TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSEMBLY OVERHAUL MANUAL 27-55-21

REVISION NO. 3, DATED DEC 5/92

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 top assemblies 65-51513-3, -4												X	
Added optional and preferred shims						X						X	

TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSEMBLY

27-55-21

BOEING P/N 65-51513-1, -2, -3, -4

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT

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
	27-55-21					
*	T-1	Dec 5/92				
	T-2	BLANK				
*	LEP-1	Dec 5/92				
	LEP-2	BLANK				
	T/C-1	Mar 10/70				
	T/C-2	BLANK				
	1	Mar 10/70				
	2	Mar 10/70				
	3	Mar 10/70				
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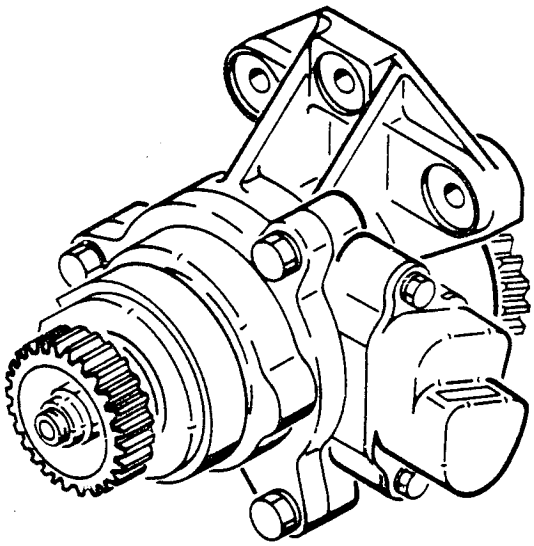
TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSEMBLY

Boeing Part Numbers: 65-51513-1 and -2



Trailing Edge Flap Drive Angle Gearbox Assembly
Figure 1

1. DESCRIPTION AND OPERATION

A. Description

(1) The trailing edge flap drive angle gearbox assembly consists of two bearing mounted bevel gears enclosed in a housing. The external ends of the gear shafts are provided with externally splined coupling halves. The gear ratio is one to one.

B. Operation

(1) The trailing edge flap drive angle gearbox assembly provides a 21.4-degree angle change of the flap drive torque tubes. The gearbox assembly transmits torque tube rotary motion from the inboard flap inboard transmission to the inboard flap outboard transmission.

C. Leading Particulars

Overall Dimensions -- 4-1/2 x 4-3/4 x 6-1/8 inches (approx.)
Drive Angle -- 21.4 degrees
Weight -- 3.59 pounds

2. DISASSEMBLY

A. Procedure (See figure 4.)

(1) Hold either coupling half (1) with Splined Coupling Wrench, F71228-500, and remove nuts (2), washers (3), and coupling halves (1).

(2) Remove bolts (4), washers (5) and drain (6) from housing (22).

(3) Remove nuts (9), washers (8), and bolts (7) and separate cover (10) from housing assembly (21).

(4) Remove gear (11), bearing (12), shim (13), and bearing (14) from cover (10).

NOTE: Measure and note thickness of shim (13), to facilitate reassembly.

(5) Remove gear (15), bearing (16), shim (17), and bearing (18) from housing assembly (21).

NOTE: Measure and note thickness of shim (17), to facilitate reassembly.

Do not remove screws (19) or nameplate (20) from housing assembly (21), unless repair or replacement is required.

Do not remove inserts (23) from housing (22), unless repair or replacement is required.

3. CLEANING

A. General

(1) Wash and rinse all parts, except bearings, in cleaning solvent, Specification P-D-680.

(2) Dry all parts with lint-free cloth or moisture-free compressed air.

(3) For further information, refer to "General Cleaning Procedures," Subject 20-30-03.

B. Bearings

(1) Clean bearings per "Cleaning and Relubricating Antifriction Bearings," Subject 20-30-01.

4. INSPECTION/CHECK

A. Visual Check

(1) Examine all parts with strong light under minimum of 10-power magnification for cracks, burrs, scratches, and corrosion.

