COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

THRUST REVERSER LOCKING ACTUATOR ASSEMBLY

PART NUMBER 315A2801–1

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COMPONENT MAINTENANCE MANUAL

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To: All holders of THRUST REVERSER LOCKING ACTUATOR ASSEMBLY 78-31-19.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

The COMPONENT MAINTENANCE MANUAL is furnished either as a printed manual, on microfilm, or digital products, or any combination of the three. This revision replaces all previous microfilm cartridges or digital products. All microfilm and digital products are reissued with all obsolete data deleted and all updated pages added.

For printed manuals, changes are indicated on the List of Effective Pages (LEP). The pages which are revised will be identified on the LEP by an R (Revised), A (Added), O (Overflow, i.e. changes to the document structure and/or page layout), or D (Deleted). Each page in the LEP is identified by Chapter-Section-Subject number, page number and page date.

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Location of Change	Description of Change
78-31-19	
TESTING AND FAULT ISOLATION	Changed the rigging pin part number and the LVDT Output Verification Test.
FITS AND CLEARANCES	Changed Fig. 801, Sheet 2 to add a reference to the rigging pin hole.

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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR 38022	SEP 01/96

All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

Revision		Filed		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

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All temporary revisions to this manual will be accompanied by a cover sheet bearing the temporary revision number. Enter the temporary revision number in numerical order, together with the temporary revision date, the date the temporary revision is inserted and the initials of the person filing.
When the temporary revision is incorporated or cancelled, and the pages are removed, enter the date the pages are removed and the initials of the person who removed the temporary revision.

Temporary Revision		Inserted		Removed	
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INTRODUCTION

1. General

A. The instructions in this manual supply the data necessary to do the maintenance functions together with the test, fault isolation, repair, and replacement of the defective parts.

B. This manual is divided into different parts:

(1) Title Page

(2) Transmittal Letter

(3) Highlights

(4) List of Effective Pages

(5) Table of Contents

(6) Temporary Revision & Service Bulletin Record

(7) Record of Revisions

(8) Record of Temporary Revisions

(9) Introduction

(10) Procedures & IPL Sections

C. Components that can be repaired have a different repair number for each specified repair. To find the repair number location of a component, look in the Repair-General procedure at the beginning of the REPAIR section. The Repair-General procedure also has an explanation of the True Position Dimension symbols used.

D. All dimensions, measures, quantities and weights included are in English units. When metric equivalents are given they will be in the parentheses that follow the English units.

E. The introduction to the Illustrated Parts List (IPL) shows how the IPL data is used.

F. Design changes, optional parts, configuration differences and Service Bulletin modifications may cause different part numbers. These part numbers are identified in the IPL with an alphabetical letter which is added to the end of the basic item number. This new item number is referred to as an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless shown differently.

G. The tool reference numbers found in the individual procedures and in the Special Tools, Fixtures, and Equipment section are used to identify if a tool is a standard tool (STD-XXXX), a commercial tool (COM-XXXX), or a Special Tool (SPL-XXXX). This reference number is also used to distinguish between tools with similar names in the same procedure. These reference numbers are for use in the documentation only. They are not to be used for ordering tools.

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LOCKING ACTUATOR ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The locking actuator assembly is a single-ended linear hydraulic actuator. The actuator is mounted by a spherical bearing at the rod end and a gimball ring assembly at the housing end. The primary components of the actuator assembly are a cylinder, housing, lead screw and piston assembly, locking mechanism and feedback mechanism. The actuator assembly has two ports for retract pressure and two ports for extend pressure and connections for the flexible shafts.

B. The actuator has an internal locking mechanism with three lock keys and a lock sleeve. The actuator also has an unlock lever and an unlock pin installed in the housing. An external handle lets manual operation of the actuator. Electrical feedback from a Linear Variable Differential Transducer (LVDT) gives actuator position.

C. The actuator is designed to be used with fluid, D00153.

D. In the system, the actuators are synchronized with a separate flexible shaft assembly contained in the extend tubes between the actuators.

2. Operation

A. Hydraulic pressure applied to the EXTEND port is pointed to both the piston head and the rod-end. The initial pressure pushes the lock sleeve in the opposite direction of the piston. This movement compresses the lock spring and releases the lock keys. The piston makes the lock keys move out radially. The piston extends because of the pressure on the different surface areas.

B. As the piston extends, the lock spring follower on the lead screw moves over the inner ends of the lock keys. This prevents the keys from moving back to the locked position after the piston is extended. The locking sleeve can be manually unlocked by moving the external unlock handle to the feedback rod end.

C. The feedback rod moves in proportion to the piston movement to provide input for the feedback system.

D. The movement of the piston causes the lead screw to turn by the forces thru the lead screw nut. This turns the worm wheel and turns the mounting worm shaft gear. In the system operation, the worm shaft gear is attached to the other actuators by flex shafts for synchronized operation. The flex shafts are closed in the rigid hydraulic supply tubes, which transmit hydraulic pressure. The actuator is held in the locked position by the locking actuator and flex shafts.

E. An internal hydraulic snubber limits fluid flow out of the rod end and stops piston movement within the last 1.5 inches. Snubbing is not required for retraction since the actuator is not subjected to external loads and the retract velocity is lower.

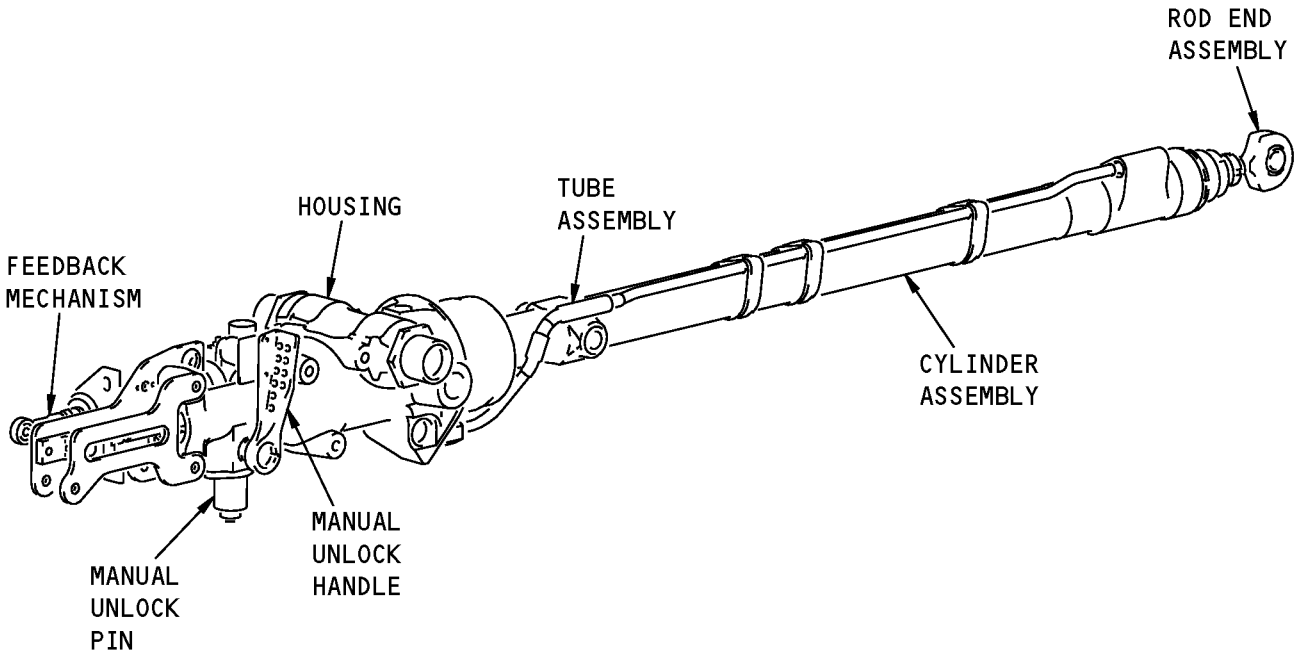
3. Leading Particulars (Approximate)

A. Length – 24 inches (retracted), 44 inches (extended)

B. Width – 6 inches

C. Height – 5 inches

D. Weight – 42 pounds



Locking Actuator Assembly
Figure 1

TESTING AND FAULT ISOLATION

1. General

A. This procedure has the data necessary to do a test of the mechanism after an overhaul or for fault isolation.

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to IPL Figure 1 for item numbers.

2. Testing and Fault Isolation

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-5359	Test Fixture - Rod End and Stroke Stop, Locking and Non-Locking Thrust Reverser Actuator (Part #: B78014-37, Supplier: 81205) (Opt Part #: B78014-29, Supplier: 81205)
SPL-6275	Overhaul Set - T/R Locking & Non-Locking Actuator Assy (Part #: B78016-1, Supplier: 81205)
SPL-6280	Test Equipment - Velocity/Position Transducer (Part #: B20005-82, Supplier: 81205) (Opt Part #: B20005-75, Supplier: 81205)
SPL-6281	Stand - Test, Functional (Part #: B78010-28, Supplier: 81205)
SPL-6373	Transducer Assembly - Velocity/Position (Part #: B20005-41, Supplier: 81205)
SPL-7292	Adapter - Worm Gear Shaft (B78016-9 is included in B78016-1) (Part #: B78016-9, Supplier: 81205)
SPL-7477	Assembly - Test Stand (B78014-30 included in Test Fixture B78014-37) (Part #: B78014-30, Supplier: 81205)

B. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00153	Fluid - Hydraulic, Erosion Arresting, Fire Resistant	BMS3-11 Type IV (interchange˜able & intermixable with Type V)

C. References

Reference	Title
SOPM 20-60-03	LUBRICANTS

D. Special Tools and Equipment

NOTE: Equivalent tool/equipment can be used.

(1) X-Y Plotter or Oscilloscope

(2) Hydraulic Test Stand, 0-4500 psi (variable) 60-140°F

(3) Voltage Source, 7.000-7.140 Volts, 3K Hz (±1%)

(4) Resistive load, 50K ohms

(5) Capacitive load, 1000 picofarads (pF)

I (6) NASM20392-2XXX, Rig Pin

(7) Consumable Materials

NOTE: Equivalent Materials can be used.

(a) BMS 3-11, Type 4 Hydraulic fluid, D00153 (SOPM 20-60-03)

E. Procedure

(1) Length Check

NOTE: This check is not required if the extended and retracted lengths have been adjusted and verified during assembly before testing.

(a) Put the actuator in the test stand assembly, SPL-7477, included in rod end and stroke stop test fixture, SPL-5359. Pull out on the rod end to fully extend piston (695) against internal stop. Secure rod end in fixture clevis with fixture pin.

(b) Do a check as shown in steps 2.H.(18) and 2.H.(19) of the Assembly Procedure and verify that extended length is 44.165-44.265 inches and retracted length is 23.660-23.670 inches.

CAUTION: DO NOT ROTATE PISTON AT ANY TIME. ROTATION FROM ORIGINAL SETTING WILL CHANGE CRITICAL LINEAR ADJUSTMENTS.

(2) Preparation for Test

(a) Install the actuator in test fixture, SPL-6281. Connect the hydraulic lines as shown in TESTING AND FAULT ISOLATION, Figure 101.

WARNING: DO NOT APPLY AIR PRESSURE TO ANY PORTS, OR DAMAGE TO THE ACTUATOR AND INJURY TO PERSONNEL CAN OCCUR.

CAUTION: DO NOT ROTATE PISTON AT ANY TIME. MAKE SURE THE ACTUATOR PISTON IS FULLY RETRACTED OR EXTENDED IN THE PROPER DIRECTION BEFORE HIGH PRESSURE FLUID IS APPLIED, OR DAMAGE TO ACTUATOR MAY OCCUR.

(b) Fill the actuator with fluid, D00153. Apply 1500 psi pressure to RET and EXT ports and cycle the actuator slowly until the air is removed.

CAUTION: DO NOT EXTEND OR RETRACT THE PISTON AT PROOF PRESSURE, OR DAMAGE TO THE ACTUATOR CAN OCCUR.

(3) Proof Pressure Test

(a) Use the worm gear shaft adapter, SPL-7292 (part of overhaul set, SPL-6275), to rotate the worm shaft gear (310) and manually retract the piston (695). Close the ports not used.

(b) Gradually apply a 4500 psi pressure to the RET port and hold the pressure for 2 minutes. There must be no external leakage, permanent deformation, or loose parts.

(c) Decrease the pressure to 5 psi and hold the pressure for 2 minutes. There shall be no external leakage.

(d) Decrease the pressure to zero. Manually extend the piston (695).

(e) Apply a 4500 psi pressure to the RET and EXT ports and hold the pressure for 2 minutes. There must be no external leakage, permanent deformation or loosen parts.

(f) Decrease the pressure to 5 psi and hold the pressure for 2 minutes. There must be no external leakage.

(4) Operation and External Leakage Test

(a) Close the not used ports. Retract and extend the actuator for 50 full stroke cycles with pressure increasing to 3000 psi at fully retracted and fully extended positions.

(b) Apply a 3000 psi pressure to the RET port.

(c) Apply a 3000 psi pressure to the EXT port and fully extend the actuator. Decrease the pressure at the EXT port to 0 psi to fully retract the actuator. Do again for twenty-five cycles.

(d) Make sure the actuator moves freely.

(e) The external leakage must not be more than 1 drop for 25 cycles at each seal.

(5) Internal Leakage Test

(a) Close the not used ports, except leave one EXT port open.

(b) Apply a 3000 psi pressure to the RET port and hold the pressure for 5 minutes.

(c) The internal leakage must not be more than 5 cc/min in the last minute.

(d) No external leakage is permitted.

(6) Lock Test

(a) Retract the piston (695) fully. Apply a hydraulic pressure, in cycles from 0-600 psi, five times, to the RET and EXT ports at the same time. Make sure the actuator does not unlock (extend). The manual unlock handle (215) must not move.

(b) Slowly increase the pressure to the RET and EXT ports at the same time until the actuator unlocks and the piston (695) starts to extend. Make sure the pressure to unlock the actuator is 900-1300 psi.

(c) Retract and lock the actuator. Apply a 3000 psi pressure to the RET port, then slowly apply a pressure to the EXT port until the piston unlocks and starts to extend. Slowly decrease the pressure at the EXT port until the actuator locks again. The actuator is locked when the manual unlock handle (215) is vertical and the piston is retracted completely. Make sure the piston fully retracts and the actuator locks at not less than 350 psi.

(d) With the piston retracted and locked, manually turn the manual unlock handle (215) to unlock the actuator. Apply a 380 psi pressure to the EXT port, and make sure the piston extends smoothly.

(7) Freeplay Test

CAUTION: DO NOT TURN THE PISTON (695).

(a) With the piston fully retracted and locked, apply a 150 psi pressure to the RET and EXT ports at the same time.

(b) Measure the distance between the stop (410) and the gland nut (425). The distance must be 0.007-0.033 inch.

(8) Friction Test

(a) Apply and maintain a 3000 psi pressure at the RET port for the steps that follow. Increase and decrease the pressure at the EXT port to extend and retract the actuator piston.

(b) Apply a sufficient pressure to extend the piston approximately two inches. Decrease the pressure to stop the movement, then slowly increase the pressure again to extend the piston another two inches. Do again five times for full travel of the piston (approximately 20 inches).

(c) The pressure at the EXT port needed to extend the piston at any two-inch increment shall not exceed 1800 psi.

(d) Apply a 3000 psi pressure to the EXT and RET ports. Decrease the pressure to the EXT port until the piston retracts approximately two inches. Increase the pressure to stop the movement of the piston. Do again five times for the full travel of the piston.

(e) The pressure at the EXT port needed to retract the piston must not be less than 1500 psi.

(9) Snubbing Test

(a) Install the transducer assembly, SPL-6373 on the test fixture, SPL-6281. Connect the transducer assembly, SPL-6373 to the piston rod end. Connect the transducer assembly, SPL-6373 to the test equipment transducer, SPL-6280. Connect the test equipment transducer, SPL-6280 to an X-Y plotter or an oscilloscope to record the piston velocity and the position.

(b) With the piston fully retracted, apply a 3000 psi pressure to the EXT and RET ports to extend the piston at a rate of 11-12 inches/second. Check the velocity versus the position during the last 1.8 inches of travel. The velocity versus the stroke shall be within the performance envelope as shown in TESTING AND FAULT ISOLATION, Figure 102.

(10) Synchronous Drive Backlash Test

NOTE: There is no pressure on the actuator for the synchronous drive backlash test.

(a) Put the actuator piston approximately at mid-stroke. Connect the worm gear shaft adapter, SPL-7292 to the worm shaft gear (310).

(b) Put a dial indicator on the test fixture to measure the movement of the piston.

(c) Turn the worm shaft gear (310) in both directions to extend and retract the piston. Check that the rotation angle of the worm shaft gear is not more than 35 degrees for piston movement of ±0.001 inch.

(11) LVDT Output Verification Test (TESTING AND FAULT ISOLATION, Figure 103)

I **NOTE**: Perform the LVDT Output Verification Test on both Channel A and Channel B.

(a) With the actuator retracted and locked, apply a 7.000-7.140 volts RMS excitation voltage with a sine wave generator at 3 KHz ±1.0% across pins 1 and 2 as shown in TESTING AND FAULT ISOLATION, Figure 103.

(b) Connect a 50 kilohms resistive load and a 1000 picofarads (pF) capacitive load across pins 3 and 5 and across pins 4 and 5.

(c) Using a digital RMS-AC voltmeter, measure and record the V1 between pins 3 and 5 and V2 between pins 4 and 5.

(d) Calculate the voltage gain VG for the actuator in the retracted position. VG is equal to (V1-V2)/(V1+V2). VG must be equal to 0.0501-0.0684 volts RMS.

(e) Apply a pressure to fully extend the actuator.

(f) Do steps (11)(a) thru (11)(c) with the actuator fully extended.

(g) Calculate the voltage gain VG for the actuator in the extended position. VG is equal to (V1-V2)/(V1+V2). VG must be equal to 0.6074-0.6445 volts RMS.

(12) Rigging Test

(a) Apply a 3000 psi pressure to RET port, and fully retract the piston. Make sure the rig pin can be installed.

(13) Synchronous Drive Operational Test

NOTE: There is no pressure on the actuator for the Synchronous Drive Operational Test.

(a) Open the EXT and RET ports to the air.

(b) Turn the worm shaft gear (310) with the worm gear shaft adapter, SPL-7292.

(c) The maximum force necessary to fully stroke the piston must be less than 2 pound-inches.

(14) Static Friction Test

(a) With the RET and EXT ports open to the air, no pressure applied, and the piston fully retracted, apply a 35 lb. maximum tension force to the rod end.

(b) The rod end (385B) and the piston (695) must extend a minimum of 0.75 inch.

(15) Unpressurize Lock Follower Operation Test

(a) With the actuator retracted and locked, install the worm gear shaft adapter, SPL-7292 on the worm shaft gear (310).

(b) Move the manual unlock lever (255) to the unlock position.

(c) Slowly turn the worm shaft gear (310) to extend the piston (695).

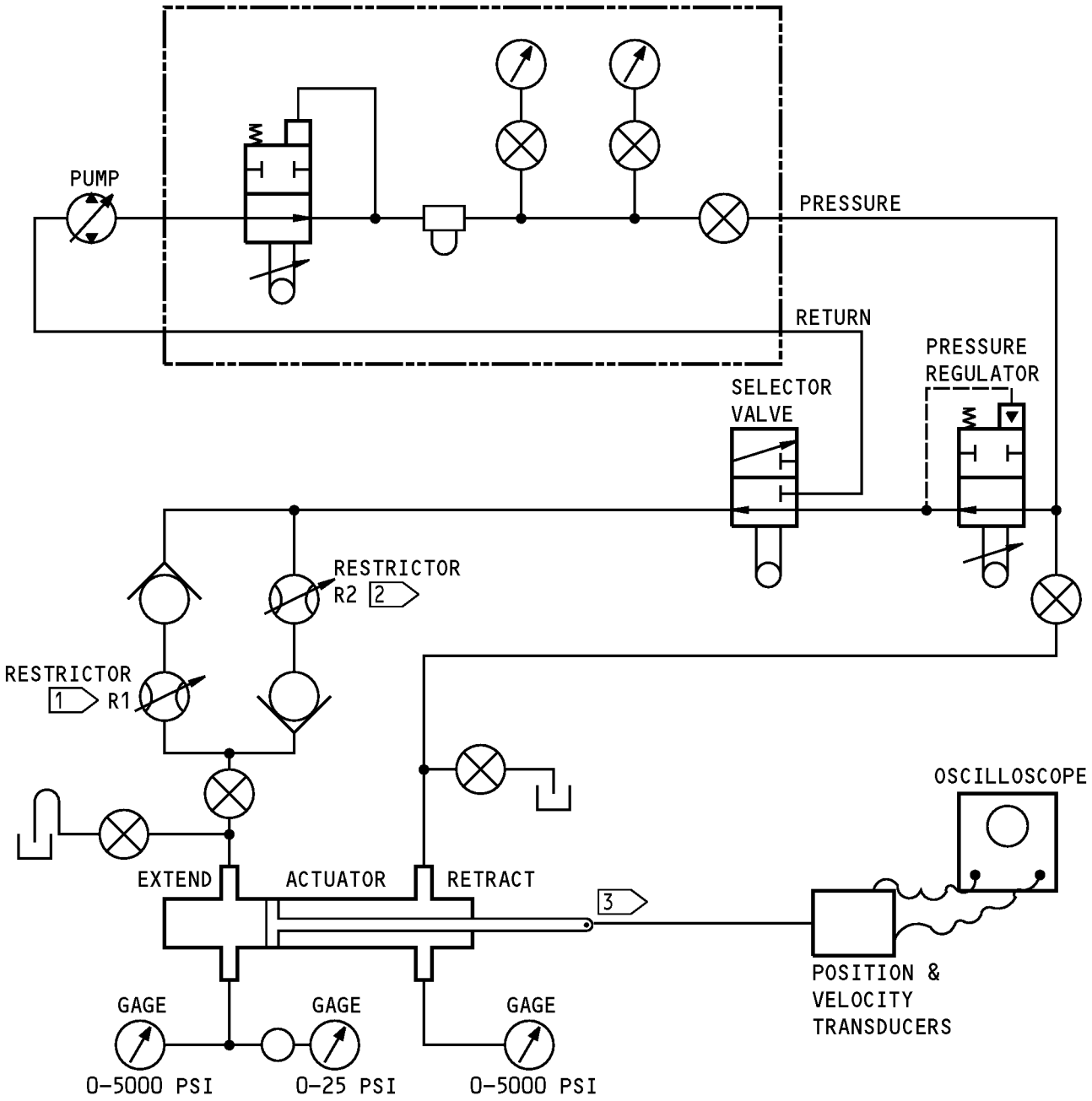
(d) When the piston (695) has extended 0.08-0.12 inch, release the manual unlock lever (255).

(e) Continue to extend the piston (695) until the piston (695) has moved 1.75-2.25 inches.

(f) Slowly turn the worm shaft gear (310) in the opposite direction to retract the piston (695). The actuator must move quickly into the lock position when the piston (695) is fully retracted.

(g) Do steps (15)(b) thru (15)(f) two more times.

(16) Disconnect the hydraulic lines and remove the actuator from the fixture. Partially drain the hydraulic fluid from the actuator. Seal the open ports.



Test Setup
Figure 101 (Sheet 1 of 2)

1 RESTRICTOR R1 LIMITS EXTEND VELOCITY TO 11-12 IN/SEC WITH TEST RIG SELECTOR VALVE OPEN

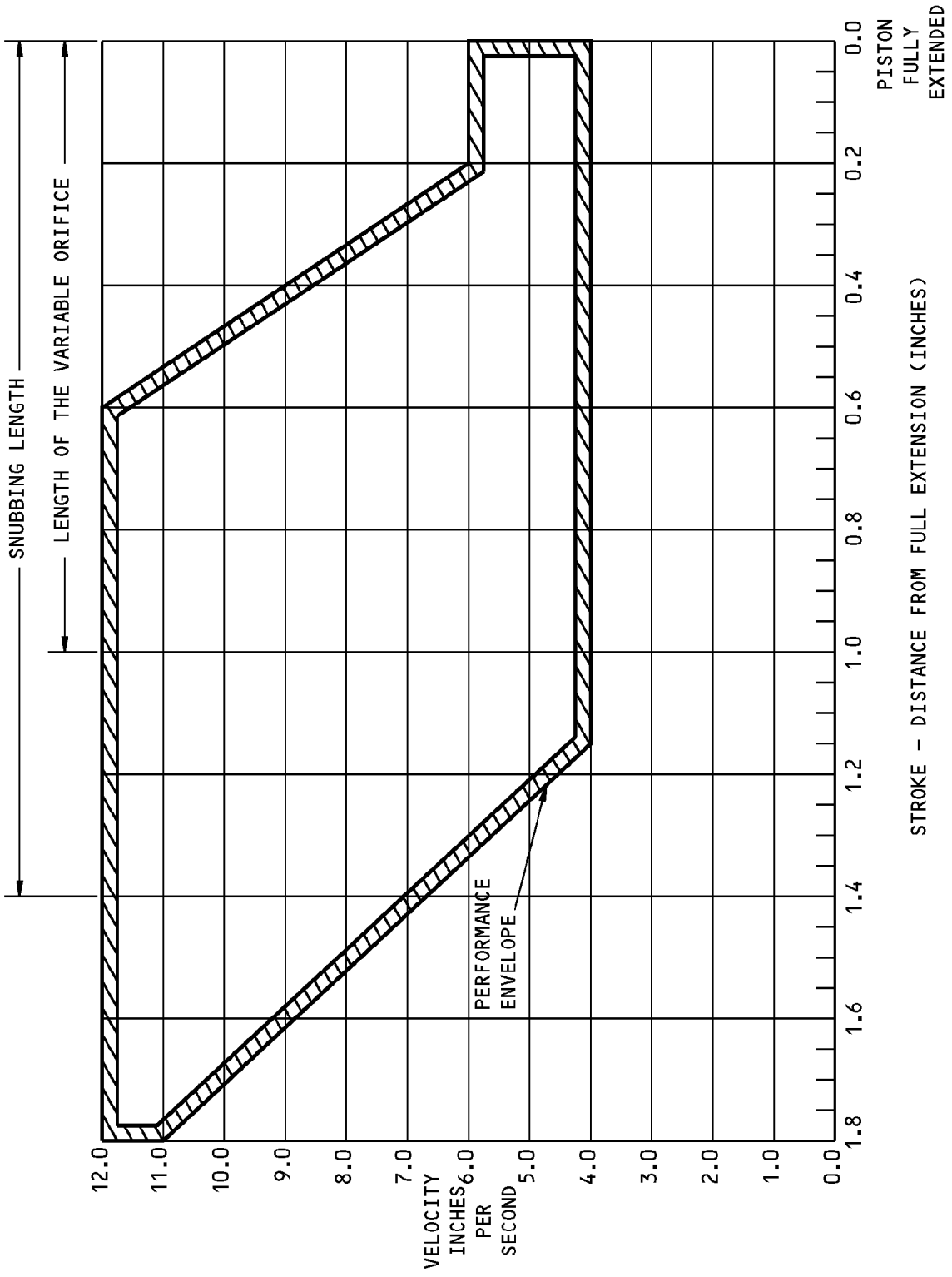
2 RESTRICTOR R2 LIMITS EXTEND VELOCITY TO 6-12 IN/SEC TEST RIG SELECTOR VALVE CLOSED.

CAUTION: DO NOT EXCEED 12 IN/SEC RETRACT VELOCITY UNDER ANY CONDITION

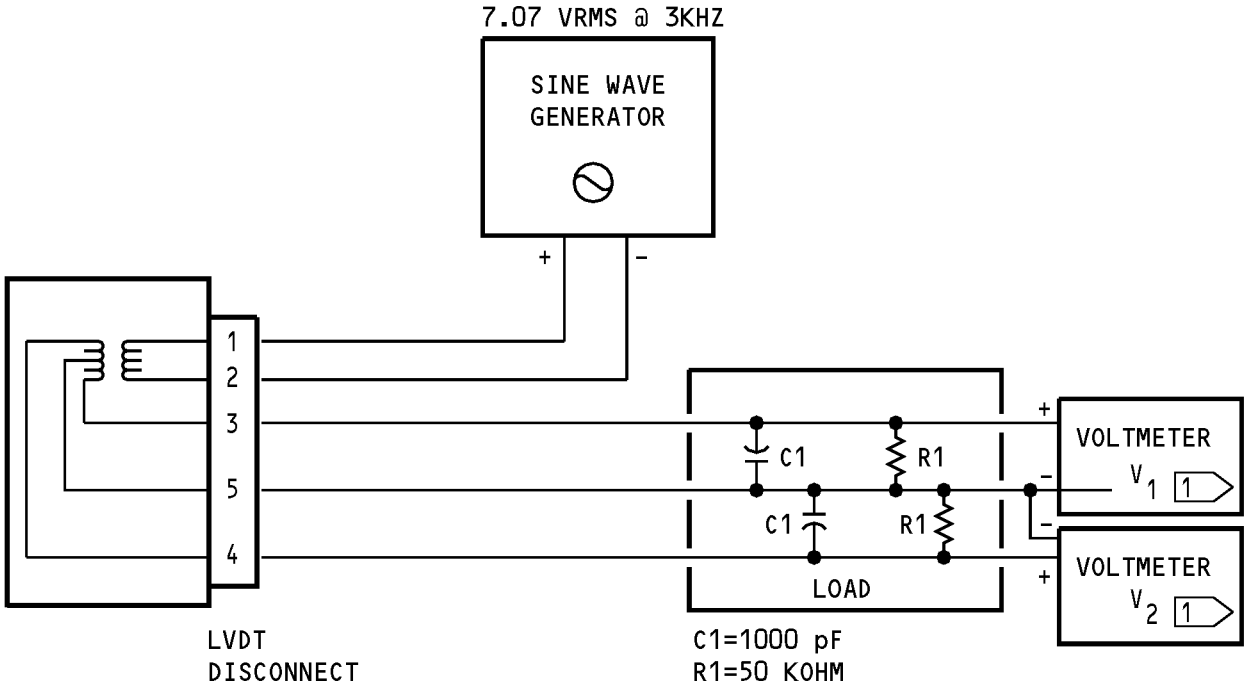
3 DURING ALL TESTS THE FIXTURE SHALL PREVENT PISTON ROD ROTATION.

CAUTION: DO NOT USE COMPRESSED AIR IN ANY PORTS.

Test Setup
Figure 101 (Sheet 2 of 2)



Snubbing Test
Figure 102



1 V1 = BETWEEN PINS 3 AND 5
V2 = BETWEEN PINS 4 AND 5

$$VG = \frac{(V1-V2)}{(V1+V2)}$$

LVDT Output Verification Test Setup
Figure 103

DISASSEMBLY

1. General

A. This procedure has the data necessary to disassemble the locking actuator assembly.

B. Disassemble this component sufficiently to isolate the defects, do the necessary repairs, and put the component back to a serviceable condition.

C. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Disassembly

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-6255	Wrench (B78008-7 is included in B78008-19) (Part #: B78008-7, Supplier: 81205)
SPL-6260	Wrench (B78008-12 included in B78008-19) (Part #: B78008-12, Supplier: 81205)
SPL-6284	Fixture - Torque, Locking and Non-Locking Thrust Reverser Acutator Assembly (Part #: B78011-25, Supplier: 81205)
SPL-7336	Wrench (B78008-9 is included in B78008-19) (Part #: B78008-9, Supplier: 81205)
SPL-7341	Spanner Wrench - Nut, Cylinder Locking Actuator (B78008-17 included in B78008-19) (Part #: B78008-17, Supplier: 81205)
SPL-7373	Plate - Disassembly (B78015-8 is included in B78015-17 and -23) (Part #: B78015-8, Supplier: 81205)
SPL-7407	Wrench - Nut Gland (B78008-5 included in T/R Actuator Wrench Set B78008-18) (Part #: B78008-5, Supplier: 81205)
SPL-7475	Holder - Feedback Lever (B78013-3 is included in B78013-1 & -2) (Part #: B78013-3, Supplier: 81205)
SPL-7557	Cap (B78015-21 included in Overhaul Set B78015-17 and -23)

B. Parts Replacement

NOTE: The following listed parts are recommended for replacement. Actual replacement may be based on in-service experience.

(1) O-rings (170, 180, 270, 320, 330, 380, 440, 455, 470, 480, 520, 630, 640), back-up rings (175, 375, 435, 465, 475, 515, 625, 635), scraper (430), foot seal (165, 450).

(2) Lock keys (620), lockwashers (405, 540), lock ring (645), retaining ring (665), lock pin (650).

(3) Bushing (30, 85, 160, 210, 240), bearing (445), lead screw guide (675).

(4) Snubber rings (485, 490).

C. Procedure

(1) Use standard industry procedures and the steps shown below to disassemble this component.

NOTE: Many parts of the actuator are selected and adjusted to get specified requirements of dimension and function. If the actuator is not fully disassembled to replace some parts, the parts which are not replaced are to be noted to decrease the number of procedures necessary for reassembly.

(2) Remove the screw (5) and the washer (10) from the transducer assembly (15).

(3) Remove the nuts (45, 55), the washers (50, 60), the shims (65, 70, 75), the bushings (85) and the feedback spindle (80) from the brackets (90, 130).

(4) Remove the bolts (20, 25), the washers (35), the spacer (30), the nuts (40) and the brackets (90, 130). The transducer assembly (15) will be installed on the bracket (130).

(5) Remove the indents in the flange of the cup lockwasher (405). Hold the flats of the stop (410) with a wrench. Use wrench, SPL-6255 to remove the nut (400) from the rod end. Move the stop (410) back and remove the key (415). Remove the rod end assembly (385B) from the piston assembly (685). Remove the stop (410) and the cup lockwasher (405). Remove the O-ring (440) and back-up rings (435).

(6) Remove the ties (335) from around the spacers (340). Loosen the nut (355) at the tube coupling. Remove the tube assembly (345) from the cylinder assembly (700).

(7) Remove the union (325) and the O-ring (330) from the housing (500).

(8) Remove the plug (315) and the O-ring (320) from the housing (500).

(9) Remove the fitting (260A) and the adapter screw (265A) from the housing (500). Remove the worm shaft gear (310) (to the adapter screw end) and remove the sleeve (300), shims (275 thru 295), and the worm shaft gear (310) with the bearing (305). Remove the bearing (305) from the worm shaft gear (310) and the other bearing (305) from the housing (500). Remove the O-rings (270) from the fitting (260A) and the adapter screw (265A).

NOTE: If the parts removed in step (9) are not replaced, identify the parts to permit easier assembly.

(10) Put the actuator so the end of the housing (500) where the fitting (260A) installs is down. Tap the housing (500) with a plastic mallet to remove the lock pin (505).

(11) Install the feedback lever holder, SPL-7475 on the housing (500). Move the manual unlock handle (215) to release the internal locks. Turn the screw of the feedback lever holder, SPL-7475 in to touch the handle assembly (215).

(12) Remove the spacer (420) from the gland nut (425). (The spacer is bonded inside the gland nut). Install the actuator in the torque fixture, SPL-6284. Use the wrench, SPL-7407 to remove the gland nut (425). Remove the scraper (430). Use the spanner wrench, SPL-7341 to loosen the cylinder nut (660). Remove the actuator from the fixture.

(13) Remove the cylinder nut (660). Slide the cylinder (710) out from the housing (500) to remove the lock keys (620) and get access to the spring retainer (605). Remove the cylinder nut rings (655).

(14) Disengage the lead screw (680) and the piston (695).

(15) Remove the gland (460) and remove the O-rings (470, 480), and the back-up rings (465, 475). Remove the foot seal (450), the piston bearing (445), and the snubber rings (485, 490) from the gland (460). Remove the piston stop (495) from the cylinder (710).

(16) Hold the rod end (145) and loosen the nut (140). Remove the lock key (135). Remove the rod end (145) and the nut (140).

(17) Use the gland wrench, SPL-7336 to remove the gland nut (150). Remove the excluder (155).

(18) Remove the assembled lead screw/piston/feedback rod from the housing (500).

NOTE: If the lead screw parts are not replaced, identify the parts to permit easier assembly.

(a) Move the lock ring (645) and remove the locking pin (650). Hold the piston assembly (685) and remove the lead screw nut (690) from the piston (695). Use the wrench, SPL-6260. Remove the piston (695) from the lead screw (680). Remove the O-ring (640) and the back-up rings (635).

NOTE: The lead screw nut (690) is part of the piston assembly (685).

(b) Remove the retaining ring (665), the retaining pin (670) and the lead screw guide (675) from the end of the lead screw (680). Remove the nut (355) from the lead screw (345). Remove the lock ring (645).

NOTE: The lead screw nut (690) is part of the piston assembly (685).

