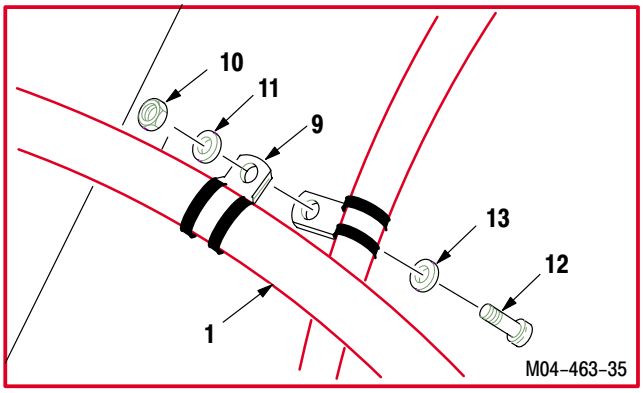
6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued

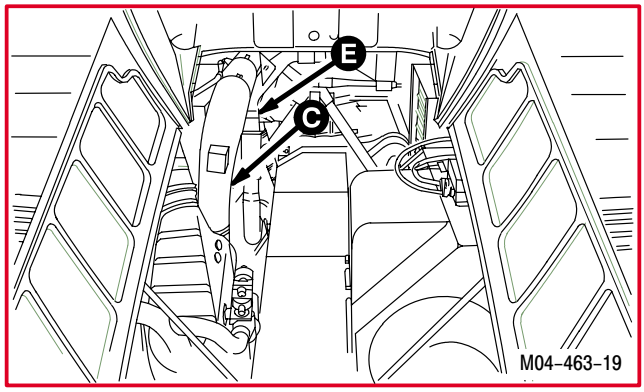
c. **Remove support clamp (9) from hose (1).**

(1) Remove nut (10) and washer (11).

(2) Remove screw (12) and washer (13).

(3) Remove clamp (9).





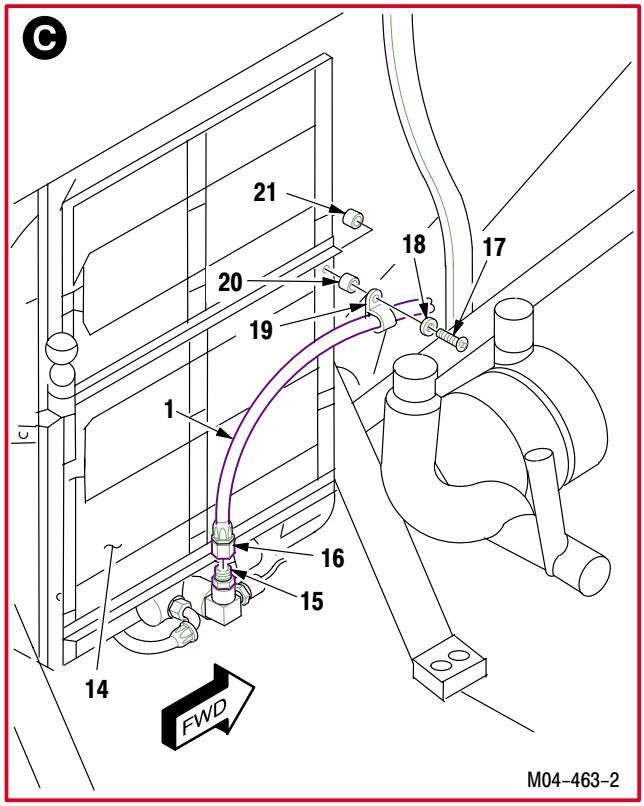
d. **Remove hose (1) from heat exchanger (14).**

(1) Hold union (15). Remove nut (16).

(2) Remove screw (17), washer (18), clamp (19), and spacers (20) and (21) from exchanger (14).

(3) Remove clamp (19) from hose (1).

(4) Remove hose (1).

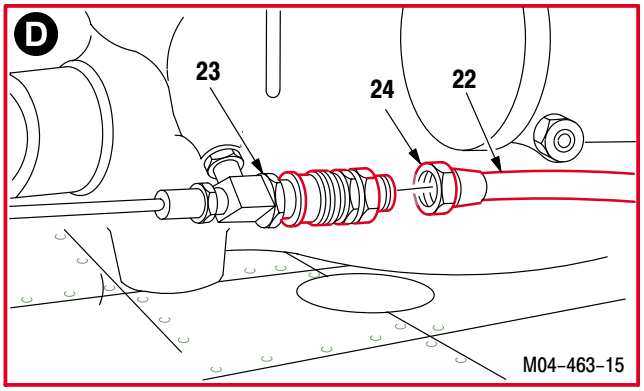


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6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued

e. **Remove oil hose (22) from main transmission coupling half (23).**

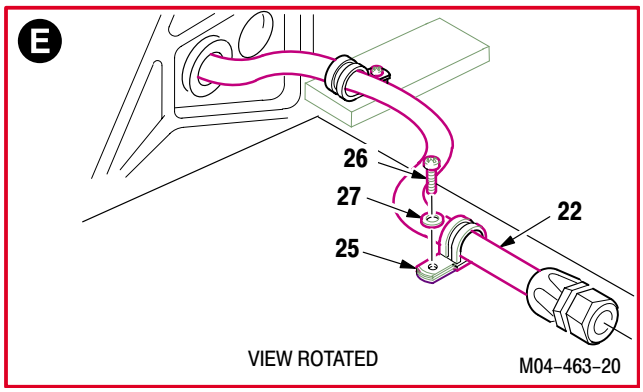
(1) Hold coupling half (23). Remove nut (24).



f. **Remove clamp (25) from hose (22).**

(1) Remove screw (26) and washer (27) from clamp (25).

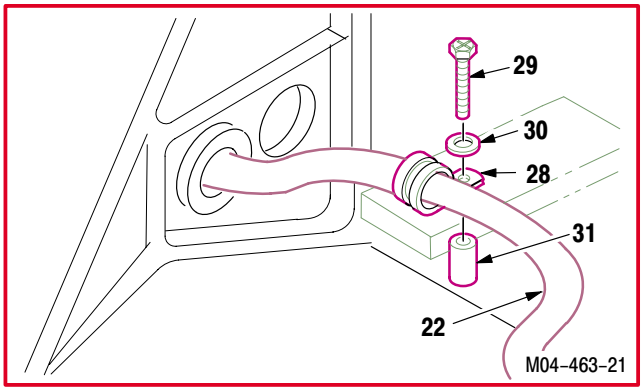
(2) Remove clamp (25).



g. **Remove clamp (28) from hose (22).**

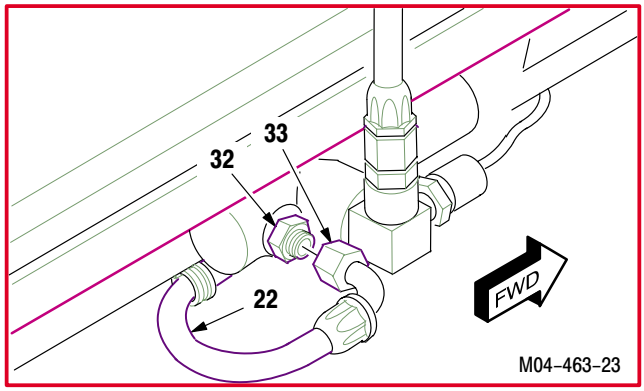
(1) Remove screw (29), washer (30), and spacer (31) from clamp (28).

(2) Remove clamp (28).



h. **Remove hose (22) from exchanger inlet union (32).**

(1) Hold union (32). Remove nut (33).



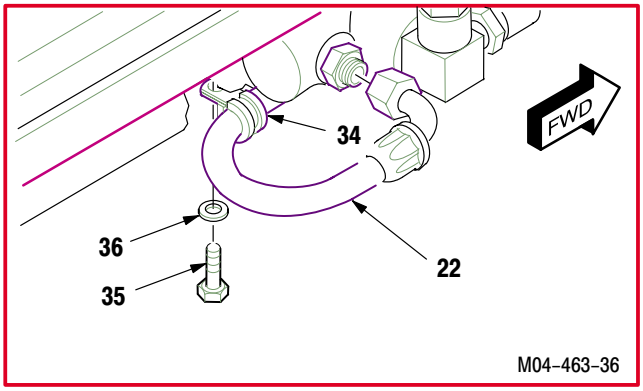
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6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued

i. **Remove clamp (34) from hose (22).**

(1) Remove screw (35) and washer (36) from clamp (34).

(2) Remove clamp (34).



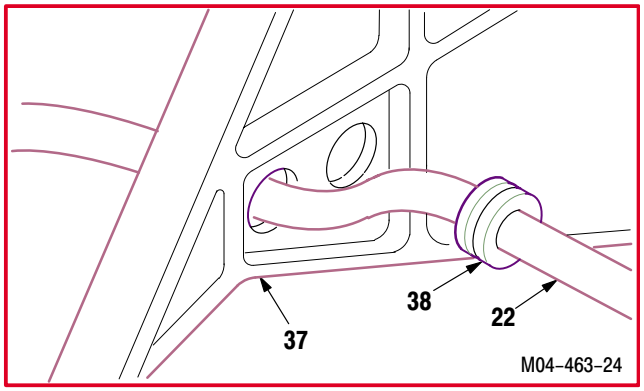
j. **Remove hose (22) from louver support (37).**

(1) Pull grommet (38) from support (37).

(2) Push hose (22) through support (37).

(3) Remove grommet (38) from hose (22).

(4) Remove hose (22).



6.81.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.81.5. Inspection

a. **Check check valve, coupling half, and unions for cracks.** None allowed.

b. **Check check valve, coupling half, and unions for corrosion** (para 1.49)**.**

c. **Check check valve, coupling half, and unions for stripped, crossed, or flattened threads.** None allowed.

d. **Check grommets and clamps for deterioration.** None allowed.

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6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued

6.81.6. Installation

CAUTION

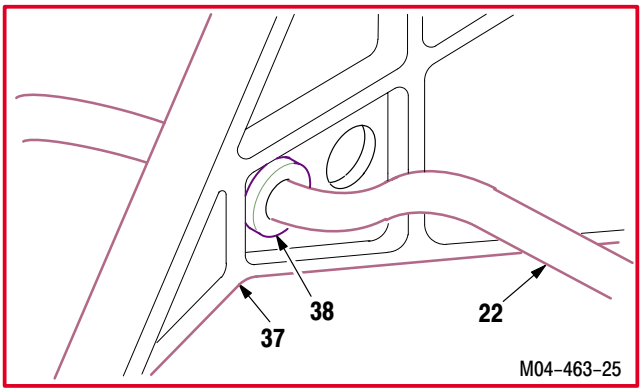
To prevent chaffing, install hose through inboard support hole.

a. **Install hose (22) in support (37).**

(1) Install grommet (38) on hose (22).

(2) Position hose (22) through inboard hole of support (37).

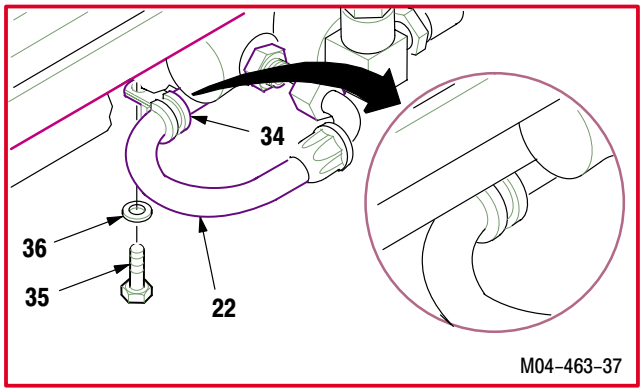
(3) Install grommet (38) in support (37).



b. **Install clamp (34) on hose (22).**

(1) Position clamp (34).

(2) Install screw (35) and washer (36) in clamp (34).



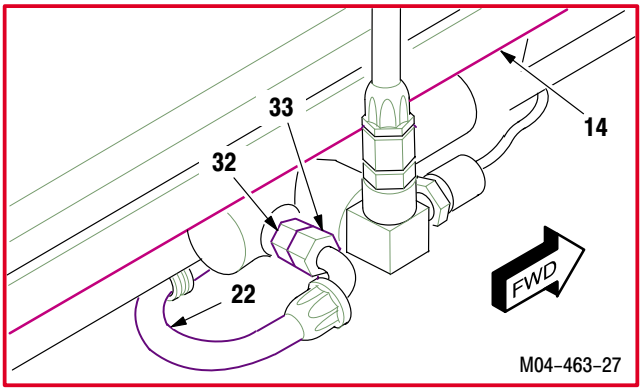
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6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued

c. **Install hose (22) on union (32).** Torque nut (33) to **245 INCH-POUNDS**.

(1) Install nut (33) on union (32).

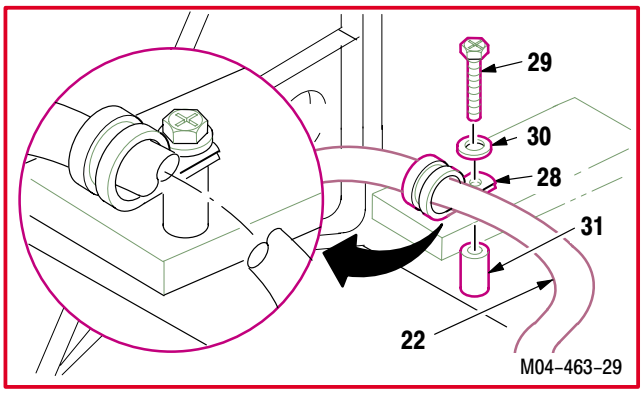
(2) Torque nut (33) to **245 INCH-POUNDS**. Use torque wrench and crowfoot.



d. **Install clamp (28) on hose (22).**

(1) Position clamp (28).

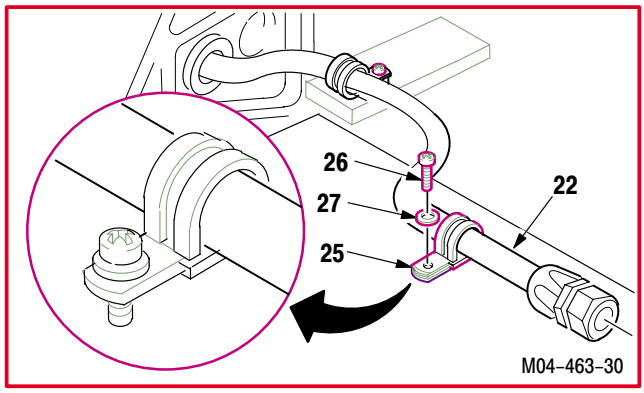
(2) Install screw (29) and washer (30) in clamp (28) and spacer (31).



e. **Install clamp (25) on hose (22).**

(1) Position clamp (25).

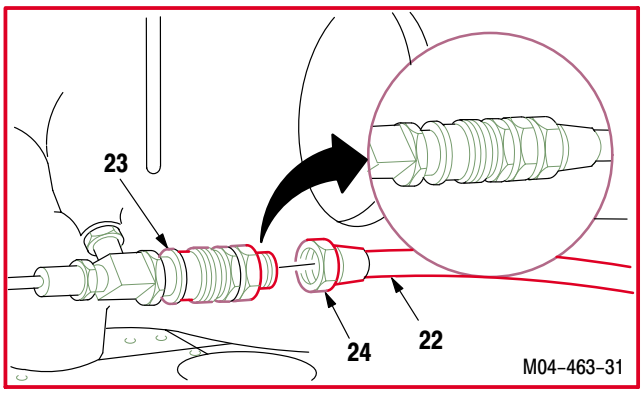
(2) Install screw (26) and washer (27) in clamp (25).



f. **Install hose (22) on coupling half (23).** Torque nut (24) to **245 INCH-POUNDS**.

(1) Hold coupling half (23). Install nut (24).

(2) Torque nut (24) to **245 INCH-POUNDS**. Use torque wrench and crowfoot.



GO TO NEXT PAGE

6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued

g. **Install hose (1) on exchanger (14).** Torque nut (16) to **345 INCH-POUNDS**.

(1) Position hose (1).

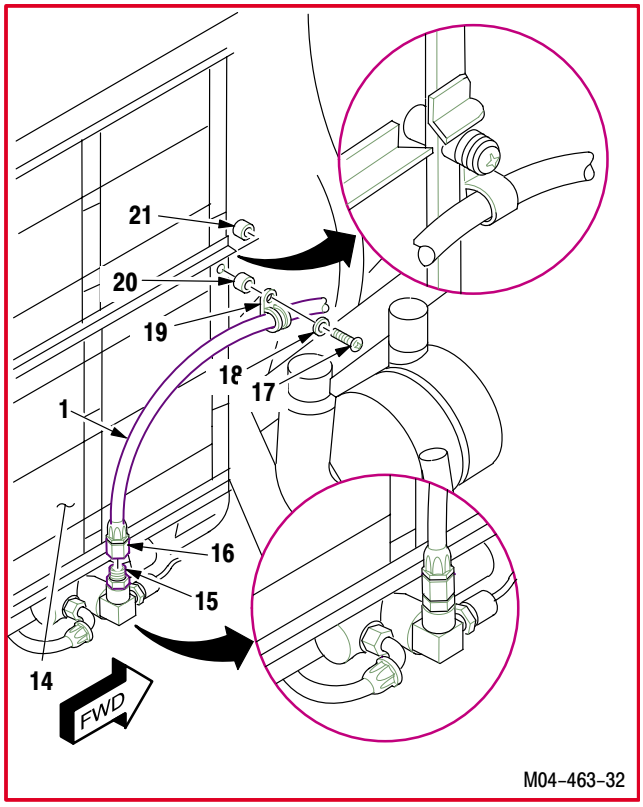
(2) Install clamp (19) on hose (1).

(3) Install screw (17) through washer (18), clamp (19), spacer (20), exchanger (14), and spacer (21).

(4) Position hose (1) on union (15).

(5) Hold union (15). Install nut (16).

(6) Torque nut (16) to **345 INCH-POUNDS**. Use torque wrench and crowfoot.

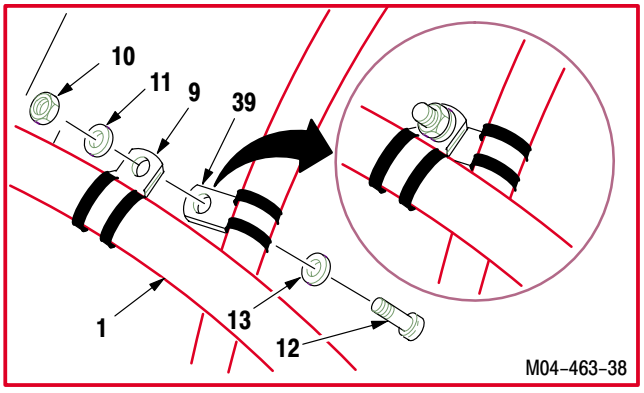


h. **Install clamp (9) on hose (1).**

(1) Position clamp (9).

(2) Install screw (12) through washer (13) and clamps (39) and (9).

(3) Install washer (11) and nut (10).

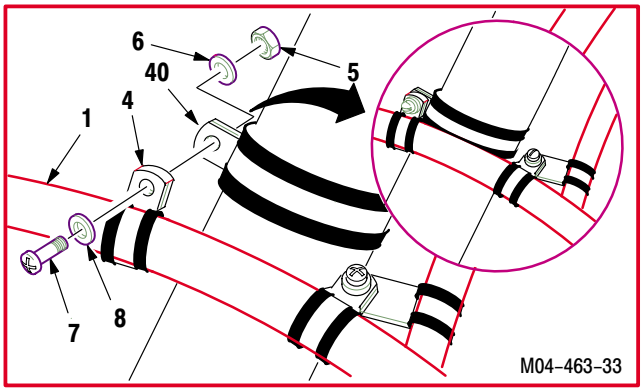


i. **Install clamp (4) on hose (1).**

(1) Position clamp (4).

(2) Install screw (7) through washer (8) and clamps (4) and (40).

(3) Install washer (6) and nut (5).



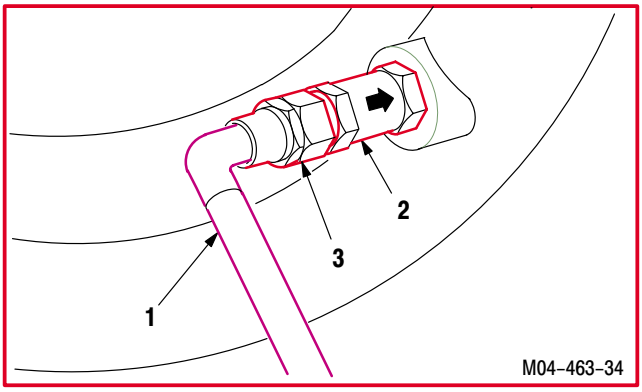
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6.81. MAIN TRANSMISSION LUBE SYSTEM HOSE (LEFT SIDE) REPLACEMENT – continued

j. **Install hose (1) on check valve (2).** Torque nut (3) to **345 INCH-POUNDS**.

(1) Hold check valve (2). Install nut (3).

(2) Torque nut (3) to **345 INCH-POUNDS**. Use torque wrench and crowfoot.



k. **Inspect (QA).**

l. **Service main transmission oil system** (para 1.32)**.**

m. **Perform drive system maintenance operational check** (TM 1-1520-238-T)**.**

n. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel L200** (para 2.2)**.**

END OF TASK

6.82. MAIN TRANSMISSION LUBE SYSTEM HOSE (RIGHT SIDE) REPLACEMENT

6.82.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.82.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
1 1/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 90, App H)
1 x 3/8-inch drive open end socket wrench crowfoot attachment (item 93, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel R200 removed
1.32	Main transmission oil system drained

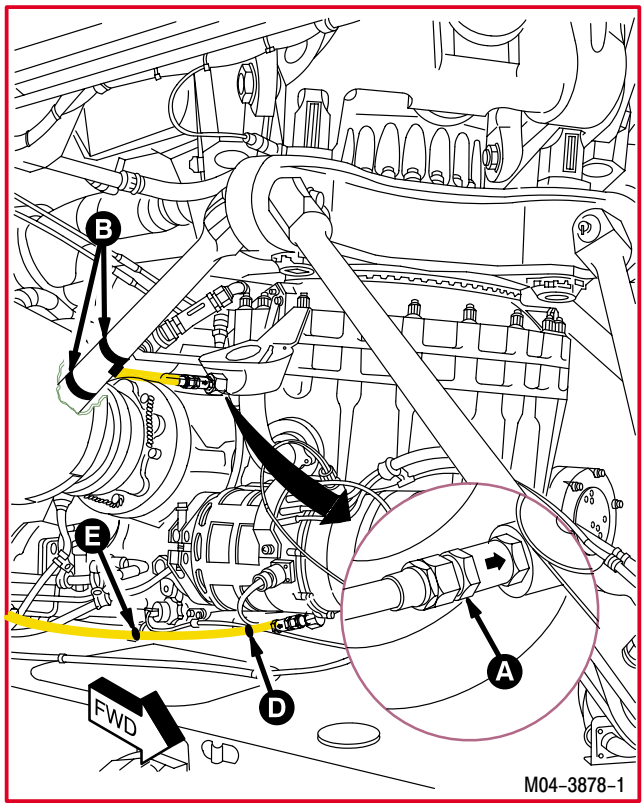
WARNING

FLIGHT SAFETY PART

The main transmission and heat exchanger are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

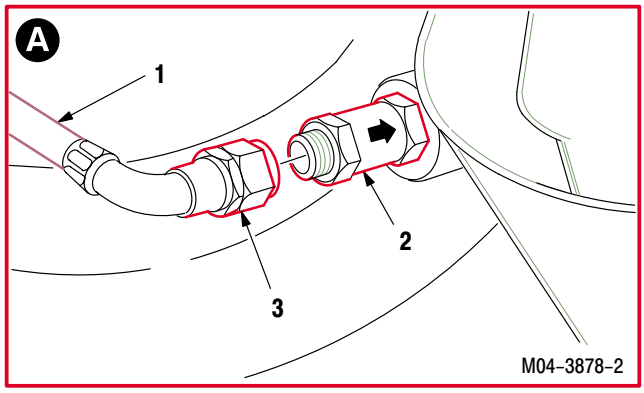
6.82. MAIN TRANSMISSION LUBE SYSTEM HOSE (RIGHT SIDE) REPLACEMENT – continued



6.82.3. Removal

a. **Remove oil hose (1) from main transmission oil inlet check valve (2).**

(1) Hold check valve (2). Remove nut (3).

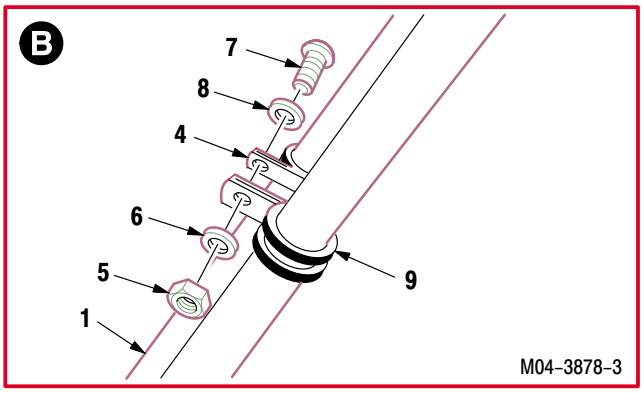


b. **Remove forward support clamp (4) from hose (1) (two places).**

(1) Remove nut (5) and washer (6) (two places).

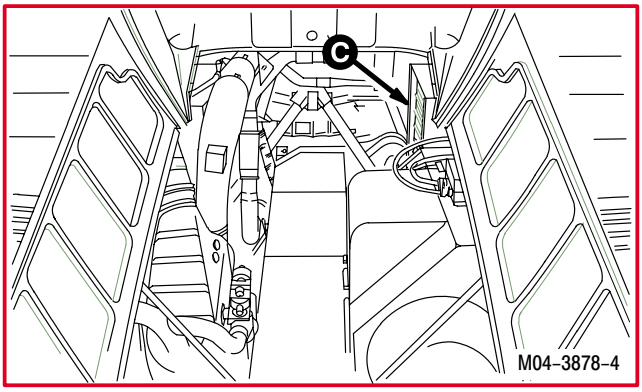
(2) Remove screw (7) and washer (8) from clamps (4) and (9) (two places).

(3) Remove clamp (4) (two places).



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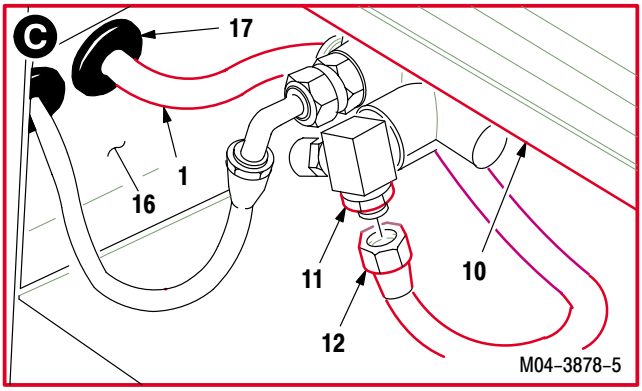
6.82. MAIN TRANSMISSION LUBE SYSTEM HOSE (RIGHT SIDE) REPLACEMENT – continued



c. **Remove hose (1) from heat exchanger (10).**

(1) Hold union (11). Remove nut (12).

(2) Remove hose (1).



d. **Remove louver support clamp (13) from hose (1).**

(1) Remove screw (14) and washer (15).

(2) Remove clamp (13).

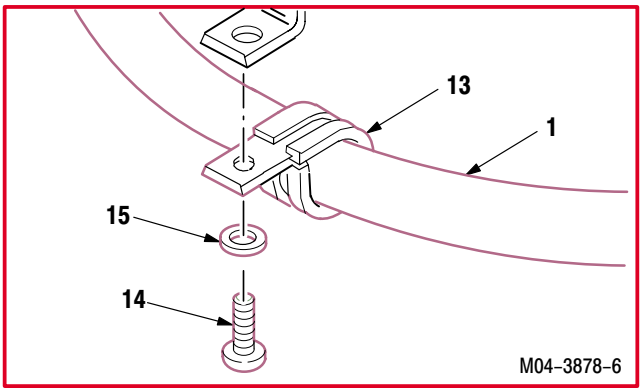
e. **Remove hose (1) from louver support (16).**

(1) Pull grommet (17) from support (16).

(2) Push hose (1) through support (16).

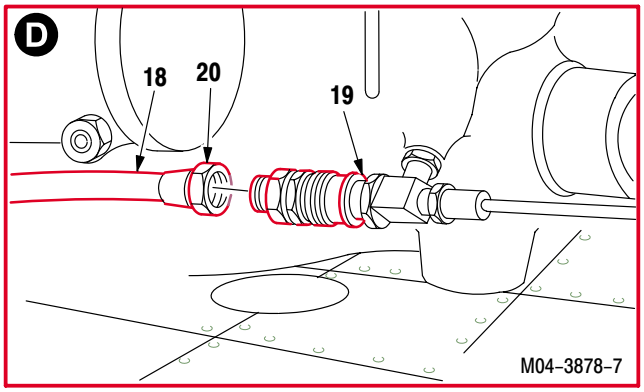
(3) Remove grommet (17) from hose (1).

(4) Remove hose (1).



f. **Remove oil hose (18) from main transmission outlet coupling half (19).**

(1) Hold coupling half (19). Remove nut (20).



GO TO NEXT PAGE

6.82. MAIN TRANSMISSION LUBE SYSTEM HOSE (RIGHT SIDE) REPLACEMENT – continued

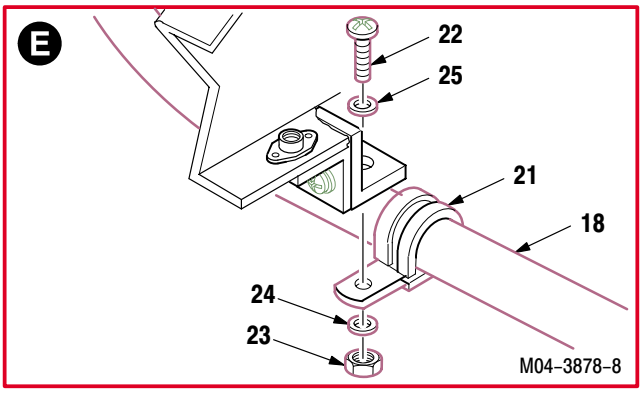
g. **Remove support clamp (21) from hose (18).**

(1) Hold screw (22).

(2) Remove nut (23) and washer (24) from clamp (21).

(3) Remove screw (22) and washer (25) from clamp (21).

(4) Remove clamp (21).



h. **Remove hose (18) from exchanger inlet union (26).**

(1) Hold union (26). Remove nut (27).

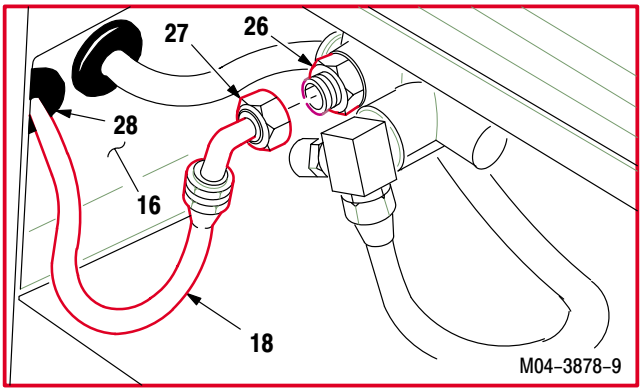
i. **Remove hose (18) from support (16).**

(1) Pull grommet (28) from support (16).

(2) Push hose (18) through support (16).

(3) Remove grommet (28) from hose (18).

(4) Remove hose (18).



6.82.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.82.5. Inspection

a. **Check check valve, coupling half, and unions for cracks.** None allowed.

b. **Check check valve, coupling half, and unions for corrosion** (para 1.49)**.**

c. **Check check valve, coupling half, and unions for stripped, crossed, or flattened threads.** None allowed.

d. **Check grommets and clamps for deterioration.** None allowed.

GO TO NEXT PAGE

6.82. MAIN TRANSMISSION LUBE SYSTEM HOSE (RIGHT SIDE) REPLACEMENT – continued

6.82.6. Installation

CAUTION

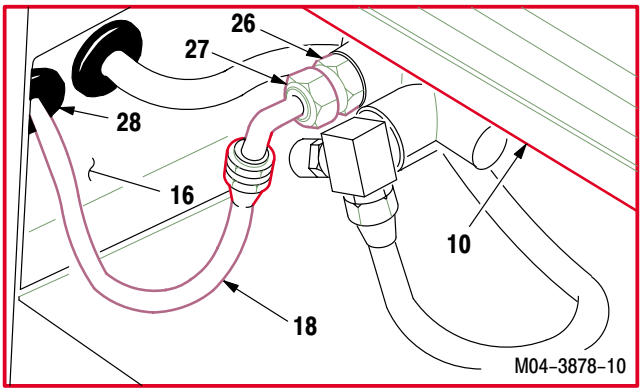
To prevent chafing, install hose (18) through inboard support hole.

a. **Install hose (18) in support (16).**

(1) Install grommet (28) on hose (18).

(2) Push hose (18) through inboard hole of support (16).

(3) Install grommet (28) in support (16).



b. **Install hose (18) on exchanger (10).** Torque nut (27) to **245 INCH-POUNDS**.

(1) Hand tighten nut (27) on union (26).

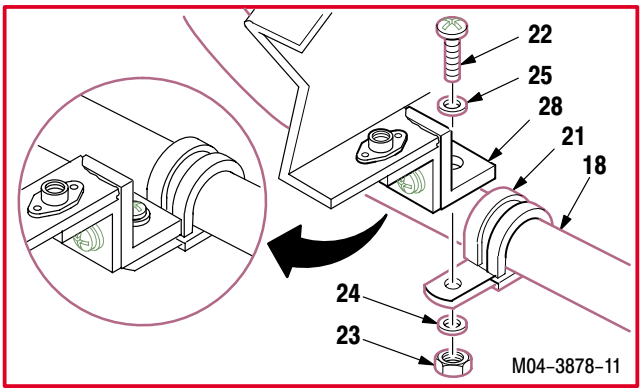
(2) Hold union (26). Torque nut (27) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.

c. **Install clamp (21) on hose (18).**

(1) Position clamp (21).

(2) Install screw (22) through washer (25), bracket (28), and clamp (21).

(3) Install washer (24) and nut (23).



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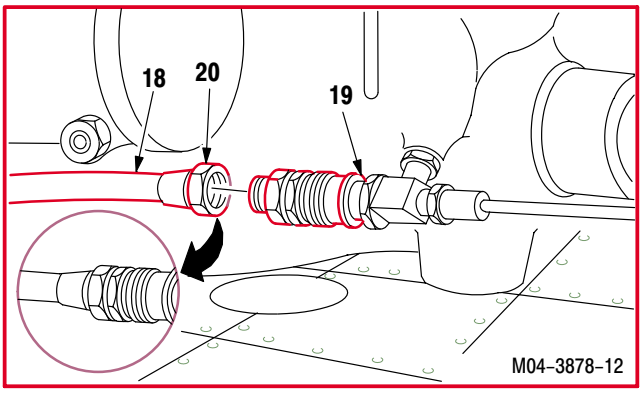
6.82. MAIN TRANSMISSION LUBE SYSTEM HOSE (RIGHT SIDE) REPLACEMENT – continued

d. **Install hose (18) on coupling half (19).** Torque nut (20) to **245 INCH-POUNDS**.

(1) Position hose (18) on coupling half (19).

(2) Hand tighten nut (20) on coupling half (19).

(3) Hold coupling half (19). Install nut (20). Torque nut (20) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.



CAUTION

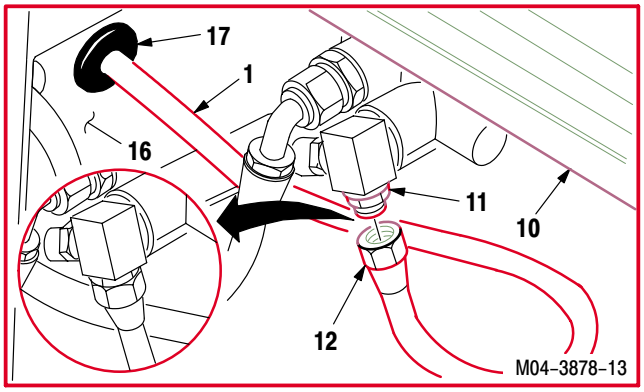
To prevent chafing, install hose through outboard louver support hole.

e. **Install hose (1) in support (16).**

(1) Install grommet (17) on hose (1).

(2) Push hose (1) through outboard hole of support (16).

(3) Install grommet (17) in support (16).



f. **Install clamp (13) on hose (1).**

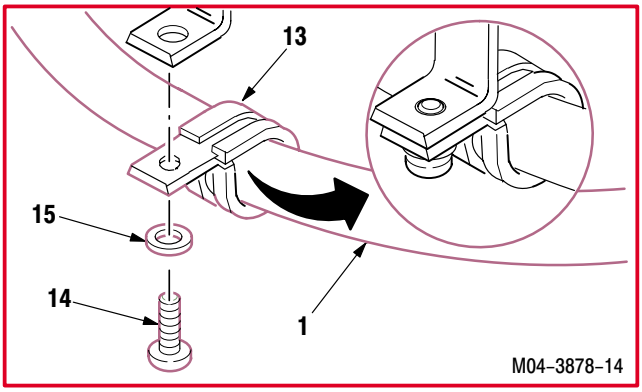
(1) Position clamp (13).

(2) Install screw (14) and washer (15) in clamp (13).

g. **Install hose (1) on exchanger (10).** Torque nut (12) to **345 INCH-POUNDS**.

(1) Hand tighten nut (12) on union (11).

(2) Torque nut (12) to **345 INCH-POUNDS**. Use torque wrench and crowfoot.



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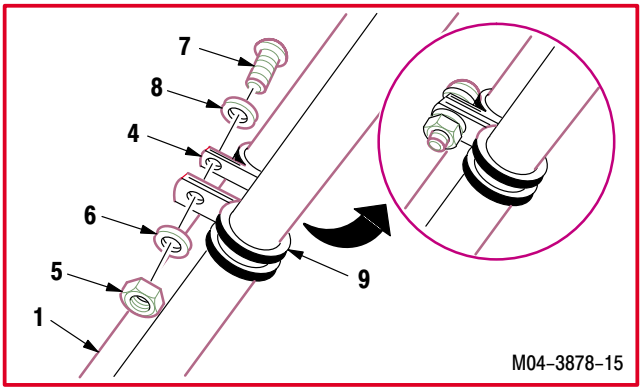
6.82. MAIN TRANSMISSION LUBE SYSTEM HOSE (RIGHT SIDE) REPLACEMENT – continued

h. **Install clamp (4) on hose (1) (two places).**

(1) Position clamp (4) (two places).

(2) Install screw (7) through washer (8), and clamps (4) and (9) (two places).

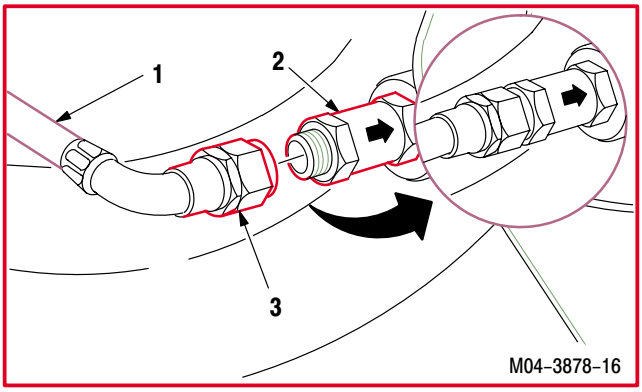
(3) Install washer (6) and nut (5) on screw (7) (two places).



i. **Install hose (1) on check valve (2).** Torque nut (3) to **345 INCH-POUNDS**.

(1) Hold check valve (2). Install nut (3).

(2) Torque nut (3) to **345 INCH-POUNDS**. Use torque wrench and crowfoot.



j. **Inspect (QA).**

k. **Service main transmission oil system** (para 1.32)**.**

l. **Perform drive system maintenance operational check** (TM 1-1520-238-T)**.**

m. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel R200** (para 2.2)**.**

END OF TASK

6.83. HEAT EXCHANGER BYPASS VALVE REPLACEMENT

6.83.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.83.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
15 - 75 foot-pound 3/8-inch drive click type torque wrench (item 440, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, L325, and R325 opened; panel L200 or R200 removed
1.32	Main transmission oil system drained

Materials/Parts:

Gasket
Lubricating oil (item 119, App F)
Wire (item 224, App F)

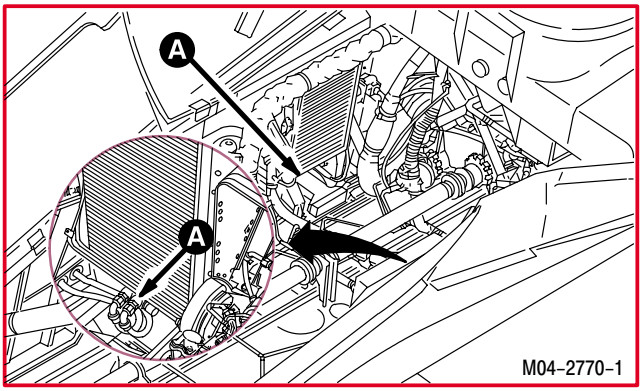
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right bypass valves.



GO TO NEXT PAGE

6.83. HEAT EXCHANGER BYPASS VALVE REPLACEMENT – continued

6.83.3. Removal



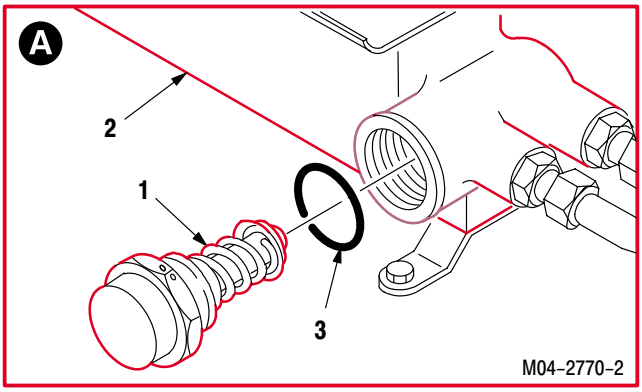
a. **Remove bypass valve (1) from heat exchanger (2).**

(1) Place rags under exchanger (2) to catch fluid spills.

(2) Remove lockwire from valve (1).

(3) Remove valve (1).

(4) Remove and discard gasket (3) from valve (1).



6.83.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

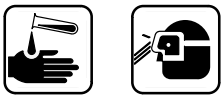
6.83.5. Inspection

a. **Check bypass valve and housing for nicks, dents, cracks, and stripped or damaged threads.** None allowed.

GO TO NEXT PAGE

6.83. HEAT EXCHANGER BYPASS VALVE REPLACEMENT – continued

6.83.6. Installation



a. **Install valve (1) in exchanger (2).** Torque valve (1) to **45 FOOT-POUNDS**.

(1) Lubricate new gasket (3). Use lubricating oil (item 119, App F).

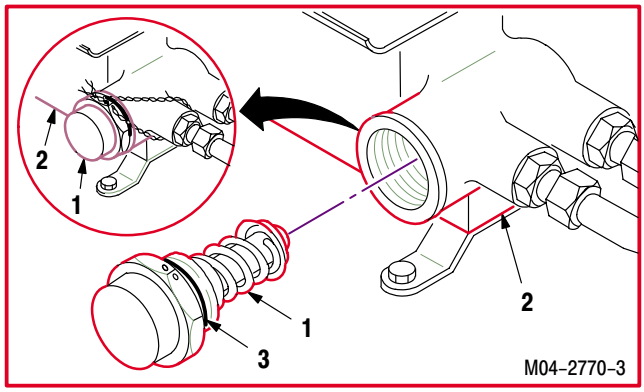
(2) Install gasket (3) on valve (1).

(3) Lubricate threads of valve (1). Use lubricating oil (item 119, App F).

(4) Install valve (1) in exchanger (2).

(5) Torque valve (1) to **45 FOOT-POUNDS**. Use torque wrench.

(6) Lockwire valve (1) to exchanger (2). Use wire (item 224, App F).



b. **Inspect (QA).**

c. **Service main transmission oil system** (para 1.32)**.**

d. **Perform pilot/CPG caution and warning system maintenance operational check** (TM 1-1520-238-T)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, L325, and R325; install panel L200 or R200** (para 2.2)**.**

END OF TASK

6.84. HEAT EXCHANGER PRESSURE TRANSDUCER REMOVAL/INSTALLATION

6.84.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.84.2. Initial Setup

Tools:

Electrical tool kit (item 378, App H)
3/8 x 1/4-inch drive socket wrench adapter (item 7, App H)
Light duty laboratory apron (item 27, App H)
11/16 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 70, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Contact (3)
Packing
Petrolatum (item 138, App F)
Wire (item 224, App F)

Personnel Required:

68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
1.32	Main transmission oil system drained

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right pressure transducers.

GO TO NEXT PAGE

6.84. HEAT EXCHANGER PRESSURE TRANSDUCER REMOVAL/INSTALLATION – continued

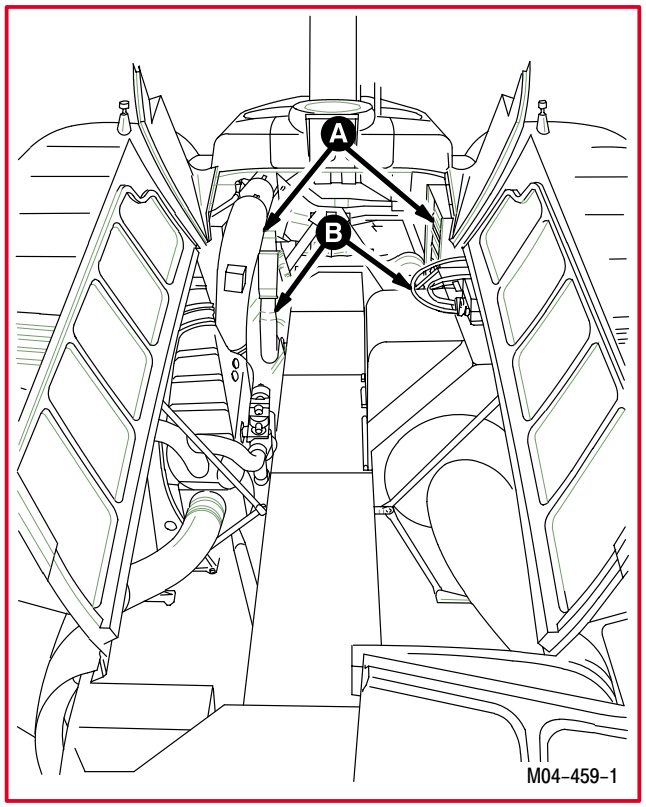
6.84.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open EMER BATT CAUT circuit breaker.**



e. **Detach connector P579 (1) from receptacle J579 (2) for left side.**

f. **Detach connector P578 (1) from receptacle J578 (2) for right side.**

g. **Identify and depin wires (3), (4), and (5) from connector (1)** (TM 55-1500-323-24)**.**

h. **Remove clamp (6).**

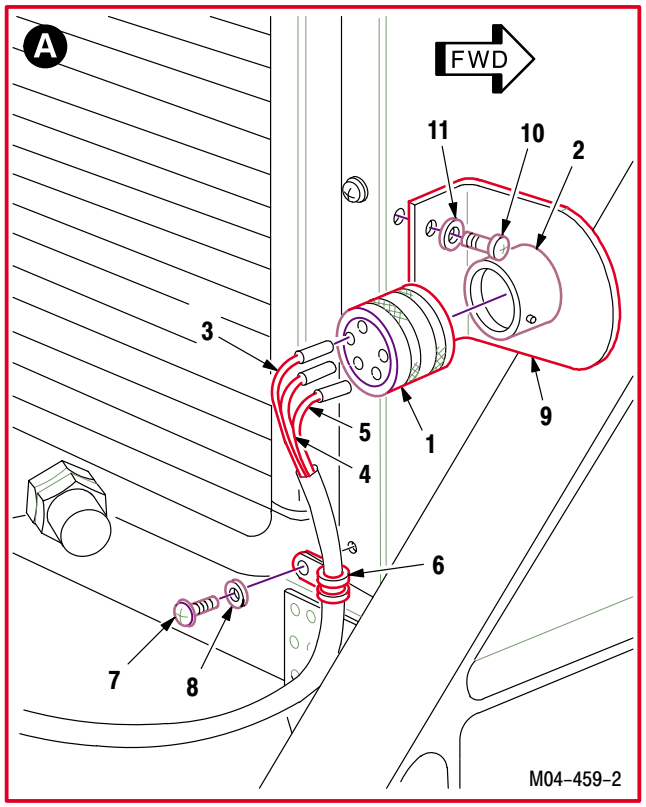
(1) Remove screw (7) and washer (8) from clamp (6).

(2) Remove clamp (6).

i. **Remove bracket (9).**

(1) Remove two screws (10) and washers (11).

(2) Remove bracket (9).



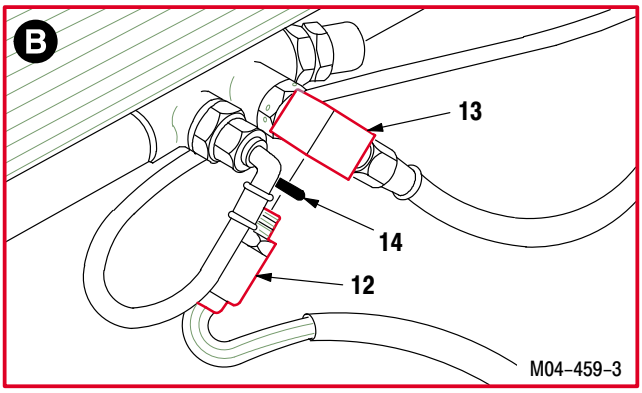
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6.84. HEAT EXCHANGER PRESSURE TRANSDUCER REMOVAL/INSTALLATION – continued

j. **Remove pressure transducer (12) from tee (13).**

(1) Remove transducer (12) from tee (13).

(2) Remove and discard packing (14) from transducer (12).



6.84.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.84.5. Inspection

a. **Check boss of tee for nicks, gouges, and stripped threads.** None allowed.

6.84.6. Installation



a. **Install transducer (12) on tee (13).** Torque transducer (12) to **20 INCH-POUNDS**.

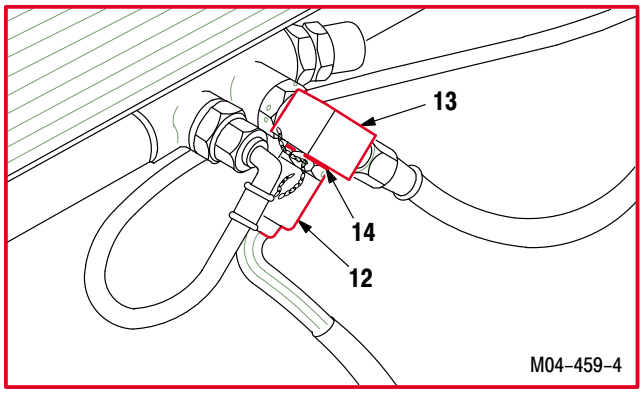
(1) Lubricate new packing (14). Use petrolatum (item 138, App F).

(2) Install packing (14) on transducer (12).

(3) Install transducer (12) on tee (13).

(4) Torque transducer (12) to **20 INCH-POUNDS**. Use crowfoot, adapter, and torque wrench.

(5) Lockwire transducer (12) to tee (13). Use wire (item 224, App F).



GO TO NEXT PAGE

6.84. HEAT EXCHANGER PRESSURE TRANSDUCER REMOVAL/INSTALLATION – continued

b. **Install bracket (9).**

(1) Install two screws (10) and washers (11).

c. **For transducer (12) replacement, install new contacts (15)** (TM 55-1500-323-24)**.**

(1) Cut wires (3), (4), and (5) to correct length.

(2) Install three new contacts (15) on wires (3), (4), and (5).

d. **Pin identified wires (3), (4), and (5) in connector (1)** (TM 55-1500-323-24)**.**

(1) Pin white wire (3) in connector hole 2.

(2) Pin black wire (4) in connector hole 3.

(3) Pin red wire (5) in connector hole 1.

e. **Attach connector P579 (1) to receptacle J579 (2) for left side.**

f. **Attach connector P578 (1) to receptacle J578 (2) for right side.**

g. **Install clamp (6) on wires (3), (4), and (5).**

(1) Position clamp (6) on wires (3), (4), and (5).

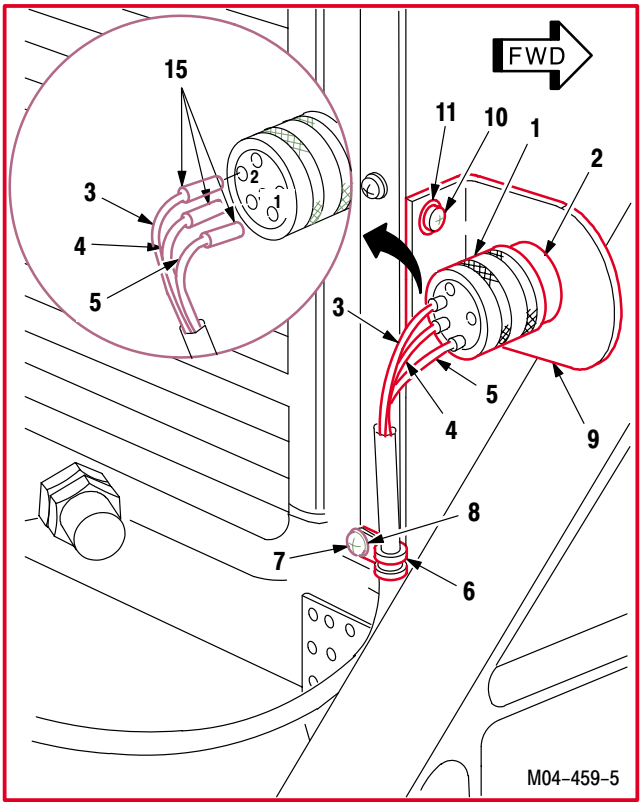
(2) Install screw (7) and washer (8).

h. **Inspect (QA).**

i. **Service main transmission oil system** (para 1.32)**.**

j. **Perform drive system maintenance operational check** (TM 1-1520-238-T)**.**

k. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

6.85. HEAT EXCHANGER REMOVAL

6.85.1. Description

This task covers: Removal. Cleaning. Inspection.

6.85.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel L200 or R200 removed
2.84	Forward catwalk removed
6.84	Heat exchanger pressure transducer removed
15.41	APU enclosure removed
6.16	No. 7 drive shaft removed (right heat exchanger only)
1.32	Main transmission oil system drained
12.29	Left engine firewall louver fire/overheat detector frame removed
12.31	Right engine firewall louver fire/overheat detector frame removed

WARNING

FLIGHT SAFETY PART

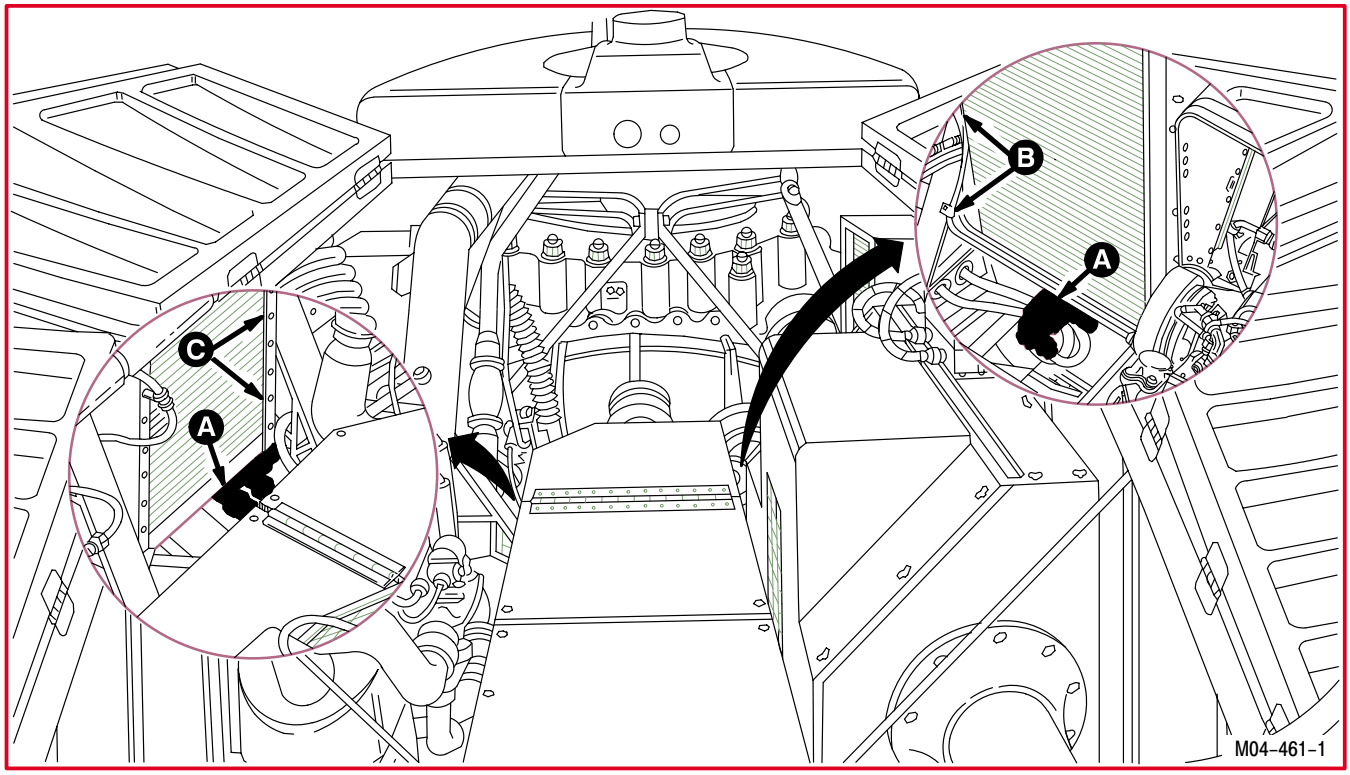
The main transmission and heat exchangers are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

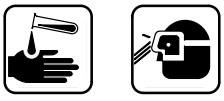
Except as specified, this task is typical for either left or right heat exchangers.

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6.85. HEAT EXCHANGER REMOVAL – continued



6.85.3. Removal

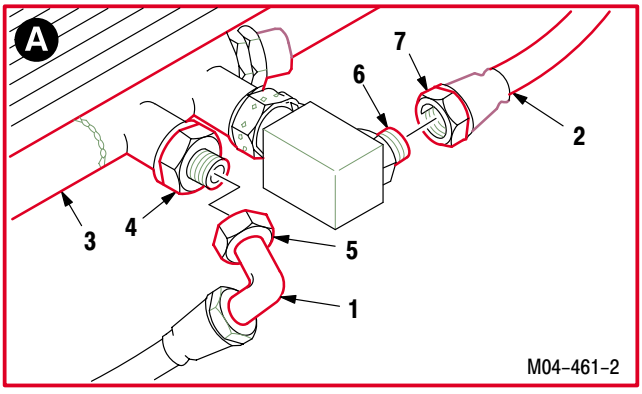


a. **Remove inlet hose (1) and outlet hose (2) from heat exchanger (3).**

(1) Place container under exchanger (3) ports to catch hydraulic oil.

(2) Hold union (4). Remove nut (5).

(3) Hold union (6). Remove nut (7).



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6.85. HEAT EXCHANGER REMOVAL – continued

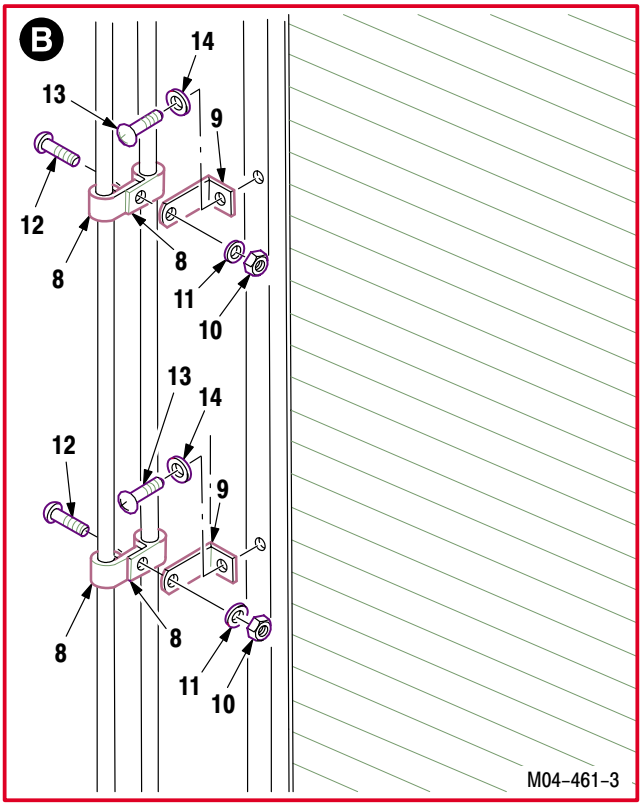
b. **For right heat exchanger removal, remove four clamps (8) and two brackets (9).**

(1) Remove two nuts (10) and washers (11).

(2) Remove two screws (12).

(3) Remove two screws (13) and washers (14).

(4) Remove two brackets (9).



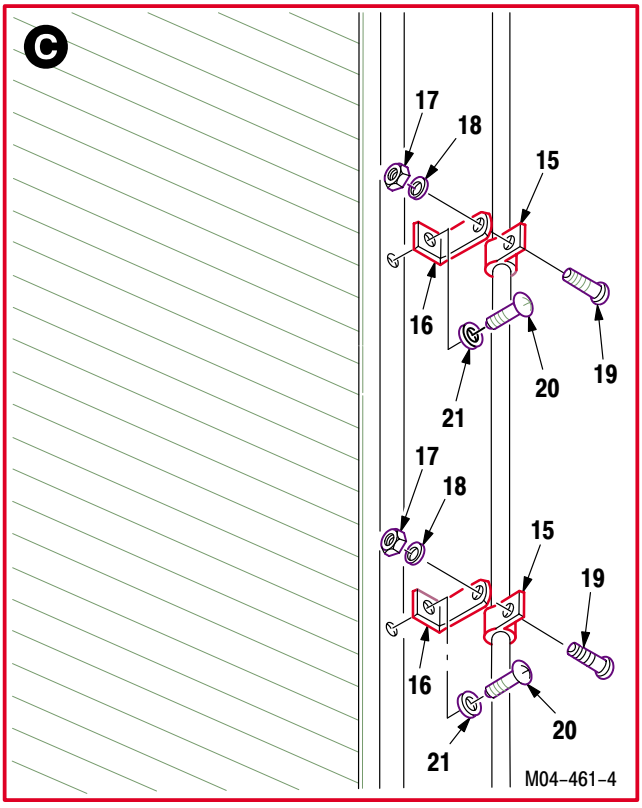
c. **For left heat exchanger removal, remove two clamps (15) and brackets (16).**

(1) Remove two nuts (17) and washers (18).

(2) Remove two screws (19).

(3) Remove two screws (20) and washers (21).

(4) Remove two brackets (16).



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6.85. HEAT EXCHANGER REMOVAL – continued

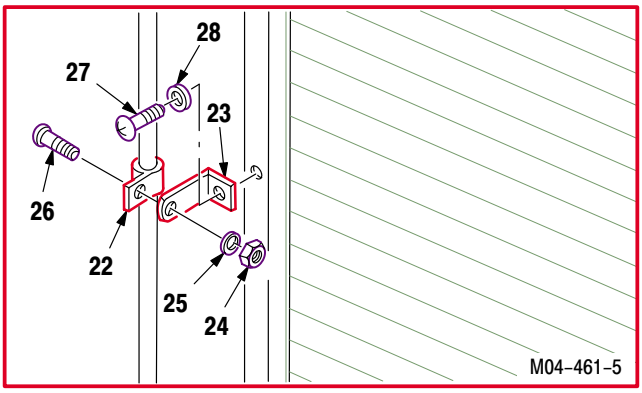
d. **For left heat exchanger removal, remove clamp (22) and bracket (23).**

(1) Remove nut (24) and washer (25).

(2) Remove screw (26).

(3) Remove screw (27) and washer (28).

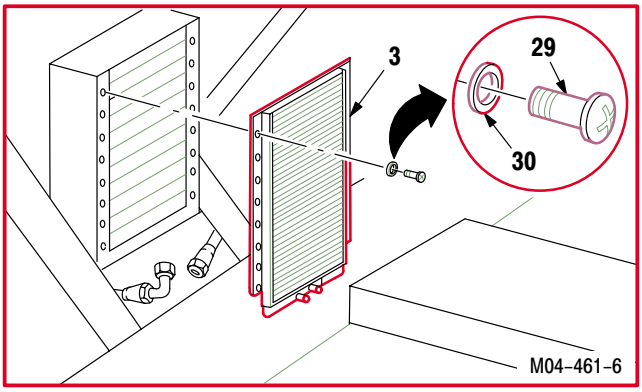
(4) Remove clamp (22) and bracket (23).



e. **Remove exchanger (3).**

(1) Remove 16 screws (29) and washers (30).

(2) Tilt exchanger (3) forward from top and lift out.



f. **For exchanger (3) replacement, remove union (4).**

(1) Remove and discard packing (31) from union (4).

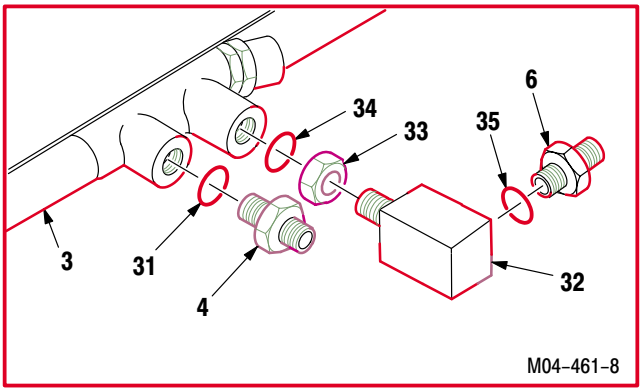
g. **For exchanger (3) replacement, remove tee (32).**

(1) Loosen jam nut (33). Remove tee (32).

(2) Remove and discard packing (34) from tee (32).

(3) Remove jam nut (33) and union (6) from tee (32).

(4) Remove and discard packing (35) from union (6).



6.85.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

6.85.5. Inspection

a. **Check mounting area of tee and union for cracks.** None allowed.

END OF TASK

6.86. HEAT EXCHANGER INSTALLATION

6.86.1. Description

This task covers: Installation.

6.86.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 90, App H)
1 x 3/8-inch drive open end socket wrench crowfoot attachment (item 93, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packings (2)
Lubricating oil (item 118, App F) or
Lubricating oil (item 119, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

WARNING

FLIGHT SAFETY PART

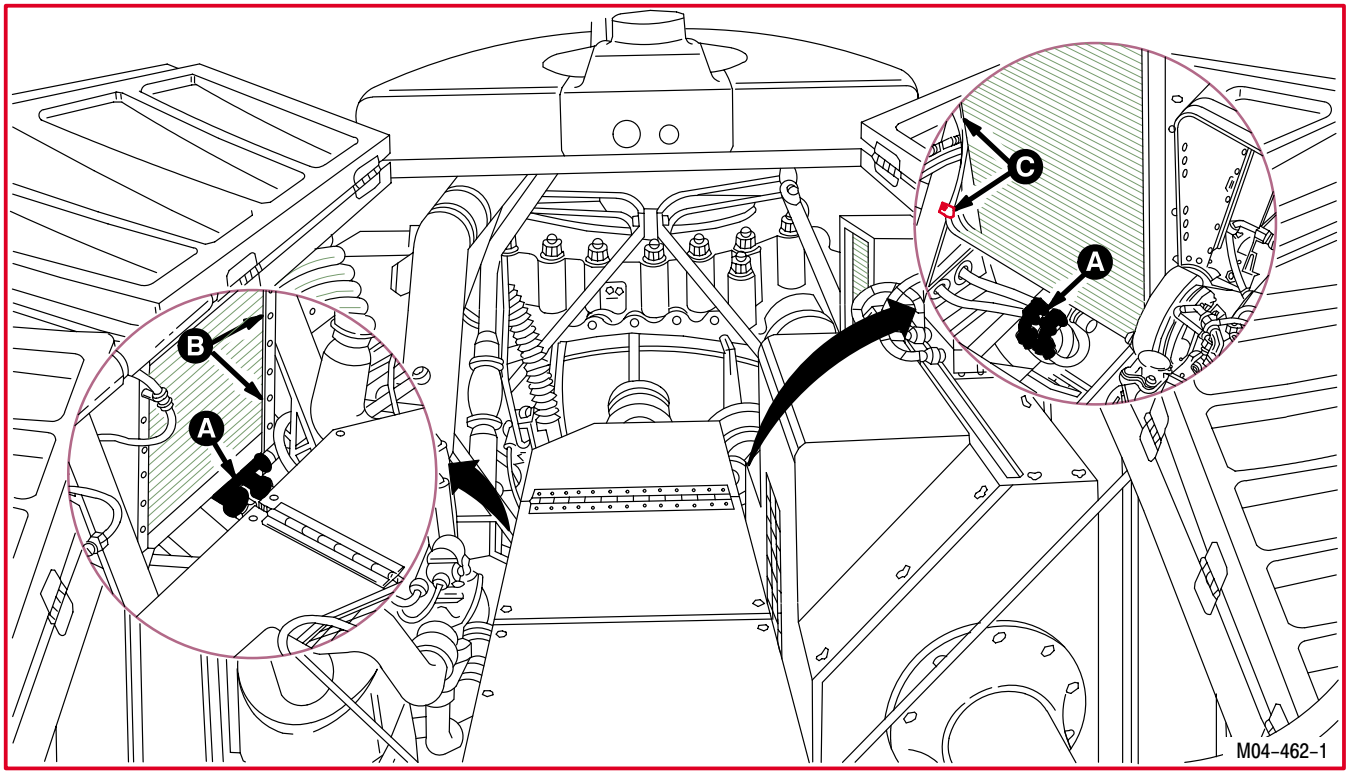
The main transmission and heat exchangers are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

Except as specified, this task is typical for either left or right heat exchangers.

GO TO NEXT PAGE

6.86. HEAT EXCHANGER INSTALLATION – continued



GO TO NEXT PAGE

6.86. HEAT EXCHANGER INSTALLATION – continued

6.86.3. Installation



a. **Install tee (1) on heat exchanger (2).** Torque union (6) to **245 INCH-POUNDS**. Torque jam nut (3) to **345 INCH-POUNDS**.

(1) Lubricate new packings (4) and (5). Use lubricating oil (item 118, App F) or lubricating oil (item 119, App F).

(2) Install packing (4) on union (6).

(3) Install union (6) in tee (1).

(4) Torque union (6) to **245 INCH-POUNDS**. Use torque wrench.

(5) Hand tighten jam nut (3) on tee (1).

(6) Install packing (5) on tee (1).

(7) Install tee (1) in heat exchanger **OUT** boss (7).

NOTE

For left exchanger, position tee so that union points up. For right exchanger, position tee so that union points aft and down.

(8) Torque jam nut (3) to **345 INCH-POUNDS**. Use torque wrench and crowfoot.

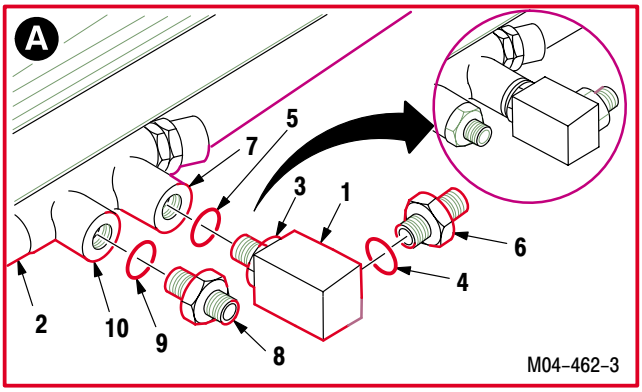
b. **Install union (8) on exchanger (2).** Torque union (8) to **245 INCH-POUNDS**.

(1) Lubricate new packing (9). Use lubricating oil (item 118, App F) or lubricating oil (item 119, App F).

(2) Install packing (9) on union (8).

(3) Install union (8) in heat exchanger **IN** boss (10).

(4) Torque union (8) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.



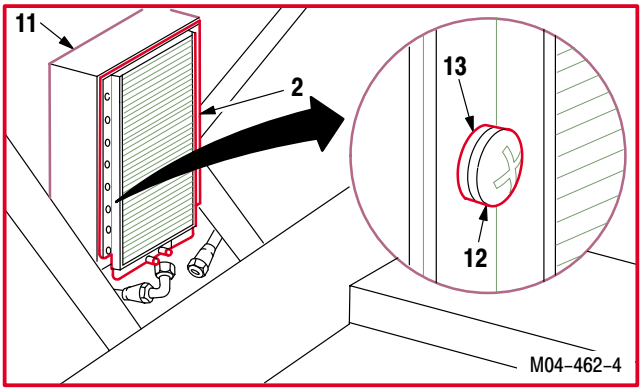
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6.86. HEAT EXCHANGER INSTALLATION – continued

c. **Install exchanger (2).**

(1) Position exchanger (2) over transmission cooling louvers (11).

(2) Install 16 screws (12) and washers (13).



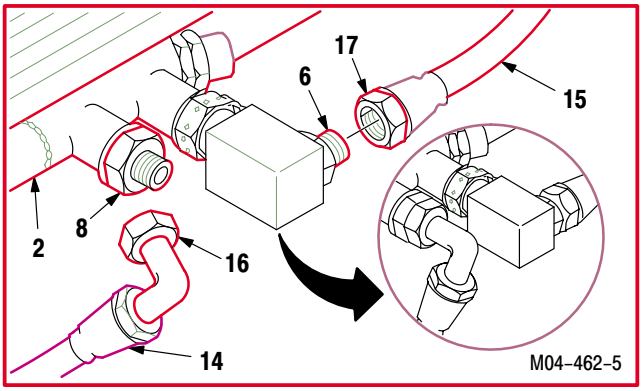
d. **Install inlet hose (14) and outlet hose (15) on exchanger (2).** Torque nut (16) to **245 INCH-POUNDS**. Torque nut (17) to **345 INCH-POUNDS**.

(1) Hold union (8). Install nut (16).

(2) Torque nut (16) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Hold union (6). Install nut (17).

(4) Torque nut (17) to **345 INCH- POUNDS**. Use crowfoot and torque wrench.



NOTE

To install left exchanger, perform steps e, f, and h. For right exchanger, perform step g.

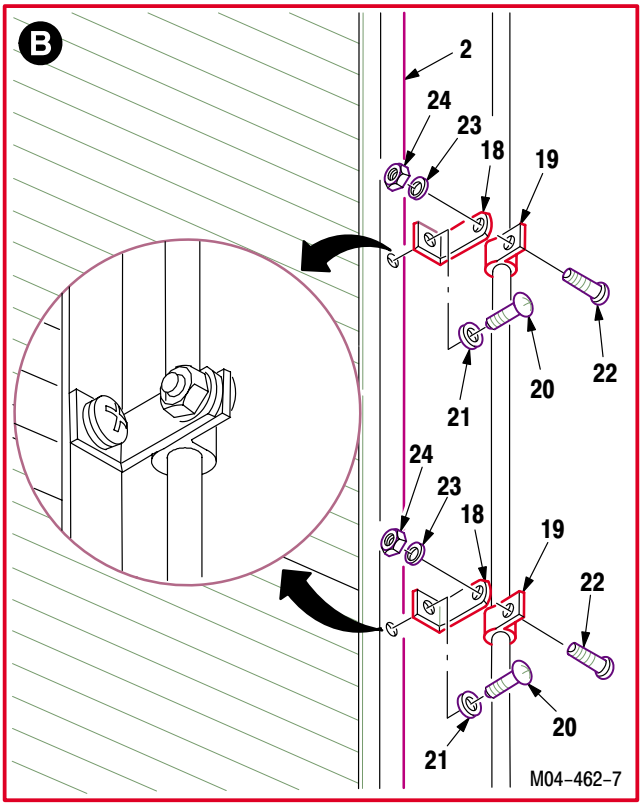
e. **For left exchanger (2) installation, install two brackets (18) and clamps (19).**

(1) Aline two brackets (18) on fourth hole from top and second hole from bottom on exchanger (2).

(2) Install two screws (20) and washers (21).

(3) Install two screws (22) through clamps (19) and brackets (18).

(4) Install two washers (23) and nuts (24).



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6.86. HEAT EXCHANGER INSTALLATION – continued

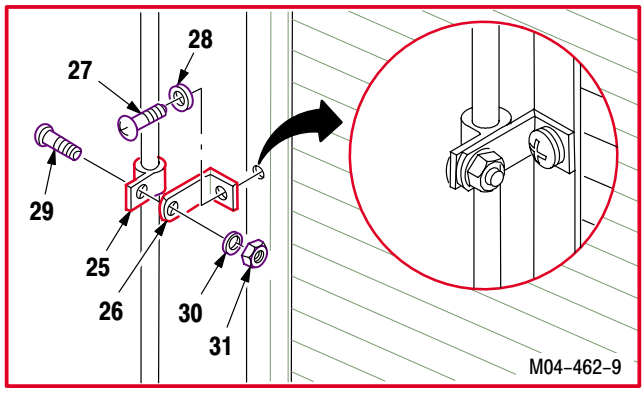
f. **Install clamp (25) and bracket (26).**

(1) Position bracket (26) in place.

(2) Install screw (27) and washer (28).

(3) Install screw (29) through clamp (25) and bracket (26).

(4) Install washer (30) and nut (31).



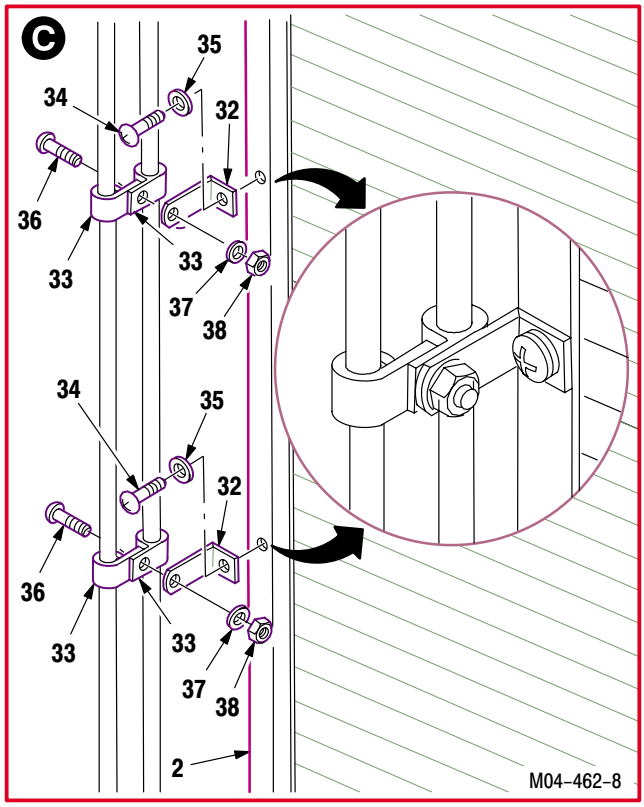
g. **For right exchanger installation, install two brackets (32) and four clamps (33).**

(1) Aline two brackets (32) on fourth hole from top and second hole from bottom of exchanger (2).

(2) Install two screws (34) and washers (35).

(3) Install two screws (36) through four clamps (33) and two brackets (32).

(4) Install two washers (37) and nuts (38).



h. **Inspect (QA).**

i. **Install pressure transducer** (para 6.84)**.**

j. **Install left engine firewall louver fire/overheat detector frame** (para 12.26)**.**

k. **Install right engine firewall louver fire/overheat detector frame** (para 12.31)**.**

l. **Install No. 7 driveshaft** (para 6.16)**.**

m. **Install forward catwalk** (para 2.84)**.**

n. **Service main transmission oil system** (para 1.32)**.**

o. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

p. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panels L200 and R200** (para 2.2)**.**

END OF TASK

6.87. MAIN TRANSMISSION OIL DRAIN TUBES REMOVAL/INSTALLATION

6.87.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

6.87.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

TM 1-1500-204-23
TM 9-1090-208-23-1

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panels L200 and R200 removed
2.84	Forward catwalk panel folded back
TM 9-1090-208-23-1	Ammunition storage magazine removed

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

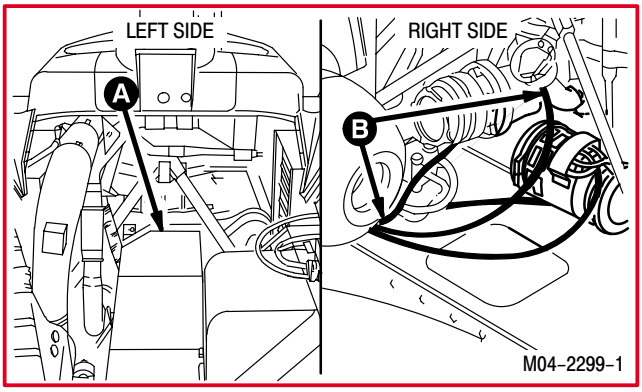
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

- Main transmission oil filler neck drain tube is on right side.
- Tail rotor output shaft seal retainer drain tube is on left side.
- Each drain tube is in three sections which can be removed or installed separately.
- Task is typical for either left or right side tube sections.

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6.87. MAIN TRANSMISSION OIL DRAIN TUBES REMOVAL/INSTALLATION – continued



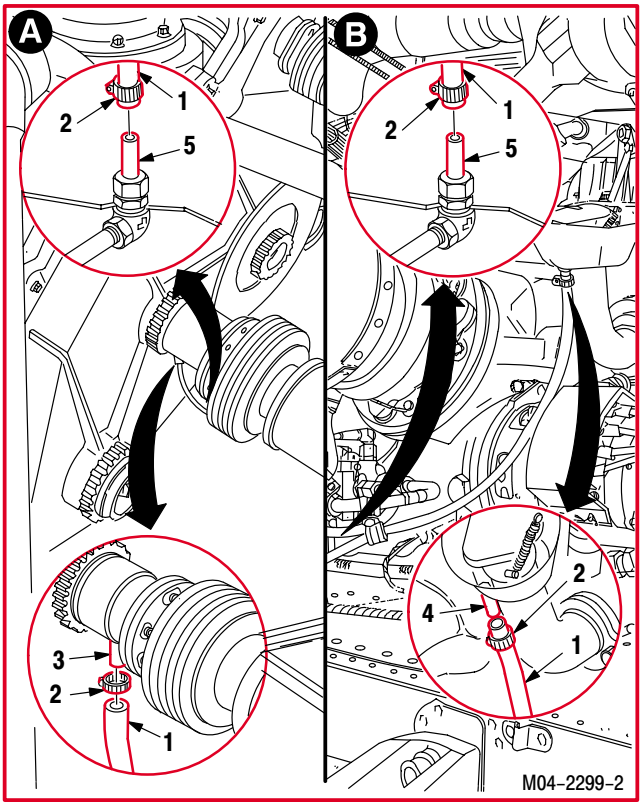
6.87.3. Removal

a. **Remove drain tube upper section (1).**

(1) Loosen two clamps (2).

(2) Remove tube section (1) from seal retainer drain tube (3) or oil filler neck drain tube (4).

(3) Remove lower end of tube section (1) from deck tube (5).



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6.87. MAIN TRANSMISSION OIL DRAIN TUBES REMOVAL/INSTALLATION – continued

b. **Remove drain tube section (6).**

(1) Remove screw (7) and spacer (8) from lower clamp (9) and clip (10).

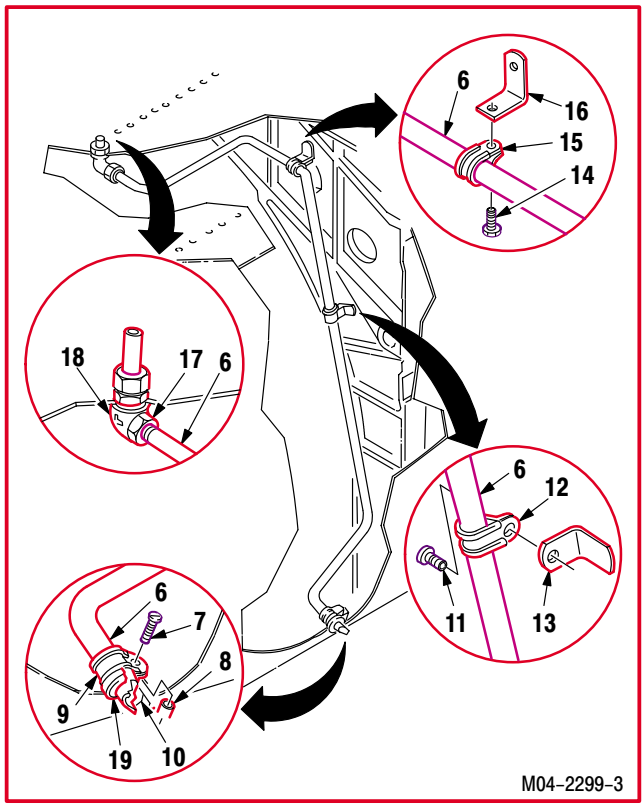
(2) Remove screw (11) from center clamp (12) and clip (13).

(3) Remove screw (14) from top clamp (15) and clip (16).

(4) Remove tube nut (17) from elbow (18).

(5) Remove tube section (6) from grommet (19).

(6) Remove three clamps (9), (12), and (15) from tube section (6).



6.87.4. Cleaning

a. **Wipe elbow, oil filler neck tube, seal retainer tube, drain tube upper section, and lower section with a clean rag.**

6.87.5. Inspection

a. **Check elbow for stripped threads, nicks, and gouges.** None allowed.

b. **Check drain tube upper section and lower section for hardness, bends, and cracks.** None allowed.

c. **Check deck tube for looseness and bends.** None allowed.

d. **Check oil filler neck tube and seal retainer tube for cracks or bends.** None allowed.

e. **Check grommet and clamps for hardness and cracks.** None allowed.

6.87.6. Repair

a. **Repair drain tubes using a tube cinch sleeve and coupling nut** (TM 1-1500-204-23)**.**

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6.87. MAIN TRANSMISSION OIL DRAIN TUBES REMOVAL/INSTALLATION – continued

6.87.7. Installation

a. **Install drain tube lower section (6).**

(1) Place three clamps (9), (12), and (15) on tube section (6).

(2) Install tube section (6) through grommet (19).

(3) Aline tube section (6) with elbow (18).

(4) Install tube nut (17). Do not tighten.

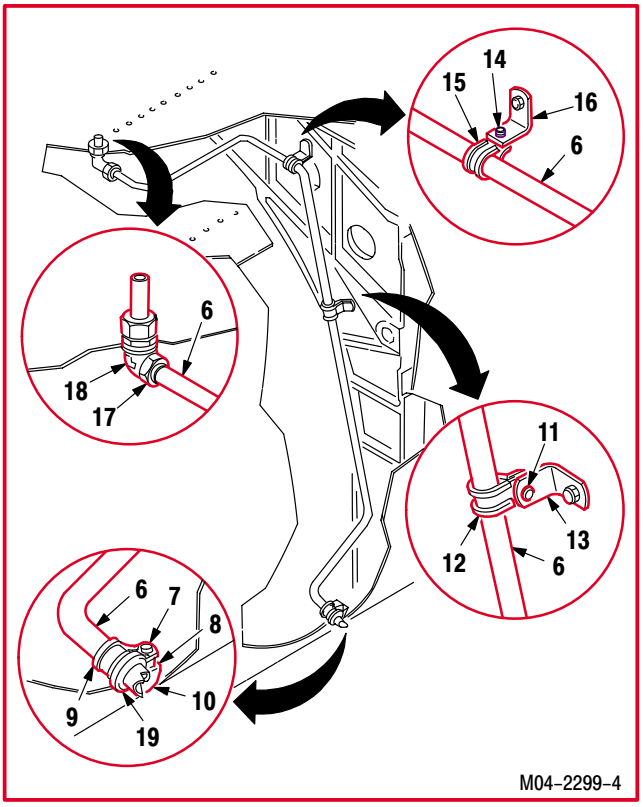
(5) Position spacer (8) between lower clamp (9) and clip (10).

(6) Install screw (7).

(7) Position top clamp (15) on clip (16). Install screw (14).

(8) Position center clamp (12) on clip (13). Install screw (11).

(9) Hold elbow (18). Tighten tube nut (17).



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6.87. MAIN TRANSMISSION OIL DRAIN TUBES REMOVAL/INSTALLATION – continued

b. **Install drain tube upper section.**

(1) Place two clamps (2) on tube section (1).

(2) Install lower end of tube section (1) on deck tube (5).

(3) Install upper end of tube section (1) on seal retainer tube (3) (left side) or oil filler neck tube (4) (right side).

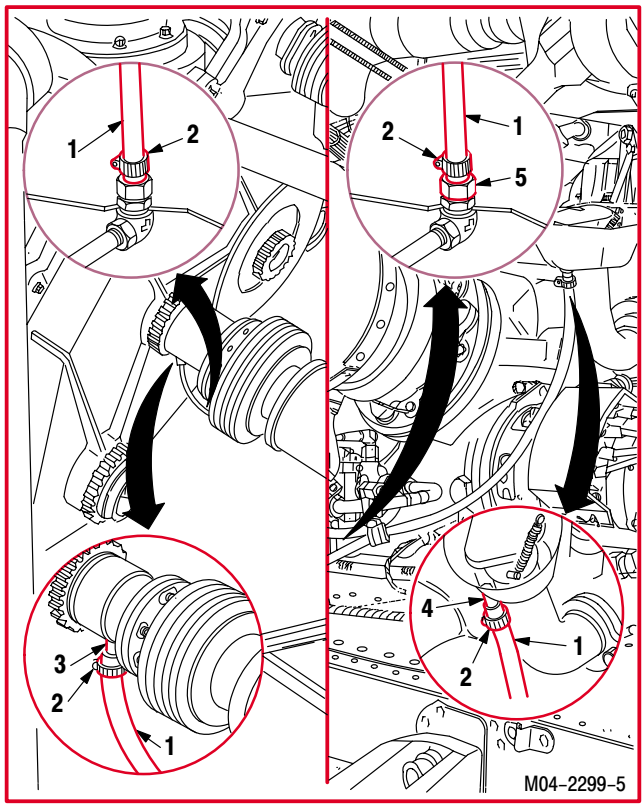
(4) Install two clamps (2).

c. **Install (QA).**

d. **Secure forward catwalk section** (para 2.84)**.**

e. **Install ammunition storage magazine** (TM 9-1090-208-23-1)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panels L200 and R200** (para 2.2)**.**



END OF TASK

6.88. QUILL HOUSING/HYDRAULIC PUMP SEAL DRAIN TUBE REMOVAL/INSTALLATION

6.88.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

6.88.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

TM 1-1500-204-23
TM 9-1090-208-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panels L200 and R200 removed
TM 9-1090-208-23	Ammunition storage magazine removed

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

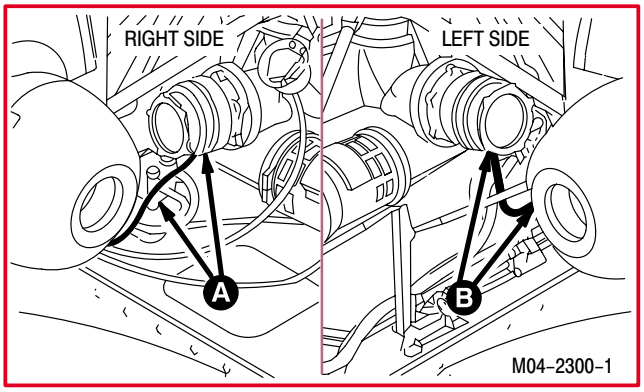
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

- Input quill housing drain tube is in three sections which can be removed or installed separately.
- Hydraulic pump seal drain tube is in two sections which can be removed or installed separately.
- Lower section (below deck) of drain tube is common to both.
- Task is typical for either left and right side.



GO TO NEXT PAGE

6.88. QUILL HOUSING/HYDRAULIC PUMP SEAL DRAIN TUBE REMOVAL/INSTALLATION – continued

6.88.3. Removal

a. **Remove quill housing drain tube (1).**

(1) Loosen two clamps (2).

(2) Remove quill tube (1).

(3) Remove two clamps (2) from quill tube (1).

b. **Remove clamp (3) from main transmission return oil line (left side).**

(1) Remove bolt (4) and washer (5).

(2) Remove clamp (3) and spacer (6).

c. **Remove tube (7) from tee (8).**

(1) Hold tee (8). Remove nut (9).

d. **Remove hydraulic pump seal drain tube (10).**

(1) Hold union (11). Remove nut (12).

(2) Hold tee (8). Remove nut (13).

e. **Remove drain tube lower section (14).**

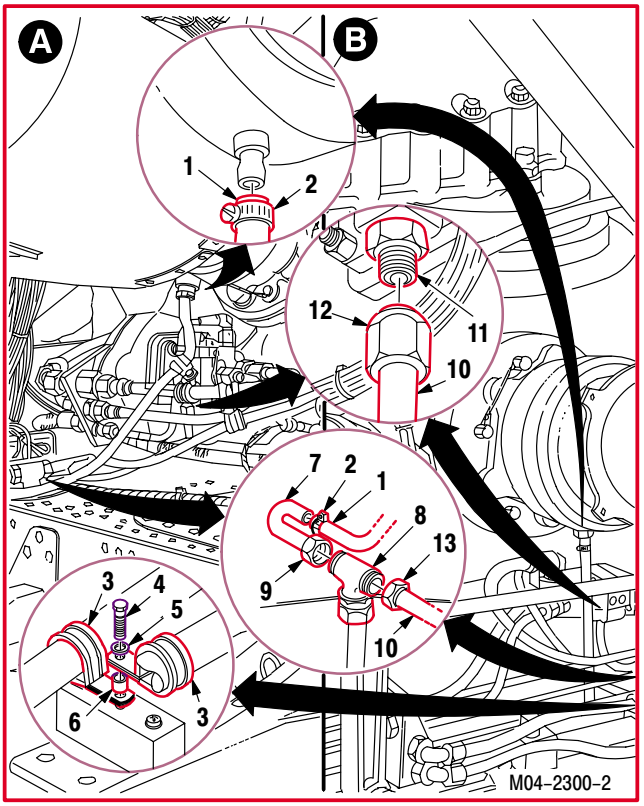
(1) Remove screw (15) and spacer (16) from lower clamp (17) and clip (18).

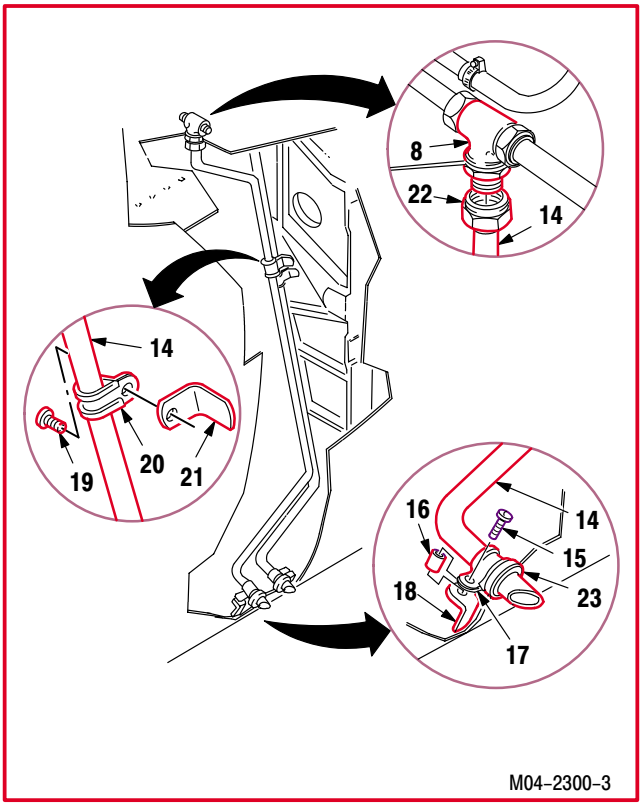
(2) Remove screw (19) and clamp (20) from upper clip (21).

(3) Hold tee (8). Remove nut (22).

(4) Remove drain tube (14) from grommet (23).

(5) Remove clamps (17) and (20) from drain tube (14).





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6.88. QUILL HOUSING/HYDRAULIC PUMP SEAL DRAIN TUBE REMOVAL/INSTALLATION – continued

6.88.4. Cleaning

a. **Wipe threads of tee union with a clean rag.**

b. **Wipe quill tube, 'U' tube, and drain tube with a clean rag.**

6.88.5. Inspection

a. **Check tee and union for stripped threads, nicks, and gouges on sealing face.** None allowed.

b. **Check quill tube for looseness and cracks.** None allowed.

c. **Check quill housing drain tube upper section for bends, cracks, hardness, holes, or looseness.** None allowed.

d. **Check pump seal drain tube for bends, cracks, or holes.** None allowed.

e. **Check tubes for bends, cracks, crimps, or holes.** None allowed.

f. **Check drain tube lower section for cracks, bends, crimps, or holes.** None allowed.

g. **Check grommet, clamp, and cushions for hardness and cracks.** None allowed.

6.88.6. Repair

a. **Repair drain tubes using tube clinch sleeve and coupling nu**t (TM 1-1500-204-23)**.**

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6.88. QUILL HOUSING/HYDRAULIC PUMP SEAL DRAIN TUBE REMOVAL/INSTALLATION – continued

6.88.7. Installation

a. **Install seal tube (10).**

(1) Position seal tube (10) on union (11).

(2) Hand tighten nut (12).

(3) Position seal tube (10) on tee (8). Install nut (13).

(4) Tighten nut (12) on union (11).

b. **Install tube (7) on tee (8).**

(1) Position tube (7) on tee (8).

(2) Hand tighten nut (9).

c. **Install clamp (3) on main transmission return oil line (left side).**

(1) Install spacer (6) and clamp (3).

(2) Install bolt (4) and washer (5).

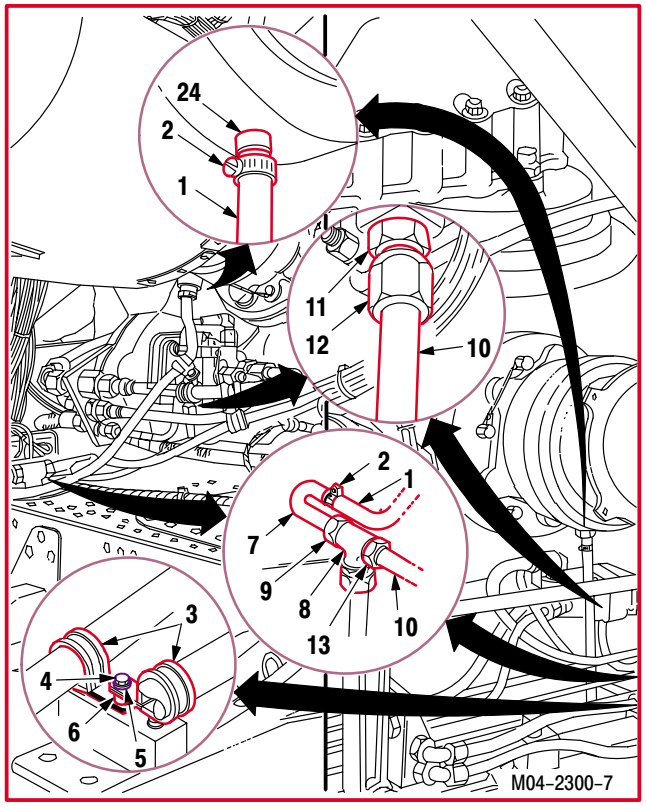
d. **Install quill tube (1).**

(1) Position two clamps (2) on quill tube (1).

(2) Install upper end of quill tube (1) on tube (24). Tighten clamp (2).

(3) Install lower end of quill tube (1) on tube (7). Tighten clamp (2).

(4) Hold tee (8). Tighten nut (9).



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6.88. QUILL HOUSING/HYDRAULIC PUMP SEAL DRAIN TUBE REMOVAL/INSTALLATION – continued

e. **Install drain tube lower section (14).**

(1) Position clamps (17) and (20) on drain tube (14).

(2) Insert lower end of drain tube (14) through grommet (23).

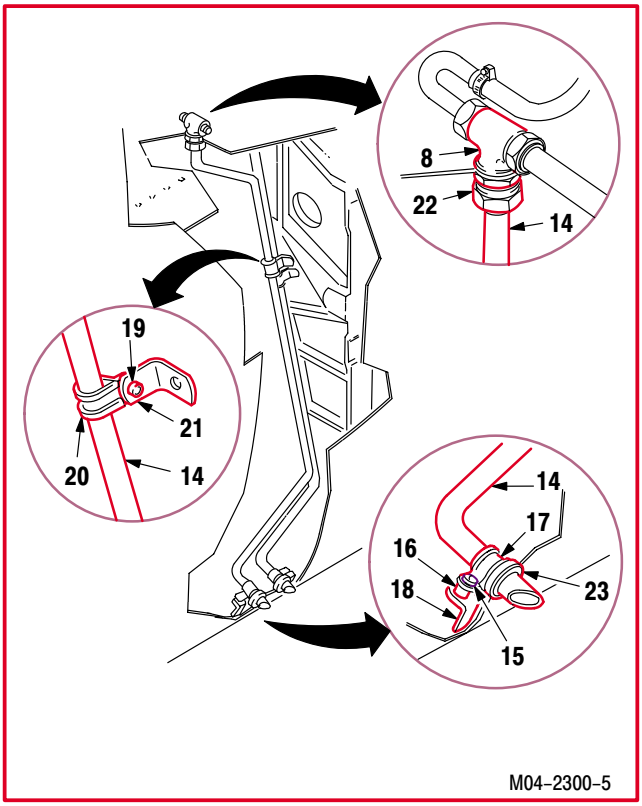
(3) Position drain tube (14) on tee (8).

(4) Hand tighten nut (22).

(5) Position spacer (16) between lower clamp (17) and clip (18). Install screw (15).

(6) Position upper clamp (20) on clip (21). Install screw (19).

(7) Hold tee (8) and tighten nut (22).



f. **Inspect (QA).**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panels L200 and R200** (para 2.2)**.**

h. **Install ammunition storage magazine** (TM 9-1090-208-23)**.**

END OF TASK

6.89. MAIN TRANSMISSION HYDRAULIC PUMP SEAL REPLACEMENT

6.89.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.89.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Main transmission seal removal/installation tool (Figure D-461, App D)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Lubricating oil (item 119, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
7.4	Primary hydraulic pump removed (as applicable)
7.58	Utility hydraulic pump removed (as applicable)
1.32	Main transmission oil system drained

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6.89. MAIN TRANSMISSION HYDRAULIC PUMP SEAL REPLACEMENT – continued

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either primary or utility pump seals.

6.89.3. Removal

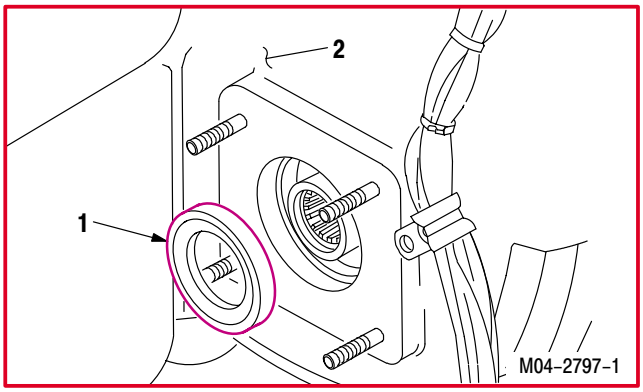
a. **Remove and discard hydraulic pump seal (1) from transmission (2).** Use seal removal/installation tool (Figure D-461, App D).

(1) Insert removal tool in seal (1). Use seal removal/installation tool (Figure D-461, App D).

(2) Insert slide hammer in removal tool. Use seal removal/installation tool (Figure D-461, App D).

(3) Slide hammer aft contacting bolt head removing seal (1) from transmission (2).

(4) Discard seal (1).



6.89.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.89.5. Inspection

a. **Check attachment area of seal for cracks.** None allowed.

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6.89. MAIN TRANSMISSION HYDRAULIC PUMP SEAL REPLACEMENT – continued

6.89.6. Installation



NOTE

- The -3 seal is two-way interchangeable with the basic seal; the -3 is the preferred part.
- The -3 seal with brown elastomer and -5 seal with black elastomer (used on the APU input shaft) are rotational dependent seals which are not interchangeable.

a. **Install new seal (1) in transmission (2).** Use seal removal/installation tool (Figure D-461, App D).

(1) Ensure new seal (1) has brown elastomer and not black elastomer (-5 seal).

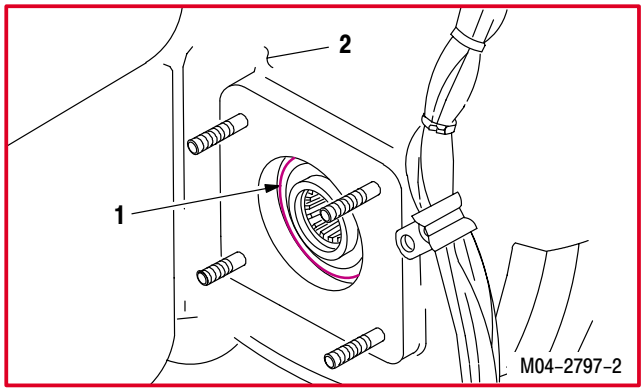
(2) Lubricate seal (1). Use lubricating oil (item 119, App F).

(3) Coat outer edge of seal (1) with sealing compound. Use sealing compound (item 177, App F).

(4) Insert guide in transmission (2). Use seal removal/installation tool (Figure D-461, App D).

(5) Install new seal (7) on guide with lip of seal firmly against transmission (2).

(6) Install pusher on guide and tap to install new seal (1). Use seal removal/installation tool (Figure D-461, App D).



b. **Install primary hydraulic pump** (para 7.4) **or utility hydraulic pump** (para 7.58)**.**

c. **Service main transmission oil system** (para 1.32)**.**

d. **Inspect (QA).**

END OF TASK

6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION

6.90.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.90.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing
Barrier material (item 32, App F)
Sealing compound (item 177, App F)
Tape (item 207, App F)
Wire (item 222, App F)
Wire (item 224, App F)

Personnel Required:

67R Attack Helicopter Repairer
One person to assist
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23
TM 1-1520-238-T
TM 9-1230-476-20-1
TM 55-1500-323-24

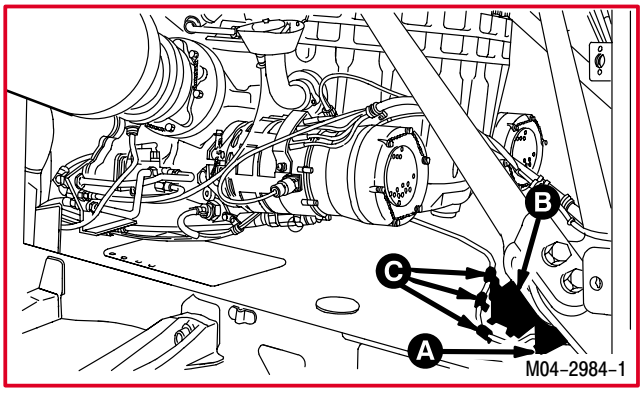
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed

WARNING

FLIGHT SAFETY PART

The main transmission and mast are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

6.90.3. Removal

a. **Remove clamp (1) from bracket (2).**

(1) Remove nut (3), screw (4), and washer (5) from clamp (1) and bracket (2).

(2) Remove two wires (6) from clamp (1).

b. **Remove wire harness (7) from bracket (8).**

(1) Detach connector P131 (9) from receptacle J131 (10).

(2) Depin ground wire (11) from pin D on module GS463 (12) (TM 55-1500-323-24).

c. **Identify and depin wires (6) from sockets D and E of connector P791 (13) on de-ice controller (14)** (TM 55-1500-323-24)**.**

d. **Remove clamps (15) and (16) from transmission deck (17) (three places).**

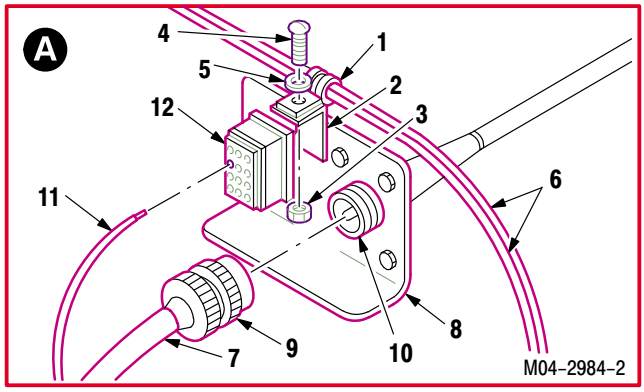
(1) Remove screw (18), washer (19), clamp (15), long spacer (20), clamp (16), and short spacer (21) from deck (17) (three places).

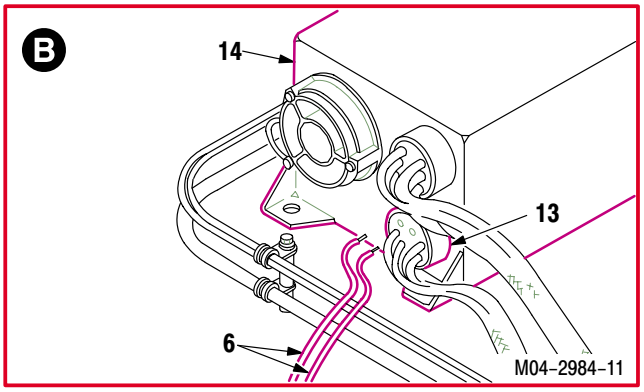
(2) Remove clamp (15) from wires (6) (three places).

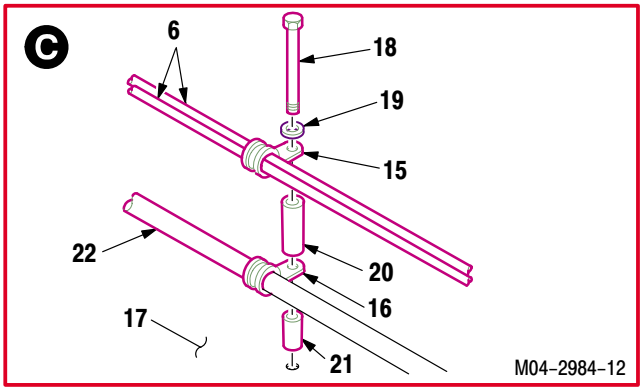
(3) Remove clamp (16) from ADS harness (22) (three places).

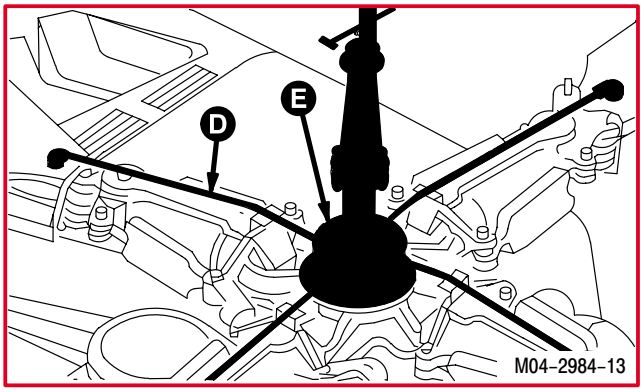
CAUTION

Main rotor blades are individually calibrated to de-icing system controller. Record blade serial number and power distributor connector number to ensure installation at same position. Failure to maintain proper de-ice system adjustment will result in damage to heater elements.









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6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

NOTE

Steps e. thru h. are typical for all four distributor cable harnesses.

e. **Remove lockwire from connectors P1, P2, P3, and P4 (23) and receptacle J1 (24).**

f. **Detach connectors P1, P2, P3, and P4 (23) from receptacle J1 (24).**

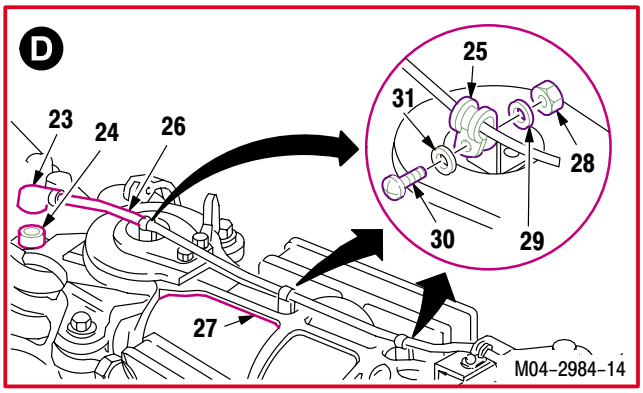
NOTE

Convoluted covering on wire harness may lose flexibility if crushed or kinked.

g. **Remove cable clamp (25) and harness (26) from main rotor pitch housing (27) (three places).**

(1) Remove nut (28), washer (29), screw (30), and washer (31) (three places).

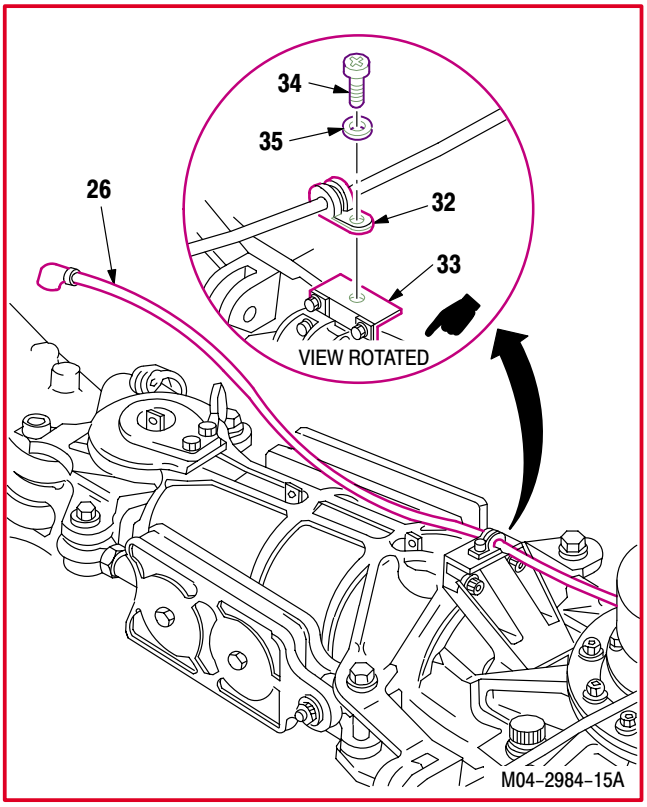
(2) Remove clamp (25) from harness (26) (three places).



h. **Remove clamp (32) and harness (26) from bracket (33).**

(1) Remove screw (34), washer (35), and clamp (32).

(2) Remove clamp (32) from harness (26).



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6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

i. **Remove de-ice power distributor (36) from main rotor drive plate (37).**

(1) Mark position of distributor (36) with paint stripe.

(2) Remove sealing compound from eight bolts (38) and from distributor (36) (para 1.47).

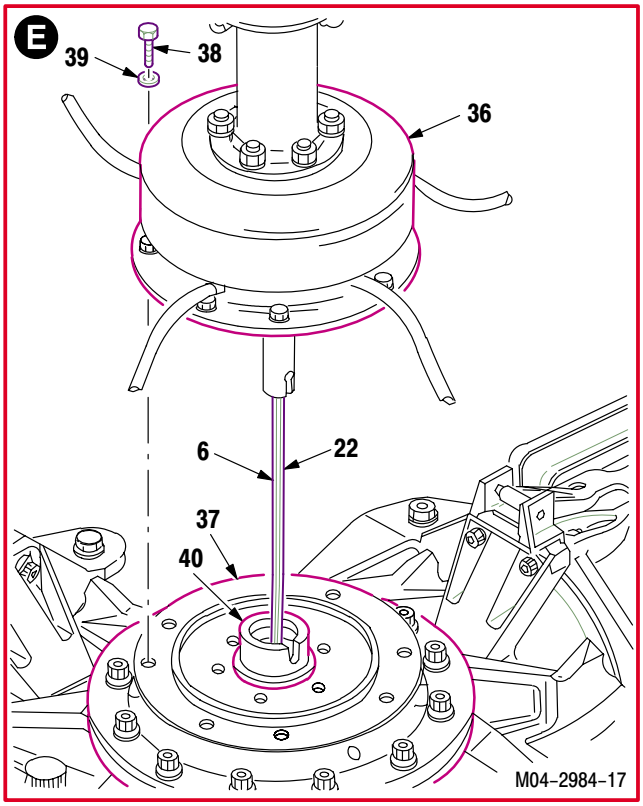
(3) Remove eight bolts (38) and washers (39) from distributor (36).

(4) First repairer lift distributor (36) from drive plate (37).

(5) Second repairer guide wires (6) and harness (22) up through bottom of standpipe (40) in transmission deck area.

(6) Lift distributor (36) clear of drive plate (37).

(7) Pull wires (6) and harness (22) until clear of standpipe (40).



NOTE

Perform step j if ADS mast is to be removed from de-ice power distributor.

j. **Remove mast (41) from distributor (36).**

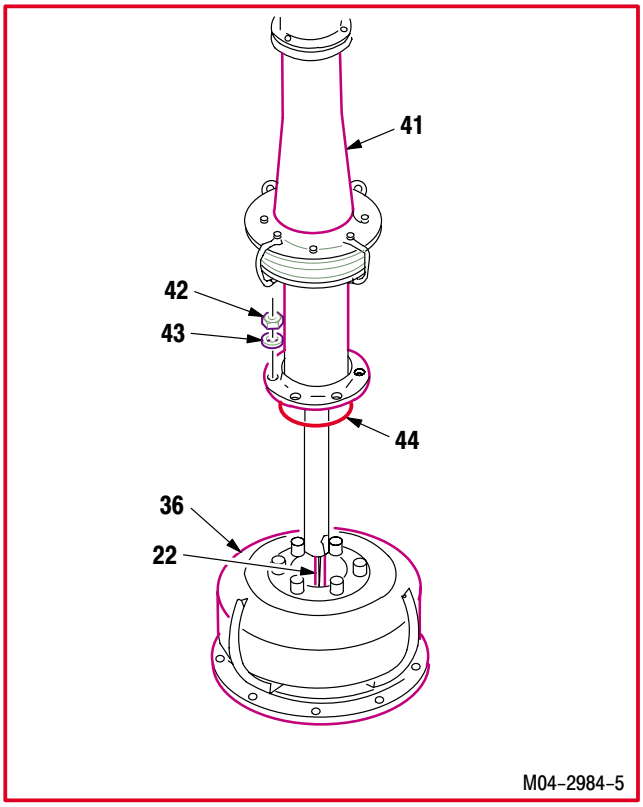
(1) Mark position of mast (41) with paint stripe.

(2) Remove sealing compound from six nuts (42).

(3) Remove six nuts (42) and washers (43).

(4) Guide harness (22) through distributor (36).

(5) Remove and discard packing (44).



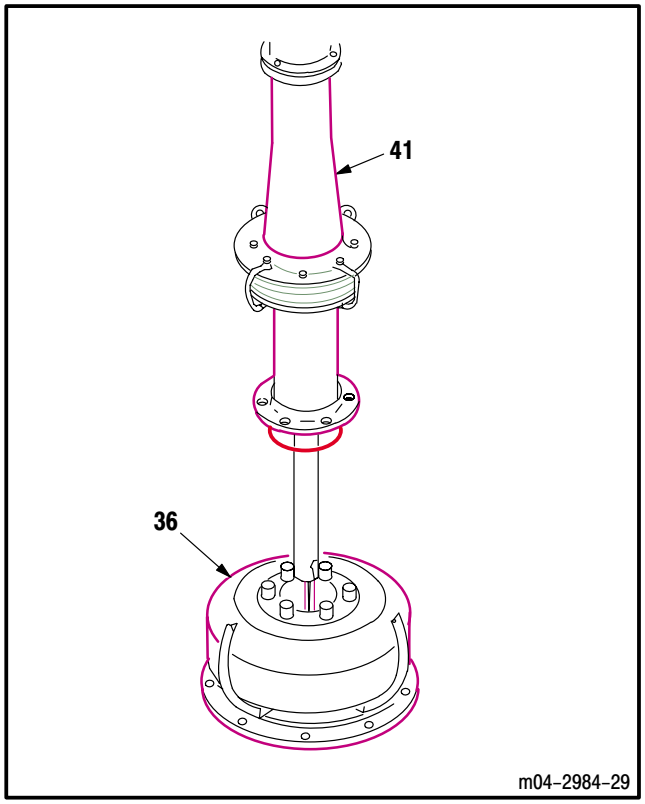
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6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

CAUTION

The ADS mast and de-ice power distributor are sensitive to bumps and moisture contamination. Damage may occur if bumped or dropped. Main transmission may be damaged by moisture intrusion; protective covering must be placed over top of transmission.

k. **Enclose mast (41), distributor (36), and mounting area on transmission with barrier material.** Use barrier material (item 32, App F) and tape (item 207, App F).



6.90.4. Cleaning

a. **Wipe drive plate, mast, distributor, and mounting surfaces with a clean rag.**

6.90.5. Inspection

a. **Check mast and distributor for cracks or damaged mast mounting studs** (TM 1-1500-204-23)**.**

b. **Check mast and distributor for corrosion** (para 1.49)**.**

c. **Check distributor wires, harnesses, and ADS harness for broken wires, bent or broken connector pins, and cracked or burned insulation** (TM 55-1500-323-24)**.**

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6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

6.90.6. Installation



NOTE

- Go to step d. if ADS mast was not removed from de-ice power distributor.
- Boresighting after removal and installation of the ADS mast must be performed by a factory team, unless the appropriate tools are available and can be performed by the unit.
- Ensure paint stripe is alined for ADS alinement.

a. **Remove barrier material from mast (41), distributor (36), and transmission.**

b. **Install mast (41) on distributor (36).** Torque six nuts (42) to **20 INCH-POUNDS**.

(1) Install new packing (44) on mast (41).

(2) Feed harness (22) through distributor (36).

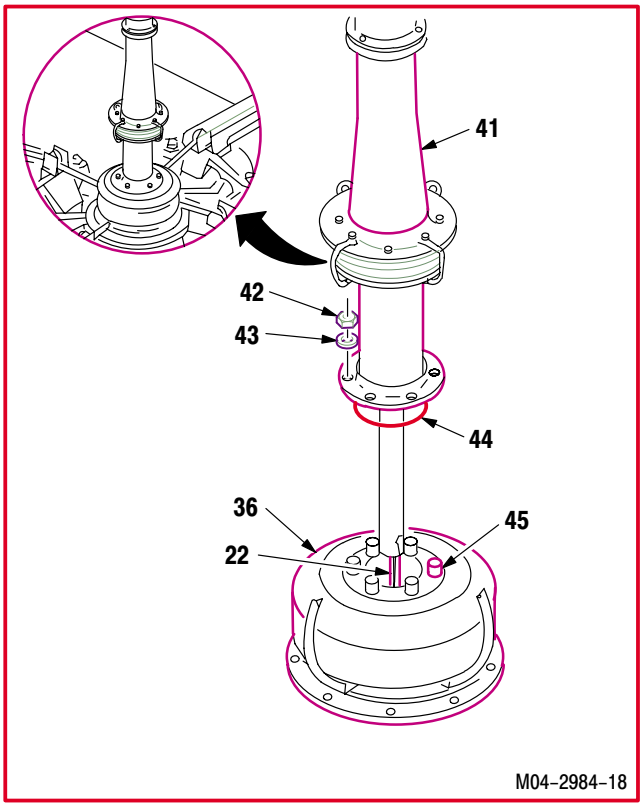
(3) Place mast (41) on distributor (36).

(4) Install six washers (43) and nuts (42) on studs (45).

(5) Torque six nuts (42) to **20 INCH-POUNDS**. Use torque wrench.

(6) Apply a continuous bead of sealing compound around outer edge of mast (41) and distributor (36). Use sealing compound (item 177, App F).

(7) Coat six nuts (42) with sealing compound. Use sealing compound (item 177, App F).



c. **Inspect (QA).**

GO TO NEXT PAGE

6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

CAUTION

Main rotor blades are individually calibrated to de-icing system controller. Ensure blade serial number and power distributor connector number are installed as recorded during removal. Failure to maintain proper de-ice system adjustment will damage heater elements.

NOTE

Ensure paint stripe is alined for ADS alinement.

d. **Install distributor (36).** Torque eight bolts (38) to **20 INCH-POUNDS**.

(1) Attach lockwire to end of wires (6) and harness (22). Use wire (item 224, App F).

(2) Feed lockwire, wires (6), and harness (22) through standpipe (40).

(3) First repairer support distributor (36). Second repairer pull lockwire, wires (6), and harness (22) through distributor (36).

(4) Remove lockwire.

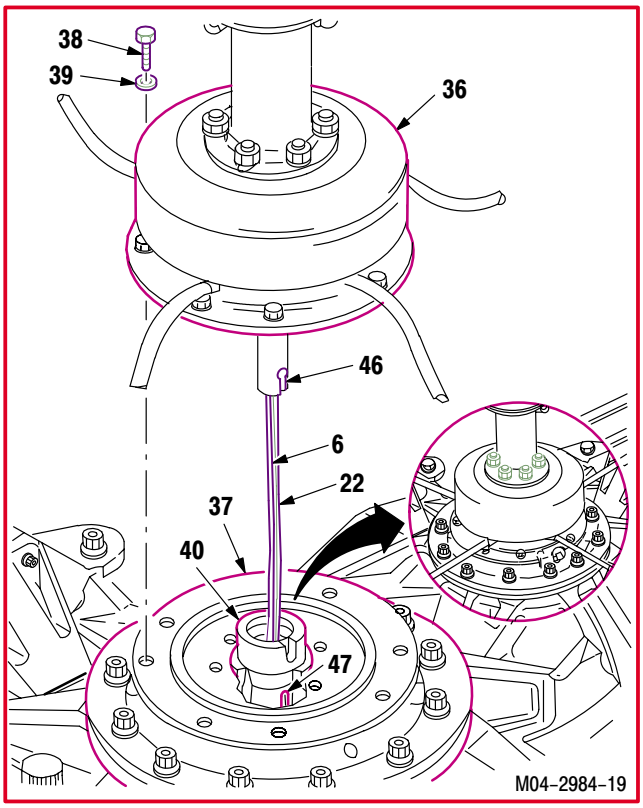
(5) Lower distributor (36) on drive plate (37) and ensure key slot (46) engages key (47) in standpipe (40).

(6) Install eight bolts (38) and washers (39).

(7) Torque eight bolts (38) to **20 INCH-POUNDS**. Use torque wrench.

(8) Apply continuous bead of sealing compound around outer edge of distributor (36) and drive plate (37). Use sealing compound (item 177, App F).

(9) Coat heads of eight bolts (38) with sealing compound. Use sealing compound (item 177, App F).



GO TO NEXT PAGE

6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

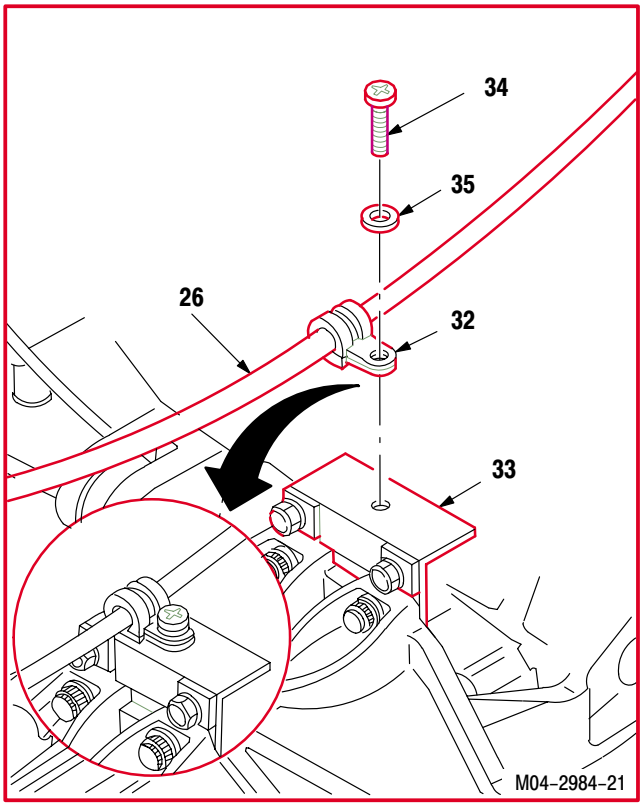
NOTE

- Convoluted covering on wire harness may lose flexibility if crushed or kinked.
- Steps e. thru h. are typical for all four distributor cable harnesses.

e. **Install clamp (32) and harness (26) on bracket (33).**

(1) Position clamp (32) on harness (26).

(2) Install screw (34) through washer (35), clamp (32), and bracket (33).

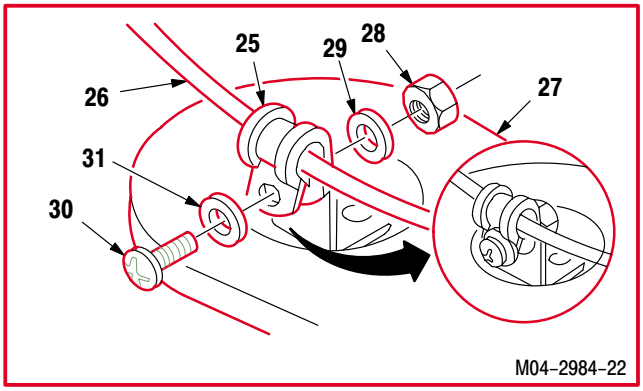


f. **Install clamp (25) and harness (26) on housing (27) (three places).**

(1) Position clamp (25) on harness (26) (three places).

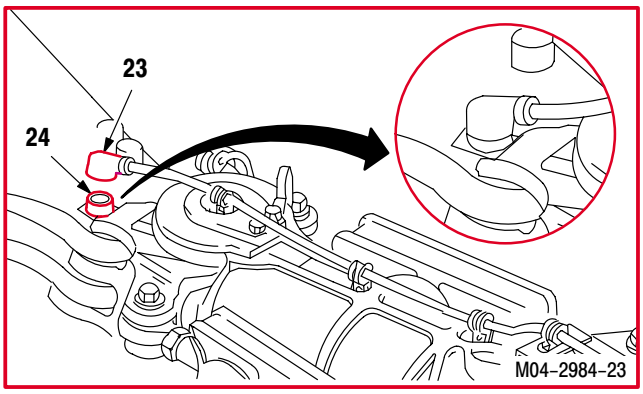
(2) Install screw (30) through washer (31), clamp (25), housing (27), and washer (29) (three places).

(3) Install nut (28) on screw (30) (three places).



g. **Attach harness connectors P1, P2, P3, and P4 (23) to receptacle J1 (24).**

h. **Lockwire connectors P1, P2, P3, and P4 (23) to receptacle J1 (24).** Use wire (item 222, App F).



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6.90. MAIN ROTOR DE-ICE POWER DISTRIBUTOR AND AIR DATA SYSTEM (ADS) MAST REMOVAL/INSTALLATION – continued

i. **Pin identified wires (6) in sockets D and E of connector P791 (13) of de-ice controller (14)** (TM 55-1500-323-24)**.**

(1) Remove tags.

j. **Install wire harness (7) on bracket (8).**

(1) Pin wire (11) in pin D on module GS463 (12) (TM 55-1500-323-24).

(2) Attach connector P131 (9) to receptacle J131 (10).

k. **Install clamp (1) on bracket (2).**

(1) Install clamp (1) on wires (6).

(2) Install screw (4) through washer (5), clamp (1), and bracket (2).

(3) Install nut (3) on screw (4).

l. **Install wires (6) and harness (22) on deck (17) (three places).**

(1) Install clamp (16) on harness (22) and clamp (15) on wires (6) (three places).

(2) Insert screw (18) through washer (19), clamp (15), long spacer (20), clamp (16), and short spacer (21) on deck (17) (three places).

m. **Inspect (QA).**

NOTE

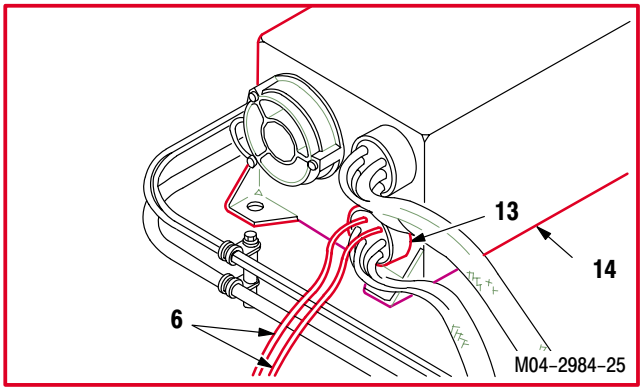
If TB 1-1520-238-20-62 (Deactivation of Main Rotor and Tail Rotor Blade De-ice Capability) is complied with, do not perform step n. Go to step o.

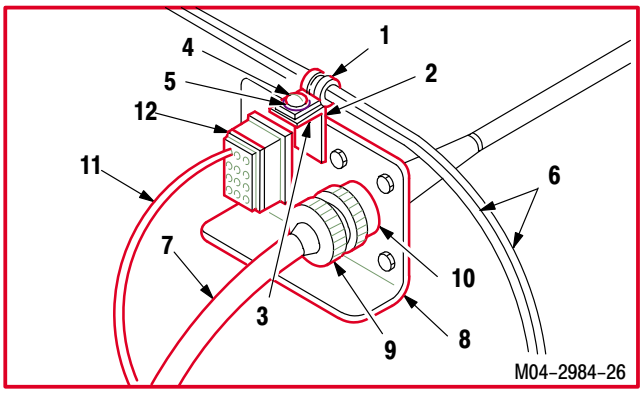
n. **Perform rotor blades de-ice maintenance operational check** (TM 1-1520-238-T)**.**

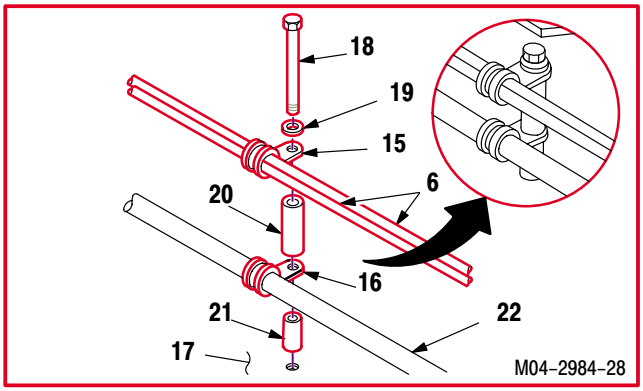
o. **Perform ADS mast assembly boresighting** (TM 9-1230-476-20-1)**.**

p. **Install access panel R200** (para 2.2)**.**

END OF TASK







6.91. MAIN ROTOR AIR DATA SYSTEM (ADS) MAST REPAIR (AVIM)

6.91.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

6.91.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)

References:

TM 9-1230-476-20-1

Materials/Parts:

Packing (3)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
TM 9-1230-476-20-1	Omnidirectional airspeed sensor (OAS) removed

WARNING

FLIGHT SAFETY PART

The main transmission drive shaft and mast are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.91. MAIN ROTOR AIR DATA SYSTEM (ADS) MAST REPAIR (AVIM) – continued

6.91.3. Disassembly

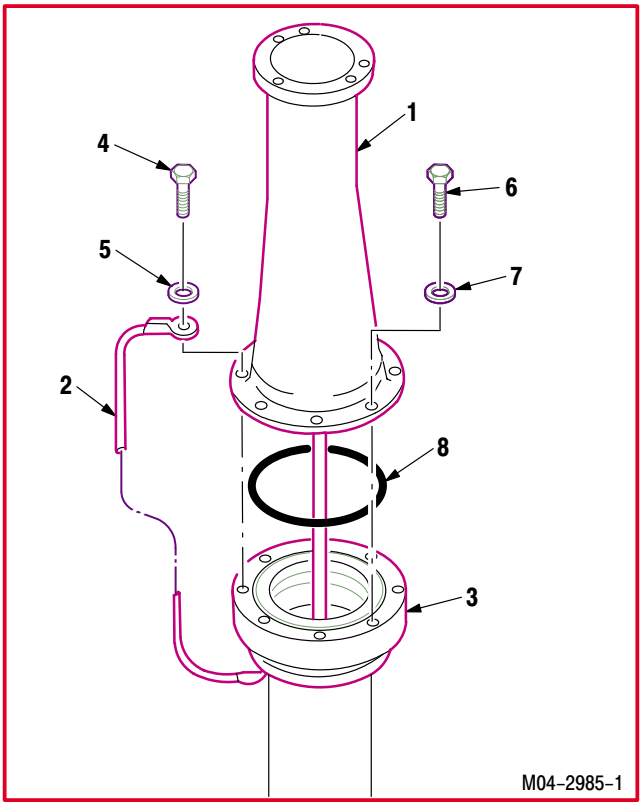
a. **Remove adapter (1) and four electrical leads (2) from soft mount (3).**

(1) Remove four bolts (4) and washers (5) from leads (2).

(2) Remove four short bolts (6) and washers (7).

(3) Lift adapter (1) from mount (3).

(4) Remove and discard packing (8) from mount (3).

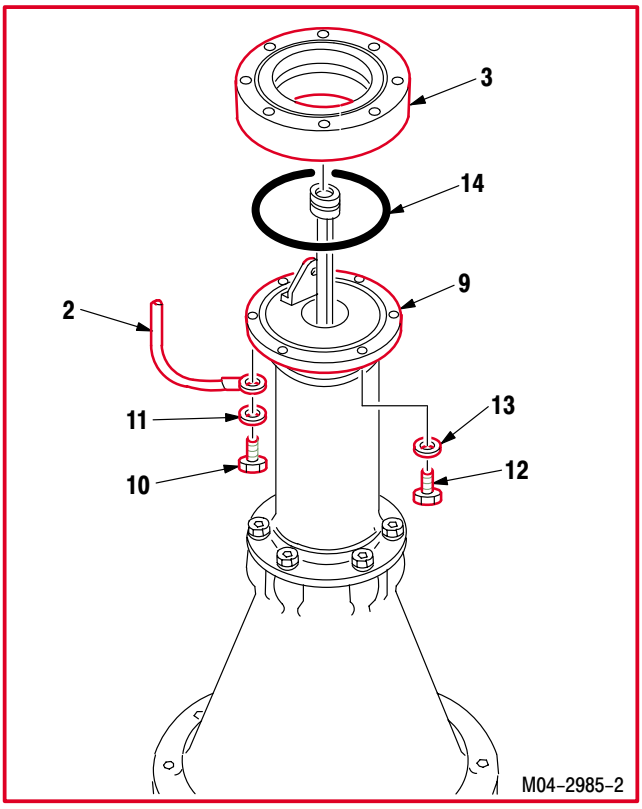


b. **Remove four leads (2) and mount (3) from shaft (9).**

(1) Remove four bolts (10), washers (11), and leads (2).

(2) Remove two bolts (12), washers (13), and mount (3).

(3) Remove and discard packing (14) from mount (3).



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6.91. MAIN ROTOR AIR DATA SYSTEM (ADS) MAST REPAIR (AVIM) – continued

c. **Identify connector P572 (15) before removing wire harness (16).**

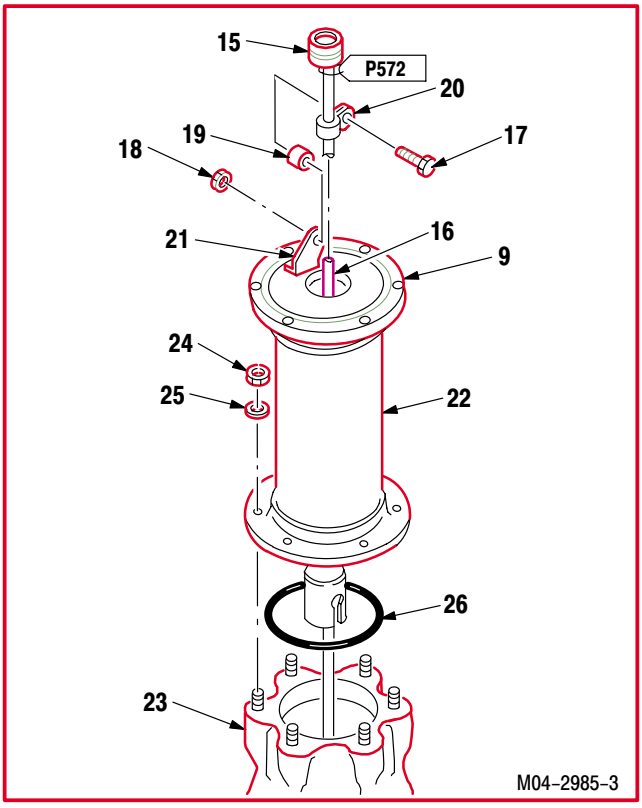
d. **Remove wire harness (16) from shaft (9).**

(1) Remove screw (17), nut (18), spacer (19), and clamp (20) from bracket (21).

e. **Remove housing (22) from support (23).**

(1) Remove six nuts (24) and washers (25).

(2) Remove and discard packing (26) from support (23).

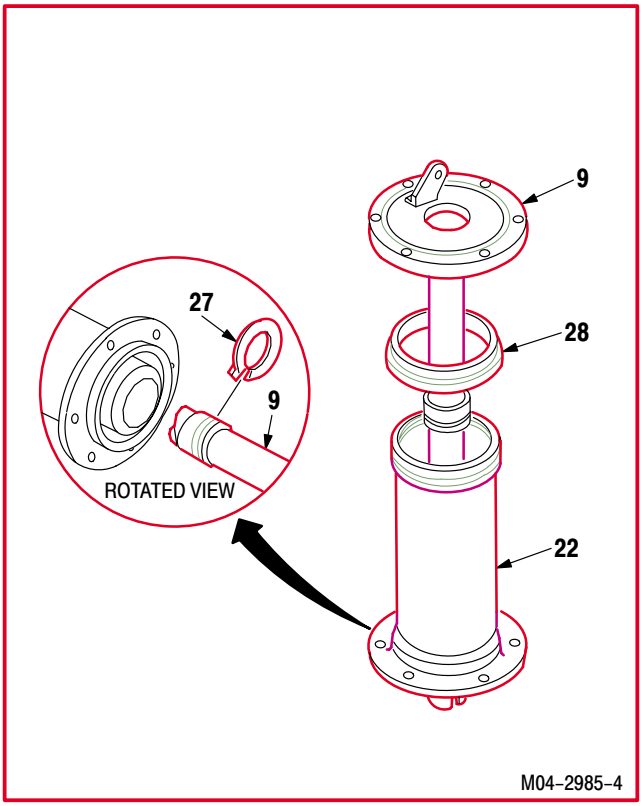


f. **Remove shaft (9) from housing (22).**

(1) Remove lockring (27) from shaft (9).

(2) Pull shaft (9) from housing (22).

(3) Remove ring seal (28) from housing (22).



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6.91. MAIN ROTOR AIR DATA SYSTEM (ADS) MAST REPAIR (AVIM) – continued

g. **Remove bearings (29) and spacer (30) from housing (22).**

(1) Remove lockring (31) from housing (22).

(2) Remove bearing (29), spacer (30), and bearing (29).

6.91.4. Cleaning

a. **Wipe mast components with a clean rag.**

6.91.5. Inspection

a. **Check mast components for cracks.** None allowed.

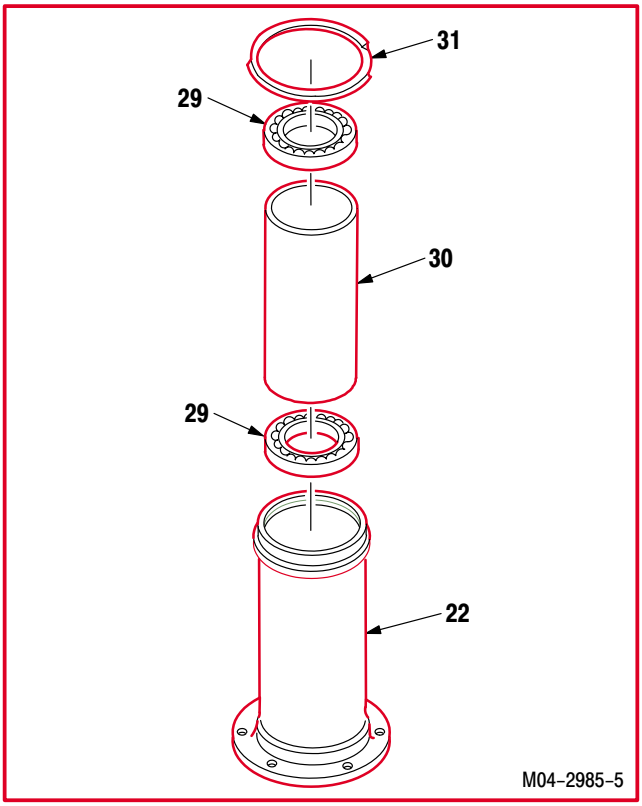
b. **Check mast components for corrosion** (para 1.49)**.**

c. **Check ADS resilient mount for tears.**

(1) Determine if damage extends through mount or tear exists. Use gap setting gage.

(2) Replace mount if tear extends through mount and 45 degrees around circumference.

(3) Check resilient mount at **125 HOUR** intervals if tear is less than above limits.



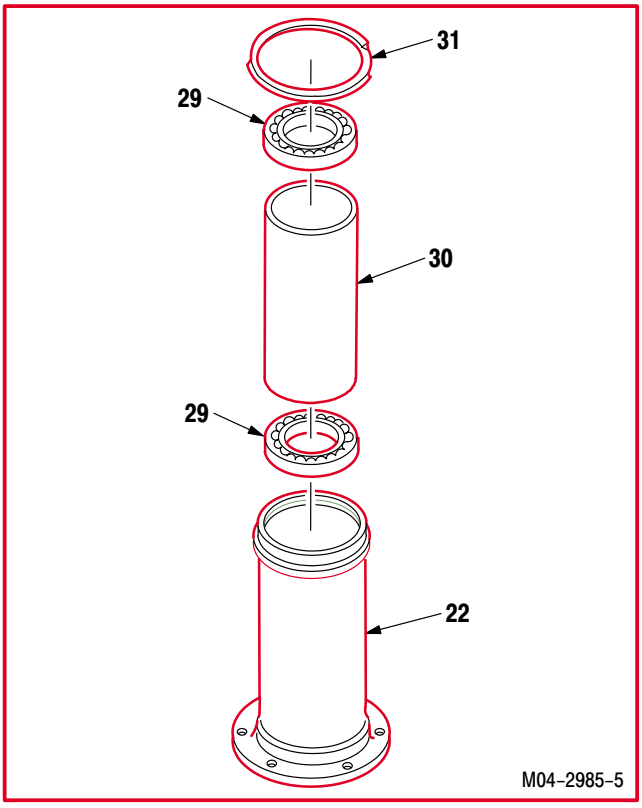
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6.91. MAIN ROTOR AIR DATA SYSTEM (ADS) MAST REPAIR (AVIM) – continued

6.91.6. Assembly

a. **Install two bearings (29) with spacer (30) in housing (22).**

b. **Install lockring (31).**

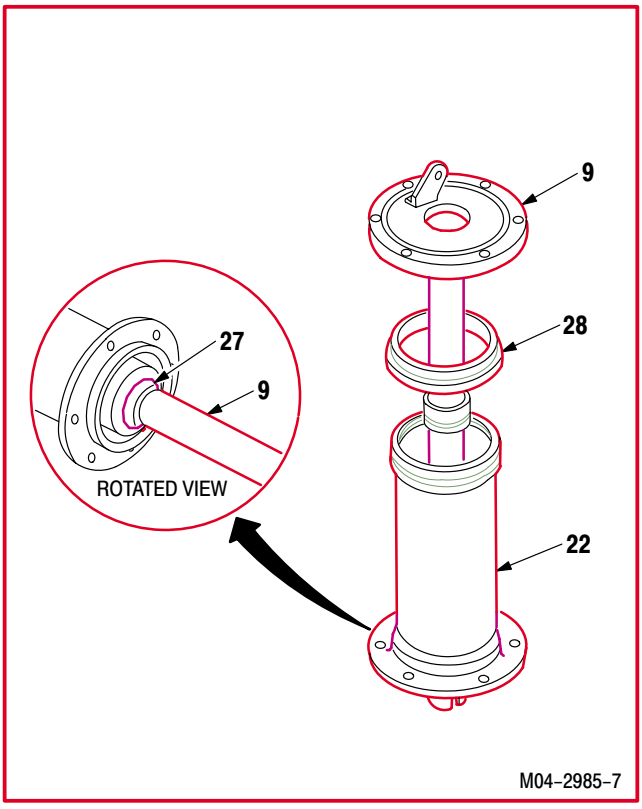


c. **Install shaft (9) into housing (22).**

(1) Press ring seal (28) on housing (22) by hand.

(2) Slide shaft (9) in housing (22).

(3) Install lockring (27) on shaft (9).



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6.91. MAIN ROTOR AIR DATA SYSTEM (ADS) MAST REPAIR (AVIM) – continued



d. **Install new packing (26) in support (23).**

(1) Lubricate packing (26). Use petrolatum (item 138, App F).

(2) Install packing (26) in support (23).

e. **Install housing (22) on support (23).**

(1) Install six washers (25) and nuts (24).

f. **Install wire harness (16) in shaft (9).**

(1) Slide wire harness (16) in shaft (9) with connector P572 (15) closest to bracket (21).

(2) Position clamp (20) on wire harness (16) **19 INCHES** below top of connector P572 (15).

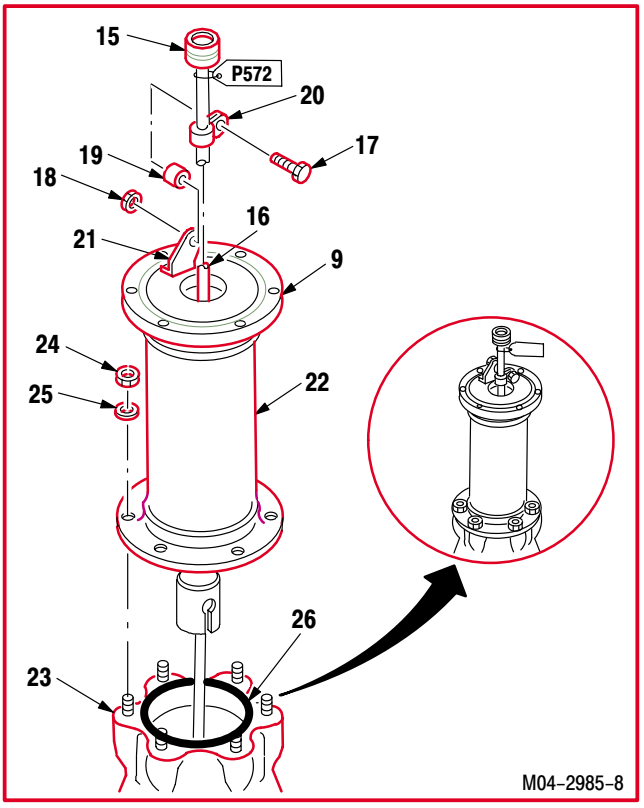
(3) Secure clamp (20) and wire harness (16) with screw (17), spacer (19), and nut (18).

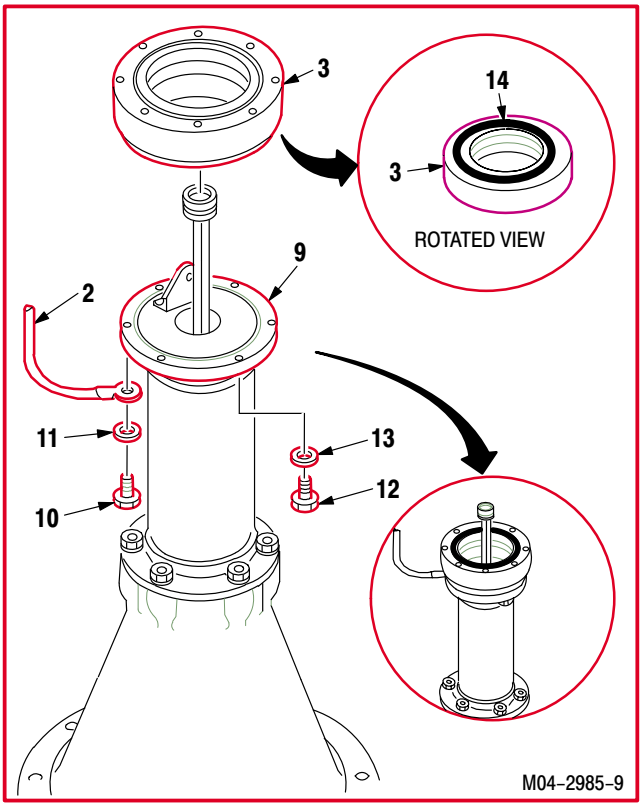
g. **Install new packing (14) on mount (3).**

h. **Install mount (3) and four leads (2) on shaft (9).**

(1) Install two washers (13) and short bolts (12).

(2) Install four leads (2), washers (11), and bolts (10).





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6.91. MAIN ROTOR AIR DATA SYSTEM (ADS) MAST REPAIR (AVIM) – continued

i. **Install new packing (8) on mount (3).**

j. **Install adapter (1) and four leads (2) on mount (3).**

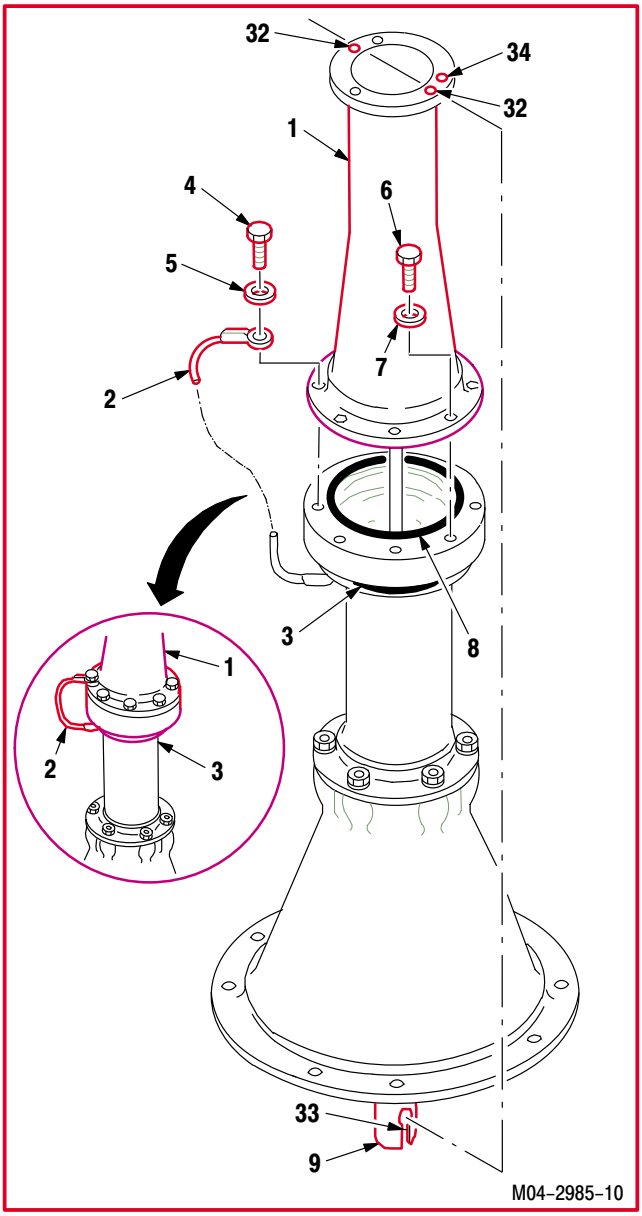
(1) Position adapter (1) on mount (3) with dowel holes (32) alined with key slot (33) on shaft (9), and with screw holes (34) positioned as shown.

(2) Install four bolts (6) through washers (7), adapter (1), and mount (3).

(3) Install four bolts (4) through washers (5), leads (2), adapter (1), and mount (3).

k. **Inspect (QA).**

l. **Install omnidirectional airspeed sensor (OAS)** (TM 9-1230-476-20-1)**.**



END OF TASK

6.92. MAIN ROTOR DRIVE PLATE COVER REMOVAL/INSTALLATION

6.92.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.92.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (2)
Screw (NAS 1096-3-20 for installation) (3)
Washer (NAS 1515H3H for installation) (3)
Epoxy primer coating kit (item NO TAG, App F)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 55-1500-335-23

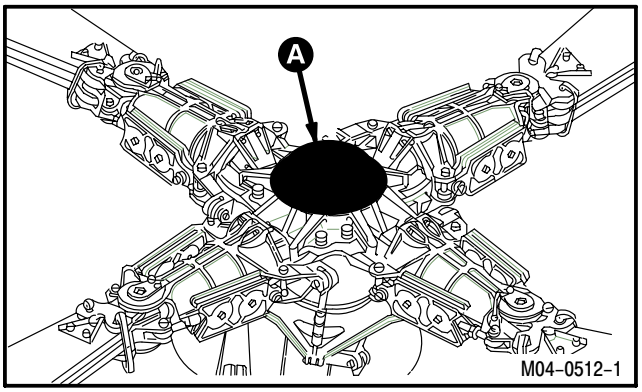
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.90	Main rotor de-ice power distributor and air data system (ADS) mast assembly removed

WARNING

FLIGHT SAFETY PART

The main rotor drive plate is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.92. MAIN ROTOR DRIVE PLATE COVER REMOVAL/INSTALLATION – continued

6.92.3. Removal

a. **Remove drive plate cover (1) from drive plate (2).**

(1) Hold cover (1) down.

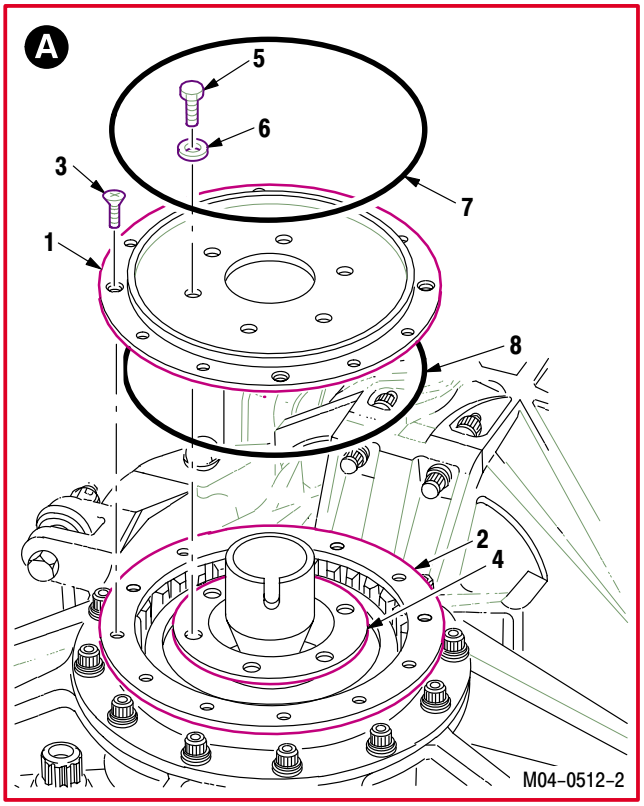
(2) Remove four countersunk screws (3).

b. **Remove cover (1) from support (4).**

(1) Remove six bolts (5) and washers (6).

(2) Lift cover (1) from support (4).

(3) Remove and discard packings (7) and (8).



6.92.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.92.5. Inspection

a. **Check drive plate for cracks and stripped nut plate.** None allowed.



b. **Check drive plate cover and drive plate for corrosion** (para 1.49)**.**

(1) If corrosion exists on less than 25 percent of surface area, or to a depth less than **0.010 INCH**, clean cover (para 1.47). Use depth gage.

(2) Remove corrosion (TM 55-1500-335-23) and apply primer. Use epoxy primer coating kit (item NO TAG, App F).

(3) If corrosion exists on more than 25 percent of surface area, or to a depth greater than **0.010 INCH**, replace drive plate cover. Use depth gage.

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6.92. MAIN ROTOR DRIVE PLATE COVER REMOVAL/INSTALLATION – continued

6.92.6. Installation



a. **Install cover (1) on support (4).** Torque six bolts (5) to **20 INCH-POUNDS**.

(1) Lubricate new packings (7) and (8). Use petrolatum (item 138, App F).

(2) Install packings (7) and (8) on cover (1).

(3) Position cover (1) on support (4).

(4) Install six bolts (5) and washers (6).

(5) Torque six bolts (5) to **20 INCH-POUNDS**. Use torque wrench.

b. **Install cover (1) on plate (2).** Toque four screws (3) to **20 INCH-POUNDS**.

(1) Position cover (1) on plate (2) so that flat section of plate (2) is midway between any two countersunk holes in cover (1).

(2) Install three NAS1096-3-20 screws (9) and NAS1515H3H washers (10), equally spaced in any three non-countersunk holes in cover (1).

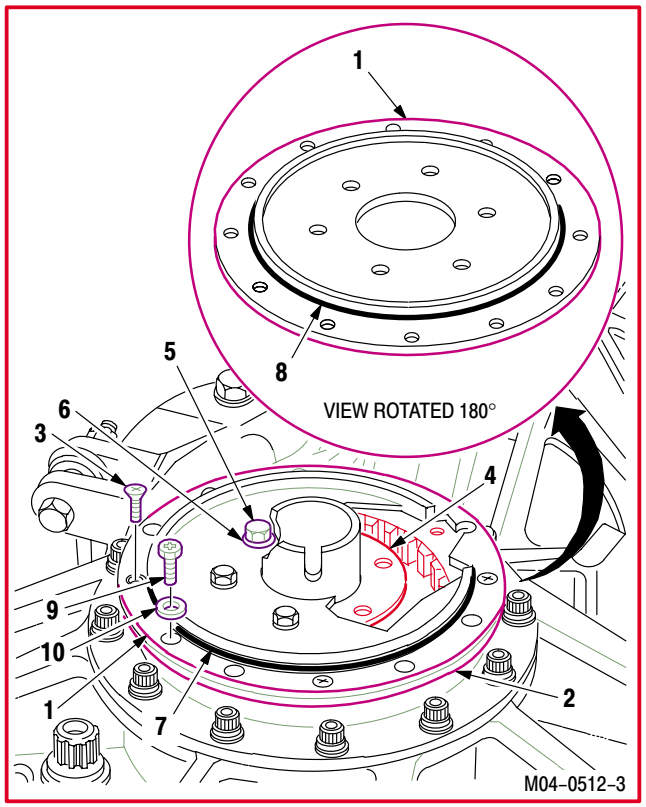
(3) Slowly tighten screws (9) evenly while rotating main rotor drive shaft back and forth until splines line up and engage.

(4) Continue to tighten screws (9) evenly until cover (1) and plate (2) are clamped together.

(5) Install four screws (3) in countersunk holes in cover (1).

(6) Torque four screws (3) to **20 INCH-POUNDS**. Use torque wrench.

(7) Remove three NAS1096-3-20 screws (9) and NAS1515H3H washers (10).



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6.92. MAIN ROTOR DRIVE PLATE COVER REMOVAL/INSTALLATION – continued

c. **Inspect (QA).**

d. **Install main rotor de-ice power distributor and air data system (ADS) mast assembly** (para 6.90)**.**

END OF TASK

6.93. MAIN ROTOR FLEXIBLE SUPPORT REMOVAL/INSTALLATION

6.93.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.93.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.92	Main rotor drive plate cover removed

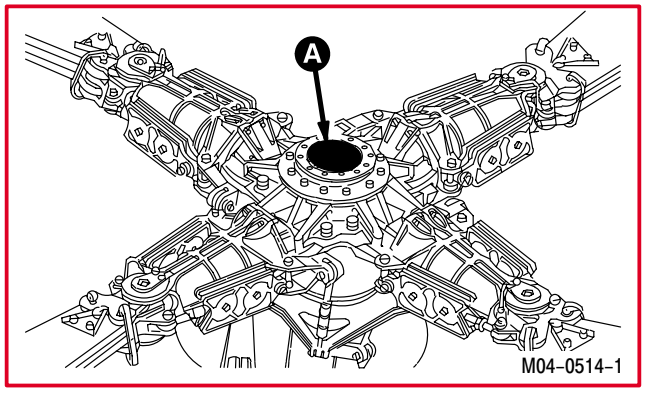
Materials/Parts:

Packing
Petrolatum (item 138, App F)

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



GO TO NEXT PAGE

6.93. MAIN ROTOR FLEXIBLE SUPPORT REMOVAL/INSTALLATION – continued

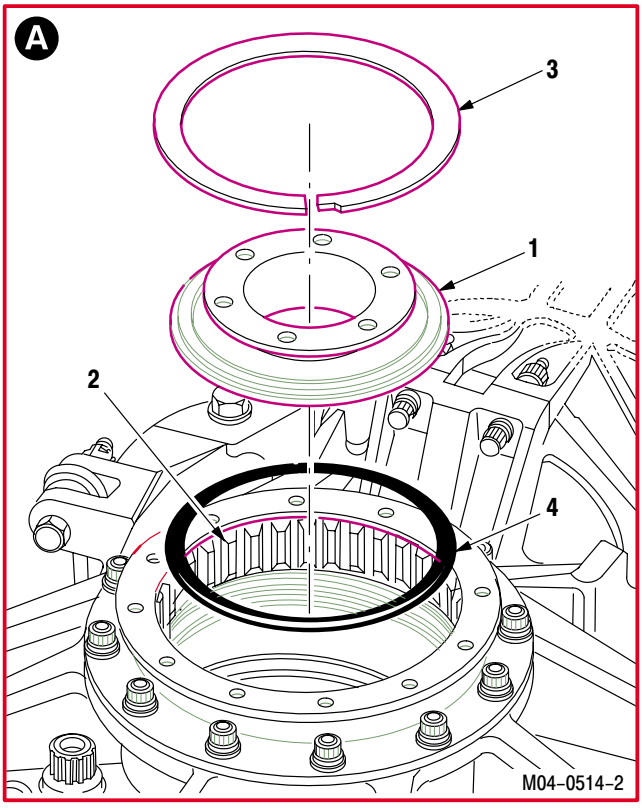
6.93.3. Removal

a. **Remove support (1) from drive shaft (2).**

(1) Remove ring (3) from shaft (2).

(2) Remove support (1) from shaft (2).

(3) Remove and discard packing (4).



6.93.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.93.5. Inspection

a. **Check drive shaft for cracks in retaining ring grooves.** None allowed.

b. **Check support and drive shaft for corrosion** (para 1.49)**.**

c. **Check support for delamination of rubber.** None allowed.

d. **Check support for loose or missing nutplates** (para 6.1)**.**

6.93.6. Installation



a. **Install support (1) in shaft (2).**

(1) Lubricate new packing (4). Use petrolatum (item 138, App F).

(2) Install packing (4) on support (1).

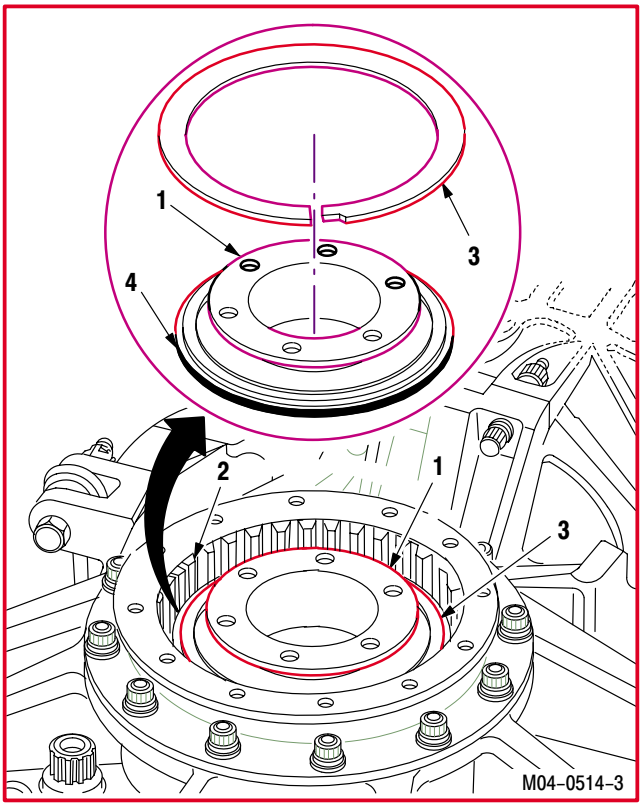
(3) Position support (1) in shaft (2).

(4) Install ring (3) in shaft (2).

b. **Inspect (QA).**

c. **Install main rotor drive plate cover** (para 6.92)**.**

d. **Perform drive system dynamics maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.94. MAIN TRANSMISSION AIR DATA SYSTEM (ADS) STANDPIPE REMOVAL/INSTALLATION

6.94.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.94.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.93	Main rotor flexible support removed

WARNING

FLIGHT SAFETY PART

The (ADS) air data system standpipe is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.94. MAIN TRANSMISSION AIR DATA SYSTEM (ADS) STANDPIPE REMOVAL/INSTALLATION – continued

6.94.3. Removal

a. **Remove standpipe (1) from rotor hub (2).**

(1) Lift standpipe (1) from hub (2).

6.94.4. Cleaning

a. **Wipe standpipe and mounting surfaces with a clean rag.**

6.94.5. Inspection

a. **Check standpipe for cracks.** None allowed.

b. **Check standpipe for corrosion** (para 1.49)**.**

c. **Check transmission rotor hub plate nuts for looseness or damage.** None allowed.

6.94.6. Installation

CAUTION

To prevent damage to standpipe, do not misaline standpipe during installation.

a. **Install standpipe (1) in hub (2).**

(1) Position standpipe (1) with two keys (3) and cutout (4) facing forward.

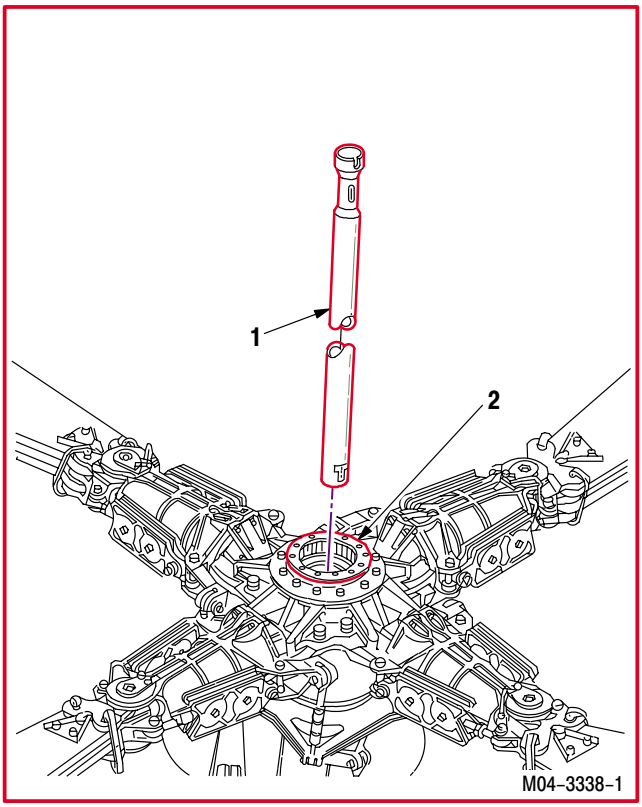
(2) Slide standpipe (1) in hub (2).

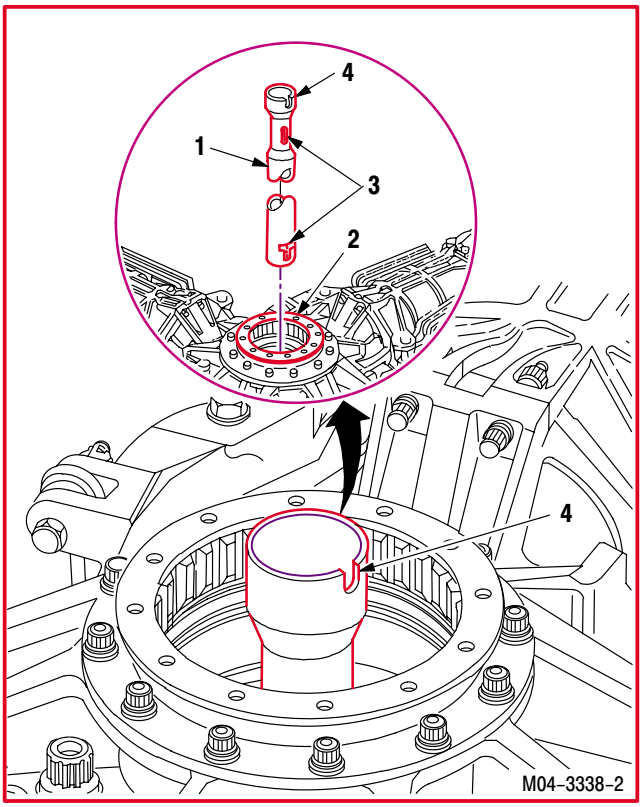
(3) Ensure that lower keys (3) engage in key slots.

(4) Standpipe (1) must not rotate.

b. **Inspect (QA).**

c. **Install main rotor flexible support** (para 6.93)**.**





END OF TASK

6.95. MAIN ROTOR GEARSHAFT REMOVAL/INSTALLATION

6.95.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.95.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Aircraft mechanic's tool kit (item 376, App H)
Airframe adapter kit (item 25, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Sling set kit (item 194, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Epoxy primer coating kit (item NO TAG, App F)
Lubricant (item 111, App F)
Wire (item 229, App F)

Personnel Required:

67R Attack Helicopter Repairer
68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

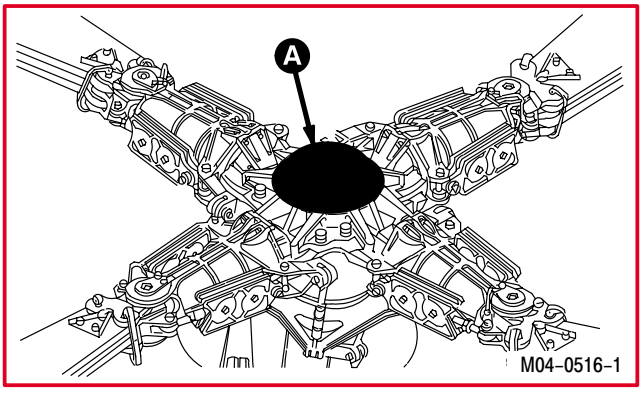
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.97	Maintenance crane installed
6.94	Air data system (ADS) standpipe removed

WARNING

FLIGHT SAFETY PART

The main rotor gearshaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



GO TO NEXT PAGE

6.95. MAIN ROTOR GEARSHAFT REMOVAL/INSTALLATION – continued

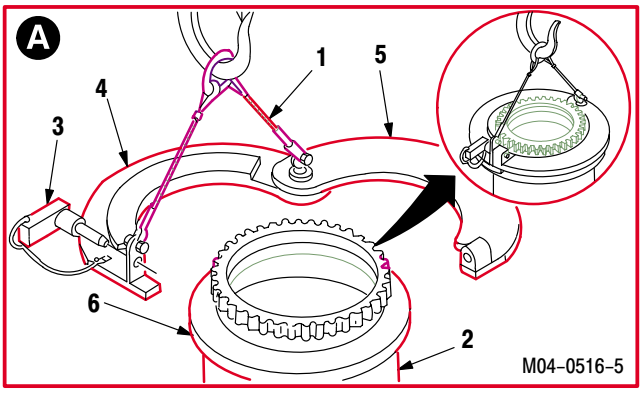
6.95.3. Removal

a. **Install sling (1) on main rotor gearshaft (2).** Use sling set kit.

(1) Remove quick release pin (3) from upper supports (4) and (5).

(2) Position supports (4) and (5) around gearshaft (2) and under gear head (6).

(3) Install pin (3) in supports (4) and (5).



CAUTION

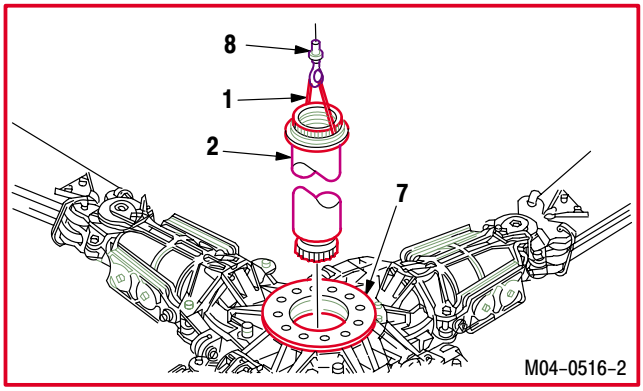
Check for binding when lifting gearshaft. Stop lifting and free gearshaft if tension increases on cable.

a.1. **Hoist main rotor gearshaft** (para 1.87)**.**

b. **Remove gearshaft (2) from rotor mast (7) .**

(1) Connect crane (8) to sling (1).

(2) Operate crane (8) slowly to lift gearshaft (2) out of mast (7).

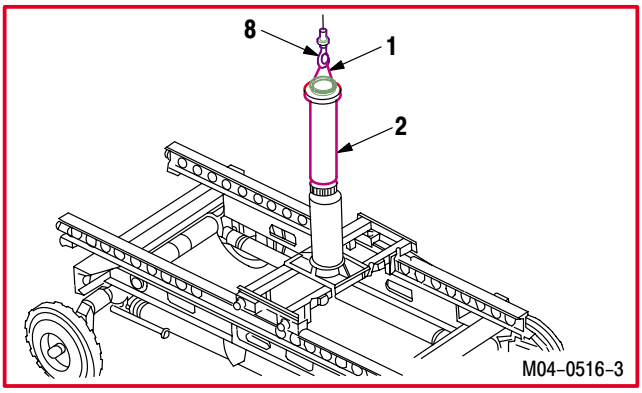


c. **Install gearshaft (2) on adapter kit.**

(1) Operate crane (8) to lower gearshaft (2) on adapter kit.

(2) Guide gearshaft (2) on adapter kit.

(3) Remove sling set kit (1) from gearshaft (2).

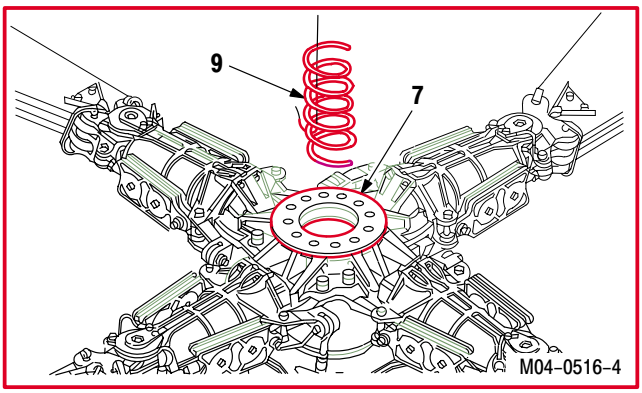


d. **Remove spring (9) from mast (7).**

(1) Bend end of lockwire to form hook. Use wire (item 229, App F).

(2) Insert lockwire in mast and hook spring (9).

(3) Pull lockwire with spring (9) out of mast (7).



GO TO NEXT PAGE

6.95. MAIN ROTOR GEARSHAFT REMOVAL/INSTALLATION – continued

6.95.4. Cleaning

a. **Clean removed and attaching parts and surfaces** (para 1.47)**.**

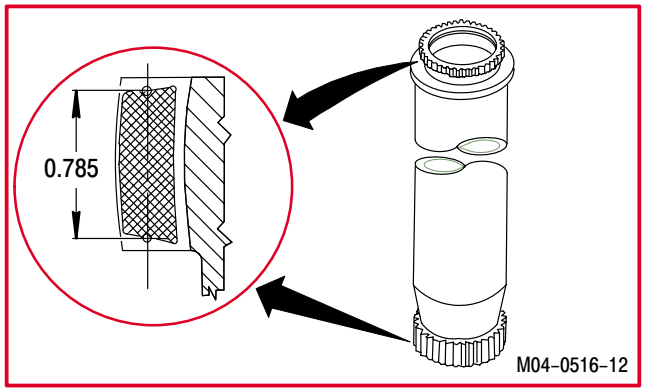
6.95.5. Inspection

a. **Check drive plate gear teeth for cracks and missing teeth.** None allowed.

b. **Check gearshaft for excessive spline wear.**

(1) Replace gearshaft if spline wear area exceeds **0.785 INCH**, measured from center of tooth depth.





c. **Check gearshaft for allowable depth and extent of corrosion pits, dents, scratches.**

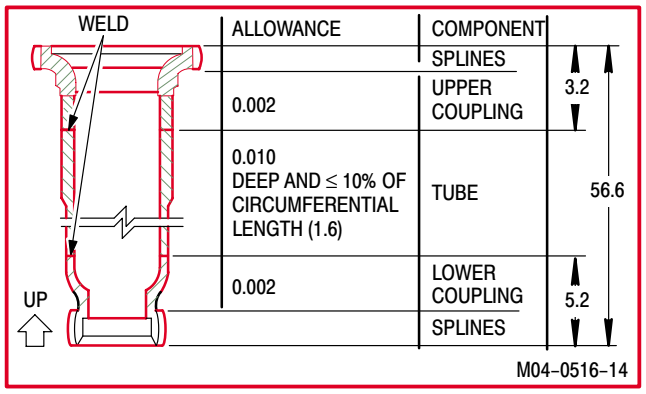
(1) Check gearshaft for excessive pitting or spalling.

(a) Replace gearshaft if pitting or spalling exceeds **0.010 INCH** deep or is outside **0.785 INCH** wear area on any spine surface. Use depth gage.

(b) Damage within specified limits shall be blended using 30/50:1 blend ratios in all areas.

(c) Touch up blended areas with two coats of primer. Use epoxy primer coating kit (item NO TAG, App F).

(d) Allow **1 HOUR** cure time between applications.



d. **Check spring for cracks, breaks, and length.**

(1) Replace if damaged or if length is less than **4 INCHES**.

GO TO NEXT PAGE

6.95. MAIN ROTOR GEARSHAFT REMOVAL/INSTALLATION – continued

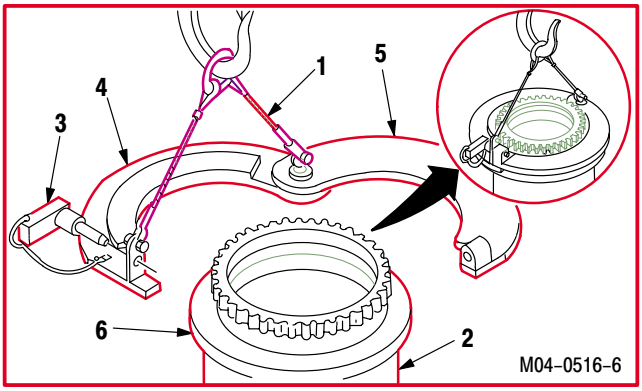
6.95.6. Installation

a. **Install sling (1) on gearshaft (2).** Use sling set kit.

(1) Remove pin (3) from upper supports (4) and (5).

(2) Position supports (4) and (5) around gearshaft (2) and under gear head (6).

(3) Install pin (3) in supports (4) and (5).

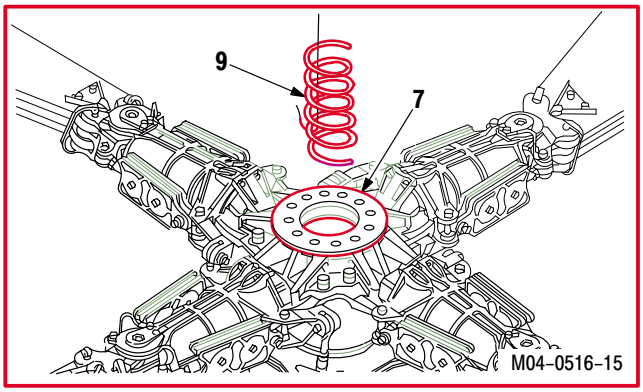




b. **Install spring (9) in mast (7).**

(1) Lubricate spring (9). Use lubricant (item 111, App F).

(2) Put spring (9) in place in mast (7). Use wire (item 229, App F).



c. **Inspect (QA).**

WARNING

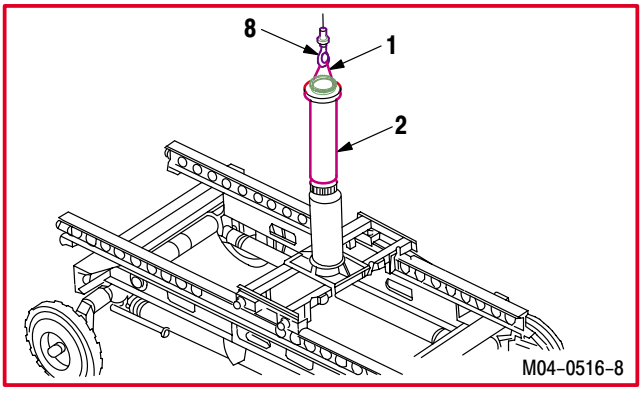
Maintain tension on maintenance crane cable, do not place fingers between sling and mast while engaging lower splines in transmission. Engagement of spline may allow gearshaft to drop, causing injury. If injury occurs, seek medical help.

d. **Hoist main rotor gearshaft** (para 1.88)**.**

e. **Remove gearshaft (2) from adapter kit.**

(1) Connect crane (8) to sling (1).

(2) Slowly lift gearshaft (2) off adapter kit.



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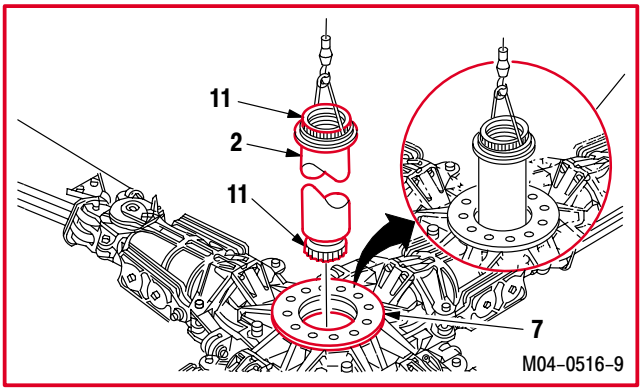
6.95. MAIN ROTOR GEARSHAFT REMOVAL/INSTALLATION – continued

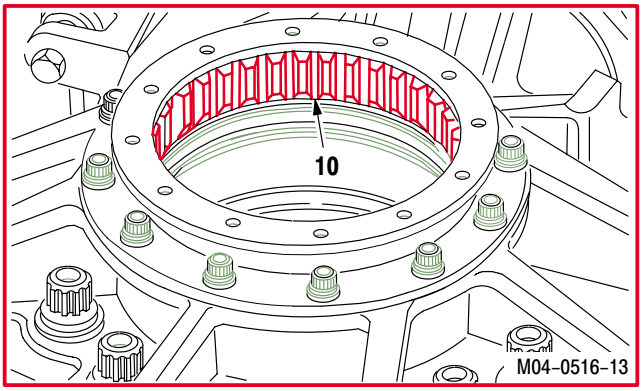
f. **Install gearshaft (2) in mast (7).**

(1) Lubricate drive plate splines (10). Use lubricant (item 111, App F).

(2) Lubricate upper and lower splines (11). Use lubricant (item 111, App F).

(3) Slowly lower gearshaft (2) in mast (7), engaging lower spline (11) in transmission.





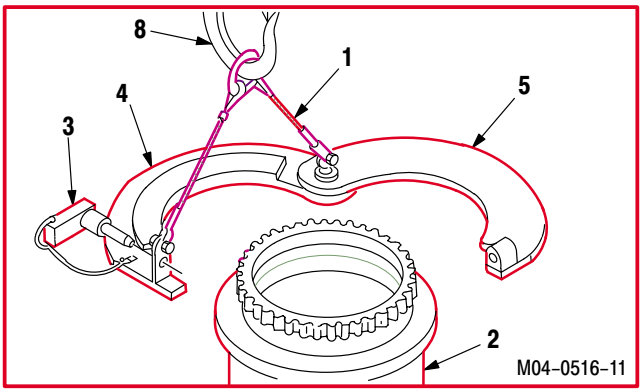
g. **Inspect (QA).**

h. **Remove sling (1) from gearshaft (2).**

(1) Disconnect crane (8) from sling (1).

(2) Remove pin (3) from supports (4) and (5).

(3) Remove supports (4) and (5) from around gearshaft (2).



i. **Remove maintenance crane** (para 1.105)**.**

j. **Install air data system (ADS) standpipe** (para 6.94)**.**

k. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.96. MAIN ROTOR DRIVE PLATE REMOVAL/INSTALLATION

6.96.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.96.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
#22 spline x 1/2-inch drive torque wrench adapter (item 18, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
5X & 12X monocular magnifier (item 206, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 175 foot-pound 1/2-inch drive dial indicator torque wrench (item 444, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing
Nut (12)
Alcohol (item 25, App F)
Lubricant (item NO TAG, App F)
Petrolatum (item 138, App F)
Sealing compound (item 177, App F)

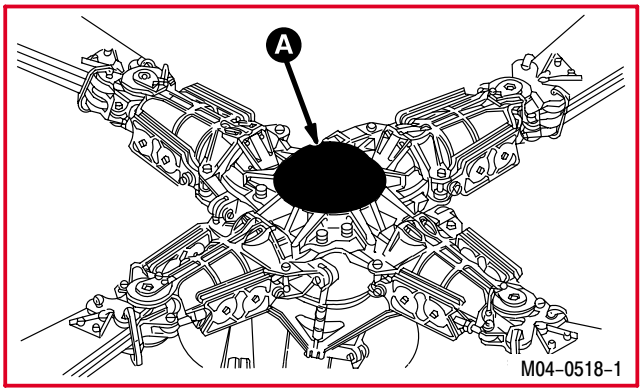
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.95	Main rotor gearshaft removed

WARNING

FLIGHT SAFETY PART

The main rotor drive plate is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



GO TO NEXT PAGE

6.96. MAIN ROTOR DRIVE PLATE REMOVAL/INSTALLATION – continued

6.96.3. Removal

a. **Remove main rotor drive plate (1) from main rotor head (2).**

(1) Remove sealant from heads of 12 bolts (3) and outer edge of plate (1) (para 1.47).

(2) Remove 12 nuts (4), washers (5), bolts (3), and countersunk washers (6).

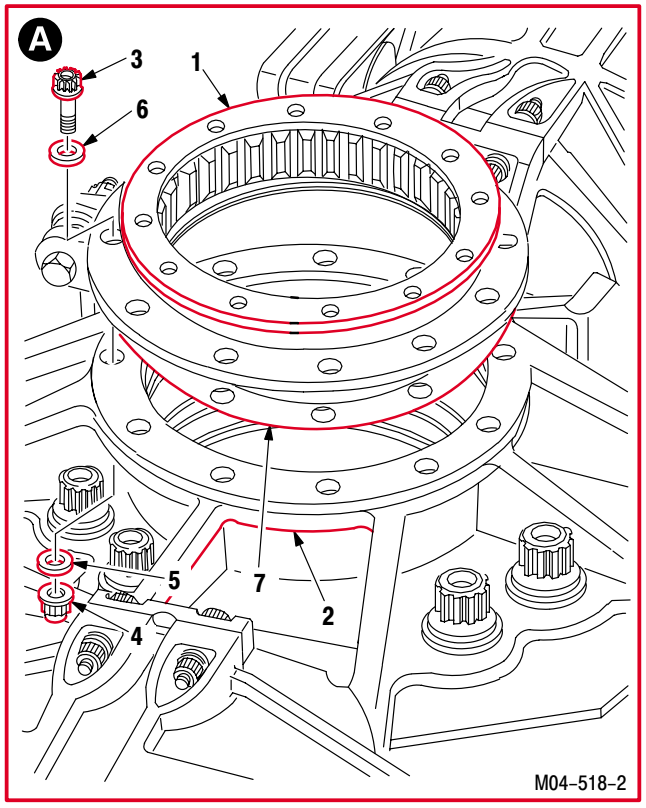
(3) Discard 12 nuts (4).

(4) Remove plate (1).

NOTE

Retain shim for installation if shim is installed.

(5) Remove shim (7), if installed, from plate (1).



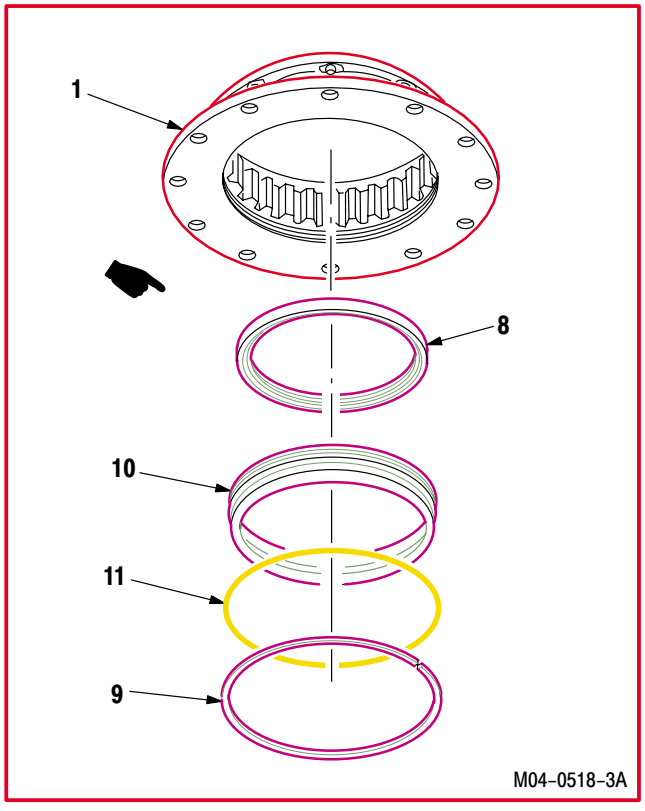
b. **Remove seal (8) from plate (1).**

(1) Remove ring (9) from plate (1).

(2) Remove retainer (10) with seal (8) from plate (1).

(3) Remove seal (8) from retainer (10).

(4) Remove and discard packing (11) from retainer (10).



6.96.4. Cleaning

a. **Clean drive plate gear teeth** (para 1.47)**.**

b. **Remove sealant from drive plate and rotor head** (para 1.47)**.**

c. **Wipe rotor head and mating surfaces of drive plate with a clean rag.**

GO TO NEXT PAGE

6.96. MAIN ROTOR DRIVE PLATE REMOVAL/INSTALLATION – continued

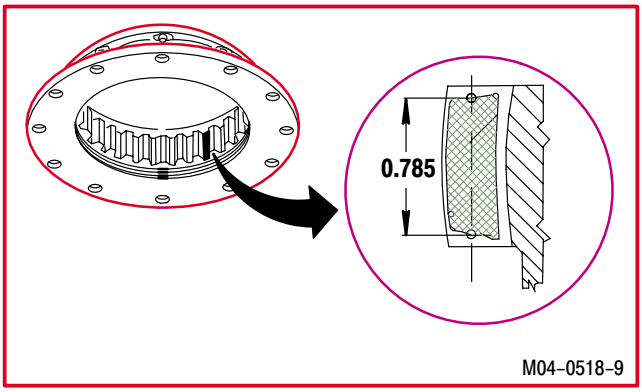
6.96.5. Inspection

a. **Check mating surfaces of rotor head for cracks and elongated bolt holes.** None allowed.

b. **Check drive plate for deformed or broken teeth or cracks.** None allowed.

c. **Check drive plate teeth for excessive wear.**

(1) Replace drive plate if wear area exceeds **0.785 INCH**, measured from center of wear area.



d. **Check drive plate teeth face for excessive pitting or spalling.**

(1) Replace drive plate if pitting or spalling exceeds **0.010 INCH** deep or is outside **0.785 INCH** wear area on any tooth. Use depth gage.

e. **Check mating surfaces of rotor head for corrosion** (para 1.49)**.**

f. **Check drive plate for corrosion** (para 1.49)**.**

NOTE

Some drive plates are furnished with a plug and plug adapter. The following inspection criteria is for those drive plates.

g. **Check plug adapter and plug for corrosion** (para 1.49)**.**

h. **Check plug adapter and plug for cracks.**

(1) Replace adapter or plug if cracks are found.

(a) Clean adapter and plug with alcohol and a clean rag. Use alcohol (item 25, App F).

(b) Apply sealing compound to threads of plug and install in adapter. Use sealing compound (item 177, App F).

GO TO NEXT PAGE

6.96. MAIN ROTOR DRIVE PLATE REMOVAL/INSTALLATION – continued

(c) Apply sealing compound to interface point where plug enters drive plate. Use sealing compound (item 177, App F).

(d) Install adapter and plug on drive plate.

i. **Check drive plate attaching surface area.**

(1) Plasma spray coating shall be free from:

(a) Cracks, excessive and massive oxides, and excessive porosity. Use magnifier.

(b) Grit particles and contamination underneath spray plasma coating. None allowed.

(c) Spalling, chipping, flaking, cracking, and other imperfections detrimental to usage. None allowed.

6.97.6. Installation



a. **Install seal (8) in plate (1).**

(1) Lubricate new packing (11). Use petrolatum (item 138, App F).

(2) Install packing (11) on retainer (10).

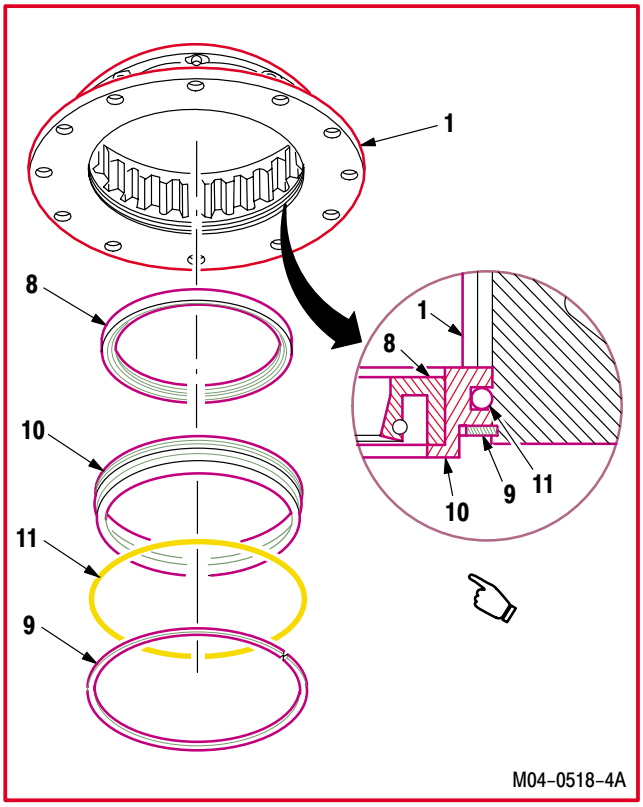
NOTE

Ensure seal open lip is in down position and spring removed, if installed.

(3) Install seal (8) on retainer (10) with open lip down.

(4) Install retainer (10) and seal (8) in plate (1).

(5) Install ring (9) in groove in plate (1).



GO TO NEXT PAGE

6.96. MAIN ROTOR DRIVE PLATE REMOVAL/INSTALLATION – continued

NOTE

Reinstall shim if removed from main rotor head.

b. **Install shim (7) if required between plate (1) and head (2).**



c. **Install plate (1) on head (2).** Torque 12 nuts (4) to **125 FOOT-POUNDS**.

(1) Position plate (1) on head (2). Ensure flat edge (13) of plate (1) is between pitch housings (14) and (15).

NOTE

Provide clearance for de-ice electrical lead over top of pitch housing.

(2) Apply a thin coat of lubricant on threads of 12 bolts (3). Use lubricant (item NO TAG, App F).

(3) Allow threads to air dry **6 HOURS** or air dry for **30 MINUTES** and cure for **30 MINUTES** at 150 °F (65.6 °C).

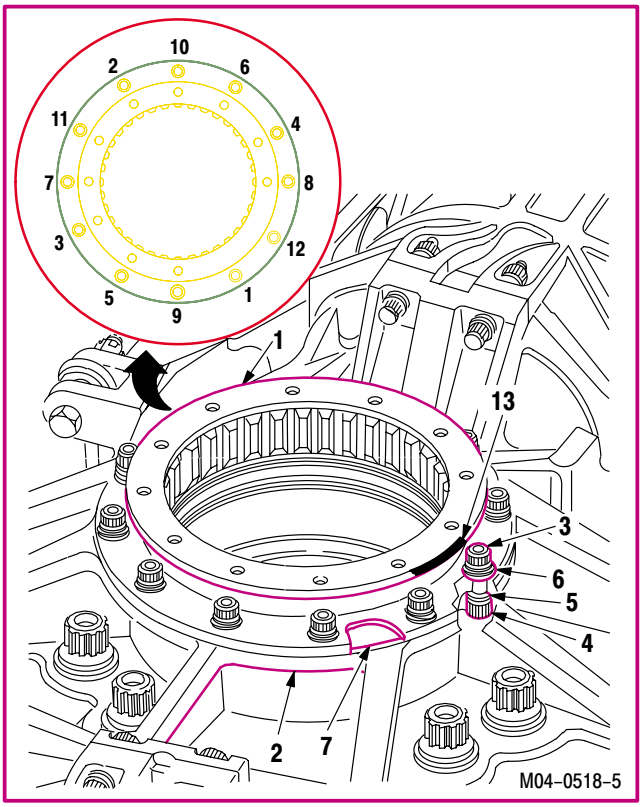
(4) Install 12 countersunk washers (6) (with countersink toward head of bolts) and bolts (3) on plate (1).

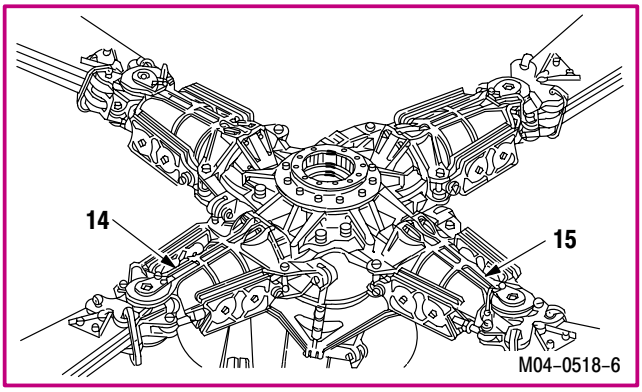
(5) Install 12 washers (5) and new nuts (4) on bolts (3).

(6) Hold 12 bolts (3). Torque 12 nuts (4) to **125 FOOT-POUNDS**. Use torque wrench adapter and torque wrench.

(a) Torque bolts (3) in the following order: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

(b) Check torque of 12 nuts (4) in same sequence as torqued in step (6).(a). Torque shall be **125 FOOT-POUNDS**.





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6.96. MAIN ROTOR DRIVE PLATE REMOVAL/INSTALLATION – continued



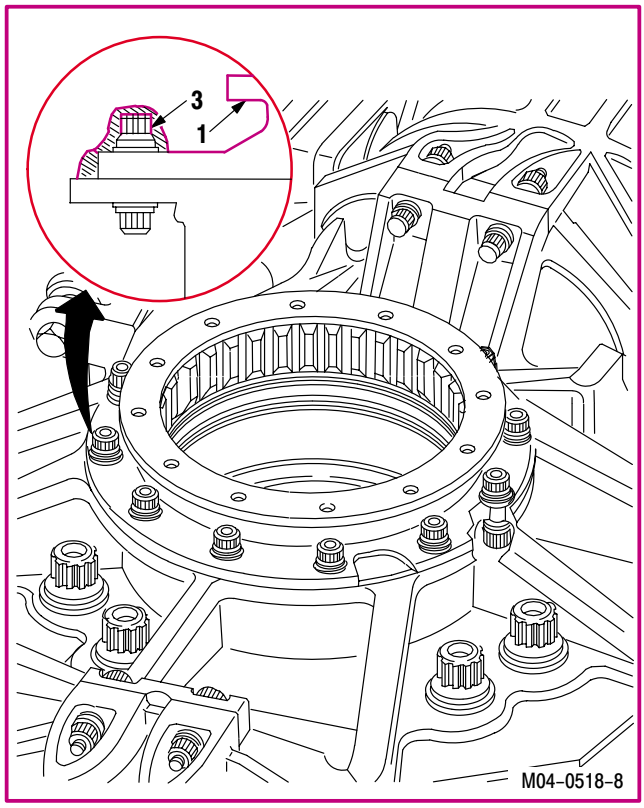
d. **Weather seal plate (1).**

(1) Apply a continuous bead of sealing compound around outer edge of plate (1). Use sealing compound (item 177, App F).

(2) Coat heads of 12 bolts (3) with sealing compound. Use sealing compound (item 177, App F).

e. **Inspect (QA).**

f. **Install main rotor gearshaft** (para 6.95)**.**



END OF TASK

6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION

6.97.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

6.97.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Fluorescent inspection kit (item 138, App H)
0 - 12-inch micrometer depth gage (item 146, App H)
Chemical protective gloves (item 154, App H)
Sling set kit (item 194, App H)
Ohmmeter (item 218, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Nut (18)
Preload indicating washer (18)
Cloth (item 48, App F)
Cloth (item 51, App F)
Corrosion preventive compound (item 62, App F)
Corrosion preventive compound (item 63, App F)
Cushioning material (item 68, App F)
Dry cleaning solvent (item 74, App F)
Epoxy primer coating kit (item 78, App F)
Isopropyl alcohol (item 106, App F)
Lubricant (item 115A, App F)
Lubricant (item 116, App F)
Primer coating (item 147, App F)
Sealing compound (item 177, App F)
Tape (item 206, App F)

Personnel Required:

67R	Attack Helicopter Repairer
68D	Aircraft Powertrain Repairer/NDI
68X	Armament/Electrical System Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 55-1500-323-24
TM 55-1500-335-23
TM 55-1500-344-23
TM 55-1500-345-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
1.98	Crane adjustment - hoisting
6.95	Main rotor gearshaft removed
5.21	Main rotor head removed
11.6	Swashplate removed

WARNING

FLIGHT SAFETY PART

The main rotor support mast is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION – continued

6.97.3. Removal

a. **Install lifting eye (1) on mast (2).** Use sling set kit.

b. **Attach hook (3) of crane to lifting eye (1).**

CAUTION

Place mast on wood pallet or similar platform to prevent damage to mast.

c. **Remove mast (2) from support (4).**

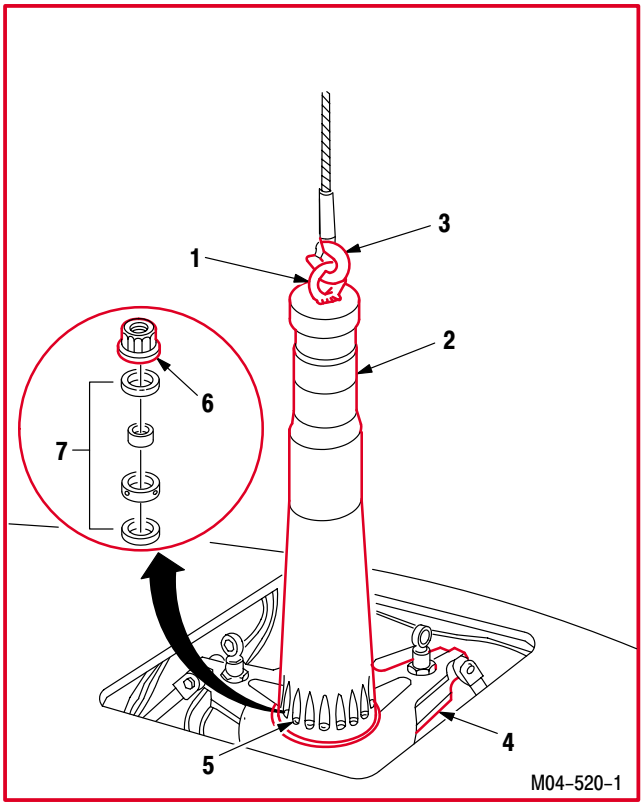
(1) Remove sealant from threads of 18 support bolts (5) (para 1.47).

(2) Remove and discard 18 nuts (6) and preload indicating (PLI) washers (7) from support bolts (5).

(3) Lift mast (2) from support (4), then lower, while guiding to platform.

d. **Cover support (4).** Use cushioning material (item 68, App F).

e. **Remove hook (3) of crane from lifting eye (1) and remove lifting eye (1) from mast (2), if mast (2) is being replaced.**



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6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION – continued

6.97.4. Cleaning

a. **Remove old sealant from support, bolts, and spacer plate** (para 1.47)**.**

b. **If mast is not being replaced, remove old sealant from bolt holes in mast base** (para 1.47)**.**

c. **Wipe removed and attaching parts with a clean rag.**

6.97.5. Inspection

a. **Check mast attachment area for cracks.** None allowed.

b. **Check bolts for thread damage.** None allowed.

c. **Check mast for cracks, nicks, gouges, and corrosion.** Use depth gage (TM 55-1500-344-23).

NOTE

The electroless nickel, cadmium, titanium, and silver plating finish applications are allowed to overlap in the thread relief area. This condition occurs during manufacturing and is not considered a defect.

(1) Damage to threads or thread relief area only allowed to top **0.160 INCH** starter threads.

(2) Damage to other areas not exceeding **0.003 INCHES** deep need not be repaired. Use depth gage.

(3) Damage to all other areas exceeding **0.003 INCHES** but not exceeding **0.020 INCHES** deep may be repaired. Use depth gage.

GO TO NEXT PAGE

6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION – continued

6.97.6. Repair

NOTE

- Surface D is nickel/silver plated. Build up of black silver oxide on this area is result of fretting action and is acceptable. Do not remove black silver oxide.
- The inspection criteria below requires no rework/repair if the limitations **(0.003 INCH)** are not exceeded.

a. **All surfaces except surface G and H.** See step b for surface H and step c for surface G.

(1) Blend damaged surfaces to a minimum of a 20:1 ratio. Each contiguous blended area shall not exceed a **2.0 INCH** diameter.

(2) Fluorescent dye penetrant inspect repaired surfaces. No cracks or deformities allowed (TM 55-1500-335-23). Use fluorescent inspection kit.

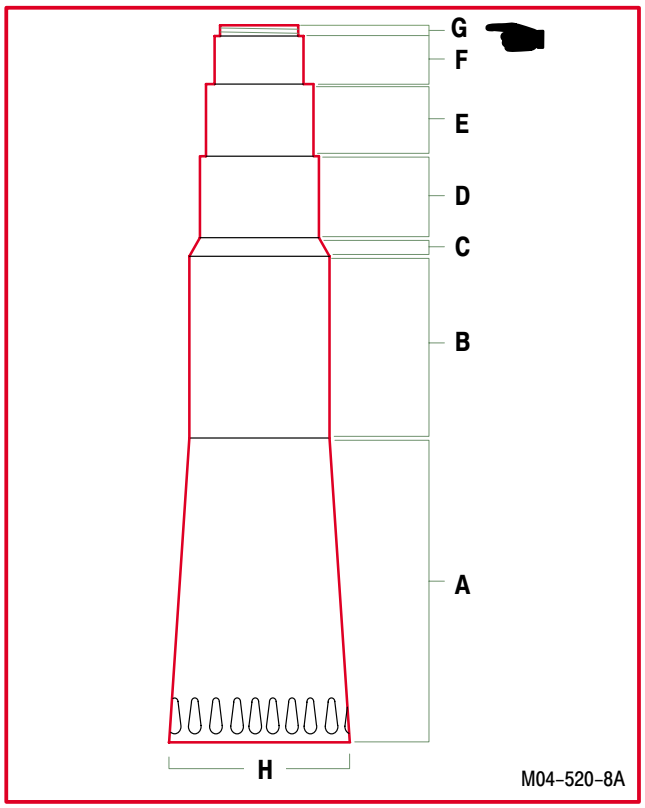


(3) Finish repaired areas as follows:

(a) Surface A, apply primer coating to repaired area. Use primer coating (item 147, App F).

(b) Surfaces B, D, E, and F. Apply lubricant to repaired area. Use lubricant (item 116, App F).

1 Allow lubricated surfaces to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at **150** °**F** (66 °C).



GO TO NEXT PAGE

6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION – continued

(c) Surface C.

1 apply corrosion preventative compound to repaired area. Use corrosion preventive compound (item 63, App F).

2 Wipe off excess compound with a clean rag. Use cloth (item 51, App F).

3 Apply corrosion preventative compound to touched up area. Use corrosion preventive compound (item 62, App F).

b. **Surface H.**

(1) Missing plating on surface H, abrade with abrasive cloth and apply primer, not to exceed **20 PERCENT** of flange surface area. Use cloth (item 48, App F) and epoxy primer coating kit (item 78, App F).

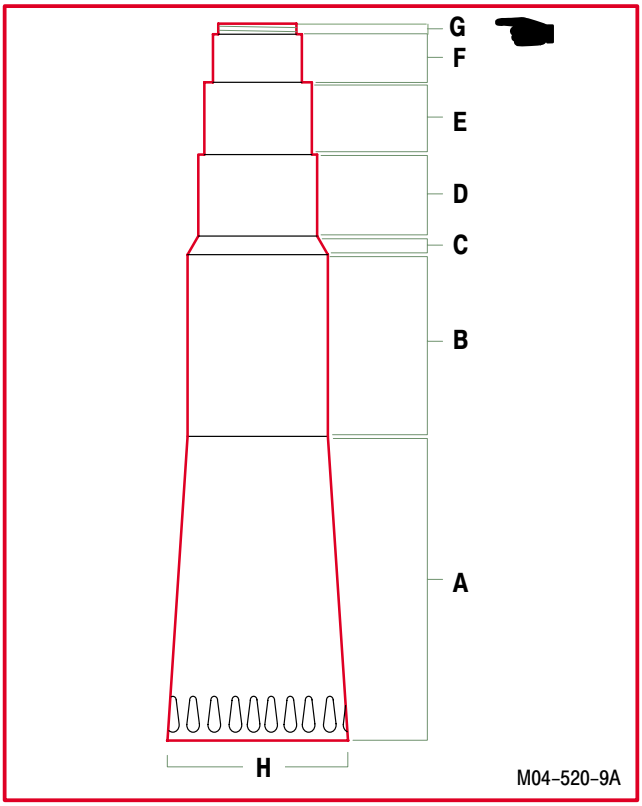
c. **Surface G.**

(1) Check threads in surface G. Damage is allowed to top **0.160 INCH** starter threads.

(2) Check that damage does not exceed **0.003 INCH** or penetrate through to base material. Ensure retention nut is not impeded during run–on.

(3) Check that lower edge of major diameter of thread is within the **0.160 INCH** on surface G.

(4) Blend damaged surface to a minimum of 20:1 ratio. Each contiguous blended area shall not exceed a **2.0 INCH** diameter.



GO TO NEXT PAGE

6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION – continued



(5) Clean repaired area.

(a) Clean repaired surface of dirt, grease, and metal particles. Use cloth (item 51, App F) and dry cleaning solvent (item 74, App F).

(b) Remove oil residue from dry cleaning solvent. Use cloth (item 51, App F) and isopropyl alcohol (item 106, App F).

(6) Fluorescent dye penetrant inspect repaired surface. No cracks or deformities allowed (TM 55-1500-335-23). Use fluorescent inspection kit

(7) Mask off area around repaired surface. Use tape (item 206, App F).

(8) Apply solid film lubricant. Use lubricant (item 115A, App F).

(a) Spray uniform coating **0.0002 – 0.0005 INCH** thick on repaired area. Use lubricant (item 115A, App F).

(b) Allow lubricant to air dry for a minimum of 18 hours at room temperature.

6.97.7. Installation

a. **Install lifting eye (1) on mast (2), if mast (2) is being replaced.**

(1) Attach crane hook (3) to lifting eye (1).



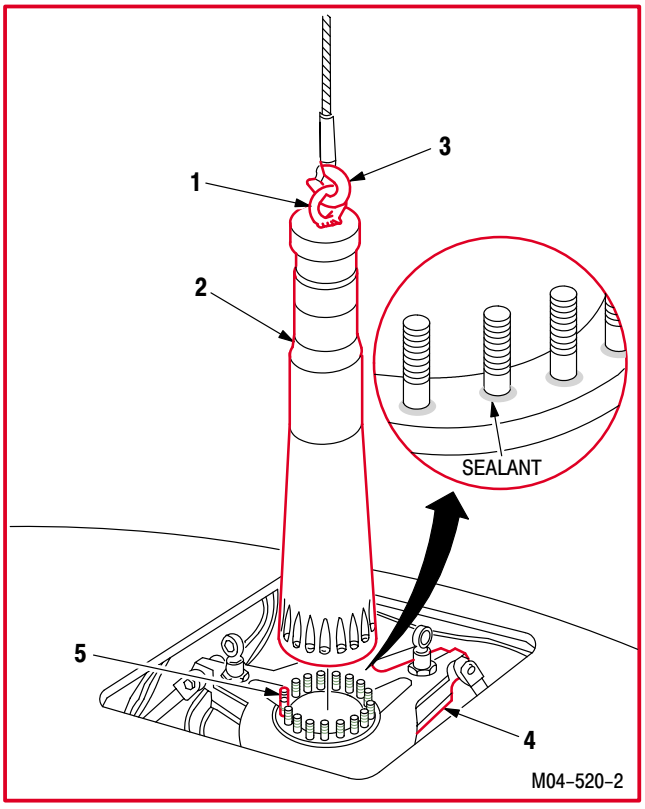
b. **Install mast (2) on support (4).**

(1) Apply a thin coat of sealing compound to bottom **3/4 INCH** of 18 support bolts (5). Use sealing compound (item 177, App F).

(2) Lift mast (2) from platform, then lower in place on support (4).

(3) Aline bolt holes in mast (2) with bolts (5) on support (4).

(4) Wipe excess sealant from bolts (5) and bolt holes in base of mast (2) with a clean rag.



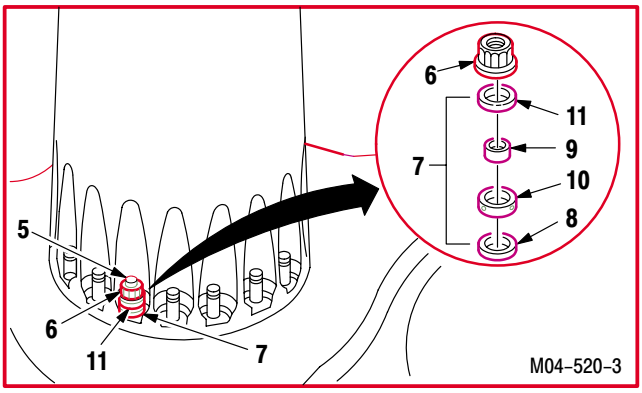
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6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION – continued

c. **Install 18 new nuts (6) and new PLI washers (7).**

(1) Put 18 PLI washers (7) in place by installing washer (8), inner washer (9), outer torque indicating washer (10), and washer (11) on each bolt (5).

(2) Thread 18 nuts (6) on bolts (5) until nuts (6) contact washers (11).



CAUTION

To prevent damage to nut, torque indicating washer, and bolt, do not tighten nut after washer will not turn.

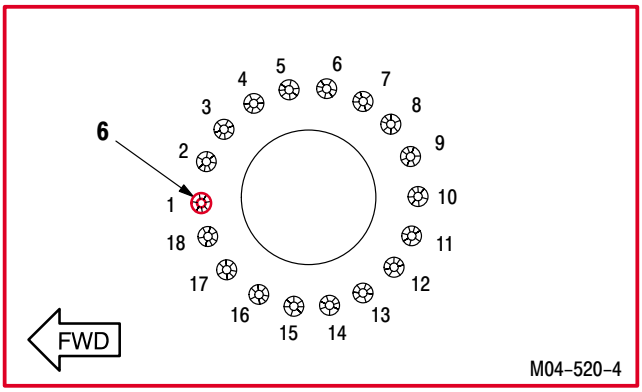
d. **Inspect (QA).**

e. **Torque 18 nuts (6), using PLI washer torque method.**

NOTE

Inspector must be present when nuts are being torqued.

(1) Tighten 18 nuts (6) in 1/8 turn increments in following order: 1, 10, 6, 14, 3, 12, 8, 16, 5, 11, 18, 9, 2, 13, 4, 15, 7, and 17.

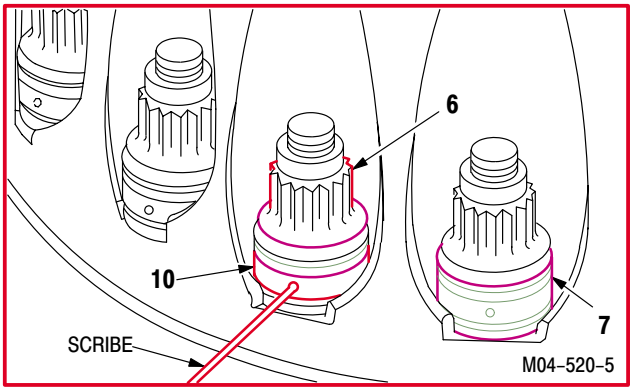


(2) Insert scriber in hole on outer torque indicating washer (10) and try to turn outer washer (10).

NOTE

Torque is correct when outer torque indicating washer will no longer turn.

(3) Continue tightening nuts (6) in 1/8 turn increments until outer washer (10) will no longer turn.



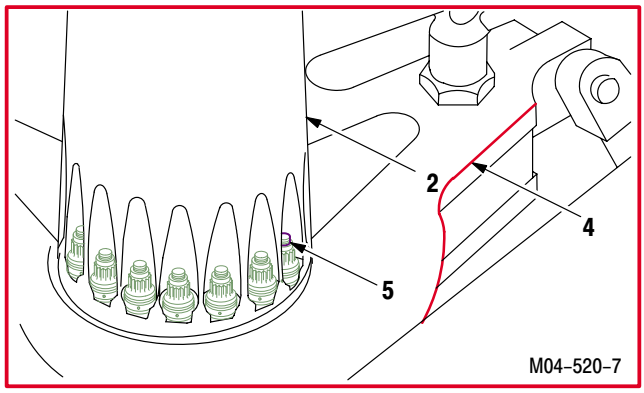
f. **Touch up bare surface of 18 PLI washers (7)** (TM 55-1500-345-23)**.**

g. **Inspect (QA).**

GO TO NEXT PAGE

6.97. MAIN ROTOR SUPPORT MAST REMOVAL/INSTALLATION – continued

h. **Apply sealing compound to exposed threads of 18 bolts (5).** Use sealing compound (item 177, App F).



i. **Perform electrical bond check between mast (2) and support (4)** (TM 55-1500-323-24)**.**

(1) Bond shall be **0.005 OHM** or less. Use ohmmeter.

(2) If resistance exceeds **0.005 OHM**, replace spacer plate (12) (para 6.98).

j. **Apply sealing compound to base of mast (2).** Use sealing compound (item 177, App F).

k. **Remove hook (3) of crane from lifting eye (1).**

l. **Remove lifting eye (1) from mast (2).**

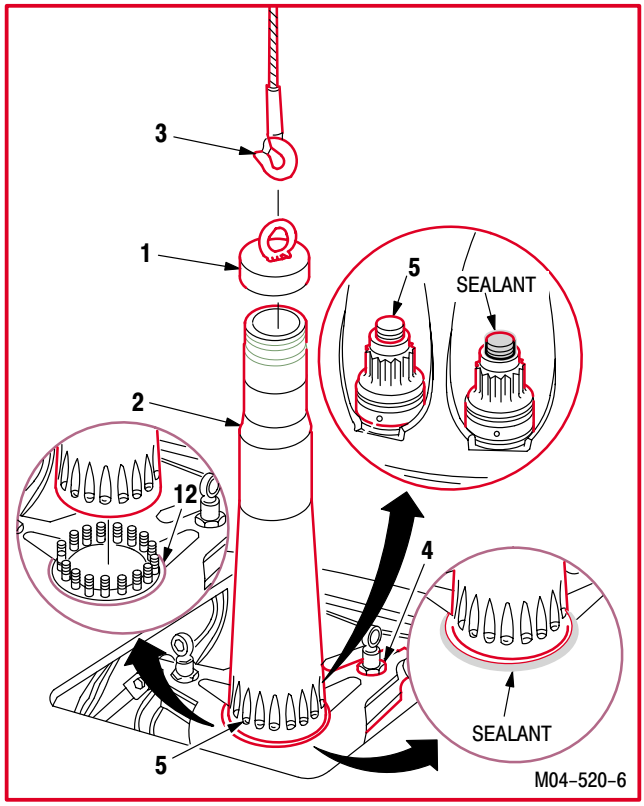
m. **Inspect (QA).**

n. **Install swashplate** (para 11.7)**.**

o. **Install main rotor head** (para 5.21)**.**

p. **Install main rotor gearshaft** (para 6.95)**.**

q. **Remove maintenance crane** (para 1.105)**.**



END OF TASK

6.98. MAIN ROTOR MAST SUPPORT BASE SPACER PLATE REMOVAL/INSTALLATION

6.98.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.98.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Ohmmeter (item 218, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Cloth (item 52, App F)
Corrosion resistant coating (item 66, App F)
Methyl ethyl ketone (item 124, App F)
Sealing compound (item 176, App F)

Personnel Required:

67R	Attack Helicopter Repairer
68D	Aircraft Powertrain Repairer/NDI
68X	Armament/Electrical System Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.97	Rotor support mast removed

WARNING

FLIGHT SAFETY PART

The main rotor mast support base is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

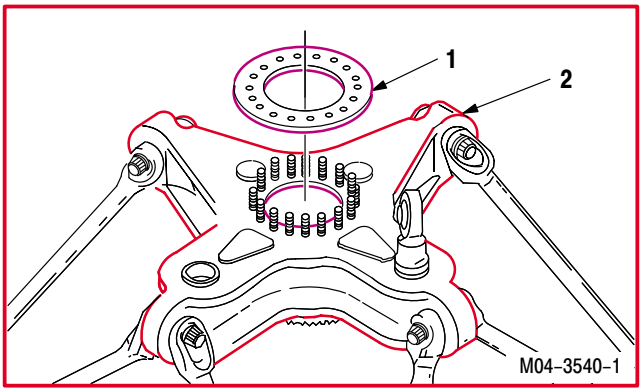
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6.98. MAIN ROTOR MAST SUPPORT BASE SPACER PLATE REMOVAL/INSTALLATION – continued

6.98.3. Removal



a. **Clean fillet sealant from base of spacer plate (1) at support base (2)** (para 1.47)**.** Use methyl ethyl ketone (item 124, App F).



CAUTION

Do not damage support base when removing support plate.

b. **Remove spacer plate (1) from support base (2).** Use putty knife.

6.98.4. Cleaning

a. **Clean support base and spacer plate** (para 1.47)**.** Use methyl ethyl ketone (item 124, App F).

6.98.5. Inspection

a. **Check base for cracks.** None allowed.

b. **Check support base for corrosion** (para 1.49)**.**

(1) Repair by blending and refinishing corrosion damage up to **0.025 INCH** deep. Use depth gage.

c. **Check spacer plate for corrosion** (para 1.49)**.**

(1) Repair by blending and refinishing corrosion damage up to **0.015 INCH** deep. Use depth gage.

d. **Check bolts for damaged or worn threads.** None allowed.

GO TO NEXT PAGE

6.98. MAIN ROTOR MAST SUPPORT BASE SPACER PLATE REMOVAL/INSTALLATION – continued

6.98.6. Installation



CAUTION

Mating surfaces of spacer plate and support base must be prepared prior to installation to ensure an acceptable electrical bond. Mating surfaces must be free of adhesive and chemical film treatments.

a. **Prepare spacer plate (1) and support base (2).**

(1) Clean mating surfaces of spacer plate (1) and support base (2) (para 1.47). Use methyl ethyl ketone (item 124, App F).

(2) Apply coating to spacer plate (1) and support base (2). Use corrosion resistant coating (item 66, App F).

(3) Allow coating to stand on surfaces for **1.5 to 2 MINUTES**, then remove excess coating with a clean lint free cloth and water. Use cloth (item 52, App F).

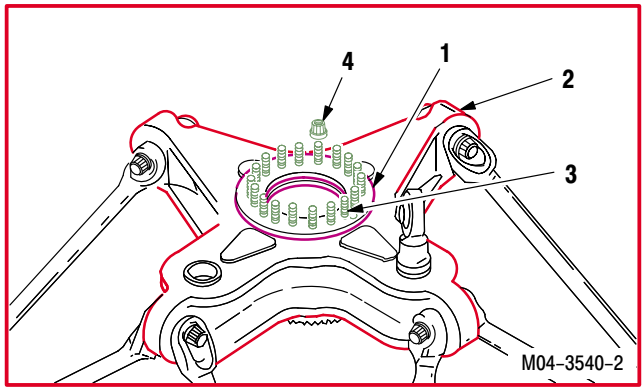
(4) Dry prepared surfaces with a clean lint free cloth. Use cloth (item 52, App F).

b. **Position spacer plate (1) over bolts (3) on support base (2)** (TM 55-1500-323-24)**.**

(1) Secure spacer plate (1) temporarily using four nuts (4) spaced evenly around perimeter of spacer plate (1).

c. **Perform electrical bond check between spacer plate (1) and support base (2)** (TM 55-1500-323-24)**.**

(1) Bond shall be **0.005 OHM** or less. Use ohmmeter.



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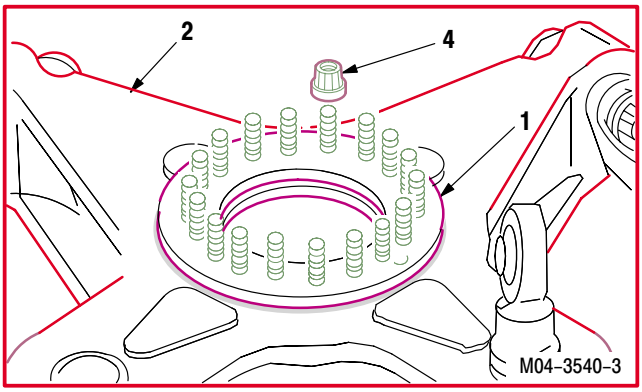
6.98. MAIN ROTOR MAST SUPPORT BASE SPACER PLATE REMOVAL/INSTALLATION – continued



d. **Seal mating surface of spacer plate (1) and support base (2).**

(1) Apply a fillet of sealant around base of spacer plate (1) at support base (2). Use sealing compound (item 176, App F).

(2) Allow sealing compound to cure a minimum of **30 MINUTES**.



e. **Remove nuts (4) from perimeter of spacer plate (1).**

f. **Inspect (QA).**

g. **Install rotor support mast** (para 6.97)**.**

END OF TASK

6.99. MAIN ROTOR MAST MOUNTING BOLT REPLACEMENT (AVIM)

6.99.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.99.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Lubricant (item NO TAG, App F)
Sealing compound (item 177, App F)
Wire (item 224, App F)

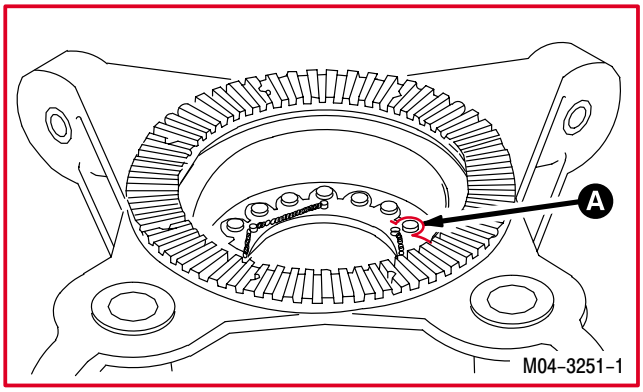
Equipment Conditions:

Ref	Condition
6.100	Mast base oil retainer removed

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.99. MAIN ROTOR MAST MOUNTING BOLT REPLACEMENT (AVIM) – continued

6.99.3. Removal

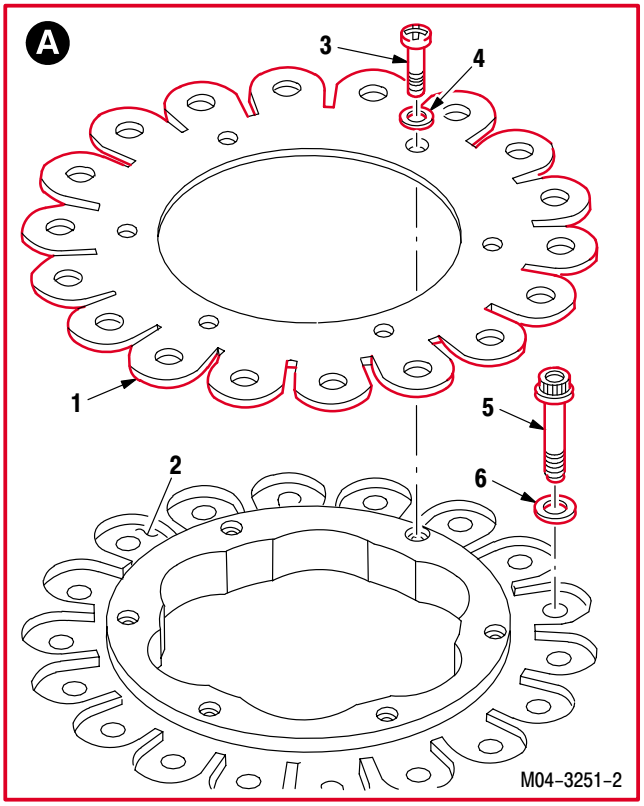
a. **Remove retainer (1) from mast base (2).**

(1) Remove lockwire from six screws (3).

(2) Remove six screws (3) and washers (4).

(3) Remove retainer (1).

b. **Remove 18 bolts (5) and washers (6) from mast base (2).**



6.99.4. Cleaning

a. **Clean bolts, washers, base, and retainer** (para 1.47)**.**

6.99.5. Inspection

a. **Check for cracks.** None allowed.

b. **Check for thread damage.** None allowed.

6.99.6. Installation



a. **Lubricate shank and threads of 18 bolts (5).** Use lubricant (item NO TAG, App F).

(1) Allow lubricated bolts to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).



b. **Apply sealing compound to bolt heads (5) at shank radius.** Use sealing compound (item 177, App F).

c. **Install washers (6) on bolts (5) and apply sealing compound on shank 1 INCH from bolt head.** Use sealing compound (item 177, App F).

GO TO NEXT PAGE

6.99. MAIN ROTOR MAST MOUNTING BOLT REPLACEMENT (AVIM) – continued

d. **Install 18 bolts (5) and washers (6) through mast base (2).**

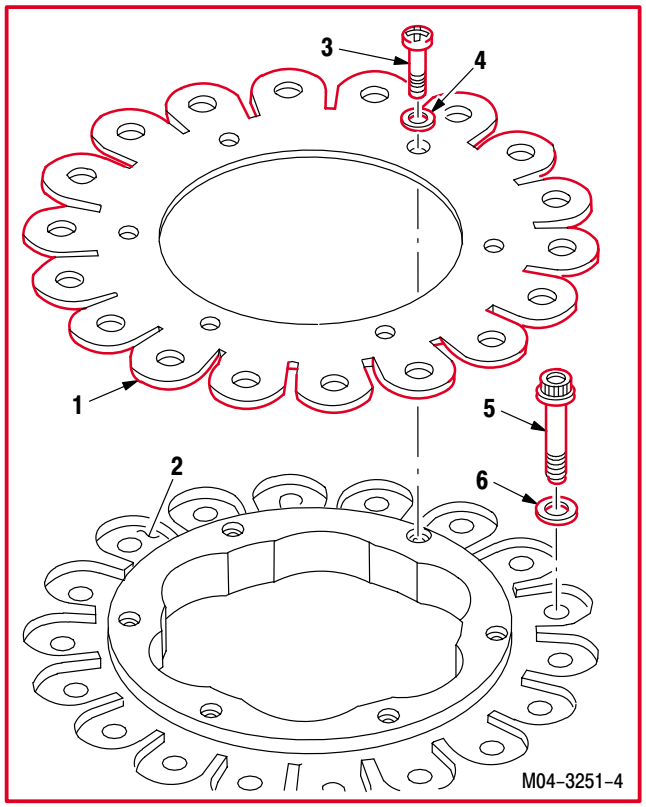
e. **Install retainer (1) on mast base (2).**

(1) Position retainer (1) over bolts (5) and mast base (2).

(2) Install six screws (3) through washers (4), retainer (1), and mast base (2).

CAUTION

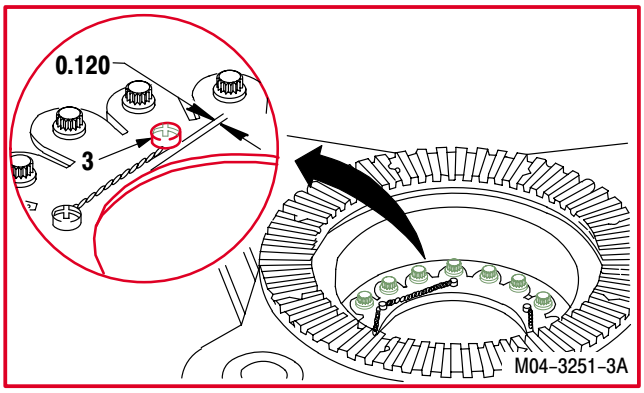
To prevent damage to main rotor drive shaft and oil seal, lockwire shall be not less than **0.120 INCH** from edge of retainer opening.



(3) Lockwire six screws (3) in sets of three.

(a) Use double twist method. Use wire (item 224, App F).

(b) Twist pigtails outboard away from rotor mast opening.



f. **Inspect (QA).**

g. **Install mast base oil seal retainer** (para 6.100)**.**

END OF TASK

6.100. MAST BASE OIL SEAL RETAINER REMOVAL/INSTALLATION (AVIM)

6.100.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.100.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Corrosion preventive compound (item 63, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The mast base oil seal retainer is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

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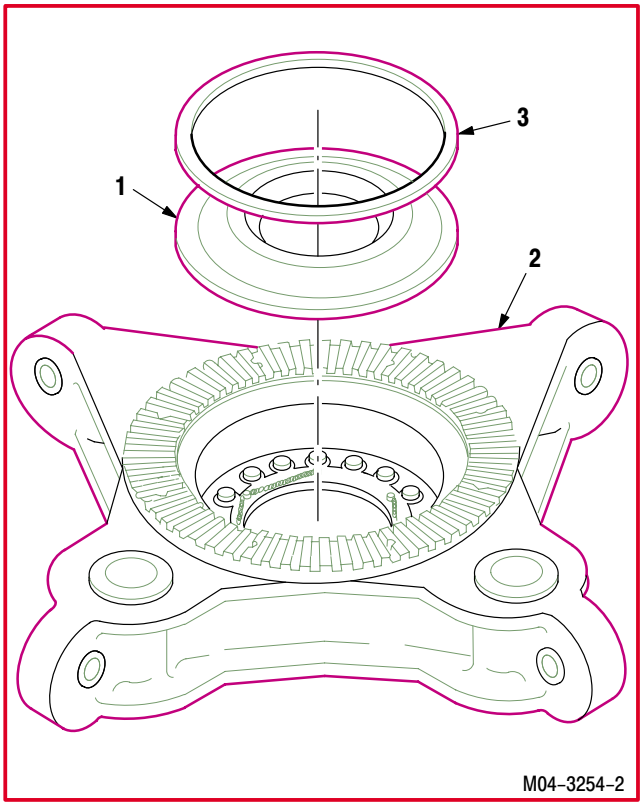
6.100. MAST BASE OIL SEAL RETAINER REMOVAL/INSTALLATION (AVIM) – continued

6.100.3. Removal

a. **Remove oil seal retainer (1) from mast base (2).**

(1) Remove retaining ring (3).

(2) Remove retainer (1).



6.100.4. Cleaning

a. **Wipe retainer and attaching area with a clean rag.**

6.100.5. Inspection

a. **Check retainer attaching area for cracks.** None allowed.

b. **Check retainer attaching area for corrosion** (para 1.49)**.**

6.100.6. Installation



a. **Install retainer (1) on base (2).**

(1) Apply a light coat of corrosion preventive compound to outer edge of shield (1), retaining ring (3), and retaining ring groove. Use corrosion preventive compound (item 63, App F).

(2) Install retainer (1).

(3) Install retaining ring (3).

b. **Inspect (QA).**

END OF TASK

6.101. MAIN TRANSMISSION REMOVAL

6.101.1. Description

This task covers:

6.102 Transmission Removal – Disconnect Left Side.
6.103 Transmission Removal – Disconnect Catwalk Area.
6.104 Transmission Removal – Disconnect Right Side.
6.105 Transmission Removal – Platform Installation.
6.106 Transmission Removal – Lower and Remove Transmission.

6.101.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Airframe adapter kit (item 25, App H)
Transmission jackscrew (item 186, App H) (p/o item 397, App H)
Sling set kit (item 194, App H)
Rail type trailer (item 396, App H)
Transmission removal kit (item 397, App H)
1 1/4 & 1 5/16-inch open end wrench (item 419, App H)
1 3/16 & 1 1/4-inch open end wrench (item 420, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
Two persons to assist

References:

TM 55-1500-335-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panels L200 and R200 removed; fairings L230 and R230 removed
1.32	Main transmission oil system drained
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented
12.32	Main deck fire/overheat detector removed
1.97	Maintenance crane installed
5.3	Main rotor blades removed
6.95	Main rotor gearshaft removed
9.26	AC generator No. 1 removed
9.27	AC generator No. 2 removed

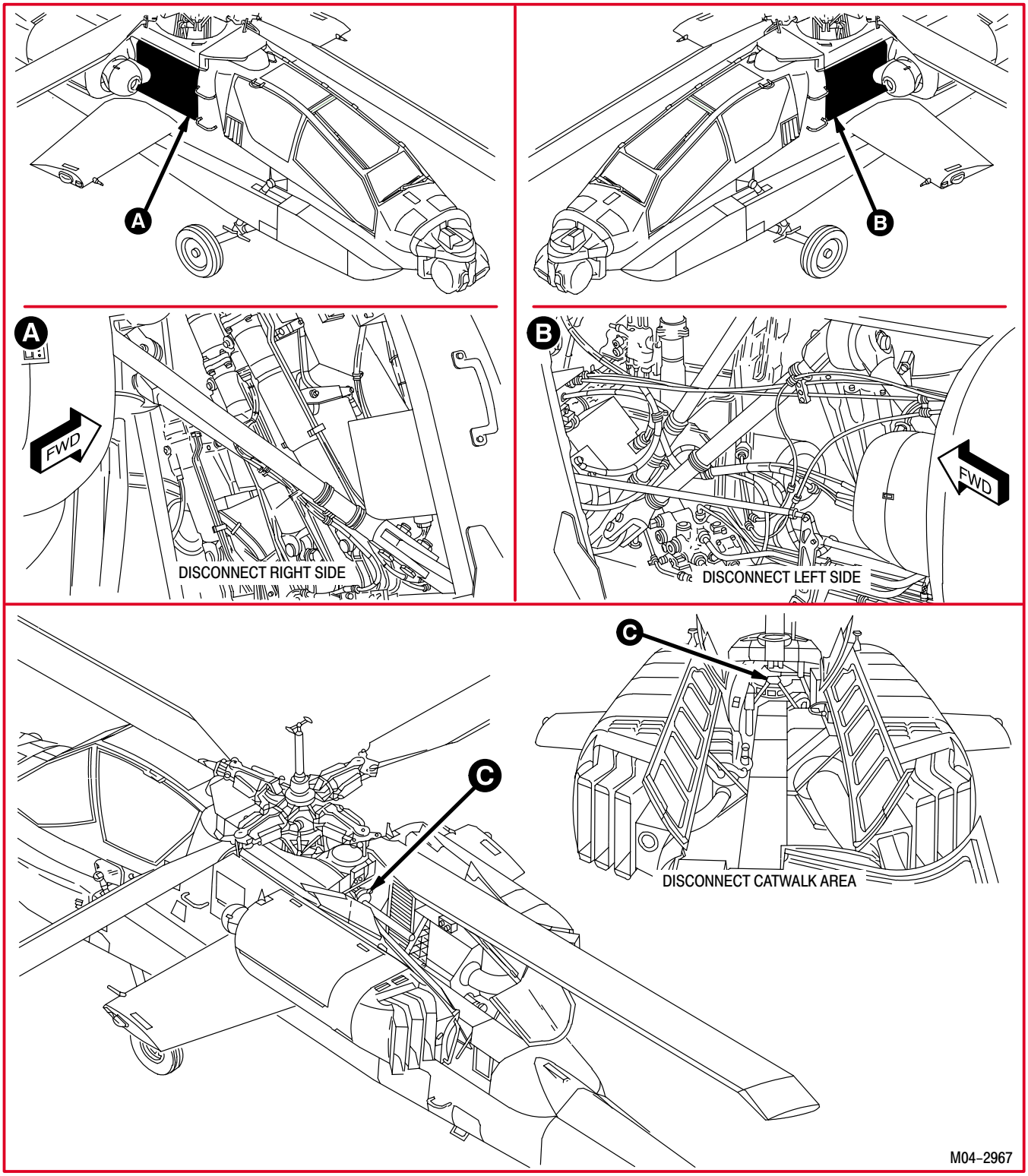
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.101. MAIN TRANSMISSION REMOVAL – continued



GO TO NEXT PARAGRAPH

6.102. TRANSMISSION REMOVAL – DISCONNECT LEFT SIDE

6.102.1. Description

This task covers: Disconnect Left Side.

6.102.2. Initial Setup

Equipment Conditions:

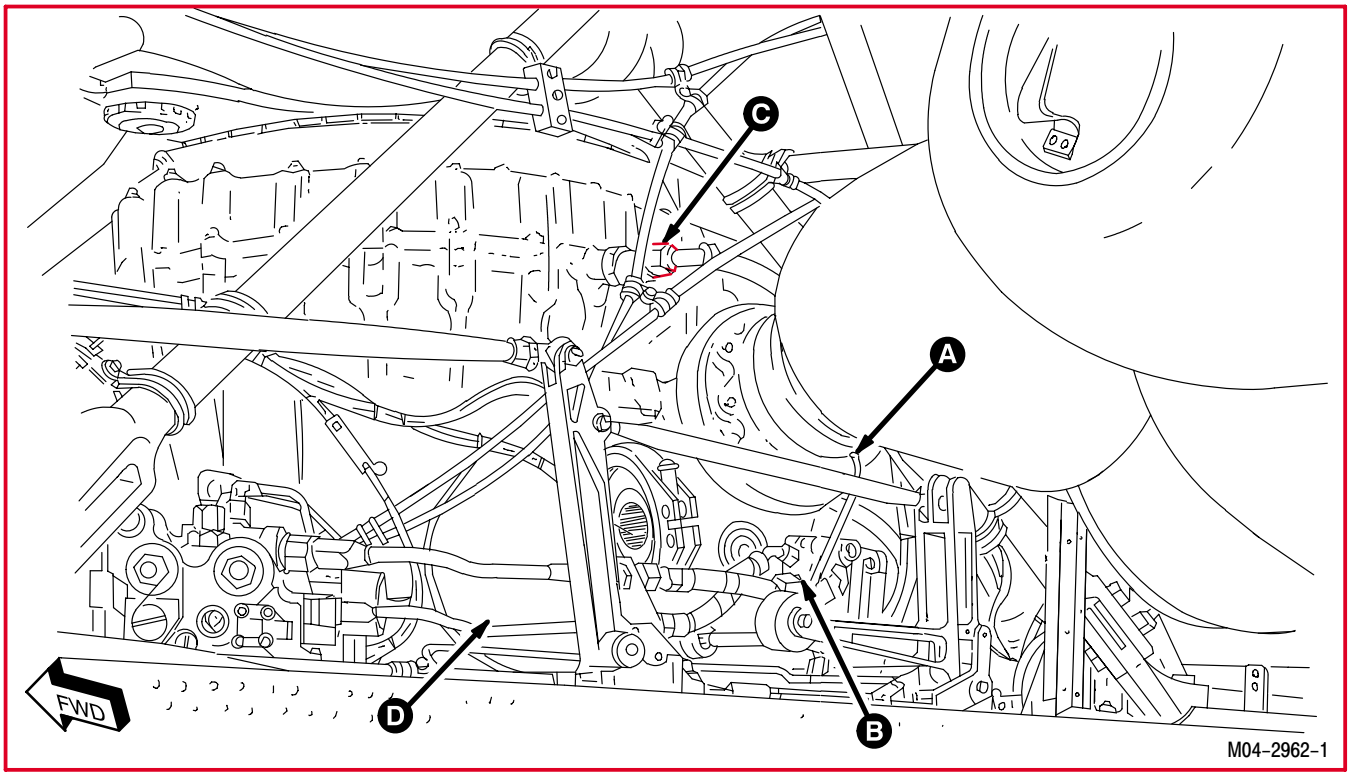
Ref	Condition
6.101	Main transmission removal

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.102.3. Disconnect Left Side



GO TO NEXT PAGE

6.102. TRANSMISSION REMOVAL – DISCONNECT LEFT SIDE – continued

a. **Remove No. 1 engine input drive shaft** (para 6.2)**.**

b. **Remove main transmission No. 1 engine input coupling** (para 6.3)**.**

c. **Remove left nose gearbox diffuser** (para 6.33)**.**

d. **Remove left main transmission filter bowl and element** (para 6.61)**.**

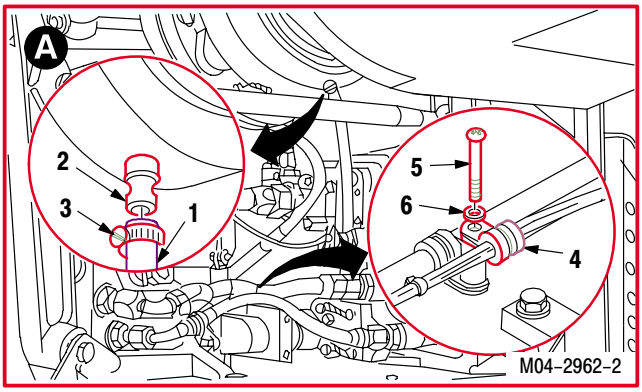
e. **Remove left input quill drain tube (1) from drain fitting (2).**

(1) Loosen clamp (3).

(2) Slide tube (1) from drain fitting (2).

f. **Remove clamp (4).**

(1) Remove screw (5) and washer (6).



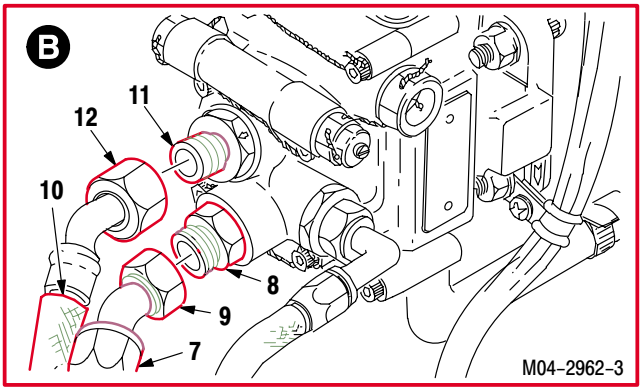
g. **Remove left hydraulic pump inlet hose (7) from reducer (8).**

(1) Hold reducer (8). Remove nut (9).

h. **Remove left hydraulic pump outlet hose (10) from valve (11).**

(1) Hold valve (11). Remove nut (12).

i. **If replacing transmission, remove hydraulic pump** (para 7.4)**.**

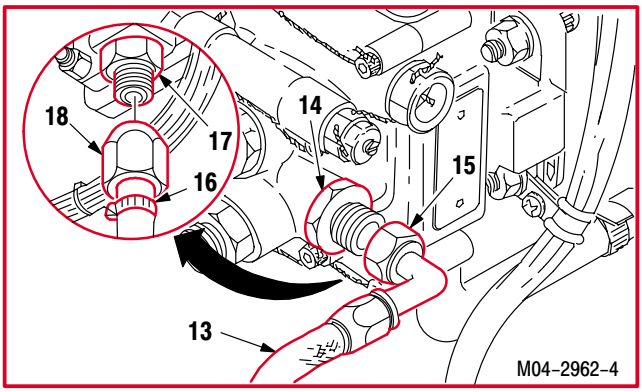


j. **Remove left hydraulic pump case drain hose (13) from union (14).**

(1) Hold union (14). Remove nut (15).

k. **Remove left hydraulic pump seal drain hose (16) from union (17).**

(1) Hold union (17). Remove nut (18).



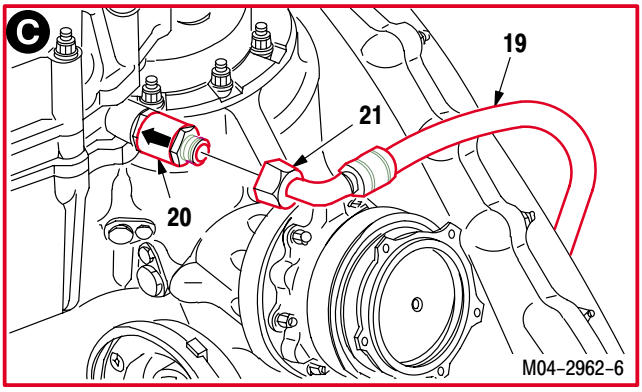
GO TO NEXT PAGE

6.102. TRANSMISSION REMOVAL – DISCONNECT LEFT SIDE – continued

l. **Remove left lube oil inlet hose (19) from check valve (20).**

(1) Hold check valve (20). Remove nut (21).

m. **If replacing transmission, remove check valve (20)** (para 6.80)**.**



n. **Remove left lube oil outlet hose (22).**

(1) Slide sleeve (23) away from body (24).

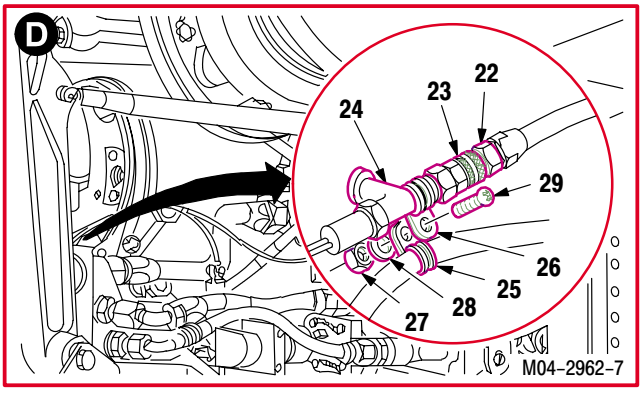
(2) Turn sleeve (23) counterclockwise until free.

o. **Remove clamps (25) and (26).**

(1) Remove nut (27) and washer (28).

(2) Remove screw (29), clamps (25), and (26).

p. **Remove oil pressure switch** (para 6.78)**.**



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6.103. TRANSMISSION REMOVAL – DISCONNECT CATWALK AREA

6.103.1. Description

This task covers: Disconnect Catwalk Area.

6.103.2. Initial Setup

Equipment Conditions:

Ref	Condition
6.101	Main transmission removal

WARNING

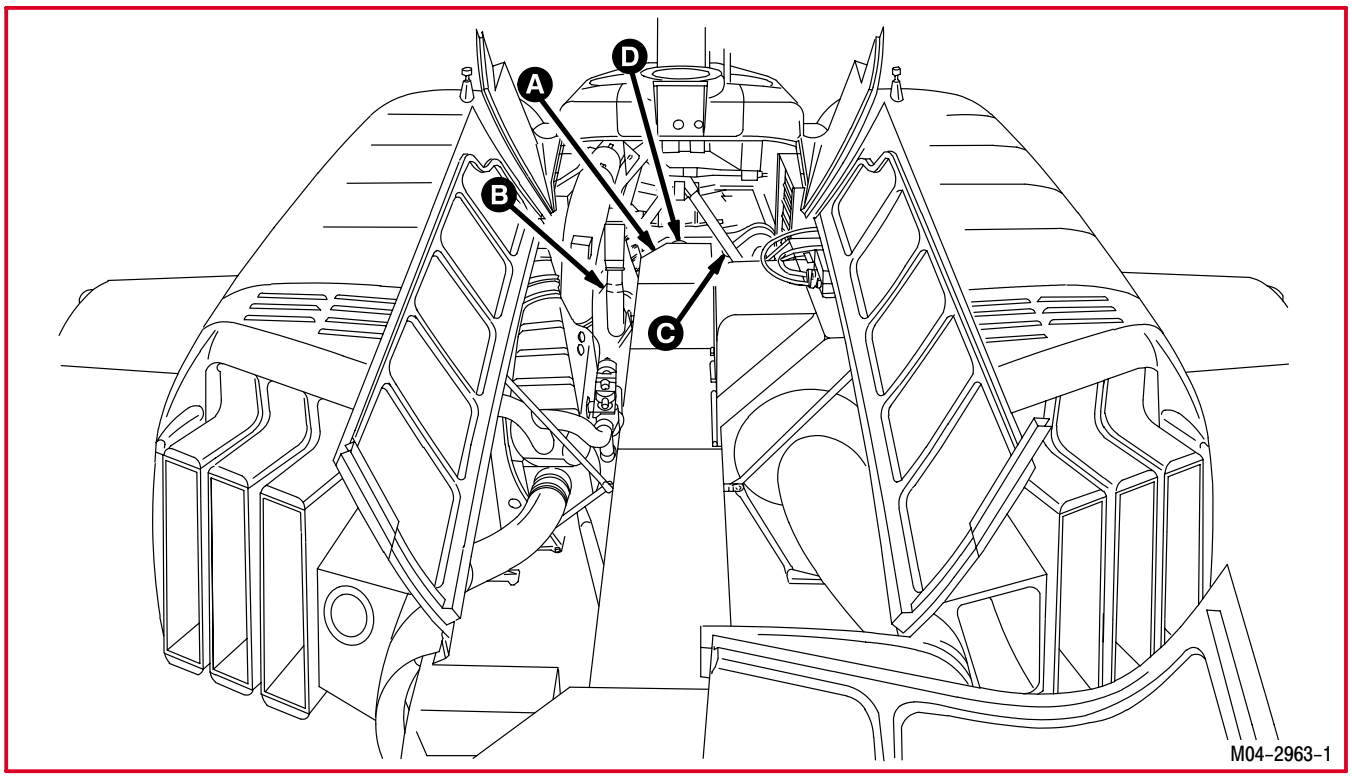
FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.103. TRANSMISSION REMOVAL – DISCONNECT CATWALK AREA – continued

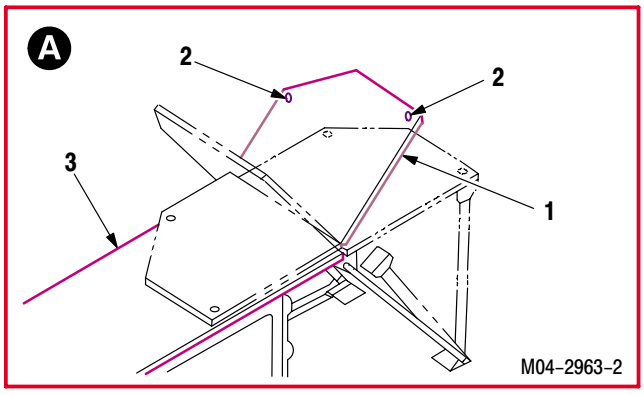
6.103.3. Disconnect Catwalk Area



a. **Fold back catwalk hinged extension (1).**

(1) Unlock two fasteners (2).

(2) Fold extension (1) back on fixed catwalk panel (3).



GO TO NEXT PAGE

6.103. TRANSMISSION REMOVAL – DISCONNECT CATWALK AREA – continued

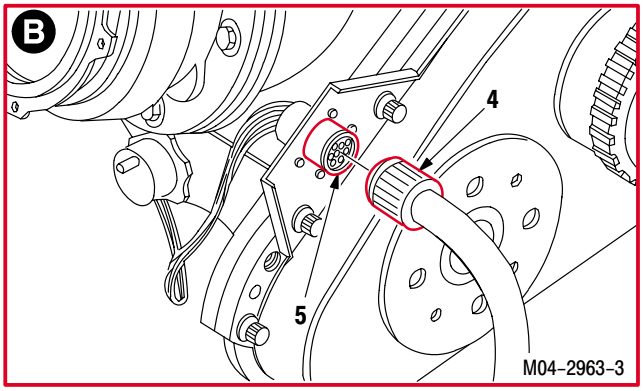
b. **Detach connector P755 (4) from receptacle J755 (5).**

c. **Remove No. 3 tail rotor drive shaft** (para 6.5)**.**

d. **Remove main transmission output coupling** (para 6.4)**.**

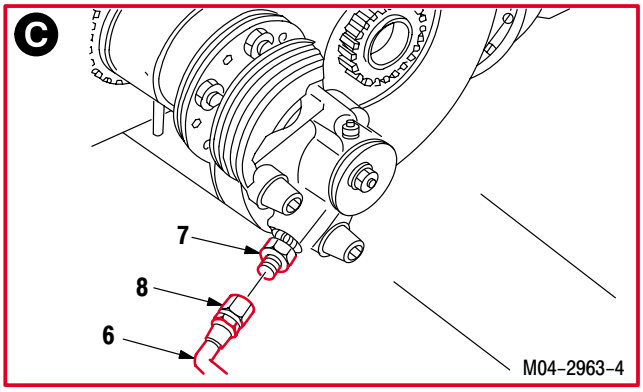
e. **Remove shaft driven compressor** (para 7.120)**.**

f. **Remove No. 7 APU drive shaft and antiflail** (para 6.16)**.**



g. **Remove rotor brake hydraulic hose (6) from union (7).**

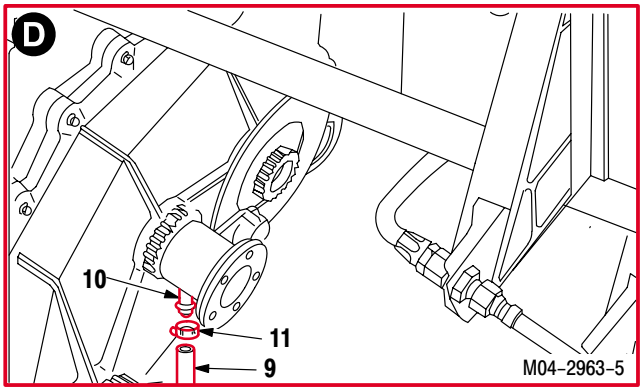
(1) Hold union (7). Remove nut (8).



h. **Remove tail rotor drive flange drain tube (9) from drain fitting (10).**

(1) Loosen clamp (11).

(2) Slide tube (9) from fitting (10).



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6.104. TRANSMISSION REMOVAL – DISCONNECT RIGHT SIDE

6.104.1. Description

This task covers: Disconnect Right Side.

