

CHAPTER

20

**STANDARD
PRACTICES -
AIRFRAME**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

CHAPTER 20
STANDARD PRACTICES - AIRFRAME

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PART NUMBER: A20001-65, -82, -83

NAME: BOOM HOIST - GENERAL

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

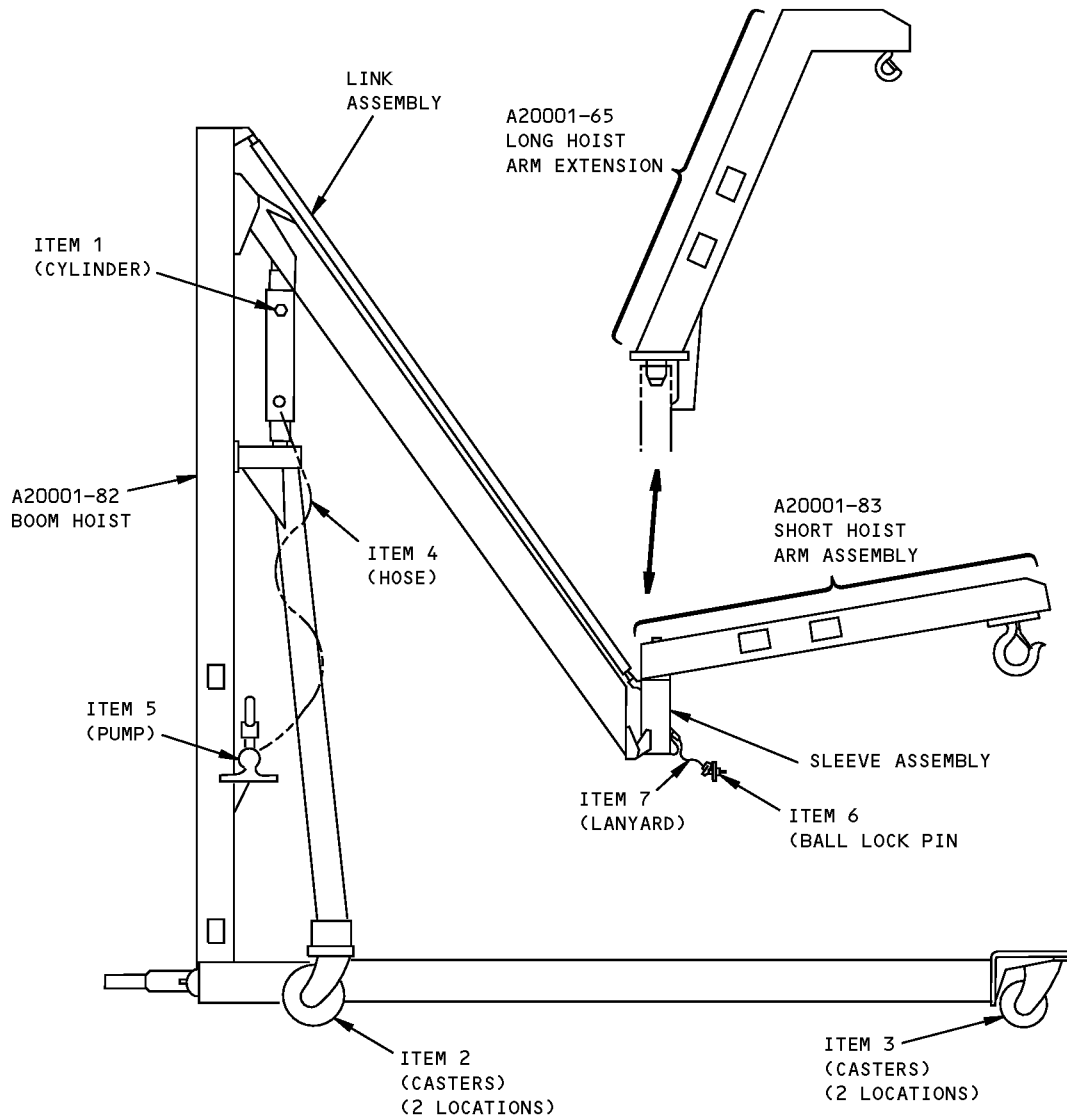
USAGE & DESCRIPTION: The A20001-82 boom hoist is used with adapters such as the J20002 load positioner, A24011 IDG hoist adapter, A29001 hydraulic pump hoist adapter, A32008 nose and main landing gear strut slings, A71016 and A71017 engine core cowl slings, A78007, A78008 and A78018 thrust reverser slings. A20001 is used on all different airplane models to remove and install airplane components. The boom hoist is an upright stand with a welded frame and base. The boom hoist is equipped with casters and a towbar attachment for mobility. The A20001 boom hoist incorporates hand-pumped hydraulic components which control the 180 degree radius of operation of the boom and the 9 foot, 10 inch lift extension. The boom hoist is limited to 400 pound maximum load. The A20001-83 short hoist arm assembly is a 27-inch arm extension attachment with a maximum load of 150 pounds when used with the A20001-82 boom hoist. The A20001-65 long hoist arm assembly is a 51-inch extension arm with a maximum load of 175 pounds when used with the A20001-82 boom hoist.

WEIGHT: A20001-65 - 36 lbs (16 kg)
A20001-82 - 416 lbs (189 kg)
A20001-83 - 18 lbs (8 kg)

DIMENSIONS: A20001-65 - 2 x 31 x 55 inches (51 x 787 x 1397 mm)
A20001-82 - 46 x 92 x 113 inches (1168 x 2337 x 787 mm)
A20001-83 - 2 x 10 x 31 inches (51 x 254 x 787 mm)

NOTE: A20001-82 supersedes A20001-79.
A20001-83 supersedes A20001-55.

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General Boom Hoist
Figure 1



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REPAIRABLE/REPLACEABLE PARTS			
ITEM NO.	PART NO.	NOMENCLATURE	VENDOR CODE
1	A20001-86	CYLINDER ASSEMBLY	
2	A20001-11	CASTERS	V96266
3	A20001-12	CASTERS	V96266
4	H-8206	HOSE	V26952
5	P392	HYDRAULIC HAND PUMP	V26952
6	NAS1334C3C28D	BALL LOCKPIN	
7	CL-63-KA-10.0	LANYARD	V99862



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PART NUMBER: A27010-11, -15

NAME: LOCK SET - CIRCUIT BREAKER

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: NO

USAGE & DESCRIPTION: This tool consists of one each -11 and -15 lock assembly sets. The -15 lock set is used to lock out the INBD LE slats in the retracted position when the inboard thrust/reversers are open over 25°. The lock set is used in conjunction with hydraulic system lock out.

- Main Power Distribution Panel P6

- Overhead Circuit Breaker Panel P11

- Cabin Pressure Circuit Breakers - Auto-1, Auto-2, Manual and Selector Panel P11

The A27010-11 lock set is used to deactivate the ram air turbine circuit breakers. The -11 lock set is used on the following:

- Power Ram Air Turbine

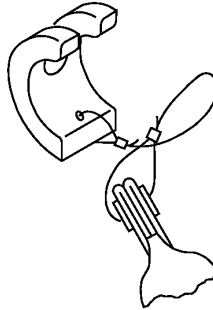
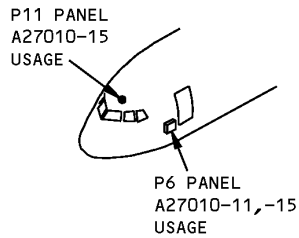
- R.A.T. Main Control

- R.A.T. Auto Control

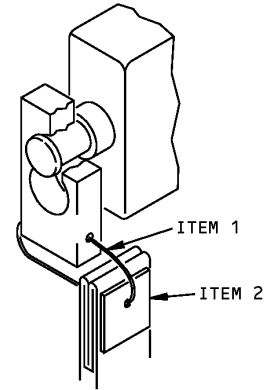
DIMENSIONS: A27010-11 - 4 x 5 x 8 inches
A27020-15 - 4 x 9 x 12 inches

NOTE: A27010 may be replaced by commercially available equipment for future procurement.

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-11 LOCK ASSEMBLY



-15 LOCK ASSEMBLY

Circuit Breaker Lock Set
Figure 1

REPAIRABLE/REPLACEABLE PARTS			
ITEM NO.	PART NO.	NOMENCLATURE	VENDOR CODE
1	CL-21-KA-4.OLR	LANYARD	V99862
2	NAS1756-24	WARNING STREAMER	



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PART NUMBER: A32045-1, -2, -3, -8, -12, -24, -25, -34, -40, -45, -46, -48, -53, -57, -58, -65, -66, -70, -75, -76, -77, -78, -79, -87, -88, -90, -91

NAME: WRENCHES - SPANNER

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: The A32045-1, -2, -3, -12, -34, -40, -45, -46, -76, -77 and -78 are used on 767-200 and -300 airplanes. The A32045-8, -24, -25, -48, -53, -57, -58, -65, -66, -70, -75, -79, -87, -88, -90 and -91 are used on all 767 airplanes. This tool is a kit of spanner wrenches used, with a customer-furnished torque wrench, to perform maintenance procedures on the following components: Outboard spoiler Power Control Actuator (PCA) scraper nut, inboard spoiler PCA spanner nut, pneumatic duct ball joint fittings, horizontal stabilizer pivot fitting, horizontal stabilizer pivot pin hinge support bushing, autothrottle assembly, aileron control drum assembly, overhead passenger door counterbalance gearbox assembly, landing gear shock struts, landing gear actuators, landing gear trunnion bearing retainer nut and main landing gear truck positioner assembly retainer nut. Refer to AMM or CMM chapter usage in Figure 1 for further usage instruction.

DIMENSIONS: See Figure 1

NOTE: A32045-79 supersedes A32045-69.
A32045-87 supersedes A32045-47.
A32045-88 supersedes A32045-80.
A32045-91 supersedes A32045-50.



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TOOL NO. A32045	TOOL SIZE	PART NO.	COMPONENT NOMENCLATURE	USAGE	
				AMM	CMM
-1	1x6x8	273T1113	RETRACT ACTUATOR SPANNER NUT		✓
-2	1x4x11	273T1129	ACTUATOR SEAL RETAINER NUT		✓
-3	1x4x4	273T1112	ACTUATOR ROD END SPANNER NUT		✓
-8	1x2x4	252T1415	OUTBOARD SPOILER PCA SCRAPER NUT		✓
-12	1x5x11	161T1192	AFT TRUNNION BEARING NUT	✓	
-24	1x5x7	332T3075	BALL JOINT BEARING NUT	✓	✓
-25	1x7x9	332T3257	BALL JOINT BEARING NUT	✓	✓
-34	4x7x8	112T1709	FWD TRUNNION BEARING NUT	✓	
-40	1x3x3	273T6205	MLG ACTUATOR GLAND RETAINER NUT		✓
-45	1x3x4	273T6310	MLG LOCK ACTUATOR ROD END NUT		✓
-46	1x4x4	273T6110	MLG TRUCK POSITIONER RETAINER		✓
-48	1x5x10	182T1305	PIVOT FTG BEARING RETAINER NUT	✓	
-53	1x2x3	273T0025	NOSE GEAR LOCK ACTUATOR NUT		✓
-57	1x5x9	312T3256	BALL JOINT BEARING NUT	✓	✓
-58	1x4x8	332T3257	BALL JOINT BEARING NUT	✓	✓
-65	1x3x7	332T1233	BALL JOINT BEARING NUT	✓	✓
-66	1x5x10	332T3257	BALL JOINT BEARING NUT	✓	✓
-70	1x4x8	332T3075	BALL JOINT BEARING NUT	✓	✓
-75	1x2x5	252T1326	END INBOARD SPOILER PCA NUT		✓
-76	1x3x3	163T2018	SHOCK STRUT ORIFICE PLATE		✓
-77	1x1x6	163T2001	TAIL SKID SHOCK STRUT BEARING		✓
-78	1x1x7	163T2004	TAIL SKID SHOCK STRUT GLANDNUT		✓
-79	1x2x3	253T1142	AILERON CONTROL DRUM ASSY NUT		✓
-87	1x4x7	180T0003	HINGE SUPPORT PIVOT PIN BUSHING	✓	
-88	1x4x4	258T1110	OVERHEAD PASSENGER DOOR BEARING RETAINING NUT		✓
-90	2x2x2	254N1147	SHAFT ASSEMBLY NUT		✓
-91	2x2x3	253T7100	AUTOTHROTTLE NUT		✓

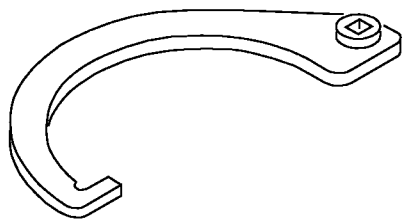
Spanner Wrench Usage Table
Figure 1

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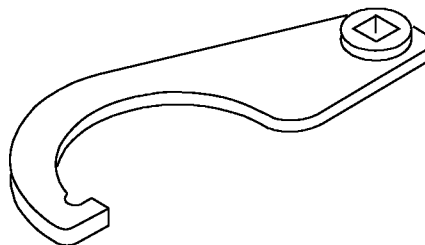
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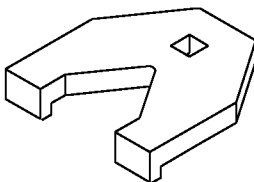
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A32045-79,-87 SIMILAR



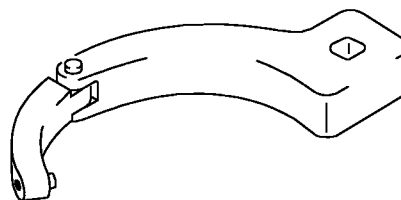
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A32045-8,-48 SIMILAR



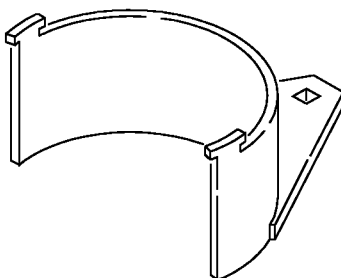
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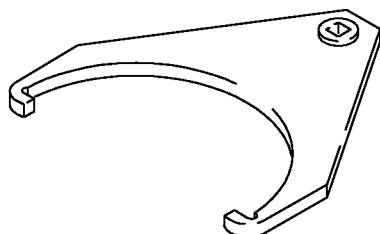
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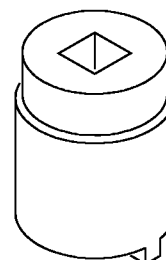
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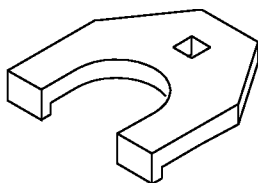
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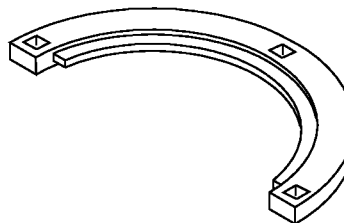
A32045-40 SHOWN
A32045-45,-46,-88 SIMILAR



