TO: ALL HOLDERS OF OUTBOARD SPOILER POWER CONTROL ACTUATOR ASSEMBLY COMPONENT MAINTENANCE MANUAL 27-61-51.

REVISION NO. 19 DATED NOV 01/03

HIGHLIGHTS

Pages which have been added or revised are outlined below together with the highlights of the revision. Remove and insert the affected pages as listed and enter Revision No. and date on the Record of Revision Sheet.

CHAPTER/SECTION AND PAGE NO.	DESCRIPTION OF CHANGE
501 REPAIR-GEN 601 REPAIR 6-2 601 REPAIR 9-1 601 705 1021	Added filter cap item (320), P/N 252T1405-2 as a preferred option to P/N 252T1405-1.
501 REPAIR-GEN 601 REPAIR 6-1 601 REPAIR 9-1 601	Edited without technical change.
703-704 803	Added torque value for items (40), P/N NAS1352-04H6P and (155), P/N BRH10C4.
1026	Revised effectivity of the pistons (540, 540A, 540B), P/N 252T1407-1, -2, and -3.

BOEING

COMPONENT
MAINTENANCE MANUAL

OUTBOARD SPOILER
POWER CONTROL ACTUATOR ASSEMBLY

PART NUMBER 252T1401-1,-2,-3

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

24369

REVISION RECORD

- Retain this record in front of manual. On receipt of revision, insert revised pages in the manual, and enter revision number, date inserted and initial.

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PAGE	DATE	CODE
27-61-51		
TITLE PAGE		
1	OCT 01/87	01.1
2	BLANK	
REVISION RECORD		
1	JUL 10/83	01
2	BLANK	
TR & SB RECORD		
1	OCT 01/87	01.1
2	BLANK	
LIST OF EFFECTIVE PAGES		
*1	NOV 01/03	01
THRU LAST PAGE		
CONTENTS		
1	JUL 10/83	01
2	BLANK	
INTRODUCTION		
1	JUL 10/83	01
2	BLANK	
DESCRIPTION & OPERATION		
1	JUL 10/83	01
2	JUL 10/83	01
3	JUL 10/83	01
4	BLANK	
TESTING & TROUBLE SHOOTING		
101	NOV 01/99	01.1
102	SEP 01/96	01.1
103	SEP 01/96	01.101
104	SEP 01/96	01.101
105	JUL 10/83	01.1
106	SEP 01/96	01.1
107	SEP 01/96	01.101
108	JUL 10/83	01.1
109	DEC 01/96	01.1

PAGE	DATE	CODE
TESTING & TROUBLE SHOOTING		CONT.
110	SEP 01/96	01.1
111	JUL 01/88	01.1
112	JUL 01/88	01.1
113	JUL 01/88	01.101
114	JUL 01/88	01.101
115	JUL 01/88	01.101
116	SEP 01/96	01.101
117	JUL 01/88	01.101
118	JUL 01/88	01.101
119	JUL 01/88	01.101
120	MAR 01/98	01.1
121	JUL 01/93	01.101
122	SEP 01/96	01.101
123	SEP 01/96	01.101
124	SEP 01/96	01.1
DISASSEMBLY		
301	JUL 10/83	01
302	JUL 10/83	01
303	OCT 10/86	01.1
304	JUL 10/83	01
CLEANING		
401	JUL 10/83	01
402	BLANK	
CHECK		
*501	NOV 01/03	01.1
502	SEP 01/96	01.1
REPAIR-GENERAL		
*601	NOV 01/03	01.1
602	JUL 10/83	01
603	JUL 10/87	01.1
604	BLANK	
REPAIR 1-1		
601	JUL 10/83	01
602	BLANK	

* = REVISED, ADDED OR DELETED

PAGE	DATE	CODE
REPAIR 2-1		
601	JUL 10/83	01
602	JUL 10/83	01
REPAIR 3-1		
601	JUL 10/83	01.1
602	JUL 10/83	01
REPAIR 4-1		
601	JUL 10/83	01
602	BLANK	
REPAIR 5-1		
601	JUL 10/83	01.1
602	BLANK	
REPAIR 6-1		
*601	NOV 01/03	01.1
602	BLANK	
REPAIR 6-2		
*601	NOV 01/03	01.1
*602	BLANK	
REPAIR 7-1		
601	APR 01/90	01.1
602	BLANK	
REPAIR 8-1		
601	JUL 10/83	01
602	BLANK	
REPAIR 9-1		
*601	NOV 01/03	01.1
602	BLANK	
ASSEMBLY		
701	OCT 10/86	01.1
702	DEC 01/96	01.1
*703	NOV 01/03	01.1
*704	NOV 01/03	01.1
*705	NOV 01/03	01.1
706	JUL 10/83	01

PAGE	DATE	CODE
ASSEMBLY		CONT.
707	JUL 10/83	01
708	JUL 10/83	01
FITS AND CLEARANCES		
801	JUL 10/87	01.1
802	JUL 10/87	01.1
*803	NOV 01/03	01.1
804	BLANK	
SPECIAL TOOLS		
901	NOV 01/99	01.1
902	NOV 01/99	01.1
ILLUSTRATED PARTS LIST		
1001	JUL 10/83	01
1002	JUL 10/83	01.1
1003	JUL 10/83	01.1
1004	APR 10/86	01.1
1005	JUL 10/83	01
1006	JUL 10/83	01
1007	JUL 10/83	01
1008	JUL 10/83	01
1009	OCT 01/87	01.1
1010	APR 01/90	01.1
*1011	NOV 01/03	01.1
1012	JUL 10/83	01.1
1013	SEP 01/96	01.1
1014	SEP 01/96	01.1
1015	SEP 01/96	01.1
1016	SEP 01/96	01.1
1017	OCT 01/87	01.1
1018	OCT 01/87	01.1
1019	JUL 10/83	01.1
1020	JUL 10/83	01.1
*1021	NOV 01/03	01.1
1022	JUL 10/83	01.1
1023	JUL 10/83	01.1
1024	JUL 10/83	01.1
1025	JUL 10/83	01.1
*1026	NOV 01/03	01.1
1027	OCT 10/86	01.1
1028	BLANK	

* = REVISED, ADDED OR DELETED

TABLE OF CONTENTS

INTRODUCTION

The instructions in this manual provide the information necessary to perform maintenance functions ranging from simple checks and replacement to complete shop-type repair.

This manual is divided into separate sections:

1. Title Page
2. Record of Revisions
3. Temporary Revision & Service Bulletin Record
4. List of Effective Pages
5. Table of Contents
6. Introduction
7. Procedures & IPL Sections

Refer to the Table of Contents for the page location of applicable sections. An asterisked flagnote *[ ] in place of the page number indicates that no special instructions are provided since the function can be performed using standard industry practices.

The beginning of the REPAIR section includes a list of the separate repairs, a list of applicable standard Boeing practices, and an explanation of the True Position Dimensioning symbols used.

An explanation of the use of the Illustrated Parts List is provided in the Introduction to that section.

All weights and measurements used in the manual are in English units, unless otherwise stated. When metric equivalents are given they will be in parentheses following the English units.

Design changes, optional parts, configuration differences and Service Bulletin modifications create alternate part numbers. These are identified in the Illustrated Parts List (IPL) by adding an alphabetical character to the basic item number. The resulting item number is called an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless otherwise indicated.

Verification:

Testing/TS	MAY 12/82
Disassembly	MAY 12/82
Assembly	MAY 12/82

OUTBOARD SPOILER POWER CONTROL ACTUATOR ASSEMBLY

DESCRIPTION AND OPERATION

1. Description

   A. The outboard spoiler power control actuator (PCA) assembly is used to position each of the eight outboard spoilers. Each of the eight identical units consists of a main actuator with a bolted-on manifold assembly.

   B. The main actuator includes cylinder, piston, and rod end assemblies and an internally-mounted linear variable differential transformer (LVDT) to provide position feedback. The head end of the actuator is attached to wing structure through a spherical bearing mounting, allowing the entire unit to pivot during spoiler actuation. The rod end of the actuator is attached to the movable spoiler surface. The unit interfaces with the electronic control system through a single external electrical connector.

   C. The bolted-on manifold includes an electro-hydraulic servovalve (EHSV), extension check and thermal relief valve assembly, filter, and a swivel shaft assembly through which hydraulic connections are made. A manual release cam allows extension of the actuator for servicing.

2. Operation

   A. The spoiler actuator system extends the flight spoilers for speedbrake operation or to supplement the ailerons in providing lateral control. The spoilers lie flush with the upper wing surface when retracted and are raised to various angles by the actuators. The output from the LVDT provides a position feedback signal for controlling spoiler actuation.

   B. With the system pressurized and an extend command directed to the EHSV the check valve is held open by a rod acting on a poppet (Ref Fig. 1). With a retract command, the poppet is opened directly by hydraulic pressure. If hydraulic pressure is lost, a spring reseats the valve to prevent actuator extension, and mechanical (spring) bias in the EHSV allows entrapped fluid in the actuator to flow to return. If the electrical command signal is lost, mechanical (magnetic) bias on the EHSV causes the actuator to retract.

C. The valve assembly also functions to protect actuator and manifold from damage due to thermal expansion of entrapped hydraulic fluid or extreme spoiler up loads when hydraulic power is on. Increasing internal pressure acting on a plunger causes the poppet to open to provide this relief. The release cam also acts on this plunger to allow manual extension of the actuator for servicing.

3. Leading Particulars (Approximate)

A. Length -- 14 inches (retracted)
-- 18 inches (extended)

B. Width -- 11 inches

C. Height -- 4 inches

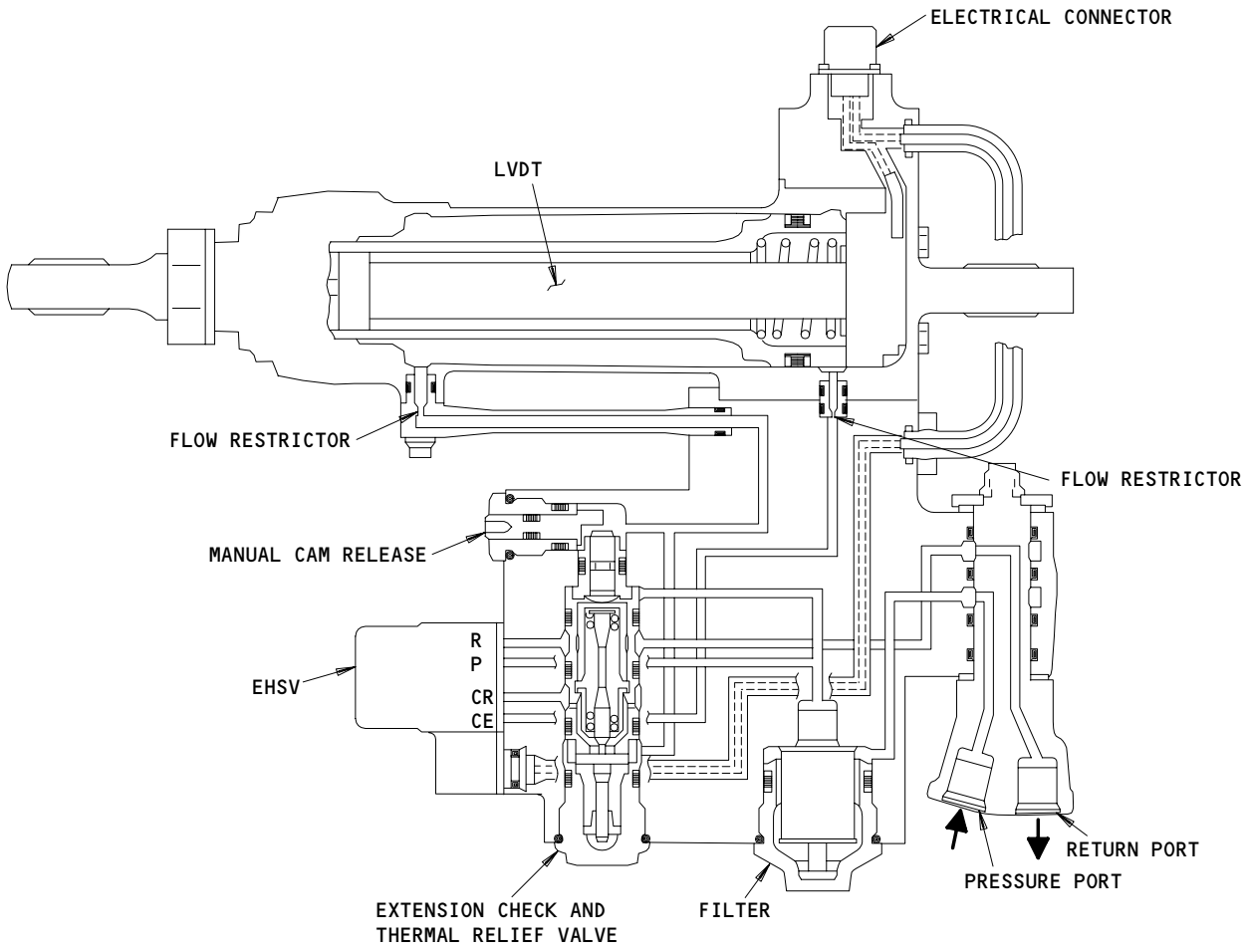
D. Weight -- 13 pounds (dry)

E. Operating Medium -- BMS 3-11 Hydraulic Fluid

F. Operating Pressure -- 3000 psi

G. Proof Pressure -- 4500 psi

H. Stroke -- 4.4 inches



Outboard Spoiler PCA Hydraulic System Functional Schematic
Figure 1

TESTING AND TROUBLE SHOOTING

1. Test Equipment and Materials

NOTE: Equivalent substitutes may be used.

A. Test block (for extension check and thermal relief valve) -- A27047-1

B. Functional test equipment -- A27042-1

C. Test equipment fixture -- A27043-1

D. Hydraulic power supply -- Teijin Seiki Model 6939000 (4500 psi max, 6.2 gal/min max)

E. Dielectric strength tester (hi-pot) -- Kikusui Electronics Model 875B or Associated Research Model 404 or Model 3500D

F. Insulation resistance tester (megger) -- Yokogawa Electric Works Model L-5, Hewlett Packard Model 412A, or Quad Tech Model 1863

G. Servo electronics test unit -- Teijin Seiki Model 6941300

H. Digital volt-ohm meter -- Takeda Riken Model TR6355 or Fluke Model 70

I. Phase angle voltmeter -- North Atlantic Model 321

J. X-Y recorder -- Hewlett-Packard Model HP7090A or Allen Datagraph Model 925E

K. Control valves (8) -- Parker Hannifin Model MV-600-S (5 gal/min at 100 psid)

L. Pressure gages (3) -- Ashcroft Model 60-1377TA (0-5000 psi ±1/2%)

M. Pressure gages (3) -- Ashcroft Model 60-1377R (0-100 psi ±1/2%)

N. Pressure reducing valve -- Circle Seal Corp. Model LR19CB2

O. Relief valve -- Circle Seal Corp. Model BPR10AB6 (300-3600 psi)

P. Flowmeter -- Cox Model 129-258 (0.25-7.3 gal/min ±1/2 %)

Q. Hand pump

R. Graduated beaker (500 cc)

S. Hydraulic fluid -- BMS 3-11, filtered to 25 microns absolute

T. Adjustment Wrench -- A27075-1

U. Dial indicator

2. Testing for Tare Values

NOTE: Prior to pressure tests, the tare values of the test block A27047-1 must be measured and recorded by the following procedures.

A. Test setup per Fig. 114.

B. Increase pressure at Cin until 4 gal/min is measured at flowmeter. Record the differential pressure between P1 and P3. This is the tare 1 value.

C. Decrease pressure at Cin until 0.5 gal/min is measured at flowmeter. Record the differential pressure between P1 and P3. This is the tare 2 value.

D. Record tare 1 and tare 2 values for use in later tests.

3. Preparation for Test

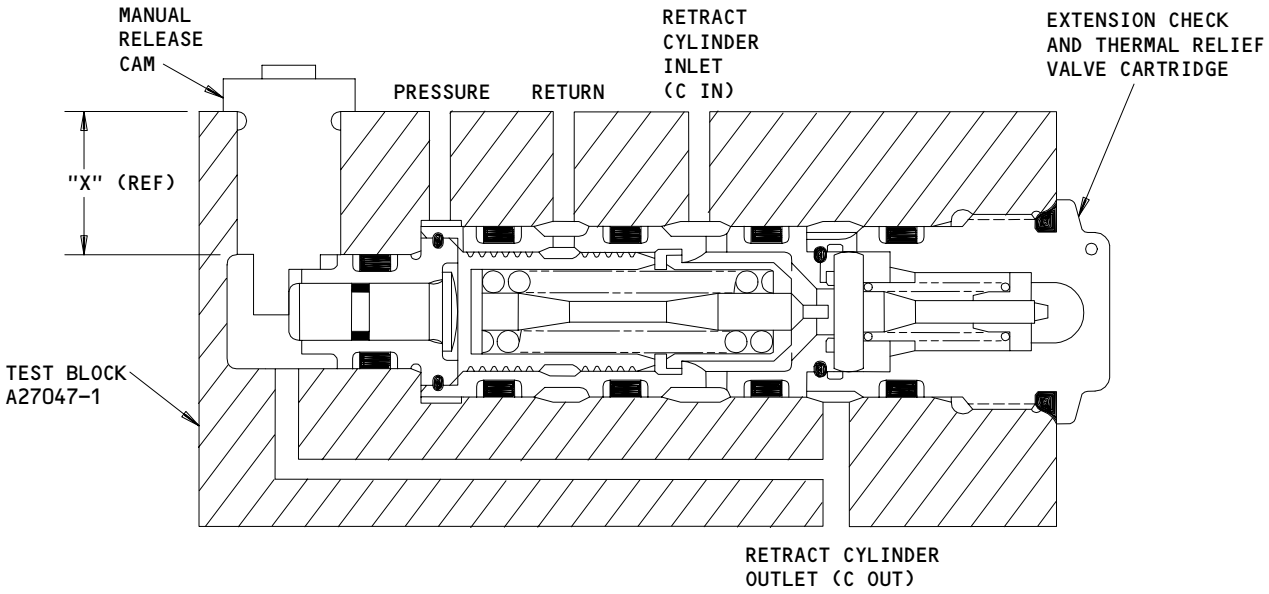
A. Conduct all tests at room temperature (60-100°F). Maintain hydraulic fluid at 80-120°F.

B. Install hydraulic fittings and packings on test unit.

NOTE: Return port is open to drain during all tests, unless otherwise specified. See Fig. 101 for check valve cartridge and test block port identification.

WARNING: DO NOT USE COMPRESSED AIR ON PORTS AT ANY TIME OR DAMAGE TO PARTS AND INJURY TO PERSONNEL MAY RESULT.

C. Bleed test unit and test fixture of all air.



Valve Cartridge and Test Block
Figure 101

24374

4. Test Extension Check and Thermal Relief Valve

A. Visually examine all seals (6 places) on valve cartridge (210, IPL Fig. 1) for damage, defects, or contamination. Replace seals as required.

B. Remove manual release cam (425) and associated parts (395 thru 420) from manifold assembly (160), and install in test block A27047-1 (Fig. 101). Install valve cartridge in test block. Leave cartridge installed until testing is completed or terminated.

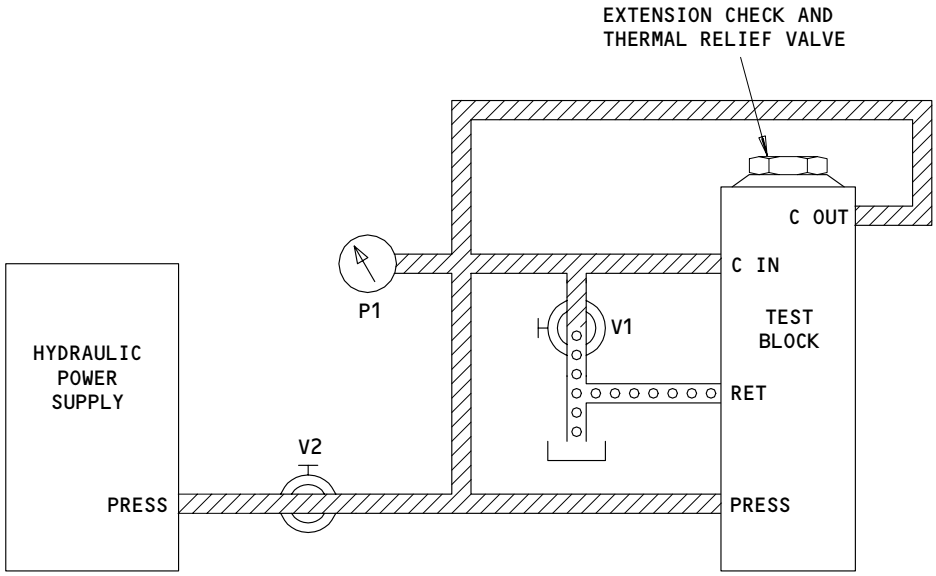
NOTE: Extension check and thermal relief valve assembly is not intended for repair by user. If test article fails any of the following functional tests, terminate valve testing and replace entire unit.

