TO: ALL HOLDERS OF INBOARD SPOILER POWER CONTROL ACTUATOR ASSEMBLY COMPONENT MAINTENANCE MANUAL 27-61-01

REVISION NO. 18 DATED NOV 01/05

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
1020	Updated piston 180, 180A, 180B effectivity codes and option information, IPL Fig. 1.
1020	Added piston P/N 252T1313-3 item 180C to IPL Fig. 1.

INBOARD SPOILER
POWER CONTROL ACTUATOR ASSEMBLY

PART NUMBER 252T1301-1,-2,-3

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

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.

REVISION NUMBER	REVISION DATE	DATE FILED	BY	REVISION NUMBER	REVISION DATE	DATE FILED	BY

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR B11469 PRR C12334	OCT 10/86 OCT 01/87

PAGE	DATE	CODE
27-61-01		
TITLE PAGE		
1	OCT 01/87	01.1
2	BLANK	
REVISION RECORD		
1	APR 10/85	01.101
2	BLANK	
TR & SB RECORD		
1	OCT 01/87	01.1
2	BLANK	
LIST OF EFFECTIVE PAGES		
*1	NOV 01/05	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	JUL 01/01	01.1
102	JUL 01/88	01.101
103	JUL 01/88	01.101
104	JUL 10/83	01
105	JUL 10/83	01
106	JUL 10/83	01
107	JUL 10/83	01
108	JUL 10/83	01
109	JUL 10/83	01

PAGE	DATE	CODE
TESTING & TROUBLE SHOOTING		CONT.
110	OCT 10/83	01.1
111	JUL 01/88	01.101
112	JUL 01/88	01.1
113	JUL 01/88	01.1
114	JUL 01/88	01.101
115	JUL 01/88	01.101
116	JUL 01/88	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 01/88	01.101
122	JUL 01/88	01.101
DISASSEMBLY		
301	JAN 01/91	01.1
302	JUL 10/83	01
303	JAN 01/91	01.1
304	JUL 10/83	01
CLEANING		
401	JUL 10/83	01
402	BLANK	
CHECK		
501	JUL 01/03	01.1
502	JUL 01/03	01.1
REPAIR-GENERAL		
601	JUL 10/86	01.1
602	JUL 10/83	01
603	JUL 10/87	01.1
604	BLANK	
REPAIR 1-1		
601	JUL 01/03	01.1
602	JUL 01/03	01.1
REPAIR 2-1		
601	JUL 10/83	01
602	JUL 10/83	01

* = REVISED, ADDED OR DELETED

PAGE	DATE	CODE
REPAIR 3-1		
601	JUL 10/83	01
602	JUL 10/83	01
REPAIR 4-1		
601	JUL 01/03	01.1
602	JUL 01/03	01.1
REPAIR 5-1		
601	APR 01/90	01.1
602	BLANK	
REPAIR 6-1		
601	JUL 10/83	01
602	BLANK	
REPAIR 7-1		
601	JUL 01/03	01.1
602	BLANK	
REPAIR 8-1		
601	JUL 10/83	01
602	JUL 10/86	01.1
REPAIR 9-1		
601	JUL 01/03	01.1
602	BLANK	
ASSEMBLY		
701	JAN 01/91	01.1
702	JAN 01/91	01.1
703	OCT 10/86	01.1
704	JUL 10/83	01
705	JUL 10/83	01
706	JUL 10/83	01
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	OCT 10/86	01.1
804	BLANK	

PAGE	DATE	CODE
SPECIAL TOOLS		
901	JUL 01/01	01.1
902	BLANK	
ILLUSTRATED PARTS LIST		
1001	JUL 10/83	01
1002	JUL 10/83	01
1003	JUL 10/83	01
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	JUL 10/83	01
1012	APR 10/86	01.1
1013	JUL 01/01	01.1
1014	JUL 01/01	01.1
1015	JUL 01/01	01.1
1016	JUL 01/01	01.1
1017	OCT 01/87	01.1
1018	JUL 10/83	01
1019	JUL 10/83	01
*1020	NOV 01/05	01.1
1021	APR 01/90	01.101
1022	OCT 01/87	01.1
1023	JUL 01/03	01.1
1024	JUL 10/83	01
1025	JUL 01/03	01.1
1026	JUL 01/03	01.1
1027	JUL 10/83	01
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

INBOARD SPOILER POWER CONTROL ACTUATOR ASSEMBLY

DESCRIPTION AND OPERATION

1. Description

   A. The inboard spoiler power control actuator (PCA) assembly is used to position each of the four inboard spoilers. Each of the four 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 actuator is mounted on wing structure with bushing-fitted brackets, which allow 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 -- 16 inches (retracted)
-- 20 inches (extended)

B. Width -- 10 inches

C. Height -- 5 inches

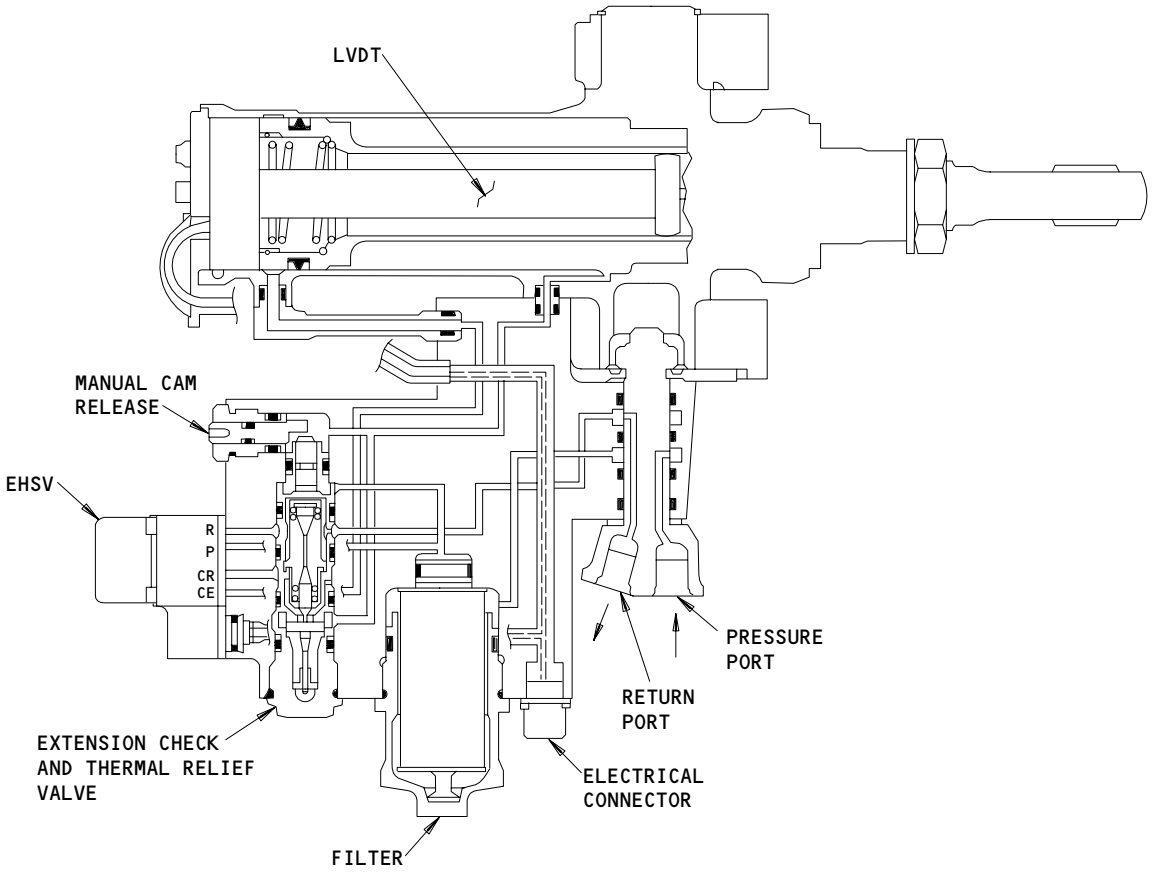
D. Weight -- 19 pounds (dry)

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

F. Operating Pressure -- 3000 psi

G. Proof Pressure -- 4500 psi

H. Stroke -- 4.4 inches



Inboard 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 (Tares: 117 psid at 4 gal/min and 4 psid at 0.5 gal/min)

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

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

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

H. Digital volt-ohm meter -- Takeda Riken Model TR6355

I. Phase angle voltmeter -- North Atlantic Model 321

J. X-Y recorder -- Hewlett-Packard Model HP7090A

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 LR19CB2412

O. Relief valve -- Circle Seal Corp. Model BPR10AB6432 (300-3600 psi)

P. Flow meter -- 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. Preparation for Test

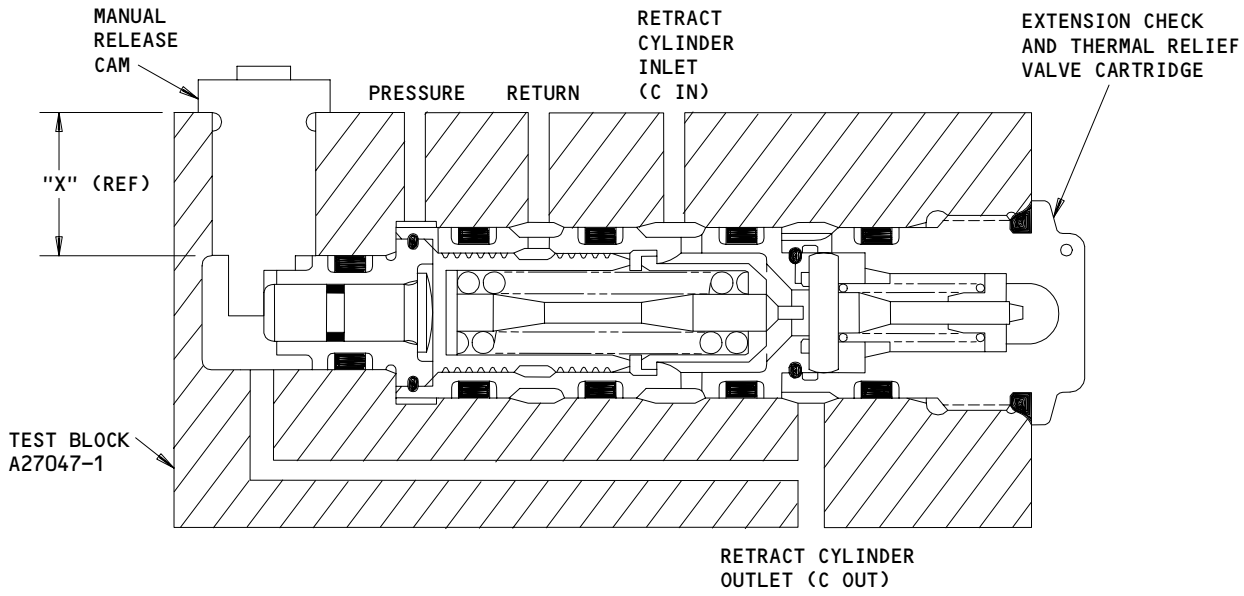
A. Conduct all tests at room temperature (60-100°F). Maintain hydraulic fluid at 80-120°F.

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

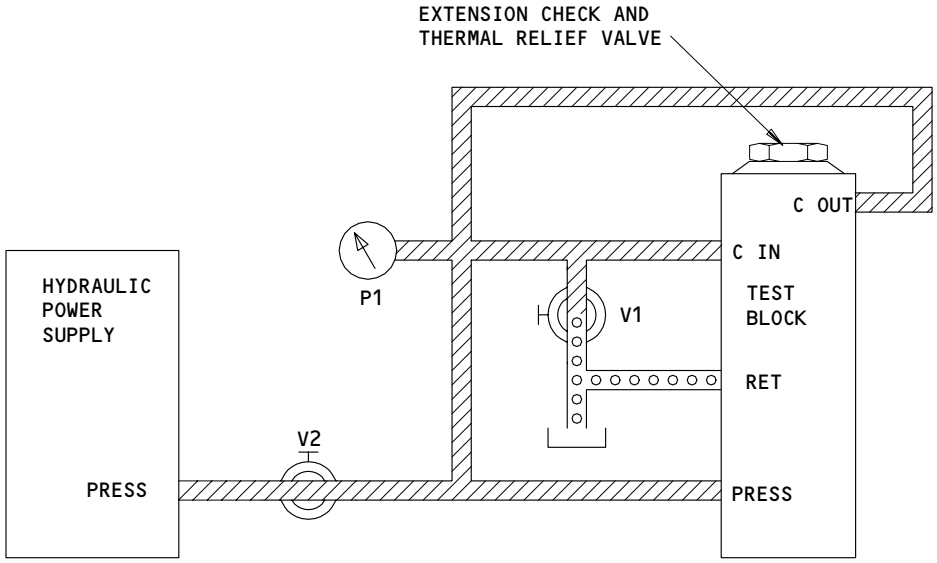
24246

3. Test Extension Check and Thermal Relief Valve

A. Visually examine all seals (6 places) on valve cartridge (485, IPL Fig. 1) for damage, defects, or contamination. Replace seals as required.

B. Remove manual release cam (270) and associated parts (275 thru 300) from manifold assembly (410), 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.



Proof Pressure Test Setup
Figure 102

24247

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.

D. Check cracking pressure (extension check mode)

(1) Set up test per Fig. 103.

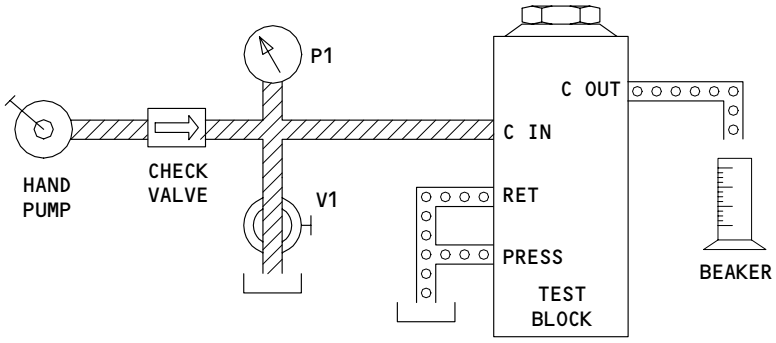
(2) Open PRESSURE port and slowly increase pressure to C IN using the hand pump.