A32045-91



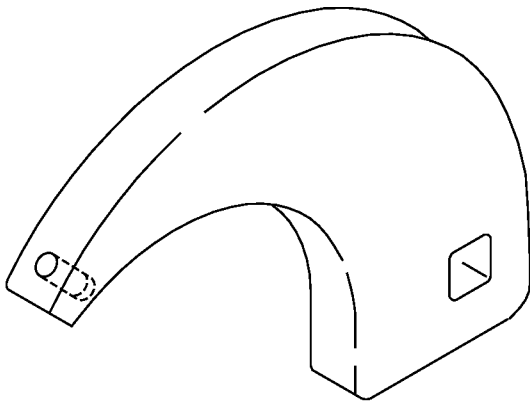
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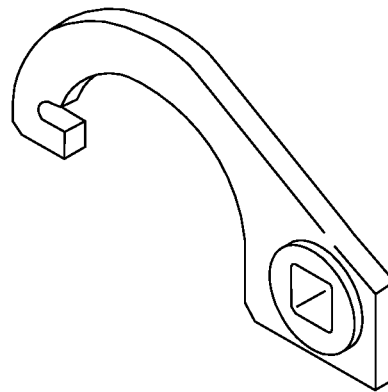
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Spanner Wrenches
Figure 2 (Sheet 1 of 2)

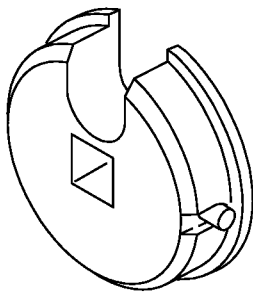
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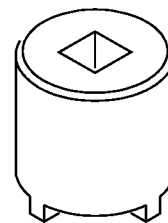
A32045-65 SHOWN
A32045-66,-70 SIMILAR



A32045-75



A32045-76



A32045-90

Spanner Wrenches
Figure 2 (Sheet 2 of 2)



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PART NUMBER: A20004-2, -68, -72, -76, -78

NAME: SET - RIG PIN

AIRPLANE MAINTENANCE: YES

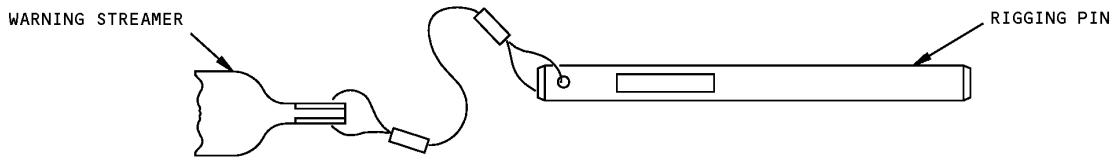
COMPONENT MAINTENANCE: NO

USAGE & DESCRIPTION: This tool consists of five rigging pin sets: -2, -68, -72, -76, and -78. The -72 and -78 pin sets are used on the airplane, the -2 on Pratt and Whitney engines, the -68 on General Electric engines, and the -76 on Rolls Royce engines. A typical rigging pin is shown in Figure 1. The -52 rigging pin assembly (part of -2 set) and the -59 rig stop assembly (part of -68 set), which have special rigging functions, are shown in Figure 1. The -72 and -78 airplane rigging pin sets are used with the following airplane equipment: aileron, rudder, elevator, trailing edge flaps, leading edge slats, stabilizers, landing gear brakes, landing gear extension and retraction, landing gear alternate extension, nose landing gear door, nose wheel steering, entry and service doors, optional large cargo door, and cargo doors.

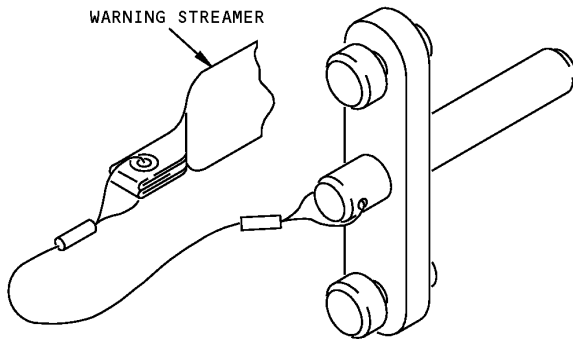
DIMENSIONS: 6 x 10 x 14 inches (152 x 254 x 356 mm)

NOTE: A20004-78 replaces A20004-72 for future procurement
A20004-72 supersedes A20004-64, -1
A20004-76 supersedes A20004-70
A20004-68 supersedes A20004-3

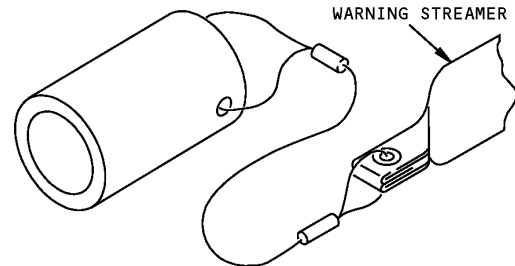
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TYPICAL RIGGING PIN ASSEMBLY



-52 RIGGING PIN ASSEMBLY



-59 RIG STOP ASSEMBLY

**Rig Pin Set
 Figure 1**



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PART NUMBER: F72959-8, -41

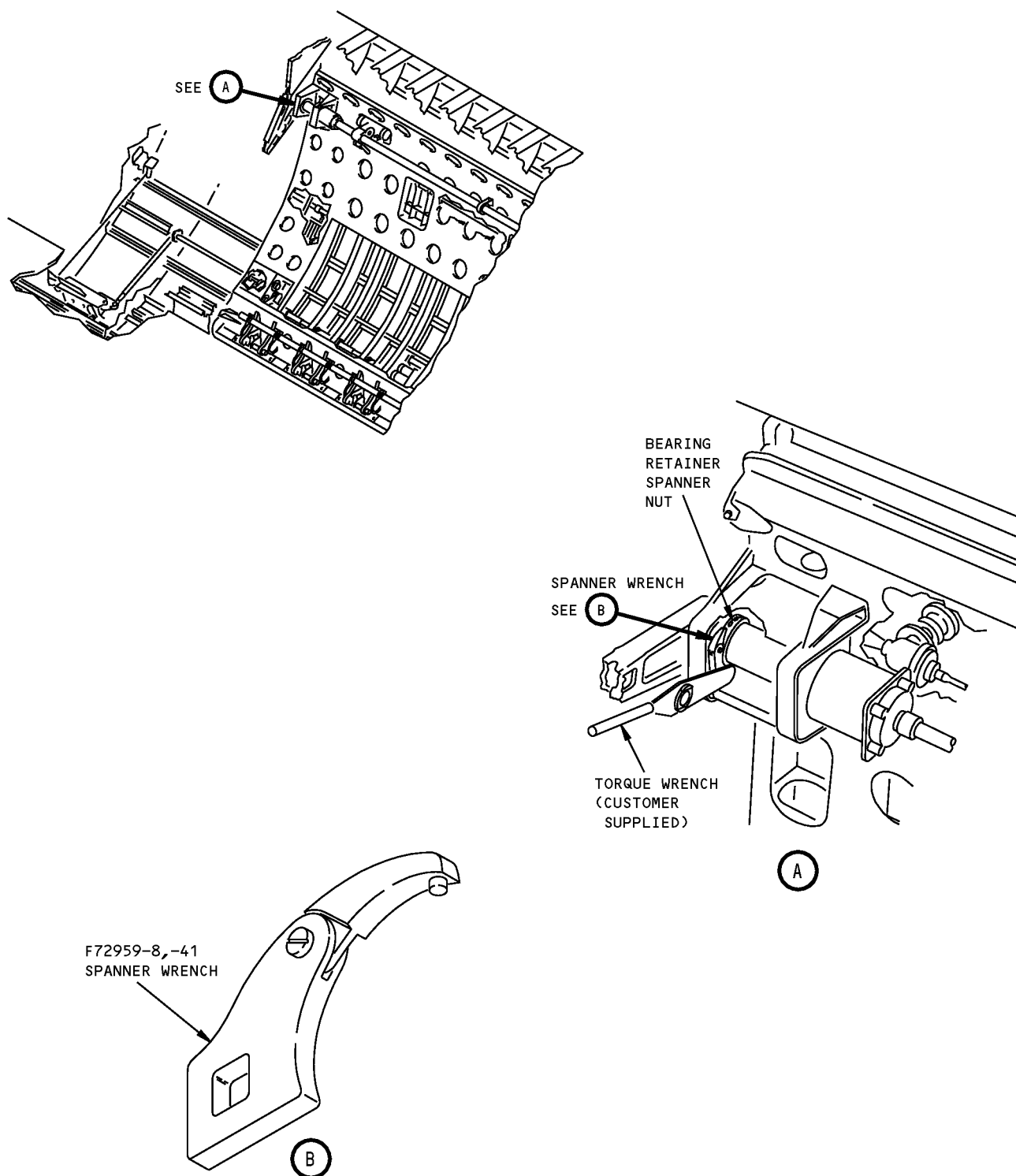
NAME: SPANNER WRENCH - AN STANDARD TYPE

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This spanner wrench with a T-bar or torque wrench is used to remove or install nuts in two separate assemblies on the airplane. The spanner wrench is used on the swivel valve retainer nuts when removing/installing the nose landing gear steering metering valve. It is also used on the bearing retainer spanner nut in the large forward cargo door lift drive mechanism shown below. The spanner wrench consists of a wrench handle with 1/2-inch square drive, an adjustable pin arm, and bolt.

NOTE: F72959-41 is an identical replacement for F72959-8



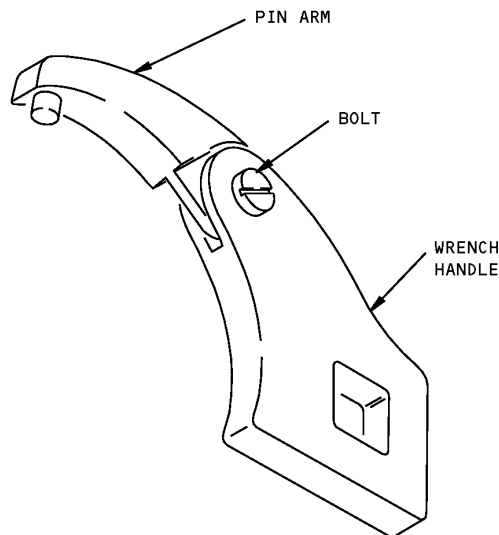
**AN Standard Type Spanner Wrench
Figure 1**

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PART NUMBER: F72959-1 thru 12, -31 thru 42**NAME:** SPANNER WRENCH - AN STANDARD TYPE**AIRPLANE MAINTENANCE:** YES**COMPONENT MAINTENANCE:** YES

USAGE & DESCRIPTION: This tool provides a full range of standard AN spanner wrench sizes for maintenance operations throughout the airplane. The twelve dash numbers cover a diameter range of 0.75 to 6.00 inches. Each dash number comprises one complete wrench; consisting of a handle, a pin arm and a bolt. Dash numbers -1 thru -4 are 3/4-inch square drive, the others are 1/2-inch square drive. Dash numbers -31 thru -42 are identical to -1 thru -12 respectively except tolerance.

DIMENSIONS: 2 x 8 x 8 inches (51 x 203 x 203 mm)



-1 THRU -12, -31 THRU -42

AN Standard Type Spanner Wrench
Figure 1



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A20006-32

NAME: INSTALLATION SET - NAS1368 GROMMET

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

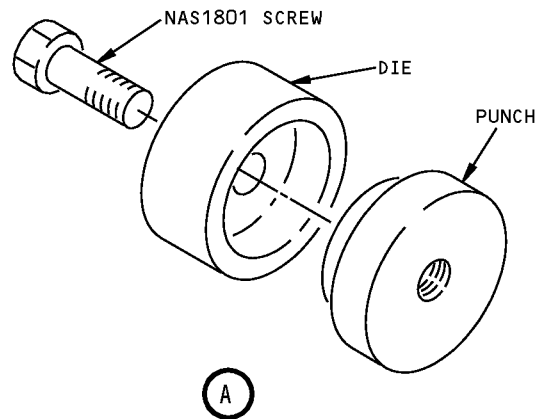
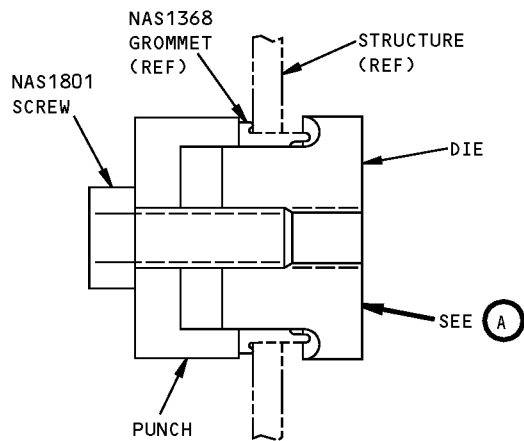
USAGE & DESCRIPTION: This tool is used to install NAS1368 plastic flip grommets. Each tool consists of a punch, die and hex head screw. The set consists of 14 tools.

DIMENSIONS: 3 x 5 x 12 inches

NOTE: A20006-32 supersedes A20006-1.
A20006-32 replaces ST1065C for future procurement.

