TO: ALL HOLDERS OF TRAILING EDGE FLAP DRIVE TRANSMISSION ASSEMBLIES NO. 3 AND 6 OVERHAUL MANUAL, 27-55-53

REVISION NO. 21, DATED MAR 1/05

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 seals BACS11W5 and NAS1523-5Y item (65) as optional parts Added details to the lockout torque test to clarify requirements at minimum lockout and maximum lockout								X				X	

TRAILING EDGE FLAP DRIVE TRANSMISSION ASSEMBLIES NOS. 3 AND 6

27-55-53

BOEING P/N 65-50253-2, -4 thru -8
65-50256-2, -4 thru -8

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
		PRR 30472	Feb 15/68
		PRR 30352-2	May 15/69
27-1015, Rev 1		PRR 31291, -1	May 15/69
		PRR 31581	Nov 10/69
		PRR 32358	Sep 25/74

LIST OF EFFECTIVE PAGES

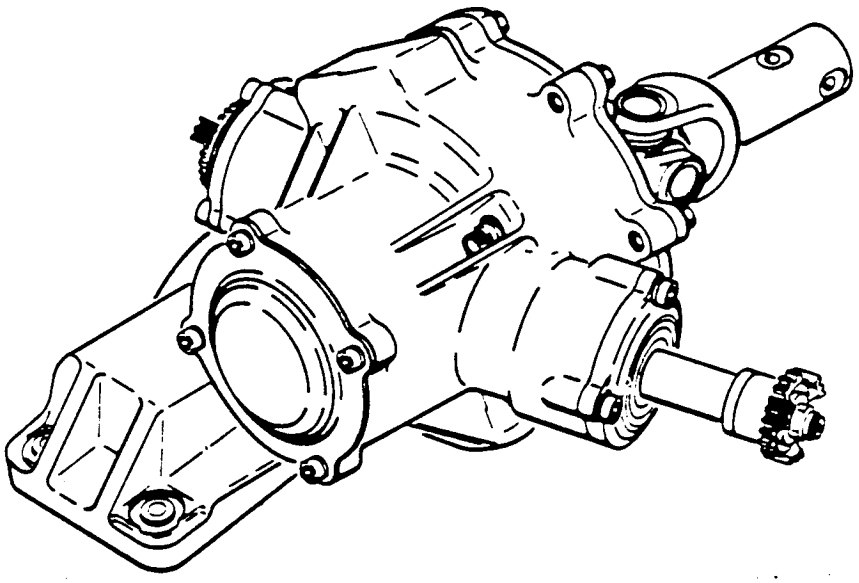
* Indicates pages revised, added or deleted in latest revision
F Indicates foldout pages - print one side only

	PAGE	DATE		PAGE	DATE		PAGE	DATE
	27-55-53			503	Jun 25/75			
	T-1	Sep 25/74		504	Jun 25/75			
	T-2	BLANK		505	Sep 5/84			
*	LEP-1	Mar 1/05		506	Sep 1/96			
	LEP-2	BLANK		507	Sep 1/96			
	T/C-1	Dec 10/70		508	May 15/69			
	T/C-2	BLANK		509	May 15/69			
	1	Dec 10/70		510	Sep 5/88			
	2	May 15/69		511	Sep 5/88			
	101	Sep 5/88		512	Sep 1/96			
	102	Sep 5/88		601	Dec 10/70			
	103	May 15/69		602	Dec 10/70			
	104	BLANK		603	Jun 25/73			
	201	May 15/69		604	Dec 5/91			
	202	BLANK		605	Sep 5/91			
	301	Jul 5/81		606	BLANK			
	302	BLANK		701	Nov 1/98			
	401	Sep 5/91	*	702	Mar 1/05			
	402	Jul 5/76		703	Mar 25/74			
	402A	Sep 5/92		704	Mar 25/74			
	402B	Mar 5/93		801	Sep 5/91			
	402C	Mar 5/93		802	BLANK			
	402D	BLANK		901	Dec 10/70			
	403	Mar 5/86		902	BLANK			
	404	Mar 5/86		1001	Jun 25/75			
	405	Dec 25/75		1002	BLANK			
	406	Dec 25/75		1101	Dec 10/70			
	407	Dec 25/75		1102	Sep 5/88			
	408	Sep 5/91		1103	Jan 5/81			
	409	Sep 5/91		1104	Jun 5/89			
	410	Jun 25/73		1105	Jun 5/89			
	411	Sep 5/84	*	1106	Mar 1/05			
	412	Jun 25/73		1107	Sep 5/88			
	413	Jun 25/73		1108	Sep 5/88			
	414	Mar 5/86		1109	Jun 5/88			
	415	Dec 25/75		1110	BLANK			
	416	Dec 25/75						
	417	Mar 5/93						
	418	Mar 5/93						
	419	Sep 5/92						
	420	BLANK						
	501	Jun 25/75						
	502	May 15/69						

TABLE OF CONTENTS

TRAILING EDGE FLAP DRIVE TRANSMISSION ASSEMBLIES NOS. 3 AND 6

Boeing Part Numbers: 65-50253-2, -4, -5, -6, -7, -8 and
65-50256-2, -4, -5, -6, -7, -8



ASSEMBLY 65-50253 SHOWN

Trailing Edge Flap Drive Transmission Assemblies Nos. 3 and 6
Figure 1

DESCRIPTION AND OPERATION

1. Description

   A. The trailing edge flap drive transmission assemblies Nos. 3 and 6 consist of a transmission gearbox, a torque brake assembly, and a universal joint. The gearbox is a sealed unit filled with hydraulic fluid, and contains two pinion bevel gears mating with inner and outer beveled ring gears. The torque brake consists of a spring pack assembly, a coupling, two supports and a housing. The spring pack contains a mated set of wound springs, input sleeves, and two silver-plated rings which act as bearings. The universal joint assembly includes an output shaft, and a trunnion cross and yoke arrangement to transmit loads to a ball nut and screw actuator.

2. Operation

A. The flap transmission assemblies convert flap torque tube rotation into linear motion to extend or retract the trailing edge flap. Flap drive torque tubes are driven by hydraulic or alternate electrical power and attach to input couplings on the gearbox. If a flap jams, excessive torque on the ball nut and screw actuator causes the torque brake spring pack to expand and bind against the housing. The universal joint allows vertical and horizontal angular deflection of the jackscrew during flap operation. The assemblies are located inboard on the outboard flap.

3. Leading Particulars

Width -- 15.00 inches
Length -- 15.50 inches
Height -- 8.75 inches
Weight -- 37.0 pounds (wet)

DISASSEMBLY

1. General (Fig. 1101)

   A. Lock universal joint (87) to prevent any motion. Using Splined Coupling Wrench F-71228-500, or equivalent, to hold couplings (5 and 12), remove nuts (3 and 10), washers (4 and 11) and couplings (5 and 12). Apply a 20 pound-inch torque to gear not being checked, and measure backlash at pitch diameters of splines on gears (37 and 47). Refer to Fig. 601 for backlash limits and dimension of pitch diameter.

   B. Remove all lockwire.

   C. Remove plugs (1), packings (2), and drain hydraulic fluid from the assembly.

2. Disassemble Universal Joint Assembly (87)

   A. Remove nut (88), and bolt (90).

   B. Push spacer (92) from pin (91). Remove pin (91) from yoke (93) and cross (96).

      NOTE: Do not remove bushings (95) from yoke (93) or shaft (94) unless necessary for inspection or replacement.

   C. If installed, remove tape (97) and placard (89) from yoke (93) and discard.

3. Disassemble Gears (37 and 47)

   A. If used, remove optional spacers (6 and 7), backup ring (8) and O-ring (9) from gear (47).

   B. Remove bolts (38), washers (39) and retainer (40). Remove O-ring (41) and shim (43) from retainer (40) or housing (82). Measure and note thickness of shim (43) to facilitate reassembly.

   C. Remove seal (42) from retainer (40). Remove bearing (44), spacer (45) (if used) and bearing (46) from gear (47).

   D. Remove gear (47) from housing (82).

   E. Remove bolts (28), washers (29) and retainer (30). Remove O-ring (31) and shim (33) from retainer (30) or housing (82). Measure and note thickness of shim (33) to facilitate reassembly.

   F. Remove seal (32) from retainer (30). Remove backup rings (13) and O-ring (14) from gear (37).

G. Remove bearing (34), spacer (35) and bearing (36) from gear (37).

H. Remove gear (37) from housing (82).

4. Remove Shaft (94)

A. Remove bolts (16), washers (17), cable guard (18), if used, and cap (19). Remove O-ring (20) from cap (19).

B. Straighten tang of washer (22). Using torque wrench adapter ST6105-3, remove nut (21), washer (22) and washer (23). Discard washer (22). Tap the end of shaft (94) and remove shaft from transmission assembly.

5. Remove Gears (52, 54)

A. Remove bolts (24), washers (25) and cover (86) from housing (82). Remove O-ring (26) from cover (86).

B. Remove shim (57), spacer (58), bearing (59) and seal (60) from cover (86). Measure and note thickness of shim (57) to facilitate reassembly.

C. Pull assembled items (27, 49 thru 56, 68) from housing (82). Use needle-nosed pliers to bend up one end of ring (27) and work ring around grooves in driver (55) and coupling (68) until ring is free. Pull coupling (68) from assembled parts.

NOTE: Coupling (68) is part of torque brake assembly (67).

D. Remove bearing (48), nuts (49), washers (50) and bolts (51). Separate gears (52, 54), driver (55), shim (53) and bearing (56). Measure and note thickness of shim (53) to facilitate reassembly.

6. Remove and Disassemble Torque Brake Assembly (67)

A. Remove nuts (63), washers (64), seals (65), and bolts (66). Position housing with flange of support (69) downward. Push components of torque brake assembly (67) from housing.

B. Lift supports (69, 70) from housing (78). Carefully remove rings (72).

C. Remove spring pack assembly (71) from housing (78), using care not to distort or change relationship of spring ends. Remove shims (75).

NOTE: There may be two shims in each end, two shims in one end only, or no shims at all installed. Note number, location and thickness of shims to facilitate reassembly.

D. Open center of Spring Pack Assembly Jig, ST6107 and slide assembled spring pack (71) into jig. Check that ends of spring set (77) contact locking lugs on bottom of circular portion of jig. Use Torque Bar, PT49001 to rotate upper ends of spring set in line with locking lugs of jig. Press lugs into place to restrain springs. Tighten set screws to prevent lugs from retracting.

E. When spring ends are securely retained, turn cranks on assembly jig as evenly as possible to expand springs. Remove adapter (76) and sleeves (73) and (74).

F. Rotate cranks in reverse direction to relieve spring load. Loosen set screws, back off locking lugs and remove spring set (77) from jig.

NOTE: Spring set (77) is a matched assembly of two springs. Identify as matched parts.

7. Remove adapter (61) and bearing (62) from housing (82). Remove bearing (62) from adapter (61).

8. Do not remove screws (79), nameplate (80), bushings (83), pins (84), or inserts (85) from housing (82) unless replacement is required.

CLEANING

1. General

   A. Wash and rinse all metal parts, except bearings (34, 36, 44, 46, 48, 56, 59, and 62, figure 1101) in dry cleaning solvent, Specification P-D-680 or equivalent.

   B. Use a stiff bristle brush to remove accumulation of foreign matter.

   C. Dry with a clean, lint-free cloth or with moisture-free air.

2. Bearings

   A. Clean bearings (34, 36, 44, 46, 48, 56, 59, and 62, figure 1101), per Subject 20-30-01.

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. Penetrant check per 20-20-02 -- cap (19), housing (82) and cover (86).

3. Magnetic particle check per 20-20-01 -- washers (4, 11, 23), couplings (5, 12, 68), spacers (6, 92), gears (37, 47, 52, 54), driver (55), adapters (61, 76), supports (69, 70), rings (72), sleeves (73, 74), spring set (77), housing (78), bolt (90), pin (91), yoke (93), shaft (94) and cross (96).

REPAIR

1. Repair

   A. Repair minor defects in accordance with standard and industry practices. Refer to 20-10-01 for applicable instructions for rework and repair of high strength steel parts (180 ksi and above).

   B. Cross (96) (Fig. 401) ID's for bolt (90), spacer (92) and pin (91).

      (1) Machine as required to remove defects, observing 0.784 max rework diameter. Machined Finish to be at least 63 microinch. No step or mismatch allowed.

      (2) Shot peen using size and intensity specified.

      (3) Nickle plate per 20-42-09, 0.004-0.006 single plate thickness as specified.

      (4) Chrome plate per 20-42-03 as specified.

      (5) Machine cross 65-76639-1 to a design diameter of 0.7532-0.7541 and machine cross 66-25116-1 to a design diameter of 0.7532-0.7545 per 20-10-04. Total plating thickness (nickle and/or chrome) after machining to be 0.015 max. Machined finish to be at least 63 microinch.

      (6) Magnetic particle examine per 20-20-01.

   C. Coupling (12), bolt (90), spacer (92), pin (91), and cross (96) exterior dimensions - Fig. 401).

      (1) Machine, as required within rework limits shown, to remove corrosion or defects. Observe surface finish requirements. Remove burrs and sharp edges. Smoothly blend all mismatch areas.

      (2) Stress relieve per Fig. 404.

      (3) Shot peen using shot size and intensity indicated.

      (4) Restore reworked surface, unless otherwise noted, by plating and machining to design dimensions and finish noted.

   D. Repair shaft (94).

      (1) Grind worn 1.3770-inch OD per 20-10-01 to a surface finish of 8 microinches. Grinding beyond service limits, shown in Fig. 601, not permitted. Ground diameter to blend smoothly into adjacent diameters. Area of grinding to be confined between axial measurement of 2.00-2.35 inches from centerline of trunnion holes.

E. Coupling (12)

(1) Grind OD per 20-10-01, as required to remove wear or defects, to 8-microinch finish. Do not exceed minimum rework diameter of 1.153 inches. Hard chrome plate per 20-42-03, and grind per 20-10-04 to restore original design dimensions and 8-microinch finish. Maintain concentric to 0.9335-inch diameter on internal spline within 0.0015 inch TIR.

F. Spacer (6)

(1) Grind per 20-10-01 as required to remove wear or defects, to 8-microinch finish. Do not exceed minimum rework diameter of 1.372 inches. Hard chrome plate per 20-42-03 and grind per 20-10-04 to restore original design dimensions shown in Fig. 601 and 8-microinch finish. Maintain perpendicularity to end face within 0.002 inch.

G. Gear (47)

(1) Grind per 20-10-01, as required to remove wear or defects, to 8-microinch finish. Do not exceed service wear limit shown in Fig. 601.

H. Torque Brake Rework (67) (Fig. 402)

CAUTION: REWORK PER FOLLOWING PROCEDURES MAY AFFECT INTERCHANGEABILITY IN ANY FUTURE OVERHAUL OR REPLACEMENT.

(1) To shift torque lockout level to a higher value, machine housing (78) surface as indicated on repair figure. Maintain finish and dimensions shown.

(2) To shift torque lockout level to a lower value,

(a) Machine spring set (77) and stress relieve as indicated (note amount of material removed).

(b) Buildup OD of sleeve with chrome plate as required to obtain finish diameter (after machining) equal to original OD plus amount that ID of spring set (77) was increased (+0.0000/ -0.0005). A shift of torque lockout level relatively affects maximum or minimum lockout levels a corresponding amount.

I. Shaft (94)

(1) Bearing and seal O.D.

(a) Magnetic particle examine per 20-20-01.

(b) Machine as required to remove defects, observing 1.3676 min rework diameter. Maintain 63-microinch surface finish and 0.25-inch fillet radius.

(c) Shot peen using size and intensity specified.

(d) Chrome plate per 20-42-03. Stop plating at least 0.03 inch from start of fillet radius.

(e) Machine to design diameter of 1.3776-1.3770 inches per 20-10-04. Surface finish must be 8 microinch or better.

(f) Magnetic particle examine per 20-20-01.

(2) Trunnion holes

(a) Magnetic particle examine per 20-20-01.

(b) Machine bores as required to remove defects, observing 0.9277 max rework diameter. Maintain perpendicularity as noted, and surface finish of at least 63 microinch.

(c) Shot peen using size and intensity specified.

(d) Chrome plate per 20-42-03.

(e) Machine to design dia of 0.9193-0.9201 and surface finish of at least 32 microinch. Remaining plate thickness to be 0.002 inch min.

(f) Magnetic particle examine per 20-20-01.

(g) Refinish as required, except no cadmium plate, primer or paint in repaired holes.

J. Yoke (93) (Fig. 403)

(1) Oversize bolt hole repair.

(a) Machine bolt holes per 20-10-02 to dimension shown.

(b) Break sharp edges as indicated.

(c) Tag yoke to indicate that yoke must be used with oversize bolt (NAS3005E23 or equivalent) and with ballscrew with oversize bolt holes.

(2) Yoke ID corrosion removal

(a) Machine per 20-10-02 the yoke ID as required, within repair limit, to remove defects. Finish should be 32 microinches or better. No step or mismatch is allowed. Break sharp edges.