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

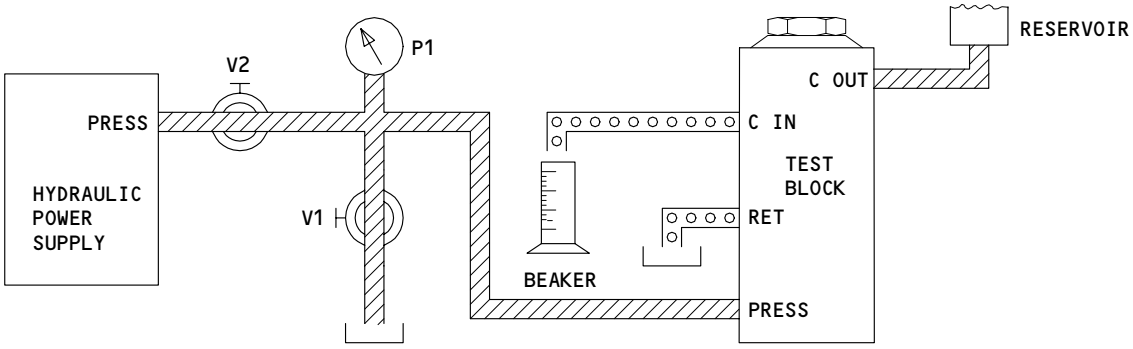
(4) Connect hydraulic power supply per Fig. 103.

(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

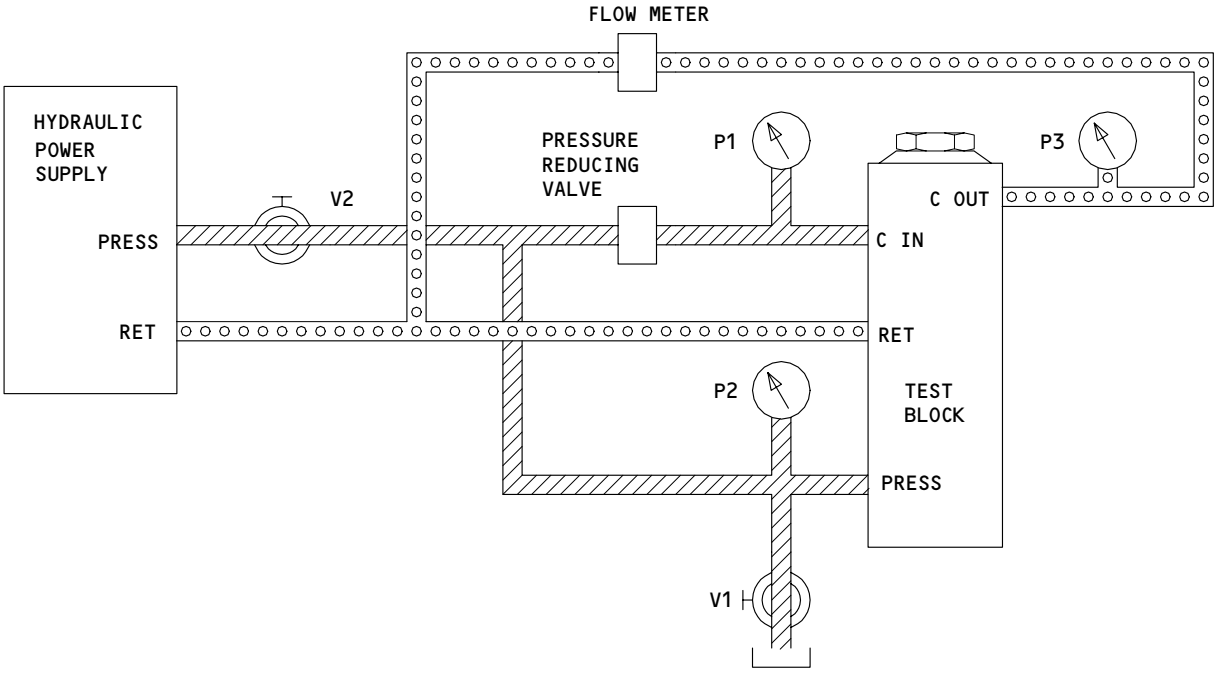
E. Check pressure drop (extension check mode)

(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) does not exceed 45 psi.

NOTE: Test block tare at 4 gal/min is nominally 117 psid (differential).



Pressure Drop (Extension Check Mode)
Figure 104

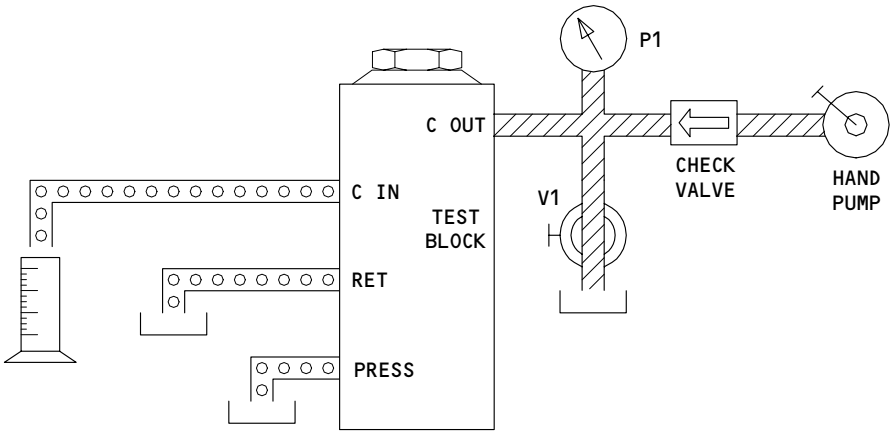
24249

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).



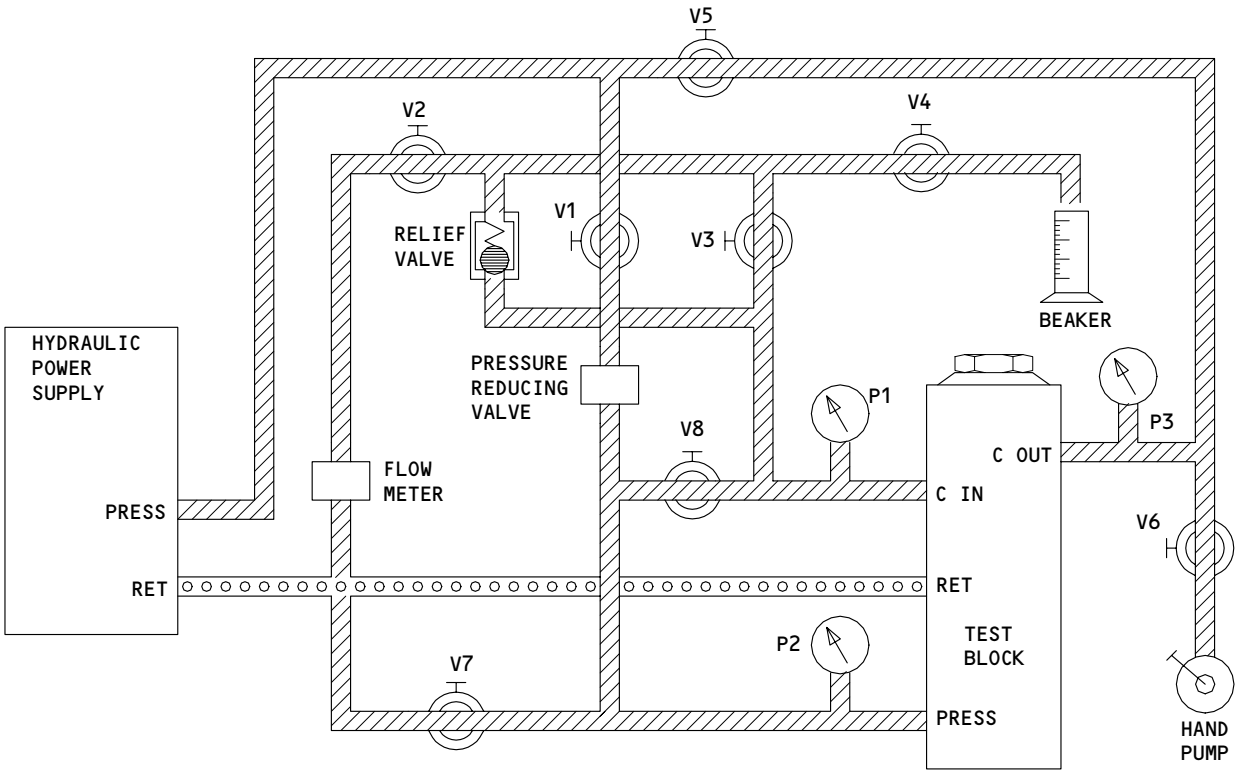
Internal Leakage (Extension Check Mode)
Figure 105

24251

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

24252

(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 - tare) does not exceed 4400 psi.

NOTE: Test block tare at 0.5 gal/min is nominally 4 psid (differential).

(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) 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.

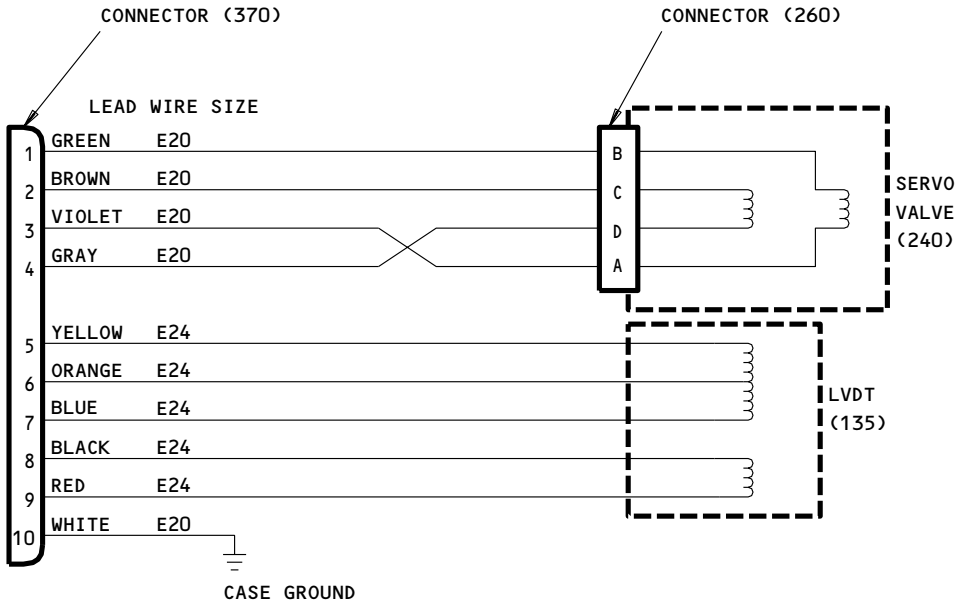
(1) Shut down hydraulic power supply.

(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 (275). Lubricate new seals with hydraulic fluid prior to installation.

(5) Install valve cartridge and release cam in manifold assembly (410, IPL Fig. 1).



Inboard Spoiler PCA Wiring Diagram
Figure 107

4. Electrical Tests

24254

A. Check wiring continuity (Fig. 107).

(1) Use volt-ohm meter 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 (370, IPL Fig. 1) for compliance with figure.

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

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 second, 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 stength 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 stength 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

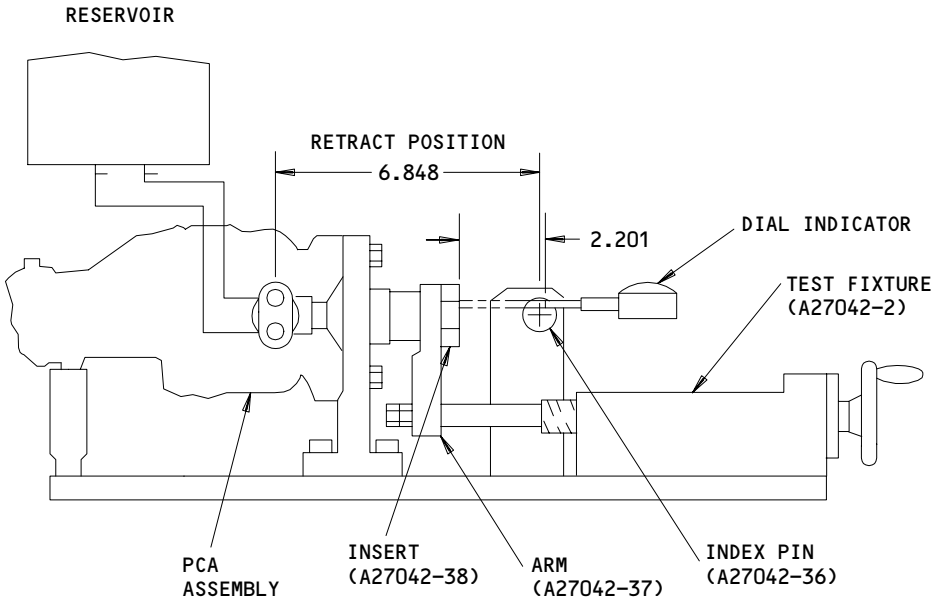
D. Check transducer null adjustment (Fig. 108).

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.

(2) Operate manual release cam (270) 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 (60) and remove rod end assembly (70), nut, and lockwasher (65). Store parts in a clean polyethylene bag for re-installation. Attach arm (A27042-37) to actuator piston (180) with rod end insert (A27042-38).



Transducer Null Adjustment Test Setup
Figure 108

24258

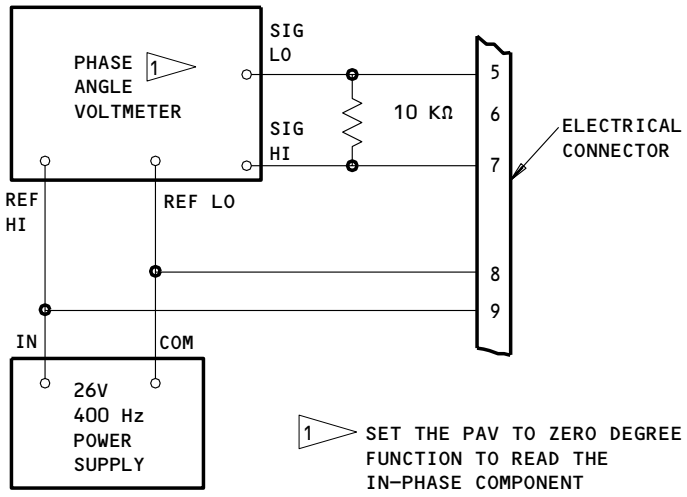
(4) Bottom the actuator in the fully-retracted position as shown. Read position with dial indicator. Operate the manual release cam and extend the piston rod 2.201 in. Hold in place.

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 (135) 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 (210). 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 (A27042-36) 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.

24259

(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 (370)(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.

5. 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.