6.104.2. Initial Setup

Equipment Conditions:

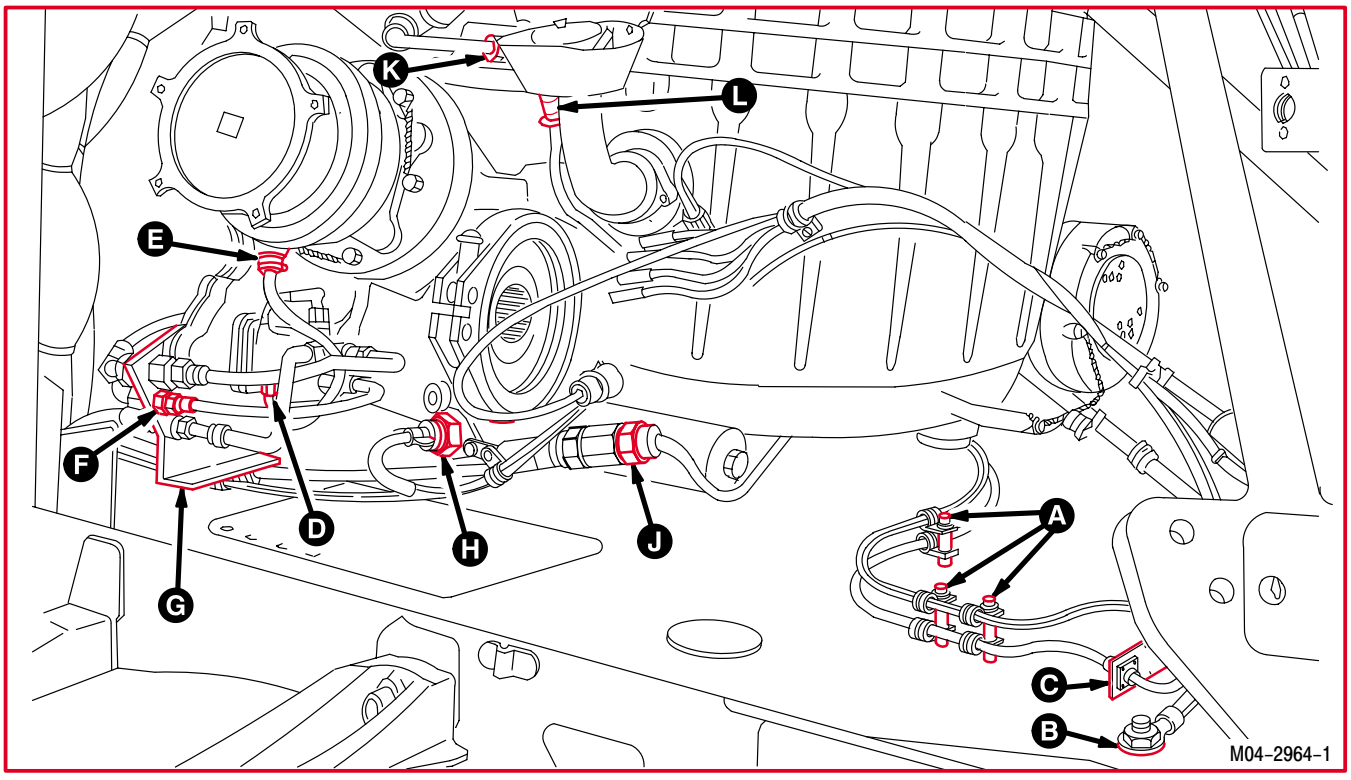
Ref	Condition
6.101	Main transmission removal

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.104.3. Disconnect Right Side



GO TO NEXT PAGE

6.104. TRANSMISSION REMOVAL – DISCONNECT RIGHT SIDE – continued

NOTE

Place rag under right side of transmission prior to disassembly.

a. **Remove blade de-ice system controller** (para 12.55)**.**

b. **Remove No. 2 engine drive shaft** (para 6.2)**.**

c. **Remove right nose gearbox diffuser** (para 6.33)**.**

d. **Remove main transmission No. 2 engine input coupling** (para 6.3)**.**

e. **Remove right forward side transmission strut** (para 2.93)**.**

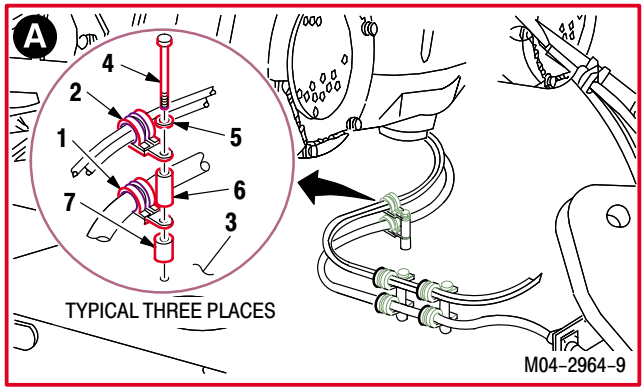
f. **Remove right aft side transmission strut** (para 2.95)**.**

g. **Remove main transmission temperature transducer** (para 6.42)**.**

h. **Remove main transmission right bowl and filter element** (para 6.61)**.**

i. **Remove three wire harness clamps (1) and clamps (2) from airframe (3).**

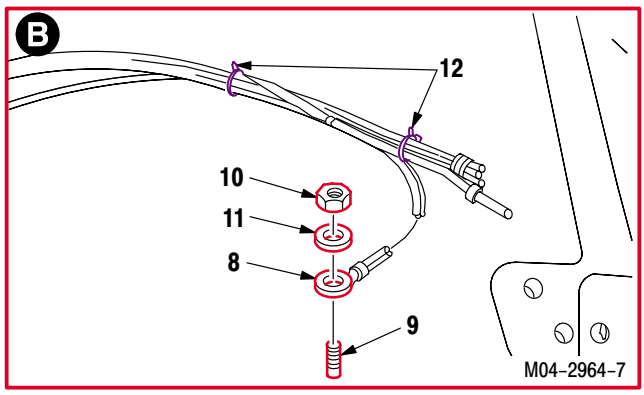
(1) Remove screw (4) and washer (5), clamp (2), spacer (6), clamp (1), and spacer (7).



j. **Remove generator electrical lead (8) from ground stud GS480 (9).**

(1) Remove nut (10), washer (11), and lead (8) from stud (9).

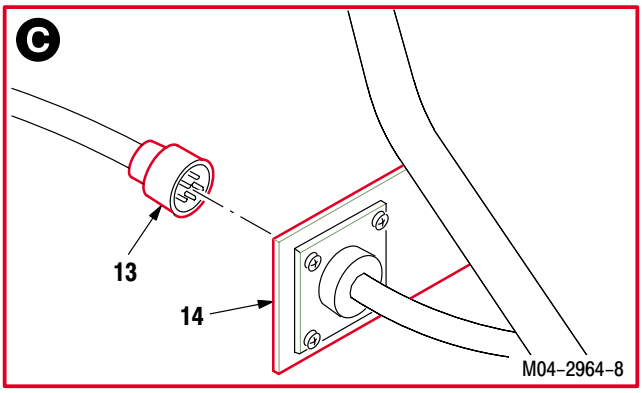
(2) Remove ties (12).



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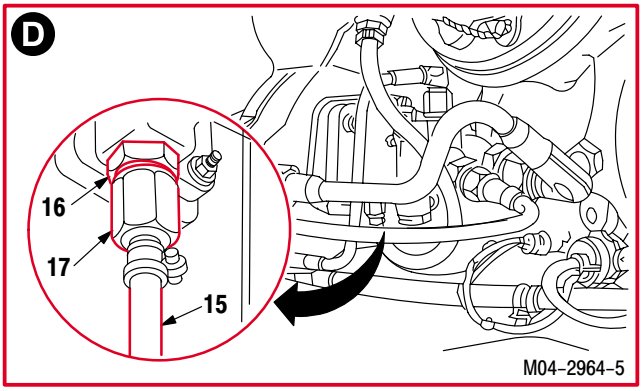
6.104. TRANSMISSION REMOVAL – DISCONNECT RIGHT SIDE – continued

k. **Detach connector P131 (13) from receptacle J131 (14).**



l. **Remove right hydraulic pump seal drain hose (15) from union (16).**

(1) Hold union (16). Remove nut (17).



m. **Remove right input quill drain tube (18) from drain fitting (19).**

(1) Loosen clamp (20).

(2) Slide tube (18) from drain fitting (19).

n. **Remove right hydraulic pump inlet hose (21) from bulkhead union (22).**

(1) Hold union (22). Remove nut (23).

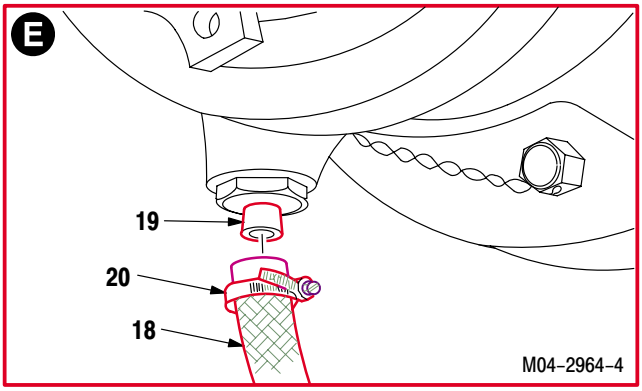
o. **Remove right hydraulic pump outlet hose (24) from bulkhead union (25).**

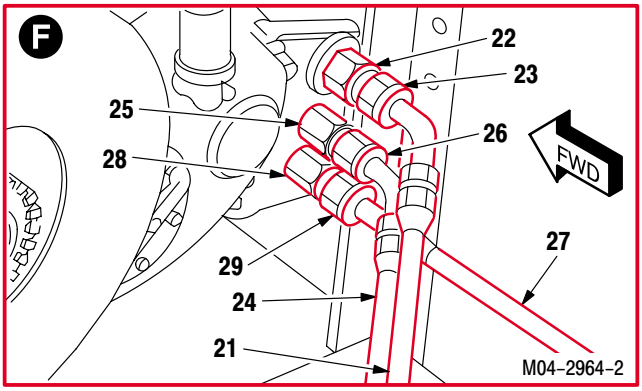
(1) Hold union (25). Remove nut (26).

p. **Remove right hydraulic pump case drain hose (27) from bulkhead union (28).**

(1) Hold union (28). Remove nut (29).

q. **If replacing transmission, remove hydraulic pump** (para 7.58)**.**



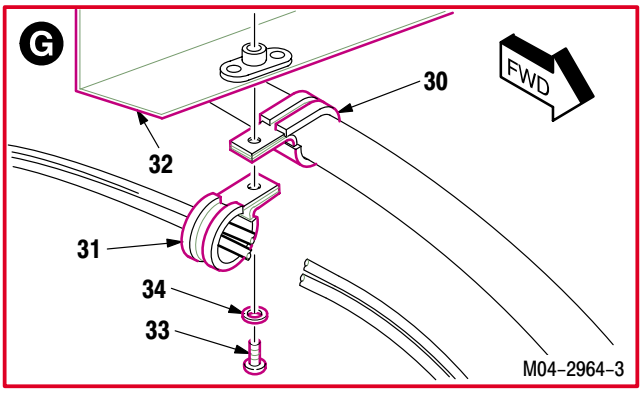


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6.104. TRANSMISSION REMOVAL – DISCONNECT RIGHT SIDE – continued

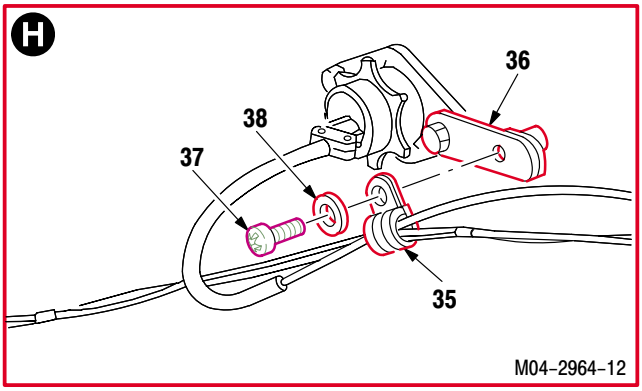
r. **Remove two clamps (30) and (31) from bracket (32).**

(1) Remove screw (33), washer (34), clamp (30), and clamp (31) from bracket (32).



s. **Remove clamp (35) from bracket (36).**

(1) Remove screw (37), washer (38), and clamp (35) from bracket (36).



t. **Remove right lube oil outlet hose (39).**

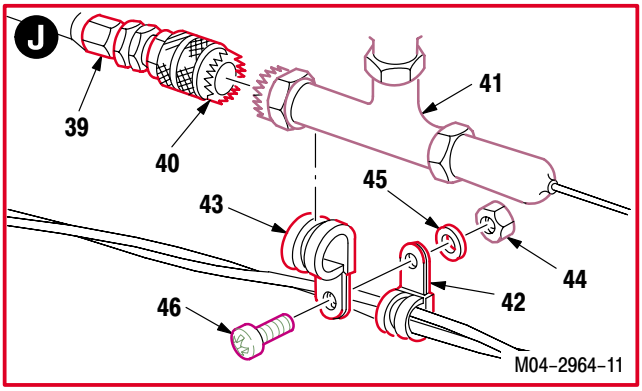
(1) Slide sleeve (40) away from body (41).

(2) Turn sleeve (40) counterclockwise until free.

u. **Remove clamps (42) and (43).**

(1) Remove nut (44) and washer (45).

(2) Remove screw (46), clamp (42), and clamp (43).



v. **If replacing transmission, remove low oil pressure switch** (para 6.78)**.**

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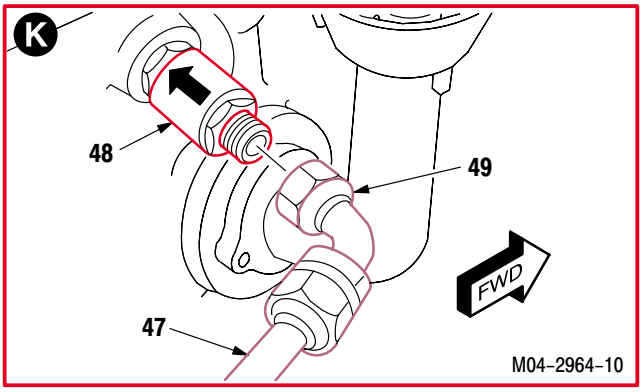
6.104. TRANSMISSION REMOVAL – DISCONNECT RIGHT SIDE – continued

w. **Remove right lube oil inlet hose (47) from check valve (48).**

(1) Hold valve (48). Use open end wrench.

(2) Remove nut (49).

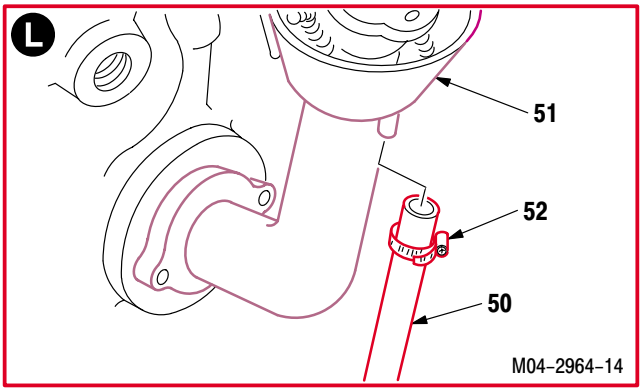
x. **If replacing transmission, remove check valve** (para 6.80)**.**



y. **Remove oil filter drain tube (50) from drain fitting (51).**

(1) Loosen clamp (52).

(2) Slide tube (50) from fitting (51).



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6.105. TRANSMISSION REMOVAL – PLATFORM INSTALLATION

6.105.1. Description

This task covers: Platform Installation.

6.105.2. Initial Setup

Equipment Conditions:

Ref	Condition
6.101	Main transmission removal

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.105.3. Platform Installation

a. **Install transmission platform (1).**

(1) Slide platform (1) under transmission (2) from right side of helicopter.

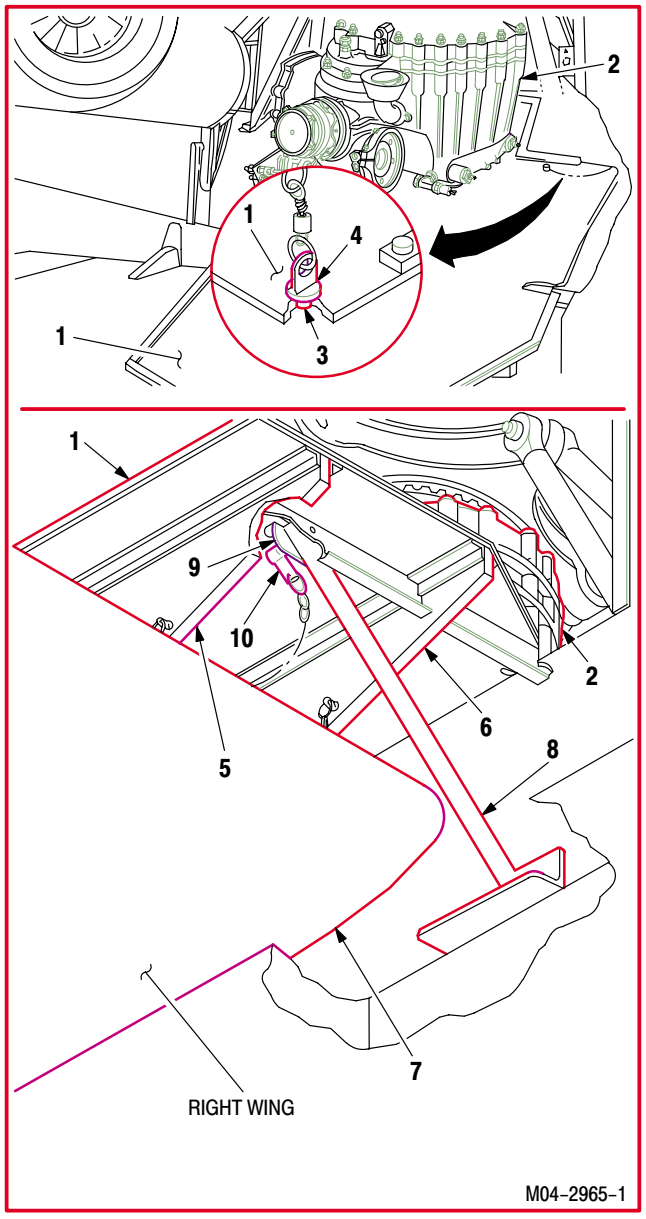
(2) Aline hole in platform (1) with hole in left forward side of transmission deck (3).

(3) Install bolt (4).

(4) Set braces (5) and (6) on wing (7).

(5) Aline holes in top of support (8) and bracket (9).

(6) Install pin (10) through bracket (9) and support (8).



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6.106. TRANSMISSION REMOVAL – LOWER AND REMOVE TRANSMISSION

6.106.1. Description

This task covers: Lower and Remove Transmission. and Cleaning..

6.106.2. Initial Setup

Equipment Conditions:

Ref	Condition
6.101	Main transmission removal

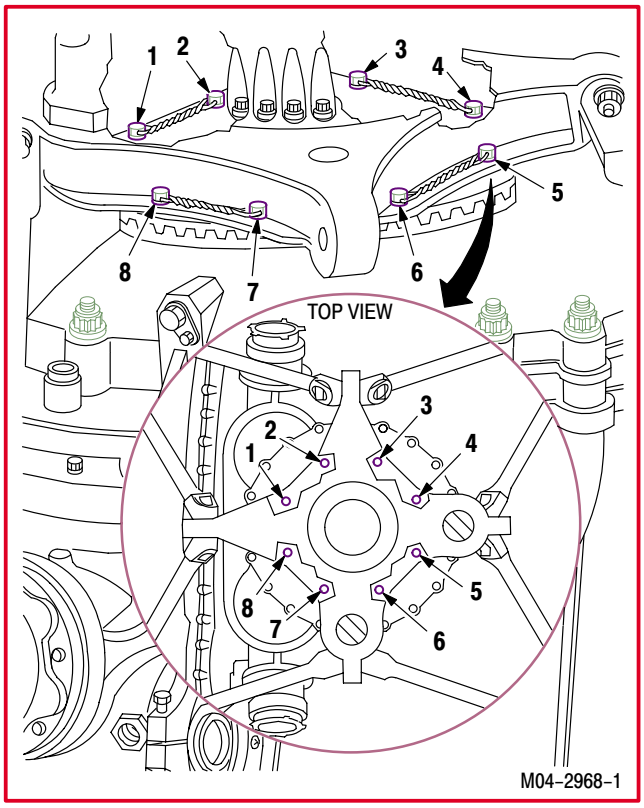
WARNING

FLIGHT SAFETY PART

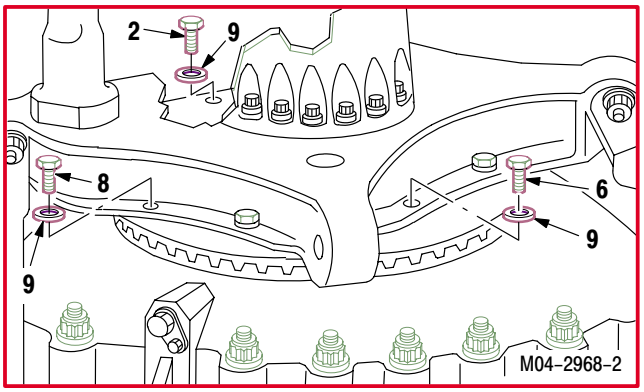
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.106.3. Lower and Remove Transmission

a. **Remove lockwire from transmission mounting bolts (1), (2), (3), (4), (5), (6), (7), and (8).**



b. **Remove mounting bolts (2), (6), and (8) and three washers (9).**



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6.106. TRANSMISSION REMOVAL – LOWER AND REMOVE TRANSMISSION – continued

CAUTION

Transmission will be lowered by three jackscrews (tools) installed in a 120 degree cross pattern. The three jackscrews must be raised or lowered at same time. Damage to aircraft could occur.

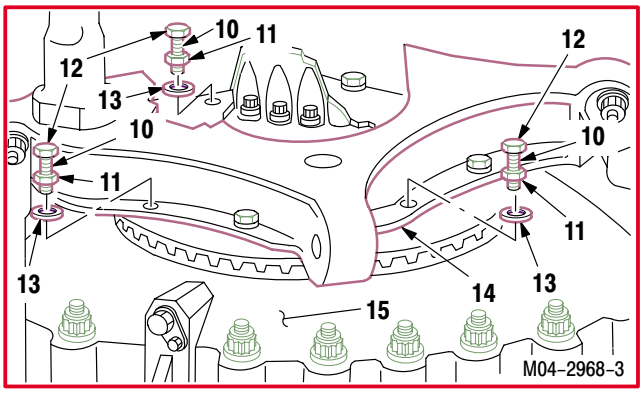
c. **Install three jackscrews (10).**

(1) Turn three jackscrew nuts (11) up to head (12) of jackscrews (10).

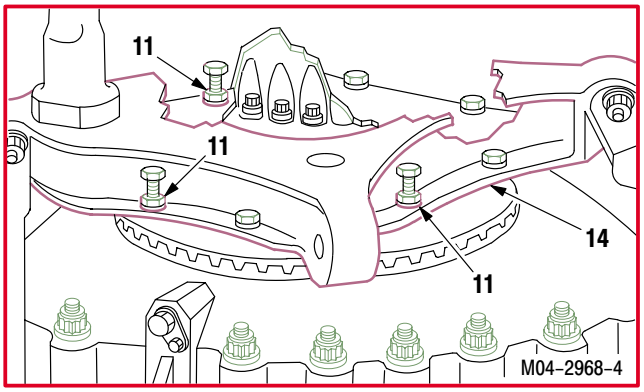
(2) Position three washers (13) over holes in mast base (14).

(3) Install three jackscrews (10) through washers (13) and base (14).

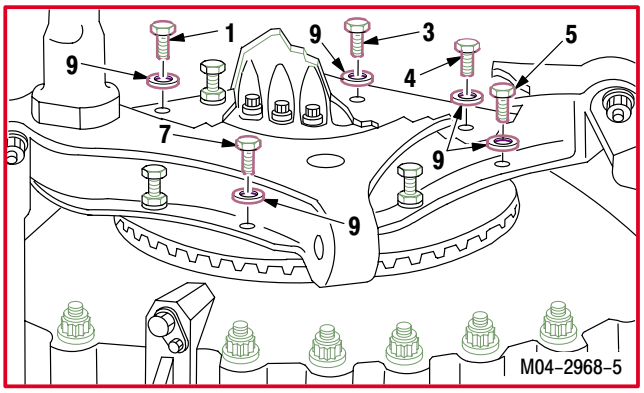
(4) Turn three jackscrews (10) 12 turns in transmission (15).



d. **Turn three jackscrew nuts (11) down to base (14).**



e. **Remove five mounting bolts (1), (3), (4), (5), and (7) and five washers (9).**



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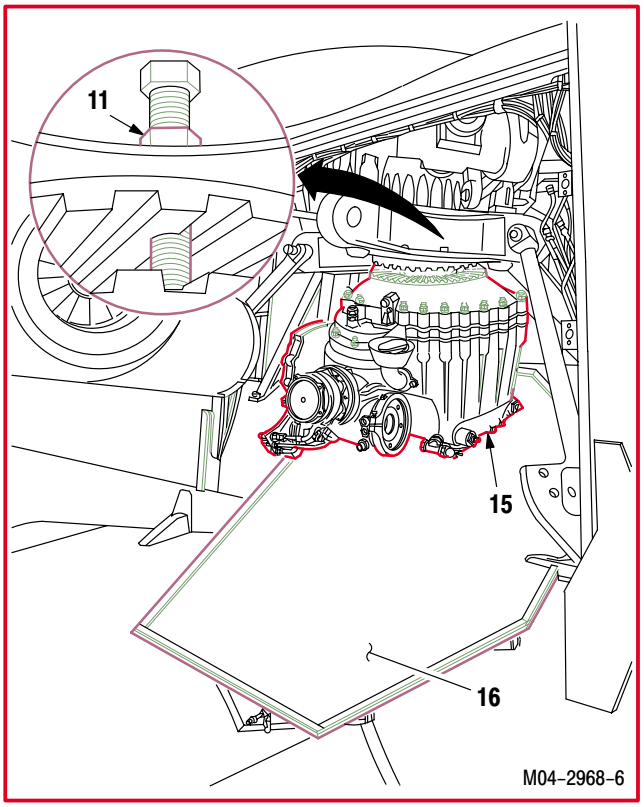
6.106. TRANSMISSION REMOVAL – LOWER AND REMOVE TRANSMISSION – continued

CAUTION

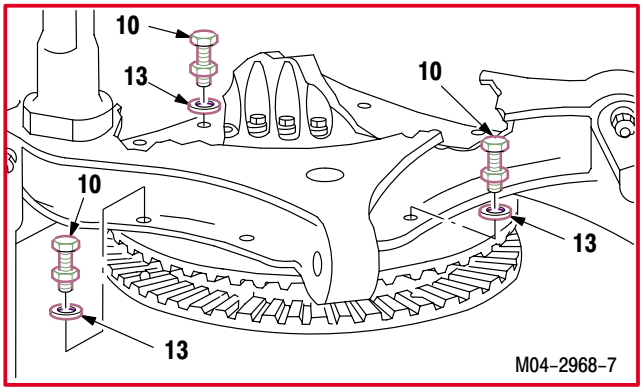
Interference between hoses, wires, and transmission can occur during removal and installation. Tie back hoses and wires.

f. **Lower transmission (15) on platform (16).**

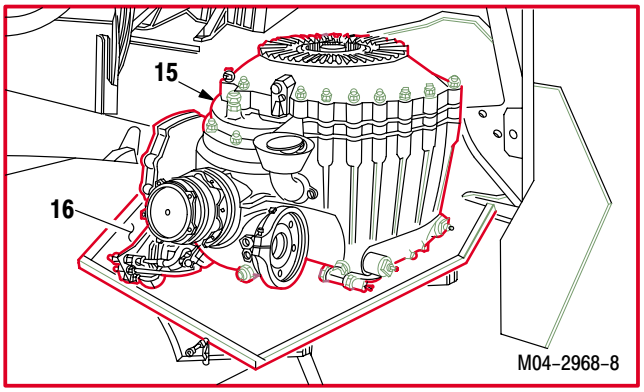
(1) Loosen jackscrew nuts (11) evenly until transmission (15) rests on platform (16).



g. **Remove three jackscrews (10) and washers (13).**



h. **Slide transmission (15) outboard on platform (16).**



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6.106. TRANSMISSION REMOVAL – LOWER AND REMOVE TRANSMISSION – continued

NOTE

FWD arrow on sling will point to first bolt hole to left of transmission forward centerline.

i. **Install transmission sling.** Torque sling bolts (17) to **250 INCH-POUNDS**.

(1) Aline holes in channel (18) over transmission (15) top mounting bolt holes. Use sling set kit.

(2) Install two bolts (17) through channel (18), and transmission (15).

(3) Torque sling bolts (17) to **250 INCH-POUNDS**. Use torque wrench.

j. **Inspect (QA).**

k. **Move transmission (15) to maintenance trailer.**

(1) Hook crane cable to shackle (19).

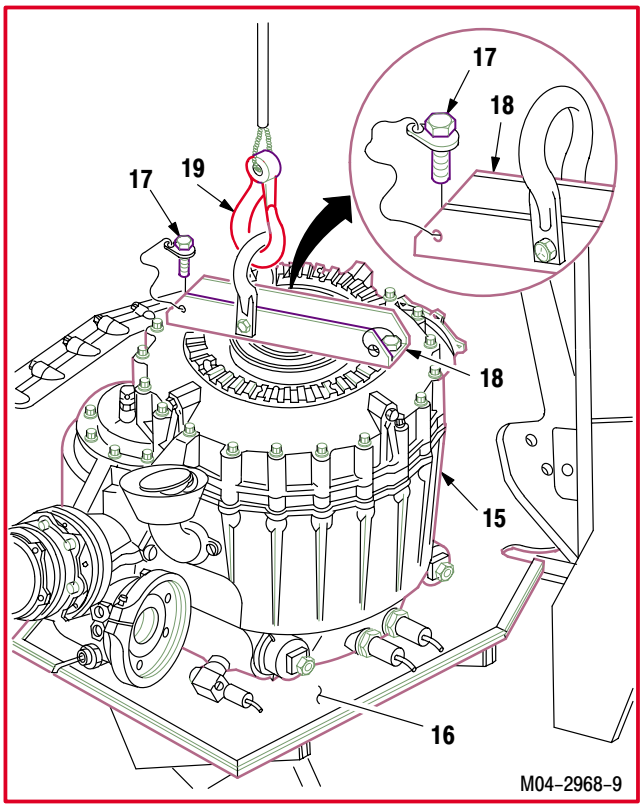
(2) Lift transmission (15) from platform (16) and to maintenance trailer. Use trailer.

l. **Remove transmission sling.**

(1) Remove two bolts (17) from channel (18) and transmission (15).

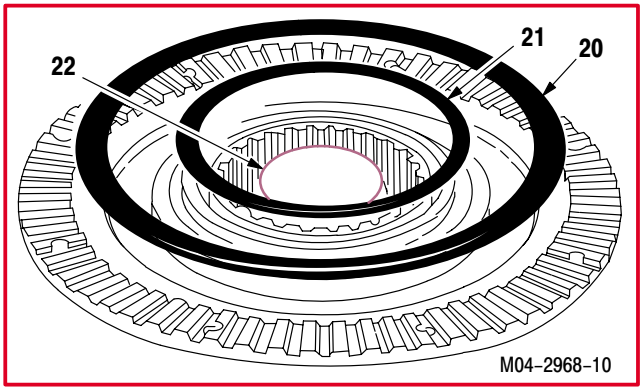
(2) Lift shackle (19) and channel from transmission (15).

m. **Remove and discard packings (20) and (21) from transmission top mast base (22).**



6.106.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**



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6.106. TRANSMISSION REMOVAL – LOWER AND REMOVE TRANSMISSION – continued

6.106.5. Inspection

a. **Check main transmission for:**

(1) Loose or missing hardware. None allowed.

(2) Cracked transmission housing. None allowed.

(3) Burrs, displaced metal, and debris on transmission curvic coupling. None allowed.

(4) Cracks and oil leakage, especially around oil jet areas of transmission cover. None allowed.

(a) If oil leakage is present, but no cracks are found, fluorescent penetrate inspect suspect areas (TM 55-1500-335-23).

(5) Leaking drive pads. None allowed.

(6) Serviceable rotor brake.

(7) Cushioning skid pads for damage. None allowed.

b. **Inspect (QA).**

END OF TASK

6.106A. TRANSMISSION INSTALLATION – PREPARATION FOR SHIPMENT

6.106A.1. Description

This task covers: Preparation for shipment.

6.106A.2. Initial Setup

Tools:

Sling set kit (item 194, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Equipment Conditions:

Ref	Condition
6.101	Main transmission removed

WARNING

FLIGHT SAFETY PART

- **The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **The main transmission is heavy, weighing approximately 667 pounds, use extreme care when lifting. Do not position personnel under the transmission while it is being lifted.**
- **Do not move or lift shipping container using cover lifting rings, these rings are only used to lift the cover from the shipping container. Use lower lifting rings or fork lift to lift or move shipping container.**

CAUTION

To avoid damaging shipping container, packing material, or main transmission, use care while packing the main transmission.

GO TO NEXT PAGE

6.106A. TRANSMISSION INSTALLATION – PREPARATION FOR SHIPMENT – continued

6.106A.3. Preparation for Shipment

a. **Obtain shipping container (1).**

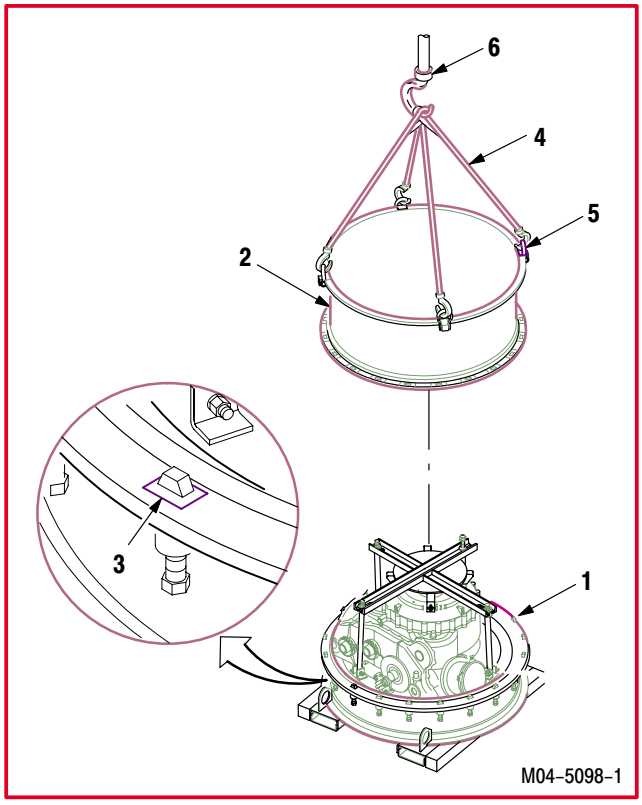
b. **Remove shipping container cover (2).**

(1) Unlock cover securing fasteners (3).

(2) Attach transmission sling (4) to four cover lifting rings (5). Use sling set kit.

(3) Attach crane cable hook (6) to sling (4).

(4) Remove cover (2).



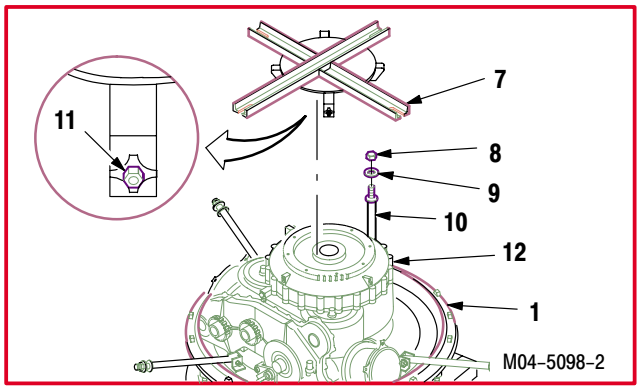
c. **Remove crossbar (7) from container (1).**

(1) Remove four nuts (8) and washers (9) from securing rods (10).

(2) Loosen securing nut (11) on crossbar (7).

(3) Remove crossbar (7).

d. **Remove transmission (12)** (para 6.101)**.**



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6.106A. TRANSMISSION INSTALLATION – PREPARATION FOR SHIPMENT – continued

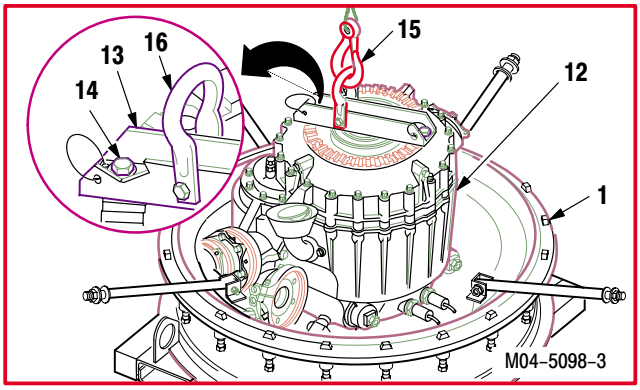
e. **Install transmission sling (13) on transmission (12).** Torque two sling bolts (14) to **250 INCH-POUNDS**.

(1) Aline holes in transmission sling (13) channel over top holes in transmission (12). Use sling set kit.

(2) Install two bolts (14) through transmission sling (13) channel.

(3) Torque two bolts (14) to **250 INCH-POUNDS**. Use torque wrench.

(4) Attach crane cable hook (15) to shackle (16).



f. **Install transmission (12) in shipping container (1).**

(1) Lift transmission (12) into container (1) with crane.

(2) Remove sling hook (15).

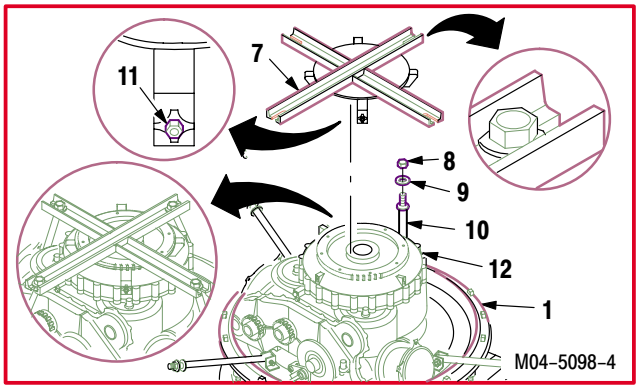
g. **Secure main transmission (12) in container (1).**

(1) Install crossbar (7) on top of main transmission (12).

(2) Tighten securing nut (11) on crossbar (7).

(3) Position four securing rods (10) in crossbar (7).

(4) Install four nuts (8) and washers (9) to securing rods (10).



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6.106A. TRANSMISSION INSTALLATION – PREPARATION FOR SHIPMENT – continued

h. **Install cover (2).**

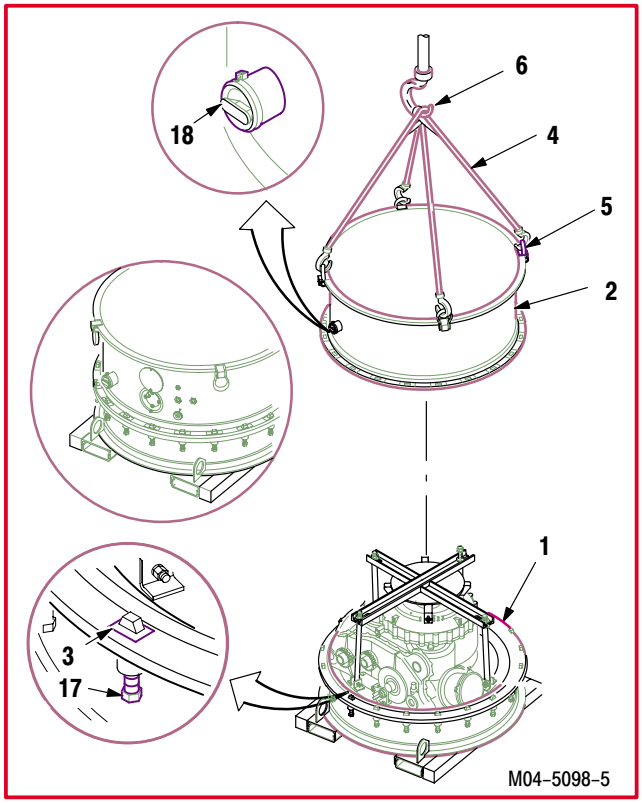
(1) Attach sling (4) to four cover lifting rings (5). Use sling set kit.

(2) Attach crane cable hook (6) to sling (4).

(3) Position cover (2) on container (1).

(4) Aline cover securing fasteners (3) with bolts (17) and tighten.

(5) Place all documents to be shipped with transmission in the records receptacle (18).



END OF TASK

6.106B. TRANSMISSION REMOVAL – PREPARATION FOR INSTALLATION

6.106B.1. Description

This task covers: Preparation for installation.

6.106B.2. Initial Setup

Tools:

Sling set kit (item 194, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Equipment Conditions:

Ref	Condition
6.101	Main transmission removed

WARNING

FLIGHT SAFETY PART

- **The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **The main transmission is heavy, weighing approximately 667 pounds, use extreme care when lifting. Do not position personnel under the transmission while it is being lifted.**
- **Do not move or lift shipping container using cover lifting rings, these rings are only used to lift the cover from the shipping container. Use lower lifting rings or fork lift to lift or move shipping container.**

CAUTION

To avoid damaging shipping container, packing material, or main transmission, use care while unpacking the main transmission.

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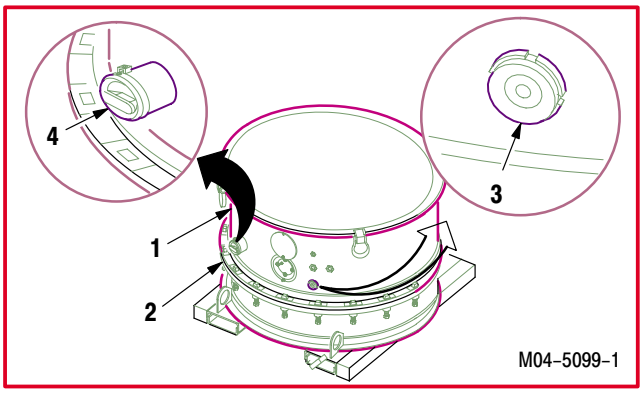
6.106B. TRANSMISSION REMOVAL – PREPARATION FOR INSTALLATION – continued

6.106B.3. Preparation for Installation

a. **Remove cover (1) from shipping container (2).**

(1) Release pressure from shipping container (2) by opening pressure relief valve (3).

(2) Remove all documents from the records receptacle (4) and submit them to Q.C.

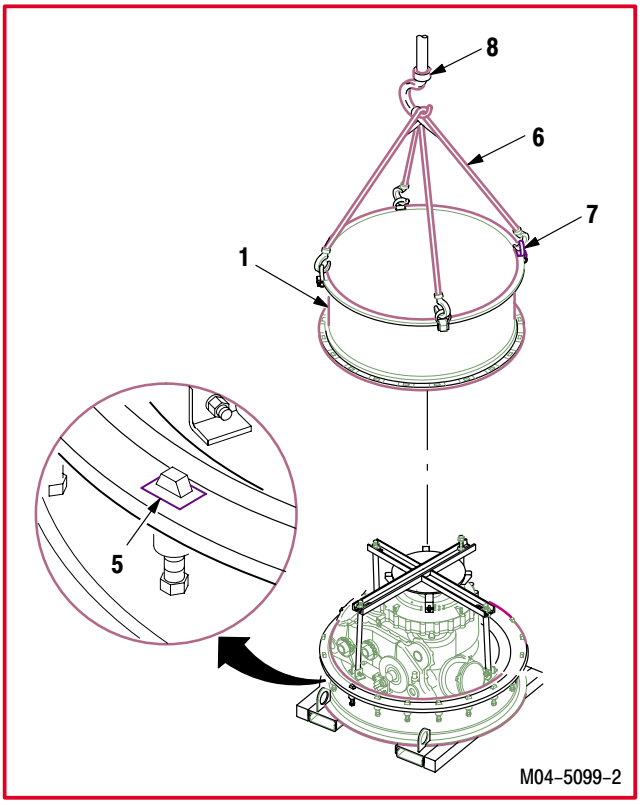


(3) Unlock cover securing fasteners (5).

(4) Attach transmission sling (6) to four cover lifting rings (7). Use sling set kit.

(5) Attach crane cable hook (8) to sling (6).

(6) Remove cover (1).



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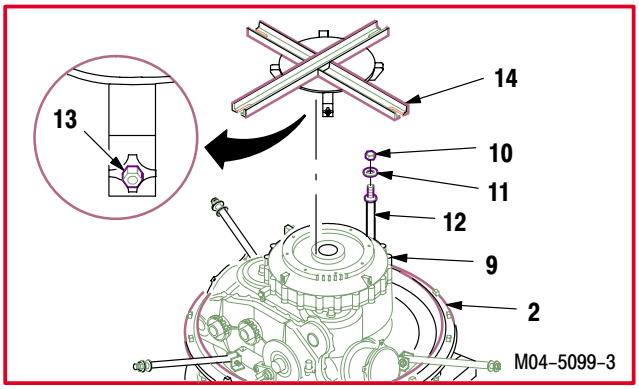
6.106B. TRANSMISSION REMOVAL – PREPARATION FOR INSTALLATION – continued

b. **Prepare to remove transmission (9) from shipping container (2).**

(1) Remove four nuts (10) and washers (11) from securing rods (12).

(2) Loosen securing nut (13) on crossbar (14).

(3) Remove crossbar (14).



c. **Install transmission sling.** Torque two sling bolts (15) to **250 INCH-POUNDS**.

(1) Aline holes in channel (16) over top holes in transmission (9). Use sling set kit.

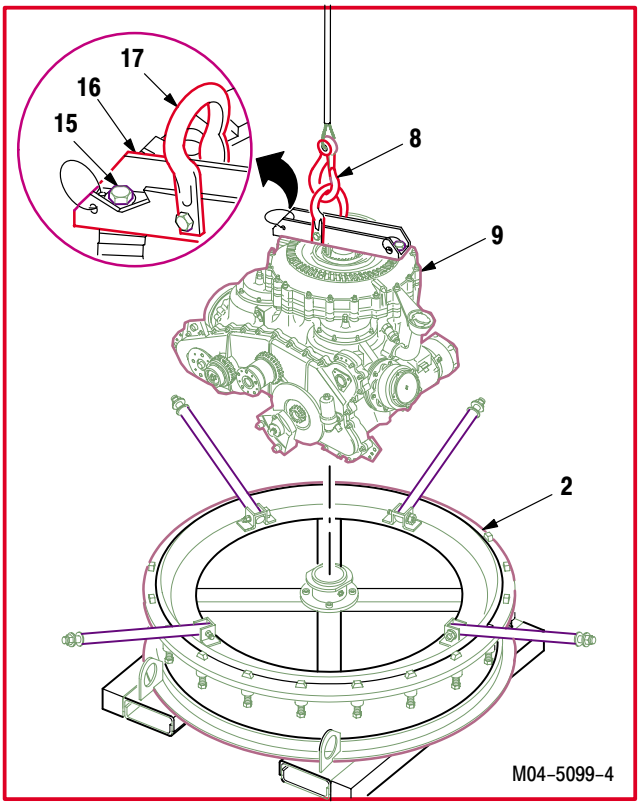
(2) Install two bolts (15) through channel (16) .

(3) Torque two bolts (15) to **250 INCH-POUNDS**. Use torque wrench.

(4) Attach crane cable hook (8) to shackle (17).

(5) Lift transmission (9) from container (2) with crane.

d. **Install transmission** (para 6.107)**.**



END OF TASK

6.107. MAIN TRANSMISSION INSTALLATION

This task covers:

6.108 Transmission Installation – Install Transmission on Platform.
6.109 Transmission Installation – Install Transmission.
6.110 Transmission Installation – Remove Platform.
6.111 Transmission Installation – Connect Catwalk Area.
6.112 Transmission Installation – Connect Left Side Area.
6.113 Transmission Installation – Connect Right Side Area.

6.107.1. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Airframe adapter kit (item 25, App H)
Light duty laboratory apron (item 27, App H)
11/16 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 70, App H)
1 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 77, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Transmission jackscrew (item 186, App H) (p/o item 397, App H) (3)
Sling set kit (item 194, App H)
Adjustable air filtering respirator (item 262, App H)
Rail type trailer (item 396, App H)
Transmission removal kit (item 397, App H)
1 1/4 & 1 5/16-inch open end wrench (item 419, App H)
1 3/16 & 1 1/4-inch open end wrench (item 420, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packing (2)
Lubricant (item 111, App F)
Lubricant (item NO TAG, App F)
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PARAGRAPH

6.108. TRANSMISSION INSTALLATION – INSTALL TRANSMISSION ON PLATFORM

6.108.1. Description

This task covers: Install Transmission on Platform.

6.108.2. Initial Setup

Equipment Conditions:

Ref	Condition
6.107	Main transmission installation

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.108.3. Install Transmission on Platform

a. **Check platform (1) installation.**

(1) Inboard platform section must be positioned on transmission deck (2).

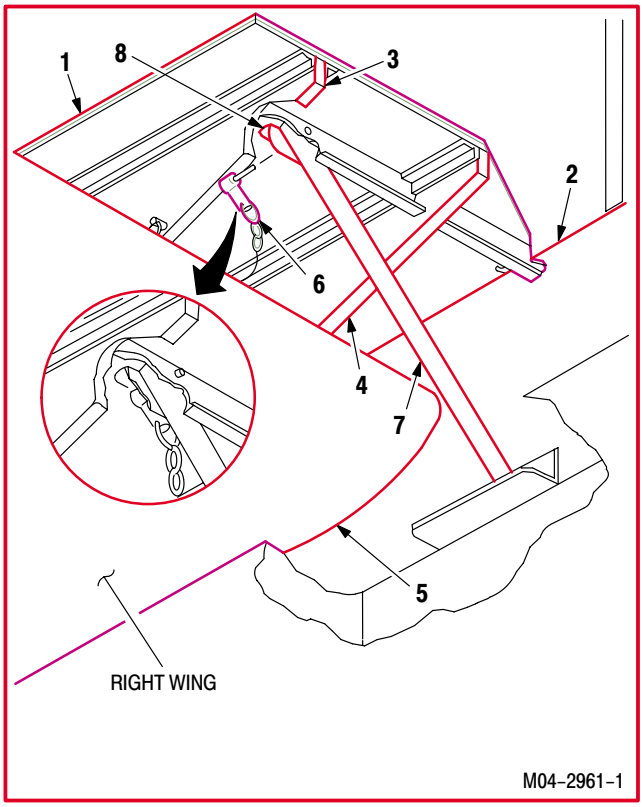
(2) Wing braces (3) and (4) must be alined on wing (5).

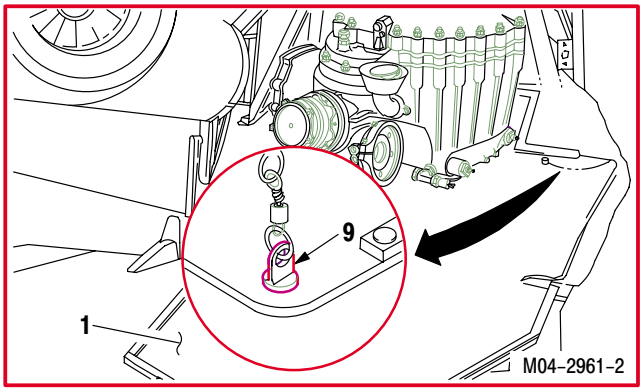
(3) Upper pin (6) must secure top end of support (7) to platform bracket (8).

(4) Alinement bolt (9) must secure platform (1) to deck at left forward side of helicopter.

NOTE

Check bottom of mast base for broken or damaged lockwire before installing transmission.





GO TO NEXT PAGE

6.108. TRANSMISSION INSTALLATION – INSTALL TRANSMISSION ON PLATFORM – continued

b. **Install transmission sling.** Torque two sling bolts (10) to **250 INCH-POUNDS**.

(1) Aline holes in channel (11) over top holes in transmission (12). Use sling set kit.

(2) Install two bolts (10) through channel (11) and transmission (12).

(3) Torque two bolts (10) to **250 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Move transmission (12) to platform (1).**

(1) Attach crane cable hook (13) to shackle (14).

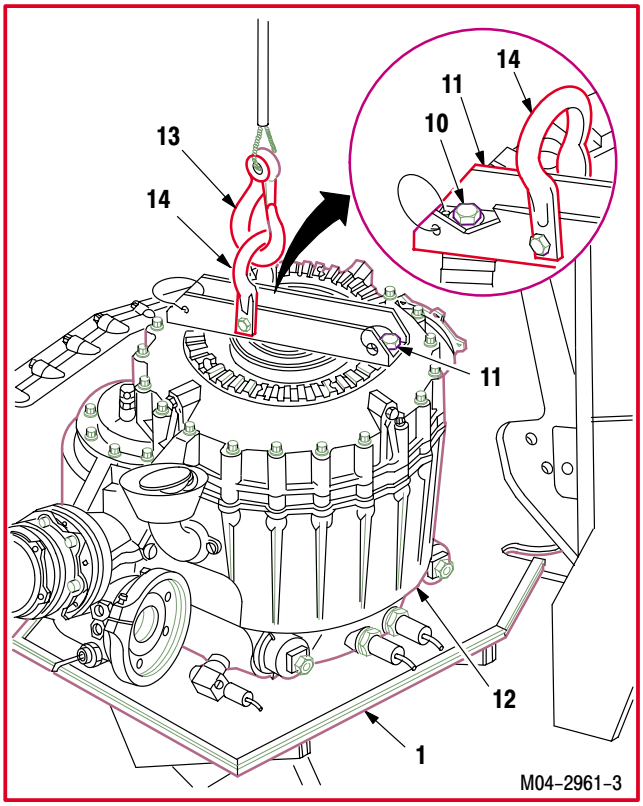
(2) Lift transmission (12) from trailer to platform (1).

(3) Detach cable hook (13) from shackle (14).

e. **Remove transmission sling.**

(1) Remove two bolts (10) from channel (11) and transmission (12).

(2) Lift shackle (14) and channel (11) from transmission (12).



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6.109. TRANSMISSION INSTALLATION – INSTALL TRANSMISSION

6.109.1. Description

This task covers: Install Transmission.

6.109.2. Initial Setup

Equipment Conditions:

Ref	Condition
6.107	Main transmission installation

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.109.3. Install Transmission



CAUTION

Verify lockwire security at base of upper mast to prevent damage to mast or transmission during installation.

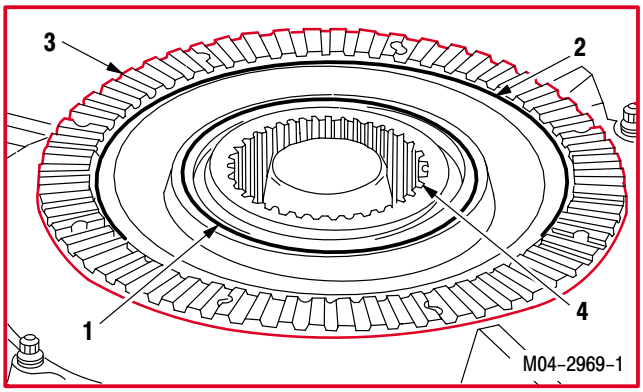
a. **Install transmission top mast base packings (1) and (2).**

(1) Lubricate new packings (1) and (2). Use petrolatum (item 138, App F).

(2) Install packing (1) in inner groove in transmission (3).

(3) Install packing (2) in outer groove in transmission (3).

(4) Lubricate splines (4). Use lubricant (item 111, App F).



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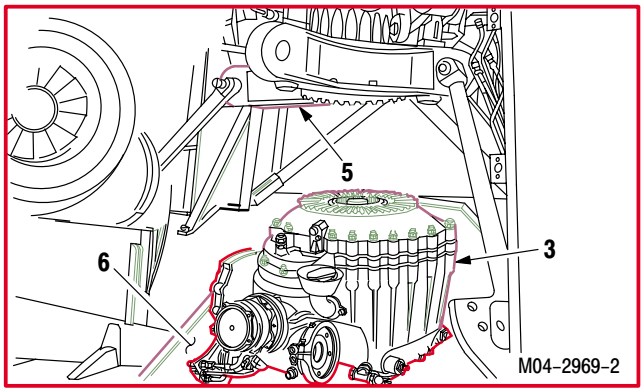
6.109. TRANSMISSION INSTALLATION – INSTALL TRANSMISSION – continued

WARNING

The surface of the transmission cover and the mast base with geared curvic coupling are precise surfaces. Normal handling of aluminum parts do not apply. Do not abrade surfaces of the curvic teeth over any extensive area. Small material movements can cause the curvic surfaces to fail to mesh. If curvic shows impact damage as would be caused by tool impact or rough handling, remove any displaced metal to the surface. If surface is corroded, send parts to depot maintenance. Both transmission cover and mast base must be entirely free of debris and burrs. If foreign matter is on these surfaces at assembly, teeth will fail to properly mesh. Inspect both curvic surfaces for burrs, displaced metal, and debris before assembly.

b. **Position transmission (3) under upper mast base (5).**

(1) Slide transmission (3) inboard on platform (6).



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6.109. TRANSMISSION INSTALLATION – INSTALL TRANSMISSION – continued

CAUTION

Transmission will be raised by three jackscrews (tools) installed in a 120 degree cross pattern. The three jackscrews must be raised or lowered at same time. Damage to aircraft could occur.

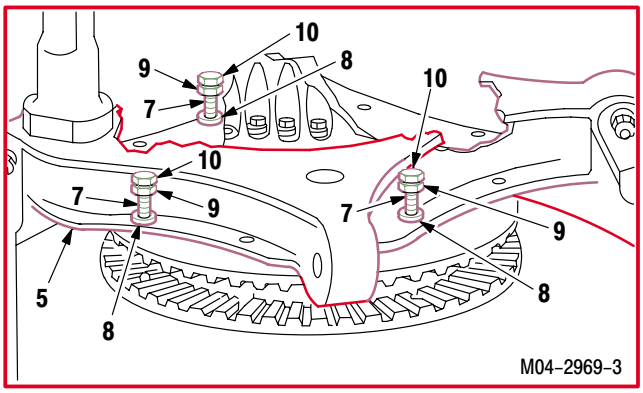
c. **Install three jackscrews (7) and washers (8).**

(1) Turn three jackscrew nuts (9) up to head (10) of three jackscrews (7).

(2) Position three washers (8) over holes in base (5).

(3) Install three jackscrews (7) through washers (8) and base (5). Use jackscrew.

(4) Turn three jackscrews (7) 12 turns in transmission (3).



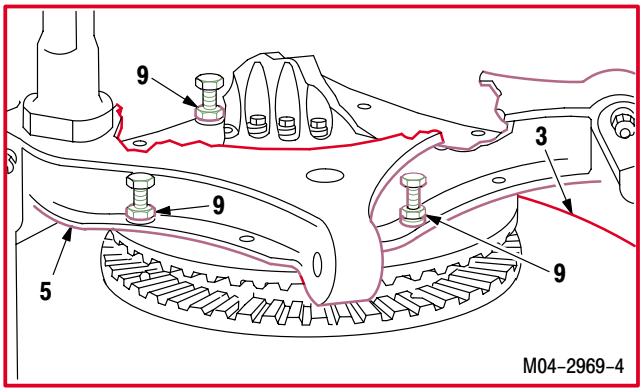
d. **Turn three jackscrew nuts (9) down to mast base (5).**

e. **Install right forward transmission strut** (para 2.93)**.**

f. **Install right aft transmission strut** (para 2.95)**.**

g. **Raise transmission (3) to base (5).**

(1) Tighten three nuts (9) evenly until transmission (3) is raised to contact base (5).



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6.109. TRANSMISSION INSTALLATION – INSTALL TRANSMISSION – continued



CAUTION

Allow bolts to air dry for **30 MINUTES** after coating with lubricant. Damage to aircraft could occur.

h. **Install mounting bolts (11), (12), (13), (14), and (15).** Torque mounting bolts (11), (12), (13), (14), and (15) to **260 INCH-POUNDS**.

(1) Lubricate bolt threads. Use lubricant (item NO TAG, App F).

(2) Allow bolts to air dry for **30 MINUTES** after coating with lubricant.

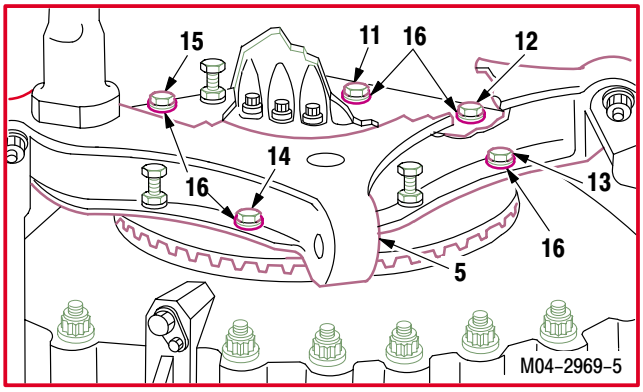
(3) Aline five washers (16) over holes in base (5).

(4) Install mounting bolts (11), (12), (13), (14), and (15) through five washers (16) in base (5).

NOTE

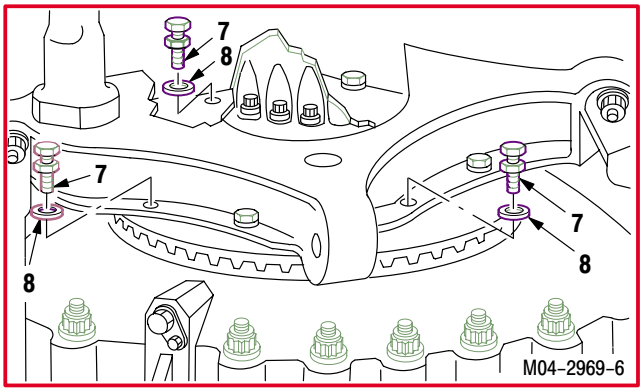
Torque bolts in following order: (11), (13), (12), (14), and (15).

(5) Torque mounting bolts (11), (12), (13), (14), and (15) to **260 INCH-POUNDS**. Use torque wrench.



i. **Inspect (QA).**

j. **Remove three jackscrews (7) and washers (8).**



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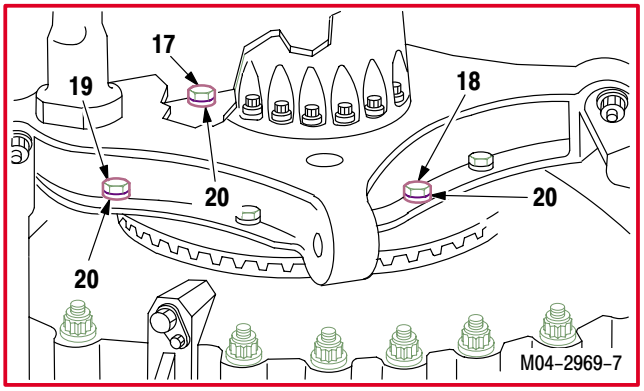
6.109. TRANSMISSION INSTALLATION – INSTALL TRANSMISSION – continued

k. **Install bolts (17), (18), and (19) and washers (20).** Torque mounting bolts (17), (18), and (19) to **260 INCH-POUNDS**.

(1) Lubricate threads of bolts. Use lubricant (item NO TAG, App F).

(2) Position three washers (16) over holes in base (5).

(3) Install bolts (17), (18), and (19) through three washers (20) and base (5).



NOTE

Torque bolts in following order: (17), (19), and (18).

(4) Torque mounting bolts (17), (18), and (19) to **260 INCH-POUNDS**. Use torque wrench.

NOTE

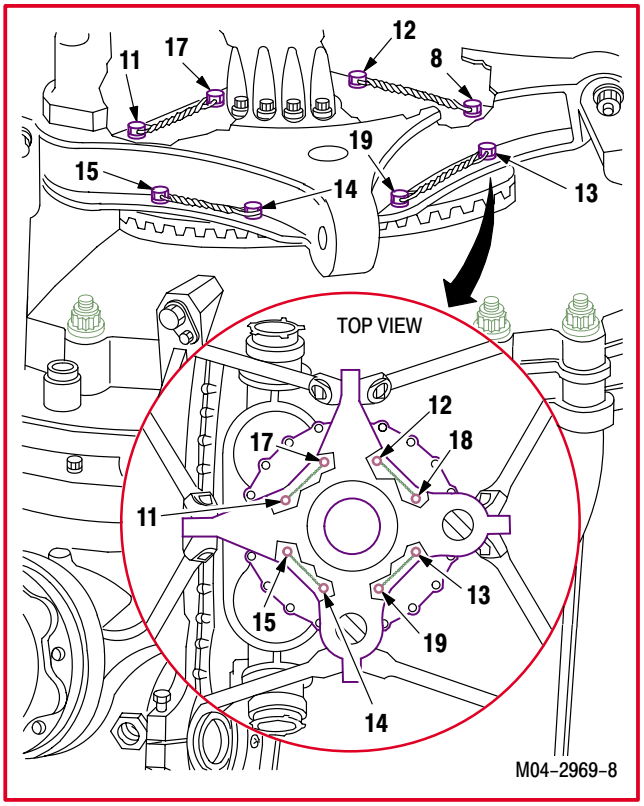
Torque bolts in following order: (11), (13), (17), (19), (12), (14), (18), and (15).

l. **Torque mounting bolts (11), (13), (17), (19), (12), (14), (18), and (15) to 260 INCH-POUNDS.** Use torque wrench.

m. **Inspect (QA).**

n. **Lockwire mounting bolts (11), (17), (12), (18), (13), (19), (14), and (15).**

(1) Lockwire each side by side pair of mounting bolts together. Use wire (item 226, App F).



GO TO NEXT PARAGRAPH

6.110. TRANSMISSION INSTALLATION – REMOVE PLATFORM

6.110.1. Description

This task covers: Remove Platform.

6.110.2. Initial Setup

Equipment Conditions:

Ref	Condition
6.107	Main transmission installation

WARNING

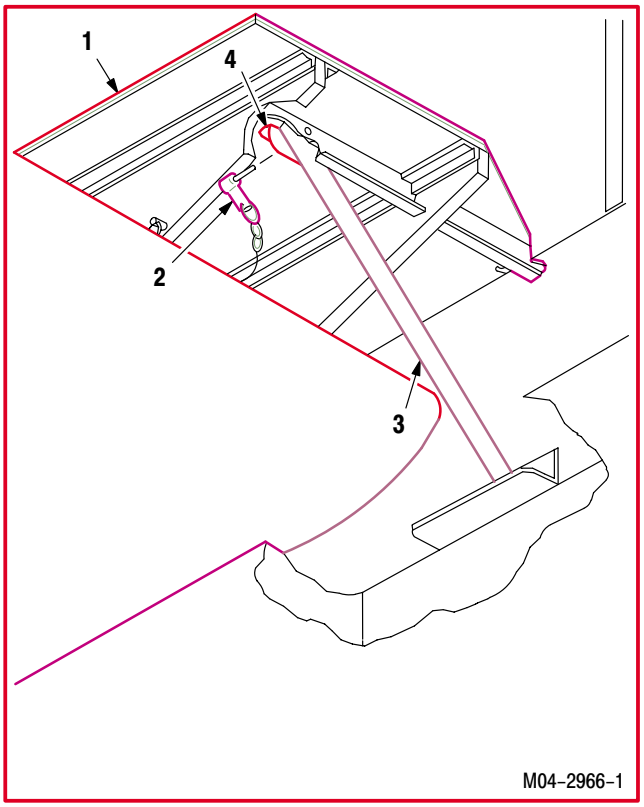
FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.110.3. Remove Platform

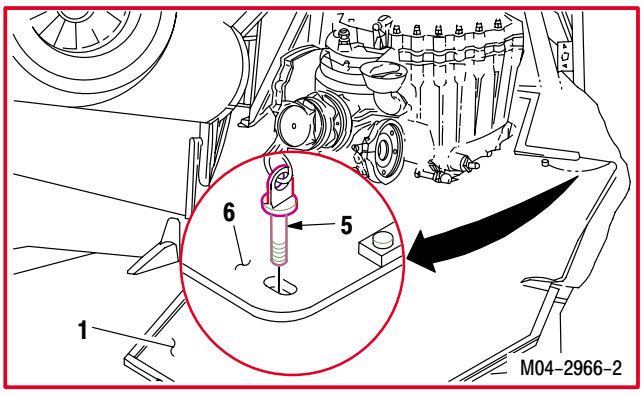
a. **Remove platform (1).**

(1) Pull pin (2) from support (3) and bracket (4).



(2) Remove bolt (5) from left forward side of transmission deck (6).

(3) Slide platform (1) from deck (6).



GO TO NEXT PARAGRAPH

6.111. TRANSMISSION INSTALLATION – CONNECT CATWALK AREA

6.111.1. Description

This task covers: Connect Catwalk Area.

6.111.2. Initial Setup

Equipment Conditions:

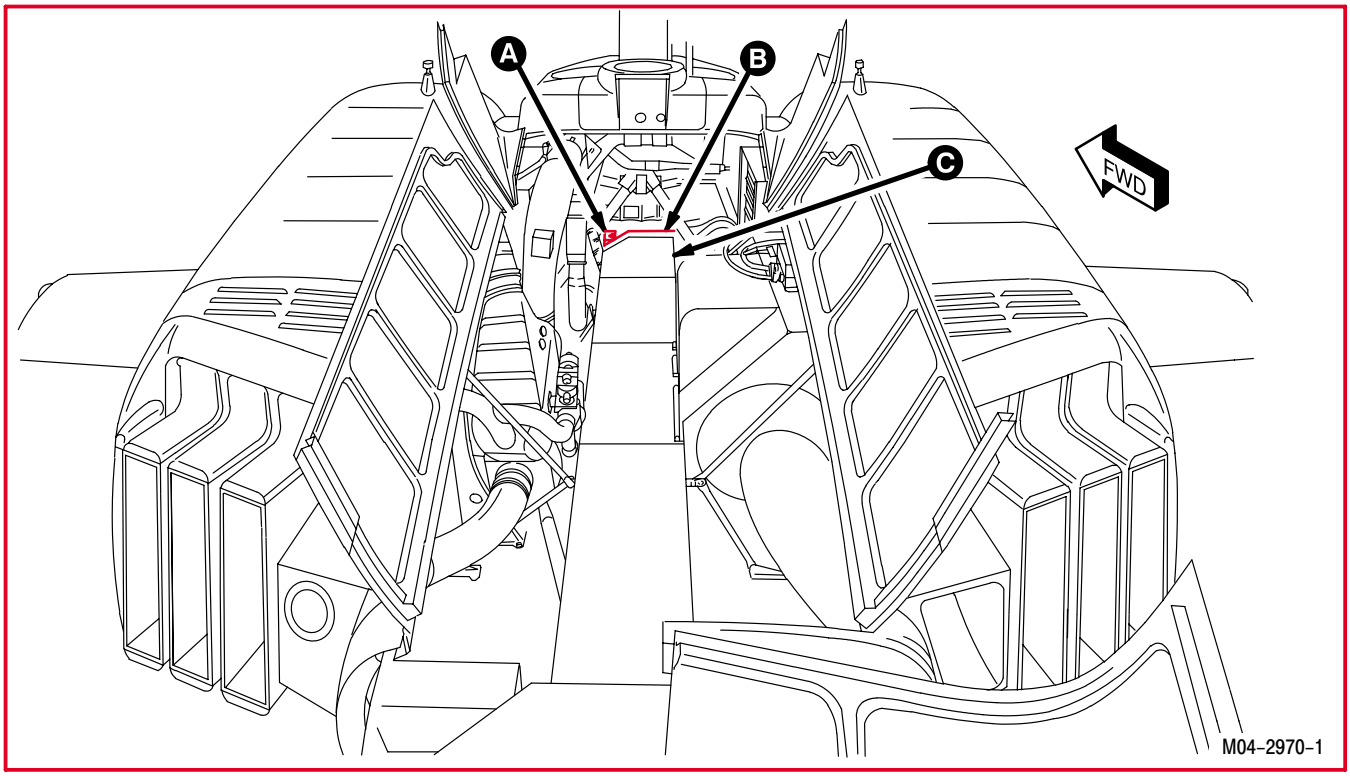
Ref	Condition
6.107	Main transmission installation

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.111.3. Connect Catwalk Area



GO TO NEXT PAGE

6.111. TRANSMISSION INSTALLATION – CONNECT CATWALK AREA – continued

a. **Install No. 7 APU drive shaft and antiflail** (para 6.16)**.**

b. **Attach connector P755 (1) to receptacle J755 (2).**

c. **Install tail rotor drive flange drain tube (3).**

(1) Slide tube (3) over fitting (4).

(2) Tighten clamp (5).

d. **Install shaft driven compressor** (para 7.121)**.**

e. **Connect rotor brake hydraulic hose (6) to union (7).**

(1) Install nut (8) on union (7).

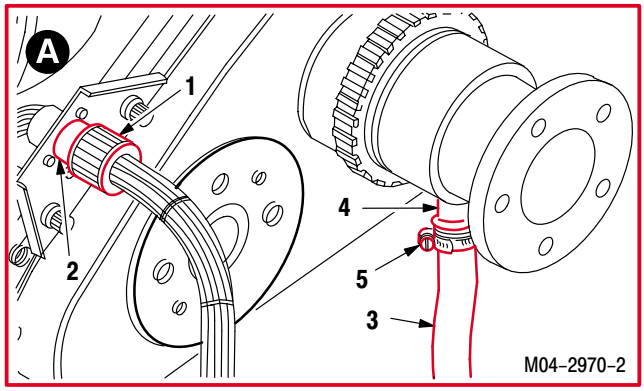
(2) Hold union (7). Tighten nut (8).

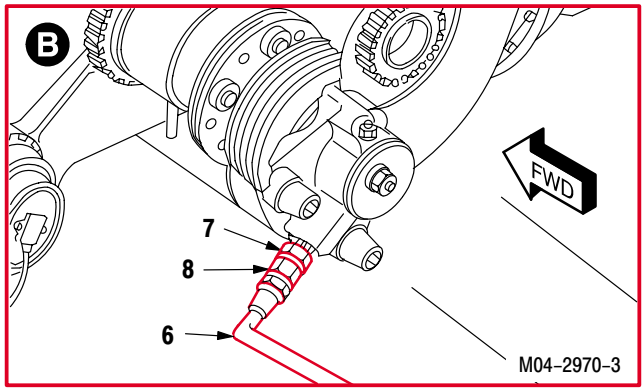
f. **Install main transmission tail rotor output coupling** (para 6.4)**.**

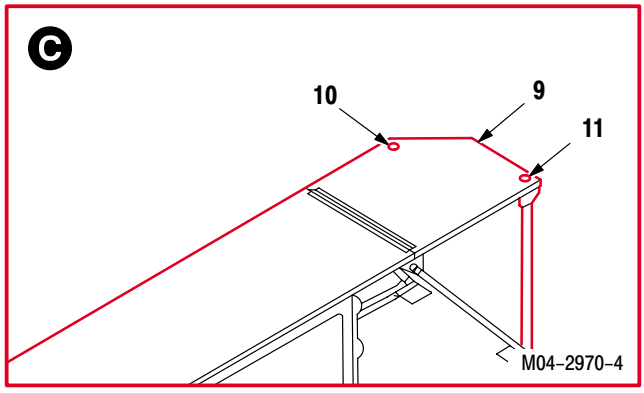
g. **Install No. 3 tail rotor drive shaft** (para 6.5)**.**

h. **Fold down catwalk hinged extension (9).**

(1) Lock fasteners (10) and (11).







GO TO NEXT PARAGRAPH

6.112. TRANSMISSION INSTALLATION – CONNECT LEFT SIDE AREA

6.112.1. Description

This task covers: Connect Left Side Area.

6.112.2. Initial Setup

Equipment Conditions:

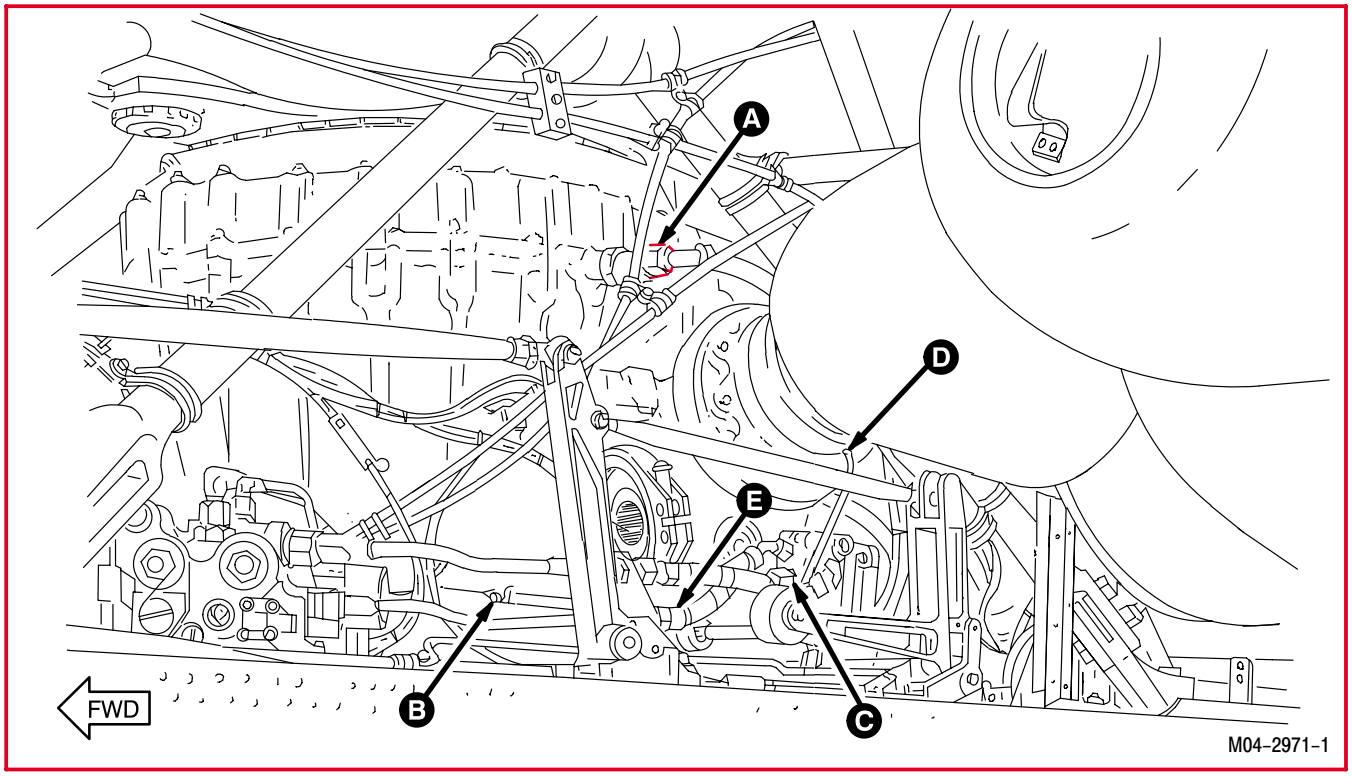
Ref	Condition
6.107	Main transmission installation

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.112.3. Connect Left Side Area



GO TO NEXT PAGE

6.112. TRANSMISSION INSTALLATION – CONNECT LEFT SIDE AREA – continued

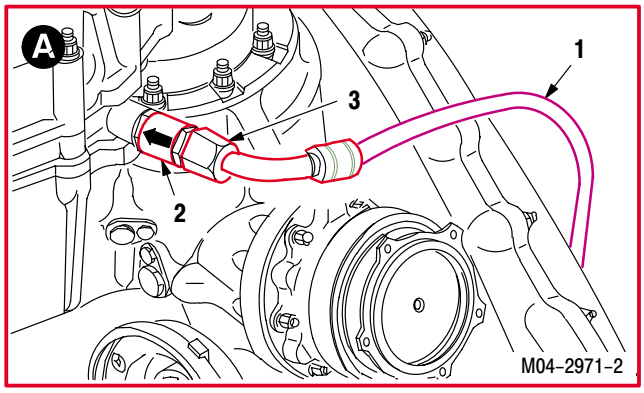
a. **If transmission was replaced, install check valve** (para 6.80)**.**

b. **Connect left lube oil inlet hose (1) to check valve (2).** Torque nut (3) to **345 INCH-POUNDS**.

(1) Install nut (3) on valve (2).

(2) Hold valve (2). Use open end wrench.

(3) Torque nut (3) to **345 INCH-POUNDS**. Use crowfoot and torque wrench.



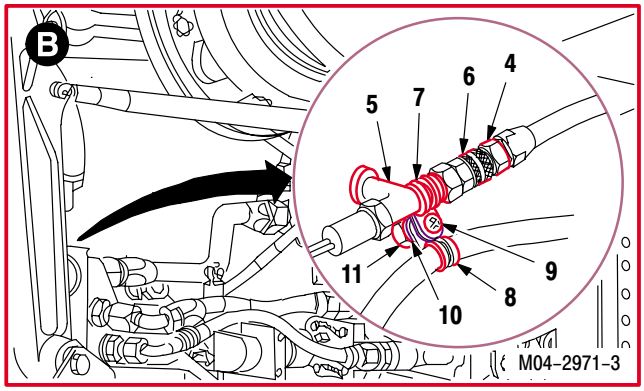
c. **Connect left lube oil outlet hose (4) to coupling body (5).**

(1) Aline sleeve (6) with body (5).

(2) Turn sleeve (6) clockwise until firmly seated and locking teeth fully engage.

d. **Install clamps (7) and (8).**

(1) Install screw (9), washer (10), and nut (11).



e. **Install oil pressure switch** (para 6.78)**.**

f. **If transmission was replaced, install left hydraulic pump** (para 7.4)**.**

g. **Connect left hydraulic pump seal drain hose (12) to drain fitting (13).**

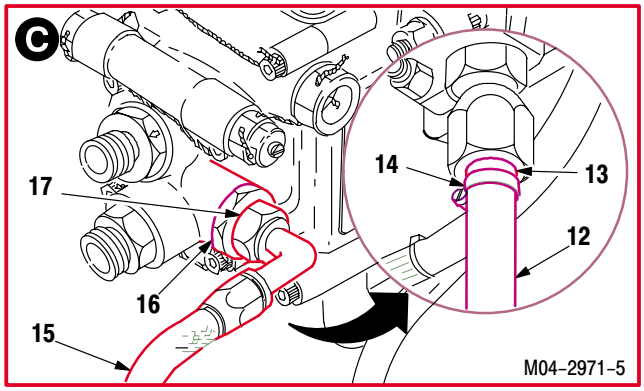
(1) Slide hose (12) over fitting (13).

(2) Tighten clamp (14).

h. **Connect left hydraulic pump case drain hose (15) to union (16).**

(1) Install nut (17) on union (16).

(2) Hold union (16). Tighten nut (17).



GO TO NEXT PAGE

6.112. TRANSMISSION INSTALLATION – CONNECT LEFT SIDE AREA – continued

i. **Connect left hydraulic pump inlet hose (18) to reducer (19).** Torque nut (20) to **245 INCH-POUNDS**.

(1) Install nut (20) on reducer (19).

(2) Hold reducer (19). Torque nut (20) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.

j. **Connect left hydraulic pump outlet hose (21) to check valve (22).** Torque nut (23) to **245 INCH-POUNDS**.

(1) Install nut (23) on check valve (22).

(2) Hold valve (22). Torque nut (23) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.

k. **Inspect (QA).**

l. **Connect left input quill drain tube (24) to drain fitting (25).**

(1) Slide tube (24) over fitting (25).

(2) Tighten clamp (26).

m. **Install clamp (27).**

(1) Install screw (28), washer (29), and clamp (27).

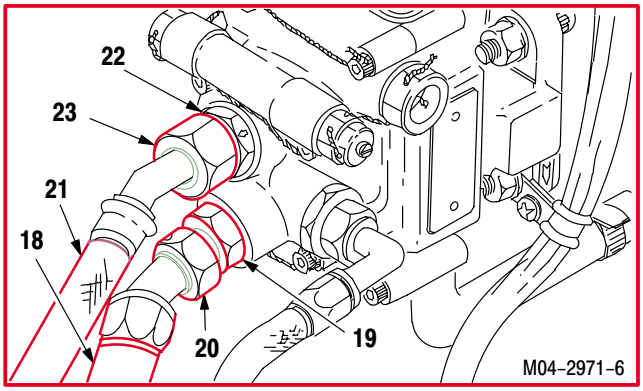
n. **Install main transmission No. 1 engine input coupling** (para 6.3)**.**

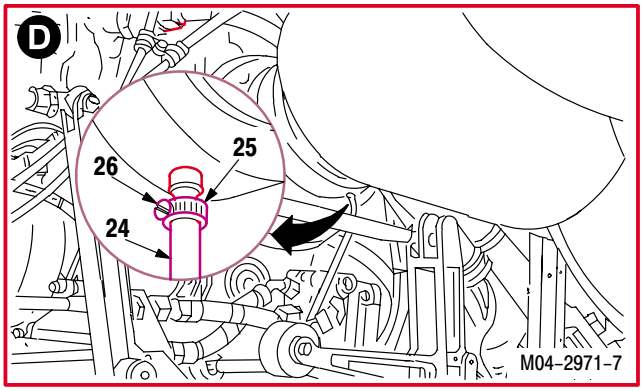
o. **Inspect (QA).**

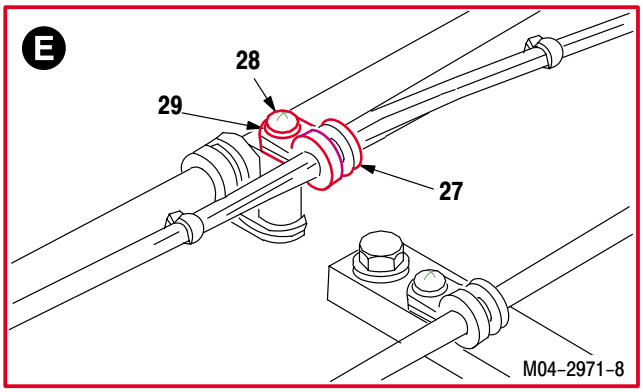
p. **Install No. 1 engine input drive shaft** (para 6.2)**.**

q. **Install nose gearbox diffuser** (para 6.33)**.**

r. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**







GO TO NEXT PARAGRAPH

6.113. TRANSMISSION INSTALLATION – CONNECT RIGHT SIDE AREA

6.113.1. Description

This task covers: Connect Right Side Area.

6.113.2. Initial Setup

Equipment Conditions:

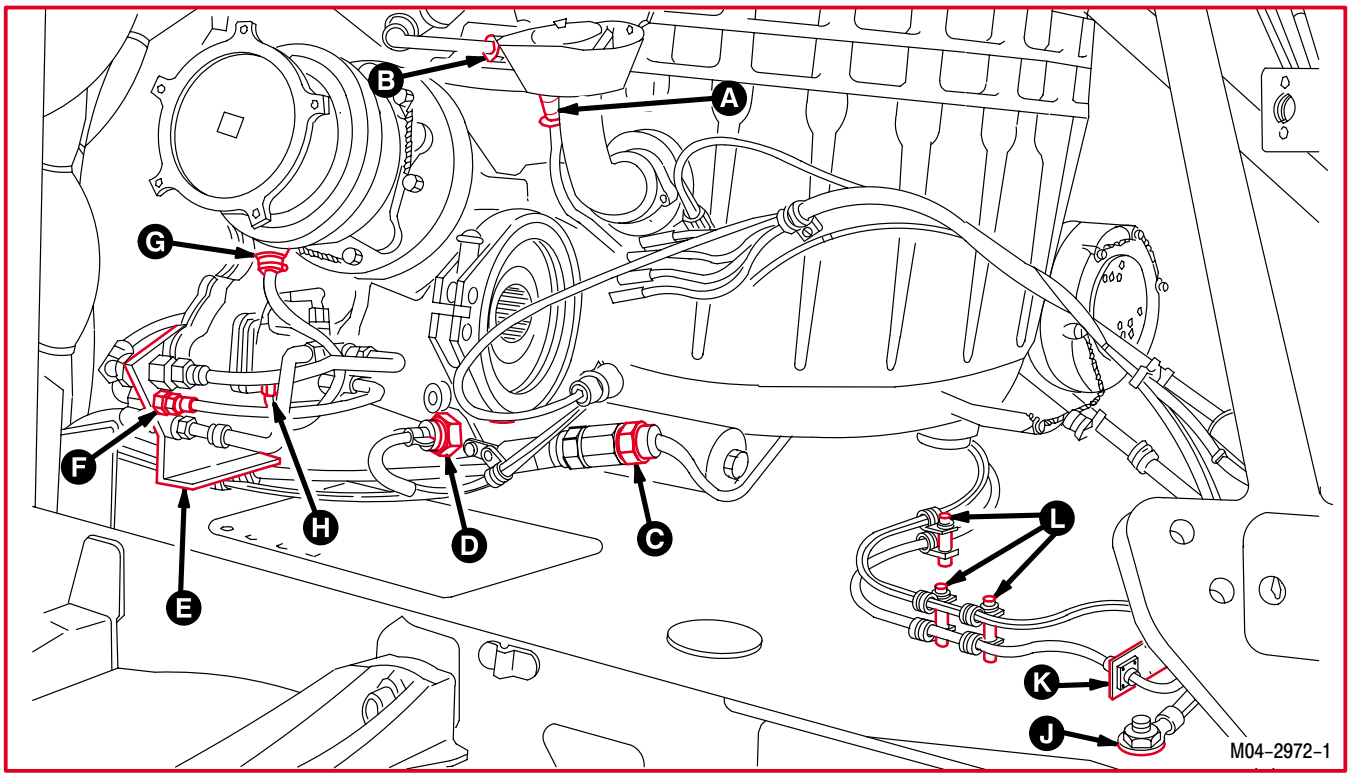
Ref	Condition
6.107	Main transmission installation

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.113.3. Connect Right Side Area



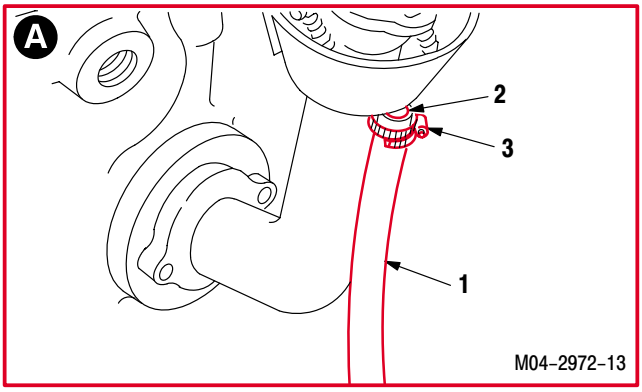
GO TO NEXT PAGE

6.113. TRANSMISSION INSTALLATION – CONNECT RIGHT SIDE AREA – continued

a. **Install oil filler drain tube (1) on drain fitting (2).**

(1) Slide tube (1) over fitting (2).

(2) Tighten clamp (3).



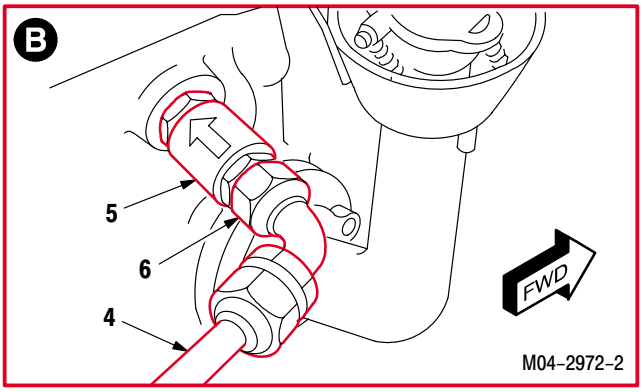
b. **If transmission was replaced, install check valve** (para 6.80)**.**

c. **Install right lube oil inlet hose (4) on check valve (5).** Torque nut (6) to **345 INCH-POUNDS**.

(1) Install nut (6) on valve (5).

(2) Hold valve (5). Use open end wrench.

(3) Torque nut (6) to **345 INCH-POUNDS**. Use crowfoot and torque wrench.

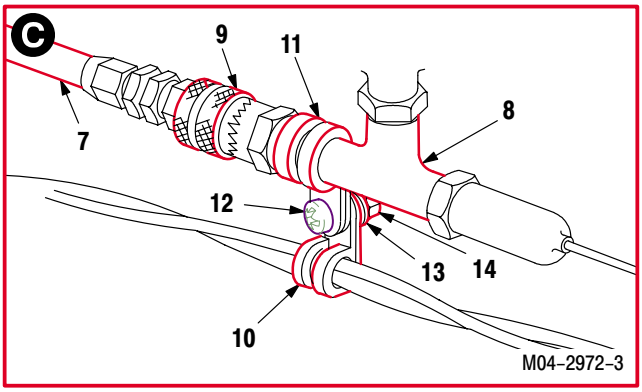


d. **Inspect (QA).**

e. **Install right lube oil outlet hose (7) on coupling body (8).**

(1) Aline sleeve (9) with body (8).

(2) Turn sleeve (9) clockwise until firmly seated and locking teeth fully engage.



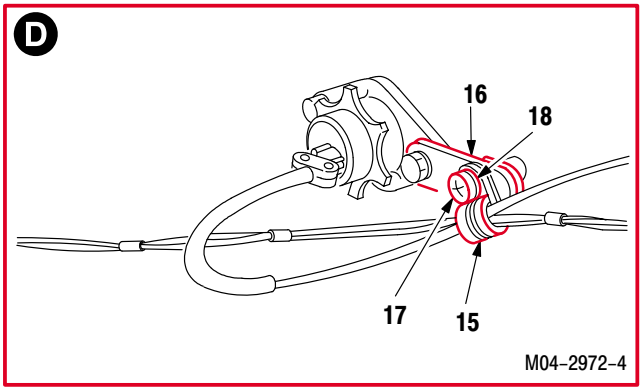
f. **If transmission was replaced, install low oil pressure switch** (para 6.78)**.**

g. **Install two clamps (10) and (11).**

(1) Install screw (12), washer (13), clamps (10), (11), and nut (14).

h. **Install clamp (15) on bracket (16).**

(1) Install screw (17) through washer (18), clamp (15), and bracket (16).



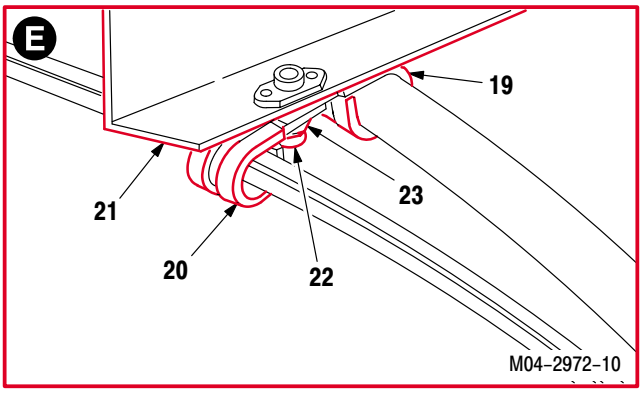
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6.113. TRANSMISSION INSTALLATION – CONNECT RIGHT SIDE AREA – continued

i. **Install two clamps (19) and (20) on bracket (21).**

(1) Install screw (22), washer (23), clamps (19), and (20) in bracket (21).

j. **If transmission was replaced, install right hydraulic pump** (para 7.58)**.**



k. **Install right hydraulic pump outlet hose (24) on union (25).** Torque nut (26) to **245 INCH-POUNDS**.

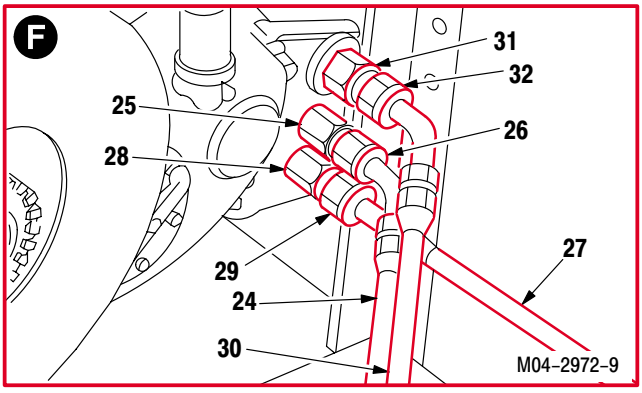
(1) Install nut (26) on union (25).

(2) Hold union (25). Torque nut (26) to **245 INCH-POUNDS**. Use crowfoot and torque wrench.

l. **Install right hydraulic pump case drain hose (27) on union (28).**

(1) Install nut (29) on union (28).

(2) Hold union (28). Tighten nut (29).



m. **Install right hydraulic pump inlet hose (30) on union (31).** Torque nut (32) to **345 INCH-POUNDS**.

(1) Install nut (32) on union (31).

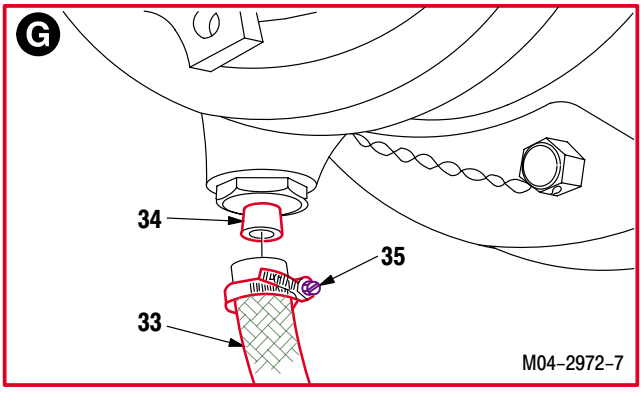
(2) Hold union (31). Torque nut (32) to **345 INCH-POUNDS**. Use crowfoot and torque wrench.

n. **Inspect (QA).**

o. **Install right input quill drain tube (33) on drain fitting (34).**

(1) Slide tube (33) over fitting (34).

(2) Tighten clamp (35).

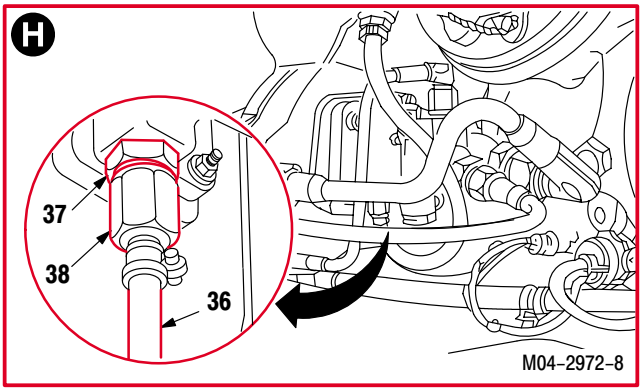


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6.113. TRANSMISSION INSTALLATION – CONNECT RIGHT SIDE AREA – continued

p. **Install right hydraulic pump seal drain hose (36) on union (37).**

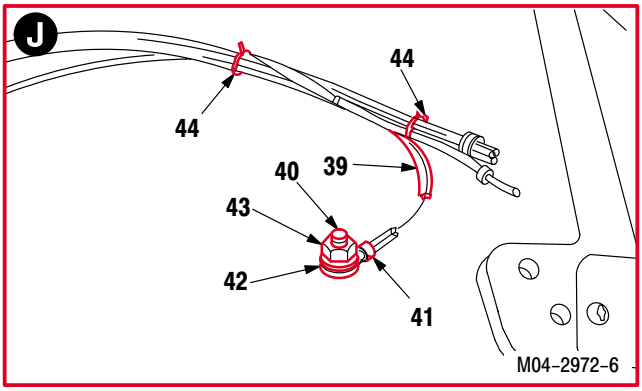
(1) Install nut (38) on union (37).



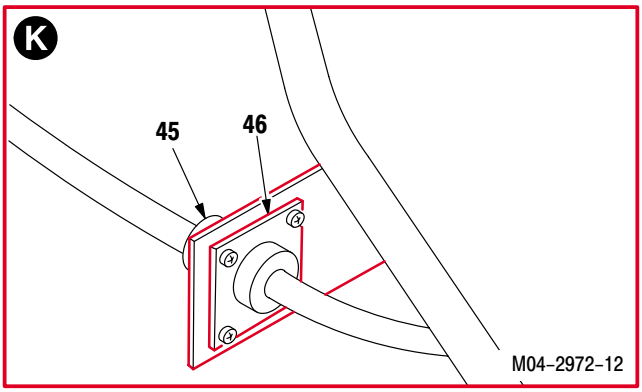
q. **Install generator electrical lead (39) on ground stud (40).**

(1) Install lug (41), washer (42), and nut (43) on stud (40).

(2) Install ties (44).

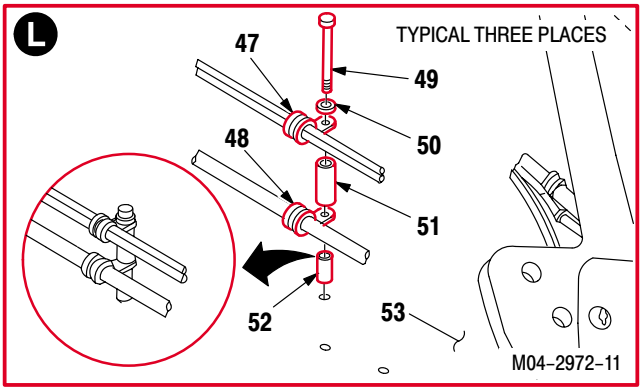


r. **Attach connector P131 (45) on receptacle J131 (46).**



s. **Install three clamps (47) and clamps (48).**

(1) Install bolt (49), washer (50), clamp (47), spacer (51), clamp (48), and spacer (52) in transmission deck (53).



GO TO NEXT PAGE

6.113. TRANSMISSION INSTALLATION – CONNECT RIGHT SIDE AREA – continued

t. **Install blade de-ice system controller** (para 12.55)**.**

u. **Install main transmission temperature transducers** (para 6.42)**.**

v. **Install main transmission filter bowls and element** (para 6.61)**.**

w. **Install main transmission No. 2 engine input coupling** (para 6.3)**.**

x. **Install No. 2 engine input drive shaft** (para 6.2)**.**

y. **Install nose gearbox diffuser** (para 6.33)**.**

z. **Install AC generator No. 1** (para 9.26)**.**

aa. **Install AC generator No. 2** (para 9.27)**.**

ab. **Secure access fairing RN6** (para 2.2)**.**

ac. **Install main rotor gearshaft** (para 6.95)**.**

ad. **Install main rotor blades** (para 5.4)**.**

ae. **Remove maintenance crane** (para 1.105)**.**

af. **Install main deck fire/overheat detector** (para 12.32)**.**

ag. **Service main transmission oil system** (para 1.32)**.**

ah. **Service utility and primary hydraulic systems** (para 1.34)**.**

ai. **Inspect (QA).**

aj. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

ak. **Secure access doors T250L, T250R, T290L, T290R, and L325, install panels L200 and R200; install fairings L230 and R230** (para 2.2)**.**

END OF TASK

6.114. MAIN TRANSMISSION PRIMARY LUBE OIL ROTARY PUMP REMOVAL/INSTALLATION

6.114.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.114.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Aircraft mounted crane (item 69, App H)
Industrial faceshield (item 129, App H)
Mount fixture (item 135, App H) (p/o item 25, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Jackscrew (NAS1801-4-19 for removal) (2)
Packing (3)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.101	Main transmission removed

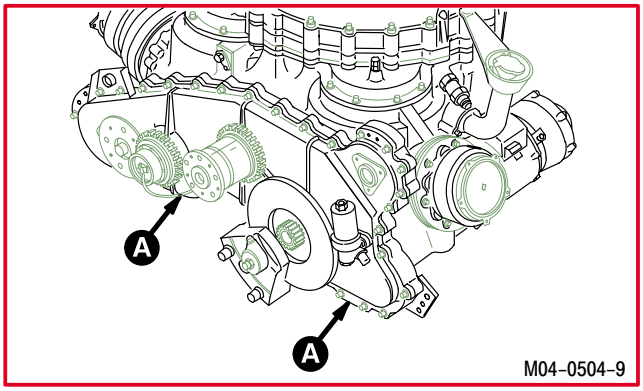
WARNING

FLIGHT SAFETY PART

The main transmission primary lube oil rotary pump is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right main transmission primary lube oil rotary pump.



GO TO NEXT PAGE

6.114. MAIN TRANSMISSION PRIMARY LUBE OIL ROTARY PUMP REMOVAL/INSTALLATION – continued

6.114.3. Removal

a. **Position main transmission (1) on mount fixture to access primary lube oil rotary pump (2).** Use mount fixture and crane (para 1.97).

b. **Remove pump (2) from transmission (1).**

(1) Remove lockwire from four bolts (3), if installed.

(2) Remove four bolts (3) and washers (4) from pump (2).

(3) Thread two jackscrews (5) in holes in flange (6).

(4) Tighten two jackscrews (5) evenly to separate pump (2) from transmission (1).

(5) Remove and discard packings (7), (8), and (9) from pump (2).

(6) Remove two jackscrews (5) from pump (2).

6.114.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.114.5. Inspection

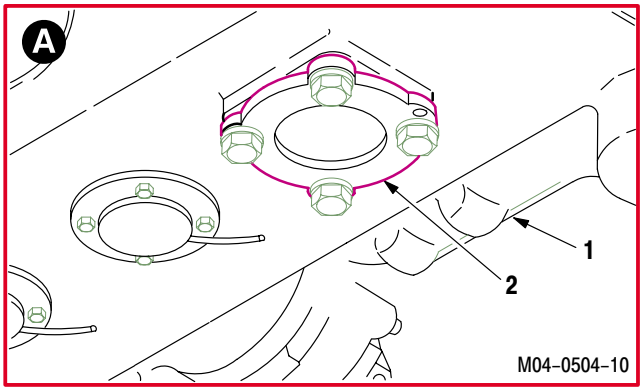
a. **Check attachment area of pump for cracks and corrosion.** None allowed.

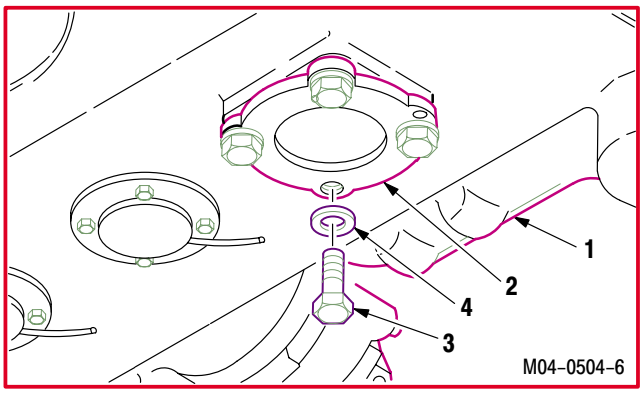
b. **Check pump for missing or damaged hardware.** None allowed.

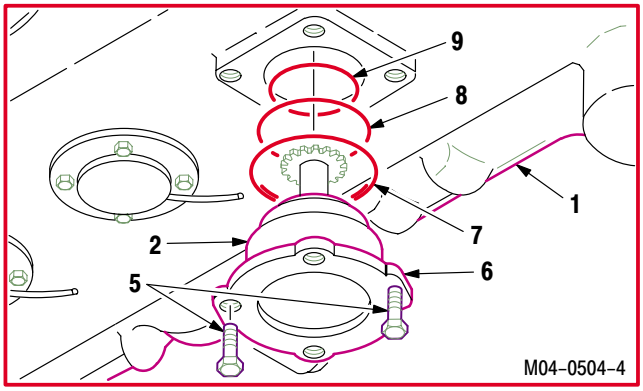
c. **Check pump for corrosion** (para 1.49)**.**

d. **Check pump for dents, chipped or broken housing.** None allowed.

e. **Check pump for damaged thread inserts.** None allowed.







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6.114. MAIN TRANSMISSION PRIMARY LUBE OIL ROTARY PUMP REMOVAL/INSTALLATION – continued

f. **Check input shaft and splines for cracks, chips, pitting, scuffing, scoring or spalling.** None allowed.

g. **Check input shaft for nicks, gouges, burrs and scratches.** Damage deeper than **0.020 INCH** must be blended.

h. **Check pump for evidence of overheating.** None allowed.

i. **Check pump packing grooves for nicks, scratches, gouges, and burrs.** None allowed.

6.114.6. Installation



a. **Install pump (2) in transmission (1).** Torque four bolts (3) to **65 INCH-POUNDS**.

(1) Lubricate new packings (7), (8), and (9). Use petrolatum (item 138, App F).

(2) Install packing (7) on head of pump (2).

(3) Install packing (8) on body of pump (2).

(4) Install packing (9) on end of pump (2).

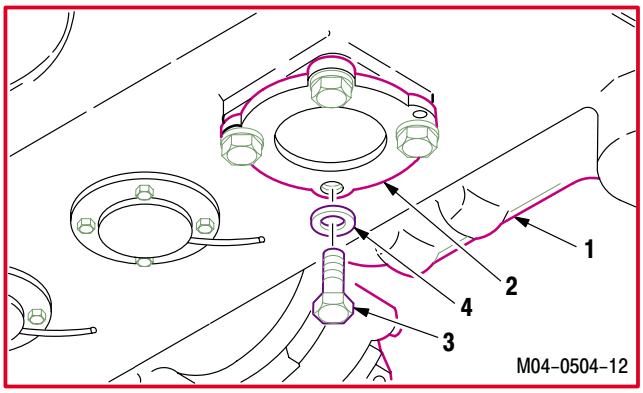
(5) Install pump (2) in transmission (1).

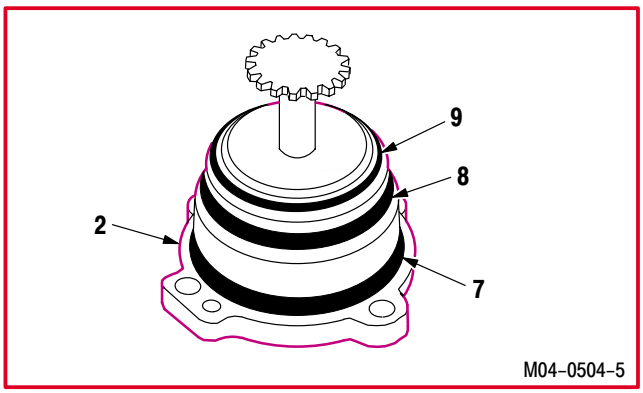
(6) Install four bolts (3) and washers (4).

(7) Torque four bolts (3) to **65 INCH-POUNDS**. Use torque wrench.

b. **Inspect (QA).**

c. **Install main transmission** (para 6.107)**.**





END OF TASK

6.115. MAIN TRANSMISSION INPUT DRIVE CLUTCH REMOVAL/INSTALLATION

6.115.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.115.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
3-inch x 3/4-inch drive socket wrench extension (item 123, App H)
Industrial faceshield (item 129, App H)
Aircraft maintenance fixture (item 133, App H)
Chemical protective gloves (item 154, App H)
3/4-inch drive hinged socket wrench handle (item 173, App H)
100 - 500 foot-pound 3/4-inch drive click type torque wrench (item 438, App H)

Materials/Parts:

Bolt (MS20074-04-22 for removal)
Packing
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 9-1090-208-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panels L200 and R200 removed
2.123	Engine nose gearbox fairings and shrouds removed
6.2	No. 1/No. 2 engine input drive shaft removed
6.3	Main transmission engine input coupling(s) removed
1.62	Lock rotor brake (if transmission is installed)
6.114	Left or right main transmission primary lube oil rotary pump removed (if transmission is removed)

WARNING

FLIGHT SAFETY PART

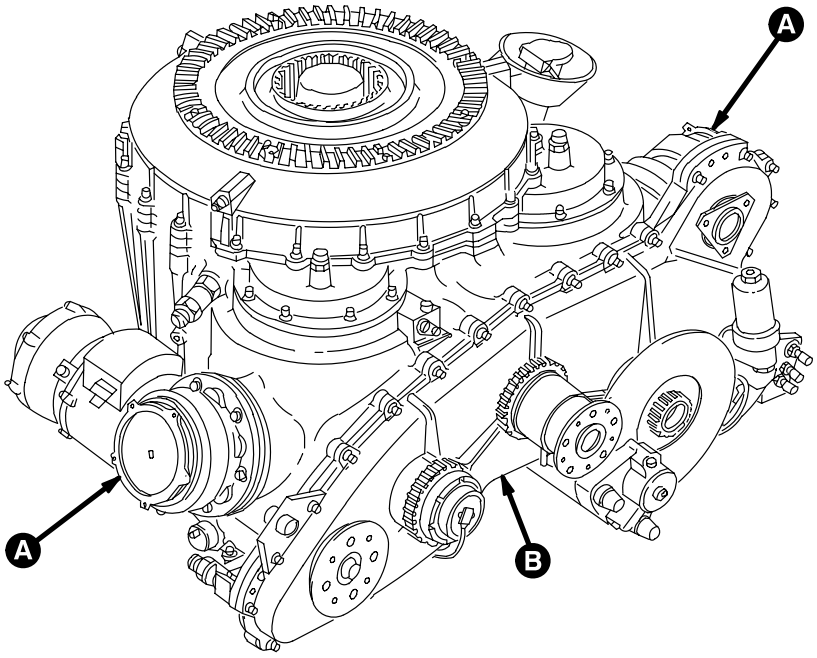
The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

6.115. MAIN TRANSMISSION INPUT DRIVE CLUTCH REMOVAL/INSTALLATION – continued

NOTE

- This task is typical for either left or right main transmission input drive clutch.
- Install maintenance fixture in left primary pump recess for No. 1 input drive clutch removal/installation or install maintenance fixture in right primary pump recess for No. 2 input drive clutch removal/installation (if transmission is removed).
- If main transmission is installed in aircraft, put rotor brake in **LOCKED** position; this will prevent main transmission input pinion from turning.



M04-0506-1

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6.115. MAIN TRANSMISSION INPUT DRIVE CLUTCH REMOVAL/INSTALLATION – continued

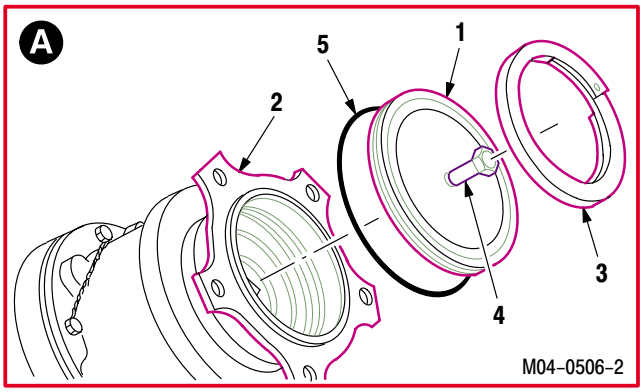
6.115.3. Removal

a. **Remove housing cover (1) from flange (2).**

(1) Remove retaining ring (3) from flange (2).

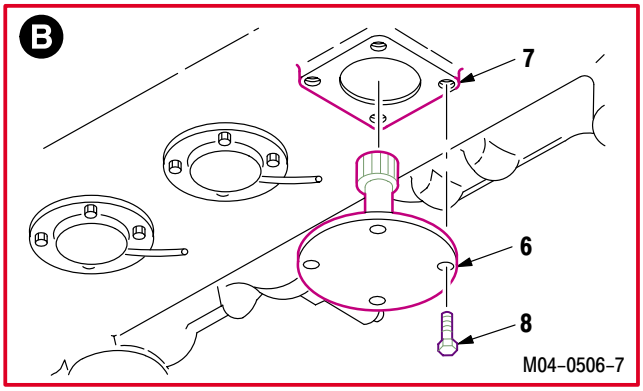
(2) Remove cover (1). Use MS20074-04-22 bolt (4).

(3) Remove and discard packing (5) from cover (1).



b. **Install maintenance fixture (6) in transmission (7) (if transmission is removed).** Use maintenance fixture.

(1) Install four primary oil pump bolts (8) through fixture (6) and transmission (7).



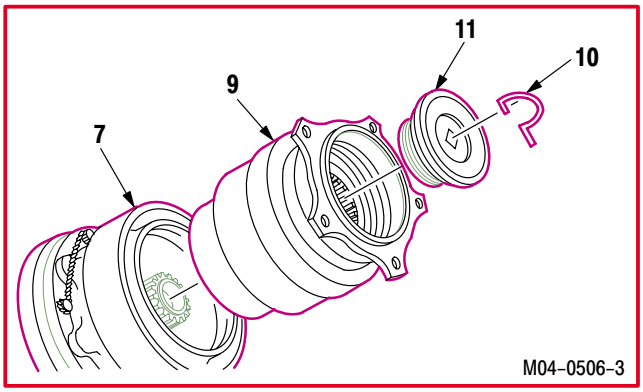
c. **Remove clutch (9) from transmission (7).**

(1) Remove retainer (10) from clamp nut (11).

(2) Remove clamp nut (11) from clutch (9). Use hinged handle and 3-inch extension.

(3) Remove clutch (9).

d. **Unlock rotor brake** (para 1.62)**.**



6.115.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.115.5. Inspection

a. **Check attachment area of clutch for cracks.** None allowed.

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6.115. MAIN TRANSMISSION INPUT DRIVE CLUTCH REMOVAL/INSTALLATION – continued

6.115.6. Installation

a. **Lock rotor brake (if transmission is installed)** (para 1.62)**.**

b. **Install clutch (9) in transmission (7).** Torque clamp nut (11) **145 to 165 FOOT-POUNDS**.

(1) Install clutch (9) in transmission (7).

(2) Install nut (11) in clutch (9).

(3) Torque nut (11) to **145 FOOT-POUNDS**. Use 3-inch extension and torque wrench.

(4) Increase torque to aline retainer holes, but do not torque nut (11) over **165 FOOT-POUNDS**. Use 3-inch extension and torque wrench.

(5) Install retainer (10) in nut (11).

c. **Unlock rotor brake** (para 1.62)**.**

d. **Inspect (QA).**



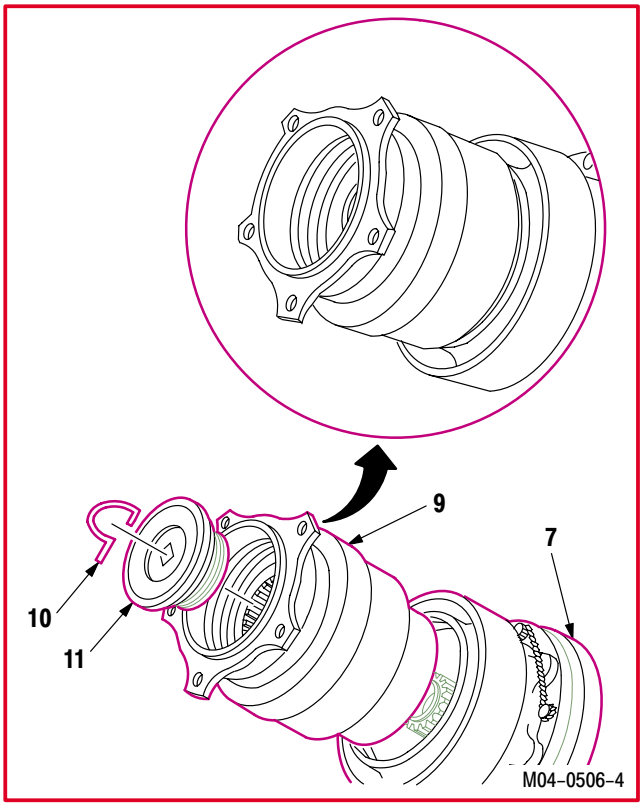
e. **Install cover (1) in flange (2).**

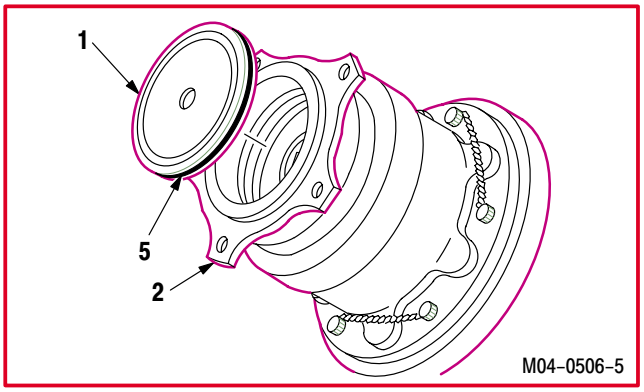
(1) Lubricate new packing (5). Use petrolatum (item 138, App F).

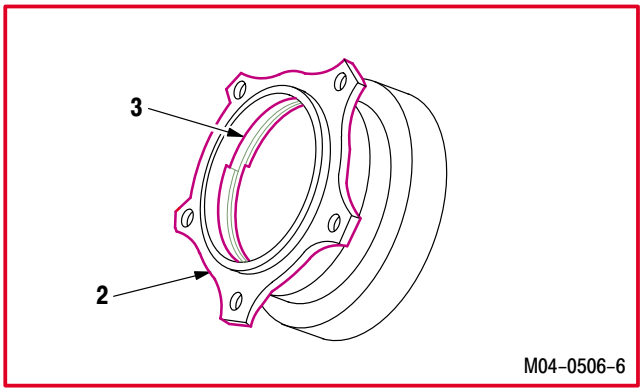
(2) Install packing (5) on cover (1).

(3) Install cover (1) in flange (2).

(4) Install retaining ring (3) on flange (2).







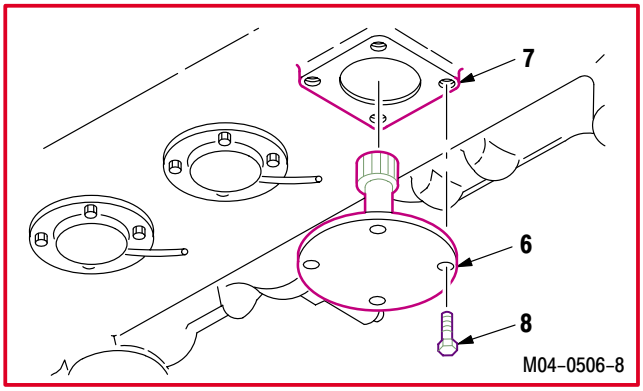
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6.115. MAIN TRANSMISSION INPUT DRIVE CLUTCH REMOVAL/INSTALLATION – continued

f. **Remove maintenance fixture (6) from transmission (7) (if transmission is removed).**

(1) Remove four bolts (8).

(2) Remove maintenance fixture (6) from transmission (7).



g. **Inspect (QA).**

h. **Install left or right main transmission primary lube oil rotary pump (if transmission is removed)** (para 6.114)**.**

i. **Install main transmission engine coupling(s)** (para 6.3)**.**

j. **Install No. 1/No. 2 engine input drive shaft(s)** (para 6.2)**.**

k. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

l. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

m. **Install access panels L200 and R200** (para 2.2)**.**

END OF TASK

6.116. MAIN TRANSMISSION INPUT PINION SEAL REMOVAL/INSTALLATION

6.116.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.116.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Mechanical puller attachment (item 240, App H)
Adjustable air filtering respirator (item 262, App H)
Bushing driver set (item 280, App H)

Materials/Parts:

Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.115	Main transmission input drive clutch removed

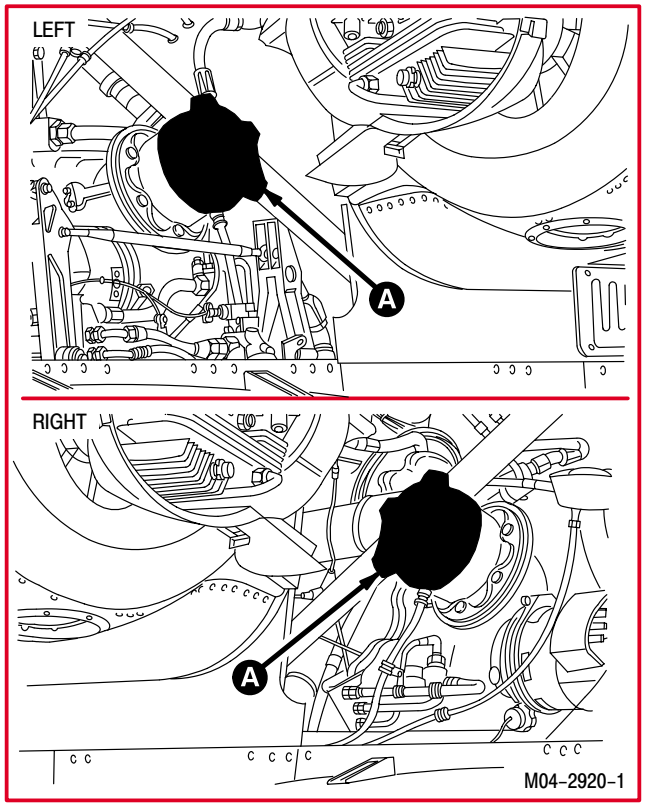
WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either left or right main transmission input pinion seal.



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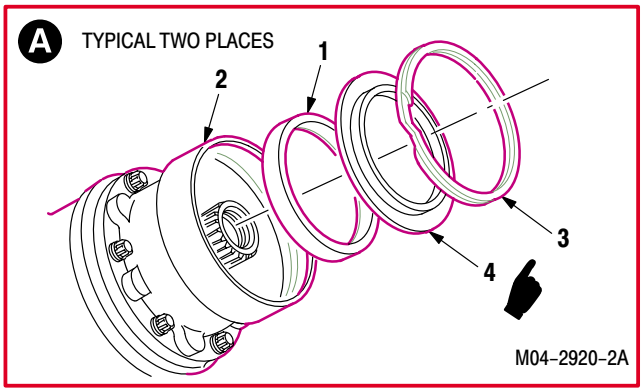
6.116. MAIN TRANSMISSION INPUT PINION SEAL REMOVAL/INSTALLATION – continued

6.116.3. Removal

a. **Remove main transmission input pinion seal (1) from main transmission input housing (2).**

(1) Remove retaining ring (3) and deflector (4).

(2) Remove and discard seal (1) from housing (2). Use mechanical puller attachment.



6.116.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.116.5. Inspection

a. **Check attachment area for cracks.** None allowed.

6.116.6. Installation



a. **Install new seal (1) into housing (2).**

(1) Apply sealing compound to seal (1) mating surface on housing (2). Use sealing compound (item 177, App F).

(2) Install seal (1) with solid shoulder (tapered side) facing out of housing (2). Use bushing driver set.

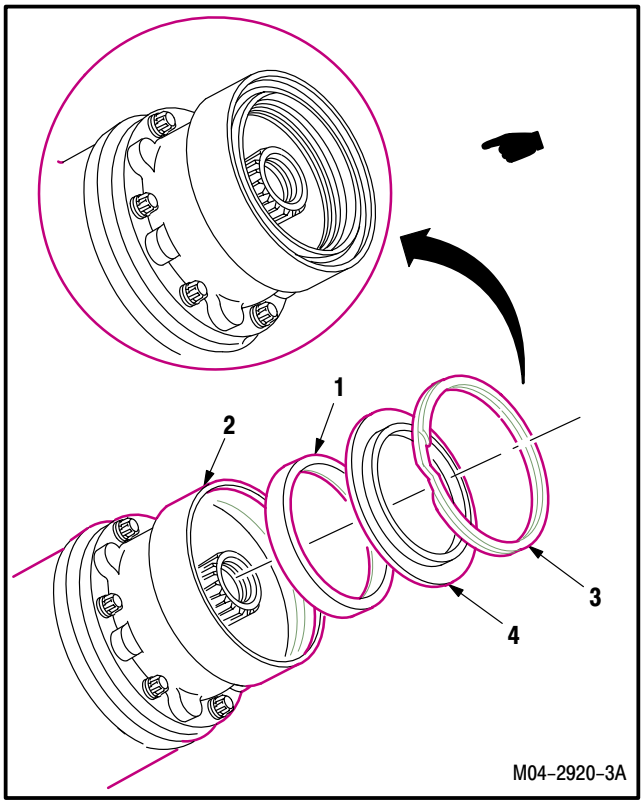
(3) Remove excess sealing compound.

(4) Install deflector (4) with flange facing out of housing (2).

(5) Install retaining ring (3).

b. **Inspect (QA).**

c. **Install main transmission input drive clutch** (para 6.115)**.**



END OF TASK

6.117. MAIN TRANSMISSION INPUT DRIVE HOUSING REMOVAL/INSTALLATION

6.117.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.117.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panels L200 and/or R200 removed
2.123	Engine nose gearbox fairings and shrouds removed
6.115	Main transmission input drive clutch removed

WARNING

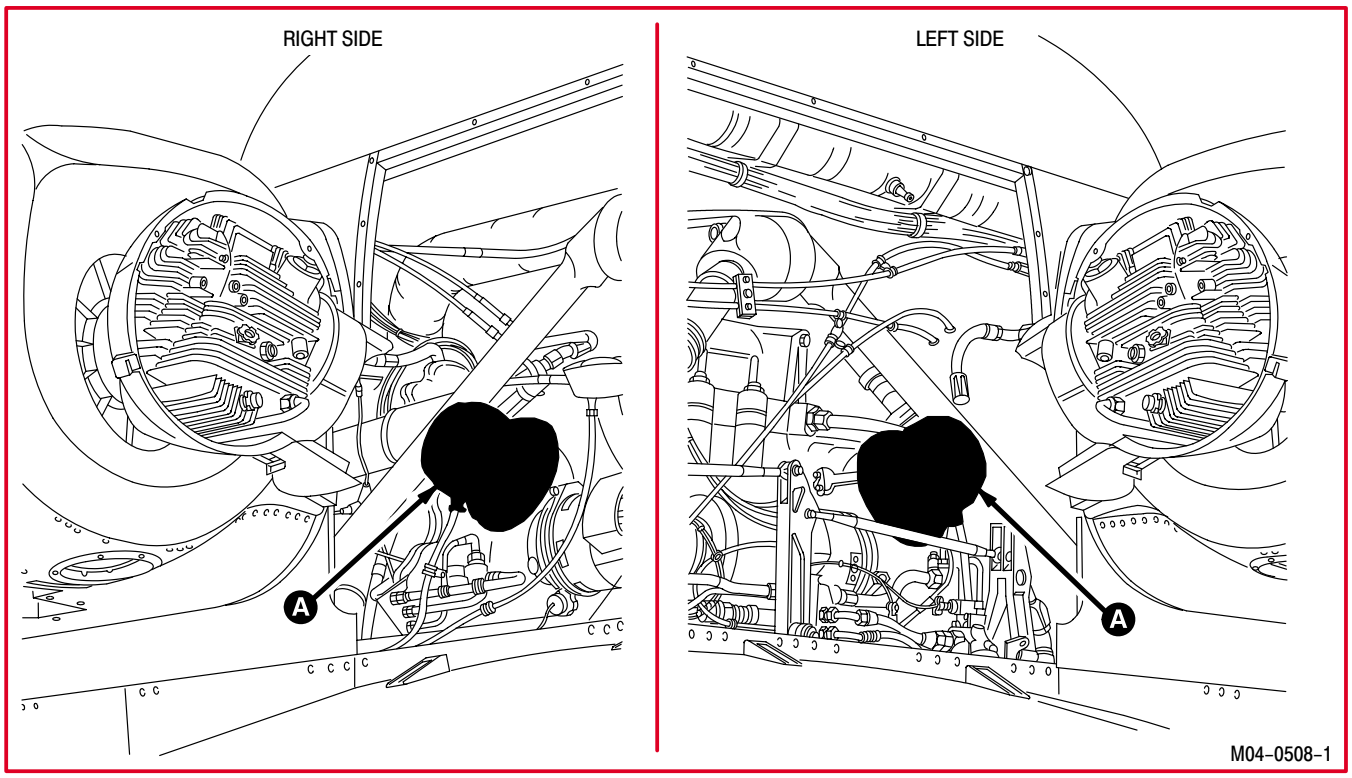
FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

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6.117. MAIN TRANSMISSION INPUT DRIVE HOUSING REMOVAL/INSTALLATION – continued

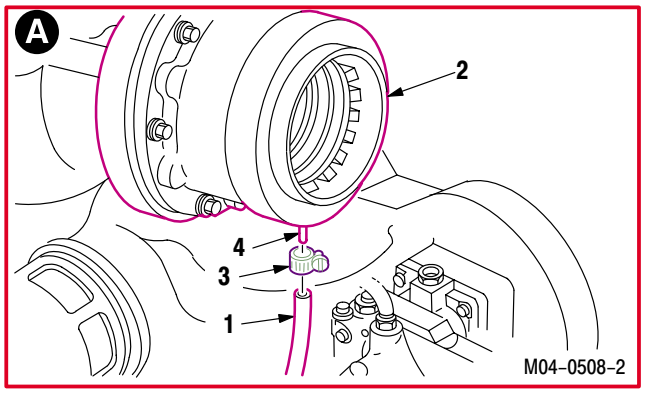
6.117.3. Removal



a. **Remove drain hose (1) from housing (2).**

(1) Loosen clamp (3).

(2) Pull hose (1) from tube (4).



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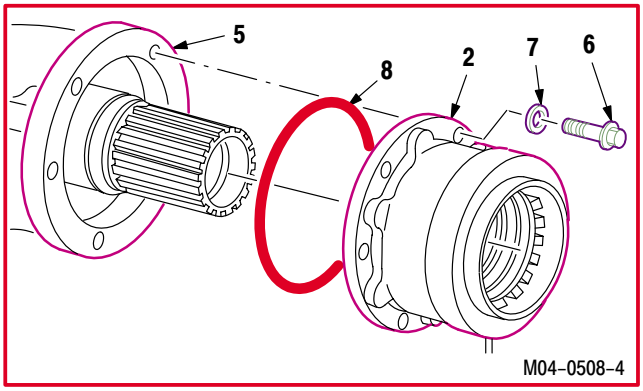
6.117. MAIN TRANSMISSION INPUT DRIVE HOUSING REMOVAL/INSTALLATION – continued

b. **Remove housing (2) from main transmission (5).**

(1) Remove six bolts (6) and washers (7).

(2) Remove housing (2) from transmission (5).

(3) Remove and discard packing (8) from housing (2).



6.117.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.117.5. Inspection

a. **Check housing for dents, cracks, and gouges** (para 6.41)**.**

6.117.6. Installation



a. **Install housing (2) on transmission (5).** Torque six bolts (6) to **65 INCH-POUNDS**.

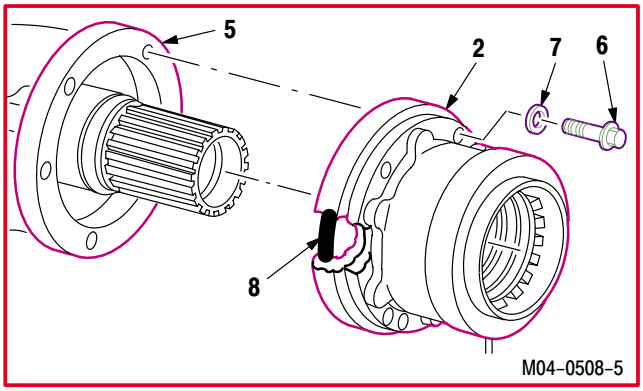
(1) Lubricate new packing (8). Use petrolatum (item 138, App F).

(2) Install packing (8) on housing (2).

(3) Install housing (2) on transmission (5).

(4) Install six washers (7) and bolts (6).

(5) Torque six bolts (6) to **65 INCH-POUNDS**. Use torque wrench.



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6.117. MAIN TRANSMISSION INPUT DRIVE HOUSING REMOVAL/INSTALLATION – continued

b. **Install hose (1) on housing (2).**

(1) Install clamp (3) on hose (1).

(2) Slide hose (1) on tube (4).

(3) Tighten clamp (3).

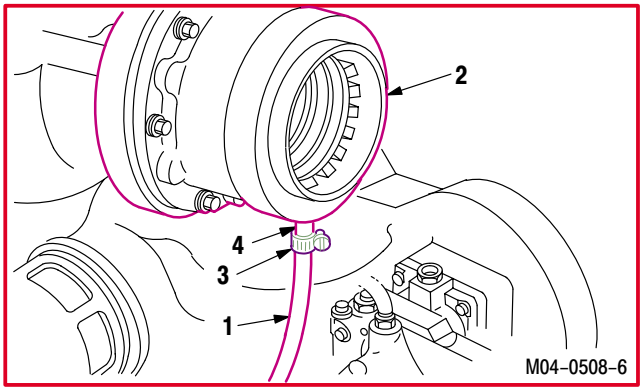
c. **Inspect (QA).**

d. **Install main transmission input drive clutch** (para 6.115)**.**

e. **Install engine nose gearbox fairings and shrouds** (para 2.123)**.**

f. **Install access panels L200 and/or R200** (para 2.2)**.**

g. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.118. MAIN TRANSMISSION STANDPIPE REMOVAL/INSTALLATION (AVIM)

6.118.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.118.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Airframe adapter kit (item 25, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Rail type trailer (item 396, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.101	Main transmission removed

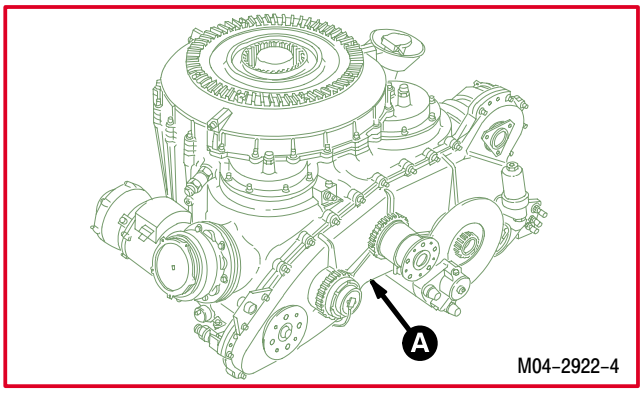
Materials/Parts:

Packing (2)
Petrolatum (item 138, App F)

WARNING

FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.118. MAIN TRANSMISSION STANDPIPE REMOVAL/INSTALLATION (AVIM) – continued

6.118.3. Removal

a. **Remove main transmission standpipe (1) from bottom of main transmission (2).**

(1) Remove retaining ring (3) from groove (4).

(2) Remove standpipe (1) from transmission (2).

(3) Remove and discard packings (5) and (6) from standpipe (1).

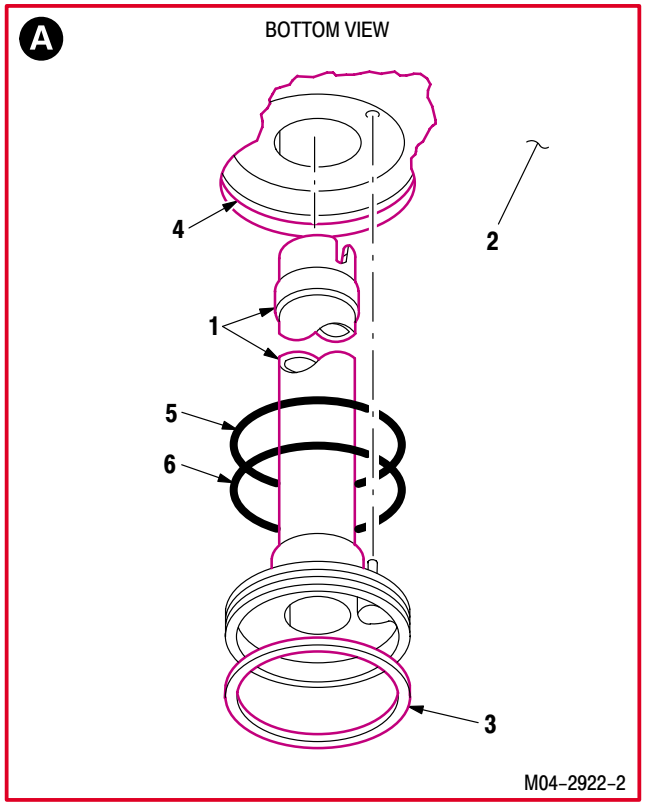
6.118.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.118.5. Inspection

a. **Check retaining ring and retaining ring groove for cracks** (TM 1-1500-204-23)**.**

b. **Check retaining ring and ring groove for corrosion** (para 1.49)**.**



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6.118. MAIN TRANSMISSION STANDPIPE REMOVAL/INSTALLATION (AVIM) – continued

6.118.6. Installation



CAUTION

Avoid damaging bottom end of standpipe on inner transmission gears during standpipe installation.

a. **Install standpipe (1) in transmission (2).**

(1) Lubricate packing (5) and (6). Use petrolatum (item 138, App F).

(2) Install packings (5) and (6) in grooves (7) and (8).

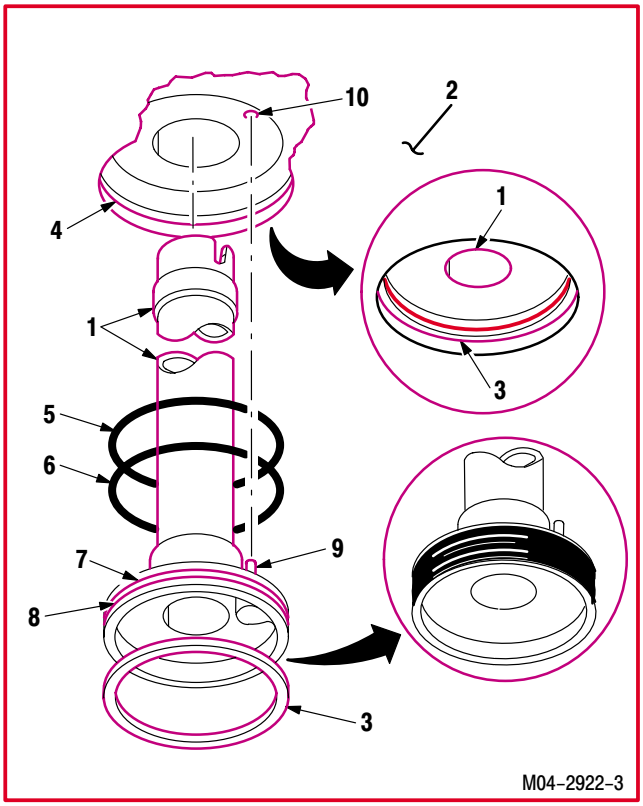
(3) Aline standpipe alinement pin (9) with hole (10) in transmission (2).

(4) Install standpipe (1) in transmission (2).

(5) Install ring (3) in groove (4).

b. **Inspect (QA).**

c. **Install main transmission** (para 6.107)**.**



END OF TASK

6.119. MAIN TRANSMISSION FLOAT DIVERTER VALVE REMOVAL/INSTALLATION

6.119.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.119.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Aircraft mounted crane (item 69, App H)
Industrial faceshield (item 129, App H)
Mount fixture (item 135, App H) (p/o item 25, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Jackscrew (NAS1801-4-19 for removal) (2)
Packing (3)
Assembly fluid (item 30, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

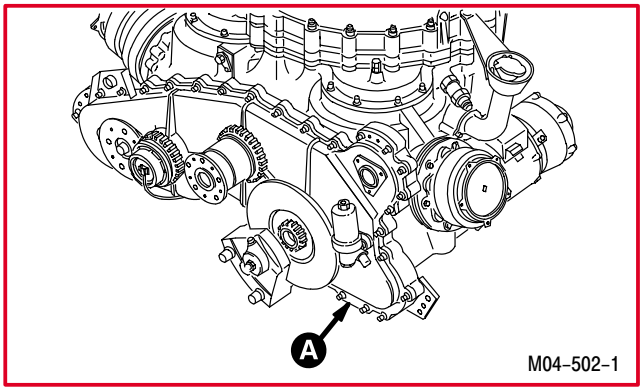
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.101	Main transmission removed

WARNING

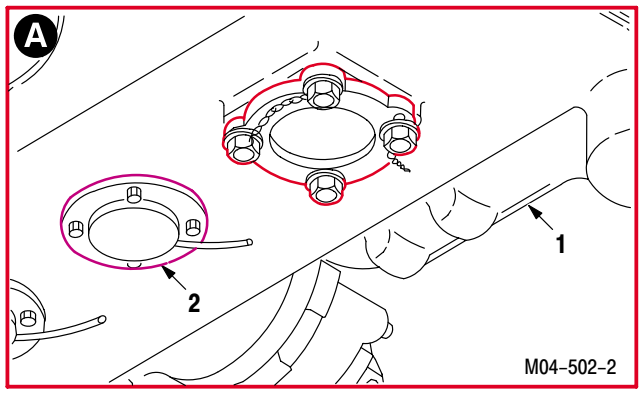
FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



6.119.3. Removal

a. **Position main transmission (1) on mount fixture to access float diverter valve (2).** Use mount fixture and crane (para 1.97).



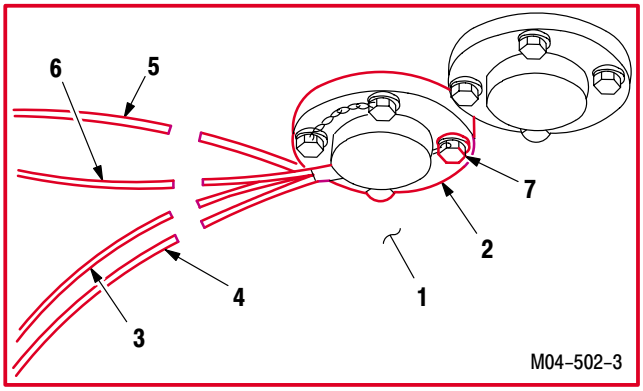
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6.119. MAIN TRANSMISSION FLOAT DIVERTER VALVE REMOVAL/INSTALLATION – continued

b. **Remove valve (2) from transmission (1).**

(1) Identify and cut lead wires (3), (4), (5), and (6) (TM 55-1500-323-24).

(2) Remove lockwire from four bolts (7), if installed.



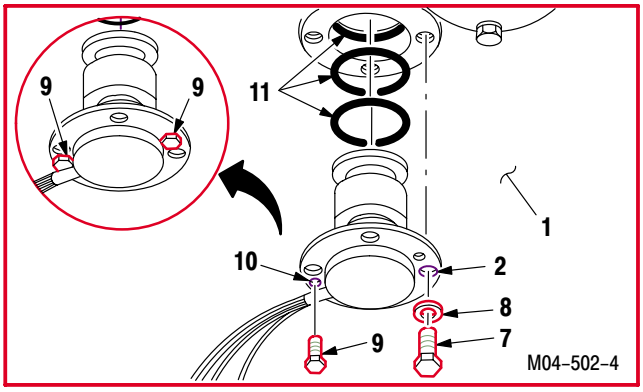
(3) Remove four bolts (7) and washers (8).

(4) Install two jackscrews (9) in jackscrew holes (10) and tighten.

(5) Remove valve (2) from transmission (1).

(6) Remove and discard three packings (11) from valve (2).

(7) Remove two jackscrews (9) from valve (2).



6.119.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.119.5. Inspection

a. **Check transmission for cracks and stripped threads.** None allowed.

b. **Check valve for cracks.** None allowed.

c. **Check valve for cracked, scratched, gouged, or chipped packing grooves.** None allowed.

d. **Check valve for elongated bolt holes.** None allowed.

e. **Check valve for corrosion** (para 1.49)**.**

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6.119. MAIN TRANSMISSION FLOAT DIVERTER VALVE REMOVAL/INSTALLATION – continued

6.119.6. Installation



a. **Install valve (2) in transmission (1).** Torque four bolts (7) to **65 INCH-POUNDS**.

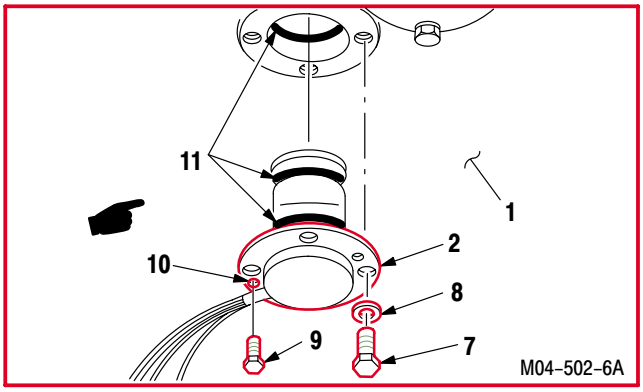
(1) Lubricate three new packings (11). Use assembly fluid (item 30, App F).

(2) Install packings (11) on valve (2).

(3) Install valve (2) in transmission (1).

(4) Install four washers (8) and bolts (7).

(5) Torque four bolts (7) to **65 INCH-POUNDS**. Use torque wrench.



b. **Connect lead wires (3), (4), (5), and (6).**

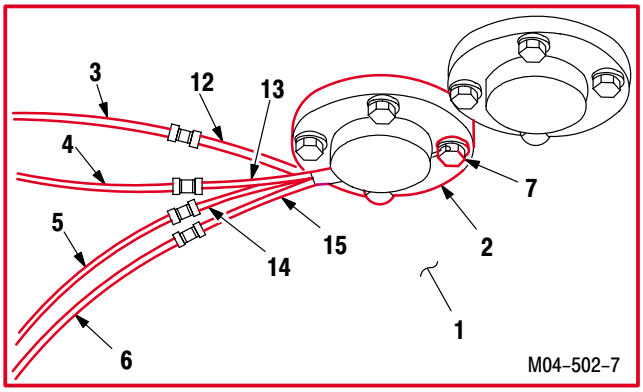
(1) Cut valve wires (12), (13), (14), and (15) to correct length.

(2) Connect lead wire (3) to valve wire (12) (TM 55-1500-323-24).

(3) Connect lead wire (4) to valve wire (13) (TM 55-1500-323-24).

(4) Connect lead wire (5) to valve wire (14) (TM 55-1500-323-24).

(5) Connect lead wire (6) to valve wire (15) (TM 55-1500-323-24).



c. **Inspect (QA).**

d. **Install main transmission** (para 6.107)**.**

e. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.120. MAIN TRANSMISSION FLOAT DIVERTER VALVE DISASSEMBLY/ASSEMBLY

6.120.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

6.120.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.119	Main transmission float diverter valve removed

WARNING

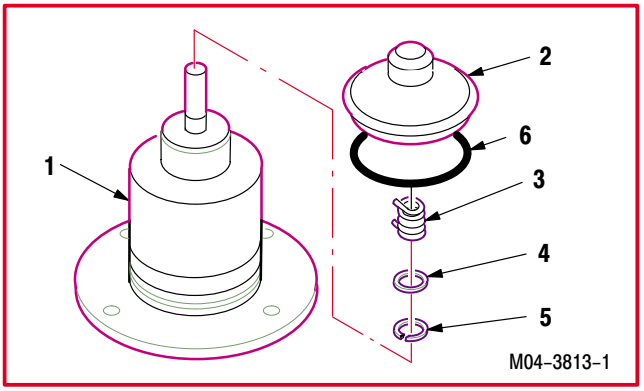
FLIGHT SAFETY PART

The main transmission is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.120.3. Disassembly

a. **Disassemble float diverter valve (1).**

(1) Remove float diverter valve top (2), spring tension clip (3), helical spring (4), retaining ring (5), and packing (6) from valve (1).



6.120.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

GO TO NEXT PAGE

6.120. MAIN TRANSMISSION FLOAT DIVERTER VALVE DISASSEMBLY/ASSEMBLY – continued

6.120.5. Inspection

a. **Check diverter valve top, spring tension clip, helical spring, and retaining ring for cracks and damage.** None allowed.

b. **Check diverter valve top, spring tension clip, helical spring, and retaining ring for corrosion** (para 1.49)**.**

c. **Check base packing grooves for cracks, scratches, gouges, and chips.** None allowed.

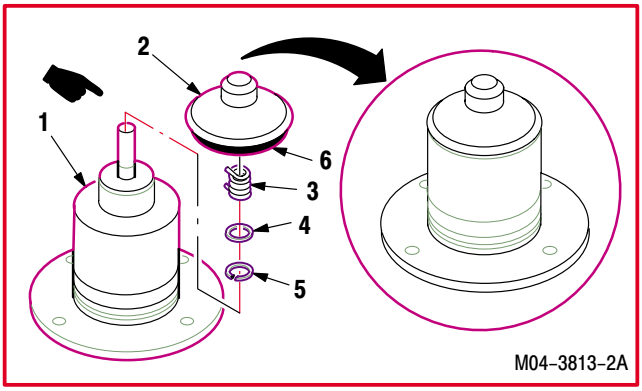
6.120.6. Assembly

a. **Assemble valve (1).**

(1) Install packing (6), ring (5), spring (4), clip (3), and valve top (2) on valve (1).

b. **Inspect (QA).**

c. **Install main transmission float diverter valve** (para 6.119)**.**



END OF TASK

SECTION IV. INTERMEDIATE GEARBOX MAINTENANCE

6.121. INTERMEDIATE GEARBOX INSPECTION

6.121.1. Description

This task covers: Inspection.

6.121.2. Initial Setup

Tools:

0.20 - 1.00-inch inside micrometer caliper (item 50, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
Fluorescent inspection kit (item 138, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
0.001 - 0.200-inch dial indicator (item 176, App H)

References:

TM 55-1500-335-23

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.121.3. Inspection

a. **Check components for damage and loose mounting.** None allowed.

b. **Check for loose, missing, or damaged mounting hardware.** None allowed.

c. **Check grease leakage from gearbox housing and input or output retainers.**

(1) Replace seal (para 6.125 or 6.124) if leakage rate exceeds 6 oz per flight.

d. **Check gearbox for serviceability.**

(1) Check for fractures and/or cracks. None allowed. Use fluorescent inspection kit (TM 55-1500-335-23).

(2) Check mounting feet for damage or corrosion on both sides of mounting area, not deeper than **0.020 INCH** before blending, and not over 25 percent of area. Use depth gage.

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6.121. INTERMEDIATE GEARBOX INSPECTION – continued

(3) Check studs for crossed, stripped, or flattened threads. None allowed.

(a) Locking serrations flush to below surface of housing. No looseness allowed.

(4) Check thread holes for crossed, stripped, or flattened threads. None allowed.

(5) Check inserts for loose, crossed, stripped, or flattened threads. None allowed. Top of insert flush to below surface of housing.

(6) Check mounting holes for a maximum diameter of **0.430 INCH**. Use caliper.

(7) Check housing for dings and nicks not to exceed **0.050 INCH** before blending. Use depth gage.

(a) After blending, magnesium must be corrosion protected (para 1.49).

e. **Check temperature sensors for cracked, broken, or burned insulation.**

(1) Check for secure splices to gearbox harness.

f. **Check retainers for serviceability.**

(1) Check for fractures and/or cracks. None allowed. Use fluorescent inspection kit (TM 55-1500-335-23).

(2) Check clinch nuts for crossed, stripped, or flattened threads. None allowed. Top of serrations flush to below surface of housing. No looseness allowed.

(3) Maximum diameter of bolt holes **0.330 INCH**. Use caliper.

(4) Check for nicks, gouges, burrs, and corrosion not deeper than **0.040 INCH** before blending, except for specific surfaces. Use depth gage.

(a) Check mounting surface for damage and/or corrosion, not deeper than **0.020 INCH** before blending and not over 25 percent of total area. Not more than 10 percent damage in one localized area. Use depth gage.

(5) Check packing groove for damage. None allowed.

g. **Check gearbox flange or shouldered shaft for serviceability.**

(1) Check for nicks, burrs, gouges, and corrosion. Except for surfaces identified below, depths less than **0.020 INCH** before blending are acceptable. Use depth gage.

(2) Check for fractures and cracks. None allowed.

(3) Check identification marking. Must be readable.

(4) Check coupling mounting diameter. Minimum diameter **2.1221 INCH**. Use caliper set.

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6.121. INTERMEDIATE GEARBOX INSPECTION – continued

(5) Check diameter of pilot between shaft and gear. Minimum diameter **2.4995 INCH**. Use caliper set.

(6) Check diameter of pilot between gear and plug. Minimum diameter **2.0940 INCH**. Use caliper set.

(7) Check shaft runout. Total indicated runout relative to pilots **0.004 INCH** Use caliper set.

(8) Check spline teeth.

(a) No scuffing, scoring, or spalling allowed.

(b) Maximum pitting depth before blending **0.008 INCH**. Use depth gage.

(c) Maximum wear step **0.008 INCH**. Use depth gage.

(d) Measure “Over Balls” diameter with two **0.2500 INCH** diameter gage balls placed in tooth spaces approximately 180 degrees apart. Take three “Over Balls” measurements at locations approximately 120 degrees apart. Minimum “Over Balls” diameter **2.737 INCH**. Use caliper set.

(9) Check five **0.2500 INCH** hole diameters. Maximum diameter **0.2585 INCH**. Use caliper set.

(10) Check plug for looseness and insertion depth. Minimum insertion depth from end of shaft, **0.060 INCH**. Use depth gage.

(11) Check cadmium plating. Damaged and missing cadmium plating is acceptable.

h. **Check breather lubricant buildup.**

i. During operation, some gearboxes may expel small amounts of grease from the gearbox breather vent. If lubricant is evident; remove, clean, and reinstall breather (para 6.126).

(1) No additional reservicing of the gearbox need be performed.

j. **Check diffuser for serviceability.**

(1) Check for fractures and/or cracks. None allowed. Use fluorescent inspection kit (TM 55-1500-335-23).

(2) Check for nicks, burrs, gouges, and corrosion, not deeper than **0.020 INCH** before blending, and not over 25 percent of area. Not more than 10 percent damage in one localized area. Use depth gage.

END OF TASK

6.122. INTERMEDIATE GEARBOX OUTPUT SHOULDERED SHAFT REMOVAL/INSTALLATION

6.122.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.122.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Packing
Grease (item 88, App F)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

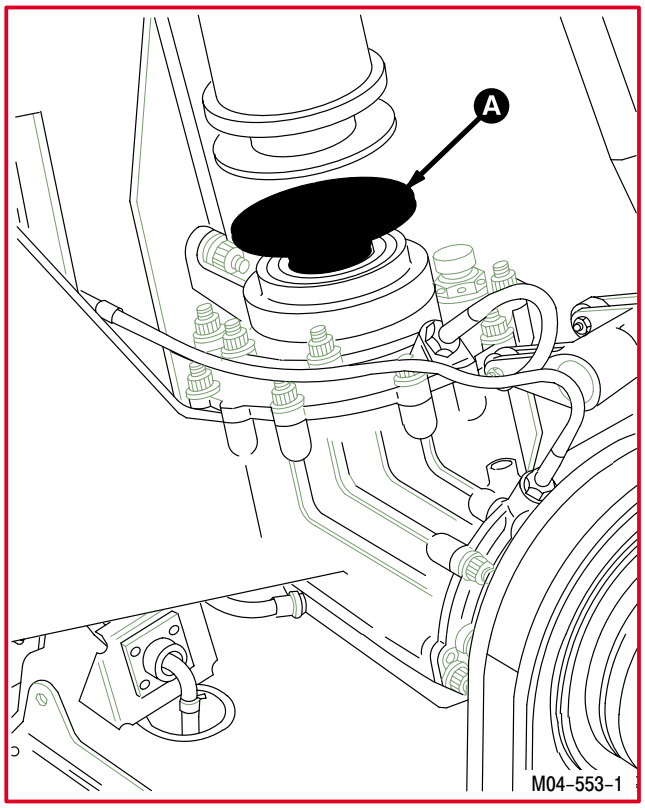
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L510 and R510 removed
6.14	No. 6 tail rotor drive shaft removed
6.13	Intermediate gearbox output coupling removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.122. INTERMEDIATE GEARBOX OUTPUT SHOULDERED SHAFT REMOVAL/INSTALLATION – continued

6.122.3. Removal

a. **Remove output shouldered shaft (1).**

(1) Pull shaft (1) straight up until clear of intermediate gearbox (2).

(2) Remove and discard packing (3).

6.122.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.122.5. Inspection

a. **Check shouldered shaft for serviceability** (para 6.121)**.**

6.122.6. Installation



a. **Lubricate new packing (3).** Use petrolatum (item 138, App F).

b. **Install packing (3) in groove of shaft (1).**

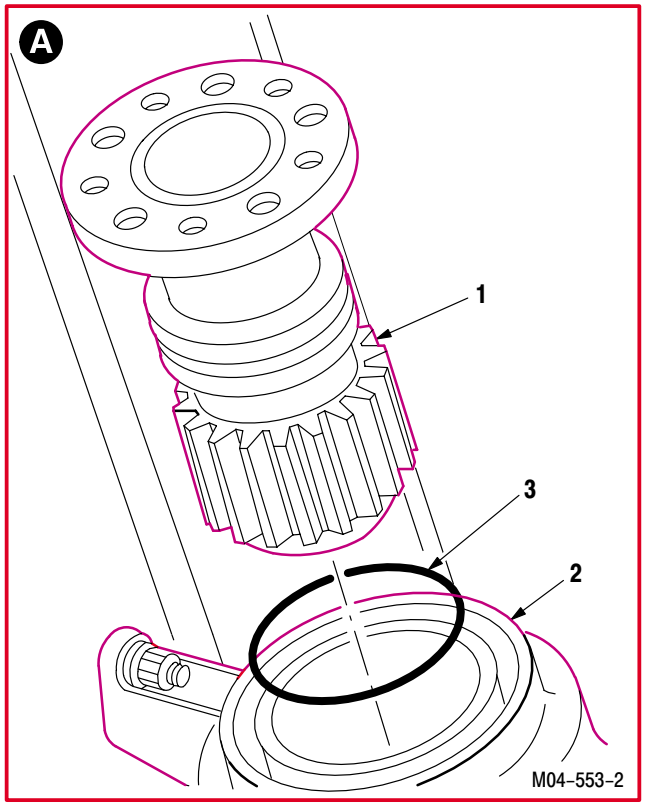


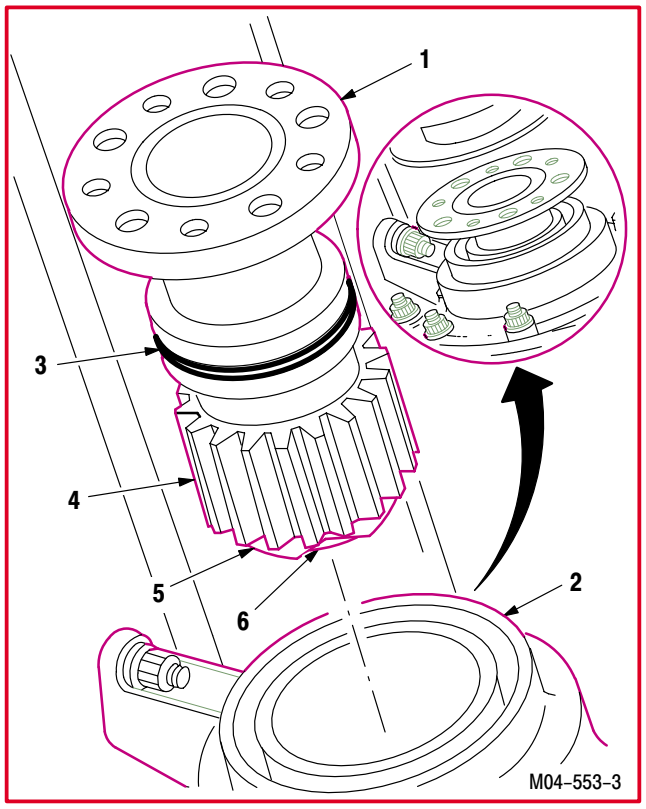
c. **Install shaft (1) in gearbox (2).**

(1) Lubricate spline (4), pilot (5), and plug (6). Use grease (item 88, App F).

(2) Slowly rotate shaft (1) until spline (4) alines with spline of gearbox (2).

(3) Push in until shaft (1) bottoms in gearbox (2).





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6.122. INTERMEDIATE GEARBOX OUTPUT SHOULDERED SHAFT REMOVAL/INSTALLATION – continued

d. **Inspect (QA).**

e. **Install No. 6 tail rotor drive shaft** (para 6.14)**.**

f. **Install intermediate gearbox output shaft coupling** (para 6.13)**.**

g. **Install access fairings L510 and R510** (para 2.2)**.**

END OF TASK

6.123. INTERMEDIATE GEARBOX INPUT FLANGE AND OUTPUT SHOULDERED SHAFT EXPANSION PLUG REPLACEMENT (AVIM)

6.123.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.123.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
7/8 x 7 3/4-inch long brass driftpin (item 114, App H)
Rawhide mallet (item 212, App H)

Equipment Conditions:

Ref	Condition
6.12	Intermediate gearbox input flange removed or
6.122	Intermediate gearbox output shouldered shaft removed

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The intermediate gearbox input flange and output shouldered shaft are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either intermediate gearbox input flange or output shouldered shaft expansion plug.

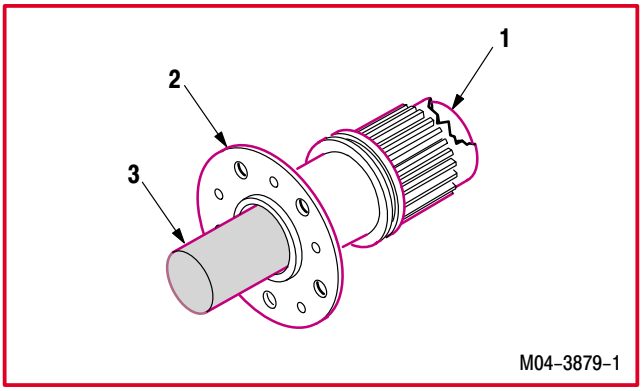
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6.123. INTERMEDIATE GEARBOX INPUT FLANGE AND OUTPUT SHOULDERED SHAFT EXPANSION PLUG REPLACEMENT (AVIM) – continued

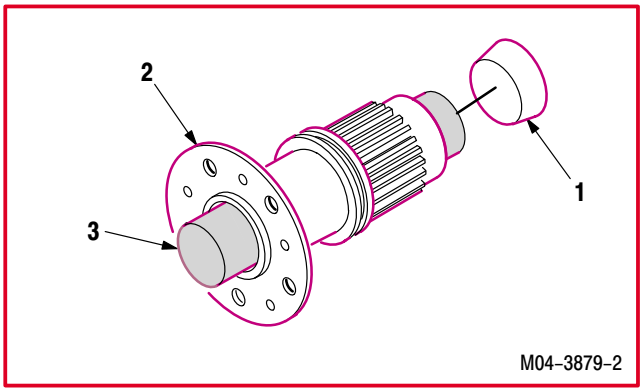
6.123.3. Removal

a. **Remove expansion plug (1) from flange/shaft (2).**

(1) Insert driftpin (3) in flange/shaft (2) from flange end. Use driftpin and mallet.



(2) Remove and discard plug (1) from flange/shaft (2).



6.123.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.123.5. Inspection

CAUTION

Structural integrity and heat treated condition of intermediate gearbox input flange and output shouldered shaft is critical to its serviceability. Any evidence of material fatigue, intergranular corrosion, cracking, heat oxidation (discoloration) or similar defect requires replacement of part.

a. **Check removed and attaching parts for corrosion** (para 1.49)**.**

b. **Check flange for serviceability** (para 6.121)**.**

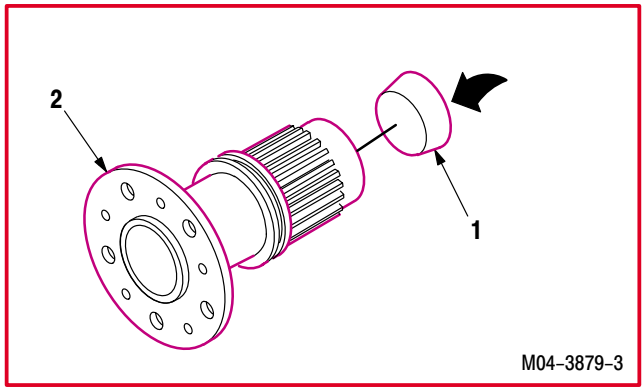
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6.123. INTERMEDIATE GEARBOX INPUT FLANGE AND OUTPUT SHOULDERED SHAFT EXPANSION PLUG REPLACEMENT (AVIM) – continued

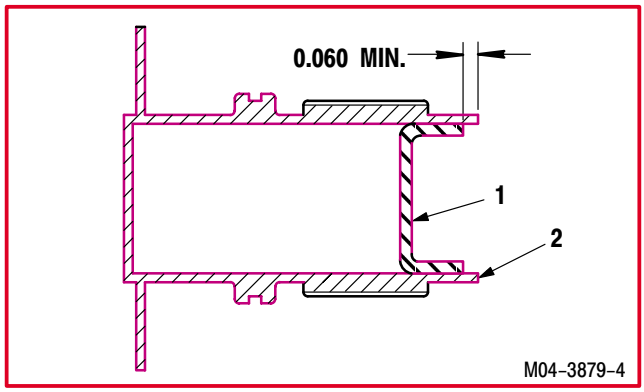
6.123.6. Installation

a. **Install new plug (1) in flange/shaft (2).**

(1) Position plug (1) on geartooth end of flange/shaft (2).



(2) Press plug (1) in flange/shaft (2) until end of plug (1) is recessed a minimum of **0.060 INCH** from geartooth end of flange/shaft (2). Use driftpin, mallet, and depth gage.



b. **Inspect (QA).**

c. **Install intermediate gearbox input flange** (para 6.12) **or intermediate gearbox output shouldered shaft** (para 6.122)**.**

END OF TASK

6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION

6.124.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.124.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
0.0015 - 0.0250-inch thickness gage (item 152, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Bolt (NAS564-33 for removal) (2)
Packing (3)
Self-locking nut (6)
Spacer
Assembly fluid (item 30, App F)
Cloth (item 52, App F)
Corrosion preventive compound (item 63, App F)
Lubricating oil (item 119, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

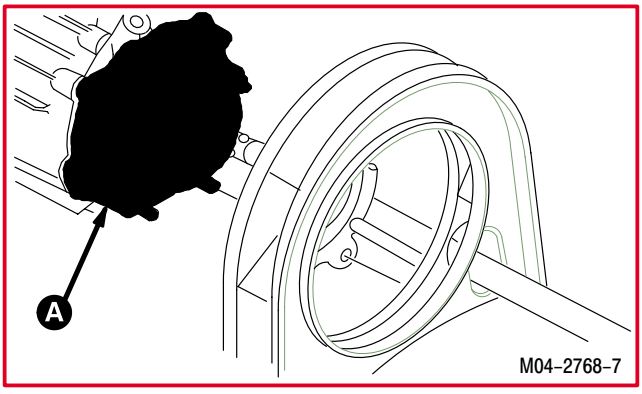
Equipment Conditions:

Ref	Condition
6.12	Intermediate gearbox input flange removed
6.131	Intermediate gearbox diffuser removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.124.3. Removal

a. **Remove retainer (1) from intermediate gearbox (2).**

(1) Remove sealing compound from retainer (1), gearbox (2), six self-locking nuts (3), washers (4) and studs (5).

(2) Remove six self-locking nuts (3) and washers (4) from studs (5).

(3) Discard nuts (3).

(4) Remove sealing compound from two nylon setscrews (6).

(5) Remove two nylon setscrews (6) from retainer (1).

(6) Install two removal bolts (7) on retainer (1). Use NAS564-33 bolts.

CAUTION

Removal bolts must be tightened evenly to avoid damage to gearbox.

(7) Tighten two removal bolts (7) evenly until retainer (1) separates from gearbox (2).

(8) Remove retainer (1) from gearbox (2).

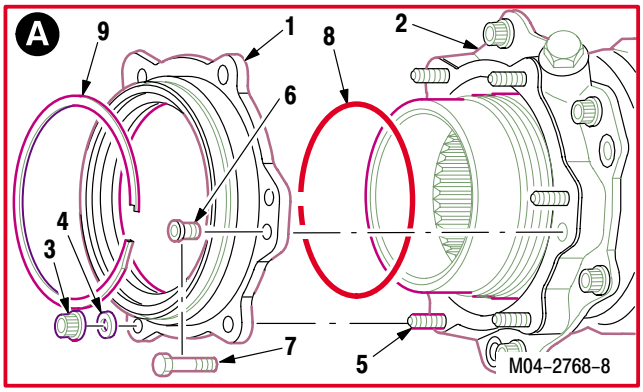
(9) Remove two removal bolts (7) from retainer (1).

(10) Remove and discard packing (8) from retainer (1).

NOTE

Some retainers have retaining rings.

(11) Remove retaining ring (9) from retainer (1), if installed.



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6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.

NOTE

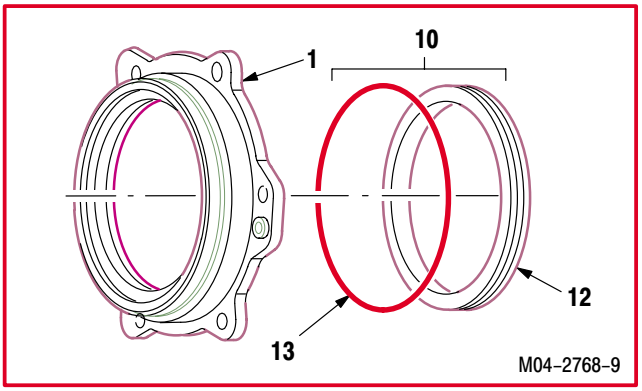
- The seal assembly is a two-piece magnetic seal. Ensure both halves of seal assembly are removed.
- The two-piece seal assembly shall be kept as a matched unit.

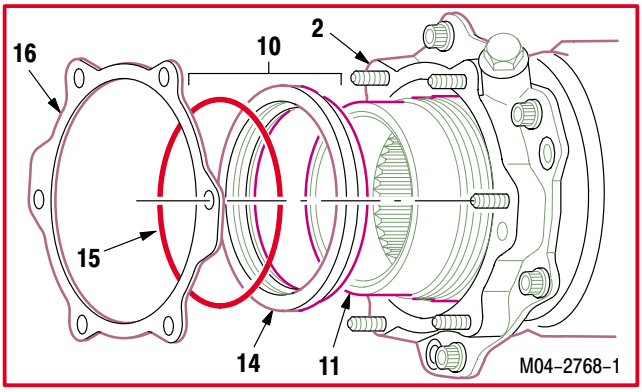
b. **Remove input seal assembly (10) from retainer (1) and input gear (11).**

(1) Remove seal half (12) from retainer (1) by hand. Discard packing (13).

(2) Remove seal half (14) from input gear (11). Discard packing (15).

c. **Remove and discard spacer (16) from gearbox (2).**





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6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.124.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.124.5. Inspection

a. **Check retainer for nicks, gouges, and burrs.**

(1) Repair damage **0.040 INCH** or less deep by blending. Use depth gage.

(2) On mounting surface, repair damage **0.020 INCH** or less deep by blending. Use depth gage.

b. **Check retainer for loose or damaged clinch nuts** (TM 1-1500-204-23)**.**

c. **Check retainer for elongated bolt holes.** None allowed.

d. **Check retainer and seal assembly for cracks.** None allowed.

e. **Check retainer and seal assembly for corrosion** (para 1.49)**.**

f. **Check gearbox housing mating surface studs for damaged threads.** None allowed.

g. **Check seal assembly for scratches, nicks, and gouges.** Casting defects on non-mating surfaces are permissible.

h. **Check seal assembly carbon seal air gap measurement.**

(1) Measure air gap between carbon seal surface and mating surface. Use gap setting gage.

(2) If less than **0.012 INCH**, replace seal.

i. **Check seal assembly for wear step on carbon seal mating surface (highly polished surface).** None allowed.

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6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.124.6. Installation

CAUTION

Prior to installing retainer ensure temperature sensor has not dropped into housing. This will cause interference during installation of retainer and the required gap cannot be attained.

a. **Install new spacer (16) on gearbox (2).**

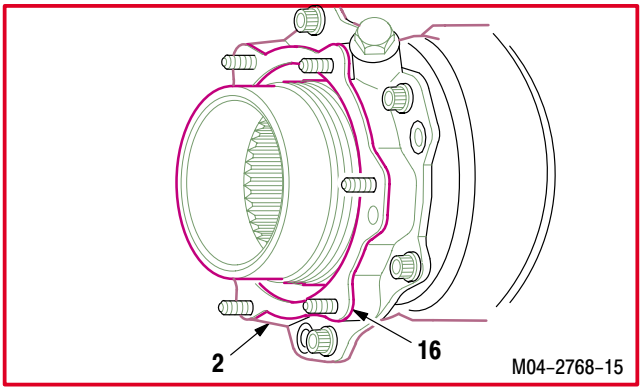
(1) Temporarily install retainer (1) on gearbox (2) with spacer (16) not installed.

(2) Install two washers (4) and nuts (3) on two studs (5) 180 degrees apart until retainer (1) seats firmly against gearbox (2).

(3) Measure gap between retainer (1) and gearbox (2). Use thickness gage.

(4) Remove two nuts (3) and washers (4) from studs (5).

(5) Remove retainer (1) from gearbox (2).



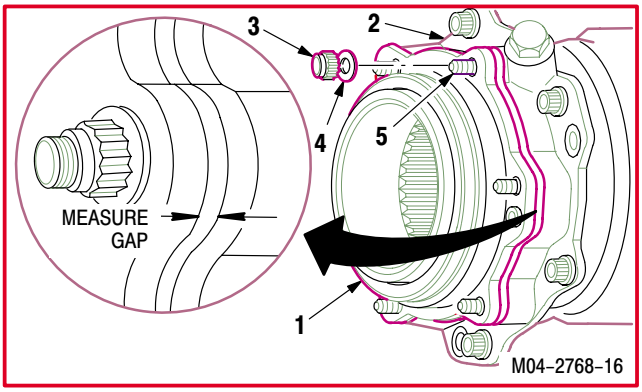
NOTE

Spacer laminations are **0.002 INCH** thick.

(6) Peel off laminations from spacer (16) to acquire a gap of **0.003 to 0.005 INCH** less than measured. Use thickness gage.

(7) Coat both sides of spacer (16) with corrosion preventive compound. Use corrosion preventive compound (item 63, App F).

(8) Install spacer (16) on gearbox (2).



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6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not allow seal halves to slide across each other or damage to mating faces may occur.

NOTE

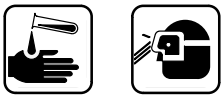
If installing new seal assembly, go to step b. If reinstalling seal, go to step c.

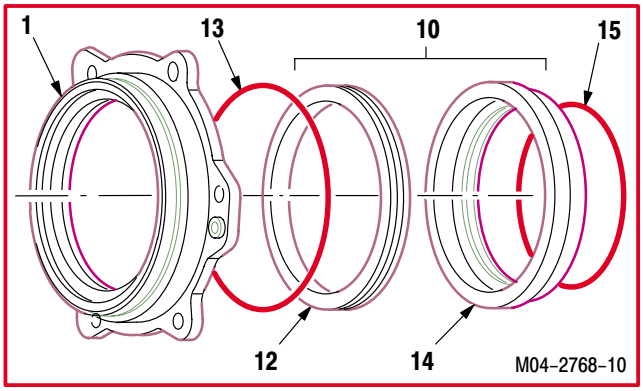
b. **Remove packaging materials from new seal assembly (10).**

(1) Remove seal half (12) from seal half (14) axially, without sliding.

(2) Discard paper separator between seal halves (12) and (14).

(3) Remove new packings (13) and (15).





c. **Install seal assembly (10) in retainer (1).**

(1) Lubricate new packings (13) and (15). Use assembly fluid (item 30, App F).

(2) Install packings (13) and (15) on seal halves (12) and (14).

CAUTION

Mating faces must be clean and free of any contamination and/or packing lubricant or damage to seal may result.

(3) Clean mating surfaces of seal halves (12) and (14) (para 1.47).

NOTE

Some retainers have retaining rings.

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6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(4) Install retaining ring (9) on retainer (1), if removed.

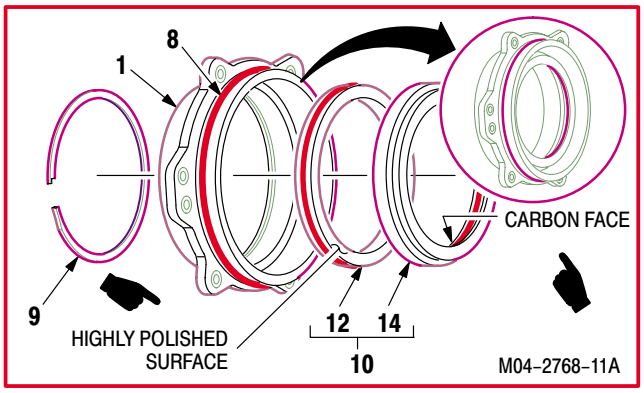
(5) Lubricate seal assembly mating surface of retainer (1). Use assembly fluid (item 30, App F).

(6) Position retainer (1) on a flat surface with mounting surface up.

(7) Ensuring seal half (12) part number is facing front side of retainer (1) and highly polished surface is facing aft side of retainer (1), position seal half (12) in retainer (1).

(8) Cover seal half (12) with lint-free cloth and hand press seal half (12) in retainer (1) until it bottoms against retainer (1) flange or retaining ring (9). Use cloth (item 52, App F).

(9) Lubricate mating surfaces of seal halves (12) and (14) with three or four drops of lubricating oil prior to mating. Use lubricating oil (item 119, App F).



CAUTION

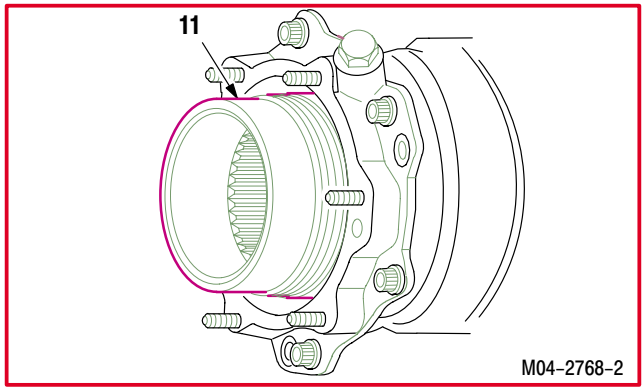
- Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.
- The seal assembly is a magnetic seal. Hold seal assembly firmly to prevent faces from slamming together. Care must be used when mating seal assembly or damage to mating faces may result.
- Do not allow seal halves to slide across each other or damage to mating faces may occur.

(10) Bring carbon face of seal half (14) and highly polished (unmarked) surface of seal half (12) together axially, without sliding, and mate seal assembly.

(11) Lubricate new packing (8). Use assembly fluid (item 30, App F).

(12) Install packing (8) on retainer (1).

(13) Lubricate sealing surface of input gear (11). Use assembly fluid (item 30, App F).



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6.124. INTERMEDIATE GEARBOX INPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not move retainer axially away from gearbox housing before securing, as seal leakage may result and seal must be completely removed from retainer and re-installed.

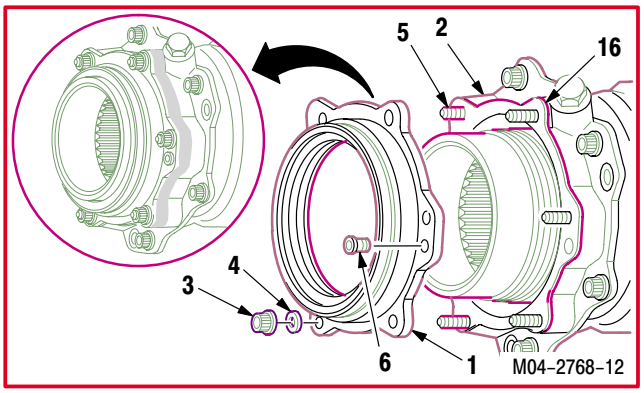
d. **Install retainer (1) on gearbox (2).** Torque six nuts (3) to **60 INCH-POUNDS**.

(1) Position retainer (1) on studs (5) and spacer (16).

(2) Install six washers (4) and new nuts (3) on studs (5).

(3) Torque six nuts (3) to **60 INCH-POUNDS**. Use torque wrench.

(4) Install two nylon setscrews (6) in retainer (1).



e. **Inspect (QA).**



f. **Apply sealing compound to two nylon setscrews (6).** Use sealing compound (item 177, App F).

g. **Apply bead of sealing compound to joint between gearbox (2) and retainer (1).** Use sealing compound (item 177, App F).

h. **Apply sealing compound to studs (5), nuts (3) and washers (4).** Use sealing compound (item 177, App F).

i. **Inspect (QA).**

j. **Install intermediate gearbox diffuser** (para 6.131)**.**

k. **Install intermediate gearbox input flange** (para 6.12)**.**

END OF TASK

6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION

6.125.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.125.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
0.0015 - 0.0250-inch thickness gage (item 152, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Bolt (NAS564-33 for removal) (2)
Packing (3)
Self-locking nut (6)
Spacer
Assembly fluid (item 30, App F)
Cloth (item 52, App F)
Corrosion preventive compound (item 63, App F)
Lubricating oil (item 119, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

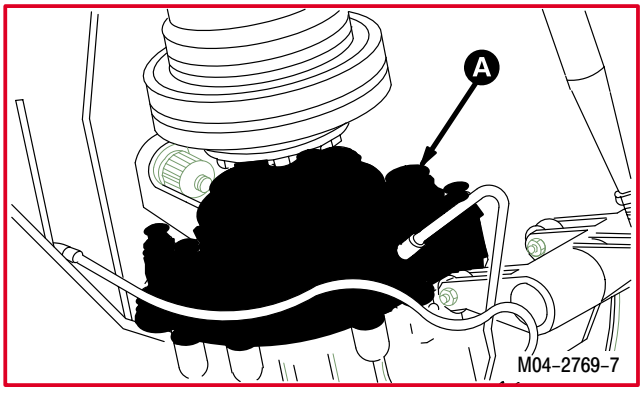
Equipment Conditions:

Ref	Condition
6.122	Intermediate gearbox output shouldered shaft removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

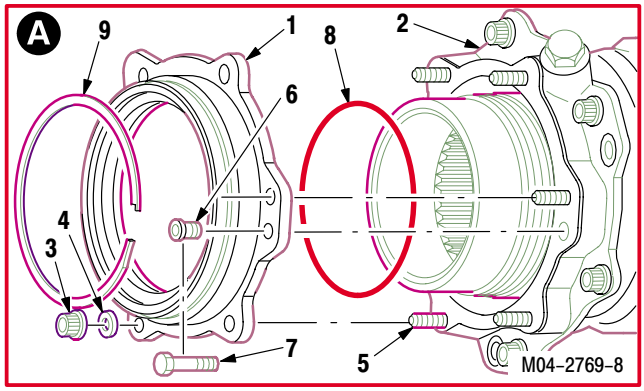


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6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.125.3. Removal

a. **Remove retainer (1) from intermediate gearbox (2).**



(1) Remove sealing compound from retainer (1), gearbox (2), six self-locking nuts (3), washers (4) and studs (5).

(2) Remove six self-locking nuts (3) and washers (4) from studs (5).

(3) Discard nuts (3).

(4) Remove sealing compound from two nylon setscrews (6).

(5) Remove two nylon setscrews (6) from retainer (1).

(6) Install two removal bolts (7) on retainer (1). Use NAS564-33 bolts.

CAUTION

Removal bolts must be tightened evenly to avoid damage to gearbox.

(7) Tighten two removal bolts (7) evenly until retainer (1) separates from gearbox (2).

(8) Remove retainer (1) from gearbox (2).

(9) Remove two removal bolts (7) from retainer (1).

(10) Remove and discard packing (8) from retainer (1).

NOTE

Some retainers have retaining rings.

(11) Remove retaining ring (9) from retainer (1), if installed.

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6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.

NOTE

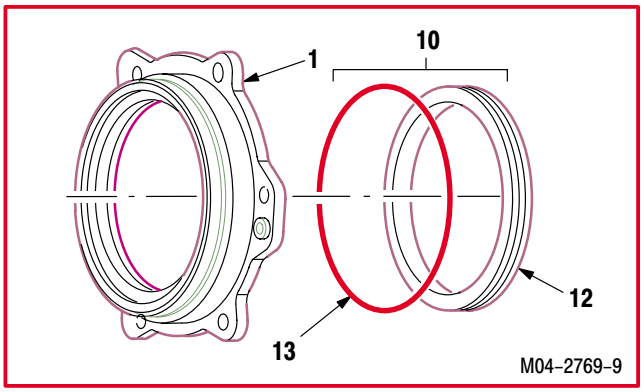
- The seal assembly is a two-piece magnetic seal. Ensure both halves of seal assembly are removed.
- The two-piece seal assembly shall be kept as a matched unit.

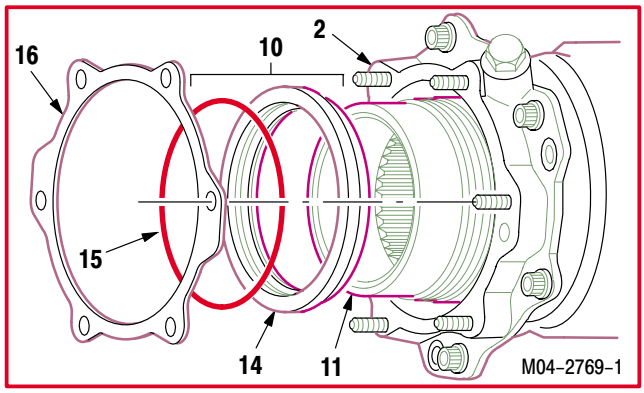
b. **Remove input seal assembly (10) from retainer (1) and output gear (11).**

(1) Remove seal half (12) from retainer (1) by hand. Discard packing (13).

(2) Remove seal half (14) from output gear (11). Discard packing (15).

c. **Remove and discard spacer (16) from gearbox (2).**





GO TO NEXT PAGE

6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.125.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.125.5. Inspection

a. **Check retainer for nicks, gouges, and burrs.**

(1) Repair damage **0.040 INCH** or less deep by blending. Use depth gage.

(2) On mounting surface, repair damage **0.020 INCH** or less deep by blending. Use depth gage.

b. **Check retainer for loose or damaged clinch nuts** (TM 1-1500-204-23)**.**

c. **Check retainer for elongated bolt holes.** None allowed.

d. **Check retainer and seal assembly for cracks.** None allowed.

e. **Check retainer and seal assembly for corrosion** (para 1.49)**.**

f. **Check gearbox housing mating studs for damaged threads.** None allowed.

g. **Check gearbox case to bearing liner surface interface for corrosion (caused by moisture intrusion into unprotected jack screw holes)** (para 1.49)**.** Minor line corrosion allowed.

h. **Check seal assembly for scratches, nicks, and gouges.** Casting defects on non-mating surfaces are permissible.

i. **Check seal assembly carbon seal air gap measurement.**

(1) Measure air gap between carbon seal surface and mating surface. Use gap setting gage.

(2) If less than **0.012 INCH**, replace seal.

j. **Check seal assembly for wear step on carbon seal mating surface (highly polished surface).** None allowed.

GO TO NEXT PAGE

6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.125.6. Installation

CAUTION

Prior to installing retainer ensure temperature sensor has not dropped into housing. This will cause interference during installation of retainer and the required gap cannot be attained.

a. **Install new spacer (16) on gearbox (2).**

(1) Temporarily install retainer (1) on gearbox (2) with spacer (16) not installed.

(2) Install two washers (4) and nuts (3) on two studs (5) 180 degrees apart until retainer (1) seats firmly against gearbox (2).

(3) Measure gap between retainer (1) and gearbox (2). Use thickness gage.

(4) Remove two nuts (3) and washers (4) from studs (5).

(5) Remove retainer (1) from gearbox (2).

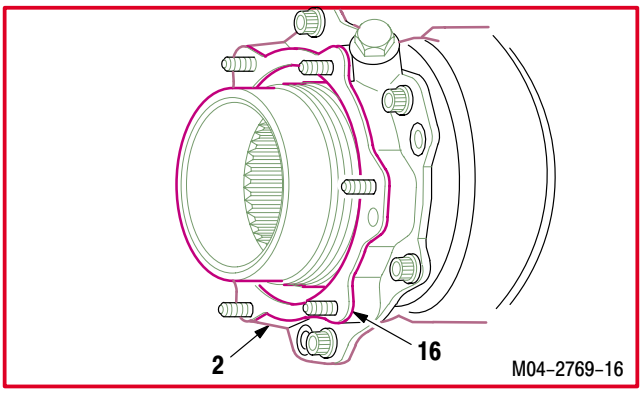
NOTE

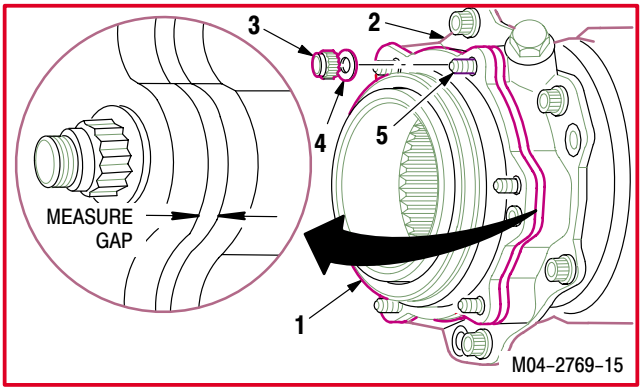
Spacer laminations are **0.002 INCH** thick.

(6) Peel off laminations from spacer (16) to acquire a gap of **0.003 to 0.005 INCH** less than measured. Use thickness gage.

(7) Coat both sides of spacer (16) with corrosion preventive compound. Use corrosion preventive compound (item 63, App F).

(8) Install spacer (16) on gearbox (2).





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6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not allow seal halves to slide across each other or damage to mating faces may occur.

NOTE

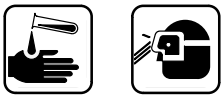
If installing new seal assembly, go to step b. If reinstalling seal, go to step c.

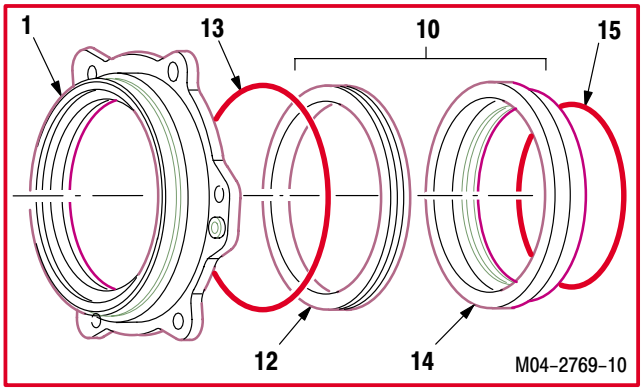
b. **Remove packaging materials from new seal assembly (10).**

(1) Remove seal half (12) from seal half (14) axially, without sliding.

(2) Discard paper separator between seal halves (12) and (14).

(3) Remove new packings (13) and (15).





c. **Install seal assembly (10) in retainer (1).**

(1) Lubricate new packings (13) and (15). Use assembly fluid (item 30, App F).

(2) Install packings (13) and (15) on seal halves (12) and (14).

CAUTION

Mating faces must be clean and free of any contamination and/or packing lubricant or damage to seal may result.

(3) Clean mating surfaces of seal halves (12) and (14) (para 1.47).

NOTE

Some retainers have retaining rings.

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6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(4) Install retaining ring (9) on retainer (1), if removed.

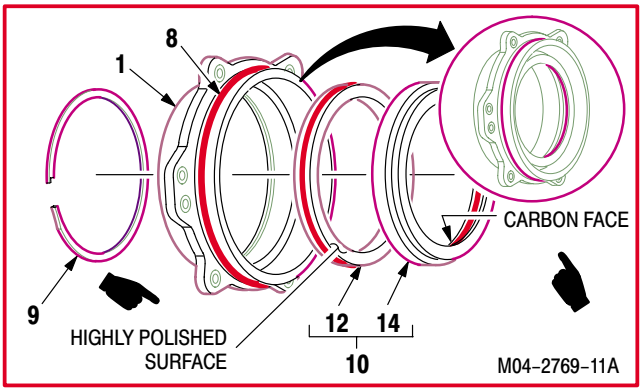
(5) Lubricate seal assembly mating surface of retainer (1). Use assembly fluid (item 30, App F).

(6) Position retainer (1) on a flat surface with mounting surface up.

(7) Ensuring seal half (12) part number is facing front side of retainer (1) and highly polished surface is facing aft side of retainer (1), position seal half (12) in retainer (1).

(8) Cover seal half (12) with lint-free cloth and hand press seal half (12) in retainer (1) until it bottoms against retainer (1) flange or retaining ring (9). Use cloth (item 52, App F).

(9) Lubricate mating surfaces of seal halves (12) and (14) with three or four drops of lubricating oil prior to mating. Use lubricating oil (item 119, App F).



CAUTION

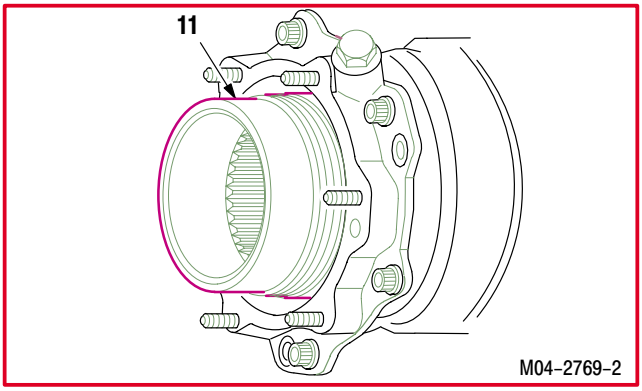
- Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.
- The seal assembly is a magnetic seal. Hold seal assembly firmly to prevent faces from slamming together. Care must be used when mating seal assembly or damage to mating faces may result.
- Do not allow seal halves to slide across each other or damage to mating faces may occur.

(10) Bring carbon face of seal half (14) and highly polished (unmarked) surface of seal half (12) together axially, without sliding, and mate seal assembly.

(11) Lubricate new packing (8). Use assembly fluid (item 30, App F).

(12) Install packing (8) on retainer (1).

(13) Lubricate sealing surface of output gear (11). Use assembly fluid (item 30, App F).



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6.125. INTERMEDIATE GEARBOX OUTPUT SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not move retainer axially away from gearbox housing before securing, as seal leakage may result and seal must be completely removed from retainer and and reinstalled.

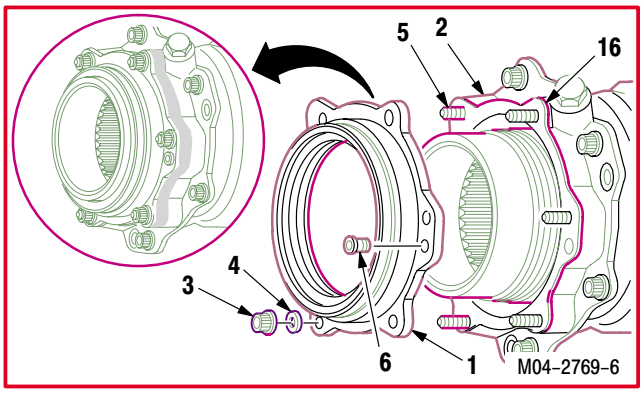
d. **Install retainer (1) on gearbox (2).** Torque six nuts (3) to **60 INCH-POUNDS**.

(1) Position retainer (1) on studs (5) and spacer (16).

(2) Install six washers (4) and new nuts (3) on studs (5).

(3) Torque six nuts (3) to **60 INCH-POUNDS**. Use torque wrench.

(4) Install two nylon setscrews (6) in retainer (1).



e. **Inspect (QA).**



f. **Apply sealing compound to nylon setscrews (6).** Use sealing compound (item 177, App F).

g. **Apply bead of sealing compound to joint between gearbox (2) and retainer (1).** Use sealing compound (item 177, App F).

h. **Apply sealing compound to studs (5), nuts (3) and washers (4).** Use sealing compound (item 177, App F).

i. **Inspect (QA).**

j. **Install intermediate gearbox output shouldered shaft** (para 6.122)**.**

END OF TASK

6.126. INTERMEDIATE GEARBOX BREATHER REMOVAL/INSTALLATION

6.126.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.126.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Cloth (item 52, App F)
Dry cleaning solvent (item 74, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

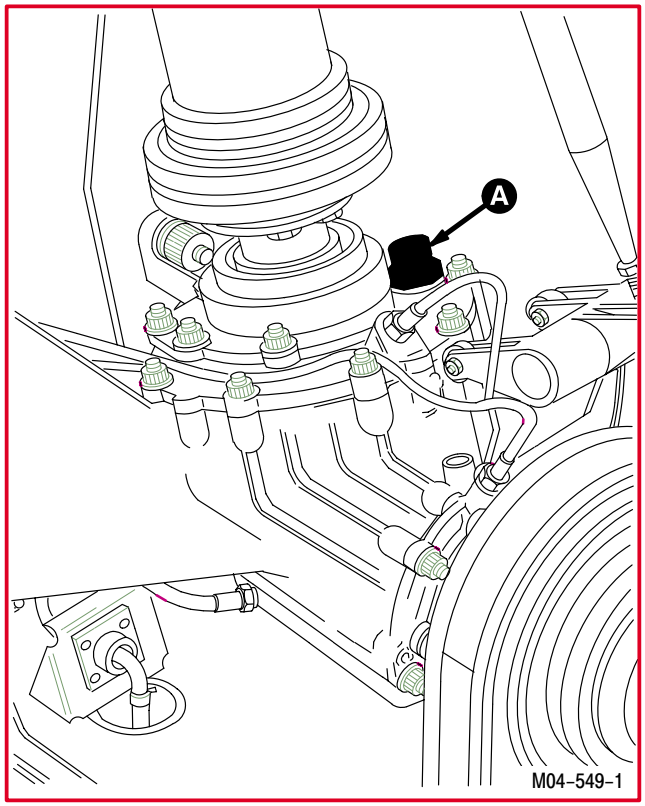
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L510 removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



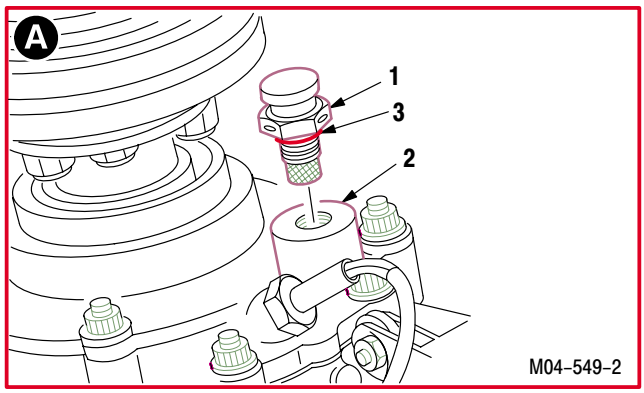
GO TO NEXT PAGE

6.126. INTERMEDIATE GEARBOX BREATHER REMOVAL/INSTALLATION – continued

6.126.3. Removal

a. **Remove breather (1) from intermediate gearbox housing (2).**

(1) Remove and discard packing (3), if installed.



6.126.4. Cleaning



a. **Clean breather by agitating in solvent.** Use dry cleaning solvent (item 74, App F).

(1) Dry with a clean cloth. Use cloth (item 52, App F).

6.126.5. Inspection

a. **Check breather and housing for nicks, gouges, and stripped or damaged threads** (para 6.121)**.**

b. **Check breather for dents, 0.040 INCH maximum before blending.** Use depth gage.

c. **Check breather for fractures or cracks.** None allowed.

6.126.6. Installation

NOTE

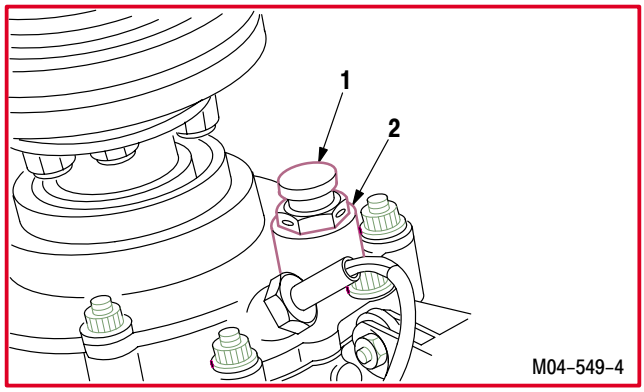
If packing was removed, do not reinstall packing. Packing could cause leakage.

a. **Install breather (1) on housing (2).**

b. **Torque breather (1) to 40 INCH-POUNDS.** Use torque wrench.

c. **Inspect (QA).**

d. **Install access fairing L510** (para 2.2)**.**



END OF TASK

6.127. INTERMEDIATE GEARBOX MACHINE PLUG REMOVAL/INSTALLATION

6.127.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.127.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing
Protective plug (M5501/1-F3)
Assembly fluid (item 30, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing R510 removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

6.127.3. Removal

a. **Remove machine plug (1) from intermediate gearbox (2).**

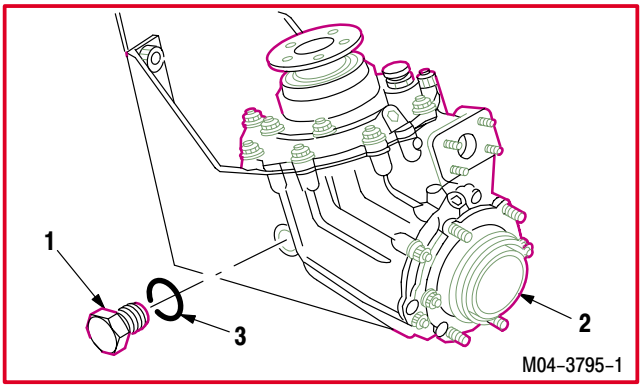
(1) Remove plug (1) from gearbox (2).

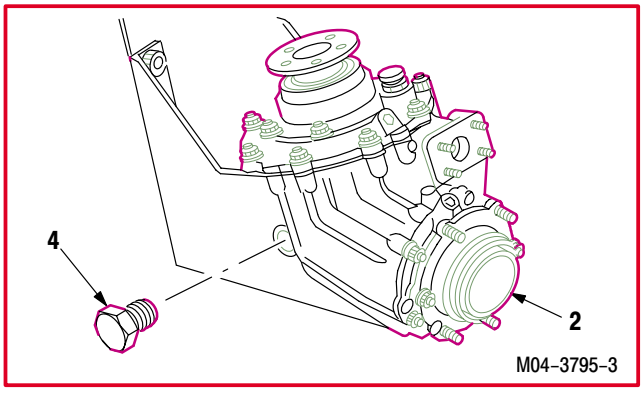
(2) Remove and discard packing (3) from plug (1).

b. **Install protective plug (4) in gearbox (2).**

6.127.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**





GO TO NEXT PAGE

6.127. INTERMEDIATE GEARBOX MACHINE PLUG REMOVAL/INSTALLATION – continued

6.127.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to machine plug, machine plug recess, and adjacent surfaces on intermediate gearbox housing.

a. **Check for cracks.** None allowed.

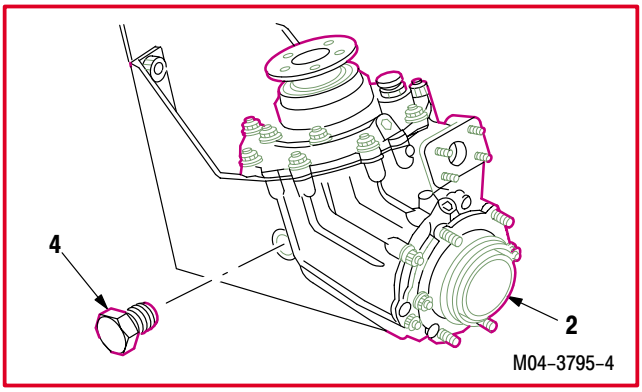
b. **Check for stripped, crossed, or flattened threads.** None allowed.

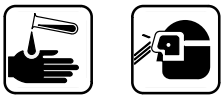
c. **Check for scratches, nicks, and gouges** (para 6.121)**.**

d. **Check for corrosion** (para 1.49)**.**

6.127.6. Installation

a. **Remove protective plug (4) from gearbox (2).**





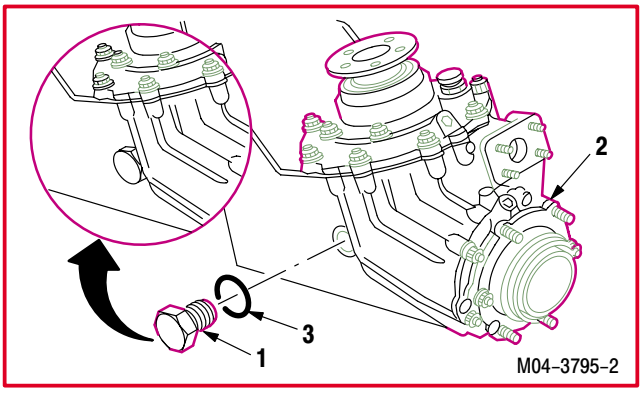
b. **Install plug (1) in gearbox (2).** Torque plug (1) to **40 INCH-POUNDS**.

(1) Lubricate new packing (3). Use assembly fluid (item 30, App F).

(2) Install packing (3) on plug (1).

(3) Install plug (1) in gearbox (2).

(4) Torque plug (1) to **40 INCH-POUNDS**. Use torque wrench.



c. **Inspect (QA).**

d. **Install access fairing R510** (para 2.2)**.**

END OF TASK

6.128. INTERMEDIATE GEARBOX IDENTIFICATION PLATE REPLACEMENT

6.128.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.128.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Adhesive (item 10, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Isopropyl alcohol (item 106, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L510 and R510 removed

WARNING

FLIGHT SAFETY PART

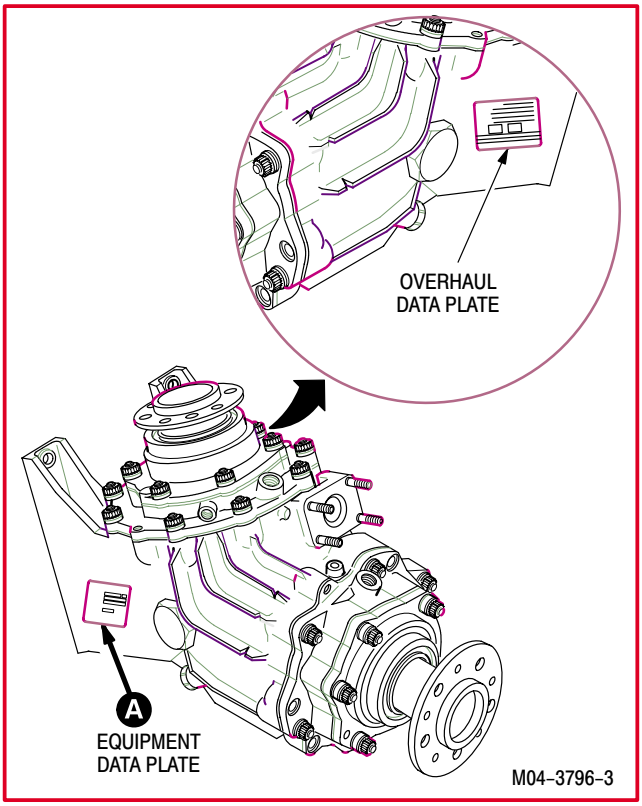
The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either equipment data plate or overhaul data plate.

GO TO NEXT PAGE

6.128. INTERMEDIATE GEARBOX IDENTIFICATION PLATE REPLACEMENT – continued



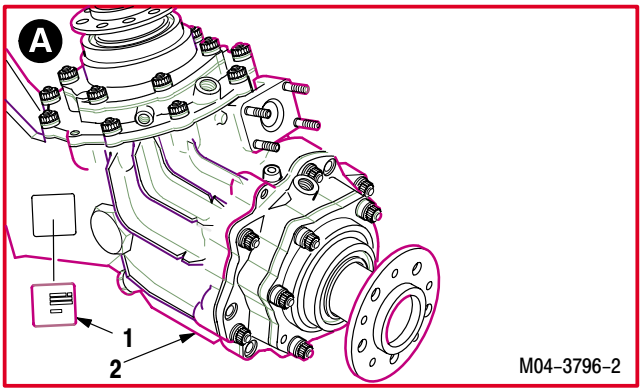
6.128.3. Removal

a. **Record all data found on existing identification plate (1).**

b. **Remove plate (1) from intermediate gearbox (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove and discard plate (1) from gearbox (2).



GO TO NEXT PAGE

6.128. INTERMEDIATE GEARBOX IDENTIFICATION PLATE REPLACEMENT – continued

6.128.4. Cleaning



CAUTION

Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in name, for cleaning titanium, magnesium, aluminium, or galvanized metals. Products with “chlor” in name are corrosive to these metals.

NOTE

Do not allow alcohol to evaporate from surface. Discoloration will occur.

a. **Clean identification plate mounting area on gearbox.**

(1) Remove all cured compound from gearbox housing. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F).

6.128.5. Inspection

NOTE

The following inspection procedures apply to identification plate mounting area on intermediate gearbox.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for scratches, nicks, and gouges** (para 6.121)**.**

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6.128. INTERMEDIATE GEARBOX IDENTIFICATION PLATE REPLACEMENT – continued

6.128.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.



b. **Install plate (1) on gearbox (2).**

(1) Remove lining from mounting surface of plate (1).

(2) Lightly abrade mounting surface of plate (1). Use cloth (item 48, App F).

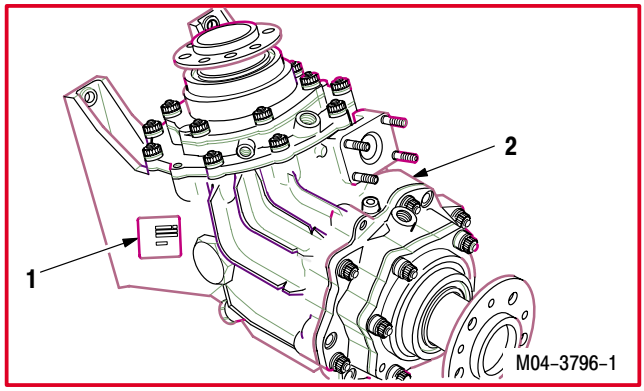
(3) Apply a smooth continuous coat of adhesive to mounting surface of plate (1). Use brush (item 34, App F) and adhesive (item 10, App F).

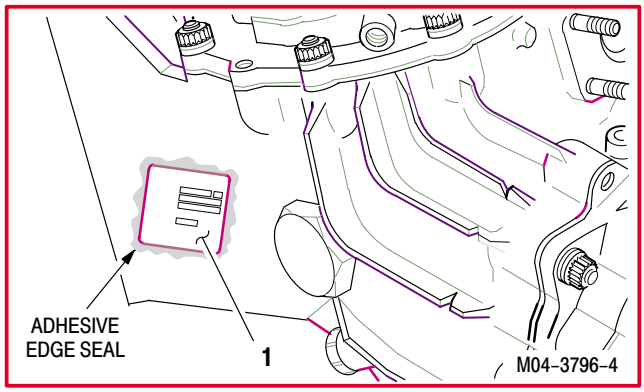
(4) Install plate (1) on gearbox housing (2) in same location as old plate.

(5) Seal edges of plate (1). Use adhesive (item 10, App F).

c. **Inspect (QA).**

d. **Install access fairings L510 and R510** (para 2.2)**.**





END OF TASK

6.129. INTERMEDIATE GEARBOX ACCELEROMETER REMOVAL/INSTALLATION

6.129.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.129.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

References:

TM 1-1520-238-T
TM 55-1500-323-24

Materials/Parts:

Brush (item 34, App F)
Sealing compound (item 176, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

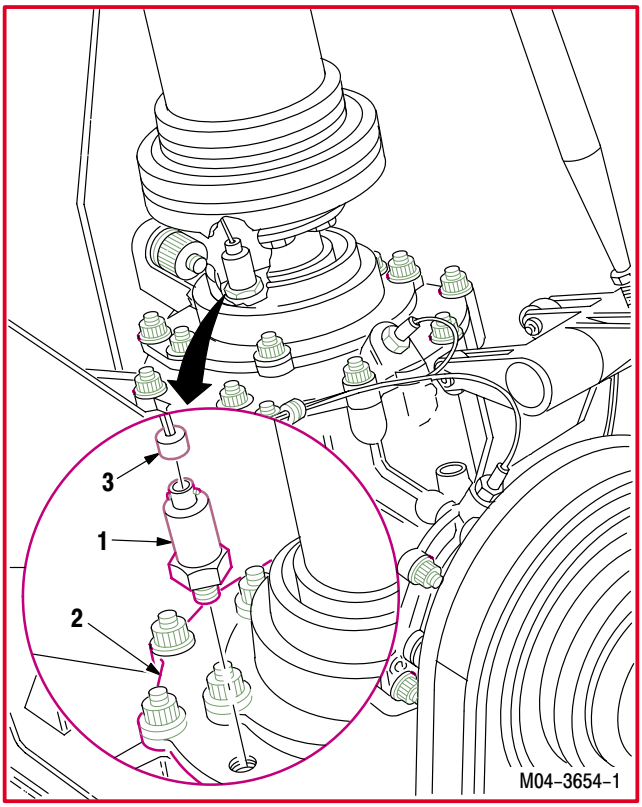
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L510 and R510 removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



6.129.3. Removal

a. **Remove accelerometer (1) from intermediate gearbox (2).**

(1) Detach connector P59 (3) from accelerometer (1).

(2) Remove accelerometer (1).

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6.129. INTERMEDIATE GEARBOX ACCELEROMETER REMOVAL/INSTALLATION – continued

6.129.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.129.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to the accelerometer recess and adjacent surface areas on the intermediate gearbox housing.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for scratches, nicks, and gouges** (para 6.121)**.**

d. **Check for stripped, crossed, or flattened threads.** None allowed.

e. **Check connector P59 and harness for cracks, corrosion, broken wires, bent, or broken connector pins, and for cracked or burned insulation** (TM 55-1500-323-24)**.**

f. **Check accelerometer for cracks, corrosion, damaged threads, bent, or broken body, and evidence of overheating.** None allowed.

GO TO NEXT PAGE

6.129. INTERMEDIATE GEARBOX ACCELEROMETER REMOVAL/INSTALLATION – continued

6.129.6. Installation



a. **Install accelerometer (1) on gearbox (2).** Torque accelerometer (1) to **23 INCH-POUNDS**.

(1) Install accelerometer (1) on gearbox (2).

(2) Torque accelerometer (1) to **23 INCH-POUNDS**. Use torque wrench.

(3) Apply a 1/8 inch bead of sealant around base of accelerometer (1). Use brush (item 34, App F) and sealing compound (item 176, App F).

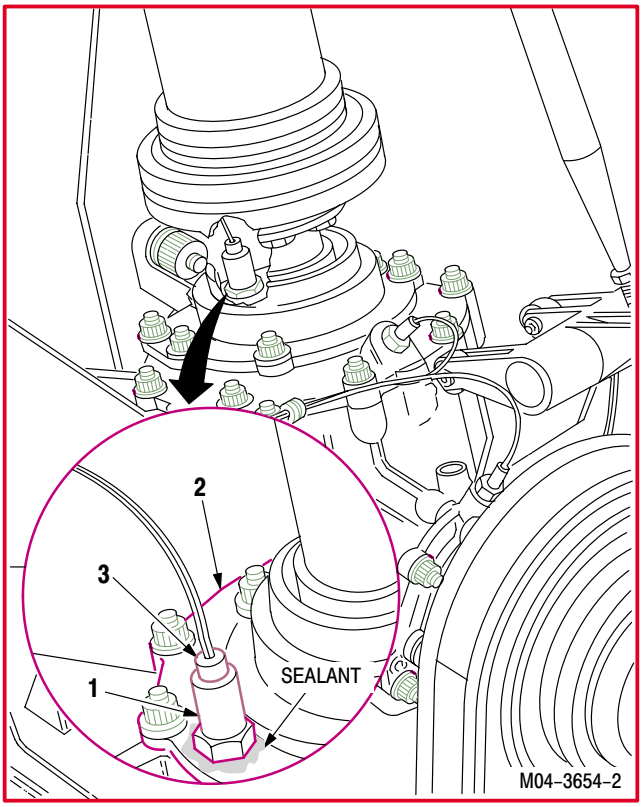
(a) Allow sealant to air dry for **1 HOUR** at room temperature.

(4) Attach connector P59 (3) to accelerometer (1).

b. **Inspect (QA).**

c. **Install access fairings L510 and R510** (para 2.2)**.**

d. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.130. INTERMEDIATE GEARBOX TEMPERATURE SENSOR REMOVAL/INSTALLATION

6.130.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.130.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
5/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 98, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Packing with retainer
Assembly fluid (item 30, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L510 and/or R510 removed
6.131	Intermediate gearbox removed (if bottom temperature sensor to be removed)

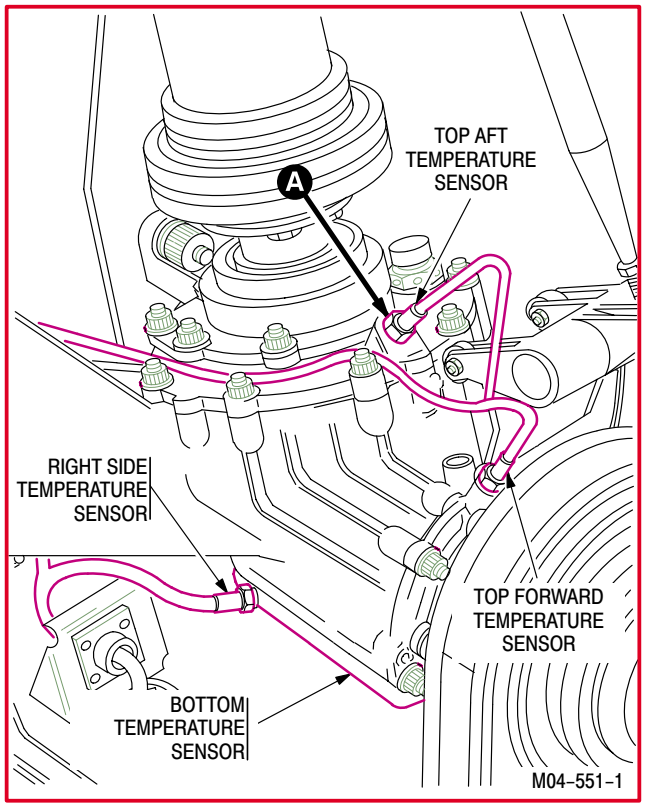
WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

- This task is typical for all four intermediate gearbox temperature sensors.
- Identify each sensor and each boss if more than one sensor is removed at a time.



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6.130. INTERMEDIATE GEARBOX TEMPERATURE SENSOR REMOVAL/INSTALLATION – continued

6.130.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open CAUT circuit breaker.**

e. **Remove temperature sensor (1) from housing boss (2).**

(1) Remove sensor (1) from boss (2).

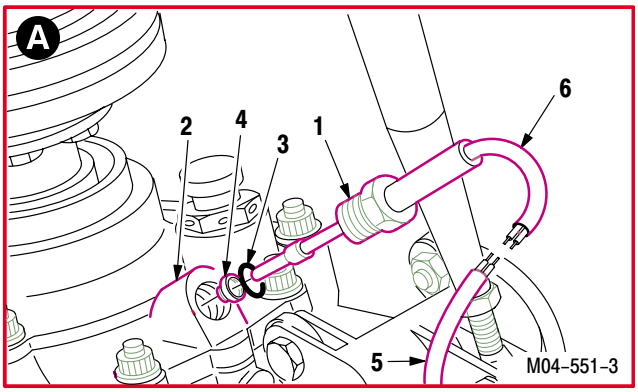
(2) Remove and discard packing (3) and packing with retainer (4).

NOTE

If not replacing temperature sensor, go to paragraph 6.130.4.

(3) Identify and cut two wires (5) from sensor wires (6) (TM 55-1500-323-24).

(4) Discard sensor (1).



6.130.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.130.5. Inspection

a. **Check boss for stripped or damaged threads.** None allowed.

b. **Check sensor for cracks.** None allowed.

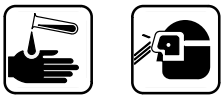
c. **Check sensor for damaged threads, damaged or bent body.** None allowed.

d. **Check sensor and boss for corrosion** (para 1.49)**.**

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6.130. INTERMEDIATE GEARBOX TEMPERATURE SENSOR REMOVAL/INSTALLATION – continued

6.130.6. Installation



a. **Install sensor (1) on boss (2).** Torque sensor (1) to **30 INCH-POUNDS**.

(1) Lubricate new packing (3) and new packing with retainer (4). Use assembly fluid (item 30, App F).

(2) Install packing (3) and packing with retainer (4) on sensor (1).

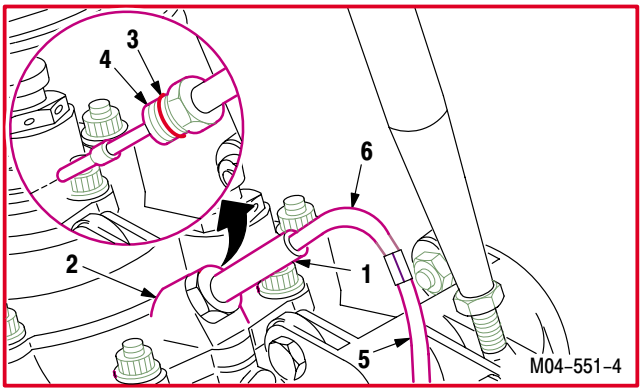
(3) Install sensor (1) on boss (2).

(4) Torque sensor (1) to **30 INCH-POUNDS**. Use crowfoot and torque wrench.

NOTE

If sensor was not replaced, go to step b.

(5) Identify and splice two identified wires (5) to sensor wires (6) (TM 55-1500-323-24).



b. **Inspect (QA).**

c. **Install access fairings L510 and/or R510** (para 2.2)**.**

d. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.131. INTERMEDIATE GEARBOX REMOVAL/INSTALLATION

6.131.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

6.131.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
5/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 98, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Adhesive (item 18, App F)
Cloth (item 52, App F)
Corrosion preventive compound (item 62, App F)
Epoxy primer coating kit (item 78, App F)
Naphtha (item 127, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

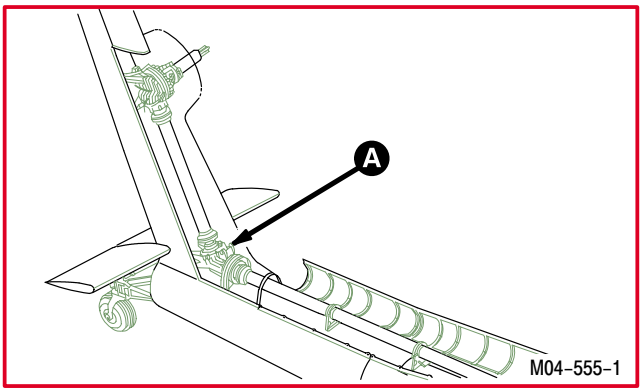
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings R475, L510, and R510 removed
6.11	No. 5 tail rotor drive shaft, damper, and anti-flail assemblies removed
6.12	Intermediate gearbox input coupling removed
6.13	Intermediate gearbox output coupling removed
6.14	No. 6 tail rotor drive shaft removed
6.130	Intermediate gearbox temperature sensors (top forward, top aft, and right side) removed
11.267	Directional F.S. 520 bellcrank removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox and/or components of the intermediate gearbox are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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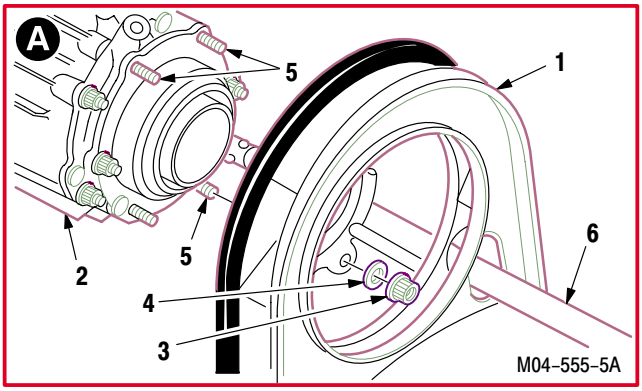
6.131. INTERMEDIATE GEARBOX REMOVAL/INSTALLATION – continued

6.131.3. Removal

a. **Remove diffuser (1) from intermediate gearbox (2).**

(1) Remove four nuts (3) and washers (4) from studs (5).

(2) Slide diffuser (1) forward on push rod (6) until clear of four studs (5).



WARNING

The intermediate gearbox is heavy. It can cause injury to personnel or damage the tail boom if dropped. Two people should lift the gearbox off the stabilizer mount studs.

CAUTION

Do not damage studs when removing gearbox.

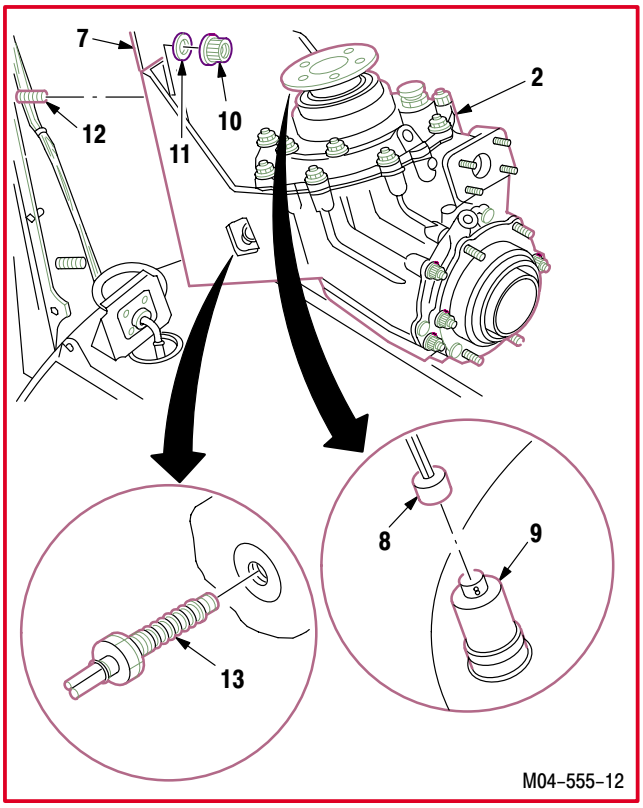
b. **Remove gearbox (2) from stabilizer (7).**

(1) Detach connector P59 (8) from accelerometer receptacle J1 (9).

(2) Remove four nuts (10) and washers (11) from studs (12).

(3) Pull gearbox (2) straight out until clear of studs (12).

(4) Remove bottom temperature sensor (13).



6.131.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

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6.131. INTERMEDIATE GEARBOX REMOVAL/INSTALLATION

6.131.5. Inspection

a. **Check gearbox for cracks.** None allowed.

b. **Check studs for damaged threads.** None allowed.

c. **Ensure nylon setscrews are installed in both retainers and input/output bearing housings.**

d. **Check diffuser seal for tears, cuts, debonding or missing seal.** None allowed. Repair in accordance with paragraph 6.134.6.

e. **Check gearbox diffuser for cracks.** None allowed (para 6.1)**.**

f. **Check gearbox diffuser for nicks and deformation** (para 6.1)**.**

g. **Check gearbox and gearbox diffuser for corrosion** (para 1.49)**.**

6.134.6. Repair



a. **Remove seal (14) from diffuser (1).**

(1) Remove seal (14) from diffuser (1).

(2) Clean residue remaining on mating surface of diffuser (1). Use cloth (item 52, App F) moistened with naphtha (item 127, App F).

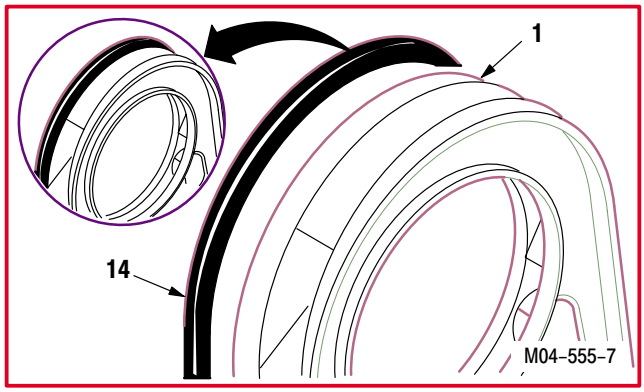


b. **Install new seal (14) on diffuser (1).**

(1) Apply adhesive to mating surface of seal (14) and diffuser (1). Use adhesive (item 18, App F).

(2) Position seal (14) on diffuser (1). Apply firm uniform pressure.

(3) Clean excess adhesive around joints and seams. Use cloth (item 52, App F) moistened with naphtha (item 127, App F).



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6.131. INTERMEDIATE GEARBOX REMOVAL/INSTALLATION – continued

6.131.7. Installation



WARNING

The intermediate gearbox is heavy. It can cause injury to personnel or damage the tail boom if dropped. Two people should lift the gearbox into position on the stabilizer mount studs.

CAUTION

If installing a new gearbox, **DO NOT** add grease to gearbox. Gearbox is factory lubricated.

a. **Install gearbox (2) on stabilizer (7).** Torque sensor (13) to **30 INCH-POUNDS**. Torque four nuts (10) to **175 INCH-POUNDS**.

(1) Apply primer to mounting surface of gearbox (2) and stabilizer (7). Use epoxy primer coating kit (item 78, App F).

(a) Allow primer to cure **2 HOURS**.

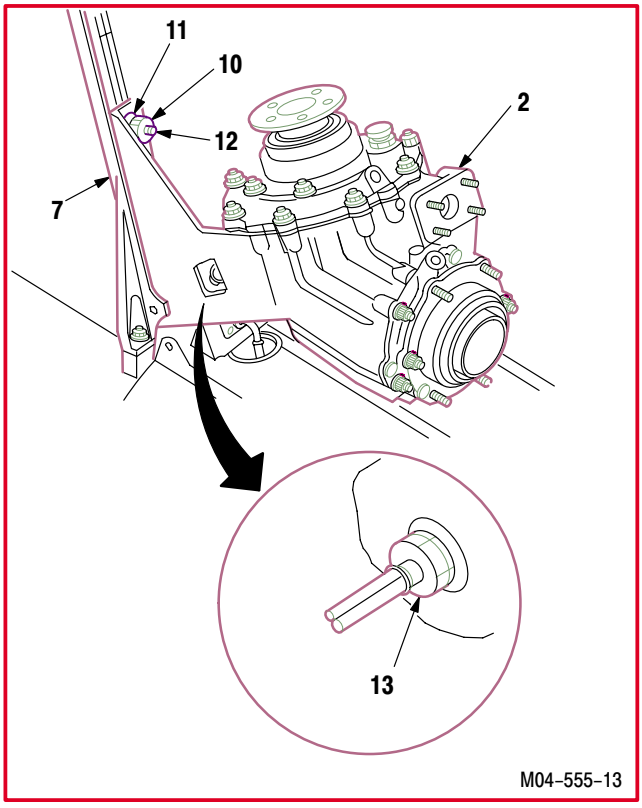
(2) Install sensor (13) on gearbox (2).

(3) Torque sensor (13) to **30 INCH-POUNDS**. Use crowfoot and torque wrench.

(4) Install gearbox (2) on four studs (12).

(5) Install four washers (11) and nuts (10) on studs (12).

(6) Torque four nuts (10) to **175 INCH-POUNDS**. Use torque wrench.



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6.131. INTERMEDIATE GEARBOX REMOVAL/INSTALLATION – continued

(7) Apply corrosion preventive compound to four nuts (10), washers (11), and exposed threads on studs (12). Use corrosion preventive compound (item 62, App F).

(8) Attach connector P59 (8) to accelerometer receptacle J1 (9).

(9) Apply a bead of sealant around each gearbox mounting foot at mating point on stabilizer (7). Use sealing compound (item 177, App F).

b. **Install diffuser (1) on four studs (5).** Torque four nuts (3) to **60 INCH-POUNDS**.

(1) Slide diffuser (1) aft until four studs (5) are engaged.

(2) Install four washers (4) and nuts (3) on studs (5).

(3) Torque four nuts (3) to **60 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Install directional F.S. 520 bellcrank** (para 11.267)**.**

e. **Install intermediate gearbox input coupling** (para 6.12)**.**

f. **Install No. 5 tail rotor drive shaft, damper, and antiflail** (para 6.11)**.**

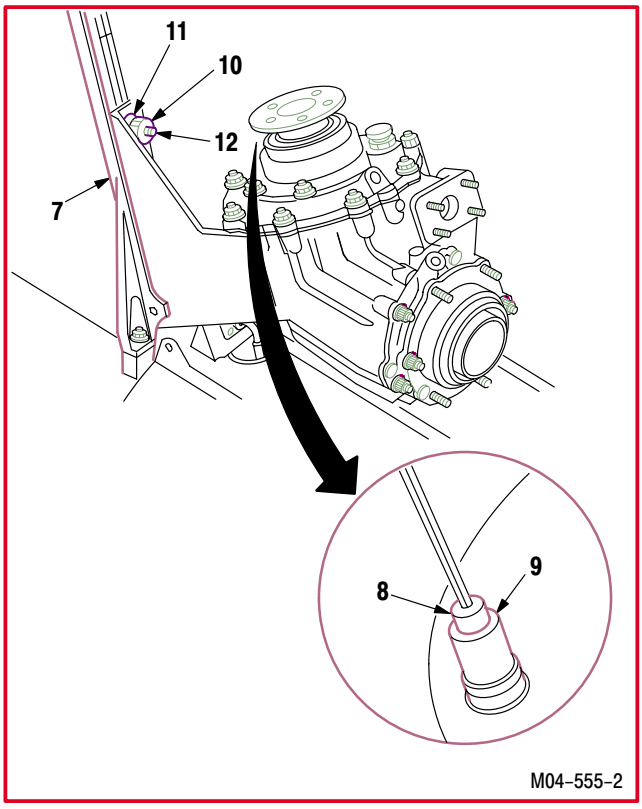
g. **Install intermediate gearbox output coupling** (para 6.13)**.**

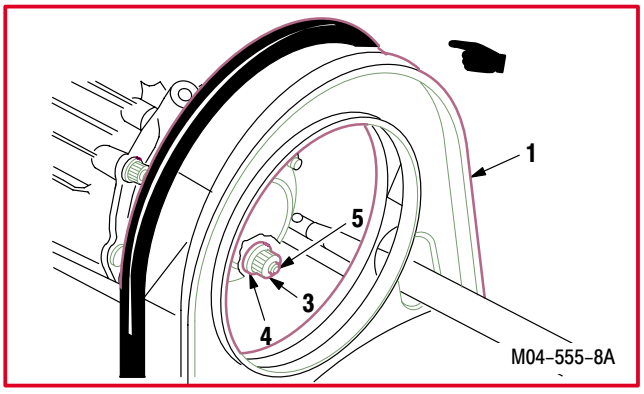
h. **Install No. 6 tail rotor drive shaft** (para 6.14)**.**

i. **Install intermediate gearbox temperature sensors (top forward, top aft, and right side)** (para 6.130)**.**

j. **Install access fairings R475, L510, and R510** (para 2.2)**.**

k. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**





END OF TASK

SECTION V. TAIL ROTOR GEARBOX MAINTENANCE

6.132. TAIL ROTOR GEARBOX INSPECTION

6.132.1. Description

This task covers: Inspection.

6.132.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.20 - 1.00-inch inside micrometer caliper (item 50, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
Industrial faceshield (item 129, App H)
Fluorescent inspection kit (item 138, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)
0.001 - 0.200-inch dial indicator (item 176, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Materials/Parts:

Alcohol (item 25, App F)
Brush (item 34, App F)
Lubricating oil (item 119, App F)
Mat (item 122, App F)
Methyl ethyl ketone (item 124, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 55-1500-335-23

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

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6.132. TAIL ROTOR GEARBOX INSPECTION – continued

6.132.3. Inspection

a. **Check tail rotor gearbox for serviceability.**

(1) Check for fractures and/or cracks. None allowed. Use fluorescent inspection kit (TM 55-1500-335-23).

(2) Check mounting feet for nicks, gouges, burrs, and corrosion not deeper than **0.020 INCH** before blending, and not over 30 percent of area. Maximum hole diameter **0.530 INCH**. Criteria are for both sides of mounting feet. Use depth gage and caliper.

(3) Check cover studs for crossed, stripped, or flattened threads. None allowed. Maximum total side play **0.022 INCH** when measured **1.0 INCH** above base.

(a) Lockring serrations flush or below surface of housing. Use gap setting gage.

(4) Check cover inserts for looseness, crossed, stripped, or flattened threads. None allowed.

(a) Top insert flush or below surface of housing.

(b) Keys not to protrude above insert.

(5) Check pins on cover for looseness. None allowed.

(6) Check holes on face of cover for maximum diameter of **0.287 INCH**. Use caliper.

(7) Check mounting flanges for nicks, gouges, burrs, and corrosion not deeper than **0.020 INCH** before blending. Use depth gage.

(8) Check cover for nicks, gouges, burrs, and corrosion not deeper than **0.040 INCH** before blending. Use depth gage.

(9) Check housing for nicks, gouges, and burrs not deeper than **0.020 INCH** before blending. Use depth gage.

(a) Corrosion not deeper than **0.020 INCH** over 30 percent of area. Use depth gage.

(b) Scratches not deeper than **0.015 INCH** over 20 percent of area. Use depth gage.

(10) Check housing studs for stripped or flattened threads. None allowed.

(a) Maximum total side play **0.010 INCH** when measured **0.750 INCH** above base. Use gap setting gage.

(b) Lockring serrations flush to below surface of housing.

(11) Check housing inserts for looseness, crossed, stripped, or flattened threads. None allowed. Top of insert flush or below surface of housing.

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6.132. TAIL ROTOR GEARBOX INSPECTION – continued

(12) Check tail rotor head attachment studs for looseness, crossed, stripped, or flattened threads. None allowed.

(a) Maximum allowable side play **0.022 INCH** when measured **1.00 INCH** above base. Use gap setting gage.

(b) Lockring is flush or below base.

(13) If tail rotor gearbox collar was removed, ensure torque on nuts is **220 INCH-POUNDS**. Use torque wrench.

b. **Check tail rotor gearbox shouldered shaft for serviceability.**

(1) Check for nicks, burrs, gouges, and corrosion. Except for surfaces identified below, depths not deeper than **0.020 INCH** before blending are acceptable. Use depth gage.

(2) Check for fractures and cracks. None allowed.

(3) Check identification marking. Must be readable.

(4) Check coupling mounting diameter. Minimum diameter **2.1221 INCH**. Use caliper set.

(5) Check diameter of pilot between shaft and gear. Minimum diameter **2.4995 INCH**. Use caliper set.

(6) Check diameter of pilot between gear and plug. Minimum diameter **2.0940 INCH**. Use caliper set.

(7) Check shaft runout. Total indicated runout relative to pilots **0.004 INCH**. Use dial indicator.

(8) Check spline teeth.

(a) No scuffing, scoring, or spalling allowed.

(b) Maximum pitting depth before blending **0.008 INCH**. Use depth gage.

(c) Maximum wear step **0.008 INCH**. Use depth gage.

(d) Measure “Over Balls” diameter with two **0.2500 INCH** diameter gage balls placed in tooth spaces approximately 180 degrees apart. Take three “Over Balls” measurements at locations approximately 120 degrees apart. Minimum “Over Balls” diameter **2.737 INCH**. Use caliper set.

(9) Check five **0.2500 INCH** hole diameters. Maximum diameter **0.2585 INCH**. Use caliper set.

(10) Check plug for looseness and insertion depth. Minimum insertion depth from end of shaft **0.060 INCH**. Use depth gage.

(11) Check cadmium plating. Damaged or missing cadmium plating is acceptable.

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6.132. TAIL ROTOR GEARBOX INSPECTION – continued



c. **Tail rotor gearbox inspection for grease leakage.**

(1) Check gearbox for evidence of grease leakage from gearbox at static seams and joints. None allowed.

(2) Check for evidence of grease leakage at input seal.

(a) Seepage of grease is not cause for concern.

(b) If evidence of grease exists, wipe off purged grease.

(c) If new grease leakage is observed in excess of **1 OUNCE** (approximately 33 drops) during standard 10 hour and/or 14 day maintenance inspection, replace seal (para 6.135).

(3) Check for evidence of grease leakage at output seal.

(a) Seepage of grease is not cause for concern.

(b) Initially 1/2 ounce of grease (approximately 15 drops) is expected to be purged and is required to lubricate lip sealing surface.

(c) If evidence of initial grease is observed, wipe or wash away purged grease with alcohol. Use caution not to push grit-filled grease in lip seal which could cause it to be cut and wear at an excessively high rate. Use alcohol (item 25, App F).

(d) At next standard 10 hour and/or 14 day inspection interval, examine output seal for evidence of new grease leakage.

(e) If amount of grease purged is sufficient to collect at base of static shaft and form a drop, remove gearbox.



d. **Check tail rotor gearbox housing, and pinion gear input and output retainers for cracks.** None allowed. Use magnifier where needed.

(1) Clean suspected areas. Use brush (item 34, App F) and methyl ethyl ketone (item 124, App F).

(2) Check for fractures and/or cracks. None allowed. Use fluorescent inspection kit (TM 55-1500-335-23).

e. **Check temperature sensors for cracked, broken, or burned insulation.**

(1) Check for secure splices to gearbox harness (para 6.138).

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6.132. TAIL ROTOR GEARBOX INSPECTION – continued

f. **Check retainers for serviceability.**

(1) Check for fractures and/or cracks. None allowed. Use fluorescent inspection kit (TM 55-1500-335-23).

(2) Check clinch nuts for crossed, stripped, or flattened threads. None allowed.

(3) Check top of serrations, flush or below surface of housing, for looseness. None allowed.

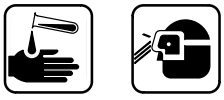
(4) Maximum diameter of bolt holes **0.330 INCH**. Use caliper.

(5) Check for nicks, gouges, burrs, and corrosion not deeper than **0.040 INCH** before blending, except for specific surfaces. Use depth gage.

(a) Check mounting surface for damage or corrosion not deeper than **0.020 INCH** before blending, and not over 25 percent of total area. Not more than 10 percent damage in one localized area. Use depth gage.

(6) Minimum mounting diameter **4.6225 INCH**. Use caliper.

(7) Check packing groove for damage. None allowed.



g. **Check static support mast for serviceability.**

NOTE

Discoloration on static support mast can be caused by teflon wear.

(1) Check static support mast for surface discoloration or corrosion.

(a) Remove surface discoloration and corrosion by polishing. Use mat (item 122, App F) and lubricated with lubricating oil (item 119, App F).

(b) If surface discoloration cannot be removed by polishing, replace (paragraph 6.145).

(2) Inspect for surface scratches and nicks. Use magnifier, as required.

(a) Axial scratches shall not exceed 15 scratches per discolored band, **3.00 INCH** in length or **0.030 INCH** wide.

(b) Radial scratches. None allowed.

h. **Check gearbox cooling fins for serviceability.**

(1) 10 degree maximum allowable bend in fins.

(2) Check for damage and corrosion to fins not deeper than **0.250 INCH** before blending. Use depth gage.

(3) Check for broken or cracked fins. None allowed.

END OF TASK

6.133. TAIL ROTOR GEARBOX SHOULDERED SHAFT REMOVAL/INSTALLATION

6.133.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.133.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

References:

TM 1-1520-238-T

Materials/Parts:

Packing
Grease (item 88, App F)
Petrolatum (item 138, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

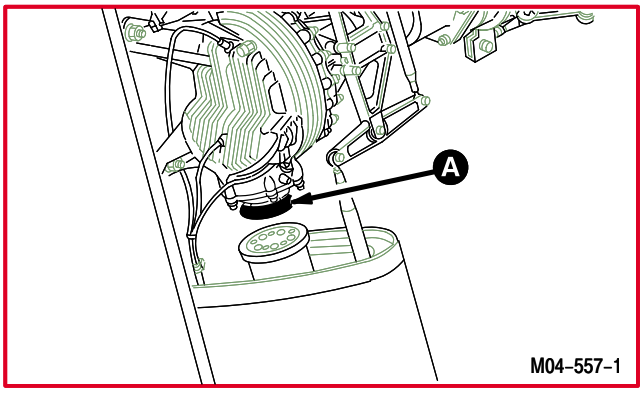
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L510, L530, and L540 removed
6.14	No. 6 tail rotor drive shaft removed
6.15	Tail rotor gearbox input coupling removed
6.138	Forward temperature sensor removed

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.133. TAIL ROTOR GEARBOX SHOULDERED SHAFT REMOVAL/INSTALLATION – continued

6.133.3. Removal

a. **Remove shouldered shaft (1) from tail rotor gearbox (2).**

(1) Remove retaining ring (3) from shaft (1).

(2) Remove shaft (1).

(3) Remove and discard packing (4) from shaft (1).

6.133.4. Cleaning

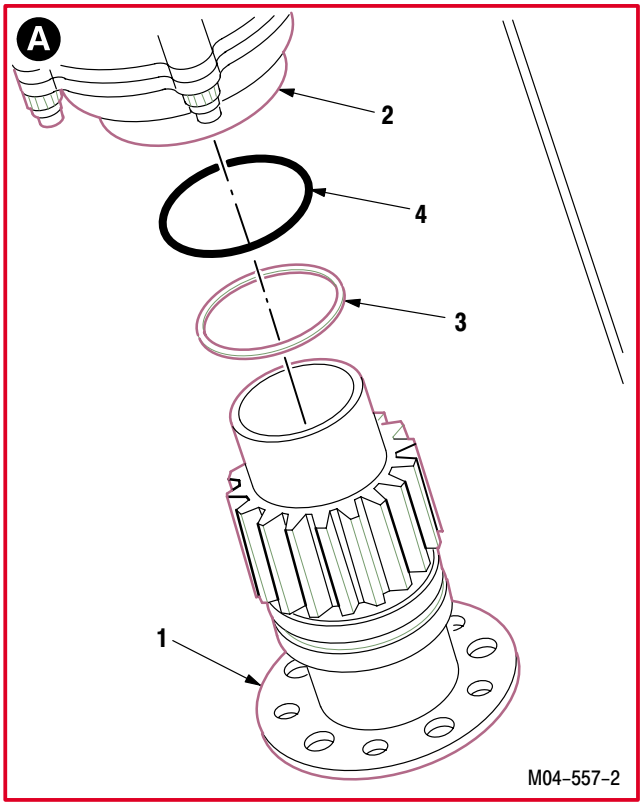
a. **Wipe removed and attaching parts with a clean rag.**

6.133.5. Inspection

a. **Check shouldered shaft for serviceability** (para 6.132)**.**

b. **Check retaining ring for serviceability** (para 6.132)**.**

c. **Check No. 6 drive shaft mating surface for cracks.** None allowed.



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6.133. TAIL ROTOR GEARBOX SHOULDERED SHAFT REMOVAL/INSTALLATION – continued

6.133.6. Installation



a. **Install shaft (1) in gearbox (2).**

(1) Position retaining ring (3) at flared end of shaft (1).

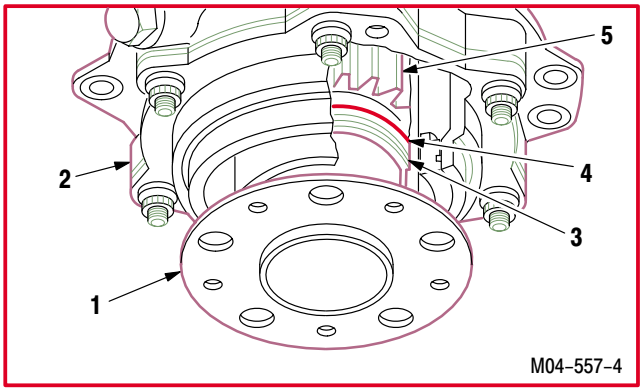
(2) Lightly coat new packing (4) with petrolatum. Use petrolatum (item 138, App F).

(3) Install packing (4) in shaft (1) groove closest to splines (5).

(4) Lightly coat splines (5) with grease. Use grease (item 88, App F).

(5) Install shaft (1) in gearbox (2) by pushing upward until shaft (1) seats.

(6) Install retaining ring (3) on shaft (1).



b. **Inspect (QA).**

c. **Install forward tail rotor temperature sensor** (para 6.138)**.**

d. **Install tail rotor gearbox input coupling** (para 6.15)**.**

e. **Install No. 6 tail rotor drive shaft** (para 6.14)**.**

f. **Install access fairings L510, L530, and L540** (para 2.2)**.**

g. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.134. TAIL ROTOR GEARBOX SHOULDERED SHAFT EXPANSION PLUG REPLACEMENT (AVIM)

6.134.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.134.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
7/8 x 7 3/4-inch long brass driftpin (item 114, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Rawhide mallet (item 212, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The tail rotor shouldered shaft is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

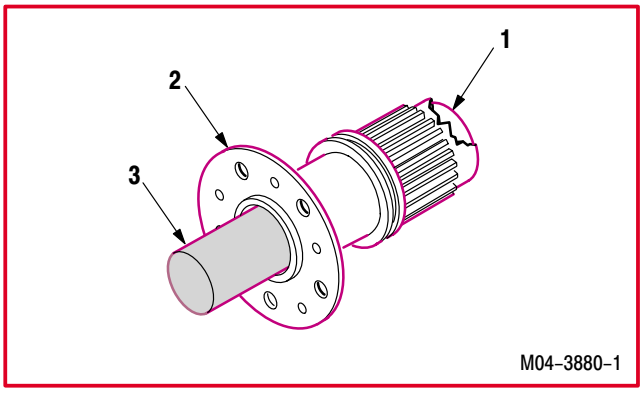
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6.134. TAIL ROTOR GEARBOX SHOULDERED SHAFT EXPANSION PLUG REPLACEMENT (AVIM) – continued

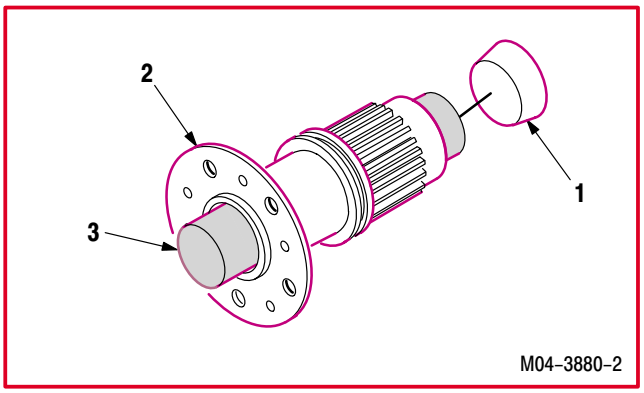
6.134.3. Removal

a. **Remove expansion plug (1) from shouldered shaft (2).**

(1) Insert driftpin (3) in shaft (2) from flange end. Use driftpin and mallet.



(2) Remove and discard plug (1) from shaft (2).



6.134.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.134.5. Inspection

CAUTION

Structural integrity and heat treated condition of tail rotor shouldered shaft is critical to its serviceability. Any evidence of material fatigue, intergranular corrosion, cracking, heat oxidation (discoloration), or similar defect requires replacement of part.

a. **Check shouldered shaft for serviceability** (para 6.132)**.**

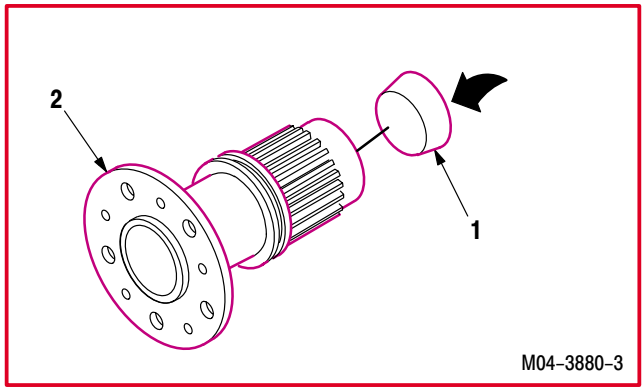
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6.134. TAIL ROTOR GEARBOX SHOULDERED SHAFT EXPANSION PLUG REPLACEMENT (AVIM) – continued

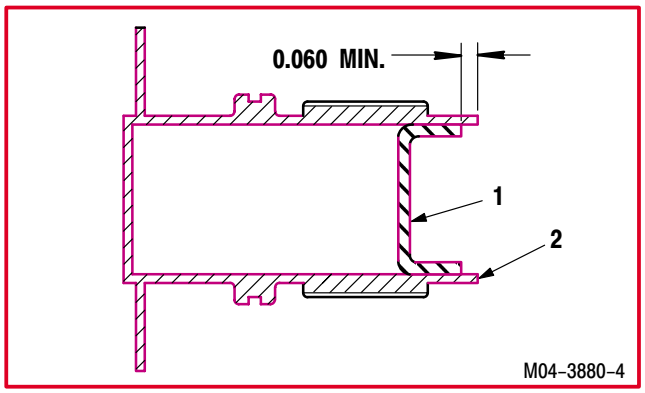
6.134.6. Installation

a. **Install new plug (1) in shaft (2).**

(1) Position plug (1) on geartooth end of shaft (2).



(2) Press plug (1) in shaft (2) until end of plug (1) is recessed a minimum of **0.060 INCH** from geartooth end of shaft (2). Use driftpin, mallet, and depth gage.



b. **Inspect (QA).**

END OF TASK

6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION

6.135.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.135.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
0.0015 - 0.0250-inch thickness gage (item 152, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Jackscrew set (item 281, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Packing (3)
Self-locking nut (6)
Spacer
Assembly fluid (item 30, App F)
Cloth (item 52, App F)
Lubricating oil (item 119, App F)
Sealing compound (item 177, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

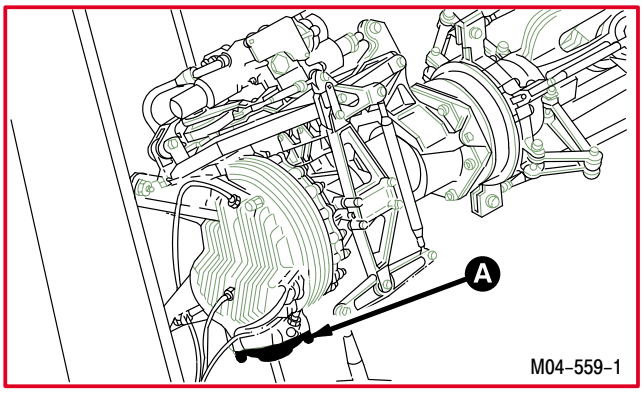
Equipment Conditions:

Ref	Condition
6.133	Tail rotor gearbox shoulder shaft removed

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

- Ensure pinion gear and bearings do not fall out of tail rotor gearbox when retainer is removed. Tail rotor gearbox must be returned to depot if gear and bearings fall out.
- The seal contains a magnet. Do not store or handle near metal filings or chips.

6.135.3. Removal

a. **Remove retainer (1) from tail rotor gearbox (2).**

(1) Remove sealing compound from retainer (1) and gearbox (2).

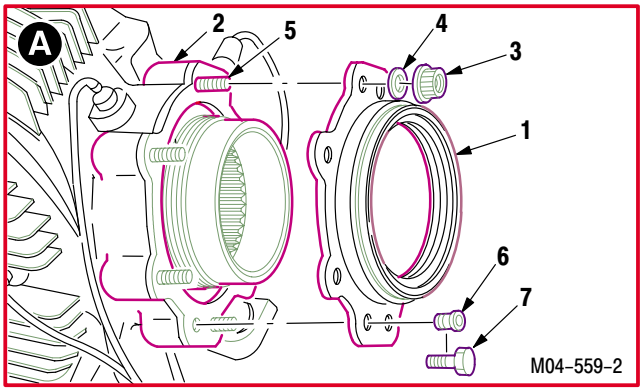
(2) Remove six self-locking nuts (3) and spacers or washers (4) from studs (5).

(3) Discard nuts (3).

(4) Remove sealing compound from two nylon setscrews (6).

(5) Remove two nylon setscrews (6) from retainer (1).

(6) Install two jackscrews (7) on retainer (1). Use jackscrew set.



CAUTION

Jackscrews must be tightened evenly to avoid damage to gearbox.

(7) Tighten two jackscrews (7) evenly until retainer (1) separates from gearbox (2).

(8) Remove retainer (1) from gearbox (2).

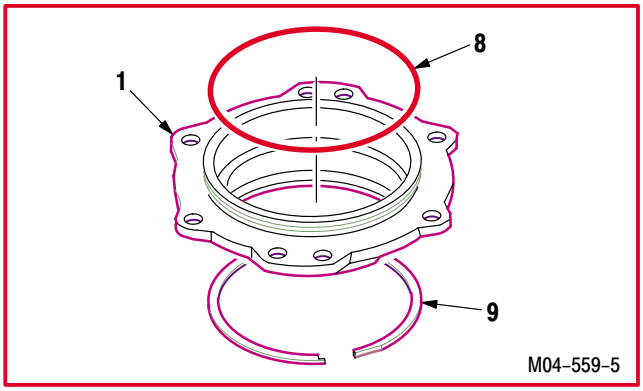
(9) Remove two jackscrews (7) from retainer (1).

(10) Remove and discard grease from input drive cavity of gearbox housing (2).

GO TO NEXT PAGE

6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(11) Remove and discard packing (8) from retainer (1).



NOTE

Some retainers have retaining rings.

(12) Remove retaining ring (9) from retainer (1), if installed.

CAUTION

Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.

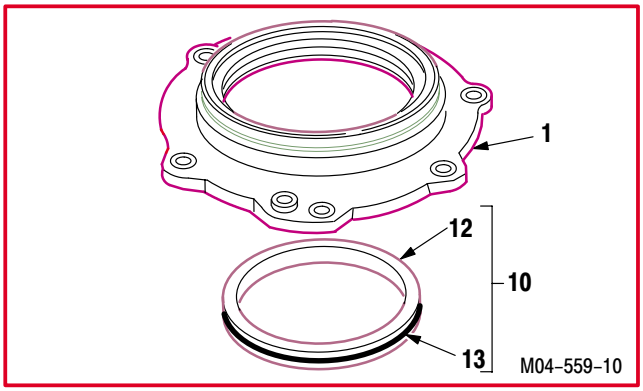
NOTE

- The seal assembly is a two piece magnetic seal. Ensure both halves of seal assembly are removed.
- The two-piece seal assembly shall be kept together as a matched unit.

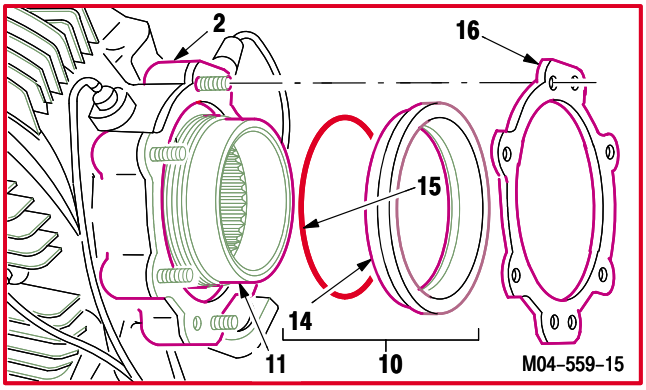
b. **Remove input seal assembly (10) from retainer (1) and input gear (11).**

(1) Remove seal half (12) from retainer (1) by hand. Discard packing (13).

(2) Remove seal half (14) from input gear (11). Discard packing (15).



c. **Remove and discard spacer (16) from gearbox (2).**



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6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.135.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.135.5. Inspection

a. **Check retainer for nicks, gouges, and burrs.**

(1) Repair damage **0.040 INCH** or less deep by blending. Use depth gage.

(2) On mounting surface, repair damage **0.020 INCH** or less deep by blending. Use depth gage.

b. **Check retainer for loose or damaged clinch nuts** (TM 1-1500-204-23)**.**

c. **Check retainer for elongated bolt holes.** None allowed.

d. **Check retainer and seal assembly for cracks.** None allowed.

e. **Check retainer and seal assembly for corrosion** (para 1.49)**.**

f. **Check gearbox housing mating surface studs for damaged threads.** None allowed.

g. **Check seal assembly for scratches, nicks, and gouges.** Casting defects on non-mating surfaces are permissible.

h. **Check seal assembly carbon seal air gap measurement.**

(1) Measure air gap between carbon seal surface and mating surface. Use gap setting gage.

(2) If less than **0.012 INCH**, replace seal.

i. **Check seal assembly for wear step on carbon seal mating surface (highly polished surface).** None allowed.

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6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

6.135.6. Installation

CAUTION

Prior to installing retainer ensure temperature sensor has not dropped into housing. This will cause interference during installation of retainer and the required gap cannot be attained.

a. **Install new spacer (16) on gearbox (2).**

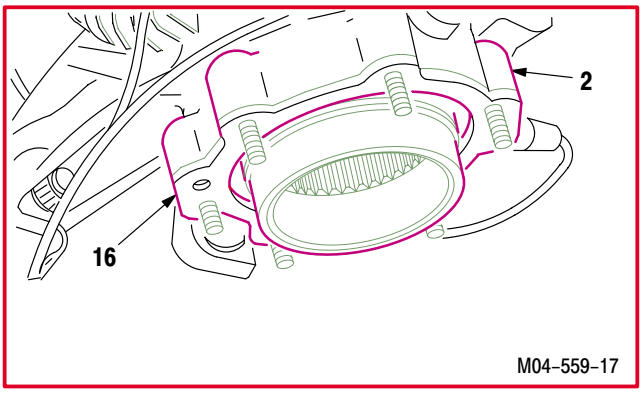
(1) Temporarily install retainer (1) on gearbox (2) with spacer (16) not installed.

