TO: ALL HOLDERS OF AILERON GEARED TRIM ASSEMBLY OVERHAUL MANUAL, 27-14-11

REVISION NO. 1, DATED JUL 5/78

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 |
| Beginning with this revision, separate consecutively numbered highlight sheets will be provided whenever this subject is revised. | | | | | | | | | | | | | |
| Added shim for centering gear sector | | X | | | | X | | X | | | | X | |
| Deleted extraneous data, and procedures which can be accomplished using standard industry practices | X | X | | | | | X | | | | X | | |

# AILERON GEARED TRIM ASSEMBLY

# 27-14-11

BOEING P/N 65-52284-5, -6, -8, -9

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

| BOEING SERVICE BULLETIN | BOEING TEMPORARY REVISION | OTHER DIRECTIVES | DATE DIRECTIVE INCORPORATED INTO TEXT |
|---|---|---|---|
| | | PRR 30500-32 | Nov 15/67 |
| | | PRR 32121-10 | Jun 10/72 |
| 27-1058 | | PRR 32073 | Sep 10/72 |

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 |
|---|---|---|---|---|---|---|
| | 27-14-11 | | | | | |
| | T-1 | Sep 10/72 | | | | |
| | T-2 | BLANK | | | | |
| * | LEP-1 | Jul 5/78 | | | | |
| | LEP-2 | BLANK | | | | |
| * | T/C-1 | Jul 5/78 | | | | |
| | T/C-2 | BLANK | | | | |
| * | 1 | Jul 5/78 | | | | |
| * | 2 | Jul 5/78 | | | | |
| | 3 | Aug 15/67 | | | | |
| | 4 | Dec 25/72 | | | | |
| * | 5 | Jul 5/78 | | | | |
| | 6 | Aug 15/67 | | | | |
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| * | 8 | Jul 5/78 | | | | |
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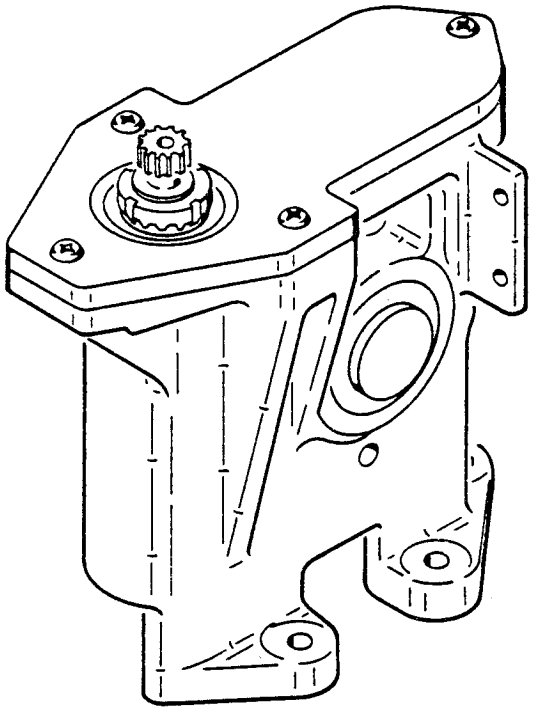
*[1] Special instructions not required. Use standard industry practices and procedures in 20-30-01 and 20-30-03.

*[2] Special instructions not required. Use standard industry practices and data in 20-44-02.

# AILERON GEARED TRIM ASSEMBLY



Figurel. Aileron Geared Trim Assembly

## 1. DESCRIPTION AND OPERATION

A. The aileron geared trim assembly consists of a housing which contains a worm drive, and a sector gear splined to a shaft. Atrim arm is splined to the shaft externally.

B. The worm is splined externally to an aileron trim input shaft and transmits inputs thru the sector and splined shaft to the trim arm.

C. Leading Particulars (Approximate)

Length - - 6 in.
Width - - 3 in.
Height - - 6 in.
Weight - - 3 lbs

2. DISASSEMBLY (Fig. 3.)

NOTE: Do not remove bearing (19,23, 24) unless replacement is necessary.