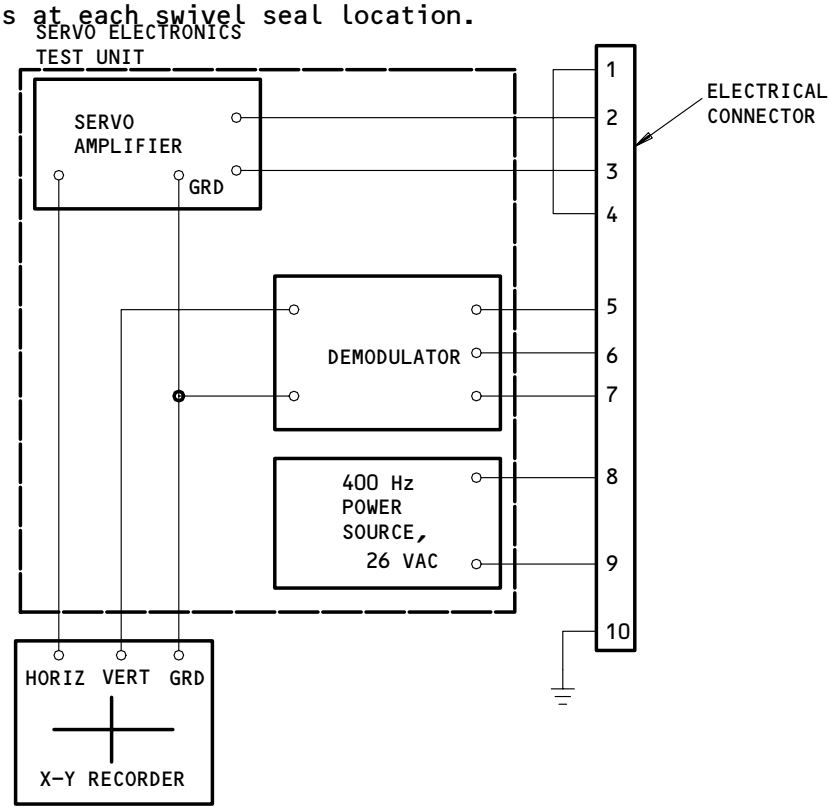
(2) Apply 3000 psi to the pressure port. Check that the flow from the return port is less than 1750 cc/minute for unit with a new servovalve, or less than 3500 cc/minute for a unit in service.

D. Check external leakage.

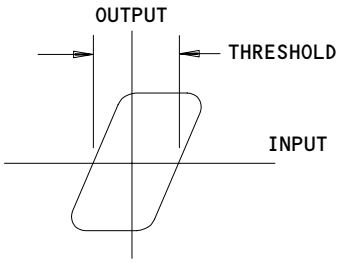
NOTE: Clean all external surfaces before performing leakage check.

(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.



A. TEST SETUP



B. THRESHOLD PLOT

Input Signal Threshold
Figure 110

24260

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.

F. Check no-load rate.

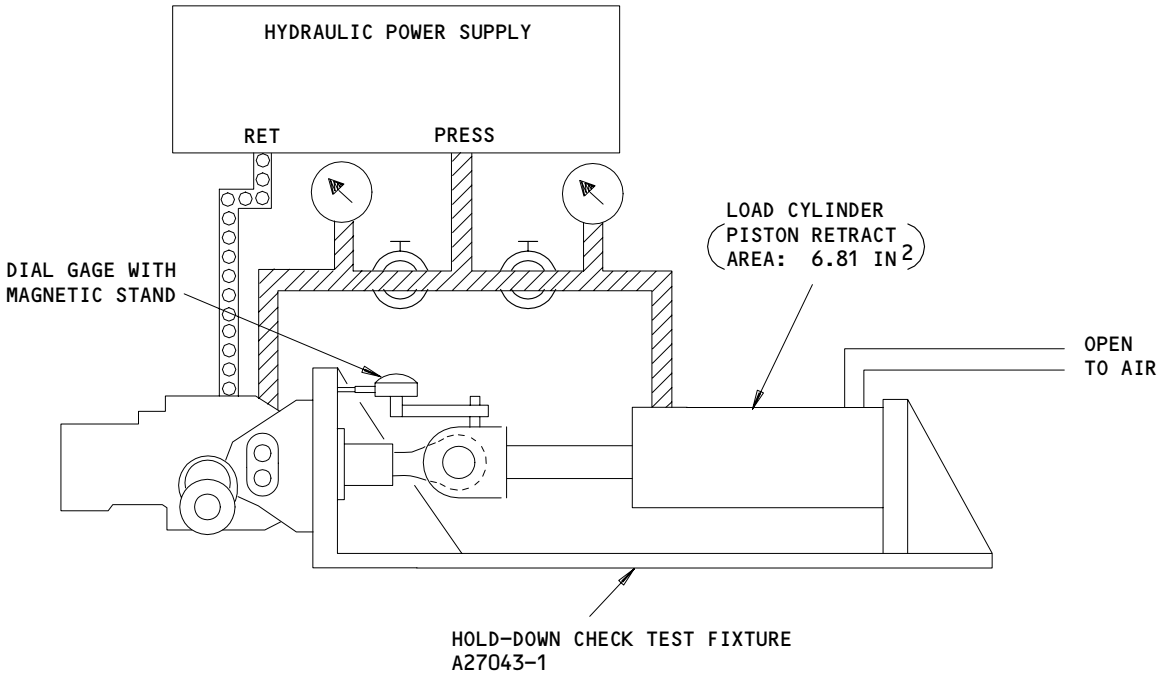
(1) Connect the servo electronics test unit to the actuator connector. Switch the monitor selector to NO LOAD RATE.

(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.



Hold-Down Check Valve Leakage
Figure 111

24261

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 1070 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 7235-7335 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.

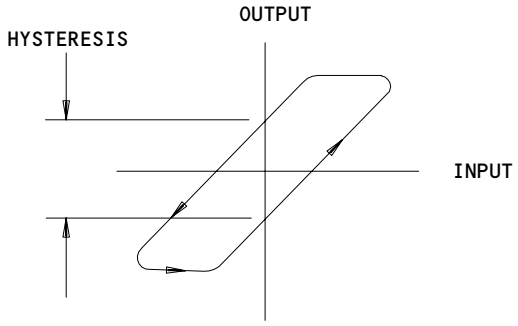
H. Check output hysteresis.

(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

24262

6. 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.

7. Trouble Shooting

TROUBLE	PROBABLE CAUSE	CORRECTION
Piston sticks or binds	Piston (180), bearing (225), or barrel (120) damaged or defective	Repair or replace parts
Excessive external leakage	Defective packings or seals	Replace packings or seals in area of leakage
Acutator creeps under load (fails hold-down test)	Defective check valve (485)	Replace check valve
	Defective piston seals (220 with 215, or 222)	Replace seals
	Defective GT ring (175)	Replace GT ring
Slow piston velocity	Clogged filter	Replace filter element (310)
	Clogged flow passages	Clean passages; check for fluid contamination
	Defective EHSV (240)	Replace EHSV
Actuator stroke out of range	Misadjusted or defective LVDT (135)	Adjust or replace LVDT
	Defective EHSV	Replace EHSV

Trouble Shooting Chart
Figure 113

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 (440) and plugs (445) which seal drilled passages unless they are leaking or obviously defective. Do not remove inserts (415 thru 430), locating pins (45, 435), or lubrication fittings (75, 475) unless repair or replacement is necesary (Ref IPL Fig. 1).

1. Equipment

   NOTE: Equivalent substitutes may be used.

   A. Spanner wrench -- A32045-75

2. Parts Replacement (Ref 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 (155, 165, 185, 215, 227, 250, 280, 290, 295, 315, 320, 330, 360, 495, 500, 530)

   B. Backup rings (160, 170, 190, 230, 285, 300, 325, 335, 365, 505)

   C. Connector retainer (255)

   D. Teflon scraper ring (145) and swivel washer (405)

   E. Seals (220, 450)

   F. Filter element (310)

   G. GT ring (175)

   H. Gasket plate (265)

   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 (375) and pull connector (370) away from manifold assembly (410). Remove wires from connector.

B. Remove screw (385) and washer (390) to disconnect terminal (380) from manifold.

C. Remove parts (22 thru 40, 55). Pull transducer leads out of wire conduit (57).

D. Remove screw (10) and washer (15), then remove end plate assembly (20) with conduit. Remove clamp (5) and separate end plate and conduit.

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

A. Remove bolts (340) and washers (345) attaching transfer tube (350) to barrel (120).

CAUTION: SUPPORT BOTH MANIFOLD (410) AND BARREL WHEN SEPARATING PARTS TO AVOID BENDING TRANSFER TUBE OR QUILL TUBE (355).

B. Remove bolts (90,95), washers (100), and nuts (105) and separate manifold assembly and barrel.

C. Remove transfer tube from manifold assembly and remove packings (360) and backup rings (365).

D. Remove quill tube (355) and strip off packings (360) and backup rings (365).

E. Remove ring (110) and trunnion washer (115), then remove bracket assemblies (465).

NOTE: Do not remove bushings (470) from bracket assemblies unless necessary for repair or replacement.

6. Disassemble Barrel and Associated Parts (Ref IPL Fig. 1)

A. Loosen nut (60) then remove rod end assembly (70) from piston (180). Remove nut and rod end lockwasher (65).

CAUTION: MATING HALVES OF SPLIT BALL (80) MAKE UP A MATCHED SET AND MUST BE KEPT TOGETHER.

B. Remove split ball from rod end assembly. Tag and store in a sealed bag.

C. Push LVDT retainer (137) into barrel and remove exposed shear rings (125).

D. Remove piston, transducer (135) and associated parts from barrel.

E. Remove end nut (140) with wrench A32045-75 then remove parts (145, 150, 165, 170, 215 thru 225) from barrel.

F. Remove nut (210) and remove transducer from piston. Remove GT ring (175).

G. For 252T1301-1 only, depress snubber plunger (200) to expose lockring (195). Remove lockring, then remove plunger and snubber spring (205).

H. Remove parts (130, 137, 235) from transducer.

I. Remove packings (155, 185) and backup rings (160, 190) from LVDT retainer (137).

7. Disassemble Manifold Assembly (410) and Attached Parts (Ref IPL Fig. 1)

A. Remove screws (245) and detach servovalve (240) and gasket plate (265). Remove packing (250).

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

B. Pull connector (260) and attached wiring out of manifold assembly. Discard connector retainer (255).

C. Remove filter cap (305) and strip off packings (315, 320) and backup rings (325).

D. Remove filter element (310) and strip off packing (330) and backup rings (335).

E. Remove nut (395), retainer (455), antirotation plate (460), swivel washer (405), and pull swivel shaft (400) out of manifold. Remove seals (450) and swivel washer (405) from swivel shaft.

F. Remove cam retainer (275) and release cam (270). Strip off packings (280, 290, 295) and retainers (285, 300).

G. Remove extension check and thermal relief valve assembly (485). Strip off packings (495, 500) and retainers (505).

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 (260, 370) 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 SOPM 20-20-01:

   A. Anti-rotation plate (460)

   B. End nut (140)

   C. Support plate (130) and LVDT retainer (137)

   D. Release cam (270)

   E. Rod end (85) and rod end lock washer (65)

   F. Shear ring (125)

   G. Snubber plunger (200), spring (205), and lockring (195) for 252T1301-1 only

   H. Swivel retainer (455)

   I. Piston (180)

   J. Filter cap (305A)

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

   A. Bearing (225) and seal retainer (150)

   B. Bracket (480) and bushing (470)

   C. Cam retainer (275)

   D. End plate (50)

   E. Filter cap (305)

   F. Quill tube (355), transfer tube (350), and wire conduit (57)

   G. Split ball (80)

   H. Trunnion washer (115)

I. Manifold (447)

5. Check spring (205, IPL Fig. 1)

A. Compress spring to 1.280 in. and check that load is 20.2-22.4 lbs.

B. Compress spring to 1.063 in. and check that load is 27.1-29.9 lbs.

REPAIR - GENERAL

1. Content

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

P/N	NAME	REPAIR
252T1302	MANIFOLD	1-1
252T1303	SWIVEL SHAFT	2-1
252T1310	BARREL	3-1
252T1311	BRACKET	4-1
252T1313	PISTON	5-1
252T1357	ROD END	6-1
252T1332	NAMEPLATE	7-1
--	MISC PARTS REFINISH	8-1
252T1307	FILTER CAP	9-1

2. Standard Practices

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

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

3. Materials

NOTE: Equivalent substitutes may be used.

A. Dry Lubricant -- BMS 3-8, Class A or MIL-L-8937 (Ref 20-60-03)

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

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

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])

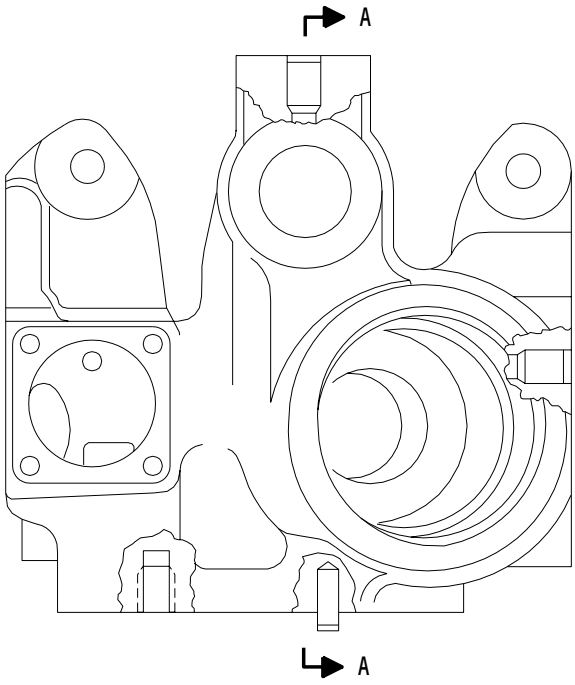
True Position Dimensioning Symbols
Figure 601

MANIFOLD ASSEMBLY - REPAIR 1-1

252T1302-1, -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.



