ENSTROM HELICOPTER CORPORATION

2209 22nd Street | Menominee, MI 49858
EnstromHelicopter.com | 906.863.1200

ENSTROM F-28F/280F SERIES MAINTENANCE MANUAL

Revision 13, dated Jan 5/2024, applies to the Enstrom F-28F/280F Series Maintenance Manual, 1985 Edition/1990 2nd Edition. Place this cover sheet behind the "Record of Revisions" card after removing and inserting the pages listed below.

Remove Pages	**Insert Pages**
Cover	Cover
i through ii	i through ii
vii through x	vii through x
xiii through xiv	xiii through xiv
MM-10-1 through MM-10-68	MM-10-1 through MM-10-74
MM-11-1 through MM-11-68	MM-11-1 through MM-11-84
20 – Belt Drive System	**20 – Reserved** (tab divider)*
MM-20-1 through MM-20-2	MM-20-1 through MM-20-2
25 – Tail Rotor Drive Assembly	**25 – Reserved** (tab divider)*
MM-25-1 through MM-25-3	MM-25-1 through MM-25-2

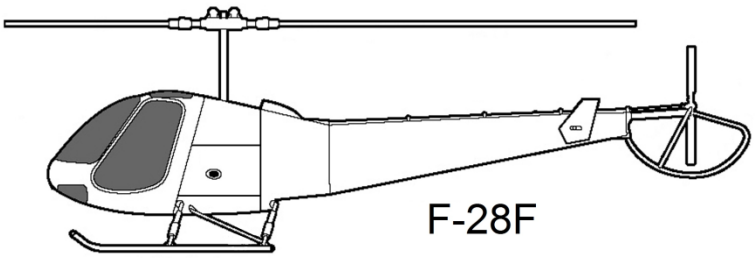
*Tab dividers can be re-labeled per the discretion of owner/operator.

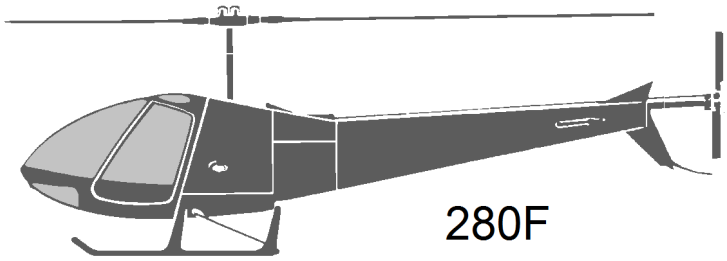
.....End of List.....

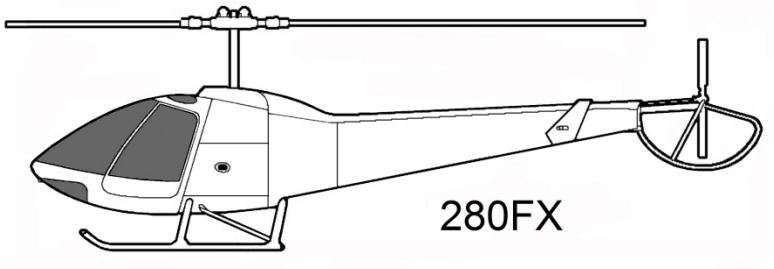
INTENTIONALLY LEFT BLANK

ENSTROM
HELICOPTER CORPORATION

ENSTROM F-28F AND 280F SERIES MAINTENANCE MANUAL







The Enstrom Helicopter Corporation
2209 22nd Street
Menominee, Michigan 49858-3515

Telephone: 906-863-1200
Fax: 906-863-6821
www.enstromhelicopter.com

INTENTIONALLY LEFT BLANK

RECOMMENDED CHANGE REPORT

This maintenance manual is prepared and distributed by The Enstrom Helicopter Corporation and is intended for use by personnel responsible for maintaining Enstrom F-28F, 280F, and 280FX helicopters. This manual is periodically revised. If, in the opinion of the user, any information has been omitted or requires clarification, please direct your comments to Enstrom via this form (duplicate of this page), or via the Enstrom Helicopter website, or other similar form.

To submit comments online via the Enstrom Helicopter website, navigate to the *SUPPORT* drop-down menu at the top of the web page, select *MANUAL UPDATE REQUEST,* fill in the fields, and click *SUBMIT*.

If viewing this page online, access to the form is provided in the following link:

Manual Update Request - Enstrom Helicopter Corporation

Otherwise, if corresponding by postal mail, send the recommended changes to:

The Enstrom Helicopter Corporation
2209 22nd Street
Menominee, MI 49858-3515

ATTN: Technical Publications

Manual Identification: Enstrom F-28F/280F Series Maintenance Manual, dated 1985

Revision Number and Date: _____

Aircraft Model: _____

Recommended Change:

INTENTIONALLY LEFT BLANK

9-6. Main Rotor Blades MM-9-49
9-7. Description MM-9-49
9-8. Removal MM-9-49
9-9. Inspection MM-9-52
9-10. Repair MM-9-62
9-11. Refinishing MM-9-74
9-12. Corrosion Prevention MM-9-75
9-13. Installation MM-9-76

Section 10 – Tail Rotor

10-1. Tail Rotor Assembly MM-10-3
10-2. Static Balance MM-10-25
10-3. Tracking and Dynamic Balance MM-10-27
10-4. Tail Rotor Pitch Control Assembly MM-10-37
10-5. Tail Rotor Gearbox MM-10-45
10-5.1. Tail Rotor Gearbox Chip Detector MM-10-52
10-6. Tail Rotor Driveshaft MM-10-54
10-6.1. Tail Rotor Driveshaft Flex Coupling MM-10-60
10-6.2. Tail Rotor Driveshaft Pillow Block MM-10-65
10-6.3. Tail Drive Pulley Guard MM-10-65
10-7. Tail Rotor Control System MM-10-67
10-8. Tail Rotor Control Cables MM-10-70

Section 11 – Drive Belt System

11-1. Clutch Control Rigging MM-11-3
11-2. Clutch Cable MM-11-10
11-3. Clutch Control Lever MM-11-13
11-4. Jackstrut and Pulley Assembly MM-11-14
11-5. Drive Belt MM-11-21
11-6. Main Rotor Gearbox MM-11-36
11-6.1. Chip Detector MM-11-41
11-7. Overrunning Clutch and Pulley Assembly MM-11-42
11-7.1. Upper Jackstrut Bearing MM-11-47
11-8. Idler Pulley – Troubleshooting MM-11-53
11-8.1. Yoke End Assembly MM-11-56
11-8.2. Actuator Arm Assembly and Snubber Roller Assembly MM-11-58
11-9. Belt Tension Assembly MM-11-73

Section 12 – Flight Controls

12-1. Troubleshooting the Articulated Rotor System MM-12-3
12-2. Main Rotor Blade Tracking MM-12-5
12-3. Collective Pitch Control Stick MM-12-19
12-4. Collective Trim System MM-12-22
12-5. Cyclic Pitch Control Stick MM-12-27
12-6. Lateral and Longitudinal Trim Actuators MM-12-28
12-7. Flight Control Rigging MM-12-34
12-8. Cyclic Azimuth Check MM-12-42
12-9. Cyclic Trim Springs Rigging Procedure MM-12-44
12-10. Lower Swashplate Assembly MM-12-46
12-11. Upper Swashplate Assembly MM-12-58
12-12. Main Rotor Push Pull Rods MM-12-70

12-13. Flight Test Procedure MM-12-75

Section 13 – Powerplant and Associated Systems

13-1. Powerplant (General Information) MM-13-1
13-2. Engine MM-13-3
13-3. Engine Exhaust System.....MM-13-19
13-4. Fuel Injection System MM-13-23
13-5. Turbocharger.....MM-13-47
13-6. Turbocharger Static Air Fuel Nozzle Pressure System MM-13-49
13-7. Primary Airflow System.....MM-13-52
13-8. Cooling System MM-13-57
13-9. Ignition System.....MM-13-64
13-10. Fuel System MM-13-72
13-11. Lubricating System MM-13-88
13-12. Correlator MM-13-94

Section 14 – Utility Systems

14-1. Cabin Heat MM-14-1

MAINTENANCE MANUAL SUPPLEMENT 280FX & 1986 F-28F – SECTIONS 15 THROUGH 25

Section 15 – Supplemental Procedures

15-1. Introduction..... MM-15-1
15-2. Table of Contents MM-15-1
15-3. Manual Changes and Revisions MM-15-1

Section 16 – [Reserved]

Section 17 – [Reserved]

Section 18 – Powerplant

18-1. General..... MM-18-1

Section 19 – Main Rotor Transmission

19-1. General..... MM-19-1
19-2. Main Rotor Gearbox Chip Detector..... MM-19-1
19-3. Lubricant Change MM-19-2

Section 20 – Belt Drive System

20-1. [Reserved] MM-20-1

Section 21 – Electrical Systems and Components

21-1. General..... MM-21-1
21-2. Combined Anticollision and Navigation Lights MM-21-1
21-3. Annunciator Panel MM-21-1

21-4. Anticollision and Navigation Light and Annunciator Panel Troubleshooting Chart MM-21-6
21-5. Lamp/Assembly Replacement Guide Chart MM-21-8
21-6. Ampere Load Conditions MM-21-8
21-7. Hi/Lo Rotor RPM Warning System.....MM-21-11
21-8. Schematic Diagrams.....MM-21-14
21-9. Illuminated Panels MM-21-33
Illuminated Collective Switch Panel MM-21-33
Illuminated Switch and Circuit Breaker Panel MM-21-35

Section 22 – [Reserved]

Section 23 – [Reserved]

Section 24 – Instruments

24-1. Engine Monitor MM-24-1
24-2. Description MM-24-1
24-3. Maintenance..... MM-24-2
24-4. Programming Alarm Limits MM-24-2
24-5. Troubleshooting..... MM-24-2
24-6. Clock MM-24-7
24-7. Outside Air Temperature Indicator (OAT) MM-24-7
24-8. Magnetic Compass..... MM-24-7
24-9. Rotor RPM Magnetic Pickup..... MM-24-8

Section 25 – [Reserved]

INTENTIONALLY LEFT BLANK

REV. NO	REV DATE	DESCRIPTION	DATE	FAA APPROVED
10	Feb 7/19	Cover ix, xiii, xiv MM-4-40, MM-4-42 MM-8-0 through MM-8-0.2 MM-8-12 through MM-8-16.2 MM-12-18 through MM-12-22 MM-21-1 through MM-21-4 MM-21-6 through MM-21-8, MM-21-14 MM-21-33 through MM-21-58 MM-24-7 through MM-24-8	N/A	N/A
11	Oct 25/19	Cover iv through vii, ix, xiii MM-1-3 MM-2-11, MM-2-12 MM-2-14 through MM-2-20 MM-4-3, MM-4-9, MM-4-11 MM-4-22, MM-4-32 MM-4-47, MM-4-51 through MM-4-56 MM-4-65, MM-4-66, MM-4-77, MM-4-78 MM-6-0.1, MM-6-0.2 MM-6-1 through MM-6-8 MM-8-36 MM-9-1 through MM-9-48 MM-10-1 through MM-10-68 MM-12-1 through MM-12-80 MM-13-0.1, MM-13-0.2, MM-13-31 MM-13-35, MM-13-37, MM-13-49 MM-13-67 through MM-13-71 MM-13-93 through MM-13-100 MM-21-15, MM-21-16 MM-24-0.1, MM-24-0.2 MM-24-8 through MM-24-10	N/A	N/A
12	Jul 16/2020	Cover vi, xiii, MM-1-1, MM-1-4, MM-1-5 MM-2-1, MM-2-12, MM-2-21, MM-2-22 MM-8-0, MM-8-0.2, MM-8-17, MM-8-18 MM-8-19, MM-8-20, MM-8-61, MM-8-62 MM-21-2 MM-23-1, MM-23-2	N/A	N/A
13	Jan 5/24	Cover i, vii, viii, ix, xiii MM-10-1 through MM-10-74 MM-11-1 through MM-11-84 MM-20-1 through MM-20-2 MM-25-1 through MM-25-2	N/A	N/A

INTENTIONALLY LEFT BLANK

SECTION 10

TAIL ROTOR

TABLE OF CONTENTS

Paragraph		Page
10-1	**Tail Rotor Assembly**	**MM-10-3**
	A. General Description	MM-10-3
	B. Troubleshooting	MM-10-3
	C. Removal	MM-10-4
	D. Disassembly	MM-10-4
	E. Cleaning	MM-10-7
	F. Inspection	MM-10-7
	G. Repair	MM-10-7
	H. Refinishing	MM-10-9
	I. Assembly	MM-10-11
	J. Pitch Link Inspection, Repair, Assembly, and Installation	MM-10-13
	K. Installation	MM-10-17
10-2	**Static Balance**	**MM-10-25**
	A. Balance Procedure	MM-10-25
10-3	**Tracking and Dynamic Balance**	**MM-10-27**
	A. Tracking and Balancing Equipment Installation	MM-10-27
	B. Tail Rotor Balance Procedure	MM-10-29
	C. Clock Angle Correction Procedure	MM-10-31
	D. Teeter Trunnion Shimming Procedure	MM-10-36
10-4	**Tail Rotor Pitch Control Assembly**	**MM-10-37**
	A. Removal	MM-10-37
	B. Disassembly	MM-10-37
	C. Inspection	MM-10-39
	D. Assembly	MM-10-39
	E. Installation	MM-10-40
10-5	**Tail Rotor Gearbox**	**MM-10-45**
	A. General Description	MM-10-45
	B. Troubleshooting	MM-10-45
	C. Removal	MM-10-45
	D. Inspection	MM-10-46
	E. Installation	MM-10-46
	F. Input Seal Replacement	MM-10-47
	G. Output Seal Replacement	MM-10-49
	H. Output Shaft Runout	MM-10-51
10-5.1	**Tail Rotor Gearbox Chip Detector**	**MM-10-52**
	A. Removal	MM-10-52
	B. Installation	MM-10-52
10-6	**Tail Rotor Driveshaft**	**MM-10-54**
	A. Alignment	MM-10-54
	B. Removal	MM-10-55
	C. Disassembly	MM-10-55
	D. Inspection	MM-10-56
	E. Installation	MM-10-56

SECTION 10

TAIL ROTOR

TABLE OF CONTENTS – CONTINUED (PAGE MM-10-2)

Paragraph		Page
10-6.1	**Tail Rotor Driveshaft Flex Coupling**	**MM-10-60**
	A. General Information	MM-10-60
	B. Removal	MM-10-60
	C. Inspection	MM-10-60
	D. Installation	MM-10-61
10-6.2	**Tail Rotor Driveshaft Pillow Block**	**MM-10-65**
	A. Disassembly	MM-10-65
	B. Inspection	MM-10-65
	C. Assembly	MM-10-65
10-6.3	**Tail Drive Pulley Guard**	**MM-10-65**
	A. Modification	MM-10-65
10-7	**Tail Rotor Control System**	**MM-10-67**
	A. Tension Adjustment	MM-10-67
	B. Rigging	MM-10-67
10-8	**Tail Rotor Control Cables**	**MM-10-70**
	A. Inspection	MM-10-70
	B. Replacement	MM-10-71

10-1 TAIL ROTOR ASSEMBLY

A. General Description – Tail Rotor Assembly

The tail rotor assembly consists of two blade and grip units mounted on a common spindle by the use of a pair of matched DT ball bearings and one needle bearing per grip. This rotating assembly is teeter-mounted on a center hub by the use of two roller bearings. The center hub is splined to match the tail rotor gearbox output shaft for positive mounting and driving. The control of this assembly is blade to pitch link, to sliding pivot yoke, to cables, cables to bell crank and bell crank to foot pedals in the cockpit.

B. Troubleshooting – Tail Rotor Assembly

NOTE: Previous tail rotor assembly P/N 28-150050 is superseded and replaced by P/N 28-150079.

Problem	Possible Cause	Required Action
Foot pedal controls are binding	Pivot bolts on tail rotor bracket overtorqued	Loosen pivot bolts and retorque.
	Improper assembly of pitch links to pitch arm	Install spacers properly to allow for needed clearance on each side of pitch links.
	Tail rotor misaligned on output shaft, causing pitch links to bind	Remove tail rotor and reinstall using correct alignment. Refer to Fig. 10-6.
Noticeable dead spot in tail rotor	Improper tension on control	Check rigging procedure and adjust cables to 35-40 lb/15.9-18.1 kg pedal control cables.
	Feathering bearings worn or rubber bumper shifted and binding	Disconnect pitch links and rotate grips to determine problem blade. Replace faulty or worn parts.
Tail rotor vibration	Out of balance	Dynamic balance.
	Excessive axial play in the hub teeter bearings (P/N 28-150079 tail rotor assembly)	Reshim (Para. 10-1.I.(1)(h)) or replace the teeter bearings (Para. 10-1.G).
	Tail stringer clamp loose on aft bulkhead	Replace clamp attaching hardware, as required or replace bulkhead.

Problem	Possible Cause	Required Action
Tail rotor vibration (continued)	Excessive end play in teeter bearings, creating out of balance condition (P/N 28-150050 tail rotor assembly)	Remove tail rotor assembly and retighten retainer caps until hub rotates firmly by hand with no end play. Grease and static balance. NOTE: If teeter bearings are bad, they may be replaced without removing blade and grip assemblies.
	Improper lubrication	Both grips must be greased each time tail rotor is lubricated or an out of balance condition will result.

NOTE: The following instructions pertain to tail rotor assembly P/N 28-150079. Tail rotor assembly P/N 28-150050 is no longer supported.

C. Removal – Tail Rotor Assembly

NOTE: Refer to Fig. 10-1 for numbered items.

NOTE: Index mark (color code) the pitch change links to the pitch change plates.

NOTE: Retain the order of the hardware stack-up for ease of installation.

(1) Remove bolt (1), washers (5), (13), and (8), spacers (10) and (9), and nut (6) to disconnect pitch change links from the pitch plates (horn) (Fig. 10-3, left).

(2) Remove safety wire from the tail rotor retention bolt. Remove bolt (31), washer (30), and teeter stop (29).

NOTE: Index mark hub and shaft splines for ease of installation.

(3) Carefully slide tail rotor assembly from the transmission output shaft.

(4) Temporarily install teeter stop (29), washer (30), and bolt (31) or a PD-40 (-4 plug) into the transmission output shaft to prevent oil leaking from the gearbox.

D. Disassembly – Tail Rotor Blade Assembly

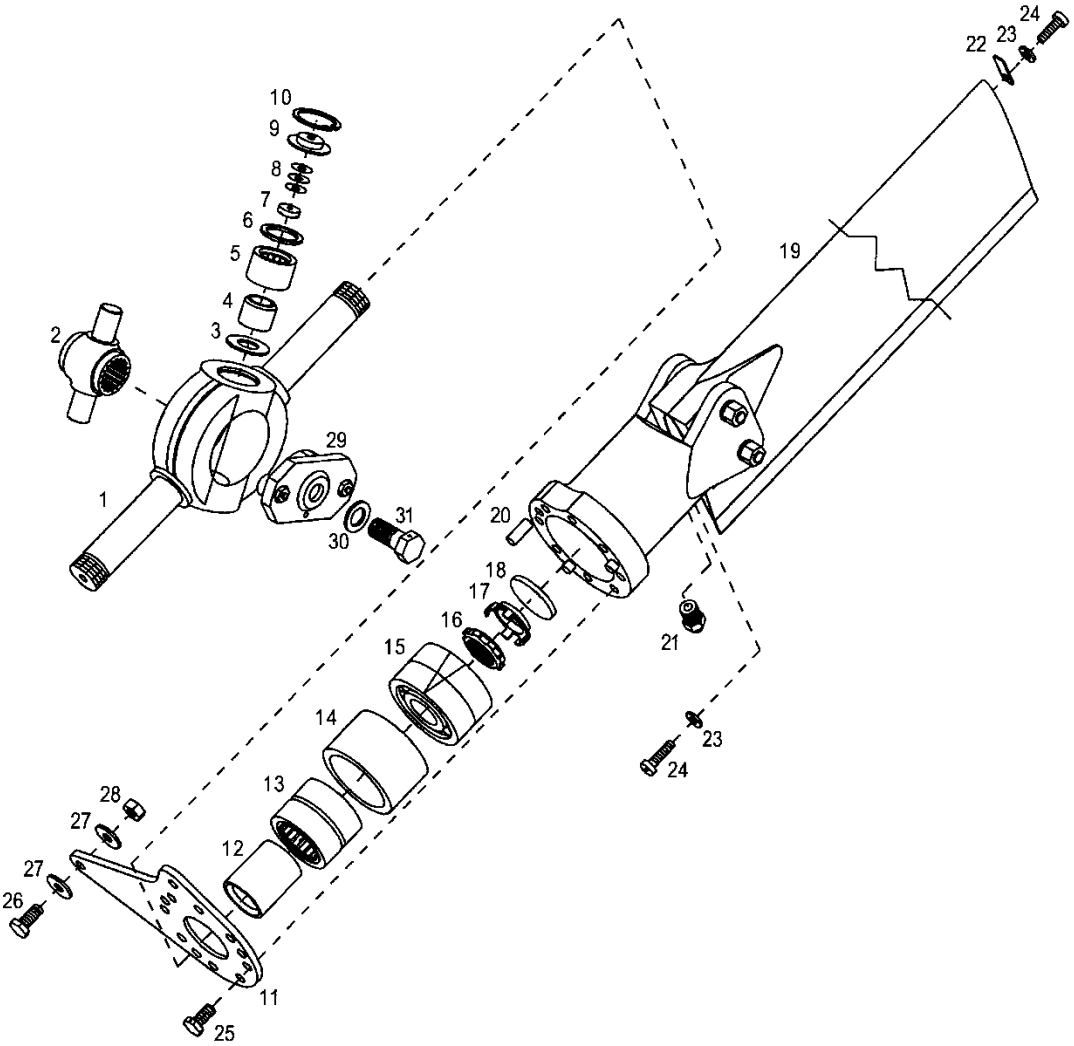
NOTE: The removal procedures are the same for both blade and grip assemblies.

CAUTION: USE BRASS PROTECTOR PLATED IN THE VISE JAWS TO PREVENT FROM DAMAGING THE TAIL ROTOR SPINDLE OR INSTALL SPINDLE ON TOOL T-0168-1.

(1) Clamp tail rotor assembly in a vise so that the blades can be rotated.

(2) Remove retention bolt safety wire from around center hub.

(3) Remove bolts (26), washers (27), and nuts (28) from the pitch change plates (11).



1. Tail Rotor Spindle
2. Tail Rotor Hub
3. Washer
4. Bearing Journal
5. Teeter Bearing
6. Seal
7. Thrust Bumper
8. Shims
9. End Plate Assembly
10. Retaining Ring
11. Pitch Change Plate
12. Bearing Sleeve
13. Bearing
14. Bearing Retainer
15. Thrust Bearing Set
16. Nut
17. Lock Washer
18. Bumper
19. Blade and Grip Assembly
20. Dowel Pin
21. Lubrication Fitting
22. Strike Indicator
23. Washer
24. Screw
25. Bolt
26. Bolt
27. Harper Washer
28. Nut
29. Teeter Stop
30. Washer
31. Bolt

Figure 10-1. Tail Rotor Assembly

(4) Remove safety wire and bolts (25) from the pitch change plates.

NOTE: Remove the lubrication fitting (21) from the blade grip to ease removal and installation of the blade and grip assembly.

CAUTION: DO NOT TAP ON THE ROOT OF THE BLADE DURING THE REMOVAL PROCESS OR REMOVE THE BLADE FROM THE BLADE GRIP. THEY ARE MATCH DRILLED WHEN ASSEMBLED.

(5) Use a rubber hammer to tap retention plate (11) to loosen it from the blade grip.

WARNING: USE EXTREME CAUTION WHEN REMOVING OR INSTALLING THE BLADE AND GRIP ASSEMBLIES TO PREVENT FROM INJURING PERSONNEL. USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.

NOTE: A deflector may be used as an aid during heating the grip.

(6) Loosen blade retention bolt nuts slightly (sufficient to remove the torque and clearance is observed between the nut and the grip) and heat blade grip to approximately 250°F/121°C.

(7) Remove blade and grip assembly (19) by pulling on the blade with one hand and tapping on the blade bolt nuts with a nylon hammer. If required, rotate tail rotor assembly and remove the opposite blade and grip assembly.

(8) Remove bumper (18) from the end of the spindle.

(9) Remove lock washer (17) by prying up on the tabs with a screw driver.

(10) Remove nut (16) from spindle using tool T-0056-3 or T-0056-1 if available. If tangs on the nut are damaged, T-0056-1 can be used with an impact wrench to remove the nut.

NOTE: The thrust bearings are matched sets. Keep together.

(11) Remove thrust bearings (15) from spindle.

(12) Remove bearing retainer (14) and bearing (13).

(13) Remove bearing sleeve (12).

(14) Remove pitch change plate (11).

(15) Remove retaining rings (10), end plates (9), shims (8), thrust bumpers (7) and seals (6) from the spindle.

CAUTION: WHEN PRESSING THE BEARINGS OUT OF THE SPINDLE, DO NOT ALLOW THE HUB TO BOTTOM AGAINST THE SPINDLE.

(16) Using tool kit T-2893 or other suitable device with a properly sized dowel, press hub (2) toward one side of the spindle until the hub is about to contact the spindle. Turn the spindle over and press the hub and opposite needle bearing in the same manner.

(17) Move hub to the opposite side of the spindle as the bearing to be removed and insert the split pressing tools from the tool kit onto the journal (4). Press needle bearing (5) from the spindle. Insert the T-2893 split pressing tools onto the opposite side of the hub and press out the remaining needle bearing.

NOTE: The journals are installed with Loctite 277 (red). It will be necessary to heat the journals to 250°F to soften the Loctite and remove the journals.

(18) Using the tool kit or other suitable device, remove one of the journals from the hub. Remove the hub from the spindle and remove the remaining journal and the washers (3).

E. Cleaning – Tail Rotor Assembly

NOTE: Care should be used in cleaning the tail rotor to prevent scratching or damaging parts.

(1) Wash parts in cleaning solvent.

(2) Wash bearings in clean solvent to prevent contamination of the bearings.

F. Inspection – Tail Rotor Assembly

(1) See Table 10-1 for detailed inspection requirements for the tail rotor assembly.

(2) Inspect paint finish of the blades for blistering, erosion, cracking, chipping, peeling, and overall oxidation.

(3) Inspect trailing edge bond lines for voids or openings, dark deposits, and bubbly or scaly paint.

(4) Inspect spar bond lines for raised sections or voids, dark deposits, and bubbly or scaly paint.

(5) Inspect bond lines at the doubler edges for paint cracking or scaling, dark deposits, and void in the fairing compound.

(6) Inspect tail rotor blade skins, abrasion strip, retention plates, and root doublers for nicks, scratches, dents, and cracks.

(7) Inspect blade tip rib for loose rivets.

G. Repair – Tail Rotor Assembly

CAUTION: THE TAIL ROTOR ASSEMBLY MUST BE STATICALLY AND DYNAMICALLY REBALANCED AFTER ANY REPAIR.

NOTE: Refinish the repaired area in accordance with Para. 9-10.A, or Para. 9-11 depending on the condition of the rest of paint finish.

(1) Repair small areas of the paint finish (Para. 9-11).

(2) Reject tail rotor blades with the following bond line separations or voids:

(a) Trailing edge separations deeper than .050 inch/1.3 mm or more than 2.0 inch/5.1 cm in length.

(b) Stainless steel abrasion strip separations more than 2.0 in/5.1 cm from the tip of the blade or deeper than .062 inch/1.6 mm.

(c) Root doubler separations closer than 2.0 in/5.1 cm from the tip of the doubler under which the separation appears, or greater than 1.0 in/2.5 cm in length, or deeper than .062 in/1.6 mm.

(3) Repair voids and separations of the tail rotor blade bond lines that do not exceed the limits step (2) above, in accordance with Para. 9-10.D.

(4) Reject tail rotor blades with the following blade skin damage:

(a) Scratches, nicks, or sharp dents deeper than .010 in/.25 mm.

(b) Nicks in trailing edge deeper than .100 in/2.5 mm.

(c) Smooth dents exceeding .025 in/0.6 mm.

(d) Cracks or punctures.

(5) Repair damage to the blade skins not exceeding the limits in step (4) above as follows:

(a) Buff out all scratches not deep enough to penetrate the clad material.

(b) Blend scratches, nicks, or sharp dents out smooth over a 2.0 in/5.1 cm diameter area.

(c) Blend out nicks in the trailing edge in accordance with Fig. 10-2.

(d) No repair required for smooth dents.

(6) Reject tail rotor blades with the following abrasion strip damage:

(a) Nicks and scratches deeper than .005 in/0.13 mm.

(b) Dents deeper than .040 in/0.1 mm.

(c) Cracks, punctures, or erosion penetration of the stainless steel.

(7) Repair damage to the abrasion strip not exceeding the limits in step (6) above, as follows:

(a) Blend nicks and scratches out smooth over an area 1 in/2.5 cm long (parallel to the leading edge) by .50 in/0.13 mm wide.

(b) No repair required for smooth dents.

(8) Reject tail rotor blades with the following root doubler damage:

(a) Nick, scratches, or sharp dents deeper than .010 in/.25.

(b) Smooth dents deeper than .020 in/5.1 mm.

(c) Cracks.

(9) Repair damage to the root doublers not exceeding the limits in step (8) above, as follows:

(a) Blend nicks, scratches, or sharp dents out smooth to approximately .50 in/13 mm on either side of the damaged area.

(b) No repair required for smooth dents.

(10) Reject tail rotor blades with the following retention plate damage:

(a) Nick, scratches, or sharp dents deeper than .030 in/0.8 mm.

(b) Cracks.

(11) Repair damage to the retention plates not exceeding the limits in step (10) above as follows:

(a) Blend nicks, scratches, or sharp dents out smooth to approximately 1.0 in/2.5 cm in diameter.

(12) Reject tail rotor blades with cracked tip ribs.

(13) Replace loose rivets.

H. Refinishing – Tail Rotor Assembly

(1) Remove tail rotor assembly and disassemble.

(2) Index mark hardware in the blade and grip assembly.

(3) Remove hardware from the blade and grip assemblies and separate the blades from the grips.

(4) Refinish blades (Para. 9-11).

(5) Reinstall blades into the grips. Torque blade retention bolt nuts to 75 in-lb/8.5 Nm (140 in-lb/15.9 Nm if the blade and grip assembly has been factory repaired and 5/16 inch bolts installed).

(6) If required, reassemble tail rotor assembly.

(7) Statically balance tail rotor assembly (Para. 10-2).

