TO: ALL HOLDERS OF RUDDER CONTROLS CENTERING UNIT ASSEMBLY OVERHAUL MANUAL, 27-24-32

REVISION NO. 7, DATED NOV 1/02

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 or added part number on page header to be listed as 65-70973					X							X	
Changed part number for spacer (44) from 65-43930-1 to 69-43930-1												X	

RUDDER CONTROLS CENTERING UNIT ASSEMBLY

27-24-32

BOEING P/N 65-70973-2, -3, -4, -6

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
		PRR 31506-3	Mar 10/71
		PRR 31506-4	Mar 10/71
27-1052		PRR 32043	Dec 10/71

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
27-24-32						
	T-1	Jan 5/83				
	T-2	BLANK				
*	LEP-1	Nov 1/02				
	LEP-2	BLANK				
	T/C-1	Jun 5/90				
	T/C-2	BLANK				
	1	Jan 5/83				
	2	Mar 10/71				
	3	Mar 10/71				
	4	Jun 1/95				
	4A	Dec 5/85				
*	4B	Nov 1/02				
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*	9	Nov 1/02				
*	10	Nov 1/02				
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*	13	Nov 1/02				
*	14	Nov 1/02				
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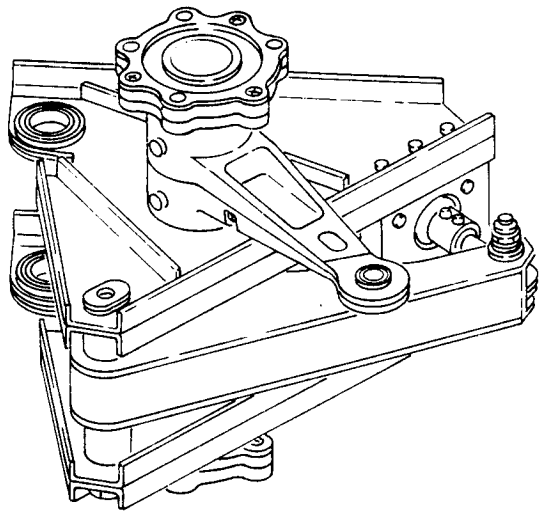
RUDDER CONTROLS CENTERING UNIT ASSEMBLY



Rudder Controls Centering Unit Assembly
Figure 1

1. DESCRIPTION AND OPERATION

A. Description

(1) The rudder controls centering unit assembly consists of two frame assemblies, two shafts, a spring assembly, arm assembly, crank assembly, cam assembly and bearing seat assembly. The bearing seat assembly is installed between the two frames and supports the spring assembly.

(2) The shafts, mounted in ball bearings in the frames, carry the crank assembly and the cam assembly.

(3) The arm assembly is attached on one end to the frames, and on the other end connected to the spring assembly. A ball bearing installed in the arm assembly is pressed against the cam on the shaft by the springs.

B. Operation

(1) When the shaft is rotated from neutral position in either direction, the arm assembly is moved outward by the cam thus increasing the load of the springs and in turn increasing torque required to rotate shaft.

C. Leading Particulars

Length (overall) -- 8.5 inches
Height (overall) -- 9.5 inches
Width (overall) -- 5 inches
Weight -- 6.95 pounds

NOTE: Special instructions for cleaning and storage are not required. Standard aircraft shop practices are sufficient for overhaul of this component.

2. DISASSEMBLY

A. Standard aircraft shop practices are sufficient for disassembly of this unit. (See figure 5.)

NOTE: Do not disassemble bolt assembly (5), spring assembly (8), shaft assembly (32), arm assembly (36), housing assemblies (56 and 69), crank assembly (79), cam assembly (85), bearing seat assembly (92), and frame assemblies (100 and 113), unless repair or replacement is necessary.

3. INSPECTION/CHECK

A. Visual Check

(1) Examine all metal parts for cracks, burrs, corrosion and any other damage using strong light and minimum of 10-power magnification.

(2) Examine all threads for cross-threading and stripping.

(3) Examine surface finish for wear, blistering, gouging, flaking and discontinuity.

(4) Examine all bearings for roughness, binding, and excessive axial and radial play.

(5) Examine bores and bolts for excessive or eccentric wear.

B. Special Checks (See figure 5.)

(1) If visual examination discloses evidence of defects in any parts listed, perform following checks.

(a) Fluorescent dye penetrant check -- rod end assembly (11), bearing (16), seat (18), rod assembly (21), shafts (55 and 78), plate assemblies (65 and 75), crank assembly (79), hub (84), bearing seat assembly (92), frame assemblies (100 and 113), and spacer (125).

(b) Magnetic particle check -- bolt assemblies (5 and 41), springs (19 and 20), nuts (29 and 30), and cam assembly (85).

(2) Check characteristics of springs (19 and 20) per figure 2.

Index No. Fig. 5	Approximate Free Length (inches)	Test Length (inches)	Allowable Load Limits (pounds)
19	4.920	4.49 1.79	18.3 to 19.1 129.1 to 143.1
20	4.920	4.49 1.79	13.1 to 13.9 93.6 to 103.6

Spring Check Data
Figure 2

4. REPAIR

A. Repair

(1) Repair minor scratches, nicks, pitting or corrosion by polishing lightly with 220-grit or finer, aluminum oxide abrasive cloth.

(2) Chase or file minor thread damage.

(3) Refinish reworked surfaces as required for protection against corrosion.

B. Refinish (Fig. 5)

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

(1) Refinish parts as follows:

(a) Sleeve (15), seats (17, 18), rod assemblies (21, 25), shaft (55), plate (63), spacers (68, 88, 125), frame assemblies (100, 113) -- Anodize (F-18.05) all over. Material: Al alloy.