REFINISH

MANIFOLD (447): 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

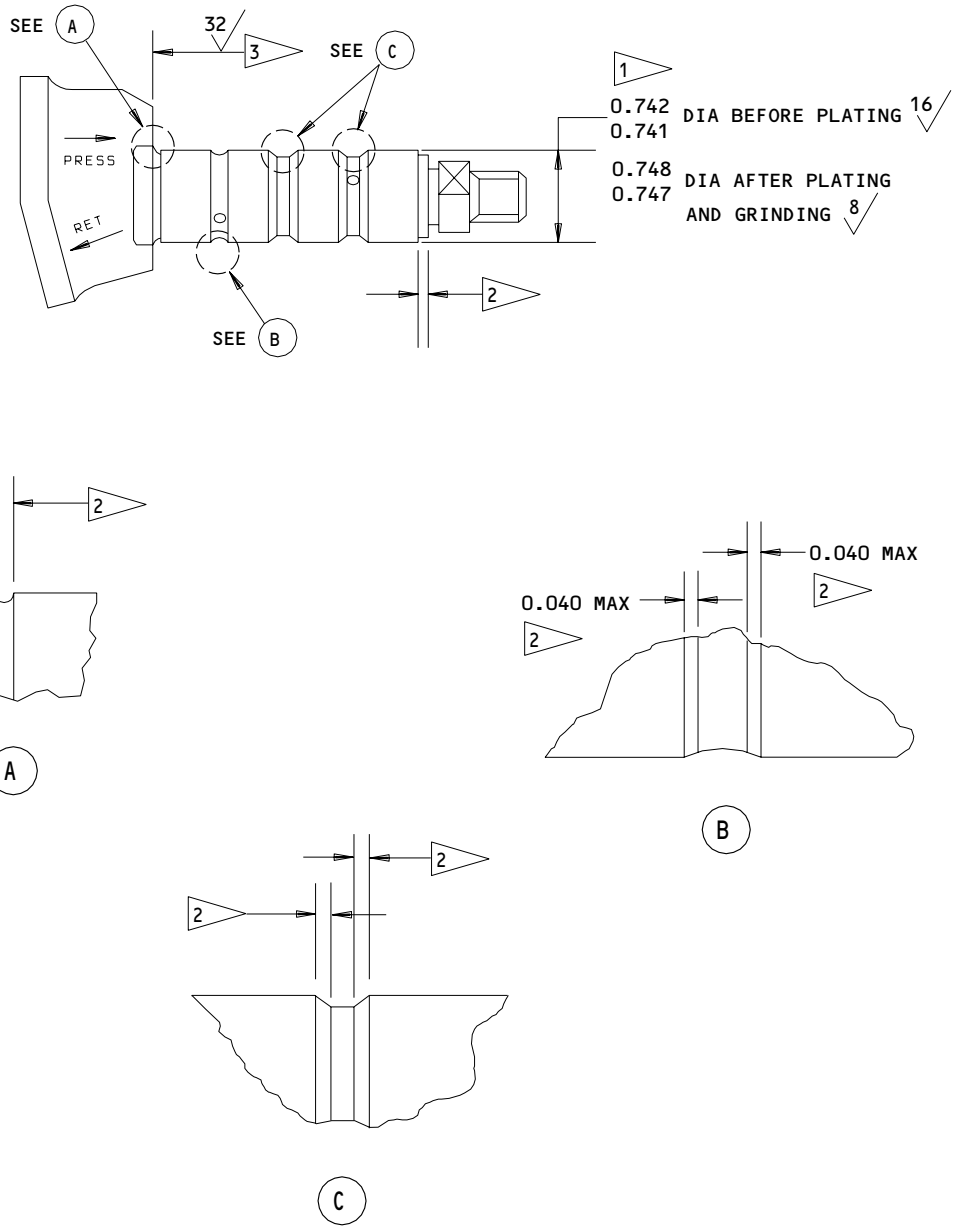
252T1302-1,-3
Manifold Refinish
Figure 601

24264

SWIVEL SHAFT - REPAIR 2-1
252T1303-1

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

252T1303-1
Swivel Shaft Refinish
Figure 601

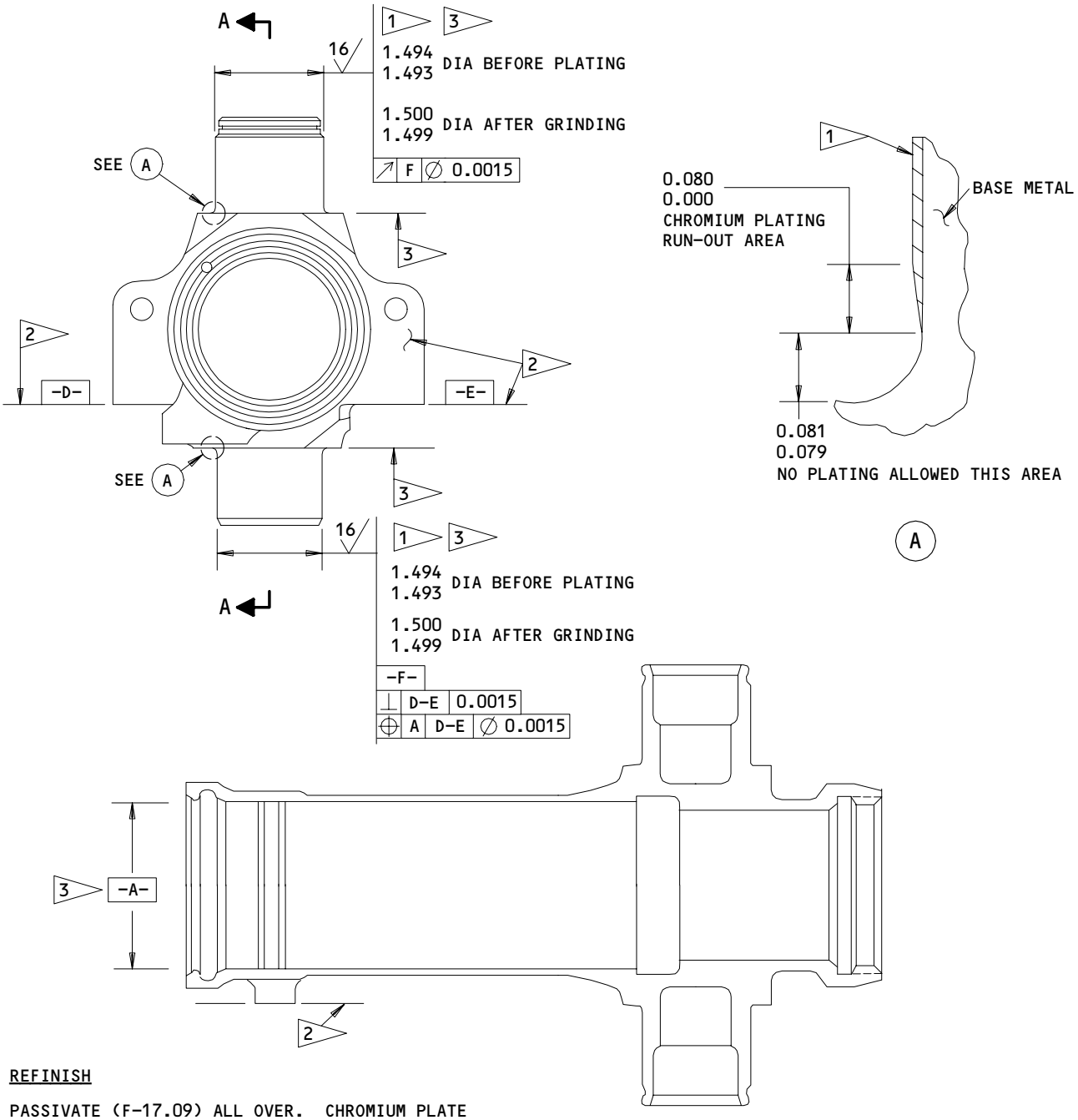
24268

BARREL - REPAIR 3-1

252T1310-1

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) ALL OVER. CHROMIUM PLATE (F-15.03) 0.003-0.005 THICK AS NOTED. CADMIUM PLATE (F-15.06) MOUNTING SURFACES AS NOTED. OTHER AREAS OPTIONAL EXCEPT AS NOTED. OPTIONAL: BRUSH CADMIUM PLATE 0.0003-0.0005 THICK.

1 CHROMIUM PLATE THIS SURFACE.

2 CADMIUM PLATE THIS SURFACE.

3 NO CADMIUM PLATE ALLOWED THIS SURFACE.

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

ALL DIMENSIONS ARE IN INCHES

252T1310-1
Barrel Refinish
Figure 601

BRACKET ASSEMBLY - REPAIR 4-1

252T1311-1

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

1. Bushing Replacement (Ref IPL Fig. 1)

   A. Remove bushing (470).

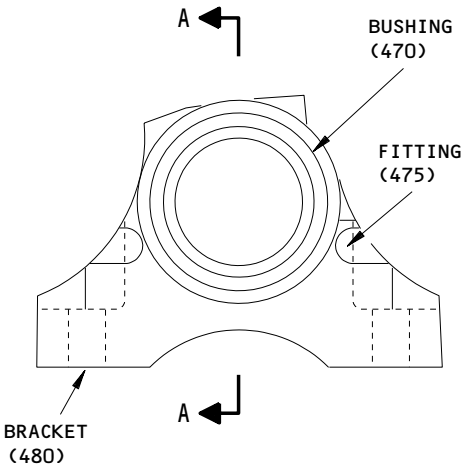
   B. Install replacement bushing per SOPM 20-50-03.

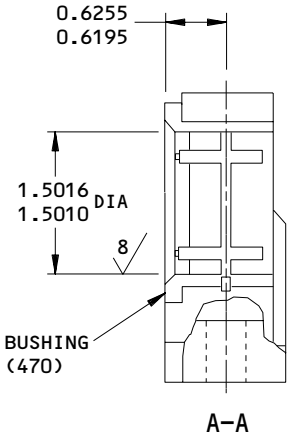
   C. Machine bushing ID to 1.5010-1.5016 as shown (Fig. 601).

2. Refinish (Ref IPL Fig. 1)

   A. Chromic acid anodize (F-17.04) bracket (480).

   B. Material: Aluminum alloy.





A-A

REFINISH

BRACKET (480) -- CHROMIC ACID ANODIZE (F-17.04).

MATERIAL: AL ALLOY

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

252T1311-1
Bracket Assembly Bushing Replacement and Refinish
Figure 601

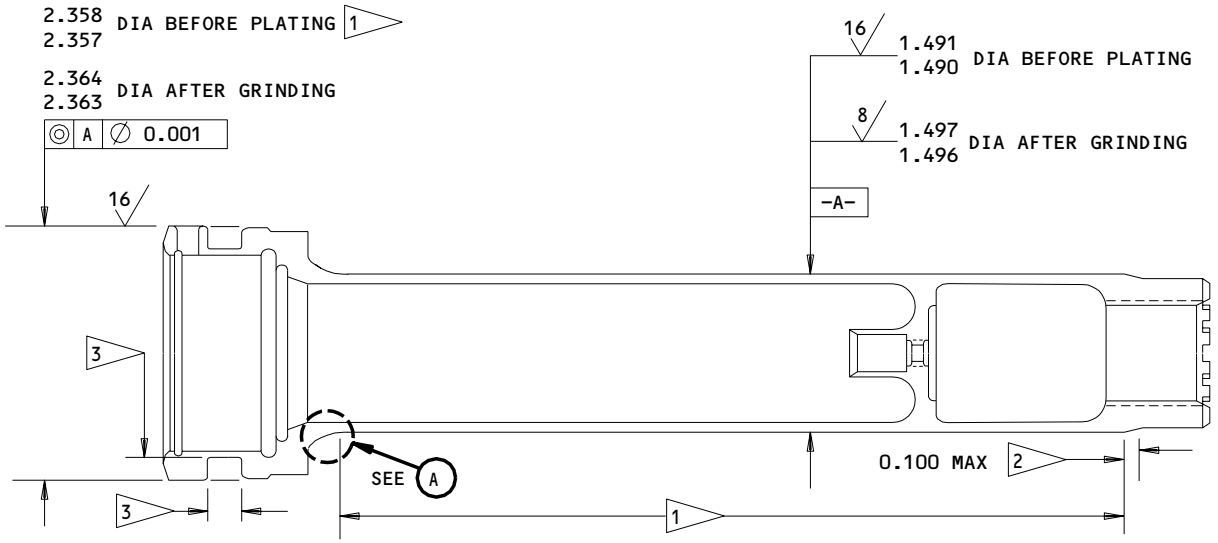
W26416

PISTON - REPAIR 5-1

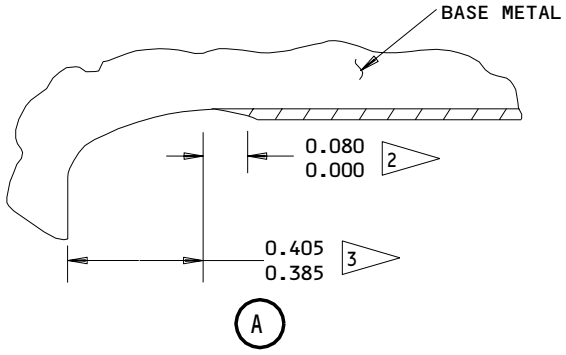
252T1313-1, -2, -3

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.



252T1313-1 (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° 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

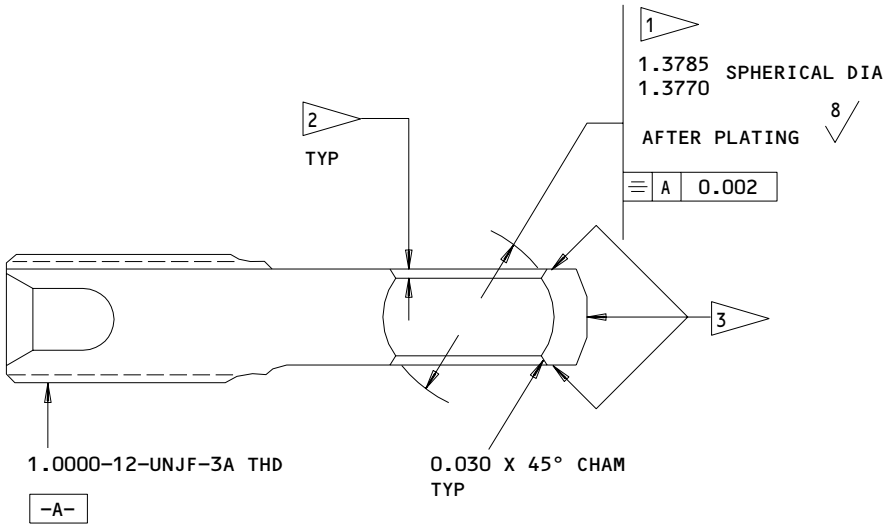
24349

ROD END - REPAIR 6-1

252T1357-1

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: 15-5PH 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

NAMEPLATE - REPAIR 7-1

252T1332-1

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 barrel.

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

MISCELLANEOUS PARTS REFINISH - REPAIR 8-1

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

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
End plate (50)	Al alloy	Chromic acid anodize plus one coat primer, BMS 10-11, type 1 (F-18.13), except no primer on threads, four 0.250-0.261 dia holes, and two 0.125-0.129 dia holes.
Wire cover (55)	301 CRES 1/4 H	Passivate (F-17.09)
Wire conduit (57) Trunnion washer (115) Cam retainer (275) Transfer tube (350)	Al alloy	Chromic acid anodize (F-17.04)
Rod end lock washer (65) Support plate (130) LVDT retainer (137) End nut (140) Swivel retainer (455) Anti-rotation plate (460)	15-5PH CRES	Passivate (F-17.09)
Release cam (270)	15-5PH CRES 180-200 ksi	Passivate (F-17.09) plus chromium plate (F-15.03). Plating thickness 0.003-0.005

Refinish Details
Figure 601 (Sheet 1)

IPL FIG. & ITEM	MATERIAL	FINISH
Filter cap (305)		See Repair 9-1.
Quill tube (355)	304 CRES Cond B	Passivate (F-17.09)

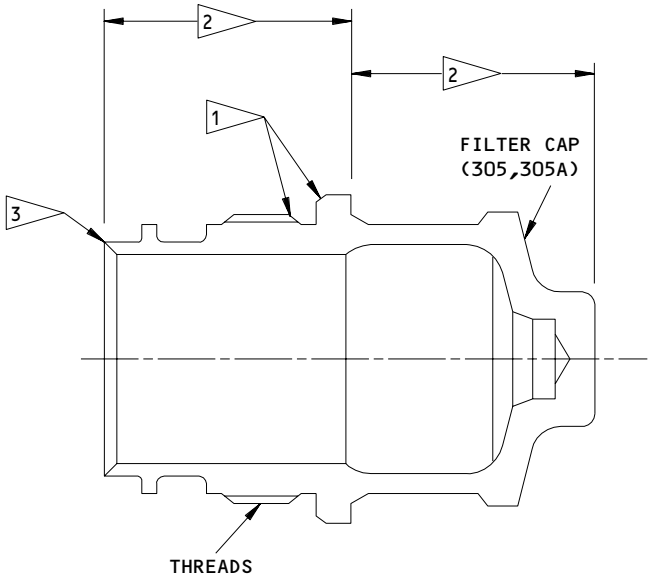
Refinish Details
Figure 601 (Sheet 2)

FILTER CAP - REPAIR 9-1

252T1307-1, -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

CAP (305, P/N 252T1307-1) 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.