(b) Surface temper etch with ammonium persulphate per 20-20-02.

(c) Stress relieve at 350-400 °F for 4 hours per 20-10-02.

(d) Magnetic particle check per 20-20-01, class B.

(e) Shot peen machined area per 20-10-03. Observe material heat treat criteria specified.

(f) Check if mating part (jackscrew) has been chrome plated. Use optional repair method for yoke if mating part has been chrome plated.

1) Build up ID with chrome plate per 20-42-03. Chrome plate runout 0.01-0.03 inch around edges of ID and all holes.

2) OPTIONAL REPAIR: Build up ID using electrodeposited nickel plate per 20-42-09, type 3. Nickel plate runout 0.01-0.03 inch around edges of ID and all holes.

(g) Stress relieve per 20-10-02 within 10 hours of plating. Stress relieve bake at 350-400°F for 12 hours per 20-10-02.

(h) Grind yoke ID per 20-10-04 to design diameter shown. Surface finish to be 63 microinches or better.

(i) Magnetic particle check per 20-20-01 class B.

(j) Low hydrogen embrittlement stylus cad plate per 20-42-10 any unplated areas created due to chrome plate stops. Observe post plate bake requirements in 20-42-03.

(3) Trunnion hole corrosion removal

(a) Machine trunnion hole per 20-10-02 as required to remove corrosion within maximum repair limit shown. Finish to 32 microinches. Break sharp edges.

NOTE: Remove only enough material that is necessary to remove corrosion.

(b) Surface temper etch the machined area with ammonium persulphate per 20-10-02.

(c) Stress relieve at 350-400°F for 4 hours per 20-10-02.

(d) Magnetic particle check the machined area per 20-20-01, class B.

(e) Shot peen the area shown using size, intensity and coverage specified per 20-10-03. Observe material heat treat criteria specified.

(f) Build up the hole diameter with chrome plate per 20-42-03. Chrome plate runout 0.01-0.02 inch around edges of hole. Do not chrome plate chamferred area.

(g) Stress relieve per 20-10-02 within 10 hours of plating. Stress relieve bake at 350-400°F for 12 hours per 20-10-02.

(h) Grind hole ID per 20-10-04 to the after plating design diameter shown. Surface finish to be 63 microinches or better.

(i) Magnetic particle check per 20-20-01 class B.

(j) Low hydrogen embrittlement stylus cad plate per 20-42-10 any unplated areas created due to chrome plate stops. Observe post plate bake requirements in 20-42-03 (section 7).

2. Refinish (Fig. 1101)

NOTE: Refer to 20-30-02 for stripping of protective coatings and to 20-41-01 for explanation of F and SRF finish codes and to AMS (Aeronautical Materials Specifications) for AMS references.

A. Washers (4, 11), coupling (5) -- Cadmium-titanium plate (F-1.18). Material: 4130 steel (120-150 ksi).

B. Spacers (6), gears (37, 47), yoke (93), shaft (94) -- Fig. 403.

C. Cap (19) -- Anodize per AMS 2470 plus apply one coat primer BMS 10-11, type 1 (SRF-12.205) on external surfaces only. Material: Al alloy.

D. Washer (23) -- Cadmium-titanium plate (F-1.18) and apply one coat primer BMS 10-11, type 1 (SRF-12.205). Material: 6150 steel (Rockwell (48-52)).

E. Retainers (30, 40) -- Anodize per AMS 2470 plus apply one coat primer BMS 10-11, type 1 (SRF-12.205) and SRF-12.63 on external surfaces and smallest ID. Material: Al alloy.

F. Spacers (35, 45, 58) -- Anodize per AMS 2470. Material: Al alloy.

G. Coupling (12), bolt (90), pin (91), spacer (92), cross (96) -- Fig. 401.

H. Support (70) -- Phosphate coat per AMS 2481.

I. Deleted.

J. Housing (78) -- Fig. 402.

K. Spring set (77) -- Fig. 402.

3. Replacement (Fig. 1101)

A. Replace all O-rings, seals, and backup rings.

B. deleted

C. Inserts (85)

(1) Remove damaged insert.

(2) Clean and check threads in bore of housing.

(3) Apply primer, BMS 10-11, type 1, to bore of housing (82) and to insert (85). Install insert 3/4-1 1/2 turn below surface of housing while primer is wet. Remove tang.

D. Replace bearings per 20-50-03.

E. If screws (79) or nameplate (80) require replacement, proceed as follows:

(1) Remove screws (79) and nameplate (80).

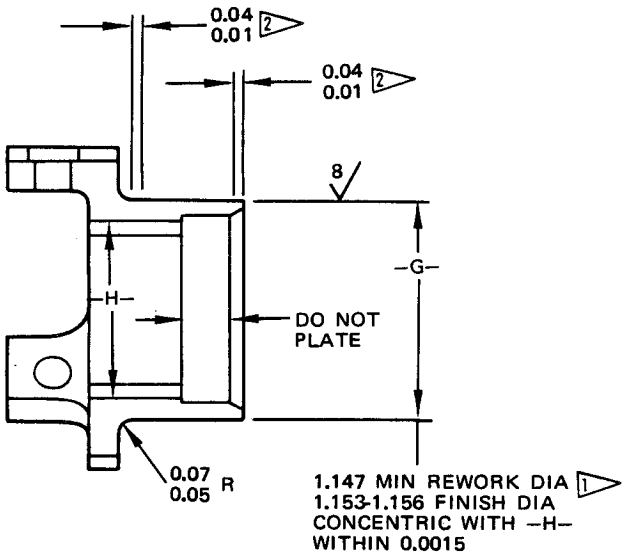
(2) Check condition of surrounding surface.

(3) Apply sealant , Loctite, Grade B (American Sealants Corp., Hartford, Conn.) on screws, position nameplate, and install screws while sealant is wet.

F. Replace bushings (95) as follows:

(1) If installed bushings (95) meet Inspection/Check requirements, and the service wear limits are less than those shown in Fig. 601, mark position of bushings (95) in yoke (93) and shaft (94), rotate bushings 180 degrees, and reinstall.

(2) If bushings (95) are damaged, or exceed the limits shown in Fig. 601, Ref 20-50-03, Bearing Installation and Retention for replacement instructions.



REFINISH

CADMIUM-TITANIUM PLATE ALL OVER PER 4 EXCEPT DIA -G- AND AS NOTED

REPAIR

AS NOTED BY 1 2

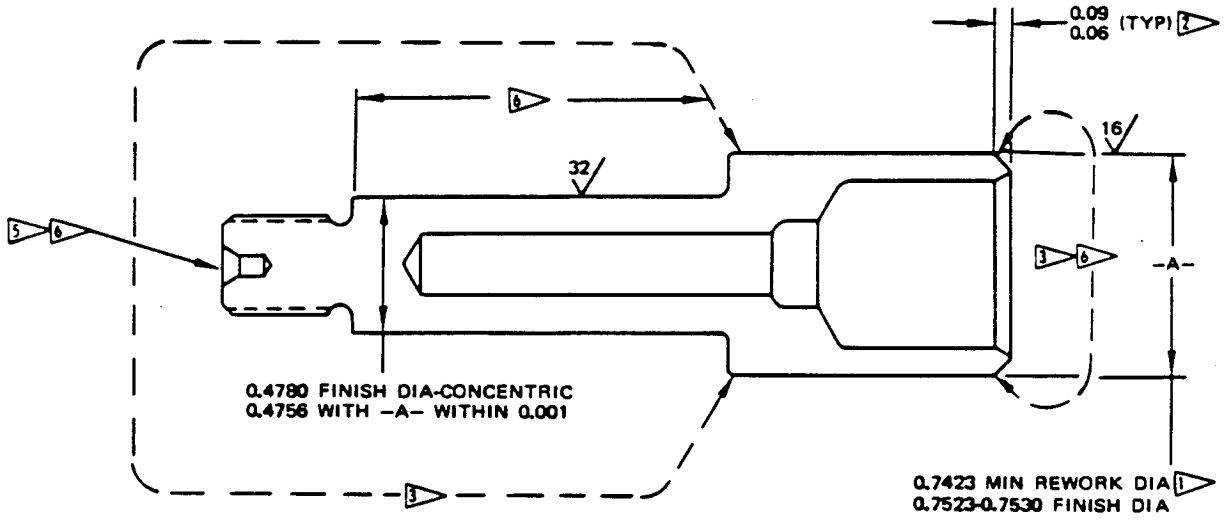
SHOT PEEN: (20-10-03)

0.017-0.033 SHOT SIZE
0.015 A2 INTENSITY

BREAK SHARP EDGES 0.003-0.020R

MATERIAL: 8740 STEEL (150-180 KSI)

COUPLING (12)



REFINISH 7

CHROME PLATE (F-15.04) -A- CADMIUM-TITANIUM PLATE ALL OTHER SURFACES PER 3 APPLY PRIMER AND PAINT PER 6

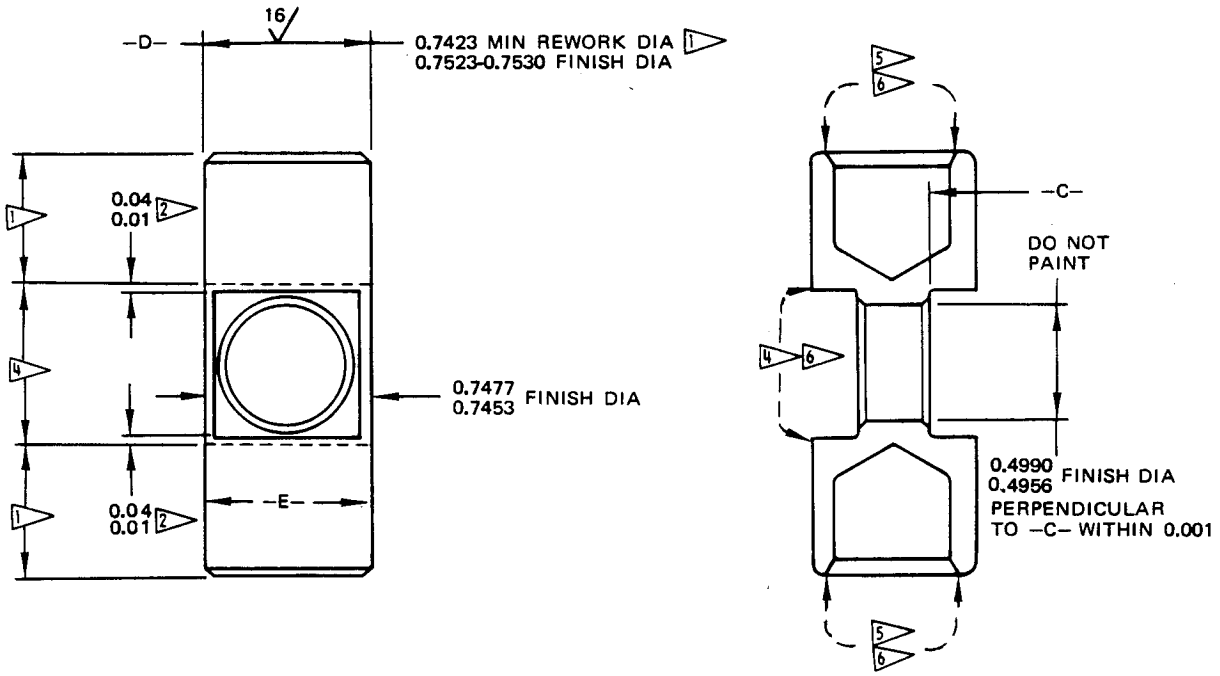
REPAIR

AS NOTED BY 1 2

SHOT PEEN: (20-10-03)
0.017–0.033 SHOT SIZE
0.015 A2 INTENSITY

MATERIAL: (65-76805-1) 4340 STEEL (275–300 KSI)
(66-25119-1,-2) MOD H-11 STEEL (RC 54-56)

BOLT (90)



REFINISH 7

CHROME PLATE (F-15.04) -D- AND -E-
CADMIUM-TITANIUM PLATE ALL
OTHER SURFACES PER 4
APPLY PRIMER AND PAINT PER 6

REPAIR

AS NOTED BY 1 2

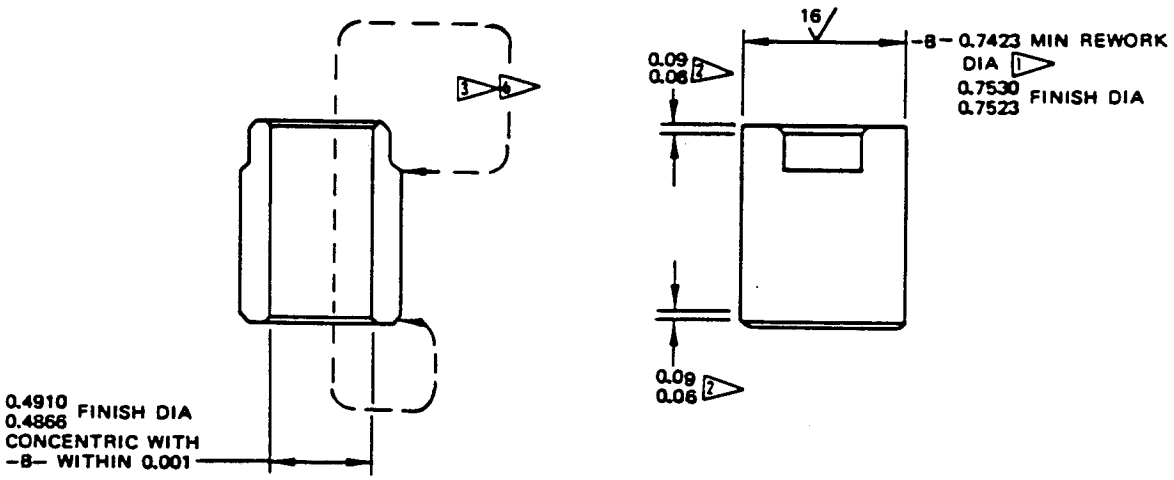
SHOT PEEN: (20-10-03)

0.017–0.033 SHOT SIZE
0.015 A2 INTENSITY

BREAK SHARP EDGES 0.005–0.015R

MATERIAL: MOD H-11 STEEL (275–300 KSI)

PIN (91)



REFINISH 7

CHROME PLATE (F-15.04) DIA -8-. CADMIUM TITANIUM PLATE ALL OTHER SURFACES PER 3. APPLY PRIMER AND PAINT PER 6

REPAIR

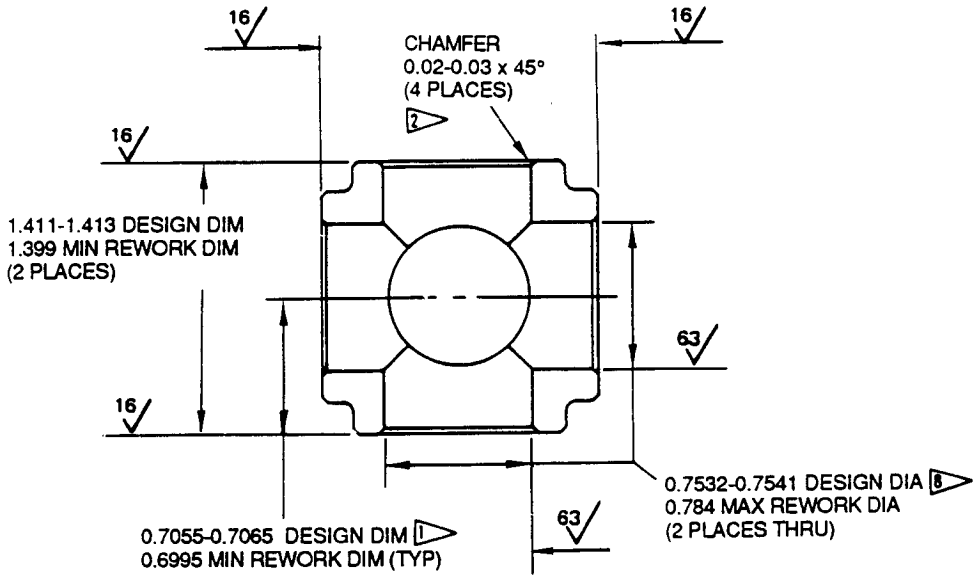
AS NOTED BY 1 2

SHOT PEEN: (20-10-03)
0.017-0.033 SHOT SIZE
0.015 A2 INTENSITY

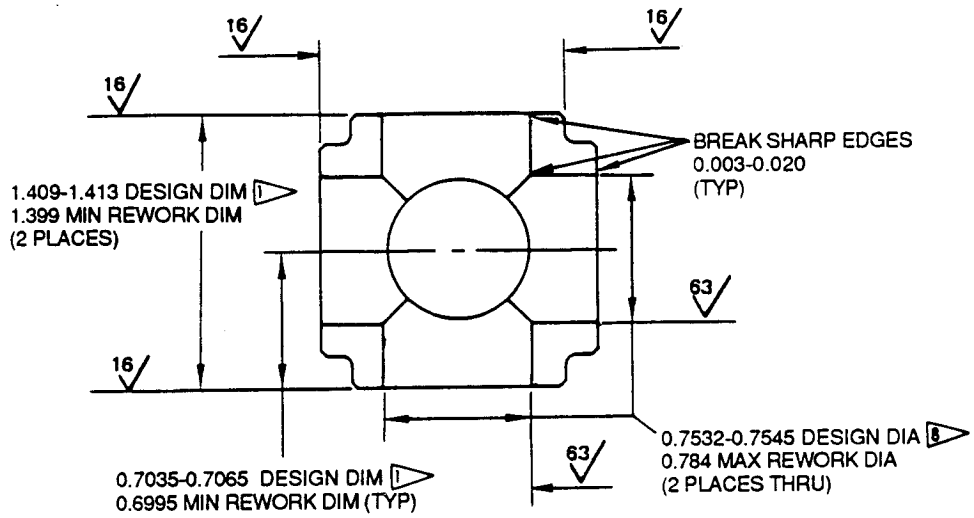
BREAK SHARP EDGES 0.005–0.015R

MATERIAL: MOD H-11 STEEL (275–300 KSI)