(2) Install two washers (4) and nuts (3) on two studs (5) 180 degrees apart until retainer (1) seats firmly against gearbox (2).

(3) Measure gap between retainer (1) and gearbox (2). Use thickness gage.

(4) Remove two nuts (3) and washers (4) from studs (5).

(5) Remove retainer (1) from gearbox (2).

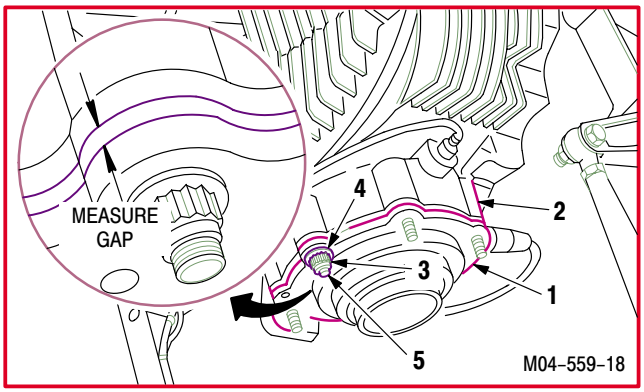


NOTE

Spacer laminations are **0.002 INCH** thick.

(6) Peel off laminations from spacer (16) to acquire a gap of **0.003 to 0.005 INCH** less than measured. Use thickness gage.

(7) Install spacer (16) on gearbox (2).



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6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not allow seal halves to slide across each other or damage to mating faces may occur.

NOTE

If installing new seal assembly, go to step b. If reinstalling seal go to step c.

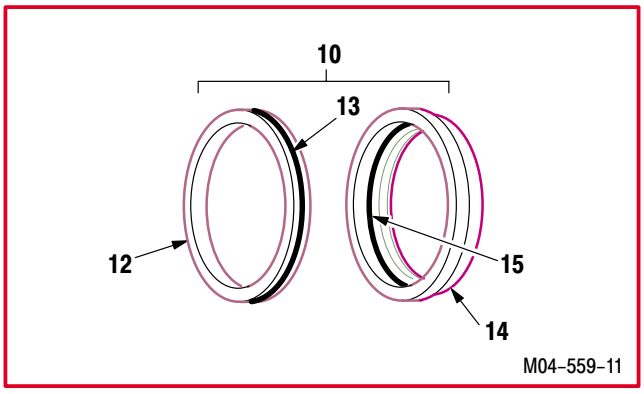
b. **Remove packaging materials from new seal assembly (10).**

(1) Remove seal half (12) from seal half (14) axially, without sliding.

(2) Discard paper separator between seal halves (12) and (14).

(3) Remove new packings (13) and (15).





c. **Install seal assembly (10) in retainer (1).**

(1) Lubricate new packings (13) and (15). Use assembly fluid (item 30, App F).

(2) Install packings (13) and (15) on seal halves (12) and (14).

CAUTION

Mating faces must be clean and free of any contamination and/or packing lubricant or damage to seal may result.

(3) Clean mating surfaces of seal halves (12) and (14) (para 1.47).

NOTE

Some retainers have retaining rings.

GO TO NEXT PAGE

6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

(4) Install retaining ring (9) on retainer (1), if removed.

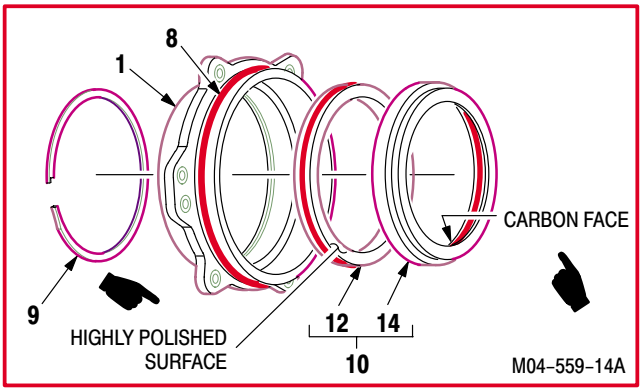
(5) Lubricate seal assembly mating surface of retainer (1). Use assembly fluid (item 30, App F).

(6) Position retainer (1) on a flat surface with mounting surface up.

(7) Ensuring seal half (12) part number is facing front side of retainer (1) and highly polished surface is facing aft side of retainer (1), position seal half (12) in retainer (1).

(8) Cover seal half (12) with lint-free cloth and hand press seal half (12) in retainer (1) until it bottoms against retainer (1) flange or retaining ring (9). Use cloth (item 52, App F).

(9) Lubricate mating surfaces of seal halves (12) and (14) with three or four drops of lubricating oil prior to mating. Use lubricating oil (item 119, App F).



CAUTION

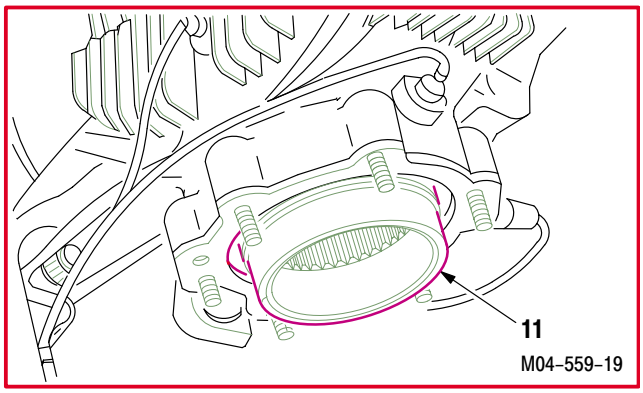
- Do not apply any direct physical shock to seal assembly or damage to seal assembly may occur.
- The seal assembly is a magnetic seal. Hold seal assembly firmly to prevent faces from slamming together. Care must be used when mating seal assembly or damage to mating faces may result.
- Do not allow seal halves to slide across each other or damage to mating faces may occur.

(10) Bring carbon face of seal half (14) and highly polished (unmarked) surface of seal half (12) together axially, without sliding, and mate seal assembly.

(11) Lubricate new packing (8). Use assembly fluid (item 30, App F).

(12) Install packing (8) on retainer (1).

(13) Lubricate sealing surface of input gear (11). Use assembly fluid (item 30, App F).



GO TO NEXT PAGE

6.135. TAIL ROTOR GEARBOX INPUT GEAR SEAL ASSEMBLY REMOVAL/INSTALLATION – continued

CAUTION

Do not move retainer axially away from gearbox housing before securing, as seal leakage may result and seal must be completely removed from retainer and re-installed.

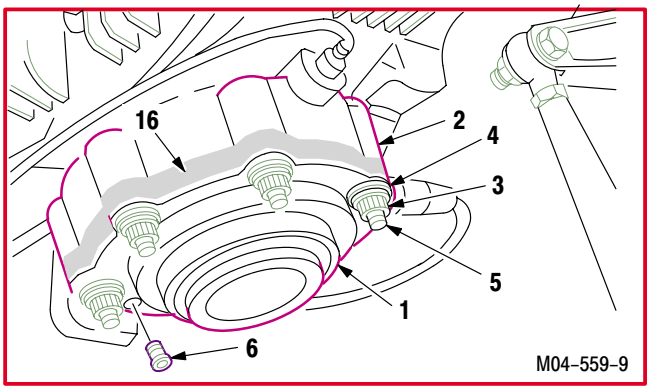
d. **Install retainer (1) on gearbox (2).** Torque six nuts (3) to **60 INCH-POUNDS**.

(1) Position retainer (1) on studs (5) and spacer (16).

(2) Install six spacers or washers (4) and new nuts (3) on studs (5).

(3) Torque six nuts (3) to **60 INCH-POUNDS**. Use torque wrench.

(4) Install two nylon setscrews (6) in retainer (1).



e. **Inspect (QA).**



f. **Apply sealing compound to nylon setscrews (6).** Use sealing compound (item 177, App F).

g. **Apply bead of sealing compound to joint between gearbox (2) and retainer (1).** Use sealing compound (item 177, App F).

h. **Apply sealing compound to studs (5), nuts (3) and washers (4).** Use sealing compound (item 177, App F).

i. **Inspect (QA).**

j. **Install tail rotor gearbox shouldered shaft** (para 6.133)**.**

END OF TASK

6.136. TAIL ROTOR GEARBOX BREATHER REMOVAL/INSTALLATION

6.136.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.136.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L530 and R540 removed

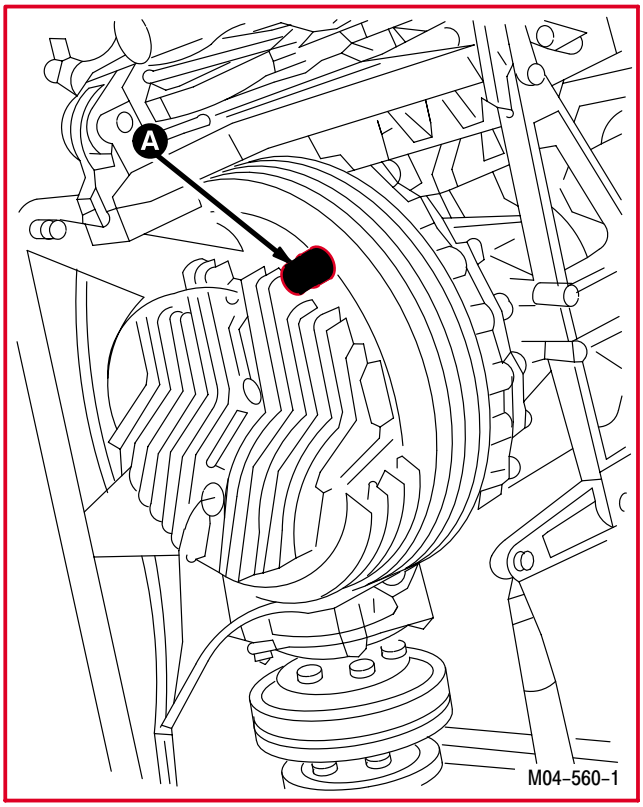
Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



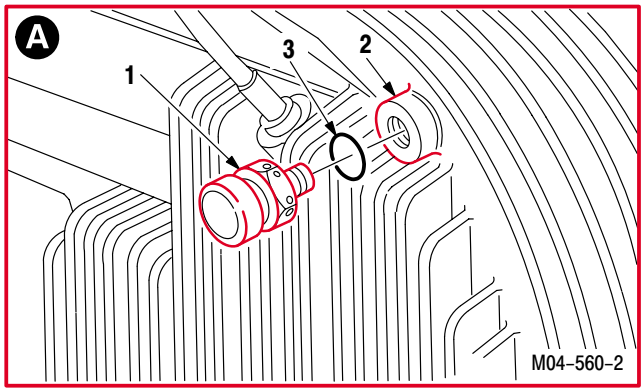
GO TO NEXT PAGE

6.136. TAIL ROTOR GEARBOX BREATHER REMOVAL/INSTALLATION – continued

6.136.3. Removal

a. **Remove breather (1) from tail rotor gearbox housing (2).**

(1) Remove and discard packing (3), if installed.



6.136.4. Cleaning

a. **Wipe breather and housing with a clean rag.**

6.136.5. Inspection

a. **Check breather and housing for nicks, gouges, and stripped or damaged threads** (para 6.132)**.**

b. **Check breather for dents, 0.040 INCH maximum before blending.** Use depth gage.

c. **Check breather for fractures or cracks.** None allowed.

6.136.6. Installation

NOTE

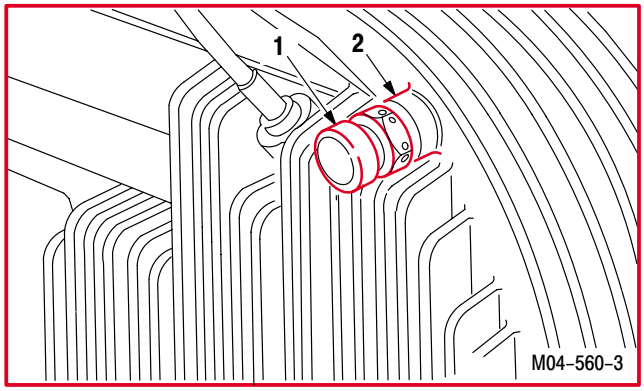
If packing was removed, do not reinstall packing. Packing could cause leakage.

a. **Install breather (1) on housing (2).**

b. **Torque breather (1) to 40 INCH-POUNDS.** Use torque wrench.

c. **Inspect (QA).**

d. **Install access fairings R530 and R540** (para 2.2)**.**



END OF TASK

6.137. TAIL ROTOR GEARBOX IDENTIFICATION PLATE REPLACEMENT

6.137.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.137.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Adhesive (item 10, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Isopropyl alcohol (item 106, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed

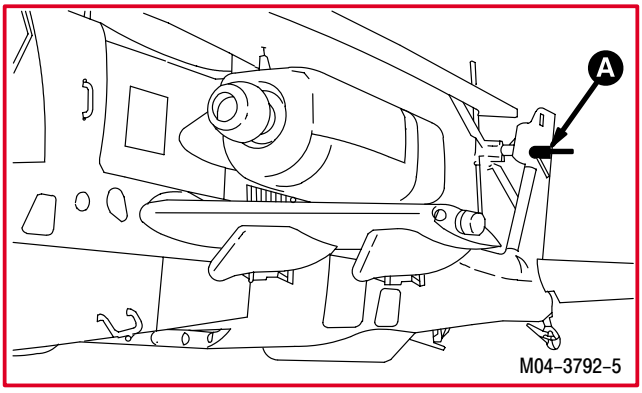
WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

This task is typical for either the equipment data plate or the overhaul data plate.



GO TO NEXT PAGE

6.137. TAIL ROTOR GEARBOX IDENTIFICATION PLATE REPLACEMENT – continued

6.137.3. Removal

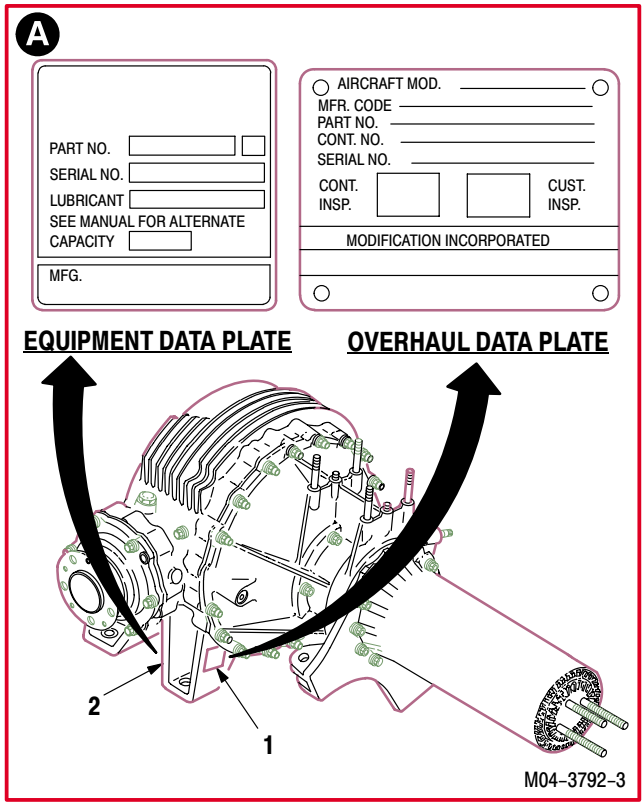
a. **Record all data found on existing identification plate (1).**

b. **Remove plate (1) from intermediate gearbox (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from gearbox housing (2).

(3) Discard plate (1).



6.137.4. Cleaning



CAUTION

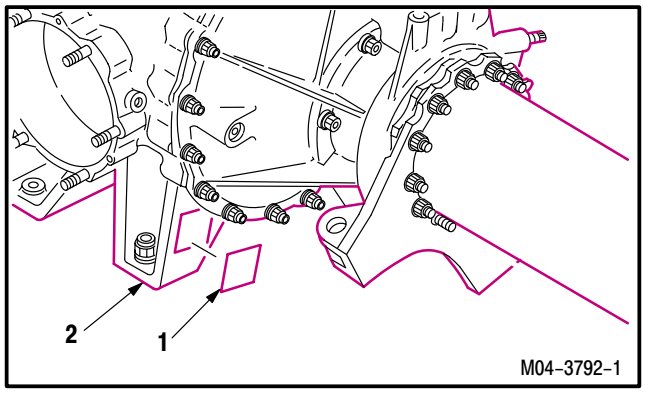
Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in the name, for cleaning titanium, magnesium, aluminium, or galvanized metals. Products with “chlor” in the name are corrosive to these metals.

NOTE

Do not allow alcohol to evaporate from surface. Discoloration will occur.

a. **Clean identification plate mounting area on gearbox housing.**

(1) Remove all cured compound from gearbox housing. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F).



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6.137. TAIL ROTOR GEARBOX IDENTIFICATION PLATE REPLACEMENT – continued

6.137.5. Inspection

a. **Check identification plate mounting area for cracks.** None allowed.

b. **Check identification plate mounting area for scratches, nicks, and gouges** (para 6.132)**.**

c. **Check identification plate mounting area for corrosion and erosion of surface finish** (para 1.49)**.**

6.137.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.



b. **Install plate (1) on gearbox (2).**

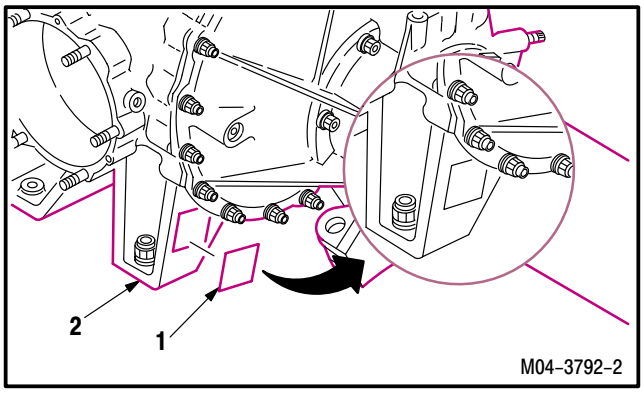
(1) Remove lining from mounting surface of plate (1).

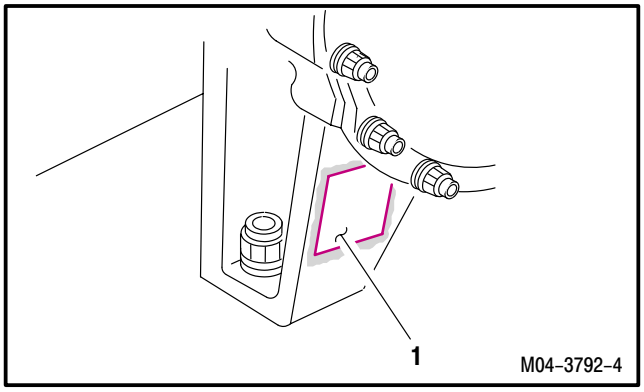
(2) Lightly abrade mounting surface of plate (1). Use cloth (item 48, App F).

(3) Apply a smooth continuous coat of adhesive to mounting surface of plate (1). Use brush (item 34, App F) and adhesive (item 10, App F).

(4) Install plate (1) on gearbox (2) in same location as old plate.

(5) Seal edges of plate (1). Use adhesive (item 10, App F).





c. **Inspect (QA).**

d. **Install fairings L540 and L546** (para 2.2)**.**

END OF TASK

6.138. TAIL ROTOR GEARBOX TEMPERATURE SENSOR REMOVAL/INSTALLATION

6.138.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.138.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
5/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 98, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing
Packing with retainer
Assembly fluid (item 30, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L530 and L540 removed

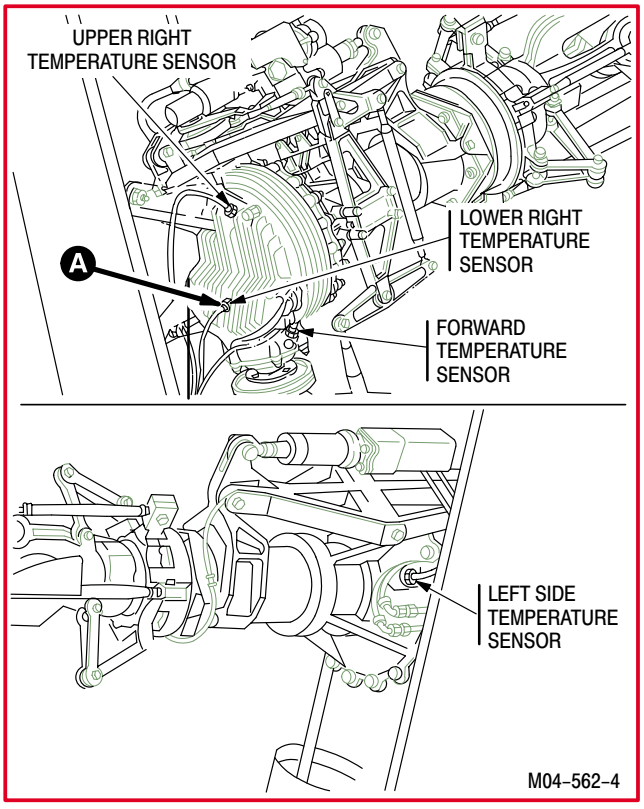
WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

NOTE

- This task is typical for all four tail rotor gearbox temperature sensors.
- Identify each sensor and each boss if more than one sensor is removed at a time.



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6.138. TAIL ROTOR GEARBOX TEMPERATURE SENSOR REMOVAL/INSTALLATION – continued

6.138.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open LT CAUT circuit breaker.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG left console circuit breaker panel No. 1, open CAUT circuit breaker.**

e. **Remove temperature sensor (1) from housing boss (2).**

(1) Remove sensor (1) from boss (2).

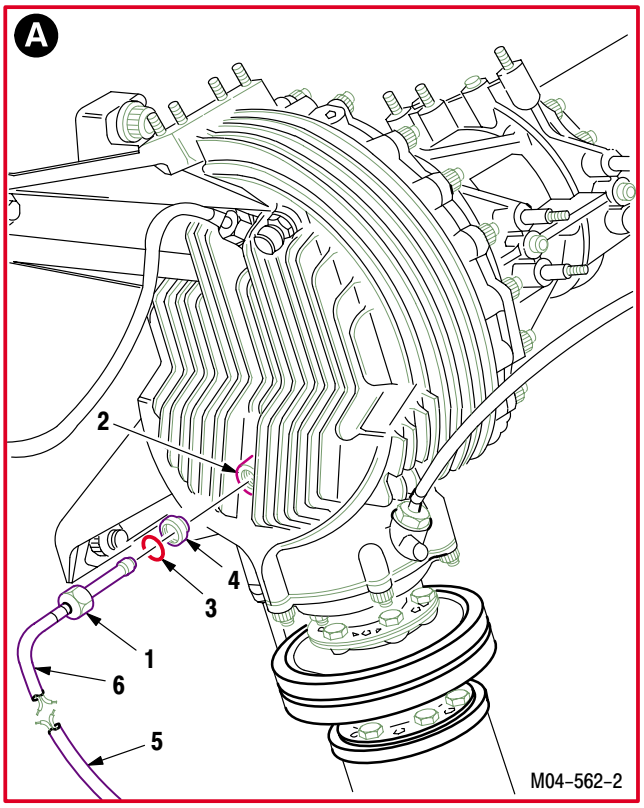
(2) Remove and discard packing (3) and packing with retainer (4).

NOTE

If not replacing temperature sensor, go to paragraph 6.138.4.

(3) Identify and cut two wires (5) from sensor wires (6) (TM 55-1500-323-24).

(4) Discard sensor (1).



6.138.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

6.138.5. Inspection

a. **Check boss for stripped or damaged threads.** None allowed.

b. **Check sensor for cracks.** None allowed.

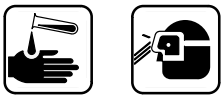
c. **Check sensor for damaged threads, damaged or bent body.** None allowed.

d. **Check sensor and boss for corrosion** (para 1.49)**.**

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6.138. TAIL ROTOR GEARBOX TEMPERATURE SENSOR REMOVAL/INSTALLATION – continued

6.138.6. Installation



a. **Install sensor (1) on boss (2).** Torque sensor (1) to **30 INCH-POUNDS**.

(1) Lubricate new packing (3) and new packing with retainer (4). Use assembly fluid (item 30, App F).

(2) Install packing with retainer (4) on sensor (1).

(3) Install packing (3) in groove closest to spring on sensor (1).

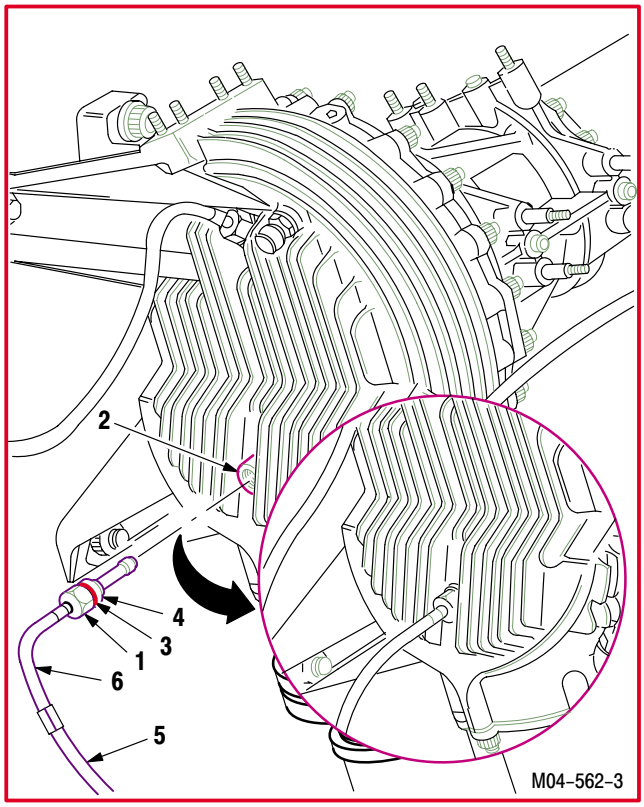
(4) Install sensor (1) on boss (2).

(5) Torque sensor (1) to **30 INCH-POUNDS**. Use crowfoot and torque wrench.

NOTE

If sensor was not replaced, go to step b.

(6) Identify and splice two identified wires (5) to sensor wires (6) (TM 55-1500-323-24).



b. **Inspect (QA).**

c. **Install fairings L530 and L540** (para 2.2)**.**

d. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.139. TAIL ROTOR GEARBOX ACCELEROMETER REMOVAL/INSTALLATION

6.139.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.139.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T
TM 55-1500-323-24

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L546 removed

Materials/Parts:

Brush (item 34, App F)
Sealing compound (item 176, App F)

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

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6.139. TAIL ROTOR GEARBOX ACCELEROMETER REMOVAL/INSTALLATION – continued

6.139.3. Removal

a. **Remove accelerometer (1) from gearbox (2).**

(1) Detach accelerometer harness connector P58 (3) from accelerometer (1).

(2) Remove accelerometer (1) from gearbox (2).

6.139.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

6.139.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to accelerometer recess and adjacent surface areas on tail rotor gearbox housing.

a. **Check for cracks.** None allowed.

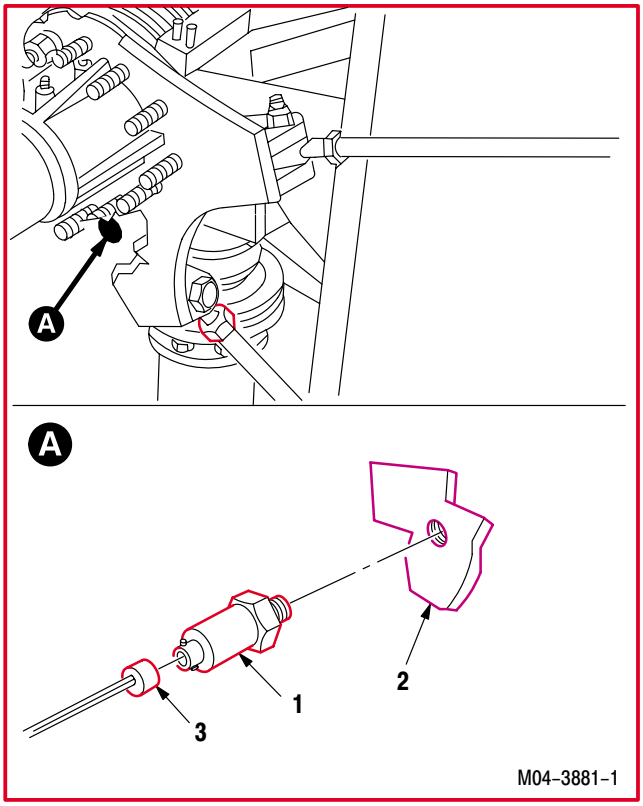
b. **Check for corrosion** (para 1.49)**.**

c. **Check for scratches, nicks, and gouges** (para 6.132)**.**

d. **Check for stripped, crossed, or flattened threads.** None allowed.

e. **Check connector P58 and harness for cracks, corrosion, broken wires, bent or broken connector pins, and for cracked or burned insulation** (TM 55-1500-323-24)**.**

f. **Check accelerometer for cracks, corrosion, damaged threads, bent or broken body, and evidence of overheating.** None allowed.



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6.139. TAIL ROTOR GEARBOX ACCELEROMETER REMOVAL/INSTALLATION – continued

6.139.6. Installation



a. **Install accelerometer (1) on gearbox (2).** Torque accelerometer (1) to **23 INCH-POUNDS**.

(1) Install accelerometer (1) in gearbox (2) recess.

(2) Torque accelerometer (1) to **23 INCH-POUNDS**. Use torque wrench.

(3) Apply bead of sealant around base of accelerometer (1). Use brush (item 34, App F) and sealing compound (item 176, App F).

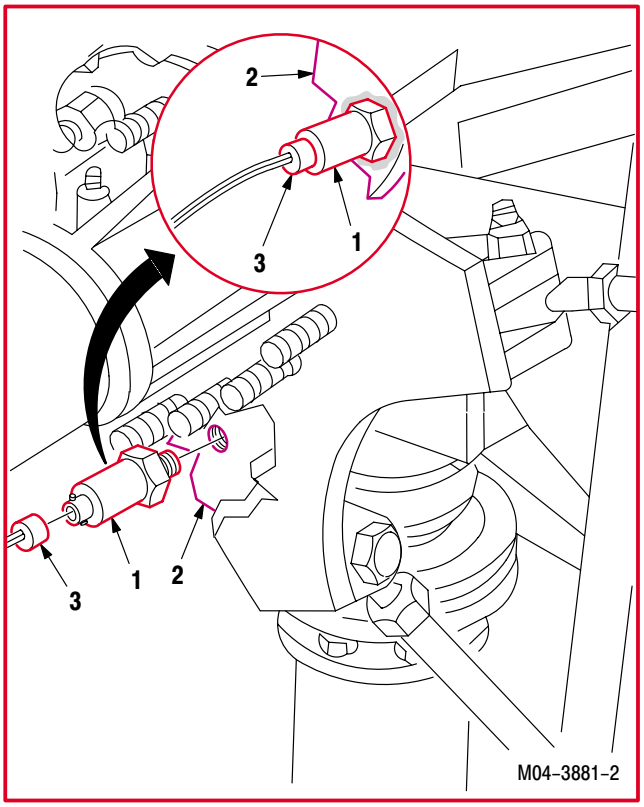
(4) Allow sealant to air dry **1 HOUR** at room temperature.

(5) Attach accelerometer harness connector P58 (3) to accelerometer (1).

b. **Inspect (QA).**

c. **Install access fairing L546** (para 2.2)**.**

d. **Perform drive system vibration maintenance operational check** (TM 1-1520-238-T)**.**



END OF TASK

6.140. TAIL ROTOR GEARBOX AFT STRUT REMOVAL/INSTALLATION

6.140.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.140.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Nut (2)
Sealing compound (item 158A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

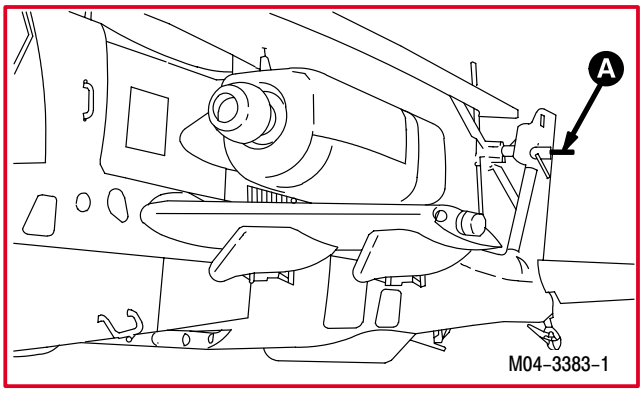
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L540 and L546 removed

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.140. TAIL ROTOR GEARBOX AFT STRUT REMOVAL/INSTALLATION – continued

6.140.3. Removal

a. **Remove aft strut (1) from tail rotor gearbox collar clevis (2).**

(1) Remove sealing compound from bolt (3), nut (4), and washer (5) (para 1.47).

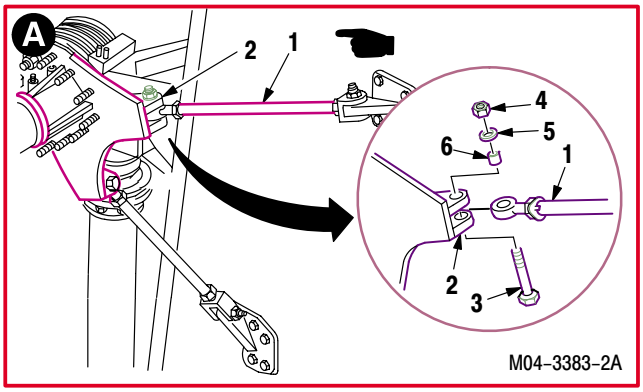
(2) Hold bolt (3).

(3) Remove nut (4) and washer (5).

(4) Discard nut (4).

(5) Remove bolt (3) and bushing (6) from clevis (2).

(6) Remove strut (1).



b. **Remove strut (1) from aft gear fitting (7).**

(1) Remove sealing compound from bolt (8), nut (9), and washer (10) (para 1.47).

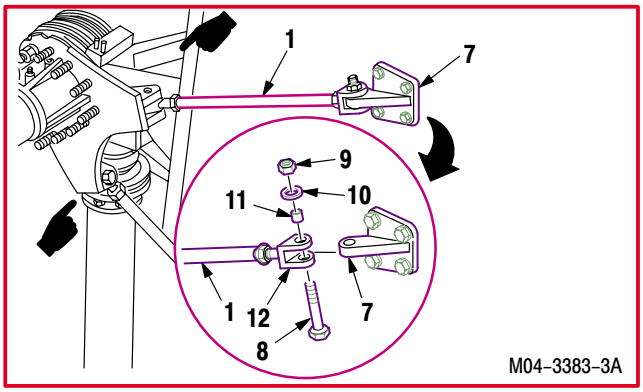
(2) Hold bolt (8).

(3) Remove nut (9) and washer (10).

(4) Discard nut (9).

(5) Remove bolt (8) and bushing (11) from strut clevis (12).

(6) Remove strut (1).



6.140.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

6.140.5. Inspection

a. **Check strut for cracks, nicks, or dents.** None allowed.

b. **Check strut surface for radial scratches.** None allowed.

GO TO NEXT PAGE

6.140. TAIL ROTOR GEARBOX AFT STRUT REMOVAL/INSTALLATION – continued

c. **Check strut surface for axial scratches.**

(1) Axial scratches not to exceed **0.002 INCH** in depth. Use depth gage.

(2) Axial scratches less than **0.002 INCH** may be blended out. Use depth gage.

d. **Check rod end bearing for play.**

(1) Maximum allowable play shall be **0.010 INCH** in any direction. Use depth gage.

e. **Check strut, rod end bearing, and strut clevis for corrosion and erosion of surface finish** (para 1.49)**.**

6.140.6. Installation

a. **Install strut (1) on fitting (7).** Torque nut (9) to **300 INCH-POUNDS**.

(1) Position clevis (12) on fitting (7) with bushing side of clevis (12) facing up.

(2) Install bushing (11) in clevis (12).

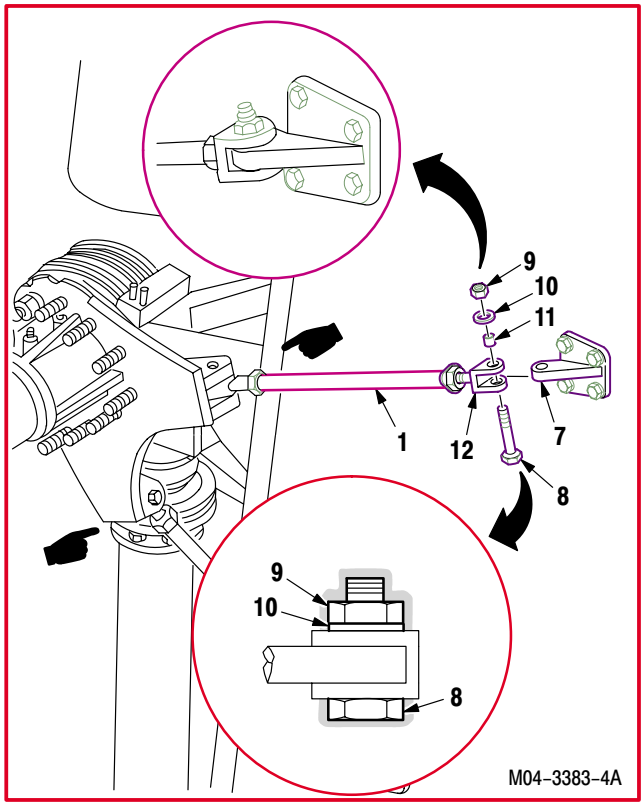
(3) Install bolt (8) through clevis (12) and fitting (7) from opposite side of bushing (11).

(4) Install washer (10) and new nut (9) on bolt (8).

(5) Hold bolt (8). Torque nut (9) to **300 INCH-POUNDS**. Use torque wrench.



b. **Apply sealing compound to bolt (8) head, washer (10), and nut (9).** Use sealing compound (item 158A, App F).



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6.140. TAIL ROTOR GEARBOX AFT STRUT REMOVAL/INSTALLATION – continued

c. **Install strut (1) in clevis (2).** Torque nut (4) to **300 INCH-POUNDS**.

(1) Position rod end bearing (13) in clevis (2).

(2) Install bushing (6) in clevis (2).

(3) Install bolt (3) through clevis (2) from opposite side of bushing (6).

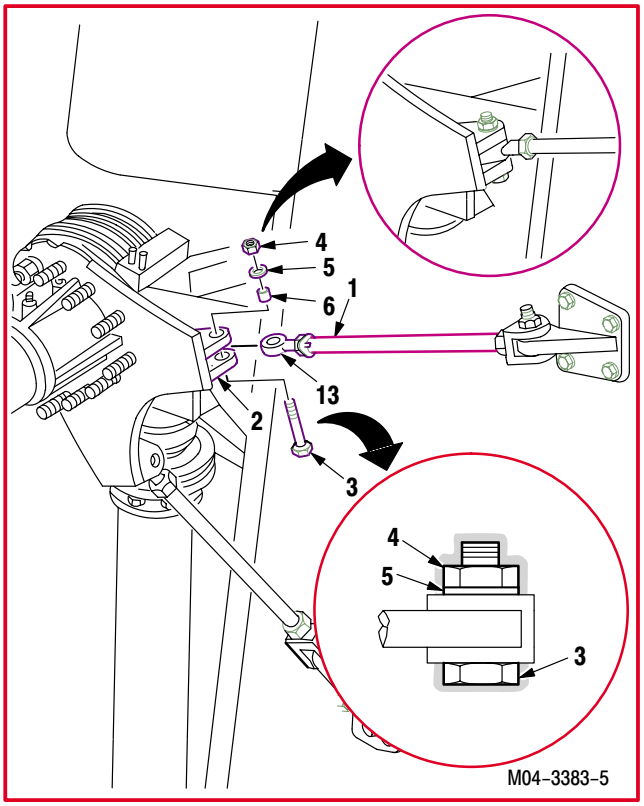
(4) Install washer (5) and new nut (4) on bolt (3).

(5) Hold bolt (3). Torque nut (4) to **300 INCH-POUNDS**. Use torque wrench.

d. **Apply sealing compound to bolt (3) head, washer (5), and nut (4).** Use sealing compound (item 158A, App F).

e. **Inspect (QA).**

f. **Install access fairings L540 and L546** (para 2.2)**.**



END OF TASK

6.141. TAIL ROTOR GEARBOX AFT GEAR FITTING REPLACEMENT

6.141.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.141.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Brush (item 34, App F)
Primer coating (item 147, App F)
Sealing compound (item 158A, App F)

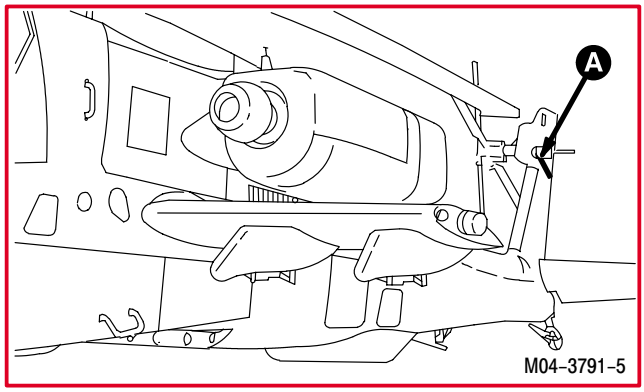
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.140	Tail rotor gearbox aft strut removed

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



6.141.3. Removal

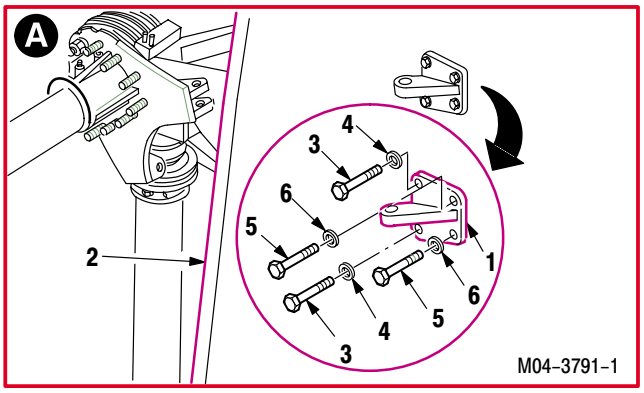
a. **Remove aft gear fitting (1) from stabilizer (2).**

(1) Remove sealing compound from fitting (1), bolts (3) and (5), and washers (4) and (6) (para 1.47).

(2) Remove two bolts (3) and washers (4).

(3) Remove two bolts (5) and washers (6).

(4) Remove fitting (1) from stabilizer (2).



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6.141. TAIL ROTOR GEARBOX AFT GEAR FITTING REPLACEMENT – continued

6.141.4. Cleaning

a. **Clean removed and attaching parts and surfaces** (para 1.47)**.**

6.141.5. Inspection

NOTE

The following inspection procedures apply to aft gear fitting mating surface and adjacent areas on vertical stabilizer.

a. **Check for cracks** (para 2.102)**.**

b. **Check for dents** (para 2.102)**.**

c. **Check for nicks, scratches, and gouges** (para 2.102)**.**

d. **Check for corrosion and erosion of surface finish** (para 1.49)**.**

e. **Check for evidence of wear due to movement of fitting** (para 2.102)**.**

f. **Check for loose or missing rivets** (para 2.102)**.**

g. **Check nutplates for stripped, crossed, or flattened threads** (para 2.102)**.**

GO TO NEXT PAGE

6.141. TAIL ROTOR GEARBOX AFT GEAR FITTING REPLACEMENT – continued

6.141.6. Installation



a. **Install new fitting (1) on stabilizer (2).** Torque four bolts (3) and (5) to **155 INCH-POUNDS**.

(1) Apply a uniform coat of primer to mating surface of fitting (1). Use brush (item 34, App F) and primer coating (item 147, App F).

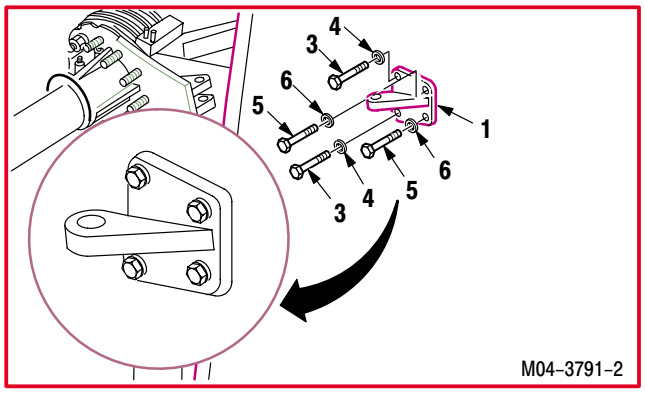
(2) Allow primer to air dry **20 MINUTES** maximum.

(3) Position fitting (1) on stabilizer (2).

(4) Install two bolts (3) and washers (4).

(5) Install two bolts (5) and washers (6).

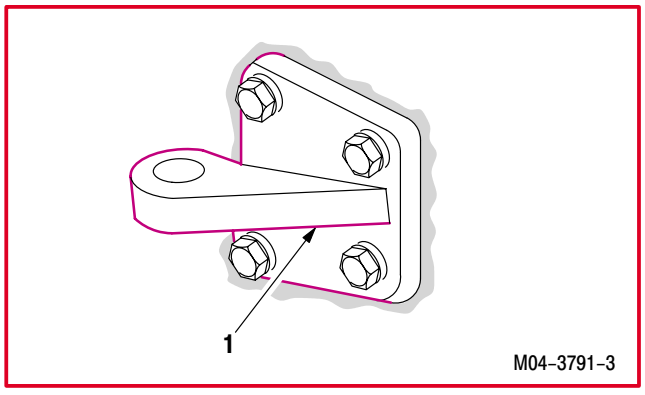
(6) Torque four bolts (3) and (5) to **155 INCH-POUNDS**. Use torque wrench.



M04-3791-2



b. **Apply continuous bead of sealing compound around outer edge of fitting (1).** Use sealing compound (item 158A, App F).



M04-3791-3

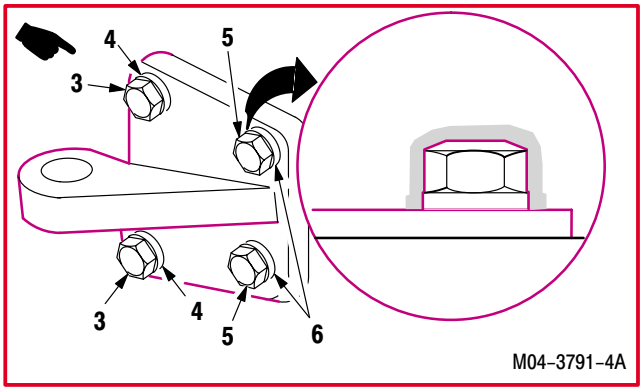
GO TO NEXT PAGE

6.141. TAIL ROTOR GEARBOX AFT GEAR FITTING REPLACEMENT – continued

c. **Apply sealing compound to bolt (3) and (5) heads, and washers (4) and (6).** Use sealing compound (item 158A, App F).

d. **Inspect (QA).**

e. **Install tail rotor gearbox aft strut** (para 6.140)**.**



END OF TASK

6.142. TAIL ROTOR GEARBOX FORWARD STRUT REMOVAL/INSTALLATION

6.142.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.142.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Nut (2)
Sealing compound (item 158A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

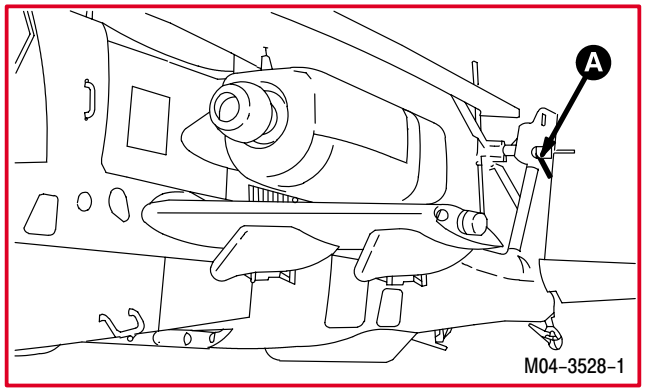
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



GO TO NEXT PAGE

6.142. TAIL ROTOR GEARBOX FORWARD STRUT REMOVAL/INSTALLATION – continued

6.142.3. Removal

a. **Remove forward strut (1) from tail rotor gearbox collar clevis (2).**

(1) Remove sealing compound from bolt (3), nut (4), and washer (5) (para 1.47).

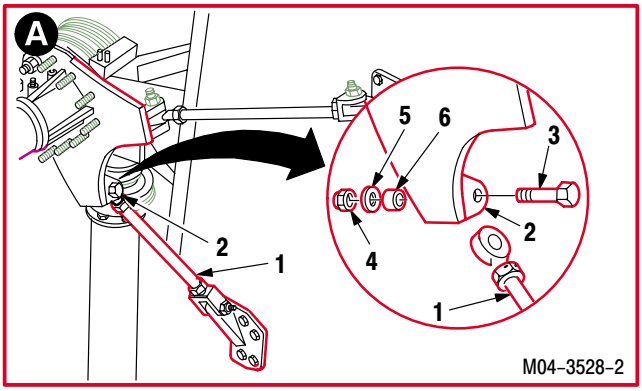
(2) Hold bolt (3).

(3) Remove nut (4) and washer (5).

(4) Discard nut (4).

(5) Remove bolt (3) and bushing (6) from clevis (2).

(6) Remove strut (1).



b. **Remove strut (1) from forward gear fitting (7).**

(1) Remove sealing compound from bolt (8), nut (9), and washer (10) (para 1.47).

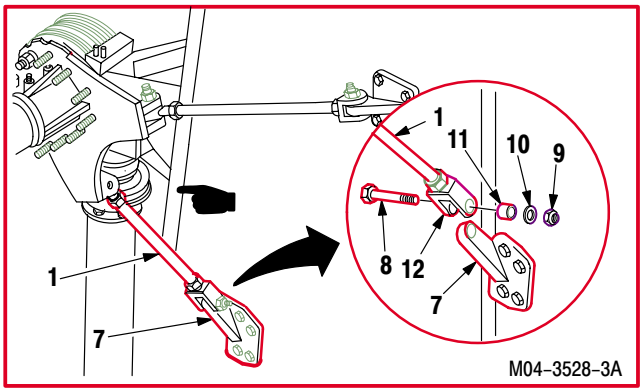
(2) Hold bolt (8).

(3) Remove nut (9) and washer (10).

(4) Discard nut (9).

(5) Remove bolt (8) and bushing (11) from strut clevis (12).

(6) Remove strut (1).



6.142.4. Cleaning

b. **Clean removed and attaching parts** (para 1.47)**.**

6.142.5. Inspection

a. **Check strut for cracks, nicks, or dents.** None allowed.

b. **Check strut surface for radial scratches.** None allowed.

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6.142. TAIL ROTOR GEARBOX FORWARD STRUT REMOVAL/INSTALLATION – continued

c. **Check strut surface for axial scratches.**

(1) Axial scratches not to exceed **0.002 INCH** in depth. Use depth gage.

(2) Axial scratches less than **0.002 INCH** may be blended out. Use depth gage.

d. **Check rod end bearing for play.**

(1) Maximum allowable play shall be **0.010 INCH** in any direction. Use depth gage.

e. **Check strut, rod end bearing, and strut clevis for corrosion and erosion of surface finish** (para 1.49)**.**

6.142.6. Installation

a. **Install strut (1) on fitting (7).** Torque nut (9) to **300 INCH-POUNDS**.

(1) Position clevis (12) on fitting (7) with bushing side of clevis (12) facing aft.

(2) Install bushing (11) in clevis (12).

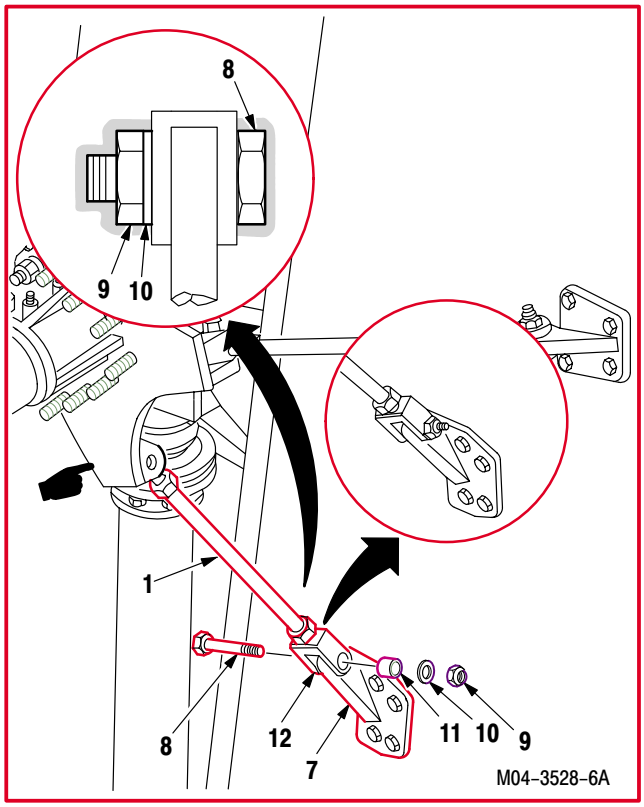
(3) Install bolt (8) through clevis (12) and fitting (7) from opposite side of bushing (11).

(4) Install washer (10) and new nut (9) on bolt (8).

(5) Hold bolt (8). Torque nut (9) to **300 INCH-POUNDS**. Use torque wrench.



b. **Apply sealing compound to bolt (8) head, washer (10), and nut (9).** Use sealing compound (item 158A, App F).



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6.142. TAIL ROTOR GEARBOX FORWARD STRUT REMOVAL/INSTALLATION – continued

c. **Install strut (1) in clevis (2).** Torque nut (4) to **300 INCH-POUNDS**.

(1) Position rod end bearing (13) in clevis (2).

(2) Install bushing (6) in clevis (2).

(3) Install bolt (3) through clevis (2) from opposite side of bushing (6).

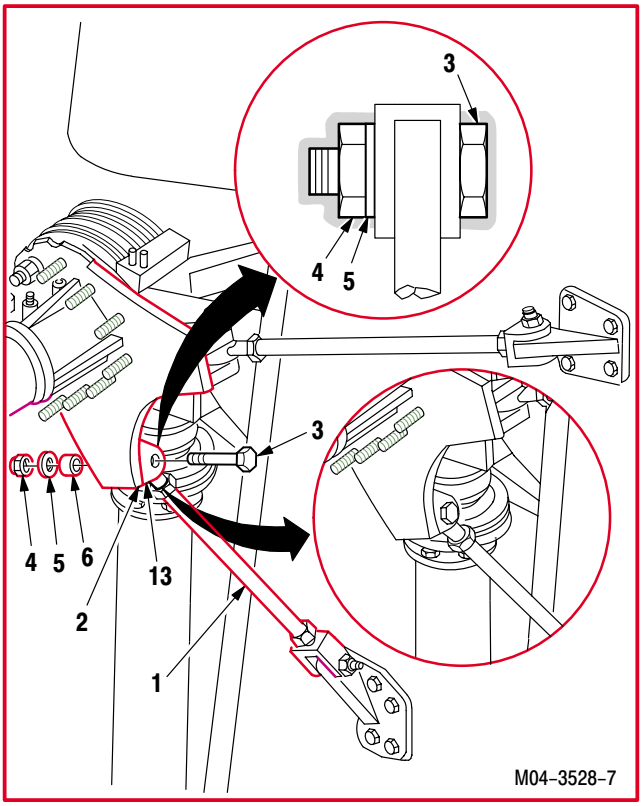
(4) Install washer (5) and new nut (4) on bolt (3).

(5) Hold bolt (3). Torque nut (4) to **300 INCH-POUNDS**. Use torque wrench.

d. **Apply sealing compound to bolt (3) head, washer (5), and nut (4).** Use sealing compound (item 158A, App F).

e. **Inspect (QA).**

f. **Install access fairings L540 and L546** (para 2.2)**.**



END OF TASK

6.143. TAIL ROTOR GEARBOX FORWARD GEAR FITTING REPLACEMENT

6.143.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.143.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Materials/Parts:

Brush (item 34, App F)
Primer coating (item 147, App F)
Sealing compound (item 158A, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
6.142	Tail rotor gearbox forward strut removed

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

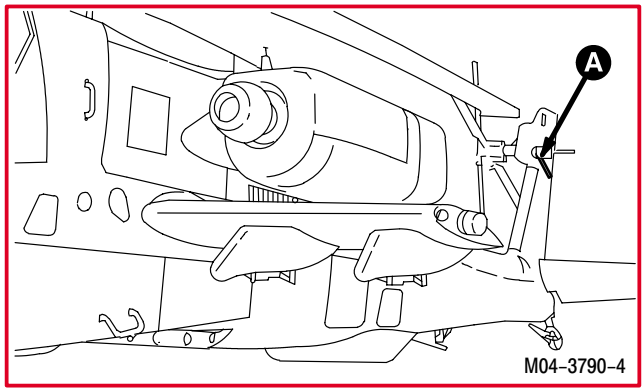
6.143.3. Removal

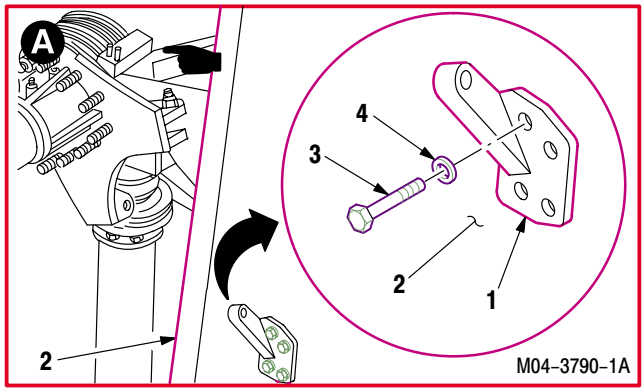
a. **Remove forward gear fitting (1) from stabilizer (2).**

(1) Remove sealing compound from fitting (1), bolts (3), and washers (4) (para 1.47).

(2) Remove four bolts (3) and washers (4).

(3) Remove fitting (1) from stabilizer (2).





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6.143. TAIL ROTOR GEARBOX FORWARD GEAR FITTING REPLACEMENT – continued

6.143.4. Cleaning

a. **Clean removed and attaching parts and surfaces** (para 1.47)**.**

6.143.5. Inspection

NOTE

The following inspection procedures apply to forward gear fitting mating surface and adjacent areas on vertical stabilizer.

a. **Check for cracks** (para 2.102)**.**

b. **Check for dents** (para 2.102)**.**

c. **Check for nicks, scratches, and gouges** (para 2.102)**.**

d. **Check for corrosion and erosion of surface finish** (para 1.49)**.**

e. **Check for evidence of wear due to movement of fitting** (para 2.102)**.**

f. **Check for loose or missing rivets** (para 2.102)**.**

g. **Check nutplates for stripped, crossed, or flattened threads** (para 2.102)**.**

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6.143. TAIL ROTOR GEARBOX FORWARD GEAR FITTING REPLACEMENT – continued

6.143.6. Installation



a. **Install new fitting (1) on stabilizer (2).** Torque four bolts (3) to **155 INCH-POUNDS**.

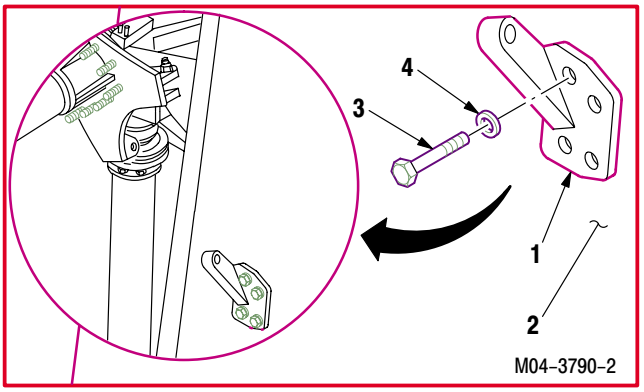
(1) Apply a uniform coat of primer to mating surface of fitting (1). Use brush (item 34, App F) and primer coating (item 147, App F).

(2) Allow primer to air dry for **20 MINUTES** maximum.

(3) Position fitting (1) on stabilizer (2).

(4) Install four bolts (3) and washers (4).

(5) Torque four bolts (3) to **155 INCH-POUNDS**. Use torque wrench.



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6.143. TAIL ROTOR GEARBOX FORWARD GEAR FITTING REPLACEMENT – continued

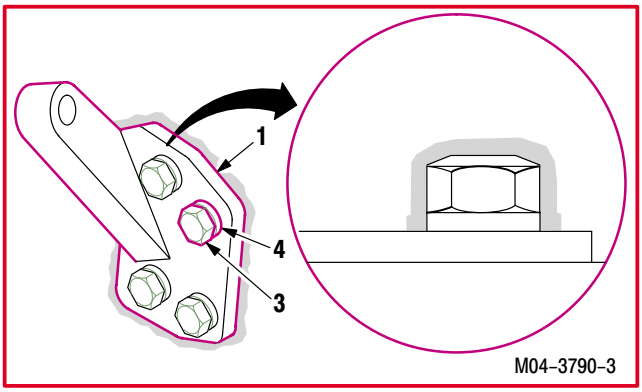


b. **Apply continuous bead of sealing compound around outer edge of fitting (1).** Use sealing compound (item 158A, App F).

c. **Apply sealing compound to bolt (3) heads and washers (4).** Use sealing compound (item 158A, App F).

d. **Inspect (QA).**

e. **Install tail rotor gearbox forward strut** (para 6.142)**.**



END OF TASK

6.144. TAIL ROTOR GEARBOX STRUT DISASSEMBLY/ASSEMBLY

6.144.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

6.144.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
7/8 x 3/8-inch drive open end box socket wrench crow-foot attachment (item 86, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Brush (item 34, App F)
Primer coating (item 147, App F)
Sealing compound (item 158A, App F)
Wire (item 227, App F)

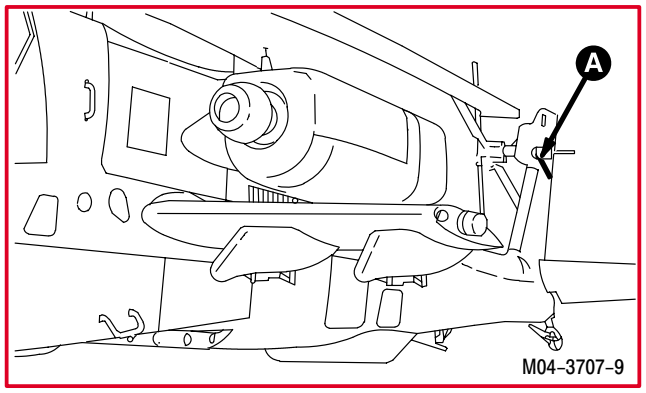
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed

WARNING

FLIGHT SAFETY PART

The intermediate gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



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6.144. TAIL ROTOR GEARBOX STRUT DISASSEMBLY/ASSEMBLY – continued

NOTE

This task is typical for either forward or aft struts. The aft strut is shown.

6.144.3. Disassembly

a. **Remove lockwire (1) from nuts (2) and (3).**

b. **Loosen nuts (2) and (3).**

c. **Remove strut (4) from helicopter** (para 6.140) **or** (para 6.142)**.**

d. **Remove rod end clevis (5) with key washer (6) and nut (2) from strut (4).**

e. **Remove rod end bearing (7) with key washer (8) and nut (3) from strut (4).**

6.144.4. Cleaning

a. **Clean grease, oil, and lubricant from exterior of strut components** (para 1.47)**.**

b. **Clean primer from threads of rod end bearing and clevis** (para 1.47)**.**

c. **Clean sealing compound from key washers, threads of clevis, and rod end nuts** (para 1.47)**.**

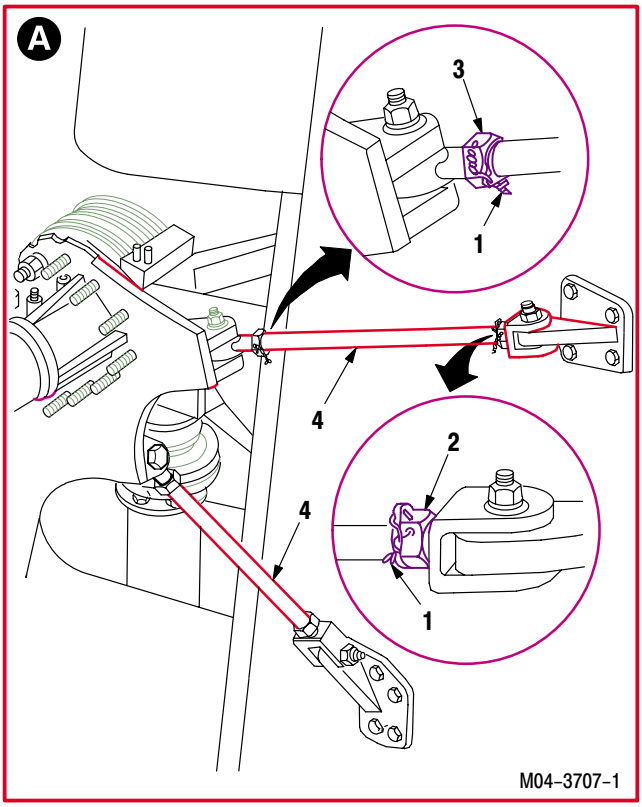
6.144.5. Inspection

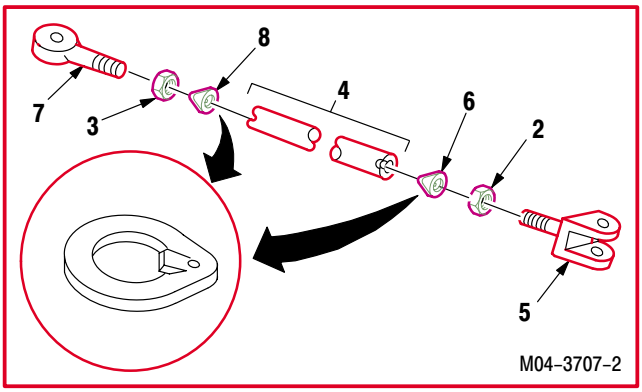
a. **Check strut for cracks, nicks, dents, or radial scratches in the steel.** None allowed.

b. **Check strut for axial scratches in the steel not to exceed 0.002 INCH in depth.** Use depth gage.

(1) Axial scratches **0.002 INCH** deep or less may be blended out.

c. **Check strut, rod end bearing, and clevis for stripped or damaged threads.** None allowed.





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6.144. TAIL ROTOR GEARBOX STRUT DISASSEMBLY/ASSEMBLY – continued

d. **Check strut for straightness.**

(1) Replace strut if bent more than **0.030 INCH** total indicator reading. Use depth gage.

e. **Check strut, rod end bearing, and clevis for corrosion** (para 1.49)**.**

6.144.6. Assembly



a. **Assemble rod end (7) on strut (4).**

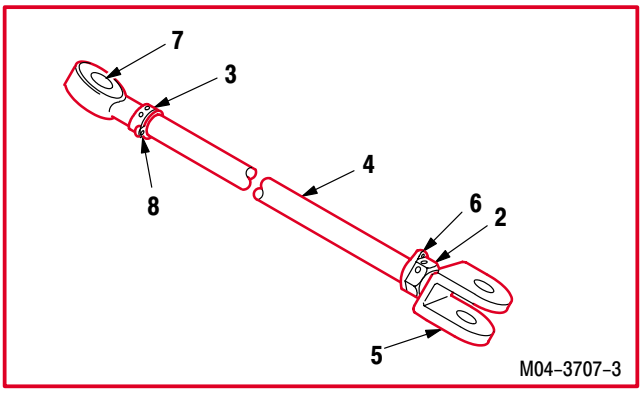
(1) Thread nut (3) on rod end (7) until nut (3) bottoms out.

(2) Install key washer (8) on rod end (7) against nut (3).

(3) Coat exposed threads of rod end (7) with primer. Use brush (item 34, App F) and primer coating (item 147, App F).

(4) Thread rod end (7) in narrow end of strut (4).

(5) Do not tighten nut (3).



b. **Assemble clevis (5) on strut (4).**

(1) Thread nut (2) on clevis (5) until nut (2) bottoms out.

(2) Install key washer (6) on clevis (5) against nut (2).

(3) Coat exposed threads of clevis (5) with primer. Use brush (item 34, App F) and primer coating (item 147, App F).

(4) Thread clevis (5) in wide end of strut (4).

(5) Do not tighten nut (2).

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6.144. TAIL ROTOR GEARBOX STRUT DISASSEMBLY/ASSEMBLY – continued

c. **Adjust rod end (7) and clevis (5).**

(1) Position clevis (5) on fitting (9) with bushing side of clevis (5) facing up.

(2) Position rod end (7) in collar clevis (10).

(3) Adjust rod end (7) and clevis (5) so that bolt holes aline with collar clevis (10) and fitting (9) and strut (4) is centered between rod end (7) and clevis (5).

d. **Install strut (4) on collar clevis (10).** Torque nut (11) to **300 INCH-POUNDS**.

(1) Install bushing (12) in collar clevis (10).

(2) Install bolt (13) through collar clevis (10) from opposite side of bushing.

(3) Install washer (14) and new nut (11).

(4) Hold bolt (13). Torque nut (11) to **300 INCH-POUNDS**. Use torque wrench.

e. **Install strut (4) on fitting (9).** Torque nut (15) to **300 INCH-POUNDS**.

(1) Install bushing (16) in clevis (5).

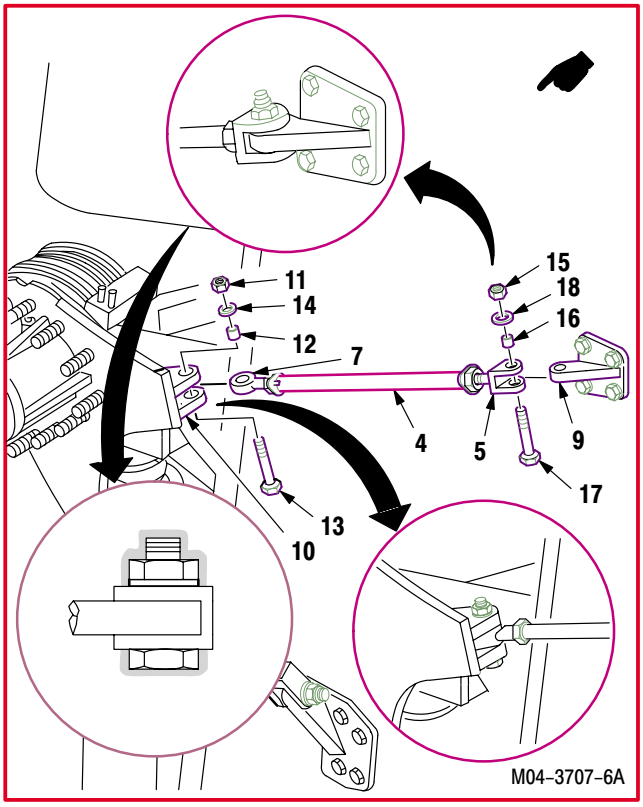
(2) Install bolt (17) through clevis (5) and fitting (9) from opposite side of bushing.

(3) Install washer (18) and new nut (15).

(4) Hold bolt (17). Torque nut (15) to **300 INCH-POUNDS**. Use torque wrench.



f. **Apply sealing compound to head of bolts (13) and (17), washers (14) and (18), and nuts (11) and (15).** Use sealing compound (item 158A, App F).



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6.144. TAIL ROTOR GEARBOX STRUT DISASSEMBLY/ASSEMBLY – continued

g. **Tighten nut (3) on rod end (7).** Torque nut (3) to **540 INCH-POUNDS**.

(1) Torque nut (3) to **540 INCH-POUNDS**. Use crowfoot and torque wrench.

(2) Lockwire nut (3) to key washer (8). Use wire (item 227, App F).

h. **Tighten nut (2) on clevis (5).** Torque nut (2) to **540 INCH-POUNDS**.

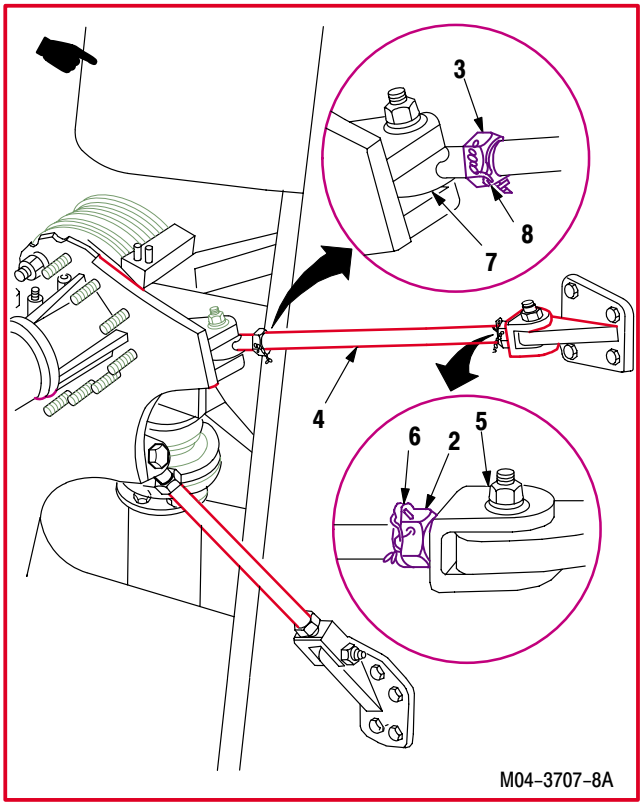
(1) Torque nut (2) to **540 INCH-POUNDS**. Use crowfoot and torque wrench.

(2) Lockwire nut (2) to key washer (6). Use wire (item 227, App F).

i. **Inspect (QA).**

j. **Apply sealing compound to key washers (6) and (8), nuts (2) and (3), and exposed threads of clevis (5) and rod end (7).** Use sealing compound (item 158A, App F).

k. **Install access fairings L540 and L546** (para 2.2)**.**



END OF TASK

6.145. TAIL ROTOR GEARBOX REMOVAL/INSTALLATION

6.145.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.145.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
5/8 x 3/8-inch drive box end torque wrench adapter (item 14, App H)
Airframe adapter kit (item 25, App H)
Light duty laboratory apron (item 27, App H)
Eye bolt (item 39, App H) (p/o item 194, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Rotor universal sling (item 292, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

Materials/Parts:

Sealing compound (item 177, App F)
Sealing compound (item 178, App F)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
11.266	Tail rotor connecting link removed
11.262	Tail rotor swashplate removed
11.261	Directional servocylinder support and support bracket removed
11.253	Tail rotor control bracket removed
11.269	Directional F.S. 520 push-pull rod removed
6.133	Tail rotor gearbox shouldered shaft removed
6.139	Tail rotor gearbox accelerometer removed
6.142	Tail rotor gearbox forward strut removed from gearbox
6.140	Tail rotor gearbox aft strut removed

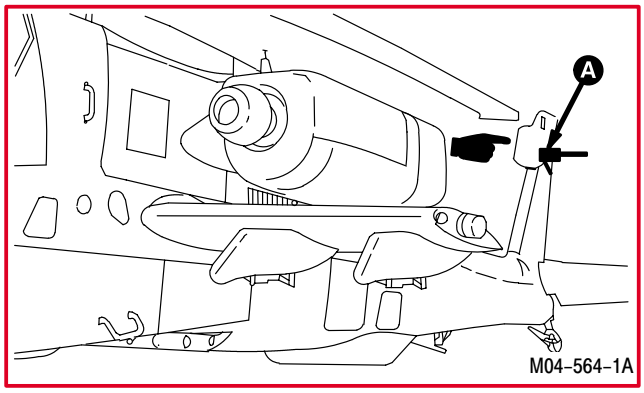
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6.145. TAIL ROTOR GEARBOX REMOVAL/INSTALLATION – continued

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

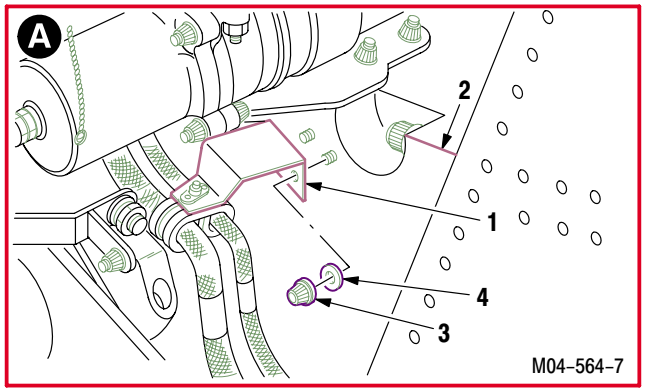


6.145.3. Removal

a. **Remove hydraulic hose support bracket (1) from gearbox (2).**

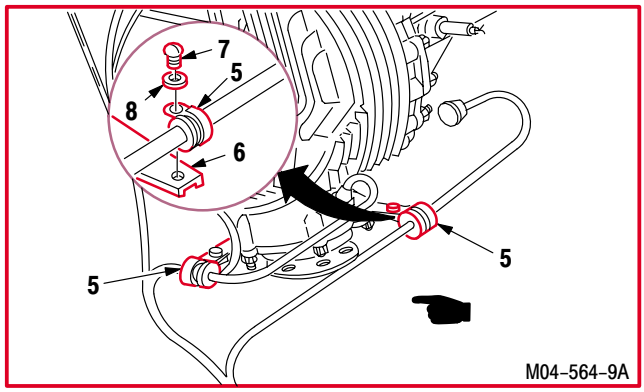
(1) Remove two nuts (3) and washers (4).

(2) Remove bracket (1).



b. **Remove two clamps (5) from clamp supports (6).**

(1) Remove two screws (7), washers (8), and clamps (5) from clamp supports (6).



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6.145. TAIL ROTOR GEARBOX REMOVAL/INSTALLATION – continued

c. **Remove gearbox (2) from stabilizer (9).**

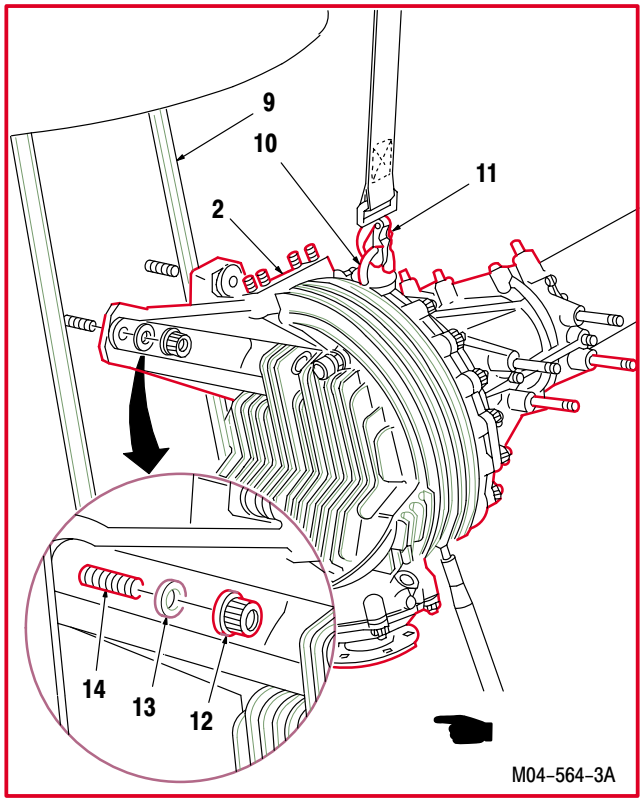
(1) Install eye bolt (10) in gearbox (2) until fully seated. Use eye bolt.

(2) Support gearbox (2) by taking up slack on sling (11) with components handler.

(3) Remove sealant from attaching hardware (para 1.47).

(4) Remove four nuts (12) and washers (13) from mounting studs (14).

(5) Place gearbox (2) on fixture assembly. Use adapter kit and sling.



6.145.4. Cleaning

a. **Clean mounting area of gearbox and hydraulic support hose bracket** (para 1.47)**.**

6.145.5. Inspection

a. **Check four mounting studs for thread damage.** None allowed.

b. **Check four mounting studs for dents, nicks, cracks, or scratches.**

(1) No dents, cracks, or nicks allowed.

(2) Axial scratches to **0.0002 INCH** in depth allowed. Use depth gage.

c. **Check four mounting studs for corrosion** (para 1.49)**.**

d. **Check gearbox mounting area bracket supports for cracks.** None allowed.

e. **Check gearbox mounting area bracket supports for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

6.145. TAIL ROTOR GEARBOX REMOVAL/INSTALLATION – continued

6.145.6. Installation



a. **Install gearbox (2) on stabilizer (9).** Torque four nuts (12) to **655 INCH-POUNDS**.

(1) Remove gearbox (2) from fixture. Use adapter kit and sling.

(2) Position gearbox (2) on studs (14).

(3) Lightly coat four washers (13) with sealing compound. Use sealing compound (item 177, App F).

(4) Install four washers (13) and nuts (12) on studs (14).

(5) Torque four nuts (12) to **655 INCH-POUNDS**. Use torque wrench and torque wrench adapter.

(6) Apply sealing compound to heads of four studs (14) washers (13), and nuts (12). Use sealing compound (item 178, App F).

(7) Fill gaps and coat exposed faying surfaces around gearbox (2). Use sealing compound (item 178, App F).

(8) Remove sling (11) and eye bolt (10).

b. **Inspect (QA).**

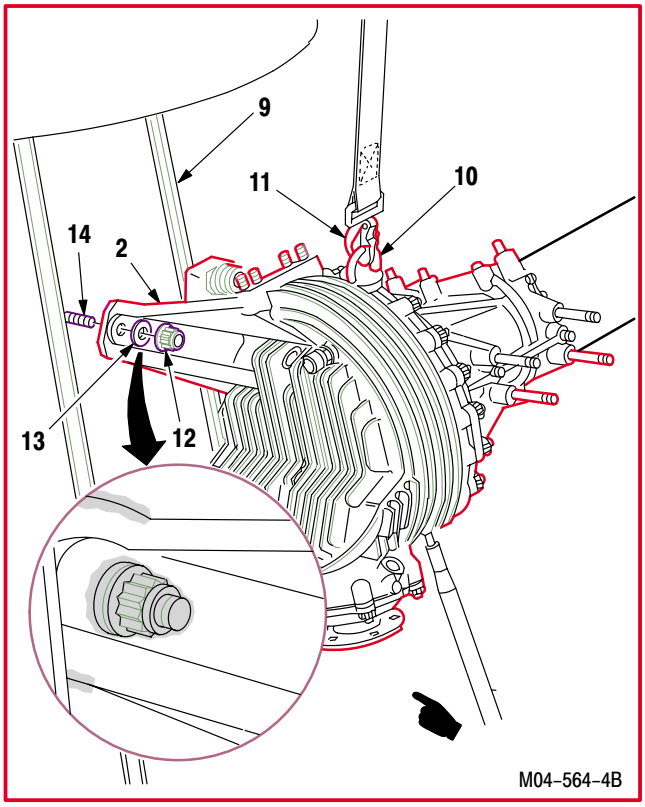
c. **Install two clamps (5) on clamp supports (6).**

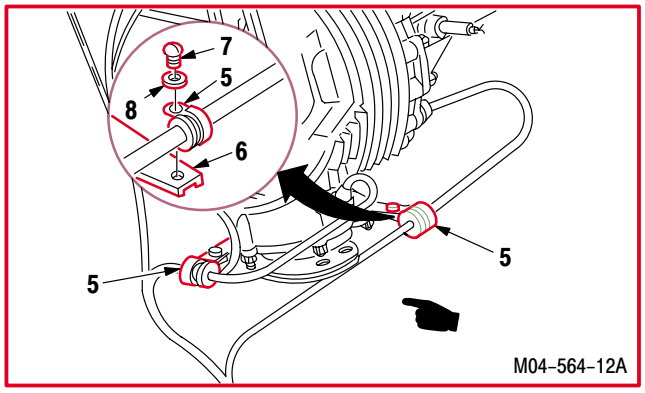
(1) Install two screws (7) through washers (8), clamps (5), and clamp supports (6).

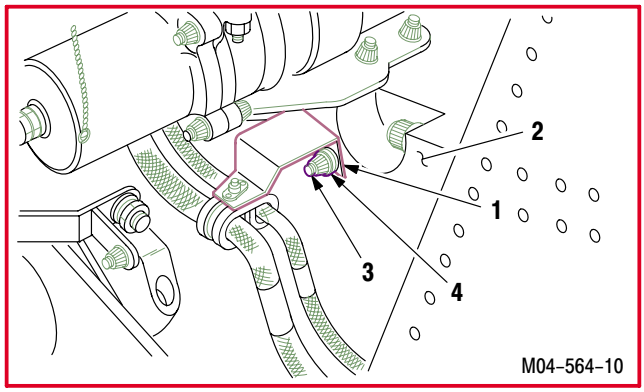
d. **Install bracket (1) on gearbox (2).**

(1) Install two washers (4) and nuts (3).

e. **Inspect (QA).**







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6.145. TAIL ROTOR GEARBOX REMOVAL/INSTALLATION – continued

f. **Install tail rotor gearbox aft strut on gearbox** (para 6.140)**.**

g. **Install tail rotor gearbox forward strut on gearbox** (para 6.142)**.**

h. **Install tail rotor gearbox accelerometer** (para 6.139)**.**

i. **Install four tail rotor gearbox temperature sensors** (para 6.138)**.**

j. **Install directional F.S. 520 push-pull rod** (para 11.269)**.**

k. **Install tail rotor control bracket** (para 11.253)**.**

l. **Install directional servocylinder support and support bracket** (para 11.261)**.**

m. **Install tail rotor swashplate** (para 11.262)**.**

n. **Install tail rotor connecting link** (para 11.266)**.**

o. **Perform drive system dynamic maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

6.146. TAIL ROTOR GEARBOX MACHINE PLUG REMOVAL/INSTALLATION

6.146.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.146.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing
Protective plug (M5501/1-F3)
Assembly fluid (item 30, App F)

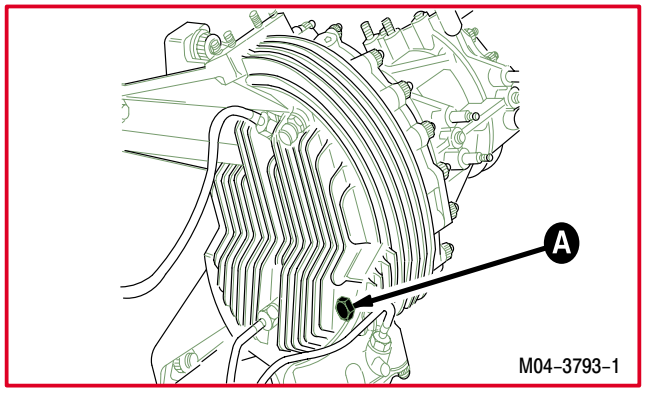
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L540 removed

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



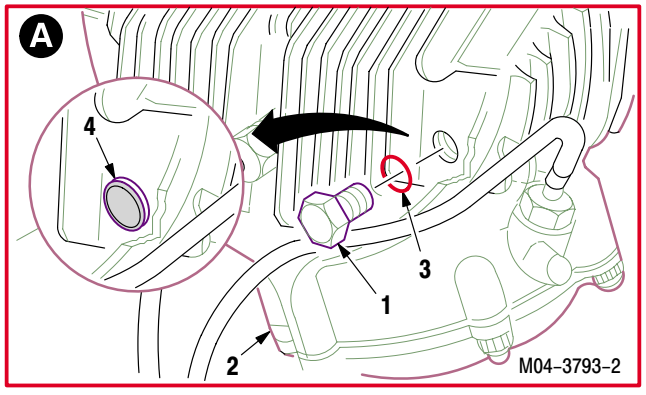
6.146.3. Removal

a. **Remove machine plug (1) from tail rotor gearbox (2).**

(1) Remove plug (1) from gearbox (2).

(2) Remove and discard packing (3).

b. **Install protective plug (4) in gearbox (2).**



6.146.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

GO TO NEXT PAGE

6.146. TAIL ROTOR GEARBOX MACHINE PLUG REMOVAL/INSTALLATION – continued

6.146.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to machine plug, machine plug recess, and adjacent surfaces on tail rotor gearbox housing.

a. **Check for cracks.** None allowed.

b. **Check for stripped, crossed, or flattened threads.** None allowed.

c. **Check for scratches, nicks, and gouges** (para 6.132)**.**

d. **Check for corrosion** (para 1.49)**.**

6.146.6. Installation

a. **Remove protective plug (4) from gearbox (2).**



b. **Install plug (1) in gearbox (2).** Torque plug (1) to **40 INCH-POUNDS**.

(1) Lubricate new packing (3). Use assembly fluid (item 30, App F).

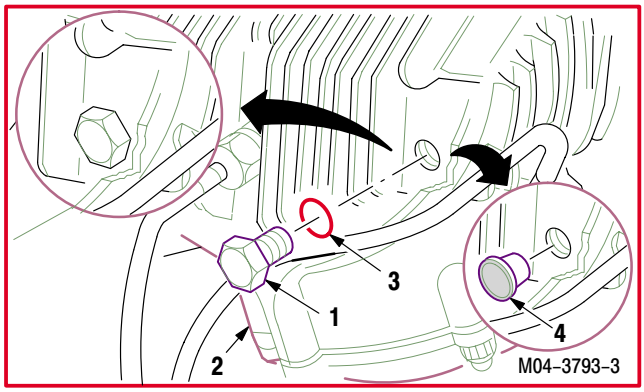
(2) Install packing (3) on plug (1).

(3) Install plug (1) in gearbox (2).

(4) Torque plug (1) to **40 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Install access fairing L540** (para 2.2)**.**



END OF TASK

6.147. TAIL ROTOR GEARBOX SHOULDERED SHAFT STUD REPLACEMENT (AVIM)

6.147.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

6.147.2. Initial Setup

Tools:

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Hand hacksaw blade (item 38, App H)
3/8-inch portable pneumatic drill (item 116, App H)
Lockring stud driver (item 121, App H)
Electric etcher (item 121A, App H)
Industrial faceshield (item 129, App H)
Hand hacksaw frame (item 139, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)
Wrench insert (item 177, App H)
Adjustable air filtering respirator (item 262, App H)
Lockring removal tool (item NO TAG, App H)

Materials/Parts:

Serrated lockring
Stud
Brush (item 34, App F)
Epoxy primer coating kit (item 78, App F)

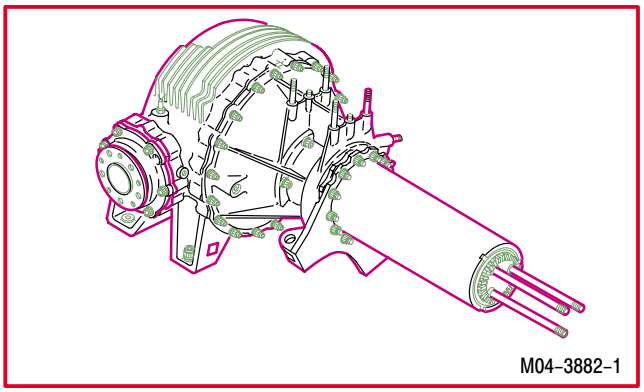
Personnel Required:

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

FLIGHT SAFETY PART

The tail rotor gearbox is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.



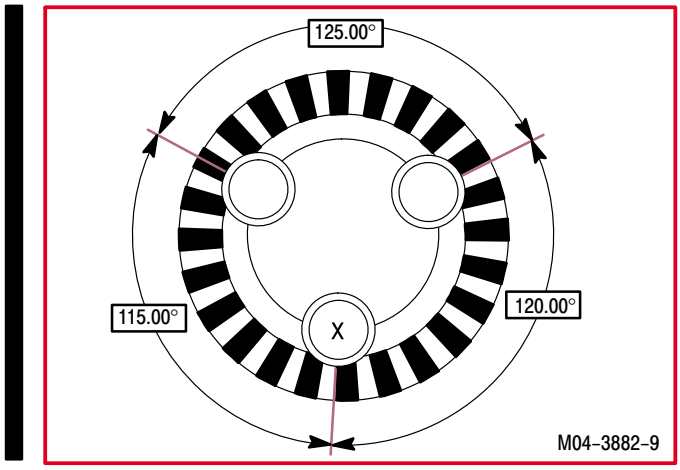
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6.147. TAIL ROTOR GEARBOX SHOULDERED SHAFT STUD REPLACEMENT (AVIM) – continued

6.147.3. Removal

CAUTION

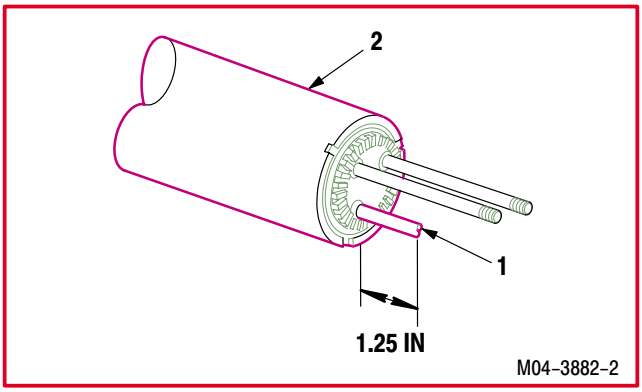
- Do not cut stud flush with housing. The lockring removal tool uses a protruding portion of defective stud as a centering guide. Damage to tail rotor gearbox shouldered shaft may result if lockring removal tool is used without a centering guide.
- Do not mill through lockring. Stop milling immediately after lockring removal tool has milled inner lockring serrations. Failure to do may damage tail rotor gearbox shouldered shaft.
- The shouldered shaft mounting studs are offset. Ensure "X" etched stud hole is properly identified.



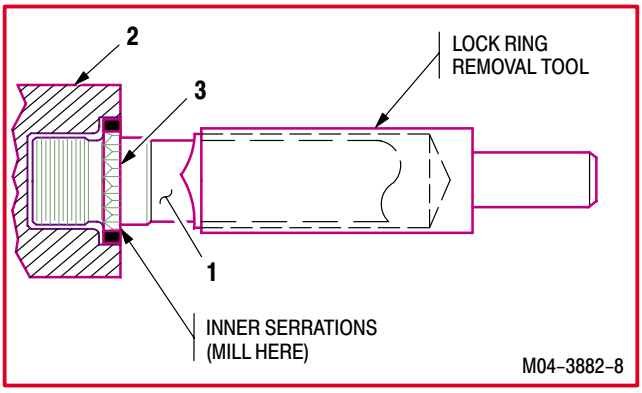
a. **Remove shouldered shaft stud (1) from tail rotor gearbox shouldered shaft (2).**

(1) If replacing stud etched with "X", note location on shouldered shaft for correct installation of new stud.

(2) Cut defective stud (1) so that it protrudes **1.25 INCH** from shaft (2). Use hacksaw frame and blade.



(3) Mill inner serrations of lockring (3). Use removal tool and pneumatic drill.



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6.147. TAIL ROTOR GEARBOX SHOULDERED SHAFT STUD REPLACEMENT (AVIM) – continued

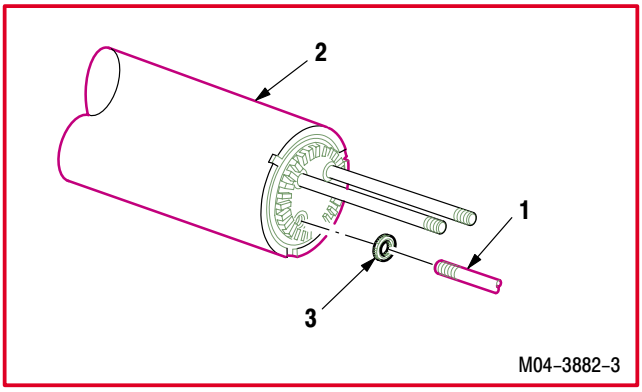
(4) Remove lockring (3) and stud (1) from shaft (2).

(5) Discard stud (1) and lockring (3).

NOTE

Perform following step only if lockring remains inside tail rotor gearbox shouldered shaft after stud is removed.

(6) Collapse lockring (3) inward with a punch and remove.



6.147.4. Cleaning

a. **Remove debris inside shouldered shaft threaded hole.**

6.147.5. Inspection

NOTE

Unless otherwise specified, the following inspection procedures apply to both stud threaded hole and adjacent surface areas on shouldered shaft.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for scratches, nicks, and gouges** (para 6.132)**.**

d. **Check for debris inside threaded hole.** None allowed.

e. **Check threaded hole for stripped, crossed, or flattened threads.** None allowed.

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6.147. TAIL ROTOR GEARBOX SHOULDERED SHAFT STUD REPLACEMENT (AVIM) – continued

6.147.6. Installation



CAUTION

- To prevent damage to shouldered shaft and stud, ensure that inner serrations of lockring are alined with stud serrations and that outer serrations of lockring are alined with shaft housing serrations.
- To prevent damage to tail rotor gearbox, ensure that new lockring is installed flush with or below surface of shouldered shaft.
- To prevent corrosion, ensure that primer is wet when installing new stud. Do not allow primer to air dry.

a. **Install new stud (1) and new lockring (3) in shaft (2).**

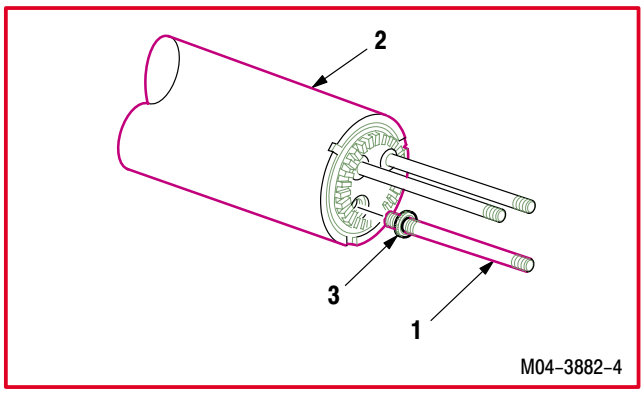
(1) If replacing stud (1) that was etched with “X”, ensure “X” is etched on replacement stud prior to installation. Use etcher

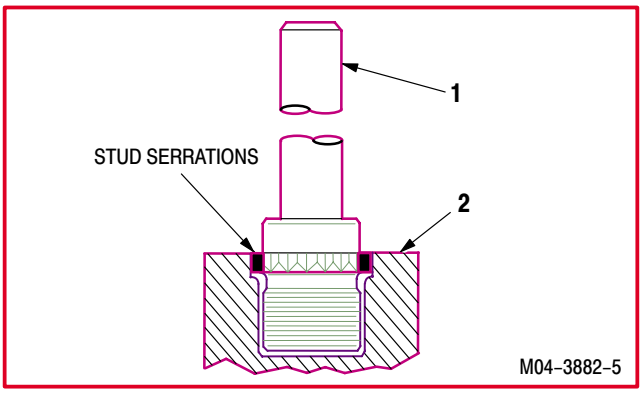
(2) Coat threaded hole in shaft (2) with primer. Use brush (item 34, App F) and epoxy primer coating kit (item 78, App F).

NOTE

Install stud while primer is wet.

(3) Install stud (1) until stud serrations are flush with or **0.005 INCH** below surface of shaft (2). Use insert.

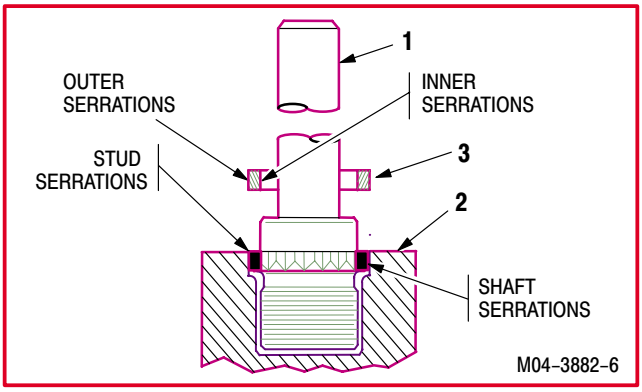




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6.147. TAIL ROTOR GEARBOX SHOULDERED SHAFT STUD REPLACEMENT (AVIM) – continued

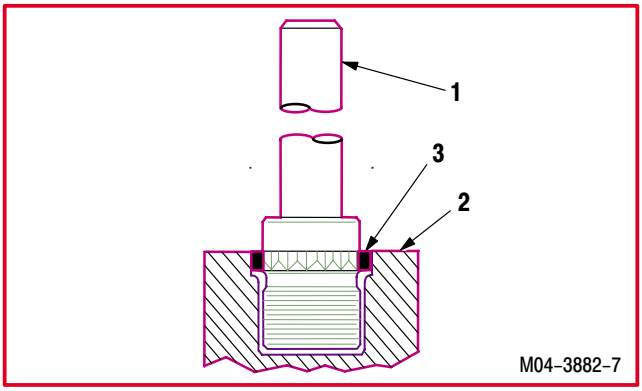
(4) Aline both inner and outer serrations of lockring (3) with stud (1) and shaft (2) serrations. Use stud driver.



(5) Drive lockring (3) flush or below surface of shaft (2). Use stud driver.

b. **Check installed stud (1) for side play.**

(1) Maximum total side play shall be **0.022 INCH** when measured **1.0 INCH** above base of stud. Use gap setting gage.



c. **Inspect (QA).**

END OF TASK

CHAPTER 7
HYDRAULIC AND PNEUMATIC SYSTEMS

CHAPTER OVERVIEW

Chapter 7 contains the maintenance instructions for the hydraulic and pneumatic systems. Hydraulic and pneumatic systems description, operation, and troubleshooting information is contained in TM 1-1520-238-T.

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SECTION I. PRIMARY HYDRAULIC SYSTEM MAINTENANCE

10.1. PRIMARY HYDRAULIC SYSTEM INSPECTION

10.1.1. Description

This task covers: Inspection.

10.1.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

TM 55-1500-323-24
TM 55-1500-344-23
TM 55-1500-345-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

Personnel Required:

67R Attack Helicopter Repairer

10.1.3. Inspection

a. **Check exterior surfaces of hydraulic components for nicks, gouges, scratches, cracks, and corrosion.**

(1) Minor scratches (without burrs or raised material) that do not penetrate through protective finish are acceptable without rework.

(2) Nicks, gouges, corrosion pits (TM 55-1500-344-23), or other minor surface damage that does not exceed a depth of **0.040 INCH** or 10 percent of material thickness, whichever is less after rework, is permissible.

(3) No burnishing is allowed within **0.75 INCH** of a bolt hole or corner.

(4) No cracks are allowed.

(5) No mating or working surface repair is allowed.

(6) Touch up removed protective finish as required (TM 55-1500-345-23).

(7) Replace components if damage exceeds repairable limits; or if damage occurs on an oil seal surface, radius, in a hole, or on a mating or working surface of a part.

b. **Repair of internal parts is limited to removal of minor burrs, nicks, or scratches.** No repair of working or mating surfaces is allowed.

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10.1. PRIMARY HYDRAULIC SYSTEM INSPECTION – continued

c. **Check for chafed, cracked, dented, nicked, and scored tubes.**

(1) Replace tube assembly if tubing is deformed or if nuts and unions are damaged (para 7.113).

(2) Replace tube assembly if tube is dented more than 20 percent of tube diameter (para 7.113).

(3) Replace tube assembly if nicked or chafed more than 10 percent of tube wall thickness (para 7.113).

(4) Install screws until mating rubber cushions just make contact when reinstalling rubber cushioned tubing clamp blocks.

d. **Check for chafed, deteriorated, cut, frayed, and cracked hoses.** Replace damaged or worn hoses.

e. **Check for loose, broken, and cracked clamps.** Replace damaged clamps.

f. **Check primary hydraulic manifold reservoir fluid level. Service as required** (para 1.34)**.**

g. **Check and replace contaminated strainers** (para 7.16)**.**

h. **Check for leaks.** No external leakage allowed except at servocylinder rod ends and at the cylinder mating flange of directional and main rotor servocylinders. Perform the following to determine if leakage is excessive:

(1) Initiate DASE before performing leak check.

(2) Slight wetting at seals or signs of fluid insufficient to form a drop is considered seepage or residual fluid and is not external leakage.

(3) Wipe servocylinder clean of any fluid at rod end, weep hole, or mating flange.

(4) Operate flight controls through a minimum of 25 full-stroke cycles with hydraulic systems pressurized to 3000 psi (with ground power or APU operating).

(5) Leakage at the rod end or at the weep hole shall not exceed 1 drop in 25 cycles; leakage at the mating flange shall not exceed 2 drops in 25 cycles.

NOTE

The double rod seal at the mating flange of the servocylinders is in a “floating” gland which moves slightly when the servocylinder is cycled. This results in a pumping action which produces a “breathing” of fluid at the mating flange. This “breathing” of fluid is not to be considered leakage.

(6) Primary hydraulic pump seal drain maximum seepage: 5 drops in 3 minutes.

(7) When external servocylinder leakage is observed on aircraft standing idle for any length of time, wipe servocylinder and clean up any fluid spillage. Perform hydraulic systems maintenance operational check (MOC) and inspect for dynamic seal leaks [reference steps h.(2) through h.(5)]. Static leakage is allowed and is not cause for servocylinder removal.

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10.1. PRIMARY HYDRAULIC SYSTEM INSPECTION – continued

i. **Check fittings for crossed, burred, and stripped threads when hoses and tubes are disconnected.** Cap or plug all disconnected fittings. Plug all open ports. Replace all packings and seals on fittings to be used again. To indicate exact location, identify ends before disconnecting lines and hoses.

j. **Check general mounting hardware for cracks, gouges, nicks, scratches, chafing, damage, rounded flats, and stripped or damaged threads.** Replace damaged hardware.

k. **Check electrical connectors for:**

(1) Foreign objects and corroded, bent, broken, loose, or missing pins (TM 55-1500-323-24).

(2) Dirt, contamination with fluids, or rough locking action (TM 55-1500-323-24).

l. **Check wire harness for chafing and loose installation** (TM 55-1500-323-24)**.**

m. **If a pump is known to have operated without fluid 5 minutes or more:**

(1) Replace pump (para 7.4).

(2) Remove and check pressure strainer element for metallic particles (para 7.16).

n. **Check primary hydraulic manifold air check valve for cleanliness of filter.** If filter is contaminated, install new filter (para 7.160).

END OF TASK

7.2. HYDRAULIC SYSTEM LEAK CHECK

7.2.1. Description

This task covers: Leak Check.

7.2.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Fluid service unit (item 137, App H)

References:

TM 55-1520-238-10

Personnel Required:

67R	Attack Helicopter Repairer One person to assist
152F	Pilot (if method a(3) is used)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

7.2.3. Leak Check

NOTE

This task verifies hydraulic system leaks or system integrity.

a. **Apply pressure to hydraulic system.** The hydraulic system may be pressurized by:

(1) External hydraulic power:

(a) Primary hydraulic system (para 1.72).

(b) Utility hydraulic system (para 1.73).

(2) APU:

(a) Using battery power (para 1.74).

(b) Using external power (para 1.75).

(3) Ground run of helicopter (TM 55-1520-238-10).

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7.2. HYDRAULIC SYSTEM LEAK CHECK – continued

NOTE

The primary and utility hydraulic pumps cannot be leak checked by external hydraulic power.

b. **Check for leaks.**

(1) If hydraulic fluid is leaking from drilled passageway/port on inboard side of primary hydraulic manifold about one inch below dirty filter indicators, replace indicator packings (para 7.17).

(2) If hydraulic fluid is leaking from drilled passageway/port forward of utility hydraulic manifold about one inch below dirty filter indicators, replace indicator packings (para 7.71).

CAUTION

Hydraulic system operates at 3000 psi. Do not perform any maintenance on system until hydraulic pressure is removed from helicopter.

c. **Remove pressure from hydraulic system.**

END OF TASK

7.3. VENT PRIMARY HYDRAULIC SYSTEM

7.3.1. Description

This task covers: Vent Primary Hydraulic System.

7.3.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door L190 opened

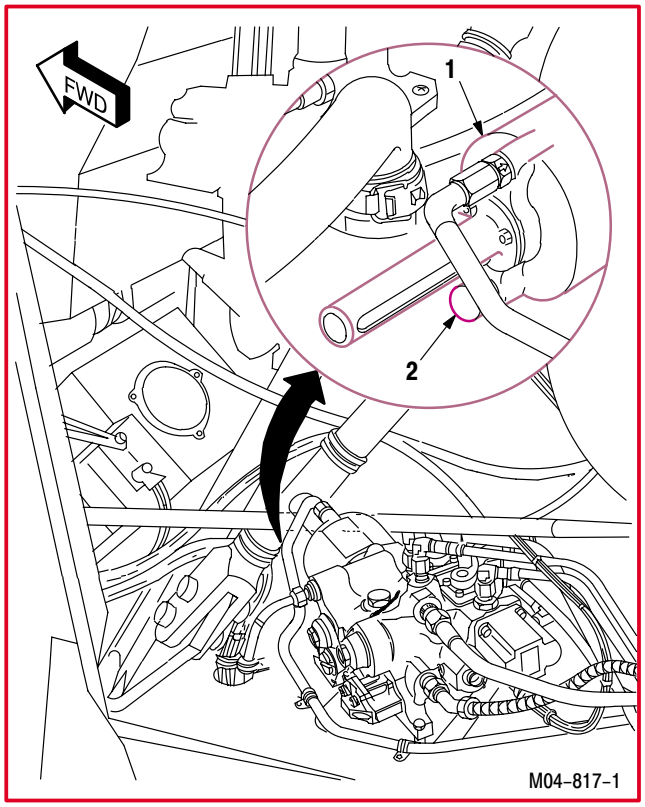
7.3.3. Vent Primary Hydraulic System

a. **Vent primary manifold (1).**

(1) Push and hold relief valve button (2) until sound of escaping air stops.

(2) Release button (2).

b. **Secure access door L190** (para 2.2)**.**



END OF TASK

7.4. PRIMARY HYDRAULIC PUMP REMOVAL/INSTALLATION

7.4.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.4.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
5/16 x 3/8-inch drive box end torque wrench adapter (item 12, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23
TM 1-1520-238-T

Materials/Parts:

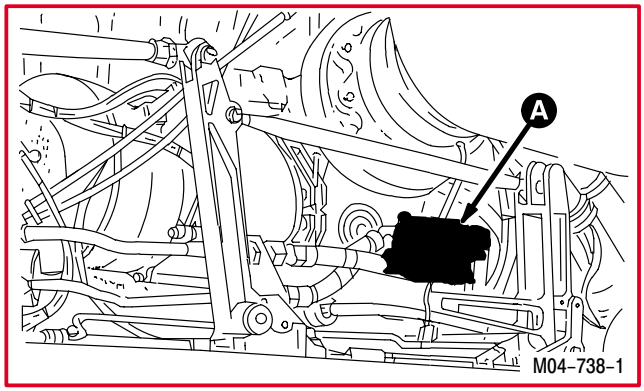
Gasket
Packing (5)
Grease (item 88, App F)
Hydraulic fluid (item 92, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented

CAUTION

To prevent moisture and foreign matter from damaging the hydraulic system, be sure to install protective covers on all lines, ducts, ports, tubes, and connectors immediately after removing.

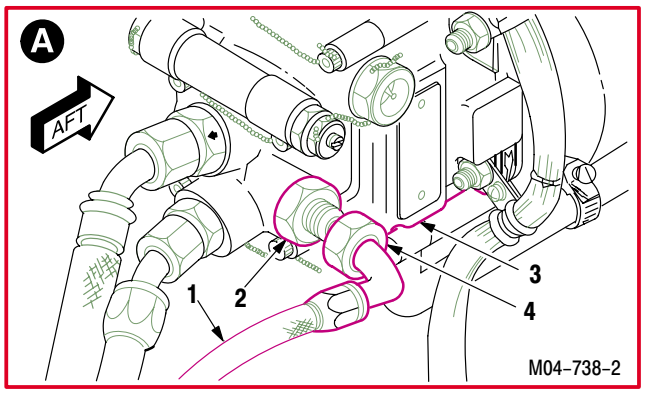


7.4.3. Removal

a. **Remove hose (1) from nipple (2).**

(1) Place rags under primary hydraulic pump (3) to catch hydraulic fluid spills.

(2) Hold nipple (2). Remove nut (4).



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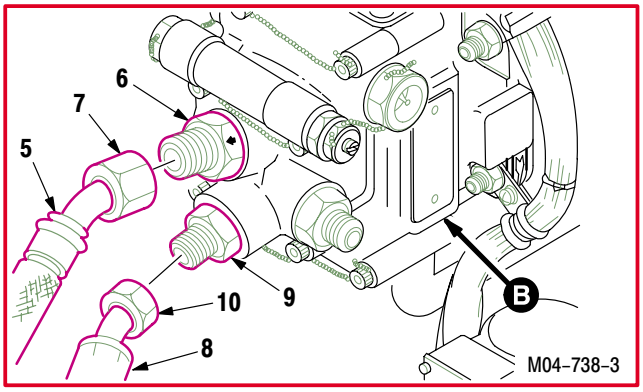
7.4. PRIMARY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

b. **Remove hose (5) from check valve (6).**

(1) Hold check valve (6). Remove nut (7).

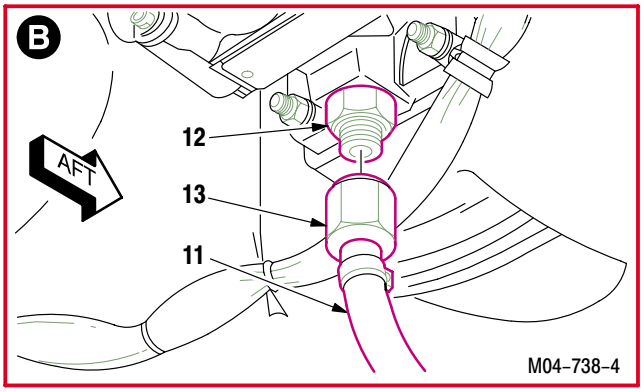
c. **Remove hose (8) from reducer (9).**

(1) Hold reducer (9). Remove nut (10). Use open end wrench.



d. **Remove hose (11) from nipple (12).**

(1) Hold nipple (12). Remove nut (13).



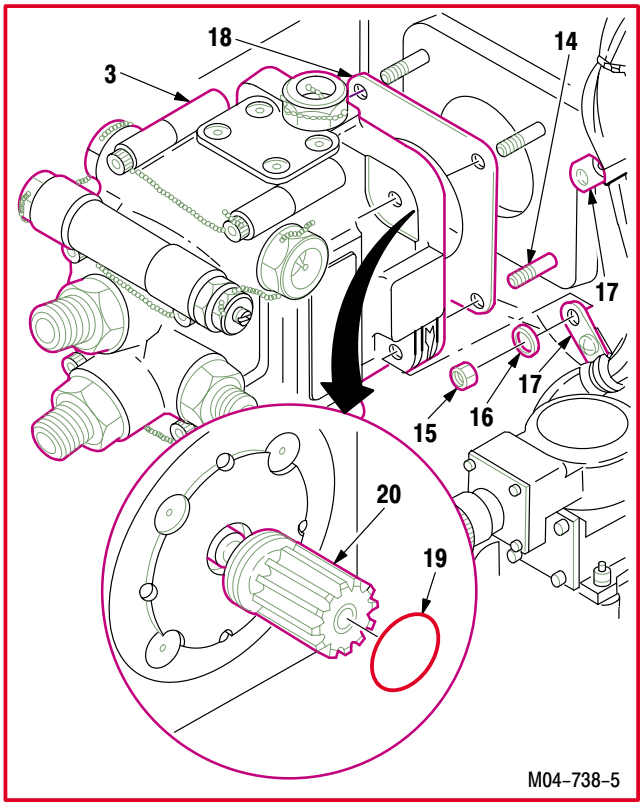
e. **Remove pump (3) from mounting studs (14).**

(1) Remove four nuts (15), washers (16), and two cable clamps (17) from studs (14). Use torque wrench adapter.

(2) Pull pump (3) straight off studs (14).

(3) Remove and discard gasket (18).

f. **Remove and discard packing (19) from pump shaft (20).**



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7.4. PRIMARY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

NOTE

Perform steps g. thru i. off helicopter if removing pump for replacement. Go to paragraph 7.4.4 if removing pump for re-installation.

g. **Remove nipples (2) and (12) from pump (3).**

(1) Remove nipples (2) and (12).

(2) Remove and discard packings (21) and (22).

h. **Remove check valve (6) from pump (3).**

(1) Remove check valve (6).

(2) Remove and discard packing (23).

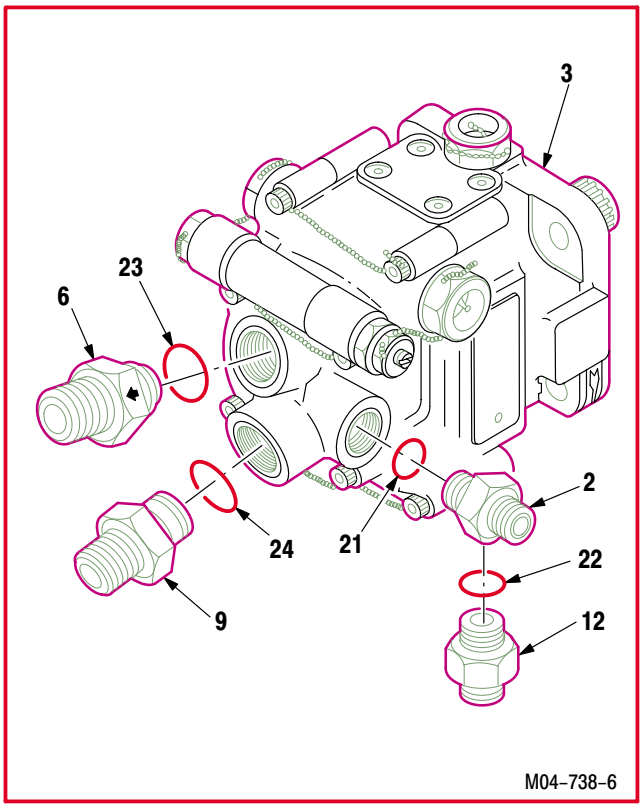
i. **Remove reducer (9) from pump (3).**

(1) Remove reducer (9). Use open end wrench.

(2) Remove and discard packing (24).

7.4.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**



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7.4. PRIMARY HYDRAULIC PUMP REMOVAL/INSTALLATION

7.4.5. Inspection

a. **Check tubes, hoses, and studs for nicks, cuts, chafing, and stripped threads** (para 7.56)**.**

b. **Check reducer, check valve, and nipples for stripped threads and rounded flats** (TM 1-1500-204-23)**.**

c. **Check pump for stripped threads and worn splines on pump shaft.** None allowed.

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

e. **Check pump for missing or damaged hardware.** None allowed.

f. **Check pump for cracks and dents.** None allowed.

g. **Check pump for chipped or broken housing.** None allowed.

h. **Check pump for evidence of overheating.** None allowed.

i. **Check pump for broken or missing lockwire.** None allowed.

j. **Check pump for damaged threaded inserts.** None allowed.

k. **Check pump for leakage between case halves.** None allowed.

l. **Check pump packing grooves for nicks, gouges, scratches, and burrs.** None allowed.

m. **Check pump for chipped or broken gear teeth.** None allowed.

n. **Check pump mounting flange holes.** Maximum diameter allowed is **0.289 INCH**.

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7.4. PRIMARY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

7.4.6. Installation

NOTE

Steps a. thru c. will be performed off helicopter when installing new pump. Go to step d. if original pump is to be reinstalled.



a. **Install reducer (9) on pump (3).**

(1) Lubricate new packing (24) and threads of reducer (9). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (24) on small side of reducer (9).

(3) Install reducer (9). Use open end wrench.

b. **Install check valve (6) on pump (3).**

(1) Lubricate new packing (23) and threads of check valve (6). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (23) on inlet side (see flow arrow) of check valve (6).

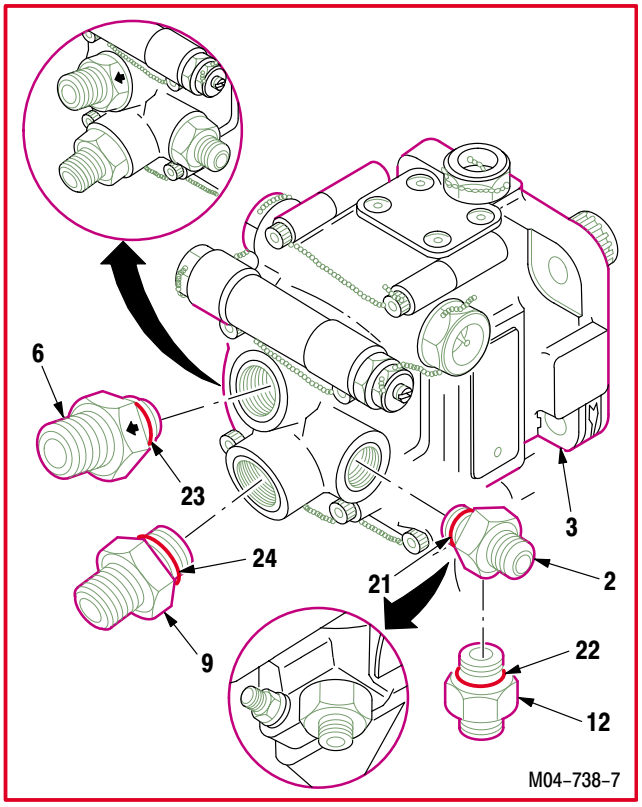
(3) Install check valve (6) with flow arrow pointing away from pump (3).

c. **Install nipples (2) and (12) on pump (3).**

(1) Lubricate new packings (21) and (22), and threads of nipples (2) and (12). Use clean hydraulic fluid (item 92, App F).

(2) Install packings (21) and (22) on nipples (2) and (12).

(3) Install nipples (2) and (12).



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7.4. PRIMARY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

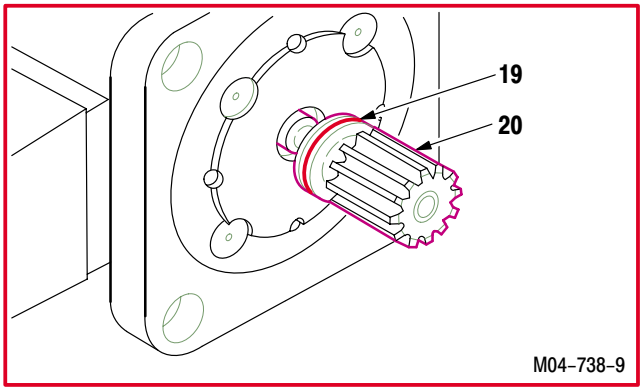


d. **Install new packing (19) on hydraulic pump shaft (20).**

(1) Lubricate packing (19). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (19) on pump shaft (20).

(3) Lubricate pump shaft splines (20). Use grease (item 88, App F).



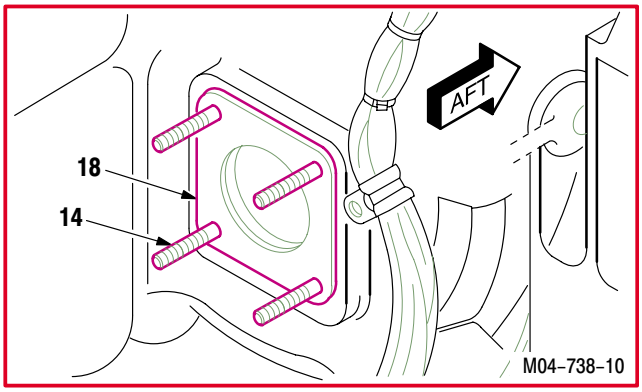
e. **Install pump (3) and new gasket (18) on studs (14).**

(1) Install gasket (18) on studs (14).

(2) Aline pump (3) on four studs (14) with nipple (2) facing outboard.

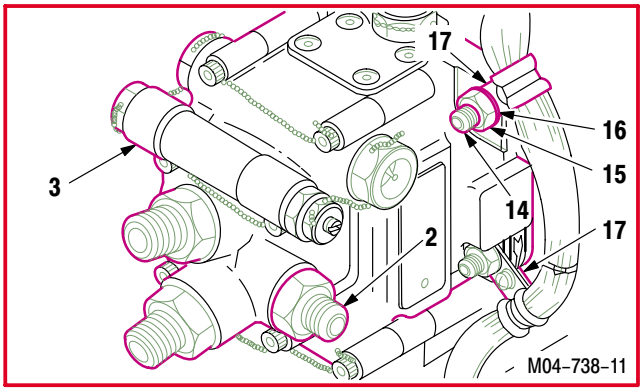
(3) Install two cable clamps (17) on two outboard studs (14).

(4) Install four washers (16) and nuts (15) on studs (14). Use torque wrench adapter.



CAUTION

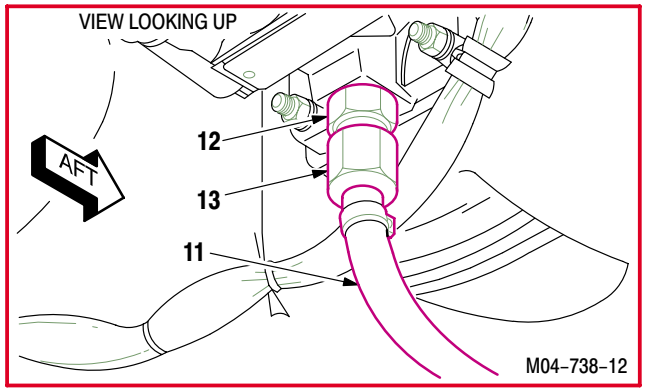
To prevent stress related damage to hydraulic hoses, ensure that the hoses are not twisted upon installation.



f. **Install hose (11) on nipple (12).**

(1) Lubricate threads on nipple (12). Use clean hydraulic fluid (item 92, App F).

(2) Hold nipple (12). Install nut (13).



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7.4. PRIMARY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

g. **Install hose (8) on reducer (9).**

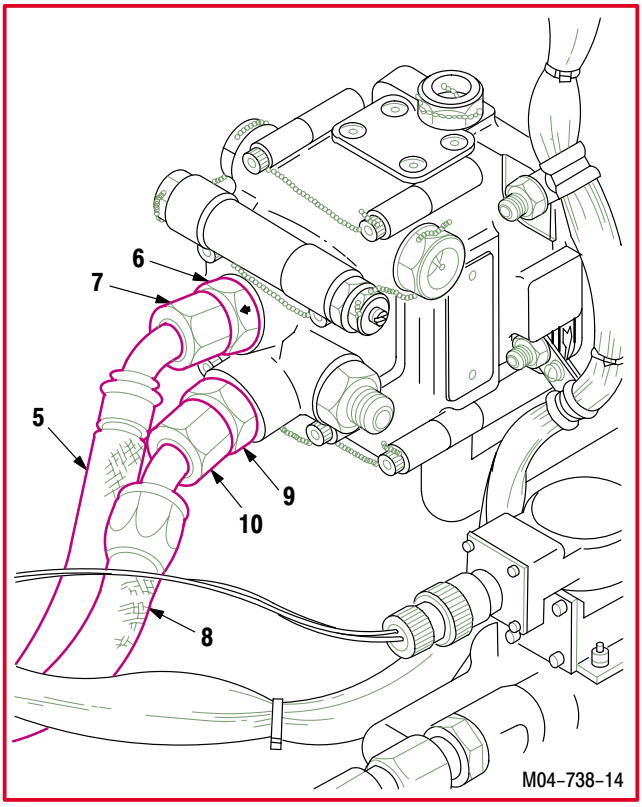
(1) Lubricate threads on reducer (9). Use clean hydraulic fluid (item 92, App F).

(2) Hold reducer (9). Install nut (10). Use open end wrench.

h. **Install hose (5) on check valve (6).**

(1) Lubricate threads on check valve (6). Use clean hydraulic fluid (item 92, App F).

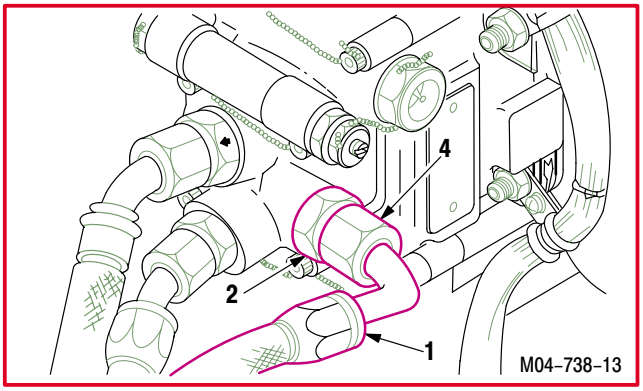
(2) Hold check valve (6). Install nut (7).



i. **Install hose (1) on nipple (2).**

(1) Lubricate threads on nipple (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold nipple (2). Install nut (4).



j. **Inspect (QA).**

k. **Bleed primary hydraulic system** (para 1.35)**.**

l. **Service primary hydraulic system** (para 1.34)**.**

m. **Perform primary hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

n. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.5. PRIMARY HYDRAULIC PUMP PRESSURE HOSE REPLACEMENT

7.5.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.5.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

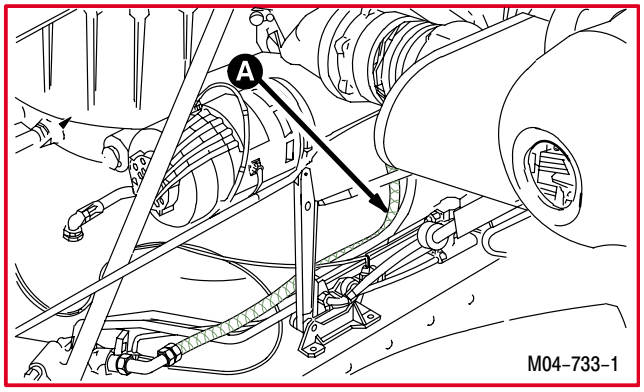
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented



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7.5. PRIMARY HYDRAULIC PUMP PRESSURE HOSE REPLACEMENT – continued

7.5.3. Removal

a. **Remove primary hydraulic pump pressure hose (1) from bracket (2).**

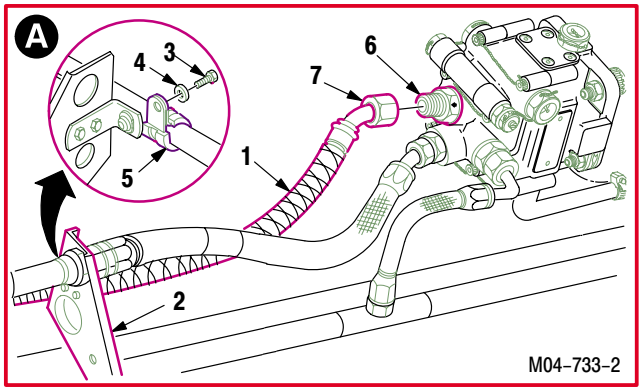
(1) Remove screw (3) and washer (4) from bracket (2) and clamp (5).

(2) Remove and retain clamp (5) from hose (1).

b. **Remove hose (1) from check valve (6).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

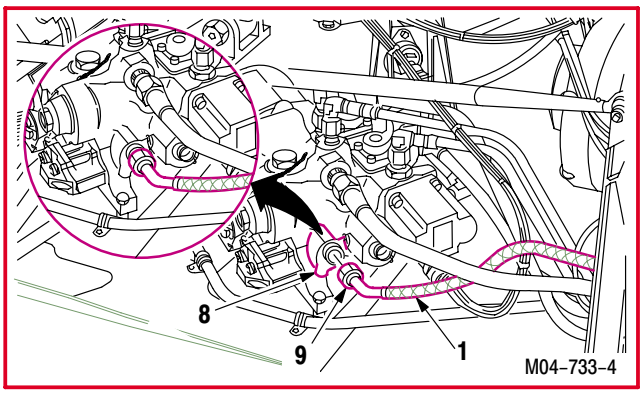
(2) Hold check valve (6). Remove nut (7).



c. **Remove hose (1) from manifold (8).**

(1) Remove nut (9).

(2) Remove and discard hose (1).



7.5.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.5.5. Inspection

a. **Check tubes, hoses, bracket, and check valve for nicks, scratches, chafing, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.5.6. Installation



a. **Install new hose (1) on manifold (8).**

(1) Lubricate threads on manifold (8). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (9).

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7.5. PRIMARY HYDRAULIC PUMP PRESSURE HOSE REPLACEMENT – continued

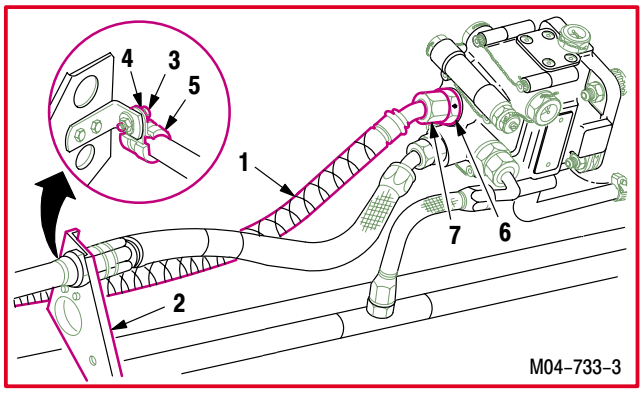
b. **Install hose (1) on check valve (6).**

(1) Lubricate valve threads (6). Use clean hydraulic fluid (item 92, App F).

(2) Hold check valve (6). Install nut (7).

CAUTION

Ensure that metal ID band is not under clamp when installing hose. Failure to do so could cause chafing condition on hose.



c. **Install hose (1) on bracket (2).**

(1) Install clamp (5) on hose (1).

(2) Aline clamp (5) with bracket (2).

(3) Install screw (3) and washer (4) through clamp (5) on bracket (2).

d. **Inspect (QA).**

e. **Bleed primary hydraulic system** (para 1.35)**.**

f. **Service primary hydraulic system** (para 1.34)**.**

g. **Perform hydraulic system leak check** (para 7.2)**.**

h. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.6. PRIMARY HYDRAULIC PUMP RETURN HOSE REPLACEMENT

7.6.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.6.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

Materials/Parts:

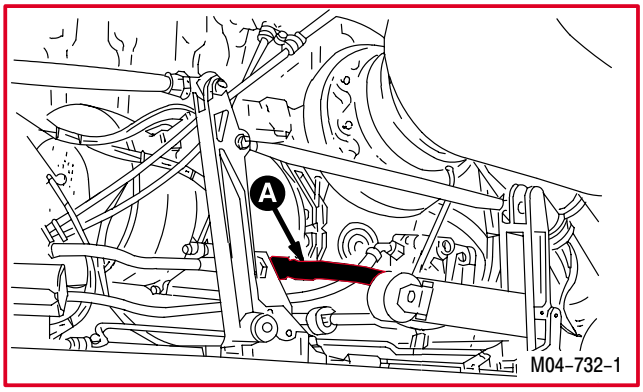
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented



7.6.3. Removal

a. **Remove primary hydraulic pump return hose (1) from union (2).**

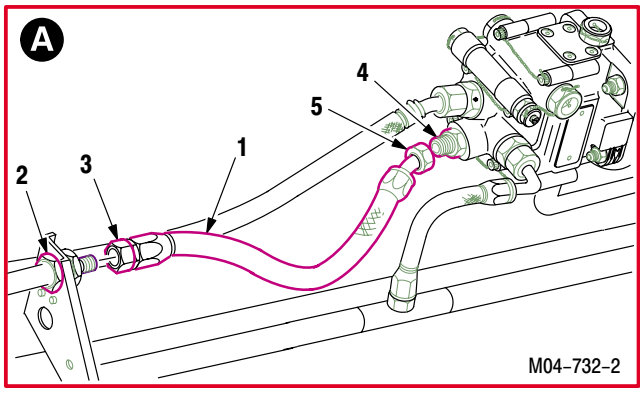
(1) Place rags under hose (1) to catch hydraulic fluid spills.

(2) Hold union (2). Remove nut (3). Use open end wrench.

b. **Remove hose (1) from reducer (4).**

(1) Hold reducer (4). Remove nut (5). Use open end wrench.

(2) Remove and discard hose (1).



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7.6. PRIMARY HYDRAULIC PUMP RETURN HOSE REPLACEMENT – continued

7.6.4. Cleaning

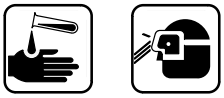
a. **Wipe attaching parts with a clean rag.**

7.6.5. Inspection

a. **Check union and reducer for nicks, scratches, chafing, and stripped or damaged threads** (para 10.1)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.6.6. Installation



a. **Install new hose (1) on reducer (4).**

(1) Lubricate reducer threads (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold reducer (4). Install nut (5). Use open end wrench.

b. **Install hose (1) on union (2).**

(1) Lubricate union (2) threads. Use clean hydraulic fluid (item 92, App F).

(2) Hold union (2). Install nut (3). Use open end wrench.

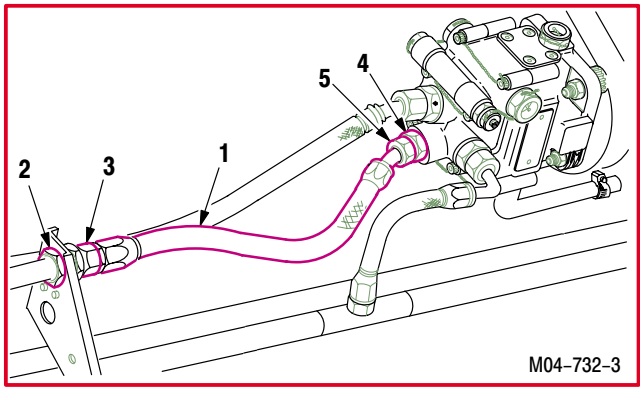
c. **Inspect (QA).**

d. **Bleed primary hydraulic system** (para 1.35)**.**

e. **Service primary hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Install access panel L200** (para 2.2)**.**



END OF TASK

7.7. PRIMARY HYDRAULIC PUMP CASE DRAIN HOSE REPLACEMENT

7.7.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.7.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

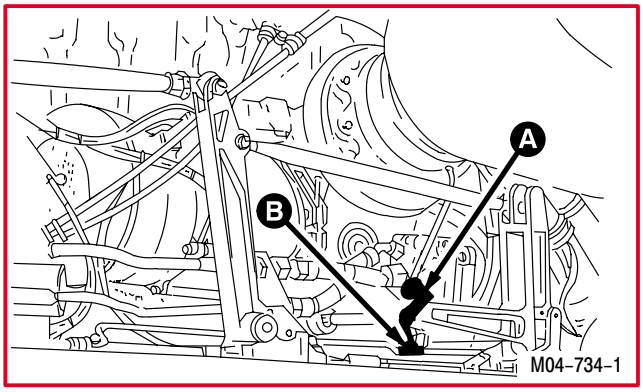
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented

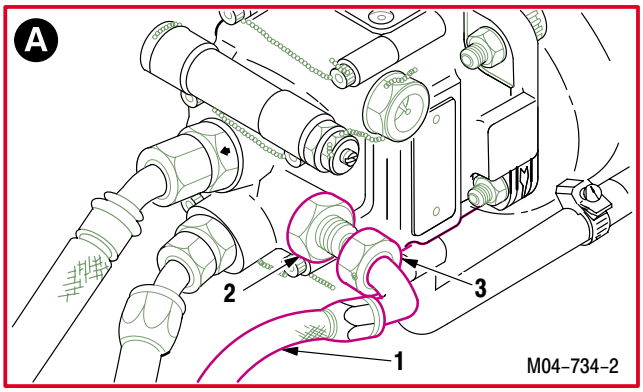


7.7.3. Removal

a. **Remove primary hydraulic pump case drain hose (1) from nipple (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

(2) Hold nipple (2). Remove nut (3).



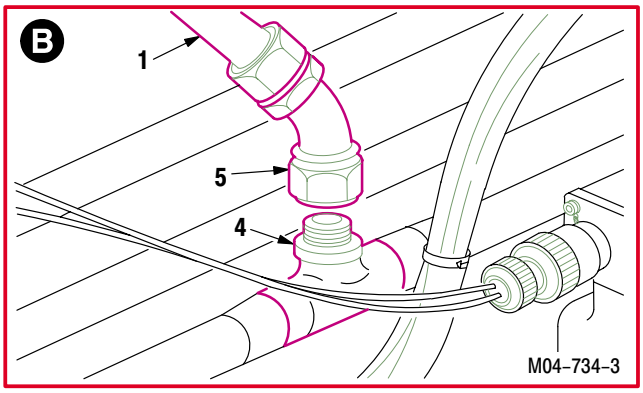
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7.7. PRIMARY HYDRAULIC PUMP CASE DRAIN HOSE REPLACEMENT – continued

b. **Remove hose (1) from tee (4).**

(1) Remove nut (5).

(2) Remove and discard hose (1).



7.7.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.7.5. Inspection

a. **Check nipple and tee for nicks, scratches, chafing, and stripped or damaged threads** (para 10.1)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

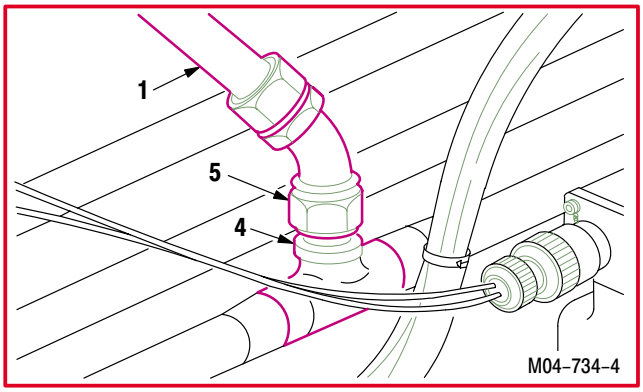
7.7.6. Installation



a. **Install hose (1) on tee (4).**

(1) Lubricate threads of tee (4). Use clean hydraulic fluid (item 92, App F).

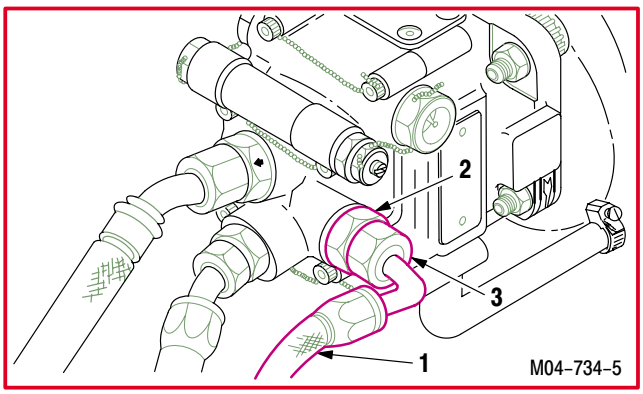
(2) Install nut (5) on tee (4).



b. **Install hose (1) on nipple (2).**

(1) Lubricate threads of nipple (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold nipple (2). Install nut (3).



GO TO NEXT PAGE

7.7. PRIMARY HYDRAULIC PUMP CASE DRAIN HOSE REPLACEMENT – continued

c. **Inspect (QA).**

d. **Bleed primary hydraulic system** (para 1.35)**.**

e. **Service primary hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.8. PRIMARY HYDRAULIC PUMP SEAL DRAIN HOSE REPLACEMENT

7.8.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.8.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

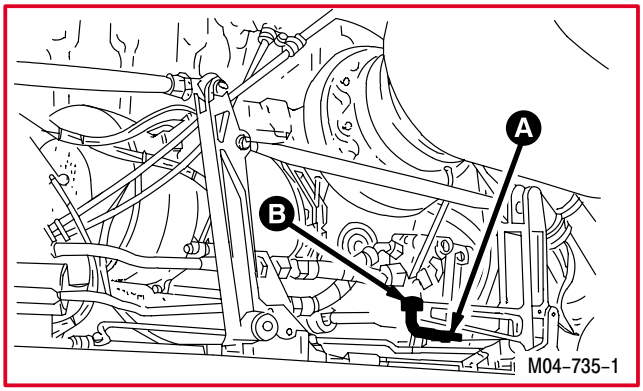
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed

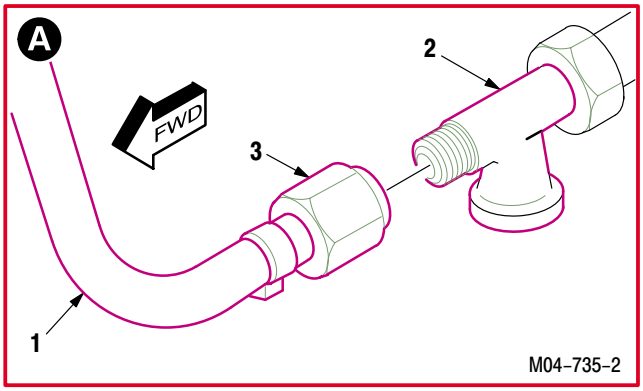


7.8.3. Removal

a. **Remove primary hydraulic pump seal drain hose (1) from tee (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

(2) Hold tee (2). Remove nut (3).



GO TO NEXT PAGE

7.8. PRIMARY HYDRAULIC PUMP SEAL DRAIN HOSE REPLACEMENT – continued

b. **Remove hose (1) from nipple (4).**

(1) Hold nipple (4). Remove nut (5).

c. **Remove hose (1) from nut (3).**

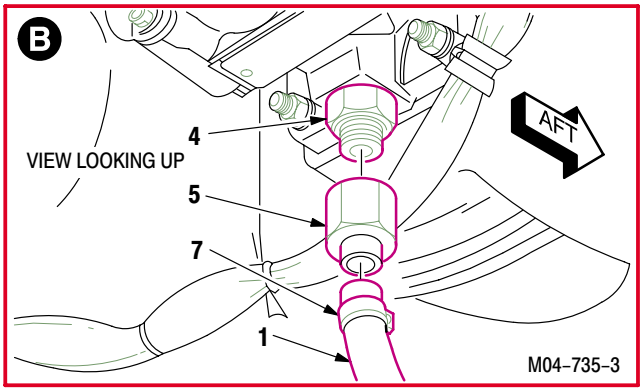
(1) Loosen and slide clamp (6) away from nut (3).

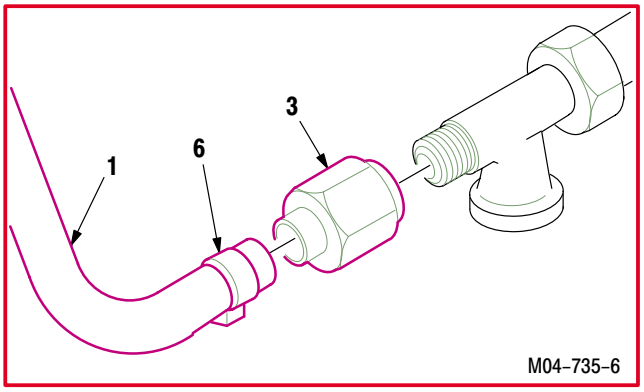
(2) Remove hose (1).

d. **Remove hose (1) from nut (5).**

(1) Loosen and slide clamp (7) away from nut (5).

(2) Remove and discard hose (1).





7.8.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.8.5. Inspection

a. **Check tee and union for nicks, scratches, chafing, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.8. PRIMARY HYDRAULIC PUMP SEAL DRAIN HOSE REPLACEMENT – continued

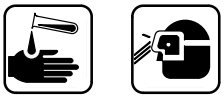
7.8.6. Installation

a. **Install new hose (1) on nut (5).**

(1) Install clamp (7).

b. **Install hose (1) on nut (3).**

(1) Install clamp (6).



c. **Install hose (1) on nipple (4).**

(1) Lubricate threads on nipple (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold nipple (4). Install nut (5).

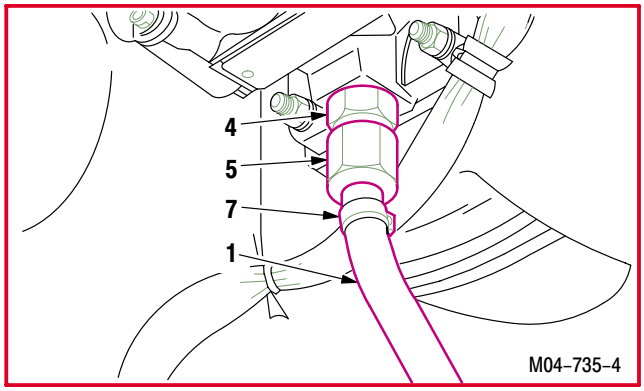
d. **Install hose (1) on tee (2).**

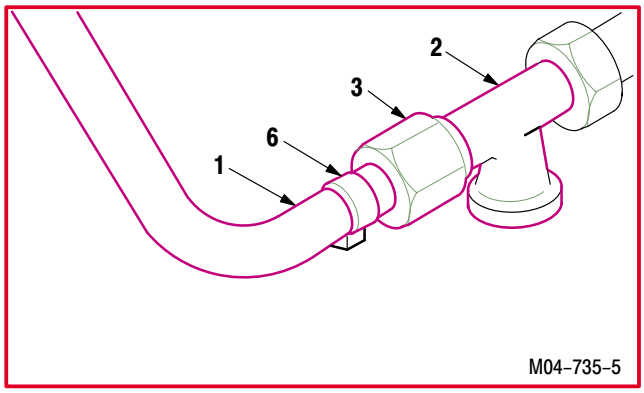
(1) Lubricate threads on tee (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold tee (2). Install nut (3).

e. **Inspect (QA).**

f. **Install access panel L200** (para 2.2)**.**





END OF TASK

7.9. PRIMARY HYDRAULIC PUMP PRESSURE CHECK VALVE REMOVAL/INSTALLATION

7.9.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.9.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

References:

TM 1-1520-238-T

Materials/Parts:

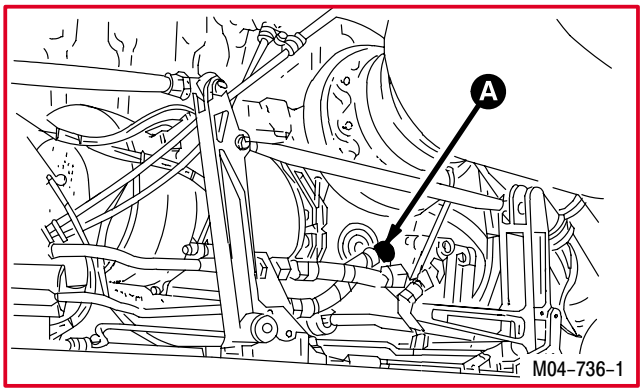
Packing
Hydraulic fluid (item 92, App F)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented

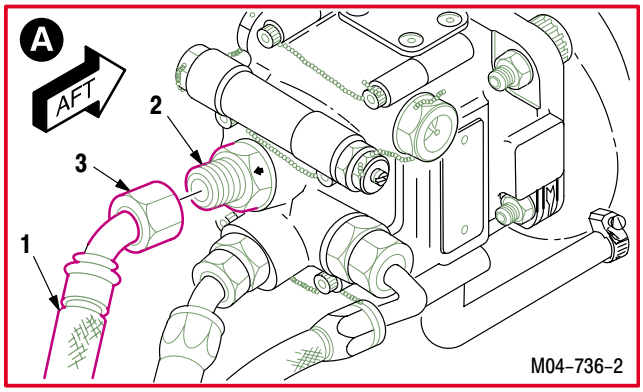


7.9.3. Removal

a. **Remove pressure hose (1) from check valve (2).**

(1) Place rags under check valve (2) to catch hydraulic fluid spills.

(2) Hold check valve (2). Remove nut (3).



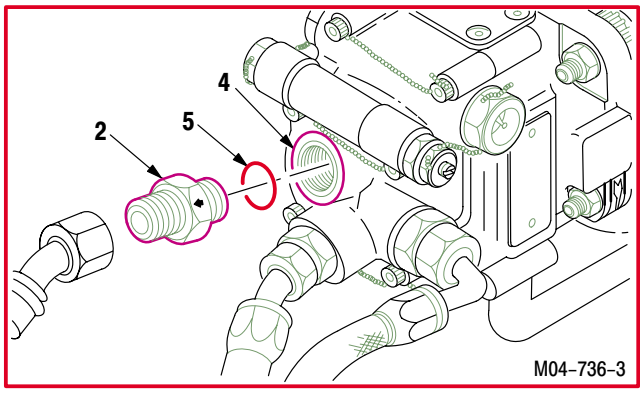
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7.9. PRIMARY HYDRAULIC PUMP PRESSURE CHECK VALVE REMOVAL/INSTALLATION – continued

b. **Remove check valve (2) from outlet port (4).**

(1) Remove check valve (2).

(2) Remove and discard packing (5).



7.9.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.9.5. Inspection

a. **Check pressure hose, valve, and outlet port for nicks, scratches, chafing, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.9.6. Installation



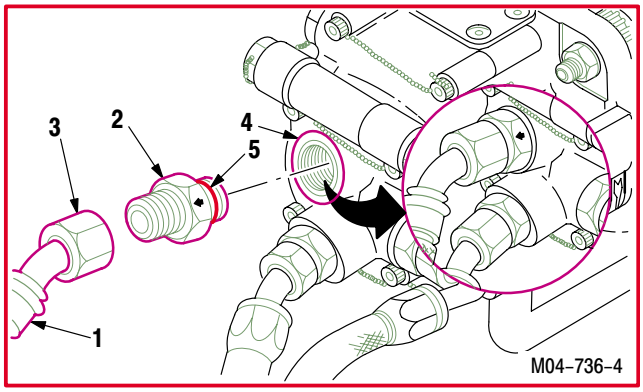
a. **Install check valve (2) on outlet port (4).**

(1) Lubricate new packing (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (5) on check valve (2).

(3) Lubricate threads of check valve (2). Use clean hydraulic fluid (item 92, App F).

(4) Install check valve (2) with flow arrow facing away from pump.



b. **Install hose (1) on check valve (2).**

(1) Lubricate threads of check valve (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold check valve (2). Install nut (3).

GO TO NEXT PAGE

7.9. PRIMARY HYDRAULIC PUMP PRESSURE CHECK VALVE REMOVAL/INSTALLATION – continued

c. **Inspect (QA).**

d. **Bleed primary hydraulic system** (para 1.35)**.**

e. **Service primary hydraulic system** (para 1.34)**.**

f. **Perform primary hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.10. PRIMARY HYDRAULIC PUMP PRESSURE AND RETURN TUBE SUPPORT BRACKET REMOVAL/INSTALLATION

7.10.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.10.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

Materials/Parts:

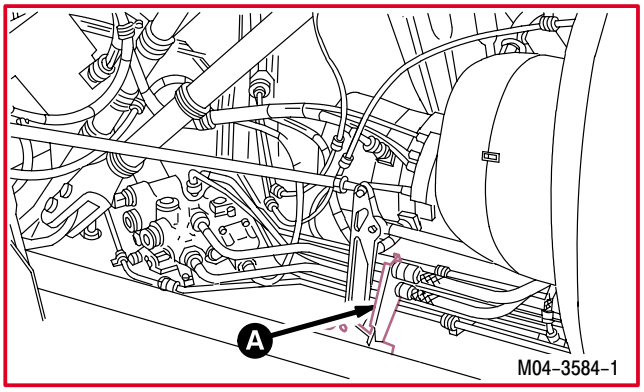
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented



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7.10. PRIMARY HYDRAULIC PUMP PRESSURE AND RETURN TUBE SUPPORT BRACKET REMOVAL/INSTALLATION – continued

7.10.3. Removal

a. **Remove return hose (1) from union (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

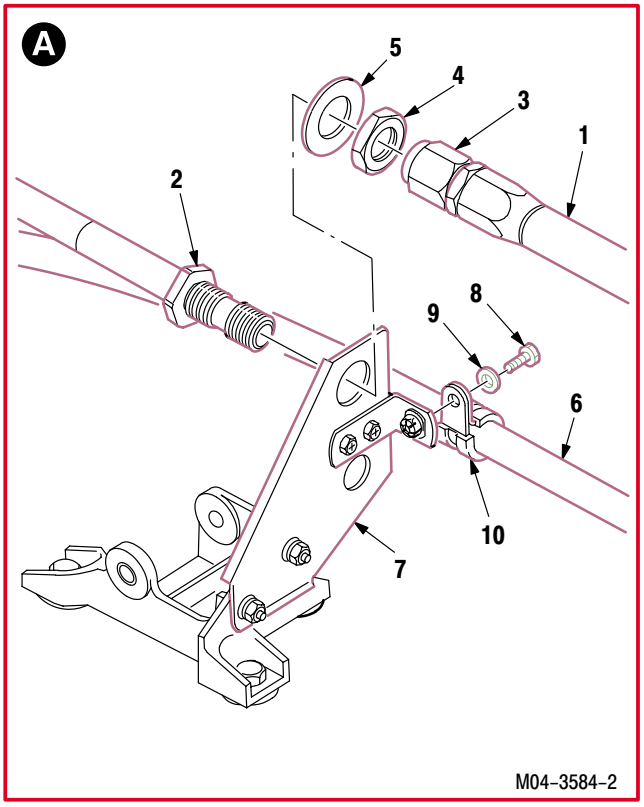
(2) Hold union (2). Remove nut (3). Use open end wrench.

(3) Hold union (2). Remove nut (4) and washer (5). Use open end wrench.

b. **Remove pressure hose (6) from bracket (7).**

(1) Remove screw (8) and washer (9) from bracket (7) and clamp (10).

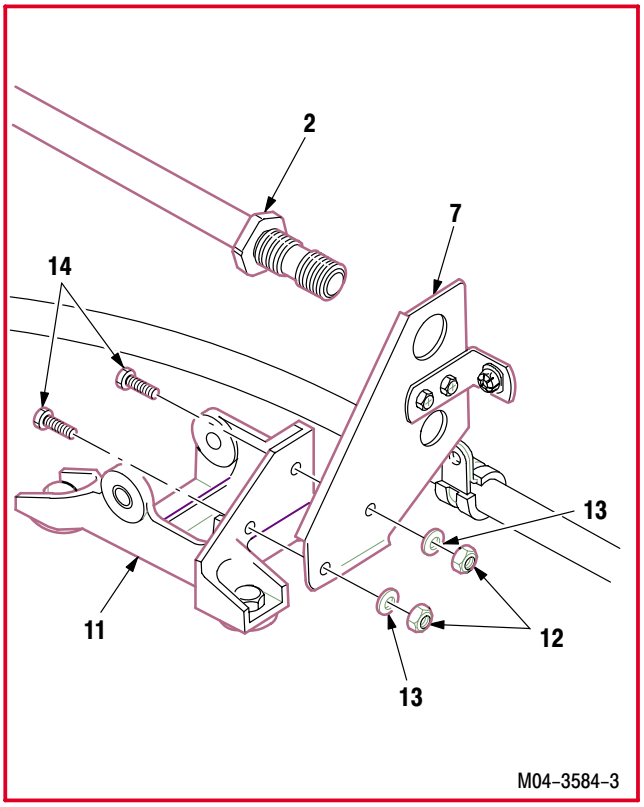
(2) Push hose (6) away from bracket (7).



c. **Remove bracket (7) from fitting (11).**

(1) Remove two nuts (12), washers (13), and screws (14).

(2) Remove bracket (7) from fitting (11) and union (2).



7.10.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.10.5. Inspection

a. **Check tubes, hoses, union, and fitting for nicks, scratches, chaffing, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.10. PRIMARY HYDRAULIC PUMP PRESSURE AND RETURN TUBE SUPPORT BRACKET REMOVAL/INSTALLATION – continued

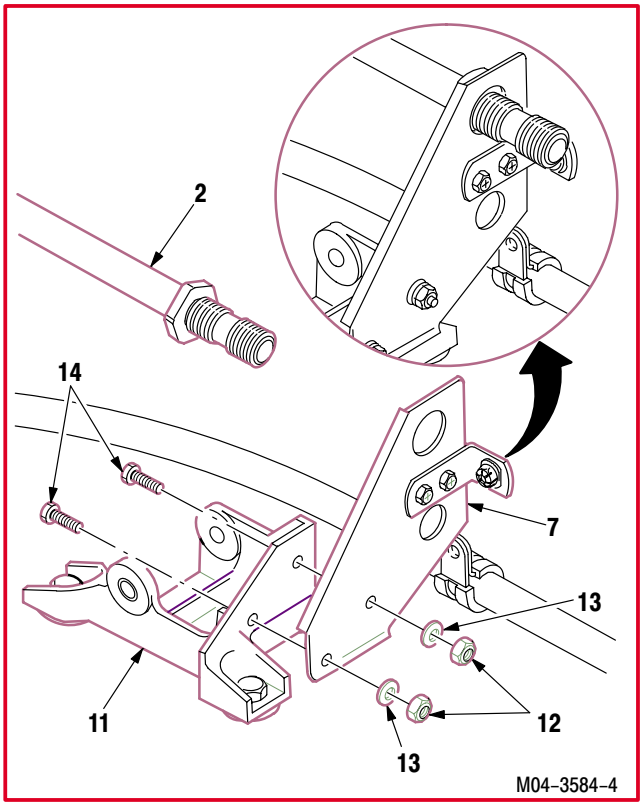
7.10.6. Installation

a. **Install bracket (7) on fitting (11).**

(1) Install bracket (7) over union (2).

(2) Install two screws (14) through fitting (11) and bracket (7).

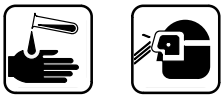
(3) Install two washers (13) and nuts (12) on screws (14).



b. **Install hose (6) on bracket (7).**

(1) Aline clamp (10) with bracket (7).

(2) Install screw (8) and washer (9) through clamp (10) on bracket (7).

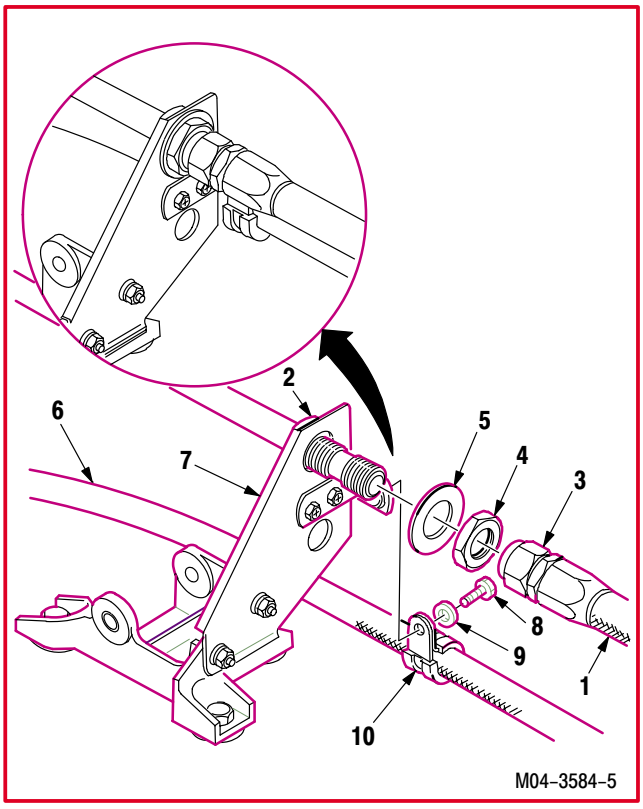


c. **Install hose (1) on union (2).**

(1) Hold union (2). Install washer (5) and nut (4) on union (2). Use open end wrench.

(2) Lubricate threads of union (2). Use clean hydraulic fluid (item 92, App F).

(3) Hold union (2). Install nut (3). Use open end wrench.



d. **Inspect (QA).**

e. **Bleed primary hydraulic system** (para 1.35)**.**

f. **Service primary hydraulic system** (para 1.34)**.**

g. **Perform hydraulic system leak check** (para 7.2)**.**

h. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.11. PRIMARY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION

7.11.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.11.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Filter
Damping fluid (item 69, App F)
Hydraulic fluid (item 92, App F)

Personnel Required:

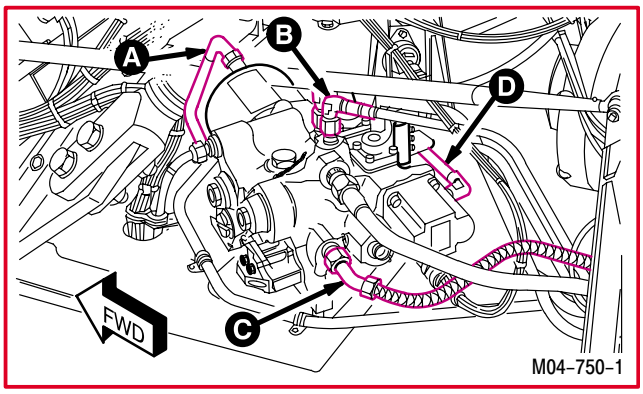
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented



GO TO NEXT PAGE

7.11. PRIMARY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

7.11.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot forward circuit breaker panel, open EMER HYD and LT CAUT circuit breakers.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

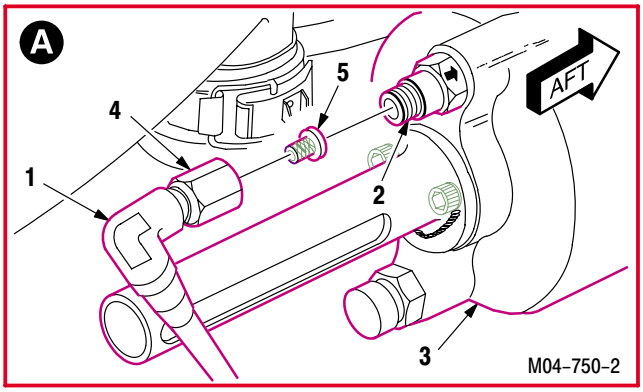
d. **On CPG circuit breaker panel, open EMER BATT CAUT circuit breaker.**

e. **Remove tube (1) from air check valve (2).**

(1) Place rags around primary hydraulic manifold (3) to catch hydraulic fluid spills.

(2) Hold check valve (2). Remove nut (4).

(3) Remove and discard filter (5).

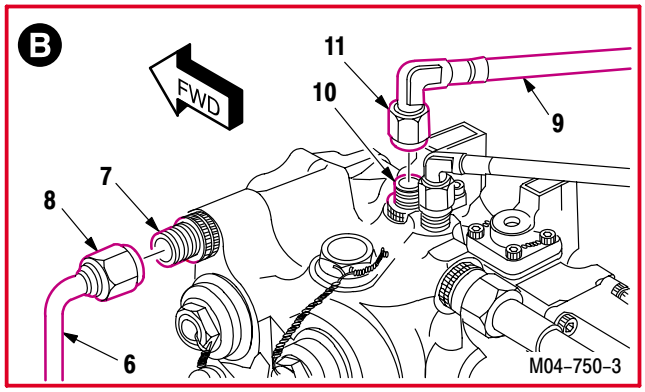


f. **Remove tube (6) from adapter (7).**

(1) Remove nut (8).

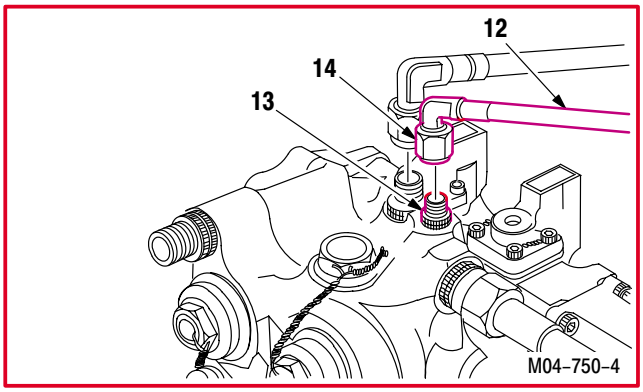
g. **Remove tube (9) from adapter (10).**

(1) Remove nut (11).



h. **Remove tube (12) from adapter (13).**

(1) Remove nut (14).



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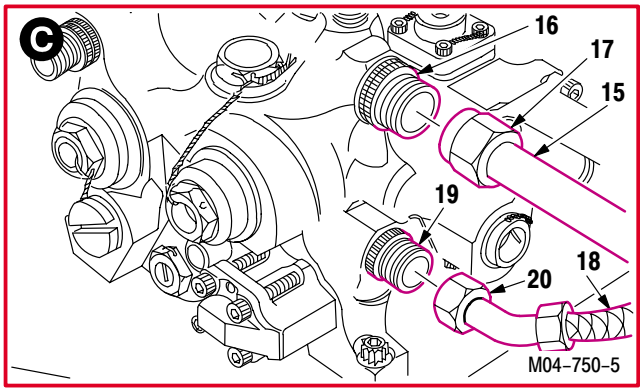
7.11. PRIMARY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

i. **Remove tube (15) from adapter (16).**

(1) Remove nut (17).

j. **Remove hose (18) from adapter (19).**

(1) Remove nut (20).



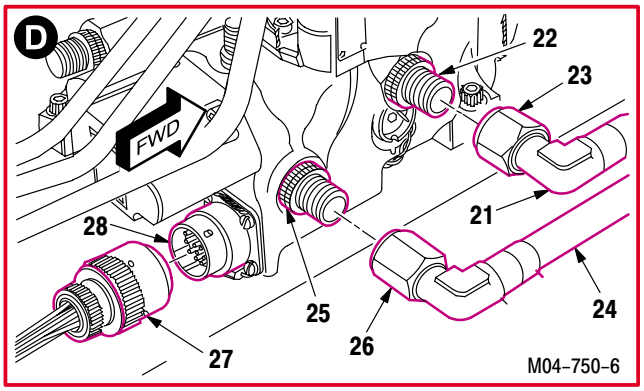
k. **Remove tube (21) from adapter (22).**

(1) Remove nut (23).

l. **Remove tube (24) from adapter (25).**

(1) Remove nut (26).

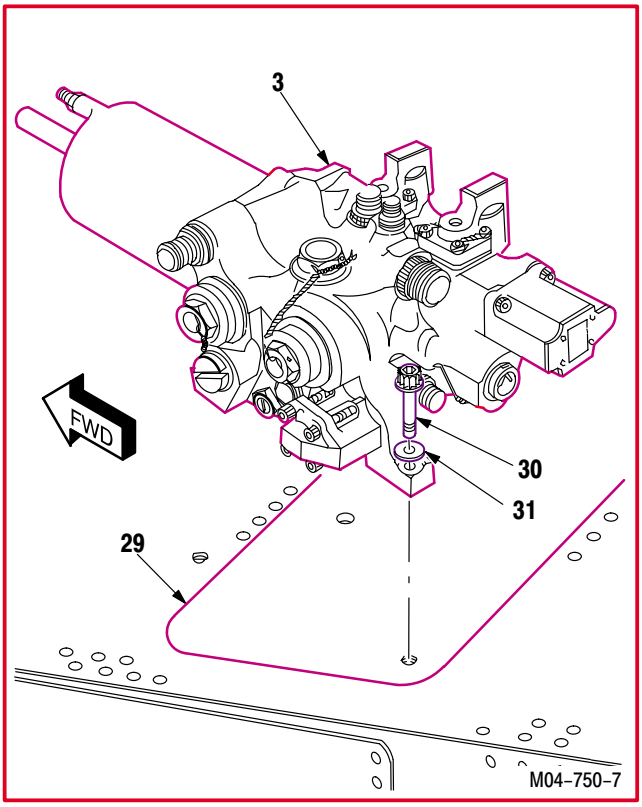
m. **Detach connector P239 (27) from receptacle (HP1)J6 (28).**



n. **Remove manifold (3) from transmission deck (29).**

(1) Remove three bolts (30) and washers (31).

(2) Remove manifold (3).



7.11.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.11.5. Inspection

a. **Check manifold, check valve, and adapters for stripped or damaged threads** (para 10.1)**.**

b. **Check tubes and hose for chafing and stripped or damaged threads** (para 10.1)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.11. PRIMARY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

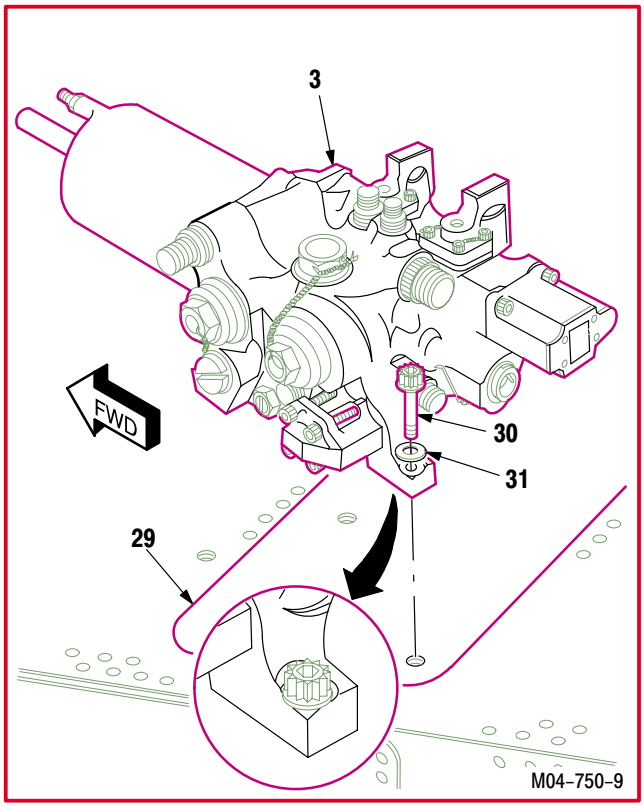
7.11.6. Installation

a. **Install manifold (3) on transmission deck (29).** Torque three bolts (30) to **65 INCH-POUNDS**.

(1) Aline manifold (3) on deck (29).

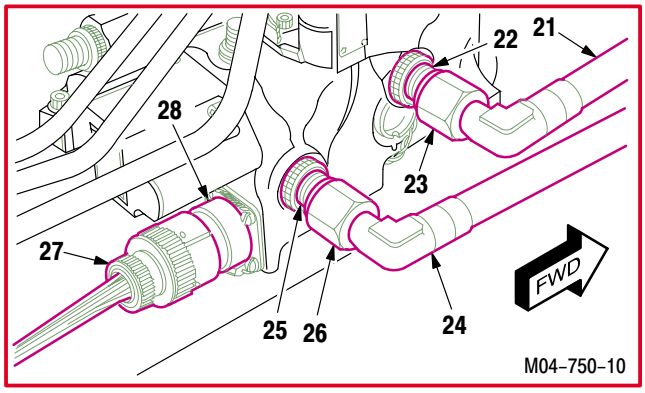
(2) Install three bolts (30) and washers (31).

(3) Torque three bolts (30) to **65 INCH-POUNDS**. Use torque wrench.



b. **Attach connector P239 (27) to receptacle (HP1)J6 (28).**





c. **Install tube (24) on adapter (25).**

(1) Lubricate threads of adapter (25). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (26) on adapter (25).

d. **Install tube (21) on adapter (22).**

(1) Lubricate threads of adapter (22). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (23) on adapter (22).

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7.11. PRIMARY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

e. **Install hose (18) on adapter (19).**

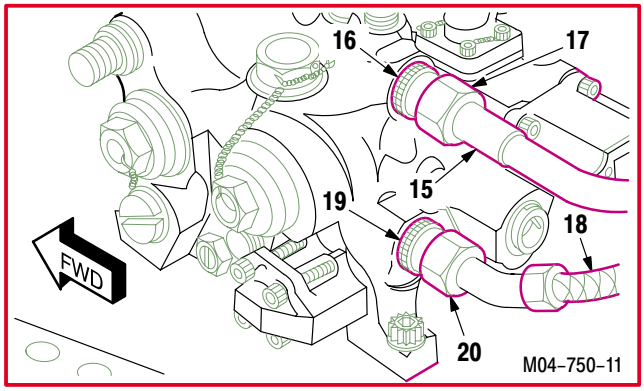
(1) Lubricate threads of adapter (19). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (20) on adapter (19).

f. **Install tube (15) on adapter (16).**

(1) Lubricate threads of adapter (16). Use clean hydraulic fluid (item 92, App F).

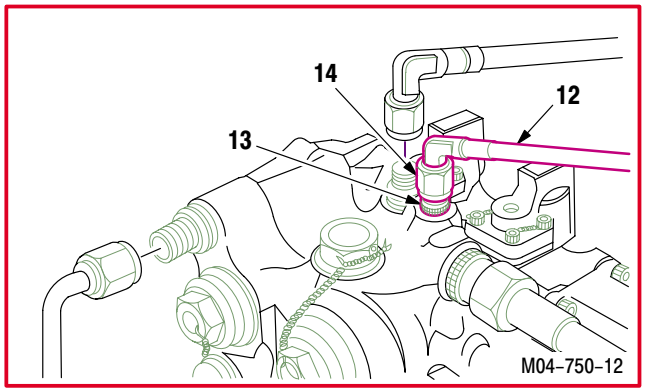
(2) Install nut (17) on adapter (16).



g. **Install tube (12) on adapter (13).**

(1) Lubricate threads of adapter (13). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (14) on adapter (13).



h. **Install tube (9) on adapter (10).**

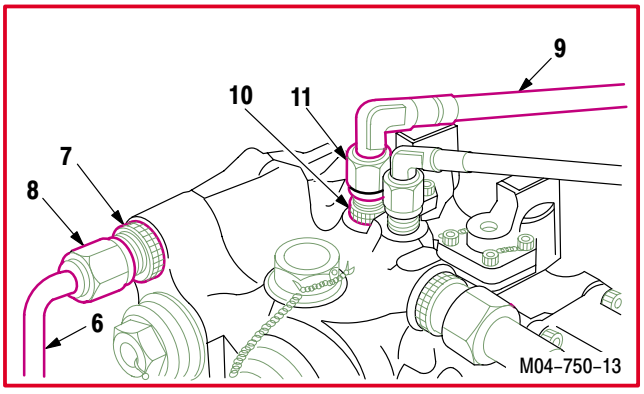
(1) Lubricate threads of adapter (10). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (11) on adapter (10).

i. **Install tube (6) on adapter (7).**

(1) Lubricate threads of adapter (7). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (8) on adapter (7).



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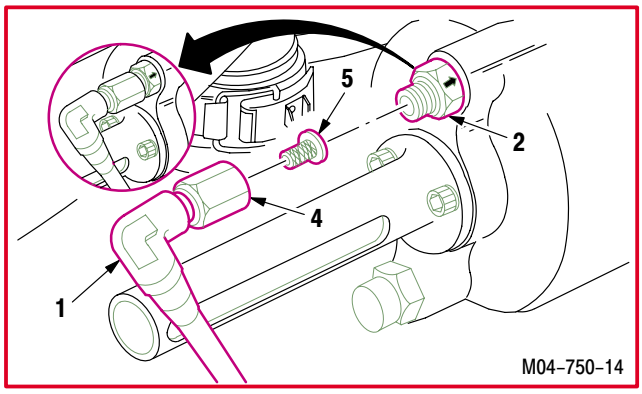
7.11. PRIMARY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

j. **Install tube (1) on check valve (2).**

(1) Install new filter (5) in tube (1).

(2) Lubricate threads of check valve (2). Use damping fluid (item 69, App F).

(3) Hold check valve (2). Install nut (4).



k. **Inspect (QA).**

l. **Bleed primary hydraulic system** (para 1.35)**.**

m. **Service primary hydraulic system** (para 1.34)**.**

n. **Perform primary hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

o. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.12. PRIMARY HYDRAULIC MANIFOLD MANUAL BLEED VALVE REPLACEMENT

7.12.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.12.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

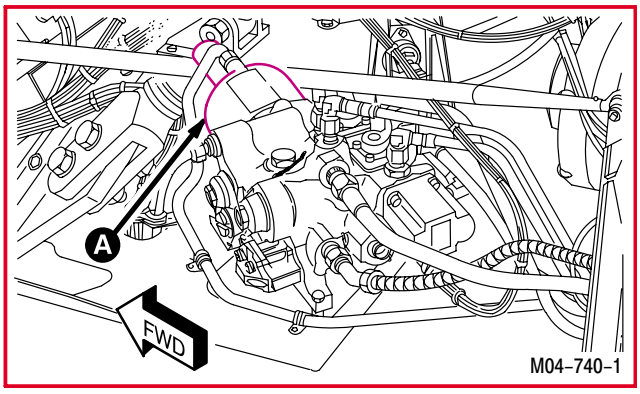
Packing
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

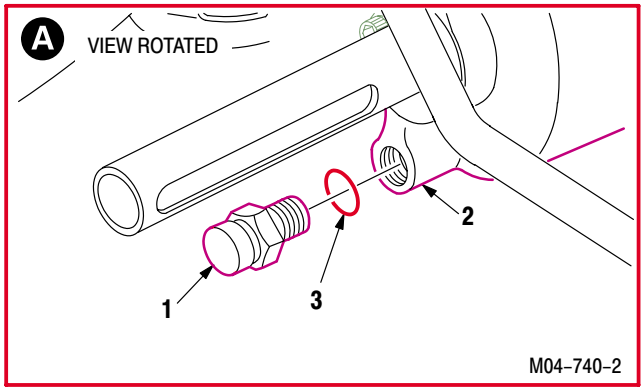
Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented



7.12.3. Removal

a. **Remove bleed valve (1) from manifold (2).**

(1) Remove and discard valve (1) and packing (3).



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7.12. PRIMARY HYDRAULIC MANIFOLD MANUAL BLEED VALVE REPLACEMENT – continued

7.12.4. Cleaning

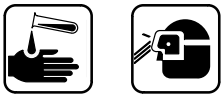
a. **Wipe attaching parts with a clean rag.**

7.12.5. Inspection

a. **Check manifold for cracks and stripped or damaged threads** (para 10.1)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

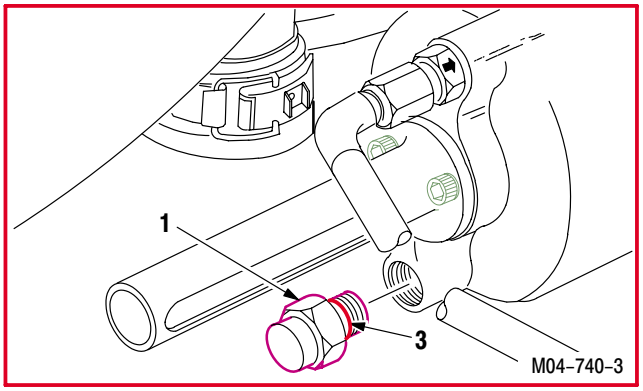
7.12.6. Installation



a. **Install new packing (3) on new valve (1).**

(1) Lubricate packing (3). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (3) on valve (1).

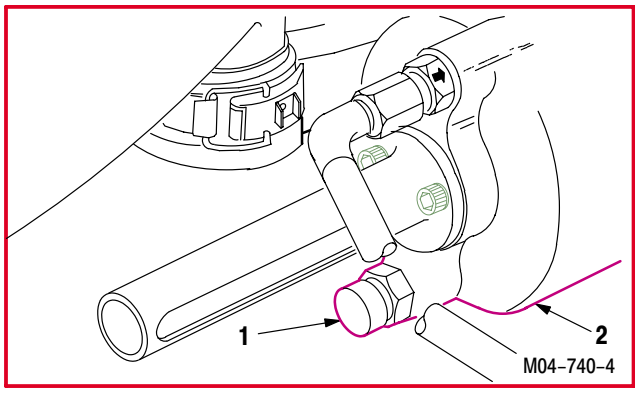


b. **Install valve (1) on manifold (2).** Torque to **100 INCH-POUNDS**.

(1) Lubricate valve threads. Use clean hydraulic fluid (item 92, App F).

(2) Install valve (1) on manifold (2).

(3) Torque valve (1) to **100 INCH-POUNDS**. Use torque wrench.



c. **Inspect (QA).**

d. **Perform pressurized air system leak check** (para 7.115)**.**

e. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.13. PRIMARY HYDRAULIC MANIFOLD AIR CHECK VALVE REPLACEMENT

7.13.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.13.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Filter
Packing
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented

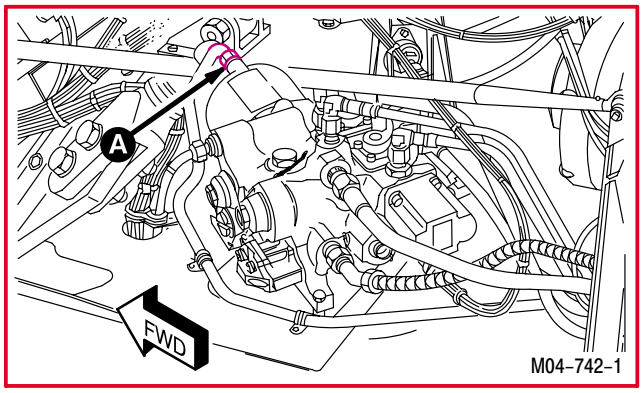
7.13.3. Removal

a. **Remove tube (1) from check valve (2).**

(1) Hold check valve (2). Remove nut (3).

(2) Remove and discard filter (4).

b. **Remove and discard check valve (2) and packing (5) from manifold (6).**



7.13.4. Cleaning

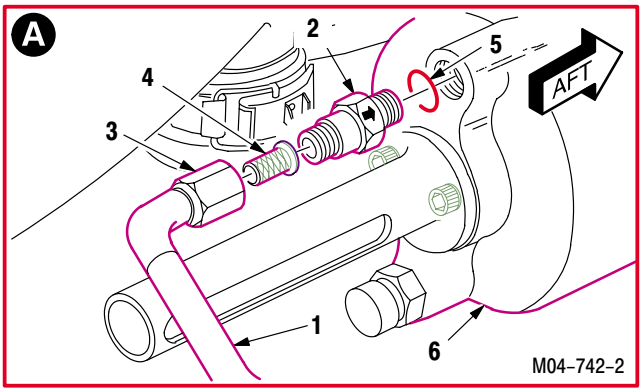
a. **Wipe removed and attaching parts with a clean rag.**

7.13.5. Inspection

a. **Check tube for chafing, cracks, dents, nicks, and scratches** (para 10.1)**.**

b. **Check nut for cracks, stripped threads, and rounded flats** (para 10.1)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.13. PRIMARY HYDRAULIC MANIFOLD AIR CHECK VALVE REPLACEMENT – continued

7.13.6. Installation



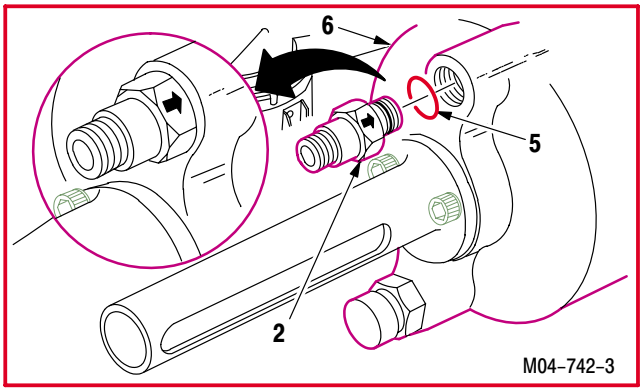
a. **Install new check valve (2) on manifold (6).** Torque check valve (2) to **100 INCH-POUNDS**.

(1) Lubricate new packing (5). Use petrolatum (item 138, App F).

(2) Install packing (5) on check valve (2).

(3) Lubricate threads of check valve (2). Use damping fluid (item 69, App F).

(4) Install check valve (2) on manifold (6) with arrow pointing toward manifold (6). Torque check valve (2) to **100 INCH-POUNDS**. Use torque wrench.

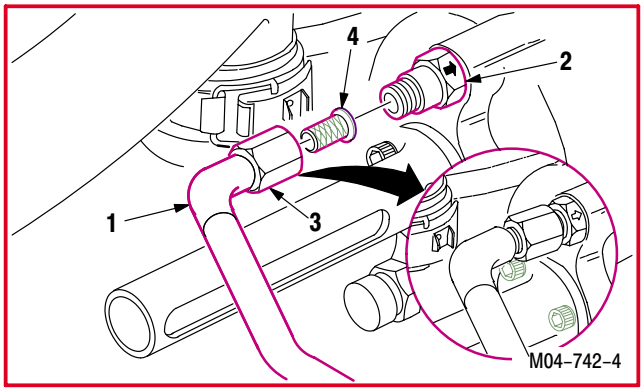


b. **Install new filter (4) in tube (1).**

c. **Install tube (1) on check valve (2).**

(1) Lubricate threads of check valve (2). Use damping fluid (item 69, App F).

(2) Hold check valve (2). Install nut (3).



d. **Inspect (QA).**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.14. PRIMARY HYDRAULIC MANIFOLD PRESSURE SWITCH REPLACEMENT

7.14.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.14.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (2)
Hydraulic fluid (item 92, App F)

Personnel Required:

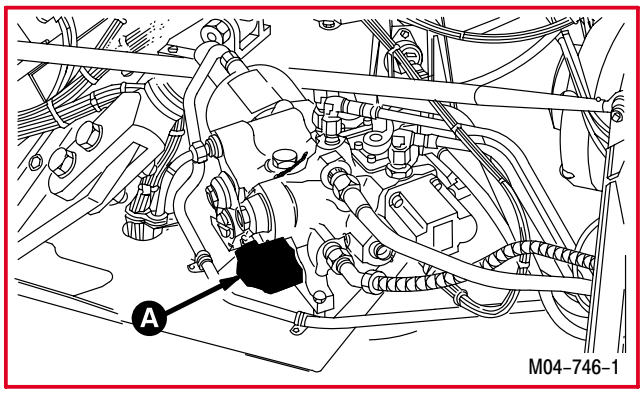
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented



GO TO NEXT PAGE

7.14. PRIMARY HYDRAULIC MANIFOLD PRESSURE SWITCH REPLACEMENT – continued

CAUTION

Extreme care must be taken to prevent foreign objects from entering open passages of manifold.

7.14.3. Removal

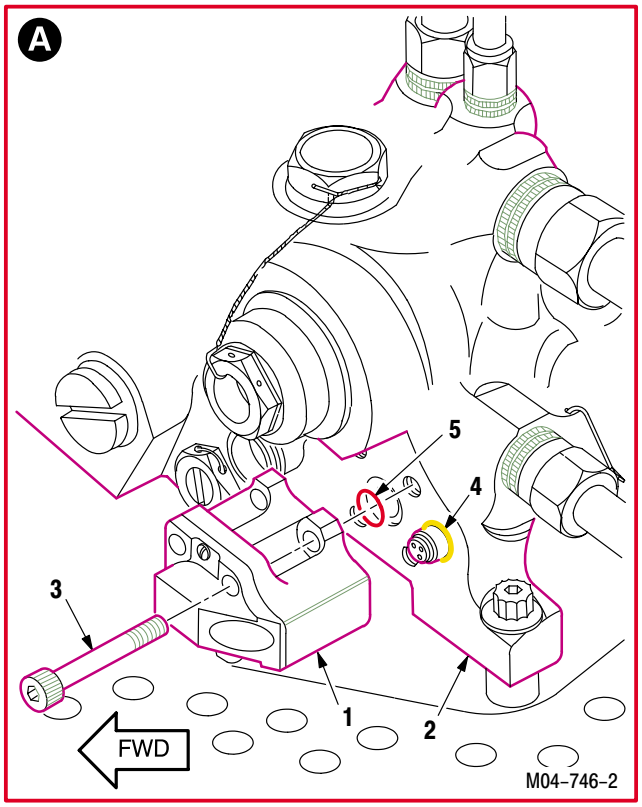
a. **Remove pressure switch (1) from primary manifold (2).**

(1) Place rags under manifold (2) to catch hydraulic fluid spills.

(2) Remove four screws (3).

(3) Pull switch (1) straight out from manifold (2).

(4) Discard switch (1) and packings (4) and (5).



7.14.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.14.5. Inspection

a. **Check mounting surface and electrical connector for damage** (para 10.1)**.**

b. **Check screws for stripped or damaged threads** (para 10.1)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.14. PRIMARY HYDRAULIC MANIFOLD PRESSURE SWITCH REPLACEMENT – continued

7.14.6. Installation



a. **Install new packings (4) and (5) on manifold (2).**

(1) Lubricate packings (4) and (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (5) in manifold recess (7).

(3) Install packing (4) on connector (6).

b. **Install new switch (1) on manifold (2).** Torque four screws (3) to **22 INCH-POUNDS**.

(1) Aline switch (1) on manifold (2) with connector (6) and four screw holes.

(2) Install four screws (3).

(3) Torque four screws (3) to **22 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

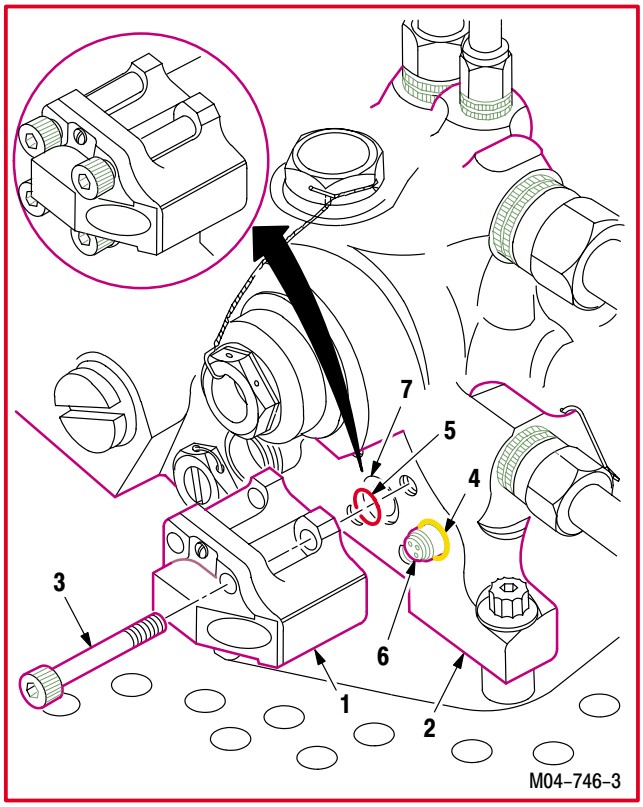
c. **Inspect (QA).**

d. **Bleed primary hydraulic system** (para 1.35)**.**

e. **Service primary hydraulic system** (para 1.34)**.**

f. **Perform primary hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Install access panel L200** (para 2.2)**.**



END OF TASK

7.15. PRIMARY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT

7.15.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.15.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (2)
Hydraulic fluid (item 92, App F)
Sealing compound (item 174, App F)

Personnel Required:

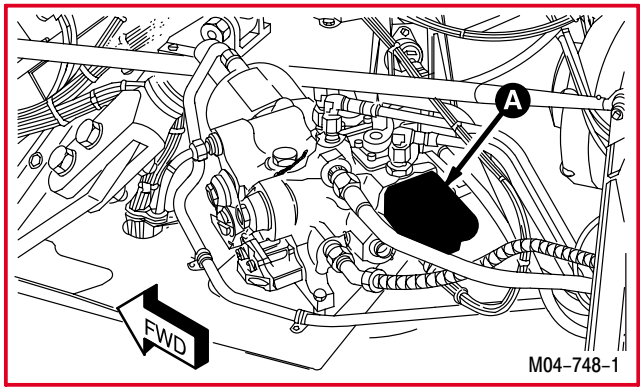
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented



GO TO NEXT PAGE

7.15. PRIMARY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT – continued

CAUTION

Extreme care must be taken to prevent foreign objects from entering open passages of manifold.

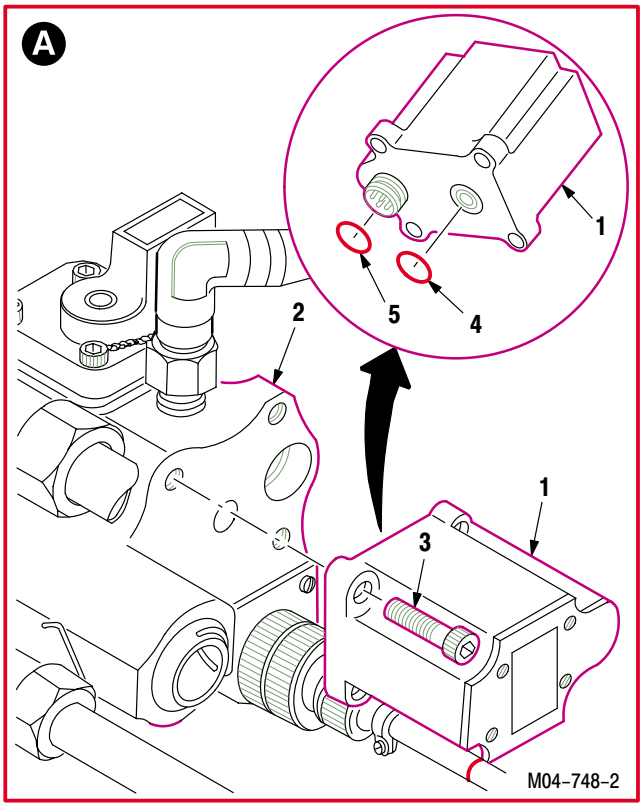
7.15.3. Removal

a. **Remove pressure transducer (1) from primary manifold (2).**

(1) Place rags under manifold (2) to catch hydraulic fluid spills.

(2) Remove four screws (3).

(3) Remove and discard transducer (1) and packings (4) and (5).



7.15.4. Cleaning

a. **Clean sealing compound from manifold and four screws** (para 1.47)**.**

b. **Clean removed and attaching parts** (para 1.47)**.**

7.15.5. Inspection

a. **Check mounting surface and electrical connector for damage** (para 10.1)**.**

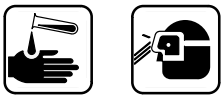
b. **Check screws for stripped or damaged threads** (para 10.1)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.15. PRIMARY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT – continued

7.15.6. Installation



a. **Install new packings (4) and (5) on new transducer (1).**

(1) Lubricate packings (4) and (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (4) in port (6).

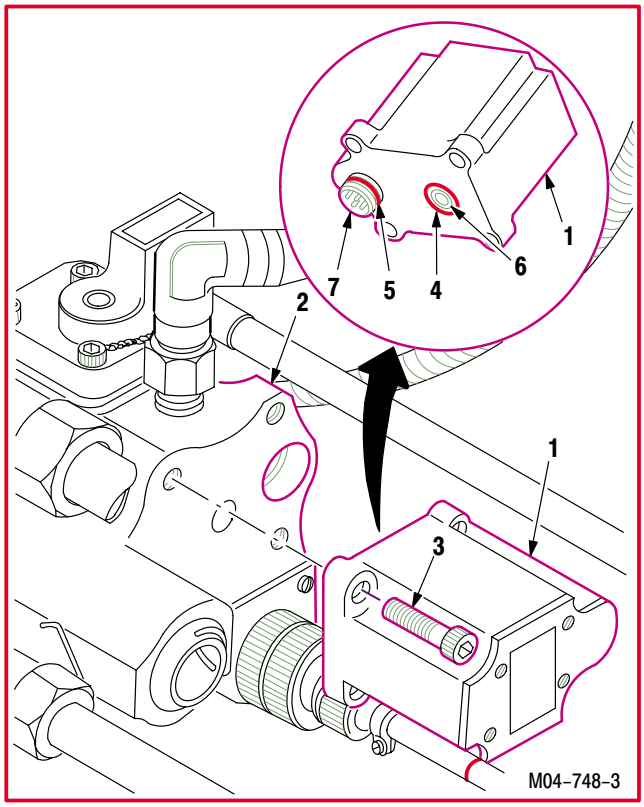
(3) Install packing (5) on connector (7).

b. **Install transducer (1) on manifold (2).** Torque four screws (3) to **22 INCH-POUNDS**.

(1) Aline transducer (1) on manifold (2).

(2) Install four screws (3).

(3) Torque four screws (3) to **22 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

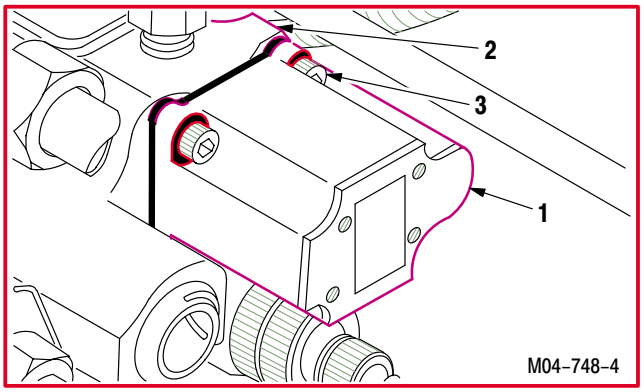


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7.15. PRIMARY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT – continued



c. **Apply sealing compound around entire base of transducer (1) where it contacts manifold (2) and around four screws (3).** Use sealing compound (item 174, App F).



d. **Allow sealing compound to dry for 24 HOURS at 65 °F (18 °C) minimum.**

e. **Inspect (QA).**

f. **Bleed primary hydraulic system** (para 1.35)**.**

g. **Service primary hydraulic system** (para 1.34)**.**

h. **Perform primary hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

i. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.16. PRIMARY HYDRAULIC MANIFOLD STRAINER REPLACEMENT

7.16.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.16.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing (4)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

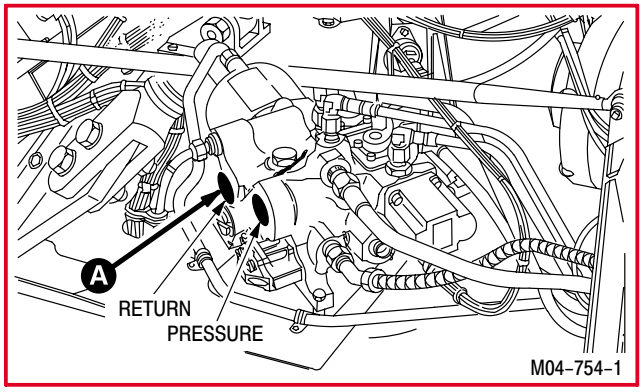
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented

NOTE

This task is typical for pressure and return strainer.



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7.16. PRIMARY HYDRAULIC MANIFOLD STRAINER REPLACEMENT – continued

7.16.3. Removal

a. **Remove pressure cap (1) and return cap (2) from primary manifold (3).**

(1) Place rags under manifold (3) to catch hydraulic fluid spills.

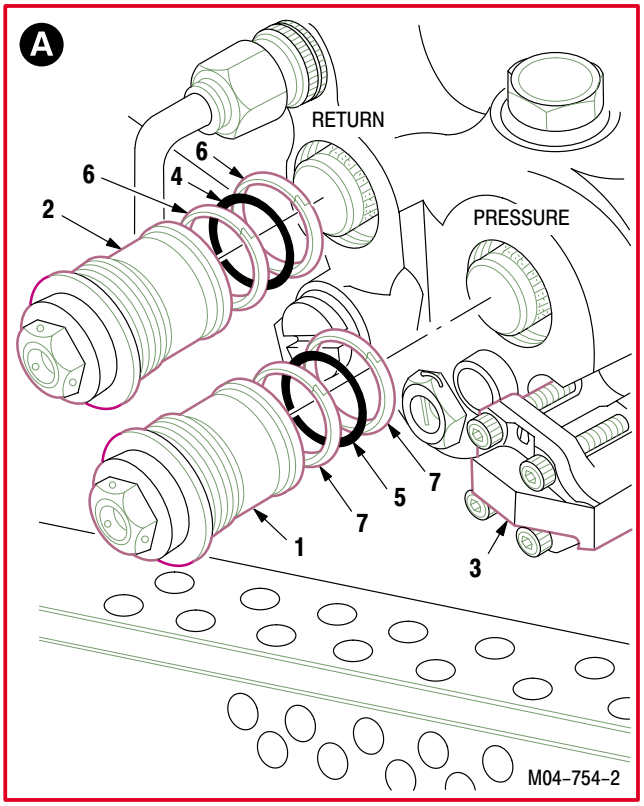
(2) Remove lockwire from caps (1) and (2).

(3) Remove caps (1) and (2).

(4) Remove and discard packings (4) and (5).

(5) Remove and retain backup rings (6) and (7).

b. **Remove and discard two strainers (8) and packings (9) from strainer cavities (10) and (11).**



7.16.4. Cleaning

a. **Wipe strainer cavities.** Use cloth (item 52, App F).

b. **Wipe caps.** Use cloth (item 52, App F).

7.16.5. Inspection

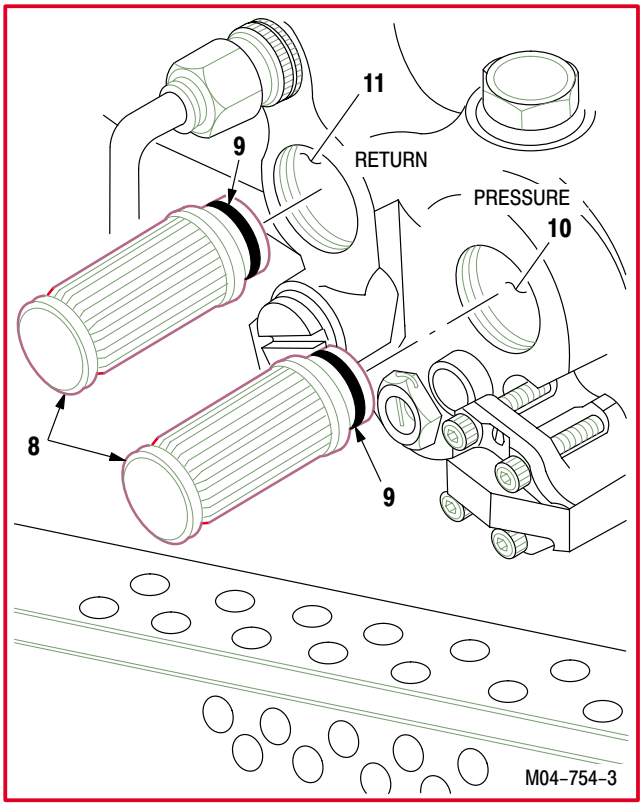
a. **Check caps for stripped or damaged threads** (para 10.1)**.**

b. **Check caps for rounded or damaged flats** (para 10.1)**.**

c. **Check strainer cavities for stripped or damaged threads** (para 10.1)**.**

d. **Check backup rings for damage.** None allowed.

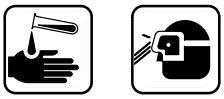
e. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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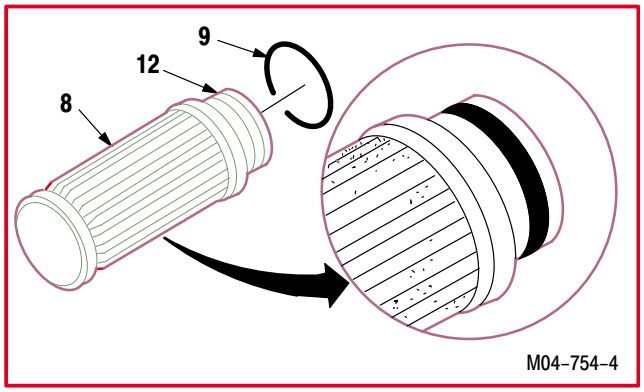
7.16. PRIMARY HYDRAULIC MANIFOLD STRAINER REPLACEMENT – continued

7.16.6. Installation



a. **Lubricate two new packings (9).** Use clean hydraulic fluid (item 92, App F).

b. **Install two packings (9) in grooves (12) of two new strainers (8).**



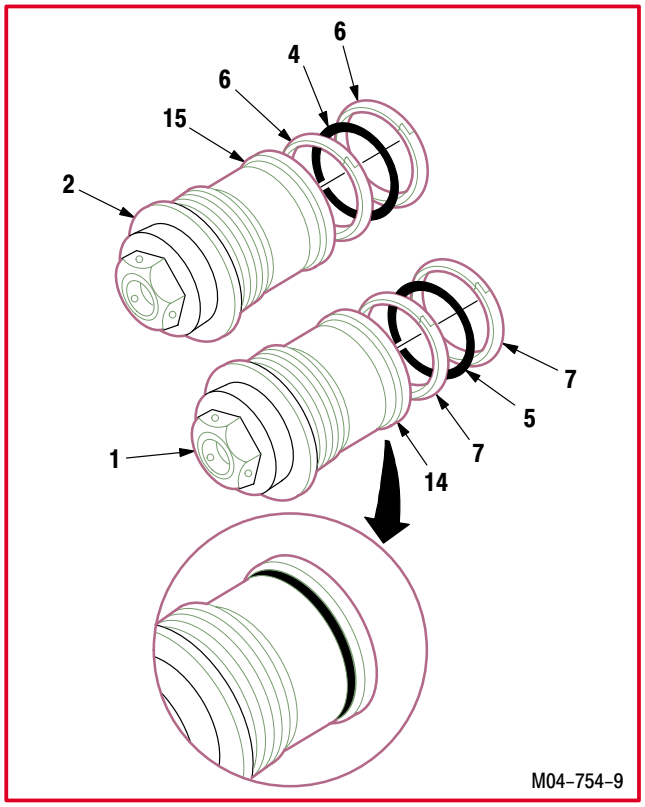
NOTE

The pressure cap and return cap differ only slightly in size. Ensure that the larger packing and backup rings are installed on the return cap, and the smaller packing and backup rings are installed on the pressure cap.

c. **Lubricate new packings (4) and (5), two sets of backup rings (6) and (7), and threads of pressure cap (1) and return cap (2).** Use clean hydraulic fluid (item 92, App F).

d. **Install packing (5) between two backup rings (7) in groove (14) on pressure cap (1).**

e. **Install packing (4) between two backup rings (6) in groove (15) on return cap (2).**



GO TO NEXT PAGE

7.16. PRIMARY HYDRAULIC MANIFOLD STRAINER REPLACEMENT – continued

f. **Install strainer (8) in pressure cap (1).** Torque cap (1) to **60 INCH-POUNDS**.

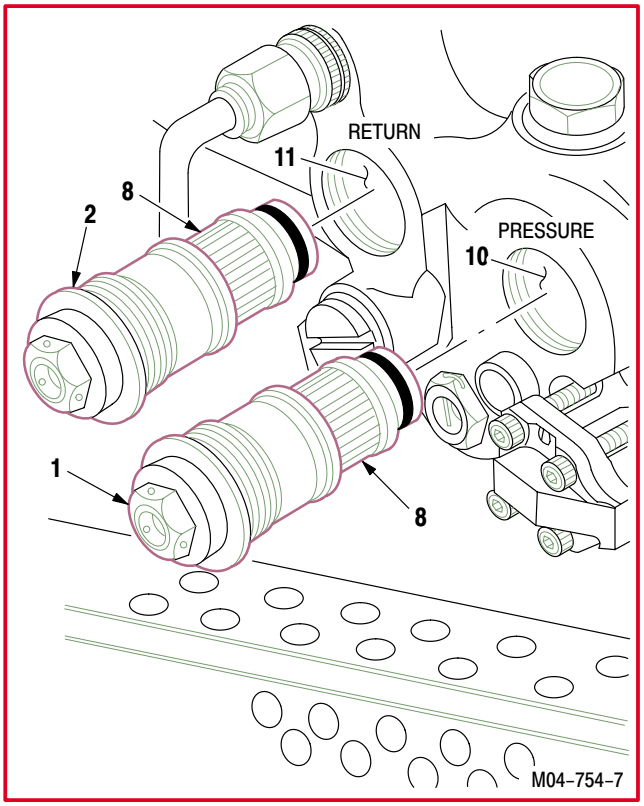
(1) Install cap (1) and strainer (8) in cavity (10).

(2) Torque cap (1) to **60 INCH-POUNDS**. Use torque wrench.

g. **Install strainer (8) in return cap (2).** Torque cap (2) to **60 INCH-POUNDS**.

(1) Install cap (2) and strainer (8) in cavity (11).

(2) Torque cap (2) to **60 INCH-POUNDS**. Use torque wrench.



h. **Lockwire pressure cap (1) and return cap (2) to manifold (3).** Use wire (item 226, App F).

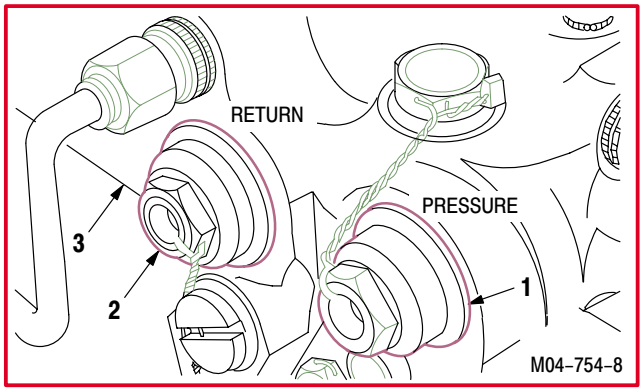
i. **Inspect (QA).**

j. **Bleed primary hydraulic system** (para 1.35)**.**

k. **Service primary hydraulic system** (para 1.34)**.**

l. **Perform primary hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

m. **Install access panel L200** (para 2.2)**.**



END OF TASK

7.17. PRIMARY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT

7.17.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.17.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
9/64-inch hexagon x 3/8-inch drive screwdriver socket wrench attachment (item 330, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (4)
Hydraulic fluid (item 92, App F)
Wire (item 222, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

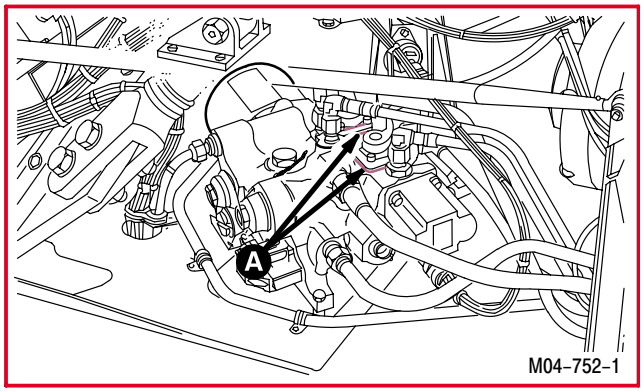
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 removed
7.3	Primary hydraulic system vented
7.16	Primary hydraulic manifold pressure and/or return strainer removed

NOTE

This task is typical for pressure or return dirty filter indicator.



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7.17. PRIMARY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT – continued

CAUTION

Extreme care must be taken to prevent foreign objects from entering open passages of manifold.

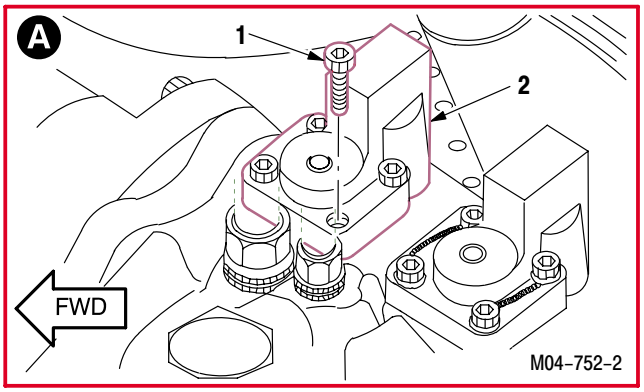
7.17.3. Removal

a. **Remove four screws (1) from dirty filter indicator (2).**

(1) Place rags around indicator (2) to catch hydraulic fluid spills.

(2) Remove lockwire (if installed).

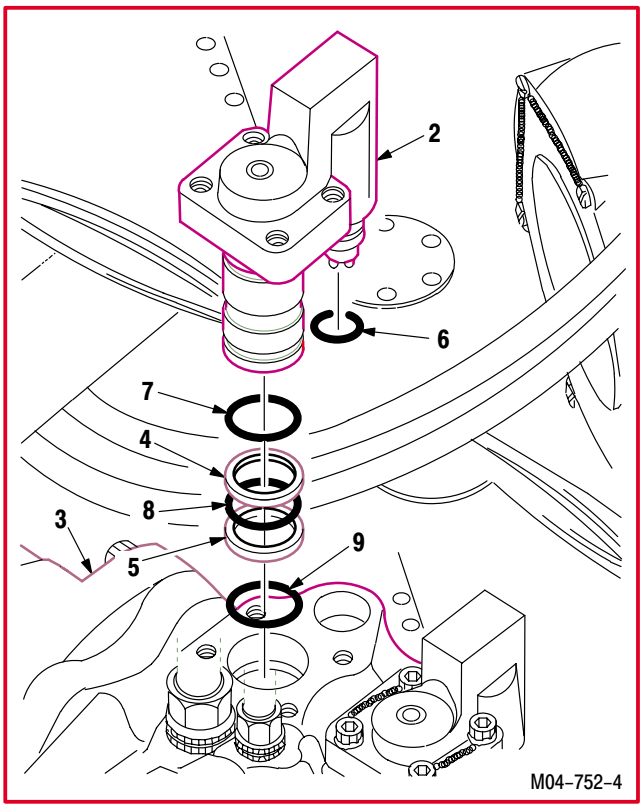
(3) Remove four screws (1). Use hexagon screwdriver.



b. **Remove indicator (2) from primary manifold (3).**

(1) Remove and save retainers (4) and (5).

(2) Discard indicator (2) and packings (6), (7), (8), and (9).



7.17.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.17.5. Inspection

a. **Check indicator mounting surface and electrical connector for damage** (para 10.1)**.**

b. **Check manifold and screws for damage** (para 10.1)**.**

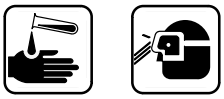
c. **Check retainers for damage.** None allowed.

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.17. PRIMARY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT – continued

7.17.6. Installation



a. **Install new packings (6), (7), (8), and (9), and retainers (4) and (5) on new indicator (2).**

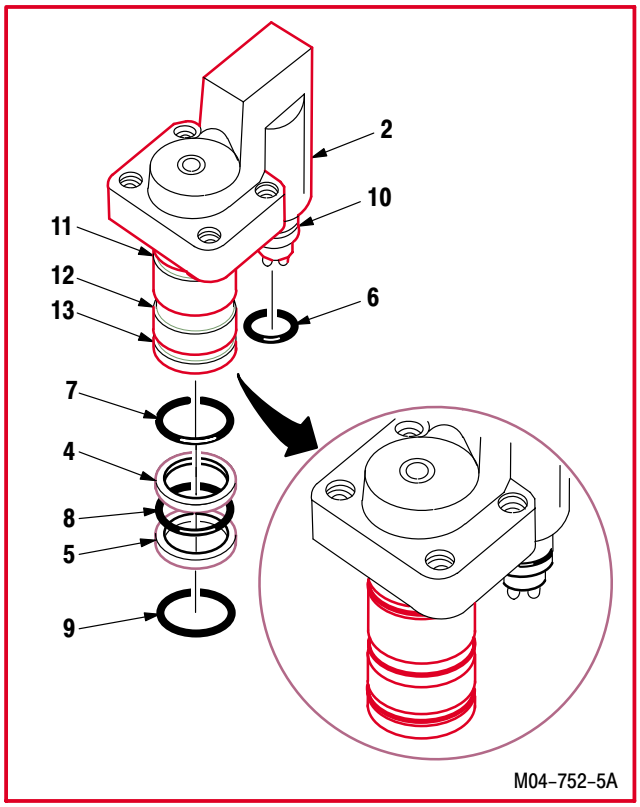
(1) Lubricate packings (6), (7), (8), and (9), and retainers (4) and (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (6) in groove (10).

(3) Install packing (7) in groove (11).

(4) Install retainer (4), packing (8), and retainer (5) in groove (12).

(5) Install packing (9) in groove (13).



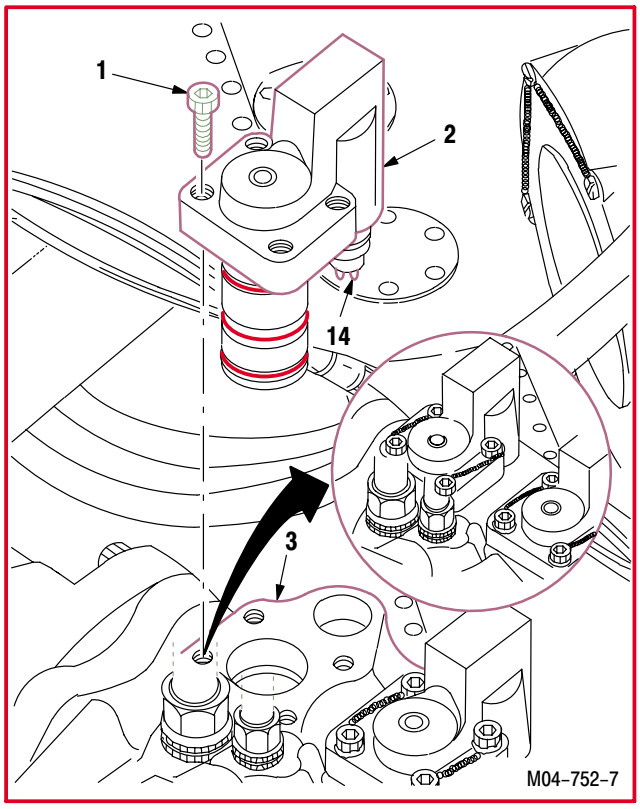
b. **Install indicator (2) on manifold (3).** Torque four screws (1) to **14 INCH-POUNDS**.

(1) Position indicator (2) on manifold (3). Aline connector (14) with cavity and screw holes.

(2) Install four screws (1) in indicator (2) and manifold (3).

(3) Torque four screws (1) to **14 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(4) Lockwire four screws (1) if screw heads are drilled for lockwire. Screw heads must be lockwired in pairs. Use wire (item 222, App F).



GO TO NEXT PAGE

7.17. PRIMARY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT – continued

c. **Inspect (QA).**

d. **Replace primary hydraulic manifold pressure and/or return strainer** (para 7.16)**.**

e. **Bleed primary hydraulic system** (para 1.35)**.**

f. **Service primary hydraulic system** (para 1.34)**.**

g. **Perform primary hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

h. **Install access panel L200** (para 2.2)**.**

END OF TASK

7.18. PRIMARY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM)

7.18.1. Description

This task covers: Removal. Cleaning. Inspection. Installation. Testing.

7.18.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
9/64-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 329, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Channel seal
Packing (6)
Packing (MS28775-4) (2)
Seal (2)
Union (HS4508-4C4)
Union (MS21902J4)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

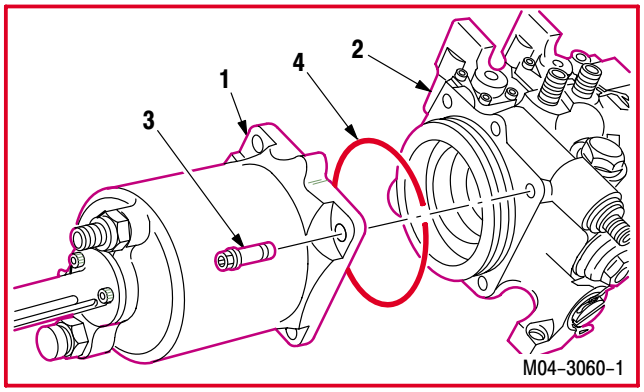
7.18.3. Removal

a. **Remove housing (1) from manifold (2).**

(1) Remove lockwire. Remove four bolts (3).

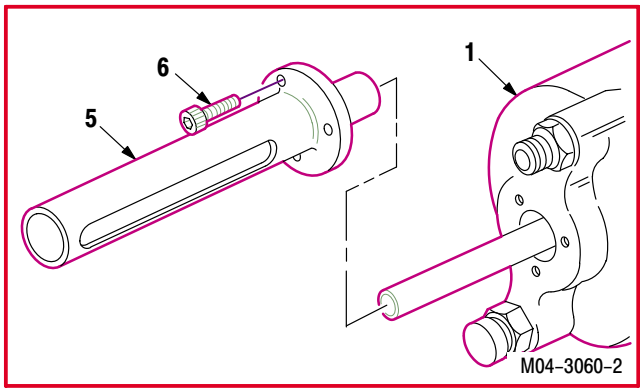
(2) Remove housing (1) from manifold (2).

(3) Remove and discard packing (4) from manifold (2).



b. **Remove guard (5) from housing (1).**

(1) Remove lockwire. Remove three screws (6). Use hexagon screwdriver.



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7.18. PRIMARY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

c. **Remove piston (7) from housing (1).**

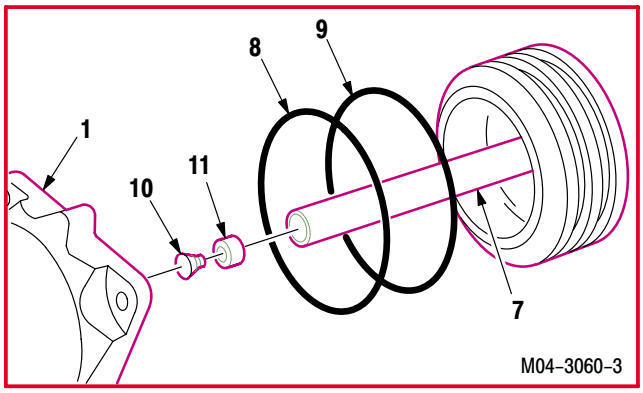
(1) Remove and discard two seals (8) and (9) from piston (7).

d. **Remove and discard relief valve (10) and retainer (11) from end of piston (7).**

e. **Remove and discard channel seal (12) and packing (13) from housing (1).**

f. **Remove transfer tube (14) from manifold (2).**

(1) Remove and discard two packings (15).

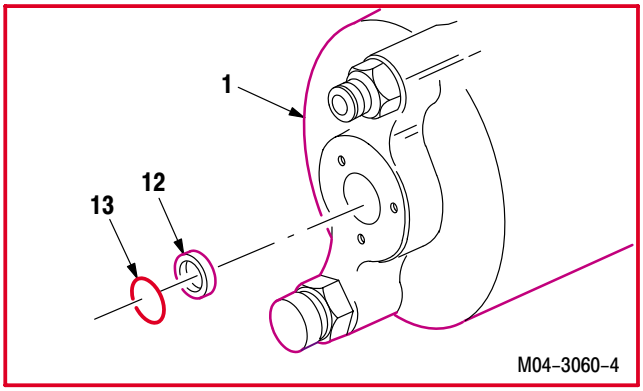


7.18.4. Cleaning

a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).



b. **Clean internal surface of housing and manifold with cloth dipped in small amount of hydraulic fluid.** Use cloth (item 52, App F) and clean hydraulic fluid (item 92, App F).



7.18.5. Inspection

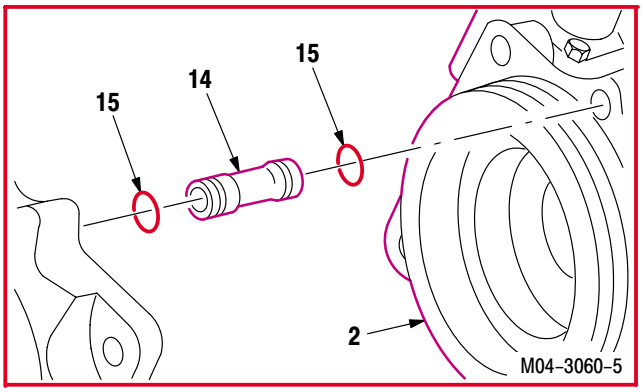
a. **Check housing for cracks, dents, or distortion** (para 10.1)**.**

b. **Check interior of housing for scratches, scoring, galling, or other indications of binding** (para 10.1)**.**

c. **Check piston for indications of binding, particularly on the rod end.** None allowed.

d. **No repair of working or mating surfaces is allowed.**

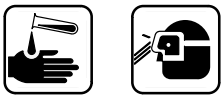
e. **Check removed and attaching parts for corrosion** (para 1.49)**.**



GO TO NEXT PAGE

7.18. PRIMARY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

7.18.6. Installation



a. **Install new packing (4) on manifold (2).**

(1) Lubricate packing (4). Use clean hydraulic fluid (item 92, App F).

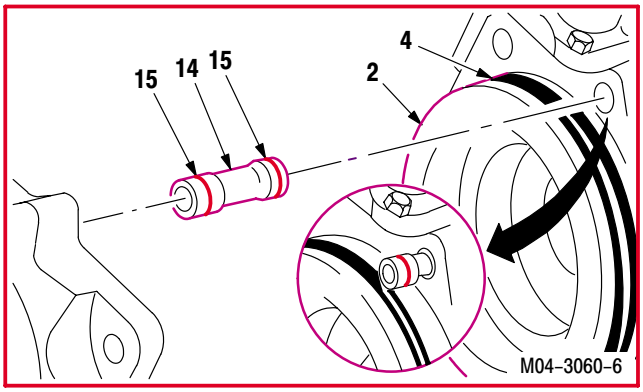
(2) Install packing (4).

b. **Install transfer tube (14) and two new packings (15).**

(1) Lubricate two packings (15). Use clean hydraulic fluid (item 92, App F).

(2) Install packings (15) on transfer tube (14).

(3) Install transfer tube (14) in manifold (2).



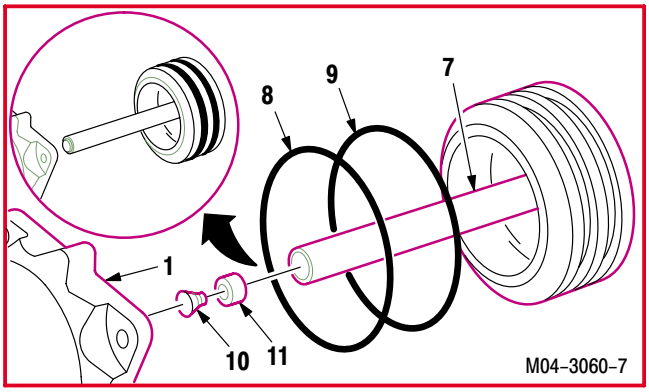
c. **Install new relief valve (10) and new retainer (11) on end of piston (7).**

d. **Install piston (7) in housing (1).**

(1) Lubricate two new seals (8) and (9). Use clean hydraulic fluid (item 92, App F).

(2) Install two seals (8) and (9) on piston (7).

(3) Install piston (7) in housing (1).



GO TO NEXT PAGE

7.18. PRIMARY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

e. **Install guard (5) on housing (1).** Torque three screws (6) to **14 INCH-POUNDS**.

(1) Lubricate new channel seal (12) and new packing (13). Use clean hydraulic fluid (item 92, App F).

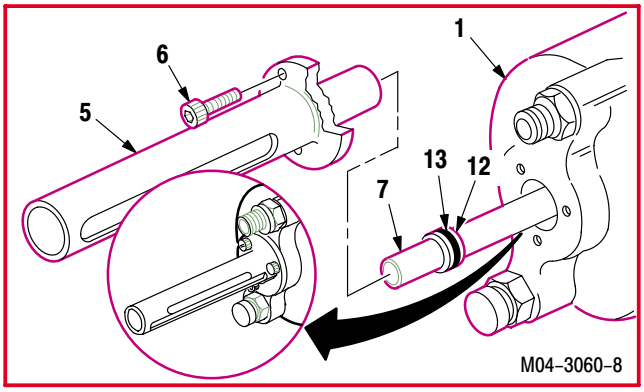
(2) Install packing (13) in groove of channel seal (12).

(3) Slide channel seal (12) over end of piston (7) protruding from housing (1).

(4) Push seal (12) into housing (1) using guard (5).

(5) Install three screws (6). Torque three screws (6) to **14 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(6) Lockwire screws (6) together. Use wire (item 222, App F).

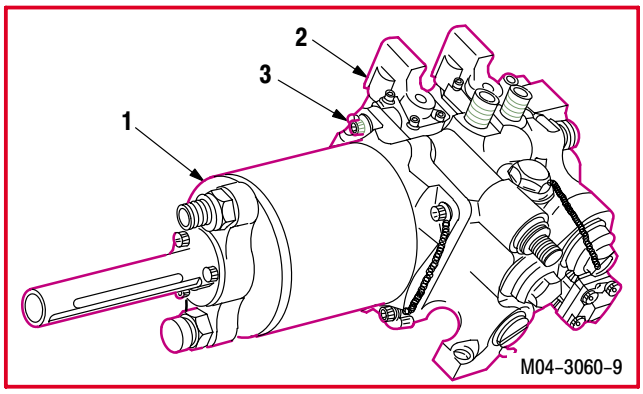


f. **Install housing (1) on manifold (2).** Torque four bolts (3) to **60 INCH-POUNDS**.

(1) Install and torque four bolts (3) to **60 INCH-POUNDS**. Use torque wrench.

(2) Lockwire bolts (3) in pairs. Use wire (item 222, App F).

g. **Inspect (QA).**



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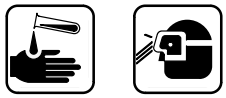
7.18. PRIMARY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

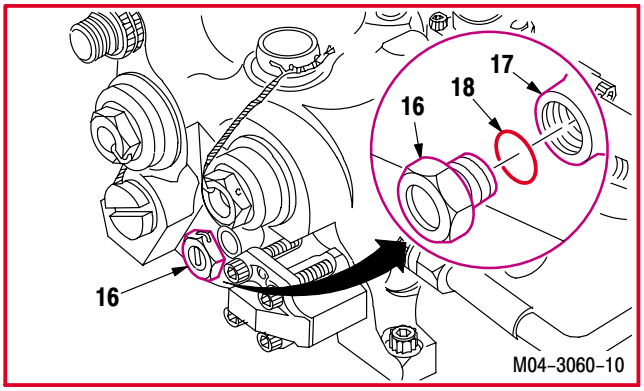
7.18.7. Testing

a. **Remove plug (16) from drain port (17).**

(1) Remove lockwire from plug (16).

(2) Remove and discard packing (18).





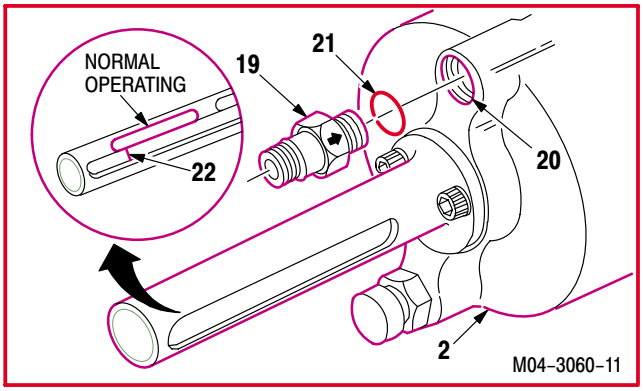
b. **Install MS21902J4 union with MS28775-4 packing on drain port (17).**

(1) Lubricate MS28775-4 packing. Use clean hydraulic fluid (item 92, App F).

c. **Remove check valve (19) from valve port (20).**

(1) Remove and discard packing (21).





d. **Install HS4508-4C4 union with MS28775-4 packing on valve port (20).**

(1) Lubricate MS28775-4 packing. Use petrolatum (item 138, App F).

e. **Cap all other ports.**

f. **Service manifold (2) with hydraulic fluid through drain port (17) until indicator (22) is in normal (green) operating area.** Use clean hydraulic fluid (item 92, App F).

g. **Connect shop air, regulated to 25 psi, to manifold (2) through valve port (20).**

(1) Hold pressure 5 minutes and check for leaks. No leakage allowed. Show of fluid too small to form a drop is allowable. Manifold is leaking if drop of fluid is formed.

(2) Remove air pressure.

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7.18. PRIMARY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

h. **Remove MS21902J4 and HS4508-4C4 unions and two MS28775-4 packings from ports (17) and (20).**

(1) Discard two MS28775-4 packings.

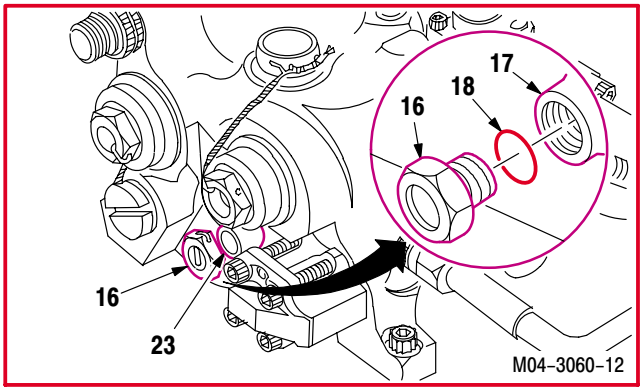
i. **Install plug (16) on drain port (17).** Torque plug (16) to **100 INCH-POUNDS**.

(1) Lubricate new packing (18). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (16) on plug (16).

(3) Torque plug (16) to **100 INCH-POUNDS**.

(4) Lockwire plug (16) to filter bypass valve cover (23). Use wire (item 222, App F).

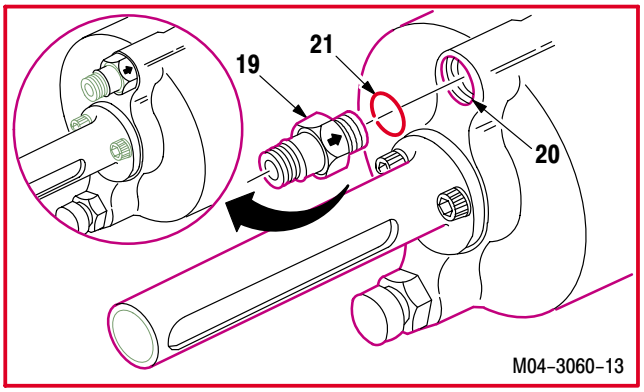


j. **Install check valve (19) on valve port (20).** Torque check valve (19) to **100 INCH-POUNDS**.

(1) Lubricate new packing (21). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (21) on check valve (19).

(3) Torque check valve (19) to **100 INCH-POUNDS**. Use torque wrench.



k. **Remove caps from all ports.**

l. **Inspect (QA).**

END OF TASK

7.19. PRIMARY HYDRAULIC MANIFOLD DRAIN HOSE REPLACEMENT

7.19.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.19.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

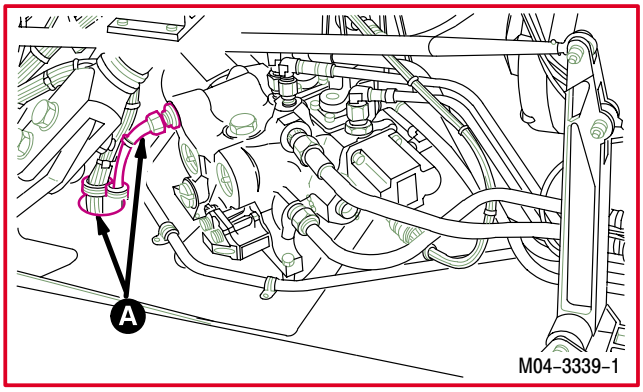
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

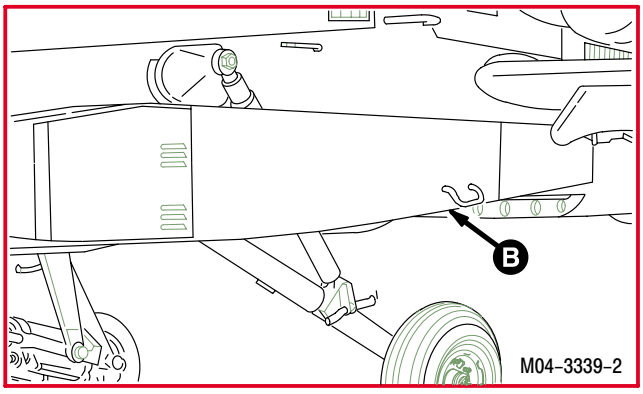
References:

TM 9-1090-208-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panels B200 and L200 removed
TM 9-1090-208-23	Ammunition storage magazine removed





GO TO NEXT PAGE

7.19. PRIMARY HYDRAULIC MANIFOLD DRAIN HOSE REPLACEMENT – continued

7.19.3. Removal

a. **Remove hose (1) from tube (2).**

(1) Loosen and remove clamp (3).

b. **Remove two clamps (4) from bracket (5).**

(1) Hold screw (6). Remove nut (7).

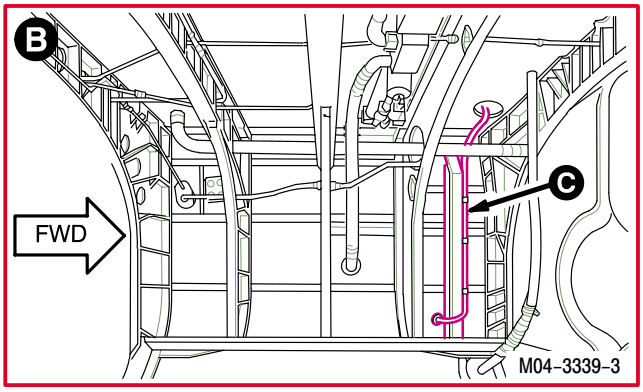
(2) Remove screw (6), washer (8), two clamps (4), and spacer (9) from bracket (5).

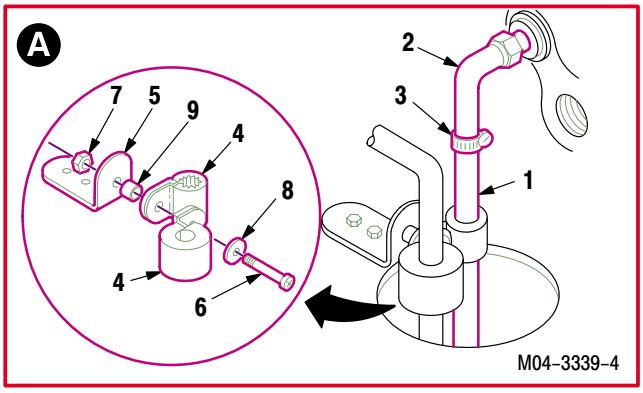
c. **Remove clamp (10) from bracket (11) (three places).**

(1) Hold screw (12). Remove nut (13) and washer (14).

(2) Remove screw (12) and clamp (10).

d. **Remove and discard hose (1) from grommet (15).**





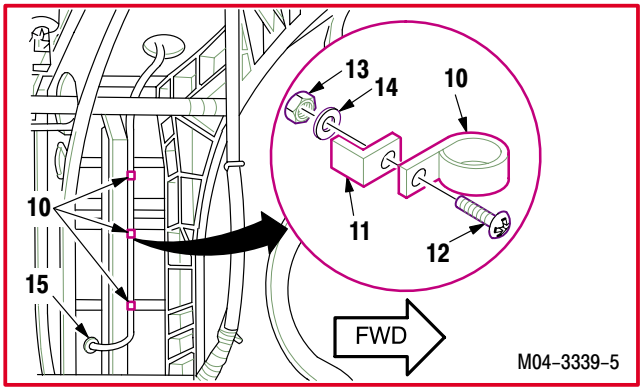
7.19.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.19.5. Inspection

a. **Check grommet for deterioration.** None allowed.

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**



7.19.6. Installation

a. **Install clamp (3) on new hose (1).**

(1) Position clamp (3) over hose (1).

(2) Slide hose (1) over tube (2).

(3) Tighten clamp (3) around hose (1) and tube (2).

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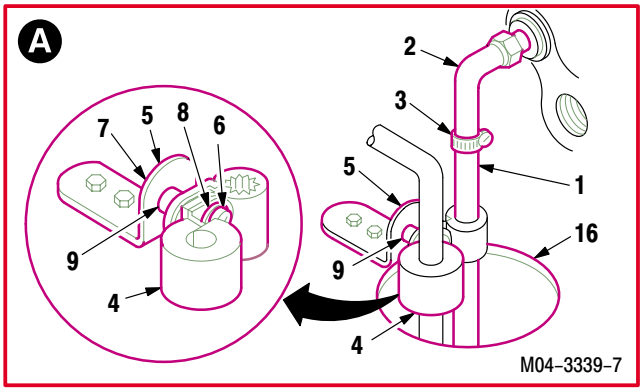
7.19. PRIMARY HYDRAULIC MANIFOLD DRAIN HOSE REPLACEMENT – continued

b. **Install two clamps (4) on bracket (5).**

(1) Route hose (1) through hole (16).

(2) Install screw (6) through washer (8), clamps (4), spacer (9), and bracket (5).

(3) Hold screw (6). Install nut (7).

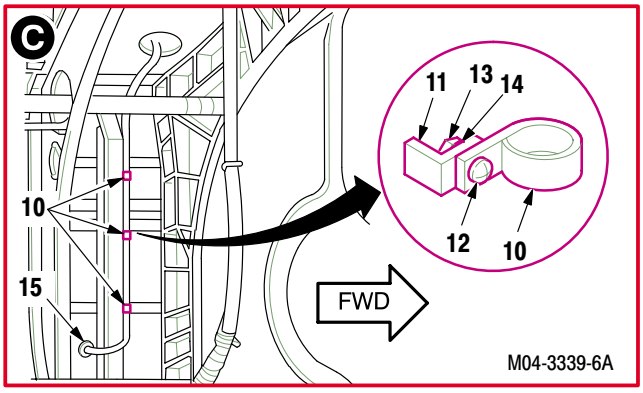


c. **Install clamp (10) on hose (1) (three places).**

(1) Install screw (12) through clamp (10) and bracket (11).

(2) Install washer (14) and nut (13).

(3) Hold screw (12). Tighten nut (13).



d. **Route hose (1) through grommet (15).**

e. **Inspect (QA).**

f. **Install ammunition magazine** (TM 9-1090-208-23)**.**

g. **Install access panels B200 and L200** (para 2.2)**.**

END OF TASK

7.20. PRIMARY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION

7.20.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.20.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Airframe repairman's tool kit (item 377, App H)

Personnel Required:

67R	Attack Helicopter Repairer
68G	Aircraft Structural Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Rivets (5)

References:

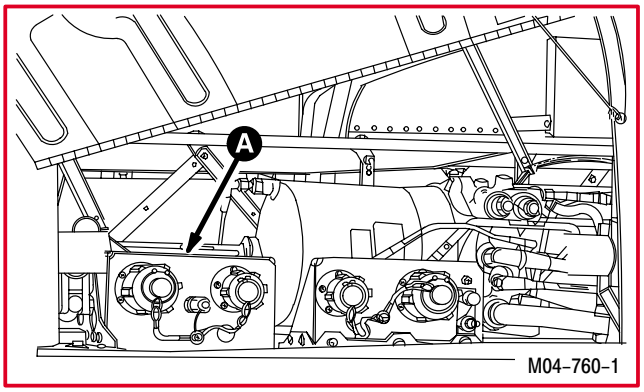
TM 1-1500-204-23

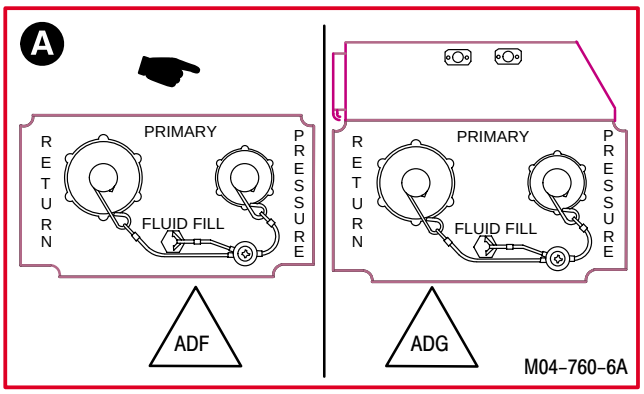
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing T325 removed
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented
7.22	Primary hydraulic GSE fill port nipple removed
7.23	Primary hydraulic GSE pressure coupling removed
7.24	Primary hydraulic GSE return coupling removed
7.25	Hydraulic hand pump removed

NOTE

This task typical for primary hydraulic GSE panel with or without filter bracket installed.





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7.20. PRIMARY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION – continued

7.20.3. Removal

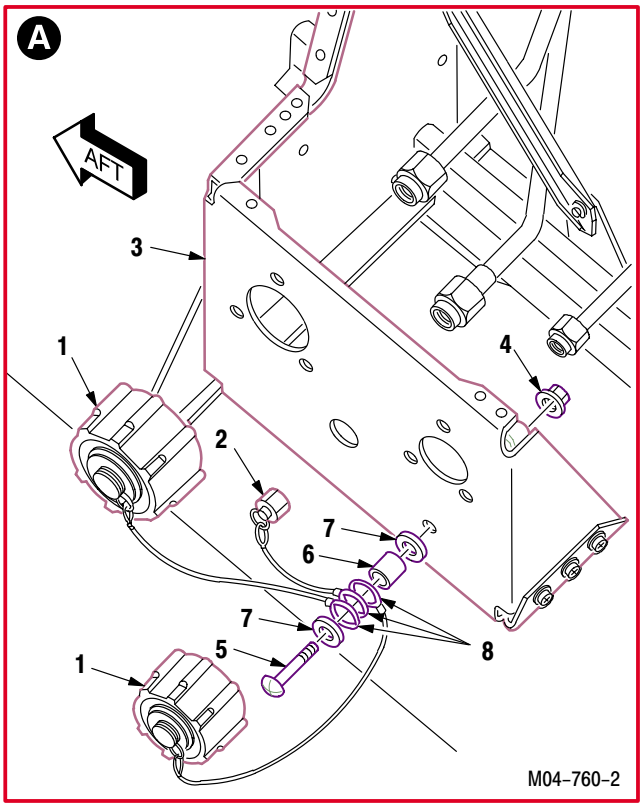
a. **Remove dust caps (1) and fill port cap (2) from primary hydraulic GSE panel (3).**

(1) Hold nut (4).

(2) Remove screw (5), spacer (6), and two washers (7).

(3) Remove three cables (8) from spacer (6).

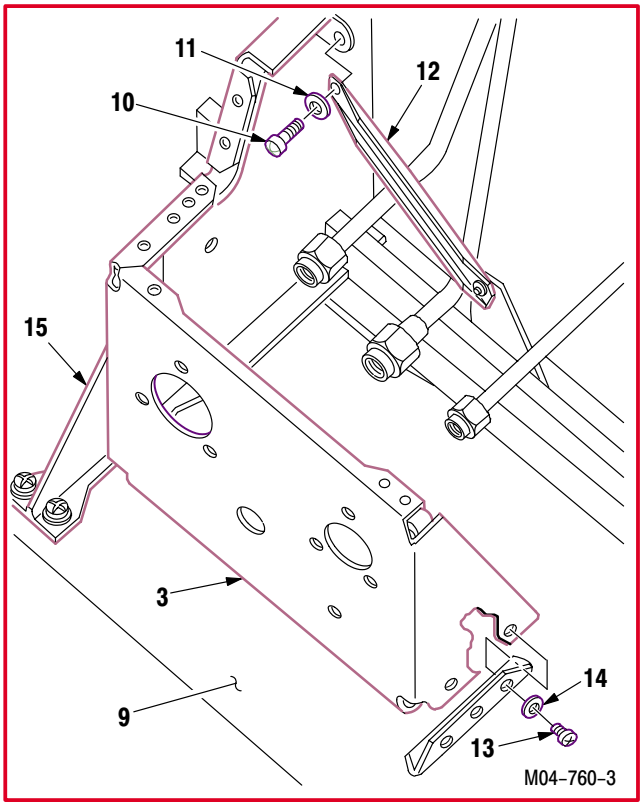
(4) Remove caps (1) and (2).



b. **Remove panel (3) from deck (9).**

(1) Remove screw (10) and washer (11) from brace (12).

(2) Remove 14 screws (13) and washers (14) from panel (3) and hand pump support (15).



GO TO NEXT PAGE

7.20. PRIMARY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION – continued

c. **Remove bracket (16) from panel (3).**

(1) Remove screw (17).

(2) Remove screw (18) and washer (19).

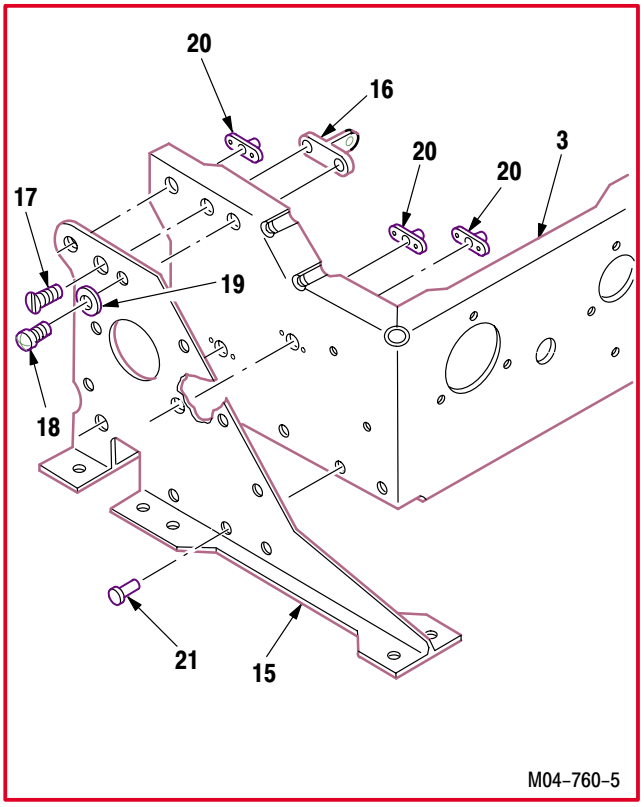
(3) Remove bracket (16).

d. **Remove three nutplates (20) from panel (3)** (TM 1-1500-204-23)**.**

e. **Remove support (15) from panel (3).**

(1) Remove eight rivets (21) from support (15) and panel (3) (TM 1-1500-204-23).

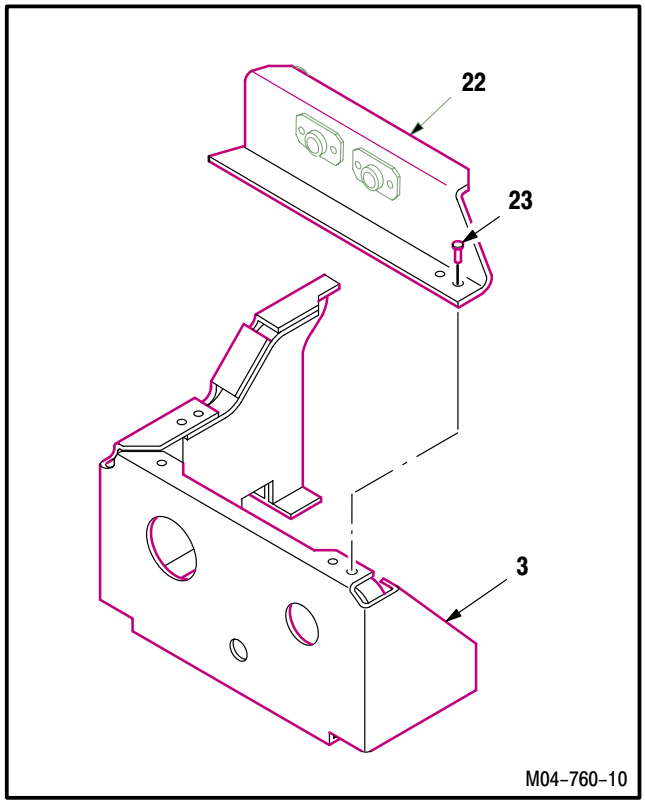
(2) Remove support (15).



f. **If required, remove bracket (22) from panel (3) installed.**

(1) Remove five rivets (23) from bracket (22) and panel (3) (TM 1-1500-204-23).

(2) Remove bracket (22).



7.20.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.20.5. Inspection

a. **Check panel, support, and bracket for dents, nicks, or cracks** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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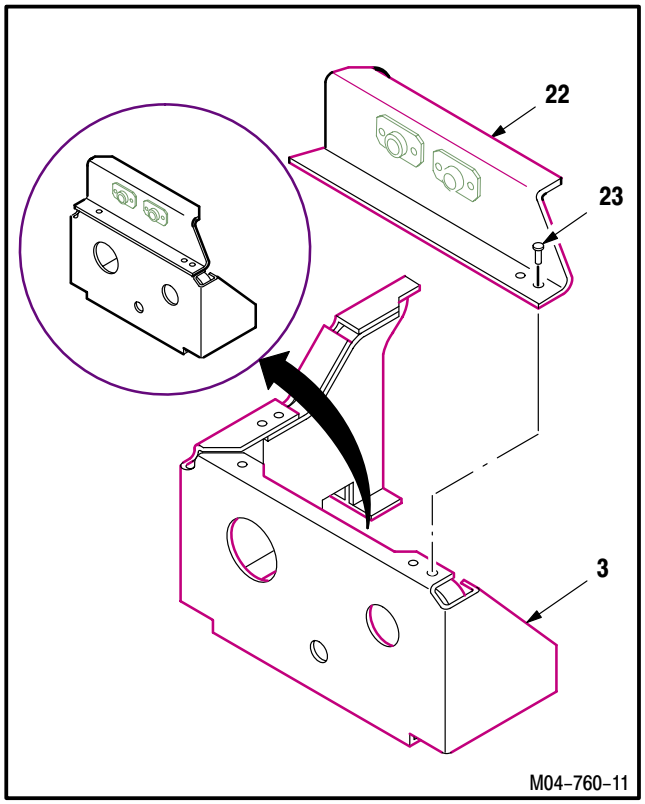
7.20. PRIMARY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION – continued

7.20.6. Installation

a. **If removed, install bracket (22) on panel (3).**

(1) Aline bracket (22) with panel (3).

(2) Install five rivets (23) through bracket (22) and panel (3) (TM 1-1500-204-23).



b. **Install support (15) on panel (3).**

(1) Aline support (15) with panel (3).

(2) Install eight rivets (21) (TM 1-1500-204-23).

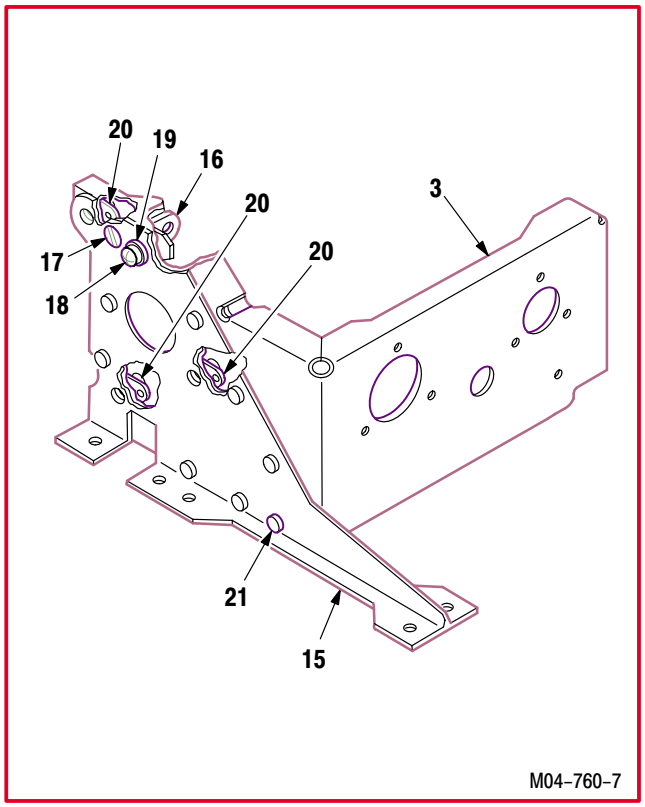
c. **Install three nutplates (20) on panel (3)** (TM 1-1500-204-23)**.**

d. **Install bracket (16) on panel (3).**

(1) Aline bracket (16) with panel (3).

(2) Install screw (17).

(3) Install screw (18) and washer (19).



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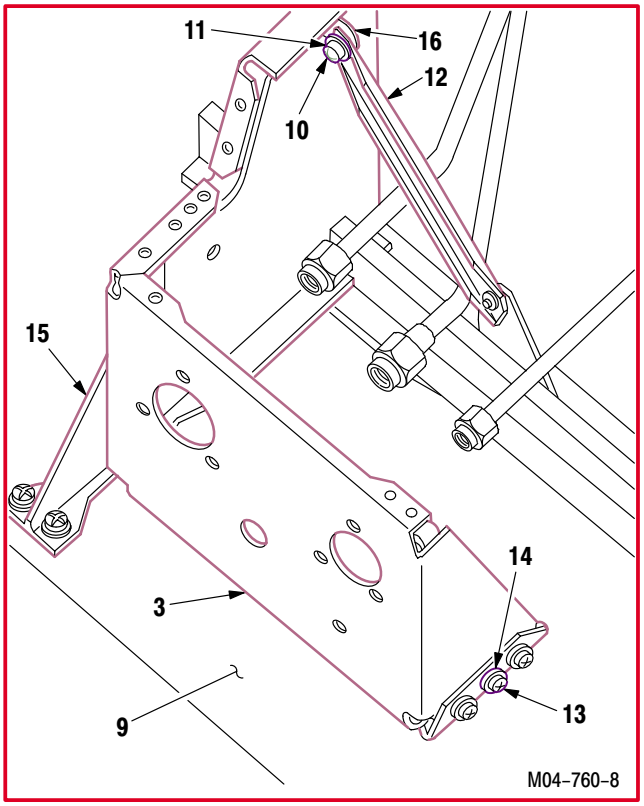
7.20. PRIMARY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION – continued

e. **Install panel (3) on deck (9).**

(1) Aline panel (3) and support (15) on deck (9).

(2) Install 14 screws (13) and washers (14) through panel (3) and support (15) into deck (9).

(3) Install screw (10) and washer (11) through brace (12) into bracket (16).

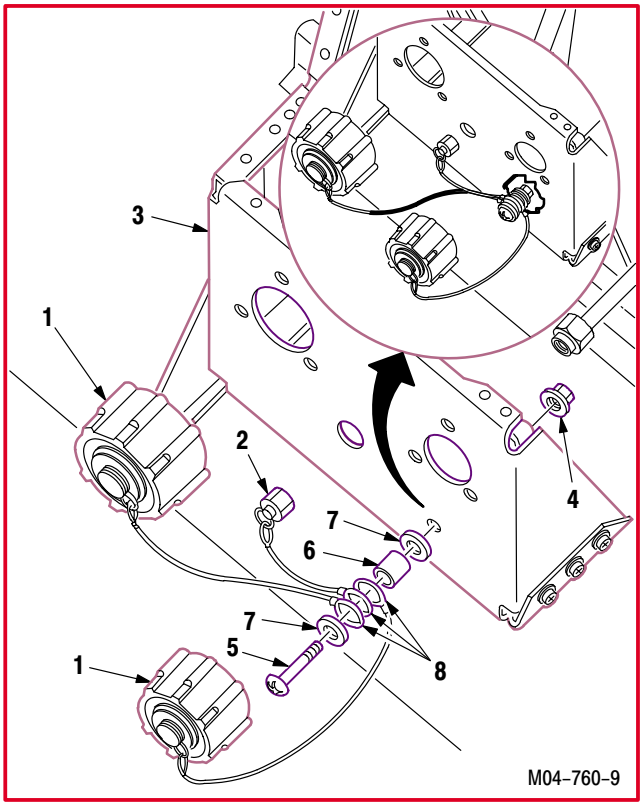


f. **Install caps (1) and cap (2) on panel (3).**

(1) Insert spacer (6) through three cables (8).

(2) Install screw (5) through two washers (7) and spacer (6) into panel (3).

(3) Install nut (4).



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7.20. PRIMARY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION – continued

g. **Inspect (QA).**

h. **Install primary hydraulic GSE fill port nipple** (para 7.22)**.**

i. **Install primary hydraulic GSE pressure coupling** (para 7.23)**.**

j. **Install primary hydraulic GSE return coupling** (para 7.24)**.**

k. **Install hydraulic hand pump** (para 7.25)**.**

l. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

m. **Service primary and utility hydraulic systems** (para 1.34)**.**

n. **Perform hydraulic system leak check** (para 7.2)**.**

o. **Install access fairing T325** (para 2.2)**.**

END OF TASK

7.21. PRIMARY HYDRAULIC GSE FILL PORT FORTY-FIVE MICRON SCREEN FILTER REPLACEMENT (ADF)

7.21.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.21.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

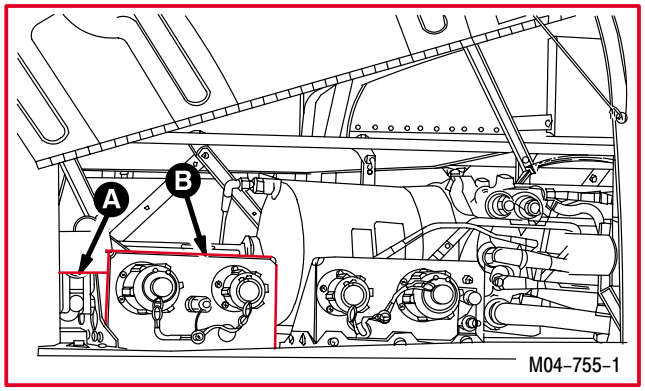
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented



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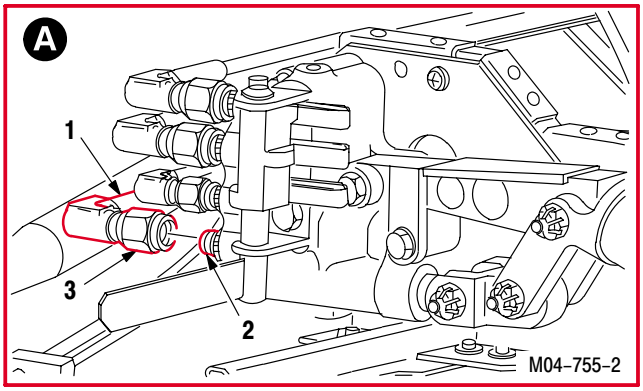
7.21. PRIMARY HYDRAULIC GSE FILL PORT FORTY-FIVE MICRON SCREEN FILTER REPLACEMENT (ADF) – continued

7.21.3. Removal

a. **Remove tube (1) from adapter (2).**

(1) Place rags under tube (1) to catch hydraulic fluid spills.