(c) Remove the lock follower (615), the spring (610), and the spring retainer (605) from the lead screw (680).

(19) Bend back the deformed edges of the cup lockwasher (540) at the end of the lead screw (680). Hold the lead screw (680) with a wrench across the flats of the shoulder and remove the nut (535). Turning the nut (535) clockwise. Remove the feedback rod (550) and the spacer (545).

(20) Remove the nut (200), the shim (205) and the bushing (210). Pull out the manual unlock handle assembly (215) and remove the spring (235), the bushing (240) and the unlock lever (255).

(21) Remove the lock sleeve (510), the lock spring (525) and the shim (530) from the housing (500).

(22) Remove the O-rings (180, 520) and the back-up rings (175, 515) from the lock sleeve (510).

(23) Remove the rod bushing (160), the footseal (165), the O-rings (170, 180) and the back-up rings (175) from the retainer (185).

(24) Use the cap, SPL-7557 and the disassembly plate, SPL-7373 to remove the bearing (570) from the lead screw (345).

(25) Remove the worm wheel (585), the spacer (590), the shims (555 thru 565) and the key (575) from the lead screw (680).

NOTE: The worm wheel (585) and the spacer (590) are a matched set.

(26) Use the cap, SPL-7557 and the disassembly plate, SPL-7373 to remove the bearing (595) from the lead screw (680).

CLEANING

1. General

A. This procedure has the data necessary to clean the locking actuator assembly.

B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to IPL Figure 1 for item numbers.

2. Cleaning

A. References

Reference	Title
SOPM 20-30-01	CLEANING AND RELUBRICATING BEARINGS
SOPM 20-30-03	GENERAL CLEANING PROCEDURES

B. Procedure

(1) Clean the bearings (305) as specified in SOPM 20-30-01.

(2) Use standard industry procedures and refer to SOPM 20-30-03 to clean all parts.

CHECK

1. General

A. This procedure has the data necessary to find defects in the material of the specified parts.

B. Refer to FITS AND CLEARANCES for the design dimension and wear limits.

C. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Check

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-20-02	PENETRANT METHODS OF INSPECTION

B. Procedure

(1) Use standard industry procedures to do a visual check of all the parts for defects. Do the penetrant or magnetic particle check if the visual check shows possible damage or if you suspect possible damage on the parts listed below:

(2) Do a magnetic particle check, class A, (SOPM 20-20-01) of these parts:

(a) Spring (235, 525, 610)

(b) Lead screw nut (690)

(3) Do a magnetic particle check, class B, (SOPM 20-20-01) of these parts:

(a) Bracket (90, 130)

(b) Key (135)

(c) Rod end (145)

(d) Target (195)

(e) Handle assembly (215)

(f) Housing (225, 500)

(g) Lever (255)

(h) Fitting (260A)

(i) Screw (265A)

(j) Rod (550)

(k) Ring (655)

(l) Lead screw (680)

(m) Cylinder (710)

(4) Do a magnetic particle check, class C, (SOPM 20-20-01) of these parts:

(a) Spindle (80)

(b) Nut (150, 400, 425, 660)

(c) Lockwasher (405)

(d) Stop (410, 495)

(e) Gland (460)

(f) Lock follower (615)

(g) Ring (665)

(h) Piston (695)

(5) Do a penetrant check (SOPM 20-20-02) of these parts:

(a) Bracket (115)

(b) Bushing (160, 210, 240)

(c) Retainer (185)

(d) Pin (245, 505, 650, 670)

(e) Guide (250, 675)

(f) Sleeve (300)

(g) Plug (315)

(h) Tube (370)

(i) Rod end ball (390A)

(j) Key (415)

(k) Bearing (445)

(l) Snubber rings (485, 490)

(m) Nut (535)

(n) Lockwasher (540)

(o) Spacer (545)

(p) Lock Sleeve (510)

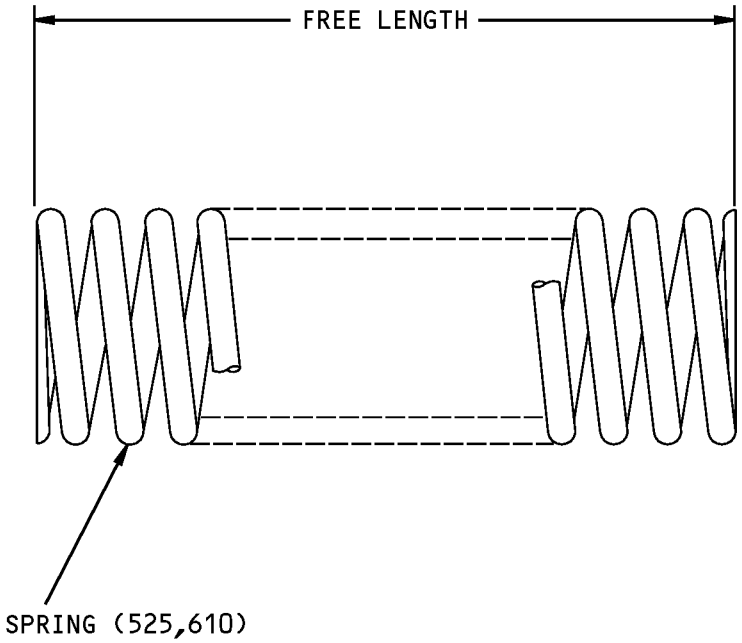
(6) Do a spring displacement check (CHECK, Figure 501).

(a) Spring (525, 610)

(7) Do a spring angular displacement check (CHECK, Figure 502).

(a) Spring (235)

ITEM NO. IPL FIG. 1	FREE LENGTH (INCHES)	TEST LENGTH (INCHES)	PERMITTED LOAD LIMIT (POUNDS)
525	2.00	1.380	125–135
610	2.80	0.80 1.25	20–24 15–19

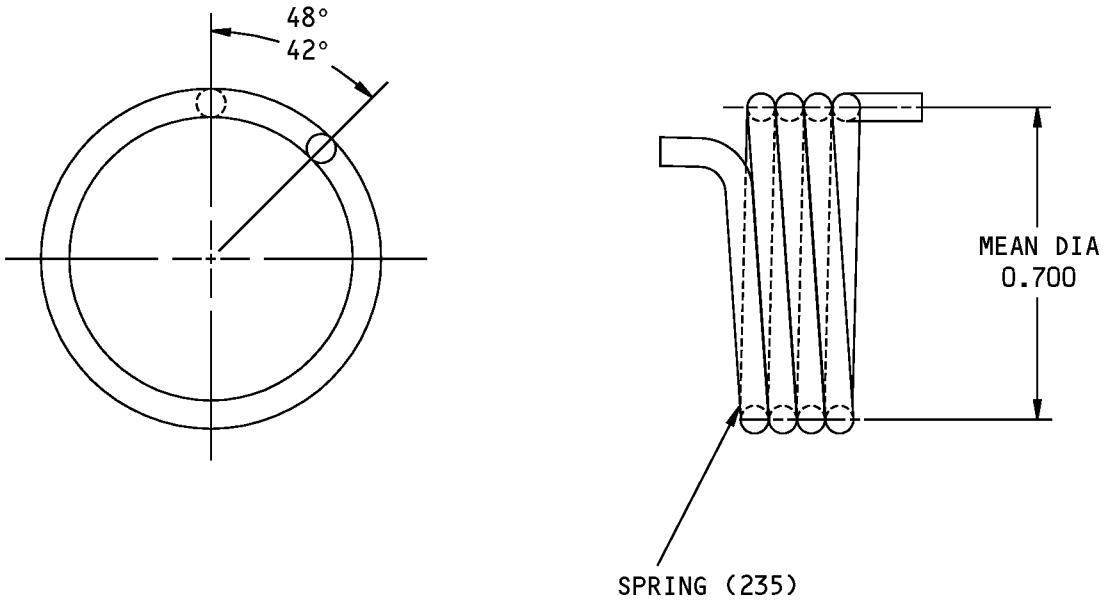


ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1848-1 315A1849-2 Spring Check Details
Figure 501

ITEM NO. IPL FIG. 1	FREE DISPLACEMENT (DEGREES)	TEST DISPLACEMENT (DEGREES)	LOAD LIMIT ROTATION (LB-IN)	1 (DEGREES)
235	42-48	63	3.15-3.85	100



1 MAXIMUM ANGULAR DISPLACEMTNT WITHOUT PERMANENT SET.

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1860-2 Spring Check Details
Figure 502

REPAIR

1. General

A. Instructions for repair, refinish, and replacement of the specified subassembly parts are included in each REPAIR when applicable:

Table 601:

PART NUMBER	NAME	REPAIR
—	REFINISH OF OTHER PARTS	1-1
1452-010	LOCK SLEEVE	2-1
315A1812-1	GLAND	3-1
315A1817-3	WORM SHAFT GEAR	4-1
315A1842-4	PISTON	5-1
315A1847-1	LOCK FOLLOWER	6-1
315A1850-6	LEAD SCREW	7-1
315A1868-4	FEEDBACK ROD	8-1
315A2807-1,-2	CYLINDER ASSEMBLY	9-1, 9-2
315A2831-1,-2	ROD END ASSEMBLY	10-1, 10-2
315A2857-1	MANUAL UNLOCK HANDLE ASSEMBLY	11-1
315A2896-1	MANUAL UNLOCK SHAFT	11-2

2. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in the applicable repair procedures are shown in REPAIR-GENERAL, Figure 601.

—	STRAIGHTNESS
▱	FLATNESS
⊥	PERPENDICULARITY (OR SQUARENESS)
//	PARALLELISM
○	ROUNDNESS
⌭	CYLINDRICITY
⌒	PROFILE OF A LINE
⌓	PROFILE OF A SURFACE
◎	CONCENTRICITY
⌯	SYMMETRY
∠	ANGULARITY
↗	RUNOUT
↗↗	TOTAL RUNOUT
⌴	COUNTERBORE OR SPOTFACE
∨	COUNTERSINK
⌖	THEORETICAL EXACT POSITION OF A FEATURE (TRUE POSITION)
∅	DIAMETER
S ∅	SPHERICAL DIAMETER
R	RADIUS
SR	SPHERICAL RADIUS
()	REFERENCE
BASIC (BSC) OR [DIM]	A THEORETICALLY EXACT DIMENSION USED TO DESCRIBE SIZE, SHAPE OR LOCATION OF A FEATURE. FROM THIS FEATURE PERMISSIBLE VARIATIONS ARE ESTABLISHED BY TOLERANCES ON OTHER DIMENSIONS OR NOTES.
[-A-]	DATUM
Ⓜ	MAXIMUM MATERIAL CONDITION (MMC)
Ⓛ	LEAST MATERIAL CONDITION (LMC)
Ⓢ	REGARDLESS OF FEATURE SIZE (RFS)
Ⓟ	PROJECTED TOLERANCE ZONE
FIM	FULL INDICATOR MOVEMENT

EXAMPLES

— | 0.002	STRAIGHT WITHIN 0.002
⊥ | 0.002 | B	PERPENDICULAR TO DATUM B WITHIN 0.002
// | 0.002 | A	PARALLEL TO DATUM A WITHIN 0.002
○ | 0.002	ROUND WITHIN 0.002
⌭ | 0.010	CYLINDRICAL SURFACE MUST LIE BETWEEN TWO CONCENTRIC CYLINDERS, ONE OF WHICH HAS A RADIUS 0.010 INCH GREATER THAN THE OTHER
⌒ | 0.006 | A	EACH LINE ELEMENT OF THE SURFACE AT ANY CROSS SECTION MUST LIE BETWEEN TWO PROFILE BOUNDARIES 0.006 INCH APART RELATIVE TO DATUM A
⌓ | 0.020 | A	SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.020 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE
◎ | ∅ 0.0005 | C	CONCENTRIC TO DATUM C WITHIN 0.0005 DIAMETER
⌯ | 0.010 | A	SYMMETRICAL WITH DATUM A WITHIN 0.010
∠ | 0.005 | A	ANGULAR TOLERANCE 0.005 WITH DATUM A
⌖ | ∅ 0.002 Ⓢ | B	LOCATED AT TRUE POSITION WITHIN 0.002 DIA RELATIVE TO DATUM B, REGARDLESS OF FEATURE SIZE
⊥ | ∅ 0.010 Ⓜ | A 0.510 Ⓟ	AXIS IS TOTALLY WITHIN A CYLINDER OF 0.010 INCH DIAMETER, PERPENDICULAR TO DATUM A, AND EXTENDING 0.510 INCH ABOVE DATUM A, MAXIMUM MATERIAL CONDITION
[2.000] OR 2.000 BSC	THEORETICALLY EXACT DIMENSION IS 2.000

True Position Dimensioning Symbols
Figure 601

REFINISH OF OTHER PARTS - REPAIR 1-1

1. General

A. This procedure has the data necessary to refinish the parts which are not given in the specified repairs.

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to IPL Figure 1 for item numbers.

2. Refinish of Other Parts

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00543	Lubricant - Dry Film - Everlube 967	

B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-50-07	LUBRICATION
SOPM 20-60-03	LUBRICANTS

C. Procedure

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For the decoding table for Boeing finish codes, refer to SOPM 20-41-01. For lubricants, refer to SOPM 20-60-03.

(1) Instructions for the repair of the parts listed in REPAIR 1-1, Table 601 is for repair of the initial finish.

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
IPL Fig. 1		
Shims (65,70,75, 275,280,285,290, 295,530,555,560, 565) Bracket (115)	301 CRES	Passivate (F-17.09).
Bracket (90,130) Rod End (145), Target (195), Housing (225,500), Lever (255), Stop (410,495), Nut (400,660), Spacer (545)	15-5PH CRES 150-170 Ksi	Passivate (F-17.09).

Table 601: Refinish Details (Continued)

IPL FIG. & ITEM	MATERIAL	FINISH
Retainer (185) Sleeve (300), Key (415), Pin (505,650)	304 CRES	Passivate (F-17.09).
Plug (315) Lockwasher (540) Pin (670)	303 CRES	Passivate (F-17.09).
Springs (235,525,610) Cupwasher (405) Ring (655,665)	17-4PH CRES	Passivate (F-17.09).
IPL Fig. 1 (Cont)		
Fitting (260A), Screw (265A)	15-5PH CRES 150-170 Ksi	Passivate (F-17.09). Apply Everlube 967 lubricant, D00543 as shown in SOPM 20-50-07, 0.0003-0.0005 inch thick.
Key (135)	15-5PH CRES 180-200 Ksi	Passivate (F-17.09).
Pin (245)	PH 13-8MO CRES 200-220 Ksi	Passivate (F-17.09).
Nut (425)	15-5PH CRES 150-170 Ksi	Cadmium Plate, Type 1, Class 3.
Nut (150)	15-5PH CRES 150-170 Ksi	Passivate (F-17.09). Silver plate (F-15.07), 0.00015-0.00020 inch thick.

BOEING®

COMPONENT MAINTENANCE MANUAL

LOCK SLEEVE - REPAIR 2-1

1452–010

1. General

A. This procedure has the data necessary to repair and refinish the lock sleeve (510).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair Details:

(1) Material:15-5PH CRES, AMS 5659

(a) 150-170 Ksi

2. Lock Sleeve Repair

A. References

Reference	Title
SOPM 20-20-02	PENETRANT METHODS OF INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Machine or grind the lock sleeve (510) to remove defects. Grind no more than repair dimensions shown in REPAIR 2-1, Figure 601.

(2) Break all sharp edges.

(3) Do a penetrant check as shown in SOPM 20-20-02.

(4) Passivate (F-17.04), Type II.

(5) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the lock sleeve (510) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the lock sleeve (510) surface as shown in REPAIR 2-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the lock sleeve (510) at 350-400°F for 8 hours minimum.

3. Lock Sleeve Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

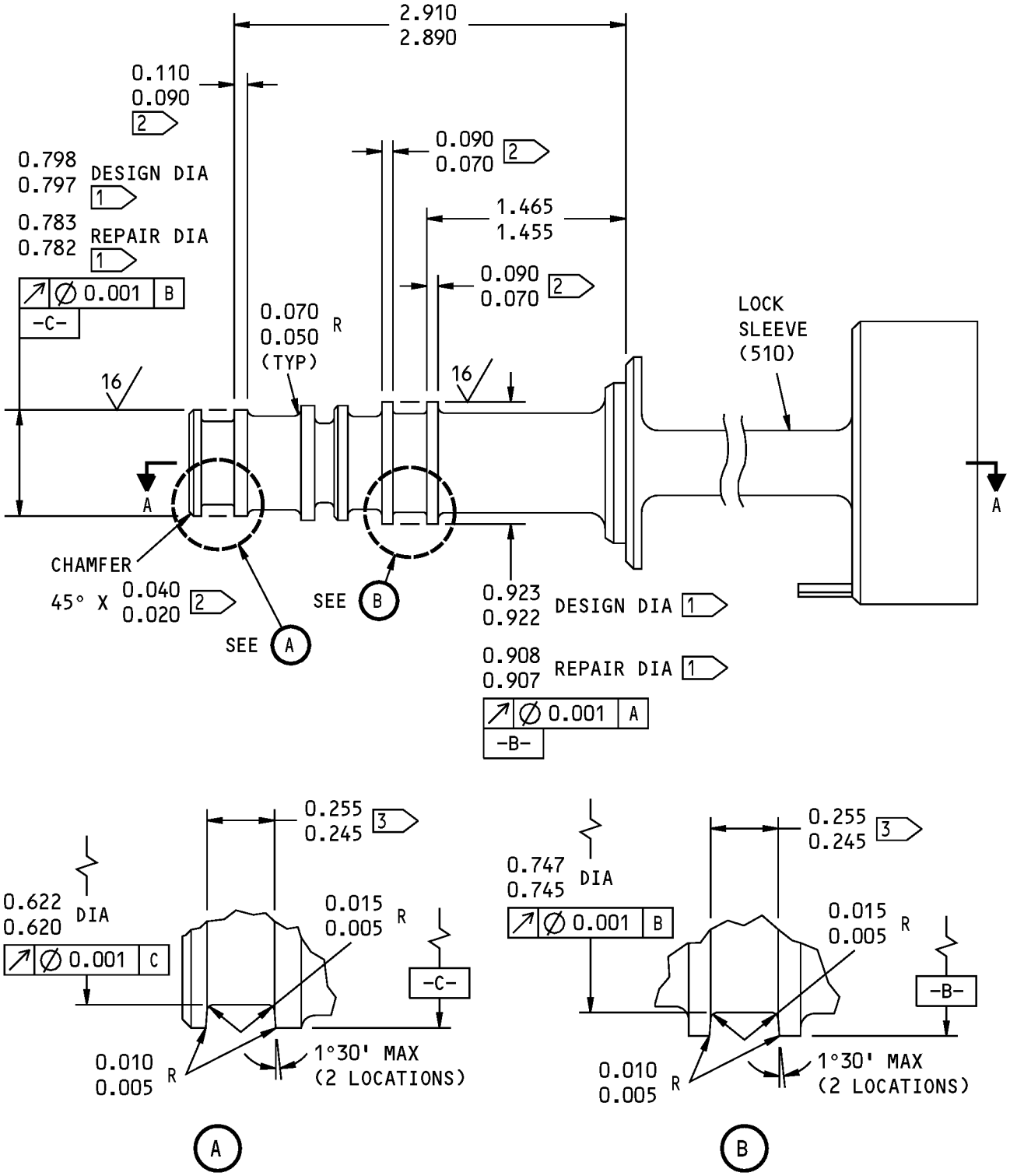
(1) Passivate (F-17.09), type II.

(2) Apply chrome plate (F-15.34).

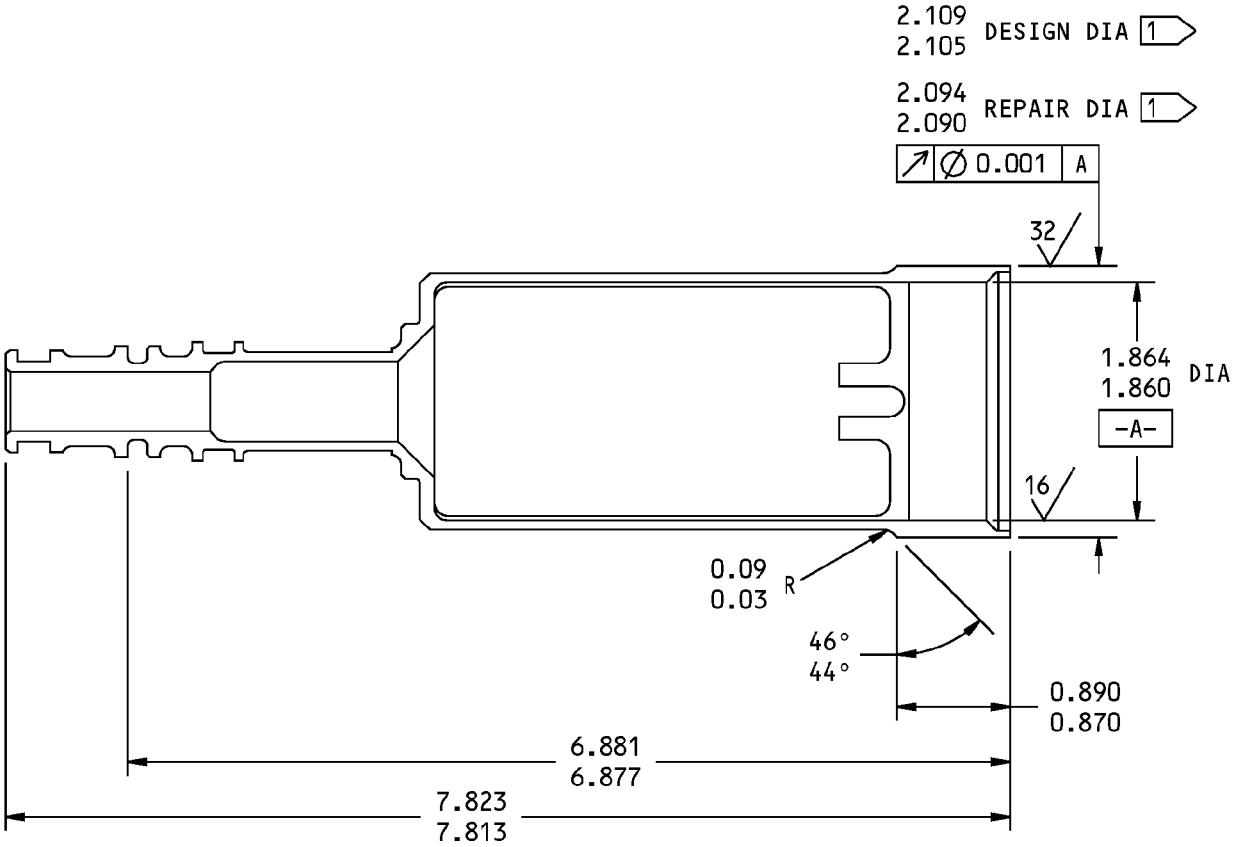
(a) Before chrome plate application, stress relieve the lock sleeve (510) at 775-825°F for one hour.

(b) Apply chrome plate (F-15.34) to the lock sleeve (510) surface as shown in REPAIR 2-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the lock sleeve (510) at 350-400°F for 8 hours minimum.



1452-010 Lock Sleeve Repair
Figure 601 (Sheet 1 of 2)



A–A

1 APPLY CHROME PLATE (F-15.34) ON THIS SURFACE

2 CHROME RUNOUT 0.030 INCH MAXIMUM PERMITTED ON THIS SURFACE.

3 SURFACE FINISH THE WALLS AND THE BOTTOM 32 MICROINCHES.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

1452-010 Lock Sleeve Repair
Figure 601 (Sheet 2 of 2)

GLAND - REPAIR 3-1

315A1812–1

1. General

A. This procedure gives the data that is necessary to repair the gland (460).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material:15-5PH CRES, AMS 5659

(a) 150-170 Ksi

2. Gland Repair

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Machine or grind the gland (460) to remove defect. Grind no more than repair dimension shown in REPAIR 3-1, Figure 601. Make sure to maintain a surface finish of 32 micro-inches Ra.

(2) Break all sharp edges

(3) Do a magnetic particle check as shown in SOPM 20-20-01.

(4) Passivate (F-17.09), Type II.

(5) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the gland (460) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the gland (460) area shown in REPAIR 3-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the gland (460) at 350-400°F for 8 hours minimum.

3. Gland Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

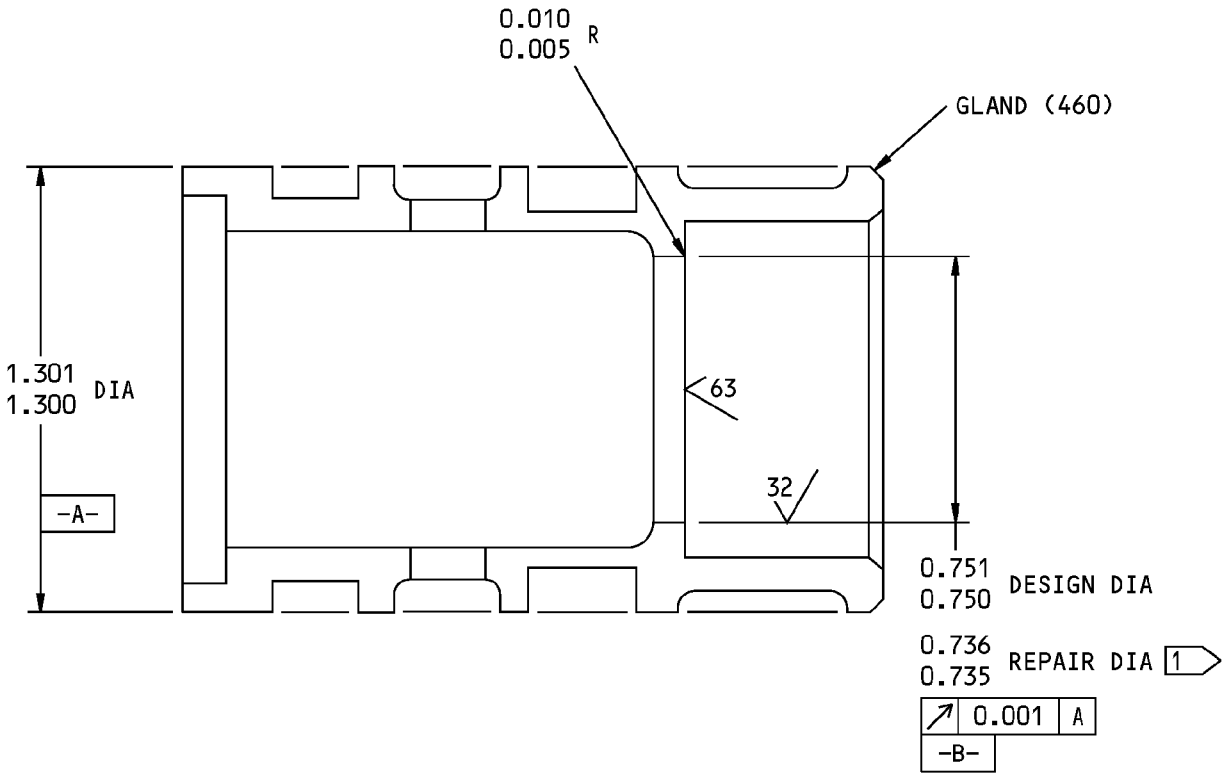
(1) Passivate (F-17.09), Type II.

(2) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the gland (460) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the gland (460) area shown in REPAIR 3-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the gland (460) at 350-400°F for 8 hours minimum.



1 APPLY CHROME PLATE (F-15.34) ON THIS SURFACE

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1812-1 Gland Repair
Figure 601

WORM SHAFT GEAR REPAIR 4-1

315A1817–3

1. General

A. This procedure gives the data that is necessary to repair the worm shaft gear (310).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair details:

(1) Material: 9310 Steel, AMS 6265

2. Worm Shaft Gear Repair

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Machine or grind the worm shaft gear (310) to remove defects. Grind no more than the repair dimension shown in REPAIR 4-1, Figure 601.

(2) Break all sharp edges.

(3) Do a magnetic particle check as shown in SOPM 20-20-01.

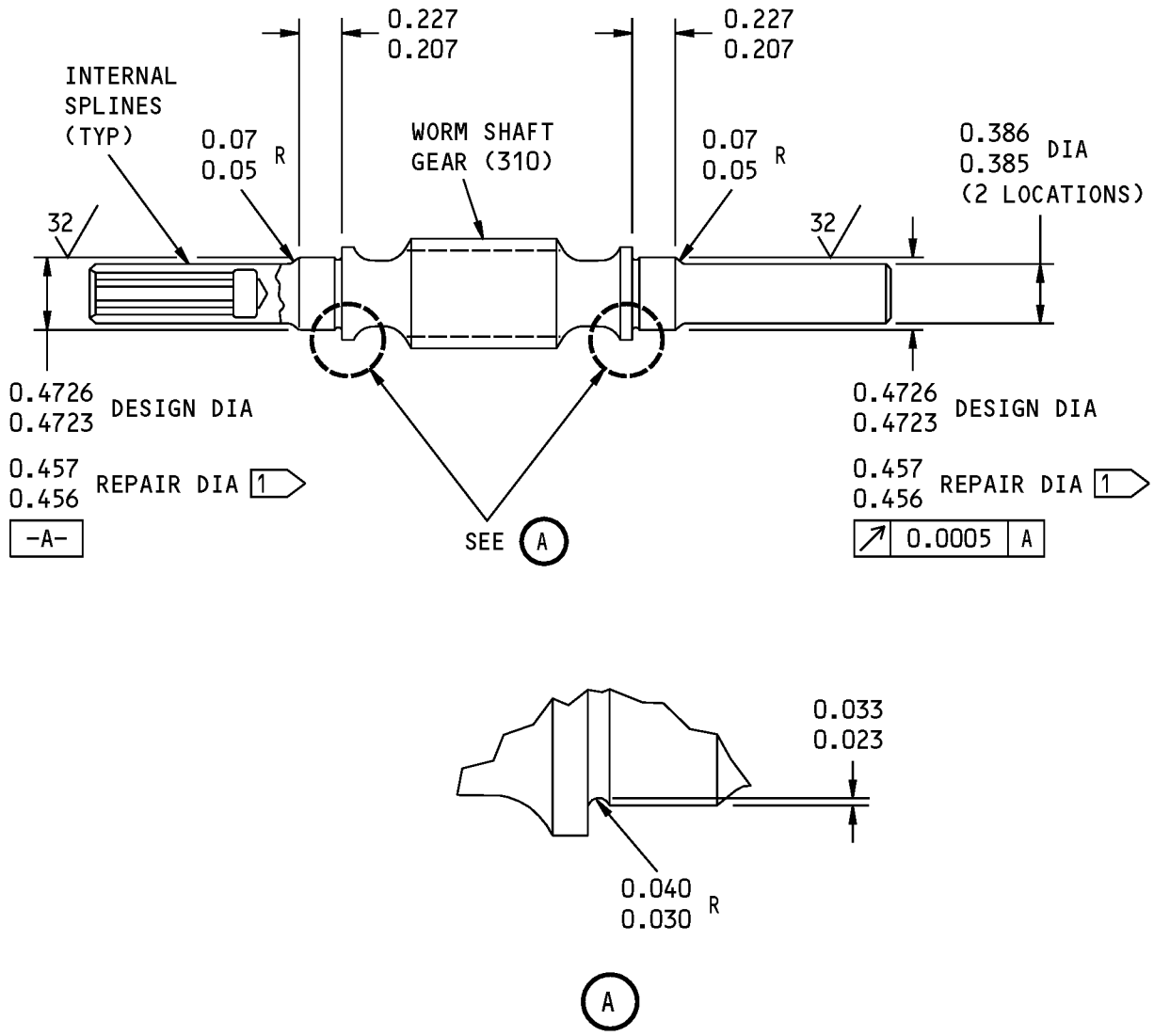
(4) Passivate (F-17.09), Type II.

(5) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the worm shaft gear (310) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the worm shaft gear (310) area shown in REPAIR 4-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the worm shaft gear (310) at 350-400°F for 8 hours minimum.



1 APPLY CHROME PLATE (F-15.34) ON THIS SURFACE.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1817-3 Worm Shaft Gear Repair
Figure 601

PISTON - REPAIR 5-1

315A1842–4

1. General

A. This procedure gives the data necessary to repair and refinish the piston (695).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair Details:

(1) Material:15-5PH CRES

(a) 150-170 Ksi

(2) Shot Peen: Surface shown in REPAIR 5-1, Figure 601

(a) Shot size: 0.017-0.046

(b) Intensity: 0.008A

(c) Coverage: 1.0

2. Piston Repair

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Grind the piston (695) to remove any defects. Grind no more than the dimensions shown in REPAIR 5-1, Figure 601.

(2) Break all sharp edges.

(3) Do a magnetic particle check as shown in SOPM 20-20-01.

(4) Shot peen machined surfaces as shown in REPAIR 5-1, Paragraph 1.E.(2) and REPAIR 5-1, Figure 601.

(5) Passivate (F-17.09), Type II.

(6) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the piston (695) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the piston (695) surface shown in REPAIR 5-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the piston (695) at 350-400°F for 12 hours minimum.

3. Piston Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Passivate (F-17.09), Type II.

(2) Apply chrome plate (F-15.34).

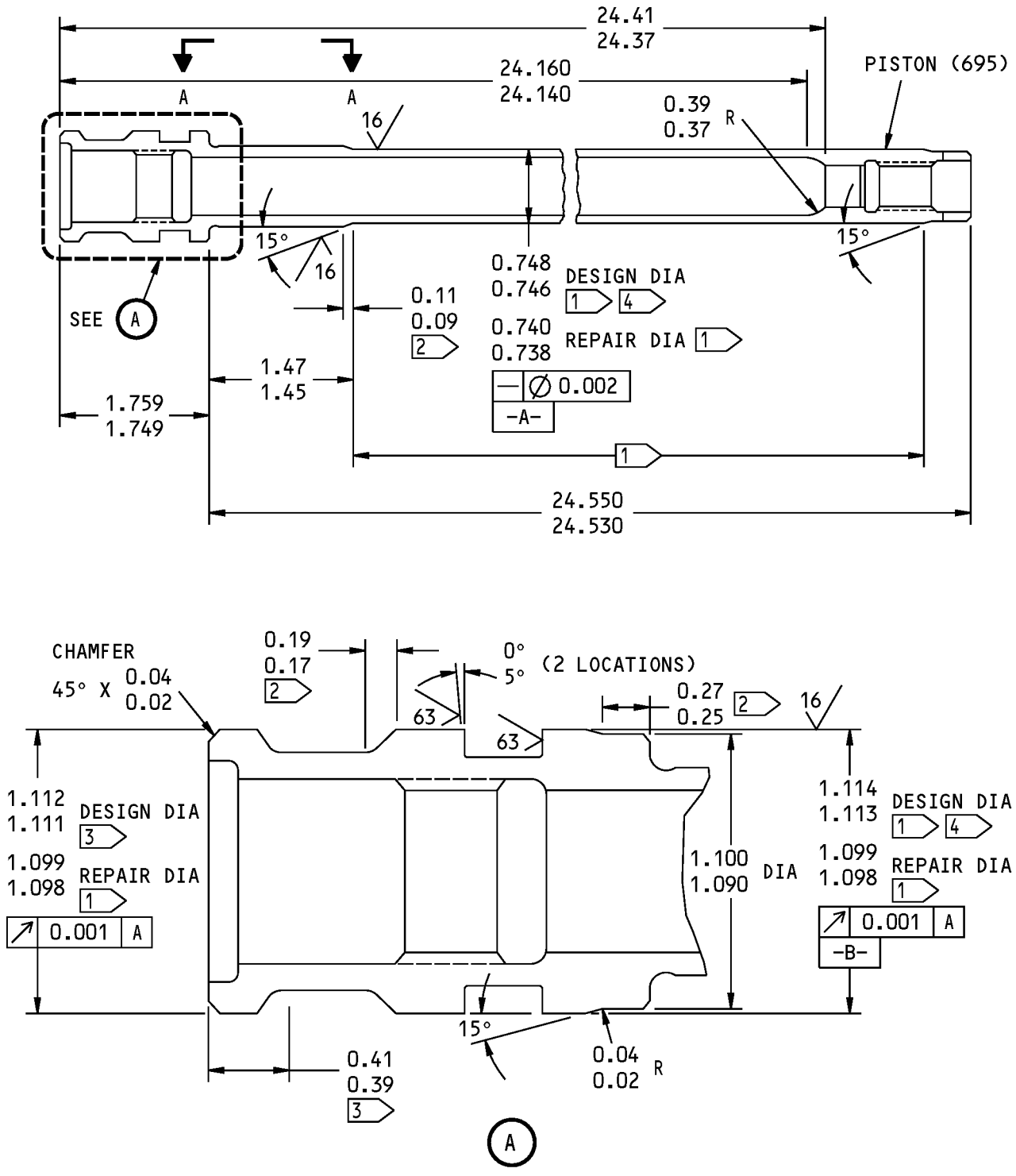
(a) Obey the plating runout area.

