

TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE ANGLE GEARBOX ASSEMBLY OVERHAUL MANUAL 27-55-31

REVISION NO. 1, DATED DEC 5/90

HIGHLIGHTS

		TOPICS AFFECTED											
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DESCRIPTION OF CHANGE	D&0	D/Assy	Cleaning	Insp/Chk	R e pair	A s s y	F/C	Test	T/Shooting	S/Tools	Storage	I P L	L/Overhau1
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TRAILING EDGE FLAP DRIVE POWER UNIT

27-55-31

BOEING P/N 65-51500-2, -3, -4, -6

AIRLINE P/N

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BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
27-1041		PRR 31 940 PRR 320 69 PRR 3211 6	Mar 10/71 Sep 10/71 Mar 10/72
27-1076		PRR 32121-1 0	Mar 10/72 Dec 25/75



OVERHAUL MANUAL

LIST OF EFFECTIVE PAGES

Indicates pages revised, added or deleted in latest revision

F Indicates foldout pages - print one side only

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	T-1	Dec 25/75				
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	LEP-1	Dec 5/90				
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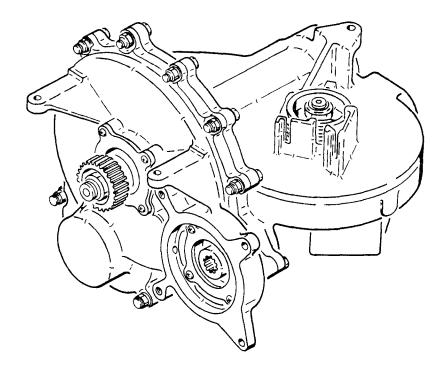
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TRAILING EDGE FLAP DRIVE POWER UNIT ASSEMBLY

Boeing Part Numbers: 65-51500-2, -3, -4, and -6



Trailing Edge Flap Drive Power Unit Assembly Figure 1

DESCRIPTION AND OPERATION

1. Description

A. The trailing edge flap drive power unit assembly consists of two input pinions, one output shaft, two spur gears, and two cable drums enclosed in a housing. The input pinions, output shaft, and the drum shaft are bearing mounted. The input pinions are spur geared to the output shaft. The output shaft is provided with a worm gear drive. The worm gear is splined to the drum shaft. A coupling half is provided at one end of the output shaft. The other end of the output shaft is provided with a splined coupling.



2. Operation

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A. The trailing edge flap drive power unit assembly functions to transmit power from an electric motor or a hydraulic motor to the trailing edge flap right and left torque tubes. The imput pinions are geared to spur gears which are splined to the output shaft. The worm gear is splined to a shaft which is splined to the drums. The drums operate cables of the flap control system. The ends of the output shaft drive the trailing edge flap torque tubes.

NOTE: Special instructions for Cleaning, Fits and Clearances, Trouble Shooting and Storage Instructions are not required. Standard aircraft shop practices are sufficient for these overhaul functions.

3. Leading Particulars

Dimensions -- 9-3/4 x 9-3/4 x 11-1/4 inches Weight -- 14.6 pounds



DISASSEMBLY

- 1. General (See figure 1101.)
 - A. Cover (14) and housing (15) constitute a matched assembly. Do not interchange covers or housings of housing assembly (10).
- 2. Disassembly (See figure 1101.)
 - A. Hold coupling half (1) with Splined Coupling Wrench, F71228-500, and loosen nuts (2, 3, and 4).
 - B. Remove nut (2), washer (5), and coupling half (1).
 - C. Remove nuts (6), washers (7), and bolts (8 and 9).
 - D. Remove nuts (11), washers (12), and bolts (13).
 - E. Separate cover (14) from housing (15).
 - F. Remove screws (19), retainers (20), and bearings (21) from cover (14).
 - NOTE: Do not remove inserts (16 or 18) from cover (14), unless repair or replacement is required.
 - G. Remove gear (22 and 23) and spacer (24) from shaft (25).
 - H. Remove pinions (26 and 27) and bearing (28) from housing (15).
 - I. Remove screws (29), retainer (30), and bearing (31) from housing (15).
 - J. Remove shaft (25) and bearing (32) from housing (15). Rotate and tilt shaft while withdrawing to clear gear (33).
 - NOTE: Exercise care to avoid damage to shaft (25) and gear (33).
 - K. Remove nuts (3 and 4), washers (34), and drums (35 and 36) from housing (15).
 - L. Remove bolts (37), washers (38), retainer (39), bearing (42), spacer (41), and shaft (40).
 - NOTE: Gear (33) will be free when shaft (40) is removed. Exercise care to avoid damage.