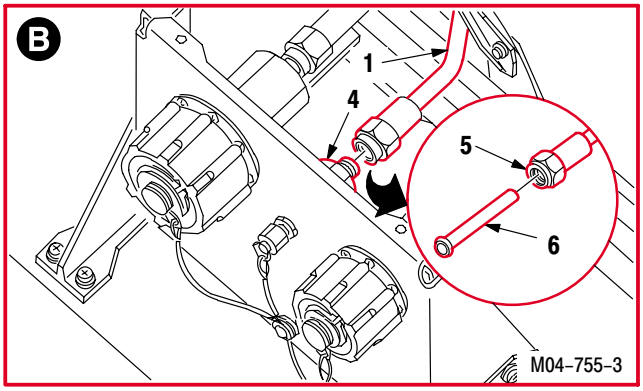
(2) Remove nut (3).



b. **Remove tube (1) from union (4).**

(1) Hold union (4). Remove nut (5).

(2) Remove and discard filter (6).



7.21.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.21.5. Inspection

a. **Check tube, adapter, and union for stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for nicks, scratches, cracks, stripped threads, and rounded flats** (para 10.1)**.**

7.21.6. Installation

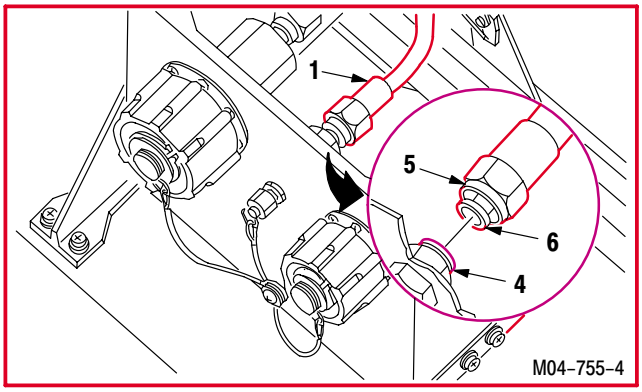
a. **Install new filter (6) in tube (1).**



b. **Install tube (1) on union (4).**

(1) Lubricate union (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (4). Install nut (5).



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7.21. PRIMARY HYDRAULIC GSE FILL PORT FORTY-FIVE MICRON SCREEN FILTER REPLACEMENT (ADF) – continued

c. **Install tube (1) on adapter (2).**

(1) Lubricate adapter (2). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (3) on adapter (2).

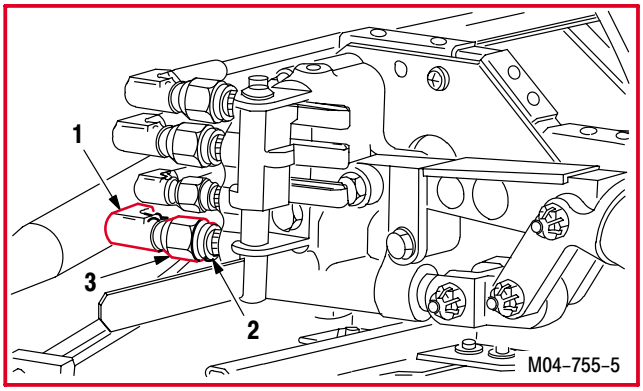
d. **Inspect (QA).**

e. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

f. **Service primary and utility hydraulic systems** (para 1.34)**.**

g. **Perform hydraulic system leak check** (para 7.2)**.**

h. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.21A. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ELEMENT REPLACEMENT (ADG)

7.21A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.21A.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

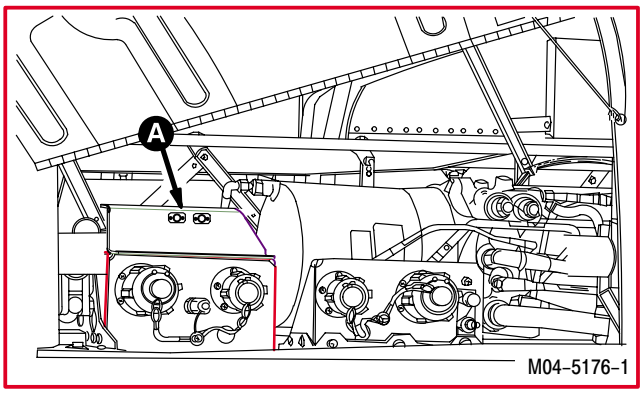
Packing (2)
Retainer packing
Filter element
Hydraulic fluid (item 92, App F)
Wire (item 227, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented



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7.21A. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ELEMENT REPLACEMENT (ADG) – continued

7.21A.3. Removal

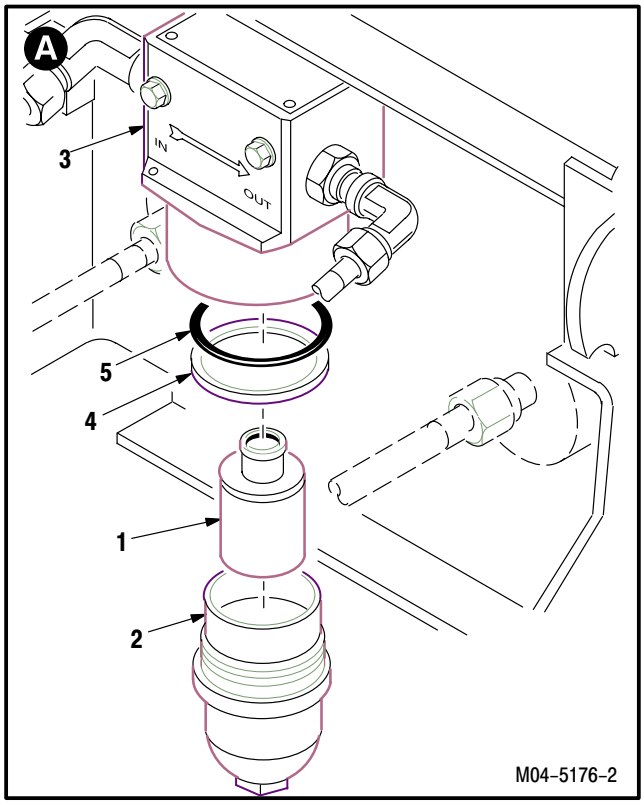
a. **Remove filter element (1) from filter bowl housing (2).**

(1) Remove lockwire from housing (2).

(2) Remove housing (2) from filter (3).

(3) Remove retainer packing (4) and packing (5).

(4) Remove and discard housing packing (5), and element (1).



7.21A.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.21A.5. Inspection

a. **Check filter and filter bowl for stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for nicks, scratches, cracks, stripped threads, and rounded flats** (para 10.1)**.**

GO TO NEXT PAGE

7.21A. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ELEMENT REPLACEMENT (ADG) – continued

7.21A.6. Installation

NOTE

The new filter element contains a packing in it that must be removed and lubricated prior to installation.

a. **Install filter element (1) in bowl (2).** Torque bowl to **27 INCH-POUNDS.**

(1) Remove packing (6) from inside of new element (1).

(2) Lubricate packings (6), (5), and retainer packing (4). Use clean hydraulic fluid (item 92, App F).

(3) Install packing (6) in element (1) and install in bowl (2).

(4) Install packing (5) and retainer (4) in bowl (2).

(5) Install bowl (2) on filter (3).

(6) Torque bowl (2) to **27 INCH-POUNDS**. Use torque wrench.

(7) Lockwire bowl (2) to filter (3). Use wire (item 227, App F).

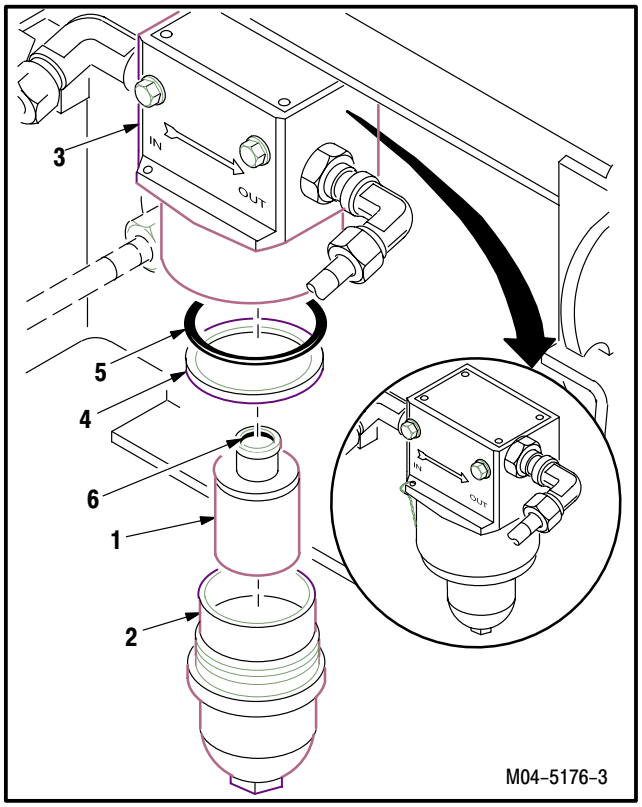
b. **Inspect (QA).**

c. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

d. **Service primary and utility hydraulic systems** (para 1.34)**.**

e. **Perform hydraulic system leak check** (para 7.2)**.**

f. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.21B. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ASSEMBLY REPLACEMENT (ADG)

7.21B.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.21B.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

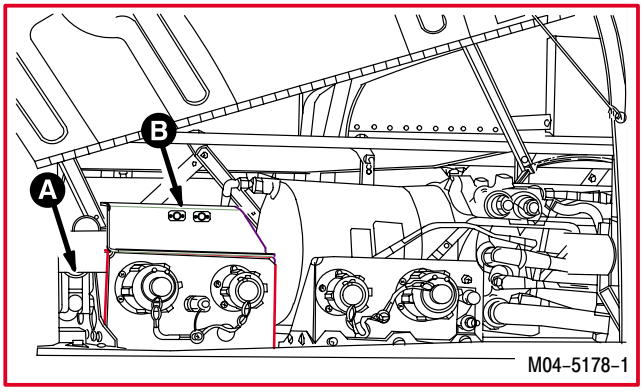
Packing (2)
Retainer packing (2)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented



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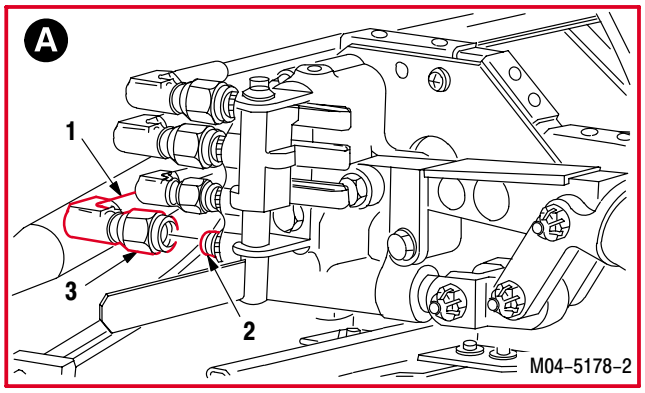
7.21B. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ASSEMBLY REPLACEMENT (ADG) – continued

7.21B.3. Removal

a. **Remove tube (1) from adapter (2).**

(1) Place rags under tube (1) to catch hydraulic fluid spills.

(2) Remove nut (3).

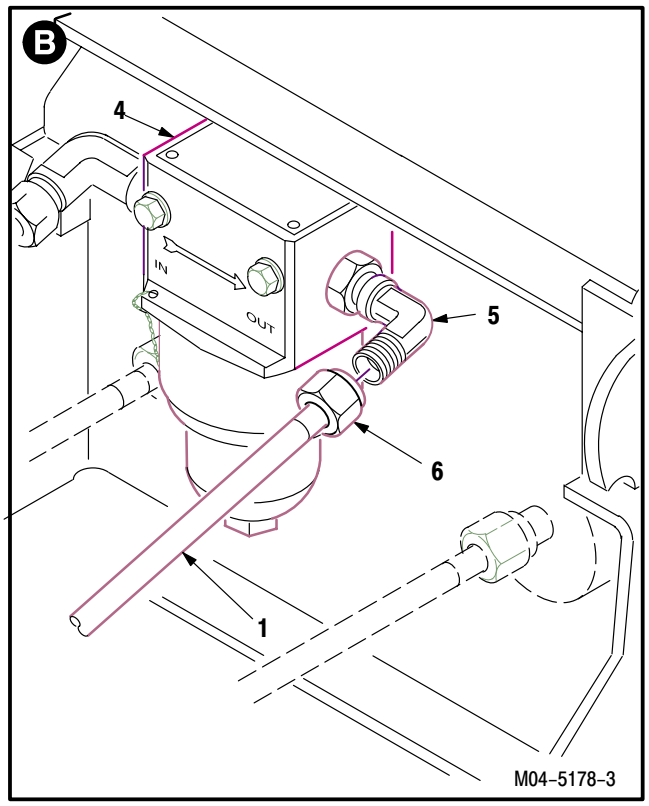


b. **Remove tube (1) from filter (4).**

(1) Place rags under filter (4) to catch hydraulic fluid spills.

(2) Hold elbow (5). Remove nut (6).

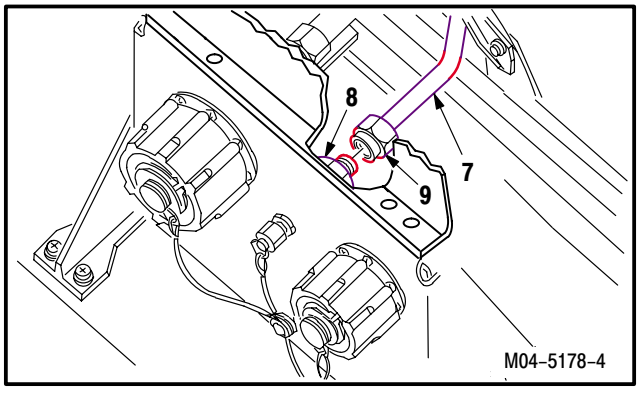
(3) Remove tube (1).



c. **Remove tube (7) from union (8).**

(1) Place rags under tube (7) to catch hydraulic fluid spills.

(2) Hold union (8). Remove nut (9).



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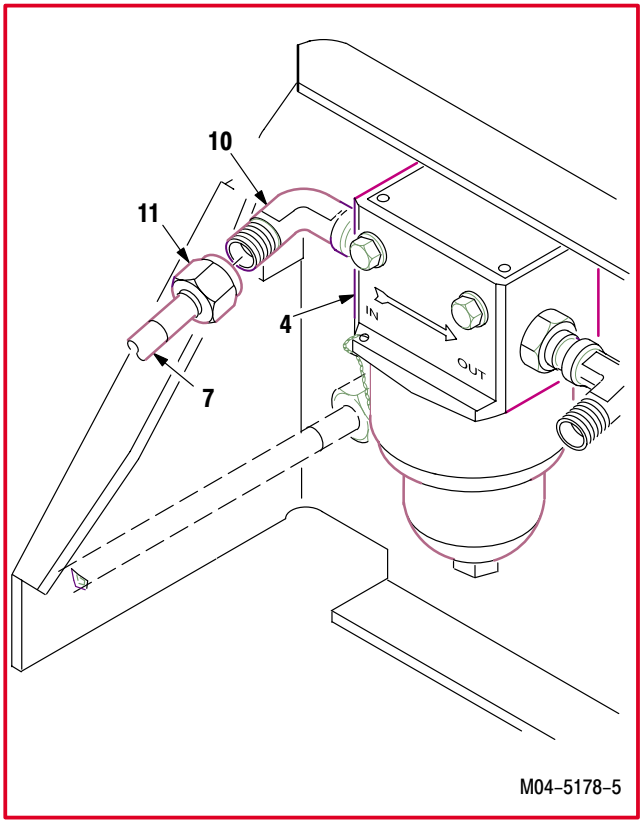
7.21B. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ASSEMBLY REPLACEMENT (ADG) – continued

d. **Remove tube (7) from filter (4).**

(1) Place rags under tube (7) to catch hydraulic fluid spills.

(2) Hold elbow (10). Remove nut (11).

(3) Remove tube (7).



e. **Remove filter (4) from bracket (12).**

(1) Remove two bolts (13), washers (14), and spacers (15) from filter (4).

(2) Remove filter (4) from bracket (12).

f. **Remove elbow (10) from filter (4).**

(1) Hold elbow (10). Loosen nut (16).

(2) Remove elbow (10) and nut (16) from filter (4).

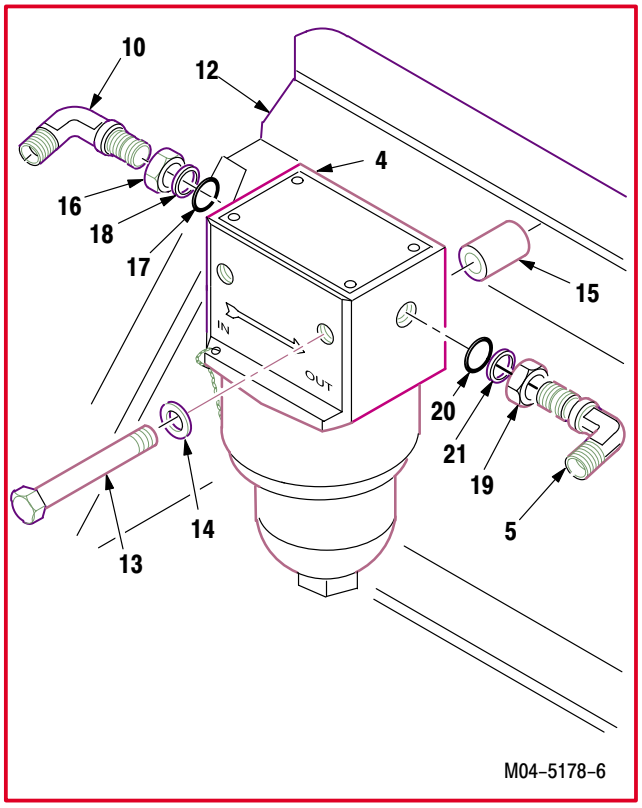
(3) Remove and discard packing (17) and retainer packing (18).

g. **Remove elbow (5) from filter (4).**

(1) Hold elbow (5). Loosen nut (19).

(2) Remove elbow (5) and nut (19) from filter (4).

(3) Remove and discard packing (20) and retainer packing (21).



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7.21B. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ASSEMBLY REPLACEMENT (ADG) – continued

7.21B.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.21B.5. Inspection

a. **Check tubes, elbows, and filter for stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for nicks, scratches, cracks, stripped threads, and rounded flats** (para 10.1)**.**

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7.21B. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ASSEMBLY REPLACEMENT (ADG) – continued

7.21B.6. Installation

CAUTION

To prevent filter assembly from being installed backwards ensure arrow on filter points aft. Failure to comply could result in damage to equipment.

NOTE

Do not torque nuts at this time to allow for alinement of components.

a. **Install elbow (10) on filter (4).**

(1) Lubricate elbow (10), packing (17), and retainer packing (18). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (16), retainer packing (18), and packing (17), on elbow (10).

(3) Install elbow (10) in filter (4).

b. **Install elbow (5) on filter (4).**

(1) Lubricate elbow (5), packing (20), and retainer packing (21). Use clean hydraulic fluid (item 92, App F).

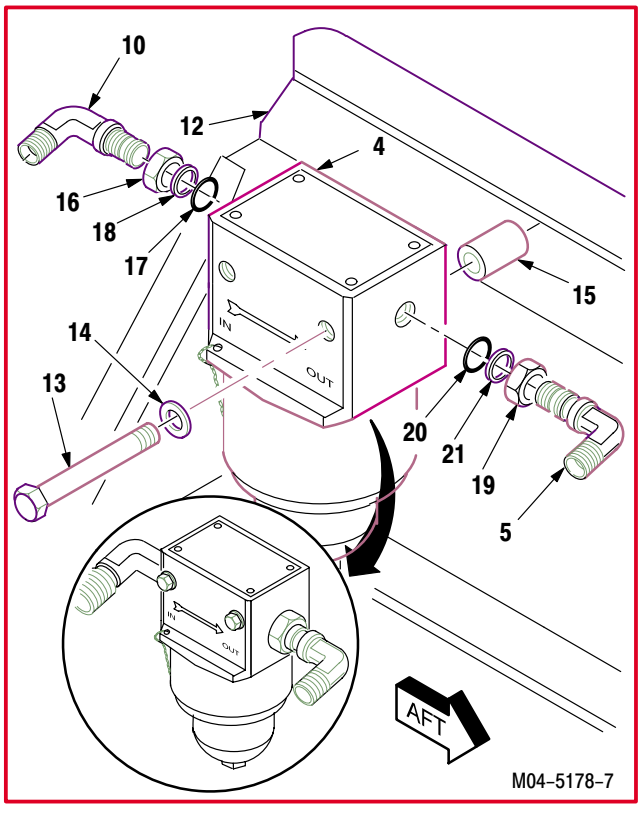
(2) Install nut (19), retainer packing (21), and packing (20) on elbow (5).

(3) Install elbow (5) in filter (4).

c. **Install filter (4) on bracket (12).**

(1) Align filter (4) on bracket (12).

(2) Install two bolts (13) through two washers (14), filter (4), two spacers (15), and bracket (12).



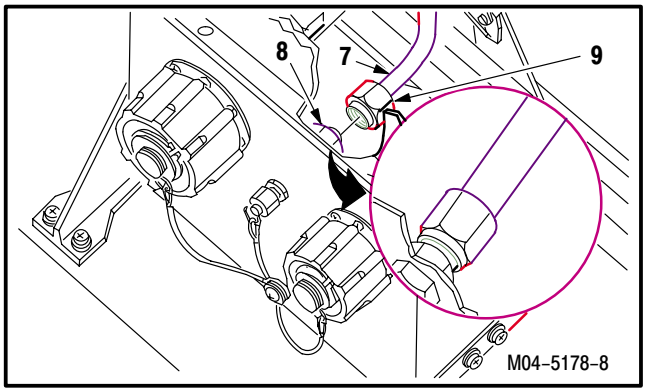
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7.21B. PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ASSEMBLY REPLACEMENT (ADG) – continued

d. **Install tube (7) on union (8).**

(1) Lubricate union (8). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (8). Install nut (9).

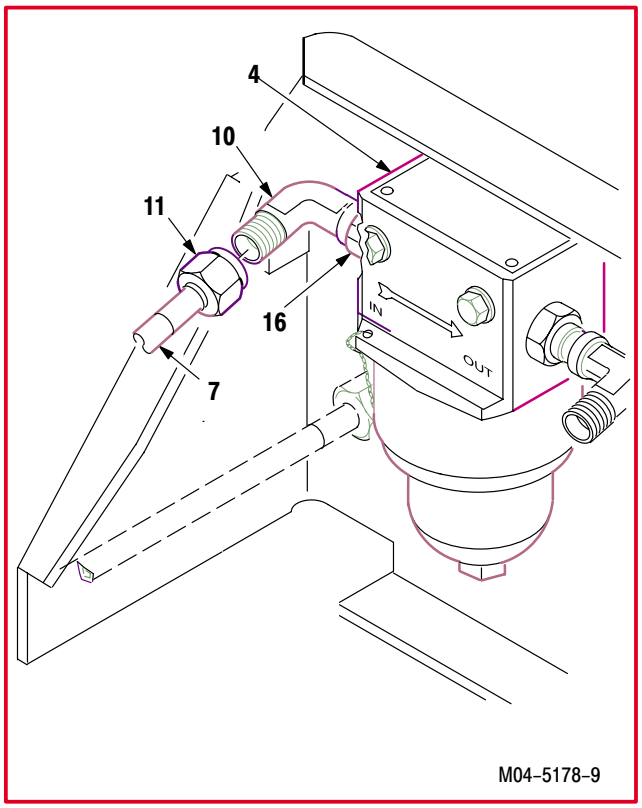


e. **Install tube (7) on filter (4).** Torque nut (16) to **95 INCH-POUNDS.**

(1) Lubricate elbow (10). Use clean hydraulic fluid (item 92, App F).

(2) Hold elbow (10). Install nut (11).

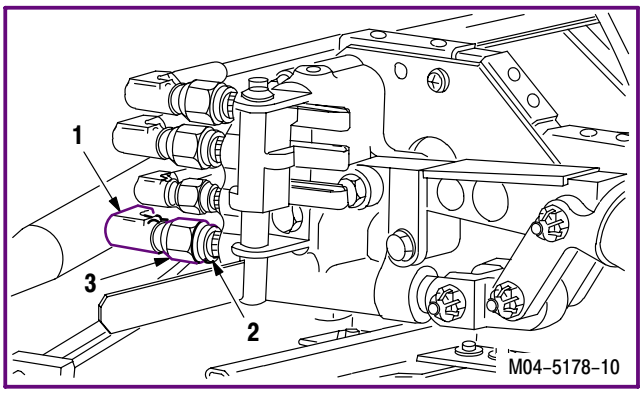
(3) Torque nut (16) to **95 INCH-POUNDS**. Use torque wrench.



f. **Install tube (1) on adapter (2).**

(1) Lubricate adapter (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold adapter (2). Install nut (3).



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7.21B PRIMARY HYDRAULIC GSE FILL PORT FIVE MICRON CARTRIDGE FILTER ASSEMBLY REPLACEMENT (ADG) – continued

g. **Install tube (1) on filter (4).** Torque nut (19) to **95 INCH-POUNDS.**

(1) Lubricate elbow (5). Use clean hydraulic fluid (item 92, App F).

(2) Hold elbow (5). Install nut (6).

(3) Torque nut (19) to **95 INCH-POUNDS**. Use torque wrench.

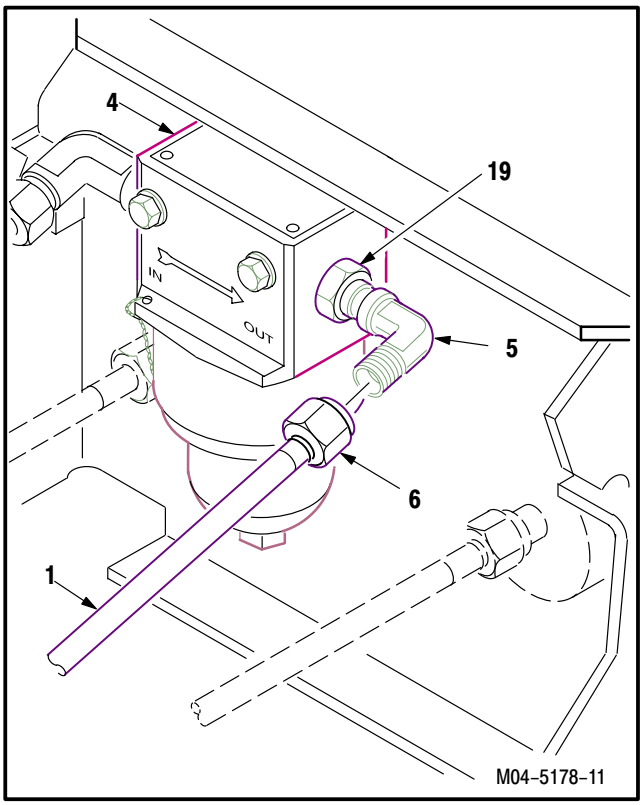
h. **Inspect (QA).**

i. **Bleed primary and utility hydraulic system** (para 1.35)**.**

j. **Service primary and utility hydraulic system** (para 1.34)**.**

k. **Perform hydraulic system leak check** (para 7.2)**.**

l. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.22. PRIMARY HYDRAULIC GSE FILL PORT NIPPLE REPLACEMENT

7.22.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.22.2. Initial Setup

Tools:

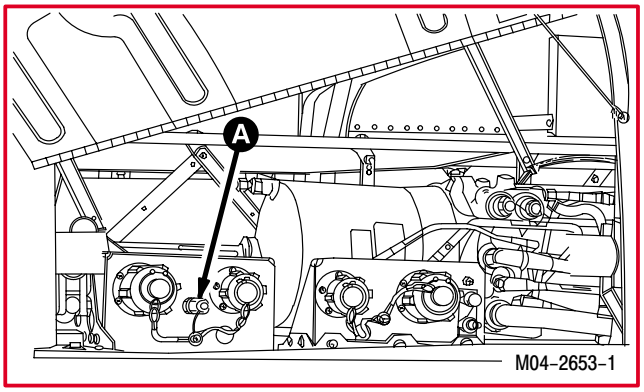
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
7.21	Primary hydraulic GSE fill port forty-five micron screen filter tube removed (ADF)
	or
7.21B	Primary hydraulic GSE fill port five micron cartridge filter tube removed (ADG)



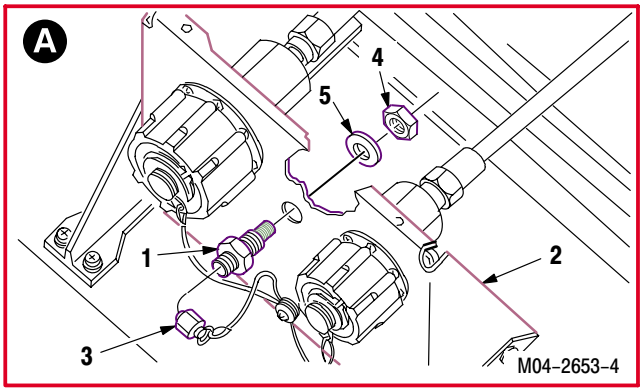
7.22.3. Removal

a. **Remove nipple (1) from GSE panel (2).**

(1) Remove cap (3) from nipple (1).

(2) Hold nipple (1). Remove nut (4) and washer (5).

(3) Remove nipple (1).



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7.22. PRIMARY HYDRAULIC GSE FILL PORT NIPPLE REPLACEMENT – continued

7.22.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.22.5. Inspection

a. **Check removed and attaching parts for nicks, scratches, cracks, stripped threads, and rounded flats** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.22.6. Installation

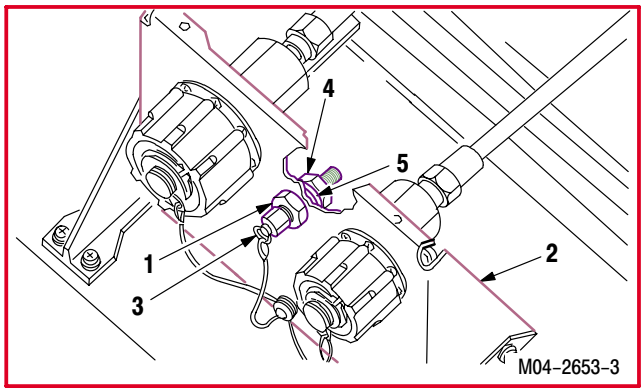
a. **Install new nipple (1) on panel (2).**

(1) Install nipple (1) on panel (2).

(2) Hold nipple (1). Install washer (5) and nut (4).

(3) Install cap (3).

b. **Install primary hydraulic GSE fill port five micron cartridge filter tube (ADG)** (para 7.21B) **or install primary hydraulic GSE fill port forty-five micron screen filter tube (ADF)** (para 7.21)**.**



END OF TASK

7.23. PRIMARY HYDRAULIC GSE PRESSURE COUPLING REPLACEMENT

7.23.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.23.2. Initial Setup

Tools:

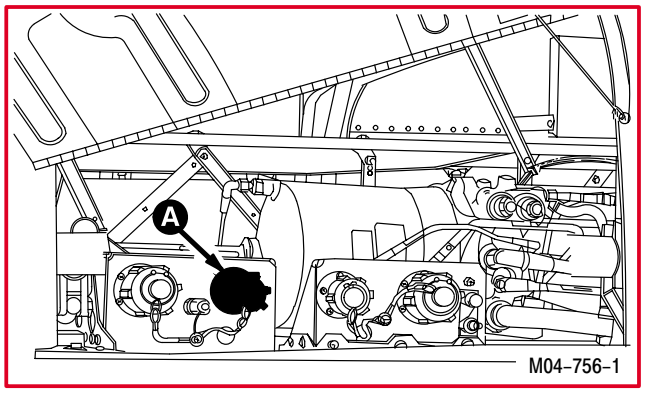
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.3	Primary hydraulic system vented



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7.23. PRIMARY HYDRAULIC GSE PRESSURE COUPLING REPLACEMENT – continued

7.23.3. Removal

a. **Remove dust cap (1) from GSE pressure coupling (2).**

b. **Remove pressure tube (3) from coupling (2).**

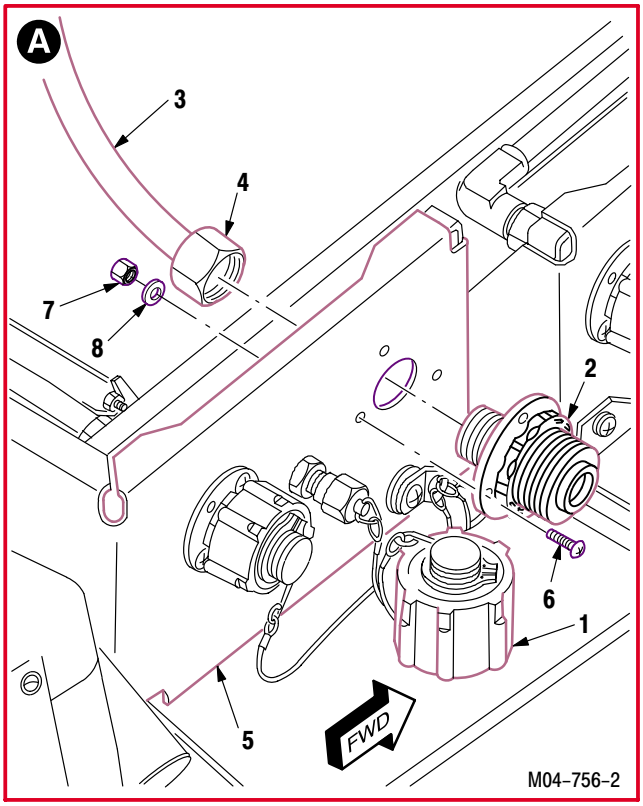
(1) Place rags under nut (4) to catch hydraulic fluid spills.

(2) Hold coupling (2). Remove nut (4).

c. **Remove coupling (2) from GSE panel (5).**

(1) Remove three screws (6), nuts (7), and washers (8).

(2) Remove coupling (2).



7.23.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.23.5. Inspection

a. **Check dust cap, tube, and nut for nicks, cracks, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.23. PRIMARY HYDRAULIC GSE PRESSURE COUPLING REPLACEMENT – continued

7.23.6. Installation

a. **Install new coupling (2) on panel (5).**

(1) Insert and aline coupling (2) through panel (5).

(2) Install three screws (6), washers (8), and nuts (7).

b. **Install tube (3) on coupling (2).**

(1) Hold coupling (2). Install nut (4).

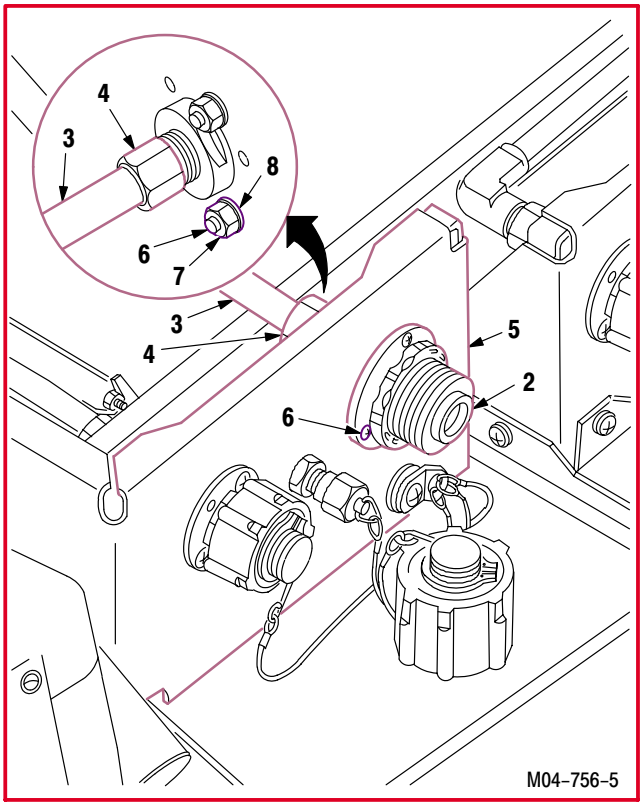
c. **Inspect (QA).**

d. **Bleed primary hydraulic system** (para 1.35)**.**

e. **Service primary hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.24. PRIMARY HYDRAULIC GSE RETURN COUPLING REPLACEMENT

7.24.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.24.2. Initial Setup

Tools:

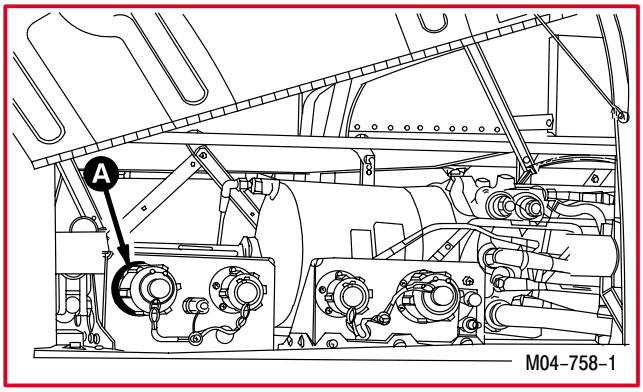
Aircraft mechanic's tool kit (item 376, App H)
1 1/4 & 1 5/16-inch open end wrench (item 419, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.3	Primary hydraulic system vented



GO TO NEXT PAGE

7.24. PRIMARY HYDRAULIC GSE RETURN COUPLING REPLACEMENT – continued

7.24.3. Removal

a. **Remove dust cap (1) from GSE return coupling (2).**

b. **Remove return tube (3) from coupling (2).**

(1) Place rags under nut (4) to catch hydraulic fluid spills.

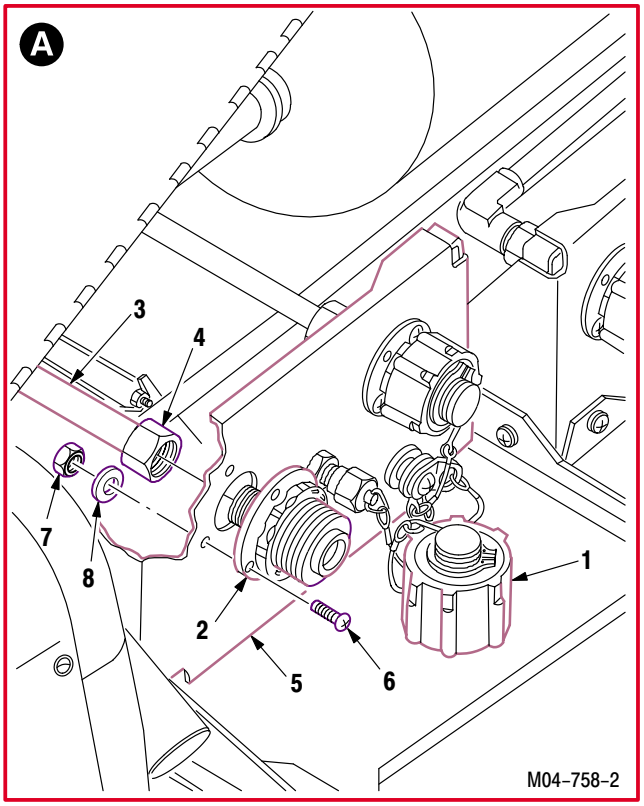
(2) Hold coupling (2). Use open end wrench.

(3) Remove nut (4).

c. **Remove coupling (2) from GSE panel (5).**

(1) Remove three screws (6), nuts (7), and washers (8).

(2) Remove coupling (2).



7.24.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.24.5. Inspection

a. **Check dust cap, tube, and nut for nicks, cracks, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.24. PRIMARY HYDRAULIC GSE RETURN COUPLING REPLACEMENT – continued

7.24.6. Installation

a. **Install new coupling (2) on panel (5).**

(1) Insert and aline coupling (2) through panel (5).

(2) Install three screws (6), washers (8), and nuts (7).

b. **Install tube (3) on coupling (2).**

(1) Hold coupling (2). Use open end wrench.

(2) Install nut (4).

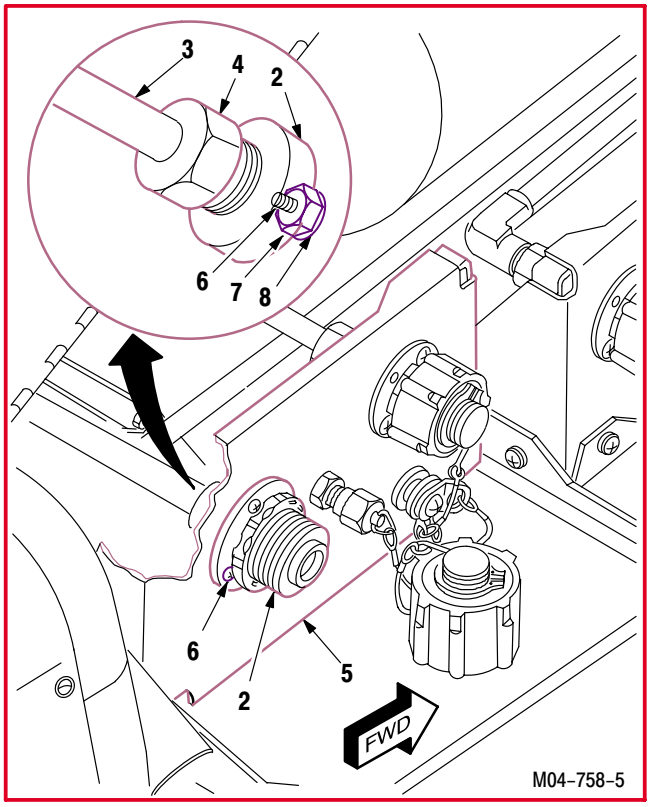
c. **Inspect (QA).**

d. **Bleed primary hydraulic system** (para 1.35)**.**

e. **Service primary hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.25. HYDRAULIC HAND PUMP REMOVAL/INSTALLATION

7.25.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.25.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

References:

TM 1-1520-238-T

Materials/Parts:

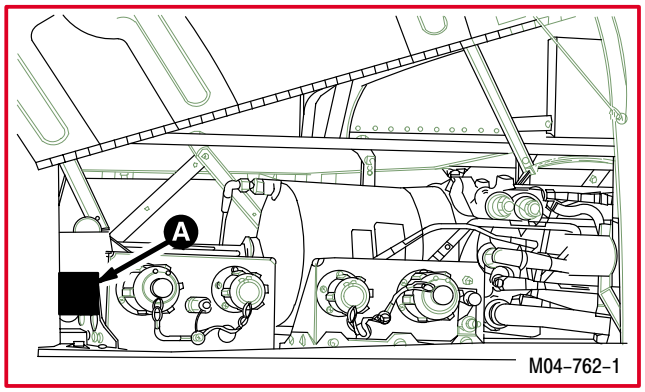
Hydraulic fluid (item 92, App F)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented



GO TO NEXT PAGE

7.25. HYDRAULIC HAND PUMP REMOVAL/INSTALLATION – continued

7.25.3. Removal

a. **Remove tube (1) from adapter (2).**

(1) Place rags around hydraulic hand pump (3) to catch hydraulic fluid spills.

(2) Remove nut (4) from adapter (2).

b. **Remove tube (5) from adapter (6).**

(1) Remove nut (7) from adapter (6).

c. **Remove tube (8) from adapter (9).**

(1) Remove nut (10) from adapter (9).

d. **Remove tube (11) from adapter (12).**

(1) Remove nut (13) from adapter (12).

e. **Remove pump (3) from GSE panel (14).**

(1) Remove three bolts (15), (16), and (17), and washers (18).

(2) Remove pump (3) from panel (14).

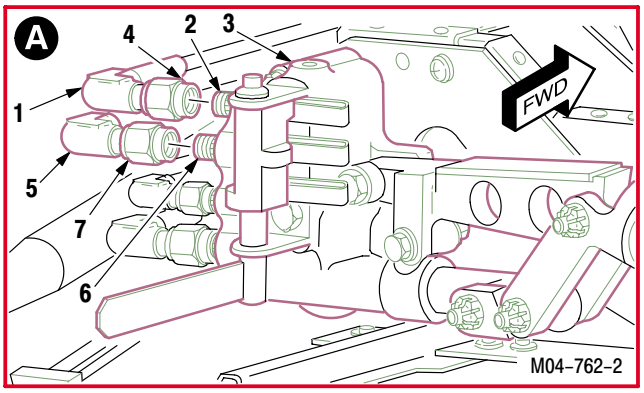
7.25.4. Cleaning

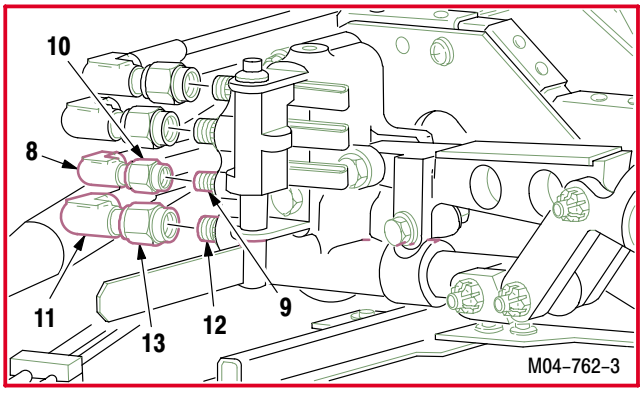
a. **Wipe removed and attaching parts with a clean rag.**

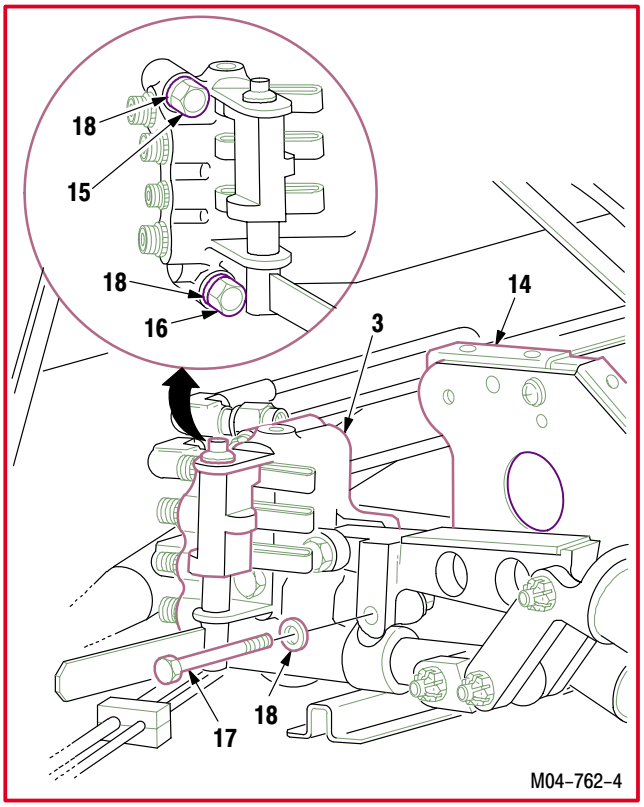
7.25.5. Inspection

a. **Check removed parts for nicks, dents, cracks, rounded flats, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**







GO TO NEXT PAGE

7.25. HYDRAULIC HAND PUMP REMOVAL/INSTALLATION – continued

7.25.6. Installation

NOTE

Ensure all shipping hardware is removed from three mounting areas of new hand pump before installation.

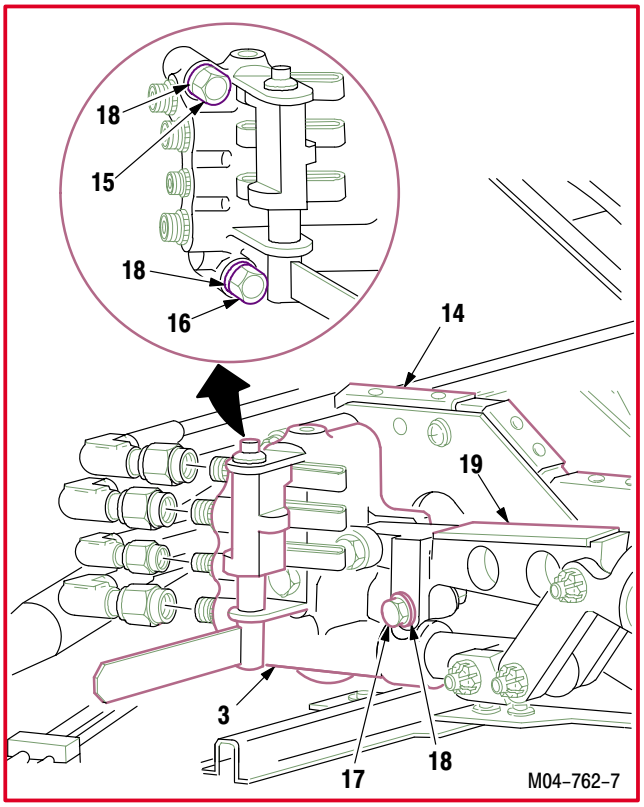
a. **Install pump (3) on panel (14).**

(1) Aline pump (3) on panel (14).

(2) Install two bolts (15) and (16) and washers (18).

(3) Aline holes on pump (3) and support (19).

(4) Install bolt (17) and washer (18).





b. **Install tube (11) on adapter (12).**

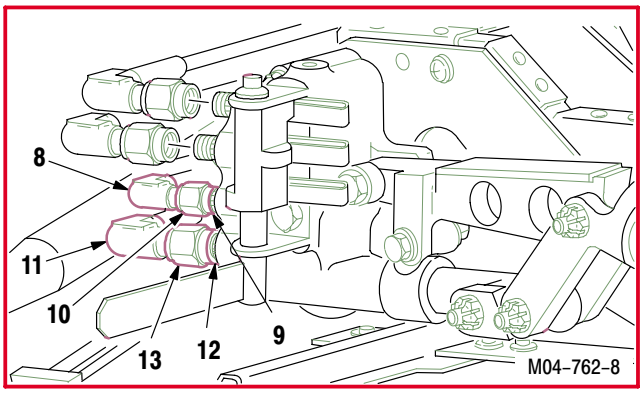
(1) Lubricate threads on adapter (12). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (13) on adapter (12).

c. **Install tube (8) on adapter (9).**

(1) Lubricate threads on adapter (9). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (10) on adapter (9).



GO TO NEXT PAGE

7.25. HYDRAULIC HAND PUMP REMOVAL/INSTALLATION – continued

d. **Install tube (5) on adapter (6).**

(1) Lubricate threads on adapter (6). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (7) on adapter (6).

e. **Install tube (1) on adapter (2).**

(1) Lubricate threads on adapter (2). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (4) on adapter (2).

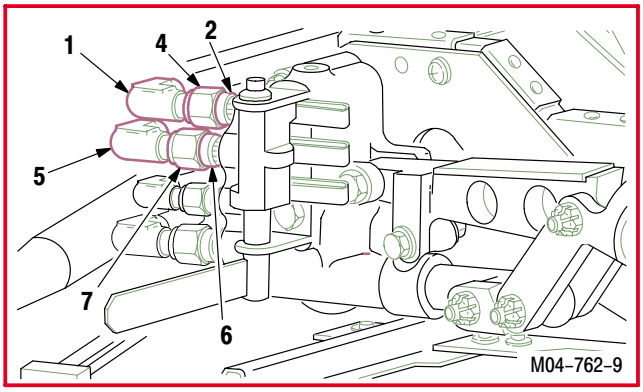
f. **Inspect (QA).**

g. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

h. **Service primary and utility hydraulic systems** (para 1.34)**.**

i. **Perform primary and utility hydraulic systems maintenance operational checks** (TM 1-1520-238-T)**.**

j. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.26. HYDRAULIC HAND PUMP LEVER BELLCRANK REPLACEMENT

7.26.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.26.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
7.25	Hydraulic hand pump removed

Materials/Parts:

Cotter pin (2)

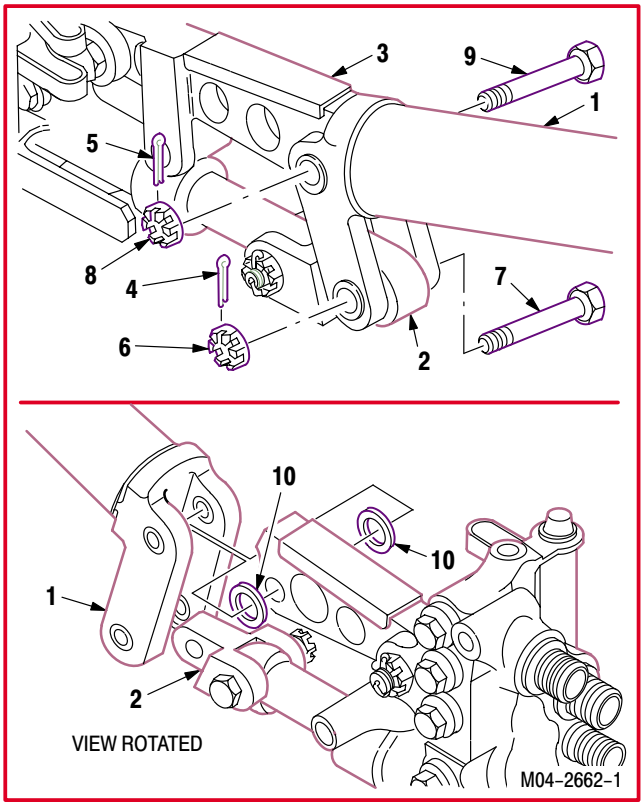
7.26.3. Removal

a. **Remove bellcrank (1) from articulating link (2) and support (3).**

(1) Remove and discard cotter pins (4) and (5).

(2) Hold nut (6). Remove bolt (7).

(3) Hold nut (8). Remove bolt (9), bellcrank (1), and two washers (10).



7.26.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.26.5. Inspection

a. **Check removed and attaching parts for nicks, dents, cracks, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.26. HYDRAULIC HAND PUMP LEVER BELLCRANK REPLACEMENT – continued

7.26.6. Installation

a. **Install bellcrank (1) on link (2) and support (3).**

(1) Aline bellcrank (1) on support (3).

(2) Install two washers (10) between support (3) and bellcrank (1).

(3) Install bolt (9).

(4) Aline bellcrank (1) on link (2).

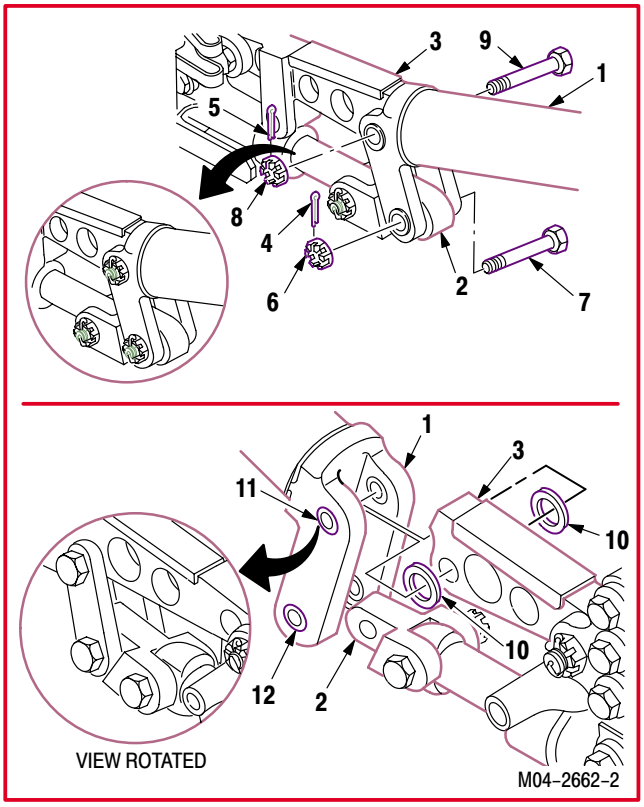
(5) Install bolt (7).

(6) Install nut (8) on bolt (9) until bushings (11) are just clamped. Continue tightening until cotter pin hole is alined.

(7) Install new cotter pin (5).

(8) Install nut (6) on bolt (7) until bushings (12) are just clamped. Continue tightening until cotter pin hole is alined.

(9) Install new cotter pin (4).



b. **Inspect (QA).**

c. **Install hydraulic hand pump** (para 7.25)**.**

END OF TASK

7.27. HYDRAULIC HAND PUMP PISTON REMOVAL/INSTALLATION

7.27.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.27.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Materials/Parts:

Cotter pin
Packing
Hydraulic fluid (item 92, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
7.25	Hydraulic hand pump removed

7.27.3. Removal

a. **Remove articulating link (1) from piston (2).**

(1) Remove and discard cotter pin (3) from bolt (4).

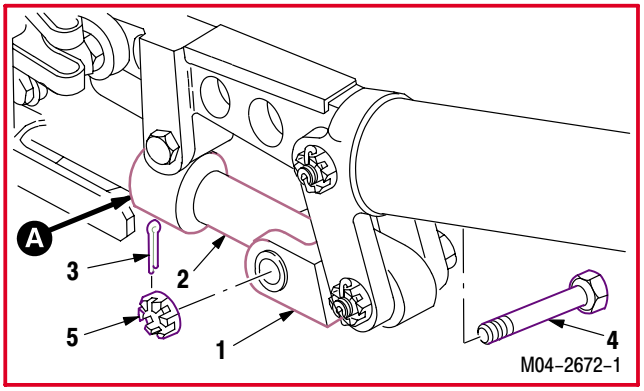
(2) Remove nut (5) and bolt (4).

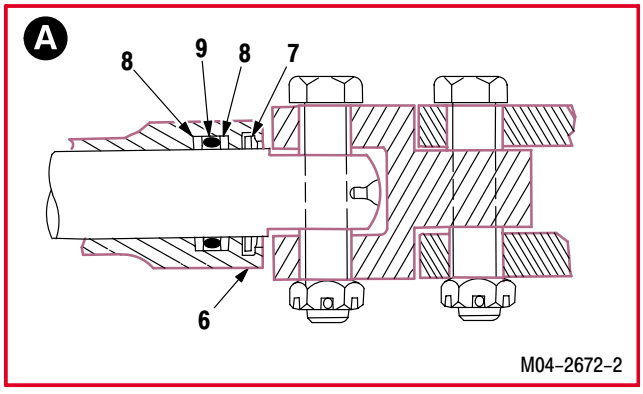
(3) Remove link (1) from piston (2).

b. **Remove piston (2) from piston bore (6).**

c. **Remove and retain scraper ring (7) and two retainers (8) from piston bore (6).**

(1) Remove and discard packing (9).





7.27.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

GO TO NEXT PAGE

7.27. HYDRAULIC HAND PUMP PISTON REMOVAL/INSTALLATION – continued

7.27.5. Inspection

a. **Check piston bore and removed parts for nicks, dents, cracks, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.27.6. Installation



a. **Install new packing (9) and two retainers (8).**

(1) Lubricate packing (9) and two retainers (8). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (9) between two retainers (8) in groove (10).

b. **Install scraper ring (7).**

(1) Lubricate scraper ring (7). Use clean hydraulic fluid (item 92, App F).

(2) Install scraper ring (7) in groove (11).

c. **Install piston (2) in piston bore (6).**

(1) Lubricate piston (2). Use clean hydraulic fluid (item 92, App F).

(2) Install piston (2) in piston bore (6).

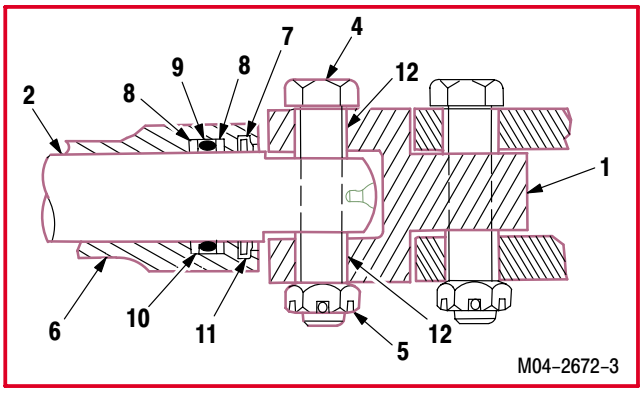
d. **Install link (1) on piston (2).**

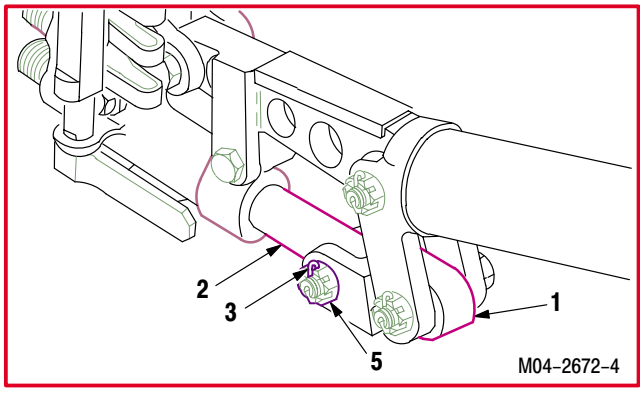
(1) Install bolt (4) through link (1) and piston (2).

(2) Install nut (5) on bolt (4).

(3) Tighten nut (5) until bushings (12) are just clamped. Continue tightening until cotter pin hole is alined.

(4) Install new cotter pin (3).





GO TO NEXT PAGE

7.27. HYDRAULIC HAND PUMP PISTON REMOVAL/INSTALLATION – continued

e. **Inspect (QA).**

f. **Install hydraulic hand pump** (para 7.25)**.**

END OF TASK

7.28. HYDRAULIC HAND PUMP SUPPORT REPLACEMENT

7.28.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.28.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
7.25	Hydraulic hand pump removed
7.29	Hydraulic hand pump selector lever and spring removed

Materials/Parts:

Cotter pin (2)

7.28.3. Removal

a. **Remove hand pump support (1) from hand pump (2).**

(1) Remove cotter pins (3) and (4).

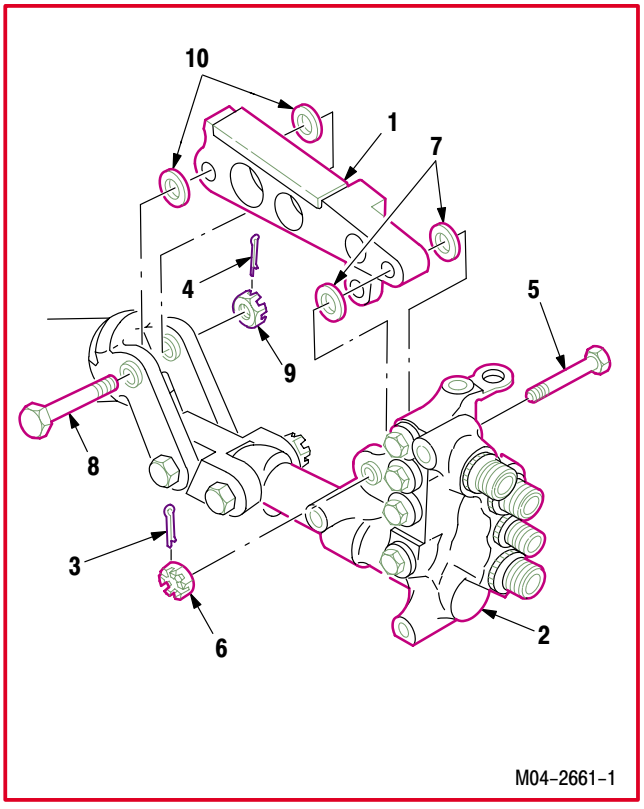
(2) Hold bolt (5). Remove nut (6).

(3) Remove bolt (5) and two washers (7).

(4) Hold bolt (8). Remove nut (9).

(5) Remove bolt (8) and two washers (10).

(6) Remove support (1).



7.28.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

GO TO NEXT PAGE

7.28. HYDRAULIC HAND PUMP SUPPORT REPLACEMENT – continued

7.28.5. Inspection

a. **Check removed and attaching parts for nicks, dents, cracks, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.28.6. Installation

a. **Install support (1) on pump (2).**

(1) Aline support (1) between pump lugs (11).

(2) Install one washer (7) on each side of support (1) between support (1) and lugs (11).

(3) Install bolt (5).

(4) Aline support (1) between bellcrank lugs (12).

(5) Install one washer (10) on each side of support (1) between support (1) and lugs (12).

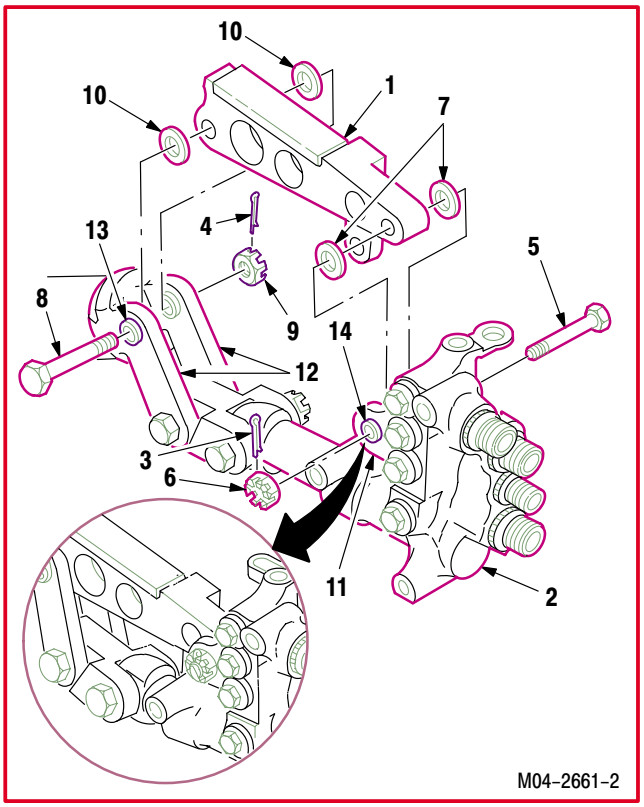
(6) Install bolt (8).

(7) Install nut (9) on bolt (8) until bushings (13) are just clamped. Continue tightening until cotter pin hole is alined.

(8) Install new cotter pin (4).

(9) Install nut (6) on bolt (5) until bushings (14) are just clamped. Continue tightening until cotter pin hole is alined.

(10) Install new cotter pin (3).



b. **Inspect (QA).**

c. **Install hydraulic hand pump selector lever and spring** (para 7.29)**.**

d. **Install hydraulic hand pump** (para 7.25)**.**

END OF TASK

7.29. HYDRAULIC HAND PUMP SELECTOR LEVER REPLACEMENT (AVIM)

7.29.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.29.2. Initial Setup

Tools:

Airframe repairman's tool kit (item 377, App H)

Materials/Parts:

Collar
Swage pin

Personnel Required:

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23

7.29.3. Removal

a. **Remove and discard swage pin (1) and collar (2)** (TM 1-1500-204-23)**.**

(1) Remove lever (3), washer (4), and camshaft (5).

NOTE

If selector spring is to be replaced, go to step b. If not, go to paragraph 7.29.4.

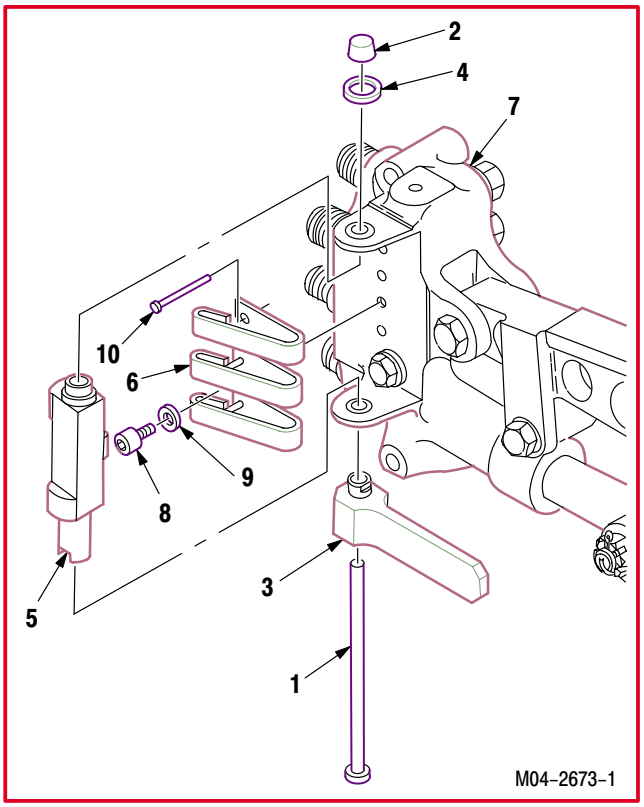
b. **Remove selector spring (6) from manifold (7).**

(1) Remove bolt (8) and washer (9) from spring (6).

(2) Remove spring (6) and three pins (10) from manifold (7).

(3) Remove and retain three pins (10) from spring (6).

(4) Discard spring (6).



GO TO NEXT PAGE

7.29. HYDRAULIC HAND PUMP SELECTOR LEVER REPLACEMENT (AVIM) – continued

7.29.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.29.5. Inspection

a. **Check removed and attaching parts for nicks, dents, and cracks** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.29.6. Installation

NOTE

If selector spring was replaced, go to step a. If not, go to step b.

a. **Install new spring (6) on manifold (7).**

(1) Install three pins (10) on spring (6).

(2) Aline and insert three pins (10) into manifold (7).

(3) Install bolt (8) and washer (9) through spring (6) into manifold (7).

b. **Position camshaft (5) on manifold (7).**

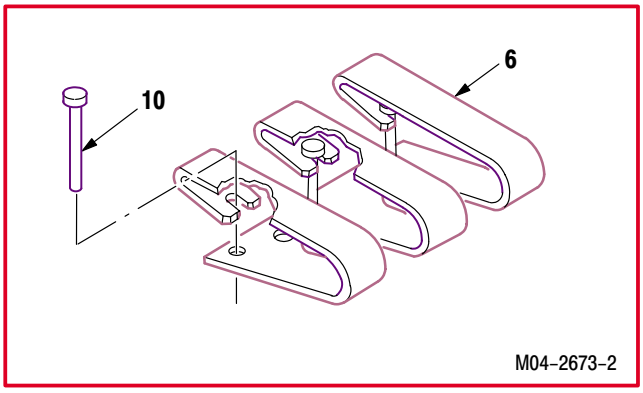


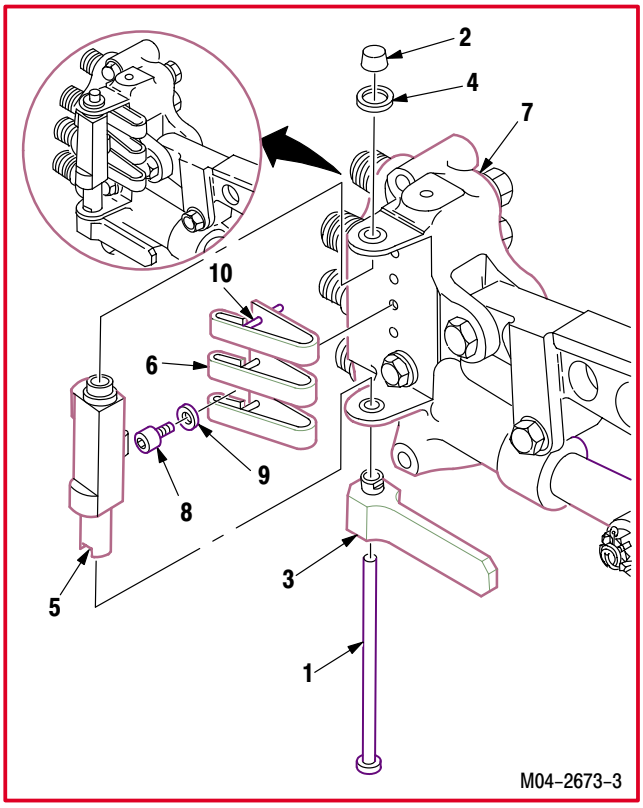
c. **Install new swage pin (1) through lever (3), manifold (7), camshaft (5), washer (4), and new collar (2)** (TM 1-1500-204-23)**.**

d. **Inspect (QA).**

e. **Perform hydraulic hand pump functional check** (para 7.31)**.**

END OF TASK





7.30. HYDRAULIC HAND PUMP CHECK VALVE REPLACEMENT (AVIM)

7.30.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.30.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing (2)
Retainer (2)
Hydraulic fluid (item 92, App F)
Wire (item 230, App F)

Equipment Conditions:

Ref	Condition
7.29	Hydraulic hand pump selector lever removed (if required)

NOTE

This task is typical for any of the five check valves on the hydraulic hand pump. Access to the utility accumulator check valve requires removal of the pump selector lever.

7.30.3. Removal

a. **Remove check valve (1) from pump manifold (2).**

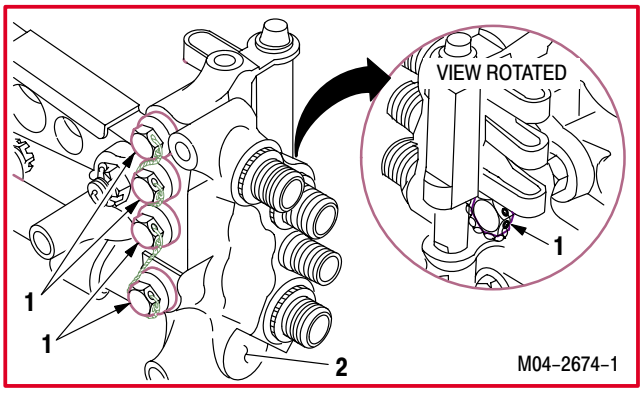
(1) Remove lockwire from valve (1).

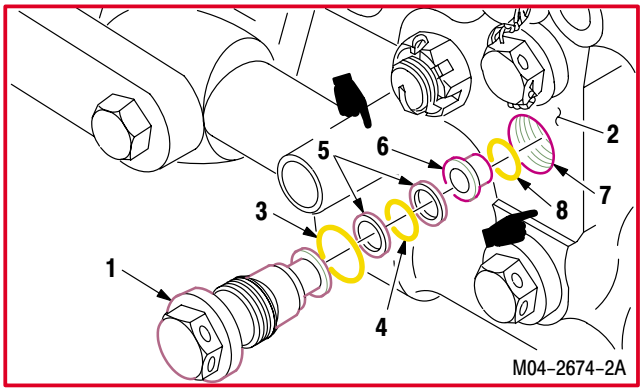
(2) Remove valve (1).

(3) Remove and discard packings (3) and (4) and two retainers (5).

(4) Remove spacer (6) from valve port (7).

(5) Remove and discard packing (8).





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7.30. HYDRAULIC HAND PUMP CHECK VALVE REPLACEMENT (AVIM) – continued

7.30.4. Cleaning

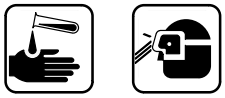
a. **Wipe removed and attaching parts with a clean rag.**

7.30.5. Inspection

a. **Check valve for nicks, dents, rounded flats, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.30.6. Installation



a. **Install new valve (1) in manifold (2).** Torque valve (1) to **30 INCH-POUNDS**.

(1) Lubricate three new packings (3), (4), and (8), and two new retainers (5). Use clean hydraulic fluid (item 92, App F).

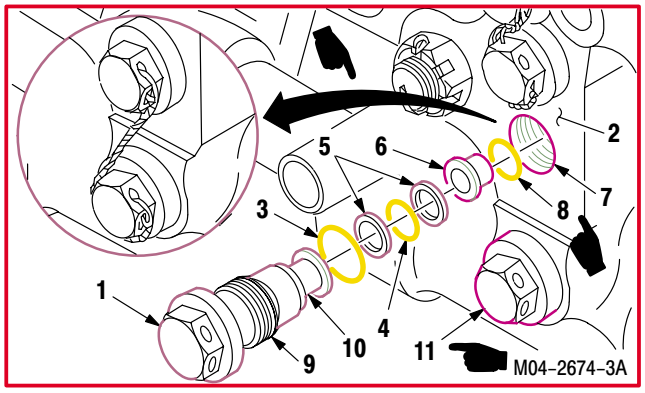
(2) Install spacer (6) and packing (8) in valve port (7).

(3) Install packing (3) in groove (9) and packing (4) between two retainers (5) in groove (10).

(4) Install valve (1).

(5) Torque valve (1) to **30 INCH-POUNDS**. Use torque wrench.

(6) Lockwire valve (1) to adjacent valve (11). Use wire (item 230, App F).



b. **Inspect (QA).**

c. **Install pump selector lever (if removed)** (para 7.29)**.**

d. **Perform hydraulic hand pump functional check** (para 7.31)**.**

END OF TASK

7.31. HYDRAULIC HAND PUMP FUNCTIONAL CHECK (AVIM)

7.31.1. Description

This task covers: Functional Check.

7.31.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
1 1/8-inch x 1/4-20 shear bolt (item 40, App H)
1 9/16-inch x 1/4-20 shear bolt (item 41, App H) (2)
1/4-inch tube cap (item 57, App H)
3/8-inch tube cap (item 58, App H) (3)
100-milliliter graduated laboratory cylinder (item 105, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Hydraulic system components test stand (item 359, App H)
Flat washer (item 403, App H) (3)
Holding plate, 7-3631MF002 hydraulic hand pump (Figure D-450, App D)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

CAUTION

To prevent moisture and foreign matter from damaging the hydraulic system, be sure to install protective covers on all lines, ducts, ports, tubes, and connectors immediately after removing.

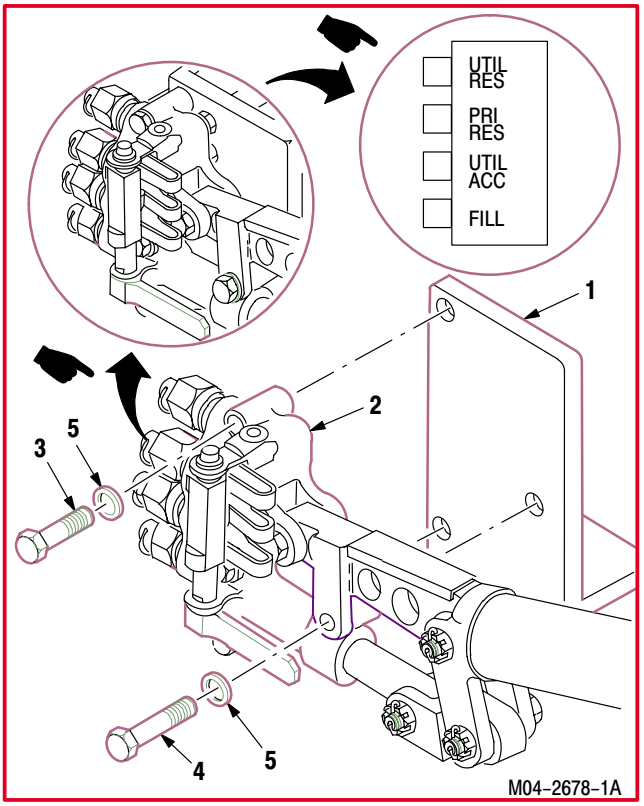
7.31.3. Functional Check

a. **Install holding plate (1) on a suitable bench or vise.** Use holding plate (1) (Figure, D-450, App D).

b. **Install hand pump (2) on holding plate (1).**

(1) Align hand pump (2) with holding plate (1).

(2) Install two bolts (3) and bolt (4) through three washers (5), and pump (2) in plate (1). Use two 1 9/16 x 1/4-20 bolts (3) and one 1 1/8 x 1/4-20 bolt (4).



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7.31. HYDRAULIC HAND PUMP FUNCTIONAL CHECK (AVIM) – continued

NOTE

Slight wetting of seals insufficient to form a drop in 5 minutes is not considered external leakage.

c. **Perform pressure proof test.**

(1) Remove cap (6) from **PRI RES** port (7).

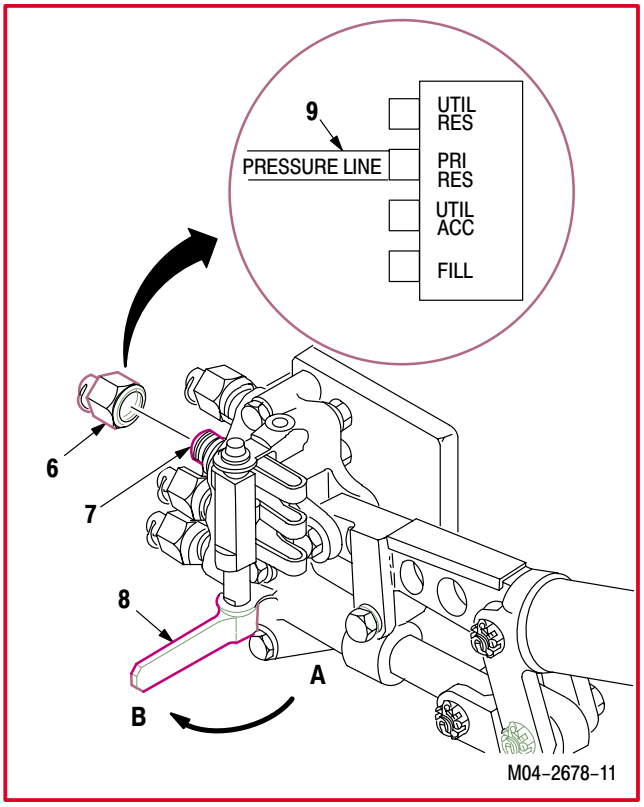
(2) Move lever (8) to fill utility accumulator position (B).

(3) Install pressure line (9) on **PRI RES** port (7).

(4) Increase line (9) pressure to **4500 PSI**.

(5) Hold pressure for 5 minutes (para 10.1).

(6) Decrease pressure to **0 PSI**.



d. **Perform return pressure proof test.**

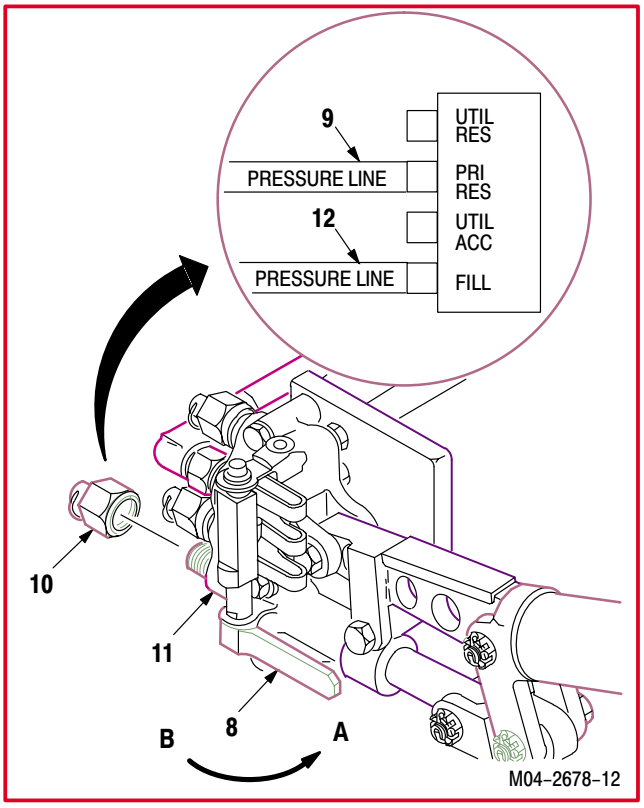
(1) Remove cap (10) from **FILL** port (11).

(2) Move lever (8) to fill utility reservoir position A.

(3) Install pressure line (12) on **FILL** port (11).

(4) Increase pressure in lines (9) and (12) to **2250 PSI** and hold for 5 minutes (para 10.1).

(5) Decrease pressure to **0 PSI**.

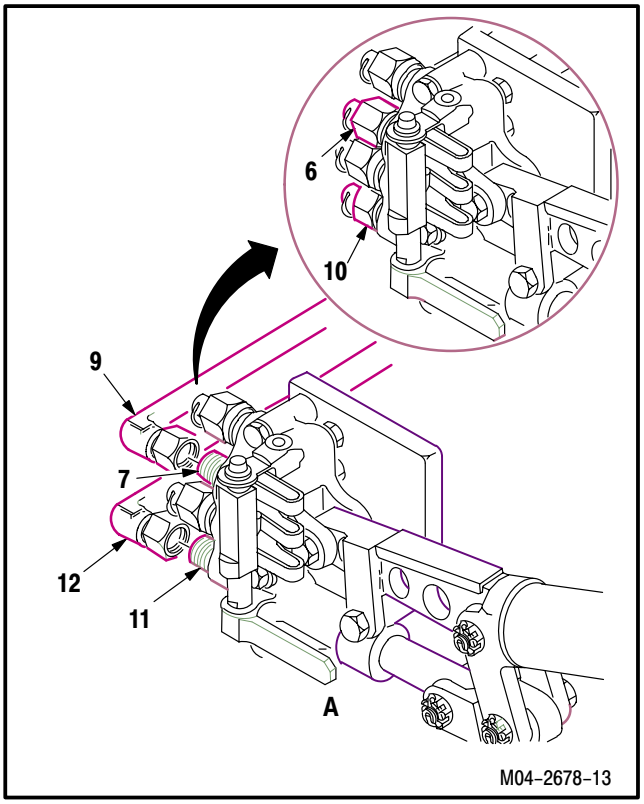


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7.31. HYDRAULIC HAND PUMP FUNCTIONAL CHECK (AVIM) – continued

(6) Remove pressure lines (9) and (12) from **PRI RES** port (7) and **FILL** port (11).

(7) Install caps (6) and (10) on **PRI RES** port (7) and **FILL** port (11).



e. **Perform continuity test.**

(1) Remove cap (13) from **UTIL RES** port (14).

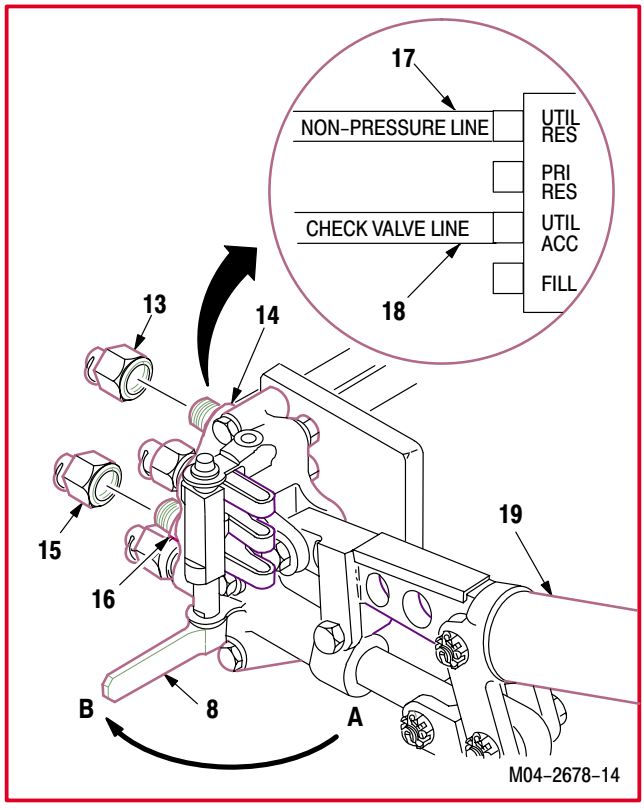
(2) Remove cap (15) from **UTIL ACC** port (16).

(3) Install nonpressurized hydraulic fluid supply line (17) on **UTIL RES** port (14).

(4) Install check valve line (18) on **UTIL ACC** port (16).

(5) Move lever (8) to fill utility accumulator position B.

(6) Operate hand pump handle (19). Flow should occur at **UTIL ACC** port (16).



GO TO NEXT PAGE

7.31. HYDRAULIC HAND PUMP FUNCTIONAL CHECK (AVIM) – continued

(7) Remove check valve line (18) from **UTIL ACC** port (16).

(8) Install cap (15) on **UTIL ACC** port (16).

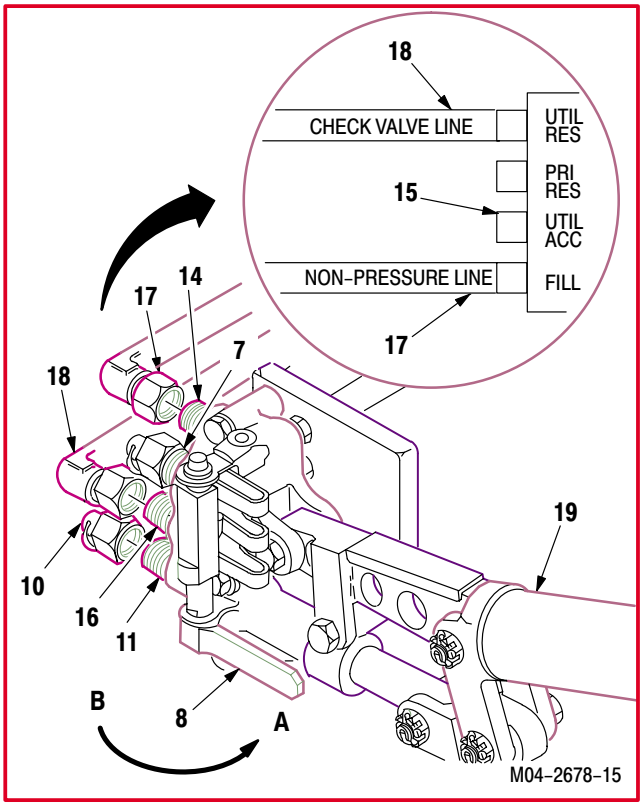
(9) Remove cap (10) from **FILL** port (11).

(10) Remove nonpressurized hydraulic fluid supply line (17) from **UTIL RES** port (14) and install on **FILL** port (11).

(11) Install check valve line (18) on **UTIL RES** port (14).

(12) Move lever (8) to fill utility reservoir position A.

(13) Operate pump handle (19). Flow should occur at **UTIL RES** port (14) only.



(14) Move lever (8) to fill primary reservoir position C.

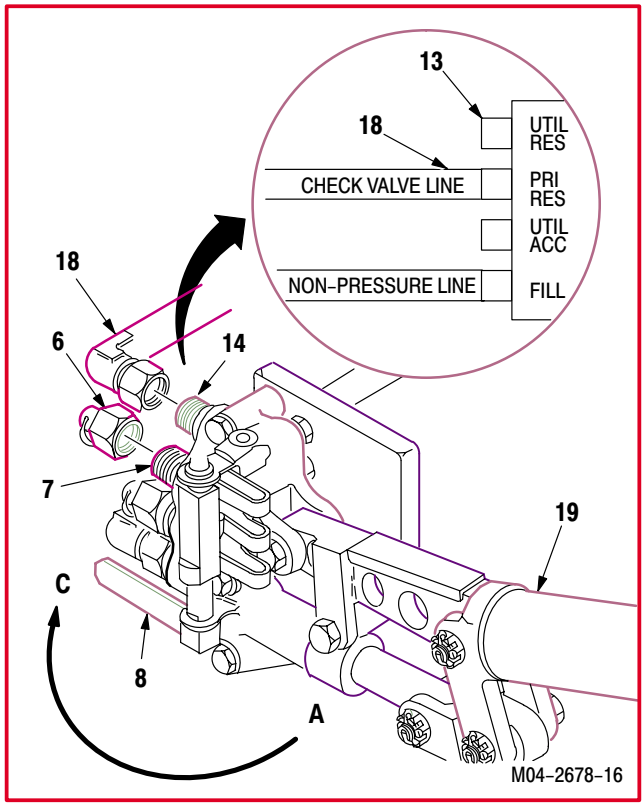
(15) Remove cap (6) from **PRI RES** port (7).

(16) Remove check valve line (18) from port **UTIL RES** (14).

(17) Install cap (13) on port **UTIL RES** (14).

(18) Install check valve line (18) on port **PRI RES** (7).

(19) Operate hand pump handle (19). Flow should occur at **PRI RES** port (7) only.



GO TO NEXT PAGE

7.31. HYDRAULIC HAND PUMP FUNCTIONAL CHECK (AVIM) – continued

f. **Perform displacement test.**

(1) Place pump handle (19) in the up position.

(2) Move lever (8) to fill utility accumulator position B.

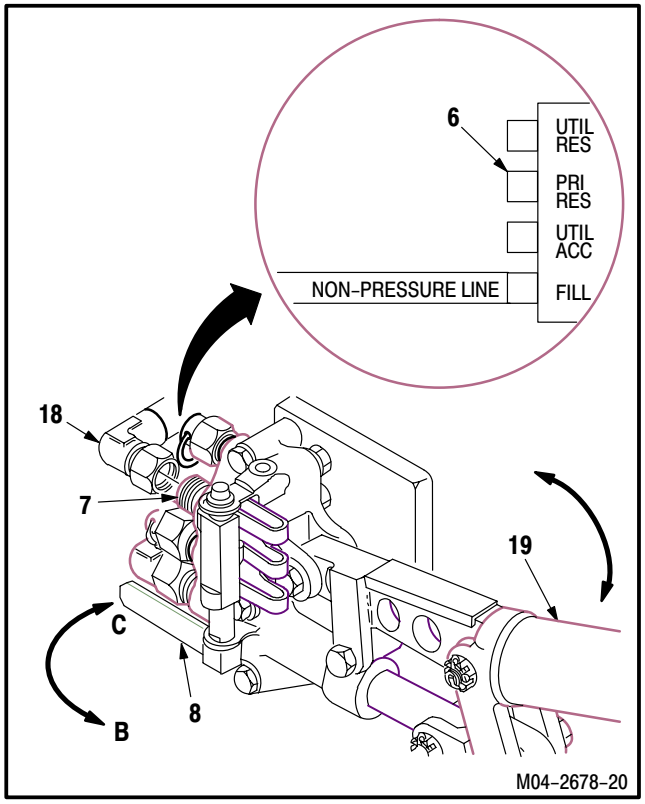
(3) Remove check valve line (18) from **PRI RES** port (7).

(4) Pull pump handle (19) down and move lever (8) simultaneously to position C fill primary reservoir .

(5) Position graduated glass cylinder under **PRI RES** port (7). Use 100-mL cylinder.

(6) Operate pump handle (19) 10 full strokes stop to stop. Volume pumped into glass cylinder should be a minimum of **57 CC**.

(7) Install cap (6) on **PRI RES** port (7).



g. **Perform external leakage test.**

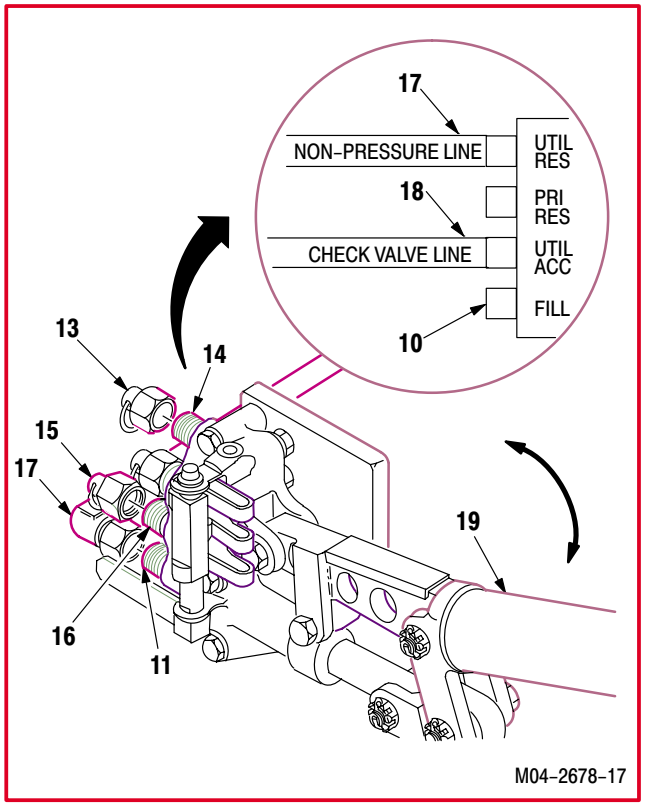
(1) Remove cap (13) from **UTIL RES** port (14).

(2) Remove nonpressurized hydraulic fluid supply line (17) from **FILL** port (11) and install on **UTIL RES** port (14).

(3) Install cap (10) on **FILL** port (11).

(4) Remove cap (15) from **UTIL ACC** port (16).

(5) Install check valve line (18) on **UTIL ACC** port (16).



GO TO NEXT PAGE

7.31. HYDRAULIC HAND PUMP FUNCTIONAL CHECK (AVIM) – continued

(6) Move lever (8) to fill utility accumulator position B.

(7) Operate pump handle (19) 25 full strokes stop to stop. Flow should occur at **UTIL ACC** port (16). Maximum external leakage **1 DROP**.

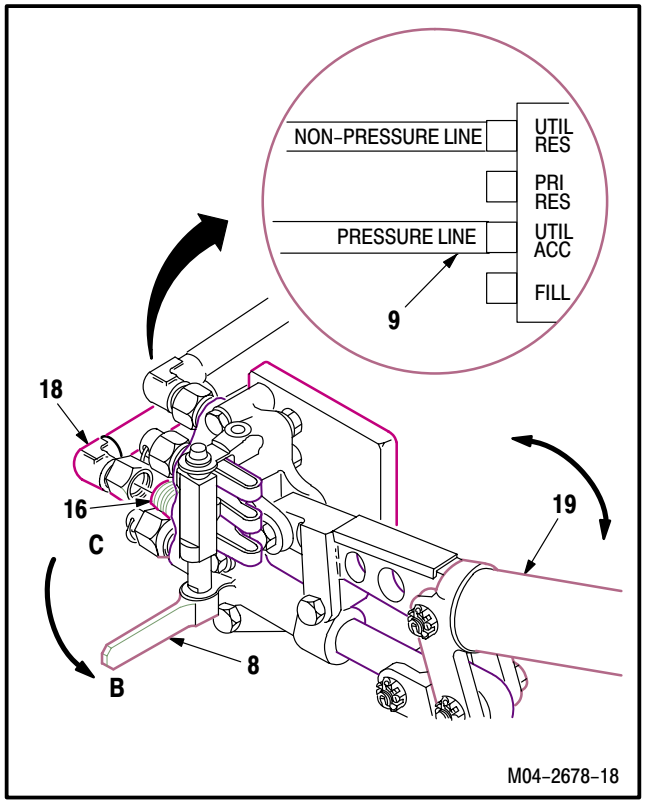
(8) Remove check valve line (18) from **UTIL ACC** port (16).

(9) Install pressure line (9) on **UTIL ACC** port (16).

(10) Increase pressure in line (9) to **3000 PSI**.

(11) Operate pump handle (19) 25 full strokes stop to stop. Maximum external leakage **1 DROP**.

(12) Decrease pressure to **0 PSI**.



(13) Move lever (8) to fill utility reservoir position A.

(14) Remove pressure line (9) from **UTIL ACC** port (16).

(15) Remove nonpressurized hydraulic fluid supply line (17) from **UTIL RES** port (14).

(16) Install cap (13) on **UTIL RES** port (14) and cap (15) on **UTIL ACC** port (16).

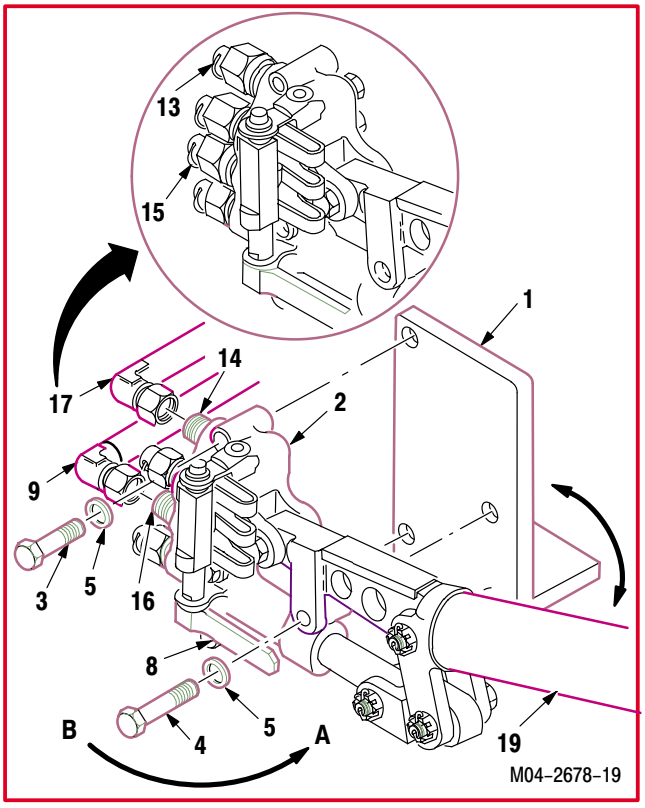
h. **Remove hydraulic hand pump (2) from holding plate (1).**

(1) Remove two bolts (3), bolt (4), and three washers (5) from pump (2) and plate (1).

(2) Remove hand pump (2) from plate (1).

i. **Remove holding plate (1) from bench or vice.**

j. **Inspect (QA).**



END OF TASK

7.32. DIRECTIONAL SERVOCYLINDER REMOVAL

7.32.1. Description

This task covers: Removal. Cleaning. Inspection.

7.32.2. Initial Setup

Tools:

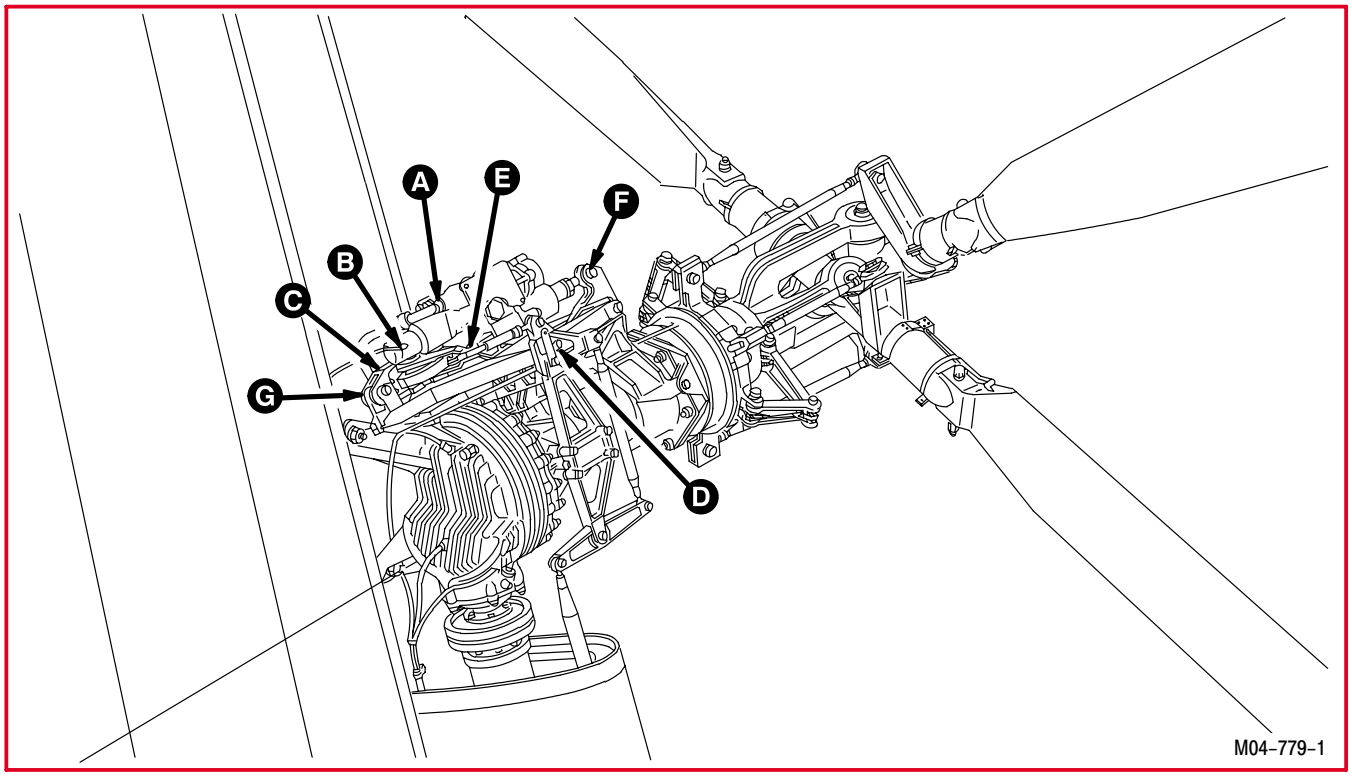
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Fairings L540 and L546 removed
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented



WARNING

FLIGHT SAFETY PART

The directional servocylinder and/or components of the directional servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

GO TO NEXT PAGE

7.32. DIRECTIONAL SERVOCYLINDER REMOVAL – continued

7.32.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open ASE AC, DC, and BUCS circuit breakers.**

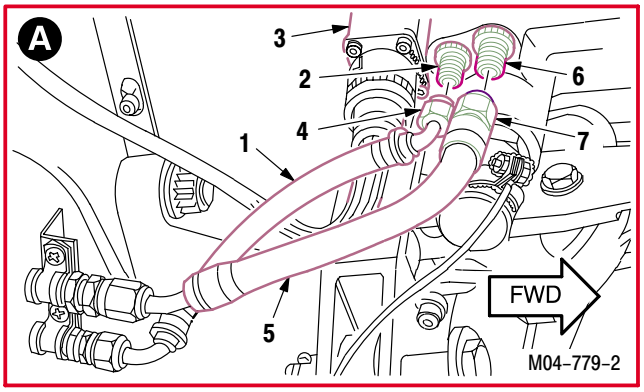
c. **Remove primary pressure hose (1) from adapter (2).**

(1) Place rags around servocylinder (3) to catch hydraulic fluid spills.

(2) Remove nut (4).

d. **Remove primary return hose (5) from adapter (6).**

(1) Remove nut (7).



NOTE

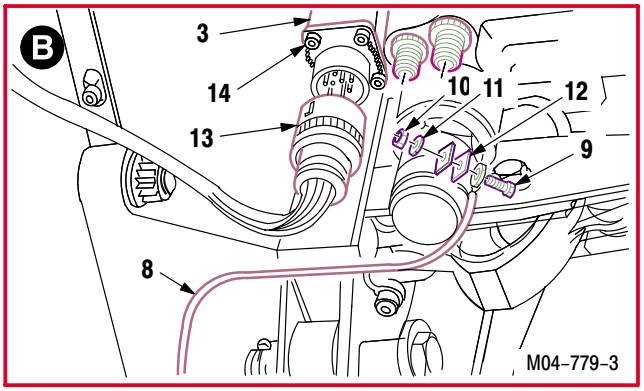
If ground cable is installed on helicopter, go to step e. If not, go to step f.

e. **Remove cable (8) from servocylinder (3).**

(1) Remove sealant from screw (9), nut (10), washer (11), and clamp (12) (para 1.47).

(2) Hold screw (9). Remove nut (10) and washer (11).

(3) If replacing servocylinder (3), remove and discard clamp (12).



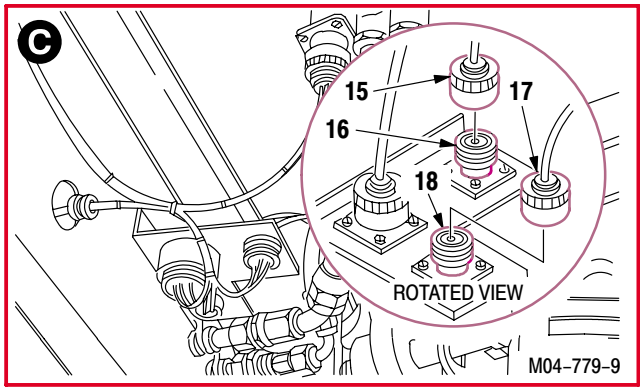
f. **Detach connector P224 (13) from receptacle (L36)J224 (14).**

GO TO NEXT PAGE

7.32. DIRECTIONAL SERVOCYLINDER REMOVAL – continued

g. **Detach connector (L36)P223 (15) from receptacle J223 (16).**

h. **Detach connector (L36)P215 (17) from receptacle J215 (18).**

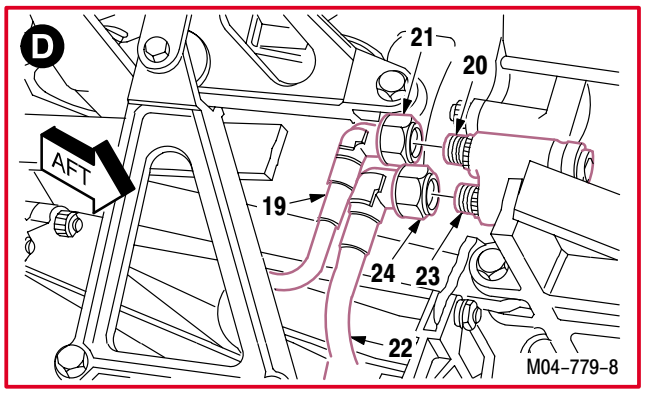


i. **Remove utility pressure hose (19) from adapter (20).**

(1) Remove nut (21).

j. **Remove utility return hose (22) from adapter (23).**

(1) Remove nut (24).

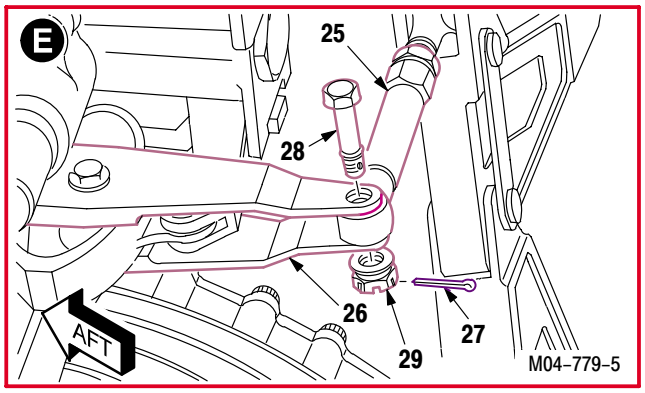


k. **Remove link (25) from control arm (26).**

(1) Remove and discard cotter pin (27).

(2) Hold bolt (28). Remove nut (29).

(3) Remove bolt (28).

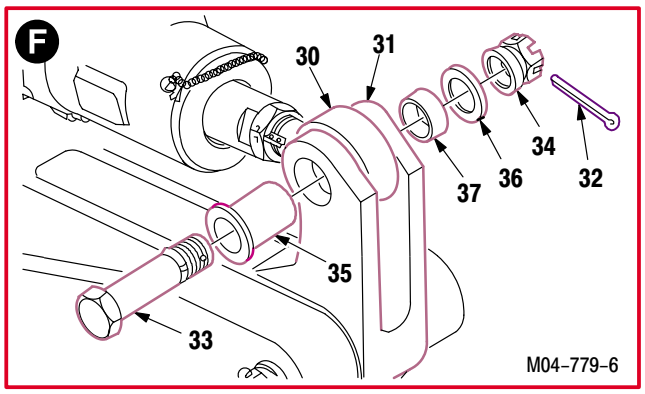


l. **Remove piston rod end (30) from bellcrank (31).**

(1) Remove and discard cotter pin (32).

(2) Hold bolt (33). Remove nut (34).

(3) Remove washer (36), bushing (37), bolt (33), and pin (35).



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7.32. DIRECTIONAL SERVOCYLINDER REMOVAL – continued

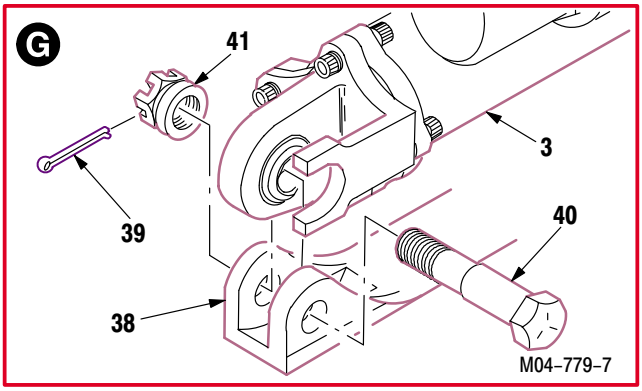
m. **Remove servocylinder (3) from pivot bracket (38).**

(1) Remove and discard cotter pin (39).

(2) Hold bolt (40). Remove nut (41).

(3) Remove bolt (40).

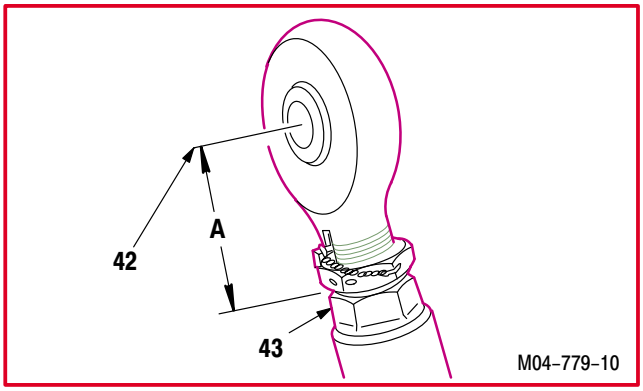
(4) Remove servocylinder (3).



NOTE

Perform step n off helicopter if replacing servocylinder.

n. **Measure and record distance A between center of rod end bore (42) and top of servocylinder piston rod (43). Keep recorded measurement for installation of new servocylinder.**



7.32.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

7.32.5. Inspection

a. **Check hoses for fraying, tears, or cuts** (para 10.1)**.**

b. **Check adapters for stripped or damaged threads** (para 10.1)**.**

c. **Check control arm, bellcrank, and pivot bracket for cracks, nicks, or dents** (para 10.1)**.**

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.32. DIRECTIONAL SERVOCYLINDER REMOVAL – continued

e. **Check inside diameter of clevis and outside diameter of bolt. The maximum difference shall not exceed 0.012 INCH.**

(1) Actuator clevis inside diameter of **0.828 INCH** or larger:

(a) Bucs equipped aircraft, actuator must be returned to vendor for clevis replacement.

(b) NON-BUCS equipped aircraft, replace clevis (para 7.40A).

(2) If clevis inside diameter is less than **0.828 INCH**, a **0.012 INCH** or smaller difference may be achieved by replacing the bolt.

f. **Check rod end for bearing play.**

(1) Maximum radial bearing play **0.0045 INCH**.

(2) Maximum axial bearing play **0.020 INCH**.

g. **Check servocylinder linkage control fasteners for damage and security.**

(1) Check fasteners with 10X magnifying glass for cracks and corrosion. None allowed.

(2) Manually try to rotate fasteners (no tools or pliers) to check for loose or rotating hardware. None allowed.

END OF TASK

7.33. DIRECTIONAL SERVOCYLINDER INSTALLATION

7.33.1. Description

This task covers: Installation.

7.33.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Cotter pin (3)
Hydraulic fluid (item 92, App F)
Sealing compound (item 175, App F)

Personnel Required:

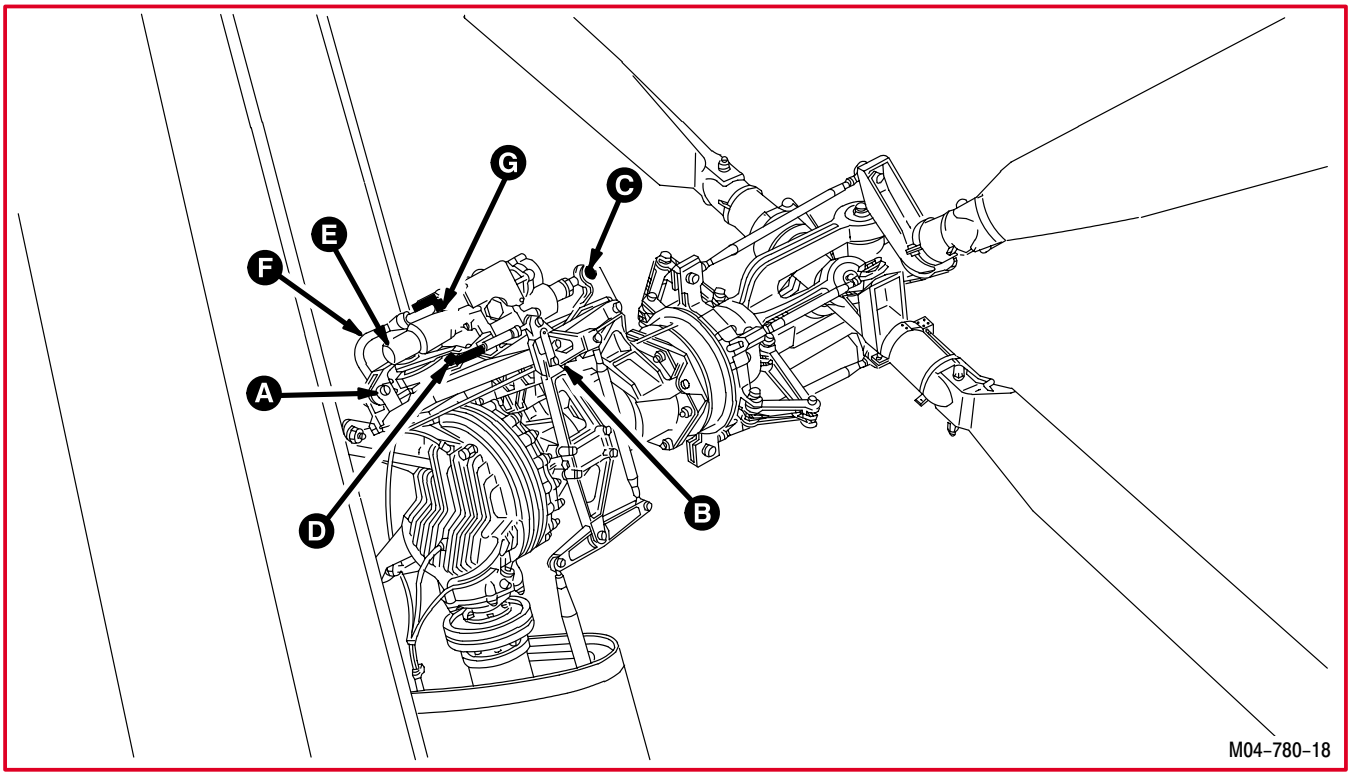
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed



GO TO NEXT PAGE

7.33. DIRECTIONAL SERVOCYLINDER INSTALLATION – continued

WARNING

FLIGHT SAFETY PART

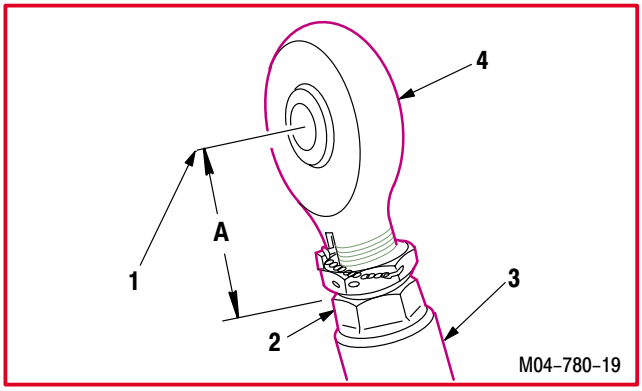
- **The directional servocylinder and/or components of the directional servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Installation of a non-BUCS servocylinder in a BUCS equipped helicopter will render the BUCS system inoperative. Installation of a BUCS servocylinder in a helicopter not equipped with BUCS may result in loss of flight controls, serious injury or death to crewmembers, and/or serious damage to helicopter.**

7.33.3. Installation

NOTE

Perform step a if installing a replacement servocylinder. Go to step b if reinstalling servocylinder.

a. **Measure and record distance A between center of rod end bore (1) and top of servocylinder piston rod (2) on new servocylinder (3).** Ensure that distance A on new servocylinder is within **0.016 INCH** of the measurement recorded in paragraph 7.32 on the old servocylinder. If distance A is not within **0.016 INCH**, adjust rod end (4) (para 7.34).



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7.33. DIRECTIONAL SERVOCYLINDER INSTALLATION – continued

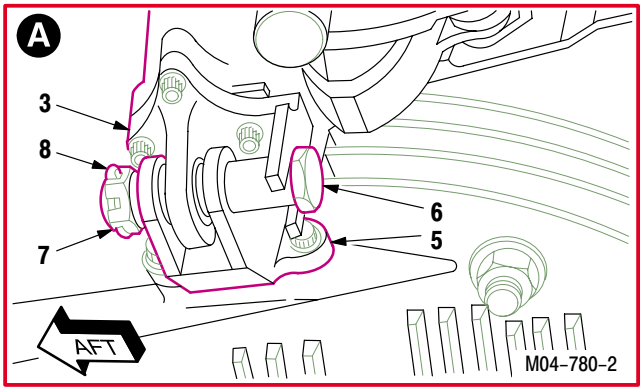
b. **Install servocylinder (3) on bracket (5).**

(1) Position servocylinder (3) on bracket (5).

(2) Install bolt (6) through bracket (5) and servocylinder (3).

(3) Check fit of self-retaining bolt (6) (para 11.1).

(4) Install nut (7).



c. **Torque nut (7) 450 to 570 INCH-POUNDS.**

(1) Hold bolt (6). Torque nut (7) to **450 INCH-POUNDS**. Use torque wrench.

(2) Increase torque to aline cotter pin hole, but do not exceed **570 INCH-POUNDS**.

(3) Install new cotter pin (8).



d. **Install utility return hose (9) on adapter (10).**

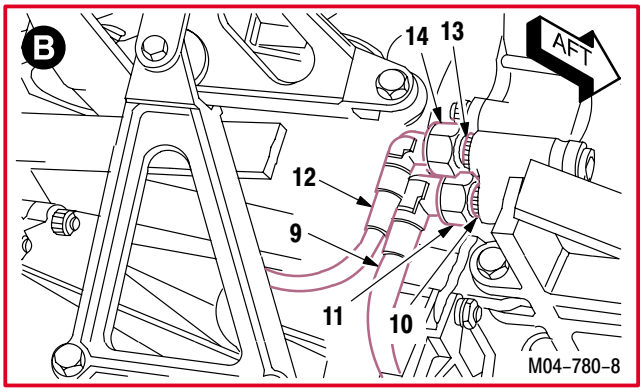
(1) Lubricate threads on adapter (10). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (11) on adapter (10).

e. **Install utility pressure hose (12) on adapter (13).**

(1) Lubricate threads on adapter (13). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (14) on adapter (13).

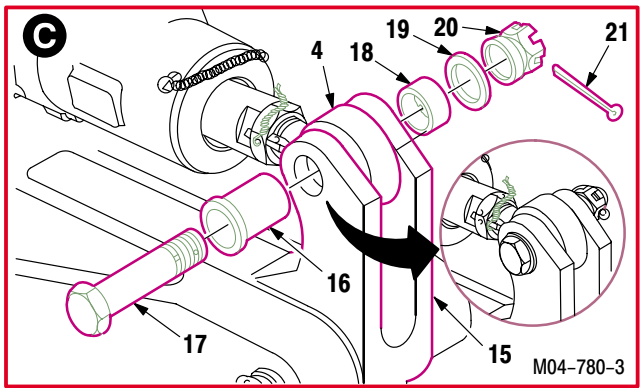


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7.33. DIRECTIONAL SERVOCYLINDER INSTALLATION – continued

CAUTION

To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** during rigging and installation. Adjustments are made by turning rod end, not piston rod.



f. **Install piston rod end (4) on bellcrank (15).**

(1) Install pin (16) on bolt (17).

(2) Position bushing (18) in bellcrank (15).

(3) Install bolt (17) through pin (16), bellcrank (15), rod end (4), and bushing (18).

(4) Check fit of self-retaining bolt (17) (para 11.1).

(5) Install washer (19) and nut (20).

g. **Torque nut (20) 225 to 285 INCH-POUNDS.**

(1) Hold bolt (17). Torque nut (20) to **225 INCH-POUNDS**. Use torque wrench.

(2) Increase torque to aline cotter pin hole, but do not exceed **285 INCH-POUNDS**.

(3) Install new cotter pin (21).

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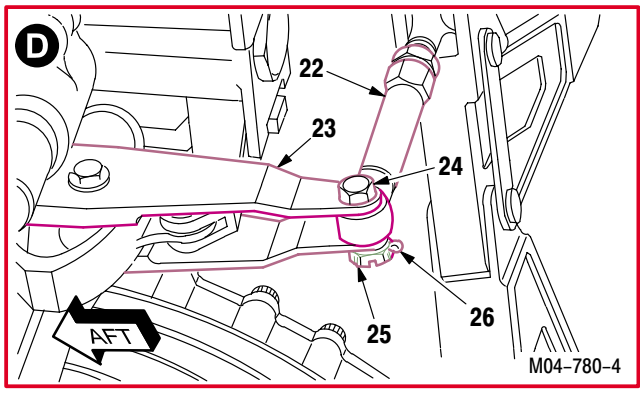
7.33. DIRECTIONAL SERVOCYLINDER INSTALLATION – continued

h. **Install link (22) on control arm (23).**

(1) Install bolt (24) in arm (23) and link (22).

(2) Check fit of self-retaining bolt (24) (para 11.1).

(3) Install nut (25).



i. **Torque nut (25) 30 to 45 INCH-POUNDS.**

(1) Hold bolt (24). Torque nut (25) to **30 INCH-POUNDS**. Use torque wrench.

(2) Increase torque to aline cotter pin hole, but do not exceed **45 INCH-POUNDS**.

(3) Install new cotter pin (26).



NOTE

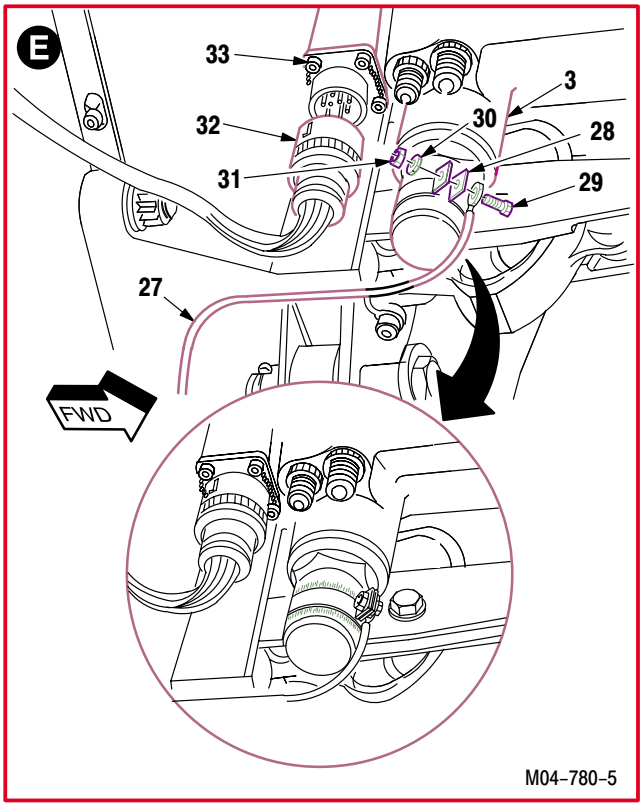
If ground cable is installed on helicopter, go to step j. If not, go to step k.

j. **Install cable (27) on servocylinder (3).**

(1) If installing a new servocylinder, aline new clamp (28) on servocylinder (3). If reinstalling servocylinder, use existing clamp (28).

(2) Install screw (29) through cable (27), clamp (28), washer (30), and nut (31).

(3) Apply sealing compound over screw (29), washer (30), nut (31), and around edges of clamp (28). Use sealing compound (item 175, App F).



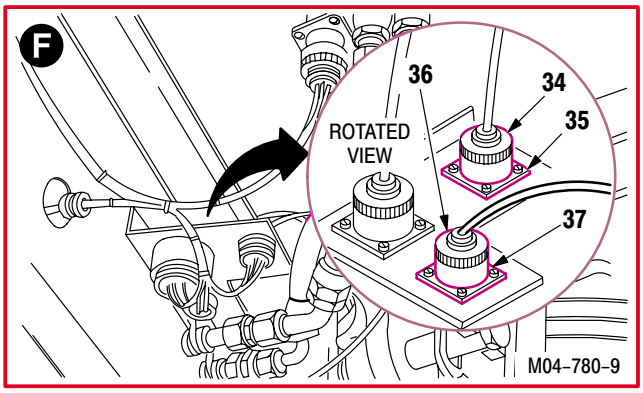
k. **Attach connector P224 (32) to receptacle (L36)J224 (33).**

GO TO NEXT PAGE

7.33. DIRECTIONAL SERVOCYLINDER INSTALLATION – continued

l. **Attach connector (L36)P223 (34) to receptacle J223 (35).**

m. **Attach connector (L36)P215 (36) to receptacle J215 (37).**



n. **Install primary pressure hose (38) on adapter (39).**

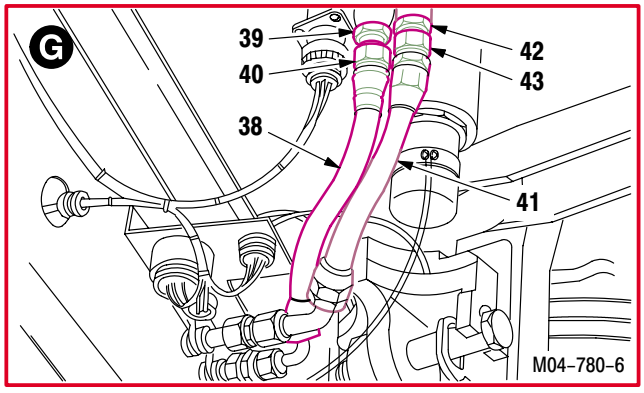
(1) Lubricate threads on adapter (39). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (40) on adapter (39).

o. **Install primary return hose (41) on adapter (42).**

(1) Lubricate threads on adapter (42). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (43) on adapter (42).



p. **Inspect (QA).**

q. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

r. **Service primary and utility hydraulic systems** (para 1.34)**.**

s. **Perform directional flight controls rigging maintenance operational check** (TM 1-1520-238-T)**.**

t. **Perform linear variable differential transducer (LVDT) adjustment** (para 11.216)**.**

u. **Perform primary and utility hydraulic systems maintenance operational checks** (TM 1-1520-238-T)**.**

v. **Install fairings L540 and L546** (para 2.2)**.**

END OF TASK

7.34. DIRECTIONAL SERVOCYLINDER ROD END REPLACEMENT

7.34.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.34.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
3/8 x 1/2-inch drive socket wrench adapter (item 6, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 90, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H).
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Cotter pin
Barrier material (item 32, App F)
Grease (item 87, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

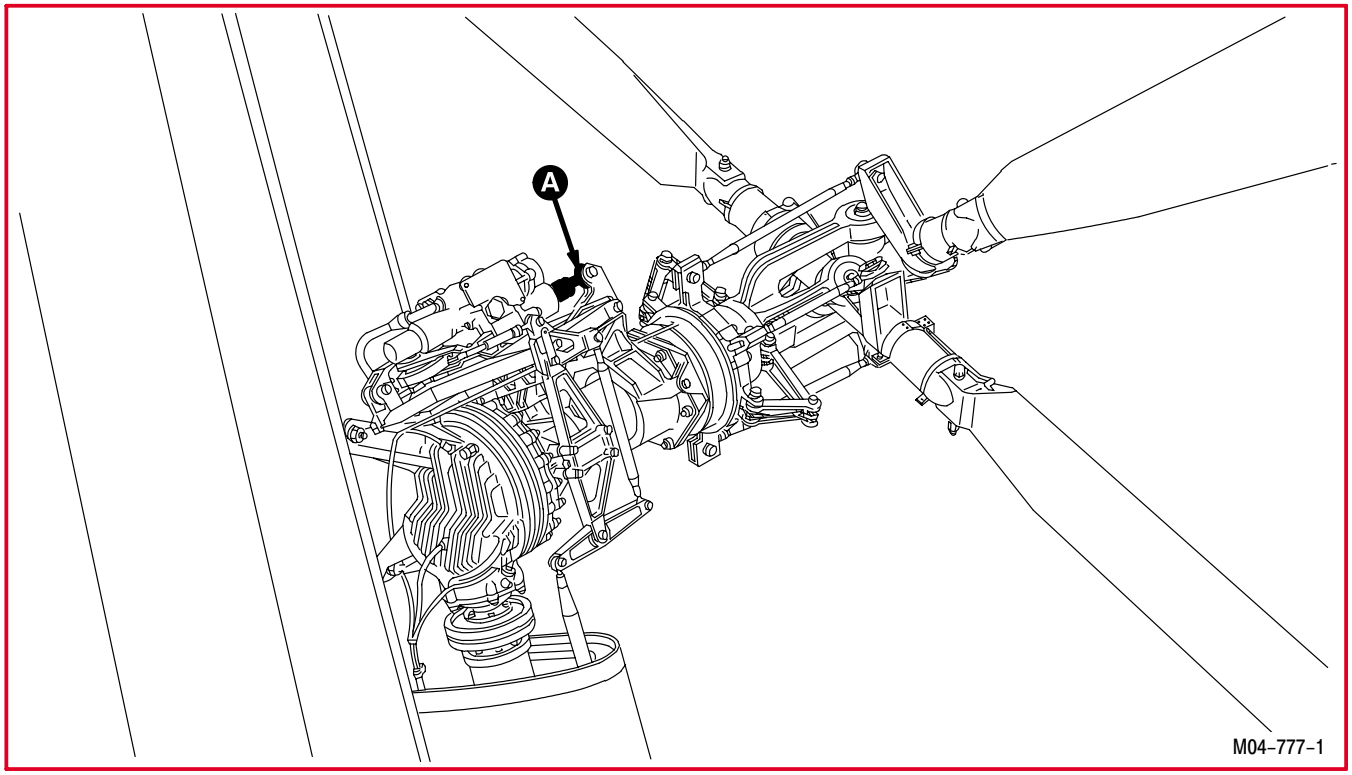
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Fairings L540 and L546 removed

GO TO NEXT PAGE

7.34. DIRECTIONAL SERVOCYLINDER ROD END REPLACEMENT – continued



7.34.3. Removal

NOTE

If servocylinder dust boot is installed, perform step a. If boot is not installed, go to step b.

a. **Slide servocylinder dust boot (1) away from piston rod (2) to get access to lock (3) and piston flats (4).**

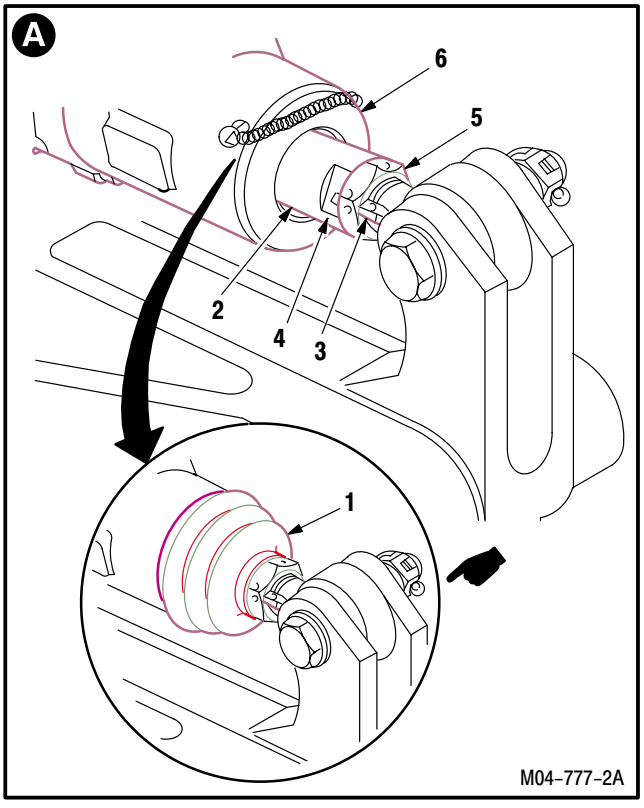
b. **Loosen nut (5) two full turns.**

(1) Remove lockwire from lock (3) and nut (5).

(2) Hold piston flats (4).

(3) Loosen nut (5). Use crowfoot.

c. **Support servocylinder (6).** Use barrier material (item 32, App F).



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7.34. DIRECTIONAL SERVOCYLINDER ROD END REPLACEMENT – continued

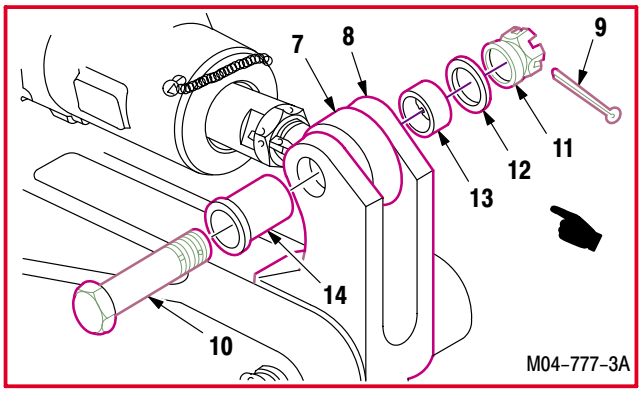
d. **Remove rod end (7) from bellcrank (8).**

(1) Remove and discard cotter pin (9).

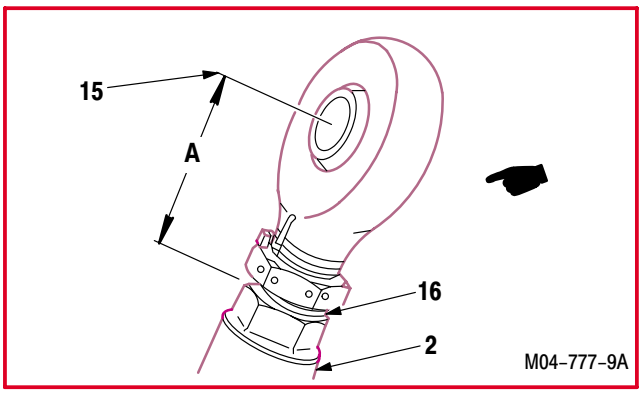
(2) Hold bolt (10). Remove nut (11).

(3) Remove washer (12), bushing (13), bolt (10), and pin (14).

(4) Remove rod end (7).

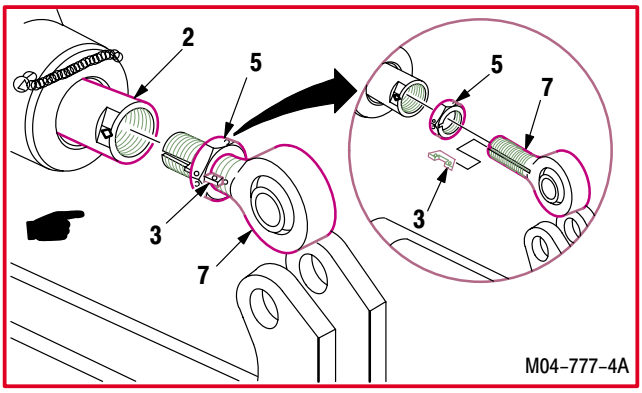


e. **Measure and record distance A between center of rod end bore (15) and top (16) of piston rod (2).**



f. **Remove piston rod end (7) with nut (5) and lock (3) from piston rod (2).**

g. **Remove lock (3) and nut (5) from piston rod end (7).**



GO TO NEXT PAGE

7.34. DIRECTIONAL SERVOCYLINDER ROD END REPLACEMENT – continued

7.34.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.34.5. Inspection

a. **Check rod end and piston rod for stripped or damaged threads** (para 10.1)**.**

b. **Check bellcrank, bolt, washer, bushing, and pin for nicks, dents, and cracks** (para 10.1)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.34.6. Installation

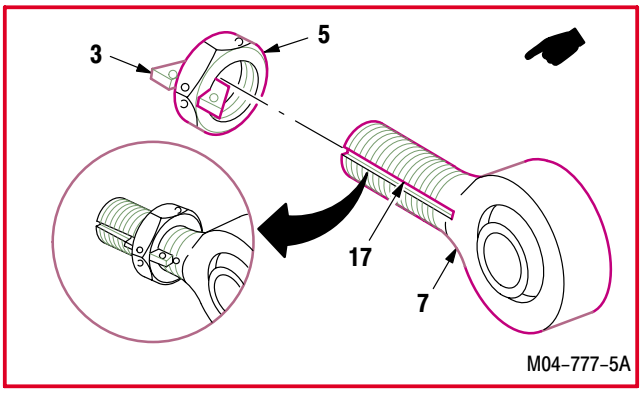


a. **Coat threads of rod end (7).** Use grease (item 87, App F).

b. **Position lock (3) and nut (5) on piston rod end (7).**

(1) Insert lock (3) into nut (5).

(2) Aline lock (3) with rod end machined slot (17).



GO TO NEXT PAGE

7.34. DIRECTIONAL SERVOCYLINDER ROD END REPLACEMENT – continued

WARNING

Distance between center of rod end bore and top of piston shall not exceed 3.06 INCHES. A measurement less than 3.06 INCHES is necessary to provide enough thread engagement to maintain safe flight. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

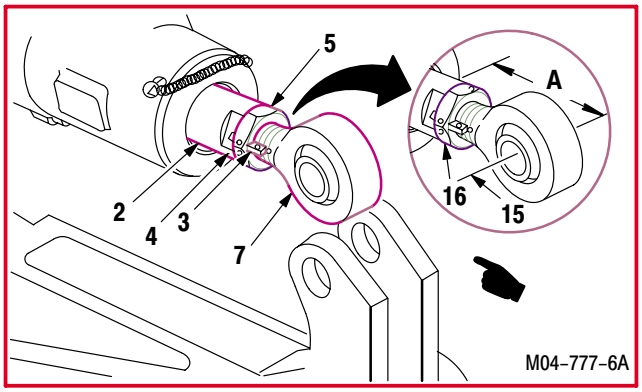
To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** so that rod end can be alined with bellcrank during rigging and installation. Adjustments are made by turning rod end, not piston rod.

c. **Install piston rod end (7) with lock (3) and nut (5) on piston rod (2).**

(1) Hold piston flats (4).

(2) Screw rod end (7) with lock (3) and nut (5) on piston rod (2).

(3) Adjust rod end (7) so distance A between center of rod end bore (15) and top (16) of piston rod (2) is within **0.016 INCH** of the measurement recorded in paragraph 7.34.3.



GO TO NEXT PAGE

7.34. DIRECTIONAL SERVOCYLINDER ROD END REPLACEMENT – continued

d. **Remove barrier material (item 32, App F) from servocylinder (6).**

e. **Install piston rod end (7) on bellcrank (8).**

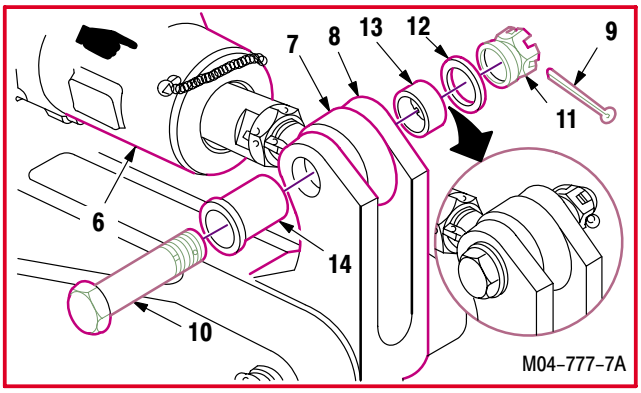
(1) Position rod end (7) in clevis of bellcrank (8).

(2) Insert bushing (13) in aft side of bellcrank (8).

(3) Insert bolt (10) through pin (14), bellcrank (8), rod end (7), bushing (13), and washer (12).

(4) Check fit of self-retaining bolt (10) (para 11.1).

(5) Install nut (11) on bolt (10).



f. **Torque nut (11) 225 to 285 INCH-POUNDS.**

(1) Hold bolt (10). Torque nut (11) to **225 INCH-POUNDS**. Use torque wrench.

(2) Increase torque to aline cotter pin hole, but do not exceed **285 INCH-POUNDS**.

(3) Install new cotter pin (9).

g. **Torque nut (5) to 930 INCH-POUNDS.**

(1) Hold rod (2). Torque nut (5) to **930 INCH-POUNDS**. Use crowfoot, adapter, and torque wrench.

h. **Lockwire nut (5) to lock (3).** Use wire (item 226, App F).

NOTE

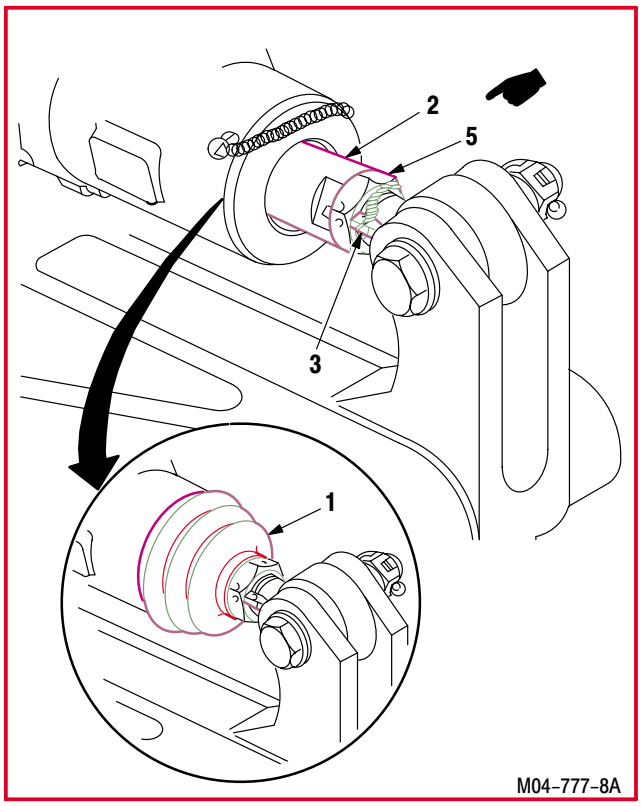
Step i. applies only if boot was removed, if boot was not removed, go to step j.

i. **Slide boot (1) over piston and over the end of piston rod (2).**

j. **Inspect (QA).**

k. **Perform directional flight controls rigging maintenance operational check** (TM 1-1520-238-T)**.**

l. **Install fairings L540 and L546** (para 2.2)**.**



END OF TASK

7.35. DIRECTIONAL SERVOCYLINDER BUCS WARNING PLATE REPLACEMENT

7.35.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.35.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
3/16-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 322, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Adhesive (item 6, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L540 removed

7.35.3. Removal

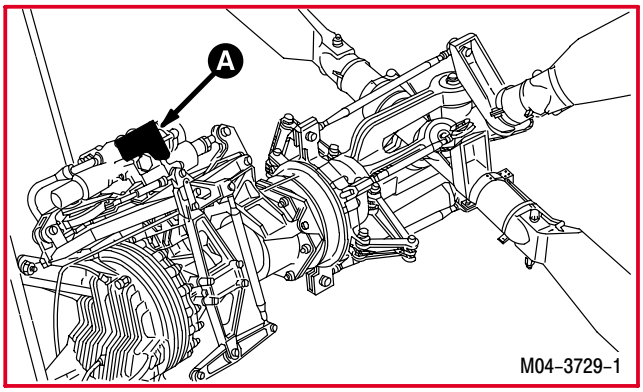
a. **Remove armor plate (1) from actuator (2).**

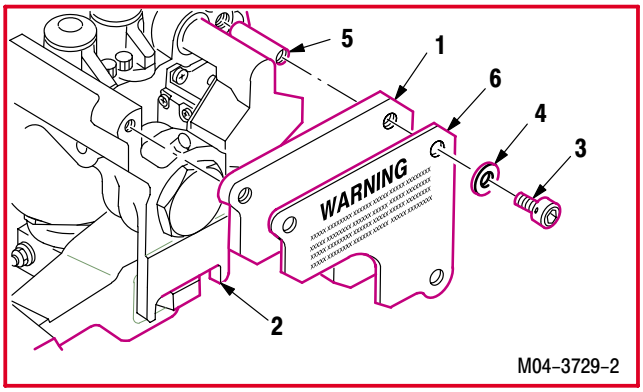
(1) Remove lockwire from three bolts (3).

(2) Remove three bolts (3), three washers (4), and standoff (5) from actuator (2). Use hexagon screwdriver.

(3) Remove armor plate (1).

b. **Remove and discard warning plate (6) from armor plate (1).**





7.35.4. Cleaning

a. **Clean adhesive from armor plate** (para 1.47)**.**

GO TO NEXT PAGE

7.35. DIRECTIONAL SERVOCYLINDER BUCS WARNING PLATE REPLACEMENT – continued

7.35.5. Inspection

a. **Check servocylinder and screws for stripped and damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

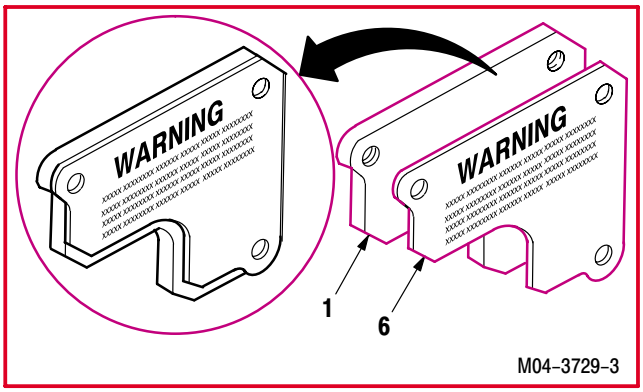
7.35.6. Installation



a. **Install new warning plate (6) on armor plate (1).**

(1) Apply thin layer of adhesive on plate (6) and armor plate (1). Use adhesive (item 6, App F).

(2) Aline plate (6) on armor plate (1). Hold for two minutes.



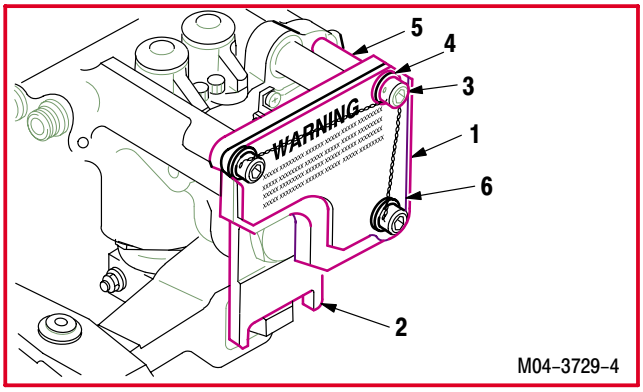
b. **Install armor plate (1) on actuator (2).** Torque three bolts (3) to **75 INCH-POUNDS**.

(1) Aline armor plate (1) on standoff (5) and actuator (2).

(2) Install three bolts (3) and three washers (4). Use hexagon screwdriver.

(3) Torque three bolts (3) to **75 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(4) Lockwire three bolts (3) together. Use wire (item 226, App F).



c. **Inspect (QA).**

d. **Install access fairing L540** (para 2.2)**.**

END OF TASK

7.36. DIRECTIONAL SERVOCYLINDER PRIMARY PRESSURE HOSE REPLACEMENT

7.36.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.36.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

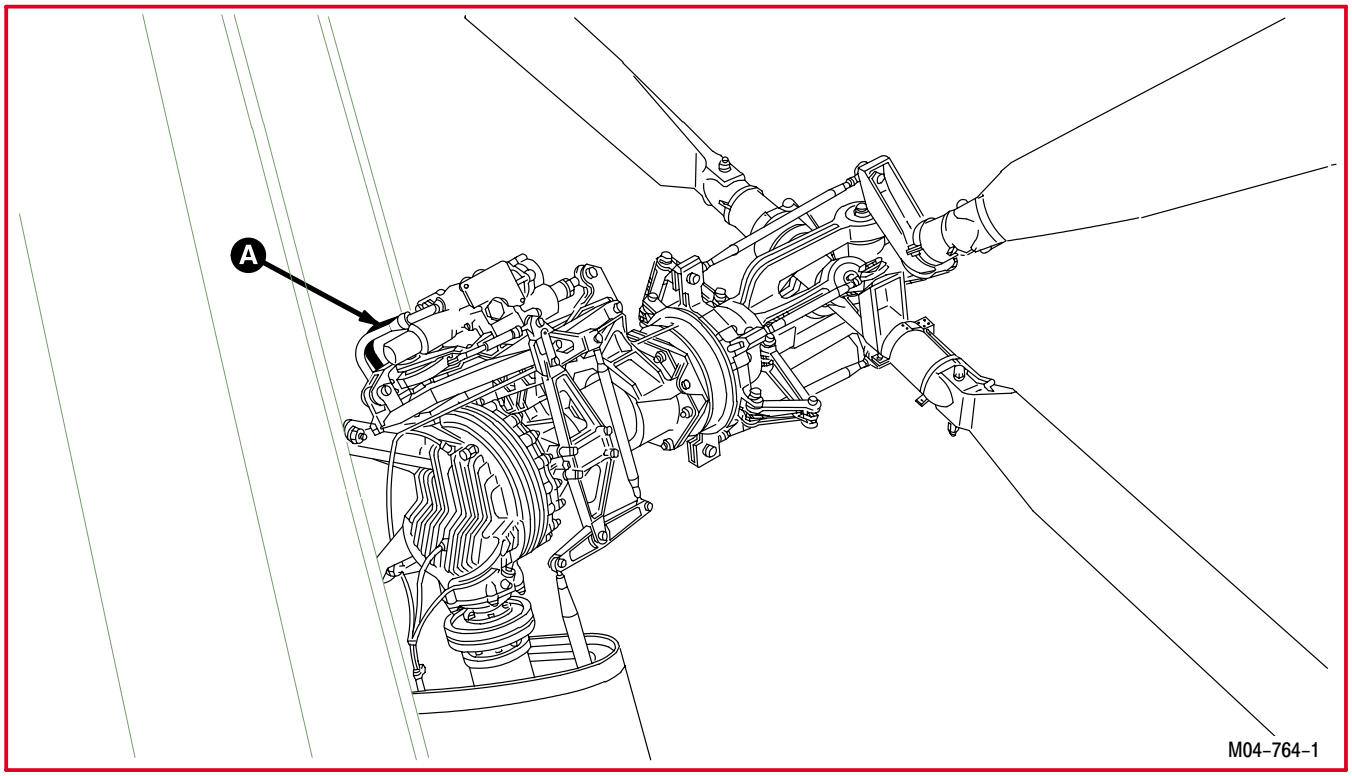
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L530, L540, and L546 removed
7.3	Primary hydraulic system vented



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7.36. DIRECTIONAL SERVOCYLINDER PRIMARY PRESSURE HOSE REPLACEMENT – continued

7.36.3. Removal

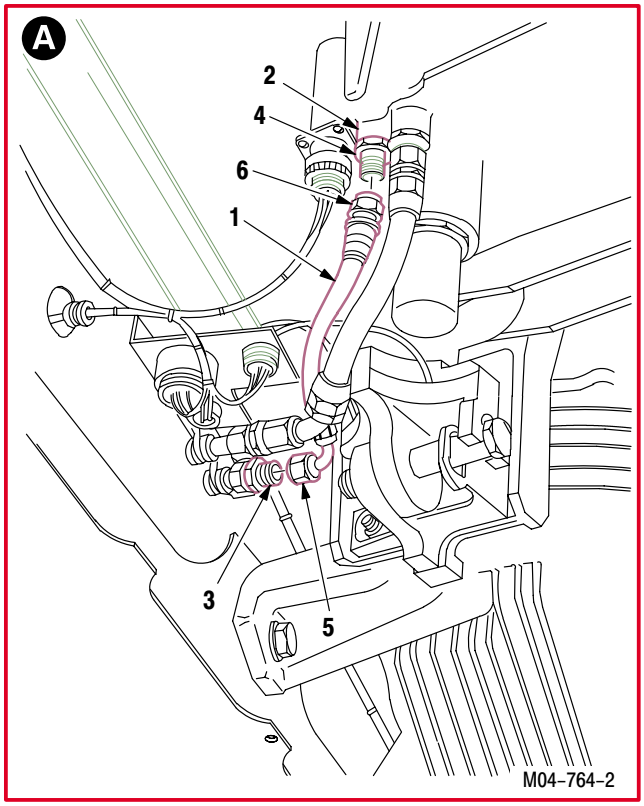
a. **Remove hose (1) from servocylinder (2).**

(1) Place rags under unions (3) and (4) to catch hydraulic fluid spills.

(2) Hold union (3). Remove nut (5).

(3) Hold union (4). Remove nut (6).

(4) Discard hose (1).



7.36.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.36.5. Inspection

a. **Check unions and nuts for cracks, rounded flats, and stripped or damaged threads** (para 10.1)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.36. DIRECTIONAL SERVOCYLINDER PRIMARY PRESSURE HOSE REPLACEMENT – continued

7.36.6. Installation



a. **Install new hose (1) on servocylinder (2).**

   (1) Lubricate threads on unions (3) and (4). Use clean hydraulic fluid (item 92, App F).

   (2) Hold union (3). Install nut (5).

   (3) Hold union (4). Install nut (6).

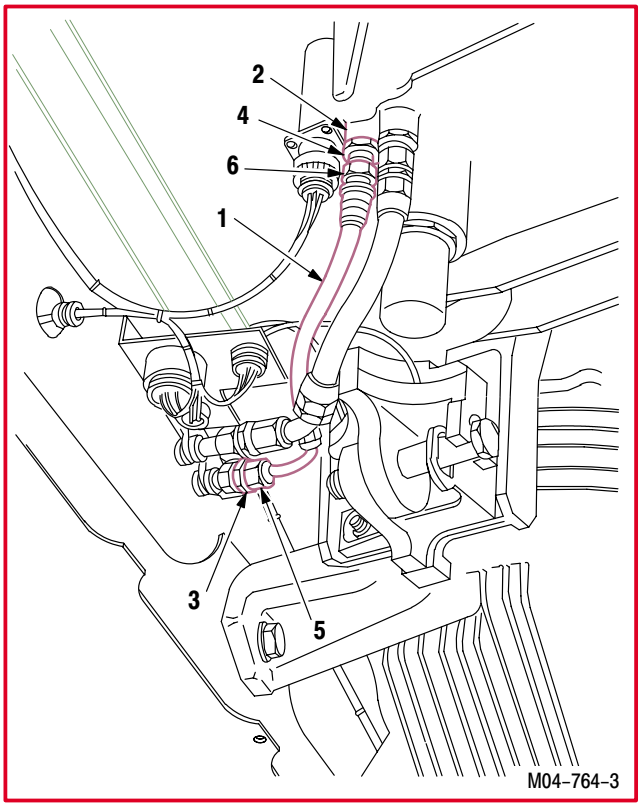
b. **Inspect (QA).**

c. **Bleed primary hydraulic system** (para 1.35)**.**

d. **Service primary hydraulic system** (para 1.34)**.**

e. **Perform hydraulic system leak check** (para 7.2)**.**

f. **Install access fairings L530, L540, and L546** (para 2.2)**.**



END OF TASK

7.37. DIRECTIONAL SERVOCYLINDER PRIMARY RETURN HOSE REPLACEMENT

7.37.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.37.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

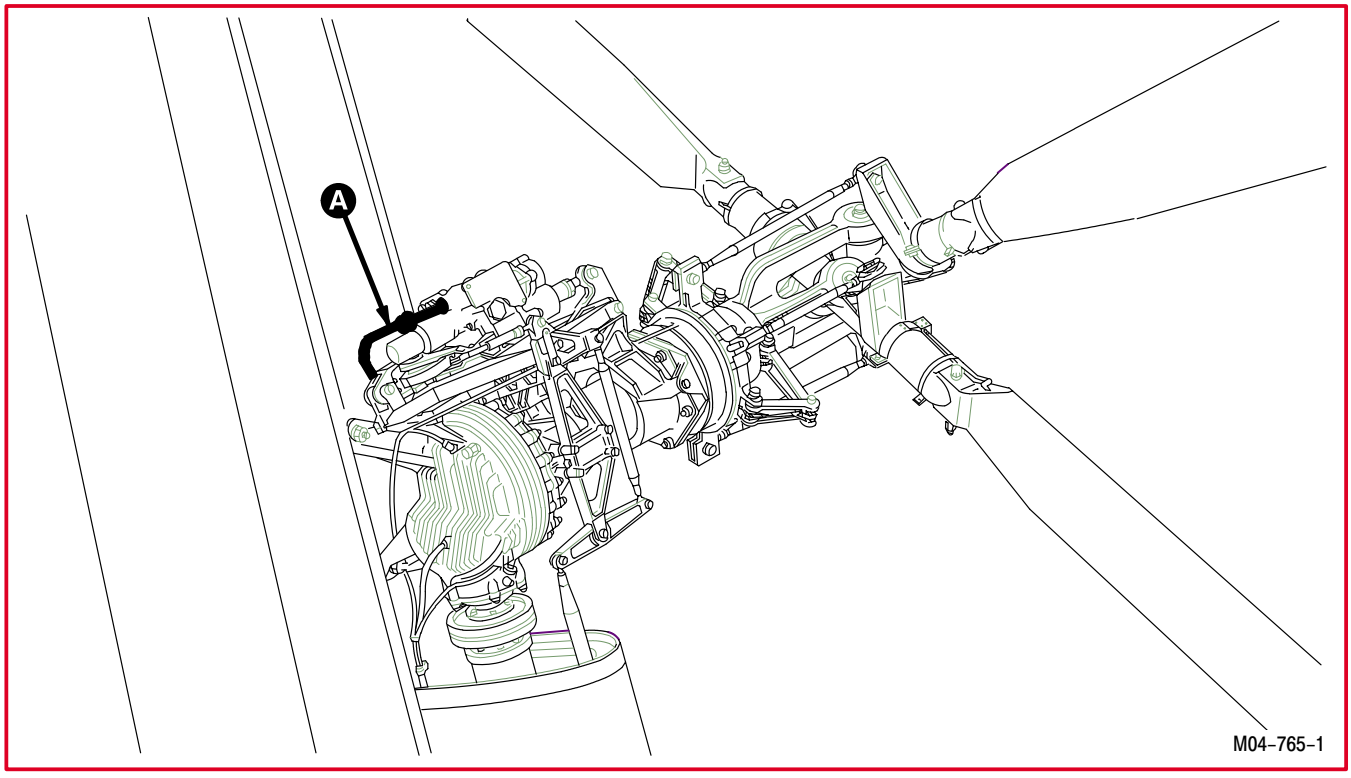
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L530, L540, and L546 removed
7.3	Primary hydraulic system vented



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7.37. DIRECTIONAL SERVOCYLINDER PRIMARY RETURN HOSE REPLACEMENT – continued

7.37.3. Removal

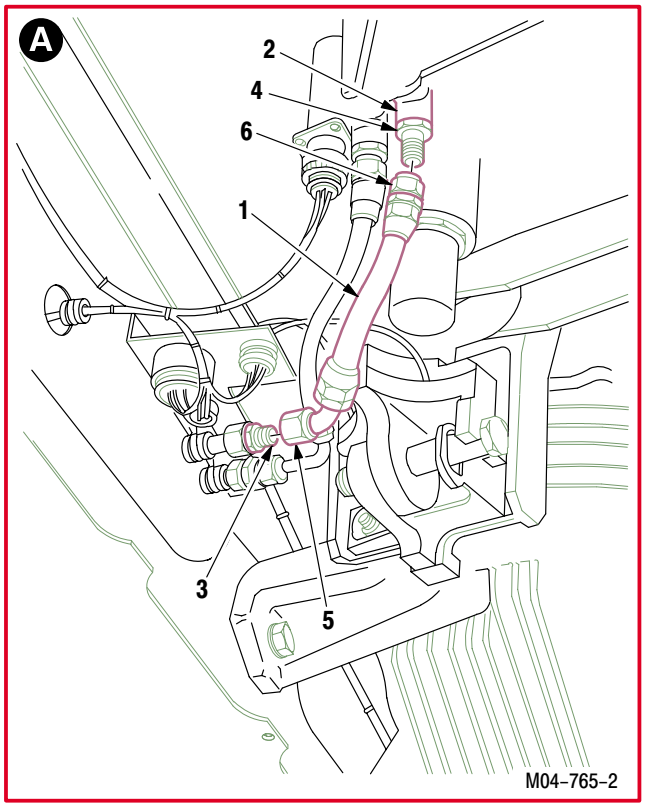
a. **Remove hose (1) from servocylinder (2).**

(1) Place rags under unions (3) and (4) to catch hydraulic fluid spills.

(2) Hold union (3). Remove nut (5).

(3) Hold union (4). Remove nut (6).

(4) Discard hose (1).



7.37.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.37.5. Inspection

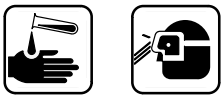
a. **Check unions and nuts for cracks, rounded flats, and stripped or damaged threads** (para 10.1)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.37. DIRECTIONAL SERVOCYLINDER PRIMARY RETURN HOSE REPLACEMENT – continued

7.37.6. Installation



a. **Install new hose (1) on servocylinder (2).**

(1) Lubricate threads on unions (3) and (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (3). Install nut (5).

(3) Hold union (4). Install nut (6).

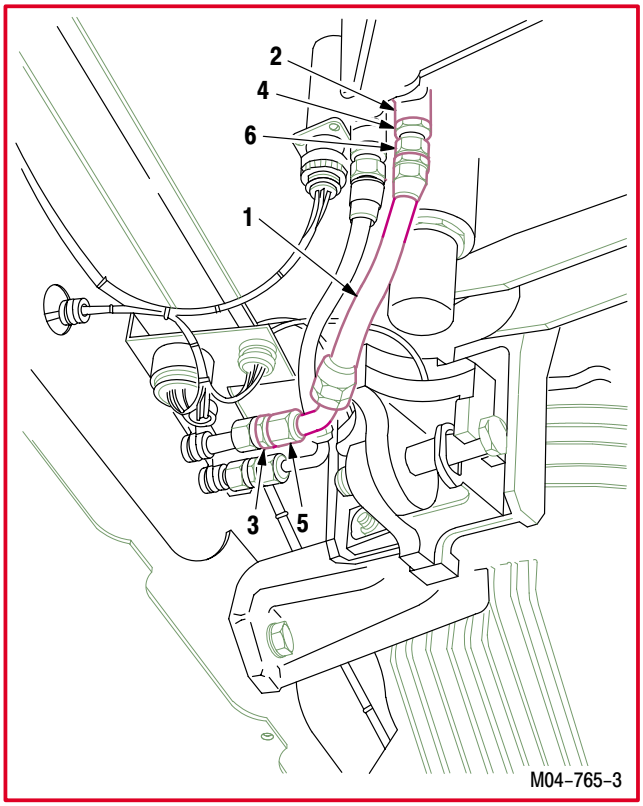
b. **Inspect (QA).**

c. **Bleed primary hydraulic system** (para 1.35)**.**

d. **Service primary hydraulic system** (para 1.34)**.**

e. **Perform hydraulic system leak check** (para 7.2)**.**

f. **Install access fairings L530, L540, and L546** (para 2.2)**.**



END OF TASK

7.38. DIRECTIONAL SERVOCYLINDER UTILITY PRESSURE HOSE REPLACEMENT

7.38.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.38.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

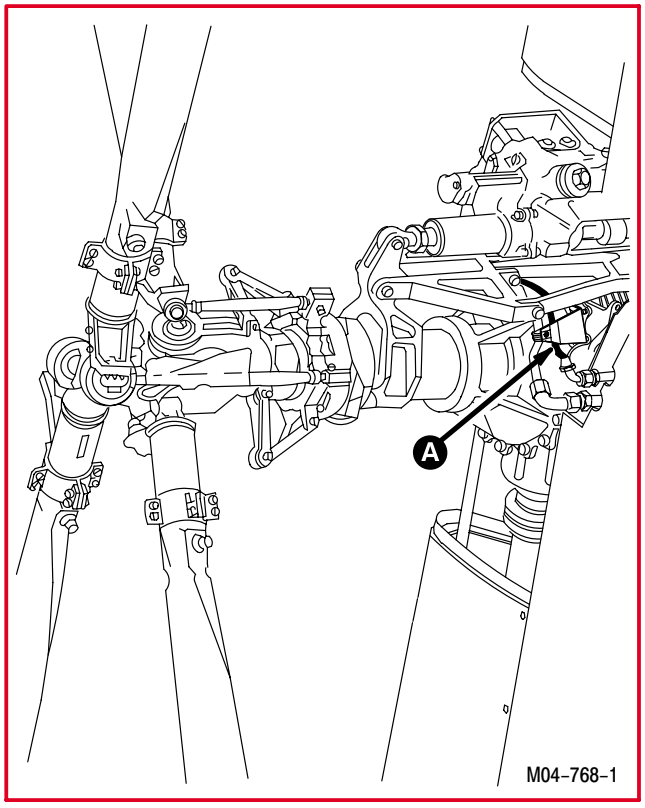
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed
7.57	Utility hydraulic system vented



GO TO NEXT PAGE

7.38. DIRECTIONAL SERVOCYLINDER UTILITY PRESSURE HOSE REPLACEMENT – continued

7.38.3. Removal

a. **Remove hose (1) from bracket (2).**

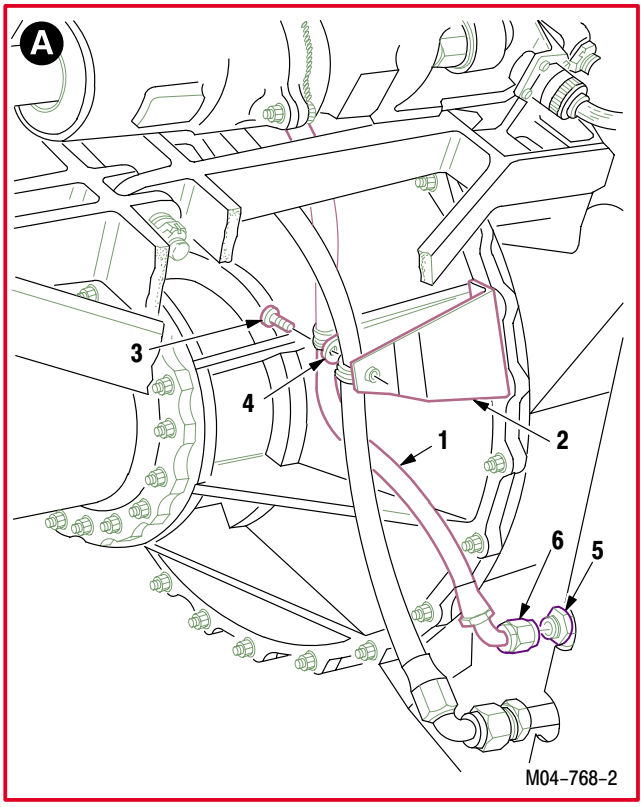
(1) Remove screw (3) from bracket (2).

(2) Remove and retain clamp (4) from hose (1).

b. **Remove hose (1) from union (5).**

(1) Place rags under union (5) to catch hydraulic fluid spills.

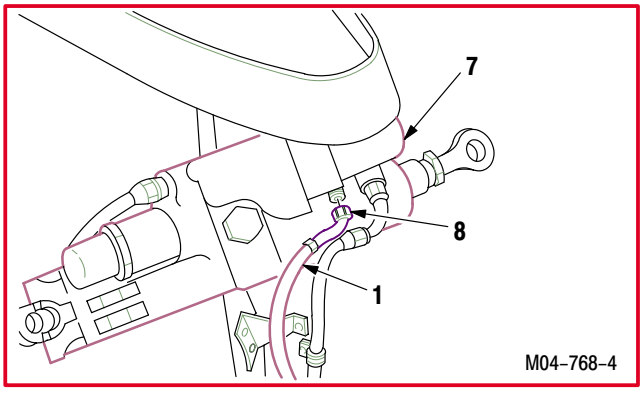
(2) Hold union (5). Remove nut (6).



c. **Remove hose (1) from servocylinder (7).**

(1) Remove nut (8).

(2) Discard hose (1).



7.38.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.38.5. Inspection

a. **Check unions and nuts for cracks, rounded flats, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.38. DIRECTIONAL SERVOCYLINDER UTILITY PRESSURE HOSE REPLACEMENT – continued

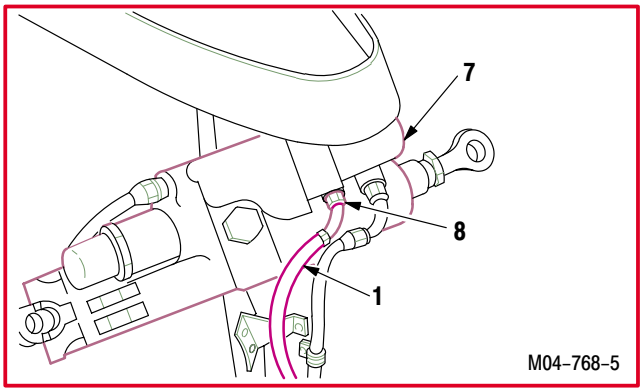
7.38.6. Installation



a. **Install new hose (1) on servocylinder (7).**

(1) Lubricate threads on servocylinder (7). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (8).



b. **Install hose (1) on union (5).**

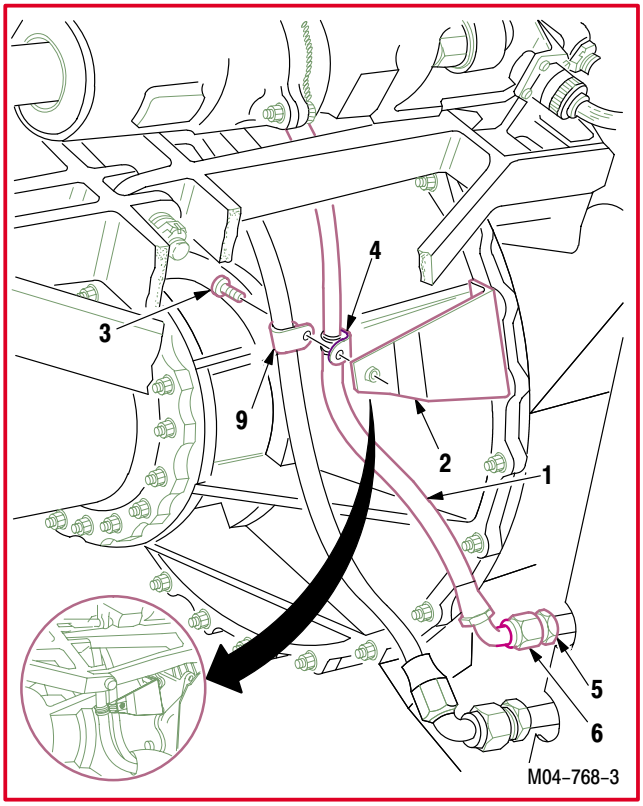
(1) Lubricate threads of union (5). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (5). Install nut (6).

c. **Install hose (1) on bracket (2).**

(1) Install clamp (4) on hose (1).

(2) Install screw (3) through clamps (4) and (9) on bracket (2).



d. **Inspect (QA).**

e. **Bleed utility hydraulic system** (para 1.35)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform hydraulic system leak check** (para 7.2)**.**

h. **Install access fairings L540 and L546** (para 2.2)**.**

END OF TASK

7.39. DIRECTIONAL SERVOCYLINDER UTILITY RETURN HOSE REPLACEMENT

7.39.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.39.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

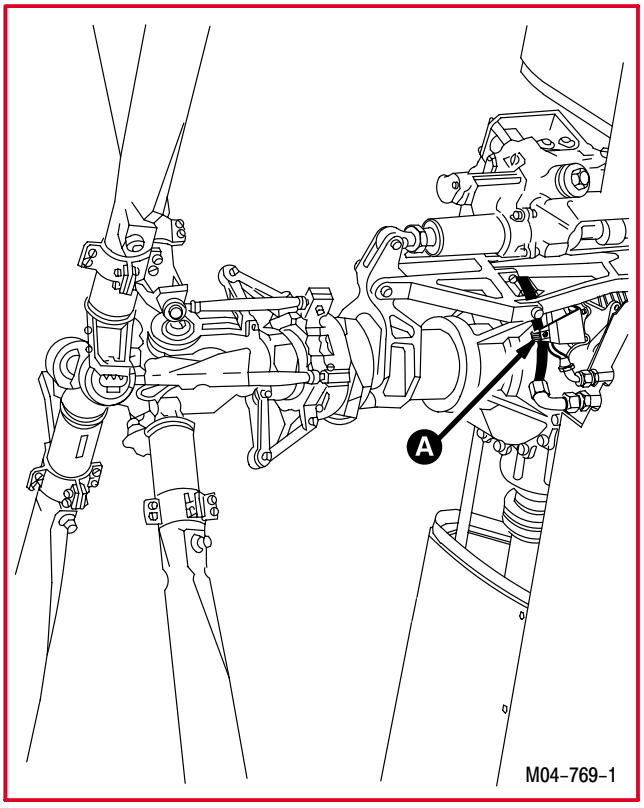
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed
7.57	Utility hydraulic system vented



GO TO NEXT PAGE

7.39. DIRECTIONAL SERVOCYLINDER UTILITY RETURN HOSE REPLACEMENT – continued

7.39.3. Removal

a. **Remove hose (1) from bracket (2).**

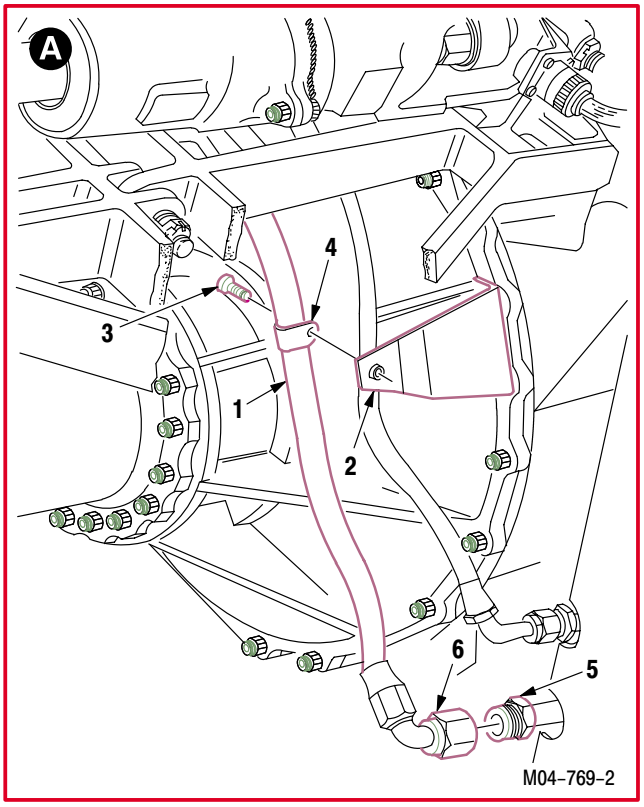
(1) Remove screw (3) from bracket (2).

(2) Remove and retain clamp (4) from hose (1).

b. **Remove hose (1) from union (5).**

(1) Place rags under union (5) to catch hydraulic fluid spills.

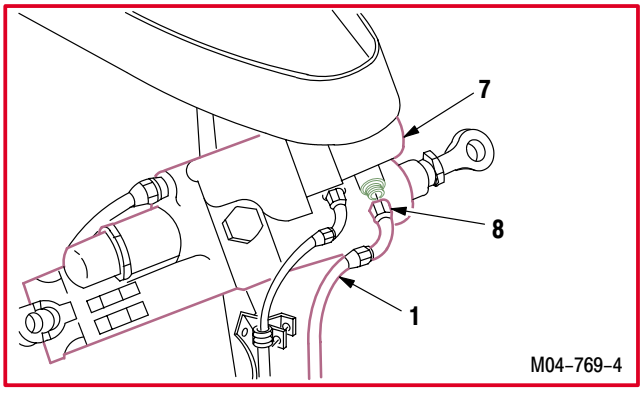
(2) Hold union (5). Remove nut (6).



c. **Remove hose (1) from servocylinder (7).**

(1) Remove nut (8).

(2) Discard hose (1).



7.39.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.39.5. Inspection

a. **Check unions and nuts for cracks, rounded flats, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

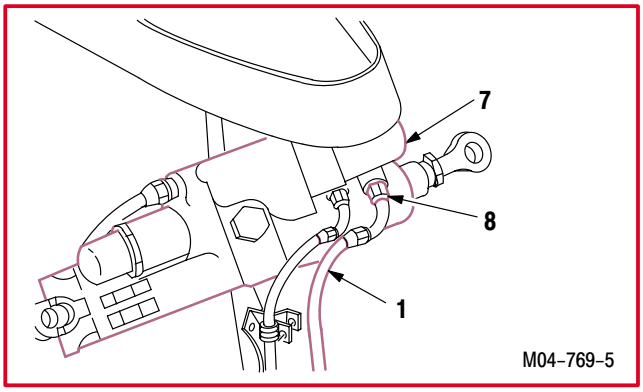
7.39. DIRECTIONAL SERVOCYLINDER UTILITY RETURN HOSE REPLACEMENT – continued

7.39.6. Installation

a. **Install new hose (1) on servocylinder (7).**

(1) Lubricate threads on servocylinder (7). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (8).



b. **Install hose (1) on union (5).**

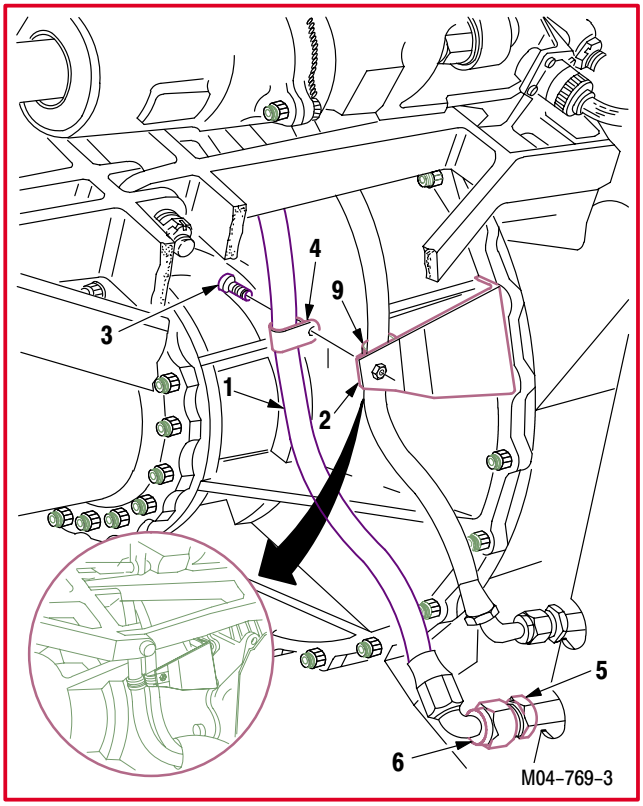
(1) Lubricate threads of union (5). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (5). Install nut (6).

c. **Install hose (1) on bracket (2).**

(1) Install clamp (4) on hose (1).

(2) Install screw (3) through clamps (4) and (9) on bracket (2).



d. **Inspect (QA).**

e. **Bleed utility hydraulic system** (para 1.35)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform hydraulic system leak check** (para 7.2)**.**

h. **Install access fairings L540 and L546** (para 2.2)**.**

END OF TASK

7.40. DIRECTIONAL SERVOCYLINDER UTILITY HYDRAULIC PRESSURE/RETURN HOSE BRACKET REMOVAL/INSTALLATION

7.40.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.40.2. Initial Setup

Tools:

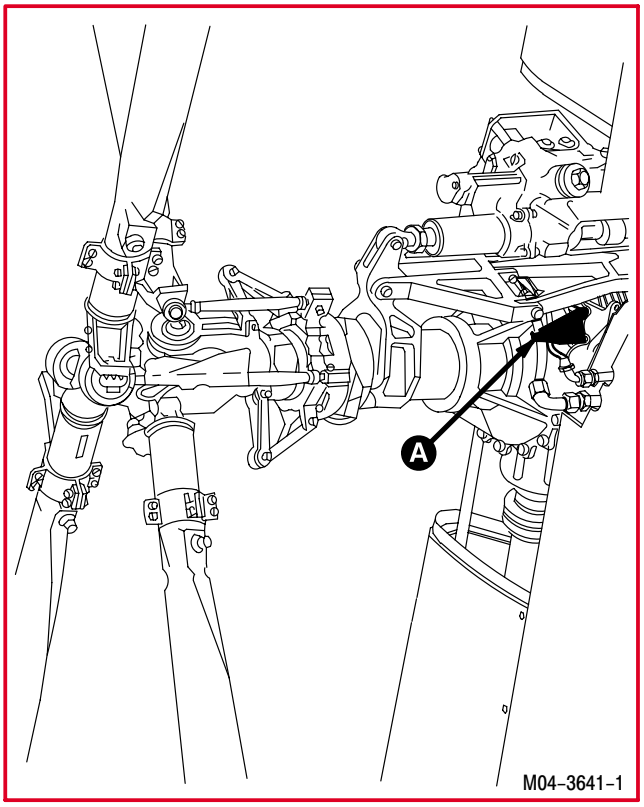
Aircraft mechanic's tool kit (item 376, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed



GO TO NEXT PAGE

7.40. DIRECTIONAL SERVOCYLINDER UTILITY HYDRAULIC PRESSURE/RETURN HOSE BRACKET REMOVAL/INSTALLATION – continued

7.40.3. Removal

a. **Remove pressure and return hoses (1) from bracket (2).**

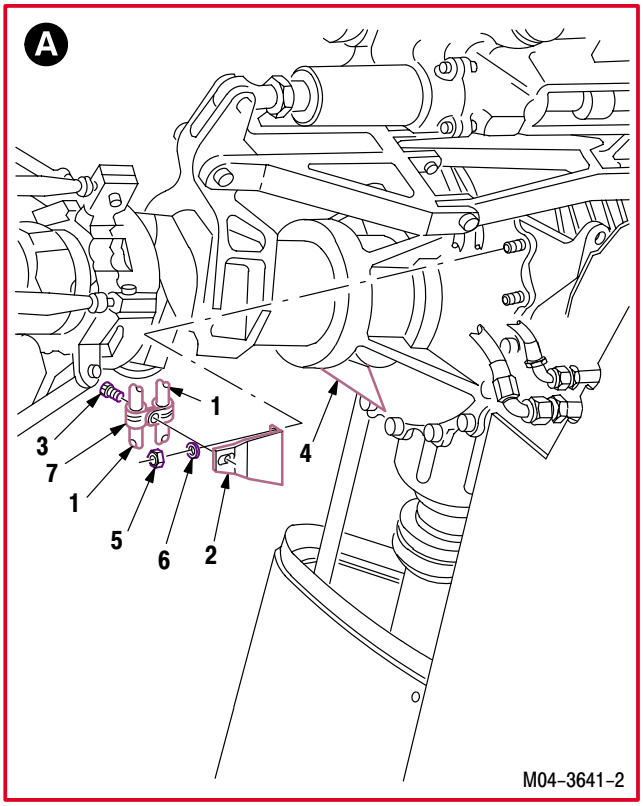
(1) Remove screw (3) from bracket (2).

(2) Push hoses (1) away from bracket (2).

b. **Remove bracket (2) from gearbox (4).**

(1) Remove two nuts (5) and washers (6) from gearbox (4).

(2) Remove bracket (2).



7.40.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.40.5. Inspection

a. **Check hoses for nicks, cuts, and chafing** (para 10.1)**.**

b. **Check nuts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 10.1)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.40. DIRECTIONAL SERVOCYLINDER UTILITY HYDRAULIC PRESSURE/RETURN HOSE BRACKET REMOVAL/INSTALLATION – continued

7.40.6. Installation

a. **Install bracket (2) on gearbox (4).** Torque nuts (5) to **165 INCH-POUNDS**.

(1) Install bracket (2) on gearbox (4).

(2) Install two nuts (5) and washers (6).

(3) Torque nuts (5) to **165 INCH-POUNDS**. Use torque wrench.

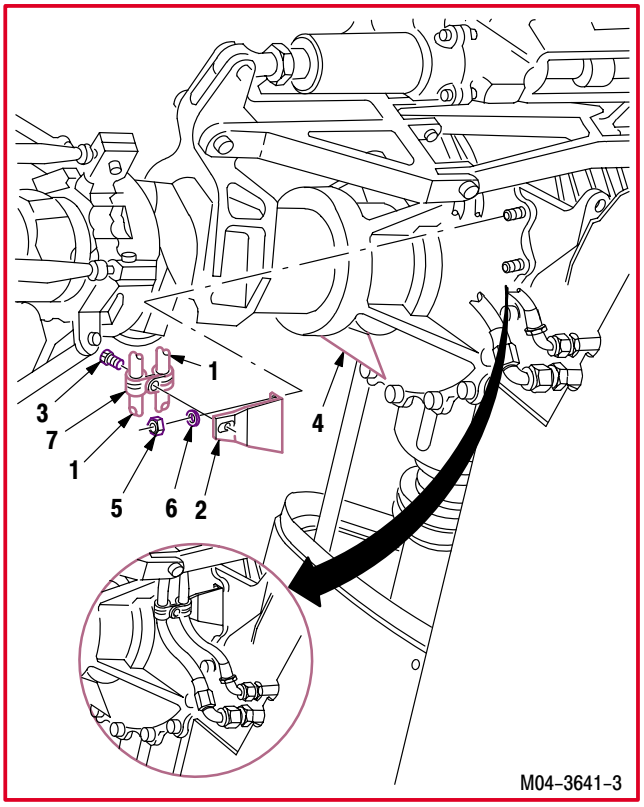
b. **Install pressure and return hoses (1) on bracket (2).**

(1) Aline clamps (7) with bracket (2).

(2) Install screw (3) through clamps (7) to bracket (2).

c. **Inspect (QA).**

d. **Install access fairings L540 and L546** (para 2.2)**.**



END OF TASK

7.40A. DIRECTIONAL SERVOCYLINDER CLEVIS ASSEMBLY REPLACEMENT (AVIM)

7.40A.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

7.40A.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
1/2 x 3/8-inch drive socket wrench adapter (item 3, App H)
3/16 - 5/8-inch hexagon x 1/2-inch drive screwdriver bit set (item 37, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Materials/Parts:

Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

7.40A.3. Disassembly

CAUTION

This task applies to non-bucs aircraft only.

a. **Remove clevis assembly (1) from servo actuator (2).**

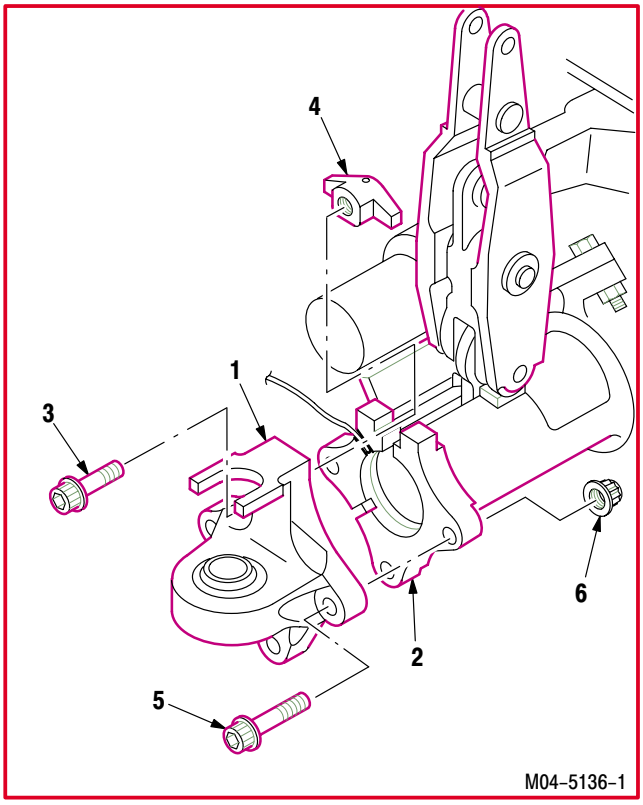
(1) Remove lockwire from bolt (3) and clamp (4).

(2) Remove bolt (3) from clevis (1) and clamp (4).

(3) Remove clamp (4) from actuator (2).

(4) Remove three bolts (5) and nuts (6) from clevis (1) and actuator (2).

(5) Remove clevis (1) from actuator (2).



7.40A.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

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7.40A. DIRECTIONAL SERVOCYLINDER CLEVIS ASSEMBLY REPLACEMENT (AVIM) – continued

7.40A.5. Inspection

a. **Check removed and attaching parts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.40A.6. Assembly

a. **Install clevis assembly (1) on servo actuator (2).** Torque bolts (5) and (3) to **155 INCH-POUNDS**.

(1) Aline clevis (1) on actuator (2).

(2) Install three bolts (5) through clevis (1) and actuator (2).

(3) Install three nuts (6) on bolts (5).

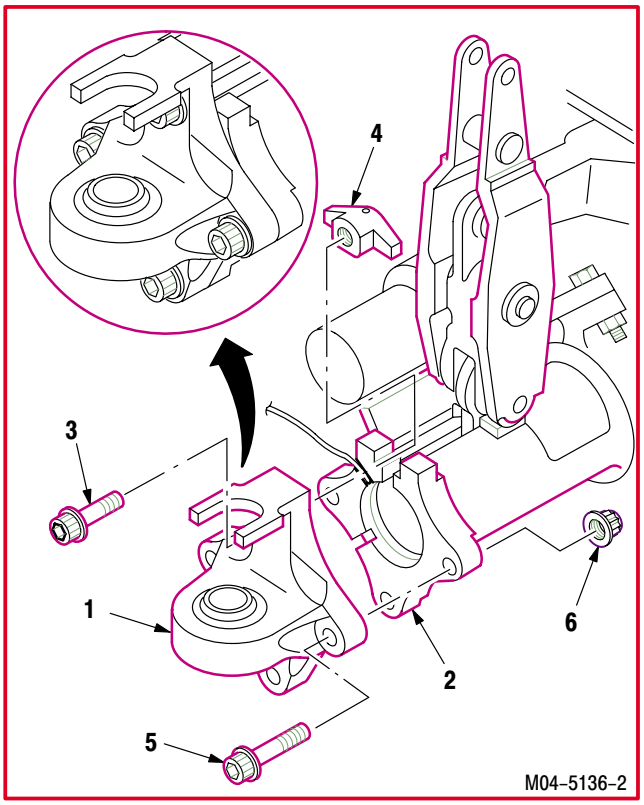
(4) Aline clamp (4) with actuator (2).

(5) Install bolt (3) through clevis (1) in clamp (4).

(6) Hold three nuts (6) and torque bolts (5) to **155 INCH-POUNDS**. Use torque wrench, screwdriver bit set, and adapter.

(7) Torque bolt (3) to **155 INCH-POUNDS**. Use torque wrench, screwdriver bit set, and adapter.

(8) Lockwire bolt (3) to clamp (4). Use wire (item 226, App F).



b. **Inspect (QA).**

END OF TASK

7.41. COLLECTIVE SERVOCYLINDER REMOVAL

7.41.1. Description

This task covers: Removal. Cleaning. Inspection.

7.41.2. Initial Setup

Tools:

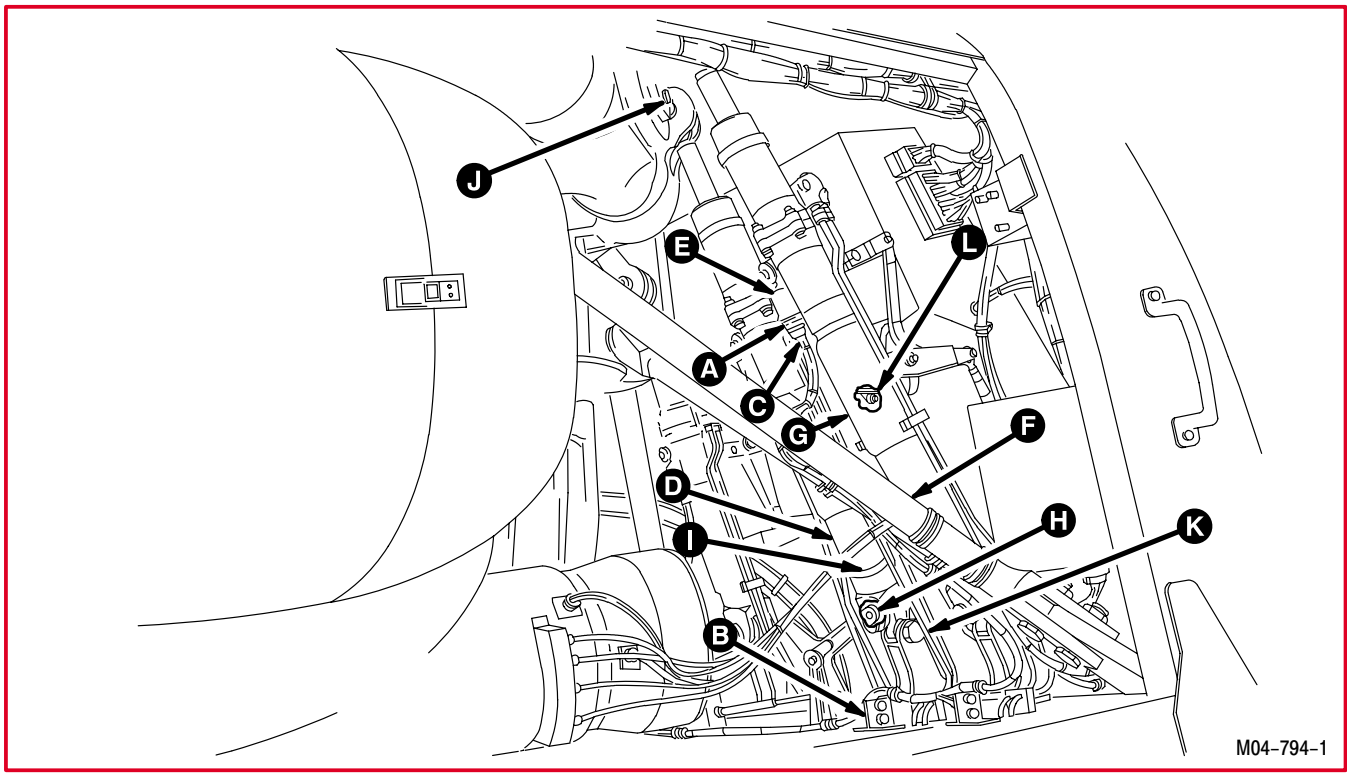
Aircraft mechanic's tool kit (item 376, App H)
Aircraft power unit (item 232, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H) (2)
15/16 & 1-inch box wrench (item 412, App H) (2)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 and fairing T205R removed

Personnel Required:

67R Attack Helicopter Repairer
One person to assist



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7.41. COLLECTIVE SERVOCYLINDER REMOVAL – continued

WARNING

FLIGHT SAFETY PART

The collective servocylinder and/or components of the collective servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

7.41.3. Removal

a. **Apply external electrical power to aircraft** (para 1.70)**.** Use aircraft power unit.

b. **Apply external hydraulic power to aircraft** (para 1.72)**.** Use aircraft power unit.

c. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

d. **On pilot center circuit breaker panel, open ASE AC, DC, and BUCS circuit breakers.**

CAUTION

Do not force movement of cyclic or collective control sticks if any binding is felt in system. Serious damage can result to control system if cause of binding is not corrected.

e. **Place pilot cyclic stick in full aft position.**

f. **Place pilot collective stick in full down position.**

g. **Remove external electrical power from aircraft** (para 1.70)**.**

h. **Remove external hydraulic power from aircraft** (para 1.72)**.**

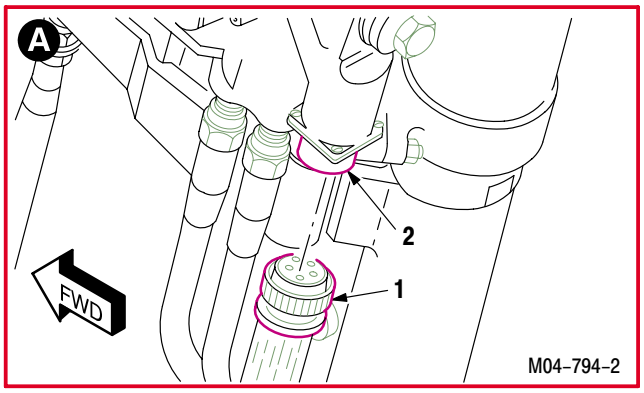
i. **Vent primary hydraulic system** (para 7.3)**.**

j. **Vent utility hydraulic system** (para 7.57)**.**

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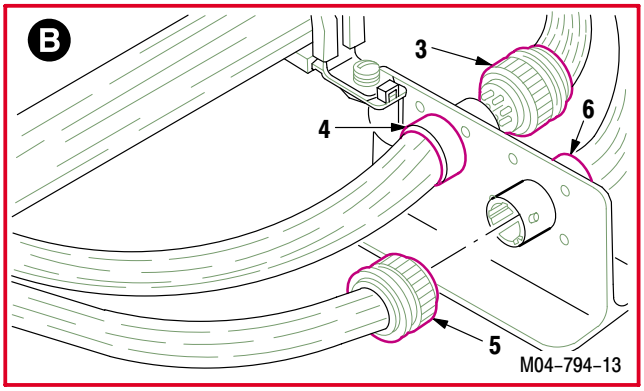
7.41. COLLECTIVE SERVOCYLINDER REMOVAL – continued

k. **Detach connector P228 (1) from receptacle (L33)J228 (2).**



l. **Detach connector (L33)P227 (3) from receptacle J227 (4).**

m. **Detach connector (L33)P417 (5) from receptacle J417 (6).**



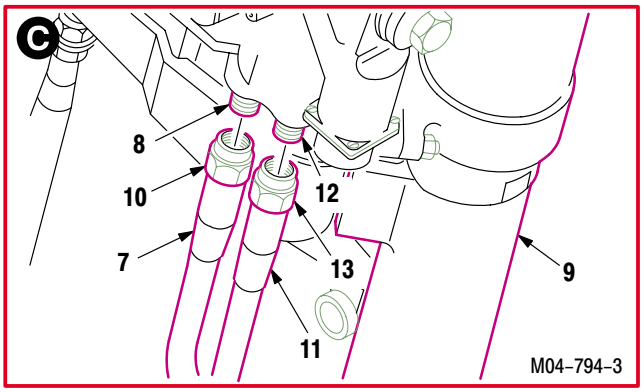
n. **Remove primary pressure tube (7) from adapter (8).**

(1) Place rags around servocylinder (9) to catch hydraulic fluid spills.

(2) Remove nut (10).

o. **Remove primary return tube (11) from adapter (12).**

(1) Remove nut (13).

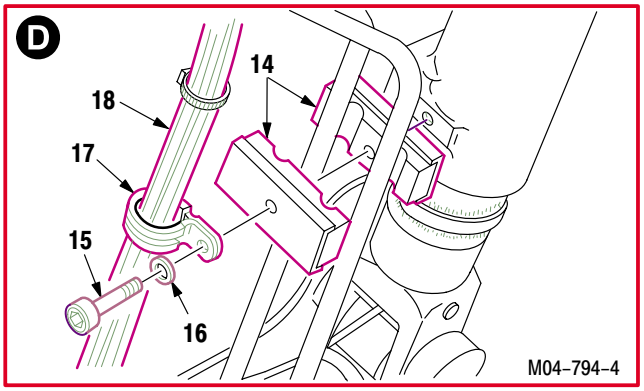


p. **Remove tube clamp (14).**

(1) Remove screw (15) and washer (16) and wire clamp (17).

(2) Remove wire clamp (17) from wire harness (18).

(3) Remove halves of clamp (14).



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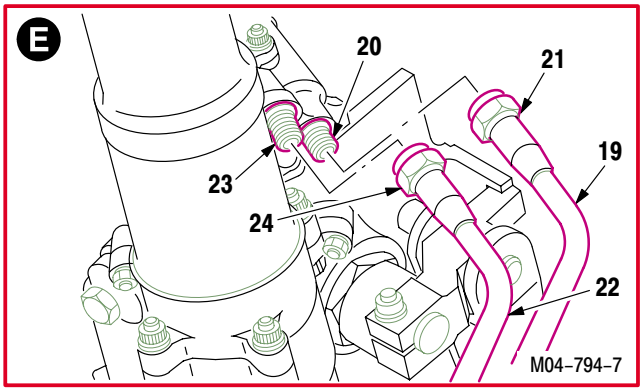
7.41. COLLECTIVE SERVOCYLINDER REMOVAL – continued

q. **Remove utility pressure tube (19) from adapter (20).**

(1) Remove nut (21).

r. **Remove utility return tube (22) from adapter (23).**

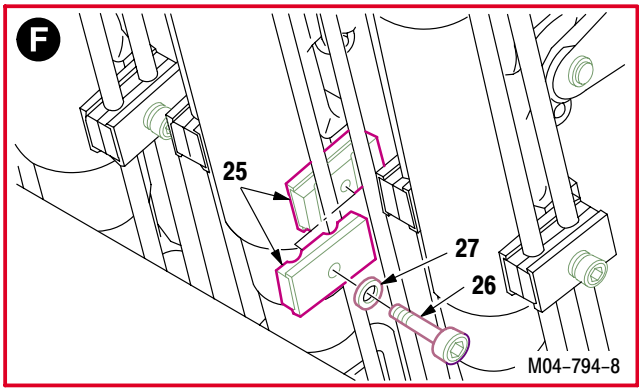
(1) Remove nut (24).



s. **Remove tube clamp (25).**

(1) Remove screw (26) and washer (27).

(2) Remove halves of clamp (25).

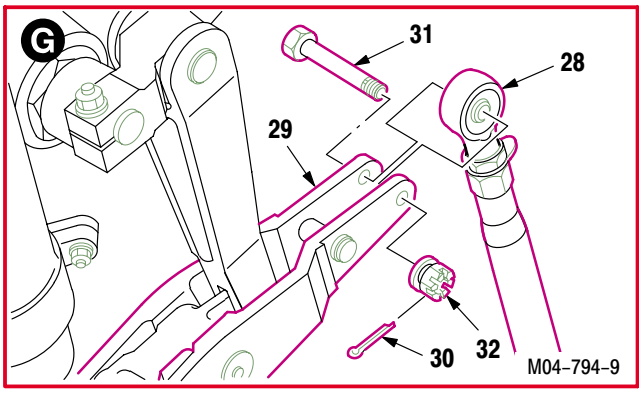


t. **Remove rod end (28) from control arm (29).**

(1) Remove and discard cotter pin (30).

(2) Hold bolt (31). Remove nut (32).

(3) Remove bolt (31).

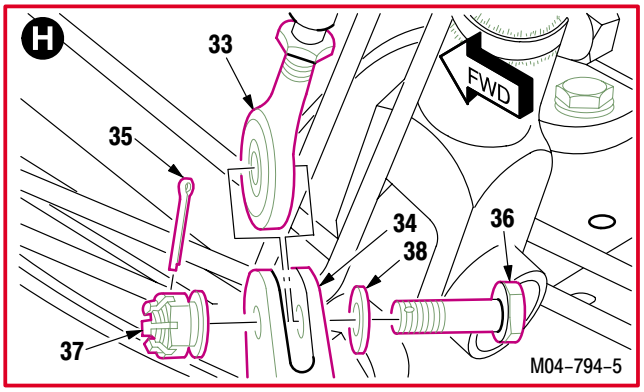


u. **Remove rod end (33) from bellcrank (34).**

(1) Remove and discard cotter pin (35).

(2) Hold bolt (36). Remove nut (37).

(3) Remove bolt (36) and washer (38).



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7.41. COLLECTIVE SERVOCYLINDER REMOVAL – continued

NOTE

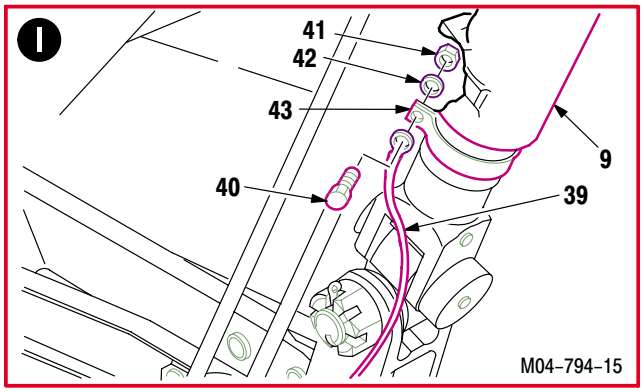
If ground cable is installed on helicopter, go to step v. If not, go to step w.

v. **Remove cable (39) from servocylinder (9).**

(1) Remove sealant from screw (40), nut (41), washer (42), and clamp (43) (para 1.47).

(2) Hold screw (40). Remove nut (41) and washer (42).

(3) If replacing servocylinder (9), remove clamp (43).



WARNING

To prevent movement of bellcrank and possible injury, support bellcrank before disconnecting servocylinder. If injury occurs, seek medical aid.

w. **Remove rod end (44) from bellcrank (45).**

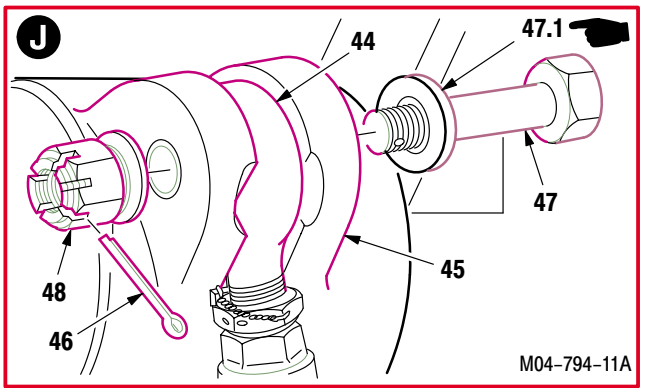
(1) Remove sealant from attaching hardware (para 1.47).

(2) Remove and discard cotter pin (46).

(3) Hold bolt (47). Use box wrench.

(4) Remove nut (48). Use box wrench.

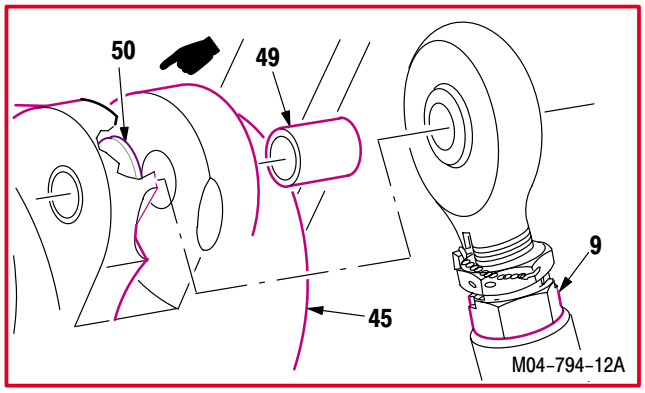
(5) Remove bolt (47) and washer(s) (47.1) if installed.



NOTE

Do not remove nylon washer unless it is loose or excessively worn.

(6) Remove bushing (49) and nylon washer (50) (if necessary).



x. **Remove servocylinder (9) from bellcrank (45).**

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7.41. COLLECTIVE SERVOCYLINDER REMOVAL – continued

y. **Remove tube clamp (51).**

(1) Remove screw (52) and washer (53).

(2) Remove halves of tube clamp (51).

CAUTION

Improper removal of self-retaining bolt will damage bolt and pin.

z. **Remove self-retaining bolt (54) from pin (55).**

(1) Remove and discard cotter pin (56).

(2) Hold pin (55). Use box wrench.

(3) Loosen bolt (54) one-half turn. Use box wrench.

(4) Press button (57) in center of bolt (54).

(5) Keeping button (57) pressed, remove bolt (54) from pin (55).

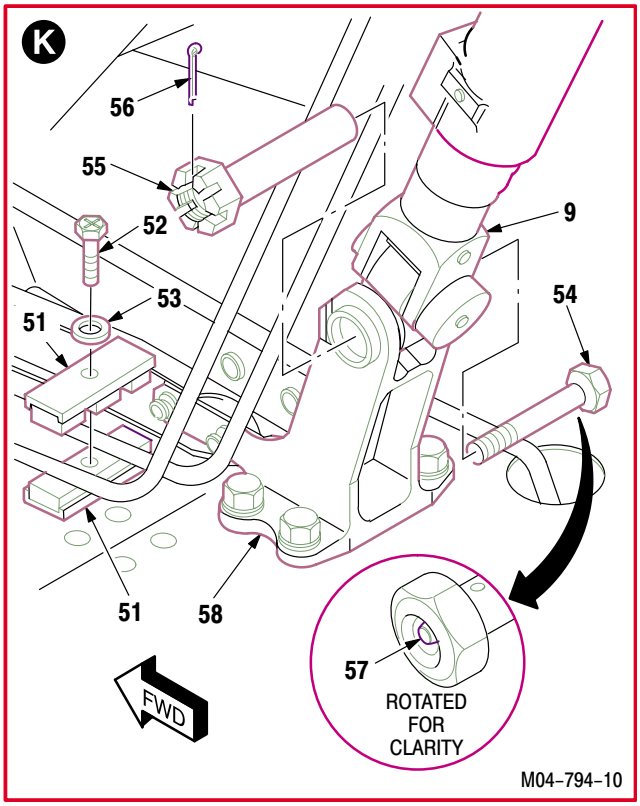
aa. **Remove servocylinder (9) from bracket (58).**

(1) Remove pin (55).

ab. **Remove servocylinder (9) from aircraft.**

(1) One person hold servocylinder upper end and a second person lift lower end.

(2) Carefully remove servocylinder (9).



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7.41. COLLECTIVE SERVOCYLINDER REMOVAL – continued

NOTE

Perform steps ac. and ad. off helicopter if replacing servocylinder. Go to paragraph 7.41.4 if removing servocylinder for reinstallation.

ac. **Remove control tube (59) and adapter (60) from servocylinder (9).**

(1) Remove and discard cotter pin (61).

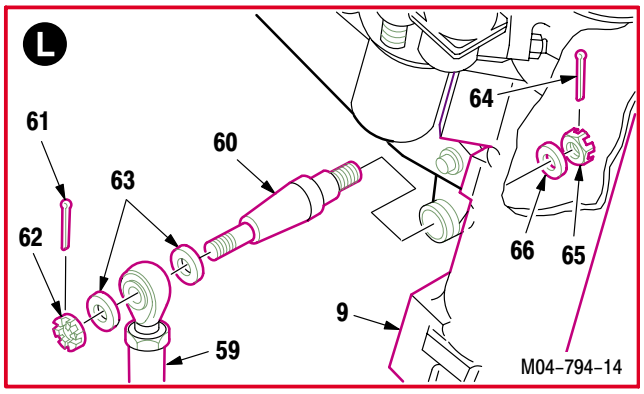
(2) Hold adapter (60). Remove nut (62).

(3) Remove control tube (59) and two washers (63).

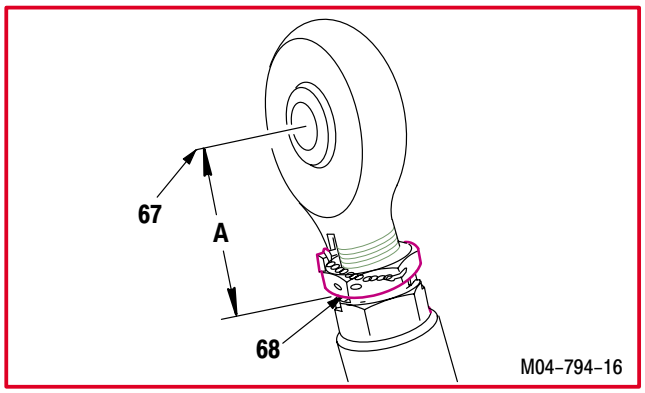
(4) Remove and discard cotter pin (64).

(5) Hold adapter (60). Remove nut (65) and washer (66).

(6) Remove adapter (60) from servocylinder (9).



ad. **Measure and record distance A between center of rod end bore (67) and top of servocylinder piston rod (68). Keep recorded measurement for installation of new servocylinder.**



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7.41. COLLECTIVE SERVOCYLINDER REMOVAL – continued

7.41.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

7.41.5. Inspection

a. **Check removed and attaching parts for cracks, nicks, or dents** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Check rod end for bearing play.**

(1) Maximum radial bearing play **0.005 INCH**.

(2) Maximum axial bearing play **0.020 INCH**.

d. **Check universal link bushing for radial play.**

(1) Maximum radial bushing play **0.005 INCH**.

e. **Check servocylinder linkage control fasteners for damage and security.**

(1) Check fasteners with 10X magnifying glass for cracks and corrosion. None allowed.

(2) Manually try to rotate fasteners (no tools or pliers) to check for loose or rotating hardware. None allowed.

f. **Check servocylinder mount bracket bushing for wear.**

(1) Maximum inside diameter **0.754 INCH**.

g. **Check servocylinder pin for wear.**

(1) Minimum outer diameter **0.748 INCH**.

END OF TASK

7.42. COLLECTIVE SERVOCYLINDER INSTALLATION

7.42.1. Description

This task covers: Installation.

7.42.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 77, App H)
1 1/16 x 3/8-inch drive open end socket wrench crowfoot attachment (item 87, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/16 x 1/2-inch drive socket wrench socket (item 305, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
15/16 & 1-inch box wrench (item 412, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Bolt MS27576-10-46 (for alinement)
Cotter Pin (6)
Corrosion preventive compound (item 62A, App F)
Hydraulic fluid (item 92, App F)
Sealing compound (item 175, App F)
Sealing compound (item 176, App F)

Personnel Required:

67R	Attack Helicopter Repairer One person to assist
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

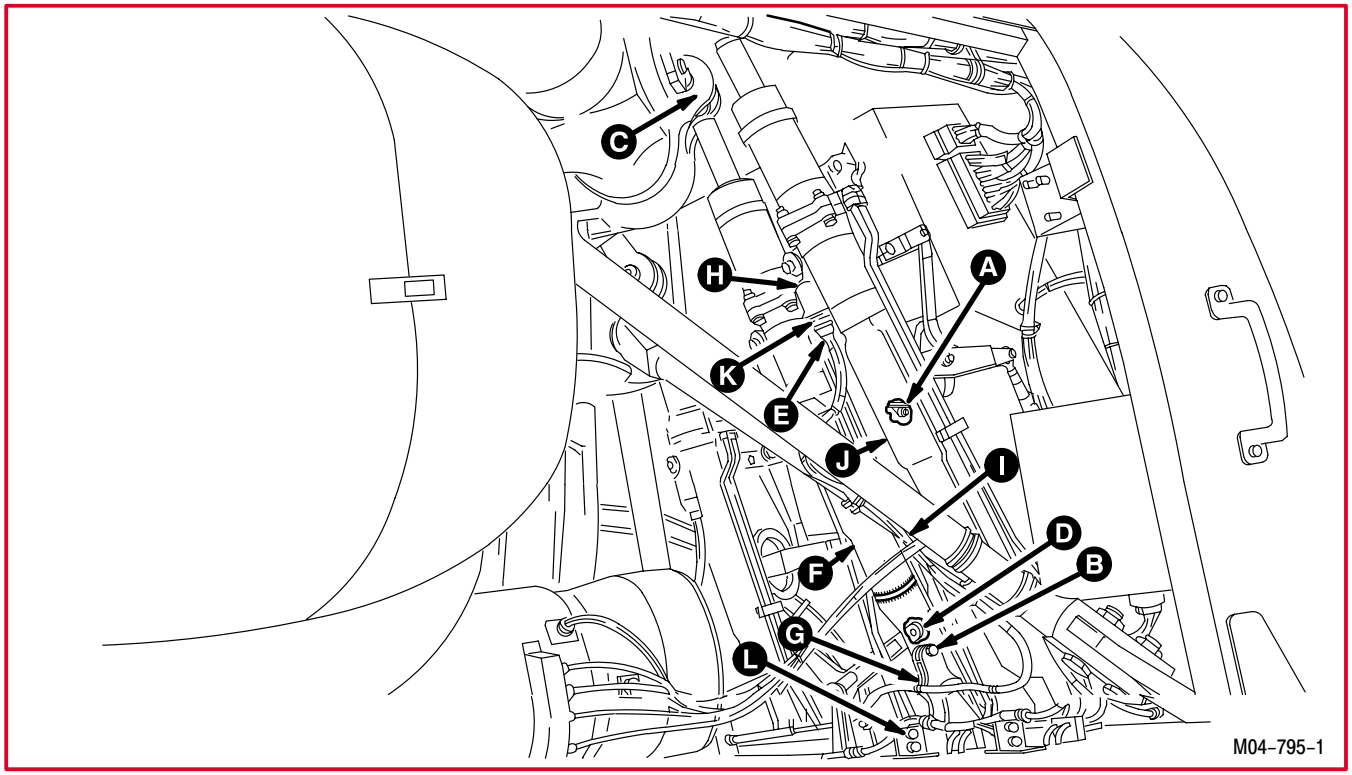
WARNING

FLIGHT SAFETY PART

- **The collective servocylinder and/or components of the collective servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Installation of a non-BUCS servocylinder in a BUCS equipped helicopter will render the BUCS system inoperative. Installation of a BUCS servocylinder in a helicopter not equipped with BUCS may result in loss of flight controls, serious injury or death to crewmembers, and/or serious damage to helicopter.**

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7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

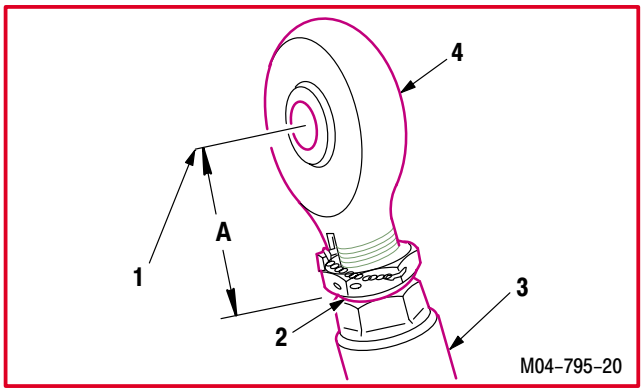


7.42.3. Installation

NOTE

Perform steps a. thru c. off helicopter if installing a replacement servocylinder. Go to step d. if reinstalling servocylinder.

a. **Measure and record distance A between center of rod end bore (1) and top of servocylinder piston rod (2) on new servocylinder (3).** Ensure that distance A on new servocylinder is within **0.016 INCH** of the measurement recorded in paragraph 7.41 on the old servocylinder. If distance A is not within **0.016 INCH**, adjust rod end (4) (para 7.43).



GO TO NEXT PAGE

7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

b. **Install adapter (5) on servocylinder (3).** Torque nut (6) **30 to 40 INCH-POUNDS**.

(1) Position adapter (5) on servocylinder (3).

(2) Install washer (7) and nut (6).

(3) Hold adapter (5). Torque nut (6) to **30 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(5) Install new cotter pin (8).

c. **Install control tube (9) on adapter (5).** Torque nut (10) **30 to 40 INCH-POUNDS**.

(1) Install one washer (11) on adapter (5).

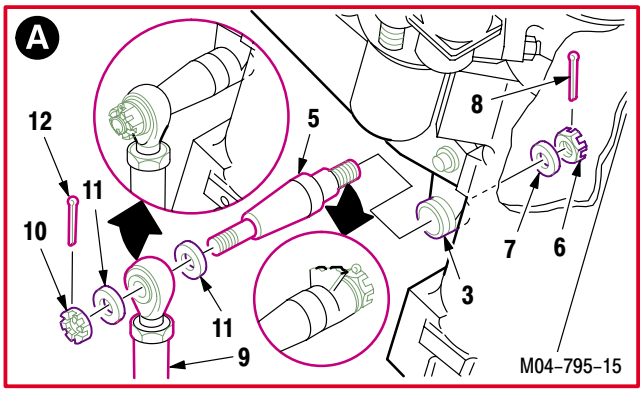
(2) Position tube (9) on adapter (5).

(3) Install one washer (11) and nut (10) on adapter (5).

(4) Hold adapter (5). Torque nut (10) to **30 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(6) Install new cotter pin (12).



GO TO NEXT PAGE

7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

d. **Install servocylinder (3) on bracket (13).**

(1) One person hold upper end of servocylinder and second person lift lower end. Position servocylinder (3) on bracket (13).

(2) Install pin (14).

CAUTION

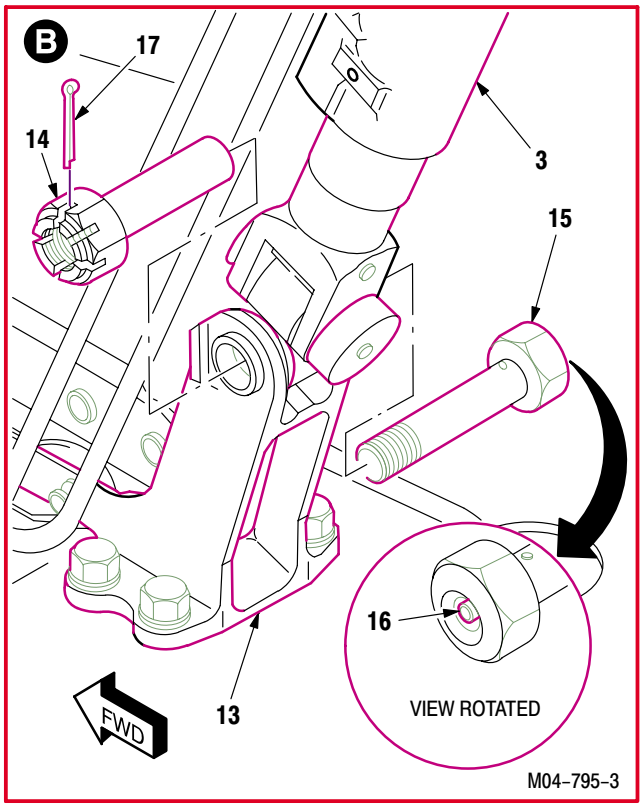
Improper installation of self-retaining bolt will damage bolt and pin.

e. **Install self-retaining bolt (15) in pin (14).**

(1) Insert bolt (15) into pin (14).

(2) Press button (16) in center of bolt (15).

(3) Screw bolt (15) into pin (14) as far as possible before releasing button (16).



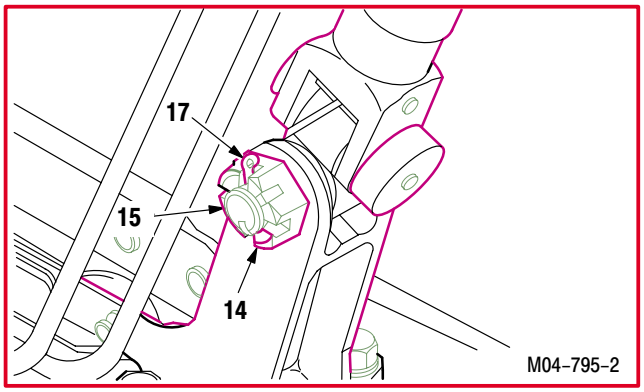
f. **Torque bolt (15) 50 to 70 INCH-POUNDS.**

(1) Hold pin (14). Use box wrench.

(2) Torque bolt (15) to **50 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Increase torque to aline cotter pin hole, but do not exceed **70 INCH-POUNDS**.

(4) Install new cotter pin (17).



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7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

CAUTION

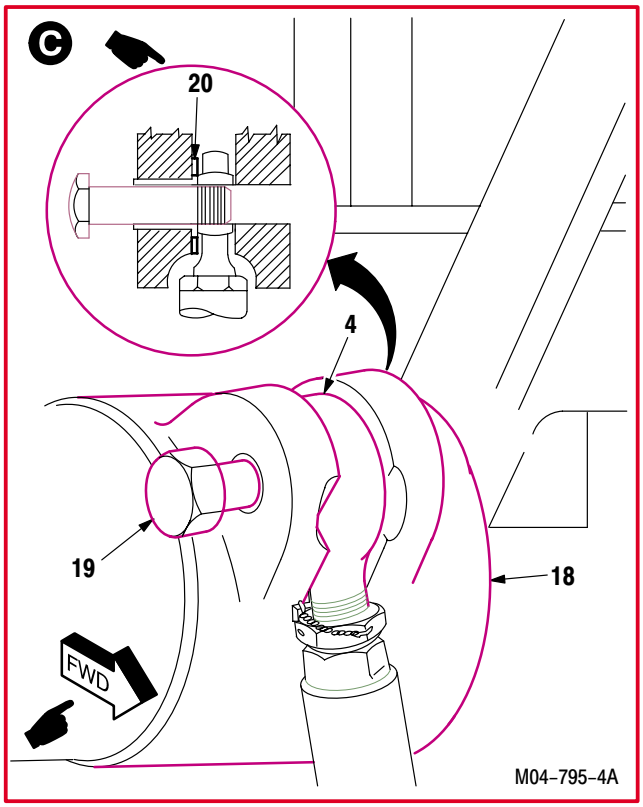
To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** so that rod end can be alined with bellcrank during rigging and installation. Adjustments are made by turning rod end, not piston rod.

NOTE

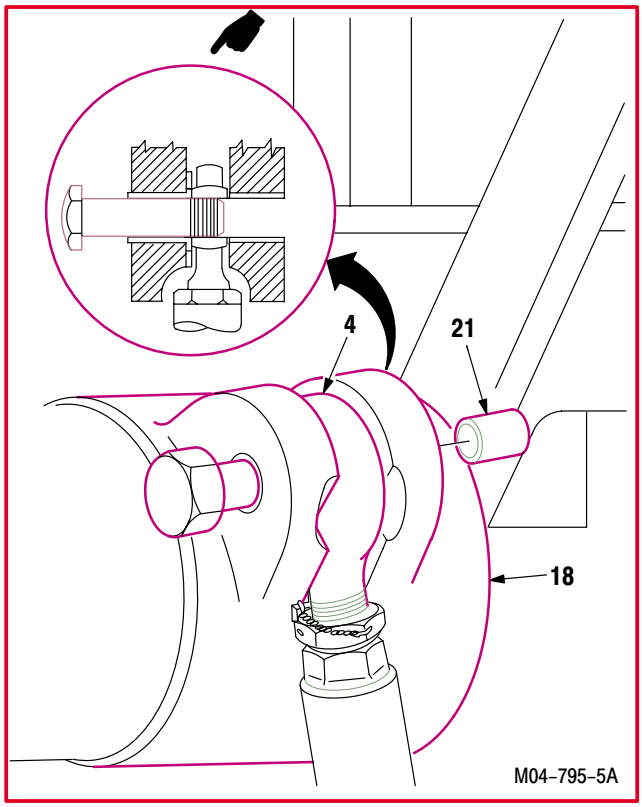
If nylon washer is excessively worn or has debonded from bellcrank, repair (para 11.12).

g. **Aline rod end (4) with bellcrank (18).**

(1) Insert alinement bolt (19) halfway through bellcrank (18), nylon washer (20), and rod end (4) from inboard side of bellcrank.



h. **Insert bushing (21) through bellcrank (18) until it seats against rod end (4).**



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7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued



i. **Install rod end (4) on bellcrank (18).**

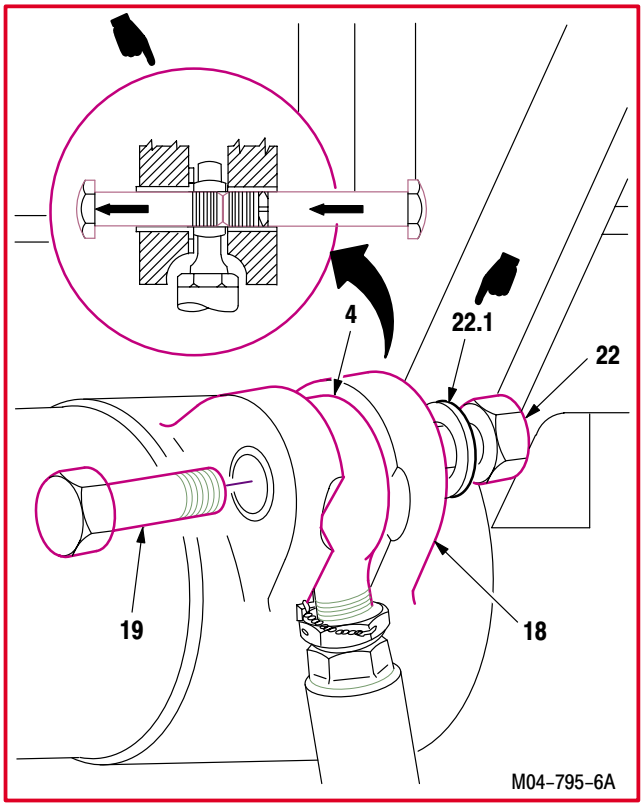
CAUTION

Threads of bolt and nut shall be clean and compound free. Contaminated threads can cause improper torque, which may cause damage to flight control system.

(1) Apply a light coat of corrosion preventive compound to shank of bolt (22). Use corrosion preventive compound (item 62A, App F).

(2) Install bolt (22) through washer(s) (22.1) (if required) and force alinement bolt (19) out of bellcrank (18).

(3) Check fit of self-retaining bolt (22) (para 11.1).





j. **Install nut (23) on bolt (22).** Torque nut (23) **900 to 1100 INCH-POUNDS**.

(1) Hold bolt (22). Use box wrench.

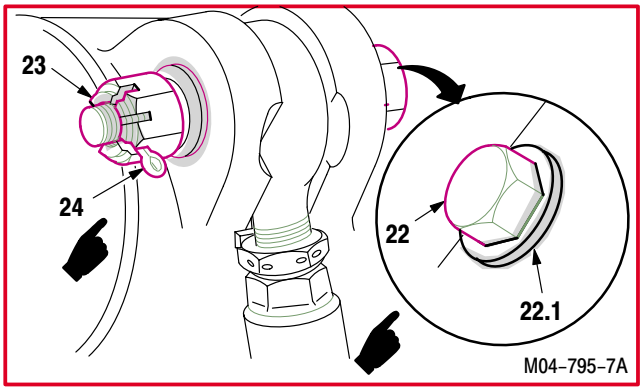
(2) Install nut (23).

(3) Torque nut (23) to **900 INCH-POUNDS**. Use socket and torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **1100 INCH-POUNDS**.

(5) Install new cotter pin (24).

(6) Apply sealing compound around bolt (22) head, washer(s) (22.1), and nut (23). Use sealing compound (item 176, App F).



GO TO NEXT PAGE

7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

k. **Install rod end (25) on bellcrank (26).** Torque nut (27) **14 to 18 INCH-POUNDS**.

(1) Insert bolt (28) through washer (29), bellcrank (26), and rod end (25).

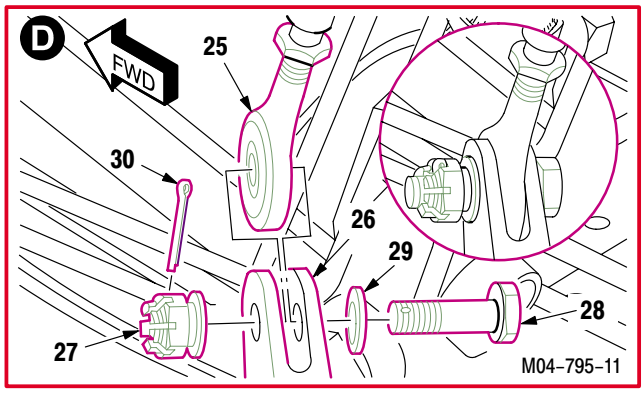
(2) Check fit of self-retaining bolt (28) (para 11.1).

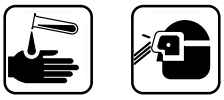
(3) Hold bolt (28). Install nut (27).

(4) Torque nut (27) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (30).





CAUTION

Ensure tubes are not crossed when installed.

l. **Install primary pressure tube (31) on adapter (32).**

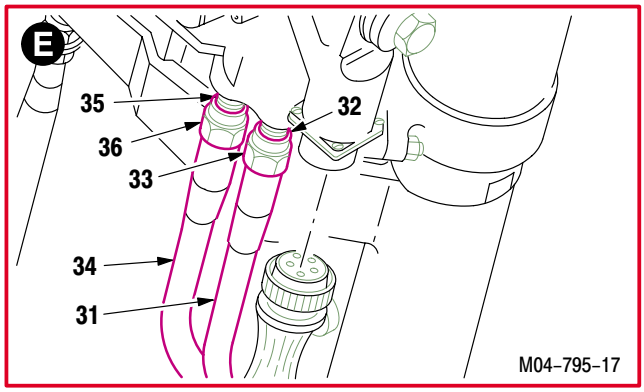
(1) Lubricate threads on adapter (32). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (33). Use crowfoot.

m. **Install primary return tube (34) on adapter (35).**

(1) Lubricate threads on adapter (35). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (36). Use crowfoot.



GO TO NEXT PAGE

7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

n. **Install wire harness (37) and tube clamp (38).** Torque screw (39) to **23 INCH-POUNDS**.

(1) Position half of clamp (38) between servocylinder (3) and tubes (31) and (34).

(2) Position other half of clamp (38) over tubes (31) and (34). Aline mounting holes.

(3) Install clamp (40) on wire harness (37).

(4) Aline clamp (40) with clamp (38) mounting holes.

(5) Install screw (39) and washer (41).

(6) Torque screw (39) to **23 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

o. **Install tube clamp (42).** Torque screw (43) to **23 INCH-POUNDS**.

(1) Position half of clamp (42) under tubes (31) and (34).

(2) Position other half of clamp (42) over tubes (31) and (34). Aline mounting hole.

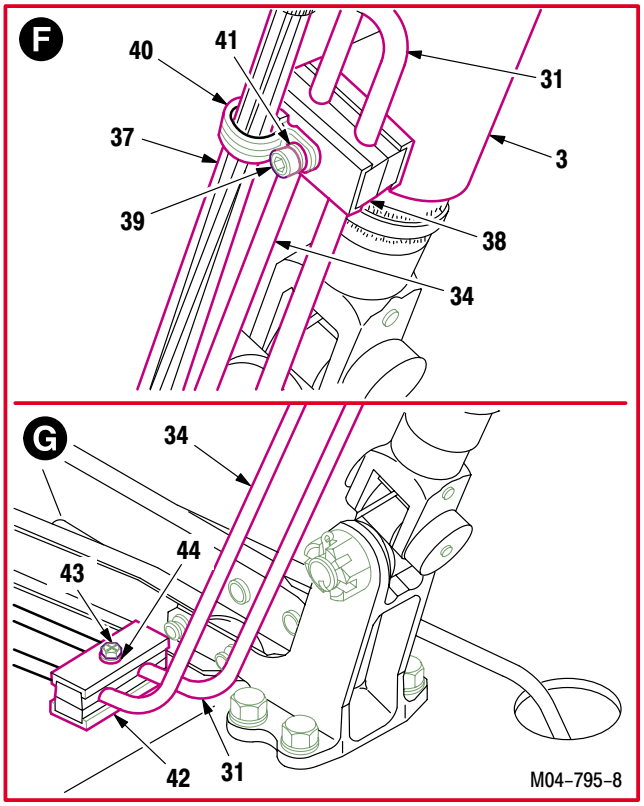
(3) Install screw (43) and washer (44).

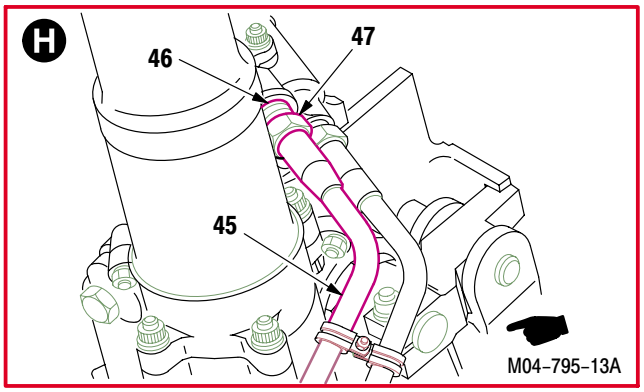
(4) Torque screw (43) to **23 INCH-POUNDS**. Use torque wrench.

p. **Install utility return tube (45) on adapter (46).**

(1) Lubricate threads on adapter (46). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (47). Use crowfoot.





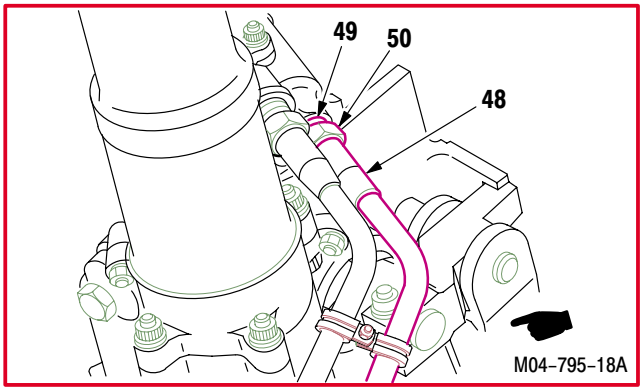
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7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

q. **Install utility pressure tube (48) on adapter (49).**

(1) Lubricate threads on adapter (49). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (50). Use crowfoot.



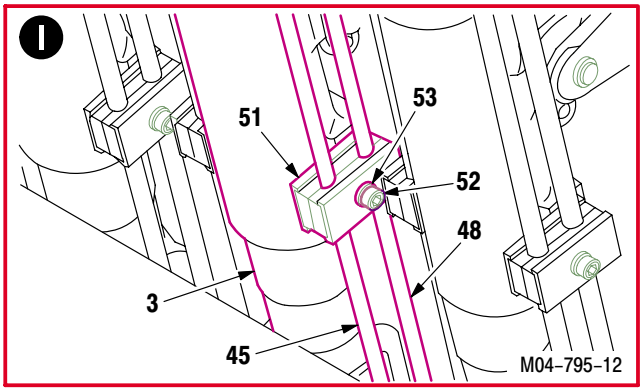
r. **Install tube clamp (51).** Torque screw (52) to **23 INCH-POUNDS**.

(1) Position inner half of clamp (51) between servocylinder (3) and tubes (45) and (48).

(2) Position outer half of clamp (51) over tubes (45) and (48). Aline mounting hole.

(3) Install screw (52) through washer (53) and clamp (51).

(4) Torque screw (52) to **23 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



s. **Install rod end (54) to control arm (55).**

(1) Install bolt (56) through arm (55) and rod end (54).

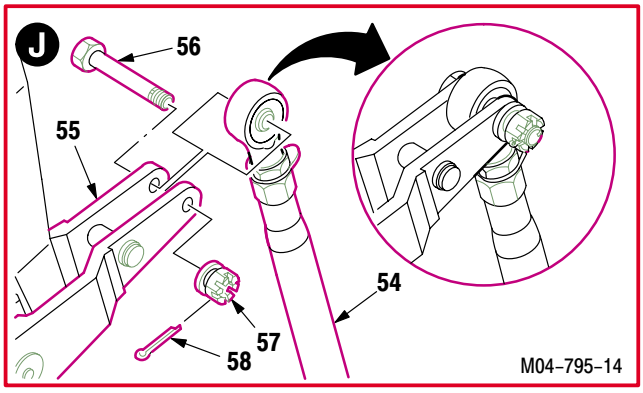
(2) Check fit of self-retaining bolt (56) (para 11.1).

t. **Install and torque nut (57) on bolt (56) 30 to 40 INCH-POUNDS.**

(1) Hold bolt (56). Torque nut (57) to **30 INCH-POUNDS**. Use torque wrench.

(2) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(3) Install new cotter pin (58).



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7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued



NOTE

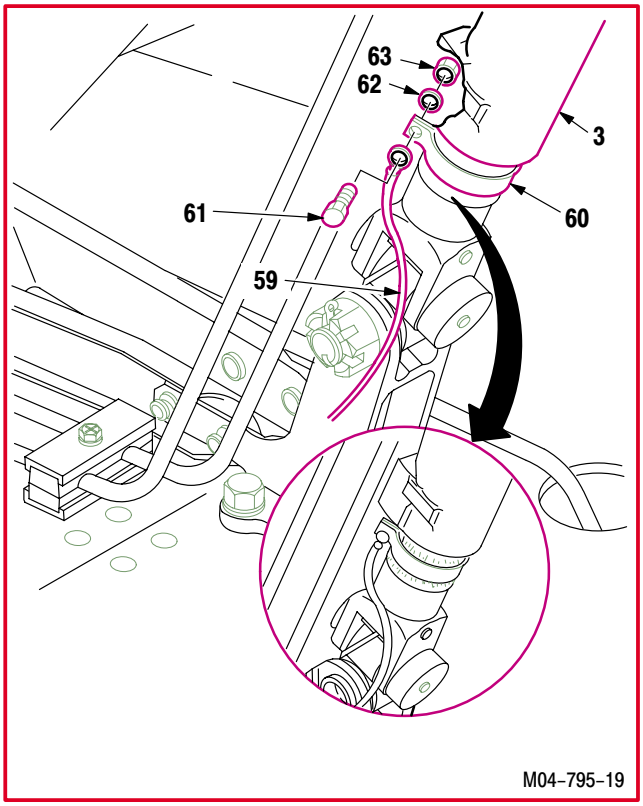
If ground cable is installed on helicopter, go to step u. If not, go to step v.

u. **Install cable (59) on servocylinder (3).**

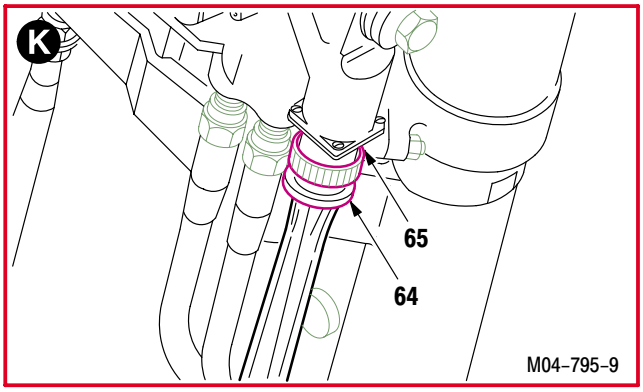
(1) If installing a new servocylinder, aline new clamp (60) on servocylinder (3). If reinstalling servocylinder, use existing clamp (60).

(2) Install screw (61) through cable (59), clamp (60), washer (62), and nut (63).

(3) Apply sealing compound over screw (61), washer (62), nut (63), and around edges of clamp (60). Use sealing compound (item 175, App F).

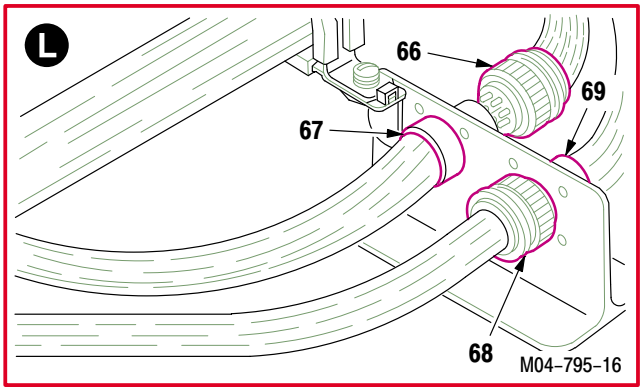


v. **Attach connector P228 (64) to receptacle (L33)J228 (65).**



w. **Attach connector (L33)P227 (66) to receptacle J227 (67).**

x. **Attach connector (L33)P417 (68) to receptacle J417 (69).**



GO TO NEXT PAGE

7.42. COLLECTIVE SERVOCYLINDER INSTALLATION – continued

y. **Inspect (QA).**

z. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

aa. **Service primary and utility hydraulic systems** (para 1.34)**.**

ab. **Perform collective flight control rigging maintenance operational check** (TM 1-1520-238-T)**.**

ac. **Perform No. 1 and No. 2 engine load demand spindle (LDS) rigging check** (para 4.184)**.**

ad. **Perform linear variable differential transducer (LVDT) adjustment** (para 11.216)**.**

ae. **Perform primary and utility hydraulic systems maintenance operational checks** (TM 1-1520-238-T)**.**

af. **Install access panel R200 and fairing T205R** (para 2.2)**.**

END OF TASK

7.43. COLLECTIVE SERVOCYLINDER ROD END REPLACEMENT

7.43.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.43.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/16 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 71, App H)
1 1/8 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 75, App H)
15/16 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 80, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)

Materials/Parts:

Bolt MS27576-10-46 (for alinement)
Cotter pin
Corrosion preventive compound (item 62A, App F)
Grease (item 87, App F)
Sealing compound (item 176, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

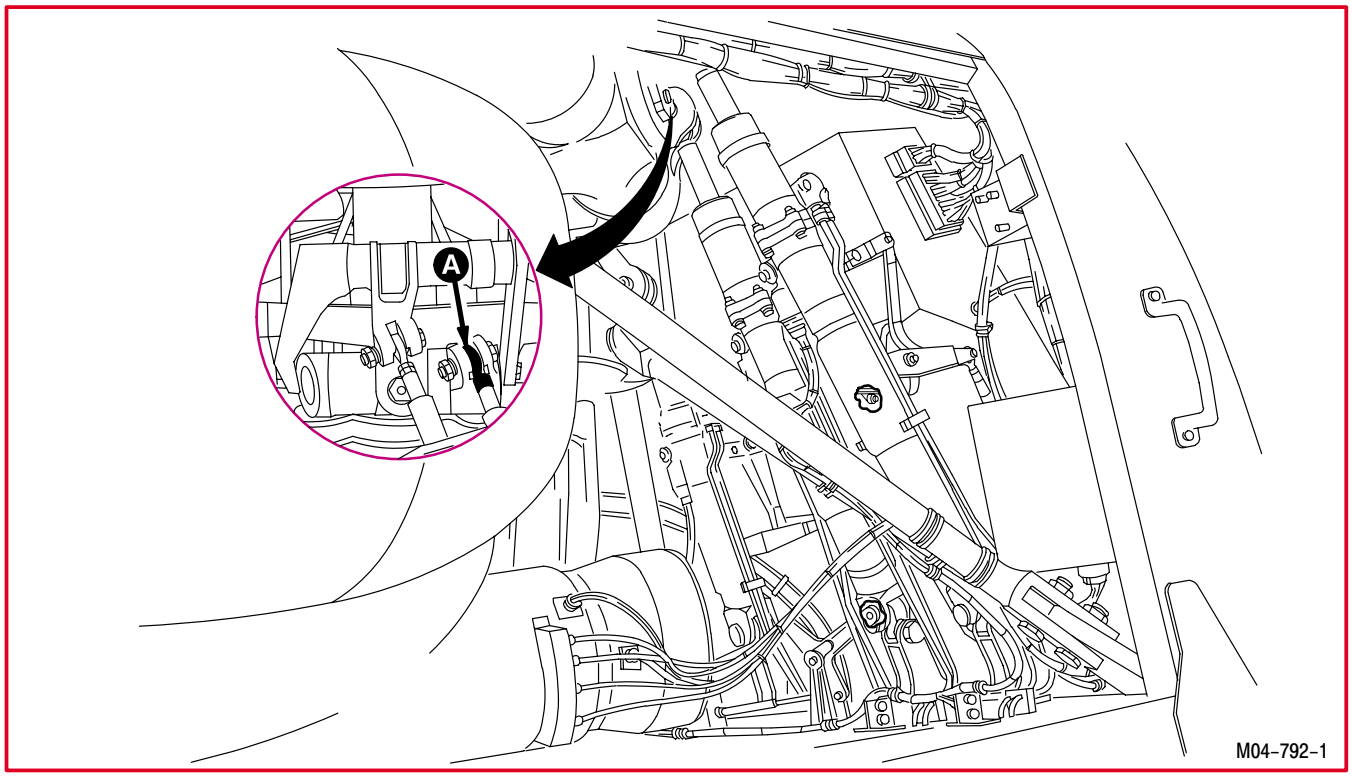
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 and fairing T205R removed

GO TO NEXT PAGE

7.43. COLLECTIVE SERVOCYLINDER ROD END REPLACEMENT – continued



GO TO NEXT PAGE

7.43. COLLECTIVE SERVOCYLINDER ROD END REPLACEMENT – continued

7.43.3. Removal

WARNING

To prevent movement of bellcrank and possible injury, support bellcrank before disconnecting servocylinder. If injury occurs, seek medical aid.

CAUTION

To prevent damage to rigid hydraulic tubes, ensure upper end of servocylinder is supported when rod end is disconnected from the bellcrank.

a. **Remove rod end (1) from bellcrank (2).**

(1) Remove sealant from attaching hardware (para 1.47).

(2) Remove and discard cotter pin (3).

(3) Hold self-retaining bolt (4). Use box wrench.

(4) Remove nut (5). Use crowfoot.

(5) Remove bolt (4) and washer(s) (4.1) if installed.

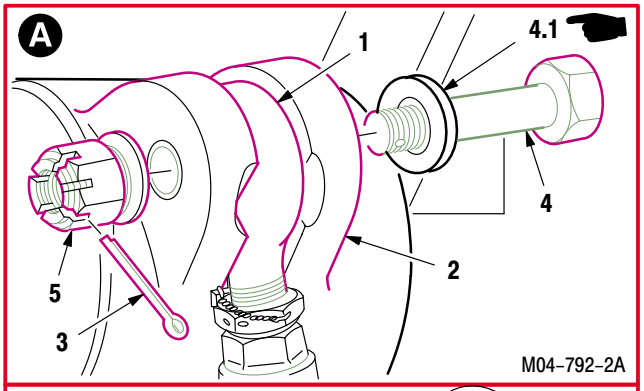
NOTE

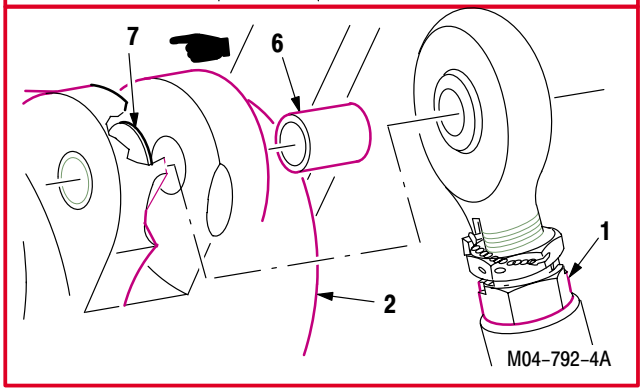
Do not remove nylon washer unless it is loose or excessively worn.

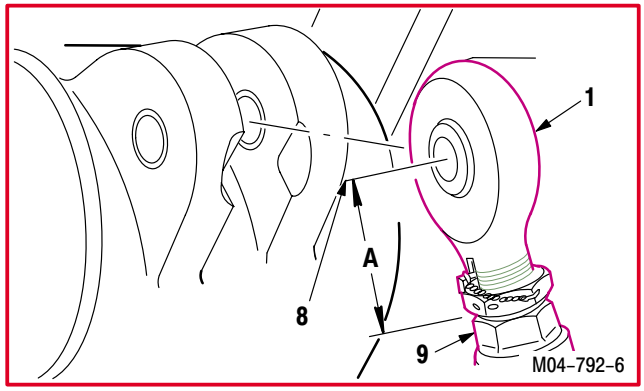
(6) Remove bushing (6) and nylon washer (7) (if necessary).

(7) Remove rod end (1) from bellcrank (2).

b. **Measure and record distance A between center of rod end bore (8) and top of piston rod (9).**







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7.43. COLLECTIVE SERVOCYLINDER ROD END REPLACEMENT – continued

NOTE

If servocylinder dust boot is installed, perform step c. If boot is not installed, go to step d.

c. **Slide servocylinder dust boot (9.1) away from piston rod (9) to get access to lock (11).**

d. **Remove rod end (1) from piston rod (9) with nut (10) and lock (11) installed.**

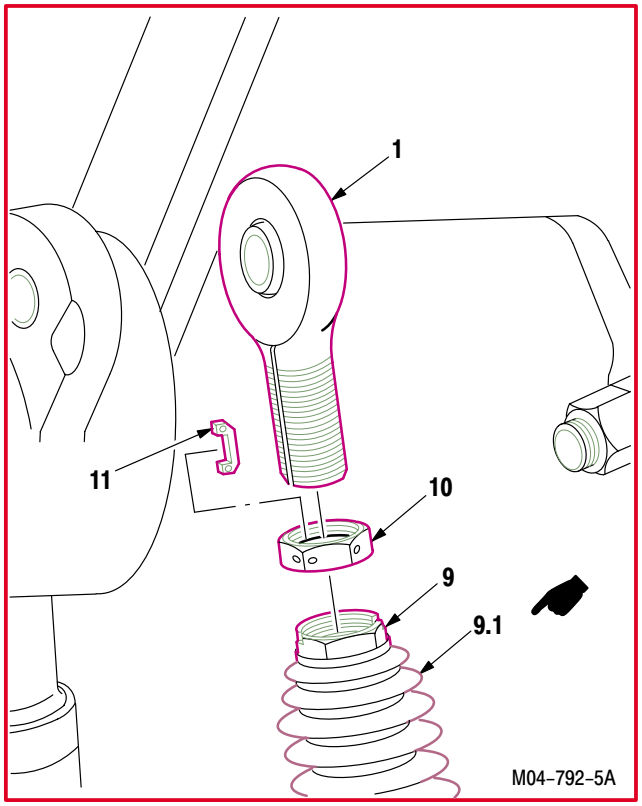
(1) Remove lockwire from nut (10) and lock (11).

(2) Hold piston rod (9). Use crowfoot.

(3) Loosen nut (10). Use box wrench.

(4) Remove rod end (1).

e. **Remove nut (10) and lock (11) from rod end (1).**



7.43.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.43.5. Inspection

a. **Check bellcrank, self-retaining bolt, piston rod, bushing, nut, and lock for cracks and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.43.6. Installation

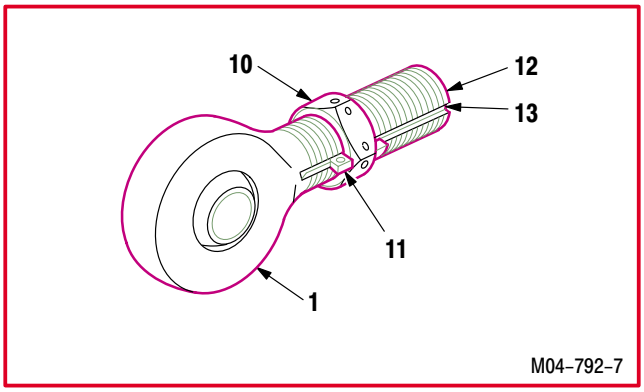


a. **Coat threads (12) of rod end (1).** Use grease (item 87, App F).

b. **Install lock (11) and nut (10) on rod end (1).**

(1) Insert lock (11) inside nut (10).

(2) Aline lock (11) with machined slot (13) on rod end (1). Screw lock (11) and nut (10) on rod end (1).



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7.43. COLLECTIVE SERVOCYLINDER ROD END REPLACEMENT – continued

WARNING

Distance between center of rod end bore and top of piston shall not exceed 3.06 INCHES. A measurement less than 3.06 INCHES is necessary to provide enough thread engagement to maintain safe flight. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

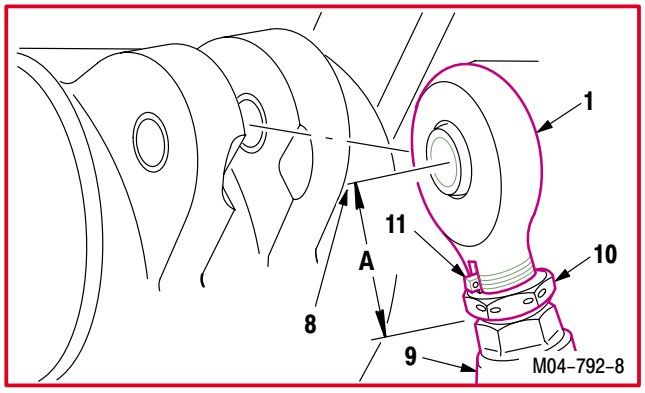
To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** so that rod end can be alined with bellcrank during rigging and installation. Adjustments are made by turning rod end, not piston rod.

c. **Install rod end (1), with nut (10) and lock (11), on piston rod (9).**

(1) Hold piston rod (9). Use crowfoot.

(2) Screw rod end (1), with nut (10) and lock (11), into piston rod (9).

(3) Adjust rod end (1) so distance A between center of rod end bore (8) and top of piston rod (9) is within **0.016 INCH** of the measurement recorded in paragraph 7.43.3.



GO TO NEXT PAGE

7.43. COLLECTIVE SERVOCYLINDER ROD END REPLACEMENT – continued

NOTE

If nylon washer is excessively worn or has debonded from bellcrank, repair (para 11.12).

d. **Aline rod end (1) with bellcrank (2).**

(1) Insert alinement bolt (14) halfway through bellcrank (2), nylon washer (7), and rod end (1) from inboard side of bellcrank.

e. **Insert bushing (6) through bellcrank (2) until it seats against rod end (1).**



f. **Install rod end (1) on bellcrank (2).**

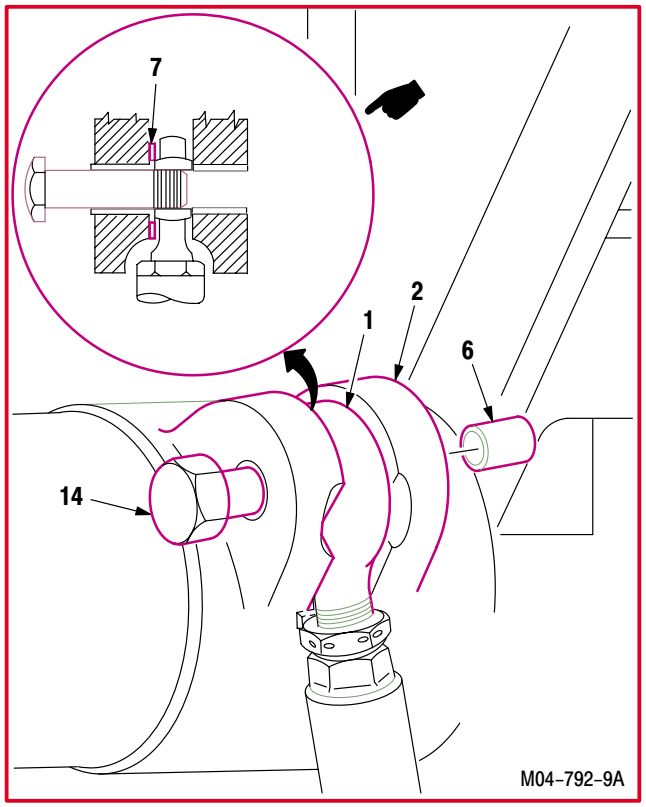
CAUTION

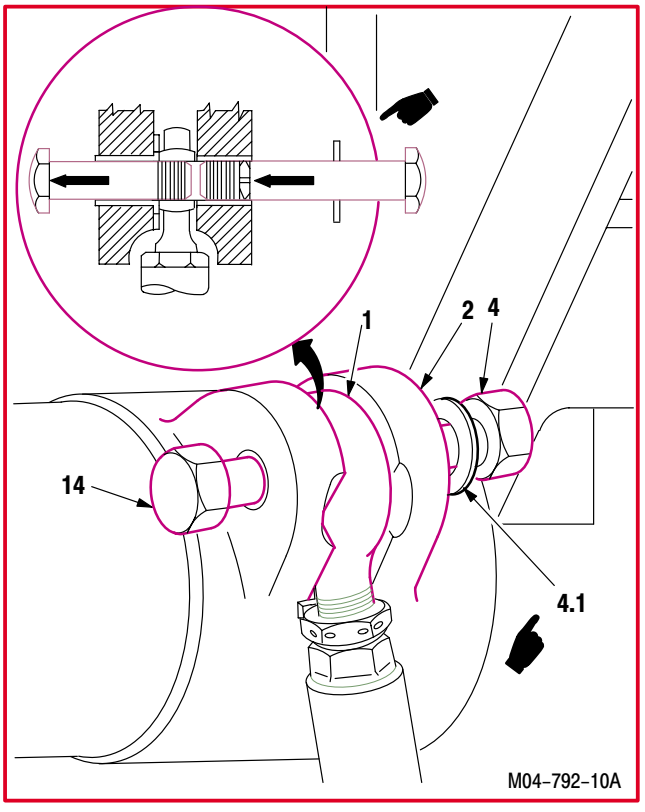
Threads of bolt and nut shall be clean, and compound free. Contaminated threads can cause improper torque, which may cause damage to flight control system.