(b) Before chrome plate application, stress relieve the piston (695) at 775-825°F for 1 hour.

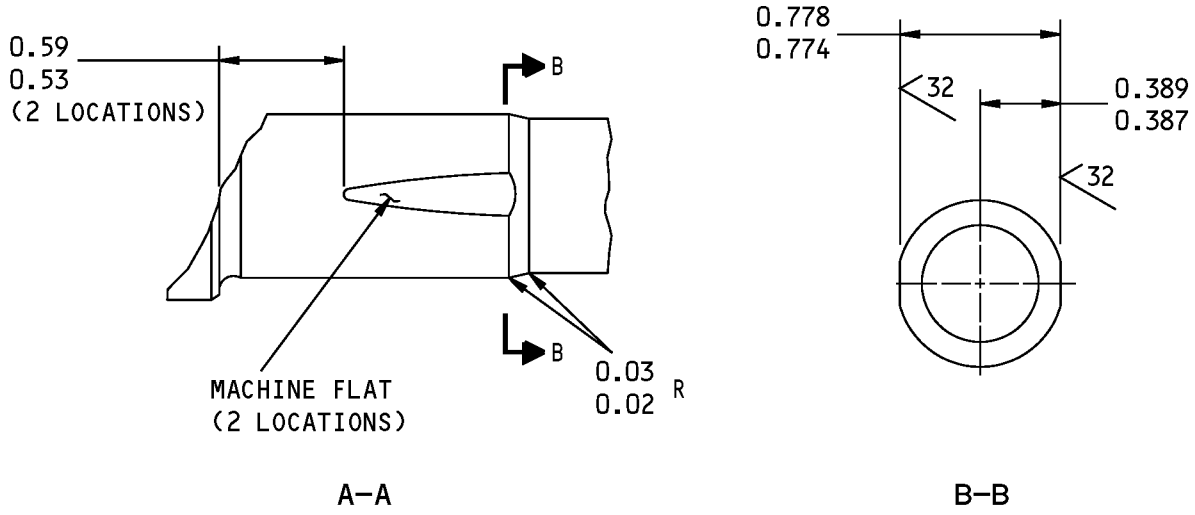
(c) Apply chrome plate (F-15.34) to the piston (695) surface shown in REPAIR 5-1, Figure 601.

(d) In less than 4 hours after chrome plate application, bake the piston (695) at 350-400°F for 12 hours minimum.

(e) Finish grind 15 degrees ramp after plating.



315A1842-4 Piston Repair
Figure 601 (Sheet 1 of 2)



1 APPLY CHROME PLATE (F-15.34) ON THIS SURFACE

2 PLATING RUNOUT AREA

3 THIS AREA CASE HARDENED

4 SHOT PEEN THIS SURFACE.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1842-4 Piston Repair
Figure 601 (Sheet 2 of 2)

LOCK FOLLOWER - REPAIR 6-1

315A1847–1

1. General

A. This procedure gives the data necessary to repair and refinish the lock follower (615).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair Details:

(1) Material:15-5PH CRES

(a) 150-170 Ksi

2. Lock Follower Repair

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Grind the lock follower (615) to remove any defects. Grind no more than the dimensions shown in REPAIR 6-1, Figure 601.

(2) Break all sharp edges.

(3) Do a magnetic particle check, class C, as shown in SOPM 20-20-01.

(4) Passivate (F-17.09), Type II.

(5) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the lock follower (615) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the lock follower (615) surface as shown in REPAIR 6-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the lock follower (615) at 350-400°F for 8 hours minimum.

3. Lock Follower Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Passivate (F-17.09), Type II.

(2) Apply chrome plate (F-15.34).

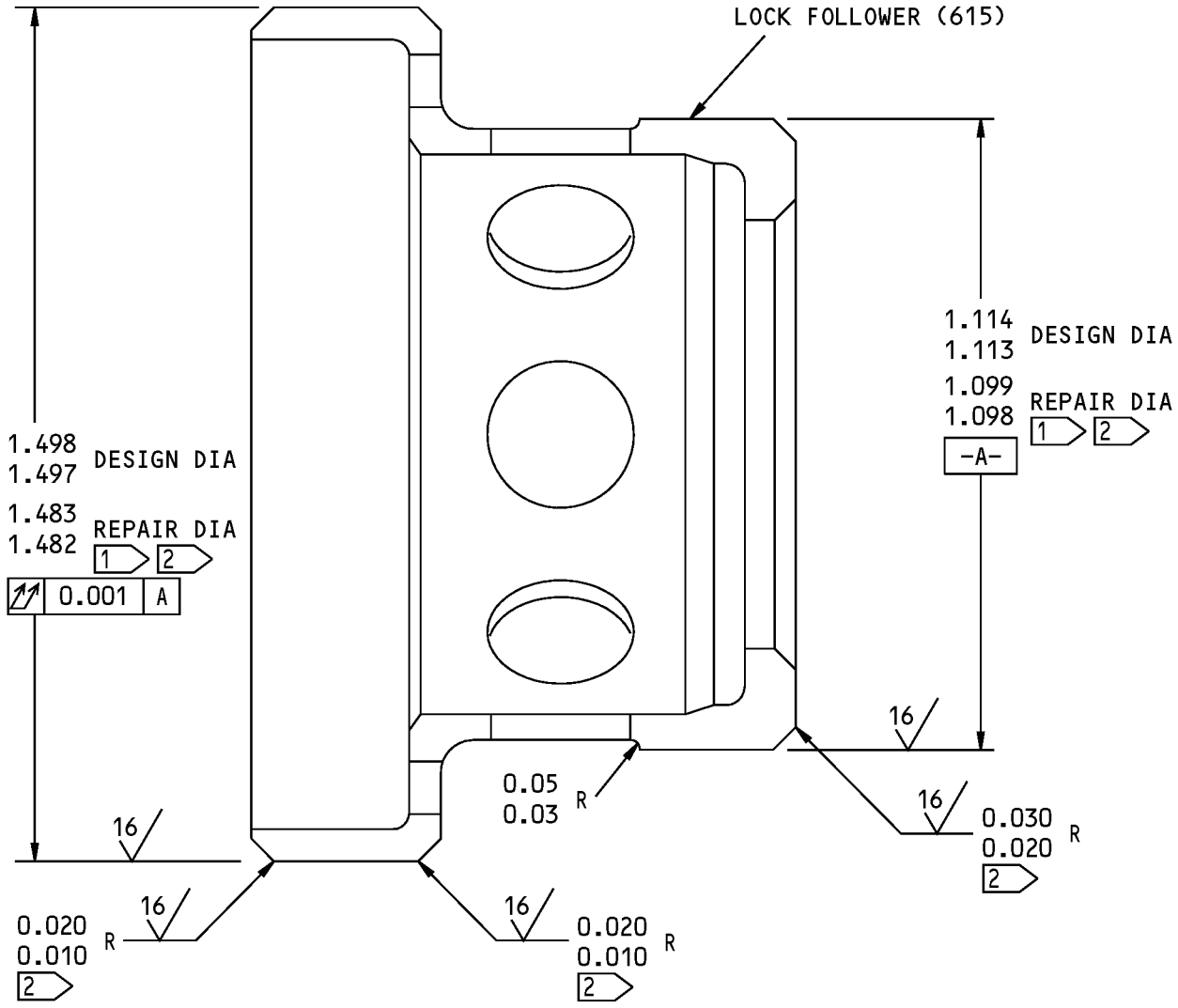
(a) Before chrome plate application, stress relieve the lock follower (615) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the lock follower (615) surface as shown in REPAIR 6-1, Figure 601.

(c) Plating runout on the chamfers is permitted.

(d) In less than 4 hours after chrome plate application, bake the lock follower (615) at 350-400°F for 8 hours minimum.

(3) Buff the surface as shown in REPAIR 6-1, Figure 601.



1 APPLY CHROME PLATE (F-15.34) TO THIS SURFACE

2 BUFF THIS SURFACE.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1847-1 Lock Follower Repair
Figure 601

LEAD SCREW - REPAIR 7-1

315A1850–6

1. General

A. This procedure gives the data necessary to repair and refinish the lead screw (680).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair Details:

(1) Material: 4340 Steel

(a) 160-180 Ksi

(2) Shot Peen: Surface shown in REPAIR 7-1, Figure 601

(a) Shot size: 0.017-0.046

(b) Intensity: 0.016A

(c) Coverage: 2.0

2. Lead Screw Repair

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure (REPAIR 7-1, Figure 601)

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Grind the lead screw (680) to remove all defects. Grind no more than the dimension shown in REPAIR 7-1, Figure 601.

(2) Break all sharp edges.

(3) Do a magnetic particle check, class B, as shown in SOPM 20-20-01.

(4) Passivate (F-17.09), Type II.

(5) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the lead screw (680) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the lead screw (680) surface shown in REPAIR 7-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the lead screw (680) at 350-400°F for 8 hours minimum.

3. Lead Screw Refinish

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00543	Lubricant - Dry Film - Everlube 967	

B. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-50-07	LUBRICATION
SOPM 20-60-03	LUBRICANTS

C. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01. For lubricant, refer to SOPM 20-60-03.

(1) Passivate (F-17.09), Type II.

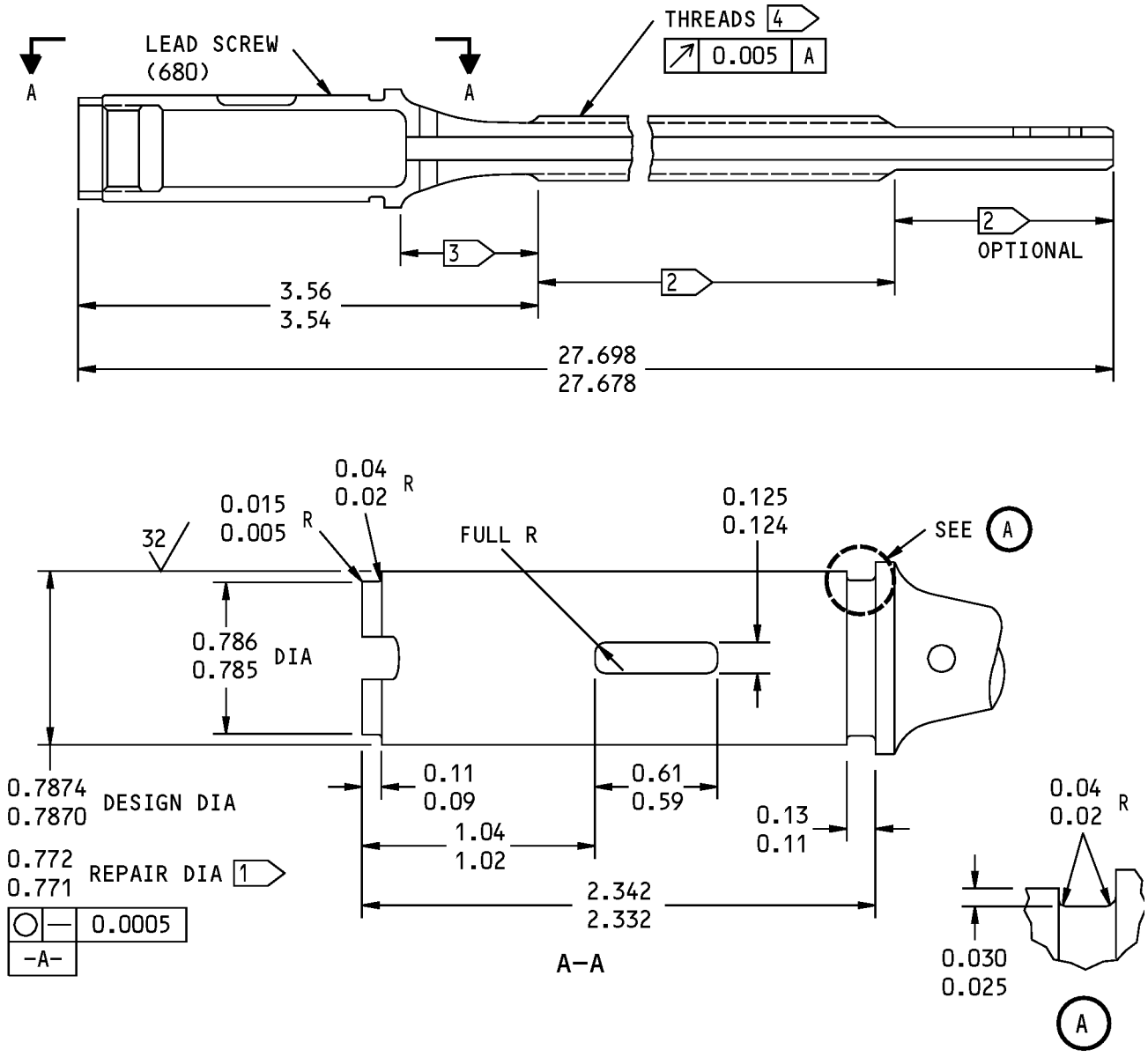
(2) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the lead screw (680) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the lead screw (680) surface shown in REPAIR 7-1, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the lead screw (680) at 350-400°F for 8 hours minimum.

(3) Apply Everlube 967 lubricant, D00543 dry film lube Microseal 100-1 on the acme threads as shown in REPAIR 7-1, Figure 601 (SOPM 20-50-07).



1 APPLY CHROME PLATE (F-15.34) TO THIS SURFACE

2 ION-NITRIDE TO THIS SURFACE

3 SHOT PEEN THIS AREA ONLY

4 APPLY DRY FILM LUBE MICROSEAL 100-1 ON ACME THREADS.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1850-6 Lead Screw Repair
Figure 601

BOEING®

COMPONENT MAINTENANCE MANUAL

FEEDBACK CONTROL ROD - REPAIR 8-1

315A1868–4

1. General

A. This procedure gives the data necessary to repair and refinish the feedback control rod (550).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair Details:

(1) Material:15-5PH CRES

(a) 150-170 Ksi

(2) Shot Peen: Surface shown in REPAIR 8-1, Figure 601

(a) Shot size: 0.017-0.046

(b) Intensity: 0.016A

(c) Coverage: 2.0

2. Feedback Control Rod Repair

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure (REPAIR 8-1, Figure 601)

NOTE: For decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Grind the feedback control rod (550) to remove any defects. Grind no more than the repair dimension shown in REPAIR 8-1, Figure 601.

(2) Break all sharp edges.

(3) Do a magnetic particle check, class B, as shown in SOPM 20-20-01.

(4) Shot peen machined surface as shown in REPAIR 8-1, Paragraph 1.E.(2) and REPAIR 8-1, Figure 601.

(5) Passivate (F-17.09), Type II.

(6) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the feedback control rod (550) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the feedback control rod (550) surface as shown in REPAIR 8-1, Figure 601 and flagnote 1.

(c) In less than 4 hours after chrome plate application, bake the feedback control rod (550) at 350-400°F for 12 hours minimum.

(d) Obey the chrome plate runout area as shown in REPAIR 8-1, Figure 601.

3. Feedback Control Rod Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure (REPAIR 8-1, Figure 601)

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Passivate (F-17.09), Type II.

(2) Apply chrome plate (F-15.34).

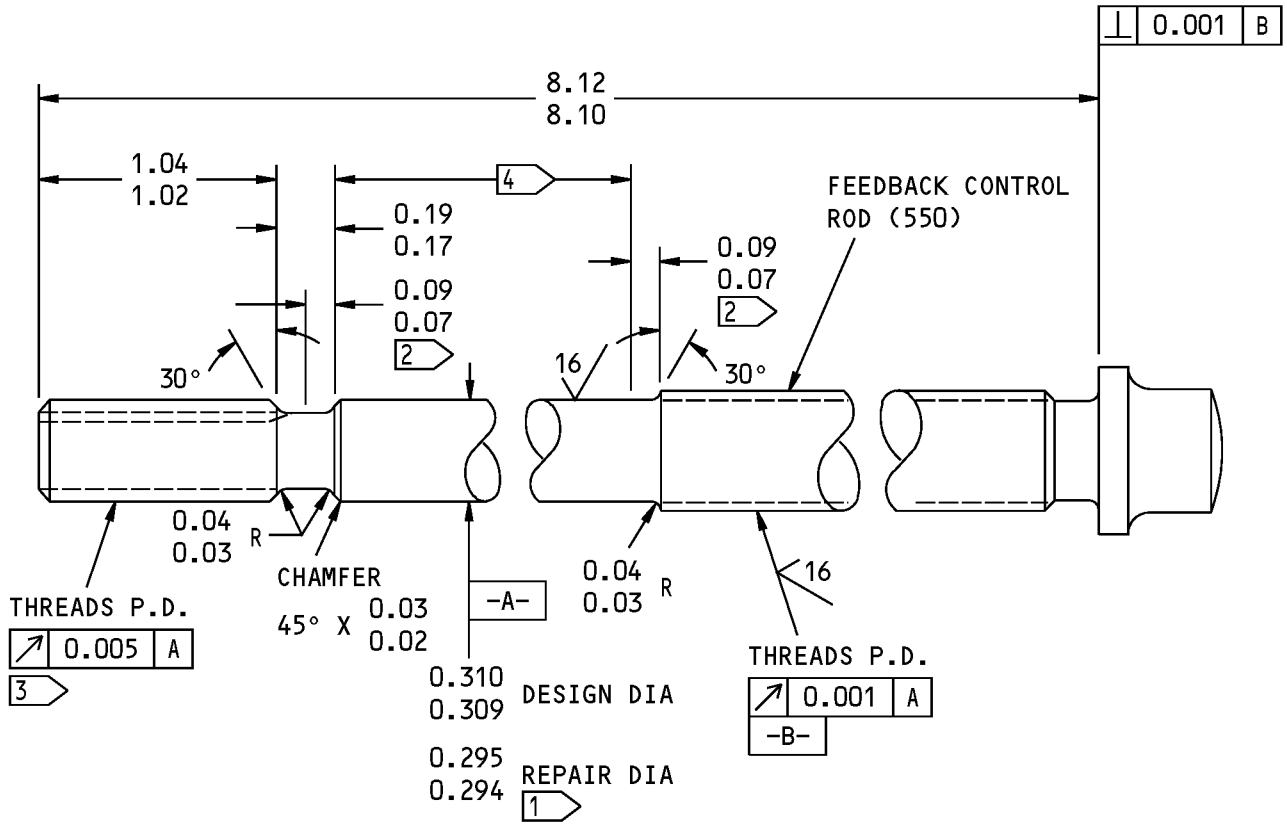
(a) Before chrome plate application, stress relieve the feedback control rod (550) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the feedback control rod (550) surface as shown in REPAIR 8-1, Figure 601 and flagnote 1.

(c) In less than 4 hours after chrome plate application, bake the feedback control rod (550) at 350-400°F for 12 hours minimum.

(d) Obey the chrome plate runout area as shown in REPAIR 8-1, Figure 601.

(3) Apply silver plate (F-15.07), 0.00015-0.00020 inch thick, to the surface and REPAIR 8-1, Figure 601.



1 APPLY CHROME PLATE (F-15.34) ON THIS SURFACE

2 PLATING RUNOUT AREA

3 APPLY SILVER PLATE (F-15.07) IN THIS AREA

4 SHOT PEEN THIS AREA.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1868-4 Feedback Control Rod Repair
Figure 601

CYLINDER ASSEMBLY - REPAIR 9-1

315A2807–1

1. General

A. This procedure gives the data necessary to replace the bushings (705) on the cylinder assembly (700).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to IPL Figure 1 for item numbers.

2. Bushing Replacement

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00015	Grease - Aircraft Bearing (Use BMS 3-24 until existing stocks are depleted, BMS 3-33 supersedes BMS 3-24)	BMS3-24 (Superseded by BMS 3-33)

B. References

Reference	Title
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT
SOPM 20-60-03	LUBRICANTS

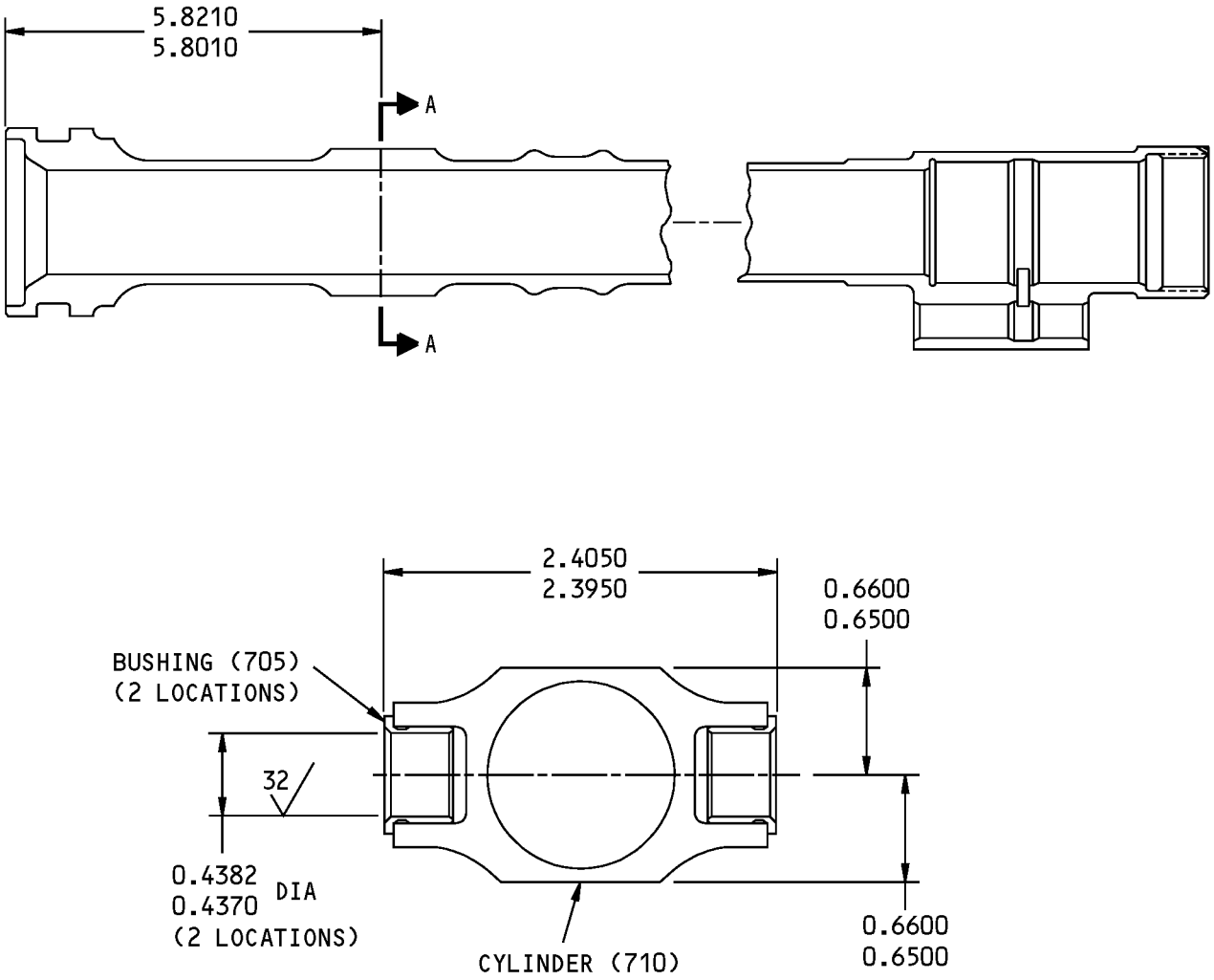
C. Procedure (REPAIR 9-1, Figure 601)

NOTE: For lubricants, refer to SOPM 20-60-03.

(1) Remove the bushing (705) from the cylinder (710).

(2) Install the bushing (705) with grease, D00015 as shown in SOPM 20-50-03.

(3) Machine the bushings (705) to the dimensions shown in REPAIR 9-1, Figure 601.



A–A

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A2807-1 Cylinder Assembly Repair
Figure 601

CYLINDER - REPAIR 9-2

315A2807–2

1. General

A. This procedure gives the data necessary to repair and refinish the cylinder (710).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair Details:

(1) Material:15-5PH CRES

(a) 150-170 Ksi

2. Cylinder Repair

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure (REPAIR 9-2, Figure 601)

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Grind the cylinder (710) to remove defects as shown in . Grind no more than the repair dimension as shown in REPAIR 9-2, Figure 601.

(2) Break all sharp edges.

(3) Do a magnetic particle check, class B, as shown in SOPM 20-20-01.

(4) Passivate (F-15.09), Type II.

(5) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the cylinder (710) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the cylinder (710) surface shown in REPAIR 9-2, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the cylinder (710) at 350-400°F for 8 hours minimum.

3. Cylinder Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

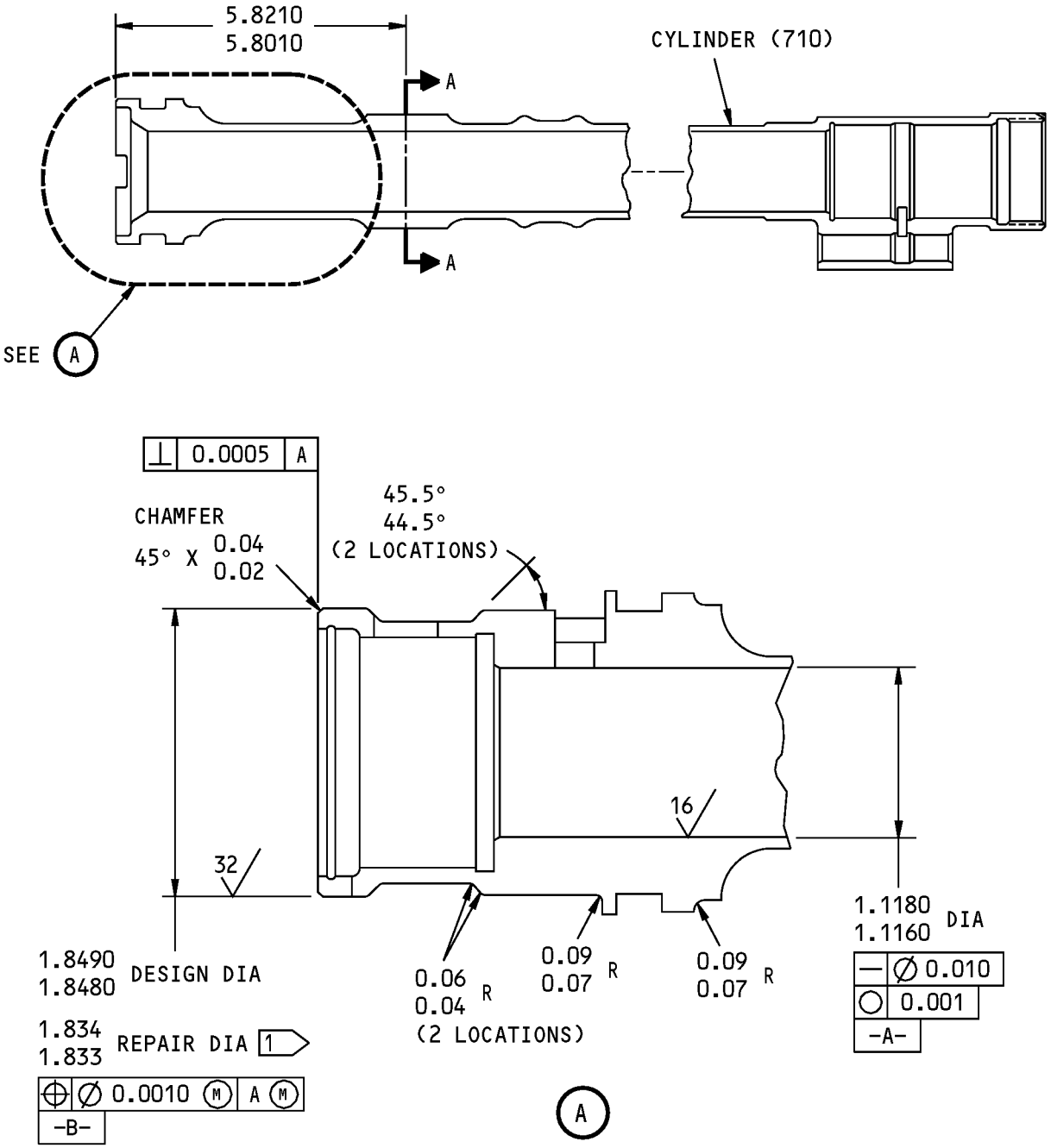
(1) Passivate (F-17.09), Type II.

(2) Apply chrome plate (F-15.34).

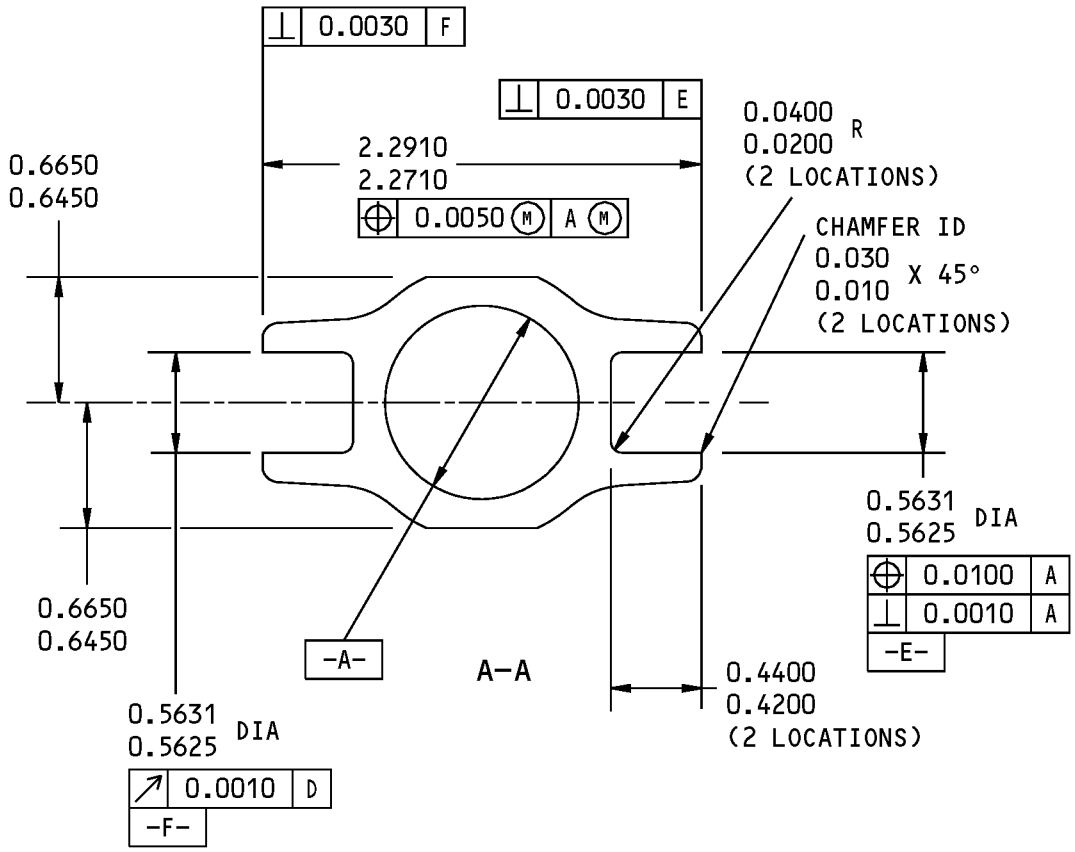
(a) Before chrome plate application, stress relieve the cylinder (710) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the cylinder (170) surface shown in REPAIR 9-2, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the cylinder (710) at 350-400°F for 8 hours minimum.



315A2807-2 Cylinder Repair
Figure 601 (Sheet 1 of 2)



1 APPLY CHROME PLATE (F-15.34) ON THIS SURFACE.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A2807-2 Cylinder Repair
Figure 601 (Sheet 2 of 2)

ROD END ASSEMBLY - REPAIR 10-1

315A2831–1

1. General

A. This procedure gives the data that is necessary to repair the rod end assembly.

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

2. Ball Replacement

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00543	Lubricant - Dry Film - Everlube 967	

B. References

Reference	Title
SOPM 20-60-03	LUBRICANTS

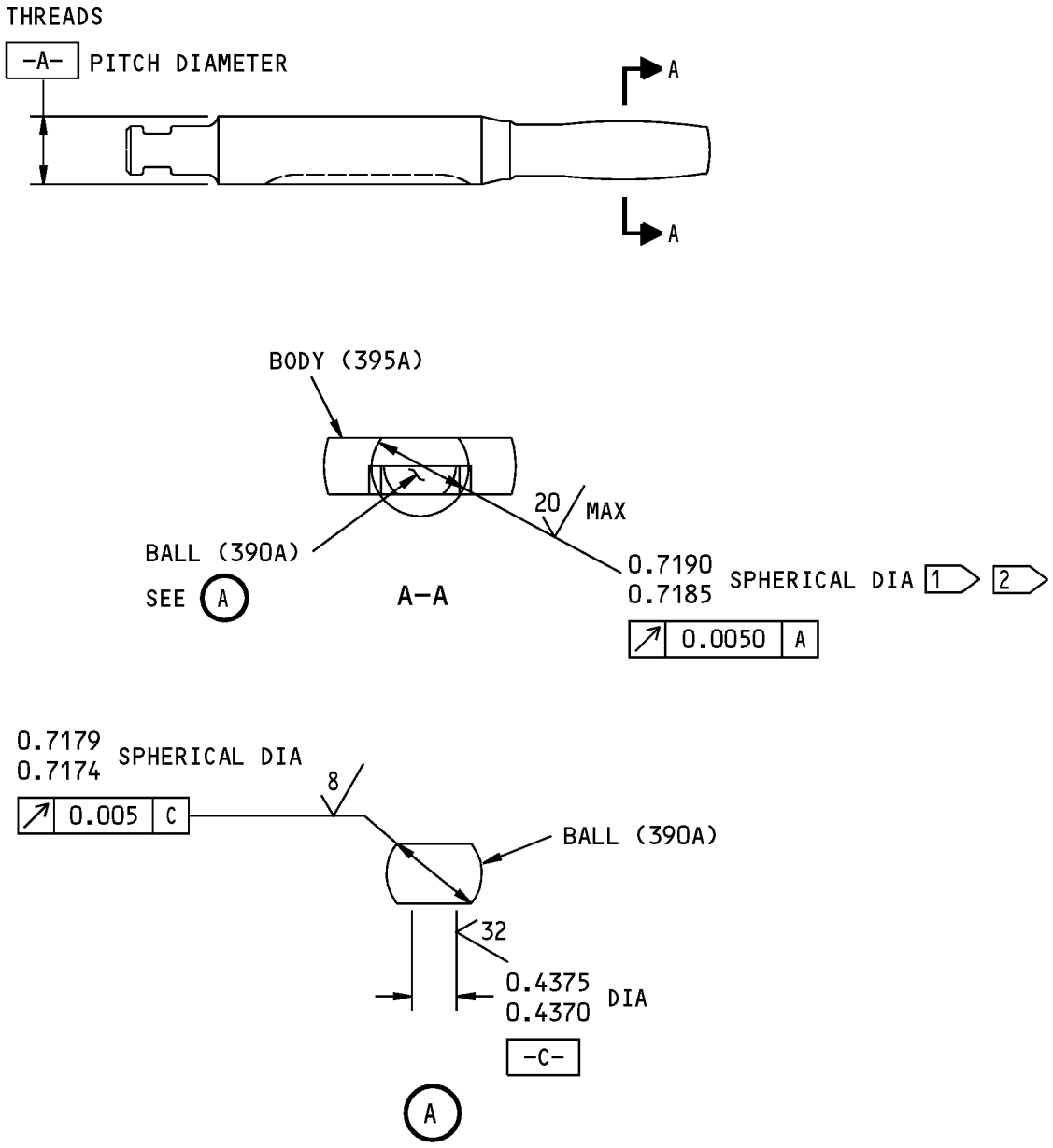
C. Procedure

NOTE: For lubricants, refer to SOPM 20-60-03.

(1) Remove the ball (390A) from the body (395A).

(2) Apply Everlube 967 lubricant, D00543, 0.0003-0.0005 inch thick as shown in REPAIR 10-1, Figure 601. The body (395A) must accept 0.7180 inch diameter ball (390A) after Everlube 967 lubricant, D00543. Make sure the surface finish of the spherical inner diameter of the body (395A) is 20 micro-inches Ra maximum.

(3) Install the ball (390A) in the body (395A).



