TO: ALL HOLDERS OF RUDDER TRIM ACTUATOR ASSEMBLY OVERHAUL MANUAL, 27-24-01

REVISION NO. 14, DATED NOV 1/99

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
Revised item number for cover in step K. from (23) to (24)					X								
Updated IPL for cover item (24), indicating that 65-81657-3 can replace 65-81657-2												X	
Edited without technical change												X	

RUDDER TRIM ACTUATOR ASSEMBLY

27-24-01

BOEING P/N 65-21831-9, -10, -14 thru -17, -19 thru -23, -25 thru -28

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
		PRR 23187	Feb 10/70
		PRR 31823	Feb 10/70
		PRR 31506	Sep 10/71
		PRR 31506-1	Sep 10/71
		PRR 31506-2	Sep 10/71
27-1026 (737)		PRR 31506-3	Sep 10/71
27-1037 (737)			Sep 10/71
27-1053R2 (737)		PRR 32063	Mar 25/75
		PRR 24017	May 10/77
		PRR 32625	May 10/77
		PRR 24609	Nov 10/80
		PRR 33073	Nov 10/80
		PRR 34045	Dec 5/86

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
	27-24-01					
	T-1	Mar 5/89				
	T-2	BLANK				
*	LEP-1	Nov 1/99				
	LEP-2	BLANK				
	T/C-1	Nov 10/80				
	T/C-2	BLANK				
	1	May 10/77				
	2	BLANK				
	101	Sep 10/71				
	102	BLANK				
	301	Nov 10/80				
	302	BLANK				
	401	Mar 5/89				
*	402	Nov 1/99				
	403	Jun 5/86				
	404	BLANK				
	501	Jun 5/86				
	502	Dec 1/95				
	503	Dec 1/95				
	504	BLANK				
	601	Jul 5/82				
	602	Jul 5/82				
	701	Nov 10/80				
	702	BLANK				
	801	Nov 10/80				
	802	BLANK				
	901	Nov 10/80				
	902	BLANK				
	1101	Jan 15/67				
	1102	Mar 5/89				
*	1103	Nov 1/99				
*	1104	Nov 1/99				
*	1105	Nov 1/99				
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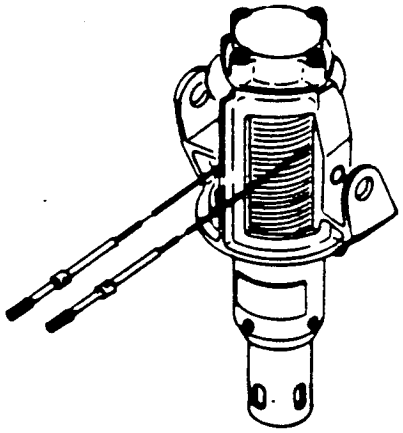
*[1] Special instructions not required. Use standard industry practices and the information contained in 20-30-01 and 20-30-03..

BOEING COMMERCIAL JET
OVERHAUL MANUAL

RUDDER TRIM ACTUATOR ASSEMBLY



Rudder Trim Actuator Assembly
Figure 1

DESCRIPTION AND OPERATION

1. Description

   A. The actuator assembly consists of a cable drum, cable assemblies, actuator housing, screw, compression spring, and spring guide.

2. Operation

   A. Rotation of the cable drum causes the actuator housing to move linearly on the screw. Movement of the actuator housing causes the centering spring and feel assembly to rotate.

3. Leading Particulars

   Length -- 9 inches (with drum in neutral position)
   Width (overall) -- 4-3/4 inches
   Weight -- 2.7 pounds

DISASSEMBLY

1. Procedures (See figure 1101.)

   A. Remove all lockwiring.

   B. Remove cotter pins (12) and cable assemblies (13 and 14).

   C. Relax tension of spring (4) by rotating screw (7) out of cable drum (15) until the distance from end of screw to end of cable drum (15) is between 2 and 3 inches.

      CAUTION: COVER (2) REMOVED IN FOLLOWING STEP RETAINS COMPRESSED SPRING (4).