(b) Shaft (78), hub (84), spacers (104, 107) -- Anodize (F-18.05) all over, except no primer on interior surfaces. Material: Al alloy.

(c) Rod end assembly (11) -- Hard anodize (F-2.94) all over. Apply primer (SRF-12.205) on interior surfaces only. Material: Al alloy.

(d) Springs (19, 20) -- Cadmium plate (F-16.03) all over. Material: Chrome Silicon Alloy.

(e) Nuts (29, 30) -- Cadmium plate (F-15.02) all over. Material: Steel, 180-200 ksi.

(f) Arm assembly (46), crank assembly (79) -- Hard anodize (F-2.94) all over. Material: Al alloy.

(g) Plate assemblies (65, 75) -- Hard anodize (F-2.94) all over. Apply primer (SRF-12.205), except no primer in bore. Material: Al alloy.

(h) Bearing seat assembly (92) -- Anodize (F-18.05) all over, except no primer on mating surfaces. Material: Al alloy.

C. Replacement (Fig. 5)

(1) If bearing (103, 106, 115 or 118) needs replacement, install new bearing by roller-swaged sleeve method per 20-50-03 using new sleeve (105, 108, 117 or 120).

(2) If bearing (45) needs replacement, install new bearing as follows:

(a) Remove parts (37 through 45).

(b) Position new bearing (45) and spacers (35) in arm assembly (46) and align bores.

(c) Insert new bolt assembly (41). Secure with washer (40) and nut (39). Tighten nut within torque range of 60 to 80 pound-inches.

(d) Install washer (38) and collar (37) on bolt assembly (41).

(3) If bearing (12, 81) requires replacement, install new bearing as follows:

(a) Install bearing with replacement sleeve (13, 82) positioned as shown (Fig. 2A).

(b) Roller swage sleeve per 20-50-03.

(4) If bearing (64, 74) requires replacement, install new bearing as follows:

(a) Remove fasteners (57 thru 62 or 70 thru 72) and plate (63 or 73), then remove bearing (64 or 74).

(b) Install replacement bearing in plate assy (65 or 75) per 20-50-03 except install with MIL-C-11796, class 3 corrosion preventive compound applied to mating surfaces.

(c) Reinstall plate (63 or 73) and secure with fasteners (57 thru 62 or 70 thru 72).

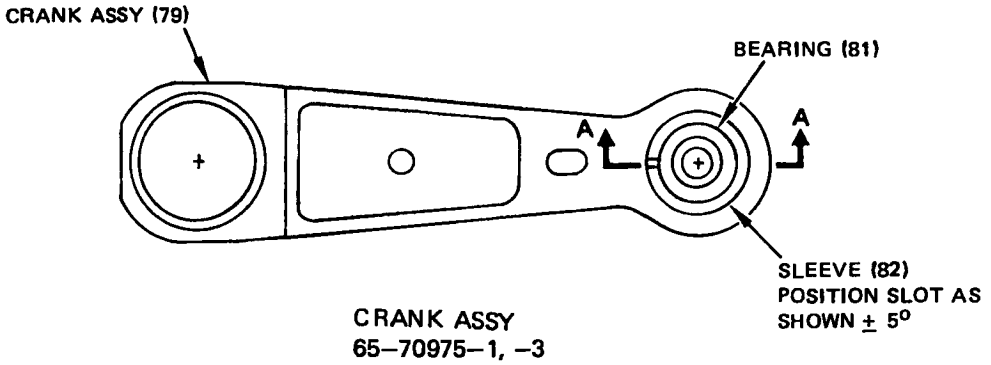
(5) If rod end assy (11), sleeve (15), or rod assy (21) require replacement, proceed as follows:

WARNING: REMOVE FASTENERS CAREFULLY TO AVOID INJURY TO PERSONNEL. SPRINGS ARE UNDER APPROXIMATELY 30 POUNDS PRE-LOAD.

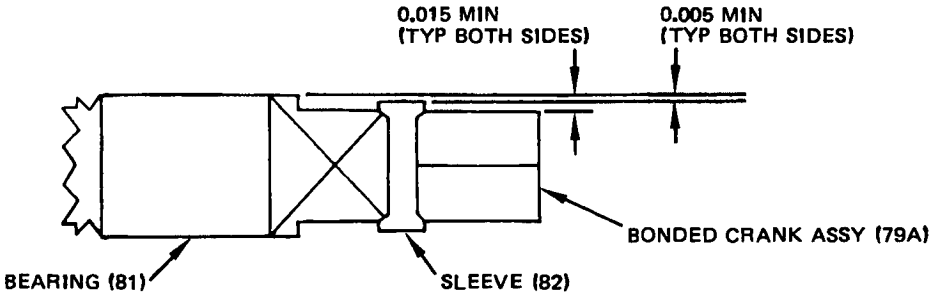
(a) Restrain springs (19, 20) by compressing. Remove fasteners (9, 10); disassemble spring assy (8) as required.

(b) Reassemble replacement parts; locate and drill 0.164-0.165 inch diameter bolt holes per Fig. 2A.

