TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE RIGHT ANGLE GEARBOX ASSEMBLY OVERHAUL MANUAL, 27-55-11

REVISION NO. 5, 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 finish callout in repair					X								

TRAILING EDGE FLAP DRIVE RIGHT ANGLE GEARBOX ASSEMBLY

27-55-11

BOEING P/N 65-51510-1, -2

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
	27-55-11					
	T-1	Mar 10/70				
	T-2	BLANK				
*	LEP-1	Nov 1/02				
	LEP-2	BLANK				
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	1	Aug 15/67				
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TRAILING EDGE FLAP RIGHT ANGLE GEARBOX ASSEMBLY

Boeing Part Numbers 65-51510-1 and -2

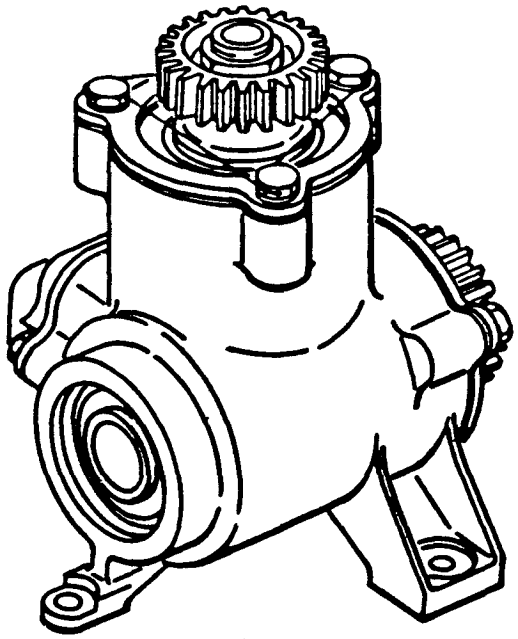

Figure 1. Trailing Edge Flap Right Angle Gearbox Assembly

DESCRIPTION AND OPERATION

1. Description

   A. The trailing edge flap right 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.

2. Operation

A. The trailing edge flap right angle gearbox assembly provides a 90 degree angle change of the trailing edge flap drive torque tubes. The gearbox assembly transmits torque tube rotary motion from the trailing edge flap drive power unit assembly to the inboard flap inboard transmission assembly.

3. Leading Particulars

Overall Dimensions	-- 5.0 x 5.0 x 6.0 inches (approximate)
Drive Angle	-- 90 degrees
Weight (pounds)	-- 4.66 (65-51510-1)
	-- 4.71 (65-51510-2)

DISASSEMBLY

1. Procedures (See figure 1101.)

   A. If installed, remove all lockwire.

   B. Hold coupling half (7) with a Splined Spanner Wrench, F71228-500, and remove nuts (8 and 2 or 5), washers (9 and 3 or 6), and coupling halves (7 and 1 or 4) from gears (18 and 20).

   C. Remove bolts (10), washers (11), covers (12), and shims (13 and 14) from housing (30).

      NOTE: Measure and note thickness of shims (13 and 14) to facilitate reassembly.

   D. Remove gear (18) with attached parts from housing (30).

   E. Remove bearings (15 and 17) and spacer (16) from gear (18).

      NOTE: Measure and note stacked height of bearings (15 and 17) inner race width and spacer (16) length, to facilitate reassembly. Keep these parts together to ensure reassembly on gear (18).

   F. Remove gear (20) with attached parts from housing (30).

   G. Remove bearings (19 and 21) from gear (20).

   H. Remove bolts (22), washers (23), and drain (24) from housing (30).

      NOTE Do not remove screws (25) or nameplate (26) from housing assembly (27), unless repair or replacement is required.

      Do not remove inserts (28 and 29) from housing (30), unless repair or replacement is required.

CLEANING

1. General

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

   B. Dry all parts, except bearings, with lint-free cloth or moisture-free compressed air.

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

2. Bearings

   A. Wipe bearings with clean lint-free cloth moistened with dry cleaning solvent.

   B. Dry bearings with moisture-free compressed air or clean, lint-free cloth.

   C. For further information, refer to "Cleaning and Relubricating Antifriction Bearings," Subject 20-30-01.

INSPECTION/CHECK

1. External Check

   A. Examine all parts, under strong light and 10-power magnification, for cracks, burrs, scratches, and corrosion.

   B. Check threaded areas for stripped threads.

   C. Examine painted and plated surfaces for blisters, peeling, flaking or chipping.

   D. Examine teeth of splines and gears for chips, cracks, and abnormal wear pattern. Wear pattern must be smooth and centered on tooth.