   D. Loosen cap screws (1). Carefully remove items (1 through 4, 23 and 24) from housing assembly (17).

   E. Remove screw (7) from cable drum (15) and remove items (5 and 6).

      NOTE: Items (7A and 7B) are bonded together to form screw assembly (7) and should not be disassembled

   F. Bend back tab ear on bearing retainer nut (8) and remove from cable drum (15).

   G. Disassemble items (9 through 11, 15 and 16) from housing assembly (17).

      NOTE: Do not remove marker (16) from cable drum (15) or sleeves (18 and 19) from housing assembly (17) unless replacement or inspection makes it necessary.

INSPECTION/CHECK

1. Check all parts for obvious defects in accordance with standard industry practices. Refer to Fits and Clearances for design dimensions and wear limits.

2. Perform penetrant check on housing cover (2), plug (6), screws (7, 7A), screw sleeve (7B), cable drum (15) and housing (20) per 20-20-02.

   NOTE: Since screw (7A) and screw sleeve (7B) are bonded together, it may not be feasible to perform a penetrant examination of each of these items.

3. Compress spring (4) to 1.20 inches. Check load shall be 7.9-17.9 pounds. Compress spring (4) to 3.40 inches. Check load shall be 5.2-9.2 pounds.

REPAIR

1. Repair minor defects in accordance with standard industry practices. Refer to Fits and Clearances for design dimensions and wear limits.

2. Refinish (Fig. 1101)

   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. Housing cover (2) -- Chromic acid anodize (F-2.20) all over. Alodize or chromic acid anodize and apply primer, BMS 10-11, type 1 (SRF-2.30) on exterior surfaces only. Material: Al alloy.

   B. Spring guide (3), bushing (5) (69-26415-1) -- Chromic acid anodize (F-2.20) all over. Material: Al alloy.

   C. Spring (4) -- Cadmium plate (F-1.1922) all over. Material: Music wire, QQ-W-470.

   D. Plug (6)

      (1) (66-17708-1) -- Chromic acid anodize and apply primer, BMS 10-11, type 1 (SRF-2.19) except in radial bore. Material: Al alloy.

      (2) (P/N 66-23560-1) -- Alodize or chromic acid anodize and apply primer, BMS 10-11, type 1 (SRF-2.30) except in radial bore. Material: Al alloy.

   E. Screw (7) (69-15819-series)

      (1) (69-15819-4) Hard coat, per BMS 10-6B, 0.0005-0.0010 inch on exterior threads and 0.002-0.003 inch on remaining surfaces, except anodize internal threads (F-2.20). Also apply solid film dry lubricant per BMS 3-8, class A on all exterior surfaces. Material: Al alloy.

         NOTE: Rubber stamp part number within 1.12 inches from internal threaded end with black ink and apply BMS 3-11 resistant top coating per 20-50-10.

      (2) Deleted.

F. Screw (7A) -- Hard coat per BMS 10-6B, 0.0005-0.0010 inch on Acme thread and 0.002-0.003 inch on exterior surfaces. Alodize or chromic acid anodize and apply primer, BMS 10-11, Type 1 (SRF-2.30) interior surfaces, except omit primer on thread. Apply solid film dry lubricant per BMS 3-8, Class A on all exterior surfaces. Material: Al alloy.

G. Screw sleeve (7B) -- Alodize or chromic acid anodize and apply primer, BMS 10-11, Type 1 (SRF-2.30) on both exterior and interior surfaces, except omit primer on threads. Material: Al alloy.

H. Bearing retainer nut (8) -- Cadmium plate (F-1.1923) all over. Material: 1015, 1020, or 1025 steel.

I. Cable drum (15) -- Chromic acid anodize (F-2.20) all over and apply primer, BMS 10-11, Type 1 (SRF-12.205) on outside surfaces except 4.38 inches from threaded end. Apply solid film dry lubricant per BMS 3-8, Class A on all interior surfaces. Restore index mark as shown in Fig. 501, with enamel BMS 10-11, Type 2 (SRF-14.905-201) (orange). Material: Al alloy.

J. Housing (17) -- Chromic acid anodize (F-2.20) all over and apply primer, BMS 10-11, Type 1 (SRF-12.205) on nonmachined surfaces only. Material: Al alloy.