(2) Check threaded areas for stripped threads.

(3) Examine plated and painted surfaces for blisters, peeling, flaking, or chipping.

(4) Examine teeth of splines and gears for chipping, cracking, and abnormal wear pattern. Wear pattern must be smooth and centered on tooth.

(5) Check mating of coupling halves and gears. Splines of gears must mate with splines of coupling halves without free play.

(6) Examine bearings for binding and excessive radial or axial play. Check bearing races for cracks and scoring.

B. Special Check (See figure 4.)

(1) If visual examination discloses evidence of defects on any of listed parts, perform the following checks:

(a) Fluorescent dye penetrant check -- cover (10), and housing (22).

(b) Magnetic particle check -- coupling halves (1), and gears (11 and 15).

5. REPAIR

A. Repair

(1) Repair minor defects and remove corrosion by polishing with aluminum oxide abrasive cloth, 220 grit or finer.

(2) Repair damaged threads with triangular file or thread chaser.

(3) Refinish polished surfaces as required for corrosion protection.

B. Refinish (Fig. 4)

NOTE: Refer to Subject 20-30-02 for stripping of protective finishes, and to Subject 20-41-01 for decoding of F and SRF finish symbols and their BAC equivalents.

(1) If plated or painted surfaces are worn or chipped, refinish listed items as indicated.

(a) Coupling Half (1) -- Apply F-1.1913, except 0.0002 to 0.0003 inch single plate thickness.

(b) Drain (6) -- Apply F-2.26 plus SRF-12.205 except no paint in holes.

(c) Cover (10) -- Apply F-2.26 all over, plus SRF-12.205 and SRF-12.63 to all external surfaces except faying surface.

(d) Gear (11 and 15) -- Apply F-1.1927 all over except on gear teeth. Apply SRF-12.206 plus F-14.13 to interior surfaces.

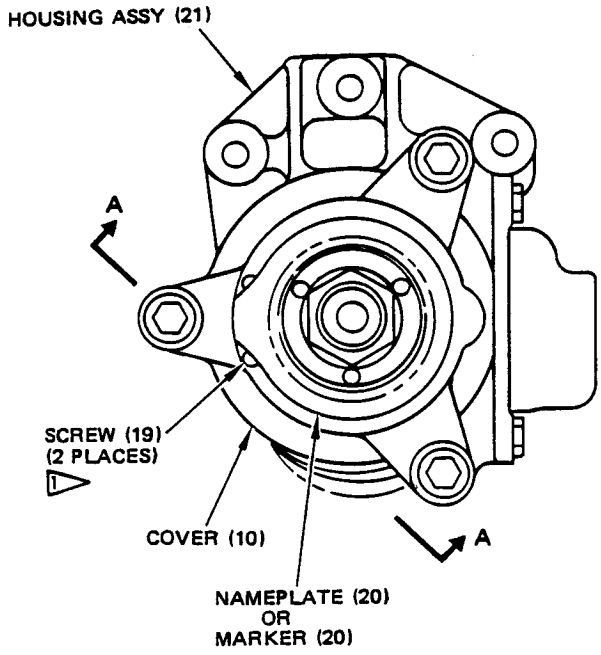
(e) Housing (22) -- Apply F-2.26 all over, plus SRF-12.205 and SRF-12.63 to all external surfaces except faying surfaces.

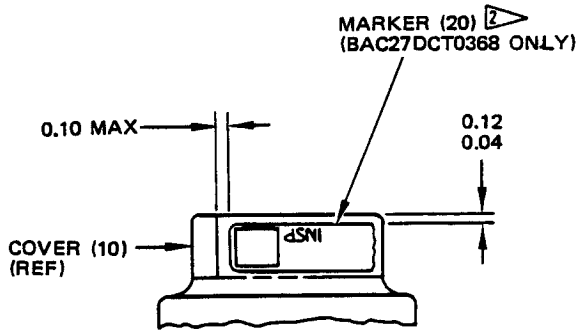
C. Replacement (Fig. 4)

(1) Replace all unserviceable parts.