- M. Remove gear (33) from housing (15).
- N. Remove bearing from housing (15).
- O. Remove bolts (44), washers (45), and drain (46).
- P. Remove bolts (49), washers (50), and cover (51).
- Q. Remove nuts (52), washers (53), bolts (54) and cable guard (55).

 $\underline{\text{NOTE}}$: Do not remove inserts (16 or 17), screws (47), or nameplate (48) from housing (15), unless repair or replacement is required.



INSPECTION/CHECK

- 1. Check all parts for defects in accordance with standard industry practices.
- 2. Perform magnetic particle examination per 20-20-01 on coupling half (1), gears (22, 23), shafts (25, 40), pinions (26, 27).
- 3. Perform penetrant examination per 20-20-02 on cover (14), housing (15), retainers (20, 30, 39), gear (33), drums (35, 36).
- 4. Inspect worm gear (33) teeth for deformation, secondary grooving and abnormal wear (SB 27-1076).



REPAIR

1. Repair

- A. Repair minor defects and remove corrosion by polishing with aluminum oxide abrasive cloth, number 200 grit or finer. Refinish as required for protection against corrosion.
- B. Repair damaged threads with triangular file or thread chaser.
- 2. Refinish (See figure 1101.)
 - NOTE: Refer to 20-41-01 for decoding of F and SRF finish symbols and to S 20-30-02 for stripping of protective finishes.
 - A. If plated or painted surfaces are worn or chipped, refinish listed items as indicated.
 - (1) Coupling half (1) (69-40831) -- F-1.20, except 0.0002 to 0.0003 inch single plate.
 - (2) Coupling half (1) (69-46619-1) -- F-1.1926, except 0.0002 to 0.0003 inch single plate.
 - (3) Housing assembly (10) (65-51505-6)
 - (a) Cover (14) -- F-2.26 all over, plus SRF-12.205 on all external surfaces.
 - (b) Housing (15) -- F-2.26 all over, plus SRF-12.205 on all external surfaces. Do not apply primer to bearing faying surfaces.
 - (4) Housing assembly (10) (65-51505-9)
 - (a) Cover (14) -- F-2.26 all over, plus SRF-12.250 and SRF-14.9813 on all external surfaces. Do not apply primer to bearing faying surfaces.
 - (5) Retainer (20, 30, 39) -- F-2.26 and SRF-12.205 all over.
 - (6) Gear (22 and 23) -- F-1.1927, except on gear teeth. Single plate thickness on spline to be 0.0002 to 0.0003 inch.





- (7) Spacer (24) -- F-1.1927 all over.
- (8) Shaft (25) -- F-1.1926 all over, except on worm. Plating thickness on splines, threads, and bearing seats to be 0.0002 to 0.0003 inch, plus SRF-12.206 and F-14.13 on internal surfaces.
- (9) Pinion (26 and 27) -- F-1.1927, except on gear teeth. Single plate thickness on spline and bearing seats to be 0.0002 to 0.0003 inch, plus F-14.13 on internal surface.
- (10) Gear (33) -- F-4.201 on spline and machined surface of hub. Alternate: F-4.201 all over except gear teeth.
- (11) Drum (35 and 36) -- F-2.26 all over, plus SRF-12.205 all over except no primer on spline.
- (12) Shaft (40) -- F-1.1926 all over. Plating thickness on spline threads, and bearing seats to be 0.0002 to 0.0003 inch.
- (13) Spacer (41) -- F-1.1926 all over.
- (14) Drain (46) -- F-2.26 all over, plus SRF-12.205 all external surfaces. Alternate: F-2.26 and SRF-12.205 all over.
- (15) Cover (51) -- F-2.26 and SRF-12.205 all over.
- 3. Replacement (See figure 1101.)
 - A. Replace all unserviceable parts.
 - B. If inserts (15, 16, or 17) require replacement, remove damaged insert, clean bore, apply primer, Specification BMS 10-11, Type I, to bore and new insert, and seat while primer is wet. Cut tang.
 - C. If nameplate (48) or screws (47) require replacement, apply primer, Specification BMS 10-11, Type I, to screws and install while primer is wet. Stamp information on nameplate before installation.