C. Perform proof pressure test (Fig. 102)

(1) Connect hydraulic power supply as shown.

(2) Apply 4500 psi to the PRESSURE port, the Retract Cylinder inlet (C IN), and the Retract Cylinder outlet (C OUT). Hold for two minutes and check for any sign of permanent deformation.

(3) Reduce pressure to 2-8 psi and hold for two minutes. Check for any sign of permanent deformation.



Proof Pressure Test Setup
Figure 102

24375

D. Check cracking pressure (extension check mode)

(1) Set up test per Fig. 103.

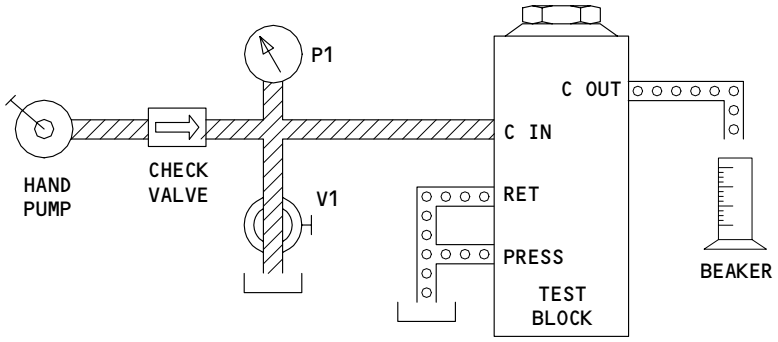
(2) Open PRESSURE port and slowly increase pressure to C IN using the hand pump.

(3) Note pressure when flow of 2 cc/min or more is measured at C OUT. Check that pressure does not exceed 15 psi.

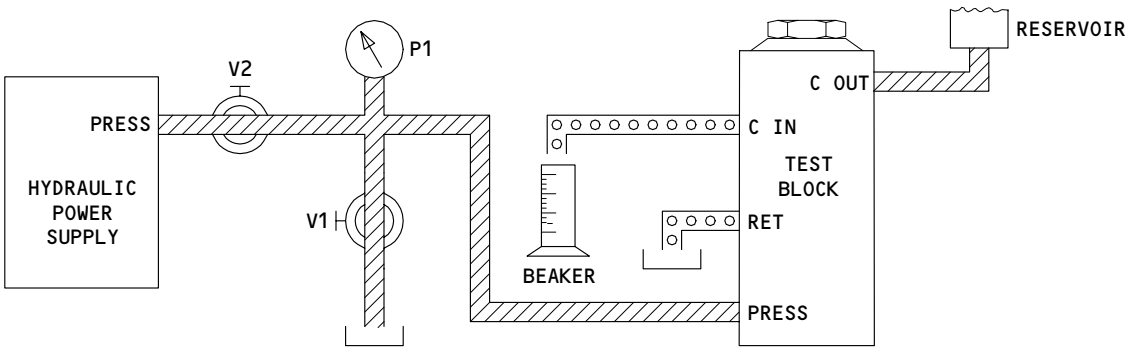
(4) Connect hydraulic power supply per Fig. 103.

(5) Open RETURN port and C IN. Connect a reservoir with at least a 3-foot head to C OUT. Slowly increase pressure to PRESSURE port.

(6) Note pressure when flow (2 cc/min or more) is observed at C IN. Check that pressure does not exceed 350 psi.



A. RETRACT COMMAND



B. PRESSURE ON

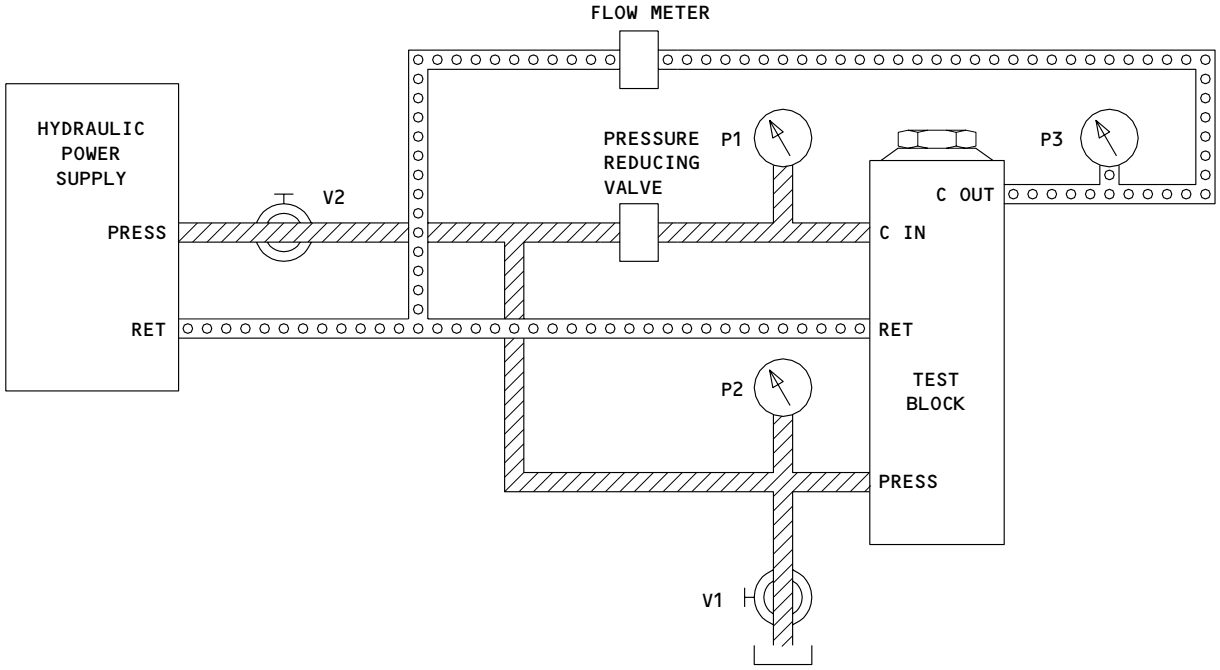
Cracking Pressure (Extension Check Mode)
Figure 103

E. Check pressure drop (extension check mode)

(1) Set up test per Fig. 104.

(2) Apply 3000 psi to the PRESSURE port. Apply increasing pressure to C IN until a flow of 4 gal/min is obtained at C OUT.

(3) Note pressure difference between C IN and C OUT while maintaining 4 gal/min flow and check that net pressure drop (P1 - P3 - tare 1) does not exceed 45 psi.



Pressure Drop (Extension Check Mode)
Figure 104

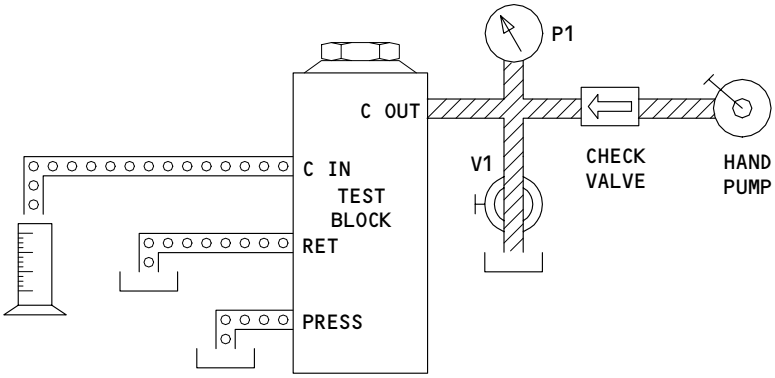
24377

F. Check internal leakage (extension check mode)

(1) Set up test per Fig. 105.

(2) Open PRESSURE port. Apply 5 psi at C OUT and hold for five minutes. Check that leakage at C IN does not exceed 3 cc/hr (or 1 drop/min).

(3) Increase pressure at C OUT to 3000 psi and hold for five minutes. Check that leakage at C IN does not exceed 3 cc/hr (or 1 drop/min).



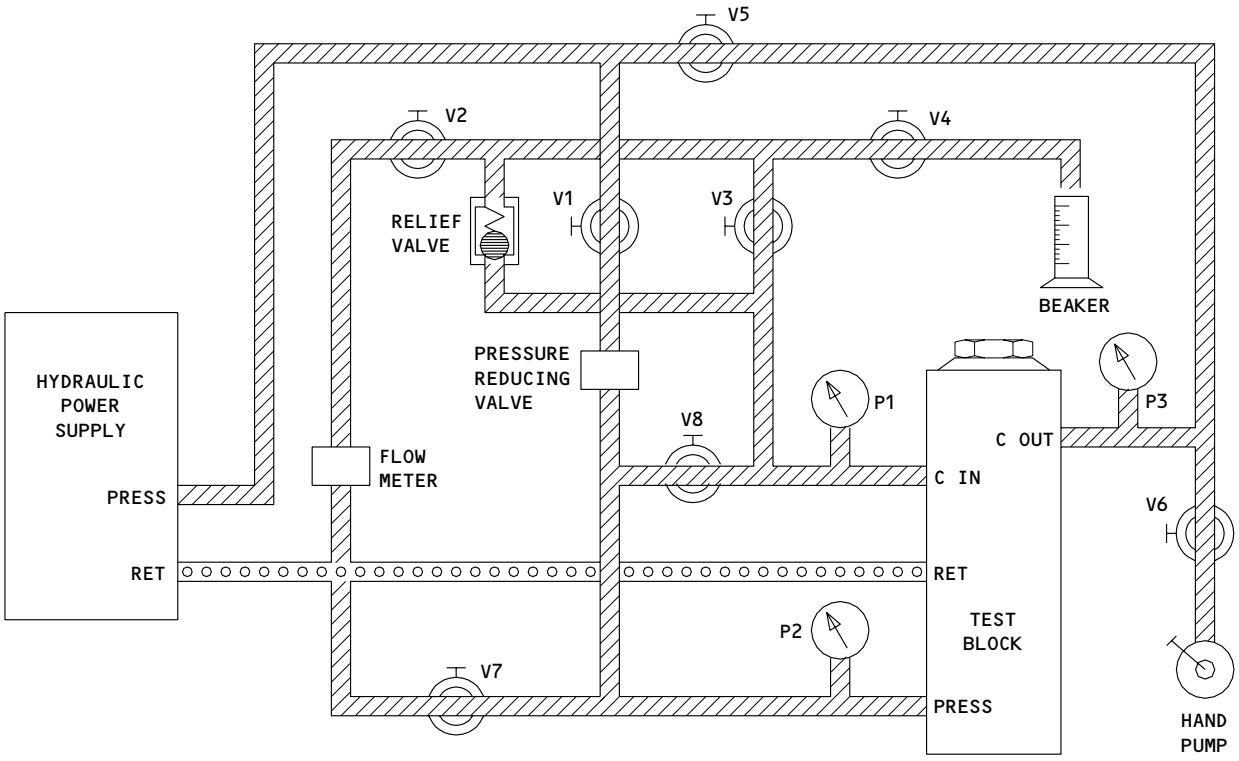
Internal Leakage (Extension Check Mode)
Figure 105

24378

G. Check cracking pressure (thermal relief mode).

(1) Set up test per Fig. 106.

NOTE: This test set-up will be used for all thermal relief mode tests which follow.



Thermal Relief Mode Test Setup
Figure 106

24380

(2) Close valves V1, V2, V5, V6, and V8. Open valves V3, V4, and V7.

(3) Slowly open V5 to apply increasing pressure on gage P3. Check that gage P3 shows 3500-3900 psi when a flow of 2 cc/min or more is observed at the beaker.

(4) Close valves V3, V5, and V7. Open valves V1, V6, and V8.

(5) Increase hydraulic supply pressure until gages P1 and P2 read 3000 psi.

(6) Slowly increase pressure at C OUT using the hand pump. Check that peak pressure shown on P3 is 3500-3900 psi.

(7) Stop hand pump operation and proceed with reseat pressure test below.

H. Check reseat pressure (thermal relief mode, system pressure on).

(1) After completing cracking pressure test above, read remaining pressure shown on gage P3.

(2) Check that this reseat pressure is at least 3100 psi.

I. Check pressure drop (thermal relief mode).

NOTE: Relief valve shall have been adjusted to 0.5 gal/min flow at 3000 psi prior to test.

(1) Close valves V4, V6, and V8. Open valve V2.

NOTE: Valve V1 is open and valves V3, V5, and V7 are closed from previous test.

(2) Slowly open V5 until a steady flow of 0.5 gal/min is measured by the flow meter.

(3) Note pressure shown on gage P3 and check that net pressure drop (i.e., P3 - P1-tare 2) does not exceed 4400 psi.

(4) Close valves V1 and V5. Open valves V3 and V7.

(5) Slowly open V5 until a steady flow of 0.5 gal/min is measured by the flow meter.

(6) Note pressure shown on gages P1 and P3 and check that net pressure drop (i.e., P3 - P1 - tare 2) does not exceed 4400 psi.

(7) Maintain V5 valve position and proceed with reseat pressure test below.

J. Check reseat pressure (thermal relief mode, system pressure off).

(1) Slowly close valve V5 to reduce flow through flow meter and pressure shown on gage P3.

(2) Check that reseat pressure shown on gage P3 when flow falls below 5 cc/min is at least 3100 psi.

K. Prepare valve cartridge for actuator assembly tests.

(1) Shut down hydraulic power supply.

(2) Open valves V7 and V8 and reduce pressure on gages P1, P2, and P3 to zero.

(3) Remove valve cartridge and manual release cam from test block and visually examine for any evidence of damage, defects, or contamination.

(4) Replace all seals on exterior of valve cartridge and cam retainer (410). Lubricate new seals with hydraulic fluid prior to installation.

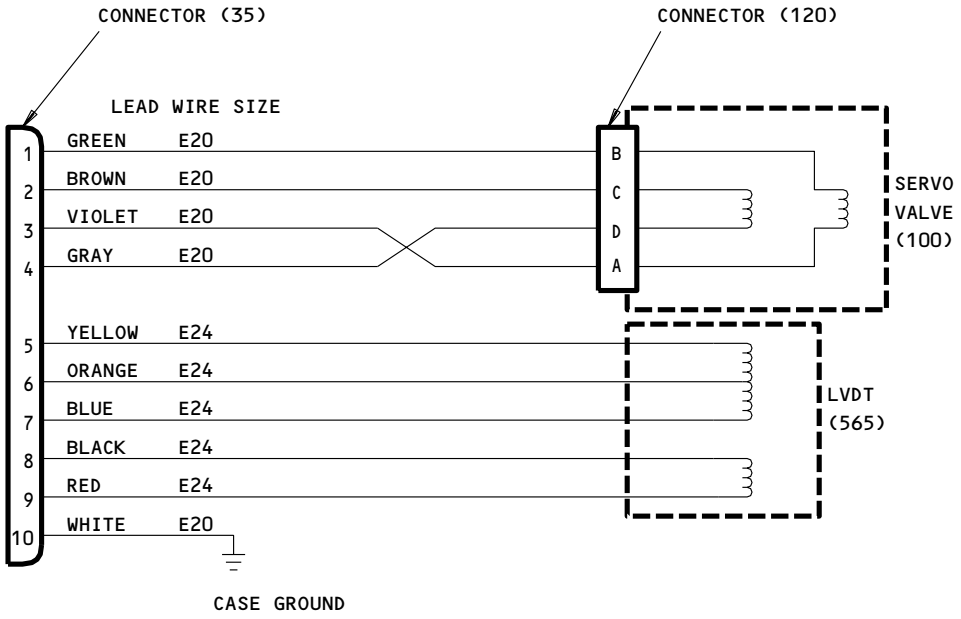
(5) Install valve cartridge and release cam in manifold assembly (160, IPL Fig. 1).

5. Electrical Tests

A. Check wiring continuity (Fig. 107).

(1) Use volt-ohmmeter to check each pin pair (i.e., pins 1 and 3, 2 and 4, 5 and 6, 5 and 7, 8 and 9 of connector (35, IPL Fig. 1) for compliance with figure.

(2) Check continuity between pin 10 and case ground.



Outboard Spoiler PCA Wiring Diagram
Figure 107

24382

CAUTION: EXTENDED PERIODS OF TESTING WILL DAMAGE INSULATION. DAMAGE IS CUMULATIVE WITH SUCCESSIVE TESTS.

B. Check Dielectric Strength

NOTE: In the following tests, apply and remove voltage at a rate of 500 volts per seconds, or less. Actuator must meet the requirements of the insulation resistance tests after being subjected to these dielectric strength tests.

(1) Connect the leads of the dielectric strength tester (hi-pot) per Table I. For each condition, apply the indicated voltage for a minimum of 1 minute. Check that no arcing or flashover occurs.

NOTE: Reduce voltage to zero before changing connections.

TEST CONDITION	LEAD A (COMMON LEAD)	LEAD B	60HZ TEST VOLTAGE (VOLTS, RMS)
1	Pins 1 thru 9	Manifold	1000
2	Pins 1,4,5,8	Pin 10	1000
3	Pins 1,5,8	Pin 4	1000
4	Pins 4,5,8	Pin 1	1000
5	Pins 1,4,5	Pin 8	500
6	Pins 1,4,8	Pin 5	500

Table I
Dielectric Strength Tests

C. Check Insulation Resistance

NOTE: Dielectric strength tests must be completed before performing these insulation resistance tests.

(1) Connect the leads of the insulation resistance tester (megger) per Table II. Apply 500 volts dc to each combination specified. Check that the minimum resistance for each pin combination is 100 megohms.

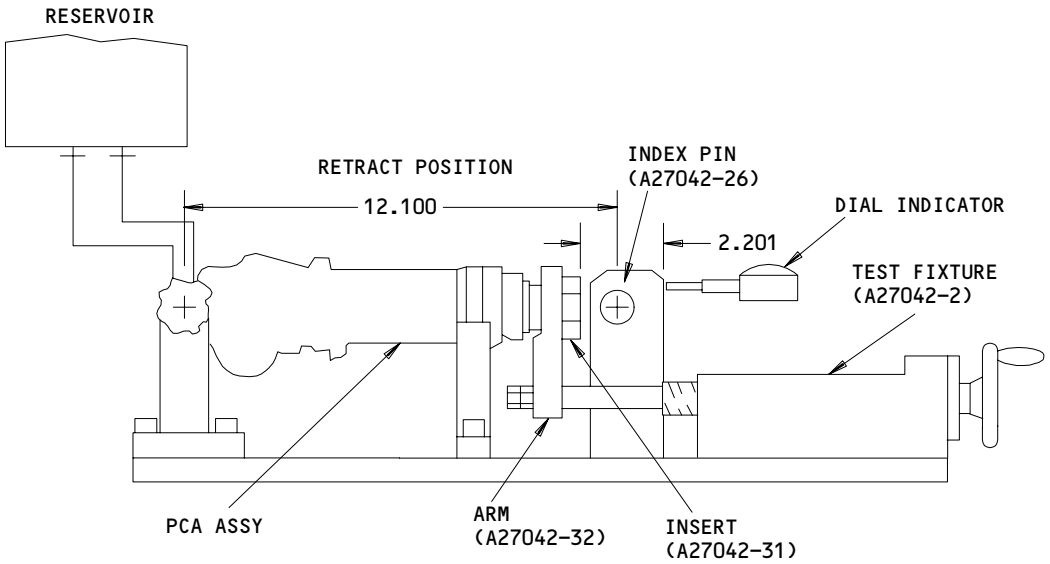
TEST CONDITION	LEAD A (COMMON LEAD)	LEAD B
1	Pins 1,4,5,8	Pin 10
2	Pins 1,4,5	Pin 8
3	Pins 1,4,8	Pin 5
4	Pins 1,5,8	Pin 4
5	Pins 4,5,8	Pin 1

Table II
Insulation Resistance Tests

D. Check transducer null adjustment (Fig. 108).

NOTE: Equipment identified by part numbers in parentheses (A27042-XX) are included in test equipment A27042-1.