SPACER (92)



P/N 65-76639-1



P/N 66-25116-1

REFINISH

65-76639-1-CHROME PLATE OUTER SURFACES (F-15.04) PER F-1.842 (0.003-0.005 PLATE THICKNESS)

66-25116-1-ELECTROLESS NICKEL PLATE OUTER SURFACE (F-15.08)

REPAIR

AS NOTED BY 1

SHOT PEEN: (20-10-03)

0.017-0.033 SHOT SIZE
0.015 A2 INTENSITY

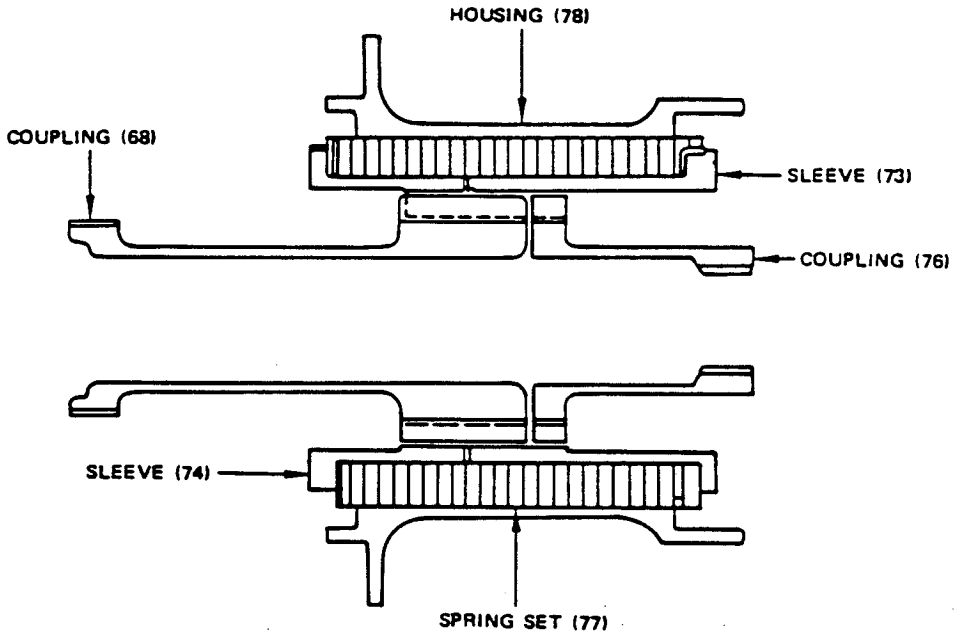
BREAK SHARP EDGES

MATERIAL: (65-76639-1): CRES 15-5PH (180-200KSI)
(66-25116-1): STEEL, MOD H-11 (RC 54-56)

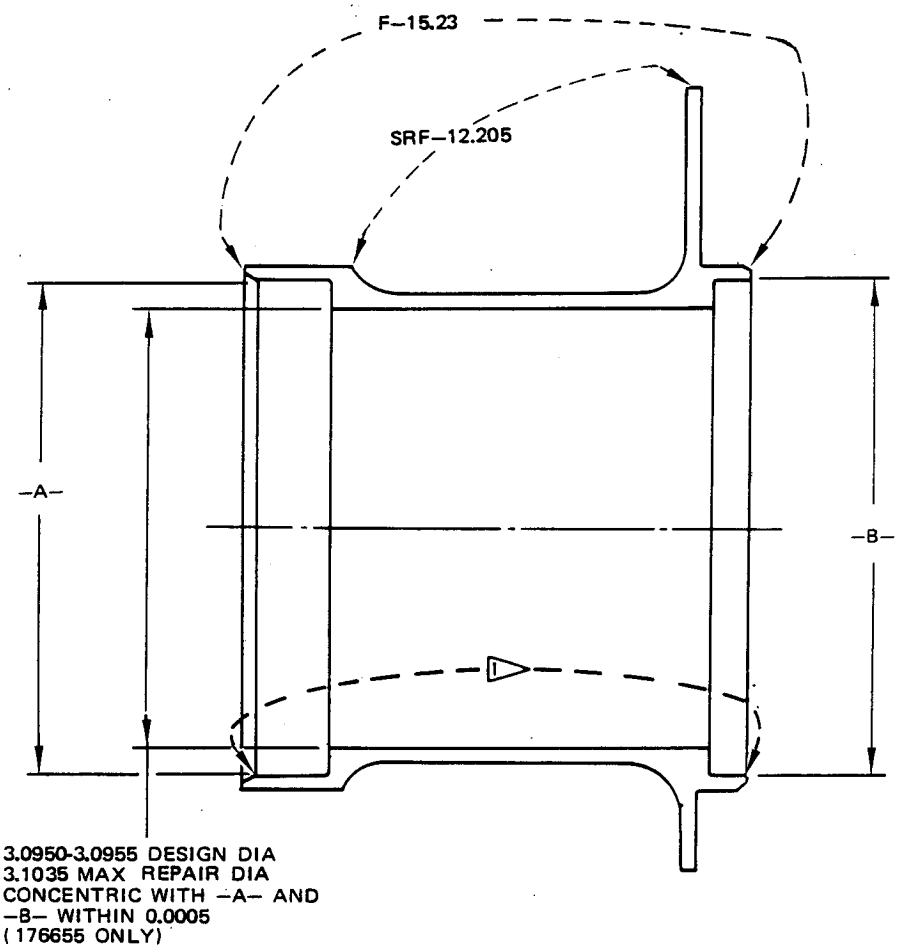
CROSS (96)

1. BUILD UP WITH CHROME PLATE (REF 20-42-03) AND GRIND TO FINISH AND DIMENSIONS SHOWN. OBSERVE PLATING RUNOUT AS NOTED.
2. CHROME PLATE RUNOUT
3. CADMIUM-TITANIUM PLATE (F-1.18) 0.0003—0.0005 THICKNESS (20-42-02)
4. CADMIUM-TITANIUM PLATE (F-1.181) 0.0005—0.0007 THICKNESS (20-42-02)
5. CADMIUM-TITANIUM PLATE THROW IN PREFERRED IN THESE AREAS.
6. AFTER PLATING APPLY PRIMER (SRF-12.205) BMS 10-11, TYPE 1 AND PAINT (SRF-12.63) BMS 10-11, TYPE 2.
7. REPLACES ORIGINAL ELECTROLESS NICKEL PLATING
8. BUILD UP WITH NICKEL PLATE (20-42-09) (0.004—0.006 THICK), CHROME PLATE (20-42-03) AND MACHINE TO DESIGN DIMENSIONS SHOWN. TOTAL PLATE THICKNESS AFTER MACHINING 0.015 MAX.

ALL DIMENSIONS ARE IN INCHES



TORQUE BRAKE ASSEMBLY (67)



REFINISH (OPTIONAL)

CADMIUM PLATE (F-15.23) EXTERIOR SURFACES AS NOTED. APPLY PRIMER, BMS 10-11, TYPE 1 (SRF-12.205) AS NOTED. OMIT PRIMER IN BOLT HOLES

1 CARBURIZED, 0.025-0.035 DEEP

REPAIR

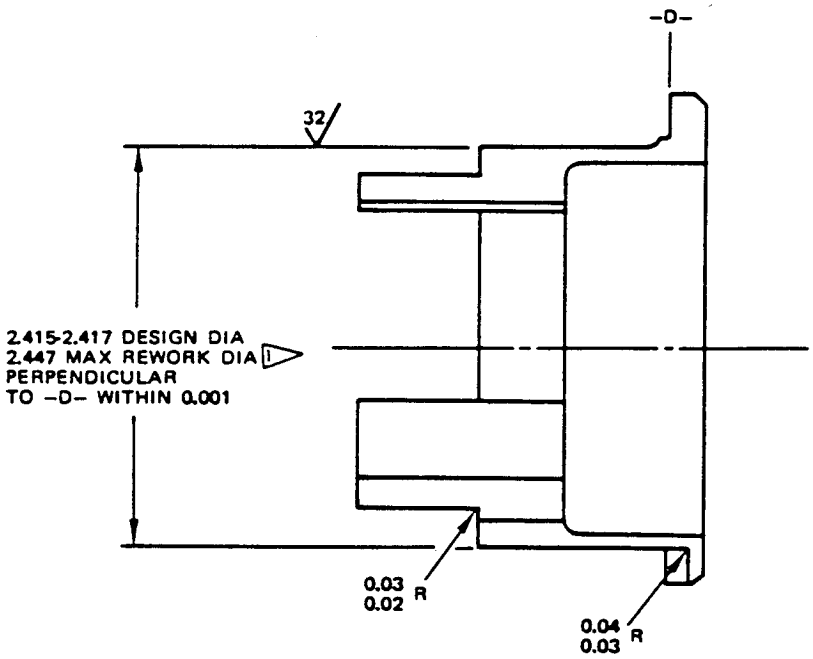
MACHINE ID AS REQUIRED TO INCREASE TORQUE SETTING DESIRED AMOUNT (TORQUE SETTING INCREASES 5.0 POUND-INCHES FOR EACH 0.001 INCREASE OF ID.)

MATERIAL: 9310 STEEL PER AMS 6265
RC 32-43 CORE HARDNESS
CARBURIZED, RC 60 MIN
AS NOTED

BREAK SHARP EDGES 0.003-0.020R

ALL DIMENSIONS ARE IN INCHES

TORQUE BRAKE HOUSING (78)



REPAIR

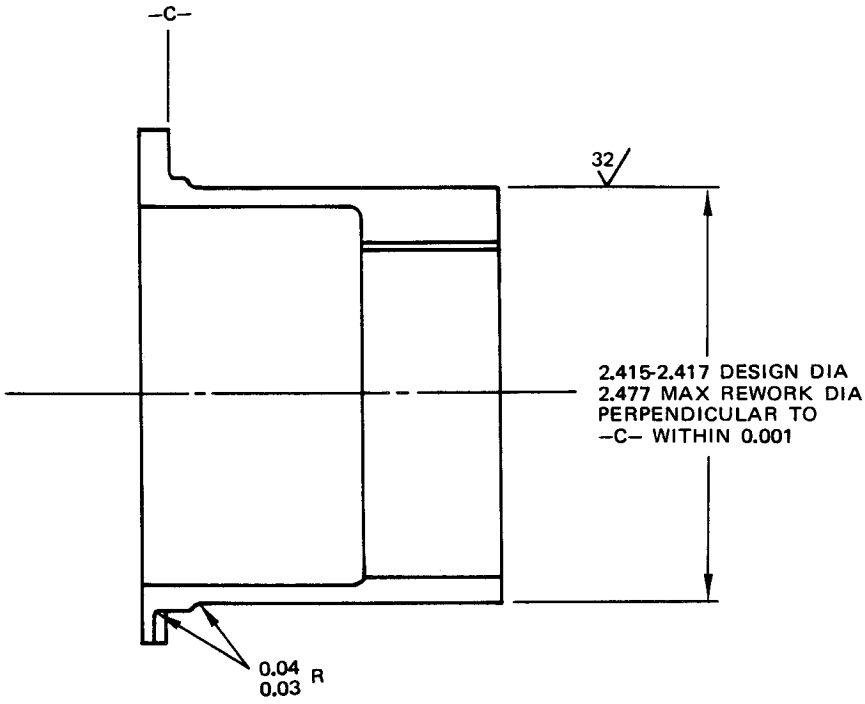
AS NOTED BY 1

MATERIAL: STEEL (HT 290-300 KSI)

BREAK SHARP EDGES 0.005-0.015R

SHOT PEEN: (REFER TO 20-10-03)
0.010-0.019 SHOT SIZE
0.012-0.015 A2 INTENSITY

SLEEVE (74)



REPAIR

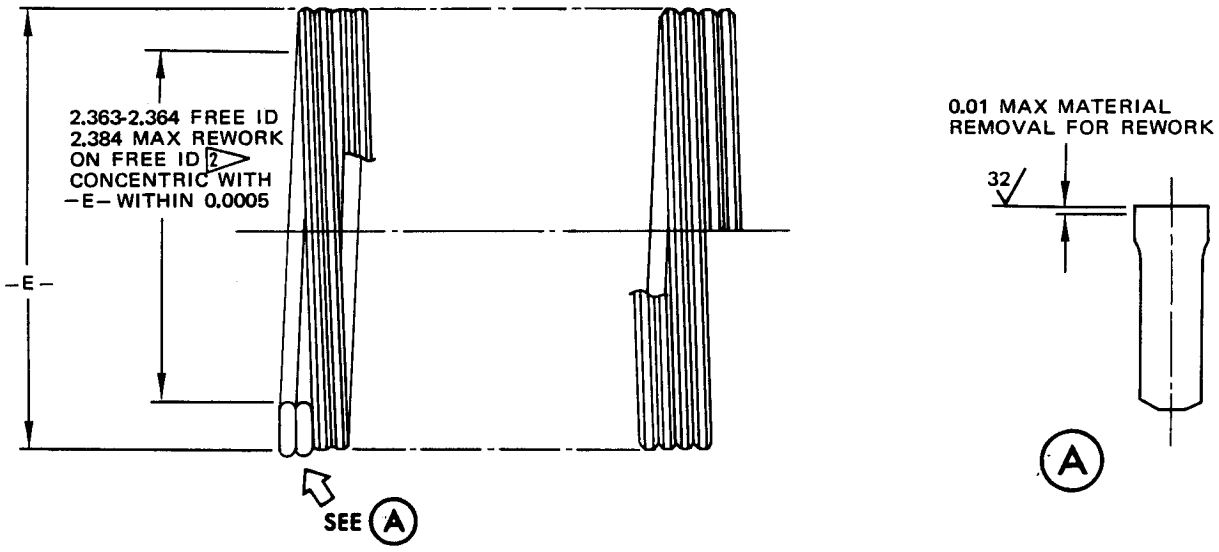
AS NOTED BY 1

MATERIAL: STEEL (HT 290-300 KSI)

BREAK SHARP EDGES 0.005-0.015R

SHOT PEEN: (REFER TO 20-10-03)
0.010-0.019 SHOT SIZE
0.012-0.015 A2 INTENSITY

SLEEVE (73)



REFINISH

CADMIUM-TITANIUM PLATE ID AND SPRING FLANKS PER 20-42-02

REWORK

1. MACHINE ID AS REQUIRED TO DECREASE TORQUE LEVEL BY DESIRED INCREMENT (VALUE DECREASES 1.8 POUND-INCHES FOR EACH 0.001 INCREASE OF ID).
2. STRESS RELIEVE IN FOLLOWING ORDER:
   A. 320°-330°F FOR 1 HOUR
   B. 625°-675°F FOR 1 HOUR
   C. 920°-930°F FOR 2 HOURS
   D. AIR COOL AT 65°-75°F

MATERIAL: STEEL (HT 290-300 KSI)

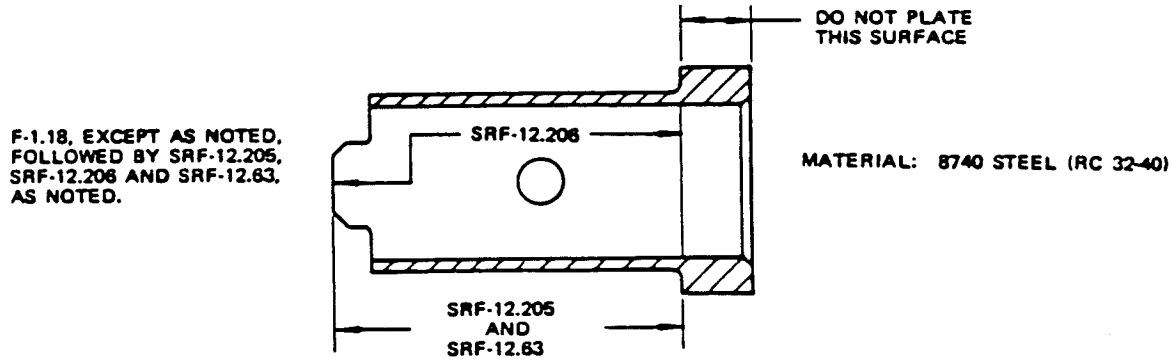
BREAK SHARP EDGES 0.005-0.015R

SPRING SET (77)