(2) If nameplate/marker (20) requires replacement, remove old nameplate and clean mounting surface. Steel stamp serial number and assembly number on nameplate prior to installation. Secure replacement nameplate, 69-51951-1 or 69-39304-1, with screws (19) installed with wet primer, BMS 10-11, type 1. Install marker BAC27DCT0368 per 20-50-05, in location shown in Fig. 1A. Edge seal with clear, skydrol-resistant topcoating per 20-44-01, type 41.

(3) If inserts (23) require replacement, remove damaged insert, clean bore, apply primer, BMS 10-11, type 1, to bore and new insert, and seat while primer is wet.





A–A
(ROTATED APPROX. 45° CCW)

1 USED TO INSTALL 69–51591–1 OR 69–39304–1 ONLY

2 LOCATE INSPECTION END OF BAC27DCT0368 AS SHOWN

ALL DIMENSIONS ARE IN INCHES

6. ASSEMBLY

A. General (See figure 4.)

(1) Apply film of grease, Specification MIL-G-21164, to all external surfaces of gears (11 and 15).

(2) Apply grease, Specification MIL-G-21164, to all external surfaces of bearings (12, 14, 16, and 18).

(3) Apply film of grease, Specification MIL-G-21164, to faying surfaces of housing (22), shims (13 and 17), cover (10), and drain (6).

(4) Dip bolts (4 and 7) in primer, Specification BMS 10-11, type 1, and install while primer is wet.

(5) Examine interior of housing (22) and cover (10) and do not allow chips or other foreign matter to enter the unit during reassembly. Do not fill gearbox with grease.

B. Reassembly (See figure 4.)

(1) Install bearings (16 and 18) and shim (17) on gear (15).

NOTE: If new shim (17) will be used, measure width of inner race of bearing (18) prior to installation and identify code number stamped on face of housing bore. Select correct shim from figure 2.

(2) Pack gear teeth with MIL-G-21164 grease. Insert gear (15) with attached parts into housing (22) until bottomed.

(3) Install coupling half (1), washer (3), and nut (2) on gear (15).

(4) Hold coupling half (1) with Splined Coupling Wrench, F71228-500 and tighten nut (2) to a torque range of 250 of 300 pound-inches.

(5) Install drain (6), washers (5), and bolts (4) on housing assembly (21).

(6) Install bearings (12 and 14) and shim (13) on gear (11).

NOTE: If new shim (13) will be used, measure width of inner race of bearing (14) prior to installation and identify code number stamped on face of cover (10). Select correct shim (13) from figure 3.

(7) Pack gear teeth with MIL-G-21164 grease. Insert gear (11) with attached parts into cover (10) until bottomed.

(8) Install coupling half (1), washer (3), and nut (2) on gear (11).

(9) Hold coupling half (1) with Splined Coupling Wrench, F71228-500, and tighten nut (2) to a torque range of 250 to 300 pound-inches.

(10) Mate cover (10) to housing assembly (21) and secure with bolts (7), washers (8), and nuts (9).

(11) Hold one coupling half (1) with Splined Coupling Wrench, F71228-500, and measure gear backlash at 1.10 inch radius of other coupling half.

NOTE: Backlash must be 0.002 to 0.0085 inch at 1.10 inch radius, within a torque range of 15 to 30 pound-inches. If necessary, replace shim (13 and 17), as required, to obtain specified backlash. See figures 2 and 3.