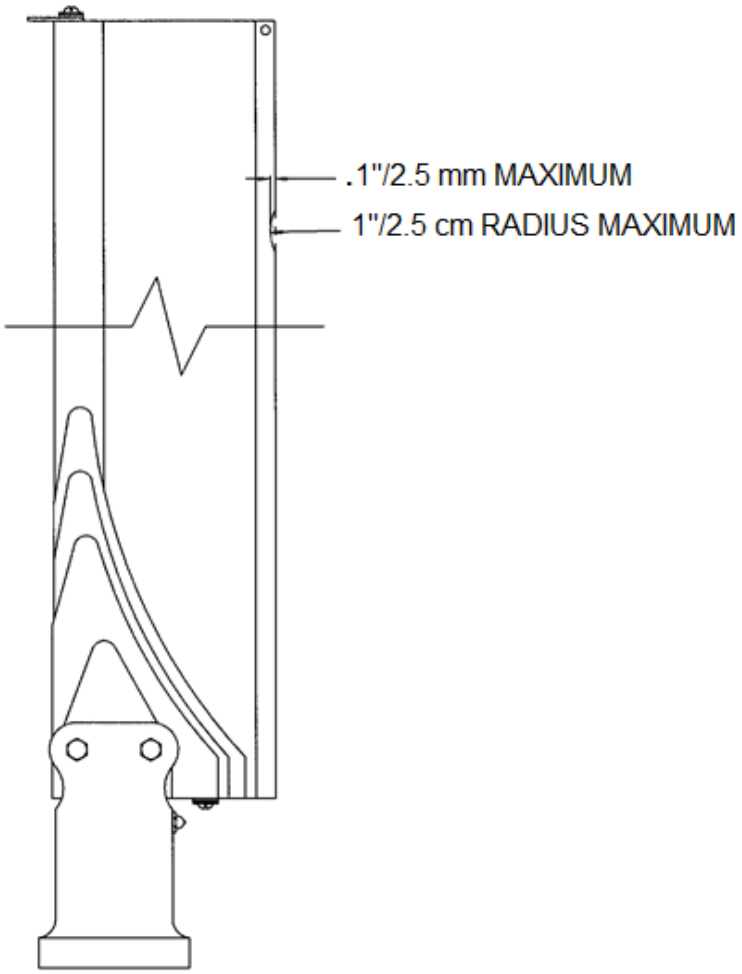


Figure 10-2. Tail Rotor Blade Trailing Edge Repair Limits

I. Assembly – Tail Rotor Assembly (Fig. 10-1)

(1) Install hub (2) into spindle (1) using the following procedure:

(a) Install one of the washers (3) onto the hub with the chamfer toward the center of the hub.

(b) Apply a light coating of Loctite® 277 (red) to the inside diameter of one of the journals (4). Install the journal onto the hub (2) with the large chamfer outboard. Remove any excess Loctite®.

(c) Install hub (2) into the spindle (1) and install the other washer (3) and journal (4) in the same manner.

NOTE: Position teeter bearing (5) such that the end with the printed manufacturer data is facing outboard.

NOTE: Use ultra fine crocus cloth to eliminate interference fit between the hub journal and the bearing journal.

(d) Position one of the teeter bearings (5) at the teeter bearing bore of the spindle and using the installation tool from the tool kit T-2893 press the bearing into the spindle.

NOTE: Install the teeter bearing (5) into the spindle (1) to a depth of .191/.193 inch if not using tool kit T-2893.

CAUTION: ENSURE THE HUB AND JOURNAL ARE ALIGNED WITH THE REMAINING NEEDLE BEARING DURING INSTALLATION TO PREVENT ANY DAMAGE.

(e) Turn spindle over and insert hub (2) into teeter bearing (5) that was just installed. Install the remaining teeter bearing (5).

(f) Check that the hub rotates freely in the bearings. Determine the cause if the hub does not rotate freely.

(g) Install seal (6), thrust bumper (7) with the lubrication grooves toward the hub, end cap (9), and retaining ring (10) in both sides of the spindle.

NOTE: Ensure the retaining ring is fully seated after installation.

(h) Determine amount of shims (8) required to remove end play from the hub. Add an additional .004 to .005 in/0.10 to 0.13 mm of shims to each side for preload.

(i) Remove retaining rings (10) and end plates (9) from the spindle. Divide the shims into two equal amounts. Install the shims between the thrust bumpers (7) and the end caps (9). Reinstall the end caps and retaining rings. If the caps or retaining rings do not seat properly in the spindle, use a pair of non-marring pliers to rotate the cap to seat it properly.

(j) Check that the hub still rotates freely in the spindle. There should be a slight preload (1/2-1 lb/0.22-.45 kg, 6 in/15.2 cm from the hub) on the hub but the hub should still be able to be rotated.

(k) Purge lubricate teeter bearings (5) (MIL-G-25537 (preferred) or MIL-PRF-81322).

NOTE: The installation procedures are the same for both blade and grip assemblies.

CAUTION: USE BRASS PROTECTOR PLATED IN THE VISE JAWS TO PREVENT FROM DAMAGING THE TAIL ROTOR SPINDLE.

(2) Place spindle into a vise so that the blade and grip assemblies can be rotated when installed or use tool T-0168-1.

(3) Install pitch change plate (11) on the spindle with the machined clearance surface of the pitch arm facing outboard.

(4) Lubricate (MIL-G-25537 or MIL-PRF-81322) inner diameter of the bearing sleeve (12) and install bearing sleeve onto spindle.

(5) Lubricate (MIL-G-25537 or MIL-PRF-81322) outside of the bearing (13) and press into bearing retainer (14).

NOTE: Install bearing (13) and retainer (14) on spindle with closed end of the retainer facing outboard toward the thrust bearings.

(6) Install the thrust bearings (15) in matched sets with the closed side of the bearing facing inboard toward the hub. This side of the bearing will also have the word "thrust" imprinted on the face of the outer race. Most of these bearing sets will be scribed with a "V" on the outer races pointing toward the center hub.

(7) Install retaining nuts (16) using tool T-0056 and torque to 80-90 ft-lb/109.1-122.7 Nm.

(8) Align and install lock washer (17).

(9) Clean surface of the bumper (18) and end of the spindle with acetone or equivalent. Apply a small amount of MIL-G-25537 or MIL-PRF-81322 onto the end of the bumper and the end of the spindle and attach the bumper to the end of the spindle. (The plastic disk on the side of the bumper fits into the bearing retaining nut lockwasher (17).)

(10) Lubricate (MIL-PRF-81322) the O.D. of the bearings (15).

WARNING: USE EXTREME CAUTION WHEN REMOVING OR INSTALLING THE BLADE AND GRIP ASSEMBLIES TO PREVENT FROM INJURING PERSONNEL. USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.

(11) Using a heat gun, heat blade grip (19) to approximately 250°F/121°C.

(12) Place a dab of grease (MIL-G-25537 or MIL-PRF-81322) onto the outboard surface of the bumper (18).

(13) Lubricate (MIL-G-25537 or MIL-PRF-81322) bore of the blade grip. Quickly slide blade and grip assembly onto the spindle. Align the pitch link hole in the pitch change plate to the leading edge of the blade. Leave about 1/8 inch between the grip and the retention plate.

NOTE: Alternately tighten the bolts 1 to 2 turns to pull the pitch change plate and grip straight together.

(14) Start three bolts (25) into the grip, each closest to a dowel pin (20), and tighten to pull the grip and the pitch change plate together.

(15) Install remaining bolts (25). After blade and grip assembly has cooled, torque bolts to 50-70 in-lb/5.7-8.0 Nm and safety wire (.032) in pairs.

NOTE: Ensure the safety wire does not interfere with the pitch change link hardware when the blades are alternately pitched.

(16) Torque blade retention bolt nuts to 75 in-lb/8.5 Nm (140 in-lb/15.9 Nm if the blade and grip assembly has been factory repaired and 5/16 inch bolts installed) after the blade grip has cooled.

(17) Install grease fitting (21) into grip and lubricate grip (Para. 4-31) until grease purges from the pitch change plate from around the spindle.

(18) If required, install the opposite blade and grip assembly.

(19) Statically balance tail rotor (Para. 10-2).

(20) Install bolts (26), washers (27), and nuts (28) onto the pitch arms, if not installed.

NOTE: Complete static balance procedure before installing the tail rotor on helicopter.

J. Inspection, Repair, Assembly, and Installation – Pitch Link Assembly

NOTE: Pitch change links P/N 28-16345-11 or P/N 28-16391-1 must be installed as same part number pairs (either two P/N 28-16345-11 or two P/N 28-16391-1). Pitch change links P/N 28-16391-3 or P/N 28-16391-5 may be installed in combination with each other but not in combination with P/N 28-16345-11 or P/N 28-16391-1. For the barrel type, the pitch change link length and rod end orientation has been set at the factory. Do not disassemble unless the rod ends need replacement. If replacement is necessary, follow steps (3) through (6) (Refer to Fig. 10-5 for pitch link configurations).

(1) Inspect pitch change links for cracks, corrosion, bends, damage, and proper and secure installation.

NOTE: The following step requires disconnecting the pitch change link from the pitch arm. Keep bolt and washer stack up together.

(2) Inspect bolts, spacers,O-rings, and washers for wear. Observe if any distinct wear pattern is evident through the cad-plate and into the base material.

(3) Corrosion, nicks, or scratches in the solid link, barrel, or rod end outer race not exceeding 0.010 in/0.25 mm deep may be burnished out. Replace the solid link, barrel, or rod end if cracked or damage exceeds 0.010 in/0.25 mm deep. Replace the rod end if its axial play is exceeds 0.005 in/0.13 mm.

(4) Inspect pitch arm for damage. Replace pitch arm if cracks are detected or the pitch link bolt hole exceeds 0.251 in/6.38 mm diameter. Edge nicks may not exceed 0.005 in/0.13 mm deep. Polish and blend locally to a maximum 0.008 in/0.20 mm deep.

NOTE: Steps (5) through (8) and (11) apply to the barrel type pitch change links only.

(5) Install lock nuts on rod ends.

(6) Apply VC-3 Loctite to threads of rod ends.

(7) Turn right hand rod end into barrel until threads just cover the witness hole in the barrel.

(8) Turn left hand rod end into barrel until overall length of pitch link measures 4.260 in ± 0.005 in/10.82 cm ± 0.13 mm.

NOTE: Replacing pitch links or rod ends requires checking tail rotor balance.

NOTE: Steps (9) through (12) are to be completed after installation of tail rotor on transmission.

NOTE: For aircraft manufactured or modified with P/N 28-16391-3 or 28-16391-5 pitch link assemblies, the rod end labeled "**T/R ↑ BLADE,"** must be installed in the proper orientation (Fig. 10-3, (4)).

NOTE: Refer to Fig. 10-3 and Fig. 10-4 for the following steps unless stated otherwise.

(9) Install inboard-hand thread rod end of the pitch change link and spacers (3) into the retainer. Install bolts (1) so that heads are in the direction of rotation, washers (2) and (5), and nuts (6). Torque nuts and install the cotter pins (7).

(10) Connect outboard-hand thread rod ends to the pitch arms with the hardware in the following sequence: bolt (1) (bolt head installed in direction of rotation), washer (8), thin spacer (9), O-ring (11), pitch change link rod end (4), thick spacer (10), washer (13), pitch arm, washer(s) (5) (use stack-up retained in Para. C.(1)), and nut (6). Torque the nuts (55-75 in-lb/6.2-8.5 Nm) and install the cotter pins (7).

NOTE: For washers (5) and (13), replace any AN960 with the equivalent size NAS1149C04XXR (passivated stainless steel).

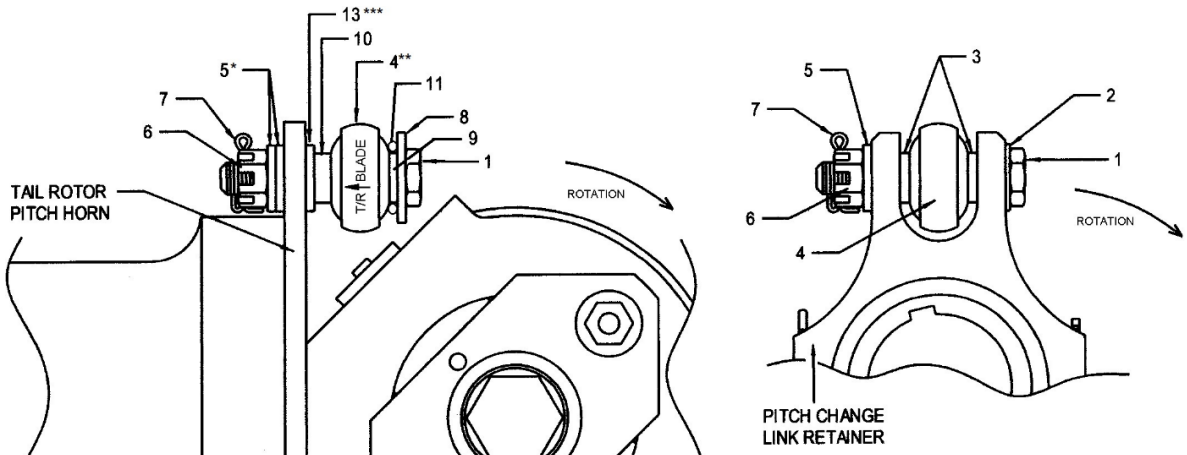
NOTE: A pre-existing spacer may have been wider or narrower than a replacement spacer. Adjust the number of washers under the nut (6) to account for the dimensional difference.

NOTE: Any modification must be made to both sides to maintain the dynamic balance of the tail rotor.

(11) Adjust length of assembly by rotating barrel until pitch link assembly measures 4.260 in ± 0.005 in/10.82 cm ± 0.13 mm. Holding barrel with wrench, tighten lock nuts in place. Recheck length of assembly to be sure it is still 4.260 in ± 0.005 in/10.82 cm ± 0.13 mm (Fig. 10-5).

CAUTION: USING A PIECE OF 0.025 SAFETY WIRE, INSERT WIRE IN WITNESS HOLE OF BARREL TO BE SURE RIGHT HAND THREAD ROD END IS STILL TURNED IN PAST HOLE.

(12) If rod ends were replaced or if changes were made to the tail rotor rotating controls assembly hardware as a result of incorporating missing hardware, dynamic balance tail rotor assembly (Para. 10-3).



* WASHER THICKNESS, MATERIAL, AND QUANTITY MAY VARY DEPENDING ON DYNAMIC BALANCE REQUIREMENTS FOR THE TAIL ROTOR ASSEMBLY. REPLACE ANY AN960 WASHER WITH EQUIVALENT SIZE NAS1149C04XXR WASHER.

** INSTALL PITCH CHANGE LINK ROD END WITH ARROW POINTING TOWARD THE TAIL ROTOR BLADE (APPLICABLE TO AIRCRAFT MANUFACTURED OR MODIFIED WITH P/N 28-16391-3 OR P/N 28-16391-5 PITCH CHANGE LINK ASSEMBLY)

*** REPLACE AN960 WASHER WITH EQUIVALENT SIZE NAS1149C04XXR WASHER.

1. Bolt
2. Washer
3. Spacer
4. Pitch Change Link Rod End
5. Washer
6. Nut
7. Cotter Pin
8. Washer
9. Spacer
10. Spacer
11. O-ring
12. Pitch Change Link (28-16391-3 or -5 are shown in Fig. 10-4)
13. Washer

Figure 10-3. Tail Rotor Pitch Change Link Installation

Figure 10-4. Pitch Change Link Installation

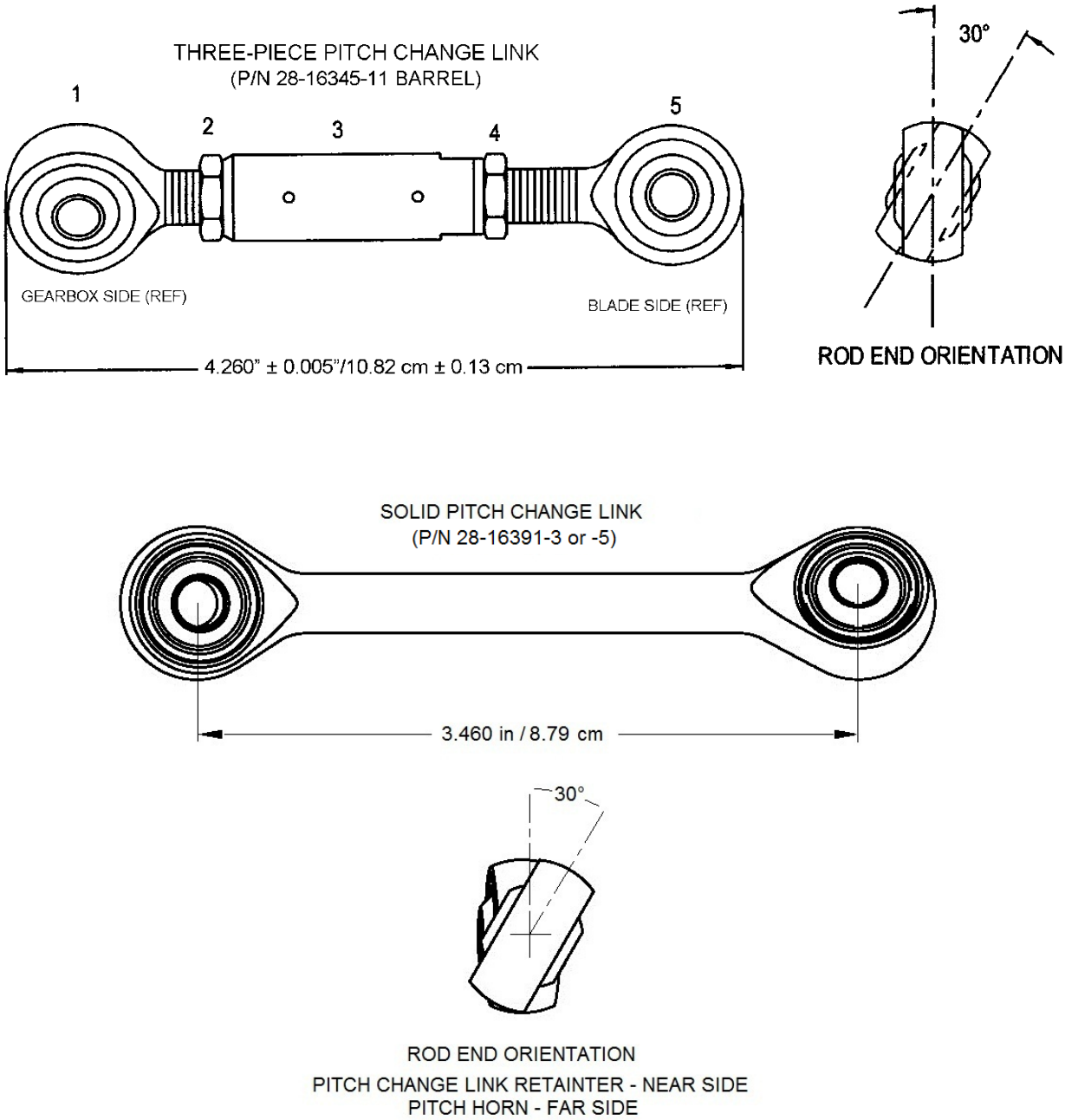


Figure 10-5. Tail Rotor Pitch Change Link

K. Installation – Tail Rotor Assembly

(1) Start a .041 wrap of safety wire around the hub.

NOTE: The tail rotor assembly may be rotated 180° or the center hub may be pivoted 180° to obtain the proper installation position of the tail rotor assembly.

NOTE: See Fig. 10-6. A line drawn through the grease fittings of either end of the teetering hub (tail rotor hub pivot center line) should align with the lagging ears of the pitch link retainer. If the tail rotor hub pivot centerline is centered between the ears of the pitch link retainer, rotate the teeter trunnion 180° to obtain the correct 8° alignment.

(2) Install tail rotor assembly onto transmission output shaft. Ensure center line of the tail rotor hub pivot axis aligns with the inboard side of the pitch change link retainer ear that lags in the direction of rotation.

(3) Feed safety wire through the hole in the teeter stop and install teeter stop so that the rubber bumpers align with the flats of the spindle.

(4) Install retention bolt and washer into teeter stop. Torque the retaining bolt to 300 in-lb/34.1 Nm and complete the safety.

(5) Connect pitch change links to the pitch change plates (Para. 10-1.J.(8)).

(6) Dynamically balance the tail rotor (Para. 10-3).

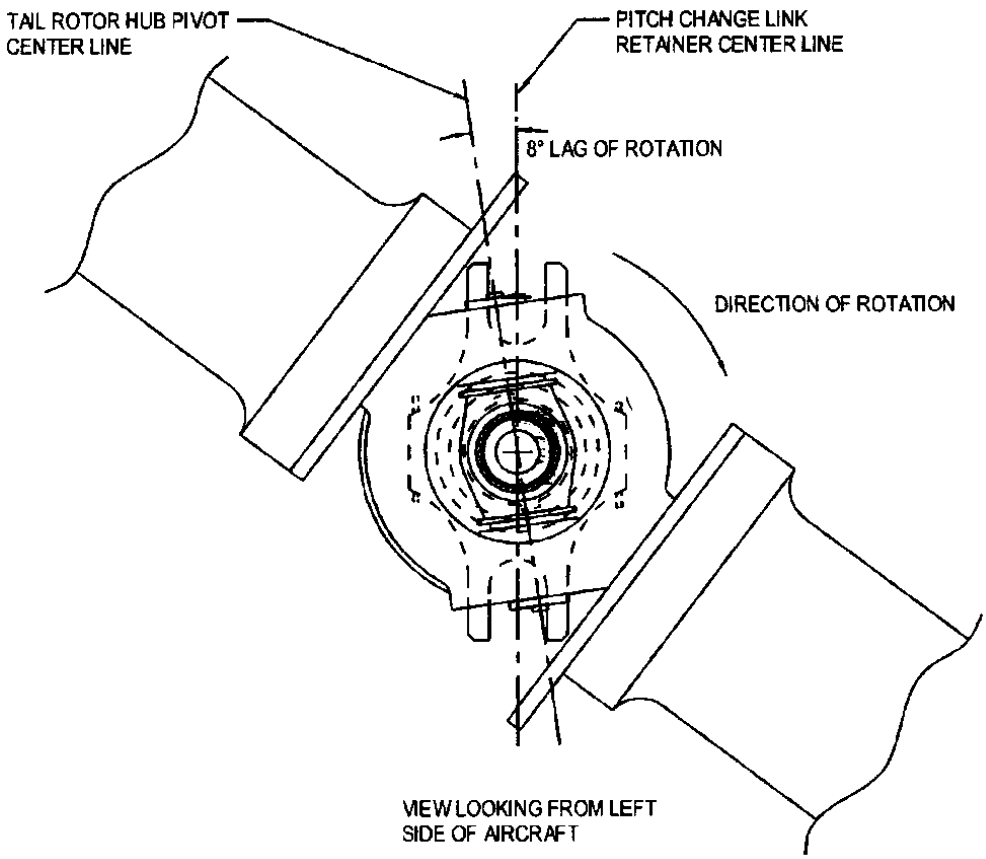


Figure 10-6. Tail Rotor Installation Orientation

Table 10-1. Inspection Requirements – Tail Rotor Assembly

Part Number	Fig. 10-1 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-150074-11, -13	1	Spindle	Surface scratches, nicks, or corrosion	None Allowed	≤ .001 deep	Polish with Scotch Brite pad or equivalent
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Spindle
			Feathering bearing shaft O.D. .7864 to .7868	-.0002	Not Repairable	Replace Spindle
			Teeter bearing bore Dia. 1.0002 to 1.0007	-.0002	Not Repairable	Replace Spindle
			Cracks	None Allowed	Not Repairable	Replace Spindle
28-150067-15	2	Hub	Splines (pitted or wicked)	None Allowed	Not Repairable	Replace Hub
			Teeter bearing shaft Dia. .4989 to .4994	-.0002	Not Repairable	Replace Hub
			Nicks, scratches, or corrosion	None Allowed	≤ .005	Blend out smooth
			Cracks	None Allowed	Not Repairable	Replace Hub
			Threads (stripped or missing)	None Allowed	Not Repairable	Replace Hub

Table 10-1. Inspection Requirements – Tail Rotor Assembly

Part Number	Fig. 10-1 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-150076-15	4	Journal	Journal I.D. .4995 to .4998	+.0002	Not Repairable	Replace Journal
			Journal O.D. .7509 to .7511	-.0002	Not Repairable	Replace Journal
B-1210	5	Needle Bearing	Bearing O.D. 1.000	-.0002	Not Repairable	Replace Bearing
			Visible wear of the needles	None Allowed	Not Repairable	Replace Bearing
28-150076-13	7	Thrust Bumper	Thickness .123 to .125	-.002	Not Repairable	Replace Bumper
28-150060-11	11	Pitch Change Plate	Nicks in edge of plate	None Allowed	≤ .005 deep	Polish and blend locally not to exceed .008
			Pitch link bolt hole Dia. .250 to .251	+.0005	Not Repairable	Replace pitch change plate
			Corrosion	None Allowed		Return to the factory for inspection and replating, or replace pitch change plate
			Cracks	None Allowed	Not Repairable	Replace pitch change plate
28-150063-11, -13	12	Sleeve	Sleeve I.D. .7878 to .7882 (-11)	+.0002	Not Repairable	Replace Sleeve
			Sleeve I.D. .7872 to .7876 (-13)	+.0002	Not Repairable	Replace Sleeve
			Sleeve O.D. 1.1245 to 1.1250	-.0002	Not Repairable	Replace Sleeve

Table 10-1. Inspection Requirements – Tail Rotor Assembly

P/N	Fig. 10-1 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
MR-18, ECD001-11	13	Bearing	Bearing O.D. 1.6250	+.0000 -.0005	Not Repairable	Replace Bearing
			Visible wear of the rollers	None Allowed	Not Repairable	Replace Bearing
28-150055-13, -15	14	Retainer	Retainer I.D. 1.6250 to 1.6255 (-13)	+.0005	Not Repairable	Replace Retainer
			Retainer I.D. 1.6240 to 1.6247 (-15)	+.0005	Not Repairable	Replace Retainer
			Retainer O.D. 2.043 to 2.044	-.001	Not Repairable	Replace Retainer
ECD002-11, -13, -15, -17	15	Bearing	Bearing O.D. 2.0467 to 2.0472	-.0002	Not Repairable	Replace Bearing
			Bearing Bore Dia. .7870 to.7874	+.0002	Not Repairable	Replace Bearing
			Preload to the trust side and check for roughness or ratcheting	None Allowed	Not Repairable	Replace Bearing
SL61N5P SL61N5F	16	Nut	Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut
			Nicks and burrs on O.D.	None Allowed	≤ .10 deep	Blend and polish out smooth
			Rounded or burred locking tabs	Max. 2 slightly rounded tabs	To allow use of the locknut wrench	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Nut

Table 10-1. Inspection Requirements – Tail Rotor Assembly

P/N	Fig. 10-1 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
SL61W5P	17	Lockwasher	Nicked locking tabs	None Allowed	≤ .005 deep	Blend and polish out smooth
			Bent locking tabs	> 10° from parallel to the bore	≤ 10° from parallel to the bore	Bend the tabs until parallel to the bore
			Serrated splines (smooth or rolled)	None Allowed	Not Repairable	Replace Lockwasher
28-15033	18	Bumper	Both sides for friction wear	Surfaces must be smooth	Not Repairable	Replace Bumper
			Cracks	None Allowed	Not Repairable	Replace Bumper
28-150001-5	19	Blade and Grip Assembly	Blade Grip:			
		Note 1	Bearing bore Dia. 2.0454 to 2.0466	+.0005	Not Repairable	Replace Blade and Grip Assembly
			Nicks, scratches, or corrosion in the bearing housing area of the grip	.020 deep	≤ .020 deep	Blend and polish out smooth, treat with chemical conversion coating
			Nicks, scratches, or corrosion in the blade retention area or the grip	.010 deep	≤ .010 deep	Blend and polish out smooth, brush with iridite finish
			Cracks	None Allowed	Not Repairable	Replace blade and grip assembly

Table 10-1. Inspection Requirements – Tail Rotor Assembly

P/N	Fig. 10-1 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-150001-5	19	Blade and Grip Assembly (Cont'd) Note 1	Blade:			
			Doubler Separation	None Allowed	See Para.10-1.G	See Para.10-1.G
			Leading edge bond separations	None Allowed	See Para.10-1.G	See Para.10-1.G
			Trailing edge bond separations	None Allowed	See Para.10-1.G	See Para.10-1.G
			Sharp dents or scratches in the blade skin	None Allowed	See Para.10-1.G	See Para.10-1.G
			Smooth dents in the blade skin	.020 deep, not to exceed 1.0" in Dia.	See Para.10-1.G	See Para.10-1.G
			Bent, distorted or rippled blades	None Allowed	Not Repairable	Replace Blade
			Smooth dents in the leading edge	Not to exceed .020 deep	See Para.10-1.G	See Para.10-1.G
			Sharp dents or scratches in the leading edge	None Allowed	See Para.10-1.G	See Para.10-1.G
28-15030-1	29	Teeter Stop	Rubber bumpers for deterioration or cracks	Excessive cracking or deterioration	Not Repairable	Replace Bumper
			Nicks, scratches, or corrosion	.010 deep	≤ .010 deep	Replace Teeter Stop

Note 1 - If the blade is attached to the grip using 1/4" bolts, a new grip or blade can be installed by Enstrom. The blade and grip assembly will have 5/16"bolts installed. Both of the blade and grip assemblies must have the same size retaining bolts. Do not intermix blade and grip assemblies that have different size retaining bolts.

* All dimensions are in inches.

10-2 STATIC BALANCE

A. Balance Procedure

NOTE: Refer to Fig. 10-1 for numbered items.

(1) Remove bolt (26), washers (27), and nut (28) from the pitch arms if installed.

(2) Install balance mandrel, T-0087-15, through the hub (2). Align plates of the mandrel with the flats of the spindle and with the recesses in the plates in toward the hub.

(3) Rotate blades so that the leading edge of the blades align with the teeter bearings in the spindle (1).

(4) Align pitch arm plates (11) with hole in mandrel and install the bolt through the pitch arms and mandrel. Install the nuts finger tight and ensure the bolt is centered when finished.

(5) Install assembly onto the balancing stand in the vertical position to obtain the chordwise balance (Fig. 10-7).

(6) Determine which direction the lower blade tends to rotate. Rotate the assembly 180° and repeat.

NOTE: If the trailing edge of the blade rises, this is the light blade. If the leading edge of the blade rises, this is the heavy blade.