(1) Install PCA assembly on test equipment A27042-1.



Transducer Null Adjustment Test Setup
Figure 108

24383

(2) Operate manual release cam (425) with a 5/32-in. allen wrench and cycle test unit several times until fluid flows smoothly and continuously without bubbles from the return port. Check that piston operates smoothly with no sticking or binding in either direction.

(3) Loosen nut (5) and remove rod end assembly (15), nut, and lockwasher (10). Store parts in a clean polyethylene bag for re-installation. Attach arm (A27042-32) to actuator piston (540) with rod end insert (A27042-31).

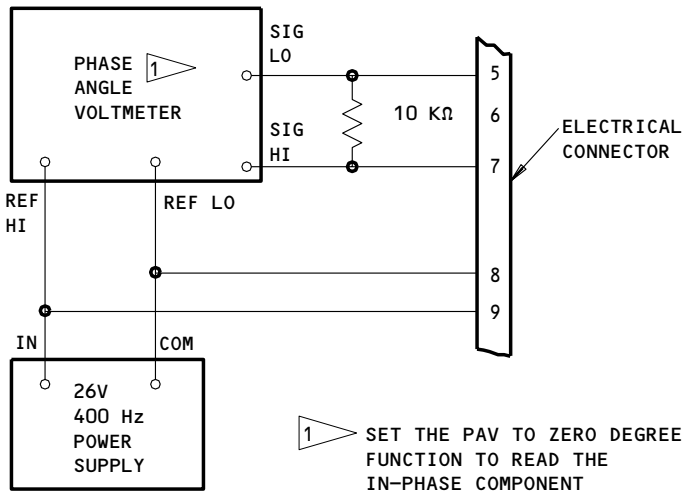
(4) Bottom the actuator in the fully-retracted position as shown. Read position with dial indicator. Operate the manual release cam and extend the piston rod 2.201 in. Hold in place.

NOTE: Plug (A27042-30) may be used as a 2.201-in. gage block.

(5) Connect electrical power supply, phase angle voltmeter (PAV), and 10,000 ohm external load to the connector as shown in Fig. 109. Energize the transducer (565) with 26 volts RMS, 400 Hz, single phase.

(6) Use LVDT adjustment wrench A27075-1 on transducer probe to obtain a zero reading for the in-phase component of the output voltage. Check that total output voltage does not exceed 30 millivolts. Lock the transducer probe in the adjusted position with nut (545). Tighten nut to 50-70 lb-in.

(7) Check condition of dry film lubricant on threads of rod end and restore, per REPAIR 6-1, as required. Detach test fixture arm and insert from piston and install rod end assembly, nut and lockwasher. Adjust rod end to align with index pin (A27042-26) with piston bottomed. Tighten nut to lock rod end in position. Remove index pin.



Null Voltage and Output Voltage Test Setup
Figure 109

E. Check transducer output and actuator stroke.

24384

(1) With PCA unit still mounted in test fixture (Fig. 108), replace reservoir with the hydraulic power supply. Connect the servo electronics test unit to connector pin pairs 1-3 and/or 2-4.

WARNING: ACTUATOR WILL AUTOMATICALLY RETRACT WHEN SUBJECTED TO HYDRAULIC PRESSURE.

(2) Remove arm of the test fixture from the piston rod and apply 3000 psi to the actuator pressure port.

(3) Energize the LVDT with 26 volts RMS, 400 Hz single phase power. Apply a 16 mA extend command to connector pin pairs 1-3 and/or 2-4.

NOTE: Actuator will move to the fully extended position.

(4) Check that transducer output voltage reading on the PAV is at least 7.8 volts at the full-stroke position.

NOTE: The LVDT output voltage is the in-phase component with respect to the excitation.

(5) Check that total actuator stroke is 4.392-4.412 in.

F. Check electrohydraulic servovalve (EHSV) polarity.

(1) Disconnect the servo amplifier from EHSV pins 1, 2, 3, and 4 on connector (35) (Ref Fig. 110).

(2) Apply 3000 psi hydraulic pressure to actuator pressure port.

(3) Connect EHSV pin 1 to pin 4. Apply a 32 VDC open loop signal to pins 2 and 3 with pin 2 positive and pin 3 negative. Check that actuator extends.

(4) Reverse the polarity of the input signal and check that the actuator retracts.

6. Hydraulic Tests

NOTE: Supply pressure will be 2950-3050 psi and return pressure will be 0-50 psi except as noted.

A. Perform pressure system proof pressure test

(1) Connect hydraulic power supply to pressure port. Connect return port to drain. Remove any electrical signal to the servovalve.

NOTE: The piston is free to move during these tests.

(2) Retract the piston. Apply 4500 psi to the pressure port and hold for one minute. Check that there is no permanent distortion, external leakage, or other damage to the unit. Reduce pressure to zero.

(3) Extend the piston and apply a full-extend command to the servovalve. Apply 4500 psi to the pressure port and hold for one minute. Check that there is no permanent distortion, external leakage, or other damage to the unit. Reduce pressure to zero.

B. Perform return system proof pressure test

(1) Bleed unit and cap return port. Remove any electrical signal to the servovalve.

WARNING: ACTUATOR MAY EXTEND WHEN PRESSURE IS APPLIED.

(2) Apply 3000 psi to the pressure port and hold for one minute. Check for any sign of binding, chatter, permanent distortion, external leakage, or other damage to the unit.

(3) Reduce pressure to 1-5 psi and hold for one minute. Check for any sign of binding, chatter, permanent distortion, external leakage, or other damage to the unit. Reduce pressure to zero.

C. Check system internal leakage.

(1) Open return port to atmosphere. Command the servovalve to a null flow position.

(2) Apply 3000 psi to the pressure port. Check that the flow from the return port is less than 1200 cc/minute for unit with a new servovalve, or less than 2400 cc/minute for a unit in service.

D. Check external leakage.

NOTE: Clean all external surfaces before performing leakage check.

(1) Connect the return port to test stand return and apply 3000 psi to the pressure port.

(2) Command the servovalve to cycle the unit through 100 full strokes. The cycling rate must be slow enough to allow the piston to extend and retract completely. Check that there is no leakage at any of the static external seals. Check that the dynamic seal leakage does not exceed one drop in 25 cycles at each rod seal, or one drop in 100 cycles at each swivel seal location.

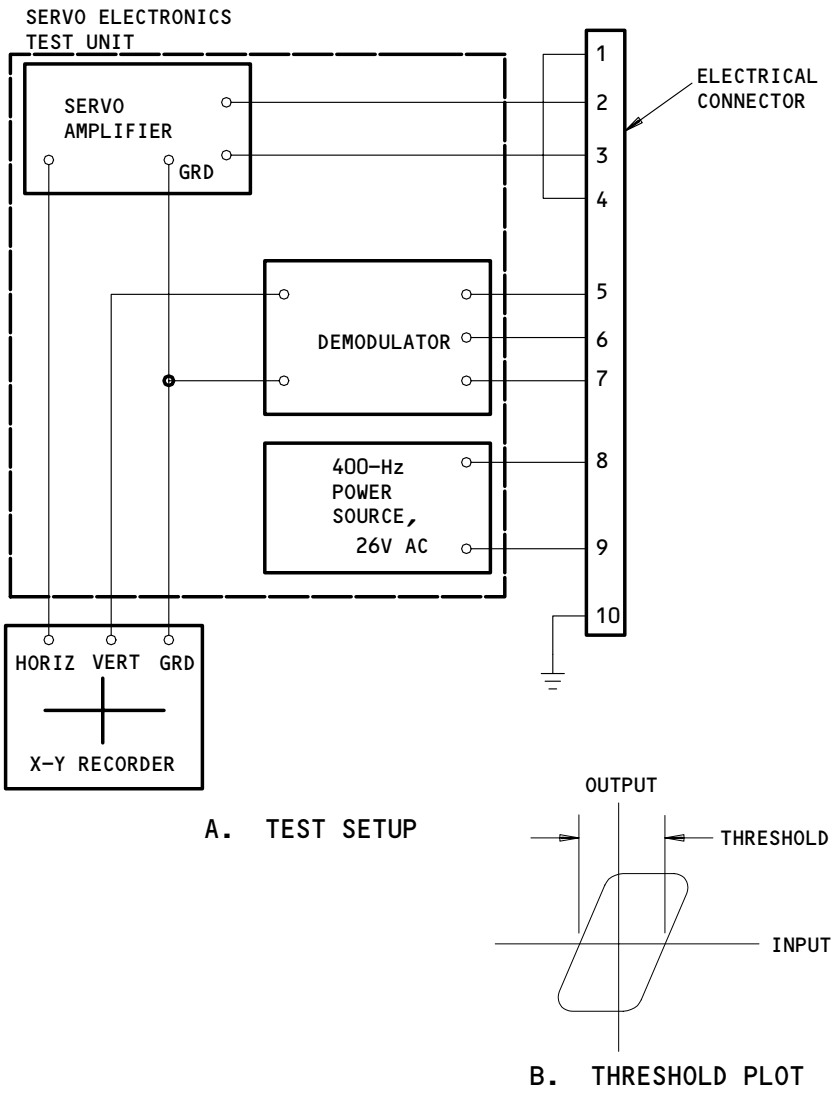
E. Check input signal threshold (Fig. 110).

(1) Connect the servo electronics test unit to the connector (370) and X-Y recorder as shown.

(2) Position actuator at midstroke. Apply 3000 psi to the pressure port. Apply a null command to the servovalve.

(3) Slowly increase the input signal until piston rod motion is observed. Decrease the signal until motion in the retract direction is observed.

(4) Measure the threshold as indicated by the width of the loop on the threshold plot. The threshold shall not exceed 0.08 mA.



Input Signal Threshold
Figure 110

24385

F. Check no-load rate.

(1) Connect the servo electronics test unit to the actuator connector. Switch the monitor selector to NO LOAD RATE.

(2) Retract the actuator fully and apply 3000 psi to the pressure port. Apply an 18 mA step signal to the servovalve. Measure the piston travel time from full retraction to full extension.

(3) Determine no-load rate by dividing stroke by travel time. Check that rate is at least 5.4 in./sec.

(4) With the actuator fully extended and 3000 psi applied to the pressure port, apply a zero mA step signal to the servovalve. Measure the piston travel time from full extension to full retraction.

(5) Determine no-load retraction rate by dividing stroke by travel time. Check that rate is at least 3.0 inch/second.

G. Check hold-down check valve leakage (Fig. 111).

(1) Install assembly in test fixture A27043-1. Remove electrical power to EHSV. Apply 3000 psi to the pressure port.

NOTE: The actuator will retract fully.

(2) Reduce the inlet pressure to zero.

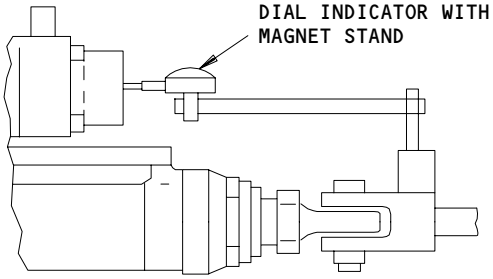
(3) Apply 766 psi pressure to the load cylinder retract port. Immediately before load cylinder pressure has been applied, note the initial piston position.

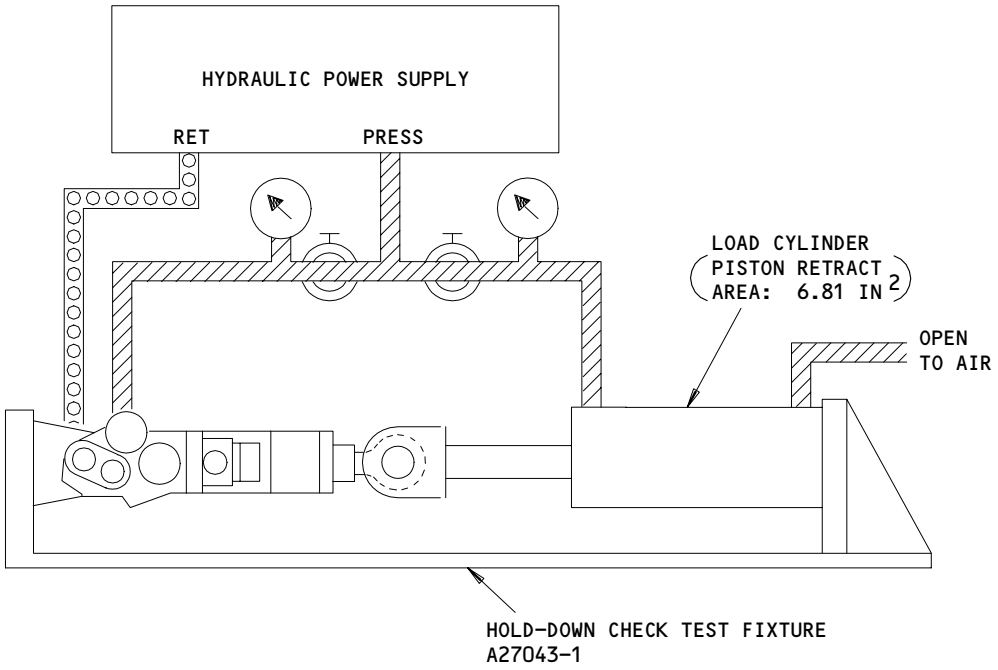
NOTE: Cylinder pressure is given for 6.81 sq. in. piston retract area. Adjust pressure to provide equivalent 5165-5265 lb test load if different size hydraulic cylinder is used.

(4) After 15 seconds, note piston position and check that piston has not moved more than 0.03 in. from initial position.

(5) After 5 minutes, note piston position again and check that piston has not moved more than 0.08 in. from initial position.

(6) Reduce cylinder pressure to zero.





Hold-Down Check Valve Leakage
Figure 111

24387

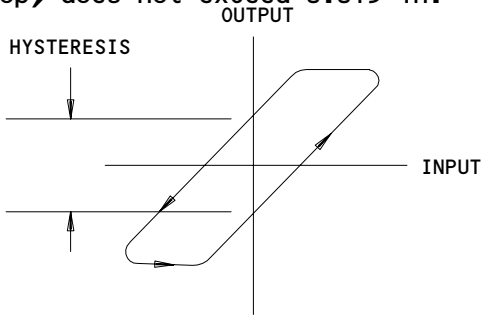
H. Check output hysteresis.

(1) Connect the servo electronics test unit to the connector and X-Y recorder per Fig. 110A.

(2) Apply 3000 psi to the pressure port. Apply a 0.01 Hz sinusoidal input to the servovalve. Adjust the input amplitude to obtain a total (peak-to-peak) piston rod displacement of 0.50 in.

(3) Cycle the actuator through at least one full stroke. Record output displacement versus input signal over one complete cycle as shown in Fig. 112.

(4) Check that the output hysteresis, as measured on a vertical line through the loop, does not exceed 0.015 in.



Output Hysteresis Plot
Figure 112

24388

7. Post-test Inspection and Storage

A. Disconnect all test equipment and remove test unit from fixture.

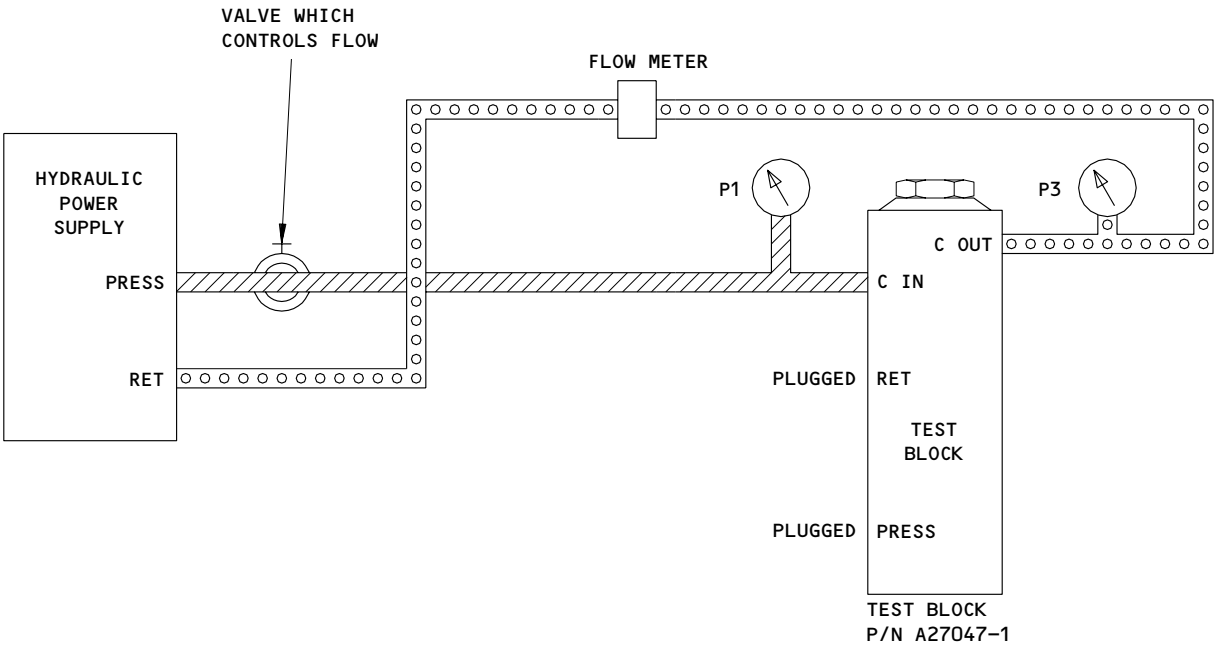
B. Examine all ports and mounting points for damage.

C. Refer to ASSEMBLY for storage procedures.

8. Trouble Shooting

TROUBLE	PROBABLE CAUSE	CORRECTION
Piston sticks or binds	Piston (540), gland (495), or barrel (490) damaged or defective	Repair or replace parts
Excessive external leakage	Defective packings or seals	Replace packings or seals in area of leakage
Actuator creeps under load	Defective check valve (210)	Replace check valve
(fails hold-down test	Defective piston seals (535 with 530, or 537)	Replace seals
	Defective GT ring (570)	Replace GT ring
Slow piston velocity	Clogged filter	Replace filter element (340)
	Clogged flow passages	Clean passages; check for fluid contamination
	Defective EHSV (100)	Replace EHSV
Acutator stroke out of range	Misadjusted or defective LVDT (565)	Adjust or replace LVDT
	Defective EHSV	Replace EHSV

Trouble Shooting Chart
Figure 113



Test Setup, Tare Values
Figure 114

F92548

DISASSEMBLY

NOTE: Refer to TESTING/TROUBLE SHOOTING to establish condition or probable cause of any malfunction and to determine extent of disassembly or repair.

NOTE: Do not remove pins (185, 195) and plugs (180, 190) which seal drilled passages unless they are leaking or obviously defective. Do not remove inserts (60, 165, 170, 470), locating pins (175, 385, 615), or lubrication fittings (20, 475) unless replacement is necessary (Ref IPL Fig. 1).

1. Equipment

   NOTE: Equivalent substitutes may be used.

   A. Spanner Wrench -- A32045-8

2. Parts Replacement (IPL Fig. 1)

   NOTE: The following parts are recommended for replacement. Unless otherwise specified, actual replacement of parts may be based on in-service experience.

   A. Packings (95, 110, 220, 225, 235, 325, 330, 345, 395, 405, 415, 430, 500, 505, 530, 550, 590, 600)

   B. Backup rings (230, 240, 335, 350, 400, 420, 435, 510, 555, 595, 605)

   C. Connector retainer (115)

   D. Teflon scraper ring (520) and swivel washers (380)

   E. Seals (355, 535, 537)

   F. Filter element (340)

   G. GT ring (570)

   H. Gasket plate (205)

   I. Lockwire

CAUTION: DO NOT PLACE UNIT IN ANY CLAMPING DEVICE OR DAMAGE MAY RESULT.

3. General

   A. Drain hydraulic fluid from unit.

B. Remove lockwire from assembly.

4. Disconnect Wiring (Ref IPL Fig. 1)

A. Remove screws (40) and pull connector (35) away from cover assembly (45). Remove wires from connector.

B. Remove screws (50) and washers (55) and separate cover from cylinder assembly (465) and conduit assembly (70).

C. Remove screw (75) and washer (80) to detach conduit. Remove packings (95).

NOTE: Do not disassemble conduit assembly unless repair or replacement is necessary.

