TO: ALL HOLDERS OF FEEL ACTUATOR AND BRAKE METERING VALVE ASSEMBLY OVERHAUL MANUAL, 32-43-21

REVISION NO. 19, DATED NOV 1/00

HIGHLIGHTS

DESCRIPTION OF CHANGE	TOPICS AFFECTED												
	D & O	D / Assy	Cleaning	Insp/Chk	Repair	Assy	F/C	Test	T/Shooting	S/Tools	Storage	IPL	L/Overhaul
Added replacements for bolt (1), washer (2) (Fig. 1102)												X	
Upgraded grease callouts						X							

FEEL ACTUATOR AND BRAKE METERING VALVE ASSEMBLY

32-43-21

BOEING P/N 65-44931-3 thru -6, -8 thru -12

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
32-1017		PRR 31230	Mar 10/70
32-1021		PRR 31388	Mar 10/70
		PRR 31783	Mar 10/70

LIST OF EFFECTIVE PAGES

* Indicates pages revised, added or deleted in latest revision

F Indicates foldout pages - print one side only

	PAGE	DATE		PAGE	DATE		PAGE	DATE
	32-43-21			1106	Mar 10/70			
	T-1	Mar 10/70	*	1107	Nov 1/00			
	T-2	BLANK		1108	Jul 5/81			
*	LEP-1	Nov 1/00		1109	Jul 5/81			
	LEP-2	BLANK		1110	Jun 25/75			
	T/C-1	Jan 5/80		1111	Dec 1/97			
	T/C-2	BLANK		1112	Jun 5/85			
	1	Mar 25/73		1113	Dec 1/97			
	2	Mar 10/70	*	1114	Nov 1/00			
	101	Mar 1/00		1115	Jul 5/81			
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	403	Jan 5/80						
	404	Jan 5/80						
*	501	Nov 1/00						
*	502	Nov 1/00						
	503	Mar 1/00						
	504	Dec 1/97						
	601	Nov 15/68						
	602	Jun 5/87						
	701	Dec 1/96						
	702	Dec 1/97						
	703	Jun 1/97						
	704	Jul 1/00						
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	710	BLANK						
	801	Dec 1/97						
	802	BLANK						
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	902	BLANK						
	1001	Jan 5/79						
	1002	BLANK						
	1101	Feb 15/68						
	1102	Dec 1/97						
	1103	Jul 5/81						
	1104	Mar 1/00						
	1105	BLANK						

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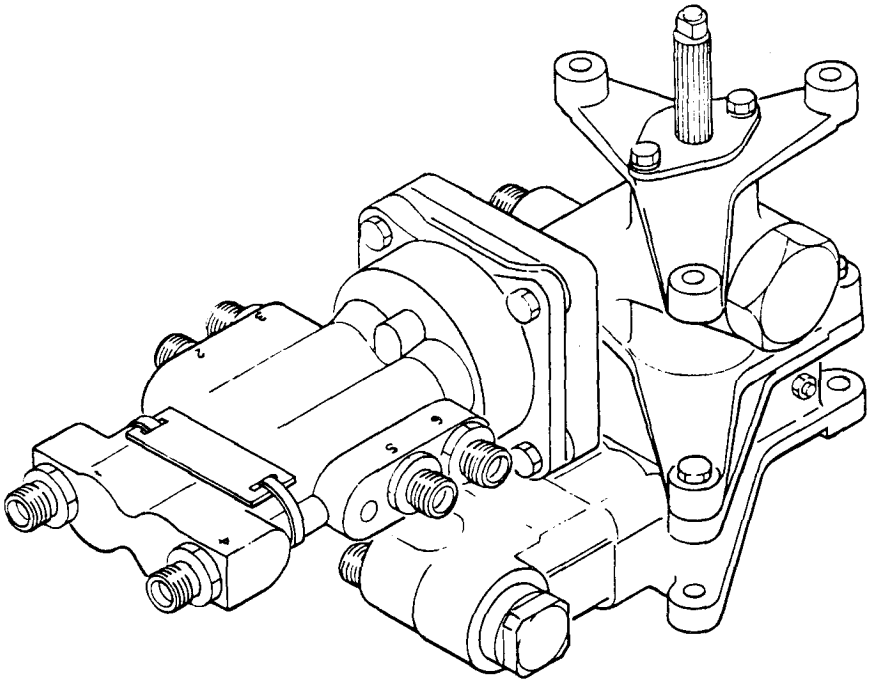
*[1] Special instructions not required. Use standard industry practices and the information contained in 20-30-01 and 20-30-03.

FEEL ACTUATOR AND BRAKE METERING VALVE ASSEMBLY



(LEFT HAND ASSEMBLY SHOWN)

Feel Actuator and Brake Metering Valve Assembly
Figure 1

DESCRIPTION AND OPERATION

1. Description

   A. The feel actuator and brake metering valve assembly consists of two subassemblies, as follows:

      (1) Main gear brake metering and auto brake assembly, which consists of a valve housing assembly and a valve body assembly. The body contains two valve slide assemblies. The housing contains a sleeve and two auto brake pistons, and supports a link assembly and a crank assembly mounted on a shaft. The body has two pressure ports, two pressure supply ports and two return ports. The housing has the auto brake pressure port.

(2) Brake valve feel augmentation actuator assembly, which consists of a housing containing a piston and two slide assemblies. A mount assembly, to which is attached a crank assembly, is bolted to the housing, holding the piston and a combination of sleeve, slide and poppet or check valve. The other slide assembly is held in the housing by a threaded plug.

2. Operation

A. Main gear brake metering and auto brake assembly

(1) By operating brake pedals, the shaft rotates and moves the link assembly and valve slides. Slide displacement opens the valve, supplying pressure to brakes. When pedals are released, the slides move back by spring force, closing pressure and opening the return. The link assembly makes it possible to displace both slides or only one if the other jams.

(2) Automatic braking of wheels, while retracting gear into wheel well is done by directing pressure to the housing pressure port of unit. A small piston installed in the housing assembly displaces the link assembly and both valve slides, thus supplying pressure to the wheel brakes.

B. Brake valve feel augmentation actuator assembly

(1) This unit serves to increase brake pedal resistance at low braking pressure without increasing it at maximum breaking pressure.

(2) With brake pedals partially depressed, low braking pressure at port 1 (figure 704) will act opposing system A pressure at port 3. Pressure from port 3 will be greater and maintain poppet open, allowing pressure to act on piston head. Movement of piston will oppose movement of crank with increase in brake pedal resistance.

(3) With brake pedals fully depressed, high braking pressure at port 1 will force poppet to a closed position and no pressure will act on piston. As crank arm moves, pedal resistance will not increase.

3. Leading Particulars

Length (overall) -- 12.4 inches
Width (overall) -- 5.7 inches
Height (overall) -- 7.7 inches
Weight -- 10.3 pounds
Operating medium -- Hydraulic fluid, BMS 3-11

DISASSEMBLY

1. Remove Brake Metering Valve Assembly (6) From Feel Augmentation Actuator Assembly (7). (Fig. 1101)

   A. Remove lockwire.

   B. Remove bolts (1), washers (2) and nuts (3).

   C. Remove bolt (4) and washer (5) and valve assembly (6) from actuator assembly (7).

   D. Remove screw (8), nut (9) and shield (10) from actuator assembly (7).

   E. As applicable, remove unions (11 thru 14) and check valve (13) from valve assembly (6). Remove 0-rings (15, 16) from unions.

   F. Remove unions (17) from actuator assembly (7). Remove 0-rings (18) from unions.

2. Disassemble Brake Metering Valve (Fig. 1102)

   A. Remove bolts (1) and washers (2). Pull housing assembly (38) out of body (72).

      NOTE: Slides (58) are under spring load. Make sure they do not pop out.

   B. Remove link assembly (3) from housing assembly (38).

   C. Remove parts (15 thru 18) from housing (47).

   D. Disassemble parts (19, 20, 21, 25).

   E. Push out shaft assembly (33). Disassemble parts (22, 26 thru 32).

      CAUTION: HOUSING ASSEMBLY (38) IS A MATCHED SET OF PRECISION PARTS. KEEP PISTONS (39, 40) IN THEIR BORE WHEN NOT IN WORK.

   F. Remove O-rings (37, 48) from housing assembly (38).

   G. Remove parts (49 thru 53) from body (72). Unscrew stop nuts (54).

CAUTION: SLIDE ASSEMBLY (57) IS A MATCHED SET OF PRECISION PARTS. KEEP THE PARTS TOGETHER WHEN NOT IN WORK. KEEP THESE PARTS IN A CONTAINER OF BMS 3-11 HYDRAULIC FLUID.

H. Remove slide assemblies (57) from body (72). Disassemble parts (55, 56).

J. Remove parts (61 thru 67) from bores of body (72). Make a note of the total thickness of washers (65, 66) in each bore to help during assembly.

3. Disassemble the Feel Actuator (Fig. 1103)

A. Remove bolts (1) and washers (2). Remove mount assembly (3) from housing (49).

B. Remove bolt (8), bushing (9), nut (10) and bearing (12) from crank (11). Remove bolts (13), retainers (14), bearings (15) and crank (11) from mount (6).

C. Remove scraper ring (16) from mount (6).

CAUTION: SLIDE (19) AND SLEEVE (20) ARE A MATCHED SET OF PRECISION PARTS. KEEP THE PARTS TOGETHER. KEEP SLIDE (19), SLEEVE (20) AND POPPET (21) IN A CONTAINER OF BMS 3-11 HYDRAULIC FLUID.

D. Remove plug (17), slide assembly (18), poppet (21) and spring (22) or check valve (23) and attaching parts from housing (49). Dissassemble O-rings (25, 26, 28), backup rings (27, 29) and cap ring (24), if installed.

NOTE: Refer to vendor's overhaul instructions for overhaul of check valve (23), if used.

E. Remove piston (30) and attached parts. Disassemble seal retainer (31), bearing (32), cap ring (33), O-ring (34), backup rings (35), O-ring (36) and seals (37).

F. Remove end cap (38), spacer (39), washers (40), spring (41) and spring retainer (42).

G. Remove O-ring (43) from housing (49).

H. Remove slide assembly (44) and attached parts from housing (49). Disassemble O-rings (45) and backup rings (46) from slide assembly.

NOTE: Refer to vendor's overhaul instructions for overhaul of slide assembly (44).

J. Remove spacer (47) from housing (49).

INSPECTION/CHECK

1. Check all parts for obvious defects in accordance with standard industry practices. See Fig. 601 for design dimensions and wear limits.

2. Magnetic particle check per 20-20-01:

   A. Crank stop (17), crank (23), plug (24), shear pin (35), shaft (36), pistons (39, 40), stop nut (54), slide (58), sleeve (59), spring guide (61), spring seat (62), spacer (63), spring (64) and spring retainer (67) (Fig. 1102).

   B. Slide (19), sleeve (20), poppet (21) and piston (30) (Fig. 1103).

3. Penetrant check per 20-20-02:

   A. Bearing retainer (21), seal retainer (27), sleeve (30), housing (47), retaining plate (53), washers (65 and 66) and body (72) (Fig. 1102).

   B. Mount (6), crank (11), plug (17), retainer (31), bearing (32), cap (38), spacers (39 and 47) and housing (49) (Fig. 1103).

4. Check movement of pistons (39, 40, Fig. 1102) in housing (38, Fig. 1102). Lubricate with hydraulic fluid BMS 3-11. Check that pistons must move freely without sticking or binding at each of three positions approximately 120 degrees apart with respect to sleeve (43, Fig. 1102).