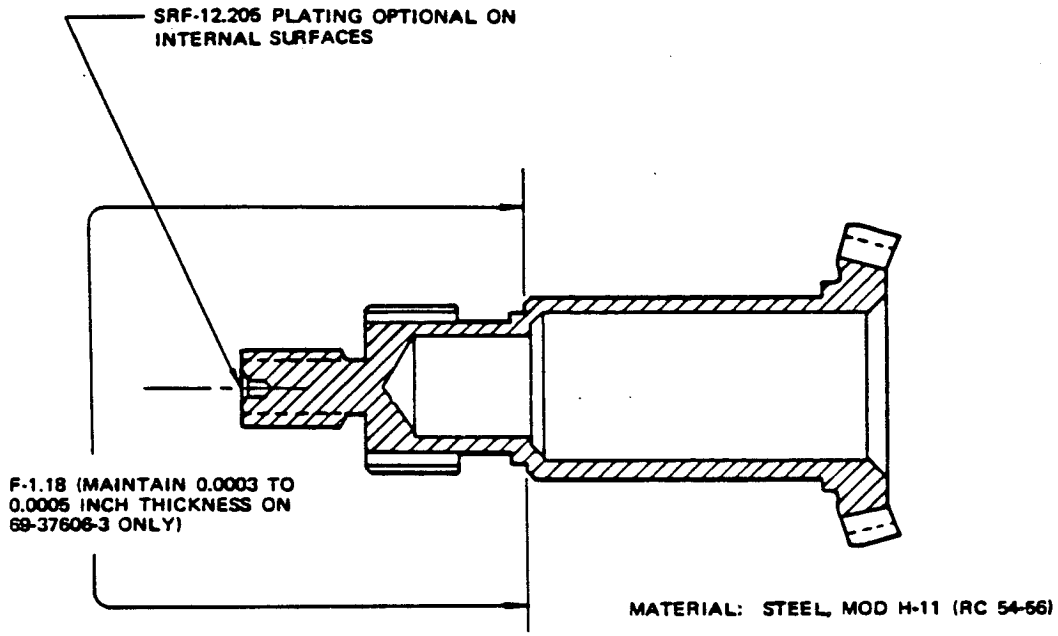
ALL DIMENSIONS ARE IN INCHES

1 BUILD UP WITH HARD CHROME PLATE (REFER TO 20-42-03) AS REQUIRED TO OBTAIN FINISH DIA (AFTER MACHINING) EQUAL TO MEASURED OD PLUS AMOUNT THAT ID OF SPRING SET (77) WAS INCREASED (+ 0.0000,-0.0005)

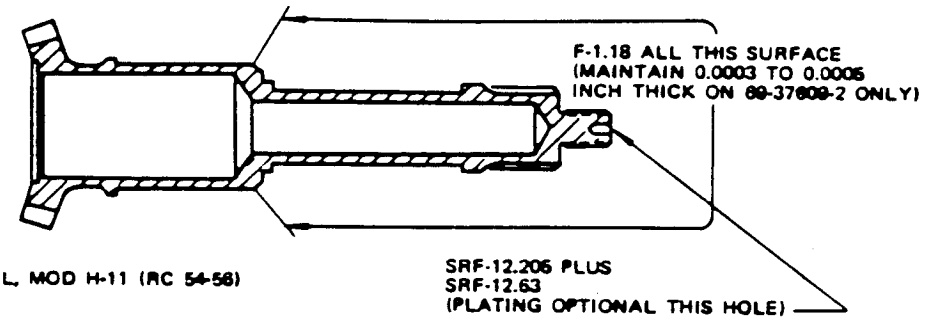
2 NOTE AMOUNT ID IS INCREASED TO DETERMINE REWORK OF SLEEVES (73, 74)



SPACER (6)

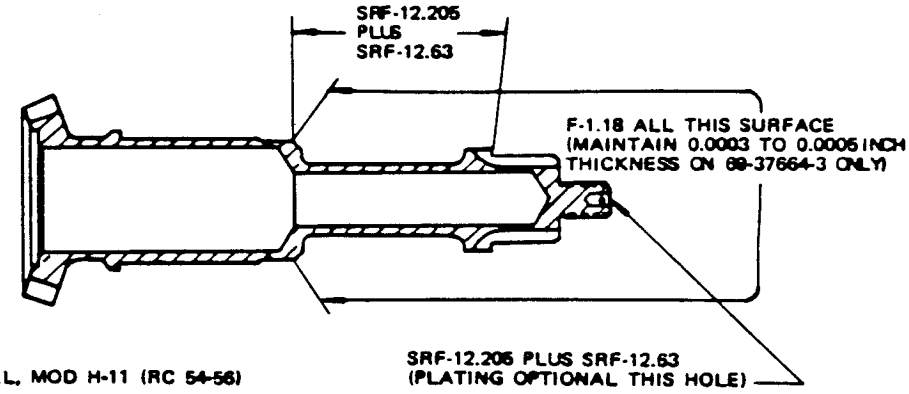


GEAR (37)



MATERIAL: STEEL, MOD H-11 (RC 54-56)

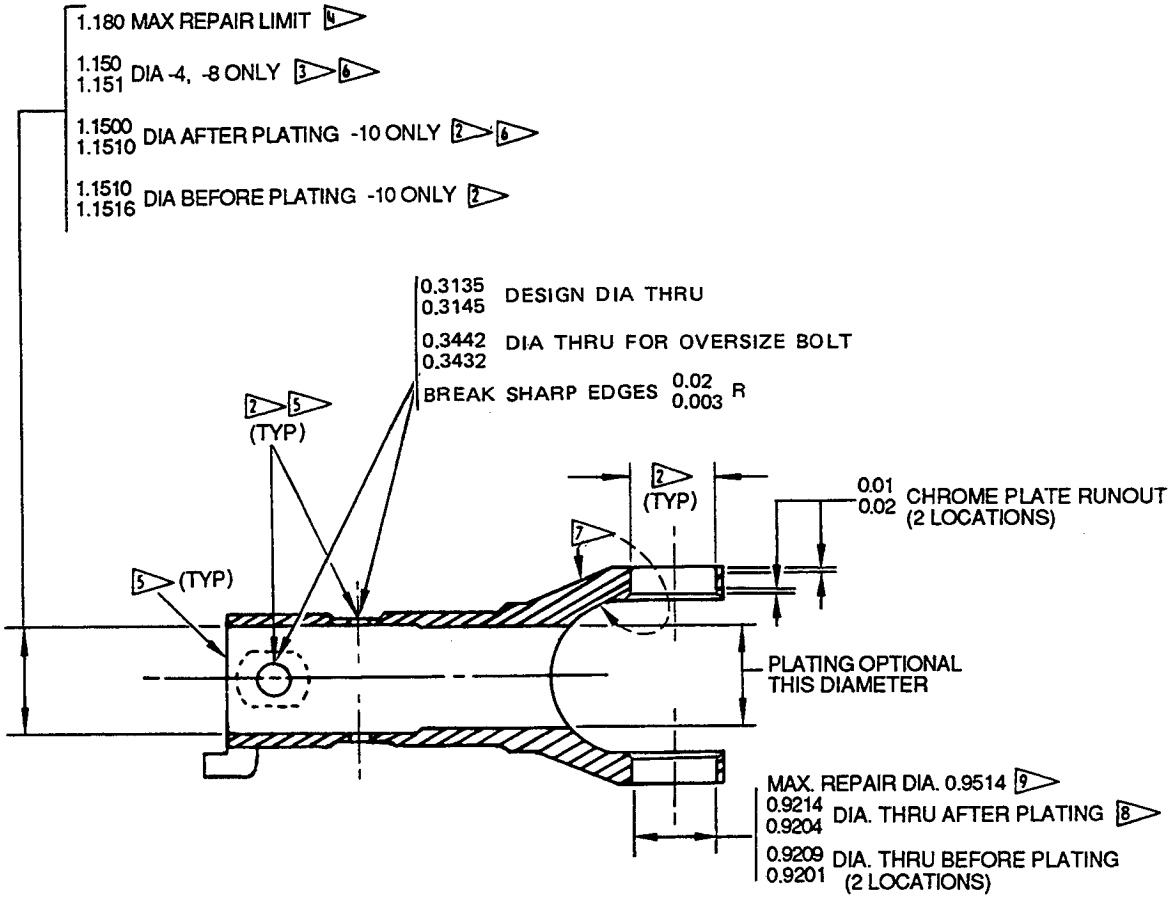
69-37609-2,-3
GEAR (47)



MATERIAL: STEEL, MOD H-11 (RC 54-56)

69-37664-3,-4
GEAR (47)

Refinish Diagram
Figure 403 (Sheet 2)



REFINISH

CADMIUM-TITANIUM ALLOY PLATE (F-15.01) 0.0003 TO 0.0005 INCH THICK EXCEPT AS NOTED BY 3. APPLY TWO COATS OF PRIMER, BMS 10-11, TYPE I (F-20.03) EXCEPT AS NOTED BY 2 AND 3

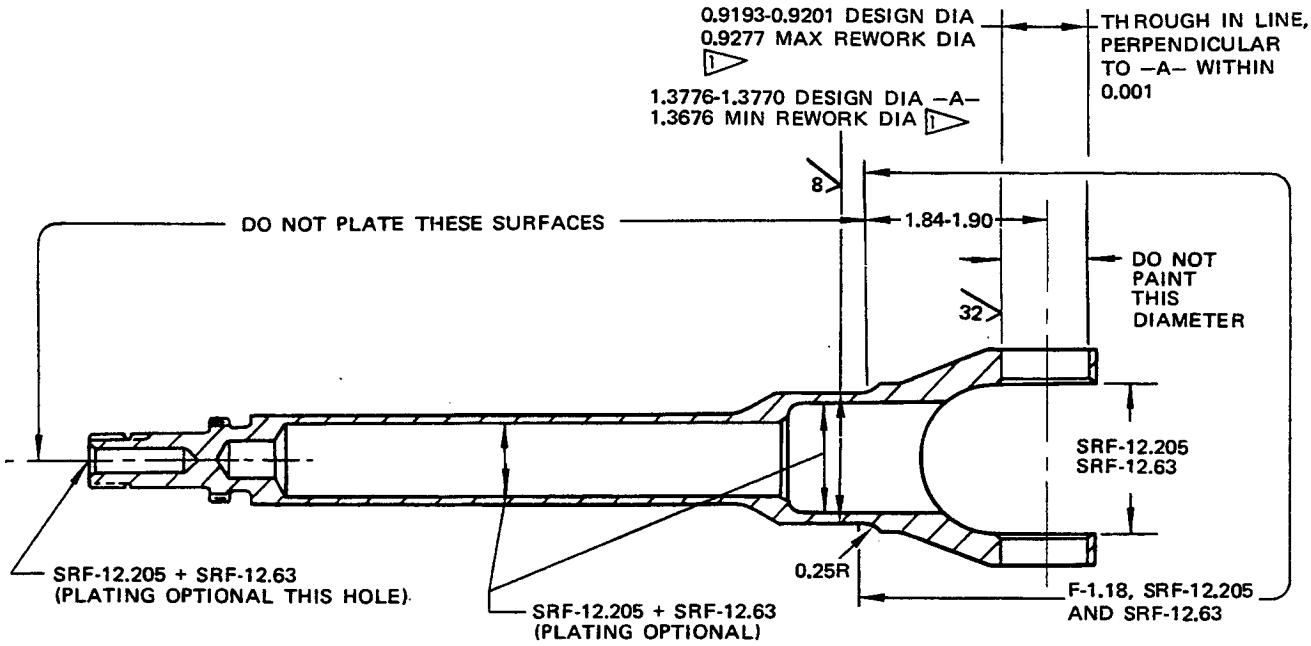
REPAIR

REF 4 THRU 9

MATERIAL: (65-50286-4, -8) MOD H-11 STEEL (270-300 KSI)
(65-50286-10) 4340 M STEEL (270-300 KSI)

SHOT PEEN (REF 20-10-03)

YOKE (93)



REFINISH

CADMIUM-TITANIUM (F-1.18) EXCEPT AS NOTED (MAINTAIN 0.0003 TO 0.000 INCH THICKNESS ON 65-50284-4 ONLY), FOLLOWED BY PRIMER BMS 10-11 TYPE 1 (SRF-12.205) AND ENAMEL (SRF-12.63) EXCEPT AS NOTED

REPAIR

AS NOTED BY 1
SHOT PEEN: (20-10-03)
0.017-0.039 SHOT SIZE
0.016 A2 INTENSITY

MATERIAL: (65-50284-4, -5)
STEEL, MOD H-11
(270-300 KSI)

(65-50284-6)
STEEL, 4340M
(270-300 KSI)

SHAFT (94)

1. BUILD UP WITH CHROME PLATE (20-42-03). MACHINE TO FINISH AND DIMENSIONS SHOWN.
2. NO SHOT PEEN OR PRIMER THIS SURFACE
3. NO CADMIUM-TITANIUM PLATING, SHOT PEEN OR PRIMER
4. BUILD UP WITH CHROME PLATE (REF 20-42-03) (OPTIONAL: ELECTRODEPOSITED NICKEL PLATE (REF 20-42-09)
5. PLATING RUNOUT IS 0.01-0.03 INCH AROUND EDGES OF ID AND ALL HOLES
6. OMIT CADMIUM-TITANIUM PLATING IF THIS SURFACE IS REP AIRED
7. SHOT PEEN ALL AROUND HOLE AS SHOWN, 2 LOCATIONS
8. NO CAD-TI PLATING OR PRIMER IF THIS SURFACE IS REPAIRED
9. BUILD UP CHROME PLATE (REF 20-42-03)

ALL DIMENSIONS ARE IN INCHES

Refinish Diagram
Figure 403 (Sheet 4)

Index No. Fig.1101	Part Number	Part Name	Material	Tensile Strength (ksi)	Stress Relief After Base Metal Rework *	
					Temperature (°F)	Time (hours)
90	66-25119-1, -2	Bolt	S.A.E. H-11**	275 to 300	900 to 950	2
	65-76605-1		S.A.E. 4340 modified		500 to 550	4
91	66-25118-1 69-60055-1	Pin	S.A.E. H-11**	275 to 300	900 to 950	2
92	66-25117-1 69-60051-1	Spacer				
94	65-50284-4, -5	Shaft				
96	66-25116-1 69-76639-1	Cross				

* After stress relieving, air cool part at 65°-75°F temperature and magnetic particle examine per 20-20-01

** AMS 6487 is the closest equivalent aeronautical material specification.

Stress Relief Data
Figure 404

ASSEMBLY

1. General

   A. Immerse all O-rings and internally installed parts in hydraulic fluid, Specification MIL-H-5606. These parts are installed wet. Use of MIL-G-7711 grease is optional for O-rings and seals.

   B. Apply primer, BMS 10-11, type 1, on faying surfaces, from O-ring groove to outer edge, where required by reassembly procedures. Mate and install while primer is wet. Do not allow primer in O-ring grooves, on O-rings, or on sealing surfaces.

   C. Apply primer, BMS 10-11, type 1, to shank and threads of bolts, where required by reassembly procedures, and install while primer is wet.

2. Assembly (Fig. 1101)

   A. Assemble and install torque brake assembly (67).

      (1) Align ends of springs in spring set (77) approximately 180 degrees apart.

      NOTE: Spring set consists of two matched springs coiled together.

      (2) Deleted.

      (3) Place spring set (77) into Spring Pack Assembly Jig, ST6107 (Fig. 501).

      NOTE: Install rolled shim between OD of spring set and ID of jig, if necessary to maintain concentricity of spring set when springs are expanded.

      (4) Check that top ends of coil are in line with the two locking lugs on jig before applying torque to springs. Insert Torque Bar, PT49001 into coil ends and wind spring ends until they are past the locking lugs on top of jig.

      (5) Maintain pressure on torque bar. Insert an allen wrench into lockscrew holding locking lug. Rotate lugs inward, in position to prevent springs from unwinding. Lock set screws to prevent lugs from retracting (Fig. 501).

(6) Remove circular portion of assembly jig from its base. Invert unit and reinstall firmly on base. Use torque bar to align locking lugs into spring ends on bottom of spring set. Lock lugs in place by tightening set screws.

(7) Wind springs about 30 degrees further by rotating takeup screws in spring pack jig. This will expand spring set so that sleeves (73 and 74) can be inserted.

(8) Coat all surfaces of sleeve (73) with a light film of hydraulic fluid, MIL-H-5606, and assemble into expanded spring pack.