D. Remove screw (450) and washer (455) to disconnect terminal (445) from cylinder.

5. Disassemble Actuator Assembly (Ref IPL Fig. 1)

A. Remove bolts (130) and washers (135) attaching transfer tube (125) to cylinder assembly (465).

CAUTION: SUPPORT BOTH MANIFOLD (160) AND CYLINDER WHEN SEPARATING ASSEMBLIES TO AVOID BENDING TRANSFER TUBE OR QUILL TUBE (440).

B. Remove bolts (140, 145), washers (150), and nuts (155) and separate manifold assembly and cylinder assembly.

C. Remove transfer tube from manifold assembly and remove packings (430) and retainers (435).

D. Remove quill tube and strip off packings (430) and retainers (435).

6. Disassemble Cylinder Assembly (465) and Internal Parts (Ref IPL, Fig. 1)

A. Loosen nut (5) then remove rod assembly (15) from piston (540). Remove nut and lockwasher (10) from rod assembly.

CAUTION: MATING HALVES OF SPLIT BALL (25) COMPRISE A MATCHED SET AND MUST BE KEPT TOGETHER.

B. Remove split ball from rod end (30). Tag and store in a sealed bag.

C. Remove scraper retainer (515) using wrench A32045-8, then remove scraper ring (520), seal retainer (525), and packing (530).

D. Remove nut (545) from end of transducer assembly (565).

E. Remove piston gland (495) from cylinder assembly (465), then remove piston and strip off packings (500, 505), backup rings (510), and GT ring (570).

F. For 252T1401-1 only, depress snubber plunger (575) to expose lockring (585). Remove lockring, then remove plunger and snubber spring (580).

G. Remove screws (450), then pull transducer assembly and attached parts out of cylinder assembly, making sure wire bundle feeds freely through slot in cylinder wall.

H. Remove transducer guide (560), packings (590, 600), backup ring (595), and retainers (605).

CAUTION: MATING HALVES OF SPLIT BALL (480) COMPRISE A MATCHED SET AND MUST BE KEPT TOGETHER.

I. Remove split ball from cylinder assembly. Tag and store in a sealed bag.

NOTE: Do not remove outer race (485) or name plate (625) from cylinder assembly unless replacement is necessary.

7. Disassemble Manifold Assembly (160) and Attached Parts (Ref IPL Fig. 1)

A. Remove screws (105) and detach servovalve (100) and gasket plate (205). Remove packing (110).

NOTE: Do not disassemble servovalve. In case of malfunction, replace as a unit.

B. Pull connector (120) and attached wiring out of manifold assembly. Discard connector retainer (115).

C. Remove filter cap (320) and strip off packings (325, 330) and retainers (335).

D. Remove filter element (340) and strip off packing (345) and retainers (350).

E. Remove nut (365), washer (370), swivel washers (375, 380), and pull swivel shaft assembly (360) out of manifold. Remove seals (355) and swivel washer (380) from swivel shaft.

F. Remove cam retainer (410) and release cam (425). Strip off packings (395, 405, 415) and retainers (400, 420).

G. Remove extension check and thermal relief valve assembly (210). Strip off packings (220, 225) and retainers (230).

NOTE: Do not disassemble valve assembly. In case of malfunction, replace as a unit.

CLEANING

1. Materials

NOTE: Equivalent substitutes may be used.

A. Solvent -- Aliphatic naphtha, TT-N-95 (20-60-01)

B. Solvent -- Isopropyl alcohol, MIL-E-5566 (20-60-01)

2. Cleaning

NOTE: Refer to 20-30-03 for cleaning of parts using standard industry practices.

A. Electrical parts

WARNING: MAKE CERTAIN ALL SOURCES OF FLASH OR FIRE ARE ELIMINATED FROM CONTACT WITH COMBUSTIBLE MATERIALS AND VAPORS.

CAUTION: DO NOT APPLY ABRASIVE CLEANING MATERIALS. MAKE CERTAIN SOLVENT BMS 3-2 OR OTHER CLEANING MATERIALS (EXCEPT NAPHTHA AND ALCOHOL) DO NOT CONTACT ELECTRICAL PARTS. CLEANING FLUIDS MUST NOT CONTACT PLASTIC OR RUBBER PARTS.

(1) Remove dust or foreign matter from connectors (35, 120) and wire bundle using mild air suction.

(2) Clean electrical contacts of connectors with naphtha or alcohol. Dry with low pressure air. For cleaning related to soldering, refer to 20-12-01. Clean terminal lugs and other bonding areas per 20-11-03.

CHECK

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. Magnetic particle check the following parts (Ref IPL Fig. 1) per 20-20-01:

   A. Rod end (30) and rod end lock washer (10).

   B. Swivel shaft (390), release cam (425).

   C. Barrel (490), outer race (485), piston (540).

   D. Scraper retainer (515) and transducer retainer (620).

   E. Snubber plunger (575), spring (580), and lockring (585) for 252T1401-01 only.

   F. Filter cap (320) P/N 252T1405-2.

4. Penetrant check the following parts (Ref IPL Fig. 1) per 20-20-02:

   A. Split balls (25, 480).

   B. Cover (65), filter cap (320) P/N 252T1405-1, swivel washer (375), cam retainer (410).

   C. Plate (85), transfer tube (125), quill tube (440).

   D. Piston gland (495), seal retainer (525).

5. Check spring (580, IPL Fig. 1)

   A. Compress spring to 1.239 in. and check that load is 15.8-17.4 lbs.

   B. Compress spring to 1.024 in. and check that load is 24.7-26.9 lbs.

6. Check Spring (250, IPL Fig. 1)

   A. Compress spring to .787 in. and check that load is .54-.66 lbs.

   B. Compress spring to .650 in. and check that load is .92-1.20 lbs.

7. Check Spring (290, IPL Fig. 1)

   A. Compress spring to 1.545 in. and check that load is 91.9-94.1 lbs.

   B. Compress spring to 1.494 in. and check that load is 112.4-121.2 lbs.

8. Check dimensions of the following components

   A. Poppet (255, IPL Fig. 1) minimum thickness 0.148 inches.

   B. Rod (295, IPL Fig. 1) minimum length 1.932 inches.

REPAIR - GENERAL

1. Content

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

P/N	NAME	REPAIR
252T1436	ROD END	1-1
252T1431	MANIFOLD	2-1
252T1437	SWIVEL SHAFT	3-1
252T1406	CYLINDER	4-1
252T1432	BARREL	5-1
252T1405	FILTER CAP	6-1, 6-2
252T1407	PISTON	7-1
252T1332	NAMEPLATE	8-1
- -	MISC PARTS REFINISH	9-1

2. Standard Practices

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

SOPM 20-30-02 Stripping of Protective Finishes
SOPM 20-41-01 Decoding Table for Boeing Finish Codes
SOPM 20-42-03 Hard Chrome Plating
SOPM 20-43-01 Chromic Acid Anodizing
SOPM 20-50-03 Bearing Installation and Retention
SOPM 20-50-08 Application of Dry Lubricant
SOPM 20-50-12 Application of Adhesives

3. Materials

NOTE: Equivalent substitutes may be used.

A. Dry Lubricant -- BMS 3-8, Class A (Ref 20-60-03)

B. Primer -- BMS 10-11, Type 1 (Ref 20-60-02)

C. Adhesive -- Type 44 (Ref 20-50-12)

D. Grease -- MIL-G-23827 (Ref 20-60-03)

4. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in applicable repair procedures are shown in Fig. 601.

⏤	STRAIGHTNESS
▱	FLATNESS
⊥	PERPENDICULARITY (OR SQUARENESS)
//	PARALLELISM
○	ROUNDNESS
⌭	CYLINDRICITY
⌒	PROFILE OF A LINE
⌓	PROFILE OF A SURFACE
◎	CONCENTRICITY
⌯	SYMMETRY
∠	ANGULARITY
↗	RUNOUT
⌰	TOTAL RUNOUT
⌴	COUNTERBORE OR SPOTFACE
⌵	COUNTERSINK
⌖	THEORETICAL EXACT POSITION OF A FEATURE (TRUE POSITION)
∅	DIAMETER
S ∅	SPHERICAL DIAMETER
R	RADIUS
SR	SPHERICAL RADIUS
()	REFERENCE
BASIC (BSC) OR DIM	A THEORETICALLY EXACT DIMENSION USED TO DESCRIBE SIZE, SHAPE OR LOCATION OF A FEATURE FROM 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

EXAMPLES

⏤ 0.002	STRAIGHT WITHIN 0.002
⊥ B 0.002	PERPENDICULAR TO B WITHIN 0.002
// A 0.002	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
⌒ A 0.006	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
⌓ A 0.020	SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.02 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE
◎ C ∅ 0.0005	CONCENTRIC TO C WITHIN 0.0005 DIAMETER
⌯ A 0.010	SYMMETRICAL WITH A WITHIN 0.010
∠ A 0.005	ANGULAR TOLERANCE 0.005 WITH A
⌖ B ∅ 0.002 Ⓢ	LOCATED AT TRUE POSITION WITHIN 0.002 DIA RELATIVE TO DATUM B, REGARDLESS OF FEATURE SIZE
⊥ A ∅ 0.010 Ⓜ 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	EXACT DIMENSION IS 2.000

(NOTE THAT ⌓ A 0.020 MAY ALSO APPEAR AS ⌓ 0.020 A)

True Position Dimensioning Symbols
Figure 601

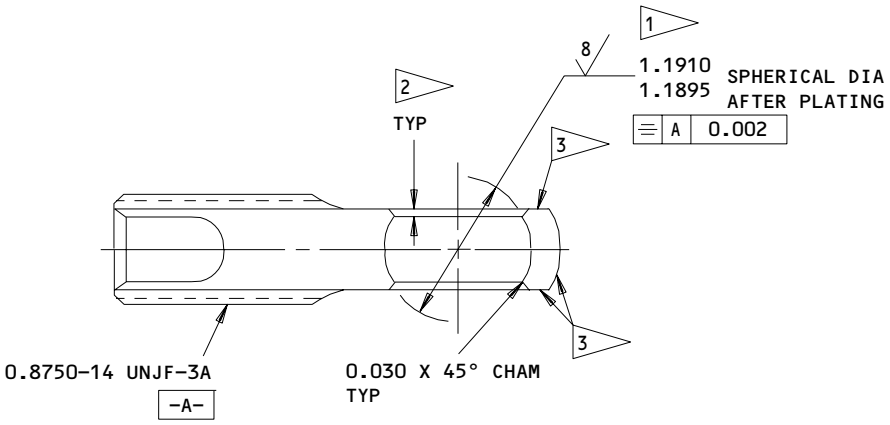
24371

ROD END - REPAIR 1-1

252T1436-1

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.



REFINISH

PASSIVATE (F-17.09). CHROMIUM PLATE (F-15.03) AS NOTED. APPLY DRY FILM LUBRICANT, BMS 3-8, CLASS A, OR MIL-L-8937 TO THREADS.

MATERIAL: 15-5 PH CRES (180-200 KSI)

ALL DIMENSIONS ARE IN INCHES

1 CHROMIUM PLATE THIS SURFACE TO THICKNESS 0.0005-0.0007

2 PLATING RUNOUT AREA

3 NO PLATING THIS SURFACE

Rod End Refinish
Figure 601

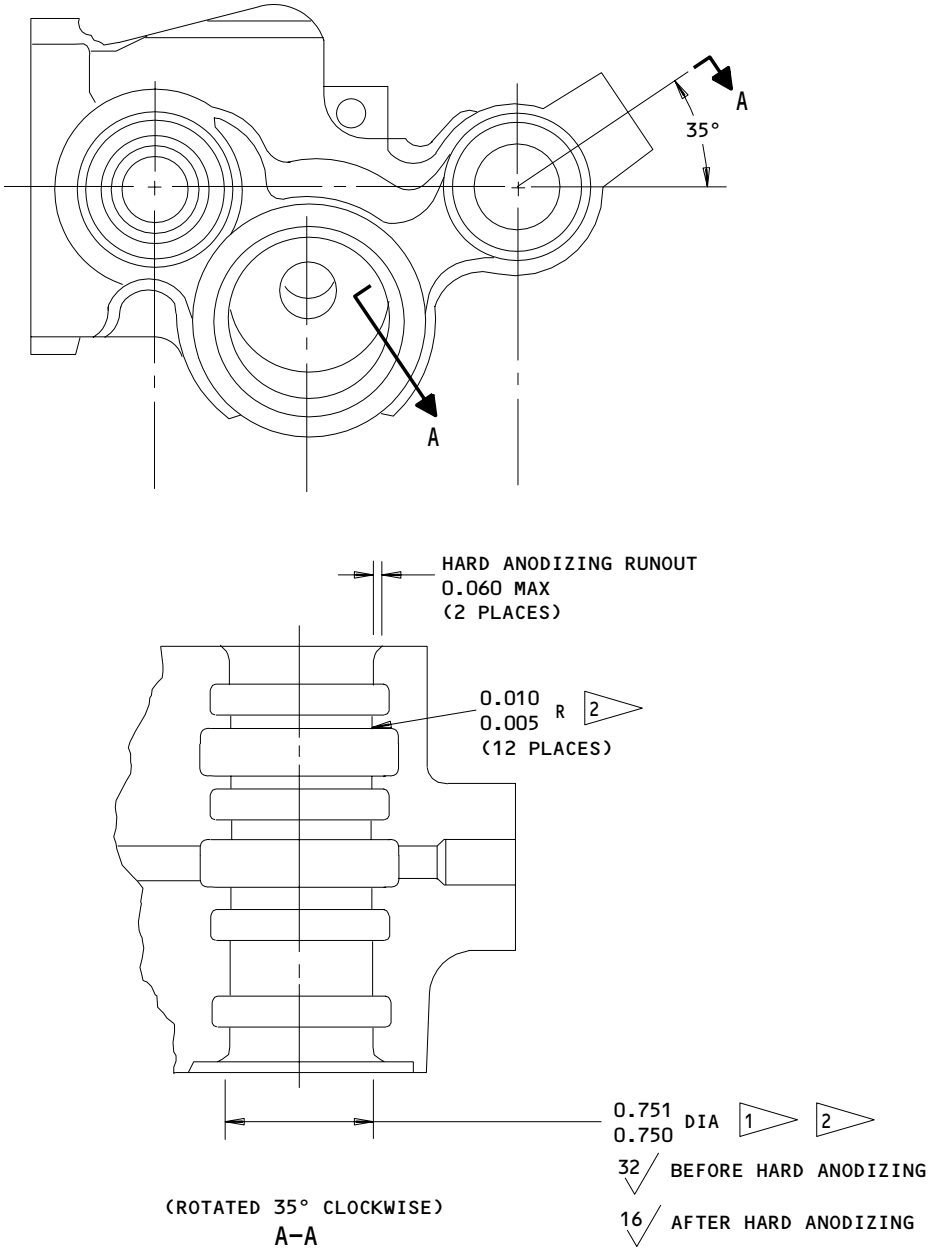
24391

MANIFOLD - REPAIR 2-1

252T1431-1

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.



REFINISH

MANIFOLD (200): SULFURIC ACID ANODIZE (F-17.03) EXCEPT AS NOTED

1 HARD ANODIZE (F-17.06) THIS SURFACE, 0.002-0.004 HARD COAT THICKNESS

2 DIMENSIONS BEFORE AND AFTER HARD ANODIZING

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

252T1402-1
Manifold Refinish
Figure 601

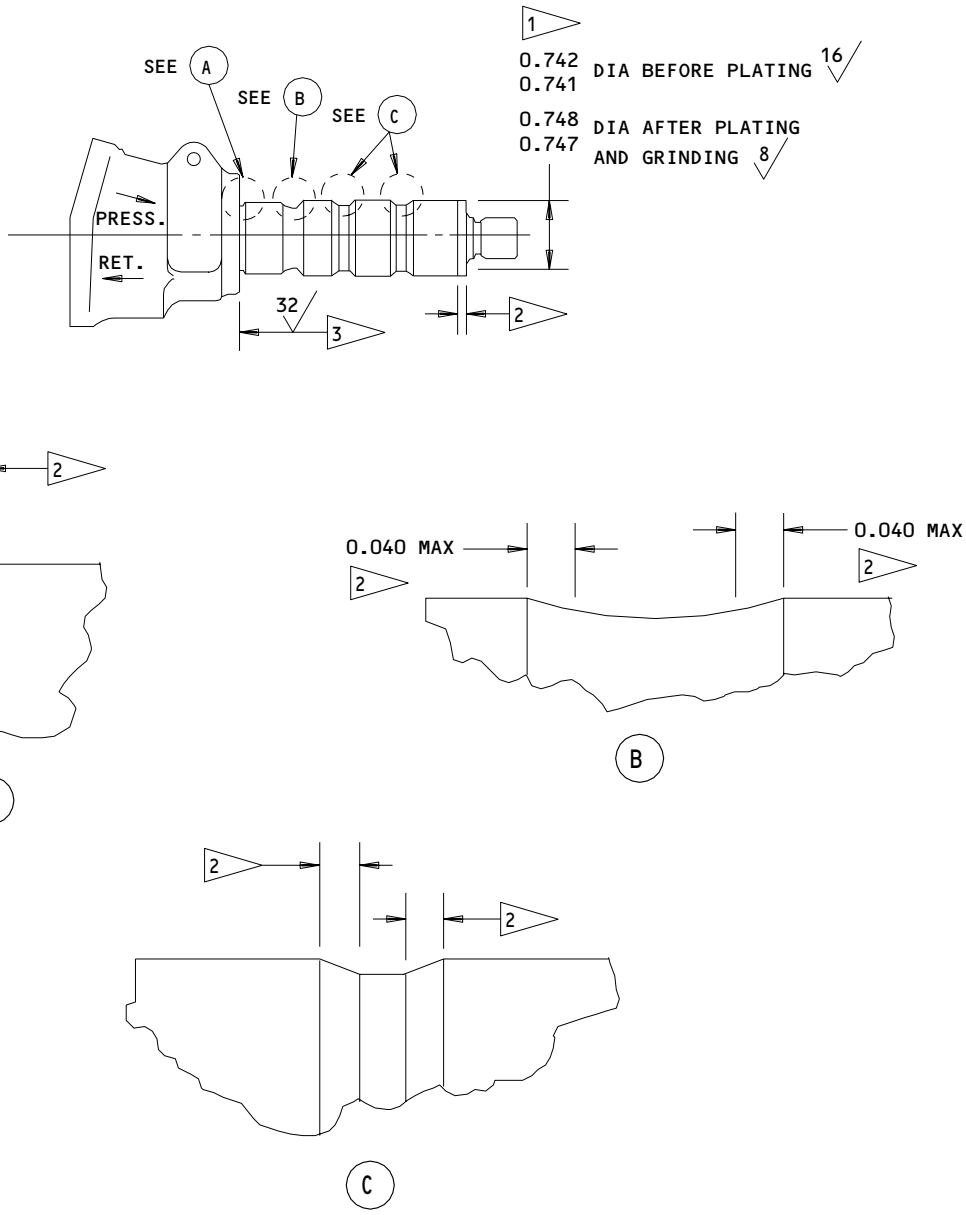
24392

SWIVEL SHAFT - REPAIR 3-1

252T1437-1

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.



REFINISH

PASSIVATE (F-17.09). CHROMIUM PLATE (F-15.03) AS NOTED. SINGLE PLATE THICKNESS 0.003-0.005

MATERIAL: 15-5PH CRES (180-200 KSI)

ALL DIMENSIONS ARE IN INCHES

1 CHROMIUM PLATE THIS SURFACE

2 PLATING RUNOUT AREA

3 NO PLATING THIS SURFACE

252T1437-1
Swivel Shaft Refinish
Figure 601

24397

CYLINDER ASSY - REPAIR 4-1

252T1406-1

NOTE: Refer to REPAIR-GEN for list of applicable standard practices.