5. Check slides (57, Fig. 1102) and (18, Fig. 1103) for free movement. Lubricate with hydraulic fluid BMS 3-11 and turn on end. Slides must move by their own weights at each of three positions approximately 120 degrees apart, with respect to sleeves.

6. Check springs in accordance with Fig. 301.

Fig. and Item No.	Approximate Free Length (inches)	Test Length (inches)	100K Min with Load Limits (pounds)
1102-64	1.42	1.24-1.26 1.12-1.14	30.15-36.85 50.85-62.15
1103-22	0.78	0.46-0.48 *[1]	0.49-0.61
1103-41 (3186592)	1.584	1.084-1.142 1.337-1.495	40 10
1103-41 (554293)	1.40	1.091-1.129	52
1103-41 (69-68894-1)	1.70	1.19-1.21 1.53-1.55	31.5-35.5 9.7-11.7

*[1] No permanent set allowed when compressed to 0.34 max. solid height.

Spring Check Data
Figure 301

REPAIR

1. Repair

A. Repair minor defects in accordance with standard industry practices. Refer to Fig. 601 for design dimensions and wear limits.

B. Shaft (36, Fig. 1102)

NOTE: Material is 17-4PH CRES (180-200 ksi).

(1) Machine 0.798-0.799 diameter per 20-10-02 to 0.779 minimum repair diameter. Maintain concentric to 0.5904 diameter within 0.002 inch TIR.

(2) Machine 0.621-0.622 diameter per 20-10-02 to 0.601 minimum repair diameter. Maintain concentric to 0.798-0.799 diameter within 0.001 inch TIR.

(3) If machining of base metal is required, stress relieve at 825-875°F for three hours and shot peen per 20-10-03 prior to chrome plating.

(4) Build up with chrome plate per 20-42-03. Do not plate radii.

(5) Grind per 20-10-04 as required to restore design dimensions 32 microinch finish. Maintain concentricity requirements.

D. Rod (8, Fig. 1102)

NOTE: Material is 52100 steel per AMS 6444 (300 ksi minimum).

(1) Machine 0.3105-0.3115 diameter per 20-10-01 to 0.2905 minimum repair diameter and 125 microinch finish. Maintain parallel to flats within 0.0005 inch.

(2) If machining of base metal is required, stress relieve at 300°-350°F for 3 hours and shot peen 20-10-03 prior to chrome plating.

(3) Build up with chrome plate per 20-42-03. Do not plate radii.

(4) Grind per 20-10-04 to 0.3105-0.3115, design dimension and 8 microinch finish, parallel to flats within 0.0005 inch.

E. Piston (30, Fig. 1103) (Fig. 401)

(1) Machine diameters -A- and -B- to remove defects within repair limits shown.

(2) If base metal was machined, stress relieve at 775°-825°F for 2 hours before chrome plating.

(3) Build up with chrome plate per 20-42-03. Do not plate radii.

(4) Grind to design dimensions and finish.

2. Refinish

NOTE: Refer to 20-30-02 for stripping of protective finishes and to 20-41-01 for explanation of F and SRF finish codes.

A. Fig. 1101 Parts

(1) Shield (10) -- Alodize or chromic acid anodize and apply primer BMS 10-11, type 1 (SRF-2.30) all over. Material: Al alloy.

B. Fig. 1102 Parts

(1) Crank Stop (17) -- Cadmium plate (F-1.1926), except on threads and 0.23 inch diameter end. Material: 4340 Steel, 180-200 ksi.

(2) Bearing Retainer (21), Plate (53), Body (72) -- Chromic acid anodize (F-2.26) all over. Material: Al alloy.

(3) Seal Retainer (27) -- Cadmium plate (F-4.201) on flange surfaces only, except recess. Material: Al-Bronze alloy.

(4) Sleeve (30) -- Cadmium plate (F-4.201) on exterior surfaces only. Material: Al-Bronze alloy.

(5) Shear Pin (35) -- Cadmium plate (F-1.1926) all over. Pin OD to be 0.1880 to 0.1895 inch after plating. Material: 4340 steel, 180-200 ksi.

(6) Housing (47) -- Sulfuric acid anodize (F-2.201) all over. Material: Al alloy.

C. Fig. 1103 Parts

(1) Mount (6), Crank (11) (65-44528-2), Retainer (14), Plug (17), End Cap (38), Spacers (39, 47), Housing (49) -- Chromic acid anodize (F-2.26) all over. Material: Al alloy.

(2) Bushing (9), Piston (30), Retainer (31), Bearing (32) -- Fig. 401.

(3) Spring (22) -- Cadmium plate (F-1.20) and bake 8 hours at 350 to 400°F after plating. Material: Music wire, MIL-W-6101.

3. Replacement

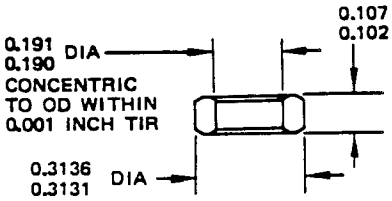
A. Replace all O-rings, backup rings, cap rings, scraper (16, Fig. 1103) and seals (37, Fig. 1103).

B. Inserts (4, 5, 52, Fig. 1103).

(1) Remove defective insert. Clean and check threads in bore of mount (6, Fig. 1103) or housing (49, Fig. 1103).

(2) Apply primer BMS 10-11, type 1, to bore of mount or housing and to insert. Install insert 1/4 to 1/2 turn below surface of part while primer is wet. Remove tang.

C. Replace housing (38, Fig. 1102) or slide (57, Fig. 1102) as matched sets if leakage requirements during testing are not met.

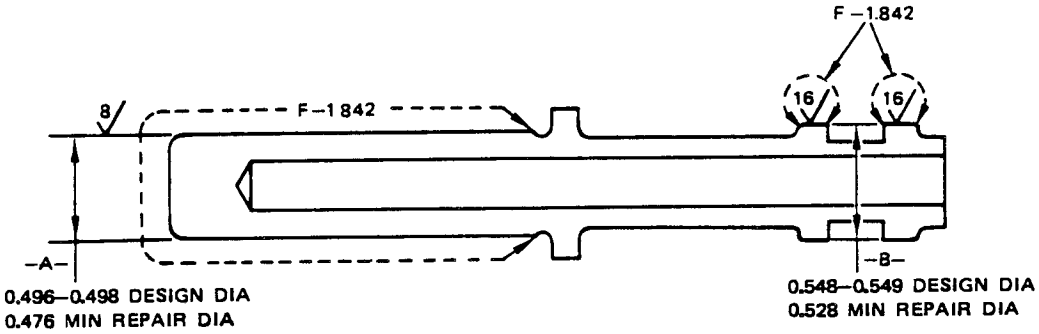


REFINISH

(65-54571-1) - - CHROMIC ACID ANODIZE (F-2.26) ALL OVER.
(65-44528-3) - - CADMIUM PLATE (F-1.1923) ALL OVER, 0.0003-0.0005 THICK.

MATERIAL :
(69-54571-1) - - AL ALLOY
(65-44528-3) - - 4130 STEEL, 125-145 KSI

BUSHING (9)

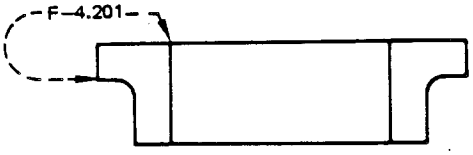


REFINISH

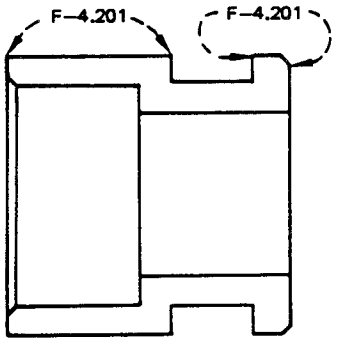
CHROME PLATE (F-1.842) ON DIAS -A- AND -B- ONLY

MATERIAL: 4340 STEEL, 180-200 KSI

PISTON (30)



SEAL RETAINER (31)



BEARING (32)

REFINISH

CADMIUM PLATE (F-4.201) IN AREAS INDICATED, 0.0003-0.0005 INCH THICK

MATERIAL: AL-NI-BRONZE PER AMS 4640

NOTE: ITEM NUMBERS REFER TO FIG. 1103.

Refinish Diagrams
Figure 401

ASSEMBLY

1. Materials

   NOTE: Equivalent substitutes can be used.

   A. Hydraulic Fluid -- BMS 3-11 (SOPM 20-60-03)

   B. Assembly Lube -- MCS 352 (SOPM 20-60-03)

   C. Grease -- BMS 3-33 or MIL-G-23827 (SOPM 20-60-03)

   D. Primer -- BMS 10-11, Type 1 (SOPM 20-60-02)

2. General

   A. Before you install them, lubricate all packings, backup rings, cap rings and threaded fittings with BMS 3-11 hydraulic fluid, or Assembly Lube MCS-352. Install them wet.

   B. Install packings and cap rings per SOPM 20-50-06.

3. Brake Metering Valve (Fig. 1102)

   A. Install spring retainers (67), washers (66, 65) as they were found during disassembly, springs (64), spacers (63) with flat face forward, spring seats (62) and spring guides (61) in the bores of body (72).

   B. Install packings (55) and backup rings (56) on sleeves (59).

   C. Lightly lubricate threads for stop nuts (54) in body bores with BMS 3-11 hydraulic fluid, or Assembly Lube MCS-352.

   D. Install slide assemblies (57) in body bores with nuts (54). Tighten the nuts until at the bottom, with 15 pound-inch minimum torque.

   E. Install retaining plate (53) in body (72) with bolts (52).

   F. Install nameplate (51) on body with strap (50).

   G. Install packings (48 and 37) in housing (47).

   H. Install packing (32) and internal packing cap ring (31) on shaft (36).

   I. Install crank assembly (22) in housing (47). Slide the shaft assembly (33) into the bore of housing (47) and through the crank.

      NOTE: The missing spline on the shaft must be aligned with the missing space on the crank.

   J. Install sleeve (30), packing (29), internal packing cap ring (28), seal retainer (27), bearings (26), retainer ring (25), bearing retainers (21), washers (20) and bolts (19) on shaft (36) and housing (47). Tighten the bolts to 35 pound-inches.

K. Install packings (16, 18) and bolts (15, 17) on housing (47).

L. Before you install link assembly (3), make sure pistons (39, 40) are in the correct position.

M. Install link assembly (3) on housing assembly (38), with the shaft of rod (8) in the bore of housing assembly.

N. Apply a layer of BMS 3-33 or MIL-G-23827 grease to washers (2), bolts (1) and threads for bolts in housing (47).

O. Install shims (49) on housing (47). Install housing assembly (38) with attached parts on body assembly (68). Make sure that heads of slides (58) go between retainers of link assembly (3) and touch the ball bearings. Install washers (2) and bolts (1). Tighten the bolts to 60 - 85 pound-inches.

P. Make a check of the shaft rotation per par. 2.B. of TESTING. Adjust thickness of shims as necessary. Then install the shims with wet BMS 10-11, Type 1 primer.

Q. Lockwire bolts as follows:

CAUTION: DO NOT USE CORROSION RESISTANT STEEL LOCKWIRE. GALVANIC ACTION WILL OCCUR AND CAUSE CORROSION OF PARTS.

(1) Lockwire bolts (1) by pairs.

(2) Lockwire bolts (19) to bearing retainers (21).

(3) Lockwire bolts (15 and 17) to housing (47).

4. Feel Actuator (Fig. 1103)

A. Install spacer (47) into housing (49).

B. Make sure that check valve (23), if used, and slide assembly (44) are serviceable. If necessary, refer to the vendor's overhaul instructions.