K. Cover (24)

(1) 65-81657-2 -- Apply one coat BMS 10-11, Type 1 primer (SRF-12.205) all over. Material: glass reinforced plastic.

(2) 65-81657-3

(a) Material: glass reinforced plastic -- Apply one coat BMS 10-11, Type 1 primer (SRF-12.205) all over.

(b) Material: Thermoplastic sheet (BMS 8-86, Type 3, or BMS 8-135, Type 1, grade PC) -- Apply BMS 10-83, Type 1 primer and BMS 10-83, Type 2 enamel, BAC401 green (optional: BAC7067 white) (F-22.05-401 or -7067) all over. Optional finish: Apply two coats BMS 10-11, Type 1 primer (F-20.03) all over.

3. Replacement (Fig. 1101)

   A. Replace all cotter pins.

   B. Sleeve (18) -- Install new sleeve with wet BMS 10-11, type 1 primer and seat 1/4 to 1/2 turn below countersink with thread gage while primer is still wet. Remove tang.

   C. Sleeve (19) -- Install new sleeve with wet BMS 10-11, type 1 primer and seat with thread gage while primer is still wet. Sleeve should not protrude from either side of housing (17). Remove tang.

   D. Marker (16) -- Install new marker per 20-50-05.

4. Materials

   A. Solid Film Dry Lubricant -- BMS 3-8, class A (Ref 20-60-03)

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

   C. Enamel -- BMS 10-11, type 2 (Ref 20-60-02)

   D. Primer -- BMS 10-83, type 1 (Ref 20-60-02)

   E. Enamel -- BMS 10-83, type 2 (Ref 20-60-02)

ASSEMBLY

1. Materials

   A. Deleted

   B. Grease -- BMS 3-24 (Ref 20-60-03)

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

   D. Oil -- MIL-L-23699 (Ref 20-60-03)

   E. Lockwire - MS20995N32, MS20995F32, or M520995C32 (shop option)

2. Lubrication

   A. Deleted.

   B. Lubricate all exterior surfaces of screw (7), with a light coat of grease, BMS 3-24. Apply grease to interior threads of drum (15) and to drum/screw mating surfaces.

3. Assembly

   A. Install cable drum (15), bearing (11, 10), cotter pins (9) and bearing retainer nut (8) in housing (17). Tighten nut (8) finger tight. With flat punch, tap tighten nut to align next tab with cable drum slot. Bend tab on nut into slot on cable drum. If nut has been used previously, be sure an unused tab is bent into slot. If all tabs have previously been bent, replace nut (8).

   B. Install plug (6) in screw (7). Apply grease, MIL-G-23827, to bushing (5) then insert bushing thru screw and plug and retain with string for storage. Install screw and assembled items in cable drum (15). Engage only 3 or 4 threads of screw to facilitate assembly.

      NOTE: Screw (7A) and screw sleeve (7B) are bonded items which comprise screw assembly (7).

   C. Install cable assemblies (13, 14)

      (1) Lubricate grooves and OD of cable drum (15) and cables (13, 15) with a coating of oil, MIL-L-23699. Rotate drum through complete cycle during application of oil.

      (2) Position cable drum (15) in neutral position by aligning center of orange index mark on cable drum with cotter pin hole of housing (20) (Fig. 501).

(3) Insert cable (13) terminal into slot and retain with cotter pin (12) (Fig. 501, section B-B). Turn cable drum (15) clockwise, as viewed from cover (2) end, to wrap cable 9-1/2 turns.

(4) Insert cable (14) terminal into slot and retain with cotter pin (12) (Fig. 501, section A-A). Turn cable drum (15) counterclockwise, as viewed from cover (2) end, to wrap cable 4-3/4 turns.