A. Remove nuts (1), washers (2), screws (3, 4, 5), and cover (6).

B. Disassemble items (7 thru 12) and arm (13).

C. Disassemble nut (14), washer (15), bolt (16), shaft (17), gear sector (18), bearings (19), and shims (19A). Note thicknesses of shims to aid in assembly.

D. Remove nut (20), washer (21), worm shaft (22), shim (22A), and bearings (23, 24) from housing (25).

3. DELETED

4. INSPECTION/CHECK (See figure 3.)

A. Visually examine all metal parts for cracks, burrs and corrosion using strong light and 10-power magnification.

B. Visually examine all threads for cross-threading or stripping.

C. Check all plated and painted surfaces for blistering or flaking.

D. Check all bearings for roughness, binding and excessive radial or axial play. Pass bearings through a demagnetizer. (A completely demagnetized bearing will not deflect a compass needle). After demagnetizing bearings, clean in accordance with paragraph 3.B.

E. Check worm shaft (22) and gear sector (18) for broken, chipped and cracked teeth. Check them for excessive wear as evidenced by an abnormal tooth pattern.

F. Check splines on arm (13), shaft (17), gear sector (18) and worm shaft (22) for nicks, chips, and wear.

G. Perform a magnetic particle examination on shaft (17) and worm shaft (22).

H. Perform a penetrant check on cover (6), arm (13), gear sector (18), and housing (25) if any questionable areas show up under visual examination per 4.A. above.

I. Check parts listed in figure 2 for wear beyond allowable limits.

5. REPAIR (See figure 3.)

A. Repair

(1) Remove minor scratches, nicks and corrosion by polishing lightly with 220 grit or finer abrasive cloth. Refinish as necessary for protection against corrosion.

(2) Repair minor defects on splines and gear teeth by light filing or using an abrasive.

(3) Chase or file minor thread damage.

(4) If gears do not meet backlash requirements of TESTING section, thin dense chrome plating per BMS 10-70, type 1 (F-14.891) may be applied to teeth of sector gear (18) to reduce backlash within acceptable limits.

B. Refinish

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

(1) If plated or painted surfaces are worn or chipped, refinish items as indicated in the following list:

(a) Worm shaft (22) -- Apply F-8.07 all surfaces except finish per F-1.1926 on spline and threaded areas. Material is 17-4PH stainless steel heat treated to 180 to 200 ksi.

(b) Housing (25) -- Apply F-2.201 plus SRF-12.205 and SRF-14.9812 all surfaces, except no primer or enamel on bearing surfaces.

(c) Shaft (17) -- Apply F-1.181 all surfaces; plating thickness 0.0005 to 0.0007 inch. F-1.73 applied to internal bore only after plating. Material is 4340M steel heat treated to 270 to 300 ksi.

(d) Arm (13) -- Apply SRF-2.30 plus SRF-14.9812 all surfaces, except no primer or enamel on internal spline and in 0.2495 to 0.2505 diameter hole.

(e) Cover (6) -- Apply SRF-2.30 plus SRF-14.9812 all over.

C. Replacement

(1) Replace cotter pin (7) at each overhaul.

(2) Replace gear sector (18) and worm shaft (22) if worn.

6. ASSEMBLY (Fig. 3.)

A. Install bearing (24), in housing (25). Butter lube teeth of worm shaft (22) with grease, MIL-G-23827 and install shaft with shim (22A), bearing (23), washer (21) and nut (20). Install bearings with wet BMS 10-11, Type 1, primer and apply a thin coat of MIL-C-16173, grade 2, corrosion preventive compound to threads of nut (20) and shaft (22). Adjust thickness shim (22A) by removing laminations as required to allow 0.002 inch maximum axial play of shaft (22).

B. Apply grease, MIL-G-23827, to outer races of bearings (19) and bores of housing (25), and install shims (19A) and bearings in housing bores.

C. Butter lube sector (18) tooth area with grease, MIL-G-23827. Install gear sector (18) and shaft (17). Adjust thickness of shims (19A), by removing laminations as required, to center sector in housing and allow 0.002-inch maximum axial play of shaft. Install bolt, washer and nut (16, 15, 14), with nut finger tight.