C. Install packings (45) and backup rings (46) on slide assembly (44) and install slide assembly into housing (49).

D. Install packing (43) into housing (49). Install spring retainer (42), spring (41), washers (40) and spacer (39) into end cap (38) and install assembled items into housing (49). Tighten end cap into housing to 50 - 100 pound-inches. Do not lockwire.

E. Install seals (37) on piston (30). Install packings (34, 36) and backup rings (35) on bearing (32) and cap ring (33). Install bearing (32), cap ring (33) and seal retainer (31) on piston (30). Then install piston and assembled parts into housing (49).

CAUTION: TEMPORARILY ATTACH SLIDE (19) INSIDE SLEEVE (20) TO KEEP IT IN POSITION IN THE SLEEVE AS YOU INSTALL THE SLEEVE INTO THE HOUSING.

F. Install packings (25, 26, 28) and backup rings (27, 29) on plug (17), sleeve (20) and cap ring (24), if used. Install poppet (21) and spring (22) or check valve (23) (if used) into sleeve (20). Install sleeve (20) and attached parts into housing (49) and install plug (17).

G. Install bolt (8), bushing (9), nut (10) and bearing (12) on crank (11). Then install crank (11), bearings (15), retainers (14) and bolts (13) on mount (6).

H. Install scraper ring (16) on mount (6). Install mount (6) and assembled parts on housing (49) with bolts (1) and washers (2). Tighten bolts to 30-40 pound-inches.

4. Brake Metering Valve Assembly on Feel Actuator (Fig. 501, 1101)

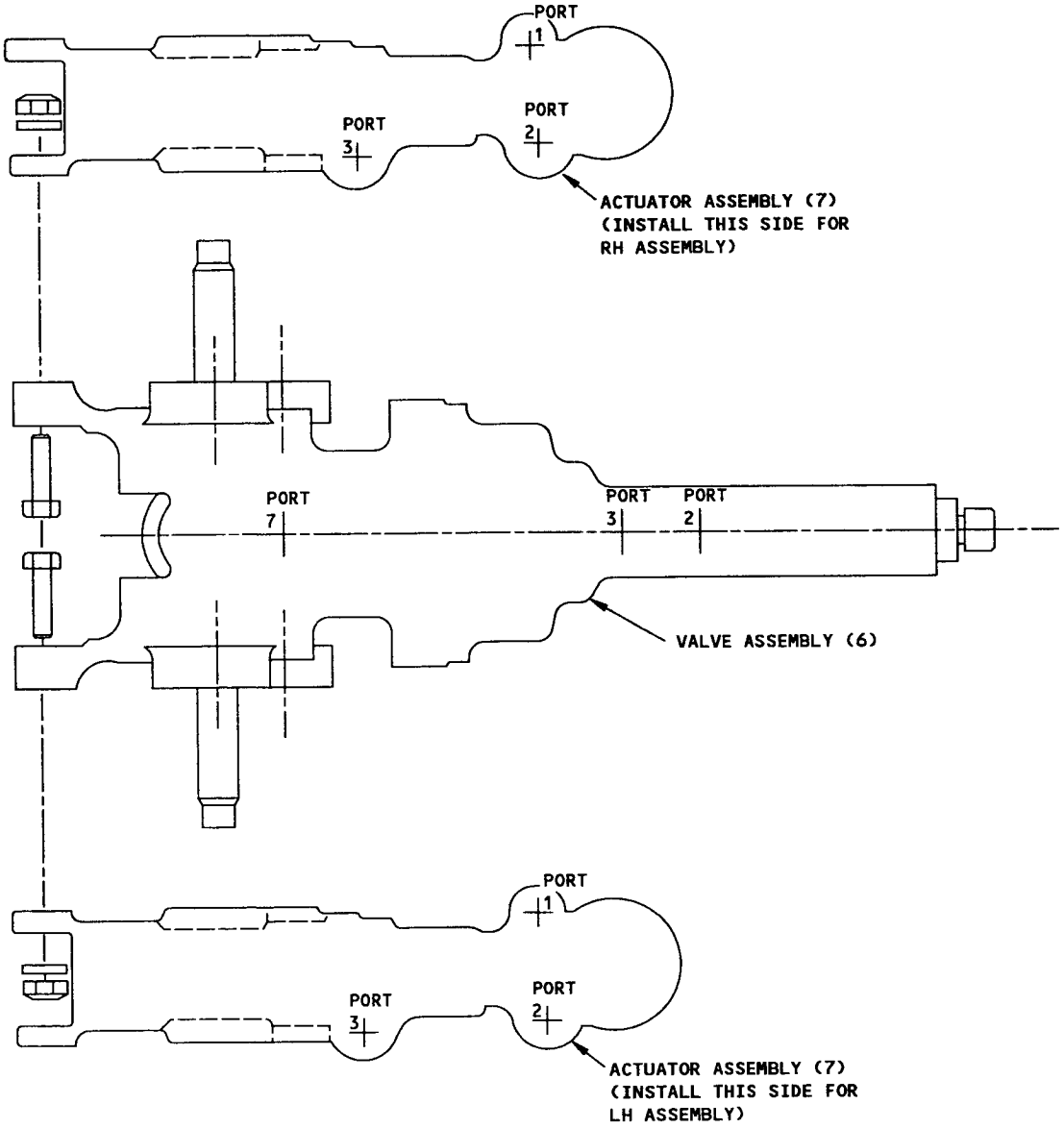
A. Install packings (16) on unions (11, 12) and check valve (13). Install packing (15) on union (14). Install packings (18) on unions (17).

CAUTION: BE SURE TO INSTALL CHECK VALVE (13) WITH ITS ARROW POINTED OUT AND ITS SMOOTH CYLINDRICAL DIAMETER AGAINST THE HOUSING OF VALVE (6).

B. As applicable, install unions (11 thru 14, 17) and check valve (13) on valve assembly (6) and actuator assembly (7).

C. Install actuator assembly (7) on valve assembly (6) with bolts (1, 4), washers (2, 5) and nuts (3). See Fig. 501 for left and right hand configurations.

D. Install shield (10) on actuator assembly (7) with screw (8) and nut (9).



ITEM NUMBERS REFER TO FIG. 1101

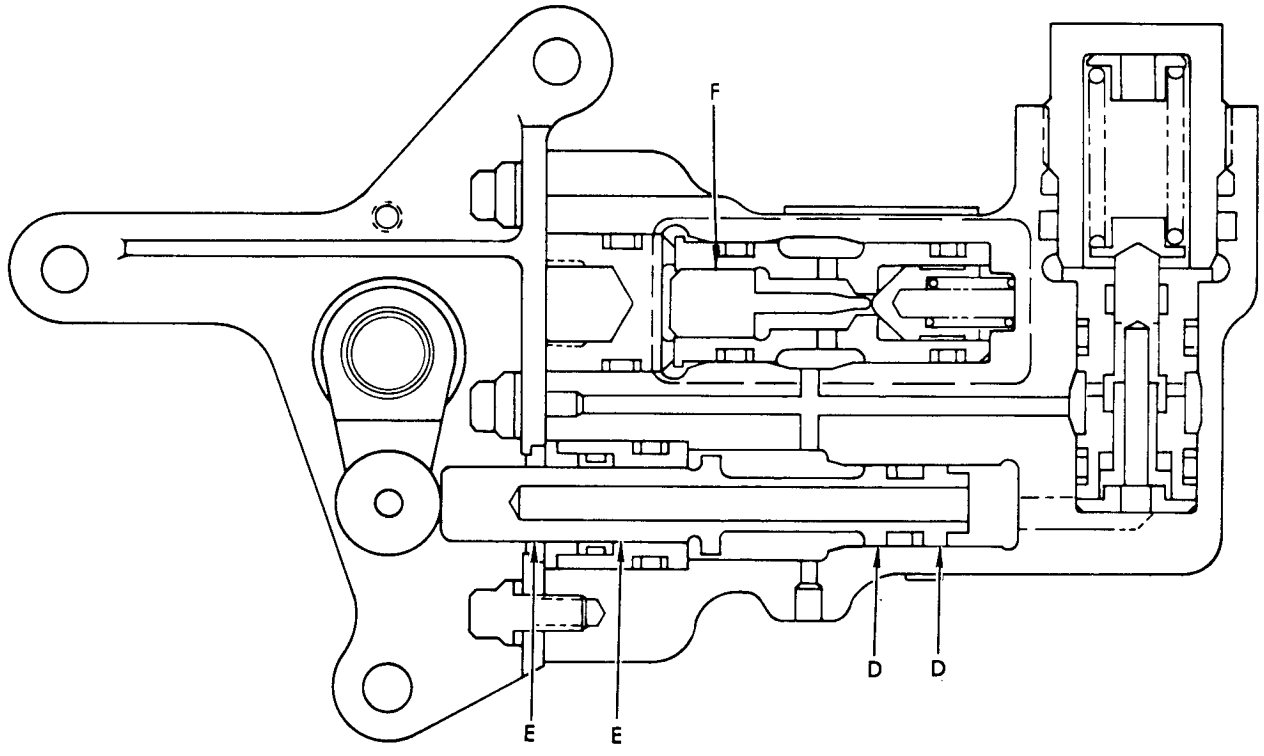
Feel Actuator and Brake Metering Valve Assembly Details
Figure 501

G82937

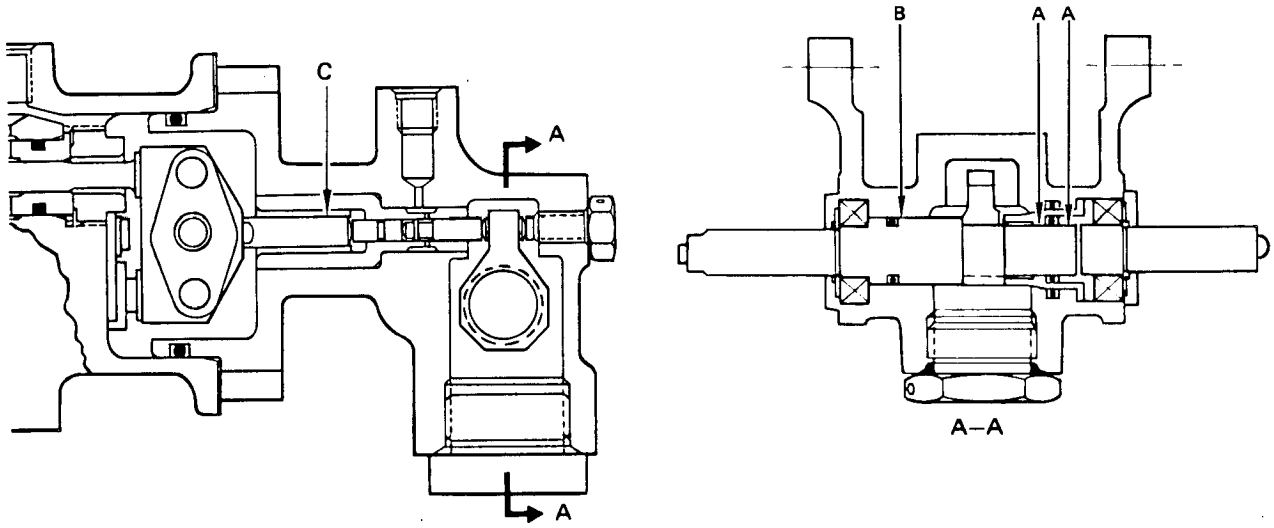
FITS AND CLEARANCES

1. Figure 601 lists original design dimensions and service wear limits for certain close tolerance parts of the assembly. The original design dimensions are to be used as a guide for rework of parts which fail to meet the wear tolerance requirements. Unless otherwise specified in the rework procedure, a part should be returned to the design dimensions whenever rework is accomplished.