(7) Rotate assembly 180° and repeat.

(8) Install a short plug screw in the root end of the heavy blade.

NOTE: Use AN515-10 screws of various lengths for balancing.

(9) Install the length of screw and as many AN960-10 or -10L washers as required in the root of the light blade until the assembly will remain stationary in the vertical position.

NOTE: The maximum length of the screw is 3 inches and maximum washer stack up is .5 in/12.7 mm.

(10) If tail rotor assembly will not balance with the maximum weight allowed, adjust the shimming of the center hub (2) by removing a shim (8) from under the teeter bearing end cap (9) on the side of the heavy blade and installing it on the side with the light blade. Use the thinnest shim installed and repeat the chordwise balancing procedure.

(11) Place assembly in the horizontal position to obtain the spanwise balance (Fig. 10-7).

(12) Install a short screw in the heavy blade.

(13) Install the length of screw and amount of washers required until the assembly will remain stationary in the horizontal position. Rotate the assembly 180° and recheck.

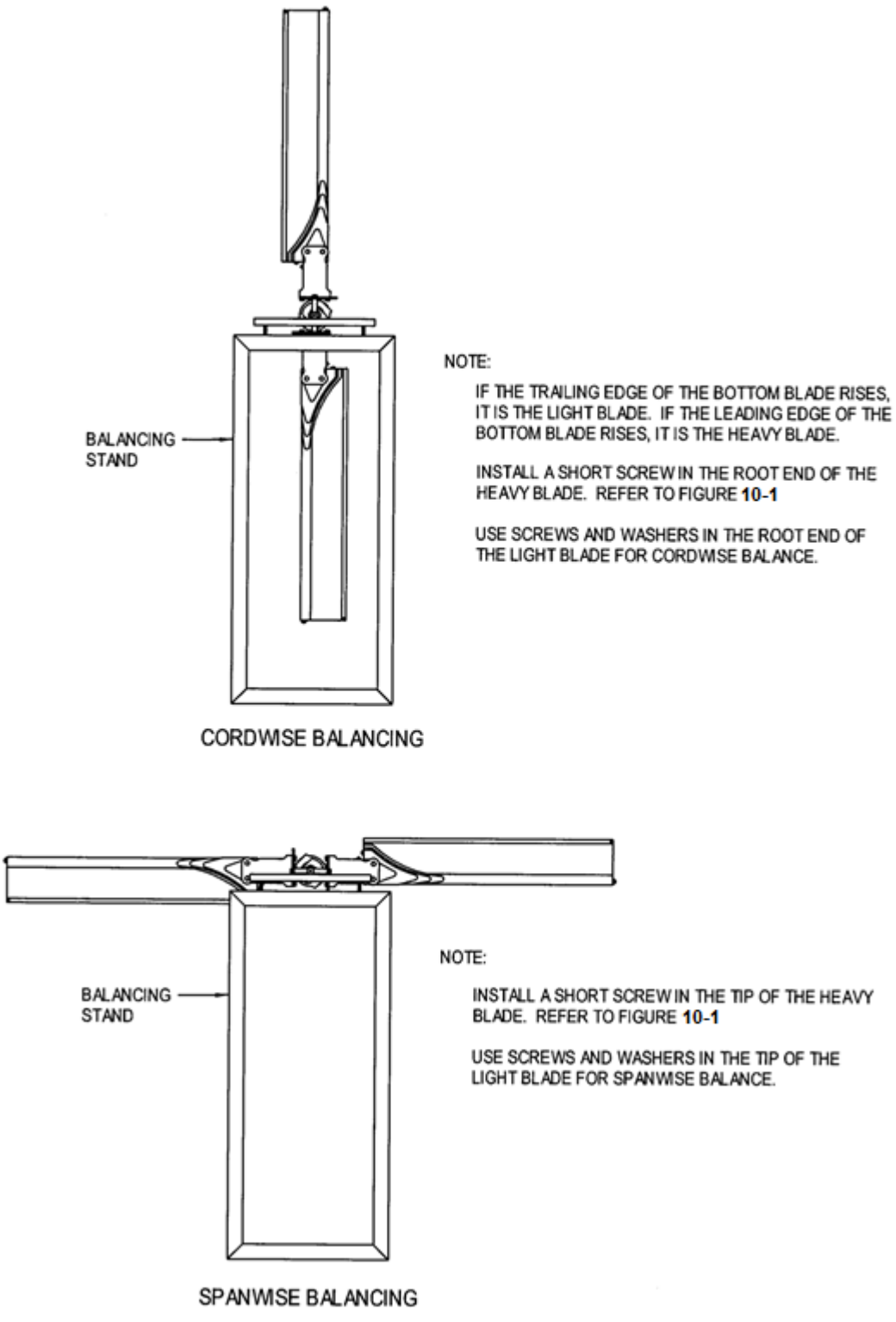


Figure 10-7. Tail Rotor Static Balancing

(14) Recheck static balance at the vertical and 45° positions.

(15) Install strike tabs and tighten all screws.

(16) Remove assembly from the balance fixture and remove the balancing mandrel.

(17) Install bolt (26), washers (27), and nut (28) into pitch arm plate (11). Ensure the head of the bolt is on the inboard side of the plate.

(18) Assembly is ready for installation on the aircraft.

NOTE: It is recommended that all tail rotor assemblies be dynamically balanced on the helicopter.

10-3 TRACKING AND DYNAMIC BALANCE

NOTE: It is not necessary to track the tail rotor blades on Enstrom tail rotor assemblies. Earlier tail rotor assemblies with the 3 piece pitch links should be set to an overall length of 4.26 in/10.82 cm in accordance with Fig. 10-5.

NOTE: The Honeywell-Chadwick 2000 system is described in the following instructions. Follow the operating instructions for the equipment being used if different than the following instructions.

NOTE: The procedure below should work for any of the digital balance systems but if the Velocimeter is installed in the vertical orientation, the polar chart will have to be rotated to compensate.

A. Tracking and Balancing Equipment Installation:

(1) Install optical sensor into the tail rotor balance fixture T-0152.

(2) Install velocimeter onto the right side of the tail rotor transmission under the tail rotor guard mounting nut. The velocimeter should be in a horizontal position with the connector pointing aft (Fig. 10-8).

(3) Connect velocimeter and optical sensor cables and wrap the cable around the stinger tube, around the right side horizontal stabilizer, the right rear oleo, and then into the right side cabin door. Secure the cables to the stinger tube, tailcone, and landing gear with tape.

(4) Install a 1.5 inches piece of reflective tape on one of the grips lengthwise. This will be the target blade (Fig. 10-9).

(5) Connect velocimeter and optical sensor cables to the Balancer box in accordance with the manufacturer’s instructions.

Figure 10-8. Velocimeter and T-0152 Installation

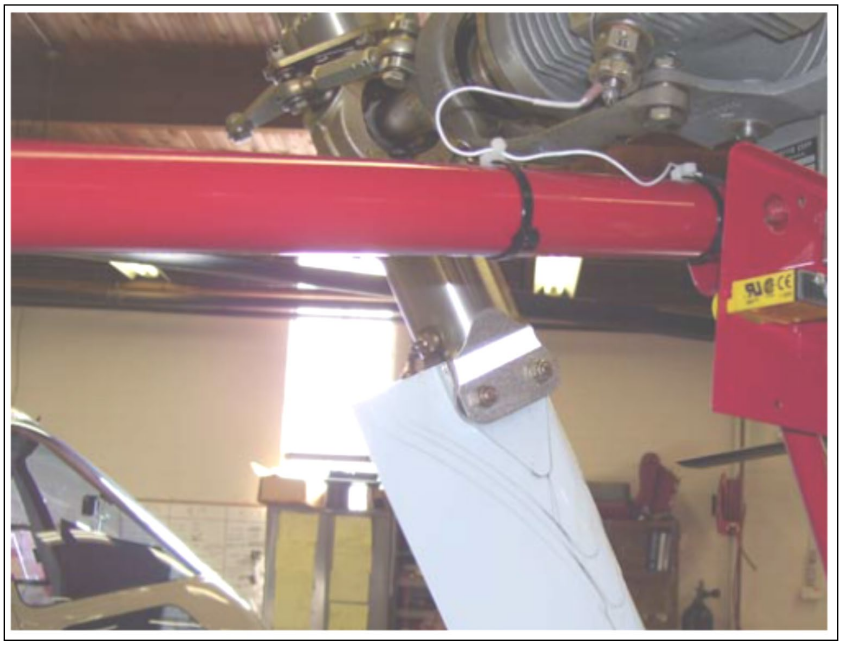


Figure 10-9. Reflective Tape Installed on the Target Blade

B. Tail Rotor Balance Procedure:

WARNING: THE FOLLOWING STEPS ARE TO BE PERFORMED BY AUTHORIZED PERSONNEL.

(1) Position helicopter so the tail rotor transmission output shaft is pointing into the wind (either upwind or downwind).

(2) Ground run the aircraft at 350 main rotor RPM with the tail rotor pedals neutral.

(3) Using the procedures provided by the operation instructions, obtain a clock angle and ips reading from the balance box.

(4) End ground run to stop the blades from turning.

(5) Plot ips reading and clock angle on the tail rotor balance chart (Fig. 10-10).

NOTE: If more than five washers are required on the pitch change link bolts, the teeter hub can be shifted to move the balance fulcrum (Para. 10-3.D). On early production tail rotors, with KP8A or KRP8A( ) bearings, the tail rotor must be removed to shift the teeter hub. On current production tail rotors, the teeter trunnion can be shifted without removing the tail rotor from the helicopter.

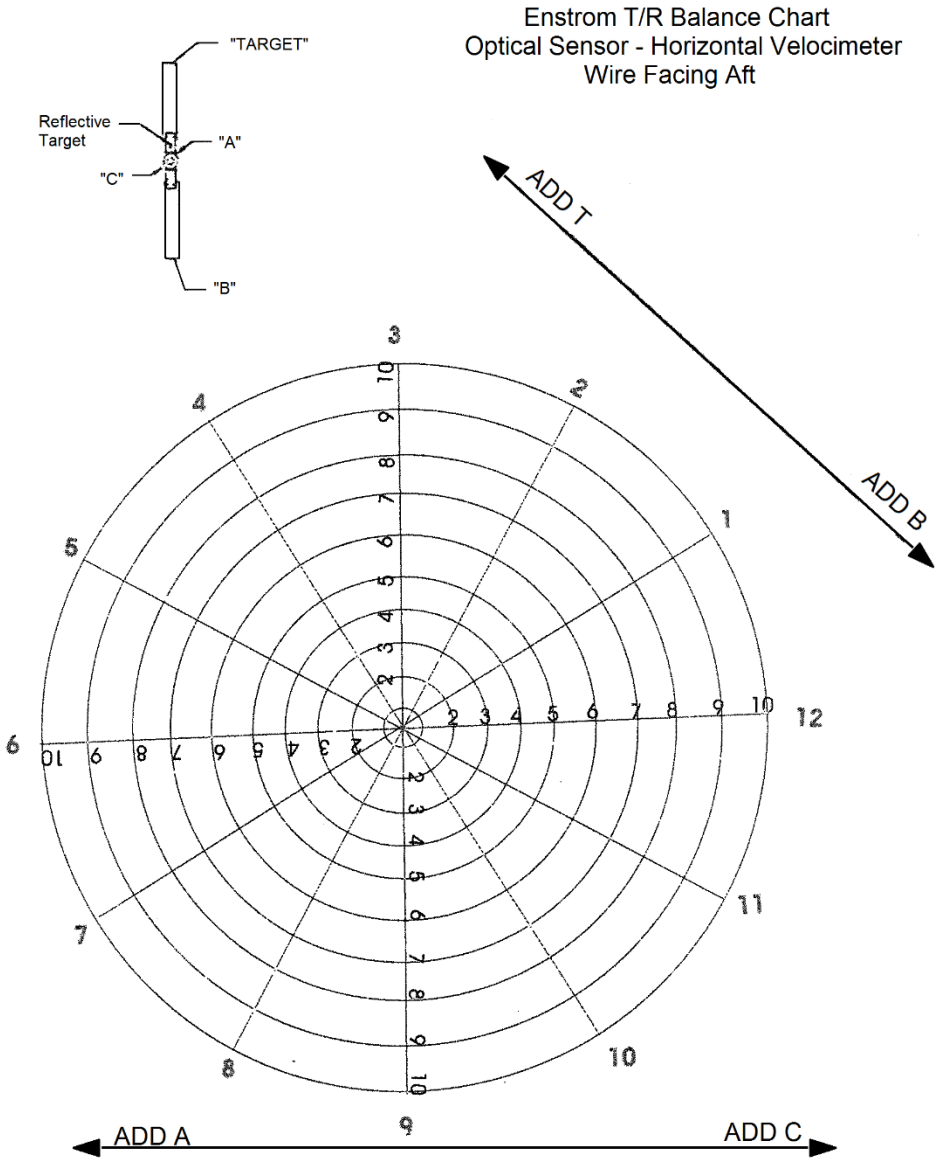
CAUTION: IF ADDING OR SUBTRACTING WASHERS FROM THE PITCH CHANGE LINK BOLTS, ENSURE THE CORRECT GRIP LENGTH BOLT IS INSTALLED AND ACCOUNT FOR THE WEIGHT CHANGE OF THE BOLT DURING THE BALANCING PROCEDURE.

NOTE: If the tail rotor is difficult to balance, plot the move lines for both the tip weights and the pitch link weights. If the two move lines are parallel or don't intersect, then remove the tail rotor from the gearbox, turn it 180° and re-install it. It will also be necessary to rotate the trunnion 180° to maintain the 8° lag of rotation (Fig. 10-6).

(6) Add weight in accordance with the chart (Fig. 10-10) and check the clock angle and ips reading of the tail rotor. If the move line of the weight change does not coincide with the move lines on the chart, use the "Clock Angle Correction" procedure (Para. 10-3.C).

(7) Continue tail rotor balance procedure until the ips reading is 0.2 ips or less.

(8) Remove tracking and balancing equipment from the aircraft.



Run	Clock	IPS	Move	Notes
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Figure 10-10. Tail Rotor Balancing Chart

C. “Clock Angle Correction” Procedure

(1) Obtain ips reading and clock angle using the procedure in Para. B.

(2) As an example, the following results were obtained: Run 1, ips .55 @ 4:30 clock angle.

(3) Plot Run 1 on the tail rotor polar chart (Fig. 10-11).

(4) Add a small washer (AN960-10L) to the tip at “B”.

(5) Run helicopter again and record the ips reading and clock angle. In this example the following results were obtained: Run 2, 4.5 ips @ 6:30 clock angle.

(6) Plot Run 2 on the chart (Fig. 10-12).

(7) Since the move line between Run 1 and Run 2 did not follow the chart in the expected direction, a correction must be made to the positions of the tip weight line and pitch link weight line relative to the clock orientation.

(8) Drawn a line between plot 1 and plot 2. Label the line “add B”.

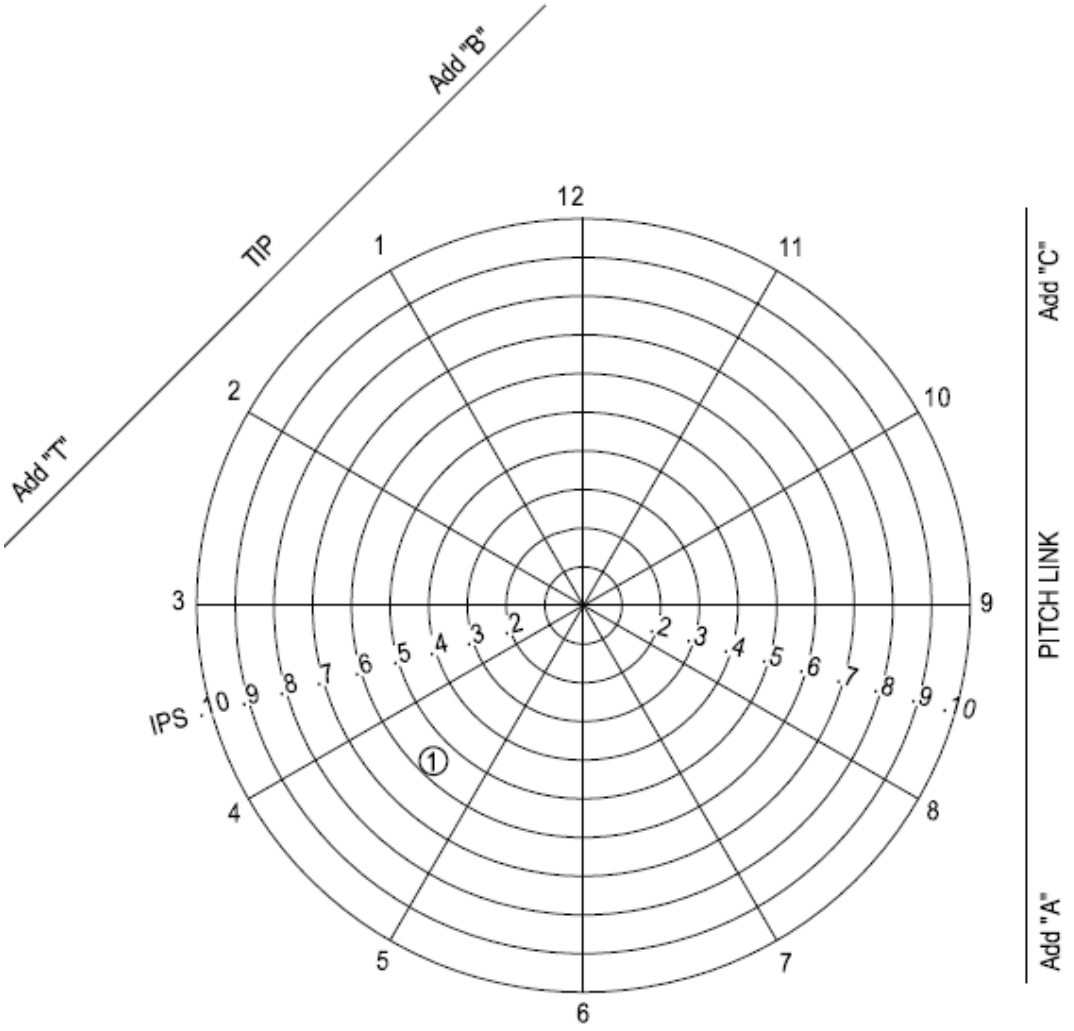
(9) Rotate tip weight line approximately 45° clockwise to reflect the actual results of the first weight change.

(10) The relationship between the tip weight line and the pitch link weight line should remain constant; therefore, the pitch link weight line can be rotated 45° clockwise (Fig. 10-13).

(11) Re-plot original target reading (Fig. 10-14).

(12) Remove the AN960-10L washer from tip B and add three 1/4 harper washers to the pitch link position C.

(13) Run helicopter again and record the ips reading and clock angle. The following results were obtained: Run 3, .18 @ 6:00 clock angle (Fig. 10-14).



RUN	IPS/CLOCK	
# 1	5.5 @ 4:30	add AN960-10L to B

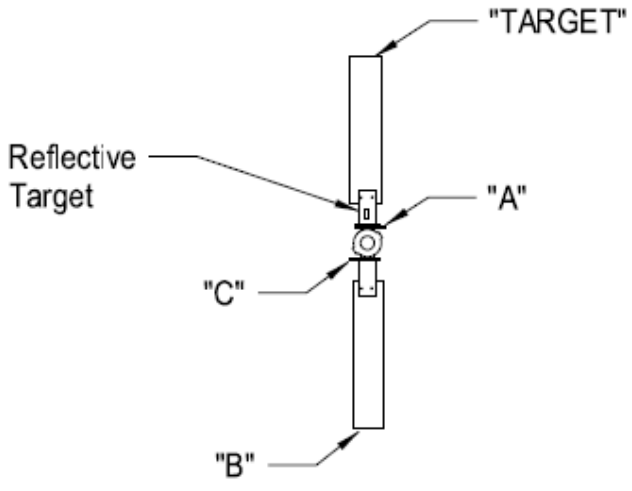
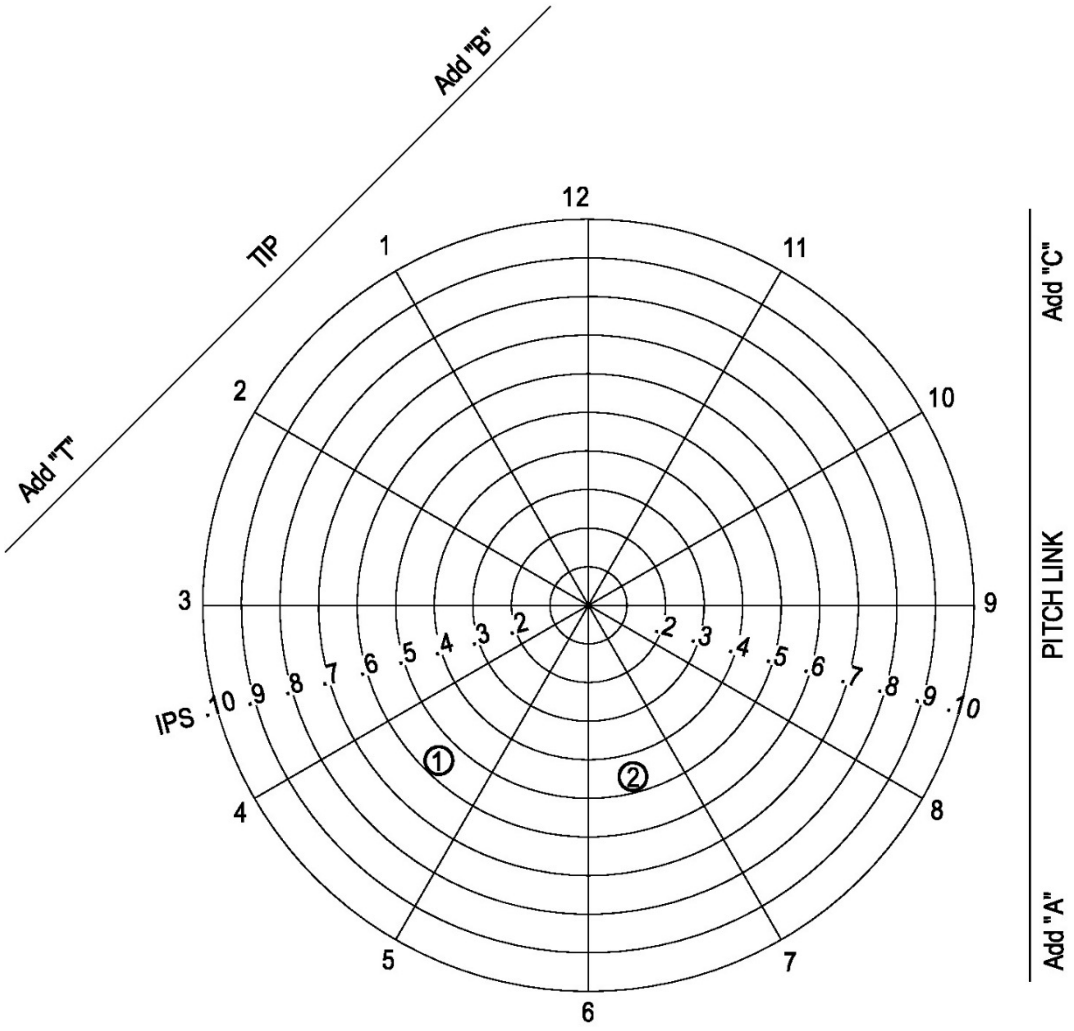


Figure 10-11. Tail Rotor Clock Angle Correction Example



RUN	IPS/CLOCK	CORRECTIVE ACTION
#1	5.5 @ 4:30	add AN960-10L to B
#2	4.5 @ 6:30	

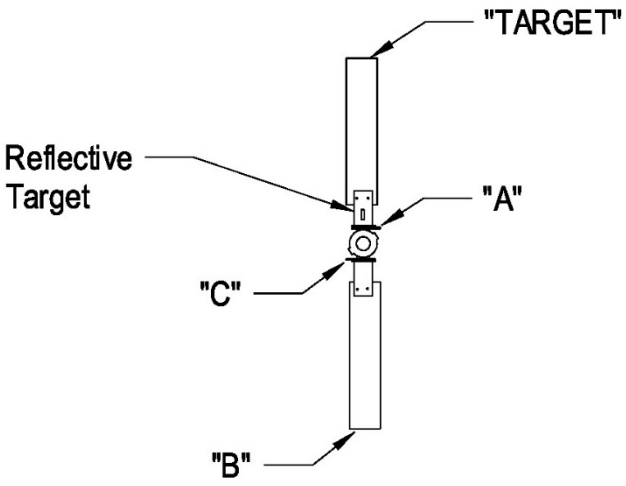
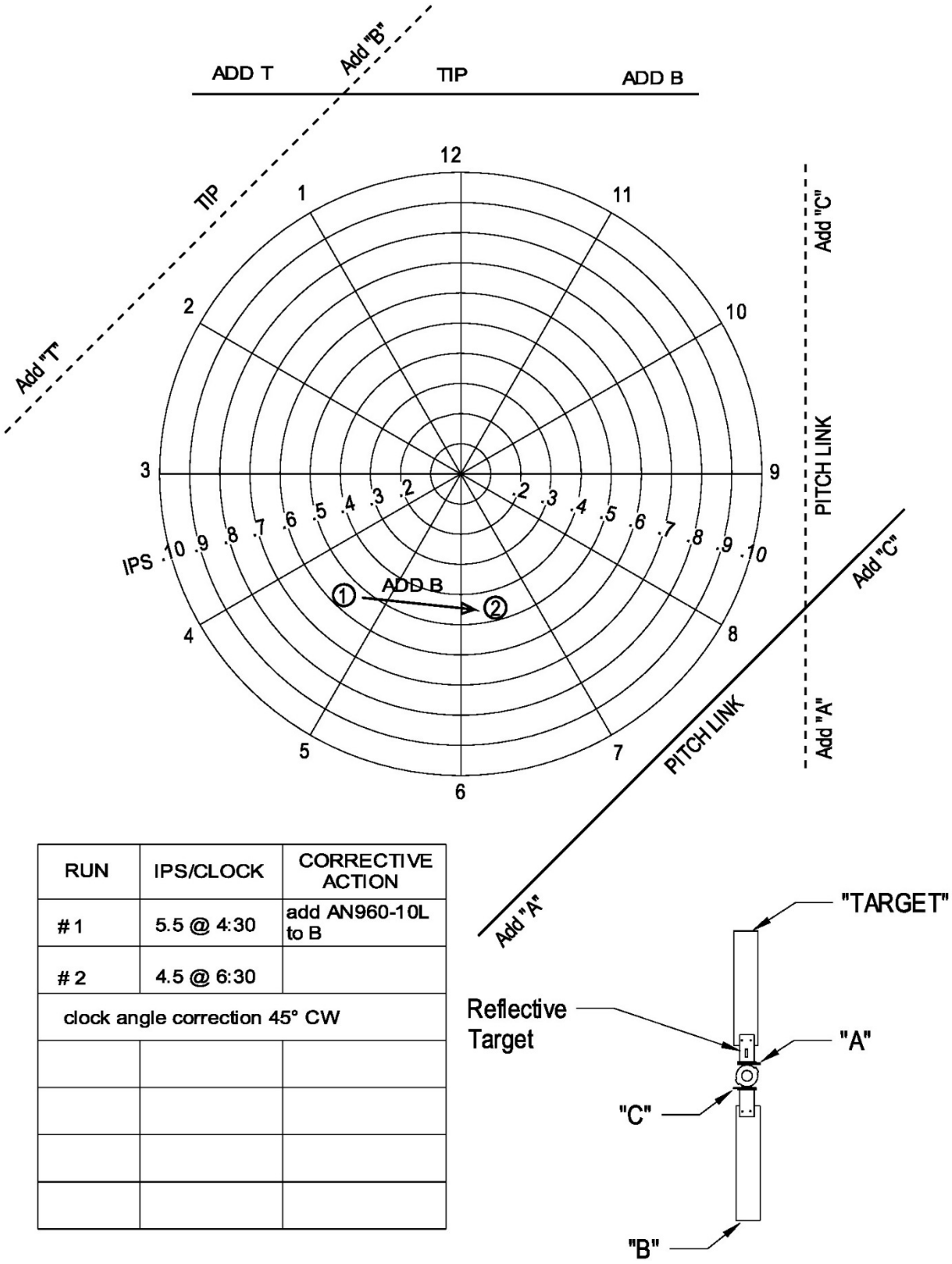
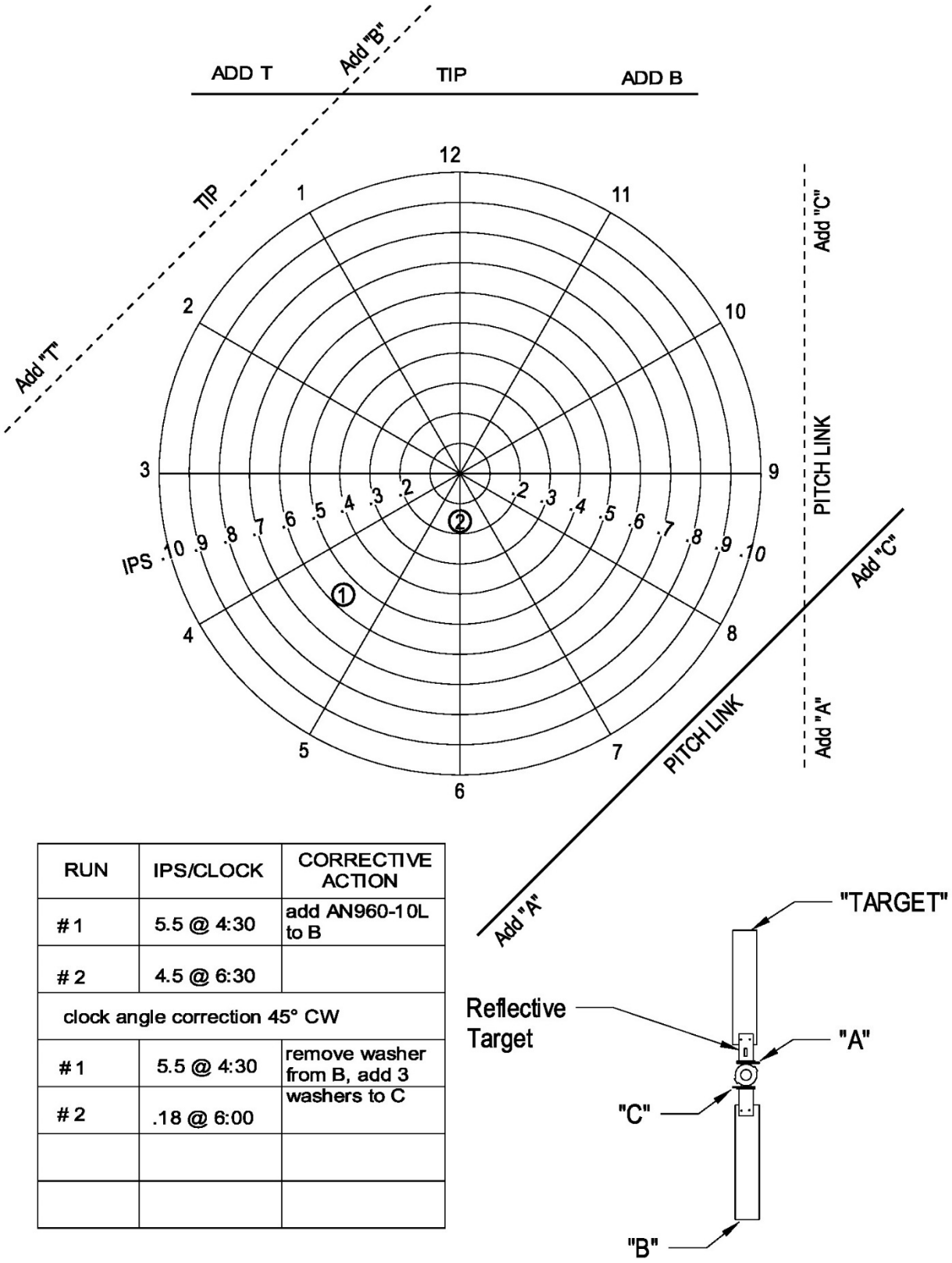


Figure 10-12. Tail Rotor Clock Angle Correction Example



RUN	IPS/CLOCK	CORRECTIVE ACTION
# 1	5.5 @ 4:30	add AN960-10L to B
# 2	4.5 @ 6:30	
clock angle correction 45° CW		

Figure 10-13. Tail Rotor Clock Angle Correction Example



RUN	IPS/CLOCK	CORRECTIVE ACTION
#1	5.5 @ 4:30	add AN960-10L to B
#2	4.5 @ 6:30	
clock angle correction 45° CW		
#1	5.5 @ 4:30	remove washer from B, add 3
#2	.18 @ 6:00	washers to C

Figure 10-14. Tail Rotor Clock Angle Correction Example

D. Teeter Trunnion Shimming Procedure

NOTE: Refer to Fig. 10-1 for numbered items.