(1) Apply a light coat of corrosion preventive compound to shank of bolt (4). Use corrosion preventive compound (item 62A, App F).

(2) Install bolt (4) through washer(s) (4.1) (if required) and force alinement bolt (14) out of bellcrank (2).

(3) Check fit of self-retaining bolt (4) (para 11.1).





GO TO NEXT PAGE

7.43. COLLECTIVE SERVOCYLINDER ROD END REPLACEMENT – continued



g. **Install nut (5) on bolt (4).** Torque nut (5) **900 to 1100 INCH-POUNDS**.

(1) Hold bolt (4). Use box wrench.

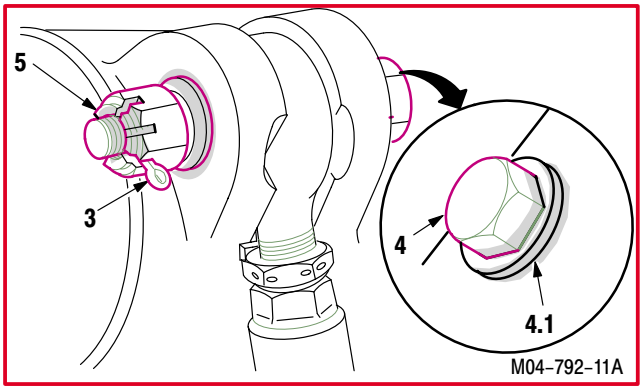
(2) Install nut (5). Use crowfoot.

(3) Torque nut (5) to **900 INCH-POUNDS**. Use crowfoot and torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **1100 INCH-POUNDS**.

(5) Install new cotter pin (3).

(6) Apply sealing compound around bolt (4) head, washer(s) (4.1), and nut (5). Use sealing compound (item 176, App F).

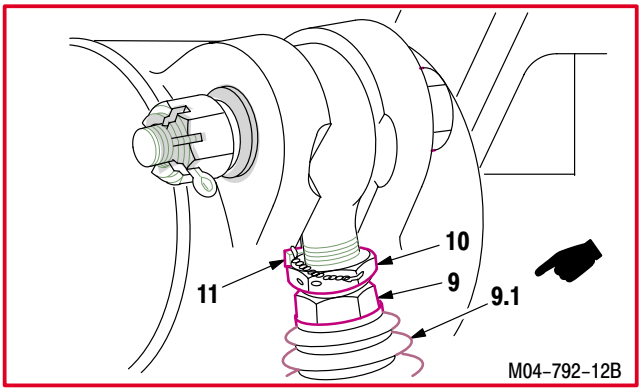


h. **Torque nut (10) to 930 INCH-POUNDS.**

(1) Hold piston rod (9). Use crowfoot.

(2) Torque nut (10) to **930 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Lockwire nut (10) to lock (11). Use wire (item 226, App F).



NOTE

Step i. applies only if boot was removed, if boot was not removed, go to step j.

i. **Slide boot (9.1) over piston and over the end of piston rod (2).**

j. **Inspect (QA).**

k. **Perform collective flight controls rigging maintenance operational check** (TM 1-1520-238-T)**.**

l. **Perform No. 1 and No. 2 engine load demand spindle (LDS) rigging check** (para 4.184)**.**

m. **Install access panel R200 and fairing T205R** (para 2.2)**.**

END OF TASK

7.44. LATERAL SERVOCYLINDER REMOVAL

7.44.1. Description

This task covers: Removal. Cleaning. Inspection.

7.44.2. Initial Setup

Tools:

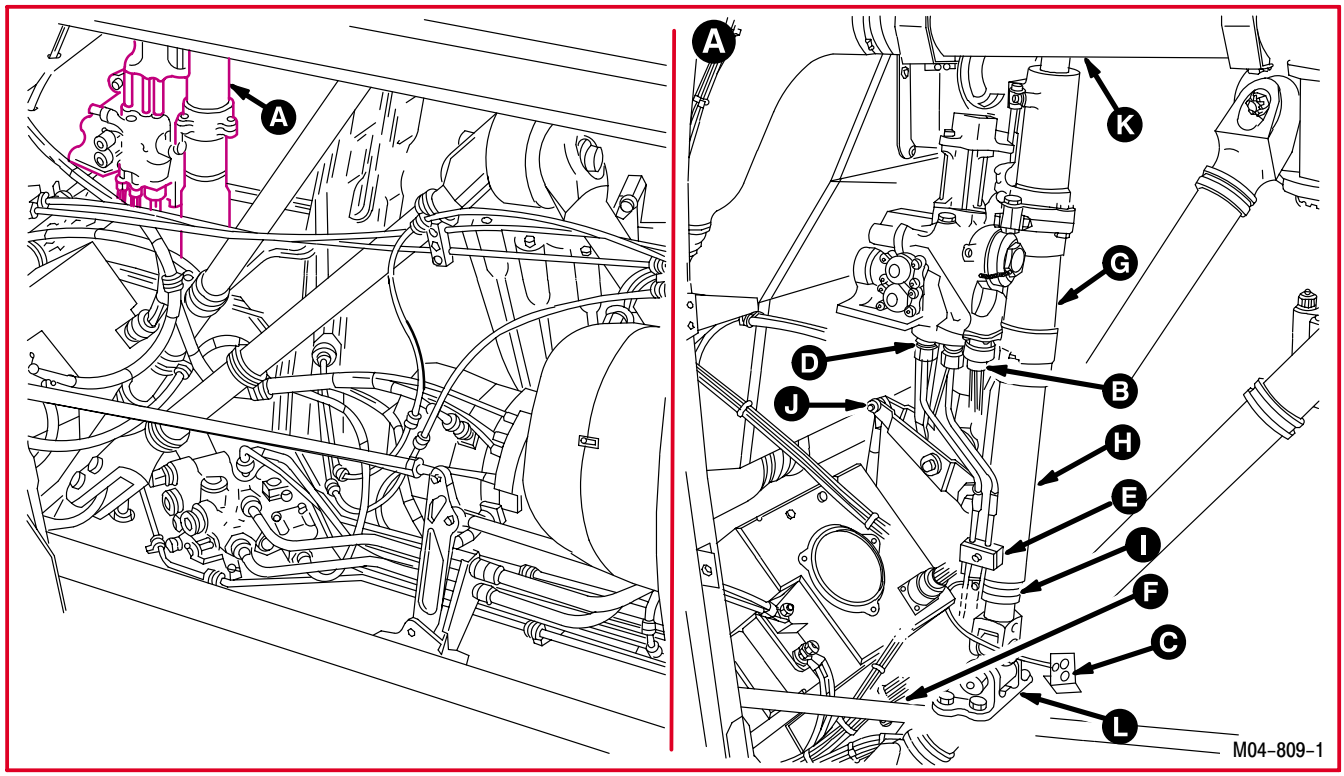
Aircraft mechanic's tool kit (item 376, App H)
Aircraft power unit (item 232, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H) (2)
15/16 & 1-inch box wrench (item 412, App H) (2)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 and fairing T205L removed

Personnel Required:

67R Attack Helicopter Repairer
One person to assist



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7.44. LATERAL SERVOCYLINDER REMOVAL – continued

WARNING

FLIGHT SAFETY PART

The lateral servocylinder and/or components of the lateral servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

7.44.3. Removal

a. **Apply external electrical power to aircraft** (para 1.70)**.** Use aircraft power unit.

b. **Apply external hydraulic power to aircraft** (para 1.72)**.** Use aircraft power unit.

c. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

d. **On pilot center circuit breaker panel, open ASE, AC, DC, and BUCS circuit breakers.**

CAUTION

Do not force movement of cyclic or collective control sticks if any binding is felt in system. Serious damage can result to control system if cause of binding is not corrected.

e. **Place pilot cyclic stick in full aft position.**

f. **Place pilot collective stick in full down position.**

g. **Remove external electrical power from aircraft** (para 1.70)**.**

h. **Remove external hydraulic power from aircraft** (para 1.72)**.**

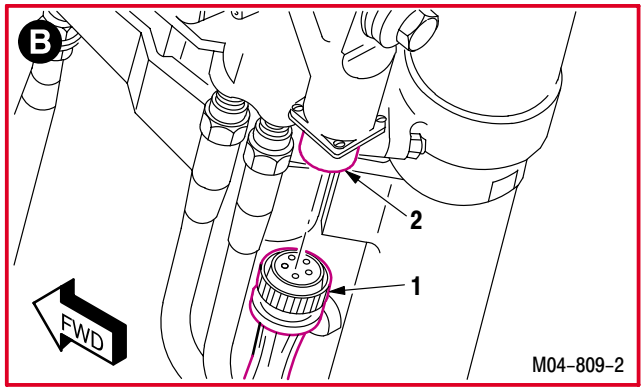
i. **Vent primary hydraulic system** (para 7.3)**.**

j. **Vent utility hydraulic system** (para 7.57)**.**

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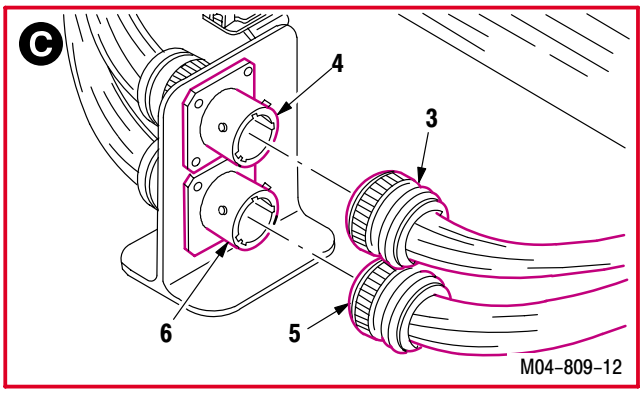
7.44. LATERAL SERVOCYLINDER REMOVAL – continued

k. **Detach connector P226 (1) from receptacle (L35)J226 (2).**



l. **Detach connector (L35)P225 (3) from receptacle J225 (4).**

m. **Detach connector (L35)P415 (5) from receptacle J415 (6).**



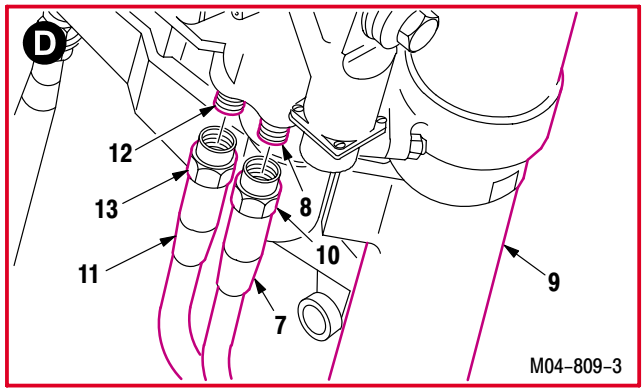
n. **Remove primary pressure tube (7) from adapter (8).**

(1) Place rags around servocylinder (9) to catch hydraulic fluid spills.

(2) Remove nut (10).

o. **Remove primary return tube (11) from adapter (12).**

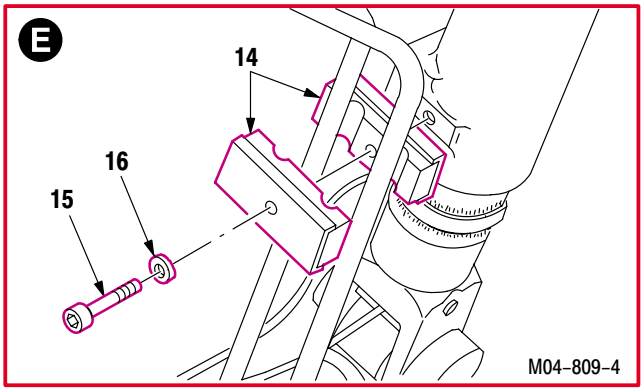
(1) Remove nut (13).



p. **Remove tube clamp (14).**

(1) Remove screw (15) and washer (16).

(2) Remove clamp halves (14).



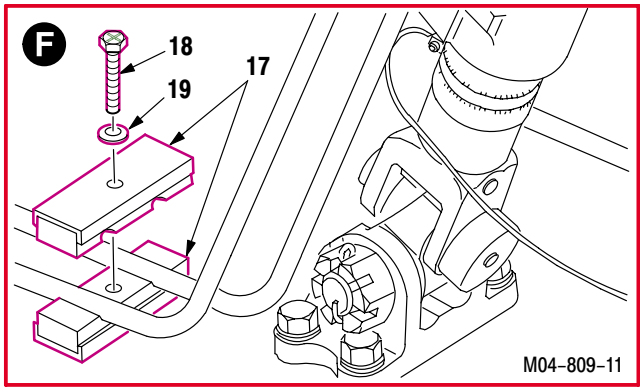
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7.44. LATERAL SERVOCYLINDER REMOVAL – continued

q. **Remove tube clamp (17).**

(1) Remove screw (18) and washer (19).

(2) Remove halves of tube clamp (17).

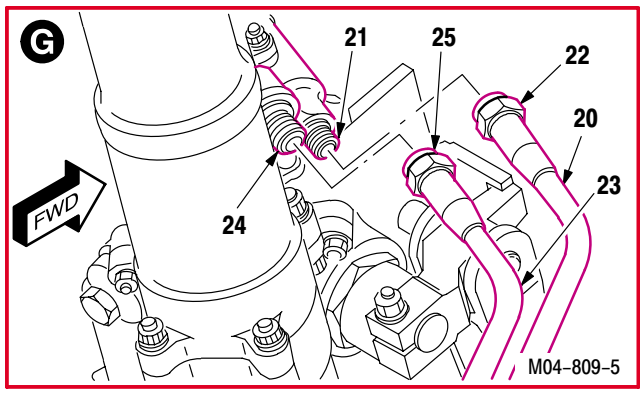


r. **Remove utility pressure tube (20) from adapter (21).**

(1) Remove nut (22).

s. **Remove utility return tube (23) from adapter (24).**

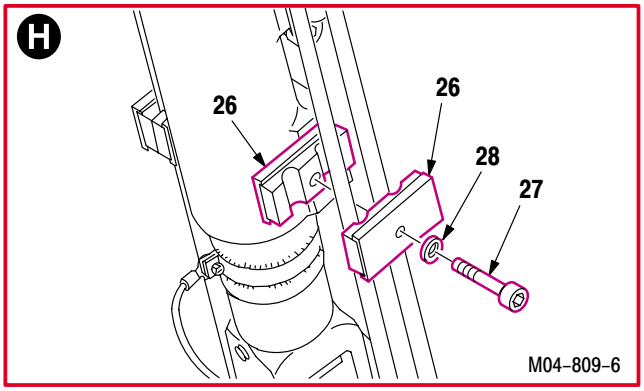
(1) Remove nut (25).



t. **Remove tube clamp (26).**

(1) Remove screw (27) and washer (28).

(2) Remove halves of clamp (26).



NOTE

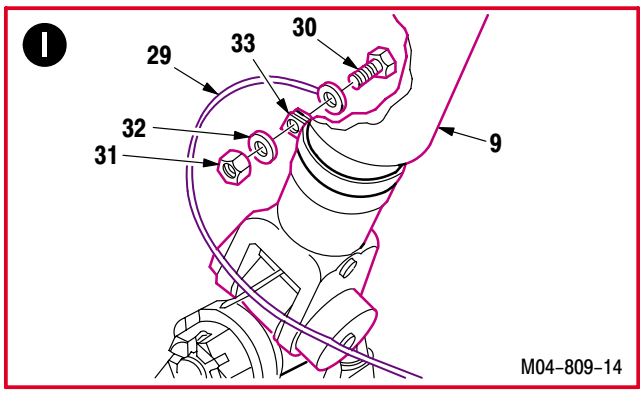
If ground cable is installed on helicopter, go to step u. If not, go to step v.

u. **Remove cable (29) from servocylinder (9).**

(1) Remove sealant from screw (30), nut (31), washer (32), and clamp (33) (para 1.47).

(2) Hold screw (30). Remove nut (31) and washer (32).

(3) If replacing servocylinder (9), remove clamp (33).



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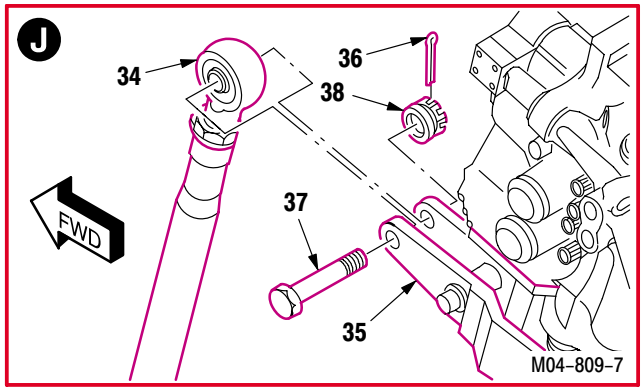
7.44. LATERAL SERVOCYLINDER REMOVAL – continued

v. **Remove rod end (34) from control arm (35).**

(1) Remove and discard cotter pin (36).

(2) Hold bolt (37). Remove nut (38).

(3) Remove bolt (37).



WARNING

To prevent movement of bellcrank and possible injury, support bellcrank before disconnecting servocylinder. If injury occurs, seek medical aid.

w. **Remove rod end (39) from bellcrank (40).**

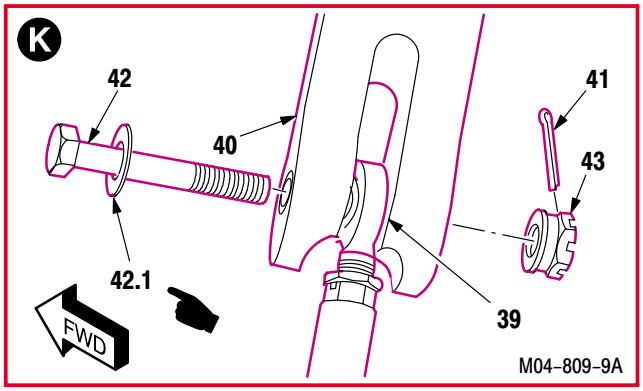
(1) Remove sealant from attaching hardware (para 1.47).

(2) Remove and discard cotter pin (41).

(3) Hold self-retaining bolt (42). Use box wrench.

(4) Remove nut (43). Use box wrench.

(5) Remove bolt (42) and washer(s) (42.1), if installed.

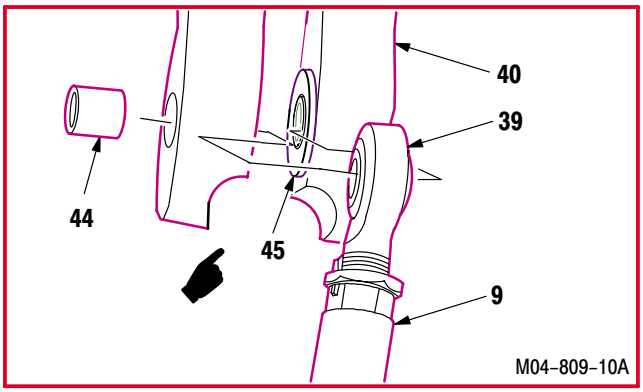


NOTE

Do not remove nylon washer unless it is loose or excessively worn.

(6) Remove bushing (44) and nylon washer (45) (if necessary).

x. **Remove servocylinder (9) from bellcrank (40).**



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7.44. LATERAL SERVOCYLINDER REMOVAL – continued

CAUTION

Improper removal of self-retaining bolt will damage bolt and pin.

y. **Remove self-retaining bolt (46) from pin (47).**

(1) Remove and discard cotter pin (48).

(2) Hold pin (47). Use box wrench.

(3) Loosen bolt (46) one-half turn. Use box wrench.

(4) Press button (49) in center of bolt (46).

(5) Remove bolt (46) from pin (47). Keep button (49) pressed.

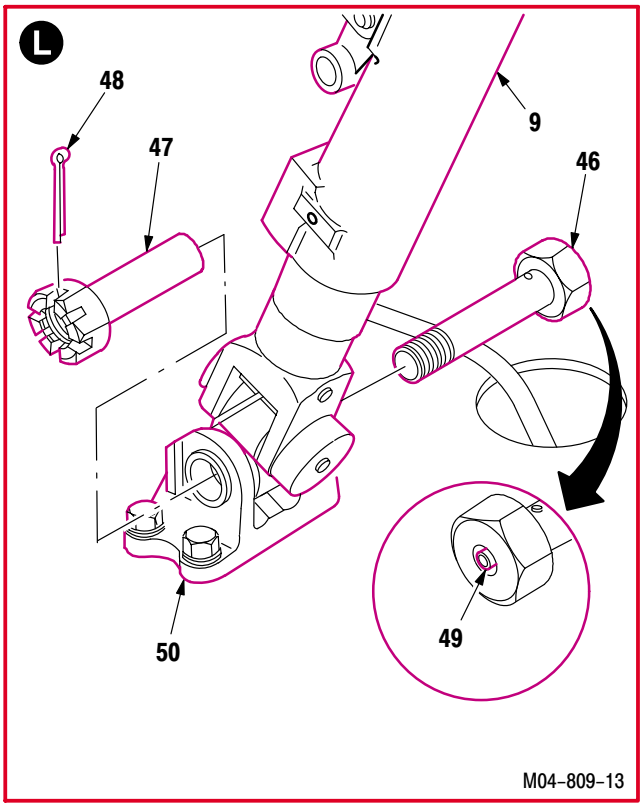
z. **Remove servocylinder (9) from bracket (50).**

(1) Remove pin (47).

aa. **Remove servocylinder (9) from aircraft.**

(1) One person hold servocylinder upper end and second person lift lower end.

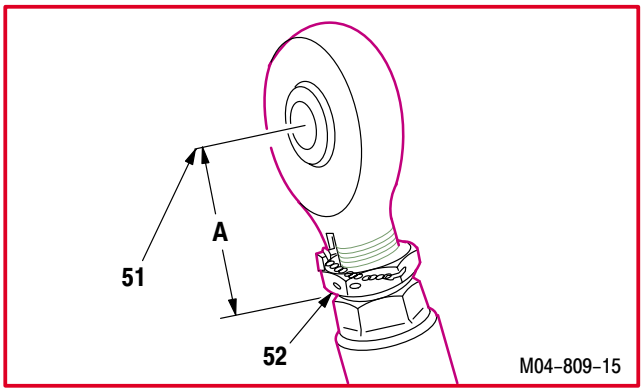
(2) Carefully remove servocylinder (9).



NOTE

Perform step ab off helicopter if replacing servocylinder.

ab. **Measure and record distance A between center of rod end bore (51) and top of servocylinder piston rod (52). Keep recorded measurement for installation of new servocylinder.**



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7.44. LATERAL SERVOCYLINDER REMOVAL – continued

7.44.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

7.44.5. Inspection

a. **Check removed and attaching parts for cracks, nicks, or dents** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Check rod end for bearing play.**

(1) Maximum radial bearing play **0.005 INCH**.

(2) Maximum axial bearing play **0.020 INCH**.

d. **Check universal link bushing for radial play.**

(1) Maximum radial bushing play **0.005 INCH**.

e. **Check servocylinder linkage control fasteners for damage and security.**

(1) Check fasteners with 10X magnifying glass for cracks and corrosion. None allowed.

(2) Manually try to rotate fasteners (no tools or pliers) to check for loose or rotating hardware. None allowed.

f. **Check servocylinder mount bracket bushing for wear.**

(1) Maximum inside diameter **0.754 INCH**.

g. **Check servocylinder pin for wear.**

(1) Minimum outer diameter **0.748 INCH**.

END OF TASK

7.45. LATERAL SERVOCYLINDER INSTALLATION

7.45.1. Description

This task covers: Installation.

7.45.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 x 3/8-inch drive open end box socket wrench crow-foot attachment (item 77, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/16 x 1/2-inch drive socket wrench socket (item 305, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
15/16 & 1-inch box wrench (item 412, App H)
1 1/16 & 1 1/4-inch open end wrench (item 416, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Bolt MS27576-10-46 (for alinement)
Cotter pin (3)
Corrosion preventive compound (item 62A, App F)
Hydraulic fluid (item 92, App F)
Sealing compound (item 175, App F)
Sealing compound (item 176, App F)

Personnel Required:

67R	Attack Helicopter Repairer One person to assist
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

WARNING

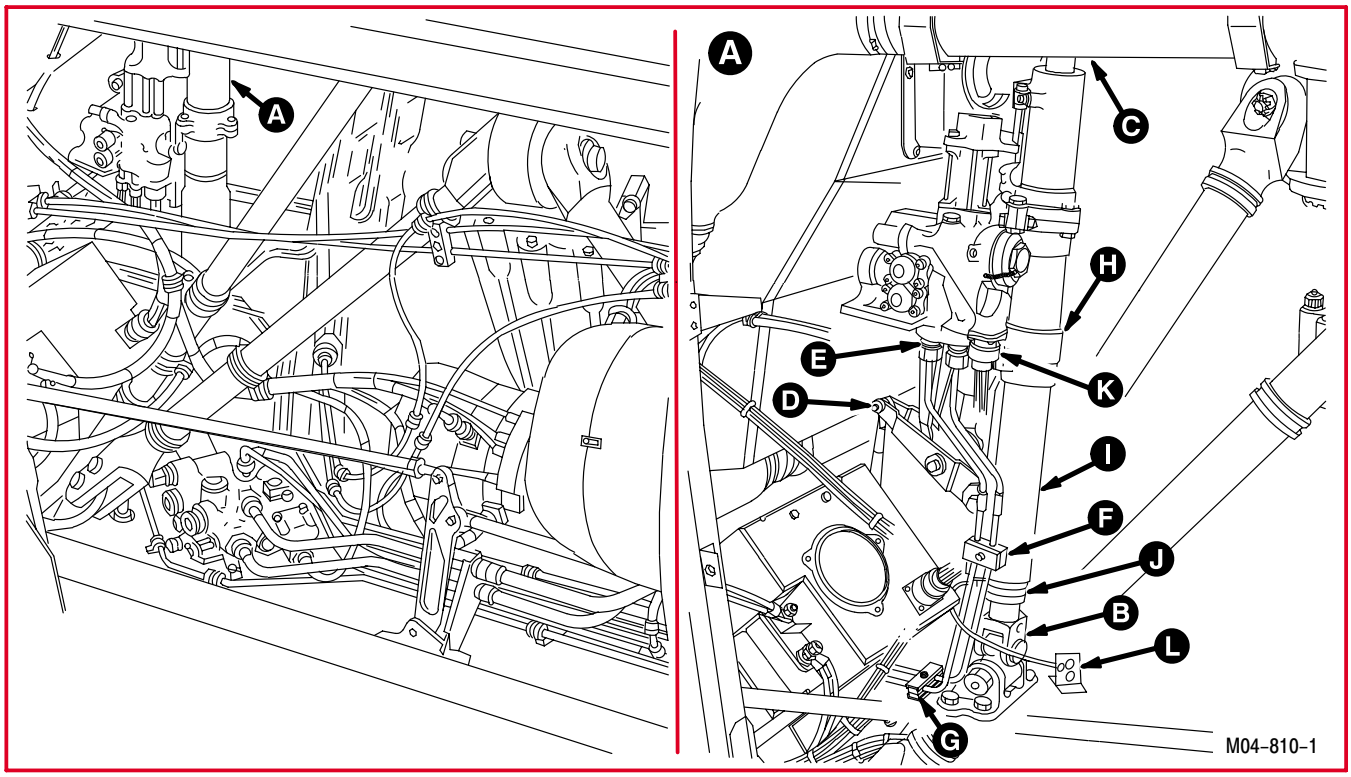
FLIGHT SAFETY PART

- **The lateral servocylinder and/or components of the lateral servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

- **Installation of a non-BUCS servocylinder in a BUCS equipped helicopter will render the BUCS system inoperative. Installation of a BUCS servocylinder in a helicopter not equipped with BUCS may result in loss of flight controls, serious injury or death to crewmembers, and/or serious damage to helicopter.**

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7.45. LATERAL SERVOCYLINDER INSTALLATION – continued

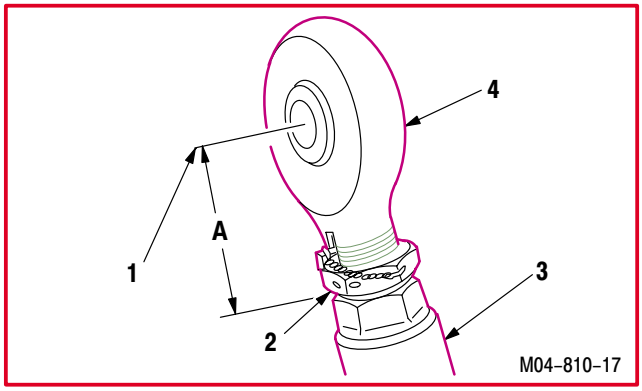


7.45.3. Installation

NOTE

Perform step a if installing a replacement servocylinder. Go to step b if reinstalling servocylinder.

a. **Measure and record distance A between center of rod end bore (1) and top of servocylinder piston rod (2) on new servocylinder (3).** Ensure that distance A on new servocylinder is within **0.016 INCH** of the measurement recorded in paragraph 7.44 on the old servocylinder. If distance A is not within **0.016 INCH**, adjust rod end (4) (para 7.46).



GO TO NEXT PAGE

7.45. LATERAL SERVOCYLINDER INSTALLATION – continued

b. **Install servocylinder (3) on bracket (5).**

(1) One person hold upper end of servocylinder and second person lift lower end. Position servocylinder (3) on bracket (5).

(2) Install pin (6).

CAUTION

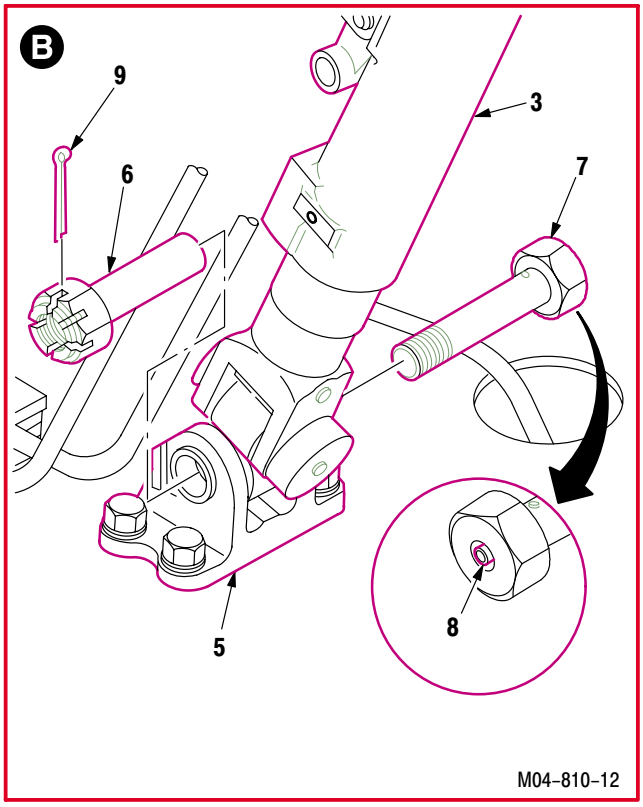
Improper installation of self-retaining bolt will damage bolt and pin.

c. **Install self-retaining bolt (7) in pin (6).**

(1) Install bolt (7) in pin (6).

(2) Press button (8) in center of bolt (7).

(3) Screw bolt (7) into pin (6) as far as possible before releasing button (8).



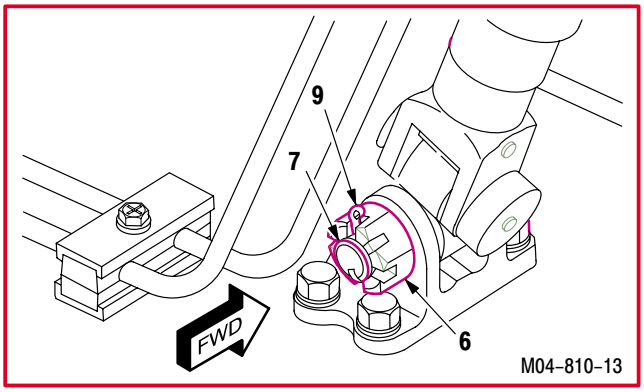
d. **Torque bolt (7) 50 to 70 INCH-POUNDS.**

(1) Hold pin (6). Use box wrench.

(2) Torque bolt (7) to **50 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Increase torque to aline cotter pin hole, but do not exceed **70 INCH-POUNDS**.

(4) Install new cotter pin (9).



GO TO NEXT PAGE

7.45. LATERAL SERVOCYLINDER INSTALLATION – continued

CAUTION

To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** so that rod end can be alined with bellcrank during rigging and installation. Adjustments are made by turning rod end, not piston rod.

NOTE

If nylon washer is excessively worn or has debonded from bellcrank, repair (para 11.11).

e. **Aline rod end (4) with bellcrank 10).**

(1) Insert alinement bolt (11) halfway through bellcrank (10), nylon washer (12), and rod end (4) from inboard side of bellcrank.

f. **Insert bushing (13) through bellcrank (10) until it seats against rod end (4).**



g. **Install rod end (4) on bellcrank (10).**

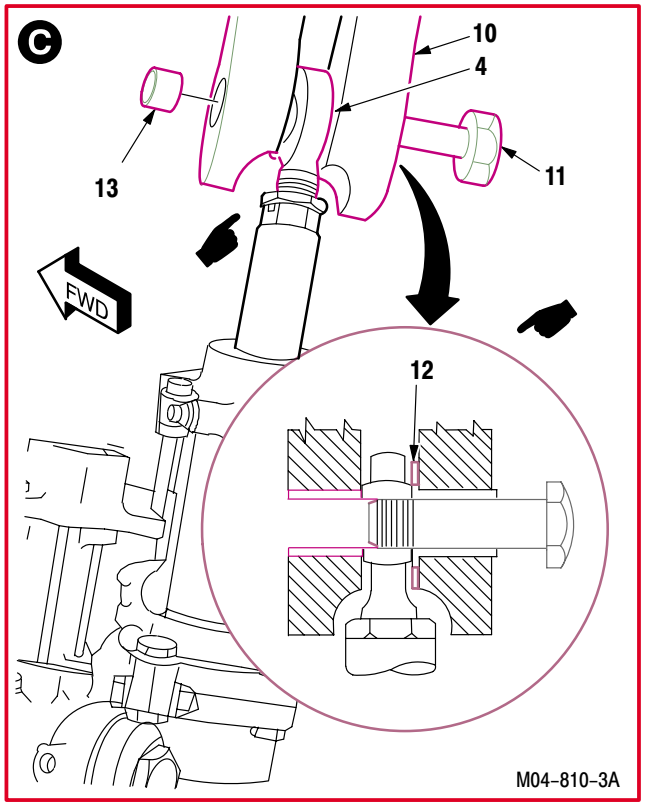
CAUTION

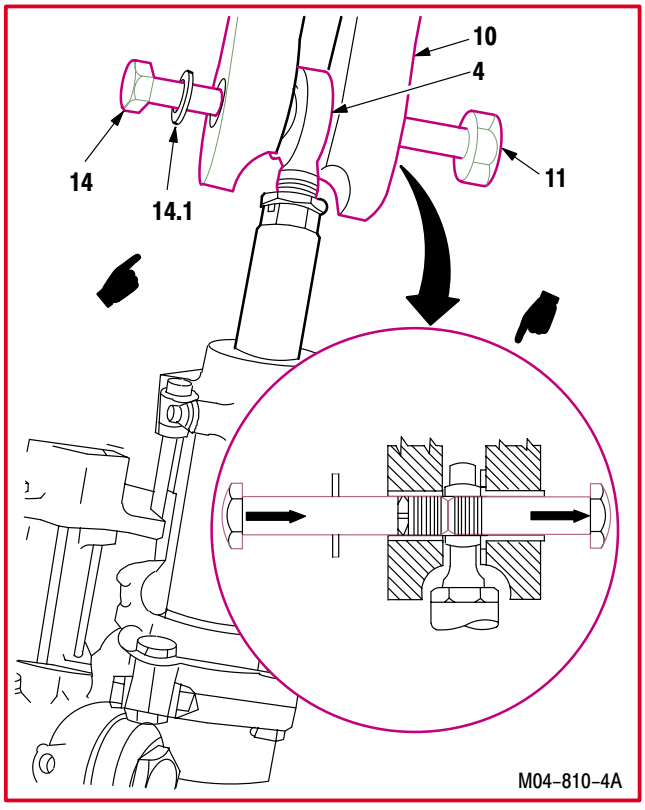
Threads of bolt and nut shall be clean and compound free. Contaminated threads can cause improper torque, which may cause damage to flight control system.

(1) Apply a light coat of corrosion preventive compound to shank of bolt (14). Use corrosion preventive compound (item 62A, App F).

(2) Install bolt (14) through washer(s) (14.1) (if required) and force alinement bolt (11) out of bellcrank (10).

(3) Check fit of self-retaining bolt (14) (para 11.1).





GO TO NEXT PAGE

7.45. LATERAL SERVOCYLINDER INSTALLATION – continued



h. **Install nut (15) on bolt (14).** Torque nut (15) **900 to 1100 INCH-POUNDS**.

(1) Hold bolt (14). Use open end wrench.

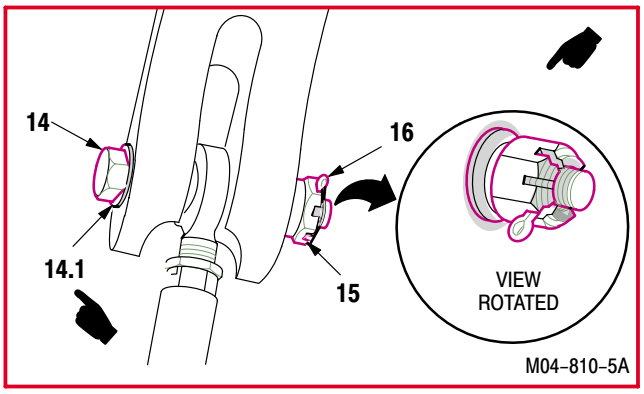
(2) Install nut (15).

(3) Torque nut (15) to **900 INCH-POUNDS**. Use socket and torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **1100 INCH-POUNDS**.

(5) Install new cotter pin (16).

(6) Apply sealing compound around bolt (14) head, washer(s) (14.1), and nut (15). Use sealing compound (item 176, App F).



i. **Install rod end (17) on control arm (18).** Torque nut (20) **30 to 40 INCH-POUNDS**.

(1) Install bolt (19) through arm (18) and rod end (17).

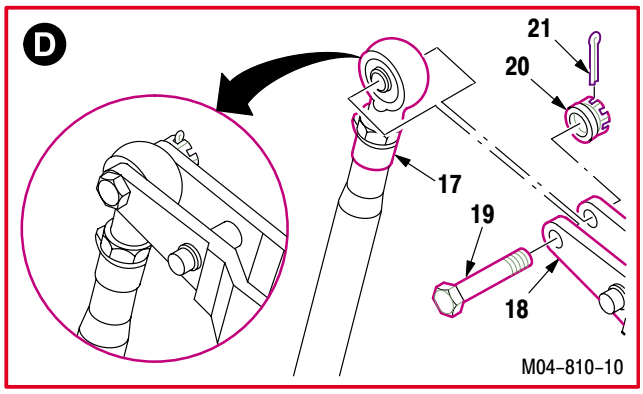
(2) Check fit of self-retaining bolt (19) (para 11.1).

(3) Install nut (20).

(4) Hold bolt (19). Torque nut (20) to **30 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(6) Install new cotter pin (21).



GO TO NEXT PAGE

7.45. LATERAL SERVOCYLINDER INSTALLATION – continued

CAUTION

Ensure tubes are not crossed when installed.

j. **Install primary pressure tube (22) on adapter (23).**

(1) Lubricate threads on adapter (23). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (24).

k. **Install primary return tube (25) on adapter (26).**

(1) Lubricate threads on adapter (26). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (27).

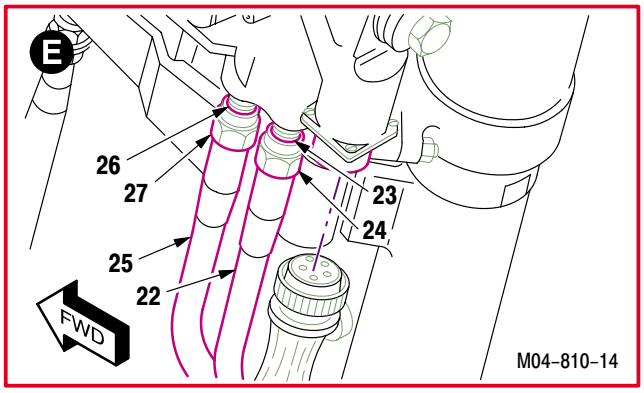
l. **Install tube clamp (28).** Torque screw (29) to **23 INCH-POUNDS**.

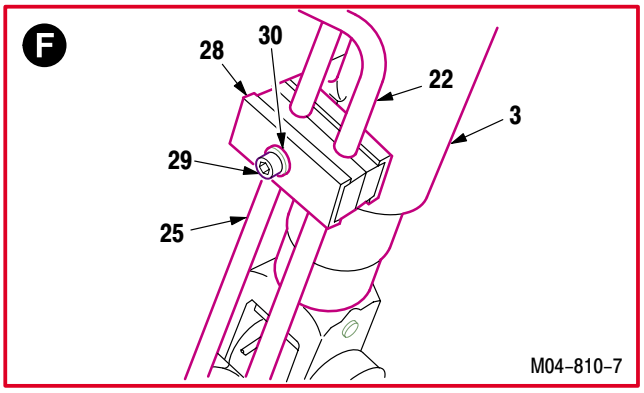
(1) Position half of clamp (28) between servocylinder (3) and tubes (22) and (25).

(2) Position half of clamp (28) over tubes (22) and (25). Aline mounting holes.

(3) Install screw (29) and washer (30).

(4) Torque screw (29) to **23 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.





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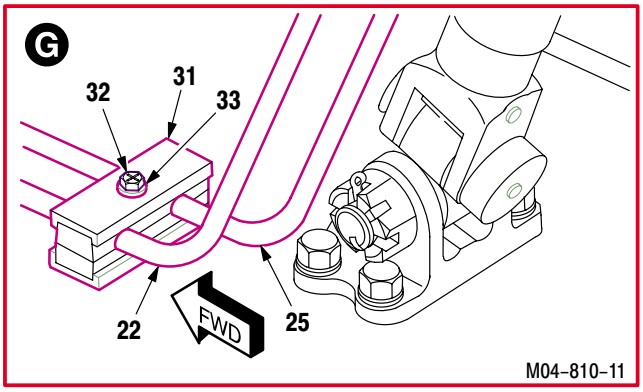
7.45. LATERAL SERVOCYLINDER INSTALLATION – continued

m. **Install tube clamp (31).** Torque screw (32) to **23 INCH-POUNDS**.

(1) Install halves of tube clamp (31) over tubes (22) and (25). Aline mounting holes.

(2) Install screw (32) and washer (33).

(3) Torque screw (32) to **23 INCH-POUNDS**. Use torque wrench.



n. **Install utility return tube (34) on adapter (35).**

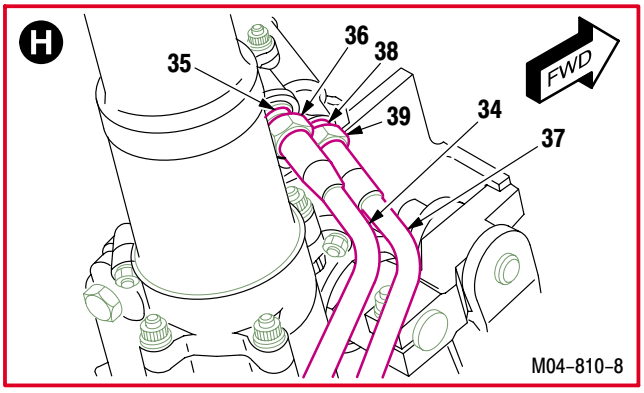
(1) Lubricate threads on adapter (35). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (36).

o. **Install utility pressure tube (37) on adapter (38).**

(1) Lubricate threads on adapter (38). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (39).



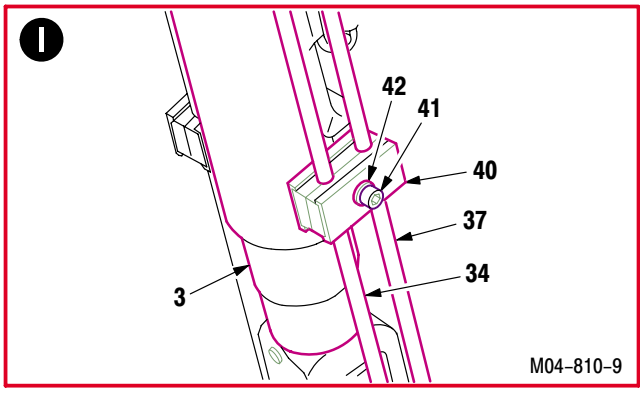
p. **Install tube clamp (40).** Torque screw (41) to **23 INCH-POUNDS**.

(1) Position half of clamp (40) between servocylinder (3) and tubes (34) and (37).

(2) Position other half of clamp (40) over tubes (34) and (37). Aline mounting hole.

(3) Install screw (41) through washer (42) and clamp (40).

(4) Torque screw (41) to **23 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



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7.45. LATERAL SERVOCYLINDER INSTALLATION – continued



NOTE

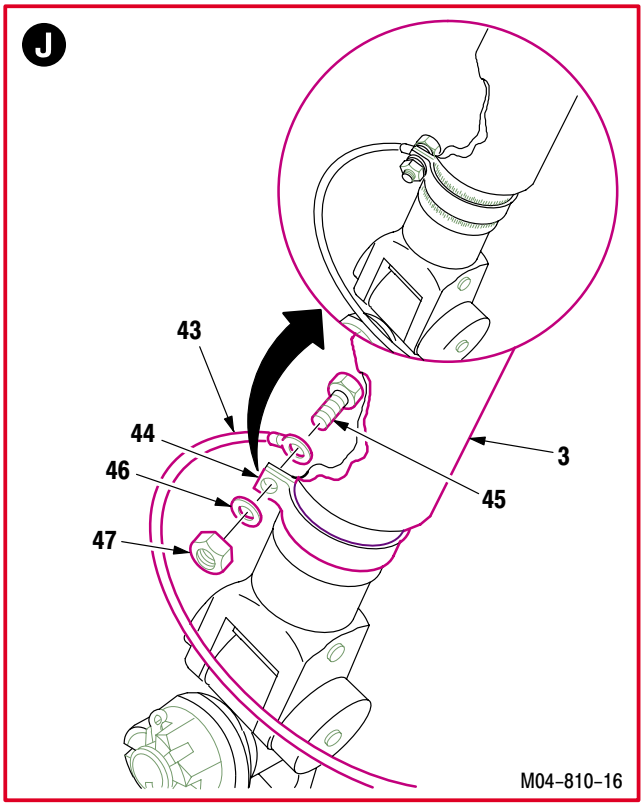
If ground cable is installed on helicopter, go to step q. If not, go to step r.

q. **Install cable (43) on servocylinder (3).**

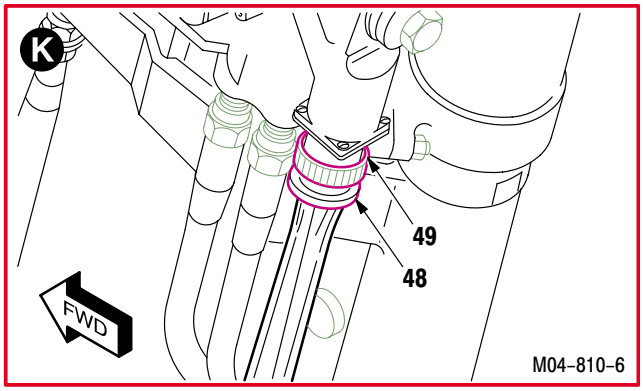
(1) If installing a new servocylinder, aline new clamp (44) on servocylinder (3). If reinstalling servocylinder, use existing clamp (44).

(2) Install screw (45) through cable (43), clamp (44), washer (46), and nut (47).

(3) Apply sealing compound over screw (45), washer (46), nut (47), and around edges of clamp (44). Use sealing compound (item 175, App F).

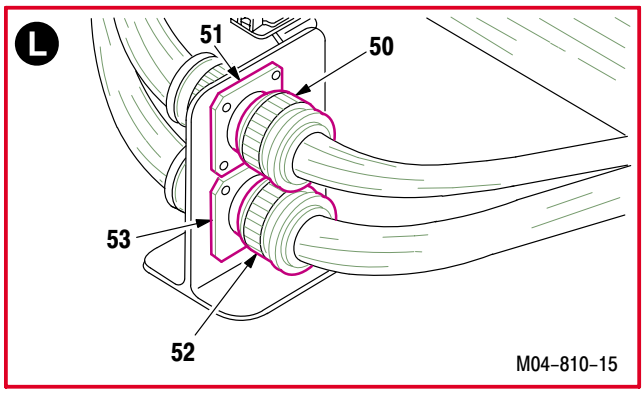


r. **Attach connector P226 (48) to receptacle (L35)J226 (49).**



s. **Attach connector (L35)P225 (50) to receptacle J225 (51).**

t. **Attach connector (L35)P415 (52) to receptacle J415 (53).**



GO TO NEXT PAGE

7.45. LATERAL SERVOCYLINDER INSTALLATION – continued

u. **Inspect (QA).**

v. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

w. **Service primary and utility hydraulic systems** (para 1.34)**.**

x. **Perform lateral (cyclic) flight control rigging maintenance operational check** (TM 1-1520-238-T)**.**

y. **Perform linear variable differential transducer (LVDT) adjustment** (para 11.216)**.**

z. **Perform primary and utility systems maintenance operational checks** (TM 1-1520-238-T)**.**

aa. **Install access panel L200 and fairing T205L** (para 2.2)**.**

END OF TASK

7.46. LATERAL SERVOCYLINDER ROD END REPLACEMENT

7.46.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.46.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 75, App H)
15/16 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 80, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/16 x 1/2-inch drive socket wrench socket (item 305, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)

Materials/Parts:

Bolt MS27576-10-46 (for alinement)
Cotter pin
Corrosion preventive compound (item 62A, App F)
Grease (item 87, App F)
Sealing compound (item 176, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

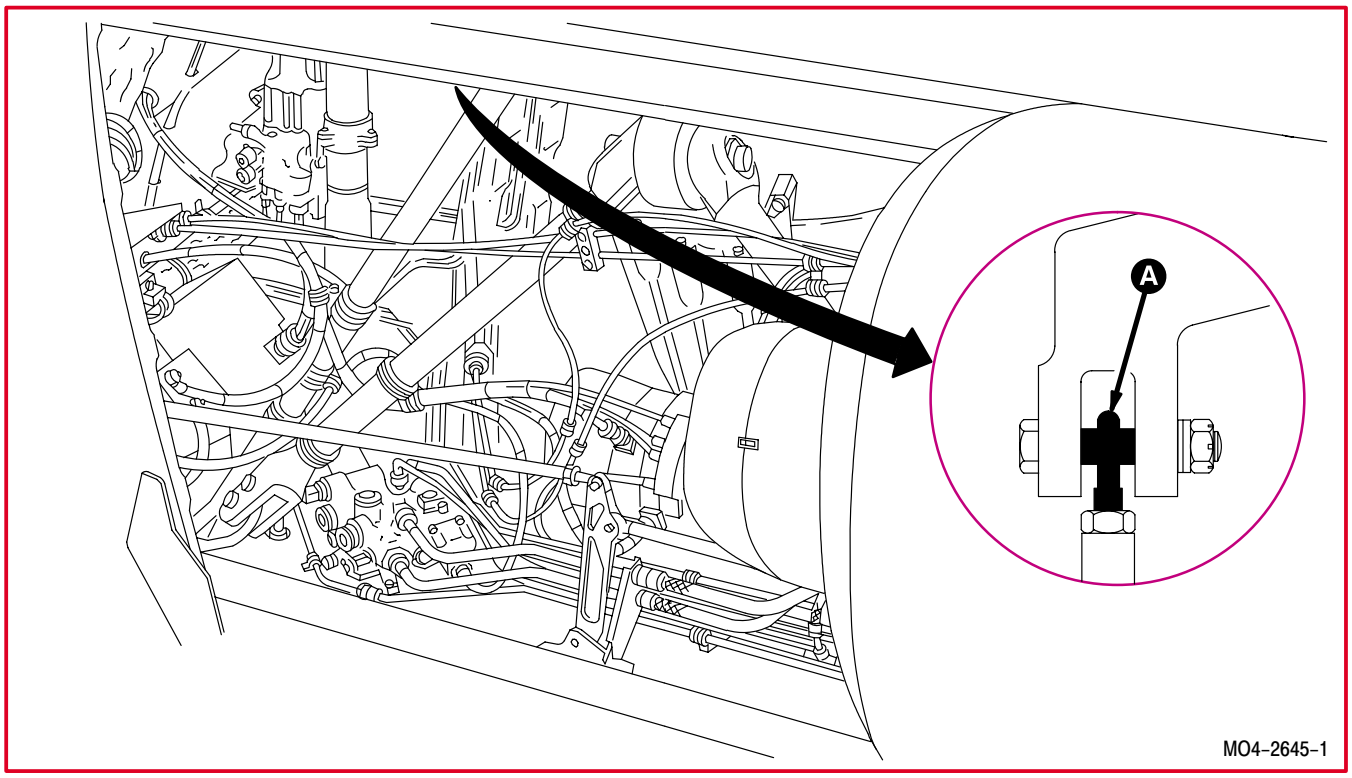
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200 and fairing T205L removed

GO TO NEXT PAGE

7.46. LATERAL SERVOCYLINDER ROD END REPLACEMENT – continued



GO TO NEXT PAGE

7.46. LATERAL SERVOCYLINDER ROD END REPLACEMENT – continued

7.46.3. Removal

WARNING

To prevent movement of bellcrank and possible injury, support bellcrank before disconnecting servocylinder. If injury occurs, seek medical aid.

CAUTION

To prevent damage to rigid hydraulic tube assemblies, ensure upper end of servocylinder is supported when rod end is disconnected from the bellcrank.

a. **Remove rod end (1) from bellcrank (2).**

(1) Remove sealant from attaching hardware (para 1.47).

(2) Remove and discard cotter pin (3).

(3) Hold self-retaining bolt (4). Use box wrench.

(4) Remove nut (5). Use socket.

(5) Remove bolt (4) and washer(s) (4.1), if installed.

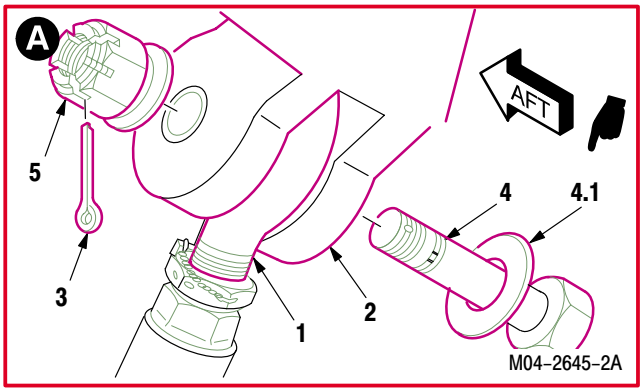
NOTE

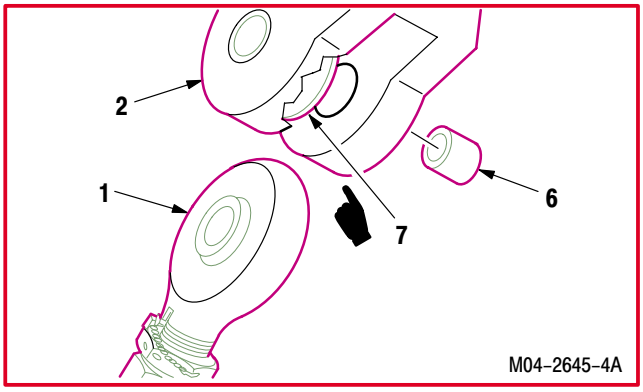
Do not remove nylon washer unless it is loose or excessively worn.

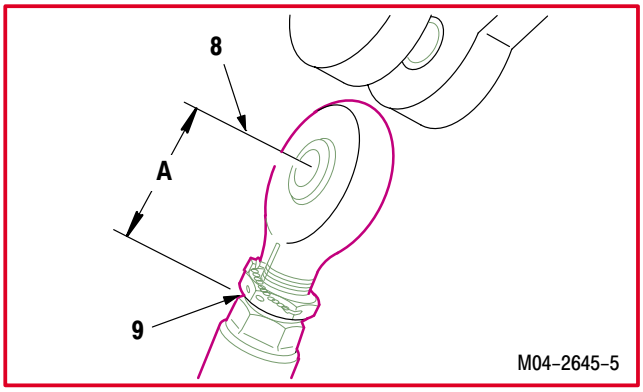
(6) Remove bushing (6) and nylon washer (7) (if necessary).

(7) Remove rod end (1) from bellcrank (2).

b. **Measure and record distance A between center of rod end bore (8) and top of piston rod (9).**







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7.46. LATERAL SERVOCYLINDER ROD END REPLACEMENT – continued

NOTE

If servocylinder dust boot is installed, perform step c. If boot is not installed, go to step d.

c. **Slide boot (9.1) away from servocylinder piston rod (9) to get access to lock (11).**

d. **Remove rod end (1) from piston rod (9) with nut (10) and lock (11) installed.**

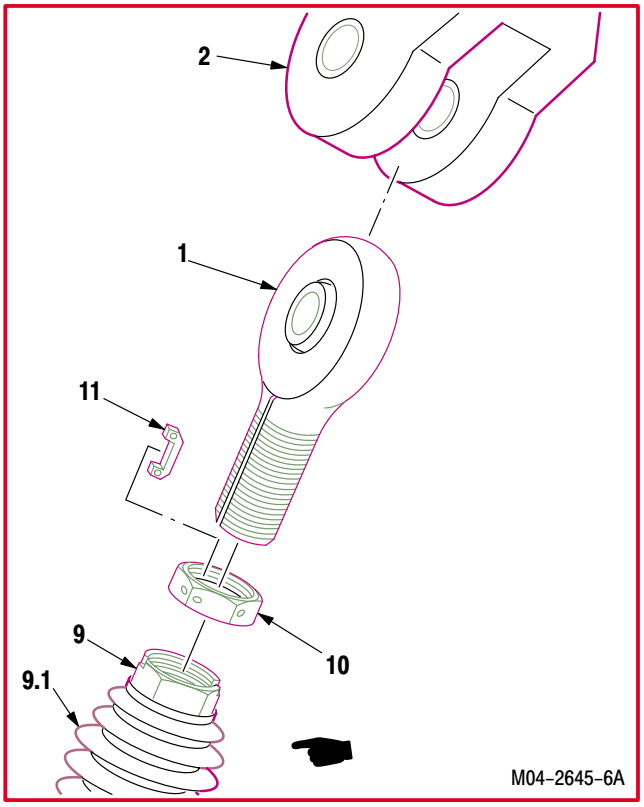
(1) Remove lockwire from nut (10) and lock (11).

(2) Hold piston rod (9). Use crowfoot.

(3) Loosen nut (10). Use box wrench.

(4) Remove rod end (1).

e. **Remove nut (10) and lock (11) from rod end (1).**



7.46.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.46.5. Inspection

a. **Check bellcrank, self-retaining bolt, piston rod, bushing, nut, and lock for cracks and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.46.6. Installation

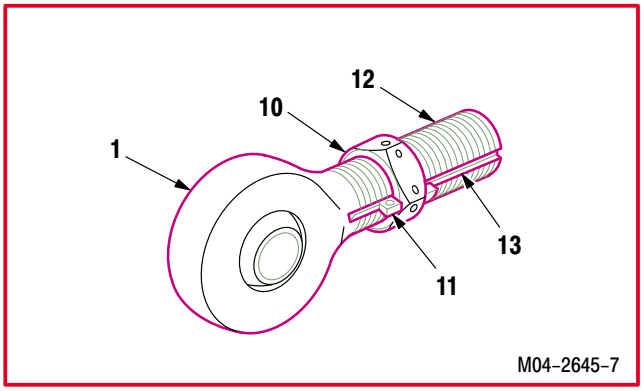


a. **Coat threads (12) of rod end (1).** Use grease (item 87, App F).

b. **Install lock (11) and nut (10) on rod end (1).**

(1) Insert lock (11) inside nut (10).

(2) Aline lock (11) with machined slot (13) on rod end (1). Screw lock (11) and nut (10) on rod end (1).



GO TO NEXT PAGE

7.46. LATERAL SERVOCYLINDER ROD END REPLACEMENT – continued

WARNING

Distance between center of rod end bore and top of piston shall not exceed 3.06 INCHES. A measurement less than 3.06 INCHES is necessary to provide enough thread engagement to maintain safe flight. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

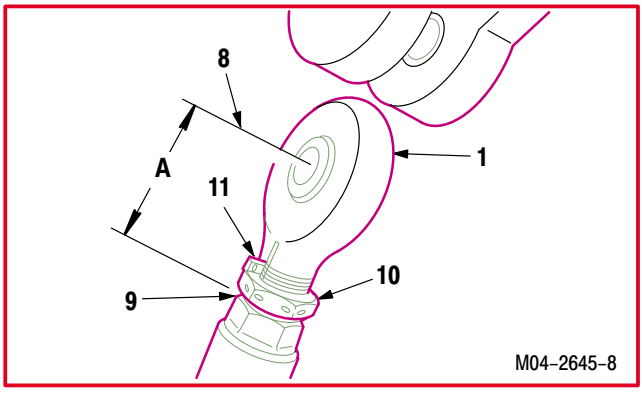
To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** so that rod end can be alined with bellcrank during rigging and installation. Adjustments are made by turning rod end, not piston rod.

c. **Install rod end (1), with nut (10) and lock (11), on piston rod (9).**

(1) Hold piston rod (9). Use crowfoot.

(2) Screw rod end (1), with nut (10) and lock (11), into piston rod (9).

(3) Adjust rod end (1) so distance A between center of rod end bore (8) and top of piston rod (9) is within **0.016 INCH** of the measurement recorded in paragraph 7.46.3.



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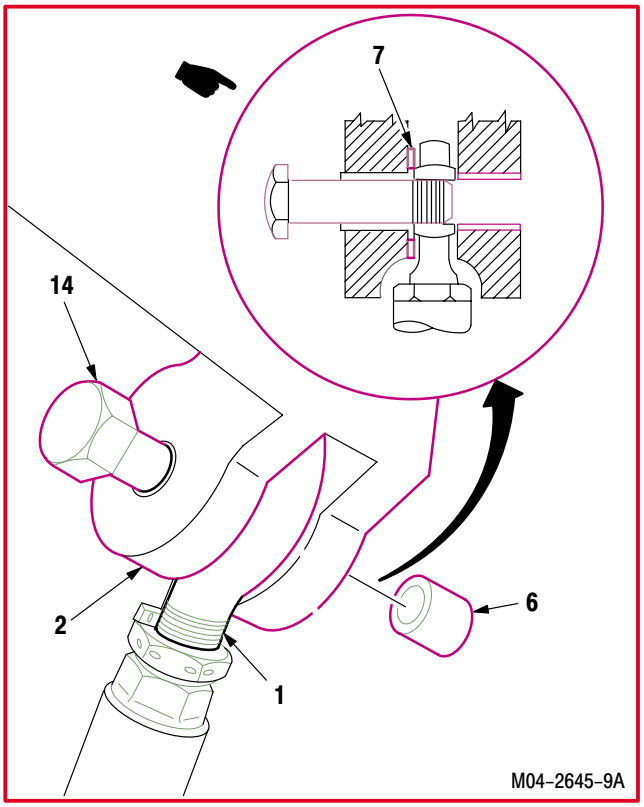
7.46. LATERAL SERVOCYLINDER ROD END REPLACEMENT – continued

NOTE

If nylon washer is excessively worn or has debonded from bellcrank, repair (para 11.11).

d. **Aline rod end (1) with bellcrank (2).**

(1) Insert alinement bolt (14) halfway through bellcrank (2), nylon washer (7), and rod end (1) from inboard side of bellcrank.



e. **Insert bushing (6) through bellcrank (2) until it seats against rod end (1).**



f. **Install rod end (1) on bellcrank (2).**

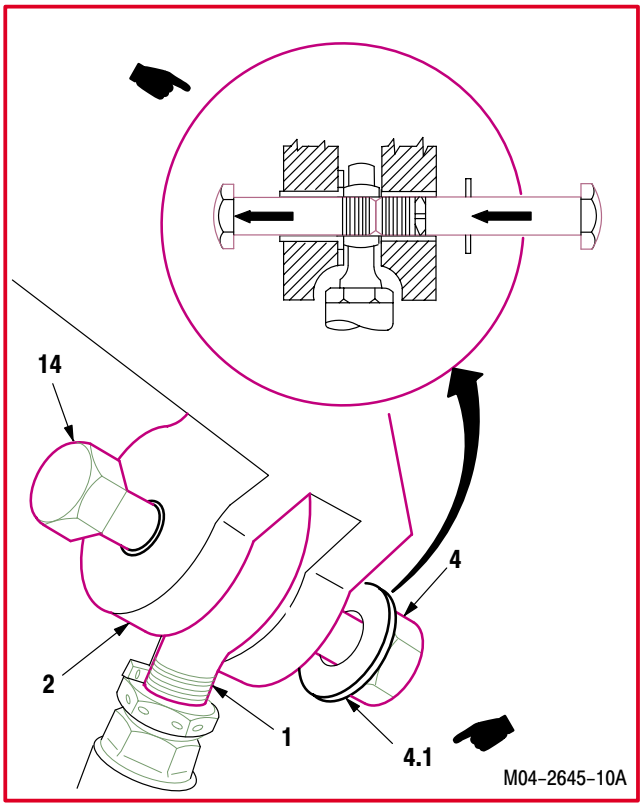
CAUTION

Threads of bolt and nut shall be clean and compound free. Contaminated threads can cause improper torque, which may cause damage to flight control system.

(1) Apply a light coat of corrosion preventive compound to shank of bolt (4). Use corrosion preventive compound (item 62A, App F).

(2) Install bolt (4) through washer(s) (4.1) (if required) and force alinement bolt (14) out of bellcrank (2).

(3) Check fit of self-retaining bolt (4) (para 11.1).



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7.46. LATERAL SERVOCYLINDER ROD END REPLACEMENT – continued



g. **Install nut (5) on bolt (4).** Torque nut (5) **900 to 1100 INCH-POUNDS**.

(1) Hold bolt (4). Use box wrench.

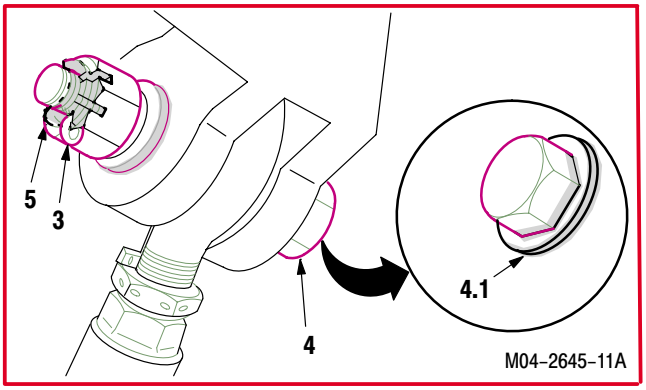
(2) Install nut (5). Use socket.

(3) Torque nut (5) to **900 INCH-POUNDS**. Use socket and torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **1100 INCH-POUNDS**.

(5) Install new cotter pin (3).

(6) Apply sealing compound around bolt (4) head, washer(s) (4.1), and nut (5). Use sealing compound (item 176, App F).

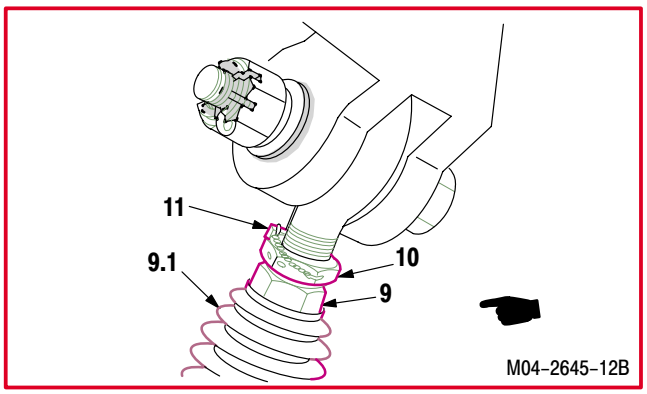


h. **Torque nut (10) to 930 INCH-POUNDS.**

(1) Hold piston rod (9). Use crowfoot.

(2) Torque nut (10) to **930 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Lockwire nut (10) to lock (11). Use wire (item 226, App F).



NOTE

Step i. applies only if boot was removed, if boot was not removed, go to step j.

i. **Slide boot (9.1) over piston and over the end piston rod (9).**

j. **Inspect (QA).**

k. **Perform lateral (cyclic) flight controls rigging maintenance operational check** (TM 1-1520-238-T)**.**

l. **Install access panel L200 and fairing T205L** (para 2.2)**.**

END OF TASK

7.47. LONGITUDINAL SERVOCYLINDER REMOVAL – continued

7.47.1. Description

This task covers: Removal. Cleaning. Inspection.

7.47.2. Initial Setup

Tools:

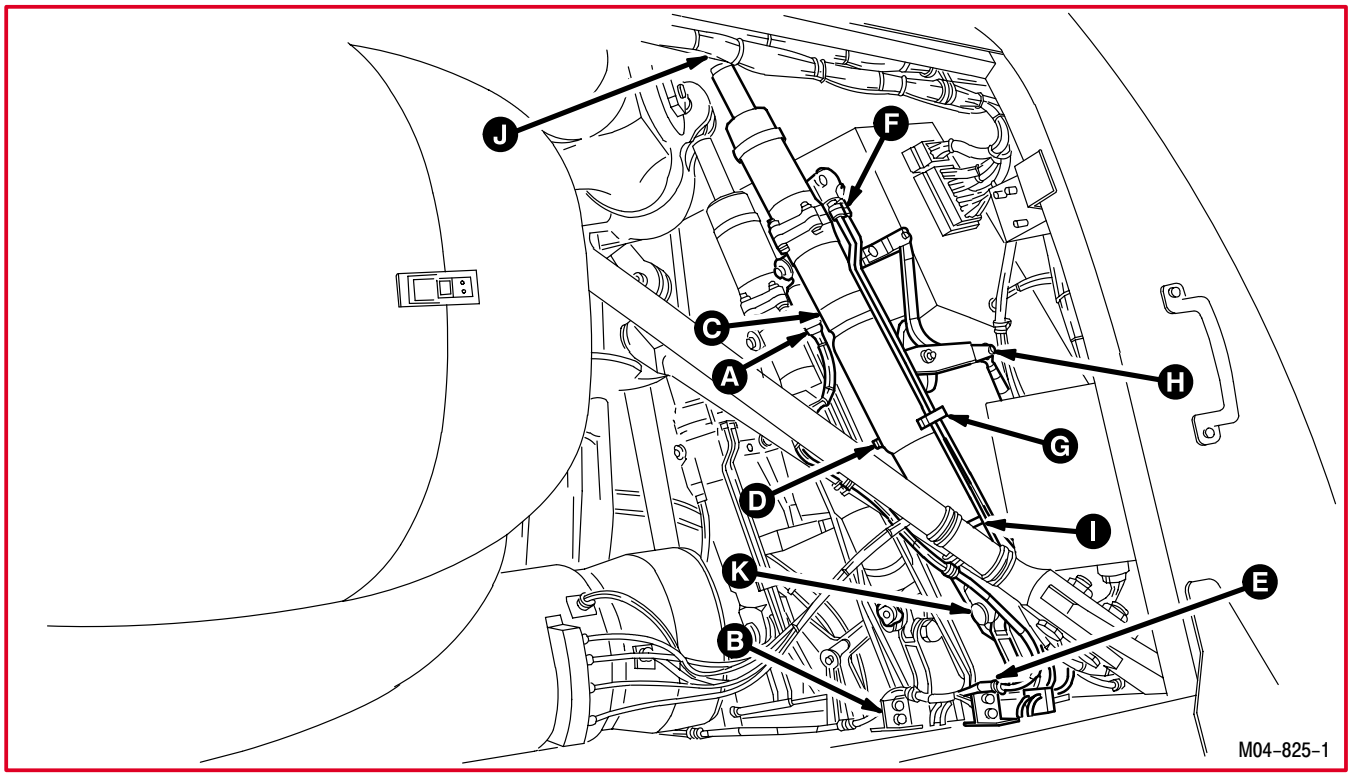
Aircraft mechanic's tool kit (item 376, App H)
Aircraft power unit (item 232, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H) (2)
15/16 & 1-inch box wrench (item 412, App H) (2)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 and fairing T205R removed

Personnel Required:

67R Attack Helicopter Repairer
One person to assist



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7.47. LONGITUDINAL SERVOCYLINDER REMOVAL – continued

WARNING

FLIGHT SAFETY PART

The longitudinal servocylinder and/or components of the longitudinal servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

7.47.3. Removal

a. **Apply external electrical power to aircraft** (para 1.70)**.** Use aircraft power unit.

b. **Apply external hydraulic power to aircraft** (para 1.72)**.** Use aircraft power unit.

c. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

d. **On pilot center circuit breaker panel, open ASE AC, DC, and BUCS circuit breakers.**

e. **Open trim circuit breaker on pilot forward circuit breaker panel.**

CAUTION

Do not force movement of cyclic or collective control sticks if any binding is felt in system. Serious damage can result to control system if cause of binding is not corrected.

f. **Place pilot cyclic stick in full aft position.**

g. **Place pilot collective stick in full down position.**

h. **Remove external electrical power from aircraft** (para 1.70)**.**

i. **Remove external hydraulic power from aircraft** (para 1.72)**.**

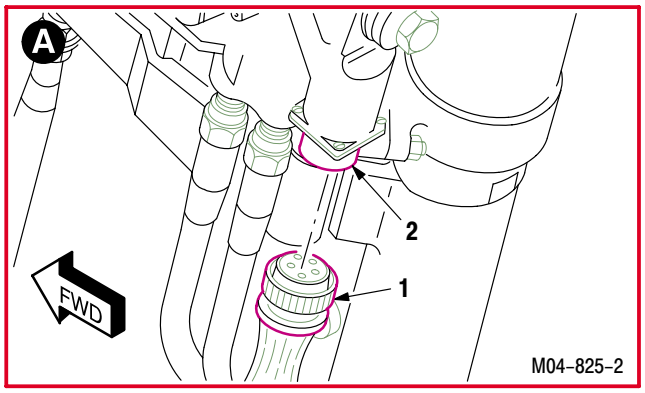
j. **Vent primary hydraulic system** (para 7.3)**.**

k. **Vent utility hydraulic system** (para 7.57)**.**

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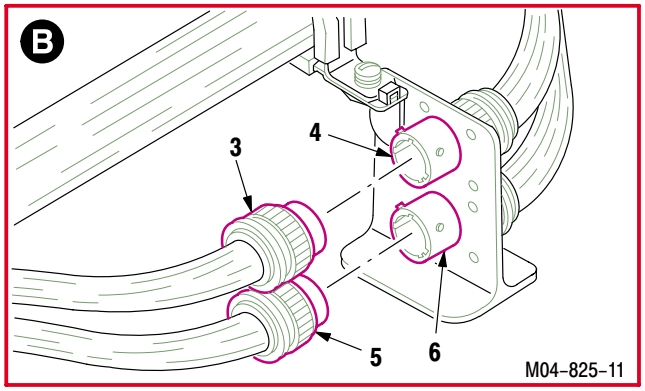
7.47. LONGITUDINAL SERVOCYLINDER REMOVAL – continued

l. **Detach connector P220 (1) from receptacle (L34)J220 (2).**



m. **Detach connector (L34)P219 (3) from receptacle J219 (4).**

n. **Detach connector (L34)P408 (5) from receptacle J408 (6).**



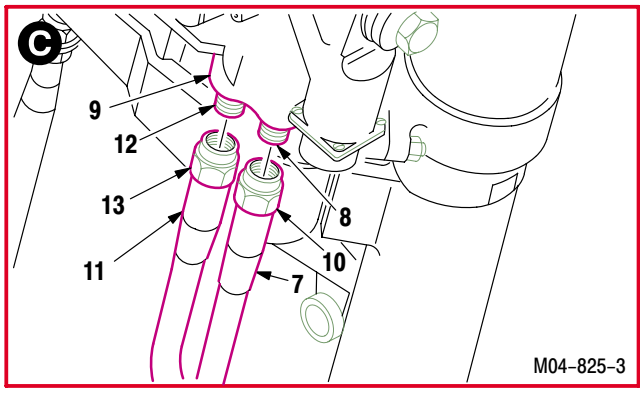
o. **Remove primary pressure tube (7) from adapter (8).**

(1) Place rags around servocylinder (9) to catch hydraulic fluid spills.

(2) Remove nut (10).

p. **Remove primary return tube (11) from adapter (12).**

(1) Remove nut (13).

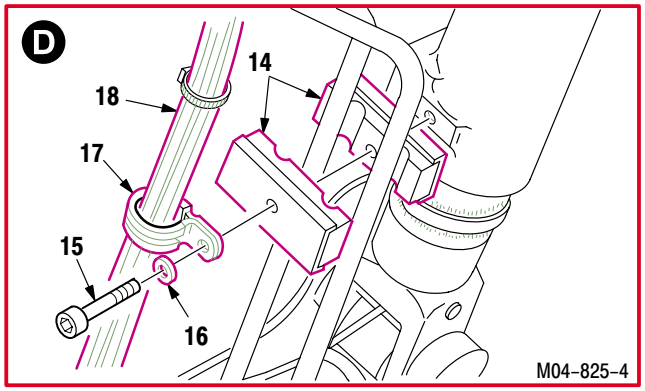


q. **Remove tube clamp (14).**

(1) Remove screw (15), washer (16), and wire clamp (17).

(2) Remove wire clamp (17) from wire harness (18).

(3) Remove halves of clamp (14).



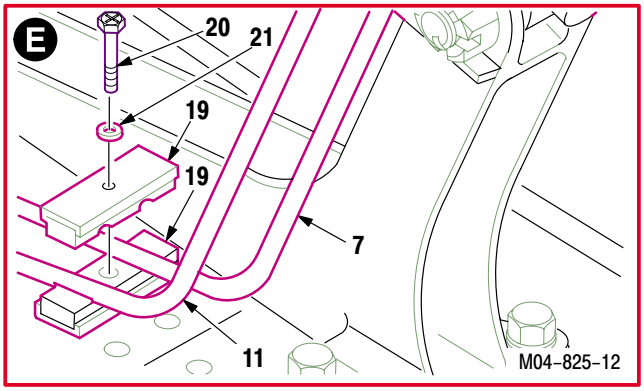
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7.47. LONGITUDINAL SERVOCYLINDER REMOVAL – continued

r. **Remove tube clamp (19).**

(1) Remove screw (20) and washer (21).

(2) Remove halves of clamp (19) from primary pressure tube (7) and primary return tube (11).

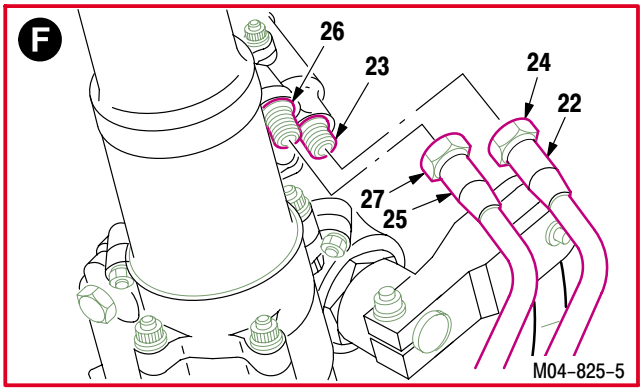


s. **Remove utility pressure tube (22) from adapter (23).**

(1) Remove nut (24).

t. **Remove utility return tube (25) from adapter (26).**

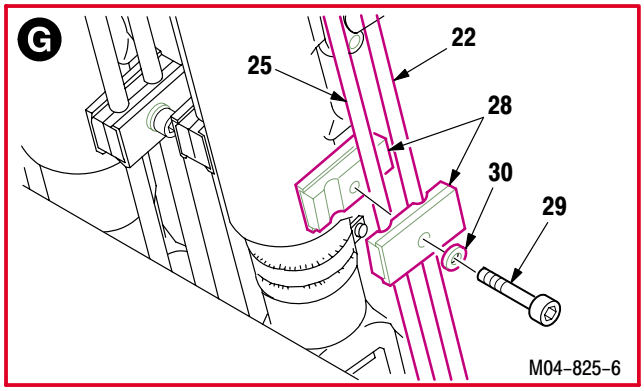
(1) Remove nut (27).



u. **Remove tube clamp (28).**

(1) Remove screw (29) and washer (30).

(2) Remove halves of clamp (28) from utility pressure tube (22) and utility return tube (25).

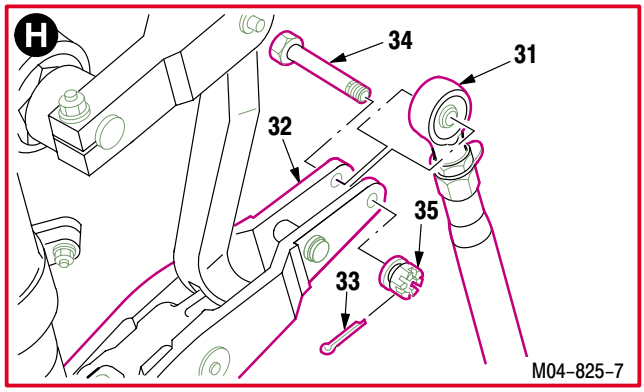


v. **Remove rod end (31) from control arm (32).**

(1) Remove and discard cotter pin (33).

(2) Hold bolt (34). Remove nut (35).

(3) Remove bolt (34).



GO TO NEXT PAGE

7.47. LONGITUDINAL SERVOCYLINDER REMOVAL – continued

NOTE

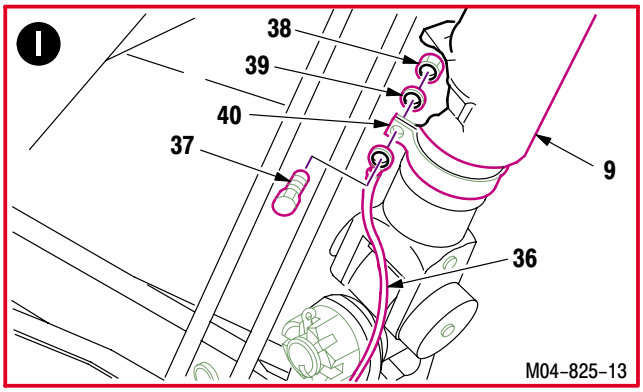
If ground cable is installed on helicopter, go to step w. If not, go to step x.

w. **Remove cable (36) from servocylinder (9).**

(1) Remove sealant from screw (37), nut (38), washer (39), and clamp (40) (para 1.47).

(2) Hold screw (37). Remove nut (38) and washer (39).

(3) If replacing servocylinder (9), remove clamp (40).



WARNING

To prevent movement of bellcrank and possible injury, support bellcrank before disconnecting servocylinder. If injury occurs, seek medical aid.

x. **Remove rod end (41) from bellcrank (42).**

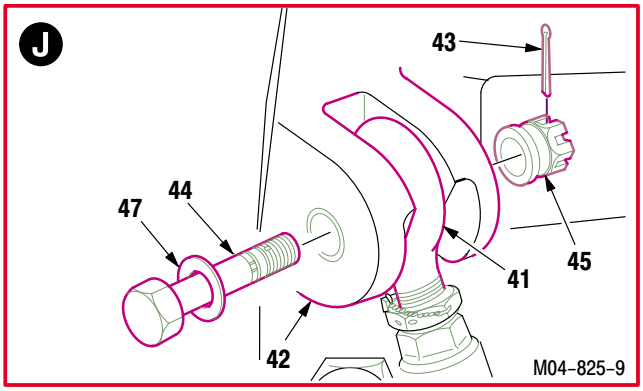
(1) Remove sealant from attaching hardware (para 1.47).

(2) Remove and discard cotter pin (43).

(3) Hold bolt (44). Use box wrench.

(4) Remove nut (45). Use box wrench.

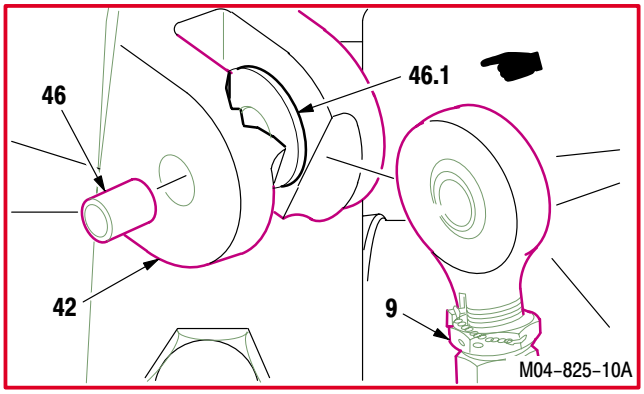
(5) Remove bolt (44) and washer(s) (47), if installed.



NOTE

Do not remove nylon washer unless it is loose or excessively worn.

(6) Remove bushing (46) and nylon washer (46.1) (if necessary).



y. **Remove servocylinder (9) from bellcrank (42).**

GO TO NEXT PAGE

7.47. LONGITUDINAL SERVOCYLINDER REMOVAL – continued

CAUTION

Improper removal of self-retaining bolt will damage bolt and pin.

z. **Remove self-retaining bolt (48) from pin (49).**

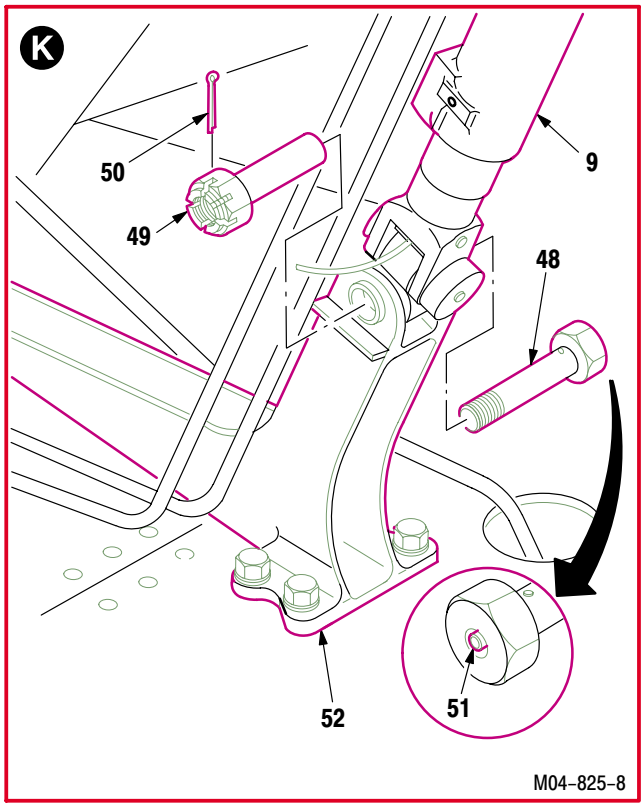
(1) Remove and discard cotter pin (50).

(2) Hold pin (49). Use box wrench.

(3) Loosen bolt (48) one-half turn. Use box wrench.

(4) Press button (51) in center of bolt (48).

(5) Remove bolt (48) from pin (49). Keep button (51) pressed.



aa. **Remove servocylinder (9) from bracket (52).**

(1) Remove pin (49).

ab. **Remove servocylinder (9) from aircraft.**

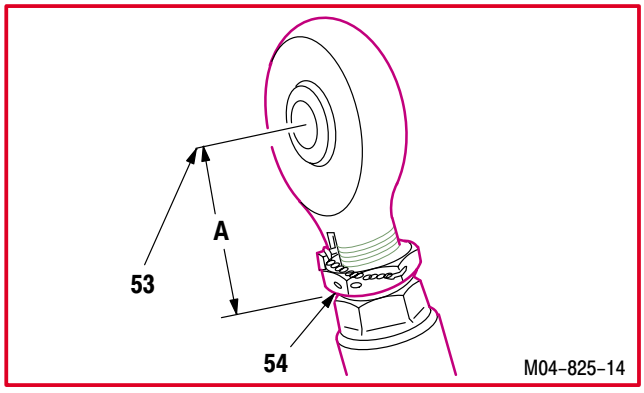
(1) One person hold servocylinder upper end and second person lift lower end.

(2) Carefully remove servocylinder (9).

NOTE

Perform step ac off helicopter if replacing servocylinder.

ac. **Measure and record distance A between center of rod end bore (53) and top of servocylinder piston rod (54). Keep recorded measurement for installation of new servocylinder.**



GO TO NEXT PAGE

7.47. LONGITUDINAL SERVOCYLINDER REMOVAL – continued

7.47.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

7.47.5. Inspection

a. **Check removed and attaching parts for cracks, nicks, or dents** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Check rod end for bearing play.**

(1) Maximum radial bearing play **0.005 INCH**.

(2) Maximum axial bearing play **0.020 INCH**.

d. **Check universal link bushing for radial play.**

(1) Maximum radial bushing play **0.005 INCH**.

e. **Check servocylinder linkage control fasteners for damage and security.**

(1) Check fasteners with 10X magnifying glass for cracks and corrosion. None allowed.

(2) Manually try to rotate fasteners (no tools or pliers) to check for loose or rotating hardware. None allowed.

f. **Check servocylinder mount bracket bushing for wear.**

(1) Maximum inside diameter **0.754 INCH**.

g. **Check servocylinder pin for wear.**

(1) Minimum outer diameter **0.748 INCH**.

END OF TASK

7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION

7.48.1. Description

This task covers: Installation.

7.48.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 x 3/8-inch drive open end box socket wrench crow-foot attachment (item 77, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/16 x 1/2-inch drive socket wrench socket (item 305, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
15/16 & 1-inch box wrench (item 412, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Bolt MS27576-10-46 (for alinement)
Cotter pin (3)
Corrosion preventive compound (item 62A, App F)
Hydraulic fluid (item 92, App F)
Sealing compound (item 175, App F)
Sealing compound (item 176, App F)

Personnel Required:

67R	Attack Helicopter Repairer One person to assist
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

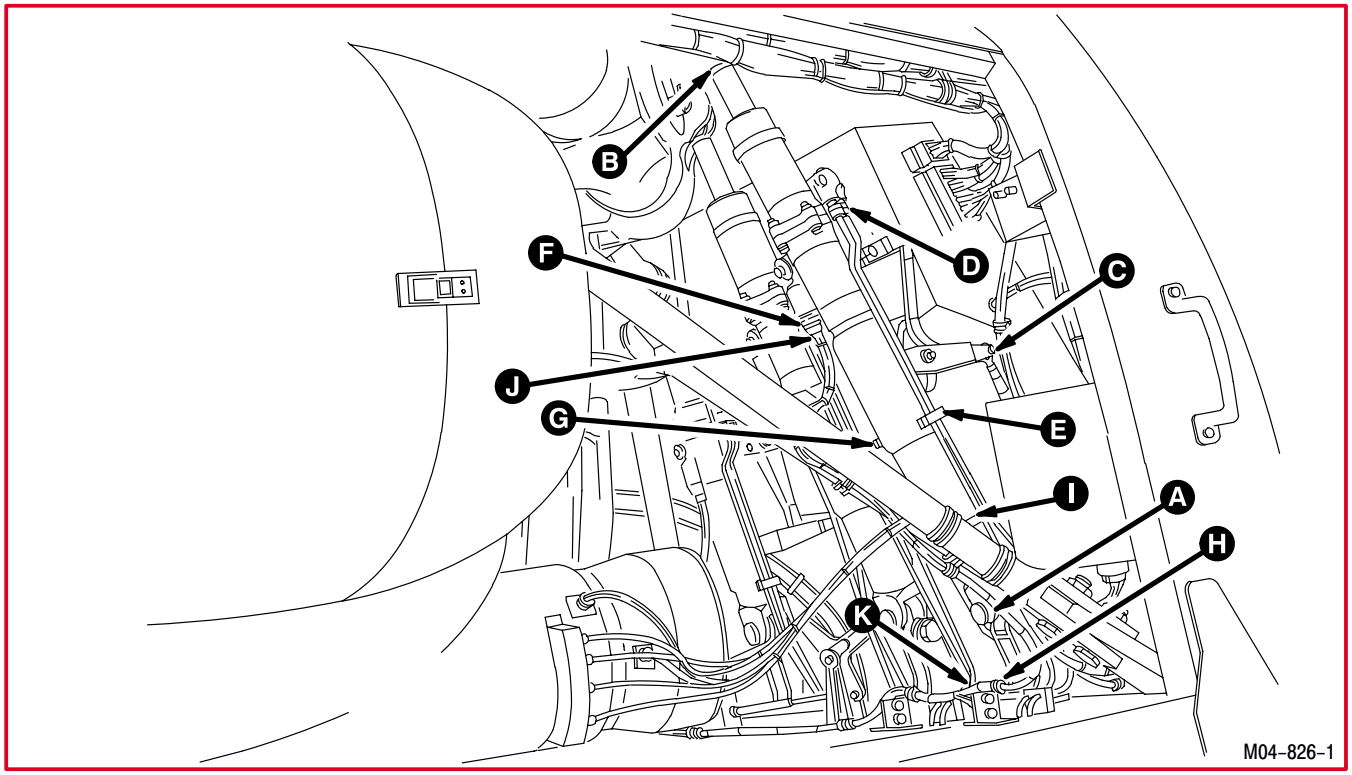
WARNING

FLIGHT SAFETY PART

- **The longitudinal servocylinder and/or components of the longitudinal servocylinder are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Installation of a non-BUCS servocylinder in a BUCS equipped helicopter will render the BUCS system inoperative. Installation of a BUCS servocylinder in a helicopter not equipped with BUCS may result in loss of flight controls, serious injury or death to crewmembers, and/or serious damage to helicopter.**

GO TO NEXT PAGE

7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued

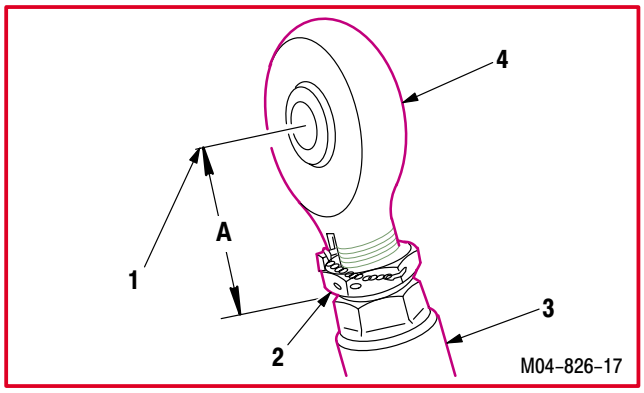


7.48.3. Installation

NOTE

Perform step a if installing a replacement servocylinder. Go to step b if reinstalling servocylinder.

a. **Measure and record distance A between center of rod end bore (1) and top of servocylinder piston rod (2) on new servocylinder (3).** Ensure that distance A on new servocylinder is within **0.016 INCH** of the measurement recorded in paragraph 7.47 on the old servocylinder. If distance A is not within **0.016 INCH**, adjust rod end (4) (para 7.49).



GO TO NEXT PAGE

7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued

b. **Install servocylinder (3) on bracket (5).**

(1) One person hold upper end of servocylinder and second person lift lower end. Position servocylinder (3) on bracket (5).

(2) Install pin (6).

CAUTION

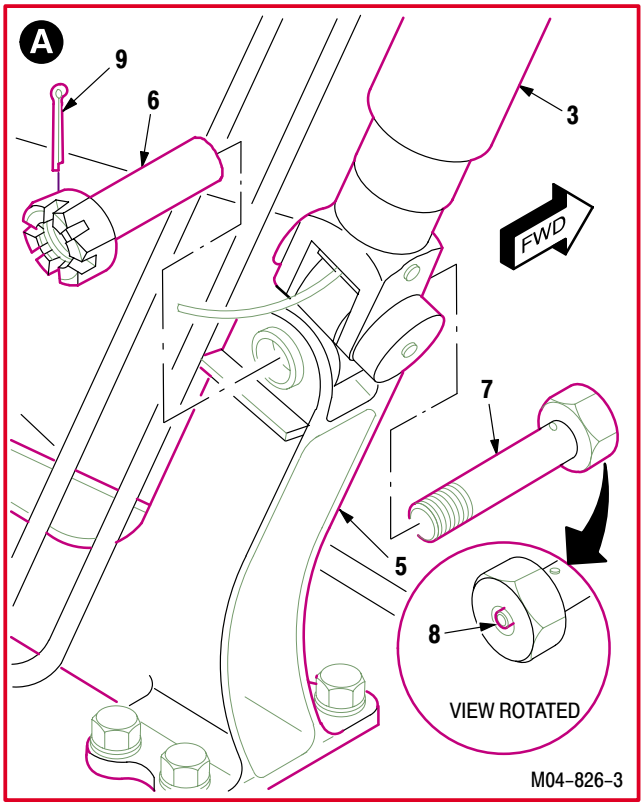
Improper installation of self-retaining bolt will damage bolt and pin.

c. **Install self-retaining bolt (7) in pin (6).**

(1) Install bolt (7) into pin (6).

(2) Press button (8) in center of bolt (7).

(3) Screw bolt (7) into pin (6) as far as possible before releasing button (8).



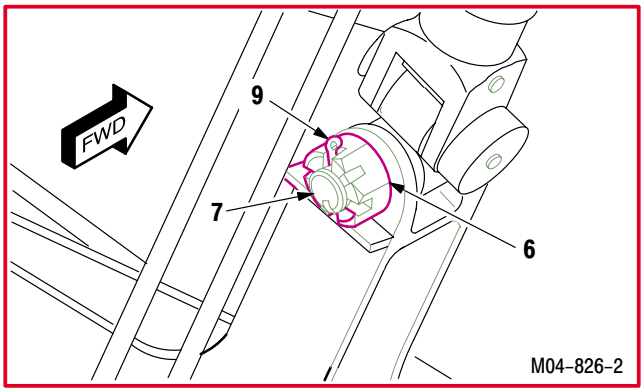
d. **Torque bolt (7) 50 to 70 INCH-POUNDS.**

(1) Hold pin (6). Use box wrench.

(2) Torque bolt (7) to **50 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Increase torque to aline cotter pin hole, but do not exceed **70 INCH-POUNDS**.

(4) Install new cotter pin (9).



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7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued

CAUTION

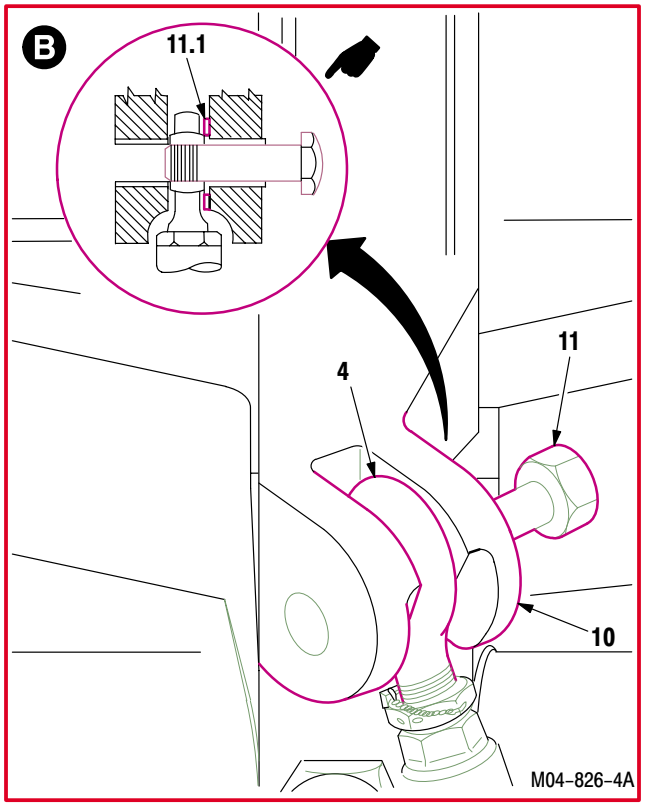
To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** so that rod end can be alined with bellcrank during rigging and installation. Adjustments are made by turning rod end, not piston rod.

NOTE

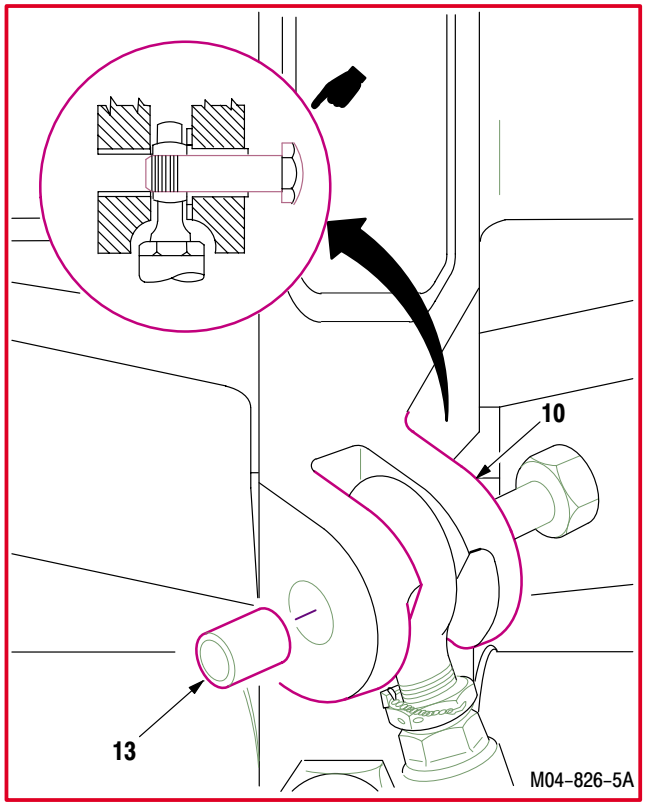
If nylon washer is excessively worn or has debonded from bellcrank, repair (para 11.11).

e. **Aline rod end (4) with bellcrank (10).**

(1) Insert alinement bolt (11) halfway through bellcrank (10), nylon washer (11.1), and rod end (4) from inboard side of bellcrank.



f. **Insert bushing (13) through bellcrank (10) until it seats against rod end (4).**



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7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued



g. **Install rod end (4) on bellcrank (10).**

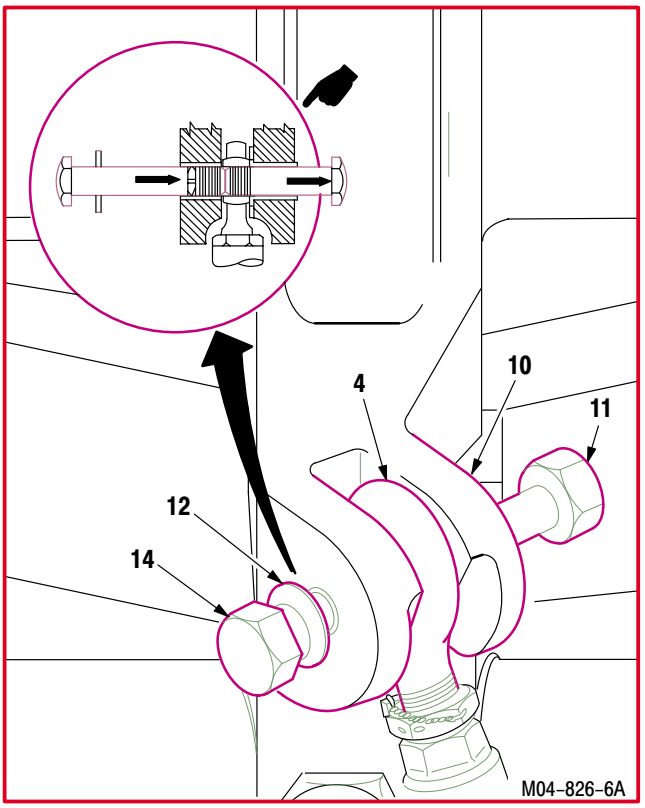
CAUTION

Threads of bolt and nut shall be clean and compound free. Contaminated threads can cause improper torque, which may cause damage to flight control system.

(1) Apply a light coat of corrosion preventive compound to shank of bolt (14). Use corrosion preventive compound (item 62A, App F).

(2) Install bolt (14) through washer(s) (12) (if required) and force alinement bolt (11) out of bellcrank (10).

(3) Check fit of self-retaining bolt (14) (para 11.1).





h. **Install nut (15) on bolt (14).** Torque nut (15) **900 to 1100 INCH-POUNDS**.

(1) Hold bolt (14). Use box wrench.

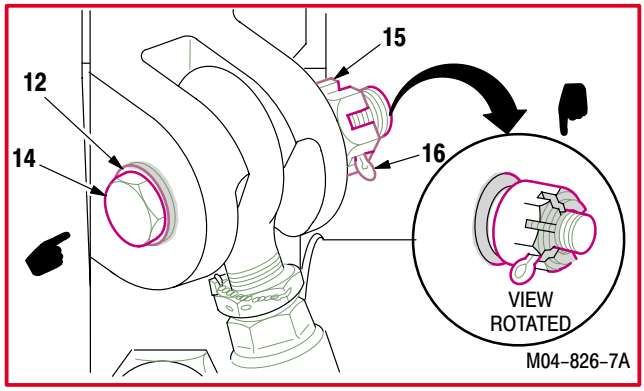
(2) Install nut (15).

(3) Torque nut (15) to **900 INCH-POUNDS**. Use socket and torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **1100 INCH-POUNDS**.

(5) Install new cotter pin (16).

(6) Apply sealing compound around bolt (14) head, washer (12), and nut (15). Use sealing compound (item 176, App F).



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7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued

i. **Install rod end (17) on control arm (18).** Torque nut (20) **30 to 40 INCH-POUNDS**.

(1) Install bolt (19) through arm (18) and rod end (17).

(2) Check fit of self-retaining bolt (19) (para 11.1).

(3) Hold bolt (19).

(4) Install nut (20).

(5) Torque nut (20) to **30 INCH-POUNDS**. Use torque wrench.

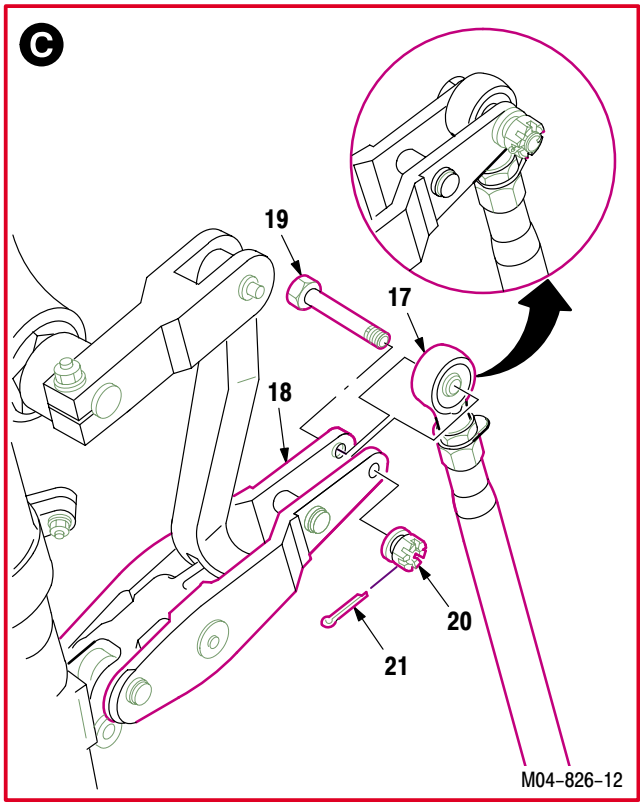
(6) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(7) Install new cotter pin (21).



CAUTION

Ensure tubes are not crossed when installed.



j. **Install utility pressure tube (22) on adapter (23).**

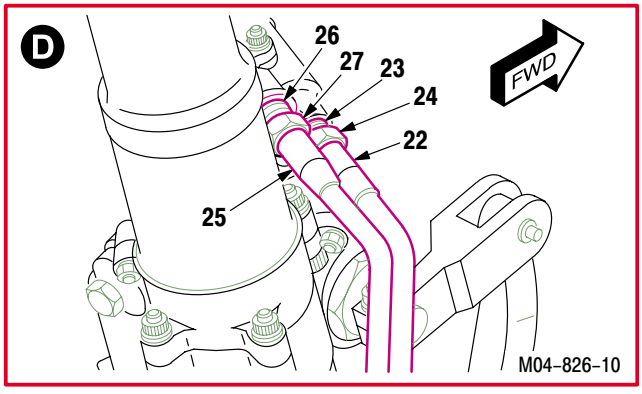
(1) Lubricate threads on adapter (23). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (24).

k. **Install utility return tube (25) on adapter (26).**

(1) Lubricate threads on adapter (26). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (27).



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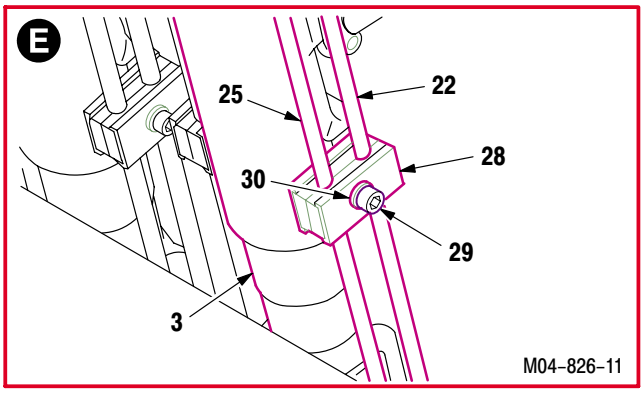
7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued

l. **Install tube clamp (28).** Torque screw (29) to **23 INCH-POUNDS**.

(1) Position one half of clamp (28) between servocylinder (3) and tubes (22) and (25). Position other half of clamp (28) over tubes (22) and (25) and aline mounting holes.

(2) Install screw (29) with washer (30).

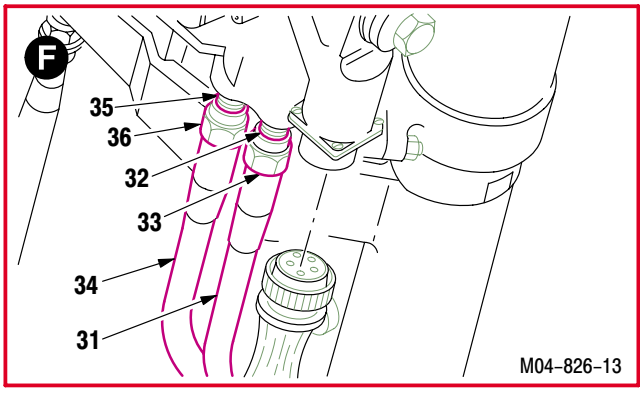
(3) Torque screw (29) to **23 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



m. **Install primary pressure tube (31) on adapter (32).**

(1) Lubricate threads on adapter (32). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (33).



n. **Install primary return tube (34) on adapter (35).**

(1) Lubricate threads on adapter (35). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (36).

o. **Install wire harness (37) and tube clamp (38).** Torque screw (39) to **23 INCH-POUNDS**.

(1) Position half of clamp (38) between servocylinder (3) and tubes (31) and (34).

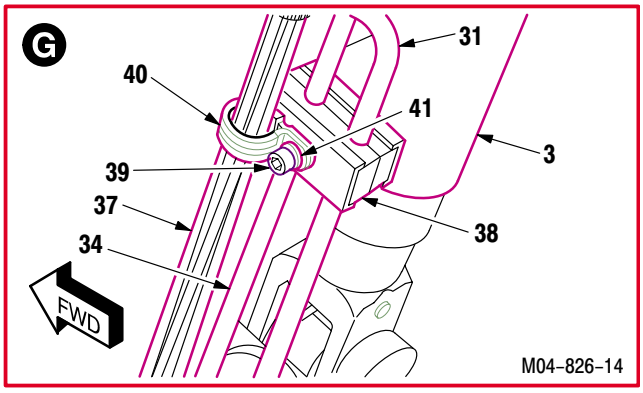
(2) Position other half of clamp (38) over tubes (31) and (34) and aline mounting hole.

(3) Install clamp (40) on wire harness.

(4) Aline clamp (40) with clamp (38) mounting holes.

(5) Install screw (39) with washer (41).

(6) Torque screw (39) to **23 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



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7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued

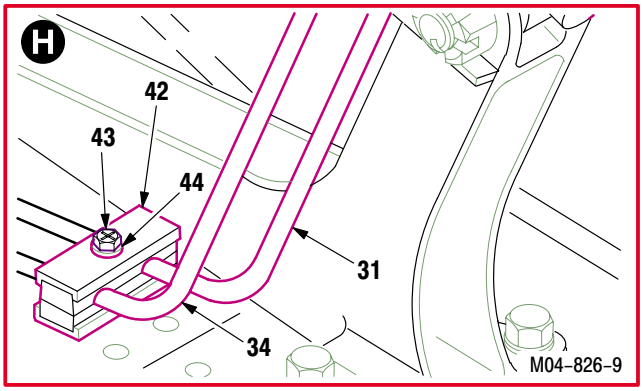
p. **Install tube clamp (42).** Torque screw (43) to **23 INCH-POUNDS**.

(1) Position half of clamp (42) under tubes (31) and (34).

(2) Position other half of clamp (42) over tubes (31) and (34). Aline mounting holes.

(3) Install screw (43) through washer (44) and clamp (42).

(4) Torque screw (43) to **23 INCH-POUNDS**. Use torque wrench.





NOTE

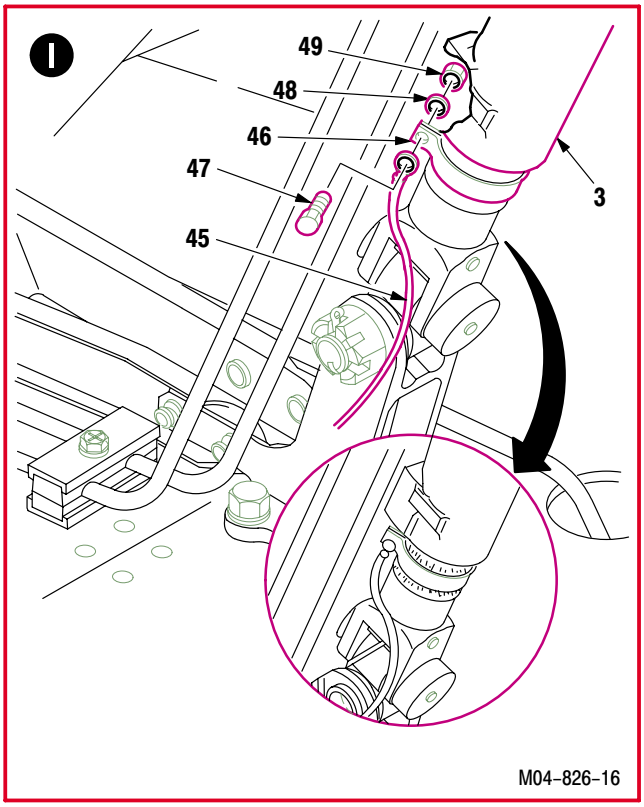
If ground cable is installed on helicopter, go to step q. If not, go to step r.

q. **Install cable (45) on servocylinder (3).**

(1) If installing a new servocylinder, aline new clamp (46) on servocylinder (3). If reinstalling servocylinder, use existing clamp (46).

(2) Install screw (47) through cable (45), clamp (46), washer (48), and nut (49).

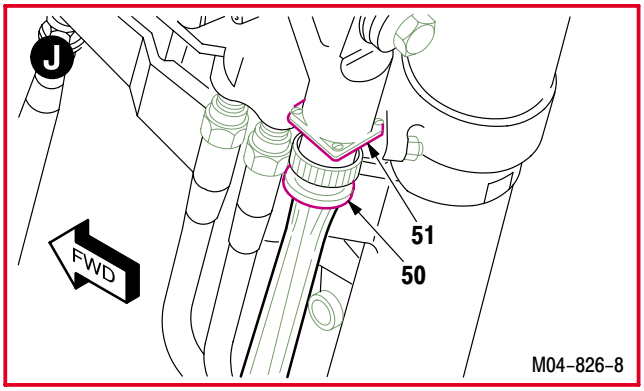
(3) Apply sealing compound over screw (47), washer (48), nut (49), and around edges of clamp (46). Use sealing compound (item 175, App F).



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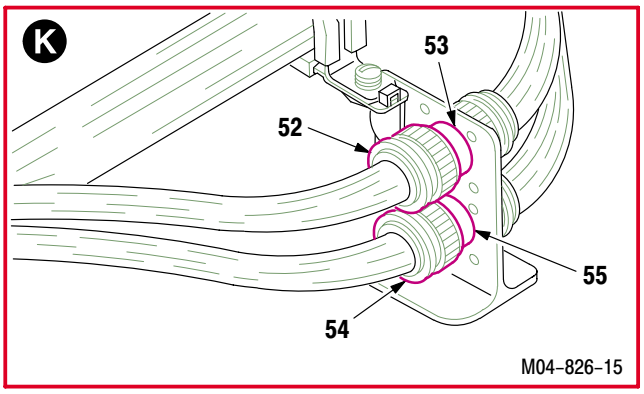
7.48. LONGITUDINAL SERVOCYLINDER INSTALLATION – continued

r. **Attach connector P220 (50) to receptacle (L34)J220 (51).**



s. **Attach connector (L34)P219 (52) to receptacle J219 (53).**

t. **Attach connector (L34)P408 (54) to receptacle J408 (55).**



u. **Inspect (QA).**

v. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

w. **Service primary and utility hydraulic systems** (para 1.34)**.**

x. **Perform longitudinal (cyclic) flight control rigging maintenance operational check** (TM 1-1520-238-T)**.**

y. **Perform linear variable differential transducer (LVDT) adjustment** (para 11.216)**.**

z. **Perform primary and utility hydraulic systems maintenance operational checks** (TM 1-1520-238-T)**.**

aa. **Install access panel R200 and fairing T205R** (para 2.2)**.**

END OF TASK

7.49. LONGITUDINAL SERVOCYLINDER ROD END REPLACEMENT

7.49.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.49.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 75, App H)
15/16 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 80, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/16 x 1/2-inch drive socket wrench socket (item 305, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Materials/Parts:

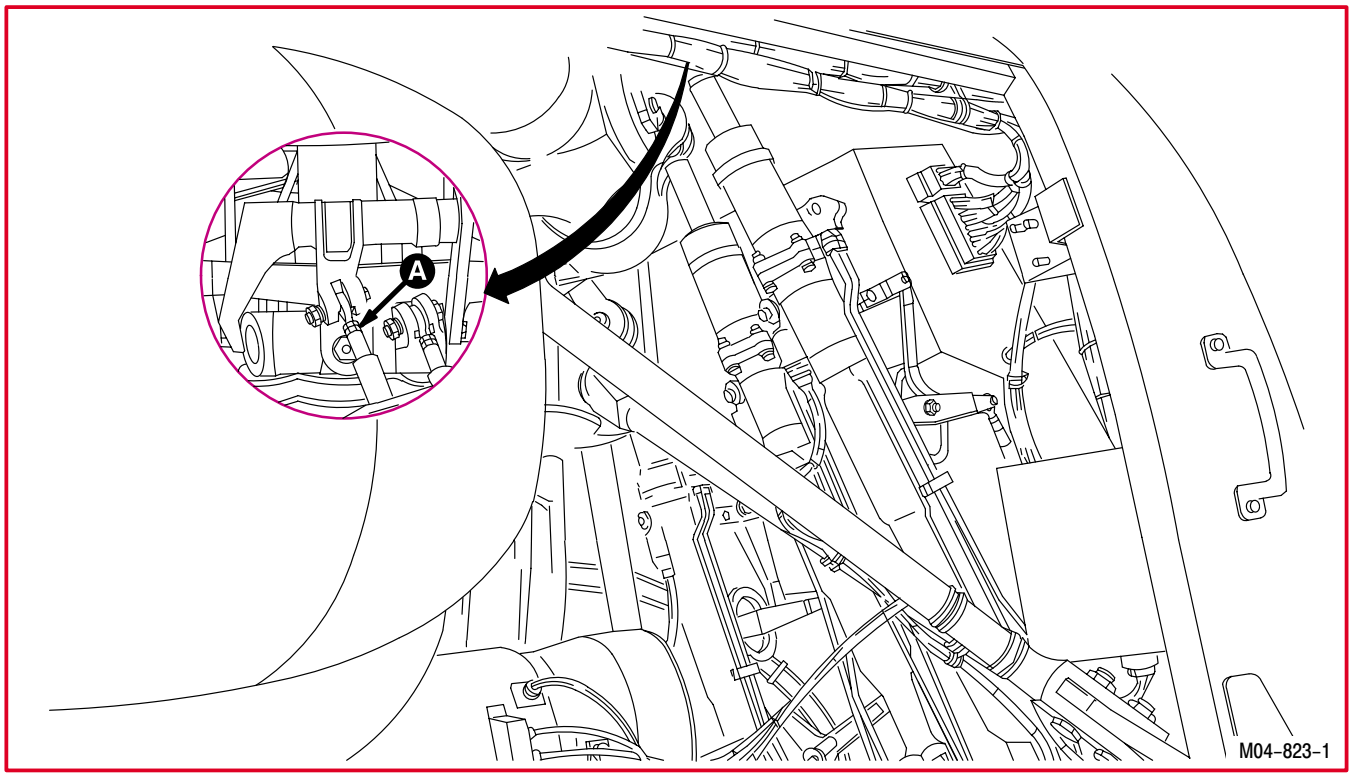
Bolt MS27576-10-46 (for alinement)
Cotter pin
Corrosion preventive compound (item 62A, App F)
Grease (item 87, App F)
Sealing compound (item 176, App F)
Wire (item 226, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 and fairing T205R removed

GO TO NEXT PAGE

7.49. LONGITUDINAL SERVOCYLINDER ROD END REPLACEMENT – continued



GO TO NEXT PAGE

7.49. LONGITUDINAL SERVOCYLINDER ROD END REPLACEMENT – continued

7.49.3. Removal

WARNING

To prevent movement of bellcrank and possible injury, support bellcrank before disconnecting servocylinder. If injury occurs, seek medical aid.

CAUTION

To prevent damage to rigid hydraulic tube assemblies, ensure upper end of servocylinder is supported when rod end is disconnected from the bellcrank.

a. **Remove rod end (1) from bellcrank (2).**

(1) Remove sealant from attaching hardware (para 1.47).

(2) Remove and discard cotter pin (3).

(3) Hold self-retaining bolt (4). Use box wrench.

(4) Remove nut (5). Use socket.

(5) Remove bolt (4) and washer(s) (6), if installed.

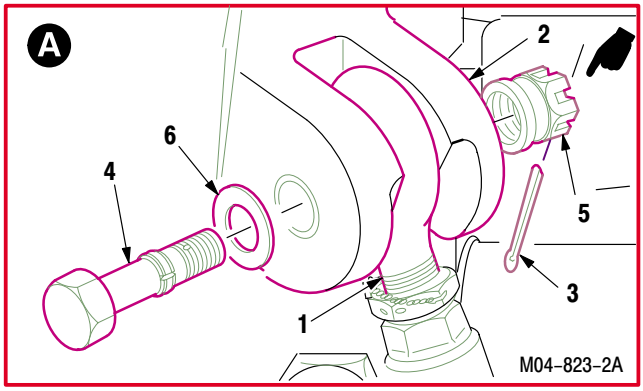
NOTE

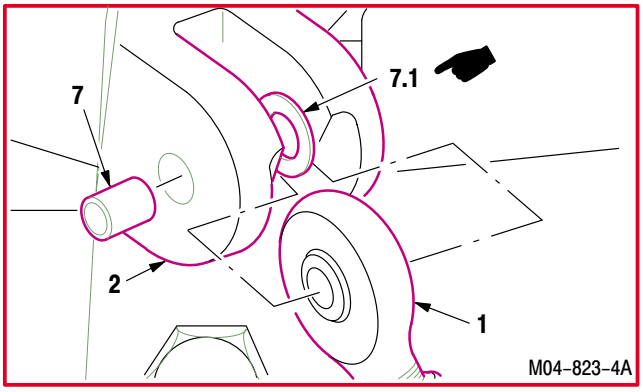
Do not remove nylon washer unless it is loose or excessively worn.

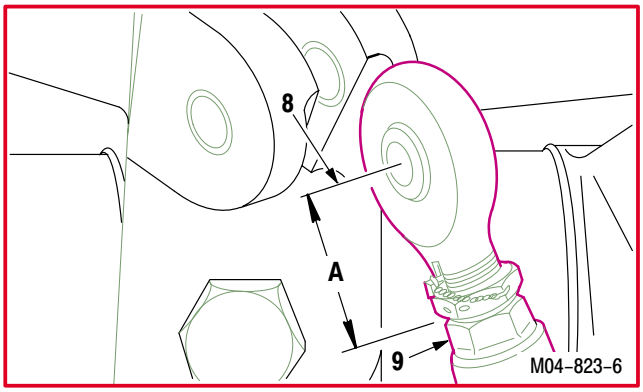
(6) Remove bushing (7) and nylon washer (7.1) (if necessary).

(7) Remove rod end (1) from bellcrank (2).

b. **Measure and record distance A between center of rod end bore (8) and top of piston rod (9).**







GO TO NEXT PAGE

7.49. LONGITUDINAL SERVOCYLINDER ROD END REPLACEMENT – continued

NOTE

If servocylinder dust boot is installed, perform step c. If boot is not installed, go to step d.

c. **Slide boot (9.1) away from piston rod (9) to get access to lock (11).**

d. **Remove rod end (1) from piston rod (9) with nut (10) and lock (11) installed.**

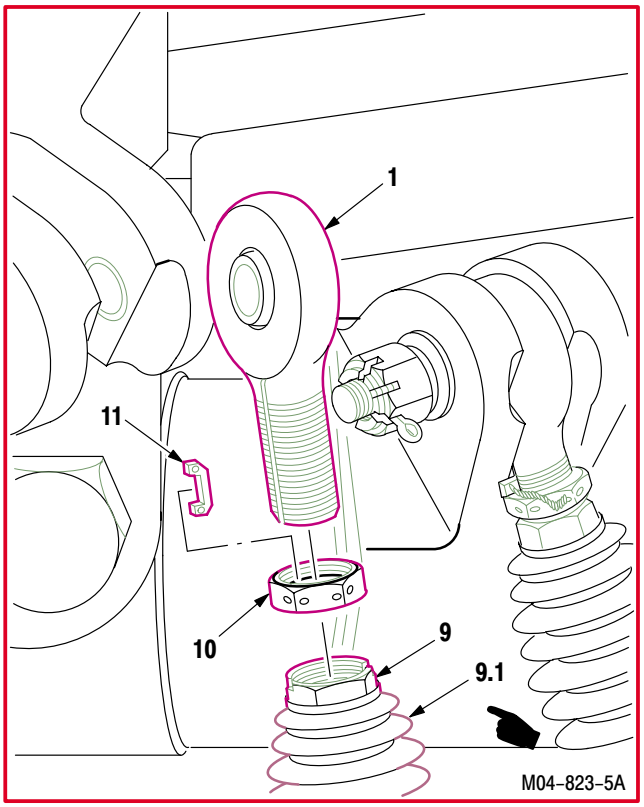
(1) Remove lockwire from nut (10) and lock (11).

(2) Hold piston rod (9). Use crowfoot.

(3) Loosen nut (10). Use open end wrench.

(4) Remove rod end (1).

e. **Remove nut (10) and lock (11) from rod end (1).**



7.49.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.49.5. Inspection

a. **Check bellcrank, self-retaining bolt, piston rod, bushing, nut, and lock for cracks and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.49.6. Installation

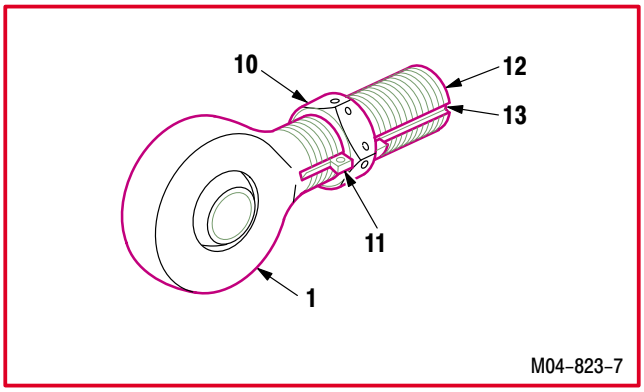


a. **Coat threads (12) of rod end (1).** Use grease (item 87, App F).

b. **Install lock (11) and nut (10) on rod end (1).**

(1) Insert lock (11) inside nut (10).

(2) Aline lock (11) with machined slot (13) on rod end (1). Screw lock (11) and nut (10) on rod end (1).



GO TO NEXT PAGE

7.49. LONGITUDINAL SERVOCYLINDER ROD END REPLACEMENT – continued

WARNING

Distance between center of rod end bore and top of piston shall not exceed 3.06 INCHES. A measurement less than 3.06 INCHES is necessary to provide enough thread engagement to maintain safe flight. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.

CAUTION

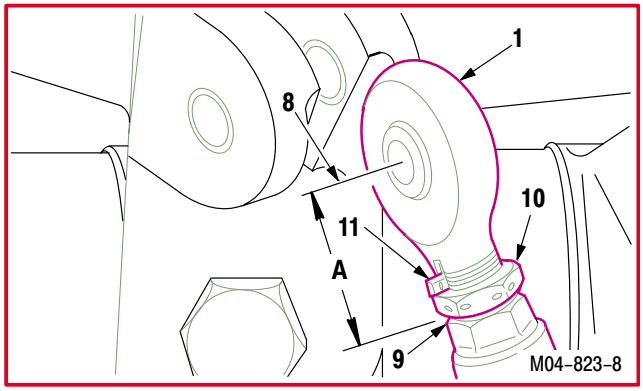
To prevent breakdown of cylinder piston rings, rotation of piston rod is limited to ±**45 DEGREES** so that rod end can be alined with bellcrank during rigging and installation. Adjustments are made by turning rod end, not piston rod.

c. **Install rod end (1), with nut (10) and lock (11), on piston rod (9).**

(1) Hold piston rod (9). Use crowfoot.

(2) Screw rod end (1), with nut (10) and lock (11), into piston rod (9).

(3) Adjust rod end (1) so distance A between center of rod end bore (8) and top of piston rod (9) is within **0.016 INCH** of the measurement recorded in paragraph 7.49.3.



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7.49. LONGITUDINAL SERVOCYLINDER ROD END REPLACEMENT – continued

NOTE

If nylon washer is excessively worn or has debonded from bellcrank, repair (para 11.11).

d. **Aline rod end (1) with bellcrank (2).**

(1) Insert alinement bolt (14) halfway through bellcrank (2), nylon washer (7.1), and rod end (1) from inboard side of bellcrank.

e. **Insert bushing (7) through bellcrank (2) until it seats against rod end (1).**



f. **Install rod end (1) on bellcrank (2).**

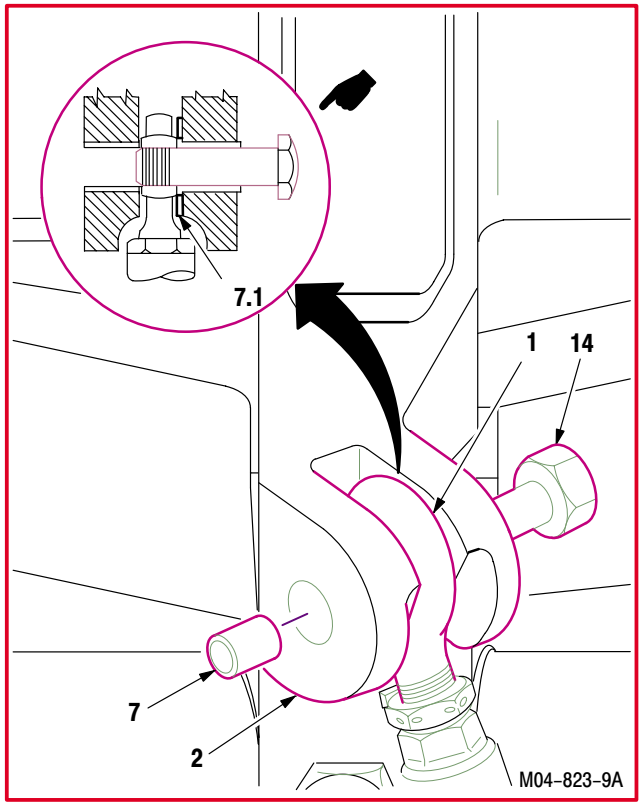
CAUTION

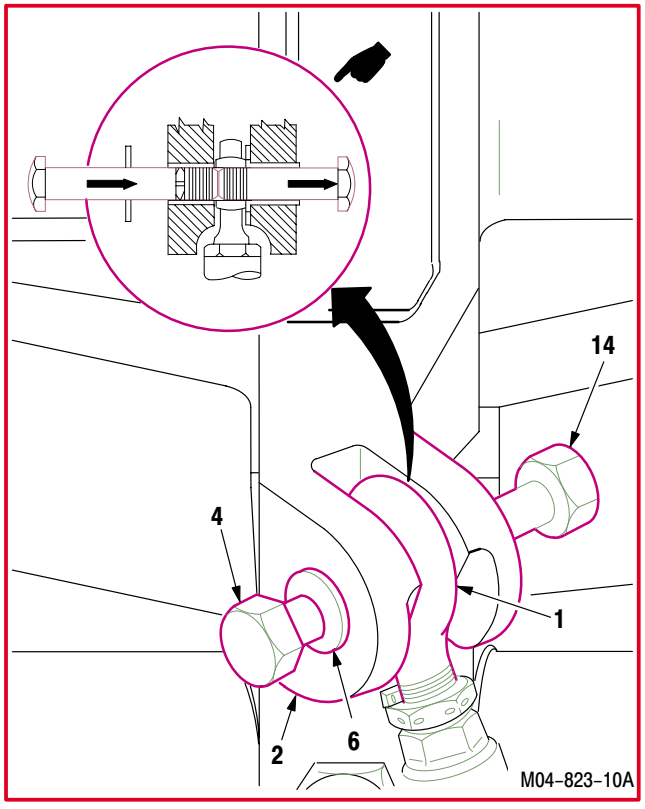
Threads of bolt and nut shall be clean and compound free. Contaminated threads can cause improper torque, which may cause damage to flight control system.

(1) Apply a light coat of corrosion preventive compound to shank of bolt (4). Use corrosion preventive compound (item 62A, App F).

(2) Install bolt (4) through washer(s) (6) (if required) and force alinement bolt (14) out of bellcrank (2).

(3) Check fit of self-retaining bolt (4) (para 11.1).





GO TO NEXT PAGE

7.49. LONGITUDINAL SERVOCYLINDER ROD END REPLACEMENT – continued



g. **Install nut (5) on self-retaining bolt (4).** Torque nut (5) **900 to 1100 INCH-POUNDS**.

(1) Hold bolt (4). Use box wrench.

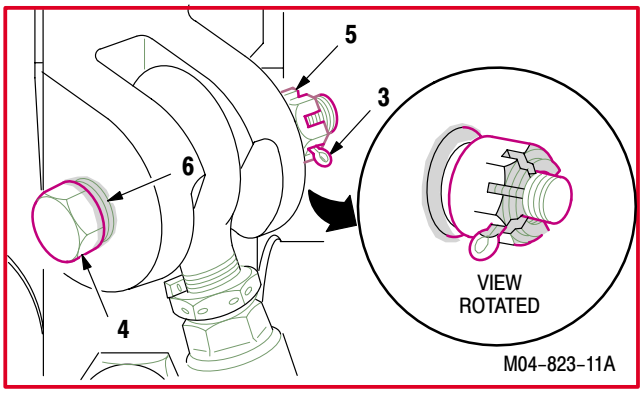
(2) Install nut (5). Use socket.

(3) Torque nut (5) to **900 INCH-POUNDS**. Use socket and torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **1100 INCH-POUNDS**.

(5) Install new cotter pin (3).

(6) Apply sealing compound around bolt (4) head, washer(s) (6), and nut (5). Use sealing compound (item 176, App F).

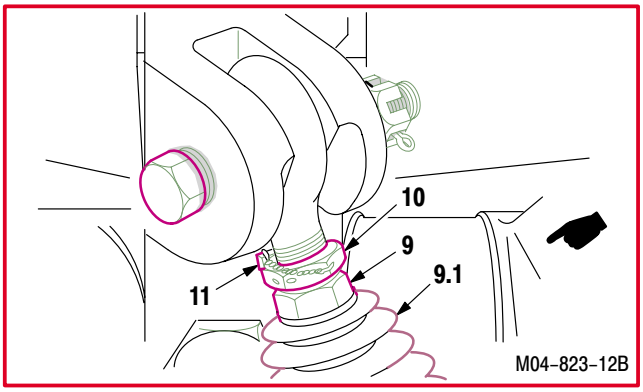


h. **Torque nut (10) to 930 INCH-POUNDS.**

(1) Hold piston rod (9). Use crowfoot.

(2) Torque nut (10) to **930 INCH-POUNDS**. Use crowfoot and torque wrench.

(3) Lockwire nut (10) to lock (11). Use wire (item 226, App F).



NOTE

Step i. applies only if boot was removed, if boot was not removed, go to step j.

i. **Slide boot (9.1) over piston and over the end of piston rod (9).**

j. **Inspect (QA).**

k. **Perform longitudinal (cyclic) flight controls rigging maintenance operational check** (TM 1-1520-238-T)**.**

l. **Install access panel R200 and fairing T205R** (para 2.2)**.**

END OF TASK

7.50. SERVOCYLINDER CHECK VALVE REMOVAL/INSTALLATION

7.50.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.50.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/16 - 5/8-inch hexagon x 1/2-inch drive screwdriver bit set (item 37, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Backup ring (4)
Packing (2)
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

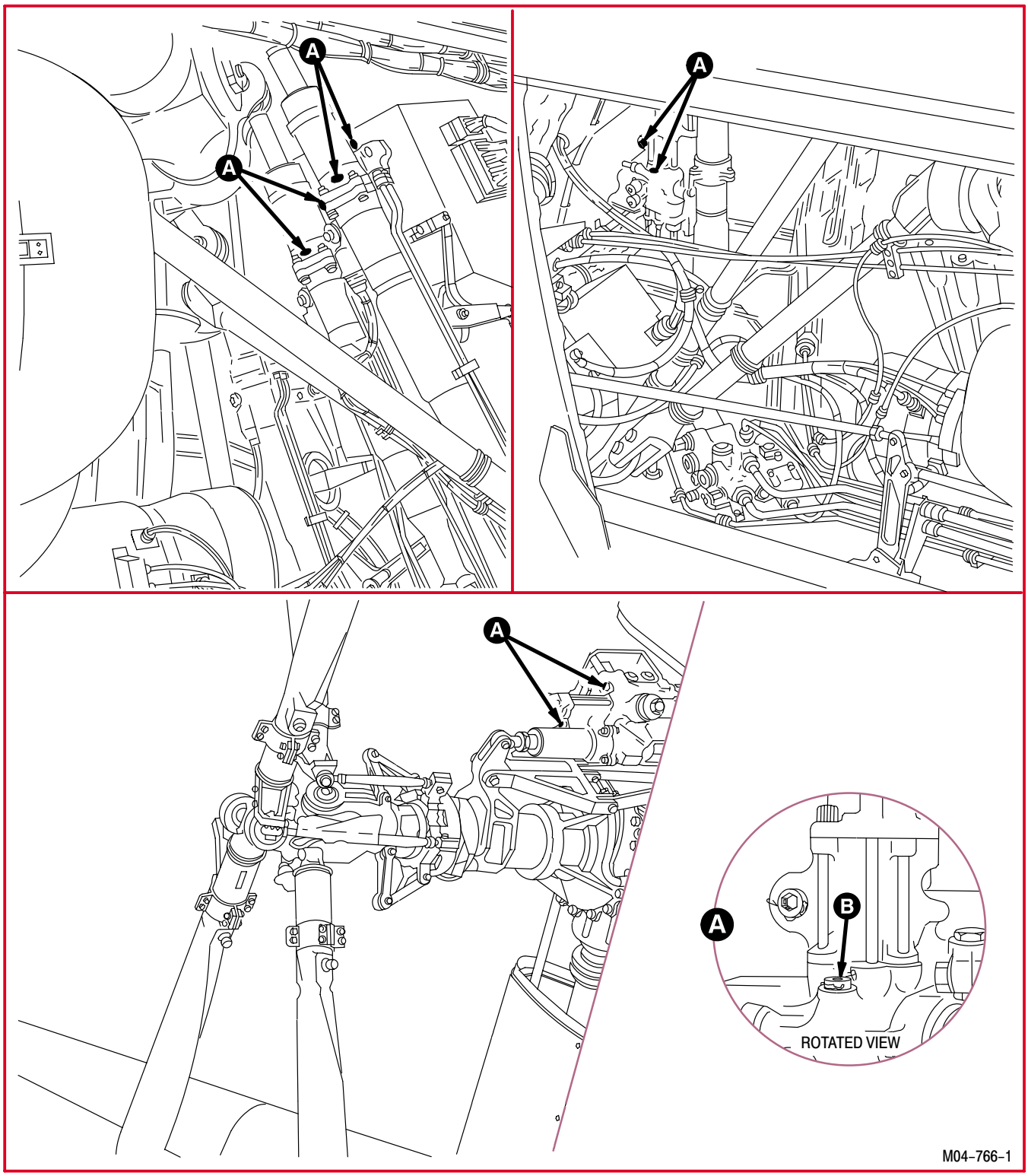
Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed (directional servocylinders only) Access panel R200 removed (collective and longitudinal servocylinders only) Access panel L200 removed (lateral servocylinder only)
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented

NOTE

This task is typical for primary and utility check valves in the directional, collective, lateral, and longitudinal servocylinder. Valves differ only in their locations.

GO TO NEXT PAGE

7.50. SERVOCYLINDER CHECK VALVE REMOVAL/INSTALLATION – continued



GO TO NEXT PAGE

7.50. SERVOCYLINDER CHECK VALVE REMOVAL/INSTALLATION – continued

7.50.3. Removal

a. **Remove check valve (1) from servocylinder (2).**

(1) Remove lockwire. Remove check valve (1). Use screwdriver bit set.

b. **Remove and discard two packings (3) and four backup rings (4) from two grooves (5).**

7.50.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.50.5. Inspection

a. **Check valve cavity and check valve for nicks, cracks, and stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.50.6. Installation



a. **Install two new packings (3) and four backup rings (4) on check valve (1).**

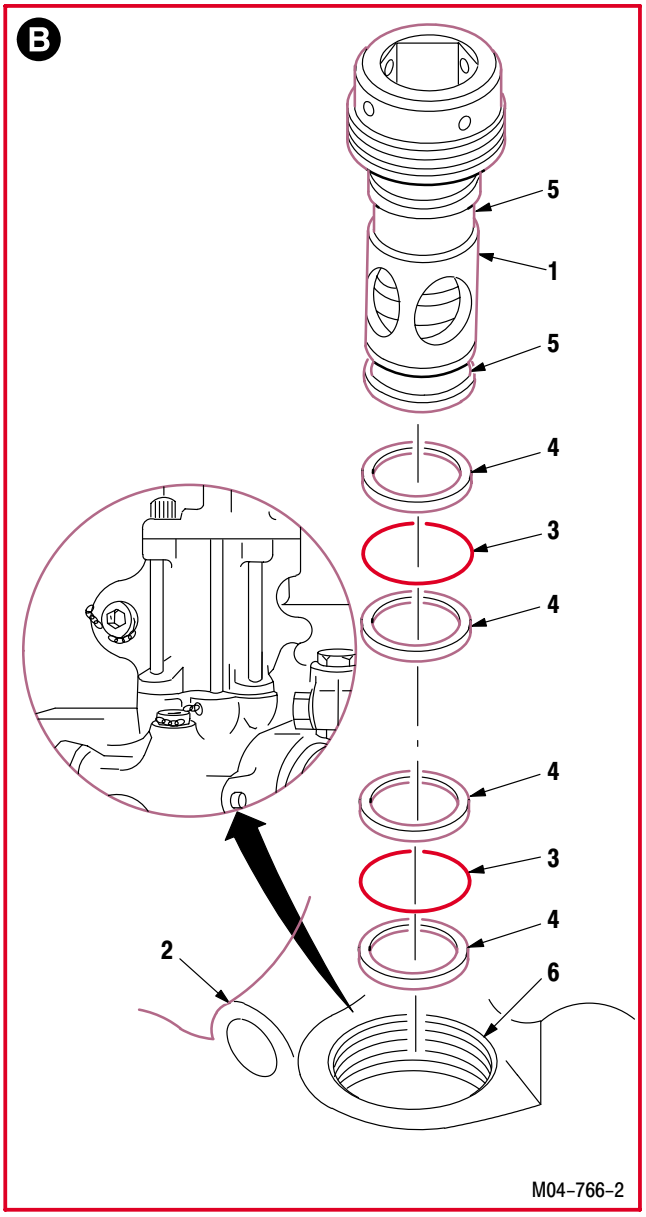
(1) Lubricate two packings (3). Use clean hydraulic fluid (item 92, App F).

(2) Install two packings (3) in grooves (5).

(3) Install one backup ring (4) on each side of both packings (3).

b. **Install check valve (1) in valve cavity (6).** Torque valve (1) to **35 INCH-POUNDS**. Use screwdriver bit set and torque wrench.

c. **Lockwire check valve (1) to servocylinder (2).** Use wire (item 226, App F).



GO TO NEXT PAGE

7.50. SERVOCYLINDER CHECK VALVE REMOVAL/INSTALLATION – continued

d. **Inspect (QA).**

e. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

f. **Service primary and utility hydraulic systems** (para 1.34)**.**

g. **Perform primary and utility hydraulic systems maintenance operational checks** (TM 1-1520-238-T)**.**

h. **Install fairings L540 and L546 (directional servocylinders only)** (para 2.2)**.**

i. **Install access panel R200 (collective and longitudinal servocylinders only)** (para 2.2)**.**

j. **Install access panel L200 (lateral servocylinder)** (para 2.2)**.**

END OF TASK

7.51. SERVOCYLINDER CONTROL SOLENOID VALVE REPLACEMENT

7.51.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.51.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (3)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

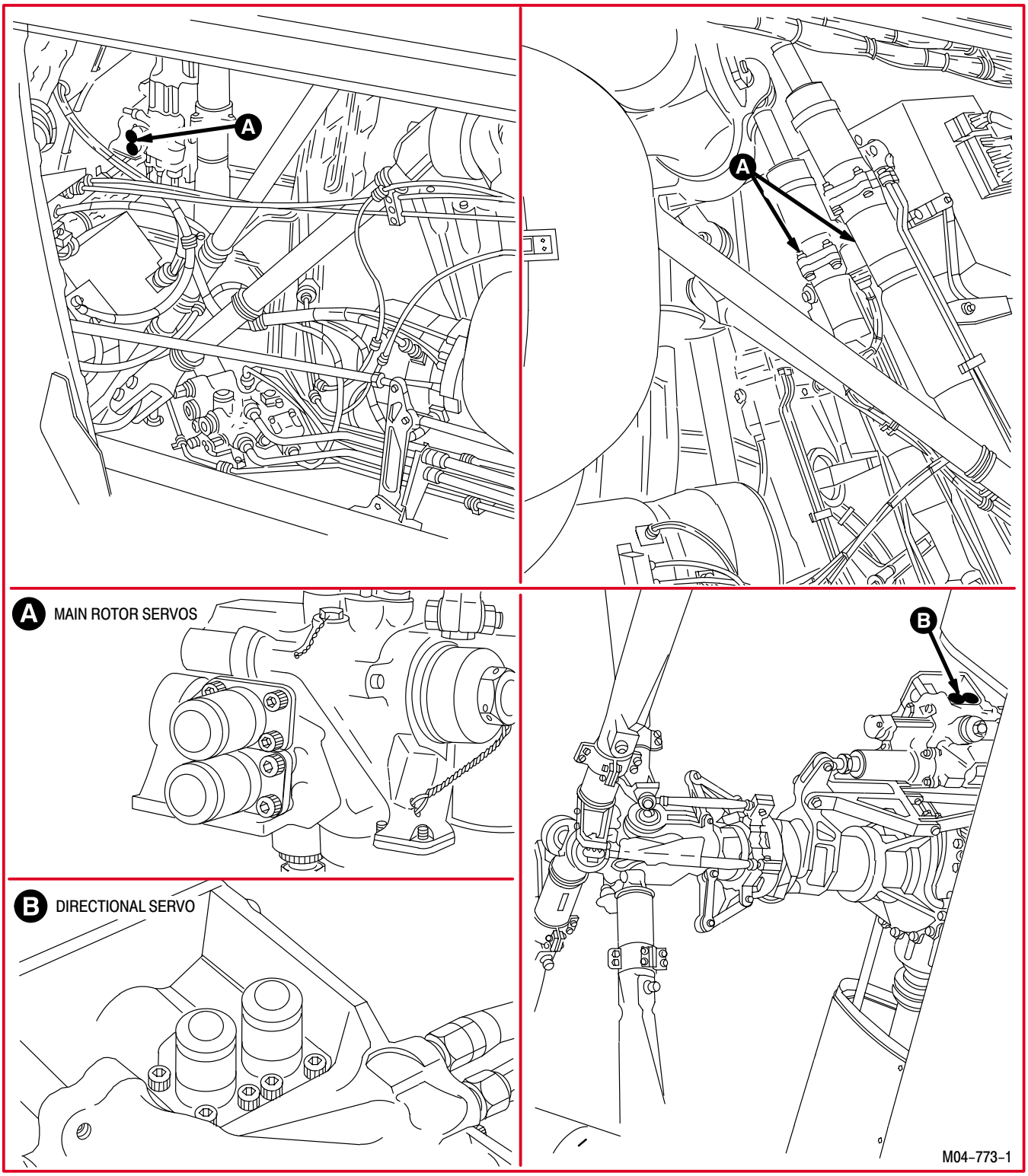
Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed (directional servocylinder only) Access panel R200 removed (collective and longitudinal servocylinders only) Access panel L200 removed (lateral servocylinder only)
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented

NOTE

This task is typical for the SAS solenoid valve and BUCS solenoid valve on the lateral, longitudinal, collective, and directional servocylinders. Valves differ only in their locations.

GO TO NEXT PAGE

7.51. SERVOCYLINDER CONTROL SOLENOID VALVE REPLACEMENT – continued



GO TO NEXT PAGE

7.51. SERVOCYLINDER CONTROL SOLENOID VALVE REPLACEMENT – continued

7.51.3. Removal

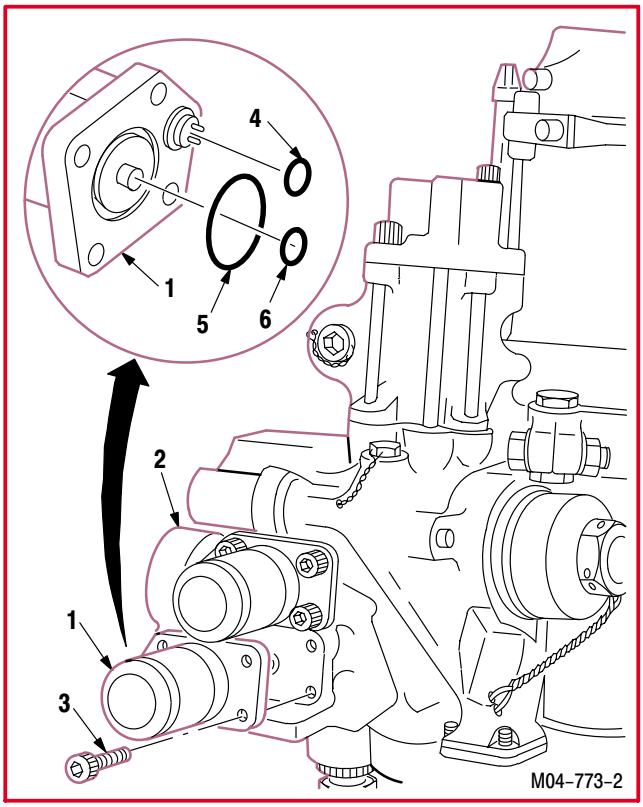
a. **Remove valve (1) from servocylinder (2).**

(1) Place rags under valve (1) to catch hydraulic fluid spills.

(2) Remove four screws (3).

(3) Pull valve (1) straight away from servocylinder (2).

(4) Remove and discard packings (4), (5), and (6).



7.51.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.51.5. Inspection

a. **Check removed and attaching parts for nicks, dents, and cracks** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.51.6. Installation



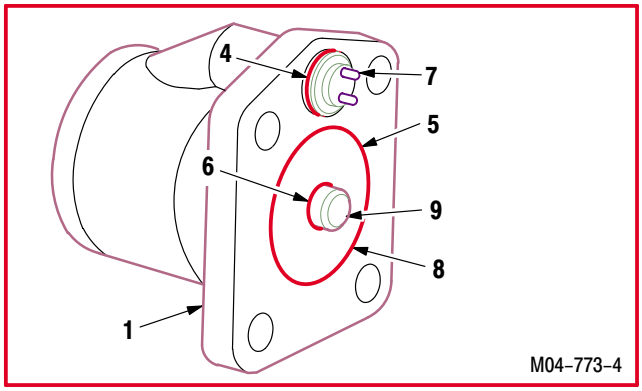
a. **Install new packings (4), (5), and (6) on new valve (1).**

(1) Lubricate packings (4), (5), and (6). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (4) on connector (7).

(3) Install packing (5) in groove (8).

(4) Install packing (6) on fitting (9).



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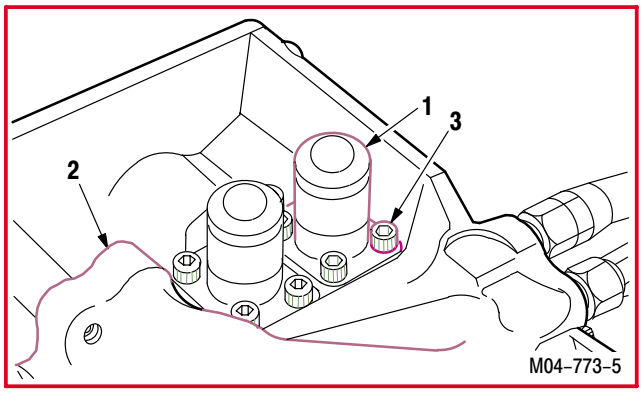
7.51. SERVOCYLINDER CONTROL SOLENOID VALVE REPLACEMENT – continued

b. **Install valve (1) on servocylinder (2).** Torque four screws (3) to **22 INCH-POUNDS**.

(1) Position valve (1) on servocylinder (2).

(2) Install four screws (3) through valve (1) into servocylinder (2).

(3) Torque four screws (3) to **22 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



c. **Inspect (QA).**

d. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

e. **Service primary and utility hydraulic systems** (para 1.34)**.**

f. **Perform primary and utility hydraulic systems maintenance operational checks** (TM 1-1520-238-T)**.**

g. **Install fairings L540 and L546 (directional servocylinder only)** (para 2.2)**.**

h. **Install access panel R200 (collective and longitudinal servocylinders only)** (para 2.2)**.**

i. **Install access panel L200 (lateral servocylinder only)** (para 2.2)**.**

END OF TASK

7.52. SERVOCYLINDER SERVOVALVE REPLACEMENT

7.52.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.52.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
3/16-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 322, App H)
7/64-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 328, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (5)
Hydraulic fluid (item 92, App F)
Wire (item 222, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

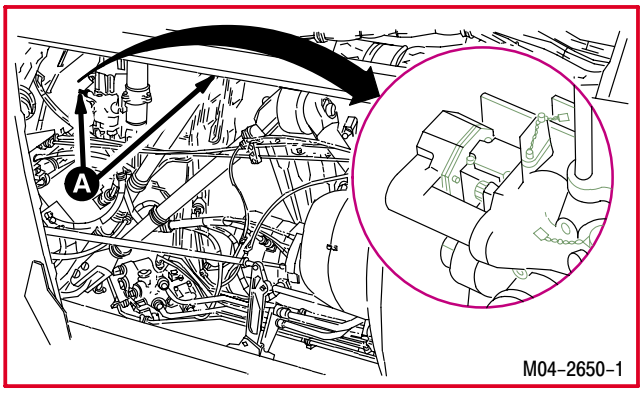
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed (directional servocylinder only) Access panel L200 removed (lateral servocylinder only) Access panel R200 removed (collective and longitudinal servocylinders only)
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented

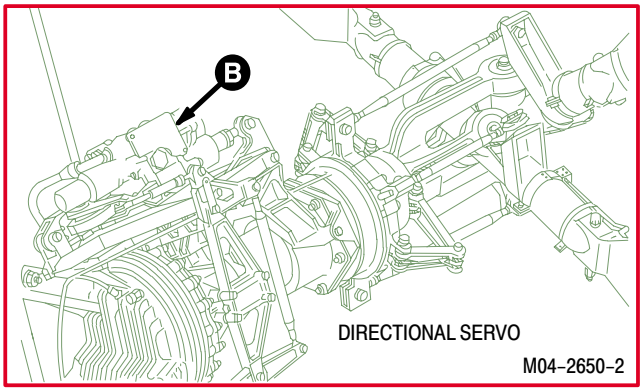
NOTE

- This task is typical for servovalves on the lateral, longitudinal, collective, and directional servocylinders. The directional servovalve is protected by an armor plate not on the other servocylinders.
- If replacing directional servocylinder servovalve, go to step a. If not, go to step b.



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7.52. SERVOCYLINDER SERVOVALVE REPLACEMENT – continued

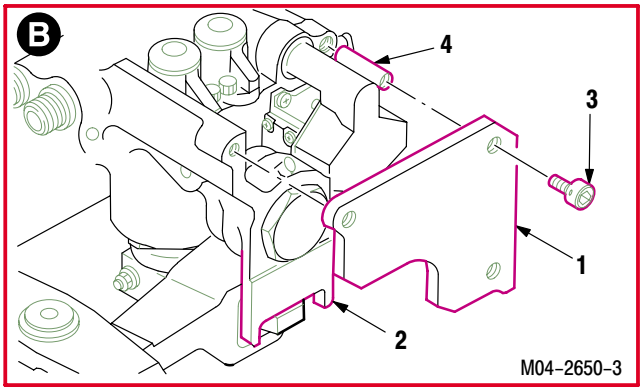


7.52.3. Removal

a. **Remove armor plate (1) from servocylinder (2).**

(1) Remove lockwire from three screws (3).

(2) Remove three screws (3), standoff (4), and plate (1). Use hexagon screwdriver.



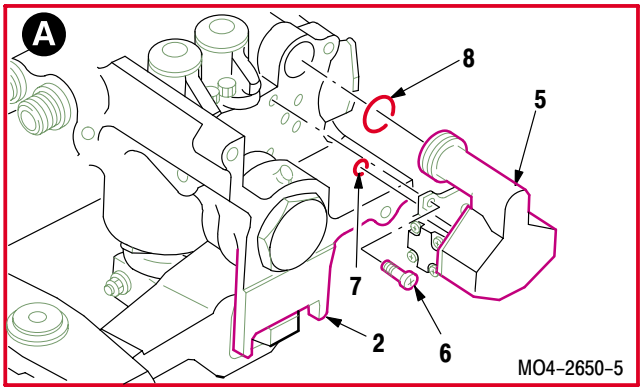
b. **Remove servovalve (5) from from servocylinder (2).**

(1) Place rags under servocylinder (2) to catch hydraulic fluid spills.

(2) Remove lockwire from screws (6).

(3) Remove four screws (6). Carefully pull servovalve (5) straight away from servocylinder (2). Use hexagon screwdriver.

(4) Remove and discard servovalve (5), four packings (7), and packing (8).



7.52.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

GO TO NEXT PAGE

7.52. SERVOCYLINDER SERVOVALVE REPLACEMENT – continued

7.52.5. Inspection

a. **Check servocylinder for nicks, dents, or cracks** (para 10.1)**.**

b. **Check servocylinder and screws for stripped or damaged threads** (para 10.1)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.52.6. Installation



a. **Install four new packings (7) on servovalve fluid ports (9).**

(1) Lubricate four packings (7). Use clean hydraulic fluid (item 92, App F).

(2) Install four packings (7) on ports (9).

b. **Install new packing (8) on connector (10).**

(1) Lubricate packing (8). Use clean hydraulic fluid (item 92, App F).

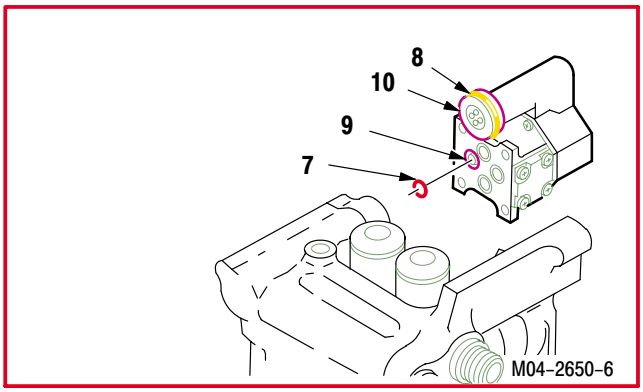
(2) Install packing (8) on connector (10).

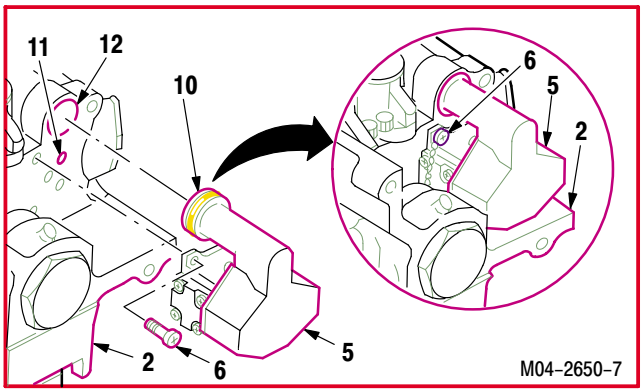
c. **Install new servovalve (5) on servocylinder (2).** Torque four screws (6) to **10 INCH-POUNDS**.

(1) Aline ports (9) and connector (10) with servocylinder ports (11) and receptacle (12). Carefully press servovalve (5) on servocylinder (2).

(2) Install and torque four screws (6) to **10 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(3) Lockwire screws (6) in pairs. Use wire (item 222, App F).





GO TO NEXT PAGE

7.52. SERVOCYLINDER SERVOVALVE REPLACEMENT – continued

d. **Inspect (QA).**

e. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

f. **Service primary and utility hydraulic systems** (para 1.34)**.**

g. **Perform primary and utility hydraulic systems maintenance operational check** (TM 1-1520-238-T)**.**

NOTE

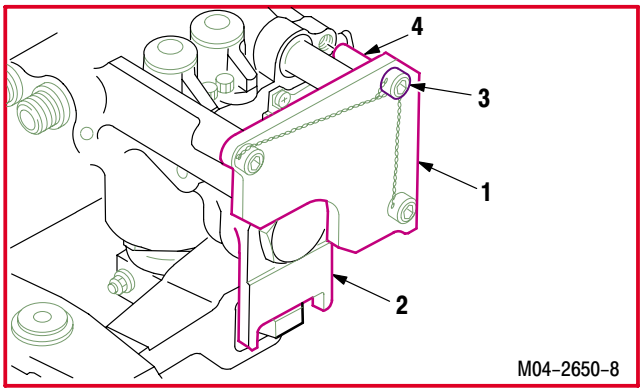
If replacing directional servocylinder, go to step h. If not, go to step j.

h. **Install armor plate (1) on servocylinder (2).** Torque three screws (3) to **75 INCH-POUNDS**.

(1) Position plate (1) and standoff (4) on servocylinder (2).

(2) Install and torque three screws (3) to **75 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(3) Lockwire screws (3) together. Use wire (item 226, App F).



i. **Inspect (QA).**

j. **Install access panel L200 (lateral servocylinder only)** (para 2.2)**.**

k. **Install access panel R200 (collective and longitudinal servocylinder only)** (para 2.2)**.**

l. **Install access fairings L540 and L546 (directional servocylinder only)** (para 2.2)**.**

END OF TASK

7.53. SERVOCYLINDER PRESSURE FILTER REPLACEMENT

7.53.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.53.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

Materials/Parts:

Backup ring (2)
Packing (2)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

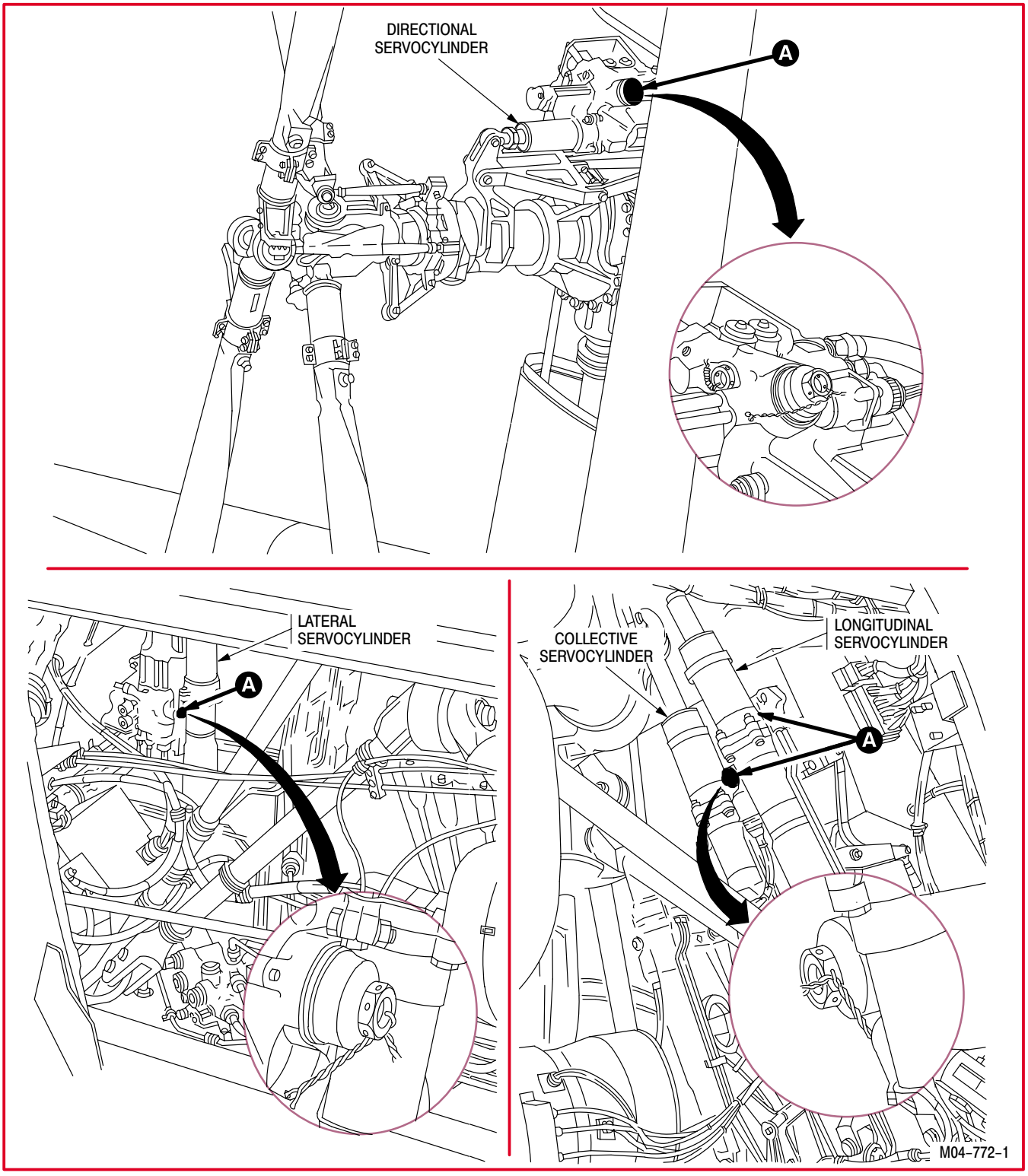
Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L540 and L546 removed (directional servocylinder only) Access panel R200 removed (collective and longitudinal servocylinders only) Access panel L200 removed (lateral servocylinder only)
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented

NOTE

This task is typical for lateral, longitudinal, collective, and directional servocylinders.

GO TO NEXT PAGE

7.53. SERVOCYLINDER PRESSURE FILTER REPLACEMENT – continued



GO TO NEXT PAGE

7.53. SERVOCYLINDER PRESSURE FILTER REPLACEMENT – continued

7.53.3. Removal

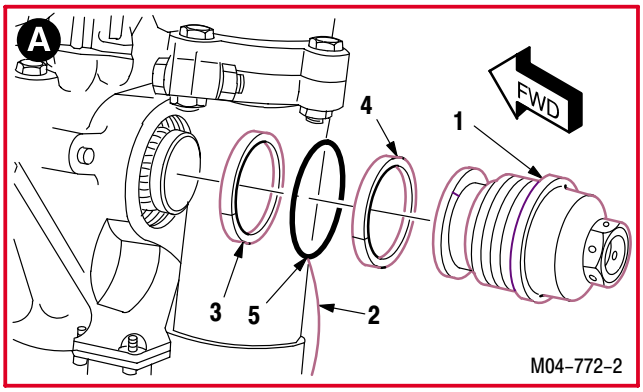
a. **Remove cap (1) from servocylinder (2).**

(1) Remove lockwire from cap (1).

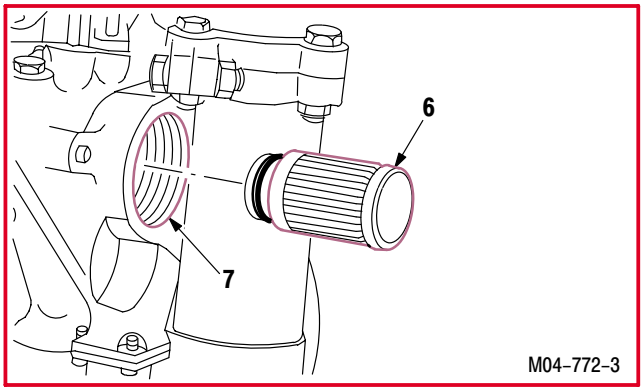
(2) Place rags under cap (1) to catch hydraulic fluid spills.

(3) Remove cap (1).

(4) Remove and discard backup rings (3) and (4) and packing (5) from cap (1).



b. **Remove and discard pressure filter (6) from cavity (7).**



7.53.4. Cleaning

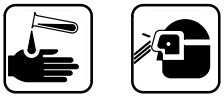
a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).

7.53.5. Inspection

a. **Check cap and cavity for stripped or damaged threads** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

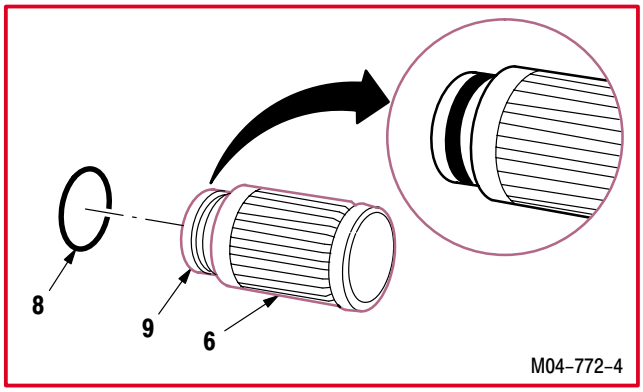
7.53.6. Installation



a. **Install new packing (8) on new filter (6).**

(1) Lubricate packing (8). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (8) in groove (9) of filter (6).



GO TO NEXT PAGE

7.53. SERVOCYLINDER PRESSURE FILTER REPLACEMENT – continued

b. **Install new packing (5) and new backup rings (3) and (4) on cap (1).**

(1) Lubricate rings (3) and (4) and packing (5). Use clean hydraulic fluid (item 92, App F).

(2) Install ring (3), packing (5), and ring (4) in groove (10) of cap (1).

c. **Install pressure filter (6) and filter cap (1) in cavity (7).** Torque cap (1) to **235 INCH-POUNDS**.

(1) Lubricate filter cap threads. Use hydraulic fluid (item 92, App F).

(2) Insert filter (6) into cavity (7).

(3) Install cap (1) on servocylinder (2).

(4) Torque cap (1) to **235 INCH-POUNDS**. Use torque wrench.

d. **Inspect (QA).**

e. **Lockwire filter cap (1) to servocylinder (2).** Use wire (item 226, App F).

f. **Inspect (QA).**

g. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

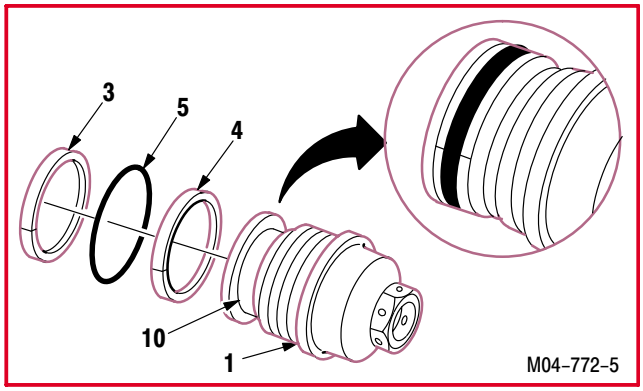
h. **Service primary and utility hydraulic system** (para 1.34)**.**

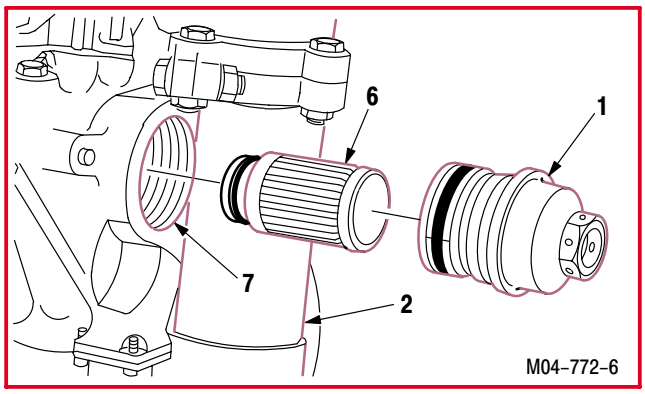
i. **Perform primary and utility hydraulic systems maintenance operational check** (TM 1-1520-238-T)**.**

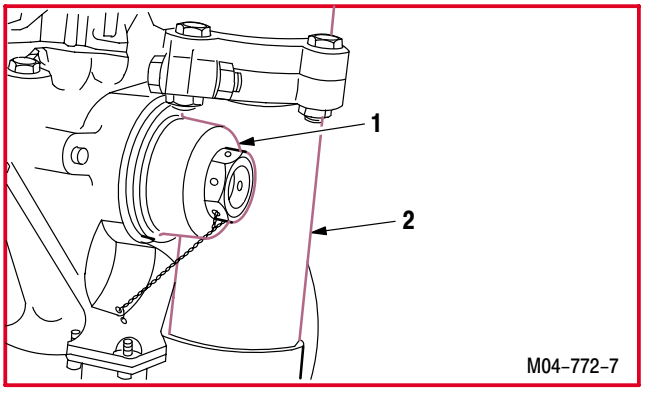
j. **Install fairings L540 and L546 (directional servocylinder only)** (para 2.2)**.**

k. **Install access panel R200 (collective and longitudinal servocylinders only)** (para 2.2)**.**

l. **Install access panel L200 (lateral servocylinder only)** (para 2.2)**.**







END OF TASK

7.54. HYDRAULIC SERVOCYLINDER NAME PLATE AND BUCS WARNING PLATE REPLACEMENT

7.54.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.54.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

Adhesive (item 6, App F)

Personnel Required:

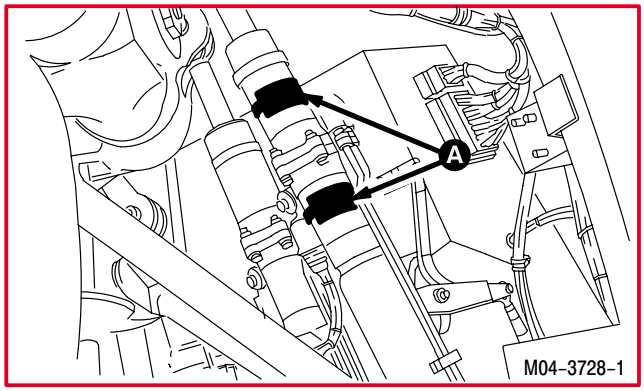
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

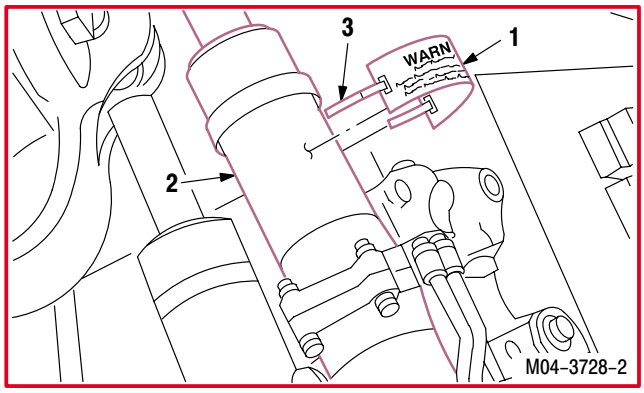
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel L200, R200, or fairing L540 removed

NOTE

This task is typical for the lateral, longitudinal, and collective servocylinder name plates and BUCS warning plates. This task is also typical for the directional servocylinder name plate.





7.54.3. Removal

a. **Remove plate (1) from servocylinder (2).**

(1) Remove and discard plate strap (3) from servocylinder (2).

(2) Remove and discard plate (1).

7.54.4. Cleaning

a. **Clean adhesive from servocylinder** (para 1.47)**.**

7.54.5. Inspection

a. **Check servocylinder for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.54. HYDRAULIC SERVOCYLINDER NAME PLATE AND BUCS WARNING PLATE REPLACEMENT – continued

7.54.6. Installation



a. **Install new plate (1) on servocylinder (2).**

(1) Pre-form plate (1) to servocylinder (2).

(2) Install one side of new plate strap (3) on plate (1).

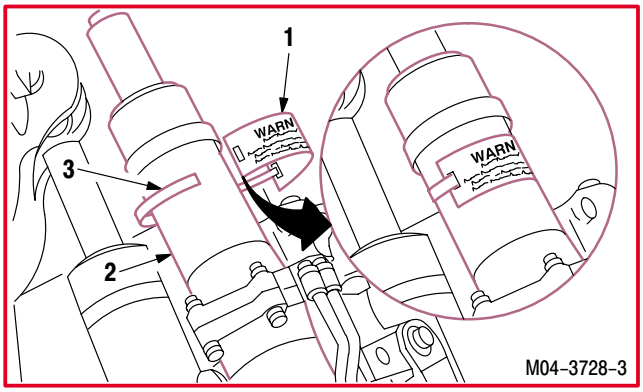
(3) Apply thin layer of adhesive on plate (1) and servocylinder (2). Use adhesive (item 6, App F).

(4) Install plate (1) on servocylinder (2).

(5) Install other side of plate strap (3) on plate (1). Trim excess length from strap (3).

(6) Hold plate (1) in place for 2 minutes.

(7) Allow **4 HOUR** cure time.



b. **Inspect (QA).**

c. **Install access panels L200, R200, or fairing L540** (para 2.2)**.**

END OF TASK

7.55. SERVOCYLINDER UNIVERSAL LINK REPLACEMENT (AVIM)

7.55.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.55.2. Initial Setup

Tools:

Airframe repairman's tool kit (item 377, App H)
Adapter (item 23, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Rivet pin gun kit (item 191, App H)
Nose (item 217, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Collar
Pin
Retaining ring
Epoxy primer coating kit (item 78, App F)

References:

TM 1-1500-204-23

NOTE

- This task is typical for the longitudinal, lateral, and collective servocylinder universal links.
- Universal links are interchangeable between the lateral and the collective servocylinders only. The longitudinal servocylinder universal link is not interchangeable with any other servocylinder universal link.

GO TO NEXT PAGE

7.55. SERVOCYLINDER UNIVERSAL LINK REPLACEMENT (AVIM) – continued

7.55.3. Removal

a. **Remove universal link (1) from servocylinder clevis (2).**

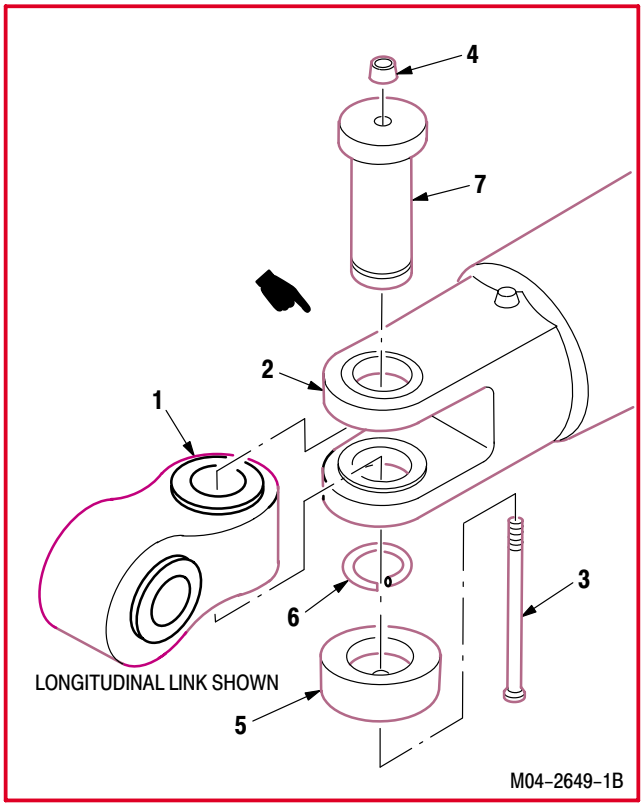
(1) Remove and discard pin (3) and collar (4) (TM 1-1500-204-23).

(2) Remove cap (5).

(3) Remove and discard retaining ring (6).

(4) Remove pin (7) from clevis (2) and link (1).

(5) Remove and discard link (1).



7.55.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

7.55.5. Inspection

a. **Check removed and attaching parts for nicks and gouges** (para 10.1)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Check universal link bushing for radial play.**

(1) Maximum radial bushing play **0.005 INCH**.

d. **Check universal link bushing for wear.**

(1) Maximum inside diameter **0.754 INCH**.

e. **Check servocylinder clevis bushing for wear.**

(1) Maximum inside diameter **0.754 INCH**.

f. **Check servocylinder pin for wear.**

(1) Minimum outer diameter **0.748 INCH**.

GO TO NEXT PAGE

7.55. SERVOCYLINDER UNIVERSAL LINK REPLACEMENT (AVIM) – continued

7.55.6. Installation



a. **Install new universal link (1) on servocylinder clevis (2).**

(1) Aline link (1) on clevis (2).

(2) Install new pin (7) through clevis (2) and link (1).

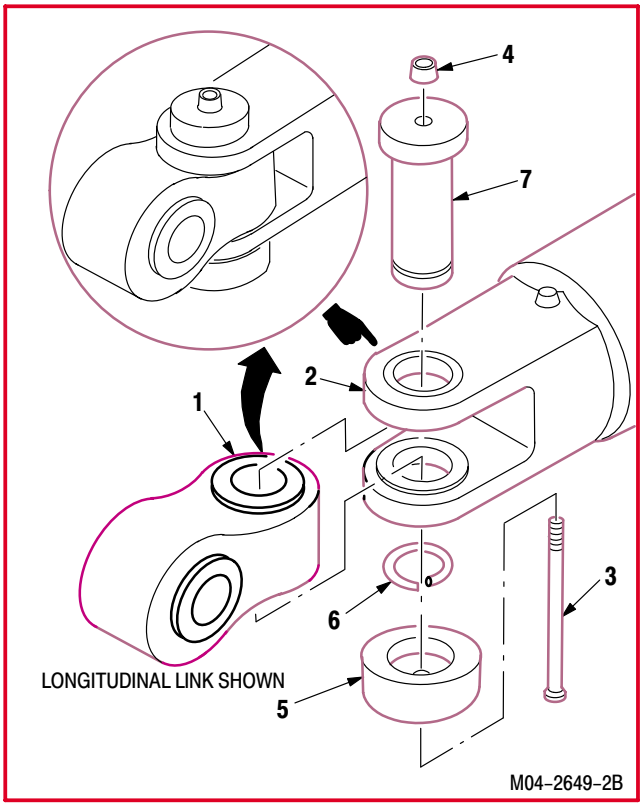
(3) Install new retaining ring (6) on pin (7).

(4) Install new cap (5) on end of pin (7).

(5) Coat new pin (3) with primer. Use epoxy primer coating kit (item 78, App F). Insert pin (3) through cap (5) and pin (7) while primer is still wet.

(6) Install new collar (4) on pin (3). Use rivet gun, adapter, and nose (TM 1-1500-204-23).

b. **Inspect (QA).**



END OF TASK

SECTION II. UTILITY HYDRAULIC SYSTEM MAINTENANCE

7.56. UTILITY HYDRAULIC SYSTEM INSPECTION

7.56.1. Description

This task covers: Inspection.

7.56.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

TM 55-1500-323-24
TM 55-1500-344-23
TM 55-1500-345-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

Personnel Required:

67R Attack Helicopter Repairer

7.56.3. Inspection

a. **Check exterior surfaces of hydraulic system components for nicks, gouges, scratches, cracks, and corrosion.**

(1) Minor scratches (without burrs or raised material) that do not penetrate through protective finish are acceptable without rework.

(2) Nicks, gouges, corrosion pits (TM 55-1500-344-23), or other minor surface damage that does not exceed a depth of **0.040 INCH** or 10 percent of material thickness, whichever is less after rework, is permissible.

(3) No burnishing is allowed within **0.75 INCH** of a bolt hole or corner.

(4) No cracks are allowed.

(5) No mating or working surface repair is allowed.

(6) Touch up removed protective finish as required (TM 55-1500-345-23).

(7) Replace component if damage exceeds repairable limits; or if damage occurs on an oil seal surface, radius, or in a hole, or on a mating or working surface of a part.

b. **Repair of internal parts is limited to removal of minor burrs, nicks, or scratches.** No repair of working or mating surfaces is allowed.

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7.56. UTILITY HYDRAULIC SYSTEM INSPECTION – continued

c. **Check for chafed, cracked, dented, nicked, and scored tubes.**

(1) Replace tube assembly if tube is deformed or if nuts and unions are damaged (para 7.113).

(2) Replace tube assembly if tube is dented more than 20 percent of tube diameter (para 7.113).

(3) Replace tube assembly if nicked or chafed more than 10 percent of tube wall thickness (para 7.113).

(4) Install screws until mating rubber cushions just make contact when reinstalling rubber cushioned tubing clamp blocks.

d. **Check for chafed, deteriorated, cut, frayed, and cracked hoses.** Replace damaged or worn hoses.

e. **Check for loose, broken, and cracked clamps.** Replace damaged clamps.

f. **Check utility hydraulic manifold reservoir fluid level. Service as required** (para 1.34)**.**

g. **Check and replace contaminated strainers** (para 7.69)**.**

h. **Check nitrogen gas charge in pneumatic accumulator as indicated on utility ground service panel. Service as required** (para 1.36)**.**

i. **Check for leaks.** No external leakage allowed except at servocylinder rod ends and at the cylinder mating flange of directional and main rotor servocylinders. Perform the following to determine if leakage is excessive:

(1) Slight wetting at seals or signs of fluid insufficient to form a drop is considered seepage or residual fluid and is not external leakage.

(2) Wipe servocylinder clean of any fluid at rod end, weep hole, or mating flange.

(3) Operate flight controls through a minimum of 25 full-stroke cycles with hydraulic systems pressurized to 3000 psi (with ground power or APU operating).

(4) Leakage at the rod end or at the weep hole shall not exceed 1 drop in 25 cycles; leakage at the mating flange shall not exceed 2 drops in 25 cycles.

NOTE

The double rod seal at the mating flange of the servocylinders is in a ‘‘floating’’ gland which moves slightly when the servocylinder is cycled. This results in a pumping action which produces a ‘‘breathing’’ of fluid at the mating flange. This ‘‘breathing’’ of fluid is not to be considered leakage.

(5) Utility hydraulic pump seal drain maximum seepage: 5 drops in 3 minutes.

(6) When external servocylinder leakage is observed on aircraft standing idle for any length of time, wipe servocylinder and clean up any fluid spillage. Perform hydraulic systems maintenance operational check (MOC) and inspect for dynamic seal leaks [reference steps i.(1) through i.(4)]. Static leakage is allowed and is not cause for servocylinder removal.

GO TO NEXT PAGE

7.56. UTILITY HYDRAULIC SYSTEM INSPECTION – continued

j. **Check fittings for crossed, burred, and stripped threads when hoses and tubes are disconnected.** Cap or plug all disconnected fittings. Plug all open ports. Replace all packings and seals on fittings to be used again. To indicate exact location, identify ends before disconnecting lines and hoses.

k. **Check general mounting hardware for cracks, gouges, nicks, scratches, chafing, damage, rounded flats, and stripped or damaged threads.** Replace damaged hardware.

l. **Check electrical connectors for:**

(1) Foreign objects and corroded, bent, broken, loose, or missing pins (TM 55-1500-323-24).

(2) Dirt, contamination with fluids, or rough locking action (TM 55-1500-323-24).

m. **Check wire harness for chafing and loose installation** (TM 55-1500-323-24)**.**

n. **If a pump is known to have operated without fluid 5 minutes or more:**

(1) Replace pump.

(2) Remove and check pressure strainer element for metallic particles (para 7.69).

o. **Check utility hydraulic manifold air check valve for cleanliness of filter.** If filter is contaminated, install new filter (para 7.160).

END OF TASK

7.57. VENT UTILITY HYDRAULIC SYSTEM

7.57.1. Description

This task covers: Vent Utility Hydraulic System.

7.57.2. Initial Setup

Tools:

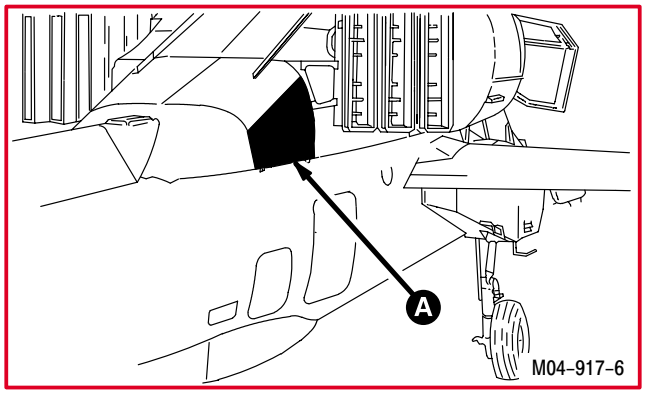
Aircraft mechanic's tool kit (item 376, App H)
14-quart utility pail (item 222, App H)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened



GO TO NEXT PAGE

7.57. VENT UTILITY HYDRAULIC SYSTEM – continued

7.57.3. Vent Utility Hydraulic System

a. **Vent utility manifold (1).**

(1) Push and hold relief valve button (2) until sound of escaping air stops.

(2) Release button (2).

b. **Secure access door R325** (para 2.2)**.**

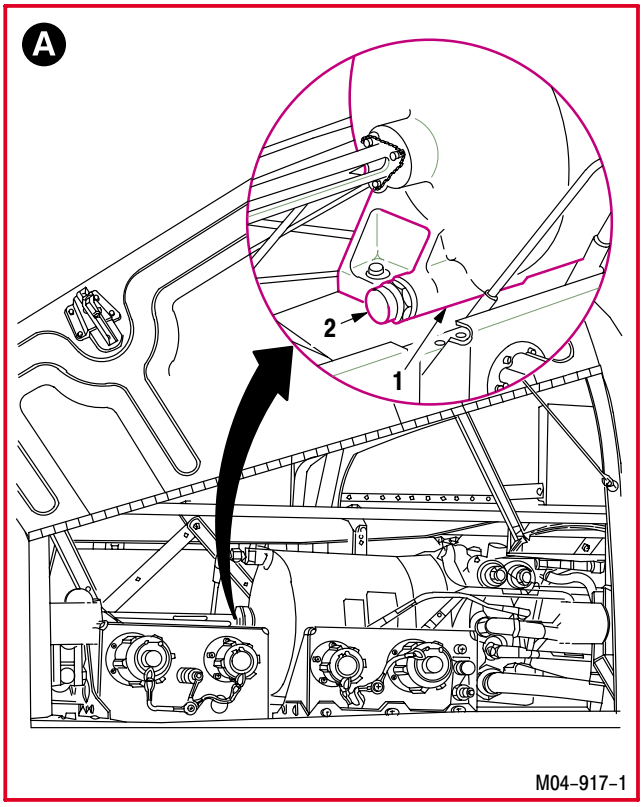
NOTE

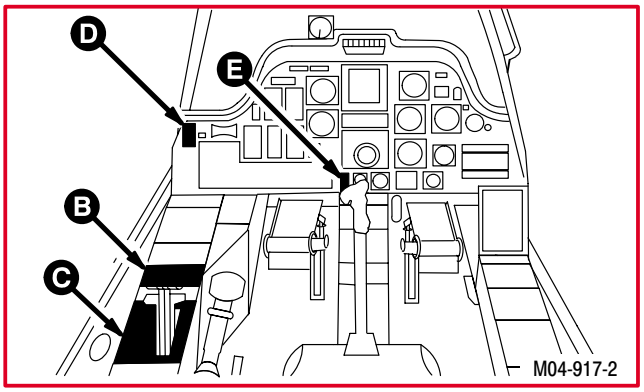
Excess hydraulic fluid will vent from lower right side of fuselage when **EMERG HYD** switch is activated. To catch fluid, place pail under drain before setting of **EMERG HYD** switch.

c. **Vent accumulator by activating emergency hydraulic system.**

(1) Connect battery (para 9.40).

(2) Enter pilot station (para 1.56). **Observe all safety precautions.**



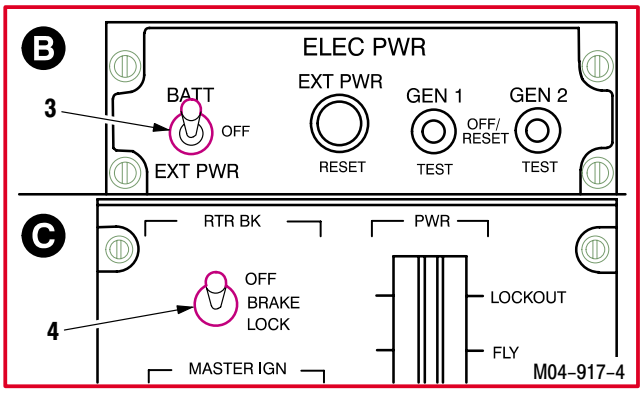


GO TO NEXT PAGE

7.57. VENT UTILITY HYDRAULIC SYSTEM – continued

(3) Set **BATT/EXT PWR** switch (3) to **BATT**.

(4) Set **RTR BK** switch (4) to **OFF**.



(5) Set **TAIL WHEEL** switch (5) to **UNLOCK**.

(6) Set **EMERG HYD** switch (6) to **EMERG HYD**.

WARNING

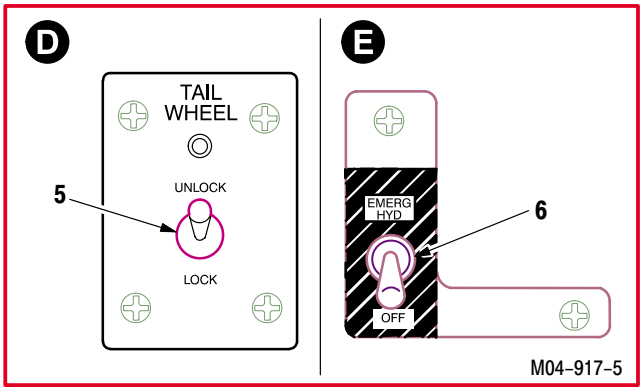
To prevent injury, ensure all personnel are clear of flight controls before moving flight controls. If injury occurs, seek medical aid.

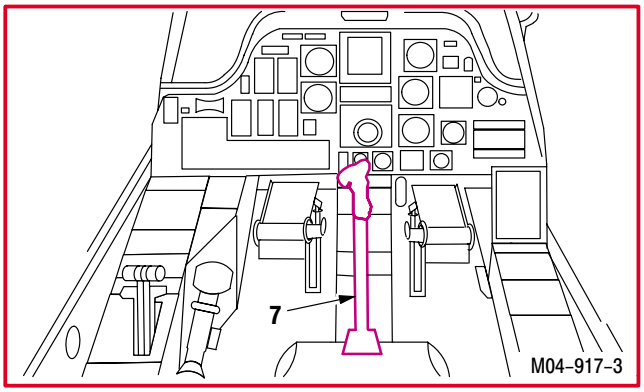
(7) Move pilot cyclic stick (7) until resistance is felt.

(8) Set **EMERG HYD** switch (6) to **OFF**.

(9) Set **BATT/EXT PWR** switch (3) to **OFF**.

(10) Disconnect battery (para 9.40).





END OF TASK

7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION

7.58.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.58.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
5/16 x 3/8-inch drive box end torque wrench adapter (item 12, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 74, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

Materials/Parts:

Gasket
Packing (5)
Grease (item 88, App F)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1500-204-23
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed
7.3	Utility hydraulic system vented

7.58.3. Removal

a. **Remove tube (1) from utility hydraulic pump (2) and bracket (3).**

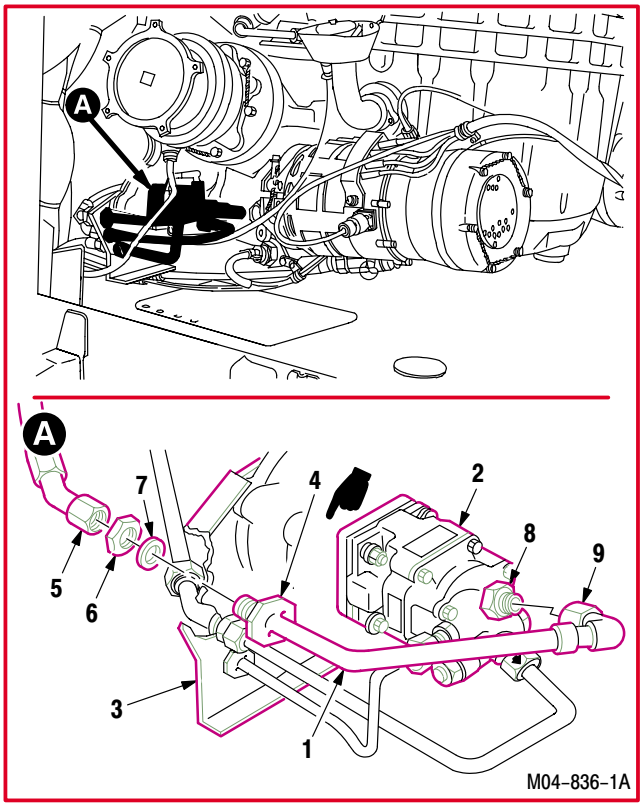
(1) Place rags under pump (2) to catch hydraulic fluid spills.

(2) Hold union (4). Remove nut (5). Use crowfoot and open end wrench.

(3) Hold union (4). Remove nut (6) and washer (7). Use open end wrench.

(4) Hold reducer (8). Remove nut (9). Use open end wrench.

(5) Remove tube (1).



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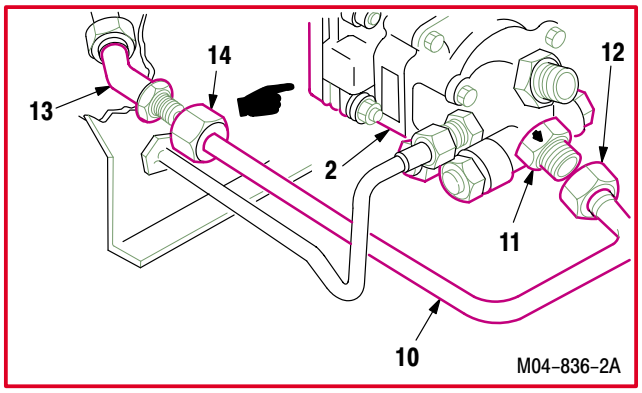
7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

b. **Remove tube (10) from pump (2).**

(1) Hold check valve (11). Remove nut (12).

(2) Hold elbow (13). Remove nut (14).

(3) Remove tube (10).



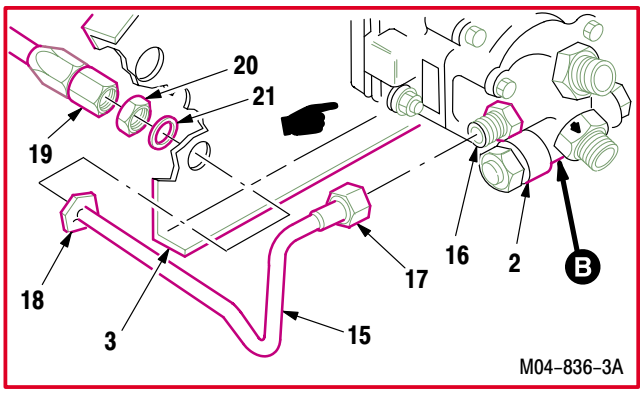
c. **Remove tube (15) from pump (2) and bracket (3).**

(1) Hold nipple (16). Remove nut (17).

(2) Hold union (18). Remove nut (19).

(3) Hold union (18). Remove nut (20) and washer (21).

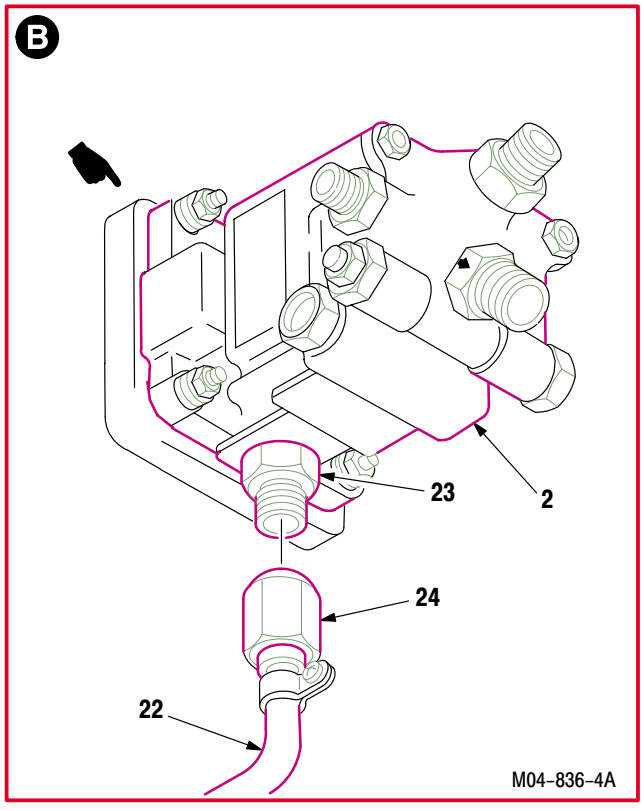
(4) Remove tube (15).



d. **Remove hose (22) from pump (2).**

(1) Hold nipple (23). Remove nut (24).

(2) Remove hose (22).



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7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

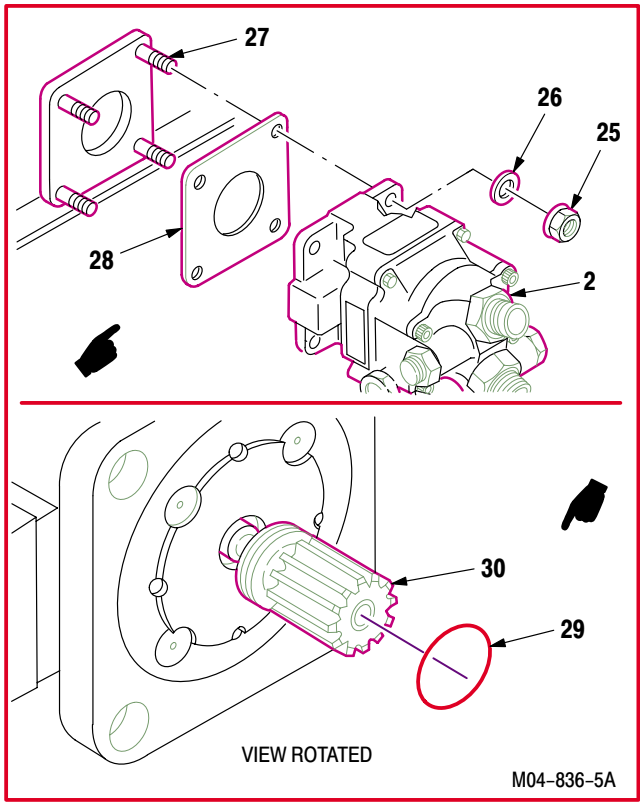
e. **Remove pump (2).**

(1) Remove four nuts (25) and washers (26) from mounting studs (27). Use torque wrench adapter.

(2) Pull pump (2) straight off studs (27).

(3) Remove and discard gasket (28).

f. **Remove and discard packing (29) from pump shaft (30).**



NOTE

Perform steps g. thru i. off helicopter if removing pump for replacement. Go to paragraph 7.58.4 if removing pump for reinstallation.

g. **Remove nipples (16) and (23) from pump (2).**

(1) Remove nipples (16) and (23).

(2) Remove and discard packings (31) and (32).

h. **Remove reducer (8) from pump (2).**

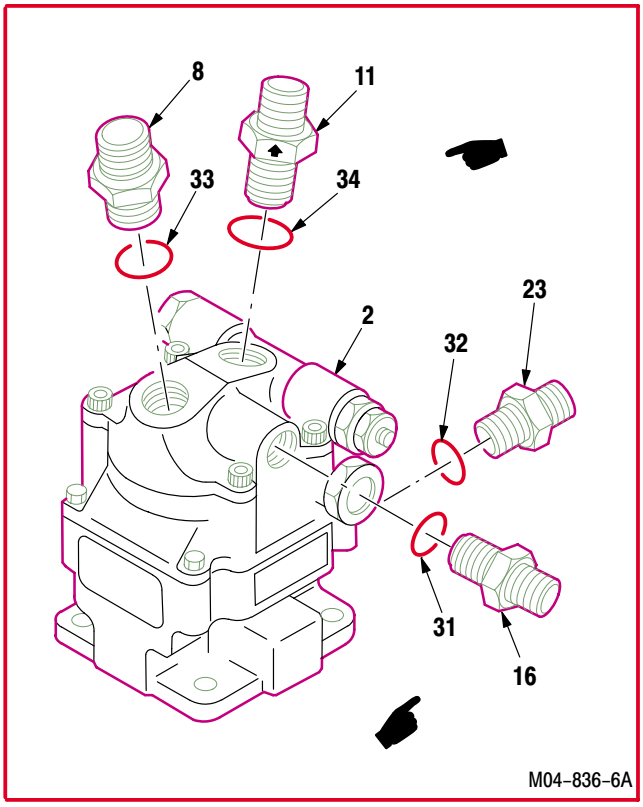
(1) Remove reducer (8). Use open end wrench.

(2) Remove and discard packing (33).

i. **Remove check valve (11) from pump (2).**

(1) Remove check valve (11).

(2) Remove and discard packing (34).



GO TO NEXT PAGE

7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

7.58.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.58.5. Inspection

a. **Check tubes, hoses, and studs for nicks, cuts, chafing, and stripped threads** (para 7.56)**.**

b. **Check reducer, check valve, and nipples for stripped threads and rounded flats** (TM 1-1500-204-23)**.**

c. **Check pump for stripped threads and worn splines on pump shaft.** None allowed.

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

e. **Check pump for missing or damaged hardware.** None allowed.

f. **Check pump for cracks.** None allowed.

g. **Check pump for chipped or broken housing.** None allowed.

h. **Check pump for evidence of overheating.** None allowed.

i. **Check pump for broken or missing lockwire.** None allowed.

j. **Check pump for damaged threaded inserts.** None allowed.

k. **Check pump for leakage between case halves.** None allowed.

l. **Check pump packing grooves for nicks, gouges, scratches, and burrs.** None allowed.

m. **Check pump for chipped or broken gear teeth.** None allowed.

n. **Check pump mounting flange holes.** Maximum diameter allowed is **0.289 INCH**.

GO TO NEXT PAGE

7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

7.58.6. Installation

NOTE

Steps a. thru c. will be performed off helicopter when installing a new pump. Go to step d. if original pump is to be reinstalled.



a. **Install check valve (11) on pump (2).**

(1) Lubricate new packing (34) and threads of check valve (11). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (34) on inlet side (see flow arrow) of check valve (11).

(3) Install check valve (11) with flow arrow pointing away from hydraulic pump (2).

b. **Install reducer (8) on pump (2).**

(1) Lubricate new packing (33) and threads of reducer (8). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (33) on small side of reducer (8).

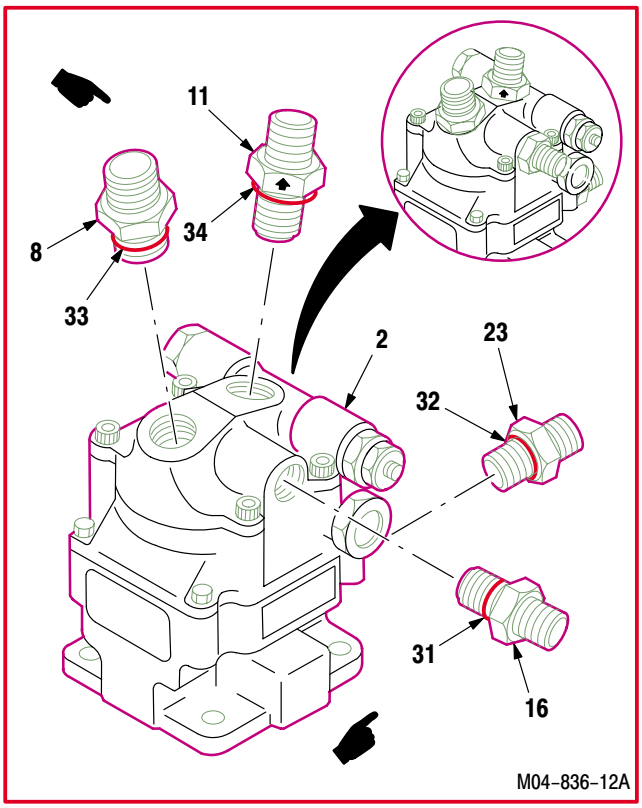
(3) Install reducer (8). Use open end wrench.

c. **Install nipples (16) and (23) on pump (2).**

(1) Lubricate new packings (31) and (32), and threads of nipples (16) and (23). Use clean hydraulic fluid (item 92, App F).

(2) Install packings (31) and (32) on nipples (16) and (23).

(3) Install nipples (16) and (23).



GO TO NEXT PAGE

7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

d. **Install new packing (29) on pump shaft (30).**

(1) Lubricate packing (29). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (29) on pump shaft (30).

(3) Lubricate pump shaft (30) splines. Use grease (item 88, App F).

e. **Install pump (2) and new gasket (28) on studs (27).**

(1) Install gasket (28) on studs (27).

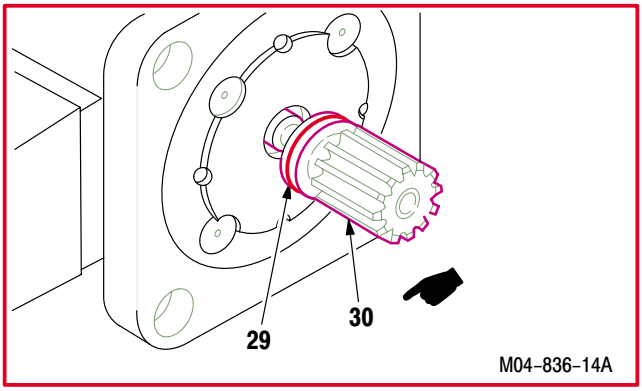
(2) Install pump (2) on four studs (27) with nipple (16) facing outboard.

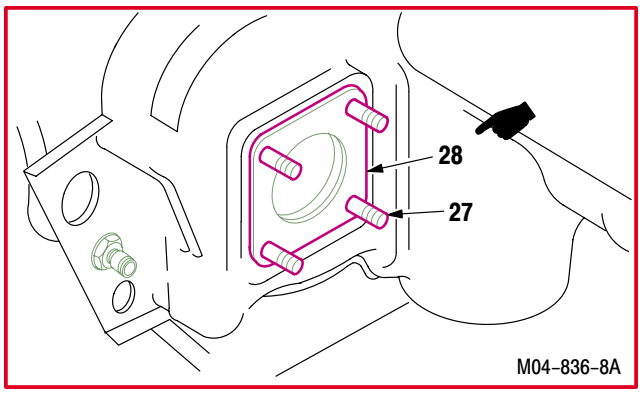
(3) Install four washers (26) and nuts (25) on studs (27). Use torque wrench adapter.

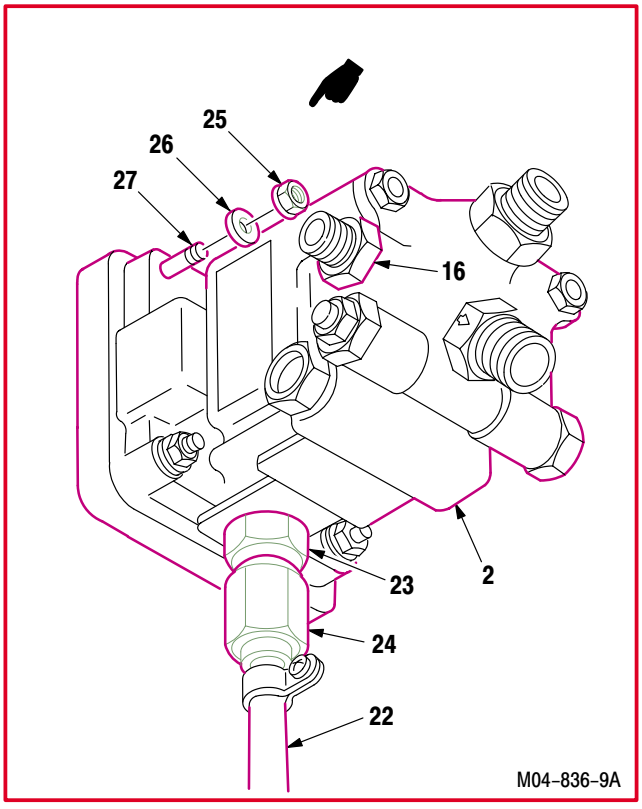
f. **Install hose (22) on nipple (23).**

(1) Lubricate threads on nipple (23). Use clean hydraulic fluid (item 92, App F).

(2) Hold nipple (23). Install nut (24).







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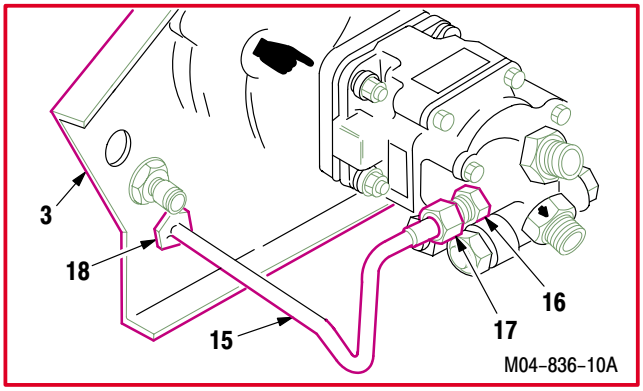
7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

g. **Install tube (15) on nipple (16) and bracket (3).**

(1) Insert union (18) through hole in bracket (3).

(2) Lubricate threads on nipple (16). Use clean hydraulic fluid (item 92, App F).

(3) Hold nipple (16). Install nut (17).

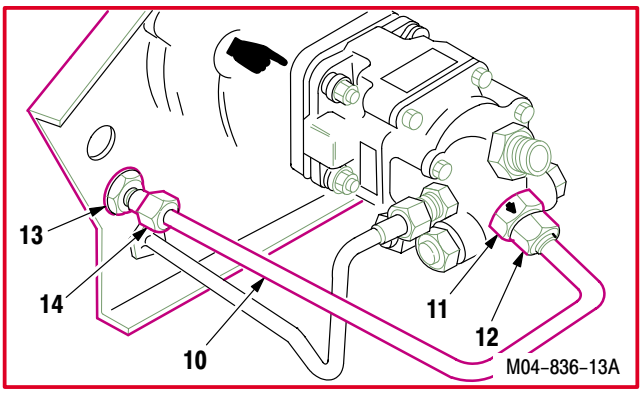


h. **Install tube (10) on elbow (13) and check valve (11).**

(1) Lubricate threads on elbow (13) and check valve (11). Use clean hydraulic fluid (item 92, App F).

(2) Hold elbow (13). Install nut (14) on elbow (13).

(3) Hold check valve (11). Install nut (12).

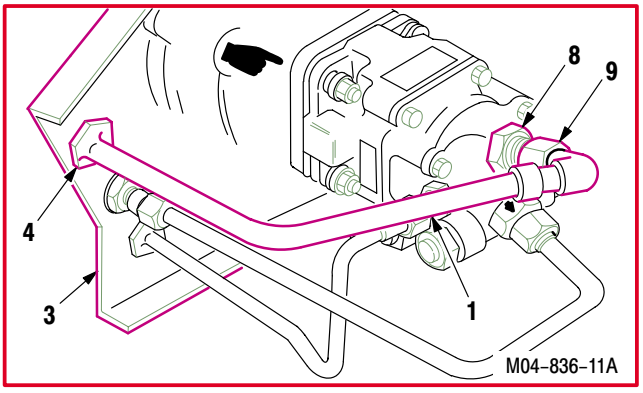


i. **Install tube (1) on reducer (8) and bracket (3).**

(1) Insert union (4) through hole in bracket (3).

(2) Lubricate threads on reducer (8). Use clean hydraulic fluid (item 92, App F).

(3) Hold reducer (8). Install nut (9) on reducer (8). Use open end wrench.



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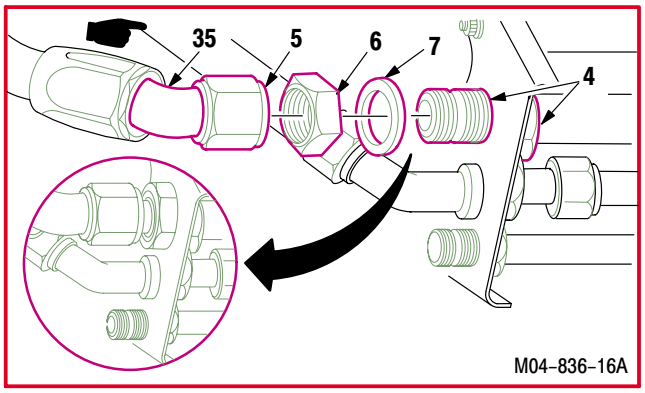
7.58. UTILITY HYDRAULIC PUMP REMOVAL/INSTALLATION – continued

j. **Install hose (35) on union (4).**

(1) Lubricate threads of union (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (4). Install washer (7) and nut (6). Use crowfoot and open end wrench.

(3) Hold union (4). Install nut (5). Use open end wrench.

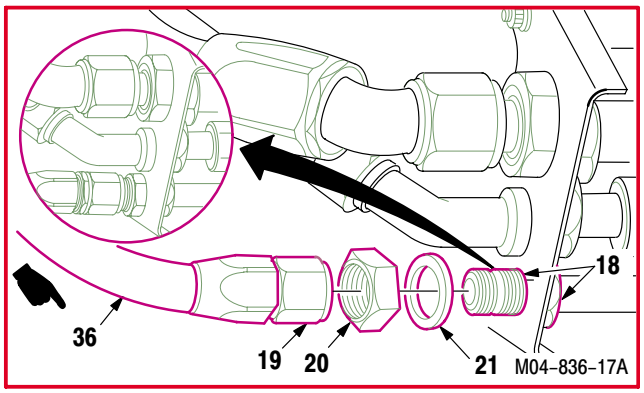


k. **Install hose (36) on union (18).**

(1) Lubricate threads of union (18). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (18). Install washer (21) and nut (20).

(3) Hold union (18). Install nut (19).



l. **Inspect (QA).**

m. **Bleed utility hydraulic system** (para 1.35)**.**

n. **Service utility hydraulic system** (para 1.34)**.**

o. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

p. **Install access panel R200** (para 2.2)**.**

END OF TASK

7.59. UTILITY HYDRAULIC PUMP PRESSURE HOSE REPLACEMENT

7.59.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.59.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

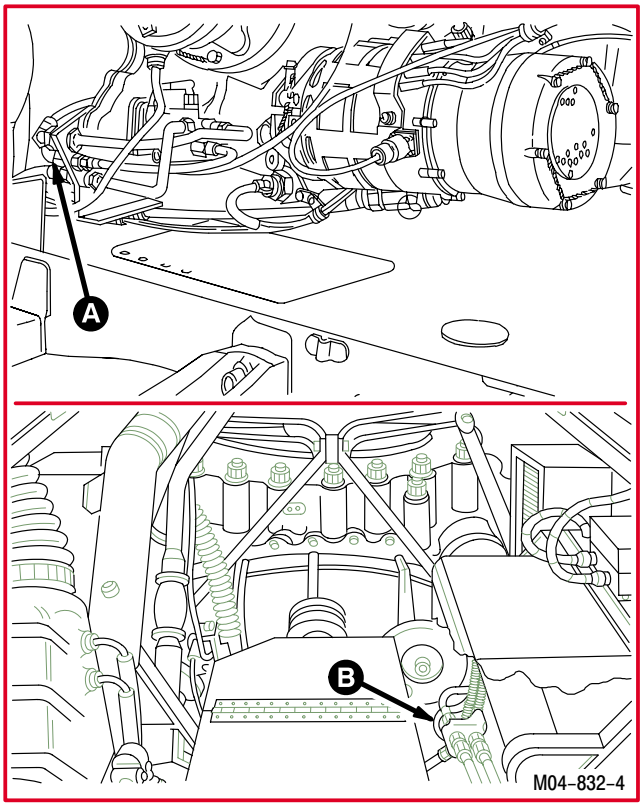
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel R200 removed
7.57	Utility hydraulic system vented

Materials/Parts:

Hydraulic fluid (item 92, App F)



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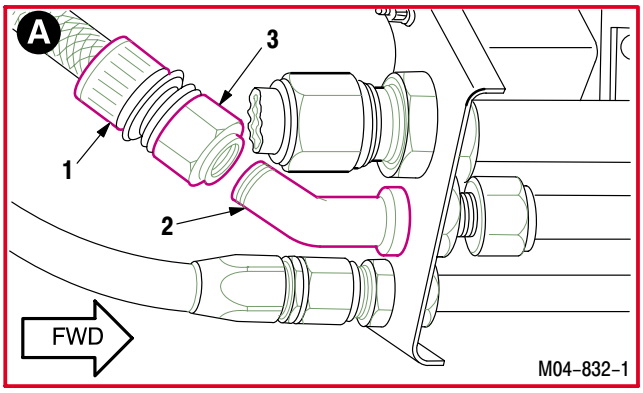
7.59. UTILITY HYDRAULIC PUMP PRESSURE HOSE REPLACEMENT – continued

7.59.3. Removal

a. **Remove utility hydraulic pump pressure hose (1) from elbow (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

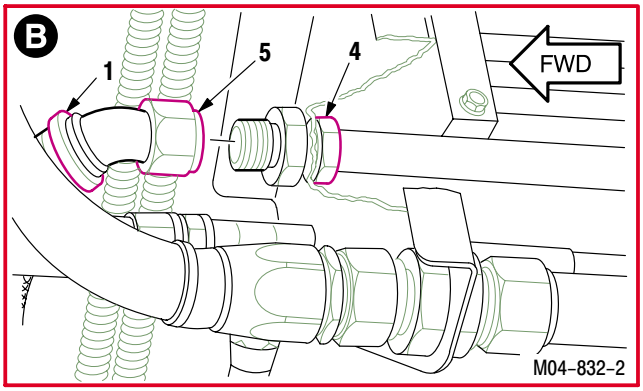
(2) Hold elbow (2). Remove nut (3).



b. **Remove hose (1) from union (4).**

(1) Hold union (4). Remove nut (5).

(2) Remove and discard hose (1).



7.59.4. Cleaning

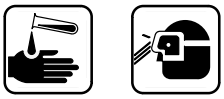
a. **Wipe attaching parts with a clean rag.**

7.59.5. Inspection

a. **Check tubes, hoses, unions, and elbow for nicks, cuts, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.59.6. Installation



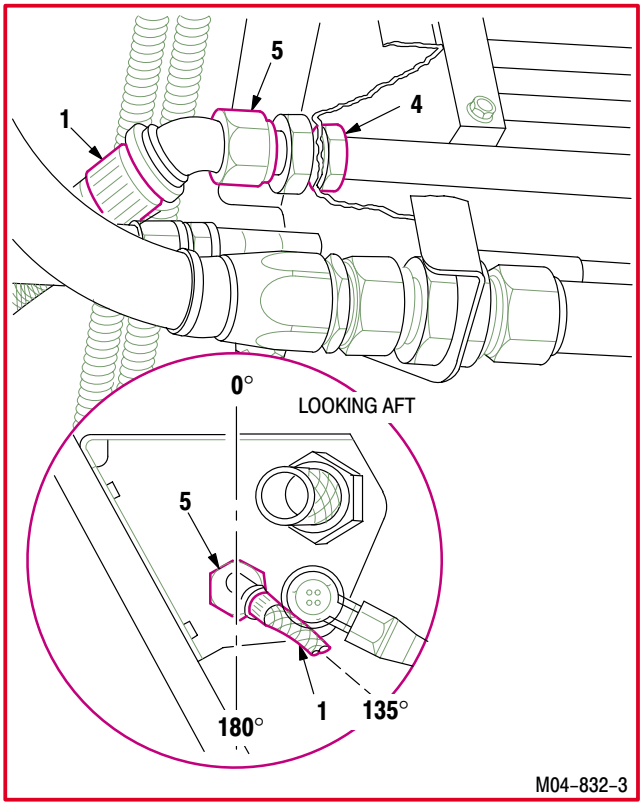
a. **Install new hose (1) on union (4).**

(1) Lubricate threads on union (4). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (5) fingertight on union (4).

(3) Aline hose (1) to 135 degrees.

(4) Hold union (4). Tighten nut (5).



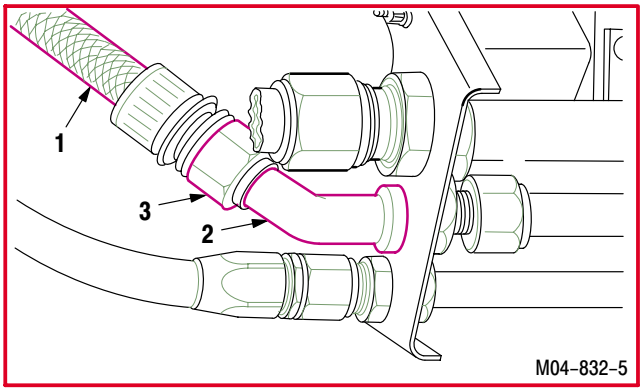
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7.59. UTILITY HYDRAULIC PUMP PRESSURE HOSE REPLACEMENT – continued

b. **Install hose (1) on elbow (2).**

(1) Lubricate threads of elbow (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold elbow (2). Install nut (3).



c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel R200** (para 2.2)**.**

END OF TASK

7.60. UTILITY HYDRAULIC PUMP RETURN HOSE REPLACEMENT

7.60.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.60.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/16 & 1 1/4-inch open end wrench (item 416, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

Materials/Parts:

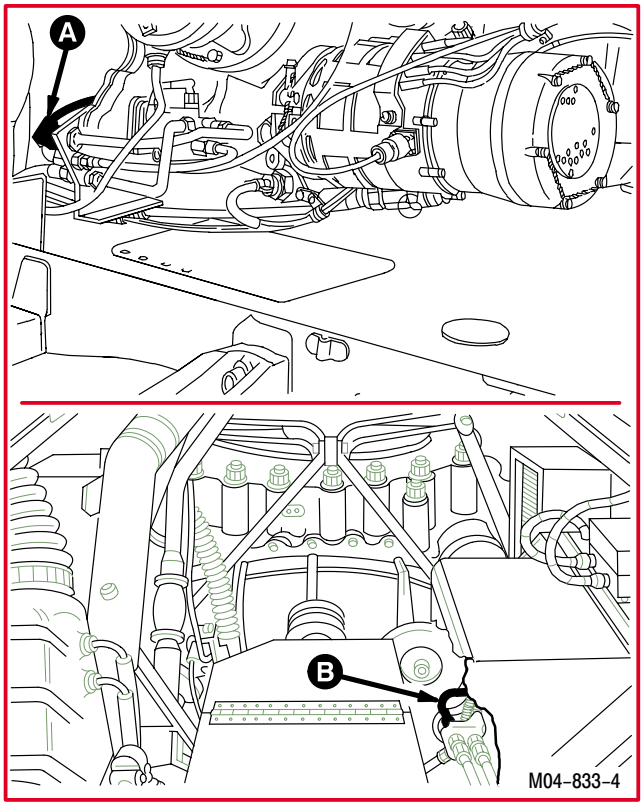
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel R200 removed
7.57	Utility hydraulic system vented



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7.60. UTILITY HYDRAULIC PUMP RETURN HOSE REPLACEMENT – continued

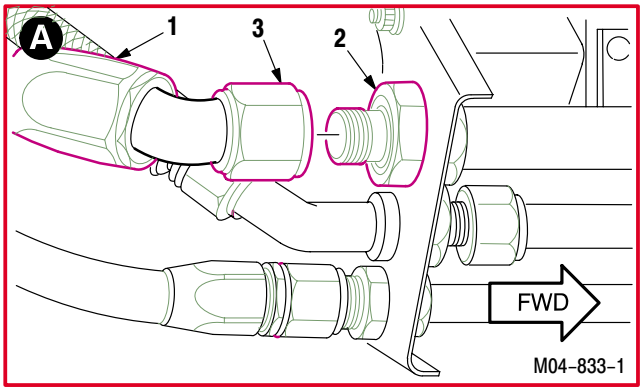
7.60.3. Removal

a. **Remove utility hydraulic pump return hose (1) from union (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

(2) Hold union (2). Use open end wrench.

(3) Remove nut (3). Use open end wrench.

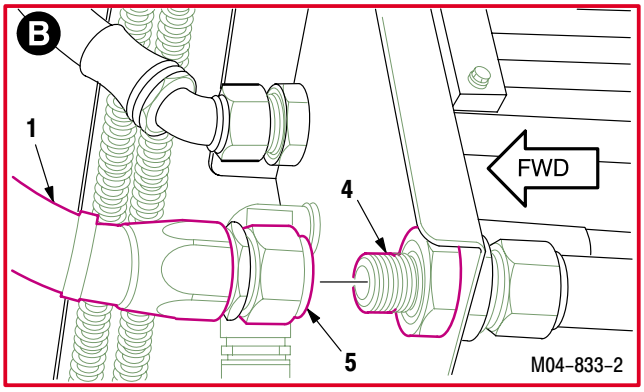


b. **Remove hose (1) from union (4).**

(1) Hold union (4). Use open end wrench.

(2) Remove nut (5). Use open end wrench.

(3) Remove and discard hose (1).



7.60.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.60.5. Inspection

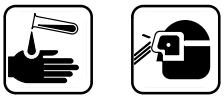
a. **Check tubes, hoses, and unions for nicks, scratches, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.60. UTILITY HYDRAULIC PUMP RETURN HOSE REPLACEMENT – continued

7.60.6. Installation



a. **Install hose (1) on union (4).**

(1) Lubricate threads of union (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (4). Use open end wrench.

(3) Install nut (5) on union (4). Use open end wrench.

b. **Install hose (1) on union (2).**

(1) Lubricate threads of union (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (2). Use open end wrench.

(3) Install nut (3) on union (2). Use open end wrench.

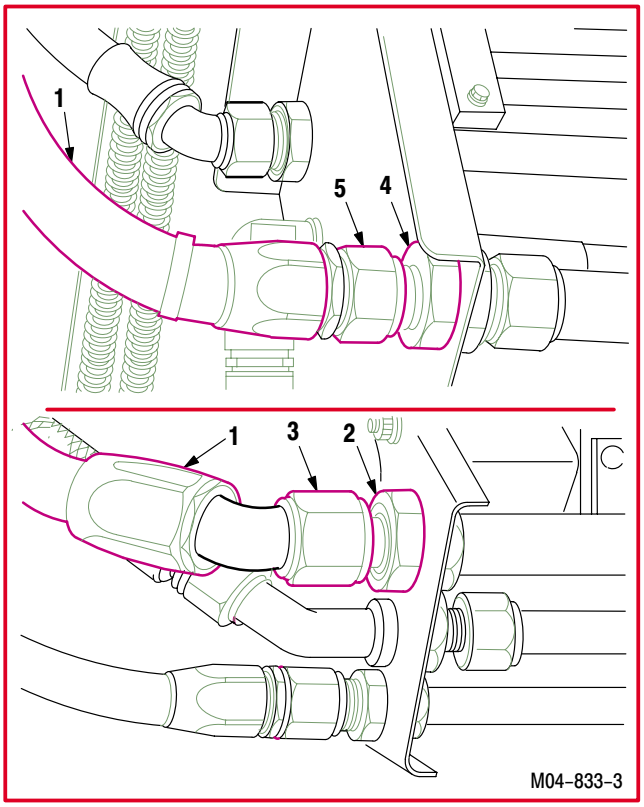
c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel R200** (para 2.2)**.**



END OF TASK

7.61. UTILITY HYDRAULIC PUMP CASE DRAIN HOSE REPLACEMENT

7.61.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.61.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

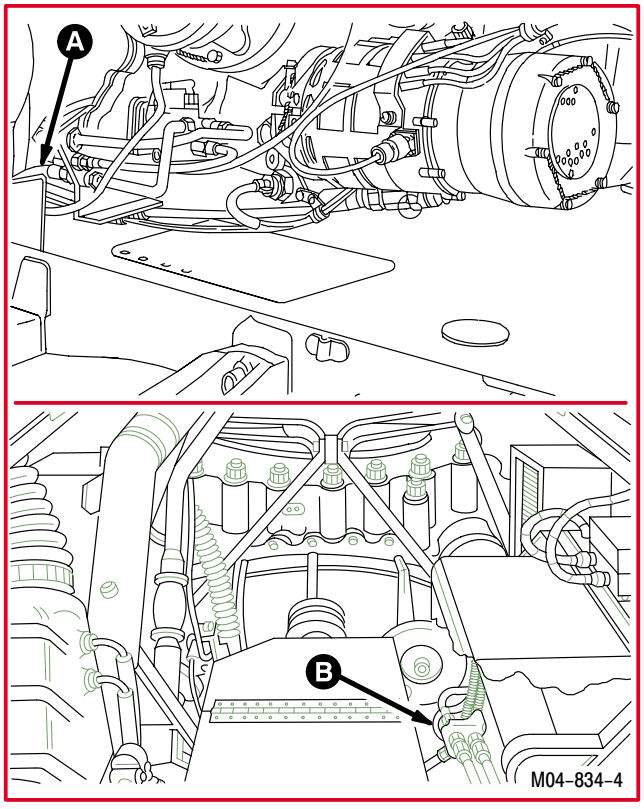
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; panel R200 removed
7.57	Utility hydraulic system vented



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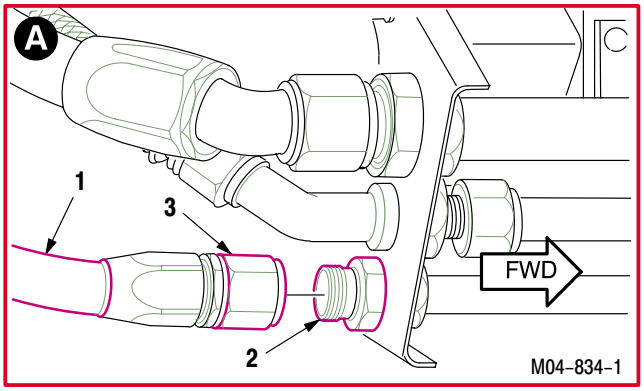
7.61. UTILITY HYDRAULIC PUMP CASE DRAIN HOSE REPLACEMENT – continued

7.61.3. Removal

a. **Remove utility hydraulic pump case drain hose (1) from union (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

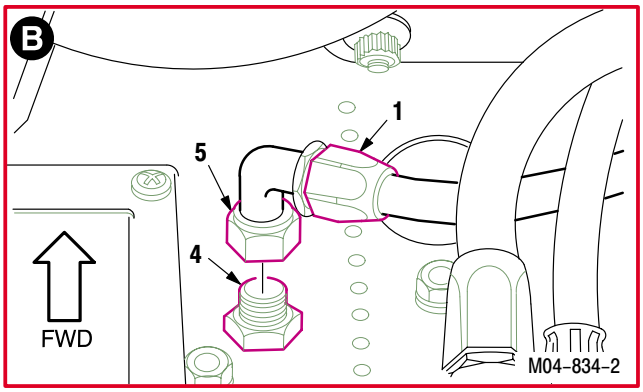
(2) Hold union (2). Remove nut (3).



b. **Remove hose (1) from union (4).**

(1) Hold union (4). Remove nut (5).

(2) Remove and discard hose (1).



7.61.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.61.5. Inspection

a. **Check hoses and unions for nicks, scratches, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.61. UTILITY HYDRAULIC PUMP CASE DRAIN HOSE REPLACEMENT – continued

7.61.6. Installation



a. **Install new hose (1) on union (4).**

(1) Lubricate threads of union (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (4). Install nut (5).

b. **Install hose (1) on union (2).**

(1) Lubricate threads of union (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (2). Install nut (3).

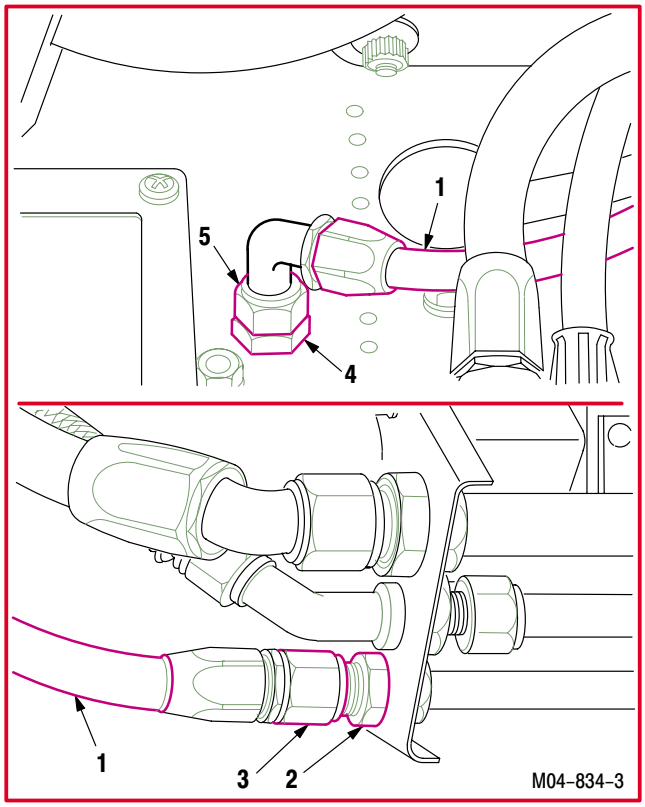
c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325; install panel R200** (para 2.2)**.**



END OF TASK

7.62. UTILITY HYDRAULIC PUMP SEAL DRAIN HOSE REPLACEMENT

7.62.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.62.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed

7.62.3. Removal

a. **Remove utility hydraulic pump seal drain hose (1) from nipple (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

(2) Hold nipple (2). Remove nut (3).

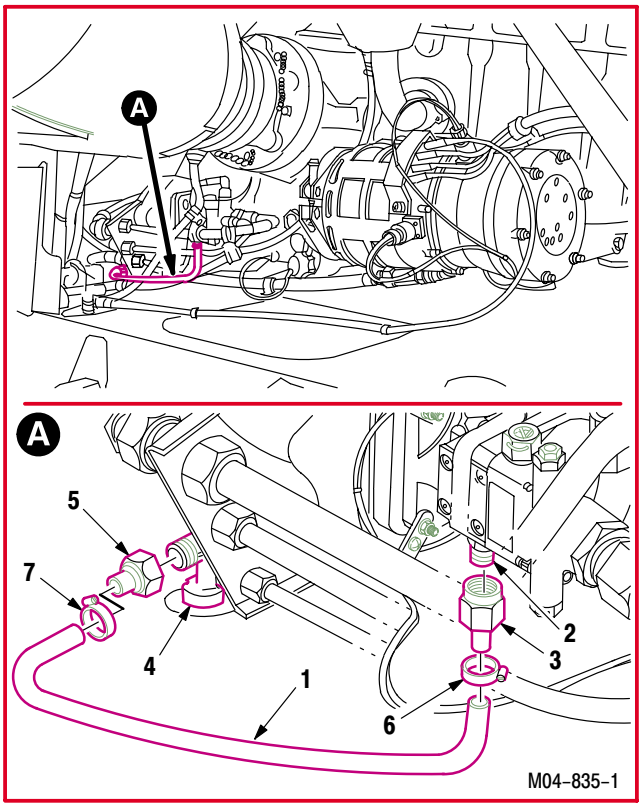
b. **Remove hose (1) from tee fitting (4).**

(1) Remove nut (5).

c. **Remove hose (1) from nuts (3) and (5).**

(1) Remove clamps (6) and (7).

(2) Discard hose (1).



GO TO NEXT PAGE

7.62. UTILITY HYDRAULIC PUMP SEAL DRAIN HOSE REPLACEMENT – continued

7.62.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.62.5. Inspection

a. **Check nipple and tee fitting for nicks, scratches, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.62.6. Installation

a. **Install new hose (1) on nuts (3) and (5).**

(1) Install clamps (6) and (7).



b. **Install hose (1) on nipple (2).**

(1) Lubricate threads on nipple (2). Use hydraulic fluid (item 92, App F).

(2) Hold nipple (2). Install nut (3).

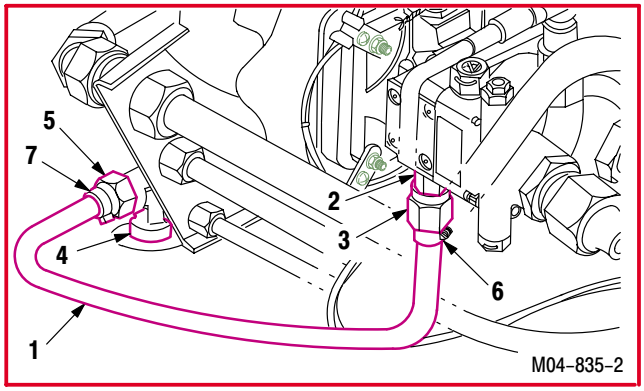
c. **Install hose (1) on tee (4).**

(1) Lubricate threads on tee (4). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (5) on tee (4).

d. **Inspect (QA).**

e. **Install access panel R200** (para 2.2)**.**



END OF TASK

7.63. UTILITY HYDRAULIC PUMP TUBING SUPPORT BRACKET REMOVAL/INSTALLATION

7.63.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.63.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 74, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

Materials/Parts:

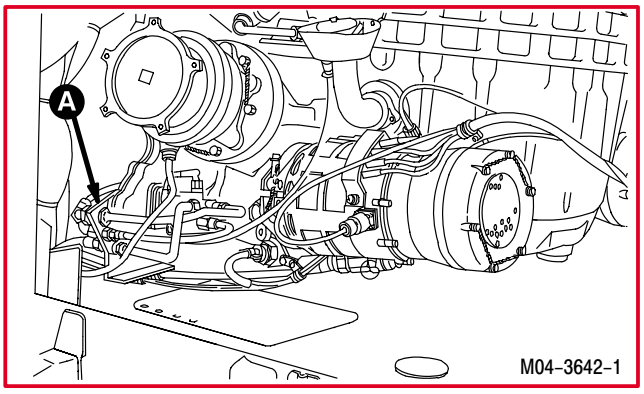
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access panel R200 removed
7.57	Utility hydraulic system vented

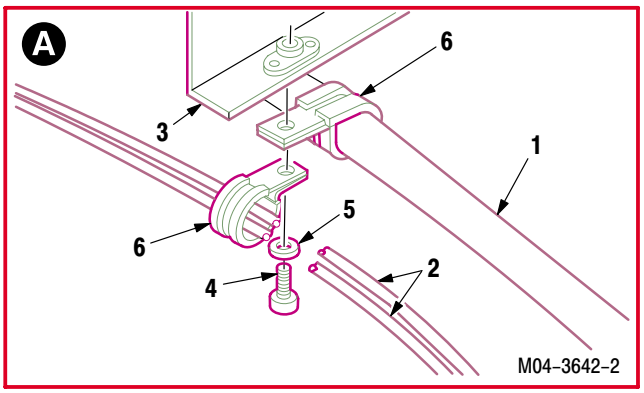


7.63.3. Removal

a. **Remove hose (1) and wires (2) from bracket (3).**

(1) Remove screw (4) and washer (5) from two clamps (6) and bracket (3).

(2) Push hose (1) and wires (2) from bracket (3).



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7.63. UTILITY HYDRAULIC PUMP TUBING SUPPORT BRACKET REMOVAL/INSTALLATION – continued

b. **Remove return hose (7) from union (8).**

(1) Place rags under bracket (3) to catch hydraulic fluid spills.

(2) Hold union (8). Use crowfoot.

(3) Remove nut (9). Use open end wrench.

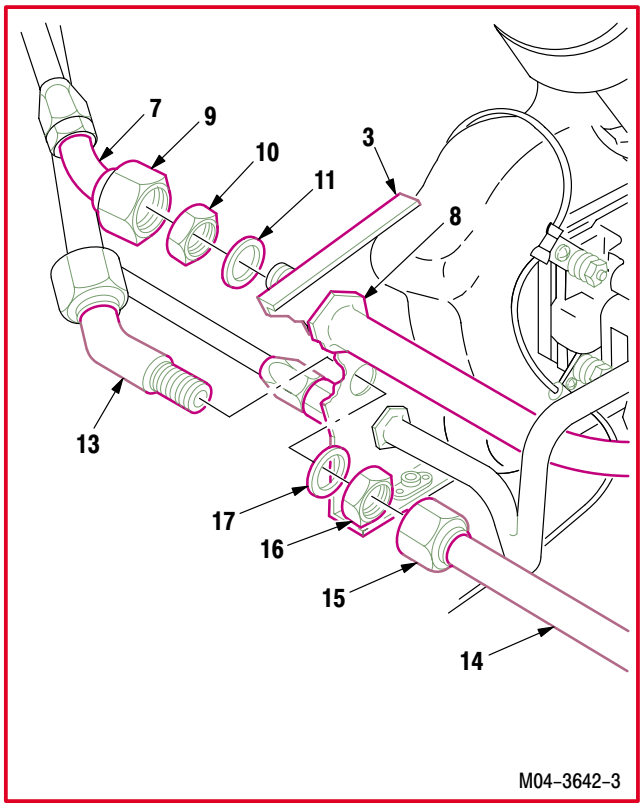
(4) Remove nut (10) and washer (11). Use open end wrench.

c. **Remove elbow (13) from tube (14).**

(1) Hold elbow (13). Remove nut (15).

(2) Remove nut (16) and washer (17).

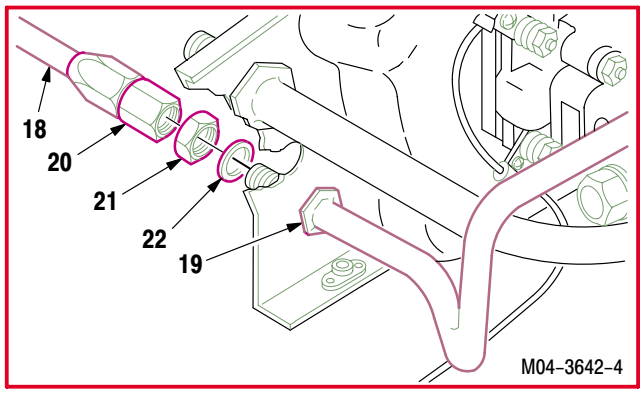
(3) Remove elbow (13) from bracket (3).



d. **Remove drain hose (18) from union (19).**

(1) Hold union (19). Remove nut (20).

(2) Remove nut (21) and washer (22).



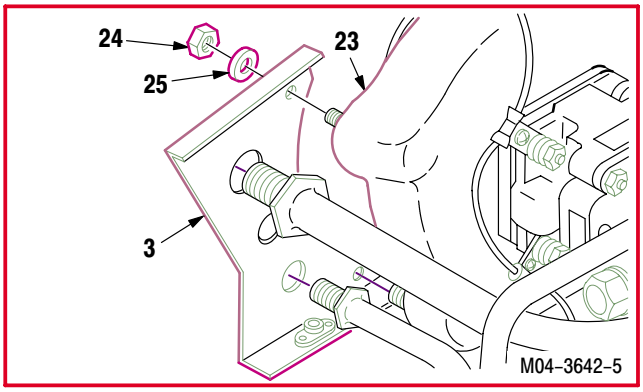
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7.63. UTILITY HYDRAULIC PUMP TUBING SUPPORT BRACKET REMOVAL/INSTALLATION – continued

e. **Remove bracket (3) from transmission (23).**

(1) Remove two nuts (24) and washers (25).

(2) Remove bracket (3).



7.63.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.63.5. Inspection

a. **Check hoses and tubes for nicks, cuts, chafing, and stripped or damaged threads** (para 10.1)**.**

b. **Check nuts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 10.1)**.**

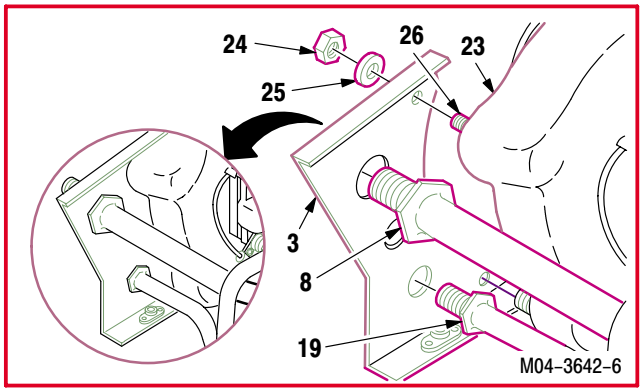
c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.63.6. Installation

a. **Install bracket (3) on transmission (23).**

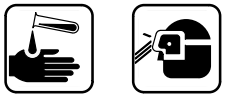
(1) Aline bracket (3) on posts (26) and unions (8) and (19).

(2) Install two washers (25) and nuts (24) on posts (26).



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7.63. UTILITY HYDRAULIC PUMP TUBING SUPPORT BRACKET REMOVAL/INSTALLATION – continued



b. **Install hose (18) on union (19).**

(1) Hold union (19). Install washer (22) and nut (21).

(2) Lubricate threads of union (19). Use clean hydraulic fluid (item 92, App F).

(3) Hold union (19). Install nut (20).

c. **Install elbow (13) on bracket (3).**

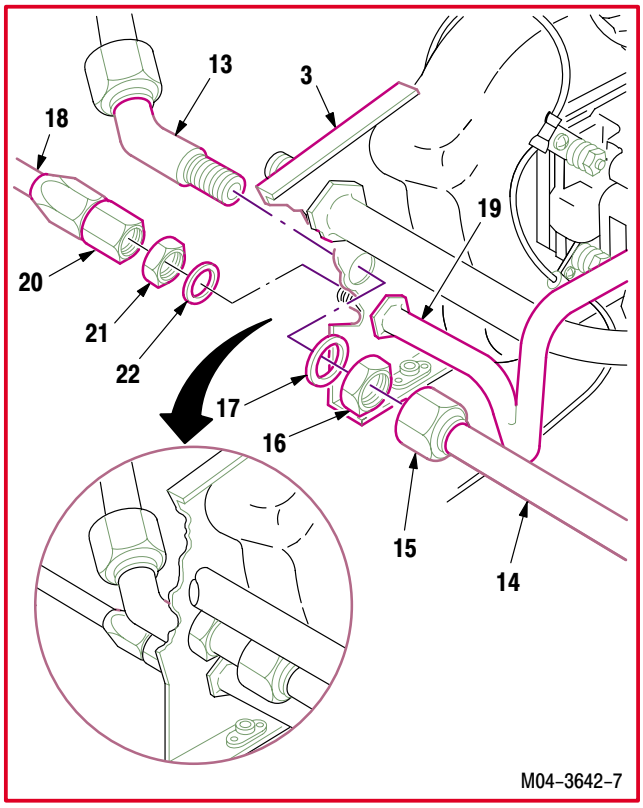
(1) Insert elbow (13) through bracket (3).

(2) Hold elbow (13). Install washer (17) and nut (16).

d. **Install tube (14) on elbow (13).**

(1) Lubricate threads of elbow (13). Use clean hydraulic fluid (item 92, App F).

(2) Hold elbow (13). Install nut (15).



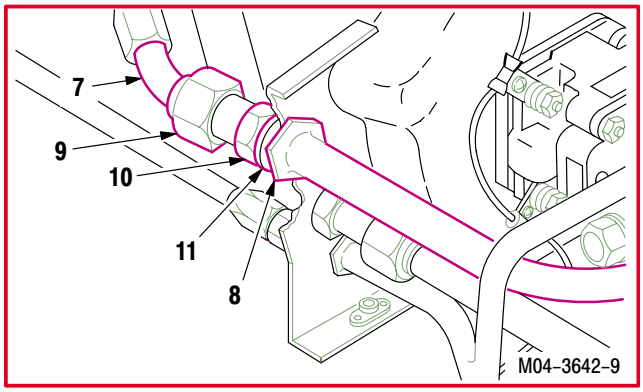
e. **Install hose (7) on union (8).**

(1) Hold union (8). Use crowfoot.

(2) Install washer (11) and nut (10). Use open end wrench.

(3) Lubricate threads of union (8). Use clean hydraulic fluid (item 92, App F).

(4) Hold union (8). Install nut (9). Use open end wrench.



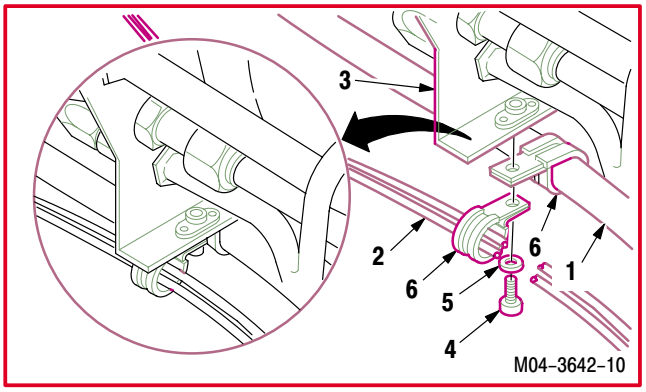
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7.63. UTILITY HYDRAULIC PUMP TUBING SUPPORT BRACKET REMOVAL/INSTALLATION – continued

f. **Install hose (1) and wires (2) on bracket (3).**

(1) Aline two clamps (6) with bracket (3).

(2) Install screw (4) and washer (5) through two clamps (6) to bracket (3).



g. **Inspect (QA).**

h. **Bleed utility hydraulic system** (para 1.35)**.**

i. **Service utility hydraulic system** (para 1.34)**.**

j. **Perform hydraulic leak check** (para 7.2)**.**

k. **Install access panel R200** (para 2.2)**.**

END OF TASK

7.64. UTILITY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION

7.64.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.64.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/2 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 72, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

References:

TM 1-1520-238-T

Materials/Parts:

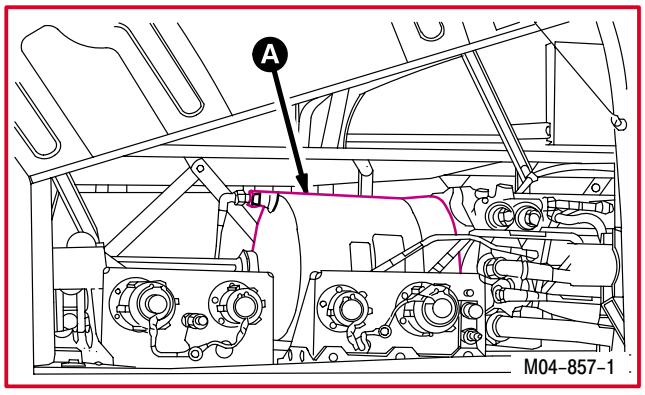
Filter
Damping fluid (item 69, App F)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

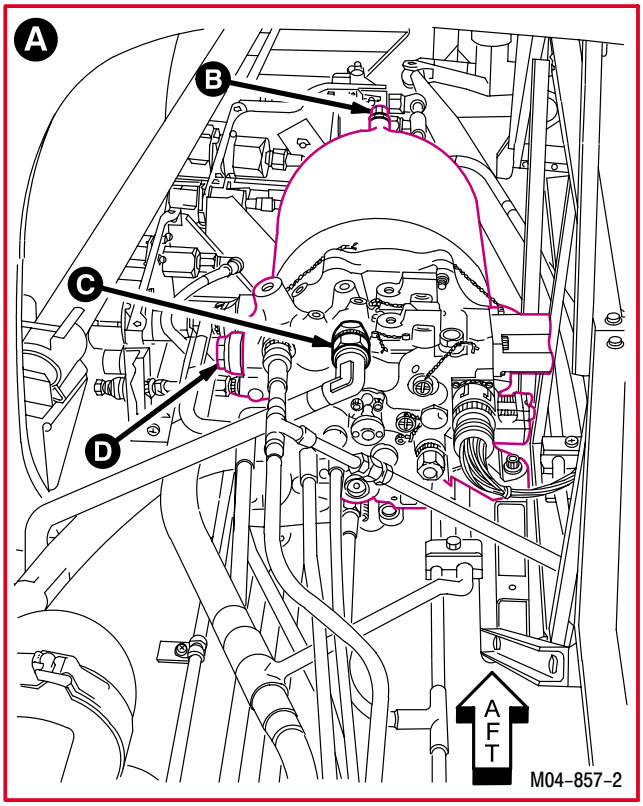
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, L325, and R325 opened; fairing T355 removed
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented



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7.64. UTILITY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued



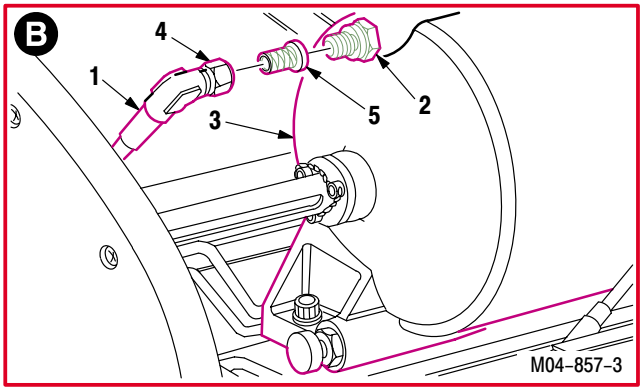
7.64.3. Removal

a. **Remove tube (1) from air check valve (2).**

(1) Place rags around utility hydraulic manifold (3) to catch hydraulic fluid spills.

(2) Hold check valve (2). Remove nut (4).

(3) Remove and discard filter (5).



b. **Detach connector P238 (6) from receptacle (HP2)J1 (7).**

c. **Remove tube (8) from adapter (9).**

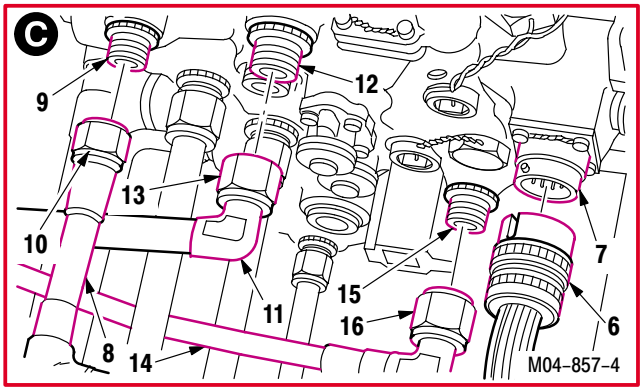
(1) Remove nut (10).

d. **Remove tube (11) from adapter (12).**

(1) Remove nut (13).

e. **Remove tube (14) from adapter (15).**

(1) Remove nut (16).



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7.64. UTILITY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

f. **Remove tube (17) from adapter (18).**

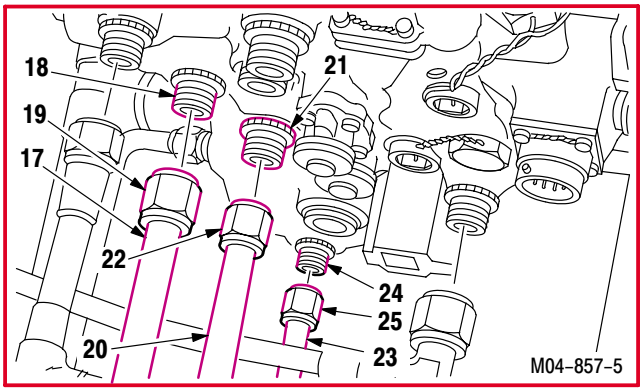
(1) Remove nut (19).

g. **Remove tube (20) from adapter (21).**

(1) Remove nut (22).

h. **Remove tube (23) from adapter (24).**

(1) Remove nut (25).



i. **Remove tube (26) from adapter (27).**

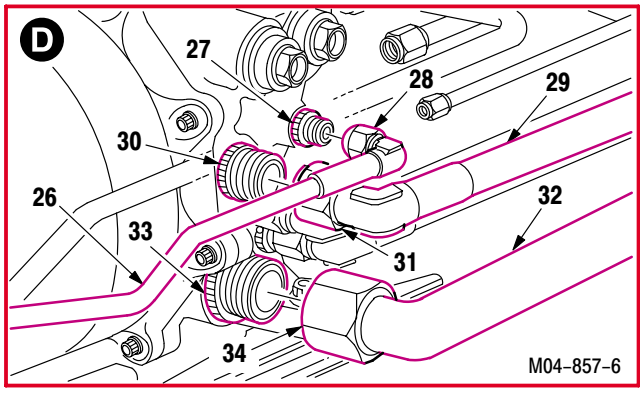
(1) Remove nut (28).

j. **Remove tube (29) from adapter (30).**

(1) Remove nut (31).

k. **Remove tube (32) from adapter (33).**

(1) Remove nut (34). Use crowfoot.