C. Material

(1) Primer -- Specification BMS 10-11, type 1

(2) Grease -- Specification MIL-G-21164

Housing Code No.	Width of Inner Race of Bearing (18) (inch)	Shim (Pref) Part No.	Shim (Opt) Part No.	Shim Thickness ± 0.001 (inch)
13	0.4674 to 0.4685	69-38159-12	69-38159-5	0.055
	0.4686 to 0.4715	69-38159-11	69-38159-4	0.052
	0.4716 to 0.4724	69-38159-10	69-38159-3	0.049
12	0.4674 to 0.4705	69-38159-11	69-38159-4	0.052
	0.4706 to 0.4724	69-38159-10	69-38159-3	0.049
11	0.4674 to 0.4695	69-38159-11	69-38159-4	0.052
	0.4696 to 0.4724	69-38159-10	69-38159-3	0.049
10	0.4674 to 0.4685	69-38159-11	69-38159-4	0.052
	0.4686 to 0.4715	69-38159-10	69-38159-3	0.049
	0.4716 to 0.4724	69-38159-9	69-38159-2	0.046
9	0.4674 to 0.4680	69-38159-11	69-38159-4	0.052
	0.4681 to 0.4710	69-38159-10	69-38159-3	0.049
	0.4711 to 0.4724	69-38159-9	69-38159-2	0.046
8	0.4674 to 0.4700	69-38159-10	69-38159-3	0.049
	0.4701 to 0.4724	69-38159-9	69-38159-2	0.046
7	0.4674 to 0.4690	69-38159-10	69-38159-3	0.049
	0.4691 to 0.4720	69-38159-9	69-38159-2	0.046
	0.4721 to 0.4724	69-38159-8	69-38159-1	0.043
6	0.4674 to 0.4680	69-38159-10	69-38159-3	0.049
	0.4681 to 0.4710	69-38159-9	69-38159-2	0.046
	0.4711 to 0.4724	69-38159-8	69-38159-1	0.043
5	0.4674 to 0.4700	69-38159-9	69-38159-2	0.046
	0.4701 to 0.4724	69-38159-8	69-38159-1	0.043

NOTE: Thickness of shim 69-38159-7, -14 is 0.063 inch.

Shim (17) Selection
Figure 2

Housing Code No.	Width of Inner Race of Bearing (18) (inch)	Shim (Pref) Part No.	Shim (Opt) Part No.	Shim Thickness ± 0.001 (inch)
17	0.4674 to 0.4695	69-38159-13	69-38159-6	0.058
	0.4696 to 0.4724	69-38159-12	69-38159-5	0.055
16	0.4674 to 0.4685	69-38159-13	69-38159-6	0.058
	0.4686 to 0.4715	69-38159-12	69-38159-5	0.055
	0.4716 to 0.4724	69-38159-11	69-38159-4	0.052
15	0.4674 to 0.4705	69-38159-12	69-38159-5	0.055
	0.4706 to 0.4724	69-38159-11	69-38159-4	0.052
14	0.4674 to 0.4715	69-38159-12	69-38159-5	0.055
	0.4716 to 0.4724	69-38159-11	69-38159-4	0.052
4	0.4674 to 0.4690	69-38159-12	69-38159-5	0.055
	0.4691 to 0.4720	69-38159-11	69-38159-4	0.052
	0.4721 to 0.4724	69-38159-10	69-38159-3	0.049
3	0.4674 to 0.4680	69-38159-12	69-38159-5	0.055
	0.4681 to 0.4710	69-38159-11	69-38159-4	0.052
	0.4711 to 0.4724	69-38159-10	69-38159-3	0.049
2	0.4674 to 0.4700	69-38159-11	69-38159-4	0.052
	0.4701 to 0.4724	69-38159-10	69-38159-3	0.049
1	0.4674 to 0.4690	69-38159-11	69-38159-4	0.052
	0.4691 to 0.4720	69-38159-10	69-38159-3	0.049
	0.4721 to 0.4724	69-38159-9	69-38159-2	0.046
0	0.4674 to 0.4680	69-38159-11	69-38159-4	0.052
	0.4681 to 0.4710	69-38159-10	69-38159-3	0.049
	0.4711 to 0.4724	69-38159-9	69-38159-2	0.046

NOTE: If backlash is excessive with listed shim installed, replace shim with next higher shim dash number. If backlash is below minimum with listed shim installed, replace shim with next lower shim dash number. Thickness of shim 69-38159-1, -8 is 0.043 inch, and 69-38159-7, -14 is 0.063 inch.