ASSEMBLY

1. Materials

- A. Primer -- BMS 10-11, type 1 (Ref 20-60-02)
- B. Grease --
 - (1) MIL-G-21164 (Ref 20-60-03)
 - (2) Lubriplate Low-Temp, Fiske Brothers Refining Co., 129 Lockwood St., Newark, New Jersey 07105 (Optional)
 - (3) Aeroshell #7 per MIL-G-23827, Shell Oil Co., (Ref 20-60-03) (Optional)

CAUTION: AEROSHELL #7 IS THE ONLY ACCEPTABLE MIL-G-23827 GREASE FOR THIS COMPONENT.

2. Worm gear and output shaft tooth pattern check (Fig. 1101).

NOTE: This procedure is applicable only if a check of tooth mating characteristics of worm gear (33) and output shaft (25) is desired.

- A. Apply coating of blueing compound to worm teeth of output shaft (25). Assemble parts in gear housing.
- B. Apply load of 15-20 lb-in. to asymmetry drum (36) in counterclockwise direction and rotate output shaft (25) five revolutions in both directions.
- C. Disassemble and check that tooth bearing pattern is centered on gear teeth and indicates contact across involute profile. If pattern is not centered, adjust shims (56) to change position of worm gear.

3. General

- A. Apply a film of grease to all external surfaces of all coupling halves, shafts, gears, pinions, and spacers.
- B. Lubricate bearings and apply a film of grease to external surfaces of all bearings.
- C. Apply a film of grease to faying surfaces of housing (15), cover (14), drain (46), cover (51), and retainers (20, 30, 39).
- D. Dip all bolts and screws in primer, BMS 10-11, type 1, and install while primer is wet.
- E. Examine interior of housing (15) and cover (14) and do not allow chips or other foreign matter to enter the assembly during reassembly. Do not fill gearbox with grease.
- 4. Install bearing (43) in housing (15).



- 5. Pack teeth of gear (33) with grease and position gear in housing (15).
- 6. Position bearing (42) and spacer (41) on shaft (40), insert shaft (40) through gear (33) and bearing (43), and install retainer (39), washers (38), and bolts (37). Lockwire bolts using double wire twist method.
- 7. Install drums (35, 36), washers (34), and nuts (3, 4). Hold either nut and tighten both nuts to 250-300 lb-in.
- 8. Install bearing (32) and insert shaft (25) through bearing (32) into housing (15). Tilt and rotate shaft while inserting in order to clear gear (33).
 - CAUTION: USE CARE TO AVOID DAMAGE TO GEAR (33) AND SHAFT (25).
- 9. Pack teeth of gear (23) with grease and position spacer (24) and gear (23) on shaft (25).
- 10. Install bearings (28, 31) in housing (15) and install retainer (30) and screws (29).
- 11. Pack teeth of pinion (27) with grease and position pinion in bearing (31).
- 12. Pack teeth of gear (22) with grease and position gear on shaft (25).
- 13. Pack teeth of pinion (26) with grease and position pinion in bearing (28) with internal splines outward. Install bearing (21) for pinion (27) in cover (14) and mate cover (14) to housing (15).
 - <u>CAUTION</u>: ENSURE THAT PINIONS (26, 27) AND SHAFT (25) ARE PROPERLY POSITIONED.
- 14. Install parts (7, 9, 11, 12, 13). Do not tighten nuts (11) or bolts (9).
- 15. Install bolts (8), washers (7), and nuts (6). Tighten nuts (6, 11) and bolts (9).
- 16. Install bearings (21) for pinion (26) and shaft (25) in cover (14).
- 17. Install retainers (20) and screws (19).
- 18. Install coupling half (1), washer (5), and nut (2) on shaft (25). Hold coupling half (1) with splined coupling wrench, F71228-500, and tighten nut (2) to 250-300 lb-in.
- 19. Install drain (46). Position power unit assembly with worm gear (33) vertical and above shaft (25). Fill power unit to level of opening for cover (51) with grease (approx 2 pounds required).
- 20. Install cover (51) and cable guard (55).