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

GROMMET NO. (REF)	PUNCH NO.	DIE NO.	SCREW SIZE
NAS1368-3	- 4	-18	<div> <div>NAS1801-06-24</div> <div> <div>↑ -08</div> <div>↑ - 4</div> <div>↑ - 4</div> <div>↑ - 6</div> </div> <div> <div>↓</div> <div>↓</div> <div>↓</div> <div>↓</div> </div> <div>NAS1801- 6-24</div> </div>
NAS1368-4	- 5	-19	
NAS1368-6	- 6	-20	
NAS1368-8	- 7	-21	
NAS1368-10	- 8	-33	
NAS1368-12	- 9	-34	
NAS1368-14	-10	-35	
NAS1368-16	-11	-36	
NAS1368-18	-12	-37	
NAS1368-20	-13	-38	
NAS1368-22	-14	-39	
NAS1368-24	-15	-40	
NAS1368-26	-16	-41	
NAS1368-28	-17	-42	



NAS1368 Grommet Installation Set
Figure 1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

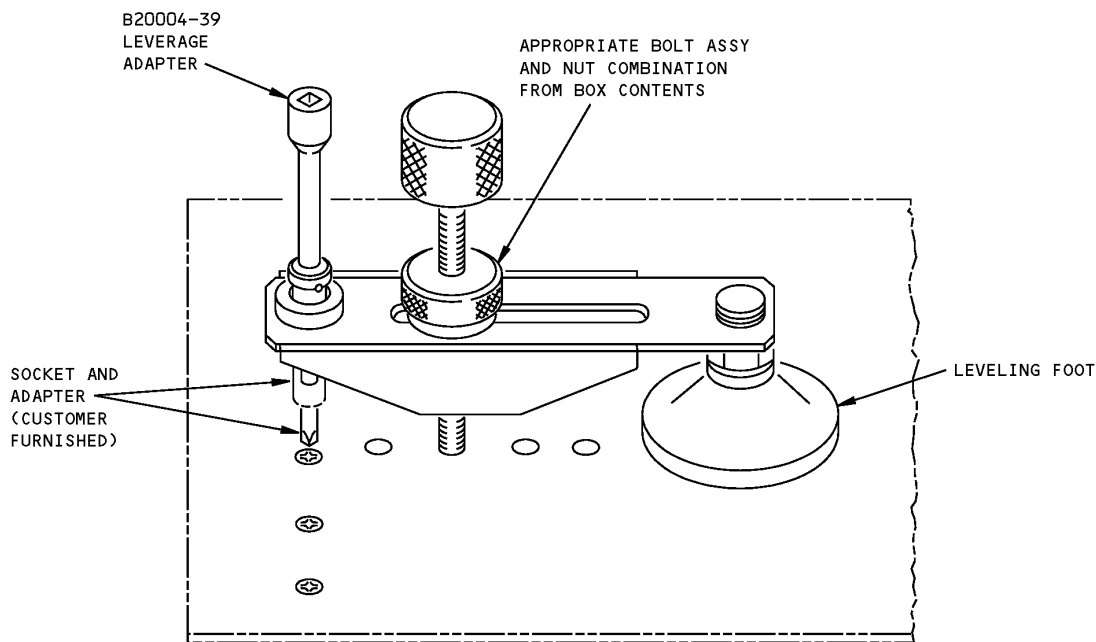
PART NUMBER: B20004-21**NAME:** LEVERAGE ADAPTER - ACCESS PANEL**AIRPLANE MAINTENANCE:** YES**COMPONENT MAINTENANCE:** NO

USAGE & DESCRIPTION: This tool is used with a customer furnished ratchet wrench to remove damaged or hard-to-loosen access panel screws. The tool consists of a slotted arm with a threaded screwdriver in one end, and a pivoted pressure pad at the other end. An attaching screw secures the tool to the airplane.

WEIGHT: 8 lbs (3.6 kg) (excluding box)

DIMENSIONS: 3 x 6 x 10 inches (76 x 152 x 254 mm) (excluding box)

NOTE: B20004-13 replaces B20004-1.
B20004-16 supersedes B20004-13.
B20004-21 supersedes B20004-16.



**Access Panel Leverage Adapter
Figure 1**

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST926E-*

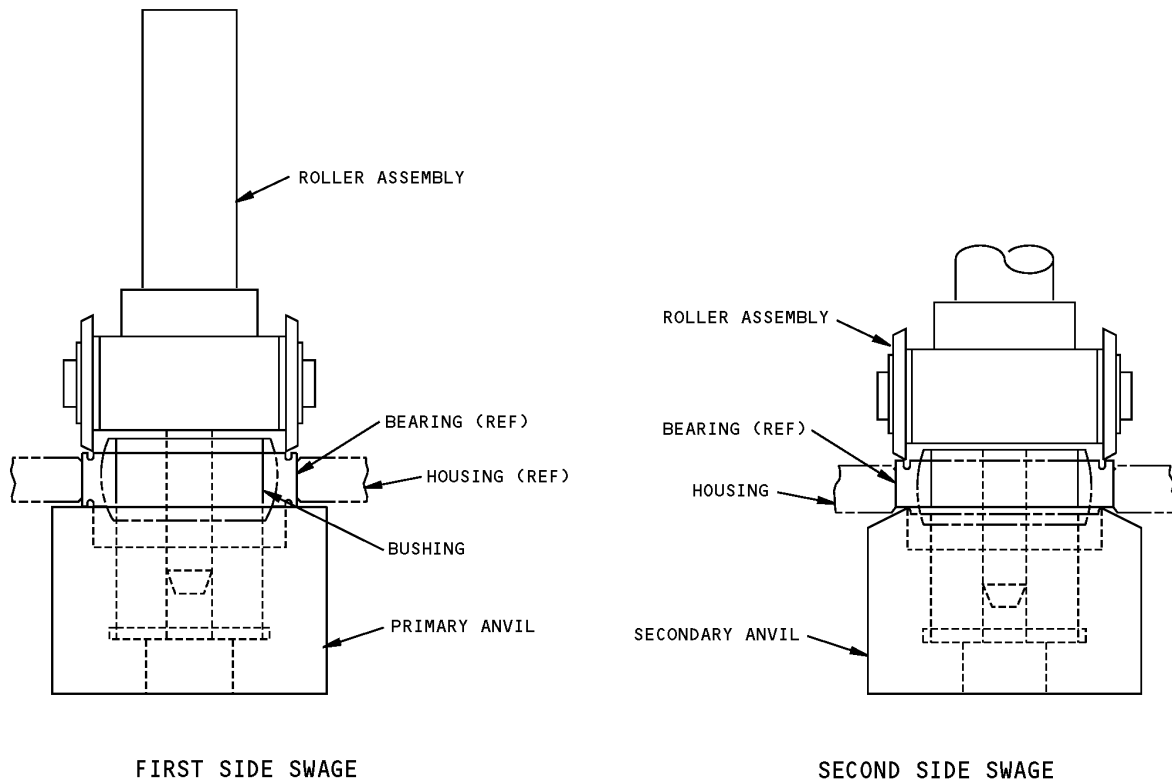
NAME: ROLLER SWAGING TOOL - BEARING

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool is used for roller swaging bearings. The tool consists of roller assembly, bushing, primary anvil and secondary anvil.

*Refer to Figure 2 for applicable dash numbers.



**Bearing Roller Swaging Tool
Figure 1**

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL



BEARING NO. (REF)	TOOL DASH NO.	ROLLER ASSEMBLY	BAR	SHAFT	BUSHING	PRIMARY ANVIL	SECONDARY ANVIL
10-60545-1615	-53	-54	-56	-58	-60	-61	-62
10-60545-156S	-63	-64	-65	-66	-67	-68	-69
10-60545-60	-70	-71	-72	-73	-74	-75	-76
60B00180-208,-228	-77	-78	-79	-80	-81	-82	-83
10-60545-63 60B00180-25	-84	-85	-86	-87	-81	-88	-89
10-60545-71	-90	-91	-92	-93	-94	-95	-96
60B00180-203	-97	-98	-99	-100	-101	-102	-103
10-60545-66	-104	-105	-106	-107	-108	-109	-110
10-60545-78	-111	-112	-113	-114	-115	-116	-117
10-60545-72	-130	-131	-132	-133	-134	-135	---
60B00180-20	-136	-137	-138	-139	-140	-141	-142
60B00180-300	-162	-163	-164	-165	-166	-167	-168
69B94365-1 69B94365-2	-169	-98	-99	-100	-170	-171	---
60B00180-39	-172	-78	-79	-133	-74	-173	-174
60B990021-1 VTB01310 	-175	-176	-178	-179	-180	-181	-182

TABLE 1

OVERSIZE BEARING NO.	SHIM THICKNESS
VTB01310-P01	NO-SHIM
VTB01310-P02	NO-SHIM
VTB01310-P05	0.0025 RECOMMENDED
VTB01310-P10	0.005 REQUIRED
VTB01310-P15	(0.0025 + 0.005) REQUIRED
VTB01310-P20	0.010 REQUIRED
VTB01310-P30	0.015 REQUIRED

TABLE 2

 SEE TABLE 2 FOR OVERSIZED BEARING SHIMING REQUIREMENTS.

Bearing Roller Swaging Tool Usage
Figure 2



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST927C-*

NAME: BEARING REMOVAL TOOL

AIRPLANE MAINTENANCE: NO

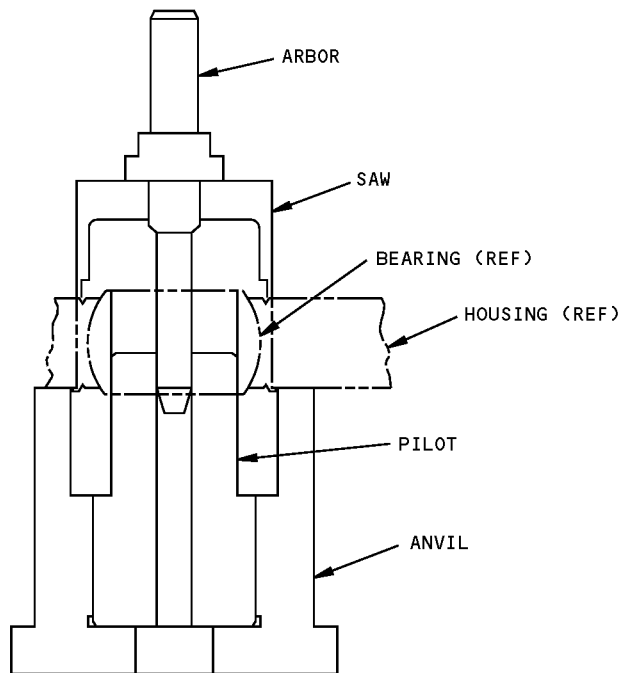
COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool is used to remove roller swaged bearings. The tool consists of a saw, an anvil, and a pilot.

*Refer to Figure 1 for applicable dash numbers.

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL



BEARING NO. (REF)	TOOL DASH NO.	SAW	ANVIL	PILOT
60B00180-205	-1	-24	-43	-56
10-60545-207S	-2	-25	-44	-57
MS21230-12	-3	-25	-44	-58
10-60545-154S	-4	-26	-45	-59
60B00180-300 BACB10AB20M	-5	-27	-46	-60
10-60545-155S	-6	-27	-46	-61
10-60545-149S	-7	-28	-47	-62
60B00180-1	-8	-29	-48	-63
60B00180-2	-9	-30	-48	-64

Bearing Removal Tool and Usage
Figure 1 (Sheet 1 of 3)



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

BEARING NO. (REF)	TOOL DASH NO.	SAW	ANVIL	PILOT
10-60545-64	-10	-31	-48	-65
60B00180-301	-11	-31	-48	-66
10-60545-161S	-12	-31	-48	-67
69B13953-2	-13	-32	-49	-68
10-60545-156S	-14	-33	-49	-69
60B00180-204	-15	-34	-49	-70
60B00180-3	-16	-35	-50	-71
10-60545-60	-17	-36	-50	-72
60B00180-208	-18	-37	-51	-73
60B00180-25 10-60545-63	-19	-38	-52	-73
10-60545-71	-20	-39	-53	-74
60B00180-203	-21	-40	-53	-75
60B00180-12	-22	-41	-54	-76
10-60545-66	-23	-42	-55	-77
69-57625-1	-80	-87	-94	-101
10-60545-40 10-60545-163S	-81	-88	-95	-102
10-60545-146S	-82	-89	-96	-103
10-60545-144S	-83	-90	-97	-104
10-60545-72	-84	-91	-98	-105
10-60545-205S	-85	-92	-99	-106
10-60545-11	-86	-93	-100	-107
60B00180-20	-108	-109	-111	-110
10-60545-43	-112	-38	-116	-118
10-60545-44	-113	-115	-117	-119
10-60545-204S	-114	-24	-43	-120
10-61970-2 10-61846-3	-121	-122	-123	-124
HUDL24-101	-125	-126	-50	-104
60B90021-1 VTB01310	-127	-128	-129	-130
VTB01310-P01	-145	A32091-1624	-129	-130
VTB01310-P02		A32091-1625		
VTB01310-P05		A32091-1628		
VTB01310-P10		A32091-1633		
VTB01310-P15		A32091-1638		
VTB01310-P20		A32091-1643		
VTB01310-P30		A32091-1653		

Bearing Removal Tool and Usage
Figure 1 (Sheet 2 of 3)



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

BEARING NO. (REF)	TOOL DASH NO.	SAW	ANVIL	PILOT
60B00180-43	-131	A32091-4110	-132	-133
60B00180-48		A32091-4125		
60B00180-49		A32091-4145		
60B00180-50		A32091-4165		
BACB10ES06	-134	A32091-0872	-135	--
BACB10FC10C	-136	A32091-1178	-43	-56
BACB10FH12	-137	A32091-1745	-138	-58
S302T001-215	-139	A32091-1065	-140	-141
S302T001-219	-142	A32091-3000	-143	-144

Bearing Removal Tool and Usage
Figure 1 (Sheet 3 of 3)



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST879A

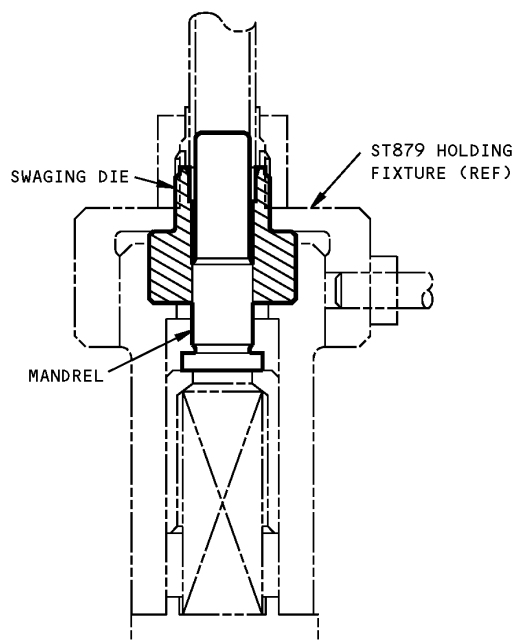
NAME: TUBE PRESETTING TOOL - FLARELESS

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool is used to manually preset flareless coupling sleeve MS21922. The tool is composed of a mandrel and a swaging die.