1 APPLY DRI-FILM LUBE, EVERLUBE 967, 0.0003-0.0005 INCH THICK

2 AFTER DRI-FILM LUBE, BODY (395A) MUST ACCEPT 0.7180 INCH DIAMETER BALL

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A2831-1 Rod End Assembly Repair
Figure 601

ROD END BODY - REPAIR 10-2

315A2831–2

1. General

A. This procedure gives the data necessary to refinish the body (395A).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to IPL Figure 1 for item numbers.

D. General Repair Details:

(1) Material: PH 13-8MO CRES 175-200 Ksi

2. Cylinder Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Prepare the surface and passivate as shown in (F-17.09).

MANUAL UNLOCK HANDLE ASSEMBLY - REPAIR 11-1

315A2857–1

1. General

A. This procedure gives the data necessary to refinish the manual unlock handle assembly (215).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer toREPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

2. Manual Unlock Handle Assy Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For the decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Prepare the surface and passivate (17.09).

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MANUAL UNLOCK SHAFT - REPAIR 11-2

315A2896–1

1. General

A. This procedure gives the data necessary to repair and refinish the manual unlock shaft (218).

B. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Figure 601 shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General Repair Details:

(1) Material:

2. Manual Unlock Shaft Repair

A. References

Reference	Title
SOPM 20-10-04	GRINDING OF CHROME PLATED PARTS
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure (REPAIR 11-2, Figure 601)

NOTE: For decoding table for Boeing finish codes, refer to SOPM 20-41-01.

(1) Grind the shaft (218) to remove defects as shown in SOPM 20-10-04. Grind no more than the repair dimensions as shown in REPAIR 11-2, Figure 601.

(2) Break all sharp edges.

(3) Do a magnetic particle check, class B, as shown in SOPM 20-20-01.

(4) Passivate (F-17.09), Type II.

(5) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the manual unlock shaft (218) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the manual unlock shaft (218) surface as shown in REPAIR 11-2, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the manual unlock shaft (218) at 350-400°F for 8 hours minimum.

3. Manual Unlock Shaft Refinish

A. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES

B. Procedure

NOTE: For decoding table for Boeing finish codes, refer to SOPM 20-41-01.

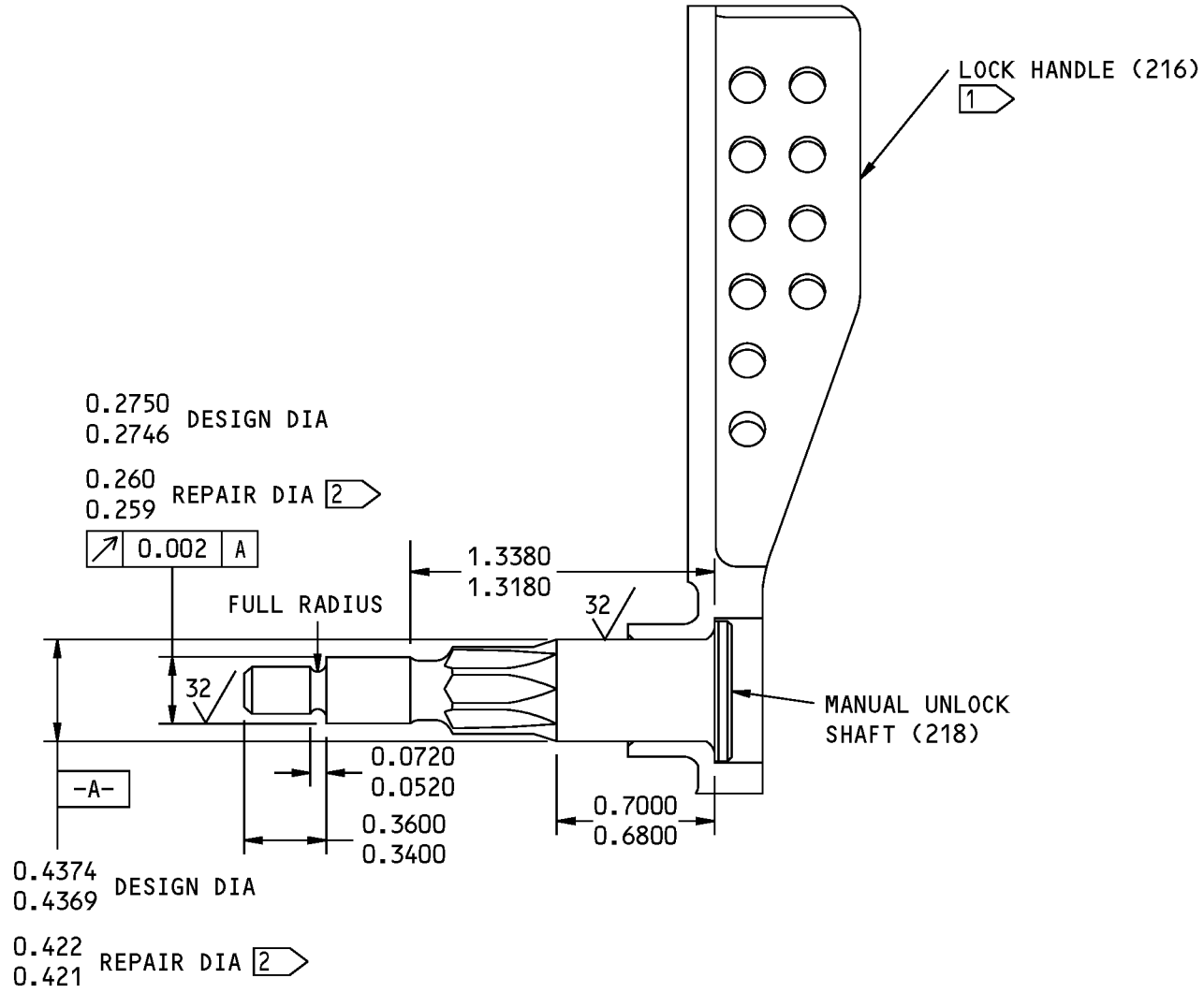
(1) Passivate (F-17.09), Type II.

(2) Apply chrome plate (F-15.34).

(a) Before chrome plate application, stress relieve the manual unlock shaft (218) at 775-825°F for 1 hour.

(b) Apply chrome plate (F-15.34) to the manual unlock shaft (218) surface as shown in REPAIR 11-2, Figure 601.

(c) In less than 4 hours after chrome plate application, bake the manual unlock shaft (218) at 350-400°F for 8 hours minimum.



1 LOCK HANDLE (216) SHOWN FOR CLARITY.
LOCK HANDLE IS WELDED TO THE MANUAL UNLOCK SHAFT (218)

2 APPLY CHROME PLATE (F-15.34) ON THIS SURFACE.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A2896-1 Manual Unlock Shaft Repair
Figure 601

ASSEMBLY

1. General

A. This procedure has the data necessary to assemble the locking actuator assembly.

B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM identified in this procedure.

C. Refer to IPL Figure 1 for item numbers.

2. Special Tools and Equipment

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
COM-4950	Installation Tool - Cable Tie, (Part #: GS4MT, Supplier: 06383) (Part #: PPTMT, Supplier: 06383) (Part #: ST2MT, Supplier: 06383)
SPL-6255	Wrench (B78008-7 is included in B78008-19) (Part #: B78008-7, Supplier: 81205)
SPL-6257	Wrench (B78008-5 is included in B78008-19) (Part #: B78008-5, Supplier: 81205)
SPL-6259	Wrench (B78008-10 included in B78008-19) (Part #: B78008-10, Supplier: 81205)
SPL-6272	Plug (B78016-6 is included in B78016-1) (Part #: B78016-6, Supplier: 81205)
SPL-6273	Sleeve (B78016-5 inlcuded in Overhaul Set B78016-1) (Part #: B78016-5, Supplier: 81205)
SPL-6274	Cap (B78016-3 is included in B78016-1) (Part #: B78016-3, Supplier: 81205)
SPL-6284	Fixture - Torque, Locking and Non-Locking Thrust Reverser Acutator Assembly (Part #: B78011-25, Supplier: 81205)
SPL-7341	Spanner Wrench - Nut, Cylinder Locking Actuator (B78008-17 included in B78008-19) (Part #: B78008-17, Supplier: 81205)
SPL-7356	Alignment Sleeve - Lead Screw (B78008-11 included in B78008-18) (Part #: B78008-11, Supplier: 81205)
SPL-7405	Alignment Tool - Clevis (B78015-2 is included in B78015-17 and -23) (Part #: B78015-2, Supplier: 81205)
SPL-7406	Washer - Stop Adjustment, Thrust Reverser (B78015-11 is included in B78015-17 and -23) (Part #: B78015-11, Supplier: 81205)
SPL-7407	Wrench - Nut Gland (B78008-5 included in T/R Actuator Wrench Set B78008-18) (Part #: B78008-5, Supplier: 81205)

Reference	Description
SPL-7471	Spacer - Locking Actuator Assembly (B78013-9 is included in B78013-1 & -2) (Part #: B78013-9, Supplier: 81205)
SPL-7473	Spacer - Locking Actuator Assembly (B78013-8 is included in B78013-1 & -2) (Part #: B78013-8, Supplier: 81205)
SPL-7477	Assembly - Test Stand (B78014-30 included in Test Fixture B78014-37) (Part #: B78014-30, Supplier: 81205)
SPL-7480	Rigging Bar - Thrust Reverser, Position Feedback LVDT (Part #: B78006-1, Supplier: 81205)
SPL-7520	Locator Assembly - Proximity Switch (B78015-28 included in Overhaul Set B78015-17 and -23)
SPL-7523	Sleeve (B78015-10 included in Overhaul Set B78015-17 and -23)
SPL-7554	Plate - Assembly (B78015-7 is included in B78015-17 and -23) (Part #: B78015-7, Supplier: 81205)

B. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS 5-95
A01070	Adhesive - Polyamide	BAC5010, Type 38
D00015	Grease - Aircraft Bearing (Use BMS 3-24 until existing stocks are depleted, BMS 3-33 supersedes BMS 3-24)	BMS3-24 (Superseded by BMS 3-33)
D00153	Fluid - Hydraulic, Erosion Arresting, Fire Resistant	BMS3-11 Type IV (interchange˜able & intermixable with Type V)
G50347	Lockwire - Nickel-copper, 0.032 inch diameter	NASM20995N˜C32

C. References

Reference	Title
SOPM 20-50-01	BOLT AND NUT INSTALLATION
SOPM 20-50-02	INSTALLATION OF SAFETYING DEVICES
SOPM 20-60-03	LUBRICANTS
SOPM 20-60-04	MISCELLANEOUS MATERIALS

D. Consumable Materials

NOTE: Equivalent material can be used.

(1) D00220 Grease – Braycote 660 Bray Oil Company 1925N Marianna Ave Los Angeles, CA 90032-4007

(2) D00444 Assembly Lube – MCS 352

E. Procedure

NOTE: For bolt and nut installation, refer to SOPM 20-50-01. For lubricants, refer to SOPM 20-60-03. For miscellaneous materials, refer to SOPM 20-60-04.

(1) Use standard industry procedures and the steps shown below to assemble this component.

(2) Lubricate all O-rings and seals with fluid, D00153 or assembly lube at assembly.

(3) Lubricate all internal parts with the fluid, D00153 as parts are assembled.

(4) Use a micrometer to measure the width of the outer race of the bearing (595). The design dimension is 0.546-0.551 inch.

NOTE: The dimension D1 to the nearest 0.001 inch (ASSEMBLY, Figure 701, ASSEMBLY, Figure 702).

(5) Use the sleeve, SPL-7523 and the assembly plate, SPL-7554 to install the bearing (595) on the lead screw (680), as shown in ASSEMBLY, Figure 702.

NOTE: The bearings (570, 595) are a matched set and must be installed correctly. The bearings OD is marked with lines that form a "V" when positioned properly.

(6) Install the key (575) in the slot on lead screw (680). Install the worm wheel (585) on the lead screw with the part-numbered side away from the bearing.

(7) Check and note the centerline dimension of the worm wheel (585) marked on the face of the worm wheel spacer (590). The design dimension is 0.4975-0.5025 inch. Make a note of this dimension as D3 (ASSEMBLY, Figure 701, ASSEMBLY, Figure 702).

NOTE: The worm wheel (585) and spacer (590) are a matched set. Dimensions D1, D2 and D3 will be used in subsequent procedures.

CAUTION: THE WORM WHEEL (585) AND SPACER (590) ARE A MATCHED SET AND MUST BE USED TOGETHER OR THE ACTUATOR WILL MALFUNCTION.

(8) Measure the width of the outer race of the bearing (570). The design dimension is 0.546-0.551 inch. Make a note of the measurement D2 to the nearest 0.001 inch (ASSEMBLY, Figure 701, ASSEMBLY, Figure 702).

(9) Install the spacer (590) over the worm wheel (585). Use the sleeve, SPL-7523 and the assembly plate, SPL-7554 to install the bearing (570) on the lead screw (680).

NOTE: The bearings (570, 595) are a matched set and must be installed correctly. The bearings OD is marked with lines that form a "V" when positioned properly.

CAUTION: THE MATING THREADS OF THE LEAD SCREW (680) AND THE NUT (535) ARE LEFT-HAND. CLOCKWISE ROTATION WILL NOT ENGAGE AND MAY DAMAGE PARTS.

(10) Install the spacer (545) on the end of the lead screw (680) with the chamfered end of the bore away from the bearing (570). Install a new lockwasher (540).

CAUTION: THE NUT (535) HAS LEFT-HAND THREADS. CLOCKWISE ROTATION WILL NOT ENGAGE AND MAY DAMAGE PARTS.

(11) Screw the nut (535) on the feedback rod (550). Make sure the feedback rod (550) turns freely with no binding. Screw the nut (535) and feedback rod (550) into the end of the lead screw (680) (counterclockwise).

(12) Slide the alignment sleeve, SPL-7356 over the bearings (570, 595) and the spacer (590) on the lead screw (680). Restrain the flats on the lead screw (680) with wrench, SPL-6259 and tighten the nut (535) counterclockwise to 500-700 pound-inches.

(13) Install the assembled parts in the housing (500) and retain with cap, SPL-6274 used with the rings (655) and the cylinder nut (660). Install the actuator in torque fixture, SPL-6284, and tighten the cylinder nut (660) to 2900-3100 pound-inches with spanner wrench, SPL-7341.

(14) Use the wrench, SPL-6259, to make sure the torque required to turn the lead screw (680) is not more than 2.5 pound-inches. If the torque is acceptable, go to ASSEMBLY, Paragraph 2.E.(15). If the torque is more than 2.5 pound-inches do the following:

(a) Remove the parts from actuator and replace the worm wheel (585) and the spacer (590) as a matched set.

(b) Do again ASSEMBLY, Paragraph 2.E.(6) thru ASSEMBLY, Paragraph 2.E.(14) and check the torque again.

(15) Remove cap, SPL-6274 and the lead screw (680) from the housing (500). Break the flange of lockwasher (540) into the two slots of the nut (535). Make sure the break is complete.

(16) Use the plug, SPL-6272 installed in the housing (500), to get the centerline dimension C of the mounting holes of the worm gear in the housing (500) as shown in ASSEMBLY, Figure 701, 703.

NOTE: This dimension C will be used in subsequent procedures to find the axial position of the lead screw (680).

(17) Install the spring retainer (605), the spring (610) and the lock follower (615) on the lead screw (680) against the bearing (595).

(18) Use the wrench, SPL-6259, to remove the lead screw nut (690) from the piston (695). Install the lock ring (645) on the lead screw nut (690). Screw the lead screw nut on the lead screw (680) to the approximate center of the threaded length.

NOTE: The lead screw nut (690) is part of the piston assembly (685).

(19) Install the lead screw guide (675), the retaining pin (670) and the retaining ring (665) on the end of the lead screw (680).

(20) Slide the piston (685) over the lead screw (680). Restrain the piston (685) and using wrench, SPL-6259, turn the lead screw nut (690) into the piston (685) until the two halves of the holes for the locking pin (650) align.

NOTE: Align the radius on the ring (645) with the radius on the nut (690).

(21) Insert the locking pin (650) into the hole and lightly tap it until it bottons. Make sure the retaining ring engages the shoulder of the locking pin (650). Rotate the lock ring (645) until its radius passes the locking pin (650). Deform the lock ring (645) as shown in ASSEMBLY, Figure 704.

(22) Install the O-ring (640) and the two rings (635) in the groove on the piston (695).

(23) Use the sleeve, SPL-6273, to install one bearing (305) against the shoulder of the worm shaft gear (310).

(24) Insert the worm shaft gear (310) thru the adapter screw (265A) port in the housing (500) and seat the bearing (305) against the shoulder in the housing (500).

(25) Install the O-ring (270) on the undercut of the adapter screw (265A). Install the adapter screw (265A) in the housing (500). Tighten the adapter screw (265A) to 1140-1200 pound-inches.

(26) Install the other bearing (305) on the other end of the worm shaft gear (310) and into the housing (500) with the sleeve, SPL-6273.

(27) Position the actuator so the worm shaft gear (310) is vertical and the adapter screw (265A) is at the bottom. Press down on the worm shaft gear (310) to make sure the outer race of the bottom bearing (305) is seated against the adapter screw (265A). Make sure the inner race of the upper bearing (305) is seated on shoulder of worm shaft gear (310).

F. Determine Necessary Shims (275 thru 295)

(1) Using a depth micrometer, measure the distance from the face of the housing (500) to the outer race of the bearing. Measure at two locations, 180 degrees apart, and divide the sum by two (2). This is dimension D (dimension D will be between 0.783 and 0.833 inch) (ASSEMBLY, Figure 701, 705).

(2) Install the sleeve (300) in the bore of the fitting (260A) (in the end with the shortest thread). Use a depth micrometer to measure the distance from the face of the sleeve (300) to the bottom face of the fitting flange. Measure at two locations, 180 degrees apart, and divide the sum by two (2). This is dimension E (dimension E will be between 0.740 and 0.760 inch) (ASSEMBLY, Figure 701, 705).

(3) Subtract dimension D obtained in ASSEMBLY, Paragraph 2.F.(1) from dimension E obtained in ASSEMBLY, Paragraph 2.F.(2). The result is dimension S2 (ASSEMBLY, Figure 701, 705). S2 is the required shim thickness. Select the minimum combination of shims (275 thru 295) to achieve the value, S2, to the nearest 0.001 inch.

(4) Remove the sleeve (300) from the fitting (260A). Install the O-ring (270) on the fitting (260A). Install the shims (275 thru 295) selected in ASSEMBLY, Paragraph 2.F.(3) on the sleeve (300) and install the sleeve in the fitting (260A). Install the assembled parts in the housing. Tighten the fitting (260A) to 1140-1200 pound-inches.

(5) Check the worm gear shaft (310) turns freely. Make sure the axial movement (end play) does not exceed 0.003 inch.

(a) If the shaft does not turn freely, reduce the total shim thickness in 0.001 increments until the shaft turns freely.

(b) If the axial movement exceeds 0.003 inch, replace the bearings (305) and repeat the assembly and check procedures.

(6) Disassemble all of the parts from the housing (500), take note of the attitude of the bearings. The parts will be identically installed at a later time.

G. Adjust Shim (205)

(1) Install the bushing (240) in the housing (500). Make sure the cut-out in the flange is adjacent to the small hole in the housing (500).

(2) Install the bushing (210) in the housing (500).

(3) Insert the handle assembly (215) thru the bushings (210, 240). Make sure the handle turns freely.

NOTE: Do not install the torsion spring (235) and unlock lever (255) at this time.

(4) With the handle assembly (215) against the bushing (240), measure the distance from the shoulder end of the handle assembly (215) to the flange of the bushing (210). This is dimension F (ASSEMBLY, Figure 701, ASSEMBLY, Figure 706).

(5) Subtract 0.002 inch from dimension F. This is dimension S3. Dimension S3 is the required shim thickness (ASSEMBLY, Figure 701, ASSEMBLY, Figure 706).

(6) Adjust the shim (205) counterbore depth to the dimension S3.

(7) Install the shim (205) and the nut (200) as shown in ASSEMBLY, Figure 706. Tighten the nut to 20-30 pound-inches. Make sure the clearance between the shim (205) and the bushing (210) is 0.002 inch maximum. Make sure the handle assembly turns freely.

(8) Remove the handle assembly (215).

(9) Install the O-ring (515) and the back-up rings (520) and the O-ring (180) and the back-up rings (175) in their respective grooves on the lock sleeve (510) (ASSEMBLY, Figure 707).

(10) Insert the feedback seal retainer (185) in the housing (500) and install the feedback gland nut (150) finger-tight.

NOTE: Related parts (160, 165, 170) are not necessary at this time.

(11) If necessary, install the shim (530) with the lockspring (525) in the housing (500). Install the locksleeve (510) in the housing. Make sure the slotted tang is located to engage the plug (315) (ASSEMBLY, Figure 707).

(12) Install assembly tool spacer, SPL-7473 and spacer, SPL-7471 in the housing (500).

(13) Install the index plug (315) in the housing (500) finger tight. Do not install the O-ring (320). Push the lock sleeve (510) until it bottoms in the housing (500).

(14) Remove the index plug (315) and make sure the tang of the lock sleeve (510) is still aligned under the port.

(15) Install the torsion spring (235) on the handle assembly (215). Locate one leg of the spring (235) in the hole.

(16) Install the unlock lever (255) in the housing (500) as shown in ASSEMBLY, Figure 708. Insert the handle assembly (215) thru the bushing (240) with the leg of the spring (235) thru the cutout in the flange of the bushing (240). Then pull the free leg of the spring (235) around to align with the hole in the housing (500) (ASSEMBLY, Figure 706).

(17) Push the handle assembly (215) through until it bottoms on the bushing (240). Make sure the spring (235) is installed correctly.

(18) Install the shim (205), with the counterbore towards the housing and the nut (200). Tighten the nut (200) to 20-30 pound-inches.

(19) Install the guide (250), the manual lock spring (230), the unlock pin (245), the detent housing (225) and the screws (220) as shown in ASSEMBLY, Figure 708. Tighten the screws (220) to 27-30 pound-inches.

(20) Unscrew the knob of the tools (installed previously) to permit the lock sleeve (510) to move from the unlock position.

(21) Pull the handle assembly (215) to the unlocked position to permit the piston (695) to extend from the locked position, then push and release the unlock pin (245). Make sure there is no binding and the unlock pin (245) springs back smoothly.

(22) Push and hold the unlock pin (245) in the housing (500). Slowly release the handle assembly (215) until the unlock lever (255) latches into the unlock pin (245). This must prevent the handle assembly (215) from moving.

(23) Remove the assembly tool spacer, SPL-7471, unscrewing the knob first.

(24) Remove the feedback seal retainer (185) and the feedback gland nut (150) from the housing (500).

H. Determine Necessary Shims (555 thru 565)

(1) Add the worm wheel center distance D3 to the bearing width D2. The sum is dimension D. Subtract the dimension D from the housing dimension C. Select shims (555, 560, 565) as required to obtain this value S1 to the neareast 0.001 inch. Apply grease, D00015 to the shims and install the shims in the housing (500) against the shoulder of the bearing (ASSEMBLY, Figure 701, ASSEMBLY, Figure 702, ASSEMBLY, Figure 703).

NOTE: Dimensions D2 and D3 were obtained and noted from ASSEMBLY, Paragraph 2.E.(7) and ASSEMBLY, Paragraph 2.E.(8). Dimension C was obtained and noted from ASSEMBLY, Paragraph 2.E.(16).

(2) Install the assembled lead screw/piston parts in the housing (500). Make sure the bearing (570) is seated against the shims and that the cutout area of the spacer (590) is aligned with the opening in the housing boss for the worm shaft gear (310). Install the pin (505) with housing (500) in the mating hole at the spacer (590).

(3) Install the feedback control rod (550) from the housing (500) until it bottoms. Install the feedback rod spacer, SPL-7473 on the feedback control rod (550) finger against the end of the housing (500).

(4) Coat the inside of the cylinder (710) with fluid, D00153. Locate the cylinder nut (660) on the outside diameter of the cylinder (710). Install the O-ring (630) and two back-up rings (635) in the grooves on the cylinder (710).

(5) Move the cylinder (710) over the piston assy (685). Install the lock follower (615) in the bore of the cylinder and install the spring (610) in the lock follower. Install the spring retainer (605) on the spring (610), then install the retainer ring (600).

(6) Install the lock keys (620) in the three slots in the cylinder (710). Slide the assembled cylinder into the housing (500). Make sure the hole for the plug (315) is aligned with the slotted tang of the lock sleeve (510). Seat the cylinder against bearing.

(7) Apply grease, D00015 to the cylinder nut rings (655) and the threads of the cylinder nut (660). Install the rings in the nut, and install the nut into the housing (500) finger-tight.

(8) Install the O-ring (320) on the plug (315) and install the plug in the housing (500). Tighten the plug to 50-60 pound-inches.

(9) Install the O-ring (480) and the back-up rings (475), and the O-ring (470) and the back-up rings (465) in the grooves on the gland (460) (ASSEMBLY, Figure 709).

(10) Apply grease, D00015 to the snubber rings (485, 490). Install the snubber rings (485, 490) in the gland (460) as shown in ASSEMBLY, Figure 709.

(11) Install the footseal (450) and the O-ring (455) in the gland (460). Install the piston bearing (445) in the gland (460) as shown in ASSEMBLY, Figure 709.

(12) Apply grease, D00015 to the threads of the gland nut (425). Install the scraper (430) as shown in ASSEMBLY, Figure 709 in the end of the gland nut (425). Slide the gland nut (425) over the piston (695), and install the gland nut (425) into the cylinder finger tight.

(13) Insert the locking pin (505) inside the hole for the worm shaft gear bearing (305). The top of the pin must be below the surface for the installation of the bearing. If the pin is obstructed, turn the worm wheel spacer (590) until end of the pin enters the recessed cutout in the spacer.

(14) With the actuator in torque fixture, SPL-6284, use spanner wrench, SPL-7341 to tighten the cylinder nut (660) to 2900-3100 pound-inches. Tighten the gland nut (425) to 800-1000 pound-inches using wrench, SPL-6257. Remove the actuator from the fixture.

(15) Remove feedback rod spacer, SPL-7471 from the feedback control rod (550).

(16) Install the worm gear parts (260A thru 310) determined in the previous steps.

NOTE: Turn the worm shaft gear (310) slowly to the engage the worm wheel (585).

(17) Install the O-ring (330) on the union (325). Install the union in the tube port on the cylinder (710) and tighten the union (325) to 133-147 pound-inches.

(18) Install the O-ring (180) and the two back-up rings (175) in the groove on the feedback seal retainer (185). Put the retainer (185) on the feedback rod (550). Do not install the feedback seal retainer (185) in the housing (500).

(19) Put a cover on the threads on the end of the feedback control rod (550) to prevent damage to the seals. Install the O-ring (170) and the foot seal (165) onto the chrome plated surface of the feedback control rod (550) as shown in ASSEMBLY, Figure 710. Remove the thread cover.

(20) Slide the bushing (160) onto the feedback control rod (550) against the foot seal (165). Press the bushing (160) into feedback seal retainer (185) until the flange seats against the feedback seal retainer. Install the assembled parts in the housing (500).

(21) Put a cover on the threads on end of the feedback control rod (550) to prevent damage to the seals (550). Install the excluder (155) onto the chrome plated surface of the feedback control rod (550) as shown in ASSEMBLY, Figure 710. Remove the thread cover. Slide the feedback gland nut (150) over the feedback control rod (550) and install the excluder in the recess in the end of the feedback gland nut. Apply grease, D00015 to the threads of the feedback gland nut, and install the feedback gland nut into the housing (500). Tighten the feedback gland nut (150) to 425-475 pound-inches, using wrench adapter B78008-9.

(22) Install the O-ring (440) and the two back-up rings (435) in the grooves on the rod end assembly (385B). Make sure the spiral direction of the two back-up rings (435) will prevent separation of the two back-up rings during installation.

I. Piston/Rod Adjustment

(1) Install the nut (400) on the rod end assembly (385B) until it reaches the end of the thread, near the bearing end. Install assembly tool washer, SPL-7406 against the nut (400).

NOTE: Do not install the stop (410) and lock cupwasher (405) at this time.

(2) Install the rod end assembly (385B) into the piston (695) and turn it for fourteen full turns.

(3) Push the piston (695) in until the lock keys (620) in cylinder (700) is engaged.

(4) Put the actuator in test stand assembly, SPL-7477.

(5) Align the key slot in the rod end (385B) with either slot in the end of the piston (695) and install the key (415). Install the rod end assembly (385B) in the fixture clevis with the fixture pin. Move the adjustment washer, SPL-7406 installed in ASSEMBLY, Paragraph 2.I.(1) over the key (415) against end of the piston (695).

(6) Tighten the nut (400) to 600-800 pound-inches against the adjustment washer, SPL-7406 using wrench, SPL-6259 and a wrench holding the washer flats. Pull on the clevis of the fixture to make sure the piston (695) is against the internal lock keys (620).

(7) Put a dial indicator on the fixture to measure the axial movement of the piston (695). Rotate the worm shaft gear (310) and retract the piston (695) 0.019-0.021 inch. Tighten the clevis clamp on the fixture.

(8) Using a 1-2 inch micrometer, measure dimension F1 across the gage block and the pin on the fixture to the nearest 0.001 inch (ASSEMBLY, Figure 711). Subtract 1.665 inches from this value, then multiply the remainder by 40. Make a note of the F2 result result to the nearest whole number. If F2 is zero, go to ASSEMBLY, Paragraph 2.I.(9). If F2 is plus (+) or minus (-), do the following:

(a) Loosen the nut (400). Remove the fixture pin from the clevis and the key (415) from the rod end assembly (385B).

(b) If dimension F2 is plus (+), turn the rod end assembly (385B) into the piston (695) F2 number of half-turns. If dimension F2 is minus (-), turn the rod end assembly (385B) out of piston (695) F2 number of half-turns.

(c) Loosen the clevis clamp on the fixture. Install the key (415) and install the rod end assembly (385B) in the fixture clevis with the fixture pin.

(d) Repeat ASSEMBLY, Paragraph 2.I.(5) thru ASSEMBLY, Paragraph 2.I.(8)(c) to check the adjustment.

(9) Use a 1-2 inch micrometer to make sure the dimension across the gage block and the fixture pin is 1.652-1.678 inches. Install the dial indicator (see ASSEMBLY, Paragraph 2.I.(7)). Slowly loosen the clevis clamp on the fixture to permit the piston (695) to move in or out, with or against the spring load, the amount necessary to get a dimension of 1.664-1.666 inches. Tighten the clevis clamp on the fixture. Check the dimension with a micrometer.

(10) Measure the distance H from the end of the gland nut (425) to the end of the piston (695) (surface of adjustment washer, SPL-7406). Note the value of the H to nearest 0.001 inch (ASSEMBLY, Figure 711).

(11) On the stop (410) measure the depth G of diameter A from the surface B- (the non-chamfered face). Note this dimension G to nearest 0.001 inch. (The design dimension is 0.344-0.354 inch.) Calculate dimension J by subtracting dimension H from dimension G. Note dimension J to the nearest 0.001 inch.

(12) As shown in ASSEMBLY, Figure 711, machine surface -B- stop to remove the amount of material equal to dimension J, obtained in ASSEMBLY, Paragraph 2.I.(11) to within 0.0005 inch. Break all sharp edges.

(13) Remove the rod end assembly (385B) from the fixture. Loosen the nut (400) and remove the key (415). Use a temporary marking method, identify the exact position of the rod end assembly (385B) relative to the piston (695). Remove the rod end assembly (385B) and remove the adjustment washer, SPL-7406.

(14) Apply Braycoat 660 grease lubricant to the face of the nut (400) to contact the lockwasher (405) and to the threads. Do not apply lubricant to the lockwasher (405).

(15) Install the nut (400) and cup lockwasher (405) onto the rod end (385B). Make sure the cup lockwasher (405) tang faces away from the bearing end. Install the machined stop (410), with chamfered side near the bearing end.

(16) Install the rod end assembly (385B) into piston (695) to the same position as marked in ASSEMBLY, Paragraph 2.I.(13). Install the key (415). Slide the stop over the piston and key and seat the stop (410) firmly against the end of the piston.

(17) Install the rod end assembly (385B) in the clevis in the fixture. Put the tang of the cup lockwasher (405) in the slot in the stop (410). Tighten the nut (410) to 600-800 pound-inches using wrench, SPL-6255 and a wrench to hold the flats on the stop (410).

(18) Push on the clevis of the fixture to make sure stop (410) contacts the gland nut (425). Tighten the clamp on the clevis. Use a micrometer to make sure the dimension across the gage block and pin of fixture is 1.661-1.669 inches. Add 22.000 to this measurement. This sum is the fully retracted dimension of the actuator and should be noted for functional test data.

(19) Loosen the clamp on the fixture clevis and pull on the rod end assembly (385B) to make sure the piston head contacts the internal lock keys (620). Use feeler gages to make sure the gap between the face of the stop (410) and the gland nut (425) is 0.007-0.033 inch. Push the manual unlock lever assembly (215) to extend the actuator to check the full extend length. Remove the actuator from the fixture.

J. Feedback Rod Adjustment

(1) Hold the actuator in a fixture and install the feedback control rod (550) in until it stops (ASSEMBLY, Figure 712). Using a dial indicator, measure the distance M1 from the end of the rod end assembly (385B) to the face of the gland nut (425) in the housing. Turn the feedback control rod (550) out until it stops. Measure the distance, M2. Subtract the smaller value from the larger value to obtain the stroke N. Subtract 1.577 inches from the stroke N and divide the remainder by 2. The result is dimension P. (Dimension P will be 0.055-0.099 inch.)

(2) Make sure the piston (695) is in the full retracted position and the feedback control rod (550) is fully turned out. Use a dial indicator to turn the feedback control rod (550) in the amount determined as dimension P in ASSEMBLY, Paragraph 2.J.(1).

(3) Do not permit the feedback control rod (550) to turn. Install the nut (140) on the feedback control rod (550) to the end of the threads. Install the feedback rod end (145) on the feedback control rod (550) 3-4 turns, and position the flats of the clevis parallel with the faces of the rod end in the piston at the other end of the actuator.

(4) Install the alignment tool, SPL-7405 on the housing (500). Hold the feedback control rod (550) and align the holes in the feedback rod end (145) with the mating holes in the tool. Remove the tool and turn the feedback rod end (145) in 180 degree increments until the holes are aligned.

(5) Remove the alignment tool from the housing (500). Turn the feedback rod (550) in either direction to align the slots in each part for the lock key (135). Do not turn the feedback control rod (550) more than 45 degrees. Install the lock key (135) and seat. Make sure the feedback rod and the rod end do not turn. Tighten the nut (140) to 75-85 pound-inches.

(6) Install the nutplates (125) on the proximity sensor bracket (130) with the rivets (120).

(7) Install the proximity sensor bracket (130), the L.H. bracket (90) and the bushing (30) with the bolts (20, 25), washers (35) and the nuts (40). Tighten the nuts (40) to 60-70 pound-inches.

(8) Install one bushing (85) on the feedback spindle (80) against the shoulder on the largest thread end. Install the feedback spindle through the feedback rod end (145) of the actuator. Install the other bushing (85) on the feedback spindle. Install the washers (50) and nut (45) on the spindle (80). Tighten the nut (45) to 120-130 pound-inches.

(9) Move the manual unlock lever handle assembly (215) to release the internal lock key (620). Fully extend the actuator by turning the worm shaft gear (310) using wrench, SPL-7407. Make sure the actuator operates freely.

(10) Put the actuator in the fully locked, retracted position. Install the target (195) on the handle assembly (215).

(a) See ASSEMBLY, Figure 714 for target installation.

(b) It is recommended to use proximity switch locator assembly, SPL-7520, to position the target on the handle.

(11) Install the O-rings (380) and the backup rings (375) in the grooves of the tube assembly (345). Install the tube assembly (345) in the actuator. Tighten the tube nut (355) to 133-147 pound-inches.

K. Transducer Assembly (15) Installation

(1) Install the LVDT rigging bar, SPL-7480 with three screws. If there is axial freeplay in the feedback spindle (80), put the feedback spindle (80) approximately at the middle position of the freeplay.

(2) Measure the gap between the shoulder of the feedback spindle (80) and the LVDT rigging bar, SPL-7480, use a feeler gage with the feedback spindle (80) at the middle position to measure the gap.

(3) Remove the LVDT rigging bar, SPL-7480 and make a selection of the smallest quantity of shims (65,70,75) equal to the thickness measured in ASSEMBLY, Paragraph 2.K.(2) to within 0.002 inch. Install the shims (65, 70, 75) on the feedback spindle (80).