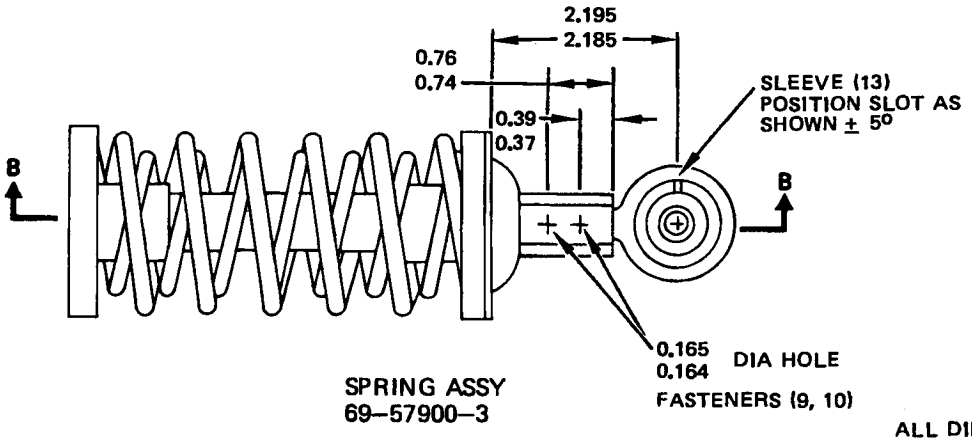
(c) Install fasteners (9, 10) using wet BMS 10-11, type 1 primer.



CRANK ASSY
65-70975-1, -3

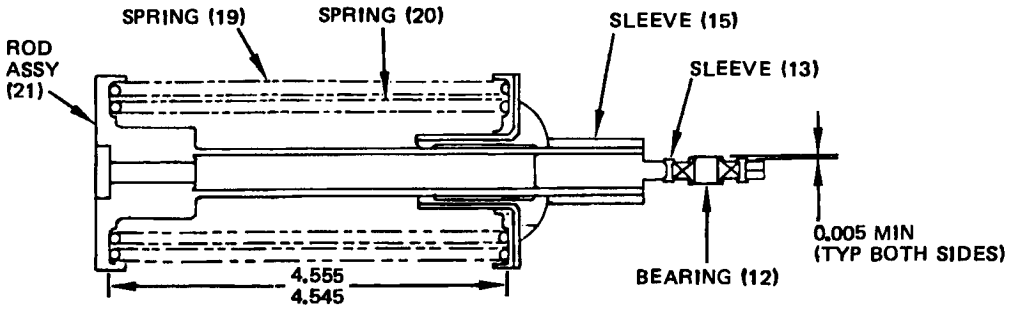


A-A



SPRING ASSY
69-57900-3

ALL DIMENSIONS
ARE IN INCHES



B-B

Replacement Diagram
Figure 2A

5. ASSEMBLY

A. Standard aircraft practices are sufficient for assembly of this unit except as follows (Fig. 2B, 5):

(1) Fill cavity on inside diameter of bearing (16) with MIL-G-23827 grease. Apply a film of grease (100 percent coverage required) on the spherical end of bearing (16) and on rod assembly (25) (Fig. 2B).

(2) Install bolts (91) with head direction per Fig. 5, except head location of center bolt is optional.

(3) Position hub (84) and cam assembly (85) on shaft (78) so that bearing (45) in arm assembly (36) rests in detent of cam.

(4) Install bolts (54) with head direction per Fig. 5.

(5) Tighten nuts (52) within torque range of 12 to 15 pound-inches.

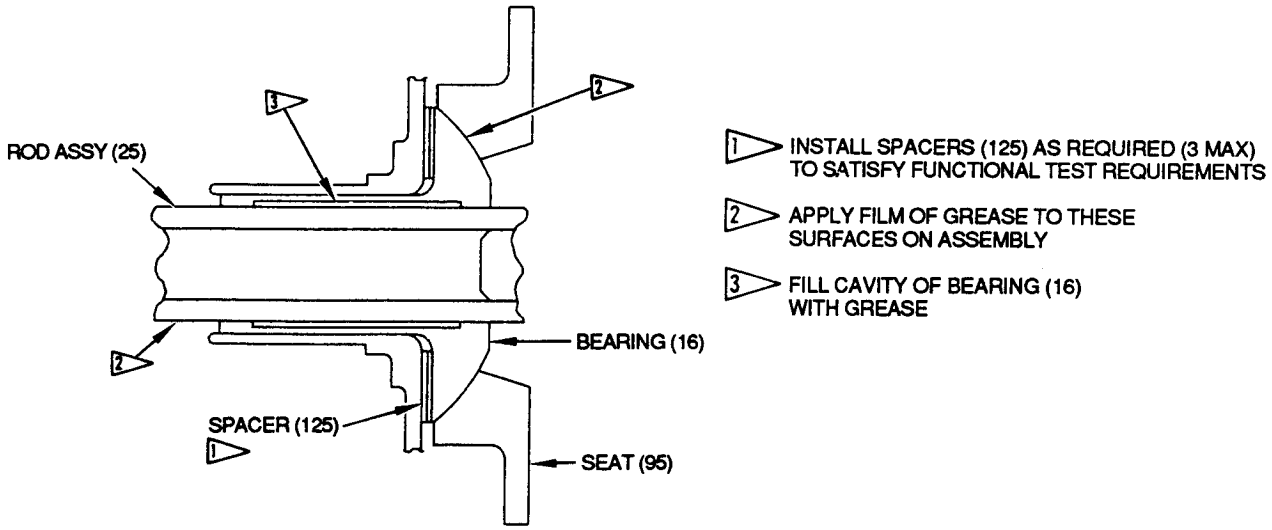
(6) Tighten nut (30) within torque range of 30 to 40 pound-inches first. Then tighten nut (29) within torque range of 20 to 30 pound-inches.

NOTE: Do not attempt to reset torque value of nut (30).

(7) Tighten nut (3) within torque range of 45 to 60 pound-inches first. Then tighten nut (1) within torque range of 12 to 15 pound-inches.

NOTE: Do not attempt to reset torque value of nut (3).

(8) Lockwire nuts (29 and 30) separately to frame assembly (113) using double twist method.



Assembly Details
Figure 2B

6. TESTING

A. Test Equipment

(1) Test Fixture: F80120-1

(2) 6-volt electric power source

B. Preparation for Test (Fig. 3)

(1) Install unit in test fixture, F80120-1.

(2) Connect electric power source to light assembly of fixture.