Shim (13) Selection
Figure 3

7. TESTING

A. Test Equipment

(1) None

B. Preparation for Test

(1) None

C. Functional Test (See figure 4.)

(1) Rotate gears (11 and 15) by hand. Gears and bearings shall be free running without evidence of binding in any position.

8. TROUBLE SHOOTING

A. Trouble during test after overhaul

Trouble	Possible Cause	Correction
(1) Binding or rough movement	Improperly installed or defective bearings	Check or replace bearings
	Improper backlash adjustment	Check and readjust backlash
	Defective gears	Replace gears

9. STORAGE INSTRUCTIONS

A. Wrap assembly in vapor barrier paper and tape securely.

B. Tag assembly with test date.

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

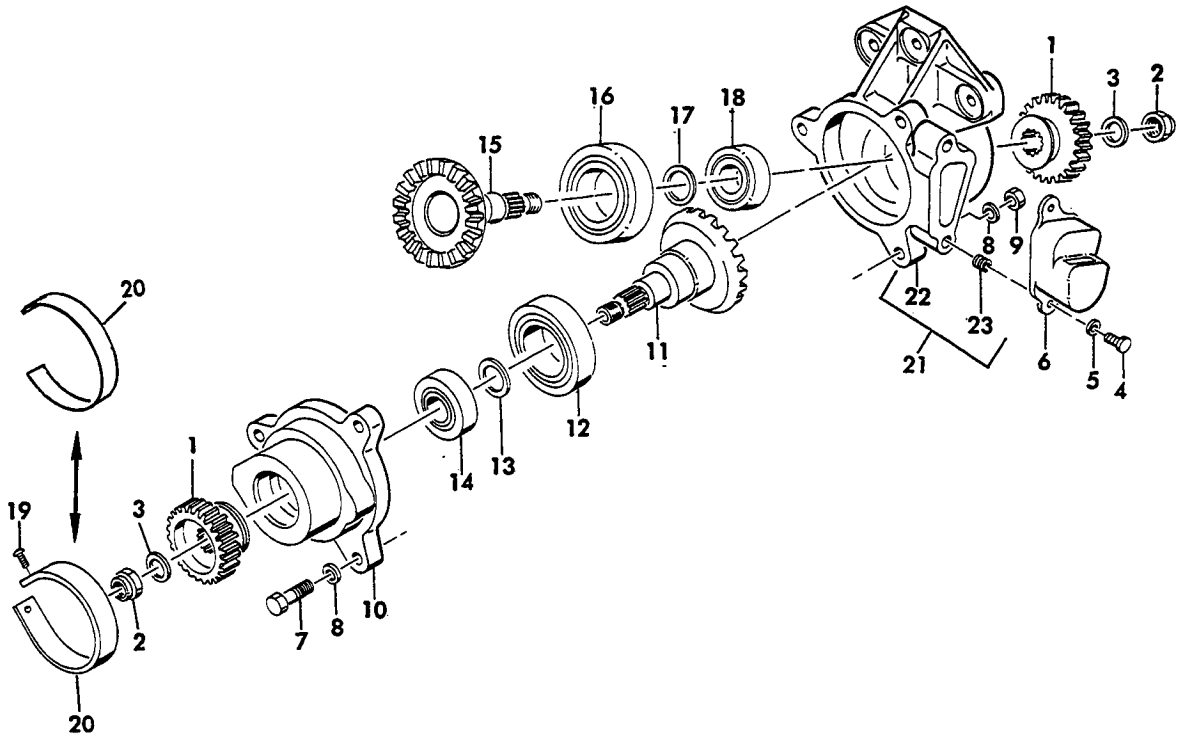
10. SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

A. F71228-500 -- Splined Coupling Wrench

B. Dial Indicator, calibrated to 0.001 inch

NOTE: Listed items are recommended. Equivalent substitutes may be used.