(4) Apply sealant, A00247 to the surfaces of the bracket (115) that touch the proximity sensor bracket (130) and the bracket on the transducer assembly (15).

CAUTION: DO NOT BEND THE PROBE OF THE TRANSDUCER ASSEMBLY (15) DURING INSTALLATION.

(5) Install the bracket (115) on the proximity sensor bracket (130) with the screws (95) and the washers (105). Tighten the screws so the bracket (115) continues to move in the slots.

(6) Loosely install the transducer assembly (15) with the screws (5) and the washers (10).

(7) Tighten the screws (5) to 27-33 pound-inches. Install lockwire, G50347 as shown in SOPM 20-50-02.

(8) Push the bracket (115) firmly against the mounting bracket of the transducer assembly (15) and tighten the screws (95) to 27-33 pound-inches.

(9) Install the bolts (100), the washers (105) and the collars (110). Remove the unwanted sealant.

(10) Install the washer (60) and the nut (55). Tighten the nut (55) to 20-30 pound-inches.

(11) Do the functional test as shown in TESTING AND FAULT ISOLATION.

(12) Safety the Parts:

(a) Use a 0.12 inch square punch, break the flange of the cup lockwasher (405) at the rod end (385B) into each of the four slots in the nut (400). Make sure each break is complete.

(b) Install lockwire, G50347 from the gland nut (425) to the cylinder assembly (700).

(c) Install lockwire, G50347 from the cylinder nut (660) to the housing (500).

(d) Lockwire the end fitting (260A), the adapter screw (265A) and the plug (315) to the housing (500).

(e) Secure the screws (5, 220) with lockwire, G50347.

(13) Install the spacers (340) around the cylinder and the tube. Bond the spacers to the cylinder with adhesive, A01070. Install the ties (335) around the spacers using cable tie installation tool, COM-4950. Set the tool to 165 pounds maximum, locating the joints of the ties approximately as shown in ASSEMBLY, Figure 713. If necessary, tighten the coupling nut (355) to 133-147 pound-inches.

(14) Install the spacer (420) in the groove on the gland nut (425) with adhesive, A01070.

CALCULATION OF D (FIG. 702)	1. WIDTH OF BEARING (595) ACROSS OUTER RACE (DIMENSION D1).	1	
	2. WIDTH OF BEARING (570) ACROSS OUTER RACE (DIMENSION D2).	2	
	3. WIDTH OF WARM WHEEL (585), CENTERLINE DIMENSION (DIMENSION D3).	3	
	4. ADD LINE 2 AND LINE 3 (DIMENSION D)	4	
CALCULATION OF A (FIG. 703)	5. A. UPPER HEIGHT OF BORE (DIMENSION A1).	5A	
	B. UPPER HEIGHT OF BORE (DIMENSION A2).	5B	
	C. ADD LINES 5.A. AND 5.B.	5C	
	D. DIVIDE LINE 5.C. BY TWO (2) (DIMENSION A). . . .	5D	
CALCULATION OF B (FIG. 703)	6. A. LOWER HEIGHT OF BORE (DIMENSION B1).	6A	
	B. LOWER HEIGHT OF BORE (DIMENSION B2).	6B	
	C. ADD LINES 6.A. AND 6.B.	6C	
	D. DIVIDE LINE 6.C. BY TWO (2) (DIMENSION B). . . .	6D	
CALCULATION OF C (FIG. 703)	7. ENTER QUANTITY FROM LINE 5D	7	
	8. ADD LINES 6.D. AND 7.	8	
			5.500
	9. DIVIDE LINE 8. BY TWO (2)	9	(-)
	10. SUBTRACT LINE 9. FROM 5.500 (DIMENSION C)	10	
CALCULATION OF S1 SHIM THICKNESS (FIG. 703)	11. ENTER QUANTITY FROM LINE 4.	11	(-)
	12. SUBTRACT LINE 11. FROM LINE 10. (DIMENSION S1). . .	12	
	THIS IS THE REQUIRED THICKNESS OF SHIMS (555,560, 565) TO WITHIN 0.001 INCH.		
CALCULATION OF D (FIG. 705)	13. A. FIRST READING OF DISTANCE FROM HOUSING FACE TO BEARING OUTER RACE	13A	
	B. SECOND READING OF DISTANCE FROM HOUSING FACE TO BEARING OUTER RACE	13B	
	C. ADD LINES 13.A. AND 13.B.	13C	
	D. DIVIDE LINE 13.C. BY TWO (2) (DIMENSION D) . . .	13D	

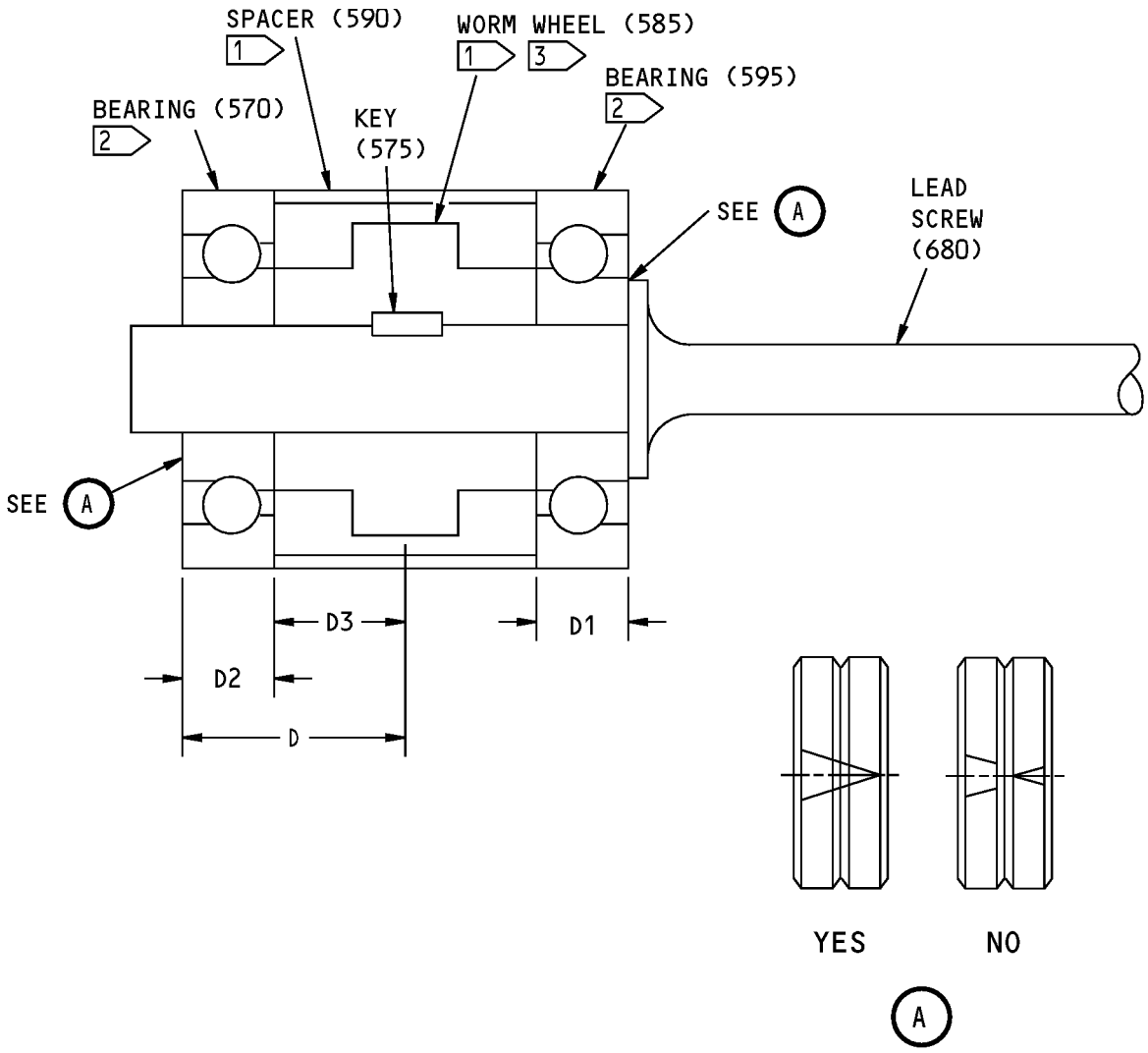
Actuator Worksheet
Figure 701 (Sheet 1 of 3)

CALCULATION OF E (FIG. 705)	14. A. FIRST READING OF DISTANCE FROM SLEEVE FACE TO BOTTOM FACE OF FITTING FLANGE.	14A	
	B. SECOND READING OF DISTANCE FROM SLEEVE FACE TO BOTTOM FACE OF FITTING FLANGE.	14B	
	C. ADD LINES 14.A. AND 14.B.	14C	
	D. DIVIDE LINE 14.C. BY TWO (2) (DIMENSION E) . . .	14D	
CALCULATION OF S2 SHIM THICKNESS (FIG. 705)	15. ENTER LINE 13.D. AMOUNT	15	(-)
	16. SUBTRACT LINE 15. FROM LINE 14.D. (DIMENSION S2). .	16	
	THIS IS THE REQUIRED THICKNESS OF SHIMS (275 THRU 295) TO WITHIN 0.001 INCH		
CALCULATION OF S3 (FIG. 706)	17. DISTANCE FROM THE SHOULDER END OF THE HANDLE ASSEMBLY (215) TO THE FLANGE OF THE BUSHING (210) (DIMENSION F)	17	
	18. SUBTRACT 0.002 FROM LINE 17. (DIMENSION S3). . . . ADJUST THE COUNTERBORE DEPTH OF THE SHIM (205) TO THE DIMENSION S3	18	
PISTON/ROD TRAVEL ADJUSTMENT (FIG. 711)	19. DISTANCE ACROSS GAGE BLOCK AND FIXTURE PIN (DIMENSION F1).	19	
			(-) 1.665
	20. SUBTRACT 1.665 FROM LINE 19.	20	
	21. MULTIPLY LINE 20. BY FORTY (40). ENTER RESULT TO NEAREST WHOLE NUMBER (DIMENSION F2)	21	
MACHINING OF STOP (FIG. 711)	22. STOP (420) DIAMETER A DEPTH, MEASURED FROM GLAND NUT CONTACT FACE (SURFACE B) (DIMENSION G).	22	
	23. DISTANCE FROM END OF GLAND NUT TO END OF PISTON (SURFACE OF ADJUSTMENT WASHER) (DIMENSION H). . . .	23	(-)
	24. SUBTRACT LINE 23. FROM LINE 22. (DIMENSION J) . . .	24	
	MACHINE MATERIAL FROM SURFACE B EQUAL TO LINE 24., TO OBTAIN DEPTH OF DIAMETER A EQUAL TO LINE 23. WITHIN 0.0005 INCH.		
RETRACTED ACTUATOR LENGTH (FIG. 711)	25. WITH MACHINED STOP IN CONTACT WITH GLAND NUT, MEASURE AND ENTER DISTANCE ACROSS GAGE BLOCK AND PIN ON FIXTURE (DIMENSION F1).	25	
			22.000
	26. ADD 22.000 TO LINE 25. (DIMENSION L).	26	

Actuator Worksheet
Figure 701 (Sheet 2 of 3)

FEEDBACK ROD ADJUSTMENT (FIGURE 712)	27. DISTANCE FROM END OF FEEDBACK ROD TO FACE OF THE GLAND NUT (150), WITH ROD FULLY RETRACTED (DIMENSION M1).	27	
	28. DISTANCE FROM END OF FEEDBACK ROD TO FACE OF THE GLAND NUT (150), WITH ROD FULLY EXTENDED (DIMENSION M2).	28	
	29. SUBTRACT LINE 27. FROM LINE 28. (STROKE N).	29	
			(–) 1.577
	30. SUBTRACT 1.577, FROM LINE 29.	30	
	31. DIVIDE LINE 30. BY TWO (2)(DIMENSION P)	31	
	TURN FEEDBACK ROD IN A DISTANCE EQUAL TO THE QUANTITY IN LINE 30.		

Actuator Worksheet
Figure 701 (Sheet 3 of 3)



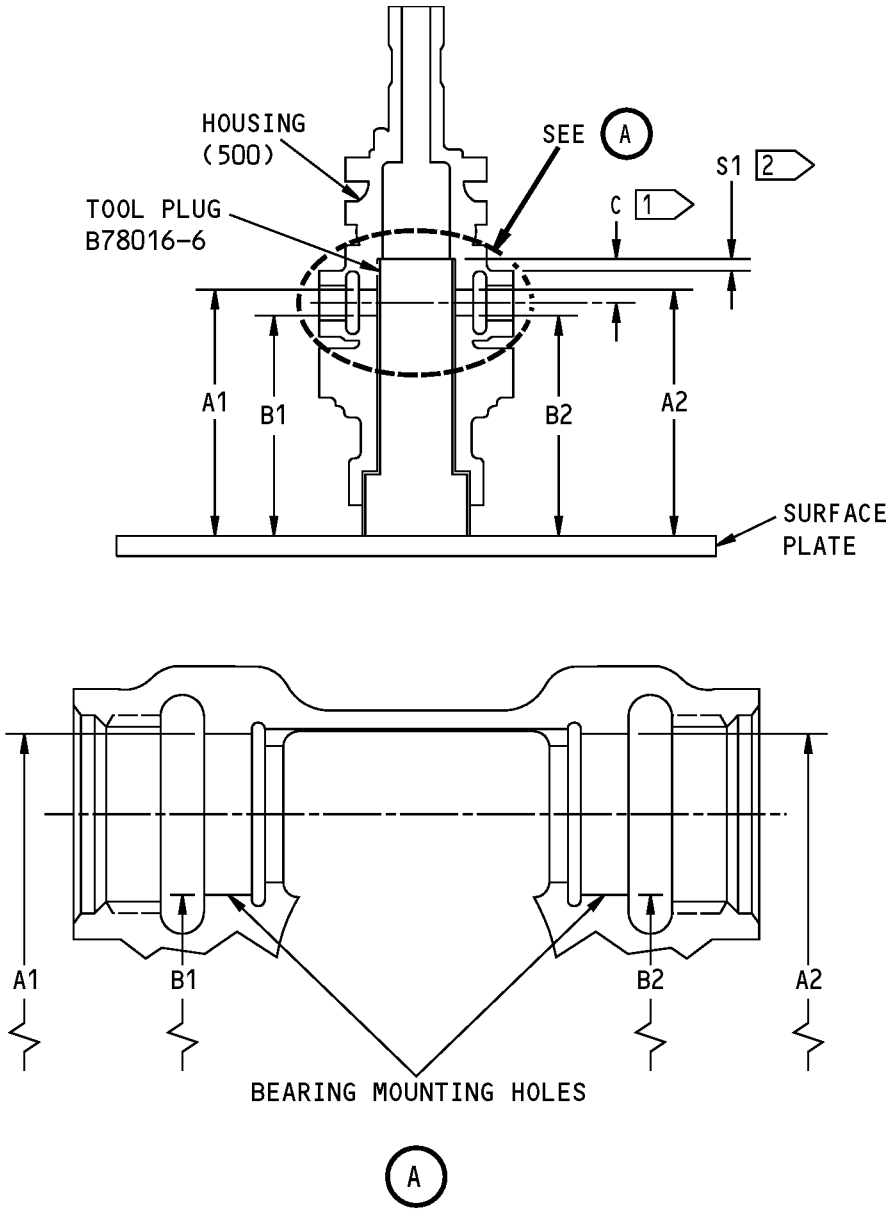
1 WORM WHEEL (585) AND THE SPACER (590) ARE A MATCHED SET

2 THE BEARING (570,595) ARE A MATCHED SET AND MUST BE INSTALLED PROPERLY.
THE BEARINGS OD IS MARKED WITH LINES THAT FORM A "V" WHEN POSITIONED PROPERLY

3 INSTALL WORM WHEEL (585) WITH ITS PART NUMBER AGAINST BEARING (570).

ITEM NUMBERS REFER TO IPL FIG. 1

Worm Wheel and Bearing Assembly
Figure 702

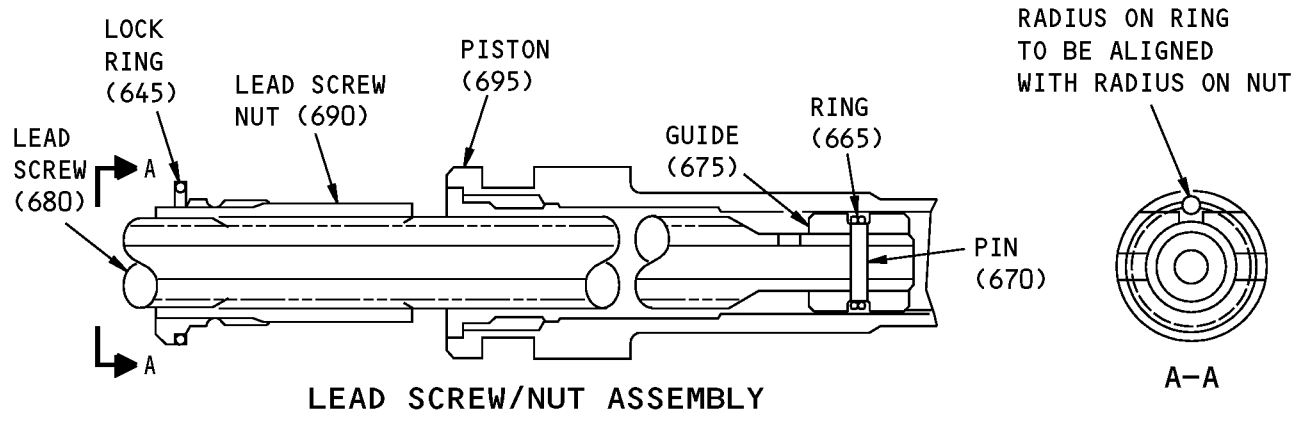


1 C = DISTANCE FROM CENTERLINE OF WORM WHEEL BEARING MOUNTING TO END OF HOUSING (500) ID.

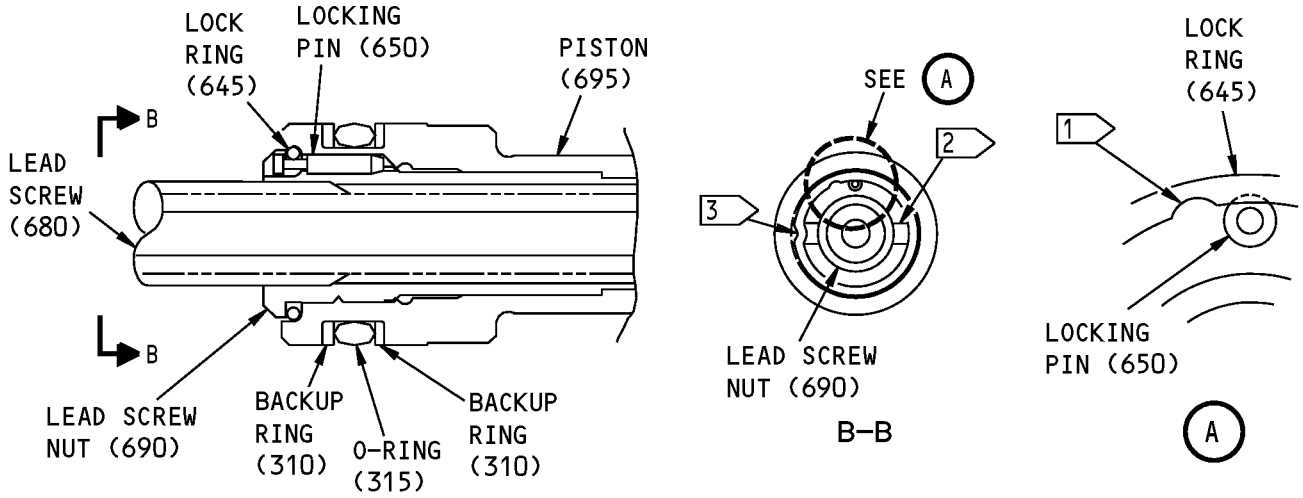
2 DIMENSION S1 IS THE REQUIRED THICKNESS OF SHIMS (555,560,565) TO THE NEAREST 0.001 INCH.

ITEM NUMBERS REFER TO IPL FIG. 1

Housing/Worm Shaft Gear Centerline Dimension
Figure 703



LEAD SCREW/NUT ASSEMBLY



PISTON/NUT ASSEMBLY

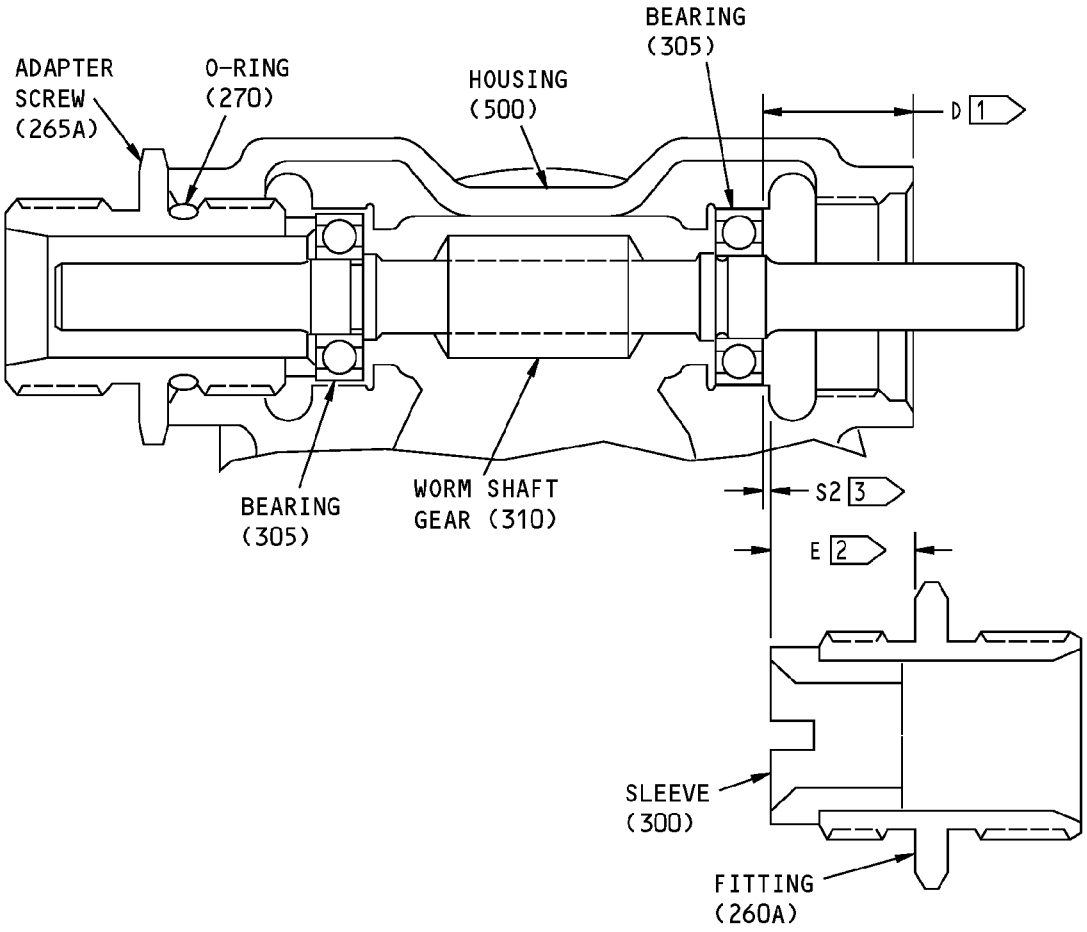
1 ROTATE THE LOCK RING UNTIL THE HALF-CIRCULAR GROOVE PASSES THE LOCKING PIN.

2 USE THE SLOT OF THE LEAD SCREW NUT TO ROTATE THE RING.

3 DEFORM LOCK RING.

ITEM NUMBERS REFER TO IPL FIG. 1

Locking Actuator Assembly
Figure 704



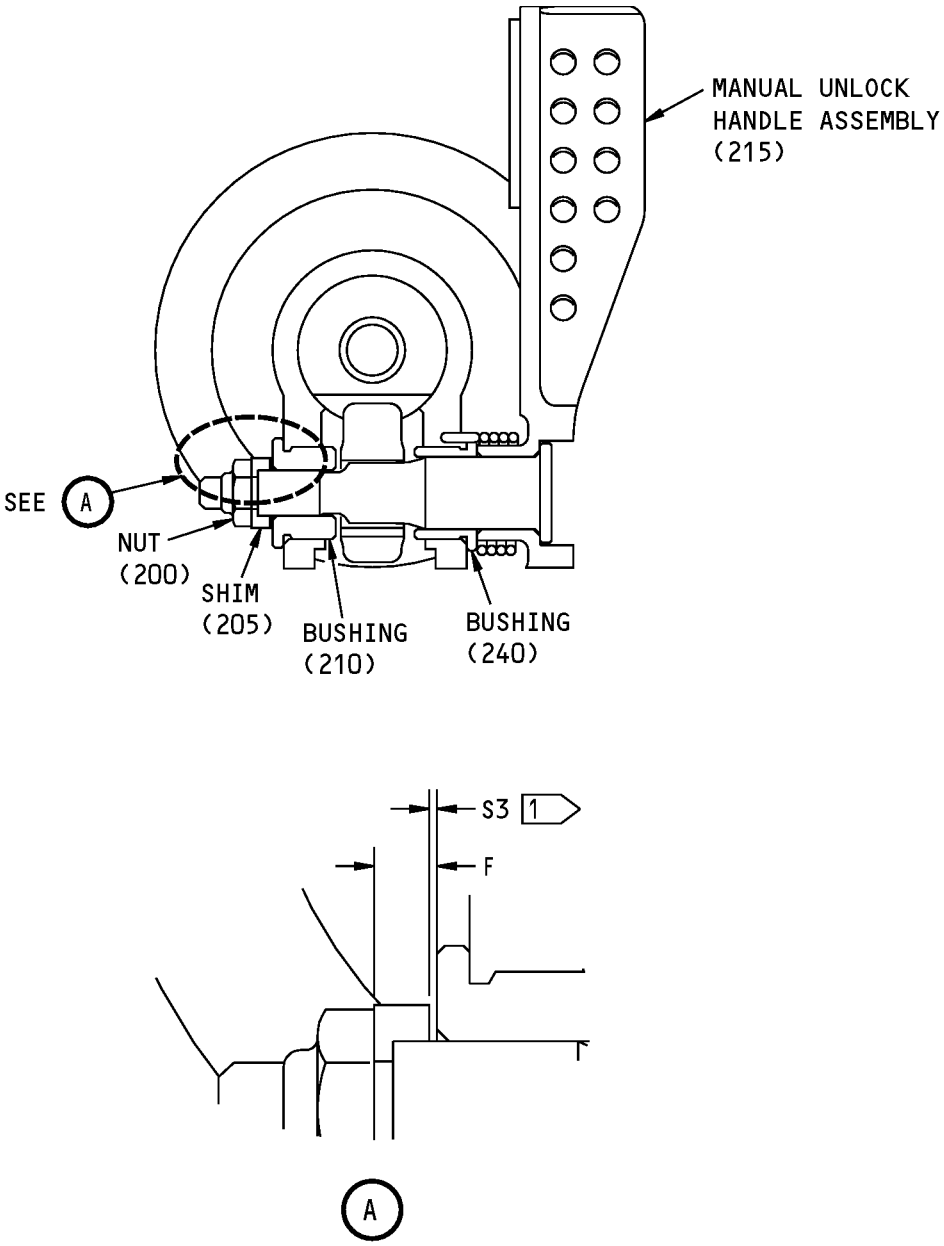
1 D = THE DISTANCE FROM THE OUTER FACE OF THE HOUSING TO THE OUTER FACE OF THE BEARING. (D WILL BE BETWEEN 0.783 AND 0.833 INCH).

2 E = THE DISTANCE FROM THE FACE OF THE SLEEVE TO THE BOTTOM FACE OF THE FLANGE OF THE FITTING. (E WILL BE BETWEEN 0.740 AND 0.760 INCH).

3 S2 = D-E
S2 = THE REQUIRED SHIM (20 THRU 40) THICKNESS TO THE NEAREST 0.001 INCH.

ITEM NUMBERS REFER TO IPL FIG. 1

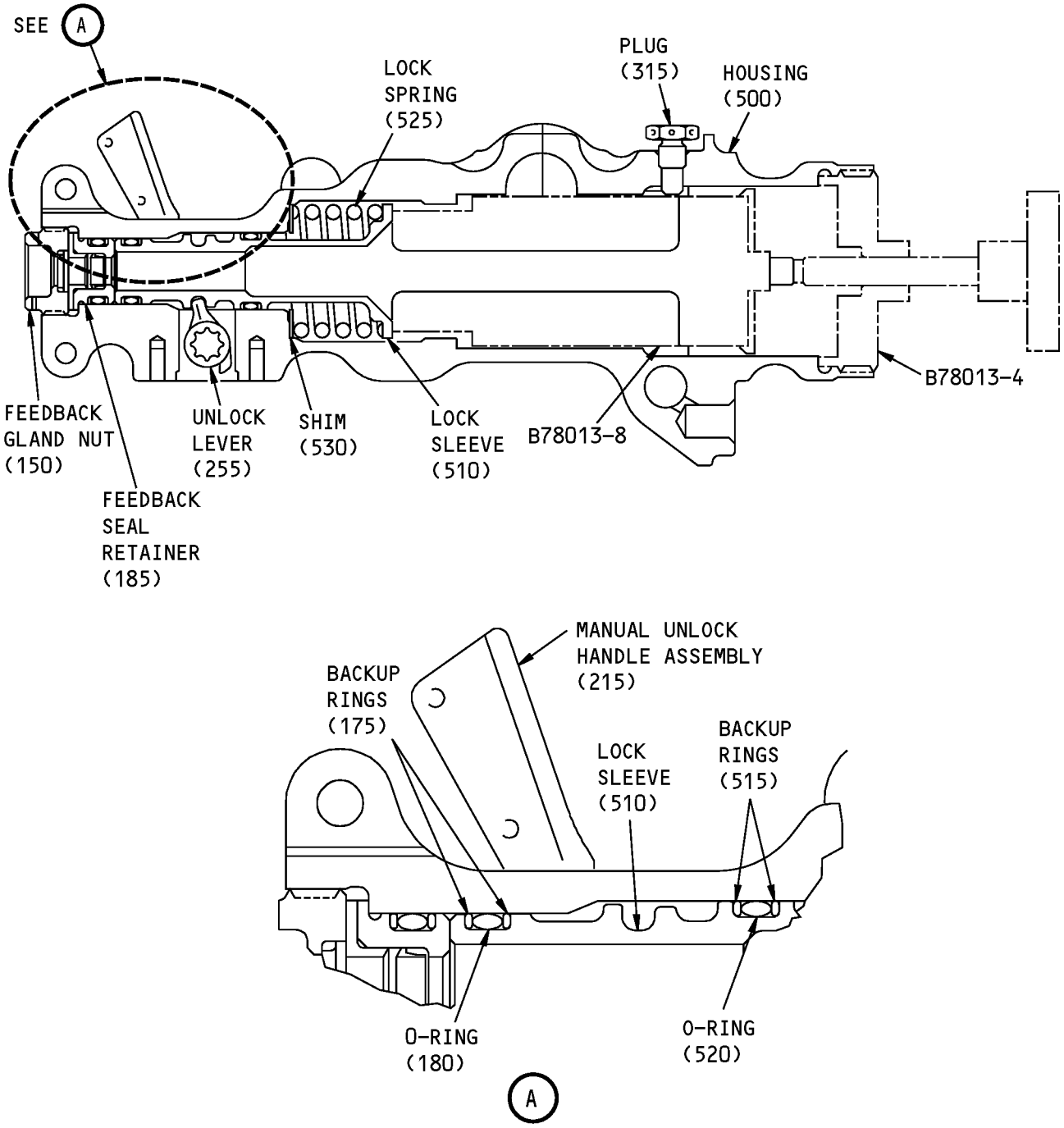
Worm Shaft Assembly/Shim Requirement
Figure 705