(9) Remove circular portion of assembly jig from its base. Reinstall this section onto base so that sleeve (73) is on bottom. Slip a wood block between sleeve (73) and base to prevent sleeve from dropping out.

(10) Coat sleeve (74) with hydraulic fluid, MIL-H-5606 and insert into spring pack. Make sure sleeve is fully inserted and internal lugs align with sleeve (73). Loosen locking lugs on assembly jig and press sleeve (74) further into spring set. Slide locking lugs inward and secure flats on sleeve (74).

(11) Remove circular portion of assembly jig from base. Apply a light film of hydraulic fluid, MIL-H-5606 to adapter (76).

(12) Insert adapter (76) into spring pack with internal splines pointing outward. Ears of adapter must mate with lands of sleeve (73). (See figure 502.)

(13) Slowly unwind spring set by rotating assembly jig to relieve spring expansion. Spring friction will prevent sleeves and adapter from dropping out.

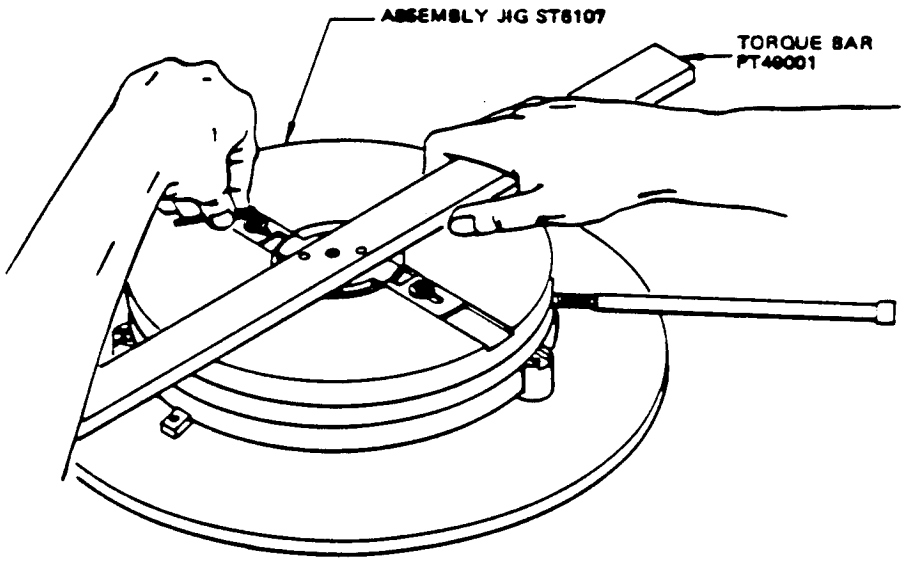
(14) Back off locking lugs on top side of assembly jig. Use thumbs to remove spring pack by applying pressure on flange of sleeve (74). Use care to prevent misalignment of internal components.

NOTE: A light plastic drift may be used to force pack from jig. Do not permit spring pack to drop.

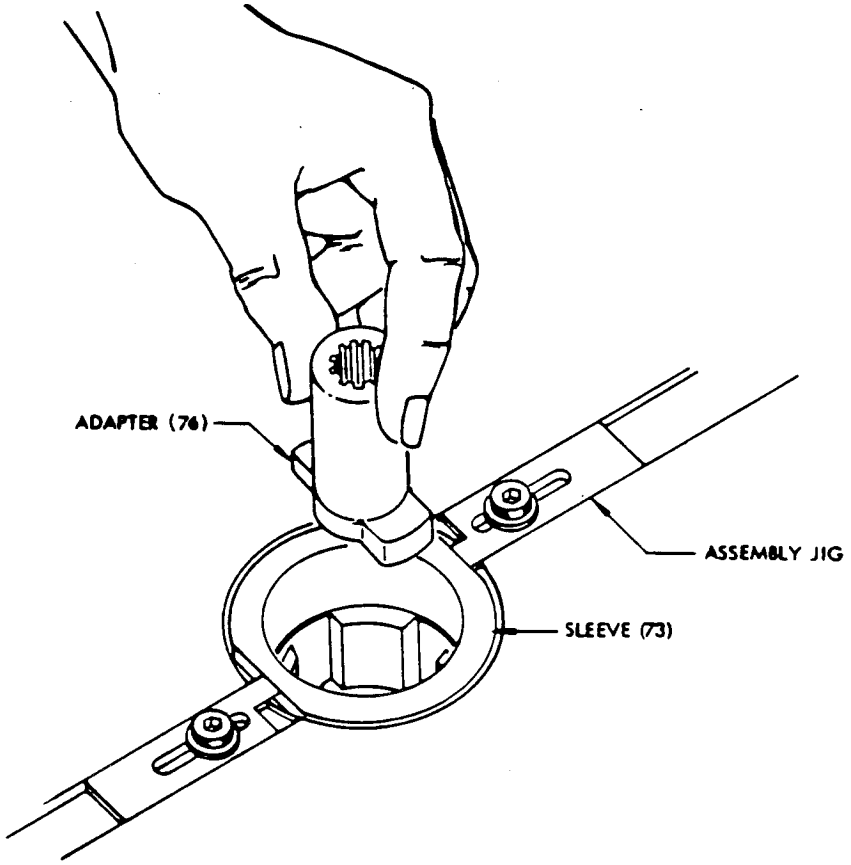
(15) Place assembled parts in arbor press. Protect flanged faces of sleeves (73 and 74) and apply an end load of 75 to 100 pounds to stack springs tight.

(16) Install rings (72) over spring set and press down to remove clearance and end play.

(17) Measure stacked height of assembled parts. Select shims (75) to provide dimension of 3.538-3.550 inches after installation. Remove end rings (72) and install shims as shown in Fig. 503. Shims used on same end of assembly are to be identical at two places 180 degrees opposite. Use the least quantity of shims required by selecting the larger sizes of shims. The dimension may be met without requiring shims, or with shims at one end only. When more than one shim is required, use same thickness at each end within 0.01 inch. Two shims may be stacked together to increase range. Maximum permissible shimming is 0.09 inch at each end (one 0.04-inch shim and one 0.05-inch shim). Trim ends of stacked shims as required so they do not protrude beyond spring O.D.



Spring Pack Assembly Jig, ST6107
Figure 501



Spring Pack Buildup
Figure 502

(18) Install one ring (72) over spring on sleeve (73) end. Slide other end of pack into housing (78), and press the remaining ring (72) over spring set (77) and into housing ID.

(19) Tap support (70) over aft end of torque brake housing (78), aligning slots in ring with tangs on housing.

(20) Invert assembled parts with flange of housing (78) upward, and tap support firmly onto housing. Turn assembled units so that support (69) is on bottom and rests on a small 2-inch thick block of wood.

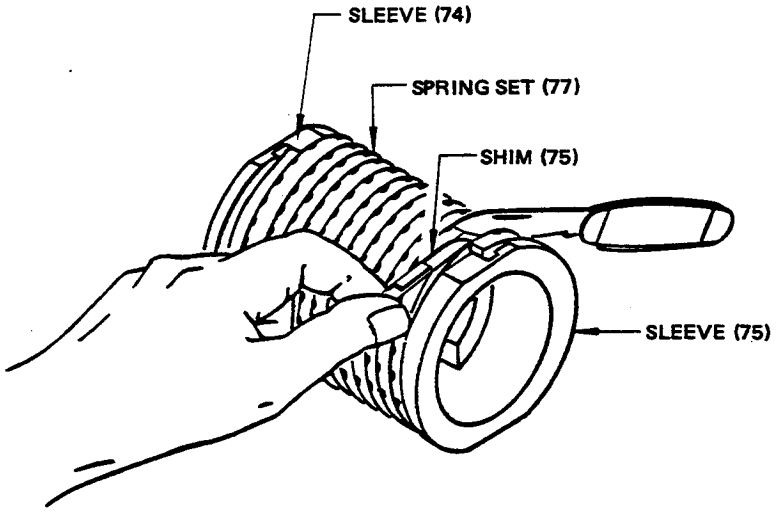
(21) Install bearing (62) on adapter (61). Place assembled bearing (62) and adapter (61) in housing (82). Hold bearing in place.

(22) Place housing assembly (81) over inverted torque brake components until parts are seated.

(23) Turn assembled components so that housing assembly ID is upward. Align bolt holes in support (69) flange.

NOTE: Hole locations are nonsymmetrical.

(24) Insert bolts (66) through flange of support (69). Install seals (65), washers (64), and nuts (63). Tighten nuts (63) to a torque range of 200 to 300 pound-inches.



Spring Pack Shim Installation
Figure 503

B. Install components in cover (86).

(1) Fill groove in cover with Sealant BMS 5-95 and insert seal (60) in cover. Apply light film of lubricant to sealing surface of seal.

(2) Press bearing (59) into cover (86).

(3) Install spacer (58) in cover (86) over bearing (59).

C. Assemble gears (54 and 52).

(1) Press bearing (48) on driver (55) at internal spline end. Check that bearing is firmly seated on shoulder of driver.

(2) Place driver (55) and bearing (48) in cover (86) ID. Determine thickness of shim (57) required as shown on Fig. 504, diagram No. 1.

(3) Remove driver and bearing, install shim (57) on spacer (58), and reinstall driver and bearing.

(4) See figure 504, diagram No. 2, and calculate thickness of shim (53) required.

(5) Install shim (53) between gears (54 and 52). Place parts on driver (55) and installed bearing (48).

(6) Apply primer BMS 10-11, type 1 to shank and threads of bolts (51). Install bolts through gear (54), shim (53), gear (52), and driver (55). Install washers (50). Install nuts (49) and tighten to a torque range of 90 to 125 pound-inches.

(7) Place assembled unit in suitable press. Apply light coating of hydraulic fluid, MIL-H-5606 to bearing rings and install bearing (56) on driver (55). Ensure that bearing is firmly seated.

D. Assemble gear (47).

(1) See Fig. 504, diagram No. 3, and calculate thickness of shim (43).

(2) Apply light coating of hydraulic fluid, MIL-H-5606, to rings of bearings (46 and 44). Install bearing (46) on gear (47). Install spacer (45) and bearing (44).

(3) Place assembled unit in housing (82).

(4) Install shim (43) in retainer (40).

(5) Fill grooves in retainer (40) with Sealant BMS 5-95 and insert seal (42) in retainer. Apply light film of lubricant to surfaces of seal.

(6) Apply primer, BMS 10-11, type 1 to mounting surfaces of retainer (40) and housing (82). Install O-ring (41). Prevent primer from entering O-ring groove.

(7) Install retainer on housing using washers (39) and bolts (38). Tighten bolts to a torque range of 80 to 100 pound-inches. Lockwire bolts (38) together.

(8) Check for free rotation of gear (47).

E. Assemble gear (37).

(1) See Fig. 504, diagram No. 4, and determine thickness of shim (33).

(2) Apply light coating of hydraulic fluid, MIL-H-5606, to gear (37) shaft and bearings (36 and 34). Install bearing (36), spacer (35) and bearing (34) on gear (37).

(3) Place assembled unit in housing (82).

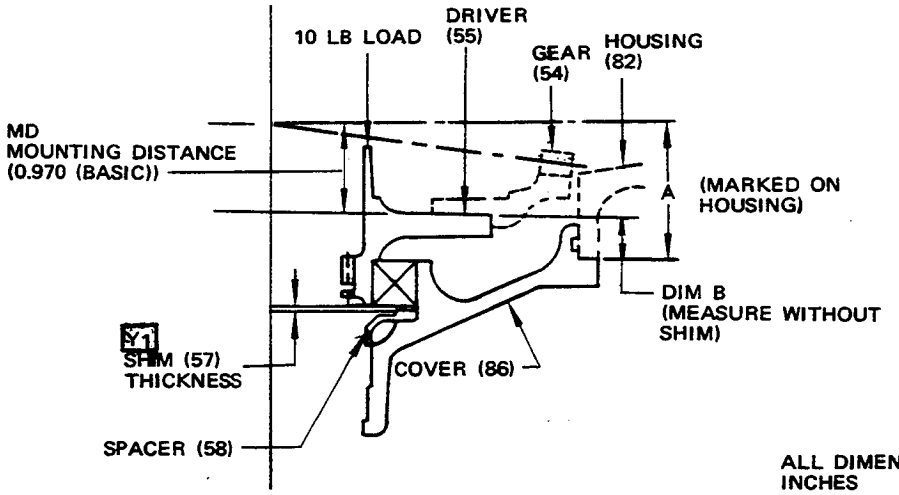
(4) Install shim (33) in retainer (30).

(5) Fill grooves in retainer (30) with Sealant BMS 5-95 and insert seal (32) in retainer (30). Apply light film of lubricant to surfaces of seal.

(6) Apply primer, BMS 10-11, type 1 to mounting surfaces of retainer (30) and housing (82). Install O-ring (31). Prevent primer from entering O-ring groove.

(7) Install retainer on housing using washers (29) and bolts (28). Tighten bolts to torque range of 80 to 100 pound-inches.

(8) Check for free rotation of gear (37).

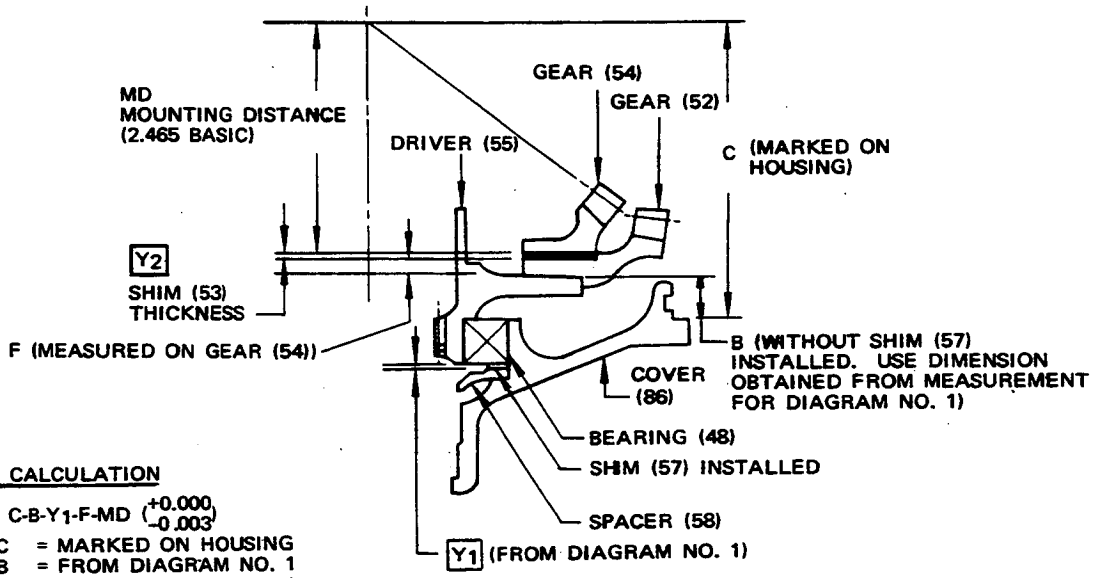


SHIMMING CALCULATION

SHIM Y1 = A-MD-B $(^{+0.000}_{-0.003})$

WHERE: A = MARKED ON HOUSING
MD = MOUNTING DISTANCE
B = MEASURED WITHOUT SHIM

DIAGRAM NUMBER 1



SHIMMING CALCULATION

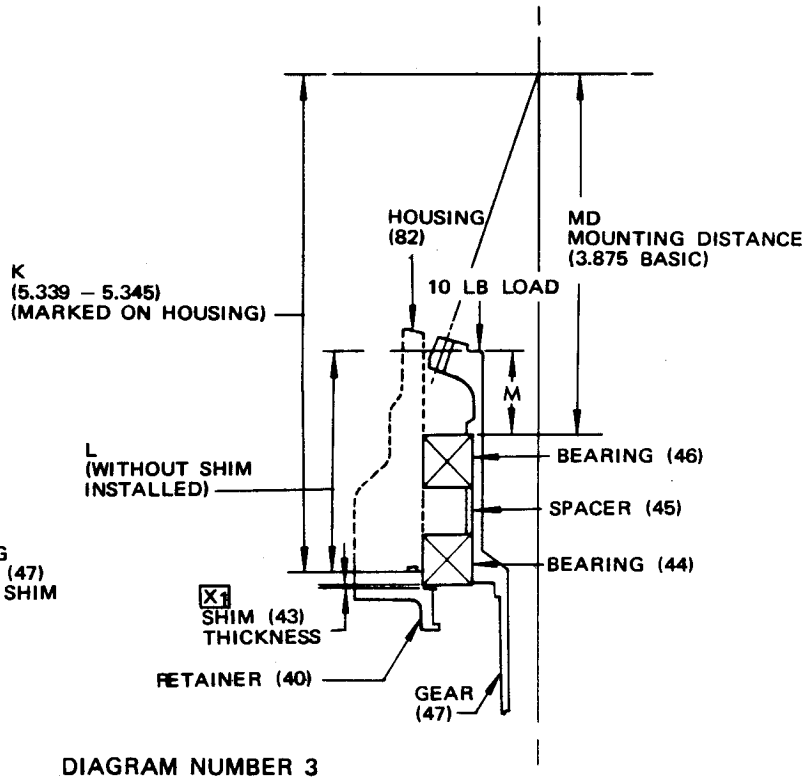
SHIM Y2 = C-B-Y1-F-MD $(^{+0.000}_{-0.003})$