C. Functional Test (Fig. 5)

(1) Rotate shaft (78) in both directions. Record break-out torque. Break-out torque shall be 54 to 64 pound-inches in either direction.

(2) Rotate shaft (78) through one complete cycle, starting from zero, in counterclockwise direction. Rate of rotation shall be approximately 20 degrees per second.

(3) Plot input torque versus shaft rotation. Resultant curve shall be continuous, smooth and fall entirely within boundaries specified on Fig. 4.

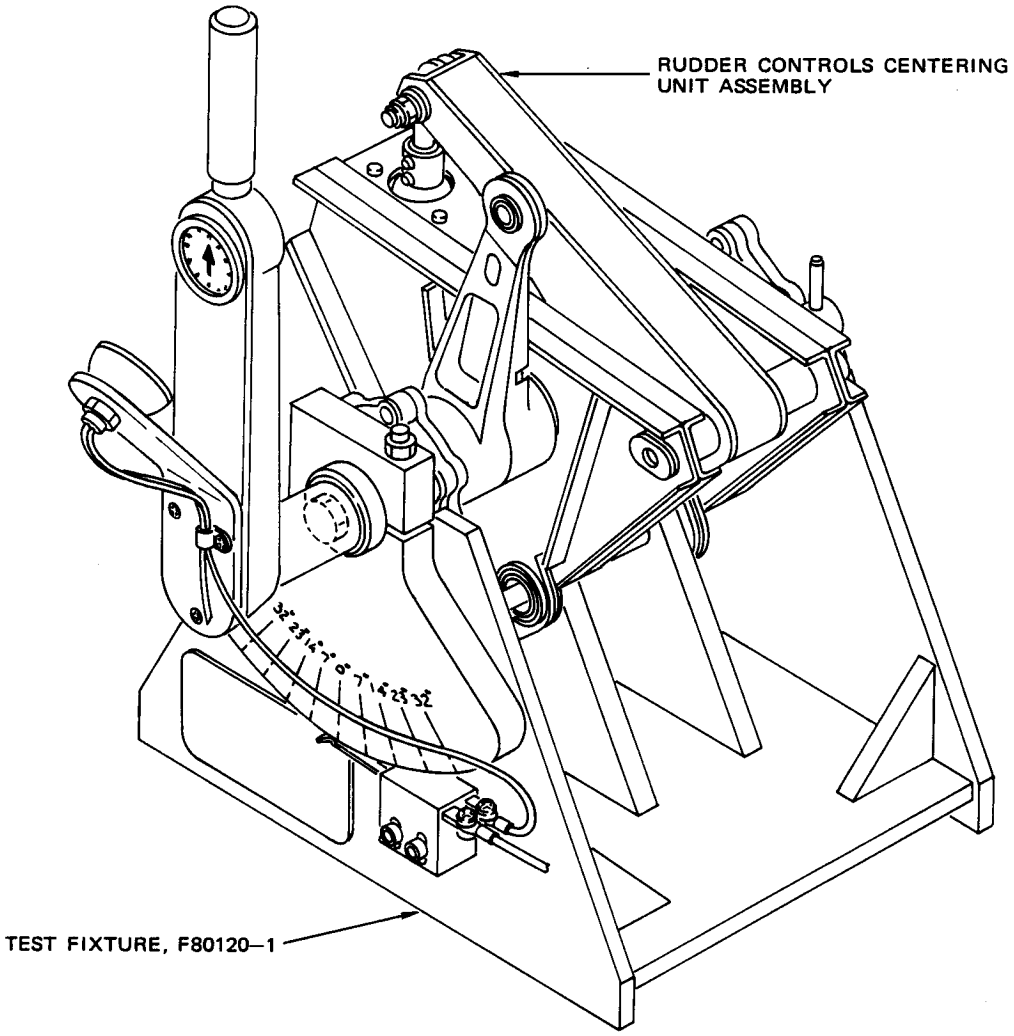
(4) Rotate shaft (78) a minimum of 44 degrees in each direction. Input torque shall be within torque values shown on Fig. 4.