1 DIMENSION S3 IS THE REQUIRED SHIM THICKNESS. ADJUST COUNTERBORE DEPTH OF SHIM (205) TO DIMENSION S3.

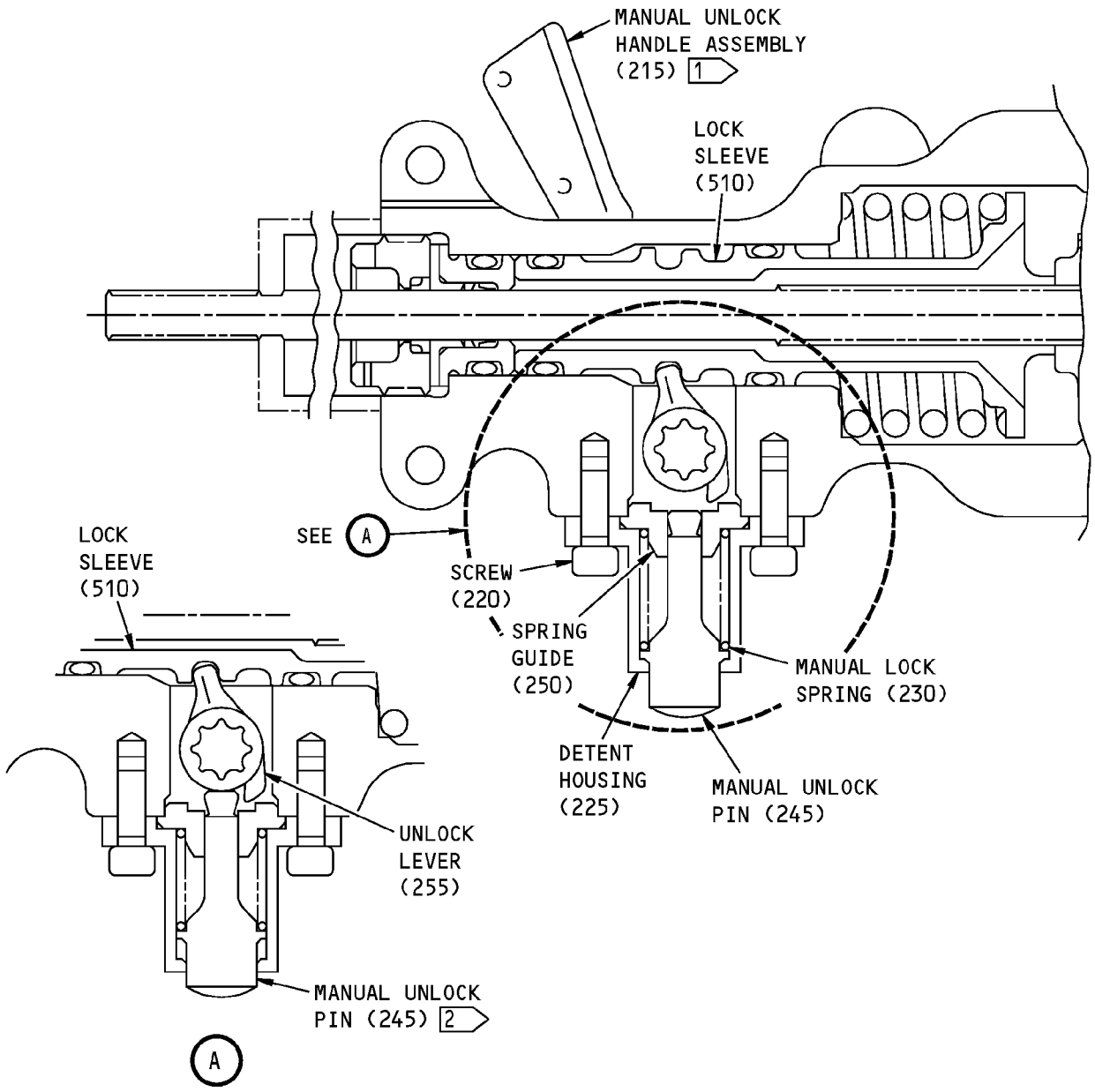
ITEM NUMBERS REFER TO IPL FIG. 1

Housing/Handle Assembly
Figure 706



ITEM NUMBERS REFER TO IPL FIG. 1

Housing/Lock Sleeve Assembly
Figure 707

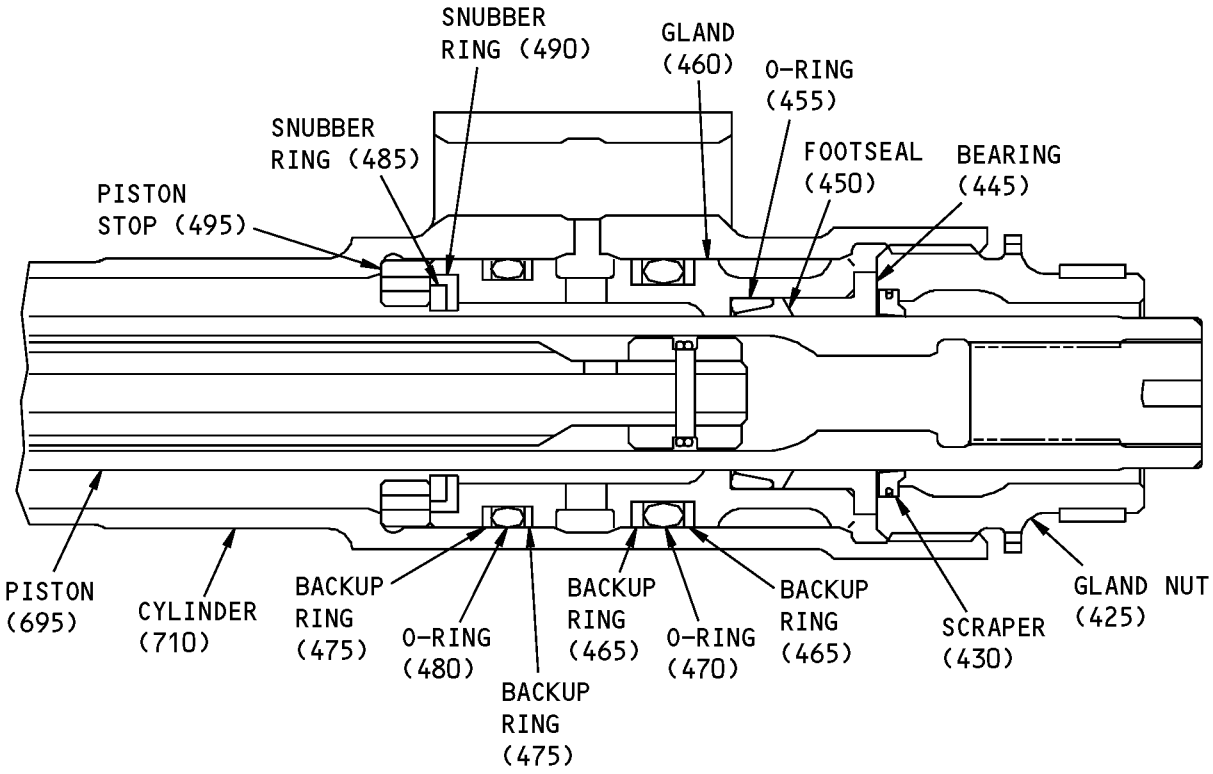


1 SHOWN IN THE UNLOCK POSITION.

2 MANUAL UNLOCK PIN (245) SHOWN IN THE LOCKED POSITION.

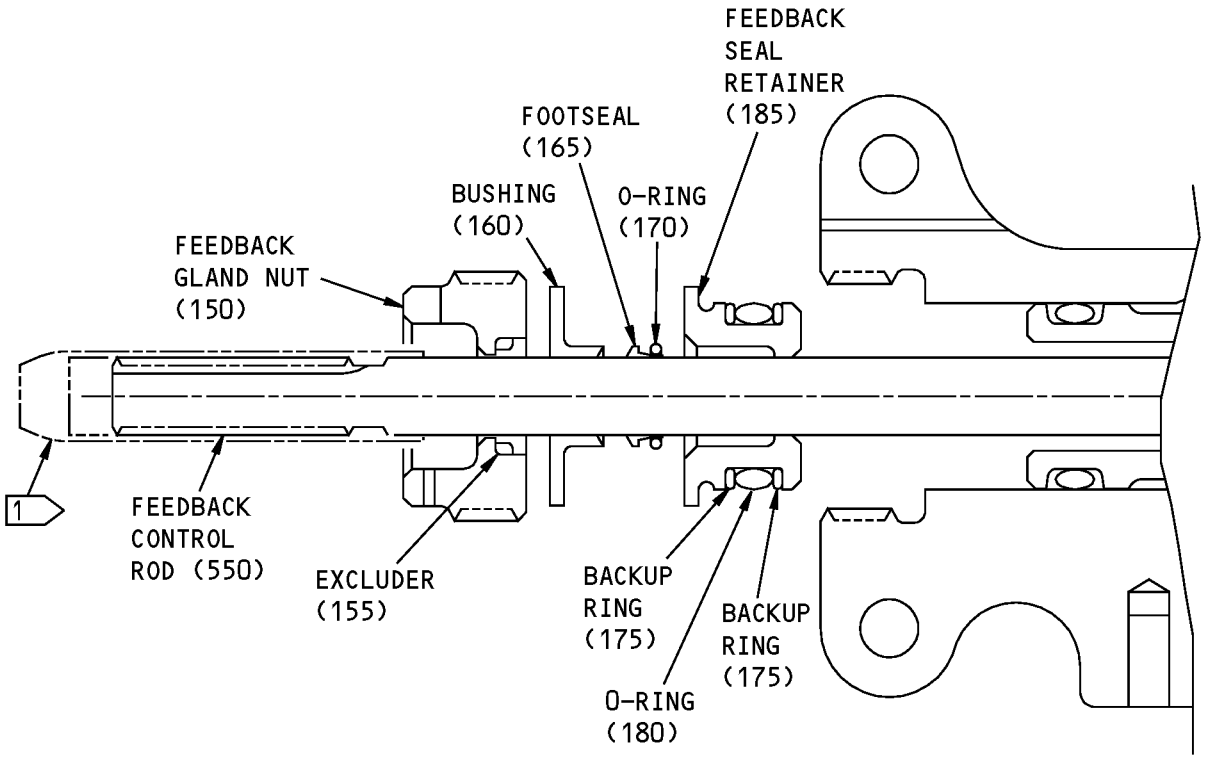
ITEM NUMBERS REFER TO IPL FIG. 1

Housing/Manual Unlock Assembly
Figure 708



ITEM NUMBERS REFER TO IPL FIG. 1

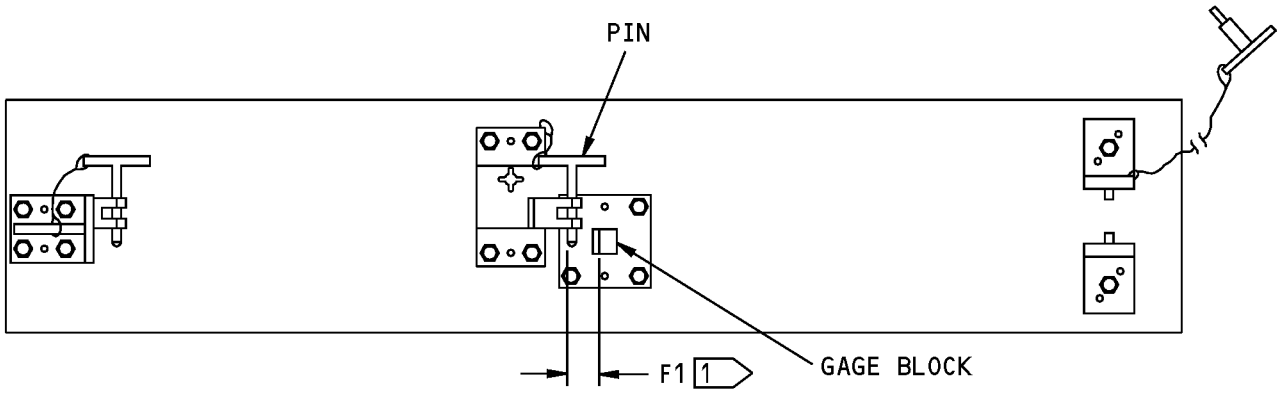
Locking Actuator Assembly
Figure 709

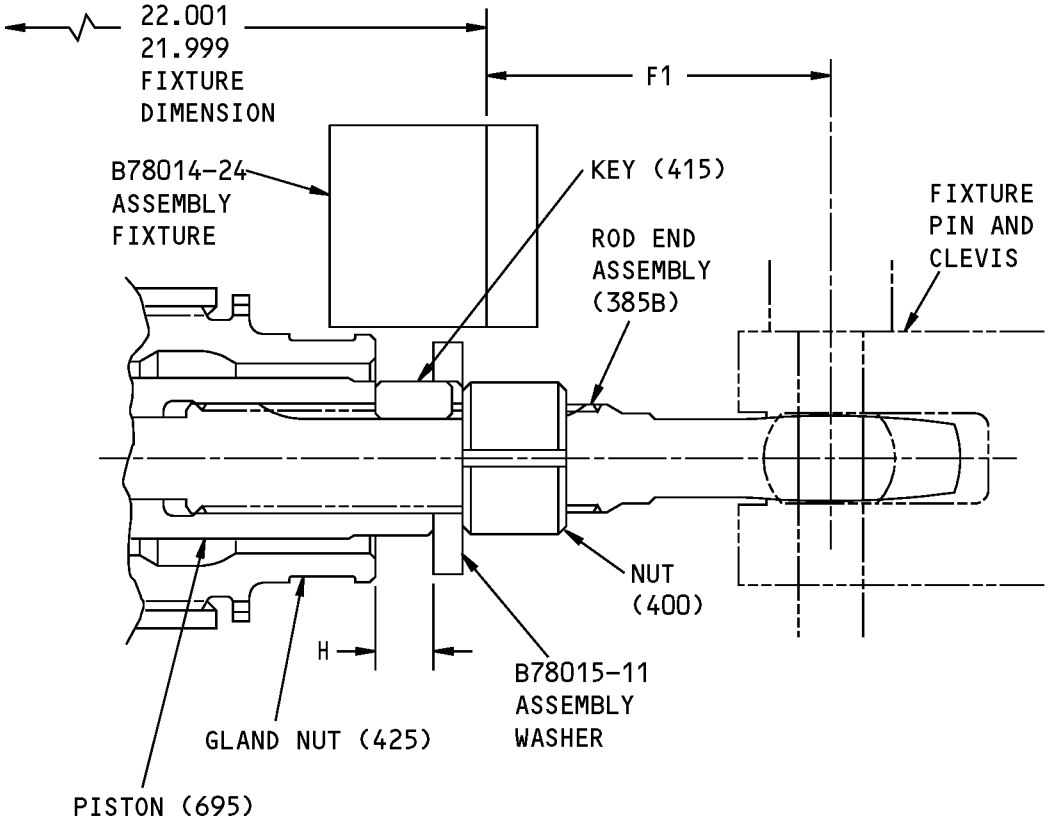


1 PUT A COVER ON THE THREADS OF THE FEEDBACK CONTROL ROD (550).

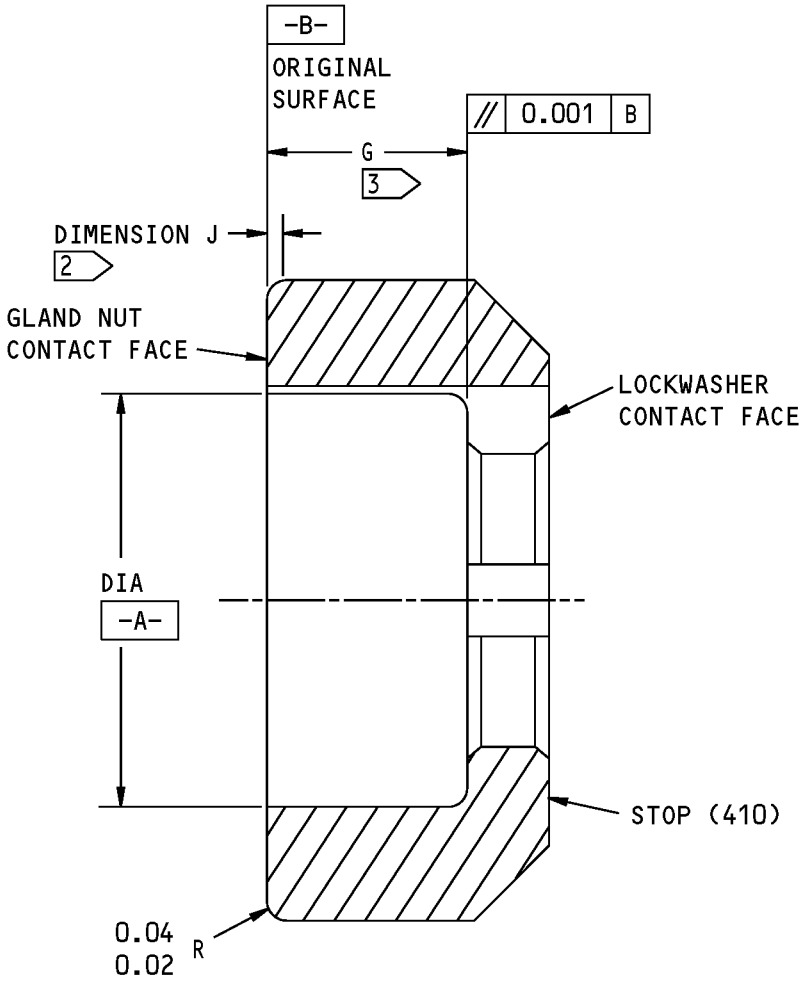
ITEM NUMBERS REFER TO IPL FIG. 1

Locking Actuator Assembly
Figure 710





Machining of Stop
Figure 711 (Sheet 1 of 2)



CAUTION: WHEN STOP (410) IS REMOVED FOR SERVICE, SURFACE -B- WILL HAVE A DIFFERENT DEPTH FROM ORIGINAL DESIGN CONFIGURATION. BECAUSE THE MACHINING WAS DONE DURING THE ASSEMBLY OF PARTS.

1 F1 = THE DISTANCE ACROSS THE GAGE BLOCK AND THE FIXTURE PIN.

2 J = G-H
J = THE AMOUNT OF MATERIAL TO REMOVE FROM SURFACE -B- (J WILL BE BETWEEN 0.023 AND 0.115 INCH).

3 G = DEPTH OF DIAMETER -A- FROM SURFACE -B-.

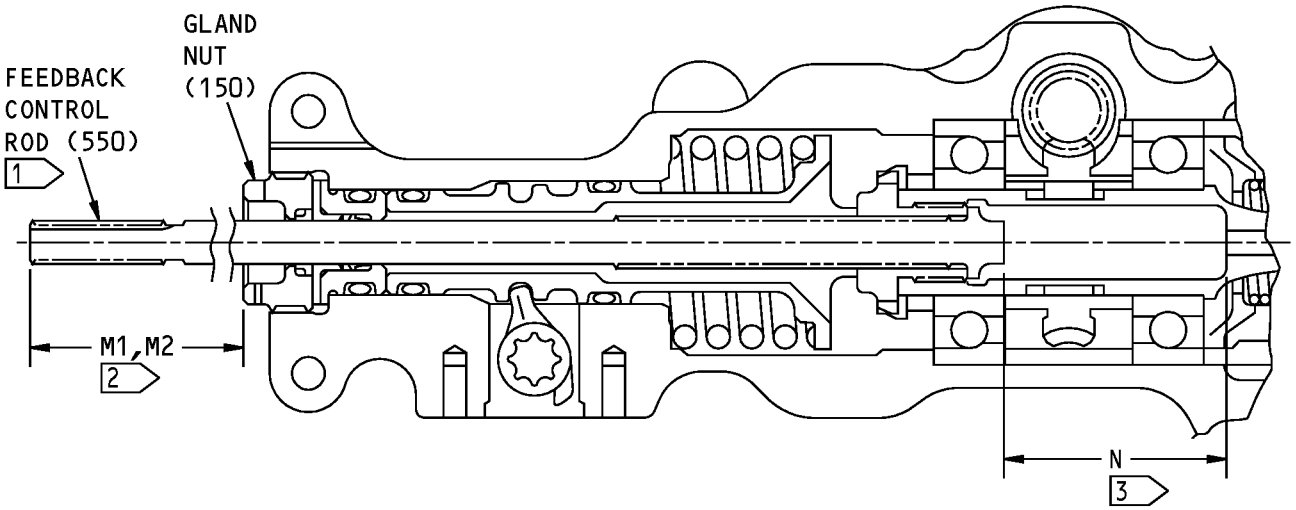
125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

Machining of Stop
Figure 711 (Sheet 2 of 2)



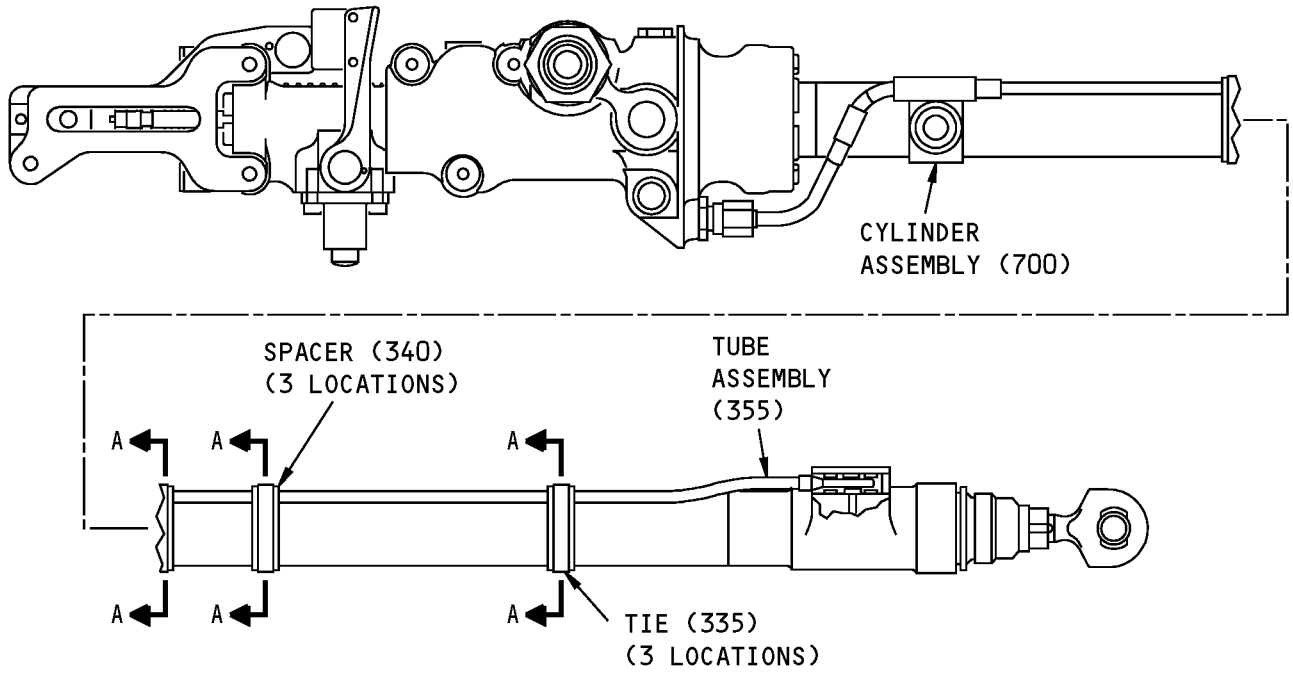
1 FEEDBACK CONTROL ROD (550) SHOWN IN FULLY RETRACTED POSITION.

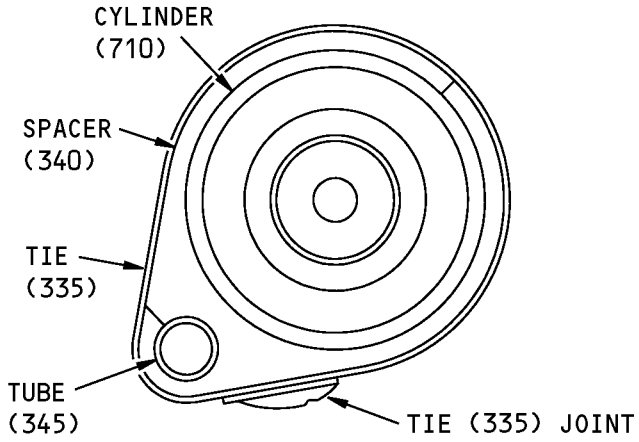
ITEM NUMBERS REFER TO IPL FIG. 1

2 M1 = DISTANCE FULLY RETRACTED.
M2 = DISTANCE FULLY EXTENDED.
M1,M2 = DISTANCE FROM THE END OF FEEDBACK ROD (550) TO THE FACE OF THE GLAND NUT (150).

3 N = M2–M1
N = STROKE OF FEEDBACK ROD (550).

Feedback Rod Stroke Clearance
Figure 712

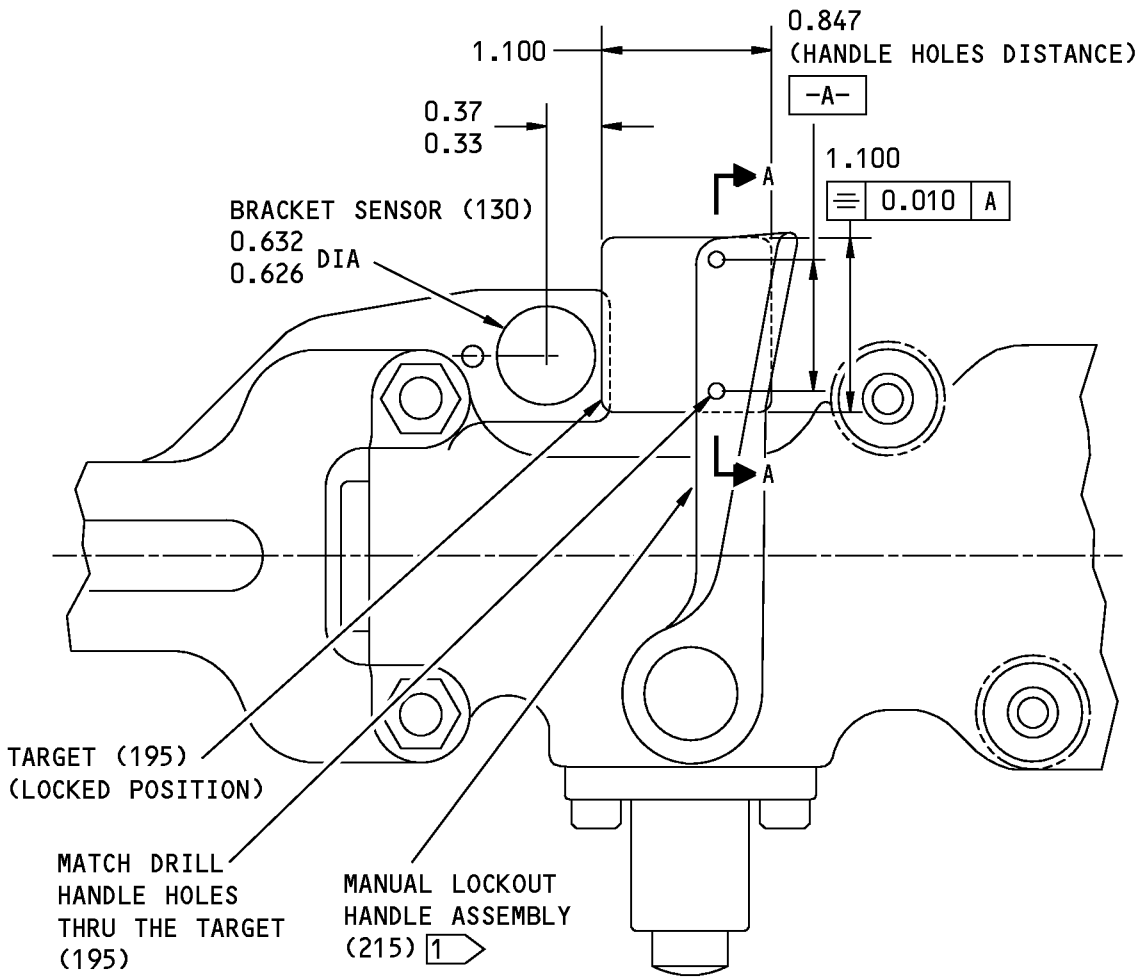


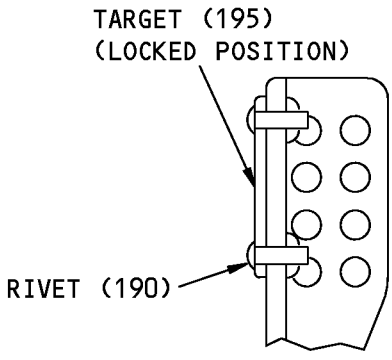


A–A

ITEM NUMBERS REFER TO IPL FIG. 1

Locking Actuator Assembly
Figure 713

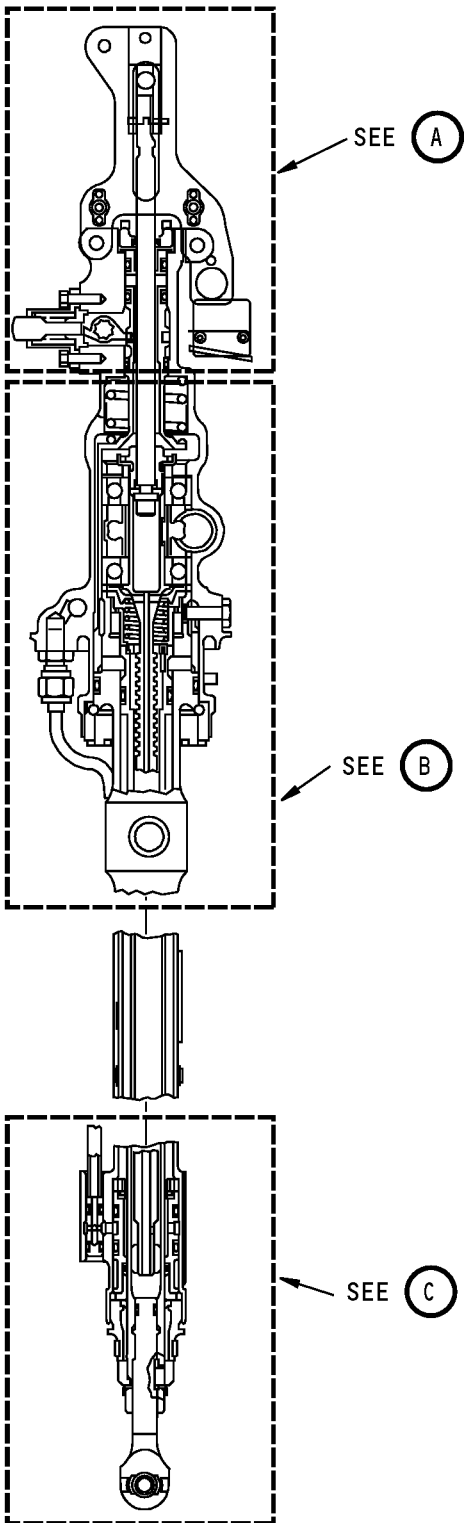




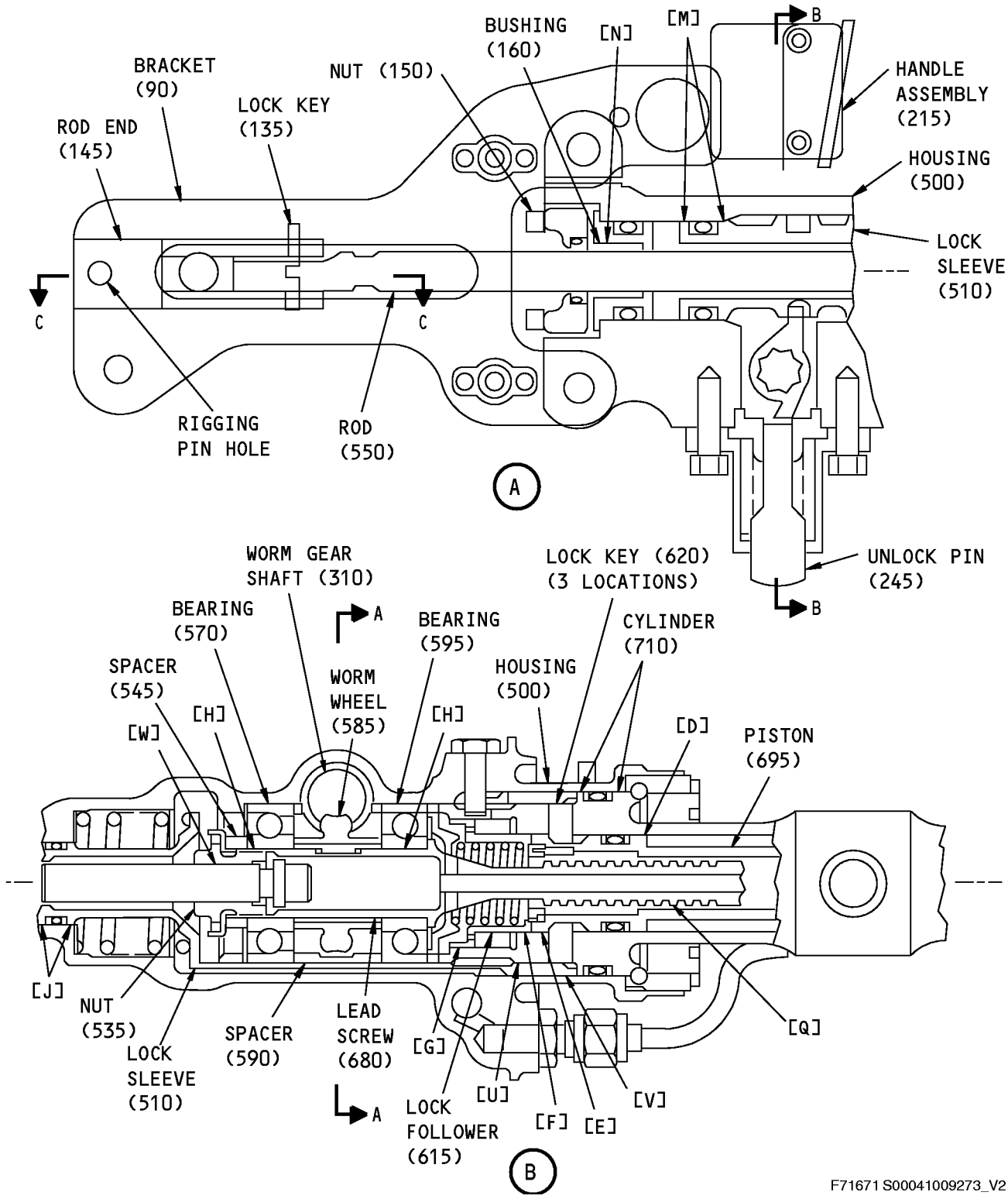
A–A

1 APPROXIMATELY PERPENDICULAR WITH ACTUATOR CENTERLINE WHEN PISTON IS IN FULLY LOCKED POSITION.

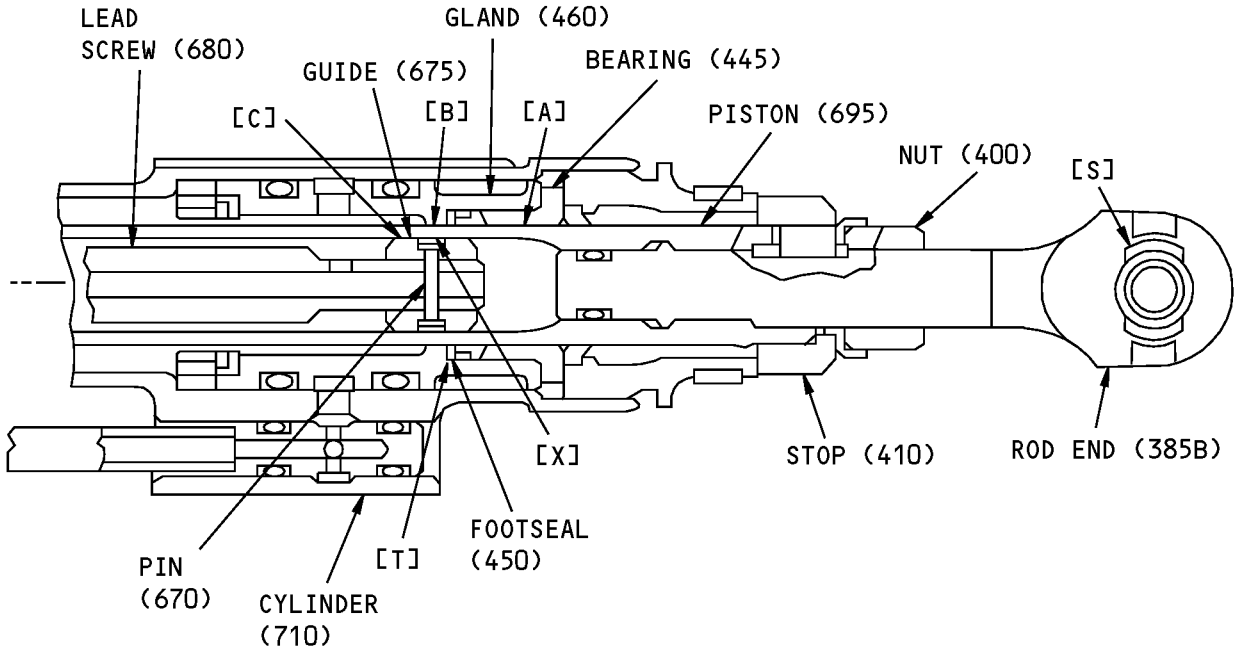
Target Installation
Figure 714

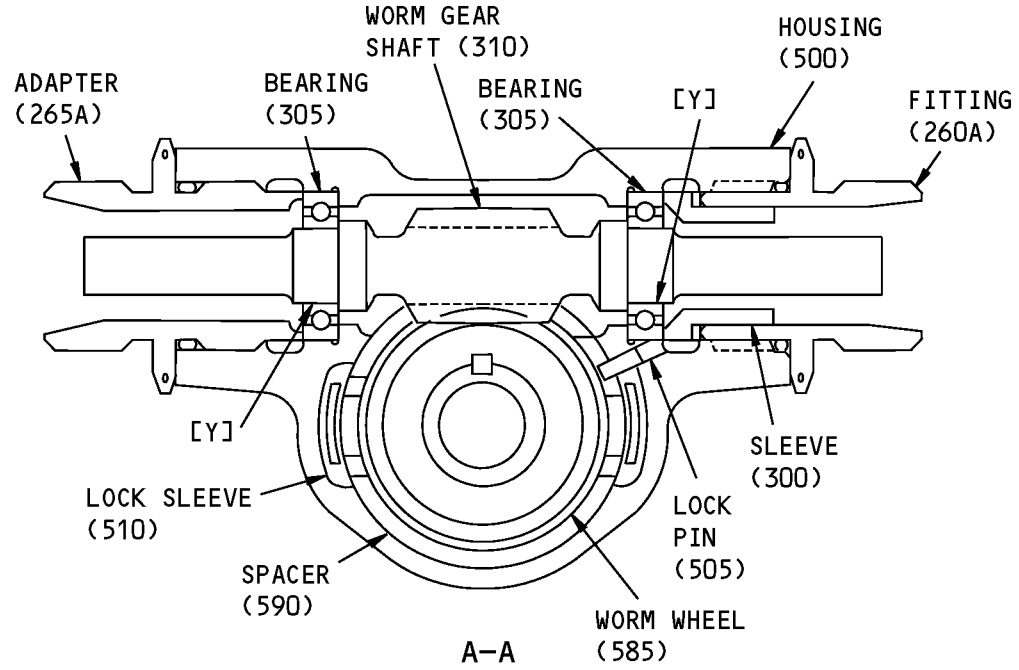


Fits and Clearances
Figure 801 (Sheet 1 of 7)