NOTE: If more than five harper washers are required to balance the tail rotor in the chordwise axis, it may be necessary to shift the teeter hub to move the balance fulcrum.

NOTE: This procedure can be completed with the tail rotor installed on the helicopter and it is not necessary to disconnect the pitch change links from the tail rotor retention plate.

(1) From the previous example (Para. 10-3.C.(12)), the out-of-balance could be corrected by shifting the teeter hub (changing the balance fulcrum) rather than adding weight to the pitchlink.

(2) The chart calls for adding weight to the pitchlink at point A, which indicates that C is the heavy side of the blade in the vertical (chordwise) balance axis.

NOTE: This procedure can be completed with the tail rotor installed on the helicopter and it is not necessary to disconnect the pitch change links from the tail rotor retention plate.

(3) Remove retaining ring (10) from the tail rotor spindle at the position closest to point C.

(4) Remove end cap (9) and the seal (6). Use caution not to drop the thrust bumper (7) and the shims (8) as they may remain in the cap or stuck to the spindle.

(5) It may be necessary to insert a sharp hooked pick into the center hole of the thrust bumper (7) to withdraw it from inside the cap.

(6) Remove a 0.002 inch or 0.003 inch shim (8) from under the cap and carefully set it aside.

(7) Install shims (8), seal (6), cap (9), and the retaining ring (10) back into the spindle.

(8) Add the 0.002 inch or 0.003 inch shim previously removed from the C side to the shims (8) on the A side of the tail rotor spindle and reassemble the spindle.

(9) Ensure retaining ring is securely seated in the grooves on both sides of the spindle and there is no end play.

(10) Continue with balance procedure.

10-4 TAIL ROTOR PITCH CONTROL ASSEMBLY

NOTE: Refer to Fig. 10-15 for numbered items unless stated otherwise.

A. Removal – Pitch Control

(1) Disconnect pitch change links from pitch link retainer (18).

(a) Remove bolt (1), washer (2), spacers (3), washer (5), and nut (6) to disconnect the pitch change link (4) (Fig. 10-3, right).

(2) Remove tail rotor assembly (Para. 10-1.C).

(3) Remove bolt (5), washers (6) and (8), and nut (9) from the pitch control and control brackets (1) and (2).

NOTE: The stainless steel washers (6) located between the control brackets and iolite bushings of pitch control assembly must be saved for reinstallation.

NOTE: Extra force may be required to slide the pitch change mechanism off the tail rotor output shaft because the keys will force the seal retainer from the pitch change bearing.

(4) Slide pitch control assembly off of chrome sleeve on the tail rotor transmission output shaft.

(5) Remove keys (11), seal retainer (13) and seal (12), from the sleeve.

(6) Disconnect tail rotor control cables from pivot brackets (Fig. 10-30).

(7) Remove bolts (3) and washers (4) securing the pivot brackets (1) and (2) together. Remove the brackets from the transmission.

B. Disassembly – Pitch Control

(1) Remove cotter pins (20) from the retainer (18).

(2) Place pitch link retainer (18) in a small arbor press and press dowel pin (19) through retainer and pitch control bearing (14).

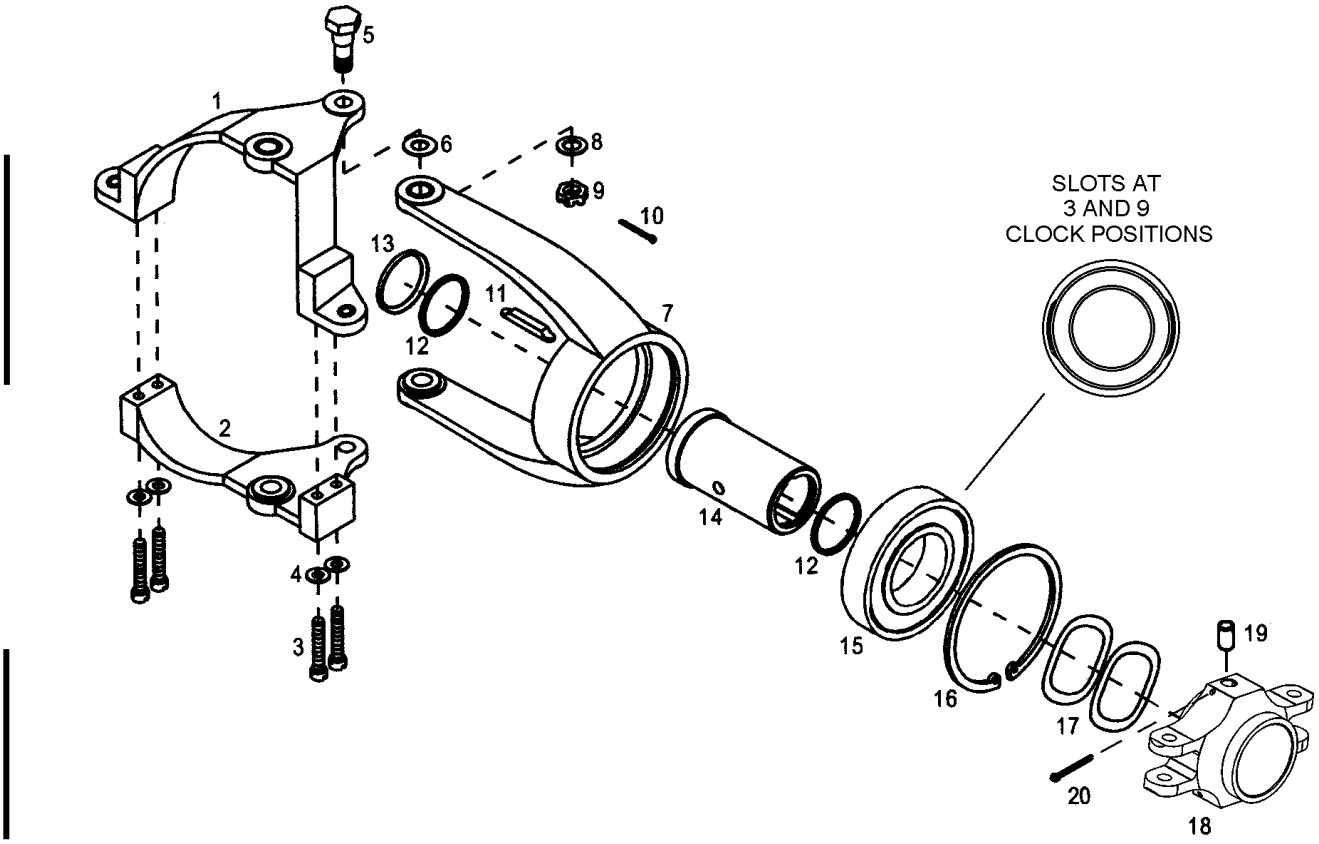
(3) Rotate the retainer and repeat for the opposite pin.

CAUTION: USE A PRESS TOOL THAT EXACTLY FITS THE BRONZE PITCH CONTROL BEARING OR DAMAGE WILL OCCUR TO THE BEARING. HEAT THE BEARING HOUSING AND PITCH CHANGE RETAINER TO 230°F/110°C WITH A HEAT GUN BEFORE ATTEMPTING TO PRESS THE PITCH CONTROL BEARING FROM THE BEARING HOUSING AND THE PITCH CHANGE RETAINER.

(4) Gently press pitch control bearing (14) from the pitch link retainer (18), wave spring washers (17), and bearing (15).

(5) Remove seal (12) from the outboard end of the pitch control bearing (14).

(6) Remove retaining ring (16).



1.	Upper Bracket	11.	Key
2.	Lower Bracket	12.	Seal
3.	Screw	13.	Seal Retainer
4.	Washer	14.	Pitch Control Bearing
5.	Bolt	15.	Bearing
6.	Washer	16.	Retaining Ring
7.	Bearing Housing	17.	Spring Washer
8.	Washer	18.	Pitch Link Retainer
9.	Nut	19.	Pin
10.	Cotter Pin	20.	Cotter Pin

Figure 10-15. Tail Rotor Pitch Control Assembly

WARNING: USE EXTREME CAUTION WHEN REMOVING OR INSTALLING THE BLADE AND GRIP ASSEMBLIES TO PREVENT FROM INJURING PERSONNEL.

WARNING: USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.

(7) Heat bearing housing (7) to approximately 250°/121°C. Gently tap the bearing (15) from the housing.

(8) Clean parts for inspection.

C. Inspection – Pitch Control

(1) See Table 10-2 for the detailed inspection requirements for the tail rotor pitch control assembly.

D. Assembly – Pitch Control

WARNING: USE EXTREME CAUTION WHEN REMOVING OR INSTALLING THE BLADE AND GRIP ASSEMBLIES TO PREVENT FROM INJURING PERSONNEL.

WARNING: USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.

(1) Heat bearing housing (7) to approximately 250°F/121°C. Install bearing (15) into the housing with the slots for removing the inner bearing section facing outboard towards the pitch change link retainer and oriented 90° to the pivot arms of the bearing housing.

(2) Install retaining ring (16) with opening in line with one of the bearing housing (7) pivot arms.

(3) Press pitch control bearing (14) into the bearing (15) in the outboard direction.

(4) Install two wave spring washers (17) onto the pitch control bearing (14).

NOTE: Assembly of the pitch link retainer and bearing can be facilitated by using alignment pins (0.75 in/1.9 cm max. length) fabricated from 1/4 inch bolts (1.5 in long bolt; head and threads removed).

CAUTION: USE GLOVES WHEN HANDLING HEATED PARTS.

(5) Heat pitch link retainer (18) to approximately 230°F/110°C and slide it over the bearing (15). Insert the two alignment pins to align the bearing with the pitch link retainer. When the retainer has cooled, push the alignment pins into the inside of the bushing to remove.

NOTE: If pin holes do not completely line up, gently tap the ear of the pitch link retainer with a plastic mallet until the holes line up.

(6) Press dowel pin (19) into pitch link retainer (18). Rotate retainer and repeat.

NOTE: Seat dowel pins into the pitch link retainer far enough that the cotter pins can be installed. The pins must not extend through the pitch control bearing.

NOTE: Installation of the dowel pins may distort the bottom surface of the pitch control bearing. Check that the inside bearing surface is free of distortion after installing the pins.

(7) Install cotter pins (20) into pitch link retainer (18).

(8) Install the pitch change assembly onto the tail rotor gearbox output shaft to ensure that it will slide on the chrome shaft without binding. It is common for the bronze pitch control bearing (5) to be slightly distorted on the inside in the area of the pins. If this is the case, use a fine tooth (1/2) round file to dress the bearing so it will slide freely.

(9) Install seal (12) into outboard groove of pitch control bearing (14).

E. Installation – Pitch Control

(1) Install pivot brackets (1) and (2) onto the tail rotor transmission. Install bolts (3) and washers (4), torque, and lockwire (.025).

CAUTION: THE CONNECTING LINKS MUST PIVOT FREELY AT THE CABLE CONNECTIONS AND AT THE BELLCRANK AND PITCH CONTROL ASSEMBLY CONNECTIONS.

(2) Connect tail rotor control cables to the pivot brackets.

(3) Slide seal retainer (13) and seal (12) onto the chrome sleeve.

(4) Install keys (11) in slots of sleeve.

(5) Align keyway in pitch control bearing (14) with keys (11) and slide the pitch control assembly onto the chrome sleeve.

(6) Install stainless steel washers (6) between the pivot brackets and the arms of the bearing housing.

(7) Install pivot bolts (5) connecting the brackets to the bearing housing. Install the washers (8) (typically one AN960-6 and one AN960-6L) and locknuts (9). Torque the nuts and align the cotter pin holes. Install the cotter pins (10) and cycle the pivot brackets to check for interference.

(8) Cycle control brackets ensure the pitch control assembly pivots and slides freely.

NOTE: The heads of the pivot bolts must rotate when control brackets are moving. If they do not rotate, check for binding in the bushings.

(9) Install seal (12) into the seal retainer (13). Install the seal retainer into the recessed area of pitch control bearing (14) using tool T-0140. Alternatively, the seal may be installed by tapping it with a small punch.

(10) Install tail rotor assembly (Para. 10-1.K).

(11) Connect pitch change links to the pitch change retainer (Para. 10-1.J.(7)).

NOTE: Omit steps (12) and (13) if no major components of the pitch control assembly were replaced.

(12) Check tail rotor control rigging (Para. 10-7.A).

INTENTIONALLY LEFT BLANK

Table 10-2. Inspection Requirements – Tail Rotor Pitch Control Assembly

Part Number	Fig. 10-15 Item Number	Part Name	Inspect*	Serviceable Limits*	Repair Limits*	Repair or Action
28-16331-1	7	Bearing Housing	Bearing bore 2.6774 to 2.6779	+.0002	Not Repairable	Replace Housing
			Oilite bushing I.D. .3755 to .3765	+.0005	Not Repairable	Replace Housing
			Surface nicks and scratches	None Allowed	≤ .020 deep	Blend and polish out smooth
T-533-023, TS-023	12	Seal	Visual for cuts or tears	None Allowed	Not Repairable	Replace Seal
28-16394-2, -11	14	Pitch Control Bearing	Bronze O.D. 1.3777 to 1.3781	-.0005	Not Repairable	Replace Bearing
			Bore Dia. 1.079 to 1.081	+.001	Not Repairable	Replace Bearing
			Keyway width .1875 to .1895	+.0005	Not Repairable	Replace Bearing
			Dowel pin holes .2450 to .2470 (-2)	+.003	Not Repairable	Replace Bearing
			Dowel pin holes .2490 to .2495 (-11)	+.0005	Not Repairable	Replace Bearing
			Distortion of bore	None Allowed	Not Repairable	Replace Bearing

Table 10-2. Inspection Requirements – Tail Rotor Pitch Control Assembly

Part Number	Fig. 10-15 Item Number	Part Name	Inspect*	Serviceable Limits*	Repair Limits*	Repair or Action
107-KSZZ6, ECD016-11	15	Bearing	O.D. 2.6772	+.0000/-.0005	Not Repairable	Replace Bearing
			I.D. 1.3780	+.0005/-.0000	Not Repairable	Replace Bearing
			Axial movement of the inner race to the outer race	.002	Not Repairable	Replace Bearing
			Ratcheting or roughness	None Allowed	Not Repairable	Replace Bearing
5002-268-PP	16	Retaining Ring	Check for flatness	No Distortion	Not Repairable	Replace Retaining Ring
W1819-020	17	Wave Spring Washer	Check for wave contour	No Flat Spots	Not Repairable	Replace Washer
28-16392-13	18	Pitch Link Retainer	Bore 1.3782 to 1.3787	+.0002	Not Repairable	Replace Retainer
			Dowel pin holes .2490 to .2495	+.0002	Not Repairable	Replace Retainer
			Pitch link retainer bolt holes .250 to .251	+.0005	Not Repairable	Replace Retainer
			Surface nicks and scratches	None allowed	≤ .010 deep	Blend and polish out smooth
28-16397-11	19	Dowel Pin	O.D. .2495 to .2505	-.0005	Not Repairable	Replace Pin

* All dimensions are in inches.

10-5 TAIL ROTOR GEARBOX

A. General Description – Tail Rotor Gearbox

The tail rotor gearbox consists of an aluminum cast housing for a 90° degree miter gear drive, with integral cast mount and control pivot bosses. The gearbox mechanical input is an independently mounted shaft and gear assembly that is retained by a matched pair of duplex ball bearings. The gearbox output to the tail rotor assembly is an internally mounted shaft and gear assembly that is retained by another pair of matched duplex ball bearings.

The tail rotor gearbox is equipped with a magnetic chip detector located in the rear of the bottom of the gearbox. This unit comprises a magnetic plug which locks into a self-sealing base. If the tail rotor gearbox chip light illuminates, follow the procedures in Para. 4-62.B. See Para. 10-5.1 for instructions for removing and inserting the magnetic plug.

B. Troubleshooting – Tail Rotor Gearbox

Problem	Possible Cause	Required Action
Gearbox running hot	Low on oil	Add oil, check sight plug for proper level
	Bad internal bearing	Return to factory or overhaul facility for inspection
Oil leakage	Worn input or output seal shaft	Replace seal
Roughness in bearing operation	Worn or pitted bearings	Return to factory or overhaul facility for inspection
Excessive TIR check on output shaft (.005 max.)	Gearbox sudden stoppage or tail rotor strike	Return for gearbox overhaul
Tool T-0068 installed	Improper spline alignment of chrome sleeve to output shaft	Rotate chrome sleeve at 90° intervals until runout falls in tolerance
Excessive metal particles on mag plug	Large pieces or slivers of metal flaking from gears or bearings	Refer to Para. 4-62.B and 4-62.C
	Fine powdery-type metal can result from normal gear break-in	

C. Removal – Tail Rotor Gearbox

NOTE: It is not necessary to remove the tail rotor assembly from the helicopter for this procedure.

(1) Remove tail rotor assembly, if required (Para. 10-1.C).

(2) Disconnect tail rotor pitch change cables at the gearbox or remove the pivot control brackets (Fig. 10-15) from the tail rotor gearbox with the cables attached.

(3) Disconnect electrical wiring for the chip detector.

(4) On flex coupling, remove the two bolts from aft coupling half only.

(5) Disconnect or remove tail rotor guard.

(6) Remove te safety wire and six screws or bolts, as applicable, that secure gearbox to extension tube.

(7) Remove gearbox by pulling the unit aft with a slight rotational motion.

D. Inspection – Tail Rotor Gearbox

(1) Remove top visual inspection plug and inspect gears and gearbox internally for damage and condition. Install and secure top visual inspection plug (20-60 in-lb/2.3-6.8 Nm).

(2) Rotate output shaft and inspect for any bearing roughness, if any roughness, return transmission for overhaul.

(3) Inspect input shaft taper pin hole for elongation or cracks; return transmission for overhaul if either condition is found.

(4) Inspect input and output shaft seals for leakage. Replace seals if leaking (Para. 10-5.F or Para. 10-5.G, as applicable).

(5) Inspect chip detector for accumulation of metal particles (Para. 10-5.1, Para. 4-62.B.(3)).

E. Installation – Tail Rotor Gearbox

(1) Apply Lubriplate 630-AA (MIL-PRF-81322) to transmission mount.

(2) Insert chip detector wiring through hole in transmission mount.

(3) Install transmission in extension tube. Install mounting bolts and torque to 25 in-lb/2.8 Nm. Lockwire (.032”) bolts.

(4) Connect flex pack coupling to drive hub (Para. 10-6.D).

(5) Connect electrical wiring to the chip detector.

(6) Connect tail rotor guard to the transmission.

(7) Connect tail rotor control cables to pitch control assembly (Para. 10-4.E).

(8) Install tail rotor assembly (Para. 10-1.K).

NOTE**:** Omit steps 9 and 10 if the transmission and tail rotor control assembly being installed are the same ones that were removed.

(9) Check tail rotor control cable tension (Para. 10-7.A).

(10) Check tail rotor control rigging (Para. 10-7.B).

F. Input Seal Replacement – Tail Rotor Gearbox

NOTE: Refer to Fig. 10-17 for numbered items unless stated otherwise.

(1) Drain oil from tail rotor transmission (Para. 4-16.A through C).

NOTE**:** Omit steps 2 through 3 if the transmission is not installed on the aircraft.

NOTE**:** Failure to align the index marks or to return the shims to the original position will require realignment of the tail rotor drive shaft.

(2) Disconnect the aft three drive shaft bearing assemblies (Fig. 10-25) from the tail cone.

(a) Mark drive shaft bearing assemblies and tail cone with an index mark so that the bearing assemblies are installed in the identical lateral positions as previously installed.

(b) Remove hardware securing aft three drive shaft bearing assemblies to the tail cone.

(c) Tape shims and hardware to the tail cone to facilitate reinstallation of the drive shaft bearing assemblies in the same position (returns the tail rotor driveshaft to the same position vertically).

NOTE**:** Failure to align the index marks or to return the shims to the original position will require realignment of the tail rotor drive shaft.

WARNING: DISPLACE THE TAIL ROTOR DRIVE SHAFT THE MINIMUM AMOUNT NECESSARY AS DAMAGE TO THE DRIVE SHAFT MAY RESULT. WHEN REMOVING THE FLEX COUPLING, RETAIN THE ORDER OF THE HARDWARE AND SPACERS FOR RE-INSTALLATION OF THE FLEX COUPLING.

(3) Remove bolts (10) securing flex pack coupling to the aft drive hub (Fig. 10-18). Index mark the drive hub and the flex plate coupling so that the flex pack coupling is installed in the identical position as previously installed.

(4) Remove taper pin (6) (Fig. 10-18) next to the rain slinger (18) (Fig. 10-17) using tool T-0092-5 and remove slinger.

NOTE: Earlier version gearboxes will have two tab washers securing the input seal into the gearbox housing. Later manufactured gearboxes use a retaining ring.

(5) Remove seal retaining ring (15) or two retaining tabs (16), as applicable.

(6) Using an awl or small screwdriver, carefully remove the input shaft seal, (14) (P/N 1539-001). Note the part number on the seal. Use the same part number for the seal, when installing the new seal.

NOTE: Do not remove the screws that secure the bearing housing to the gearbox housing. Do not remove the lead seal from the input shaft assembly. Removal of the seal will void the warranty on the tail rotor transmission.

(7) Clean tail rotor transmission seal surface and the O.D of new seal (14).

(8) Install seal (14).

(a) Apply a small amount of MIL-PRF-2105 to the O.D. and I.D. of the seal and the seal lip.

(b) Wrap stainless steel shim stock around the input shaft nut to protect the seal lip during installation.

(c) Use a soft plastic or rubber hammer or other suitable press tool to tap the seal into place.

(9) Install retaining ring (15) or the retaining tab washers (16), as applicable.

(a) Torque tab washer screws to 25 in-lb/2.8 Nm and lockwire if using the retaining tabs.

(10) Install slinger (18) and taper pin (6) (Fig. 10-18). Torque to 25 in-lb/2.8 Nm.

(11) Install flex coupling. Install all hardware, spacers, and washers in the same position as previously installed.

(12) Install three drive shaft bearing assemblies.

NOTE: Install the bearing assemblies to the index marks (as previously installed). If not properly marked for reinstallation, the tail rotor drive shaft will require alignment.

(a) Use same shims, spacers, and bolts (retained in place with tape) for each bearing assembly.

(b) Align bearing assemblies laterally to the index marks.

(c) Torque bolts to 35 in-lb/4.0 Nm.

(13) Service tail rotor transmission (Para. 4-15).

G. Output Seal Replacement – Tail Rotor Gearbox

(1) Drain oil from tail rotor transmission (Para. 4-16.A through C).

(2) Remove tail rotor assembly (Para. 10-1.C; omit step 4).

(3) Remove pitch control bearing assembly (Fig. 10-15).

NOTE: Retain all hardware together for re-installation.

(a) Disconnect bearing housing (7) from pivot brackets (1) and (2) by removing bolts (5), washers (6) and (8), nut (9), and cotter pins (10) (Fig. 10-15).

(b) Index mark the position of the sleeve as installed on the output shaft.

(c) Slide pitch control assembly off of the sleeve of the tail rotor transmission output shaft.

(d) Remove keys (11), seal (12), and seal retainer (13).

(4) Remove retaining ring (20) from output shaft seal (19) (Fig. 10-17).

NOTE: As the seal (19) is removed from the output shaft, the sleeve (21) will also be removed with it. Wrapping the end of the output shaft with masking tape may help prevent the sleeve from being displaced when the seal is removed. Clean the area prior to applying tape.

Otherwise, mark the sleeve spline to the output shaft spline so as to install the sleeve in the same location on the output shaft on reassembly.

(5) If preferred, wrap the end of the output shaft with masking tape, otherwise clean the spline edges of the output shaft and sleeve and apply a paint stripe across the splines.

(6) Using an awl or small screwdriver, carefully remove the seal (19). Note the part number on the seal. Use the same part number for the seal, when installing the new seal.

(7) Install new seal (19).

NOTE: It may be necessary to chamfer the inboard edge of the new seal using 200 grit sandpaper, or equivalent, for ease of installation.

(a) Clean tail rotor transmission seal surface and O.D. of new seal.

(b) Lubricate (MIL-PRF-2105) the O.D. and inside lip of new seal.

CAUTION: BE CAREFUL NOT TO TEAR THE NEW SEAL WHEN TAPPING THE SEAL INTO PLACE.

(c) Use a soft plastic or rubber hammer or other suitable press tool to tap seal into place.

NOTE: Positioning the sleeve on the output shaft in a location different than previously installed may affect the runout (TIR) and negatively affect the rail rotor balance. Output shaft runout may be checked in accordance with Para. 10-5.H.

(8) If required, install sleeve (21). Match spline mark of the sleeve to the spline mark on the output shaft.

(a) Lubricate (MIL-PRF-2105) seal end of sleeve (21).

(b) Use a bushing driver or equivalent press tool, push the sleeve (21) into the seal (19). The seal seats in a groove of the sleeve (21).

(9) Install retaining ring (20).

(10) Place seal retainer (13) and seal (12) onto output shaft.

(11) Install two keys (17) into key slots in sleeve (21).

(a) Lubricate (MIL-PRF-81322) keys (17) during installation and prior to installing pitch control assembly.

NOTE: Take care to align the pitch control assembly to the index marks. If the pitch control assembly cannot be realigned to the original index marks, the tail rotor assembly must be dynamically balanced.

(12) Install pitch control assembly (Fig. 10-15).

(a) Align pitch control assembly to the index marks on the sleeve and slide the assembly onto the tail rotor transmission output shaft.

(b) Insert seal (12) into the groove in the pitch control bearing (14).

CAUTION: BE GENTLE WHEN INSERTING THE SEAL RETAINER (13). EXCESSIVE FORCE WILL DAMAGE THE SEAL RETAINER.

(c) Use a small straight screwdriver or punch and a small hammer to tap the seal retainer (13) into the groove in the pitch control bearing (14).

(13) Install pivot brackets (Fig. 10-15).

NOTE: Washer (6) must be installed between the upper pivot bracket (1) and the bearing housing (7).

(a) Install bolts (5), washers (6) and (8), and nut (9).

(b) Torque nuts to 60-85 in-lb/6.8-9.6 Nm and install new cotter pins (10).

(14) Install tail rotor blade assembly (Para. 10-1.K).

(15) Install bottom plug (Para. 4-16.D) and service tail rotor transmission (Para. 4-15).

H. Output Shaft Runout – Tail Rotor Gearbox

(1) Runout of the output shaft is checked as follows: (.005-inch Total Indicated Runout (TIR) maximum.) (Fig. 10-16)

(a) Secure gearbox in a vise if removed from the helicopter.

(b) Install sleeve T-0068 on output shaft. Install spacer T-0068 and torque bolt to 300 in-lb/34.1 Nm.

(c) Position height gauge and dial indicator with indicator arm on outboard diameter of T-0068.

(d) Zero dial indicator and rotate the input shaft. Note output shaft TIR.

(e) If runout exceeds .005 TIR, remove bolt and tool. Remove output seal. Reposition sleeve on output shaft in one spline intervals until runout falls within tolerance.

NOTE: If the tail rotor components are installed in the exact position as removed, the dynamic balance step (Para. 10-3) may be omitted

NOTE: If the tail rotor components are not installed in the exact position as removed, the tail rotor must be balanced.

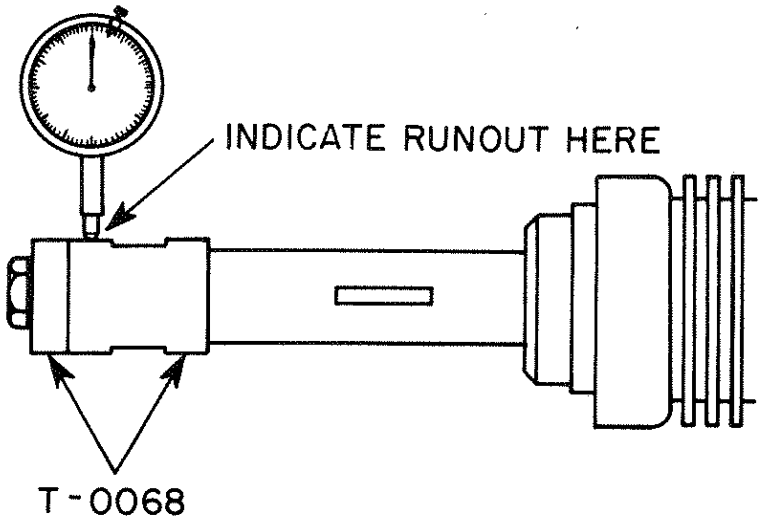


Figure 10-16. TIR Indicator for the Output Shaft

10-5.1 TAIL ROTOR GEARBOX CHIP DETECTOR

NOTE: The following procedure applies to gearbox installations having the self-sealing base for the magnetic plug (Fig. 10-17, Detail A).