11. ILLUSTRATED PARTS LIST



Trailing Edge Flap Drive Angle Gearbox Assembly
Figure 4

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
4-	65-51513-1		TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSY	A	RF
	65-51513-2		TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSY (OPP TO 65-51513-1)	B	RF
	65-51513-3		TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSY	C	RF
	65-51513-4		TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSY	D	RF
1	69-47815-1		. COUPLING HALF (PREFD)		2
1	69-16758-1		. COUPLING HALF (OPT TO 69-47815-1)		2

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
4-					
2	BACN10JC9		. NUT (REPLS BACN10BY59)		2
3	AN960D916		. WASHER		2
4	BACB30NE3-2		. BOLT (REPLS NAS1303-2)		2
5	AN960D10L		. WASHER		2
6	66-24135-1		. DRAIN	AC	1
6	66-24135-2		. DRAIN	BD	1
7	BACB30NE4-13		. BOLT (REPLS NAS1304-13)		3
8	AN960D416		. WASHER		6
9	BACN10JC4		. NUT (REPLS NAS679A4W)		3
10	69-38163-1		. COVER		1
11	69-38157-1		. GEAR		1
12	BACB10BA30PP		. BEARING (REPLS BACB10A95H)		1
13	69-38159-9		. SHIM *[1] (PREF)		1
13	69-38159-10		. SHIM *[1] (PREF)		1
13	69-38159-11		. SHIM *[1] (PREF)		1
13	69-38159-12		. SHIM *[1] (PREF)		1
13	69-38159-13		. SHIM *[1] (PREF)		1
13	69-38159-14		. SHIM (PREF FOR SPARES)		
13	69-38159-2		. SHIM *[1] (OPT)	AB	1
13	69-38159-3		. SHIM *[1] (OPT)	AB	1
13	69-38159-4		. SHIM *[1] (OPT)	AB	1
13	69-38159-5		. SHIM *[1] (OPT)	AB	1
13	69-38159-6		. SHIM *[1] (OPT)	AB	1
13	69-38159-7		. SHIM (OPT FOR SPARES)		1
14	BACB10BA20PP		. BEARING (REPLS BACB10A131H)		1
15	69-38157-1		. GEAR		1
16	BACB10BA30PP		. BEARING (REPLS BACB10A95H)		1
17	69-38159-8		. SHIM *[2] (PREF)		1
17	69-38159-9		. SHIM *[2] (PREF)		1
17	69-38159-10		. SHIM *[2] (PREF)		1
17	69-38159-11		. SHIM *[2] (PREF)		1
17	69-38159-12		. SHIM *[2] (PREF)		1
17	69-38159-14		. SHIM (PREF FOR SPARES)		
17	69-38159-1		. SHIM *[2] (OPT)	AB	1
17	69-38159-2		. SHIM *[2] (OPT)	AB	1
17	69-38159-3		. SHIM *[2] (OPT)	AB	1
17	69-38159-4		. SHIM *[2] (OPT)	AB	1
17	69-38159-5		. SHIM *[2] (OPT)	AB	1
17	69-38159-7		. SHIM (OPT FOR SPARES)		1
18	BACB10BA20PP		. BEARING (REPLS BACB10A131H)		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
4-					
19	NAS601-3P		. SCREW (REPLS AN515-6R3) (USED WITH 69-51591-1, 69-39304-1 ONLY)		2
20	BAC27DCT0368		. MARKER (PREFD)		1
20	69-51591-1		. NAMEPLATE (OPT TO BAC27DCT0368)		1
20	69-39304-1		. NAMEPLATE (OPT TO 69-51591-1)		1
21	65-51512-1		. HOUSING ASSY	AC	1
21	65-51512-2		. HOUSING ASSY	BD	1
22	65-51512-3		. . HOUSING (USED ON 65-51512-1)		1
22	65-51512-4		. . HOUSING (USED ON 65-51512-2)		1
23	MS21209F1-15		. . INSERT, HELICOIL		2

*[1] SEE FIG. 3
*[2] SEE FIG. 2