2. Clearances are given to aid assembly of the component. The value given in the "Maximum Allowable Clearance" column is the maximum permitted to ensure proper functioning until the next overhaul cycle of the component. If assembled parts fail to meet these requirements, one or more of the parts must be rejected. Parts that are rejected should be reworked if within the rework limits given in the repair procedure; if not within rework limits, the parts should be scrapped. It is recommended that whenever newly reworked parts are assembled, the design clearances should be used as the guiding assembly criteria.



ACTUATOR ASSEMBLY (7, FIGURE 1101)



VALVE (6, FIG. 1101)

Ref Letter Fig. 601	Mating Item No. Fig. 1102		Design Dimensions: Dimensions (inches) Min	Design Dimensions: Dimensions (inches) Max	Design Dimensions: Assembly Clearance (inch) Min	Design Dimensions: Assembly Clearance (inch) Max	Service Wear Limits: Dimension Limits (inches) Min	Service Wear Limits: Dimension Limits (inches) Max	Service Wear Limits: Maximum Allowable Clearance (inch)
A	ID OD	27,30 36	0.625 0.621	0.626 0.622	0.003	0.005	0.618	0.629	0.007
B	ID OD	38 36	0.801 0.798	0.803 0.799	0.002	0.005	0.794	0.806	0.007
C	ID OD	42 8	0.3125 0.3105	0.3140 0.3115	0.0010	0.0035	0.3075	0.3165	0.0050
	Fig. 1103								
D	ID OD	49 30	0.552 0.548	0.553 0.549	0.003	0.005	0.546	0.554	0.007
E	ID OD	31,32 30	0.500 0.496	0.501 0.498	0.002	0.005	0.494	0.505	0.007
F	ID OD	20 19				0.0005			0.0006

TESTING

1. Test Equipment

   A. Hydraulic test stand to supply controllable hydraulic pressure from zero to 4500 psi.

   B. Flow measuring equipment for flow range from zero to 2000 cc per minute.

   C. Suitable pressure gages.

   D. Holding fixture TSJ 65-44521-1 or F80189-1, to measure angular rotation of input shaft.

2. Preparation for Test

   A. General

      (1) Do the tests at room temperature with BMS 3-11 hydraulic fluid (Skydrol 7000 optional).

      WARNING: DO NOT APPLY COMPRESSED AIR TO PORTS AT ANY TIME. DO NOT CYCLE UNIT AT PROOF PRESSURE.

      (2) Ports not specified in any particular test must be open.

      (3) Flow through any open port is not to be included as external leakage.

      (4) Tests of valve assembly (6, Fig. 1101) can be done in any sequence after the shaft rotation check and the proof pressure test. Tests of actuator assembly (7, Fig. 1101) must be done in the sequence shown.

   B. Shaft Rotation Check (Fig. 1102)

      (1) Put the unit in holding fixture TSJ 65-44521-1 or F80189-1. Make a check of the shaft rotation as follows:

         (a) From the bottomed (fully off) position, turn the shaft and make a note of the angular position at which a sudden increase in torque occurs. Make sure the torque at this position is not more than 70 pound-inches.

            NOTE: This angular position is the amount of backlash between crank (23) and shaft (36).

(b) Continue to turn the shaft and make a note of the total angular travel.

(c) The difference between angular travel (backlash) of step (a) and total travel of step (b) must be 8°37' to 9°23'.

(2) Adjust the thickness of shims (49) as necessary to get the correct shaft angular rotation. To increase angular rotation increase the thickness of the shim. To decrease angular rotation decrease the thickness of the shim. Refer to Disassembly and Assembly as necessary.

C. Deaeration of Units

(1) Connect ports 1 and 4 of valve assembly (6, Fig. 1101) to the hydraulic pressure source (Fig. 701). Keep all other ports open. Apply moderate hydraulic pressure. Turn shaft (36) in each direction until the hydraulic fluid comes from the open ports with no sign of aeration.

(2) Fill actuator assembly (7, Fig. 1101) with hydraulic fluid BMS 3-11 and bleed off all air.

3. Brake Metering and Auto Brake Valve Assembly (Fig. 1102)

A. Proof and External Leakage Test

(1) Plug ports 2 and 5. Turn shaft (36) to fully open the valve (Fig. 702). Hold the valve in the open position. Apply 4500 psi hydraulic pressure to ports 1, 4 and 7 for a two minute period. There must be no external leakage or permanent set.

(2) Plug ports 1, 2, 4 , 5 and 7. If installed, temporarily remove the check valve from part 3 to do this test. Turn the shaft to fully open the valve and hold the valve in the open position. Apply 900 psi hydraulic pressure to ports 3 and 6 and hold for a two minute period. There must be no external leakage or permanent set.

(3) Do step (2) again with 2 psi hydraulic pressure. There must be no external leakage.

B. Slide Operation Test

(1) With valve in closed position, apply 2 psi hydraulic pressure to ports 2 and 5. Hydraulic fluid must flow freely from ports 3 and 6. Open valve. Hydraulic fluid must flow freely from ports 1 and 4.

(2) Apply 100 psi hydraulic pressure to ports 2 and 5 at the same time. Hydraulic fluid must flow from ports 3 and 6 at 700-2000 cc per minute from each port.

(3) There must be no flow from ports 3 and 6 after the shaft gets to the 1°30' to 2°40' position.

(4) There must be flow from ports 1 and 4 by the time the shaft gets to the 4°00' maximum position.

(5) If necessary, add or remove washers (65, and 66) to adjust the unit to the return flow, flow stop and flow start requirements of steps (1) through (4). Refer to Disassembly and Assembly as necessary.

C. Internal Leakage Test

(1) Plug ports 2, 5 and 7. With the valve in the closed position, apply 3000 psi hydraulic pressure to ports 1 and 4. Leakage from port 3 and 6 during the first minute of seating period must not be more than 1.5 cc from each port. Leakage after a six minute seating period must not be more than 1.0 cc per minute from each port.

(2) Do step (1) again with the valve in the open position.

D. Operating Test

(1) Connect hydraulic lines to all seven ports.

(2) Apply 3000 psi hydraulic pressure to ports 1 and 4. Quickly operate the valve through five complete cycles. The valve must not stick, lag or chatter. There must be no external leakage.

(3) Apply 3000 psi hydraulic pressure to ports 1, 4 and 7. The pressure at port 2 and 5 must be 400-560 psi.

(4) Remove pressure from port 7. The pressure at ports 2 and 5 must decrease to zero psi.

E. Flow Test

(1) Apply 3000 psi hydraulic pressure to ports 1 and 4. Open the valve fully. Monitor the flow through ports 2 and 5. The flow rate from each port must be within the limits of Fig. 702.

F. Auto Brake Piston Leakage Test

(1) Remove plug (15) and install a reducer union. Seal with a plug the 0.12-inch passage that connects the two cavities in the housing, or turn the unit to put this 0.12-inch passage above port 3 and the hole for plug (15).

(2) Cover ports 1, 2, 4, 5 and 6.

(3) Remove check valve (13, Fig. 1101) from port 3. Fill the valve assembly cavities with hydraulic fluid through port 3 and the union until the fluid starts to come out of port 3 and the union.

(4) Apply 3000 psi to port 7. After a three minute seating period, make sure the leakage is 0.10-1.00 cc per minute at each of these locations: port 3 and at the reducer union.

(5) Remove the reducer union and install plug (15) again.

(6) Install check valve (13, Fig. 1101) into port 3.

G. Preparation for Storage

(1) After the testing, partially fill the unit with hydraulic fluid, BMS 3-11. If you used Skydrol 7000 in the test, drain the unit thoroughly then partially fill with BMS 3-11 fluid.

(2) Cap or plug the ports with hydraulic-fluid-resistant packings and plugs or caps.

4. Actuator Assembly Functional Tests

A. Pressure Reducer Adjustment Test

(1) Apply and hold 3000 psi hydraulic pressure at port 3, and 45 psi at port 2. At port 1, increase the pressure from 0 to 700 psi, then decrease the pressure from 700 to 0 psi.

(2) The forces at the piston must be within the limits shown in Fig. 704. Add or remove washers (40) as necessary to adjust the force within the limits.

B. Proof Pressure Test

(1) Open port 2 and apply 4500 psi at ports 1 and 3 for 2 minutes. There must be no external leakage or permanent set.

(2) Plug ports 1 and 3 and apply 900 psi at port 2 for 2 minutes. There must be no external leakage or permanent set.

(3) Plug port 2 and apply 100 psi to port 3 and 50 psi to port 1 for 2 minutes. There must be no external leakage.

C. Internal Leakage Test

(1) Open port 2 and apply 3000 psi at ports 1 and 3. The leakage from port 2 must not be more than 20 cc per minute.

(2) For assemblies 65-44731-1 -- Open ports 2 and 3 and apply 3000 psi to port 1. After a 15 minute stabilizing period, combined leakage from ports 2 and 3 must not be more than 2 drops per minute.

(3) For assemblies 65-44731-2, -4 -- Open ports 2 and 3 and apply 3000 psi to port 1. The total leakage during the first 2 minutes must not be more than 3 cc. The leakage rate after 2 minutes must not be more than 2 drops per minute.

D. Piston Rod Seal Leakage Test -- Apply 45 psi at port 2 and 300 psi at ports 1 and 3. Cycle actuator through 25 full cycles by depressing and releasing the piston rod. Leakage at rod seal must not be more than one drop.

E. Operational Test -- Apply 3000 psi at port 3 and 45 psi at port 2. Gradually increase the pressure to port 1. The force necessary to push down the piston or to hold the piston from extending must be within the limits of Fig. 704.

F. Stability Test

(1) Open port 2, and apply 1450-1550 psi to port 1.

(2) Apply and slowly increase the pressure from 0 to 2000 psi at port 3, then slowly decrease this pressure to zero. If the unit is not stable, you will hear a knocking noise inside the unit.

(3) Do steps (2) and (3) again to make sure the unit is stable.

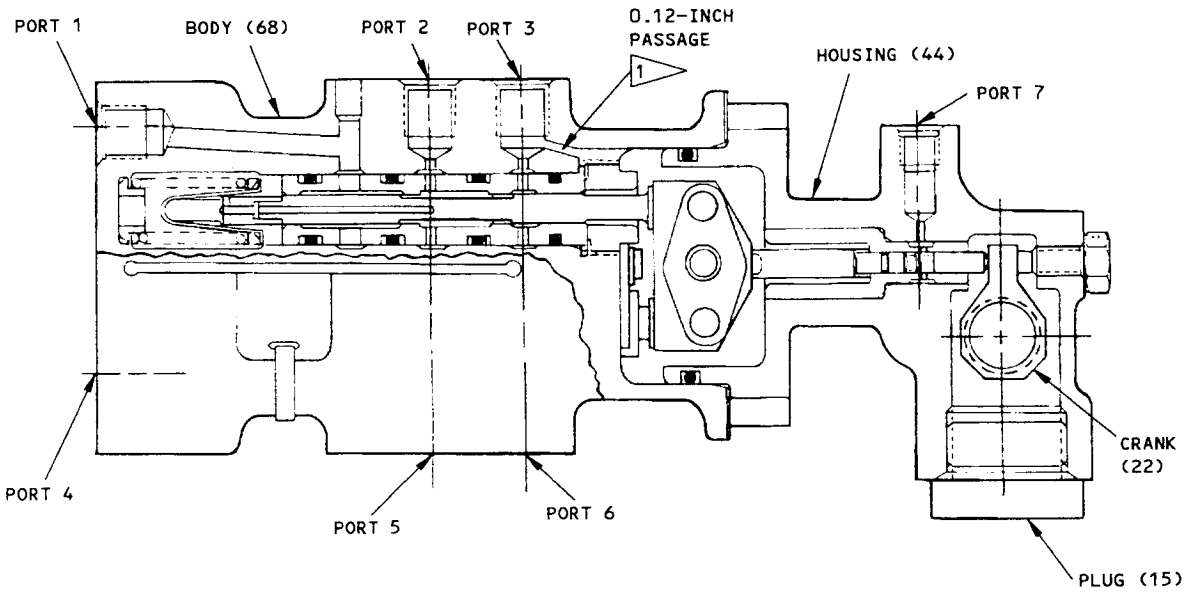
G. Check Valve Stability Test

NOTE: This test is optional.