D. Install arm (13) on shaft (17) and assemble with bolt (12), washer (11), and nut (10), with nut finger tight.

E. Apply thin coat of corrosion preventive compound, MIL-C-16173, grade 2, to threads of nut (8) and shaft (17). Install washer (9), and nut (8). Tighten nut and install cotter pin (7).

F. Tighten nuts (10, 14) to 30-40 lb-in.

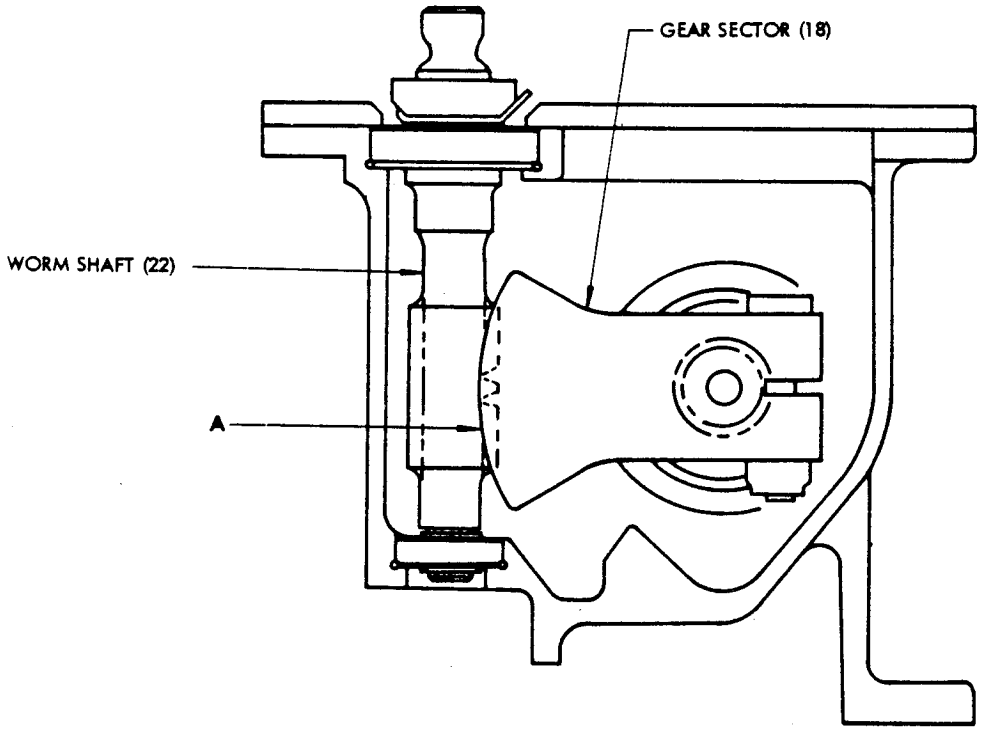
G. Install cover (6) with screws (3, 4, 5), washers (2) and nuts (1).

7. FITS AND CLEARANCES(Fig. 2).

A.& B. DELETED

| | | Original Design Clearances | | | | Service Wear Limits | | |
|---|---|---|---|---|---|---|---|---|
| Ref. Letter Fig(2) | Mating Index No. Fig(3) | Dimension (inches) | | Assembly Clearance (inches) | | Dimension Limits (inches) | | Maximum Allowable Clearance (inch) |
| | | Min. | Max. | Min. | Max. | Min. | Max. | |
| A | 22<br>18 | | | 0.003 ▷ | 0.008 ▷ | | | 0.016 ▷ |

▷ Gear Backlash




Fits and Clearances
Figure 2

8. TESTING (Fig. 3)

A. Rotate worm shaft (22) full travel in both directions. Motion shall be smooth with no binding or interference.

B. Apply a 10-20 lb axial load to either end of shaft (17) and rotate in both directions. Motion shall be smooth with no binding.

C. Check Backlash

(1). Position worm shaft (22) at rig point by temporarily inserting a MS20392-4 pin (or comparable rod of 0.311-0.319-inch diameter) through aligned rig pin holes of housing (25) and output arm (13).