1. Outer Race Replacement

   A. Remove outer race.

   B. Apply grease, MIL-G-23827, to clean faying surfaces of barrel and outer race.

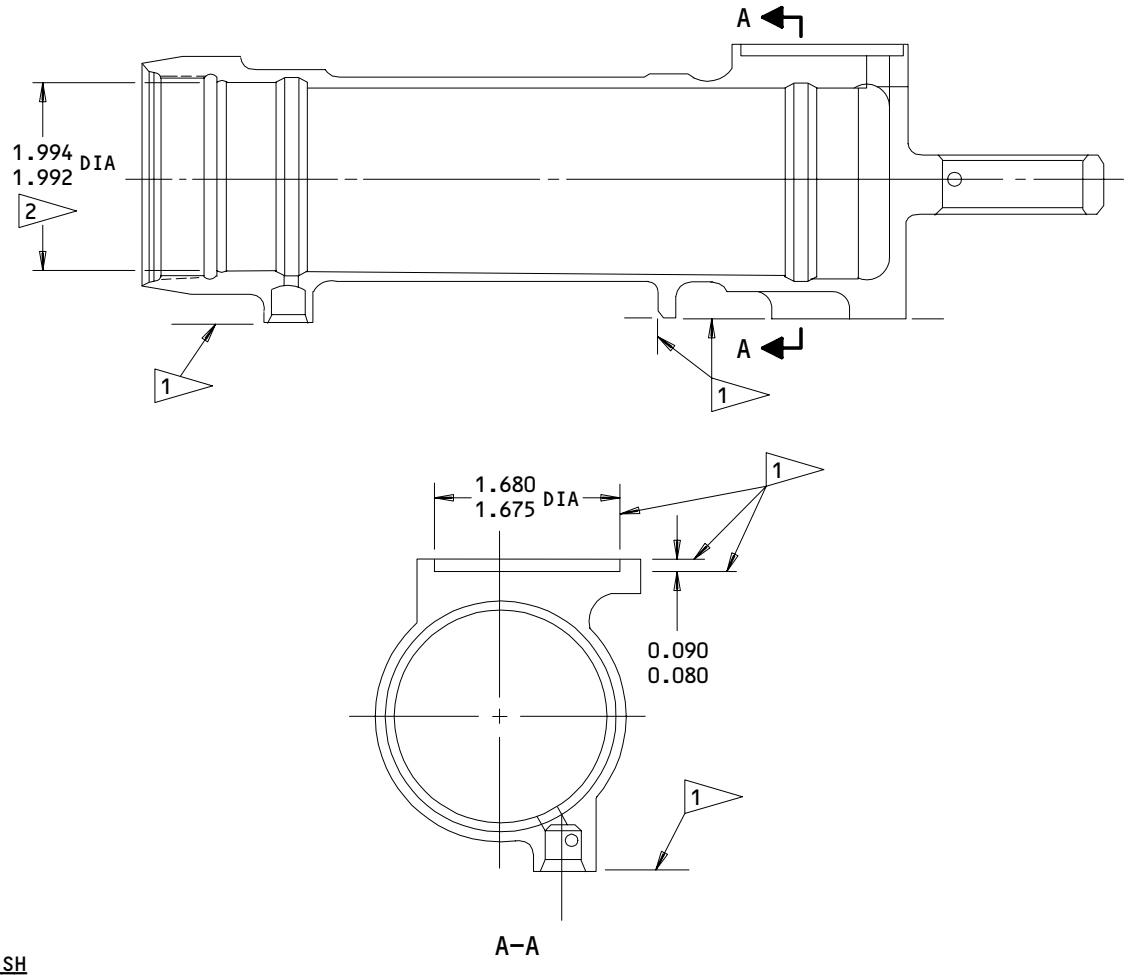
   C. Install new outer race and roller swage in place per 20-50-03.

BARREL - REPAIR 5-1

252T1432-1

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.



REFINISH

CADMIUM PLATE (F-15.06) FLAGGED SURFACES.
OTHER AREAS OPTIONAL EXCEPT AS NOTED.

MATERIAL: 15-5PH CRES (180-200 KSI)

ALL DIMENSIONS ARE IN INCHES

1 CADMIUM PLATE THIS SURFACE

2 NO PLATING THIS SURFACE

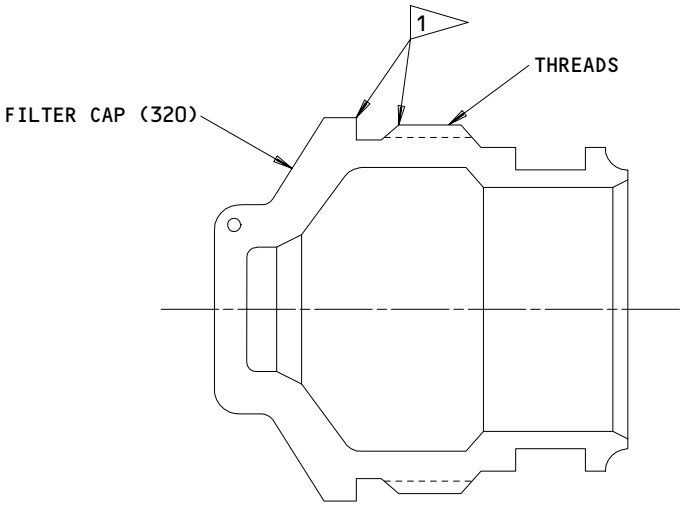
Barrel Refinish
Figure 601

FILTER CAP - REPAIR 6-1

252T1405-1

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.



REFINISH

CHROMIC ACID ANODIZE (F-17.04);
OMIT SEALING OPERATION FROM
AREAS TO BE DRY FILM LUBED.
APPLY DRY FILM LUBE (F-19.10)
TO THREADS AND 1

MATERIAL: AL ALLOY

1 APPLY DRY FILM LUBE TO THIS AREA (OPT)

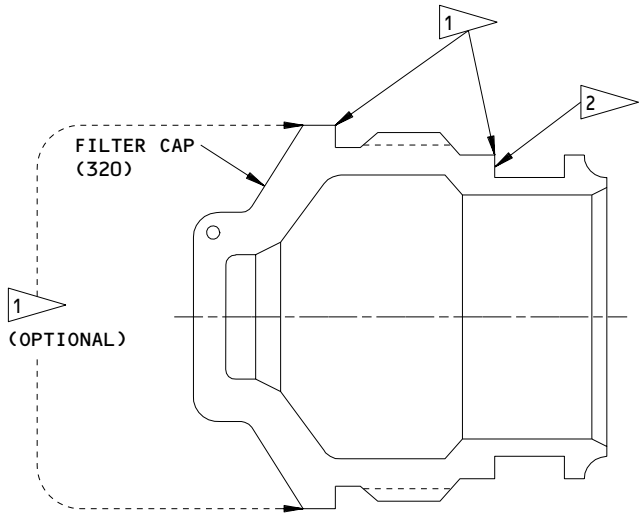
Filter Cap Refinish
Figure 601

FILTER CAP - REPAIR 6-2

252T1405-2

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.



REFINISH

PASSIVATE (F-17.25). CADMIUM PLATE (F-15.02) AS NOTED.

MATERIAL: 15-5PH CRES (150-170 KSI)

1 CADMIUM PLATE (F-15.02)

2 RUNOUT ALLOWED ON SIDEWALL OF SEAL GROOVE

Filter Cap Refinish
Figure 601

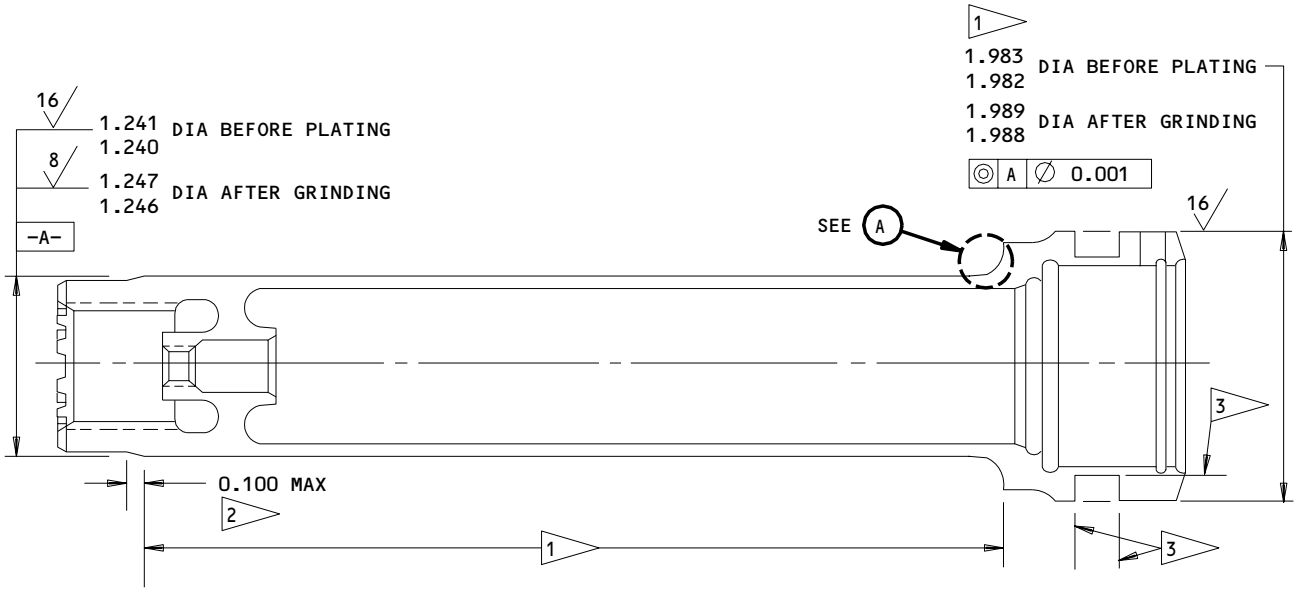
W49381

PISTON - REPAIR 7-1

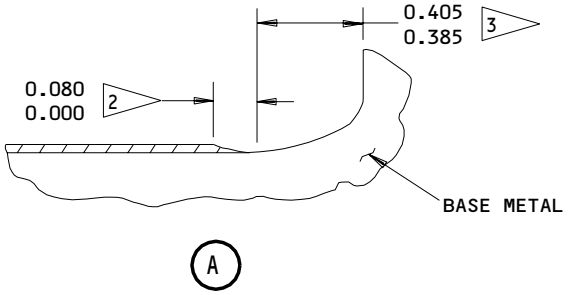
252T1407-1, -2, -3

1. Plating Repair

NOTE: Repair consists of stripping and restoration of original finish. Refer to Refinish instruction in Fig. 601 and to REPAIR-GEN for list of applicable standard practices.



252T1407-1 (SHOWN)



REFINISH

PASSIVATE (F-17.09) ALL OVER. CHROMIUM PLATE (F-15.03) 0.003-0.005 THICK AS NOTED. WITHIN 4 HOURS AFTER CHROMIUM PLATE BAKE AT 375 ±25°F FOR 8 HOURS

1 CHROMIUM PLATE THIS SURFACE
2 CHROMIUM PLATE RUN-OUT AREA
3 NO PLATING ALLOWED THIS SURFACE

MATERIAL: 15-5PH CRES (180-200 KSI)

ALL DIMENSIONS ARE IN INCHES

Piston Refinish
Figure 601

NAMEPLATE - REPAIR 8-1

252T1332-2

1. Nameplate Replacement

NOTE: Refer to REPAIR-GEN for list of applicable standard practices.

A. Steel stamp serial number and dash number on nameplate.

B. Preform nameplate to match curvature of cylinder assembly.

C. Bond nameplate to cylinder assembly with Type 44 adhesive per 20-50-12 (Ref Fig. 702).

MISCELLANEOUS PARTS REFINISH - REPAIR 9-1

1. Repair of parts listed in Fig. 601 consists of restoration of the original finish.

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Rod end lock-washer (10)	15-5PH 180-200 ksi	Passivate (F-17.09).
Cover (65)	Al alloy	Chromic acid anodize (F-17.04).
Plate (85)	Al alloy	Chromic acid anodize (F-17.04).
Conduit (90)	Al alloy	Chromic acid anodize (F-17.04).
Transfer tube (125)	Al alloy	Chromic acid anodize (F-17.04).
Filter cap (320)		See Repair 6-1 or 6-2.
Swivel washer (375)	Al alloy	Chromic acid anodize plus one coat primer BMS 10-11, type 1 (F-18.13).
Cam retainer (410)	Al alloy	Chromic acid anodize (F-17.04).
Release cam (425)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09) plus chromium plate (F-15.03).
Quill tube (440)	304 CRES, Cond. B	Passivate (F-17.09).
Scraper retainer (515)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09).
Transducer retainer (620)	15-5PH CRES, 180-200 ksi	Passivate (F-17.09).

Refinish Details
Figure 601

ASSEMBLY

1. Materials and Equipment

NOTE: Equivalent substitutes may be used.

A. Grease -- MIL-G-23827 (Ref 20-60-03)

B. Sealant -- BMS 5-26 or MIL-S-8802 (Ref 20-60-04)

C. Topcoating -- Type 41 (Ref 20-60-02)

D. Hydraulic Fluid -- BMS 3-11 (Ref 20-60-03)

E. Lockwire -- MS20995NC20, MS20995NC32

F. Spanner Wrench -- A32045-8

2. Lubrication

A. Prior to assembly, lubricate all packings, retainers, and backup rings with hydraulic fluid per 20-50-06. Lubricate all sliding parts with hydraulic fluid.

3. Assembly

A. Assemble cylinder and piston.

(1) Install packings (590, 600), backup rings (595) and retainers (605) on transducer retainer assembly (610), then slide unit onto transducer assembly (565). Make sure pin (615) on transducer retainer engages slot in base of transducer.

(2) Install packing (550), retainer (555), and guide (560) on transducer, then insert assembly into cylinder (465), making sure transducer wiring feeds directly through slot near cylinder base. Secure transducer retainer with bolts (460).

(3) For 252T1401-1 only, install snubber spring (580) and plunger (575) in piston (540) and secure with new lock ring (585).

(4) Install GT ring (570) on piston, then slide piston over transducer and into cylinder. Install nut (545) and tighten finger-tight.

NOTE: Tightening of nut (545) will be completed after adjusting transducer output.

(5) Install packings (500, 505) and backup rings (510) on piston gland (495). Install piston gland in cylinder and tighten to 400-500 lb-in.

(6) Install packing (530), foot seal (535), seal retainer (525), and scraper ring (520) on piston and secure with scraper retainer (515) using wrench A32045-8. Torque scraper retainer (515) to 50 - 70 lbs-in. Apply sealant to scraper retainer - piston gland contact area. Apply topcoating over sealant.

(7) Adjust transducer output according to procedure given in TESTING/TROUBLE SHOOTING. Tighten nut (545) to 50-70 lb-in.

CAUTION: THREADS ON ROD ASSEMBLY (15) HAVE DRY FILM LUBRICANT WHICH MUST BE KEPT CLEAN AND PROTECTED FROM MECHANICAL DAMAGE DURING ASSEMBLY.

(8) Fill cavity at base of rod assembly with grease. Thread nut (5) fully onto rod end. Slide on lockwasher (10), then thread assembly into piston until distance between rod end and cylinder bearing centers is 12.090-12.110 in. when piston is fully retracted. Slide lockwasher onto piston end, making sure washer key engages a slot in piston. Run nut down onto washer but do not tighten. Attach tag stating "Nut (P/N NAS509-14C) not tightened and lockwire not installed."

NOTE: Nut (5) will be tightened and lockwired after final installation and check in airplane.

CAUTION: MATING HALVES OF SPLIT BALLS (25, 480) COMPRISE MATCHED SETS AND MUST NOT BE INTERCHANGED. SERIAL NUMBERS MUST MATCH AND INDEX MARKS MUST LINE UP.

(9) Check serial numbers of mating halves of split balls. Pack lube grooves with grease and install balls in rod end and cylinder. Check that index marks match and balls rotate freely. Use aluminum wire to retain split ball until actuator is installed in airplane.

B. Assemble manifold and attached parts.

(1) Install packings (220, 225, 235) and retainers (230, 240) on extension check and thermal relief valve assembly (210). Install valve in manifold assembly (160) and tighten to 250-300 lb-in.

(2) Install packings (325, 330, 345) and retainers (335, 350) on filter cap (320) and filter element (340). Install cap and element and tighten cap to 200-250 lb-in.

(3) Attach wiring to connector (120) per wiring diagram, Fig. 701. Feed wire bundle through manifold passage and secure connector with new connector retainer (115).

(4) Install packing (110) on servovalve (100), then attach gasket plate (205) and servovalve to manifold with screws (105). Tighten screws to 50-70 pound-inches.

(5) Install packings (395, 405, 415) and retainers (400, 420) on release cam (425) and cam retainer (410). Position cam in retainer and install in manifold. Tighten retainer to 200-250 lb-in.

(6) Install swivel washer (380) and seals (355) on swivel shaft assembly (360). Insert in manifold and secure with swivel washers (375, 380), washer (370) and nut (365).

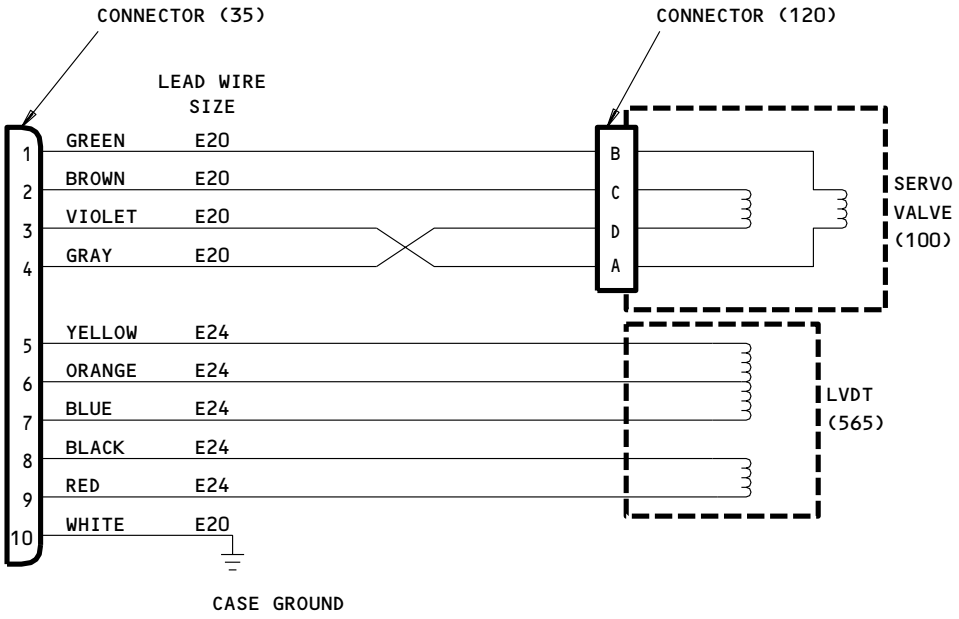
C. Assemble power control actuator assembly.

CAUTION: DO NOT PLACE ACTUATOR ASSEMBLY IN ANY CLAMPING DEVICE OR DAMAGE MAY RESULT.

(1) Install packings (430) and retainers (435) on transfer tube (125) and quill tube (440). Insert quill tube in manifold with flow restrictor facing inward. Position transfer tube in manifold.

CAUTION: SUPPORT MANIFOLD AND CYLINDER ASSEMBLIES TO AVOID BENDING TRANSFER AND QUILL TUBES WHILE JOINING PARTS.

(2) Attach manifold assembly to cylinder assembly with screws (140, 145), washers (150), and nuts (155). Tighten nuts to 50-70 pounds-inches. Secure transfer tube with bolts (130) and washers (135).



Outboard Spoiler PCA Wiring Diagram
Figure 701

24401

(3) Install packings (95) on conduit assembly (70). Feed servovalve wiring through conduit and attach conduit to manifold with screw (75) and washer (80).

(4) Attach connector (35) to cover assembly (45) with screws (40). Tighten screws to 6-8 pounds-inches. Fillet seal connector-cover contact area from inside of cover assembly. Apply topcoating over sealant.

(5) Attach ground wire terminal (445) to cylinder with screw (450) and washer (455). Apply sealant over screw head to completely seal attachment area. Cover with topcoat.

(6) Feed conduit wiring through hole in cover assembly and attach to connector (35) per Fig. 701. Attach ground wire and transducer wiring per figure. Attach cover to cylinder with screws (50) and washers (55). Apply sealant along contact areas between conduit (90) and plate (85), conduit and cover, and cover and cylinder. Apply topcoating over sealant.