(1) Connect and apply 3000 psi to port 1 and 45 psi return pressure to port 2.

(2) Apply and slowly increase the pressure from 0 to 3000 psi at port 3. There must be no leakage at check valve (23) as indicated by a noise.

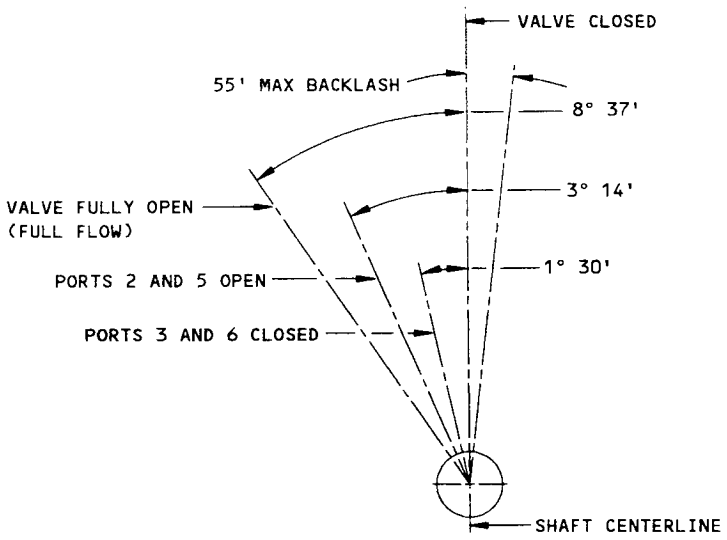
(3) Do step (2) again, but decrease the pressure from 3000 to 0 psi.



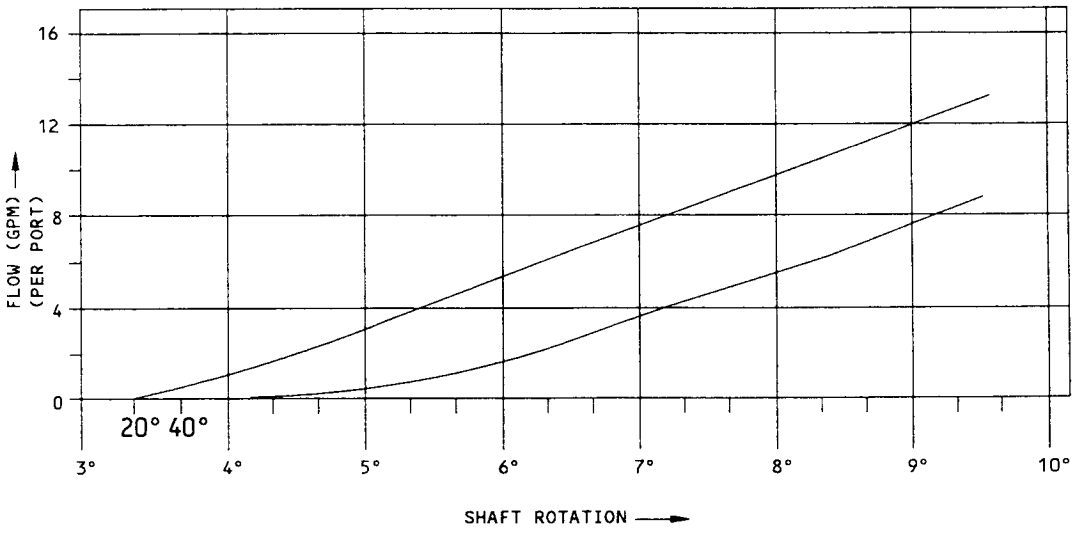
1 SEAL THIS PASSAGE WITH A PLUG OR TURN THE UNIT TO PREVENT FLOW THROUGH THIS PASSAGE DURING THE LEAKAGE TEST (PAR. 3.F.)

Location of Valve Assembly Ports
Figure 701

G14090



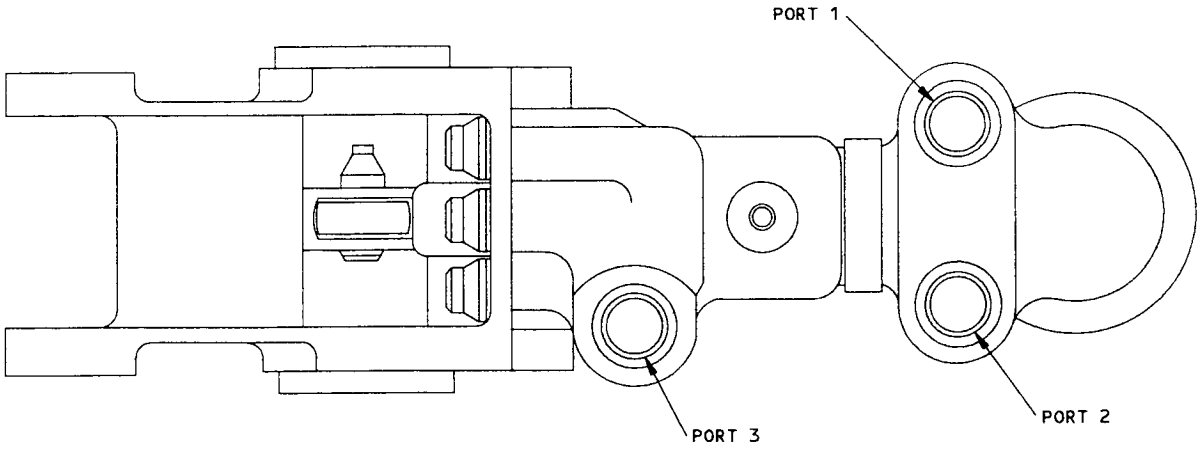
SHAFT ROTATION



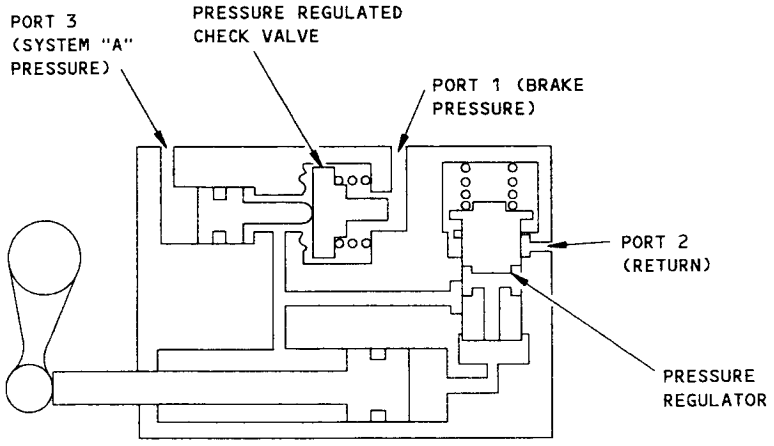
FLOW VERSUS SHAFT ROTATION CHARACTERISTICS FOR EACH SIDE OF BRAKE METERING VALVE AT 3000 PSI PRESSURE DROP WITH BOTH PRESSURE PORTS PRESSURIZED. MAX AND MIN FLOW SHOWN IS FROM PRESSURE PORT (1 AND 4) TO BRAKE PORT (2 AND 5).

SLIDE TRAVEL EQUALS SHAFT ROTATION IN DEGREES TIMES 0.0137 INCH.

Shaft Rotation Diagrams
Figure 702

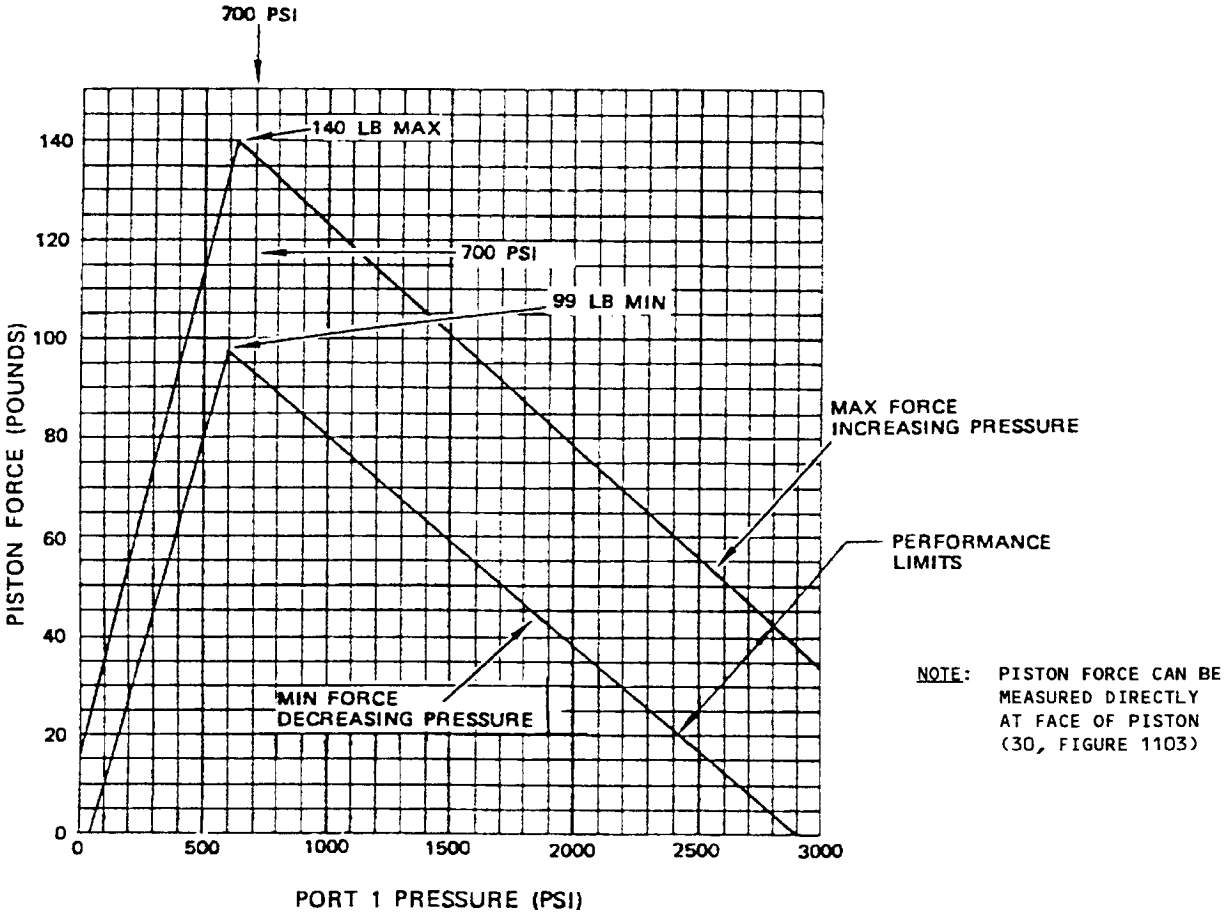


LOCATION OF ACTUATOR ASSEMBLY PORTS



ACTUATOR ASSEMBLY SCHEMATIC DIAGRAM

Actuator Assembly Characteristics
Figure 703



Actuator Assembly Operational Test
Figure 704

TROUBLE SHOOTING

1. Trouble During Test After Overhaul of Valve Assembly (See Fig. 1102.)

	Trouble	Possible Cause	Correction
A.	External leakage between housing (47) and body (72)	Defective packing (48)	Disassemble, examine, replace
B.	Leakage around shaft (36) on housing (47)	Defective packing (29, 32 or 37)	Disassemble, examine, replace
C.	Flow outside the limits of Testing par. 3.C.	Slide assembly (57) worn or damaged. Defective packings (55)	Disassemble, examine, replace
D.	Unit cannot be pressurized or does not operate correctly	Check valve installed backward or not removed if specified	Remove check valve. Keep it out for the test or install it correctly (arrow out, cylindrical body against housing)