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

   F. Examine bearings for binding and excessive radial or axial play.

2. Component Check (See figure 1101.)

   A. Demagnetize bearings and check for residual magnetism.

   B. Perform a magnetic particle examination per Subject 20-20-01 on coupling halves (1, 4, and 7), and gears (18 and 20).

   C. Perform a fluorescent dye penetrant examination per Subject 20-20-02 on covers (12), and housing (30).

REPAIR

1. Repair

   A. Repair minor defects and remove corrosion by polishing with abrasive cloth, 200 grit or finer.

   B. Repair damaged threads with triangular file or thread chaser.

2. Refinish (Fig. 1101)

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

   A. Coupling Half (1, 4, 7).

      (1) 69-16758-2 -- Cadmium Plate (F-1.1913), 0.0002-0.0004 inch thick. Material: 4340 steel, 150-170 ksi.

      (2) 69-47815-2 -- Cadmium Plate (F-15.02). Apply primer BMS 10-11, Type 1 (F-20.02) but not on splines or in threads. Material: 4340 steel, 150-170 ksi.

      (3) 251N4270-4 -- Cadmium Plate (F-15.02). Apply primer BMS 10-11, Type 1 (F-20.03) but not on splines or in threads. Material: 4340 steel, 150-170 ksi.

   B. Cover (12) -- Chromic acid anodize (F-17.04) and apply one coat BMS 10-11, Type 1, primer (F-20.02) all over.

   C. Shim (13, 14), except 65-39307-8 -- Chromic acid anodize (F-2.26) all over.

   D. Spacer (16) -- Chromic acid anodize (F-2.26) all over.

   E. Gear (18, 20) -- Cadmium plate 0.0002 to 0.0004 inch (F-1.1927) except on gear teeth. Plating on threads, splines, and bearing seats to be 0.0002 to 0.0003 inch and uncontrolled on bores. Apply two coats BMS 10-11, Type 1, primer (SRF-12.206) to bores.

   F. Drain (24) -- Chromic acid anodize (F-17.04) and apply one coat BMS 10-11, Type 1, primer (F-20.02) to all external and faying surfaces.

   G. Housing (30) -- Chromic acid anodize (F-17.04) and apply one coat BMS 10-11, Type 1, primer (F-20.02) to all external and faying surfaces except omit from bores.

3. Replacement (Fig. 1101)

   A. Replace all unserviceable parts.

   B. If nameplate (26, P/N 69-38154-1) or screws (25) require replacement, apply BMS 5-95 to screw threads and install while wet.

C. If nameplate (26, P/N BAC27DCT0442) requires replacement, bond per 20-50-12, Type 89, 100 percent fay surface coverage is required.

D. Inserts (28 or 29) require replacement, remove damaged insert, clean bore, apply primer, BMS 10-11, Type I, to bore and new insert, and seat while primer is wet. Remove tang.

ASSEMBLY

1. General (See figure 1101.)

   A. Examine interior of housing (30) for metal chips or other foreign objects and do not allow chips or other foreign matter to enter housing during reassembly. Do not fill housing with grease.

2. Reassembly (See figure 1101.)

   A. Apply thin coat of grease, Specification MIL-G-21164, to exterior surfaces of bearing (19) and install bearing in housing (30).

   B. Install bearing (21) on gear (20). Thinly coat external surfaces of bearing and pack teeth of gear with MIL-G-21164 grease. Install in housing (30).

      NOTE: If new shim (14) will be used, measure width of inner race of bearing (21) prior to installation. Identify code number stamped on face of housing bore. Select correct shim from figure 502.

   C. Apply thin coat of grease, Specification MIL-G-21164 to faying surfaces of cover (12), shim (14), and housing (30). Install shim and cover on housing and attach with washers (11) and bolts (10). Dip bolts in BMS 10-11, type 1, primer and install while primer is wet.

   D. Install bearings (15 and 17) and spacer (16) on gear (18). Thinly coat external surfaces of bearings and pack gear teeth with MIL-G-21164, grease. Insert gear with attached parts into housing (30).

   E. Apply thin coat of grease, Specification MIL-G-21164, to faying surfaces of cover (12), shim (13), and housing (30). Install shim and cover on housing and attach with washers (11) and bolts (10). Dip bolts in BMS 10-11, type 1, primer and install while primer is wet.

      NOTE: If new shim (13) will be used, measure staked height of inner races of bearings (15 and 17) and spacer (16) prior to installation. Identify code number stamped on face of housing bore. Select correct shim (13) from figure 501.

