COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

THRUST REVERSER LOCKING ACTUATOR ASSEMBLY

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To: All holders of THRUST REVERSER LOCKING ACTUATOR ASSEMBLY 78-31-04.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

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COMPONENT MAINTENANCE MANUAL

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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.

THRUST REVERSER LOCKING ACTUATOR ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The locking actuator is a hydraulic, linear motion operating device consisting of a housing and attached cylinder with the following major components.

(1) A piston, with a head-end surface area of 0.98 sq-in. and rod-end surface area of 0.54 sq-in.

(2) A threaded (Acme) lead screw and nut. The lead screw rotates thru the nut fastened at the head end of the piston. An integral shaft at the head end of the lead screw mounts in two anti-friction bearings. The other end of the lead screw has an aluminum-nickel-bronze guide attached which rotates against the inside diameter of the piston. This maintains the 22-inch free end of the lead screw concentric with the piston, and allows the piston to move axially independently of the lead screw.

(3) A worm wheel, mounted between the two bearings on the lead screw shaft.

(4) A bearing-mounted worm gear shaft positioned perpendicular to the axis of the lead screw/ worm wheel.

(5) An internal locking mechanism, consisting of the following:

(a) Three radially located locking keys, mounted in slots in the cylinder. The keys and slots have sufficient clearance to enable the keys to move radially.

(b) A locking sleeve, with two side rails. The rails connect the two ends of the sleeve, and are recessed into mating grooves in the housing, enabling the sleeve to move axially independently of the lead screw shaft and bearing rotation.

(c) A locking sleeve spring, mounted against the locking sleeve, which holds the sleeve in the locked position.

(d) A lockspring follower and spring, mounted on the lead screw, with spring force against the piston head.

(e) An unlock lever, mounted in the housing at the rod end of the locking sleeve. An external handle provides for manual operation.

(6) A feedback mechanism consisting of a threaded feedback nut attached to the inside of the lead screw at the worm wheel end. An externally threaded feedback rod rotates in the threaded nut and extends thru the locking sleeve.

(7) A feedback lever and mounting brackets for the feedback system are attached externally at the end of the housing.

2. Operation

A. Hydraulic pressure applied to the EXTEND port is directed to both the piston head end and rod end. The initial pressure forces the locking sleeve in the opposite direction of the piston, compressing the lock sleeve spring, and releasing the locking keys. As the piston extends due to pressure on the differential surface areas, the piston forces the locking keys radially outward.

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

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

(1) Linear movement of the actuator piston rotates the Acme threaded lead screw thru the Acme threaded lead screw nut connected to the piston.

(2) Rotation of the lead screw and the connected internally-threaded feedback nut causes linear movement of the feedback rod.

(3) The difference in thread pitch between the Acme lead screw/nut and the feedback rod/nut produce a total feedback rod travel of 1.52 inches for total actuator travel of 19.78 inches. (1:13 ratio). The feedback rod always moves in the opposite direction from the piston.

D. Movement of the piston and rotation of the lead screw within the piston also turns the worm wheel on the lead screw shaft. This turns the mating worm gear shaft. In system operation, the worm gear shaft drives flexshafts for synchronized operation of other non-locking actuators. The flexshafts also are installed inside rigid hydraulic supply tubes, which transmit hydraulic extend pressure.

E. As the actuator extends and nears the end of stroke, an internal hydraulic snubber restricts fluid flow out of the rod end and slowly stops piston movement in 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 – 39 inches

B. Width – 6 inches

C. Depth – 6 inches

D. Weight – 20 pounds

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. Test Equipment and Materials

NOTE: Equivalent substitutes may be used.

A. Hydraulic Test Stand – hydraulic test stand, 0 to 4500 psi (0 to 31026 kPa), STD-901 capable of supplying hydraulic fluid at variable pressure 0-4500 psi, temperature 60-140° F.

B. B20005-41 – transducer assembly, SPL-6373 Transducers, Velocity, 1-13 in/sec Position, 0-1.80 inches, 0.1 inch resolution

C. X-Y recorder/plotter, SPL-5349 or oscilloscope, COM-5782

D. B78008-19 –wrench set, SPL-8215 Wrench Set, Thrust Reverser Actuator

E. B78010-28 (Replaces B78010-9) – test fixture, SPL-6281 Functional Test Equipment - Stand

F. Hydraulic Fluid – fluid, D00153 BMS 3-11, Type 4 (Ref SOPM 20-60-03)

G. B78013-1 – overhaul equipment, SPL-8278 Overhaul Equipment, Thrust Reverser Locking Actuator

H. B78011-25 – torque fixture, SPL-6284 Torque Fixture, Thrust Reverser Actuator

I. B78014-37 (Replaces B78014-29) – rod end and stroke stop test fixture, SPL-5359 Test Fixture, Rod End & Stroke Stop

J. B20005-41 – transducer assembly, SPL-6373 Velocity/Position Transducer

K. B20005-52, B20005-82 (Replaces B20005-75) – test equipment, SPL-8238, transducer, SPL-6280 Test Equipment

L. B78016-1 – overhaul set, SPL-6275 Overhaul Set, Thrust Reverser Actuator

M. micrometer, STD-595 Micrometer

N. dial indicator, STD-1238 dial indicator

O. MS21914 caps or polypropylene caps and gaskets

P. feeler gauge, STD-405 feeler gage

Q. GS4MT-165 – cable tie installation tool, COM-4950 Cable Tie Installation Tool

3. Length Check

NOTE: This check is not required if the retracted length has been adjusted and verified during assembly before testing.

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-6281	Stand - Test, Functional (Part #: B78010-28, Supplier: 81205)
STD-595	Micrometer

B. Procedure

(1) Mount unit in test fixture, SPL-6281. Secure with fixture pin. Push in on fixture clevis to ensure stop contacts gland nut. Tighten fixture clamp.

(2) Using micrometer, STD-595, check dimension across gage block and pin of fixture. (Value should be 1.495-1.505 inches.) Add actual measured value to 22.000. The sum is retracted length of the actuator. Verify that retracted length is 23.495-23.505 inches.

4. Preparation for Test

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

4. A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-6281	Stand - Test, Functional (Part #: B78010-28, 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. Procedure

(1) Install actuator in test fixture, SPL-6281. Connect lines per TESTING AND FAULT ISOLATION, Figure 101.

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

(3) Pre-Assembly Unlock Test.

5. Test

WARNING: DO NOT APPLY AIR PRESSURE TO ANY PORTS.

(WARNING PRECEDES)

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.

5. A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
COM-5782	Oscilloscope (Part #: TDS-220, Supplier: 80009)
SPL-5349	X-Y Recorder/Plotter (Part #: 925E, Supplier: 60795)
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-8238	Test Equipment - Velocity/Position Transducer (Part #: B20005-52, Supplier: 81205)
STD-1238	Indicator - Dial

B. Proof Pressure Test

WARNING: DO NOT EXTEND OR RETRACT PISTON AT PROOF PRESSURE OR DAMAGE TO INTERNAL PARTS AND INJURY TO PERSONNEL MAY OCCUR.

(1) Retract actuator with 3000 psi.

(2) Gradually apply 4500 psi pressure to RET port and hold for 2 minutes. Reduce pressure to 5 psi and hold for 2 minutes. Check that there is no external leakage, permanent deformation, or loosening of parts.

(3) Reduce pressure to zero. Manually extend piston. Remove adapter.

(4) Repeat step TESTING AND FAULT ISOLATION, Paragraph 5.B.(2) except apply pressure to RET and EXT ports.

C. Operation/Leakage

(1) Plug or close unused ports. Retract and extend actuator for 25 full-stroke cycles, with pressure increasing to 3000 psi at fully retracted and fully extended positions.

(2) Check that there is no binding or external leakage, except one drop per 25 cycles is acceptable at dynamic seals (170A, 180, 185).

D. Internal Leakage

(1) Plug or close unused ports, except leave one EXT port open.

(2) Apply 3000 psi pressure at RET port and hold for 5 minutes. Check that internal leakage does not exceed 5 cc/min during the last 1 minute. No external leakage is acceptable.

E. Locking Test

(1) Retract piston fully. Apply pressure, cycling from 0-600 psi five times, simultaneously to RET and EXT parts. Check that actuator piston does not unlock (extend).

(2) Slowly increase pressure to RET and EXT ports simultaneously until actuator unlocks and piston starts to extend. Check that unlocking pressure is 750-1200 psi.

(3) Retract and lock piston. Apply 3000 psi pressure to RET port, then slowly apply pressure to EXT port until piston unlocks and begins to extend. Slowly decrease pressure at EXT port, and check that piston fully retracts and locks at not less than 350 psi.

(4) With piston retracted and locked, manually rotate unlock handle to unlock unit. Apply 380 psi pressure to EXT port, and check that piston extends smoothly.

F. Axial Play Check

(1) With piston fully retracted and locked, apply 150 psi pressure to RET and EXT ports simultaneously.

(2) Pull on piston rod end and check that gap between stop (420) and gland nut (435) is 0.007-0.033 inch. (Do not rotate piston rod.)

G. Friction Test

(1) Apply and maintain 3000 psi pressure at RET port for steps TESTING AND FAULT ISOLATION, Paragraph 5.G.(2) and TESTING AND FAULT ISOLATION, Paragraph 5.G.(3). Extend and retract actuator piston by increasing/decreasing pressure at EXT port.

(2) Apply enough pressure to extend piston approximately two inches, decrease pressure to stop movement, then slowly increase pressure to again extend piston another two inches. Repeat this procedure minimum of 4 times (approximately 20 inches total). Pressure at EXT port required to extend piston at any two-inch increment shall not exceed 1900 psi.

(3) Repeat step TESTING AND FAULT ISOLATION, Paragraph 5.G.(2), except reduce pressure to retract piston and increase pressure to stop movement. Pressure at EXT port required to retract piston at any two-inch increment shall not be less than 1500 psi.

H. Snubbing Test

(1) Install transducer assembly, SPL-6373 on test fixture, SPL-6281. Connect position and velocity transducer assembly, SPL-6373 to piston rod end. Connect the transducer assembly, SPL-6373 to the test equipment, SPL-8238, transducer, SPL-6280. Connect test equipment, SPL-8238, transducer, SPL-6280 to an X-Y recorder/plotter, SPL-5349 or an oscilloscope, COM-5782 to record piston velocity and position.

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

I. Synchronous Drive Backlash Check

(1) Postion actuator piston approximately at mid-stroke. Connect worm gear shaft adapter, SPL-7292 to shaft.

(2) Mount dial indicator on test fixture to measure movement of piston.

(3) Turn worm gear shaft in both directions to extend and retract piston. Check that rotation angle of shaft does not exceed 35 degrees for piston movement of ±0.001 inch.

J. Feedback Travel Check

NOTE: Feedback lever travel is the linear distance that the lever moves on an axis parallel to the actuator. Lever travel can be measured at the clevis at the end of lever.

(1) Fully extend actuator piston. Mount and set dial indicator, STD-1238 to measure feedback travel as shown in (TESTING AND FAULT ISOLATION, Figure 103).

(2) Fully retract actuator piston. Check that feedback travel is 3.45-3.50 inches at end of lever (TESTING AND FAULT ISOLATION, Figure 103).

K. Feedback Lever Rig Check

(1) Apply 3000 psi pressure to RET port, and fully retract actuator piston. Check that rig pin can be inserted thru feedback bracket and lever.

L. Mechanical Drive Check

(1) Open RET and EXT ports to atmosphere, and ensure that no pressure is applied.

(2) Using worm gear shaft adapter, SPL-7292 attached to worm gear shaft, rotate shaft and fully extend and retract actuator. Check that torque does not exceed 2 lb-in.

M. Static Friction Check

(1) With RET and EXT ports open to atmosphere, and no pressure applied, move manual unlock lever toward feedback rod end to unlock unit, and hold lever in unlocked position.

(2) Apply a tension force to piston rod end, and check that piston extends 0.75 inch or more at a force not exceeding 40 lb.

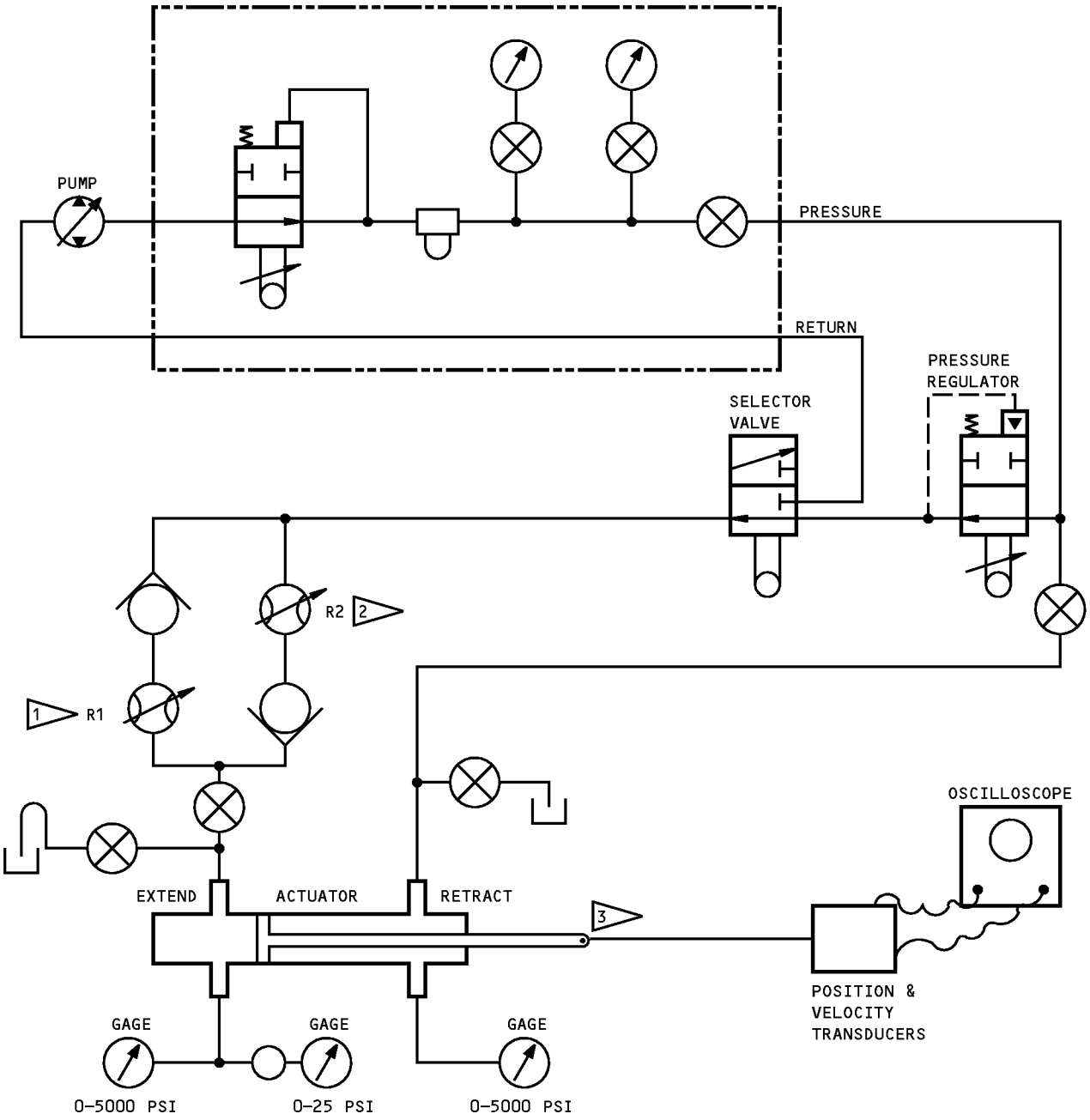
(3) Disconnect hydraulic lines and remove actuator from fixture. Partially drain hydraulic fluid from actuator. Seal open ports with MS21914 caps or polypropylene caps and gaskets.

Table 101: Trouble Shooting Chart

TROUBLE	PROBABLE CAUSE	CORRECTION
Proof Pressure Test		
External leakage At Feedback Rod End	Defective excluder (170A), feedback seal retainer (200), packings (185, 195), seal (180), bushing (175)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.B.
At Piston Rod End	Defective gland nut (435), scraper (440), bearing (455), hatseal (460), footseal (460B), packings (475, 485), rings (470,480)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.C.
At Tube Ends	Defective union (335), packings (340, 390), backup rings (385), tube ends	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.D.
Operation/ Leakage Test		
External leakage exceeds one drop in 25 cycles	Defective seals (Refer to Proof Pressure test preceding)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.C.
Internal Leakage Test		
Internal leakage exceeds 5cc/min.	Defective packing (670) and rings (665)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.C.

Table 101: Trouble Shooting Chart (Continued)

TROUBLE	PROBABLE CAUSE	CORRECTION
Locking Test		
Unlocks at 5- cycle 0-600 psi	Defective spring (565) or shimming	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.E.
Does not unlock at 750-1200 psi	Defective unlock lever (245), lock sleeve (550), lead screw (710), lock keys (650), piston assy (715)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.F.
Does not lock at 350 psi min	Defective spring (640), follower (645), keys (650), lever (245)	Replace parts per par.TESTING AND FAULT ISOLATION, Paragraph 6.F.
Does not extend at 380 psi when unlocked manually	Defective unlock lever (245), lock sleeve (550), piston assy (715) or keys (650)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.F.
Axial Play Check		
Gap between stop and nut not 0.007-0.033 with piston fully retracted	Piston rod/stop out of adjustment	Adjust parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.G.
Friction Test		
Pressure to extend exceeds 1900 psi	Feed back rod lead screw nut (570) or lead screw (710) threads binding. Worm wheel (620)/spacer (625) binding lead screw nut (718) or lead screw (710) threads binding	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.F.
Pressure to retract less than 1500 psi	Worm wheel (620) or spacer (625) worm	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.F.
Snubbing Test		
Piston snubs too rapidly or too slowly	Defective snubber rings (490, 495) stop (500)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.H.
Synchronous Drive Backlash Check		
Angle of shaft exceeds 35 degrees for piston movement of ± 0.001 inch	Defective teeth on worm wheel and spacer assy (615), worm gear shaft (300)	Replace parts per par. TESTING AND FAULT ISOLATION, Paragraph 6.F.
Feedback Travel Check		
Feedback travel not within limits	Rod (585) worn out	Replace 570,575,585
Mechanical Drive Check		
Torque exceeds 2 lb-in	(Refer to TESTING AND FAULT ISOLATION, Paragraph 5.G.)	(Refer to TESTING AND FAULT ISOLATION, Paragraph 5.G.)
Static Friction Check		
Force to extend piston exceeds 40 lb.	(Refer toTESTING AND FAULT ISOLATION, Paragraph 5.G.)	(Refer to TESTING AND FAULT ISOLATION, Paragraph 5.G.)

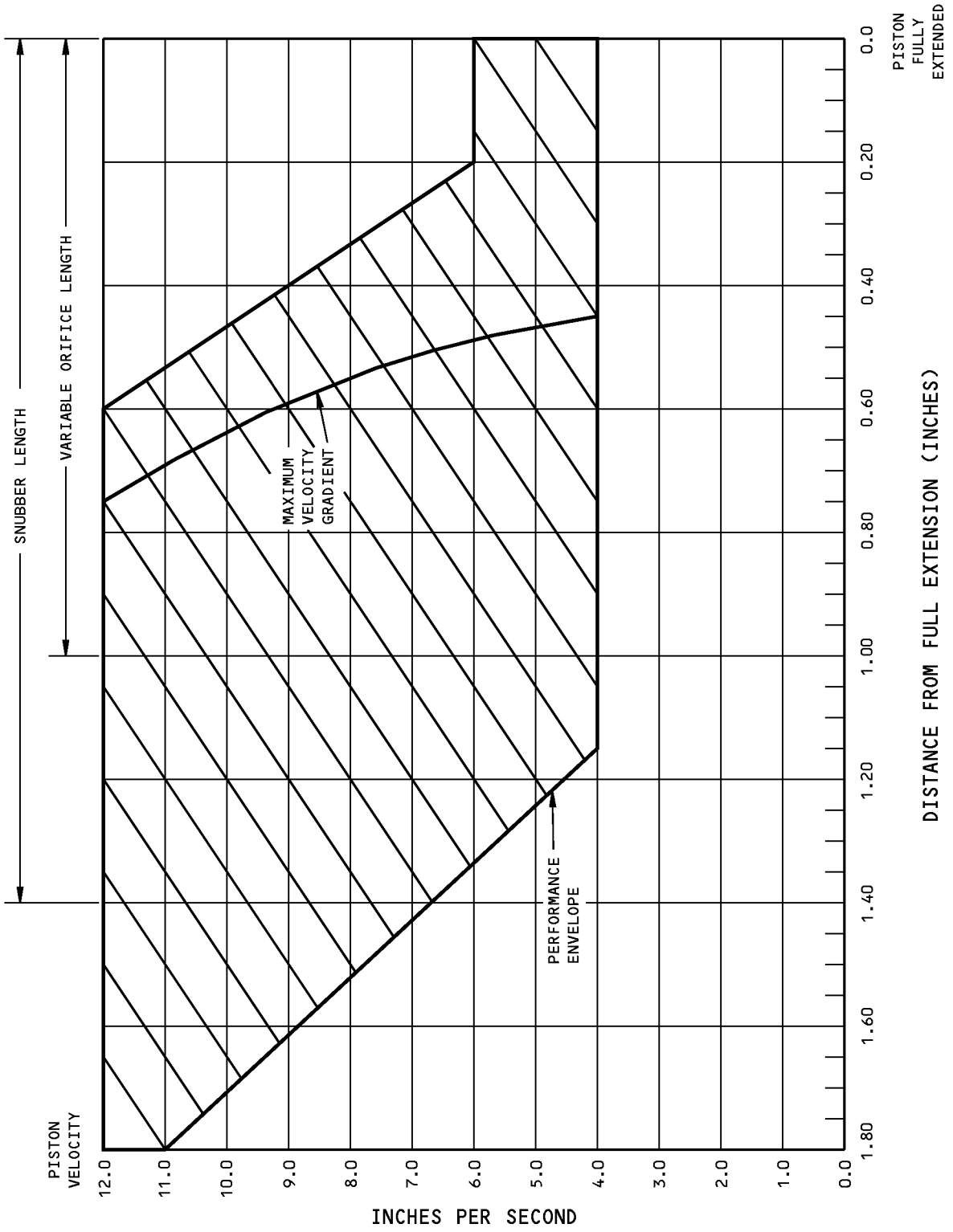


1 RESTRICTOR R1 LIMITS EXTEND VELOCITY TO 11-12 IN/SEC WITH SELECTOR VALVE OPEN

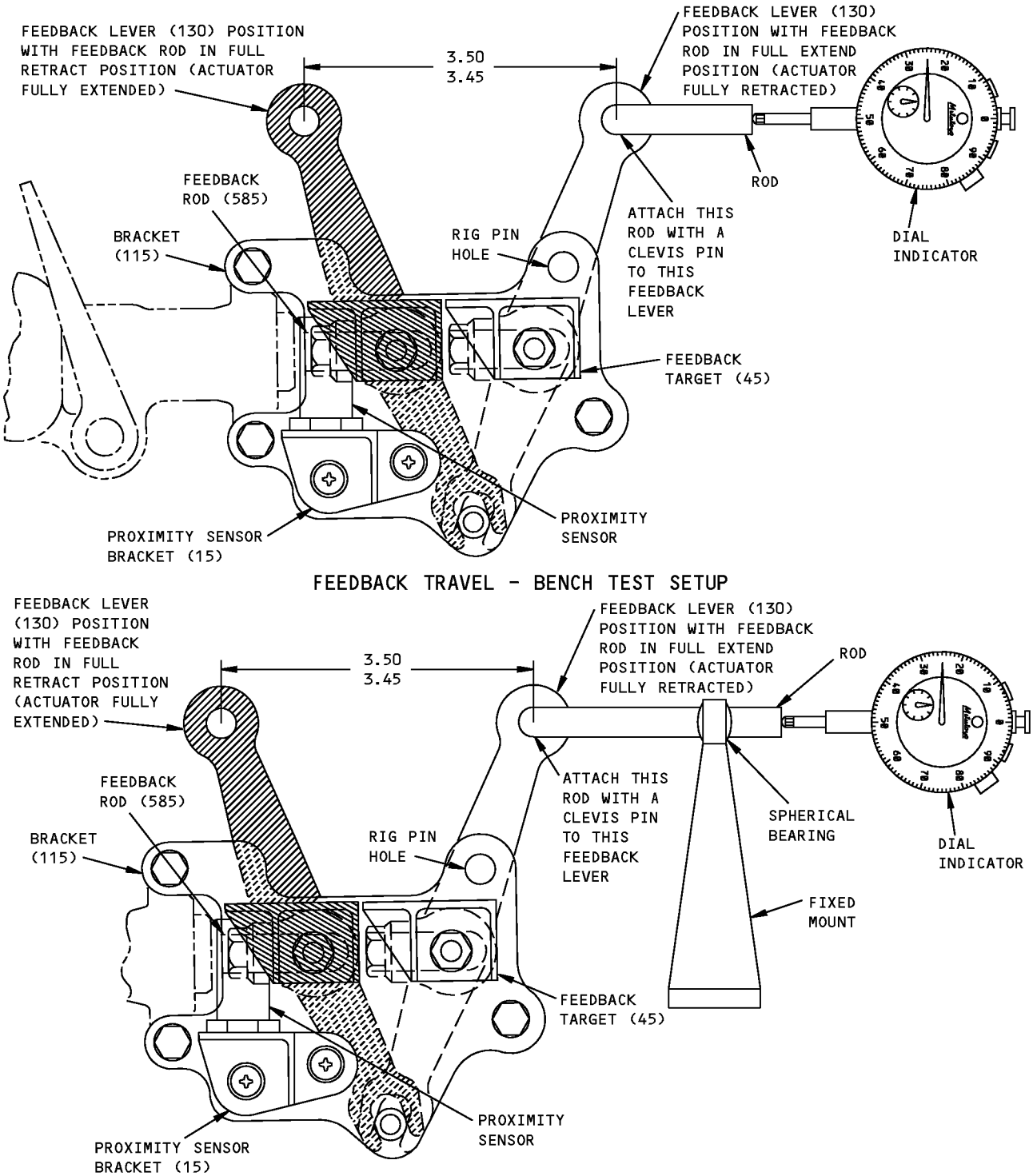
2 RESTRICTOR R2 LIMITS EXTEND VELOCITY TO 3-6 IN/SEC WITH SELECTOR VALVE CLOSED
CAUTION: DO NOT EXCEED 12 IN/SEC RETRACT VELOCITY UNDER ANY CONDITION.

3 DURING ALL TESTS, MAKE SURE THAT PISTON ROD END DOES NOT ROTATE DURING ACTUATOR OPERATION

Schematic Diagram Test Setup
Figure 101



Snubbing Test Snubbing Performance Envelope
Figure 102



Feedback Travel - Bench Test Setup
Figure 103

6. Corrective Procedures

NOTE: Many parts of the actuator are selected and adjusted after detailed dimensional measurements and computation during original assembly. Corrective procedures will be simplified if such parts are identified and segregated if not replaced.

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-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-6255	Wrench (B78008-7 is included in B78008-19) (Part #: B78008-7, Supplier: 81205)
SPL-6284	Fixture - Torque, Locking and Non-Locking Thrust Reverser Acutator Assembly (Part #: B78011-25, 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)
STD-405	Gauge - Feeler

B. Feedback rod seal replacement – Excluder (170A), retainer (200), O-rings (190), seal (180), bushing (175).

(1) Remove parts (35, 40), target (45), spindle (50), bushings (55, 61), and lever (130).

(2) Remove parts (30, 25, 20) and detach bracket (65) from housing.

(3) Ensure that piston is fully retracted and locked. Using temporary marking method, mark exact linear and angular position of rod (585) with face of nut (205).

(4) Restrain feedback rod and loosen nut (155). Remove lock key (150), rod end (160), and nut (155).

(5) Remove gland nut (165) using wrench, SPL-7407.

(6) Remove parts (170A, 175, 180, 185, 200). Remove parts (190, 195) from retainer (200).

(7) Replace and assemble seal parts per ASSEMBLY section steps ASSEMBLY, Paragraph 5.C.(5)(a) thru ASSEMBLY, Paragraph 5.C.(5)(d).

(8) Ensure that piston is bottomed in fully retracted position. Restrain actuator and screw feedback rod (585) inward to the exact position as index marked in step TESTING AND FAULT ISOLATION, Paragraph 6.B.(3)

(9) Assemble and adjust rod end per ASSEMBLY section, steps ASSEMBLY, Paragraph 5.C.(7)(c) thru ASSEMBLY, Paragraph 5.C.(7)(e).

(10) Assemble feedback system parts per ASSEMBLY section, steps ASSEMBLY, Paragraph 5.C.(8)(a) thru ASSEMBLY, Paragraph 5.C.(8)(f).

C. Piston/Cylinder Seal Replacement

(1) Ensure that piston is fully retracted. Pry out indents of lockwasher (415), loosen nut (410) using wrench, SPL-6255, and unscrew nut toward rod end. Slide stop (420) back and remove key (425). Using temporary marking method, identify exact linear and angular location of piston rod end (395) with face of piston by index marks. Unscrew rod end. Remove stop, lockwasher, and nut. Remove O-rings and backup rings (445, 450).

(2) Loosen tube coupling nut (360).

(3) Remove spacer (430) from gland nut (435). Using wrench, SPL-7407, remove gland nut.

(4) Remove index plug (305).

(5) Install feedback lever holder, SPL-7475 on housing. Move handle to release internal locks, hold in position and turn screw of holder inward to contact handle.

(6) Unscrew cylinder nut (690). Slide cylinder out from housing sufficiently to remove lock keys (650) and expose retainer. Remove rings (685).

(7) Push retainer inward and rotate to disengage tangs from slots in end of cylinder. Slide cylinder out from piston and lead screw. Remove lock keys (650).

(8) Remove scraper (440) and gland (465) from cylinder. Remove bearing (455), hatseal (460), footseal (460B), O-rings and retainers (470, 475, 480, 485) from gland. Remove O-ring and backup ring (660, 665) from cylinder.

(9) Replace parts (440, 455, 460, 475, 485, 655, 660, 665, 670). Assemble parts per ASSEMBLY section, steps ASSEMBLY, Paragraph 5.C.(3)(p) thru ASSEMBLY, Paragraph 5.C.(3)(x).

(10) Mount unit in torque fixture, SPL-6284. Using adapter B78008-8, tighten cylinder nut (690) to 2900-3100 lb-in. Tighten gland nut (435) to 800-1000 lb-in. using wrench, SPL-7407. Install spacer (430) on gland nut.

(11) Remove feedback lever holder, SPL-7475 from housing. Push piston inward to ensure that lock keys (650) in cylinder engage.

(12) Tighten coupling nut (360) to 133-147 lb-in.

(13) Install O-ring (450) and backup rings (445) on rod end (395). Ensure spiral direction of backup rings is in same direction as threads. Screw nut (410) back to rod end bearing and install lockwasher (415) on rod with tang facing threaded end. Install stop (420) with chamfered side against lockwasher.

(14) Screw rod end (445) into piston to exact position as index marked in step (1). Install key (425). Slide stop over piston and key.

(15) Mount unit in rod end and stroke stop test fixture, SPL-5359. Connect rod to clevis in fixture. Position tang of lockwasher in slot in stop. Tighten nut (410) to 600-800 lb-in. using wrench, SPL-6255 and wrench to flats on stop.

(16) Push inward on clevis of fixture to ensure stop (420) contacts gland nut (435), and tighten clamp on clevis. Using micrometer, check that dimension across gage block and pin of fixture is 1.495-1.505 inches.

CAUTION: STOP (420) IS MACHINED DURING ORIGINAL ASSEMBLY TO OBTAIN SPECIFIED GAP. IF STOP IS REPLACED, A COMPLETE ADJUSTMENT IS REQUIRED PER ASSEMBLY, STEPS ASSEMBLY, PARAGRAPH 5.C.(5)(G) THRU ASSEMBLY, PARAGRAPH 5.C.(5)(J), ASSEMBLY, PARAGRAPH 5.C.(6)(A) THRU ASSEMBLY, PARAGRAPH 5.C.(6)(M) AND ASSEMBLY, FIGURE 707 TO ENSURE SPECIFIED GAP IS ATTAINED.

(17) Loosen clamp on fixture clevis and pull on rod end to ensure piston contacts internal lock keys. Using feeler gauge, STD-405, verify that gap between face of stop (420) and gland nut (435) is 0.007-0.033 inch.

D. Tube (355) Seal Replacement

(1) Loosen nut (360). Remove ties (345) from spacers (350) and remove tube from spacers and actuator.

(2) Remove union (335) and O-ring (340) from housing.

(3) Install replacement O-rings and back up rings (390, 385) on tube. Install replacement O-ring (340) on union (335).

(4) Install union in housing and tighten to 133-147 lb-in.

(5) Align tube ends with cylinder and housing ports, and install tube into spacers (350) thru split line breaks. Tighten coupling nut (360) finger tight.

(6) Install ties (345) around spacers and secure with cable tie installation tool, COM-4950 using a setting of 165 lbs maximum.

(7) Tighten coupling nut (360) to 133-147 lb-in.

E. Lock Spring (565) Replacement or shimming

(1) Disassemble actuator per DISASSEMBLY, except omit steps DISASSEMBLY, Paragraph 4.B.(15)(a) thru DISASSEMBLY, Paragraph 4.B.(15)(d).

(2) Check lock spring (565) per CHECK, Table 501. If defective, replace spring and reinstall parts per TESTING AND FAULT ISOLATION, Paragraph 6.E.(3). If spring is within design tolerances, add one shim (567A), then reinstall parts per TESTING AND FAULT ISOLATION, Paragraph 6.E.(3).

(3) Replace lock spring (565) and assemble parts per ASSEMBLY, except steps ASSEMBLY, Paragraph 5.C.(1)(a) thru ASSEMBLY, Paragraph 5.C.(1)(p), ASSEMBLY, Paragraph 5.C.(2)(a) thru ASSEMBLY, Paragraph 5.C.(2)(i) and ASSEMBLY, Paragraph 5.C.(3)(m) may be omitted.

F. Lock sleeve (550), spring follower (645), spring (640), worm gear shaft (300), lead screw (710), piston (715), worm wheel (620), lever (245) Replacement.

(1) Disassemble per par. DISASSEMBLY, Paragraph 4. of DISASSEMBLY section.

(2) Replace parts and assemble per par. ASSEMBLY, Paragraph 5. of ASSEMBLY section.

G. Piston Rod End Axial Play Adjustment

(1) Disassemble rod end per DISASSEMBLY section, step DISASSEMBLY, Paragraph 4.B.(3).

(2) Install and check parts per ASSEMBLY section, steps ASSEMBLY, Paragraph 5.C.(5)(g) thru ASSEMBLY, Paragraph 5.C.(5)(j), ASSEMBLY, Paragraph 5.C.(6)(a) thru ASSEMBLY, Paragraph 5.C.(6)(m).

H. Snubber Ring (490, 495), Stop (500) Replacement.

(1) Disassemble and assemble parts per preceding steps TESTING AND FAULT ISOLATION, Paragraph 6.C.(1) thru TESTING AND FAULT ISOLATION, Paragraph 6.C.(16), except additionally replace rings (490, 495) and stop (500).

I. Feedback Rod (585) Adjustment

(1) Disassemble parts per par. DISASSEMBLY, Paragraph 4. of DISASSEMBLY section, steps DISASSEMBLY, Paragraph 4.B.(1), DISASSEMBLY, Paragraph 4.B.(2), and DISASSEMBLY, Paragraph 4.B.(13).

(2) Assemble and adjust parts per par. ASSEMBLY, Paragraph 5. of ASSEMBLY section, steps ASSEMBLY, Paragraph 5.C.(7)(a) thru ASSEMBLY, Paragraph 5.C.(7)(e) and ASSEMBLY, Paragraph 5.C.(8)(a) thru ASSEMBLY, Paragraph 5.C.(8)(f).

J. Feedback Lever (130) Adjustment

(1) Disassemble parts per DISASSEMBLY section, steps DISASSEMBLY, Paragraph 4.B.(1), and DISASSEMBLY, Paragraph 4.B.(2).

(2) Replace bolt bushing (140) in lever assembly (130). Assemble and adjust parts per ASSEMBLY section, steps ASSEMBLY, Paragraph 5.C.(8)(a) thru ASSEMBLY, Paragraph 5.C.(8)(f).

DISASSEMBLY

1. **General**

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

   B. Disassemble this component only as necessary to complete fault isolation, determine the serviceability of parts, perform required repairs, and restore the unit to serviceable condition.

   C. Refer to IPL Figure 1 for item numbers.

2. **Equipment - Special Tools**

   NOTE: Equivalent substitutes may be used.

   A. B78015-23 (Replaces B78015-17) – overhaul set, SPL-7522 Overhaul Set, Thrust Reverser Locking Actuator

   B. B78008-19 – wrench set, SPL-8215 Wrench Set, Thrust Reverser Actuator

   C. B78013-1 – overhaul equipment, SPL-8278 Overhaul Equipment, Thrust Reverser Locking Actuator

3. **Parts Replacement**

   NOTE: Refer to TESTING AND FAULT ISOLATION to establish condition or probable cause of any malfunction and to determine extent of disassembly and repair.

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

   A. Procedure

      (1) O-rings, seals, seal rings (180, 185, 190, 195, 260, 310, 320, 330, 340, 385, 390, 445, 450, 460, 470, 475, 480, 485, 535, 540, 555, 560, 655, 660, 665, 670).

      (2) Lock keys (650), lockwashers (415, 575), retaining ring (675, 695), lock pin (680), cylinder nut ring (685).

      (3) Bushings (55, 175, 215, 240), bolt (140), bearing (455), guide (705).

      (4) Snubber rings (490, 495)

4. **Disassembly**

   NOTE: Many parts of the actuator are selected and adjusted to obtain specified dimensional and functional requirements. If the unit is only partially disassembled to replace parts in segregated places, parts which are not replaced should be noted accordingly to reduce the extent of procedures required for reassembly.

   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-6259	Wrench (B78008-10 included in B78008-19) (Part #: B78008-10, Supplier: 81205)
SPL-6260	Wrench (B78008-12 included in B78008-19) (Part #: B78008-12, Supplier: 81205)

Reference	Description
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-7554	Plate - Assembly (B78015-7 is included in B78015-17 and -23) (Part #: B78015-7, Supplier: 81205)

B. Procedure

(1) Remove parts (35, 40) and remove target (45), spindle (50), bushings (55, 60A) and lever assembly (130).

(2) Remove screws (5), washers (10), and bracket (15).

(3) Pry out indents in flange of lockwasher (415). Hold flats of stop (420), loosen nut (410) using wrench, SPL-6255, and unscrew nut toward rod end. Slide stop (420) back and remove key (425). Unscrew rod (405) from piston and remove stop (420), lockwasher (415), and nut (410). Remove O-ring (450) and backup rings (445).

(4) Remove ties (345) around spacers (350). Loosen nut (360) at tube coupling. Remove tube assembly (355) from cylinder assembly (725) port and spacers.

NOTE: Do not remove synthetic rubber spacers bonded to cylinder unless necessary for repair.

(5) Remove plugs (315) and unions (325, 335). Remove O-rings (320, 330, 340).

(6) Remove fitting (250) and adapter screw (255) from housing. Slowly press out worm gear shaft (300) in direction of port in which fitting (250) was installed. Remove sleeve (290), shims (265 thru 285), and shaft with bearing (295). Remove bearing (295) from shaft and other bearing (295) from housing. Remove O-rings (260) from fitting (250) and adapter screw (255).

NOTE: If parts removed in DISASSEMBLY, Paragraph 4.B.(6) are not interchanged or replaced, assembly procedures will be simplified if parts are identified and segregated accordingly.

(7) Position unit so that mounting boss in which fitting (250) and sleeve (290) was installed is facing downward. Tap on housing with plastic mallet to eject anti-rotation pin (545) from hole in bearing mounting diameter.

NOTE: Pin has 0.006-0.008 inch clearance with hole in housing and should fall free. If not, check for grease entrapment in hole over end of pin. Moving spacer (625) back and forth against pin may also assist removal.

(8) Install feedback lever holder, SPL-7475 on housing. Move manual release handle to release internal locks, hold in position and turn screw of holder inward to contact handle.

NOTE: This relieves force of spring (565) against cylinder nut (690) until nut is loosened and cylinder removed.

(9) Remove spacer (430) from gland nut (435). (Spacer is bonded inside gland nut.) Install unit in torque fixture, SPL-6284. Remove index plug (305) and O-ring (310). Remove gland nut (435) using wrench, SPL-7407. Using adapter B78008-8, loosen cylinder nut (690). Remove unit from fixture.

(10) Remove cylinder nut (690) using spanner wrench, SPL-7341. Slide cylinder out from housing sufficiently to remove lock keys (650) and expose retainer (635). Remove rings (685). Remove tool feedback lever holder, SPL-7475 from housing.