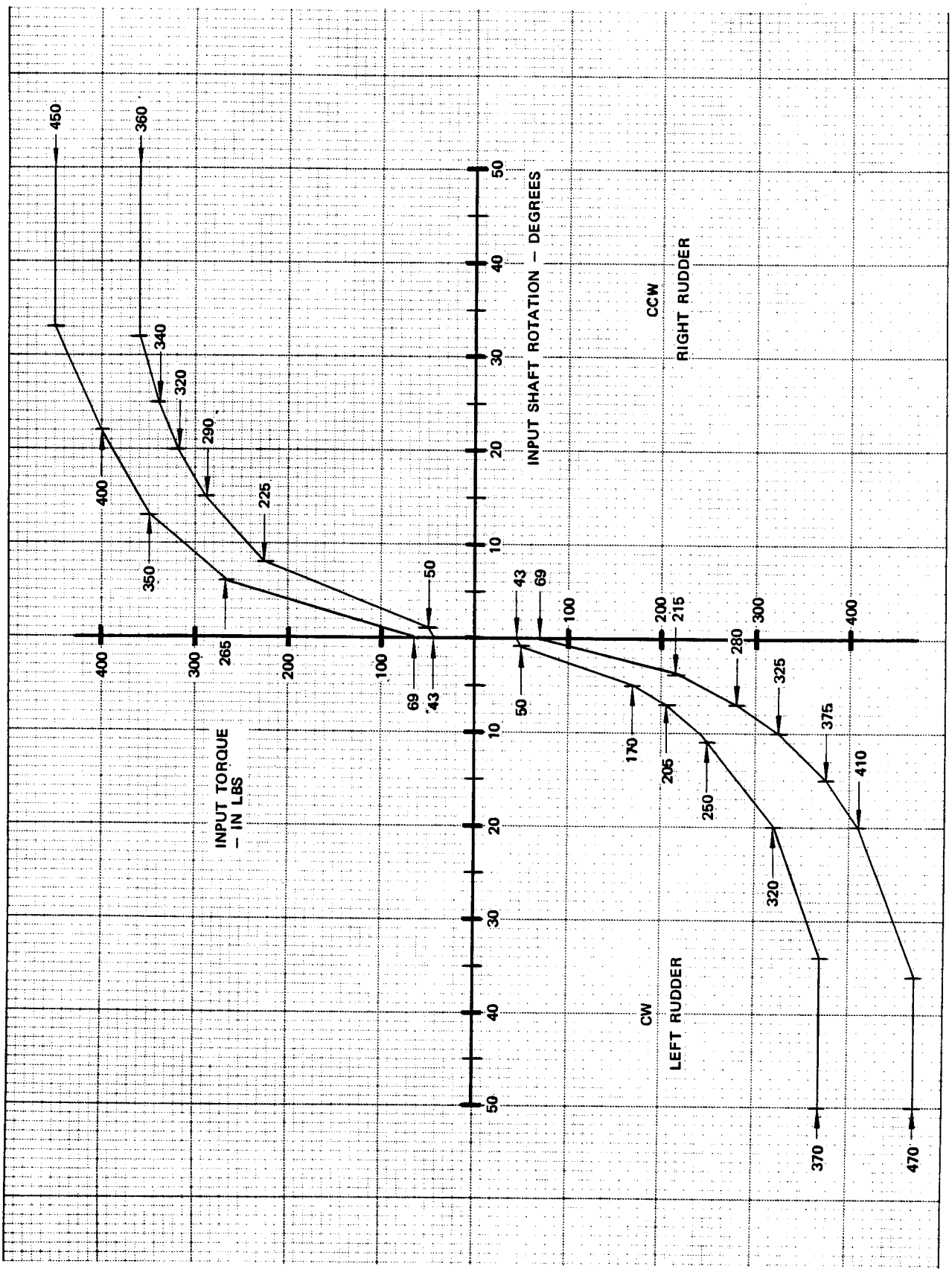
NOTE: Use spacers (125) if required (maximum of three) to maintain functional test requirements.

7. SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

A. F80120-1 -- Test Fixture

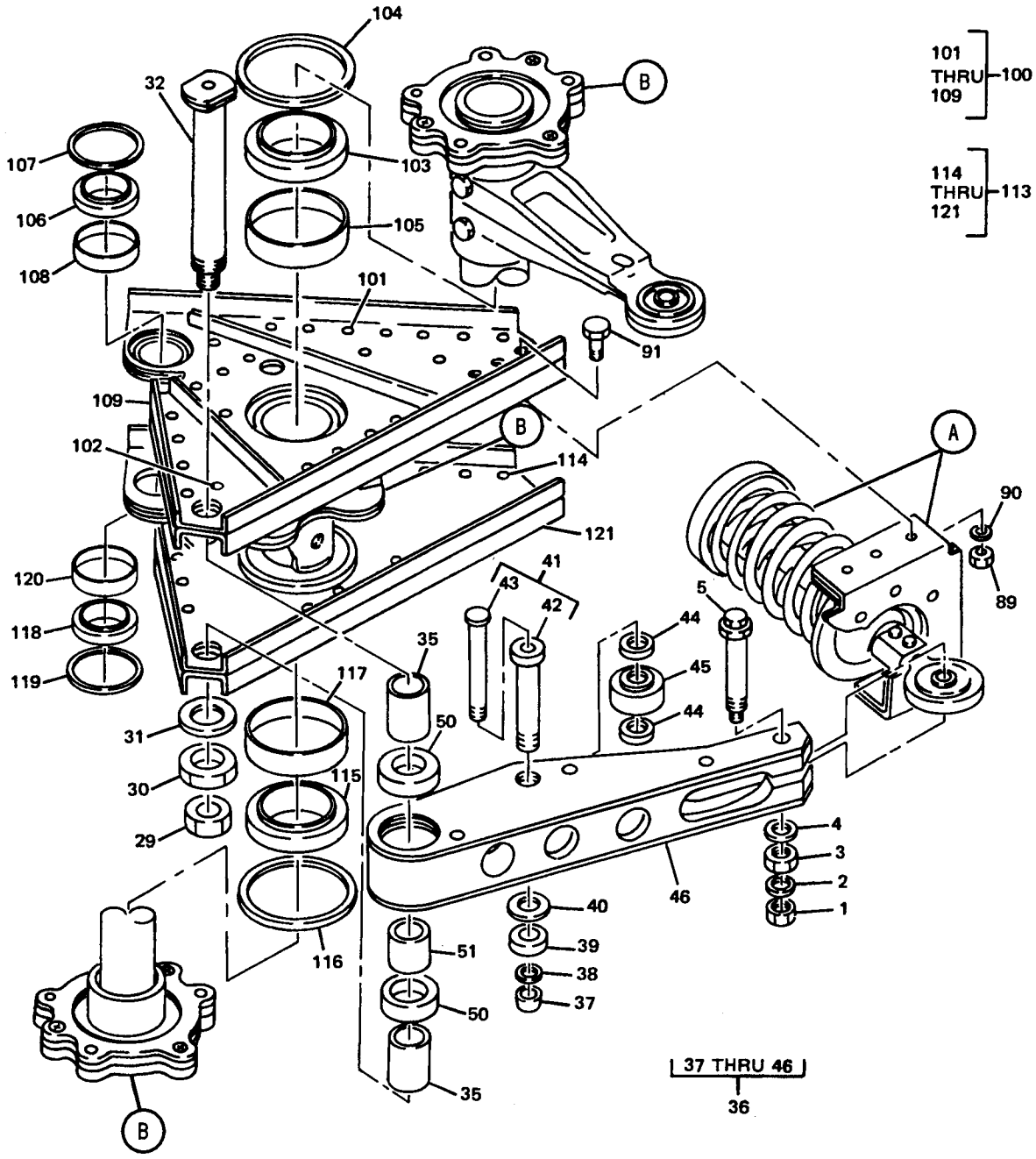
NOTE: Listed item is recommended. Equivalent substitute may be used.