WHERE: C = MARKED ON HOUSING
B = FROM DIAGRAM NO. 1
Y1 = FROM DIAGRAM NO. 1
F = MEASURED ON GEAR (54)
MD = MOUNTING DISTANCE

DIAGRAM NUMBER 2

Shimming Diagrams
Figure 504 (Sheet 1)

NOTE: ALL DIMENSIONS ARE IN INCHES



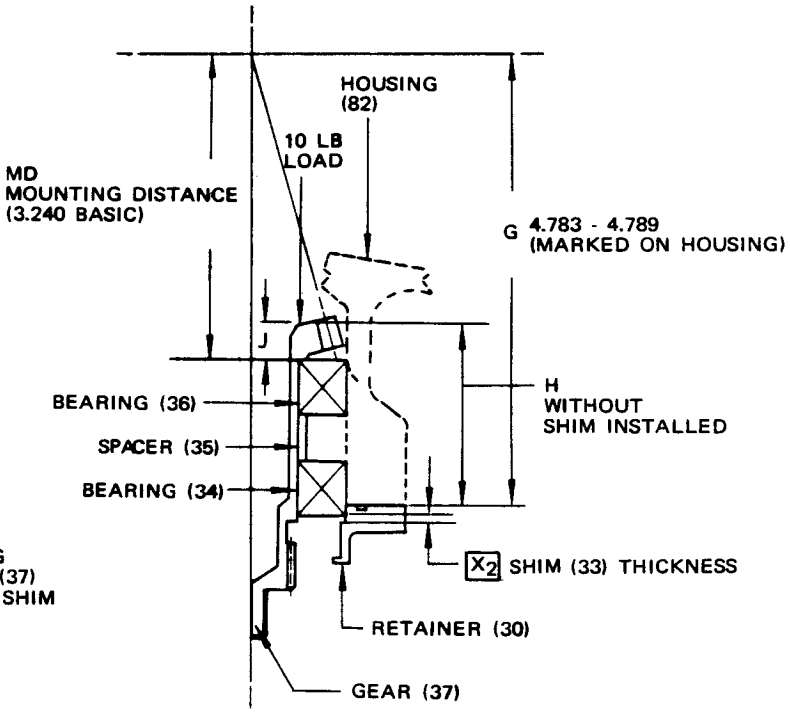
SHIMMING CALCULATION

SHIM [X1] = K+M-L-MD $(^{+0.000}_{-0.003})$

WHERE: K = MARKED ON HOUSING
M = MEASURED ON GEAR (47)
L = MEASURED WITHOUT SHIM
MD = MOUNTING DISTANCE

DIAGRAM NUMBER 3

NOTE: ALL DIMENSIONS ARE IN INCHES.



SHIMMING CALCULATION

SHIM [X2] = G+J-H-MD $(^{+0.000}_{-0.003})$

WHERE: G = MARKED ON HOUSING
J = = MEASURED ON GEAR (37)
H = MEASURED WITHOUT SHIM
MD = MOUNTING DISTANCE

DIAGRAM NUMBER 4

F. Insert coupling (68) into assembled units (56 thru 49). Align gaps in teeth between coupling (68) and driver (55). Open coils of ring (27) and feed end into ring recess in a clockwise direction, until entirely installed in grooves and coupling and driver are locked together.

G. Install assembled parts (68, 56 thru 48, 27) into transmission housing. Ears on end of coupling (68) must align with valleys of ID of sleeve (74) and align with ears on adapter (76).

(1) Press down evenly around gear (54) to seat units. If necessary, tap driver (55) with plastic drift to mesh gear teeth. Assembled unit must rotate evenly and freely before installing cover (86).

(2) Check assembly backlash of gear (47) and gear (37) with ring gear (52 and 54) (Fig. 601 for backlash limits).

H. Lubricate O-ring (26) and place in sealing groove of cover (86).

I. Apply primer, BMS 10-11, type 1 to mating surfaces of cover (86) and housing assembly (81). Do not allow primer to enter O-ring groove. Install cover and attached parts on housing assembly. Install washers (25) and bolts (24). Tighten bolts (24) to 80-100 lb-in.

J. Assemble universal joint (87) and cap (19).

(1) Insert shaft (94) firmly into housing (82).

(2) Install washer (23) on splined end of shaft (94).

CAUTION: DO NOT RE-USE OLD WASHER (22), OR FAILURE OF TANGS & LOSS OF NUT RETENTION MAY OCCUR.

(3) Install new washer (22) and nut (21). Tighten nut (21) to 200-240 lb-in., using Wrench Adapter ST6105-3. Bend tang of washer (22) to secure nut (21).

(4) Lubricate O-ring (20) and install O-ring in groove of cover (19). Apply primer, BMS 10-11, type 1 to mating surfaces of cap and housing (82). Assemble cap to housing. Do not allow primer to enter O-ring groove.

(5) Install washers (17) and bolts (16). Install cable guards (18), if used. Tighten bolts to 80-100 lb-in.

(6) Coat shank of bolt (90) and threads of nut (88) with MIL-C-11796, corrosion preventive compound. Position yoke (93) on cross (96) and install pin (91), bolt (90), spacer (92) and nut (88). Tighten nut (88) as follows:

(a) Tighten nut to 170-200 lb-in. if used with bolt 66-25119-1, -2.

(b) Deleted.

(c) The requirements for nut (88) installation, when it is used with bolt P/N 65-76605-1, are as follows:

1) The self-locking mechanism of the nut must develop a torque between 25 and 100 pound-inches, at room temperature with no axial load on the nut and the thread fully engaged. The full chamfer of the bolt thread must protrude beyond the locking mechanism of the nut.

2) Torque nut to 170-200 pound-inches.

K. Install external components on gear (37).

(1) Lubricate backup rings (13) and O-ring (14). Install O-ring (14) with backup rings (13) (on each side of O-ring) on shaft of gear (37).

(2) Install coupling (12) on gear (37).

(3) Install washer (11) on shaft of gear (37). Install nut (10), and holding coupling (12) with splined coupling wrench F-71228-500 or equivalent, tighten nut (10) to a torque range of 160 to 190 pound-inches.

L. Install external components on gear (47).

NOTE: Refer to parts list for preferred and optional parts.

(1) Install coupling (5) on gear (47). Install washer (4) on gear (47). Install nut (3), and holding coupling (5) with splined coupling wrench F-71228-500 or equivalent, tighten nut (3) to a torque range of 160 to 190 pound-inches.

(2) If optional gear (47), P/N 69-37609-2 or -3, is used, build up with the following parts.

(a) Lubricate O-ring (9) and backup ring (8) and install on gear (47) shaft, against shoulder. Install spacers (7) on gear shaft with ends against backup ring (8).

(b) Hold spacers (7) and slide spacer (6) over spacers (7) and gear shaft.

(c) Install coupling (5) on gear (47). Install washer (4) and nut (3) on shaft of gear (47), and holding coupling (5) with Splined Coupling Wrench F-71228-500 or equivalent, tighten nut (3) to a torque range of 160 to 190 pound-inches.

NOTE: Hold components from turning by inserting a plastic rod through universal joint.

M. Lubricate O-ring (2) and install O-ring (2) and plug (1) in filler port nearest the universal joint assembly. Lockwire plug (1) to cover (86).

N. After testing, lockwire bolts (24), bolts (16, 28, and 38) and plugs (1) using double twist method. Refer to Subject 20-50-02.

O. Service transmission assembly.

(1) Position assembly with longitudinal axis of universal joint assembly (87) 13.25 degrees above true horizontal at yoke end.

(2) Fill transmission assembly with hydraulic fluid, MIL-H-5606 to level of filler port lip. Nominal capacity is 37 to 38 ounces. Install O-ring (2) and plug (I).

(3) Apply Glyptal across exposed bolt threads and nuts, and to lockwire ends, fasteners and plugs, as applicable.

(4) Repair or touch-up any damaged or omitted finished surface.

3. Materials

A. Hydraulic Fluid -- Specification MIL-H-5606

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

C. Grease -- Specification MIL-G-21164

D. Adhesive -- Permatex 2 (Permatex Co. Inc., Huntington Station, N.Y.)

E. Sealant -- BMS 5-95 (Ref 20-60-04), replaces Permatex No. 2

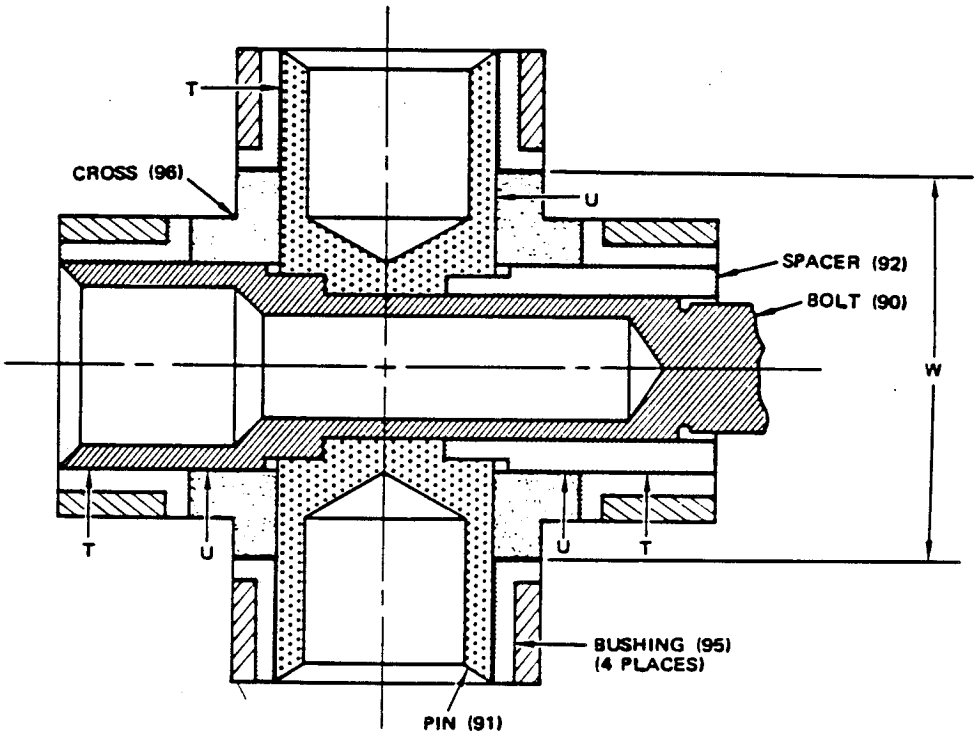
F. Paint -- Glyptal (General Electric Co, Insulating Materials Department, Downey, California)

G. Corrosion Preventive Compound -- Specification MIL-C-11796, class 3

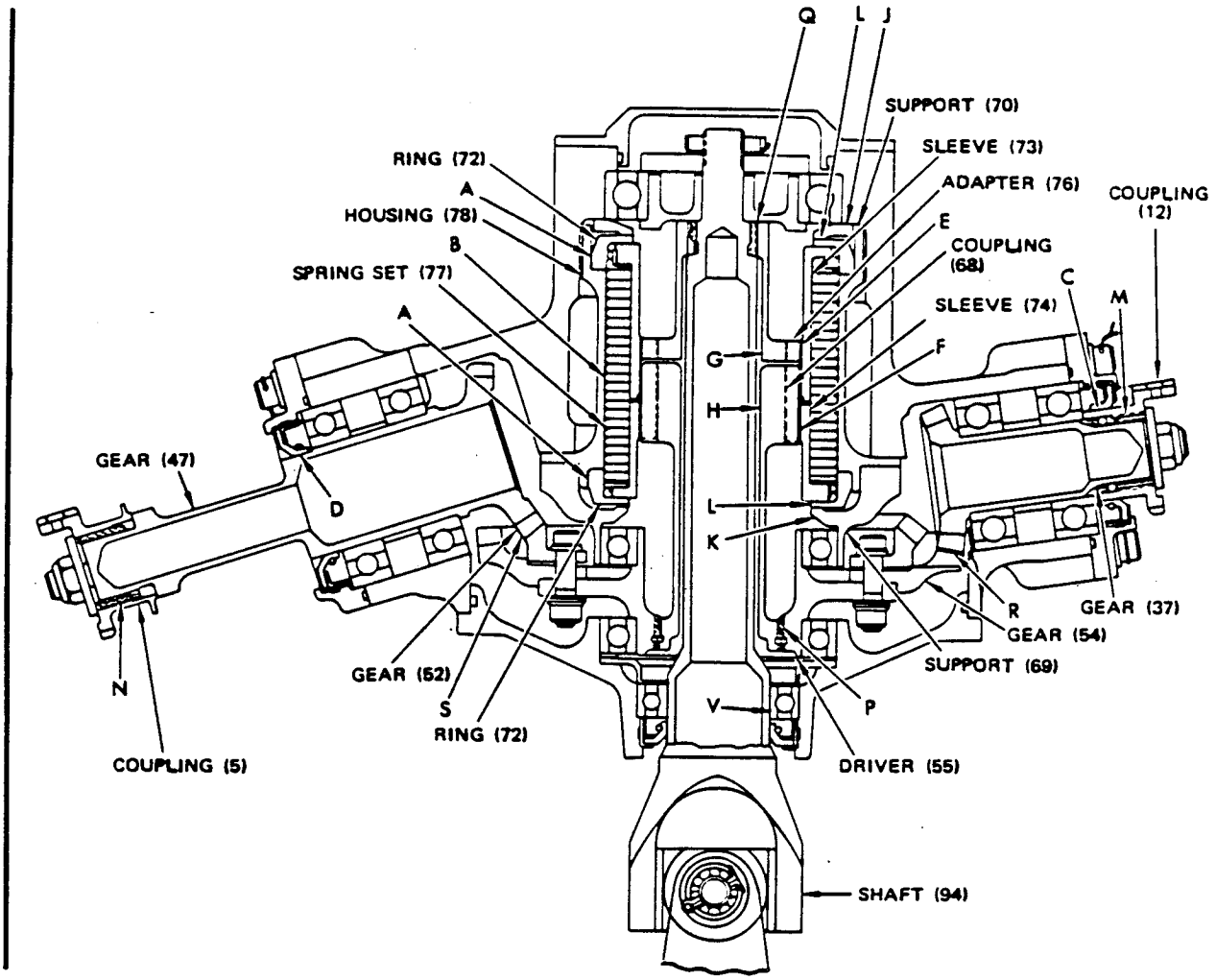
FITS AND CLEARANCES

1. The fits and clearances table lists design dimensions and service wear limits for close tolerance parts of the assembly that are subject to wear or corrosion. Unless otherwise specified, parts should be returned to the design dimensions whenever rework is accomplished.

2. Clearances are given to aid assembly of the components. The values given in the Maximum Allowable Clearance column are the maximum permitted to ensure proper functioning of the unit. If assembled parts fail to meet this requirement, one or more of the parts must be rejected. Parts that are rejected should be reworked if within the rework limits given in the Repair procedure; if not within rework limits, the parts should be scrapped. It is recommended that the design clearances be used as the guiding assembly criteria when newly reworked parts are assembled.



UNIVERSAL JOINT


Q
L
J
SUPPORT (70)
SLEEVE (73)
ADAPTER (76)
COUPLING (12)
RING (72)
A
HOUSING (78)
B
SPRING SET (77)
A
E
COUPLING (68)
C
M
SLEEVE (74)
F
G
H
L
K
GEAR (47)
D
R
GEAR (37)
GEAR (54)
SUPPORT (69)
N
GEAR (52)
S
RING (72)
V
P
DRIVER (55)
COUPLING (5)
SHAFT (94)

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	78	3.524	3.525	0.004	0.006		3.526	0.008
	OD	72	3.519	3.520			3.518		
B	ID	78	3.0950	3.0955	0.0710	0.0725		3.0960	[1]
	OD	77	3.0230	3.0240			3.0225		
C	OD	12	1.153	1.159			1.153		
D	OD	47	1.376	1.378			1.372		
D	OD	6	1.372	1.378			1.372		
E	[2]	73	0.883	0.887			0.875		
F	[2]	74	0.883	0.887			0.875		
G	[3]	76	0.645	0.649			0.637		
H	[3]	68	0.645	0.649			0.637		
J	[8]	70	0.199	0.201			0.197		
K	[8]	69	0.561	0.563				0.565	
L	[8]	72	0.088	0.090			0.086		
M	[4]	12 37			0.0000	0.0054			0.0090
N	[4]	5 47			0.0000	0.0054			0.0090
P	[5]	55 68			0.0015	0.0073			0.0090
Q	[6]	94 76			0.0015	0.0068			0.0090

		Design Dimensions				Service Wear Limits		
Ref Letter Fig.601	Mating Item No. Fig. 1101	Dimensions (inches)		Assembly Clearance (inch)		Dimension Limits (inches)		Maximum Allowable Clearance (inch)
		Min	Max	Min	Max	Min	Max	
R	37 *[7] 54			0.0010	0.0041			0.0061
S	47 *[7] 52			0.0008	0.0032			0.0049
T	ID 95 *[12]	0.7550	0.7560	0.0002	0.0033	0.7513	0.7633	0.0120
	OD 90,91,92	0.7523	0.7530					
U *[9]	ID 96 *[10]	0.7532	0.7545	0.0002	0.0022	0.7513	0.7563	0.0050
	OD 90,91,92	0.7523	0.7530					
U *[13]	ID 96 *[11]	0.7532	0.7541	0.0002	0.0018	0.7513	0.7563	0.0050
	OD 90,91,92	0.7523	0.7530					
V	OD 94	1.3770	1.3776			1.3720		
W *[10]	96 *[8]	1.409	1.413			1.409		
W *[11]	96 *[8]	1.411	1.413			1.409		

*[1] Dimension of spring set (77) to be measured with set installed on 2.4190 inches diameter mandrel.