(11) Push retainer inward and rotate to disengage tangs from slots in cylinder end. Slide cylinder out from piston and lead screw.

(12) Remove gland nut (435), then remove scraper (440) and gland (465) from cylinder. Remove rings (490, 495), bearing (455), hatseal (460), O-rings and retainers (470, 475, 480, 485) from gland. Remove stop (500) from cylinder.

(13) Restrain rod end (160) and loosen nut (155). Remove lock key (150). Remove rod end (160) and nut (155).

(14) Remove gland nut (165) using adapter wrench, SPL-7336. Remove excluder (170A).

(15) Screw feedback rod into lead screw until it stops. Remove assembled lead screw, piston, and feedback rod from housing.

NOTE: If lead screw parts are not interchanged or replaced, assembly procedures will be simplified if parts are identified and segregated accordingly.

(a) Pry up retaining ring (675) and remove locking pin (680). Restrain piston (720), and unscrew lead screw nut (718) from piston using wrench wrench, SPL-6260. Remove piston from lead screw and remove O-ring (670) and retainers (665).

(b) Remove retaining ring (695), pin (700), and guide (705) from end of lead screw. Unscrew nut (718) from lead screw and remove retaining ring (675).

(c) Remove spring follower (645), spring (640), and retainer (635) from lead screw (710).

CAUTION: LEAD SCREW NUT (570) HAS LEFT HAND THREADS. COUNTERCLOCKWISE TORQUE WILL OVERTIGHTEN AND MAY DAMAGE PARTS.

(d) Pry up lock washer (575) at end of lead screw. Restrain wrench flats on lead screw with holder wrench, SPL-6259 and unscrew nut (570) clockwise from lead screw. Remove feedback rod (585) and spacer (580).

(16) Remove nut (205) and washer (210). Remove bushing (215), pull out handle assembly (220A), and remove spring (235), bushing (240), and lever (245).

(17) Remove lock sleeve (550), lock spring (565), and shim (567) if used, from housing. Remove O-rings and retainers (560, 555, 540, 535) from lock sleeve (550).

(18) Remove bushing (175), foot seal (180), O-ring (185), retainer (200) from housing. Remove O-ring and retainers (190, 195) from retainer (200).

(19) Using tool assembly plate, SPL-7554, disassembly plate, SPL-7373 remove bearing (605), spacer (625), worm wheel (620), key (610), and bearing (630) from lead screw (710).

(NOT APPLICABLE)

CHECK

1. General

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

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. Check

A. References

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

B. Procedure

(1) Check all parts for obvious defects in accordance with standard industry practices.

(2) Refer to FITS AND CLEARANCES for design dimensions and wear limits.

(3) Penetrant check per SOPM 20-20-02:

(a) Brackets (115, 115A, 120, 120A)

(b) Lever (145)

(c) Retainer (200)

(d) Fitting (250), adapter screw (255)

(e) Sleeve (290), Key (650)

(f) Tube (380)

(4) Magnetic particle check per SOPM 20-20-01:

(a) Spindle (50), target (45)

(b) Rod end (160)

(c) Gland nuts (165, 435)

(d) Springs (235, 565, 640)

(e) Lever (245)

(f) Worm gear shaft (300), lead screw (710), feedback rod (585)

(g) Stop (420)

(h) Housing (530), cylinder (735)

(i) Nut (690)

(j) Spring Follower (645)

(k) Nut (718)

(l) Piston (720)

(5) Check springs per CHECK, Table 501.

Table 501: Spring Check Data

ITEM NO. IPL Figure 1	APPROXIMATE FREE LENGTH (INCHES)	TEST LENGTH (INCHES)	LOAD LIMIT (POUNDS)
565	2.00	1.256	105-115
565A, 565B	2.00	1.380	125-135
640	2.80	0.80	20-24
		1.25	15-19
235	45° (Angular Displacement)	63° (Angular Displace˜ ment)	3.15-3.85 lb-in (Torque)

REPAIR

1. Content

A. Repair, refinish and replacement procedures are included in separate repair sections as follows:

Table 601:

P/N	NAME	REPAIR
1334-012	LOCK SLEEVE	1-1
315A1807	CYLINDER	2-1, 2-2
315A1809 315A1861	HOUSING	3-1
315A1812	GLAND	4-1
315A1815	NUT	5-1
315A1817	WORM GEAR SHAFT	6-1
315A1818	FITTING	7-1
315A1831	ROD END	8-1
315A1842	PISTON	9-1
315A1847	LOCK FOLLOWER	10-1
315A1850	LEAD SCREW	11-1
315A1854	RETAINER	12-1
315A1857	HANDLE	13-1
315A1896	MANUAL UNLOCK SHAFT	13-2
315A1859	ROD END	14-1
315A1868	ROD	15-1
315A1880	BRACKET	16-1, 16-2
315A1883	LEVER	17-1
315A1884	SPINDLE	18-1
315A1891	STOP	19-1
315A1903	ADAPTER	20-1
315A1912	WORM WHEEL AND SPACER ASSY	21-1
- -	MISCELLANEOUS PARTS REFINISH	22-1
- -	EXTERNAL PARTS REPLACEMENT	23-1, 23-2

2. Standard Practices

A. Refer to the following standard practices, as applicable, for details of procedures in individual repairs.

(1) SOPM 20-10-01 Repair and Refinish of High Strength Steel Parts

(2) SOPM 20-10-03 Shot Peening

(3) SOPM 20-10-04 Grinding of Chrome Plated Parts

(4) SOPM 20-30-02 Stripping of Protective Finishes

(5) SOPM 20-30-03 General Cleaning Procedures

(6) SOPM 20-41-01 Decoding Table for Boeing Finish Codes

(7) SOPM 20-41-02 Application of Chemical and Solvent Resistant Finishes

(8) SOPM 20-42-03 Hard Chrome Plating

(9) SOPM 20-42-06 Silver Plating

(10) SOPM 20-43-01 Chromic Acid Anodizing

(11) SOPM 20-50-03 Bearing and Bushing Replacement

(12) SOPM 20-50-05 Installation of Aluminum Foil and Other Markers

(13) SOPM 20-50-12 Application of Adhesives

(14) SOPM 20-60-02Finishing Materials

(15) SOPM 20-60-03Lubricants

(16) SOPM 20-60-04Miscellaneous Materials

3. Materials

NOTE: Equivalent substitutes may be used.

A. Primer – primer, C00259 BMS 10-11, Type 1 (Ref SOPM 20-60-02)

B. Enamel – coating, C50069 BMS 10-11, Type 2, gloss white color 702 (Ref SOPM 20-60-02)

C. Enamel – coating, C00700 BMS 10-60, Type 1, gloss grey color 707 (Ref SOPM 20-60-02)

D. Dry Film Lube – dry film lubricant, D50107 Micro Seal 100-1 (Ref SOPM 20-60-03)

E. Dry Film Lube – Everlube 967 lubricant, D00543 967 (Ref SOPM 20-60-03)

F. Topcoat – coating, B00571 BMS 3-11 resistant, Type 41 (Ref SOPM 20-60-02)

G. Grease – grease, D00015 BMS 3-24 (Ref SOPM 20-60-03)

H. Sealant – sealant, A00247 BMS 5-95 (Ref SOPM 20-60-04)

I. Adhesive – Type 38 (BMS 5-126) (Ref SOPM 20-50-12)

J. Dry Film Lube – DICRONITE DL-5 Per DOD-L-85645, Drilube Company, 711 West Broadway Street, Glendale, California 91204-1009.

4. 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)
Ø	DIAMETER
S Ø	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 WHICH 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
TIR	TOTAL INDICATOR READING

EXAMPLES

[— | 0.002]	STRAIGHT WITHIN 0.002
[⊥ | 0.002 | B]	PERPENDICULAR TO B WITHIN 0.002
[// | 0.002 | A]	PARALLEL TO 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 PLANE A
[⌓ | 0.020 | A]	SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.02 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE
[◎ | Ø 0.0005 | C]	CONCENTRIC TO C WITHIN 0.0005 DIAMETER
[⌯ | 0.010 | A]	SYMMETRICAL WITH A WITHIN 0.010
[∠ | 0.005 | A]	ANGULAR TOLERANCE 0.005 WITH A
[⌖ | Ø 0.002 Ⓢ | B]	LOCATED AT TRUE POSITION WITHIN 0.002 DIA RELATIVE TO DATUM B, REGARDLESS OF FEATURE SIZE
[⊥ | Ø 0.010 Ⓜ | A] [0.510 Ⓟ]	AXIS IS TOTALLY WITHIN A CYLINDER OF 0.010-INCH DIAMETER, PERPENDICULAR TO, AND EXTENDING 0.510-INCH ABOVE, DATUM A, MAXIMUM MATERIAL CONDITION
[2.000] OR 2.000 BSC	THEORETICALLY EXACT DIMENSION IS 2.000

NOTE: DATUM MAY APPEAR AT EITHER SIDE OF TOLERANCE FRAME [0.020 | A] [A | 0.020]

True Position Dimensioning Symbols
Figure 601

LOCK SLEEVE - REPAIR 1-1

1334–012

1. General

A. This procedure gives the data that is necessary to repair and refinish the lock sleeve.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

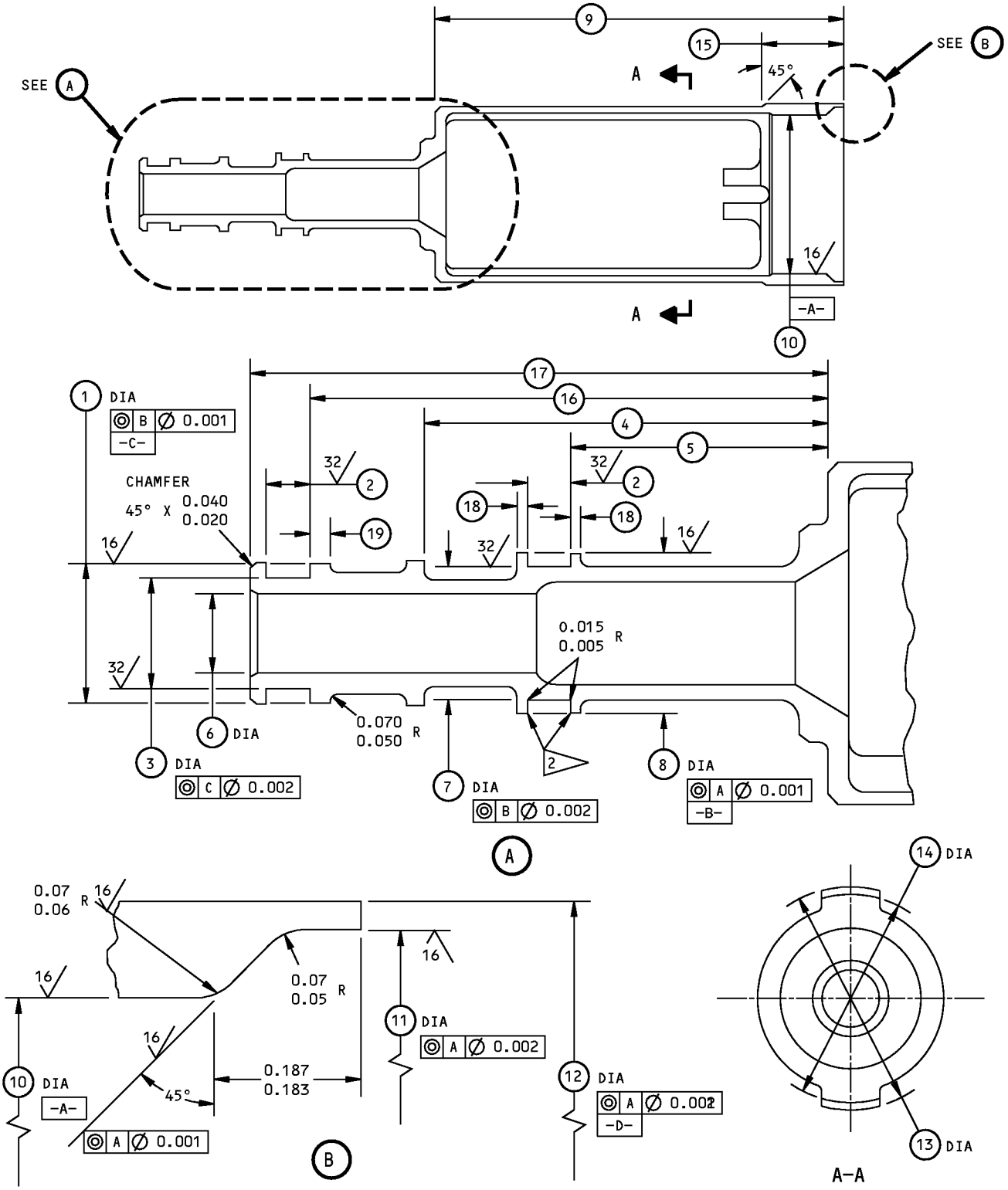
2. Plating Repair

A. Machine defects from the datum -B-, -C-, or -D- diameter to within the repair limit as shown in REPAIR 1-1, Figure 601.

B. Shot peen the machined diameter as shown in REPAIR 1-1, Figure 601 and the SOPM 20-10-03.

C. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

D. Grind to the dimension and finish as shown in REPAIR 1-1, Figure 601 and the SOPM 20-10-04.



1334-012 Lock Sleeve Repair and Refinish
Figure 601 (Sheet 1 of 2)

	1	2	3	4	5	6	7	8	9
DESIGN DIM	0.798 0.797	0.251 0.249	0.622 0.620	2.303 2.293	1.465 1.455	0.465 0.455	0.747 0.745	0.923 0.922	4.586 4.576
REPAIR LIMIT	0.767 ▷1	---	---	---	---	---	---	0.892 ▷1	---

	10	11	12	13	14	15	16	17	18	19
DESIGN DIM	1.864 1.860	2.042 2.038	2.109 2.105	2.000 1.980	1.880 1.860	0.890 0.870	2.910 2.890	3.250 3.230	0.090 0.070	0.110 0.090
REPAIR LIMIT	---	---	2.099 ▷1	---	---	---	---	---	---	---

REFINISH

CHROME PLATE DIAMETER OF DATUMS -B- AND -C- (F-15.03) WITH A MINIMUM THICKNESS OF 0.003 INCH.

PASSIVATE (F-17.09) ALL OTHER SURFACES

▷1 MAXIMUM REPAIR LIMIT

▷2 BREAK SHARP EDGES 0.005-0.010

REPAIR

REF ▷1 ▷2

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK SHARP EDGES 0.005-0.015 EXCEPT AS NOTED

SHOT PEEN: 0.017-0.046 SHOT SIZE
0.004 A2 INTENSITY

MATERIAL: 15-5PH CRES, COND H1025

DIMENSIONS APPLY AFTER PLATING

ALL DIMENSIONS ARE IN INCHES

1334-012 Lock Sleeve Repair and Refinish
Figure 601 (Sheet 2 of 2)

CYLINDER ASSEMBLY - REPAIR 2-1

315A1807–4

1. General

A. This procedure gives the data that is necessary to repair and refinish the cylinder assembly.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

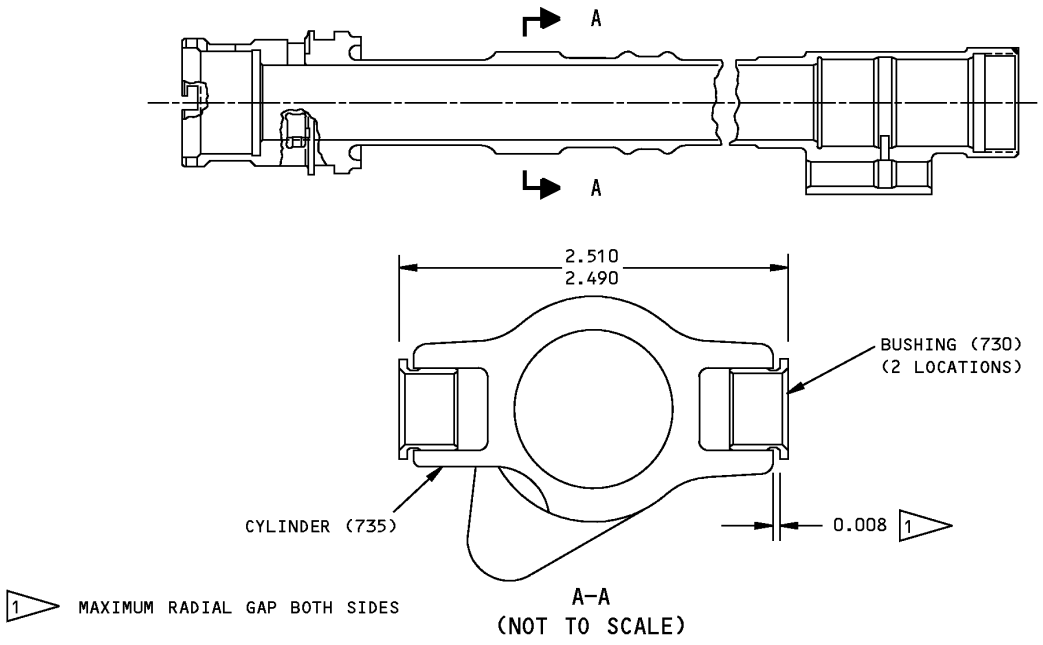
2. Bushing Replacement

A. Remove bushings.

B. If corrosion or damage exists on lug faces or hole surfaces refer to REPAIR 2-2 for repair instructions.

C. Install new bushings using shrink-fit method with grease, D00015 grease instead of BMS 10-11 primer as shown in SOPM 20-50-03 and REPAIR 2-1, Figure 601.

NOTE: There is a maximum radial gap tolerance for this bushing installation (see REPAIR 2-1, Figure 601).



315A1807-4 Bushing Replacement
Figure 601

CYLINDER - REPAIR 2-2

315A1807–5

1. General

A. This procedure gives the data that is necessary to repair and refinish the cylinder.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

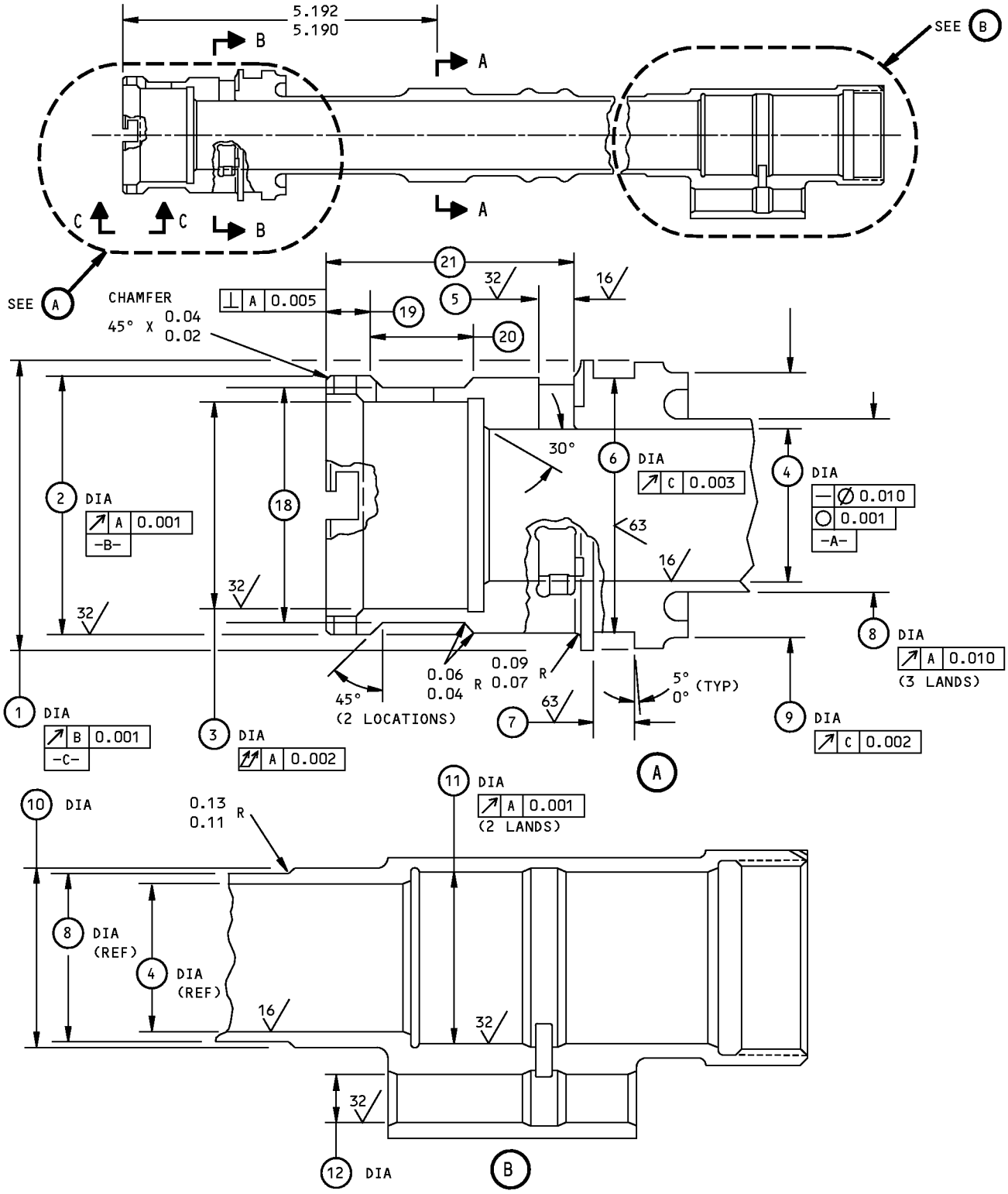
D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Plating Repair

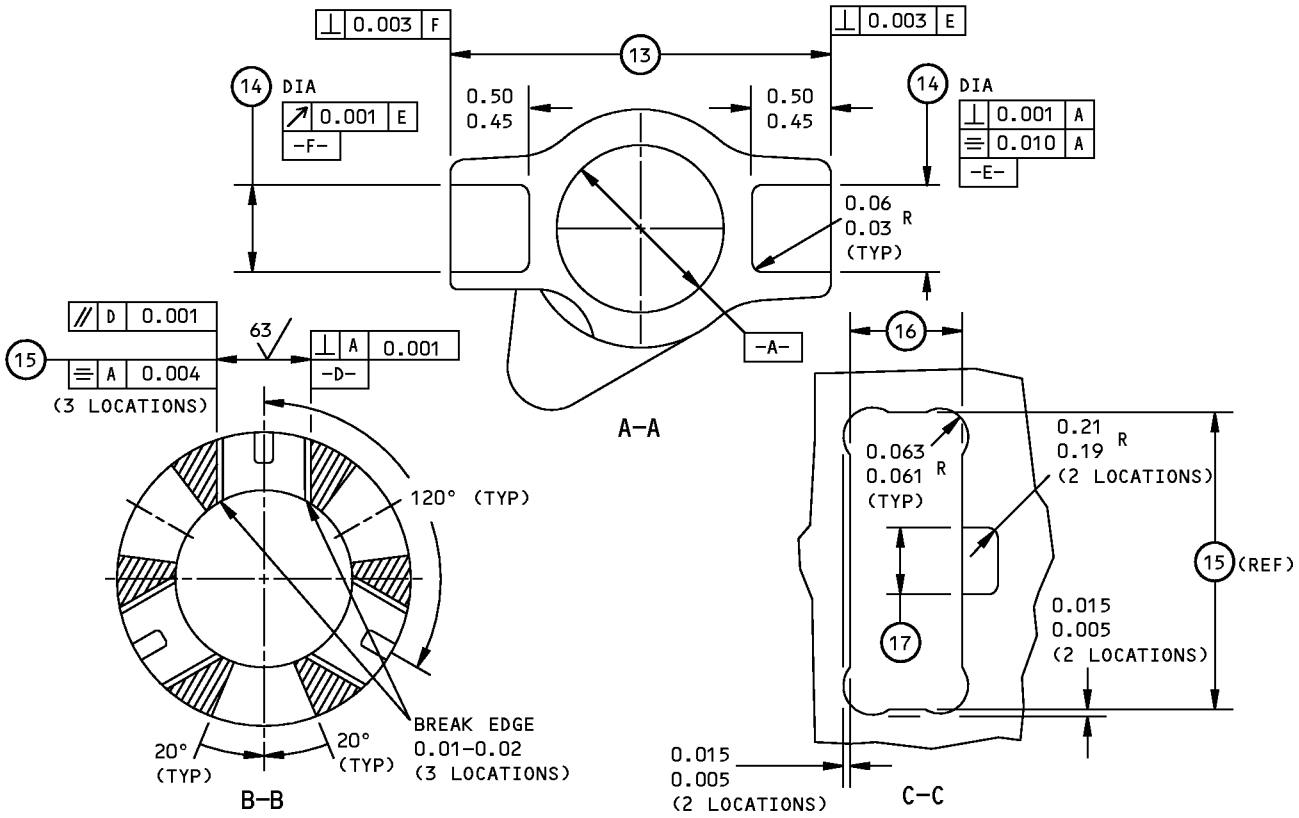
A. Machine defects from the datum -B- diameter to within the repair limit as shown in REPAIR 2-2, Figure 601.

B. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

C. Grind to the dimension and finish as shown in REPAIR 2-2, Figure 601 and the SOPM 20-10-04.



315A1807-5 Cylinder Repair and Refinish
Figure 601 (Sheet 1 of 2)



	1	2	3	4	5	6	7	8	9	10	11
DESIGN DIM	2.115 2.114	1.849 1.848	1.502 1.500	1.118 1.116	0.254 0.252	1.875 1.873	0.314 0.304	1.278 1.268	1.930 1.920	1.320 1.310	1.305 1.303
REPAIR LIMIT	---	1.818 ▷1	---	---	---	---	---	---	---	---	---

	12	13	14	15	16	17	18	19	20	21
DESIGN DIM	0.361 0.360	2.386 2.376	0.5631 0.5625	0.631 0.629	0.256 0.254	0.145 0.135	1.705 1.695	0.31 0.29	0.76 0.74	1.817 1.807
REPAIR LIMIT	---	---	---	---	---	---	---	---	---	---

REFINISH

CHROME PLATE DIAMETER OF DATUM -B- (F-15.03) WITH A MINIMUM THICKNESS OF 0.003 INCH.

PASSIVATE (F-17.09) ALL OTHER SURFACES

▷1 MAXIMUM REPAIR LIMIT

REPAIR

REF ▷1

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

315A1807-5 Cylinder Repair and Refinish
Figure 601 (Sheet 2 of 2)

HOUSING - REPAIR 3-1

315A1809–4, 315A1861–1, –5

1. General

A. This procedure gives the data that is necessary to repair and refinish the housing.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

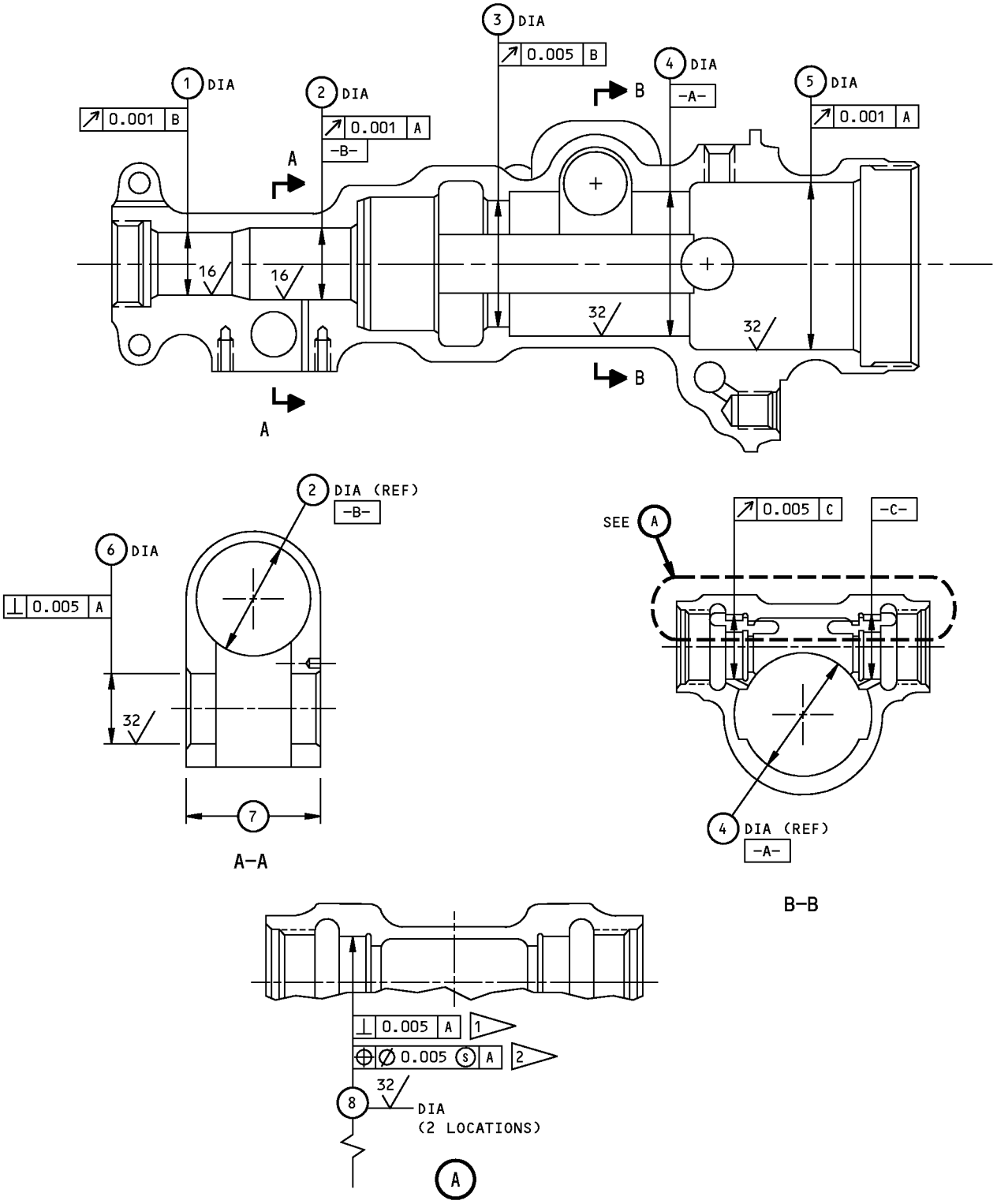
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to REPAIR 3-1, Figure 601 for refinish instructions.



315A1809-4 315A1861-1,-5 Housing Repair and Refinish
Figure 601 (Sheet 1 of 2)

	①	②	③	④	⑤	⑥	⑦	⑧
315A1809-4	0.802 0.800	0.927 0.925	1.625 1.620	1.8510 1.8504	2.120 2.118	0.5638 0.5631	1.125 1.120	0.9454 0.9449
315A1861-1,-5	0.802 0.800	0.927 0.925	1.640 1.620	1.8512 1.8506	2.120 2.118	0.5638 0.5631	1.125 1.120	0.9454 0.9449

REFINISH

PASSIVATE (F-17.09)

1 > 315A1809-4

2 > 315A1861-1,-5

63 √ ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY 1

125 √ ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY 2

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

315A1809-4 315A1861-1,-5 Housing Repair and Refinish
Figure 601 (Sheet 2 of 2)

GLAND - REPAIR 4-1

315A1812–1

1. General

A. This procedure gives the data that is necessary to repair and refinish the gland.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

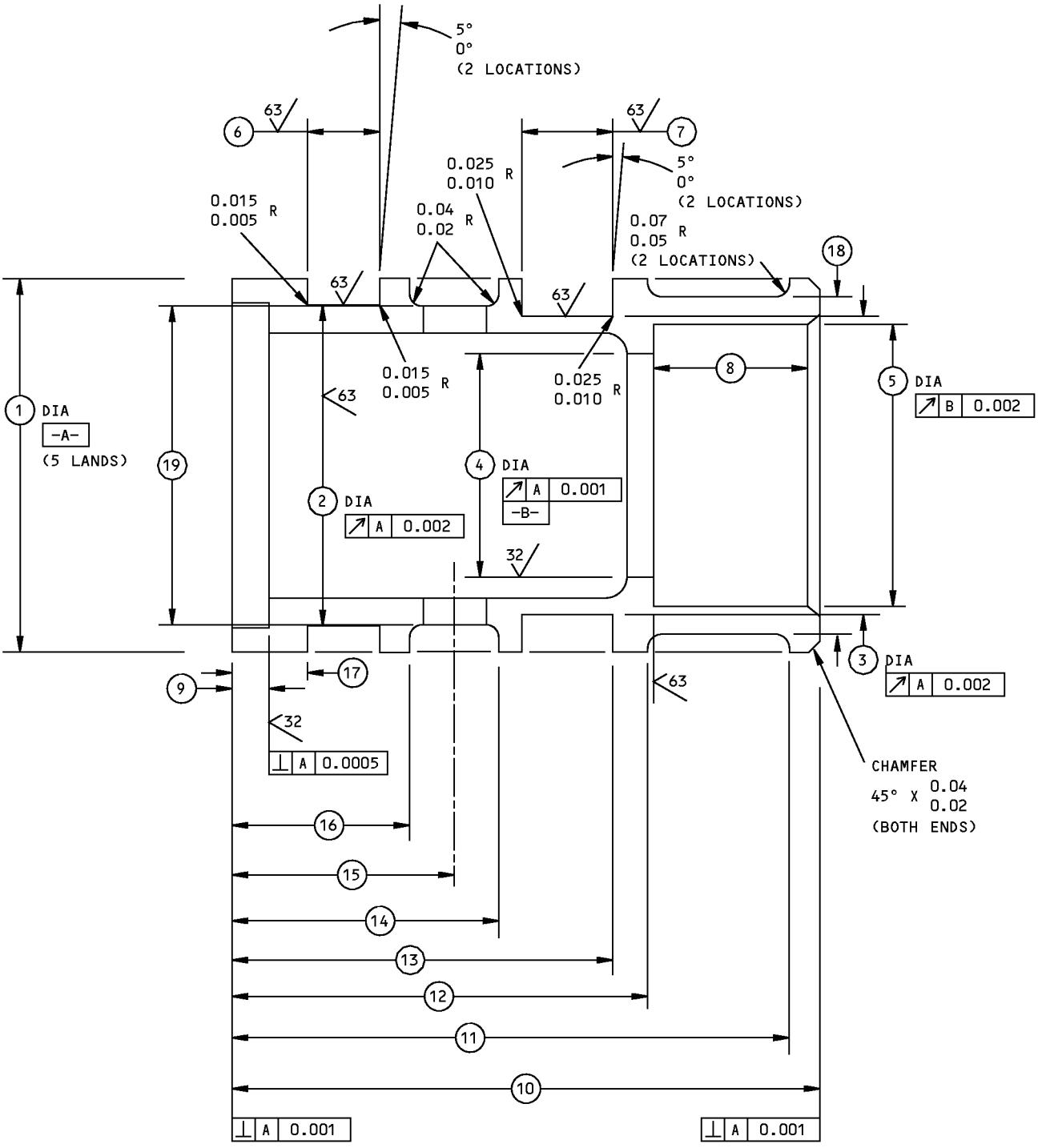
D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Plating Repair

A. Machine defects from the datum -A- diameter to within the repair limit as shown in REPAIR 4-1, Figure 601.

B. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

C. Grind to the dimension and finish as shown in REPAIR 4-1, Figure 601 and the SOPM 20-10-04.



315A1812-1 Gland Repair and Refinish
Figure 601 (Sheet 1 of 2)

	1	2	3	4	5	6	7	8	9	10
DESIGN DIM	1.301 1.300	1.125 1.123	1.060 1.058	0.751 0.750	0.928 0.926	0.255 0.245	0.314 0.304	0.602 0.598	0.135 0.125	2.062 2.058
REPAIR LIMIT	---	---	---	0.781 1	---	---	---	---	---	---

	11	12	13	14	15	16	17	18	19
DESIGN DIM	1.96 1.94	1.40 1.38	1.29 1.27	0.90 0.88	0.76 0.74	0.62 0.60	0.26 0.24	1.130 1.110	1.129 1.119
REPAIR LIMIT	---	---	---	---	---	---	---	---	---

REFINISH

CHROME PLATE DIAMETER OF DATUM -A- (F-15 03) WITH A MINIMUM THICKNESS OF 0.003 INCH.

PASSIVATE (F-17.09) ALL OTHER SURFACES

1 MAXIMUM REPAIR LIMIT

REPAIR

REF 1

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

315A1812-1 Gland Repair and Refinish
Figure 601 (Sheet 2 of 2)

LEAD SCREW NUT - REPAIR 5-1

315A1815–3, –4

1. General

A. This repair gives the data that is necessary to repair and refinish the lead screw nut.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

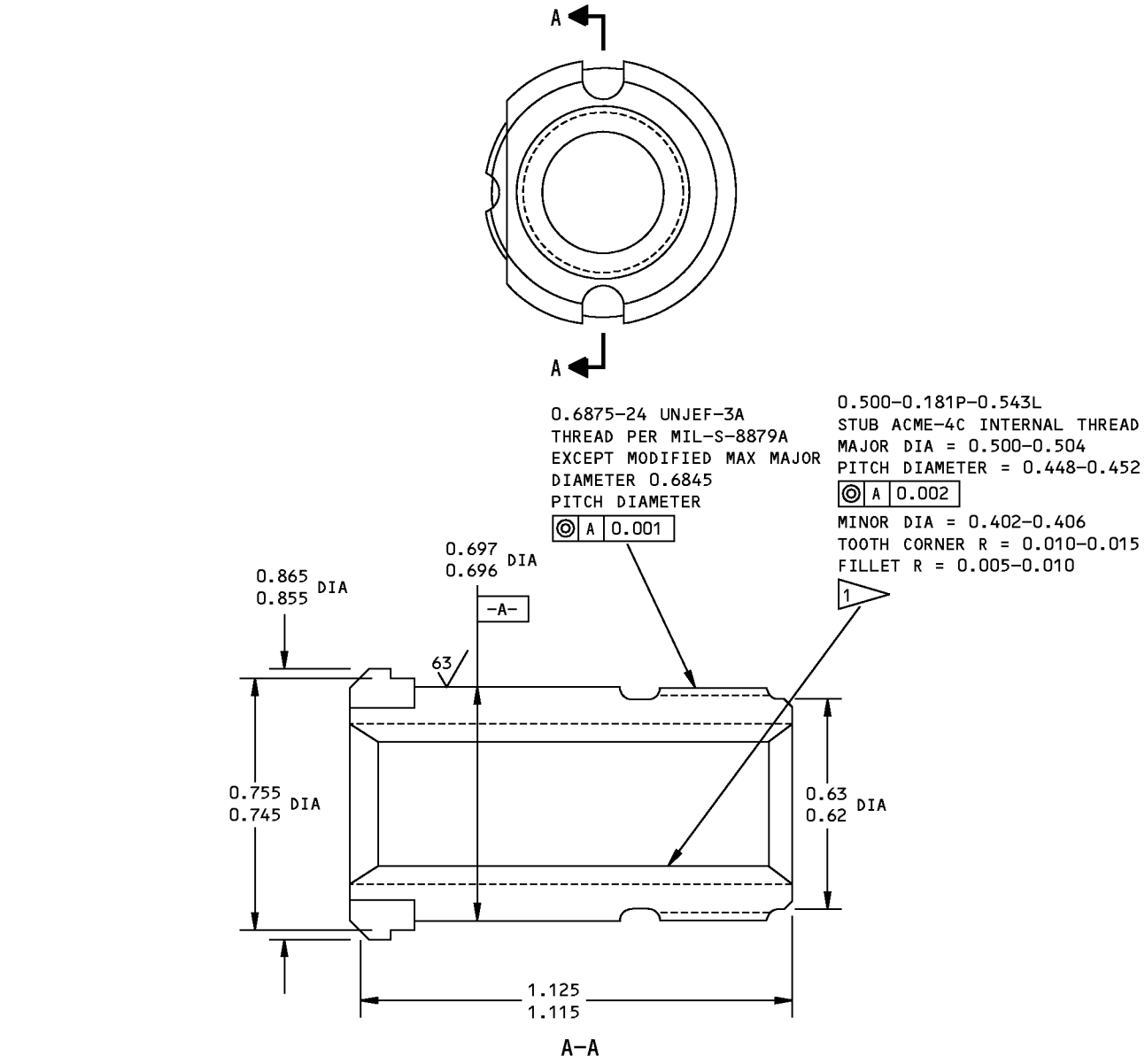
D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to Refinish instructions REPAIR 5-1, Figure 601



1 FOR 315A1815-3 ONLY ON ACME THREADS, APPLY DRY FILM LUBE MICROSEAL 100-1 (VENDOR 11770)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: FOR 315A1815-3 ONLY
52100 TOOL STEEL PER AMS 6440
OPTIONAL: AISI06 GRAPH-MO PER QQ-T-570 OR ASTM A681
FOR 315A1815-4 ONLY
AISI GRAPH-MO PER QQ-T-570 OR ASTM A681

ALL DIMENSIONS ARE IN INCHES

315A1815-3,-4 Lead Screw Nut Repair and Refinish
Figure 601

WORM GEAR SHAFT - REPAIR 6-1

315A1817–2

1. General

A. This procedure gives the data that is necessary to repair and refinish the worm gear shaft.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

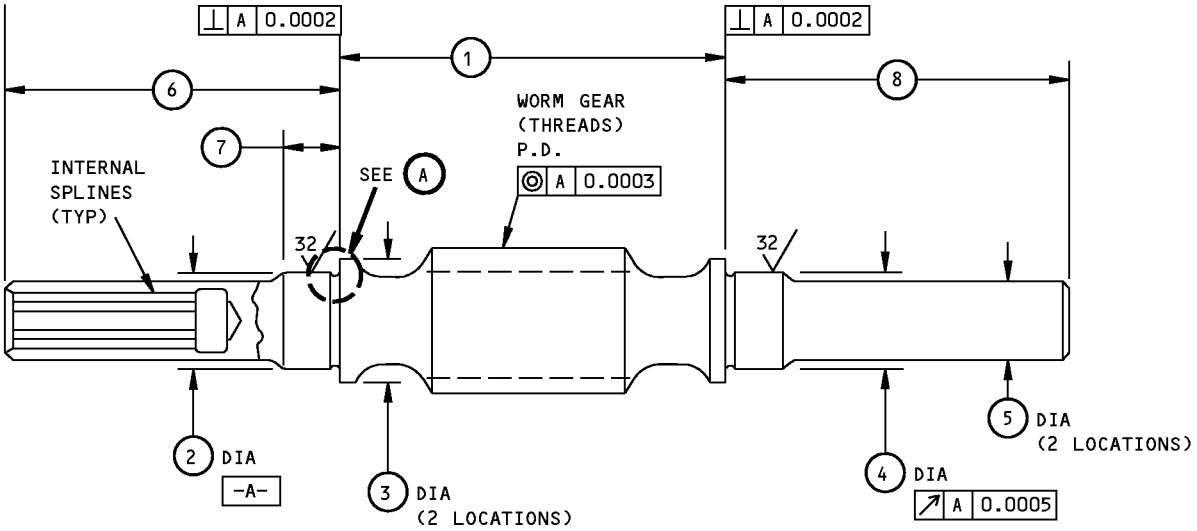
D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

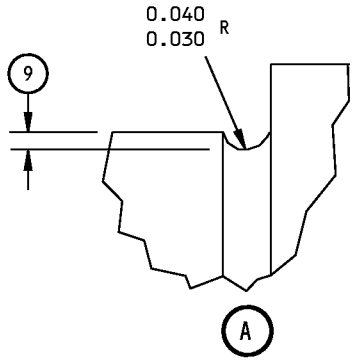
2. Plating Repair

A. Machine defects from the datum -A- or circle 4 diameter to within the repair limit as shown in REPAIR 6-1, Figure 601.

B. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

C. Grind to the dimension and finish as shown in REPAIR 6-1, Figure 601 and the SOPM 20-10-04.





	1	2	3	4	5	6	7	8	9
DESIGN DIM	1.855 1.845	0.4726 0.4723	0.525 0.520	0.4726 0.4723	0.385 0.365	1.610 1.590	0.227 0.207	1.610 1.590	0.033 0.023
REPAIR LIMIT	—	0.441 1	—	0.441 1	—	—	—	—	—

REFINISH

CHROME PLATE DIAMETER OF DATUM -A- AND 4 (F-15.03) WITH A MINIMUM THICKNESS OF 0.003 INCH ON WORM GEAR THREADS, APPLY DRY FILM LUBE MICROSEAL 100-1

1 MAXIMUM REPAIR LIMIT

REPAIR

REF 1

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 9310 STEEL

ALL DIMENSIONS ARE IN INCHES

315A1817-2

Worm Gear Shaft Repair and Refinish
Figure 601

FITTING - REPAIR 7-1

315A1818–2

1. General

A. This procedure gives the data that is necessary to repair and refinish the fitting.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

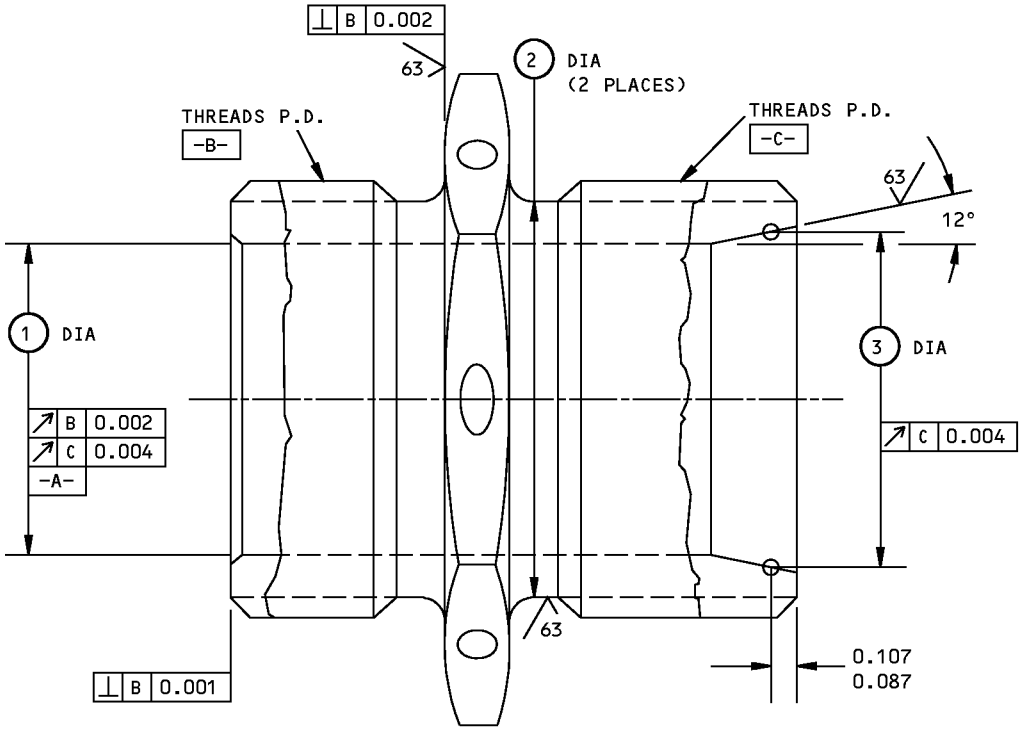
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions REPAIR 7-1, Figure 601



	1	2	3
DESIGN DIM	0.770 0.766	0.947 0.942	0.8101 0.8099
REPAIR LIMIT	—	—	—

REFINISH

PASSIVATE (F-17.09) ALL OVER

REPAIR

(SAME AS REFINISH)

125 MACHINE FINISH EXCEPT AS NOTED

MATERIAL: 303, 303SE, OR 304 CRES

ALL DIMENSIONS ARE IN INCHES

315A1818-2

Fitting Repair and Refinish
Figure 601

ROD END - REPAIR 8-1

315A1831–1

1. General

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

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

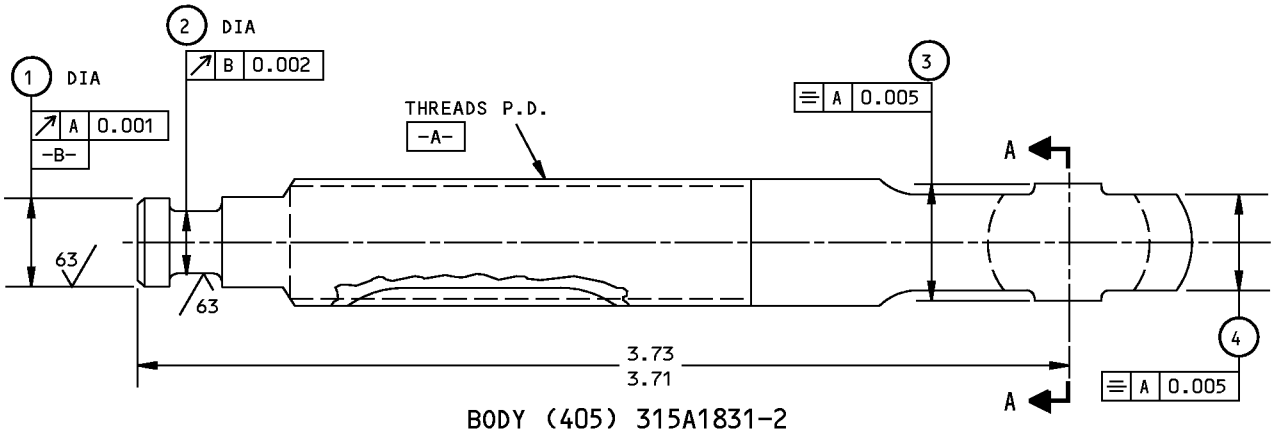
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

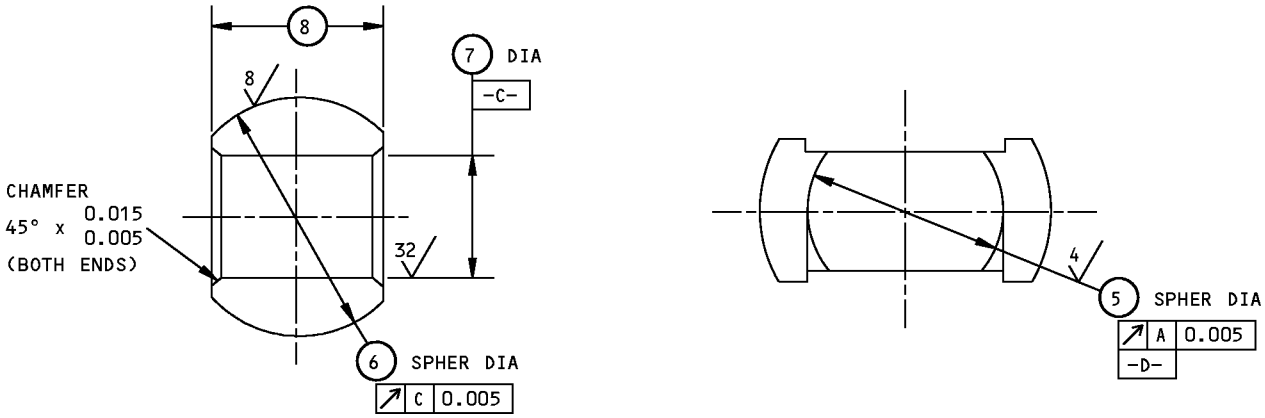
2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions on REPAIR 8-1, Figure 601.



BODY (405) 315A1831-2



BALL (400) 315A1831-3 A-A

	1	2	3	4	5	6	7	8
DESIGN DIM	0.420 0.419	0.310 0.309	0.425 0.415	0.380 0.370	0.6270 0.6265	0.6255 0.6250	0.3125 0.3120	0.437 0.433
REPAIR LIMIT	—	—	—	—	—	—	—	—

REFINISH

BALL (400): NO FINISH
BODY (405): PASSIVATE (F-17.09) ALL OVER. APPLY DRY FILM LUBRICANT EVER-LUBE 967, 0.0003-0.0007 THICK ON DIA -D-

REPAIR

(SAME AS REFINISH)

125 MACHINE FINISH EXCEPT AS NOTED

MATERIAL: BODY (405): 15-5PH CRES, 150-170 KSI
BALL (400): STELLITE NO. 6 PER AMS 5387

DIMENSIONS APPLY BEFORE APPLICATION OF DRY-FILM LUBRICANT

ALL DIMENSIONS ARE IN INCHES

315A1831-1 Rod End Repair and Refinish
Figure 601

PISTON - REPAIR 9-1

315A1842–2

1. General

A. This procedure gives the data that is necessary to repair and refinish the piston.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Plating Repair

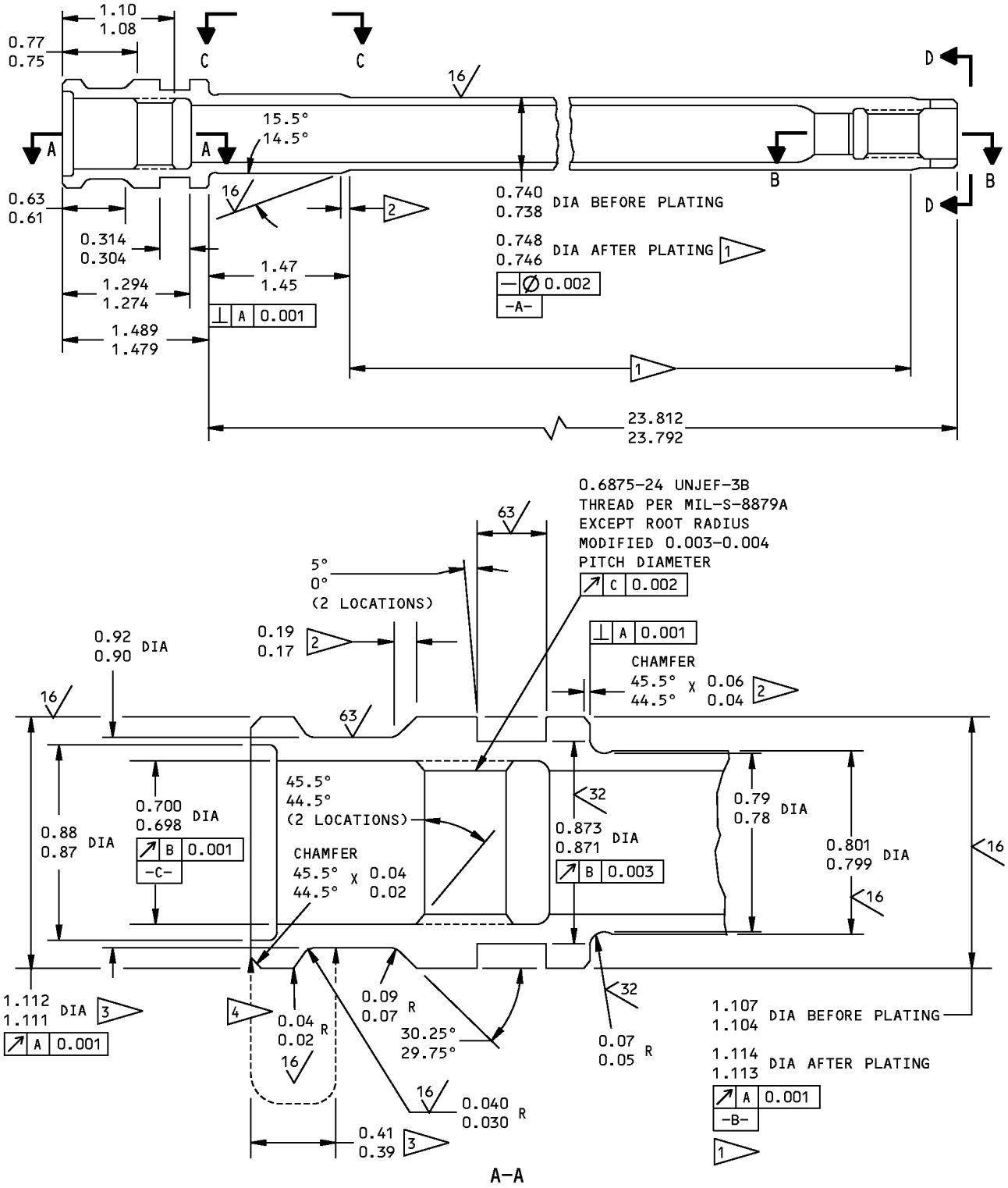
A. Grind the surface to the dimensions indicated by Flagnotes 1 and 2 as shown in REPAIR 9-1, Figure 601 and shown in SOPM 20-10-04.

B. Passivate (F-17.25).

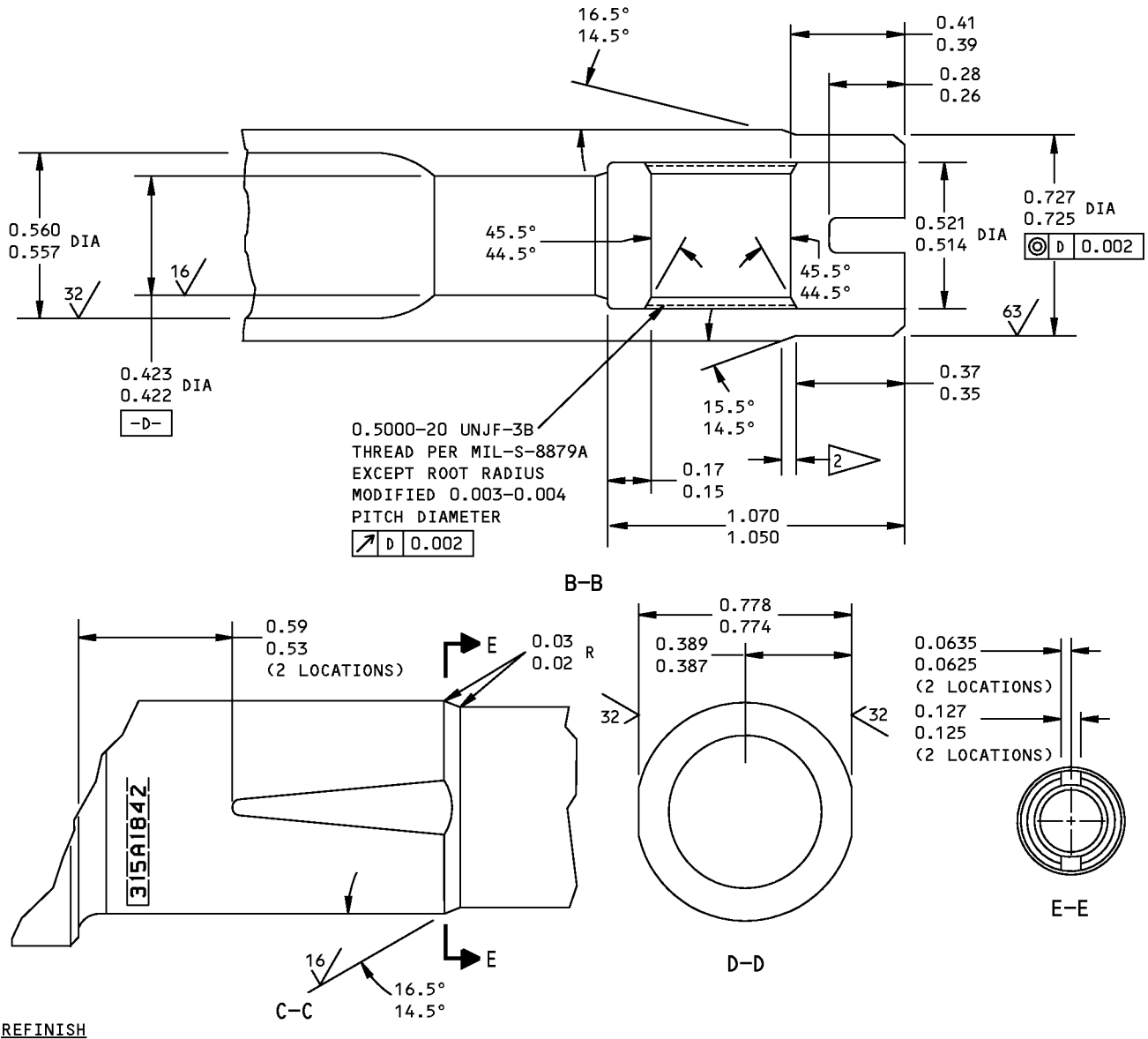
C. Hard chrome plate (F-15.03) the area indicated by Flagnotes 1 and 2 as shown in REPAIR 9-1, Figure 601.

(1) Bake 12 hours minimum at 350F-400F as shown in SOPM 20-42-03.

D. Grind the surface to the dimensions indicated by Flagnotes 1 and 2 as shown in REPAIR 9-1, Figure 601 and shown in SOPM 20-10-04.



315A1842-2 Locking Actuator Piston Repair and Refinish
Figure 601 (Sheet 1 of 2)



REFINISH

PASSIVATE (F-17.25). HARD CHROME PLATE (F-15.03) THE SURFACES INDICATED BY 1. FINISH GRIND THE FINAL DIAMETER AS SHOWN IN SOPM 20-10-04.

1 HARD CHROME PLATE (F-15.03). BAKE 12 HOURS MINIMUM AT 350F-400F AS SHOWN IN SOPM 20-42-03.

2 PLATING RUNOUT AREA. GRIND AS SHOWN IN SOPM 20-10-04 AFTER HARD CHROME PLATE

3 ION NITRIDE. NITRID CASE DEPTH 0.003-0.005 INCH. CASE HARDNESS RC 55 MINIMUM. COMPOUND LAYER 0.0001-0.0003

125 MACHINE FINISH UNLESS SHOWN DIFFERENTLY

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

4 ONE CONTINUOUS SMOOTH SURFACE ALL AROUND. NO MISMATCH ALLOWED

315A1842-2 Locking Actuator Piston Repair and Refinish
Figure 601 (Sheet 2 of 2)

LOCK FOLLOWER - REPAIR 10-1

315A1847–1

1. General

A. This procedure gives the data that is necessary to repair and refinish the lock follower.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

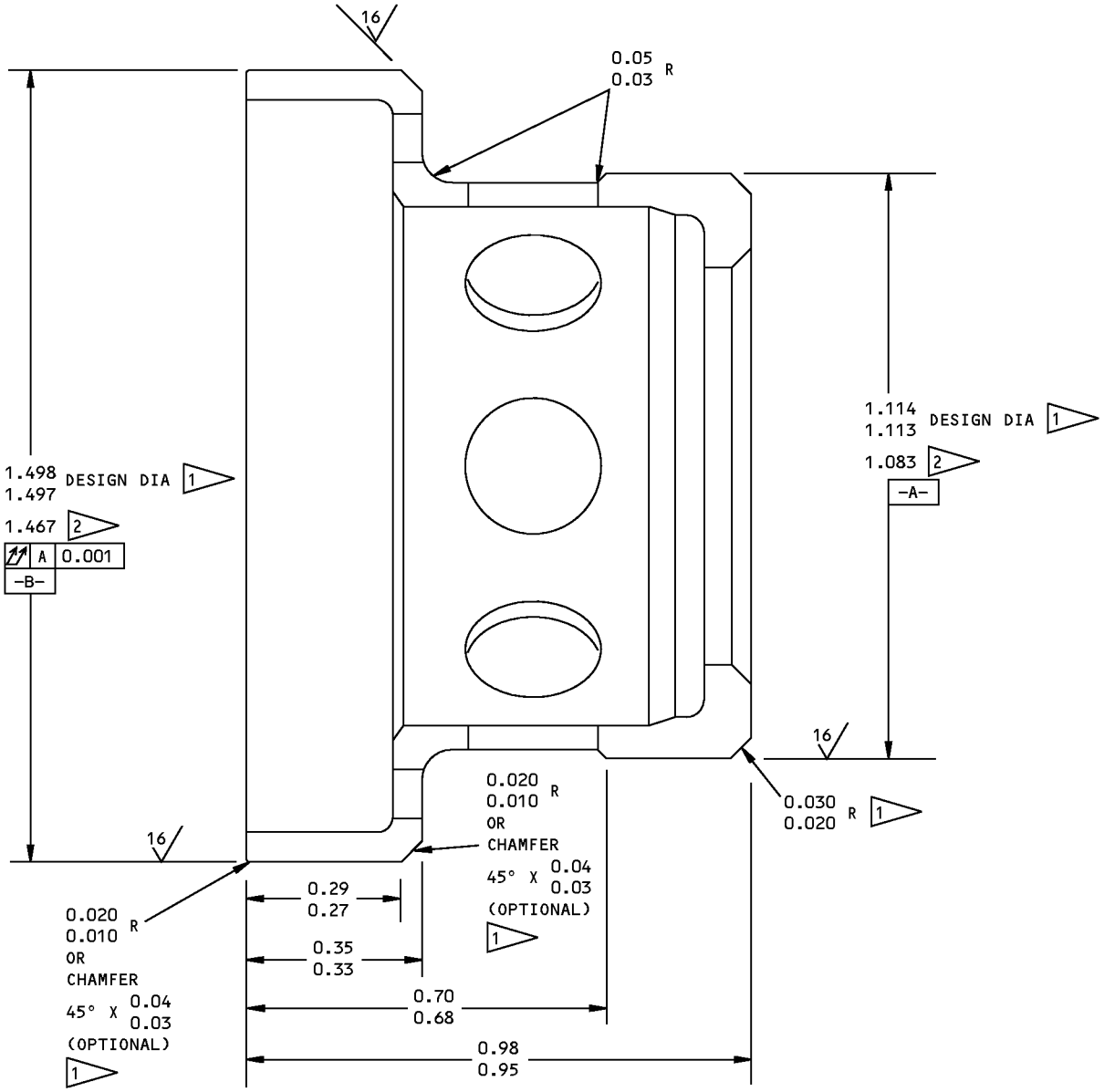
D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Plating Repair

A. Machine defects from the datum -A- or -B- diameter to within the repair limit as shown in REPAIR 10-1, Figure 601.

B. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

C. Grind to the dimension and finish as shown in REPAIR 10-1, Figure 601 and the SOPM 20-10-04.



REFINISH

CHROME PLATE DIAMETER OF DATUM -A-,-B- (F-15.03) WITH A MINIMUM THICKNESS OF 0.003 INCH. PLATING RUNOUT ON CHAMFERS IS PERMITTED

PASSIVATE (F-17.09) ALL OTHER SURFACES

1 BUFF INDICATED SURFACES ALL AROUND

2 MAXIMUM REPAIR LIMIT

REPAIRS

1
REF 1 2

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

315A1847-1

Lock Follower Repair and Refinish
Figure 601

LEAD SCREW - REPAIR 11-1

315A1850–3, –4, –5

1. General

A. This procedure gives the data that is necessary to repair and refinish the lead screw.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

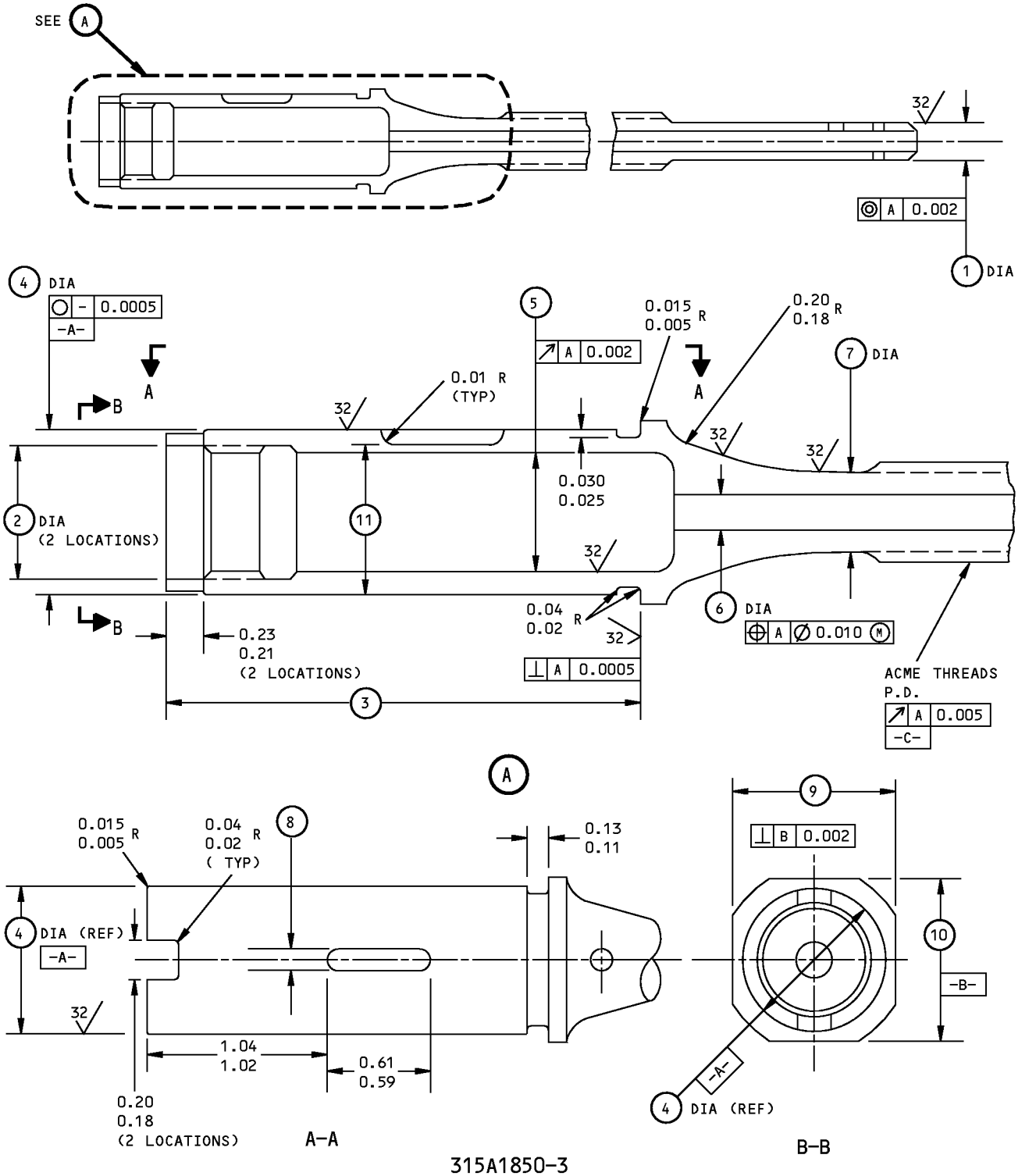
2. Plating Repair

A. Machine defects from the datum -A- diameter to within the repair limit as shown in REPAIR 11-1, Figure 601.

B. Shot peen the machined diameter as shown in REPAIR 11-1, Figure 601 and the SOPM 20-10-03.

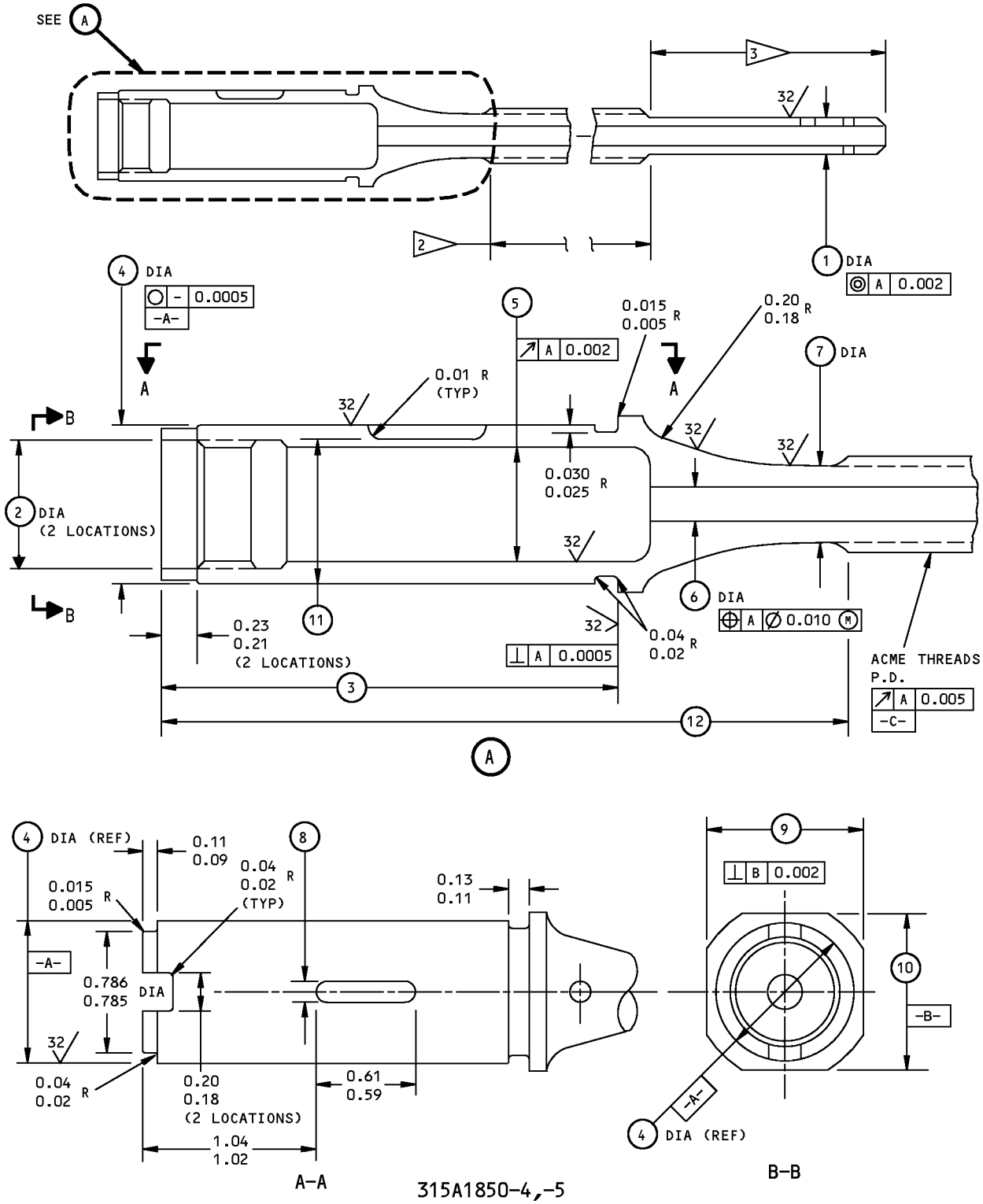
C. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

D. Grind to the dimension and finish as shown in REPAIR 11-1, Figure 601 and the SOPM 20-10-04.



315A1850-3

Lead Screw Repair and Refinish
Figure 601 (Sheet 1 of 3)



Lead Screw Repair and Refinish
Figure 601 (Sheet 2 of 3)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DESIGN DIM	0.311 0.310	0.648 0.641	2.342 2.332	0.7874 0.7870	0.570 0.550	0.187 0.180	0.380 0.375	0.125 0.124	0.850 0.846	0.850 0.846
REPAIR LIMIT	---	---	---	0.756 ▷1	---	---	---	---	---	---

	(11)	(12)
DESIGN DIM	0.719 0.709	3.56 3.54
REPAIR LIMIT	---	---

REFINISH

CHROME PLATE DIAMETER OF DATUM -A- (F-15 03) WITH A MINIMUM THICKNESS OF 0.003 INCH.

ON ACME THREADS (DIA -C-), APPLY DRY FILM LUBE MICROSEAL 100-1

▷1 MAXIMUM REPAIR LIMIT

▷2 ION NITRIDE THIS AREA ONLY

▷3 ION NITRIDE OPTIONAL IN THIS AREA

REPAIR

REF ▷1

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

SHOT PEEN:
0.017-0.046 SHOT SIZE
0.016 A2 INTENSITY

MATERIAL: 4340 STEEL, 180-200 KSI (315A1850-3)
4340 STEEL, 160-180 KSI (315A1850-4,-5)

ALL DIMENSIONS ARE IN INCHES

315A1850-3,-4,-5

Lead Screw Repair and Refinish
Figure 601 (Sheet 3 of 3)

RETAINER - REPAIR 12-1

315A1854–1

1. General

A. This procedure gives the data that is necessary to repair and refinish the retainer.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

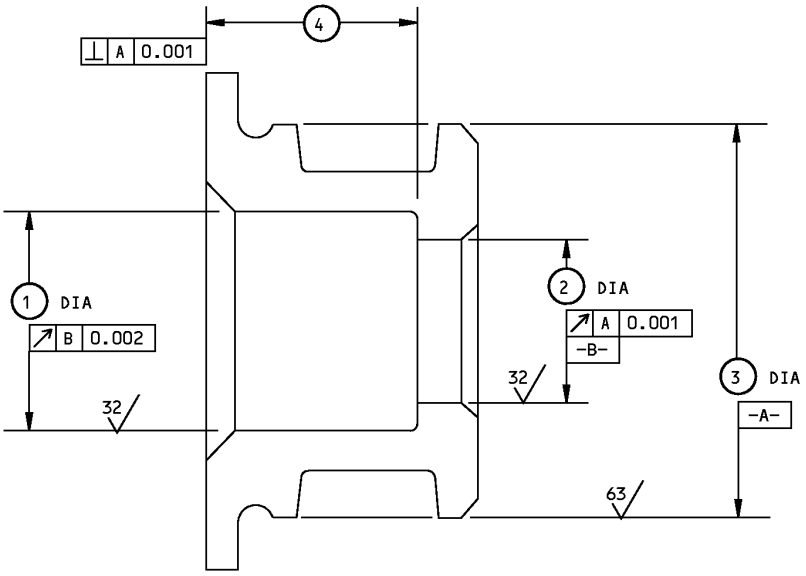
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions shown on REPAIR 12-1, Figure 601



	1	2	3	4
DESIGN DIM	0.423 0.422	0.313 0.312	0.798 0.797	0.433 0.427
REPAIR LIMIT	—	—	—	—

REFINISH

PASSIVATE (F-17.09) ALL OVER

REPAIR

(SAME AS REFINISH)

125 MACHINE FINISH EXCEPT AS NOTED

MATERIAL: 304 CRES

ALL DIMENSIONS ARE IN INCHES

315A1854-1 Retainer Repair and Refinish
Figure 601

MANUAL UNLOCK HANDLE - REPAIR 13-1

315A1857–2, –4

1. General

A. This procedure gives the data that is necessary to repair and refinish the manual unlock handle.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

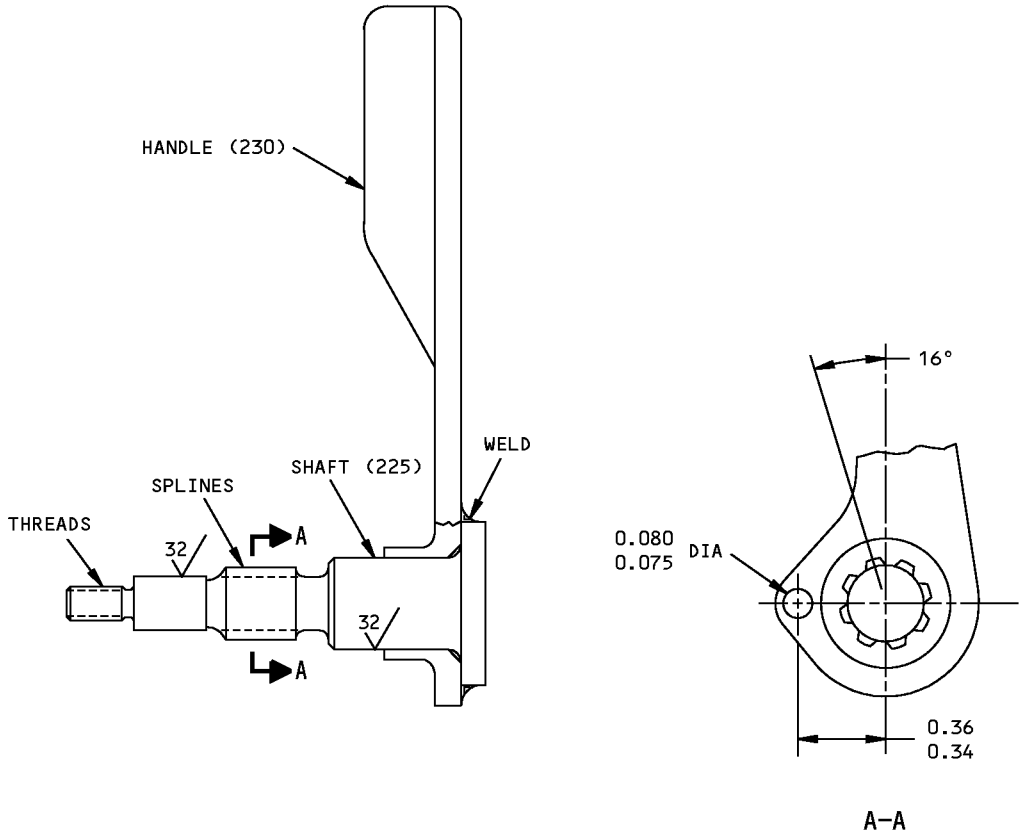
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 13-1, Figure 601



REFINISH

PASSIVATE (F-17.25) ALL OVER

REPAIR

(SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: SHAFT (225): 321 OR 347 CRES
SHAFT (225A): 15-5PH CRES
HANDLE (230): 347 CRES
HANDLE (230A): 15-5PH CRES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

315A1857-2,-4 Manual Unlock Handle Repair and Refinish
Figure 601

MANUAL UNLOCK SHAFT - REPAIR 13-2

315A1896–2, –3

1. General

A. This procedure gives the data that is necessary to repair and refinish the manual unlock shaft.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

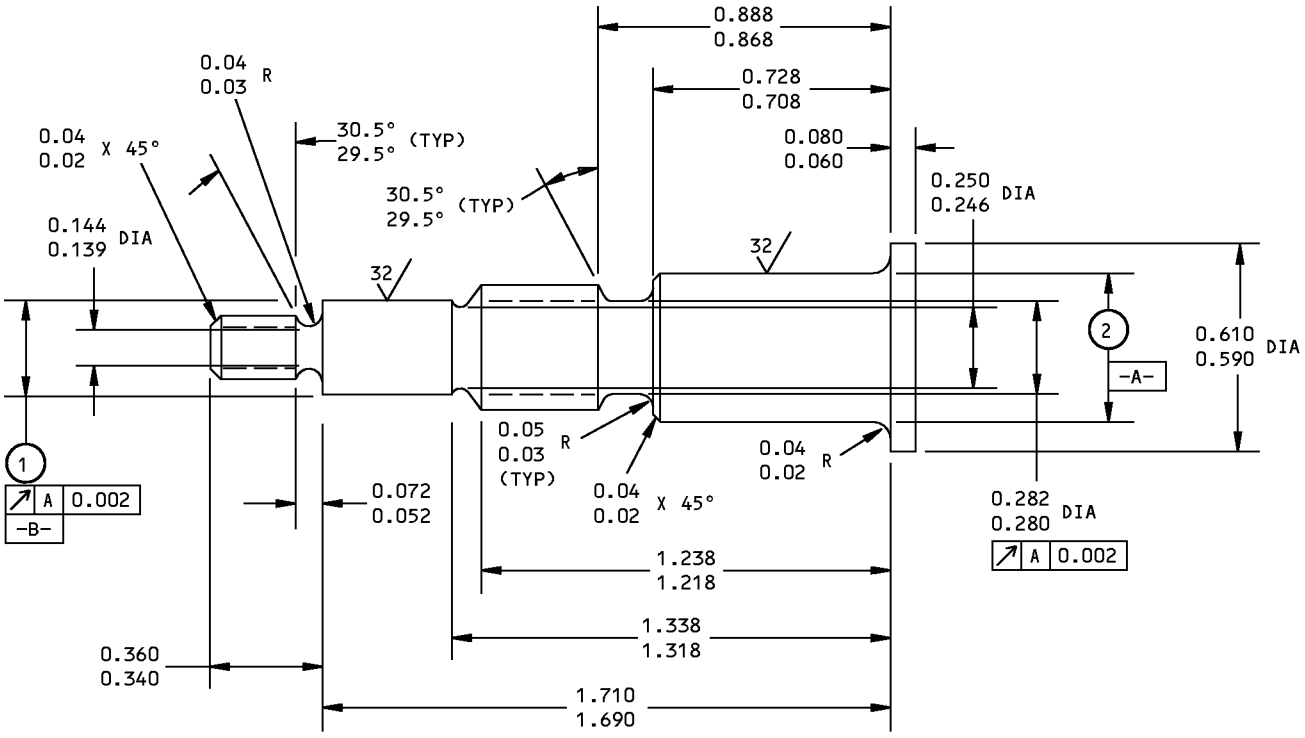
D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Plating Repair

A. Machine defects from the datum -A- or -B- diameter to within the repair limit as shown in REPAIR 13-2, Figure 601.

B. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

C. Grind to the dimension and finish as shown in REPAIR 13-2, Figure 601 and the SOPM 20-10-04.



	1	2
DESIGN DIM	0.2750 0.2746	0.4374 0.4369
REPAIR LIMIT	0.245 1	0.406 1

REFINISH

CHROME PLATE DIAMETER OF DATUM -A-,-B- (F-15.03) WITH A MINIMUM THICKNESS OF 0.003 INCH.