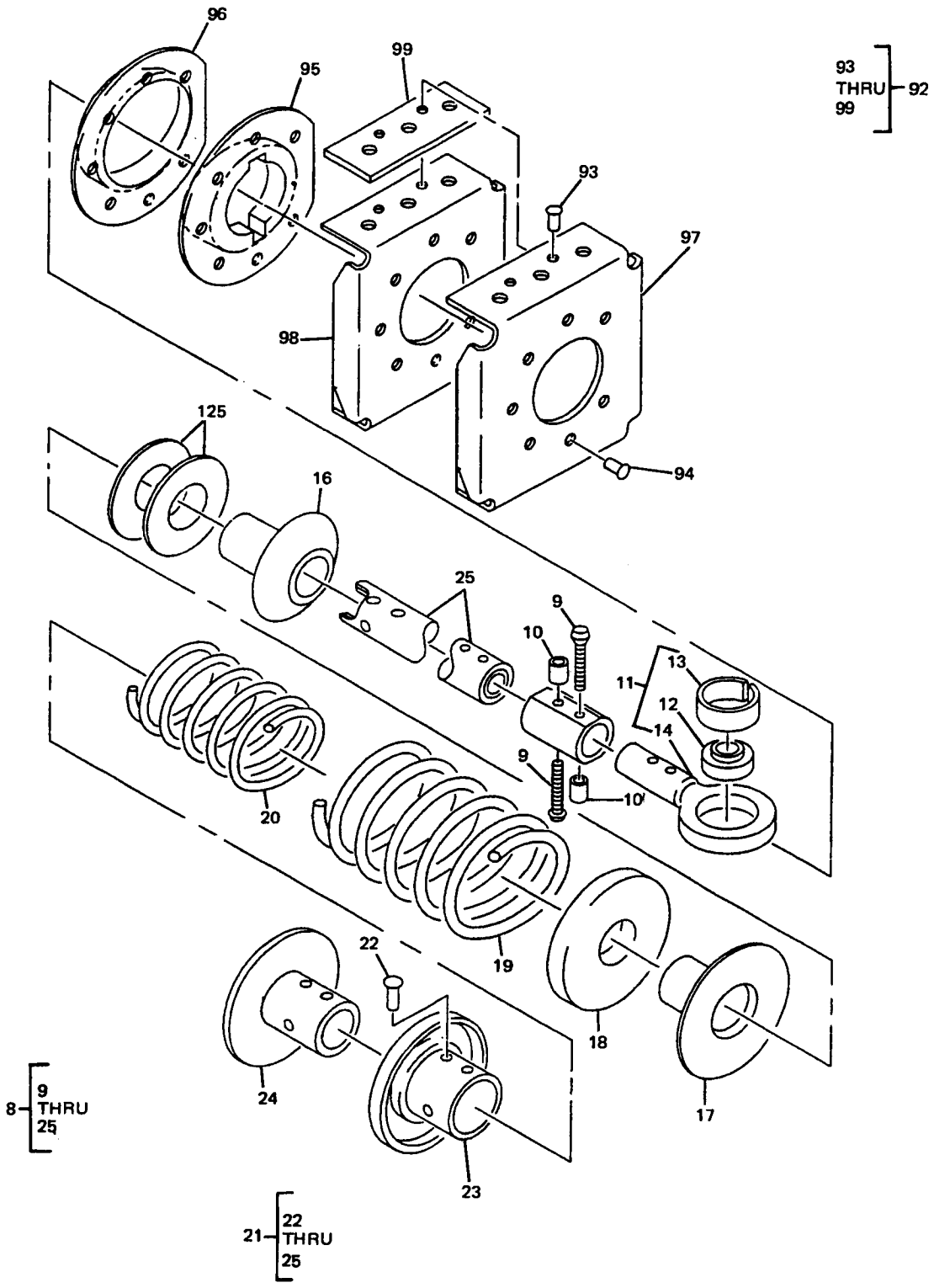


Input Torque Versus Shaft Rotation Diagram
Figure 4

8. ILLUSTRATED PARTS LIST

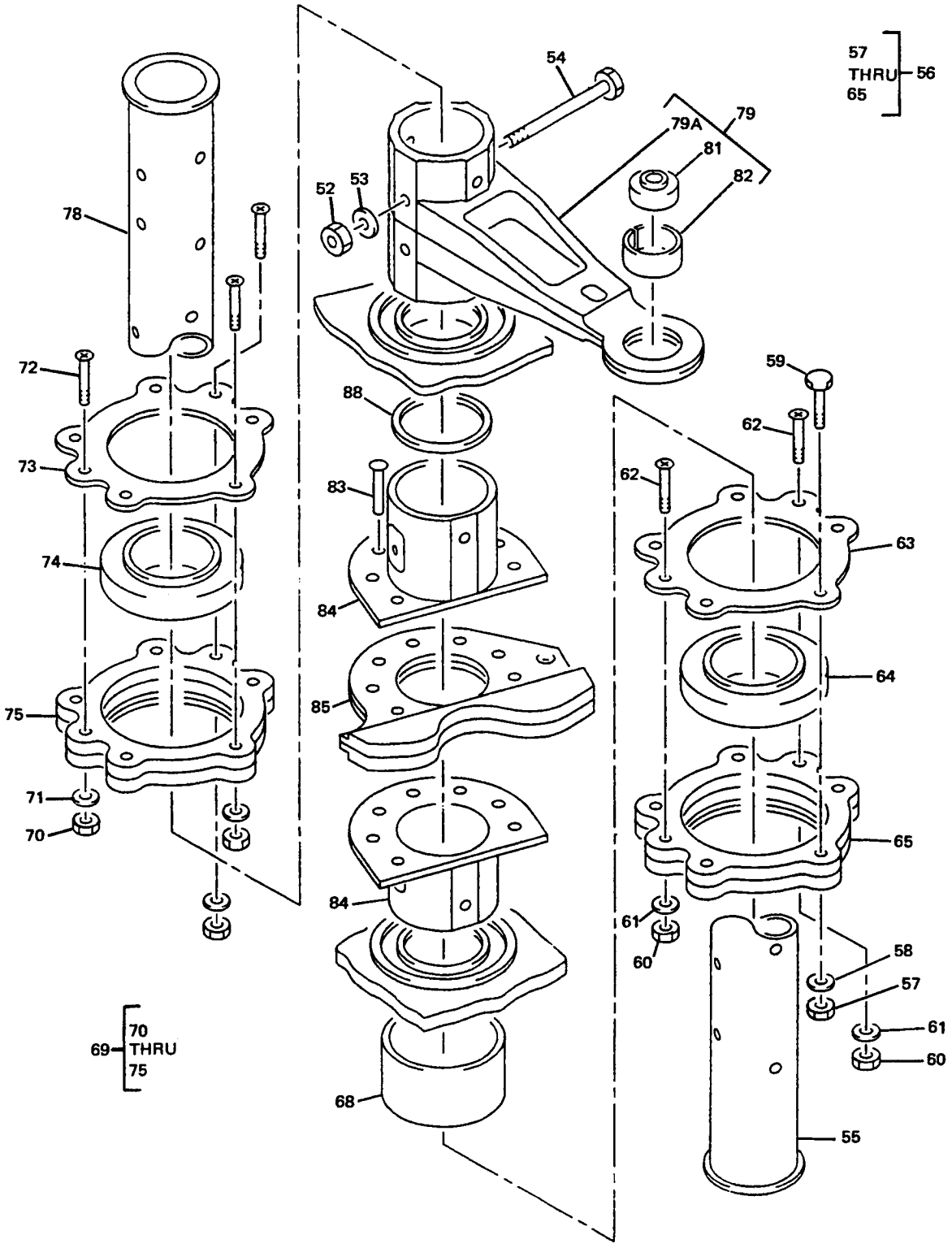


Rudder Controls Centering Unit Assembly
Figure 5 (Sheet 1)



Rudder Controls Centering Unit Assembly
Figure 5 (Sheet 2)

M95453



Rudder Controls Centering Unit Assembly
Figure 5 (Sheet 3)

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
5-					
	65-70973-2		RUDDER CONTROLS CENTERING UNIT ASSY	A	
	65-70973-3		RUDDER CONTROLS CENTERING UNIT ASSY (SB 27-1052)	B	
	65-70973-4		RUDDER CONTROLS CENTERING UNIT ASSY	C	
	65-70973-6		RUDDER CONTROLS CENTERING UNIT ASSY *[1]	D	
1	BACN10JC3		. NUT		1
2	AN960PD10		. WASHER		1
3	BACN10JC5		. NUT		1
4	AN960PD516		. WASHER		1
5	69-27229-13		. BOLT ASSY		1
-6	BACB30NE3-30		. . BOLT		1
-7	69-27228-12		. . BOLT		1
8	69-57900-3		. SPRING ASSY		1
9	BACB30GP5-12		. . LOCKBOLT		2
10	NAS1080D5		. . COLLAR		2