TESTING

- 1. Test Equipment
 - A. Splined Coupling Wrench: F71228-500, or equivalent
 - B. Dial Indicator: calibrated to 0.001 inch
- 2. Check backlash (See figure 1101.)
 - A. Hold output shaft (25) with splined coupling wrench and clamp shaft to prevent axial movement relative to housing (10). Apply torque of 5 to 10 pound-inches to drum shaft (40) and check that backlash is 0.002 to 0.008 inch measured at radius of 2.8 inches from centerline of assymmetry drum shaft (40).
- 3. Check that gears and bearings are free running without evidence of binding in any position.



SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

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

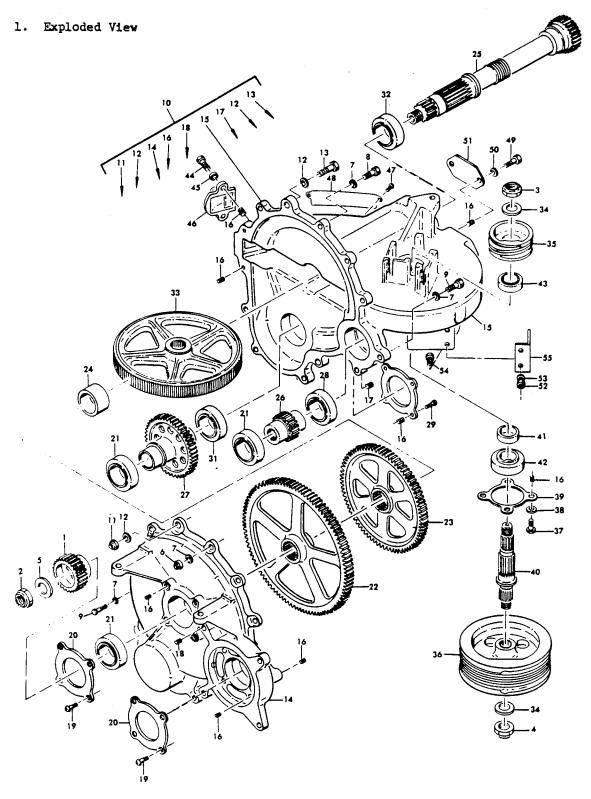
NOTE: Listed items are recommended. Equivalent substitutes may be used.



ILLUSTRATED PARTS LIST

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Trailing Edge Flap Drive Power Unit Assembly Figure 1101