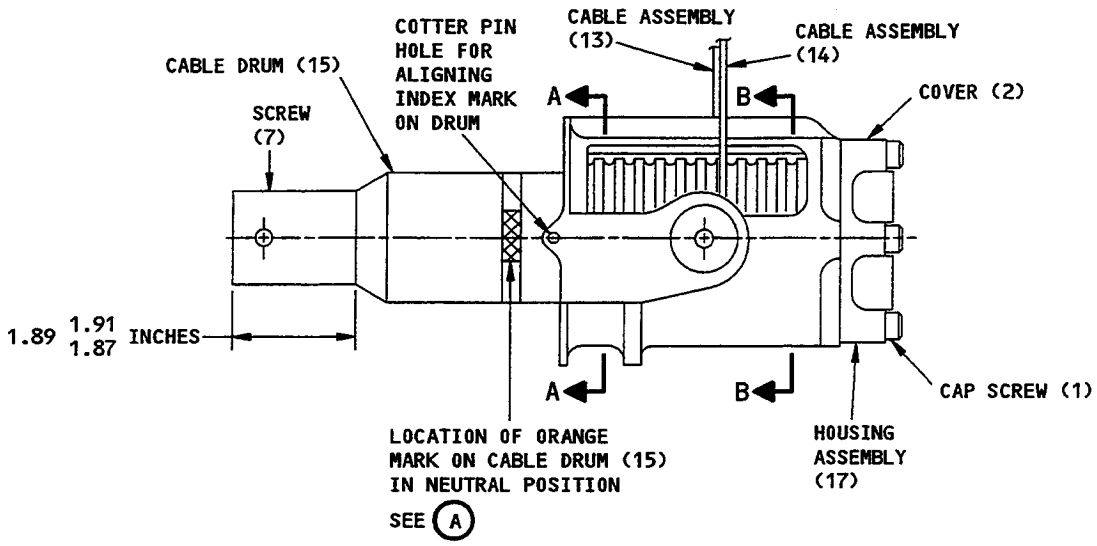
NOTE: Cable (13) will unwrap during this step to 4-3/4 turns.

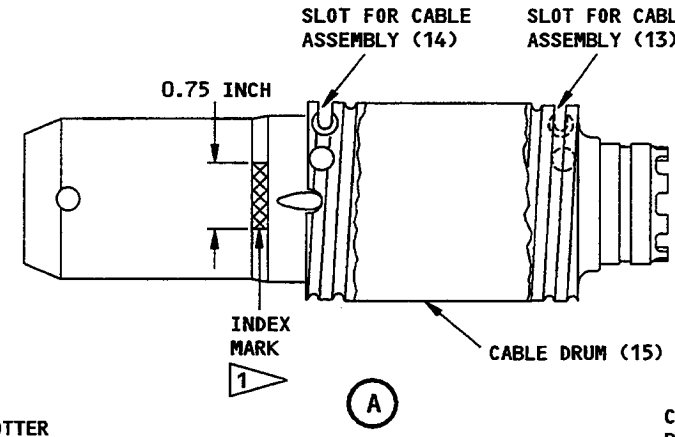
(5) Secure cables (13, 14) to prevent unwrapping prior to installation on airplane.

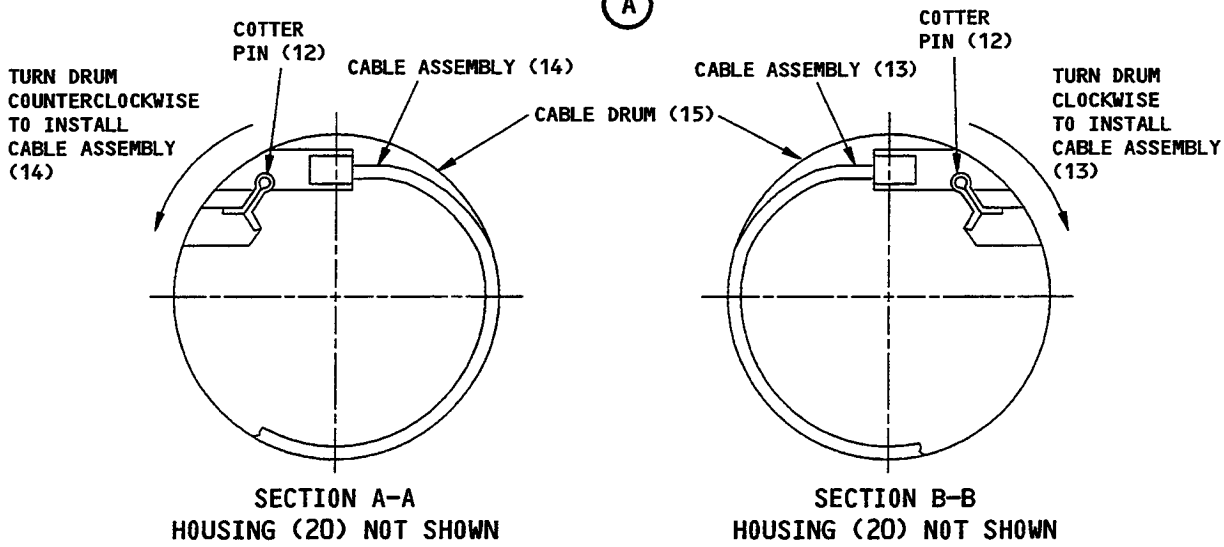
D. Apply grease, MIL-G-23827, to mating surfaces of cover (2) and spring guide (3), then install items (1 thru 4, 23, 24).