NOTE: Refer to Para. 4-62.B.(3) for metal particle criteria limits.

A. Removal – Tail Rotor Gearbox Chip Detector

(1) Do not disconnect the wire.

(2) Grasp the magnetic plug (11) and push upward. While holding upward pressure, begin turning plug counter-clockwise.

(3) Turn plug (11) counter-clockwise one-quarter turn.

(4) Pull plug (11) out of the socket in the base fitting (27).

B. Installation – Tail Rotor Gearbox Chip Detector

(1) After inspection and after determining that the transmission is airworthy, clean the magnetic plug (11) with a soft cloth or with a strong magnet attached to a pointed object or use compressed air. Use caution to avoid scratching the magnetic plug.

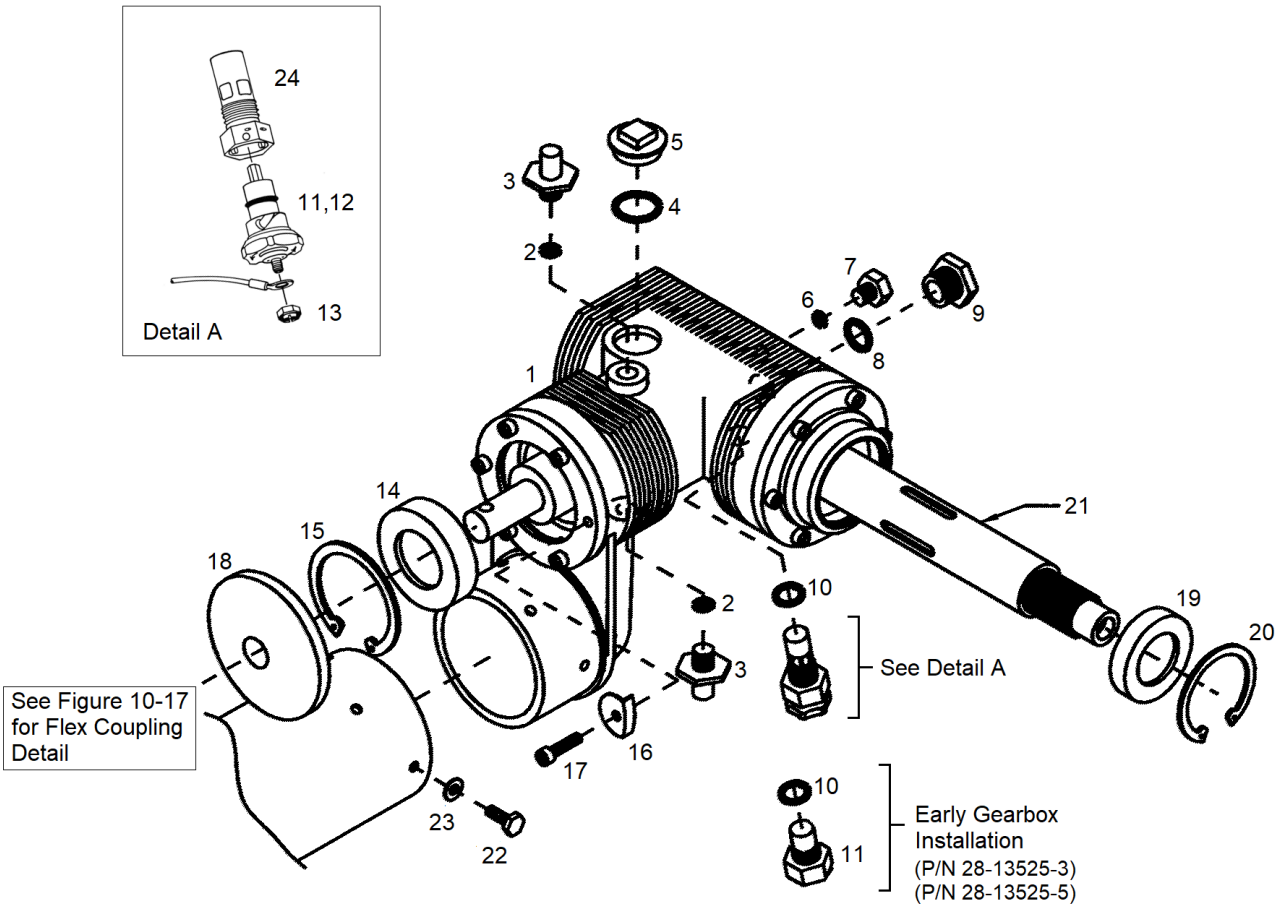
(2) Insert plug (11) into the socket in the base fitting (27).

(3) Align lugs in the plug (11) with the slots in the base fitting (27).

(4) Push plug (11) upward while turning the plug clockwise (approximately one-quarter turn).

(5) When plug (11) stops turning, pull downward.

(6) Check plug (11) to ensure that it is locked in the base (27).



1.	Tail Rotor Gearbox Assembly	13.	Nut
2.	O-Ring	14.	Seal
3.	Bolt	15.	Retaining Ring
4.	O-Ring	16.	Tab (omitted if (15) is used)
5.	Plug	17.	Screw
6.	O-Ring	18.	Slinger
7.	Plug	19.	Seal
8.	O-Ring	20.	Retaining Ring
9.	Sight Plug	21.	Sleeve
10.	Gasket (Crush Washer)	22.	Bolt
11.	Magnetic Plug/Chip Detector	23.	Washer
12.	O-Ring	24.	Chip Detector Base

Figure 10-17. Tail Rotor Transmission Assembly

10-6. TAIL ROTOR DRIVESHAFT

A. Alignment – Tail Rotor Driveshaft

(1) (280FX) Remove aft tail rotor drive shaft cover and open remaining covers.

(2) Clamp piano wire attachment tools T-0088 to each end of the driveshaft. Attach the piano wire between the tools and center it vertically down the centerline of the driveshaft.

NOTE: If the alignment tools differ in height greater than allowable, it is not possible to obtain proper alignment of the tail rotor drive shaft.

(3) Verify alignment tool heights are within ±.001 inch at the forward and aft positions as follows:

(a) Using a set of calipers, measure the distance between the wire and short shaft approximately 1 inch aft of the forward alignment tool.

(b) Measure distance between the wire and the long shaft 1 inch forward of the aft alignment tool.

(c) The difference between the two previous measurements should be no greater than .002 inch.

(d) If the alignment tool heights are outside allowable limits, it will be necessary to file the high/tall alignment tool saddle (the location where the piano wire rests in the alignment tool) to obtain the proper height. File the saddle and measure per step c) until the proper tolerance of ±.001 inch is obtained.

(4) Starting at the forward drive shaft bearing assembly, measure the distance between the drive shaft and the piano wire. Repeat this for the remaining drive shaft bearing assemblies. The vertical difference at any position should be within ±.012 inch. If the difference is greater than ±.012 inch, add or subtract shims under the bearing assembly to bring the shaft into proper alignment. Tighten the hardware and recheck the alignment after each adjustment.

NOTE: Ensure the tail rotor drive shaft bearing hardware is properly torqued before taking measurements and after each adjustment.

(5) When proper vertical alignment is achieved, rotate the tail rotor drive shafts 90° to check the lateral alignment.

a) Starting at the forward drive shaft bearing assembly, measure the distance between the drive shaft and the piano wire. Repeat this for the remaining drive shaft bearing assemblies. The lateral difference at any position should be within ±.012 inch. If the difference is greater than ±.012 inch, loosen the bearing assembly hardware and shift the position of the bearing assembly. Tighten the hardware and recheck the alignment.

(6) (280FX) Check the drive shaft cover bracket alignment by temporarily installing the drive shaft aft cover. Adjust the bracket, if required.

(7) Torque the drive shaft bearing assembly mount bolts to 20-25 in-lbs/2.3-2.8 Nm and recheck the vertical and lateral alignment. Adjust as required.

(8) Lockwire (MS20995C32) the aft drive shaft bearing assembly mounting hardware. Route the lockwire under the bearing assembly to avoid interfering with the drive shaft.

(9) Remove the alignment tools from the drive shafts.

(10) (280FX) Close the drive shaft covers and install the aft cover.

B. Removal – Driveshaft

(1) (280 FX) Remove the aft tail rotor drive shaft cover and open the remaining covers.

(2) Remove the upper cowling and the side cowling from one side.

(3) Remove tach drive cover and remove O-rings from pulley. (See Para. 10-6.3 for optional tach drive cover modification.)

(4) Disconnect the forward and aft couplings (Para. 10-6.1.B.(1) through (2)).

(5) Remove the anti-collision light from top of tailcone, if required.

(6) (280F) Remove the top vertical stabilizer from aft end of tailcone.

(7) Mark the pillow blocks to the tailcone to assist with alignment during installation.

(8) Remove bolts and washers attaching pillow blocks to tailcone.

NOTE: Save shims for reinstallation. Temporarily tape the shims to the tailcone in the respective positions.

(9) (280FX) Remove the drive shaft cover bracket from under the aft drive shaft bearing assembly.

(10) Remove the driveshaft assembly from tailcone.

C. Disassembly – Driveshaft

(1) Remove the taper pins and couplings from forward and aft ends of driveshaft. Use tool T-0092-5 to remove the taper pins.

(2) Slide the tach drive cover and O-rings from the shaft.

(3) Separate and remove the tach drive pulley.

(4) Apply lubricant (soapy water) to the driveshaft and slide the pillow blocks from the shaft.

D. Inspection – Driveshaft

(1) Straightness. Sharp kinks or bends that exceed .030 inch per foot section/.76 mm per 1 meter section are cause for rejection.

(2) Nicks and scratches.

(a) Examine the driveshaft surface for nicks and scratches. Include inspection of the circumference of the driveshaft where the driveshaft passes through the tach drive pulley guard hole.

1 Nicks or scratches not deeper than 0.030 inch/0.76 mm may be blended out. Apply corrosion protection after repair.

2 Nicks or scratches in excess of 0.030 inch/0.76 mm are cause for rejection.

(b) If either conditions 1 or 2 are present as a result of contact with the pulley guard, proceed as follows:

1 Verify driveshaft straightness (step (1)) and alignment (Para. 10-6.A).

2 Inspect pulley guard installation for mount, security, and damage. Replace a damaged pulley guard.

3 (Optional) Modify the tach drive cover in accordance with Para. 10-6.3.

(3) Taper pin holes for elongation, excessive diameter, and cracks. Any are cause for rejection.

(4) Corrosion or rust, especially under rubber inserts. Pits that exceed .030 inch/.76 mm in depth are cause for rejection.

E. Installation – Driveshaft

NOTE: Procedure steps (1)-(12) applies to installing a replacement driveshaft. Fabrication of a replacement drive shaft requires additional skill and equipment. It is recommended to contact Enstrom for a replacement driveshaft assembly.

NOTE: If re-installing a removed driveshaft, proceed to step (13).

NOTE: When installing a tail rotor driveshaft, both the main rotor and tail rotor gearbox must be installed on aircraft. Install a coupling half secured with a taper pin in each gearbox.

(1) Ream the bore on one end of driveshaft with a .640-inch straight reamer to remove paint. Ream 2" into bore and deburr the end of the shaft.

(2) Clean the bore ends of the driveshaft and O.D. of aluminum plugs with Loctite Primer T.

(3) Apply epoxy prime (MIL-PRF-23377 Type I Class 2C or Class N) to the O.D. of aluminum plug, heat driveshaft to approximately 250°F/121°C and tap plug into driveshaft until it is flush with the end of the shaft.

(4) Drill the aft coupling as follows: (see Fig. 10-18)

(a) Mark a line on the driveshaft 7/8" from the end of the shaft.

(b) Slide the coupling on the shaft until even with the 7/8" line.

(c) Mark and center-punch Point "A" of Fig. 10-18 using dimensions given.

(d) Drill through the coupling and driveshaft with a "D" size drill (Ø.2460 inch).

NOTE: Drilling must be done in a drill press to assure that drilled hole is perpendicular to the driveshaft.

(e) Ream the hole with a #2 tapered reamer to fit an AN386-2-8A taper pin very carefully so as not to over ream.

NOTE: If over-reaming of a tapered hole occurs, use P/N 28-13623-11 through -17 taper pins as required.

NOTE: Taper pins should be seated by tapping into place and then secured with the nut.

(f) Install the taper pin through the coupling. Install cup washer (7) or washer (8), and nut (9). Torque nut (25 in-lb/2.8 Nm) (Fig. 10-21).

(5) Temporarily slide forward coupling half on the forward end of the driveshaft and place the driveshaft on the tailcone.

(6) Reassemble the couplings together such that the flanges are in alignment. Install equal thickness spacers between the flex pack and the flanges. An alternate method is to use a .235-inch aluminum block. Refer to Fig. 10-19 for either option.

(7) Mark the location of the forward coupling on the driveshaft using a felt marker and mark the location of the pillow blocks on the driveshaft.

(8) Remove the driveshaft from the tailcone.

(9) Remove the forward coupling from the driveshaft.

(10) Add 7/8" from the mark on the driveshaft and mark a new line for the end of the driveshaft. Cut the shaft to length.

NOTE: Do not cut the driveshaft at the initial coupling position mark.

(11) Ream the forward end of the driveshaft with .640-inch reamer to remove paint.

(12) Drill the forward coupling to the driveshaft following the procedure in step (4) (Fig. 10-18).

(13) Install the driveshaft on the tailcone and connect both couplings per step (6) (Fig. 10-21).

NOTE: Taper pins on both the main rotor and the tail rotor gearbox sides of the coupling are AN386-2-7A.

(14) Mark the driveshaft for the pillow block alignment to the mount holes in the tailcone.

NOTE: Place a ¾-inch block of wood under the driveshaft to remove the bow in shaft while marking the pillow block areas.

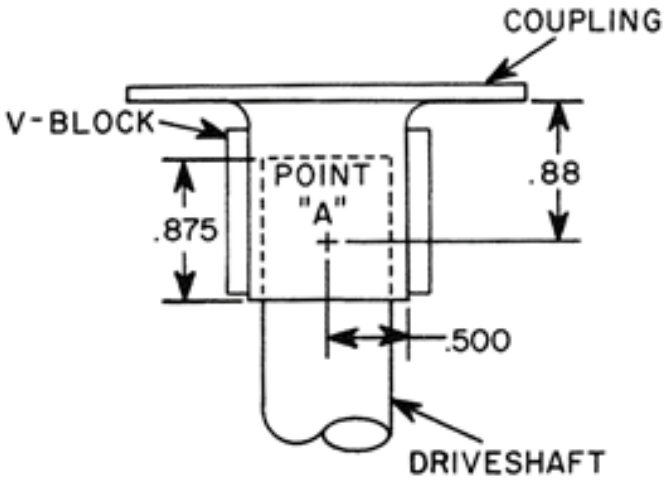


Fig. 10-18

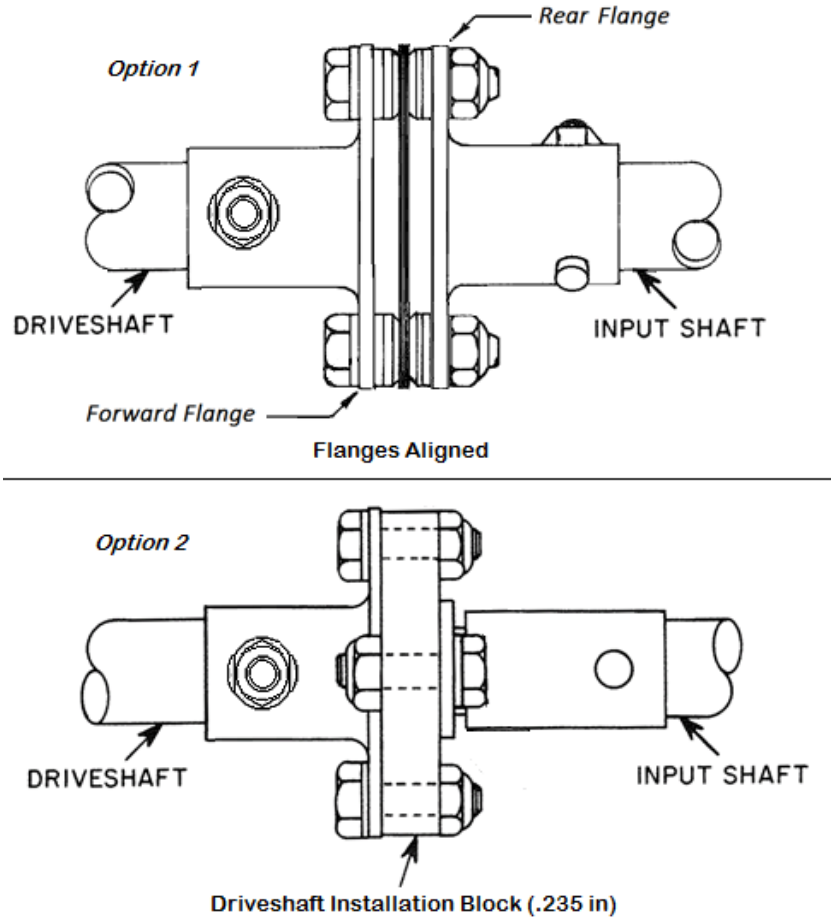


Figure 10-19

(15) Remove the driveshaft and the forward coupling.

(16) Wipe the driveshaft with liquid detergent and slide the pillow blocks into the marked positions. See Fig. 10-20 for the direction of the pillow blocks on the driveshaft.

NOTE: The forward pillow block is installed with the closed end facing aft.

(17) Place the driveshaft back on the tailcone and connect the couplings to the transmissions.

(18) Align the pillow blocks with the mount holes in the tailcone.

(19) Install the tach drive pulley on the driveshaft.

(20) Disconnect the forward coupling and install the tach drive O-rings and cover. Connect the coupling.

(21) (280FX) Install the driveshaft cover bracket and shims under the aft drive shaft bearing assembly. Temporarily install the bearing shim stack-ups and mounting hardware.

(22) Align the tail rotor driveshaft (Para. 10-6.A).

(23) (280F) Install the vertical stabilizer.

(24) If required, install the anti-collision light on top of the tailcone.

(25) Install cowling.

(26) (280FX) Close the drive shaft covers and install the aft cover.

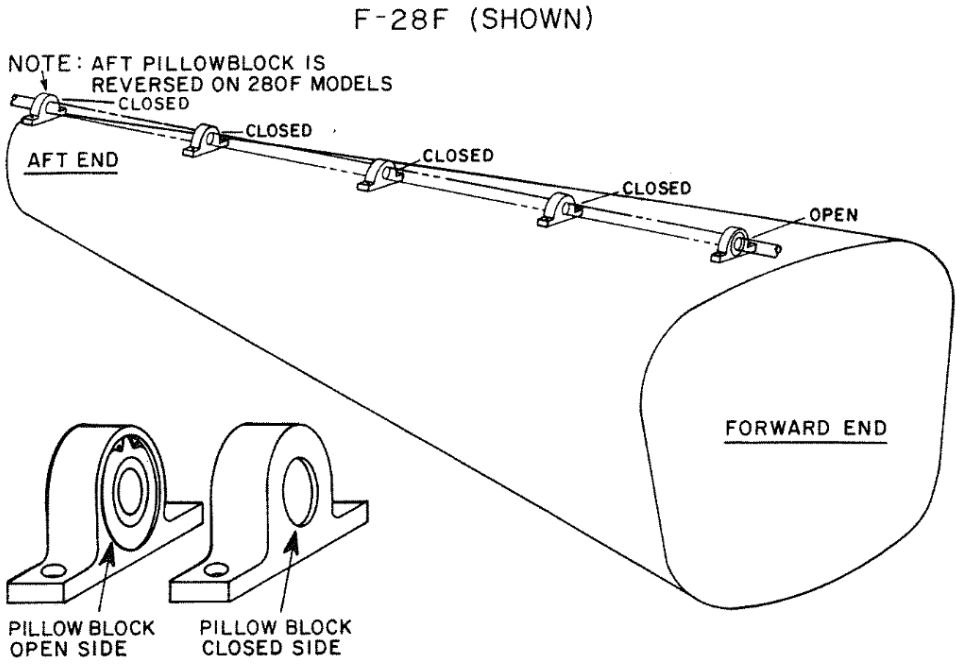


Figure 10-20. Pillow Block Orientation

10-6.1 TAIL ROTOR DRIVESHAFT FLEX COUPLING

A. General Information – Flex Coupling

The alignment of the tail rotor flex couplings is a very important factor in achieving the full service life of the flex pack. Large offsets on the tension side of the pack usually indicate improper spacing of the coupling sections and will promote premature distortion or degradation of the flex pack. A nominal device life for the flex pack has been established to ensure component integrity. The flex packs must be replaced after 1200 hours of service with new flex packs.

B. Removal – Flex Coupling (Fig. 10-21)

NOTE: Washers (11) are located between the flex coupling washers (16) and the coupling hub flanges (2) and (3) for the purpose of centering and aligning the flex elements (13) between the coupling hub flanges. Note their location before disassembly.

(1) Remove the bolts (10), washers (11) and flex coupling washers (16) which connect the coupling hubs (2) and (3) to the flex elements (3).

(2) Remove the flex elements (13).

(3) Remove the taper pins (5) and (6) and remove the coupling hubs from gearbox and driveshaft.

C. Inspection – Flex Coupling (Figs. 10-22 through 10-25)

NOTE: Fig. 10-22 shows a tail rotor driveshaft coupling installation with the tension and compression sides labeled. There are two types of flex pack distortion which are typically encountered and which are allowable IF THEY ARE WITHIN THE LIMITS listed in this section.

(1) The first type of flex element distortion typically encountered is a simple bow of the elements as shown in Fig. 10-23. This distortion is allowable ONLY as long as the coupling meets the following requirements:

(a) The bend is smooth and gradual, no kinks, etc.

(b) The elements are all deformed evenly, with no separation or voids between the elements.

(c) The bow, as measured in Fig. 10-23, is less than .080 inch deep on the compression side, and less than .060 inch deep on the tension side.

(2) The second type of flex element distortion typically encountered is an offset bend as shown in Fig. 10-24. This type of distortion usually occurs because the coupling halves are not running parallel with each other. This type of distortion is allowable ONLY as long as the flex elements meet the following requirements:

(a) The bend is smooth and fair, with no kinks, etc.

(b) The elements are all deformed evenly, with no separation or voids between the elements.

(c) The offset is less than .060 inch as shown in Fig. 10-24.

(3) The coupling hubs which hold the flex elements must be flat within .010 inch as shown in Fig. 10-25. Any hubs **deformed** beyond this limit MUST be replaced before further flight.

(4) Whether the distortions described in the preceding inspections are present or not, the couplings are UNSERVICEABLE at any time the following conditions exist:

(a) Elements have kinks or sharp bends.

(b) Separations or voids occur between any of the elements.

(c) Non-uniform or non-fair bends.

(d) Cracked or broken elements.

(e) Elongated bolt holes.

(f) Kinks or deformation adjacent to the flex coupling washers.

D. Installation – Flex Coupling (Fig. 10-21)

NOTE: Proper attention during installation and alignment must be taken to permit couplings to operate to full capacity and provide good service life.

(1) Install rain slinger on tail rotor gearbox (Fig. 10-17).

(2) Install coupling hub (3) on gearbox and coupling hub (2) on driveshaft.

NOTE: Taper pins should be seated by tapping into place and then secured with the nut.

(3) Install taper pins (5) and (6), cup washers (7) or washers (8), and nuts (9). Torque nut (25 in-lb/2.8 Nm).

(4) Install a washer (11) on each bolt and insert through the coupling hub (2) or (3).

(5) Install washer(s) (11), flex coupling washers (16), flex pack (13), flex coupling washers (16), washer (11), and nut (12) on each bolt. Torque 70 in-lb/7.9 Nm.

CAUTION: HEAVY OR LIGHT WASHERS (11) CAN BE USED WITH FLEX COUPLING WASHERS TO EQUALLY SPACE FLEX ELEMENTS BETWEEN THE COUPLING HUBS. THE CURVED SIDE OF THE FLEX COUPLING WASHERS MUST FACE AGAINST THE FLEX ELEMENTS.

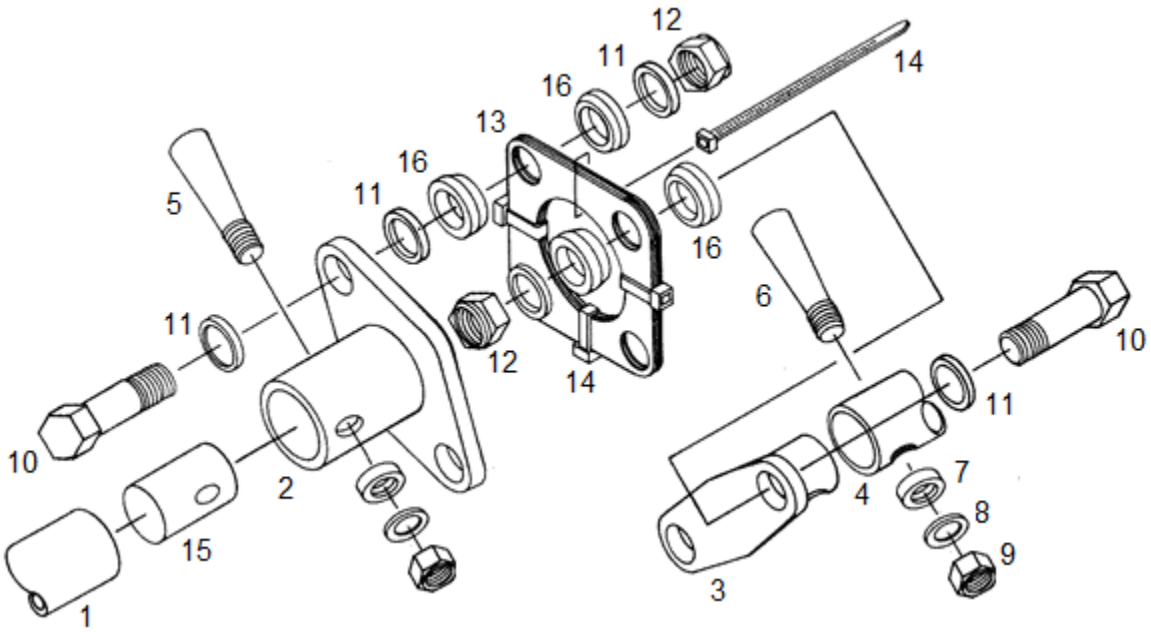
NOTE: Install the heavy and light washers in the same order and position as previously installed, if applicable.

(6) Place washers (11) on remaining two bolts and insert through the coupling hub (2) or (3), as applicable.

(7) Install washer(s) (11) and flex coupling washers (16) on bolts and insert through the flex pack (13).

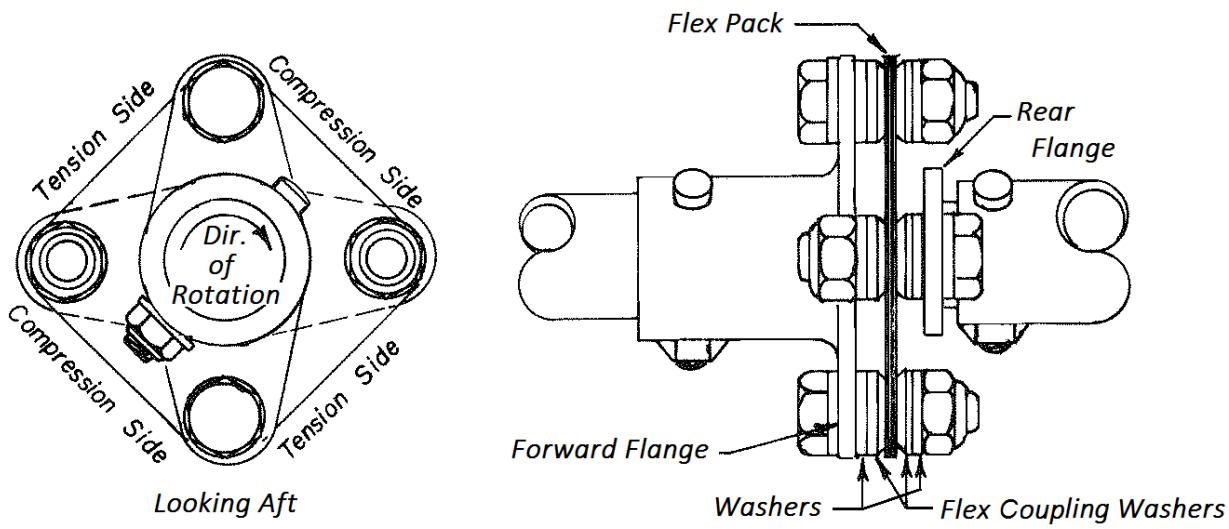
(8) Install flex coupling washers (16), washer (11), and nut (12) on each bolt. Torque 70 in-lb/7.9 Nm.

NOTE: With all bolts torqued, the flex elements (13) should be straight and equally spaced between coupling hub flanges.



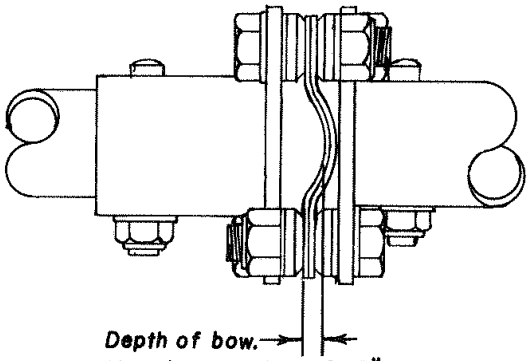
1.	Tail Rotor Driveshaft	9.	Nut
2.	Coupling Hub	10.	Bolt
3.	Coupling Hub	11.	Washer
4.	Sleeve	12.	Nut
5.	Taper Pin	13.	Flex Pack
6.	Taper Pin	14.	Cable Tie
7.	Cup Washer	15.	Plug
8.	Washer (If Item 7 is not present)	16.	Flex Coupling Washer (Beveled)

Figure 10-21. Flex Coupling Installation



NOTE: Tie-wraps eliminated for clarity.