BOEING COMMERCIAL JET OVERHAUL MANUAL

NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	USE CODE	QTY PER ASSY
1101 112345678910 100 11213145515 1617	65-51500-2 65-51500-3 65-51500-4 65-51500-6 69-46619-1 69-4083 BACN10JC9 BACN10JC8 BACN10JC8 AN960D916 BACN10JC3 AN960D10L BACB30NE3-6 BACB30NE3-6 65-51505-9 BACN10JC5 AN960D516L BACB30NE5-6 65-51505-2 65-51505-2 65-51505-3 MS21209F1-15 MS21209F4-20 MS21209F5-20 BACB30LU3-2 66-24133-1 BACB10BA25PP 69-38150-1 69-38150-1 66-24131-1 65-51506-2 65-51506-3		TRAILING EDGE FLAP DRIVE POWER UNIT ASSY TRAILING EDGE FLAP DRIVE POWER UNIT ASSY (SB 27-1041) TRAILING EDGE FLAP DRIVE POWER UNIT ASSY TRAILING EDGE FLAP DRIVE POWER UNIT ASSY COUPLING HALF (preferred) COUPLING HALF (optional) NUT (replaces BACN10BY59) NUT (replaces BACN10BY58) NUT (replaces BACN10BY58) WASHER NUT (replaces NAS679A3W) WASHER BOLT (replaces NAS1303-6) BOLT (replaces NAS1303-3) HOUSING ASSY HOUSING ASSY HOUSING ASSY HOUSING ASSY HOUSING (optional) COVER HOUSING (optional) HOUSING (preferred) INSERT INSERT SCREW (replaces NAS517-3-2) RETAINER BEARING (replaces BACB10Al17H) GEAR GEAR SPACER SHAFT (optional) SHAFT	A B C D CD A A B C D	111111787411 2421111412823111111
789101001111213141551561781902122324255	AN960D10L BACB30NE3 -6 BACB30NE3 -3 65-51505-4 65-51505-9 BACN10JC5 AN960D516L BACB30NE5-6 65-51505-2 65-51505-7 65-51505-7 65-51505-7 65-51505-8 MS21209F1-15 MS21209F5-20 BACB30LU3-2 66-24133-1 BACB10BA25PP 69-38150-1 66-24131-1 65-51506-2 65-51506-1		WASHER BOLT (replaces NAS1303-6) BOLT (replaces NAS1303-3) HOUSING ASSY HOUSING ASSY HOUSING ASSY *[1] NUT (replaces NAS679A5) WASHER BOLT (replaces NAS1305-6) COVER HOUSING HOUSING HOUSING (optional) HOUSING (preferred) INSERT INSERT SCREW (replaces NAS517-3-2) RETAINER BEARING (replaces BACB10AL17H) GEAR GEAR SPACER SHAFT (preferred) SHAFT (optional)	C D CD CD A A	
15 15 16 17 18 19 20 21 22 23 24 25 25	65-51505-5 65-51505-7 65-51505-8 MS21209F1-15 MS21209F4-20 MS21209F5-20 BACB30LU3-2 66-24133-1 BACB10BA25PP 69-38151-1 69-38150-1 66-24131-1 65-51506-2 65-51506-1		. HOUSING . HOUSING (optional) . HOUSING (preferred) . INSERT . INSERT . INSERT . SCREW (replaces NAS517-3-2) . RETAINER . BEARING (replaces BACBLOALL7H) . GEAR . GEAR . SPACER . SHAFT (preferred) . SHAFT (optional)	CD A A	



OVERHAUL MANUAL

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	N O M E N C L A T U R E 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101 126 127 127 128 130 133 133 133 133 133 133 133 133 133	69-38152-1 69-38156-1 BACB10BA25PP BACB30LU3-2 66-24133-1 66-24133-2 BACB10BA25PP BACB10BA30PP 65-51292-1 65-51292-3 AN960D816 65-51507-1 65-51507-1 65-51507-3 BACB30NE3H2 AN960D10L 66-24132-1 66-24464-1 66-24464-2 BACB10AT12PP BACB10AT12PP BACB10AT10PP BACB30NE3-3 AN960D10L 66-24134-1 NAS601-3P 69-38154-1 BACB30NE3-2 AN960D10L 66-24139-1 BACN10JC3 AN960D10L BACB30NE3-4 69-50980-1 69-20153-21		PINION, INPUT PINION, INPUT BEARING (REPLS BACB10A117H) SCREW (REPLS NAS517-3-2) RETAINER RETAINER BEARING (REPLS BACB10A117H) BEARING (REPLS BACB10A95H) GEAR, WORM GEAR, WORM WASHER DRUM DRUM DRUM BOLT (REPLS NAS1303-2H) WASHER RETAINER SHAFT SPACER BEARING (REPLS BACB10A519H) BEARING (REPLS BACB10A518H) BOLT (REPLS NAS1303-3) WASHER DRAIN SCREW (REPLS AN515-6R3) NAMEPLATE BOLT (REPLS NAS1303-2) WASHER COVER NUT (REPLS NAS679A3W) WASHER BOLT (REPLS NAS1303-4) GUARD, CABLE SHIM	ABC D ABC D ABC	11111111111111221212212

^{*[1] 65-51505-9} HOUSING ASSEMBLY IS IDENTICAL TO 65-51505-6 HOUSING ASSEMBLY EXCEPT FOR FINISH.