E. Lockwire screws (1) together per 20-50-02, double twist method.

F. Turn screw (7) into drum (15) until distance from drum to end of screw is approximately 1.90 inches.





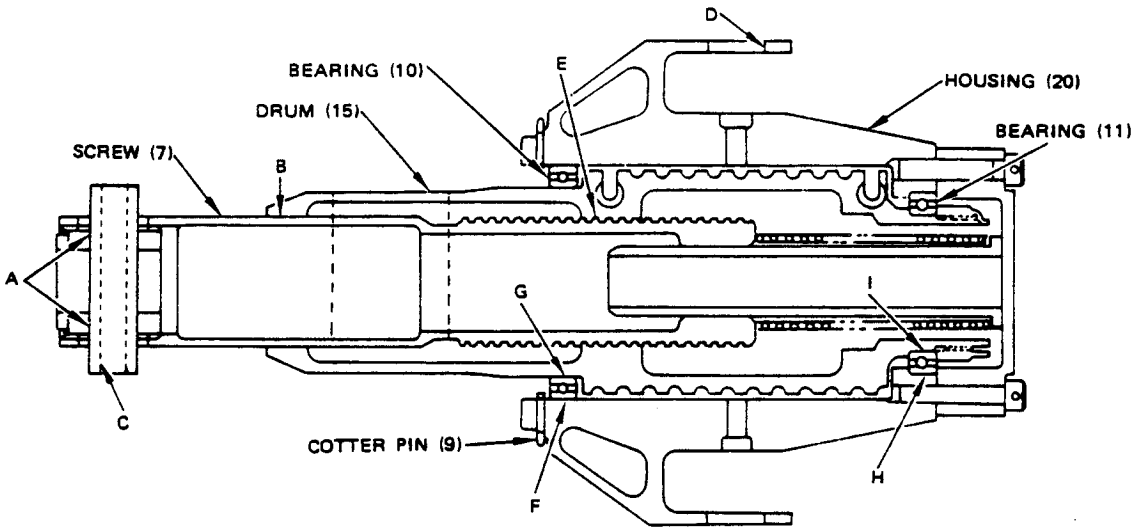


1 ENAMEL, BMS 10-11, TYPE 2 (SRF14.905-201) (ORANGE)

Assembly View
Figure 501

F28789

FITS AND CLEARANCES



Ref Letter Fig.601	Mating Item No. Fig.1101	Design Dimensions				Service Wear Limits		
		Dimensions (inches)		Assembly Clearance (inch)		Dimension Limits (inches)		Maximum Allowable Clearance (inch)
		Min	Max	Min	Max	Min	Max	
A	ID 6 OD 5	0.4355 0.4345	0.4365 0.4355	0.000	0.0020	0.4340	0.4395	0.0040
B	ID 15 OD 7	1.2545 1.2517	1.2555 1.2531	0.0014	0.0038	1.2505	1.2580	0.0050
C	ID 5 *[1]	0.2495	0.2510				0.2535	
D	ID 20	0.4700	0.4706				0.4720	
E	7 *[2]			0.002	0.008			0.015
F	ID 20 OD 10	2.2500 2.2485	2.2510 2.2500	0.0500	0.0025	2.2480	2.2530	0.003
G	ID 10 OD 15	1.8115 1.8105	1.8135 1.8115	0.0050	0.0030	1.8080	1.8140	0.0035
H	ID 20 OD 11	1.7500 1.7490	1.7510 1.7500	0.0000	0.0020	1.7485	1.7530	0.0030
I	ID 11 OD 15	1.3118 1.3105	1.3132 1.3115	0.0003	0.0027	1.3086	1.3137	0.0032

*[1] Bushing NAS72-4E113
*[2] End play

TESTING

1. Secure actuator in a fixed position so that the drum can be rotated, cables can be extended and retracted, and the screw can be extended and retracted while being restrained from rotating.