D. Lockwire the following parts per 20-50-02 and Fig. 702, using double-twist method.

NOTE: Use MS20995NC32 lockwire except as noted.

(1) Scraper retainer (515) to piston gland (495).

(2) Piston gland (495) to bolt (130).

(3) Bolt (130) to bolt (130). *[1]

(4) Screw (105) to screw (105), 2 places. *[1]

(5) Valve cap (215) to filter cap (320). *[1]

(6) Screw (75) to screw (145). *[1]

(7) Screw (145) to screw (145).

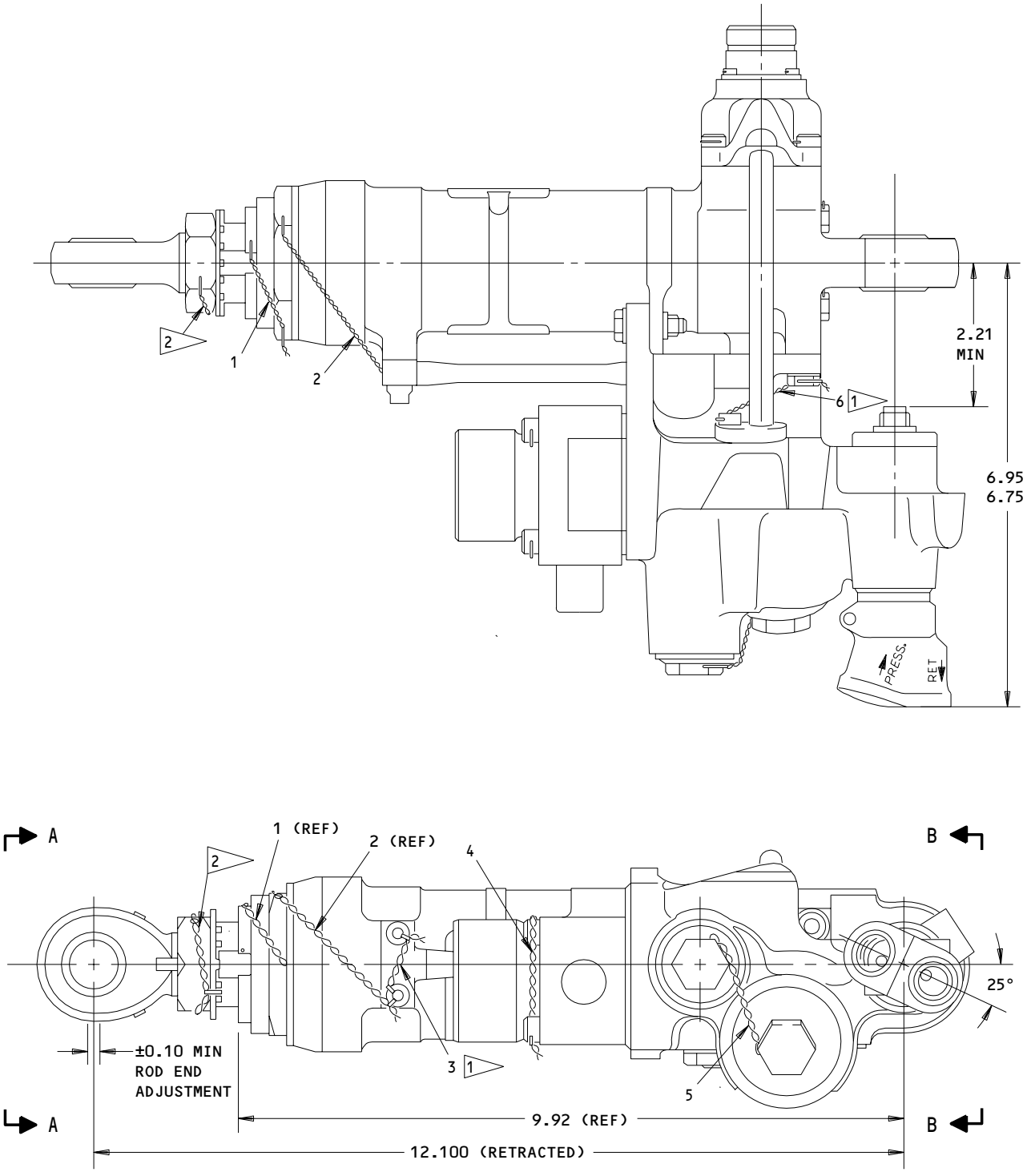
(8) Cam retainer (410) to manifold (200).

(9) Bolt (460) to bolt (460), 2 places. *[1]

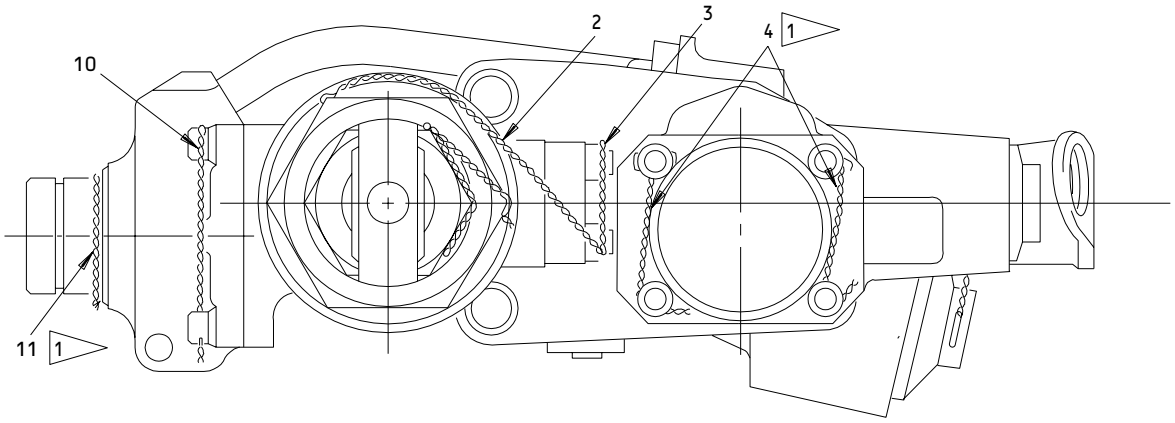
(10) Screw (50) to screw (50), 2 places. *[1]

(11) Screw (40) to screw (40), 2 places. *[1]

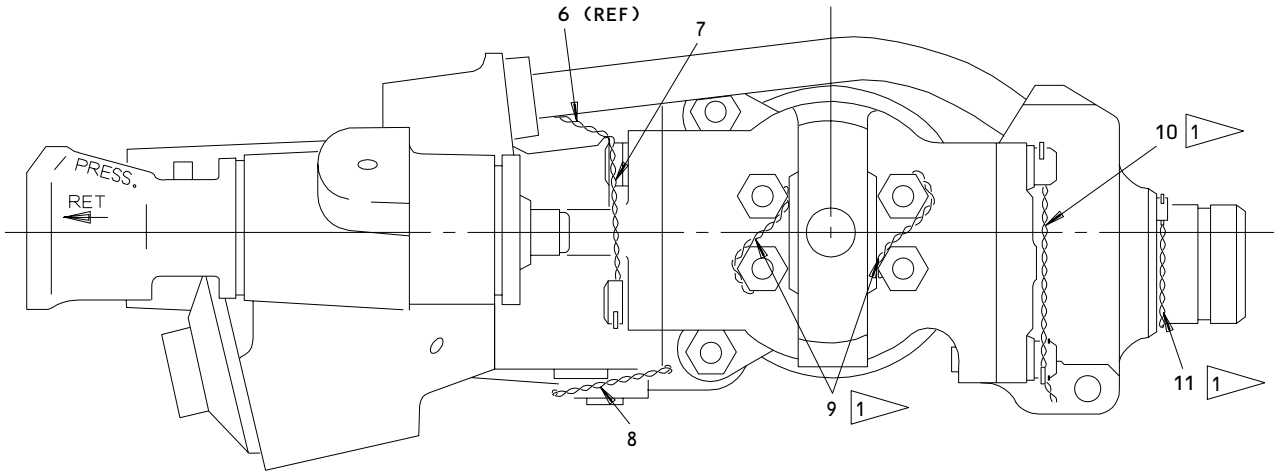
*[1] Use MS20995NC20



Lockwiring and Assembly Details
Figure 702 (Sheet 1)



A-A



B-B

1 USE MS20995NC20
2 LOCKWIRED ON INSTALLATION

ALL DIMENSIONS ARE IN INCHES
USE MS20995NC32 LOCKWIRE EXCEPT AS NOTED

Lockwiring and Assembly Details
Figure 702 (Sheet 2)

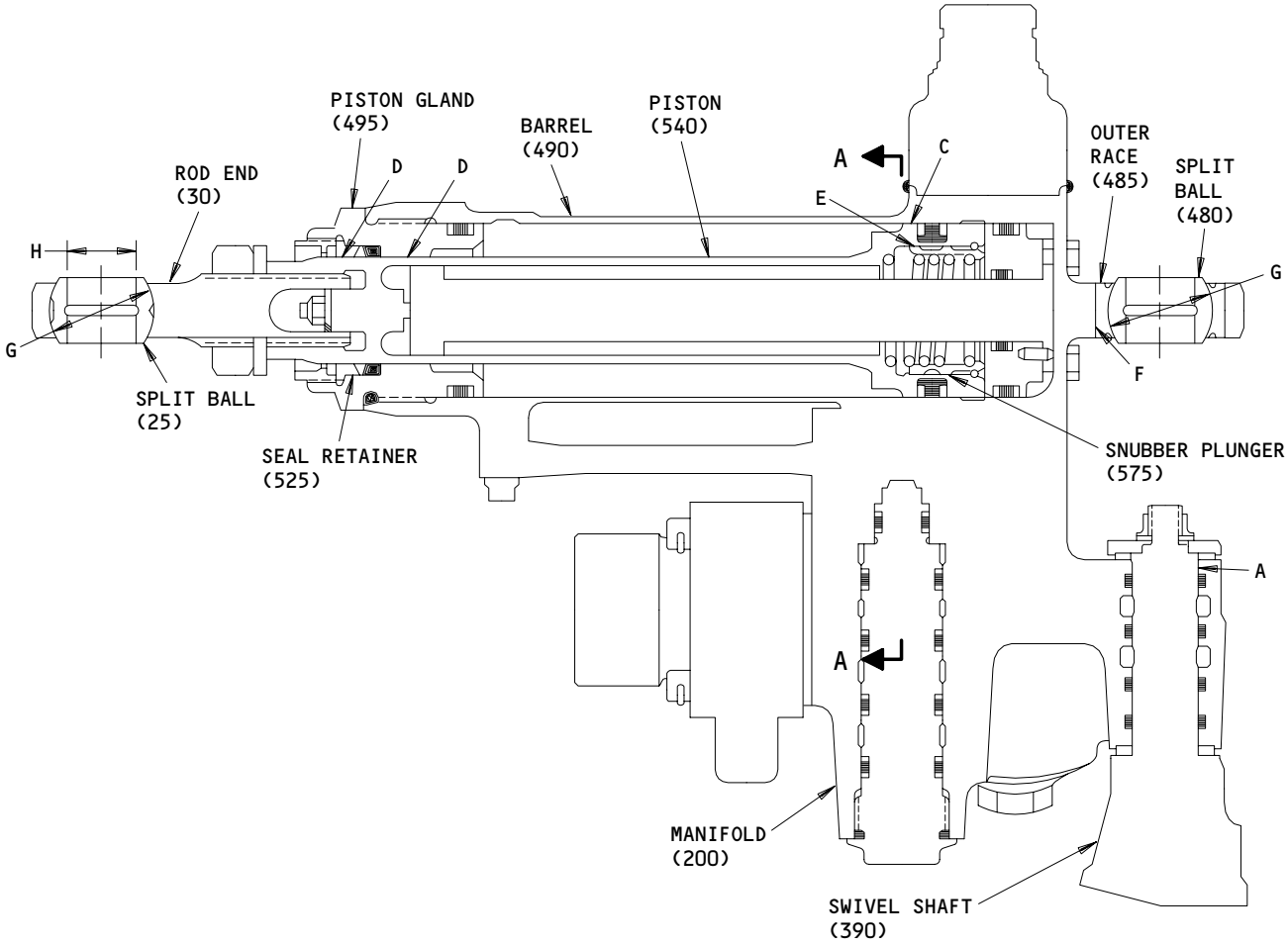
4. Storage

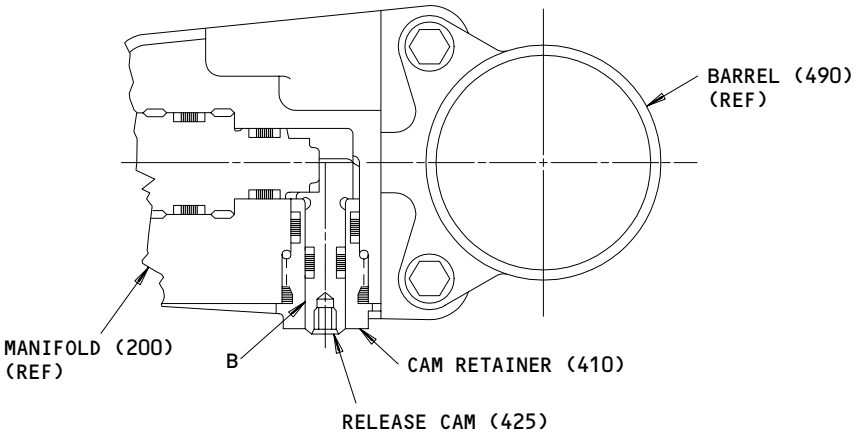
A. Fill unit with BMS 3-11 hydraulic fluid. Operate manual release cam (425) with a 5/32 in. allen wrench and manually cycle actuator two full cycles. Drain excess hydraulic fluid from unit.

B. Plug all ports with BACP20BH6 protective plugs and NAS1612-6 packings. Cap electrical connector (35) with MS90376-18 dust cap, or equivalent.

C. Place unit in heat-sealed polyethylene bag. Store separately in its own protective container.

FITS AND CLEARANCES





A-A

Fits and Clearances
Figure 801 (Sheet 1)

24451

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	
A	ID 200 OD 390	0.750 0.747	0.751 0.748	0.002	0.004	0.746	0.752	0.006
B	ID 410 OD 425	0.329 0.326	0.330 0.327	0.002	0.004	0.325	0.331	0.006
C	ID 490 OD 540	1.992 1.988	1.994 1.989	0.003	0.006	1.987	1.995	0.008
D	ID 495,525 OD 540	1.250 1.246	1.251 1.247	0.003	0.005	1.245	1.252	0.007
E	ID 540 OD 575	1.4961 1.4935	1.4965 1.4939	0.0022	0.0030	1.4933	1.4967	0.0034
F	ID 490 OD 485	1.4489 1.4495	1.4495 1.4500	-0.0011 *[1]	0.0000		1.4500	
G	ID 30,485 *[2] OD 25,480 *[2]	1.1895 1.1870	1.1910 1.1875	0.0020	0.0040	1.1865		

*[1] INTERFERENCE FIT

*[2] SPHERICAL DIAMETER

ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2)

1356

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
5	NUT		95-115 1
40	SCREW	6-8	
105	SCREW	50-70	
155	NUT	50-70	
210	VALVE ASSY	250-300	
320	FILTER CAP	200-250	
410	CAM RETAINER	200-250	
495	PISTON GLAND	400-500	
545	NUT	50-70	

1 FINAL TIGHTENING ON INSTALLATION

Torque Table
Figure 802

1439

SPECIAL TOOLS/FIXTURES/EQUIPMENT

NOTE: Equivalent substitutes may be used.

1. A27047-1 -- Test block

2. A27042-1 -- Functional test equipment

3. A27043-1 -- Test equipment fixture

4. 6939000 -- Hydraulic power supply (Teijin Seiki)

5. 6941300 -- Servo electronics test unit (Teijin Seiki)

6. TR6355 -- Digital volt-ohm meter (Takeda Riken)

7. 70 -- Digital Multimeter (Fluke Electronics Corp, 6920 Seaway Blvd, PO Box 9090, Everett, WA 98206-9090)

8. 321 -- Phase angle voltmeter (North Atlantic Industries, Inc., 60 Plant Ave, Hauppauge, NY 11787)

9. HP7090A -- X-Y recorder (Hewlett-Packard Co., Palo Alto, CA 94304)

10. 925E -- X-Y Plotter (Allen Datagraph, 2 Industrial Way, Salem, NH 03079-2837)

11. MV-600-S -- Control valve (Parker-Hannifin Corp., 16666 Von Karman Ave., Irvine, CA 92714)

12. 60-1377TA -- Pressure gage (Ashcroft Gauge Co., Dresser Industries, Inc., 250 E. Main St., Stratford, CT 06497)

13. 60-1377R -- Pressure gage (Ashcroft Gauge Co.)

14. LR19CB2 -- Pressure reducing valve (Circle Seal Corp., 1111 N. Brookhurst, P.O. Box 3666, Anaheim, CA 92803)

15. BPR10AB6 -- Relief valve (Circle Seal Corp.)

16. 129-258 -- Flow meter (Cox Instruments Corp., Div. of Lynch Corp., 15300 Fullerton Ave., Detroit, MI 48227)

17. A32045-8 -- Spanner wrench

18. A27075-1 -- Adjustment wrench

19. 875B -- Dielectric Strength Tester (Kikusui Electronics)

20. 404 -- Hypot (high potential tester) (Associated Research, Inc., 13860 W Laurel Dr, Lake Forrest, ILL 60045-4546)

21. 3500D -- Hypot (high potential tester) (Associated Research, Inc., 13860 W Laurel Dr, Lake Forrest, ILL 60045-4546)

22. L-5 -- Insulation Resistance Tester (Yokogawa Electric Works, Ltd)

23. 412A -- Megger Test Set (Hewlett Packard Co., 1501 Page Mill Road, Palo Alto, CA 94304)

24. 1863 -- Megohmmeter (Quad Tech Inc, 100 Nickerson Rd, Marlborough, MA 01752-4602)

ILLUSTRATED PARTS LIST

1. This section lists and illustrates replaceable or repairable component parts. The Illustrated Parts Catalog contains a complete explanation of the Boeing part numbering system.

2. Indentures show parts relationships as follows:

    Assembly
      Detail Parts for Assembly
      Subassembly
      Attaching Parts for Subassembly
        Detail Parts for Subassembly

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

3. One use code letter (A, B, C, etc.) is assigned in the EFF CODE column for each variation of top assembly. All listed parts are used on all top assemblies except when limitations are shown by use code letter opposite individual part entries.

4. Letter suffixes (alpha-variants) are added to item numbers for optional parts, Service Bulletin modification parts, configuration differences (except left- and right-hand parts), product improvement parts, and parts added between two sequential item numbers. The alpha-variant is not shown on illustrations when appearance and location of all variants of the part is the same.

5. Service Bulletin modifications are shown by the notations PRE SB XXXX and POST SB XXXX.

    A. When a new top assembly part number is assigned by Service Bulletin, the notations appear at the top assembly level only. The configuration differences at detail part level are then shown by use code letter.

    B. When the top assembly part number is not changed by the Service Bulletin, the notations appear at the detail part level.

6. Parts Interchangeability

Optional (OPT)	The parts are optional to and interchangeable with other parts having the same item number.
Supersedes, Superseded By (SUPSDS, SUPSD BY)	The part supersedes and is not interchangeable with the original part.
Replaces, Replaced By (REPLS, REPLD BY)	The part replaces and is interchangeable with, or is an alternate to, the original part.