DIMENSIONS: 4 x 4 x 6 inches (102 x 102 x 152 mm)



**Flareless Tube Presetting Tool
Figure 1**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST879AF

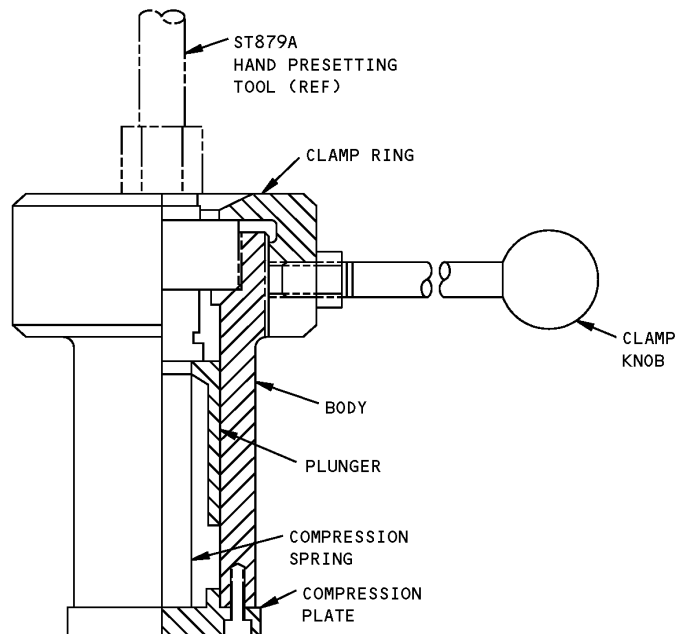
NAME: HOLDING FIXTURE - HAND PRESET TOOLS

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: The fixture receives and locks hand preset tools ST879A during manual tube presetting. The fixture is composed of a steel body, threaded clamp ring, plunger, lever and compression spring.

DIMENSIONS: 4 x 4 x 10 inches (102 x 102 x 254 mm)



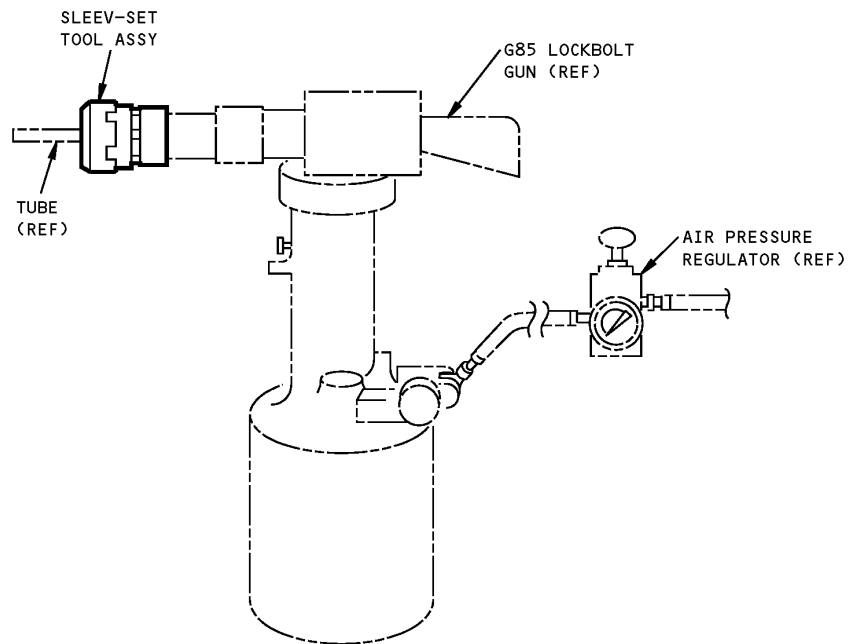
Hand Preset Tools Holding Fixture
Figure 1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST878D**NAME:** SLEEV-SET TOOL - FLARELESS TUBE FITTING**AIRPLANE MAINTENANCE:** YES**COMPONENT MAINTENANCE:** YES

USAGE & DESCRIPTION: This tool is used in conjunction with a G85 lockbolt gun in order to preset BACSS13AP flareless coupling sleeves and MS21922 fittings. The tool is composed of a clamp die, mandrel, plunger, thrust sleeve assy and two springs.

DIMENSIONS: 3 x 3 x 4 inches (76 x 76 x 102 mm)



Flareless Tube Fitting Sleeve-Set Tool
Figure 1

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

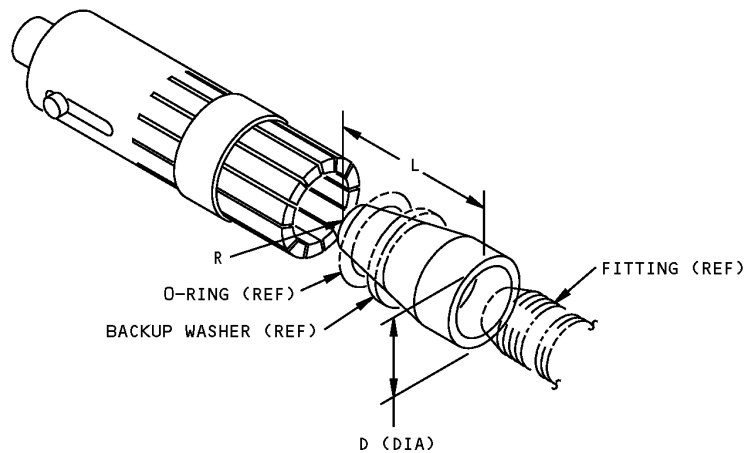
PART NUMBER: ST848

NAME: INSTALLATION TOOL, O-RING

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: The tool is used to install o-rings and backup washers on tube fittings.



TOOL NO. CODE

ST848-XXX

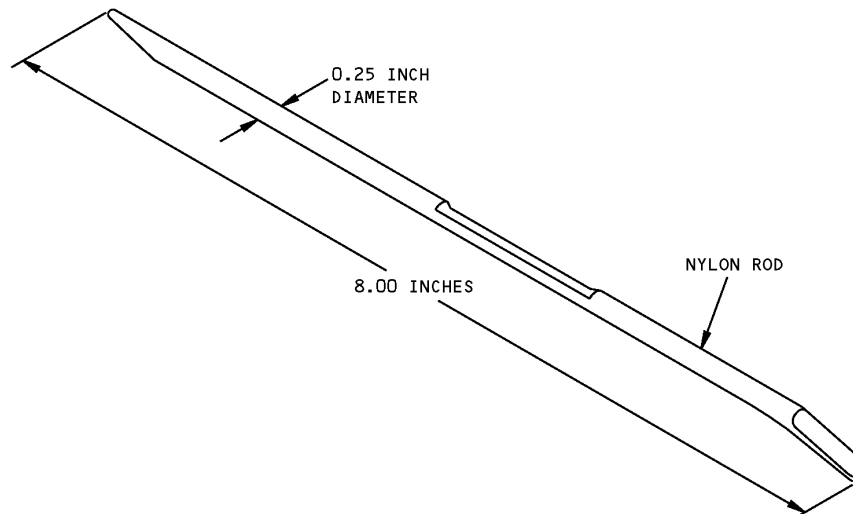
TUBE SIZE IN 1000THS

BASIC TOOL NO.

TOOL NO.	TUBE SIZE	D (DIA)	L	R
ST848-187	3/16	0.437	1.44	0.093
-250	1/4	0.502	1.56	0.125
-312	5/16	0.565	1.75	0.125
-375	3/8	0.627	1.88	0.156
-500	1/2	0.815	1.88	0.250
-625	5/8	0.940	2.25	0.281
-750	3/4	1.127	2.44	0.375
-1000	1	1.377	2.56	0.500
-1250	1 1/4	1.690	2.59	0.687
-1500	1 1/2	1.940	2.94	0.812
-1750	1 3/4	2.315	3.19	1.000

O-Ring Installation Tool
Figure 1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST848R**NAME:** REMOVAL TOOL - O-RING**AIRPLANE MAINTENANCE:** YES**COMPONENT MAINTENANCE:** NO**USAGE & DESCRIPTION:** Used to remove various o-rings from internal and external grooves. This tool consists of 0.25 x 8 inch nylon rod with tapered ends.**DIMENSIONS:** 1 x 9 inches (25 x 229 mm)

O-Ring Removal Tool
Figure 1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST878D

NAME: BACS13AP INSTALLATION TOOL

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

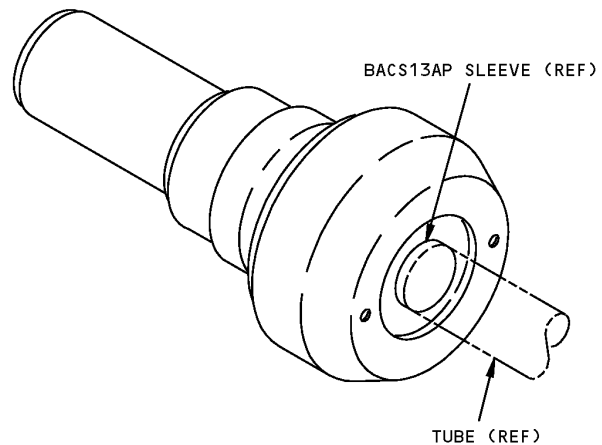
USAGE & DESCRIPTION: The tool is used to preset BACS13AP sleeve and flareless coupling using G85 lockbolt gun.

TOOL NO.	TUBE OD	WALL THICKNESS
ST878D-3-020	3/16	0.020
-3-028		0.028
-3-035		0.035
-4-020	1/4	0.020
-4-028		0.028
-4-035		0.035
-5-020	5/16	0.020
-5-028		0.028
-5-035		0.035
-6-020	3/8	0.020
-6-028		0.028
-6-035		0.035
-8-028	1/2	0.028
-8-035		0.035
-8-049		0.049
-10-028	5/8	0.028
-10-035		0.035
-10-049		0.049
-10-058		0.058
-10-083		0.083
-12-020	3/4	0.020
-12-028		0.028
-12-035		0.035
-12-042		0.042
-12-049		0.049
-12-058		0.058

TOOL NO. CODE

ST878D-X-XXX

- WALL THICKNESS IN 1000THS
- TUBE OD IN 16THS
- VARIATION
- BASIC TOOL NO.



BACS13AP Installation Tool
Figure 1



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A20008-1

NAME: SOCKET SET - SPHERICAL BEARING

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: NO

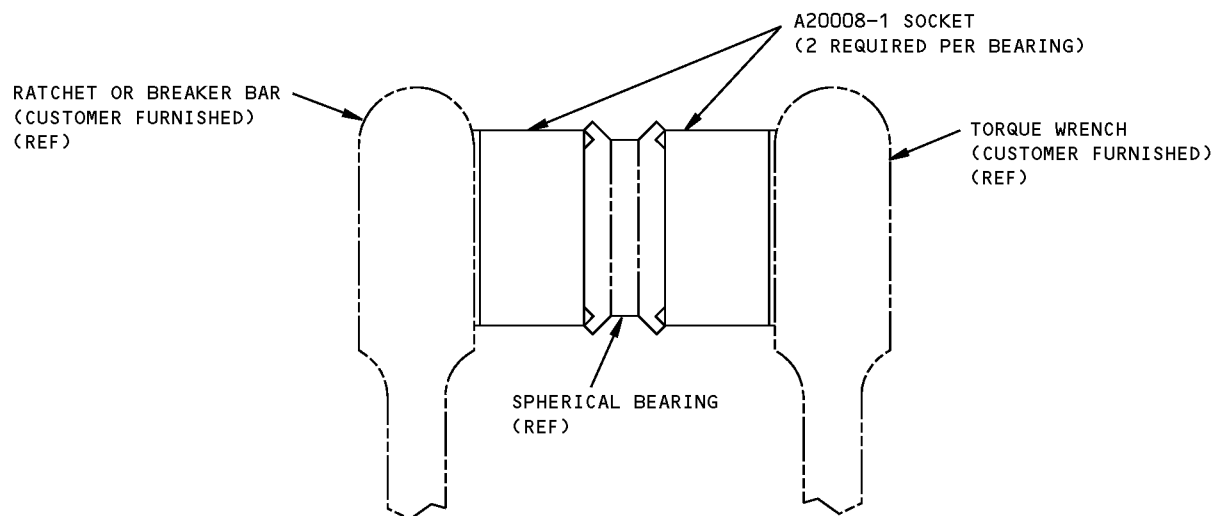
USAGE & DESCRIPTION: The sockets are required to hold the outer race and tighten the retainer ring to the required torque. This tool consists of a -3 through -7 socket in a -10 box assembly. Two sockets are required for bearing and are to be used with a customer furnished torque wrench.

WEIGHT: 3 lbs (1.4 kg) (excluding box)

DIMENSIONS: 1 x 4 x 10 inches (25 x 102 x 254 mm) (excluding box)

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

S302T001 BEARINGS	A20008-1				
	-3	-4	-5	-6	-7
-202	X				
-211	X				
-213		X			
-217			X		
-221		X			
-224					
-225	X				
-226					
-306				X	
-307					
-406	X				
-409					X
-411	X				



Spherical Bearing Socket Set
Figure 1



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

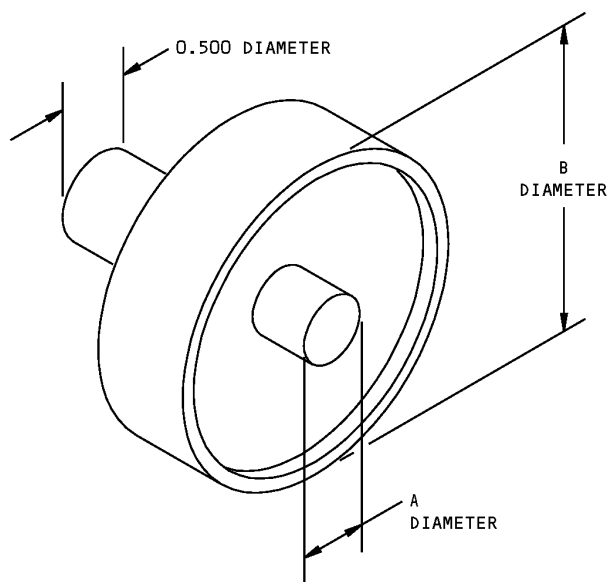
PART NUMBER: ST918C

NAME: MANDREL - ROLLER BEARING PRESSING

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: Used to press bearing BACB10C or equivalent into housing per Standard Overhaul Practices Manual 20-50-03 preparatory to staking.



A DIA = BEARING ID - 0.002
B DIA = BEARING OD - 2 X CORNER RADIUS

TOOL NO. CODE:

ST918C-XXX-XXX
— BEARING OD IN 1,000THS
— BEARING ID IN 1,000THS
— SERIES
— BASIC TOOL NO.