PASSIVATE (F-17.75) ALL OVER

1 MAXIMUM REPAIR LIMIT

REPAIR

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: SHAFT (225): 321 OR 347 CRES
SHAFT (225A): 15-5PH CRES

ALL DIMENSIONS ARE IN INCHES

315A1896-2,-3 Unlock Shaft Repair and Refinish
Figure 601

ROD END - REPAIR 14-1

315A1859–1

1. General

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

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

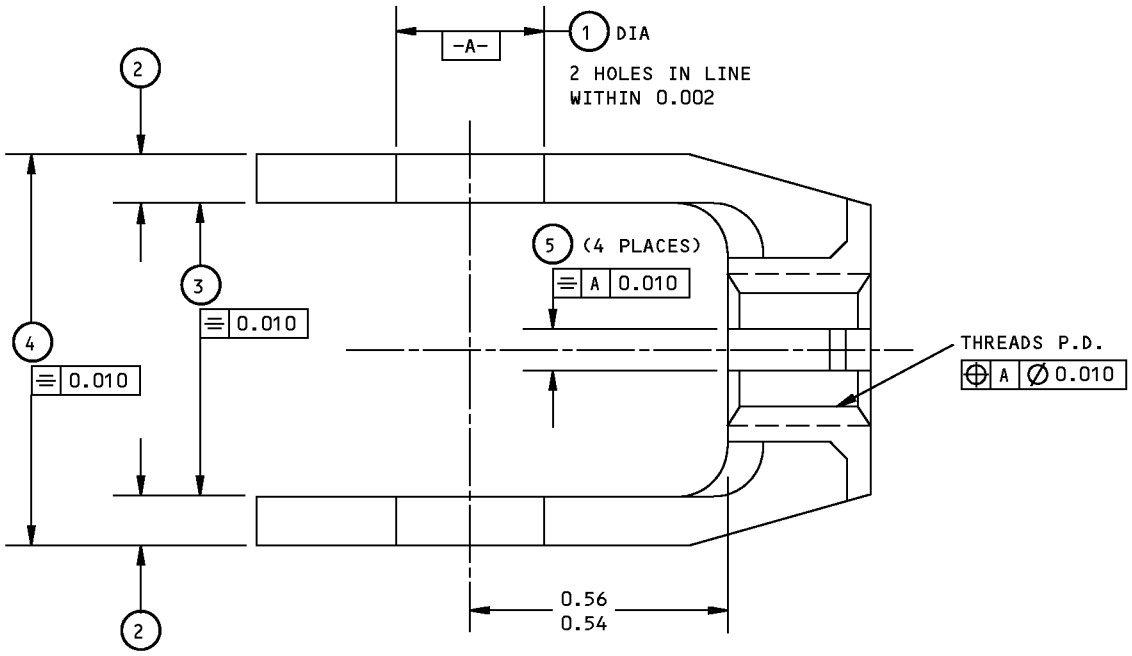
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 14-1, Figure 601



	1	2	3	4	5
DESIGN DIM	0.313 0.312	0.115 0.100	0.540 0.530	0.76 0.74	0.096 0.094
REPAIR LIMIT	—	—	—	—	—

REFINISH

PASSIVATE (F-17.09) ALL OVER

REPAIR

(SAME AS REFINISH)

125 MACHINE FINISH EXCEPT AS NOTED

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

315A1859-1

Rod End Repair and Refinish
Figure 601

FEEDBACK CONTROL ROD - REPAIR 15-1

315A1868–1, –2

1. General

A. This procedure gives the data that is necessary to repair and refinish the feedback control rod.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

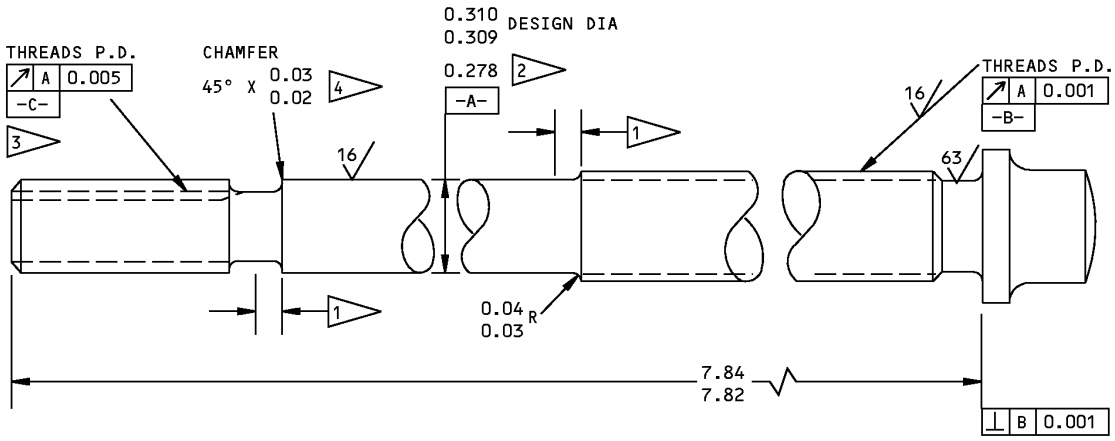
2. Plating Repair

A. Machine defects from the datum -A- diameter to within the repair limit as shown in REPAIR 15-1, Figure 601.

B. Shot peen the machined diameter as shown in REPAIR 15-1, Figure 601 and the SOPM 20-10-03.

C. Chrome plate the machined diameter as shown in the SOPM 20-42-03 and F-15.03.

D. Grind to the dimension and finish as shown in REPAIR 15-1, Figure 601 and the SOPM 20-10-04.



REFINISH

CHROME PLATE DIAMETER OF DATUM -A- (F-15.03) WITH A MINIMUM THICKNESS OF 0.003. INCH. BAKE AT 350°-400°F. OBSERVE CHROME PLATE RUNOUT AS NOTED 1

PASSIVATE (F-17.09) ALL OTHER SURFACES

1. CHROME PLATE RUNOUT 0.08 MAX
2. MAXIMUM REPAIR LIMIT
3. SILVER PLATE (F-15.07) THREADS OF DATUM -C- 0.00015-0.00020 THICK (315A1868-1)
   CADMIUM PLATE (F-15.02) THREADS OF DATUM -C- 0.0002-0.0004 THICK (315A1868-2)
4. GRIND AFTER PLATING

REPAIR

REF 2 4

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

SHOT PEEN: 0.017-0.046 SHOT SIZE
0.016 A2 INTENSITY

MATERIAL: 15-5PH CRES, 180-200 KSI (315A1868-1)
15-5PH CRES, 150-170 KSI (315A1868-2)

ALL DIMENSIONS ARE IN INCHES

315A1868-1,-2 Feedback Control Rod Repair and Refinish
Figure 601

FEEDBACK BRACKET ASSEMBLY - REPAIR 16-1

315A1880–2

1. General

A. This procedure gives the data that is necessary to repair and refinish the feedback bracket assembly.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

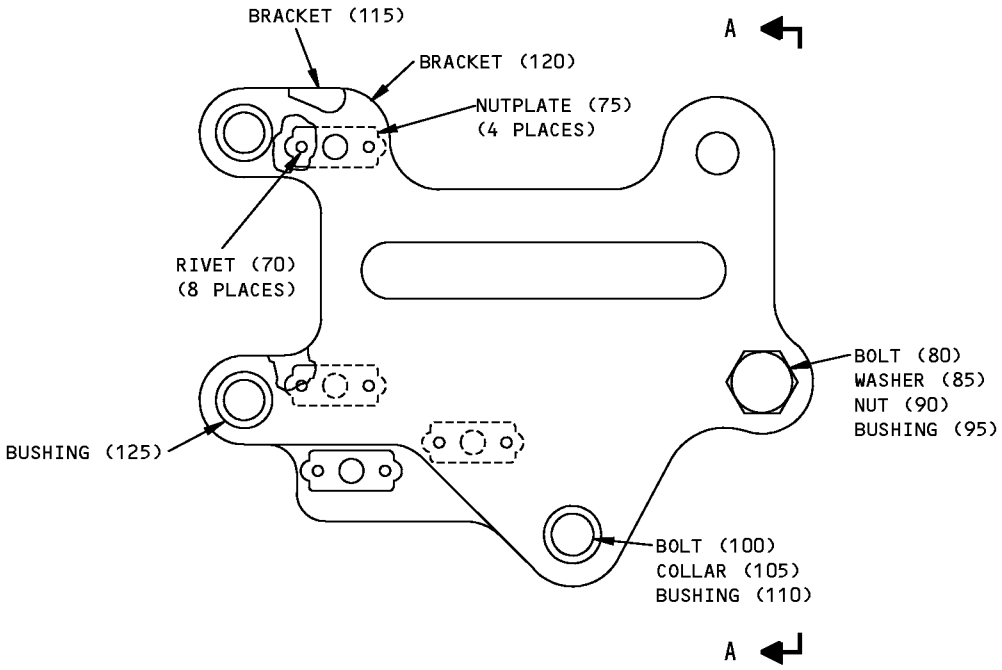
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

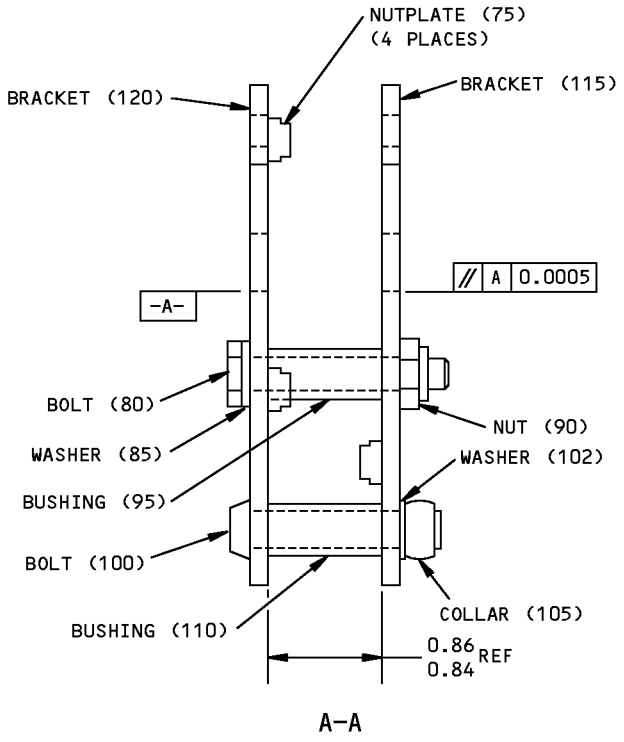
2. Parts Replacement

NOTE: For repair of surfaces which may require only restoration of original finish, refer to REPAIR 16-2.

A. Nutplates – Drill out rivets and remove defective nutplate. Install replacement nutplate with rivets.

B. Replace other parts per REPAIR 16-1, Figure 601.





315A1880-2

Feedback Bracket Assembly Parts Replacement
Figure 601

BRACKET - REPAIR 16-2

315A1881–1, –2, 315A1882–1, –2

1. General

A. This procedure gives the data that is necessary to repair and refinish the bracket.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

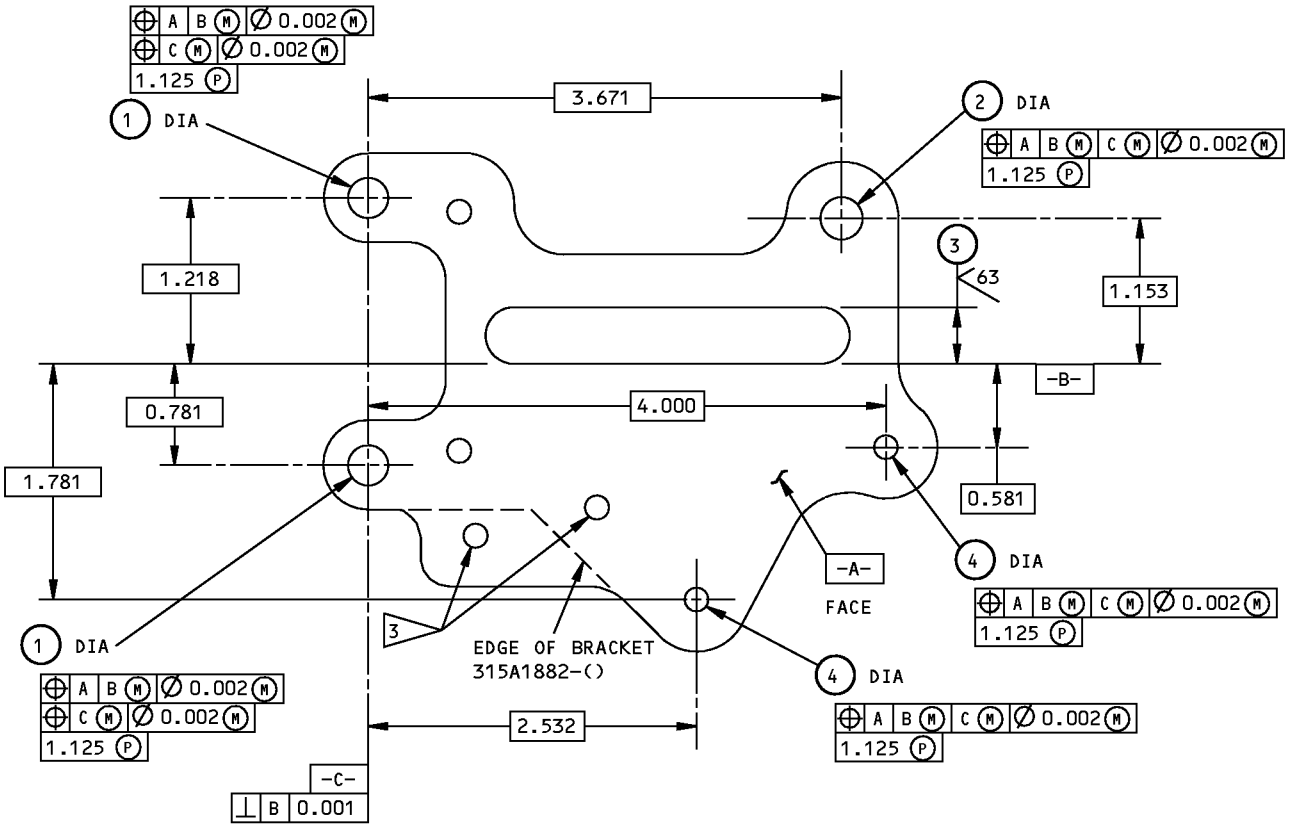
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 16-2, Figure 601



	1 (1)	1 (2)	2	3	4
DESIGN DIM	0.375 0.374	0.253 0.251	0.316 0.312	0.447 0.442	0.255 0.251
REPAIR LIMIT	—	—	—	—	—

REFINISH

PASSIVATE (F-17.09) ALL OVER

1 315A1881-1, 315A1882-1

2 315A1881-2, 315A1882-2

3 0.218-0.229 DIAMETER HOLES FOR 315A1881-1,-2

REPAIR

(SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 301 CRES

ALL DIMENSIONS ARE IN INCHES

315A1881-1,-2 Bracket Repair and Refinish
Figure 601

FEEDBACK LEVER ASSEMBLY - REPAIR 17-1

315A1883–4, –6

1. General

A. This procedure has the data that is necessary to repair and refinish the feedback lever assembly.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Bushing Replacement

A. Remove bushings.

B. If corrosion or damage exists on lug faces or hole surfaces refer to REPAIR 17-1, Paragraph 3. for repair instructions.

C. Install new bushings using shrink-fit method with sealant, A00247 as shown in SOPM 20-50-03.

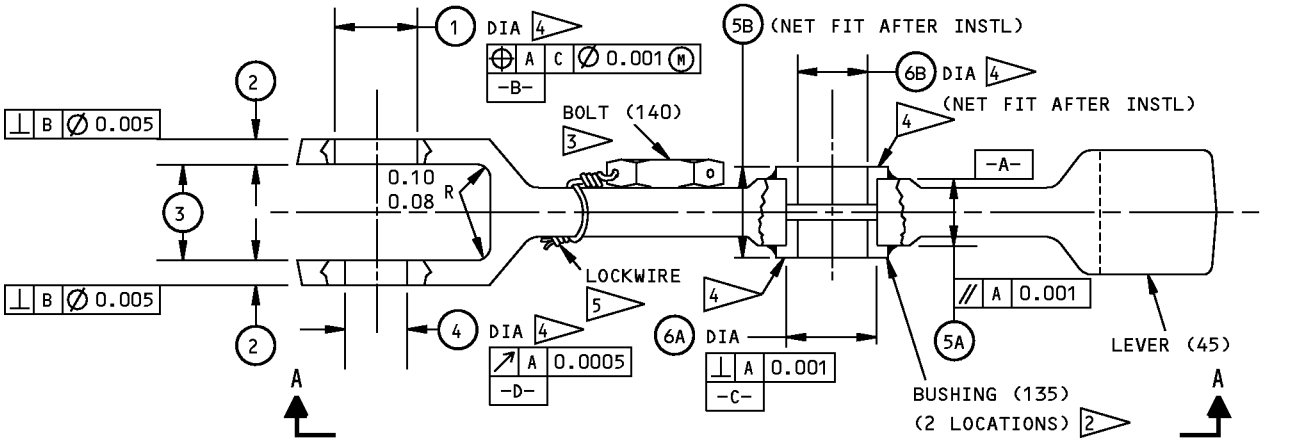
D. Check dimensions and machine as necessary to design dimensions and finish shown.

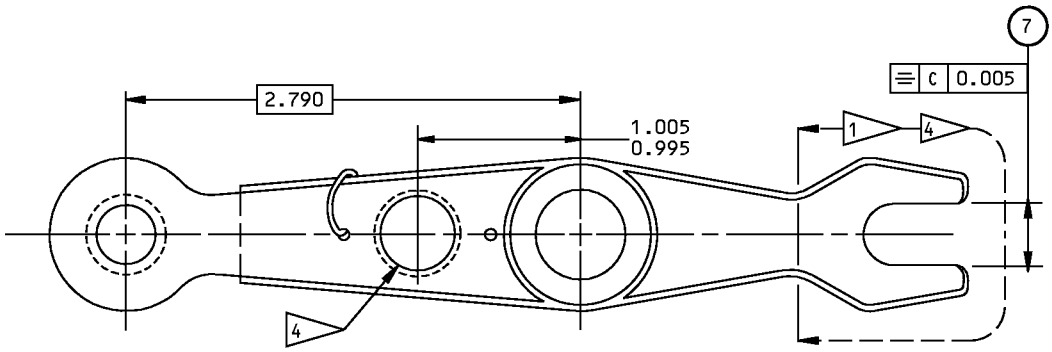
E. Seal bushings with sealant, A00247 as shown in REPAIR 17-1, Figure 601.

3. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 17-1, Figure 601



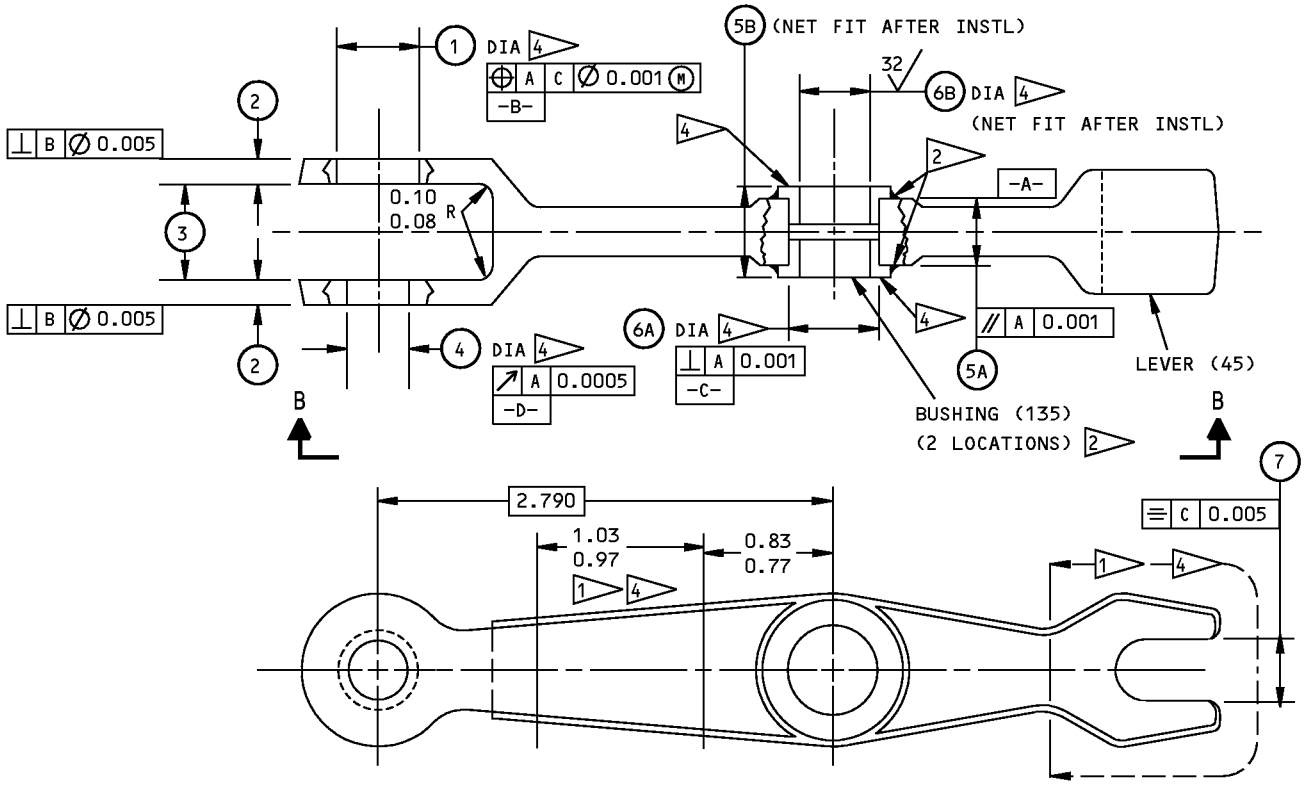


LEVER (130) 315A1883-4

A-A

315A1883-4

Feedback Lever Assembly Repair and Refinish
Figure 601 (Sheet 1 of 2)



LEVER (130A) 315A1883-6

B-B

	1	2	3	4	5A	5B	6A	6B	7
DESIGN DIM	0.5020 0.5014	0.13 0.11	0.57 0.55	0.3769 0.3762	0.405 0.395	0.529 0.509	0.5631 0.5625	0.4390 0.4368	0.379 0.375
REPAIR LIMIT	------	------	------	------	------	------	------	------	------

REFINISH

HARD ANODIZE AREA NOTED 1.
SULFURIC ACID ANODIZE (F-17.03) ALL OTHER AREAS.
AFTER BUSHING INSTALLATION, APPLY PRIMER
BMS 10-11, TYPE 1 (F-20.02) AND ENAMEL,
BMS 10-60 (SRF-14.9813) EXCEPT IN AREAS NOTED 4

REPAIR

125 ALL MACHINED SURFACES

MATERIAL: AL ALLOY

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

1. HARD ANODIZE (F-2.204) THIS AREA
2. FILLET SEAL FLANGES WITH BMS 5-95 SEALANT
3. TIGHTEN TO 120-150 LB-IN
4. NO PAINT OR PRIMER IN THIS AREA
5. LOCKWIRE DOUBLE TWIST METHOD PER SOPM 20-50-02

315A1883-6

Feedback Lever Assembly Repair and Refinish
Figure 601 (Sheet 2 of 2)

FEEDBACK SPINDLE - REPAIR 18-1

315A1884–1

1. General

A. This proceduregives the data that is necessary to repair and refinish the feedback spindle.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

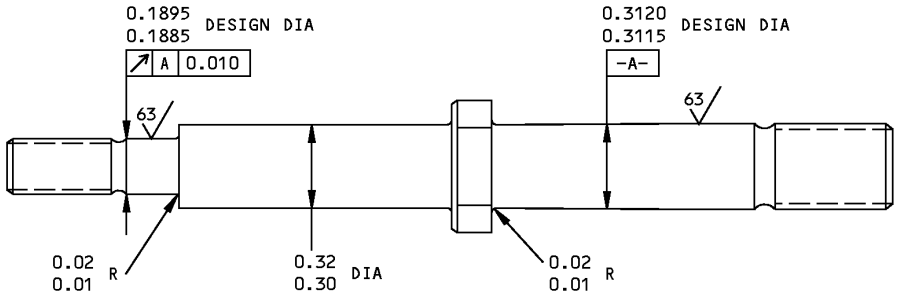
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 18-1, Figure 601



REFINISH

PASSIVATE (F-17.09) ALL OVER

REPAIR

(SAME AS REFINISH)

125 MACHINE FINISH EXCEPT AS NOTED

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

315A1884-1 Feedback Spindle Repair and Refinish
Figure 601

STOP - REPAIR 19-1

315A1891–1

1. General

A. This procedure gives the data that is necessary to repair and refinish the stop.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

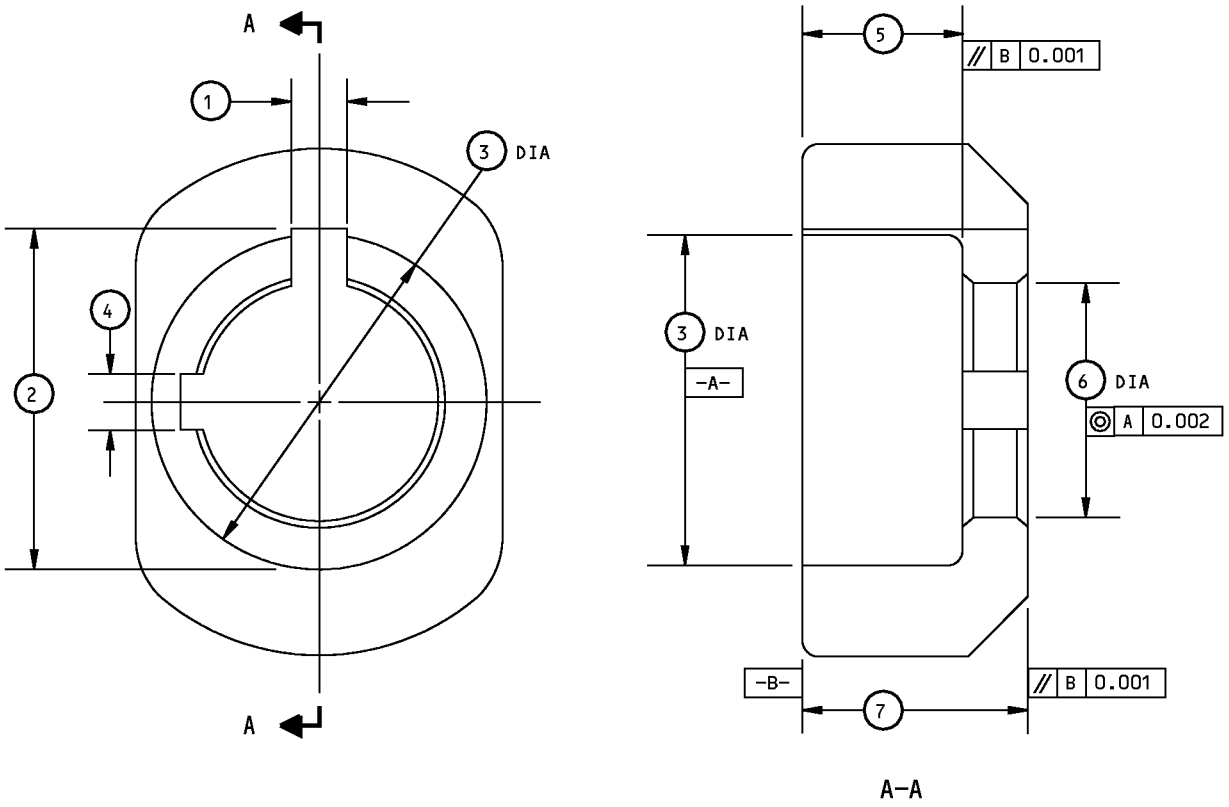
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 19-1, Figure 601



	1	2	3	4	5	6	7
DESIGN DIM	0.127 0.125	0.736 0.734	0.731 0.729	0.13 0.12	0.354 0.344 ▷1	0.516 0.512	0.489 0.479
REPAIR LIMIT	-----	-----	-----	-----	-----	-----	-----

REFINISH

PASSIVATE (F-17.09) ALL OVER

▷1 ORIGINAL DESIGN DIMENSION SEE FIG. 707 FOR FINAL MACHINING

REPAIR

REF ▷1

125 √ MACHINE FINISH

MATERIAL: 15-5PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

315A1891-1 Stop Repair and Refinish
Figure 601

ADAPTER - REPAIR 20-1

315A1903–2

1. General

A. This procedure gives the data that is necessary to repair and refinish the adapter.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

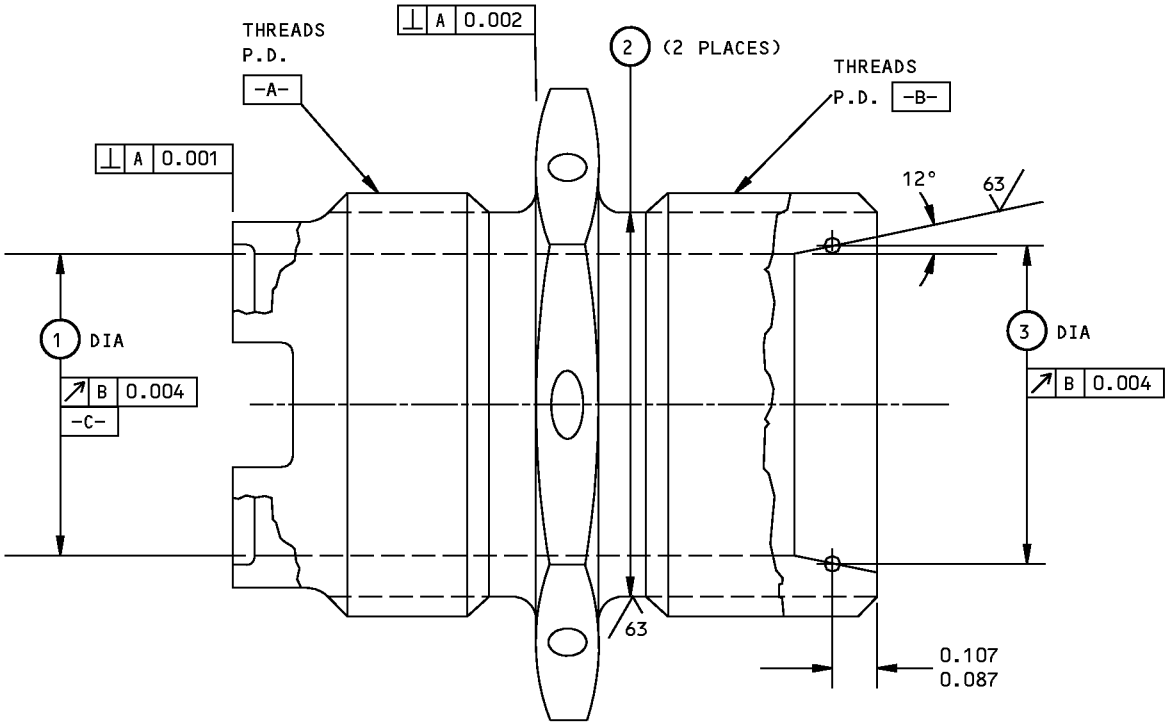
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 20-1, Figure 601



	1	2	3
DESIGN DIM	0.770 0.766	0.947 0.942	0.8100 0.8099
REPAIR LIMIT	_____	_____	_____

REFINISH

PASSIVATE (F-17.09) ALL OVER

REPAIR

(SAME AS REFINISH)

125 MACHINE FINISH EXCEPT AS NOTED

MATERIAL: 303,303SE,OR 304 RES

ALL DIMENSIONS ARE IN INCHES

315A1903-2 Adapter Repair and Refinish
Figure 601

WORM WHEEL AND SPACER ASSEMBLY - REPAIR 21-1

315A1912–9, –11

1. General

A. This procedure gives the data that is necessary to repair and refinish the worm wheel and spacer assembly.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

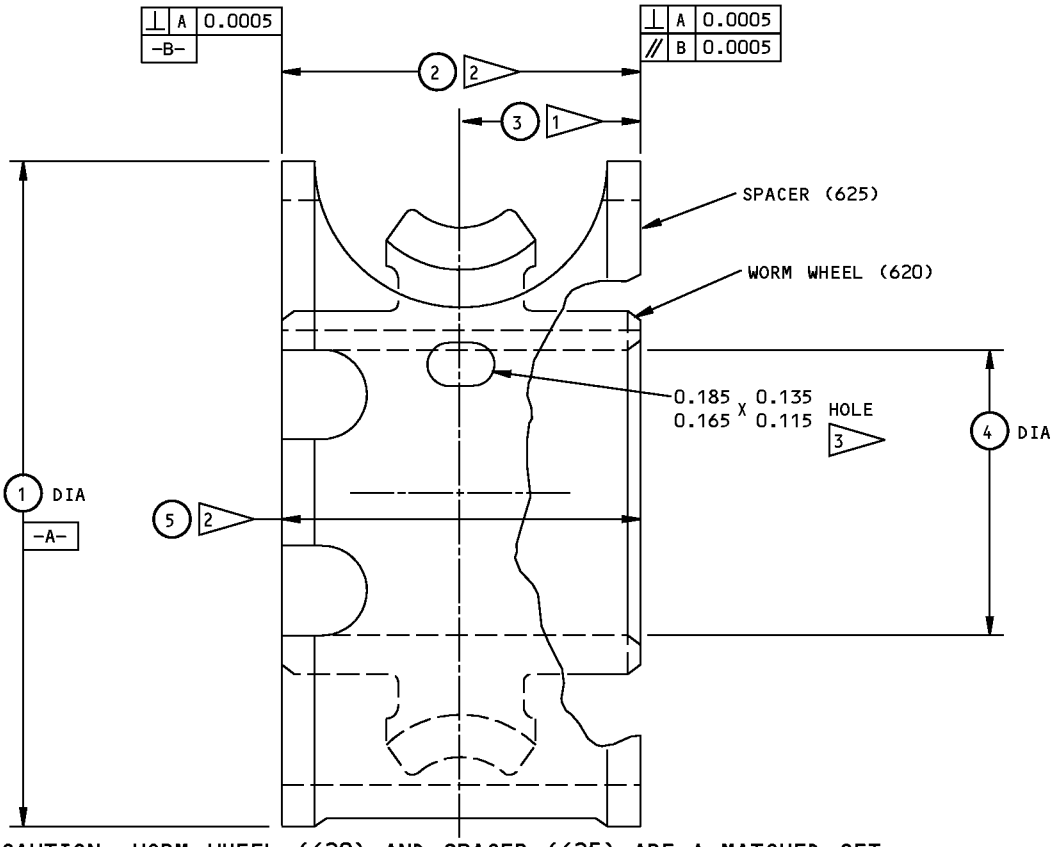
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 601 for standard true position dimensioning symbols shown in the repair.

2. Coating Repair

NOTE: Repair consists of restoration of original finish.

A. Refer to refinish instructions, REPAIR 21-1, Figure 601



CAUTION: WORM WHEEL (620) AND SPACER (625) ARE A MATCHED SET

	1	2	3	4	5
DESIGN DIM	1.848 1.843	1.005 0.995	0.5025 0.4975 ▷1	0.7879 0.7875	▷2
REPAIR LIMIT	------	------	------	------	------

REFINISH

WORM WHEEL (620): NO FINISH

SPACER (625): PASSIVATE (F-17.09)

▷1 CENTER LINE DISTANCE OF WORM WHEEL (TAKEN ON SIDE WITH PART NUMBER MARKED) IS FURNISHED WITH PART

▷2 WIDTH OF SPACER (625) SHALL BE 0.0018–0.0022 LESS THAN WIDTH OF WORM WHEEL (620)

▷3 0.073–0.076 DEEP (315A1912-5)
0.089–0.091 DEEP (315A1912-10)

REPAIR

(SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL:

WORM WHEEL (620) --- AL-NI-BRZ PER AMS4640
SPACER (625) ------- 15-5PH CRES CASTING

ALL DIMENSIONS ARE IN INCHES

315A1912-9,-11 Worm Wheel and Spacer Repair and Refinish
Figure 601

MISCELLANEOUS PARTS REFINISH - REPAIR 22-1

1. **General**

   A. This repair has the data that is necessary to refinish the parts which are not given in the specific repairs.

   B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

   C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

   D. Refer to IPL Figure 1 for item numbers.

2. **Procedure**

   A. Repair of parts listed in REPAIR 22-1, Table 601 consists of restoration of the original finish.

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1 Bracket (15)	Al alloy	Sulfuric acid anodize (F-17.03). Apply primer, C00259 (F-20.02) followed by enamel coating, C00700 (SRF-14.9813) all over.
Target (45)	15-5PH CRES	Passivate (F-17.09)
Shims (265, 270, 275, 280, 285, 590, 595, 600)	301 CRES	Passivate (F-17.09)
Key (150)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09)
Nuts (165, 435, 690)	15-5PH CRES, 150-170 ksi	Passivate (F-17.09). Cadmium plate (F-1.1914).
Nut (690A)	15-5PH CRES, 150-170 ksi	Passivate (F-17.09). Dry film lube dicronite DL-5 per DOD-L-85645.
Retainers (200, 635), plug (305), key (425), pin (545)	304 CRES	Passivate (F-17.09)
Springs (235, 565, 640)	17-7PH CRES	Passivate (F-17.09)
Lever (245), nut (410), stop (500), spacer (580), retainer (635A)	15-5PH CRES, 150-170 ksi	Passivate (F-17.09)
Pin (700)	303 CRES	Passivate (F-17.09)
Quill (370), tube (380)	21-6-9 CRES	Passivate (F-17.09)

EXTERNAL PARTS REPLACEMENT - REPAIR 23-1

BAC27DTR–11, BAC27DTR–13, 315A1836–1

1. General

A. This procedure has the data that is necessary to replace the nameplate and the marker.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Nameplate Replacement REPAIR 23-1, Figure 601

A. Steel stamp serial number and part number on nameplate (745).

B. Preform nameplate (745) to match curvature of cylinder.

C. Coat back of nameplate (745) with adhesive, A01070.

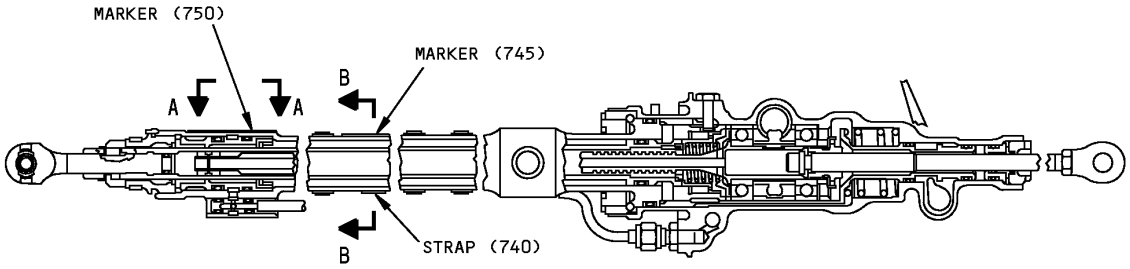
D. Install nameplate (745) and strap (740) on cylinder at position shown. Strap (740) may be used only once. Use new strap at every nameplate installation.