   F. Install coupling halves (7 and 1 or 4), washers (9 and 3 or 6) and nuts (8 and 2 or 5) on gears (18 and 20).

G. Hold coupling half (7) with a Splined Coupling Wrench, F-71228-500, and tighten both nuts (8 and 2 or 5) to a torque range of 250 to 300 pound-inches.

H. Hold coupling half (7) with a Splined Coupling Wrench, F71228-500. Measure backlash at 1.00-inch radius of coupling half (1 or 4).

NOTE: Backlash must be 0.002 to 0.007 inch at 1.0 -inch radius, within a torque range of 15 to 30 pound-inches. If necessary, replace shim (14) as required, to obtain specified backlash. See figure 502.

J. Apply coat of grease, Specification MIL-G-21164, to faying surfaces of drain (24) and housing (30). Install drain (24), washers (23), and bolts (22). Dip bolts in BMS 10-11, type 1, primer and install while primer is wet.

K. Deleted.

3. Material

A. Primer -- Specification BMS 10-11, type 1

B. Grease -- Specification MIL-G-21164

Housing Code No.	Staked Height of Inner Races of Bearings (15, 17) and Spacer (16) (inch)	Shim Part No.	Shim Thickness ± 0.001 (inch)
2	1.8596 to 1.8626	69-39307-1	0.030
	1.8627 to 1.8656	69-39307-2	0.033
	1.8657 to 1.8686	69-39307-3	0.036
	1.8687 to 1.8716	69-39307-4	0.039
	1.8717 to 1.8736	69-39307-5	0.042
1	1.8596 to 1.8616	69-39307-1	0.030
	1.8617 to 1.8646	69-39307-2	0.033
	1.8647 to 1.8676	69-39307-3	0.036
	1.8677 to 1.8706	69-39307-4	0.039
	1.8707 to 1.8736	69-39307-5	0.042

Selection of Shim (13)
Figure 501 (Sheet 1)

Housing Code No.	Staked Height of Inner Races of Bearings (15, 17) and Spacer (16) (inch)	Shim Part No.	Shim Thickness ± 0.001 (inch)
0	1.8596 to 1.8636 1.8637 to 1.8666 1.8667 to 1.8696 1.8697 to 1.8736	69-39307-2 69-39307-3 69-39307-4 69-39307-5	0.033 0.036 0.039 0.042
9	1.8596 to 1.8626 1.8627 to 1.8656 1.8657 to 1.8686 1.8687 to 1.8716 1.8717 to 1.8736	69-39307-2 69-39307-3 69-39307-4 69-39307-5 69-39307-6	0.033 0.036 0.039 0.042 0.045
8	1.8595 to 1.8616 1.8617 to 1.8646 1.8647 to 1.8676 1.8677 to 1.8706 1.8707 to 1.8736	69-39307-2 69-39307-3 69-39307-4 69-39307-5 69-39307-6	0.033 0.036 0.039 0.042 0.045
13	1.8596 to 1.8636 1.8637 to 1.8666 1.8667 to 1.8696 1.8697 to 1.8736	69-39307-3 69-39307-4 69-39307-5 69-39307-6	0.036 0.039 0.042 0.045
12	1.8596 to 1.8626 1.8627 to 1.8656 1.8657 to 1.8686 1.8687 to 1.8716 1.8717 to 1.8736	69-39307-3 69-39307-4 69-39307-5 69-39307-6 69-39307-7	0.036 0.039 0.042 0.045 0.048
11	1.8569 to 1.8616 1.8617 to 1.8646 1.8647 to 1.8676 1.8677 to 1.8706 1.8707 to 1.8736	69-39307-3 69-39307-4 69-39307-5 69-39307-6 69-39307-7	0.036 0.039 0.042 0.045 0.048
10	1.8596 to 1.8636 1.8637 to 1.8666 1.8667 to 1.8696 1.8697 to 1.8736	69-39307-4 69-39307-5 69-39307-6 69-39307-7	0.039 0.042 0.045 0.048

Selection of Shim (13)
Figure 501 (Sheet 2)