2. Operational Test (Fig. 1101).

NOTE: Maintain a slight tension on both cables during testing to prevent cable jamming on drum.

A. Rotate drum (17) to full cycle both directions and check extension and retraction of screw (7 or 8).

B. Check that bearings and screw are free running without evidence of binding in any position.

C. Return drum to neutral position.

D. Remove assembly from mounting.

TROUBLE SHOOTING

Trouble	Possible Cause	Correction
Drum does not rotate	Cable jammed on drum	Check cable installation
	Screw jammed in drum	Check screw installation
	Defective bearing	Replace bearing
Binding	Defective bearing	Replace bearing

STORAGE INSTRUCTIONS

1. Wrap and secure cable assemblies around housing.
2. Secure bushing in place in screw.
3. Protect and store assembly in accordance with standard industry practices and the information contained in 20-44-02.

ILLUSTRATED PARTS LIST

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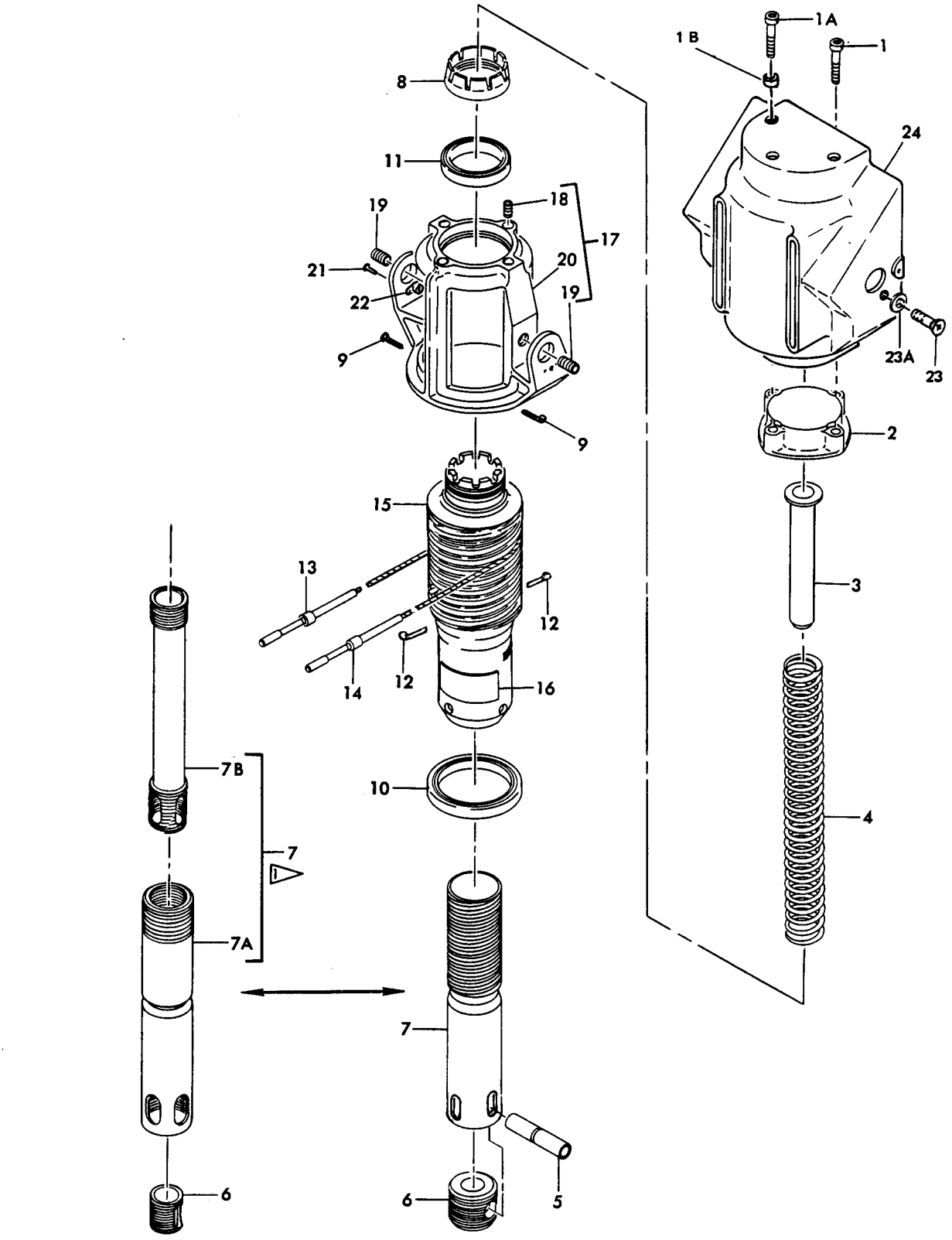