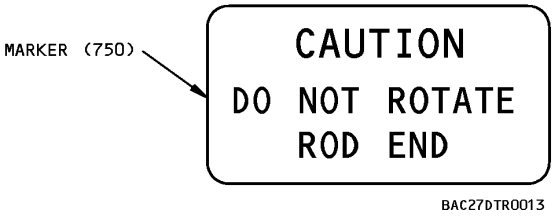
E. After adhesive has cured, completely edge-seal nameplate and strap with a bead of BMS 5-126 adhesive. Ensure that adhesive fills slots for strap in nameplate.

3. Marker Replacement REPAIR 23-1, Figure 601

A. Apply marker (750) per SOPM 20-50-05, using adhesive, A01070. When adhesive has cured, completely seal edges of marker with a bead of BMS 5-126 adhesive.

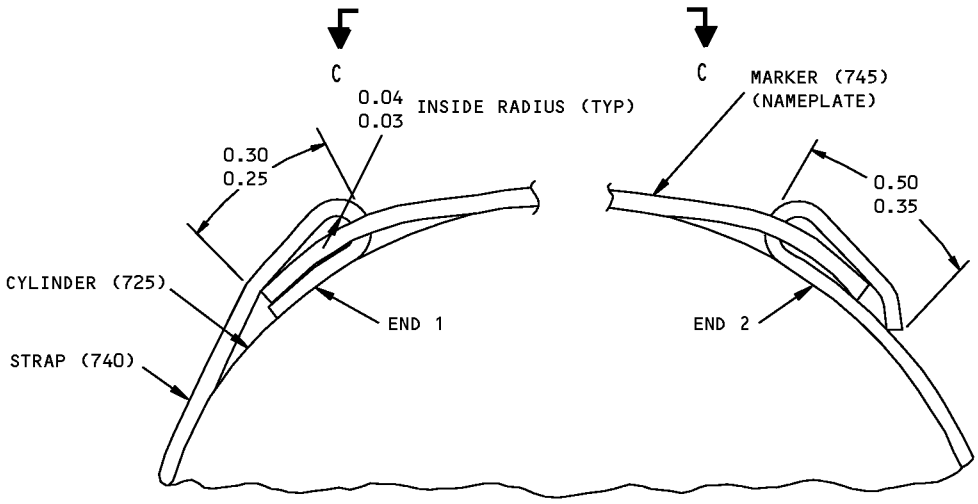
B. After installation, apply coating, B00571. Topcoat must extend at least 0.38 inch beyond edge of marker.



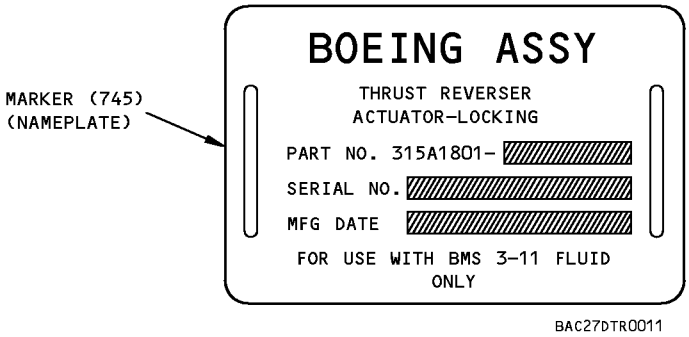


A–A

Nameplate and Marker Replacement
Figure 601 (Sheet 1 of 2)



B–B



C–C

NOTE: STRAP MAY BE USED ONLY ONCE. STRAP AND NAMEPLATE SHALL BE SNUG ON MOUNTING SURFACE.

1. FORM NAMEPLATE TO A RADIUS SLIGHTLY SMALLER THAN CYLINDER RADIUS.
2 DEFORM CORNERS OF NAMEPLATE SLIGHTLY TOWARDS MOUNTING SURFACE.
3. FORM BEND ON STRAP END 1, INSERT THRU HOLE IN NAMEPLATE AND FORM STRAP END AS SHOWN.
4. HOLD NAMEPLATE ON CYLINDER AND FEED STRAP THRU HOLE.
5. SLIGHTLY BEND STRAP END 2 WHILE APPLYING SUFFICIENT PULLING FORCE TO OBTAIN PRETENSION OF NAMEPLATE AND STRAP.
6. CUT STRAP END 2 TO CONFORM TO DIMENSION SHOWN.
7. WHILE MAINTAINING THE PRETENSION, USE SUITABLE TOOL TO MAKE FINAL BEND OF STRAP END 2 AND TO OBTAIN ADDITIONAL TENSION. USE CARE NOT TO TEAR NAMEPLATE HOLE BY OVERTENSION.
8. BEND STRAP END 2 DOWN OVER EDGE OF NAMEPLATE AND TAP WITH SUITABLE SOFT NOSED HAMMER.

ALL DIMENSIONS ARE IN INCHES

Nameplate and Marker Replacement
Figure 601 (Sheet 2 of 2)

EXTERNAL PARTS REPLACEMENT - REPAIR 23-2

315A1867–3

1. General

A. This procedure gives the data that is necessary to replace the spacers.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Spacer (350) Replacement REPAIR 23-2, Figure 601

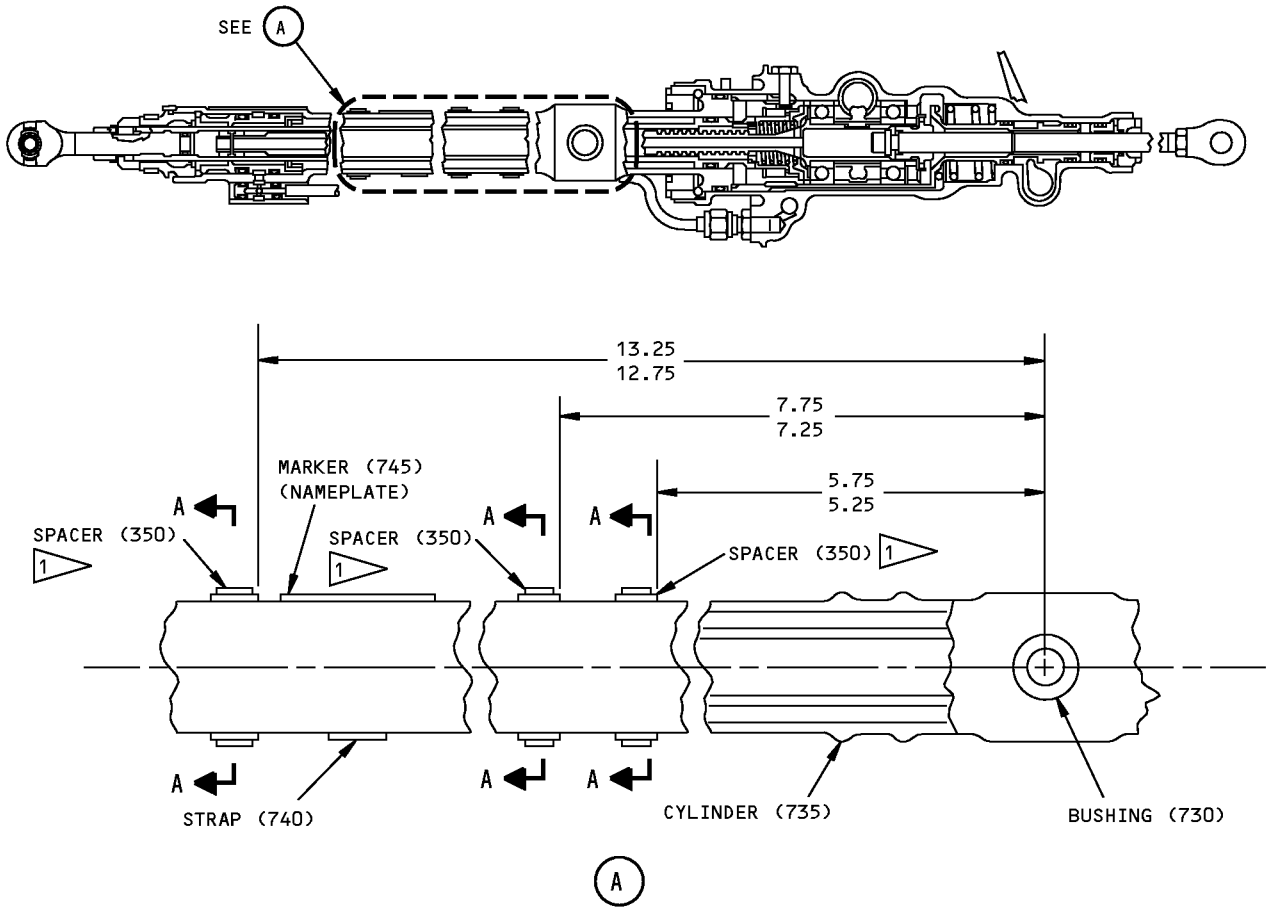
CAUTION: SPACERS (350) MUST BE RADIALLY POSITIONED ON CYLINDER (725) SO THAT TUBE (355) IS SUPPORTED WITHOUT EXERTING UNDUE STRAIN.

A. Before removing spacers, index radial position of tube support holes by temporary marking means on cylinder, to facilitate positioning of replacement spacers. Then remove defective spacers (350) from cylinder (725).

B. Clean substrate surfaces with solvent. Do not obliterate index marks.

C. Bond replacement spacers on cylinder, with adhesive, A01070, positioning supports to line up tube support holes with index marks.

D. Remove index marks after tube (355) is installed.



Spacer Replacement
Figure 601

ASSEMBLY

1. General

A. This procedure contains the data necessary to assemble the thrust reverser 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 the item numbers.

2. Materials

NOTE: Equivalent substitutes may be used.

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	

B. References

Reference	Title
SOPM 20-60-03	LUBRICANTS

C. General

(1) Assembly Lube – MCS 352B fluid, D00054 MCS 352 (Ref SOPM 20-60-03)

3. Equipment

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-6275	Overhaul Set - T/R Locking & Non-Locking Actuator Assy (Part #: B78016-1, Supplier: 81205)
SPL-7522	Overhaul Set - Locking Actuator Assembly, Thrust Reverser (Part #: B78015-23, Supplier: 81205)
SPL-8215	Wrench Set - Thrust Reverser Actuator (Part #: B78008-19, Supplier: 81205)
SPL-8278	Overhaul Equipment - T/R Locking Actuator Assembly

B. General

(1) Special Tools

NOTE: Equivalent substitutes may be used.

(a) B78008-19 – wrench set, SPL-8215 Wrench Set, Thrust Receiver Actuator

(b) B78013-1 – overhaul equipment, SPL-8278 Overhaul Equipment, Thrust Reverser Locking Actuator

(c) B78015 -23 (Replaces B78015 -17) – overhaul set, SPL-7522 Overhaul Set, Thrust Reverser Locking Actuator

(d) B78016-1 – overhaul set, SPL-6275 Overhaul Set, Thrust Reverser Actuator

4. Lubrication

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic, Erosion Arresting, Fire Resistant	BMS3-11 Type IV (interchange˜able & intermixable with Type V)

B. General

(1) Lubricate all O-rings and seals at assembly with fluid, D00153 or MCS 352B fluid, D00054.

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

5. Assembly

NOTE: See actuator Adjustments Worksheet (ASSEMBLY, Figure 701) for measurement calculations.

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-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-6259	Wrench (B78008-10 included in B78008-19) (Part #: B78008-10, Supplier: 81205)
SPL-6260	Wrench (B78008-12 included in B78008-19) (Part #: B78008-12, Supplier: 81205)
SPL-6272	Plug (B78016-6 is included in B78016-1) (Part #: B78016-6, Supplier: 81205)
SPL-6274	Cap (B78016-3 is included in B78016-1) (Part #: B78016-3, Supplier: 81205)

Reference	Description
SPL-6284	Fixture - Torque, Locking and Non-Locking Thrust Reverser Acutator Assembly (Part #: B78011-25, Supplier: 81205)
SPL-7292	Adapter - Worm Gear Shaft (B78016-9 is included in B78016-1) (Part #: B78016-9, Supplier: 81205)
SPL-7299	Plate (B78016-4 is included in B78016-1) (Part #: B78016-4, Supplier: 81205)
SPL-7300	Housing - Locking (B78016-7 is included in B78016-1) (Part #: B78016-7, Supplier: 0B9R9)
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-7356	Alignment Sleeve - Lead Screw (B78008-11 included in B78008-18) (Part #: B78008-11, Supplier: 81205)
SPL-7373	Plate - Disassembly (B78015-8 is included in B78015-17 and -23) (Part #: B78015-8, 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)
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-7475	Holder - Feedback Lever (B78013-3 is included in B78013-1 & -2) (Part #: B78013-3, Supplier: 81205)
SPL-7554	Plate - Assembly (B78015-7 is included in B78015-17 and -23) (Part #: B78015-7, Supplier: 81205)
STD-405	Gauge - Feeler
STD-595	Micrometer
STD-725	Punch
STD-1238	Indicator - Dial

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)
G50402	Abrasive Cloth - Aluminum Oxide Coated - 400 grit	P-C-451

C. Procedure

(1) Lead Screw/Piston Components (ASSEMBLY, Figure 702)

(a) Using assembly plate, SPL-7554 and disassembly plate, SPL-7373 install bearing (630) on lead screw (710) with side of bearing marked THRUST HERE facing away from shoulder on lead screw, as shown.

(b) Install key (610) in slot on lead screw. Install worm wheel (620) on lead screw with part-numbered side facing away from bearing, and engage key.

(c) Check and note centerline dimension of worm wheel (620) etched on face of worm wheel spacer (625). (Design dimension is 0.4975-0.5025). Note this dimension as D2.

NOTE: Worm wheel and spacer (620, 625) are a matched set. Dimensions D1 and D2 will be used in subsequent procedures see (ASSEMBLY, Paragraph 5.C.(3)(m)).

(d) Measure width of bearing (605) across outer race. (Design dimension is 0.541-0.551 inch). Note actual measurement (D1) to nearest 0.001 inch.

CAUTION: WORM WHEEL (620) AND SPACER (625) ARE A MATCHED SET AND MUST BE USED TOGETHER, OR UNIT WILL MALFUNCTION.

(e) Install spacer (625) over worm wheel (620). Using assembly plate, SPL-7554 and disassembly plate, SPL-7373 install bearing (605) on lead screw with side of bearing marked THRUST HERE facing worm wheel.

(f) Install spacer (580) on end of lead screw with chamfered end of bore facing away from bearing (605). Install lockwasher (575).

CAUTION: MATING THREADS OF LEAD SCREW (710) AND NUT (570) ARE LEFT HAND. CLOCKWISE ROTATION WILL NOT ENGAGE AND MAY DAMAGE PARTS.

(g) Screw nut (570) on feedback rod (585). Ensure that nut rotates freely with no binding. Screw nut and rod into end of lead screw (710) (counterclockwise).

CAUTION: NUT (570) HAS LEFT HAND THREADS. CLOCKWISE ROTATION WILL NOT ENGAGE AND MAY DAMAGE PARTS.

(h) Slide alignment sleeve, SPL-7356 over bearings and spacer on lead screw. Restrain flats on lead screw with wrench, SPL-6259 and tighten nut (570) counterclockwise to 500-700 lb-in.

(i) Install assembled parts in housing (530) and retain with locking housing, SPL-7300 used with rings (685) and nut (690). Install unit in torque fixture, SPL-6284 and tighten nut to 2900-3100 lb-in using spanner wrench, SPL-7341.

(j) Using wrench, SPL-6259, check that torque required to rotate lead screw does not exceed 2.5 lb-in. If torque is acceptable, proceed to ASSEMBLY, Paragraph 5.C.(1)(k). If torque exceeds limits, proceed as follows:

1) Remove parts from actuator and replace worm wheel and spacer (620, 625) as a matched set.

2) Reinstall parts per ASSEMBLY, Paragraph 5.C.(1)(b) thru ASSEMBLY, Paragraph 5.C.(1)(j) and recheck torque.

(k) Remove locking housing, SPL-7300 and lead screw from housing. Break flange of lockwasher (575) into two slot of nut (570).

(l) Using plug, SPL-6272 mounted in housing (530), obtain and note the centerline dimension C of worm gear mounting holes in housing per ASSEMBLY, Figure 703.

NOTE: This dimension C will be used in subsequent procedures (ASSEMBLY, Paragraph 5.C.(3)) to establish axial position of lead screw.

(m) Install spring retainer (635), spring (640), spring follower (645) on lead screw (710) against bearing (630).

(n) Using wrench, SPL-6260, remove nut (718) from piston (720). Install retaining ring (675) on nut (718). Screw nut on lead screw to approximate center of threaded length.

NOTE: Nut is part of piston assy (715).

(o) Install guide (705), retaining pin (700), and retaining ring (695) on end of lead screw.

(p) Install the O-ring (670) and two retainers (665) on head of piston (715). Slide piston over lead screw. Restrain piston and using wrench, SPL-6260, screw the lead screw nut (718) into piston until the two halves of holes for locking pin (680) align. Insert pin with end under retaining ring (675) and lightly tap pin into hole until it bottoms. Ensure that retaining ring engages shoulder of locking pin. (ASSEMBLY, Figure 706).

NOTE: When installing a new lead screw nut (718) into the piston (720), the 0.0470 - 0.0474 inch radius in the nut must align with the existing hole in the piston while torqueing the nut within the 180-200 pound-inch torque range. The 0.094 - 0.095 inch diameter hole may be drilled only as shown in ASSEMBLY, Figure 706. If the radius and the hole do not align while applying the 180-200 pound-inch torque, do not drill the hole. Contact Boeing for special instructions.

(2) Select Worm Gear Components (ASSEMBLY, Figure 704)

(a) Using cap, SPL-6274 and plate, SPL-7299 install one bearing (295) against shoulder of worm gear shaft (300).

(b) Insert shaft thru adapter screw (255) port in housing and seat bearing against shoulder in hole. Install O-ring (260) on adapter screw (255), install screw in housing, and tighten to 1140-1200 lb-in.

(c) Install bearing (295) on other end of worm gear shaft and into housing using cap, SPL-6274 and plate, SPL-7299.

(d) Position unit so that worm gear shaft is vertical and adapter screw (255) at bottom. Press downward on shaft to ensure outer race of bottom bearing is seated against adapter screw. Check that inner race of upper bearing is seated on shoulder of worm gear shaft. Using a depth micrometer, measure from face of housing (at seating surface for fitting) to outer race of bearing, as shown. Make two measurements, 180° apart. Add values together, then divide sum by 2 (Dimension will be 0.783-0.833 inch). Note obtained value (D3), rounded to nearest 0.001 inch.

(e) Install sleeve (290) in short thread end of fitting (250). Using a depth micrometer, measure dimension from face of sleeve (surface which seats against bearing) to bottom face of fitting flange, as shown. Make two measurement, 180° apart. Add values together, then divide sum by 2. (Dimension will be 0.740-0.760 inch). Note obtained value (D4), rounded to nearest 0.001 inch.

(f) Subtract dimension D3, obtained in ASSEMBLY, Paragraph 5.C.(2)(d), from dimension D4, obtained in ASSEMBLY, Paragraph 5.C.(2)(e). (Result, S2, will be 0.023-0.093). Select minimum combination of shims (265, 270, 275, 280, 285) which will obtain this calculated dimension (S2) to nearest 0.001 inch.

(g) Remove sleeve (290) from fitting (250). Install O-ring (260) on shortest thread end. Install shims (265 thru 285, as applicable) on sleeve and install sleeve in fitting. Install assembled parts in housing and tighten fitting to 1140-1200 lb-in.

(h) Check that worm gear shaft turns freely. Check that axial movement (end play) does not exceed 0.003 inch.

1) If shaft does not turn freely, reduce total shim thickness 0.002 inch (or more) until free rotation is obtained.

2) If end play exceeds 0.003 inch, replace bearings (295) and repeat assembly/check procedures.

(i) Remove fitting (250) and adapter screw (255) from housing. Press out shaft (toward adapter screw end) and remove parts (265 thru 295). Removal of bearing at adapter screw end of shaft is not necessary.

NOTE: Segregate and maintain identity and location of worm gear components for installation in subsequent procedures.

(3) Install Cylinder, Lead Screw/Piston, Locking Components

(a) Align cutout in flange of bushing (240) with small hole in housing next to bushing mounting hole. Install bushing in housing.

(b) Install O-ring and retainers (560, 555) and O-ring and retainers (540, 535) in their respective grooves on small end of lock sleeve (550).

(c) Insert seal retainer (200) in housing (530) and install gland nut (165) finger-tight.

NOTE: Associated parts (175, 180, 185) are not required at this time.

(d) Insert lever (245) in hole in end of housing (530). Install shim (567), if used, and lock spring (565) in housing. Install lock sleeve (550) in housing engaging the recessed grooves. Seat sleeve against lock spring and ensure slotted tang at top of sleeve engages index plug (305).

(e) Install spring compressor assembly tools B78013-4 and spacer, SPL-7473 in housing.

(f) Install index plug (305) in housing finger tight. Do not install O-ring (310). Push against lock spring (565) until it compresses and bottoms in housing.

(g) Remove index plug (305) and check that tang of lock sleeve (550) is still aligned under the port.

(h) Install spring (235) on handle (220) with protruding leg of spring in anti-rotation hole in handle.

(i) Install lever (245) in housing with straight side facing lock spring (565). Insert handle (220) thru bushing (240) with leg of spring (235) thru cutout in bushing flange. Restrain lever (245), position handle as shown in ASSEMBLY, Figure 706, and insert shaft of handle into lever just enough to engage splines. Pull free leg of spring (235) around to align with anti-rotation hole in housing, then push handle thru until bushing and handle are seated.

(j) Install bushing (215), washer (210), and nut (205). Tighten nut to 20-30 lb-in.

(k) Mount feedback lever holder, SPL-7475 in housing. Turn screw of tool inward until it contacts handle lever (290).

(l) Unscrew knob/shoe of compression tools (installed previously) and remove tools. Remove retainer (200) and gland nut (165) from housing. Turn screw of feedback lever holder of feedback lever holder, SPL-7475 outward (counterclockwise) two complete turns.

(m) Add worm wheel center distance (D2) to bearing width (D1). Subtract the sum (D) from housing dimension (C). Select shims (590, 595, 600) as required to obtain this value (S1). Apply grease, D00015 to shims and install in housing against mounting shoulder for bearing.

NOTE: Dimensions D1 and D2 were obtained and noted in preceding steps ASSEMBLY, Paragraph 5.C.(1)(b), ASSEMBLY, Paragraph 5.C.(1)(d). Dimension C was obtained and noted in preceding step ASSEMBLY, Paragraph 5.C.(1)(l).

(n) Install assembled lead screw/piston (Ref Step ASSEMBLY, Paragraph 5.C.(1)) in housing. Ensure that bearing (605) is seated against shims and that cutout area of spacer (625) is aligned with opening in housing boss for worm gear shaft (300).

(o) Unscrew feedback rod (585) from housing until it stops. Screw spacer, SPL-7471 on rod finger-tight.

(p) Coat inside of cylinder (725) with fluid, D00153 fluid. Position cylinder nut (690) on outside diameter of cylinder. Install O-ring and two backup rings (660, 665) in grooves on cylinder.

(q) Slide cylinder over piston assy (715). Install spring follower (645) in bore of cylinder and install spring (640) in follower. Align four tangs on retainer (635) with offset slots in end of cylinder. Push retainer inward to compress spring and rotate retainer to engage slots and lock tangs.

(r) Install lock keys (650) in three slots in cylinder (725) with rounded edge of keys inward and pin projection in slots of cylinder. Slide assembled cylinder into housing, aligning slotted tang at top of lock sleeve (550) with slotted hole near end of cylinder. Seat cylinder against bearing (630).

(s) Apply grease, D00015 to cylinder nut rings (685) and threads of cylinder nut (690). Install rings in nut, and screw nut into housing finger-tight.

(t) Install O-ring (310) on index plug (305) and install plug in housing thru tang in lock sleeve (550) and slotted hole in cylinder (725). Tighten plug to 50-70 lb-in.

(u) Install stop (500) in end of cylinder.

(v) Install O-ring (585) and backup rings (480), and O-ring (575) and retainers (470) in grooves on gland (465). Position parts per ASSEMBLY, Figure 706 and install hatseal (460) and bearing (455) in gland.

(w) Apply grease, D00015 to snubber rings (490, 495). Position parts per ASSEMBLY, Figure 706 and install rings in gland. Slide gland over piston (715) against stop (500).

NOTE: There is no requirement to locate slot in snubber ring (490) at a specified angular position relative to the four holes in stop (500).

(x) Apply grease, D00015 to threads of gland nut (435). Position scraper (440) per ASSEMBLY, Figure 706 in end of nut, slide nut over piston (715), and screw nut into cylinder finger tight.

(y) Insert locking pin (545) inside mounting hole for worm gear shaft bearing (295). Top of pin must be below surface for installation of bearing. If pin is obstructed, rotate worm wheel spacer (625) until end of pin enters recessed cutout in spacer.

NOTE: Pin has 0.007 inch clearance with hole to facilitate removal.

(z) With unit in torque fixture, SPL-6284 use spanner wrench, SPL-7341 to tighten cylinder nut (690) to 2900-3100 lb-in. Tighten gland nut (435) to 800-1000 lb-in. using wrench, SPL-7407. Remove unit from fixture.

(aa) Install spacer (430) in recess on gland nut (435). Bond in place with adhesive, A01070.

(4) Install Worm Gear Shaft/Fittings (ASSEMBLY, Figure 706)

(a) Remove spacer, SPL-7471 from feedback rod.

CAUTION: ENSURE LOCK PIN (545) IS STILL IN PLACE PRIOR TO INSTALLING WORM GEAR BEARING, OR WORM WHEEL SPACER WILL ROTATE AND UNIT WILL REQUIRE DIASSEMBLY FOR CORRECTION.

(b) Install worm gear parts (250 thru 300) pre-selected in step ASSEMBLY, Paragraph 5.C.(2). Ensure that correct shims (265 thru 285) are installed and that O-rings (260) are installed. When inserting shaft, rotate slowly to engage worm wheel (615). Tighten adapter screw (255) and fitting (250) to 1140-1200 lb-in.

(c) Install O-rings (330) on unions (325), O-rings (320) on plugs (315), and O-ring (340) on union (335). Install plug (315) in housing and tighten to 450-550 lb-in. Install union (325) in housing and tighten to 256-284 lb-in. Install union (335) in tube port on housing assembly (510) and tighten to 133-147 lb-in.

(5) Install Feedback Rod/Piston Seals and Transfer Tube (ASSEMBLY, Figure 706)

(a) Install O-ring (195) and two retainers (190) in groove on feedback seal retainer (200). Place retainer on feedback rod (585). Do not insert retainer in housing.

(b) Cover threads on end of feedback rod (585) to prevent damage to seals. Install O-ring (185) and foot seal (180) onto chrome plated area of rod and position per ASSEMBLY, Figure 707. Push parts against retainer. Remove thread covering.

(c) Slide bushing (175) onto feedback rod against foot seal (180). Press bushing into retainer until flange seats. Install assembled parts in housing.

(d) Cover threads on end of feedback rod to prevent damage to seals. Install excluder (170A) onto chrome plated area of rod and positioned per ASSEMBLY, Figure 707. Remove thread covering. Slide feedback gland nut (165) over rod and install excluder in recess in end of nut. Apply grease, D00015 to threads of nut, screw nut into housing, and tighten to 425-475 lb-in, using wrench, SPL-7336.

(e) Install ties (345) around rubber spacers (350) and secure using cable tie installation tool, COM-4950 at a setting of 165 lbs max and locating joints of ties approximately as shown. Tighten nut (360) to 133-147 lb-in.

(f) Install O-rings and backup rings (390, 385) in grooves at end of tube assy (355). Push tube into holes in rubber cylinder spacers (350) thru split line breaks at spacer holes. Align tube ends with housing union (385) and cylinder port, push tube into cylinder port, then tighten coupling nut (360) finger tight.

NOTE: If bonded synthetic rubber spacers (350) are not installed on cylinder, bond new spacers (350) to cylinder (REPAIR 23-2) after positioning spacers around cylinder and tube.

(g) Install O-ring and backup rings (450, 445) in grooves on rod end (395). Ensure that spiral direction of backup rings (445) is in same direction as threads of rod end to prevent separation of rings when rod is screwed into piston. Screw nut (410) onto rod end to end of threads (toward bearing). Install washer, SPL-7406 on rod. Screw rod into piston inside cylinder ten complete turns. Do not install stop (420).

(h) Remove feedback lever holder, SPL-7475 from other end of housing. Push piston inward until lock keys (650) in cylinder engage.

(i) Mount unit in rod end and stroke stop test fixture, SPL-5359. Check that clearance between cylinder and tube is minimum of 0.020 inch at any point.

(j) Thread rod end (395) in ten full turns. Align key slot in rod end with either slot in end of piston install key (425). Secure rod end bearing in fixture clevis with fixture pin. Slide washer, SPL-7406 installed in step ASSEMBLY, Paragraph 5.C.(5)(g) over key against end of piston (725).

(6) Piston/Rod Travel Adjustment

(a) Tighten nut (410) to 600-800 lb-in. against washer, SPL-7406 (installed in step ASSEMBLY, Paragraph 5.C.(5)) using adapter B78008-7 and wrench holding washer flats. Pull on clevis of fixture to ensure piston is against internal lock keys.

(b) Mount dial indicator, STD-1238 on fixture to measure axial movement of piston and set indicator. Rotate worm gear and retract piston 0.019-0.021 inch. Tighten clevis clamp on fixture.

(c) Using 1–2 inch micrometer, STD-595, measure dimension (E1) across gage block and pin on fixture to nearest 0.001 inch (ASSEMBLY, Figure 705). Subtract 1.500 from this value, then multiply remainder by 40. Note result F to the nearest whole number. If F is zero, proceed to step ASSEMBLY, Paragraph 5.C.(6)(d). If F is plus (+) or minus (-), proceed as follows:

1) Loosen nut (410). Remove fixture pin from clevis and key (425) from piston/rod end.

2) If F obtained in ASSEMBLY, Paragraph 5.C.(6)(c) is plus (+), screw rod end (445) into piston F number of half-turns. If F is minus (-), unscrew rod end out of piston F number of half-turns.

3) Loosen clevis clamp on fixture. Install key (425) and secure rod end bearing in fixture clevis with fixture pin.

4) Repeat steps ASSEMBLY, Paragraph 5.C.(6)(a) thru ASSEMBLY, Paragraph 5.C.(6)(c)3) once to check adjustment.

(d) Using 1-2 inch micrometer, STD-595, check that dimension across gage block and pin of fixture is 1.487-1.513 inches. Install and set dial indicator (refer to step ASSEMBLY, Paragraph 5.C.(6)(b)). Slowly loosen clevis clamp on fixture to allow piston to move (in or out) against spring load the amount necessary to obtain a dimension of 1.499-1.501 inches. Tighten clevis clamp on fixture. Recheck and verify dimension with micrometer, STD-595.

(e) Measure distance (G1) from end of gland nut (435) to end of piston (surface of washer, SPL-7406). Note value of G1 to nearest 0.001 inch.

(f) On stop (420) as shown in ASSEMBLY, Figure 708, measure depth (G2) of diameter A from surface -B- (the non-chamfered, gland nut contact face). Note this dimension G2 to nearest 0.001 inch. (Original design depth of new stop is 0.344-0.354 inch.) Calculate dimension H by subtracting dimension G1 from dimension G2. Note value of dimension H to nearest 0.001 inch.

(g) As shown in ASSEMBLY, Figure 708, machine surface -B- stop to remove amount H of material, as calculated in step ASSEMBLY, Paragraph 5.C.(6)(f), to obtain depth equal to dimension G1 (noted in step ASSEMBLY, Paragraph 5.C.(6)(e) preceding) within 0.0005 inch. Maintain parallelism as showm.

(h) Disconnect rod end from fixture. Loosen nut (410) and remove key (425). Using temporary marking method, identify exact postion of rod end relative to piston by index marks. Unscrew rod end and remove washer, SPL-7406.

(i) Check face of nut (410) to contact cupwasher (415). Nut face shall have surface roughness of 63 micro inches maximum, be free of burrs and sharp edges and smoothed by rubbing in a figure 8 motion against abrasive cloth, G50402.

(j) Apply Braycoat 660 grease lubricant to face of nut (410) to contact cupwasher (415) and to nut threads. Do not apply lubricant to cupwasher (415).

(k) Screw nut (410) back to rod end bearing and install cup lockwasher (415) over rod with tang facing away from bearing. Install stop (420), machined in ASSEMBLY, Paragraph 5.C.(6)(g), with chamfered side against lockwasher.

(l) Screw rod end into piston to same position as index marked in ASSEMBLY, Paragraph 5.C.(6)(h). Install key (425). Slide stop over piston and key and seat firmly against end of piston.

(m) Connect rod to clevis in fixture. Position tang of cup lockwasher in slot in stop. Tighten nut (410) to 600-800 lb-in. using wrench adapter B78008-7 and wrench to hold flats on stop.

(n) Push inward on clevis of fixture to ensure stop (420) contacts gland nut (435) and tighten clamp on clevis. Using micrometer, STD-595, check that dimension across gage block and pin of fixture is 1.495-1.505 inches. Add 22.000 to actual measurement and note the sum (dimension L on ASSEMBLY, Figure 706). This result is length of actuator between mounting centerlines at retracted position (23.495-23.505 inches).

(o) Loosen clamp on clevis of fixture and pull on rod end to ensure piston head contacts internal lock keys. Using feeler gauge, STD-405, verify that gap between face of stop (420) and gland nut (435) is 0.007-0.033 inch. Remove unit from fixture.

(7) Feedback Rod Adjustment

(a) Hold actuator and screw feedback rod (585) inward until it stops. Using depth micrometer, STD-595 or dial indicator, STD-1238, measure and note distance (J1) from end of rod to face of gland nut in housing. Screw feedback rod outward until it stops; then measure and note the new distance (J2). Subtract smaller value from larger value to obtain stroke K. (Value should be 1.582-1.674 inches). Subtract 1.518 from actual stroke K as obtained, divide remainder by 2, and note result as dimension M. (Result will be 0.032-0.078.)

CAUTION: AFTER ROD ADJUSTMENT IN FOLLOWING STEP, ENSURE ROD IS NOT ROTATED UNTIL REMAINING STEPS OF THE FEEDBACK ROD ADJUSTMENT ARE COMPLETED OR ROD TRAVEL WILL NOT BE WITHIN SPECIFIED LIMITS.

(b) Make sure that piston is in full retracted position and feedback rod is fully screwed out. Using micrometer or dial indicator, screw feedback rod inward the amount noted as dimension M in step ASSEMBLY, Paragraph 5.C.(7)(a).

(c) Hold feedback rod to prevent rotation. Screw nut (155) on rod to end of threads. Screw rod end (160) on feedback rod 3-4 turns, and position flats of clevis parallel with faces of rod end in piston at other end of actuator.

(d) Install alignment tool, SPL-7405 on housing. Hold feedback rod and align holes in rod end (160) with mating holes in tool by successively removing tool and screwing rod end inward in 180 degree turn increments until holes are aligned.

(e) Remove alignment tool from housing. Hold rod end stationary and rotate feedback rod in either direction only enough to align slots in each part for key (150). Do not exceed 45 degrees angular rotation of feedback rod to align slots. Install lock key (150) and seat fully. Ensure that rod and rod end do not rotate. Tighten nut (155) to 75-85 lb-in.

(8) Install Feedback System Parts (ASSEMBLY, Figure 707)

(a) Install bushing (61) in feedback lever assembly (130). Install feedback bracket (65) on housing using bolts (20), washers (25) (under bolthead and nut), and nuts (30). Tighten nuts to 60-70 lb-in.

(b) Position lever fork over bushing (110) in bracket and center lever pivot hole between clevis of actuator rod end.

(c) Install one bushing (55) on spindle (50) against shoulder on largest thread end. Install spindle in slot in one bracket plate, thur rod end of actuator, and thru bushing in lever (130). Install other bushing (55) on spindle and push spindle thru slot in other bracket plate. Install target (45) on spindle with tang on target inserted in slot in bracket. Install washer (40) and nut (35) on spindle. Tighten nut to 120-130 lb-in.

(d) Move lever handle (220A) outward (towards feedback rod end) to release internal lock key. Fully extend actuator by rotating worm gear shaft (300) using worm gear shaft adapter, SPL-7292. Check that actuator operates freely. Mount dial indicator, STD-1238 to measure feedback rod stroke and set indicator. Rotate worm gear shaft and retract actuator piston until stop (420) contacts gland nut (435). Check that feedback rod travel is 1.518 ±0.011 inches (1.507-1.529).

NOTE: Vertical face of target may be used as travel measuring surface. The 1.507-1.529 inch rod travel at the actuator axis is equivalent to 3.45-3.50 inches linear travel of the mounting hole centerline at end of feedback lever (130).

(e) Rotate worm gear shaft and extend actuator piston fully. Apply sealant, A00247 to mounting surface of proximity switch bracket (15). Mount alignment tool B78015-14 on bracket, and position tool and bracket on side bracket (115) with slots aligned for mounting holes and top of tool contacting bottom of target (45). Install washers (10), screws (5), and tighten screws to 27-33 lb-in.

NOTE: Alignment tool B78015-14 is used as a substitute for the proximity switch during adjustment of proximity switch bracket (15). The proximity switch is an installation part. If tool is not available, install proximity switch and adjust proximity switch bracket (15) per step ASSEMBLY, Paragraph 5.C.(8)(e) except obtain 0.035-0.055 inch gap between target (45) and installed proximity switch.

(f) Rotate worm gear shaft and retract actuator piston fully with stop (420) contacting gland nut (435). Clamp drill jig B78015-18 to actuator at feedback rod end. Drill hole in bolt bushing (140) on lever assy (130) or through the lever assembly (130A) using hole in bracket (65) as locator (ASSEMBLY, Figure 709). Finish hole size shall be 5/16 inch. Remove jig and verify that rig pin can be inserted. Deburr the hole.

(9) Test Actuator Assembly (Refer to TESTING AND FAULT ISOLATION).

(10) Secure Parts

(a) Using 0.12 inch square punch, STD-725, break flange of cup lockwasher (415) at piston rod end assembly (395) into each of four slots in nut (410).

(b) Lockwire nut (435) to cylinder (725).

(c) Lockwire fittings (250, 255), plug (305), cylinder nut (690) to housing (505).