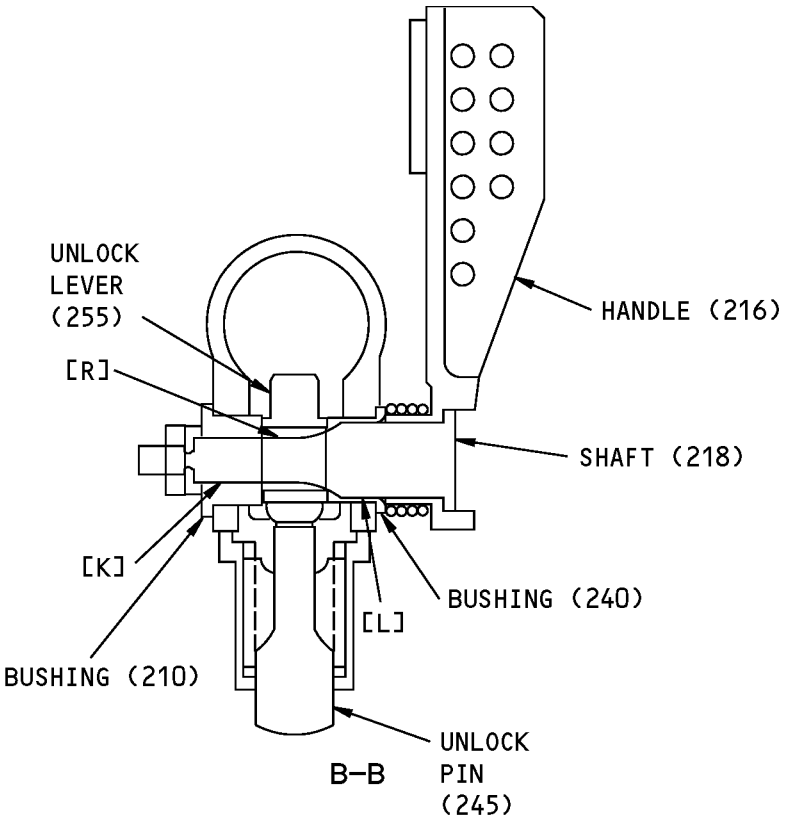


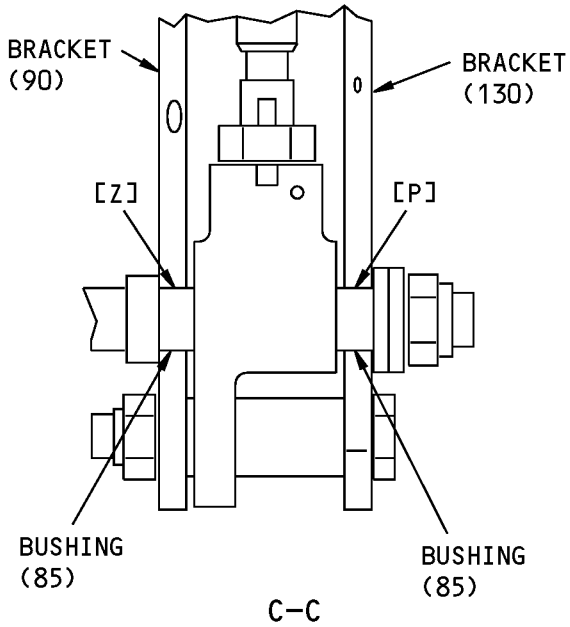
Fits and Clearances
Figure 801 (Sheet 2 of 7)





Fits and Clearances
Figure 801 (Sheet 3 of 7)





Fits and Clearances
Figure 801 (Sheet 4 of 7)

REF LETTER	REF IPL FIG. 1, MATING ITEM NO.	DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
		DIMENSION		ASSEMBLY CLEARANCE		DIMENSION		MAXIMUM CLEARANCE
		MIN	MAX	MIN	MAX	MIN	MAX	
[A]	ID 445 OD 695	0.750 0.746	0.751 0.748	0.002	0.005	0.745	0.755	0.01
[B]	ID 460 OD 695	0.750 0.746	0.751 0.748	0.002	0.005	0.745	0.755	0.01
[C]	ID 695 OD 675	0.557 0.548	0.560 0.552	0.005	0.012	0.525	0.570	0.045
[D]	ID 710 OD 695	1.116 1.113	1.118 1.114	0.002	0.005	1.110	1.121	0.011
[E]	ID 710 OD 695	1.116 1.111	1.118 1.112	0.004	0.007	1.110	1.121	0.011
[F]	ID 710 OD 615	1.116 1.113	1.118 1.114	0.002	0.005	1.110	1.121	0.011
[G]	ID 710 OD 615	1.500 1.497	1.502 1.498	0.002	0.005	1.494	1.505	0.011
[H]	ID 570,595 OD 680	0.7870 0.7870	0.7874 0.7874	-0.0004	0.0004	0.785	0.788	0.004
[J]	ID 500 OD 510	0.925 0.922	0.927 0.923	0.002	0.005	0.919	0.930	0.011
[K]	ID 210 OD 218	0.2760 0.2746	0.2770 0.2750	0.0010	0.0024	0.270	0.280	0.010
[L]	ID 240 OD 218	0.4375 0.4369	0.4390 0.4374	0.0001	0.0021	0.433	0.442	0.009

* ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 5 of 7)

REF LETTER	REF IPL FIG. 1, MATING ITEM NO.	DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
		DIMENSION		ASSEMBLY CLEARANCE		DIMENSION		MAXIMUM CLEARANCE
		MIN	MAX	MIN	MAX	MIN	MAX	
[M]	ID 500 OD 510	0.800 0.797	0.802 0.798	0.002	0.005	0.794	0.805	0.011
[N]	ID 160 OD 550	0.311 0.309	0.312 0.310	0.001	0.003	0.306	0.315	0.009
[P]	ID 130 (1) OD 85	0.4420 0.4365	0.4470 0.4370	0.0050	0.105	0.416	0.487	0.071
[Q]	ID 690 OD 680	0.448 (2) 0.440 (2)	0.452 (2) 0.444 (2)	0.0011 (3)	0.0033 (3)	(4)	(5)	0.020 (3)
[R]	ID 255 OD 218	0.0654 (6) 0.0630 (6)	0.0678 (6) 0.0654 (6)	0.0000 (3)	0.0048 (3)	0.060	0.072	0.012 (3)
[S]	ID 395A OD 390A	0.7185 0.7174	0.7190 0.7179	0.0006	0.0016			
[T]	ID 450 OD 695	0.742 0.746	0.745 0.748	-0.001	-0.006	0.745	0.746	0.001
[U]	ID 510 OD 710	1.860 1.848	1.864 1.849	0.011	0.016	1.845	1.867	0.022
[V]	ID 500 OD 510	2.118 2.105	2.120 2.109	0.009	0.015		2.123	
[W]	ID 535 OD 550	0.3479 (2) 0.3450 (2)	0.3516 (2) 0.3479 (2)	0.0000 (3)	0.0019 (3)	(4)	(5)	0.004 (3)

* ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 6 of 7)

REF LETTER	REF IPL FIG. 1, MATING ITEM NO.	DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
		DIMENSION		ASSEMBLY CLEARANCE		DIMENSION		MAXIMUM CLEARANCE
		MIN	MAX	MIN	MAX	MIN	MAX	
[X]	ID 675	0.093	0.095	0.001	0.005		0.105	0.020
	OD 670	0.090	0.092			0.085		
[Y]	ID 305	0.4721	0.4724	-0.0005	0.0001		0.473	0.004
	OD 310	0.4723	0.4726			0.470		
[Z]	ID 90 [1]	0.4425	0.4475	0.0045	0.1100		0.487	0.071
	OD 85	0.4365	0.4370			0.416		

* ALL DIMENSIONS ARE IN INCHES

[1] WIDTH OF SLOT IN BRACKET

[2] PITCH DIAMETER

[3] AXIAL BACKLASH

[4] MINUS 10% FLANKWEAR

[5] PLUS 10% FLANKWEAR

[6] CIRCULAR SPACE WIDTH

Fits and Clearances
Figure 801 (Sheet 7 of 7)

REF IPL		NAME	TORQUE*	
FIG. NO.	ITEM NO.		POUND-INCHES	POUND-FEET
1	5,95	Screw	27-30	
1	40	Nut	50-60	
1	45	Nut	100-125	
1	55,200	Nut	20-30	
1	140	Nut	75-85	
1	150	Nut	425-475	
1	260A	Fitting	1140-1200	
1	265A	Screw	1140-1200	
1	315	Plug	50-60	
1	325	Union	125-155	
1	400	Nut	600-800	
1	425	Nut	800-1000	
1	535	Nut	500-700	
1	660	Nut	2900-3100	

* REFER TO SOPM 20-50-01 FOR TORQUE VALUES OF STANDARD FASTENERS.

Torque Table
Figure 802

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. General

A. This section lists the special tools, fixtures, and equipment necessary for maintenance.

NOTE: Equivalent substitutes may be used.

Special Tools

Reference	Description	Part Number	Supplier
SPL-5359	Test Fixture - Rod End and Stroke Stop, Locking and Non-Locking Thrust Reverser Actuator	B78014-37 Opt: B78014-29	81205 81205
SPL-6255	Wrench (B78008-7 is included in B78008-19)	B78008-7	81205
SPL-6257	Wrench (B78008-5 is included in B78008-19)	B78008-5	81205
SPL-6259	Wrench (B78008-10 included in B78008-19)	B78008-10	81205
SPL-6260	Wrench (B78008-12 included in B78008-19)	B78008-12	81205
SPL-6272	Plug (B78016-6 is included in B78016-1)	B78016-6	81205
SPL-6273	Sleeve (B78016-5 inlcuded in Overhaul Set B78016-1)	B78016-5	81205
SPL-6274	Cap (B78016-3 is included in B78016-1)	B78016-3	81205
SPL-6275	Overhaul Set - T/R Locking & Non-Locking Actuator Assy	B78016-1	81205
SPL-6280	Test Equipment - Velocity/Position Transducer	B20005-82 Opt: B20005-75	81205 81205
SPL-6281	Stand - Test, Functional	B78010-28	81205
SPL-6284	Fixture - Torque, Locking and Non-Locking Thrust Reverser Acutator Assembly	B78011-25	81205
SPL-6373	Transducer Assembly - Velocity/Position	B20005-41	81205
SPL-7292	Adapter - Worm Gear Shaft (B78016-9 is included in B78016-1)	B78016-9	81205
SPL-7336	Wrench (B78008-9 is included in B78008-19)	B78008-9	81205
SPL-7341	Spanner Wrench - Nut, Cylinder Locking Actuator (B78008-17 included in B78008-19)	B78008-17	81205
SPL-7356	Alignment Sleeve - Lead Screw (B78008-11 included in B78008-18)	B78008-11	81205
SPL-7373	Plate - Disassembly (B78015-8 is included in B78015-17 and -23)	B78015-8	81205

Special Tools (Continued)

Reference	Description	Part Number	Supplier
SPL-7405	Alignment Tool - Clevis (B78015-2 is included in B78015-17 and -23)	B78015-2	81205
SPL-7406	Washer - Stop Adjustment, Thrust Reverser (B78015-11 is included in B78015-17 and -23)	B78015-11	81205
SPL-7407	Wrench - Nut Gland (B78008-5 included in T/R Actuator Wrench Set B78008-18)	B78008-5	81205
SPL-7471	Spacer - Locking Actuator Assembly (B78013-9 is included in B78013-1 & -2)	B78013-9	81205
SPL-7473	Spacer - Locking Actuator Assembly (B78013-8 is included in B78013-1 & -2)	B78013-8	81205
SPL-7475	Holder - Feedback Lever (B78013-3 is included in B78013-1 & -2)	B78013-3	81205
SPL-7477	Assembly - Test Stand (B78014-30 included in Test Fixture B78014-37)	B78014-30	81205
SPL-7480	Rigging Bar - Thrust Reverser, Position Feedback LVDT	B78006-1	81205
SPL-7520	Locator Assembly - Proximity Switch (B78015-28 included in Overhaul Set B78015-17 and -23)		
SPL-7523	Sleeve (B78015-10 included in Overhaul Set B78015-17 and -23)		
SPL-7554	Plate - Assembly (B78015-7 is included in B78015-17 and -23)	B78015-7	81205
SPL-7557	Cap (B78015-21 included in Overhaul Set B78015-17 and -23)		

Commercial Tools

Reference	Description	Part Number	Supplier
COM-4950	Installation Tool - Cable Tie,	GS4MT	06383
		PPTMT	06383
		ST2MT	06383

Tool Supplier Information

CAGE Code	Supplier Name	Supplier Address
06383	PANDUIT CORP.	17301 S. RIDGELAND AVE. TINLEY PARK, IL 60477-3048 Telephone: 800-777-3300 Facsimile: 708-532-1811 www.panduit.com
81205	THE BOEING COMPANY	17930 INTERNATIONAL BLVD. SOUTH SEATAC, WA 98188-4321 Telephone: 206-662-6650 Facsimile: 206-662-7145

ILLUSTRATED PARTS LIST

1. Introduction

A. The Illustrated Parts List (IPL) contains an illustration and a list of component parts you can repair or replace. The Illustrated Parts Catalog (IPC) shows how to use the Boeing part number system.

B. This shows how parts are related: The relation of each item to its next higher assembly (NHA) is shown in the NOMENCLATURE column. Use the indenture system that follows:

1 2 3 4 5 6 7

. Assembly

. Attaching parts for assembly

. . Detail parts for assembly

. . Subassembly

. . Attaching parts for subassembly

. . . Detail parts for subassembly

. . . Sub-subassembly

. . . Attaching parts for subassembly

. . . . . Details parts for sub-subassembly

Detail Installation Parts (Included only if installation parts may be sent to the shop as part of assembly)

C. Each top assembly is given one use code letter (A, B, C, etc.) in the USAGE CODE column. All subsequent component parts in the list can have one or more of the use code letters to show effectivity to top assemblies. A component part without a use code applies to all top assemblies.

D. An alphabetical letter is added after the item number for optional parts, parts changed by a Service Bulletin, configuration differences (except left-handed and right-handed parts), last engineering releases, and parts added between item numbers in a sequence. The alphabetical letter will not be shown on the illustration for equivalent parts of the same part number.

E. Color-coded parts are identified with a single digit alpha following the dash number or with ''SP'' suffix. If the ''SP'' suffix is used, it represents consolidation of all color codes applicable for a given usage which are not separately listed. Orders for color-coded parts should include the registry number of the airplane for which the parts are ordered.

F. If a part number is 15 characters long but will not fit in the part number column, the part number will be displayed with a ''~'' at the end of the line and will be continued on the next line. The ''~'' denotes that the part number continues on the next line.

G. Parts changed by a Service Bulletin are shown by PRE SB XXXX and POST SB XXXX added to the NOMENCLATURE column.

(1) When a new top assembly is added by a Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the top assembly level only. The configuration differences at the detail part level are shown by use code letters.

(2) When the top assembly part number is not changed by the Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the detail level.

H. Interchangeable Parts

Optional (OPT)	The part is optional to and interchangeable with other parts that have the same item number.
Replaces, Replaced by and not interchangeable with (REPLACES, REPLACED BY AND NOT INTCHG/W)	The part replaces and is not interchangeable with the initial part.
Replaces, Replaced by (REPLACES, REPLACED BY)	The part replaces and is interchangeable with, or is an alternative to, the initial part.

VENDOR CODES

Code	Name
01673	AIRDROME PRECISION COMPONENTS 3251 E AIRPORT WAY LONG BEACH, CALIFORNIA 90806-2407 FORMERLY AIRDROME PARTS CO
02107	FLOUROCARBON CO OHIO DIV DOVER, OHIO 44622 CANCELLED NO REPLACEMENT FORMERLY SPARTA MANUFACTURING CO
02886	DODGE-WASMUND MFG CO INC 9607 BEVERLY ROAD PICO RIVERA, CALIFORNIA 90660-2136
06383	PANDUIT CORPORATION 17301 RIDGELAND AVENUE TINLEY PARK, ILLINOIS 60477-3048
07128	TETRAFLUOR INC 2051 EAST MAPLE AVENUE EL SEGUNDO, CALIFORNIA 90245-5009 FORMERLY ROYAL IND TETRAFLUOR DIV V0667B ENGLEWOOD CALIF
08199	SIERRACIN CORPORATION DBA HARRISON 3020 EMPIRE AVENUE BURBANK, CALIFORNIA 91504-3109 FORMERLY TECHNICAL IND INC OR HARRISON MFG CO DIV AXIAL CORP

Code	Name
08524	Replaced: [V08524] DEUTSCH FASTENER CORP SEE CODE V97928 Replaced: [V97928] SEE V17446 HUCK INTL by Code: Name and Address below 17446: HUCK INTL INC AEROSPACE FASTENER DIV 900 WATSON CENTER ROAD CARSON, CALIFORNIA 90745-4201 FORMERLY V32134 REXNORD INC; FORMERLY V97928 HUCK INTL Referenced in FORMERLY line below [17419] DEUTSCH COMPANY THE WELLS FARGO BANK BLDG 2444 WILSHIRE BLVD #600 SANTA MONICA, CALIFORNIA 90403 FORMERLY DEUTSCH FASTENER CORP V08524 FORMERLY IN LOS ANGELES
09257	BUSAK AND SHAMBAN INC SEALS DIV 2531 BREMER DR PO BOX 176 FORT WAYNE, INDIANA 46801 FORMERLY SHAMBAN, W S AND CO
11328	Replaced: [V11328] AEROQUIP SEE EATON AEROQUIP V00624 LINAIR ENG A TELEDYNE CO SEE TELEDYNE LINAIR ENGINEERING TELEDYNE INC SEE LINAIR ENGINEERING TELEDYNE LINAIR ENG SEE AEROQUIP CORP LINAIR DIV by Code: Name and Address below 00624: EATON AEROQUIP INC ENGINEERED SYSTEMS DIV 300 S EAST AVE JACKSON, MICHIGAN 49203-1972 FORMERLY AEROQUIP ELBEE PLANT V99879 OR WESTERN PLANT V70128; FORMERLY AEROQUIP AEROSP DIV JACKSON PLANT; FORMERLY V11328 AEROQUIP LINAIR DIV
11815	CHERRY AEROSPACE FASTENERS DIV OF TEXTRON 1224 EAST WARNER AVENUE PO BOX 2157 SANTA ANA, CALIFORNIA 92707-0157 FORMERLY IN LOS ANGELES, CALIF , FORMERLY CHERRY FASTENERS TOWNSEND DIV OF TEXTRON INC V71087
14798	DEUTSCH CO METAL COMPONENTS DIV 14800 SOUTH FIGUEROA STREET GARDEN, CALIFORNIA 90248-1795 FORMERLY WEATHERHEAD V79470 FOR AEROSPACE PROD V 61498 DEUSCH CO THE DEUTSCH AEROSPACE FITTINGS CO DIV

Code	Name
15653	ALCOA GLOBAL FASTENERS INC DIV KAYNAR PRODUCTS 800 S STATE COLLEGE BLVD FULLERTON, CALIFORNIA 92831-3001 FORMERLY VK6405 MICRODOT AEROSP LTD; FORMERLY KAYNAR TECH FORMERLY FAIRCHILD FASTENERS KAYNAR DIV
21335	TIMKEN US CORPORATION DIV FAFNIR 336 MECHANIC STREET LEBANON, NH 03766-0267 FORMERLY FAFNIR BRG AND TEXTRON INC FAFNIR DIV IN NEW BRITAIN, CONNECTICUT ; FORMERLY TORRINGTON CO THE SPECIAL PRODUCTS DIV SUB OF THE INGERSOLL-RAND CO V8D210 FORMERLY TORRINGTON CO FAFNIR BEARING DIV IN TORRINGTON, CT
21760	SCHATZ BEARING CORP 10 FAIRVIEW AVENUE PO BOX 1191 POUGHKEEPSIE, NEW YORK 12601-1312 FORMERLY FEDERAL BRG CO AND SCHATZ MFG CO V53268 FORMERLY SCHATZ MFG CO
22863	KAVLICO CORP INC 14501 LOS ANGELES AVENUE MOORPARK, CALIFORNIA 93021 FORMERLY IN VAN NUYS AND CHATSWORTH, CALIFORNIA
26303	GREENE TWEED IND INC ADVANTEC DIV 7101 PATTERSON DRIVE PO BOX 5037 GARDEN GROVE, CALIFORNIA 92645-5037 FORMERLY OHIO AIRCRAFT SUPPLIES INC IN INGLEWOOD, CALIFORNIA FORMERLY ADVANTEC DIV OF IFP INC, LOS ANGELES, CA V5P801
26879	CORONADO MFG INC 11069 PENROSE AVENUE SUN VALLEY, CALIFORNIA 90352-2722 FORMERLY CORONADO PLASTICS INC IN BURBANK, CALIFORNIA
30974	AEROFIT PRODUCTS INC 6460 DALE STREET BUENA PARK, CALIFORNIA 90621-3115

Code	Name
38443	MRC BEARINGS 402 CHANDLER STREET JAMESTOWN, NEW YORK 14701-3802 FORMERLY MARLIN-ROCKWELL CORP DIV TRW AND TRW INC
40920	MPB MINIATURE PRECISION BEARING DIV PRECISION PARK PO BOX 547 KEENE, NEW HAMPSHIRE 03431 FORMERLY MPB CORP AND MINIATURE BRG DIV MPB CORP
52828	REPUBLIC FASTENER MFG CORP 1300 RANCHO CONEJO BLVD NEWBURY PARK, CALIFORNIA 91320-1405 FORMERLY IN SYLMAR, CALIFORNIA
56878	SPS TECHNOLOGIES INC AEROSPACE AND INDUSTRIAL PRODUCTS DIV 301 HIGHLAND AVE JENKINTOWN, PENNSYLVANIA 19046 FORMERLY STANDARD PRESSED STEEL FORMERLY IN SALT LAKE, UTAH
60029	SMITHS AEROSPACE ACTUATION SYSTEMS-LOS ANGELES 1700 BUSINESS CENTER DR DUARTE, CALIFORNIA 91010-2859 FORMERLY VB0067;V94641;HYDRAULIC UNITS INC SUB OF BOEING CO
60516	WEST COAST AEROSPACE INC 812 MIRAFLORES STREET SAN PEDRO, CALIFORNIA 90731-1439
71087	Replaced: [V71087] BOOTS ACFT NUT DIV TOWNSEND CO SEE TEXTRON INC CHERRY FASTENER TOWNSEND DIV V11815 by Code: Name and Address below 11815: CHERRY AEROSPACE FASTENERS DIV OF TEXTRON 1224 EAST WARNER AVENUE PO BOX 2157 SANTA ANA, CALIFORNIA 92707-0157 FORMERLY IN LOS ANGELES, CALIF , FORMERLY CHERRY FASTENERS TOWNSEND DIV OF TEXTRON INC V71087

Code	Name
72962	HARVARD INDUSTRIES INC 3 WERNER WAY SUITE 210 LEBANON, NEW JERSEY 08833 FORMERLY ESNA V7A079 FORMERLY ELASTIC STOP NUT IN UNION, NJ
73197	HI-SHEAR TECHNOLOGY CORP 2600 SKYPARK DRIVE TORRANCE, CALIFORNIA 90509
78118	SPLIT BALL BEARING DIV OF MPB CORP HIGHWAY 4 LEBANON, NEW HAMPSHIRE 03766-7301
80539	SPS TECHNOLOGIES INC DIV AERPSOACE - SANTA ANA 2701 SOUTH HARBOR BOULEVARD SANTA ANA, CALIFORNIA 92704-5803 FORMERLY NUTT-SHEL DIV OF SPC WESTERN CO V80539 AND STANDARD PRESSED STEEL WESTERN DIV V17279
92215	FAIRCHILD IND INC FAIRCHILD AEROSPACE FASTENER DIV 3010 W LOMITA BLVD TORRANCE, CALIFORNIA 90505-5102 FORMERLY VOI-SHAN IN CULVER CITY, CALIF
94878	RAYBESTOS-MANHATTAN INC PACIFIC COAST DIV FULLERTON, CALIFORNIA 92631 BUSINESS DISCONTINUED
97820	BUSAK AND SHAMBAN INC BEARING DIV 711 MITCHELL ROAD PO BOX 665 NEWBURY PARK, CALIFORNIA 91320-2214 FORMERLY IN CULVER CITY, CALIF; FORMERLY SHAMBAN W S & CO
97928	Replaced: [V97928] SEE V17446 HUCK INTL by Code: Name and Address below 17446: HUCK INTL INC AEROSPACE FASTENER DIV 900 WATSON CENTER ROAD CARSON, CALIFORNIA 90745-4201 FORMERLY V32134 REXNORD INC; FORMERLY V97928 HUCK INTL

Code	Name
9N513	VOI SHAN/CHATSWORTH DIV OF VSI CORP SUB OF FAIRCHILD IND CHATSWORTH, CALIFORNIA 91311-5013 COMPANY NO LONGER WISHES TO BE CONSIDERED FOR FED CONTRCTG
9V013	TEXTRON INC FAFNIR BEARING DIV US RT 41 S CALHOUN, GEORGIA 30701-9145
A8053	SAIEET SPA VIA DEL VETRAIO 21 BOLOGNA, ITALY 40138

NUMERICAL INDEX

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
109A9201M3		1	125	2
109LH9075-3W		1	55	1
		1	200	1
109LH9075-4W		1	40	3
109LH9075-5W		1	45	1
1334-011		1	620	3
1334-017		1	600	1
1334-018		1	605	1
1452-010		1	510	1
1452-011		1	645	1
1525-079		1	230	1
1525-098-1		1	205	1
1820-5		1	685A	1
1850-6		1	680A	1
1861-4		1	500A	1
1868-3		1	550A	1
1901-1B1-01		1	305	2
1901S		1	305	2
2-02903-04H		1	350	1
2140-5A		1	430	1
2150-122		1	475	2
315A1806-1		1	115	1
315A1812-1		1	460	1
315A1814-1		1	535	1
315A1817-3		1	310	1
315A1818-3		1	260A	1
315A1820-5		1	685	1
315A1821-1		1	655	2
315A1824-2		1	485	1
315A1824-3		1	490	1
315A1826-1		1	675	1
315A1827-1		1	665	1
315A1828-2		1	650	1
315A1828-4		1	505	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1829-1		1	670	1
315A1832-12		1	365	1
315A1833-1		1	540	1
315A1834-1		1	300	1
315A1835-1		1	275	AR
315A1835-10		1	560	AR
315A1835-11		1	565	AR
315A1835-2		1	280	AR
315A1835-3		1	285	AR
315A1835-4		1	290	AR
315A1835-5		1	295	AR
315A1835-6		1	530	1
315A1835-9		1	555	AR
315A1836-1		1	715	1
315A1839-2		1	660	1
315A1842-4		1	695	1
315A1843-2		1	150	1
315A1847-1		1	615	1
315A1848-1		1	610	1
315A1849-2		1	525	1
315A1850-6		1	680	1
315A1852-2		1	160	1
315A1853-1		1	445	1
315A1854-1		1	185	1
315A1860-2		1	235	1
315A1861-4		1	500	1
315A1861-6		1	500B	1
315A1863-3		1	210	1
315A1863-4		1	240	1
315A1865-1		1	495	1
315A1866-2		1	425	1
315A1867-1		1	420	1
315A1867-3		1	340	3
315A1868-4		1	550	1
315A1869-1		1	315	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1874-1		1	400	1
315A1884-1		1	80	1
315A1890-1		1	405	1
315A1891-1		1	410	1
315A1893-1		1	65	AR
315A1893-2		1	70	AR
315A1893-3		1	75	AR
315A1894-1		1	545	1
315A1901-1		1	415	1
315A1903-3		1	265A	1
315A1907-1		1	135	1
315A1912-10		1	590	1
315A1912-11		1	580	1
315A1912-8		1	585	1
315A2801-1		1	1A	RF
315A2807-1		1	700	1
315A2807-2		1	710	1
315A2815-1		1	690	1
315A2831-1		1	385B	1
315A2831-2		1	395A	1
315A2831-3		1	390A	1
315A2832-1		1	345	1
315A2832-2		1	360	1
315A2857-1		1	215	1
315A2858-1		1	370	1
315A2859-1		1	145	1
315A2862-1		1	255	1
315A2876-1		1	245	1
315A2881-1		1	90	1
315A2882-1		1	130	1
315A2897-1		1	195	1
315A2898-1		1	250	1
315A2899-1		1	225	1
35235V04		1	350	1
69308-6A3U		1	100A	2

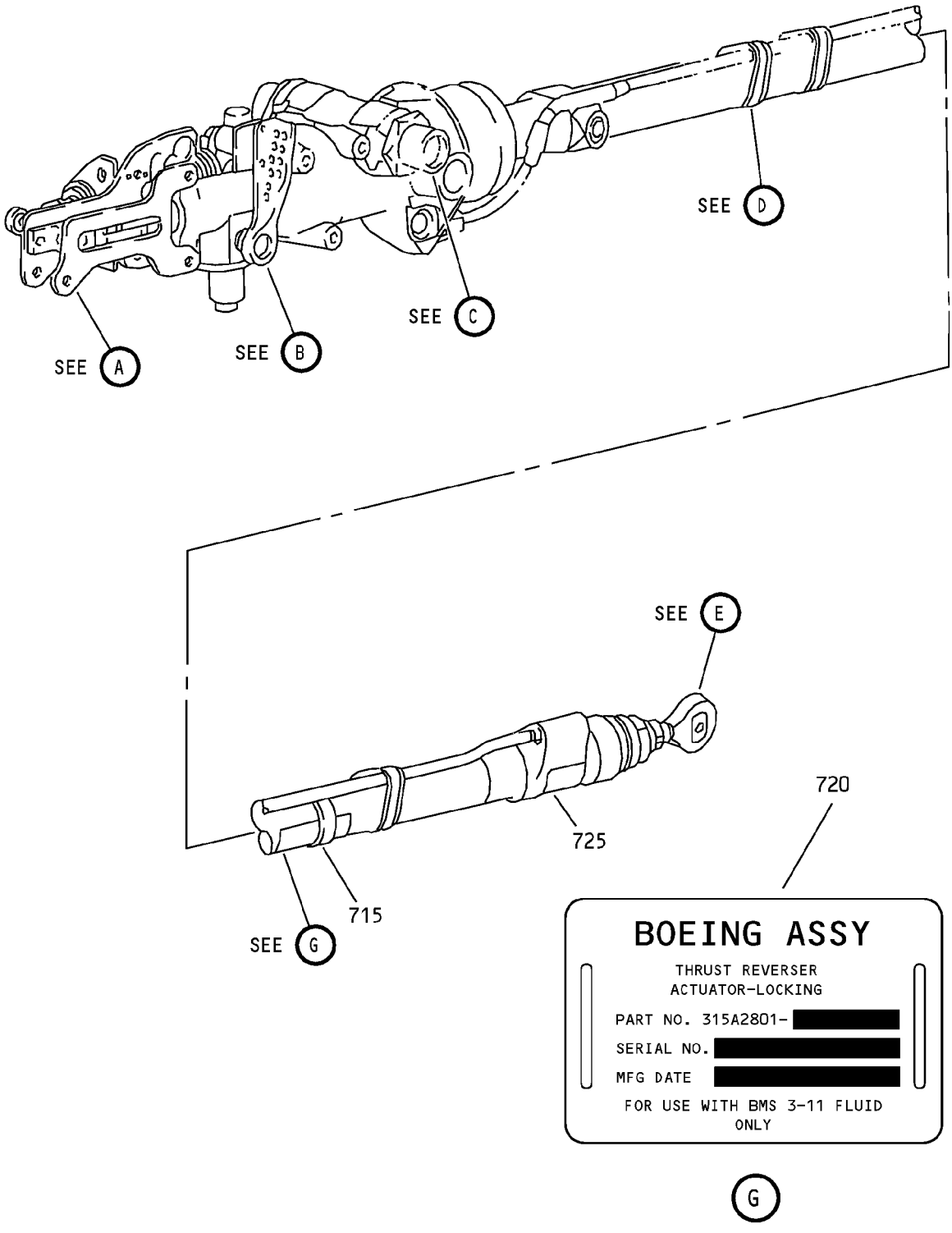
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
9301K		1	305	2
96-02		1	55A	1
		1	200A	1
96-054		1	45A	1
97E02		1	55	1
		1	200	1
97E054		1	45	1
97E48		1	40	3
9NS202101SE048		1	40	3
AFP175V04		1	350	1
AN960-10L		1	105A	4
AN960-416		1	35A	3
AP2097-04H		1	350	1
BAC27DTR0013		1	725	1
BAC27DTR31		1	720	1
BACB10BB12		1	305	2
BACB10GT12		1	305A	2
BACB28AK05-023		1	85	2
BACB28X7F037		1	705	2
BACB28Z4-086		1	30	1
BACB30DX6A3U		1	100	2
BACB30LG3-4		1	95A	2
BACB30LJ4-18		1	25A	2
BACB30LJ4U18		1	20	1
BACB30MB6A3U		1	100A	2
BACN10CS04J		1	355	1
BACN10JC3		1	55A	1
		1	200A	1
BACN10JC3CM		1	55	1
		1	200	1
BACN10JC4CM		1	40	3
BACN10JC5		1	45A	1
BACN10JC5CM		1	45	1
BACN10JP3ACM		1	125	2
BACN11U5CD1		1	140A	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
BACR12BP122		1	475	2
BACS11AA011		1	165	1
BACS11AA011A		1	165A	1
BACS12HL3AH10		1	5A	3
		1	220A	2
BACS13BX04H		1	350	1
BACS34A5A		1	430	1
BACW10BN3SP		1	10	3
		1	60	1
BACW10BN5DP		1	50	2
BACW10BN5SP		1	50A	2
BRH10A3		1	55A	1
		1	200A	1
BRH10A5		1	45A	1
BRH10C3M		1	55	1
		1	200	1
BRH10C4M		1	40	3
BRH10C5M		1	45	1
BRM200C3M		1	125	2
C001MCP0		1	305	2
C001R1P17LY331		1	305	2
C11237-122		1	475	2
C204MSDB1222		1	570	1
		1	595	1
CWR76-5B		1	430	1
DB0S13BX04H		1	350	1
DW96801-5A		1	430	1
DW969516-122		1	475	2
GM7184-4		1	15A	1
H01-3BAC		1	55	1
		1	200	1
H01-4BAC		1	40	3
H01-5BAC		1	45	1
H10-3BAC		1	55A	1
		1	200A	1

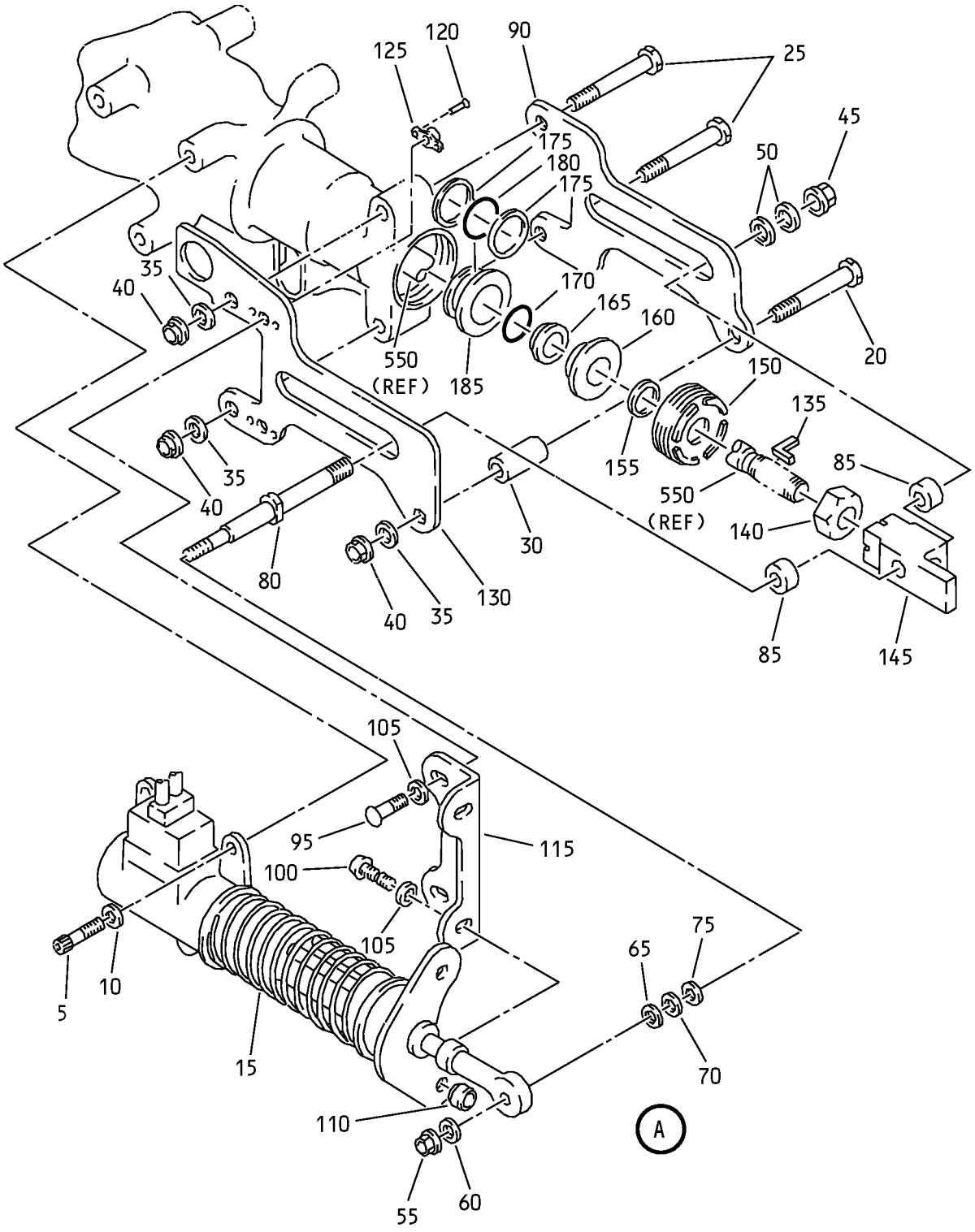
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
H10-5BAC		1	45A	1
HL448PZ6-3		1	100A	2
		1	100A	2
		1	100A	2
		1	100A	2
		1	100A	2
		1	100A	2
HL48-6-3		1	100A	2
		1	100A	2
		1	100A	2
		1	100A	2
		1	100A	2
		1	100A	2
		1	100A	2
MK1001-3BAC		1	125	2
MLT2HLP		1	335	3
MS20068-53		1	575	1
MS20427M3-4		1	120	4
MS21902J4		1	325	1
MS28782-12		1	175	4
MS28782-14		1	515	2
MS28782-17		1	635	2
MS28782-20		1	465	2
MS28782-5		1	375	4
		1	435	2
MS28783-3		1	625	2
NAS1080-06		1	110	2
NAS1149F0332P		1	105	4
NAS1149F0463P		1	35	3
NAS1198-3-5		1	190	2
NAS1351N3H10P		1	5	3
		1	220	2
NAS1611-010		1	380	2
		1	440	1
NAS1611-011		1	170	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
NAS1611-114		1	180	2
NAS1611-116		1	455	1
		1	520	1
NAS1611-122		1	480	1
NAS1611-212		1	640	1
NAS1611-215		1	470	1
NAS1611-225		1	630	1
NAS1612-12		1	270	2
NAS1612-2		1	320	1
NAS1612-4		1	330	1
NAS509-5		1	140	1
NAS623-3-4		1	95	2
NS103197SE02		1	125	2
NS202101-02		1	55A	1
		1	200A	1
NS202101SE02		1	55	1
		1	200	1
PKT001P1		1	305	2
R9301KA4298		1	305	2
		1	305	2
RM9157BU122		1	475	2
RMLH9075-3W		1	55A	1
		1	200A	1
RMLH9075-5W		1	45A	1
S30310-122		1	475	2
S30388-5-1		1	430	1
S30395-5-16H		1	155	1
S315N401-4		1	15A	1
S33121-116-99		1	450	1
STS900-122		1	475	2
T6C1032JM		1	55	1
		1	200	1
T6C428JM		1	40	3
T6C524JM		1	45	1
T6S1032J		1	55A	1