2. Trouble During Test After Overhaul of Actuator Assembly (Fig. 1103)

	Trouble	Possible Cause	Correction
A.	External leakage at proof pressure	Defective packings	Replace packings at the leakage
B.	Leakage from port 2 more than limit	Slide assembly (44) parts worn, or defective packings (45)	Replace slide assembly (44) and packings (45)
C.	Combined leakage from ports 2 and 3 more than limit	Slide (19) and sleeve (20) are worn, or defective packings (28)	Replace slide (19) and sleeve (20) and packings (28)
D.	Rod seal leakage more than limit	Defective cap ring (33) or packing (36)	Replace cap ring (33) and packing (36)
E.	Force to push down piston or force from piston as it extends are more than limits	Too much friction on piston (30) or incorrect adjustment of pressure reducer	Examine piston (30) and replace defective components. Adjust pressure on spring (41) and slide assembly (44)

STORAGE INSTRUCTIONS

1. After testing, partially fill unit with hydraulic fluid, Specification BMS 3-11, and cap or plug ports with hydraulic fluid resistant fittings to prevent leakage during storage.

2. Wrap the assembly in vapor barrier paper. Tag actuator with test date and cure date for packings. Tag should carry following information: "This unit contains hydraulic fluid, Specification BMS 3-11."

3. For further information, refer to "Temporary Protective Coatings," Subject 20-44-02.

SPECIAL TOOLS, FIXTURES AND EQUIPMENT

1. TSJ 65-44521-1 -- Holding fixture (replaced by F80189-1)
2. F80189-1 -- Holding fixture (replaces TSJ 65-4451-1)

ILLUSTRATED PARTS LIST

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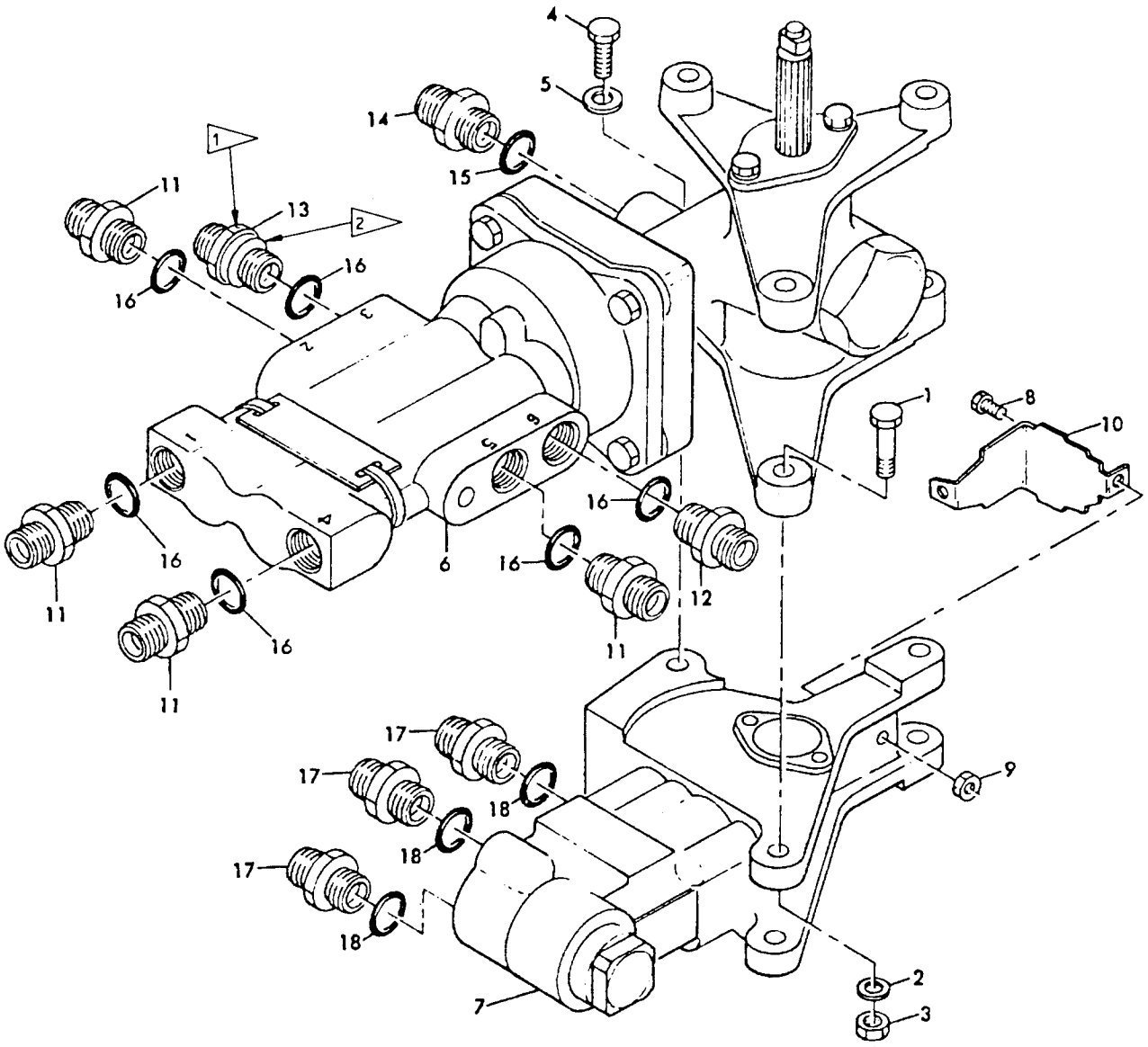


1 ARROW MUST POINT OUT FROM HOUSING
2 THIS CYLINDRICAL BODY MUST BE AGAINST HOUSING

(LH ASSEMBLY SHOWN)

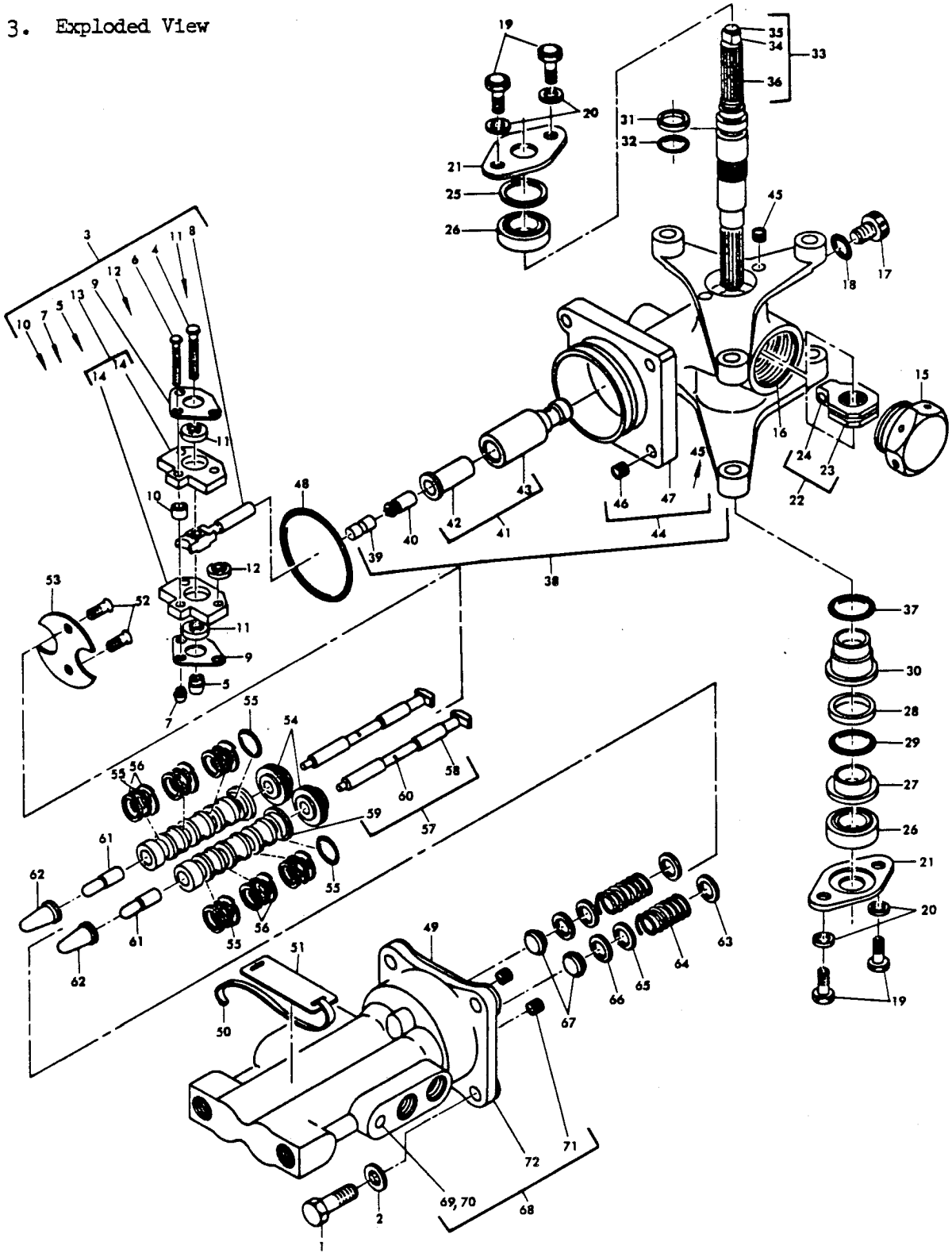
Feel Actuator and Brake Metering Valve Assembly
Figure 1101