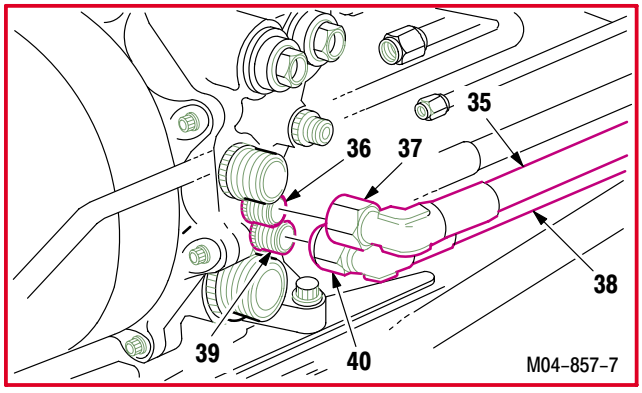


l. **Remove tube (35) from adapter (36).**

(1) Remove nut (37).

m. **Remove tube (38) from adapter (39).**

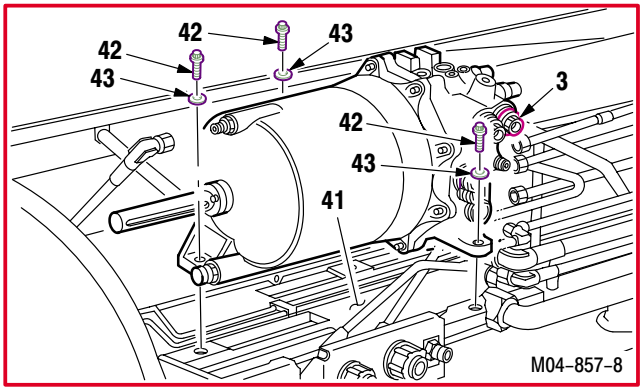
(1) Remove nut (40).



n. **Remove manifold (3) from transmission deck (41).**

(1) Remove three bolts (42) and washers (43).

(2) Carefully lift manifold (3) around nearby components.



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7.64. UTILITY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

7.64.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.64.5. Inspection

a. **Check manifold, check valve, and adapters for stripped or damaged threads** (para 7.56)**.**

b. **Check tubes for chafing and stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

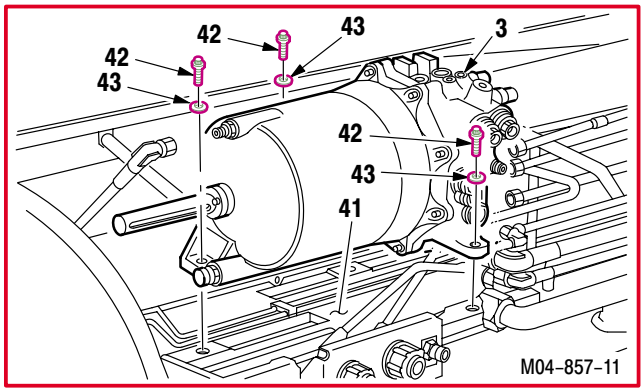
7.64.6. Installation

a. **Install manifold (3) on transmission deck (41).** Torque three bolts (42) to **120 INCH-POUNDS**.

(1) Carefully guide manifold (3) in place around nearby components.

(2) Install three bolts (42) and washers (43).

(3) Torque three bolts (42) to **120 INCH-POUNDS**. Use torque wrench.



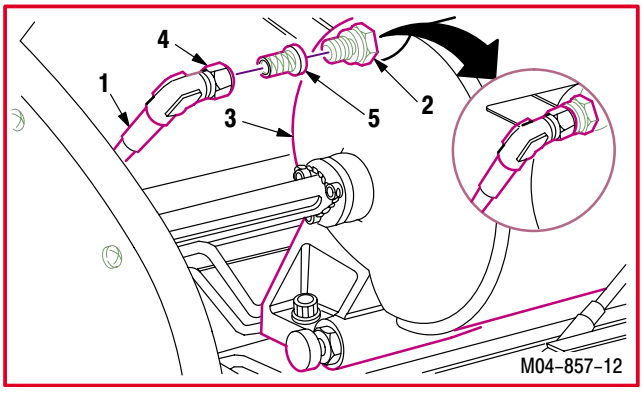
b. **Install new filter (5) in tube (1).**



c. **Install tube (1) on check valve (2).**

(1) Lubricate threads of check valve (2). Use damping fluid (item 69, App F).

(2) Hold check valve (2). Install nut (4).



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7.64. UTILITY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

d. **Install tube (38) on adapter (39).**

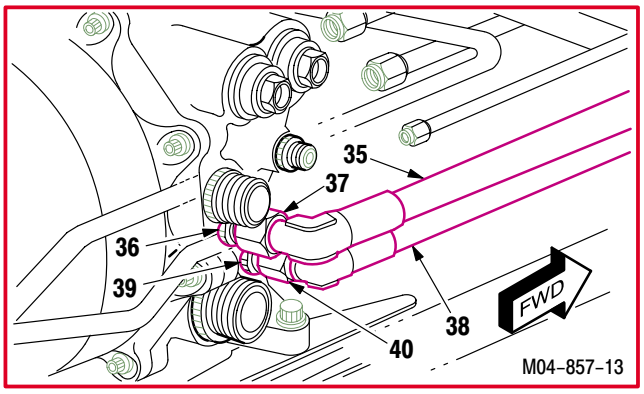
(1) Lubricate threads of adapter (39). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (40) on adapter (39).

e. **Install tube (35) on adapter (36).**

(1) Lubricate threads of adapter (36). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (37) on adapter (36).



f. **Install tube (32) on adapter (33).**

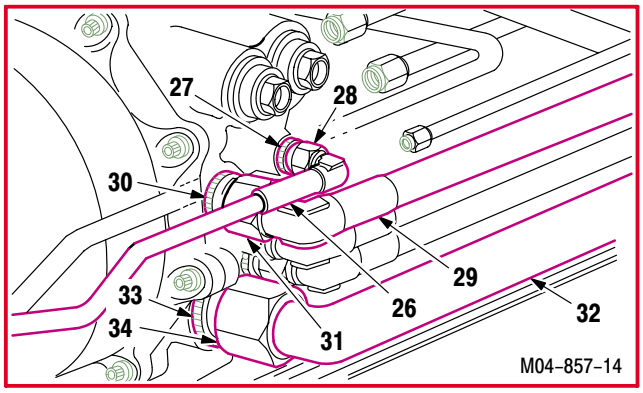
(1) Lubricate threads of adapter (33). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (34) on adapter (33). Use crowfoot.

g. **Install tube (29) on adapter (30).**

(1) Lubricate threads of adapter (30). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (31) on adapter (30). Use crowfoot.



h. **Install tube (26) on adapter (27).**

(1) Lubricate threads of adapter (27). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (28) on adapter (27).

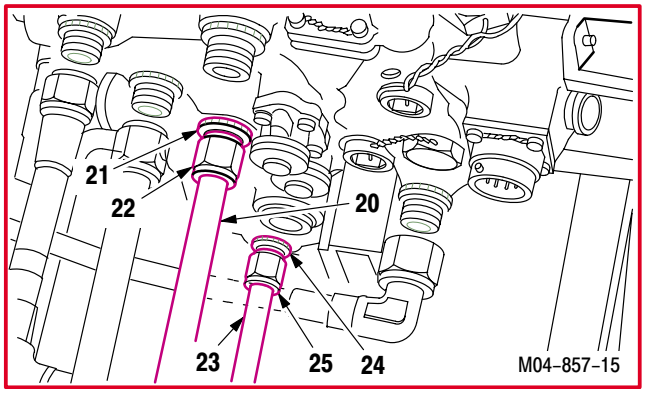
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7.64. UTILITY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

i. **Install tube (20) on adapter (21).**

(1) Lubricate threads of adapter (21). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (22) on adapter (21).



j. **Install tube (23) on adapter (24).**

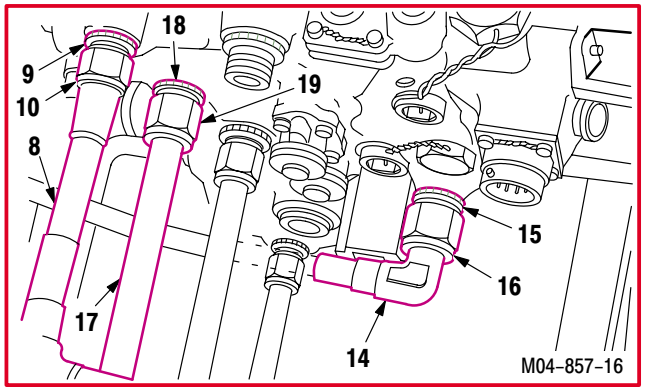
(1) Lubricate threads of adapter (24). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (25) on adapter (24).

k. **Install tube (14) on adapter (15).**

(1) Lubricate threads of adapter (15). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (16) on adapter (15).



l. **Install tube (8) on adapter (9).**

(1) Lubricate threads of adapter (9). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (10) on adapter (9).

m. **Install tube (17) on adapter (18).**

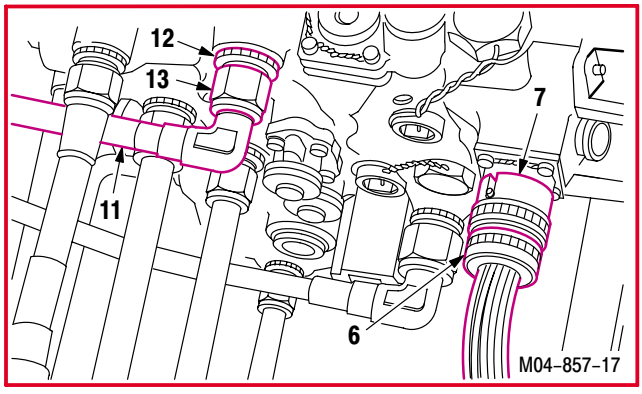
(1) Lubricate threads of adapter (18). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (19) on adapter (18).

n. **Install tube (11) on adapter (12).**

(1) Lubricate threads of adapter (12). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (13) on adapter (12).



o. **Attach connector P238 (6) to receptacle (HP2)J1 (7).**

GO TO NEXT PAGE

7.64. UTILITY HYDRAULIC MANIFOLD REMOVAL/INSTALLATION – continued

p. **Inspect (QA).**

q. **Service utility hydraulic accumulator** (para 1.36)**.**

r. **Bleed utility hydraulic system** (para 1.35)**.**

s. **Service utility hydraulic system** (para 1.34)**.**

t. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

u. **Secure access doors T250L, T250R, T290L, T290R, L325, and R325; install fairing T355** (para 2.2)**.**

END OF TASK

7.65. UTILITY HYDRAULIC MANUAL BLEED VALVE REPLACEMENT

7.65.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.65.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

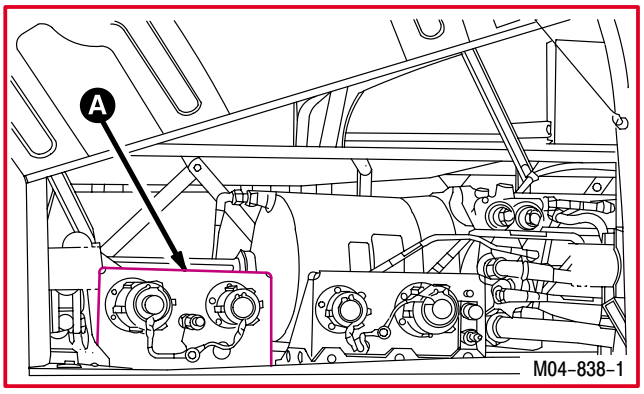
Packing
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

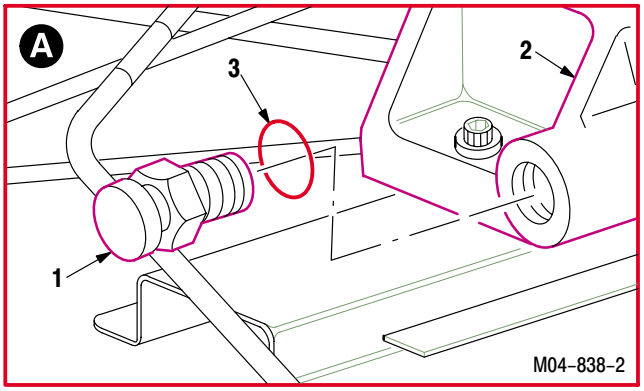
Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented



7.65.3. Removal

a. **Remove bleed valve (1) from manifold (2).**

(1) Remove and discard valve (1) and packing (3).



GO TO NEXT PAGE

7.65. UTILITY HYDRAULIC MANUAL BLEED VALVE REPLACEMENT – continued

7.65.4. Cleaning

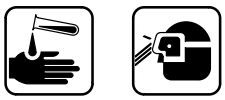
a. **Wipe attaching parts with a clean rag.**

7.65.5. Inspection

a. **Check manifold for cracks and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.65.6. Installation



a. **Install new packing (3) on new valve (1).**

(1) Lubricate packing (3). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (3) on valve (1).

b. **Install valve (1) on manifold (2).** Torque valve to **100 INCH-POUNDS**.

(1) Lubricate valve (1) threads. Use clean hydraulic fluid (item 92, App F).

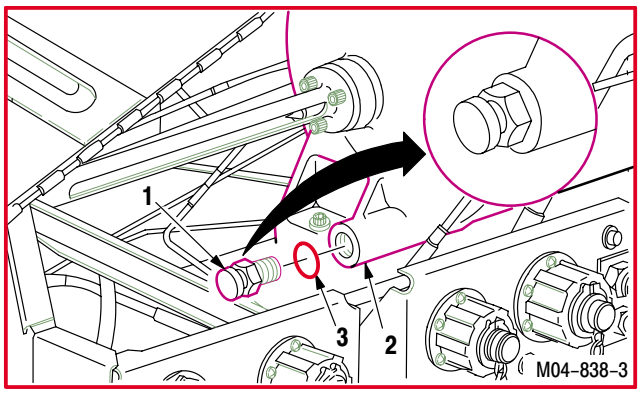
(2) Install valve (1) on manifold (2).

(3) Torque valve (1) to **100 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Perform pressurized air system leak check** (para 7.115)**.**

e. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.66. UTILITY HYDRAULIC MANIFOLD AIR CHECK VALVE REPLACEMENT

7.66.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.66.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Filter
Packing
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented

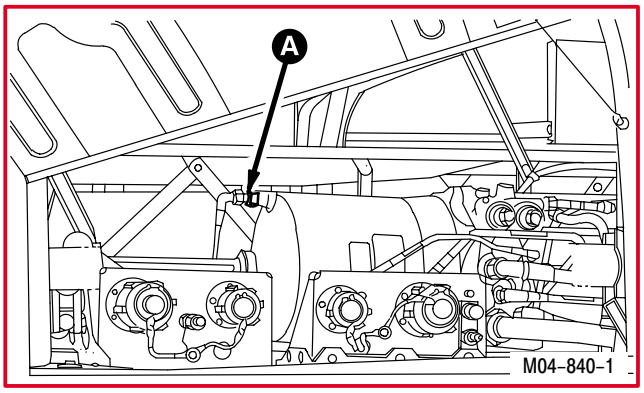
7.66.3. Removal

a. **Remove tube (1) from air check valve (2).**

(1) Hold check valve (2). Remove nut (3).

(2) Remove and discard filter (4).

b. **Remove and discard check valve (2) and packing (5) from manifold (6).**



7.66.4. Cleaning

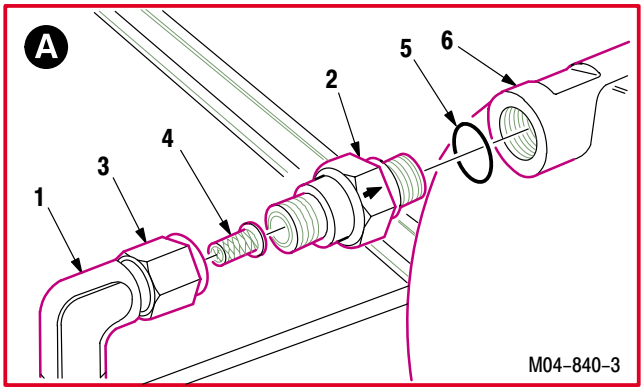
a. **Wipe removed and attaching parts with a clean rag.**

7.66.5. Inspection

a. **Check tube for chafing, cracks, dents, nicks, and scratches** (para 7.56)**.**

b. **Check nut for cracks, stripped threads, and rounded flats** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.66. UTILITY HYDRAULIC MANIFOLD AIR CHECK VALVE REPLACEMENT – continued

7.66.6. Installation



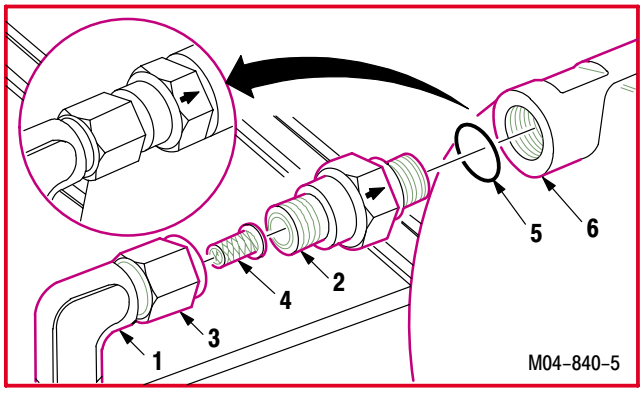
a. **Install new check valve (2) on manifold (6).** Torque check valve (2) to **100 INCH-POUNDS**.

(1) Lubricate new packing (5). Use petrolatum (item 138, App F).

(2) Install packing (5) on check valve (2).

(3) Lubricate threads of check valve (2). Use damping fluid (item 69, App F).

(4) Install check valve (2) on manifold (6) with arrow pointing toward manifold (6). Torque check valve (2) to **100 INCH-POUNDS**. Use torque wrench.



b. **Install new filter (4) in tube (1).**

c. **Install tube (1) on check valve (2).**

(1) Lubricate threads of check valve (2). Use damping fluid (item 69, App F).

(2) Hold check valve (2). Install nut (3).

d. **Inspect (QA).**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Secure access door R325** (para 2.2)**.**

END OF TASK

7.67. UTILITY HYDRAULIC MANIFOLD PRESSURE SWITCH REPLACEMENT

7.67.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.67.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (2)
Hydraulic fluid (item 92, App F)

Personnel Required:

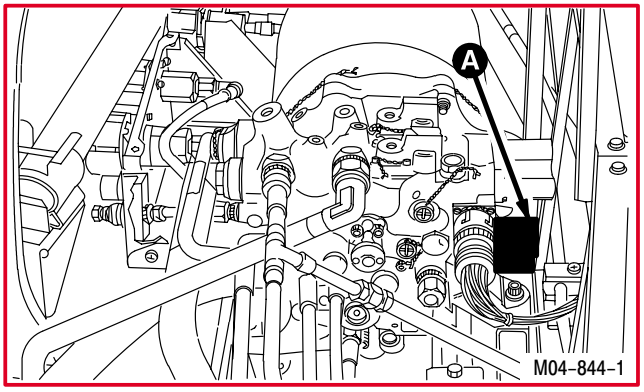
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented



GO TO NEXT PAGE

7.67. UTILITY HYDRAULIC MANIFOLD PRESSURE SWITCH REPLACEMENT – continued

CAUTION

Extreme care must be taken to prevent foreign objects from entering open passages of manifold.

7.67.3. Removal

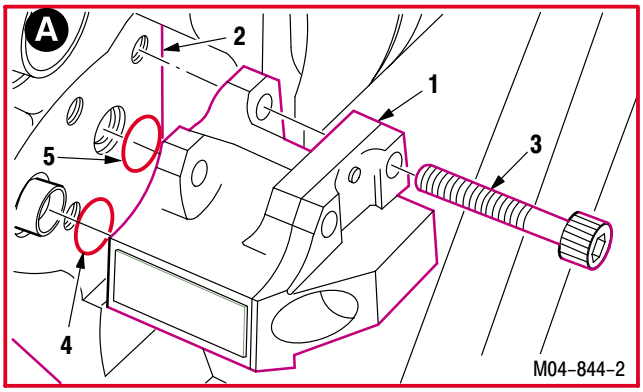
a. **Remove pressure switch (1) from utility manifold (2).**

(1) Place rags under manifold (2) to catch hydraulic fluid spills.

(2) Remove four screws (3).

(3) Pull switch (1) straight out from manifold (2).

(4) Discard switch (1) and packings (4) and (5).



7.67.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.67.5. Inspection

a. **Check mounting surface and electrical connector for damage** (para 7.56)**.**

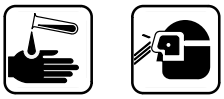
b. **Check screws for damaged or stripped threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.67. UTILITY HYDRAULIC MANIFOLD PRESSURE SWITCH REPLACEMENT – continued

7.67.6. Installation

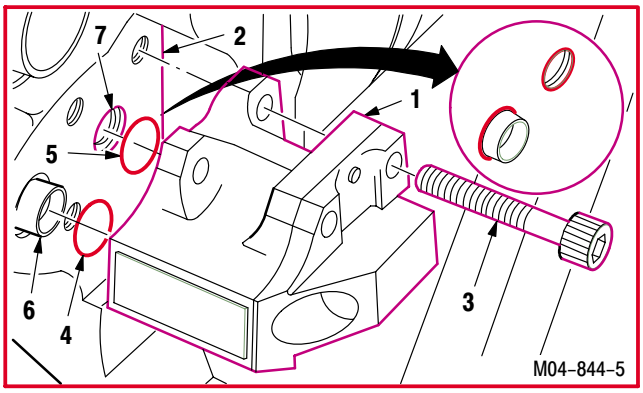


a. **Install new packings (4) and (5) on manifold (2).**

(1) Lubricate packings (4) and (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (5) in manifold recess (7).

(3) Install packing (4) on connector (6).

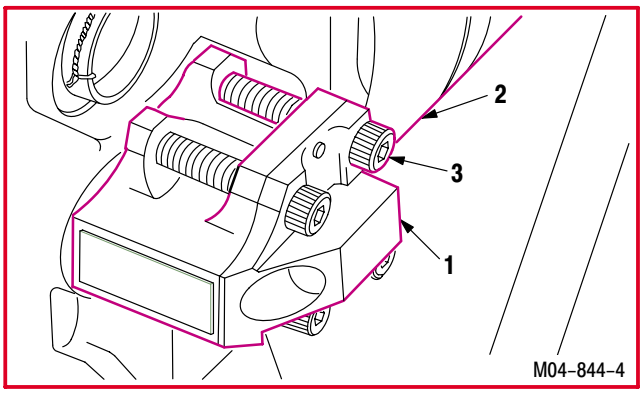


b. **Install new switch (1) on manifold (2).** Torque four screws (3) to **22 INCH-POUNDS**.

(1) Aline switch (1) on manifold (2) with connector (6) and four screw holes.

(2) Install four screws (3).

(3) Torque four screws (3) to **22 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Secure access door R325** (para 2.2)**.**

END OF TASK

7.68. UTILITY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT

7.68.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.68.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (2)
Hydraulic fluid (item 92, App F)
Sealing compound (item 174, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

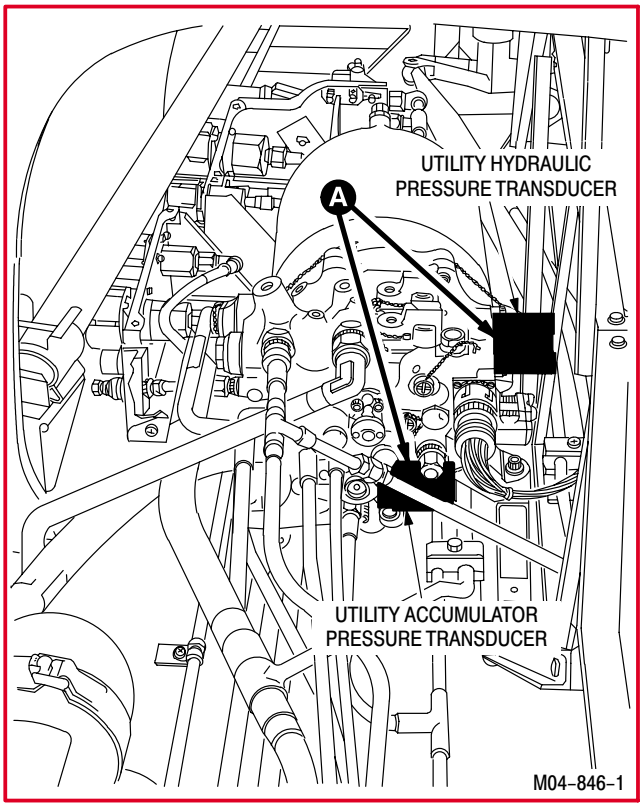
Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, L325, and R325 opened
7.57	Utility hydraulic system vented

NOTE

This task is typical for the utility hydraulic pressure transducer or utility accumulator pressure transducer.

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open EMERG HYD circuit breaker.**



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7.68. UTILITY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT – continued

CAUTION

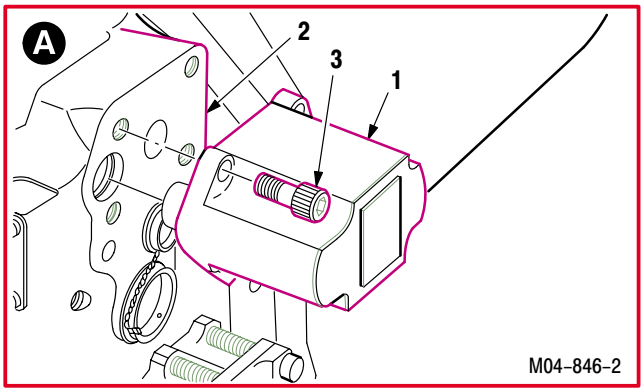
Extreme care must be taken to prevent foreign objects from entering open passages of manifold.

7.68.3. Removal

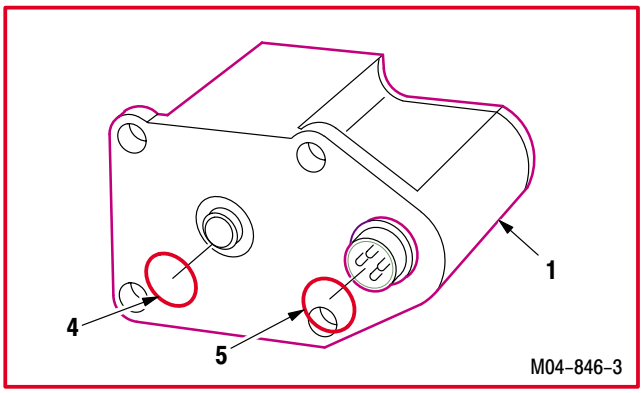
a. **Remove pressure transducer (1) from utility manifold (2).**

(1) Place rags under manifold (2) to catch hydraulic fluid spills.

(2) Remove four screws (3).



(3) Remove and discard transducer (1) and packings (4) and (5).



7.68.4. Cleaning

a. **Clean sealing compound from manifold and four screws** (para 1.47)**.**

b. **Clean removed and attaching parts** (para 1.47)**.**

7.68.5. Inspection

a. **Check mounting surface and electrical connector for damage** (para 7.56)**.**

b. **Check screws for stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.68. UTILITY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT – continued

7.68.6. Installation

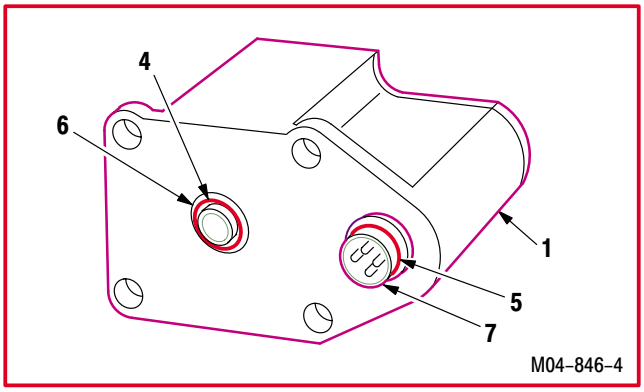


a. **Install new packings (4) and (5) on new transducer (1).**

(1) Lubricate packings (4) and (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (4) in port (6).

(3) Install packing (5) on connector (7).

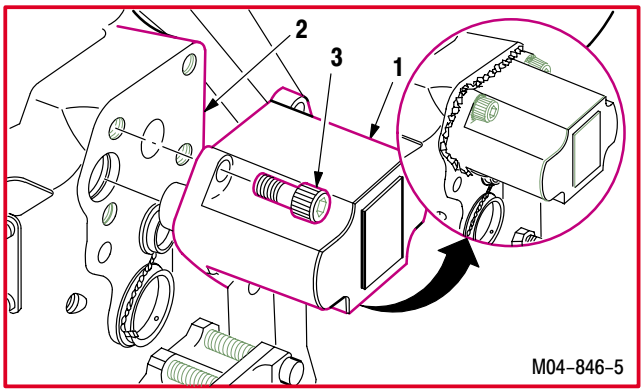


b. **Install transducer (1) on manifold (2).** Torque four screws (3) to **22 INCH-POUNDS**.

(1) Aline transducer (1) on manifold (2).

(2) Install four screws (3).

(3) Torque four screws (3) to **22 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.





c. **Apply sealing compound around entire base of transducer (1) where it contacts manifold (2) and around four screws (3).** Use sealing compound (item 174, App F).

d. **Allow sealing compound to dry for 24 HOURS at 65 °F (18 °C) minimum.**

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7.68. UTILITY HYDRAULIC MANIFOLD PRESSURE TRANSDUCER REPLACEMENT – continued

e. **Inspect (QA).**

f. **Bleed utility hydraulic system** (para 1.35)**.**

g. **Service utility hydraulic system** (para 1.34)**.**

h. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

i. **Secure access doors T250L, T250R, T290L, T290R, L325, and R325** (para 2.2)**.**

END OF TASK

7.69. UTILITY HYDRAULIC MANIFOLD STRAINER REPLACEMENT

7.69.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.69.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Packing (4)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

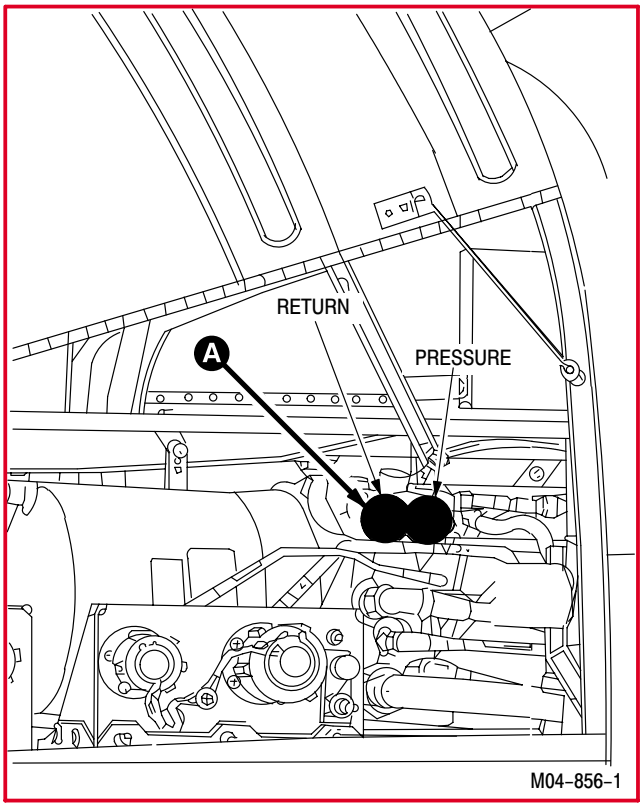
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, L325, and R325 opened
7.57	Utility hydraulic system vented

NOTE

This task is typical for pressure and return strainer.



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7.69. UTILITY HYDRAULIC MANIFOLD STRAINER REPLACEMENT – continued

7.69.3. Removal

a. **Remove pressure cap (1) and return cap (2) from utility manifold (3).**

(1) Place rags under manifold (3) to catch hydraulic fluid spills.

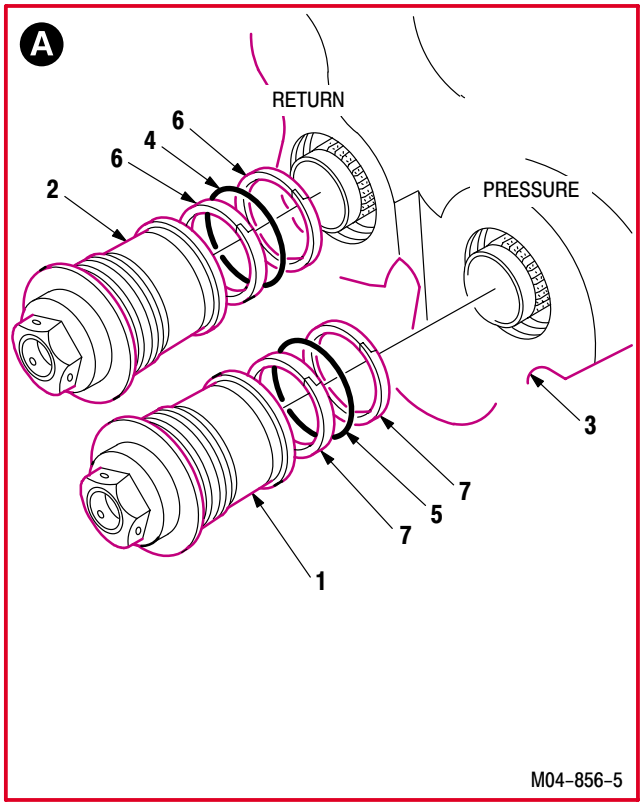
(2) Remove lockwire from caps (1) and (2).

(3) Remove caps (1) and (2).

(4) Remove and discard packings (4) and (5).

(5) Remove and retain backup rings (6) and (7).

b. **Remove and discard two strainers (8) and packings (9) from strainer cavities (10) and (11).**



7.69.4. Cleaning

a. **Wipe strainer cavities.** Use cloth (item 52, App F).

b. **Wipe caps.** Use cloth (item 52, App F).

7.69.5. Inspection

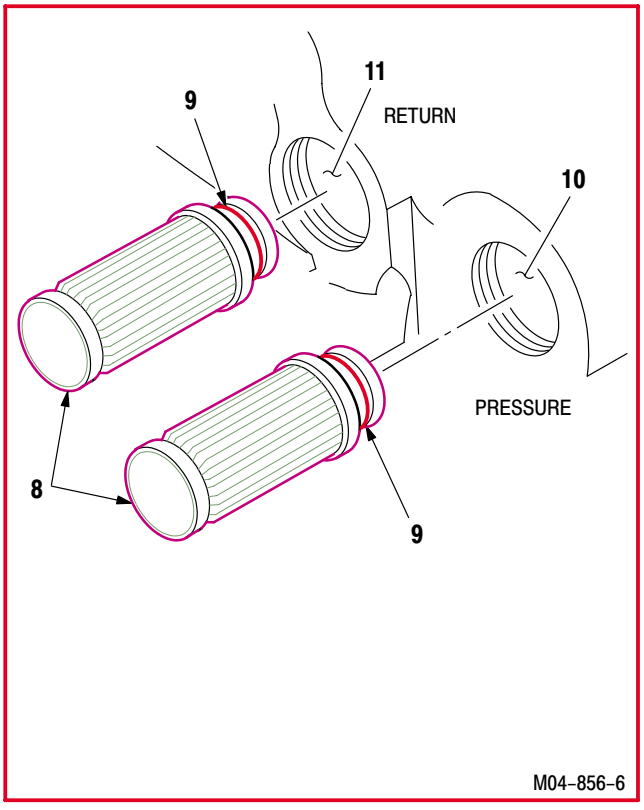
a. **Check caps for stripped or damaged threads** (para 7.56)**.**

b. **Check caps for rounded or damaged flats** (para 7.56)**.**

c. **Check strainer cavities for stripped or damaged threads** (para 7.56)**.**

d. **Check backup rings for damage.** None allowed.

e. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.69. UTILITY HYDRAULIC MANIFOLD STRAINER REPLACEMENT – continued

7.69.6. Installation

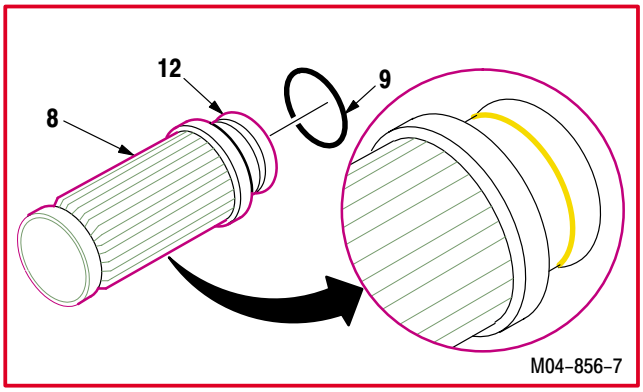


a. **Lubricate two new packings (9).** Use clean hydraulic fluid (item 92, App F).

b. **Install two packings (9) in grooves (12) of two new strainers (8).**

NOTE

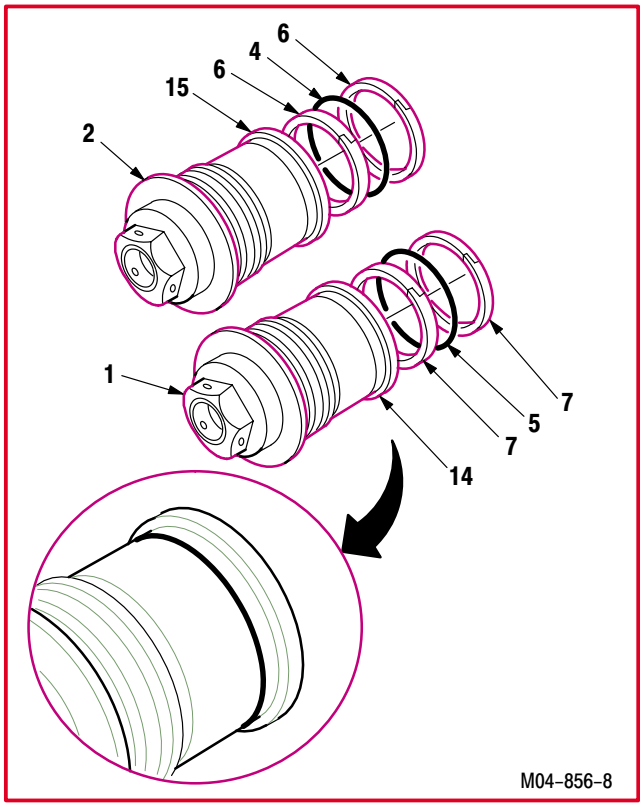
The pressure cap and return cap differ only slightly in size. Ensure that the larger packing and backup rings are installed on the return cap, and that the smaller packing and backup rings are installed on the pressure cap.



c. **Lubricate new packings (4) and (5), two sets of backup rings (6) and (7), and threads of pressure cap (1) and return cap (2).** Use clean hydraulic fluid (item 92, App F).

d. **Install packing (5) between two backup rings (7) in groove (14) on pressure cap (1).**

e. **Install packing (4) between two backup rings (6) in groove (15) on return cap (2).**



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7.69. UTILITY HYDRAULIC MANIFOLD STRAINER REPLACEMENT – continued

f. **Install strainer (8) in pressure cap (1).** Torque cap (1) to **60 INCH-POUNDS**.

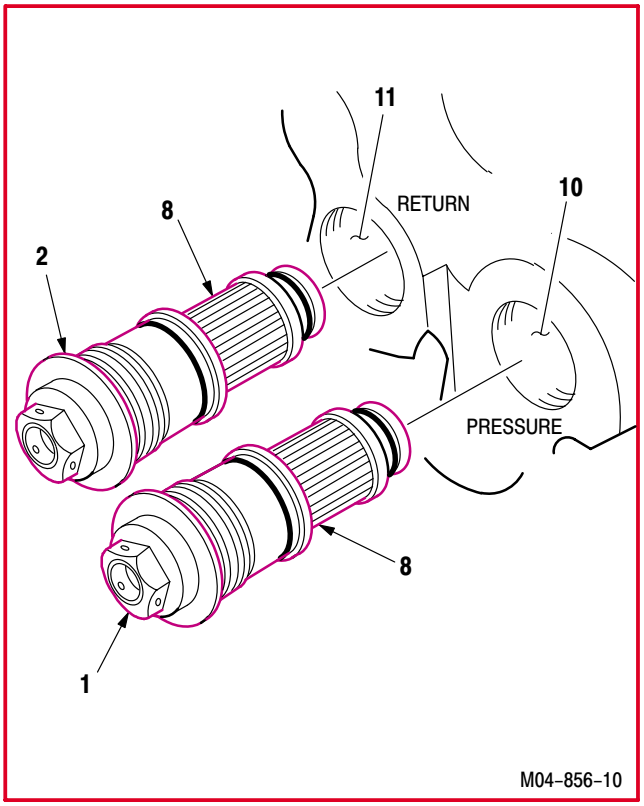
(1) Install cap (1) and strainer (8) in cavity (10).

(2) Torque cap (1) to **60 INCH-POUNDS**. Use torque wrench.

g. **Install strainer (8) in return cap (2).** Torque cap (2) to **60 INCH-POUNDS**.

(1) Install cap (2) and strainer (8) in cavity (11).

(2) Torque cap (2) to **60 INCH-POUNDS**. Use torque wrench.



h. **Lockwire caps (1) and (2) together.** Use wire (item 226, App F).

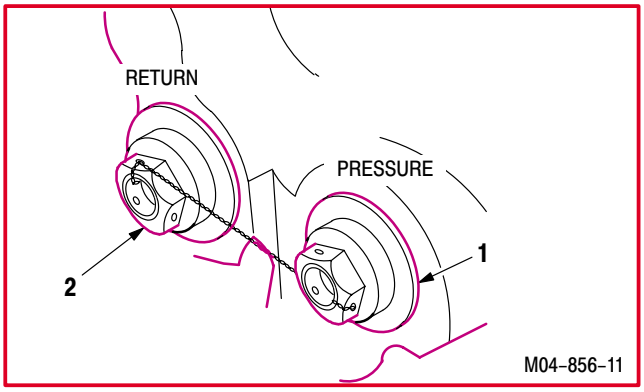
i. **Inspect (QA).**

j. **Bleed utility hydraulic system** (para 1.35)**.**

k. **Service utility hydraulic system** (para 1.34)**.**

l. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

m. **Secure access doors T250L, T250R, T290L, T290R, L325, and R325** (para 2.2)**.**



END OF TASK

7.70. HYDRAULIC MANIFOLD RETURN FILTER SLEEVE, MANIFOLD GUIDE, AND SPRING REPLACEMENT

7.70.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.70.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

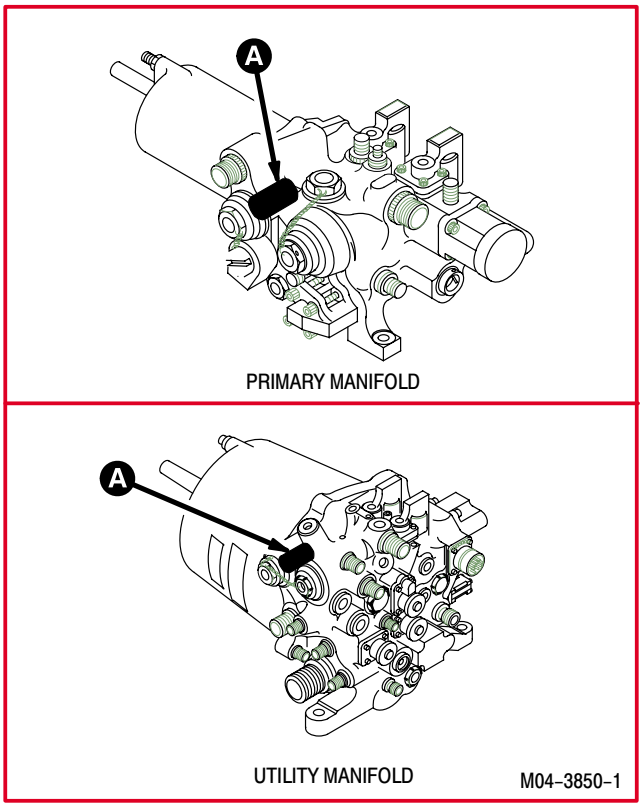
Ref	Condition
1.57	Helicopter safed
7.16	Primary hydraulic manifold return strainer removed or
7.69	Utility hydraulic manifold return strainer removed

Materials/Parts:

Packing (2)
Hydraulic fluid (item 92, App F)

NOTE

This task is typical for both primary and utility hydraulic manifold return filter sleeve, manifold guide, and spring replacement.



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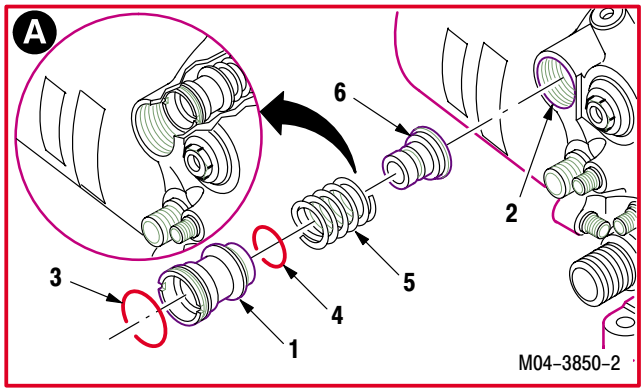
7.70. HYDRAULIC MANIFOLD RETURN FILTER SLEEVE, MANIFOLD GUIDE, AND SPRING REPLACEMENT – continued

7.70.3. Removal

a. **Remove return filter sleeve (1) from hydraulic manifold return filter cavity (2).**

(1) Remove and discard sleeve (1) and packings (3) and (4).

b. **Remove and discard spring (5) and manifold guide (6) from cavity (2).**



7.70.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.70.5. Inspection

a. **Check manifold for nicks, gouges, scratches, and cracks** (para 10.1)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.70.6. Installation

a. **Install new manifold guide (6) and new spring (5) in cavity (2).**



b. **Install new sleeve (1) in cavity (2).**

(1) Lubricate new packings (3) and (4). Use clean hydraulic fluid (item 92, App F).

(2) Install packings (3) and (4) on sleeve (1).

(3) Install sleeve (1).

c. **Inspect (QA).**

d. **Install primary hydraulic manifold return strainer** (para 7.16) **or utility hydraulic manifold return strainer** (para 7.69)**.**

END OF TASK

7.71. UTILITY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT

7.71.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.71.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
9/64-inch hexagon x 3/8-inch drive screwdriver socket wrench attachment (item 330, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (4)
Hydraulic fluid (item 92, App F)
Wire (item 222, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

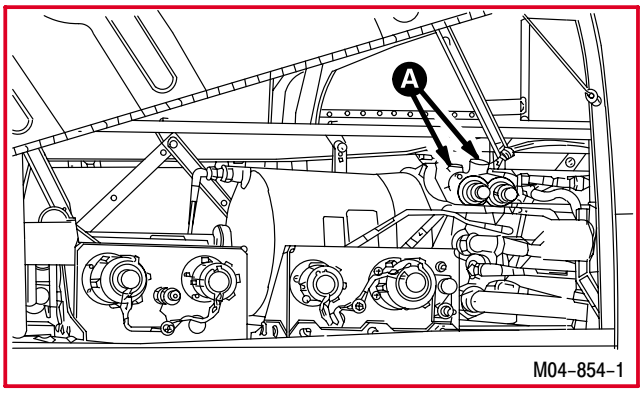
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T290L, T290R, L325, and R325 opened; fairing T325 removed
7.57	Utility hydraulic system vented
7.69	Utility hydraulic manifold pressure and /or return strainer removed

NOTE

This task is typical for pressure or return dirty filter indicator.



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7.71. UTILITY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT – continued

CAUTION

Extreme care must be taken to prevent foreign objects from entering open passages of manifold.

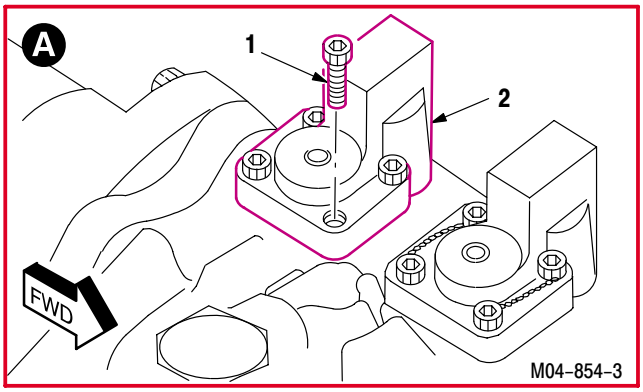
7.71.3. Removal

a. **Remove four screws (1) from dirty filter indicator (2).**

(1) Place rags around indicator (2) to catch hydraulic spills.

(2) Remove lockwire (if installed).

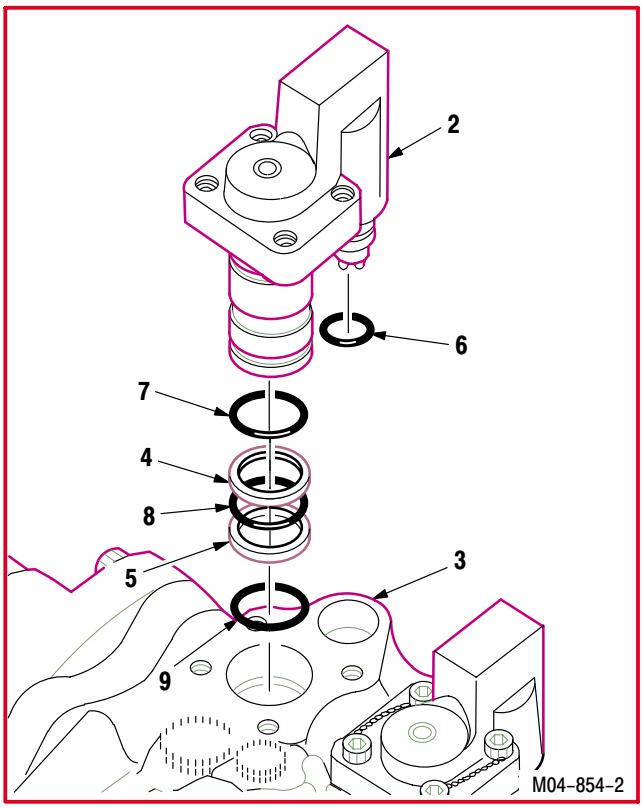
(3) Remove four screws (1). Use hexagon screwdriver.



b. **Remove indicator (2) from utility manifold (3).**

(1) Remove and save retainers (4) and (5).

(2) Discard indicator (2) and packings (6), (7), (8), and (9).



7.71.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.71.5. Inspection

a. **Check indicator mounting surface and electrical connector for damage** (para 7.56)**.**

b. **Check manifold and screws for damage.** None allowed.

c. **Check retainers for damage.** None allowed.

d. **Check manifold for corrosion** (para 1.49)**.**

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7.71. UTILITY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT – continued

7.71.6. Installation



a. **Install new packings (6), (7), (8), and (9), and retainers (4) and (5) on new indicator (2).**

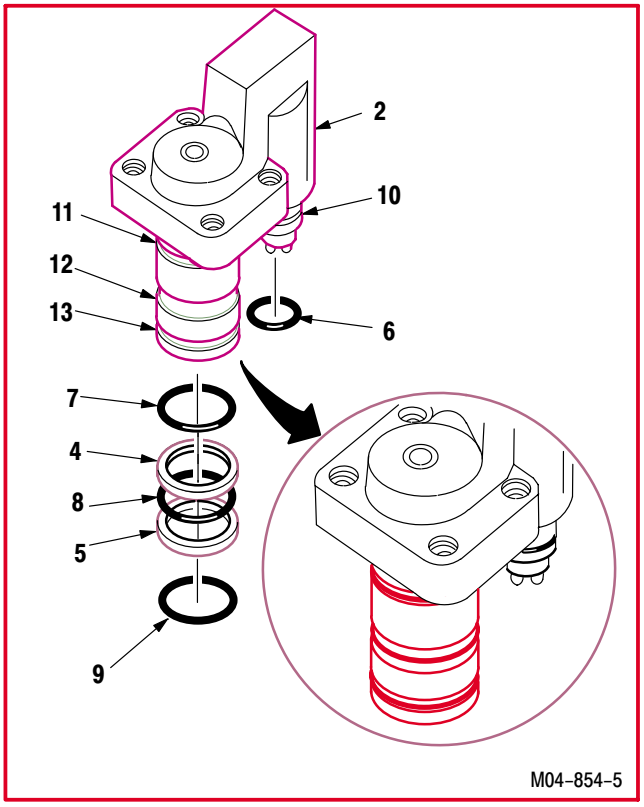
(1) Lubricate packings (6), (7), (8), and (9), and retainers (4) and (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (6) in groove (10).

(3) Install packing (7) in groove (11).

(4) Install retainer (4), packing (8), and retainer (5) in groove (12).

(5) Install packing (9) in groove (13).



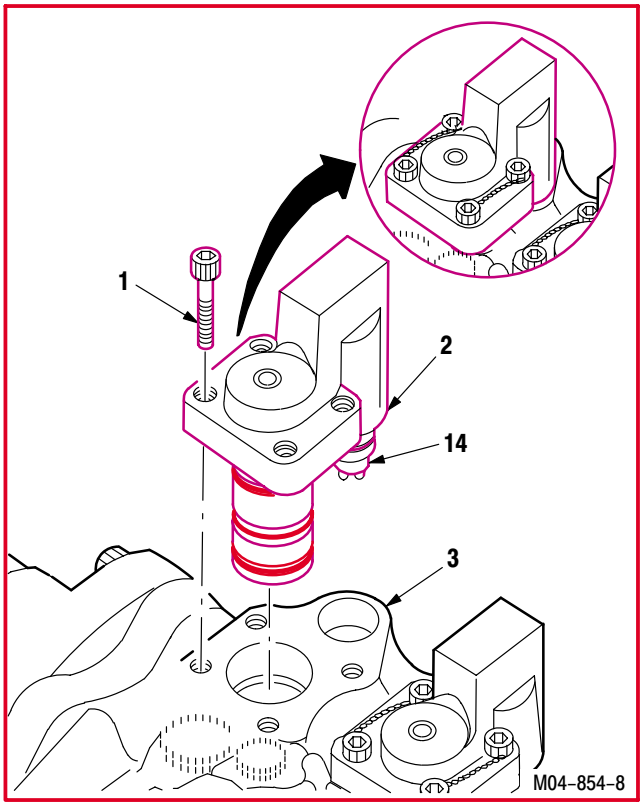
b. **Install indicator (2) on manifold (3).** Torque four screws (1) to **14 INCH-POUNDS**.

(1) Position indicator (2) on manifold (3). Aline connector (14) with cavity and screw holes.

(2) Install four screws (1) in indicator (2) and manifold (3).

(3) Torque four screws (1) to **14 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(4) Lockwire four screws (1) if screw heads are drilled for lockwire. Screw heads must be lockwired in pairs. Use wire (item 222, App F).



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7.71. UTILITY HYDRAULIC MANIFOLD DIRTY FILTER INDICATOR REPLACEMENT – continued

c. **Inspect (QA).**

d. **Replace utility hydraulic manifold pressure and/or return strainer** (para 7.69)**.**

e. **Bleed utility hydraulic system** (para 1.35)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

h. **Secure access doors T290L, T290R, L325, and R325; install fairing T325** (para 2.2)**.**

END OF TASK

7.72. UTILITY HYDRAULIC MANIFOLD PRESSURE RELIEF VALVE REPLACEMENT

7.72.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.72.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
3/8 x 1/4-inch drive socket wrench adapter (item 7, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

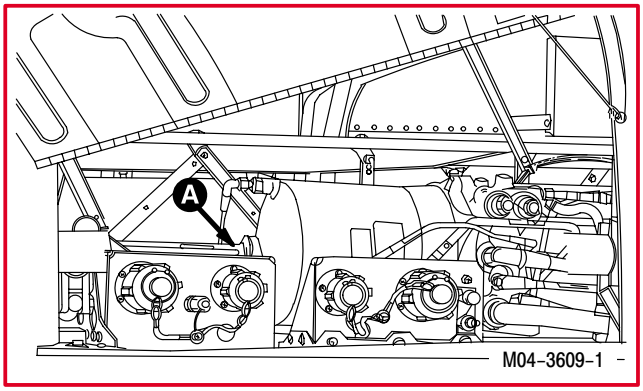
Packing
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented

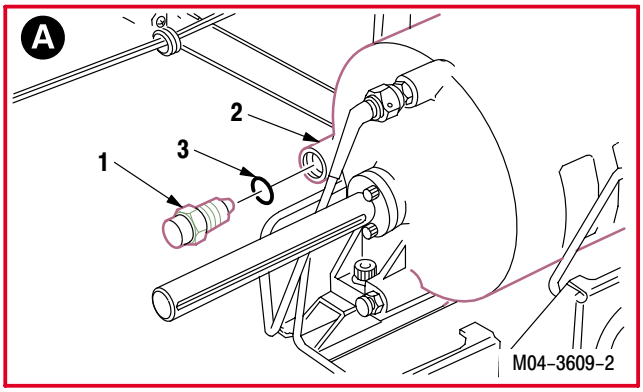


7.72.3. Removal

a. **Remove relief valve (1) from manifold (2).**

(1) Remove valve (1).

(2) Discard valve (1) and packing (3).



GO TO NEXT PAGE

7.72. UTILITY HYDRAULIC MANIFOLD PRESSURE RELIEF VALVE REPLACEMENT – continued

7.72.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.72.5. Inspection

a. **Check manifold for cracks and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.72.6. Installation



a. **Install new packing (3) on new valve (1).**

(1) Lubricate packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on valve (1).

b. **Install valve (1) on manifold (2).** Torque valve to **100 INCH-POUNDS**.

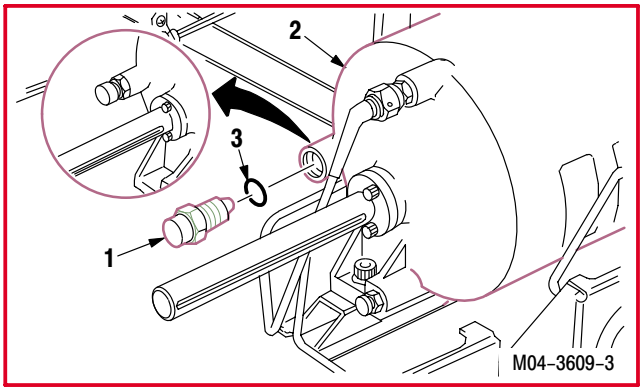
(1) Install valve (1) on manifold (2).

(2) Torque valve (1) to **100 INCH-POUNDS**. Use adapter and torque wrench.

c. **Inspect (QA).**

d. **Perform pressurized air system leak check** (para 7.115)**.**

e. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.73. UTILITY HYDRAULIC MANIFOLD SOLENOID VALVE REPLACEMENT

7.73.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.73.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing (3)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

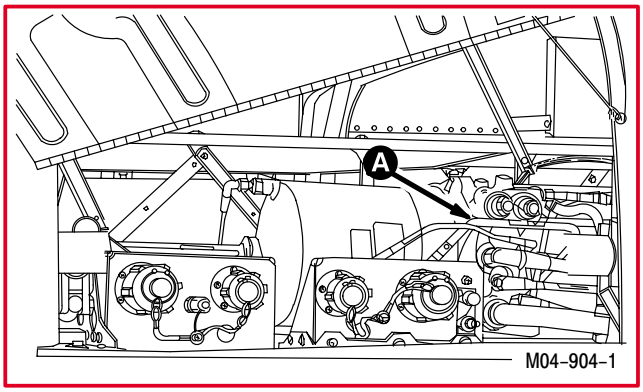
TM 1-1520-238-T

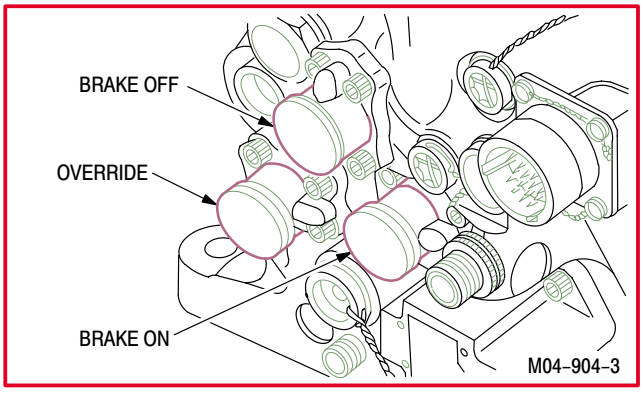
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, L325, and R325 opened
7.57	Utility hydraulic system vented

NOTE

This task is typical for brake on, brake off, or override solenoid valves on the utility hydraulic manifold.





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7.73. UTILITY HYDRAULIC MANIFOLD SOLENOID VALVE REPLACEMENT – continued

CAUTION

Extreme care must be taken to prevent foreign objects from entering open passages of manifold.

7.73.3. Removal

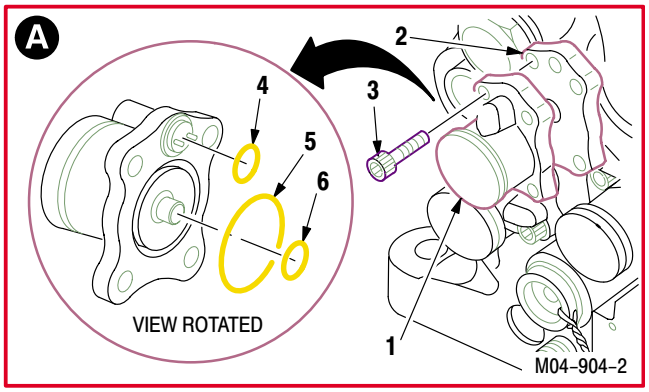
a. **Remove valve (1) from manifold (2).**

(1) Place rags under valve (1) to catch hydraulic fluid spills.

(2) Remove four screws (3).

(3) Pull valve (1) straight out of manifold (2).

(4) Discard valve (1) and packings (4), (5), and (6).



7.73.4. Cleaning

a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).

7.73.5. Inspection

a. **Check manifold and screws for stripped and damaged threads** (para 7.56)**.**

b. **Check removed parts and attaching parts for corrosion** (para 1.49)**.**

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7.73. UTILITY HYDRAULIC MANIFOLD SOLENOID VALVE REPLACEMENT – continued

7.73.6. Installation



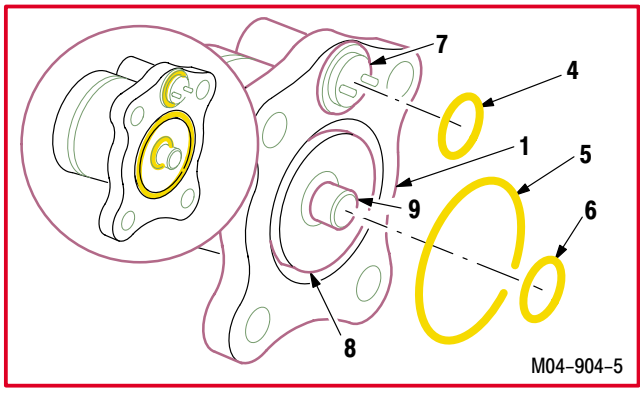
a. **Install new packings (4), (5), and (6) on new valve (1).**

(1) Lubricate packings (4), (5), and (6). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (4) on connector (7).

(3) Install packing (5) in groove (8).

(4) Install packing (6) on fitting (9).

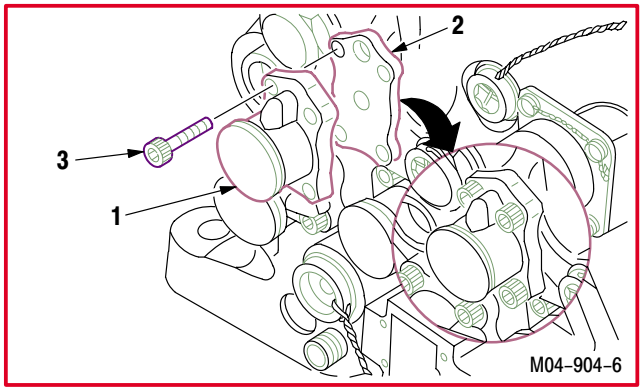


b. **Install valve (1) on manifold (2).** Torque four screws (3) to **30 INCH-POUNDS**.

(1) Aline valve (1) on manifold (2).

(2) Install four screws (3).

(3) Torque screws (3) to **30 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.



c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, L325, and R325** (para 2.2)**.**

END OF TASK

7.74. UTILITY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM)

7.74.1. Description

This task covers: Removal. Cleaning. Inspection. Installation. Testing.

7.74.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
9/64-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 329, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Channel seal
Packing (7)
Packing (MS28775-4) (2)
Retainer
Seal
Relief valve
Union (HS4508-4C4)
Union (MS21902J4)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

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7.74. UTILITY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

7.74.3. Removal

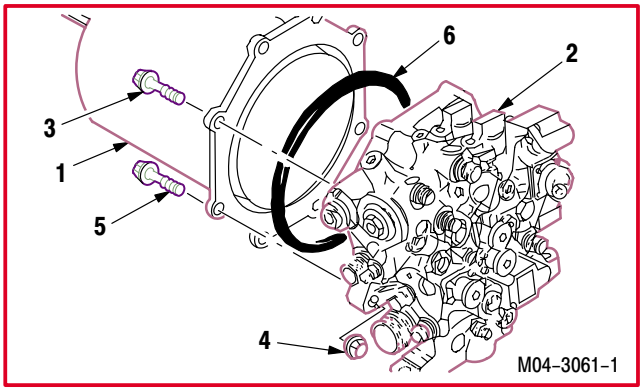
a. **Remove reservoir housing (1) from manifold (2).**

(1) Remove lockwire. Remove six bolts (3).

(2) Hold two nuts (4). Remove two long bolts (5).

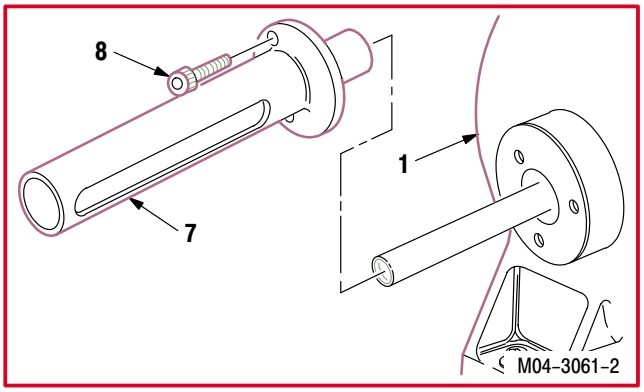
(3) Remove housing (1) from manifold (2).

(4) Remove and discard packing (6).



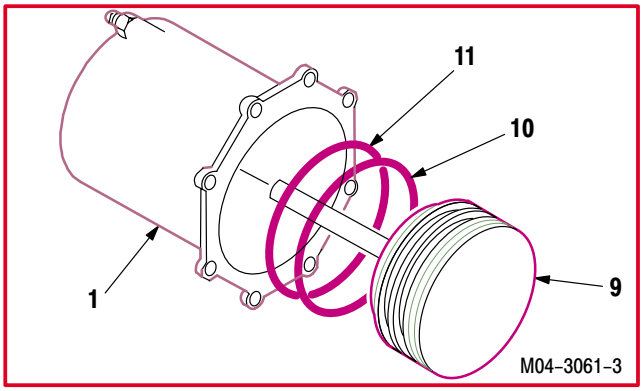
b. **Remove guard (7) from housing (1).**

(1) Remove lockwire. Remove three screws (8). Use hexagon screwdriver.

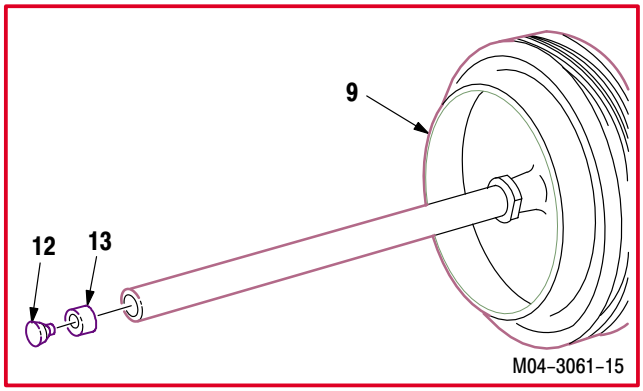


c. **Remove piston (9) from housing (1).**

(1) Remove and discard two packings (10) and (11) from piston (9).



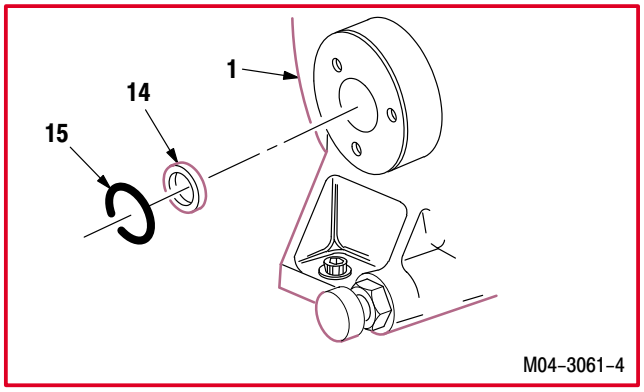
d. **Remove and discard relief valve (12) and retainer (13) from end of piston rod (9).**



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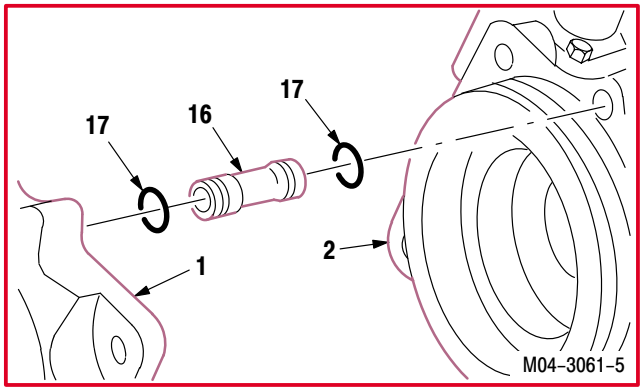
7.74. UTILITY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

e. **Remove and discard channel seal (14) and retainer (15) from housing (1).**



f. **Remove transfer tube (16) from manifold (2).**

(1) Remove and discard two packings (17).



7.74.4. Cleaning

a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).



b. **Wipe internal surface of housing and manifold with a cloth dipped in small amount of hydraulic fluid.** Use clean cloth (item 52, App F) and hydraulic fluid (item 92, App F).

7.74.5. Inspection

a. **Check housing for cracks, dents, or distortion** (para 7.56)**.**

b. **Check interior of housing for scratches, scoring, galling, or other indications of binding** (para 7.56)**.**

c. **Check piston for indications of binding, particularly on the rod end.** None allowed.

d. **No repair of working or mating surfaces is allowed.**

e. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.74. UTILITY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

7.74.6. Installation



a. **Install new packing (6) on manifold (2).**

(1) Lubricate packing (6). Use clean hydraulic fluid (item 92, App F).

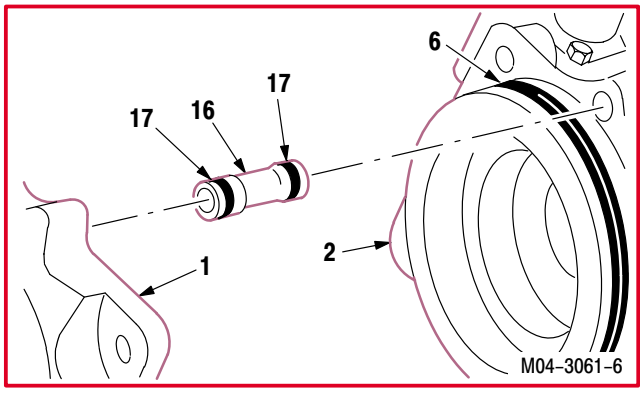
(2) Install packing (6) on manifold (2).

b. **Install transfer tube (16) and two new packings (17).**

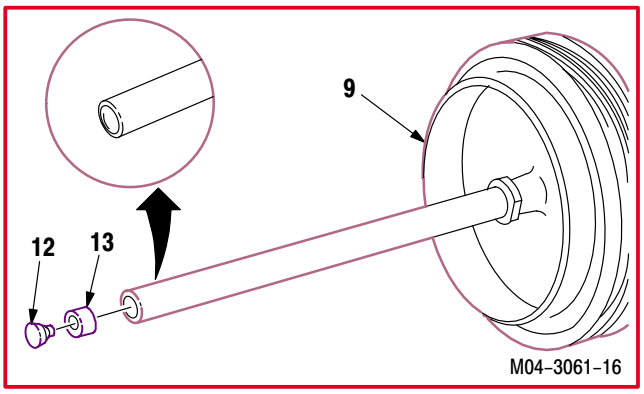
(1) Lubricate two packings (17). Use clean hydraulic fluid (item 92, App F).

(2) Install two packings (17) on tube (16).

(3) Install tube (16) in manifold (2).



c. **Install new relief valve (12) and new retainer (13) on end of piston rod (9).**

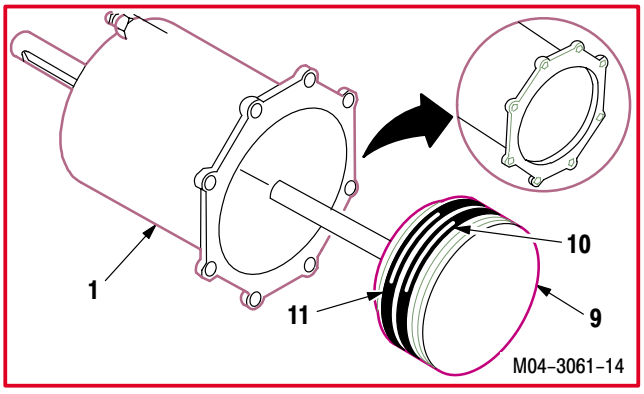


d. **Install piston (9) in housing (1).**

(1) Lubricate two new packings (10) and (11). Use clean hydraulic fluid (item 92, App F).

(2) Install two packings (10) and (11) on piston (9).

(3) Install piston (9) in housing (1).



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7.74. UTILITY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

e. **Install guard (7) on housing (1).** Torque three screws (8) to **14 INCH-POUNDS**.

(1) Lubricate new channel seal (14) and new retainer (15). Use clean hydraulic fluid (item 92, App F).

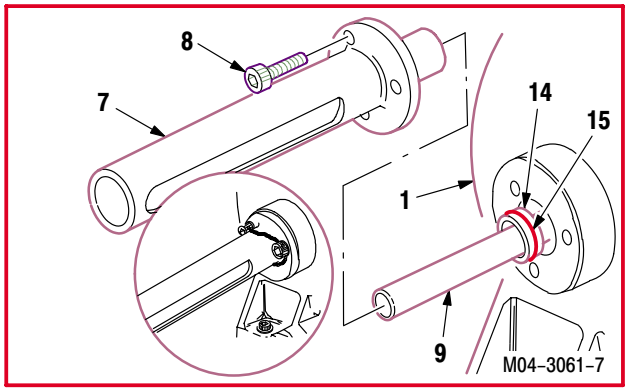
(2) Install retainer (15) in groove of channel seal (14).

(3) Slide channel seal (14) over end of piston (9) protruding from housing (1).

(4) Push seal (14) into housing (1) using guard (7).

(5) Install three screws (8). Torque three screws (8) to **14 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(6) Lockwire three screws (8) together. Use wire (item 226, App F).



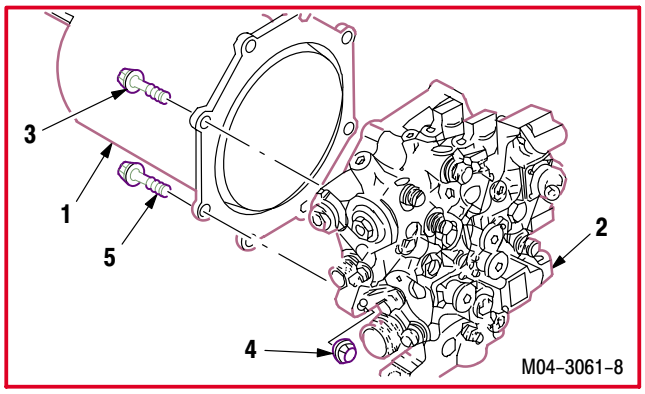
f. **Install housing (1) on manifold (2).** Torque bolts (3) and (5) to **60 INCH-POUNDS**.

(1) Install six bolts (3).

(2) Hold two nuts (4). Install two long bolts (5).

(3) Torque bolts (3) and (5) to **60 INCH-POUNDS**. Use torque wrench.

(4) Lockwire bolts (3) and (5) together. Use wire (item 226, App F).



g. **Inspect (QA).**

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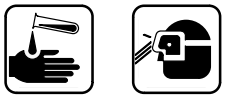
7.74. UTILITY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

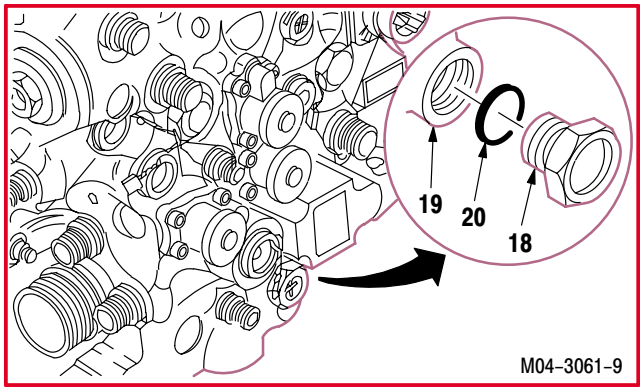
7.74.7. Testing

a. **Remove plug (18) from drain port (19).**

(1) Remove lockwire from plug (18).

(2) Remove and discard packing (20).





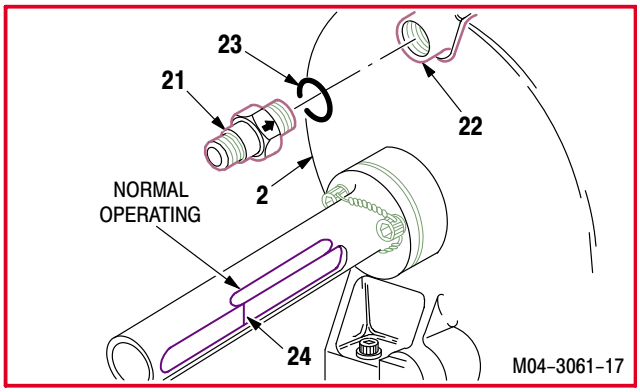
b. **Install MS21902J4 union with MS28775-4 packing on drain port (19).**

(1) Lubricate MS28775-4 packing. Use hydraulic fluid (item 92, App F).

c. **Remove check valve (21) from valve port (22).**

(1) Removed and discard packing (23).





d. **Install HS4508-4C4 union with MS28775-4 packing on valve port (22).**

(1) Lubricate MS28775-4 packing. Use petrolatum (item 138, App F).

e. **Cap all other ports.**

f. **Service manifold (2) with hydraulic fluid through drain port (19) until indicator (24) is in normal (green) operating area.** Use clean hydraulic fluid (item 92, App F).

g. **Connect shop air, regulated to 25 psi, to manifold (2) through valve port (22).**

(1) Hold pressure 5 minutes and check for leaks. No leakage allowed. Fluid too small to form a drop is allowable. Manifold is leaking if drop is formed.

(2) Remove air pressure.

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7.74. UTILITY HYDRAULIC MANIFOLD RESERVOIR SEAL REPLACEMENT (AVIM) – continued

h. **Remove MS21902J4 and HS4508-4C4 unions and two MS28775-4 packings from ports (19) and (22).**

(1) Discard two MS28775-4 packings.

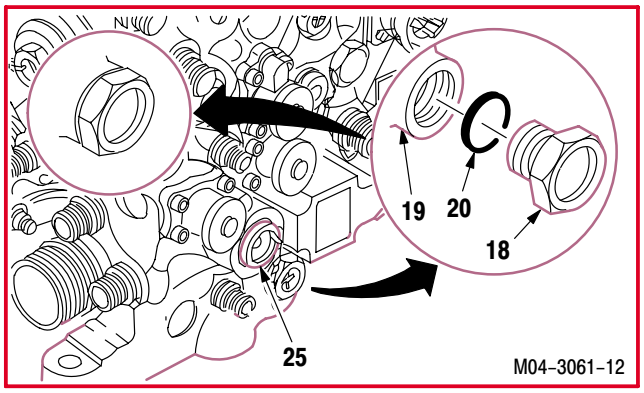
i. **Install plug (18) on drain port (19).** Torque plug (18) to **100 INCH-POUNDS**.

(1) Lubricate new packing (20). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (20) on plug (18).

(3) Torque plug (18) to **100 INCH-POUNDS**. Use torque wrench.

(4) Lockwire plug (18) to adjacent plug (25). Use wire (item 226, App F).

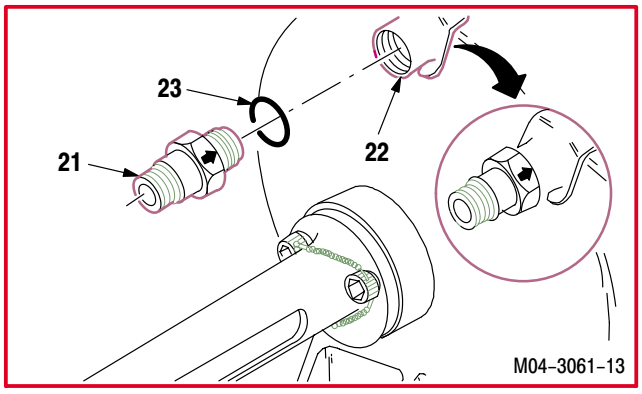


j. **Install check valve (21) on valve port (22).** Torque check valve (21) to **100 INCH-POUNDS**.

(1) Lubricate new packing (23). Use petrolatum (item 138, App F).

(2) Install packing (23) on check valve (21).

(3) Torque check valve (21) to **100 INCH-POUNDS**. Use torque wrench.



k. **Remove caps from all ports.**

l. **Inspect (QA).**

END OF TASK

7.75. UTILITY HYDRAULIC MANIFOLD STRAINER ELEMENT REMOVAL/INSTALLATION (AVIM)

7.75.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.75.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing (4)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

7.75.3. Removal

a. **Remove hydraulic manifold (1) from reservoir housing (2).**

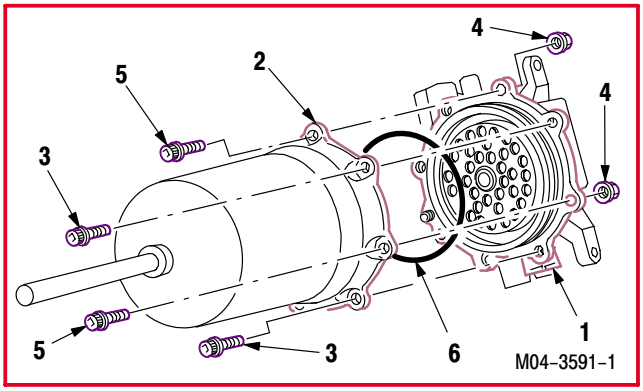
(1) Remove lockwire.

(2) Remove six bolts (3).

(3) Hold two nuts (4). Remove bolts (5).

(4) Remove manifold (1) from housing (2).

(5) Remove and discard packing (6).

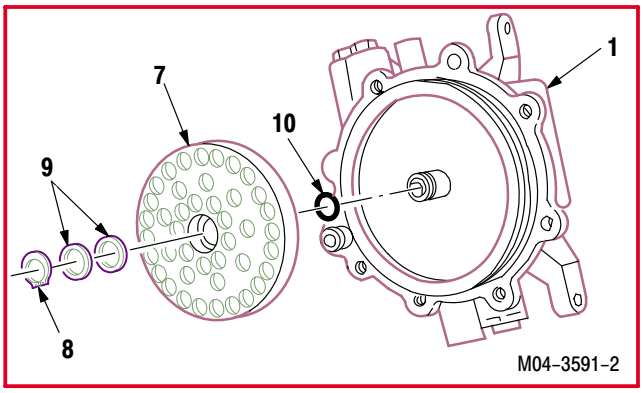


b. **Remove strainer element (7) from manifold (1).**

(1) Remove retaining ring (8) and two washers (9).

(2) Remove strainer (7) from manifold (1).

(3) Remove and discard packing (10).

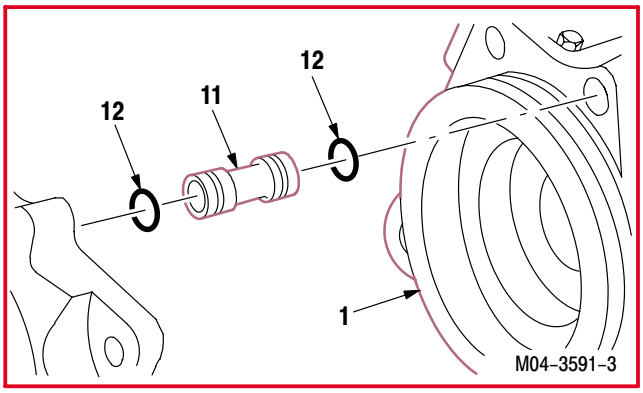


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7.75. UTILITY HYDRAULIC MANIFOLD STRAINER ELEMENT REMOVAL/INSTALLATION (AVIM) – continued

c. **Remove transfer tube (11) from manifold (1).**

(1) Remove and discard two packings (12).



7.75.4. Cleaning

CAUTION

To prevent corrosion of hydraulic components, do not use chlorinated solvents for cleaning.

a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).

b. **Clean strainer element** (para 1.47)**.**

7.75.5. Inspection

a. **Check removed and attaching parts for cracks, dents, scratches, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.75.6. Installation

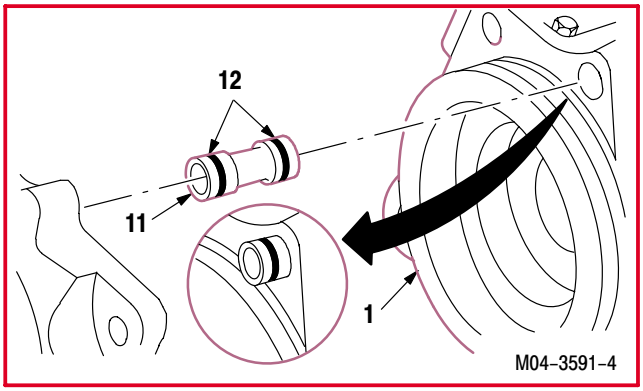


a. **Install transfer tube (11) in manifold (1).**

(1) Lubricate two new packings (12). Use clean hydraulic fluid (item 92, App F).

(2) Install packings (12) on transfer tube (11).

(3) Install transfer tube (11) in manifold (1).



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7.75. UTILITY HYDRAULIC MANIFOLD STRAINER ELEMENT REMOVAL/INSTALLATION (AVIM) – continued

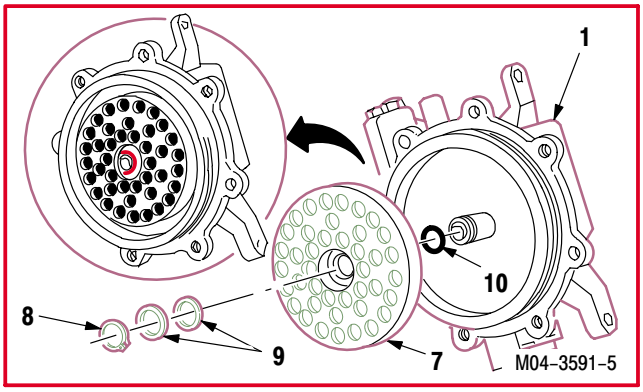
b. **Install strainer element (7) on manifold (1).**

(1) Lubricate new packing (10). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (10) on manifold (1).

(3) Install strainer (7) on manifold (1).

(4) Install two washers (9) and retaining ring (8) on manifold (1).



c. **Install manifold (1) on housing (2).** Torque bolts (3) and (5) to **60 INCH-POUNDS**.

(1) Lubricate new packing (6). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (6) on manifold (1).

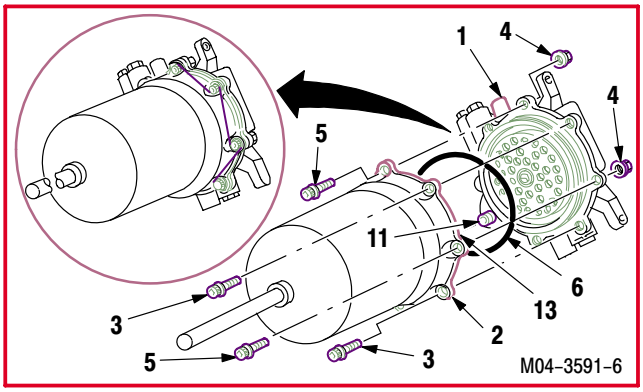
(3) Aline transfer tube (11) with housing port (13).

(4) Install six bolts (3) through housing (2) to manifold (1).

(5) Install two bolts (5) through housing (2) and manifold (1). Install two nuts (4).

(6) Torque bolts (3) and (5) to **60 INCH-POUNDS**. Use torque wrench.

(7) Lockwire bolts (3) and (5) together. Use wire (item 226, App F).



d. **Inspect (QA).**

END OF TASK

7.76. UTILITY HYDRAULIC MANIFOLD LOW LEVEL PISTON REPLACEMENT (AVIM)

7.76.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.76.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
3/8 x 1/4-inch drive socket wrench adapter (item 7, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

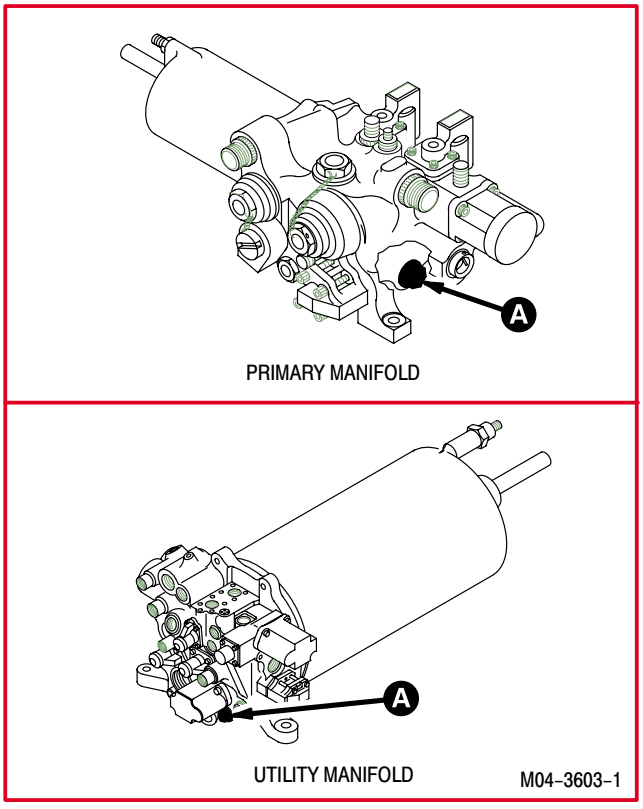
Packing (2)
Spring
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

NOTE

This task is typical for both utility and primary hydraulic manifold low level switch piston replacement.



PRIMARY MANIFOLD

UTILITY MANIFOLD

M04-3603-1

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7.76. UTILITY HYDRAULIC MANIFOLD LOW LEVEL PISTON REPLACEMENT (AVIM) – continued

7.76.3. Removal

a. **Remove cap (1) and spring (2) from manifold (3).**

(1) Remove lockwire from cap (1).

(2) Remove cap (1) from manifold (3).

(3) Remove and discard spring (2) from manifold (3).

b. **Remove and discard piston (4) and packings (5) and (6).**

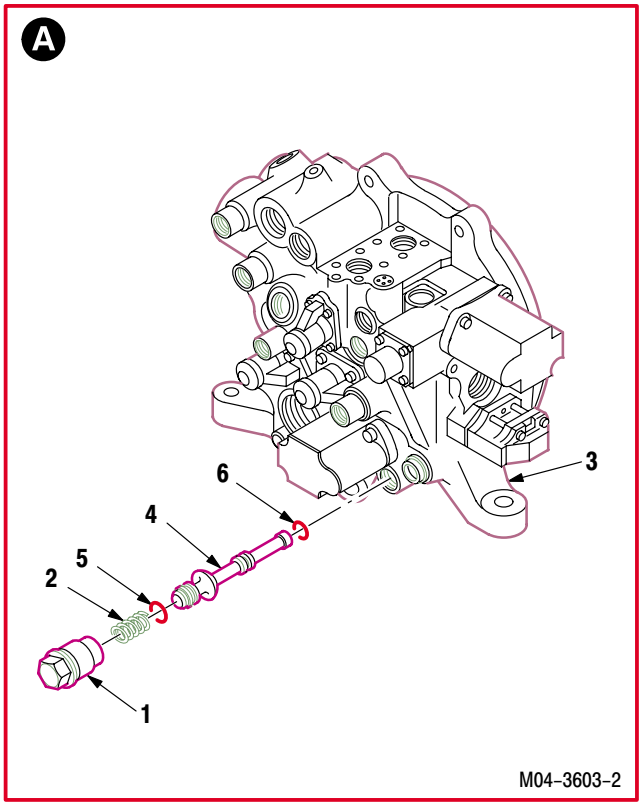
7.76.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.76.5. Inspection

a. **Check manifold and cap for stripped or damaged threads** (para 7.56)**.**

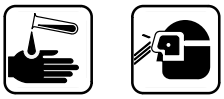
b. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.76. UTILITY HYDRAULIC MANIFOLD LOW LEVEL PISTON REPLACEMENT (AVIM) – continued

7.76.6. Installation



a. **Install new packings (5) and (6) on new piston (4).**

(1) Lubricate packings (5) and (6). Use clean hydraulic fluid (item 92, App F).

(2) Install packings (5) and (6) on piston (4).

b. **Install piston (4) in manifold (3).**

c. **Install new spring (2) in cap (1).**

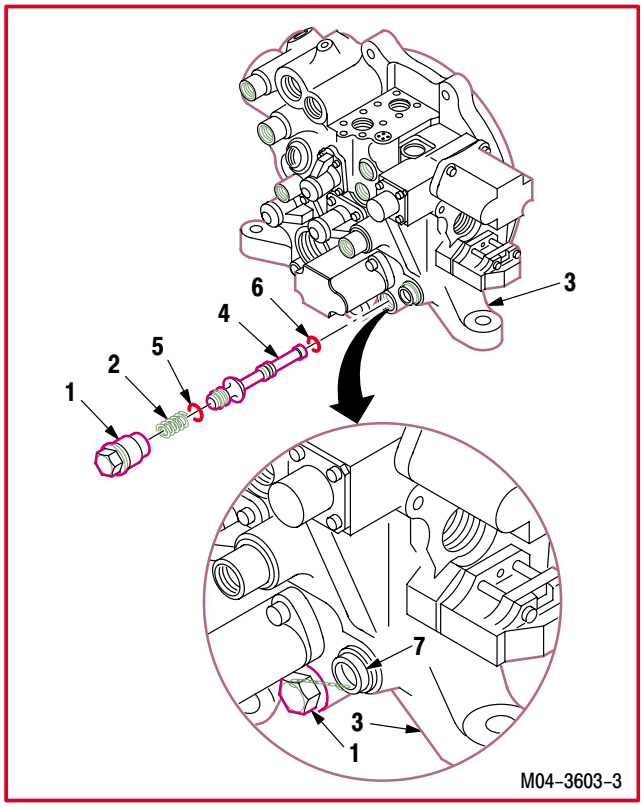
d. **Install cap (1) on manifold (3).** Torque to **75 INCH-POUNDS**.

(1) Lubricate threads of cap (1). Use clean hydraulic fluid (item 92, App F).

(2) Install cap (1) on manifold (3). Torque to **75 INCH-POUNDS**. Use adapter and torque wrench.

(3) Lockwire cap (1) to cap (7). Use wire (item 226, App F).

e. **Inspect (QA).**



END OF TASK

7.77. UTILITY HYDRAULIC MANIFOLD LOW LEVEL VALVE REPLACEMENT (AVIM)

7.77.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.77.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
3/16-inch hexagon x 3/8-inch drive screwdriver socket wrench attachment (item 323, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

Materials/Parts:

Backup ring (2)
Packing (3)
Packing retainer (4)
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

7.77.3. Removal

a. **Remove cap (1) from manifold (2).**

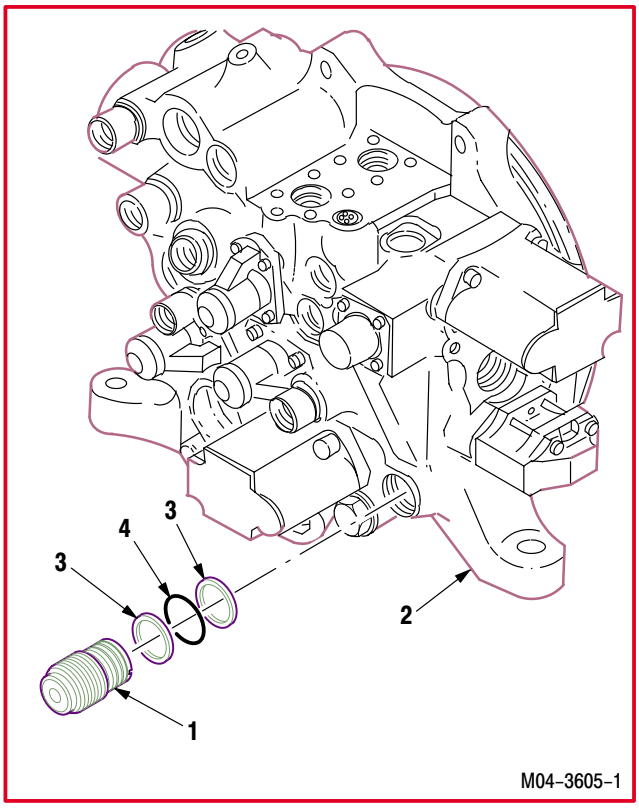
(1) Remove lockwire from cap (1).

(2) Remove cap (1) from manifold (2).

(3) Remove and discard two backup rings (3) and packing (4) from cap (1).

NOTE

The lap assembly consists of two parts, the slide and sleeve. They are a matched set and both parts must be replaced together.



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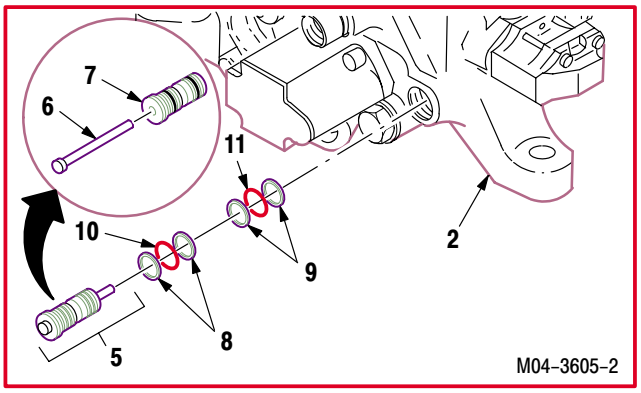
7.77. UTILITY HYDRAULIC MANIFOLD LOW LEVEL VALVE REPLACEMENT (AVIM) – continued

b. **Remove lap assembly (5) from manifold (2).**

(1) Remove and discard slide (6) from manifold (2). Use needle nose pliers.

(2) Remove sleeve (7) from manifold (2). Use scribe to dislodge sleeve (7).

(3) Discard sleeve (7), four packing retainers (8) and (9), and two packings (10) and (11).



7.77.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.77.5. Inspection

a. **Check cap and manifold for nicked or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.77.6. Installation

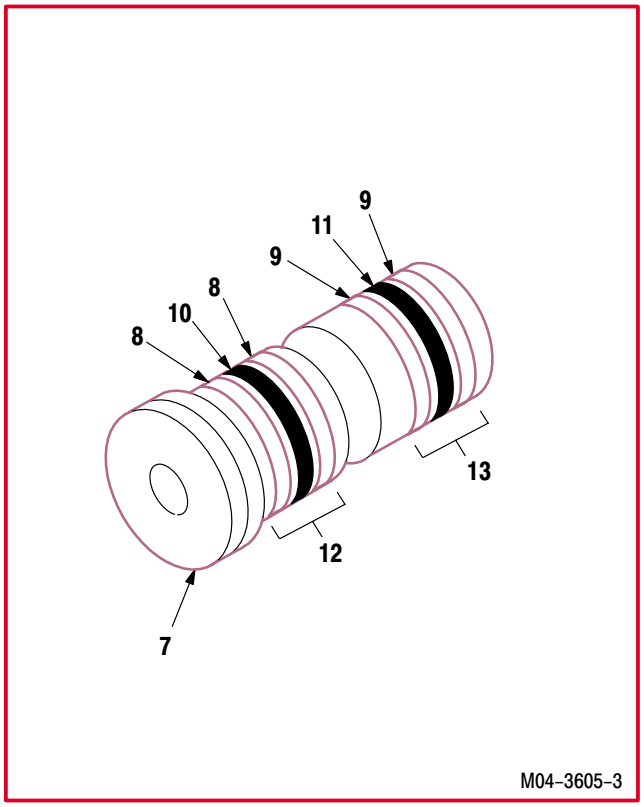


a. **Install four new packing retainers (8) and (9) and two new packings (10) and (11) on new sleeve (7).**

(1) Lubricate packing retainers (8) and (9) and packings (10) and (11). Use clean hydraulic fluid (item 92, App F).

(2) Install packing retainers (8) and packing (10) in groove (12) of sleeve (7).

(3) Install packing retainers (9) and packing (11) in groove (13) of sleeve (7).

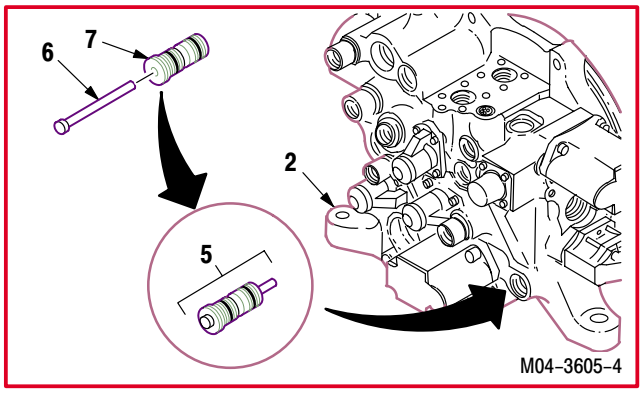


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7.77. UTILITY HYDRAULIC MANIFOLD LOW LEVEL VALVE REPLACEMENT (AVIM) – continued

b. **Install new slide (6) in sleeve (7).**

c. **Install lap assembly (5) in manifold (2).**



d. **Install new packing (4) and two new backup rings (3) on cap (1).**

(1) Lubricate packing (4) and backup rings (3). Use clean hydraulic fluid (item 92, App F).

(2) Install backup rings (3) on cap (1).

(3) Install packing (4) between backup rings (3) on cap (1).

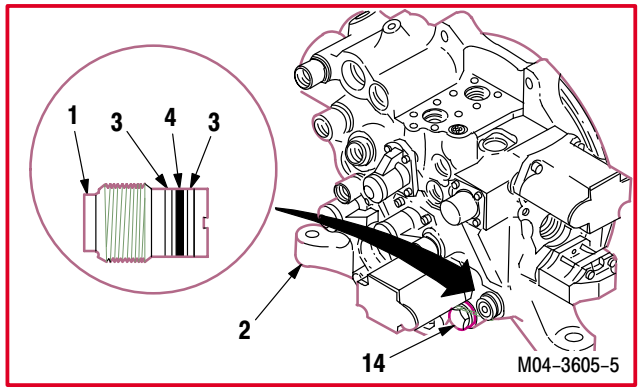
e. **Install cap (1) on manifold (2).** Torque to **75 INCH-POUNDS**.

(1) Lubricate threads of cap (1). Use clean hydraulic fluid (item 92, App F).

(2) Install cap (1) in manifold (2). Torque to **75 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(3) Lockwire cap (1) to adjacent plug (14). Use wire (item 226, App F).

f. **Inspect (QA).**



END OF TASK

7.78. UTILITY HYDRAULIC MANIFOLD DRAIN HOSE REPLACEMENT

7.78.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.78.2. Initial Setup

Tools:

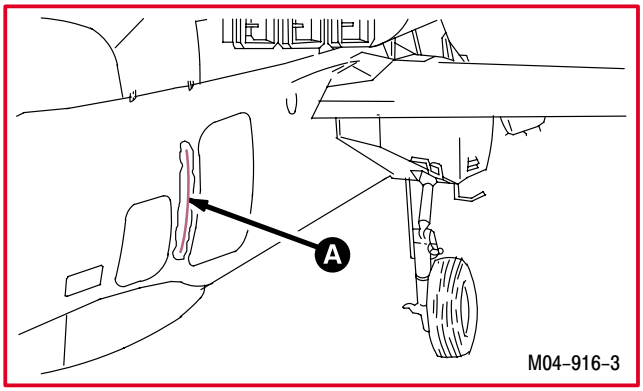
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R330 opened



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7.78. UTILITY HYDRAULIC MANIFOLD DRAIN HOSE REPLACEMENT – continued

7.78.3. Removal

a. **Remove and discard two clamps (1) from hose (2).**

b. **Remove hose (2) from tubes (3) and (4).**

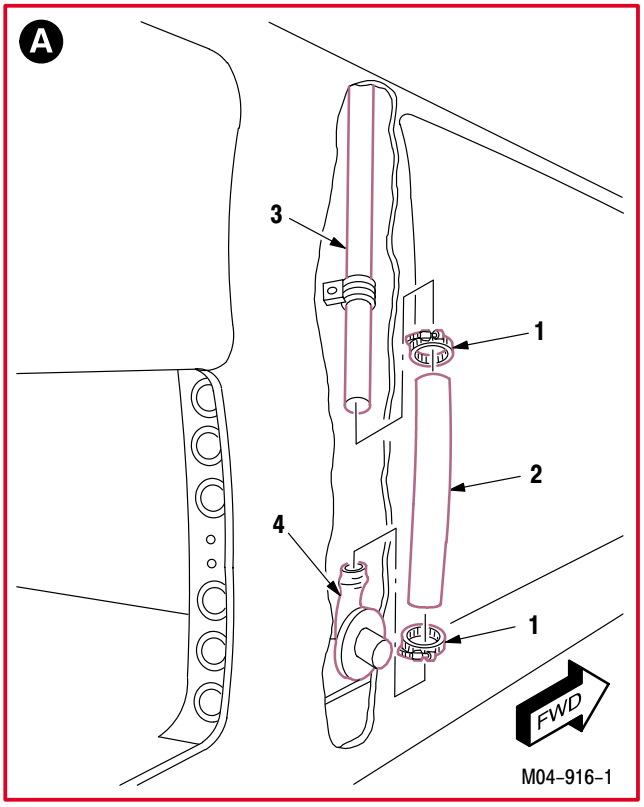
7.78.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.78.5. Inspection

a. **Check tubes for chafing, cracks, dents, nicks, and scratches** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

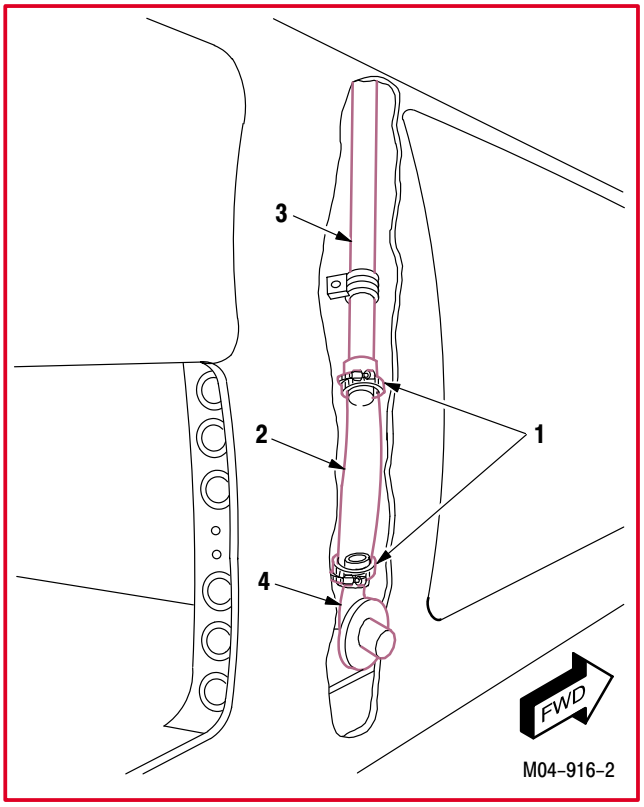


7.78.6. Installation

a. **Install new hose (2) on tubes (3) and (4).**

b. **Install two clamps (1) on hose (2).**

c. **Secure access door R330** (para 2.2)**.**



END OF TASK

7.79. UTILITY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION

7.79.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.79.2. Initial Setup

Tools:

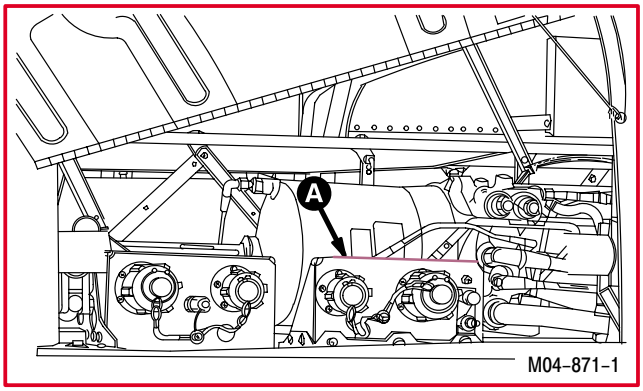
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented
7.80	Utility hydraulic GSE pressure coupling removed
7.81	Utility hydraulic GSE return coupling removed
7.85	Utility hydraulic accumulator nitrogen manifold removed



GO TO NEXT PAGE

7.79. UTILITY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION – continued

7.79.3. Removal

a. **Remove dust caps (1) from utility hydraulic GSE panel (2).**

(1) Hold nut (3).

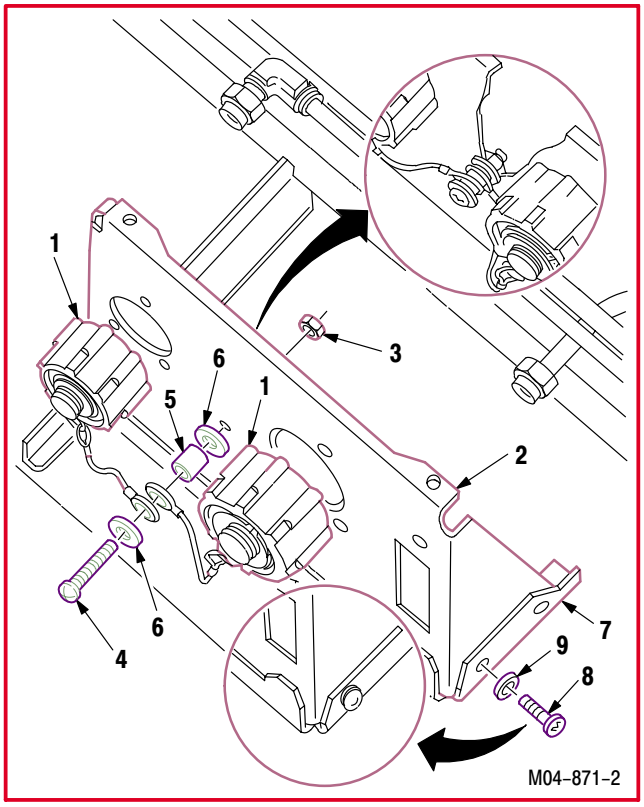
(2) Remove screw (4), spacer (5), and two washers (6) from dust cap (1) cables. Remove nut (3).

(3) Remove dust caps (1).

b. **Remove panel (2) from mounting bracket (7).**

(1) Remove seven screws (8) and washers (9).

(2) Remove panel (2).



7.79.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.79.5. Inspection

a. **Check panel for dents, nicks, and cracks** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.79. UTILITY HYDRAULIC GSE PANEL REMOVAL/INSTALLATION – continued

7.79.6. Installation

a. **Install panel (2) on mounting bracket (7).**

(1) Position panel (2) on bracket (7) to aline screw holes.

(2) Install seven screws (8) and washers (9).

b. **Install dust caps (1) on panel (2).**

(1) Insert spacer (5) through dust cap (1) cables.

(2) Install screw (4) through two washers (6) and spacer (5) into panel (2).

(3) Install nut (3).

c. **Inspect (QA).**

d. **Install utility hydraulic accumulator nitrogen manifold** (para 7.85)**.**

e. **Install utility hydraulic GSE return coupling** (para 7.81)**.**

f. **Install utility hydraulic GSE pressure coupling** (para 7.80)**.**

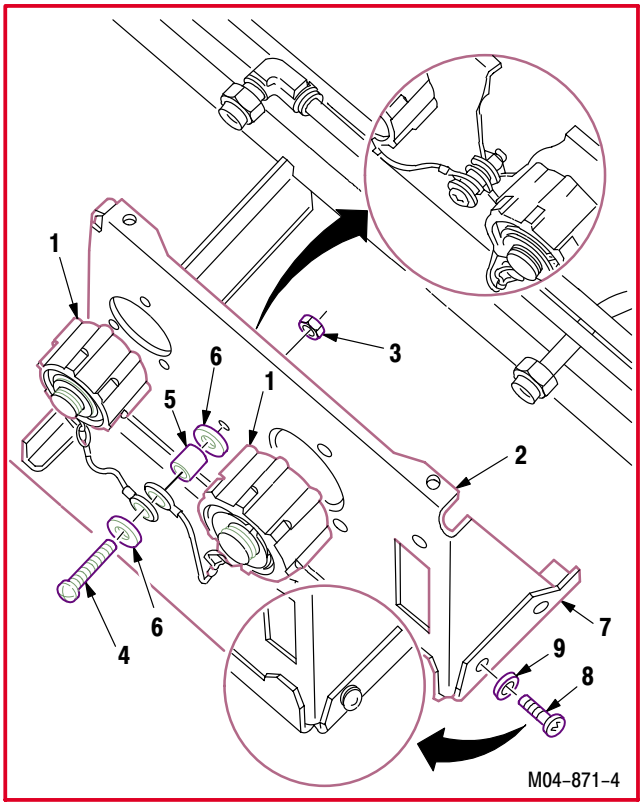
g. **Service utility hydraulic accumulator** (para 1.36)**.**

h. **Bleed utility hydraulic system** (para 1.35)**.**

i. **Service utility hydraulic system** (para 1.34)**.**

j. **Perform hydraulic system leak check** (para 7.2)**.**

k. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.80. UTILITY HYDRAULIC GSE PRESSURE COUPLING REPLACEMENT

7.80.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.80.2. Initial Setup

Tools:

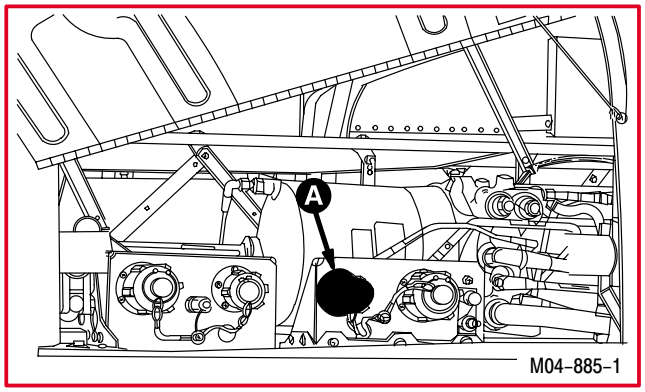
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented



GO TO NEXT PAGE

7.80. UTILITY HYDRAULIC GSE PRESSURE COUPLING REPLACEMENT – continued

7.80.3. Removal

a. **Remove dust cap (1) from GSE pressure coupling (2).**

b. **Remove pressure tube (3) from coupling (2).**

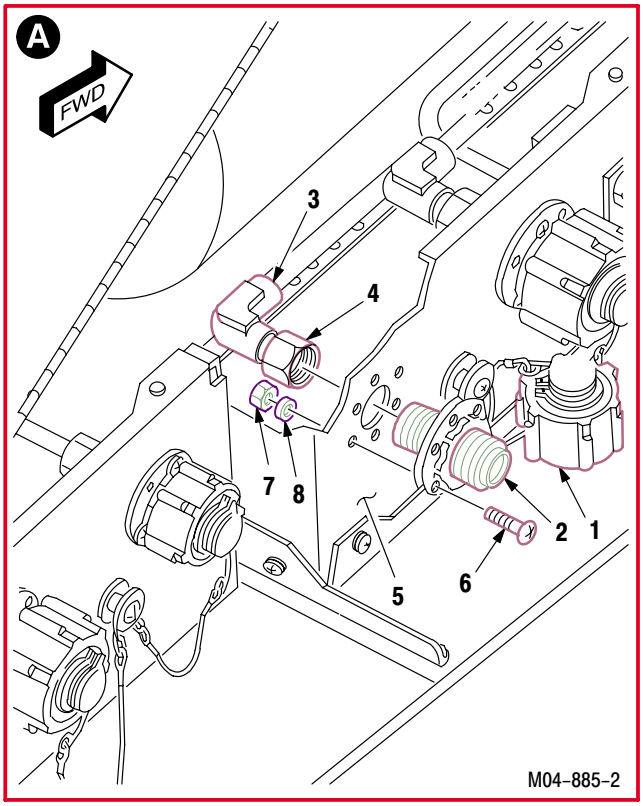
(1) Place rags under nut (4) to catch hydraulic fluid spills.

(2) Hold coupling (2). Remove nut (4).

c. **Remove coupling (2) from GSE panel (5).**

(1) Remove three screws (6), nuts (7), and washers (8).

(2) Remove coupling (2).



7.80.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.80.5. Inspection

a. **Check dust cap, tube, and nut for nicks, cracks, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.80. UTILITY HYDRAULIC GSE PRESSURE COUPLING REPLACEMENT – continued

7.80.6. Installation

a. **Install new coupling (2) on panel (5).**

(1) Insert and aline coupling (2) through panel (5).

(2) Install three screws (6), washers (8), and nuts (7).

b. **Install tube (3) on coupling (2).**

(1) Hold coupling (2). Install nut (4).

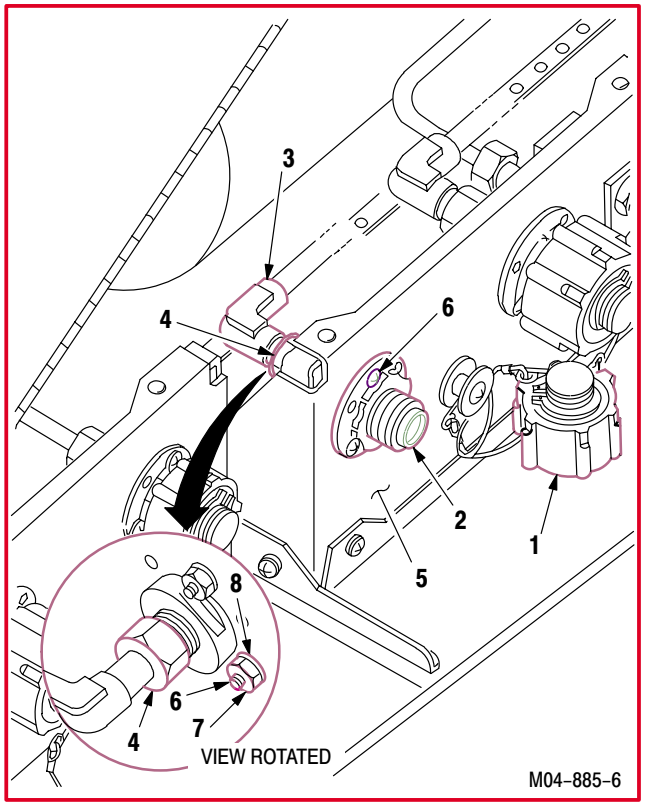
c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.81. UTILITY HYDRAULIC GSE RETURN COUPLING REPLACEMENT

7.81.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.81.2. Initial Setup

Tools:

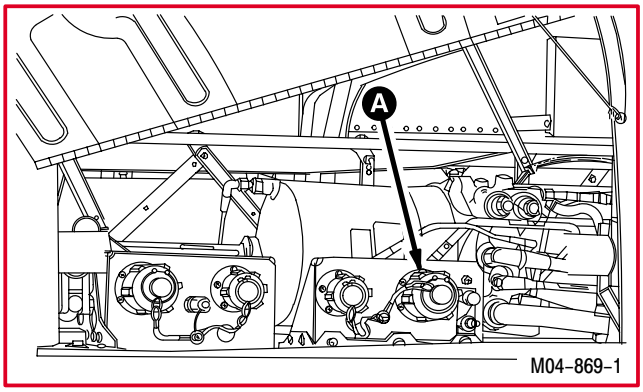
Aircraft mechanic's tool kit (item 376, App H)
1 1/4 & 1 5/16-inch open end wrench (item 419, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented



GO TO NEXT PAGE

7.81. UTILITY HYDRAULIC GSE RETURN COUPLING REPLACEMENT – continued

7.81.3. Removal

a. **Remove dust cap (1) from GSE return coupling (2).**

b. **Remove return tube (3) from coupling (2).**

(1) Place rags under nut (4) to catch hydraulic fluid spills.

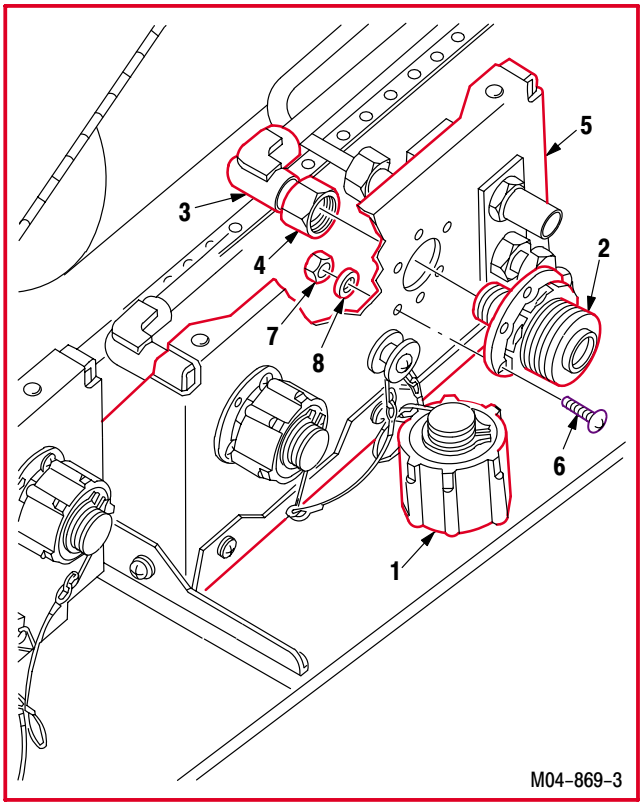
(2) Hold coupling (2). Use open end wrench.

(3) Remove nut (4).

c. **Remove coupling (2) from GSE panel (5).**

(1) Remove three screws (6), nuts (7), and washers (8).

(2) Remove coupling (2).



7.81.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.81.5. Inspection

a. **Check dust cap, tube, and nut for nicks, cracks, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.81. UTILITY HYDRAULIC GSE RETURN COUPLING REPLACEMENT – continued

7.81.6. Installation

a. **Install new coupling (2) on panel (5).**

(1) Insert and aline coupling (2) through panel (5).

(2) Install three screws (6), washers (8) and nuts (7).

b. **Install tube (3) on coupling (2).**

(1) Hold coupling (2). Use open end wrench.

(2) Install nut (4).

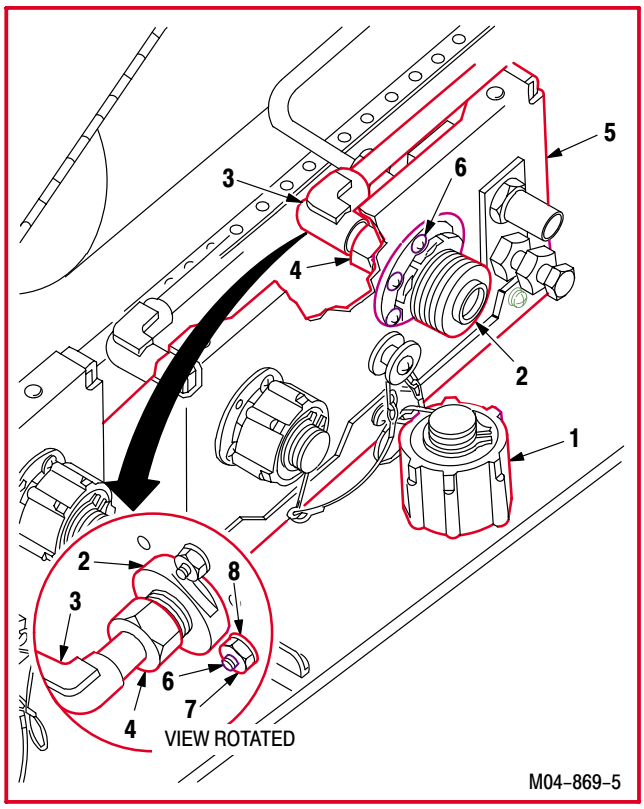
c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Secure access door R325** (para 2.2)**.**



END OF TASK

7.82. UTILITY HYDRAULIC ACCUMULATOR REMOVAL/INSTALLATION

7.82.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.82.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/16 & 1 1/4-inch open end wrench (item 416, App H)

References:

TM 1-1520-238-T

Materials/Parts:

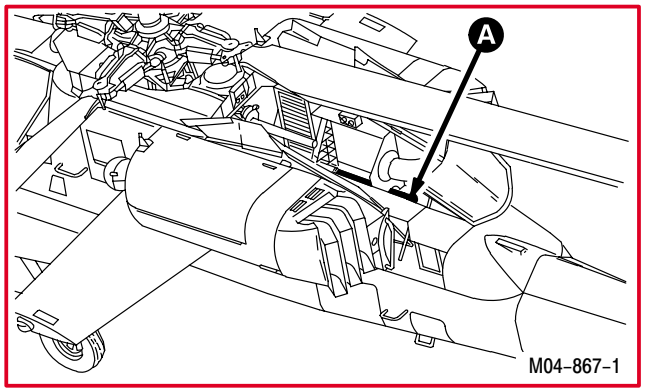
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, L325, and R325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented
15.2	APU removed



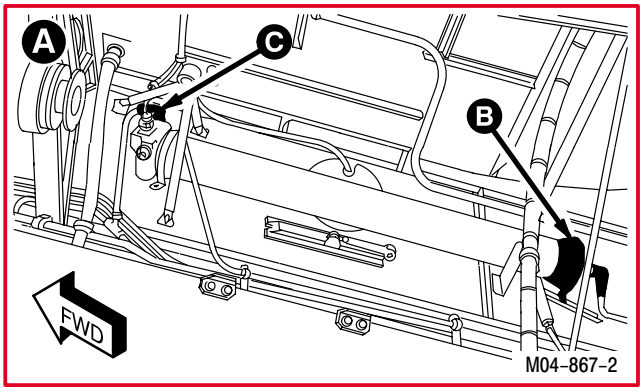
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7.82. UTILITY HYDRAULIC ACCUMULATOR REMOVAL/INSTALLATION – continued

7.82.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open EMERG HYD circuit breaker.**

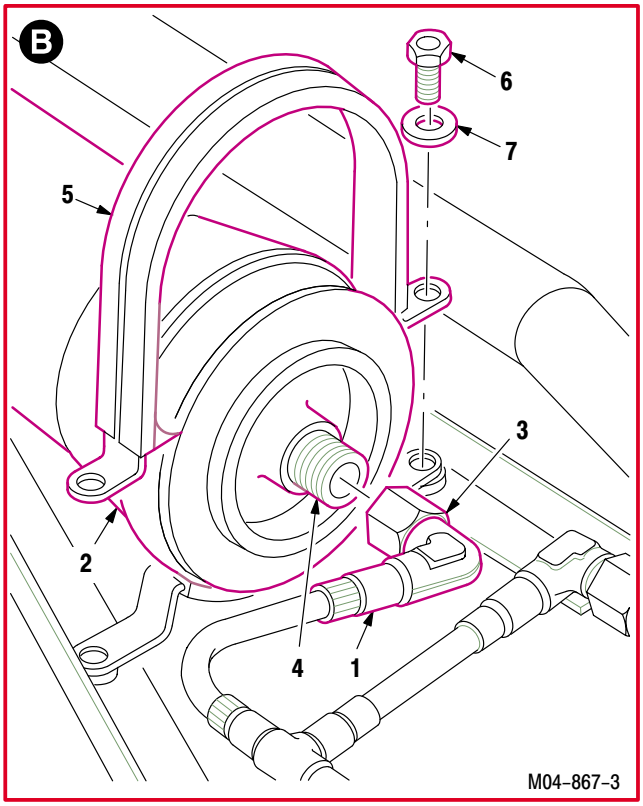


c. **Remove nitrogen gas tube (1) from hydraulic accumulator (2).**

(1) Remove nut (3) from adapter (4).

d. **Remove aft retaining strap (5) from accumulator (2).**

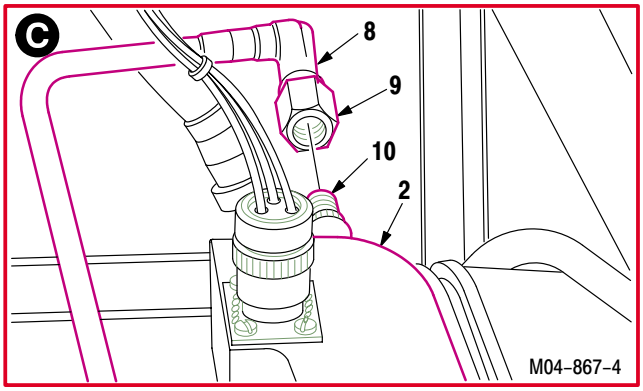
(1) Remove two bolts (6) and washers (7).



e. **Remove reservoir return tube (8) from accumulator (2).**

(1) Place rags under tube (8) to catch hydraulic fluid spills.

(2) Remove nut (9) from adapter (10).



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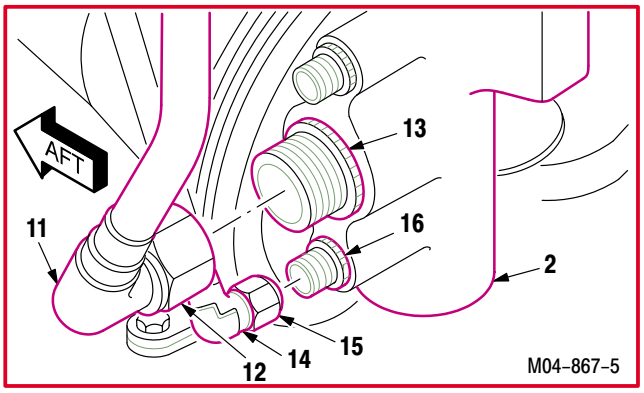
7.82. UTILITY HYDRAULIC ACCUMULATOR REMOVAL/INSTALLATION – continued

f. **Remove APU start hose (11) from accumulator (2).**

(1) Remove nut (12) from adapter (13). Use open end wrench.

g. **Remove supply pressure tube (14) from accumulator (2).**

(1) Remove nut (15) from adapter (16).



h. **Detach connector P51 (17) from receptacle (HP3)J1 (18).**

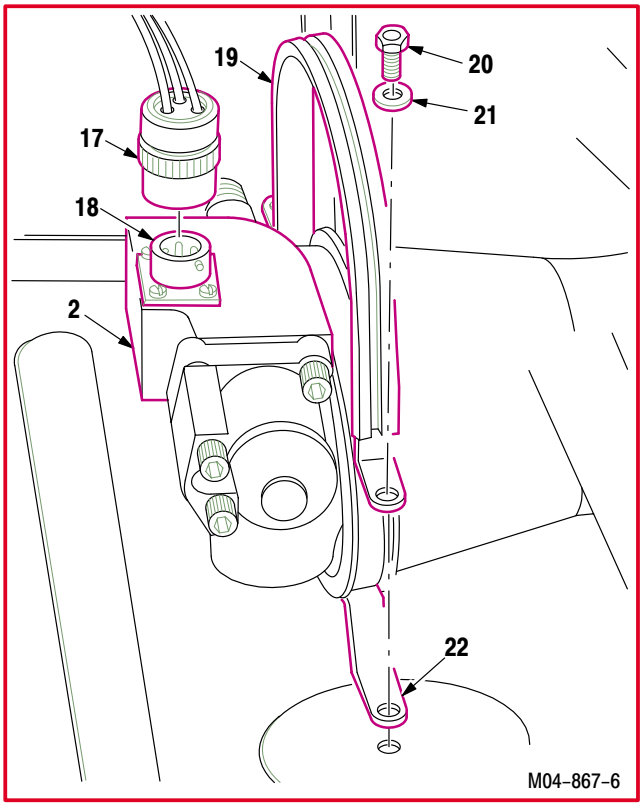
i. **Remove forward retaining strap (19) from accumulator (2).**

(1) Remove two bolts (20) and washers (21).

j. **Remove accumulator (2).**

k. **Remove bottom half of forward retaining strap (22).**

l. **Remove bottom half of aft retaining strap (23) and two bushings (24).**



7.82.4. Cleaning

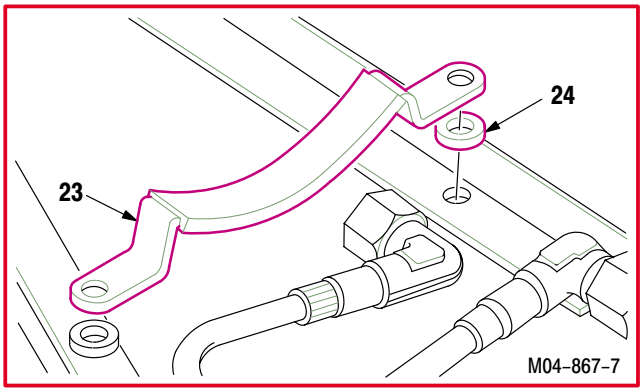
a. **Wipe removed and attaching parts with a clean rag.**

7.82.5. Inspection

a. **Check accumulator for nicks, dents, and stripped or damaged threads** (para 7.56)**.**

b. **Check tubes for nicks, cuts, chafing, and stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.82. UTILITY HYDRAULIC ACCUMULATOR REMOVAL/INSTALLATION – continued

7.82.6. Installation

a. **Install accumulator (2).**

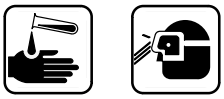
(1) Carefully install accumulator (2) around nearby components.

b. **Install aft retaining strap (5) on accumulator (2).**

(1) Install bottom half of aft retaining strap (23) on accumulator (2).

(2) Install aft retaining strap (5).

(3) Install two bolts (6) and washers (7) through straps (5) and (23) and bushings (24).



c. **Install tube (1) on accumulator (2).**

(1) Lubricate threads of adapter (4). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (3) on adapter (4).

d. **Install forward retaining strap (19) on accumulator (2).**

(1) Install bottom half of forward retaining strap (22) on accumulator (2).

(2) Install forward retaining strap (19).

(3) Install two bolts (20) and washers (21) through straps (19) and (22).

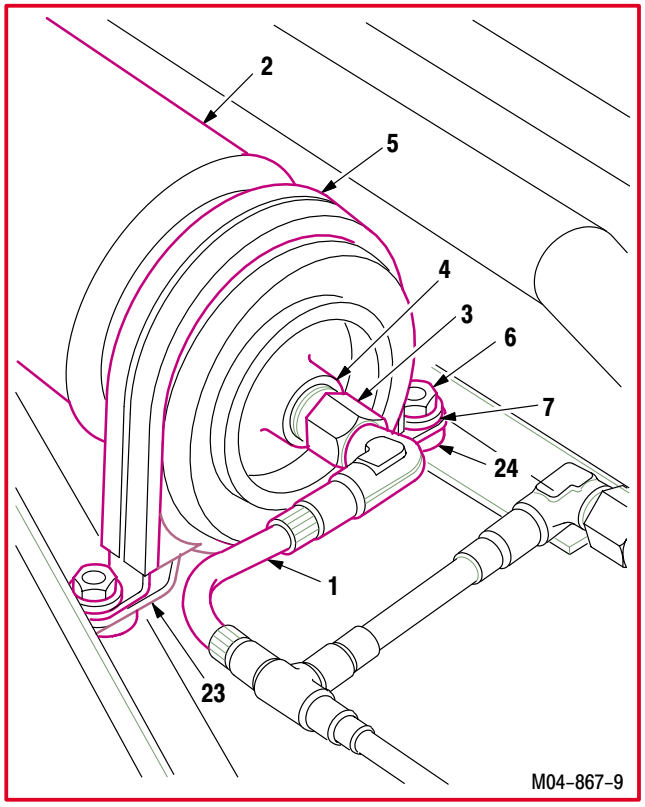
e. **Install tube (8) on accumulator (2).**

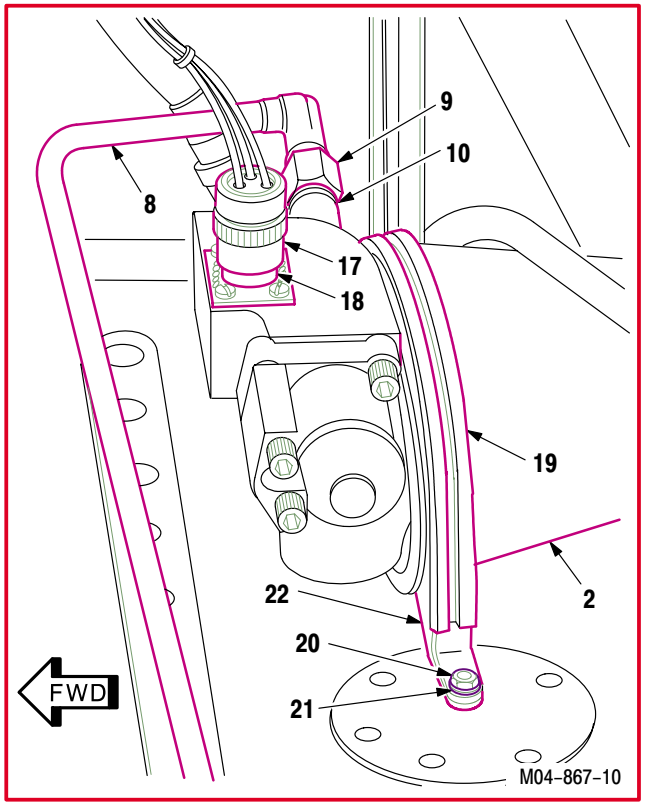
(1) Lubricate threads of adapter (10). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (9) on adapter (10).

f. **Attach connector P51 (17) to receptacle (HP3)J1 (18).**

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7.82. UTILITY HYDRAULIC ACCUMULATOR REMOVAL/INSTALLATION – continued

g. **Install hose (11) on accumulator (2).**

(1) Lubricate threads of adapter (13). Use clean hydraulic fluid (item 92, App F).

(2) Position hose (11) vertically on adapter (13). Install nut (12).

h. **Install tube (14) on adapter (16).**

(1) Lubricate threads of adapter (16). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (15) on adapter (16).

i. **Inspect (QA).**

j. **Install APU** (para 15.3)**.**

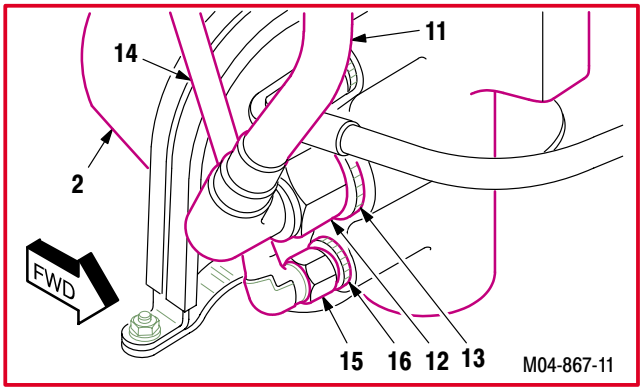
k. **Service utility hydraulic accumulator** (para 1.36)**.**

l. **Bleed utility hydraulic system** (para 1.35)**.**

m. **Service utility hydraulic system** (para 1.34)**.**

n. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

o. **Secure access doors T250L, T250R, T290L, T290R, L325, and R325** (para 2.2)**.**



END OF TASK

7.83. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD FILL/BLEED VALVE REPLACEMENT

7.83.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.83.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 3/8-inch drive open end box socket wrench crow-foot attachment (item 81, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

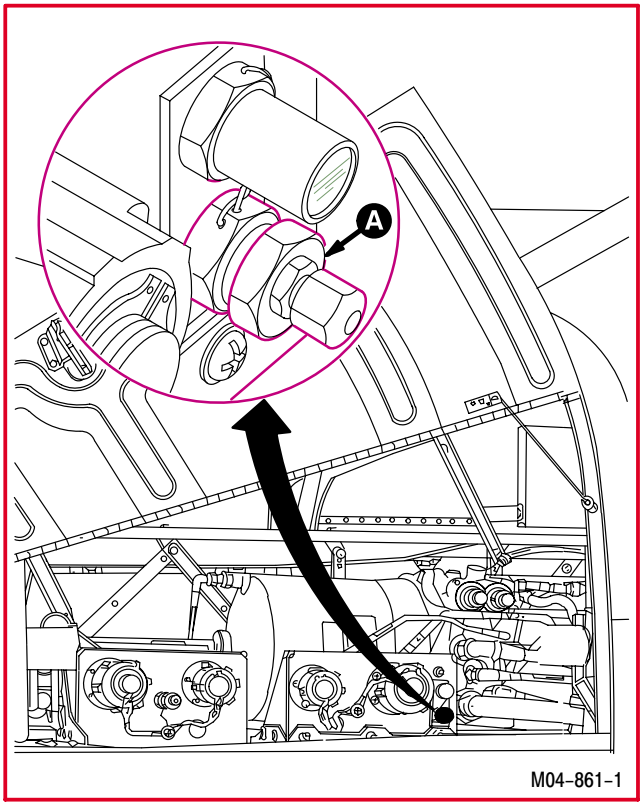
Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented



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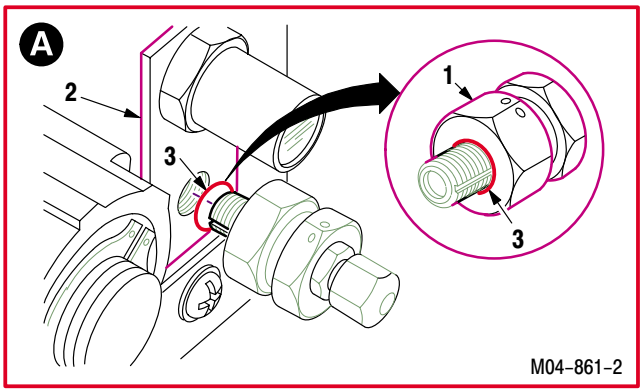
7.83. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD FILL/BLEED VALVE REPLACEMENT – continued

7.83.3. Removal

a. **Remove fill/bleed valve (1) from manifold (2).**

(1) Remove lockwire from valve (1).

(2) Remove and discard valve (1) and packing (3).



7.83.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.83.5. Inspection

a. **Check manifold for cracks, nicks, scratches, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.83.6. Installation



a. **Install new packing (3) on new valve (1).**

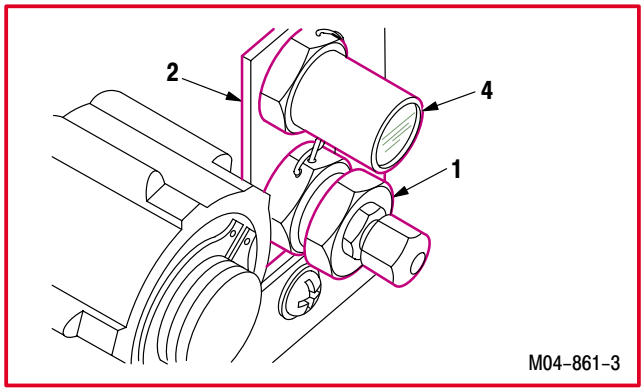
(1) Lubricate packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on valve (1).

b. **Install valve (1) on manifold (2).** Torque valve (1) to **80 INCH-POUNDS**.

(1) Install valve (1). Torque to **80 INCH-POUNDS**. Use crowfoot and torque wrench.

(2) Lockwire valve (1) to pressure gage (4). Use wire (item 226, App F).



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7.83. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD FILL/BLEED VALVE REPLACEMENT – continued

c. **Inspect (QA).**

d. **Service utility hydraulic accumulator** (para 1.36)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Secure access door R325** (para 2.2)**.**

END OF TASK

7.84. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD PRESSURE GAGE REPLACEMENT

7.84.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.84.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 3/8-inch drive open end box socket wrench crow-foot attachment (item 81, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

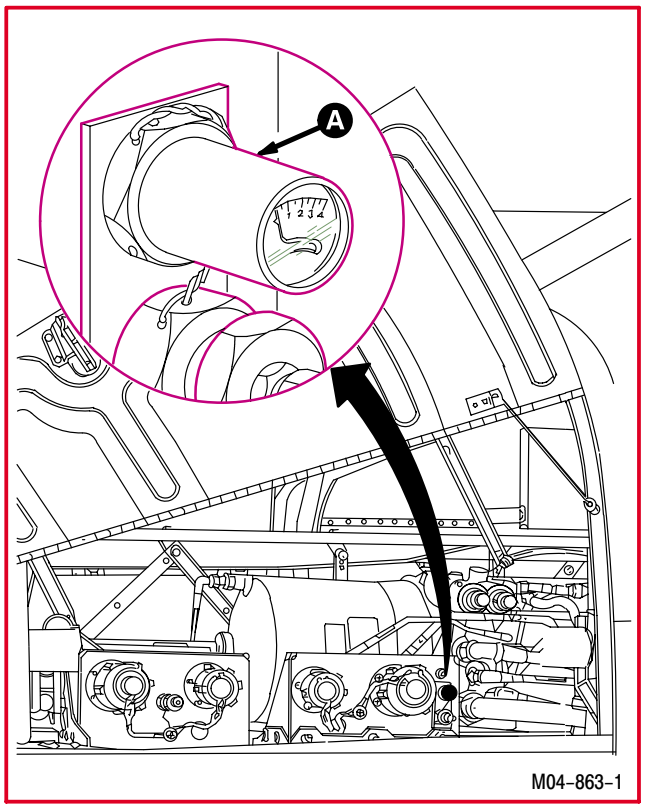
Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented



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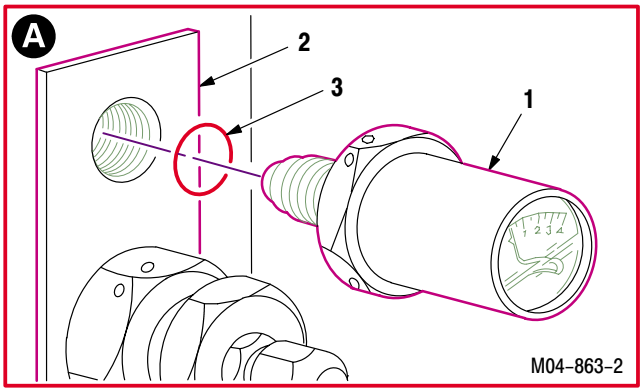
7.84. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD PRESSURE GAGE REPLACEMENT – continued

7.84.3. Removal

a. **Remove pressure gage (1) from manifold (2).**

(1) Remove lockwire from gage (1).

(2) Remove and discard gage (1) and packing (3).



7.84.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.84.5. Inspection

a. **Check manifold for cracks, nicks, scratches, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.84.6. Installation



a. **Install new packing (3) on new gage (1).**

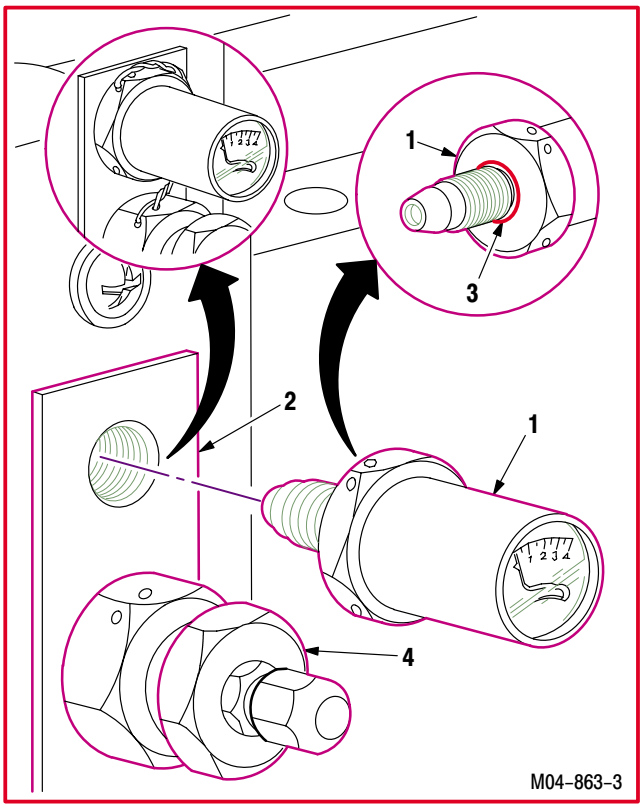
(1) Lubricate packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on gage (1).

b. **Install gage (1) on manifold (2).** Torque gage (1) to **50 INCH-POUNDS**.

(1) Install gage (1). Torque to **50 INCH-POUNDS**. Use crowfoot and torque wrench.

(2) Lockwire gage (1) to fill/bleed valve (4). Use wire (item 226, App F).



GO TO NEXT PAGE

7.84. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD PRESSURE GAGE REPLACEMENT – continued

c. **Inspect (QA).**

d. **Service utility hydraulic accumulator** (para 1.36)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Secure access door R325** (para 2.2)**.**

END OF TASK

7.85. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD REMOVAL/INSTALLATION

7.85.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.85.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

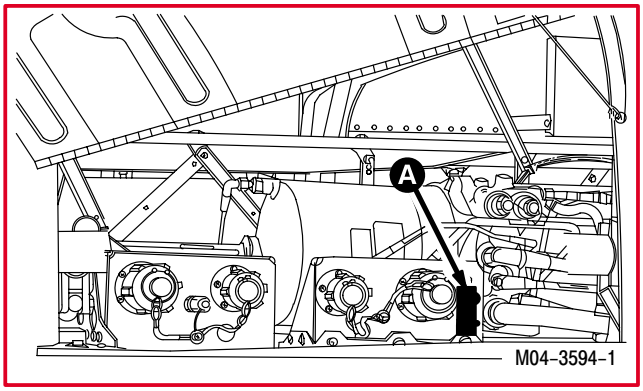
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
7.83	Utility hydraulic accumulator nitrogen manifold fill/bleed valve removed
7.84	Utility hydraulic accumulator nitrogen manifold pressure gage removed

Materials/Parts:

Locknuts (2)



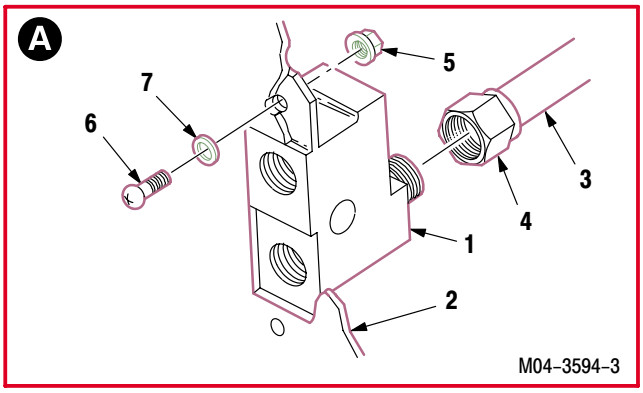
7.85.3. Removal

a. **Remove manifold (1) from utility GSE panel (2).**

(1) Remove tube (3) from manifold (1). Remove nut (4).

(2) Hold two locknuts (5). Remove two screws (6) and washers (7) from manifold (1). Discard two locknuts (5).

(3) Remove manifold (1).



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7.85. UTILITY HYDRAULIC ACCUMULATOR NITROGEN MANIFOLD REMOVAL/INSTALLATION – continued

7.85.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.85.5. Inspection

a. **Check manifold, pressure gage, and fill/bleed valve for nicks, dents, cracks, and stripped or damaged threads** (para 7.56)**.**

b. **Check tube for nicks, dents, cracks, and stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.85.6. Installation

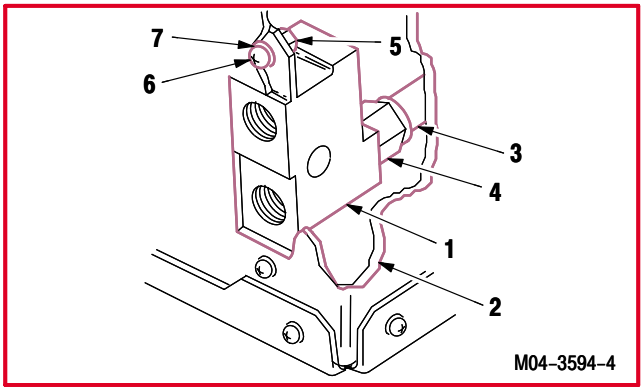
a. **Install manifold (1) on panel (2).**

(1) Aline manifold (1) on panel (2).

(2) Install two screws (6) and washers (7) through panel (2) and manifold (1).

(3) Hold two screws (6). Install two new locknuts (5) on screws (6).

(4) Install tube (3) on manifold (1). Install nut (4).



b. **Inspect (QA).**

c. **Install utility hydraulic accumulator nitrogen manifold pressure gage** (para 7.84)**.**

d. **Install utility hydraulic accumulator nitrogen manifold fill/bleed valve** (para 7.83)**.**

e. **Service utility hydraulic accumulator** (para 1.36)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Secure access door R325** (para 2.2)**.**

END OF TASK

7.86. UTILITY HYDRAULIC ACCUMULATOR ONE-WAY RESTRICTOR VALVE REPLACEMENT

7.86.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.86.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

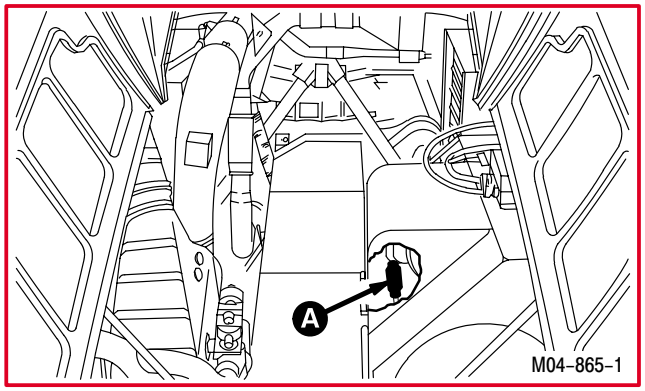
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented



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7.86. UTILITY HYDRAULIC ACCUMULATOR ONE-WAY RESTRICTOR VALVE REPLACEMENT – continued

7.86.3. Removal

CAUTION

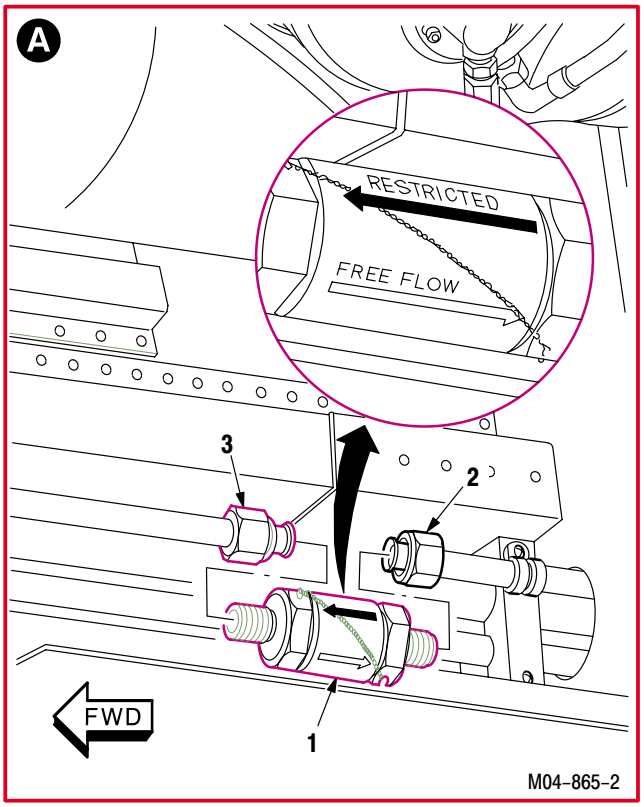
To prevent contamination or damage to restrictor valve, do not remove lockwire or disassemble restrictor valve.

a. **Remove restrictor valve (1).**

(1) Place rags under valve (1) to catch hydraulic fluid spills.

(2) Hold valve (1). Remove nuts (2) and (3).

(3) Remove and discard valve (1).



7.86.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.86.5. Installation

a. **Check tubes for chafing, cracks, dents, nicks, and scratches** (para 7.56)**.**

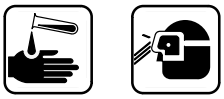
b. **Check nuts for cracks, rounded flats, and stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.86. UTILITY HYDRAULIC ACCUMULATOR ONE-WAY RESTRICTOR VALVE REPLACEMENT – continued

7.86.6. Installation



a. **Install new restrictor valve (1) with free flow arrow pointing aft.** Torque nuts (2) and (3) to **85 INCH-POUNDS**.

(1) Lubricate threads of valve (1). Use clean hydraulic fluid (item 92, App F).

(2) Hold nearest flat of valve (1). Torque nuts (2) and (3) to **85 INCH-POUNDS**. Use torque wrench.

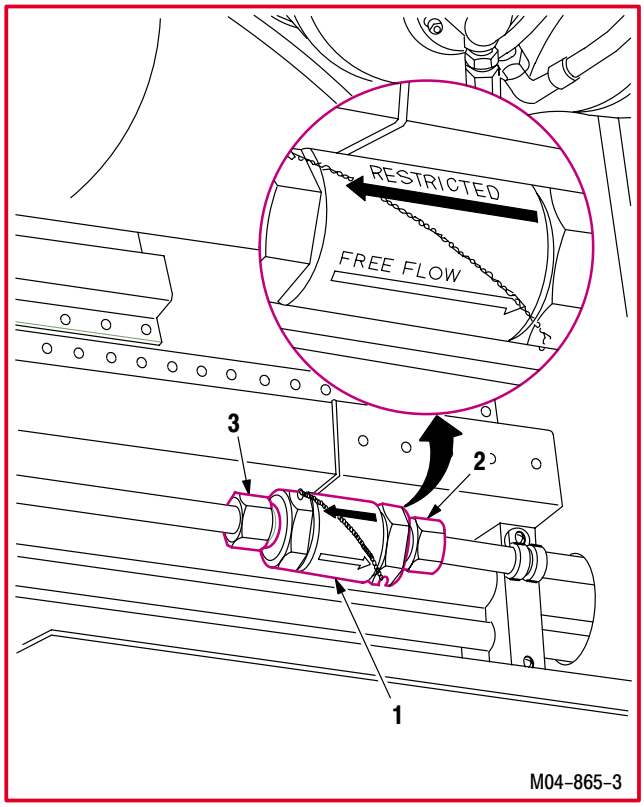
b. **Inspect (QA).**

c. **Bleed utility hydraulic system** (para 1.35)**.**

d. **Service utility hydraulic system** (para 1.34)**.**

e. **Perform hydraulic system leak check** (para 7.2)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.87. UTILITY HYDRAULIC ACCUMULATOR CHECK VALVE REPLACEMENT

7.87.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.87.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

References:

TM 1-1520-238-T

Materials/Parts:

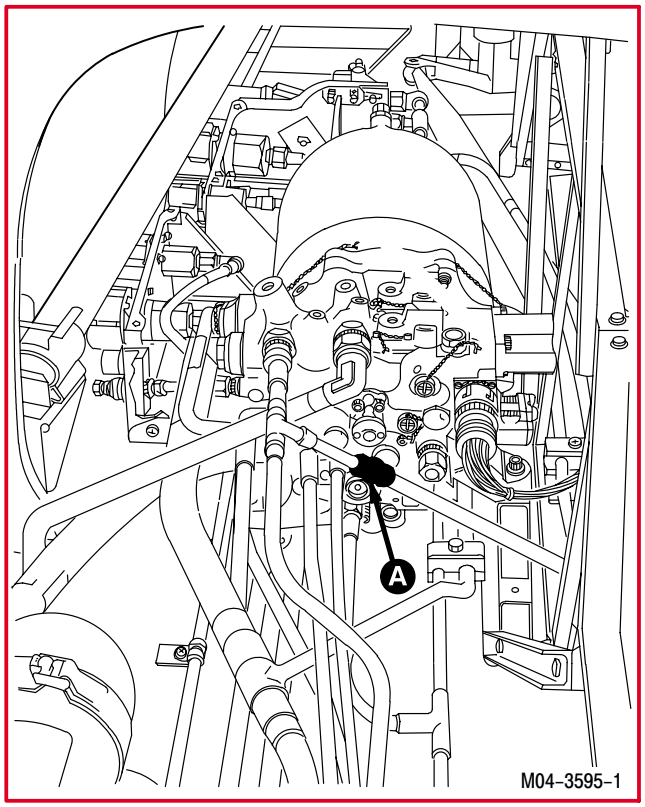
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented



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7.87. UTILITY HYDRAULIC ACCUMULATOR CHECK VALVE REPLACEMENT – continued

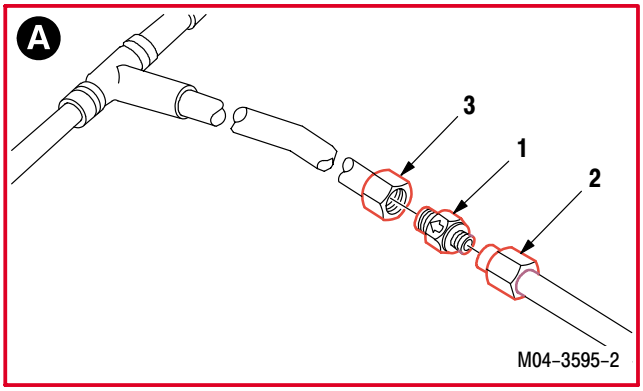
7.87.3. Removal

a. **Remove check valve (1).**

(1) Place rags under check valve (1) to catch hydraulic fluid spills.

(2) Hold check valve (1). Remove nuts (2) and (3) from check valve (1).

(3) Remove and discard check valve (1).



7.87.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.87.5. Inspection

a. **Check nuts for nicks, dents, scratches, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

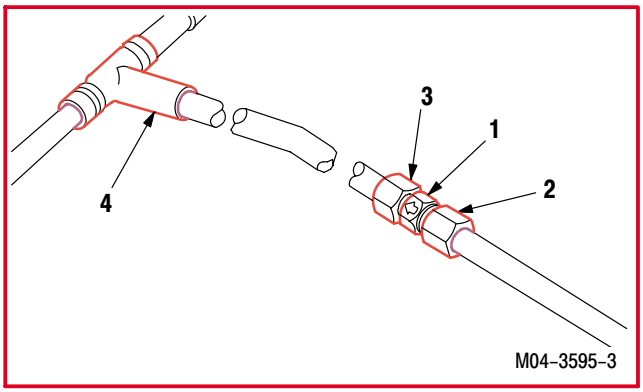
7.87.6. Installation



a. **Install new check valve (1) with arrow on valve pointing toward tee union (4).**

(1) Lubricate threads of check valve (1). Use clean hydraulic fluid (item 92, App F).

(2) Hold check valve (1). Install nuts (2) and (3) on check valve (1).



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7.87. UTILITY HYDRAULIC ACCUMULATOR CHECK VALVE REPLACEMENT – continued

b. **Inspect (QA).**

c. **Service utility hydraulic accumulator** (para 1.36)**.**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Secure access doors T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.88. UTILITY HYDRAULIC ACCUMULATOR APU START SOLENOID VALVE REPLACEMENT

7.88.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.88.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
5/32-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 324, App H)

References:

TM 1-1520-238-T

Materials/Parts:

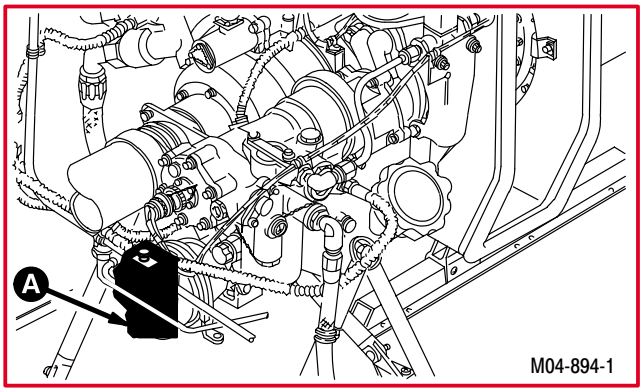
Packing (3)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented
15.41	APU enclosure removed



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7.88. UTILITY HYDRAULIC ACCUMULATOR APU START SOLENOID VALVE REPLACEMENT – continued

7.88.3. Removal

a. **Remove solenoid valve (1) from hydraulic accumulator (2).**

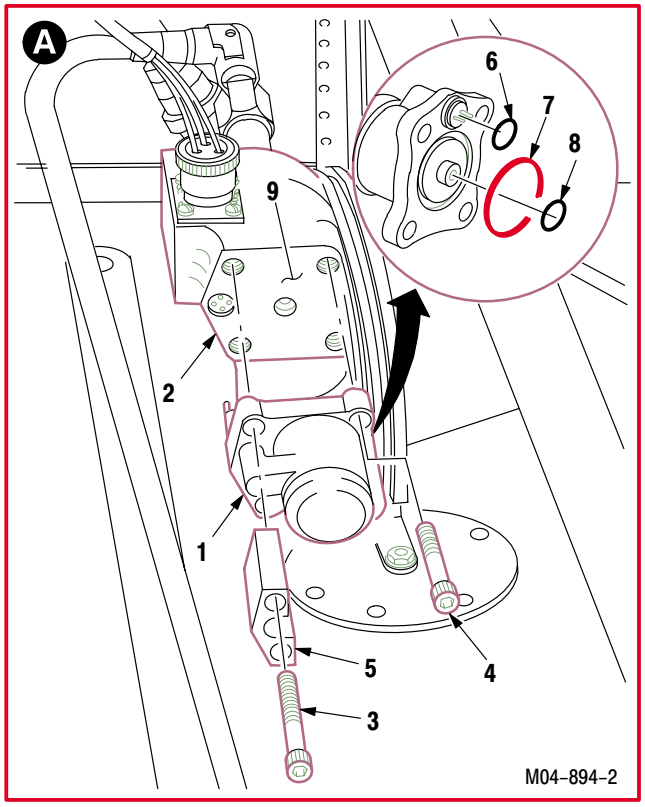
(1) Place rags under valve (1) to catch hydraulic fluid spills.

(2) Remove two screws (3) and two screws (4). Use hexagon screwdriver.

(3) Remove valve guard (5).

(4) Pull valve (1) straight away from accumulator (2).

(5) Remove and discard valve (1) with packings (6), (7), and (8) from valve mount (9).



7.88.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.88.5. Inspection

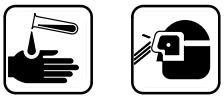
a. **Check screws for stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.88. UTILITY HYDRAULIC ACCUMULATOR APU START SOLENOID VALVE REPLACEMENT – continued

7.88.6. Installation



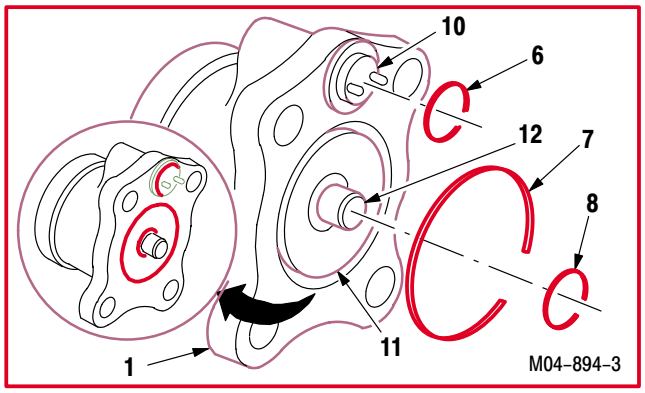
a. **Install new packings (6), (7), and (8) on new valve (1).**

(1) Lubricate packings (6), (7), and (8). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (6) on connector (10).

(3) Install packing (7) in groove (11).

(4) Install packing (8) on fitting (12).

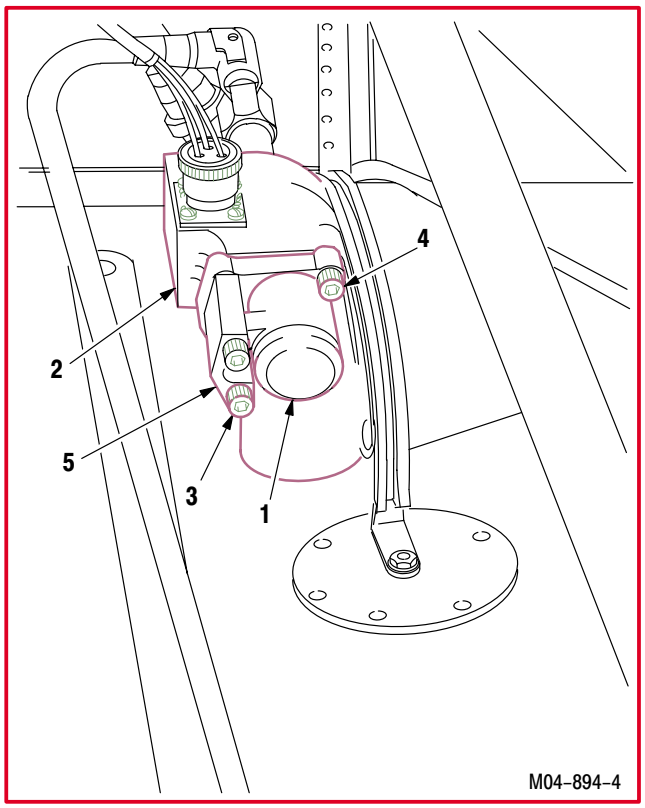


b. **Install valve (1) on accumulator (2).**

(1) Aline valve (1) on accumulator (2).

(2) Aline guard (5) on valve (1).

(3) Install two screws (3) and two screws (4). Use hexagon screwdriver.



c. **Inspect (QA).**

d. **Service utility hydraulic accumulator** (para 1.36)**.**

e. **Bleed utility hydraulic system** (para 1.35)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

h. **Install APU enclosure** (para 15.42)**.**

i. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.89. UTILITY HYDRAULIC ACCUMULATOR APU START MOTOR PRESSURE HOSE REPLACEMENT

7.89.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.89.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/4 & 1 5/16-inch open end wrench (item 419, App H)
1 3/8 & 1 7/16-inch open end wrench (item 421, App H)

References:

TM 1-1520-238-T

Materials/Parts:

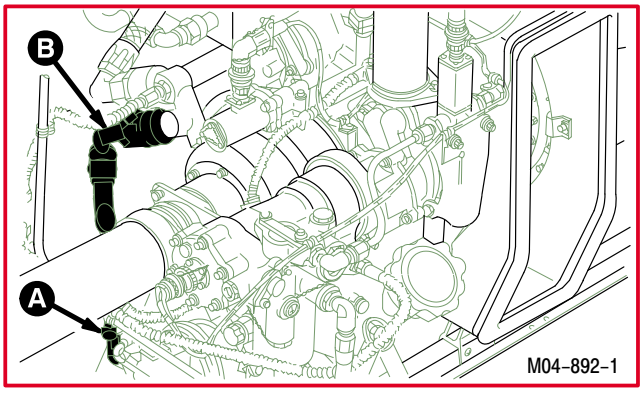
Hydraulic fluid (item 92, App F)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented
15.2	APU removed



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7.89. UTILITY HYDRAULIC ACCUMULATOR APU START MOTOR PRESSURE HOSE REPLACEMENT – continued

7.89.3. Removal

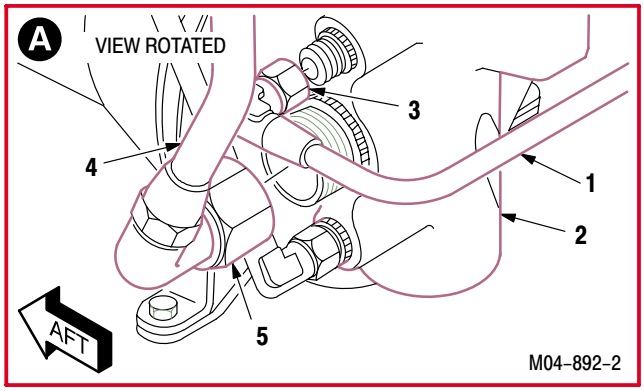
a. **Remove start valve return tube (1) from hydraulic accumulator (2).**

(1) Place rags under nut (3) to catch hydraulic fluid spills.

(2) Remove nut (3).

b. **Remove hose (4) from accumulator (2).**

(1) Remove nut (5). Use open end wrench.



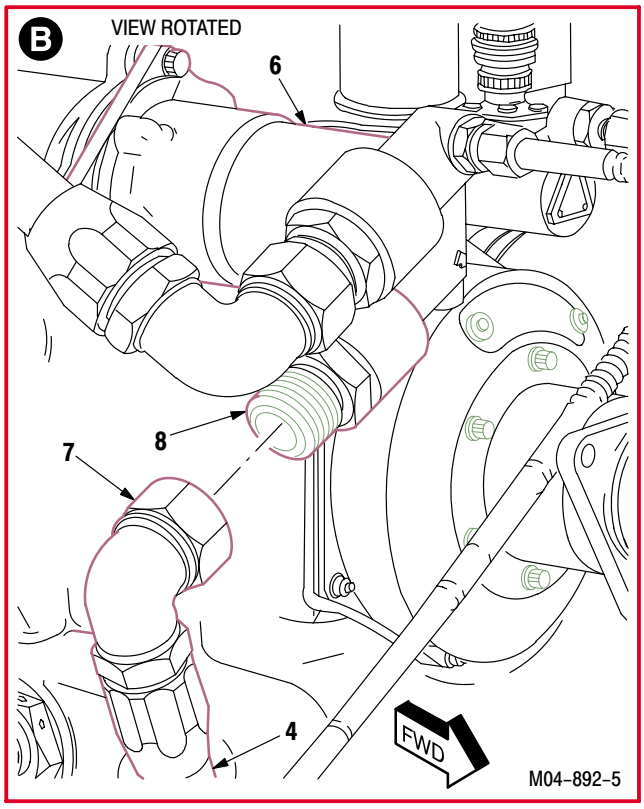
c. **Remove hose (4) from APU start motor (6).**

(1) Place rags under nut (7) to catch hydraulic fluid spills.

(2) Hold union (8). Use open end wrench.

(3) Remove nut (7). Use open end wrench.

(4) Remove and discard hose (4).



7.89.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.89.5. Inspection

a. **Check tube, union, and nuts for nicks, cuts, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.89. UTILITY HYDRAULIC ACCUMULATOR APU START MOTOR PRESSURE HOSE REPLACEMENT – continued

7.89.6. Installation

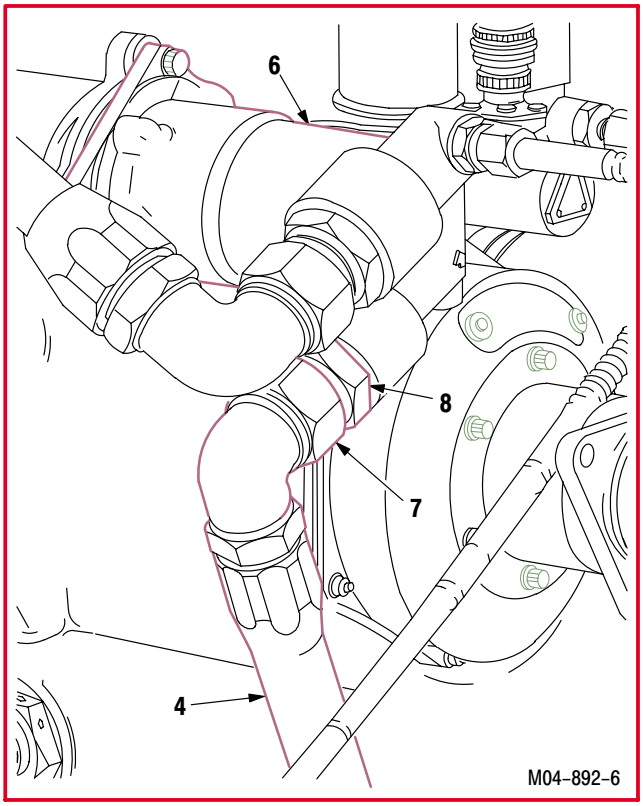


a. **Install new hose (4) on APU start motor (6).**

(1) Lubricate threads on union (8). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (8). Use open end wrench.

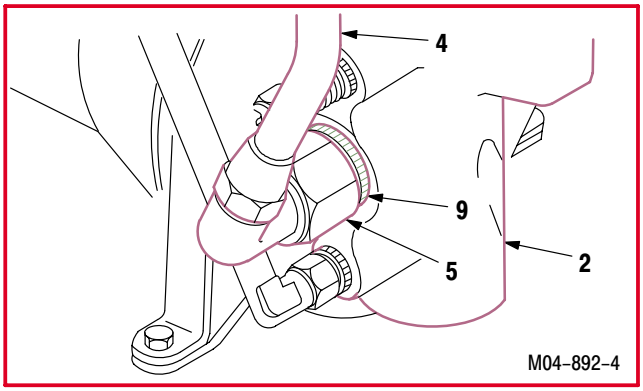
(3) Install nut (7) on union (8). Use open end wrench.



b. **Install hose (4) on accumulator (2).**

(1) Lubricate threads on adapter (9). Use clean hydraulic fluid (item 92, App F).

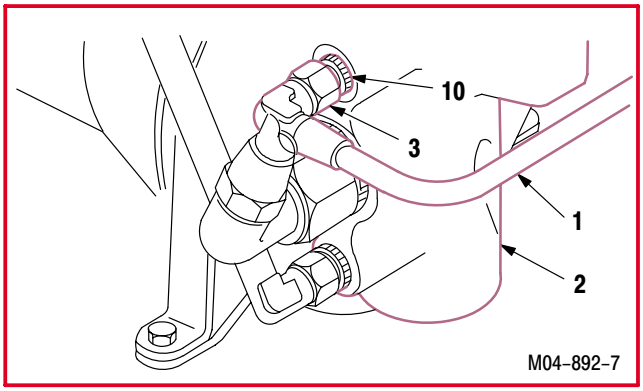
(2) Install nut (5) on adapter (9). Use open end wrench.



c. **Install tube (1) on accumulator (2).**

(1) Lubricate threads on adapter (10). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (3) on adapter (10).



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7.89. UTILITY HYDRAULIC ACCUMULATOR APU START MOTOR PRESSURE HOSE REPLACEMENT – continued

d. **Inspect (QA).**

e. **Service utility hydraulic accumulator** (para 1.36)**.**

f. **Bleed utility hydraulic system** (para 1.35)**.**

g. **Service utility hydraulic system** (para 1.34)**.**

h. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

i. **Install APU** (para 15.3)**.**

j. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.90. UTILITY HYDRAULIC ACCUMULATOR APU START MOTOR RETURN HOSE REPLACEMENT

7.90.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.90.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/2 & 1 5/8-inch open end wrench (item 418, App H) (2)

Materials/Parts:

Hydraulic fluid (item 92, App F)

Personnel Required:

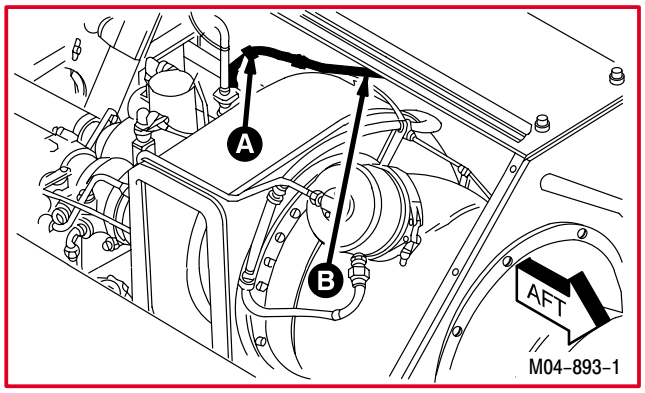
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented
15.41	APU enclosure upper front section removed



GO TO NEXT PAGE

7.90. UTILITY HYDRAULIC ACCUMULATOR APU START MOTOR RETURN HOSE REPLACEMENT – continued

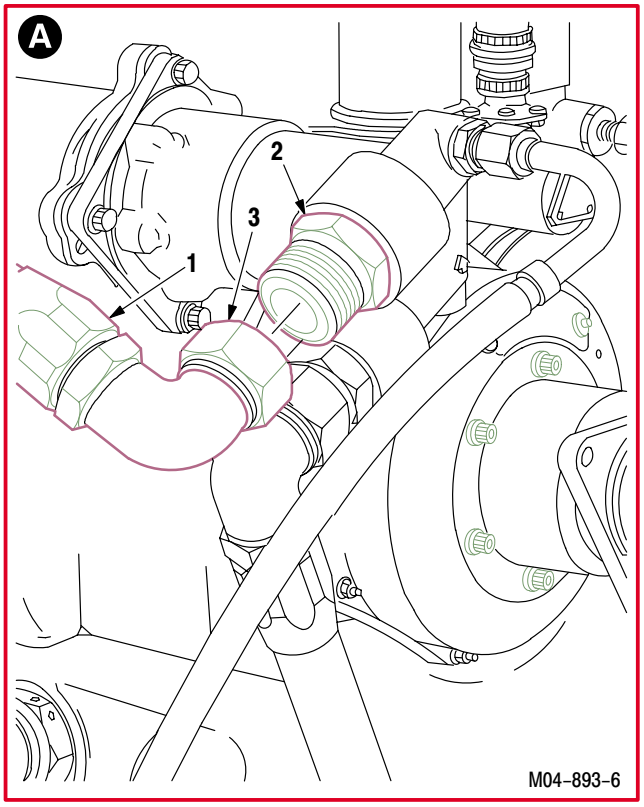
7.90.3. Removal

a. **Remove hose (1) from union (2).**

(1) Place rags under nut (3) to catch hydraulic fluid spills.

(2) Hold union (2). Use open end wrench.

(3) Remove nut (3). Use open end wrench.



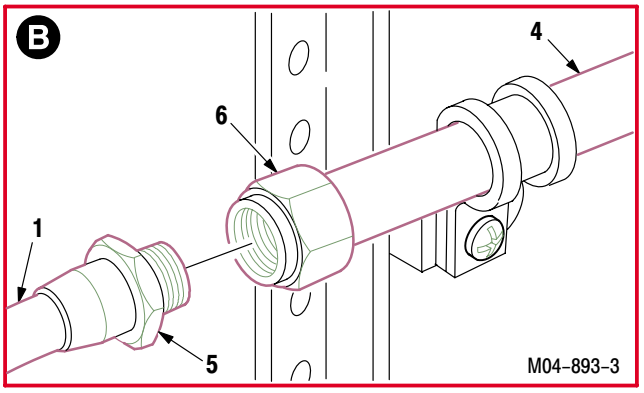
b. **Remove hose (1) from return tube (4).**

(1) Place rags under union (5) to catch hydraulic fluid spills.

(2) Hold union (5). Use open end wrench.

(3) Remove nut (6). Use open end wrench.

(4) Remove and discard hose (1).



7.90.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.90.5. Inspection

a. **Check union and nut for nicks, cuts, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

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7.90. UTILITY HYDRAULIC ACCUMULATOR APU START MOTOR RETURN HOSE REPLACEMENT – continued

7.90.6. Installation

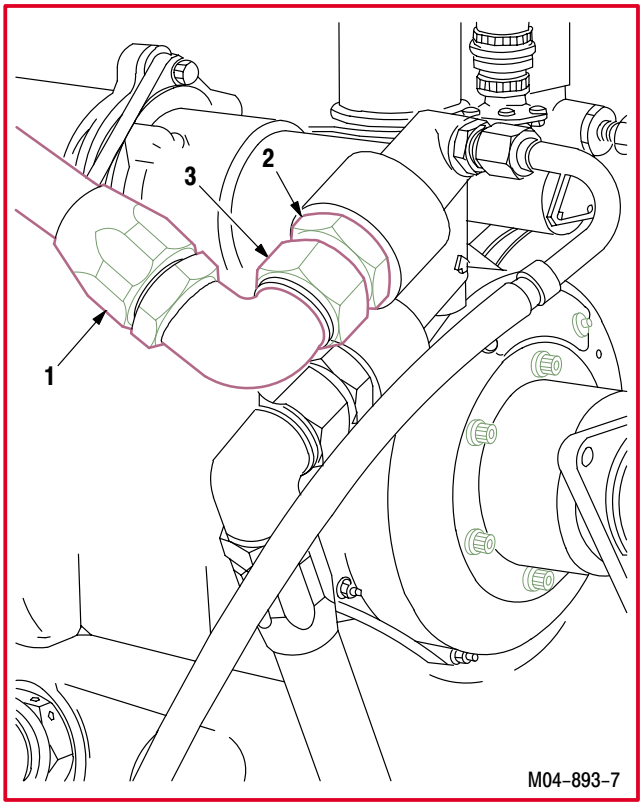


a. **Install new hose (1) on union (2).**

(1) Lubricate threads on union (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (2). Use open end wrench.

(3) Install nut (3). Use open end wrench.

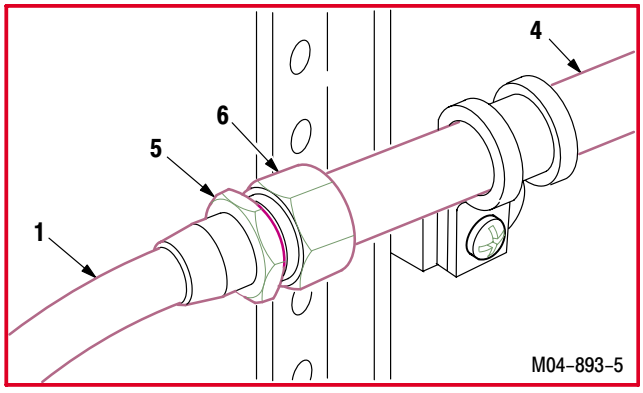


b. **Install hose (1) on tube (4).**

(1) Lubricate threads on fitting (5). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (5). Use open end wrench.

(3) Install nut (6). Use open end wrench.



c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Install APU enclosure** (para 15.42)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.91. UTILITY HYDRAULIC ACCUMULATOR APU START CHECK VALVE REPLACEMENT (AVIM)

7.91.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.91.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
5/8-inch hexagon x 1/2-inch drive screwdriver socket wrench attachment (item 326, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packing (5)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

7.91.3. Removal

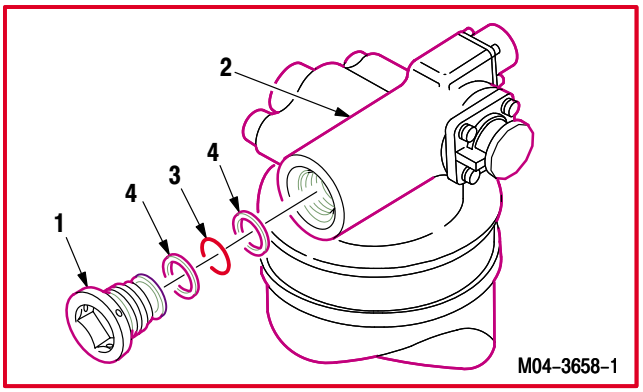
a. **Remove accumulator APU start check valve plug (1) from manifold (2).**

(1) Remove lockwire from plug (1).

(2) Remove plug (1) from manifold (2). Use hexagon screwdriver.

(3) Remove packing (3) and two retainers (4) from plug (1).

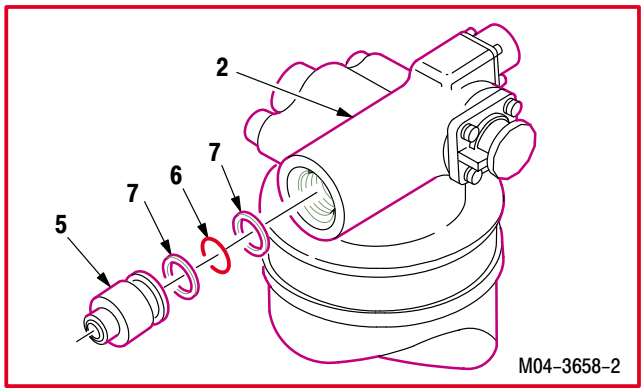
(4) Discard packing (3).



b. **Remove accumulator APU start check valve assembly (5) from manifold (2).**

(1) Remove check valve (5) with packing (6) and two retainers (7).

(2) Discard packing (6).



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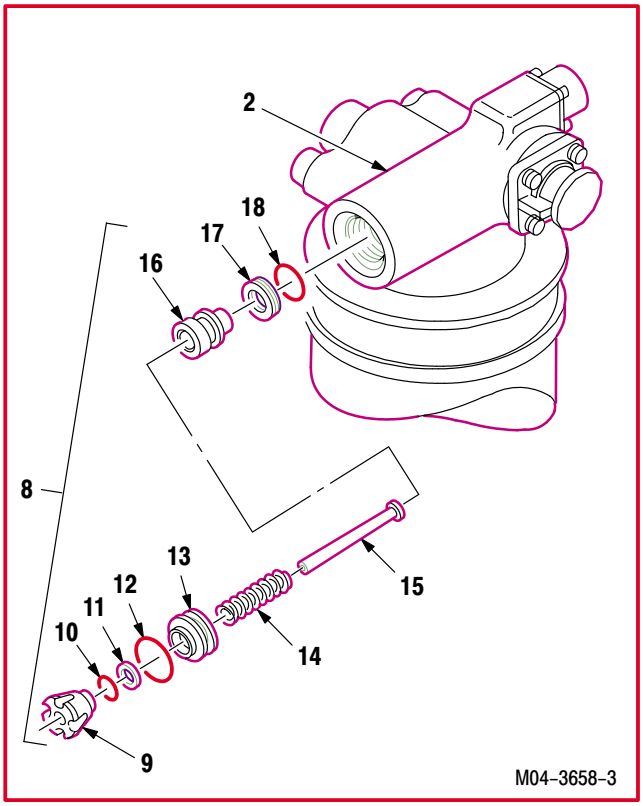
7.91. UTILITY HYDRAULIC ACCUMULATOR APU START CHECK VALVE REPLACEMENT (AVIM) – continued

c. **Remove plunger assembly (8) from manifold (2).**

(1) Remove guide (9), packing (10), channel seal (11), packing (12), and gland (13).

(2) Remove spring (14), plunger (15), piston (16), channel seal (17), and packing (18).

(3) Discard packings (10), (12), and (18).



7.91.4. Cleaning

a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).

7.91.5. Inspection

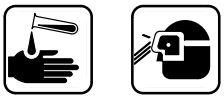
a. **Check removed and attaching parts for dents, nicks, and scratches** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.91. UTILITY HYDRAULIC ACCUMULATOR APU START CHECK VALVE REPLACEMENT (AVIM) – continued

7.91.6. Installation



a. **Install new plunger assembly (8) in manifold (2).**

(1) Lubricate new packings (10), (12) and (18). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (18) in groove of channel seal (17).

(3) Install channel seal (17) on piston (16).

(4) Install spring (14) on plunger (15).

(5) Install plunger (15) in cavity of piston (16).

(6) Install packing (10) in groove of channel seal (11).

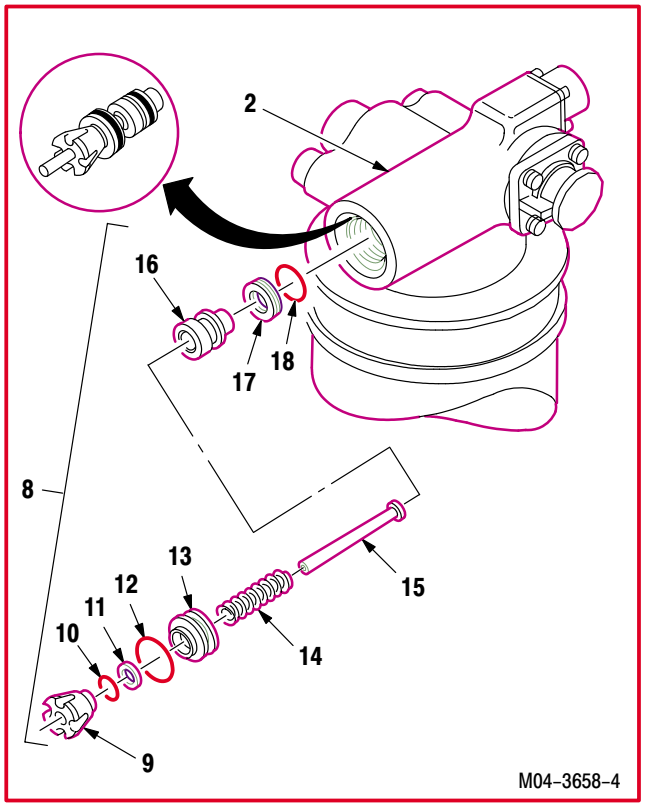
(7) Install channel seal (11) in gland (13).

(8) Install packing (12) in outside groove of gland (13).

(9) Install gland (13) on plunger (15) with flat side against spring (14).

(10) Install guide (9) on plunger (15) and seat in recess of gland (13).

(11) Install plunger assembly (8) in manifold (2).



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7.91. UTILITY HYDRAULIC ACCUMULATOR APU START CHECK VALVE REPLACEMENT (AVIM) – continued

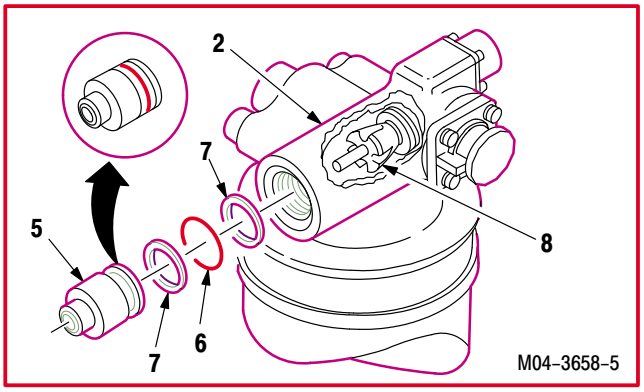
b. **Install check valve (5) in manifold (2).**

(1) Lubricate new packing (6) and two retainers (7). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (6) and two retainers (7) on valve (5).

(3) Install valve (5) in manifold (2).

(4) Fully seat valve (5) against plunger assembly (8).



c. **Install check valve plug (1) on manifold (2).** Torque plug to **275 INCH-POUNDS**.

(1) Lubricate new packing (3) and two retainers (4). Use clean hydraulic fluid (item 92, App F).

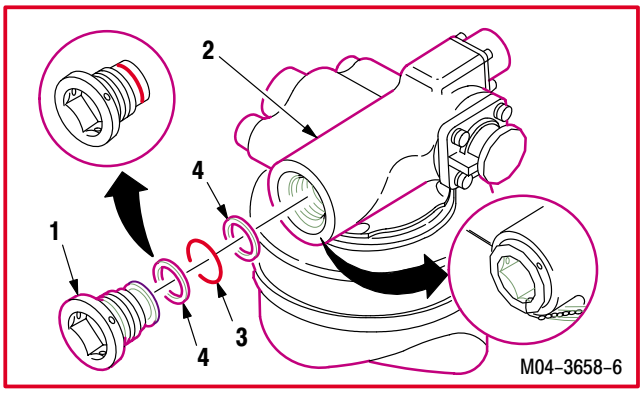
(2) Install packing (3) and two retainers (4) on plug (1).

(3) Lubricate threads of plug (1). Use clean hydraulic fluid (item 92, App F).

(4) Install plug (1) on manifold (2). Use hexagon screwdriver.

(5) Torque plug to **275 INCH-POUNDS**. Use hexagon screwdriver and torque wrench.

(6) Lockwire plug (1) to accumulator (2). Use wire (item 226, App F).



d. **Inspect (QA).**

e. **Perform utility hydraulic accumulator leak check** (para 7.93)**.**

END OF TASK

7.92. UTILITY HYDRAULIC ACCUMULATOR PISTON PACKING REPLACEMENT (AVIM)

7.92.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.92.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
2 - 12-inch inside micrometer caliper (item 56, App H)
Fluorescent inspection kit (item 138, App H)
Chemical protective gloves (item 154, App H)
Retaining ring pliers (item 228, App H)
Adjustable air filtering respirator (item 262, App H)

Personnel Required:

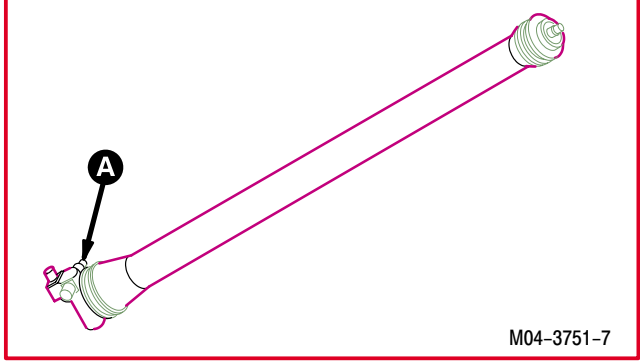
68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

GT ring
Packing (2)
Cloth (item 52, App F)
Hydraulic fluid (item 92, App F)
Sealing compound (item 161, App F)
Wire (item 229, App F)

References:

TM 55-1500-335-23



GO TO NEXT PAGE

7.92. UTILITY HYDRAULIC ACCUMULATOR PISTON PACKING REPLACEMENT (AVIM) – continued

7.92.3. Removal

WARNING

Application of pressurized fluid or gas to the end cap fitting with hydraulic accumulator partially disassembled may produce injury or death. If injury occurs, obtain medical assistance immediately.

a. **Remove manifold assembly (1) from barrel (2).**

(1) Remove lockwire from manifold (1).

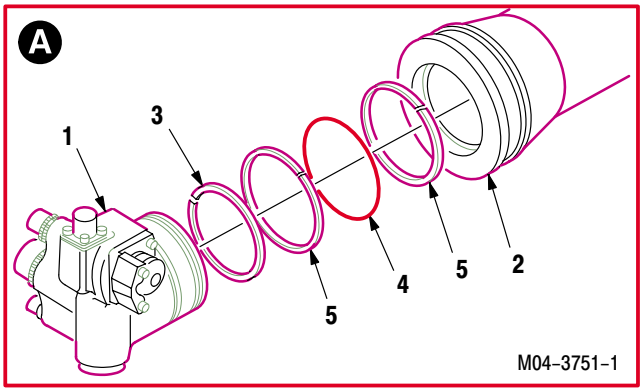
(2) Compress retainer (3) through slot in barrel (2). Use retaining ring pliers.

(3) With retainer (3) compressed, remove manifold (1) and retainer (3) from barrel (2).

(4) Remove retainer (3) from manifold (1).

(5) Remove packing (4) and two backup rings (5) from manifold (1).

(6) Discard packing (4).



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7.92. UTILITY HYDRAULIC ACCUMULATOR PISTON PACKING REPLACEMENT (AVIM) – continued

CAUTION

Use extreme care when removing end cap to prevent it from cocking, or damage to the barrel bore will occur.

b. **Remove piston (6) and end cap (7) from barrel (2).**

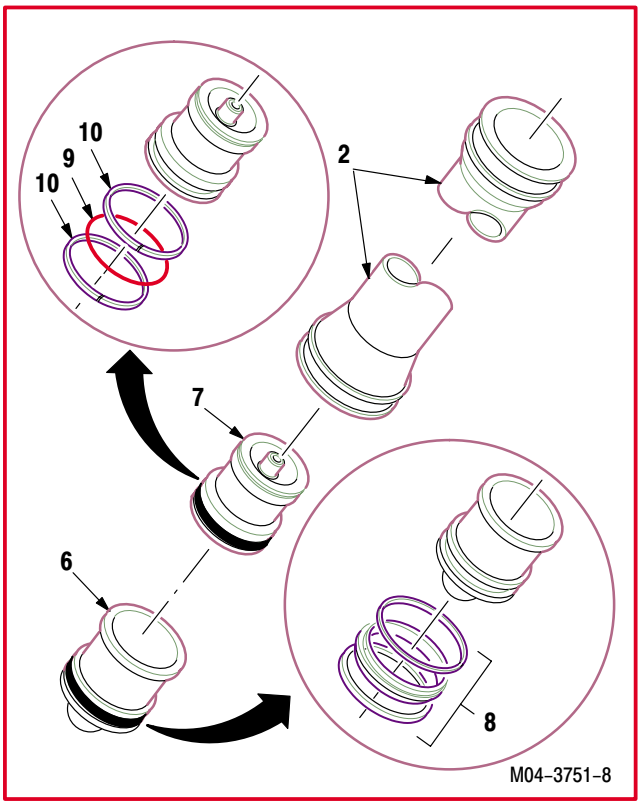
(1) Remove sealant from end cap (7) (para 1.47).

(2) Remove lockwire from cap (7).

(3) Push cap (7) thru barrel (2). Remove piston (6) and cap (7) from barrel (2).

(4) Remove and discard GT ring (8) from piston (6).

(5) Remove packing (9) and two backup rings (10) from cap (7). Discard packing (9).



7.92.4. Cleaning

a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).

7.92.5. Inspection

a. **Check removed and attaching parts for cracks, dents, nicks, and scratches** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Perform penetrant inspection.** Inspect the barrel insertion end of manifold, hydraulic fittings on the manifold, piston, end cap, and both metallic ends of the barrel inside and out. Use fluorescent inspection kit (TM 55-1500-335-23).

d. **Check barrel inside diameter for 2.7445 ±0.0005 INCHES maximum.** Use caliper.

e. **Check piston outside diameter for 2.738 ±0.001 INCHES minimum.** Use caliper set.

f. **Check end cap outside diameter for 2.739 ±0.001 INCHES minimum.** Use caliper set.

GO TO NEXT PAGE

7.92. UTILITY HYDRAULIC ACCUMULATOR PISTON PACKING REPLACEMENT (AVIM) – continued

7.92.6. Installation



CAUTION

Use extreme care when installing end cap to prevent it from cocking, or damage to the barrel bore will occur.

a. **Install cap (7) and piston (6) in barrel (2).**

(1) Lubricate new packing (9) and two backup rings (10). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (9) and two backup rings (10) on cap (7).

(3) Install cap (7) in barrel (2) until cap (7) reaches bottom of barrel (2).

(4) Seal cap (7) and barrel (2) mating surface. Use sealing compound (item 161, App F).

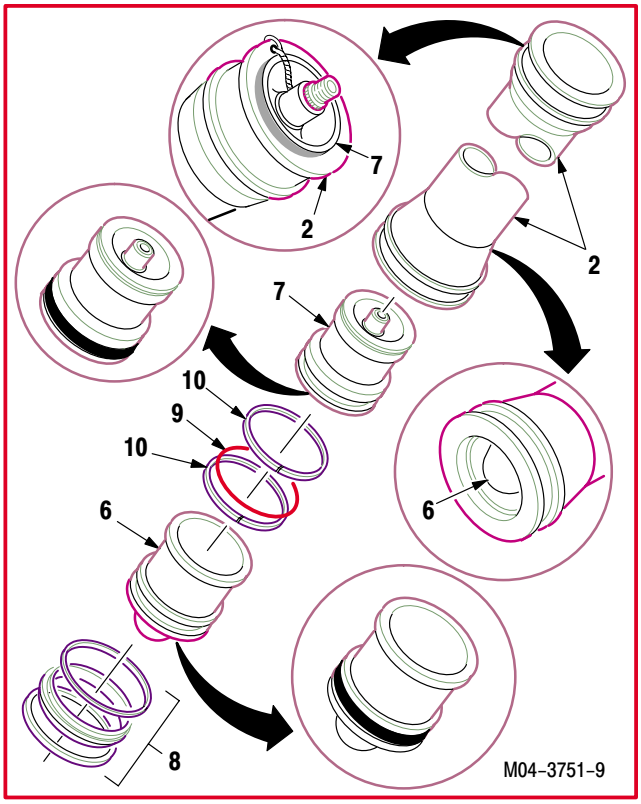
(5) Install lockwire between cap (7) and barrel (2). Use wire (item 229, App F).

(6) Lubricate new GT ring (8). Use clean hydraulic fluid (item 92, App F).

(7) Install GT ring (8) on piston (6).

(8) Lubricate piston (6) and inside of barrel (2). Use clean hydraulic fluid (item 92, App F).

(9) Install piston (6) in barrel (2) with piston cavity end first.



GO TO NEXT PAGE

7.92. UTILITY HYDRAULIC ACCUMULATOR PISTON PACKING REPLACEMENT (AVIM) – continued

b. **Install manifold (1) on barrel (2).**

(1) Lubricate new packing (4) and two backup rings (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (4) and two backup rings (5) on manifold (1).

(3) Install retainer (3) on manifold (1) and position in groove.

(4) With slot in side of barrel (2) facing up, insert manifold (1) into barrel (2) approximately **0.50 INCH** until packing (4) and backup rings (5) clear lip of barrel (2). Hold manifold (1) and aline gap of retainer (3) with slot of barrel (2).

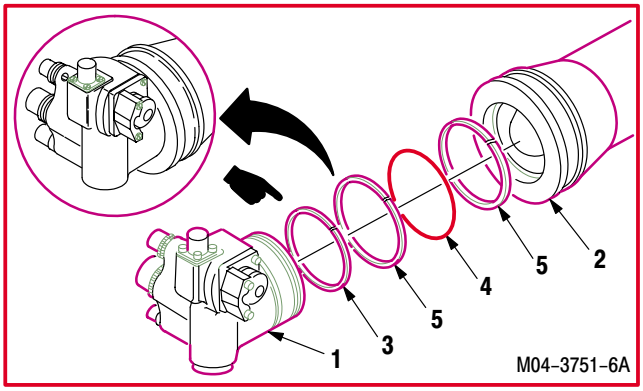
(5) Compress retainer (3), maintaining alinement of retainer gap with slot in barrel (2). Fully insert manifold (1) into barrel (2). Use retaining ring pliers.

(6) Move manifold (1) slightly in and out of barrel (2) to ensure seating of retainer (3).

(7) Check that retainer (3) is properly seated and manifold (1) is retained in barrel (2) by pulling on manifold (1).

(8) With manifold (1) held outward from barrel (2), install a minimum of two full wraps of lockwire between manifold (1) and barrel (2) to eliminate all in and out play of manifold (1). Use wire (item 229, App F).

(9) Check that all end play is eliminated.



c. **Inspect (QA).**

d. **Perform utility hydraulic accumulator leak check** (para 7.93)**.**

END OF TASK

7.93. UTILITY HYDRAULIC ACCUMULATOR LEAK CHECK (AVIM)

7.93.1. Description

This task covers: Leak Check.

7.93.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Hydraulic system components test stand (item 359, App H)
Nitrogen hand truck (item NO TAG, App H)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

WARNING

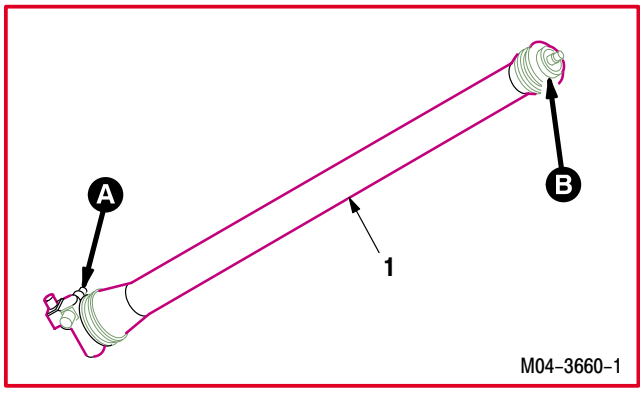
These leak checks use high hydraulic and pneumatic pressures. The checks shall be performed in an approved safety area that provides protection in the event of explosion. If injury occurs, seek medical aid.

NOTE

Check that accumulator has been properly assembled and no physical damage is visible prior to testing.

7.93.3. Leak Check

a. **Connect utility hydraulic accumulator (1) to test stand.**



GO TO NEXT PAGE

7.93. UTILITY HYDRAULIC ACCUMULATOR LEAK CHECK (AVIM) – continued

(1) Connect test stand hydraulic supply pressure line to pressure port (2).

(2) Connect test stand hydraulic supply pressure line to end cap air port (3).

(3) Apply 100 psi hydraulic pressure alternately to pressure port (2) and air port (3) until all air has been bled from accumulator (1).

CAUTION

During proof test, differential pressure shall not exceed 4500 psi at any time.

b. **Pressure proof test.**

(1) Apply 3000 psi hydraulic pressure to air port (3) and 1500 psi hydraulic pressure to pressure port (2).

(2) Increase hydraulic pressure at air port (3) to 6000 psi.

(3) Hold pressure for 5 minutes.

(4) Relieve all pressure.

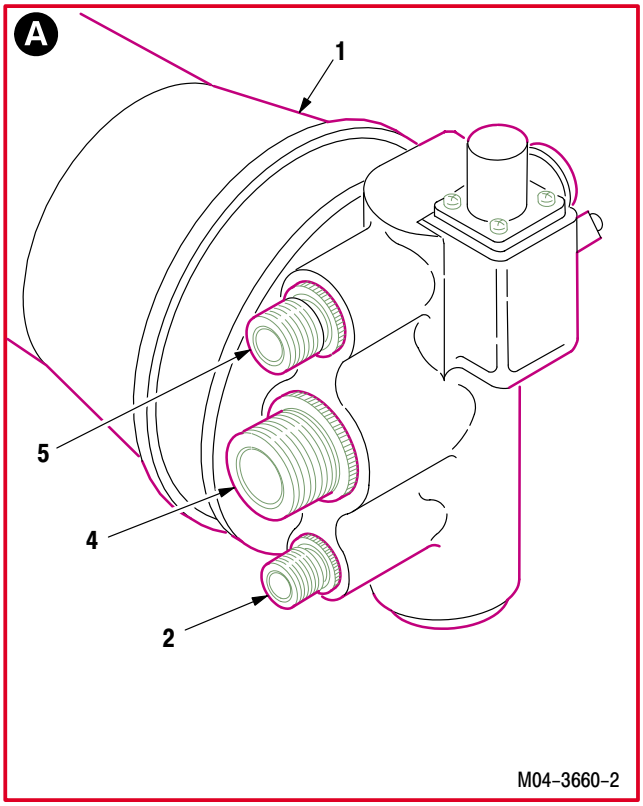
(5) Inspect accumulator (1) for deformation or leakage. None allowed.

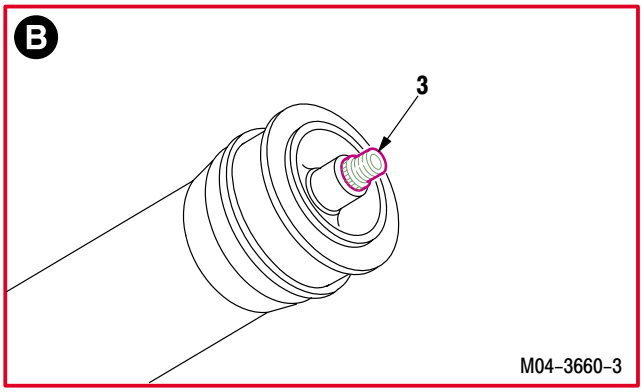
NOTE

Ports (4) and (5) are allowed leakage of 2 drops per minute.

(6) Apply 100 psi hydraulic pressure to pressure port (2) to allow fluid to return to test stand reservoir.

(7) Relieve all pressure and disconnect hydraulic pressure line from air port (3).





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7.93. UTILITY HYDRAULIC ACCUMULATOR LEAK CHECK (AVIM) – continued

(8) Remove residual fluid from air side of accumulator (1). Blow dry into air port (3) with nitrogen. Wipe residual fluid from air port (3) with a clean rag.

c. **Internal fluid leakage test.**

(1) Set accumulator (1) on end with manifold (6) up.

(2) Apply 3000 psi hydraulic pressure at pressure port (2) and hold for 3 minutes.

(3) Inspect air port (3) for hydraulic leakage. None allowed.

(4) Relieve all pressure and maintain accumulator (1) in upright position (manifold up).

(5) Connect nitrogen cart to air port (3) with accumulator still in upright position.

(6) Slowly apply nitrogen pressure to air port (3) to allow fluid to return to test stand reservoir.

(7) Relieve all pressure and disconnect hydraulic pressure line from pressure port (2).

(8) Wipe fluid from manifold (6) and pressure port (2) with a clean rag.

d. **Internal gas leakage test.**

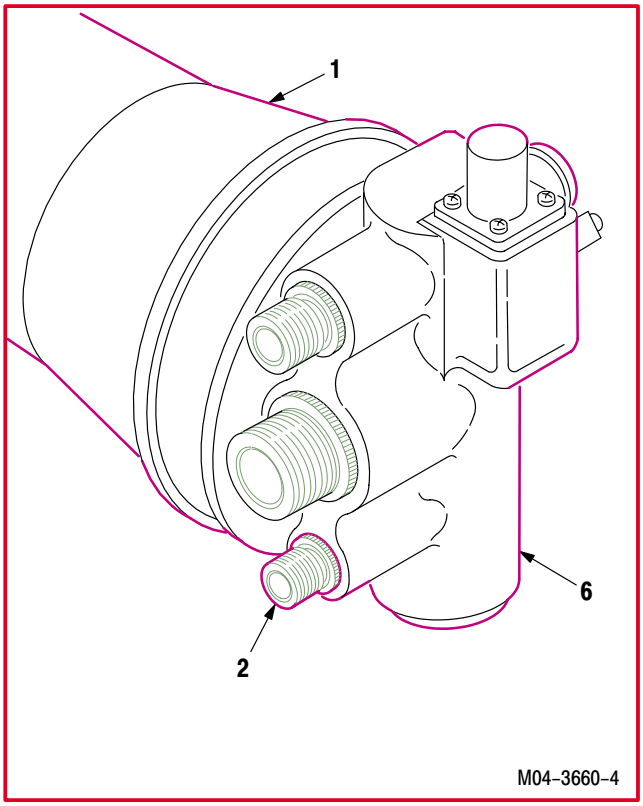
(1) Slowly apply nitrogen to air port (3) until it reaches 1640 psi and hold for 3 minutes.

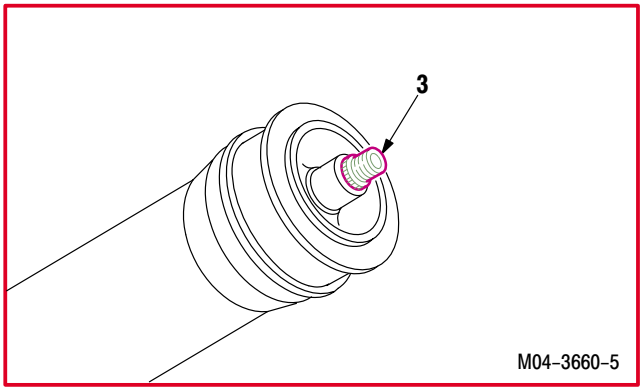
(2) Inspect for presence of fluid at pressure port (2). Displacement of 1 cc maximum in 3 minutes is allowed.

(3) Inspect for leakage at air port (3). None allowed.

(4) Relieve all pressure and disconnect nitrogen cart. Wipe accumulator (1) with a clean rag. Install protective caps on all openings.

e. **Inspect (QA).**





END OF TASK

7.94. UTILITY HYDRAULIC RETURN ACCUMULATOR REMOVAL/INSTALLATION

7.94.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.94.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 90, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

References:

TM 1-1520-238-T

Materials/Parts:

Locknut (4)
Packing (2)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

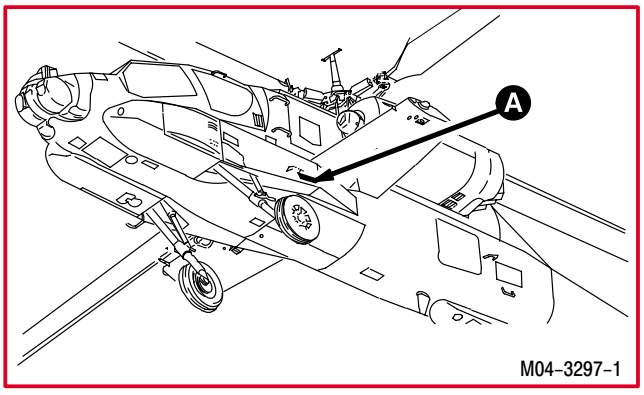
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L175 removed
7.57	Utility hydraulic system vented
1.39	Utility hydraulic return accumulator vented
7.97	Utility Hydraulic return accumulator nitrogen manifold tube removed

7.94.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open EMERG HYD circuit breaker.**



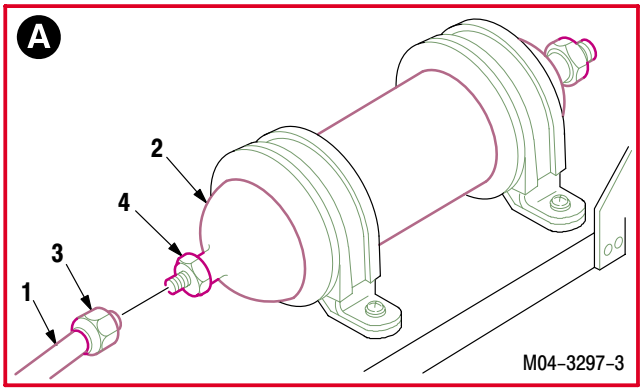
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7.94. UTILITY HYDRAULIC RETURN ACCUMULATOR REMOVAL/INSTALLATION – continued

c. **Remove tube (1) from utility hydraulic return accumulator (2).**

(1) Place rags under tube (1) to catch hydraulic fluid spills.

(2) Remove nut (3) from reducer (4).



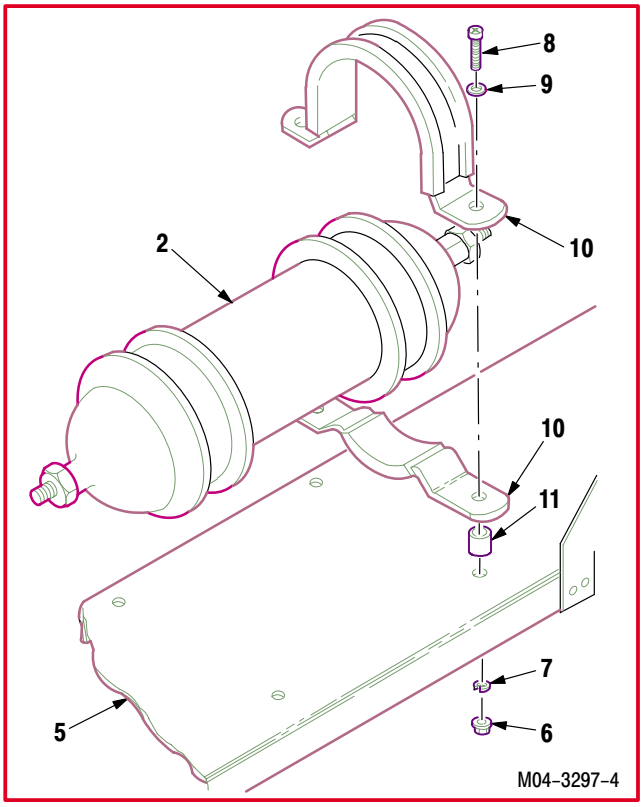
d. **Remove accumulator (2) from bracket (5).**

(1) Remove four locknuts (6), washers (7), screws (8), and washers (9) from two clamps (10) and bracket (5). Discard locknuts (6).

(2) Remove top halves of two clamps (10).

(3) Remove accumulator (2).

(4) Remove bottom halves of two clamps (10) and four spacers (11) from bracket (5).

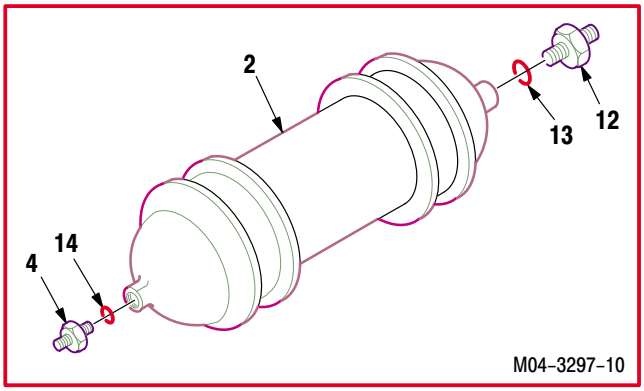


e. **Remove union (12) from accumulator (2).**

(1) Remove and discard packing (13).

f. **Remove reducer (4) from accumulator (2).** Use open end wrench and crowfoot.

(1) Remove and discard packing (14).



7.94.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

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7.94. UTILITY HYDRAULIC RETURN ACCUMULATOR REMOVAL/INSTALLATION – continued

7.94.5. Inspection

a. **Check accumulator for nicks, dents, and stripped or damaged threads** (para 7.56)**.**

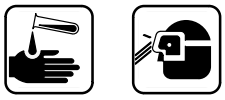
b. **Check tubes for nicks, cuts, chafing, and stripped or damaged threads** (para 7.56)**.**

c. **Check union and reducer for stripped or damaged threads** (para 7.56)**.**

d. **Check bracket for cracks** (para 7.56)**.**

e. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.94.6. Installation

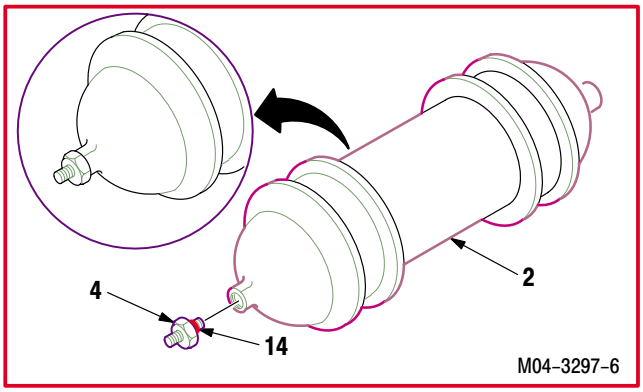


a. **Install reducer (4) on accumulator (2).**

(1) Lubricate new packing (14) and threads at large end of reducer (4). Use clean hydraulic fluid (item 92, App F).

(2) Install new packing (14) on large end of reducer (4).

(3) Install large end of reducer (4) on accumulator (2). Use open end wrench and crowfoot.

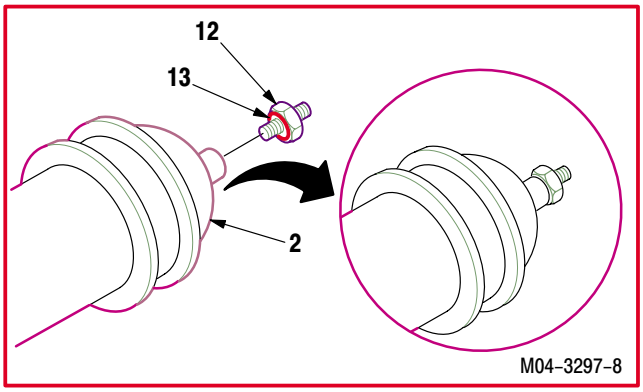


b. **Install union (12) on accumulator (2).**

(1) Lubricate new packing (13) and threads at one end of union (12). Use clean hydraulic fluid (item 92, App F).

(2) Install new packing (13) on lubricated end of union (12).

(3) Install lubricated end of union (12) on accumulator (2).



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7.94. UTILITY HYDRAULIC RETURN ACCUMULATOR REMOVAL/INSTALLATION – continued

c. **Install accumulator (2) on bracket (5).**

(1) Aline four spacers (11) and mounting holes of bottom halves of two clamps (10) with mounting holes in bracket (5).

(2) Position accumulator (2) on bottom half of two clamps (10).

(3) Position top halves of two clamps (10) on accumulator (2). Aline mounting holes.

(4) Install four screws (8) through four washers (9), clamps (10), spacers (11), bracket (5), and washers (7).

NOTE

Do not tighten locknuts until the nitrogen manifold tube is installed.

(5) Install four new locknuts (6) finger tight.

d. **Install utility hydraulic return accumulator nitrogen manifold tube** (para 7.97)**.**

e. **Install tube (1) on accumulator (2).**

(1) Lubricate threads of reducer (4). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (3) on reducer (4).

f. **Inspect (QA).**

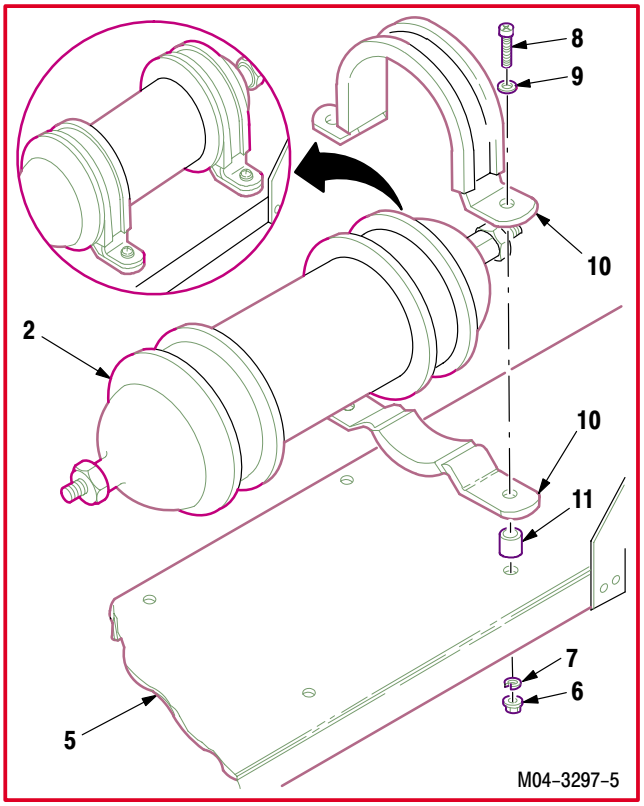
g. **Service utility hydraulic return accumulator** (para 1.37)**.**

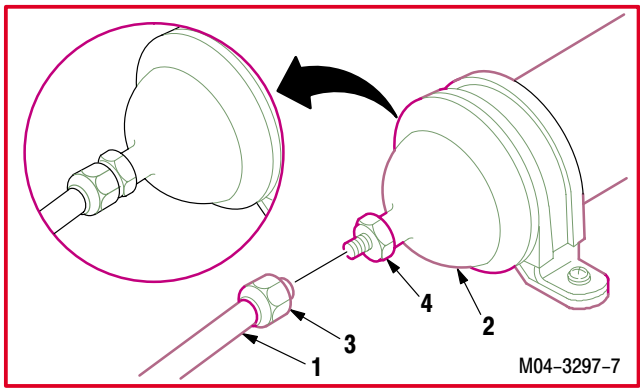
h. **Bleed utility hydraulic system** (para 1.35)**.**

i. **Service utility hydraulic system** (para 1.34)**.**

j. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

k. **Install access fairing L175** (para 2.2)**.**





END OF TASK

7.95. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD FILL/BLEED VALVE REPLACEMENT

7.95.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.95.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 3/8-inch drive open end box socket wrench crow-foot attachment (item 81, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

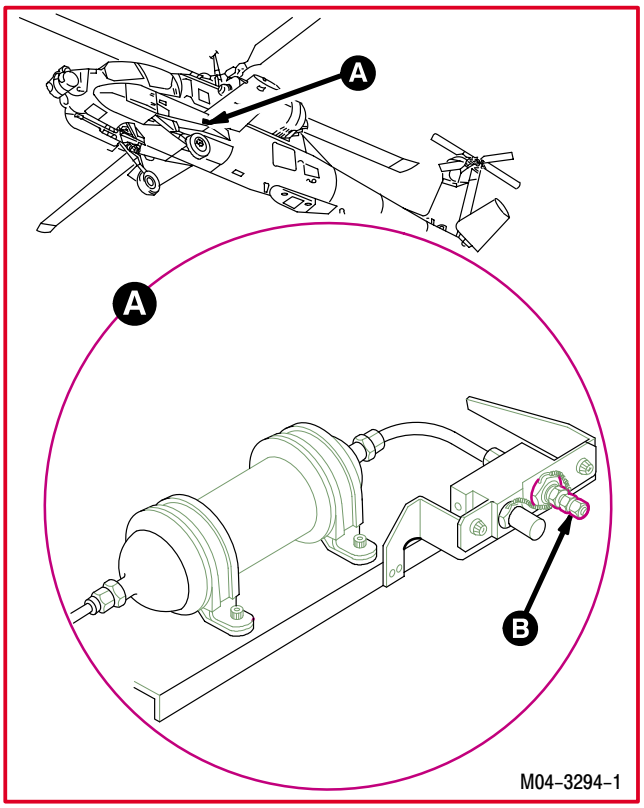
Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L175 removed
7.57	Utility hydraulic system vented
1.39	Utility hydraulic return accumulator vented



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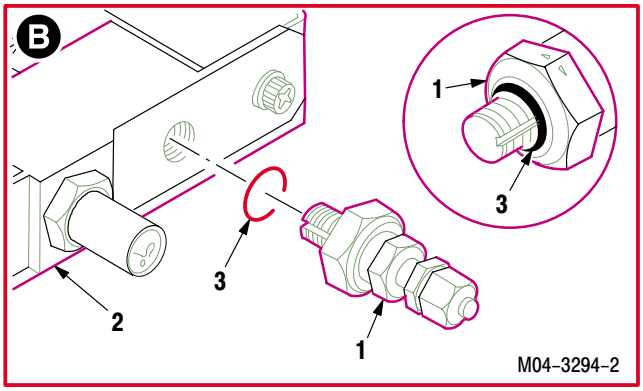
7.95. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD FILL/BLEED VALVE REPLACEMENT – continued

7.95.3. Removal

a. **Remove fill/bleed valve (1) from manifold (2).**

(1) Remove lockwire from valve (1).

(2) Remove and discard valve (1) and packing (3).



7.95.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.95.5. Inspection

a. **Check manifold for cracks, nicks, scratches, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.95.6. Installation



a. **Install new packing (3) on new valve (1).**

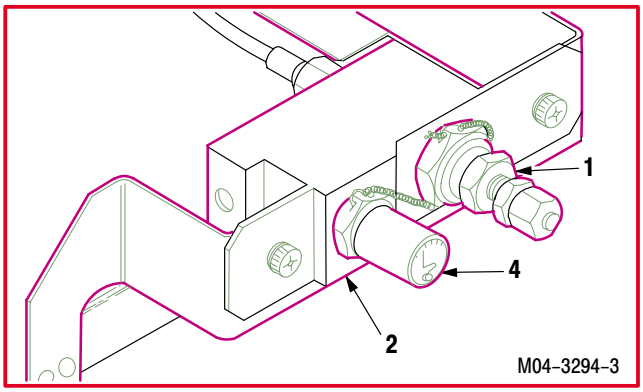
(1) Lubricate packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on valve (1).

b. **Install valve (1) on manifold (2).** Torque valve to **80 INCH-POUNDS**.

(1) Install valve (1). Torque to **80 INCH-POUNDS**. Use crowfoot and torque wrench.

(2) Lockwire valve (1) to pressure gage (4). Use wire (item 226, App F).



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7.95. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD FILL/BLEED VALVE REPLACEMENT – continued

c. **Inspect (QA).**

d. **Service utility hydraulic return accumulator** (para 1.37)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Install access fairing L175** (para 2.2)**.**

END OF TASK

7.96. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD PRESSURE GAGE REPLACEMENT

7.96.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.96.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 3/8-inch drive open end box socket wrench crow-foot attachment (item 81, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

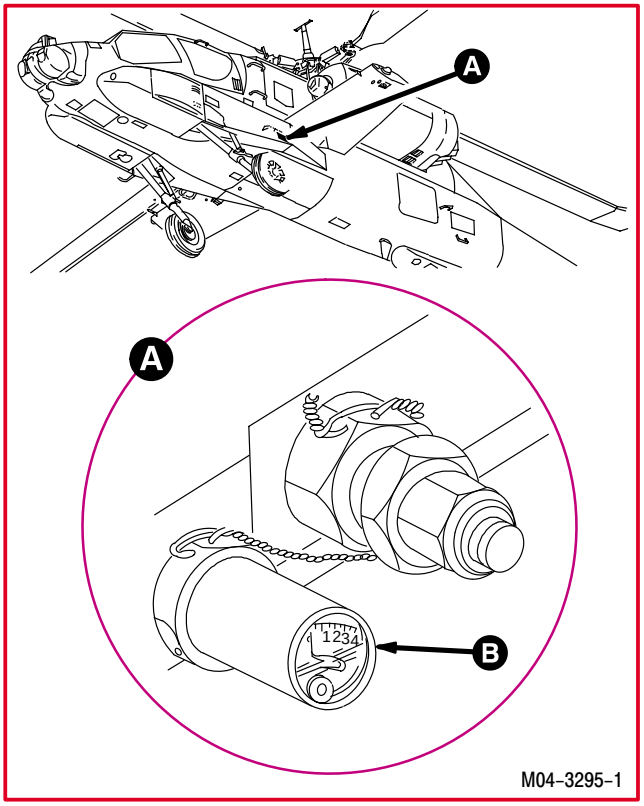
Packing
Petrolatum (item 138, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L175 removed
7.57	Utility hydraulic system vented
1.39	Utility hydraulic return accumulator vented



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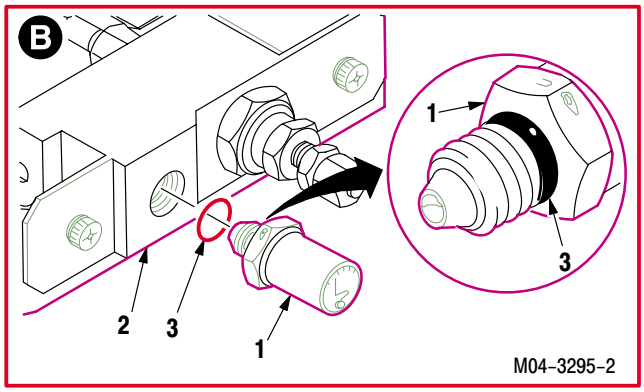
7.96. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD PRESSURE GAGE REPLACEMENT – continued

7.96.3. Removal

a. **Remove pressure gage (1) from manifold (2).**

(1) Remove lockwire from gage (1).

(2) Remove and discard gage (1) and packing (3).



7.96.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.96.5. Inspection

a. **Check manifold for cracks, nicks, scratches, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.96.6. Installation



a. **Install new packing (3) on new gage (1).**

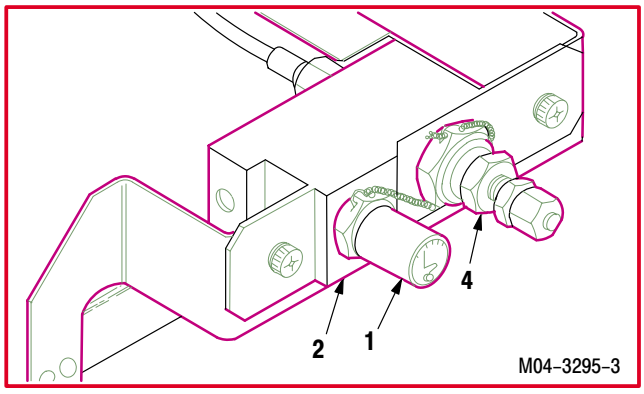
(1) Lubricate packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on gage (1).

b. **Install gage (1) on manifold (2).** Torque gage to **50 INCH-POUNDS**.

(1) Install gage (1). Torque to **50 INCH-POUNDS**. Use crowfoot and torque wrench.

(2) Lockwire gage (1) to fill/bleed valve (4). Use wire (item 226, App F).



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7.96. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD PRESSURE GAGE REPLACEMENT – continued

c. **Inspect (QA).**

d. **Service utility hydraulic return accumulator** (para 1.37)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Install access fairing L175** (para 2.2)**.**

END OF TASK

7.97. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD TUBE REMOVAL/INSTALLATION

7.97.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.97.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

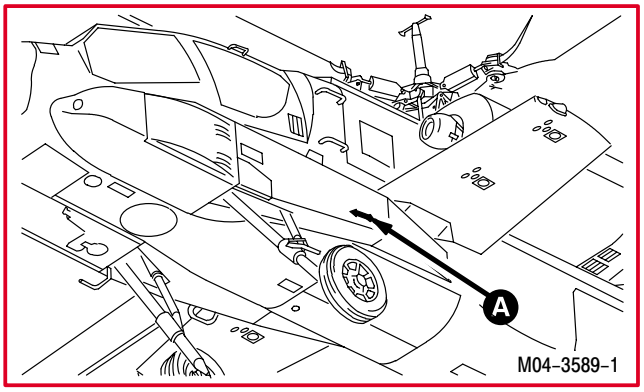
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L175 removed
7.57	Utility hydraulic system vented
1.39	Utility hydraulic return accumulator vented

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector



7.97.3. Removal

a. **Loosen four screws (1) on hydraulic accumulator clamps (2).**

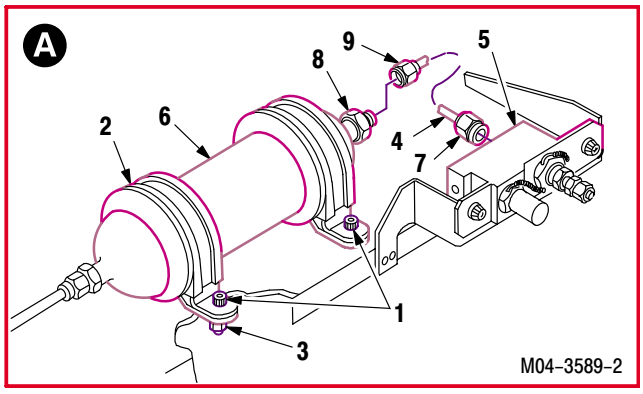
(1) Hold nuts (3). Loosen screws (1).

b. **Remove tube (4) from manifold (5) and accumulator (6).**

(1) Remove nut (7) from manifold (5).

(2) Hold union (8). Remove nut (9).

(3) Remove tube (4).



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7.97. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD TUBE REMOVAL/INSTALLATION – continued

7.97.4. Cleaning

a. **Wipe removed and attaching parts with a clean dry rag.**

7.97.5. Inspection

a. **Check manifold and accumulator for nicks, dents, and stripped or damaged threads** (para 7.56)**.**

b. **Check tube for nicks, cuts, chafing, stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.97.6. Installation

a. **Install tube (4) on manifold (5) and accumulator (6).**

(1) Hold union (8). Install nut (9).

(2) Install nut (7) on manifold (5).

b. **Tighten four screws (1) on hydraulic accumulator clamps (2).**

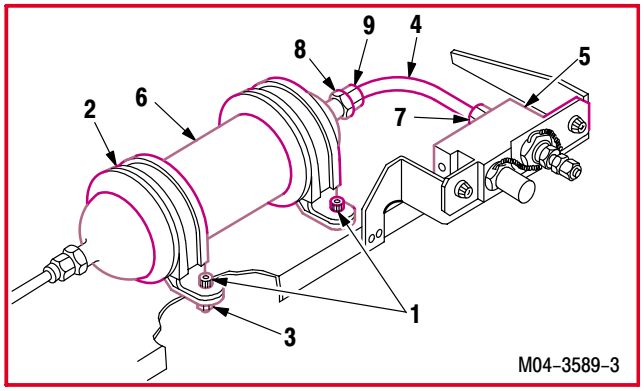
(1) Hold nuts (3). Tighten screws (1).

c. **Inspect (QA).**

d. **Service utility hydraulic return accumulator** (para 1.37)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Install access fairing L175** (para 2.2)**.**



END OF TASK

7.98. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD REPLACEMENT

7.98.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.98.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Materials/Parts:

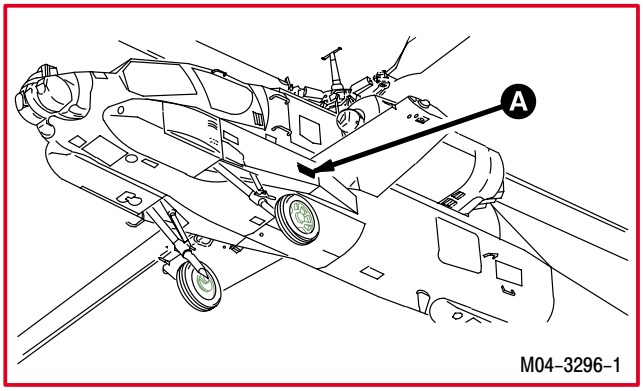
Locknut (2)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

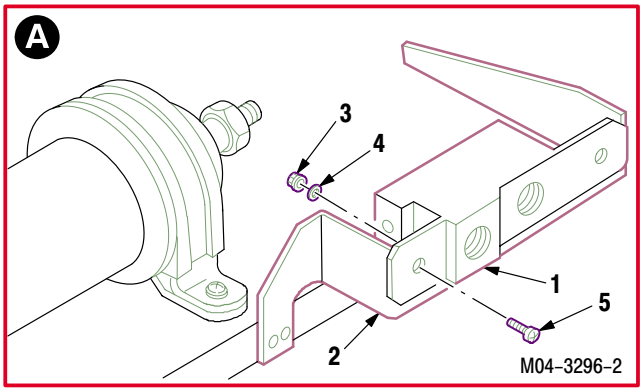
Ref	Condition
1.57	Helicopter safed
2.2	Access fairing L175 removed
7.57	Utility hydraulic system vented
1.39	Utility hydraulic return accumulator vented
7.95	Utility hydraulic return accumulator nitrogen manifold fill/bleed valve removed
7.96	Utility hydraulic return accumulator nitrogen manifold pressure gage removed
7.97	Utility hydraulic return accumulator nitrogen manifold tube removed



7.98.3. Removal

a. **Remove manifold (1) from support (2).**

(1) Remove two locknuts (3), washers (4), and screws (5). Discard locknuts (3).



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7.98. UTILITY HYDRAULIC RETURN ACCUMULATOR NITROGEN MANIFOLD REPLACEMENT – continued

7.98.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.98.5. Inspection

a. **Check pressure gage and fill/bleed valve for nicks, dents, cracks, and stripped or damaged threads** (para 7.56)**.**

b. **Check tube for nicks, dents, cracks, and stripped or damaged threads** (para 7.56)**.**

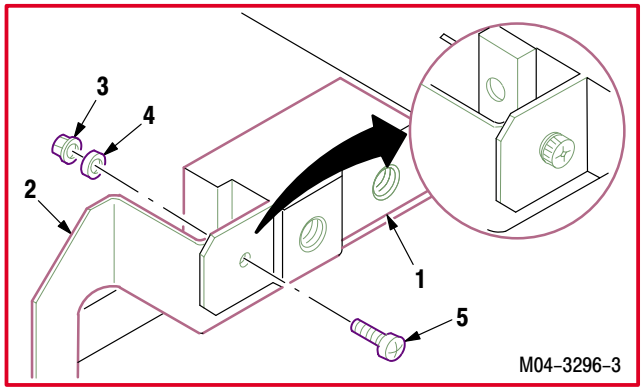
c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.98.6. Installation

a. **Install manifold (1) on support (2).**

(1) Aline manifold (1) on support (2).

(2) Install two screws (5) through manifold (1), support (2), washers (4), and new locknuts (3).



b. **Inspect (QA).**

c. **Install utility hydraulic return accumulator nitrogen manifold tube** (para 7.97)**.**

d. **Install utility hydraulic return accumulator nitrogen manifold pressure gage** (para 7.96)**.**

e. **Install utility hydraulic return accumulator nitrogen manifold fill/bleed valve** (para 7.95)**.**

f. **Service utility hydraulic return accumulator** (para 1.37)**.**

g. **Service utility hydraulic system** (para 1.34)**.**

h. **Install access fairing L175** (para 2.2)**.**

END OF TASK

7.99. UTILITY PNEUMATIC ACCUMULATOR REMOVAL/INSTALLATION

7.99.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.99.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

References:

TM 1-1520-238-T

Materials/Parts:

Hydraulic fluid (item 92, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented
1.38	Utility hydraulic accumulator vented

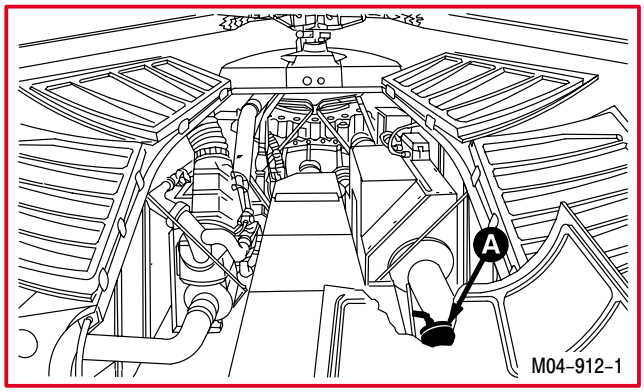
Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

7.99.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot center circuit breaker panel, open EMERG HYD circuit breaker.**

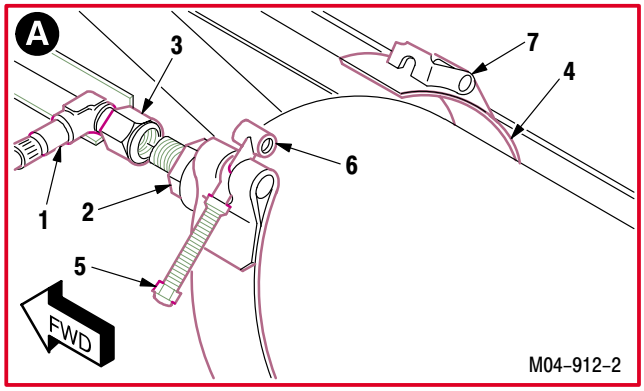


c. **Remove tube (1) from union (2).**

(1) Hold union (2). Remove nut (3).

d. **Unlatch forward clamp (4).**

(1) Loosen nut (5). Unlatch tee bolt (6) from sleeve (7).



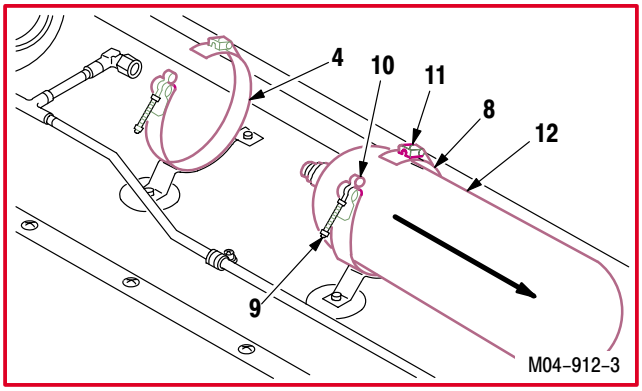
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7.99. UTILITY PNEUMATIC ACCUMULATOR REMOVAL/INSTALLATION – continued

e. **Unlatch aft clamp (8).**

(1) Loosen nut (9). Unlatch tee bolt (10) from sleeve (11).

f. **Slide accumulator (12) aft to remove from clamps (4) and (8).**



7.99.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.99.5. Inspection

a. **Check union for stripped or damaged threads** (para 7.56)**.**

b. **Check tube for chafing and stripped or damaged threads** (para 7.56)**.**

c. **Check accumulator for nicks, dents, or scratches** (para 7.56)**.**

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.99. UTILITY PNEUMATIC ACCUMULATOR REMOVAL/INSTALLATION – continued

7.99.6. Installation

a. **Position accumulator (12) between clamps (4) and (8).**



b. **Install tube (1) on union (2).**

(1) Lubricate threads of union (2). Use clean hydraulic fluid (item 92, App F).

(2) Install nut (3) on union (2).

c. **Latch two clamps (4) and (8).**

(1) Latch tee bolt (6) under sleeve (7).

(2) Tighten nut (5).

(3) Latch tee bolt (10) under sleeve (11).

(4) Tighten nut (9).

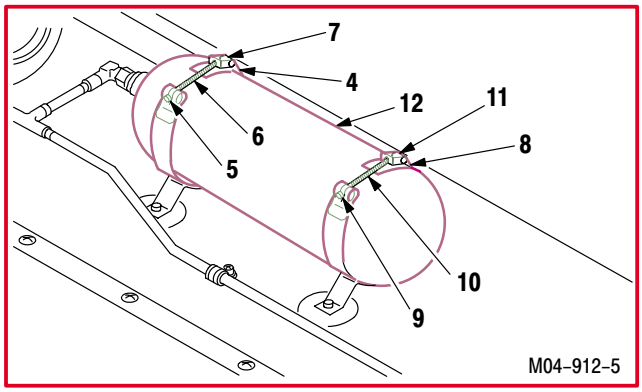
d. **Inspect (QA).**

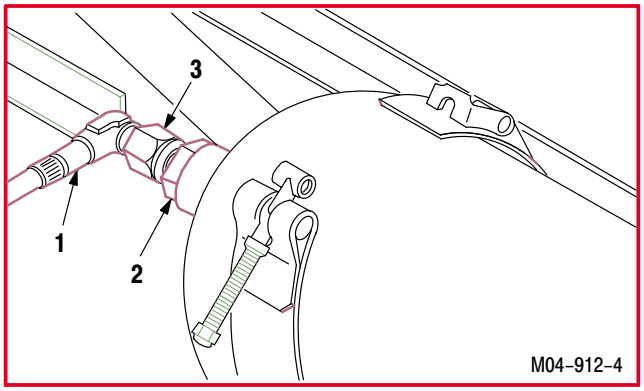
e. **Service utility hydraulic accumulator** (para 1.36)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**





END OF TASK

7.100. WING QUICK-DISCONNECT COUPLING REPLACEMENT

7.100.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.100.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
9/16 x 3/8-inch drive open end socket wrench crowfoot attachment (item 101, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/8 x 1/2-inch drive socket wrench socket (item 310, App H)

Materials/Parts:

Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

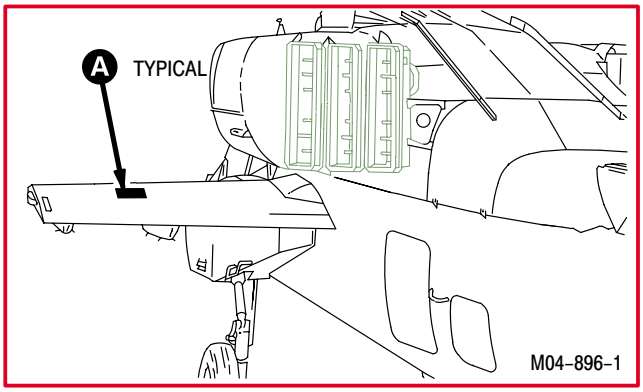
TM 1-1500-204-23

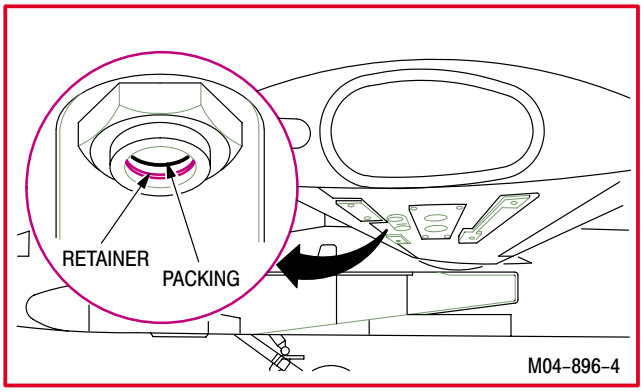
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access cover LW7, LW8, RW7, and/or RW8 removed as necessary
7.57	Utility hydraulic system vented
16.2	Pylon removed

NOTE

- This task is typical for any of the wing pylon hydraulic quick-disconnect couplings.
- If coupling is being replaced because of leakage due to damaged packing or retainer, replace both parts (TM 1-1500-204-23). If leakage continues, replace coupling.





GO TO NEXT PAGE

7.100. WING QUICK-DISCONNECT COUPLING REPLACEMENT – continued

7.100.3. Removal

a. **Remove coupling (1).**

(1) Place rags around coupling (1) to catch hydraulic fluid spills.

(2) Hold coupling (1). Use crowfoot.

(3) Remove nut (2).

b. **Remove coupling (1) from wing (3).**

(1) Hold coupling (1). Use crowfoot.

(2) Remove nut (5). Use socket.

(3) Remove and discard coupling (1).

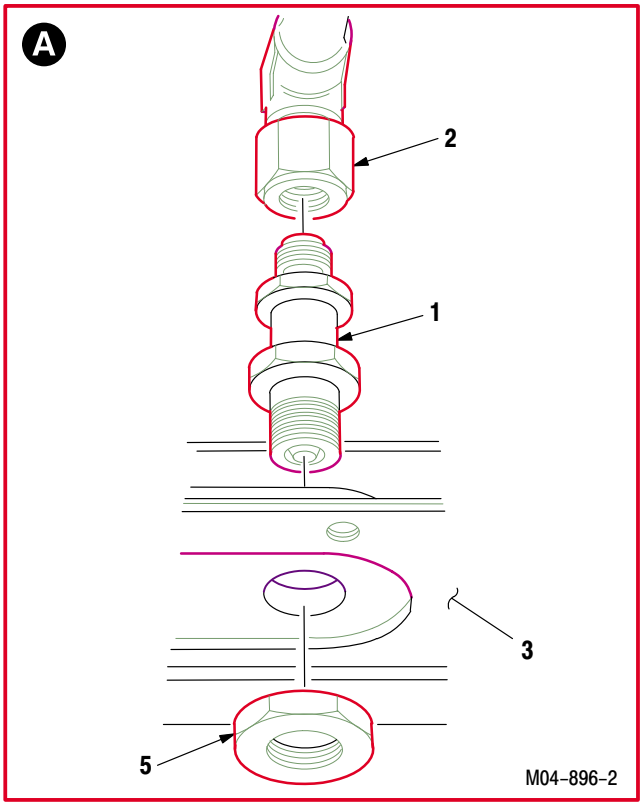
7.100.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.100.5. Inspection

a. **Check nut for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**



GO TO NEXT PAGE

7.100. WING QUICK-DISCONNECT COUPLING REPLACEMENT – continued

7.100.6. Installation

a. **Install coupling (1) on wing (3).**

(1) Install coupling (1) through wing (3).

(2) Hold coupling (1). Use crowfoot.

(3) Install nut (5). Use socket.



b. **Install tube (4) on coupling (1).**

(1) Lubricate threads on coupling (1). Use clean hydraulic fluid (item 92, App F).

(2) Hold coupling (1). Use crowfoot.

(3) Install nut (2). Use crowfoot.

c. **Inspect (QA).**

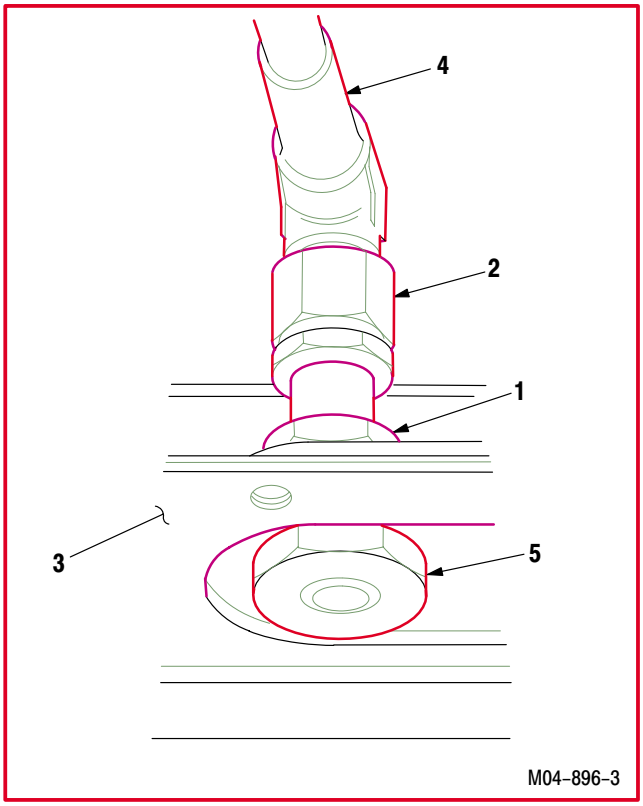
d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Install pylon** (para 16.2)**.**

h. **Install access cover LW7, LW8, RW7, and/or RW8 as necessary** (para 2.2)**.**



END OF TASK

7.101. WING FUSELAGE QUICK-DISCONNECT COUPLING REPLACEMENT

7.101.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.101.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
14-quart utility pail (item 222, App H)

Materials/Parts:

Hydraulic fluid (item 92, App F)

Personnel Required:

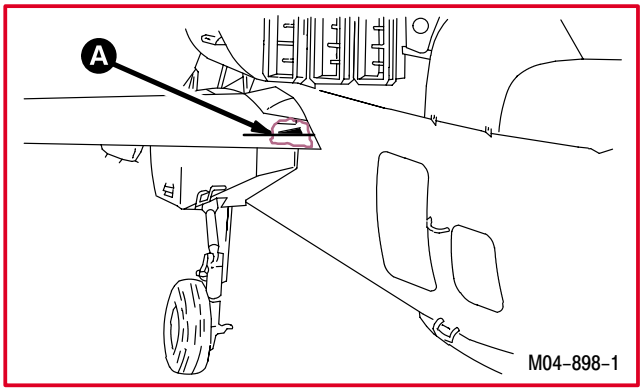
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing LW9 and/or RW9 and LW10 and/or RW10 removed
7.57	Utility hydraulic system vented

NOTE

This task is typical for pressure or return couplings on left or right wing.



7.101.3. Removal

a. **Remove coupling (1) from nipple (2).**

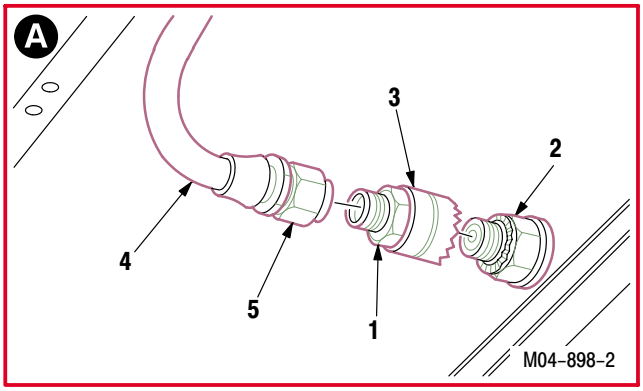
(1) Place utility pail and rags under coupling to catch hydraulic fluid spills. Use pail.

(2) Slide sleeve (3) away from nipple (2).

(3) Turn sleeve (3) counterclockwise until coupling (1) is clear of nipple (2).

b. **Remove coupling (1) from hose (4).**

(1) Hold nut (5). Remove and discard coupling (1).



GO TO NEXT PAGE

7.101. WING FUSELAGE QUICK-DISCONNECT COUPLING REPLACEMENT – continued

7.101.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

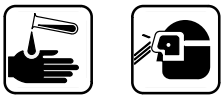
7.101.5. Inspection

a. **Check nipple and nut for nicks, dents, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check hose for chafing, nicks, cuts, or fraying** (para 7.56)**.**

c. **Check attaching parts for corrosion** (para 1.49)**.**

7.101.6. Installation



a. **Install new coupling (1) on hose (4).**

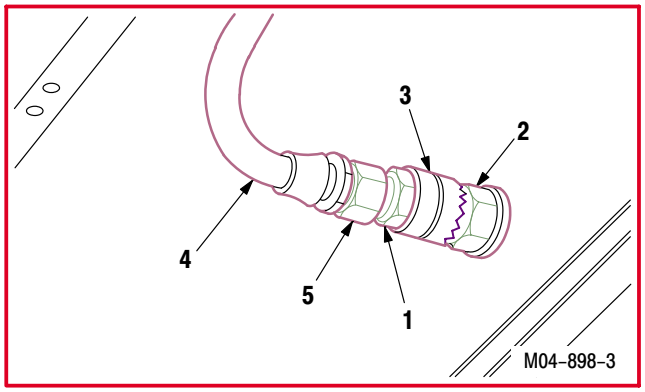
(1) Lubricate coupling (1). Use clean hydraulic fluid (item 92, App F).

(2) Hold nut (5). Install coupling (1).

b. **Install coupling (1) on nipple (2).**

(1) Aline coupling (1) with nipple (2).

(2) Turn sleeve (3) until teeth of coupling (1) and nipple (2) are fully engaged.



c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Install access fairing LW9 and/or RW9 and LW10 and/or RW10** (para 2.2)**.**

END OF TASK

7.102. WING FUSELAGE COUPLING NIPPLE REPLACEMENT

7.102.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.102.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
14-quart utility pail (item 222, App H)

Materials/Parts:

Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

References:

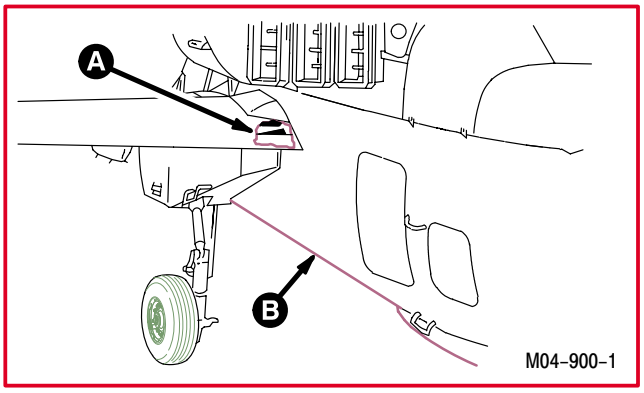
TM 9-1090-208-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing LW9 and/or RW9 and LW10 and/or RW10 removed
7.57	Utility hydraulic system vented
TM 9-1090-208-23	Ammunition storage magazine removed

NOTE

This task is typical for pressure or return coupling nipples on left or right wing.

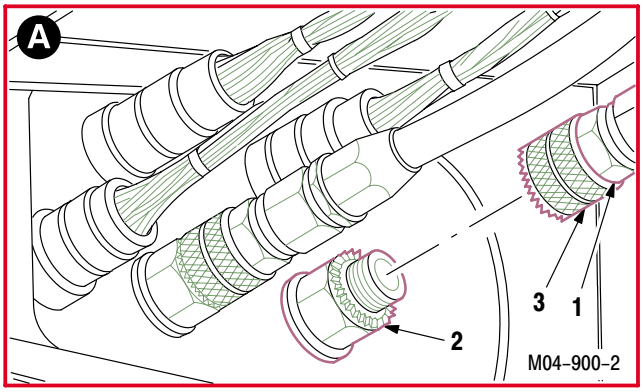


7.102.3. Removal

a. **Remove coupling (1) from nipple (2).**

(1) Slide sleeve (3) away from nipple (2).

(2) Turn sleeve (3) counterclockwise until coupling (1) is clear of nipple (2).



GO TO NEXT PAGE

7.102. WING FUSELAGE COUPLING NIPPLE REPLACEMENT – continued

b. **Remove tube (4) from nipple (2).**

(1) Place rags and pail under nipple (2) to catch hydraulic fluid spills. Use pail.

(2) One person hold nipple (2) from inside wing hydraulic panel.

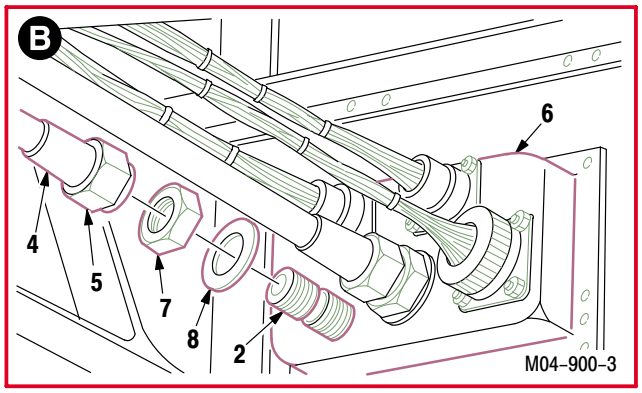
(3) One person remove nut (5) from inside ammunition bay.

c. **Remove nipple (2) from fuselage (6).**

(1) One person hold nipple (2) from inside wing hydraulic panel.