CAP (305A, P/N 252T1307-2) PASSIVATE (F-8.07) PER BAC5751, CLASS 2A CADMIUM PLATE (F-15.02) AREAS INDICATED. 2 3

1 APPLY DRY FILM LUBE TO THIS AREA (OPT)

2 CADMIUM PLATE (F-15.02)

3 RUNOUT ALLOWED ON SIDEWALL OF SEAL GROOVE

MATERIAL: CAP (305, P/N 252T1307-1)
AL ALLOY
CAP (305A, P/N 252T1307-2)
15-5 PH CRES (150-170 KSI)

ITEM NUMBERS REFER TO IPL FIG. 1

252T1307-1,-2
Filter Cap Refinish
Figure 601

221710

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 -- A32045-75

2. Lubrication

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

3. Assembly

A. Assemble barrel and piston.

(1) Install packings (165) and backup rings (170) on bearing (225), then install parts (215 thru 225 and 140 thru 150) in barrel. Tighten end nut (140) finger-tight.

(2) Install packings (155, 185) and backup rings (160, 190) on LVDT retainer (137).

(3) Slide support plate (130) and LVDT retainer onto transducer assembly (135). Install parts (227 thru 235) on transducer.

(4) For 252T1301-1 only, install snubber spring (205) and plunger (200) in piston (180) and secure with new lock ring (195).

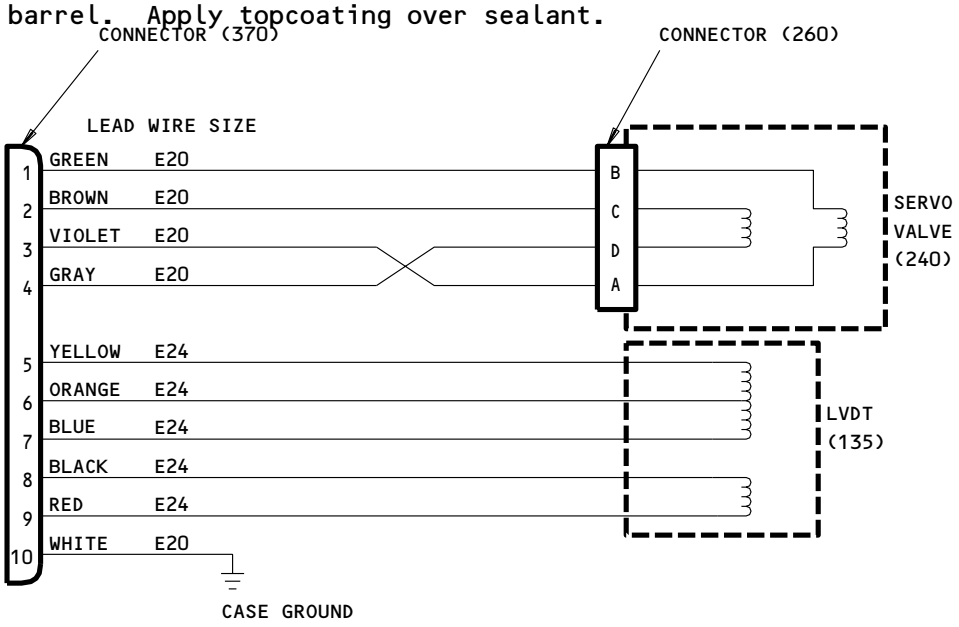
(5) Insert transducer into piston (180) and secure with nut (210). Tighten nut finger-tight.

NOTE: Do not tighten nut to final torque value until LVDT (transducer) output has been adjusted.

(6) Install GT ring (175) on piston. Insert into barrel (120), pushing in parts until ring groove in barrel is exposed. Install shear rings (125) in groove.

(7) Insert wire conduit (57) in end plate assembly (20). Position end plate on barrel. Ensure that locating pins (45) engage barrel, transducer base, and support plate. Feed transducer wires through hole in end plate and out through conduit. Install parts (35, 40) and tighten screws (35) to 6-8 lb-in. Install wire cover (55) and secure with screws (22). Apply sealant to bolts (25) and attach end plate to LVDT retainer with bolts and washers (30). Apply a bead of sealant around edge of end plate and at edge of wire cover. Apply topcoating over sealant.

(8) Tighten end nut (140) to 500-600 lb-in. using wrench A32045-75. Apply a bead of sealant around end nut at line of contact with barrel. Apply topcoating over sealant.



Inboard Spoiler PCA Wiring Diagram
Figure 701

24265

B. Assemble manifold and attached parts.

(1) Install packings (495, 500, 530) and backup rings (505, 535) on extension check and thermal relief valve assembly (485). Install valve in manifold assembly (410) and tighten to 250-300 lb-in.

(2) Install packings (315, 320, 330) and backup rings (325, 335) on filter cap (305) and filter element (310). Install cap and element and tighten cap to 200-250 lb-in.

(3) Attach wiring for servovalve (240) to connector (260) per wiring diagram, Fig. 701. Feed wire bundle through manifold passage and secure connector with new connector retainer (255).

(4) Install packing (250) on servovalve (240), then attach gasket plate (265) and servovalve to manifold with screws (245). Tighten screws to 50-70 pound-inches.

(5) Install packings (280, 290, 295) and backup rings (285, 300) on release cam (270) and cam retainer (275). Position cam in retainer and install in manifold. Tighten retainer to 200-250 lb-in.

(6) Install swivel washer (405) and seals (450) on swivel shaft (400). Insert in manifold and secure with swivel washer (405), anti-rotation plate (460), swivel retainer (455), and nut (395).

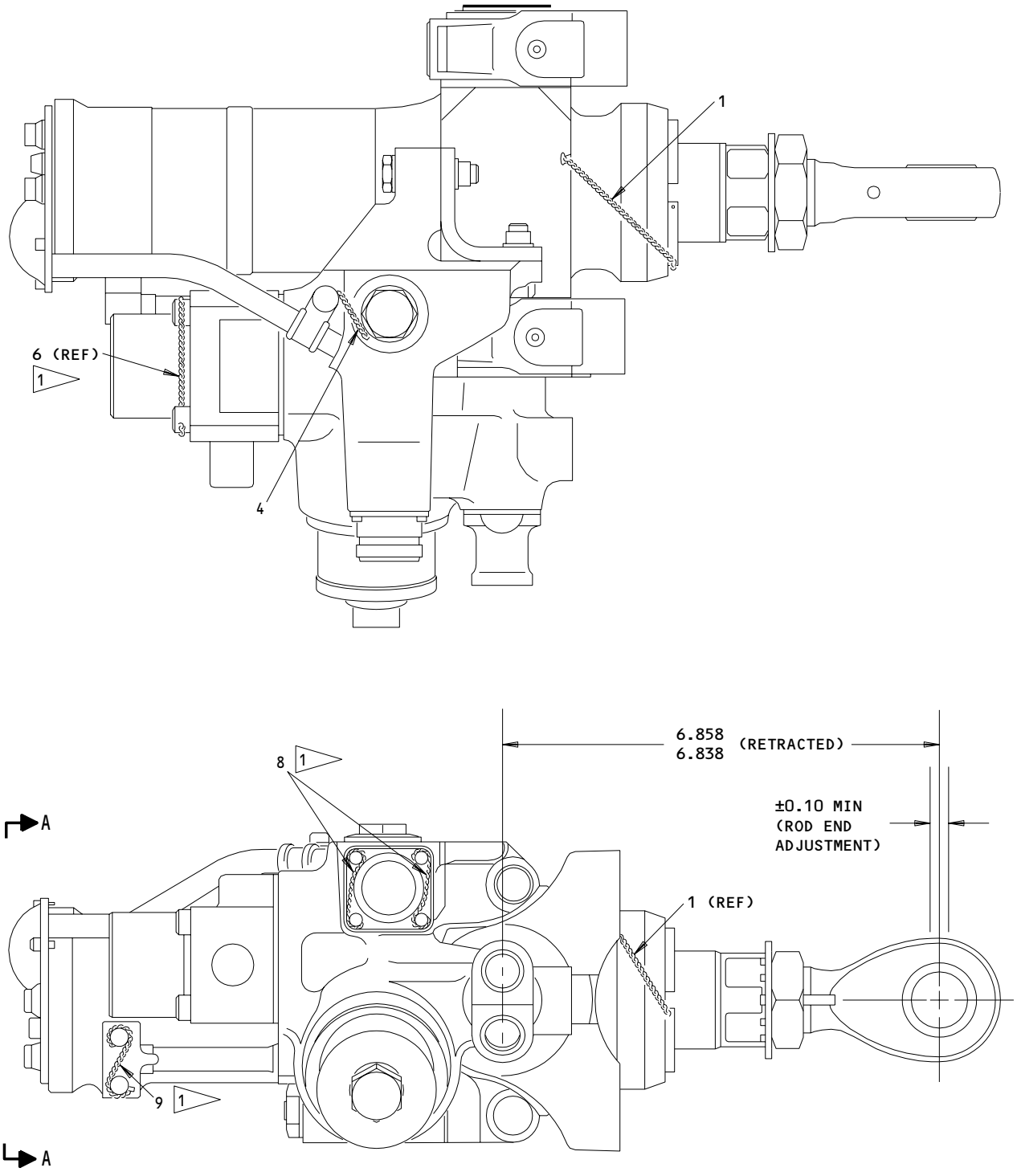
NOTE: Install swivel shaft with PRESS. port directly above RET. port per Fig. 702.

C. Assemble power control actuator assembly.

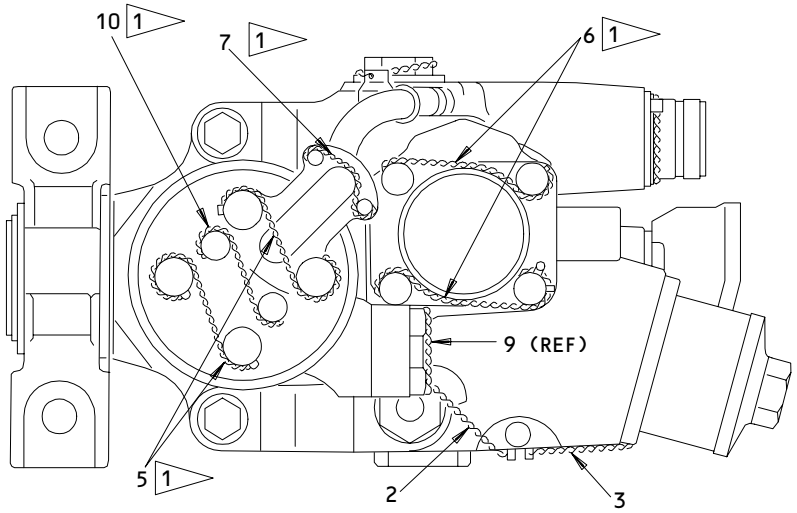
CAUTION: DO NOT PLACE ACTUATOR ASSEMBLY IN ANY CLAMPING DEVICE OR DAMAGE MAY RESULT.

(1) Install packings (360) and backup rings (365) on transfer tube (350) and quill tube (355), and position tubes in manifold. Slide clamp (5) onto wire conduit. Place one bracket assembly (465) on trunnion on side of barrel which will face manifold.

NOTE: Install bracket with notch for anti-rotation plate facing outward.



Lockwiring and Assembly Details
Figure 702 (Sheet 1)



A–A

ALL DIMENSIONS ARE IN INCHES

USE MS20995NC32 LOCKWIRE EXCEPT AS NOTED

1 USE MS20995NC20

Lockwiring and Assembly Details
Figure 702 (Sheet 2)

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

(2) Attach manifold assembly to barrel with parts (90 thru 105). Check that transfer tube, quill tube, and wire conduit seat correctly and that wiring is not pinched or kinked between conduit and manifold. Apply sealant to bolts (340) and secure transfer tube with bolts and washers (345). Install parts (10, 15) to secure conduit clamp. Apply a bead of sealant at both ends of conduit and cover sealant with topcoating.

(3) Install remaining bracket assembly (465) on barrel trunnion and secure with washer (115) and ring (110).

(4) Attach grounding wire and terminal (380) to barrel with parts (385, 390). Apply sealant over screw head to completely seal attachment area. Cover with topcoating.

(5) Attach grounding wire, transducer wires, and servovalve wires to connector (370) per Fig. 701. Apply sealant on connector - manifold faying surfaces and install connector with screws (375).

(6) Adjust LVDT output per TESTING/TROUBLESHOOTING.

CAUTION: THREADS ON ROD ASSEMBLY (70) HAVE DRY FILM LUBRICANT WHICH MUST BE KEPT CLEAN AND PROTECTED FROM MECHANICAL DAMAGE DURING ASSEMBLY.

(7) Fill cavity at end of piston with grease. (Do not fill past beginning of threads). Thread nut (60) fully onto rod end (85). Slide on lock washer (65), then thread assembly into piston until distance between rod end and bracket bushing centers is 6.75-6.95 in. when piston is fully retracted. Slide lock washer 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 NAS 509-17C) not tightened and lockwire not installed".

NOTE: Nut (60) will be tightened and lockwired after final installation and check in airplane.

CAUTION: MATING HALVES OF SPLIT BALL (80) MAKE UP A MATCHED SET. DO NOT SEPARATE. SERIAL NUMBERS MUST MATCH AND INDEX MARKS MUST LINE UP.

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

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

NOTE: Use MS20995NC32 lockwire except as noted.

(1) End nut (140) to manifold (447).

(2) Cam retainer (275) to manifold (447).

(3) Filter cap (305) to manifold (447).

(4) Screw (10) to valve cap (490).

(5) Bolt (25) to bolt (25), 2 places. *[1]

(6) Screw (245) to screw (245), 2 places. *[1]

(7) Screw (22) to screw (22). *[1]

(8) Screw (375) to screw (375), 2 places. *[1]

(9) Bolt (340) to bolt (340). *[1]

(10) Screw (35) to screw (35). *[1]

*[1] Use MS20995NC20.