GB3407

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
	65-44931-3		VALVE ASSY, FEEL ACTR & BRAKE METERING	A	RF
	65-44931-4		VALVE ASSY, FEEL ACTR & BRAKE METERING (SB 32-1021)	B	RF
	65-44931-5		VALVE ASSY, FEEL ACTR & BRAKE METERING (SB 32-1017)	C	RF
	65-44931-6		VALVE ASSY, FEEL ACTR & BRAKE METERING (SB 32-1017)	D	RF
	65-44931-8		VALVE ASSY, FEEL ACTR & BRAKE METERING (SB 32-1021)	E	RF
	65-44931-9		VALVE ASSY, FEEL ACTR & BRAKE METERING	F	RF
	65-44931-10		VALVE ASSY, FEEL ACTR & BRAKE METERING	G	RF
	65-44931-11		VALVE ASSY, FEEL ACTR & BRAKE METERING	H	RF
	65-44931-12		VALVE ASSY, FEEL ACTR & BRAKE METERING	I	RF
1	NAS1105-14		. BOLT		2
2	AN960PD516		. WASHER		2
3	BACN10JC5		. NUT (REPLS NAS679A5)		2
4	BACB30NE5H9		. BOLT		1
5	AN960PD516		. WASHER		1
6	65-44521-4		. VALVE ASSY, BRAKE METERING AND AUTO BRAKE (FIG. 1102)	A-E	1
6	65-44521-5		. VALVE ASSY, BRAKE METERING AND AUTO BRAKE (FIG. 1102)	FG	1
6	65-44521-6		. VALVE ASSY, BRAKE METERING AND AUTO BRAKE (FIG. 1102)	HI	1
7	65-44731-1		. ACTUATOR ASSY, BRAKE VALVE FEEL AUGMENTATION (FIG. 1103)	AB	1
7	65-44731-2		. ACTUATOR ASSY, BRAKE VALVE FEEL AUGMENTATION (FIG. 1103)	C-I	1
7	65-44731-4		. ACTUATOR ASSY, BRAKE VALVE FEEL AUGMENTATION (FIG. 1103)		1
8	NAS623-3-2		. SCREW		1
9	BACN10JC3		. NUT (REPLS NAS679A3W)		1
10	69-54534-1		. SHIELD		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
11	MS21902-6		. UNION		4
12	MS21902D6		. UNION		1
13	BACV10BU2		. CHECK VALVE	ACE-I	1
13	MS21902D6		. UNION (PRE SB 32-1021)	BD	1
13	BACV10BU2		. CHECK VALVE (POST SB 32-1021)	BD	1
14	MS21902-4		. UNION		1
15	NAS1612-4		. PACKING, O-RING		1
16	NAS1612-6		. PACKING, O-RING		6
17	MS21902-4		. UNION		3
18	NAS1612-4		. PACKING, O-RING		3

3. Exploded View

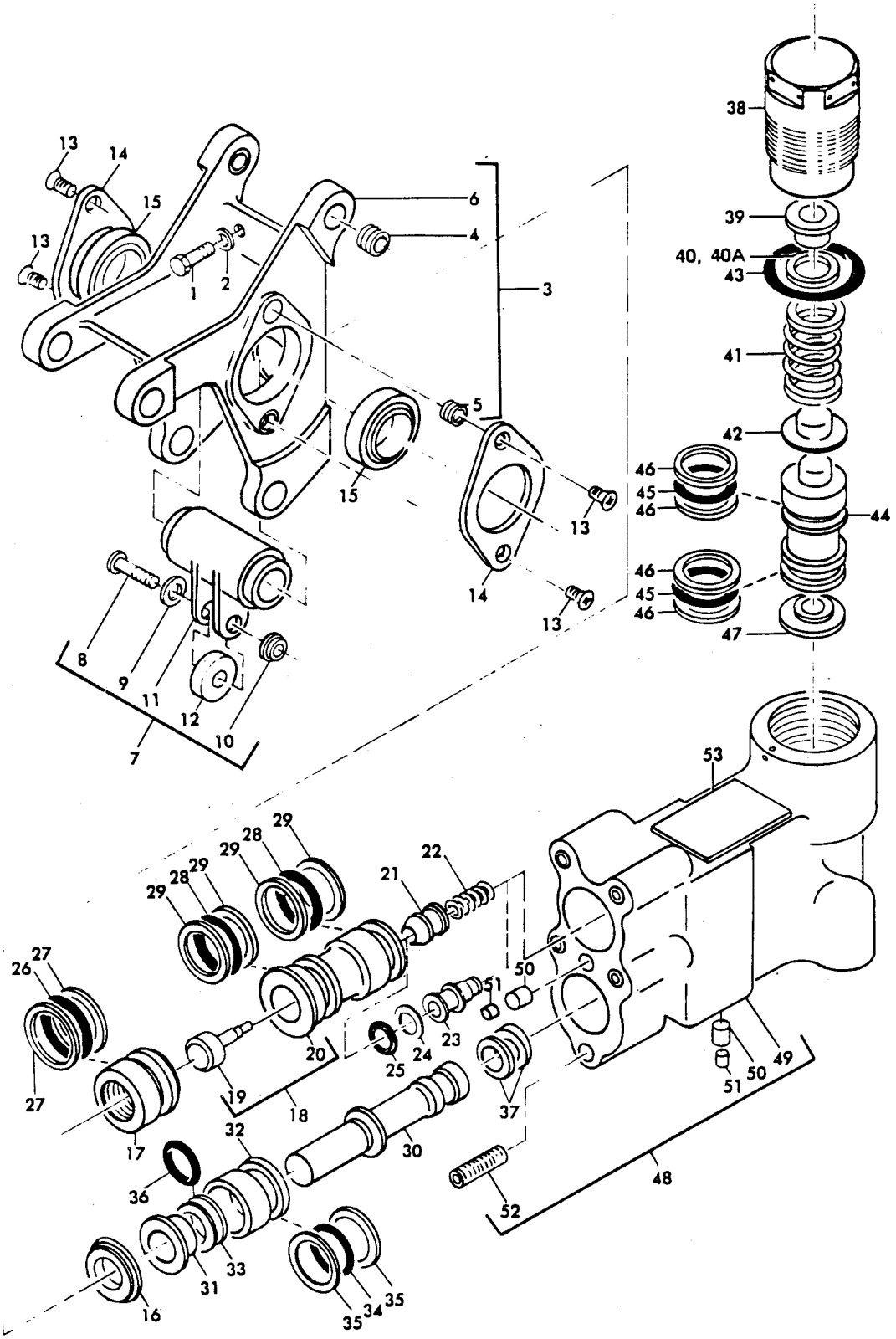


Main Gear Brake Metering and Auto Brake Valve Assembly
Figure 1102

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1102-					
	65-44521-4		VALVE ASSY, BRAKE METERING & AUTO BRAKE	A	RF
	65-44521-5		VALVE ASSY, BRAKE METERING & AUTO BRAKE	B	RF
	65-44521-6		VALVE ASSY, BRAKE METERING & AUTO BRAKE	C	RF
1	BACB30US5K4H		. BOLT		4
1	BACB30CW5H4		. BOLT (OPT)		4
2	BACW10BP5CD		. WASHER		4
2	AN960PD516		. WASHER (OPT)		4
3	69-35830-3		. LINK ASSY		1
4	BACB30GW8A14U		. . BOLT, (PREF)		1
4	BACB30GW8D14N		. . BOLT, (OPT)		1
5	NAS1080C8		. . COLLAR		1
6	BACB30GW6A14U		. . BOLT, (PREF)		3
6	BACB30GW6D14N		. . BOLT, (OPT)		3
7	NAS1080C6		. . COLLAR		3
8	69-35824-2		. . ROD		1
9	69-35823-1		. . RETAINER		2
10	69-35830-2		. . BUSHING		1
11	69-35830-5		. . BEARING		2
12	69-35830-6		. . BEARING		2
13	69-35828-1		. . RETAINER ASSY (MATCHED SET)		1
14	69-35828-2		. . . RETAINER		2
15	AN814-16DL		. PLUG		1
16	NAS1612-16		. PACKING, O-RING		1
17	66-22704-2		. STOP, CRANK		1
18	NAS1612-2		. PACKING, O-RING		1
19	BACB30NE4H2		. BOLT (REPLS NAS1304-2H)		4
20	AN960-416L		. WASHER		4
21	66-22703-1		. RETAINER, BEARING		2
22	69-35905-4		. CRANK ASSEMBLY		1
23	69-35905-2		. . CRANK		1
24	69-35905-5		. . PLUG		2
25	RSN59S		. RING, RETAINER, V80756		1
26	BACB10BA15PP		. BEARING (REPLS BACB10A523H)		2
27	66-22721-1		. RETAINER, SEAL		1
28	BACR12BD114A		. RING, INTERNAL		1
29	NAS1611-114		. PACKING, O-RING		1
30	69-35515-1		. SLEEVE		1
31	BACR12BE114A		. RING, EXTERNAL		1
32	NAS1611-114		. PACKING, O-RING		1
33	65-44524-3		. SHAFT ASSY		1
34	NAS1080-6		. . COLLAR		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1102-					
35	66-22713-2		. . PIN, SHEAR		1
36	65-44524-2		. . SHAFT		1
37	NAS1611-213		. PACKING, O-RING		1
38	69-35826-3		. HOUSING ASSY (MATCHED SET)		1
39	69-35819-3		. . PISTON		1
40	69-35820-3		. . PISTON		1
41	69-35821-5		. . SLEEVE ASSY		1
42	NAS77A5-87		. . . BUSHING		1
43	69-35821-6		. . . SLEEVE (PREF)		1
43	69-35821-7		. . . SLEEVE (OPT)		1
44	65-44922-1		. . HOUSING ASSY		1
45	MS21209F4-15		. . . INSERT		4
46	MS21209F5-20		. . . INSERT		4
47	65-44922-2		. . . HOUSING		1
48	NAS1611-228		. PACKING, O-RING		1
49	69-35524-1		. SHIM		AR
50	69-35587-15		. STRAP, NAMEPLATE		1
51	BACN12A3LT		. NAMEPLATE		1
52	BACB30EL3-1		. BOLT		2
53	69-35527-2		. PLATE, RETAINING		1
54	66-22705-2		. NUT, STOP		2
55	NAS1611-113		. PACKING, O-RING		8
56	MS28782-11		. RING, BACKUP		12
57	69-35829-3		. SLIDE ASSY		2
58	69-35825-3		. . SLIDE		1
59	69-35508-5		. . SLEEVE (PREF)		1
59	69-35508-4		. . SLEEVE (OPT)		1
60	69-35829-4		. . WIRE, MUSIC, 0.0290-0.0295 DIA X 0.45 LONG		1
61	69-35795-1		. GUIDE, SPRING		2
62	69-35796-1		. SEAT, SPRING		2
63	69-35804-1		. SPACER		2
64	66-22712-2		. SPRING, COMPRESSION		2
65	69-35834-1		. WASHER, 0.016 THICK		AR
66	69-35834-2		. WASHER, 0.006 THICK		AR
67	69-35794-1		. RETAINER, SPRING		2
68	65-44523-1		. BODY ASSY	A	1
68	65-44523-5		. BODY ASSY	B	1
68	65-44523-6		. BODY ASSY	C	1
69	BACP20AX25DP		. . PIN		2
70	BACP20AX25D		. . PLUG		2

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1102-					
71	MS21209F1-15		. . INSERT		2
72	65-44523-2		. . BODY (USED ON 65-44523-1)		1
72	65-44523-4		. . BODY (USED ON 65-44523-5)		1
72	65-44523-7		. . BODY (USED ON 65-44523-6)		1