VENDORS

00779 AMP, INCORPORATED
PO BOX 3608
HARRISBURG, PENNSYLVANIA 17105

02107 SPARTA MANUFACTURING COMPANY
PO BOX 449 5200 NORTH WOOSTER ROAD
DOVER, OHIO 44622

02660 BUNKER-RAMO CORP AMPHENOL NORTH AMERICAN DIV
2801 SOUTH 25TH AVENUE
BROADVIEW, ILLINOIS 60153

05228 PUROLATOR TECHNOLOGIES INC
950 RANCHO CONEJO BOULEVARD
NEWBURY PARK, CALIFORNIA 91320

05574 VIKING CONNECTORS INC
21001 NORDHOFF STREET
CHATSWORTH, CALIFORNIA 91331

06710 VALLEY-TODECO INCORPORATED
12975 BRADLEY AVENUE
SYLMAR,CALIFORNIA 91342

06725 AIR INDUSTRIES CORPORATION
12570 KNOTT STREET
GARDEN GROVE, CALIFORNIA 92641

07128 TETRAFLUOR INC
2051 EAST MAPLE AVENUE
EL SEGUNDO, CALIFORNIA 90245

08524 DEUTSCH FASTENER CORPORATION
PO BOX 92925 7001 WEST IMPERIAL HIGHWAY
LOS ANGELES, CALIFORNIA 90045

10630 ANILLO INDUSTRIES, INCORPORATED
2090 NORTH GLASSELL
ORANGE, CALIFORNIA 92667

13556 TRW CINCH MANUFACTURING CO
1015 SOUTH SIXTH STREET
MINNEAPOLIS, MINNESOTA 55415

VENDORS

14726 HOLLINGWORTH SOLDERLESS TERMINAL COMPANY
85 BENJAMIN FRANKLIN HWY PO BOX 499
POTTSTOWN, PENNSYLVANIA 19464

15653 KAYNAR MFG COMPANY INC KAYLOCK DIV
PO BOX 3001 800 SOUTH STATE COLLEGE BLVD
FULLERTON, CALIFORNIA 92634

17943 FEDERAL MANUFACTURING CORPORATION
6910 FARMDALE AVENUE
NORTH HOLLYWOOD, CALIFORNIA 91605

18350 AIRCRAFT POROUS MEDIA INC
6301 49TH STREET NORTH
PINELLAS PARK, FLORIDA 33565

21550 BRUNSWICK CORP WINTEC-TECHNECTICS DIV
5223 WEST IMPERIAL HIGHWAY
LOS ANGELES, CALIFORNIA 90045

22863 KAVLICO ELECTRONICS INC
20869 PLUMMER STREET
CHATSWORTH, CALIFORNIA 91311

26303 OHIO AIRCRAFT SUPPLIES INC
717 HINDRY AVENUE
INGLEWOOD, CALIFORNIA 90301

26879 CORONADO PLASTICS INCORPORATED
11069 PENROSE AVENUE
SUN VALLEY, CALIFORNIA 91352

27624 P.B. FASTENER DIV OF PAUL R BRILES INC
1700 WEST 132ND STREET
GARDENA, CALIFORNIA 90249

49367 PYLE-NATIONAL CO SUB OF AKZONA INC
1334 NORTH KOSTNER AVENUE
CHICAGO, ILLINOIS 60651

52828 REPUBLIC FASTENER MFG CORP
1300 RANCHO CONEJO BLVD
NEWBURY PARK, CALIFORNIA 91320

VENDORS

56878 SPS TECHNOLOGIES INC
HIGHLAND AVENUE
JENKINTOWN, PENNSYLVANIA 19046

71087 BOOTS ACFT NUT DIV TOWNSEND CO SEE TEXTRON INC CHERRY
FASTENER TOWNSEND DIV V11815

72902 GREENE TWEED AND CO INC
320 ELM AVENUE
NORTH WALES, PENNSYLVANIA 19454

72962 ESNA DIV OF AMERACE CORP
2330 VAUXHALL ROAD
UNION, NEW JERSEY 07083

75250 ABEX CORPORATION AEROSPACE DIV
3151 WEST 5TH STREET
OXNARD, CALIFORNIA 93030

80539 SPS TECHNOLOGIES INC AEROSPACE PRODUCTS DIV
2701 SOUTH HARBOR BOULEVARD
SANTA ANA, CALIFORNIA 92702

81205 BOEING CO THE
PO BOX 3707
SEATTLE, WASHINGTON 98124

81873 HR TEXTRON INC
25200 W. RYE CANYON RD
VALENCIA, CALIFORNIA 91355

92215 VOI-SHAN DIV OF VSI CORP
8463 HIGUERA STREET
CULVER CITY, CALIFORNIA 90230

92555 LEE COMPANY
2 PETTIPAUG ROAD
WESTBROOK, CONNECTICUT 06498

94878 RAYBESTOS-MANHATTAN INC PACIFIC COAST DIV
1400 E. ORANGETHROPE
FULLERTON, CALIFORNIA 92631

97820 SHAMBAN W S AND CO
711 MITCHELL ROAD
NEWBURY PARK, CALIFORNIA 91320

VENDORS

97928 LITTON FASTENING SYSTEMS DIV OF LITTON SYSTEMS INC
3969 PARAMONT BOULEVARD
LAKEWOOD, CALIFORNIA 90712

98410 E T C DIV OF ITT
29000 AURORA ROAD
SOLON, OHIO 44103

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
AA821-10		1	445	1
AC8818E1		1	340	1
AN960-416L		1	150	4
AN960C616L		1	370	1
BACB30MT3HT6		1	130	2
BACC45FM16-10P		1	35	1
BACN10JC4C		1	155	2
		1	545	1
BACN10JC6C		1	365	1
BACP20AX15D		1	180	1
BACP20AX15DP		1	185	1
BACP20AX18D		1	190	2
BACP20AX18DP		1	195	2
BACR12BM009		1	420A	2
		1	555A	2
BACR12BM010		1	435A	8
BACR12BM012		1	350A	2
BACR12BM111		1	240A	2
		1	400A	2
BACR12BM116		1	230A	8
		1	605A	2
BACR12BM216		1	335A	2
BACR12BM224		1	510A	2
		1	595A	2
BACS11AA218		1	535	1
BACS34A13A		1	520	1
BACT12AC3		1	445	1
BACW10BP3C		1	135	2
BRH10C4		1	155	2
		1	545	1
BRH10C6		1	365	1
CSF11-218A		1	535	1
CWR76-13B		1	520	1
C11236-009B		1	420A	2
		1	555A	2
C11236-010B		1	435A	8
C11236-012B		1	350A	2
C11236-111B		1	240A	2
		1	400A	2
C11236-116B		1	230A	8
		1	605A	2

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
C11236-216B		1	335A	2
C11236-224B		1	510A	2
		1	595A	2
C48-00R16-10P10		1	35	1
FS100-218		1	535	1
GM6850		1	565	1
H31-4BAC		1	155	2
		1	545	1
H31-6BAC		1	365	1
MS16562-219		1	615	1
MS16562-228		1	175	1
		1	385	1
MS21209C0415P		1	60	4
MS21209F1-10P		1	470	1
MS21209F1-15P		1	165	1
MS21209F4-15P		1	170	4
MS28782-14		1	230	8
		1	605	2
MS28782-21		1	335	2
MS28782-4		1	420	2
		1	555	2
MS28782-5		1	435	8
MS28782-7		1	350	2
MS28782-9		1	240	2
		1	400	2
MS28783-2		1	510	2
		1	595	2
NAS1351-3-6P		1	450	1
NAS1351-4H28P		1	105	4
NAS1351C3H10P		1	50	4
		1	75	1
NAS1352-04H6P		1	40	4
NAS1611-009		1	415	1
		1	550	1
NAS1611-010		1	430	4
NAS1611-012		1	95	2
		1	345	1
NAS1611-111		1	235	1
		1	395	1

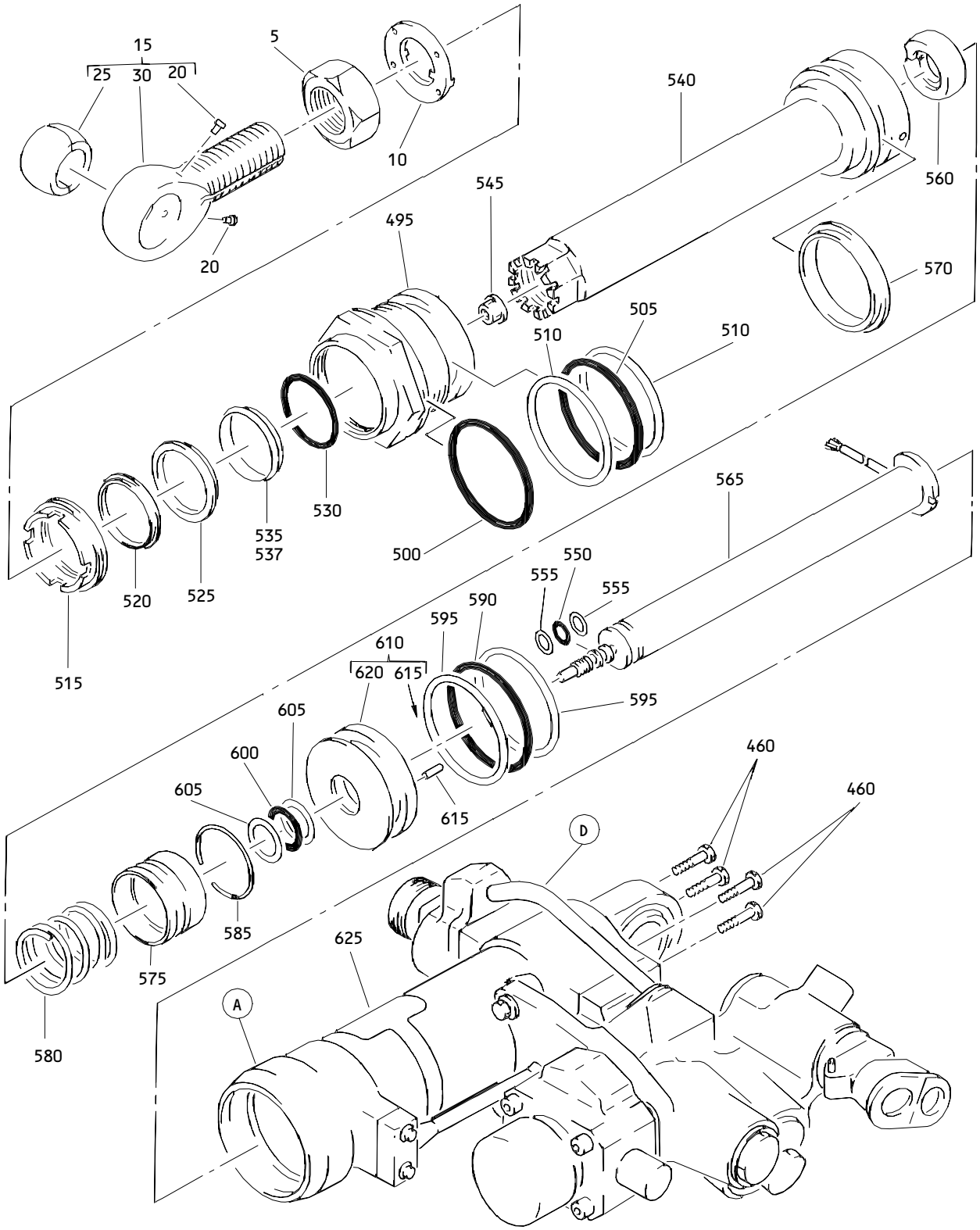
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
NAS1611-112		1	110	1
NAS1611-113		1	405	1
NAS1611-116		1	225	4
		1	600	1
NAS1611-118		1	220	1
NAS1611-125		1	325	1
NAS1611-135		1	500	1
NAS1611-216		1	330	1
NAS1611-218		1	530	1
NAS1611-224		1	505	1
		1	590	1
NAS509-14C		1	5	1
NAS516M1		1	20	2
		1	475	1
NAS620-10L		1	55	4
		1	80	1
		1	455	1
NAS6603H4		1	460	4
NAS6604-8		1	140	2
NAS6604H4		1	145	2
NS202101S048		1	155	2
		1	545	1
RMR12BM009		1	420A	2
		1	555A	2
RMR12BM010		1	435A	8
RMR12BM012		1	350A	2
RMR12BM111		1	240A	2
		1	400A	2
RMR12BM116		1	230A	8
		1	605A	2
RMR12BM216		1	335A	2
RMR12BM224		1	510A	2
		1	595A	2
RMS11-218		1	535	1
R1891SN		1	445	1
STF800-009		1	420A	2
		1	555A	2
STF800-010		1	435A	8

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
STF800-012		1	350A	2
STF800-111		1	240A	2
		1	400A	2
STF800-116		1	230A	8
		1	605A	2
STF800-216		1	335A	2
STF800-224		1	510A	2
STF800-224		1	595A	2
S12095-218		1	535	1
S252T001-1		1	100A	1
S252T001-2		1	100	1
S252T001-3		1	100B	1
S252T003-1		1	565	1
S30294-009-1		1	420A	2
		1	555A	2
S30294-010-1		1	435A	8
S30294-012-1		1	350A	2
S30294-111-1		1	240A	2
		1	400A	2
S30294-116-1		1	230A	8
		1	605A	2
S30294-216-1		1	335A	2
S30294-224-1		1	510A	2
		1	595A	2
S30388-13-1		1	520	1
S30772-009H5		1	310	1
S30775-116H5		1	355	4
S33555-218H5		1	537	1
TF005-13A		1	520	1
TF450-009A		1	420A	2
		1	555A	2
TF450-010A		1	435A	8
TF450-012A		1	350A	2
TF450-111A		1	240A	2
		1	400A	2
TF450-116A		1	230A	8
		1	605A	2
TF450-216A		1	335A	2
TF450-224A		1	510A	2
		1	595A	2
T6C428J		1	155	2
		1	545	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
VN303B048		1	155	2
		1	545	1
ZZYAC1716-10P		1	35	1
000100-0113		1	120	1
101LH9075-4W		1	155	2
		1	545	1
187101		1	180	1
187101P		1	185	1
2053-218		1	535	1
2100-009		1	420A	2
		1	555A	2
2100-010		1	435A	8
2100-012		1	350A	2
2100-111		1	240A	2
		1	400A	2
2100-116		1	230A	8
		1	605A	2
2100-216		1	335A	2
2100-224		1	510A	2
		1	595A	2
2140-13A		1	520	1
218101		1	190	2
218101P		1	195	2
22280730-001		1	100A	1
252T1306-1		1	380	2
252T1308-1		1	425	1
252T1309-1		1	410	1
252T1313-1		1	540	1
252T1313-2		1	540A	1
252T1313-3		1	540B	1
252T1316-2		1	585	1
252T1316-3		1	265	1
252T1316-4		1	260	1
252T1320-1		1	210	1
252T1329-1		1	115	1
252T1331-2		1	560	1
252T1332-2		1	625	1
252T1345-1		1	215	1
252T1346-1		1	305	1
252T1347-1		1	290	1
252T1348-1		1	250	1
252T1349-1		1	245	1

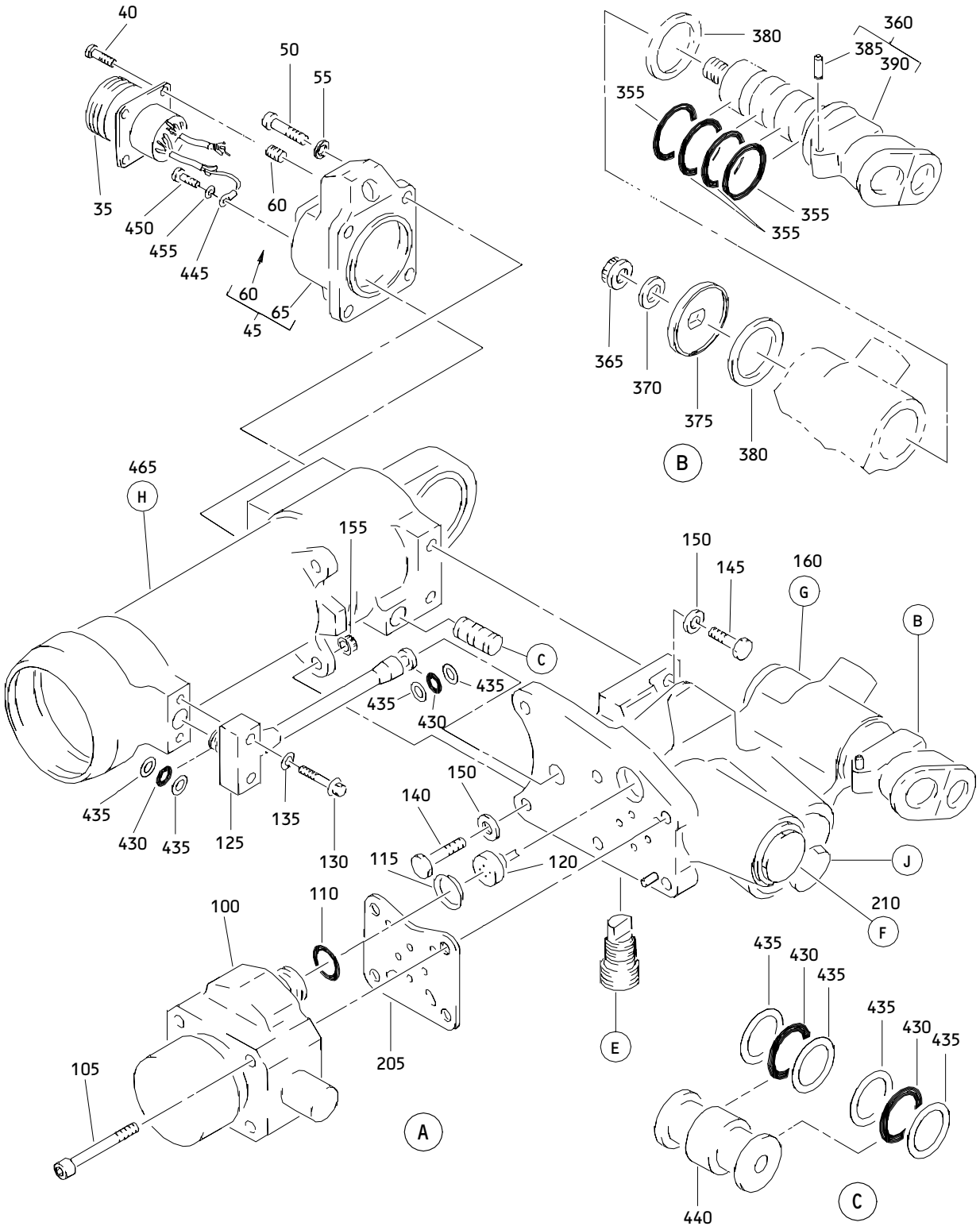
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
252T1350-1		1	295	1
252T1351-1		1	300	1
252T1352-1		1	255	1
252T1353-1		1	285	1
252T1354-1		1	270	1
252T1356-1		1	315	1
252T1356-2		1	315A	1
252T1356-3		1	315B	1
252T1358-2		1	25	1
		1	480	1
252T1365-1		1	275	1
252T1366-1		1	280	1
252T1401-1		1	1	RF
252T1401-2		1	1A	RF
252T1401-3		1	1B	RF
252T1402-1		1	160	1
252T1403-1		1	360	1
252T1404-1		1	375	1
252T1405-1		1	320	1
252T1405-2		1	320A	1
252T1406-1		1	465	1
252T1407-1		1	540	1
252T1407-2		1	540A	1
252T1407-3		1	540B	1
		1	540C	1
252T1408-1		1	575	1
252T1409-1		1	580	1
252T1411-1		1	125	1
252T1412-1		1	610	1
252T1413-1		1	495	1
252T1414-1		1	525	1
252T1415-1		1	515	1
252T1416-1		1	440	1
252T1420-1		1	15	1
252T1421-1		1	10	1
252T1423-1		1	70	1
252T1431-1		1	200	1
252T1432-1		1	490	1
252T1433-1		1	620	1
252T1435-1		1	485	1
252T1436-1		1	30	1
252T1437-1		1	390	1
252T1438-1		1	45	1
252T1438-2		1	65	1
252T1439-1		1	90	1
252T1440-1		1	85	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
252T1494-1		1	45A	1
36153		1	445	1
4228-634		1	340	1
48-00R16-10P300		1	35	1
60B80034-1		1	340	1
69-20185-3		1	205	1
72181		1	100	1
7326MS952T		1	570	1
7553574		1	340	1
97-048		1	155	2
		1	545	1
97-064		1	365	1