Housing Code No.	Inner Race Thickness of Bearing (21) (inch)	Shim Part No.	Shim Thickness ± 0.001 (inch)
7	0.5068 to 0.5100 0.5101 to 0.5118	69-39307-2 69-39307-3	0.033 0.036
6	0.5068 to 0.5088 0.5089 to 0.5118	69-39307-2 69-39307-3	0.033 0.036
5	0.5068 to 0.5080 0.5081 to 0.5118	69-39307-2 69-39307-3	0.033 0.036
4	0.5068 to 0.5097 0.5098 to 0.5118	69-39307-3 69-39307-4	0.036 0.039
3	0.5068 to 0.5090 0.5091 to 0.5118	69-39307-3 69-39307-4	0.036 0.039
17	0.5068 to 0.5080 0.5081 to 0.5118	69-39307-3 69-39307-4	0.036 0.039
16	0.5068 to 0.5100 0.5101 to 0.5118	69-39307-4 69-39307-5	0.039 0.042
15	0.5068 to 0.5090 0.5091 to 0.5118	69-39307-4 69-39307-5	0.039 0.042
14	0.5068 to 0.5080 0.5081 to 0.5118	69-39307-4 69-39307-5	0.039 0.042

NOTE: If backlash is excessive with listed shim installed, replace shim with next lower shim dash number. If backlash is below minimum, replace shim with next higher shim dash number. Thickness of shim P/N 69-39307-8 (spare), is 0.062 inch.

Selection of Shim (14)
Figure 502

FITS AND CLEARANCES

1. None

TESTING

1. Functional Test (See figure 1101.)

   A. Rotate coupling halves (7 and 1 or 4) by hand. Gears and bearings shall be free running without evidence of binding in any position.

TROUBLE SHOOTING

1. Trouble during Test after Overhaul

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

STORAGE INSTRUCTIONS

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

2. Tag assembly with test date.

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

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. F71228-500 -- Splined Coupling Wrench
2. Dial Indicator, calibrated to 0.001 inch

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

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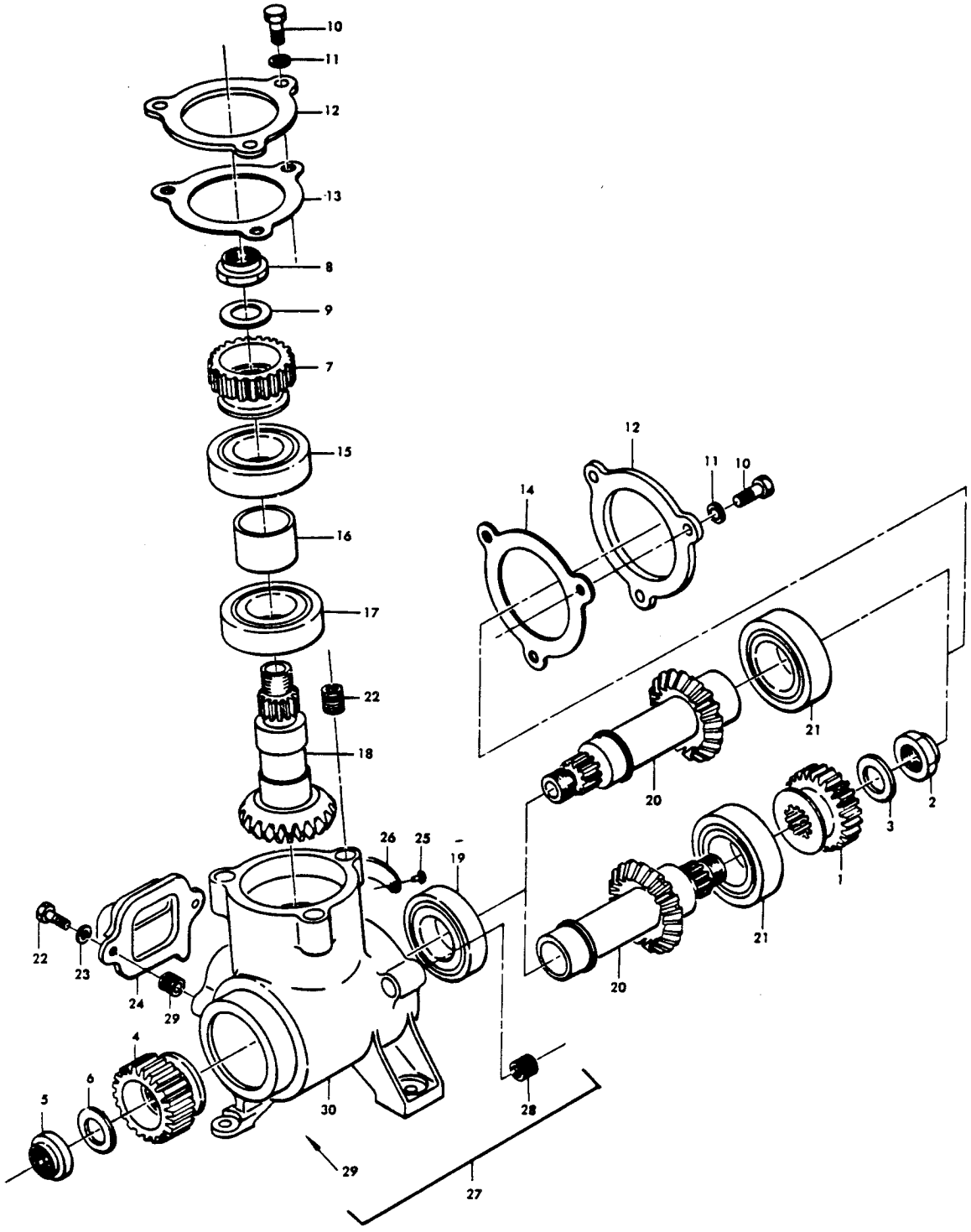
1. Exploded View