*[2] Circular tooth thickness measured at 1.9375-pitch diameter.

*[3] Chordal tooth thickness measured at 1.9375-pitch diameter.

*[4] Spline backlash. Measured at 0.8750 inch pitch diameters of splines on pinions of gears (37, 47).

*[5] Spline backlash. Measured at 1.625-inch pitch diameter of spline on driver (55).

*[6] Spline backlash. Measured at 0.8125-inch pitch diameter of spline on adapter (76).

*[7] Gear backlash, measured at pitch diameter of spline on pinions of gears (37, 47), prior to disassembly. Backlash beyond service limits requires check of wear of each gear in the pair. Lock output shaft and remove all other backlash in gearbox by applying 20 lb-in torque to pinion of gear not being checked.

*[8] Width

*[9] Used for universal joint assembly 69-37653-5, -7, -10, -12 only.

*[10] Used for 66-25116-1

*[11] Used for 65-76639-1

*[12] Bushing DBAF12-117, 90586

*[13] Used for universal joint assembly 65-76601-1.

TESTING

1. Test Equipment

NOTE: Equivalent substitutes may be used.

A. Compressed Air Source: controlled at 0 to 15 psi

B. Air valve adapter

C. Transmission Tester: ST6396 (Curtiss Wright Corp. Caldwell Facility, 300 Fairfield Rd., Caldwell, New Jersey 07006)

D. Deleted

E. X-Y Recorder:

(1) Model HP7090A (X-Y Recorder, Hewlett Packard Co., 3000 Hanover St., Palo Alto, California 94304

(2) Model 6423 DIN A3 (X-Y Recorder, Soltec Corp., Sol Vista Park, 12977 Arroyo St., San Fernando, California 91340-1597). Replaces XY530T, Esterline Corporation, Esterline-Angus Division, P.O. Box 24000, 1201 Main St., Indianapolis, Indiana 46224

F. Model 870 Signal Conditioner (Daytronic Corp., 2589 Corporate Drive Place, Miamisburg, Ohio 45342) (2 required). No longer available, see H. below.

G. Model 801 Adapter (Daytronic Corp., 2589 Corporate Drive Place, Miamisburg, Ohio 45342). No longer available, see H. below

H. Model 3170 or 3270 Strain Gage Conditioner (Daytronic Corp., 2589 Corporate Drive Place, Miamisburg, Ohio 45342). Replaces conditioner and adapter listed in F. and G.

2. Preparation for Test

A. Ensure that unit has been serviced with hydraulic fluid, MIL-H-5606.

B. Install air valve adapter in upper filler port.

C. Turn over coupling, by hand, in both directions. Gears and bearings must be free running without evidence of binding in any position.

D. With output and universal shafts free, torque required to rotate input shaft in both directions shall not exceed 12 lb-in.

3. Functional Test (Fig. 1101)

A. Connect air hose to air valve adapter in upper filler port, and pressurize with filtered air at 14.5-15.5 psi for minimum of 3 minutes. There shall be no leakage. Remove adapter and install plug (1) and O-ring (2) in upper filler port. Lockwire plug (1). Apply Glyptal to lockwire ends.

B. With universal shaft locked, apply 45-55 lb-in. torque to input shaft in clockwise direction. Mark position of input shaft. Apply same torque in counterclockwise direction. Input rotational backlash shall not exceed 20 degrees.

C. Mount assembly in test fixture (Fig. 701).

D. Connect torque transducers to X-Y recorder.

E. Connect transmission input shaft to calibrated input torque transducer, and transmission output shaft to calibrated output transducer.

F. Check that X-Y recorder is zeroed before any torque is applied to transmission.

G. Draw vertical lines on X-Y recorder paper at minimum lockout input torque (120 lb-in.) and at maximum input torques (1820, 2400 lb-in.).

H. Install manual input torque arm.

CAUTION: DO NOT EXCEED INPUT TORQUE OF 2400 LB-IN. OR DAMAGE TO UNIT MAY OCCUR.

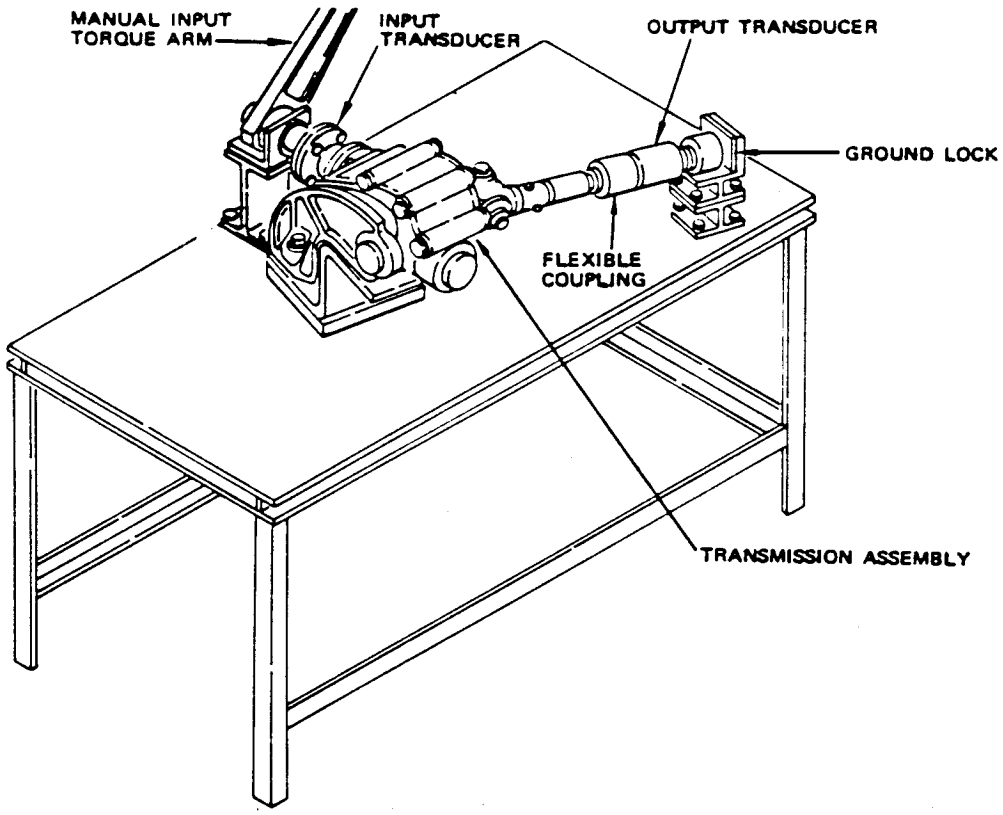
I. Slowly turn the manual input torque arm in the clockwise direction until the input torque is at the maximum limit (Fig. 703).

J. Make sure that the output torque at minimum lockout is not less than 339 lb-in. with a minimum input torque of 120 lb-in.

K. Make sure that the output torque is not more than 398 lb-in. with a maximum input torque of 1820 lb-in.

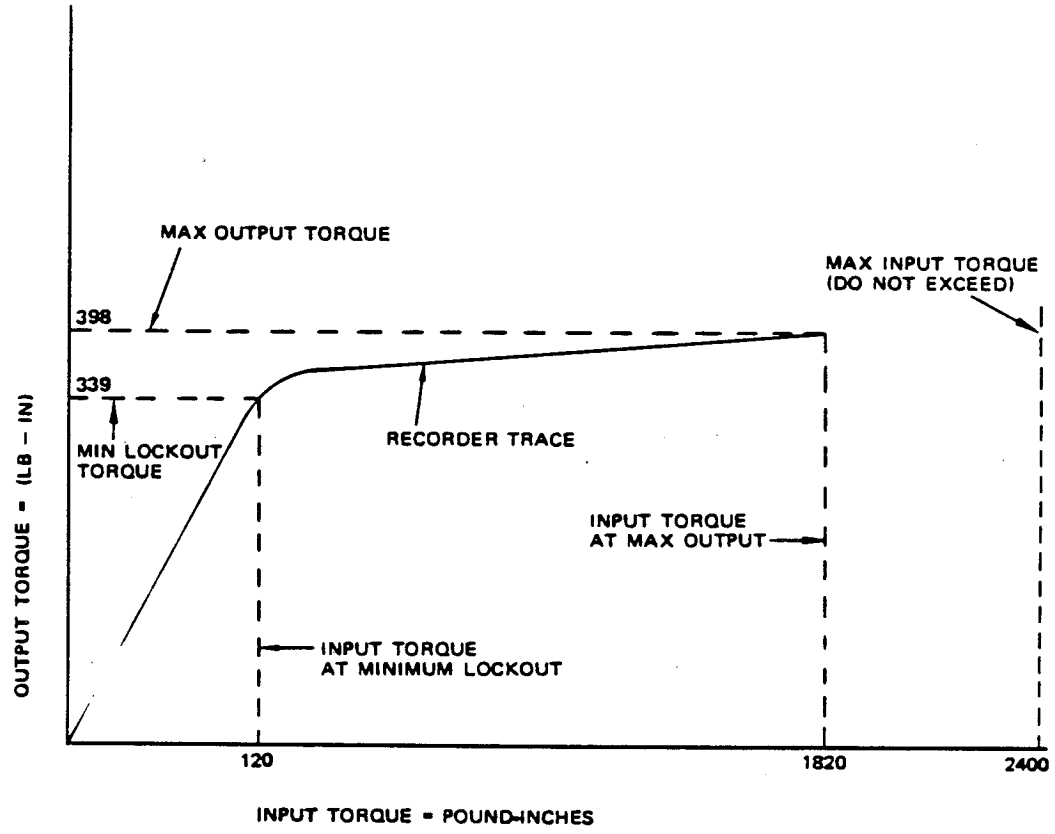
L. Repeat steps I thru K with counterclockwise input torque.

4. Deleted.



Test Fixture
Figure 701

Deleted
Figure 702



Torque Brake Test
Figure 703

TROUBLE SHOOTING

1. Trouble shooting is keyed to individual steps of the test procedure. Referenced paragraphs show test procedure in which noted trouble would appear.

	Trouble	Possible Cause	Correction
A.	External leakage, paragraph 3.A.	Defective O-rings or seals	Replace O-rings or seals
B.	Binding or rough movement, paragraph 2.C.	Improperly installed or defective components	Correct condition
C.	Excessive backlash, paragraph 3.B.	Inadequate shims or excessively worn components	Replace shims or other component
D.	Lockout occurs outside of minimum or maximum limits, paragraph 3.J., K.	Defective torque brake assembly	Replace or repair torque brake assembly

STORAGE INSTRUCTIONS

1. Wrap assembly in vapor-barrier paper and tag securely.
2. Tag assembly with test date, and cure date of rubber parts.
3. For further information, refer to Temporary Protective Coatings, Subject 20-44-02, and Protection, Storage, and Handling of Airplane Components, Subject 20-70-01.
4. Fill unit with MIL-H-5606 hydraulic fluid or suitable preservative hydraulic oil.

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: Equivalent substitutes may be used for listed items. Refer to Testing for special tools and equipment required for component test.

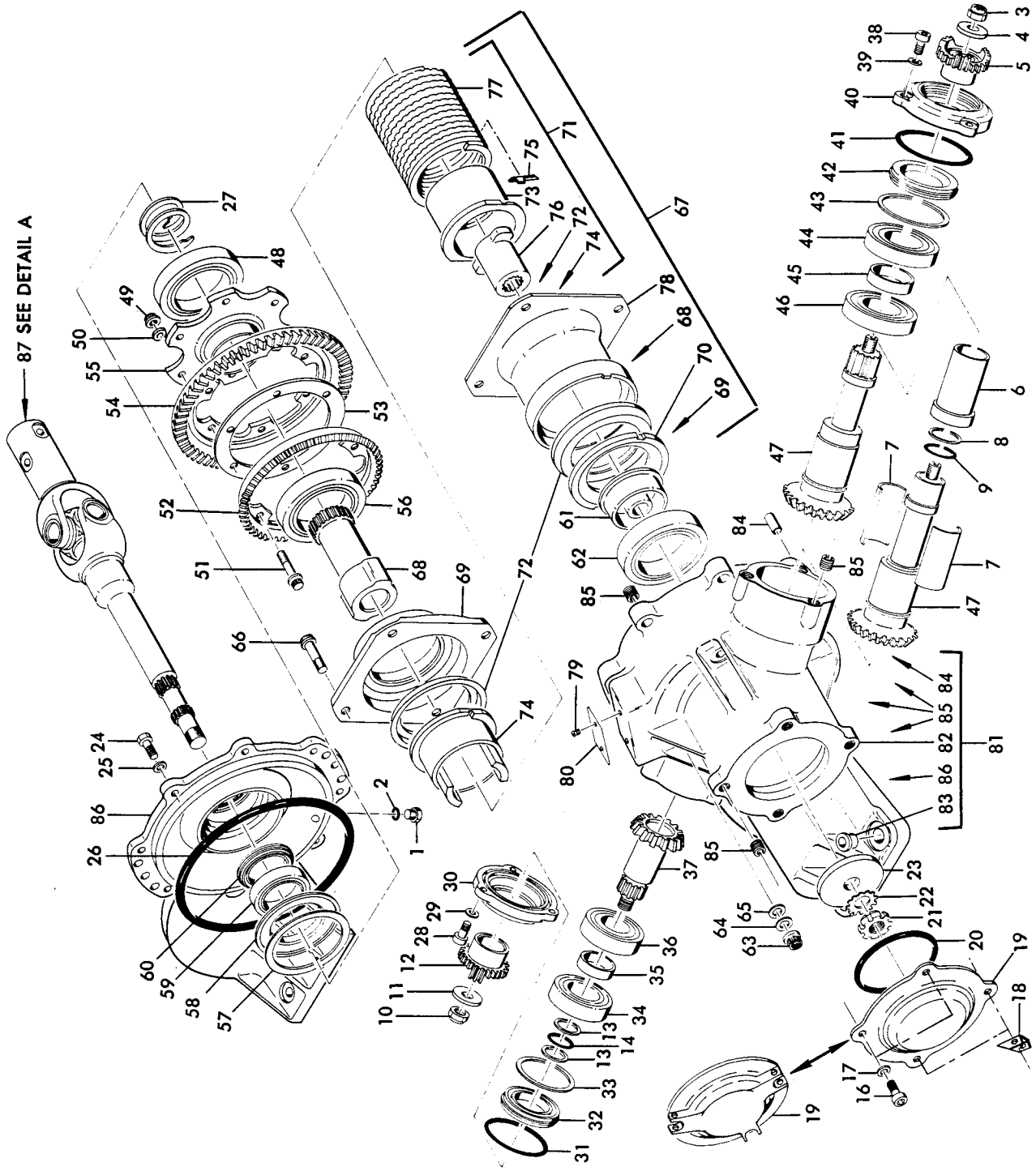
1. F-71228-500 -- Splined Coupling Wrench (Boeing)

2. ST6105-3-- Torque Wrench Adapter (Curtiss Wright Corp. Caldwell Facility, 300 Fairfield Rd., Caldwell, New Jersey 07006)

3. ST6107 -- Spring Pack Assembly Jig (Curtiss Wright Corp. Caldwell Facility, 300 Fairfield Rd., Caldwell, New Jersey 07006)