**Roller Bearing Pressing Mandrel
Figure 1**

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

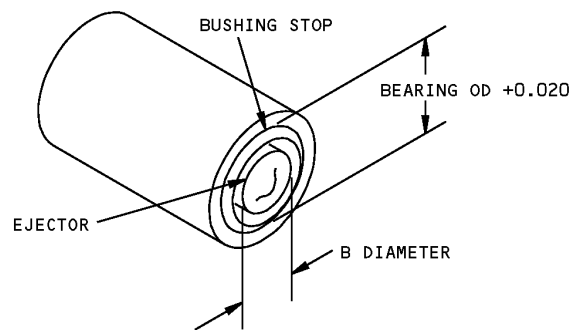
PART NUMBER: ST919

NAME: SUPPORT - BEARING INSTALLATION

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: Used in conjunction with ST919-MP to back-up and support bearing during installation and removal. See Figure 1 for application.



TOOL NO. CODE:

ST919-XXX

BEARING OD IN 1,000THS
BASIC TOOL NO.

NOTE: EJECTOR REMOVED FOR INSTALLATION OPERATION.
BUSHING STOP REMOVED FOR REMOVAL OPERATION.

TOOL NO.	B DIA
ST919- 500 THRU -859	0.343
- 860 THRU -1186	0.687
-1187 THRU -1561	1.000
-1562 THRU -2186	1.375
-2187 THRU -2686	2.000
-2687 THRU -4061	2.500
-4062 THRU -5499	3.875
-5500 THRU -6999	4.875

**Bearing Installation Support
Figure 1**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

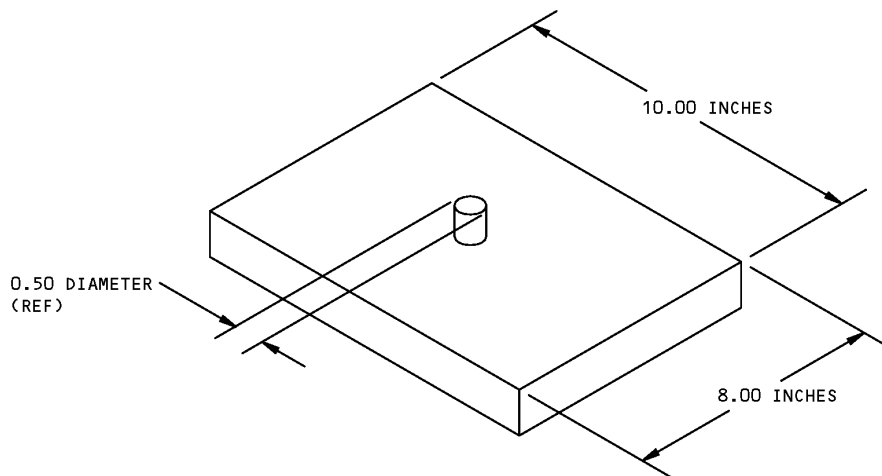
PART NUMBER: ST919-MP

NAME: MOUNTING PLATE

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: Used in conjunction with ST919 to mount bearing support on press for installation and removal.



TOOL NO. CODE:

ST919-MP

VARIATION

BASIC TOOL NO.

**Mounting Plate
Figure 1**

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

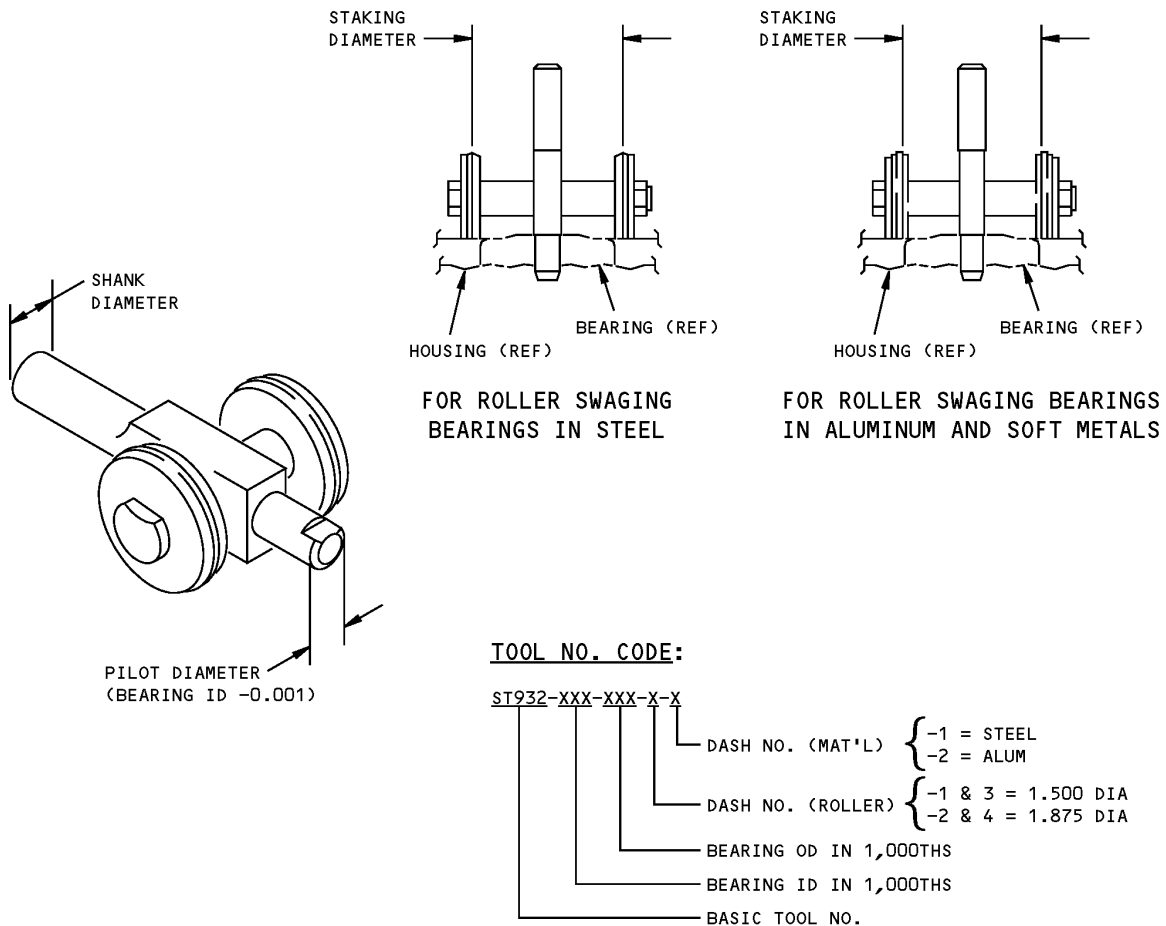
PART NUMBER: ST932

NAME: ROLLER STAKING TOOL

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: Used to roller swage housings to retain bearings per Standard Overhaul Practices Manual 20-50-03.



**Roller Staking Tool
Figure 1**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A32091

NAME: HOLE SAW

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

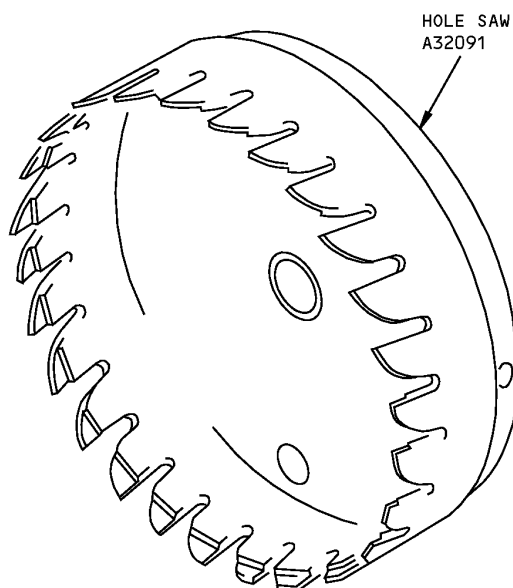
USAGE & DESCRIPTION: Used together with ST927C arbor, or equivalent pilot and anvil to remove roller swaged bearings. The saw is made of high speed steel and varies in diameter in 0.001-inch increments.

DIMENSIONS: 1.5 x 5 x 5 inches (38 x 127 x 127 mm)

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

NOTE:

PART NUMBER	DIA IN INCREMENTS OF .001	NUMBER OF TEETH
-4001 THRU -4500	4.001 THRU 4.500 INCHES	28
-0751 THRU -1000	0.751 THRU 1.000 INCHES	6
-1001 THRU -1250	1.001 THRU 1.250 INCHES	8
-1501 THRU -2000	1.501 THRU 2.000 INCHES	12
-3501 THRU -4000	3.501 THRU 4.000 INCHES	24
-2501 THRU -3500	2.501 THRU 3.500 INCHES	18



**Hole Saw
Figure 1**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: F80113-37, -50, -61, -64, -70, -88 , -105

NAME: KIT - ROLLER SWAGE

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: The F80113 tools are used on all 767 equipped with roller swaged bearings. F80113 is used to roller swage bearings by hand with a spanner wrench. The tool kits consist of body assemblies, pilots, spacers, rollers, anvils, bolts, nuts, oil impregnated bronze thrust bearings and retaining rings.

The table below provides corresponding bearing swage diameters and weights for the specific part number.

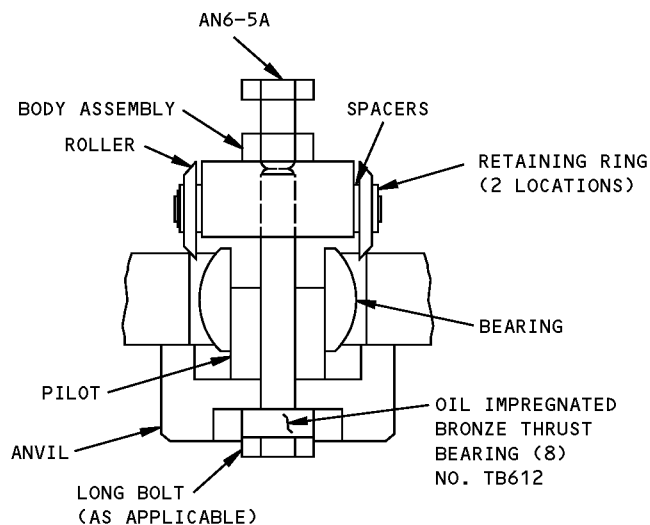
Part Number	Bearing Swage Diameter (inches)	Weight without Box Assembly lbs (kg)
F80113-37	2 3/8 thru 2 5/8	3 (1.4)
F80113-50	5/8 thru 2 3/8-	12 (5.4)
F80113-61	3 7/8 thru 4 1/8	6 (2.7)
F80113-64	5/8 thru 2 3/8	13 (5.9)
F80113-70	3 thru 3 3/8	8 (3.6)
F80113-88	3 thru 3 5/8	9 (4.1)
F80113-105	15/32 thru 2 3/8	13 (5.9)

DIMENSIONS: 7 1/8 x 12 x 12 inches (185 x 305 x 305 mm) (including box)

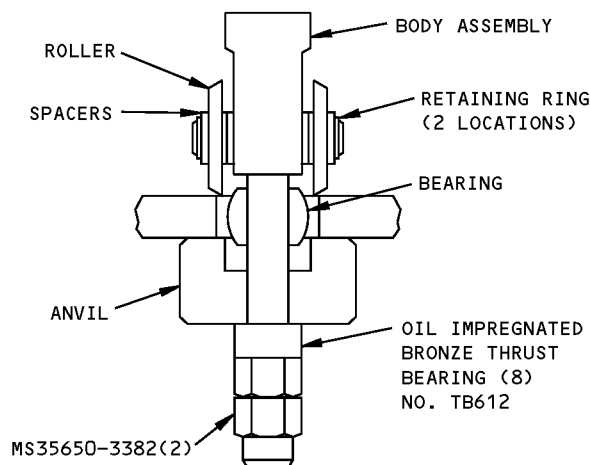
NOTE: F80113-105 replaces F80113-50 and F80113-64 for future procurement.
F80113-88 replaces F80113-70 for future procurement.
F80113-64 replaces F80113-50.
F80113-61 supersedes F80113-44.
F80113-50 supersedes F80113-34.

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL



F80113-37,-50,-61,-64,-70,-88



F80113-50,-64



 SWAGE DIAMETERS 5/8 THRU 2 3/8 INCH

Roller Swage Kit
Figure 1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST922C

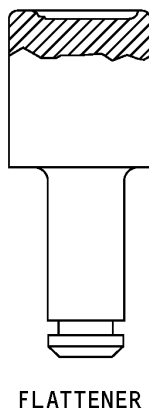
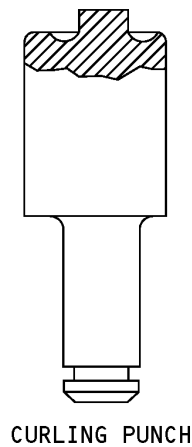
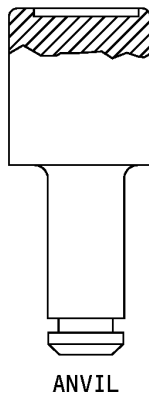
NAME: STAKING TOOL

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool is used for bushing installation and staking. This tool consists of an anvil, curling punch and a flattener.

DIMENSIONS: 1 x 1 x 2 inches (25 x 25 x 51 mm)



TOOL NUMBER CODE:

ST922C - 4

BASIC NUMBER VARIATION BUSHING SIZE IN 16THS

**Staking Tool
Figure 1**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A20011-64, -76

NAME: BUSHING REMOVAL AND INSTALLATION KIT - LANDING GEAR LOCK LINK

AIRPLANE MAINTENANCE: NO

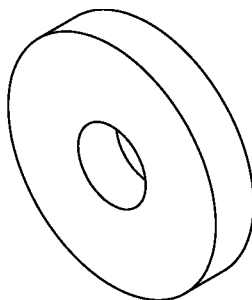
COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool is used to remove and install lock link bushings in the airplane landing gear. Refer to CMM 20-50-03 for further usage instructions. Each of -64 and -76 consists of a set of cutter assemblies, bushing removal mandrels, swage cones and related hardware. The -76 also includes a -77 cutter assembly, a -80 removal mandrel and a -81 storage box assembly. The -64 has a -65 box assembly.