315A1801-13,-17 THRUST REVERSER LOCKING ACTUATOR ADJUSTMENTS WORKSHEET

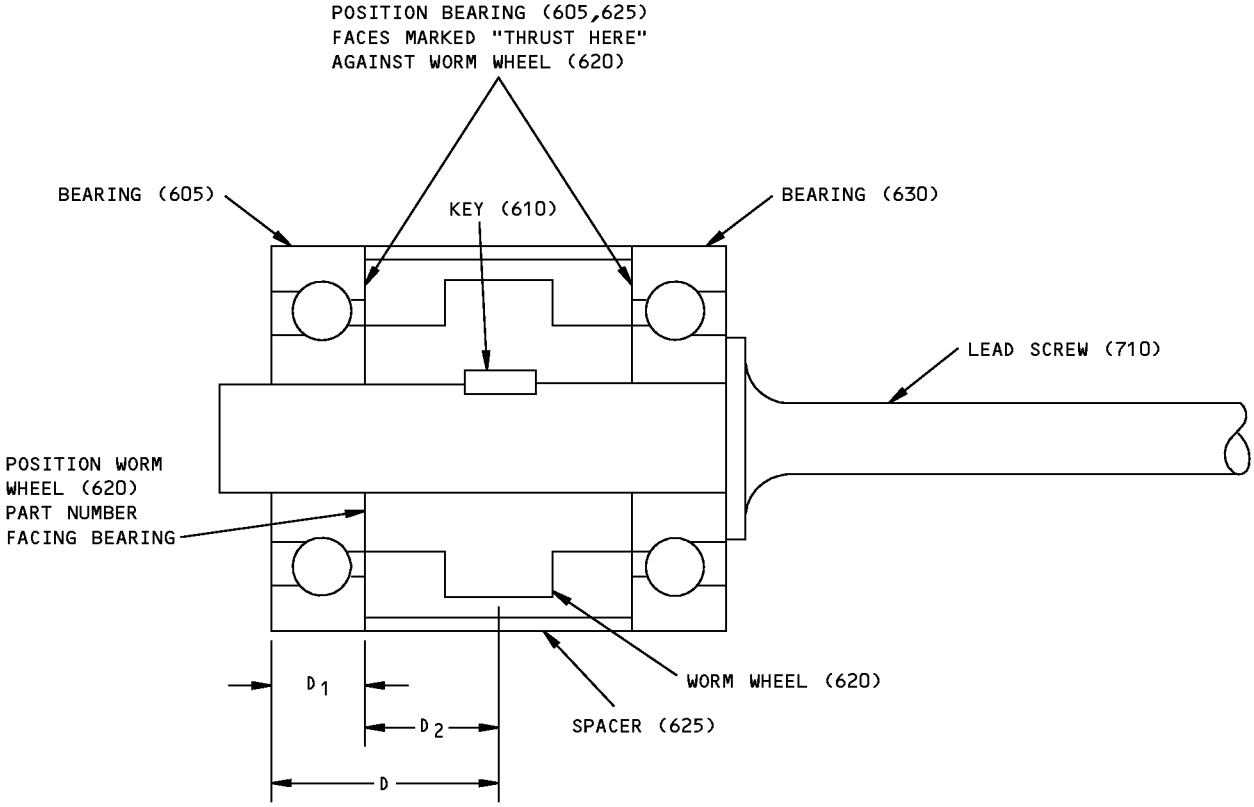
CALCULATION OF D (FIG. 701)	1. ENTER WIDTH OF BEARING (605) ACROSS OUTER RACE (DIMENSION D1). .	1	
	2. ENTER WIDTH OF WORM WHEEL (620)(CENTERLINE DIMENSION).	2	
	3. DIVIDE LINE 2 BY TWO (2) (DIMENSION D2).	3	
	4. ENTER LINE 1 AMOUNT.	4	
	5. ADD LINES 3. AND 4. (DIMENSION D).	5	
CALCULATION OF A (FIG. 702)	6. A. ENTER UPPERMOST HEIGHT OF BORE A1	6A	
	B. ENTER UPPERMOST HEIGHT OF BORE A2	6B	
	C. ADD LINES 6.A. AND 6.B.	6C	
	D. DIVIDE LINE 6.C. BY TWO (2) (DIMENSION A).	6D	
CALCULATION OF B (FIG. 702)	7. A. ENTER LOWERMOST HEIGHT OF BORE B1.	7A	
	B. ENTER LOWERMOST HEIGHT OF BORE B2.	7B	
	C. ADD LINES 7.A. AND 7.B.	7C	
	D. DIVIDE LINE 7.C. BY TWO (2) (DIMENSION B).	7D	
CALCULATION OF C (FIG. 702)	8. ENTER LINE 6.D. AMOUNT	8	
	9. ADD LINES 7.D. AND 8.	9	5.500
	10. DIVIDE LINE 9. BY TWO (2).	10	(-)
	11. SUBTRACT LINE 10. FROM 5.500 (DIMENSION C)	11	
CALCULATION OF S1 SHIM THICKNESS (FIG. 702)	12. ENTER LINE 5. AMOUNT	12	(-)
	13. SUBTRACT LINE 12. FROM LINE 11. (DIMENSION S1)	13	
	SELECT THICKNESS OF SHIMS (590,595,600) EQUAL TO LINE 13. WITHIN 0.001		
CALCULATION OF D3 (FIG. 703)	14. A. ENTER FIRST READING OF DISTANCE FROM HOUSING FACE TO BEARING OUTER RACE	14A	
	B. ENTER SECOND READING OF DISTANCE FROM HOUSING FACE TO BEARING OUTER RACE	14B	
	C. ADD LINES 14.A. AND 14.B.	14C	
	D. DIVIDE LINE 14.C. BY TWO (2) (DIMENSION D3).	14D	
CALCULATION OF D4 (FIG. 703)	15. A. ENTER FIRST READING OF DISTANCE FROM SLEEVE FACE TO BOTTOM FACE OF FITTING FLANGE	15A	
	B. ENTER SECOND READING OF DISTANCE FROM SLEEVE FACE TO BOTTOM FACE OF FITTING FLANGE	15B	
	C. ADD LINES 15.A. AND 15.B.	15C	
	D. DIVIDE LINE 15.C. BY TWO (2) (DIMENSION D4).	15D	
CALCULATION OF S2 SHIM THICKNESS (FIG. 703)	16. ENTER LINE 14.D. AMOUNT.	16	(-)
	17. SUBTRACT LINE 16. FROM LINE 15.D. (DIMENSION S2)	17	
	SELECT INITIAL THICKNESS OF SHIMS (265,270,275,280,285) EQUAL TO LINE 17. WITHIN 0.001		

Actuator Adjustments Worksheet
Figure 701 (Sheet 1 of 2)

315A1801-13,-17 THRUST REVERSER LOCKING ACTUATOR ADJUSTMENTS WORKSHEET (CONTINUED)

PISTON/ROD TRAVEL ADJUSTMENT (FIG. 704)	18. ENTER DISTANCE ACROSS GAGE BLOCK AND PIN ON FIXTURE (DIMENSION E1).	18	(–) 1.500
	19. SUBTRACT 1.500 FROM LINE 18.	19	
	20. MULTIPLY LINE 19. BY FORTY (40). ENTER RESULT TO NEAREST WHOLE NUMBER	20	
	PROCEED WITH ADJUSTMENTS OF ROD END		
MACHINING OF STOP	21. ENTER STOP (420) DIAMETER A DEPTH, MEASURED FROM GLAND NUT CONTACT FACE (SURFACE B) (DIMENSION G2)	21	
	22. ENTER DISTANCE FROM END OF GLAND NUT TO END OF PISTON (SURFACE OF ADJUSTMENT WASHER) (DIMENSION G1)	22	(–)
	23. SUBTRACT LINE 22. FROM LINE 21. (DIMENSION H)	23	
	MACHINE MATERIAL FROM SURFACE B EQUAL TO LINE 23., TO OBTAIN DEPTH OF DIAMETER A EQUAL TO LINE 22. WITHIN 0.0005.		
RETRACTED ACTUATOR LENGTH (FIG. 705)	24. WITH MACHINED STOP IN CONTACT WITH GLAND NUT, MEASURE AND ENTER DISTANCE ACROSS GAGE BLOCK AND PIN ON FIXTURE	24	22.000
	25. ADD 22.000 TO LINE 24. (DIMENSION L).	25	
FEEDBACK ROD ADJUSTMENT	26. ENTER DISTANCE FROM END OF FEEDBACK ROD TO FACE IN HOUSING, WITH ROD BOTTOMED INWARD IN ACTUATOR (DIMENSION J1)	26	
	27. ENTER DISTANCE FROM END OF FEEDBACK ROD TO FACE IN HOUSING, WITH ROD BOTTOMED OUTWARD IN ACTUATOR (DIMENSIO J2)	27	
	28. SUBTRACT SMALLER FROM LARGER OF LINES 26., 27. AMOUNTS (STROKE K).	28	(–) 1.518
	29. SUBTRACT 1.518, FROM LINE 28.	29	
	30. DIVIDE LINE 29. BY TWO (2) (DIMENSION M).	30	
	SCREW FEEDBACK ROD INWARD A DISTANCE EQUAL TO LINE 30. AMOUNT		

Actuator Adjustments Worksheet
Figure 701 (Sheet 2 of 2)



NOTE: MEASUREMENTS OF D1 AND D2 AND CALCULATION OF D ARE USED TO DETERMINE SHIM (590 THRU 600) THICKNESS S1 FOR LEAD SCREW (710)(SEE FIG. 702).

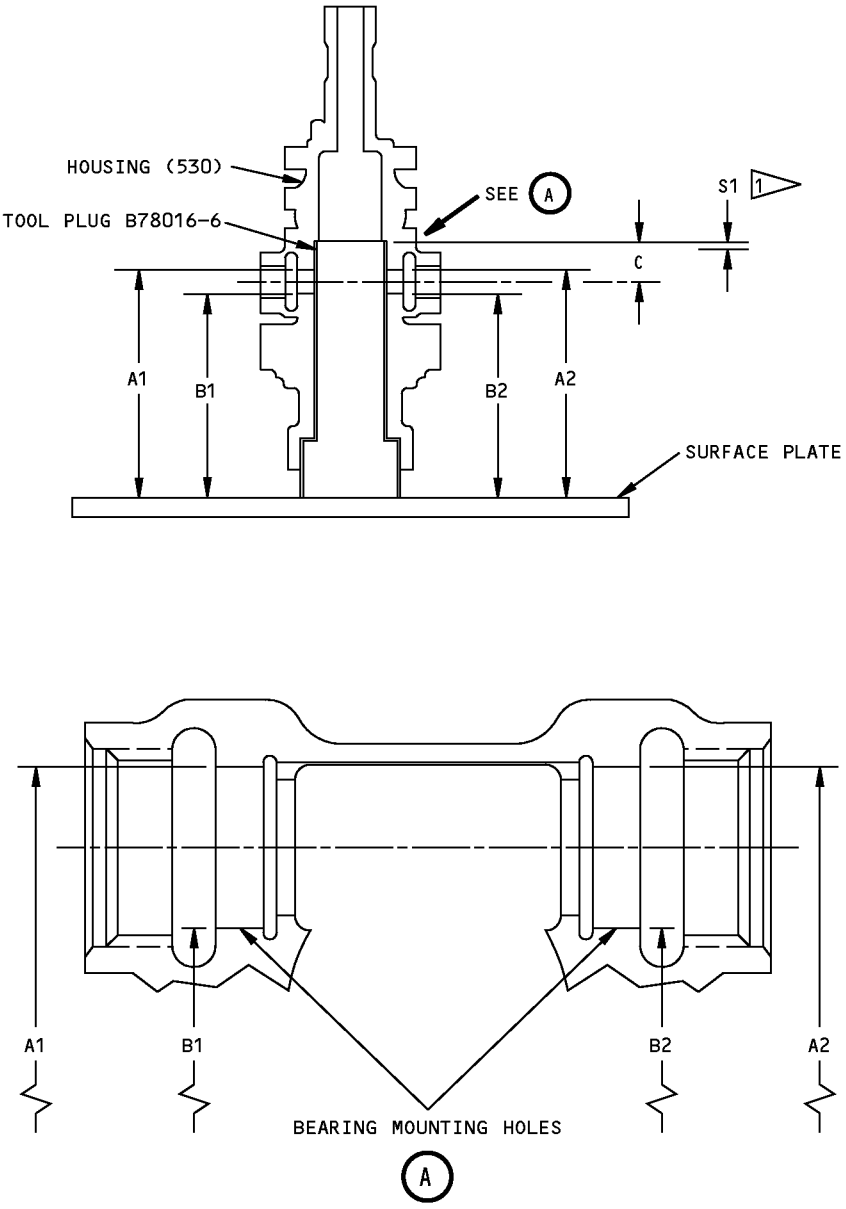
D = D 1 + D2 WHERE

D = COMBINED DISTANCE (NOMINAL, 1.0385-1.0535)

D1 = WIDTH OF BEARING (605) (NOMINAL, 0.541-0.551)

D2 = HALF-WIDTH OF WORM WHEEL (620) (NOMINAL, 0.4975-0.5025)

Worm Wheel and Bearing Installation and Measurements
Figure 702



1 SHIM (590,595,600) THICKNESS CALCULATION:

S1 = C - D WHERE

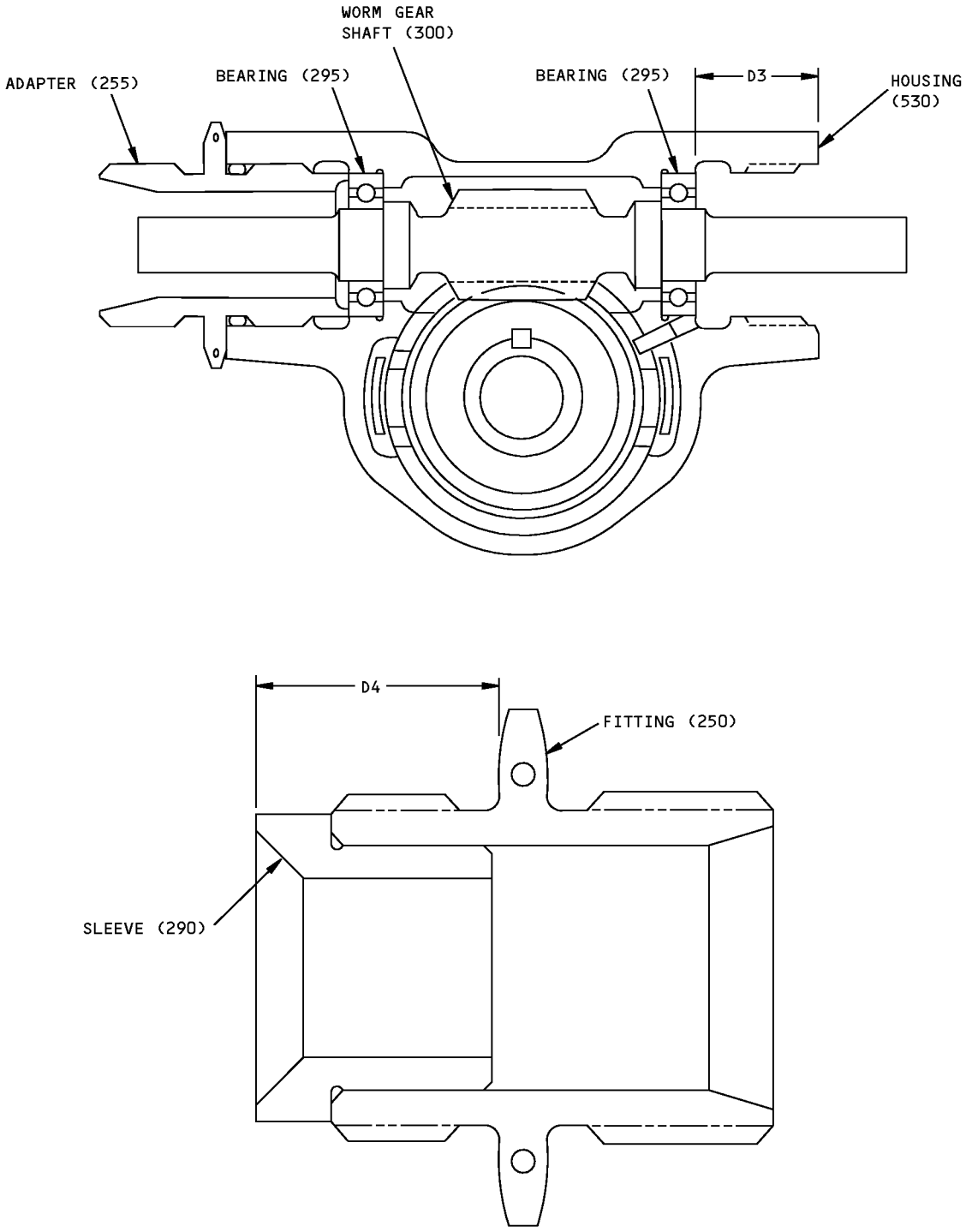
S1 = SHIM (590,595,600) THICKNESS (NOMINAL, 0.021-0.046)

C = DISTANCE FROM CENTERLINE OF WORM WHEEL BEARING MOUNTING TO END OF HOUSING (530) ID (NOMINAL, 1.075-1.085)

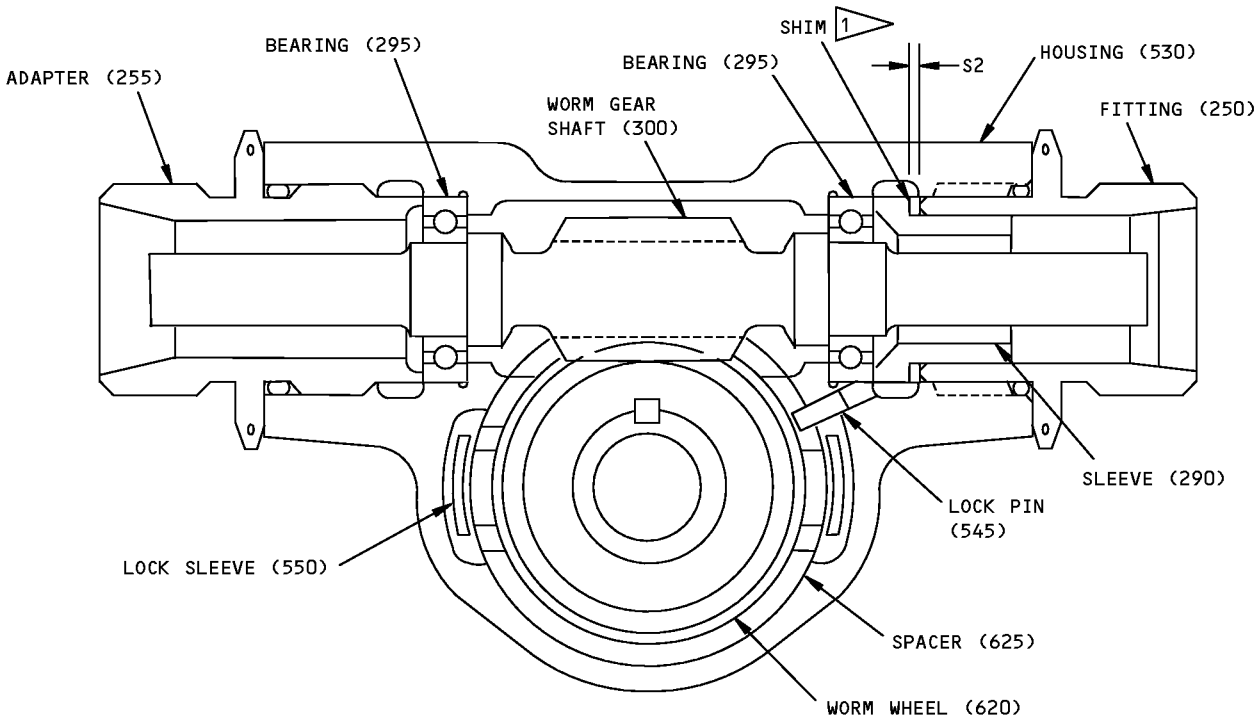
$$C = 5.500 - \left(\frac{A+B}{2}\right) \text{ WHERE } A = \left(\frac{A1+A2}{2}\right) \text{ AND } B = \left(\frac{B1+B2}{2}\right)$$

D = COMBINED DISTANCE BEARING (605) WIDTH PLUS WORM WHEEL (620) HALF WIDTH (FROM FIG. 701)

Housing Measurements - Lead Screw Bearing Shim Thickness Calculations
Figure 703



Worm Gear Assembly Details
Figure 704 (Sheet 1 of 2)



1 SHIM (265 THRU 285) THICKNESS CALCULATION:

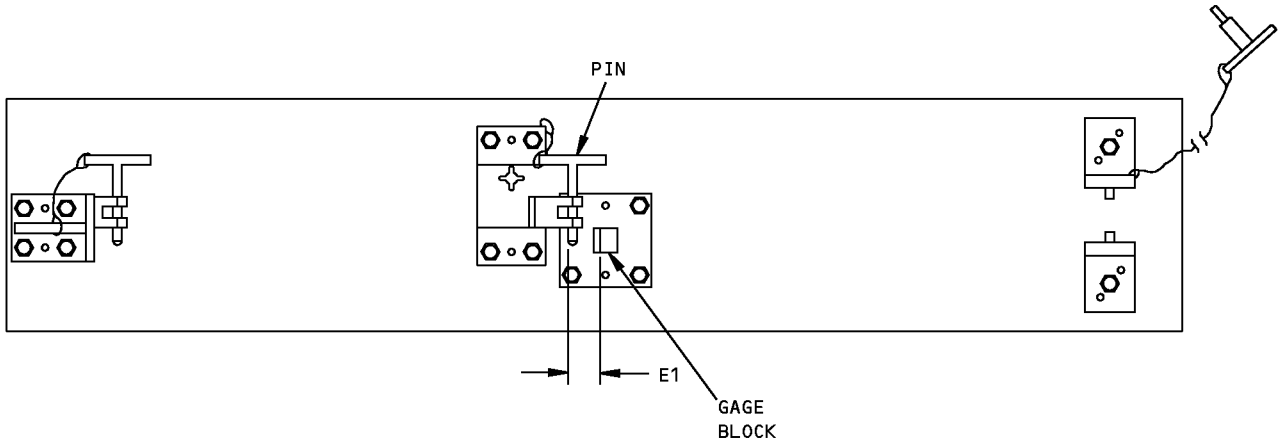
S2 = D3-D4 WHERE

S2 = SHIM (265 THRU 285) THICKNESS (NOMINAL, 0.023-0.093)

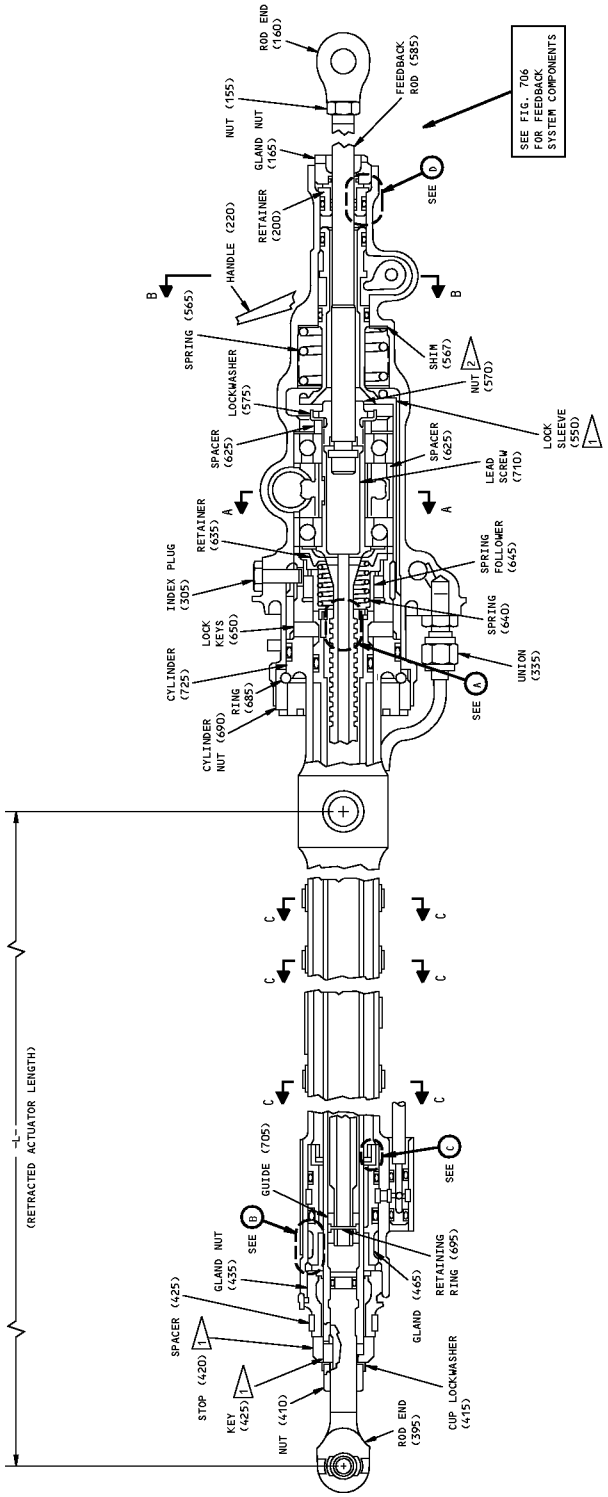
D3 = DISTANCE FROM HOUSING (530) FACE TO BEARING (295) FACE (NOMINAL, 0.783-0.833)

D4 = DISTANCE FROM FITTING (250) FACE TO SLEEVE (290) END (NOMINAL, 0.740-0.760)

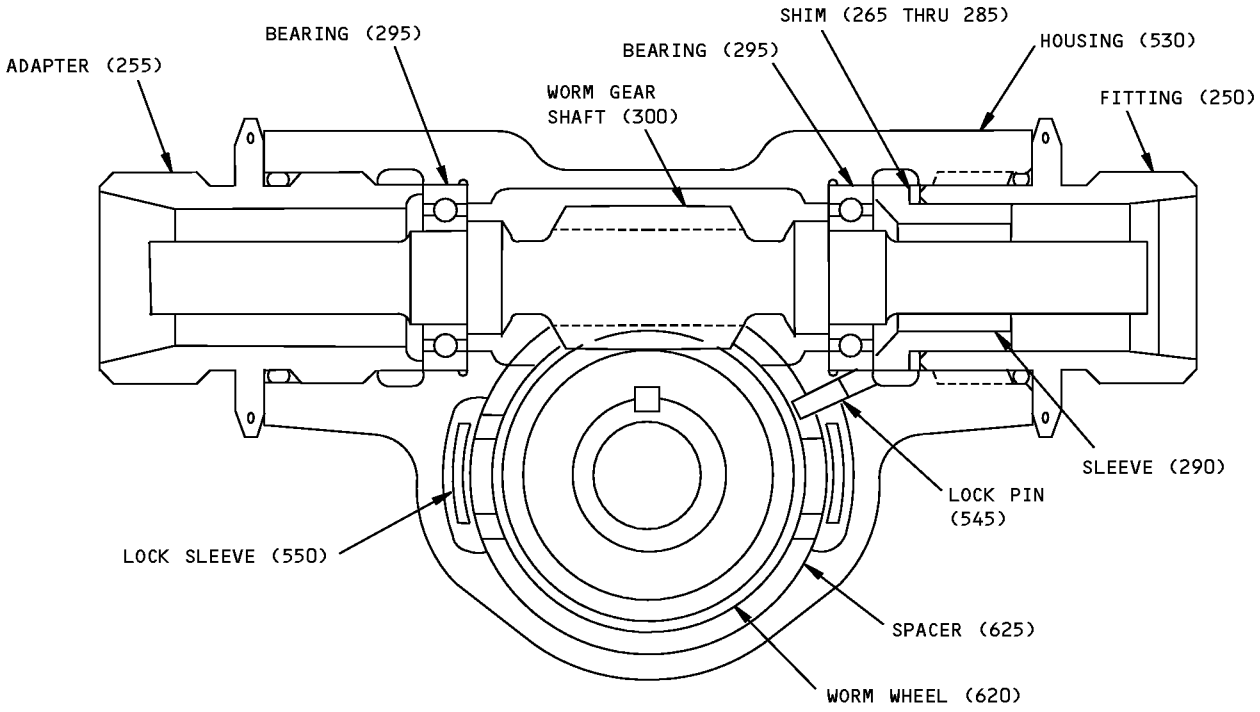
Worm Gear Assembly Details
Figure 704 (Sheet 2 of 2)



Dimension E1 Measurement - Test Fixture
Figure 705

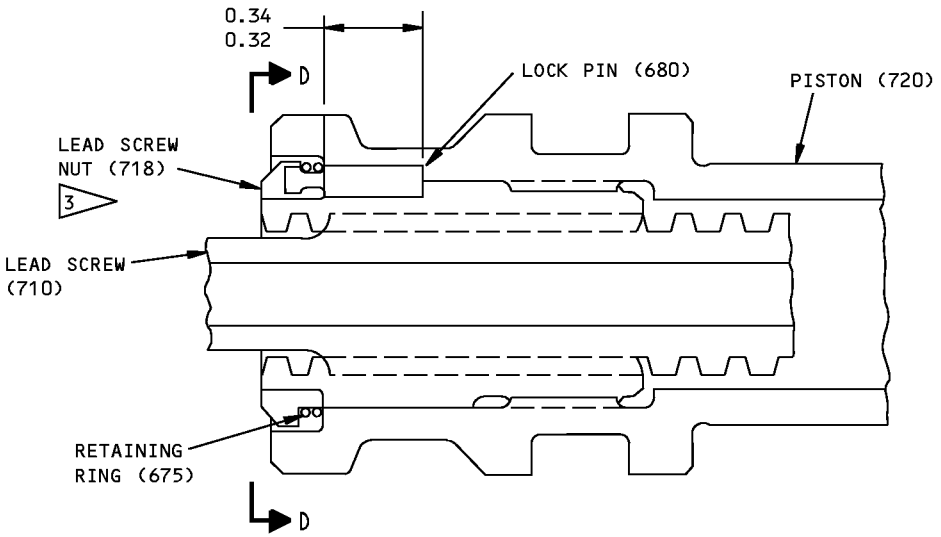


Actuator Assembly Details
Figure 706 (Sheet 1 of 5)



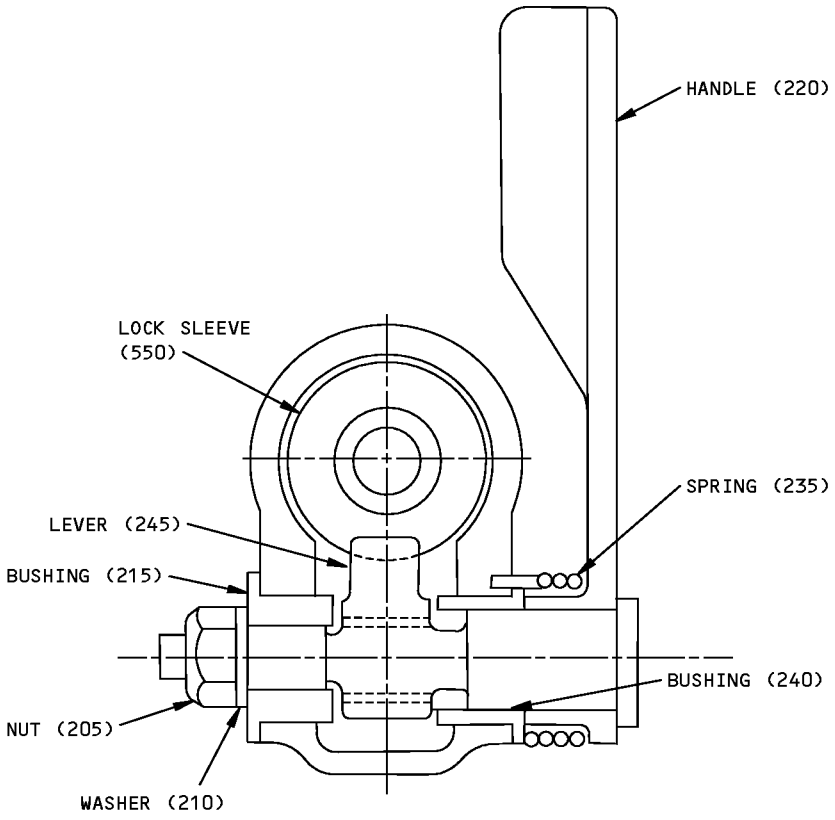
WORM GEAR ASSEMBLY DETAILS
A-A

Actuator Assembly Details
Figure 706 (Sheet 2 of 5)



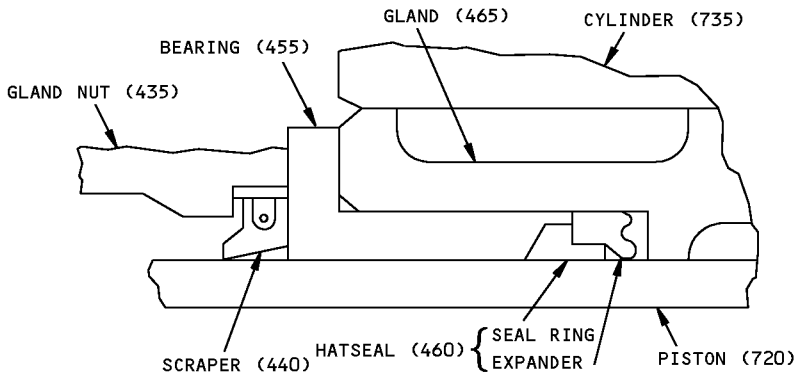
LEAD SCREW AND LEAD SCREW NUT DETAILS

A



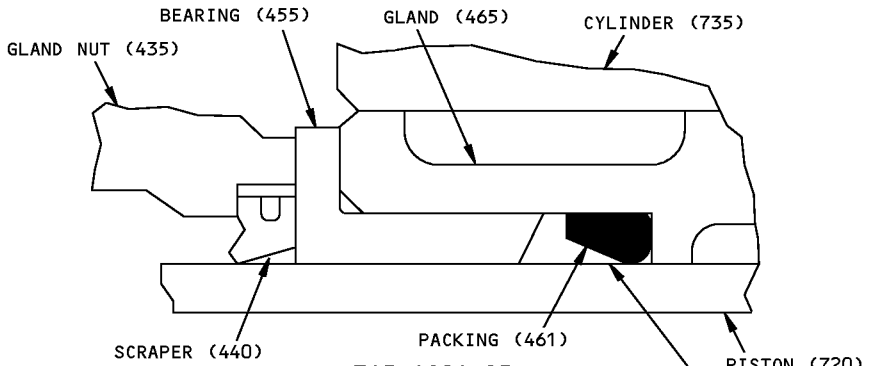
MANUAL RELEASE DETAILS
B-B

Actuator Assembly Details
Figure 706 (Sheet 3 of 5)



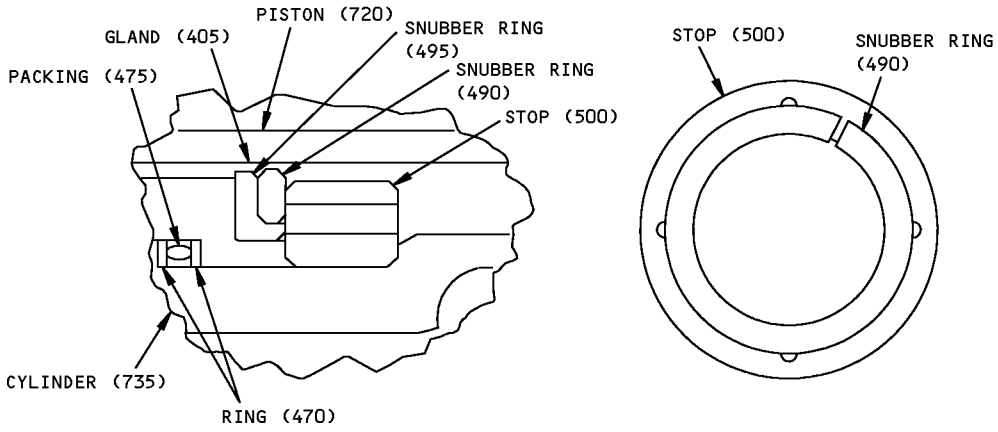
315A1801-13,-17,-21
PISTON/GLAND SEAL DETAILS

B



315A1801-25
PISTON/GLAND SEAL DETAILS

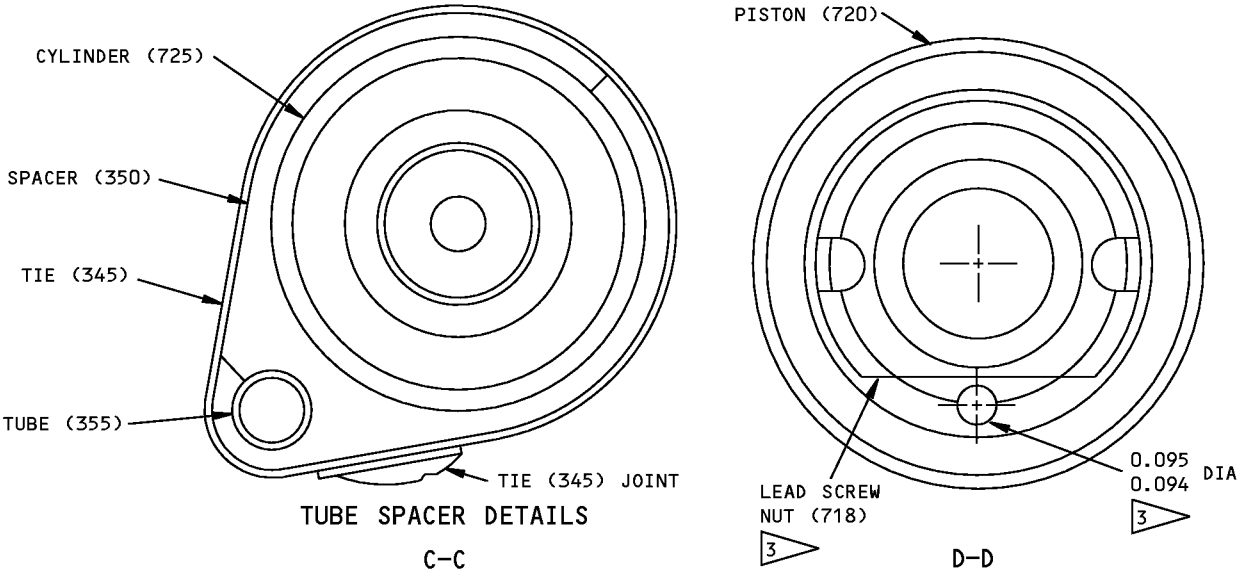
B

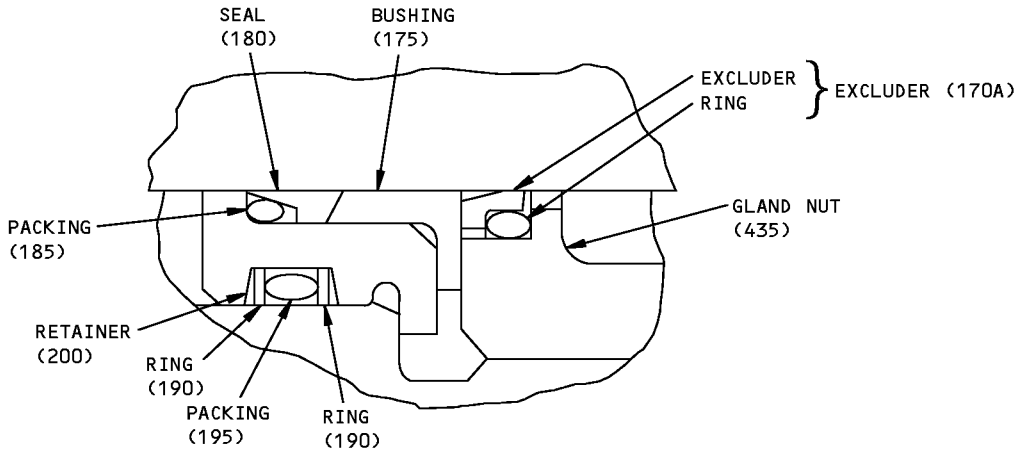


SNUBBER RING INSTL DETAILS

C

Actuator Assembly Details
Figure 706 (Sheet 4 of 5)