11	69-57908-1		. . ROD END ASSY		1
12	BACB10AC5A		. . . BEARING		1
13	69-38919-17		. . . SLEEVE		1
14	69-57908-2		. . . PLATE		2
15	69-57916-2		. . SLEEVE		1
16	69-57910-2		. . BEARING		1
17	69-57911-2		. . SEAT		1
18	69-57912-1		. . SEAT		1
19	69-57906-1		. . SPRING (REPLD BY 69-57906-2)		1
19	69-57906-2		. . SPRING (REPLS 69-57906-1)		1
20	69-57907-1		. . SPRING (REPLD BY 69-57907-2)		1
20	69-57907-2		. . SPRING (REPLS 69-57907-1)		1
21	69-57900-4		. . ROD ASSY		1
22	BACR15BB5DC		. . . RIVET (REPLS MS20470D5)		2
23	69-57913-1		. . . SEAT		1
24	69-57914-1		. . . SEAT		1
25	69-57909-4		. . . ROD ASSY		1
-26	69-57909-2		. . . . ROD		1
-27	69-57909-5		. . . . ROD		1
-28	69-57922-1		. . . . PLUG		1
29	69-57926-1		. NUT (OPT NAS1423-7)		1
30	69-57925-1		. NUT (OPT NAS1423-10)		1
31	AN960PD1016L		. WASHER		1
32	69-57919-1		. SHAFT ASSY		1
-33	69-57920-1		. . SHAFT		1
-34	69-57921-1		. . SHAFT		1
35	NAS43DD10-62		. SPACER		2