Brake Valve Feel Augmentation Actuator Assembly
Figure 1103

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1103-					
	65-44731-1		ACTUATOR ASSY, BRAKE VALVE FEEL AUGMENTATION	A	RF
	65-44731-2		ACTUATOR ASSY, BRAKE VALVE FEEL AUGMENTATION (SB 32-1017)	B	RF
	65-44731-4		ACTUATOR ASSY, BRAKE VALVE FEEL AUGMENTATION	C	RF
1	BACB30FD4-2		. BOLT (OPT TO MS24678-20)		5
1	MS24678-20		. BOLT (OPT TO BACB30FD4-2)		5
2	65-44731-5		. WASHER (REPLS NAS620A416L)		5
2	NAS620A416L		. WASHER		5
3	65-44558-1		. MOUNT ASSY		1
4	MS21208F5-10		. . INSERT		2
5	MS21209F1-15		. . INSERT		4
6	65-44558-2		. . MOUNT		1
7	65-44585-1		. CRANK ASSY (PREF)		1
7	65-44528-1		. CRANK ASSY (OPT TO 65-44585-1)		1
8	BACB30FM6-11		. . BOLT (USED ON 65-44585-1)		1
8	BACB30FM6-8		. . BOLT (USED ON 65-44528-1)		1
9	69-54571-1		. . BUSHING (USED ON 65-44585-1)		1
9	65-44528-3		. . BUSHING (USED ON 65-44528-1)		1
10	BACC30M6		. . NUT		1
11	65-44585-2		. . CRANK (USED ON 65-44585-1)		1
11	65-44528-2		. . CRANK (USED ON 65-44528-1)		1
12	KP3AR11-2 E6531		. . BEARING, V21335		1
13	BACB30LU3-2		. BOLT		4
14	69-54530-1		. RETAINER		2
15	BACB10A35DDH		. BEARING		2
16	BACS34A1		. RING, SCRAPER		1
17	69-35991-1		. PLUG		1
18	69-54531-1		. SLIDE ASSY	A	1
18	69-54531-2		. SLIDE ASSY (SB 32-1017)	BC	1
19	66-10847-1		. . SLIDE (USED ON 69-54531-1)		1
19	66-10847-2		. . SLIDE (USED ON 69-54531-2)		1
20	69-35989-1		. . SLEEVE (USED ON 69-54531-1)		1
20	69-35989-2		. . SLEEVE (USED ON 69-54531-2)		1
21	6-68428		. POPPET, CHECK VALVE	A	1
22	63-1197		. SPRING	A	1
23	200800-5001		. CHECK VALVE, V92003 (SB 32-1017)	BC	1
24	BACR12BE012NA		. RING, CAP (SB 32-1017)	BC	1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1103-24	BACR12BE012N		. RING, CAP (OPT BACR12BE012NA) (SB 32-1017)	BC	1
25	NAS1611-012		. PACKING, O-RING (SB 32-1017)	BC	1
26	NAS1611-116		. PACKING, O-RING		1
27	MS28782-14		. RING, BACKUP		2
28	NAS1611-114		. PACKING, O-RING		2
29	MS28782-12		. RING, BACKUP		4
30	69-35956-1		. PISTON		1
31	69-35990-1		. RETAINER, SEAL		1
32	69-35993-1		. BEARING		1
33	BACR12BJ112A		. RING, CAP		1
34	NAS1611-115		. PACKING, O-RING		1
35	MS28782-13		. RING, BACKUP		2
36	NAS1611-112		. PACKING, O-RING		1
37	DBPR1-02-110		. SEAL, V18426 (REPLS DBPR1-110)		2
37	DBPR1-110		. SEAL, V18426 (REPL BY DBPR1-02-110)		2
38	69-35992-1		. CAP, END		1
39	69-35942-2		. SPACER (OPT TO 69-35942-3)	AB	1
39	69-35942-3		. SPACER (OPT TO 69-35942-2)	AB	1
39	69-35942-3		. SPACER	C	1
40	AN960D616L		. WASHER (USED WITH 69-35942-2)	AB	AR
40A	65-44731-3		. SHIM (USED WITH 69-35942-3)		AR
41	3186592		. SPRING, V77068	AB	1
41	554283		. SPRING, V77068 (OPT TO 3186592)	AB	1
41	69-68894-1		. SPRING	C	1
42	411612		. RETAINER, SPRING, V77068 (OPT TO 411612-2)(REPLD BY 411612-2)	AB	1
42	411612-2		. RETAINER, SPRING, V77068 (OPT TO 411612)(REPLS 411612)	AB	1
42	69-68891-1		. RETAINER, SPRING	C	1
43	NAS1611-215		. PACKING, O-RING		1
44	547602-6		. SLIDE ASSY, V77068	AB	1
44	69-68893-1		. SLIDE ASSY	C	1
45	NAS1611-114		. PACKING, O-RING		2
46	MS28782-12		. RING, BACKUP		4
47	69-35942-1		. SPACER	AB	1
48	65-44579-1		. HOUSING ASSY		1
49	65-44579-2		. . HOUSING		1
50	BACP20AX12D		. . PLUG		2
51	BACP20AX12DP		. . PIN		2
52	MS21209F4-15		. . INSERT		5
53	BAC27DHY0263		. NAMEPLATE		1
53	BAC27DHY92		. NAMEPLATE (OPT)		1

VENDORS

V18426 THE DYNA-BAK COMPANY, 4609 70 AVE. EAST, TACOMA, WASHINGTON 98401

V21335 TORRINGTON CO., FAFNIR BEARING DIVISION, 59 FIELD STREET, TORRINGTON, CONNECTICUT 06790-4942

V77068 ALLIED CORP., BENDIX ELECTRODYNAMICS DIVISION, 11600 SHERMAN WAY, NORTH HOLLYWOOD, CALIFORNIA 91605-5887

V80756 SPIROLUX DIVISION OF KAYDON CORP., 29 CASSENS STREET, ST. LOUIS, MISSOURI 63026-2542

V92003 PARKER-HANNIFIN CORP., 18321 JAMBOREE BLVD., P.O. BOX C-19510, IRVINE, CALIFORNIA 92713

Part No.	Fig. and Index No.	Qty. per Assy.
AN814-16DL		AR
AN960-416L		AR
AN960D616L		AR
AN960PD516		AR
BACB10A35DDH	1103-15	2
BACB10BA15PP	1102-26	2
BACB30CW5H4	1102-1	4
BACB30EL3-1	1102-D2	2
BACB30FD4-2		5
BACB30FM6-11	1103-8	1
BACB30FM6-8	1103-8	1
BACB30GW6A14U	1102-6	1
BACB30GW8A14U	1102-4	1
BACB30GW8D14N	1102-4	1
BACB30US5K4H	1102-1	4
BACB30LU3-2	1103-13	4
BACB30NE4H2	1102-19	4
BACB30NE5H9	1101-4	1
BACC30M6	1103-10	1
BACN10JC3	1101-9	1
BACN10JC5	1101-3	2
BACN12A3LT	1102-51	1
BACP20AX12D	1103-50	2
BACP20AX12DP	1103-51	2
BACP20AX25D	1102-70	2
BACP20AX25DP	1102-69	2
BACR12BD114A	1102-28	1
BACR12BE01N	1103-24	1
BACR12BE012NA	1103-24	1
BACR12BE114A	1102-31	1
BACR12BJ112A	1103-33	1
BACS34A1	1103-16	1
BACV10BU2	1101-13	1
BACW10BP5CD	1102-2	4
BAC27DHY0263	1101-53	1
BAC27DHY92	1103-53	1
DBPR1-02-110	1103-37	2
DBPR1-110	1103-37	2
KP3AR11-2E6531	1103-12	1
MS21208F5-10		AR
MS21209F1-15		AR
MS21209F4-15		AR
MS21209F5-20		AR
MS21902-4		AR
MS21902-6		AR
MS21902D6		AR
MS24678-20		AR
MS28782-11		AR

Part No.	Fig. and Index No.	Qty. per Assy.
MS28782-12		AR
MS28782-13		AR
MS28782-14		AR
NAS1080-6		AR
NAS1080C6		AR
NAS1080C8		AR
NAS1105-14		AR
NAS1611-012		AR
NAS1612-112		AR
NAS1612-113		AR
NAS1612-114		AR
NAS1612-115		AR
NAS1612-116		AR
NAS1612-213		AR
NAS1612-215		AR
NAS1612-228		AR
NAS1612-16		AR
NAS1612-2		AR
NAS1612-4		AR
NAS1612-6		AR
NAS620A416L		AR
NAS623-3-2		AR
NAS77A5-87		AR
RSN59S	1102-25	1
200800-5001	1103-23	1
3186592	1103-41	1
411612	1103-42	1
411612-2	1103-42	1
547602-6	1103-44	1
554283	1103-41	1
6-68428	1103-21	1
63-1197	1103-22	1
65-44521-4	1101-6	1

Part No.	Fig. and Index No.	Qty. per Assy.
65-44521-4	1102	RF
65-44521-5	1101-6	1
65-44521-5	1102	RF
65-44521-6	1101-6	1
65-44521-6	1102	RF
65-44523-1	1102-68	1
65-44523-2	1102-72	1
65-44523-4	1102-72	1
65-44523-5	1102-68	1
65-44523-6	1102-68	1
65-44523-7	1102-72	1
65-44524-2	1102-36	1
65-44524-3	1102-33	1
65-44524-1	1103-7	1
65-44528-2	1103-11	1
65-44528-3	1103-9	1
65-44528-1	1103-3	1
65-44558-2	1103-6	1
65-44579-1	1103-48	1
65-44579-2	1103-49	1
65-44585-1	1103-7	1
65-44585-2	1103-11	1
65-44731-1	1101-7	1
65-44731-1	1103	RF
65-44731-2	1101-7	1
65-44731-2	1103	RF
65-44731-3	1103-40A	AR
65-44731-4	1101-7	1
65-44731-4	1103	RF
65-44731-5	1103-2	5
65-44922-1	1102-44	1
65-44922-2	1102-47	1
65-44931-10	1101	RF
65-44931-11	1101	RF
65-44931-12	1101	RF
65-44931-3	1101	RF
65-44931-4	1101	RF
65-44931-5	1101	RF
65-44931-6	1101	RF
65-44931-8	1101	RF
65-44931-9	1101	RF
66-10847-1	1103-19	1
66-10847-2	1103-19	1
66-22703-1	1102-21	2
66-22704-2	1102-17	1
66-22705-2	1102-54	2
66-22712-2	1102-64	2
66-22713-2	1102-35	1
66-22721-1	1102-27	1
69-35508-4	1102-59	1
69-35508-5	1102-59	1
69-35515-1	1102-30	1
69-35524-1	1102-49	AR
69-35527-2	1102-53	1
69-35587-15	1102-50	1
69-35794-1	1102-67	2
69-35795-1	1102-61	2
69-35796-1	1102-62	2
69-35804-1	1102-63	2
69-35819-3	1102-39	1
69-35820-3	1102-40	1
69-35821-5	1102-41	1
69-35821-6	1102-43	1
69-35821-7	1102-43	1
69-35823-1	1102-9	2
69-35824-2	1102-8	1
69-35825-3	1102-58	1
69-35826-3	1102-38	1
69-35828-1	1102-13	1
69-35829-2	1102-14	2
69-35829-3	1102-57	2
69-35829-4	1102-60	1
69-35829-2	1102-10	1
69-35829-3	1102-3	1
69-35830-5	1102-11	2
69-35830-6	1102-12	2
69-35834-1	1102-65	AR
69-35834-2	1102-66	AR
69-35905-2	1102-23	1
69-35905-4	1102-22	1
69-35905-5	1102-24	2
69-35942-1	1103-47	1
69-35942-2	1103-39	1
69-35942-3	1103-39	1
69-35956-1	1103-30	1
69-35989-1	1103-20	1
69-35989-2	1103-20	1
69-35990-1	1103-31	1
69-35991-1	1103-17	1
69-35992-1	1103-38	1
69-35993-1	1103-32	1
69-54430-1	1103-14	1
69-54531-1	1103-18	1

Part No.	Fig. and Index No.	Qty per. Assy
69-54531-2	1103-8	1
69-54534-1	1101-0	1
69-54571-1	1103-	1
69-68891-1	1103-2	1
69-68893-1	1103-4	1
69-68894-1	1103-1	1

Part No.	Fig. and Index No.	Qty per. Assy