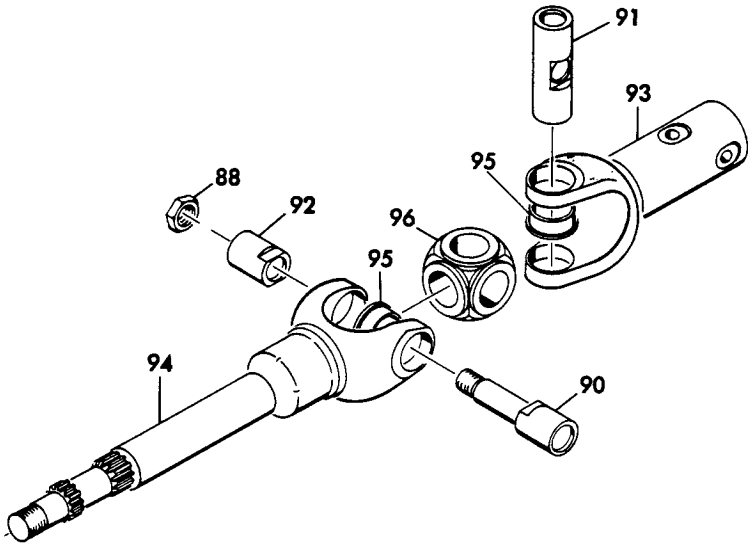
4. PT49001 -- Torque Bar (Curtiss Wright Corp. Caldwell Facility, 300 Fairfield Rd., Caldwell, New Jersey 07006)

ILLUSTRATED PARTS LIST



ASSEMBLY 65-50253 SHOWN

Trailing Edge Flap Drive Transmission Assemblies Nos. 3 and 6
Figure 1101 (Sheet 1)



UNIVERSAL JOINT ASSEMBLY (87)
DETAIL A

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
	65-50253-2		TRANSMISSION ASSY, NO. 3 TRAILING EDGE FLAP DRIVE	A	RF
	65-50256-2		TRANSMISSION ASSY, NO. 6 TRAILING EDGE FLAP DRIVE	B	RF
	65-50253-4		TRANSMISSION ASSY, NO. 3 TRAILING EDGE FLAP DRIVE	C	RF
	65-50256-4		TRANSMISSION ASSY, NO. 6 TRAILING EDGE FLAP DRIVE	D	RF
	65-50253-5		TRANSMISSION ASSY, NO. 3 TRAILING EDGE FLAP DRIVE	E	RF
	65-50256-5		TRANSMISSION ASSY, NO. 6 TRAILING EDGE FLAP DRIVE	F	RF
	65-50253-6		TRANSMISSION ASSY, NO. 3 TRAILING EDGE FLAP DRIVE (SB 27-1015)	G	RF
	65-50256-6		TRANSMISSION ASSY, NO. 6 TRAILING EDGE FLAP DRIVE (SB 27-1015)	H	RF
	65-50253-7		TRANSMISSION ASSY, NO. 3 TRAILING EDGE FLAP DRIVE (SB 27-1015)	I	RF
	65-50256-7		TRANSMISSION ASSY, NO. 6 TRAILING EDGE FLAP DRIVE (SB 27-1015)	J	RF
	65-50253-8		TRANSMISSION ASSY, NO. 3 TRAILING EDGE FLAP DRIVE	K	RF
	65-50256-8		TRANSMISSION ASSY, NO. 6 TRAILING EDGE FLAP DRIVE	L	RF
1	AN814-4DL		. PLUG		2
2	MS28778-4		. PACKING, O-RING		2
3	BACN10JC6		. NUT (REPLS NAS679A6)		1
3	NAS679A6		. NUT (REPLD BY BACN10JC6)		1
4	66-24715-1		. WASHER		1
5	69-37625-2		. COUPLING (USED WITH 69-37609-2 OR -3)	A-D G-J	1
5	69-37625-3		. COUPLING (USED WITH 69-37664-3 OR -4)(PREF)		1
6	66-23924-2		. SPACER (USED WITH 69-37609-2 OR -3)	A-D G-J	1
7	66-25127-1		. SPACER (USED WITH 69-37609-2 OR -3)	A-D G-J	2
8	MS28774-019		. RING, BACKUP (USED WITH 69-37609-2 OR -3)	A-D G-J	1
9	AN6227B14		. PACKING, O-RING (REPLS AN6227-14)(USED WITH 69-37609-2 OR -3)	A-D G-J	1
9	AN6227-14		. PACKING (REPLD BY AN6227B14)	A-D G-J	1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
10	BACN10JC6		. NUT (REPLS NAS679A6)		1
10	NAS679A6		. NUT (REPLD BY BACN10JC6)		1
11	66-24715-1		. WASHER		1
12	69-37677-2		. COUPLING		1
13	66-25129-1		. RING, BACKUP		2
14	69-37680-1		. O-RING		1
16	NAS1351-4H12P		. BOLT	A-D G-J	4
16	NAS1351-4H12P		. BOLT	EFKL	3
17	AN960-416		. WASHER	A-D G-J	2
17	AN960-416		. WASHER	EFKL	3
18	69-52985-1		. GUARD, CABLE	ABIJ	2
18	69-52985-2		. GUARD, CABLE	CDGH	2
19	69-37681-1		. CAP	AI	1
19	69-37681-2		. CAP	BJ	1
19	69-37681-3		. CAP	CG	1
19	69-37681-4		. CAP	DH	1
19	69-37694-1		. CAP	EFKL	1
20	MS28775-147		. PACKING, O-RING		1
21	MS172322		. NUT		1
22	MS172272		. WASHER		1
23	66-23913-1		. WASHER		1
24	BACB30NE4H5		. BOLT (REPLS NAS1304-5H)		8
24	NAS1304-5H		. BOLT (REPLD BY BACB30NE4H5)		8
25	AN960-416		. WASHER		8
26	2-164N304-7		. O-RING, V83259		1
27	RR165		. RING, V80756		1
28	NAS1351-4H12P		. BOLT		3
29	AN960-416		. WASHER		3
30	66-23900-4		. RETAINER		1
31	2-035N304-7		. O-RING, V83259		1
32	69-73393-3		DELETED		
32	67X363		. SEAL, V73680		1
32	21528-0363		. SEAL, V73680 (OPT)		1
32	21959-0363		. SEAL, V73680 (OPT)		1
33	66-23947-2		. SHIM		1
34	HDF205-24		. BEARING, V40920 (PREF)		1
34	HDF205P3LY167		. BEARING, V40920 (OPT)		1
35	66-23915-2		. SPACER		1
36	HDF205-24		. BEARING, V40920 (PREF)		1
36	HDF205P3LY167		. BEARING, V40920 (OPT)		1
37	69-37606-5		. GEAR		1
37	69-37606-4		. GEAR (OPT)		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
37	69-37606-3		. GEAR (OPT)	ABIJ	1
38	NAS1351-4H12P		. BOLT		3
39	AN960-416		. WASHER		3
40	69-37631-4		. RETAINER		1
40	69-37631-5		. RETAINER (OPT)		1
41	2-038N304-7		. O-RING, V83259		1
42	69-73393-4		DELETED		
42	67X544		. SEAL, V73680		1
42	21528-0544		. SEAL, V73680 (OPT)		1
42	21959-0544		. SEAL, V73680 (OPT)		1
43	66-24746-2		. SHIM		1
44	BACB10A19		. BEARING		1
45	66-23912-2		. SPACER		1
46	BACB10A19		. BEARING		1
47	69-37664-5		. GEAR		1
47	69-37664-4		. GEAR (OPT)*[1]		1
47	69-37664-3		. GEAR (OPT)*[1]	ABIJ	1
47	69-37609-3		. GEAR (OPT)*[1]	A-D G-J	1
47	69-37609-2		. GEAR (OPT)*[1]	ABIJ	1
48	BACB10A351		. BEARINGA-D	G-J	1
48	111GE		. BEARING, V21335	EFKL	1
49	BACN10HR4		. NUT		6
50	BACW10BN4P		. WASHER		6
51	BACB30MT4T8		. BOLT		6
52	69-37608-2		. GEAR		1
52	69-37608-1		. GEAR (OPT)		1
53	66-23945-1		. SHIM		1
54	69-37607-2		. GEAR		1
54	69-37607-1		. GEAR (OPT)		1
55	65-50300-5		. DRIVER	EFKL	1
55	65-50300-6		. DRIVER	A-D G-J	1
55	65-50300-1		. DRIVER (OPT TO 65-50300-6)	A-D G-J	1
55	65-50300-3		. DRIVER (OPT TO 65-50300-5)	EFKL	1
56	BACB10A351		. BEARING		1
57	66-24747-1		. SHIM	A-D G-J	1
57	69-52450-1		. SHIM	EFKL	1
58	66-23923-2		. SPACER	A-D G-J	1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101-					
58	69-52464-I		. SPACER	EFKL	1
59	HDF007-9		. BEARING, V40920		1
59	HDF007P3LY167		. BEARING, V40920 (OPT)		1
60	69-73393-4		. SEAL, V73680		1
60	21528-0535		. SEAL, V73680 (OPT)		1
60	67X535		. SEAL, V73680 (OPT)		1
60	21959-0535		. SEAL, V73680 (OPT)		1
61	66-23902-1		. ADAPTER		1
62	BACB10A474		. BEARING		1
63	SPSFNF26-524		. NUT, V56878		4
64	BACW10BN5P		. WASHER		4
65	600-001-5/16		. SEAL, V83259 (PREF)		4
65	7100-5/16		. SEAL, V83259 (OPT)		4
65	BACS11W5		. SEAL (OPT)		4
65	NAS1523-5Y		. SEAL (OPT)		4
66	SPSEWB26-5-12		. BOLT, V56878		4
67	175898		. TORQUE BRAKE ASSY, V71791		1
68	175844		. . COUPLING, V71791		1
69	175874		. . SUPPORT, V71791		1
70	175876		. . SUPPORT, V71791		1
71	175875		. . SPRING PACK ASSY, V71791		1
72	175869		. . . RING, V71791		2
73	175870		. . . SLEEVE, V71791		1
74	175871		. . . SLEEVE, V71791		1
75	176278X		. . . SHIM, V71791		AR
76	175827		. . . ADAPTER, V71791		1
77	175872		. . . SPRING SET, V71791		1
78	175873		. . HOUSING, V71791		1
79	NAS601-4P		. SCREW (REPLS AN515-6R4)		2
79	AN515-6R4		. SCREW (REPLD BY NAS601-4P)		2
80	66-25101-1		. NAMEPLATE		1
81	65-50278-1		. HOUSING AND COVER ASSY	AI	1
81	65-50278-2		. HOUSING AND COVER ASSY	BJ	1
81	65-50278-3		. HOUSING AND COVER ASSY	EK	1
81	65-50278-4		. HOUSING AND COVER ASSY	FL	1
81	65-50278-5		. HOUSING AND COVER ASSY	CG	1
81	65-50278-6		. HOUSING AND COVER ASSY	DH	1
82	65-50295-11		. . HOUSING (USED ON 65-50278-1)		1
82	65-50295-12		. . HOUSING (USED ON 65-50278-2)		1
82	65-50295-15		. . HOUSING (USED ON 65-50278-3)		1
82	65-50295-16		. . HOUSING (USED ON 65-50278-4)		1
82	65-50295-17		. . HOUSING (USED ON 65-50278-5)		1
82	65-50295-18		. . HOUSING (USED ON 65-50278-6)		1
83	66-24745-2		. . BUSHING		4
84	NAS607-6-6		. . PIN		6
85	MS21208F4-15		. . INSERT (USED ON 65-50278-1,-2,-5,-6)	18	

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
85	MS21208F4-15		. . INSERT (USED ON 65-50278-3, -4)		17
86	65-50292-7		. . COVER (USED ON 65-50278-1,-5)		1
86	65-50292-8		. . COVER (USED ON 65-50278-2,-6)		1
86	65-50292-9		. . COVER (USED ON 65-50278-3)		1
86	65-50292-10		. . COVER (USED ON 65-50278-4)		1
87	69-37653-10		. UNIVERSAL JOINT ASSY (PREF) (SB 27-1015)	A-DIJ	1
87	69-37653-5		. UNIVERSAL JOINT ASSY (OPT TO 69-37653-10)	A-D	1
87	69-37653-12		. UNIVERSAL JOINT ASSY (OPT TO 69-37653-10)(SB 27-1015)	ABIJ	1
87	69-37653-7		. UNIVERSAL JOINT ASSY (OPT TO 69-37653-5,-10,-12)	AB	1
87	69-37653-10		. UNIVERSAL JOINT ASSY (SB 27-1015)	E-H	1
87	65-76601-1		. UNIVERSAL JOINT ASSY	KL	1
88	BACN10JC7C		. . NUT (REPLS NAS1022C7)(USED ON 69-37653-5,-7)		1
88	NAS1022C7		. . NUT (REPLD BY BACN10JC7C)		1
88	BACN10JC7		. . NUT (USED ON 69-37653-10,-12; 65-76601-1)		1
89	BAC27DCT48		DELETED		
90	66-25119-1		. . BOLT (USED ON 69-37653-5,-7)		1
90	66-25119-2		. . BOLT (USED ON 69-37653-10,-12)		1
90	65-76605-1		. . BOLT (USED ON 65-76601-1)		1
91	66-25118-1		. . PIN, CROSS (USED ON 69-37653-5, -7,-10,-12)		1
91	69-60055-2		. . PIN (USED ON 65-76601-1)		1
91	69-60055-1		. . PIN, CROSS (USED ON 65-76601-1) (OPT)		1
92	66-25117-1		. . SPACER (USED ON 69-37653-5,-7, -10,-12)		1
92	69-60051-2		. . SPACER (USED ON 65-76601-1)		1
92	69-60051-1		. . SPACER (USED ON 65-76601-1)(OPT)		1
93	65-50286-10		. . YOKE		1
93	65-50286-8		. . YOKE (USED ON 69-37653-5,-10; 65-76601-1)(OPT)		1
93	65-50286-4		. . YOKE (USED ON 69-37653-7,-12) (OPT)		1
94	65-50284-6		. . SHAFT		1
94	65-50284-5		. . SHAFT (USED ON 69-37653-5,-10; 65-76601-1)(OPT)		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
1101					
94	65-50284-4		. . SHAFT (USED ON 69-37653-7,-12) (OPT)		1
95	AFDU12-3-17		. . BUSHING, V15860 (BOEING 10-61899-17) *[2]		4
95	AJF12A123DU		. . BUSHING, V50294 (BOEING 10-61899-17) *[2]		4
95	AJF12A112		. . BUSHING, V50294 (BOEING 10-60516-251) (OPT)		4
95	DBAF12-117		. . BUSHING, V81376 (BOEING 10-60516-251), (OPT)		4
95	FBR12A11BA		. . BUSHING, V73134 (BOEING 10-60516-251) (OPT)		4
	NHLF12-202A		. . BUSHING, V15860 (BOEING 10-60516-251) (OPT)		4
95	90586		. . BUSHING, V09455 (BOEING 10-60516-251), (OPT)		4
96	66-25116-1		. . CROSS, TRUNNION (USED ON 69-37653-5,-7,-10,-12)		1
96	65-76639-1		. . CROSS, TRUNNION (USED ON 65-76601-1)		1
97	69-37653-9		DELETED		

*[1] GEARS 69-37609-2 OR 69-37609-3 ARE OPTIONAL TO 69-37664-3 OR 69-37664-4 OR 69-37664-5 ONLY WHEN USED WITH ITEMS 6, 7, 8 AND 9, AND MATED WITH COUPLING 69-37625-2

*[2] REPLS BUSHING 10-60516-251

VENDORS

V09455 LEAR SIEGLER, INC., TRANSPORT DYNAMICS DIVISION, P.O. BOX 1953, 3131 W. SEGERSTROM AVE., SANTA ANA, CALIFORNIA 92702

V15860 NEW HAMPSHIRE BALL BEARINGS, INC., ASTRO DIV., 155 LEXINGTON AVE., LACONIA, NEW HAMPSHIRE 03246

V21335 FAFNIR BEARING CO., DIVISION OF TEXTRON, INC., 37 BOOTH ST., NEW BRITAIN, CONNECTICUT 06050

V40920 MINIATURE BEARING DIVISION, MPB CORP., OPTICAL AVE., PRECISION PARK, KEENE, NEW HAMPSHIRE 03431

V50294 NMB AMERICA, INC., 9730 INDEPENDENCE AVE., CHATSWORTH, CALIFORNIA 91311

V56878 SPS TECHNOLOGIES, INC., HIGHLAND AVE., JENKINTOWN, PENNSYLVANIA 19046

V71791 CURTISS WRIGHT CORP., CALDWELL FACILITY, 300 FAIRFIELD RD, CURTISS DIVISION, CALDWELL, NEW JERSEY 07006

V73134 HEIM UNIVERSAL CORP., INCOM INTERNATIONAL, INC., 60 ROUND HILL RD., FAIRFIELD, CONNECTICUT 06430

V73680 GARLOCK INC., DIVISION ST., PALMYRA, NEW YORK 14522

V80756 TRW, INC., RAMSEY CORP., P.O. BOX 513, 1233 MANCHESTER BLVD., ST. LOUIS, MISSOURI 63166

V81376 SOUTHWEST PRODUCTS COMPANY, P.O. BOX 1026, MONROVIA, CALIFORNIA 91016

V83259 PARKER-HANNIFIN CORP., SEAL GROUP, O-RING DIVISION, 2360 PALUMBO DR., LEXINGTON, KENTUCKY 40509