Figure 10-22. Tail Rotor Drive Shaft Coupling Installation, Rear Coupling Shown; Forward Coupling Similar



NOTE: Tie-wraps eliminated for clarity.

Figure 10-23. Acceptable Limits of Bowed Flex Packs

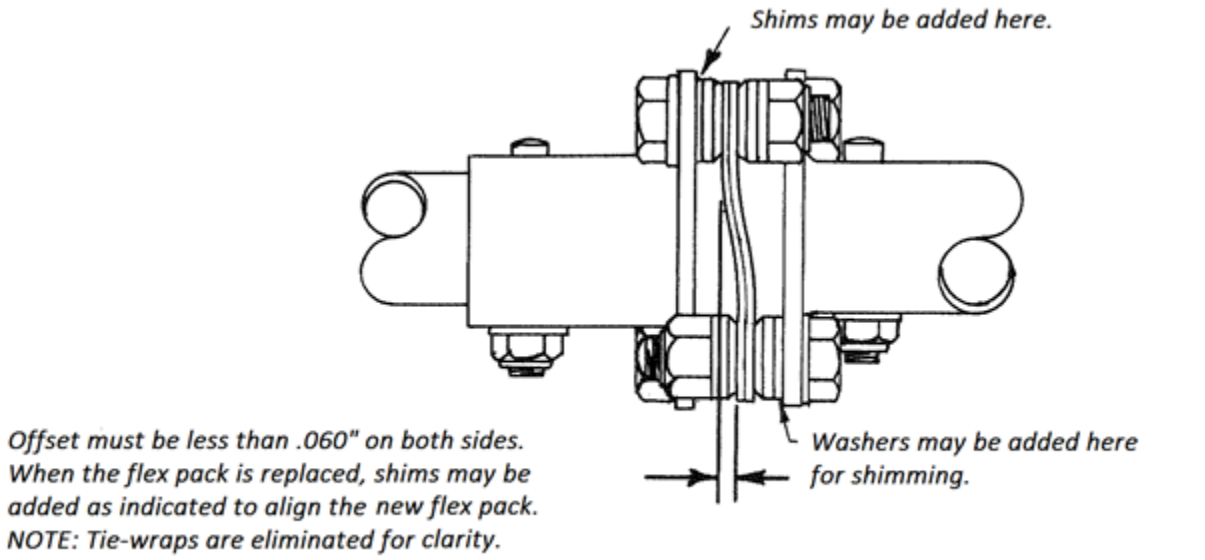


Figure 10-24. Acceptable Limits for Flex Packs with Offset Bends

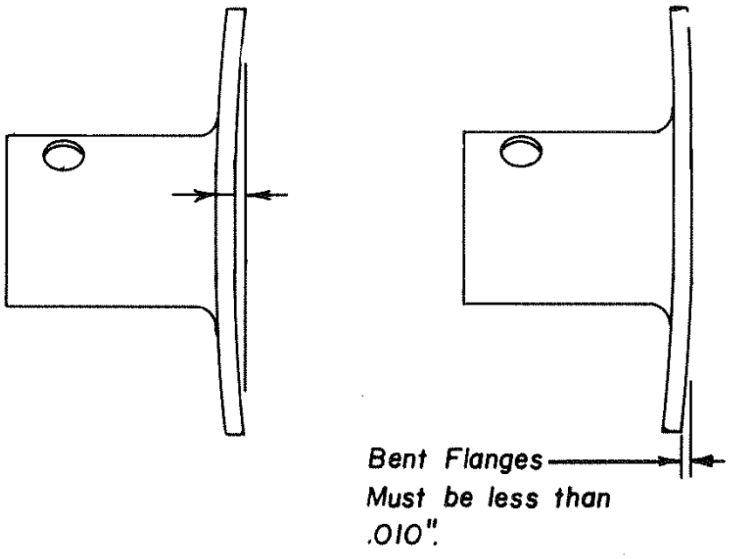


Figure 10-25. Acceptable Limits for Bent Coupling Hub Flanges

10-6.2 TAIL ROTOR DRIVESHAFT PILLOW BLOCK

A. Disassembly – Pillow Block

(1) Remove the rubber insert.

(2) Remove the snap ring.

(3) Heat the housing to approximately 250°F/121°C and gently tap bearing to remove.

B. Inspection – Pillow Block

(1) Bearing condition - no ratchety feeling.

(2) Bearing housing - no cracks, nicks, corrosion.

(3) Rubber insert - no tears or rubber deterioration.

C. Assembly – Pillow Block

(1) Heat bearing housing to approximately 250°F/121°C.

(2) Lubricate the bore of the housing and install the bearing into position.

NOTE: The open side of the bearing is installed inboard toward the grease fitting. On new bearings, one shield must be removed.

(3) Install the snap ring and allow to cool.

(4) Install the rubber insert.

10-6.3 TACH DRIVE PULLEY GUARD

NOTE: The following modifications are optional. Use caution while modifying the pulley guard to avoid damaging the tail rotor driveshaft. Refer to Fig. 10-25.1 for numbered items. Note S/N effectivity

A. Modification – Tach Drive Pulley Guard

NOTE: F-28F, S/N 829 and prior, and 280FX, S/N 2134 and prior, are eligible for the following modification if the pulley guard is original and has not been modified in accordance with SDB 0111. F-28F, S/N 830 and subsequent, and 280FX S/N 2135 and subsequent, are exempt from this modification as these S/N were equipped with the modified pulley guard from the factory.

NOTE: This modification removes material between the clips of the pulley guard to simplify maintenance operations pertaining to the rotor tach assembly or the tail rotor driveshaft and increases the hole diameter to add clearance between the driveshaft and the pulley guard. This modification may be performed with the rotor tach assembly left intact.

NOTE: Refer to Fig. 10-25.1.

(1) Remove pulley guard attachment hardware (2), (3), and (4) and slide guard (1) forward for access. Note the placement and number of washers used for shimming.

(2) Using a suitable metal cutting tool, cut out the area of the pulley guard between the clips.

(3) Remove the pulley guard by slipping it off the driveshaft via the cutout area. Avoid scratching the driveshaft. It will be necessary to twist the guard to provide additional clearance with the driveshaft.

(4) The pulley guard hole may be machined to a maximum 1.125 inch/28.58 mm diameter.

(5) Deburr and apply corrosion protection (epoxy primer) to all newly cut surfaces.

(6) Reinstall the pulley guard.

(7) Check the pulley guard clearance with the driveshaft and the pulley belts. Adjust the number of shimming washers, if necessary.

(8) If there is evidence of contact between the upper cowling and the pulley guard, install a Nitrile rubber pad, or equivalent, on top of the pulley guard to provide surface abrasion protection and vibration dampening properties.

NOTE: Select either a 1/16 inch/1.58 mm or 1/8 inch/3.17 mm to match the gap distance between the pulley guard and the cowling. A one square inch piece will be adequate.

(a) Remove contamination from the pulley guard surface with a clean shop rag wetted with an appropriate solvent.

(b) Install the rubber pad with Loctite 4212 adhesive, or equivalent.

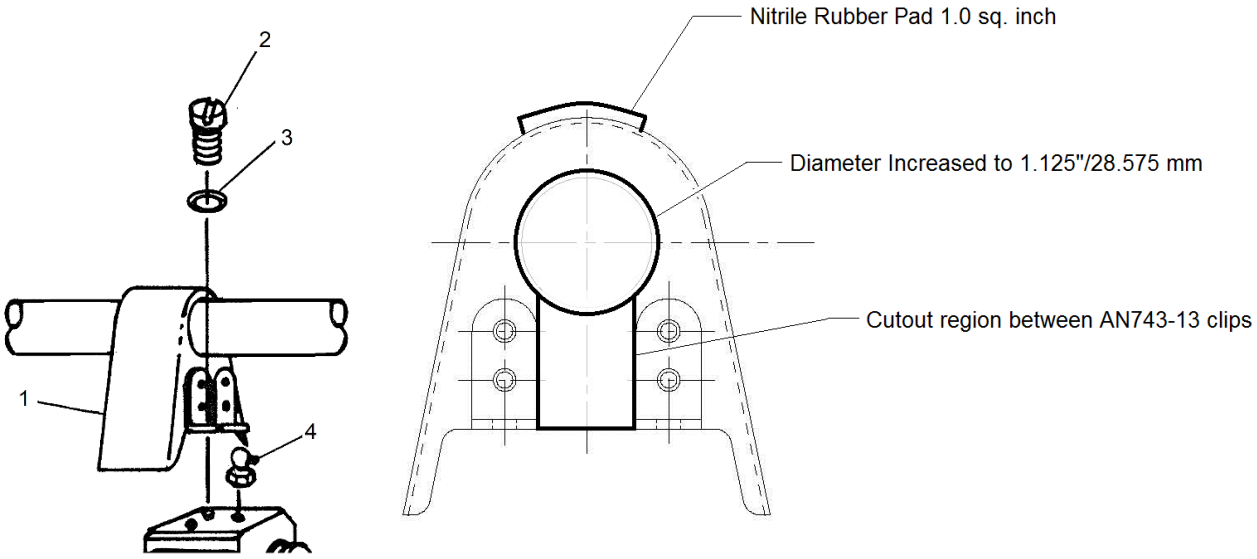


Figure 10-25.1. Tach Drive Pulley Guard Modifications

10-7 TAIL ROTOR CONTROL SYSTEM

A. Tension Check – Tail Rotor Cable Control System

(1) Install the tail rotor rigging tool T-0080 (0.590 in/15 mm side) between the bearing retainer and the output shaft seal retainer to hold the tail rotor pitch controls in the neutral position (Fig. 10-26). Secure the pitch control assembly in this position by installing wooden wedges between the pitch control assembly and the transmission on the right side of the transmission (Fig. 10-27).

(2) Verify that the pilot and co-pilot pedals are in alignment to each other.

(3) If the pedals are not even, adjust the tension as follows:

(a) Remove the wraparound cowl and baggage box, if necessary.

CAUTION: TURNBUCKLES MAY NOT HAVE MORE THAN THREE THREADS SHOWING AT EACH END.

NOTE: Use a cable tensiometer for making cable tension adjustments.

(b) Remove the safety clips or the turnbuckle safety wire. Tighten one turnbuckle and loosen the other to align the pedals and keep the tension at 35-40 lb/5.9-18.1 kg.

(c) Remove the rigging tool T-0080 and wedges from the tail rotor transmission, then cycle the pedals back and forth a few times after each adjustment to equalize the tension between the two cables.

(d) Repeat from step (1) as required.

(4) Check complete rigging of tail rotor (Para. 10-7.B), if adjustments were made.

(5) Install safety clips in the turnbuckles when the cable tension is set.

(6) Install the baggage box and the wraparound cowl.

B. Rigging – Tail Rotor Cable Control System

NOTE: Check three-piece pitch link length at 4.260 in/10.8 cm, if installed.

NOTE: Inspect control cable barrels to ensure locking clips are installed.

(1) Verify the cable tension is set (Para. 10-7.A).

(2) If required, remove the wraparound cowl and baggage box, if necessary.

(3) Remove the seat cushions, seat deck (Para. 8-8.A), and the left floor panel.

(4) Install the tail rotor rigging tool T-0080 (0.590 in/15 mm side) between the bearing retainer and the output shaft seal retainer to hold the tail rotor pitch controls in the neutral position (Fig. 10-26). Secure the pitch control assembly in this position by installing wooden wedges between the pitch control assembly and the transmission on the right side of the transmission (Fig. 10-27).

(5) Verify that the pedals are in alignment. If not aligned, adjust the cable tension in accordance with Para. 10-7.A.

(6) Remove the rigging tool T-0080 and wedges from the tail rotor transmission, then cycle the pedals and look for interference between the pitch control assembly pivot brackets and the tail rotor transmission.

(7) Move the pedals to the full left position. Insert the tail rotor rigging tool T-0080 (narrow profile) between the output shaft seal housing and the face of the brass bushing in the pitch control assembly (Fig. 10-26). The rigging tool should just fit in when the pedals contact the left stop. Adjust the “left pedal adjustment stop” until the pedal and the control assembly make contact at the same time (Fig. 10-28).

(8) Move the control pedals to the full right position. Insert the tail rotor rigging tool T-0080 (widest profile) between the output shaft seal housing and the face of the brass bushing in the pitch control assembly (Fig. 10-26). The rigging tool should just fit in when the pedals contact the right stop. Adjust the “right pedal adjustment stop” until the pedal and the control assembly make contact at the same time (Fig. 10-28).

NOTE: Control brackets should not stop against tail rotor gearbox. Pedals must stop against stop bolts on forward bellcrank.

(9) Install the wraparound cowl and the baggage box, if removed.

(10) Install the left floor panel, seat deck (Para. 8-8.D), and seat cushions.

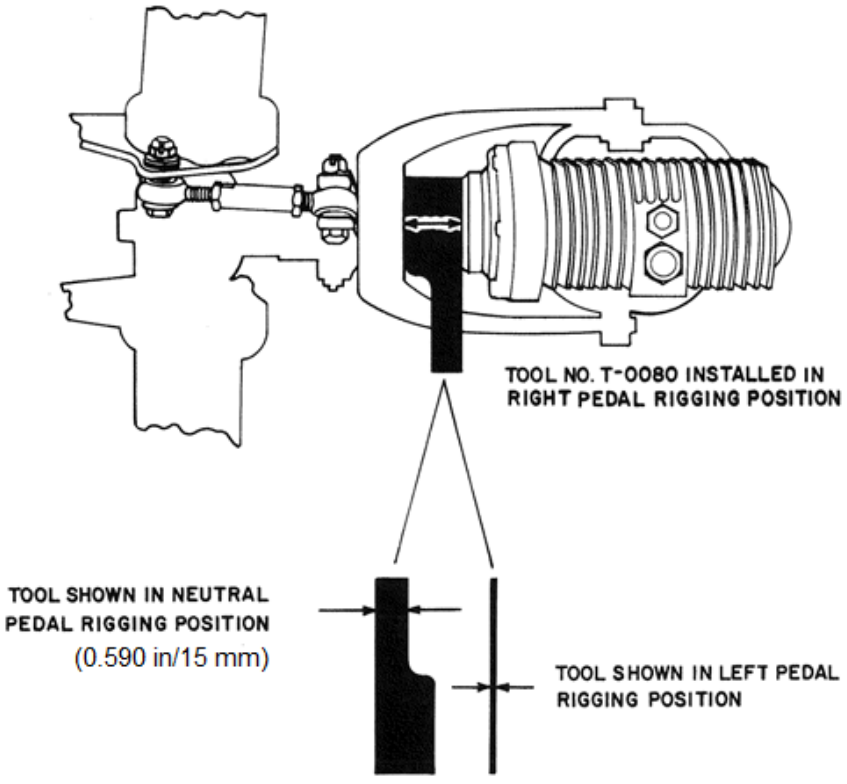


Figure 10-26. Rigging Tool T-0080 Installation

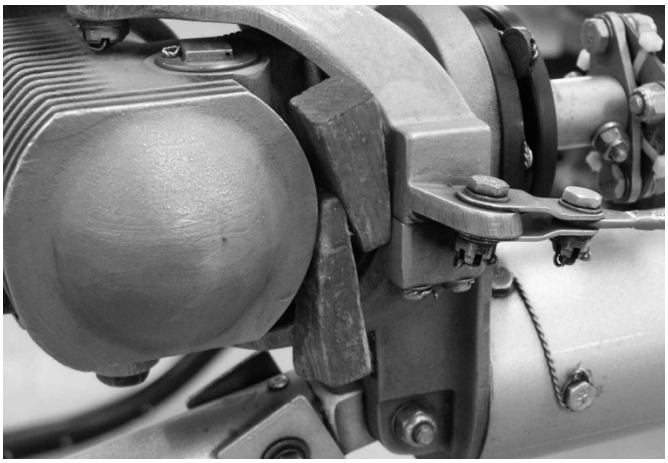
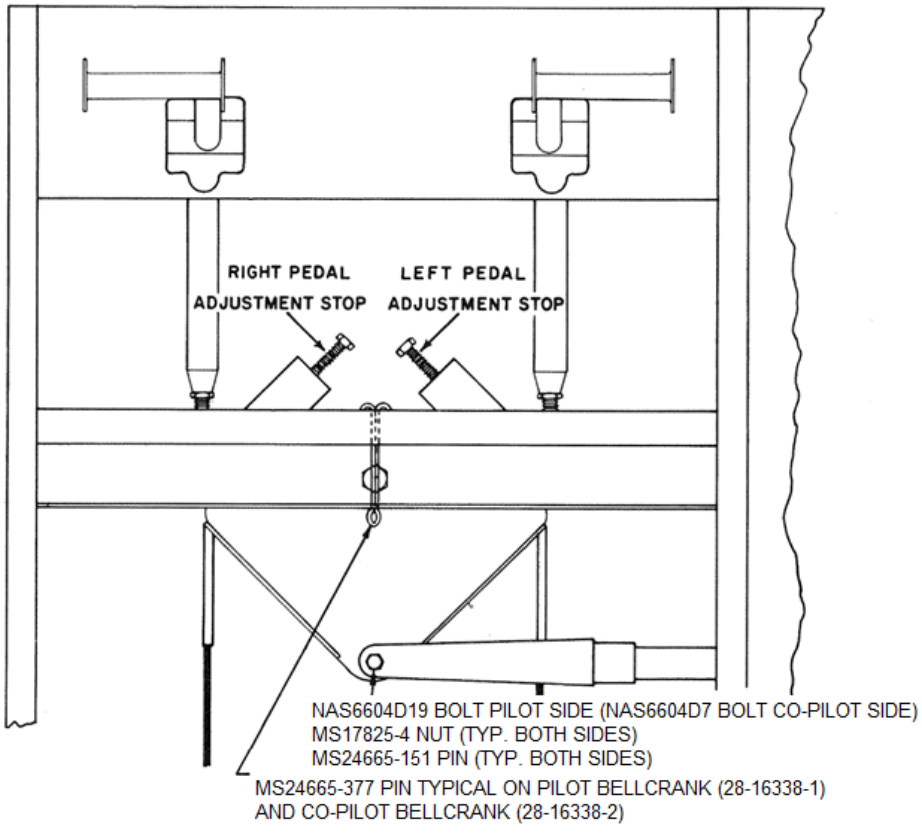


Figure 10-27. Wooden Wedges Installed



NOTES:
1. AT ALL DOUBLE LOCKING LOCATIONS, NO MORE THAN ONE THREAD OF BOLT TO BE BELOW SURFACE OF JOINT.
2. UP TO 3 WASHERS TOTAL MAY BE USED UNDER BOLT HEAD AND NUT TO ENSURE PROPER ENGAGEMENT OF COTTER PIN IN NUT CASTELLATION.
3. BOLTS OF NEXT DASH NO. IN LENGTH MAY BE SUBSTITUTED AS LONG AS REQUIREMENTS OF NOTE 2 ARE MET.
4. ALL CHECK NUTS TO BE TREATED WITH VIBRA-TITE (VC-3).
5. BELLCRANK HARDWARE TYPICAL 2 PLACES.

Figure 10-28. Tail Rotor Pedal Adjustment Stops

10-8 TAIL ROTOR CONTROL CABLES

A. Inspection – Tail Rotor Cable

(1) Remove the wraparound cowling and baggage box, if required.

(2) Remove the seat cushions, seat deck, and the floor panels on the left side of the cabin.

NOTE: Stabilizer removal is not required on 280F models.

(3) Remove the left side horizontal stabilizer and remove the inspection panel on the tailcone.

(4) Inspect the cables and cable ends for corrosion, wear, broken strands or strand separations, and fraying.

CAUTION: USE OF PVC TAPE TO COVER OR WRAP THE EXPOSED CABLE ENDS IS PROHIBITED. REMOVE ANY PVC TAPE FROM THE CABLES IF PRESENT.

(5) Visually inspect the cable pulleys for wear and security.

a) Disconnect the tail rotor cables from the tail rotor pitch change assembly and attach strings to the end of the cables.

b) Partially pull the tail rotor control cables out of the tailcone through the access opening and inspect the areas of the tail rotor control cables that pass over the pulleys and inspect the pulleys in accordance with FAA Advisory Circular 43.13-1B, Para. 7-149, Cable System Inspection. If the pulleys are rubbing on the mounting brackets, AN960-10L, NAS1149F0316P, or NAS1149F0332P washers may be used as shims to eliminate the interference.

CAUTION: IN OLDER AIRCRAFT, TURNBUCKLES LOCATED NEAR THE TURBOCHARGER HAVE A HIGH SUSCEPTIBILITY TO RAPID DETERIORATION. IT IS RECOMMENDED THAT THE LOCATION OF THE TURNBUCKLES BE REPOSITIONED UNDER THE BAGGAGE BOX. SEE SIL 0192 FOR PART NUMBER INFORMATION.

(6) Inspect the turnbuckles hardware for corrosion and security.

(7) Replace and reinstall the tail rotor cables and/or pulleys if an unsatisfactory condition, as described in steps 4 through 6, is evident.

(8) Check cable tension 35-40 lb/15.9-18.1 kg with cable tensiometer and tail rotor rigging (Para. 10-7.A).

(9) Install the left side horizontal stabilizer, if removed, and install the inspection panel on the tailcone.

(10) Install the left side floor panel, seat deck, and seat cushions.

(11) Install wraparound cowling and the baggage box, if removed.

B. Replacement – Tail Rotor Cable (Fig. 10-29)

(1) Replace the aft section of the tail rotor cable as follows:

(a) Remove the wraparound cowl and the baggage box, if required.

NOTE: Stabilizer removal is not required on 280F models.

(b) If required, remove the left side horizontal stabilizer and remove the inspection panel on the tailcone.

(c) Remove the cotter pins from the aft cable guide pulley.

(d) Remove pivot hardware from the cable links at the aft control brackets (Detail A).

(e) Cut the tail rotor cable aft of the turnbuckle in the engine compartment or aft pylon area, as applicable.

(f) Attach a string to the forward end of the cable and pull the cable out through the aft end of tailcone.

NOTE: String will follow routing through pulleys and eyelets to aid in installation of the new cable.

(g) Attach a new tail rotor cable to the string and pull it back through the tailcone eyelets and cable pulleys.

NOTE: Check that the cable is properly routed and riding on the pulleys (Detail C and Detail D).

(h) Clamp the tail rotor pedals in neutral position using two wood blocks and C-clamps.

(i) Install the tail rotor rigging tool T-0080 (0.590 in/15 mm) between the bearing retainer and the output shaft seal retainer to hold the tail rotor pitch controls in the neutral position (Fig. 10-26). Secure the pitch control assembly in this position by installing wooden wedges between the pitch control assembly and the transmission on the right side of the transmission (Fig. 10-27).

NOTE: If rigging tool is not available, install a spacer measuring 0.590 in/15 mm between the brass bushing and the seal housing.

(j) Connect the aft end of tail rotor cable to the cable links and the tail rotor control brackets. Torque the pivot bolts and install cotter pins.

CAUTION: CABLE LINKS MUST PIVOT FREELY ON THE CONTROL BRACKETS AND AT THE CABLE CONNECTIONS.

(k) Adjust the turnbuckle so only one thread of rod ends is showing at each end of turnbuckle.

(l) Position the new cable through the cable eye on the turnbuckle rod end.

(m) Pull the cable taut and swedge in this position. Allow 2 to 3 inches of cable extending from swedge and cut excess cable to leave approximately a 1 inch tail.

CAUTION: TURNBUCKLES MAY NOT HAVE MORE THAN THREE THREADS SHOWING AT EACH END.

(n) Using a cable tensiometer, adjust the turnbuckles until the cables read 35-40 lb/15.9-18.1 kg.

(o) Remove the clamps from the tail rotor pedals.

(p) Check the rigging and cable tension (Para. 10-7.A).

(q) Cycle tail rotor pedals to check for binding.

(r) Install pulley cotter pins and check pulley for binding.

(s) Install the inspection panel on the tailcone.

(t) Install the horizontal stabilizer, if removed.

(u) Install wraparound cowling and the baggage box, if removed.

(2) Replace the forward section of the tail rotor cable as follows (Fig. 10-29):

(a) Remove the seat cushions and the seat deck (Para. 8-8.A).

(b) Remove the floor panels on the left side of the cabin.

(c) Disconnect the cable from the forward tail rotor pedal bellcrank (Detail F).

(d) Cut the cable forward of the turnbuckle in the engine compartment or aft pylon area, as applicable (Detail B).

NOTE: It is not necessary to remove the pulley cotter pins.

(e) Attach a string to the aft end of the cable and pull it out forward through the firewall and the seat assembly.

(f) Attach a new cable to the string and pull it back through the firewall.

NOTE: Check that cable is properly routed and riding on pulley on forward side of firewall (Detail E).

(g) Install spacers on each side of the cable and insert into the forward bellcrank. Secure with hardware (Detail F).

(h) Clamp the tail rotor pedals in neutral position using two wood blocks and C-clamps.

(i) Install the tail rotor rigging tool T-0080 (0.590 in/15 mm) between the bearing retainer and the output shaft seal retainer to hold the tail rotor pitch controls in the neutral position (Fig. 10-26). Secure the pitch control assembly in this position by installing wooden wedges between the pitch control assembly and the transmission on the right side of the transmission (Fig. 10-27).

NOTE: If a rigging tool is not available, install a spacer measuring 0.590 in/15 mm between the brass bushing and the seal housing.

(j) Adjust the turnbuckle in the engine compartment or aft pylon area, as applicable, so only one thread of the rod ends is showing at each end of the turnbuckle.

(k) Position the new cable through the cable eye on the turnbuckle rod end.

(l) Pull the cable taut and swedge in this position. Allow 2 to 3 inches of cable extending from swedge and cut excess cable to leave approximately a 1 inch tail.

CAUTION: TURNBUCKLES MAY NOT HAVE MORE THAN THREE THREADS SHOWING AT EACH END.

(n) Using a cable tensiometer, adjust the turnbuckles until the cables read 35-40 lb/15.9-18.1 kg.

(o) Remove the clamps from the tail rotor pedals.

(p) Check the rigging and cable tension (Para. 10-7.A).

(q) Cycle tail rotor pedals to check for binding.

(r) If previously removed, install cotter pins and check pulley for binding.

(s) Install the floor panel, seat deck (Para. 8-8.D), and cushions.

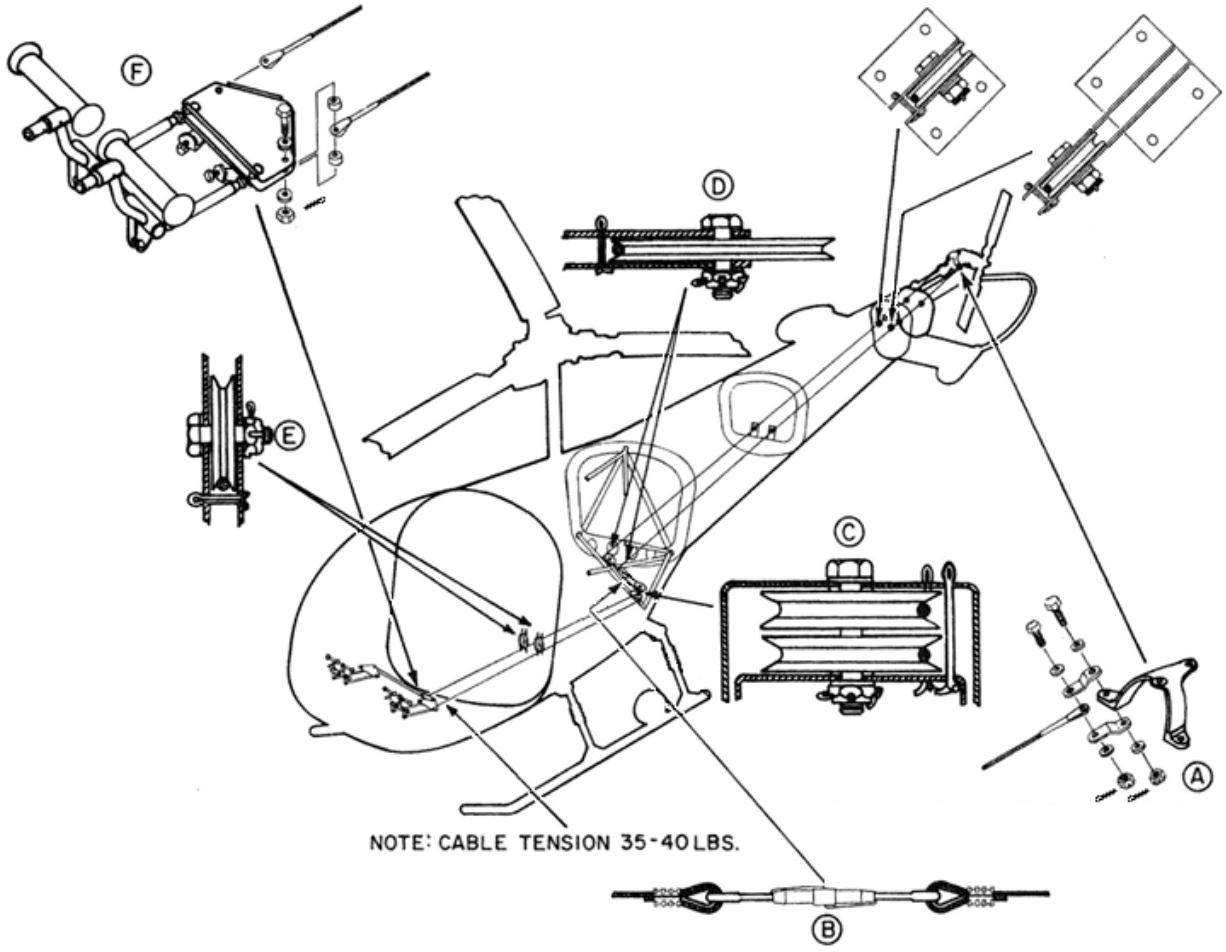


Figure 10-29. Tail Rotor Cables

SECTION 11

BELT DRIVE SYSTEM

TABLE OF CONTENTS

Paragraph		Page
	General Information	MM-11-3
11-1	**Clutch Control and Belt Tension Rigging**	**MM-11-3**
	A. Static Inspection	MM-11-3
	B. Rigging Procedures	MM-11-5
11-2	**Clutch Cable**	**MM-11-10**
	A. Removal	MM-11-10
	B. Installation	MM-11-11
11-3	**Clutch Control Lever**	**MM-11-13**
	A. Removal	MM-11-13
	B. Inspection	MM-11-13
	C. Installation	MM-11-13
11-4	**Jackstrut and Pulley Assembly**	**MM-11-14**
	A. Removal	MM-11-14
	B. Disassembly	MM-11-14
	C. Cleaning	MM-11-15
	D. Inspection	MM-11-15
	E. Assembly	MM-11-15
	F. Installation	MM-11-16
	G. Pulley Alignment Procedure	MM-11-17
11-5	**Drive Belt**	**MM-11-21**
	A. Troubleshooting	MM-11-21
	B. Tracking	MM-11-21
	C. Removal	MM-11-24
	D. Inspection	MM-11-24
	D.1. Repair	MM-11-27
	E. Installation	MM-11-33
11-6	**Main Rotor Transmission**	**MM-11-36**
	A. General Description	MM-11-36
	B. Removal	MM-11-36
	C. Seal Replacement	MM-11-37
	D. Installation	MM-11-39
11-6.1	**Main Rotor Chip Detector**	**MM-11-41**
	A. Removal	MM-11-41
	B. Installation	MM-11-41
11-7	**Overrunning Clutch and Pulley Assembly**	**MM-11-42**
	A. Troubleshooting	MM-11-42
	B. Servicing and Inspection	MM-11-42
	C. Removal	MM-11-43
	D. Disassembly	MM-11-44
	E. Cleaning	MM-11-44
	F. Inspection	MM-11-44
	G. Assembly	MM-11-44
	H. Installation	MM-11-45

SECTION 11

BELT DRIVE SYSTEM

TABLE OF CONTENTS – CONTINUED (PAGE MM-11-2)

Paragraph		Page
11-7.1	**Upper Jackstrut Bearing**	**MM-11-47**
	A. Removal	MM-11-47
	B. Cleaning	MM-11-47
	C. Inspection	MM-11-47
	D. Installation	MM-11-47
11-8	**Idler Pulley Assembly**	**MM-11-53**
	A. Troubleshooting	MM-11-53
	B. Removal	MM-11-53
	C. Disassembly	MM-11-53
	D. Cleaning	MM-11-54
	E. Inspection	MM-11-54
	F. Assembly	MM-11-54
	G. Installation	MM-11-55
11-8.1	**Yoke End Assembly**	**MM-11-56**
	A. Removal	MM-11-56
	B. Disassembly	MM-11-56
	C. Inspection	MM-11-56
	D. Assembly	MM-11-56
	E. Installation	MM-11-57
11-8.2	**Actuator Arm Assembly and Snubber Roller Assembly**	**MM-11-58**
	A. Removal	MM-11-58
	B. Disassembly	MM-11-58
	C. Cleaning	MM-11-58
	D. Inspection	MM-11-58
	E. Assembly	MM-11-59
	F. Installation	MM-11-59
11-9	**Belt Tension Assembly**	**MM-11-71**
	A. Troubleshooting	MM-11-71
	B. Removal	MM-11-71
	C. Disassembly	MM-11-71
	D. Cleaning	MM-11-72
	E. Inspection	MM-11-72
	F. Repair	MM-11-72
	G. Assembly	MM-11-72
	H. Installation	MM-11-74
	I. Replacement – Spring Capsule Bushing	MM-11-74
	J. Assembly – Spring Capsule	MM-11-76

SECTION 11

BELT DRIVE SYSTEM

General Information

The belt drive system consists of a jackstrut and pulley assembly, idler pulley assembly, belt tension assembly, and a clutch engagement lever which is controlled from the cabin. The jackstrut pulley, which is bolted to the engine, drives the main rotor gearbox through a main drive belt. By engaging the clutch lever, the belt tension assembly pulls the idler pulley into the drive belt. Belt tension is maintained by properly rigging the system. Correct rigging and maintenance are very important to keep this system working properly and extends component service life.