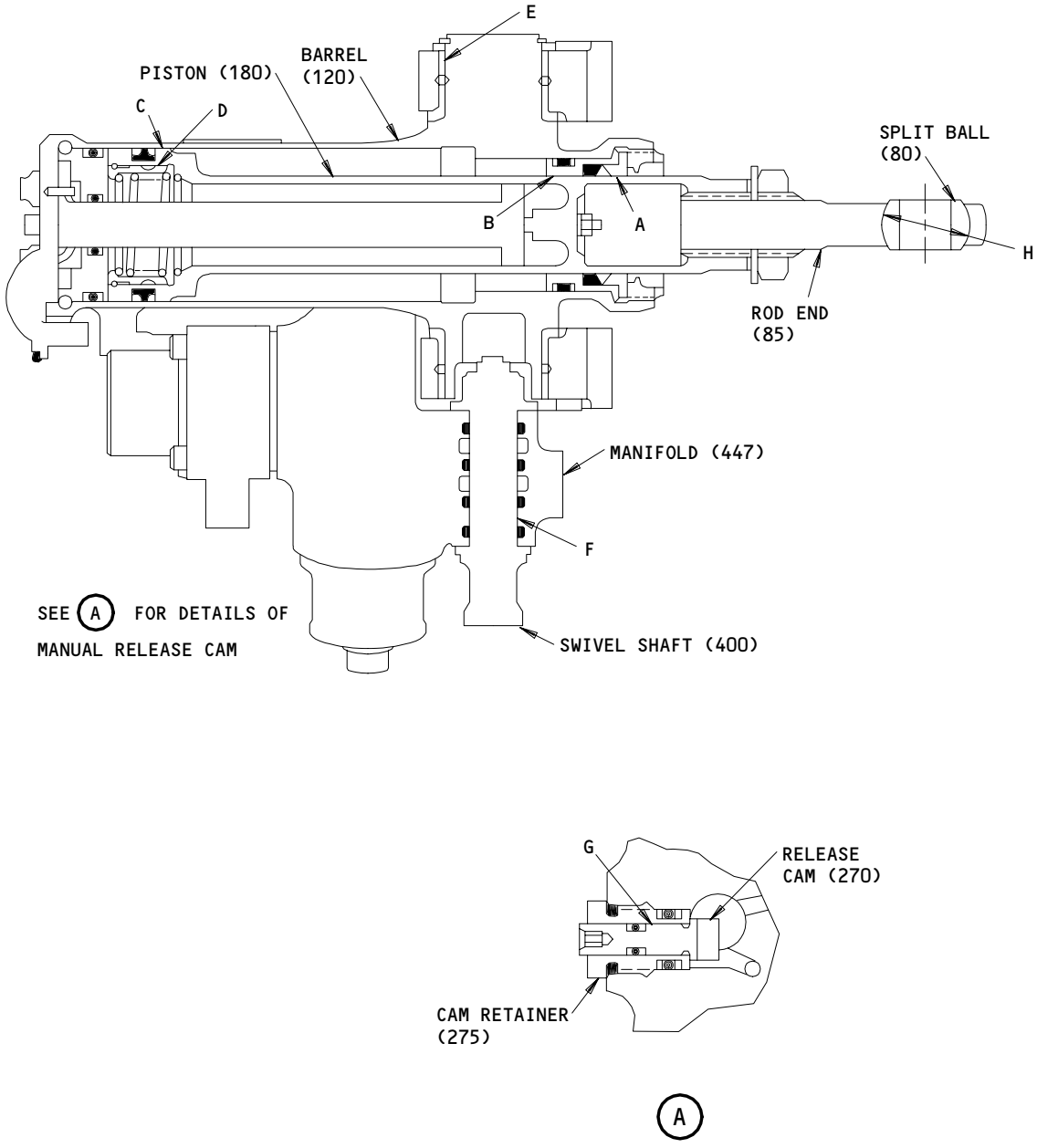
4. Storage

A. Fill unit with BMS 3-11 hydraulic fluid. Operate manual release cam (270) 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 NAS1512-6 packings. Cap electrical connector (370) with MS90376-18 dust cap, or equivalent.

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

FITS AND CLEARANCES



Fits and Clearances
Figure 801 (Sheet 1)

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 150 OD 180	1.500 1.496	1.501 1.497	0.003	0.005	1.495	1.502	0.007
B	ID 225 OD 180	1.501 1.496	1.502 1.497	0.004	0.006	1.495	1.503	0.008
C	ID 120 OD 180	2.368 2.363	2.370 2.364	0.004	0.007	2.362	2.371	0.009
D	ID 180 OD 200	1.8500 1.8474	1.8504 1.8478	0.0022	0.0030	1.8472	1.8506	0.0034
E	ID 470 OD 120	1.5010 1.499	1.5016 1.500	0.0010	0.0026	1.4985	1.5018	0.0033
F	ID 447 OD 400	0.750 0.747	0.751 0.748	0.002	0.004	0.746	0.752	0.006
G	ID 275 OD 270	0.329 0.326	0.330 0.327	0.002	0.004	0.325	0.331	0.006
H	ID 85 OD 80 *[1]	1.3770 1.3745	1.3785 1.3750	0.0020	0.0040	1.3740		

*[1] SPHERICAL DIAMETER

ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2)

261540

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
22	SCREW	6 - 8	
60	NUT		150 - 180 *[1]
140	END NUT	500 - 600	
210	NUT	50 - 70	
245	SCREW	50 - 70	
275	CAM RETAINER	200 - 250	
305	FILTER CAP	200 - 250	
375	SCREW	6 - 8	
485	VALVE ASSY	250 - 300	

*[1] FINAL TIGHTENING ON INSTALLATION

Torque Table
Figure 802

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-ohmmeter (Takeda Riken)

7. 321 -- Phase angle voltmeter (North Atlantic Industries, Inc., 60 Plant Ave., Hauppauge, NY 11789)

8. HP7090A -- X-Y recorder (Hewlett - Packard Co., Palo Alto, CA 94300)

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

10. 60-1377TA -- Pressure gage (Ashcroft Gauge Co., Dresser Industries Inc., 250 E. Main St., Stratford CT 06497)

11. 60-1377R -- Pressure gage (Ashcroft Gauge Co.)

12. LR19CB2412 -- Pressure reducing valve (Circle Seal Corp., 1111 N. Brookhurst, P.O. Box 3666, Anaheim CA 92803)

13. BPR10AB6432 -- Relief valve (Circle Seal Corp.)

14. 129-258 -- Flow meter (Cox Instruments Corp., Div. of Lynch Corp., 15300 Fullerton Ave., Detroit, MI 48227)

15. A32045-75 -- Spanner wrench

16. A27075-1 -- Adjustment wrench

17. 875B -- Dielectric Strength Tester (Kikusui Electronics)

18. 404 -- Hypot (high potential tester) (Associated Research, Inc., 3758 W. Belmont Ave., Chicago, IL 60618)

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

20. 412A -- Megger Test Set (Hewlett Packard Co., 10501 Page Mill Road, Palo Alto, CA 94304)

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 alpah-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

18076 UMPCO, INCORPORATED
12300 INDUSTRY STREET
GARDEN GROVE, CALIFORNIA 92641

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

VENDORS

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

56878 SPS TECHNOLOGIES INC
HIGHLAND AVENUE
JENKINTOWN, PENNSYLVANIA 19046

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

72285 EXACTO IND INC SEE V83930

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 CORP AEROSPACE DIV
3151 WEST 5TH STREET
OXNARD, CALIFORNIA 93030

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

80756 TRW INC RAMSEY CORP
PO BOX 513 1233 MANCHESTER ROAD
ST LOUIS, MISSOURI 63166

81205 BOEING CO THE
PO BOX 3707
SEATTLE, WASHINGTON 98124

81873 TEXTRON INC HYDRAULIC RESEARCH DIV
25200 WEST RYE CANYON ROAD
VALENCIA, CALIFORNIA 91355

83930 TRANSAMERICA DELAVAL INC ADEL FASTENERS DIV
1444 WASHINGTON AVENUE
HUNTINGTON, WEST VIRGINIA 25704

VENDORS

84971 TA MANUFACTURING CORP
375 WEST ARDEN AVENUE PO BOX 2500
GLENDALE, CALIFORNIA 91209

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

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	380	1
AC8818E2		1	310	1
AN960-516L		1	100	4
BACB30MT3HT6		1	340	2
BACB30MT4HT5		1	25	4
BACC10DW6D		1	5	1
BACC45FM16-10P		1	370	1
BACN10JC4C		1	210	1
BACN10JC5C		1	105	4
BACN10JC6C		1	395	1
BACP20AX21D		1	440	3
BACP20AX21DP		1	445	3
BACR12BM009		1	230A	2
		1	300A	2
BACR12BM011		1	365A	8
BACR12BM111		1	285A	2
		1	535A	2
BACR12BM116		1	190A	2
		1	335A	2
		1	505A	8
BACR12BM222		1	325A	2
BACR12BM225		1	170A	2
BACR12BM227		1	160A	2
BACS11AA325		1	220	1
BACS34A17A		1	145	1
BACT12AC3		1	380	1
BACW10BP3C		1	345	2
BACW10BP4C		1	30	4
BRH10C4		1	210	1
BRH10C5		1	105	4
BRH10C6		1	395	1
CSF11-325A		1	220	1
CWR76-17B		1	145	1
C11236-009B		1	230A	2
		1	300A	2
C11236-011B		1	365A	8
C11236-111B		1	285A	2
		1	535A	2

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
C11236-116B		1	190A	2
		1	335A	2
		1	505A	8
C11236-222B		1	325A	2
C11236-225B		1	170A	2
C11236-227B		1	160A	2
C48-00R16-10P10		1	370	1
FS100-325		1	220	1
GM6850		1	135	1
H31-4BAC		1	210	1
H31-5BAC		1	105	4
H31-6BAC		1	395	1
MS16562-219		1	45	2
MS16562-228		1	435	1
MS21209C0415P		1	415	4
MS21209F1-10P		1	420	1
MS21209F1-15P		1	425	1
MS21209F4-15P		1	430	4
MS28782-14		1	190	2
		1	335	2
		1	505	8
MS28782-27		1	325	2
MS28782-4		1	230	2
		1	300	2
MS28782-6		1	365	8
MS28782-9		1	285	2
		1	535	2
MS28783-3		1	170	2
MS28783-5		1	160	2
NAS1351-3H6P		1	10	1
		1	385	1
NAS1351-3H8P		1	35	2
NAS1351-4H28P		1	245	4
NAS1352-04H4P		1	22	2
NAS1352-04H6P		1	375	4
NAS1611-009		1	227	1
		1	295	1
NAS1611-011		1	360	4
NAS1611-111		1	280	1
		1	530	1
NAS1611-112		1	250	1
NAS1611-113		1	290	1

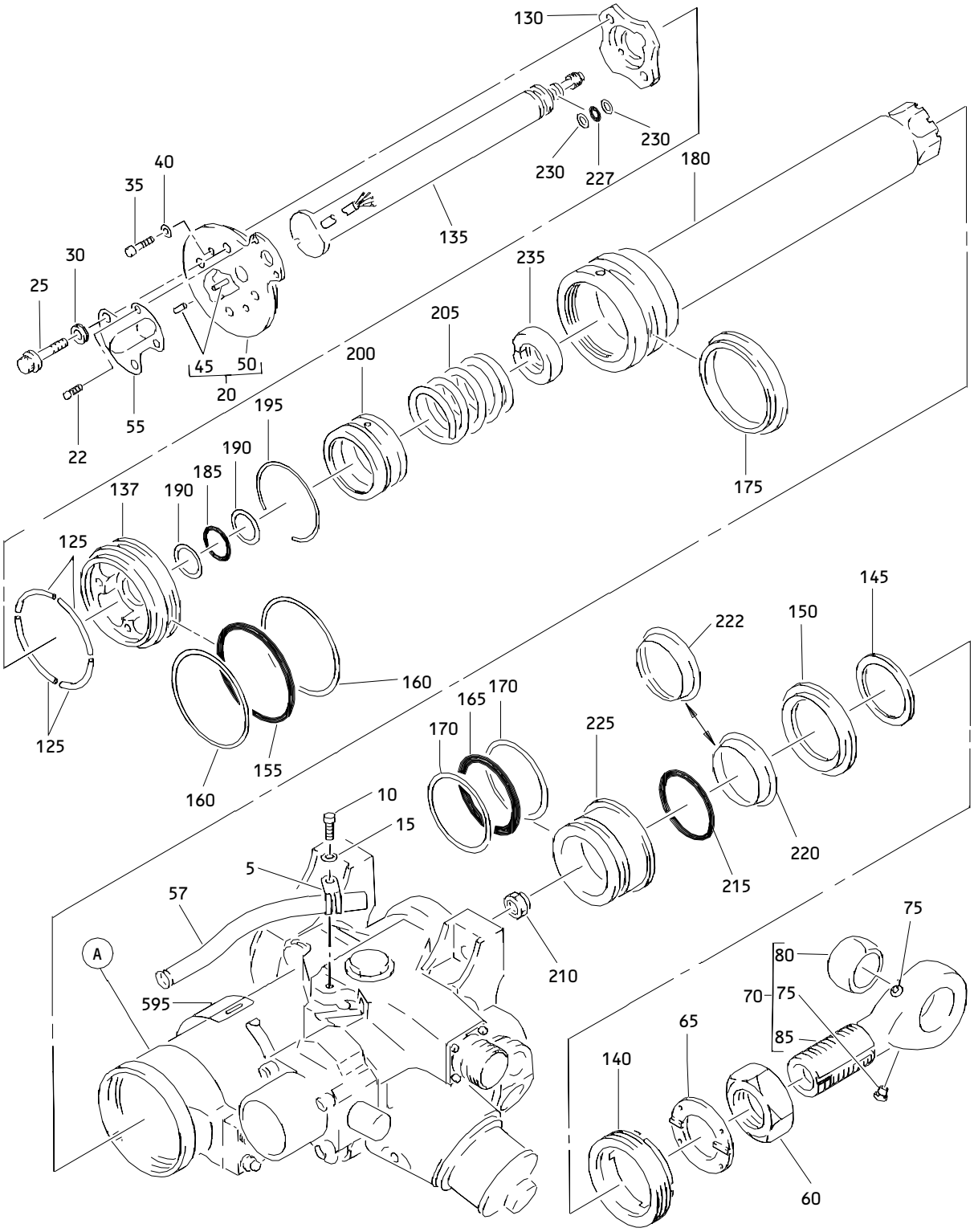
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
NAS1611-116		1	185	1
		1	330	1
		1	500	4
NAS1611-118		1	495	1
NAS1611-132		1	315	1
NAS1611-222		1	320	1
NAS1611-225		1	165	1
NAS1611-227		1	155	1
NAS1611-325		1	215	1
NAS509-17C		1	60	1
NAS516M1		1	75	2
		1	475	4
NAS620-10L		1	15	1
		1	40	2
		1	390	1
NAS6605-14		1	95	2
NAS6605-8		1	90	2
NS202101S048		1	210	1
RMR12BM009		1	230A	2
		1	300A	2
RMR12BM011		1	365A	8
RMR12BM111		1	285A	2
		1	535A	2
RMR12BM116		1	190A	2
		1	335A	2
		1	505A	8
RMR12BM222		1	325A	2
RMR12BM225		1	170A	2
RMR12BM227		1	160A	2
RMS11-325		1	220	1
RST143C		1	110	1
R1891SN		1	380	1
STF800-009		1	230A	2
		1	300A	2
STF800-011		1	365A	8
STF800-111		1	285A	2
		1	535A	2
STF800-116		1	190A	2
		1	335A	2
		1	505A	8