- ITEM NOT ILLUSTRATED

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
5-					
36	65-51251-5		. ARM ASSY		1
37	BACC30K8		. . COLLAR		1
38	AN960-416		. . WASHER		1
39	BACN10JC6		. . NUT (REPLS NAS679A6)		1
40	AN960PD616		. . WASHER		1
41	69-27158-3		. . BOLT ASSY		1
42	69-27163-4		. . . BOLT		1
43	BACB30GW8-31		. . . LOCKBOLT		1
44	69-43930-1		. . SPACER		2
45	BACB10BN06P		. . BEARING (REPLS BACB10B257R)		1
46	65-51251-6		. . ARM ASSY		1
-47	BACR15BB5DC		. . . RIVET (REPLS MS20470D5)		3
-48	65-51251-4		. . . PLATE		2
-49	65-51251-7		. . . CHANNEL		1
50	BACB10CF10PP		. BEARING (REPLS BACB10A27DDH)		2
51	NAS43DD10-50		. SPACER		1
52	BACN10JC3		. NUT		8
53	AN960PD10		. WASHER		8
54	BACB30NF3-26		. BOLT		8
55	69-57904-1		. SHAFT		1
56	69-37283-4		. HOUSING ASSY		1
57	BACN10JC4		. . NUT		1
58	AN960PD416		. . WASHER		1
59	BACB30NF4-10		. . BOLT		1
60	BACN10JC08		. . NUT		2
61	AN960PD8L		. . WASHER		2
62	BACB30LU2-8		. . BOLT (REPLS BACB30FL2-8)		2
63	69-38294-2		. . PLATE		1
64	BACB10A828		. . BEARING		1
65	69-37284-9		. . PLATE ASSY		1
-65A	69-37284-11		. . . PLATE ASSY, BONDED		1
-66	69-37284-13		. . . . PLATE		1
-67	69-37284-14		. . . . PLATE		1
68	66-24903-5		. SPACER		1
69	69-37283-3		. HOUSING ASSY		1
70	BACN10JC08		. . NUT		3
71	AN960PD8L		. . WASHER		3
72	BACB30LU2-6		. . BOLT (REPLS BACB03FL2-6)		3
73	69-38294-2		. . PLATE		1
74	BACB10A828		. . BEARING		1

- ITEM NOT ILLUSTRATED

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
5-					
75	69-37284-8		. . PLATE ASSY		1
-75A	69-37284-10		. . . PLATE ASSY, BONDED		1
-76	69-37284-12		. . . . PLATE		1
-77	69-37284-13		. . . . PLATE		1
78	69-57905-1		. SHAFT		1
79	65-70975-1		. CRANK ASSY	A	1
79	65-70975-3		. CRANK ASSY (SB 27-152)	B-D	1
79A	69-70975-2		. . CRANK ASSY, BONDED		1
-80	65-70977-1		. . . CRANK (OPT 65-70976-1)		2
81	BACB10AC5A		. . BEARING		1
82	69-38919-17		. . SLEEVE	A	1
82	69-38919-31		. . SLEEVE	B-D	1
83	BACR15BB5DC		. RIVET (REPLS MS20470D5)		7
84	69-57915-1		. HUB		2
85	65-73697-1		. CAM ASSY		1
-86	65-73697-2		. . CAM ASSY, Bonded		1
-87	65-73697-3		. . . PLATE		2
88	69-61340-1		. SPACER		1
89	BACN10JC4		. NUT		6
90	AN960PD416		. WASHER		6
91	BACB30NF4-4		. BOLT		6
92	69-57901-1		. BEARING SEAT ASSY		1
93	BACR15BA4DC		. . RIVET (REPLS MS20426D4)		4
94	BACR15BB5DC		. . RIVET (REPLS MS20470D5)		7
95	69-57902-1		. . SEAT		1
96	69-57903-1		. . RETAINER		1
97	69-57917-1		. . BRACKET		1
98	69-57917-2		. . BRACKET		1
99	BACS40C12A37		. . SHIM		1
100	65-70974-5		. FRAME ASSY	A	1
100	65-70974-9		. FRAME ASSY (SB 27-1052)	B-D	1
101	BACR15BB5DC		. . RIVET (REPLS MS20470D5)		22
102	BACR15BB4DC		. . RIVET (REPLS MS20470D4)		1
103	BACB10CF21PP		. . BEARING (REPLS BACB10A30DDH)		1
104	69-57924-1		. . SPACER		1
105	69-38919-5		. . SLEEVE		1
106	BACB10BX5		. . BEARING (REPLS BACB10A683)		1
107	69-57923-1		. . SPACER		1
108	69-38919-17		. . SLEEVE	A	1
108	69-38919-31		. . SLEEVE	B-D	1

- ITEM NOT ILLUSTRATED

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
5-					
109	66-70974-7		. . FRAME ASSY, BONDED		1
-110	69-57917-7		. . . BRACKET		1
-111	69-57918-9		. . . FRAME		1
-112	69-57918-11		. . . FRAME		1
113	65-70974-6		. FRAME ASSY	A	1
113	65-70974-10		. FRAME ASSY (SB 27-1052)	B-D	1
114	BACR15BB5DC		. . RIVET (MS20470D5)		22
115	BACB10CF21PP		. . BEARING (REPLS BACB10A30DDH)		1
116	69-57924-1		. . SPACER		1
117	69-38919-5		. . SLEEVE		1
118	BACB10BX5		. . BEARING (REPLS BACB10A683)		1
119	69-57923-1		. . SPACER		1
120	69-38919-17		. . SLEEVE	A	1
120	69-38919-31		. . SLEEVE	B-D	1
121	65-70974-8		. . FRAME ASSY, BONDED		1
-122	69-57917-8		. . . BRACKET		1
-123	69-57918-10		. . . FRAME		1
-124	69-57918-12		. . . FRAME		1
125	69-61378-1		. SPACER		AR

- ITEM NOT ILLUSTRATED

*[1] 65-70973-6 ASSY IDENTICAL TO 65-70973-4 EXCEPT FOR FACTORY LUBRICATION OF 69-57910-2 BEARING