▷1◁ BONDED ASSEMBLY

Rudder Trim Actuator Assembly
Figure 1101

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
	65-21831-2		DELETED		
	65-21831-3		DELETED		
	65-21831-4		DELETED		
	65-21831-6		DELETED		
	65-21831-7		DELETED		
	65-21831-8		DELETED		
	65-21831-9		ACTUATOR ASSY, RUDDER TRIM	G	RF
	65-21831-10		ACTUATOR ASSY, RUDDER TRIM	H	RF
	65-21831-11		DELETED		
	65-21831-13		DELETED		
	65-21831-14		ACTUATOR ASSY, RUDDER TRIM	K	RF
	65-21831-15		ACTUATOR ASSY, RUDDER TRIM (SB 27-1037)	L	RF
	65-21831-16		ACTUATOR ASSY, RUDDER TRIM	M	RF
	65-21831-17		ACTUATOR ASSY, RUDDER TRIM	N	RF
	65-21831-18		DELETED		
	65-21831-19		ACTUATOR ASSY, RUDDER TRIM (SB 27-1053)	O	RF
	65-21831-20		ACTUATOR ASSY, RUDDER TRIM	P	RF
	65-21831-21		ACTUATOR ASSY, RUDDER TRIM	Q	RF
	65-21831-22		ACTUATOR ASSY, RUDDER TRIM	R	RF
	65-21831-23		ACTUATOR ASSY, RUDDER TRIM	S	RF
	65-21831-25		ACTUATOR ASSY, RUDDER TRIM	T	RF
	65-21831-26		ACTUATOR ASSY, RUDDER TRIM	U	RF
	65-21831-27		ACTUATOR ASSY, RUDDER TRIM	V	RF
	65-21831-28		ACTUATOR ASSY, RUDDER TRIM	W	RF
1	BACS12AG16F		. SCREW, CAP		1
1A	BACS12AG16F		. SCREW, CAP	G-NQS	3
1A	MS24678-15		. BOLT (POST SB 27-1053)	HLM	3
1A	MS24678-15		. BOLT	OPRT-W	3
1B	NAS75-3-008		. SPACER (POST SB 27-1053)	HLM	3
1B	NAS75-3-008		. SPACER	OPRT-W	3
2	69-15818-1		. COVER, HOUSING	GHKQS	1
2	69-15818-3		. COVER, HOUSING	L-PR T-W	1
3	66-13272-2		. GUIDE, SPRING	GK-W	1
3	66-13272-1		. GUIDE, SPRING (OPT)	GKQS	1
3	66-13272-1		. GUIDE, SPRING	H	1
4	63-10637-2		. SPRING		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
5	NAS72-4E113		DELETED		1
5	69-26415-1		. BUSHING	GHK-W	1
6	66-17708-1		. PLUG	GKQS	1
6	66-23560-1		. PLUG	HL-PR T-W	
7	69-15819-2		DELETED		
7	69-15819-3		DELETED		
7	69-15819-4		. SCREW	GKQS	1
7	69-37296-1		. SCREW ASSY	HL-PR T-W	1
7A	69-37295-1		. . SCREW		1
7B	69-37297-1		. . SLEEVE		1
8	66-13271-1		. NUT		1
9	MS24665-281		. PIN, COTTER (REPLS AN380-3-2)		2
10	BACB10A31DD		DELETED		
10	BACB10A31DDH		. BEARING	G-W	1
11	BACB10A30DD		DELETED		
11	BACB10A30DDH		. BEARING	G-W	1
12	MS24665-1011		. PIN, COTTER		2
13	BACC13AP3E2527		. CABLE ASSY (RTB)	G	1