WEIGHT: A20011-64 - 26 lbs (12 kg) (excluding box)
A20011-76 - 26 lbs (12 kg) (excluding box)

DIMENSIONS: A20011-64 - 6 x 12 x 21 inches (152 x 305 x 533 mm) (excluding box)
A20011-76 - 6 x 12 x 21 inches (152 x 305 x 533 mm) (excluding box)

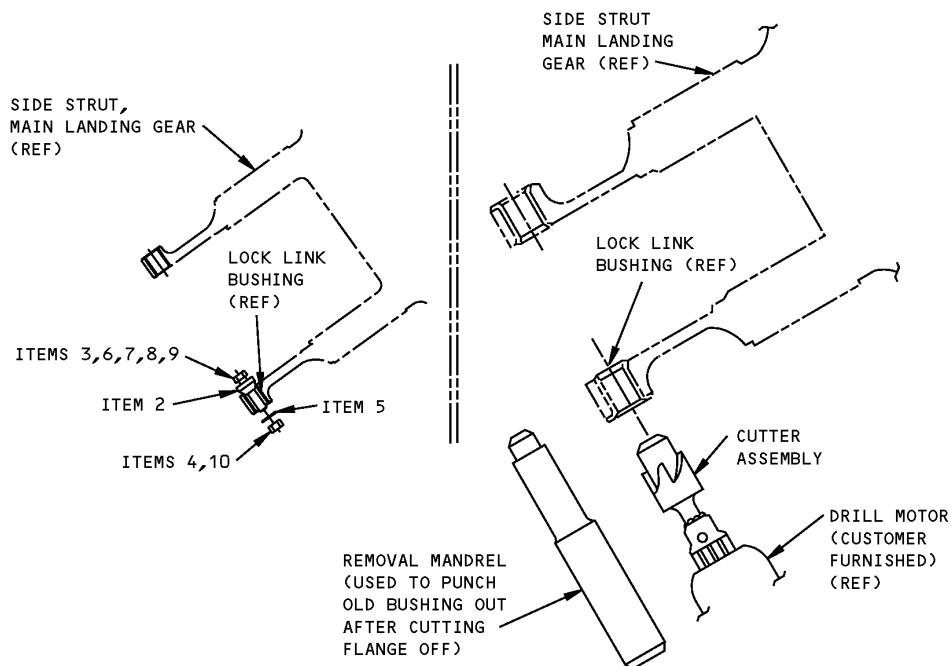
NOTE: A20011-76 replaces A20011-64 for future procurement.
A20011-64 supersedes A20011-22.
A20011-22 supersedes A20011-1.



ITEM 1

**Landing Gear Lock Bushing Removal and Installation Kit
Figure 1 (Sheet 1 of 2)**

ILLUSTRATED TOOL AND EQUIPMENT MANUAL



Landing Gear Lock Bushing Removal and Installation Kit
Figure 1 (Sheet 2 of 2)

REPAIRABLE/REPLACEABLE PARTS			
ITEM NO.	PART NO.	NOMENCLATURE	VENDOR CODE
1	-66	WASHER	
2	-67	SWAGE CONE	
3	-68	BOLT	
4	-69	NUT	
5	-70	WASHER	
6	-71	BOLT	
7	-72	BOLT	
8	-73	BOLT	
9	-74	BOLT	
10	-75	NUT	

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST929-2C

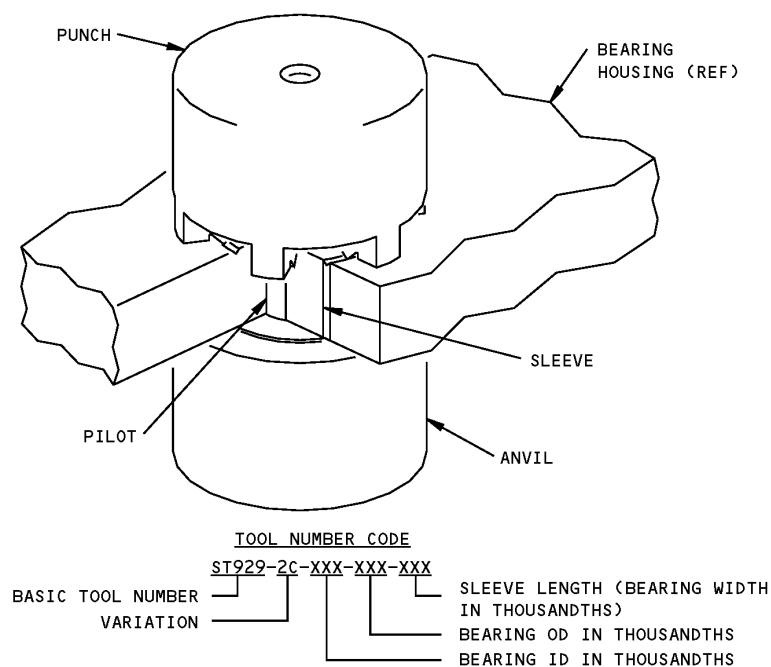
NAME: STAKING TOOL - BEARING SLEEVE, SIX POINT

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool is used to line stake BACB10CA bearings. This tool consists of an anvil, a pilot and a punch

DIMENSIONS: 2 x 2 x 2 inches (51 x 51 x 51 mm)



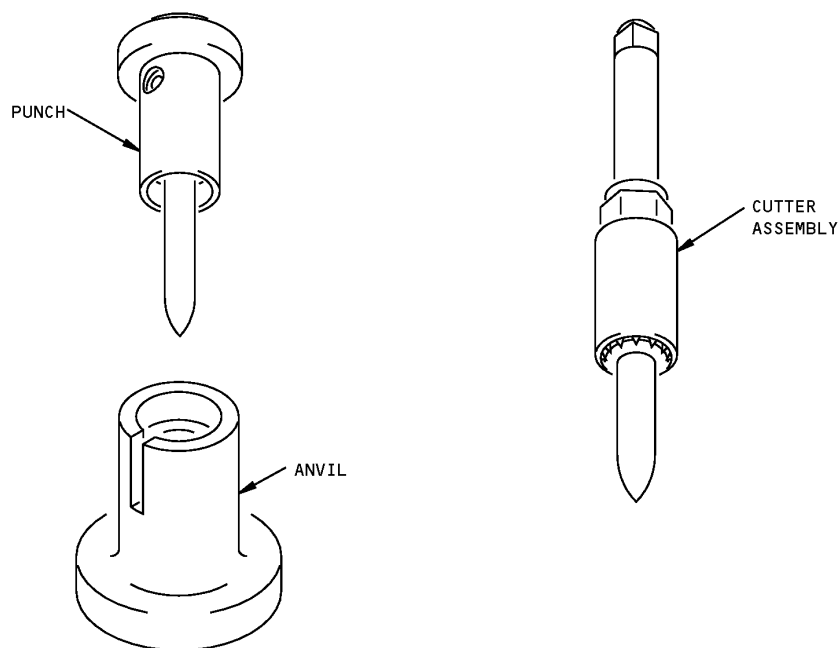
**Bearing Sleeve Six Point Staking Tool
Figure 1**

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST927**NAME:** REMOVAL TOOL - BEARING**AIRPLANE MAINTENANCE:** NO**COMPONENT MAINTENANCE:** YES

USAGE & DESCRIPTION: This tool is used to remove BACB10M series spherical bearings which have been staked into an installation. This tool consists of an anvil, a cutter assembly and a punch. See 20-50-03 for tabulation of tool requirements for installation, retention and removal of specific bearings.

DIMENSIONS: 2 x 2 x 3 to 4 x 4 x 6 inches (51 x 51 x 76 to 102 x 102 x 152 mm)



**Bearing Removal Tool
Figure 1**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A20012-10, -11

NAME: SWAGING TOOL - BEARING

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: The A20012-10 or -11 swaging tool is used on 767 airplanes equipped with CF6-80 engines. A20012-10 is used to swage the S302T001-305 bearing onto the 315T1511-2 drag link to make 315T3511-1 drag link assembly. A20012-11 is used to swage the S302T001-302 bearing onto the 315T3511-4 drag link to make 315T3511-3 drag link assembly. Refer to CMM 78-31-15 or SOPM 20-50-03 for complete usage instructions. The A20012 swaging tools consist of:

A20012-10		
QUANTITY	NOMENCLATURE	PART NUMBER
1	BASE PLATE ASSEMBLY	A20012-5
1	LOWER ANVIL ASSEMBLY	A20012-12
1	UPPER ANVIL	A20012-14
1	STORAGE BOX	

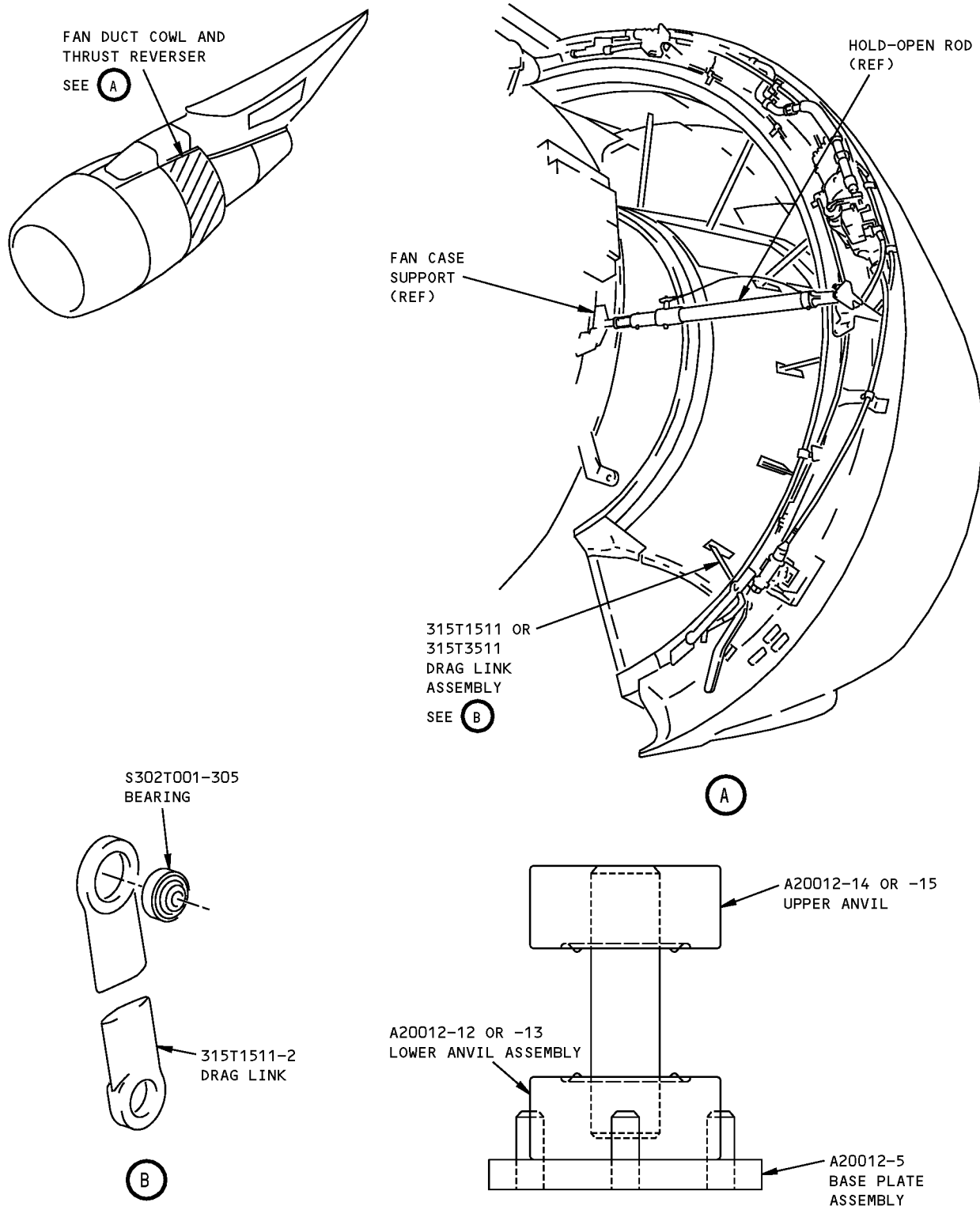
A20012-11		
QUANTITY	NOMENCLATURE	PART NUMBER
1	BASE PLATE ASSEMBLY	A20012-5
1	LOWER ANVIL ASSEMBLY	A20012-13
1	UPPER ANVIL	A20012-15
1	STORAGE BOX	

WEIGHT: 2 lbs (1 kg)

DIMENSIONS: 3 x 3 inches (76 x 76 x 76 mm)

NOTE: A20012-10 supercedes A20012-1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL



**Bearing Swaging Tool
Figure 1**

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: F70321-1, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40

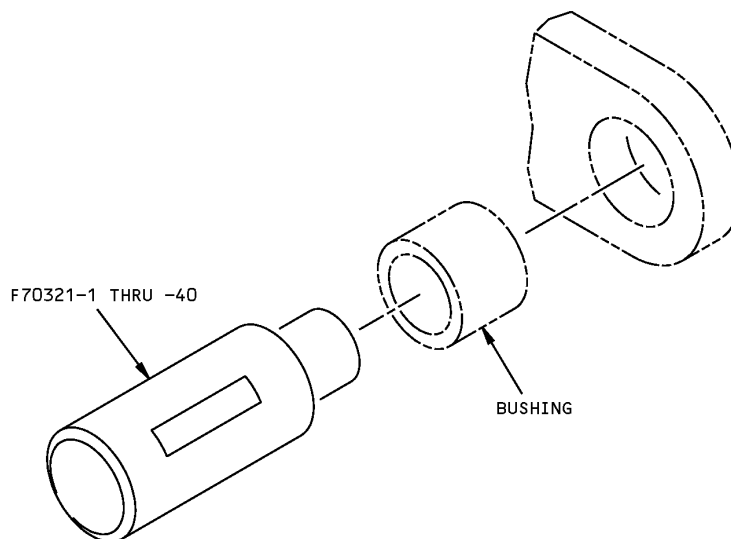
NAME: MANDREL - SHRINK FIT BUSHING INSTALLATION

AIRPLANE MAINTENANCE: NO

COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool provides a means of installing chilled shrink fit bushings. The mandrel is a step machined brass bar. The smaller diameter of the mandrel is inserted into the I.D. of the chilled bushing and inserted into the appropriate housing. The larger diameter of the mandrel prevents further insertion. The tool also helps maintain installation temperature.