Trailing Edge Flap Drive Right Angle Gearbox 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-					
	65-51510-1		TRAILING EDGE FLAP DRIVE RIGHT ANGLE GEARBOX ASSY LH	A	
	65-51510-2		TRAILING EDGE FLAP DRIVE RIGHT ANGLE GEARBOX ASSY RH	B	
1	69-16758-2		. HALF, COUPLING	A	1
1	69-47815-2		. HALF, COUPLING (OPT)	A	1
1	251N4270-4		. HALF, COUPLING (OPT)	A	1
2	BACN10JC9		. NUT, SELF-LOCKING (REPLS BACN10BY59)	A	1
3	AN960D916		. WASHER	A	1
4	69-16758-2		. HALF, COUPLING	B	1
4	69-47815-2		. HALF, COUPLING (OPT)	B	1
4	251N4270-4		. HALF, COUPLING (OPT)	B	1
5	BACN10JC9		. NUT, SELF-LOCKING (REPLS BACN10BY59)	B	1
6	AN960D916		. WASHER	B	1
7	69-16758-2		. HALF, COUPLING		1
7	69-47815-2		. HALF, COUPLING (OPT)		1
7	251N4270-4		. HALF, COUPLING (OPT)		1
8	BACN10JC9		. NUT, SELF-LOCKING (REPLS BACN10BY59)		1
9	AN960D916		. WASHER		2
10	NAS6604-4		. BOLT (REPLS NAS1304-4H, BACB30NE4H4)		6
11	AN960D416		. WASHER		6
12	66-24136-1		. COVER		2
13	69-39307-1		. SHIM *[1]		1
13	69-39307-2		. SHIM *[1]		1
13	69-39307-3		. SHIM *[1]		1
13	69-39307-4		. SHIM *[1]		1
13	69-39307-5		. SHIM *[1]		1
13	69-39307-6		. SHIM *[1]		1
13	69-39307-7		. SHIM *[1]		1
13	69-39307-8		. SHIM (PREF FOR SPARES ONLY)		1
14	69-39307-2		. SHIM *[2]		1
14	69-39307-3		. SHIM *[2]		1
14	69-39307-4		. SHIM *[2]		1
14	69-39307-5		. SHIM *[2]		1
14	69-39307-8		. SHIM (PREF FOR SPARES ONLY)		1
15	BACB10BA30PP		. BEARING (REPLS BACB10A95H)		1
16	66-24137-1		. SPACER		1
16	69-52234-1		. SPACER (PREF)		1
17	BACB10BA30PP		. BEARING (REPLS BACB10A95H)		1
18	65-51290-1		. GEAR		1
19	BACB10BA25PP		. BEARING (REPLS BACB10A117H)		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
20	65-51293-1		. GEAR	A	1
20	65-51294-1		. GEAR	B	1
21	BACB10BA30PP		. BEARING (REPLS BACB10A95H)		1
22	BACB30NE3-2		. BOLT (REPLS NAS1303-2)		2
23	AN960D10		. WASHER		2
24	66-24138-1		. DRAIN		1
25	NAS601-3P		. SCREW (REPLS AN515-6R3)(USED WITH 69-38154-1)		2
26	69-38154-1		. NAMEPLATE		1
26	BAC27DCT0442		. NAMEPLATE (OPT)		1
27	65-51509-1		. HOUSING ASSY		1
28	MS21209F4-20		. . INSERT, HELICAL COIL		6
29	MS21209F1-15		. . INSERT, HELICAL COIL		2
30	65-51509-2		. . HOUSING		1

*[1] SEE FIG. 501.

*[2] SEE FIG. 502.