(2) Position worm shaft (22) at rig point, and so that gear sector (18) is 2-3 degrees from rig point in each direction. Check backlash at these three positions as follows:

(a) Apply 6-8-pound load at clevis bolt hole on output arm (13).

(b) Establish index position at bolt hole.

(c) Reverse direction of applied load (shift of index position at bolt hole is total backlash).

(d) Check that total backlash does not exceed 0.010 inch.

(e) Repeat steps (a) thru (c), applying an 18-20-pound load. Check that total backlash does not exceed 0.016 inch.

(3) Position worm shaft (22) so that gear sector (18) is 24-25 degrees from rig point in each direction. Check backlash at these two positions as follows:

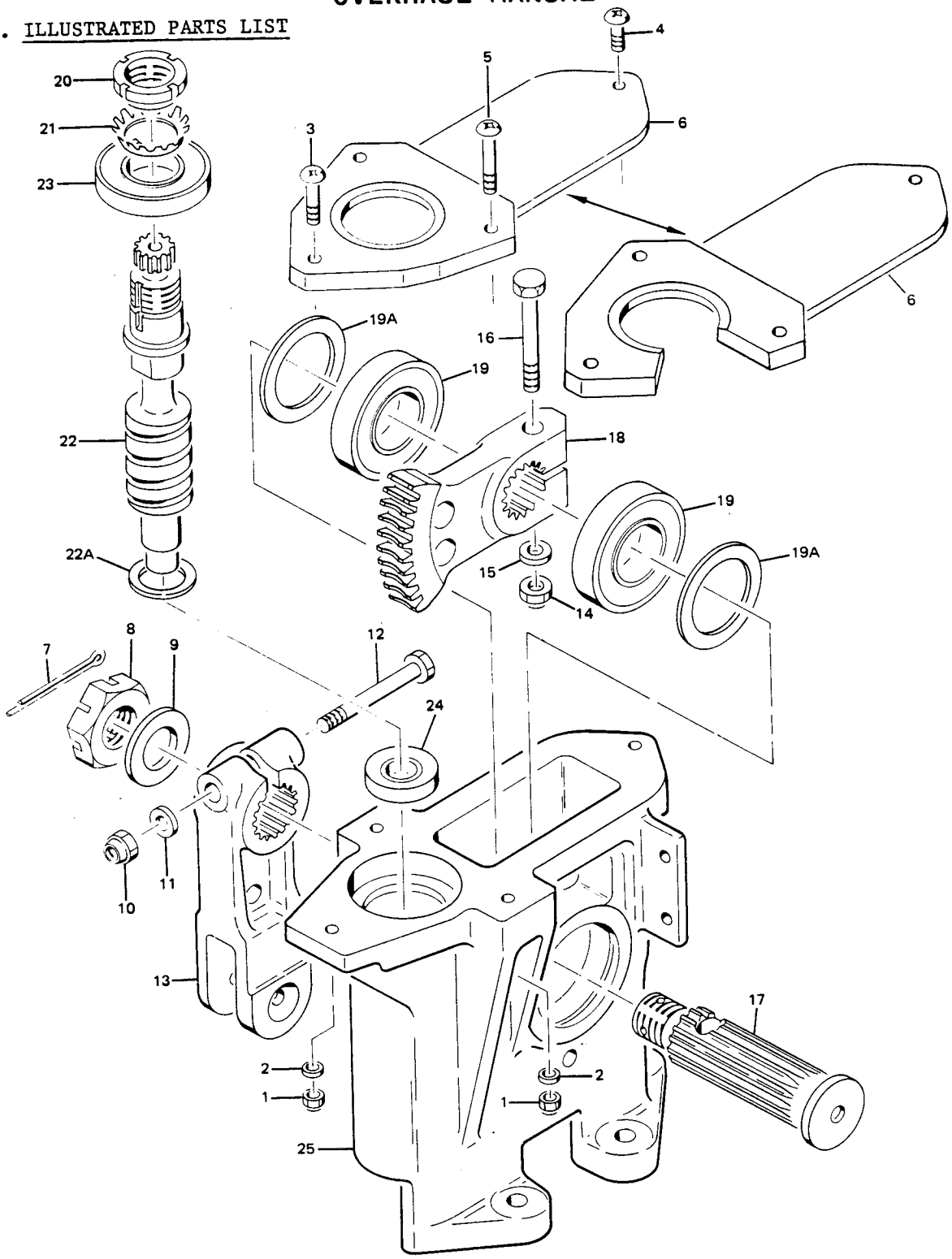
(a) Repeat step (2)(e).