(2) One person remove nut (7) and washer (8) from inside ammunition bay.

(3) Remove and discard nipple (2).



7.102.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.102.5. Inspection

a. **Check coupling for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

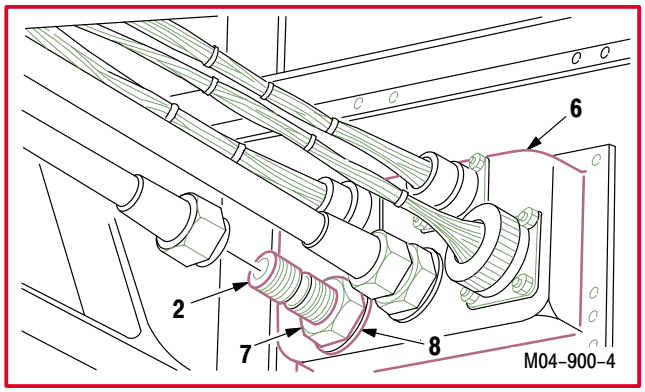
7.102.6. Installation

a. **Install new nipple (2) on fuselage (6).**

(1) Install nipple (2) through hole in fuselage (6).

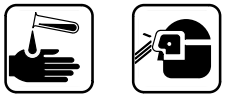
(2) One person hold nipple (2) from inside wing hydraulic panel.

(3) One person install washer (8) and nut (7) from inside ammunition bay.



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7.102. WING FUSELAGE COUPLING NIPPLE REPLACEMENT – continued

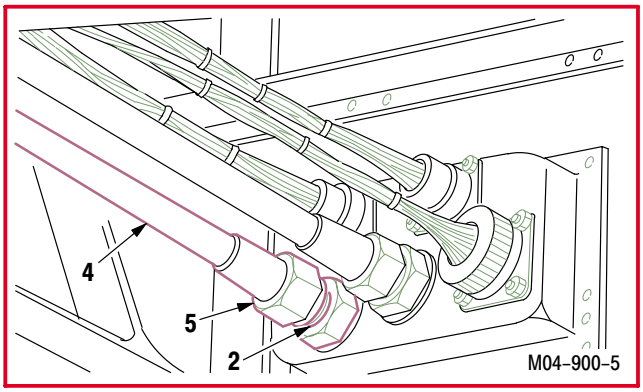


b. **Install tube (4) on nipple (2).**

(1) Lubricate threads of nipple (2). Use clean hydraulic fluid (item 92, App F).

(2) One person hold nipple (2) from inside wing hydraulic panel.

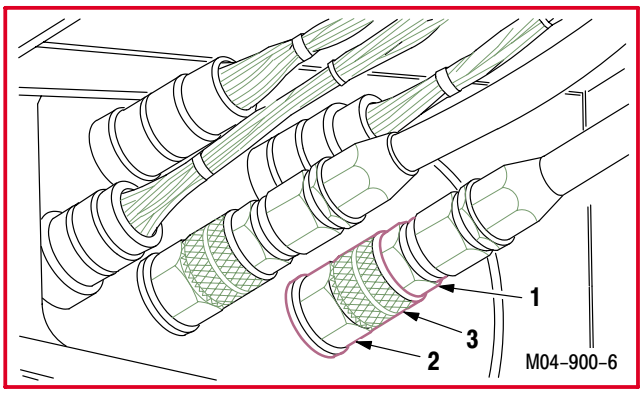
(3) One person install nut (5) on nipple from inside ammunition bay.



c. **Install coupling (1) on nipple (2).**

(1) Aline sleeve (3) with nipple (2).

(2) Turn sleeve (3) clockwise on nipple (2) until teeth of sleeve (3) and nipple (2) are fully engaged.



d. **Inspect (QA).**

e. **Bleed utility hydraulic system** (para 1.35)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform hydraulic system leak check** (para 7.2)**.**

h. **Install ammunition storage magazine** (TM 9-1090-208-23)**.**

i. **Install access fairing LW9 and/or RW9 and LW10 and/or RW10** (para 2.2)**.**

END OF TASK

7.103. WING HYDRAULIC HOSE REPLACEMENT

7.103.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.103.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
14-quart utility pail (item 222, App H)

Materials/Parts:

Hydraulic fluid (item 92, App F)

Personnel Required:

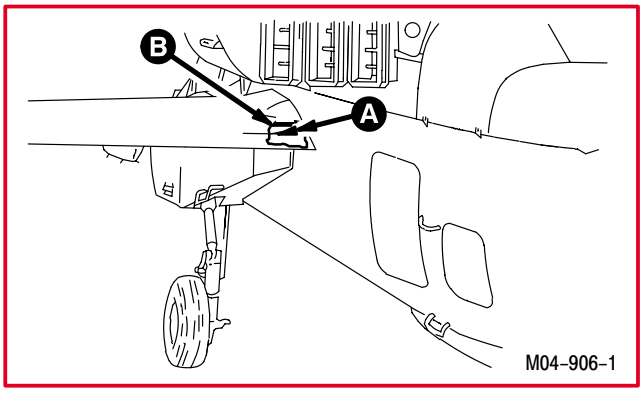
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing LW9 and LW10 or RW9 and RW10 removed
7.57	Utility hydraulic system vented

NOTE

This task is typical for the pressure or return hoses on the left or right wing.



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7.103. WING HYDRAULIC HOSE REPLACEMENT – continued

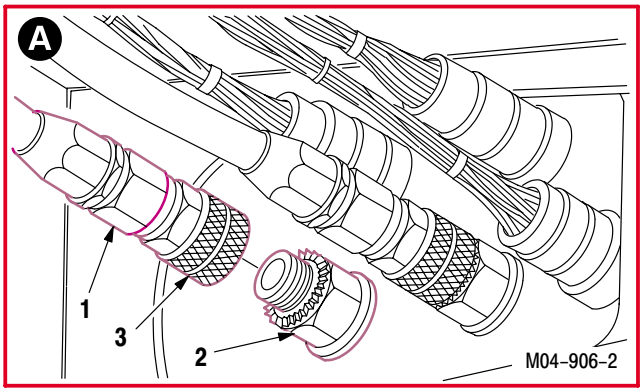
7.103.3. Removal



a. **Remove coupling (1) from nipple (2).**

(1) Place rags under coupling (1) to catch hydraulic fluid spills.

(2) Slide sleeve (3) away from nipple (2). Turn sleeve (3) counterclockwise until coupling (1) clears nipple (2).

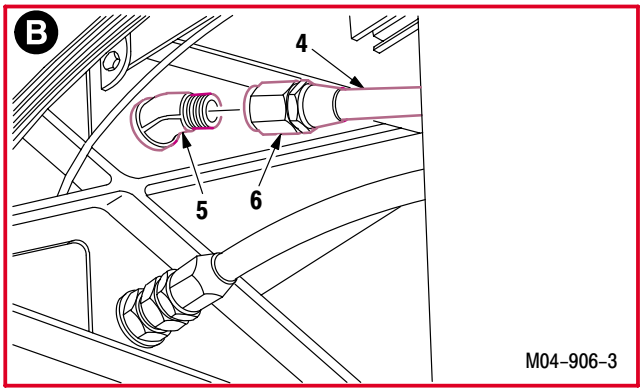


b. **Remove hose (4) from elbow (5).**

(1) Place rags and utility pail under hose (4) to catch hydraulic fluid spills.

(2) Hold elbow (5). Remove nut (6).

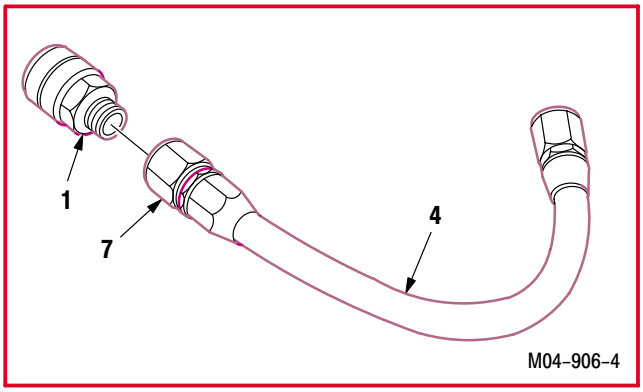
(3) Remove hose (4).



c. **Remove coupling (1) from hose (4).**

(1) Hold coupling (1). Remove nut (7).

(2) Remove coupling (1) and discard hose (4).



7.103.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.103.5. Inspection

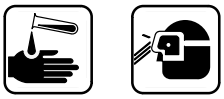
a. **Check coupling, nipple, and nuts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

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7.103. WING HYDRAULIC HOSE REPLACEMENT – continued

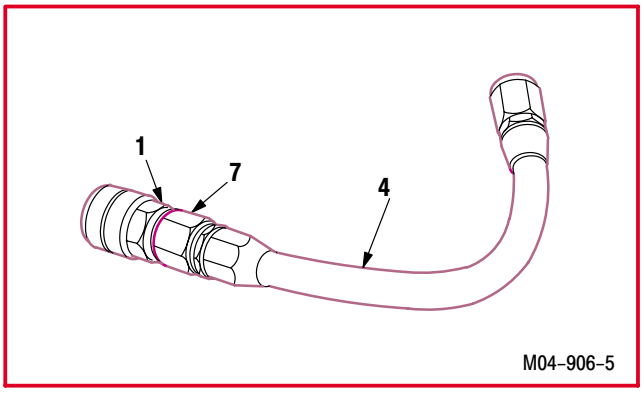
7.103.6. Installation



a. **Install new hose (4) on coupling (1).**

(1) Lubricate coupling threads. Use clean hydraulic fluid (item 92, App F).

(2) Hold coupling (1). Install nut (7) on coupling (1).



b. **Install hose (4) on elbow (5).**

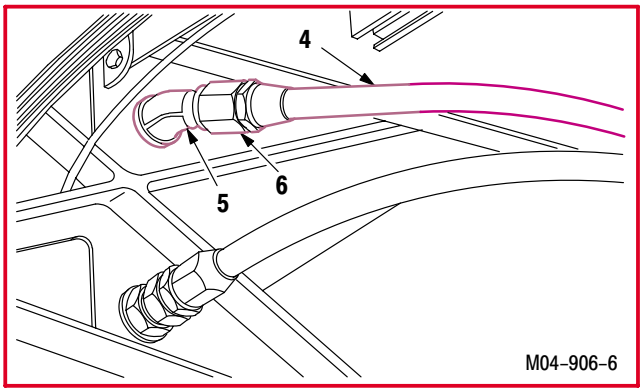
(1) Lubricate threads on elbow (5). Use clean hydraulic fluid (item 92, App F).

(2) Hold elbow (5). Install nut (6) on elbow (5).

c. **Install coupling (1) on nipple (2).**

(1) Aline coupling (1) with nipple (2).

(2) Turn sleeve (3) clockwise on nipple (2) until teeth of sleeve (3) and nipple (2) are fully engaged.



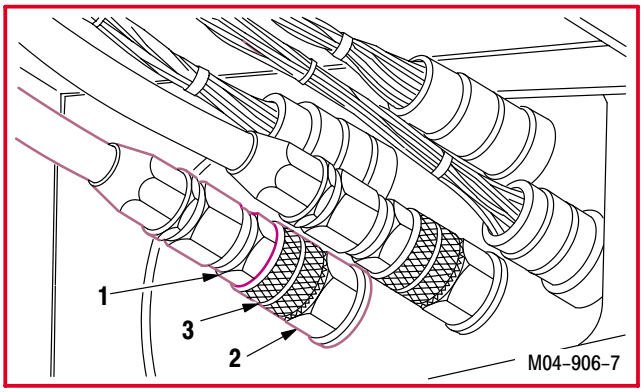
d. **Inspect (QA).**

e. **Bleed utility hydraulic system** (para 1.35)**.**

f. **Service utility hydraulic system** (para 1.34)**.**

g. **Perform hydraulic system leak check** (para 7.2)**.**

h. **Install access fairing LW9 and/or RW9 and LW10 and/or RW10** (para 2.2)**.**



END OF TASK

7.104. ROTOR BRAKE HOSE REPLACEMENT

7.104.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.104.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

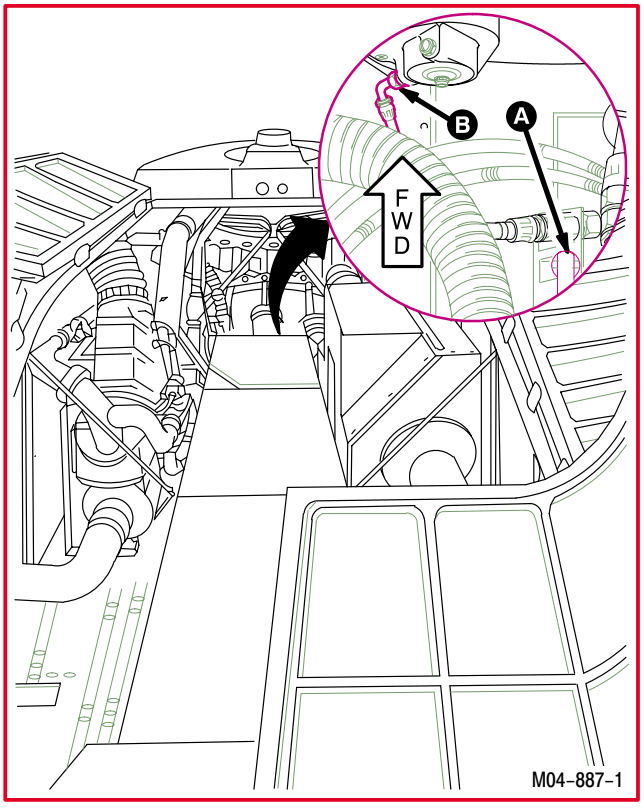
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Catwalk section folded back
7.57	Utility hydraulic system vented



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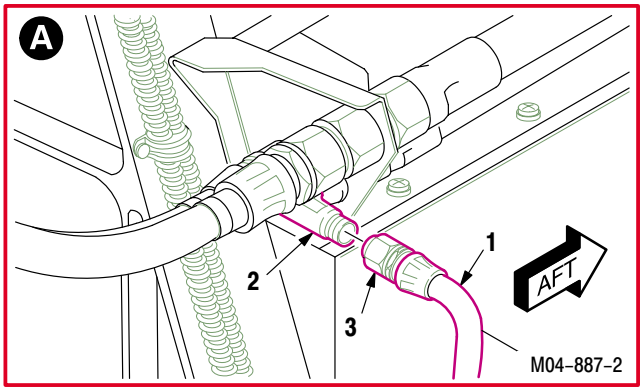
7.104. ROTOR BRAKE HOSE REPLACEMENT – continued

7.104.3. Removal

a. **Remove hose (1) from tee fitting (2).**

(1) Place rags under nut (3) to catch hydraulic fluid spills.

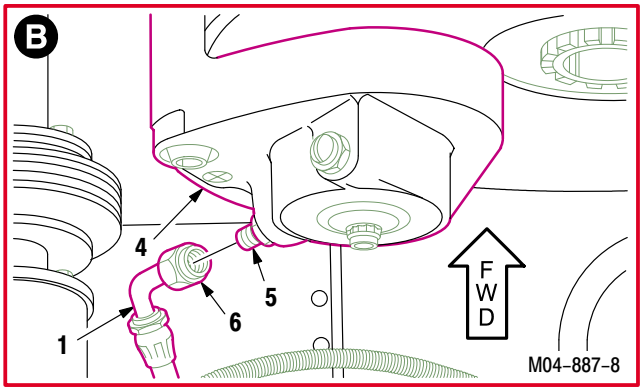
(2) Hold tee fitting (2). Remove nut (3).



b. **Remove hose (1) from rotor brake (4).**

(1) Hold union (5). Remove nut (6).

(2) Remove and discard hose (1).



7.104.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.104.5. Inspection

a. **Check tee fitting and union for nicks, cuts, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

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7.104. ROTOR BRAKE HOSE REPLACEMENT – continued

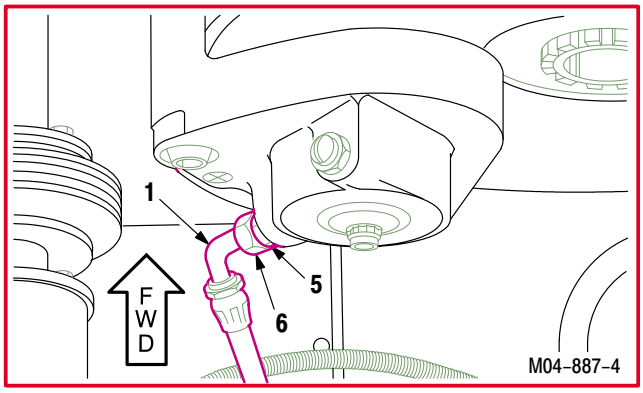
7.104.6. Installation



a. **Install new hose (1) on union (5).**

(1) Lubricate threads of union (5). Use clean hydraulic fluid (item 92, App F).

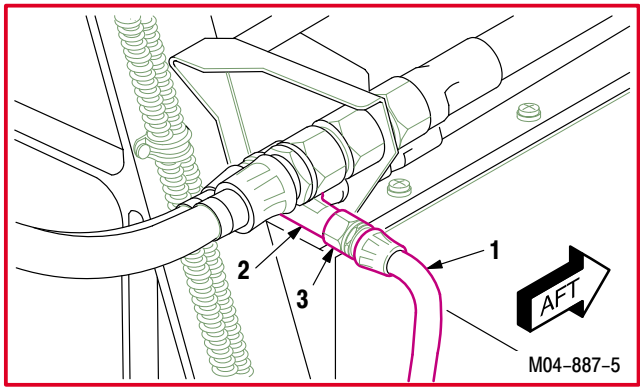
(2) Hold union (5). Install nut (6) on union (5).



b. **Install hose (1) on tee fitting (2).**

(1) Lubricate threads of tee fitting (2). Use clean hydraulic fluid (item 92, App F).

(2) Hold tee fitting (2). Install nut (3) on tee fitting (2).



c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Fold down front catwalk section** (para 2.83)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.105. ROTOR BRAKE PRESSURE SWITCH REMOVAL/INSTALLATION

7.105.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.105.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

References:

TM 1-1520-238-T

Materials/Parts:

Packing
Hydraulic fluid (item 92, App F)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented

7.105.3. Removal

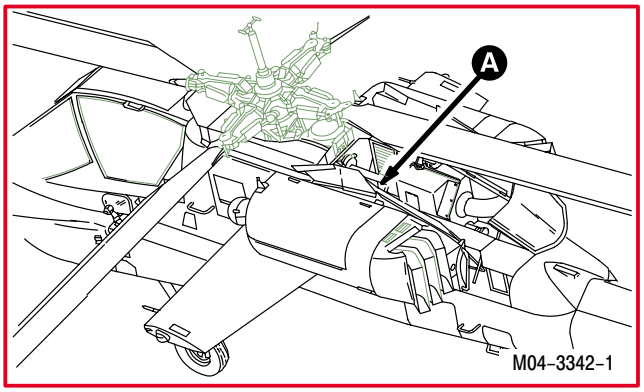
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

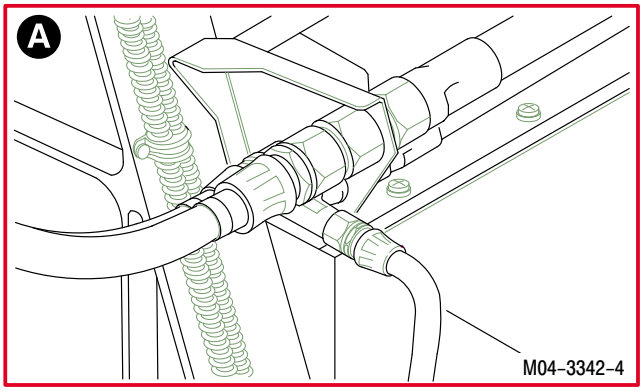
(1) Set **BATT/EXT PWR** switch to **BATT**.

(2) Set **RTR BK** switch to **OFF**.

(3) Ensure rotor brake caution light is not lighted.

(4) Set **BATT/EXT PWR** switch to **OFF**.





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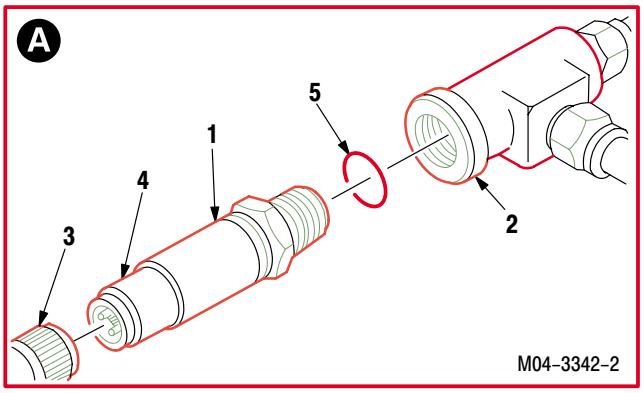
7.105. ROTOR BRAKE PRESSURE SWITCH REMOVAL/INSTALLATION – continued

b. **Remove pressure switch (1) from tee fitting (2).**

(1) Detach connector P1072 (3) from rotor brake switch receptacle (S88)J1 (4).

(2) Remove switch (1) from tee (2).

(3) Remove and discard packing (5).



7.105.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

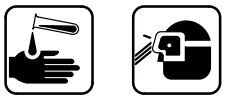
7.105.5. Inspection

a. **Check pressure switch for bent pins** (para 7.56)**.**

b. **Check tee fitting for cracks and stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.105.6. Installation



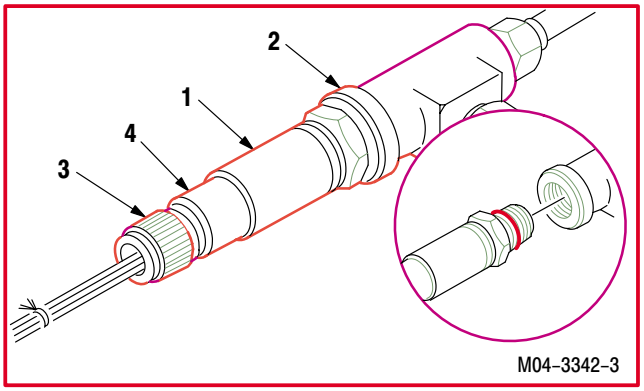
a. **Install pressure switch (1) on tee fitting (2).**

(1) Lubricate packing (5). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (5) on pressure switch (1).

(3) Install switch (1) in tee (2).

(4) Attach connector P1072 (3) to pressure switch receptacle (S88)J1 (4).



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7.105. ROTOR BRAKE PRESSURE SWITCH REMOVAL/INSTALLATION – continued

b. **Inspect (QA).**

c. **Bleed utility hydraulic system** (para 1.35)**.**

d. **Service utility hydraulic system** (para 1.34)**.**

e. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.106. TAIL WHEEL LOCK ACTUATOR HOSE REPLACEMENT

7.106.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.106.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
14-quart utility pail (item 222, App H)

Materials/Parts:

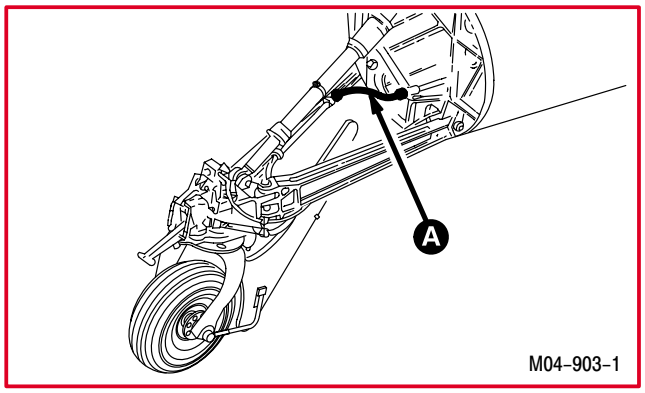
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
7.57	Utility hydraulic system vented



7.106.3. Removal

a. **Remove hose (1) from union (2).**

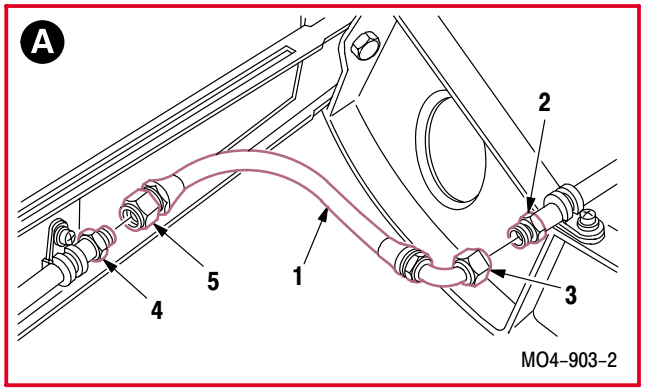
(1) Place rags and pail under hose (1) to catch hydraulic fluid spills. Use pail.

(2) Hold union (2). Remove nut (3).

b. **Remove hose (1) from union (4).**

(1) Hold union (4). Remove nut (5).

(2) Remove and discard hose (1).



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7.106. TAIL WHEEL LOCK ACTUATOR HOSE REPLACEMENT – continued

7.106.4. Cleaning

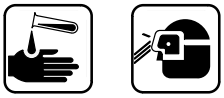
a. **Wipe attaching parts with a clean rag.**

7.106.5. Inspection

a. **Check unions for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.106.6. Installation



a. **Install new hose (1) on union (4).**

(1) Lubricate union (4). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (4). Install nut (5).

b. **Install hose (1) on union (2).**

(1) Lubricate union (2). Use clean hydraulic fluid (item 92, App F).

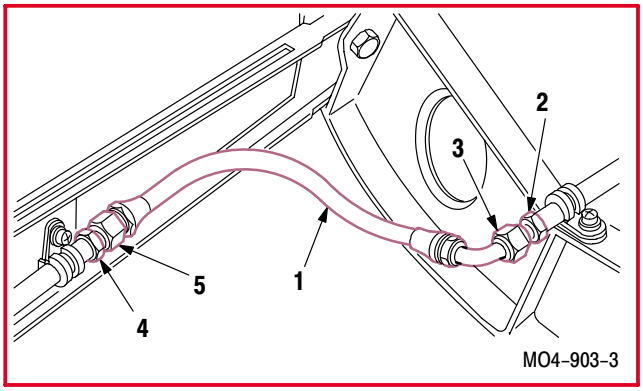
(2) Hold union (2). Install nut (3).

c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**



END OF TASK

7.107. TAIL WHEEL LOCK CONTROL VALVE REPLACEMENT

7.107.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.107.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

References:

TM 1-1520-238-T

Materials/Parts:

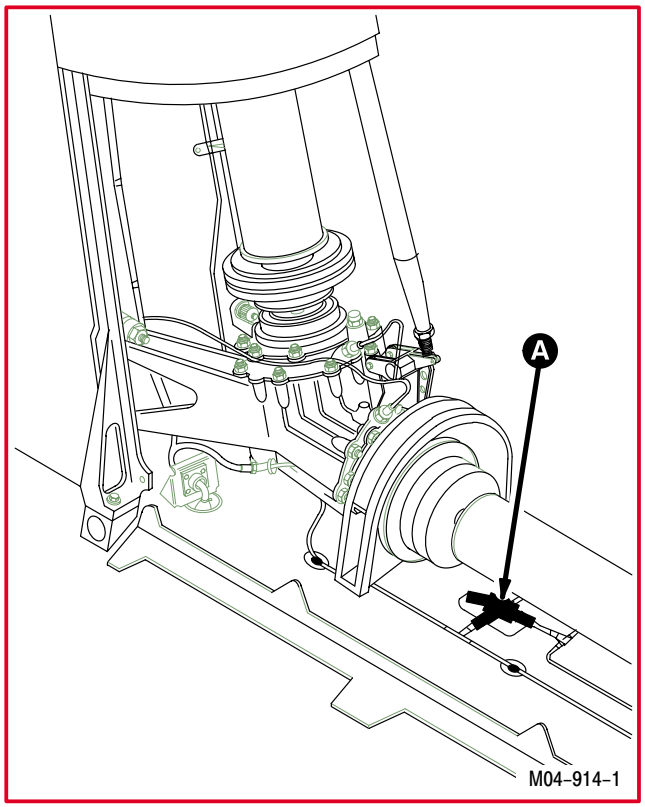
Packing (3)
Hydraulic fluid (item 92, App F)

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairings L510 and R510 removed
7.57	Utility hydraulic hydraulic system vented



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7.107. TAIL WHEEL LOCK CONTROL VALVE REPLACEMENT – continued

7.107.3. Removal

a. **Detach connector P754 (1) from receptacle (HP5)J1 (2).**

b. **Remove tube (3) from control valve (4).**

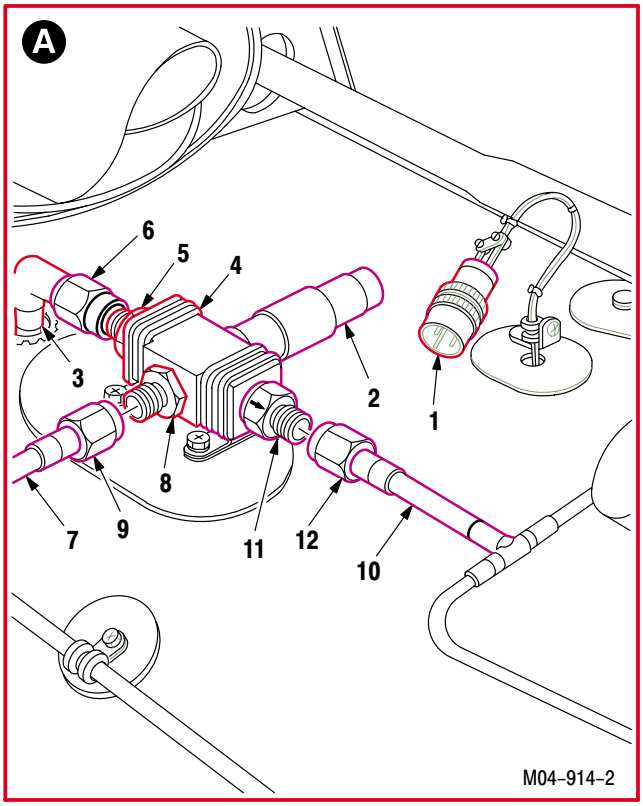
(1) Hold union (5). Remove nut (6).

c. **Remove tube (7) from valve (4).**

(1) Hold union (8). Remove nut (9).

d. **Remove tube (10) from valve (4).**

(1) Hold check valve (11). Remove nut (12).

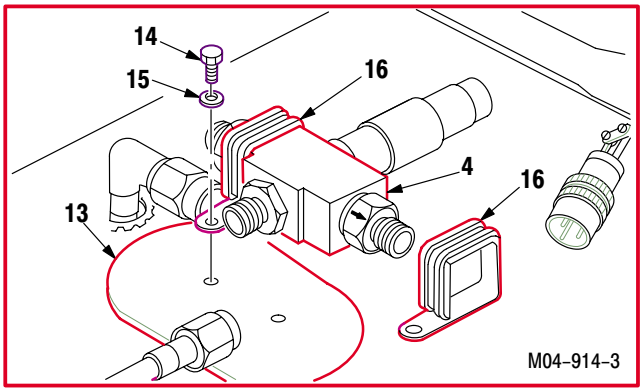


e. **Remove valve (4) from deck (13).**

(1) Remove two screws (14) and washers (15) from two clamps (16).

(2) Remove valve (4) from deck (13).

(3) Slide two clamps (16) from valve (4).



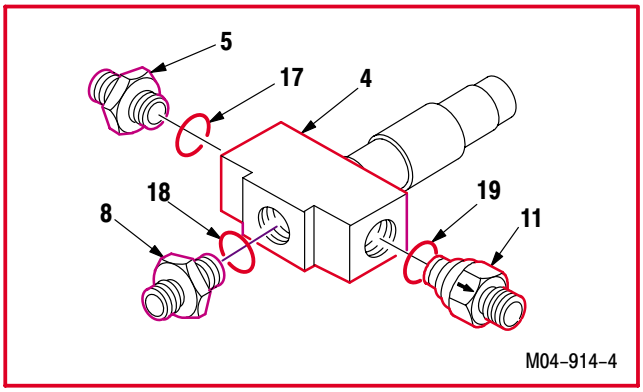
f. **Remove unions (5) and (8) from valve (4).**

(1) Remove unions (5) and (8).

(2) Remove and discard packings (17) and (18).

g. **Remove check valve (11) from valve (4).**

(1) Remove and discard check valve (11) and packing (19).



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7.107. TAIL WHEEL LOCK CONTROL VALVE REPLACEMENT – continued

7.107.4. Cleaning

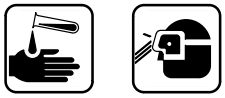
a. **Wipe removed and attaching parts with a clean rag.**

7.107.5. Inspection

a. **Check removed and attaching parts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.107.6. Installation



a. **Install union (5) on new valve (4).**

(1) Lubricate packing (17). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (17) on union (5).

(3) Install union (5) on valve (4).

b. **Install union (8) on valve (4).**

(1) Lubricate packing (18). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (18) on union (8).

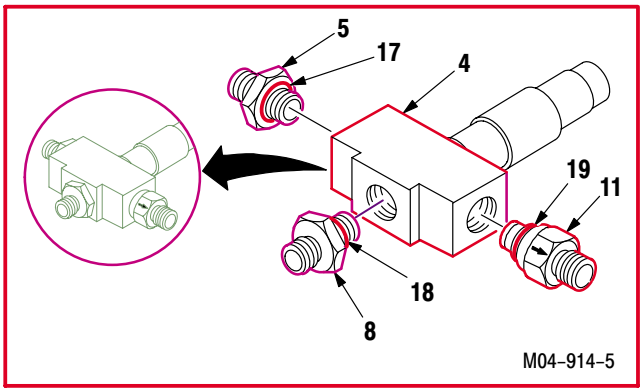
(3) Install union (8) on valve (4).

c. **Install check valve (11) on valve (4) with flow arrow pointing away from valve (4).**

(1) Lubricate packing (19). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (19) on inlet side of check valve (11).

(3) Install check valve (11) with flow arrow pointing away from valve (4).



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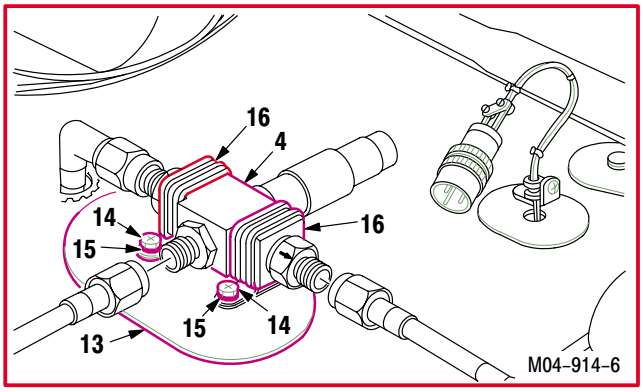
7.107. TAIL WHEEL LOCK CONTROL VALVE REPLACEMENT – continued

d. **Install valve (4) on deck (13).**

(1) Slide two clamps (16) on valve (4).

(2) Position valve (4) on deck (13).

(3) Install two screws (14) and washers (15) through two clamps (16).



e. **Install tube (10) on valve (4).**

(1) Lubricate threads of check valve (11). Use clean hydraulic fluid (item 92, App F).

(2) Hold check valve (11). Install nut (12).

f. **Install tube (7) on valve (4).**

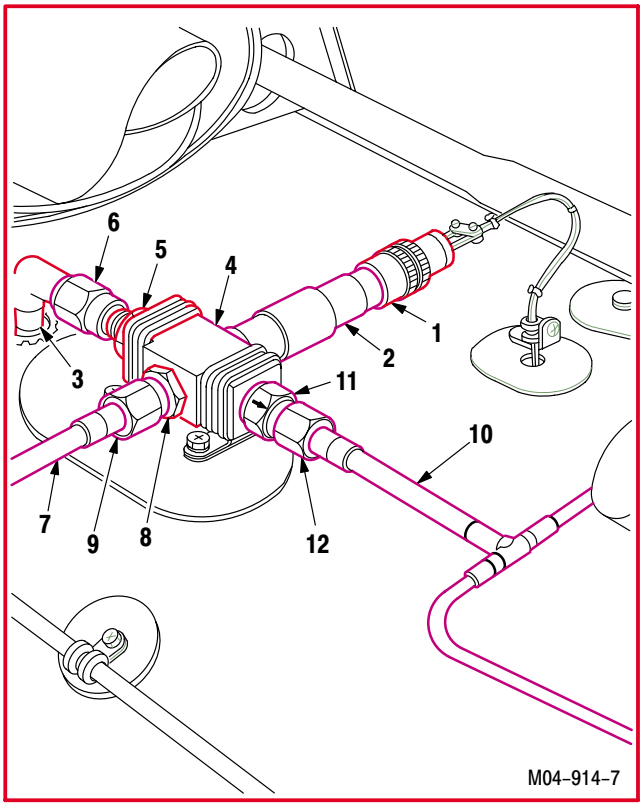
(1) Lubricate threads of union (8). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (8). Install nut (9).

g. **Install tube (3) on valve (4).**

(1) Lubricate threads of union (5). Use clean hydraulic fluid (item 92, App F).

(2) Hold union (5). Install nut (6).



h. **Attach connector P754 (1) to receptacle (HP5)J1 (2).**

i. **Inspect (QA).**

j. **Bleed utility hydraulic system** (para 1.35)**.**

k. **Service utility hydraulic system** (para 1.34)**.**

l. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

m. **Install access fairings L510 and R510** (para 2.2)**.**

END OF TASK

7.108. UTILITY LOW LEVEL SHUTOFF VALVE REPLACEMENT

7.108.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.108.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

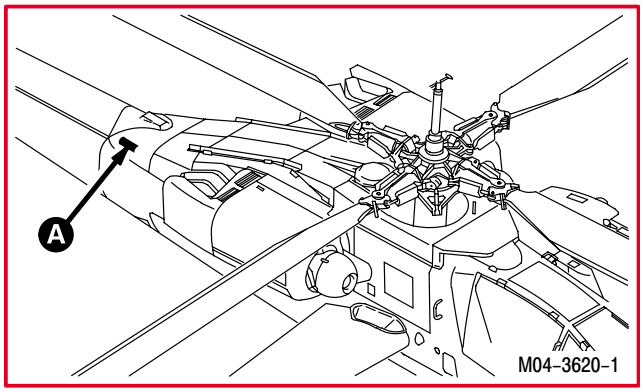
TM 1-1520-238-T

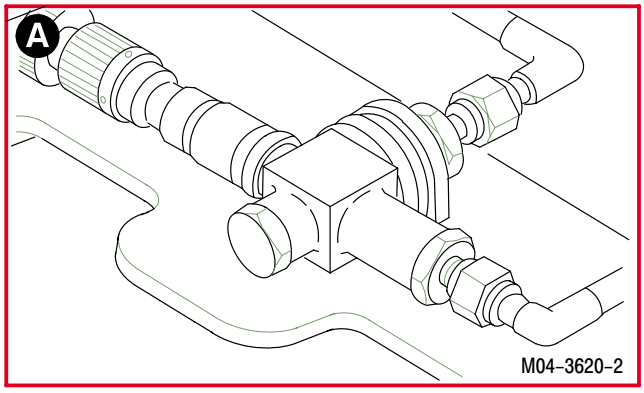
Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access fairing R410 opened; fairing T355 removed
7.57	Utility hydraulic system vented

Materials/Parts:

Packing (2)
Hydraulic fluid (item 92, App F)





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7.108. UTILITY LOW LEVEL SHUTOFF VALVE REPLACEMENT – continued

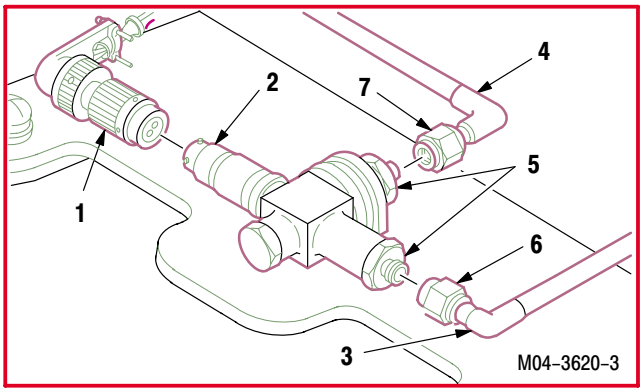
7.108.3. Removal

a. **Detach connector P1011 (1) from receptacle (HP6)J1 (2).**

b. **Remove tubes (3) and (4) from two unions (5).**

(1) Hold union (5). Remove nut (6).

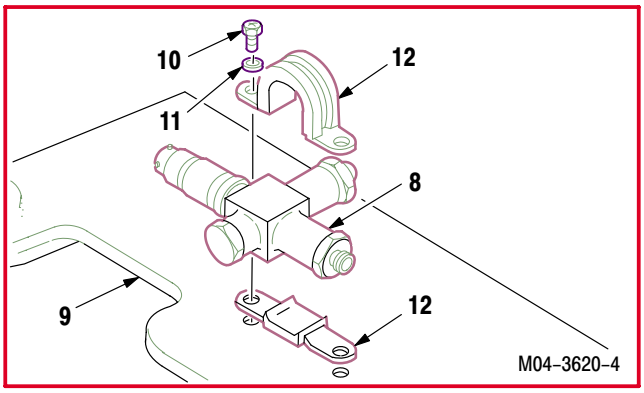
(2) Hold union (5). Remove nut (7).



c. **Remove valve (8) from armor plate (9).**

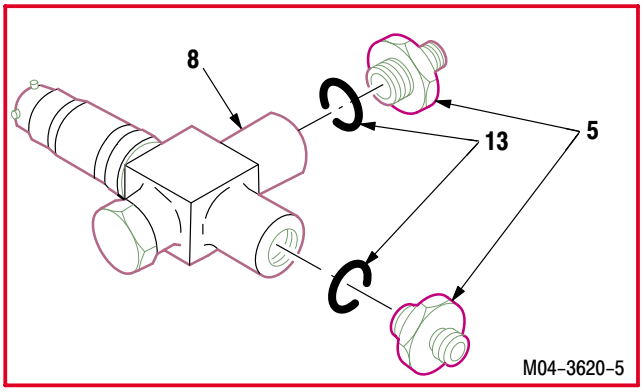
(1) Remove two screws (10) and washers (11) from clamp (12).

(2) Remove valve (8) from armor plate (9).



d. **Remove unions (5) from valve (8).**

(1) Remove and discard packings (13) and valve (8).



7.108.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.108.5. Inspection

a. **Check removed and attaching parts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.108. UTILITY LOW LEVEL SHUTOFF VALVE REPLACEMENT – continued

7.108.6. Installation

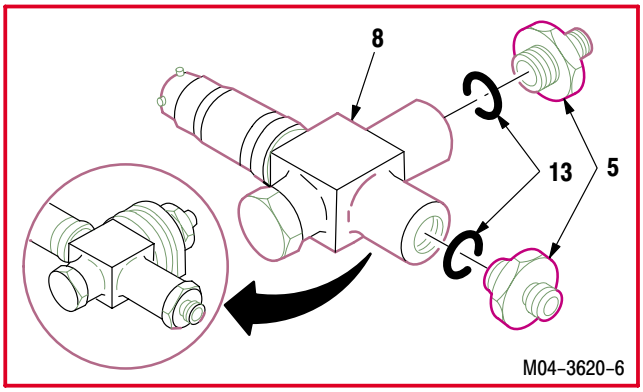


a. **Install unions (5) on new valve (8).**

(1) Lubricate new packings (13). Use clean hydraulic fluid (item 92, App F).

(2) Install packings (13) on unions (5).

(3) Install unions (5) on valve (8).



b. **Install valve (8) on armor plate (9).**

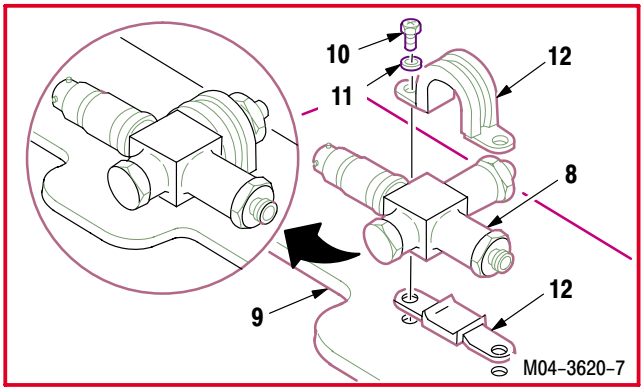
(1) Aline valve (8) and clamp (12) with armor plate (9).

(2) Install two screws (10) and washers (11) through clamp (12) into armor plate (9).

c. **Install tubes (3) and (4) on unions (5).**

(1) Hold union (5). Install nut (6).

(2) Hold union (5). Install nut (7).



d. **Attach connector P1011 (1) to receptacle (HP6)J1 (2).**

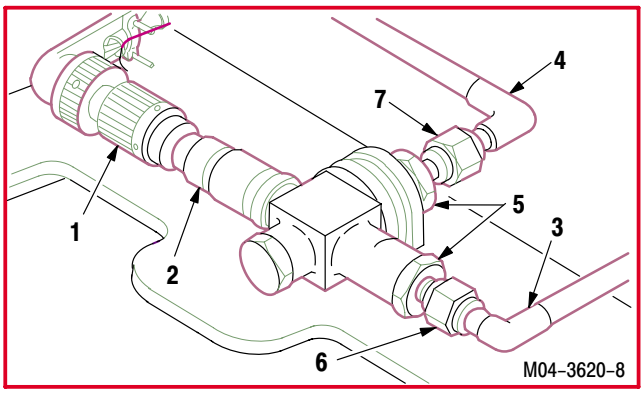
e. **Inspect (QA).**

f. **Bleed utility hydraulic system** (para 1.35)**.**

g. **Service utility hydraulic system** (para 1.34)**.**

h. **Perform utility hydraulic maintenance operational check** (TM 1-1520-238-T)**.**

i. **Secure access fairing R410; install fairing T355** (para 2.2)**.**



END OF TASK

7.109. UTILITY HYDRAULIC TUBING BULKHEAD SUPPORT BRACKET REMOVAL/INSTALLATION

7.109.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.109.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H) (2)

Materials/Parts:

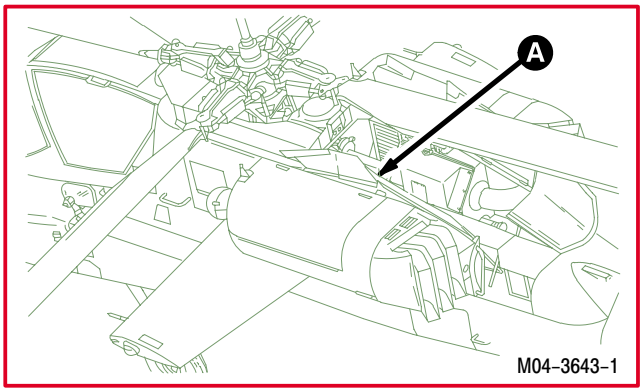
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.57	Utility hydraulic system vented
7.127	SDC pressure outlet hose removed



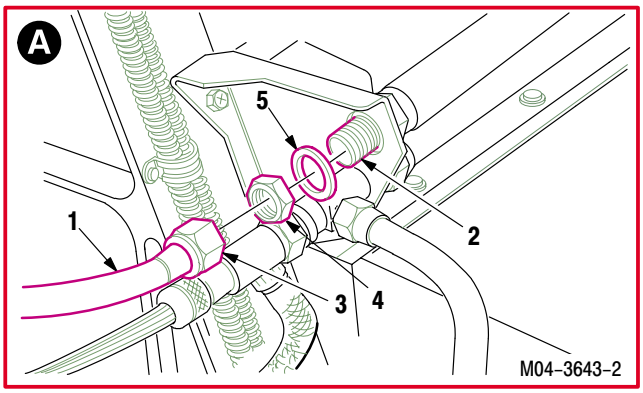
7.109.3. Removal

a. **Remove utility pump return hose (1) from union (2).**

(1) Place rags under hose (1) to catch hydraulic fluid spills.

(2) Hold union (2). Remove nut (3). Use two open end wrenches.

(3) Hold union (2). Remove nut (4) and washer (5).



GO TO NEXT PAGE

7.109. UTILITY HYDRAULIC TUBING BULKHEAD SUPPORT BRACKET REMOVAL/INSTALLATION – continued

b. **Detach connector P1072 (6) from rotor brake pressure switch (S88)J1 (7).**

c. **Remove rotor brake pressure tube (8) from tee (9).**

(1) Hold tee (9). Remove nut (10).

d. **Remove tee (9) from bracket (11).**

(1) Hold tee (9). Remove nut (12) and washer (13).

(2) Remove tee (9).

e. **Remove utility pump pressure hose (14) from union (15).**

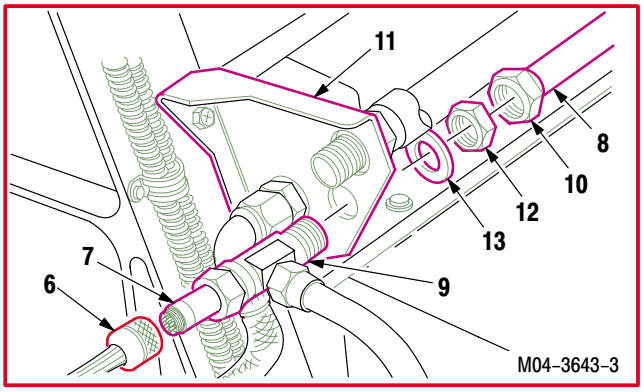
(1) Hold union (15). Remove nut (16).

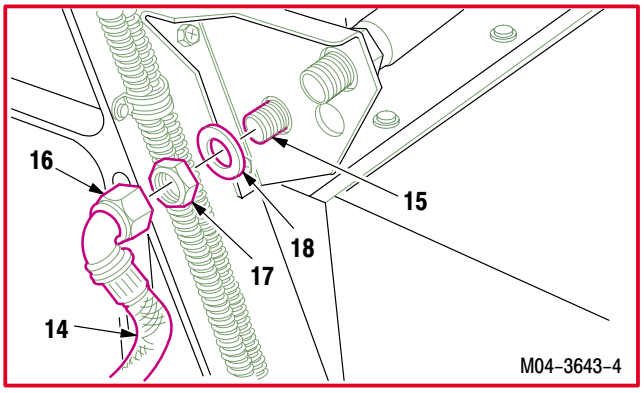
(2) Hold union (15). Remove nut (17) and washer (18).

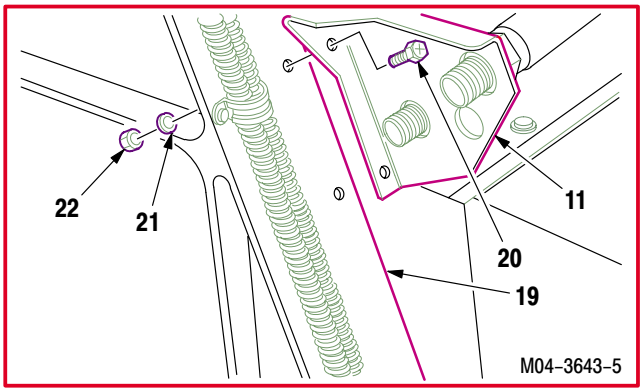
f. **Remove bracket (11) from bulkhead (19).**

(1) Remove two screws (20), washers (21), and nuts (22).

(2) Remove bracket (11).







7.109.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.109.5. Inspection

a. **Check hoses and tubes for nicks, cuts, chafing, and stripped or damaged threads** (para 7.56)**.**

b. **Check nuts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.109. UTILITY HYDRAULIC TUBING BULKHEAD SUPPORT BRACKET REMOVAL/INSTALLATION – continued

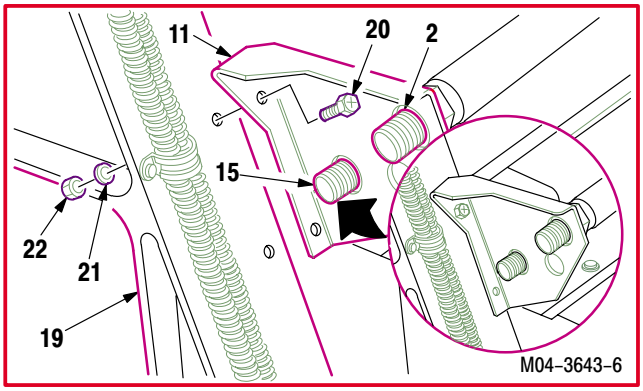
7.109.6. Installation

a. **Install bracket (11) on bulkhead (19).**

(1) Aline bracket (11) with bulkhead (19) and unions (2) and (15).

(2) Install two screws (20), washers (21), and nuts (22).





b. **Install hose (14) on union (15).**

(1) Hold union (15). Install washer (18) and nut (17).

(2) Lubricate threads of union (15). Use clean hydraulic fluid (item 92, App F).

(3) Install nut (16) fingertight on union (15).

(4) Aline hose (14) to 135 degrees.

(5) Hold union (15). Tighten nut (16).

c. **Install tee (9) on bracket (11).**

(1) Insert tee (9) through bracket (11).

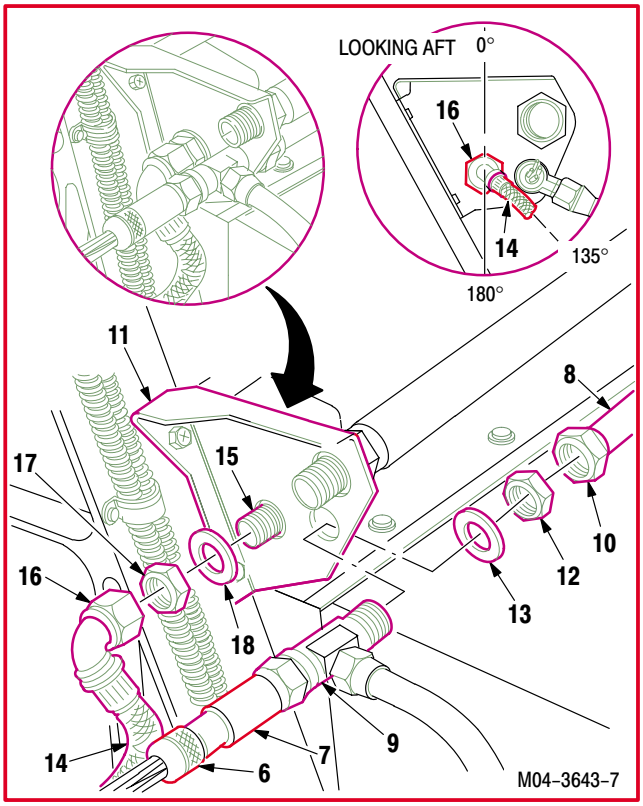
(2) Hold tee (9). Install washer (13) and nut (12).

d. **Install tube (8) on tee (9).**

(1) Lubricate threads of tee (9). Use clean hydraulic fluid (item 92, App F).

(2) Hold tee (9). Install nut (10).

e. **Attach connector P1072 (6) to rotor brake pressure switch (S88)J1 (7).**



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7.109. UTILITY HYDRAULIC TUBING BULKHEAD SUPPORT BRACKET REMOVAL/INSTALLATION – continued

f. **Install hose (1) on union (2).**

(1) Hold union (2). Install washer (5) and nut (4). Use two open end wrenches.

(2) Lubricate threads of union (2). Use clean hydraulic fluid (item 92, App F).

(3) Hold union (2). Install nut (3).

g. **Inspect (QA).**

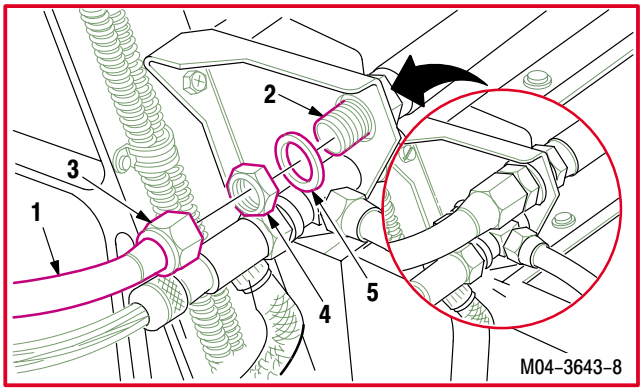
h. **Bleed utility hydraulic system** (para 1.35)**.**

i. **Service utility hydraulic system** (para 1.34)**.**

j. **Perform hydraulic system leak check** (para 7.2)**.**

k. **Install SDC pressure outlet hose** (para 7.127)**.**

l. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.110. UTILITY HYDRAULIC AUXILIARY RETURN CHECK VALVE REPLACEMENT

7.110.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.110.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
14-quart utility pail (item 222, App H)

References:

TM 1-1520-238-T
TM 9-1090-208-23

Materials/Parts:

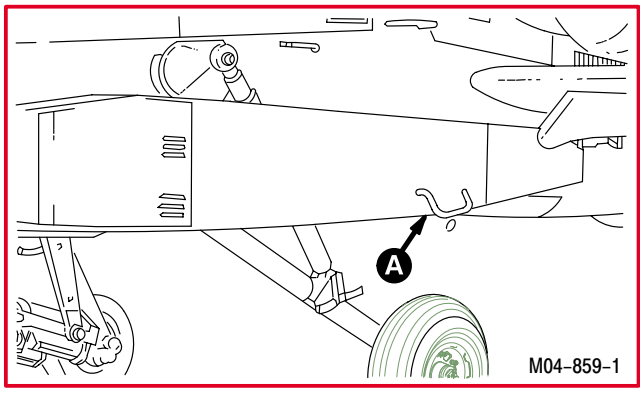
Hydraulic fluid (item 92, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
7.57	Utility hydraulic system vented
TM 9-1090-208-23	Ammunition storage magazine removed



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7.110. UTILITY HYDRAULIC AUXILIARY RETURN CHECK VALVE REPLACEMENT – continued

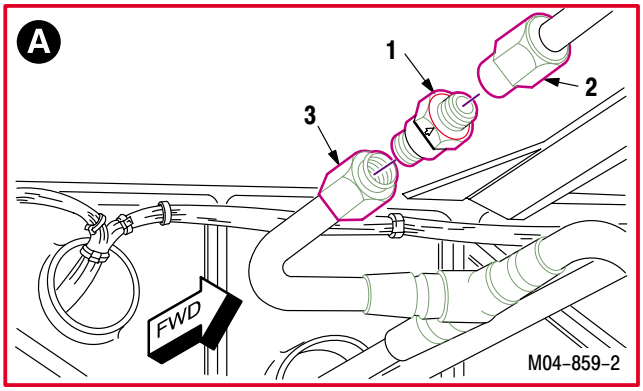
7.110.3. Removal

a. **Remove check valve (1).**

(1) Place rags and pail under check valve (1) to catch hydraulic fluid spills. Use pail.

(2) Hold check valve (1). Remove nuts (2) and (3) from check valve (1).

(3) Remove and discard check valve (1).



7.110.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.110.5. Inspection

a. **Check nuts for nicks, scratches, rounded flats, and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

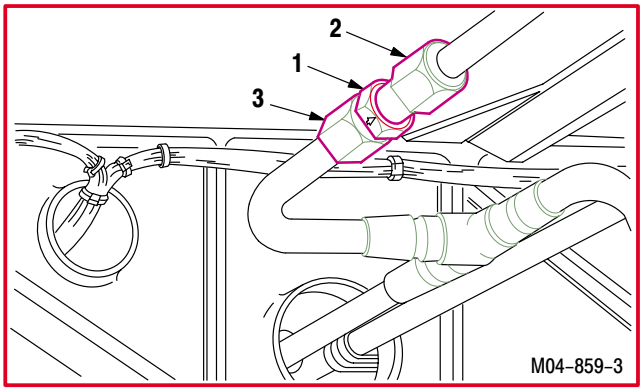
7.110.6. Installation



a. **Install new check valve (1) with arrow on valve pointing away from 90 degree tube bend toward right side of aircraft.**

(1) Lubricate threads of check valve (1). Use clean hydraulic fluid (item 92, App F).

(2) Hold check valve (1). Install nuts (2) and (3).



GO TO NEXT PAGE

7.110. UTILITY HYDRAULIC AUXILIARY RETURN CHECK VALVE REPLACEMENT – continued

b. **Inspect (QA).**

c. **Bleed utility hydraulic system** (para 1.35)**.**

d. **Service utility hydraulic system** (para 1.34)**.**

e. **Perform utility hydraulic system maintenance operational check** (TM 1-1520-238-T)**.**

f. **Install ammunition storage magazine** (TM 9-1090-208-23)**.**

END OF TASK

7.111. TURRET COUPLING HALVES REPLACEMENT

7.111.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.111.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

References:

TM 9-1090-208-23

Materials/Parts:

Hydraulic fluid (item 92, App F)
Wire (item 226, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
TM 9-1090-208-23	Gun turret removed

NOTE

This task is typical for pressure and return turret coupling halves.

7.111.3. Removal

a. **Remove tube (1) from coupling (2).**

(1) Hold coupling (2).

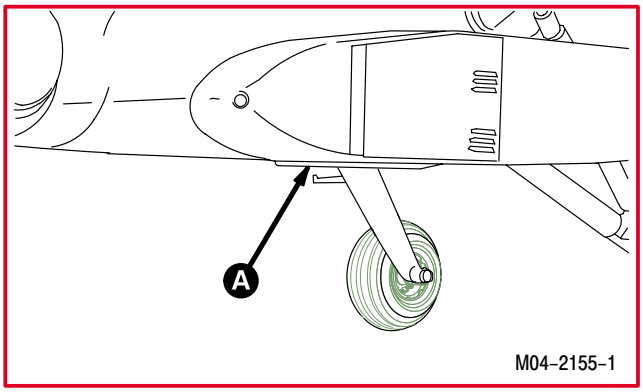
(2) Remove nut (3) from coupling (2).

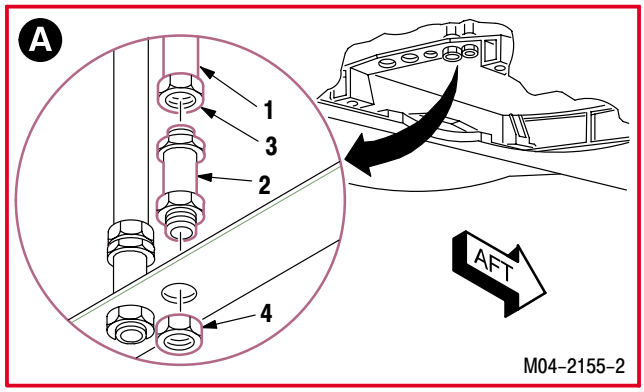
b. **Remove coupling (2).**

(1) Remove lockwire from nut (4).

(2) Hold coupling (2). Remove nut (4).

(3) Remove and discard coupling (2).





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7.111. TURRET COUPLING HALVES REPLACEMENT – continued

7.111.4. Cleaning

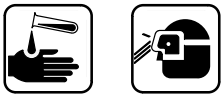
a. **Wipe removed and attaching parts with a clean rag.**

7.111.5. Inspection

a. **Check nut for stripped or damaged threads** (para 7.56)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.111.6. Installation



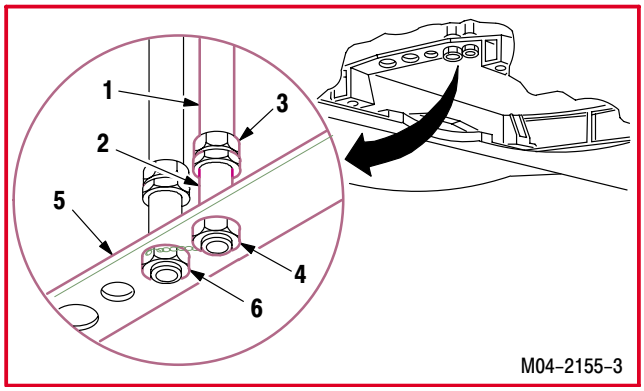
a. **Install new coupling (2) on bracket (5).**

(1) Lubricate coupling (2). Use clean hydraulic fluid (item 92, App F).

(2) Position coupling (2) on bracket (5).

(3) Hold coupling (2). Install nut (4).

(4) Lockwire nut (4) to adjacent nut (6). Use wire (item 226, App F).



b. **Install tube (1) on coupling (2).**

(1) Position tube (1).

(2) Hold coupling (2). Install nut (3).

c. **Inspect (QA).**

d. **Bleed utility hydraulic system** (para 1.35)**.**

e. **Service utility hydraulic system** (para 1.34)**.**

f. **Perform hydraulic system leak check** (para 7.2)**.**

g. **Install gun turret** (TM 9-1090-208-23)**.**

END OF TASK

7.112. HYDRAULIC ADAPTER REPLACEMENT

7.112.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.112.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
1/2 x 3/8-inch drive socket wrench adapter (item 3, App H)
3/4 x 1/2-inch drive socket wrench adapter (item 5, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1 x 1/2-inch drive deep socket wrench socket (item 293, App H)
1 1/8 x 1/2-inch drive deep socket wrench socket (item 294, App H)
1 1/2 x 1/2-inch drive socket wrench socket (item 306, App H)
13/16 x 1/2-inch drive socket wrench socket (item 311, App H)
1 3/4 x 3/4-inch drive socket wrench socket (item 312, App H)
1 3/8 x 3/4-inch drive socket wrench socket (item 313, App H)
Fluid adapter tool kit (item 380, App H)
Fluid adapter tool kit (item 381, App H)
Fluid adapter tool kit (item 382, App H)
Fluid adapter tool kit (item 383, App H)
Installation tool kit (item 385, App H)
Installation tool kit (item 386, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

Materials/Parts:

Packing
Brush (item 34, App F)
Epoxy primer coating kit (item 78, App F)
Hydraulic fluid (item 92, App F)

Personnel Required:

68H Aircraft Pneudraulics Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

NOTE

This task is typical for hydraulic adapters on the hydraulic hand pump, utility manifold, primary manifold, utility accumulator, and hydraulic servocylinders. The adapters differ only in size.

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7.112. HYDRAULIC ADAPTER REPLACEMENT – continued

NOTE

- Use the proper fluid adapter installation tool kit for the hydraulic adapter size being replaced. Refer to table 1.
- Each installation tool kit contains three tools: lockring removal tool, combination removal tool, and O-ring installation tool. Use the applicable open-end wrench and socket for each tool kit. Refer to table 1.
- The replacement of the hydraulic adapters on the hydraulic servocylinders is an AVIM task.
- The replacement of the hydraulic adapters on the other hydraulic components is an “off helicopter” task.

TABLE 1

Adapter	Tool Kit	Lockring Removal Tool Size (in.)	Combination Tool Size (in.)
HS4751-4	Installation tool kit (item 386, App H)	7/16 open-end wrench	13/16 socket
HS4751-6	Fluid adapter tool kit (item 380, App H)	9/16 open-end wrench	1-inch socket
HS4751-8	Fluid adapter tool kit (item 381, App H)	5/8 open-end wrench	1-1/8 socket
HS4751-10	Fluid adapter tool kit (item 382, App H)	15/16 open-end wrench	1-3/8 socket
HS4751-12	Fluid adapter tool kit (item 383, App H)	1-1/4 open-end wrench	1-1/2 socket
HS4751-16	Installation tool kit (item 385, App H)	1-5/16 open-end wrench	1-3/4 socket

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7.112. HYDRAULIC ADAPTER REPLACEMENT – continued

7.112.3. Removal

a. **Clean excess primer from lockring (1)** (para 1.47)**.**

b. **Unseat lockring (1) from port (2).**

(1) Install lockring removal tool (3) on adapter (4).

(2) Retract sleeve (5) until pin (6) bottoms in slot (7).

(3) Place puller halves (8) over adapter (4) into lockring groove (9).

(4) Slide sleeve (5) down over puller halves (8).

NOTE

Ensure proper engagement of puller halves in lockring groove.

(5) Hold sleeve (5). Turn bolt (10) clockwise to unseat lockring (1) from port (2). Use applicable open-end wrench. Refer to table 1.

(6) Stop turning bolt (10) when external serrations of lockring (1) are clear from surface of port (2).

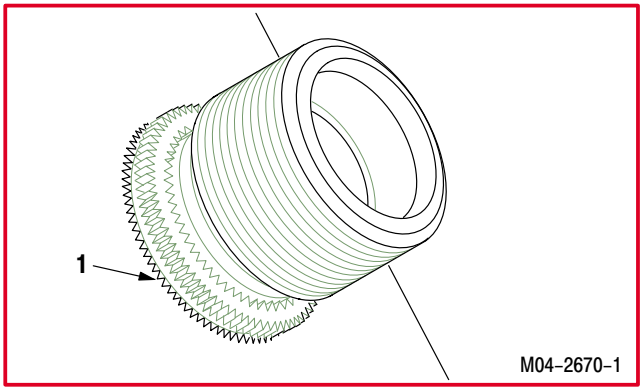
(7) Remove lockring removal tool (3).

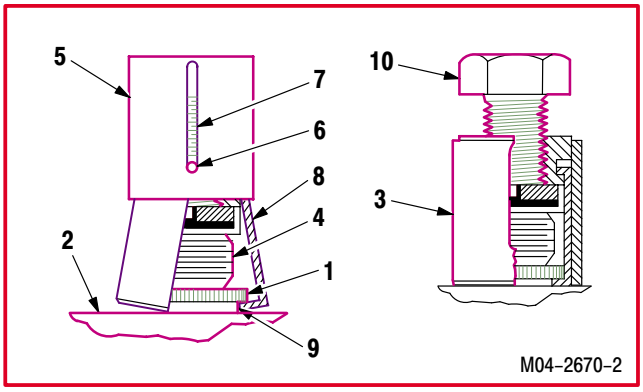
c. **Remove adapter (4) from port (2).**

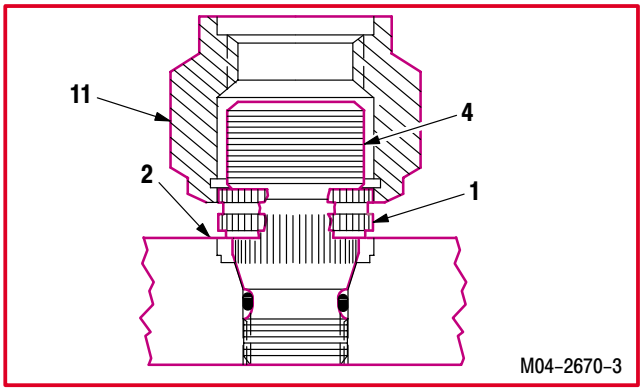
(1) Install combination tool (11) over adapter (4) and engage serrations of tool (11) and lockring (1).

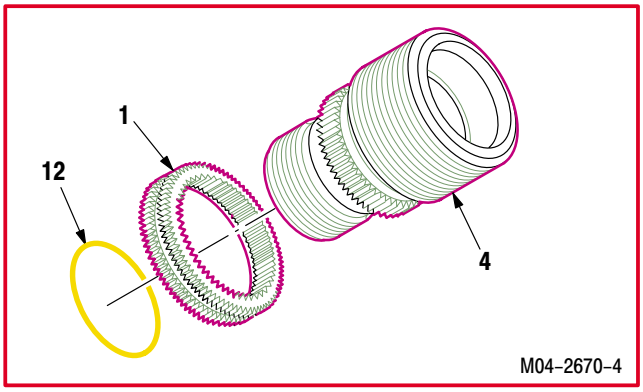
(2) Remove adapter (4) from port (2). Use applicable socket. Refer to table 1.

(3) Discard adapter (4), lockring (1), and packing (12).









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7.112. HYDRAULIC ADAPTER REPLACEMENT – continued

7.112.4. Cleaning

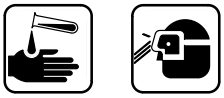
a. **Wipe removed and attaching parts with a clean rag.**

7.112.5. Inspection

a. **Check port for cracks and stripped or damaged threads** (para 7.56)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.112.6. Installation

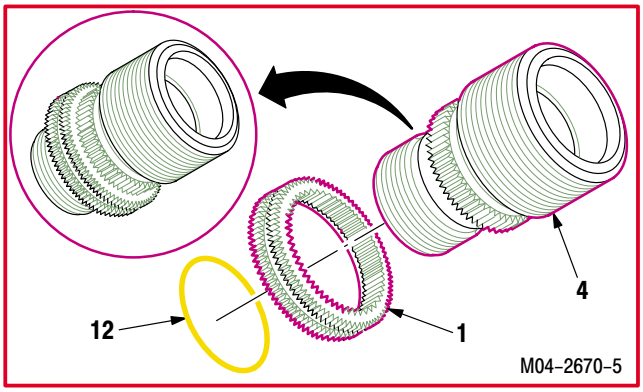


a. **Install new lockring (1) on new adapter (4).**

b. **Install new packing (12) on adapter (4).**

(1) Lubricate packing (12). Use clean hydraulic fluid (item 92, App F).

(2) Install packing (12) on adapter (4). Use O-ring installation tool.



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7.112. HYDRAULIC ADAPTER REPLACEMENT – continued

CAUTION

Do not rotate adapter counterclockwise once packing has entered the port. If adapter is rotated counterclockwise, packing must be replaced. Failure to observe can result in damage to parts and failure of equipment.

c. **Install adapter (4) on port (2).** Torque adapter (4) to applicable **minimum torque**. Do not exceed **maximum torque**. Refer to table 2.

(1) Lubricate threads of adapter (4). Use clean hydraulic fluid (item 92, App F).

(2) Install adapter (4) on port (2) finger tight.

(3) Install combination tool (11) over adapter (4) and engage serrations of tool (11) and lockring (1).

(4) Torque adapter (4) to applicable **minimum torque**. Refer to table 2. Use applicable socket and torque wrench. Refer to table 1.

(5) Increase torque until serrations of lockring (1) and port (2) are alined. Do not exceed **maximum torque**. Refer to table 2.

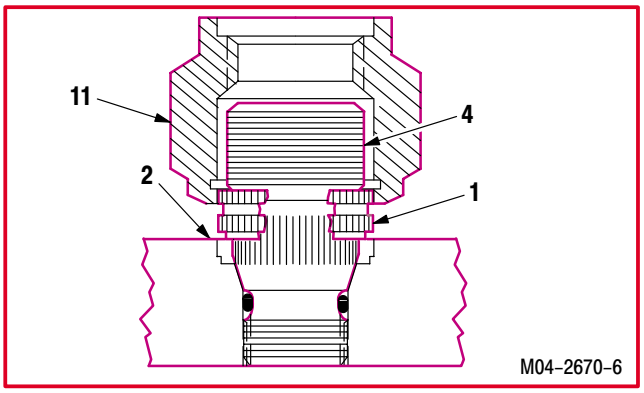


TABLE 2

Adapter	Installation Torque (in-lbs)	
	Minimum	Maximum
HS4751-4	60	100
HS4751-6	180	245
HS4751-8	430	510
HS4751-10	600	680
HS4751-12	855	945
HS4751-16	1140	1260

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7.112. HYDRAULIC ADAPTER REPLACEMENT – continued



CAUTION

- Ensure that lockring and port serrations are alined prior to seating lockring into port. Failure to observe can result in damage to parts and failure of equipment.
- Any sudden increase in resistance on combination tool prior to tool bottoming on port surface, may indicate that the lockring serrations and the port serrations are not alined. If this occurs, stop procedure to prevent damage to parts. Repeat applicable steps to ensure serrations of lockring and port are properly alined.
- To prevent port damage, do not continue turning combination tool once tool has bottomed on surface of port.

d. **Seat lockring (1) into port (2).**

(1) Apply epoxy primer on bottom of lockring (1) and down into port (2). Use epoxy primer coating kit (item 78, App F) and brush (item 34, App F).

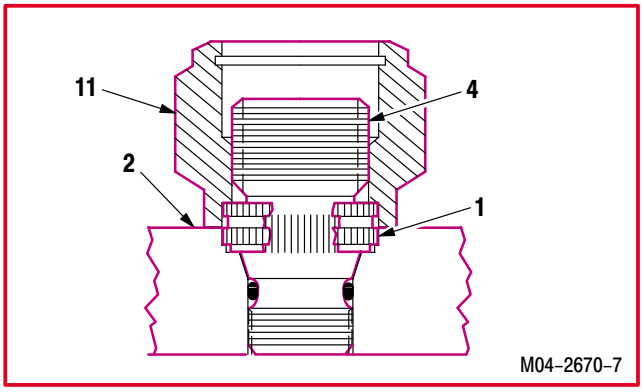
(2) Install combination tool (11) on threads of adapter (4) until tool (11) touches lockring (1).

NOTE

Seat lockring while primer is still wet.

(3) Turn combination tool (11) clockwise until lockring (1) seats down into port (2) and tool has bottomed on surface of port (2). Use applicable socket. Refer to table 1.

(4) Wipe excess epoxy primer from lockring (1) and surface of port (2).



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7.112. HYDRAULIC ADAPTER REPLACEMENT – continued

e. **Check dimensions A and B to ensure proper installation of adapter (4) and locking (1).** Refer to table 3.

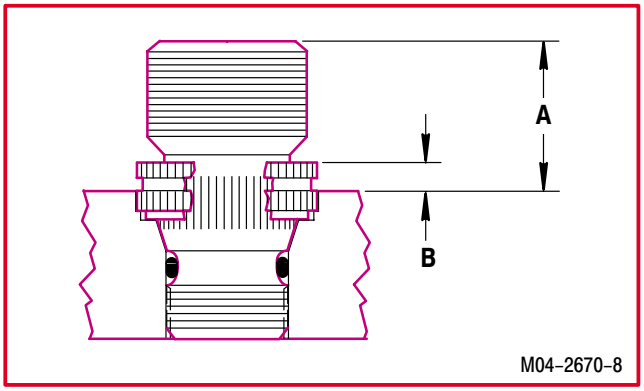


TABLE 3

Adapter	Dim. A (± 0.020 in.)	Dim. B (max. in.)
HS4751-4	0.587	0.124
HS4751-6	0.609	0.130
HS4751-8	0.702	0.130
HS4751-10	0.765	0.130
HS4751-12	0.838	0.140
HS4751-16	0.838	0.140

f. **Inspect (QA).**

END OF TASK

7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR

7.113.1. Description

This task covers: Determine Type of Repair. Select Required Tool Kit. Determine Correct Tube and Fitting Clearances. Cut Tubing. Deburr Tube. Prepare Replacement Tube. Swage Tube. Inspection.

7.113.2. Initial Setup

Tools:

Hydraulic tool kit (item 384, App H)
Swaging tool kit (item 393, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

Tubing and fittings, as required
Hydraulic fluid (item 92, App F)

Personnel Required:

68H	Aircraft Pneudraulics Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-23P

Equipment Conditions:

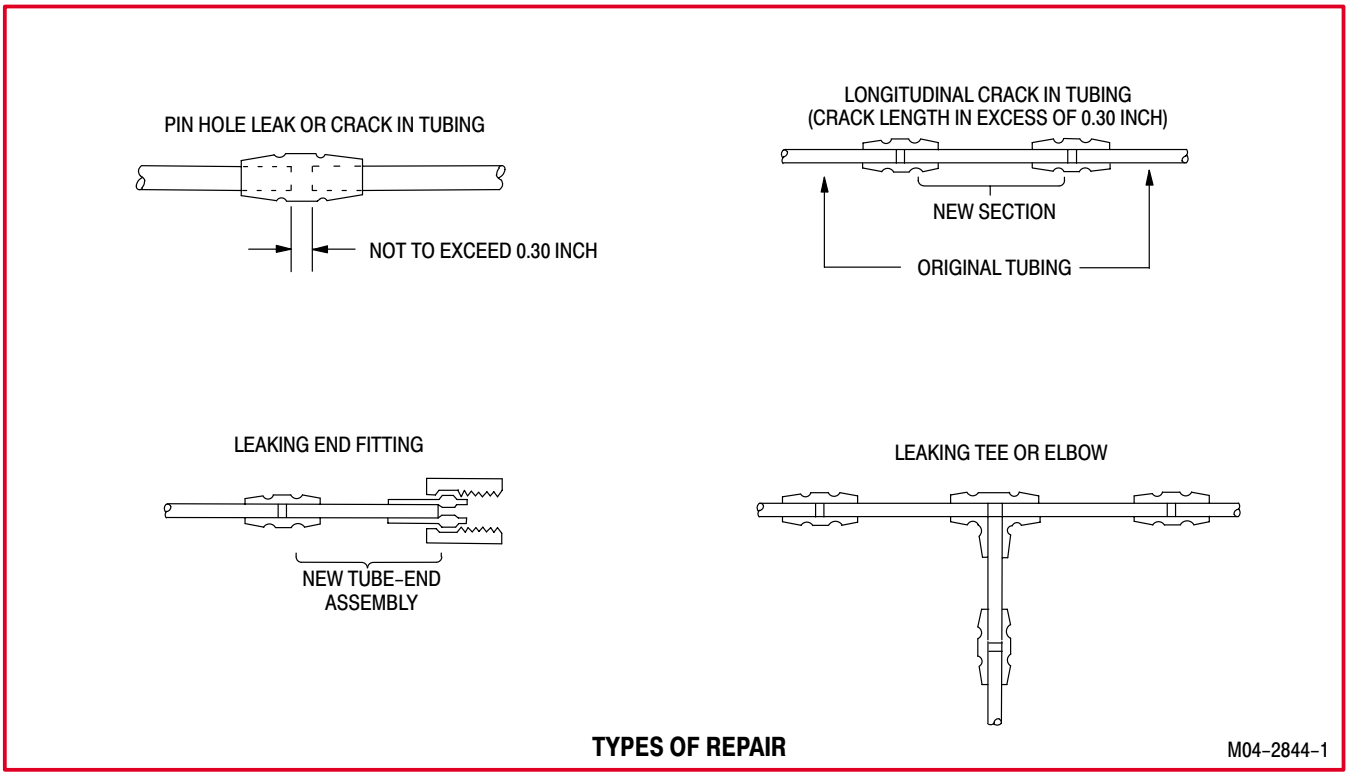
Ref	Condition
1.57	Helicopter safed
2.2	Access panels removed (as necessary)
7.3	Primary hydraulic system vented
7.57	Utility hydraulic system vented

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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

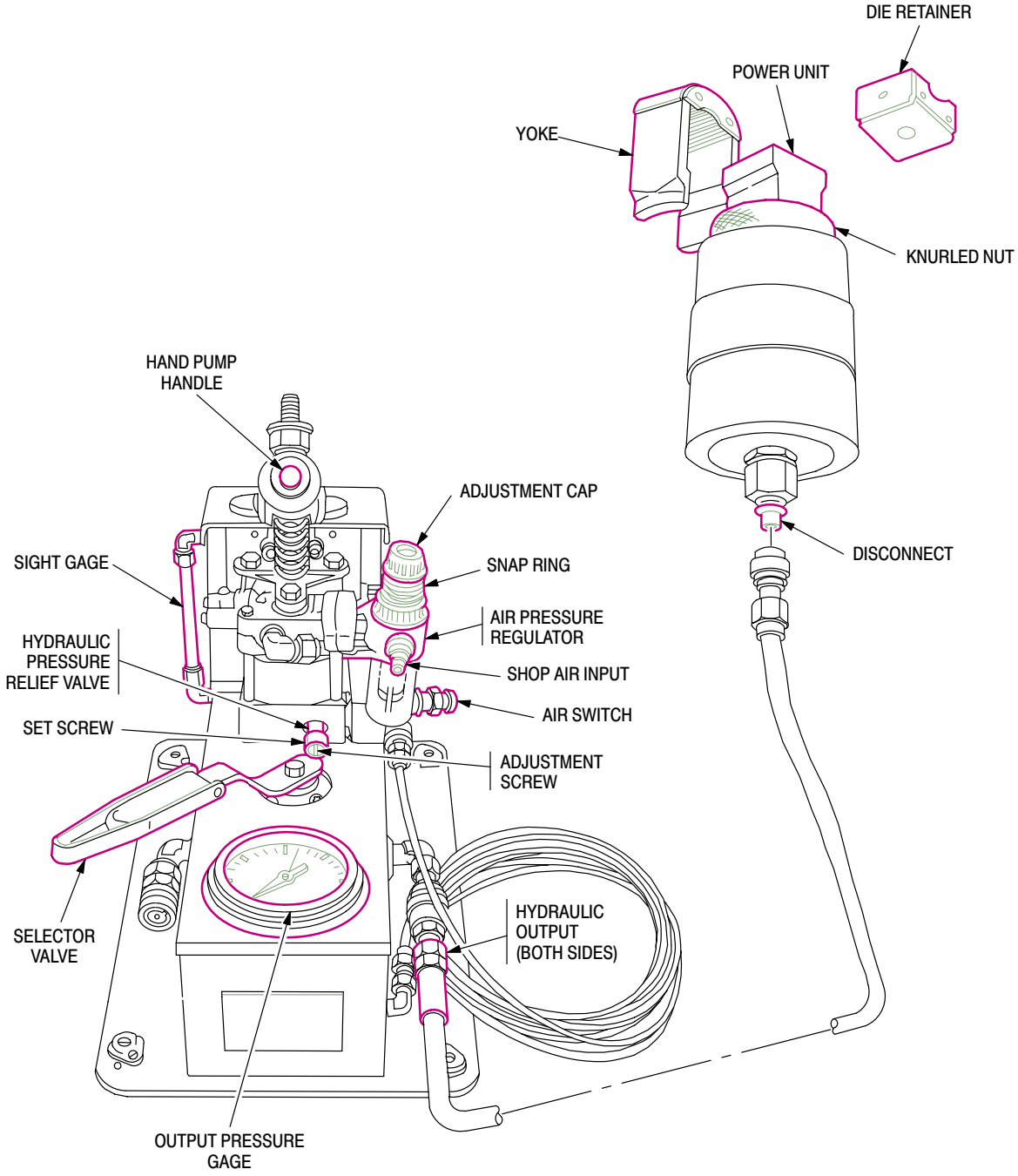
7.113.3. Determine Type of Repair

The tube swaging kit is an "in place" or "on aircraft" tool. A small pinhole or crack not exceeding **0.30 INCH** can be repaired with a single swaged union. All other damage must be repaired by removing the damaged section and splicing in a replacement section.



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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued



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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

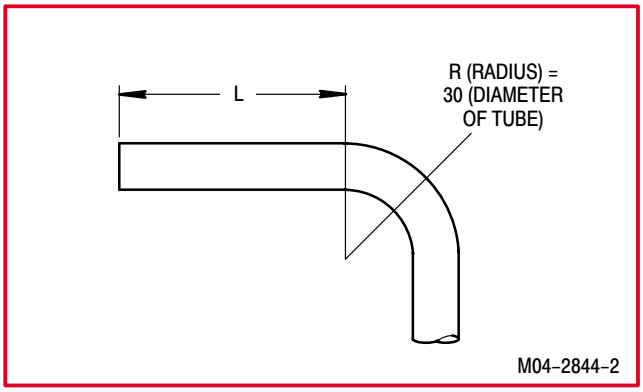
7.113.4. Select Required Tool Kit

Tube Size	Tube Repair Kit
3/16, 1/4, 5/16, 3/8	D12102C-01-01
1/2, 5/8, 3/4	D12102C-06-06
1, 1-1/4, 1-1/2	D12102C-09-04

7.113.5. Determine Correct Tube and Fitting Clearances

a. **Minimum straight tube lengths for swaging:**

Size	Length
3/16	0.600
1/4	0.740
5/16	0.780
3/8	0.816
1/2	1.318
5/8	1.358
3/4	1.428
1	1.573
1-1/4	1.675
1-1/2	1.800



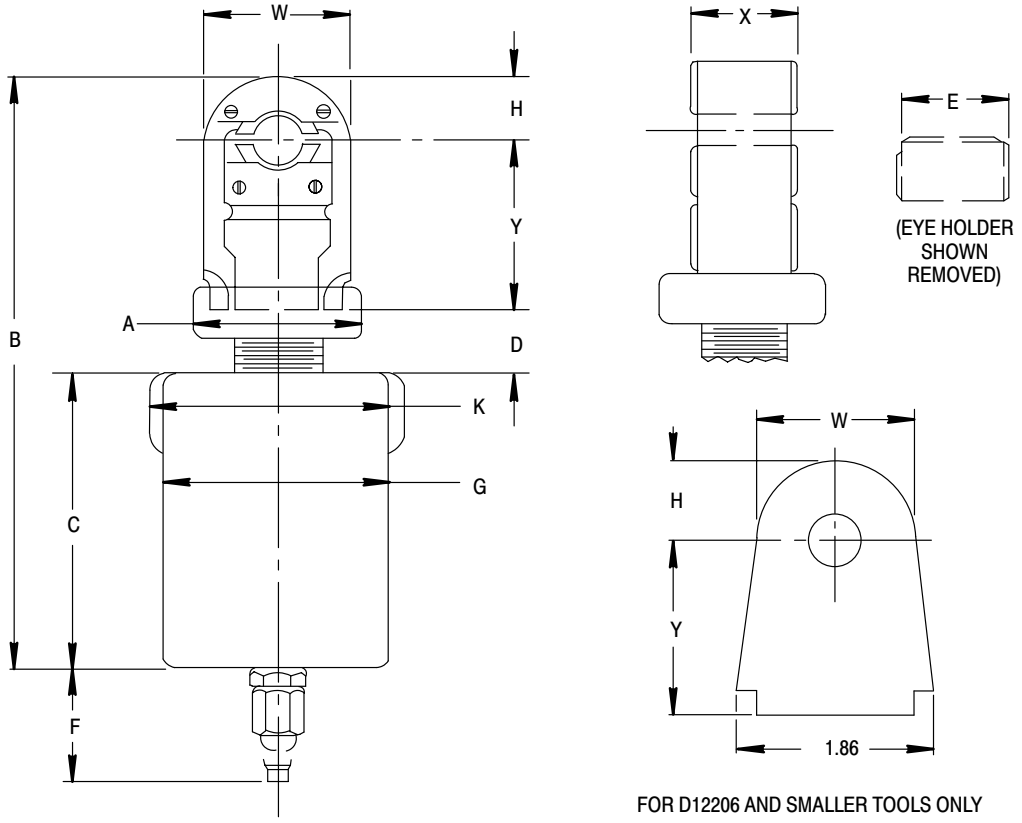
b. **Minimum bend radius for tubing is 30 times diameter of tube.**

c. **Refer to TM 1-1520-238-23P for replacement unions and fittings.**

d. **Use table of dimensions to determine if repair can be made on aircraft.**

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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued



NOTE: ALL DIMENSIONS IN INCHES

SWAGE TOOL DIMENSIONS

P.N.	SIZE	W	H	Y	X	A	B	C	D	E	F	G	K
D12204	1/4	1.60	.62	1.86	.95	1.90	5.60	2.15	.97	.89	1.47	3.15	---
D12205	5/16	1.60	.62	1.86	.95	1.90	5.60	2.15	.97	.89	1.47	3.15	---
D12206	3/8	1.60	.62	1.86	.95	1.90	5.60	2.15	.97	.89	1.47	3.15	---
D12208	1/2	2.12	.90	2.54	1.52	2.50	8.72	4.43	.85	1.46	1.47	3.24	---
D12210	5/8	2.12	.90	2.54	1.52	2.50	8.72	4.43	.85	1.46	1.47	3.24	---
D12212	3/4	2.41	.96	2.63	1.52	2.69	8.95	4.43	.83	1.46	1.47	3.62	---
D12216	1	3.30	1.39	3.41	1.78	3.50	11.04	5.08	1.17	1.71	1.47	4.04	4.10
D12220	1-1/4	3.47	1.58	3.39	1.84	3.50	11.22	5.08	1.17	1.78	1.47	4.04	4.30
D12224	1-1/2	3.74	1.74	3.57	1.84	3.50	11.56	5.08	1.17	1.78	1.47	4.04	4.30

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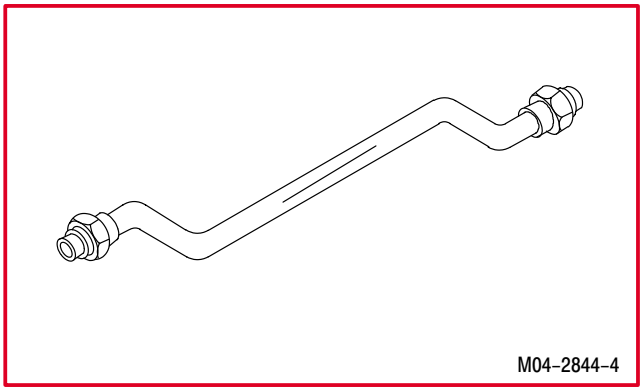
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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

7.113.6. Cut Tubing

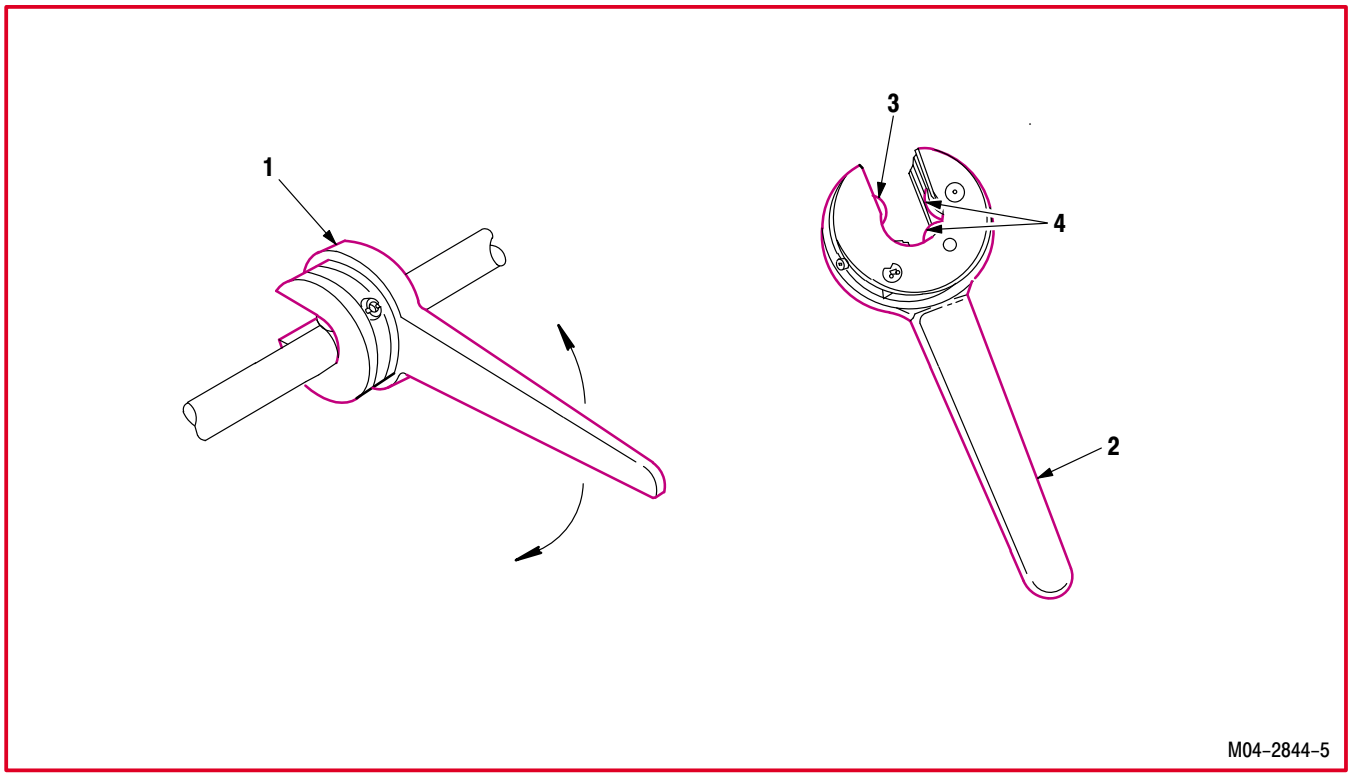
a. **Draw a line parallel to the tube, running across the section to be cut before cutting the tube.** Use marking pen and a ruler. If the end is to be replaced, make sure the line is placed in the same location on replacement section. This line will be used to aline or “clock” the tube during assembly.

b. **Select appropriate size tube cutter (1).** Check that ratchet handle (2) operates freely and that cutter wheel (3) and rollers (4) are clean and lubricated.



CHIPLESS CUTTER

Tool	3/16″ - 3/8″ (-3,-4,-5,-6)	1/2″ - 3/4″ (-8,-10,-12)	1″ - 1-1/2″ (-16,-20,-24)
Tubing Cutter	D12530-001	D12531-001	D12532-001
Hex Key	D 9802	D 9802	D 9803



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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

c. **Rotate cutter head (5) to accept tube (6).**

(1) Position tube cutter (1) on tube (6), with tube centered on two rollers (4) and cutter wheel (3).

CAUTION

Over torquing drive screw on soft tubing will cause a large burr. Over torquing drive screw on hard tubing can damage the cutter wheel.

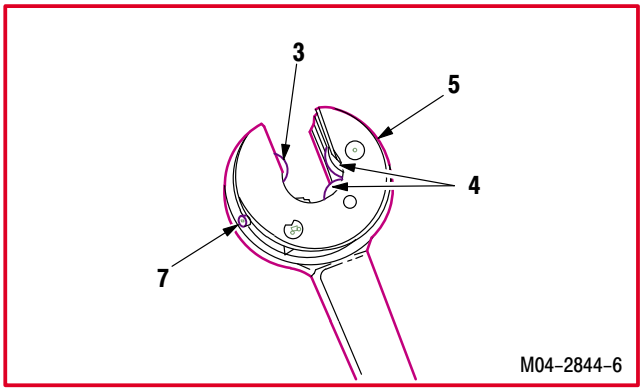
d. **Tighten drive screw (7) until light contact is made on tube (6) by cutting wheel (3).**

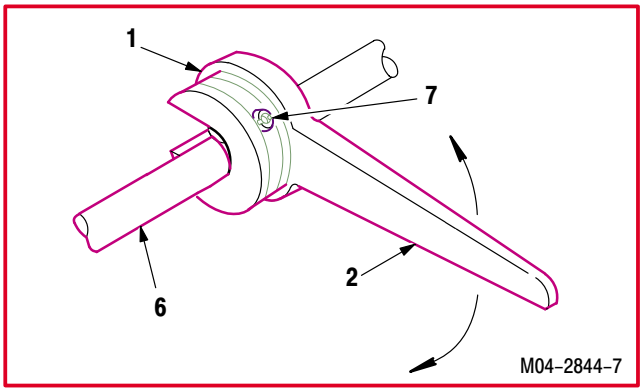
(1) Tighten screw (7) an additional 1/8 to 1/4 turn. Do not over torque.

e. **Rotate ratchet handle (2) until there is noticeable ease of rotation.**

f. **Tighten drive screw (7) an additional 1/8 to 1/4 turn.** Repeat steps e. and f. until cut is complete.

g. **Check tube (6).** Cut shall be square to tube centerline within 1/2 degree.





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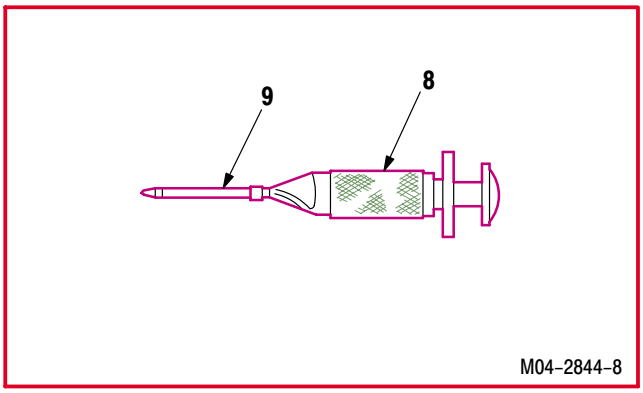
7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

7.113.7. Deburr Tube

CAUTION

Do not place fitting over tube end until tube end is properly deburred. Damage to the fitting may result.

a. **Assemble correct deburring tool (8) and stem (9).**



Deburring Tool	Tube OD (Inch)	Tube Wall Thickness (Inch)	Stem Required
D9851	1/4	0.016 - 0.028	D9851-13-04
		0.028 - 0.050	D9851-13-03
	1/16	0.016 - 0.035	D9851-13-05
	3/8	0.016 - 0.035	D9851-13-06
		0.035 - 0.058	D9851-13-07
D9850	1/2	0.016 - 0.042	D9850-13-08
		0.042 - 0.065	D9850-13-09
	5/8	0.016 - 0.058	D9850-13-10
	3/4	0.016 - 0.065	D9850-13-12
D9849	1	0.020 - 0.083	D9849-13-06
	1-1/4	0.024 - 0.065	D9849-13-20
		0.065 - 0.109	D9849-13-21
	1-1/2	0.028 - 0.083	D9849-13-24

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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

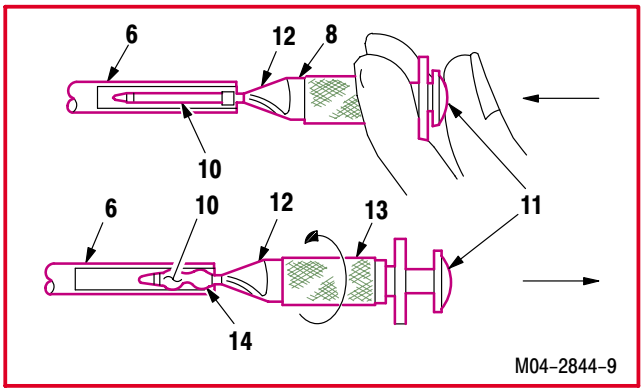
b. **Lightly lubricate plug (10).** Use clean hydraulic fluid (item 92, App F).

c. **Press plunger (11).** Carefully insert stem into tube (6) until cutter (12) is approximately **0.125 INCH** away from burr. Release plunger (11) to allow plug (10) to expand and seal tube.

d. **Rotate knurled body (13) of deburring tool clockwise while applying slight pressure to cutter (12).** Continue to rotate until cutter (12) turns smoothly, indicating tube end is deburred. Do not cut too deep into wall of tube. Width of deburring chamfer shall not exceed 1/2 wall thickness of tube.

e. **Without pressing plunger (11), pull tool (8) from tube (6) until first bulge (14) of plug (10) is exposed.** Wipe off tube (6) and plug (10). Inspect tube end for proper deburring. Repeat step d if necessary.

f. **Remove tool (8) from tube (6).** Clean all chips from tube (6) and tool (8). Clean all oil and grease from end of tube (6) (para 1.47).



7.113.8. Prepare Replacement Tube

a. **Select piece of tube of correct length.** Tube shall be same size and material as that being replaced.

b. **Bend replacement tube to shape of original tube, leaving some excess for trim at both ends.** Remove all burrs.

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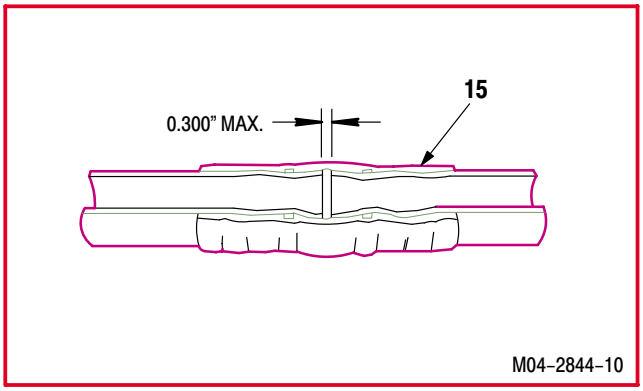
7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

CAUTION

Do not place fitting over tube end until tube is properly deburred. Damage to fitting may result.

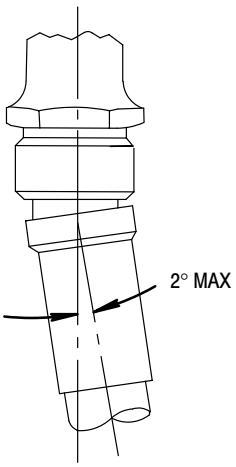
c. **Trim, deburr and clean tube.** Place fitting (15) over tube to compare length with original fitting and tube.

d. **Install fitting and tube on aircraft.** Position tube in fitting, alining other end of tube with mating tube. Remove and deburr trim. Clean ends as required. Maximum gap allowed between mating tubes is **0.300 INCH**. See figure for allowable mismatch.

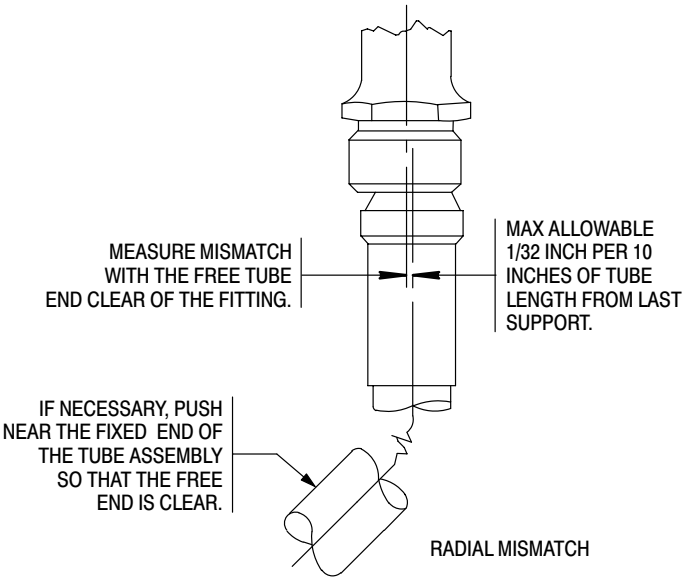


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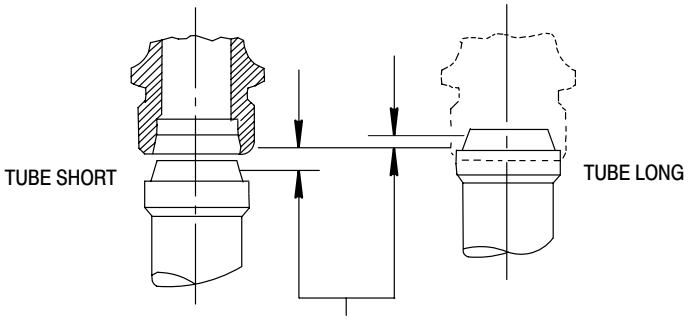
7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued



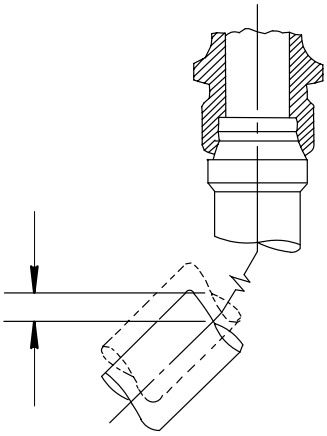
ANGULAR MISMATCH



RADIAL MISMATCH



MAX ALLOWABLE
1/32 INCH PER 10 INCHES OF TUBE
LENGTH FROM LAST SUPPORT.



IF TUBE IS TOO LONG, EITHER:
REMOVE THE FITTING AND MEASURE THE CHANGE IN POSITION OF THE FREE END: OR PUSH NEAR THE FIXED TUBE END, AND MEASURE THE DISTANCE TO JUST UNSEAT THE FREE END.

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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

7.113.9. Swage Tube

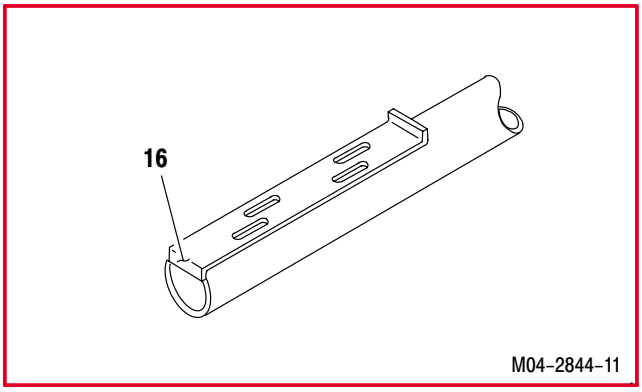
a. **Mark tube end with tool D9862.** Use slot marked with tube size dash number. Place lip stop (16) against end of tube as shown. Using slot as guide, mark tube on two places 180 degrees apart with marking pen. See table for tube insertion band marking, if marking tool D9862 is not available.

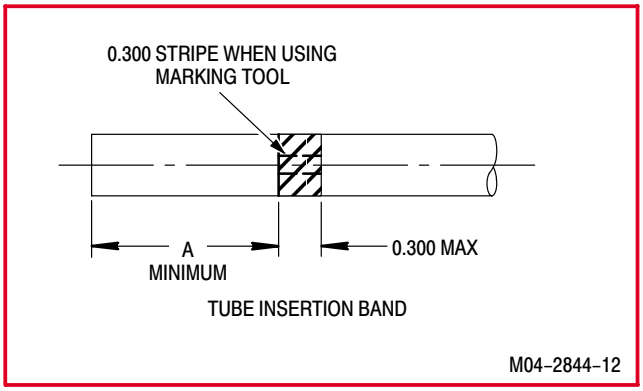
TUBE INSERTION BAND MARKING (IN.)

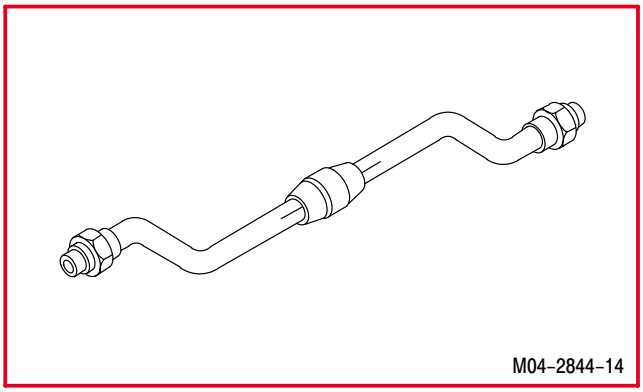
Tube Size		Minimum Tube Insertion	Maximum Tube Insertion
1/4	(-4)	0.615	0.915
5/16	(-5)	0.655	0.955
3/8	(-6)	0.690	0.990
1/2	(-8)	1.193	1.493
5/8	(-10)	1.233	1.533
3/4	(-12)	1.303	1.603
1	(-16)	1.448	1.748
1-1/4	(-20)	1.550	1.850
1-1/2	(-24)	1.675	1.975

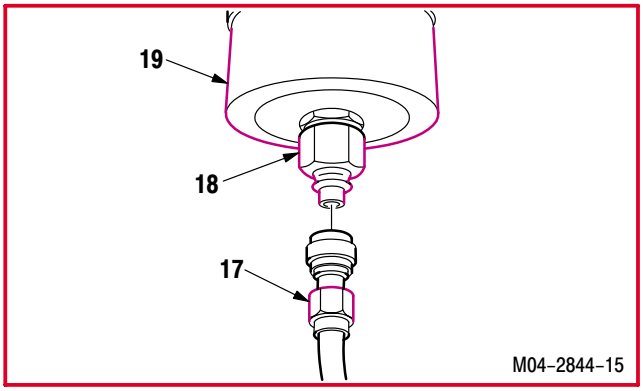
b. **Position prepared tube in fitting.** Aline mating ends. Check to see if swaging at separable fitting can be done if installed on aircraft. If not, mark fitting and tube so proper clocking is obtained. Position and attach separable end fitting to component if swaging is done on aircraft. Aline fitting mating ends. Torque end fitting to final torque, making sure fixed portion of fitting is held stationary.

c. **Connect hydraulic pressure line (17) from portable hydraulic power supply to quick disconnect fitting (18) on base of swaging tool (19).**









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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

d. **Set selector valve (20) on hydraulic power supply (21) to EXHAUST to relieve all line pressure.**

e. **Bleed air from swaging tool (19).**

(1) Set tool at lower pressure than pressure supply (21).

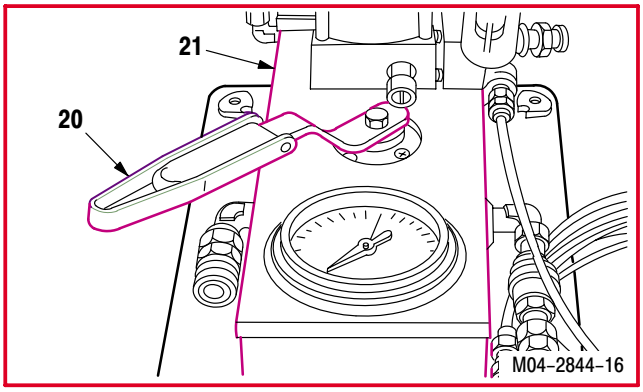
(2) Cycle pressure supply three times from 2000 psi to EXHAUST.

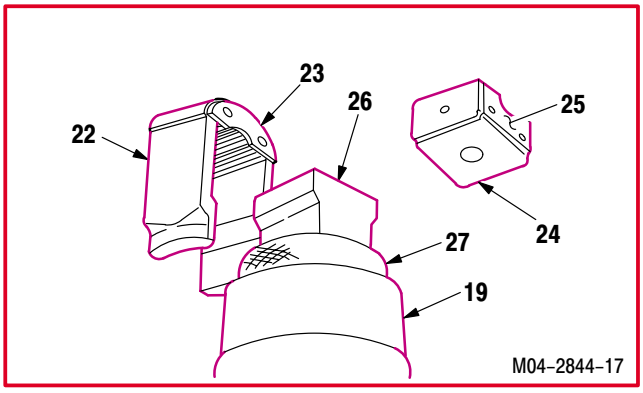
f. **See chart for correct upper yoke and lower die retainer for size of fitting to be swaged.**

g. **Slide yoke (22) over fitting to be swaged, with end stop (23) closest to end of fitting to be swaged.**

h. **Insert die retainer (24) into yoke (22) so end stop (25) of die retainer is on same side as end stop (23) of yoke (22).**

i. **Install square portion of power unit (26) in yoke (22).** Snug up knurled nut (27) hand tight.

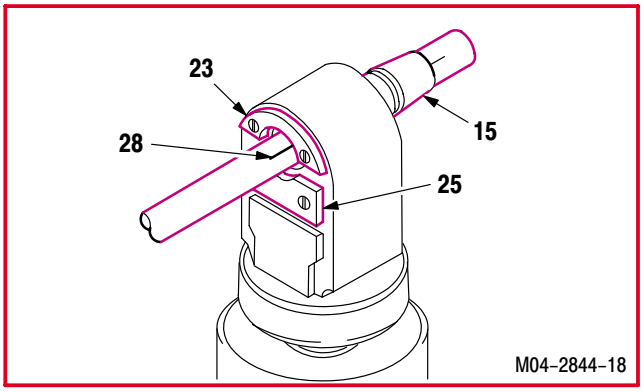




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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

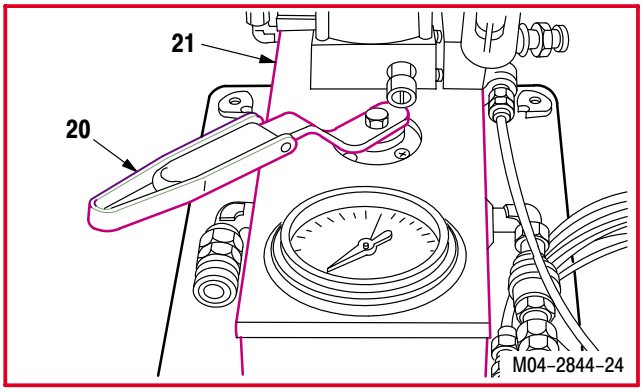
j. **Position fitting on tube so some portion of tube insertion mark (28) is visible.** Move tool along tubing toward center of fitting (15) until end stops (23) and (25) make light contact with end of fitting (15). Back tool off slightly until end stops are approximately **0.030 INCH** from fitting end.



WARNING

Never exceed 5750 psi hydraulic pressure when using swaging tool. Excessive pressure will damage the tool and could cause bodily harm. If injury occurs, seek medical aid.

k. **Maintain tool in this position and swage fitting (15).** Set selector valve (20) to appropriate hydraulic output. Actuate swaging tool with 5500 psi hydraulic pressure. Use hand pump if shop air is not available.

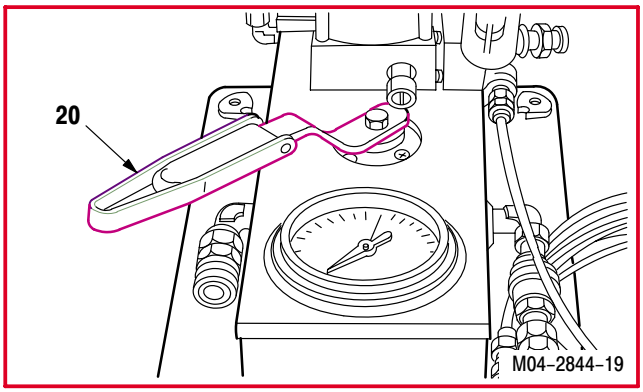


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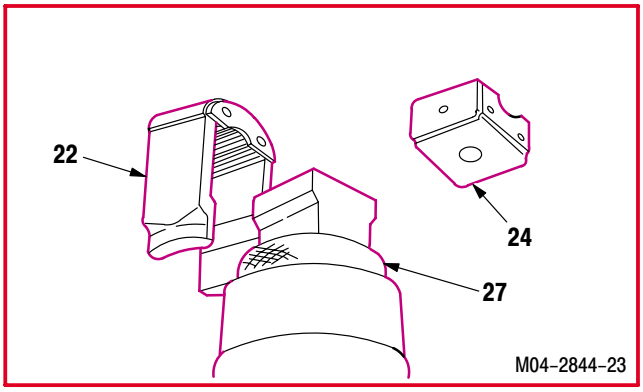
7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

Tool Part No.	Tube Size (in.)	Power Unit	Head Assembly	Yoke Assembly	Die Holder Assembly	Die Set
D12204	1/4	D12710-52	D12204-56	D12204-50	D12710-51	D12004-4
D12205	5/16	D12710-52	D12205-56	D12205-50	D12710-51	D12005-4
D12206	3/8	D12710-52	D12206-56	D12206-50	D12710-51	D12006-4
D12208	1/2	D12010-52	D12008-56	D12208-50	D12010-51	D10002-1-8
D12210	5/8	D12010-52	D12210-56	D12010-50	D12010-51	D10002-1-10
D12212	3/4	D12012-52	D12212-56	D12012-50	D12012-51	D12012-4
D12216	1	D12016-52	D12216-56	D12016-50	D12016-51	D12016-4
D12220	1-1/4	D12016-52	D12020-56	D12020-50	D12020-51	D12020-4
D12224	1-1/2	D12016-52	D12224-56	D12024-50	D12024-51	D12024-4

l. **Set selector valve (20) to EXHAUST to relieve pressure.**



m. **Loosen knurled nut (27).** Remove die retainer (24) and yoke (22) from swaged fitting.



7.113.10. Inspection

a. **Visually verify that some portion of insertion mark is visible with some portion of mark covered by swaged fitting.**

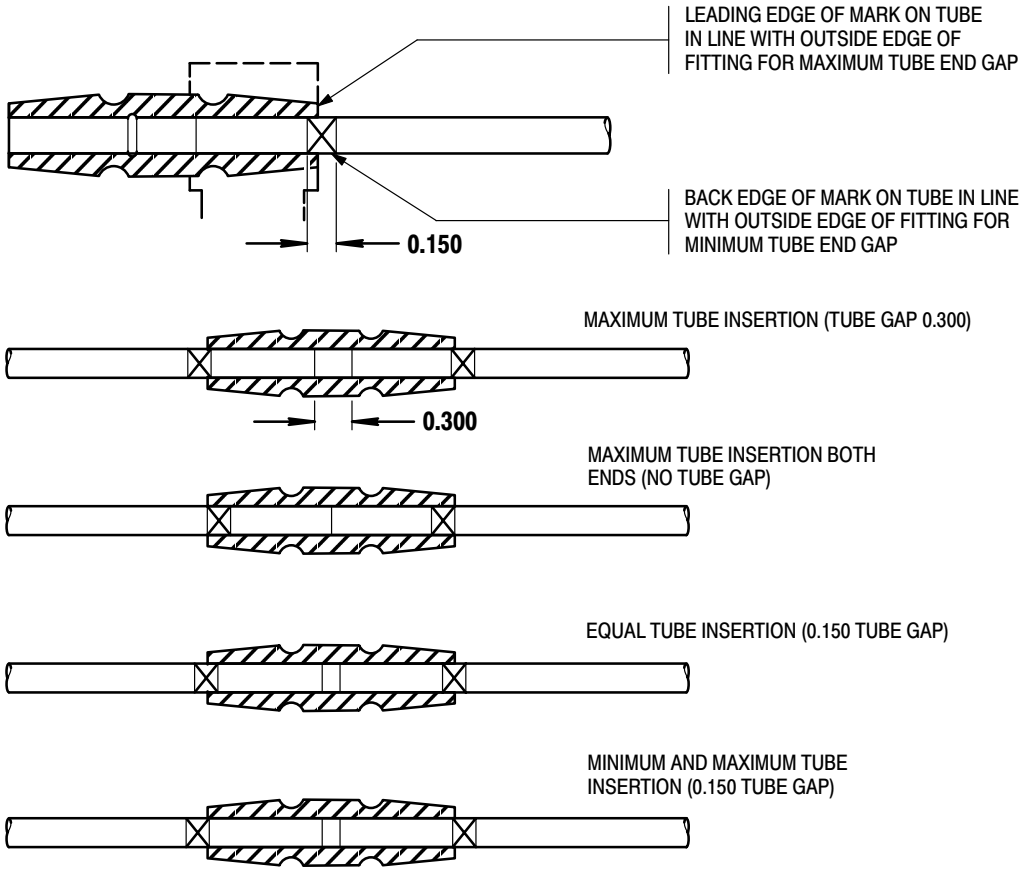
b. **Die marks on fitting caused by swaging die are acceptable.**

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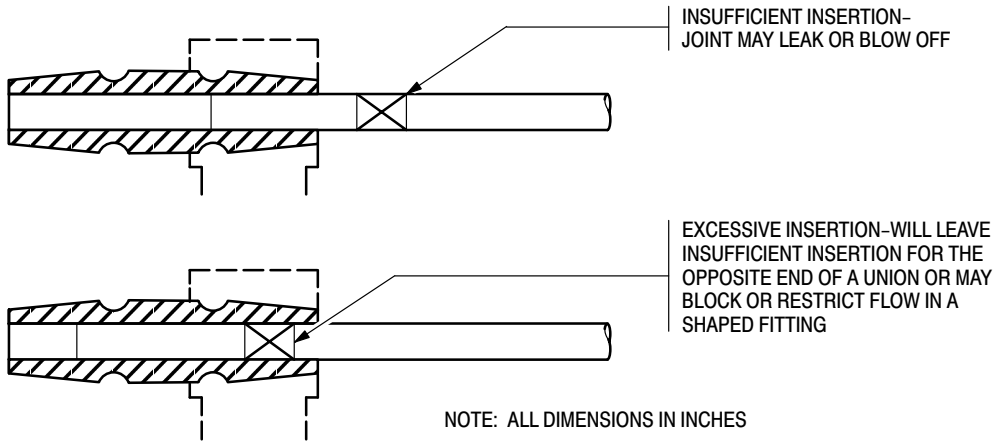
7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

ACCEPTABLE LIMITS OF TUBE INSERTION INTO UNION

(TYPICAL FOR ALL PERMASWAGE FITTINGS)



UNACCEPTABLE LIMITS



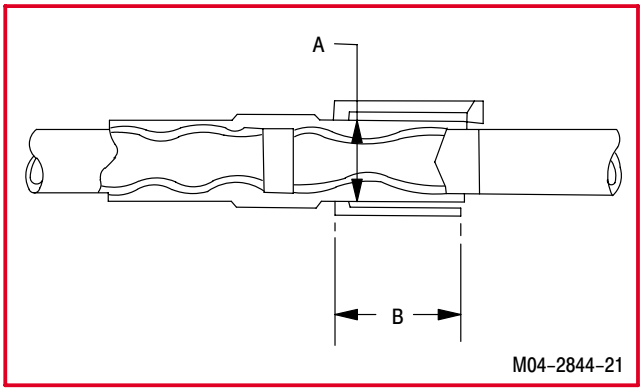
NOTE: ALL DIMENSIONS IN INCHES

M04–2844–20

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7.113. HYDRAULIC TUBES AND FITTINGS PERMASWAGE REPAIR – continued

c. **Inspect swaged fitting with appropriate go/no-go gage.** Gage must fit around OD of fitting dimension A. Gage shoulder must contact fitting end while covering minimum acceptable length of fitting dimension B. Fitting shall meet dimensional requirements of table if proper gage is not available.



NOTE

All dimensions in inches.

Tube DIA	Dimension B Min Swaged Lgth	Dimension A Max Swaged Dia	Go-No-Go Gage
1/4 (-4)	0.460	0.315	D12 9892-4
3/8 (-6)	0.530	0.447	D12 9892-6
1/2 (-8)	1.020	0.606	D12 9892-8
5/8 (-10)	1.020	0.735	D12 9892-10
3/4 (-12)	1.020	0.863	D12 9892-12
1 (-16)	1.160	1.144	D12 9892-16
1-1/4 (-20)	1.406	1.390	D12 9892-20
1-1/2 (-24)	1.420	1.680	D12 9892-24

d. **It is permissible and advised to reswage fittings to meet proper swage dimensions.** No extensive reduction in fitting diameter beyond specified tolerance limits can occur if proper upper and lower die blocks are used.

e. **Inspect (QA).**

f. **Bleed primary and utility hydraulic systems** (para 1.35)**.**

g. **Service primary and utility hydraulic systems** (para 1.34)**.**

h. **Perform hydraulic system leak check** (para 7.2)**.**

i. **Install access panels** (para 2.2)**.**

END OF TASK

SECTION III. PRESSURIZED AIR SYSTEM MAINTENANCE

7.114. PRESSURIZED AIR SYSTEM INSPECTION

7.114.1. Description

This task covers: Inspection.

7.114.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

TM 55-1500-323-24
TM 55-1500-344-23
TM 55-1500-345-23

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

7.114.3. Inspection

a. **Check exterior surfaces of pressurized air system components for nicks, gouges, scratches, cracks, and corrosion.**

(1) Minor scratches (without burrs or raised material) that do not penetrate through protective finish are acceptable without rework.

(2) Nicks, gouges, corrosion pits (TM 55-1500-344-23), or other minor surface damage that does not exceed a depth of 10 percent or **0.040 INCH** of material thickness, whichever is less after rework, is permissible.

(3) No burnishing is allowed within **0.75 INCH** of a bolt hole or corner.

(4) No cracks are allowed.

(5) No mating or working surface repair is allowed.

(6) Touch up removed protective finish as required (TM 55-1500-345-23).

(7) Replace component if damage exceeds repairable limits; or if damage occurs on a radius, in a hole, or on a mating or working surface.

GO TO NEXT PAGE

7.114. PRESSURIZED AIR SYSTEM INSPECTION – continued

b. **Check for chafed, cracked, dented, nicked, and scored tubes.**

(1) Replace cracked or deformed tubing.

(2) Replace tubes if dented more than 20 percent of tube wall thickness.

(3) Replace tubing assemblies if nicked or chafed more than 10 percent of tube wall thickness.

c. **Check for chafed, deteriorated, cut, frayed, and cracked hoses.** Replace damaged hoses.

d. **Check for loose, broken, and cracked clamps.** Replace damaged clamps.

e. **Check fittings for crossed, burred, and stripped threads when hoses are disconnected.** Plug all open ports. Replace all packings and seals on fittings to be used again. Identify ends of lines and hoses before disconnecting them to identify exact reinstallation locations.

f. **Repair is limited to removal of minor burrs, nicks, or scratches on internal parts.** No repair of working or mating surfaces is allowed.

g. **Check general mounting hardware for cracks, gouges, nicks, scratches, chafing, damage, rounded flats, and stripped or damaged threads.** Replace damaged hardware.

h. **Check connectors for:**

(1) Foreign objects and corroded, bent, broken, loose, or missing pins (TM 55-1500-323-24).

(2) Connector for rough or binding action (TM 55-1500-323-24).

i. **Wire harness for chafing and loose installation** (TM 55-1500-323-24)**.**

j. **Check SDC mounting coupling for security and coupling nut for proper torque** (para 7.121)**.** Torque nut if found loose.

k. **Check SDC housing for cracks.** None allowed.

l. **Check shaft driven compressor (SDC) oil filter for contamination.** Remove and check SDC oil filter for magnetic particles. Use permanent magnet to separate steel particles. If no particles are found, replace filter and inspection is complete (para 7.124). If particles are found, perform filter inspection (para 6.60).

m. **Check air particle separator (swirl) tubes for heat damage (melting).** If damage is found, replace air particle separator (para 7.116) and replace SDC check valve (para 7.136).

n. **Inspect air particle separator filter (if installed) for damage and cleanliness.** If damaged or dirty, replace filter (para 7.118).

END OF TASK

7.115. PRESSURIZED AIR SYSTEM LEAK CHECK

7.115.1. Description

This task covers: Leak Check.

7.115.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
152F Pilot (if method a(3) is used)

References:

TM 55-1520-238-10

Materials/Parts:

Brush (item 34, App F)
Leak test compound (item 109, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

NOTE

This task verifies pressurized air system leaks and verifies system integrity after maintenance.

7.115.3. Leak Check

a. **Apply pressure to pressurized air system.** Pressurized air system may be pressurized by:

(1) Application of external power - air (para 1.71).

(2) Operation of APU.

(a) Using battery power (para 1.74).

(b) Using external power (para 1.75).

(3) Ground run of helicopter (TM 55-1520-238-10).

b. **Check for leaks.** Use leak test compound (item 109, App F) and brush (item 34, App F).

GO TO NEXT PAGE

7.115. PRESSURIZED AIR SYSTEM LEAK CHECK – continued

c. **Remove air pressure from system.**

WARNING

To prevent injury to personnel, do not perform any maintenance on pressurized air system until pressure is removed from helicopter. If injury occurs, seek medical aid.

d. **Repair leaks by replacing packings/seals as applicable.** Replace leaking component if leak persists.

END OF TASK

7.116. AIR PARTICLE SEPARATOR REMOVAL/INSTALLATION

7.116.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.116.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Packing
Brush (item 34, App F)
Cleaner (item 42, App F)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)
Sealing compound (item 177, App F)

Personnel Required:

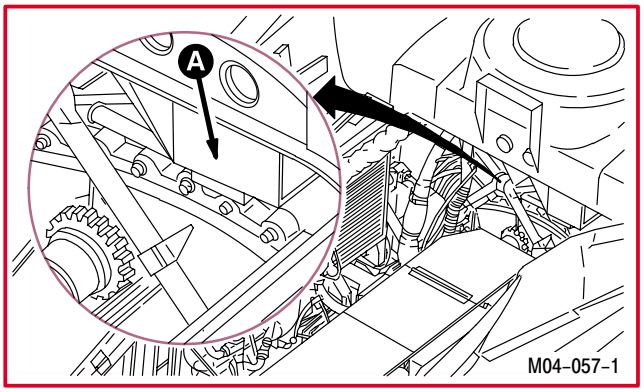
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; fairings T205R and T225 removed



GO TO NEXT PAGE

7.116. AIR PARTICLE SEPARATOR REMOVAL/INSTALLATION – continued

7.116.3. Removal

a. **Remove tube (1) from union (2).**

(1) Hold union (2). Remove nut (3).

(2) Remove tube (1) from union (2).

b. **Slide sleeve (4) on inlet throttle valve (5).**

(1) Remove two clamps (6).

(2) Slide sleeve (4) on valve (5).

c. **Remove air particle separator (7).**

(1) Remove sealant from four bolts (8), washers (9), and from separator mounting area on upper fuselage fairing frame (10) (para 1.47).

(2) Remove four bolts (8) and washers (9).

(3) Lift separator (7) from frame (10) and sleeve (4).

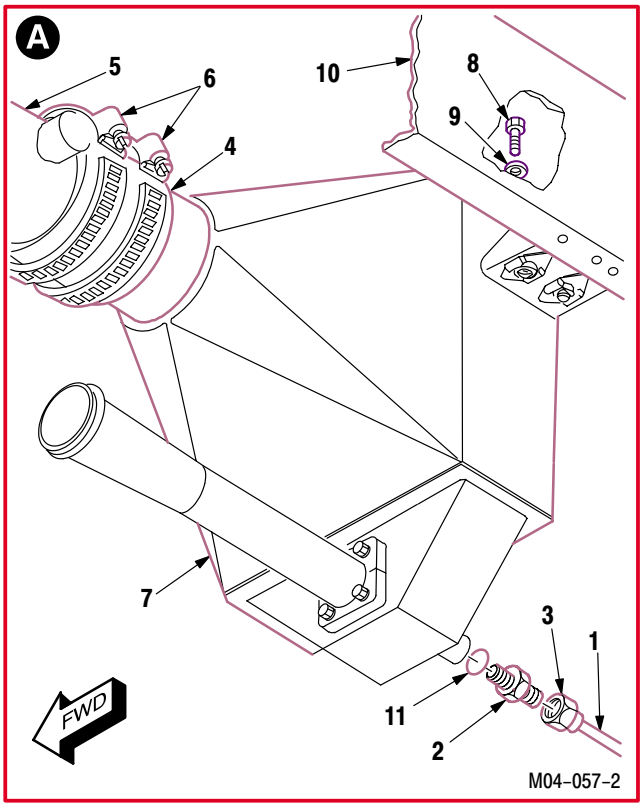
NOTE

If removing and replacing separator, go to step d. If removing and reinstalling separator, go to paragraph 7.116.4.

d. **Remove union (2) from separator (7).**

(1) Remove union (2) from separator (7).

(2) Remove and discard packing (11).



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7.116. AIR PARTICLE SEPARATOR REMOVAL/INSTALLATION – continued

7.116.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

b. **Clean external debris from separator** (para 1.47)**.**



c. **Clean separator.**

(1) Mix cleaning solution of 90 percent hot water and 10 percent cleaner. Use cleaner (item 42, App F) and suitable container.

(2) Submerge separator in cleaning solution.

(3) Agitate and swirl unit as required to remove all debris from interior of separator.

(4) Allow separator to remain in cleaning solution a minimum of 5 minutes.

d. **Rinse separator in clean, warm water.**

e. **Remove excess water from separator.**

7.116.5. Inspection

a. **Check tube, nut, union, and sleeves for cracks and stripped or damaged threads** (para 7.114)**.**

b. **Check separator (swirl) tubes for heat damage** (para 7.114)**.**

c. **Check separator openings and interior for cleanliness.** Use flashlight.

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

e. **Check inside SDC inlet duct for debris.** Use flashlight and inspection mirror. If debris is visible, go to paragraph 7.129.

GO TO NEXT PAGE

7.116. AIR PARTICLE SEPARATOR REMOVAL/INSTALLATION – continued

7.116.6. Installation



NOTE

If separator was replaced, go to step a. If not, go to step b.

a. **Install union (2) on separator (7).**

(1) Lubricate new packing (11). Use petrolatum (item 138, App F).

(2) Install packing (11) on union (2).

(3) Install union (2) on separator (7).



b. **Install separator (7).**

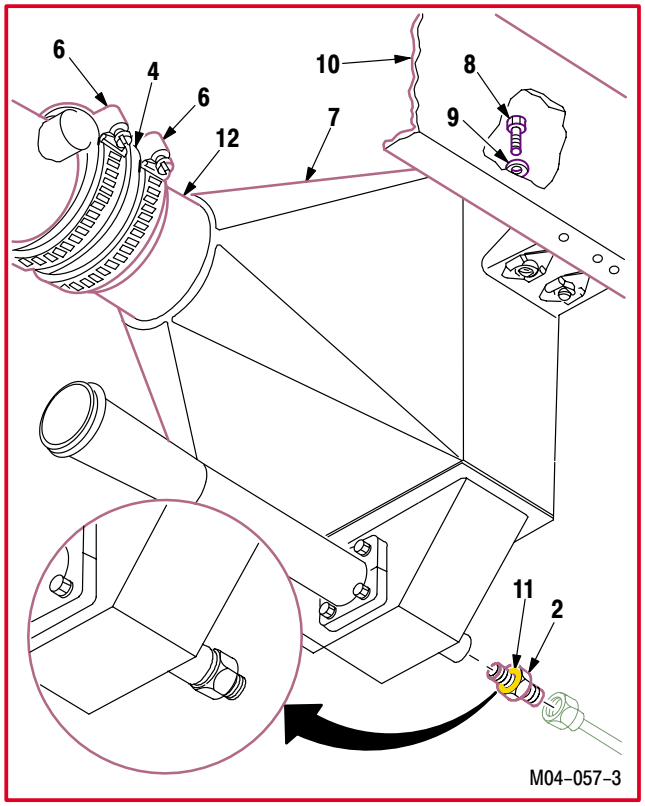
(1) Position separator (7) in upper fuselage fairing frame (10) while sliding large tube end (12) into sleeve (4).

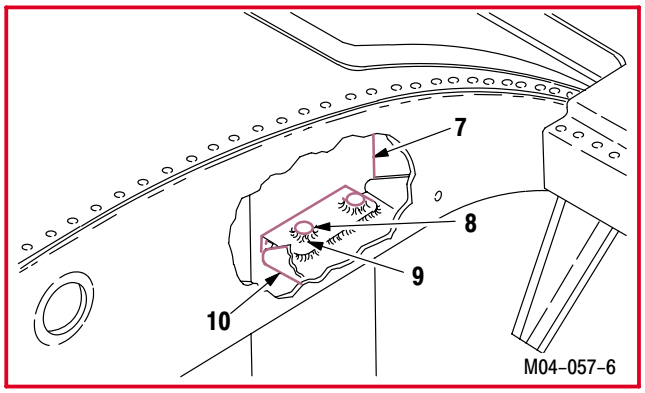
(2) Install four bolts (8) and washers (9).

(3) Slide sleeve (4) and two clamps (6) on tube (12).

(4) Center sleeve (4). Tighten two clamps (6).

(5) Install sealant between separator (7) and frame (10). Install sealant on four bolts (8) and washers (9). Use sealing compound (item 177, App F) and brush (item 34, App F).





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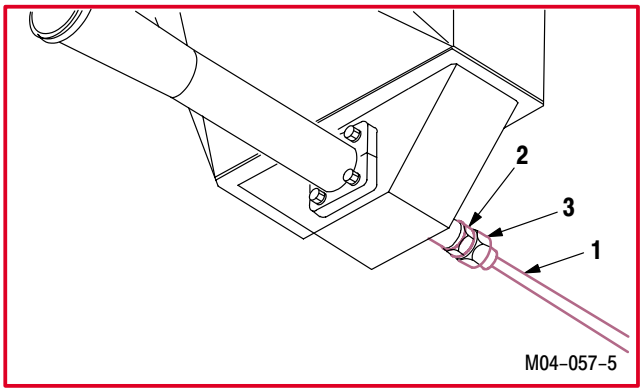
7.116. AIR PARTICLE SEPARATOR REMOVAL/INSTALLATION – continued

c. **Install tube (1) on union (2).** Torque nut (3) to **60 INCH-POUNDS**.

(1) Lubricate threads of union (2). Use damping fluid (item 69, App F).

(2) Hold union (2).

(3) Install nut (3). Torque nut (3) to **60 INCH-POUNDS**. Use torque wrench.



d. **Inspect (QA).**

e. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

f. **Perform pressurized air system leak check** (para 7.115)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325; install fairings T205R and T225** (para 2.2)**.**

END OF TASK

7.117. AIR PARTICLE SEPARATOR (WITH FILTER) REMOVAL/INSTALLATION

7.117.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.117.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

Materials/Parts:

Packing
Brush (item 34, App F)
Cleaner (item 42, App F)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)
Sealing compound (item 177, App F)

Personnel Required:

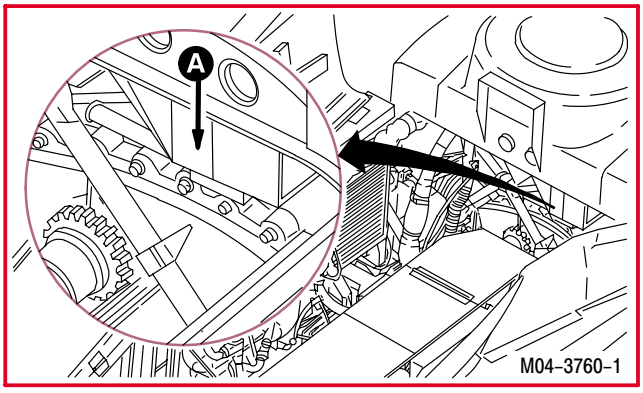
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T250R, and L325 opened; fairings T205R and T225 removed
7.118	Air particle separator filter removed



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7.117. AIR PARTICLE SEPARATOR (WITH FILTER) REMOVAL/INSTALLATION – continued

7.117.3. Removal

a. **Remove tube (1) from union (2).**

(1) Hold union (2). Remove nut (3).

(2) Remove tube (1) from union (2).

b. **Slide sleeve (4) on inlet throttle valve (5).**

(1) Remove two clamps (6).

(2) Slide sleeve (4) on valve (5).

c. **Remove air particle separator (7).**

(1) Remove sealant from four bolts (8), washers (9), and separator mounting area on upper fuselage fairing frame (para 1.47).

(2) Remove four bolts (8) and washers (9).

(3) Lift separator (7) from frame (10) and sleeve (4).

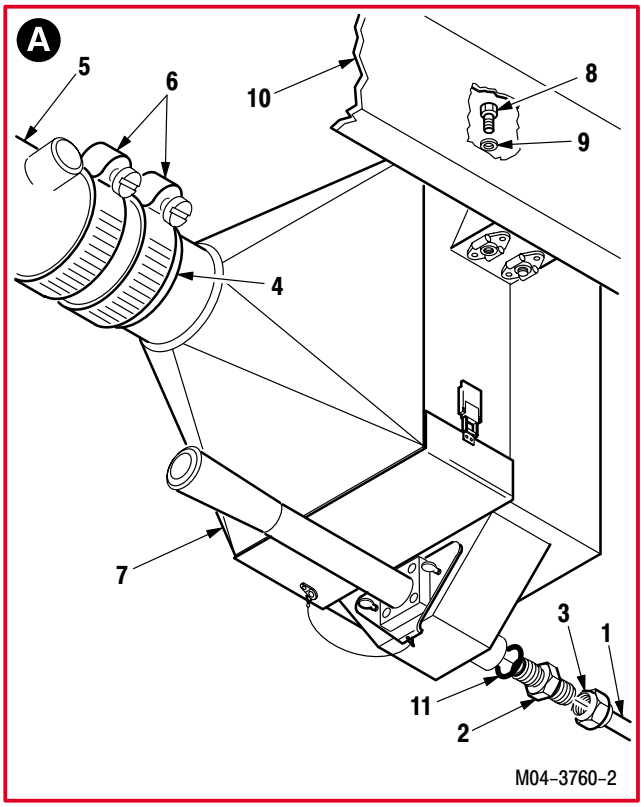
NOTE

If removing and replacing separator, go to step d. If removing and reinstalling separator, go to paragraph 7.117.4.

d. **Remove union (2) from separator (7).**

(1) Remove union (2) from separator (7).

(2) Remove and discard packing (11).



GO TO NEXT PAGE

7.117. AIR PARTICLE SEPARATOR (WITH FILTER) REMOVAL/INSTALLATION – continued

7.117.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

b. **Clean external debris from separator** (para 1.47)**.**



c. **Clean separator.**

(1) Mix cleaning solution of 90 percent hot water and 10 percent cleaner. Use cleaner (item 42, App F) and suitable container.

(2) Submerge separator in cleaning solution.

(3) Agitate and swirl unit as required to remove all debris from interior of separator.

(4) Allow separator to remain in cleaning solution a minimum of 5 minutes.

d. **Rinse separator in clean, warm water.**

e. **Remove excess water from separator.**

7.117.5. Inspection

a. **Check tube, nut, union, and sleeves for cracks and stripped or damaged threads** (para 7.114)**.**

b. **Check separator (swirl) tubes for heat damage** (para 7.114)**.**

c. **Check separator openings and interior for cleanliness.** Use flashlight.

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

e. **Check inside SDC inlet duct for debris.** Use flashlight and inspection mirror. If debris is visible, go to paragraph 7.129.

GO TO NEXT PAGE

7.117. AIR PARTICLE SEPARATOR (WITH FILTER) REMOVAL/INSTALLATION – continued

7.117.6. Installation

NOTE

If separator was replaced, go to step a. If not, go to step b.

a. **Install union (2) on separator (7).**

(1) Lubricate new packing (11). Use petrolatum (item 138, App F).

(2) Install packing (11) on union (2).

(3) Install union (2) on separator (7).

b. **Install separator (7).**

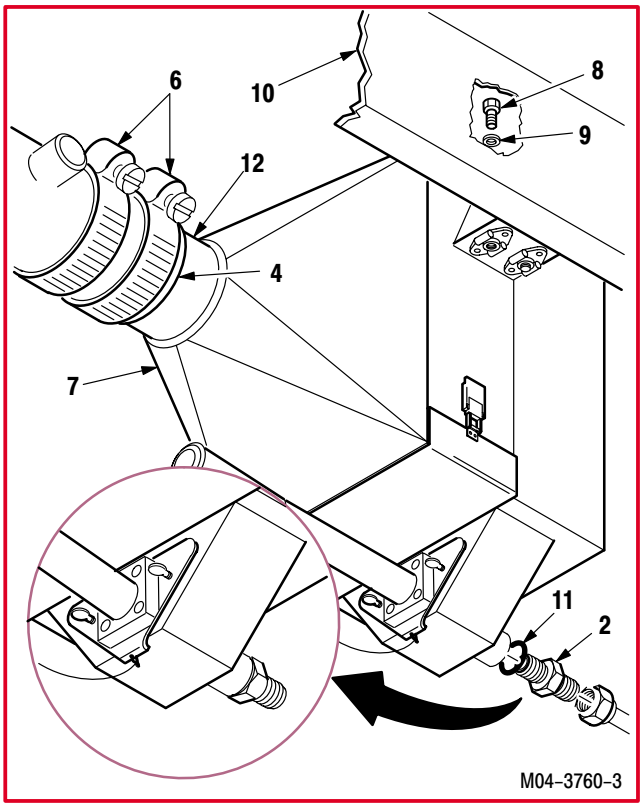
(1) Position separator (7) in upper fuselage fairing frame (10) while sliding large tube end (12) into sleeve (4).

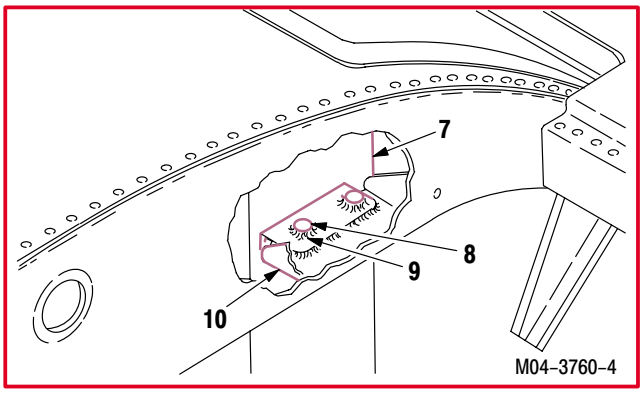
(2) Install four bolts (8) and washers (9).

(3) Slide sleeve (4) and two clamps (6) on tube (12).

(4) Center sleeve (4). Tighten two clamps (6).

(5) Install sealant between separator (7) and frame (10). Install sealant on four bolts (8) and washers (9). Use sealing compound (item 177, App F) and brush (item 34, App F).





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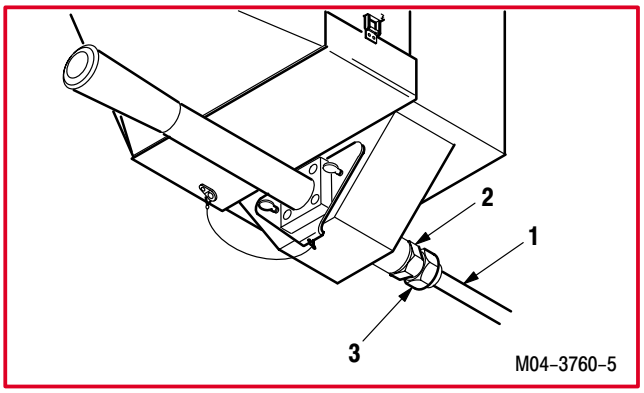
7.117. AIR PARTICLE SEPARATOR (WITH FILTER) REMOVAL/INSTALLATION – continued

c. **Install tube (1) on union (2).** Torque nut (3) to **60 INCH-POUNDS**.

(1) Lubricate threads of union (2). Use damping fluid (item 69, App F).

(2) Hold union (2).

(3) Install nut (3). Torque nut (3) to **60 INCH-POUNDS**. Use torque wrench.



d. **Inspect (QA).**

e. **Install air particle separator filter** (para 7.118)**.**

f. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Perform pressurized air system leak check** (para 7.115)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325; install fairings T205R and T225** (para 2.2)**.**

END OF TASK

7.118. AIR PARTICLE SEPARATOR FILTER REPLACEMENT

7.118.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.118.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

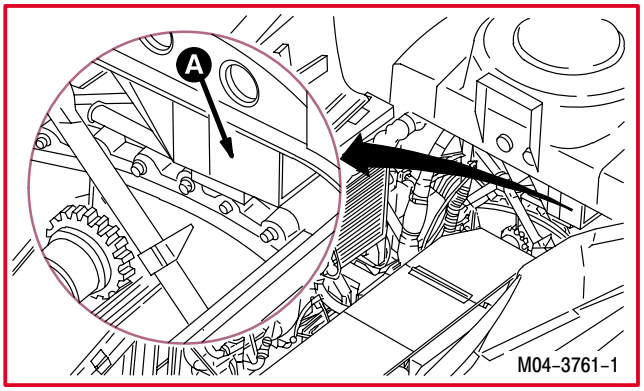
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened

Personnel Required:

67R	Attack Helicopter Repairer
67R3F	Attack Helicopter Repairer/Technical Inspector



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7.118. AIR PARTICLE SEPARATOR FILTER REPLACEMENT – continued

7.118.3. Removal

a. **Remove filter (1) from air particle separator (2).**

(1) Unlock two turnlock fasteners (3) and remove eductor tube assembly (4) from separator (2).

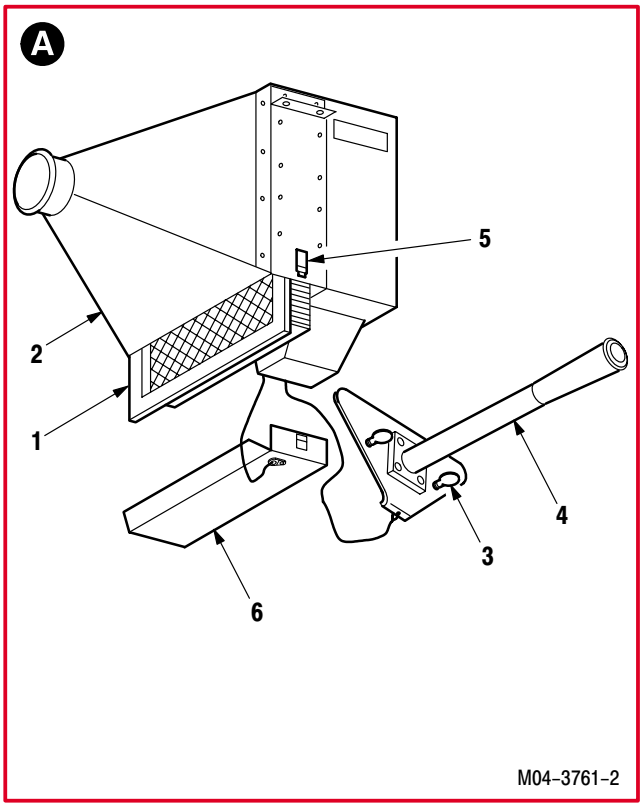
NOTE

Eductor tube and door are retained to particle separator assembly by lanyards.

(2) Unlock latches (5) from door (6).

(3) Remove door (6).

(4) Remove and discard filter (1) from extension cavity in separator (2).



7.118.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.118.5. Inspection

a. **Check removed and attaching parts for damage** (para 7.114)**.**

b. **Check inside cavity for debris** (para 7.114)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.118. AIR PARTICLE SEPARATOR FILTER REPLACEMENT – continued

7.118.6. Installation

NOTE

Eductor tube and door are retained to particle separator assembly by lanyards.

a. **Install new filter (1) (with fold side outboard and pleats horizontal) in separator (2).**

b. **Install door (6) on separator (2) and secure with two latches (5).**

c. **Install eductor tube assembly (4) on separator (2).**

(1) Aline eductor tube assembly (4) on separator (2).

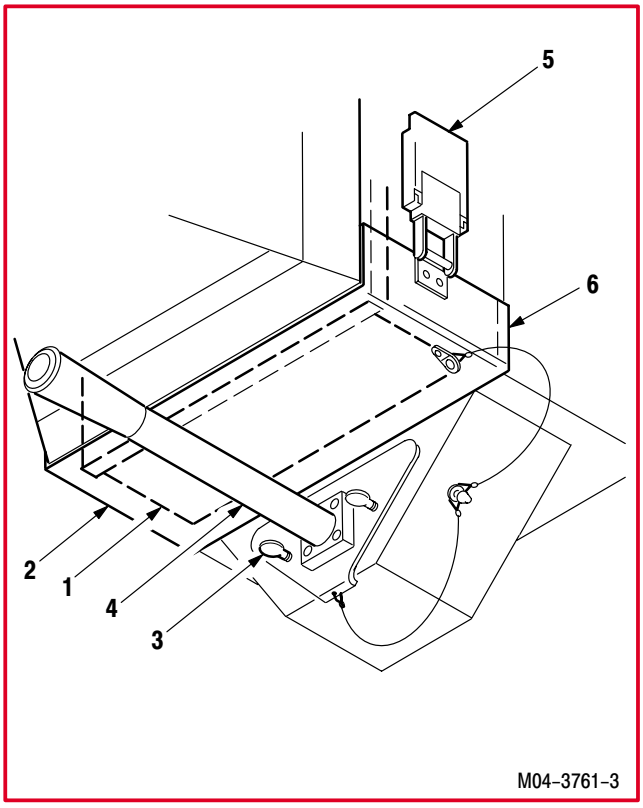
(2) Install eductor tube assembly (4) on separator (2) with two turnlock fasteners (3).

d. **Inspect (QA).**

e. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

f. **Perform pressurized air system leak check** (para 7.115)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.119. INLET THROTTLE VALVE REMOVAL/INSTALLATION

7.119.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.119.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

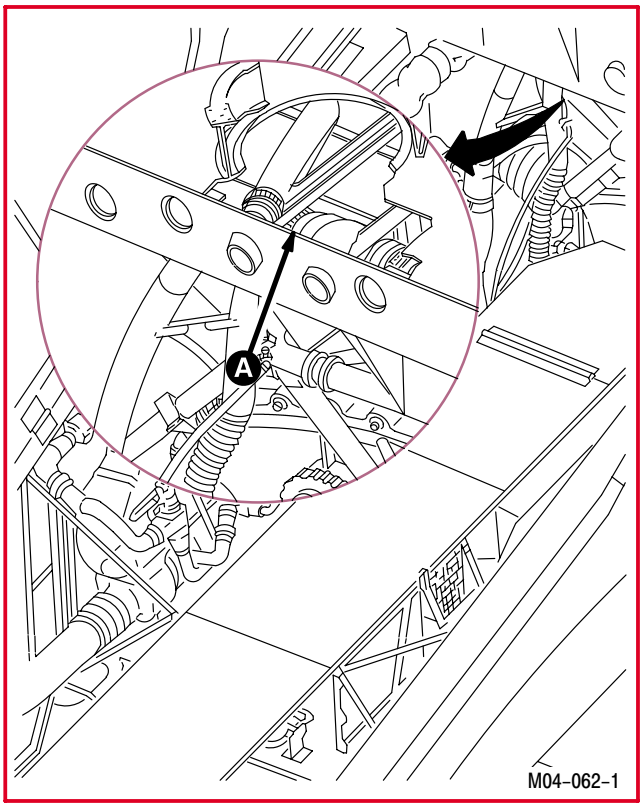
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing (2)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
7.116	Air particle separator removed



GO TO NEXT PAGE

7.119. INLET THROTTLE VALVE REMOVAL/INSTALLATION – continued

7.119.3. Removal

a. **Detach connector P217 (1) from receptacle (L13)J1 (2).**

b. **Remove tube (3).**

(1) Hold nipple (4). Remove nut (5).

c. **Remove tube (6).**

(1) Hold reducer (7). Remove nut (8).

d. **Remove inlet throttle valve (9).**

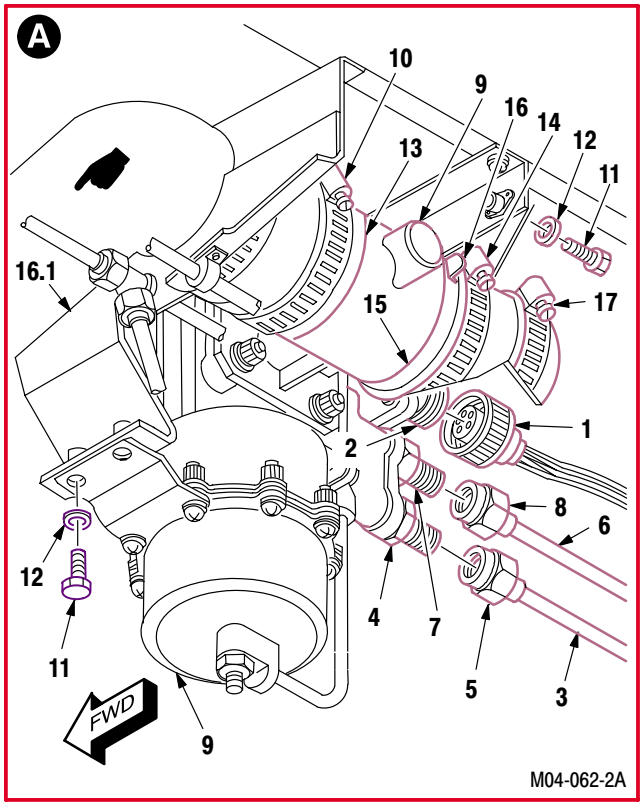
(1) Loosen clamp (10).

(2) Remove four bolts (11) from washers (12), valve (9), supports (16) and (16.1).

(3) Slide valve (9) from hose (13).

(4) Remove clamp (14), hose (15), support (16), and clamp (17) from valve (9).

(5) Remove valve (9).

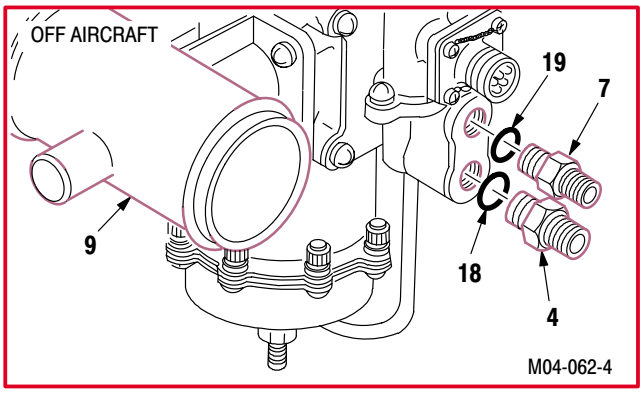


e. **Remove nipple (4) from valve (9).**

(1) Remove and discard packing (18) from nipple (4).

f. **Remove reducer (7) from valve (9).**

(1) Remove and discard packing (19) from reducer (7).



7.119.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

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7.119. INLET THROTTLE VALVE REMOVAL/INSTALLATION – continued

7.119.5. Inspection

a. **Check removed and attaching parts for nicks, gouges, scratches, and cracks** (para 7.114)**.**

b. **Check fittings for crossed, burred, and stripped threads** (para 7.114)**.**

c. **Check connector and receptacle for rough or binding action; foreign objects, and bent, broken, loose, or missing pins** (para 7.114)**.**

d. **Check valve receptacles for damaged threads.** Damage shall not exceed **1/2 OF ONE THREAD**.

e. **Check connector and case screw lockwire for loose or broken wire.** None allowed.

f. **Check cover protective finish** (para 7.114)**.**

g. **Check cover for loose inserts.** None allowed.

h. **Check sleeves for tears and deterioration.** None allowed.

i. **Check valve identification plate for deformation, illegible data, and looseness.** None allowed.

j. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.119. INLET THROTTLE VALVE REMOVAL/INSTALLATION – continued

7.119.6. Installation



a. **Install nipple (4) and reducer (7) on valve (9).**

(1) Lubricate two new packings (18) and (19). Use petrolatum (item 138, App F).

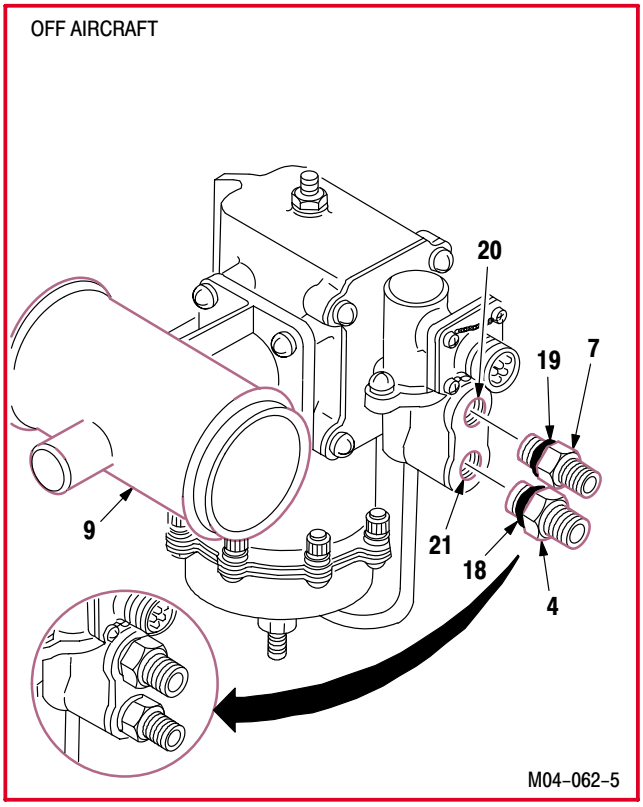
(2) Install packing (18) on nipple (4).

(3) Install packing (19) on reducer (7).

(4) Lubricate threads of nipple (4) and reducer (7). Use damping fluid (item 69, App F).

(5) Install reducer (7) in vent port (20).

(6) Install nipple (4) in pressure port (21).



b. **Install valve (9).**

(1) Install hose (15), support (16), and two clamps (14) and (17) on valve (9).

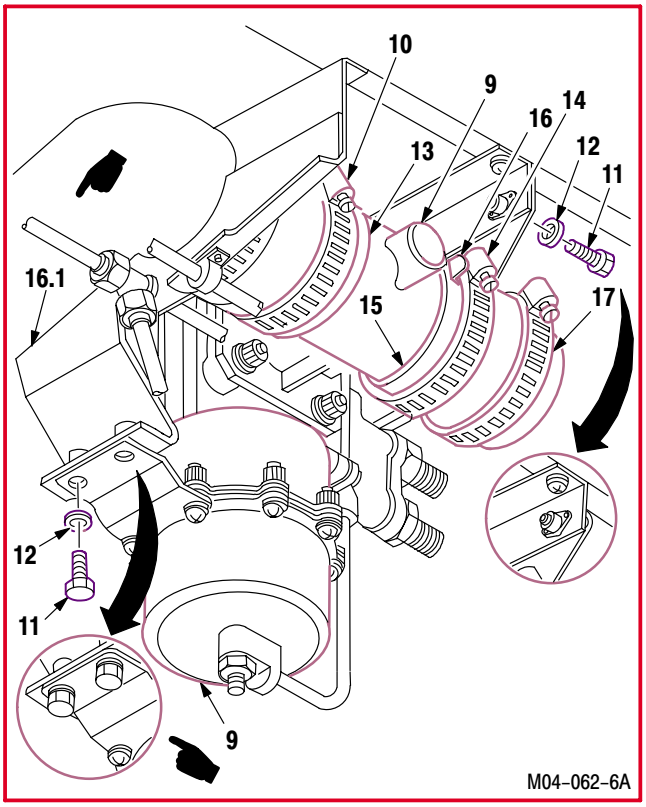
(2) Insert valve (9) into hose (13).

(3) Install four bolts (11) through washers (12), and valve (9) in supports (16) and (16.1).

(4) Tighten clamp (10) on hose (13) and valve (9).

(5) Tighten clamp (14) on support (16), hose (15), and valve (9).

(6) Tighten clamp (17) on hose (15), and valve (9).



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7.119. INLET THROTTLE VALVE REMOVAL/INSTALLATION – continued

CAUTION

Pneumatic tubes can be installed incorrectly. Ensure that tubes do not become crossed while being installed on valve.

c. **Install tubes (3) and (6) on nipple (4) and reducer (7).**

(1) Lubricate threads on nipple (4) and reducer (7). Use damping fluid (item 69, App F).

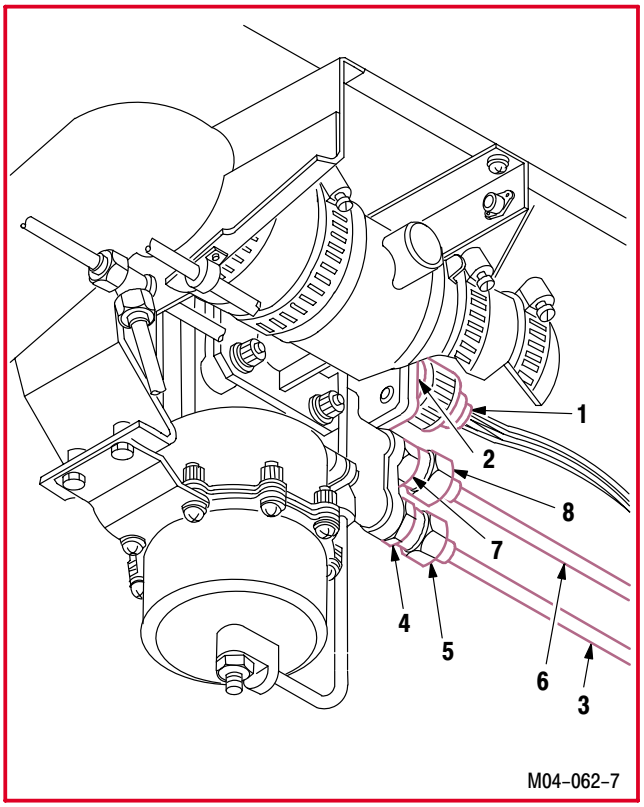
(2) Hold reducer (7). Install nut (8).

(3) Hold nipple (4). Install nut (5).

d. **Attach connector P217 (1) to receptacle (L13)J1 (2).**

e. **Inspect (QA).**

f. **Install air particle separator** (para 7.116)**.**



END OF TASK

7.120. SHAFT DRIVEN COMPRESSOR (SDC) REMOVAL

7.120.1. Description

This task covers: Removal. Cleaning. Inspection.

7.120.2. Initial Setup

Tools:

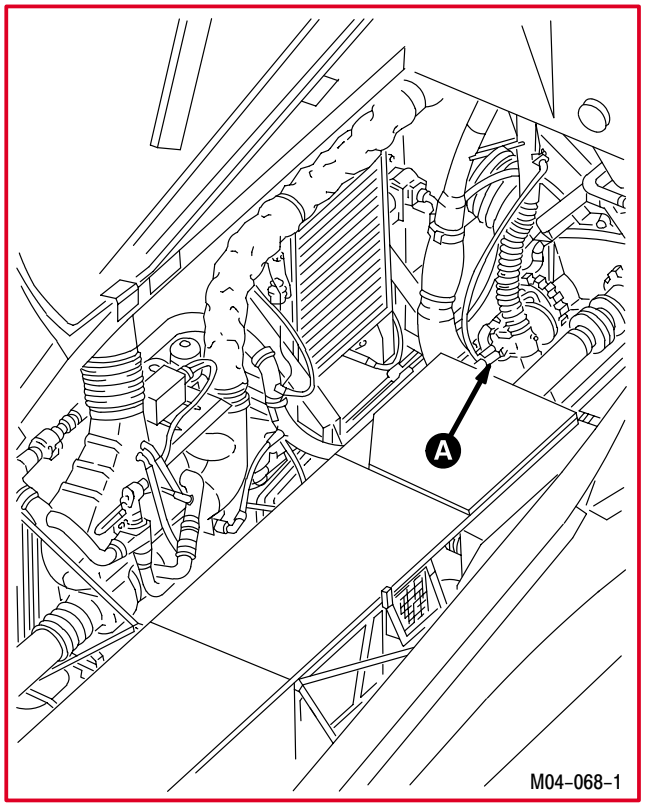
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk
7.127	SDC pressure outlet hose removed
7.123	SDC temperature sensor removed



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7.120. SHAFT DRIVEN COMPRESSOR (SDC) REMOVAL – continued

7.120.3. Removal

a. **Loosen retainer clamp (1).**

b. **Slide housing (2) on inlet duct (3) until clear of inlet (4).**

c. **Remove exhaust hose (5).**

(1) Loosen clamp (6).

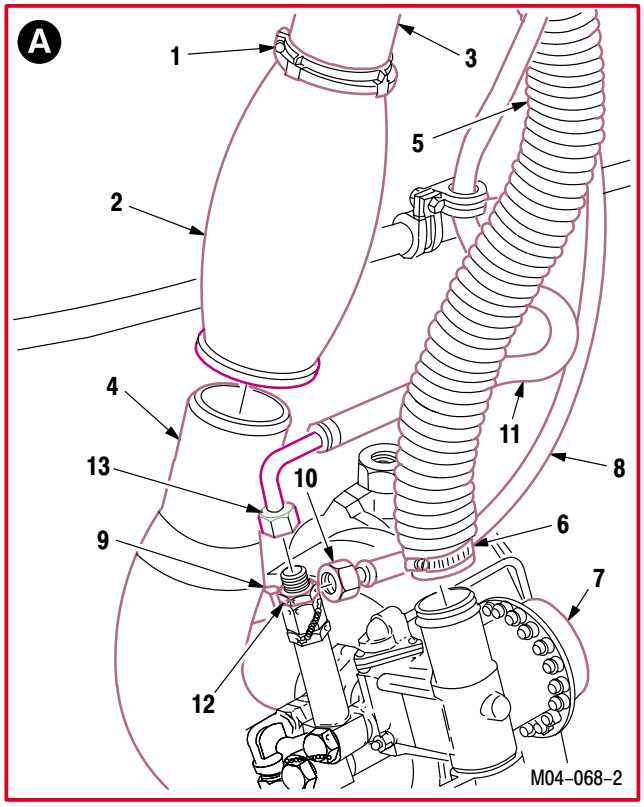
(2) Remove hose (5) from surge valve (7).

d. **Remove interconnect hose (8) from union (9).**

(1) Hold union (9). Remove nut (10).

e. **Remove surge valve pressure hose (11) from union (12).**

(1) Hold union (12). Remove nut (13).



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7.120. SHAFT DRIVEN COMPRESSOR (SDC) REMOVAL – continued

CAUTION

To prevent damage to tail rotor drive shaft and hydraulic lines, use caution while removing SDC.

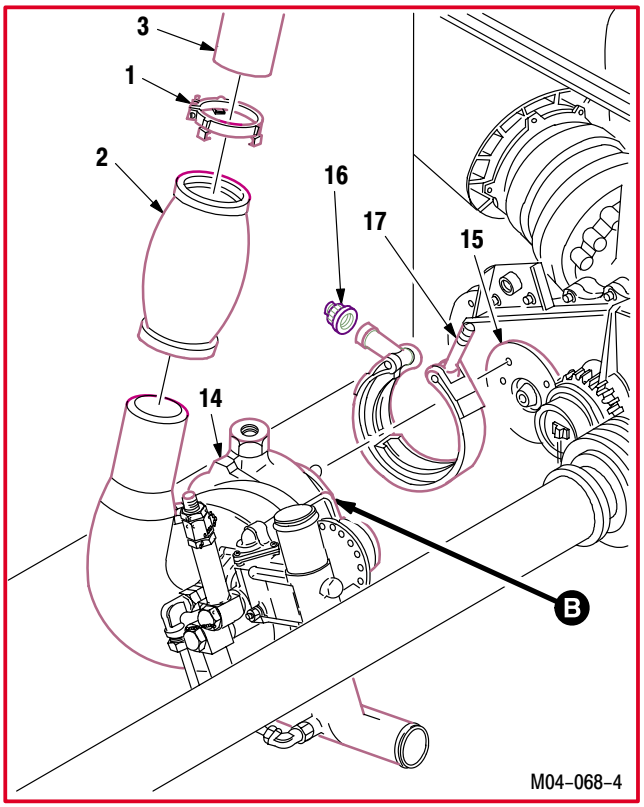
f. **Remove SDC (14) from driveplate (15).**

(1) Remove nut (16).

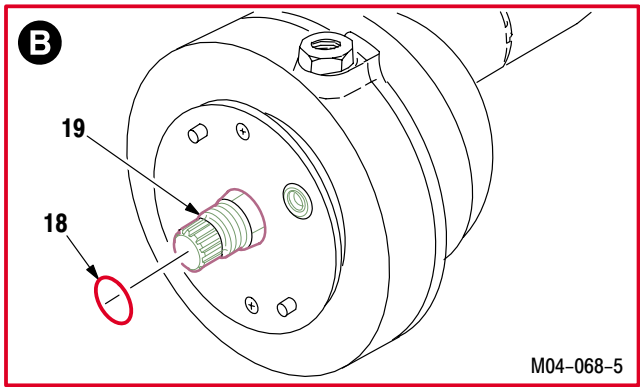
(2) Remove clamp (17).

(3) Remove SDC (14).

g. **Remove housing (2) and clamp (1) from duct (3).**



h. **Remove and discard packing (18) from SDC drive input shaft (19).**



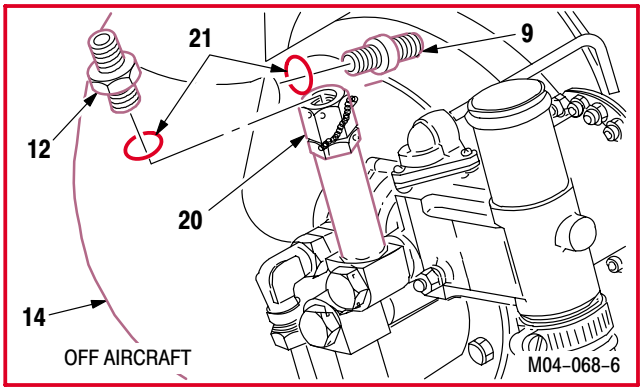
i. **Remove unions (9) and (12).**

(1) Remove union (9) from SDC (14).

(2) Hold tube reducer (20).

(3) Remove union (12) from tube reducer (20).

(4) Remove and discard two packings (21) from unions (9) and (12).



GO TO NEXT PAGE

7.120. SHAFT DRIVEN COMPRESSOR (SDC) REMOVAL – continued

7.120.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.120.5. Inspection

a. **Check removed and attaching parts for damage and wear** (para 7.114)**.**

b. **Check compressor driveplate adapter and seal for leakage** (para 6.54)**.**

c. **Check driveplate for alinement pin hole elongation** (para 6.54)**.**

d. **Check driveplate for cracks, nicks, dents, gouges, and distortion** (para 6.41)**.**

e. **Check driveplate bolts and inserts for looseness.** None allowed.

f. **Check SDC alinement pins for damage.** None allowed.

g. **Check SDC housing for cracks** (para 7.114)**.**

h. **Check removed and attaching parts for corrosion** (para 1.49)**.**

i. **Check seal plate for cracks, nicks, dents, gouges, and distortion.** None allowed.

j. **Check seal plate mounting pad for corrosion** (para 1.49)**.**

k. **Check seal surface for damage.** None allowed.

l. **Check rubber seals of seal plate for bonding by rubbing across raised portion of rubber seal to check for retention.** Replace seal plate if debonding is evident. Replace seal plate if rubber seals are damaged (para 7.122).

m. **Check rubber seals for compression capability.** Lay a straight edge across rubber seals. Ensure distance from top of seals to seal plate is **greater than or equal to 0.010 INCH**. Replace seal plate if less than **0.010 INCH** (para 7.122).

n. **Check SDC housing, shaft, and driveplates for crossed, stripped, or flattened threads.** None allowed.

o. **Check internal splines.**

(1) Check for pitting and scoring. None allowed.

(2) Check for wear step **maximum 0.0003 INCH**.

p. **Check gear teeth for scuffing, scoring, pitting, metal flow or wear steps.** None allowed.

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7.120. SHAFT DRIVEN COMPRESSOR (SDC) REMOVAL – continued

q. **Check failed SDC for damage.** Remove the SDC air inlet housing (4). Remove four bolts (22) and washers (23). Retain hardware for re-installation.

r. **Check SDC impeller for the following damage:**

(1) Missing impeller retaining nut.

(2) Burst or severely eroded impeller.

(3) Broken impeller shaft.

s. **If any of the above discrepancies are noted, perform the inspections listed below in steps t. through aa. If none of the above discrepancies exist, go to step ah.**

t. **Remove, clean, and inspect air particle separator** (para 7.116)**.**

u. **Remove, clean, and inspect inlet throttle valve** (para 7.119)**.**

v. **Using a flashlight and an inspection mirror, inspect inlet duct for FOD** (para 7.114)**.**

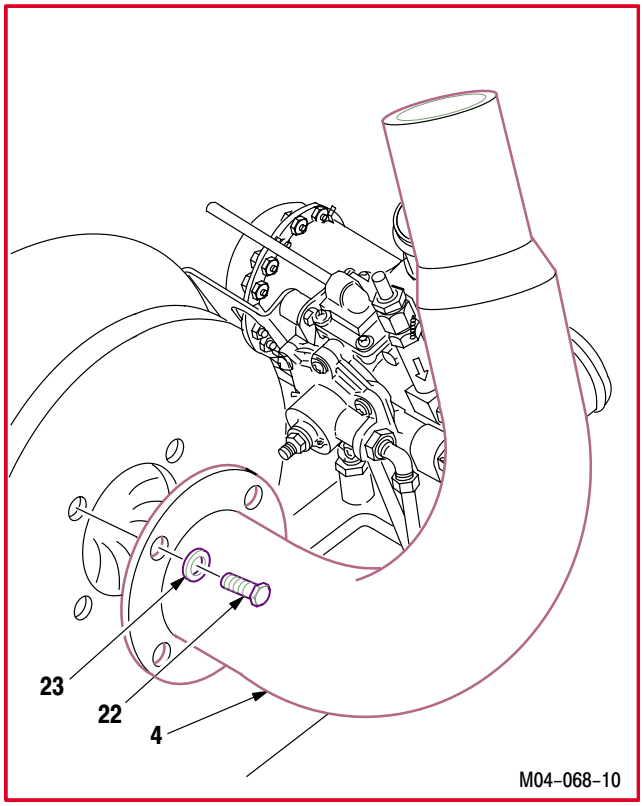
w. **Install air particle separator** (para 7.116)**.**

x. **Install inlet throttle valve** (para 7.119)**.**

y. **Remove, clean, and inspect SDC pressure outlet hose** (para 7.127)**.**

z. **Remove, clean, and inspect SDC check valve and check valve tube** (para 7.135)**.**

aa. **Using a flashlight and an inspection mirror, inspect PAS tee downstream of SDC check valve for FOD. If FOD is detected, go to step ab. If FOD is not detected, go to step af.**



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7.120. SHAFT DRIVEN COMPRESSOR (SDC) REMOVAL – continued

ab. **Remove, clean, and inspect PAS tee** (para 7.136)**.**

ac. **Remove, clean, and inspect air pressure fluid manifold** (para 7.137)**.**

ad. **Install air pressure fluid manifold** (para 7.137)**.**

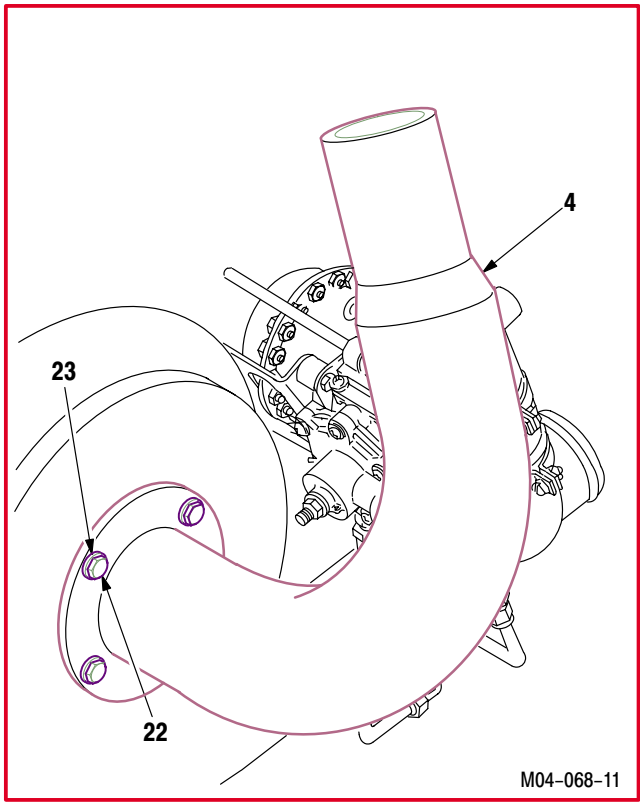
ae. **Install PAS tee** (para 7.136)**.**

af. **Install SDC check valve and check valve tube** (para 7.135)**.**

ag. **Install SDC pressure outlet hose** (para 7.127)**.**

ah. **Install SDC air inlet housing (4).**

(1) Install four bolts (22) and washers (23).



END OF TASK

7.121. SDC INSTALLATION

7.121.1. Description

This task covers: Installation.

7.121.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing (3)
Damping fluid (item 69, App F)
Grease (item 88, App F)
Petrolatum (item 138, App F)

Personnel Required:

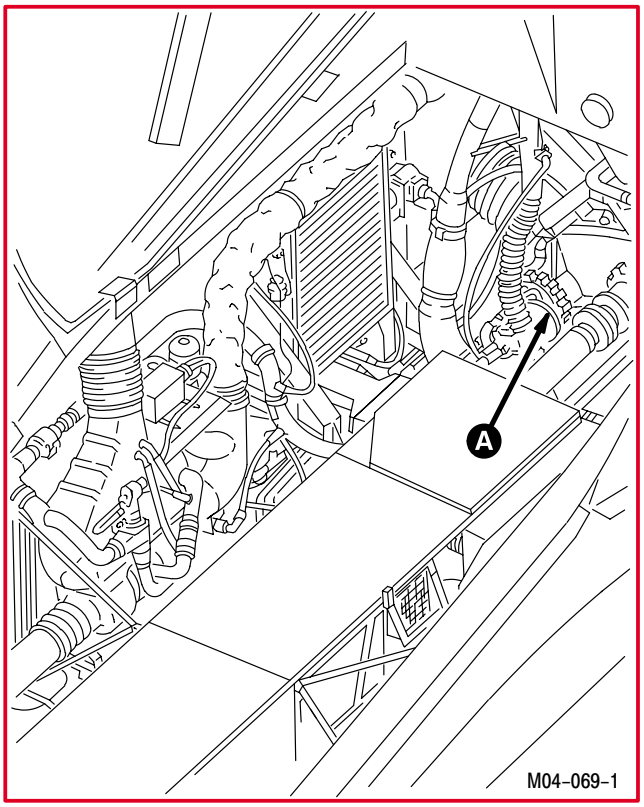
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed



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7.121. SDC INSTALLATION – continued

7.121.3. Installation



a. **Install union (1) on SDC (2).**

(1) Lubricate new packing (3). Use petrolatum (item 138, App F).

(2) Install packing (3) on union (1).

(3) Lubricate threads of union (1). Use damping fluid (item 69, App F).

(4) Install union (1) on SDC (2).

b. **Install union (4) on reducer (5).**

(1) Lubricate new packing (6). Use petrolatum (item 138, App F).

(2) Install packing (6) on union (4).

(3) Lubricate threads of union (4). Use damping fluid (item 69, App F).

(4) Hold reducer (5). Install union (4).

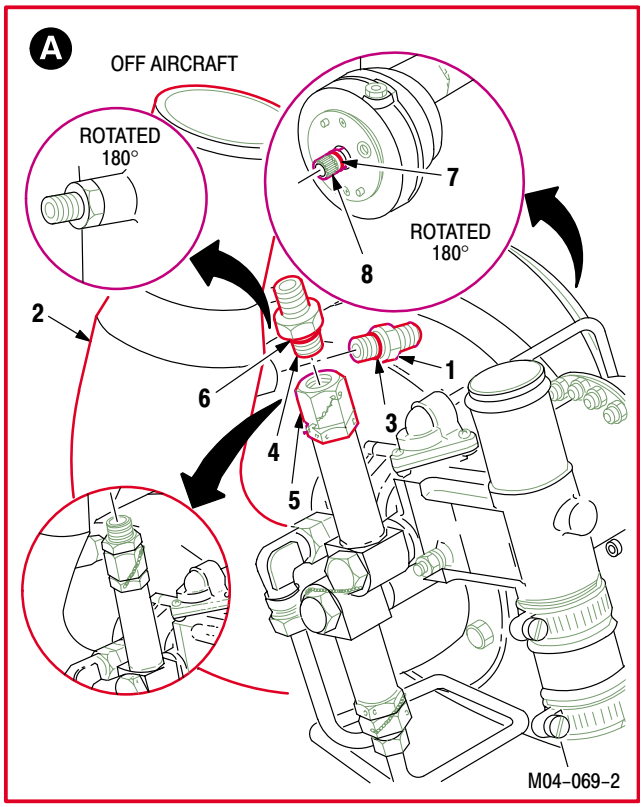


c. **Install new packing (7) on compressor drive input shaft (8).**

(1) Lubricate packing (7). Use grease (item 88, App F).

(2) Install packing (7).

d. **Lubricate splines on shaft (8).** Use grease (item 88, App F).

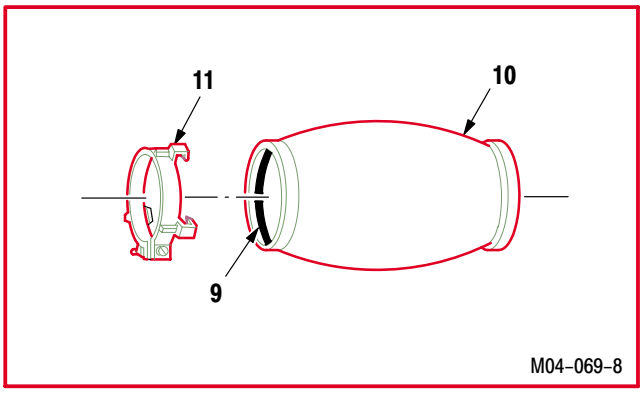


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7.121. SDC INSTALLATION – continued

e. **Lubricate seals (9) inside both ends of housing (10).** Use petrolatum (item 138, App F).

f. **Install retainer clamp (11) on housing (10).**



g. **Slide housing (10) on inlet duct (12).**

CAUTION

To prevent damage to tail rotor drive shaft and hydraulic lines, use caution while installing SDC.

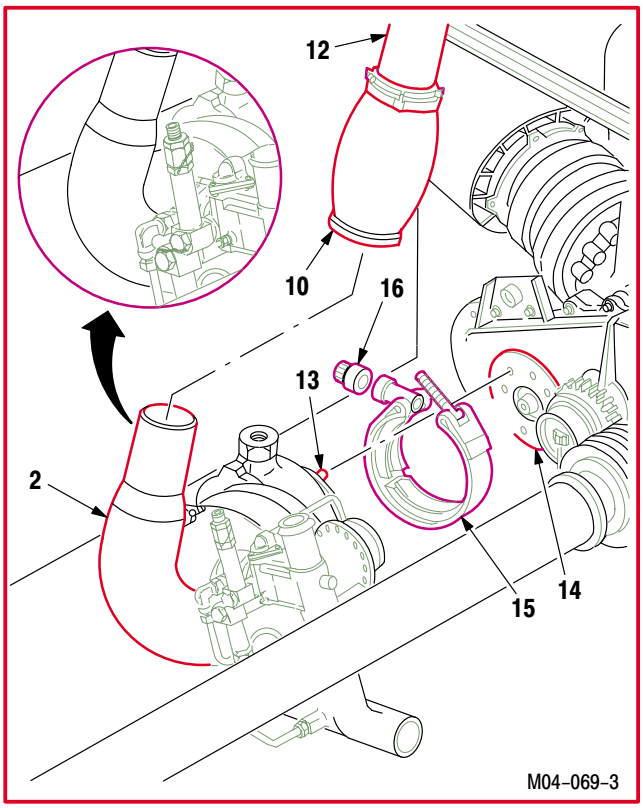
h. **Install SDC (2).**

(1) Position SDC (2) to aline pins (13) with holes in driveplate (14).

(2) Install SDC (2) on driveplate (14). Ensure pins (13) are properly engaged.

i. **Install coupling (15).** Torque nut (16) to **60 INCH-POUNDS** to seat coupling (15). Use torque wrench.

j. **Loosen nut (16) and retorque nut (16) to 60 INCH-POUNDS.** Use torque wrench.



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7.121. SDC INSTALLATION – continued

k. **Install interconnect hose (17) and surge valve pressure hose (18) on unions (1) and (4).**

(1) Lubricate threads of unions (1) and (4). Use damping fluid (item 69, App F).

(2) Hold union (1). Install nut (19).

(3) Hold union (4). Install nut (20).

CAUTION

Ensure surge valve pressure hose is not kinked or twisted after installation. Failure to do so could cause SDC malfunction.

l. **Install exhaust hose (21) on surge valve (22).**

(1) Install clamp (23).

m. **Slide housing (10) over SDC (2).**

(1) Install clamp (11).

n. **Inspect (QA).**

o. **Install SDC pressure outlet hose** (para 7.127)**.**

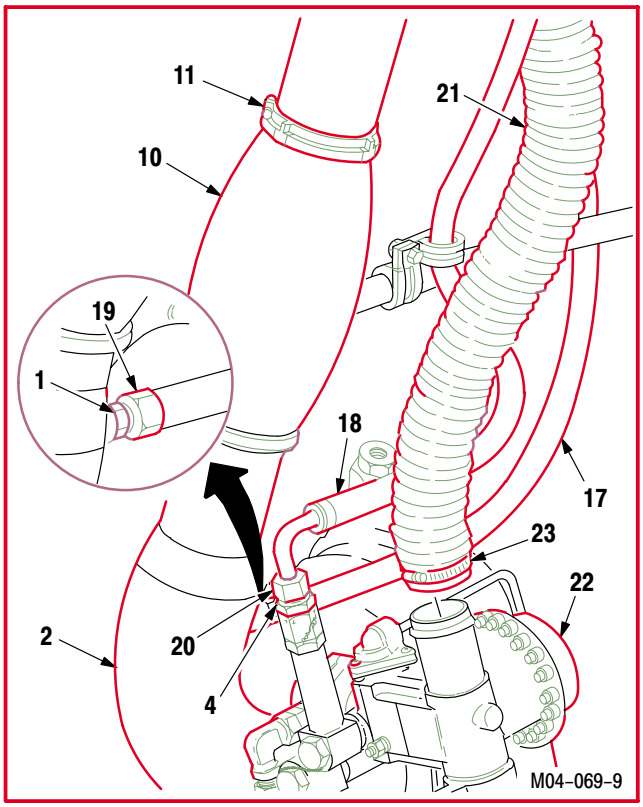
p. **Install SDC temperature sensor** (para 7.123)**.**

q. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

r. **Unfold catwalk** (para 2.83)**.**

s. **Service main transmission** (para 1.32)**.**

t. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.122. SDC SEAL PLATE REPLACEMENT

7.122.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.122.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
#1 phillips screwdriver bit (item 35, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

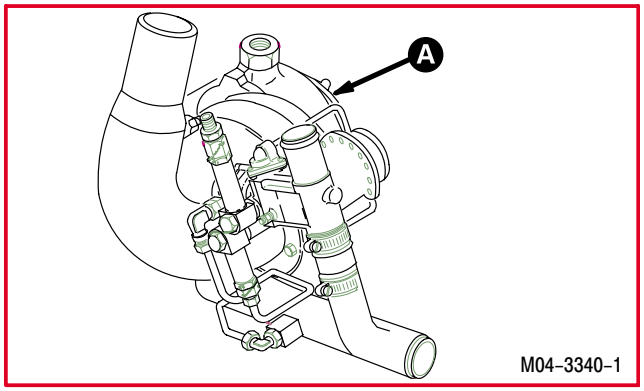
Cloth (item 52, App F)
Sealing compound (item 166, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
7.120	SDC removed

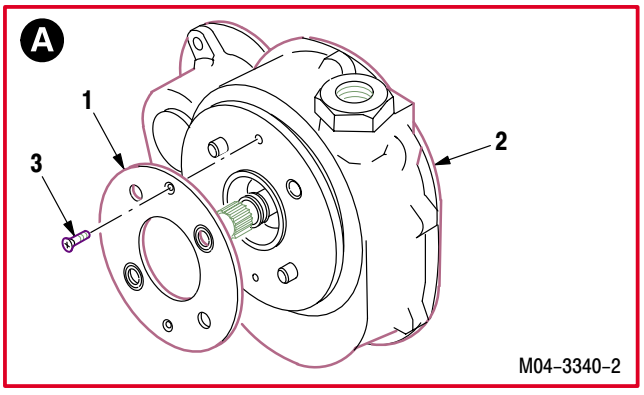


7.122.3. Removal

a. **Remove and discard seal plate (1) from SDC (2).**

(1) Remove two screws (3) from seal plate (1). Use screwdriver bit.

(2) Remove and discard seal plate (1).



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7.122. SDC SEAL PLATE REPLACEMENT – continued

7.122.4. Cleaning

a. **Clean seal plate mounting pad.** Use cloth (item 52, App F).

b. **Clean threaded screw holes and screws** (para 1.47)**.**

7.122.5. Inspection

a. **Check seal plate mounting pad for cracks, nicks, dents, and gouges.** None allowed.

b. **Check seal plate mounting pad for corrosion** (para 1.49)**.**

c. **Inspect (QA).**

7.122.6. Installation



NOTE

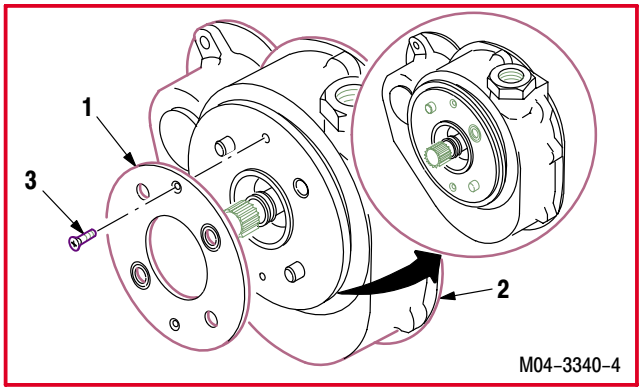
Seal plate will allow metal-to-metal contact under compression.

a. **Install new seal plate (1) on SDC (2).**

(1) Aline two screw holes on plate (1) with SDC (2).

(2) Apply sealing compound on threads of screws (3). Use sealing compound (item 166, App F).

(3) Install two screws (3) through plate (1) into SDC (2). Use screwdriver bit.



b. **Inspect (QA).**

c. **Install SDC** (para 7.121)**.**

END OF TASK

7.123. SDC TEMPERATURE SENSOR REMOVAL/INSTALLATION

7.123.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.123.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/2 x 3/8-inch drive open end socket wrench crowfoot attachment (item 88, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing
Petrolatum (item 138, App F)

Personnel Required:

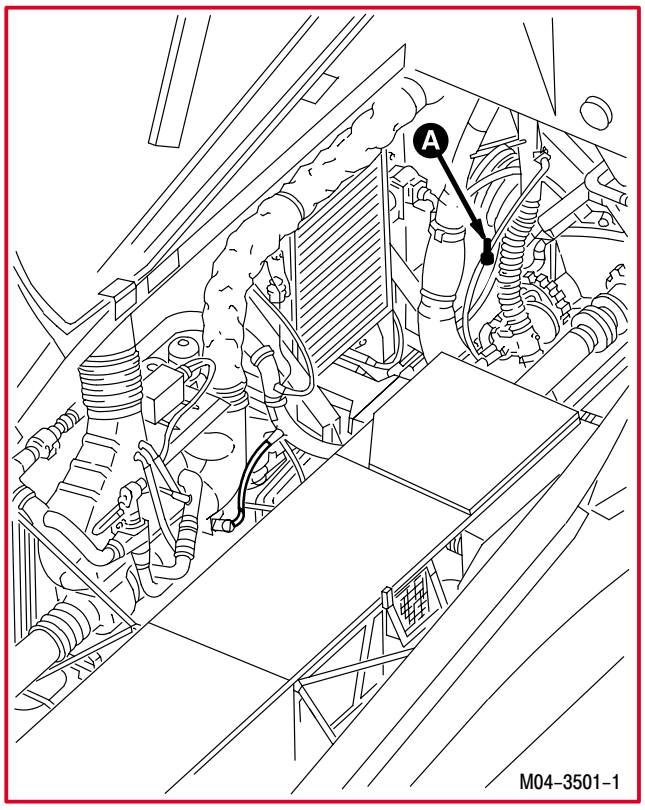
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened



GO TO NEXT PAGE

7.123. SDC TEMPERATURE SENSOR REMOVAL/INSTALLATION – continued

7.123.3. Removal

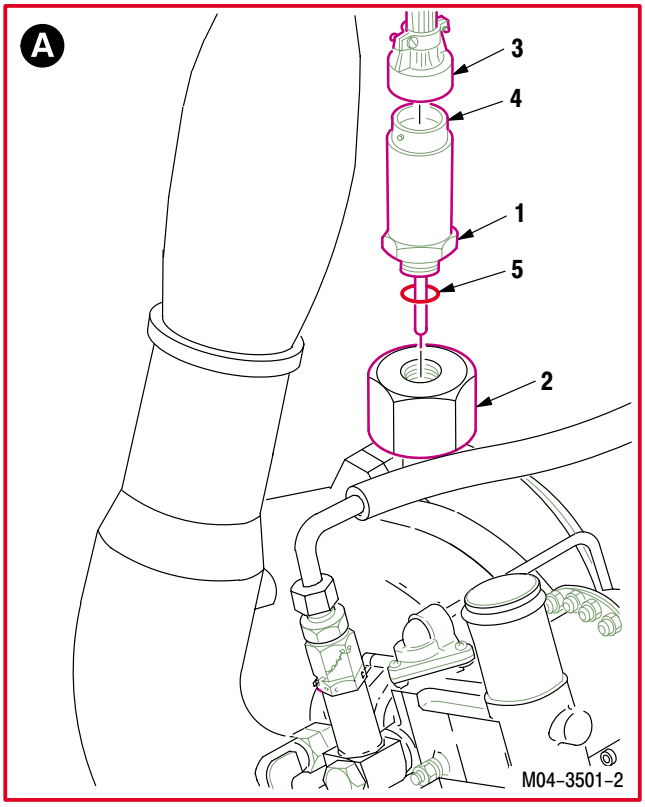
a. **Remove temperature sensor (1) from filter plug (2).**

(1) Detach connector P1323 (3) from receptacle (S132)J1 (4).

(2) Hold plug (2). Use crowfoot.

(3) Remove sensor (1) from plug (2).

(4) Remove and discard packing (5) from sensor (1).



7.123.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.123.5. Inspection

a. **Check SDC, temperature sensor, and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.123. SDC TEMPERATURE SENSOR REMOVAL/INSTALLATION – continued

7.123.6. Installation



a. **Install sensor (1) on plug (2).** Torque to **80 INCH-POUNDS**.

(1) Lubricate and install new packing (5) on sensor (1). Use petrolatum (item 138, App F).

(2) Hold plug (2). Use crowfoot.

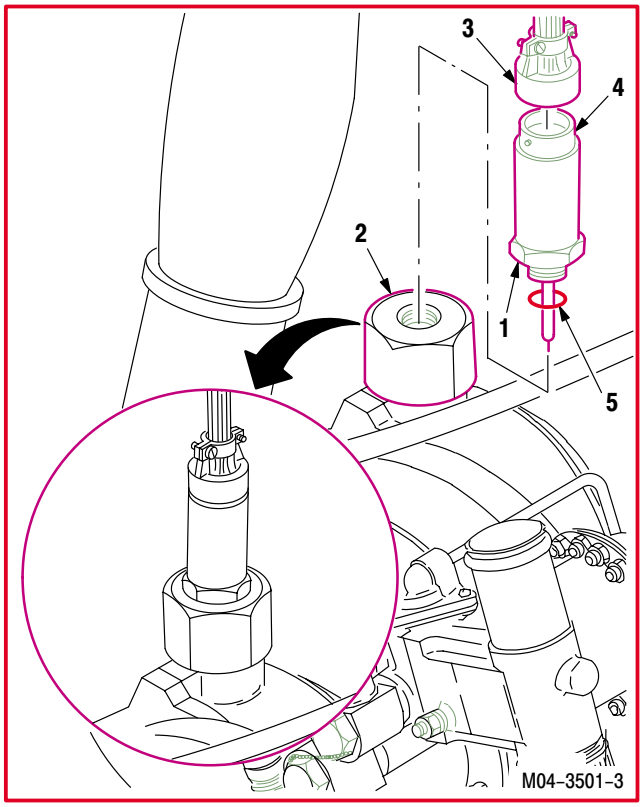
(3) Install sensor (1) on plug (2). Torque to **80 INCH-POUNDS**. Use torque wrench.

(4) Attach connector P1323 (3) to receptacle (S132)J1 (4).

b. **Inspect (QA).**

c. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

d. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.124. SDC FILTER ELEMENT REMOVAL/INSTALLATION

7.124.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.124.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/2 x 3/8-inch drive open end socket wrench crowfoot attachment (item 88, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing (4)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)

Personnel Required:

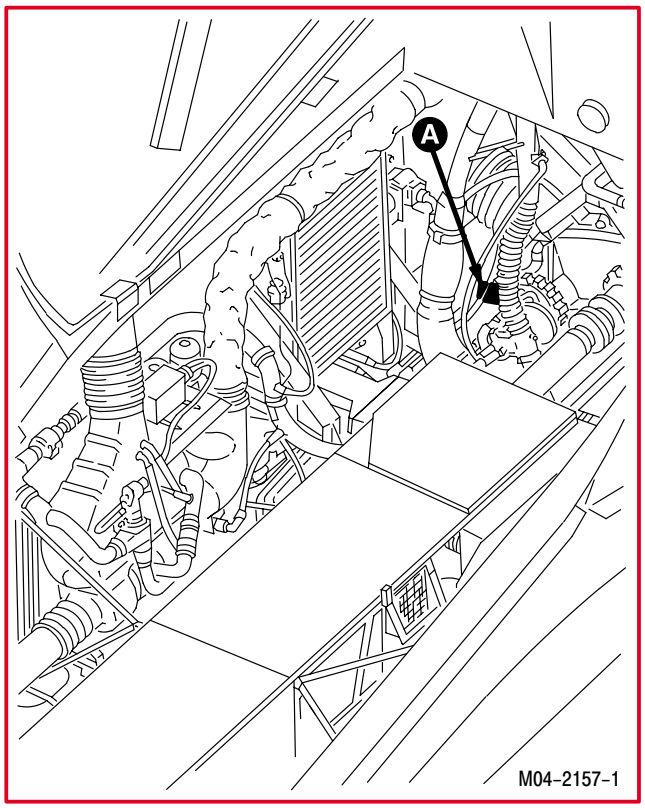
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened



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7.124. SDC FILTER ELEMENT REMOVAL/INSTALLATION – continued

7.124.3. Removal

a. **Remove temperature sensor (1) from filter plug (2).**

(1) Detach connector P1323 (3) from receptacle (S132)J1 (4).

(2) Hold plug (2). Use crowfoot.

(3) Remove sensor (1) from plug (2).

(4) Remove and discard packing (5) from sensor (1).

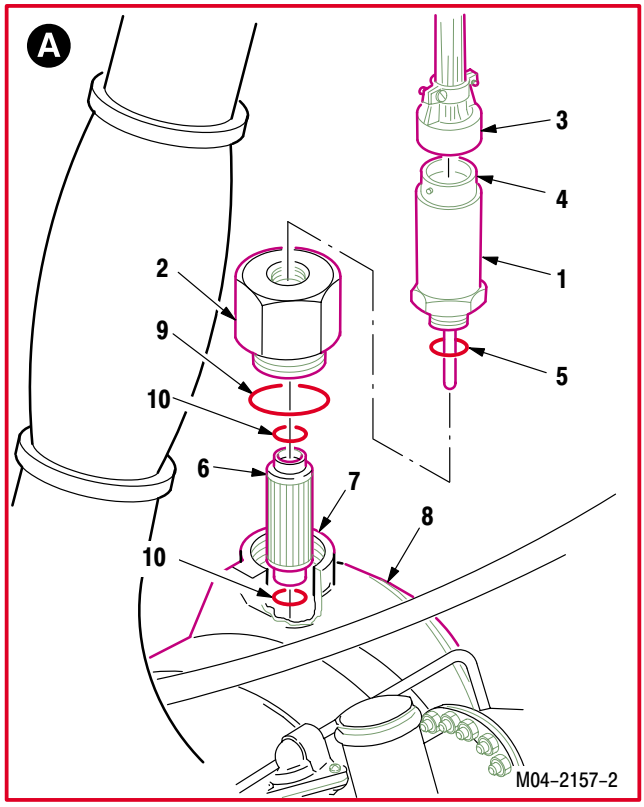
b. **Remove filter element (6) from filter recess (7) of SDC (8).**

(1) Remove plug (2). Use crowfoot.

(2) Remove and discard packing (9) from plug (2).

(3) Remove filter (6) from recess (7).

(4) Remove and discard two packings (10) from filter (6).



7.124.4. Cleaning

a. **Clean filter** (para 1.47)**.**

b. **Wipe removed and attaching parts with a clean rag.**

7.124.5. Inspection

a. **Check filter for cracks and dents.** None allowed.

b. **Check SDC, temperature sensor, and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.124. SDC FILTER ELEMENT REMOVAL/INSTALLATION – continued

7.124.6. Installation



a. **Insert filter (6) into recess (7) of SDC (8).**

(1) Lubricate and install two new packings (10) in both ends of filter (6). Use petrolatum (item 138, App F).

(2) Insert filter (6) into recess (7).



b. **Install plug (2) on SDC (8).** Torque to **65 INCH-POUNDS**.

(1) Lubricate and install new packing (9) on plug (2). Use petrolatum (item 138, App F).

(2) Lubricate threads of plug (2). Use damping fluid (item 69, App F).

(3) Install plug (2) on SDC (8). Torque plug to **65 INCH-POUNDS**. Use crowfoot and torque wrench.

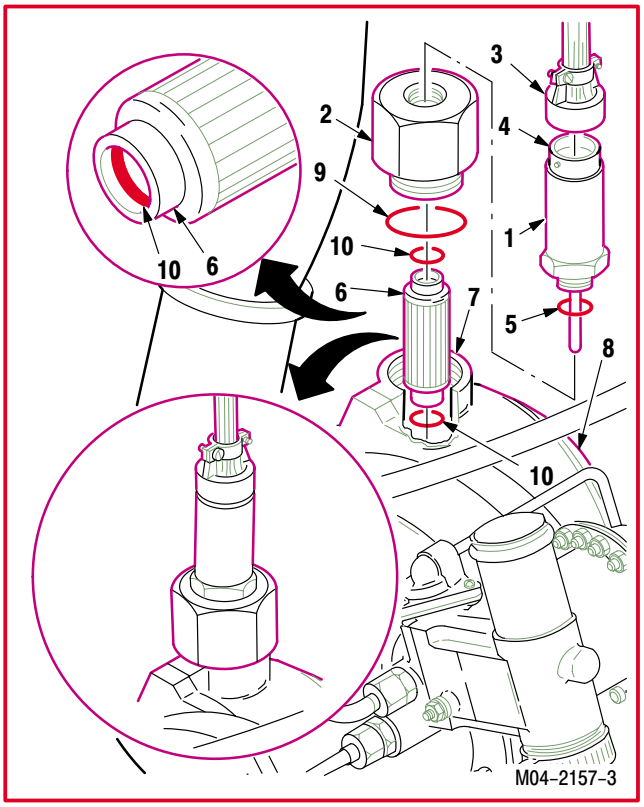
c. **Install sensor (1) on plug (2).** Torque to **80 INCH-POUNDS**.

(1) Lubricate and install new packing (5) on sensor (1). Use petrolatum (item 138, App F).

(2) Hold plug (2). Use crowfoot.

(3) Install sensor (1) on plug (2). Torque to **80 INCH-POUNDS**. Use torque wrench.

(4) Attach connector P1323 (3) to receptacle (S132)J1 (4).



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7.124. SDC FILTER ELEMENT REMOVAL/INSTALLATION – continued

d. **Inspect (QA).**

e. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.125. SDC TOTAL PRESSURE SENSE LINE FILTER AND SURGE VALVE PRESSURE FILTER REMOVAL/INSTALLATION

7.125.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.125.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

Materials/Parts:

Packing (3)
Packing with retainer (2)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

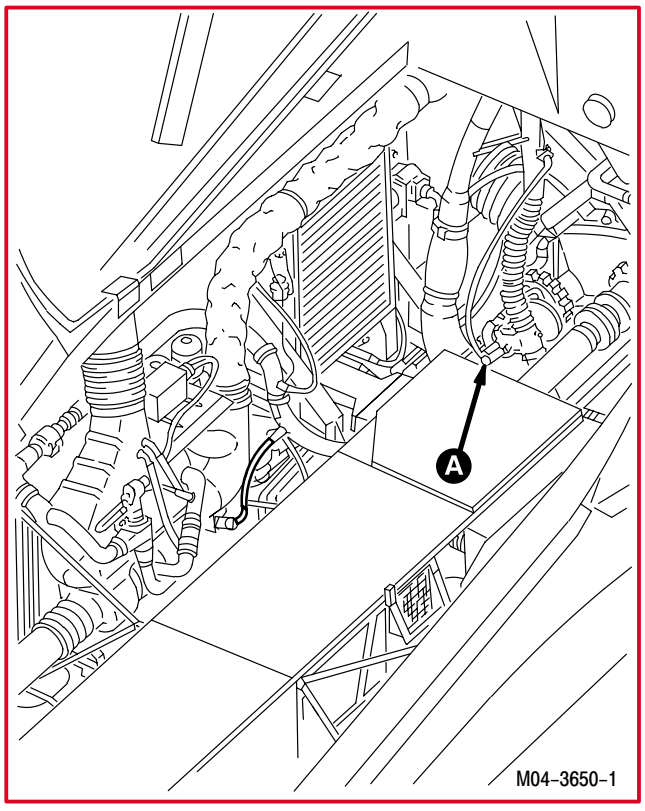
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk



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7.125. SDC TOTAL PRESSURE SENSE LINE FILTER AND SURGE VALVE PRESSURE FILTER REMOVAL/INSTALLATION – continued

7.125.3. Removal

a. **Remove total pressure tube (1).**

(1) Hold tube reducer (2). Remove nut (3).

(2) Hold elbow (4). Remove nut (5).

(3) Remove tube (1).

b. **Remove hose (6) from union (7).**

(1) Hold union (7). Remove nut (8).

(2) Remove hose (6).

c. **Remove union (7) from tube reducer (9).**

(1) Hold tube reducer (9). Remove union (7).

(2) Remove and discard packing (10).

d. **Remove lockwire from tube reducers (2) and (9).**

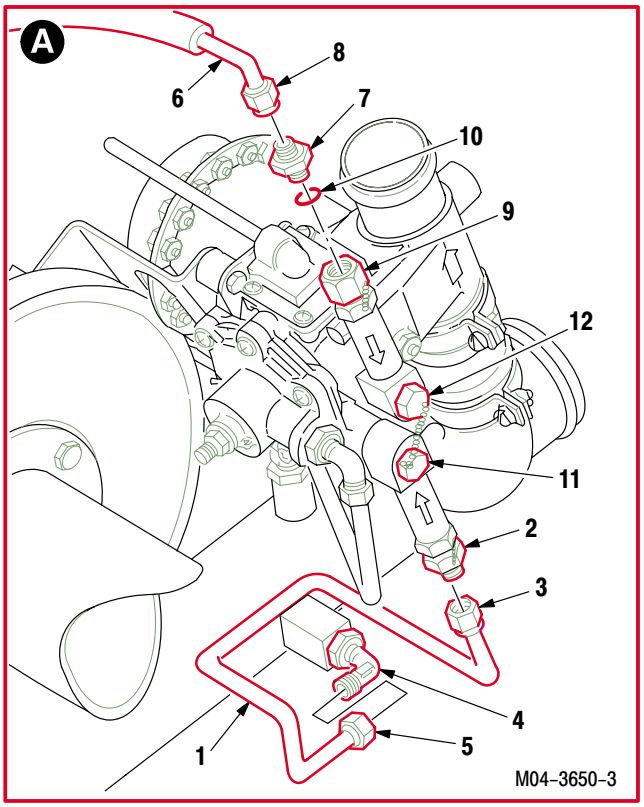
e. **Remove lockwire from bolts (11) and (12).**

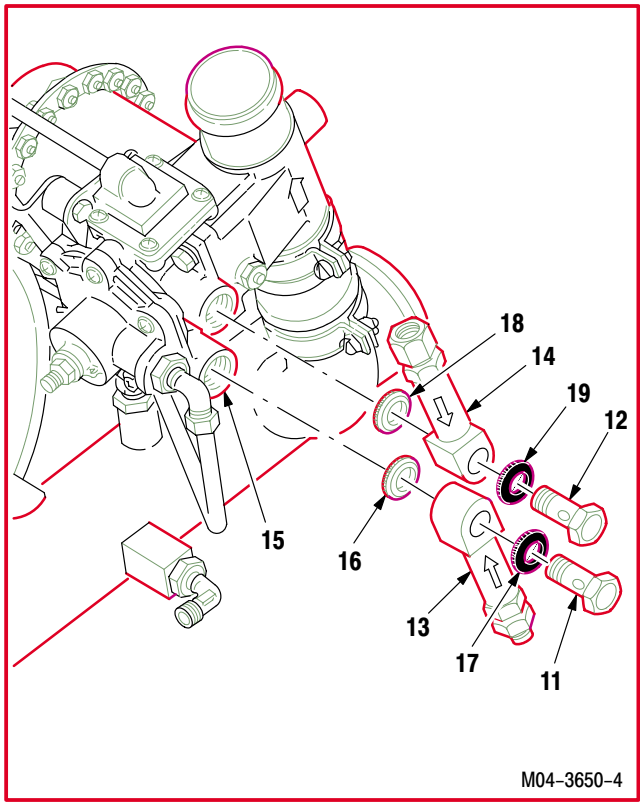
f. **Remove filter housings (13) and (14) from surge valve (15).**

(1) Remove bolt (11), packings (16) and (17), and housing (13).

(2) Remove bolt (12), packings (18) and (19), and housing (14).

(3) Discard packings (16), (17), (18), and (19).





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7.125. SDC TOTAL PRESSURE SENSE LINE FILTER AND SURGE VALVE PRESSURE FILTER REMOVAL/INSTALLATION – continued

g. **Remove total pressure sense line filter (20) from filter housing (13).**

(1) Hold housing (13).

(2) Slowly remove tube reducer (2). Discard packing (21).

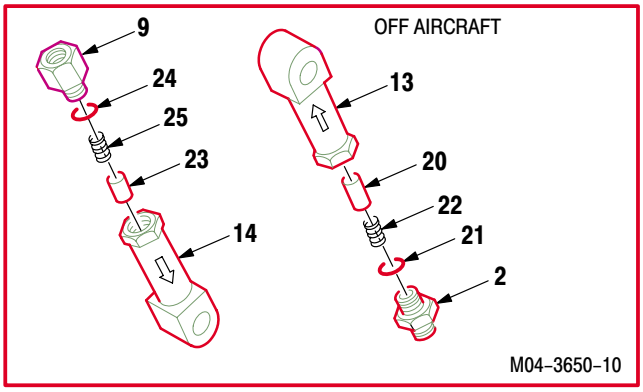
(3) Remove and retain spring (22) and filter (20).

h. **Remove surge valve pressure filter (23) from filter housing (14).**

(1) Hold housing (14).

(2) Slowly remove tube reducer (9). Discard packing (24).

(3) Remove and retain spring (25) and filter (23).



7.125.4. Cleaning

a. **Clean filters, filter housings, bolts, springs, and tube reducers** (para 1.47)**.**

b. **Wipe removed and attaching parts with a clean rag.**

7.125.5. Inspection

a. **Check housings, bolts, and tube reducers for cracks, dents, rounded flats, and stripped or damaged threads** (para 7.114)**.**

b. **Check filters for cracks and dents.** None allowed.

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.125. SDC TOTAL PRESSURE SENSE LINE FILTER AND SURGE VALVE PRESSURE FILTER REMOVAL/INSTALLATION – continued

7.125.6. Installation



a. **Install filter (23) in housing (14).** Torque reducer (9) to **60 INCH-POUNDS**.

(1) Lubricate new packing (24). Use petrolatum (item 138, App F).

(2) Install packing (24) on reducer (9).

(3) Lubricate threads of tube reducer (9). Use damping fluid (item 69, App F).

(4) Install filter (23) and spring (25) in housing (14).

(5) Install tube reducer (9) on housing (14).

(6) Hold housing (14). Torque reducer (9) to **60 INCH-POUNDS**. Use torque wrench.

(7) Lockwire reducer (9) to housing (14). Use wire (item 222, App F).

b. **Install filter (20) in housing (13).** Torque reducer (2) to **60 INCH-POUNDS**.

(1) Lubricate new packing (21). Use petrolatum (item 138, App F).

(2) Install packing (21) on reducer (2).

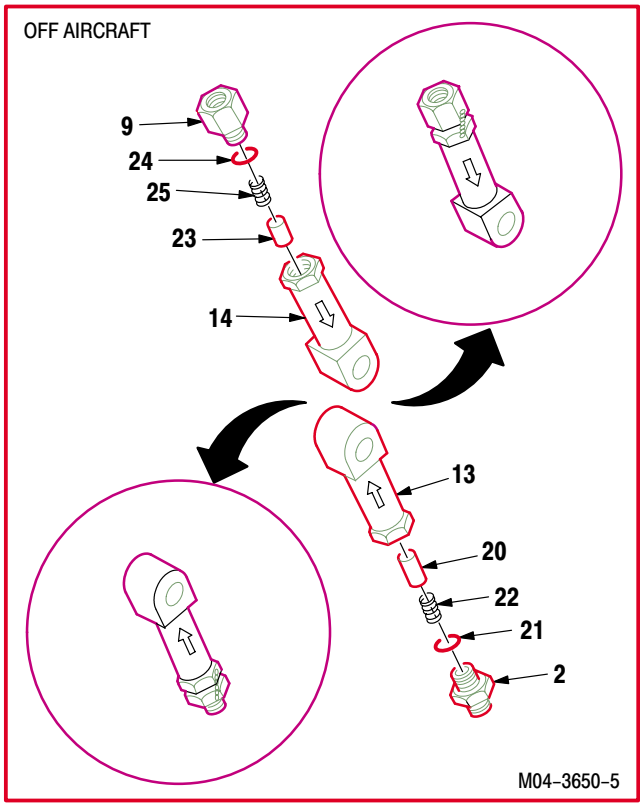
(3) Lubricate threads of reducer (2). Use damping fluid (item 69, App F).

(4) Install filter (20) and spring (22) in housing (13).

(5) Install tube reducer (2) on housing (13).

(6) Hold housing (13). Torque reducer (2) to **60 INCH-POUNDS**. Use torque wrench.

(7) Lockwire reducer (2) to housing (13). Use wire (item 222, App F).



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7.125. SDC TOTAL PRESSURE SENSE LINE FILTER AND SURGE VALVE PRESSURE FILTER REMOVAL/INSTALLATION – continued

NOTE

Packing with retainer comes in a set of two packings. The black packing is installed next to bolt. The packing with the knurled edge is installed next to surge valve.

c. **Install housings (13) and (14) on surge valve (15).** Torque bolt (11) and bolt (12) to **135 INCH-POUNDS**.

(1) Lubricate new packings (16), (17), (18), and (19). Use petrolatum (item 138, App F).

(2) Install bolt (12) through packing (19), housing (14), and packing (18) on surge valve (15). Torque bolt (12) to **135 INCH-POUNDS**. Use torque wrench.

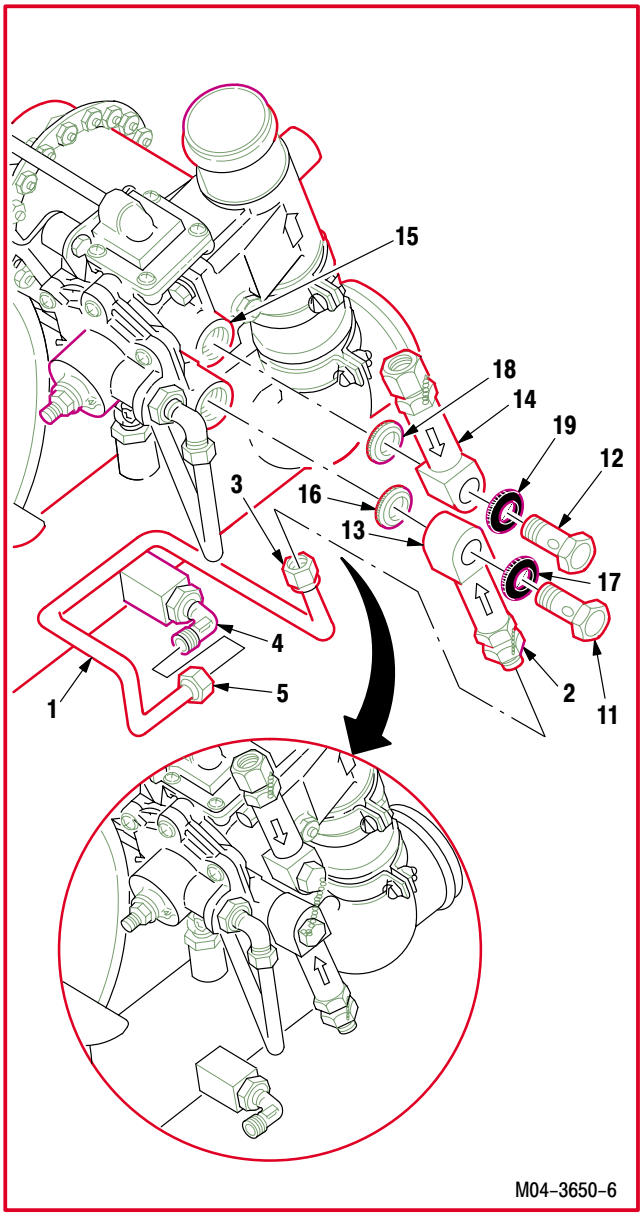
(3) Install bolt (11) through packing (17), housing (13), and packing (16) on surge valve (15).

(4) Temporarily install total pressure tube (1) on elbow (4) and reducer (2) to aline housing (13). Install nuts (3) and (5).

(5) Torque bolt (11) to **135 INCH-POUNDS**. Use torque wrench.

(6) Remove tube (1) from elbow (4) and reducer (2). Remove nuts (3) and (5).

(7) Lockwire bolts (11) and (12). Use wire (item 222, App F).



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7.125. SDC TOTAL PRESSURE SENSE LINE FILTER AND SURGE VALVE PRESSURE FILTER REMOVAL/INSTALLATION – continued

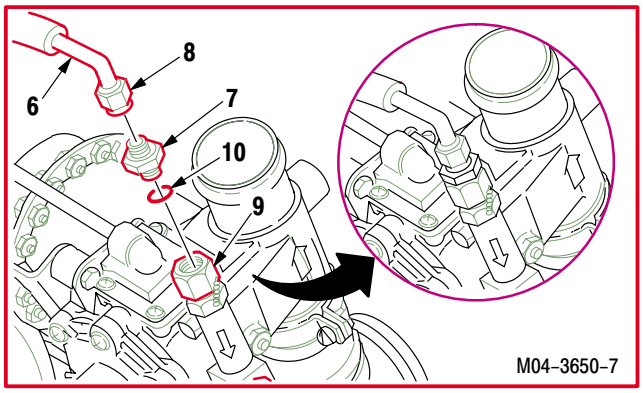
d. **Install union (7) on reducer (9).** Torque union (7) to **100 INCH-POUNDS**.

(1) Lubricate new packing (10). Use petrolatum (item 138, App F).

(2) Install packing (10) on union (7).

(3) Lubricate threads of union (7). Use damping fluid (item 69, App F).

(4) Hold reducer (9). Install union (7). Torque union (7) to **100 INCH-POUNDS**. Use torque wrench.



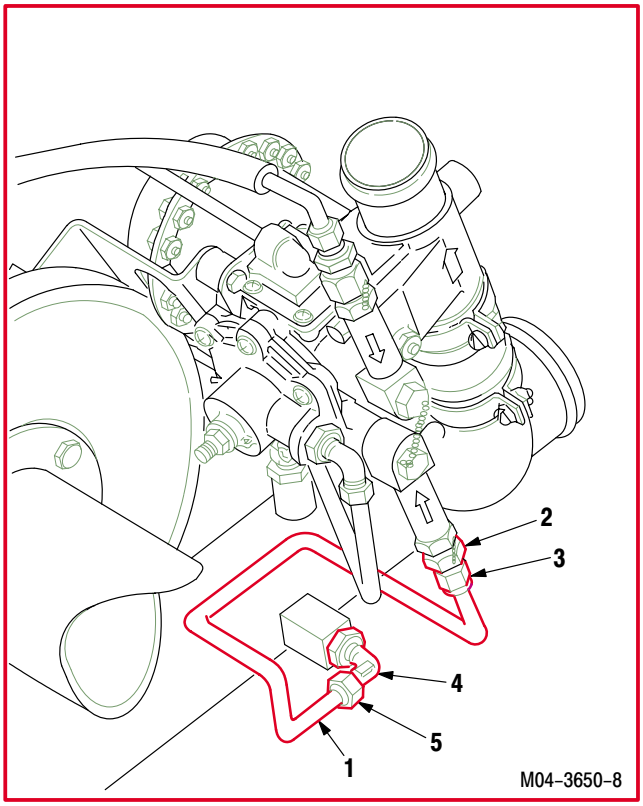
e. **Install hose (6) on union (7).**

(1) Hold union (7). Install nut (8).

f. **Install tube (1) on elbow (4) and reducer (5).** Torque nut (3) and nut (5) to **60 INCH-POUNDS**.

(1) Hold elbow (4). Install nut (5). Torque to **60 INCH-POUNDS**. Use torque wrench.

(2) Hold reducer (2). Install nut (3). Torque to **60 INCH-POUNDS**. Use torque wrench.



g. **Inspect (QA).**

h. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

i. **Perform pressurized air system leak check** (para 7.115)**.**

j. **Unfold catwalk** (para 2.83)**.**

k. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.126. SDC PRESSURE INTERCONNECT HOSE REPLACEMENT

7.126.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.126.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Materials/Parts:

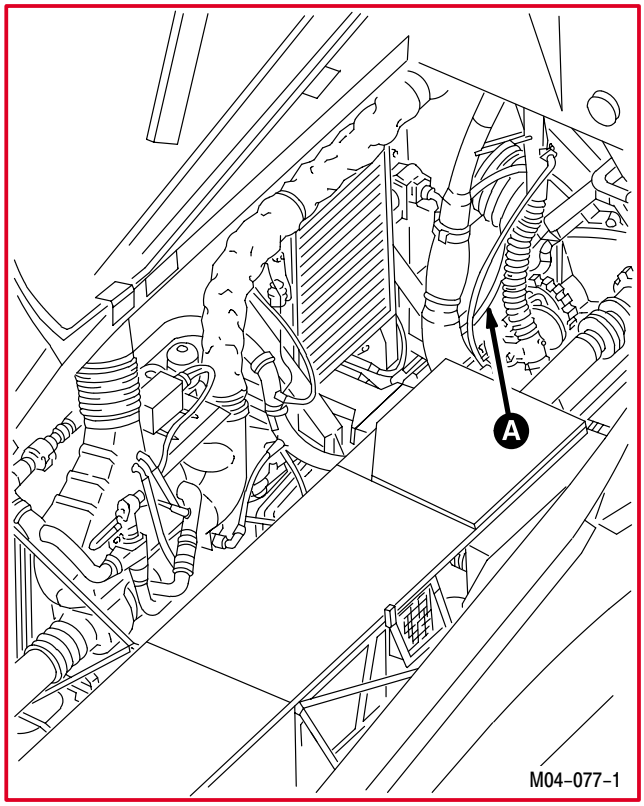
Damping fluid (item 69, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk



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7.126. SDC PRESSURE INTERCONNECT HOSE REPLACEMENT – continued

7.126.3. Removal

a. **Remove hose (1).**

(1) Hold union (2). Remove nut (3).

(2) Hold union (4). Remove nut (5).

(3) Remove nut (6), washer (7), and screw (8).

(4) Remove clamp (9) from hose (1).

(5) Remove and discard hose (1).

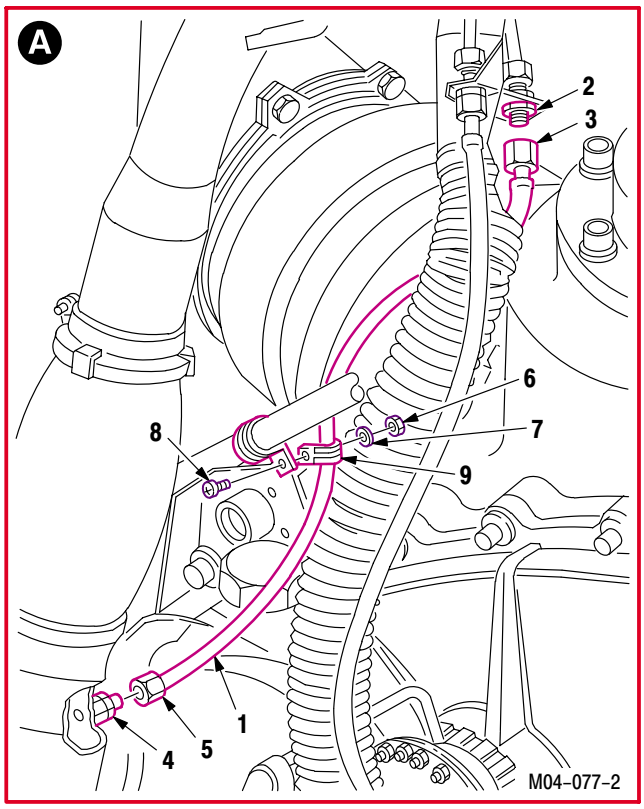
7.126.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.126.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.126. SDC PRESSURE INTERCONNECT HOSE REPLACEMENT – continued

7.126.6. Installation

a. **Install hose (1).**

(1) Lubricate threads of unions (2) and (4). Use damping fluid (item 69, App F).

(2) Connect nuts (3) and (5) to unions (2) and (4).

(3) Hold unions (2) and (4). Tighten nuts (3) and (5).

(4) Install clamp (9) on hose (1).

(5) Install screw (8) through clamps (10) and (9).

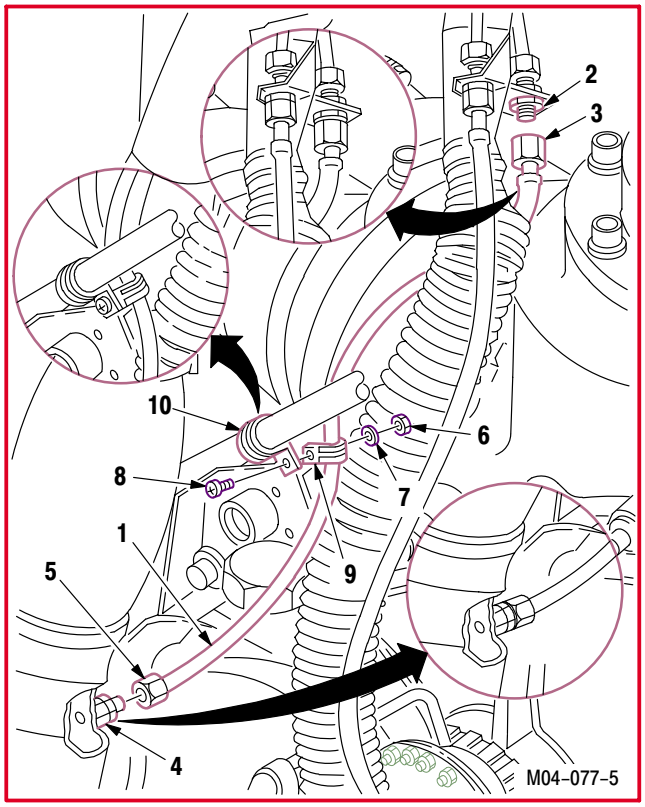
(6) Install washer (7) and nut (6) on screw (8).

b. **Inspect (QA).**

c. **Perform pressurized air system leak check** (para 7.2)**.**

d. **Unfold catwalk** (para 2.83)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.127. SDC PRESSURE OUTLET HOSE REMOVAL/INSTALLATION

7.127.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.127.2. Initial Setup

Tools:

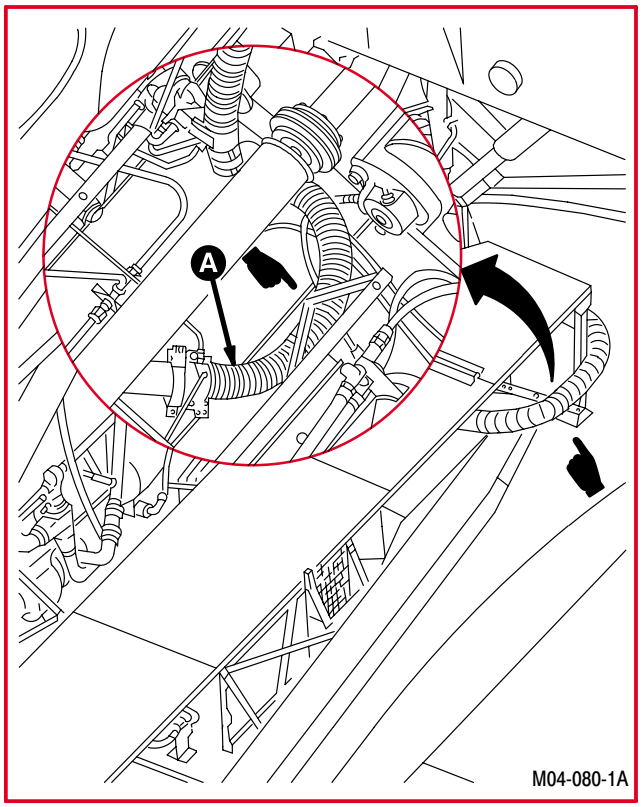
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk



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7.127. SDC PRESSURE OUTLET HOSE REMOVAL/INSTALLATION – continued

7.127.3. Removal

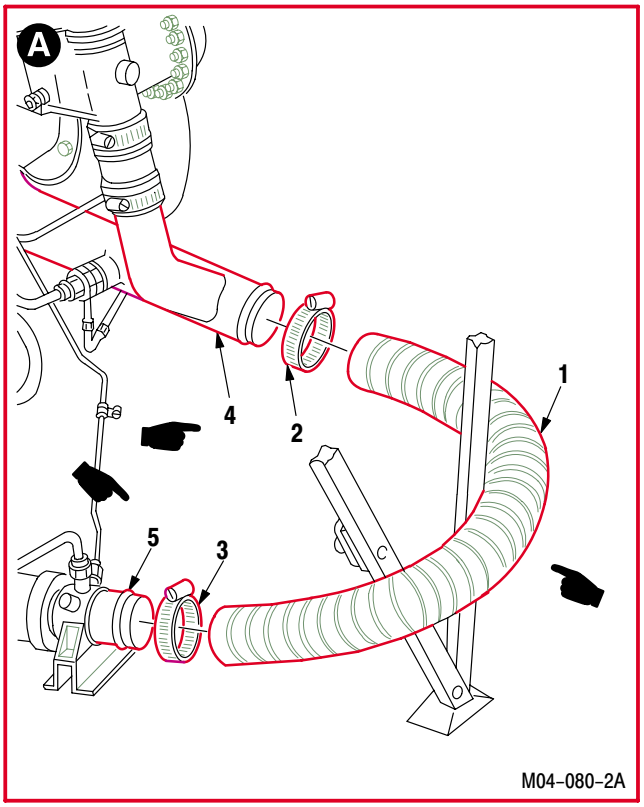
a. **Remove hose (1)**.

(1) Loosen clamps (2) and (3).

(2) Remove hose (1) from SDC (4) and check valve tube (5).

(3) Remove clamps (2) and (3) from hose (1).

(4) Remove and discard hose (1).



7.127.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag**.

7.127.5. Inspection

a. **Check SDC pressure outlet hose interior and exterior for delamination, chafing, cracks, and tears.** None allowed.

b. **Check SDC outlet and check valve tube for cracks, dents, and scratches** (para 7.114).

c. **Check removed and attaching parts for corrosion** (para 1.49).

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7.127. SDC PRESSURE OUTLET HOSE REMOVAL/INSTALLATION – continued

7.127.6. Installation

NOTE

Ensure to maintain a minimum of **0.50 INCH** clearance from any structure.

a. **Install new hose (1).**

(1) Install clamps (2) and (3) on hose (1).

(2) Install hose (1) on tube (5) and install clamp (3).

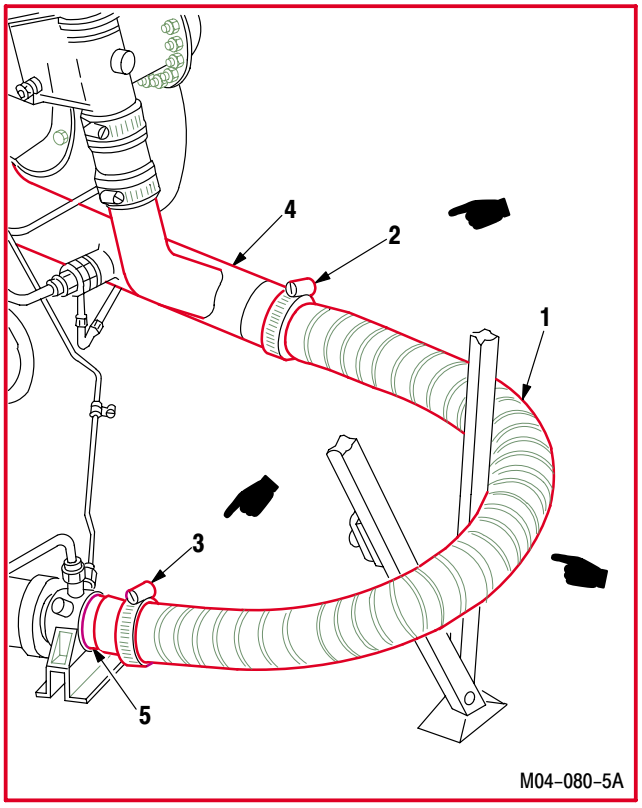
(3) Install hose (1) on SDC (4) and install clamp (2).

c. **Inspect (QA).**

d. **Perform pressurized air system leak check** (para 7.115)**.**

e. **Unfold catwalk** (para 2.83)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.128. SDC OUTLET PRESSURE SWITCH REMOVAL/INSTALLATION

7.128.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.128.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

67R Attack Helicopter Repairer
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

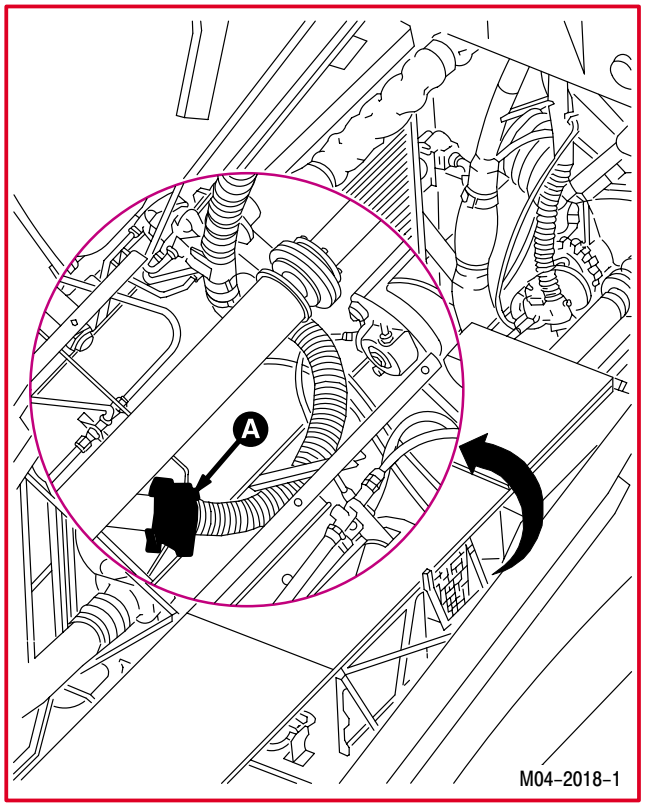
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk

Materials/Parts:

Packing
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)



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7.128. SDC OUTLET PRESSURE SWITCH REMOVAL/INSTALLATION – continued

7.128.3. Removal

a. **Remove two clamps (1) and (2).**

(1) Remove two screws (3), washers (4), and nuts (5).

b. **Remove switch (6) from valve tube (7).**

(1) Depin red wire (8) from splice SP1 (9).

(2) Depin white wire (10) from splice SP2 (11).

(3) Hold fitting (12). Remove switch (6).

(4) Remove and discard packing (13).

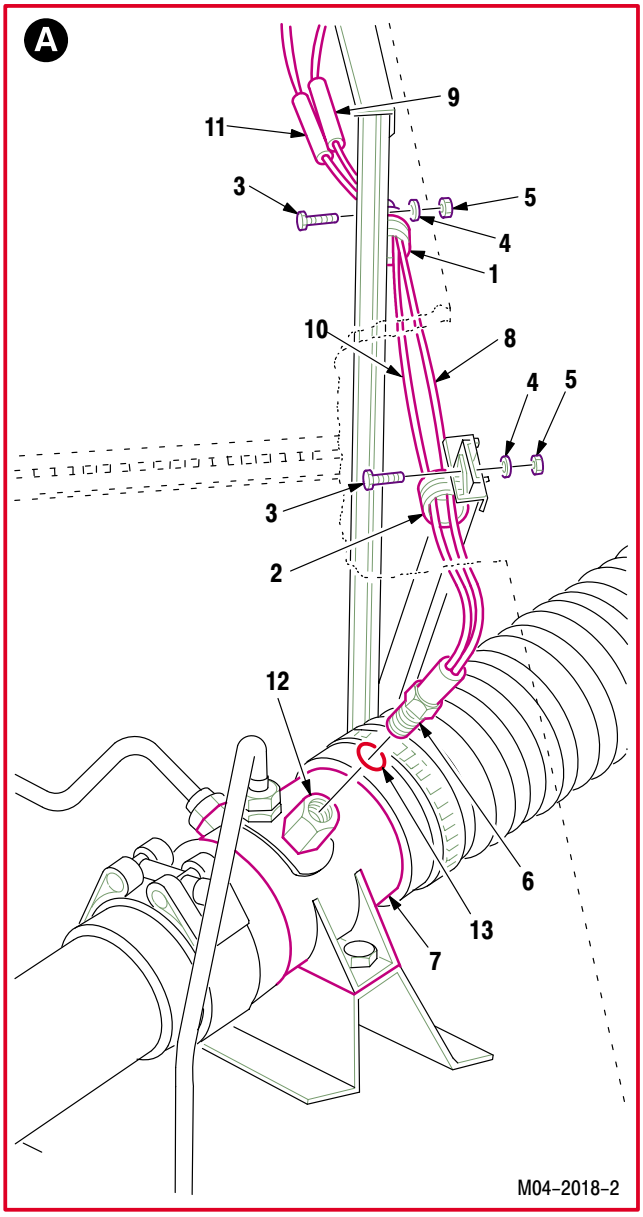
7.128.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.128.5. Inspection

a. **Check valve tube for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching for corrosion** (para 1.49)**.**



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7.128. SDC OUTLET PRESSURE SWITCH REMOVAL/INSTALLATION – continued

7.128.6. Installation



a. **Install switch (6) on tube valve (7).**

(1) Lubricate new packing (13). Use petrolatum (item 138, App F).

(2) Install packing (13) on switch (6).

(3) Lubricate switch (6) threads. Use damping fluid (item 69, App F).

(4) Install switch (6) on valve tube (7).

(5) Hold fitting (12). Install switch (6).

(6) Pin white wire (10) to splice SP2 (11).

(7) Pin red wire (8) to splice SP1 (9).

b. **Install clamps (1) and (2).**

(1) Install two screws (3) through clamps (1) and (2).

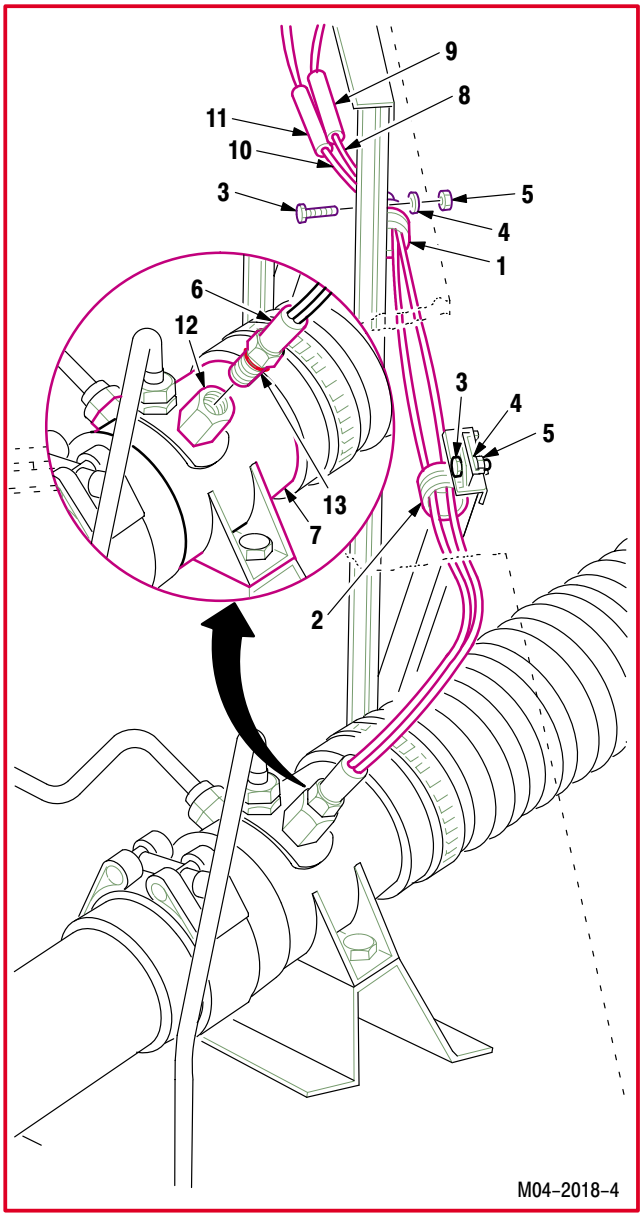
(2) Install two washers (4) and nuts (5).

c. **Inspect (QA).**

d. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

e. **Unfold catwalk** (para 2.83)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.129. SDC AIR INLET DUCT REMOVAL

7.129.1. Description

This task covers: Removal. Cleaning. Inspection.

7.129.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

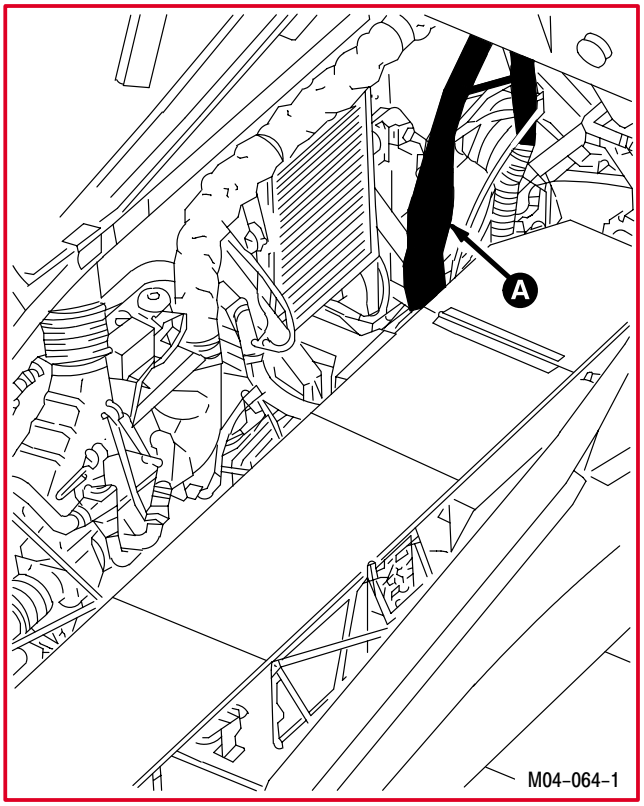
Cleaner (item 42, App F)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; fairing T225 removed
7.116	Air particle separator removed
7.119	Inlet throttle valve removed



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7.129. SDC AIR INLET DUCT REMOVAL – continued

7.129.3. Removal

a. **Remove housing (1) from inlet duct (2).**

(1) Loosen retainer clamp (3).

(2) Slide housing (1) until clear of duct (2).

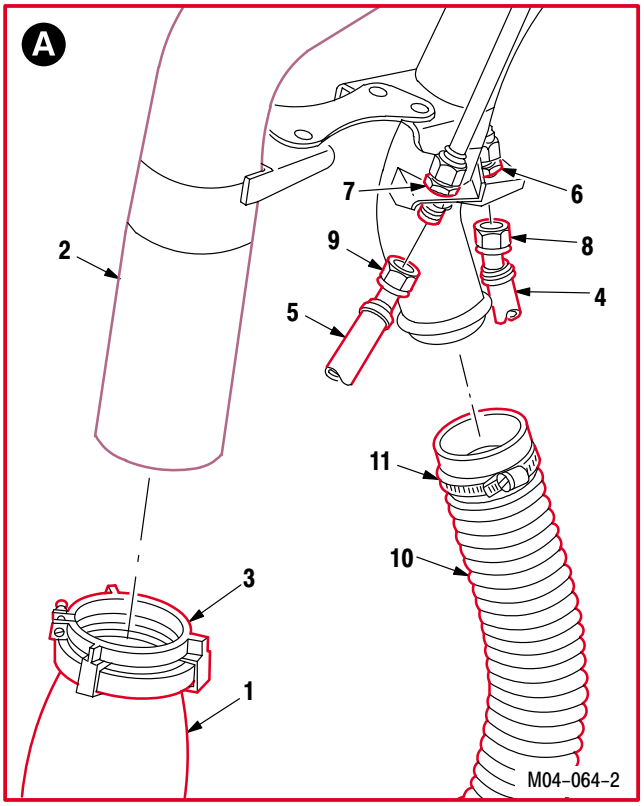
b. **Remove interconnect hose (4) and surge valve pressure hose (5) from unions (6) and (7).**

(1) Hold union (6). Remove nut (8).

(2) Hold union (7). Remove nut (9).

c. **Remove hose (10) from duct (2).**

(1) Loosen clamp (11). Remove hose (10).



d. **Remove vent tube (12) from duct (2) and union (6).**

(1) Remove nut (13), washer (14), screw (15) and clamp (16) from duct (2).

(2) Hold union (6). Remove nut (17).

e. **Remove pressure tube (18) from tee (19).**

(1) Hold tee (19). Remove nut (20).

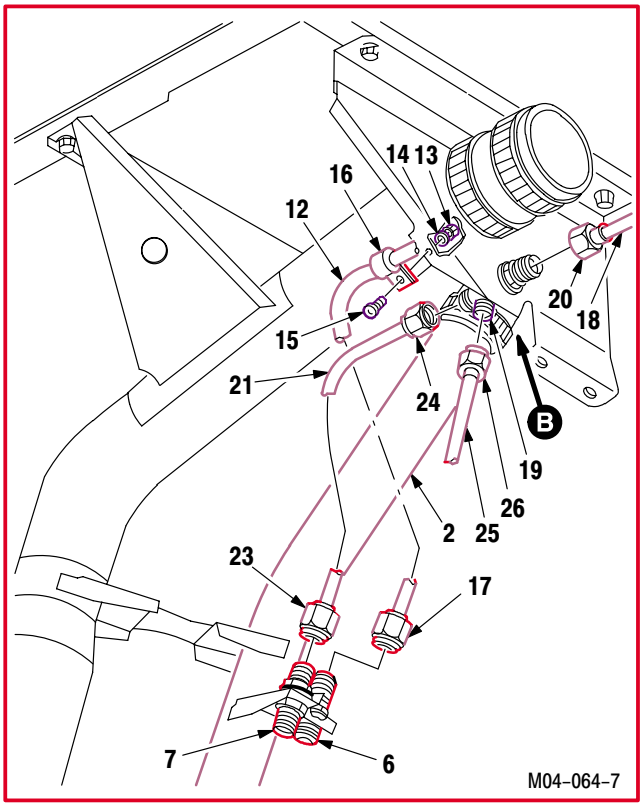
f. **Remove tube (21) from union (7) and tee (19).**

(1) Hold union (7). Remove nut (23).

(2) Hold tee (19). Remove nut (24).

g. **Remove manifold tube (25) from tee (19).**

(1) Hold tee (19). Remove nut (26).



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7.129. SDC AIR INLET DUCT REMOVAL – continued

h. **Remove duct (2) from upper fuselage fairing frame (27) and hose (28).**

(1) Loosen clamp (29).

(2) Remove sealing compound from four bolts (30).

(3) Remove four bolts (30) and washers (31).

(4) Remove duct (2).

i. **Remove hose (32) from duct (2).**

(1) Loosen clamp (33).

(2) Remove hose (32).

j. **Remove tee (19) from duct (2).**

(1) Hold tee (19).

(2) Remove nut (34) and washer (35).

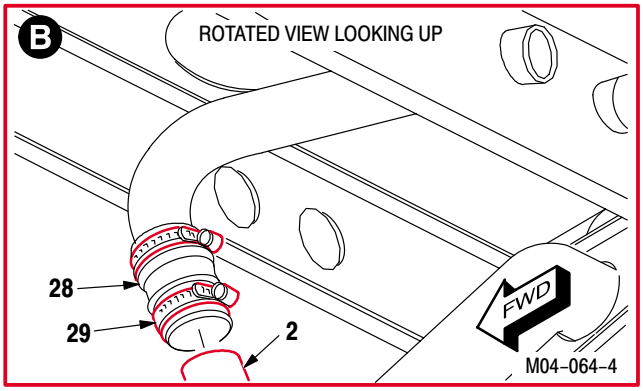
(3) Remove tee (19).

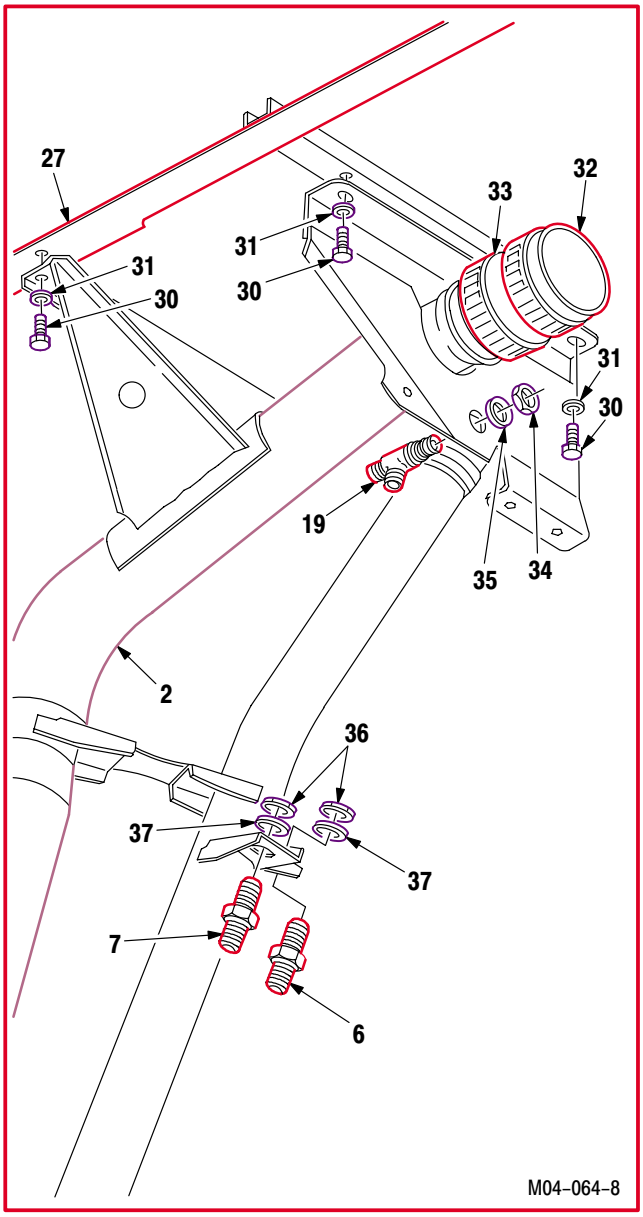
k. **Remove unions (6) and (7) from duct (2).**

(1) Hold unions (6) and (7).

(2) Remove two nuts (36) and washers (37).

(3) Remove unions (6) and (7).





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7.129. SDC AIR INLET DUCT REMOVAL – continued

7.129.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

b. **Clean sealing compound and external debris from SDC inlet duct** (para 1.47)**.**



c. **Clean inlet duct.**

(1) Mix cleaning solution of 90 percent hot tap water and 10 percent cleaner. Use cleaner (item 42, App F) and suitable container.

(2) Submerge duct in cleaning solution.

(3) Agitate and swirl duct as required to remove debris.

(4) Allow duct to remain in cleaning solution a minimum of 5 minutes.

(5) Rinse duct in clean, warm water.

(6) Remove excess water from duct.

7.129.5. Inspection

a. **Check clamps, fittings, hoses, and tubes for wear and damage** (para 7.114)**.**

b. **Inspect visible internal areas of SDC for debris.** None allowed.

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

END OF TASK

7.130. SDC AIR INLET DUCT INSTALLATION

7.130.1. Description

This task covers: Installation.

7.130.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

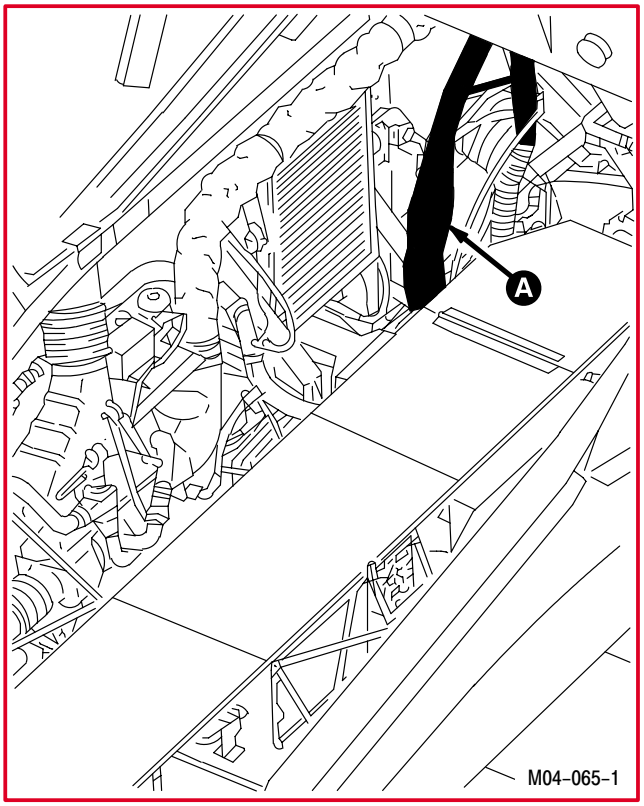
Damping fluid (item 69, App F)
Sealing compound (item 179, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed



GO TO NEXT PAGE

7.130. SDC AIR INLET DUCT INSTALLATION – continued

7.130.3. Installation

a. **Install unions (1) and (2) on inlet duct (3).**

(1) Hold unions (1) and (2).

(2) Install two washers (4) and nuts (5).

b. **Install tee (6) on duct (3).**

(1) Hold tee (6).

(2) Install washer (7) and nut (8).

c. **Install hose (9) on duct (3).**

(1) Install clamp (10).

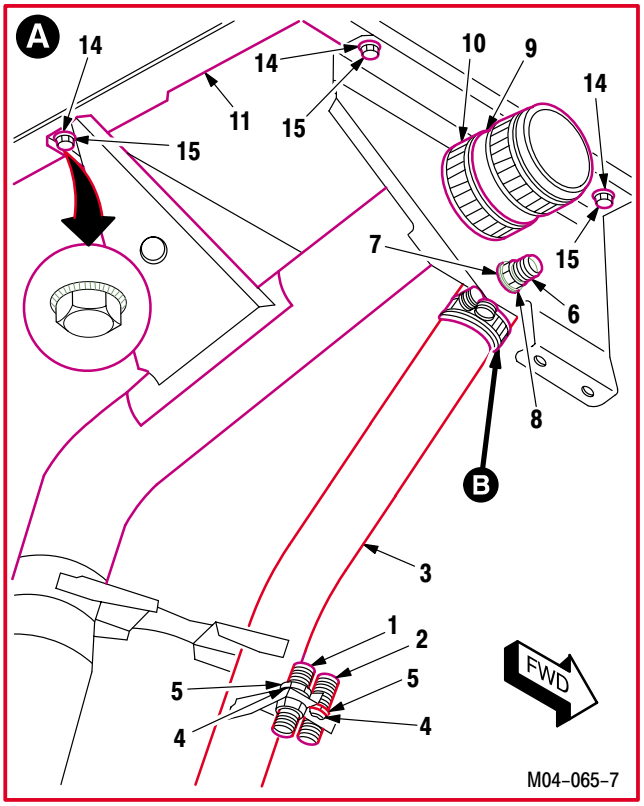
d. **Install duct (3) on upper fuselage fairing frame (11).**

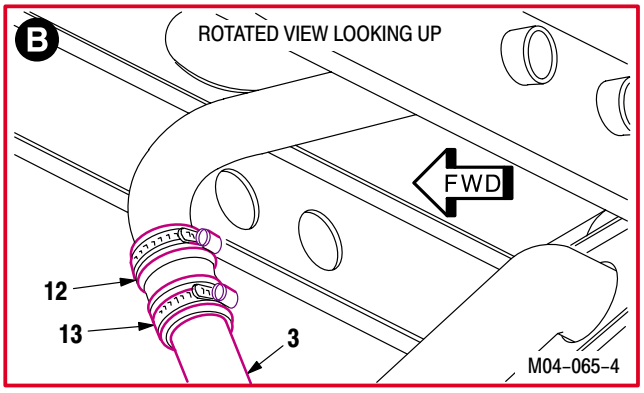
(1) Insert duct (3) in hose (12). Install clamp (13).

(2) Install four bolts (15) and washers (14).



e. **Seal four bolts (15).** Use sealing compound (item 179, App F).





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7.130. SDC AIR INLET DUCT INSTALLATION – continued

f. **Install manifold tube (16) on tee (6).**

(1) Lubricate threads on tee (6). Use damping fluid (item 69, App F).

(2) Hold tee (6). Install nut (17).

g. **Install tube (18) on union (1) and tee (6).**

(1) Lubricate threads on tee (6) and union (1). Use damping fluid (item 69, App F).

(2) Hold tee (6). Install nut (19).

(3) Hold union (1). Install nut (20).

h. **Install pressure tube (21) on tee (6).**

(1) Lubricate threads on tee (6). Use damping fluid (item 69, App F).