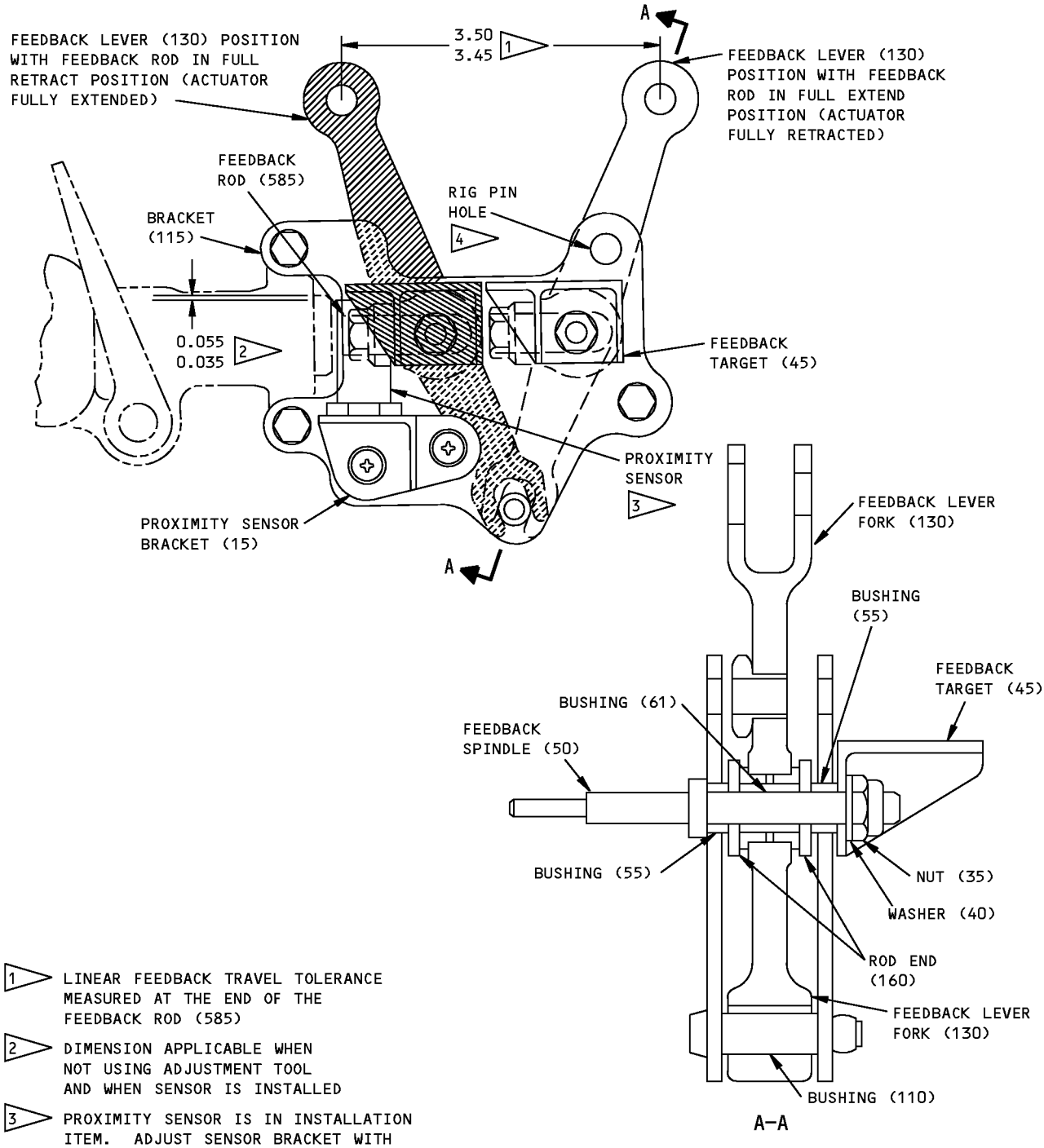


1. PARTIAL SECTION-ROTATED 90° INTO VIEW FOR CLARITY
2. LEFT HAND THREADS
3. WHEN INSTALLING A NEW LEAD SCREW NUT (718) INTO THE PISTON (720), THE 0.0470-0.0474 INCH RADIUS IN THE NUT MUST ALIGN WITH THE EXISTING HOLE IN THE PISTON WHILE TORQUEING THE NUT WITHIN THE 180-200 POUND-INCH TORQUE RANGE. THE 0.094-0.095 INCH DIAMETER HOLE MAY BE DRILLED ONLY AS SHOWN IN FIGURE 705. IF THE RADIUS AND THE HOLE DO NOT ALIGN WHILE APPLYING THE 180-200 POUND-INCH TORQUE, DO NOT DRILL THE HOLE. CONTACT BOEING FOR SPECIAL INSTRUCTIONS

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

Actuator Assembly Details
Figure 706 (Sheet 5 of 5)



1 LINEAR FEEDBACK TRAVEL TOLERANCE MEASURED AT THE END OF THE FEEDBACK ROD (585)

2 DIMENSION APPLICABLE WHEN NOT USING ADJUSTMENT TOOL AND WHEN SENSOR IS INSTALLED

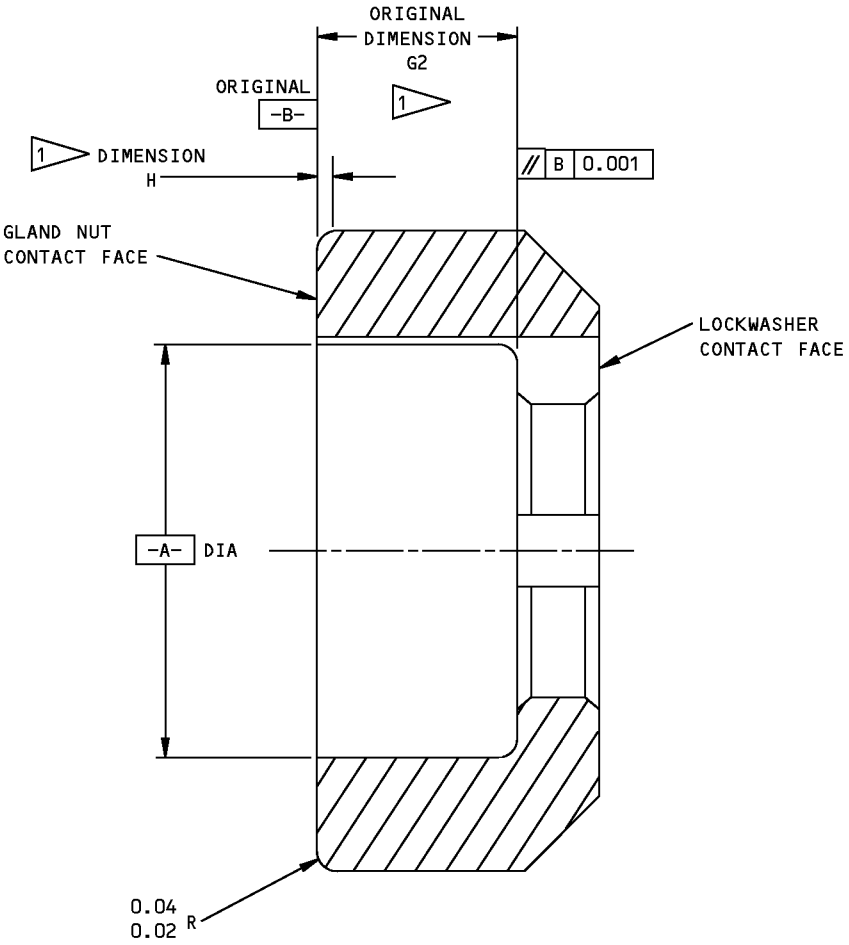
3 PROXIMITY SENSOR IS IN INSTALLATION ITEM. ADJUST SENSOR BRACKET WITH SENSOR INSTALLED ONLY WHEN ADJUSTMENT TOOL NOT AVAILABLE

4 FOR DRILLING DETAILS REFER TO FIG. 709

ITEM NUMBERS REFER TO IPL FIG. 1

160643 S00041194837_V2

Feedback System Components
Figure 707



STOP (420) 315A1891-1

1 MACHINE MATERIAL FROM SURFACE -B- OF STOP (420) IN ACCORDANCE WITH THE RELATION

H = G2 - G1 WHERE

H = MATERIAL AMOUNT TO REMOVE FROM SURFACE -B-

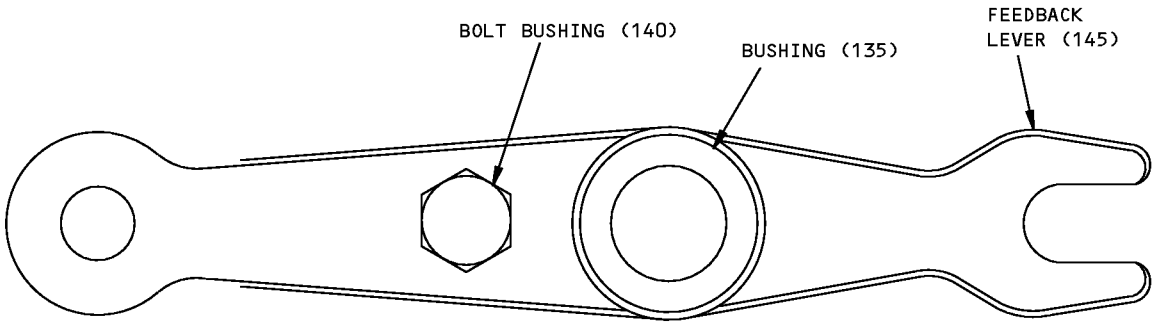
G1 = DISTANCE FROM END OF GLAND NUT (435) TO END OF PISTON (715)

G2 = DEPTH OF STOP (420) DIA -A-, MEASURED FROM ORIGINAL SURFACE -B-

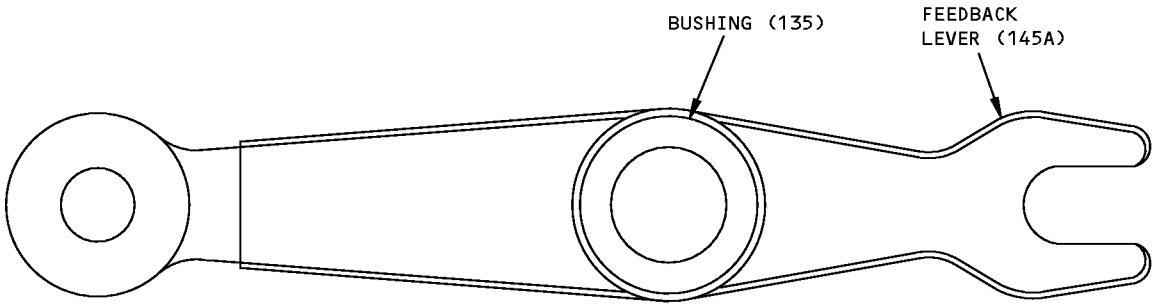
CAUTION: STOP (420) REMOVED FROM SERVICE WILL HAVE SURFACE -B- AND DEPTH DIMENSION G2 DIFFERENT FROM ORIGINAL DESIGN CONFIGURATION, DUE TO ABOVE MACHINING HAVING BEEN ALREADY PERFORMED DURING PREVIOUS ASSEMBLY OF PARTS.

NOTE: REFER TO REPAIR 19-1 FOR ADDITIONAL DETAILS.

Machining of Stop
Figure 708



315A1883-4
FEEDBACK LEVER ASSEMBLY (130)

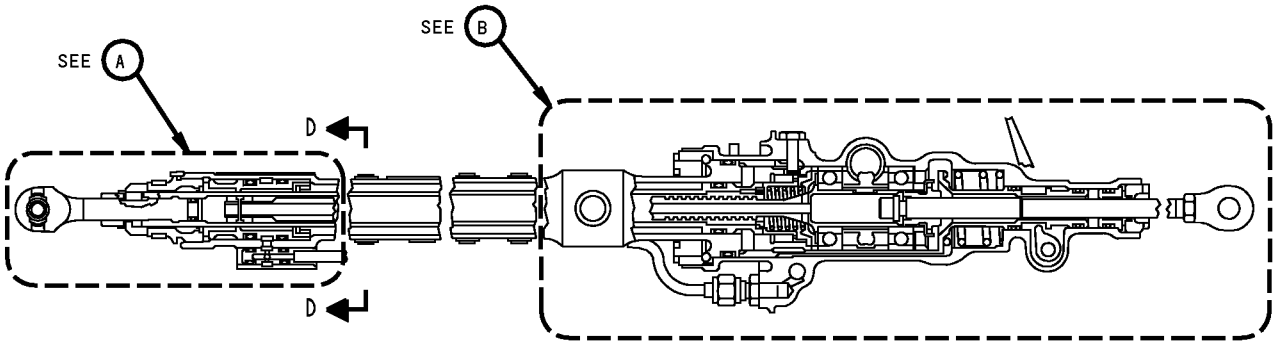


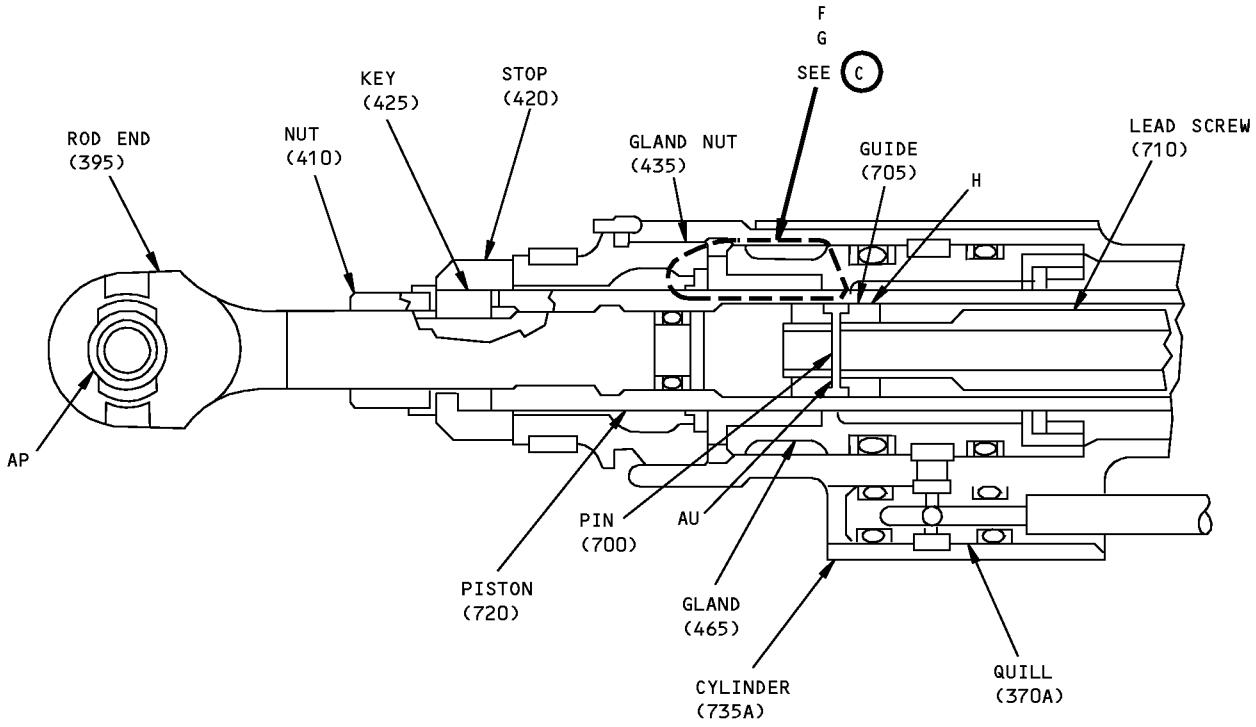
315A1883-6
FEEDBACK LEVER ASSEMBLY (130A)

NOTE: MAKE THE RIG-PIN HOLE IN THE FEEDBACK LEVER (130A) OR THE BOLT BUSHING (140) WHEN THE LEVER IS INSTALLED ON THE ACTUATOR. REFER TO PARAGRAPH 5.C (8)(F) FOR HOLE SIZE AND DRILLING DETAILS.

1315188 S00041194839_V2

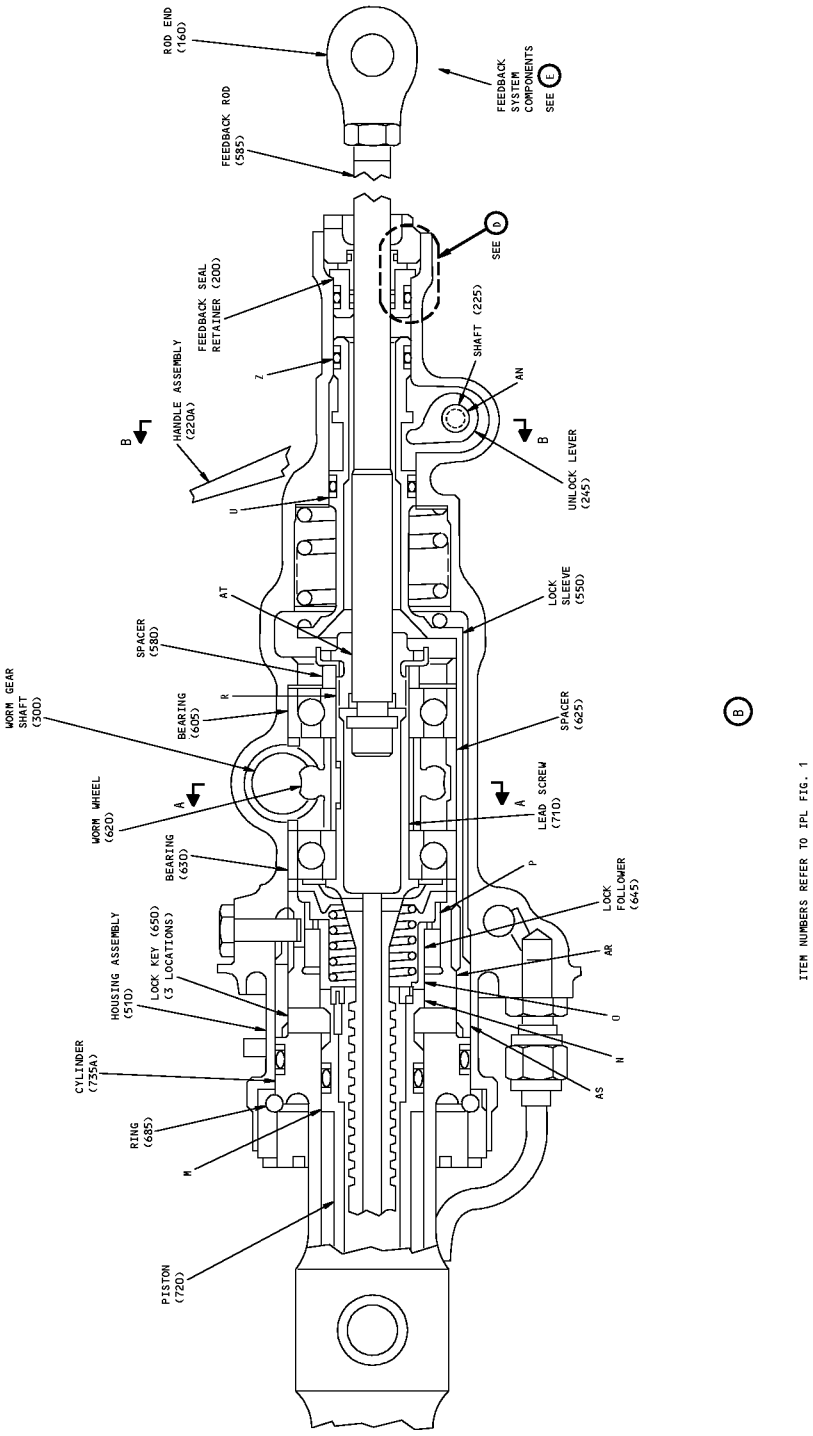
Feedback-Lever Assemblies With and Without Bolt Bushing
Figure 709



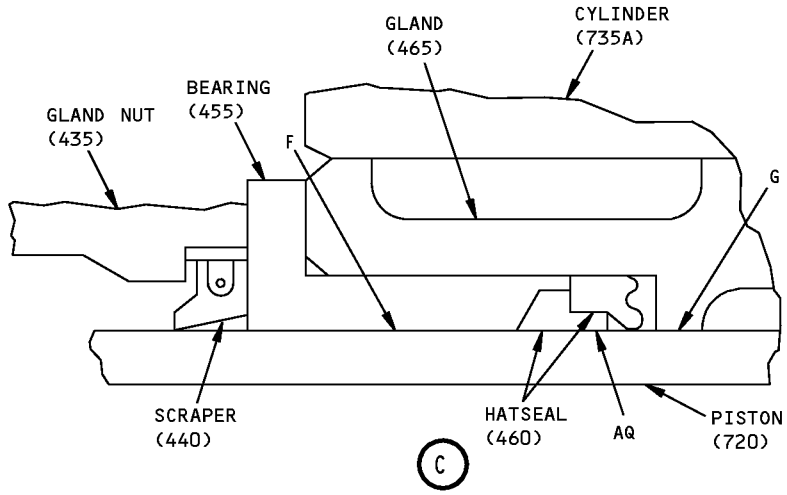


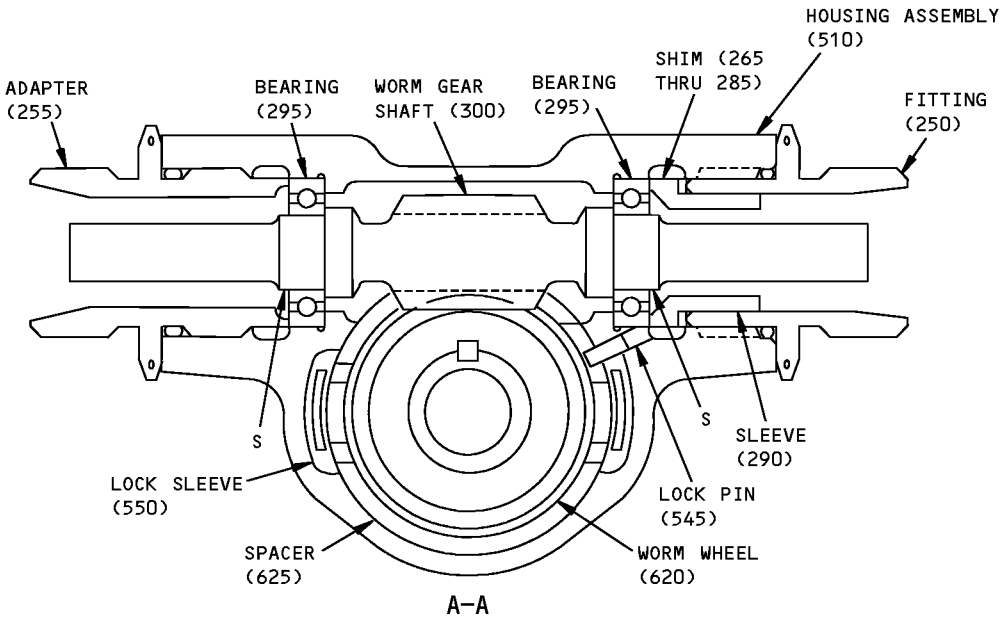
A

Fits and Clearances
Figure 801 (Sheet 1 of 8)

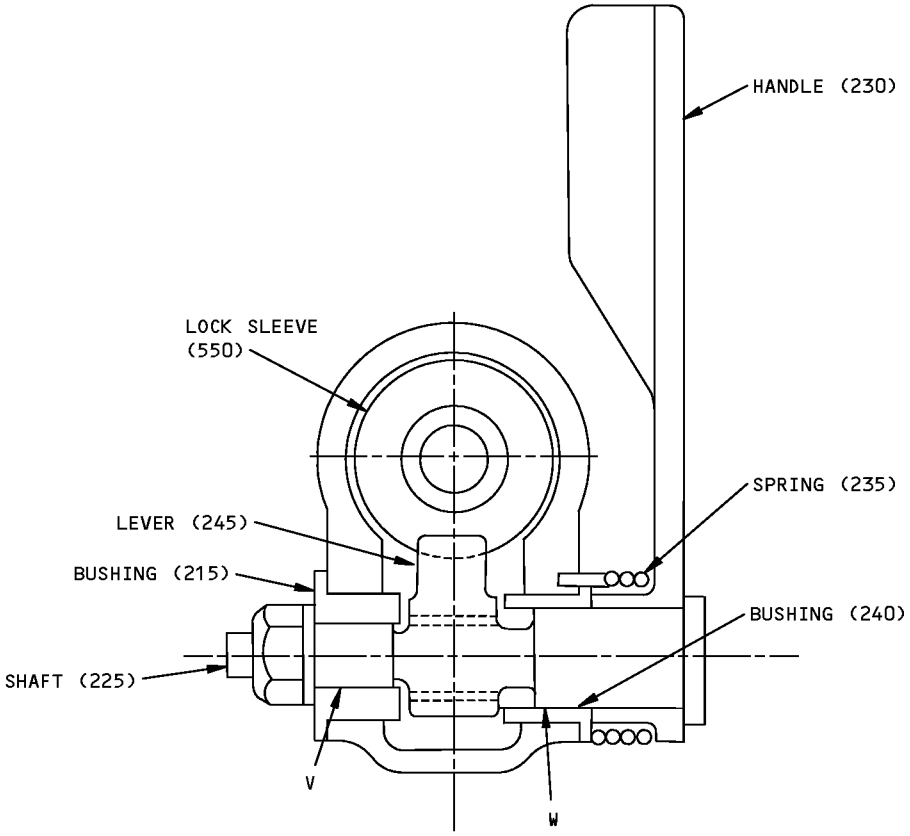


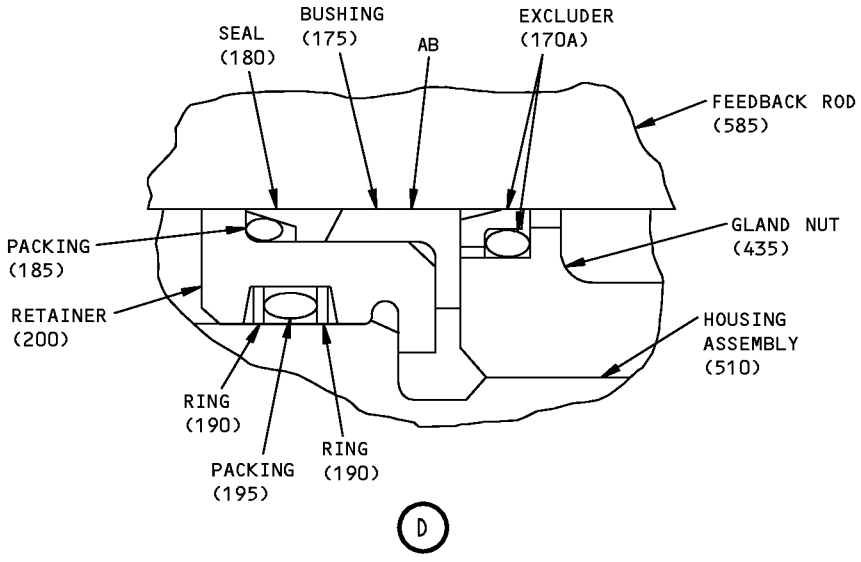
Fits and Clearances
Figure 801 (Sheet 2 of 8)





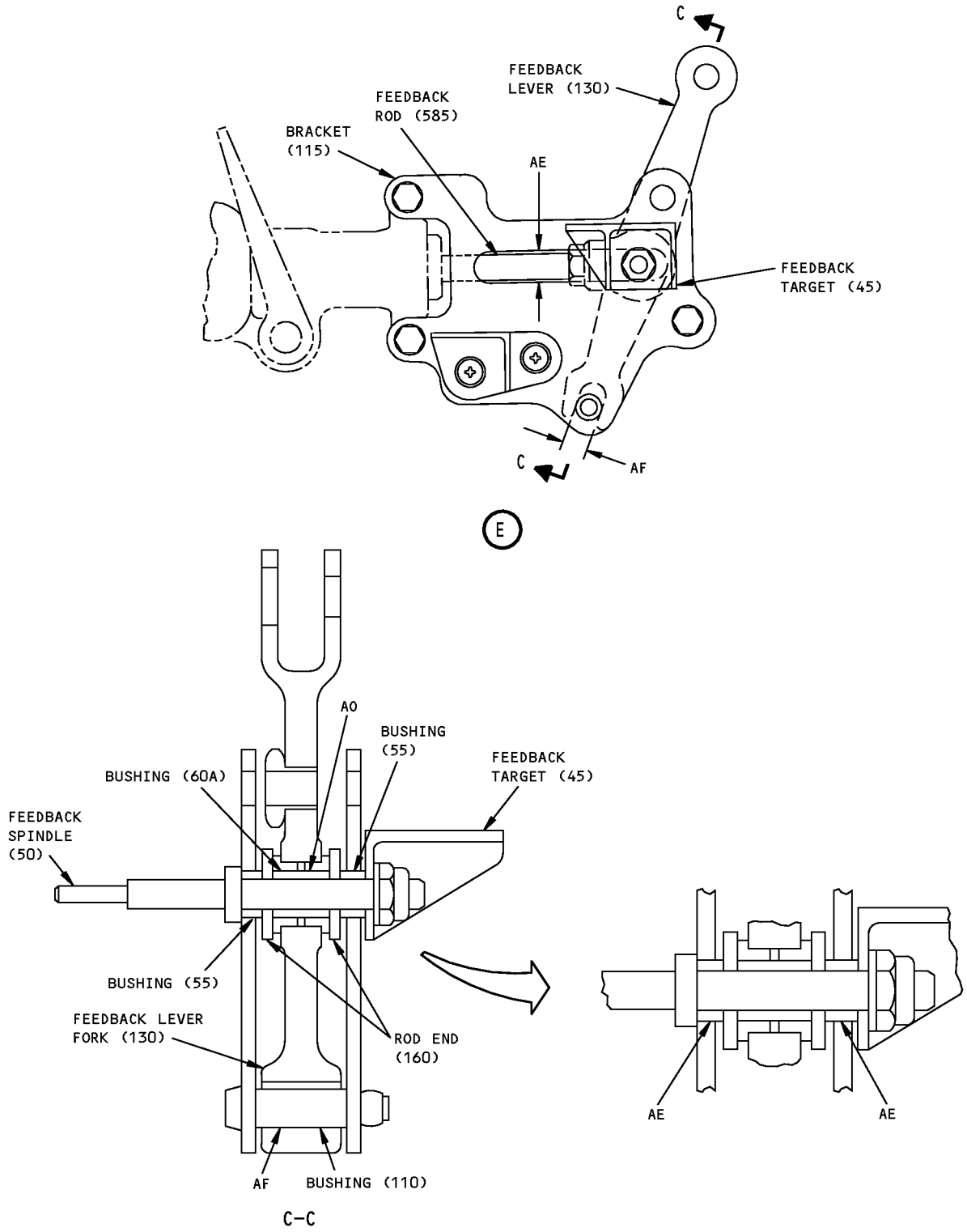
Fits and Clearances
Figure 801 (Sheet 3 of 8)



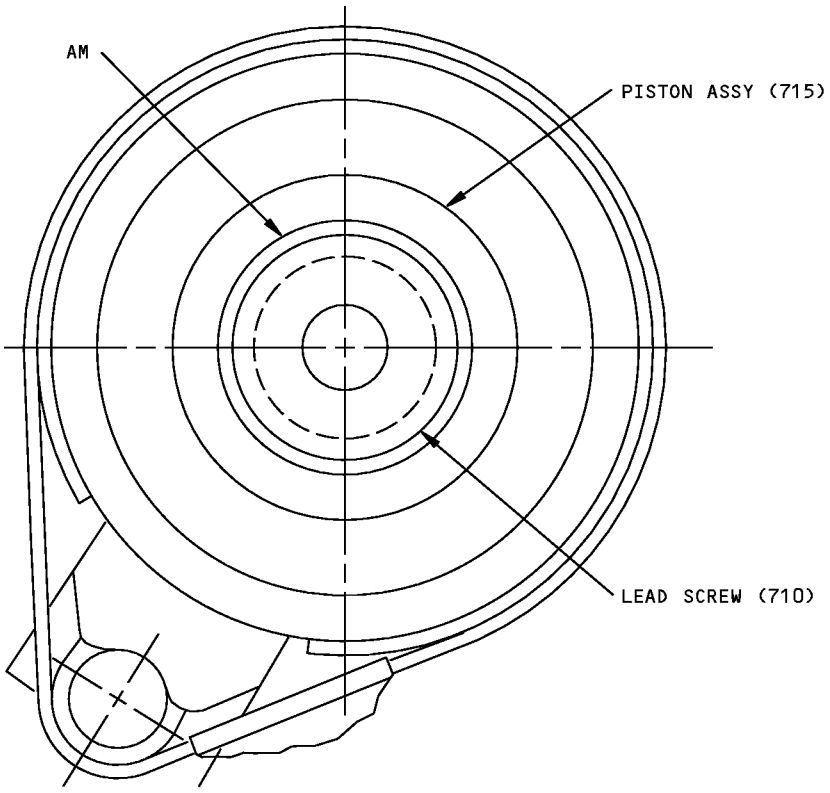


ITEM NUMBERS REFER TO IPL FIG. 1

Fits and Clearances
Figure 801 (Sheet 4 of 8)



Fits and Clearances
Figure 801 (Sheet 5 of 8)



D–D

Fits and Clearances
Figure 801 (Sheet 6 of 8)

Ref Letter Fig.801	Mating Item No. IPL Fig.1	Design Dimension				Service Wear Limit		
		Dimension		Assembly Clearance		Dimension		Maximum Clearance
		Min	Max	Min	Max	Min	Max	
F	ID 455 OD 720	0.750 0.746	0.751 0.748	0.002	0.005	0.745	0.755	0.01
G	ID 465 OD 720	0.750 0.746	0.751 0.748	0.002	0.005	0.745	0.755	0.01
H	ID 720 OD 705	0.557 0.548	0.560 0.552	0.005	0.012	0.525	0.570	0.045
M	ID 735 OD 720	1.116 1.113	1.118 1.114	0.002	0.005	1.110	1.121	0.011
N	ID 735 OD 720	1.116 1.111	1.118 1.112	0.004	0.007	1.110	1.121	0.011
O	ID 735 OD 645	1.116 1.113	1.118 1.114	0.002	0.005	1.110	1.121	0.011
P	ID 735 OD 645	1.500 1.497	1.502 1.498	0.002	0.005	1.494	1.505	0.011
R	ID 605,630 OD 710	N.A. 0.7870	N.A. 0.7874			0.785	0.788	0.004
S	ID 295 OD 300	N.A. 0.4723	N.A. 0.4726			0.470	0.473	0.004
U	ID 510 OD 550	0.925 0.922	0.927 0.923	0.002	0.005	0.919	0.930	0.011
V	ID 215 OD 225	0.2760 0.2746	0.2770 0.2750	0.0010	0.0024	0.270	0.280	0.010
W	ID 240 OD 225	0.4375 0.4369	0.4390 0.4374	0.0001	0.0021	0.433	0.442	0.009
Z	ID 510 OD 550	0.800 0.797	0.802 0.798	0.002	0.005	0.794	0.805	0.011

Fits and Clearances
Figure 801 (Sheet 7 of 8)

Ref Letter Fig.801	Mating Item No. IPL Fig.1	Design Dimension				Service Wear Limit		
		Dimension		Assembly Clearance		Dimension		Maximum Clearance
		Min	Max	Min	Max	Min	Max	
AB	ID 175 OD 585	0.311 0.309	0.312 0.310	0.001	0.003	0.306	0.315	0.009
AE	ID 1 115 OD 55	0.4420 0.4365	0.4470 0.4870	0.0050	0.105	0.416	0.487	0.071
AF	ID 2 130 OD 110	0.3750 0.3740	0.3790 0.3745	0.0005	0.0050	0.360	0.400	0.040
AM	ID 718 OD 710	0.448 0.440	0.452 0.444	0.0011 3	0.0033 3	4	5	0.020 3
AN	ID 245A OD 225	0.0654 6 0.0630 8	0.0678 7 0.0654 9	0.000	0.0048 3	0.060	0.072	0.012 3
AO	ID 130 OD 60A	0.4375 0.4365	0.4390 0.4370	0.0005	0.0025	0.425	0.450	0.025
AP	ID 405 OD 400	0.6265 0.6250	0.6270 0.6255	0.001	0.002	0.620	0.630	0.010
AQ	ID 460 OD 720	0.742 0.746	0.745 0.748	−0.001	−0.006	0.745	0.746	0.001
AR	ID 550 OD 735	1.860 1.848	1.864 1.849	0.011	0.016	1.845	1.867	0.022
AS	ID 530 OD 550	2.1180 2.105	2.1200 2.109	0.009	0.015	2.102	2.123	0.018
AT	ID 570 OD 585	0.3479 0.3450	0.3516 0.3479	0.0000 3	0.0019 3	4	5	0.004 3
AU	ID 705 OD 700	0.093 0.090	0.095 0.092	0.001	0.005	0.085	0.105	0.020

1 SLOT WIDTH
2 FORK WIDTH
3 BACKLASH AT PITCH DIAMETER
4 MINUS 10% FLANKWEAR
5 PLUS 10% FLANKWEAR
6 MIN EFFECTIVE CIRCULAR SPACE WIDTH
7 MAX ACTUAL CIRCULAR SPACE WIDTH
8 MIN ACTUAL CIRCULAR SPACE WIDTH
9 MAX EFFECTIVE CIRCULAR SPACE WIDTH

Fits and Clearances
Figure 801 (Sheet 8 of 8)

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
5	SCREW	27-33	
35	NUT	120-130	
155	NUT	75-85	
165	NUT	425-475	
205	NUT	20-30	
250	FITTING	1140-1200	
255	SCREW	1140-1200	
305	PLUG	50-75	
315	PLUG	450-550	
325	UNION	254-284	
335	UNION	133-147	
360	NUT	133-147	
410	NUT	600-800	
570	NUT	500-700	
690	NUT	2900-3100	

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-5349	X-Y Recorder/Plotter	925E	60795
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-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-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-7299	Plate (B78016-4 is included in B78016-1)	B78016-4	81205
SPL-7300	Housing - Locking (B78016-7 is included in B78016-1)	B78016-7	0B9R9
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

Special Tools (Continued)

Reference	Description	Part Number	Supplier
SPL-7373	Plate - Disassembly (B78015-8 is included in B78015-17 and -23)	B78015-8	81205
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-7522	Overhaul Set - Locking Actuator Assembly, Thrust Reverser	B78015-23	81205
SPL-7554	Plate - Assembly (B78015-7 is included in B78015-17 and -23)	B78015-7	81205
SPL-8215	Wrench Set - Thrust Reverser Actuator	B78008-19	81205
SPL-8238	Test Equipment - Velocity/Position Transducer	B20005-52	81205
SPL-8278	Overhaul Equipment - T/R Locking Actuator Assembly		

Commercial Tools

Reference	Description	Part Number	Supplier
COM-4950	Installation Tool - Cable Tie,	GS4MT	06383
		PPTMT	06383
		ST2MT	06383
COM-5782	Oscilloscope	TDS-220	80009

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
0B9R9	LORAL CORP./ AIRCRAFT BRAKING SYSTEMS CORP.	1204 MASSILLON RD. AKRON, OH 44315-0001 Telephone: 216-796-4400 Facsimile: 216-796-6230
60795	ALLEN DATAGRAPH INC.	2 INDUSTRIAL WAY SALEM, NH 03079-2837 Telephone: (603) 893-1983 Facsimile: (603) 893-9042
80009	TEKTRONIX INC.	14200 S W KARL BRAUN DRIVE P. O. BOX 500 BEAVERTON, OR 97077 Telephone: (800) 835-9433 Facsimile: (503) 627-3866
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
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
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
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
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
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
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

Code	Name
52828	REPUBLIC FASTENER MFG CORP 1300 RANCHO CONEJO BLVD NEWBURY PARK, CALIFORNIA 91320-1405 FORMERLY IN SYLMAR, CALIFORNIA
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
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
72962	HARVARD INDUSTRIES INC 3 WERNER WAY SUITE 210 LEBANON, NEW JERSEY 08833 FORMERLY ESNA V7A079 FORMERLY ELASTIC STOP NUT IN UNION, NJ
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

Code	Name
94878	RAYBESTOS-MANHATTAN INC PACIFIC COAST DIV FULLERTON, CALIFORNIA 92631 BUSINESS DISCONTINUED
97415	SMITHS AEROSPACE ACTUATION SYSTEMS-YAKIMA 2720 W WASHINGTON AVE YAKIMA, WASHINGTON 98909-0907 FORMERLY DECOTO AIRCRAFT AND DOWTY DECOTO; FORMERLY DOWTY AEROSPACE YAKIMA
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
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	75	4
109LH9075-4W		1	30	2
		1	90	1
1334-011		1	650	3
1334-012		1	550	1
1334-16		1	725A	1
1334-17		1	633	1
1334-18		1	637	1
1901-1B1-01		1	295B	2
1901S		1	295B	2
2-02903-04H		1	365	1
2140-5A		1	440	1
2150-122		1	480	2
2LPYEU8-17		1	100	1
		1	100	1
2LPYEU8-18		1	100A	1
2LPYEU8-18C		1	100A	1
315A1801-13		1	1A	RF
315A1801-17		1	1B	RF
315A1801-21		1	1C	RF
315A1801-25		1	1D	RF
315A1807-4		1	725	1
315A1807-5		1	735A	1
315A1809-4		1	530	1
315A1812-1		1	465	1
315A1814-1		1	570	1
315A1815-3		1	718	1
315A1815-4		1	718A	1
315A1817-2		1	300	1
315A1817-3		1	300A	1
315A1818-2		1	250	1
315A1820-3		1	715	1
315A1821-1		1	685	2
315A1823-1		1	140	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1824-2		1	490	1
315A1824-3		1	495	1
315A1826-1		1	705	1
315A1827-1		1	695	1
315A1828-1		1	680	1
315A1828-2		1	680A	1
		1	680B	1
315A1828-3		1	293	1
		1	293A	1
315A1828-4		1	293B	1
		1	293C	1
315A1829-1		1	700	1
315A1831-1		1	395	1
315A1831-2		1	405	1
315A1831-3		1	400	1
315A1832-10		1	355F	1
		1	355G	1
315A1832-11		1	355H	1
		1	355J	1
		1	355K	1
		1	355L	1
315A1832-12		1	375A	1
315A1832-5		1	375	1
315A1832-6		1	355A	1
315A1832-7		1	355B	1
315A1832-8		1	355C	1
315A1832-9		1	355D	1
		1	355E	1
315A1833-1		1	575	1
315A1834-1		1	290	1
315A1835-1		1	265	AR
315A1835-10		1	595	AR
315A1835-11		1	600	AR
315A1835-2		1	270	AR
315A1835-3		1	275	AR