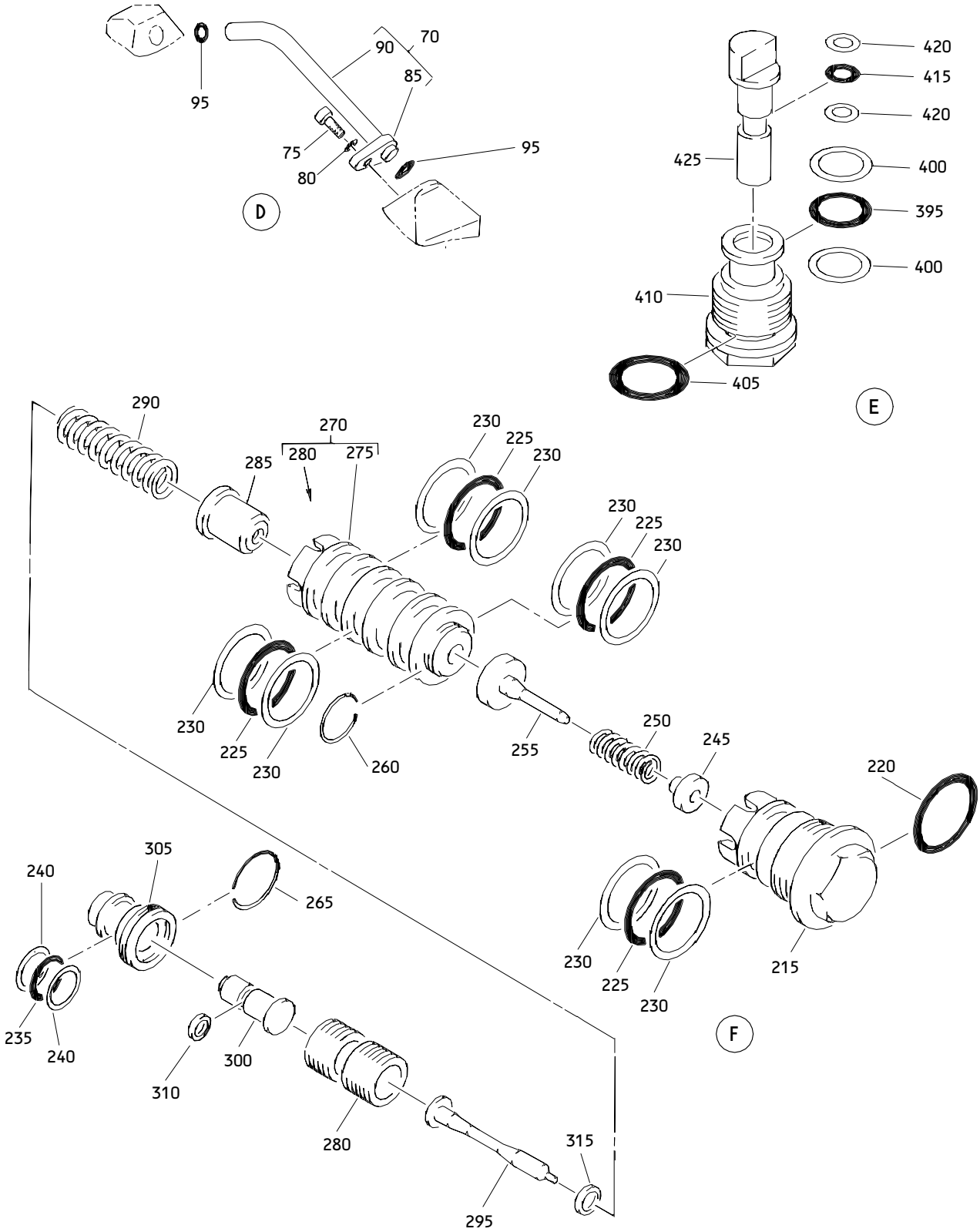
Outboard Spoiler Power Control Actuator Assembly
Figure 1 (Sheet 1)

T58338



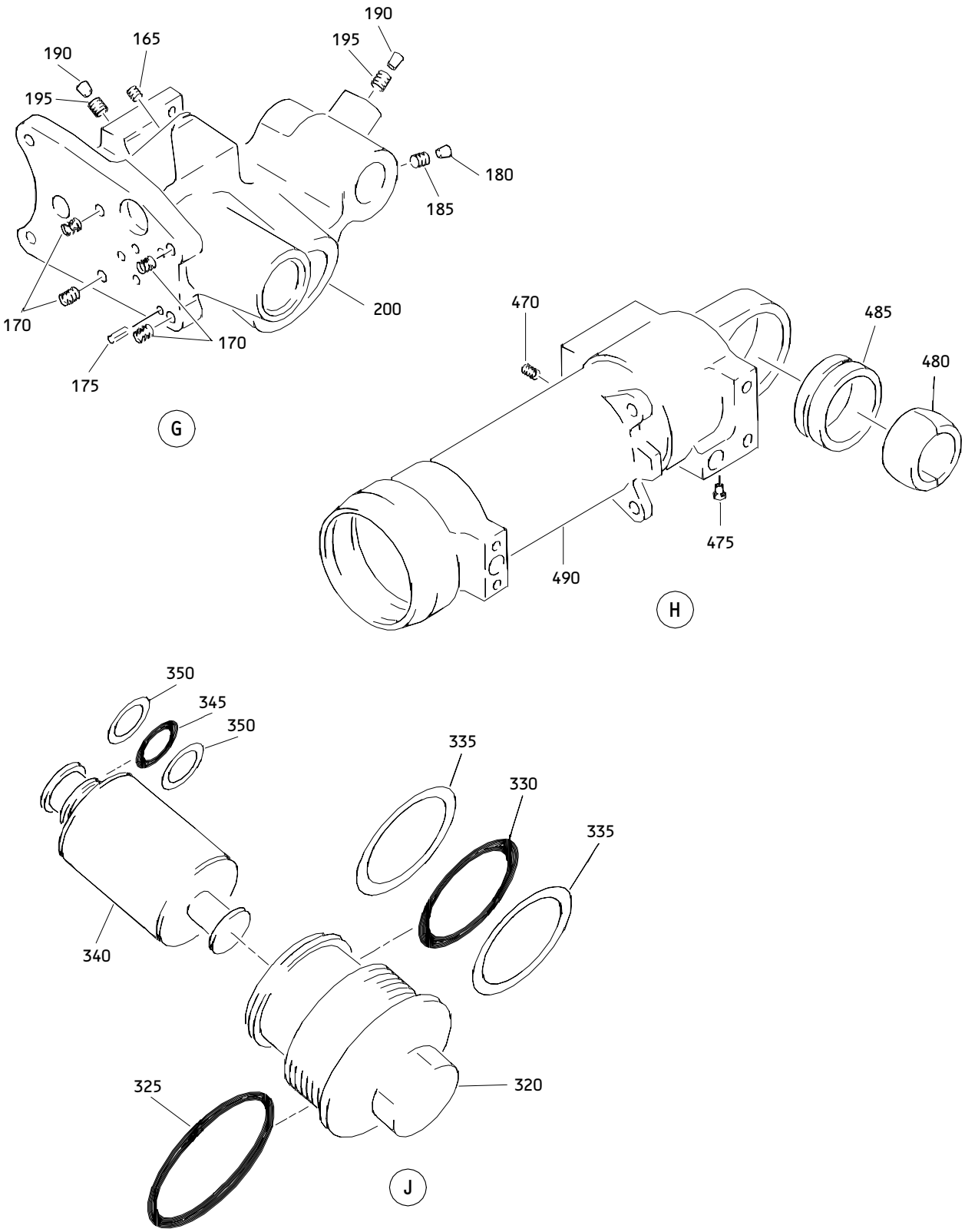
Outboard Spoiler Power Control Actuator Assembly
Figure 1 (Sheet 2)

T58339



Outboard Spoiler Power Control Actuator Assembly
Figure 1 (Sheet 3)

T58340



Outboard Spoiler Power Control Actuator Assembly
Figure 1 (Sheet 4)

T58341

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1	252T1401-1		ACTUATOR ASSY-OUTBD SPOILER PWR CONT	A	RF
-1A	252T1401-2		ACUTATOR ASSY-OUTBD SPOILER PWR CONT	B	RF
1B	252T1401-3		ACTUATOR ASSY-OUTBD SPOILER PWR CONT	C	RF
5	NAS509-14C		.NUT		1
10	252T1421-1		.WASHER-ROD END LOCK		1
15	252T1420-1		.ROD END ASSY		1
20	NAS516M1		..FITTING		2
25	252T1358-2		..BALL-SPLIT		1
30	252T1436-1		..ROD END		1
35	ZZYAC1716-10P		.CONNECTOR- (V49367) (SPEC BACC45FM16-10P) (OPT C48-00R16-10P102 (V13556)) (OPT 48-00R16-10P300 (V02660))		1
40	NAS1352-04H6P		.SCREW		4
45	252T1438-1		.COVER ASSY- (OPT ITEM 45A)		1
-45A	252T1494-1		.COVER ASSY- (OPT ITEM 45)		1
			ATTACHING PARTS		
50	NAS1351C3H10P		.SCREW		4
55	NAS620-10L		.WASHER		4
			-------*-------		
60	MS21209C0415P		..INSERT		4
65	252T1438-2		..COVER		1
70	252T1423-1		.CONDUIT ASSY		1
			ATTACHING PARTS		
75	NAS1351C3H10P		.SCREW		1
80	NAS620-10L		.WASHER		1
			-------*-------		

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
85	252T1440-1		..PLATE		1
90	252T1439-1		..CONDUIT		1
95	NAS1611-012		.PACKING		2
100	72181		.SERVOVALVE-ELECTROHYDR. (V75250) (SPEC S252T001-2) (OPT ITEMS 100A, 100B)		1
-100A	22280730-001		.SERVOVALVE-ELECTROHYDR. (V81873) (SPEC S252T001-1) (OPT ITEM 100)		1
-100B	S252T001-6		.SERVOVALVE-ELECTROHYDR (OPT ITEM 100) ATTACHING PARTS		1
105	NAS1351-4H28P		.SCREW -------*-------		4
110	NAS1611-112		.PACKING		1
115	252T1329-1		.RETAINER-CONN.		1
120	000100-0113		.CONNECTOR- (V05574)		1
125	252T1411-1		.TUBE-TRANSFER		1
130	BACB30MT3HT6		.BOLT- (V06710) (SPEC BACB30MT3HT6) (V06725) (V08524) (V17943) (V27624) (V56878) (V92215) (V97928)		2
135	BACW10BP3C		.WASHER- (V10630) (SPEC BACW10BP3C) (V81205)		2
140	NAS6604-8		.BOLT		2

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
145	NAS6604H4		.BOLT		2
150	AN960-416L		.WASHER		4
155	BRH10C4		.NUT-		2
			(V52828)		
			(SPEC BACN10JC4C)		
			(OPT H31-4BAC (V15653))		
			(OPT NS202101S048 (V80539))		
			(OPT T6C428J (V71087))		
			(OPT VN303B048 (V92215))		
			(OPT 101LH9075-4W (V72962))		
			(OPT 97-048 (V80539))		
160	252T1402-1		.MANIFOLD ASSY		1
165	MS21209F1-15P		..INSERT		1
170	MS21209F4-15P		..INSERT		4
175	MS16562-228		..PIN		1
180	187101		..PLUG-		1
			(V92555)		
			(SPEC BACP20AX15D)		
185	187101P		..PIN-		1
			(V92555)		
			(SPEC BACP20AX15DP)		
190	218101		..PLUG-		2
			(V92555)		
			(SPEC BACP20AX18D)		
195	218101P		..PIN-		2
			(V92555)		
			(SPEC BACP20AX18DP)		
200	252T1431-1		..MANIFOLD		1
205	69-20185-3		.PLATE-GSKT		1
210	252T1320-1		.VALVE ASSY-EXTENSION CHK AND THRM RELIEF		1
215	252T1345-1		..CAP		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
220	NAS1611-118		..PACKING		1
225	NAS1611-116		..PACKING		4
230	MS28782-14		..RING-BACKUP (OPT ITEM 230A)		8
-230A	C11236-116B		..RING-BACKUP (V26879) (SPEC BACR12BM116) (OPT RMR12BM116 (V94878)) (OPT STF800-116 (V02107)) (OPT S30294-116-1 (V97820)) (OPT TF450-116A (V07128)) (OPT 2100-116 (V26303)) (OPT ITEM 230)		8
235	NAS1611-111		..PACKING		1
240	MS28782-9		..RING-BACKUP (OPT ITEM 240A)		2
-240A	C11236-111B		..RING-BACKUP (V26879) (SPEC BACR12BM111) (OPT RMR12BM111 (V94878)) (OPT STF800-111 (V02107)) (OPT S30294-111-1 (V97820)) (OPT TF450-111A (V07128)) (OPT 2100-111 (V26303)) (OPT ITEM 240)		2
245	252T1349-1		..GUIDE-POPPET		1
250	252T1348-1		..SPRING		1
255	252T1352-1		..POPPET		1
260	252T1316-4		..RING-LOCK		1
265	252T1316-3		..RING-LOCK		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
270	252T1354-1		..SLIDER ASSY		1
275	252T1365-1		...SLEEVE		1
280	252T1366-1		...SLIDER		1
285	252T1353-1		..GUIDE-SPR		1
290	252T1347-1		..SPRING		1
295	252T1350-1		..ROD		1
300	252T1351-1		..PLUNGER		1
305	252T1346-1		..RETAINER-PLUNGER		1
310	S30772-009H5		..SEAL-PLUS II (V97820)		1
315	252T1356-1		..SHIM		AR
-315A	252T1356-2		..SHIM		AR
-315B	252T1356-3		..SHIM		AR
320	252T1405-1		.CAP-FILTER (OPT ITEM 320A)		1
320A	252T1405-2		.CAP-FILTER (PREF)		1
325	NAS1611-125		.PACKING		1
330	NAS1611-216		.PACKING		1
335	MS28782-21		.RING-BACKUP (OPT ITEM 335A)		2
-335A	C11236-216B		.RING-BACKUP (V26879) (SPEC BACR12BM216) (OPT RMR12BM216 (V94878)) (OPT STF800-216 (V02107)) (OPT S30294-216-1 (V97820)) (OPT TF450-216A (V07128)) (OPT 2100-216 (V26303)) (OPT ITEM 335)		2
340	7553574		.FILTER-ELEMENT (V05228) (SPEC 60B80034-1) (OPT 4228-634 (V21550)) (OPT AC8818E1 (V18350))		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
345	NAS1611-012		.PACKING		1
350	MS28782-7		.RING-BACKUP (OPT ITEM 350A)		2
-350A	C11236-012B		.RING-BACKUP (V26879) (SPEC BACR12BM012) (OPT RMR12BM012 (V94878)) (OPT STF800-012 (V02107)) (OPT S30294-012-1 (V97820)) (OPT TF450-012A (V07128)) (OPT 2100-012 (V26303)) (OPT ITEM 350)		2
355	S30775-116H5		.SEAL-PLUS II (V97820)		4
360	252T1403-1		.SHAFT ASSY-SWIVEL ATTACHING PARTS		1
365	BRH10C6		.NUT- (V52828) (SPEC BACN10JC6C) (OPT H31-6BAC (V15653)) (OPT 97-064 (V80539))		1
370	AN960C616L		.WASHER		1
375	252T1404-1		.WASHER-SWIVEL		1
380	252T1306-1		.WASHER-SWIVEL -------*-------		2
385	MS16562-228		..PIN		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
390	252T1437-1		..SHAFT-SWIVEL		1
395	NAS1611-111		.PACKING		1
400	MS28782-9		.RING-BACKUP (OPT ITEM 400A)		2
-400A	C11236-111B		.RING-BACKUP (V26879) (SPEC BACR12BM111) (REFER TO ITEM 240A FOR OPTIONAL PARTS) (OPT ITEM 400)		2
405	NAS1611-113		.PACKING		1
410	252T1309-1		.RETAINER-CAM		1
415	NAS1611-009		.PACKING		1
420	MS28782-4		.RING-BACKUP (OPT ITEM 420A)		2
-420A	C11236-009B		.RING-BACKUP (V26879) (SPEC BACR12BM009) (OPT RMR12BM009 (V94878)) (OPT STF800-009 (V02107)) (OPT S30294-009-1 (V97820)) (OPT TF450-009A (V07128)) (OPT 2100-009 (V26303)) (OPT ITEM 420)		2

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
425	252T1308-1		.CAM-RELEASE		1
430	NAS1611-010		.PACKING		4
435	MS28782-5		.RING-BACKUP (OPT ITEM 435A)		8
-435A	C11236-010B		.RING-BACKUP (V26879) (SPEC BACR12BM010) (OPT RMR12BM010 (V94878)) (OPT STF800-010 (V02107)) (OPT S30294-010-1 (V97820)) (OPT TF450-010A (V07128)) (OPT 2100-010 (V26303)) (OPT ITEM 435)		8
440	252T1416-1		.TUBE-QUILL		1
445	AA821-10		.TERMINAL- (V98410) (SPEC BACT12AC3) (OPT R1891SN (V14726)) (OPT 36153 (V00779))		1
450	NAS1351-3-6P		.SCREW		1
455	NAS620-10L		.WASHER		1
460	NAS6603H4		.BOLT		4
465	252T1406-1		.CYLINDER ASSY		1
470	MS21209F1-10P		..INSERT		1
475	NAS516M1		..FITTING		1
480	252T1358-2		..BALL-SPLIT		1
485	252T1435-1		..RACE-OUTER		1
490	252T1432-1		..BARREL		1
495	252T1413-1		.GLAND-PISTON		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
500	NAS1611-135		.PACKING		1
505	NAS1611-224		.PACKING		1
510	MS28783-2		.RING-BACKUP (OPT ITEM 510A)		2
-510A	C11236-224B		.RING-BACKUP (V26879) (SPEC BACR12BM224) (OPT RMR12BM224 (V94878)) (OPT STF800-224 (V02107)) (OPT S30294-224-1 (V97820)) (OPT TF450-224A (V07128)) (OPT 2100-224 (V26303)) (OPT ITEM 510)		2
515	252T1415-1		.RETAINER-SCRAPER		1
520	CWR76-13B		.RING-SCRAPER (V26879) (SPEC BACS34A13A) (OPT S30388-13-1 (V97820)) (OPT TF005-13A (V07128)) (OPT 2140-13A (V26303))		1
525	252T1414-1		.RETAINER-SEAL		1
530	NAS1611-218		.PACKING (USED WITH ITEM 535)		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
535	CSF11-218A		.SEAL-FOOT (V26879) (SPEC BACS11AA218) (OPT FS100-218 (V02107)) (OPT RMS11-218 (V94878)) (OPT S12095-218 (V97820)) (OPT 2053-218 (V26303)) (REPLD BY ITEM 537) (USED WITH ITEM 530)		1
537	S33555-218H5		.SEAL-HAT (V97820) (REPLS ITEM 535)		1
540	252T1407-1		.PISTON	A	1
-540A	252T1407-2		.PISTON (OPT ITEM 540B)	B	1
-540B	252T1407-3		.PISTON (PREF)	B	1
-540C	252T1407-3		.PISTON	C	1
545	BRH10C4		.NUT-SELF LOCKING (V52828) (SPEC BACN10JC4C) (REFER TO ITEM 155 FOR OPTIONAL PARTS)		1
550	NAS1611-009		.PACKING		1
555	MS28782-4		.RING-BACKUP (OPT ITEM 555A)		2
-555A	C11236-009B		.RING-BACKUP (V26879) (SPEC BACR12BM009) (REFER TO ITEM 420A FOR OPTIONAL PARTS) (OPT ITEM 555)		2
560	252T1331-2		.GUIDE-TRANSDUCER ASSY		1
565	GM6850		.TRANSDUCER ASSY-LINEAR (V22863) (SPEC S252T003-1)		1
570	7326MS952T		.RING-GT (V72902)		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
575	252T1408-1		.PLUNGER-SNUBBER	A	1
580	252T1409-1		.SPRING-SNUBBER	A	1
585	252T1316-2		.RING-LOCK	A	1
590	NAS1611-224		.PACKING		1
595	MS28783-2		.RING-BACKUP (OPT ITEM 595A)		2
-595A	C11236-224B		.RING-BACKUP (V26879) (SPEC BACR12BM224) (REFER TO ITEM 510A FOR OPTIONAL PARTS) (OPT ITEM 595)		2
600	NAS1611-116		.PACKING		1
605	MS28782-14		.RING-BACKUP (OPT ITEM 605A)		2
-605A	C11236-116B		.RING-BACKUP (V26879) (SPEC BACR12BM116) (REFER TO ITEM 230A FOR OPTIONAL PARTS) (OPT ITEM 605)		2
610	252T1412-1		.RETAINER ASSY-TRANSDUCER		1
615	MS16562-219		..PIN		1
620	252T1433-1		..RETAINER		1
625	252T1332-2		.NAMEPLATE		1