DIMENSIONS: 2 x 2 x 5 inches (51 x 51 x 127 mm)



Shrink Fit Bushing Installation Mandrel
Figure 1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: F70313-1, -2, -3, -4

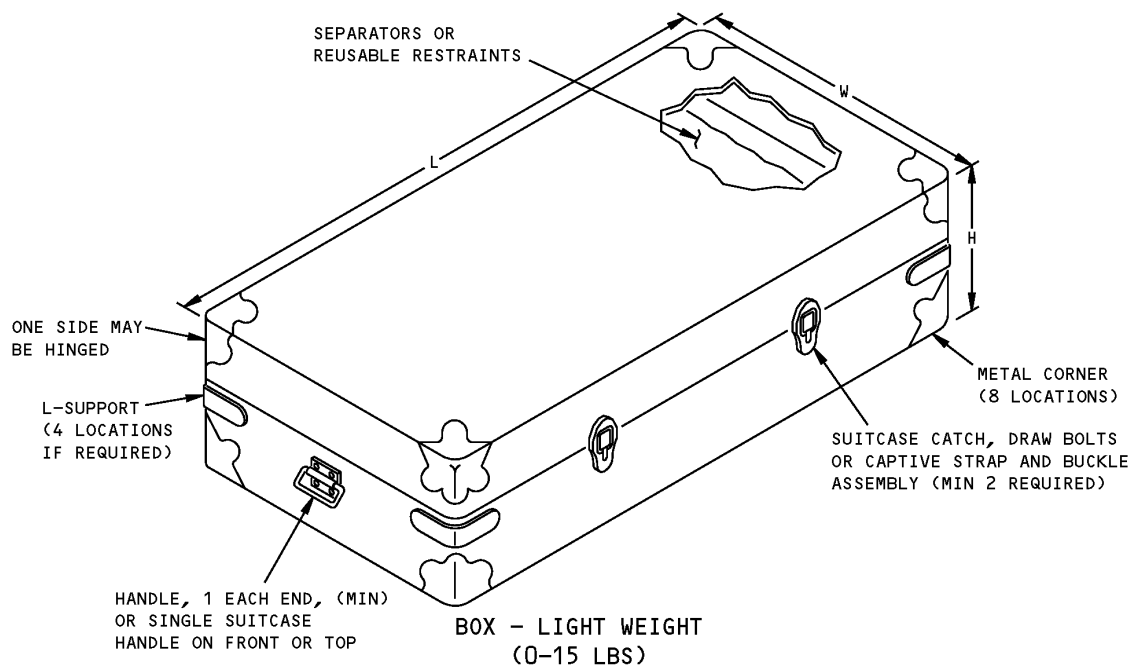
NAME: STANDARD BOX - SUPPORT EQUIPMENT

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: YES

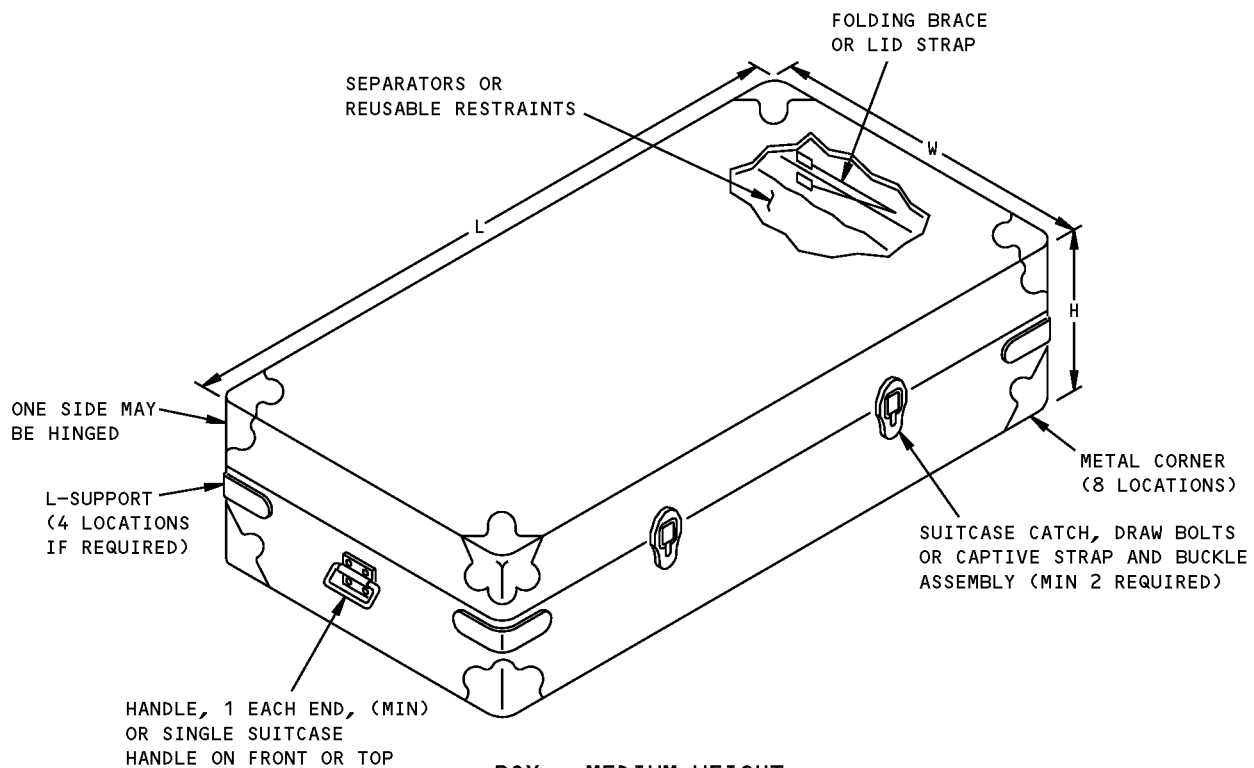
USAGE & DESCRIPTION: This tool is a standard box which is used to protect tools during storage and transportation. It also provides a method of accounting for individual parts of the tool.

NOTE: The box drawing describes the minimum standards for the design or purchase of support equipment tool boxes, and not intended to be a comprehensive design.

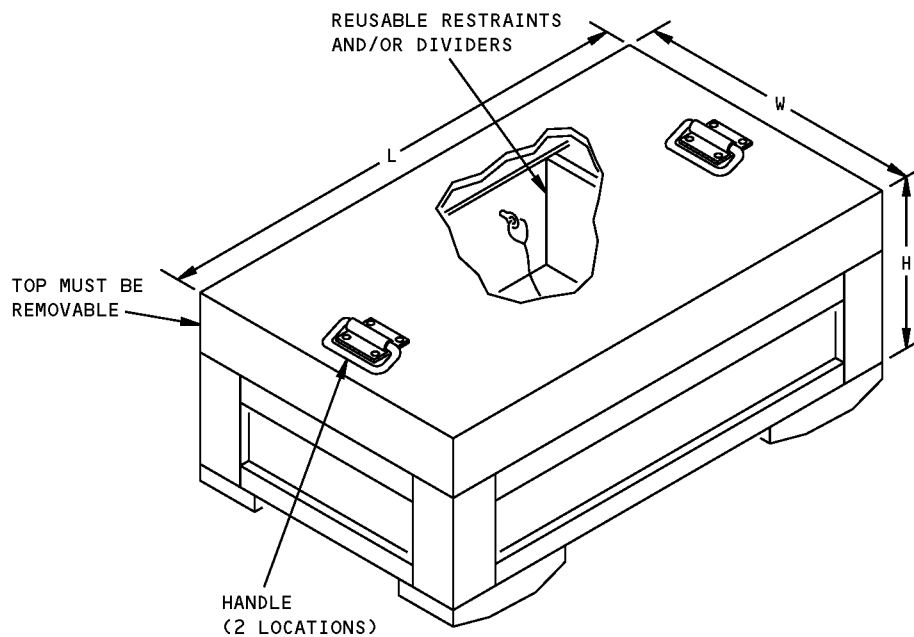


**Support Equipment Standard Box
Figure 1 (Sheet 1 of 3)**

ILLUSTRATED TOOL AND EQUIPMENT MANUAL



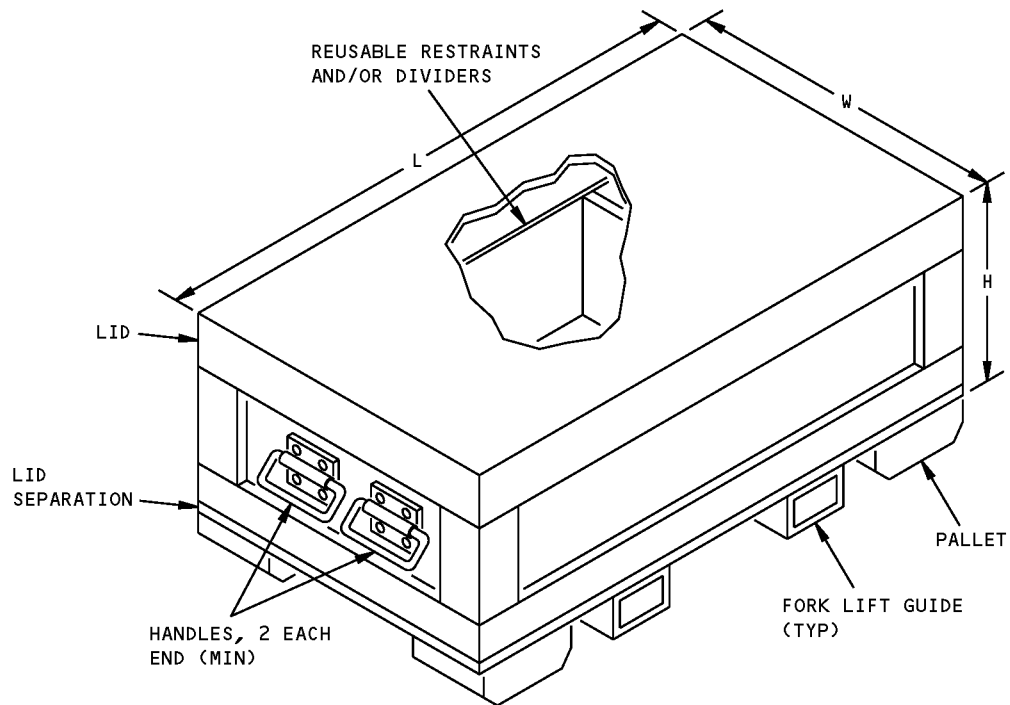
BOX - MEDIUM WEIGHT
(0-100 LBS)



BOX - HEAVY WEIGHT
(OVER 100 LBS)

Support Equipment Standard Box
Figure 1 (Sheet 2 of 3)

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL



**BOX - HEAVY WEIGHT, SKID TYPE
(OVER 100 LBS)**

**Support Equipment Standard Box
Figure 1 (Sheet 3 of 3)**



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: ST991A-2

NAME: REMOVAL TOOL - SCRIVET FASTENER

AIRPLANE MAINTENANCE: YES

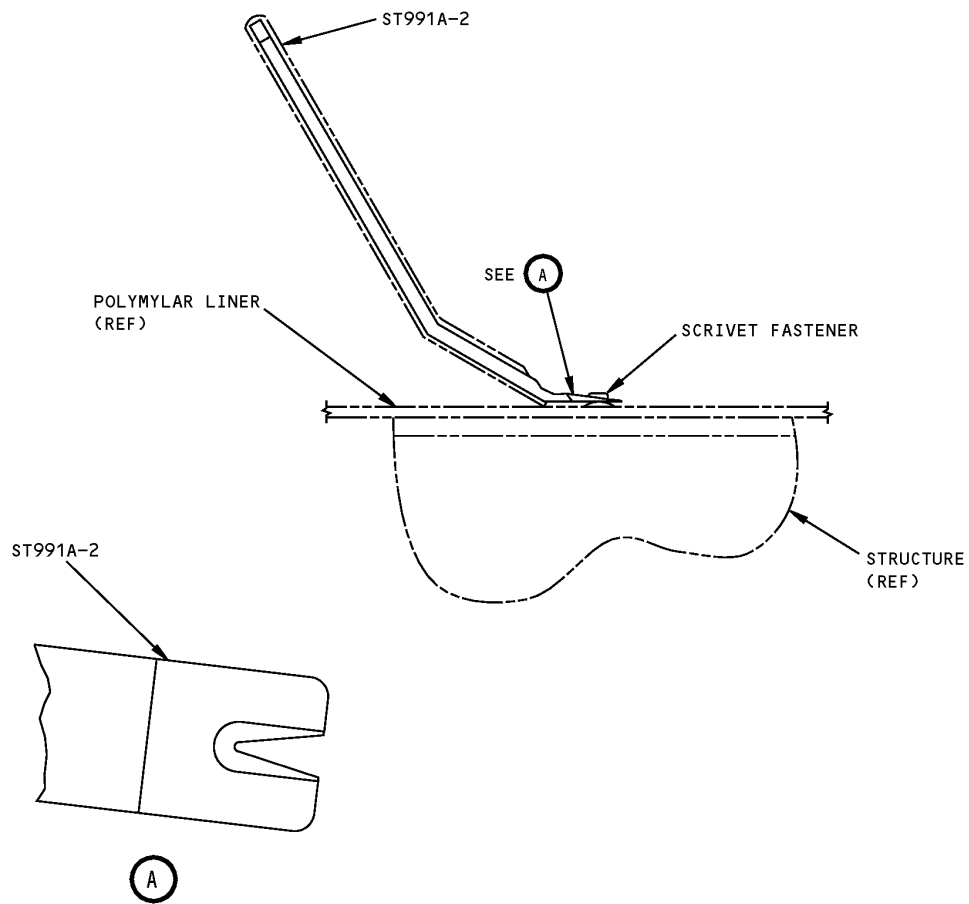
COMPONENT MAINTENANCE: YES

USAGE & DESCRIPTION: This tool is used to remove scrivet fasteners. This tool is a one inch wide heat treated dry bar approximately 7 inches long, with a shallow tapered vee shaped entry that fits under the fastener.

NOTE: This tool is common to customer airlines and Boeing manufacturing.