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
STF800-222		1	325A	2
STF800-225		1	170A	2
STF800-227		1	160A	2
S12095-325		1	220	1
S252T001-1		1	240	1
		1	240A	1
S252T001-2		1	240B	1
S252T001-6		1	240C	1
S252T003-1		1	135	1
S258DT6		1	5	1
S30294-009-1		1	230A	2
		1	300A	2
S30294-011-1		1	365A	8
S30294-111-1		1	285A	2
		1	535A	2
S30294-116-1		1	190A	2
		1	335A	2
		1	505A	8
S30294-222-1		1	325A	2
S30294-225-1		1	170A	2
S30294-227-1		1	160A	2
S30388-17-1		1	145	1
S30772-009H5		1	550	1
S30775-116H5		1	450	4
S33555-325H5		1	222	1
TA4C44D6T		1	5	1
TF005-17A		1	145	1
TF450-009A		1	230A	2
		1	300A	2
TF450-011A		1	365A	8
TF450-111A		1	285A	2
		1	535A	2
TF450-116A		1	190A	2
		1	335A	2
		1	505A	8
TF450-222A		1	325A	2
TF450-225A		1	170A	2
TF450-227A		1	160A	2
T6C428J		1	210	1
T6C524J		1	105	4
VN303B048		1	210	1
ZZYAC1716-10P		1	370	1
000100-0113		1	260	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
101LH9075-4W		1	210	1
101LH9075-5W		1	105	4
2053-325		1	220	1
2100-009		1	230A	2
		1	300A	2
2100-011		1	365A	8
2100-111		1	285A	2
		1	535A	2
2100-116		1	190A	2
		1	335A	2
		1	505A	8
2100-222		1	325A	2
2100-225		1	170A	2
2100-227		1	160A	2
2140-17A		1	145	1
22280730		1	240	1
		1	240A	1
22280730-001		1	240	1
		1	240A	1
250101		1	440	3
250101P		1	445	3
252T1301-1		1	1	RF
252T1301-2		1	1A	RF
252T1301-3		1	1B	RF
252T1302-1		1	410	1
252T1303-1		1	400	1
252T1304-1		1	460	1
252T1305-1		1	455	1
252T1306-1		1	405	2
252T1307-1		1	305	1
252T1308-1		1	270	1
252T1309-1		1	275	1
252T1310-1		1	120	1
252T1311-1		1	465	2
252T1312-1		1	115	1
252T1313-1		1	180	1
252T1313-2		1	180A	1
252T1313-3		1	180B	1
252T1314-1		1	200	1
252T1315-1		1	205	1
252T1316-1		1	195	1
252T1316-3		1	525	1
252T1316-4		1	575	1
252T1317-1		1	20	1
252T1318-1		1	57	1
252T1319-1		1	55	1

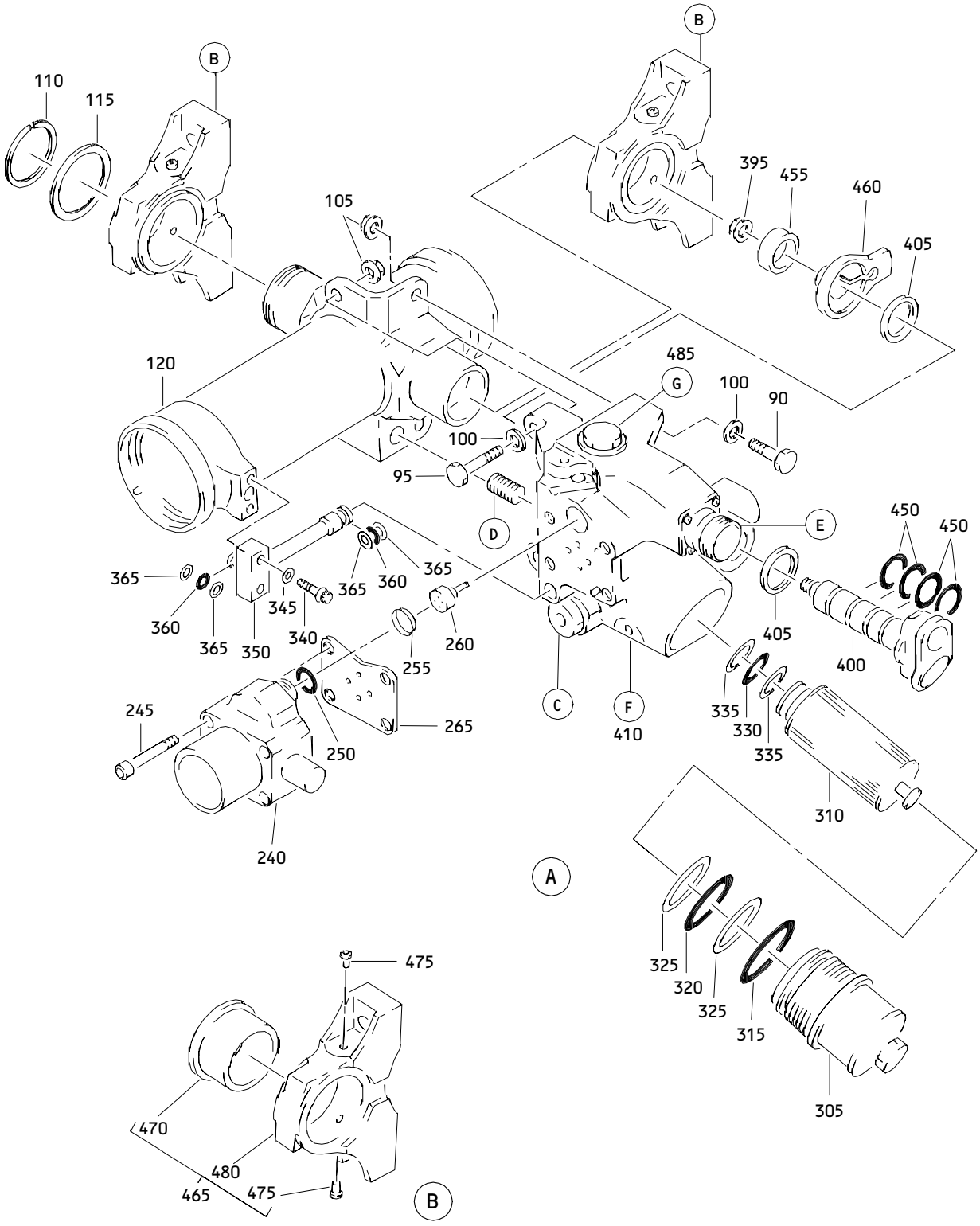
PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
252T1320-1		1	485	1
252T1321-1		1	70	1
252T1322-1		1	137	1
252T1323-1		1	130	1
252T1324-1		1	225	1
252T1325-1		1	150	1
252T1326-1		1	140	1
252T1327-1		1	125	4
252T1328-1		1	350	1
252T1329-1		1	255	1
252T1330-1		1	355	1
252T1331-1		1	235	1
252T1332-1		1	595	1
252T1333-1		1	65	1
252T1341-1		1	447	1
252T1342-1		1	480	2
252T1343-1		1	470	2
252T1344-1		1	50	1
252T1345-1		1	490	1
252T1346-1		1	540	1
252T1347-1		1	585	1
252T1348-1		1	565	1
252T1349-1		1	560	1
252T1350-1		1	590	1
252T1351-1		1	545	1
252T1352-1		1	570	1
252T1353-1		1	580	1
252T1354-1		1	510	1
252T1356-1		1	555	1
252T1356-2		1	555A	1
252T1356-3		1	555B	1
252T1357-1		1	85	1
252T1358-1		1	80	1
252T1365-1		1	515	1
252T1366-1		1	520	1
36153		1	380	1
4228-633		1	310	1
475-6		1	5	1

PART NUMBER	AIRLINE PART NO.	FIG.	ITEM	TTL REQ
48-00R16-10P300		1	370	1
60B80034-2		1	310	1
69-20185-3		1	265	1
72181		1	240B	1
7329MS952T		1	175	1
7553575		1	310	1
8084D6T		1	5	1
97-048		1	210	1
97-054		1	105	4
97-064		1	395	1



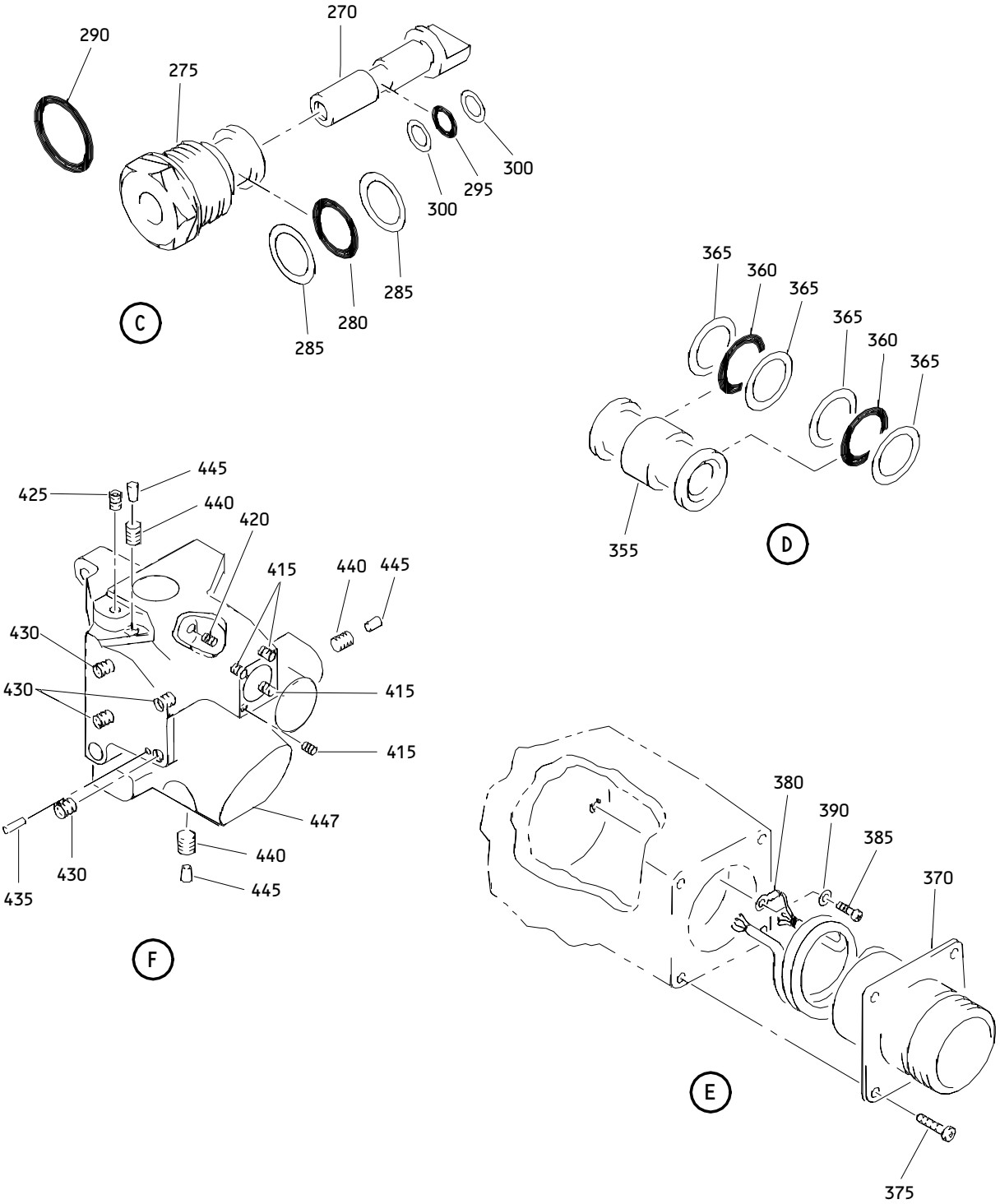
Inboard Spoiler Power Control Actuator Assembly
Figure 1 (Sheet 1)

T72552



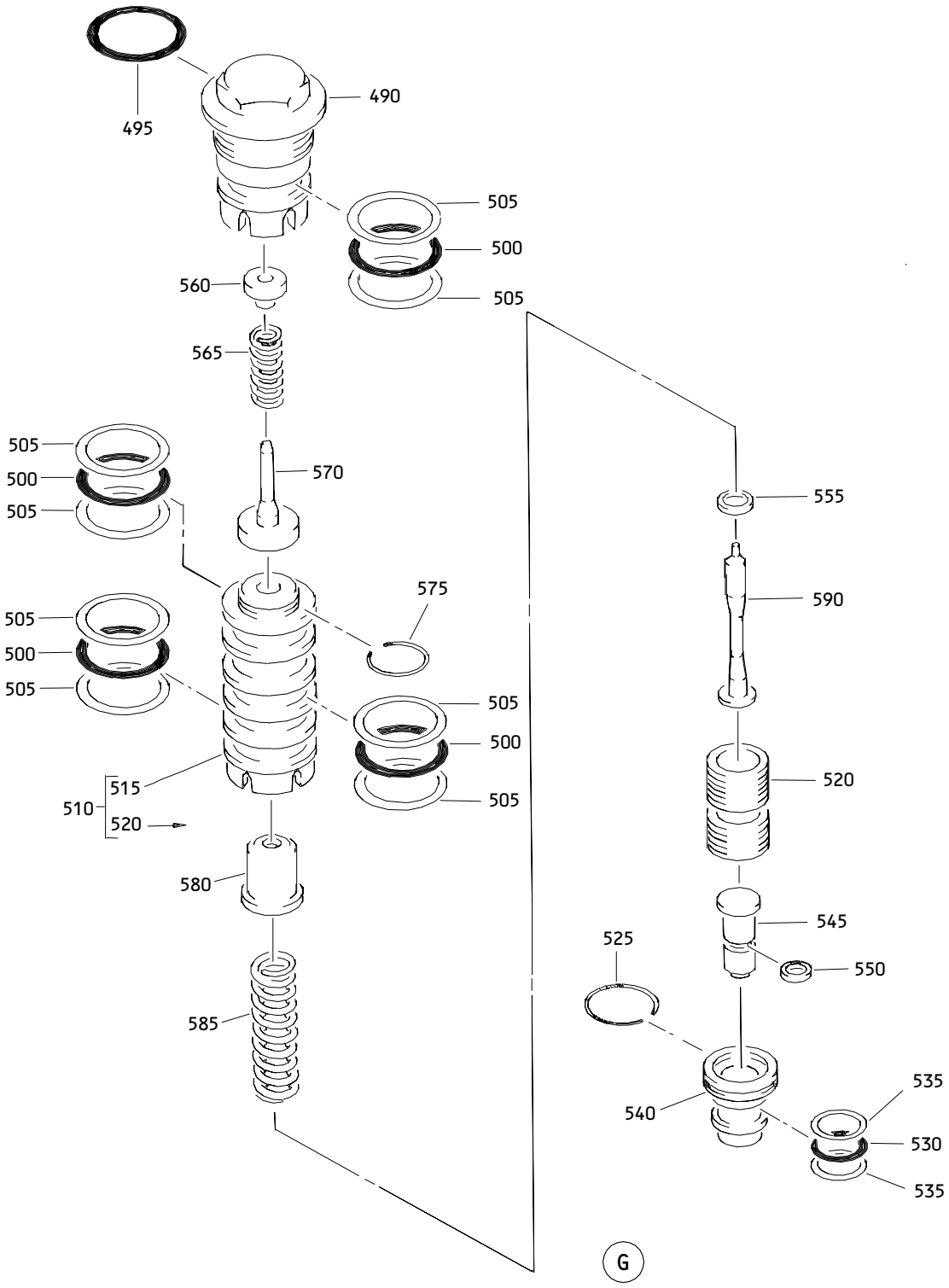
Inboard Spoiler Power Control Actuator Assembly
Figure 1 (Sheet 2)