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1835-4		1	280	AR
315A1835-5		1	285	AR
315A1835-6		1	567A	AR
315A1835-9		1	590	AR
315A1836-1		1	740	1
315A1838-1		1	510	1
315A1838-2		1	520	1
315A1838-3		1	525	1
315A1838-4		1	510A	1
		1	510B	1
315A1839-1		1	690	1
315A1839-2		1	690A	1
315A1842-2		1	720	1
315A1843-1		1	165	1
315A1843-2		1	165A	1
315A1844-1		1	635A	1
315A1847-1		1	645	1
315A1848-1		1	640	1
315A1849-1		1	565	1
315A1849-2		1	565A	1
		1	565B	1
315A1850-3		1	710	1
315A1850-4		1	710A	1
315A1850-5		1	710B	1
		1	710C	1
315A1851-1		1	635	1
315A1852-2		1	175	1
315A1853-1		1	455	1
315A1854-1		1	200	1
315A1857-2		1	220A	1
315A1857-4		1	220B	1
315A1858-4		1	380	1
315A1858-5		1	380A	1
315A1858-6		1	380B	1
315A1859-1		1	160	1

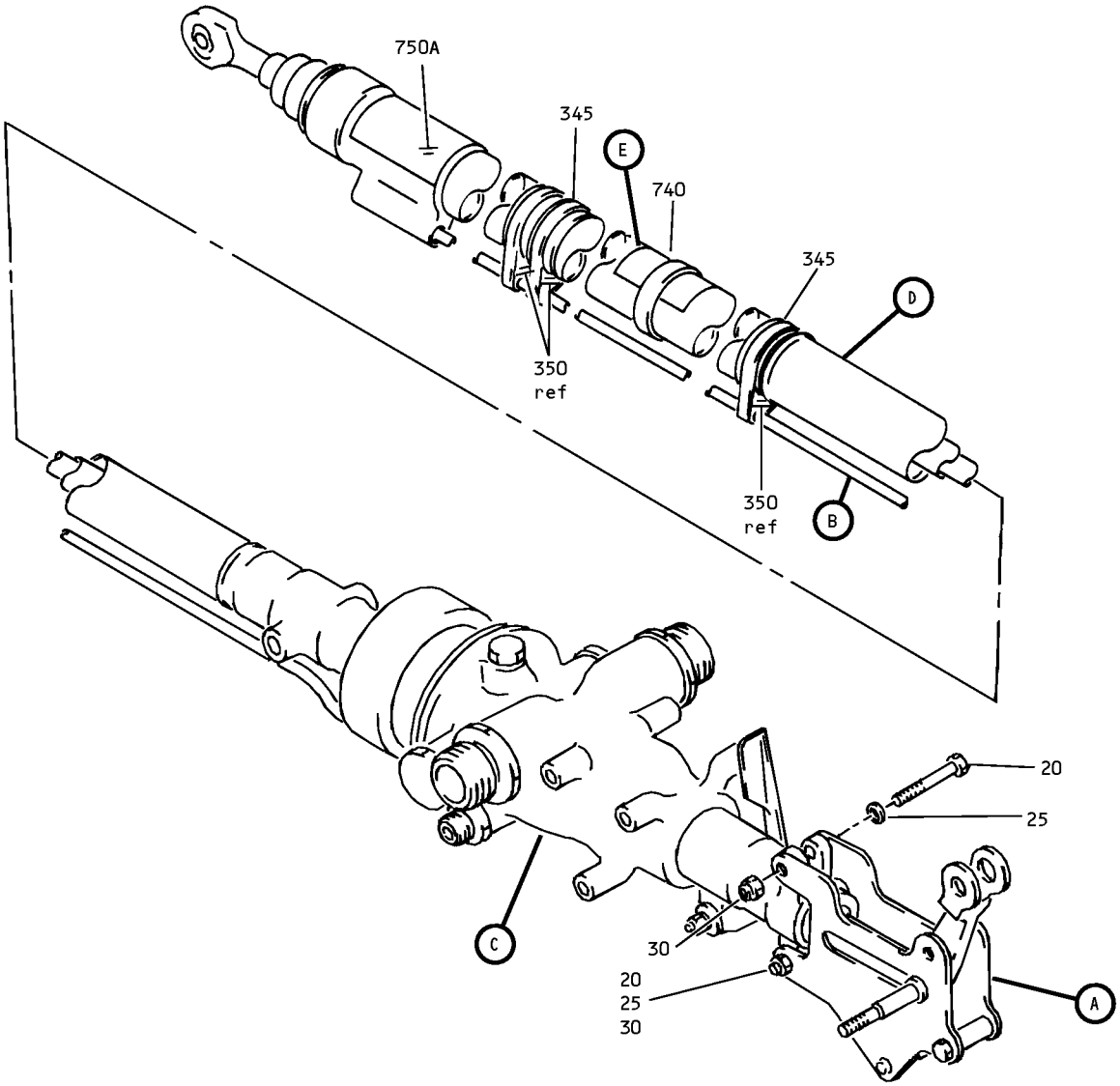
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1860-2		1	235	1
315A1861-1		1	530A	1
315A1861-5		1	530B	1
315A1862-1		1	245	1
315A1862-2		1	245A	1
		1	245B	1
315A1863-3		1	215A	1
315A1863-4		1	240A	1
315A1864-1		1	675	1
315A1865-1		1	500	1
315A1866-1		1	435	1
315A1866-2		1	435A	1
315A1867-1		1	430	1
315A1867-3		1	350	3
315A1868-1		1	585	1
315A1868-2		1	585A	1
		1	585B	1
315A1869-1		1	305	1
315A1871-4		1	370A	1
315A1871-5		1	370B	1
315A1871-6		1	370C	1
315A1874-1		1	410	1
315A1880-2		1	65	1
315A1881-1		1	115	1
315A1881-2		1	115A	1
315A1882-1		1	120	1
315A1882-2		1	120A	1
315A1883-4		1	130	1
315A1883-5		1	145	1
315A1883-6		1	130A	1
315A1883-7		1	145A	1
315A1884-1		1	50	1
315A1890-1		1	415	1
315A1891-1		1	420	1
315A1894-1		1	580	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1895-1		1	230	1
315A1895-3		1	230A	1
315A1896-2		1	225	1
315A1896-3		1	225A	1
315A1901-1		1	425	1
315A1903-2		1	255	1
315A1906-1		1	45	1
315A1907-1		1	150	1
315A1911-1		1	15	1
315A1912-10		1	625A	1
315A1912-11		1	615B	1
		1	615C	1
315A1912-5		1	625	1
315A1912-8		1	620	1
315A1912-9		1	615	1
		1	615A	1
35235V04		1	365	1
7204DB		1	605	2
9301K		1	295B	2
96-02		1	205	1
96-054		1	35	1
97E48		1	30	2
		1	90	1
9NS202101SE048		1	30	2
		1	90	1
AFP175V04		1	365	1
AN960-10L		1	10	2
AN960-416		1	25	2
		1	85	1
AN960C10L		1	210	1
AN960C416L		1	102	AR
AP2097-04H		1	365	1
BAC27DTR0011		1	745A	1
BAC27DTR0013		1	750A	1
BACB10BB12		1	295B	2

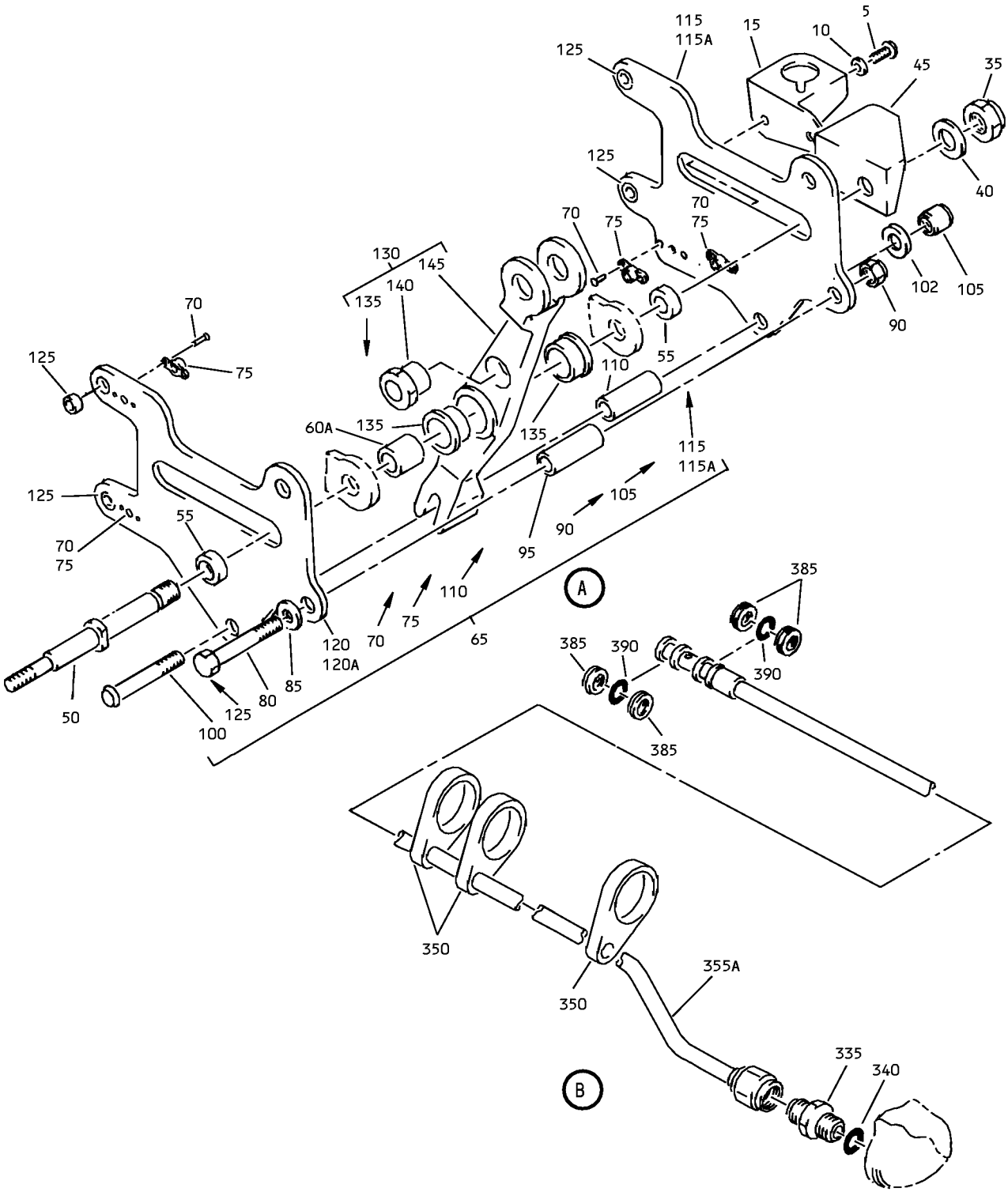
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
BACB28AK04-086		1	110	1
BACB28AK05-023		1	55	2
BACB28AK05-054		1	60A	1
BACB28X7F037		1	730	2
BACB28X7M018		1	135	2
BACB28Z4-086		1	95	1
BACB30DX8A17U		1	100	1
BACB30DX8A18		1	100A	1
BACB30LJ4-18		1	20	2
BACB30LJ4U18		1	80	1
BACN10CS04J		1	360	1
BACN10JC3		1	205	1
BACN10JC4CM		1	30	2
		1	90	1
BACN10JC5		1	35	1
BACN10JP3ACM		1	75	4
BACR12BP122		1	480	2
BACS11AA011		1	180	1
BACS13BX04H		1	365	1
BACS34A5A		1	440	1
BACW10BN5SP		1	40	1
BRH10A3		1	205	1
BRH10A5		1	35	1
BRH10C4M		1	30	2
		1	90	1
BRM200C3M		1	75	4
C001MCP0		1	295B	2
C001R1P17LY331		1	295B	2
C11237-122		1	480	2
C204MSDB1222		1	605A	2
		1	605B	2
CWR76-5B		1	440	1
DB0S13BX04H		1	365	1
DW96801-5A		1	440	1
DW969516-122		1	480	2

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
H01-4BAC		1	30	2
		1	90	1
H10-3BAC		1	205	1
H10-5BAC		1	35	1
MK1001-3BAC		1	75	4
MLT2HLP		1	345	3
MS20068-53		1	610	1
MS20427M3-4		1	70	8
MS21902J4		1	335	1
MS21902J6		1	325	2
MS28782-12		1	190	2
		1	535	2
MS28782-14		1	555	2
MS28782-17		1	665	2
MS28782-20		1	470	2
MS28782-5		1	385	4
MS28782-6		1	445	2
MS28783-3		1	655	2
MS9901-08		1	315	2
NAS1080UK08		1	105	1
NAS1352-06H8P		1	515A	2
NAS1352C06H8P		1	515	2
NAS1611-010		1	390	2
NAS1611-011		1	185	1
		1	450	1
NAS1611-114		1	195	1
		1	540	1
NAS1611-116		1	461	1
		1	560	1
NAS1611-122		1	485	1
NAS1611-212		1	670	1
NAS1611-215		1	475	1
NAS1611-225		1	660	1
NAS1612-12		1	260	2
NAS1612-2		1	310	1

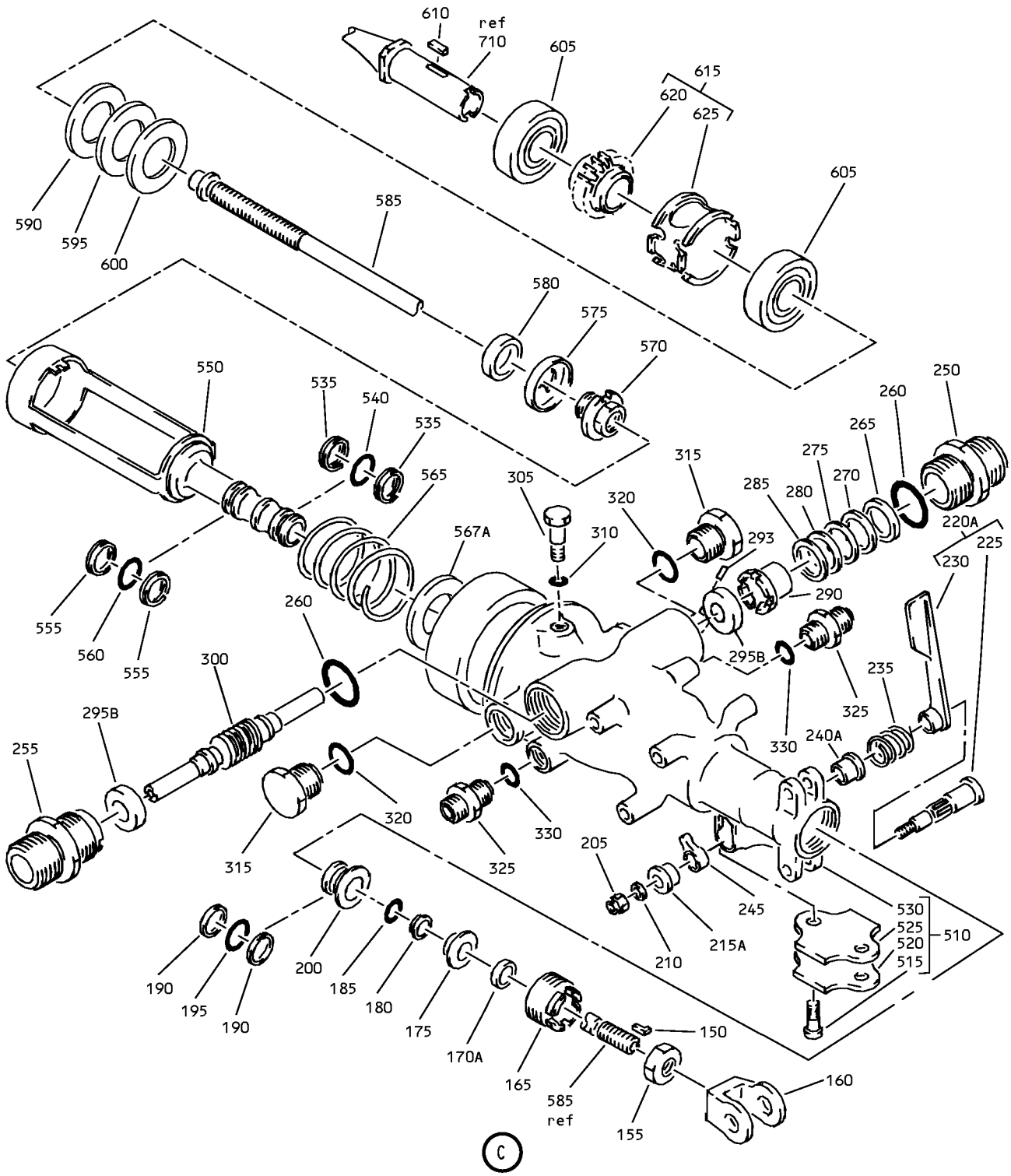
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
NAS1612-4		1	340	1
NAS1612-6		1	330	2
NAS1612-8		1	320	2
NAS509-5		1	155	1
NAS623-3-4		1	5	2
NAS76A4-004P		1	125	4
NS103197SE02		1	75	4
NS202101-02		1	205	1
PKT001P1		1	295B	2
R9301KA4298		1	295B	2
		1	295B	2
RM9157BU122		1	480	2
RMLH9075-3W		1	205	1
RMLH9075-5W		1	35	1
S30310-122		1	480	2
S30388-5-1		1	440	1
S30395-5-16H		1	170A	1
S32991-116H5		1	460	1
S33121-116-99		1	460B	1
STS900-122		1	480	2
T6C428JM		1	30	2
		1	90	1
T6S1032J		1	205	1
T6S524J		1	35	1
T8080C1032		1	75	4
TF005-5A		1	440	1
TF456-122		1	480	2
VN202D1-02		1	75	4
VN303A02		1	205	1
VN303D048		1	30	2
		1	90	1



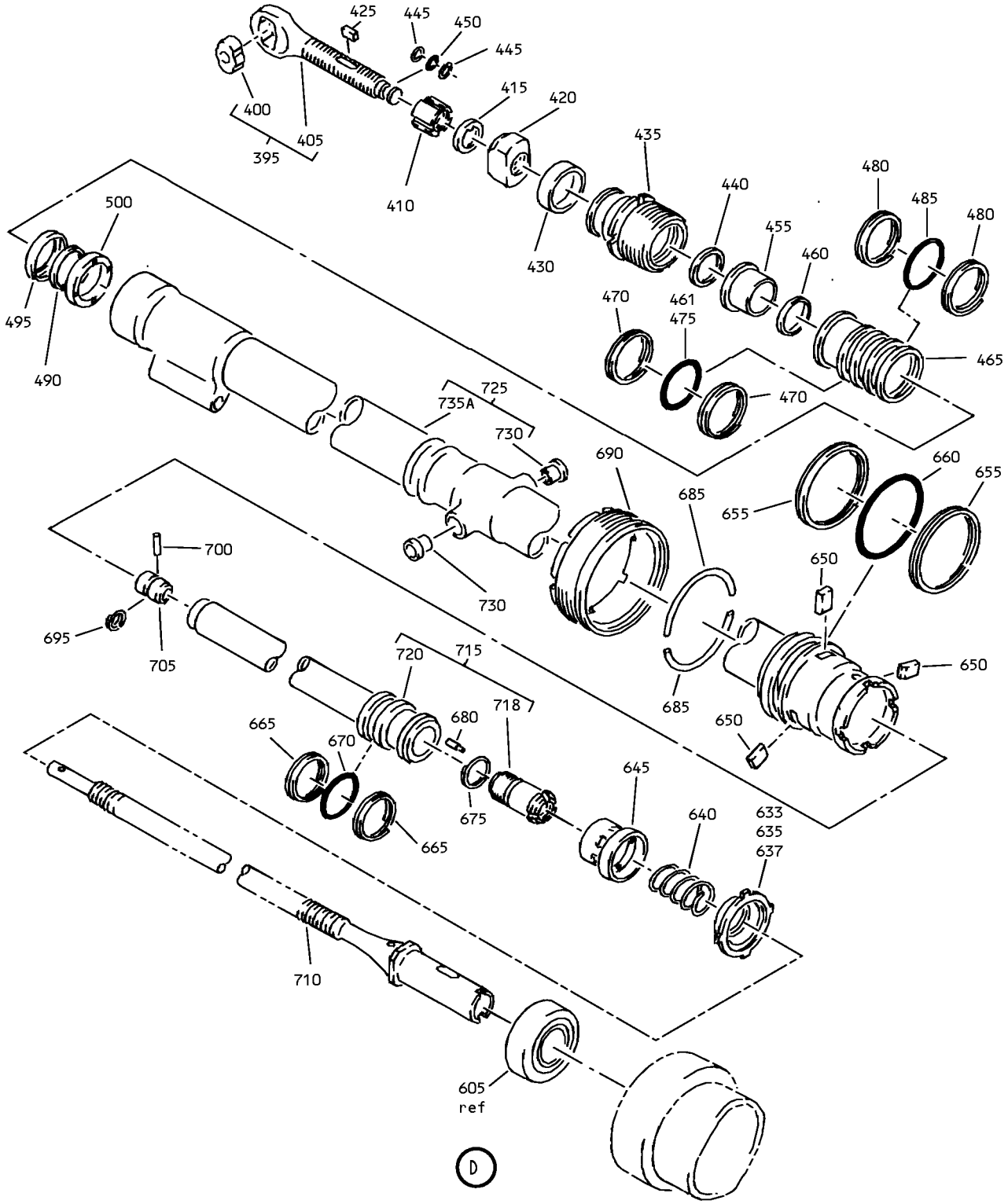
Thrust Reverse Locking Actuator Assembly
IPL Figure 1 (Sheet 1 of 5)



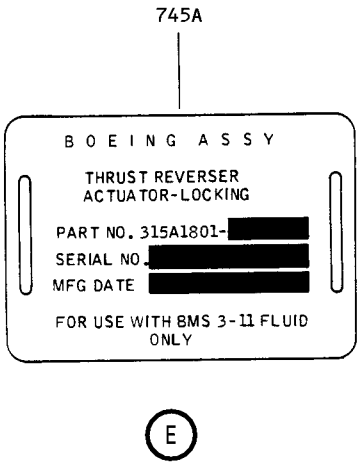
Thrust Reverse Locking Actuator Assembly
IPL Figure 1 (Sheet 2 of 5)



Thrust Reverse Locking Actuator Assembly
IPL Figure 1 (Sheet 3 of 5)



Thrust Reverse Locking Actuator Assembly
IPL Figure 1 (Sheet 4 of 5)



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

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–1	315A1801-9		DELETED		
–1A	315A1801-13		ACTUATOR ASSY-LOCKING	A	RF
–1B	315A1801-17		ACTUATOR ASSY-LOCKING	B	RF
–1C	315A1801-21		ACTUATOR ASSY-LOCKING	C	RF
–1D	315A1801-25		ACTUATOR ASSY-LOCKING	D	RF
–1E	315A1801-25		DELETED		
5	NAS623-3-4		. SCREW		2
10	AN960-10L		. WASHER		2
15	315A1911-1		. BRACKET-PROXIMITY SWITCH		1
20	BACB30LJ4-18		. BOLT		2
25	AN960-416		. WASHER		2
30	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))		2
35	BRH10A5		. NUT (V52828) (SPEC BACN10JC5) (OPT T6S524J (V11815)) (OPT 96-054 (V80539)) (OPT RMLH9075-5W (V72962)) (OPT H10-5BAC (V15653))		1
40	BACW10BN5SP		. WASHER		1
45	315A1906-1		. TARGET-FEEDBACK		1
50	315A1884-1		. SPINDLE-FEEDBACK		1
55	BACB28AK05-023		. BUSHING		2
–60	BACB28AK05-0535		DELETED		
60A	BACB28AK05-054		. BUSHING		1
65	315A1880-2		. BRACKET ASSY-FEEDBACK		1
70	MS20427M3-4		. . RIVET		8

–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	BRM200C3M		. . NUTPLATE (V52828) (SPEC BACN10JP3ACM) (OPT MK1001-3BAC (V15653)) (OPT NS103197SE02 (V80539)) (OPT T8080C1032 (V11815)) (OPT VN202D1-02 (V92215)) (OPT 109A9201M3 (V72962))		4
80	BACB30LJ4U18		. . BOLT		1
85	AN960-416		. . WASHER		1
90	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))		1
95	BACB28Z4-086		. . BUSHING		1
100	2LPYEU8-17		. . BOLT (V11815) (SPEC BACB30DX8A17U) (OPT 2LPYEU8-17 (V17446)) (OPT ITEM 100A)		1
–100A	2LPYEU8-18C		. . BOLT (V11815) (SPEC BACB30DX8A18) (OPT 2LPYEU8-18 (V17446)) (OPT ITEM 100)		1
102	AN960C416L		. . WASHER		AR
105	NAS1080UK08		. . COLLAR		1
110	BACB28AK04-086		. . BUSHING		1
115	315A1881-1		. . BRACKET (ITEM 115 USED WITH ITEM 125 (QTY 2) OPT ITEM 115A)		1
115A	315A1881-2		. . BRACKET (ITEM 115 USED WITH ITEM 125 (QTY 2) OPT ITEM 115A)		1

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
120	315A1882-1		. . BRACKET (ITEM 120 USED WITH ITEM 125 (QTY 2) OPT ITEM 120A)		1
120A	315A1882-2		. . BRACKET (ITEM 120 USED WITH ITEM 125 (QTY 2) OPT ITEM 120A)		1
125	NAS76A4-004P		. . BUSHING (ITEM 115 USED WITH ITEM 125 (QTY 2) OPT ITEM 115A) (ITEM 120 USED WITH ITEM 125 (QTY 2) OPT ITEM 125A)		4
130	315A1883-4		. LEVER ASSY-FEEDBACK	A, B	1
–130A	315A1883-6		. LEVER ASSY-FEEDBACK	C, D	1
135	BACB28X7M018		. . BUSHING		2
140	315A1823-1		. . BOLT-BUSHING	A, B	1
145	315A1883-5		. . LEVER	A, B	1
–145A	315A1883-7		. . LEVER	C, D	1
150	315A1907-1		. KEY-LOCK		1
155	NAS509-5		. NUT		1
160	315A1859-1		. END-ROD		1
165	315A1843-1		. NUT-FEEDBACK GLAND (OPT ITEM 165A)		1
–165A	315A1843-2		. NUT-FEEDBACK GLAND (OPT ITEM 165)		1
–165B	315A1843-2		DELETED		
–170	S30395-5-16		DELETED		
170A	S30395-5-16H		. EXCLUDER (V97820)		1
175	315A1852-2		. BUSHING-ROD		1
180	BACS11AA011		. SEAL-FOOT		1
185	NAS1611-011		. PACKING		1
190	MS28782-12		. RING		2
195	NAS1611-114		. PACKING		1
200	315A1854-1		. RETAINER-FEEDBACK SEAL		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–					
205	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))		1
210	AN960C10L		. WASHER		1
–215	315A1863-1		DELETED		
215A	315A1863-3		. BUSHING		1
–220	315A1857-3		DELETED		
220A	315A1857-2		. HANDLE ASSY (OPT ITEM 220B)		1
–220B	315A1857-4		. HANDLE ASSY (OPT ITEM 220A)		1
225	315A1896-2		. . SHAFT (USED ON ITEM 220A)		1
–225A	315A1896-3		. . SHAFT (USED ON ITEM 220B)		1
230	315A1895-1		. . HANDLE (USED ON ITEM 220A)		1
–230A	315A1895-3		. . HANDLE (USED ON ITEM 220B)		1
235	315A1860-2		. SPRING		1
–240	315A1863-2		DELETED		
240A	315A1863-4		. BUSHING (ALT FROM BACB28X7F034)		1
245	315A1862-1		. LEVER-UNLOCK (OPT ITEM 245A)	A-C	1
–245A	315A1862-2		. LEVER-UNLOCK (OPT ITEM 245) (PREFERED)	A-C	1
–245B	315A1862-2		. LEVER-UNLOCK	D	1
250	315A1818-2		. FITTING		1
255	315A1903-2		. SCREW-ADPTR		1
260	NAS1612-12		. PACKING		2

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
265	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) (SELECT FROM)		AR
270	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) (SELECT FROM)		AR
275	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) (SELECT FROM)		AR
280	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) (SELECT FROM)		AR
285	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) (SELECT FROM)		AR
290	315A1834-1		. SLEEVE		1
293	315A1828-3		. PIN-LOCKING	A	1
–293A	315A1828-3		. PIN-LOCKING (OPT ITEM 293B)	B, C	1
–293B	315A1828-4		. PIN-LOCKING (OPT ITEM 293A) (PREFERED)	B, C	1
–293C	315A1828-4		. PIN-LOCKING	D	1
–295	1901S		DELETED		
–295A	9301K		DELETED		

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
295B	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))		2
300	315A1817-2		. SHAFT-WORM GEAR (OPT ITEM 300A)		1
–300A	315A1817-3		. SHAFT-WORM GEAR (OPT ITEM 300)		1
305	315A1869-1		. PLUG		1
310	NAS1612-2		. PACKING		1
315	MS9901-08		. PLUG		2
320	NAS1612-8		. PACKING		2
325	MS21902J6		. UNION		2
330	NAS1612-6		. PACKING		2
335	MS21902J4		. UNION		1
340	NAS1612-4		. PACKING		1
345	MLT2HLP		. TIE (V06383)		3
350	315A1867-3		. SPACER		3
–355	315A1832-4		DELETED		
355A	315A1832-6		. TUBE ASSY (OPT ITEM 355B, 355C, 355J)	A	1
–355B	315A1832-7		. TUBE ASSY (OPT ITEM 355A, 355C, 355J)	A	1
–355C	315A1832-8		. TUBE ASSY (OPT ITEM 355A, 355B, 355J)	A	1
–355D	315A1832-9		. TUBE ASSY (OPT ITEM 355K)	B	1
–355E	315A1832-9		. TUBE ASSY (OPT ITEM 355F, 355L)	C	1
–355F	315A1832-10		. TUBE ASSY (OPT ITEM 355E, 355L)	C	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–					
–355G	315A1832-10		. TUBE ASSY (OPT ITEM 355H)	D	1
–355H	315A1832-11		. TUBE ASSY (PREFERRED OPTION FOR SPARES) (OPT ITEM 355G)	D	1
–355J	315A1832-11		. TUBE ASSY (PREFFERED OPTION FOR SPARES) (OPT ITEM 355A, 355B, 355C)	A	1
–355K	315A1832-11		. TUBE ASSY (PREFFERED OPTION FOR SPARES) (OPT ITEM 355D)	B	1
–355L	315A1832-11		. TUBE ASSY (PREFFERED OPTION FOR SPARES) (OPT ITEM 355A, 355F)	C	1
–360	BACN10CS04J		. . NUT		1
–365	DB0S13BX04H		. . SLEEVE (V14798) (SPEC BACS13BX04H) (OPT 2-02903-04H (V11328)) (OPT 35235V04 (V08199)) (OPT AP2097-04H (V01673)) (OPT AFP175V04 (V30974))		1
–370	315A1871-3		DELETED		
–370A	315A1871-4		. . QUILL (USED ON ITEM 355A)	A	1
–370B	315A1871-5		. . QUILL (USED ON ITEM 355B)	A	1
–370C	315A1871-6		. . QUILL (USED ON ITEMS 355C, 355D, 355E, 355F, 355G, 355H)		1
–375	315A1832-5		. . SPACER (USED ON ITEMS 355A, 355B, 355C, 355D, 355E, 355F, 355G)		1
–375A	315A1832-12		. . SPACER (USED ON ITEM 355H)	D	1
–380	315A1858-4		. . TUBE	A	1
–380A	315A1858-5		. . TUBE (USED ON ITEMS 355D, 355E)	B, C	1
–380B	315A1858-6		. . TUBE (USED ON ITEMS 355F, 355G, 355H)	D	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–					
385	MS28782-5		. RING		4
390	NAS1611-010		. PACKING		2
395	315A1831-1		. END ASSY-ROD		1
–395A	315A1831-4		DELETED		
–395B	315A1831-4		DELETED		
–395C	315N3832-1		DELETED		
400	315A1831-3		. . BALL		1
–400A	315N3831-2		DELETED		
405	315A1831-2		. . BODY		1
–405A	315N3831-1		DELETED		
410	315A1874-1		. NUT		1
415	315A1890-1		. WASHER-LOCK		1
420	315A1891-1		. STOP		1
425	315A1901-1		. KEY		1
430	315A1867-1		. SPACER		1
435	315A1866-1		. NUT-GLAND (OPT ITEM 435A)		1
–435A	315A1866-2		. NUT-GLAND (OPT ITEM 435)		1
–435B	315A1866-2		DELETED		
440	CWR76-5B		. SCRAPER (V26879) (SPEC BACS34A5A) (OPT S30388-5-1 (V97820)) (OPT TF005-5A (V07128)) (OPT 2140-5A (V26303)) (OPT DW96801-5A (V02886))		1
445	MS28782-6		. RING		2
450	NAS1611-011		. PACKING		1
455	315A1853-1		. BEARING-PISTON		1
460	S32991-116H5		. SEAL-HAT (V09257)	A-C	1
–460A	S34853-116499		DELETED		
–460B	S33121-116-99		. SEAL-FOOT (V09257)	D	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–					
461	NAS1611-116		. PACKING		1
465	315A1812-1		. GLAND		1
470	MS28782-20		. RING		2
475	NAS1611-215		. PACKING		1
480	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
485	NAS1611-122		. PACKING		1
490	315A1824-2		. RING-SNUBBER		1
495	315A1824-3		. RING-SNUBBER		1
500	315A1865-1		. STOP-PISTON		1
–505	315A1809-1		DELETED		
510	315A1838-1		. HOUSING ASSY (OPT ITEM 510A) (PREFERED)	A-C	1
–510A	315A1838-4		. HOUSING ASSY (OPT ITEM 510)	A-C	1
–510B	315A1838-4		. HOUSING ASSY	D	1
515	NAS1352C06H8P		. . SCREW (OPT ITEM 515A)		2
–515A	NAS1352-06H8P		. . SCREW (OPT ITEM 515)		2
520	315A1838-2		. . PLATE		1
525	315A1838-3		. . GASKET		1
530	315A1809-4		. . HOUSING (USED ON ITEM 510)	A-C	1
–530A	315A1861-1		. . HOUSING (OPT ITEM 530B) (USED ON ITEMS 510A, 510B)		1
–530B	315A1861-5		. . HOUSING (OPT ITEM 530A) (USED ON ITEMS 510A, 510B)		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–					
535	MS28782-12		. RING		2
540	NAS1611-114		. PACKING		1
–545	315A1828-3		DELETED		
–545A	315A1828-3		DELETED		
–545B	315A1828-4		DELETED		
–545C	315A1828-4		DELETED		
550	1334-012		. SLEEVE-LOCK (V60029)		1
555	MS28782-14		. RING		2
560	NAS1611-116		. PACKING		1
565	315A1849-1		. SPRING-LOCK (OPT ITEM 565A)	A-C	1
–565A	315A1849-2		. SPRING-LOCK (OPT ITEM 565)	A-C	1
–565B	315A1849-2		. SPRING-LOCK	D	1
567	315A1835-17		DELETED		
567A	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) (USED WITH ITEM 565)		AR
570	315A1814-1		. NUT		1
575	315A1833-1		. WASHER-LOCK		1
580	315A1894-1		. SPACER		1
585	315A1868-1		. ROD-FEEDBACK CONT (OPT ITEM 585A)	A-C	1
–585A	315A1868-2		. ROD-FEEDBACK CONT (OPT ITEM 585) (PREFERED)	A-C	1
–585B	315A1868-2		. ROD-FEEDBACK CONT	D	1
–585C	315A1868-3		DELETED		
–585D	315A1868-3		DELETED		

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
590	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) (SELECT FROM)		AR
595	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) (SELECT FROM)		AR
600	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) (SELECT FROM)		AR
605	7204DB		. BEARING (V38443) (OPT ITEM 605A)	A-C	2
–605A	C204MSDB1222		. BEARING (V40920) (OPT ITEM 605)	A-C	2
–605B	C204MSDB1222		. BEARING (V40920)	D	2
610	MS20068-53		. KEY		1
615	315A1912-9		. WHEEL AND SPACER ASSY-WORM	A	1
–615A	315A1912-9		. WHEEL AND SPACER ASSY-WORM (OPT ITEM 615B)	B, C	1
–615B	315A1912-11		. WHEEL AND SPACER ASSY-WORM (OPT ITEM 615A) (PREFERED)	B, C	1
–615C	315A1912-11		. WHEEL AND SPACER ASSY-WORM	D	1
620	315A1912-8		. . WHEEL (MATCHED SET)		1
625	315A1912-5		. . SPACER (MATCHED SET) (USED ON ITEMS 615, 615A)	A-C	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–					
–625A	315A1912-10		. . SPACER (MATCHED SET) (USED ON ITEMS 615B, 615C)	B-D	1
–630	7204DB		DELETED		
–630A	C204MSDB1222		DELETED		
–630B	C204MSDB1222		DELETED		
633	1334-17		. RING-RTNR (V60029)	D	1
635	315A1851-1		. RETAINER-SPR (OPT ITEM 635A)	A-C	1
–635A	315A1844-1		. RETAINER-SPR (OPT ITEM 635) (PREFERED)	A-C	1
637	1334-18		. RETAINER-SPR (V60029)	D	1
640	315A1848-1		. SPRING		1
645	315A1847-1		. FOLLOWER		1
650	1334-011		. KEY-LOCK (V60029)		3
–650A	1334-013		DELETED		
655	MS28783-3		. RING		2
660	NAS1611-225		. PACKING		1
665	MS28782-17		. RING		2
670	NAS1611-212		. PACKING		1
675	315A1864-1		. RING-RTNR		1
680	315A1828-1		. PIN-LOCKING (OPT ITEM 680A)	A-C	1
–680A	315A1828-2		. PIN-LOCKING (OPT ITEM 680) (PREFERED)	A-C	1
–680B	315A1828-2		. PIN-LOCKING	D	1
685	315A1821-1		. RING-CYL NUT		2
690	315A1839-1		. NUT-CYL (OPT ITEM 690A)		1
–690A	315A1839-2		. NUT-CYL (OPT ITEM 690)		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–					
–690B	315A1839-2		DELETED		
695	315A1827-1		. RING-RETAINING		1
700	315A1829-1		. PIN-RETAINING		1
705	315A1826-1		. GUIDE		1
710	315A1850-3		. SCREW-LEAD (OPT ITEM 710A, 710B)	A-C	1
–710A	315A1850-4		. SCREW-LEAD (OPT ITEM 710, 710B)	A-C	1
–710B	315A1850-5		. SCREW-LEAD (OPT ITEM 710, 710A) (PREFERED)	A-C	1
–710C	315A1850-5		. SCREW-LEAD	D	1
715	315A1820-3		. PISTON ASSY		1
718	315A1815-3		. . NUT-LEAD (OPT ITEM 718A)		1
–718A	315A1815-4		. . NUT-LEAD (OPT ITEM 718)		1
720	315A1842-2		. . PISTON		1
725	315A1807-4		. CYLINDER ASSY (1334-16 CYLINDER ASSY T/W 1334-18 SPRING RETAINER AND 1334-17 RETAINER RING REPLACES 315A1807-4 CYLINDER ASSY T/W 315A1844-1 SPRING RETAINER TWO-WAY INTERCHANGEABLE)	A-C	1
–725A	1334-16		. CYLINDER ASSY (V97415) (1334-16 CYLINDER ASSY T/W 1334-18 SPRING RETAINER AND 1334-17 RETAINER RING REPLACES 315A1807-4 CYLINDER ASSY T/W 315A1844-1 SPRING RETAINER TWO-WAY INTERCHANGEABLE)	D	1
730	BACB28X7F037		. . BUSHING	A-C	2
–735	315A1807-2		DELETED		
735A	315A1807-5		. . CYLINDER	A-C	1
740	315A1836-1		. STRAP-NAMEPLATE		1
–745	BAC27DTR11		DELETED		

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
745A	BAC27DTR0011		. NAMEPLATE		1
–750	BAC27DTR13		DELETED		
750A	BAC27DTR0013		. MARKER-ALUMINUM FOIL- CAUTION DO NOT ROTATE ROD END		1

–Item not Illustrated