DIMENSIONS: 0.25 x 1 x 8 inches (6 x 25 x 203 mm)

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL



Scrivet Fastener Removal Tool
Figure 1



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

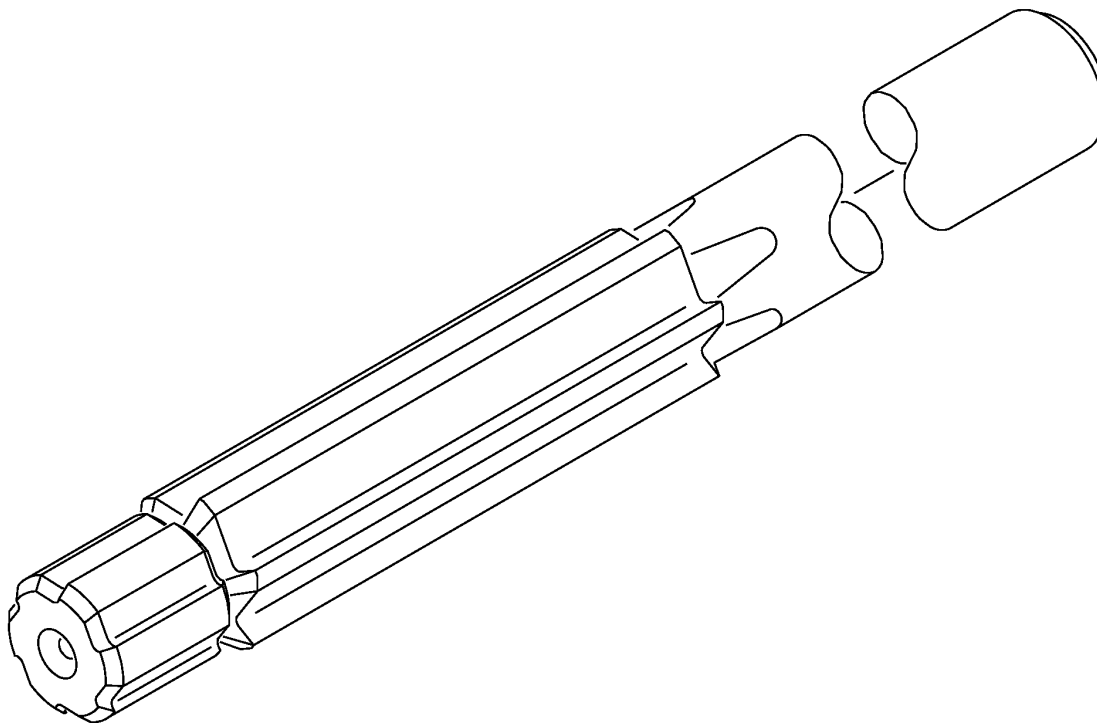
PART NUMBER: ST1864P

NAME: REAMER - CARBIDE STRAIGHT FLUTE, STRAIGHT SHANK-PILOTED

AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: NO

USAGE & DESCRIPTION: Used to generate close tolerance holes, primarily in graphite epoxy stackups. Reamer is made from C2 carbide and may be 4 or 6 fluted depending on Reamer diameter. Refer to SRM 51-30-05 for complete usage.



ST1864P - XXXX - XXX - X - XX
BASIC TOOL NUMBER ————
DIAMETER IN 1/10,000 TH'S ————
PILOT DIAMETER IN 1/1,000 TH'S ————
PILOT LENGTH IN 1/16 TH'S ————
OVERALL LENGTH IN 1/16 TH'S ————

Carbide Straight Flute, Straight Shank-Piloted Reamer
Figure 1



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A20013-1

NAME: WORK TABLE - PILOT'S AISLE STAND

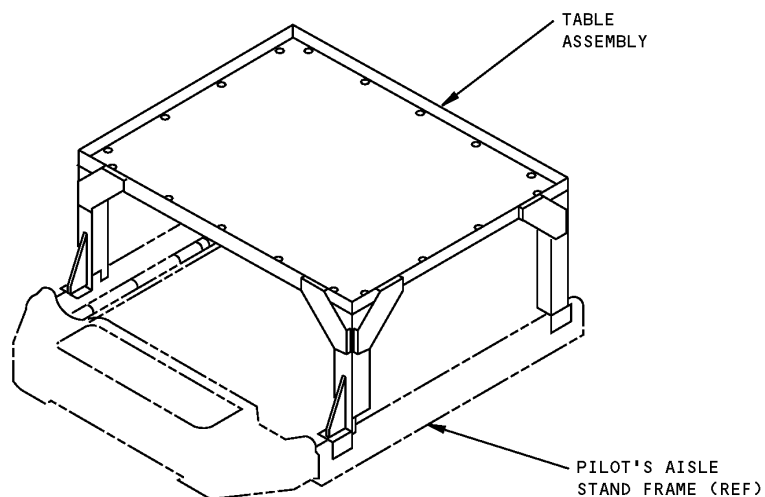
AIRPLANE MAINTENANCE: YES

COMPONENT MAINTENANCE: NO

USAGE & DESCRIPTION: This tool is used to protect modules of P-8 from being scratched or broken when maintenance is being performed. This tool consists of a table assembly and a storage box assembly.

WEIGHT: 8 lbs (3.6 kg) (excluding box)

DIMENSIONS: 10 x 18 x 20 inches (254 x 457 x 508 mm) (excluding box)



Pilot's Aisle Stand Work Table
Figure 1



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: J20002-1, -36

NAME: LOAD POSITIONER - ENGINE ACCESSORIES, 250 LB CAPACITY

AIRPLANE MAINTENANCE: YES

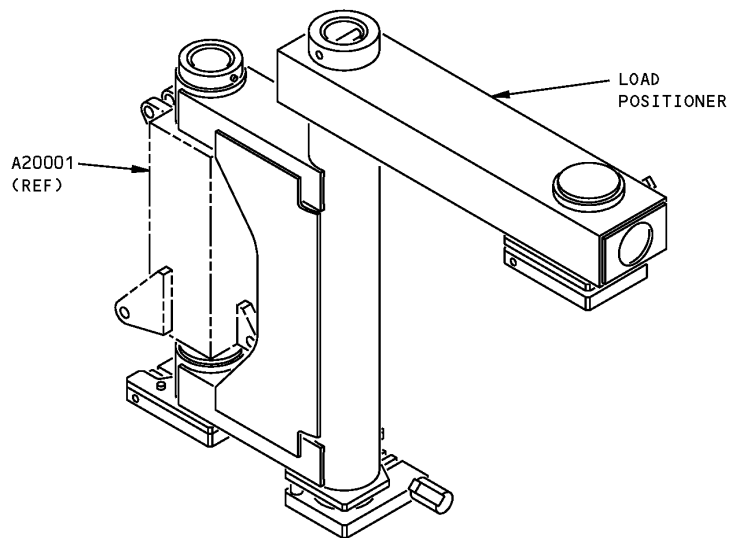
COMPONENT MAINTENANCE: NO

USAGE & DESCRIPTION: The load positioner is used in conjunction with a boom hoist and other LRU adapters to provide horizontal movement. Refer to AMM 20-00-00, AMM 24-11-01 and AMM 24-25-09 for complete usage instructions. The load positioner is used on all 767 airplanes. The load positioner has a load positioner assembly and a storage box assembly.

WEIGHT: 40 lbs (18 kg)

DIMENSIONS: 5 x 14 x 19 inches (127 x 356 x 483 mm)

NOTE: J20002-36 replaces J20002-1 for future procurement.



Engine Accessories, 250 lb Capacity Load Positioner
Figure 1



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ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A20002-4

NAME: ATTACH FITTING SET - WING AND HORIZONTAL STABILIZER, SAFETY HARNESS

AIRPLANE MAINTENANCE: YES

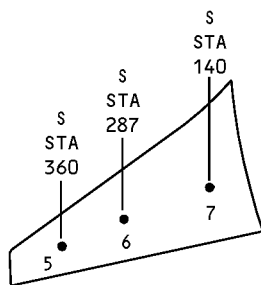
COMPONENT MAINTENANCE: NO

USAGE & DESCRIPTION: A20002-4 is used on all 767 airplanes. This tool is used to protect personnel while working on the upper surfaces of the wing, horizontal stabilizer or control surfaces. The fitting is secured at one of the airplane receiver locations and a -5 or -6 wire rope is placed between the fitting and Dynabrake for the wing receiver locations. Only the fitting and dynabrake are used at the horizontal stabilizer receiver locations. The Dynabrake is secured to a customer furnished full body personnel harness to absorb falling impact. A20002-4 is contained in a storage box.

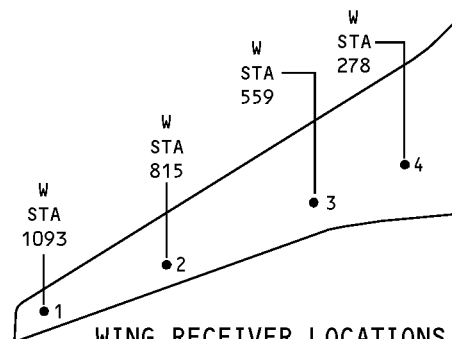
WEIGHT: 10 lbs (4.5 kg)

DIMENSIONS: 10 x 10 x 20 inches (254 x 254 x 508 mm)

NOTE: A20002-4 supersedes A20002-1.



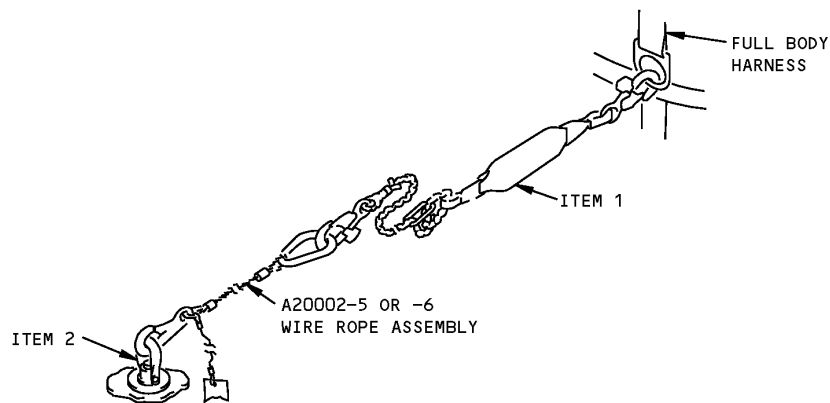
HORIZONTAL STABILIZER RECEIVER LOCATIONS



WING RECEIVER LOCATIONS

Safety Harness Attach Fitting Receiver Locations
Figure 1

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ILLUSTRATED TOOL AND EQUIPMENT MANUAL



Wing and Horizontal Stabilizer Safety Harness Attach Fitting Set
Figure 2

REPAIRABLE/REPLACEABLE PARTS			
ITEM NO.	PART NO.	NOMENCLATURE	VENDOR CODE
1	501017	DYNABRAKE	V86809
2	IL2940-1	FITTING-NORCO	V08844

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

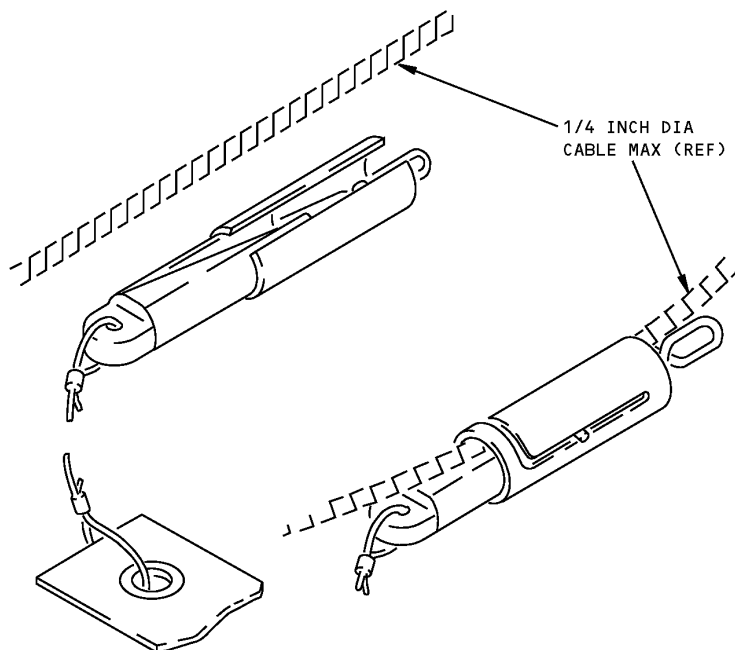
PART NUMBER: A20005-9**NAME:** CLAMP - CONTROL CABLE**AIRPLANE MAINTENANCE:** YES**COMPONENT MAINTENANCE:** NO

USAGE & DESCRIPTION: The tool is used to clamp a cable at any point while installing or rigging. The tool is a spring-loaded cylindrical assembly which applies a tension load to a cable. Refer to AMM 20-10-03 for complete usage instructions.

WEIGHT: 1 lb (0.45 kg)

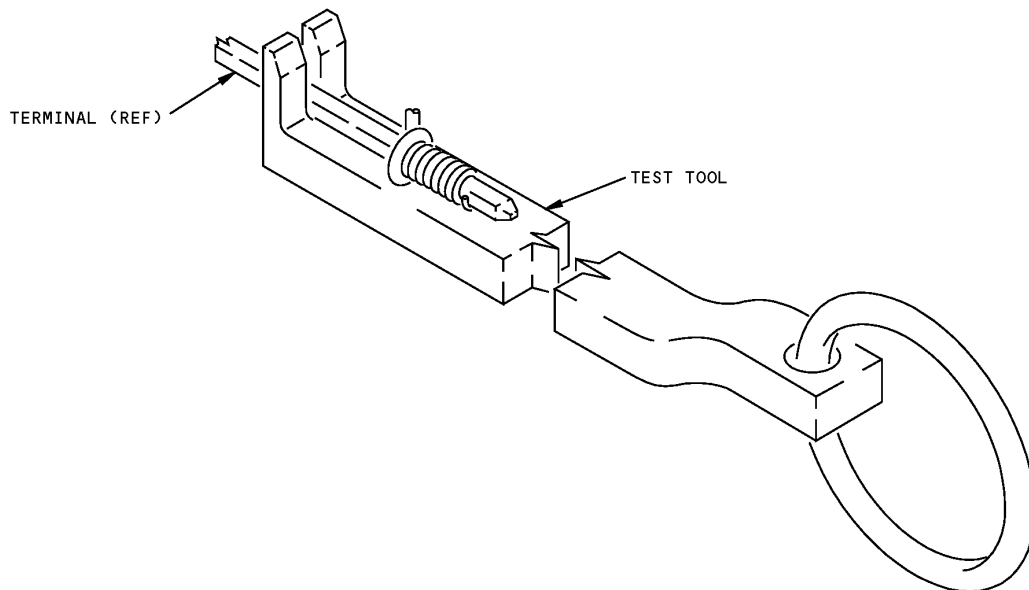
DIMENSIONS: 4 x 4 x 6 inches (102 X 102 X 152 mm)

NOTE: A20005-9 supersedes A20005-5
A20005-5 supersedes A20005-1



Control Cable Clamp
Figure 1

ILLUSTRATED TOOL AND EQUIPMENT MANUAL

PART NUMBER: A20007-1**NAME:** TEST TOOL - STRIPPING FORCE, WRAPPED WIRE CONNECTION**AIRPLANE MAINTENANCE:** NO**COMPONENT MAINTENANCE:** YES**USAGE & DESCRIPTION:** This tool is used to determine the integrity of the applied wire connection.**DIMENSIONS:** 0.16 x 0.50 x 2.20 inches (4 x 13 x 56 mm)

Wrapped Wire Connection Stripping Force Test Tool
Figure 1