11-1 CLUTCH CONTROL AND BELT TENSION RIGGING

NOTE: The clutch control and belt tension rigging static inspection assists in determining if the drive belt tension, belt tension mechanism, actuator, and clutch control handle are rigged properly and in the proper operating position.

NOTE: Inspection is to be completed in the sequence listed and with the engine off.

WARNING: EXTREME CAUTION SHOULD BE USED WHEN BELT TENSION MECHANISM IS IN ENGAGED POSITION. KEEP HANDS AWAY FROM THIS MECHANISM WHEN ENGAGING OR DISENGAGING CLUTCH, OR PERSONAL INJURY COULD OCCUR.

A. Static Inspection

(1) Pull clutch handle up a couple inches and SLOWLY return lever to CLUTCH DISENGAGED position (Fig. 11-1, Detail d).

NOTE: The clutch lever must be placed in the disengaged position gently (and the guide bushings must be snug enough) so that momentum will not continue movement of the bellcrank and give a false indication of the 1/16 to 1/8 inch/1.6-3.3 mm gap.

(a) The threaded shaft (6) should be within 1/16 to 1/8 inch/1.6-3.3 mm of the lower pivot spacer of bellcrank (2) (Fig. 11-2, Detail a).

1 If measurement is outside the limits, adjust spring capsule clearance (Para. 11-1.B.(4)).

(b) Verify guide bushings (8) (Fig. 11-18) are snug on bracket (9) (Fig. 11-3, Detail c).

1 If the guide bushings are not snug on the brackets, adjust clutch capsule slide connection (Para. 11-1.B.(3)).

(2) ENGAGE clutch and STOW clutch lever (Fig. 11-1, Detail a).

(a) The clutch lever should lie flat on the floor (Fig. 11-1, Detail a). Movement of the handle should have no effect on the bellcrank (Fig. 11-1, Detail f).

(b) Use the shank of a 1/8 drill bit or a #30 drill bit to verify that there is approximately .125-inch (3.2 mm) space between the clutch lever and the spacer in the bellcrank (Fig. 11-1, Detail e).

1 If the clearance between the handle and the spacer is not correct the clutch system will require rigging (Para. 11-1.B).

(c) Viewing the belt tension mechanism, check that the overcenter stop (8) is tightly against side plates (9) (Fig. 11-3, Detail b), and the clutch engage warning light is out.

(d) Viewing the top of the spring capsule, inspect for wear (Fig. 11-3.1) between the adapter (3) and the bushing (5) (Fig. 11-19). It may help to push the top of the capsule inboard while watching for movement between the adapter and the bushing.

1 If bushing is loose, replace the bushing (Para. 11-9.I).

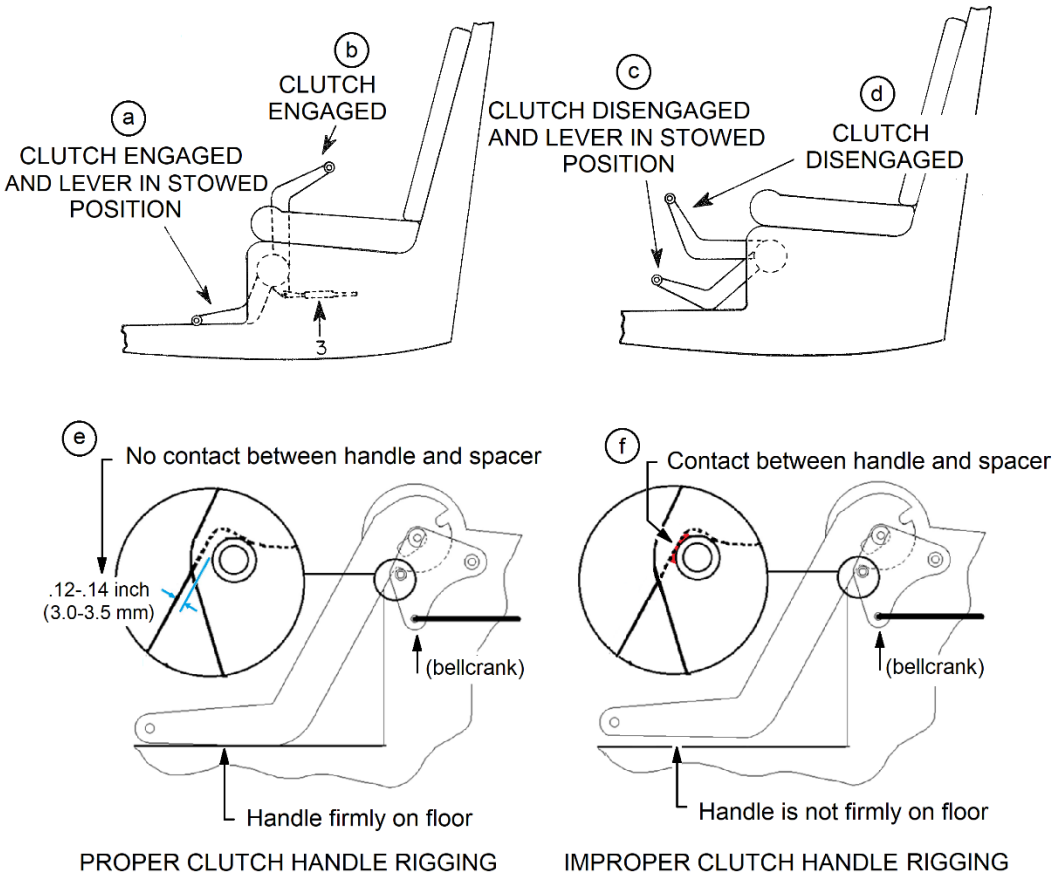


Figure 11-1. Clutch Rigging

(e) View spring capsule adapter (6) (Fig. 11-3).

1 The proper extension of adapter (6) is 1-5/8 to 1-3/4 inches/41.3-44.5 mm from top of spring capsule to bottom of adapter nut (Fig. 11-3, Detail d).

a If the adapter extension is not correct, adjust the extension (Para. 11-1.B.(5)).

NOTE: Adjusting the adapter extension will require rigging the adapter extension and the snubber roller adjustments.

NOTE: Rigging between clutch control handle and the belt tension mechanism will usually remain constant unless some portion of this system is removed or replaced.

2 The bellcrank should be horizontal to slightly below horizontal (Fig. 11-3, Detail e).

(f) Inspect for contact between the anchor (14) (Fig. 11-19) and the pylon tube.

1 If contact is evident, chamfer the anchor (Para. 11-9.F).

(g) Check clearance between the snubber roller and the back side of the belt for 0.38 inch/9.5 mm gap and parallelism to the belt.

1 If clearance is insufficient, adjust roller (Para. 11-5.B.(11)).

2 Inspect the snubber roller for wear (grooves). Wear of the snubber roller from the belt indicates contact from the belt during operation and that the gap between the belt and the roller is not sufficient.

B. Rigging Procedures

WARNING: EXTREME CAUTION SHOULD BE USED WHEN BELT TENSION MECHANISM IS IN ENGAGED POSITION. KEEP HANDS AWAY FROM THIS MECHANISM WHEN ENGAGING OR DISENGAGING CLUTCH, OR PERSONAL INJURY COULD OCCUR.

NOTE: Para. 11-1.B.(5), Belt Tension Adjustment, will have to be re-checked after belt replacement or drive system disassembly to assure proper belt tension and rigging.

NOTE: The clutch is rigged in the following steps. Rigging is to be completed in the sequence listed, with the engine off.

(1) Preliminary Clutch Lever Adjustment

NOTE: The clutch lever must be placed in the disengaged position gently (and the guide bushings must be snug enough) so that momentum will not continue movement of the bellcrank and give a false indication of the 1/16 to 1/8 inch/1.6-3.3 mm gap.

(a) Place clutch in ENGAGED position (Fig. 11-1, Detail b). With clutch engaged, lift and release clutch lever to stowed position (Fig. 11-1, Detail a). Adjust turnbuckle (3) until the clutch lever will lie flat on floor and that there is approximately 0.125 inch/3.2 mm clearance between the handle and the spacer (Fig. 11-1, Detail e).

(2) Preliminary Belt Tension Mechanism Check

(a) Check the following items before proceeding with clutch rigging.

1 Clutch cable is to have one thread exposed above jam nut (11) (Fig. 11-3).

2 Engage the clutch lever (Fig. 11-1, Detail b) and check that belt tension assembly is locked over center with stops (8) contacting side plates (9), and the clutch engage warning light is out (Fig. 11-3, Detail b).

3 Disengage the clutch (Fig. 11-1, Detail d).

(3) Spring Capsule Slide Connection Adjustment

1 With the clutch disengaged, remove the bolt (18) securing the clutch cable (15) to the clutch actuator bellcrank (13) (Fig. 11-3).

2 Pull clutch handle up 2 inches/50 mm to move the cable out of the way at the clutch capsule.

3 Loosen the torque on nuts (7) that secure the capsule assembly (6) into the guide brackets (9) so that the nylon guides (8) are loose (Fig. 11-18).

4 Connect a fish scale to the clutch capsule bellcrank assembly and measure the force required to start the bellcrank moving (Fig. 11-2, Detail b).

5 Incrementally re-tighten the nuts securing the capsule to the brackets until the force required to move the bellcrank is the original scale reading plus 3 lb/1.4 kg.

6 Connect the clutch cable rod end (10) to the bellcrank (13) and torque nut to 30-40 in-lb/3.4-4.5 Nm (Fig. 11-3, Detail a).

(4) Spring Capsule Clearance Adjustment

NOTE: Adjust spring capsule clearance with clutch disengaged.

(a) Loosen jam nut (5) (Fig. 11-2) and turn spring capsule adapter (4) in or out of spring capsule to obtain 1/16 to 1/8 inch/1.6-3.3 mm clearance between threaded shaft and lower pivot spacer of bellcrank (2) (Fig. 11-2, Detail a).

NOTE: After each adjustment of the adapter, the clutch handle must be pulled up a few inches and SLOWLY returned to the full down position.

(b) Re-check clearance after engaging and disengaging clutch.

(c) Lock jam nut (5) against adapter (4).

(5) Belt Tension Adjustment

(a) ENGAGE the clutch assembly.

(b) Measure the exposed surface of the adapter (6) (Fig. 11-3, Detail d).

NOTE: Ensure measurement is taken from the bottom of the adapter nut (4), NOT the jam nut (5) on top of adapter nut (4) (Fig. 11-3, Detail d).

(c) The length of exposed spring capsule adapter (6) should be 1-5/8 to 1-3/4 inches/41.3-44.5 mm. If length is not correct, proceed as follows:

1 Loosen jam nut (5).

2 DISENGAGE clutch assembly.

3 Disconnect rod end (1) from bellcrank (2).

4 Adjust shaft (3) in or out of yoke (4). Each turn of shaft (3) will change the exposed section of the adapter (6) by approximately 0.1 inch/2.4 mm.

5 Connect rod end (1) to bellcrank (2) and ENGAGE clutch to recheck adjustment of adapter (6).

6 Continue the adjustment process until the exposed surface of the adapter (6) is 1-5/8 to 1-3/4 inches/41.3-44.5 mm.

(d) Continue to check the following with clutch assembly ENGAGED:

1 The top edge of bellcrank (2) should be horizontal to slightly below horizontal (i.e., parallel) to the lower aft pylon cross tube (Fig. 11-3, Detail e).

2 The snubber roller should be parallel to the back side of the belt with 0.38 inch/9.5 mm clearance.

NOTE: After final adjustment of the idler pulley track, loosen the aft nut on the "snubber" roller and allow the roller to self-align on the idler straps. Torque the aft nut to 95-110 in-lb/10.8-12.5 Nm.

(e) Secure rod end (1) to bellcrank (2). Torque nut (30-40 in-lb/3.4-4.5 Nm).

(f) Secure yoke jam nut (5) against yoke (4) (40-45 ft-lb/4.5-5.1 Nm).

(g) Apply Vibra-Tite VC-3 to the following:

1 Spring capsule adapter (6) jam nuts.

2 Yoke jam nut (5).

3 Clutch cable rod end jam nut (12).

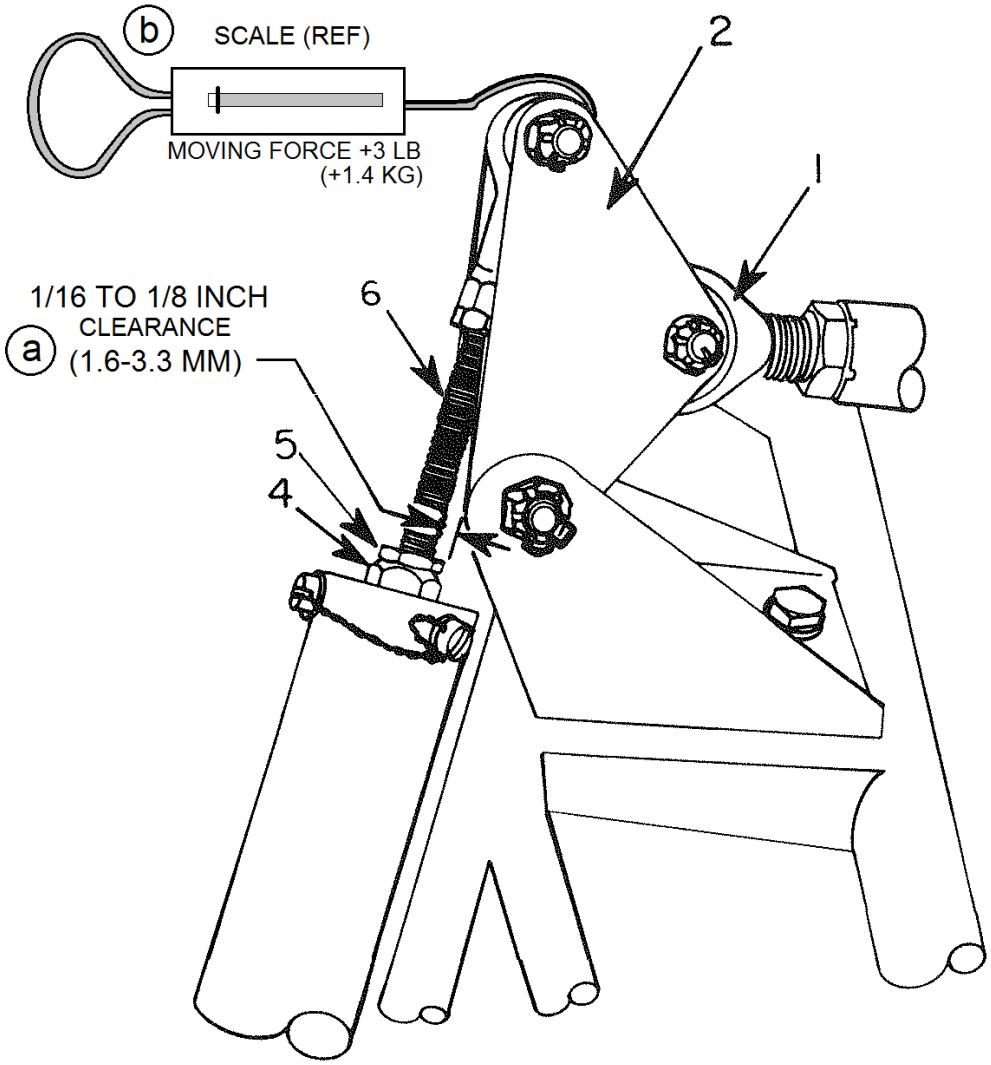
(6) Final Clutch Lever Adjustment Check

(a) With the clutch engaged and clutch lever in stowed position, the clutch lever should lie flat on the floor (Fig. 11-1, Detail a). Movement of the handle should have no effect on the bellcrank (Fig. 11-1, Detail e and Detail f).

(b) Use the shank of a 1/8 drill bit or a #30 drill bit to verify that there is approximately 0.125-inch (3.2 mm) space between the clutch lever and the spacer in the bellcrank (Fig. 11-1, Detail e).

(c) Check that the nuts on the turnbuckles and all other check nuts in the system are torqued.

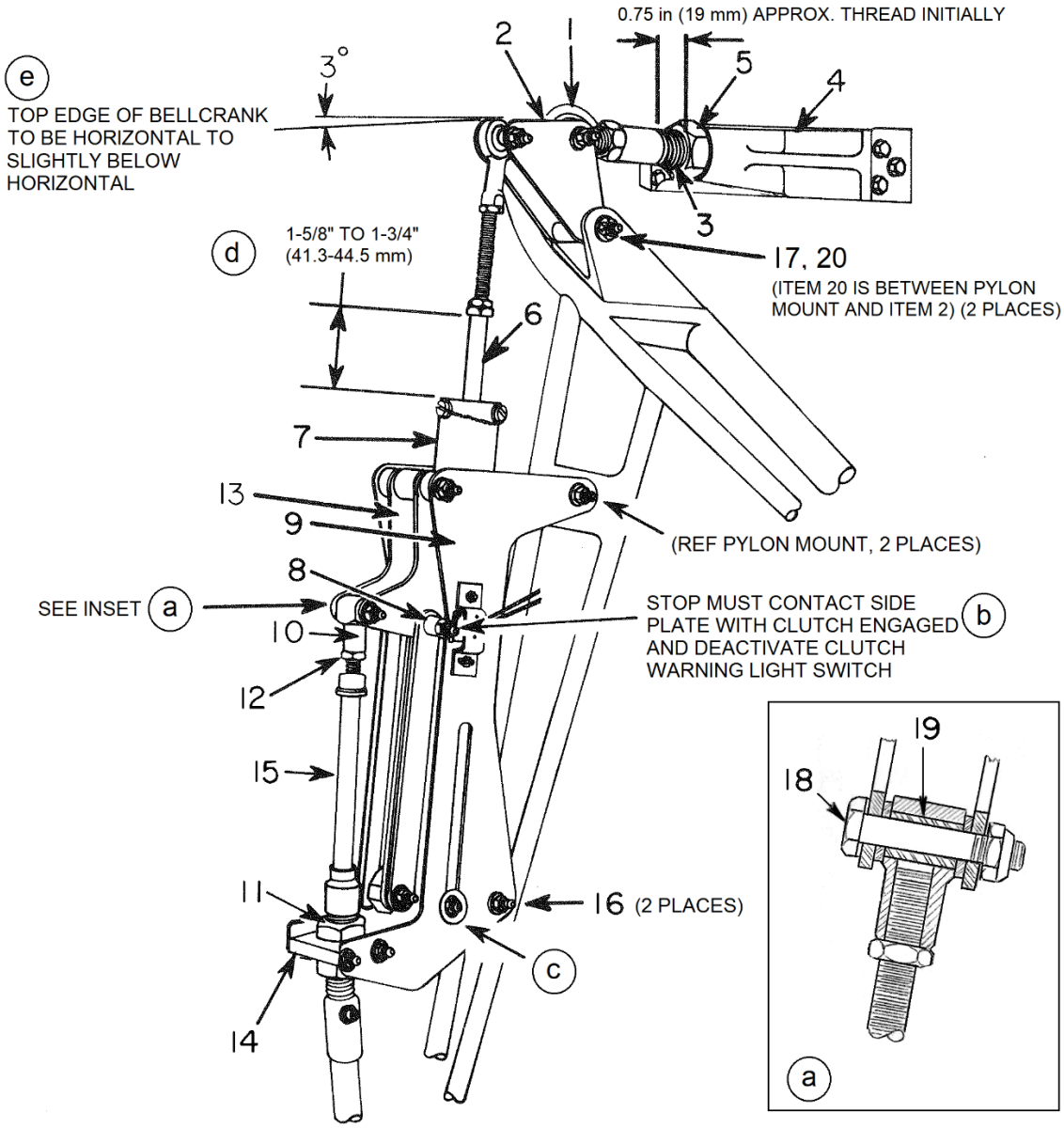
(d) Check that the clutch is over center with the stops contacting the side plates and that the clutch light is out.



(Clutch Disengaged)

1. Rod End
2. Bellcrank
3. Turnbuckle (Fig. 11-1)
4. Spring Capsule Adapter
5. Jam Nut (2 places)
6. Shaft

Figure 11-2. Clutch Rigging – Spring Capsule Adjustments



(Clutch Engaged)

1.	Rod End Bearing	11.	Jam Nut
2.	Bellcrank	12.	Jam Nut
3.	Shaft	13.	Bellcrank
4.	Yoke	14.	Mount Block
5.	Nut	15.	Cable
6.	Spring Capsule	16.	Nut (bolt head forward)
7.	Spring Capsule Housing	17.	Nut (bolt head forward)
8.	Stop	18.	Bolt
9.	Bracket (side plate)	19.	Spacer
10.	Rod End	20.	Flanged Bushing

Figure 11-3. Clutch Rigging – Belt Tension Assembly Adjustment

Figure 11-3.1 Spring Capsule Wear Inspection Area

11-2 CLUTCH CABLE

A. Removal – Clutch Cable

NOTE: Refer to Fig. 11-3 for numbered items unless stated otherwise.

(1) Disconnect clutch cable (15) at bellcrank arms (13).

(2) Loosen jam nut (12) and remove rod end (10) and spacer from end of cable (15).

(3) Remove rubber dust covers from cable.

(4) Remove upper jam nut (11) from mount block (14).

(5) Remove two bolts from mount block (14).

(6) Slide mount block (14) over the end of cable (15).

(7) Disconnect three clamps holding cable to pylon.

(8) Remove forward jam nut from pylon mount (Fig. 11-4).

(9) Remove fiberglass seat deck (Para. 8-8.A).

(10) Loosen jam nuts from turnbuckle (3) barrel (Fig. 11-1).

(11) Turn turnbuckle barrel to disconnect clutch cable.

(12) Remove jam nut and rubber dust cover from forward end of cable.

(13) Slide clutch cable aft through pylon mount and remove.

B. Installation – Clutch Cable

NOTE: Refer to Fig. 11-3 for numbered items unless stated otherwise.

(1) Remove rubber dust cover and outside jam nut from forward end of clutch cable.

(2) Remove clutch cable heat shield.

(3) Remove Adel clamps that secure cable to the pylon.

(4) Slide cable through pylon mount (Fig. 11-4). Position forward as far as possible.

(5) Install large jam nut, rubber dust cover, and small jam nut on cable.

(6) Connect clutch lever linkage and cable with turnbuckle (3) barrel (Fig. 11-1).

(7) Place clutch lever in engaged position. Lift and release clutch lever to stowed position. Adjust turnbuckle (3) until the clutch lever will lie flat on floor and there is 0.125 inch/3.2 mm clearance between the back side the handle and the spacer (Fig. 11-1, Detail e).

(8) Torque (175-200 in-lb/19.8-22.6 Nm) pylon mount jam nuts. Approximately two threads should extend between aft jam nut and grease fitting.

(9) Remove rubber dust cover and upper jam nut from aft end of clutch cable (15).

(10) Slide mount block (14) down over end of cable (15).

(11) Install mount block (14) bolts and washers.

(12) Install nuts and torque (12-15 in-lb/1.4-1.7 Nm).

(13) Install jam nut (11) and rubber dust cover.

(14) Install rod end jam nut (12) and rod end (10) on cable (15).

NOTE: Turn rod end on cable until it bottoms out, then back it off one-half turn.

(15) Slide spacer (19) into rod end (10) and place a heavy washer on each side of rod end. Install between bellcrank arms (13) of belt tension assembly.

(16) Install washer on bolt (18) and slide belt through bellcrank arms (13) and rod end (10).

(17) Install washer and nut on bolt (18) and torque (30-40 in-lb/3.4-4.5 Nm).

(18) Torque (80 in-lb/9.0 Nm) jam nut (12) against rod end (10).

(19) Torque (200 in-lb/22.6 Nm) the fitting (14) jam nuts with approximately two threads located above upper jam nut (11).

(20) Install three clamps securing clutch cable to pylon.

NOTE: Before tightening the turnbuckle jam nuts, complete the rigging procedure (Para. 11-1.B).

(21) With jam nuts torqued and rigging complete, lubricate clutch cable. See Table 4-1 chart for proper grease. Grease fittings are located on aft side of pylon mount and below belt tension assembly mount block.

(22) Engage and release clutch to check for freedom of movement in the system.

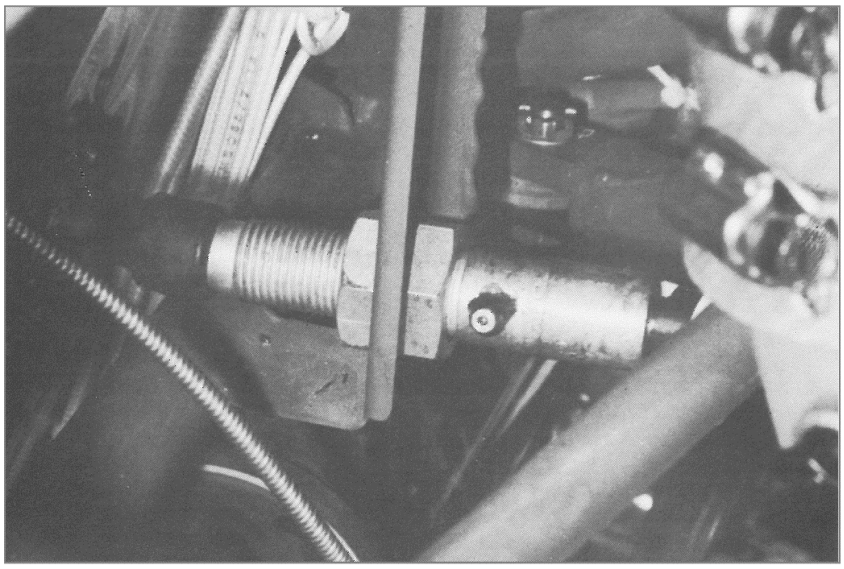


Figure 11-4. Forward End of Clutch Cable

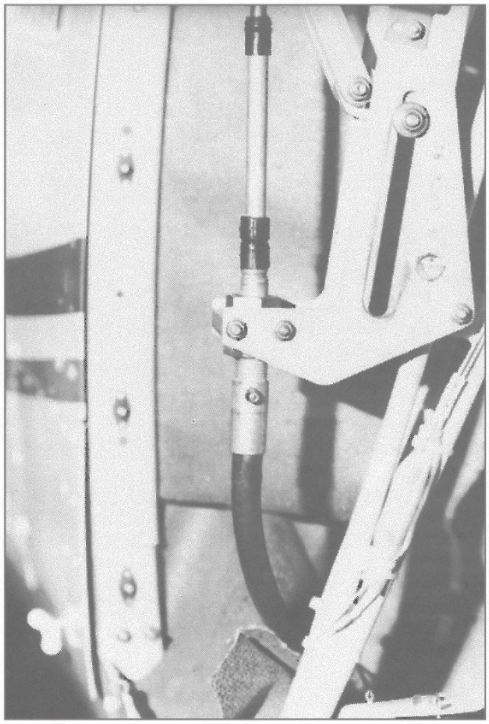


Figure 11-5. Aft End of Clutch Cable

11-3 CLUTCH CONTROL LEVER

A. Removal – Control Lever

(1) Remove fiberglass seat assembly (Para. 8-8.A).