(2) Hold tee (6). Install nut (22).

i. **Install vent tube (23) on union (2).**

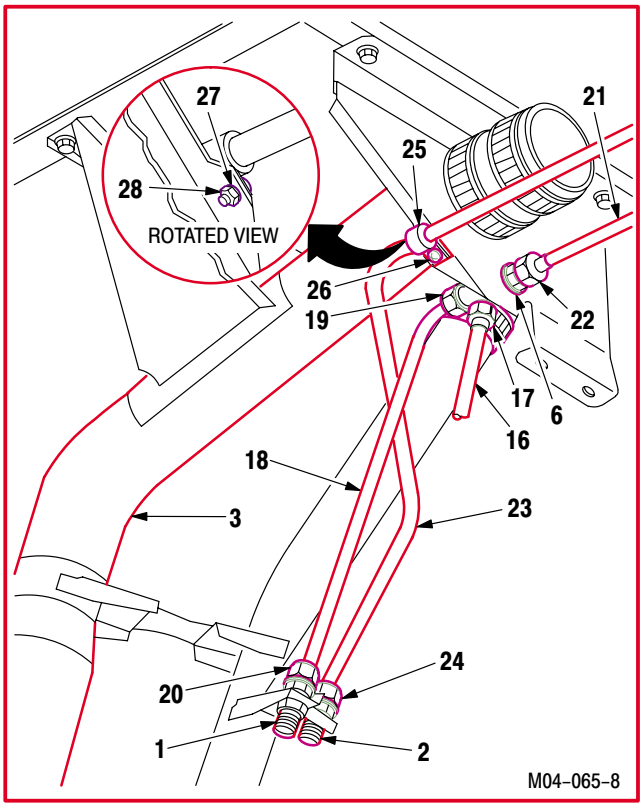
(1) Lubricate threads on union (2). Use damping fluid (item 69, App F).

(2) Hold union (2). Install nut (24).

j. **Install clamp (25) on duct (3).**

(1) Install screw (26) through clamp (25) and duct (3).

(2) Install washer (27) and nut (28) on screw (26).



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7.130. SDC AIR INLET DUCT INSTALLATION – continued

k. **Install hose (29) on duct (3).**

(1) Install clamp (30).

l. **Install surge valve pressure hose (31) and interconnect hose (32) on unions (1) and (2).**

(1) Lubricate threads on unions (1) and (2). Use damping fluid (item 69, App F).

(2) Hold unions (1) and (2). Install nuts (33) and (34).

CAUTION

Ensure surge valve pressure hose is not kinked or twisted after installation. Failure to do so could cause SDC malfunction.

m. **Install housing (35) on duct (3).**

(1) Slide housing (35) on duct (3).

(2) Tighten retainer clamp (36).

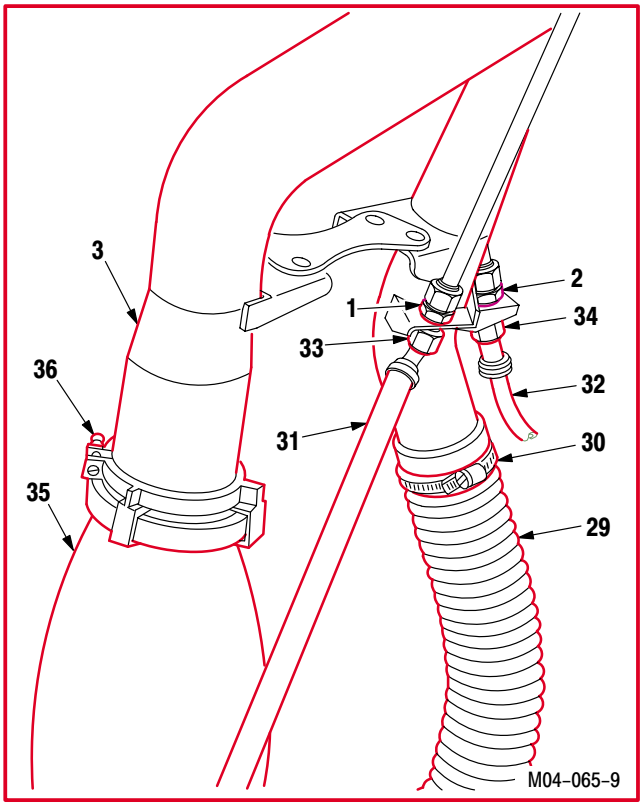
n. **Inspect (QA).**

o. **Install inlet throttle valve** (para 7.119)**.**

p. **Install air particle separator** (para 7.116)**.**

q. **Perform pressurized air system leak check** (para 7.115)**.**

r. **Secure access doors T250L, T250R, T290L, T290R, and L325; install fairing T225** (para 2.2)**.**



END OF TASK

7.130A. SURGE VALVE CLEANING

7.130A.1. Description

This task covers: Removal. Disassembly. Cleaning. Inspection. Assembly. Installation. Testing.

7.130A.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
3/16-inch flat tip screwdriver bit (item 31, App H)
3/16-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 322, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Packing (3)
Packing with retainer (2)
Alcohol (item 25, App F)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)
Wire (item 222, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

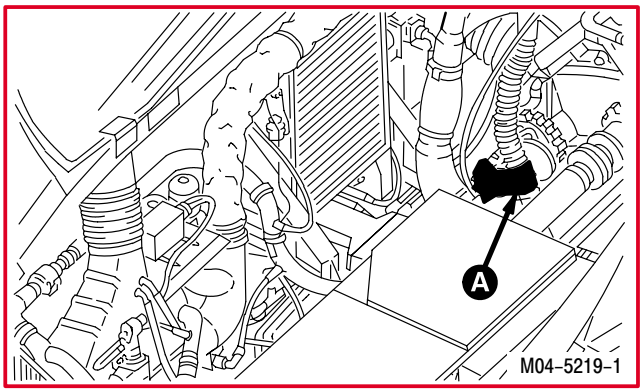
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk
7.133	Surge valve exhaust hose removed
7.132	Surge valve pressure hose removed

CAUTION

Removal of surge valve is for access purposes to clean valve only. SDC and surge valve are a mated pair. Reinstall same surge valve only. Failure to do so could result in damage to SDC.



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7.130A. SURGE VALVE CLEANING – continued

7.130A.3. Removal

a. **Remove total pressure tube (1).**

(1) Hold reducer (2). Remove nut (3).

(2) Remove tube (1).

b. **Remove static tube (4).**

(1) Hold elbow (5). Remove nut (6).

(2) Remove tube (4).

c. **Remove surge valve (7) from bracket (8).**

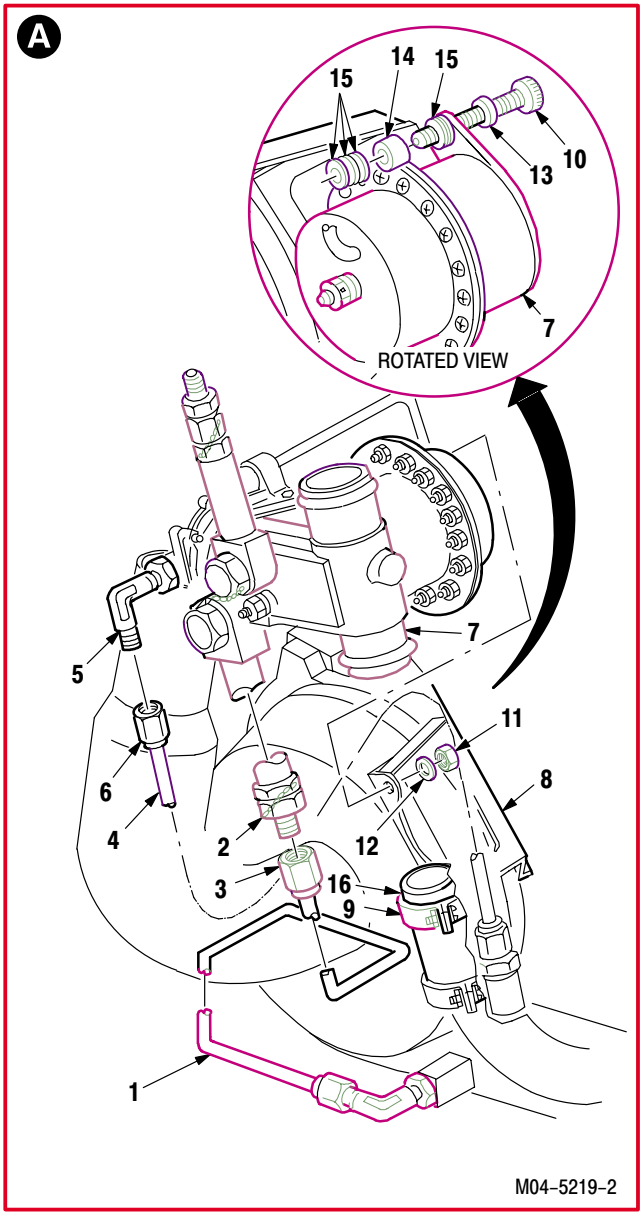
(1) Loosen clamp (9).

(2) Hold two screws (10). Use socket head screw key.

(3) Remove two nuts (11) and washers (12).

(4) Remove two screws (10), two washers (13), two bushings (14), and washers (15). Count washers (15) used as spacers.

(5) Slide valve (7) from bracket (8) and hose (16).



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7.130A. SURGE VALVE CLEANING – continued

7.130A.4. Disassembly

CAUTION

Adjustment of the surge valve is preset at time of manufacture. Do not disturb the surge valve setting.

a. **Remove surge valve cover (17) from surge valve (7).**

(1) Remove six screws (18) from cover (17). Do not tamper with adjusting screws (19).

(2) Remove spring (20), diaphragm (21), poppet valve (22), and spring (23).

CAUTION

Note the position of the diaphragm. During reassembly, the machined boss on the diaphragm must be facing up to engage the spring or failure of the surge valve will occur.

(3) Remove two screws (24) from poppet guide (25).

(4) Remove poppet guide (25).

(5) Remove seal (26) from poppet guide (25). Do not discard seal.

(6) Remove four screws (27) from quick dump valve cover (28).

(7) Remove quick dump valve (29).

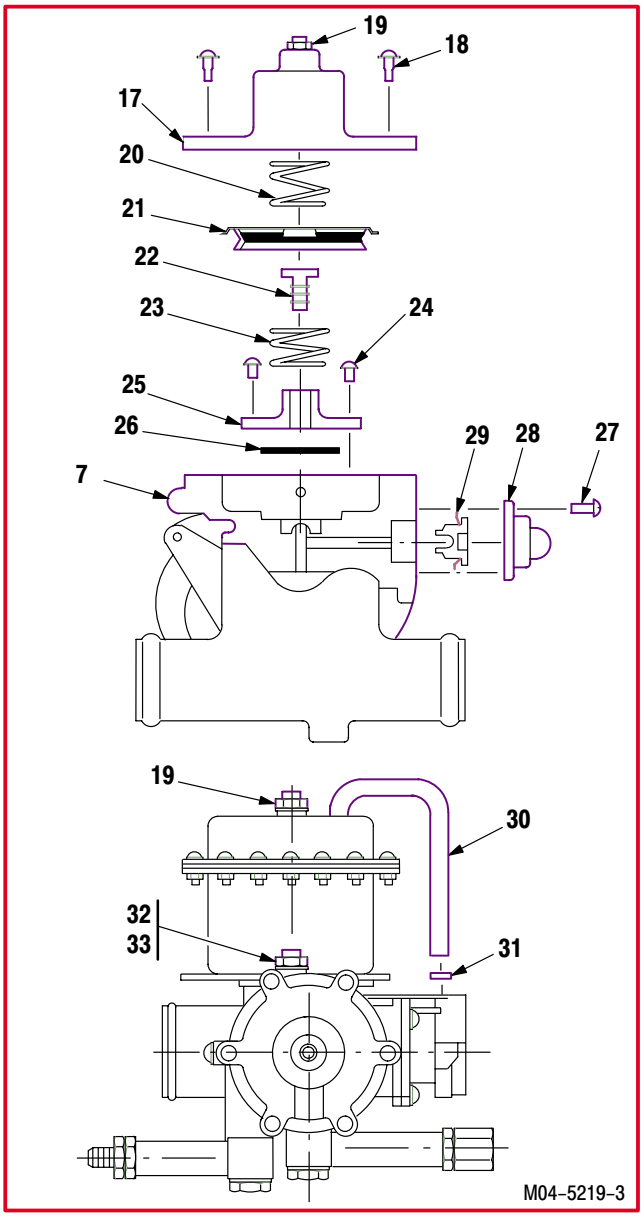
NOTE

Do not bend tube or weld at the tube-end may be broken.

(8) Separate cover (17) from tube (30).

(9) Remove and discard seal (31).

(10) Remove screw (32) and locknut (33).



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7.130A. SURGE VALVE CLEANING – continued

7.130A.5. Cleaning

a. **Clean surge valve components.**



CAUTION

Do not use alcohol on rubber parts. Premature deterioration of parts may occur. Clean all rubber parts with water only.

(1) Clean springs, covers, poppet, and guide assembly with alcohol and allow to air dry. Use alcohol (item 25, App F).

(2) Clean all passages and orifices.

NOTE

Later versions of the surge valve may have two springs under the diaphragm. Ensure to retain all removed parts for reassembly.

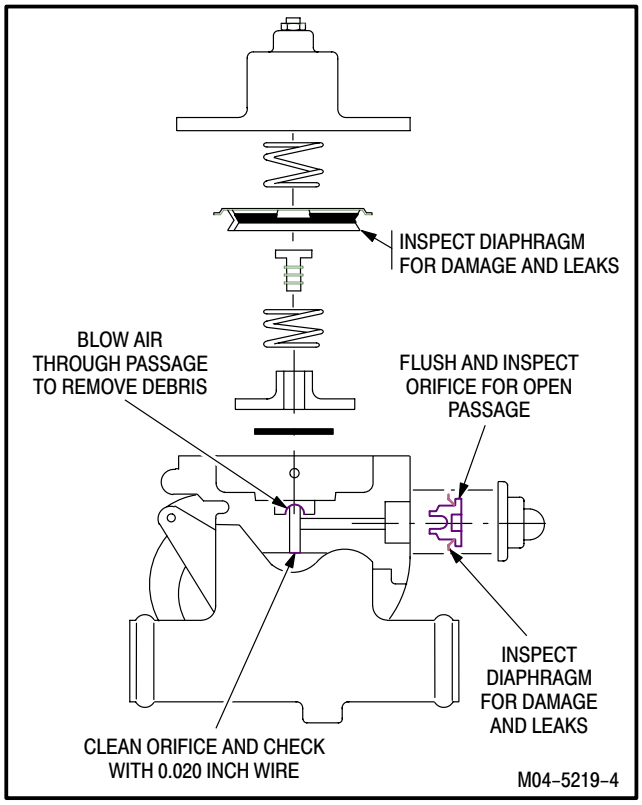
(3) Clean small orifice in valve body and check with an **0.020 INCH** safetywire. Blow air through passage to clean and remove any debris.

(4) Check for clean mating surface between poppet valve and seat. Seat must be smooth and clean for valve to operate effectively.

(5) Clean orifice in screw and check for clear passage.

(6) Flush and check orifice for open passage.

b. **Clean surge valve filters** (para 7.125)**.**



7.130A.6. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.130A. SURGE VALVE CLEANING – continued

c. **Check diaphragm for leaks.**

(1) Check mating surfaces of valve to be smooth and clean.

(2) Check poppet and guide surface. No debris allowed.

7.130A.7. Assembly

a. **Assemble surge valve (7).**

(1) Remove screw (32) and locknut (33).

(2) Install new seal (31) on tube (30).

(3) Install quick dump valve (29) and cover (28) with four screws (27).

(4) Torque screws (27) to **15 INCH-POUNDS**. Use torque wrench.

(5) Install seal (26) into poppet guide (25) and install poppet guide into valve body with screws (24).

(6) Torque screws (24) to **10 INCH-POUNDS**. Use torque wrench.

(7) Install poppet valve (22) into guide (25).

NOTE

Care must be taken when handling diaphragm. A damaged diaphragm will cause SDC malfunction.

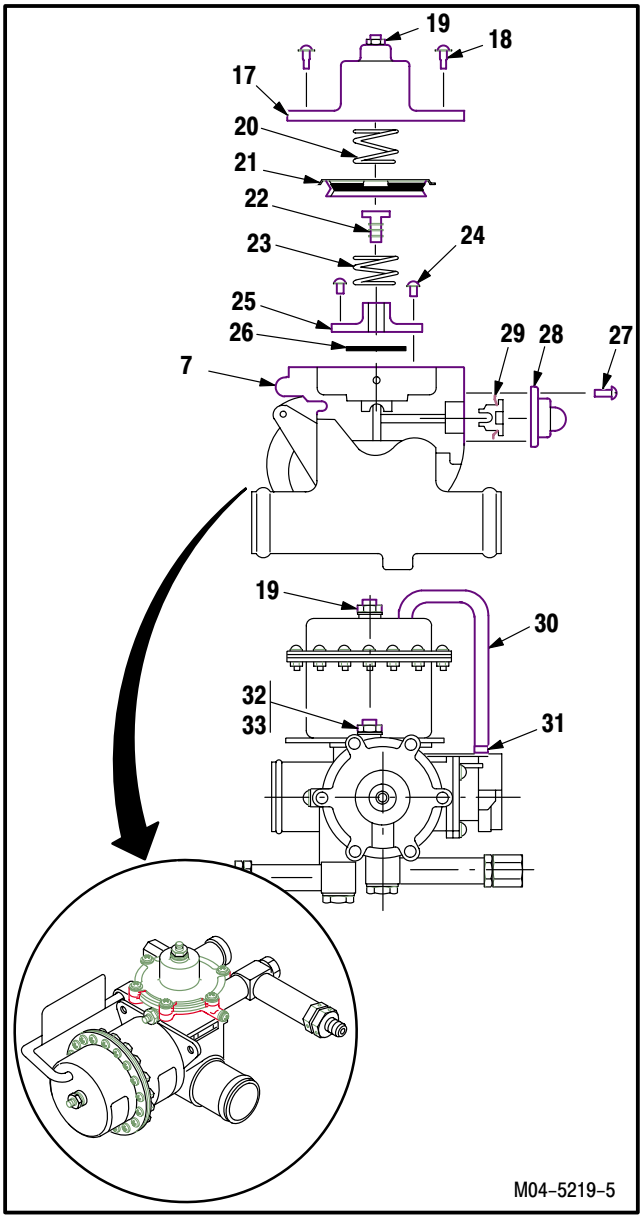
NOTE

- Diaphragm must be installed with the machined boss facing up to engage springs.
- Later versions of the surge valve may have two springs under the diaphragm. Ensure to reinstall all removed parts during reassembly.

(8) Install diaphragm (21), poppet valve (22), springs (20) and (23), cover (17), on valve body.

(9) Install six screws (18) on cover (17).

(10) Torque screws (18) to **15 INCH-POUNDS** in crisscross pattern. Use torque wrench.



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7.130A. SURGE VALVE CLEANING – continued

b. **Assemble and install surge valve filters** (para 7.125)**.**

7.130A.8. Installation

a. **Install valve (7) on bracket (8).**

(1) Slide valve (7) into hose (16).

(2) Aline valve (7) with bracket (8).

(3) Install two screws (10) through washers (13), valve (7), washers (15) (use same number as counted), bushings (14), and bracket (8).

(4) Install two washers (12) and nuts (11).

NOTE

Tighten nuts four to five turns after bushings begin to deform.

(5) Hold screws (10). Tighten nuts (11). Use socket head screw key.

b. **Torque clamp (9) to 17 INCH-POUNDS.** Use torque wrench, screwdriver bit, and hexagon screwdriver.

c. **Install static tube (4).** Torque nut (6) to **60 INCH-POUNDS**.

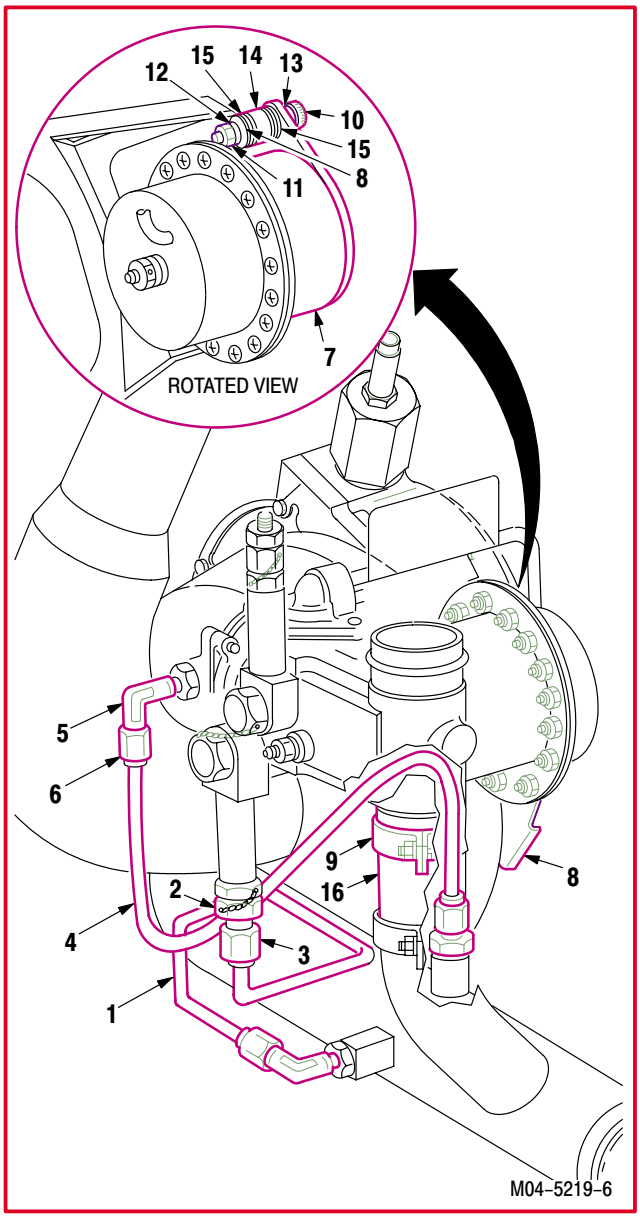
(1) Lubricate threads of elbow (5). Use damping fluid (item 69, App F).

(2) Hold elbow (5). Install nut (6). Torque nut (6) to **60 INCH-POUNDS**. Use torque wrench.

d. **Install pressure tube (1).** Torque nut (3) to **60 INCH-POUNDS**.

(1) Lubricate threads of reducer (2). Use damping fluid (item 69, App F).

(2) Hold reducer (2). Install nut (3). Torque nut (3) to **60 INCH-POUNDS**. Use torque wrench.



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7.130A. SURGE VALVE CLEANING – continued

e. **Install surge valve exhaust hose** (para 7.133)**.**

f. **Install surge valve pressure hose** (para 7.132)**.**

g. **Inspect (QA).**

h. **Unfold catwalk** (para 2.83)**.**

7.130A.9. Testing

a. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

b. **Perform pressurized air system leak check** (para 7.115)**.**

c. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.131. SURGE VALVE EXHAUST INTERCONNECT TUBE REMOVAL/INSTALLATION

7.131.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.131.2. Initial Setup

Tools:

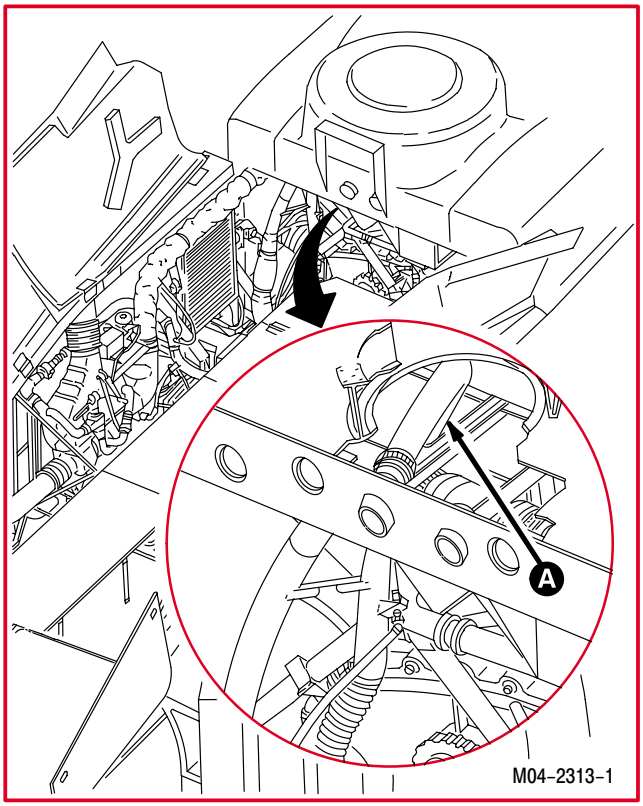
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; fairing T225 removed



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7.131. SURGE VALVE EXHAUST INTERCONNECT TUBE REMOVAL/INSTALLATION – continued

7.131.3. Removal

a. **Remove tube (1) from exhaust duct (2) and upper fuselage fairing frame (3).**

(1) Loosen two clamps (4). Slide sleeve (5) on duct (2).

(2) Loosen clamp (6). Remove tube (1).

7.131.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.131.5. Inspection

a. **Check duct, clamps, sleeves, and upper fuselage fairing frame for cracks, dents, and tears** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.131.6. Installation

a. **Install tube (1) between duct (2) and frame (3).**

(1) Insert tube (1) into sleeve (7).

(2) Aline tube (1) with duct (2).

(3) Center sleeve (5) with clamps (4) on tube (1).

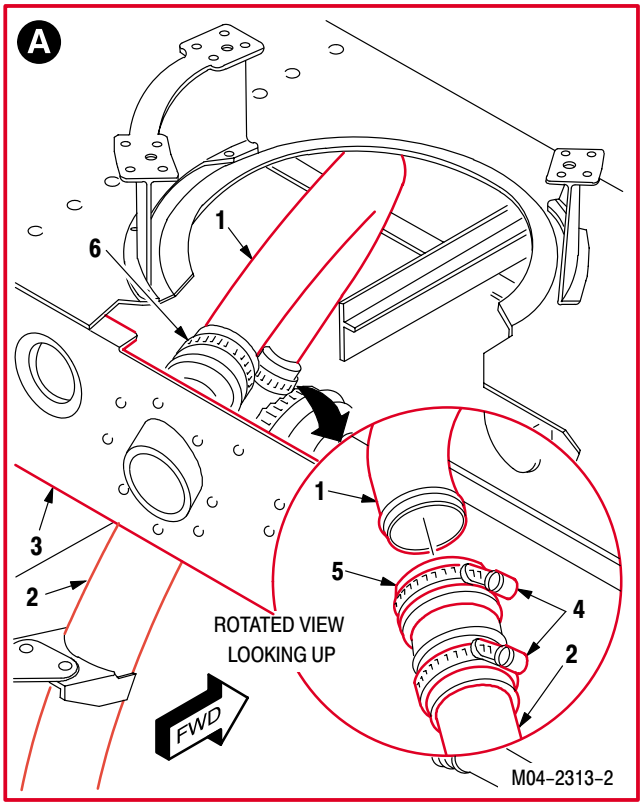
(4) Tighten two clamps (4) and one clamp (6).

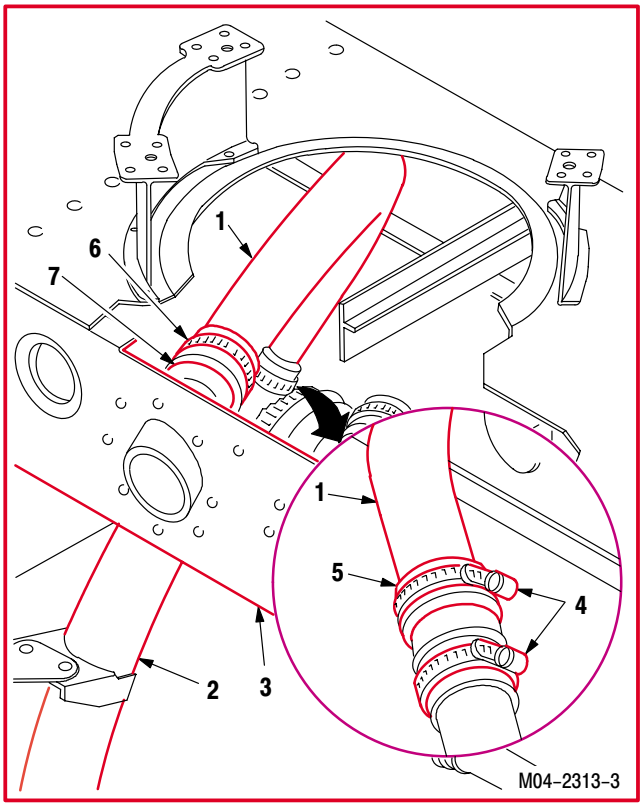
b. **Inspect (QA).**

c. **Perform pressurized air system leak check** (para 7.115)**.**

d. **Secure access doors T250L, T250R, T290L, T290R, and L325; install fairing T225** (para 2.2)**.**

END OF TASK





7.132. SURGE VALVE PRESSURE HOSE REPLACEMENT

7.132.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.132.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

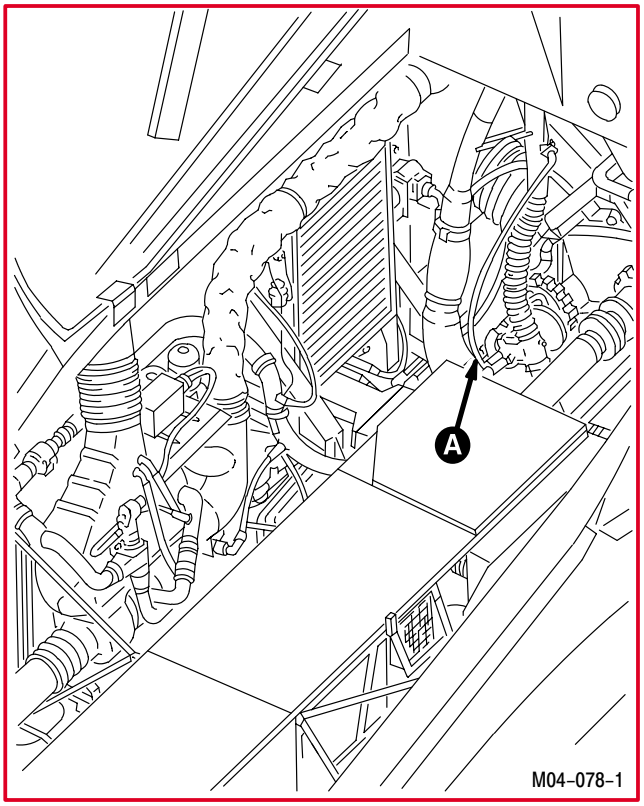
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk

Materials/Parts:

Damping fluid (item 69, App F)



GO TO NEXT PAGE

7.132. SURGE VALVE PRESSURE HOSE REPLACEMENT – continued

7.132.3. Removal

a. **Remove surge valve pressure hose (1).**

(1) Hold union (2). Remove nut (3).

(2) Hold union (4). Remove nut (5).

(3) Remove nut (6), washer (7), and screw (8).

(4) Remove clamp (9) from hose (1).

(5) Discard hose (1).

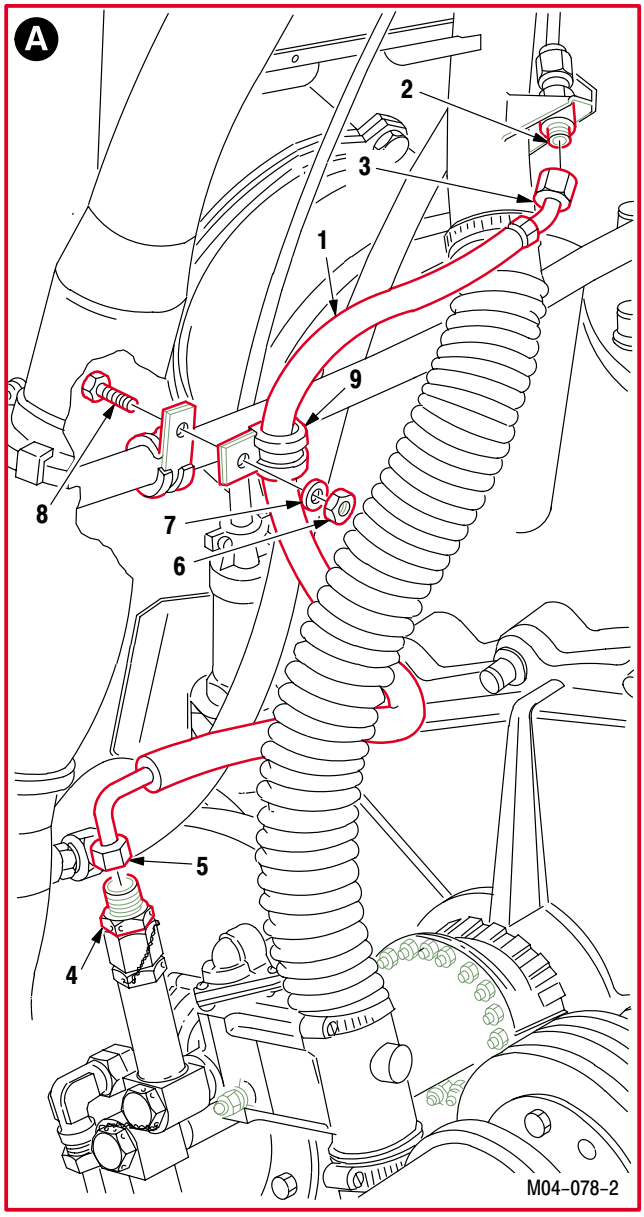
7.132.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.132.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.132. SURGE VALVE PRESSURE HOSE REPLACEMENT – continued

7.132.6. Installation

CAUTION

Ensure surge valve pressure hose is not kinked or twisted after installation. Failure to do so could cause SDC malfunction.

a. **Install new hose (1).**

(1) Lubricate threads of unions (2) and (4). Use damping fluid (item 69, App F).

(2) Hold union (2). Install nut (3).

(3) Hold union (4). Install nut (5).

(4) Install clamp (9) on hose (1).

(5) Install screw (8) through clamps (10) and (9).

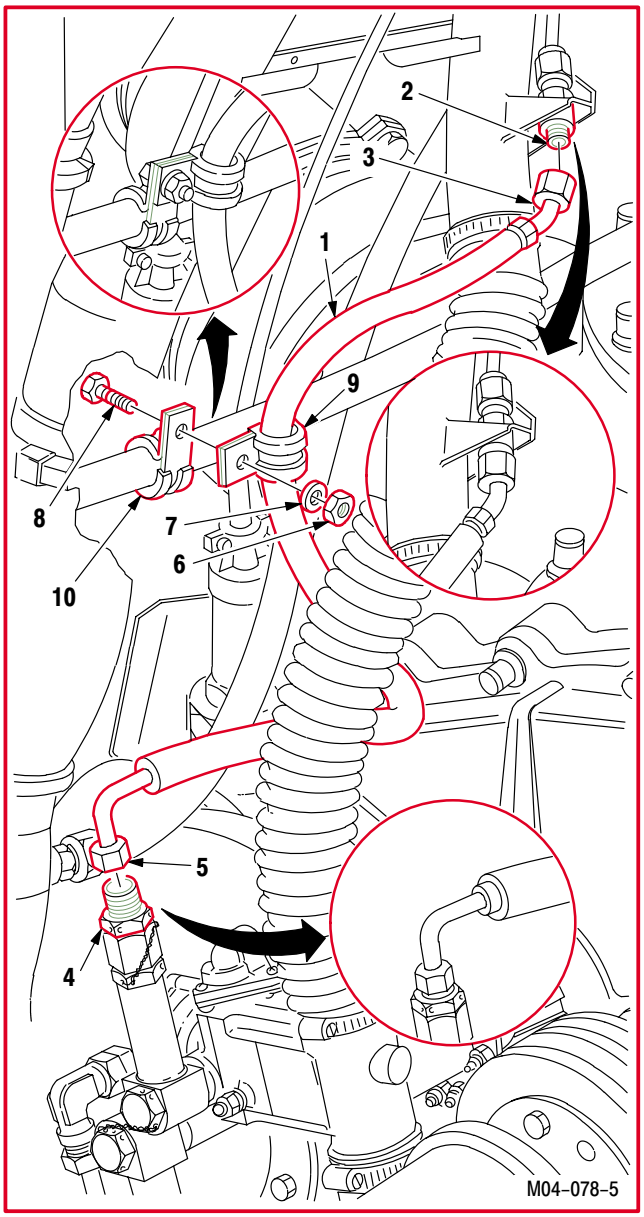
(6) Install washer (7) and nut (6) on screw (8).

b. **Inspect (QA).**

c. **Perform pressurized air system leak check** (para 7.115)**.**

d. **Unfold catwalk** (para 2.83)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.133. SURGE VALVE EXHAUST HOSE REPLACEMENT

7.133.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.133.2. Initial Setup

Tools:

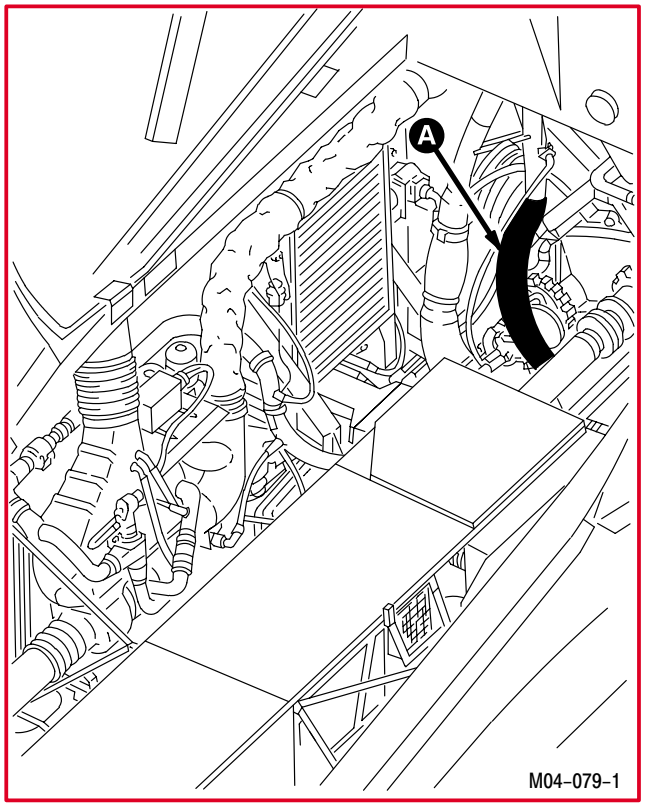
Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk



GO TO NEXT PAGE

7.133. SURGE VALVE EXHAUST HOSE REPLACEMENT – continued

7.133.3. Removal

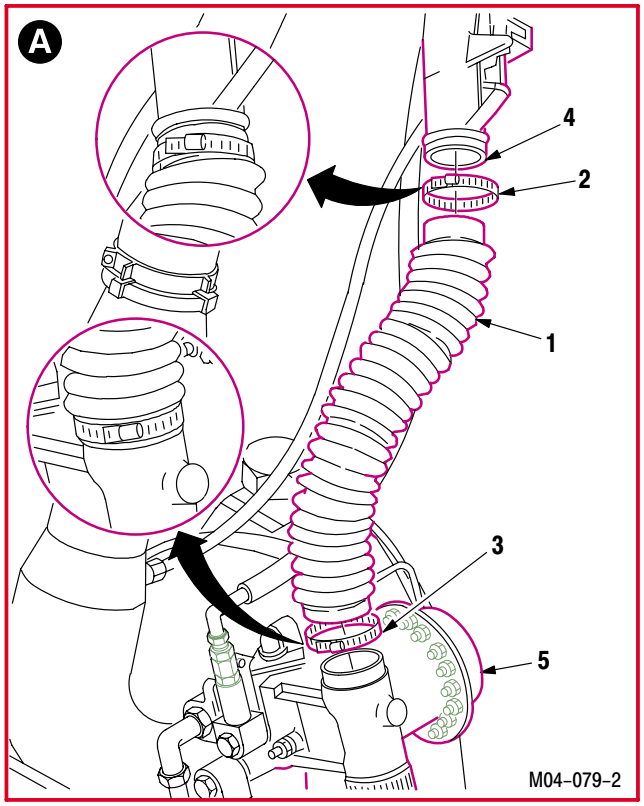
a. **Remove surge valve exhaust hose (1).**

(1) Loosen two clamps (2) and (3).

(2) Remove hose (1) from exhaust duct (4) and surge valve (5).

(3) Remove clamps (2) and (3) from hose (1).

(4) Remove and discard hose (1).



7.133.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.133.5. Inspection

a. **Check surge valve and clamps for burrs, cracks, dents, and nicks** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.133.6. Installation

a. **Install new hose (1).**

(1) Install two clamps (2) and (3) loosely on hose (1).

(2) Install hose (1) on duct (4) and valve (5).

(3) Install clamps (2) and (3).

b. **Inspect (QA).**

c. **Perform pressurized air system leak check** (para 7.115)**.**

d. **Unfold catwalk** (para 2.83)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.134. SURGE VALVE BRACKET REMOVAL/INSTALLATION

7.134.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.134.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/16-inch flat tip screwdriver bit (item 31, App H)
Chemical protective gloves (item 154, App H)
9/64-inch L-handle socket head screw key (item 188, App H)
Adjustable air filtering respirator (item 262, App H)
3/16-inch hexagon x 1/4-inch drive screwdriver socket wrench attachment (item 322, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

Materials/Parts:

Damping fluid (item 69, App F)
Sealing compound (item 156A, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

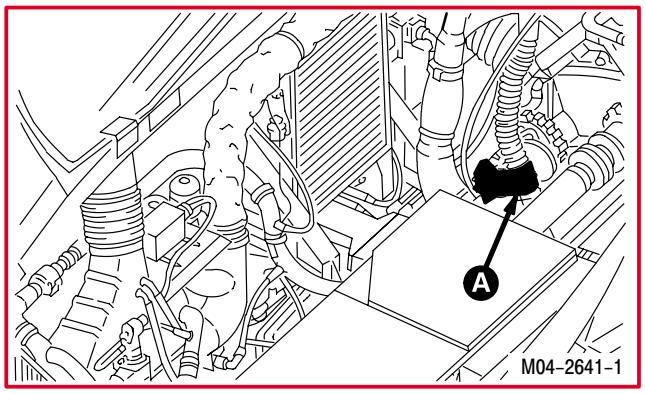
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.83	Fold catwalk

CAUTION

Removal of surge valve is for access purposes only. SDC and surge valve are a mated pair. Reinstall same surge valve only. Failure to do so could result in damage to SDC.



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7.134. SURGE VALVE BRACKET REMOVAL/INSTALLATION – continued

7.134.3. Removal

a. **Remove hose (1) from surge valve (2).**

(1) Loosen clamp (3). Remove hose (1).

b. **Remove hose (4) from union (5).**

(1) Hold union (5). Remove nut (6).

c. **Remove pressure tube (7).**

(1) Hold elbow (8). Remove nut (9).

(2) Hold reducer (10). Remove nut (11).

(3) Remove tube (7).

d. **Remove static tube (12).**

(1) Hold union (13). Remove nut (14).

(2) Hold elbow (15). Remove nut (16).

(3) Remove tube (12).

e. **Remove valve (2) from bracket (17).**

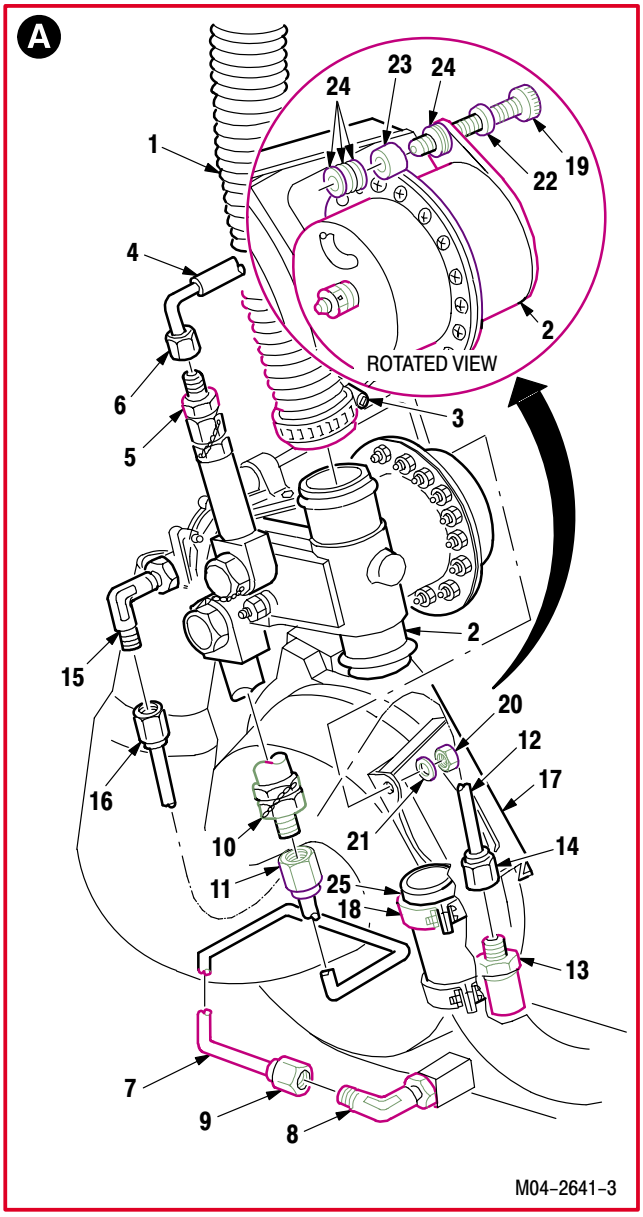
(1) Loosen clamp (18).

(2) Hold two screws (19). Use socket head screw key.

(3) Remove two nuts (20) and washers (21).

(4) Remove two screws (19), two washers (22), two bushings (23), and washers (24). Count washers (24) used as spacers.

(5) Slide valve (2) from bracket (17) and hose (25).



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7.134. SURGE VALVE BRACKET REMOVAL/INSTALLATION – continued

f. **Remove hose (25) from SDC (26).**

(1) Remove clamps (18) and (27).

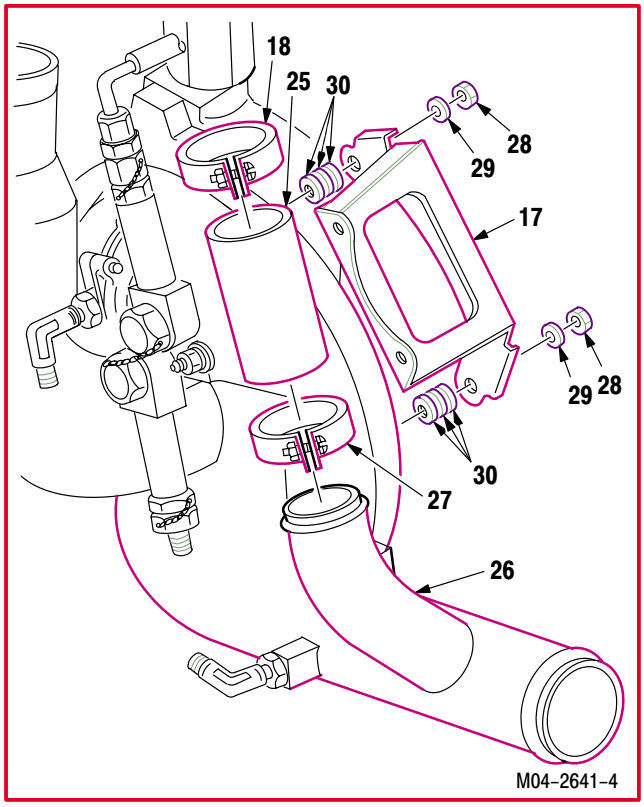
(2) Remove and discard hose (25).

g. **Remove bracket (17) from SDC (26).**

(1) Break adhesive and remove two nuts (28) and washers (29).

(2) Remove bracket (17).

(3) Remove washers (30). Count washers (30) used as spacers.



7.134.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

7.134.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.134. SURGE VALVE BRACKET REMOVAL/INSTALLATION – continued

7.134.6. Installation



a. **Install bracket (17) on SDC (26).**

(1) Apply sealing compound around mounting holes on both sides of bracket (17). Use sealing compound (item 156A, App F).

(2) Install washers (30) (use same number as counted).

(3) Install bracket (17).

(4) Install two washers (29) and nuts (28).

NOTE

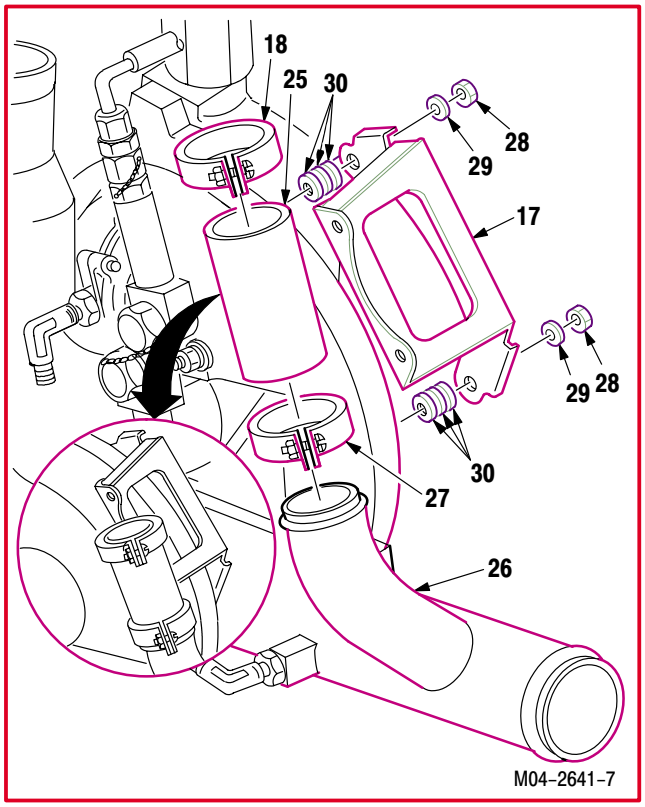
Top clamp will not be tightened and torqued at this time. It will be accomplished at a later step.

b. **Install new hose (25) on SDC (26).** Torque clamp (27) to **17 INCH-POUNDS**.

(1) Install two clamps (18) and (27) on hose (25).

(2) Slide hose (25) over inlet of SDC (26).

(3) Torque clamp (27) to **17 INCH-POUNDS**. Use torque wrench, screwdriver bit, and hexagon screwdriver.



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7.134. SURGE VALVE BRACKET REMOVAL/INSTALLATION – continued

c. **Install valve (2) on bracket (17).**

(1) Slide valve (2) into hose (25).

(2) Aline valve (2) with bracket (17).

(3) Install two screws (19) through washers (22), valve (2), washers (24) (use same number as counted), bushings (23), and bracket (17).

(4) Install two washers (21) and nuts (20).

NOTE

Tighten nuts four to five turns after bushings begin to deform.

(5) Hold screws (19). Tighten nuts (20). Use socket head screw key.

d. **Torque clamp (18) to 17 INCH-POUNDS.** Use torque wrench, screwdriver bit, and hexagon screwdriver.



e. **Install static tube (12).** Torque nuts (14) and (16) to **60 INCH-POUNDS**.

(1) Lubricate threads of union (13) and elbow (15). Use damping fluid (item 69, App F).

(2) Hold union (13). Install nut (14). Torque nut (14) to **60 INCH-POUNDS**. Use torque wrench.

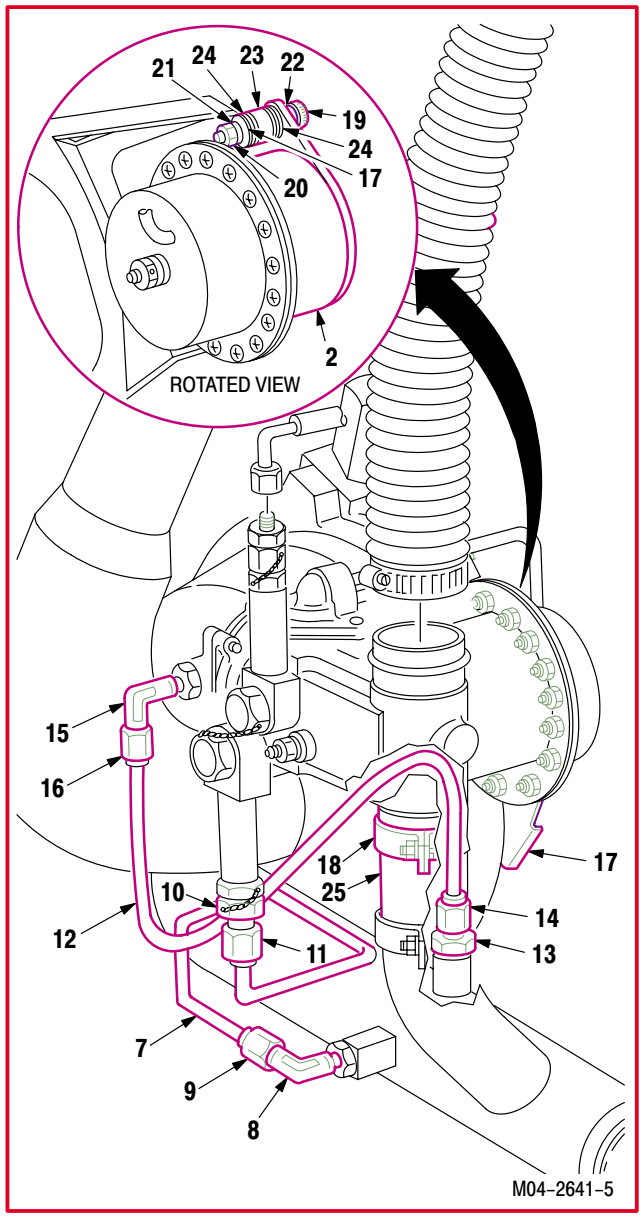
(3) Hold elbow (15). Install nut (16). Torque nut (16) to **60 INCH-POUNDS**. Use torque wrench.

f. **Install pressure tube (7).** Torque nuts (9) and (11) to **60 INCH-POUNDS**.

(1) Lubricate threads of elbow (8) and tube reducer (10). Use damping fluid (item 69, App F).

(2) Hold elbow (8). Install nut (9). Torque nut (9) to **60 INCH-POUNDS**. Use torque wrench.

(3) Hold reducer (10). Install nut (11). Torque nut (11) to **60 INCH-POUNDS**. Use torque wrench.



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7.134. SURGE VALVE BRACKET REMOVAL/INSTALLATION – continued

g. **Install hose (4) on union (5).**

(1) Hold union (5). Install nut (6).

h. **Install hose (1) on valve (2).**

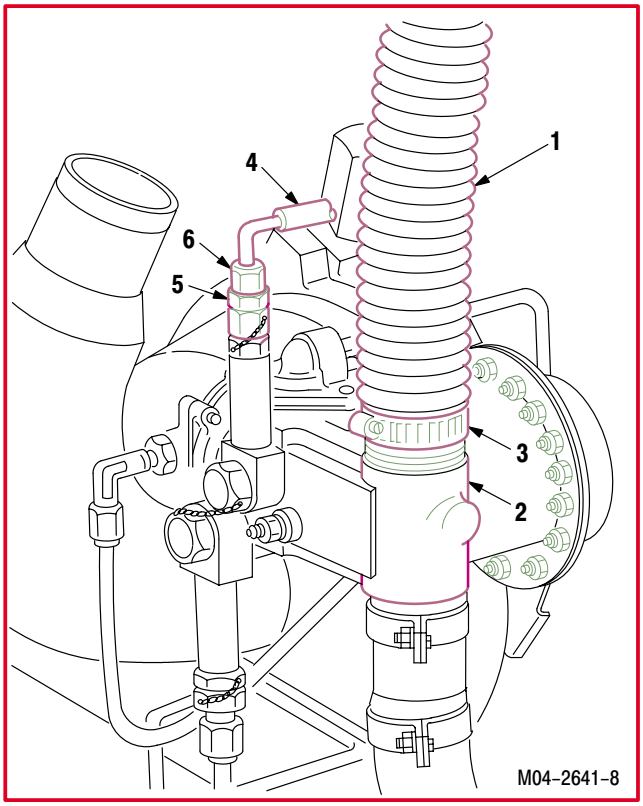
(1) Slide hose (1) on valve (2). Install clamp (3).

i. **Inspect (QA).**

j. **Unfold catwalk** (para 2.83)**.**

k. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

l. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.135. SDC CHECK VALVE TUBE REMOVAL/INSTALLATION

7.135.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.135.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
3/8 x 3/8-inch drive deep socket wrench socket (item 300, App H)

Materials/Parts:

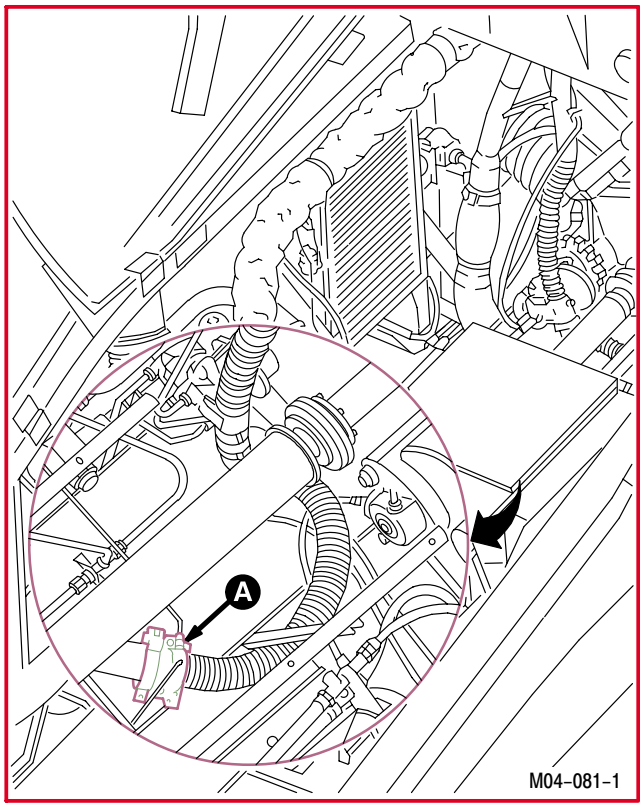
Packing
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.128	SDC outlet pressure switch removed



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7.135. SDC CHECK VALVE TUBE REMOVAL/INSTALLATION – continued

7.135.3. Removal

a. **Remove tube (1) from fitting (2).**

(1) Hold fitting (2). Remove nut (3).

b. **Remove tube (4) from fitting (5).**

(1) Hold fitting (5). Remove nut (6).

(2) Hold tee (7). Loosen nut (8). Rotate tube (4) away from fitting (5).

c. **Remove hose (9) from check valve tube (10).**

(1) Remove clamp (11).

d. **Remove tube (10) from support bracket (12).**

(1) Remove nut (13) and coupling (14). Use socket.

(2) Remove two bolts (15) and two washers (16).

e. **Remove check valve (17) from tee (18).**

(1) Remove and discard packing (19).

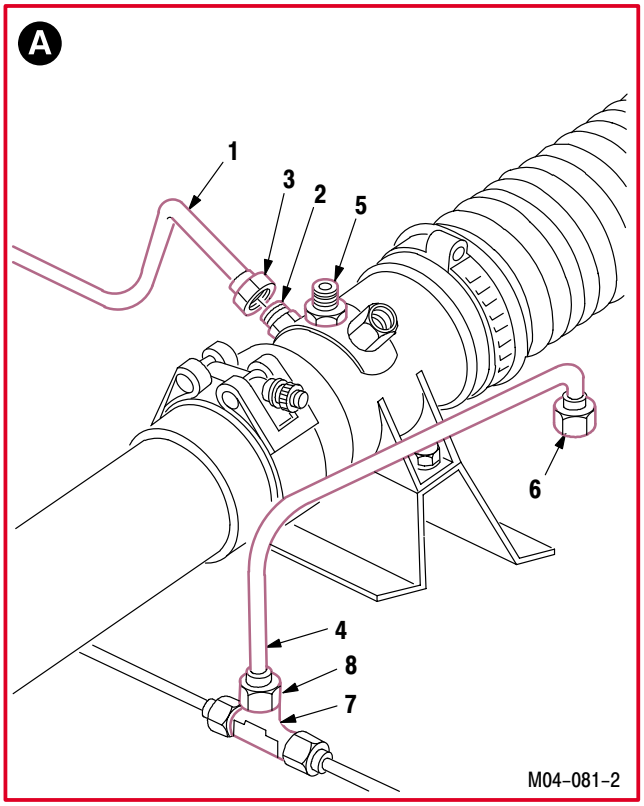
7.135.4. Cleaning

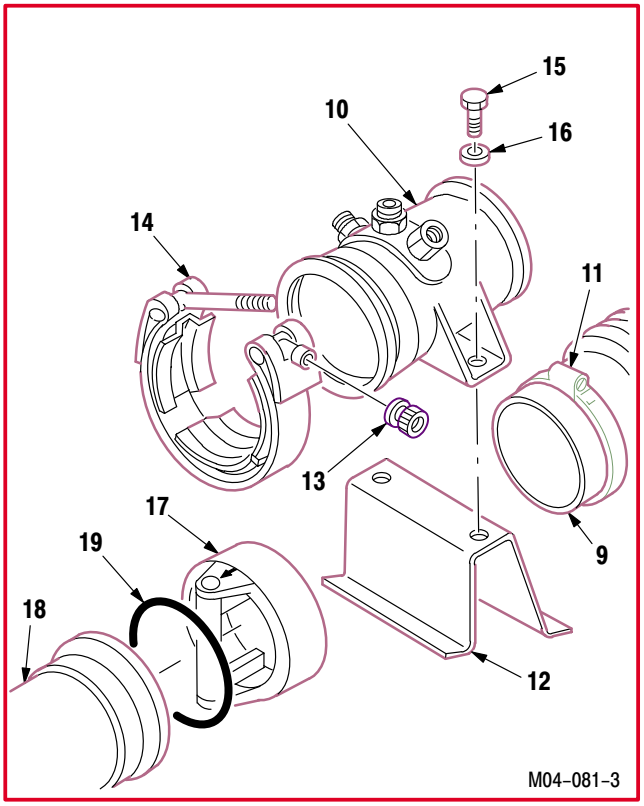
a. **Wipe removed and attaching parts with a clean rag.**

7.135.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**





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7.135. SDC CHECK VALVE TUBE REMOVAL/INSTALLATION – continued

7.135.6. Installation



CAUTION

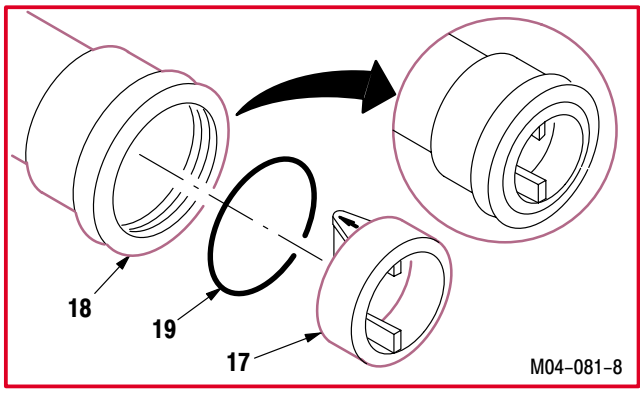
To prevent damage to SDC, check valve must be installed with hinge vertical and arrow pointing toward tee.

a. **Install check valve (17) in tee (18).**

(1) Lubricate new packing (19). Use petrolatum (item 138, App F).

(2) Install packing (19) in tee (18).

(3) Insert check valve (17) vertically with arrow pointing toward tee (18).



b. **Install tube (10) on bracket (12).**

(1) Aline tube (10) on bracket (12).

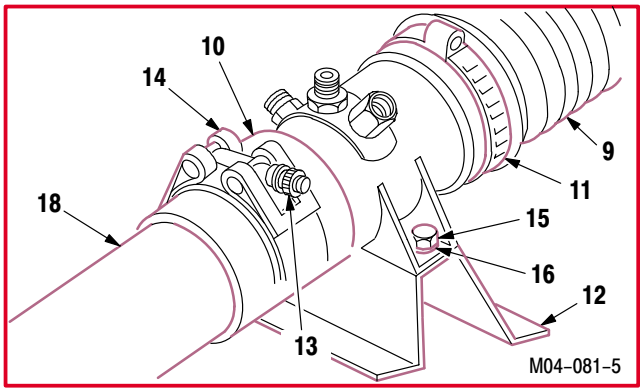
(2) Install two bolts (15) and washers (16).

(3) Place coupling (14) around tee (18) and tube (10).

(4) Install nut (13). Use socket.

c. **Install hose (9) on tube (10).**

(1) Install clamp (11).



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7.135. SDC CHECK VALVE TUBE REMOVAL/INSTALLATION – continued

d. **Install tubes (1) and (4) on fittings (2) and (5).**

(1) Lubricate threads of fittings (2) and (5). Use damping fluid (item 69, App F).

(2) Hold fitting (2). Install nut (3).

(3) Hold fitting (5). Install nut (6).

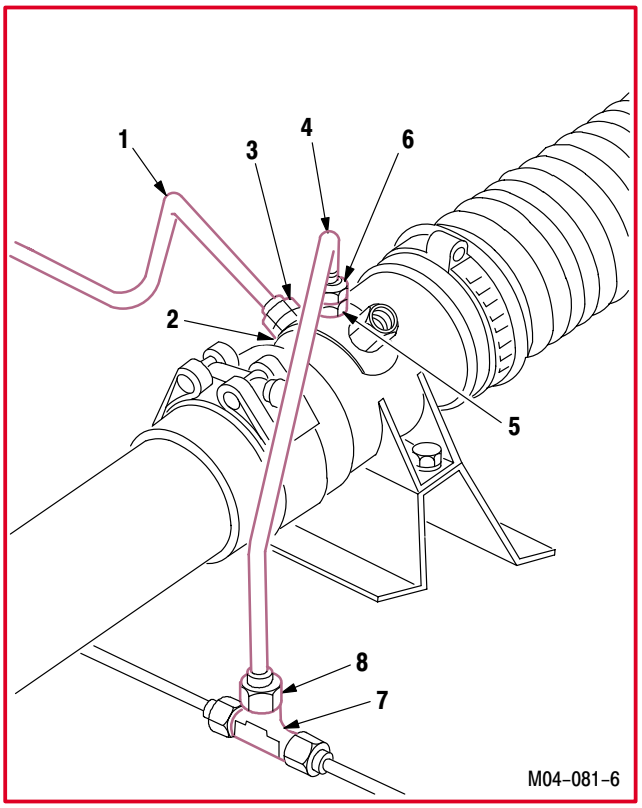
(4) Hold tee (7). Tighten nut (8).

e. **Inspect (QA).**

f. **Install SDC outlet pressure switch** (para 7.128)**.**

g. **Perform pressurized air system leak check** (para 7.115)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.136. PRESSURIZED AIR SYSTEM TEE AND CHECK VALVE REMOVAL/INSTALLATION

7.136.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.136.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

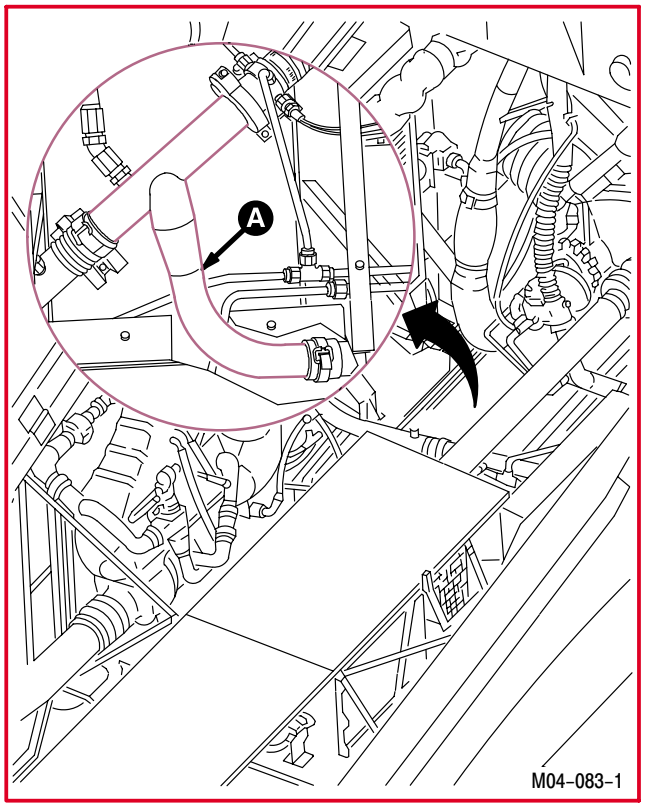
Packing (5)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.84	Two forward catwalk sections removed
15.41	APU cover removed



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7.136. PRESSURIZED AIR SYSTEM TEE AND CHECK VALVE REMOVAL/INSTALLATION – continued

7.136.3. Removal

a. **Remove tee (1).**

(1) Remove hose (2). Remove nut (3).

(2) Disconnect and remove two couplings (4) and (5).

(3) Remove nut (6). Remove coupling (7).

(4) Remove tee (1).

b. **Remove check valve (8) and packing (9) from tee (1).**

(1) Discard packing (9).

c. **Remove packings (10), (11), (12), and (13).**

(1) Remove and discard packings (10) and (11) from tee (1).

(2) Remove and discard packing (12) from pressure manifold (14).

(3) Remove and discard packing (13) from line (15).

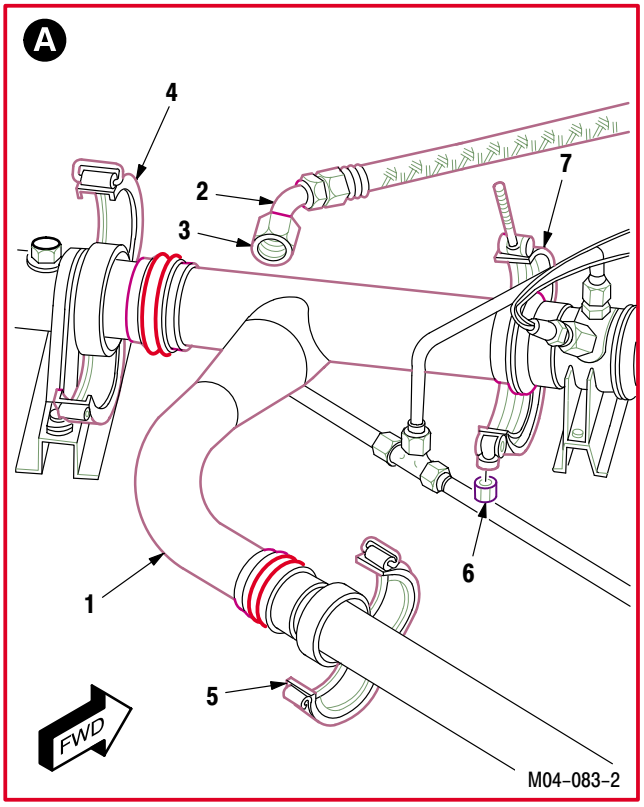
7.136.4. Cleaning

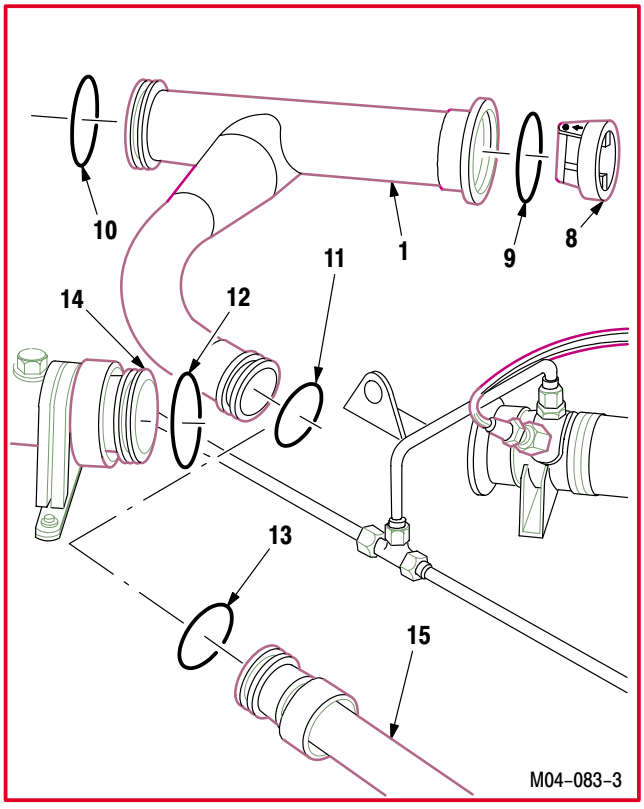
a. **Wipe removed and attaching parts with a clean rag.**

7.136.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**





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7.136. PRESSURIZED AIR SYSTEM TEE AND CHECK VALVE REMOVAL/INSTALLATION – continued

7.136.6. Installation



a. **Install new packings (10), (11), (12), and (13).**

(1) Lubricate packings (10), (11), (12), and (13). Use petrolatum (item 138, App F).

(2) Install packings (10) and (11) on tee (1).

(3) Install packing (12) on pressure manifold (14).

(4) Install packing (13) on line (15).

CAUTION

To prevent damage to SDC, check valve must be installed with hinge vertical and arrow pointing toward tee.

b. **Install check valve (8).**

(1) Lubricate new packing (9). Use petrolatum (item 138, App F).

(2) Install packing (9) on tee (1).

(3) Insert check valve (8) vertically with arrow pointing toward tee (1).

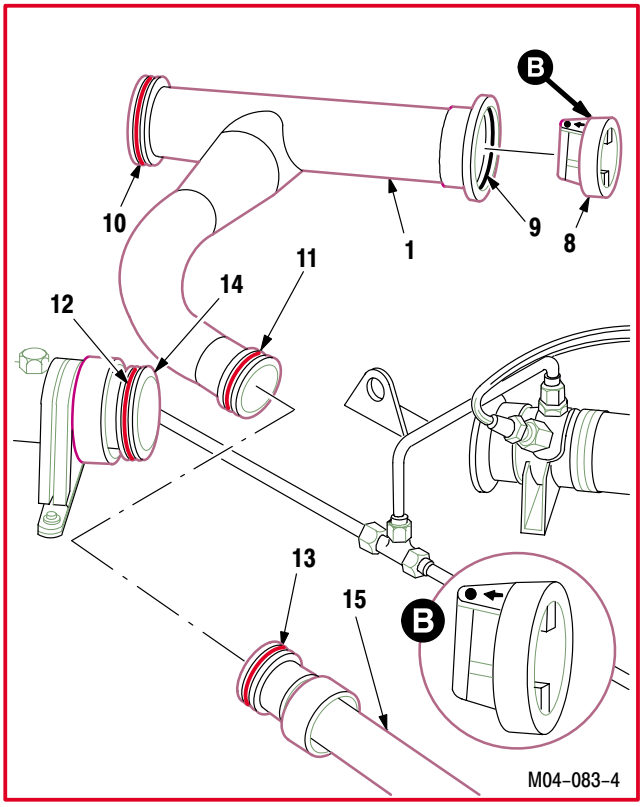
c. **Install tee (1).**

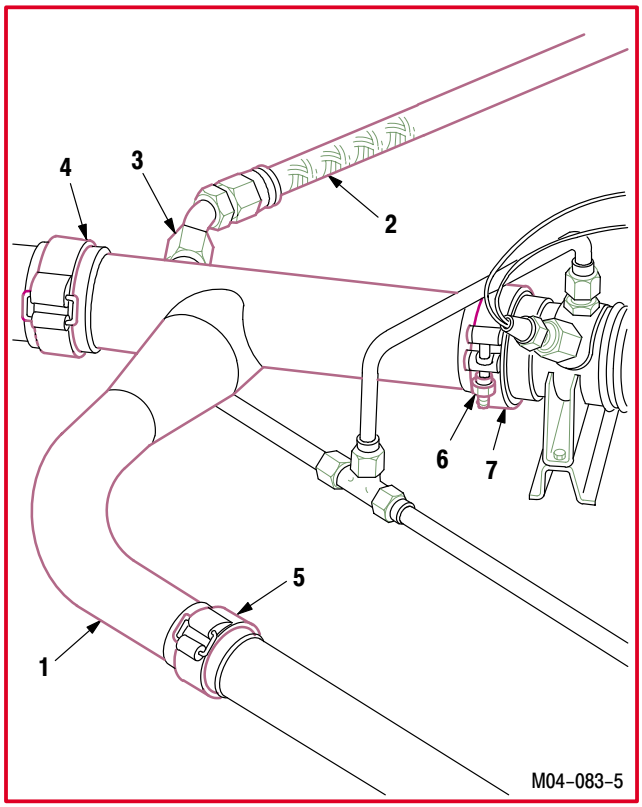
(1) Place tee (1) into position.

(2) Install and connect two couplings (4) and (5).

(3) Install coupling (7). Install nut (6).

(4) Install hose (2). Install nut (3).





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7.136. PRESSURIZED AIR SYSTEM TEE AND CHECK VALVE REMOVAL/INSTALLATION – continued

d. **Inspect (QA).**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Install APU cover** (para 15.42)**.**

g. **Install catwalk** (para 2.84)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.137. AIRCRAFT AIR PRESSURE FLUID MANIFOLD REMOVAL

7.137.1. Description

This task covers: Removal. Cleaning. Inspection.

7.137.2. Initial Setup

Tools:

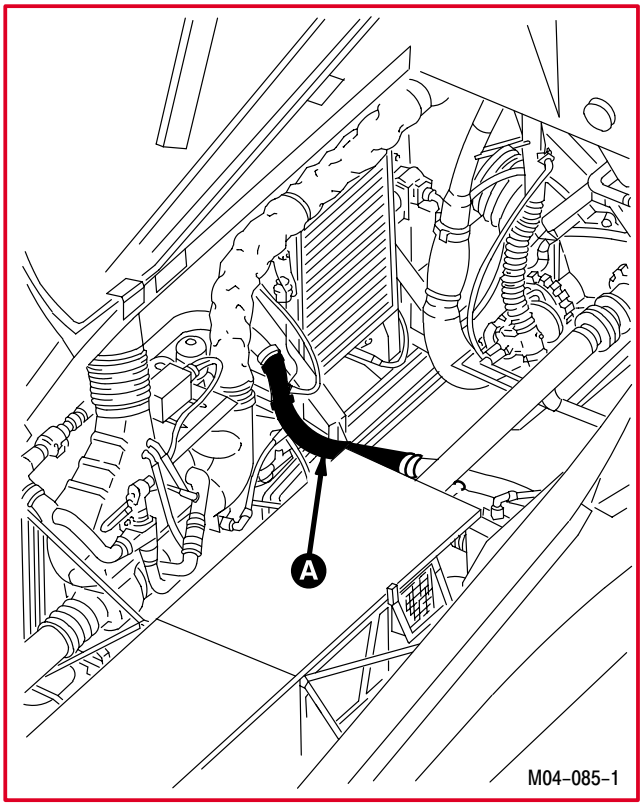
Aircraft mechanic's tool kit (item 376, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
1 3/8 & 1 7/16-inch open end wrench (item 421, App H)

Personnel Required:

67R Attack Helicopter Repairer

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
2.84	Forward two catwalk sections removed



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7.137. AIRCRAFT AIR PRESSURE FLUID MANIFOLD REMOVAL – continued

7.137.3. Removal

NOTE

If removing and replacing manifold, go to step a. If removing and reinstalling manifold, go to step b.

a. **Remove cap (1) from fitting (2).**

(1) Hold fitting (2). Use open end wrench.

(2) Remove cap (1).

b. **Remove adapter branch tube (3).**

(1) Hold tee (4). Loosen nut (5).

(2) Hold fitting (6). Remove nut (7).

(3) Rotate tube (3) away from manifold (8).

c. **Remove warm air supply tube (9) from defog shutoff valve tube (10).**

(1) Hold fitting (11). Remove nut (12).

d. **Remove valve tube (10).**

(1) Hold fitting (13) on valve (14). Loosen nut (15). Use open end wrench and crowfoot.

(2) Hold fitting (16). Remove nut (17). Use open end wrench and crowfoot.

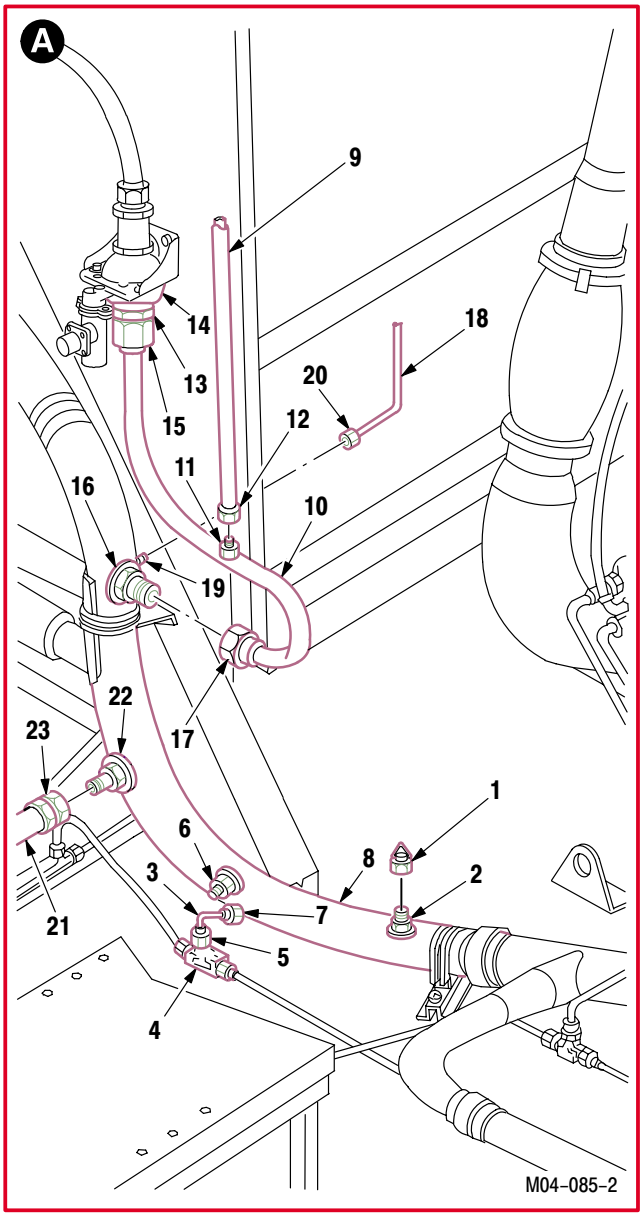
(3) Rotate tube (10) away from manifold (8).

e. **Remove vertical tube (18) from manifold (8).**

(1) Hold fitting (19). Remove nut (20).

f. **Remove fuel boost pump hose (21).**

(1) Hold fitting (22). Remove nut (23). Use open end wrench and crowfoot.



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7.137. AIRCRAFT AIR PRESSURE FLUID MANIFOLD REMOVAL – continued

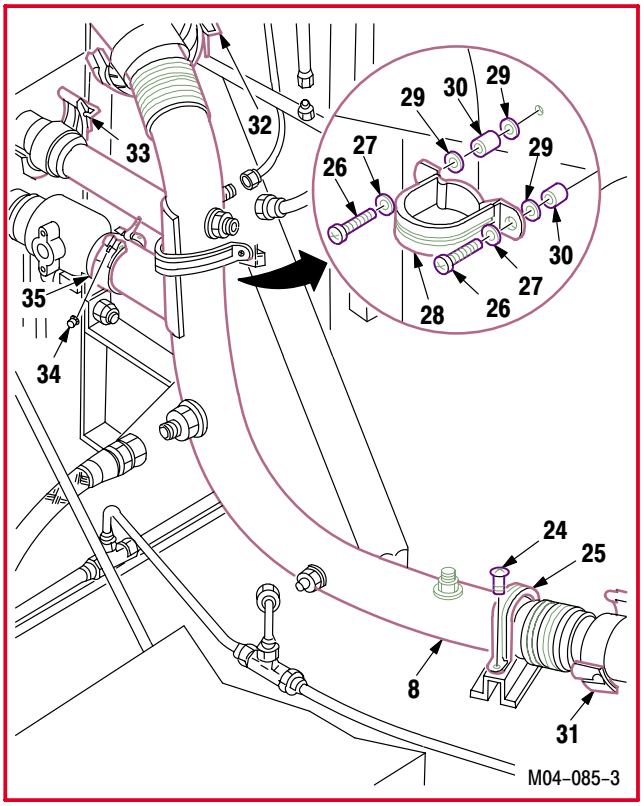
g. **Remove manifold (8).**

(1) Remove two screws (24) and clamp (25).

(2) Remove two screws (26), two washers (27), clamp (28), three washers (29), and two spacers (30).

(3) Disconnect and remove couplings (31), (32), and (33).

(4) Remove nut (34). Remove coupling (35).



h. **Remove check valve (36) and packing (37) from manifold (8).**

(1) Discard packing (37).

i. **Remove and discard packings (38), (39), and (40) from manifold (8).**

j. **Remove and discard packings (41), (42), and (43) from tubes (44) and (45), and tee (46).**

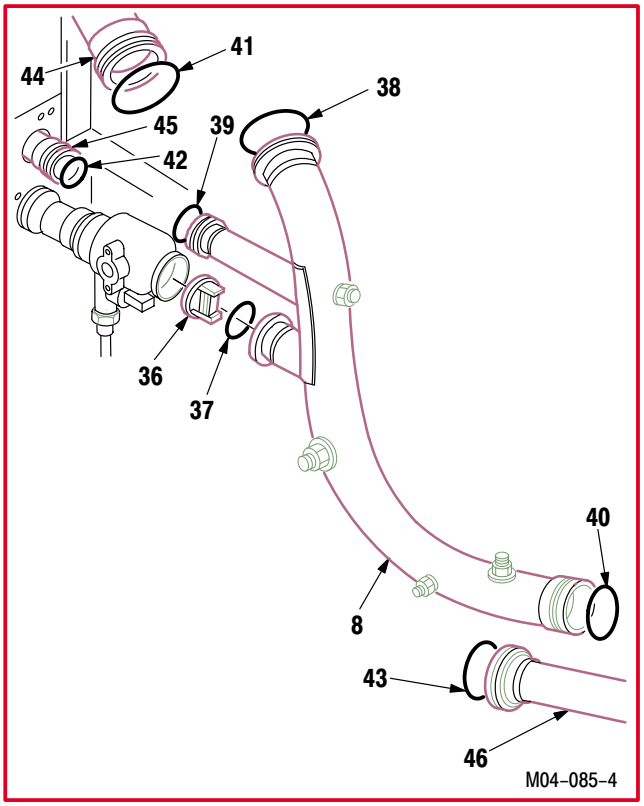
7.137.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.137.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**



END OF TASK

7.138. AIRCRAFT AIR PRESSURE FLUID MANIFOLD INSTALLATION

7.138.1. Description

This task covers: Installation.

7.138.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
1 3/8 & 1 7/16-inch open end wrench (item 421, App H)

Personnel Required:

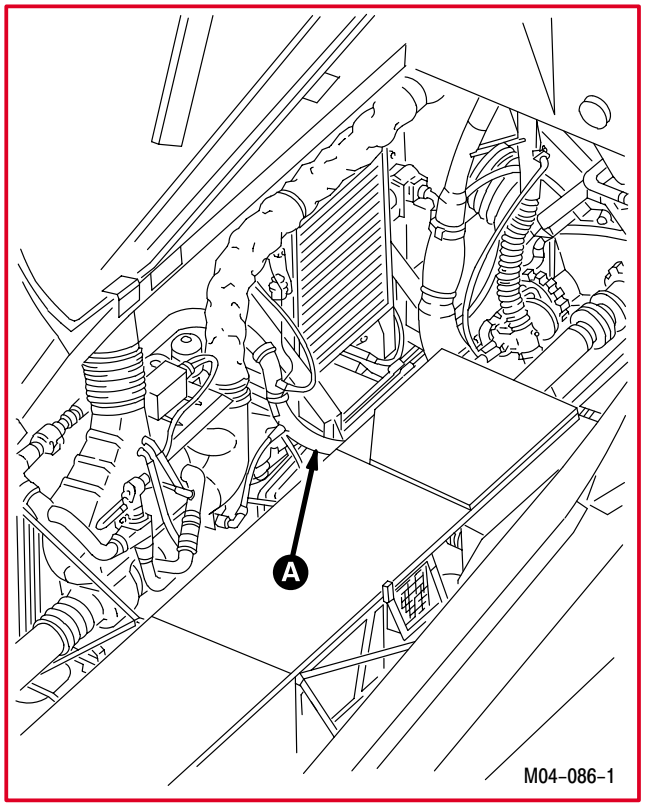
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Packing (7)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed



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7.138. AIRCRAFT AIR PRESSURE FLUID MANIFOLD INSTALLATION – continued

7.138.3. Installation



a. **Lubricate new packings (1), (2), (3), (4), (5), (6), and (7).** Use petrolatum (item 138, App F).

b. **Install packings (1), (2), and (3) on tee (8), tube (9), and tube (10).**

c. **Install packings (4), (5), and (6) on manifold (11).**

CAUTION

To prevent damage to SDC, check valve must be installed with hinge vertical and arrow pointing toward manifold.

d. **Install check valve (12) in manifold (11).**

(1) Install packing (7) in manifold (11).

(2) Install check valve (12) vertically with the arrow pointing toward manifold (11).

e. **Install manifold (11) on tube (9), (10), and tee (8).**

(1) Install couplings (13), (14), and (15).

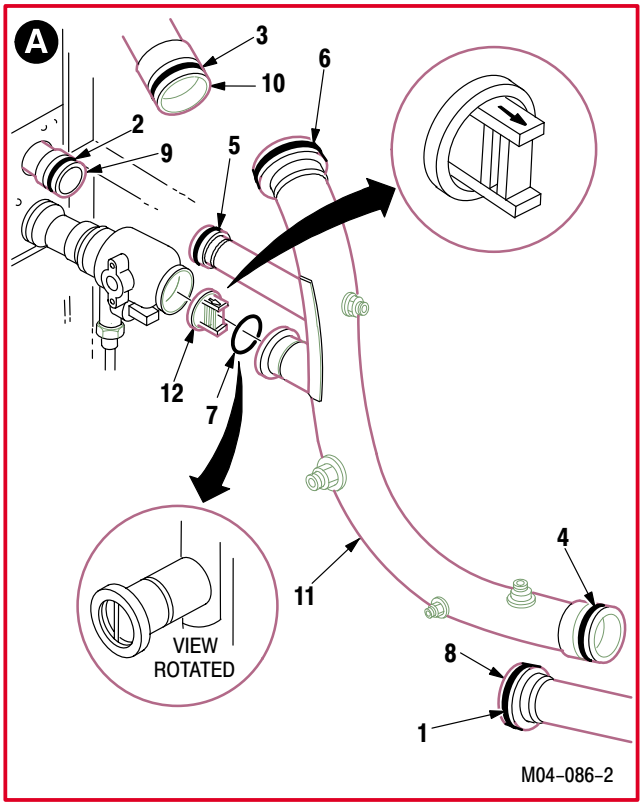
(2) Place coupling (16) in position on bleed air shutoff valve (17) and manifold (11). Install nut (18).

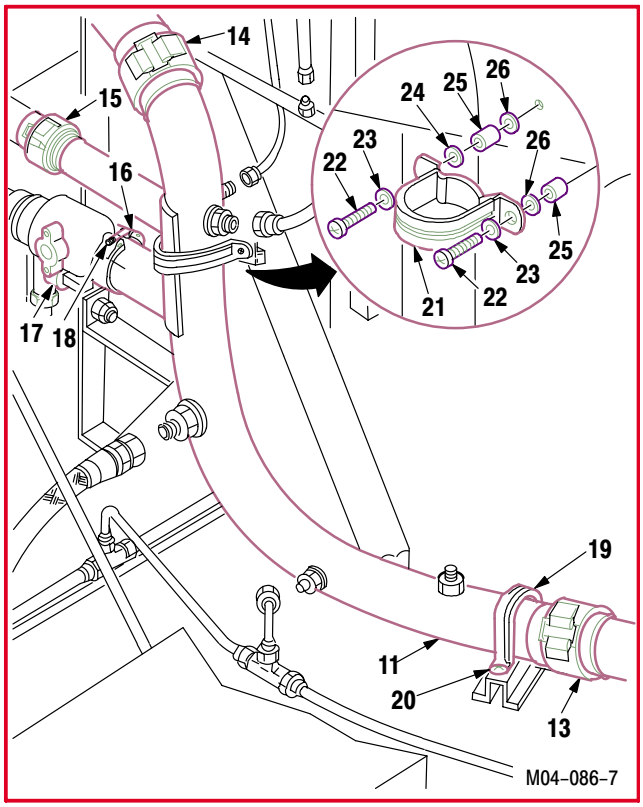
f. **Install clamp (19) and two screws (20).**

g. **Install clamp (21).**

(1) Left side: install screw (22) through washer (23), clamp (21), washer (24), spacer (25), and washer (26) into structure.

(2) Right side: install screw (22) through washer (23), clamp (21), washer (26), and spacer (25) into structure.





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7.138. AIRCRAFT AIR PRESSURE FLUID MANIFOLD INSTALLATION – continued

h. **Install fuel boost pump hose (27) on manifold (11).**

(1) Lubricate fitting (28). Use damping fluid (item 69, App F).

(2) Hold fitting (28). Install nut (29). Use open end wrench and crowfoot.

i. **Install vertical tube (30).**

(1) Lubricate fitting (31). Use damping fluid (item 69, App F).

(2) Hold fitting (31). Install nut (32).

j. **Install defog shutoff valve tube (33) on shutoff valve (34) and manifold (11).**

(1) Lubricate fitting (35). Use damping fluid (item 69, App F).

(2) Rotate tube (33) toward manifold (11).

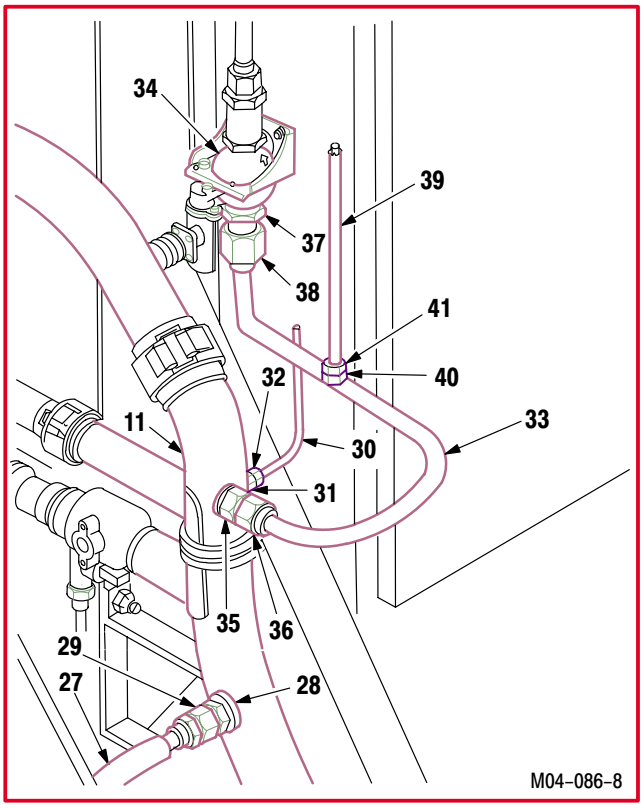
(3) Hold fitting (35). Install nut (36). Use open end wrench and crowfoot.

(4) Hold fitting (37). Tighten nut (38). Use open end wrench and crowfoot.

k. **Install warm air supply tube (39) on tube (33).**

(1) Lubricate fitting (40). Use damping fluid (item 69, App F).

(2) Hold fitting (40). Install nut (41).



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7.138. AIRCRAFT AIR PRESSURE FLUID MANIFOLD INSTALLATION – continued

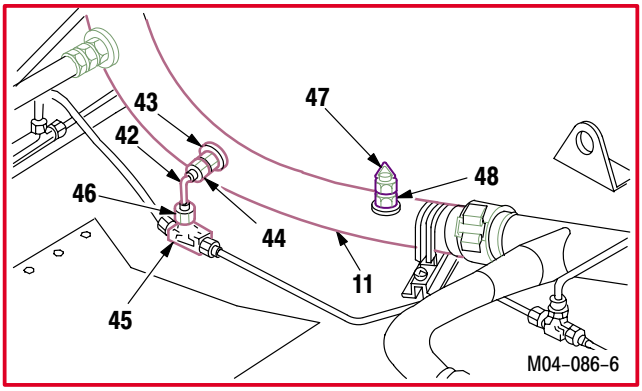
l. **Install adapter branch tube (42) on manifold (11).**

(1) Lubricate fitting (43). Use damping fluid (item 69, App F).

(2) Rotate tube (42) toward manifold (11).

(3) Hold fitting (43). Install nut (44).

(4) Hold tee (45). Tighten nut (46).



NOTE

If manifold was replaced, go to step m. If manifold was reinstalled, go to step n.

m. **Install cap (47) on fitting (48).**

(1) Hold fitting (48). Use open end wrench.

(2) Install cap (47).

n. **Inspect (QA).**

o. **Perform pressurized air system leak check** (para 7.115)**.**

p. **Install forward two catwalk sections** (para 2.84)**.**

q. **Secure access doors T250L, T250R, T290L, T290R and L325** (para 2.2)**.**

END OF TASK

7.139. BLEED AIR SHUTOFF VALVE/CHECK VALVE REMOVAL/INSTALLATION

7.139.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.139.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1/4 x 1/4-inch drive deep socket wrench socket (item 296, App H)
5/16 x 1/4-inch drive deep socket wrench socket (item 301, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

Materials/Parts:

Packing (2)
Damping fluid (item 69, App F)
Grease (item 84, App F)

Personnel Required:

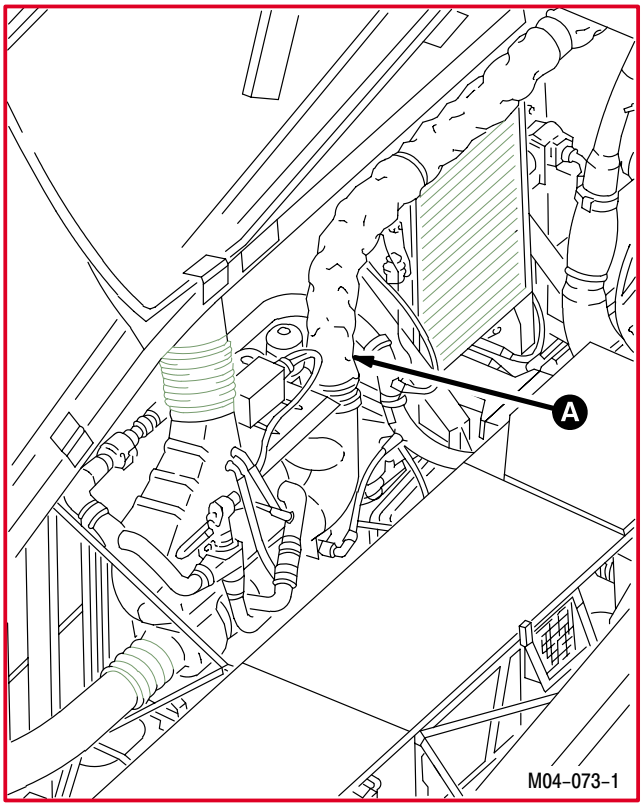
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened



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7.139. BLEED AIR SHUTOFF VALVE/CHECK VALVE REMOVAL/INSTALLATION – continued

7.139.3. Removal

a. **Remove valve (1).**

(1) Remove tube (2). Hold union (3). Remove nut (4).

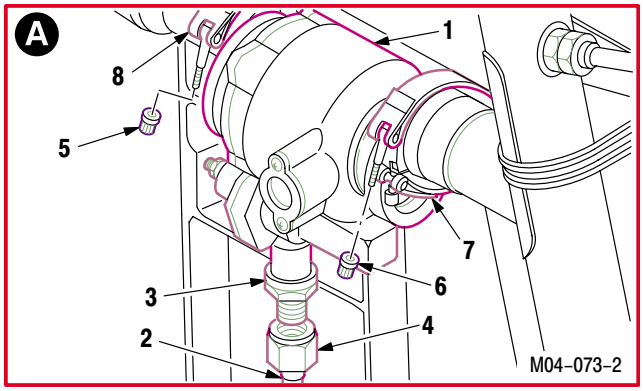
(2) Remove two nuts (5) and (6). Use socket.

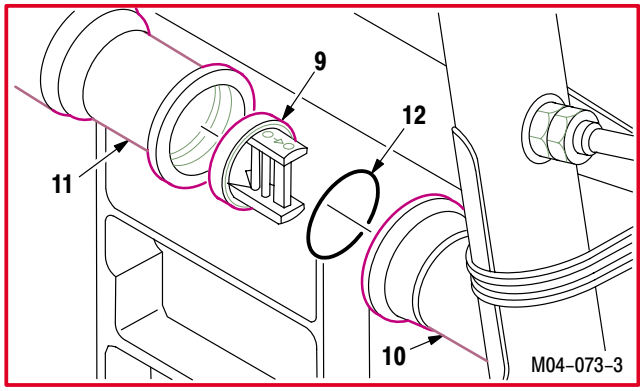
(3) Remove two couplings (7) and (8).

(4) Remove valve (1).

(5) Remove check valve (9) from between pressure manifold (10) and secondary air seal (11).

(6) Remove and discard packing (12).





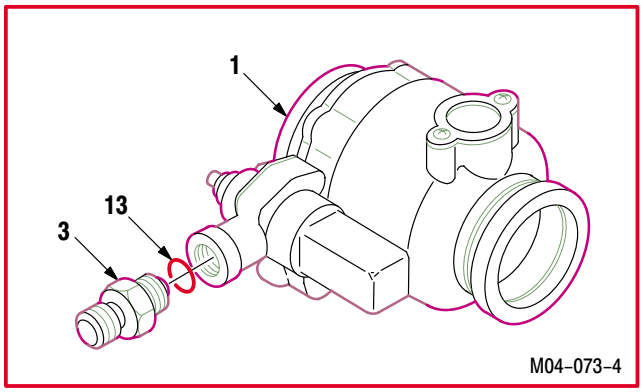
NOTE

If replacing valve, go to step b. If not, go to paragraph 7.139.4.

b. **Remove union (3) from valve (1).**

(1) Remove union (3).

(2) Remove and discard packing (13).



7.139.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.139.5. Inspection

a. **Check pressure manifold, secondary air seal and couplings for cracks, dents, distortion, and nicks** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.139. BLEED AIR SHUTOFF VALVE/CHECK VALVE REMOVAL/INSTALLATION – continued

7.139.6. Installation

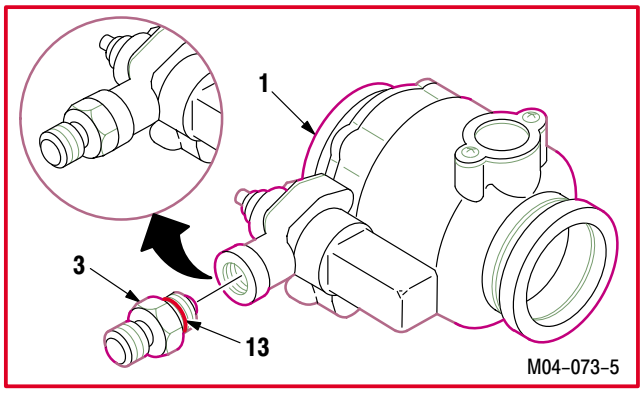


a. **Install union (3) on valve (1).**

(1) Lubricate new packing (13). Use grease (item 84, App F).

(2) Install packing (13) on union (3).

(3) Install union (3).



CAUTION

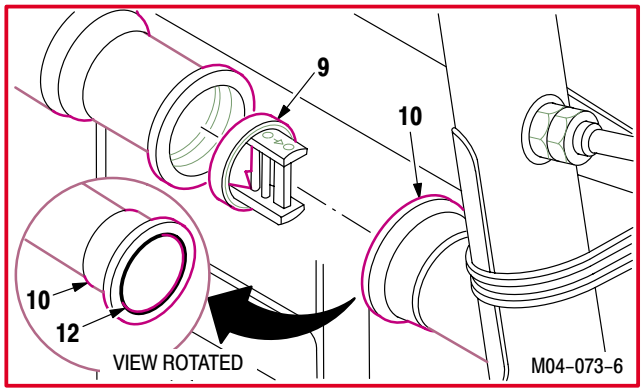
To prevent damage to SDC, check valve must be installed with hinge vertical and arrow pointing toward pressure manifold.

b. **Install valve (9) into manifold (10).**

(1) Lubricate packing (12). Use grease (item 84, App F).

(2) Install new packing (12) in manifold (10).

(3) Install valve (9) vertically with arrow pointing into manifold (10).



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7.139. BLEED AIR SHUTOFF VALVE/CHECK VALVE REMOVAL/INSTALLATION – continued

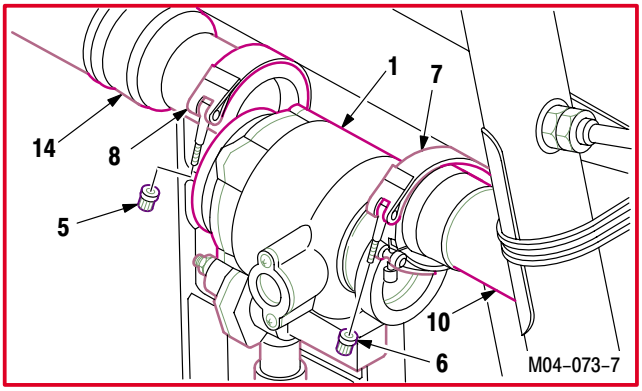
c. **Install valve (1).** Torque nuts (5) and (6) to **28 INCH-POUNDS**.

(1) Install two couplings (7) and (8) on manifold (10) and secondary air seal (14).

(2) Position valve (1) between manifold (10) and secondary air seal (14).

(3) Make sure couplings have engaged flanges of valve (1), manifold (10), and secondary air seal (14).

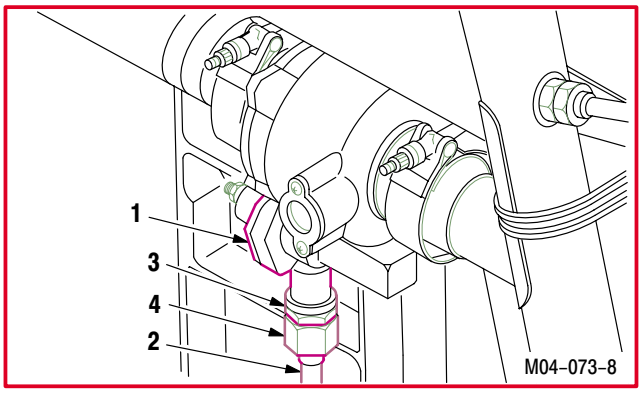
(4) Install two nuts (5) and (6) on couplings (7) and (8). Torque two nuts (5) and (6) to **28 INCH-POUNDS**. Use socket and torque wrench.



d. **Install tube (2) on valve (1).**

(1) Lubricate union (3) threads. Use damping fluid (item 69, App F).

(2) Hold union (3). Install nut (4).



e. **Inspect (QA).**

f. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.140. SECONDARY AIR FLEXIBLE CONNECTION FLANGED SEAL REPLACEMENT

7.140.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.140.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

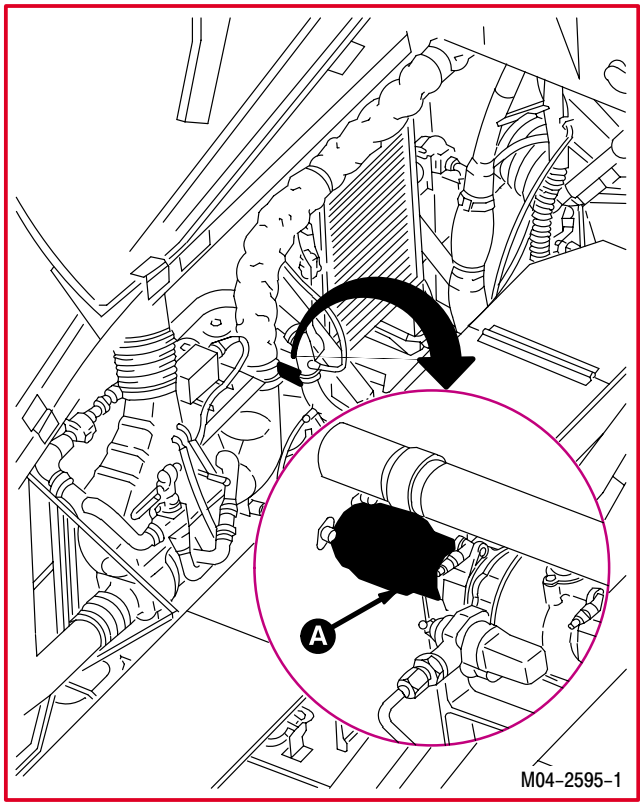
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
7.139	Bleed air shutoff valve removed



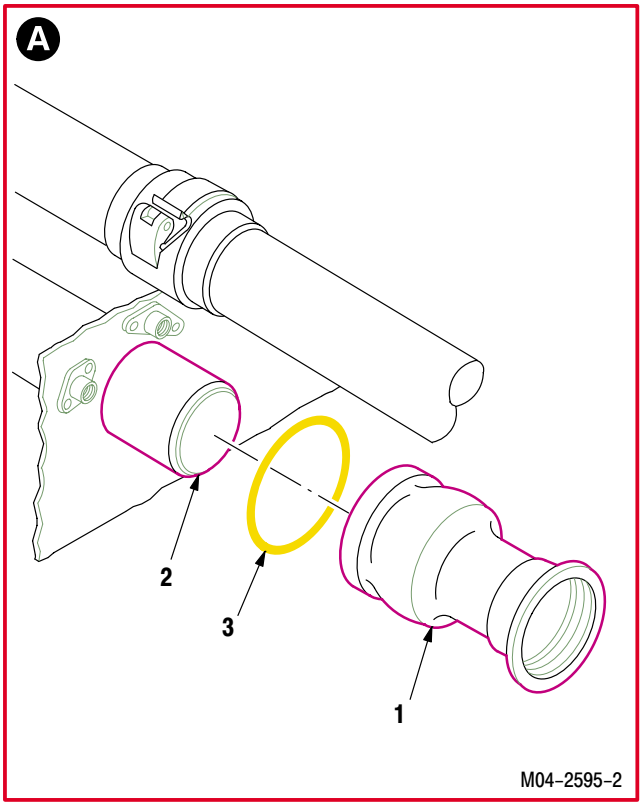
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7.140. SECONDARY AIR FLEXIBLE CONNECTION FLANGED SEAL REPLACEMENT – continued

7.140.3. Removal

a. **Remove seal assembly (1) from tube (2).**

(1) Remove and discard seal (3) from seal assembly (1).



7.140.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.140.5. Inspection

a. **Check tube for cracks, dents, and scratches** (para 7.114)**.**

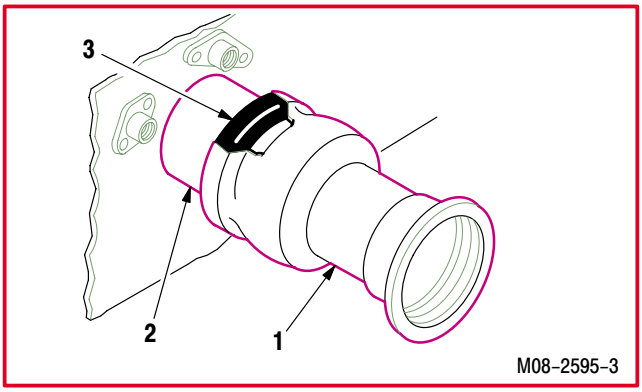
b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.140.6. Installation



a. **Install seal (3) in seal assembly (1).**

(1) Lubricate new seal (3). Use petrolatum (item 138, App F).



b. **Install seal assembly (1) on tube (2).**

c. **Inspect (QA).**

d. **Install bleed air shutoff valve** (para 7.139)**.**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.141. STANDBY SYSTEM ENGINE BLEED AIR TUBE AND ENGINE AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION

7.141.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.141.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

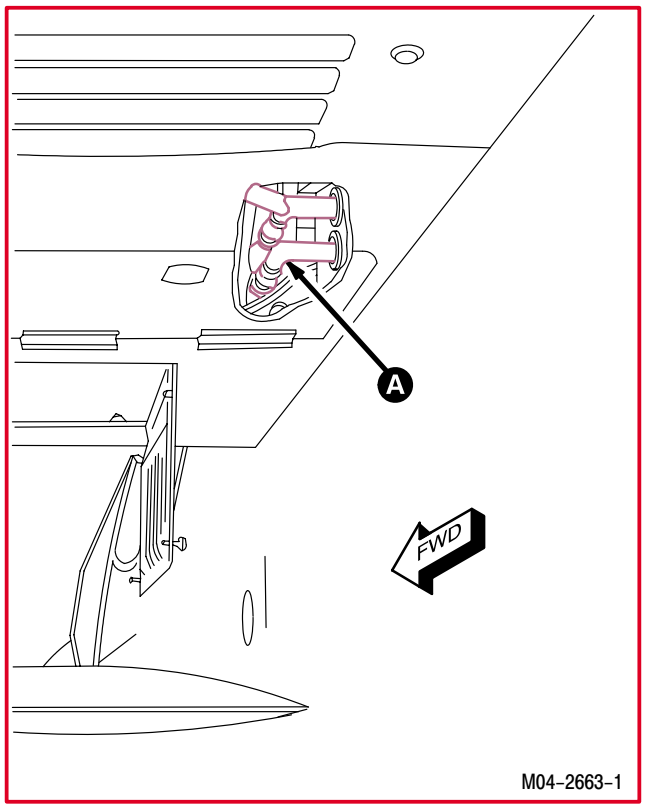
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Materials/Parts:

Gasket
Seal (2)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors LN1, LN3, and LN4 opened



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7.141. STANDBY SYSTEM ENGINE BLEED AIR TUBE AND ENGINE AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION – continued

7.141.3. Removal

a. **Remove tube (1) from air tube (2).**

(1) Hold fitting (3). Remove nut (4).

b. **Loosen two clamps (5).**

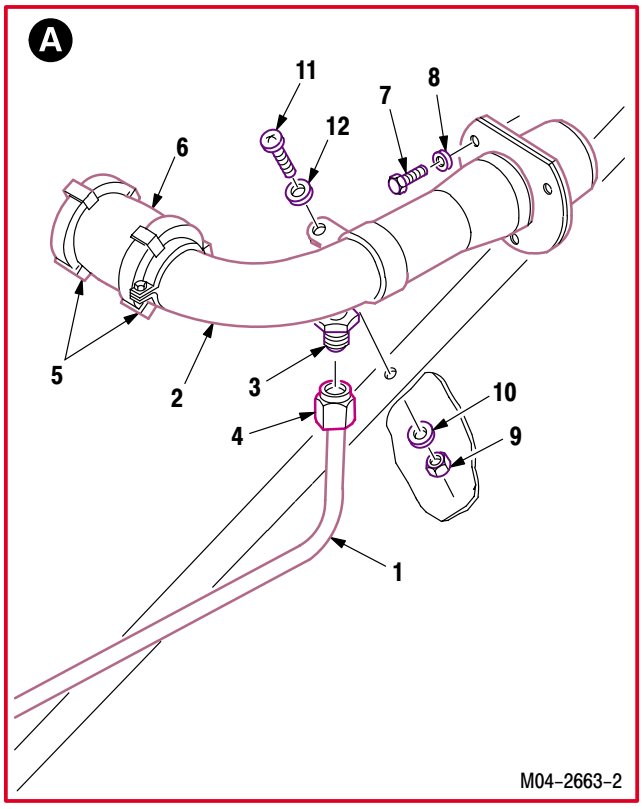
c. **Slide housing (6) on tube (2).**

d. **Remove tube (2).**

(1) Remove three bolts (7) and washers (8).

(2) Remove nut (9) and washer (10).

(3) Remove screw (11) and washer (12).



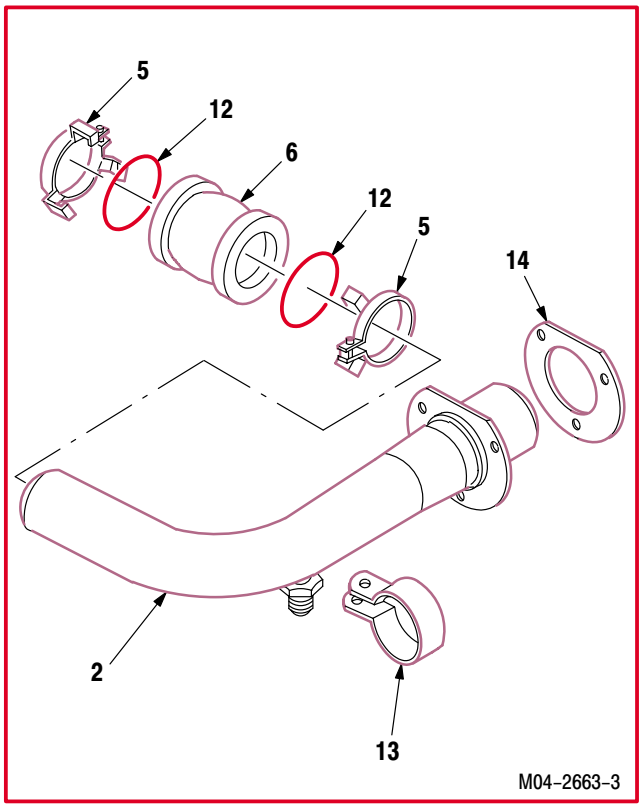
e. **Remove housing (6) and two clamps (5) from air tube (2).**

f. **Remove two clamps (5) from housing (6).**

g. **Remove and discard two seals (12) from housing (6).**

h. **Remove clamp (13) from tube (2).**

i. **Remove and discard gasket (14).**



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7.141. STANDBY SYSTEM ENGINE BLEED AIR TUBE AND ENGINE AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION – continued

7.141.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.141.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.141.6. Installation



a. **Lubricate two new seals (12).** Use petrolatum (item 138, App F).

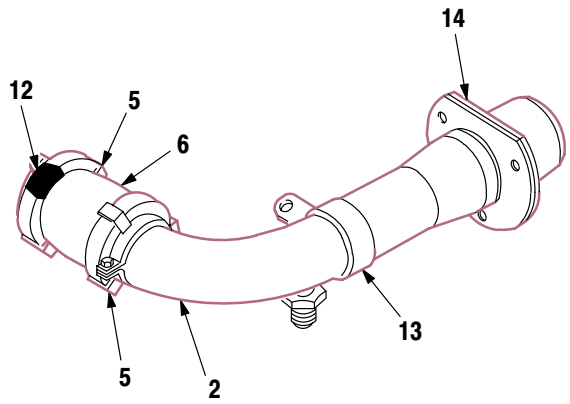
b. **Install seals (12) in housing (6).**

c. **Install clamp (13) on tube (2).**

d. **Install two clamps (5) on housing (6).**

e. **Slide housing (6) and two clamps (5) on tube (2).**

f. **Install gasket (14) on tube (2).**



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7.141. STANDBY SYSTEM ENGINE BLEED AIR TUBE AND ENGINE AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION – continued

g. **Install tube (2).**

(1) Insert tube (2) through firewall (15) into flanged seal (16).

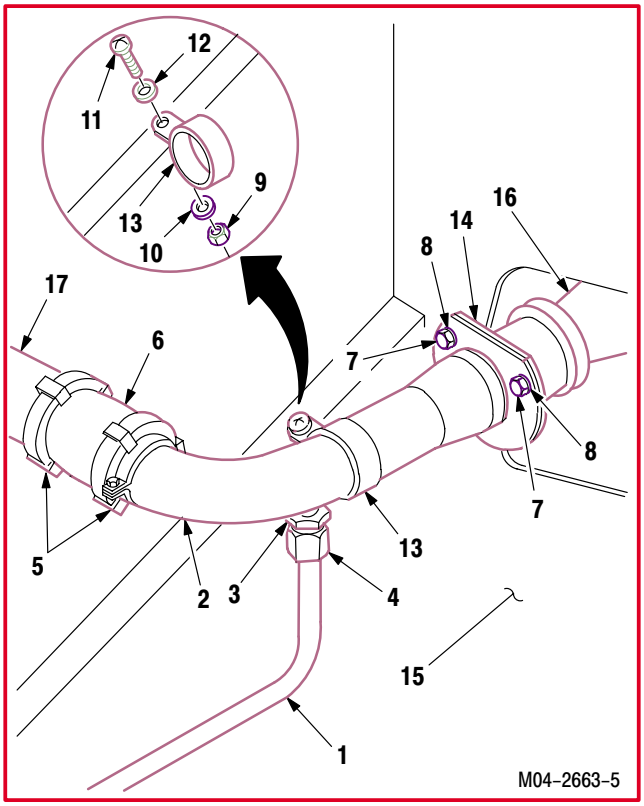
(2) Install three bolts (7) and washers (8) through tube (2) and gasket (14) into firewall (15).

(3) Install screw (11) through washer (12) and clamp (13).

(4) Install washer (10) and nut (9) on screw (11).

(5) Slide housing (6) on tube (17) until centered. Tighten two clamps (5).





h. **Lubricate fitting (3).** Use damping fluid (item 69, App F).

i. **Install tube (1) on tube (2).**

(1) Hold fitting (3). Install nut (4).

j. **Inspect (QA).**

k. **Perform pressurized air system leak check** (para 7.115)**.**

l. **Secure access doors LN1, LN2, and LN4** (para 2.2)**.**

END OF TASK

7.142. START AIR VALVE AND GROUND AIR CONNECTION FLANGE REMOVAL/INSTALLATION

7.142.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.142.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
18-inch strap pipe wrench (item 426, App H)

Materials/Parts:

Gasket
Lubricant (item NO TAG, App F)
Petrolatum (item 138, App F)
Sealing compound (item 156A, App F)
Wire (item 226, App F)

Personnel Required:

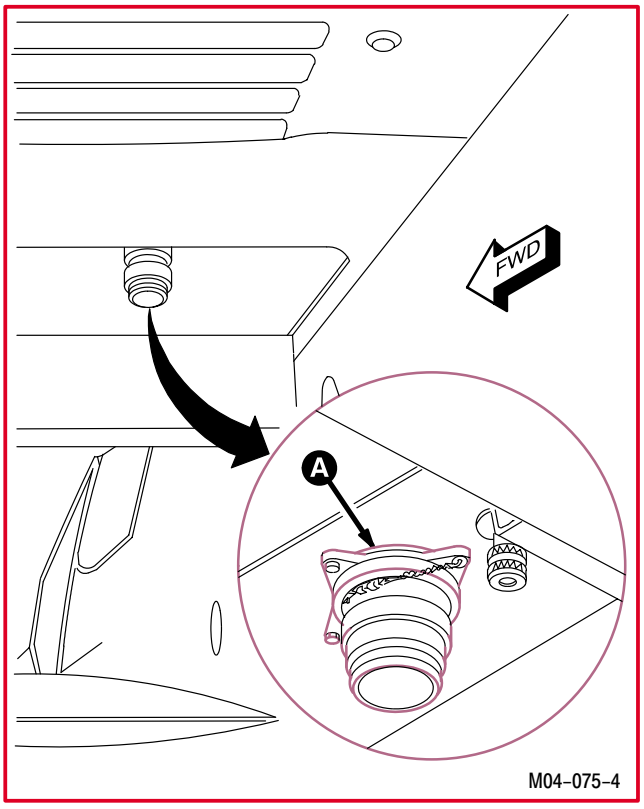
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access door LN5 opened



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7.142. START AIR VALVE AND GROUND AIR CONNECTION FLANGE REMOVAL/INSTALLATION – continued

7.142.3. Removal

CAUTION

To prevent damage to engine nacelle, do not use excessive force when removing flange.

a. **Remove valve (1).**

(1) Remove lockwire.

(2) Remove valve (1). Use strap wrench.

(3) Remove and discard packing (2).

b. **Remove flange (3).**

(1) Remove four bolts (4) and washers (5).

(2) Remove and discard gasket (6).

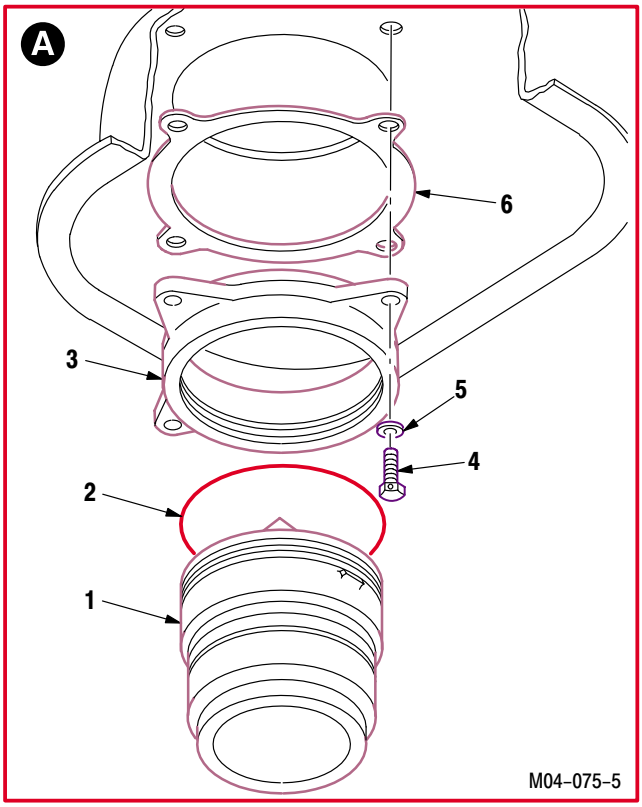
7.142.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

7.142.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**



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7.142. START AIR VALVE AND GROUND AIR CONNECTION FLANGE REMOVAL/INSTALLATION – continued

7.142.6. Installation



a. **Install flange (3).**

(1) Apply sealing compound to both surfaces of new gasket (6). Use sealing compound (item 156A, App F).

(2) Install gasket (6) on flange (3).

(3) Install four bolts (4) through four washers (5), flange (3), and gasket (6).



b. **Spray solid film lubricant on threads of valve (1).** Use lubricant (item NO TAG, App F).

c. **Let lubricant air dry for 6 HOURS or air dry for 30 MINUTES and cure for 30 MINUTES at 150 °F (65 °C).**



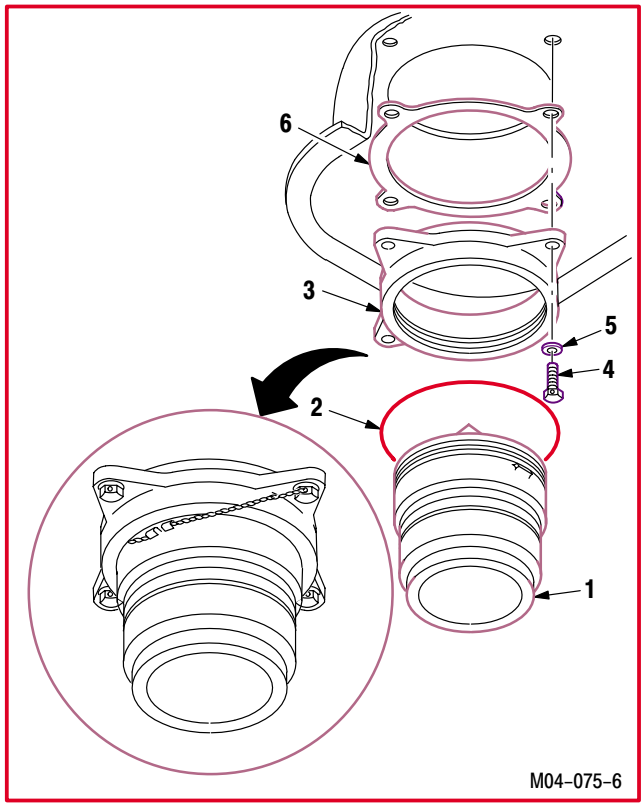
d. **Install valve (1).**

(1) Lubricate packing (2). Use petrolatum (item 138, App F).

(2) Install packing (2) on valve (1).

(3) Install valve (1). Use strap wrench.

(4) Lockwire valve (1) to bolt (4). Use wire (item 226, App F).



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7.142. START AIR VALVE AND GROUND AIR CONNECTION FLANGE REMOVAL/INSTALLATION – continued

e. **Inspect (QA).**

f. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Secure access door LN5** (para 2.2)**.**

END OF TASK

7.143. GROUND SUPPORT AIR COUPLING AND ADAPTER REMOVAL/INSTALLATION

7.143.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.143.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Materials/Parts:

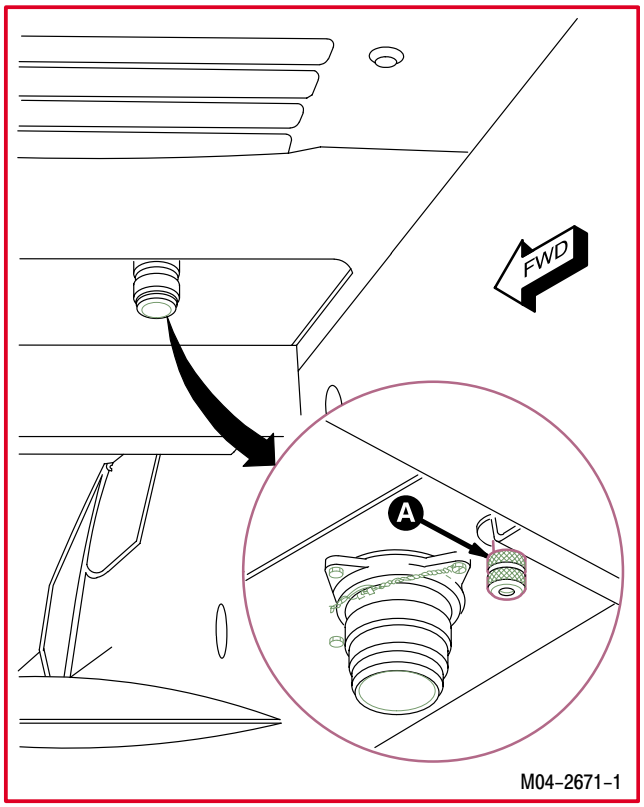
Damping fluid (item 69, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors LN3, LN4, and LN5 opened



GO TO NEXT PAGE

7.143. GROUND SUPPORT AIR COUPLING AND ADAPTER REMOVAL/INSTALLATION – continued

7.143.3. Removal

a. **Remove coupling (1) from adapter (2).**

b. **Remove adapter (2).**

(1) Remove tube (3). Remove nut (4).

(2) Remove three nuts (5), washers (6), and screws (7).

(3) Remove adapter (2).

7.143.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.143.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.143.6. Installation



a. **Install adapter (2).**

(1) Install three screws (7) through adapter (2) and structure (8).

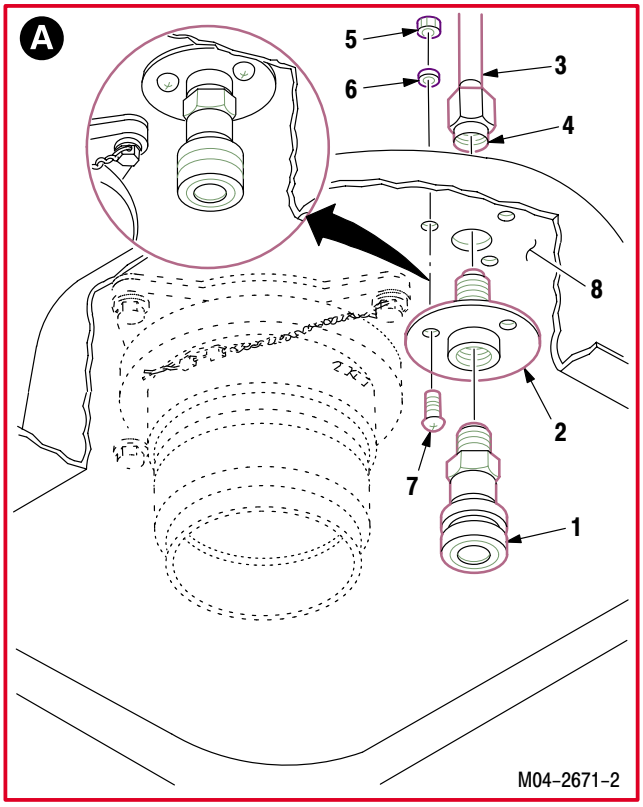
(2) Install three washers (6) and nuts (5).

(3) Lubricate male threads of adapter (2). Use damping fluid (item 69, App F).

(4) Install tube (3) on adapter (2). Install nut (4).

b. **Install coupling (1) on adapter (2).**

(1) Lubricate threads of coupling (1). Use damping fluid (item 69, App F).



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7.143. GROUND SUPPORT AIR COUPLING AND ADAPTER REMOVAL/INSTALLATION – continued

c. **Inspect (QA).**

d. **Perform pressurized air system leak check** (para 7.115)**.**

e. **Secure access doors LN3, LN4, and LN5** (para 2.2)**.**

END OF TASK

7.144. GROUND AIR CONNECTION MANIFOLD, ENGINE AIR FLEXIBLE CONNECTION HOUSING, AND UTILITY TUBE REMOVAL/INSTALLATION

7.144.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.144.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

Materials/Parts:

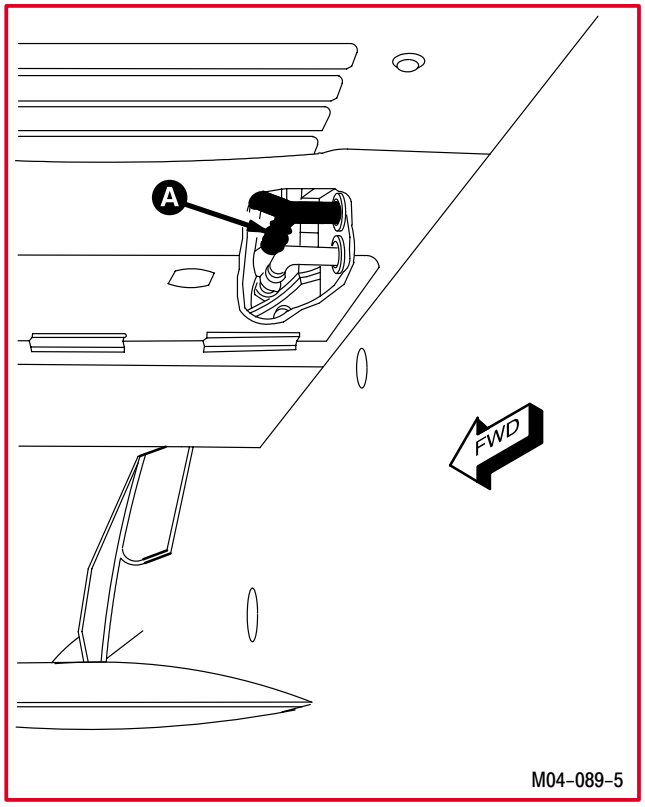
Gasket (2)
Packing (2)
Seal (2)
Petrolatum (item 138, App F)
Sealing compound (item 156A, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors LN1, LN3, LN4, T250L, T250R, T290L, T290R, and L325 opened
7.142	Start air valve and ground air connection flange removed



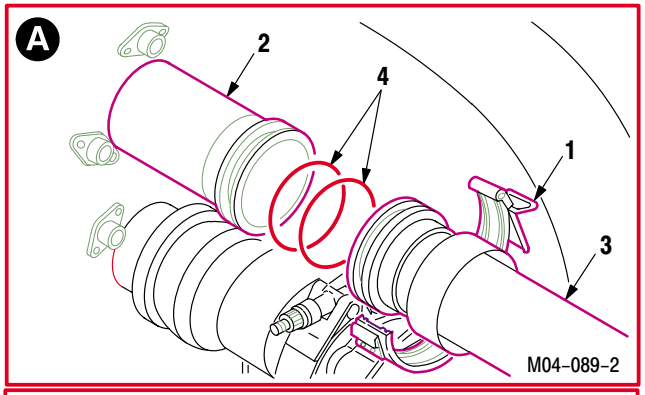
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7.144. GROUND AIR CONNECTION MANIFOLD, ENGINE AIR FLEXIBLE CONNECTION HOUSING, AND UTILITY TUBE REMOVAL/INSTALLATION – continued

7.144.3. Removal

a. **Remove coupling (1) from air connection manifold (2) and pressure fluid manifold (3).**

b. **Remove and discard two packings (4).**



c. **Remove utility tube (5).**

(1) Remove nut (6) from adapter (7).

(2) Hold fitting (8). Remove nut (9).

d. **Remove manifold (2).**

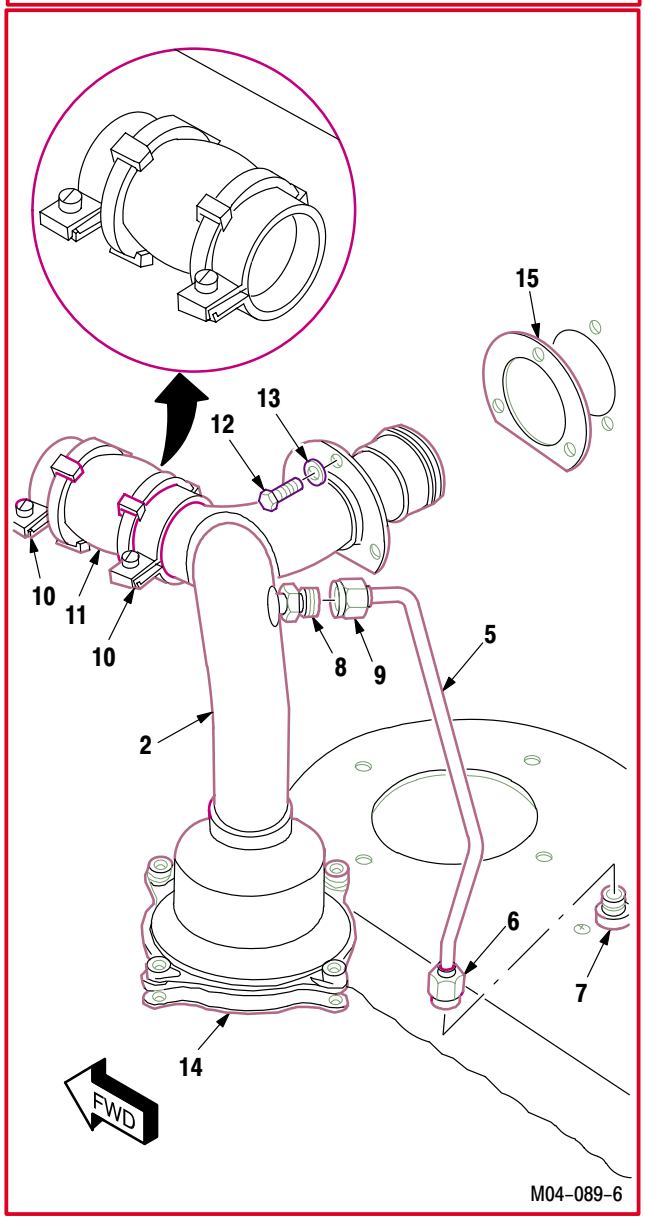
(1) Loosen two clamps (10).

(2) Slide housing (11) on manifold (2).

(3) Remove three bolts (12) and washers (13).

e. **Remove and discard gaskets (14) and (15).**

f. **Remove housing (11) and two clamps (10) from manifold (2).**

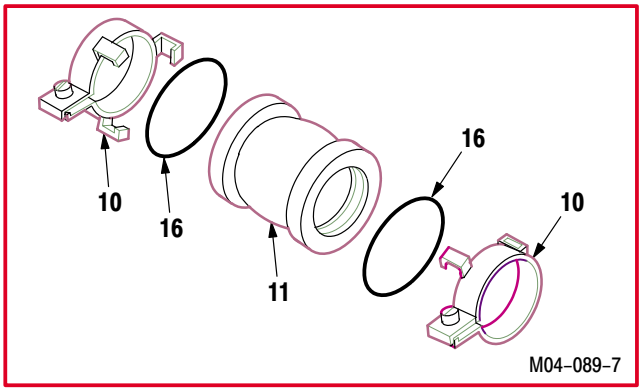


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7.144. GROUND AIR CONNECTION MANIFOLD, ENGINE AIR FLEXIBLE CONNECTION HOUSING, AND UTILITY TUBE REMOVAL/INSTALLATION – continued

g. **Remove two clamps (10) from housing (11).**

h. **Remove and discard two seals (16) from housing (11).**



7.144.4. Cleaning

a. **Clean adhesive from manifold (2) and mounting area** (para 1.47)**.**

b. **Wipe removed and attaching parts with a clean rag.**

7.144.5. Inspection

a. **Check removed and attaching parts and surfaces for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.144.6. Installation



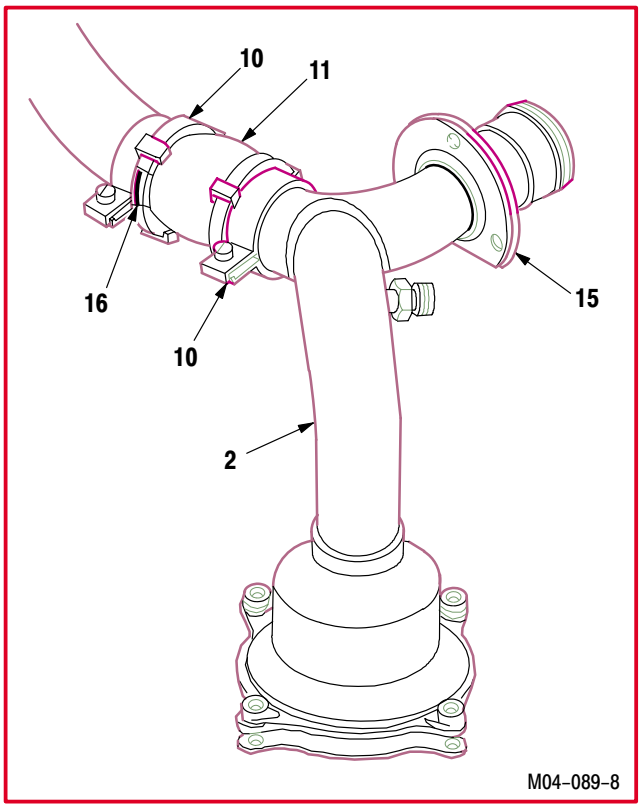
a. **Install two new seals (16) in housing (11).**

(1) Lubricate seals (16). Use petrolatum (item 138, App F).

b. **Install two clamps (10) on housing (11).**

c. **Slide housing (11) with two clamps (10) on manifold (2).**

d. **Install new gasket (15) on manifold (2).**



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7.144. GROUND AIR CONNECTION MANIFOLD, ENGINE AIR FLEXIBLE CONNECTION HOUSING, AND UTILITY TUBE REMOVAL/INSTALLATION – continued



e. **Apply adhesive to both sides of new gasket (14).** Use sealing compound (item 156A, App F).

f. **Install gasket (14) on manifold (2).**

g. **Install manifold (2).**

(1) Install manifold (2) through firewall (17).

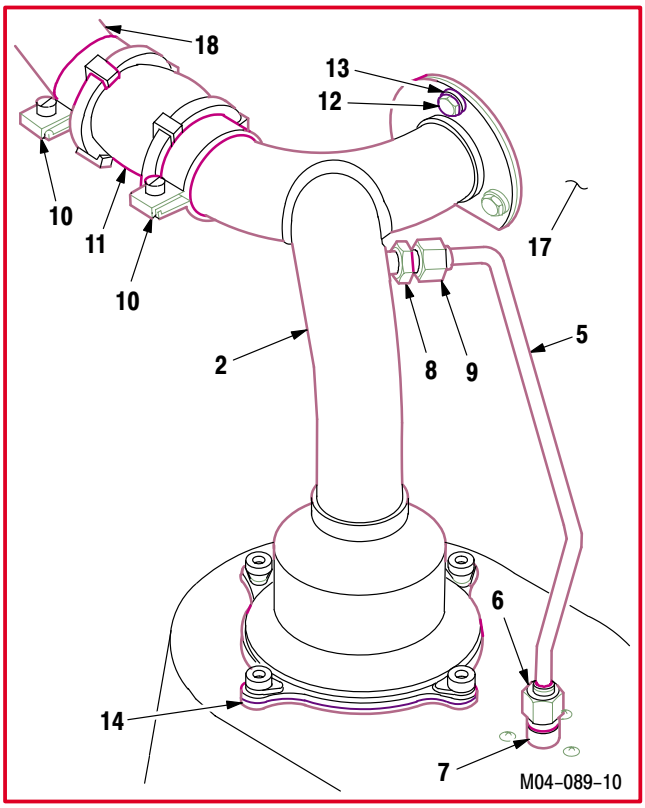
(2) Install three bolts (12) and washers (13).

(3) Slide housing (11) forward on air supply tube (18) until centered. Tighten two clamps (10).

h. **Install tube (5) on manifold (2) and adapter (7).**

(1) Hold fitting (8). Install nut (9).

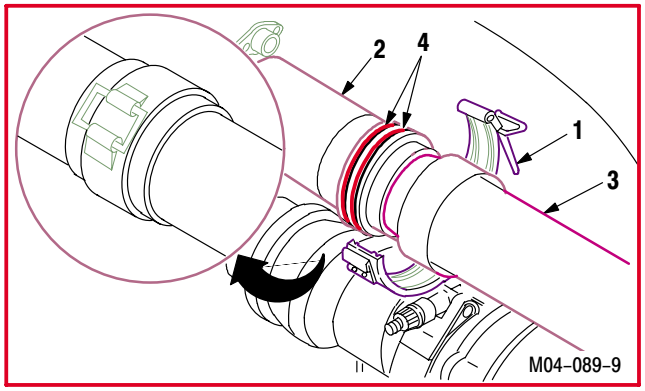
(2) Install nut (6) on adapter (7).



i. **Install coupling (1) on manifold (2) and manifold (3).**

(1) Lubricate and install two new packings (4). Use petrolatum (item 138, App F).

(2) Install coupling (1).



j. **Inspect (QA).**

k. **Install start air valve and ground air connection flange** (para 7.139)**.**

l. **Perform pressurized air system leak check** (para 7.115)**.**

m. **Secure access doors LN1, LN3, LN4, T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.145. NO. 2 ENGINE AIR START LINE REMOVAL/INSTALLATION

7.145.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.145.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

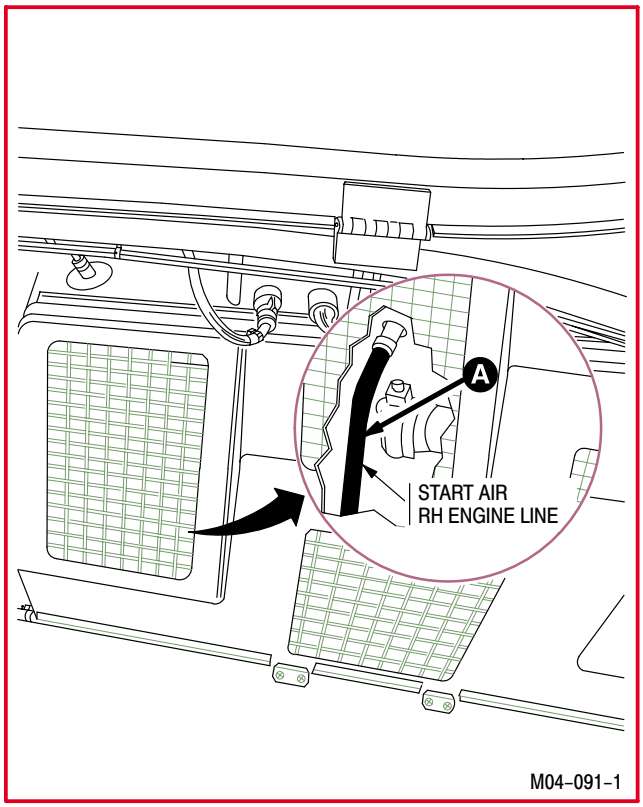
Packing (4)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.84	Forward two catwalk sections removed



GO TO NEXT PAGE

7.145. NO. 2 ENGINE AIR START LINE REMOVAL/INSTALLATION – continued

7.145.3. Removal

a. **Remove engine air start line (1).**

(1) Remove two couplings (2).

(2) Remove nut (3), screw (4), and washer (5) from clamp (6).

(3) Remove clamp (6) from line (1).

(4) Remove line (1).

(5) Remove and discard two packings (7).

b. **Remove and discard packing (8) from tee (9).**

c. **Remove and discard packing (10) from tube (11).**

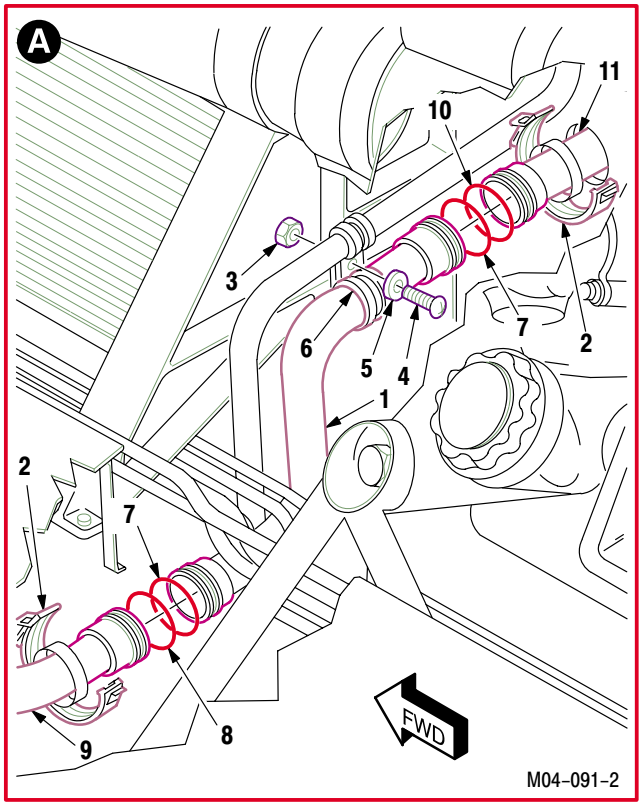
7.145.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.145.5. Inspection

a. **Check tee and line for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**



GO TO NEXT PAGE

7.145. NO. 2 ENGINE AIR START LINE REMOVAL/INSTALLATION – continued

7.145.6. Installation

NOTE

Position clamp to prevent contact with fire extinguishing line.

a. **Lubricate new packings (7), (8), and (10).** Use petrolatum (item 138, App F).

b. **Install new packing (10) on tube (11).**

c. **Install new packing (8) on tee (9).**

d. **Install line (1).**

(1) Install two packings (7) on line (1).

(2) Install line (1) between tube (11) and tee (9).

(3) Install two couplings (2).

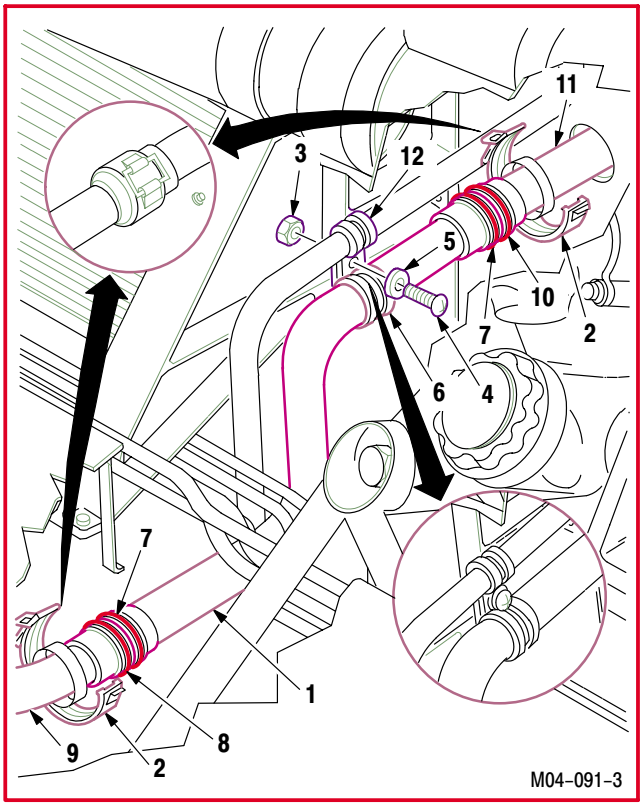
(4) Install clamp (6) on line (1).

(5) Install screw (4) through washer (5), clamp (6), and clamp (12). Install nut (3).

e. **Inspect (QA).**

f. **Perform pressurized air system leak check** (para 7.115)**.**

g. **Install forward two catwalk sections** (para 2.84)**.**



END OF TASK

7.146. NO. 2 ENGINE START AIR TUBE AND AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION

7.146.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.146.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

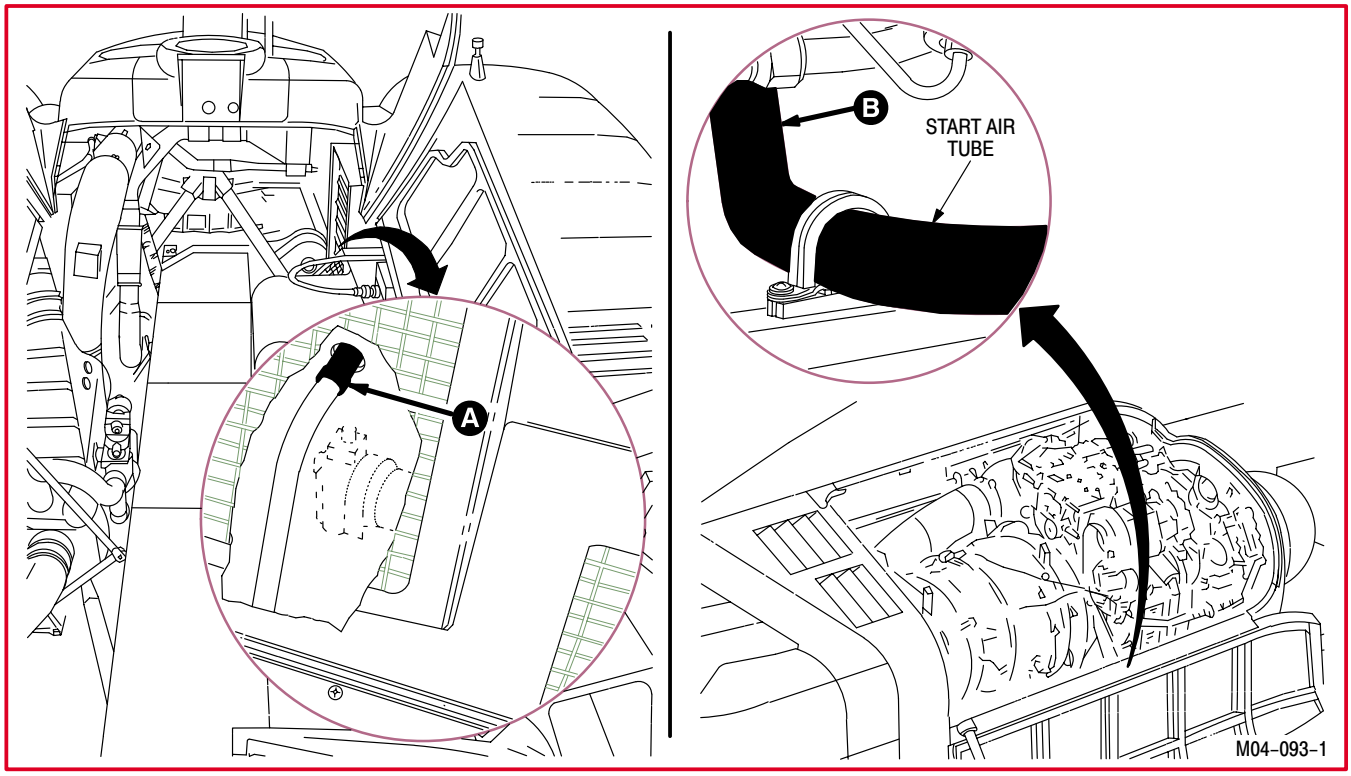
Packing (2)
Seal (2)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors RN1, RN3, RN4, T250L, T250R, T290L, T290R, and L325 opened
15.41	APU cover removed



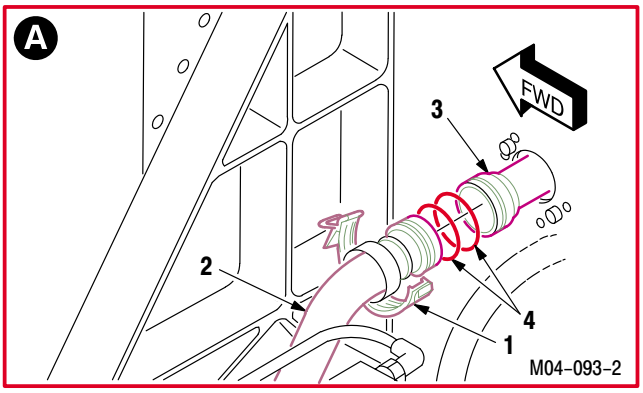
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7.146. NO. 2 ENGINE START AIR TUBE AND AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION – continued

7.146.3. Removal

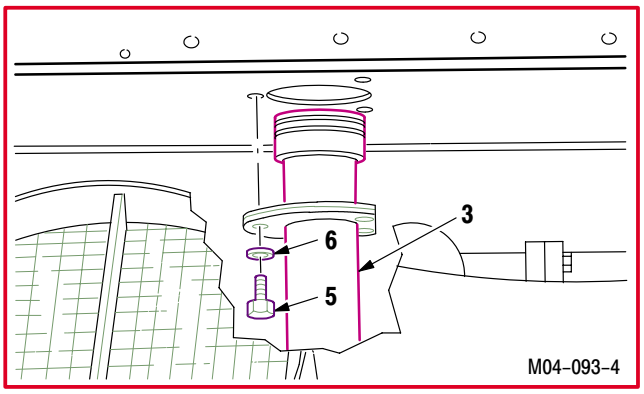
a. **Remove coupling (1) from line (2) and engine start tube (3).**

(1) Remove and discard two packings (4).



b. **Remove tube (3).**

(1) Remove three bolts (5) and washers (6).

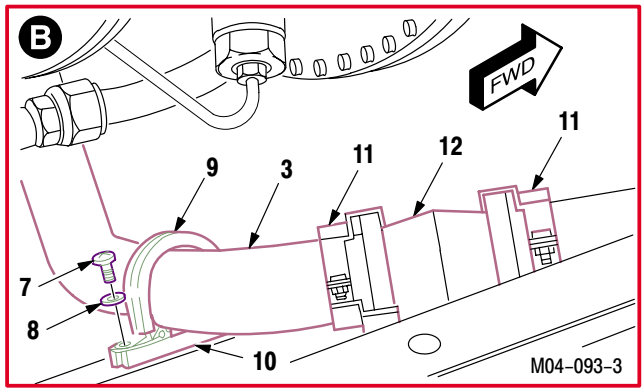


(2) Remove two screws (7), washers (8), clamp (9), and support block (10).

(3) Loosen two clamps (11).

(4) Slide housing (12) on tube (3).

(5) Remove air tube (3).

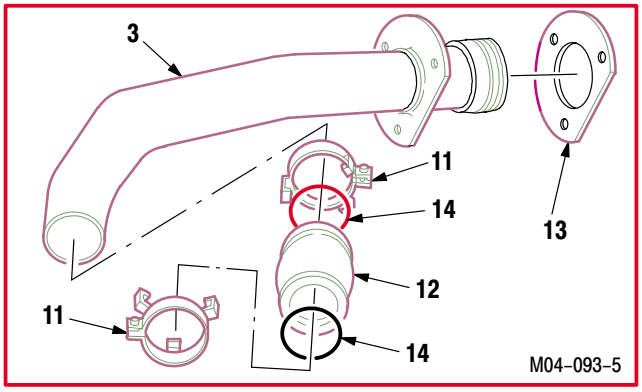


c. **Remove and discard gasket (13).**

d. **Remove housing (12) and two clamps (11) from tube (3).**

(1) Remove two clamps (11) from housing (12).

(2) Remove and discard two seals (14) from housing (12).



GO TO NEXT PAGE

7.146. NO. 2 ENGINE START AIR TUBE AND AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION – continued

7.146.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.146.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.146.6. Installation



a. **Lubricate two new seals (14).** Use petrolatum (item 138, App F).

b. **Install two seals (14) in housing (12).**

c. **Install two clamps (11) on housing (12).**

d. **Install housing (12) on tube (3).**

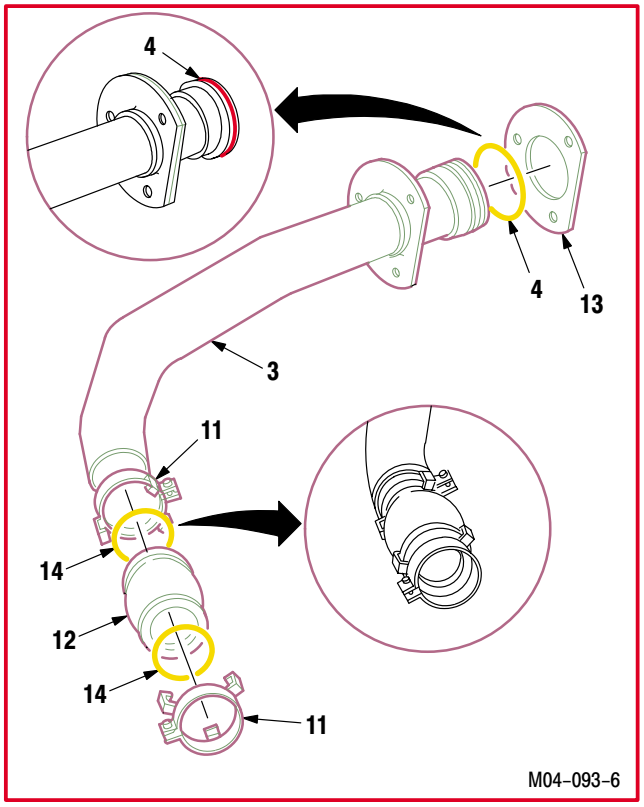
e. **Install tube (3).**

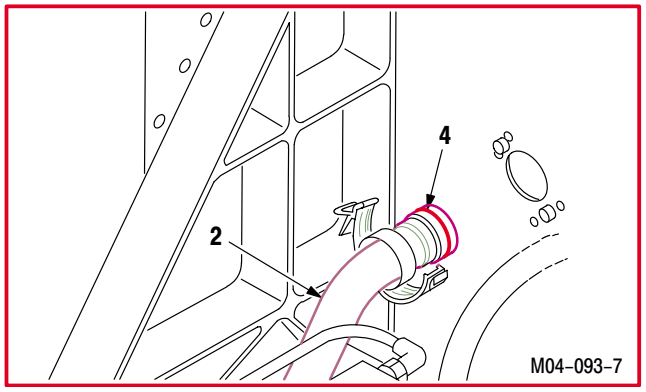
(1) Install new gasket (13) on tube (3).

(2) Lubricate two new packings (4). Use petrolatum (item 138, App F).

(3) Install packing (4) on tube (3).

(4) Install packing (4) on line (2).



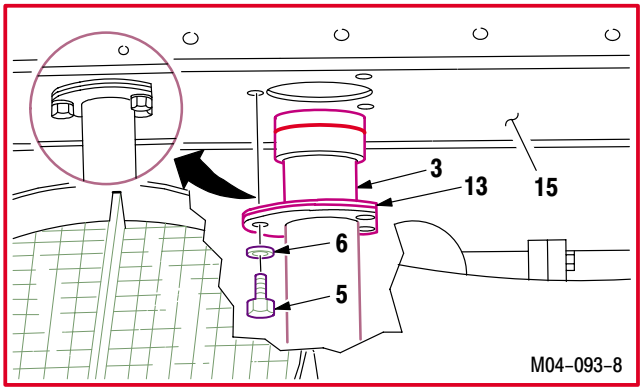


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7.146. NO. 2 ENGINE START AIR TUBE AND AIR FLEXIBLE CONNECTION HOUSING REMOVAL/INSTALLATION – continued

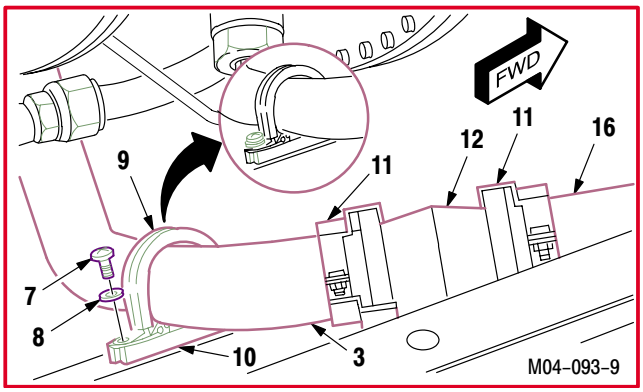
(5) Install tube (3) through firewall (15).

(6) Install three bolts (5) through washers (6), tube (3), and gasket (13) into firewall (15).



(7) Slide housing (12) on line (16) until centered. Tighten two clamps (11).

(8) Install two bolts (7) through two washers (8) and clamp (9) into support block (10).



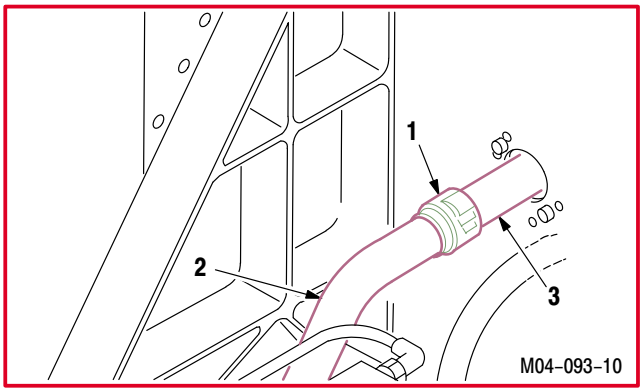
f. **Install coupling (1) on tube (3) and line (2).**

g. **Inspect (QA).**

h. **Perform pressurized air system leak check** (para 7.115)**.**

i. **Install APU cover** (para 15.42)**.**

j. **Secure access doors RN1, RN3, RN4, T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.147. PRESSURIZED AIR SYSTEM FUEL BOOST PUMP HOSE REPLACEMENT

7.147.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.147.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
1 3/8 & 1 7/16-inch open end wrench (item 421, App H)

Materials/Parts:

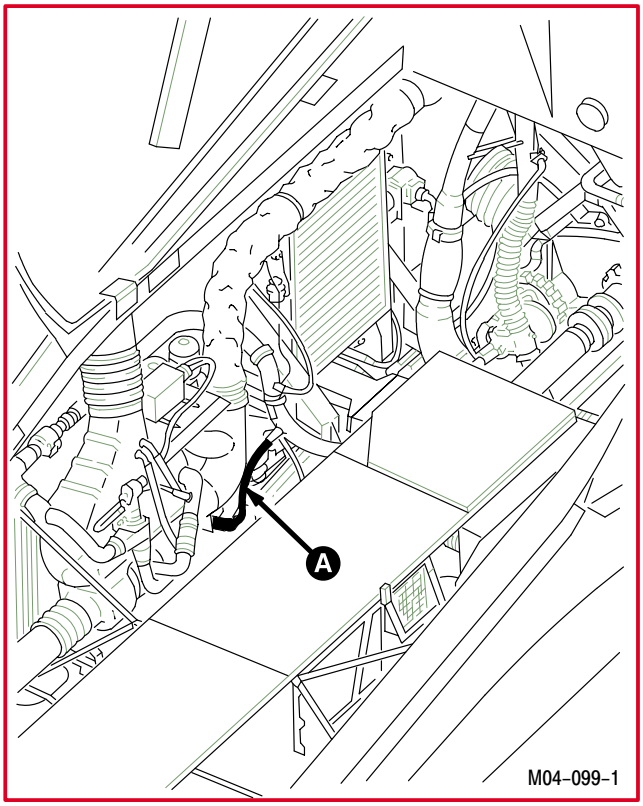
Damping fluid (item 69, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened



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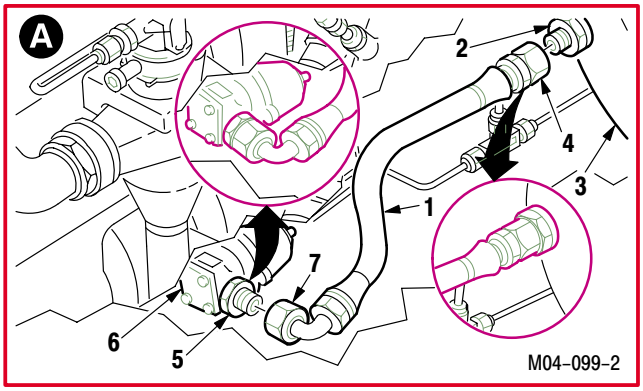
7.147. PRESSURIZED AIR SYSTEM FUEL BOOST PUMP HOSE REPLACEMENT – continued

7.147.3. Removal

a. **Remove hose (1).**

(1) Hold fitting (2) on pressure fluid manifold (3). Remove nut (4). Use open end wrench and crowfoot.

(2) Hold union (5) on valve (6). Remove nut (7). Use open end wrench and crowfoot.



7.147.4. Cleaning

a. **Wipe attaching parts with a clean rag.**

7.147.5. Inspection

a. **Check pressure fluid manifold and valve for cracks, dents, and scratches** (para 7.114)**.**

b. **Check attaching parts for corrosion** (para 1.49)**.**

7.147.6. Installation

a. **Install hose (1).**

(1) Lubricate fitting (2) and union (5) threads. Use damping fluid (item 69, App F).

(2) Hold union (5). Install nut (7). Use open end wrench and crowfoot.

(3) Hold fitting (2). Install nut (4). Use open end wrench and crowfoot.

b. **Inspect (QA).**

c. **Perform pressurized air system leak check** (para 7.115)**.**

d. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.148. AIR PRESSURE REGULATING VALVE REMOVAL/INSTALLATION

7.148.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.148.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/16 & 1 1/4-inch open end wrench (item 416, App H)
1 3/8 & 1 7/16-inch open end wrench (item 421, App H)

Materials/Parts:

Packing (2)
Petrolatum (item 138, App F)
Damping fluid (item 69, App F)

Personnel Required:

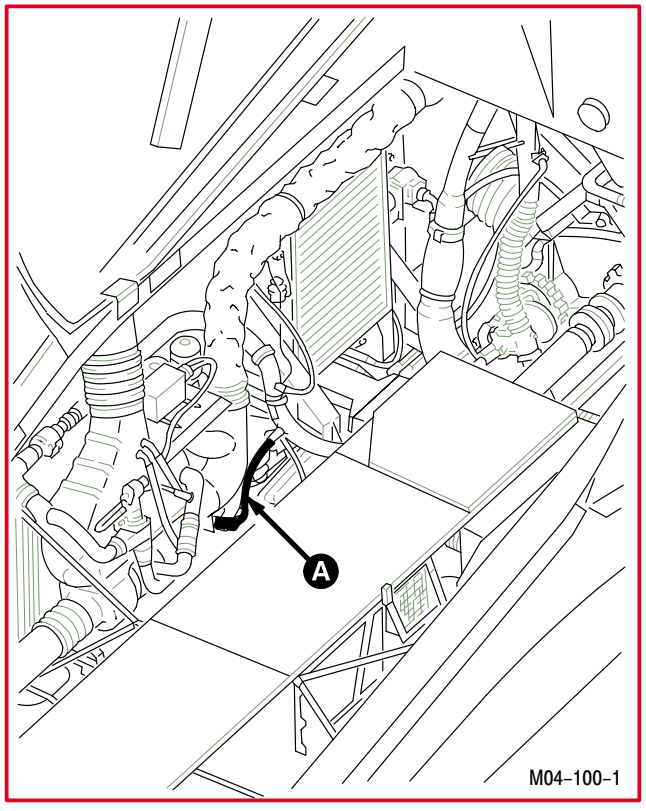
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
13.3	Environmental control unit removed



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7.148. AIR PRESSURE REGULATING VALVE REMOVAL/INSTALLATION – continued

7.148.3. Removal

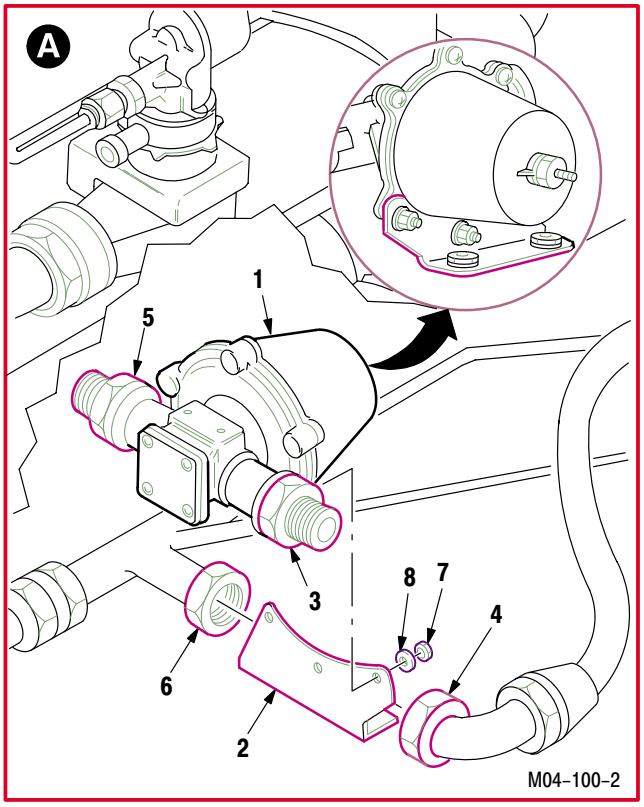
a. **Remove air pressure regulating valve (1) from support (2).**

(1) Hold union (3). Remove nut (4). Use open end wrenches.

(2) Hold union (5). Remove nut (6). Use open end wrenches.

(3) Remove three nuts (7) and washers (8) from valve (1).

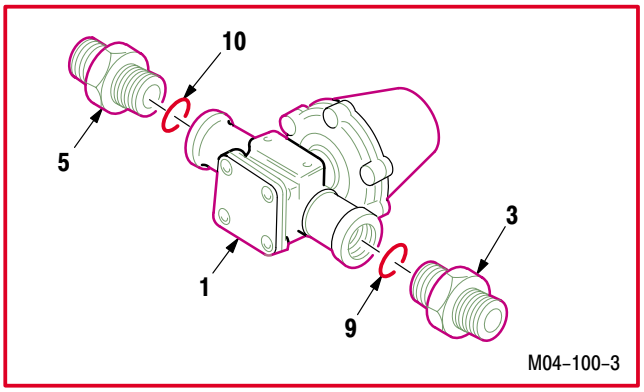
(4) Remove valve (1).



b. **Remove unions (3) and (5) from valve (1).**

(1) Remove unions (3) and (5). Use open end wrench.

(2) Remove and discard packings (9) and (10) from unions (3) and (5).



7.148.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.148.5. Inspection

a. **Check unions, hose, and pressure manifold for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.148. AIR PRESSURE REGULATING VALVE REMOVAL/INSTALLATION – continued

7.148.6. Installation



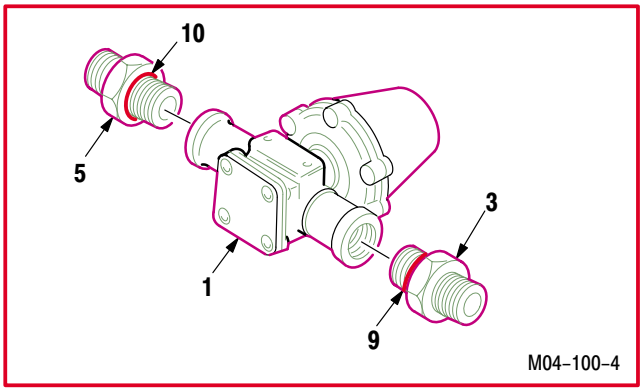
a. **Install unions (3) and (5) on valve (1).**

(1) Lubricate new packings (9) and (10). Use petrolatum (item 138, App F).

(2) Install packings (9) and (10) on unions (3) and (5).

(3) Lubricate threads of unions (3) and (5) on packing side. Use damping fluid (item 69, App F).

(4) Install unions (3) and (5). Use open end wrench.



b. **Install valve (1) on support (2).**

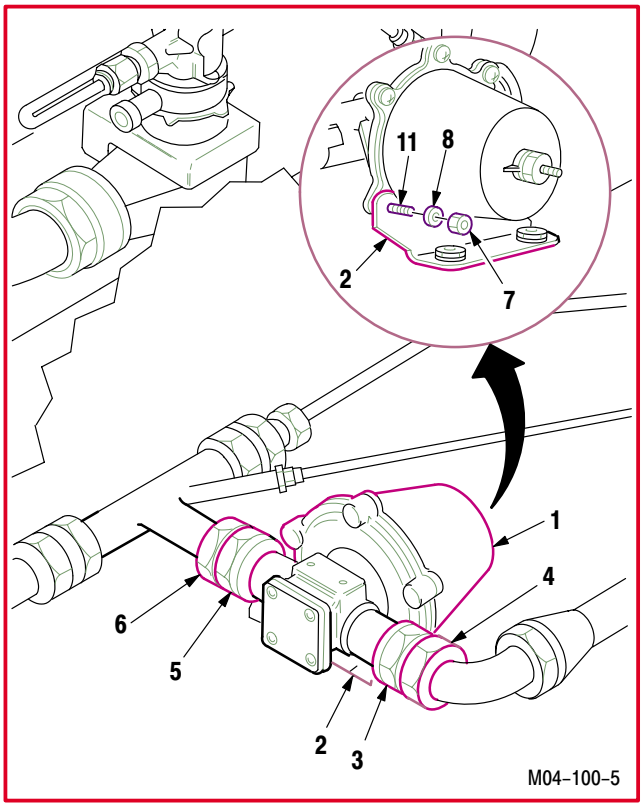
(1) Install three valve studs (11) through support (2).

(2) Install three washers (8) and nuts (7) on valve studs (11).

(3) Lubricate threads of unions (3) and (5). Use damping fluid (item 69, App F).

(4) Hold union (5). Install nut (6). Use open end wrenches.

(5) Hold union (3). Install nut (4). Use open end wrenches.



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7.148. AIR PRESSURE REGULATING VALVE REMOVAL/INSTALLATION – continued

c. **Inspect (QA).**

d. **Install environmental control unit** (para 13.3)**.**

e. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

f. **Perform pressurized air system leak check** (para 7.115)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.149. PRESSURE MANIFOLD REMOVAL/INSTALLATION

7.149.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.149.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
1 1/4 & 1 5/16-inch open end wrench (item 419, App H)
1 3/8 & 1 7/16-inch open end wrench (item 421, App H)

Materials/Parts:

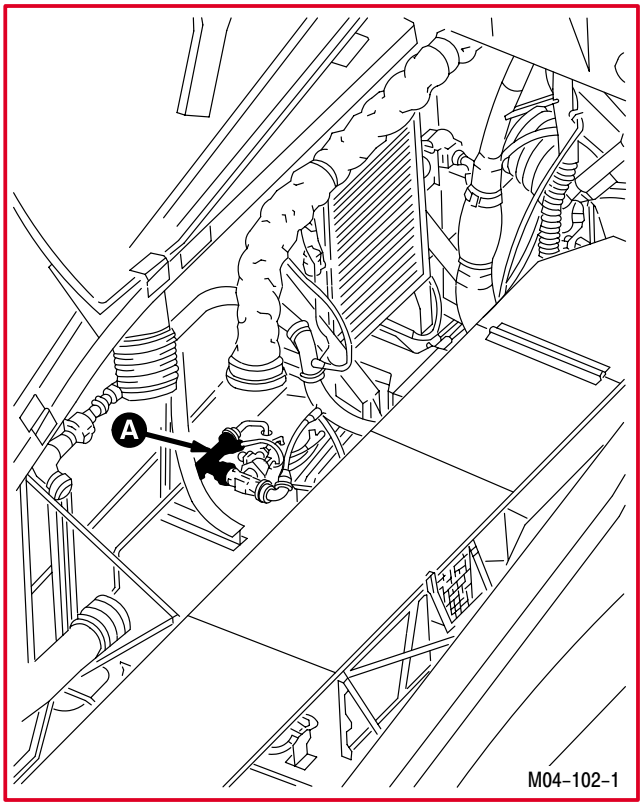
Damping fluid (item 69, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
13.3	Environmental control unit removed



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7.149. PRESSURE MANIFOLD REMOVAL/INSTALLATION – continued

7.149.3. Removal

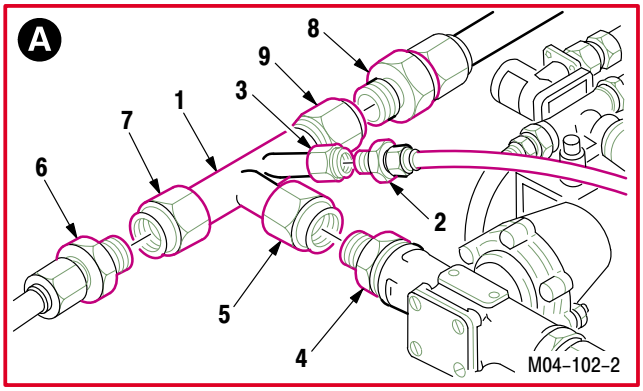
a. **Remove manifold (1).**

(1) Hold reducer (2). Remove nut (3). Use open end wrench.

(2) Hold union (4). Remove nut (5). Use open end wrenches.

(3) Hold reducer (6). Remove nut (7). Use open end wrenches.

(4) Hold reducer (8). Remove nut (9). Use open end wrenches.



7.149.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.149.5. Inspection

a. **Check reducers and union for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.149. PRESSURE MANIFOLD REMOVAL/INSTALLATION – continued

7.149.6. Installation

a. **Install manifold (1).**

(1) Lubricate threads on reducers (2), (6), (8) and union (4). Use damping fluid (item 69, App F).

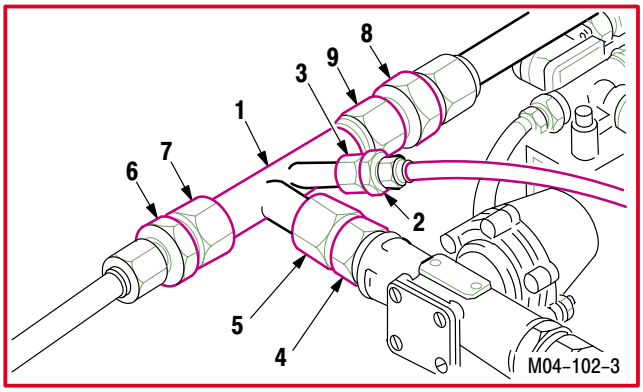
(2) Position manifold (1) in place.

(3) Hold reducer (8). Install nut (9). Use open end wrenches.

(4) Hold reducer (6). Install nut (7). Use open end wrenches.

(5) Hold union (4). Install nut (5). Use open end wrenches.

(6) Hold reducer (2). Install nut (3). Use open end wrench.



b. **Inspect (QA).**

c. **Install environmental control unit** (para 13.3)**.**

d. **Perform pressurized air system leak check** (para 7.115)**.**

e. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.150. FUEL BOOST PUMP SOLENOID SHUTOFF VALVE REMOVAL/INSTALLATION

7.150.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.150.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

References:

TM 1-1520-238-T

Materials/Parts:

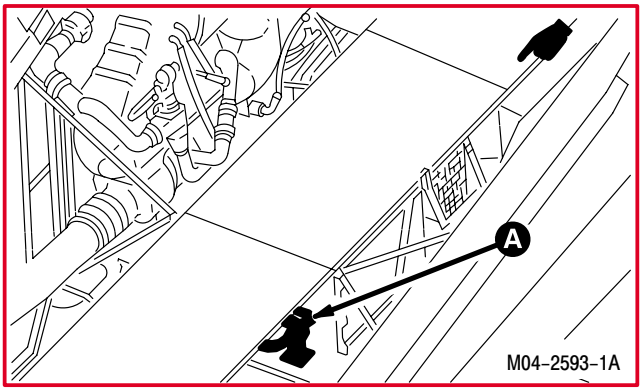
Damping fluid (item 69, App F)
Wire (item 222, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
10.32	Aft fuel cell access panel removed



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7.150. FUEL BOOST PUMP SOLENOID SHUTOFF VALVE REMOVAL/INSTALLATION – continued

7.150.3. Removal

a. **Remove lockwire from connector P242 (1).**

b. **Detach connector P242 (1) from receptacle (L15)J1 (2).**

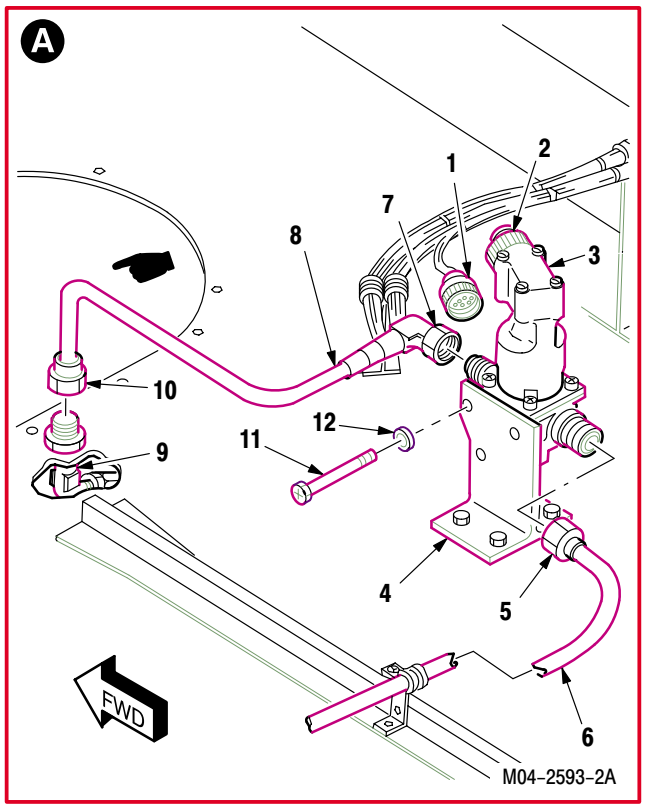
c. **Remove valve (3) from bracket (4).**

(1) Remove nut (5). Remove tube (6).

(2) Remove nut (7). Remove tube (8).

(3) Hold elbow (9). Remove nut (10).

(4) Remove three screws (11) and washers (12).



7.150.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.150.5. Inspection

a. **Check tubes and bracket for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

c. **Check connector and receptacle for cracks, corrosion, bent, broken, or damaged pins** (para 7.114)**.**

d. **Check for loose or missing screws.** None allowed.

e. **Check valve housing for cracks or dents.** None allowed.

f. **Check for stripped threads.** Thread damage shall not exceed one half of one thread.

g. **Check identification plate condition.** No damage allowed.

h. **Check electromagnet case for damage.** None allowed.

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7.150. FUEL BOOST PUMP SOLENOID SHUTOFF VALVE REMOVAL/INSTALLATION – continued

i. **Check for worn or damaged coating to bare metal** (para 7.114)**.**

7.150.6. Installation

a. **Install valve (3) on bracket (4).**

(1) Install three screws (11) and washers (12).



b. **Install tubes (6) and (8) on valve (3).**

(1) Lubricate threaded ends of valve (3). Use damping fluid (item 69, App F).

(2) Hold elbow (9). Install nut (10).

(3) Install nut (7).

(4) Install nut (5).

c. **Attach connector P242 (1) to receptacle (L15)J1 (2).**

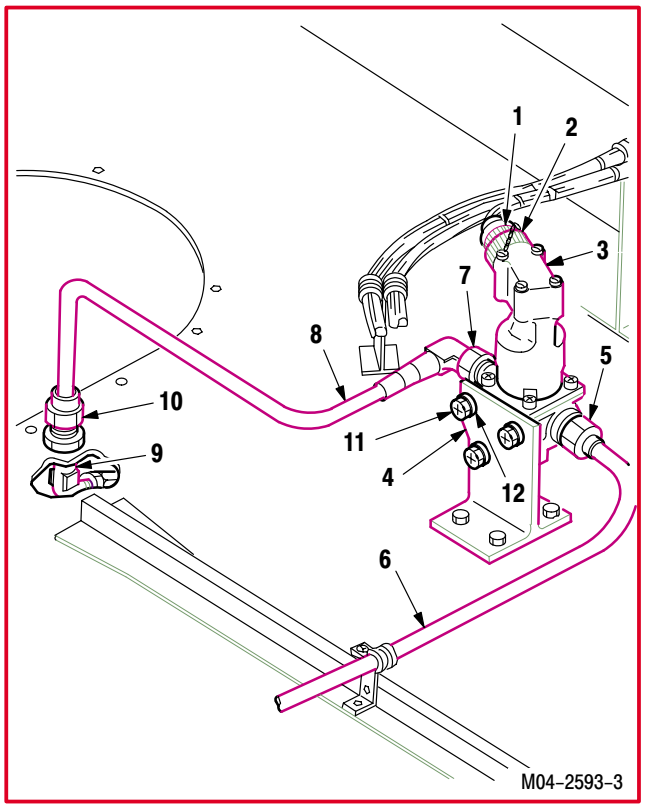
d. **Lockwire connector P242 (1) to valve (3).** Use wire (item 222, App F).

e. **Inspect (QA).**

f. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

g. **Perform pressurized air system leak check** (para 7.115)**.**

h. **Install aft fuel access panel** (para 10.32)**.**



END OF TASK

7.151. FUEL TANK PRESSURE CONTROL VALVE REMOVAL/INSTALLATION

7.151.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.151.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

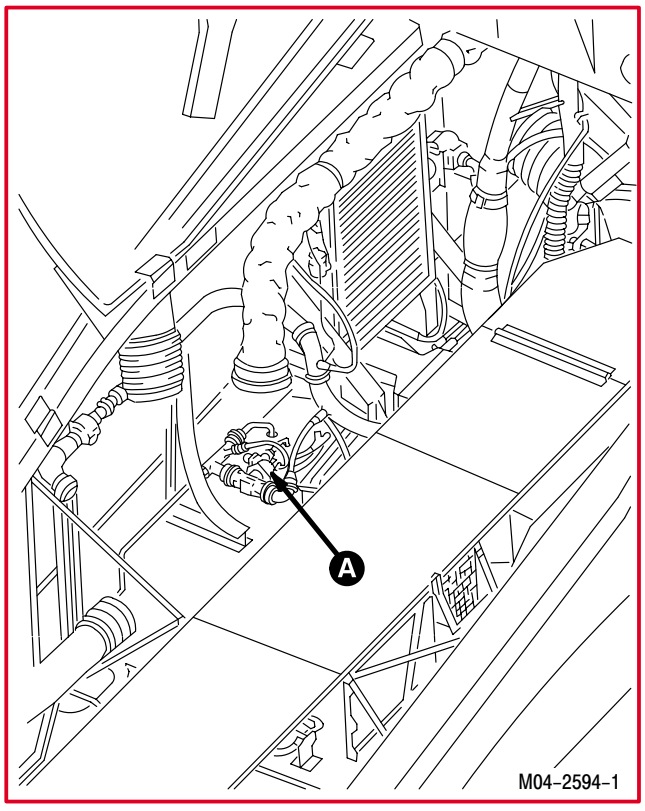
TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
13.3	Environmental control unit removed

Materials/Parts:

Packing (3)
Damping fluid (item 69, App F)
Petrolatum (item 138, App F)
Wire (item 222, App F)



GO TO NEXT PAGE

7.151. FUEL TANK PRESSURE CONTROL VALVE REMOVAL/INSTALLATION – continued

7.151.3. Removal

a. **Remove lockwire from connector P243 (1).**

b. **Detach connector P243 (1) from receptacle (L14)J1 (2).**

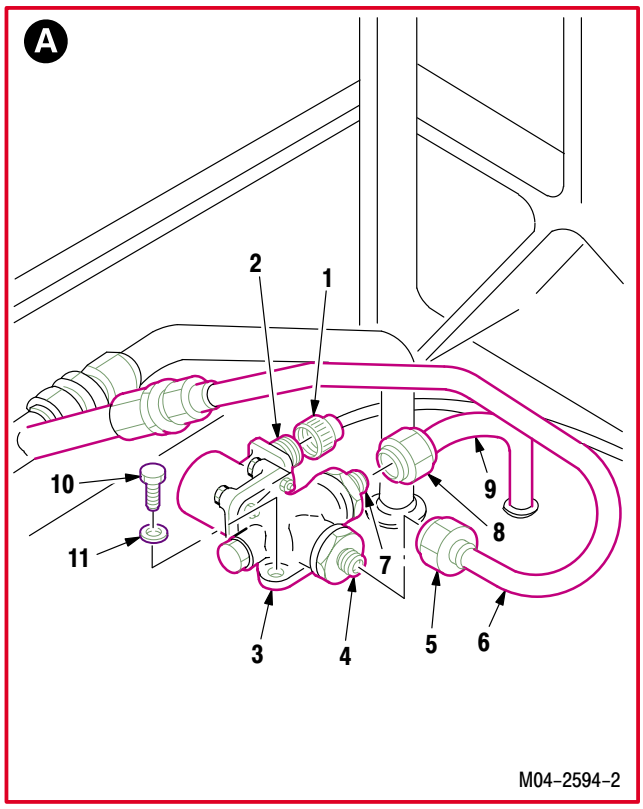
c. **Remove valve (3).**

(1) Hold reducer (4). Remove nut (5) on tube (6).

(2) Hold reducer (7). Remove nut (8) on tube (9).

(3) Remove two bolts (10) and washers (11) from valve (3).

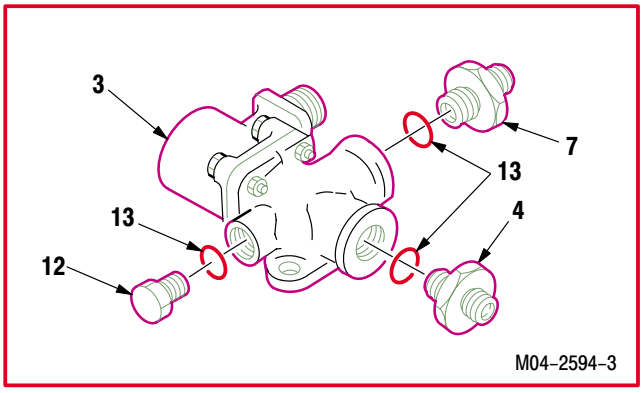
(4) Remove valve (3).



d. **Remove plug (12) and reducers (4) and (7) from valve (3).**

(1) Remove plug (12) and reducers (4) and (7).

(2) Remove and discard three packings (13) from plug (12) and reducers (4) and (7).



7.151.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.151.5. Inspection

a. **Check tubes, reducers, and plug for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.151. FUEL TANK PRESSURE CONTROL VALVE REMOVAL/INSTALLATION – continued

c. **Check fittings and plug for crossed, burred, and stripped threads** (para 7.114)**.**

d. **Check connector and receptacle for rough or binding action; foreign objects, and bent, broken, loose, or missing pins** (para 7.114)**.**

e. **Check valve and bracket for cracks and dented housing.** None allowed.

f. **Check solenoid case for damage.** None allowed.

f. **Check valve for loose or missing hardware.** None allowed.

g. **Check identification plate for damage.** None allowed.

h. **Check for worn or damaged coating to bare metal** (para 7.114)**.**

i. **Check removed and attaching parts for nicks, gouges, scratches, and cracks** (para 7.114)**.**

7.151.6. Installation



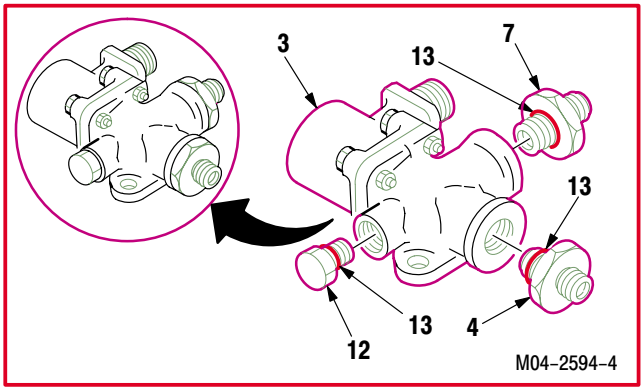
a. **Install plug (12) and reducers (4) and (7) on valve (3).**

(1) Lubricate three new packings (13). Use petrolatum (item 138, App F).

(2) Install packings (13) on plug (12) and reducers (4) and (7).

(3) Lubricate threads of plug (12) and reducers (4) and (7) on packing side. Use damping fluid (item 69, App F).

(4) Install plug (12) and reducers (4) and (7) on valve (3).



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7.151. FUEL TANK PRESSURE CONTROL VALVE REMOVAL/INSTALLATION – continued

b. **Install valve (3).**

(1) Position valve (3). Install two bolts (10) and washers (11).

(2) Install tube (9). Hold reducer (7). Install nut (8).

(3) Install tube (6). Hold reducer (4). Install nut (5).

c. **Attach connector P243 (1) to receptacle (L14)J1 (2).**

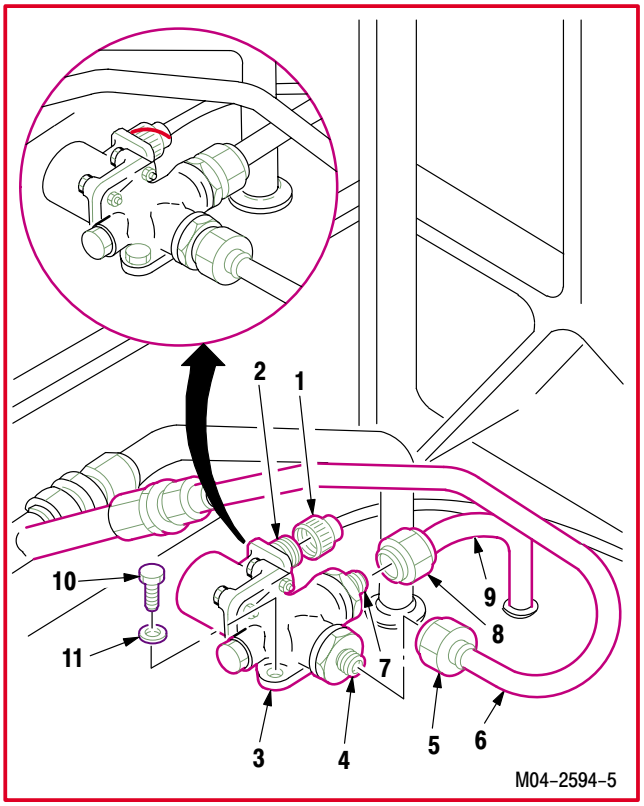
d. **Lockwire connector P243 (1) to receptacle (L14)J1 (2).** Use wire (item 222, App F).

e. **Inspect (QA).**

f. **Install environmental control unit** (para 13.3)**.**

g. **Perform pressurized air system maintenance operational check** (TM 1-1520-238-T)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.152. PRESSURIZED AIR SYSTEM LEFT AND RIGHT AUXILIARY FUEL QUICK-DISCONNECT BRANCH TUBES AND COUPLINGS REMOVAL/INSTALLATION

7.152.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.152.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Materials/Parts:

Damping fluid (item 69, App F)

Personnel Required:

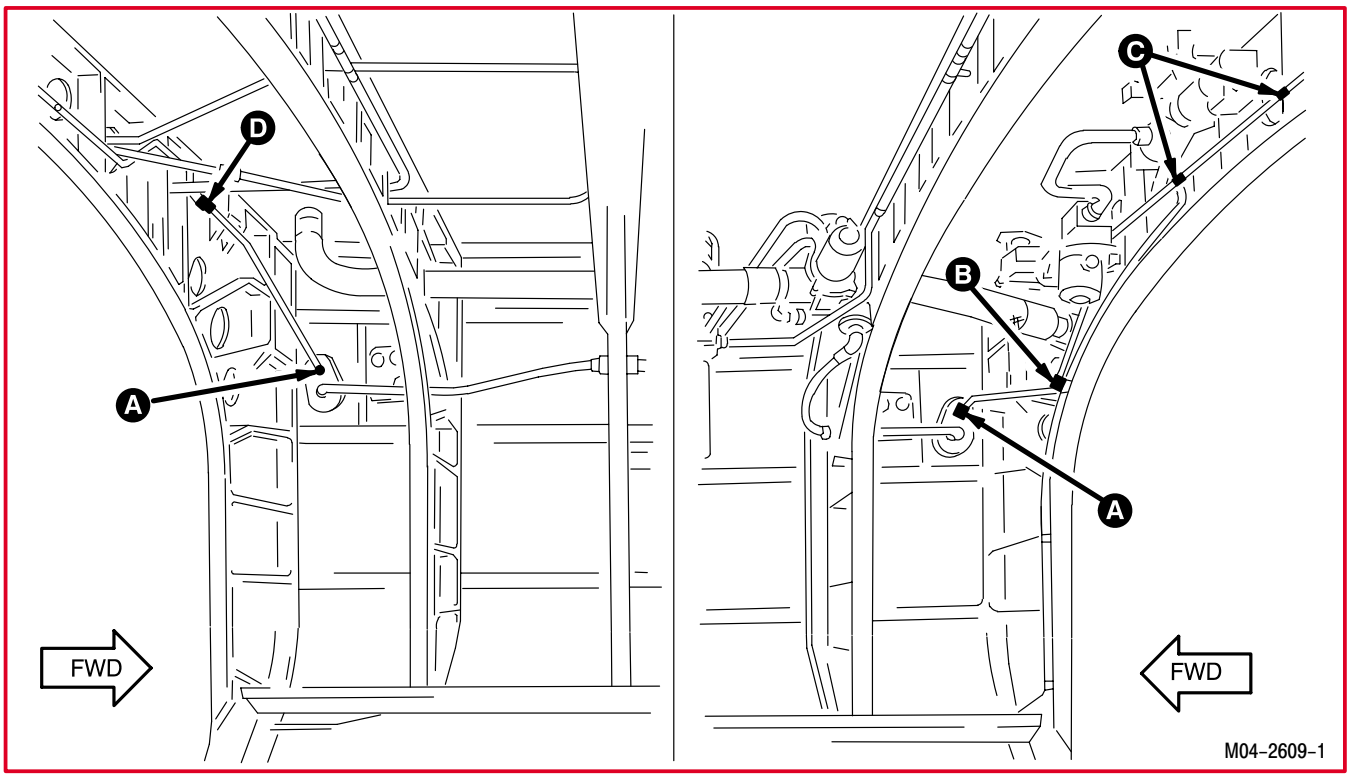
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 9-1090-208-23

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.122	Wing trailing edge removed
TM 9-1090-208-23	Ammunition storage magazine removed



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7.152. PRESSURIZED AIR SYSTEM LEFT AND RIGHT AUXILIARY FUEL QUICK-DISCONNECT BRANCH TUBES AND COUPLINGS REMOVAL/INSTALLATION – continued

NOTE

- This task is typical for left and right branch tubes.
- If extended range kit is installed, ensure air tubes are disconnected from coupling assembly.

7.152.3. Removal

a. **Remove right branch tube (1) from coupling assembly (2).**

(1) Hold coupling (2) from outside of fuselage (3).

(2) Remove nut (4) from inside of ammunition bay.

b. **Remove coupling assembly (2) from fuselage (3).**

(1) Hold coupling (2). Remove nut (5) and washer (6) from coupling (2).

(2) Remove coupling (2).

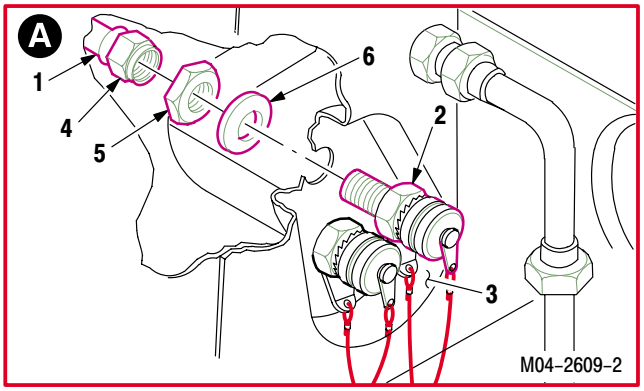
c. **Remove tube (1).**

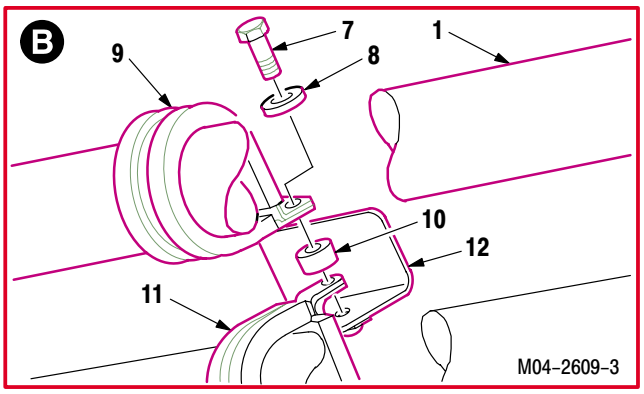
(1) Remove bolt (7), washer (8), clamp (9), spacer (10), and clamp (11) from bracket (12).

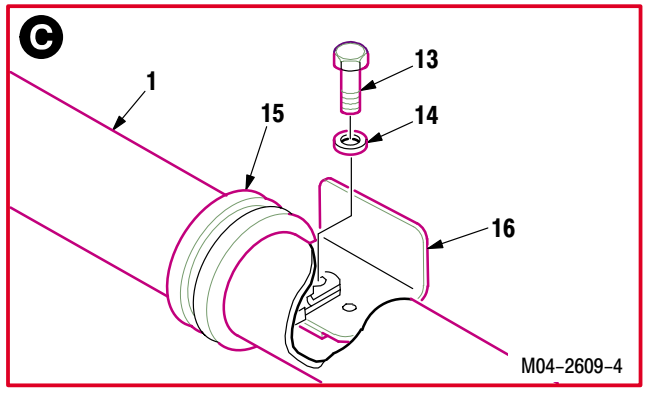
(2) Remove two bolts (13), washers (14), and clamps (15) from brackets (16).

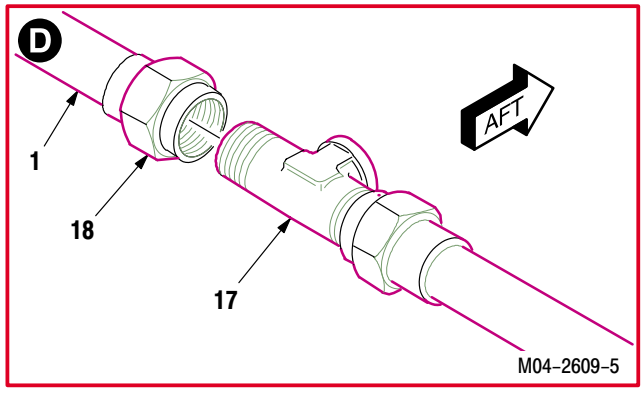
(3) Hold tee (17). Remove nut (18).

(4) Remove tube (1).









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7.152. PRESSURIZED AIR SYSTEM LEFT AND RIGHT AUXILIARY FUEL QUICK-DISCONNECT BRANCH TUBES AND COUPLINGS REMOVAL/INSTALLATION – continued

7.152.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.152.5. Inspection

a. **Check removed and attaching parts for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

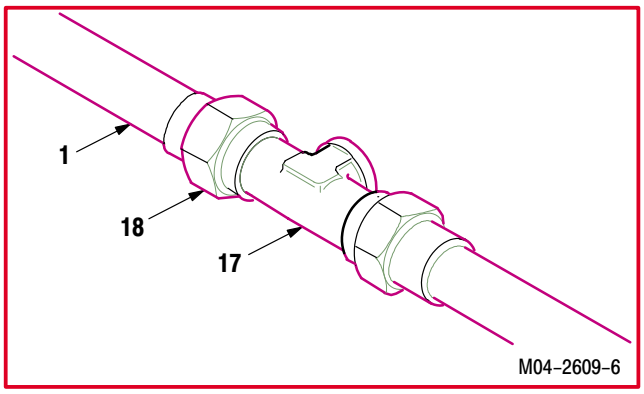
7.152.6. Installation

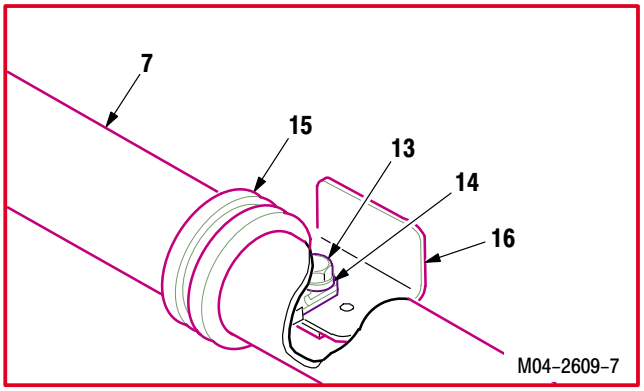
a. **Install tube (1).**

(1) Lubricate threads of tee (17). Use damping fluid (item 69, App F).

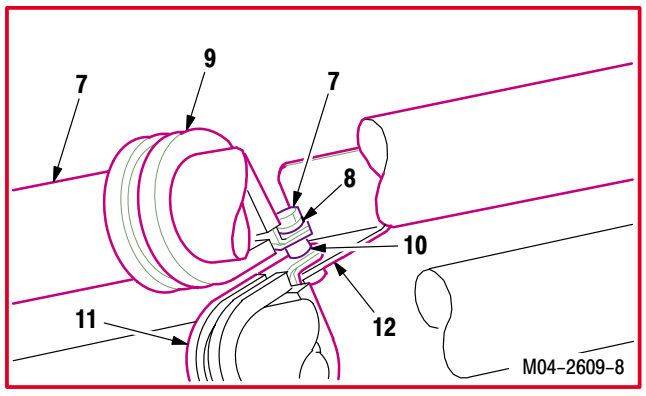
(2) Install tube (1) on tee (17). Hold tee (17). Install nut (18).

(3) Install two bolts (13) through washers (14) and clamps (15) into bracket (16).





(4) Install bolt (7) through washer (8), clamp (9), spacer (10), and clamp (11) into bracket (12).



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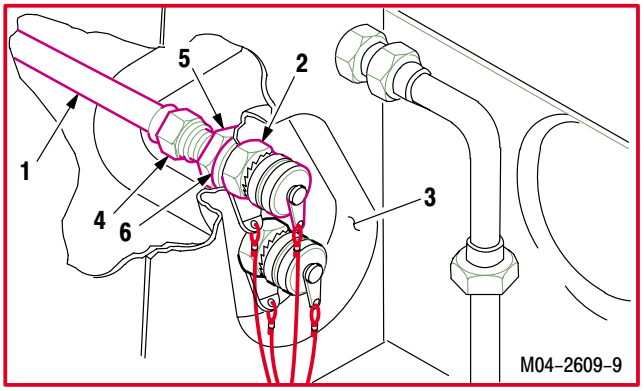
7.152. PRESSURIZED AIR SYSTEM LEFT AND RIGHT AUXILIARY FUEL QUICK-DISCONNECT BRANCH TUBES AND COUPLINGS REMOVAL/INSTALLATION – continued

b. **Install coupling (2) on fuselage (3).**

(1) Lubricate threads of coupling (2). Use damping fluid (item 69, App F).

(2) Install coupling (2) through fuselage (3).

(3) Hold coupling (2) from outside of fuselage. Install washer (6) and nut (5) on coupling (2) from inside of ammunition bay.



c. **Install tube (1) on coupling (2).**

(1) Hold coupling (2). Install nut (4).

d. **Inspect (QA).**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Install wing trailing edge** (para 2.122)**.**

g. **Install ammunition storage magazine** (TM 9-1090-208-23)**.**

END OF TASK

7.153. ENVIRONMENTAL CONTROL UNIT FORWARD AIR TUBE REMOVAL/INSTALLATION

7.153.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.153.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

Materials/Parts:

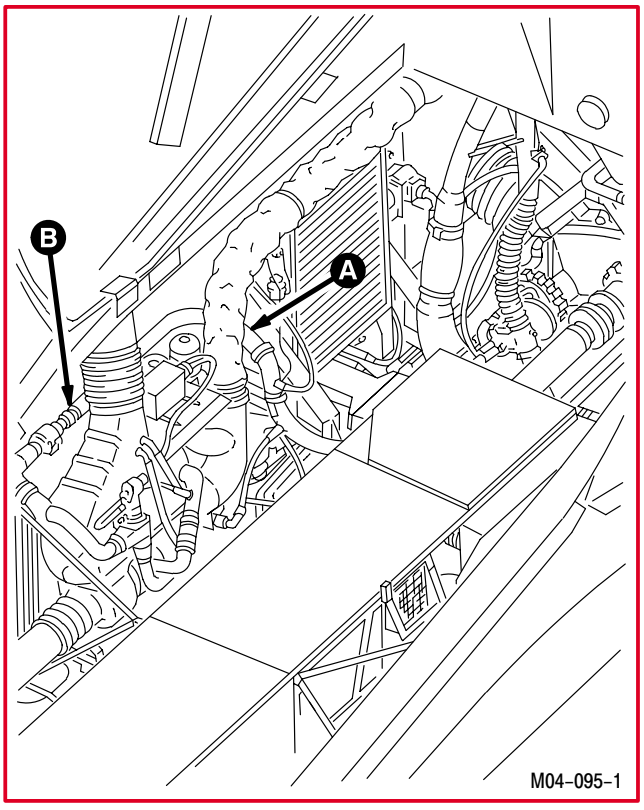
Packing (4)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened



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7.153. ENVIRONMENTAL CONTROL UNIT FORWARD AIR TUBE REMOVAL/INSTALLATION – continued

7.153.3. Removal

a. **Remove tube (1) from manifold (2) and duct (3).**

(1) Remove coupling (4) from tube (1) and manifold (2).

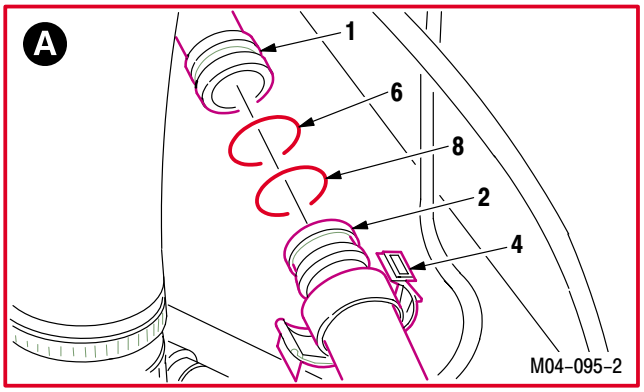
(2) Remove coupling (5) from tube (1) and duct (3).

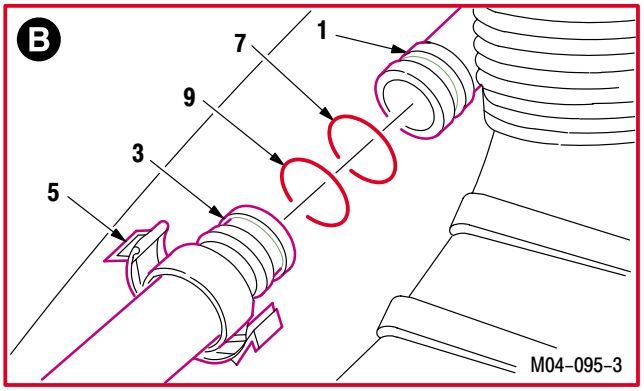
(3) Remove and discard packings (6) and (7) from tube (1).

(4) Remove tube (1).

b. **Remove and discard packing (8) from manifold (2).**

c. **Remove and discard packing (9) from duct (3).**





7.153.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.153.5. Inspection

a. **Check tube, duct, and manifold for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.153. ENVIRONMENTAL CONTROL UNIT FORWARD AIR TUBE REMOVAL/INSTALLATION – continued

7.153.6. Installation



a. **Lubricate new packings (6), (7), (8), and (9).** Use petrolatum (item 138, App F).

b. **Install packing (9) on duct (3).**

c. **Install packing (8) on manifold (2).**

d. **Install tube (1) on manifold (2) and duct (3).**

(1) Install packings (6) and (7) on tube (1).

(2) Install tube (1).

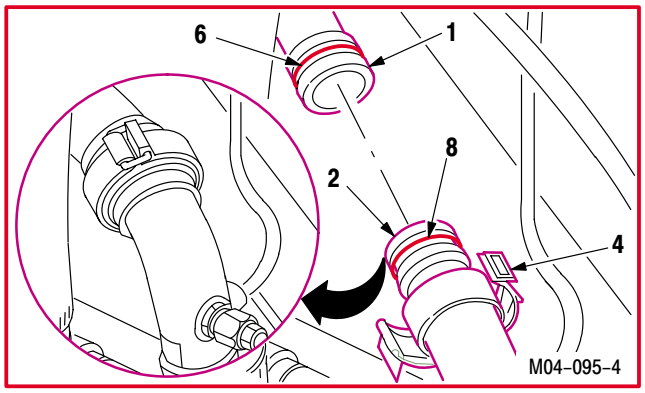
(3) Install coupling (4) on tube (1) and manifold (2).

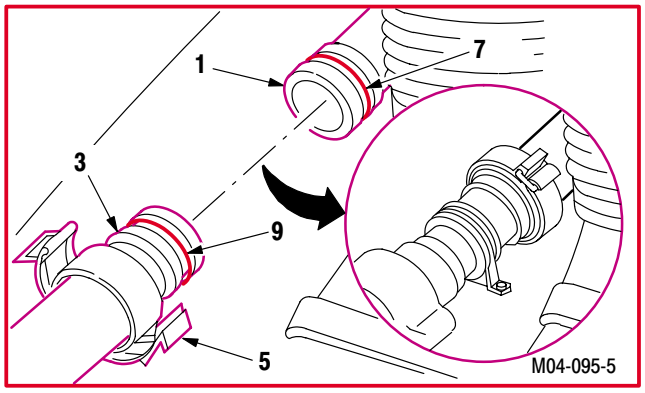
(4) Install coupling (5) on tube (1) and duct (3).

e. **Inspect (QA).**

f. **Perform pressurized air system leak check** (para 7.115)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**





END OF TASK

7.154. ENVIRONMENTAL CONTROL UNIT SHUTOFF VALVE DUCT REMOVAL/INSTALLATION

7.154.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.154.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1/4 x 1/4-inch drive deep socket wrench socket (item 296, App H)

Materials/Parts:

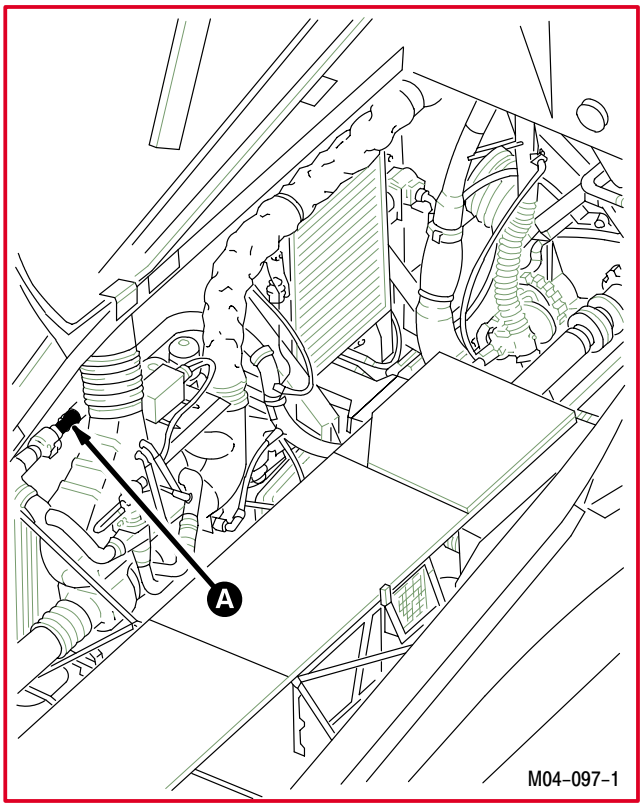
Packing (3)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened



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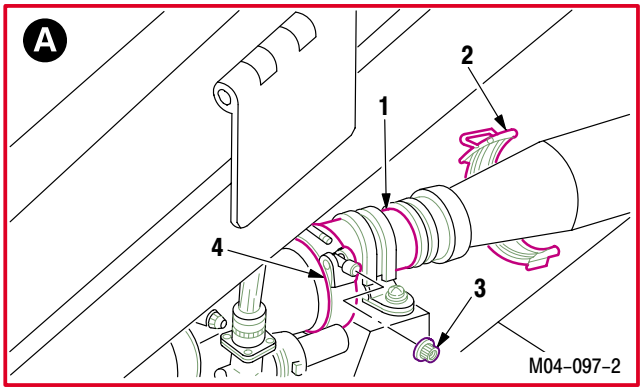
7.154. ENVIRONMENTAL CONTROL UNIT SHUTOFF VALVE DUCT REMOVAL/INSTALLATION – continued

7.154.3. Removal

a. **Remove duct (1).**

(1) Remove coupling (2).

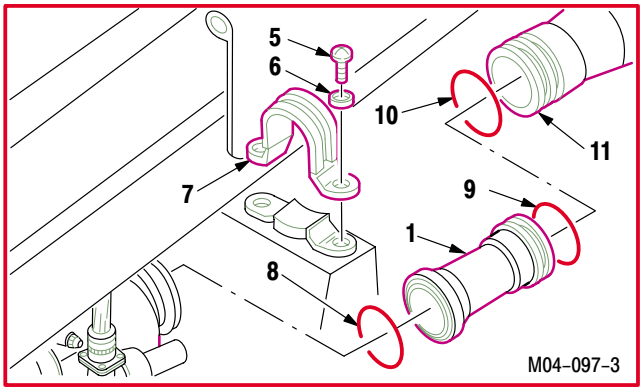
(2) Remove nut (3) and coupling (4). Use socket.



(3) Remove two screws (5), washers (6), and clamp (7).

(4) Remove duct (1).

(5) Remove and discard packings (8) and (9).



b. **Remove and discard packing (10) from tube (11).**

7.154.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.154.5. Inspection

a. **Check tube and duct for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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7.154. ENVIRONMENTAL CONTROL UNIT SHUTOFF VALVE DUCT REMOVAL/INSTALLATION – continued

7.154.6. Installation



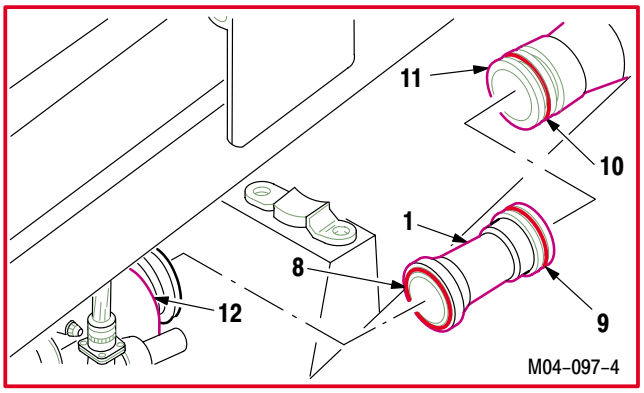
a. **Lubricate packings (8), (9), and (10).** Use petrolatum (item 138, App F).

b. **Install packing (10) on tube (11).**

c. **Install duct (1).**

(1) Install packings (8) and (9) on duct (1).

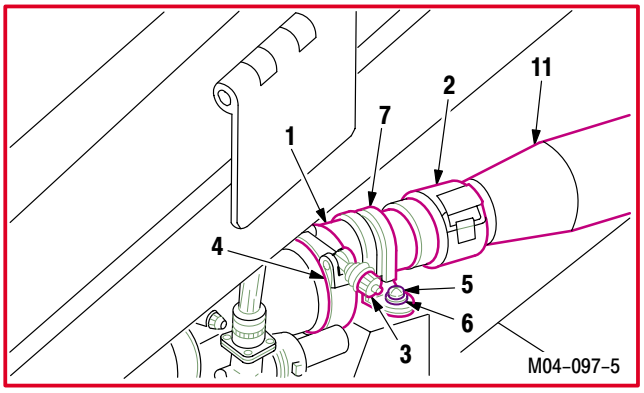
(2) Place duct (1) between tube (11) and valve (12).



(3) Install two screws (5) through two washers (6) and clamp (7).

(4) Install coupling (2).

(5) Install coupling (4) and nut (3). Use socket.



d. **Inspect (QA).**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

7.155. ENVIRONMENTAL CONTROL UNIT AFT AIR TUBE REMOVAL/INSTALLATION

7.155.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.155.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1/4 x 1/4-inch drive deep socket wrench socket (item 296, App H)

Materials/Parts:

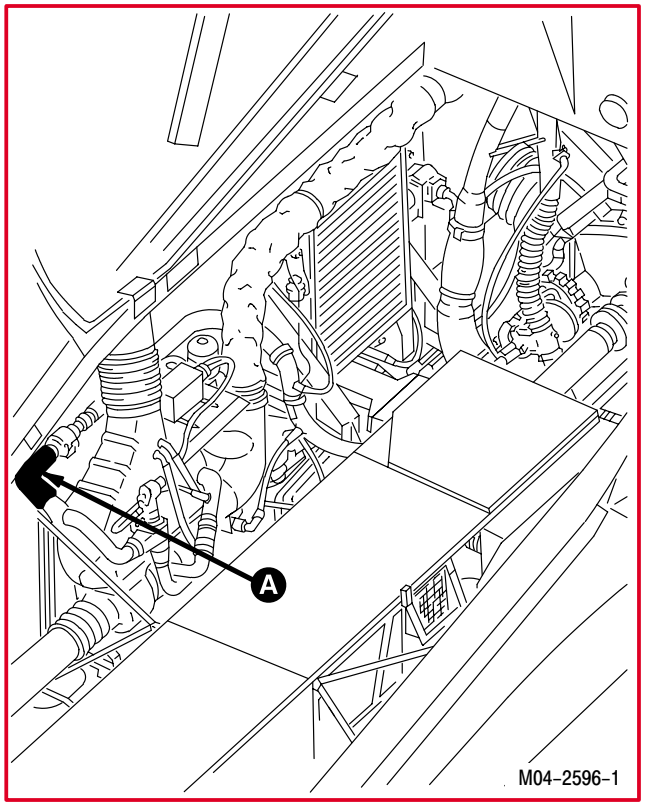
Packing (2)
Petrolatum (item 138, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened
13.15	ECS shutoff valve removed



GO TO NEXT PAGE

7.155. ENVIRONMENTAL CONTROL UNIT AFT AIR TUBE REMOVAL/INSTALLATION – continued

7.155.3. Removal

a. **Remove tube (1) from ENCU (2).**

(1) Remove nut (3) and coupling (4). Use socket.

(2) Remove and discard packings (5) and (6).

7.155.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.155.5. Inspection

a. **Check tube for cracks, dents, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.155.6. Installation



a. **Lubricate new packings (5) and (6).** Use petrolatum (item 138, App F).

b. **Install packings (5) and (6) on tube (1).**

c. **Install tube (1) on ENCU (2).**

(1) Install coupling (4). Aline tube (1).

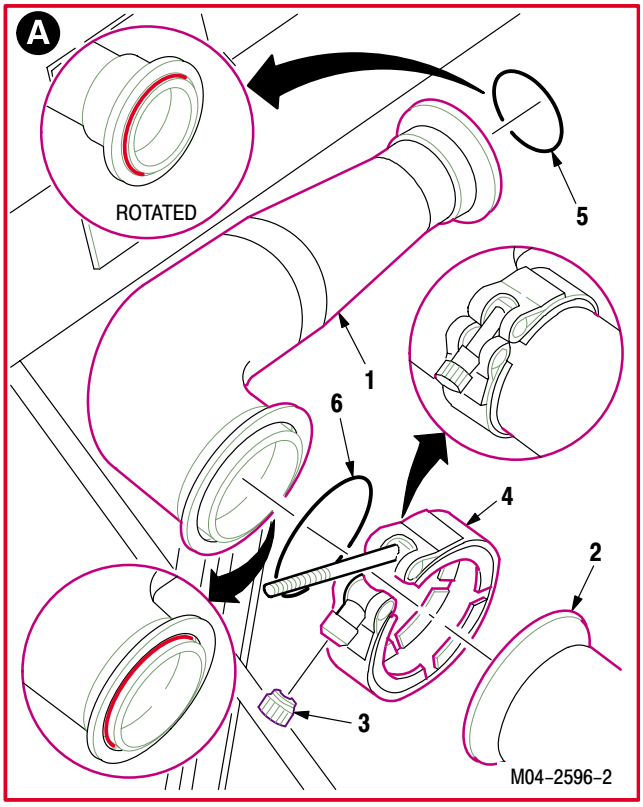
(2) Install ECS shutoff valve (para 13.15).

(3) Install nut (3). Use socket.

d. **Inspect (QA).**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**



END OF TASK

7.156. ICE DETECTOR WARM AIR SUPPLY VALVE REPLACEMENT

7.156.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.156.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Materials/Parts:

Damping fluid (item 69, App F)

Personnel Required:

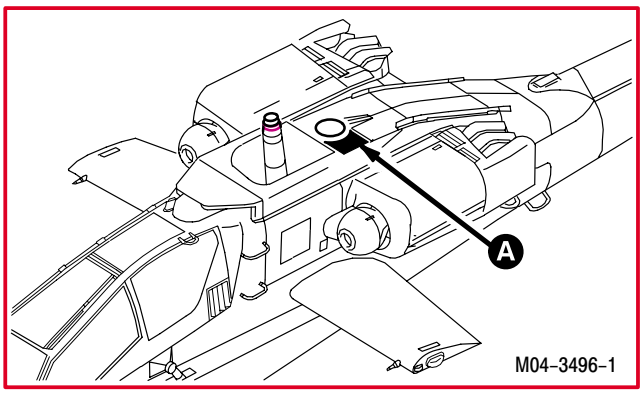
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

References:

TM 1-1520-238-T

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; fairing T205L removed



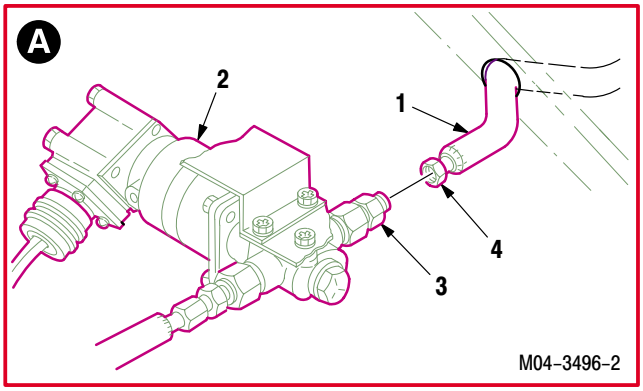
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7.156. ICE DETECTOR WARM AIR SUPPLY VALVE REPLACEMENT – continued

7.156.3. Removal

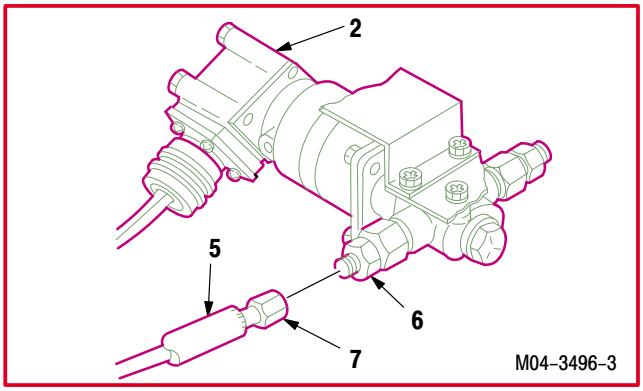
a. **Remove aft warm air supply tube (1) from warm air supply valve (2).**

(1) Hold reducer (3). Remove nut (4).



b. **Remove center warm air supply tube (5) from valve (2).**

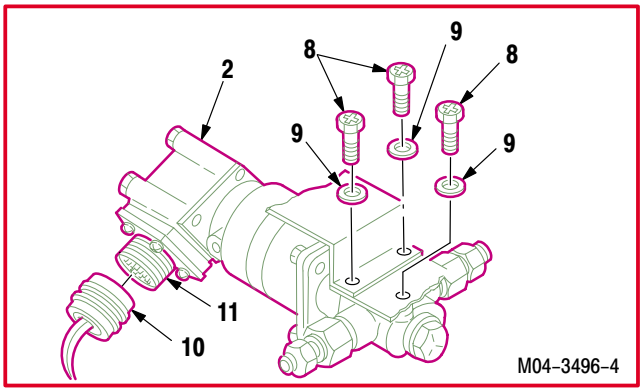
(1) Hold reducer (6). Remove nut (7).



c. **Remove valve (2).**

(1) Remove three screws (8) and washers (9).

(2) Detach connector P872 (10) from receptacle (L50)J1 (11).



7.156.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.156.5. Inspection

a. **Check removed and attaching parts for crossed, burred, or stripped threads** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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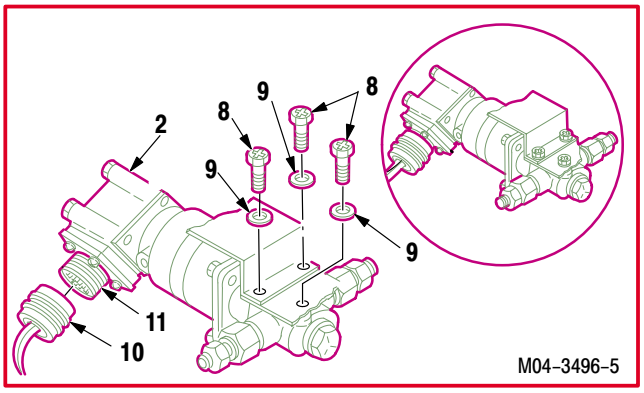
7.156. ICE DETECTOR WARM AIR SUPPLY VALVE REPLACEMENT – continued

7.156.6. Installation

a. **Install valve (2).**

(1) Attach connector P872 (10) to receptacle (L50)J1 (11).

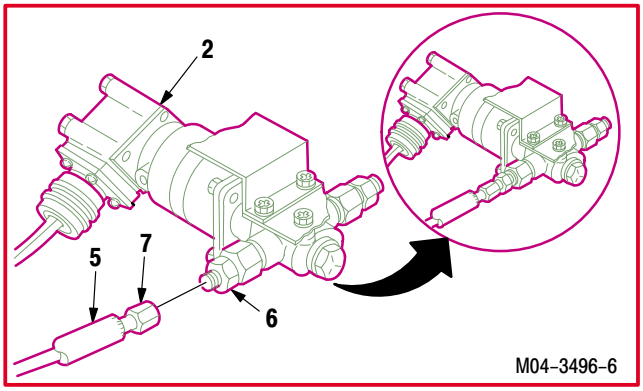
(2) Install three screws (8) and washers (9).



b. **Install tube (5) on valve (2).**

(1) Lubricate threads on reducer (6). Use damping fluid (item 69, App F).

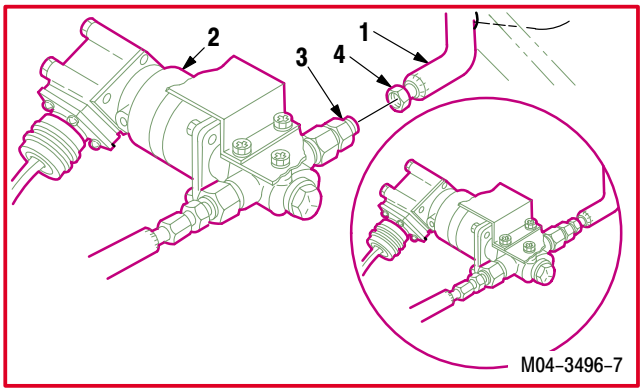
(2) Hold reducer (6). Install nut (7).



c. **Install tube (1) on valve (2).**

(1) Lubricate threads on reducer (3). Use damping fluid (item 69, App F).

(2) Hold reducer (3). Install nut (4).



d. **Inspect (QA).**

e. **Perform rotor blades de-ice maintenance operational check** (TM 1-1520-238-T)**.**

f. **Perform pressurized air system leak check** (para 7.115)**.**

g. **Secure access doors T250L, T250R, T290L, T290R, and L325; install fairing T205L** (para 2.2)**.**

END OF TASK

7.157. ICE DETECTOR AFT WARM AIR SUPPLY TUBE REPLACEMENT

7.157.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.157.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Materials/Parts:

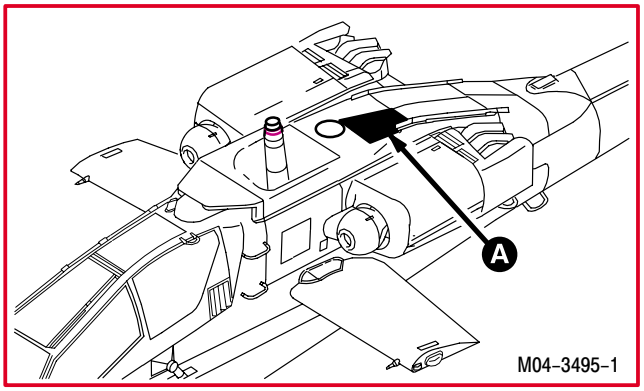
Damping fluid (item 69, App F)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Access doors T250L, T250R, T290L, T290R, and L325 opened; fairing T205L removed



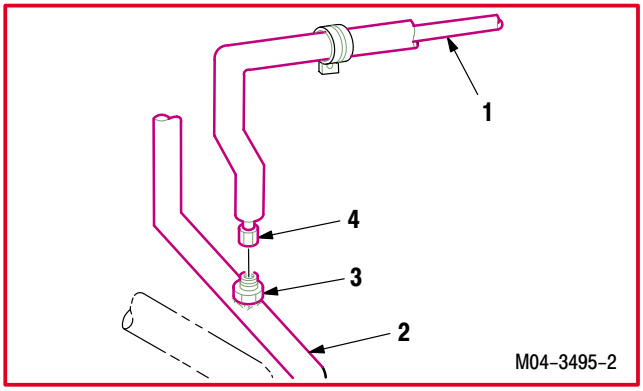
GO TO NEXT PAGE

7.157. ICE DETECTOR AFT WARM AIR SUPPLY TUBE REPLACEMENT – continued

7.157.3. Removal

a. **Remove aft warm air supply tube (1) from defog shutoff valve tube (2).**

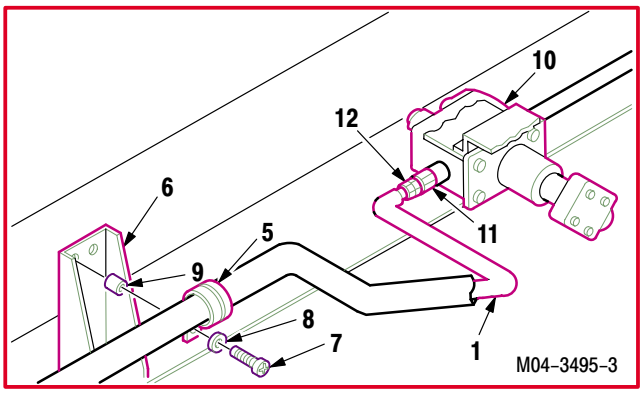
(1) Hold fitting (3). Remove nut (4).



b. **Remove clamp (5) from bracket (6).**

(1) Remove screw (7), washer (8), and spacer (9).

(2) Remove clamp (5) from warm air supply tube (1).



CAUTION

To prevent bending of the warm air supply tube, care must be used when removing tube.

c. **Remove tube (1) from ice detector warm air supply valve (10).**

(1) Hold reducer (11). Remove nut (12).

7.157.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.157.5. Inspection

a. **Check removed and attaching parts for crossed, burred, or stripped threads** (para 7.114)**.**

b. **Check warm air supply tube insulation for rips or tears.** None allowed.

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

7.157. ICE DETECTOR AFT WARM AIR SUPPLY TUBE REPLACEMENT – continued

7.157.6. Installation

CAUTION

To prevent bending of the warm air supply tube, care must be used when installing tube.

a. **Install tube (1) on valve (10).**

(1) Lubricate threads of reducer (11) with damping fluid (item 69, App F).

(2) Hold reducer (11). Install nut (12).

b. **Install clamp (5) on bracket (6).**

(1) Install clamp (5) on warm air supply tube (1).

(2) Install screw (7) through washer (8), clamp (5), and spacer (9) to bracket (6).

c. **Install tube (1) on tube (2).**

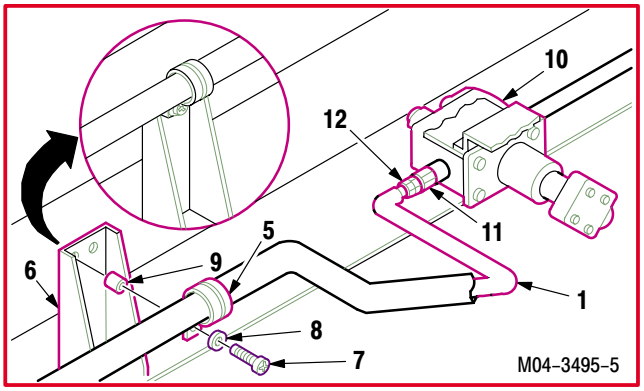
(1) Lubricate threads of fitting (3) with damping fluid (item 69, App F).

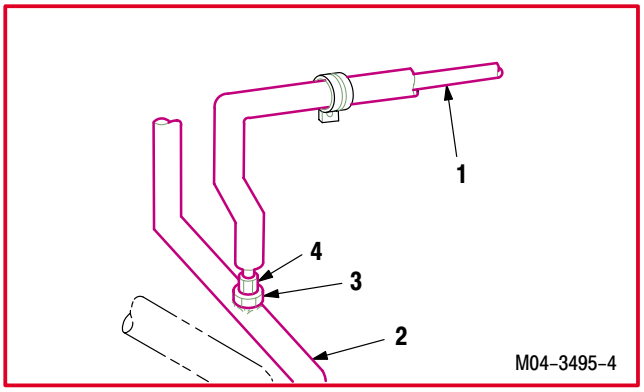
(2) Hold fitting (3). Install nut (4).

d. **Inspect (QA).**

e. **Perform pressurized air system leak check** (para 7.115)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325; install fairing T205L** (para 2.2)**.**





END OF TASK

7.158. ICE DETECTOR CENTER WARM AIR SUPPLY TUBE REPLACEMENT

7.158.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.158.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

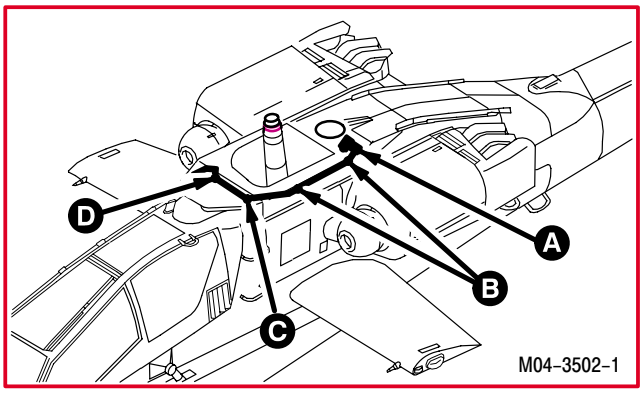
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed
2.2	Fairing T205L removed

Materials/Parts:

Damping fluid (item 69, App F)



GO TO NEXT PAGE

7.158. ICE DETECTOR CENTER WARM AIR SUPPLY TUBE REPLACEMENT – continued

7.158.3. Removal

a. **Remove center warm air supply tube (1) from warm air supply valve (2).**

(1) Hold reducer (3). Remove nut (4).

b. **Remove two clamps (5) from bracket (6).**

(1) Remove two screws (7), washers (8), and nuts (9).

(2) Remove clamps (5) from warm air supply tube (1).

c. **Remove two clamps (5) from airframe (10).**

(1) On right side: remove screw (7), washer (8), and nut (9).

(2) On left side: remove screw (7), washer (8), spacer (11), and nut (9).

(3) Remove clamps (5) from warm air supply tube (1).

d. **Remove tube (1) from forward warm air supply tube (12).**

(1) Hold union (13). Remove nut (14).

7.158.4. Cleaning

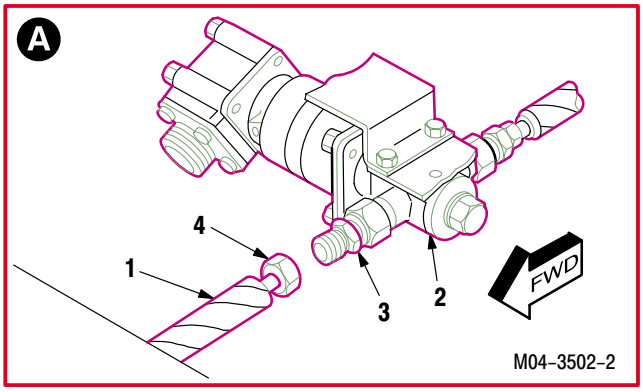
a. **Wipe removed and attaching parts with a clean rag.**

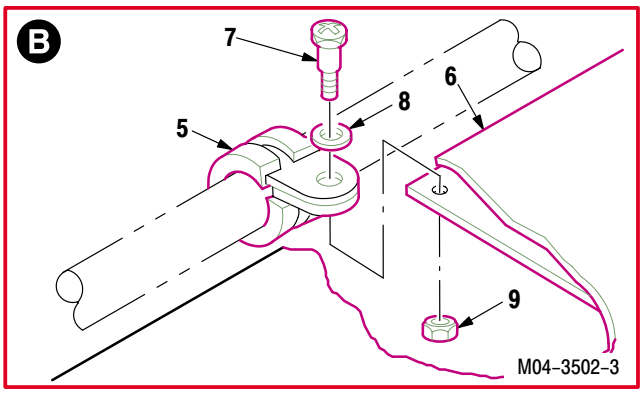
7.158.5. Inspection

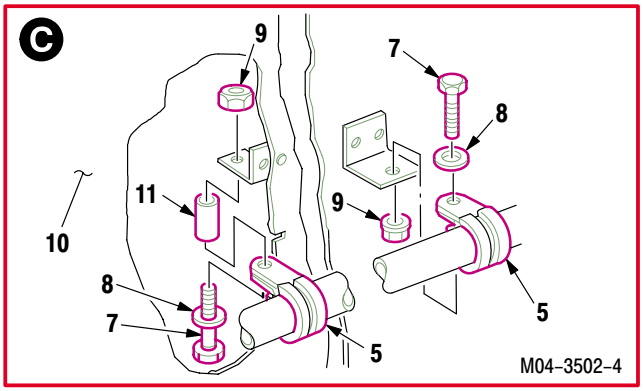
a. **Check removed and attaching parts for crossed, burred, or stripped threads** (para 7.114)**.**

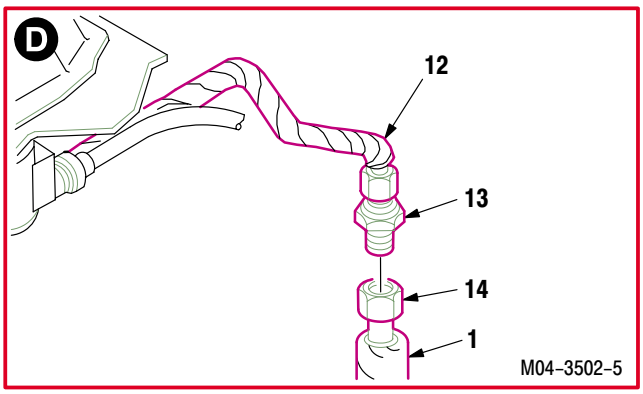
b. **Check warm air supply tube for ripped or torn insulation.** None allowed.

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**









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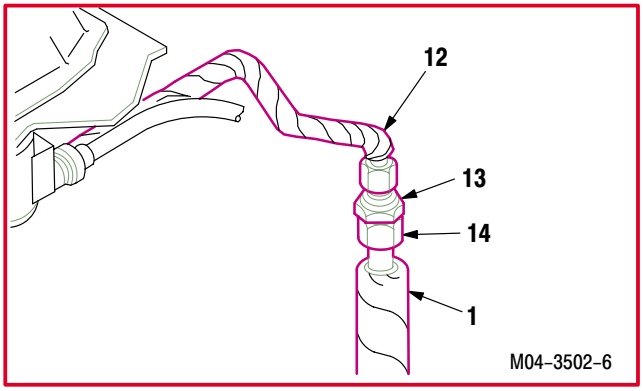
7.158. ICE DETECTOR CENTER WARM AIR SUPPLY TUBE REPLACEMENT – continued

7.158.6. Installation

a. **Install tube (1) on tube (12).**

(1) Lubricate threads of union (13). Use damping fluid (item 69, App F).

(2) Hold union (13). Install nut (14).

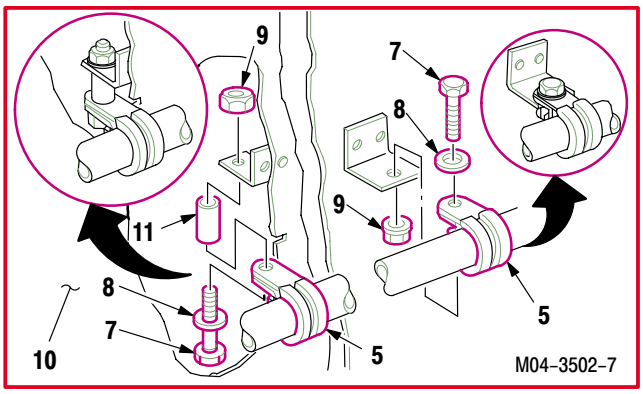


b. **Install two clamps (5) on airframe (10).**

(1) Install clamps (5) on warm air supply tube (1).

(2) On right side: install screw (7) through washer (8), clamp (5) and nut (9).

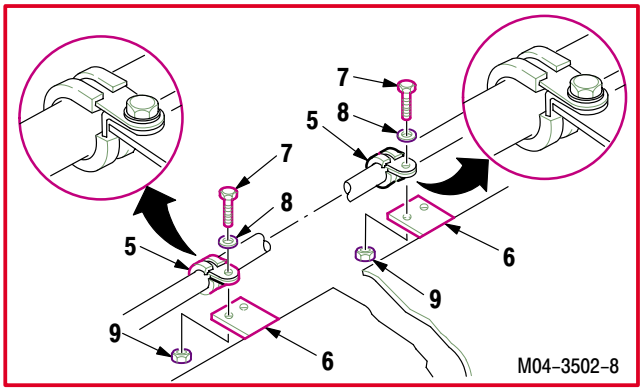
(3) On left side: install screw (7) through washer (8), clamp (5), spacer (11) and nut (9).



c. **Install two clamps (5) on brackets (6).**

(1) Install clamps (5) on warm air supply tube (1).

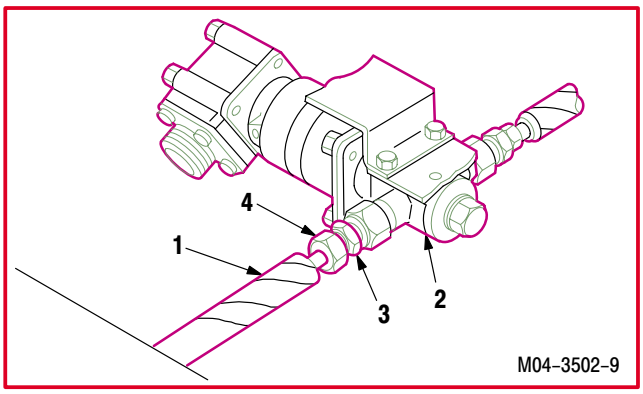
(2) Install two screws (7) through washers (8), clamps (5), bracket (6), and nuts (9).



d. **Install tube (1) on valve (2).**

(1) Lubricate threads of reducer (3). Use damping fluid (item 69, App F).

(2) Hold reducer (3). Install nut (4).



e. **Inspect (QA).**

f. **Perform pressurized air system leak check** (para 7.115)**.**

g. **Install fairing T205L** (para 2.2)**.**

END OF TASK

7.159. ICE DETECTOR FORWARD WARM AIR SUPPLY TUBE REPLACEMENT

7.159.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.159.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

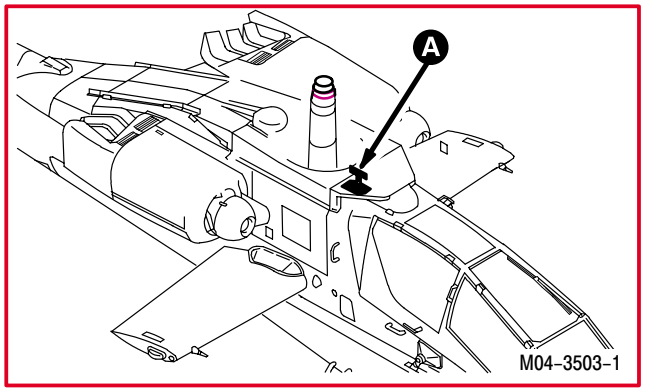
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

Ref	Condition
1.57	Helicopter safed

Materials/Parts:

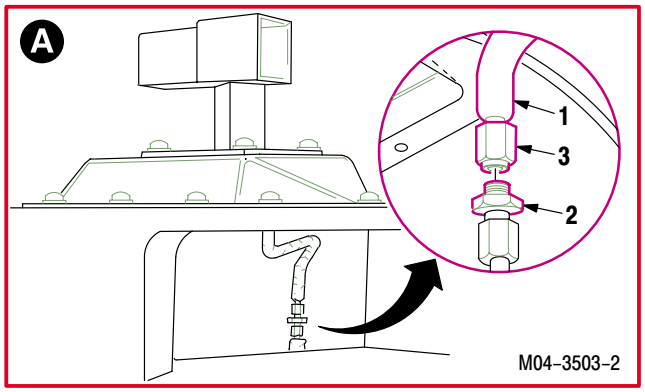
Damping fluid (item 69, App F)



7.159.3. Removal

a. **Remove warm air supply tube (1) from reducer (2).**

(1) Hold reducer (2). Remove nut (3).



GO TO NEXT PAGE

7.159. ICE DETECTOR FORWARD WARM AIR SUPPLY TUBE REPLACEMENT – continued

b. **Remove fairing support (4).**

(1) Remove nine screws (5) and washers (6).

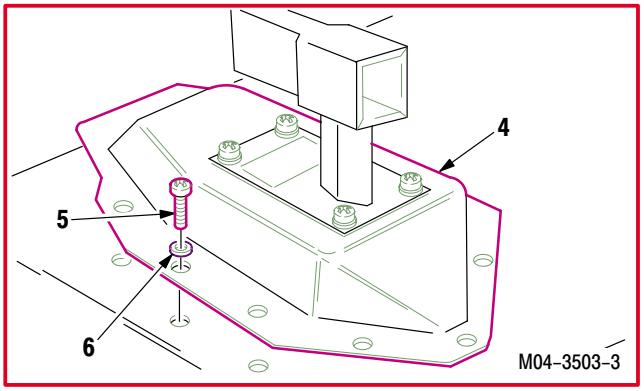
(2) Remove fairing support (4).

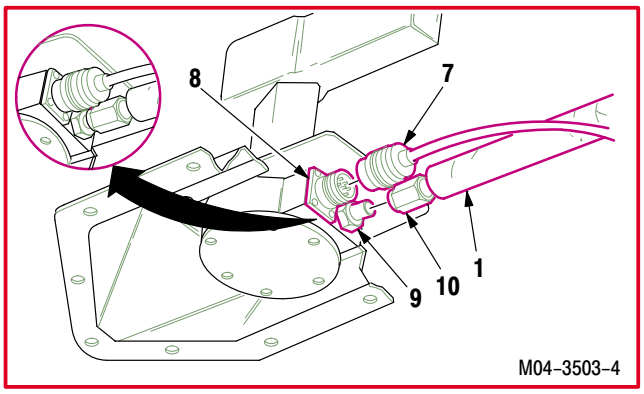
c. **Detach connector P690 (7) from receptacle (A695)J1 (8).**

d. **Remove tube (1) from union (9).**

(1) Hold union (9). Remove nut (10).

(2) Remove tube (1).





7.159.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.159.5. Inspection

a. **Check removed and attaching parts for crossed, burred, or stripped threads** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.159.6. Installation

a. **Install tube (1) on union (9).**

(1) Lubricate threads of union (9). Use damping fluid (item 69, App F).

(2) Hold union (9). Install nut (10).

b. **Attach connector P690 (7) to receptacle (A695)J1 (8).**

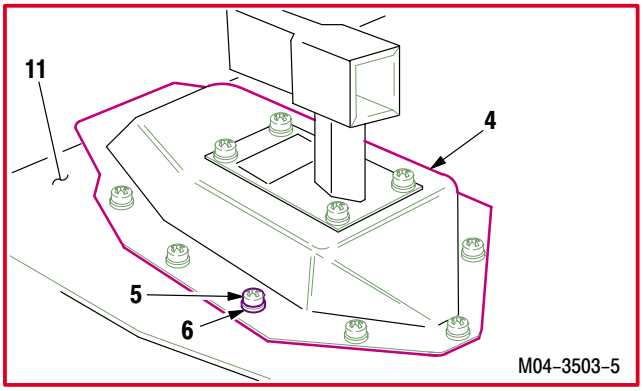
GO TO NEXT PAGE

7.159. ICE DETECTOR FORWARD WARM AIR SUPPLY TUBE REPLACEMENT – continued

c. **Install fairing support (4).**

(1) Aline fairing support (4) on fairing (11).

(2) Install nine screws (5) and washers (6).



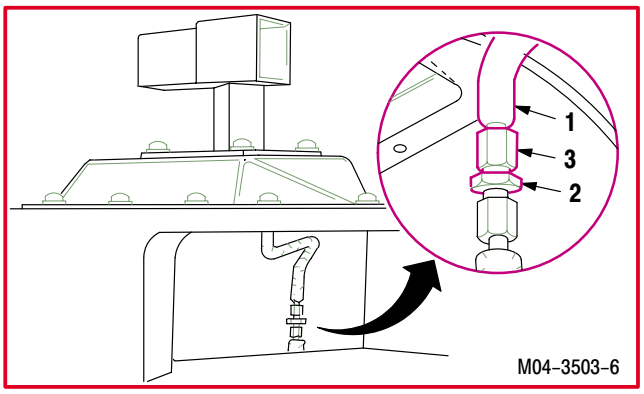
d. **Install tube (1) on reducer (2).**

(1) Lubricate threads of reducer (2). Use damping fluid (item 69, App F).

(2) Hold reducer (2). Install nut (3).

e. **Inspect (QA).**

f. **Perform pressurized air system leak check** (para 7.115)**.**



END OF TASK

7.160. PRIMARY AND/OR UTILITY HYDRAULIC MANIFOLD AIR FILTER REPLACEMENT

7.160.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

7.160.2. Initial Setup

Tools:

Aircraft mechanic's tool kit (item 376, App H)

Personnel Required:

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

Equipment Conditions:

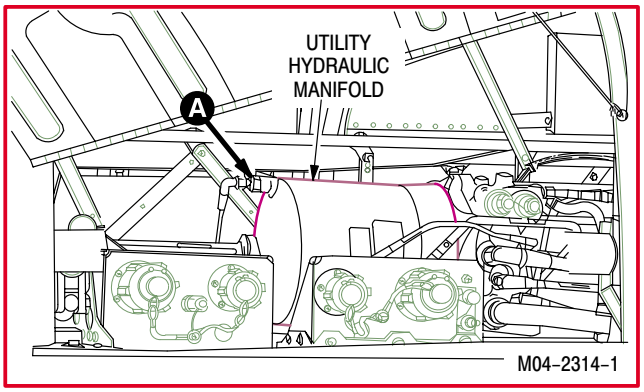
Ref	Condition
1.57	Helicopter safed
2.2	Access door R325 opened; and/or panel L200 removed

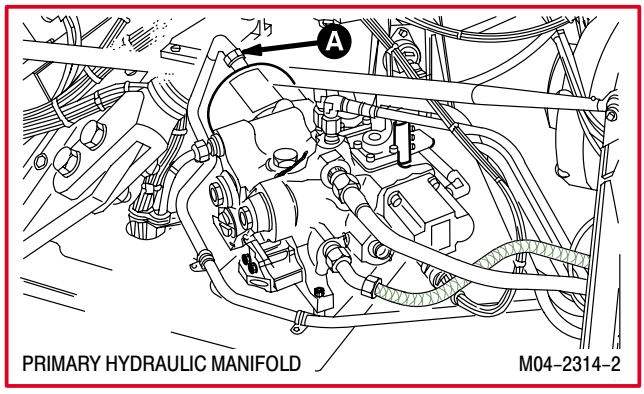
Materials/Parts:

Damping fluid (item 69, App F)

NOTE

This task is typical for the primary and utility manifold air filter.





GO TO NEXT PAGE

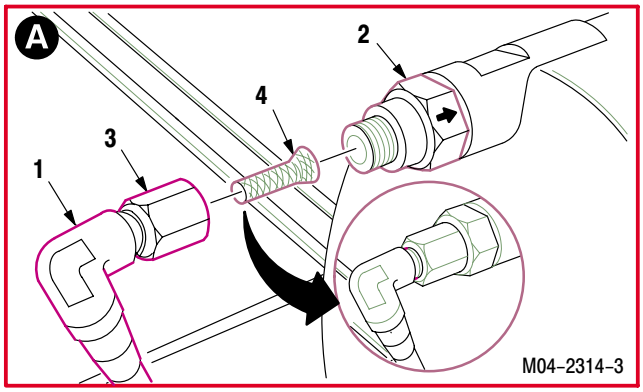
7.160. PRIMARY AND/OR UTILITY HYDRAULIC MANIFOLD AIR FILTER REPLACEMENT – continued

7.160.3. Removal

a. **Remove tube (1) from check valve (2).**

(1) Hold check valve (2). Remove nut (3).

(2) Remove and discard filter (4).



7.160.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

7.160.5. Inspection

a. **Check removed and attaching parts for dents, nicks, and scratches** (para 7.114)**.**

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

7.160.6. Installation

a. **Install new filter (4) into tube (1).**



b. **Install tube (1) on check valve (2).**

(1) Lubricate threads of check valve (2). Use damping fluid (item 69, App F).

(2) Hold check valve (2). Install nut (3).

c. **Inspect (QA).**

d. **Perform pressurized air system leak check** (para 7.115)**.**

e. **Secure access door R325; and/or install panel L200** (para 2.2)**.**

END OF TASK

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army
06941

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To: 2028@redstone.army.mil

Subject: DA Form 2028

1. **From:** Joe Smith
2. Unit: Home
3. **Address:** 4300 Park
4. **City:** Hometown
5. **St:** MO
6. **Zip:** 77777
7. **Date Sent:** 19-Oct-93
8. **Pub no:** 55-2840-229-23
9. **Pub Title:** TM
10. **Publication Date:** 04-Jul-85
11. Change Number: 7
12. Submitter Rank: MSG
13. **Submitter Fname:** Joe
14. Submitter Mname: T
15. **Submitter Lname:** Smith
16. **Submitter Phone:** (123) 123-1234
17. **Problem:** 1
18. Page: 2
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. **Text:**

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F Troop 5th Cav. 1st Training Bldg.
Fort Knox, Kentucky 12345-6789

DATE SENT

20 October 1990

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 55-1520-238-S	30 September 1990	Preparation for Shipment FOR Army Model AH-64A Helicopters

BE EXACT . . . PIN–POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2–60	2–26, 151			T.M. references should be TM 55-1520-238 S, not TM 55-1500-238-S
2–68		2–30		Support AFT FUS STA 430 should read Support AFT FUS STA 450.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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SIGN HERE

John Doe

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REDSTONE ARSENAL, AL 35898-5230

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounces
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce–inches	newton–meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.452	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound–feet	newton–meters	1.356	metric tons	short tons	1.102
pound–inches	newton–meters	.11296			

Temperature (Exact)

° F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	° C

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