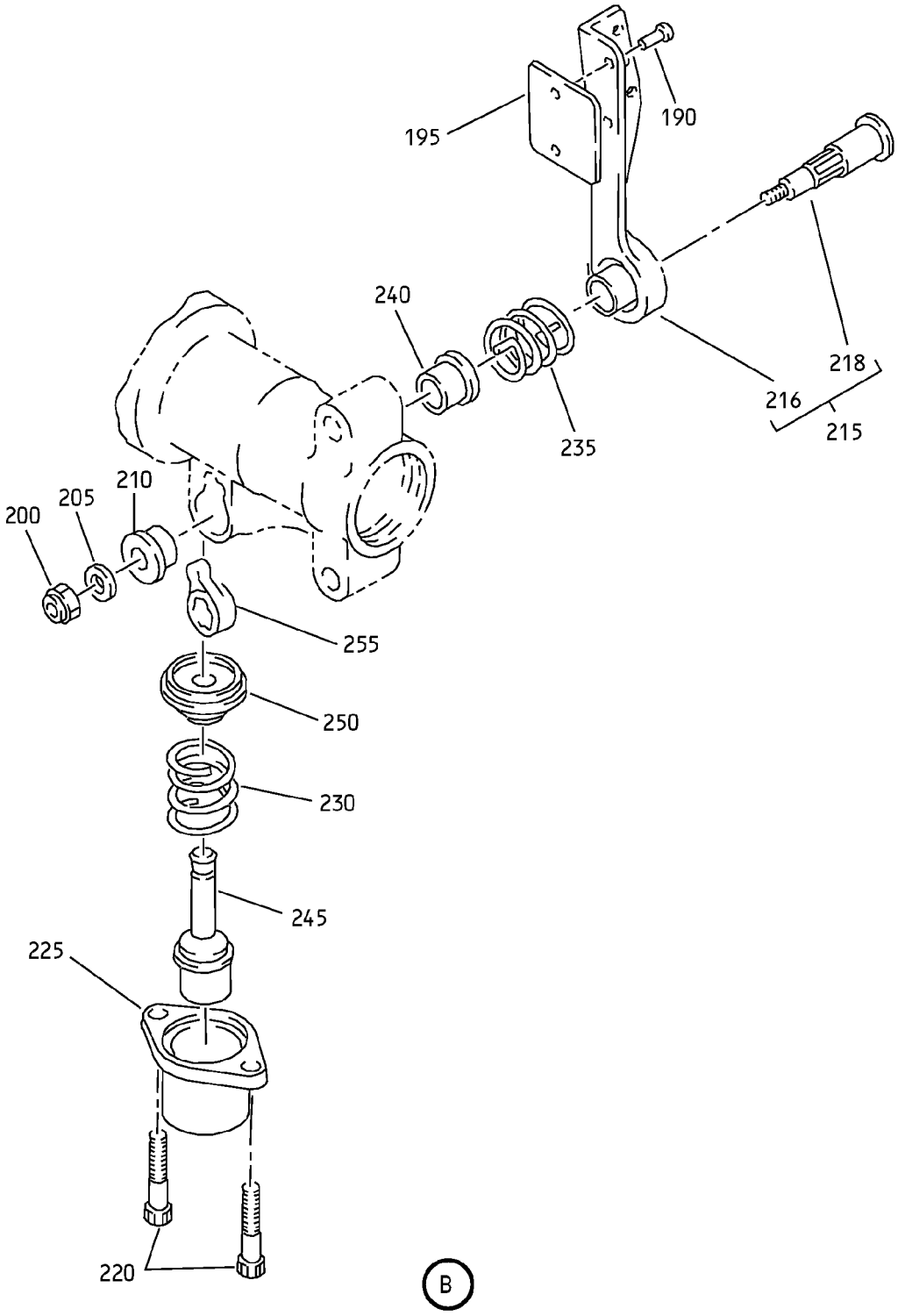
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
		1	200A	1
T6S524J		1	45A	1
T8080C1032		1	125	2
TF005-5A		1	430	1
TF456-122		1	475	2
VN202D1-02		1	125	2
VN303A02		1	55A	1
		1	200A	1
VN303D02		1	55	1
		1	200	1
VN303D048		1	40	3
Y018-800		1	570B	1
		1	595B	1



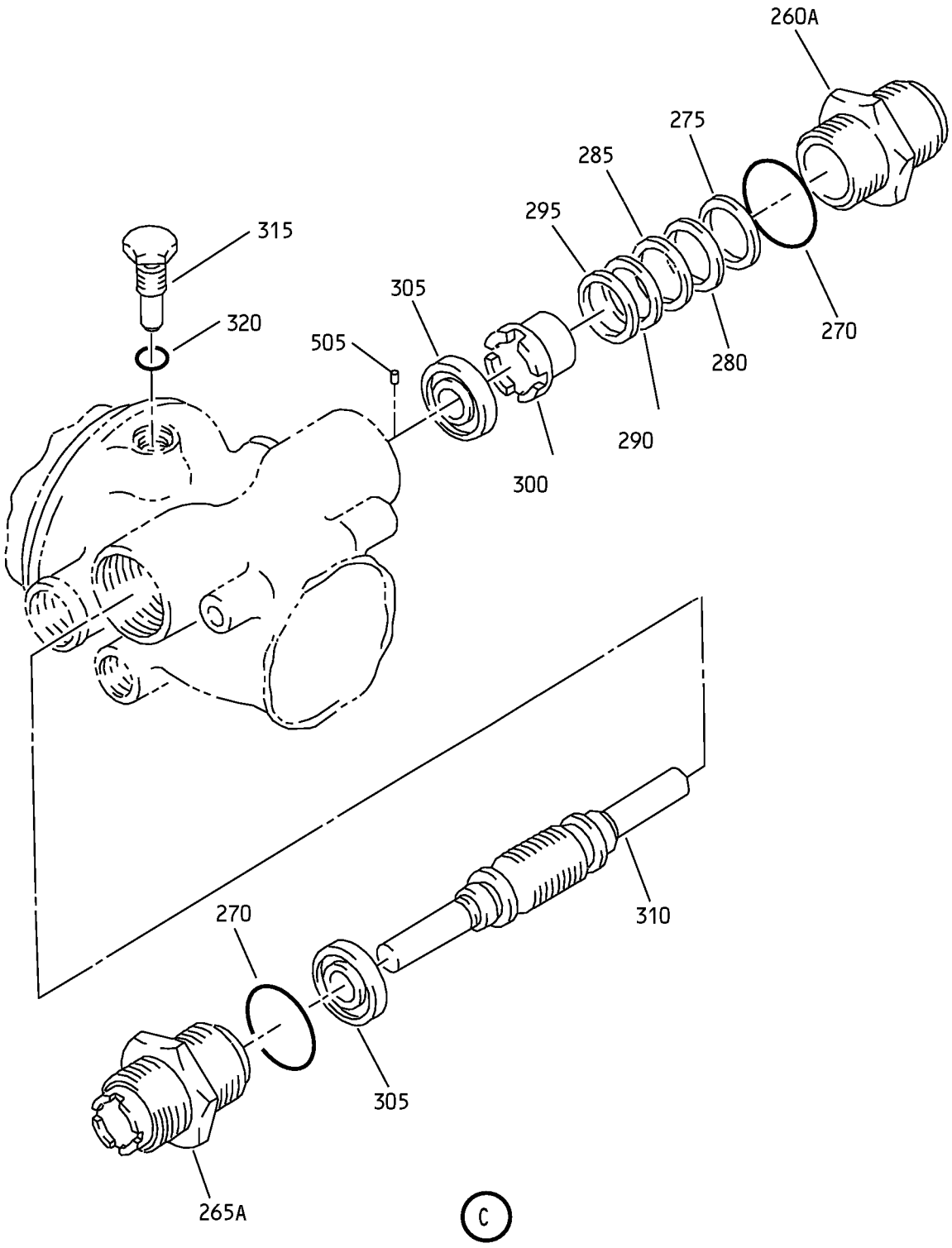
Thrust Reverser Locking Actuator Assembly
IPL Figure 1 (Sheet 1 of 7)



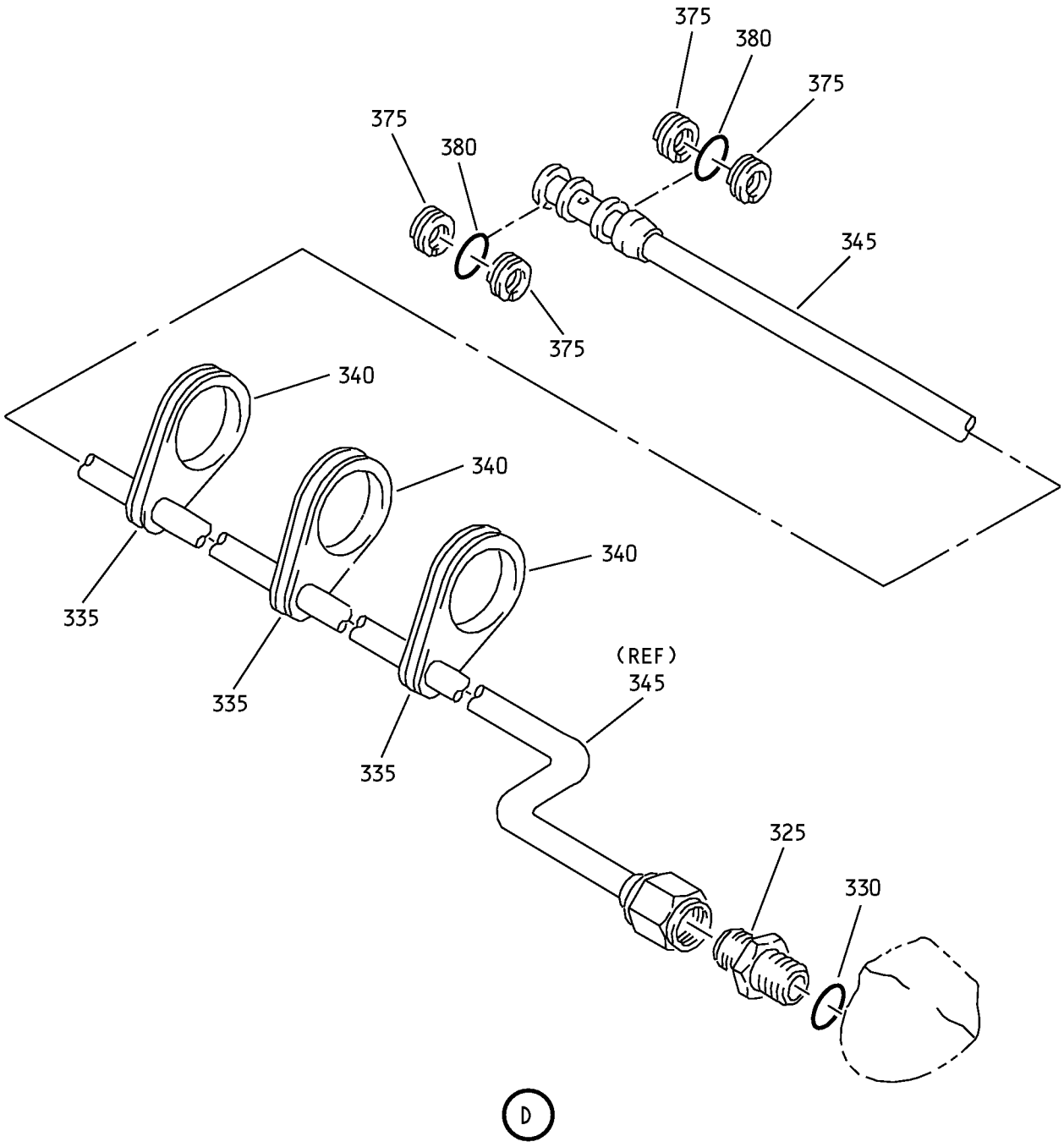
Thrust Reverser Locking Actuator Assembly
IPL Figure 1 (Sheet 2 of 7)



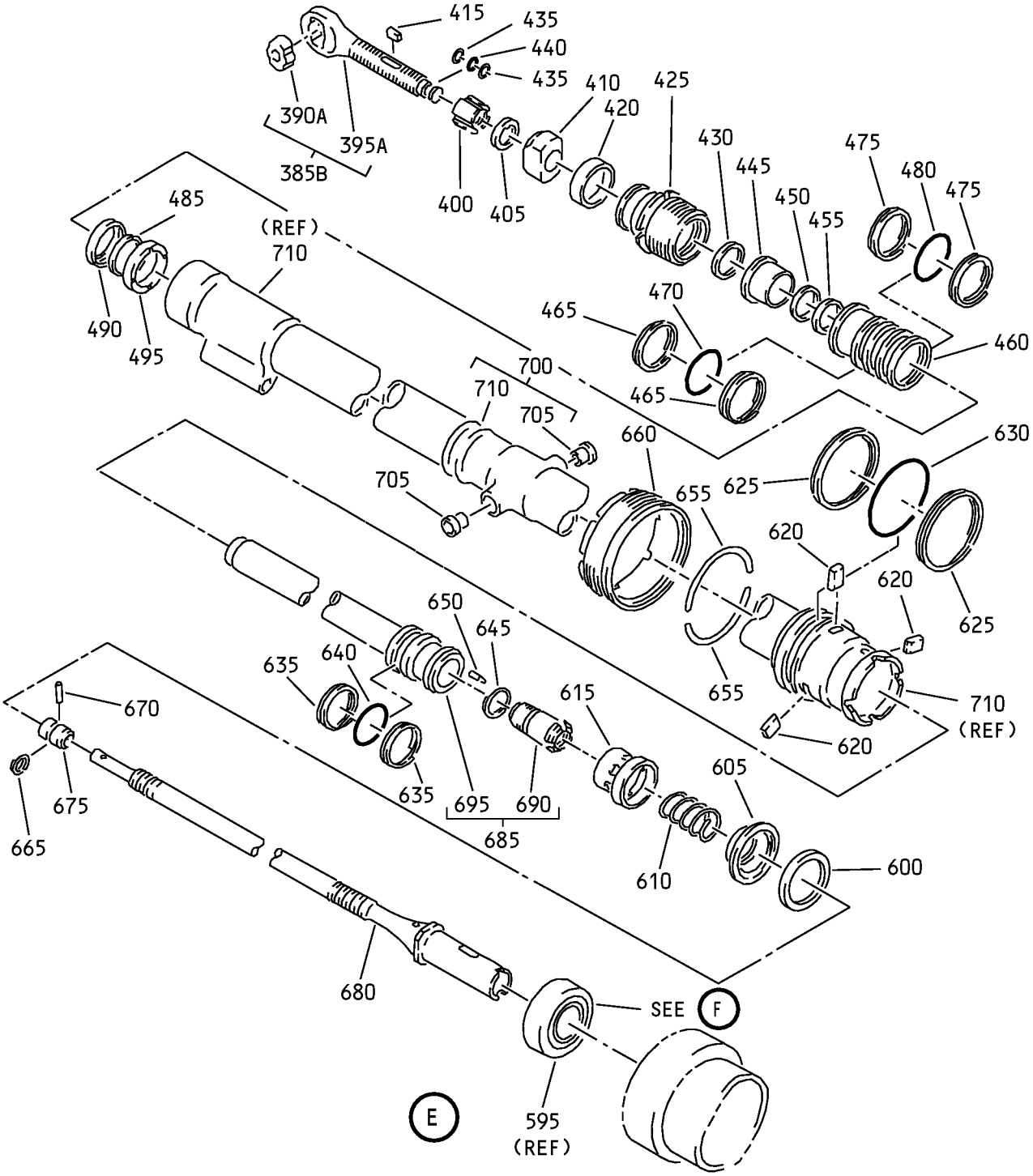
Thrust Reverser Locking Actuator Assembly
IPL Figure 1 (Sheet 3 of 7)



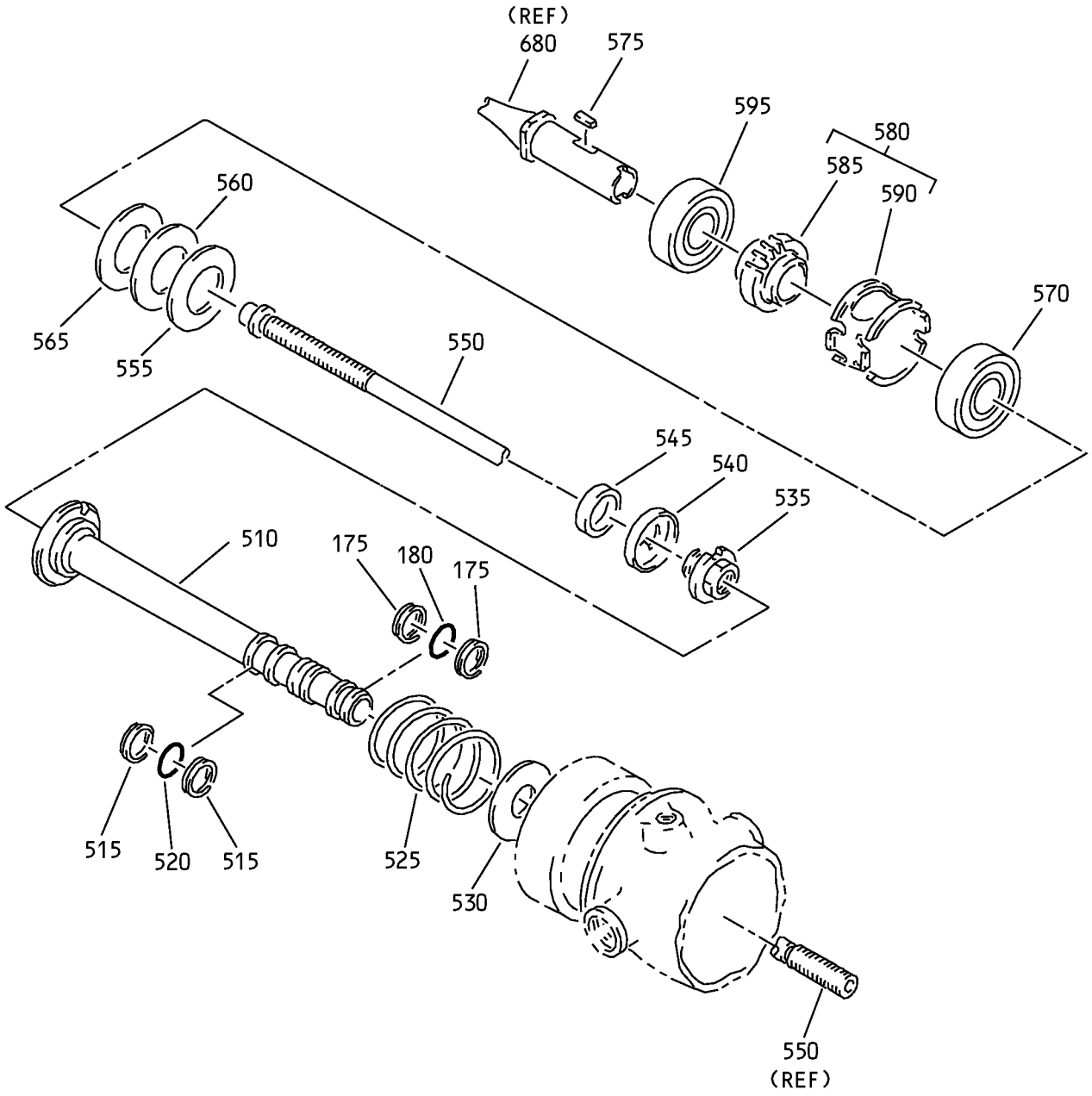
Thrust Reverser Locking Actuator Assembly
IPL Figure 1 (Sheet 4 of 7)



Thrust Reverser Locking Actuator Assembly
IPL Figure 1 (Sheet 5 of 7)



Thrust Reverser Locking Actuator Assembly
IPL Figure 1 (Sheet 6 of 7)



Thrust Reverser Locking Actuator Assembly
IPL Figure 1 (Sheet 7 of 7)

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–1A	315A2801-1		ACTUATOR ASSY-LOCKING		RF
5	NAS1351N3H10P		. SCREW (OPT ITEM 5A)		3
–5A	BACS12HL3AH10		. SCREW (OPT ITEM 5)		3
10	BACW10BN3SP		. WASHER		3
–15	S315N401-4		DELETED		
15A	GM7184-4		. TRANSDUCER ASSY-DUAL POSITION (V22863) (SPEC S315N401-4)		1
20	BACB30LJ4U18		. BOLT		1
–25	BACB30LJ418		DELETED		
25A	BACB30LJ4-18		. BOLT		2
30	BACB28Z4-086		. BUSHING		1
35	NAS1149F0463P		. WASHER (OPT ITEM 35A)		3
–35A	AN960-416		. WASHER (OPT ITEM 35)		3
40	BRH10C4M		. NUT (V52828) (SPEC BACN10JC4CM) (OPT T6C428JM (V11815)) (OPT 97E48 (V80539)) (OPT 109LH9075-4W (V72962)) (OPT VN303D048 (V92215)) (OPT 9NS202101SE048 (VA8053)) (OPT H01-4BAC (V15653))		3
45	BRH10C5M		. NUT (V52828) (SPEC BACN10JC5CM) (OPT T6C524JM (V11815)) (OPT 97E054 (V80539)) (OPT 109LH9075-5W (V72962)) (OPT H01-5BAC (V15653)) (OPT ITEM 45A)		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–45A	BRH10A5		. NUT (V52828) (SPEC BACN10JC5) (OPT T6S524J (V11815)) (OPT 96-054 (V80539)) (OPT RMLH9075-5W (V72962)) (OPT H10-5BAC (V15653)) (OPT ITEM 45)		1
50	BACW10BN5DP		. WASHER (OPT ITEM 50A)		2
–50A	BACW10BN5SP		. WASHER (OPT ITEM 50)		2
55	BRH10C3M		. NUT (V52828) (SPEC BACN10JC3CM) (OPT T6C1032JM (V11815)) (OPT 97E02 (V80539)) (OPT 109LH9075-3W (V72962)) (OPT VN303D02 (V92215)) (OPT NS202101SE02 (V80539)) (OPT H01-3BAC (V15653)) (OPT ITEM 55A)		1
–55A	H10-3BAC		. NUT (V15653) (SPEC BACN10JC3) (OPT NS202101-02 (V80539)) (OPT RMLH9075-3W (V72962)) (OPT T6S1032J (V71087)) (OPT VN303A02 (V92215)) (OPT 96-02 (V80539)) (OPT BRH10A3 (V52828)) (OPT ITEM 55)		1
60	BACW10BN3SP		. WASHER		1
65	315A1893-1		. SHIM-TRANSDUCER (MAKE FROM CRES SHEET AISI 301 ANNEALED MIL-S-5059 0.010IN 0.5IN 0.5IN)		AR
70	315A1893-2		. SHIM-TRANSDUCER (MAKE FROM CRES SHEET AISI 301 ANNEALED MIL-S-5059 0.005IN X 0.5IN X 0.5IN)		AR

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
75	315A1893-3		. SHIM-TRANSDUCER (MAKE FROM CRES SHEET AISI 301 ANNEALED MIL-S-5059 0.003IN X 0.5IN X 0.5IN)		AR
80	315A1884-1		. SPINDLE-FEEDBACK		1
85	BACB28AK05-023		. BUSHING		2
90	315A2881-1		. BRACKET-LH		1
95	NAS623-3-4		. SCREW (OPT ITEM 95A)		2
–95A	BACB30LG3-4		. BOLT (OPT ITEM 95)		2
100	BACB30DX6A3U		. BOLT (OPT ITEM 100A)		2
–100A	HL448PZ6-3		. BOLT (V60516) (SPEC BACB30MB6A3U) (OPT HL48-6-3 (V56878)) (OPT HL48-6-3 (V92215)) (OPT 69308-6A3U (V56878)) (OPT HL48-6-3 (V80539)) (OPT HL48-6-3 (V08524)) (OPT HL48-6-3 (V97928)) (OPT HL48-6-3 (V73197)) (OPT HL48-6-3 (V9N513)) (OPT HL448PZ6-3 (V56878)) (OPT HL448PZ6-3 (V73197)) (OPT HL448PZ6-3 (V80539)) (OPT HL448PZ6-3 (V9N513)) (OPT HL448PZ6-3 (V97928)) (OPT ITEM 100)		2
105	NAS1149F0332P		. WASHER (OPT ITEM 105A)		4
–105A	AN960-10L		. WASHER (OPT ITEM 105)		4
110	NAS1080-06		. COLLAR		2
115	315A1806-1		. BRACKET		1
120	MS20427M3-4		. RIVET		4

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
125	BRM200C3M		. NUTPLATE (V52828) (SPEC BACN10JP3ACM) (OPT MK1001-3BAC (V15653)) (OPT NS103197SE02 (V80539)) (OPT T8080C1032 (V11815)) (OPT VN202D1-02 (V92215)) (OPT 109A9201M3 (V72962))		2
130	315A2882-1		. BRACKET-PROX SENSOR		1
135	315A1907-1		. KEY-LOCK		1
140	NAS509-5		. NUT (OPT ITEM 140A)		1
–140A	BACN11U5CD1		. NUT (OPT ITEM 140)		1
145	315A2859-1		. END-ROD, FEEDBACK		1
150	315A1843-2		. NUT-FEEDBACK GLAND		1
155	S30395-5-16H		. EXCLUDER (V97820)		1
160	315A1852-2		. BUSHING-ROD		1
165	BACS11AA011		. SEAL-FOOT (OPT ITEM 165A)		1
–165A	BACS11AA011A		. SEAL-FOOT (OPT ITEM 165)		1
170	NAS1611-011		. PACKING		1
175	MS28782-12		. RING		4
180	NAS1611-114		. PACKING		2
185	315A1854-1		. RETAINER-FEEDBACK SEAL		1
190	NAS1198-3-5		. RIVET		2
195	315A2897-1		. TARGET		1
200	BRH10C3M		. NUT (V52828) (SPEC BACN10JC3CM) (OPT T6C1032JM (V11815)) (OPT 97E02 (V80539)) (OPT 109LH9075-3W (V72962)) (OPT VN303D02 (V92215)) (OPT NS202101SE02 (V80539)) (OPT H01-3BAC (V15653)) (OPT ITEM 200A)		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–200A	H10-3BAC		. NUT (V15653) (SPEC BACN10JC3) (OPT NS202101-02 (V80539)) (OPT RMLH9075-3W (V72962)) (OPT T6S1032J (V71087)) (OPT VN303A02 (V92215)) (OPT 96-02 (V80539)) (OPT BRH10A3 (V52828)) (OPT ITEM 200)		1
205	1525-098-1		. SHIM (V60029)		1
210	315A1863-3		. BUSHING		1
215	315A2857-1		. HANDLE ASSY-MANUAL UNLOCK		1
220	NAS1351N3H10P		. SCREW (OPT ITEM 220A)		2
–220A	BACS12HL3AH10		. SCREW (OPT ITEM 220)		2
225	315A2899-1		. HOUSING-DETENT		1
230	1525-079		. SPRING-MANUAL LOCK (V60029)		1
235	315A1860-2		. SPRING-TORSION		1
240	315A1863-4		. BUSHING		1
245	315A2876-1		. PIN-MANUAL UNLOCK		1
250	315A2898-1		. GUIDE-SPR		1
255	315A2862-1		. LEVER-UNLOCK		1
260	315A1818-2		DELETED		
260A	315A1818-3		. FITTING-END		1
–265	315A1903-2		DELETED		
265A	315A1903-3		. SCREW-ADPTR		1
270	NAS1612-12		. PACKING		2
275	315A1835-1		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.040IN 1.0IN 1.0IN)		AR

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
280	315A1835-2		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.010IN 1.0IN 1.0IN)		AR
285	315A1835-3		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.005IN 1.0IN 1.0IN)		AR
290	315A1835-4		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.003IN 1.0IN 1.0IN)		AR
295	315A1835-5		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.001IN 1.0IN 1.0IN)		AR
300	315A1834-1		. SLEEVE		1
305	R9301KA4298		. BEARING (V21335) (SPEC BACB10BB12) (OPT 1901S (V38443)) (OPT 9301K (V21335)) (OPT PKT001P1 (V78118)) (OPT C001MCP0 (V40920)) (OPT C001R1P17LY331 (V40920)) (OPT R9301KA4298 (V9V013)) (OPT 1901-1B1-01 (V21760)) (OPT ITEM 305A)		2
–305A	BACB10GT12		. BEARING (OPT ITEM 305)		2
310	315A1817-3		. SHAFT-WORM GEAR		1
315	315A1869-1		. PLUG		1
320	NAS1612-2		. PACKING		1
325	MS21902J4		. UNION		1
330	NAS1612-4		. PACKING		1
335	MLT2HLP		. TIE (V06383)		3

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
340	315A1867-3		. SPACER		3
345	315A2832-1		. TUBE ASSY		1
–350	DB0S13BX04H		. . SLEEVE (V14798) (SPEC BACS13BX04H) (OPT 2-02903-04H (V11328)) (OPT 35235V04 (V08199)) (OPT AP2097-04H (V01673)) (OPT AFP175V04 (V30974))		1
–355	BACN10CS04J		. . NUT		1
–360	315A2832-2		. . SPACER		1
–365	315A1832-12		. . SPACER		1
–370	315A2858-1		. . TUBE		1
375	MS28782-5		. RING		4
380	NAS1611-010		. PACKING		2
–385	315A1831-4		DELETED		
–385A	1831-4		DELETED		
385B	315A2831-1		. END ASSY-ROD		1
–390	315A1831-3		DELETED		
390A	315A2831-3		. . BALL		1
–395	315A1831-5		DELETED		
395A	315A2831-2		. . BODY		1
400	315A1874-1		. NUT		1
405	315A1890-1		. WASHER-LOCK		1
410	315A1891-1		. STOP		1
415	315A1901-1		. KEY		1
420	315A1867-1		. SPACER		1
425	315A1866-2		. NUT-GLAND		1
430	CWR76-5B		. SCRAPER (V26879) (SPEC BACS34A5A) (OPT S30388-5-1 (V97820)) (OPT TF005-5A (V07128)) (OPT 2140-5A (V26303)) (OPT DW96801-5A (V02886))		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
435	MS28782-5		. RING		2
440	NAS1611-010		. PACKING		1
445	315A1853-1		. BEARING-PISTON		1
450	S33121-116-99		. SEAL-FOOT (V09257)		1
455	NAS1611-116		. PACKING		1
460	315A1812-1		. GLAND		1
465	MS28782-20		. RING		2
470	NAS1611-215		. PACKING		1
475	C11237-122		. RING (V26879) (SPEC BACR12BP122) (OPT DW969516-122 (V02886)) (OPT RM9157BU122 (V94878)) (OPT STS900-122 (V02107)) (OPT S30310-122 (V97820)) (OPT TF456-122 (V07128)) (OPT 2150-122 (V26303))		2
480	NAS1611-122		. PACKING		1
485	315A1824-2		. RING-SNUBBER		1
490	315A1824-3		. RING-SNUBBER		1
495	315A1865-1		. STOP-PISTON		1
500	315A1861-4		. HOUSING-LOCKING ACTR (OPT ITEM 500A, 500B)		1
–500A	1861-4		. HOUSING-LOCKING ACTR (OPT ITEM 500, 500B)		1
–500B	315A1861-6		. HOUSING-LOCKING ACTR (OPT ITEM 500, 500A)		1
505	315A1828-4		. PIN-LOCKING		1
510	1452-010		. SLEEVE-LOCK (V60029)		1
515	MS28782-14		. RING		2
520	NAS1611-116		. PACKING		1
525	315A1849-2		. SPRING-LOCK		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
530	315A1835-6		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.060IN 1.62IN 1.62IN)		1
535	315A1814-1		. NUT		1
540	315A1833-1		. WASHER-LOCK		1
545	315A1894-1		. SPACER		1
550	315A1868-4		. ROD-FEEDBACK CONT (OPT ITEM 550A)		1
–550A	1868-3		. ROD-FEEDBACK CONT (OPT ITEM 550)		1
555	315A1835-9		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.010IN 2.0IN 2.0IN)		AR
560	315A1835-10		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.005IN 2.0IN 2.0IN)		AR
565	315A1835-11		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.001IN 2.0IN 2.0IN)		AR
570	C204MSDB1222		. BEARING (V40920) (OPT ITEM 570B)		1
–570A	7204DB		DELETED		
–570B	Y018-800		. BEARING (V40920) (OPT ITEM 570)		1
575	MS20068-53		. KEY		1
580	315A1912-11		. WHEEL AND SPACER ASSY-WORM		1
585	315A1912-8		. . WHEEL (MATCHED SET)		1
590	315A1912-10		. . SPACER (MATCHED SET)		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
595	C204MSDB1222		. BEARING (V40920) (OPT ITEM 595B)		1
–595A	7204DB		DELETED		
–595B	Y018-800		. BEARING (V40920) (OPT ITEM 595)		1
600	1334-017		. RING-RTNR (V60029)		1
605	1334-018		. RETAINER-SPR (V60029)		1
610	315A1848-1		. SPRING		1
615	315A1847-1		. FOLLOWER-LOCK		1
620	1334-011		. KEY-LOCK (V60029)		3
625	MS28783-3		. RING		2
630	NAS1611-225		. PACKING		1
635	MS28782-17		. RING		2
640	NAS1611-212		. PACKING		1
645	1452-011		. RING-LOCK		1
650	315A1828-2		. PIN-LOCKING		1
655	315A1821-1		. RING-CYL NUT		2
660	315A1839-2		. NUT-CYL		1
665	315A1827-1		. RING-RETAINING		1
670	315A1829-1		. PIN-RETAINING		1
675	315A1826-1		. GUIDE-LEAD SCREW		1
680	315A1850-6		. SCREW-LEAD (OPT ITEM 680A)		1
–680A	1850-6		. SCREW-LEAD (OPT ITEM 680)		1
685	315A1820-5		. PISTON ASSY (OPT ITEM 685A)		1
–685A	1820-5		. PISTON ASSY (OPT ITEM 685)		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
690	315A2815-1		. . NUT-LEAD SCREW (USED ON ITEM 685)		1
695	315A1842-4		. . PISTON (USED ON ITEM 685)		1
700	315A2807-1		. CYLINDER ASSY		1
705	BACB28X7F037		. . BUSHING		2
710	315A2807-2		. . CYLINDER		1
715	315A1836-1		. STRAP-NAMEPLATE		1
720	BAC27DTR31		. MARKER-ALUMINUM FOIL		1
725	BAC27DTR0013		. MARKER-ALUMINUM FOIL- CAUTION- DO NOT ROTATE ROD END		1

–Item not Illustrated