9. TROUBLE SHOOTING (Fig. 3)

| | Trouble | Possible Cause | Correction |
|---|---|---|---|
| A. | Backlash excessive along pitch diameter of worm shaft (22) | Worm shaft (22) or gear sector (18) worn to excess | Disassemble, check, replace as necessary and reassemble |
| B. | Binding or rough movement | Improperly installed components. Bearings binding or seizing | Disassemble, examine, correct condition and reassemble |

10. DELETED

11. ILLUSTRATED PARTS LIST




Aileron Geared Trim Assembly
Figure 3

| FIG. & ITEM NO. | PART NO. | AIRLINE PART NUMBER | NOMENCLATURE 1 2 3 4 5 6 7 | USE CODE | QTY PER ASSY |
|---|---|---|---|---|---|
| 3- | | | | | |
| | 65-52284-5 | | AILERON GEARED TRIM ASSY (SB 27-1058) | A | |
| | 65-52284-6 | | AILERON GEARED TRIM ASSY (SB 27-1058) | B | |
| | 65-52284-8 | | AILERON GEARED TRIM ASSY (SB 27-1058) | C | |
| | 65-52284-9 | | AILERON GEARED TRIM ASSY *[1] | D | |
| 1 | NAS679A3W | | . NUT | | 4 |
| 2 | AN960PD10 | | . WASHER | | 4 |
| 3 | NAS623-3-7 | | . SCREW | | 1 |
| 4 | NAS623-3-5 | | . SCREW | | 1 |
| 5 | NAS623-3-10 | | . SCREW | | 2 |
| 6 | 69-43896-3 | | . COVER (SB 27-1058) | ABC | 1 |
| 6 | 69-43896-2 | | . COVER (optional)(SB 27-1058) | AB | 1 |
| 6 | 69-43896-4 | | . COVER *[1] | D | 1 |
| 7 | MS24665-357 | | . PIN, Cotter | | 1 |
| 8 | AN320-9 | | . NUT | | 1 |
| 9 | AN960PD916 | | . WASHER | | 1 |
| 10 | NAS679A4W | | . NUT | | 1 |
| 11 | AN960PD416 | | . WASHER | | 1 |
| 12 | NAS1104-21 | | . BOLT | | 1 |
| 13 | 65-52288-1 | | . ARM | ABC | 1 |
| 13 | 65-52288-3 | | . ARM *[1] | D | 1 |
| 14 | NAS679A4W | | . NUT | | 1 |
| 15 | AN960PD416 | | . WASHER | | 1 |
| 16 | NAS1104-19 | | . BOLT | | 1 |
| 17 | 69-39426-1 | | . SHAFT | | 1 |
| 18 | 65-53778-1 | | . GEAR SECTOR | | 1 |
| 19 | BACB10A685 | | . BEARING | | 2 |
| 19A | 9-61297-3013 | | . SHIM | D | AR |
| 20 | MS19068-022 | | . NUT | | 1 |
| 21 | MS19070-022 | | . WASHER | | 1 |
| 22 | 65-53777-1 | | . WORM SHAFT | | 1 |
| 22A | 65-52284-7 | | . SHIM | | 1 |
| 23 | BACB10A684 | | . BEARING | | 1 |
| 24 | BACB10A543 | | . BEARING | | 1 |
| 25 | 65-52287-7 | | . HOUSING | ABC | 1 |
| 25 | 65-52287-8 | | . HOUSING *[1] | D | 1 |

*[1] Identical to same item coded ABC except for additional coating of enamel