T58292



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

T58293



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

T58294

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1	252T1301-1		ACTUATOR ASSY-INBD SPOILER PWR CONT	A	RF
-1A	252T1301-2		ACTUATOR ASSY-INBD SPOILER PWR CONT	B	RF
-1B	252T1301-3		ACTUATOR ASSY-INBD SPOILER PWR CONT	C	RF
5	S258DT6		.CLAMP- (V18076) (SPEC BACC10DW6D) (OPT TA4C44D6T (V84971)) (OPT 475-6 (V83930)) (OPT 8084D6T (V72285))		1
10	NAS1351-3H6P		.SCREW		1
15	NAS620-10L		.WASHER		1
20	252T1317-1		.PLATE ASSY-END ATTACHING PARTS		1
22	NAS1352-04H4P		.SCREW		2
25	BACB30MT4HT5		.BOLT- (V06710) (SPEC BACB30MT4HT5) (V06725) (V08524) (V17943) (V27624) (V56878) (V92215) (V97928)		4
30	BACW10BP4C		.WASHER- (V10630) (SPEC BACW10BP4C) (V81205)		4
35	NAS1351-3H8P		.SCREW		2
40	NAS620-10L		.WASHER -------*-------		2
45	MS16562-219		..PIN		2
50	252T1344-1		..PLATE-END		1
55	252T1319-1		.COVER-WIRE		1
57	252T1318-1		.CONDUIT-WIRE		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
60	NAS509-17C		.NUT		1
65	252T1333-1		.WASHER-ROD END LOCK		1
70	252T1321-1		.ROD END ASSY		1
75	NAS516M1		..FITTING		2
80	252T1358-1		..BALL-SPLIT		1
85	252T1357-1		..ROD END		1
90	NAS6605-8		.BOLT		2
95	NAS6605-14		.BOLT		2
100	AN960-516L		.WASHER		4
105	BRH10C5		.NUT-SELF LOCKING- (V52828) (SPEC BACN10JC5C) (OPT H31-5BAC (V15653)) (OPT T6C524J (V71087)) (OPT 101LH9075-5W (V72962)) (OPT 97-054 (V80539))		4
110	RST143C		.RING- (V80756)		1
115	252T1312-1		.WASHER-TRUN		1
120	252T1310-1		.BARREL		1
125	252T1327-1		.RING-SHEAR		4
130	252T1323-1		.PLATE-SPRT		1
135	GM6850		.TRANSDUCER ASSY-LINEAR (V22863) (SPEC S252T003-1)		1
137	252T1322-1		.RETAINER-LVDT		1
140	252T1326-1		.NUT-END		1
145	CWR76-17B		.RING-SCRAPER (V26879) (SPEC BACS34A17A) (OPT S30388-17-1 (V97820)) (OPT TF005-17A (V07128)) (OPT 2140-17A (V26303))		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
150	252T1325-1		.RETAINER-SEAL		1
155	NAS1611-227		.PACKING		1
160	MS28783-5		.RING-BACKUP (OPT ITEM 160A)		2
-160A	C11236-227B		.RING-BACKUP (V26879) (SPEC BACR12BM227) (OPT RMR12BM227 (V94878)) (OPT STF800-227 (V02107)) (OPT S30294-227-1 (V97820)) (OPT TF450-227A (V07128)) (OPT 2100-227 (V26303)) (OPT ITEM 160)		2
165	NAS1611-225		.PACKING		1
170	MS28783-3		.RING-BACKUP (OPT ITEM 170A)		2
-170A	C11236-225B		.RING-BACKUP (V26879) (SPEC BACR12BM225) (OPT RMR12BM225 (V94878)) (OPT STF800-225 (V02107)) (OPT S30294-225-1 (V97820)) (OPT TF450-225A (V07128)) (OPT 2100-225 (V26303)) (OPT ITEM 170)		2

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
175	7329MS952T		.RING-GT (V72902)		1
180	252T1313-1		.PISTON	A	1
-180A	252T1313-2		.PISTON (OPT ITEM 180B) (REPLD BY ITEM 180B)	B	1
-180B	252T1313-3		.PISTON (OPT ITEM 180A)	B	1
-180C	252T1313-3		.PISTON	C	1
185	NAS1611-116		.PACKING		1
190	MS28782-14		.RING-BACKUP (OPT ITEM 190A)		2
-190A	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 190)		2
195	252T1316-1		.RING-LOCK	A	1
200	252T1314-1		.PLUNGER-SNUBBER	A	1
205	252T1315-1		.SPRING-SNUBBER	A	1
210	BRH10C4		.NUT-SELF LOCKING- (V52828) (SPEC BACN10JC4C) (OPT H31-4BAC (V15653)) (OPT NS202101S048 (V80539)) (OPT T6C428J (V71087)) (OPT VN303B048 (V92215)) (OPT 101LH9075-4W (V72962)) (OPT 97-048 (V80539))		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
215	NAS1611-325		.PACKING (USED WITH ITEM 220)		1
220	CSF11-325A		.SEAL-FOOT (V26879) (SPEC BACS11AA325) (OPT FS100-325 (V02107)) (OPT RMS11-325 (V94878)) (OPT S12095-325 (V97820)) (OPT 2053-325 (V26303)) (REPLD BY ITEM 222) (USED WITH ITEM 215)		1
222	S33555-325H5		.SEAL-HAT (V97820) (REPLS ITEM 220)		1
225	252T1324-1		.BEARING		1
227	NAS1611-009		.PACKING		1
230	MS28782-4		.RING-BACKUP (OPT ITEM 230A)		2
-230A	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 230)		2
235	252T1331-1		.GUIDE-LVDT		1
240	22280730		.SERVOVALVE- ELECTROHYDRAULIC (V81873) (SPEC S252T001-1) (OPT ITEMS 240A, 240B, 240C)		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-240A	22280730-001		.SERVOVALVE- ELECTROHYDRAULIC (V81873) (SPEC S252T001-1) (OPT ITEMS 240, 240B, 240C)		1
-240B	72181		.SERVOVALVE- ELECTROHYDRAULIC (V75250) (SPEC S252T001-2) (OPT ITEMS 240, 240A)		1
-240C	S252T001-6		.SERVOVALVE- ELECTROHYDRAULIC (OPT ITEMS 240,240A) ATTACHING PARTS		1
245	NAS1351-4H28P		.SCREW -------*-------		4
250	NAS1611-112		.PACKING		1
255	252T1329-1		.RETAINER-CONN.		1
260	000100-0113		.CONNECTOR- (V05574)		1
265	69-20185-3		.PLATE-GASKET		1
270	252T1308-1		.CAM-RELEASE		1
275	252T1309-1		.RETAINER-CAM		1
280	NAS1611-111		.PACKING		1
285	MS28782-9		.RING-BACKUP (OPT ITEM 285A)		2
-285A	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 285)		2
290	NAS1611-113		.PACKING		1
295	NAS1611-009		.PACKING		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
300	MS28782-4		.RING-BACKUP (OPT ITEM 300A)		2
-300A	C11236-009B		.RING-BACKUP (V26879) (SPEC BACR12BM009) (REFER TO ITEM 230A FOR OPTIONAL PARTS) (OPT ITEM 300)		2
305	252T1307-1		.CAP-FILTER (OPT ITEM 305A)		1
305A	252T1307-2		.CAP-FILTER (PREF)		1
310	7553575		.FILTER-ELEMENT (V05228) (SPEC 60B80034-2) (OPT AC8818E2 (V18350)) (OPT 4228-633 (V21550))		1
315	NAS1611-132		.PACKING		1
320	NAS1611-222		.PACKING		1
325	MS28782-27		.RING-BACKUP (OPT ITEM 325A)		2
-325A	C11236-222B		.RING-BACKUP (V26879) (SPEC BACR12BM222) (OPT RMR12BM222 (V94878)) (OPT STF800-222 (V02107)) (OPT S30294-222-1 (V97820)) (OPT TF450-222A (V07128)) (OPT 2100-222 (V26303)) (OPT ITEM 325)		2

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
330	NAS1611-116		.PACKING		1
335	MS28782-14		.RING-BACKUP		2
			(OPT ITEM 335A)		
-335A	C11236-116B		.RING-BACKUP		2
			(V26879)		
			(SPEC BACR12BM116)		
			(REFER TO ITEM 190A		
			FOR OPTIONAL PARTS)		
			(OPT ITEM 335)		
340	BACB30MT3HT6		.BOLT-		2
			(V06710)		
			(SPEC BACB30MT3HT6)		
			(V06725)		
			(V08524)		
			(V17943)		
			(V27624)		
			(V56878)		
			(V92215)		
			(V97928)		
345	BACW10BP3C		.WASHER-		2
			(V10630)		
			(SPEC BACW10BP3C)		
			(V81205)		
350	252T1328-1		.TUBE-TRANSFER		1
355	252T1330-1		.TUBE-QUILL		1
360	NAS1611-011		.PACKING		4
365	MS28782-6		.RING-BACKUP		8
			(OPT ITEM 365A)		
-365A	C11236-011B		.RING-BACKUP		8
			(V26879)		
			(SPEC BACR12BM011)		
			(OPT RMR12BM011		
			(V94878))		
			(OPT STF800-011		
			(V02107))		
			(OPT S30294-011-1		
			(V97820))		
			(OPT TF450-011A		
			(V07128))		
			(OPT 2100-011		
			(V26303))		
			(OPT ITEM 365)		

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
370	ZZYAC1716-10P		.CONNECTOR- (V49367) (SPEC BACC45FM16-10P) (OPT C48-00R16-10P102 (V13556)) (OPT 48-00R16-10P300 (V02660))		1
375	NAS1352-04H6P		.SCREW		4
380	AA821-10		.TERMINAL- (V98410) (SPEC BACT12AC3) (OPT R1891SN (V14726)) (OPT 36153 (V00779))		1
385	NAS1351-3H6P		.SCREW		1
390	NAS620-10L		.WASHER		1
395	BRH10C6		.NUT-SELF LOCKING- (V52828) (SPEC BACN10JC6C) (OPT H31-6BAC (V15653)) (OPT 97-064 (V80539))		1
400	252T1303-1		.SHAFT-SWIVEL		1
405	252T1306-1		.WASHER-SWIVEL		2
410	252T1302-1		.MANIFOLD ASSY	A	1
410A	252T1302-1		.MANIFOLD ASSY (OPT TO ITEM 410B)	BC	1
410B	252T1302-3		.MANIFOLD ASSY (PREF)	BC	1
415	MS21209C0415P		..INSERT		4
420	MS21209F1-10P		..INSERT		1
425	MS21209F1-15P		..INSERT		1
430	MS21209F4-15P		..INSERT		4
435	MS16562-228		..PIN		1
440	250101		..PIN- (V92555) (SPEC BACP20AX21D)		3

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
445	250101P		..PLUG- (V92555) (SPEC BACP20AX21DP)		3
447	252T1341-1		..MANIFOLD (OPT ITEM 447B)	A	1
447A	252T1341-2		..MANIFOLD (OPT ITEM 447B)	BC	1
447B	252T1341-3		..MANIFOLD (PREF)	ABC	1
450	S30775-116H5		.SEAL-PLUS II (V97820)		4
455	252T1305-1		.RETAINER-SWIVEL		1
460	252T1304-1		.PLATE-ANTIROTATION		1
465	252T1311-1		.BRACKET ASSY		2
470	252T1343-1		..BUSHING		1
475	NAS516M1		..FITTING		2
480	252T1342-1		..BRACKET		1
485	252T1320-1		.VALVE ASSY-EXTENSION CHK AND THRM RELIEF		1
490	252T1345-1		..CAP		1
495	NAS1611-118		..PACKING		1
500	NAS1611-116		..PACKING		4
505	MS28782-14		..RING-BACKUP (OPT ITEM 505A)		8
-505A	C11236-116B		..RING-BACKUP (V26879) (SPEC BACR12BM116) (REFER TO ITEM 190A FOR OPTIONAL PARTS) (OPT ITEM 505)		8
510	252T1354-1		..SLIDER ASSY		1
515	252T1365-1		...SLEEVE		1
520	252T1366-1		...SLIDER		1
525	252T1316-3		..RING-LOCK		1
530	NAS1611-111		..PACKING		1
535	MS28782-9		..RETAINER-BACKUP RING (OPT ITEM 535A)		2
-535A	C11236-111B		..RING-BACKUP (V26879) (SPEC BACR12BM111) (REFER TO ITEM 285A FOR OPTIONAL PARTS) (OPT ITEM 535)		2
540	252T1346-1		..RETAINER-PLUNGER		1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
545	252T1351-1		..PLUNGER		1
550	S30772-009H5		..SEAL-PLUS II (V97820)		1
555	252T1356-1		..SHIM		AR
-555A	252T1356-2		..SHIM		AR
-555B	252T1356-3		..SHIM		AR
560	252T1349-1		..GUIDE-POPPET		1
565	252T1348-1		..SPRING		1
570	252T1352-1		..POPPET		1
575	252T1316-4		..RING-LOCK		1
580	252T1353-1		..GUIDE-SPR		1
585	252T1347-1		..SPRING		1
590	252T1350-1		..ROD		1
595	252T1332-1		.NAMEPLATE		1