13	BACC13AP3D1385		. CABLE ASSY (RTB)	HL	1
13	BACC13AP3E1264		. CABLE ASSY (RTA)(REPLS BACC13AP3D 1385 [RTB] PER SB 27-1026)	HL	1
13	BACC13AP3E1264		. CABLE ASSY (RTA)	MNOT	1
13	BACC2A3A01264 FG		. CABLE ASSY (RTA)	PRUV	1
13	65-77223-12		. CABLE ASSY (RTB)	K	1
13	65-77223-44		. CABLE ASSY (RTB)	QS	1
13	BACC2C3D01264 FG		. CABLE ASSY (RTA)	W	1
14	BACC13AP3E2292		. CABLE ASSY (RTA)	G	1
14	BACC13AP3E1215		. CABLE ASSY (RTA)	HL	1
14	BACC13AP3D1493		. CABLE ASSY (RTB)(REPLS BACC13AP3E 1215 [RTA] PER SB 27-1026)	HL	1
14	BACC13AP3D1493		. CABLE ASSY (RTB)	MNOT	1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
14	BACC2A3A01493 EG		. CABLE ASSY (RTB)	PRUV	1
14	65-77223-11		. CABLE ASSY (RTA)	K	1
14	65-77223-43		. CABLE ASSY (RTA)	QS	1
14	BACC2C3D01493 EG		. CABLE ASSY (RTB)	W	1
15	65-21833-2		. DRUM	GK-W	1
15	65-21833-1		. DRUM (OPT)	GKQS	1
15	65-21833-1		. DRUM	H	1
16	BACM10W21-2RY		. MARKER, ALUMINUM FOIL		1
17	65-21832-1		. HOUSING ASSY	G-MQS	1
17	65-21832-6		. HOUSING ASSY (POST SB 27-1026)	HL	1
17	65-21832-8		. HOUSING ASSY (POST SB 27-1053)	HL	1
17	65-21832-6		. HOUSING ASSY	N	1
17	65-21832-8		. HOUSING ASSY	OPRT-W	1
18	MS21209F1-15		. . INSERT (REPLS BACS13W3CN3)		4
19	MS21209F4-15		. . INSERT (REPLS BACS13W4CN3)		4
20	65-21832-2		. . HOUSING (USED ON 65-21832-1)		1
20	65-21832-7		. . HOUSING (USED ON 65-21832-6, -8)		1
21	BACR15BA3		. . RIVET (USED ON 65-21832-8)		4
21	BACR15BA3		. . RIVET (POST SB 27-1053)	M	4
22	BACN10JP08A		. . NUTPLATE (USED ON 65-21832-8)		2
22	BACN10JP08A		. . NUTPLATE (POST SB 27-1053)	M	2
23	NAS602-7P		. SCREW (POST SB 27-1053)	HLM	2
23	NAS1352-08-H8		. SCREW (PREF)	OPRT-W	2
23	NAS602-7P		. SCREW (OPT)	OPRT-W	2
23A	AN960D8		. WASHER (POST SB 27-1053)	HLM	2
23A	AN960D8		. WASHER	OPRT-W	2
24	65-81657-2		. COVER	OPR	1
24	65-81657-3		. COVER (PREF)	OPR	1
24	65-81657-2		. COVER (POST SB 27-1053)	HLM	1
24	65-81657-3		. COVER *[1]	HLM	1
24	65-81657-3		. COVER	T-W	1

*[1] SB 27-1053 ADDED COVER 65-81657-2 TO TOP ASSEMBLIES 65-21831-10, -15, -16. COVER 65-81657-3 CAN BE USED AS A PREFERRED REPLACEMENT FOR COVER 65-81657-2.