(2) Loosen jam nuts on turnbuckle (3) and rotate to disconnect clutch lever linkage from cable (Fig. 11-1).

(3) Remove hardware that attaches bellcrank to the seat section.

(4) Remove clevis pin on the bottom of the bellcrank to remove linkage.

(5) Remove lever and bellcrank assembly.

(6) Remove spacer from oilite bushings.

B. Inspection – Control Lever

(1) Inspect bellcrank bushings for excessive wear.

(2) Inspect roll pins and spacers in the bellcrank for security and wear.

C. Installation – Control Lever

(1) Attach linkage to the bottom of the bellcrank and install clevis pin and cotter pin.

(2) Install spacer in oilite bushings of bellcrank.

(3) Install a light washer on mount bolt and, with head of bolt inboard, slide bolt through one side of seat section.

(4) Install three washers (1/4 Harper), bellcrank and spacer assembly, and then two washers (1/4 Harper) on bolt.

(5) Slide bolt through second side of seat section and install a light washer and nut. Torque nut (30-40 in-lb/3.4-4.5 Nm).

(6) Attach clutch lever linkage to the clutch cable with turnbuckle.

NOTE: Adjust rigging per instructions (Para. 11-1.B).

(7) Tighten turnbuckle jam nuts.

(8) Inspect installation and engage and disengage the clutch to check freedom of operation.

(9) Reinstall fiberglass seat deck (Para. 8-8.D).

11-4 JACKSTRUT AND DRIVER PULLEY ASSEMBLY

A. Removal – Jackstrut and Driver Pulley

NOTE: Refer to Fig. 11-6 for numbered items.

(1) Remove wraparound cowl and baggage compartment (Para. 8-11.A).

(2) Remove four bolts (20) and (23) connecting upper end of jackstrut (11) to bearing housing assembly (17).

NOTE: Keep shims (16) together. Temporarily install a screwdriver through bearing housing and jackstrut to keep the strut from falling and cocking the bearing in lower drive pulley.

(3) Cut safety wire and remove the six bolts (10) from the driver pulley (2).

(4) Carefully pull driver pulley (2) and strut assembly (11) from the mount flange end and lift free of the belt.

NOTE: Keep shims (1) together. Shims (1) and (16) must be kept for reinstallation as they are required to properly align the drive pulley to the driven pulley.

CAUTION: Exercise care not to cock the self-aligning bearing (5) in the pulley (2) by letting the jackstrut (11) deflect. If bearing should get cocked, don't force it straight. Slowly rotate the pulley until it aligns itself.

B. Disassembly – Jackstrut and Driver Pulley

NOTE: Refer to Fig. 11-6 for numbered items.

(1) Remove grease fitting (14) and relief valve (15) from driver pulley (2).

(2) Place pulley (2) face down on work bench with jackstrut (11) extended horizontally. Place blocks beneath strut to keep it from cocking the self-aligning bearing.

NOTE: A suggested method for heating the bearing housing is to use a fabricated oven of cinder blocks or bricks. Suspend the pulley such that the jackstrut is 2 or 3 inches from the floor. Then use a heat gun or torpedo heater and heat the assembly until the jackstrut assembly drops out of the pulley.

NOTE: Do not use blunt force, i.e., hammer, on the pulley flange surface when removing or installing the pulley.

(3) Heat pulley to approximately 250°F/121°C and, using a soft mallet, gently tap the jackstrut on lower side to remove strut and bearing assembly from pulley.

(4) Remove nut (3) and washer (4) from strut.

(5) Remove washer (12) and bolt (13) from bore.

(6) Place seal retainer (8) in press and press strut through bearing (5), seal (6) and spacer (6A), and retainer.

(7) Press inner race of seal (6A) from retainer (8) and remove O-ring (7).

C. Cleaning – Jackstrut and Driver Pulley

(1) The pulley, washers, seal retainer and jackstrut should be washed in a cleaning solvent before inspection.

(2) The seal (6) and spacer (6A) should be cleaned with a damp, lint-free cloth.

(3) Clean bearing (5) in accordance with Para. 11-7.1.B.

D. Inspection – Jackstrut and Driver Pulley

(1) See Table 11-1 for detailed inspection requirements of the jackstrut and driver pulley assembly.

E. Assembly – Jackstrut and Driver Pulley (Fig. 11-6)

NOTE: Refer to Fig. 11-6 for numbered items.

NOTE: The seal, shim, and spacer are supplied as an assembly due to the spacer being critical to the fit of the assembly. Contact customer support if the clearance between the seal and the spacer needs to be measured or adjusted.

(1) Apply grease (MIL-PRF-81322) to O.D. of spacer (6A) and press seal into retainer (8) with conical side of spacer facing forward.

(2) Install O-ring (7) on seal retainer (8).

(3) Install seal retainer (8) on jackstrut (11).

(4) Apply grease (MIL-PRF-81322) to I.D. of male half of seal (6) and with conical side facing aft, install seal on jackstrut (11).

(5) Apply grease (MIL-PRF-81322) to I.D. of bearing (5) and press on jackstrut (11).

(6) Install washer (12) on bolt (13) and position in bore of jackstrut with bolt extending through bearing (5).

(7) Install washer (4) on bolt (13) with undercut side of washer mounted in bearing bore (5).

(8) Install nut (3) and torque to 300 in-lb/33.9 Nm.

(9) Heat driver pulley (2) to approximately 250°F/121°C.

(10) Lubricate bore of pulley and O.D. of bearing (5) with grease (MIL-PRF-81322) or equivalent.

(11) While holding jackstrut, visually align bearing (5) with pulley bore and drop into place.

CAUTION: Do not hammer or force bearing into pulley as serious damage could result to pulley and bearing. If bearing stops while only partially into bore, remove by gently tapping up on bottom side of jackstrut and repeat steps 9, 10 and 11.

(12) Install washers (9) onto bolts (10) and lubricate bolt shanks with grease (MIL-PRF-81322).

(13) Align holes in seal retainer (8) with bolt holes in pulley and install bolts (10).

CAUTION: Exercise care not to cock the self-aligning bearing during handling.

(14) Install grease fitting (14) and relief valve (15) in driver pulley (2). Torque 40-44 in-lb/4.5-5.0 Nm.

NOTE: The grease fitting hole has a small diameter hole at base extending to the bottom of the bearing bore. The relief valve hole has an equal diameter hole extending to one-half depth of the bearing bore.

CAUTION: Exercise care not to cock the self-aligning bearing during handling.

F. Installation – Jackstrut and Driver Pulley (Fig. 11-6)

NOTE: Refer to Fig. 11-6 for numbered items.

NOTE: To prevent pulley misalignment, the original shims (1) and (16) must be used on reinstallation.

NOTE: Shim (1) is designed with one of the six holes larger for proper locating onto the engine crankshaft.

NOTE: There is a 0.125 shim between the engine flywheel and fan that always stays in place. Only shim between the fan and pulley for pulley alignment.

CAUTION: Do not install an extra shim between the crankshaft and the engine flywheel.

(1) Install shims (1) on engine crankshaft between fan and pulley (2).

(2) Carefully install driver pulley (2) on crankshaft flange while aligning belt and secure with bolts (10) as follows:

NOTE: The pulley may only be installed on the crankshaft flange in one position as one bushing is larger than the other.

NOTE: Temporarily install screwdriver or alignment aid through jackstrut upper bearing housing (17) and jackstrut (11) to keep bearing from cocking.

(a) Install pulley (2) with 2 bolts (10) 180° apart. Torque (50 ft-lb/67.8 Nm).

(b) Install screwdriver or alignment aid through upper jackstrut (11) and shims (16) and hold together with c-clamp or vise grip. Check alignment and change shimming as required. Pulley must be engaged while checking alignment.

(c) After alignment is acceptable, install remaining bolts (10) and torque (50 ft-lb/67.8 Nm) in cross pattern.

(d) Install 2 bolts (20), (23) through upper jack strut and main rotor gearbox.

(e) Safety wire bolts in pairs using .041 wire.

NOTE: Do not safety across the relief valve (15).

(3) Install shims (16) between jackstrut (11) and jackstrut upper bearing housing assembly (17).

(4) Install four bolts (20) and (23) and washers (19) and (22) through jackstrut (11) and jackstrut upper bearing housing assembly (17).

(5) Install nuts (18) and (21) and torque.

(a) Bolt (20) and nut (18): 50-70 in-lb/5.6-7.9 Nm.

(b) Bolt (23) and nut (21): 160-190 in-lb/18.1-21.5 Nm.

(6) Remove relief valve (15) and lubricate driver pulley bearing (5) until grease appears through relief valve hole. See Table 4-1 for proper grease.

(7) Install relief valve (15) in driver pulley. Torque 40-44 in-lb/4.5-5.0 Nm.

G. Pulley Alignment Procedure

NOTE: If main rotor gearbox, engine, pulleys, or shims have been changed, it is required to check upper and lower pulley alignment using tool T-0044. Adjustments are made with engine off.

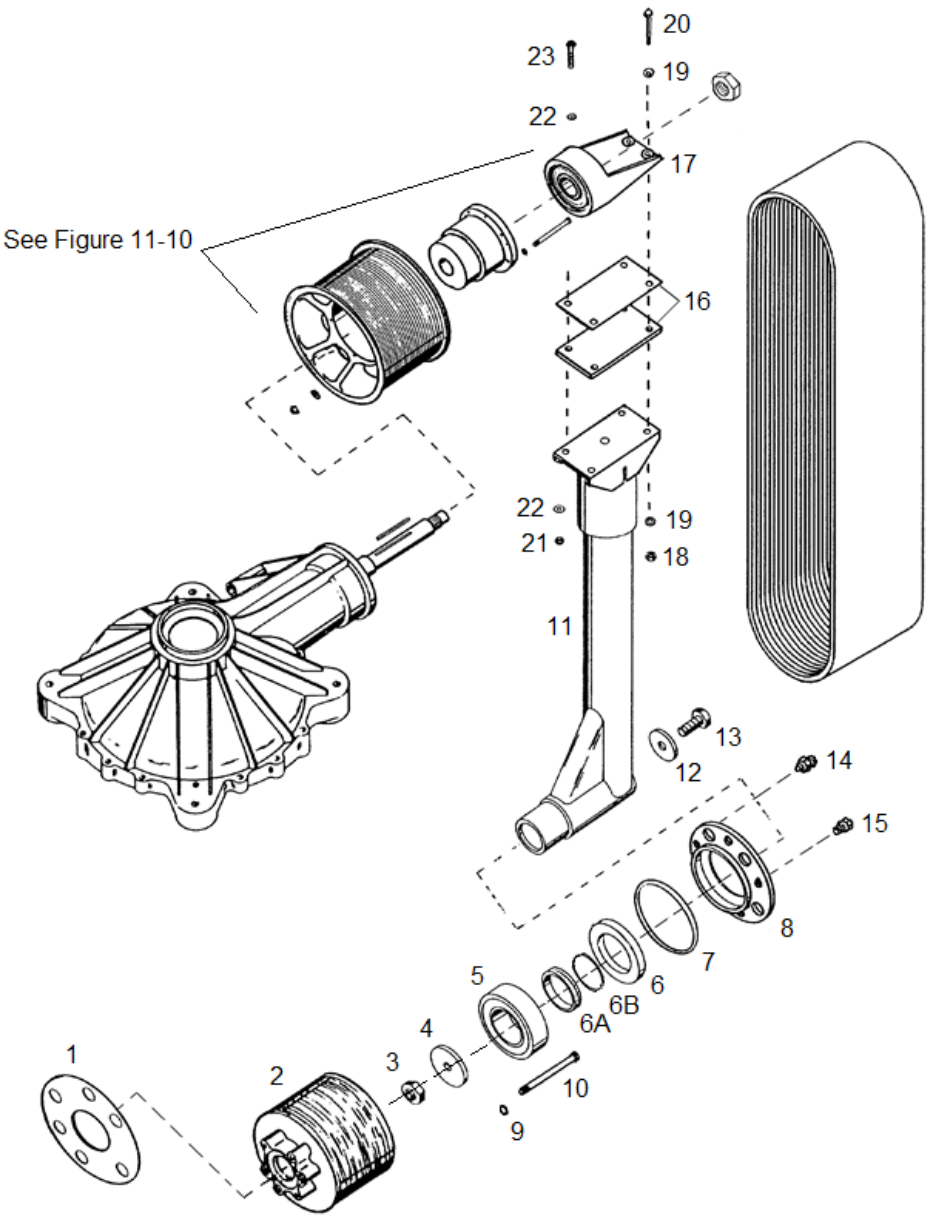
(1) Engage clutch and place tool T-0044 against aft face of upper or lower pulley. Pulleys should be parallel with a maximum gap of .010 inch or less between tool and second pulley.

(2) If pulleys are parallel but have a gap exceeding .020 inch, the shims (1) between fan and lower pulley must be changed. Add shims to bring lower pulley aft and remove shims to move pulley forward. Repeat this step until parallel gap is in tolerance.

(3) If pulleys are not parallel, add or subtract shims (16) between jackstrut upper bearing housing assembly (17) and jackstrut (11). Adding shims brings lower face of pulley towards engine and subtracting shims brings face aft.

NOTE: If shims have been changed, belt adjustment must be checked (Para. 11-1.A) and the belt track needs to be checked (Para. 11-5.B).

(4) Install baggage compartment (Para. 8-11.D) and wraparound cowl.



1.	Shim	12.	Washer
2.	Driver Pulley	13.	Bolt
3.	Nut	14.	Grease Fitting
4.	Washer	15.	Relief Valve
5.	Bearing	16.	Shim
6/6A.	Seal and Spacer	17.	Bearing Housing Assembly
6B.	Shim, if equipped	18.	Nut
7.	O-Ring	19.	Washer
8.	Bearing Retainer	20.	Bolt
9.	Washer	21.	Nut
10.	Bolt	22.	Washer
11.	Jackstrut Assembly	23.	Bolt

Figure 11-6. Jackstrut Assembly

Table 11-1. Inspection Requirements – Jackstrut and Pulley Assembly

Part Number	Fig. 11-6 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13273-1, -13	2	Driver Pulley	(-1) Bearing Bore Dia. 3.3447 to 3.3453	+.0008	Not Repairable	Replace Pulley
			(-13) Bearing Bore Dia. 3.3447 to 3.3459	+.0008	Not Repairable	Replace Pulley
			Cracks	None Allowed	Not Repairable	Replace Pulley
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Polish and blend out smooth
			Depth of grooves	≤ .176	Not Repairable	Replace Pulley
			Nicks and gouges in belt grooves	None Allowed	≤ .25 long and ≤ .025 deep	Polish and blend out smooth
			Concentricity	.001 TIR	Not Repairable	Replace Pulley
			Threaded Holes	No crossed or missing threads	Not Repairable	Replace Pulley
28-13210-13	4	Washer	Visual check for defects			Replace if required
ECD020	5	Bearing	O.D. 3.3459 to 3.3465	None Allowed	Not Repairable	Replace Bearing
			I.D. 1.7712 to 1.7717	None Allowed	Not Repairable	Replace Bearing
			Axial play	None Allowed	Not Repairable	Replace Bearing
28-13319	6, 6A	Seal	Outer race on O.D. for galling	None Allowed	Not Repairable	Replace Seal
			Condition of Teflon, race and O-ring (no cuts or scratches)	None Allowed	Not Repairable	Replace Seal
			Spherical steel portion of seal (no scratches)	None Allowed	Not Repairable	Replace Seal

Table 11-1. Inspection Requirements – Jackstrut and Pulley Assembly

Part Number	Fig. 11-6 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13305	8	Bearing Retainer	Seal bore dia. 3.065 to 3.069	-.005	Not Repairable	Replace Retainer
			Cracks	None Allowed	Not Repairable	Replace Retainer
28-13227-5	11	Jackstrut	Bearing surface dia. 1.7715 to 1.7721	-.0003	Not Repairable	Replace Strut
			Inspect bond for security around strut	If bond appears loose, insert .032 safety wire into loose area. Maximum depth wire can be inserted is 0.75.	In excess of .75 looseness	Replace Strut
			Dents in strut tubing	Dia. ≤ .50 and ≤ .0625 deep, maximum of one dent	Not Repairable	Replace Strut
28-13212	12	Washer	Corrosion	None Allowed	Not exceeding 15% of surface	Remove corrosion and touch up with brush-on cad plate

* All dimensions are in inches.

11-5 DRIVE BELT

A. General Information and Troubleshooting

The drive belt is a one piece synthetic rubber Poly-V belt with a series of parallel V-ribs molded lengthwise around the inside circumference with Kevlar tension cords that makes it extremely strong, stable, and fail safe. The Kevlar cord runs in a continuous fashion around the circumference of the belt and is imbedded in a fiber reinforced rubber compound backed by 3 ply fabric for maximum cord support and adhesion. The rubber compound is both heat and oil resistant and is also used to form the rubber ribs. This composite construction holds the belt in position to make the gripping force on the pulleys to transmit the torque. The belt diameter, width, and number of grooves are all computed for stress in relation to the amount of horsepower required. Once the clutch engaged, the belt is under a constant static tension of 1400 pounds/635 kg.

Refer to the following table for troubleshooting.

Problem	Possible Cause	Action
Cuts, damage, or blisters on back of belt.	Possible separation of fabric plies.	Remove belt and inspect. Replace if plies are peeling or separating.
Fraying on edge of belt.	Belt out of track rubbing idler straps.	Track belt (Para. 11-5.B).
	Interference problem in belt alignment.	Check upper and lower pulley alignment, idler straps, and belt track.
Pieces of rib section missing.	Rib cracking.	See Belt Inspection (Para. 11-5.D).
Belt vibration.	Large pieces of belt missing causing dynamic unbalance (Fig. 11-8.1, D, E).	Replace belt.
	Belt roller improperly adjusted	Adjust roller to belt.
	NOTE: With engine off, engage clutch and check for proper rigging. Adjust belt roller to 0.38 inch/9.5 mm clearance between roller and belt before tracking belt.	

B. Tracking – Drive Belt

(1) Remove upper cowling.

NOTE: Refer to Fig. 11-7 for location and sequence of locking points used during belt tracking.

Point 1 - Belt mounting support shaft strap to pylon.

Point 2 - Nut on forward end of idler shaft.

Point 3 - Nut on aft end of idler shaft.

(2) Decrease the torque on the bolt and nuts at Points 1 through 3. The bolts and nuts at points 2 and 3 should be snug enough that they require force to turn but not be “loose.” Point 1 must loose enough to allow the idler stabilizer strut to slide as the idler support shaft is turned.

(3) Rotate the idler support shaft using a wrench so that Point 3 is at the highest position. Then rotate the shaft approximately 75° towards the right side of the aircraft (clockwise looking forward) before starting the engine and engaging the belt drive system.

WARNING: USE CAUTION WHEN ADJUSTING THE IDLER PULLEY TRACK WITH THE ENGINE RUNNING AND THE BELT DRIVE SYSTEM ENGAGED.

(4) Start engine and slowly engage rotor system while observing idler pulley track on belt. During engagement, use a 7/8” wrench to rotate the idler shaft as necessary to keep the belt aligned.

(5) When clutch is fully engaged at idle, use 7/8" wrench and turn idler support shaft until the belt is centered on the pulley and between the actuator arm assemblies.

NOTE: When pulley is tracked it will be centered on belt.

(6) When pulley is centered, tighten bolt at pylon strap (Point 1).

(7) Holding idler support shaft with wrench, tighten forward idler shaft nut (Point 2) (50-65 ft-lb/68-88 Nm).

(8) While holding idler shaft, tighten aft nut (Point 3) (24-34 ft-lb/33-46 Nm).

(9) Increase engine to 2000 rpm and check track.

(10) If belt track is good at 2000 rpm, gradually increase to 3050 rpm while constantly watching belt track under increased power.

(11) Observe the belt “snubber” roller. While running the engine at 3050 rpm, there should be approximately 0.38 inch/9.5 mm clearance between the belt surface and the roller.

NOTE: If vibration is felt upon engaging the clutch, check that the clearance between with the belt is at least 0.38 inch/9.5 mm.

WARNING: SHUT DOWN THE ENGINE BEFORE MAKING ANY ADJUSTMENTS TO THE BELT ROLLER.

(a) If roller adjustment is required, disengage clutch, and shut off the engine.

(b) Engage clutch and adjust the belt “snubber” roller so that it is parallel to the belt surface and has 0.25-0.38 inch/6.4-9.5 mm clearance between the belt surface and the roller.

(c) After final adjustment of the idler pulley track, loosen the aft nut on the “snubber” roller and allow the roller to self-align on the idler straps. Torque the aft nut to 95-110 in-lb/10.8-12.5 Nm.

(d) Disengage clutch.

WARNING: EXTREME CAUTION SHOULD BE USED WHEN BELT TENSION MECHANISM IS IN ENGAGED POSITION. PERSONAL INJURY COULD OCCUR.

(e) Start engine, engage rotor system, and verify that the belt “snubber” roller clearance (0.38 inch/9.5 mm) is correct.

(12) Inspect assembly for security before installing cowling.

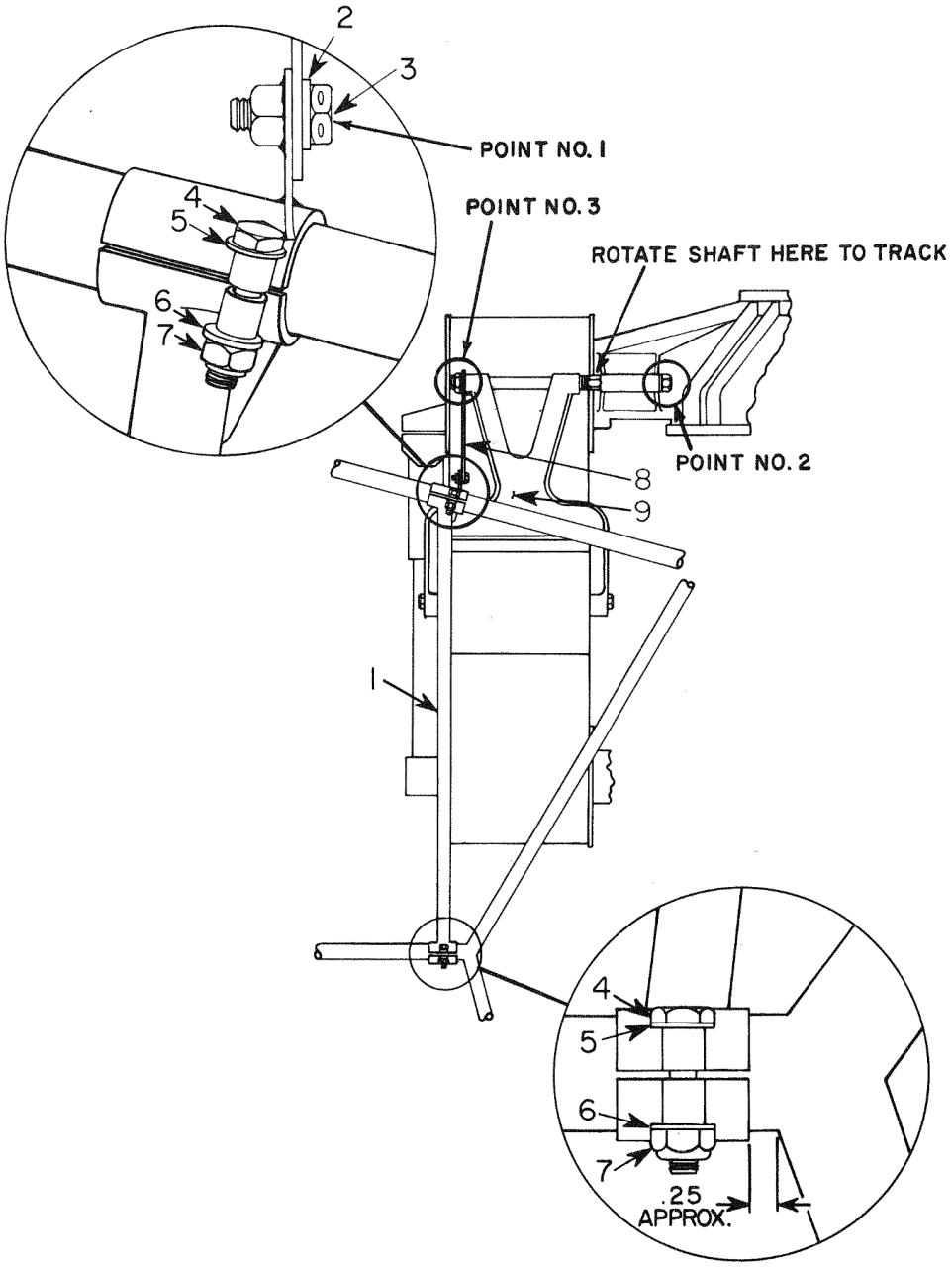


Figure 11-7. Idler Stabilizer and Belt Tracking Adjustment Points

C. Removal – Drive Belt

(1) Remove cowling.

(2) Remove jackstrut and driver pulley assembly (Para. 11-4).

(3) Disconnect the flex coupling (Fig. 11-9) as follows:

(a) Remove the bolts (5), washers (6), beveled washers (2), and nuts (7) connecting aft hub (1) of coupling to flex element (3).

(4) Loosen aft nut (14) on belt roller (11) (Fig. 11-14).

(5) Remove hardware attaching aft actuator arm (10) to idler yoke assembly (8) and idler yoke end (15). Let the actuator arm assembly hang in a vertical position on the belt roller (11).

(6) Remove bolts from the forward drive shaft three bearing assembly mounts to avoid bending the shaft. Push the drive shaft to one side to clear the pulley and then secure with safety wire.

NOTE: Mark location of bearing assemblies before removal.

NOTE: Use care to avoid causing a bend or bow in the driveshaft.

NOTE: The F-28F models may be equipped with a strobe mounted over the drive shaft. Remove the strobe mount, if installed.

(7) Ease the belt off of the top pulley and, with drive shaft to one side, slide the belt between the coupling halves to remove.

D. Inspection – Drive Belt

NOTE: Drive belt conditions that could be identified during an inspection are described as follows.

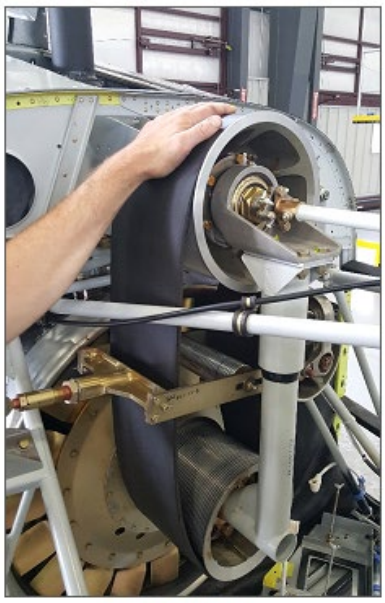
Rib cracking is a normal occurrence on this belt. The cracks normally extend to the base of the rib and go no further. Numerous cracks of this type are not significant. The belt should be examined for cracks which have extended below the base of the ribs and, if this has occurred, the belt should be removed. This is very important if the cracks extend to the cord line and the cord is exposed when the crack is opened. Loss of small pieces or rib section may accompany the rib cracking. This is normally a random occurrence. The belt should be replaced if there is a loss of three or more adjacent ribs for a length of two inches or more. The belt should be replaced if there is any piece of rib missing which is of sufficient depth to leave the cord exposed. A missing belt rib piece can eventually cause the belt to slip. Usually, the belt will cause vibrations because it becomes unbalanced, and these vibrations are noticed a long time before the belt starts to slip.

The back of the belt should be examined for cuts or damage and blisters which may indicate separation of the fabric plies. The belt should be replaced if there is any damage which appears to penetrate the fabric cover or if any blisters are present. A small crack in the back of the belt at the fabric splice is not significant, and often this is the fabric overlap created during manufacture of the belt. The belt should be replaced, however, if there is any loosening or peeling of the fabric in the splice area. The backing will take a long time to peel and, if this happens, it will cause vibrations, make a mess, and probably cause a “burning rubber” odor. The vibrations and the flapping backing material might damage some of the surrounding parts but normally not to the point where they will fail. This will also happen a long time before the belt fails completely.

The edge of the belt should be examined for emerging cord, cord damage or damage that extends beyond the first "V" groove. Also, the belt edge should be examined for signs of rubber separation. The belt should be replaced if there is any sign of emerging cord, cord damage, damage beyond the first “V” groove, or rubber separation from the cord. If any of these conditions are present, the cord can get torn and pulled out at the sides. When this happens, the belt will start to “unwind.” The cord will normally break before it unwinds very far, the pilot will smell “burning rubber” and a vibration will be felt. A pilot will normally have ample time to make a precautionary landing. This is the most serious of the possible failure modes. The belt is 6 inches (15 cm) wide. Tests performed at the factory have proven that 1.5 inches (3.5 cm) is more than enough to fly the helicopter at full power.

Perform an as-installed belt inspection with cowling removed and the clutch disengaged. Slowly rotate the belt around the diameter of the upper pulley by placing a hand flat against the belt surface, as shown in Fig. 11-8 – *Proper Method*.

WARNING: DO NOT GRIP EDGE OF BELT TO ROTATE (Fig. 11-8 – *Improper Method*). GRIPPING THE EDGE MAY RESULT IN FINGERS BEING PINCHED IN BOTTOM PULLEY, CAUSING SERIOUS INJURY.



Proper Method –
Hand flat against belt surface

Improper Method –
DO NOT grip edge of belt

Figure 11-8. Belt Inspection – Safe and Unsafe Methods

(1) Belt Rib Surface:

(a) Examine the belt for cracks which have extended below the base of the ribs. If this has occurred, and the cords are exposed, the belt should be removed. Examples of rib cracks are depicted in Fig. 11-8.1. Photographs A, B, and C are examples of serviceable belts.

1 Replace the belt if rib cracks extend below the base of the ribs.

2 Replace the belt if it has been determined that cord failure exists.

(b) Examine the belt for loss of small pieces of rib section that may accompany the rib cracking. Examples of loss of pieces of rib section are depicted in Fig. 11-8.1. Photographs D, E, and F are examples of unserviceable belts which should be replaced.

1 Replace the belt if there is a loss of three or more adjacent ribs for a length of two inches or more.

2 Replace the belt if there is any piece of rib missing which is of sufficient depth to leave the cord exposed.

3 Replace the belt when missing pieces of the “V” area becomes large enough to cause vibration in the drive system.

4 Replace the belt if it has been determined that cord failure exists.

(2) Back of Belt:

(a) Examine the back of the belt for cuts or damage and blisters. Replace the belt if there is any damage which appears to penetrate the fabric cover or if any blisters are present.

(b) Examine the back of the belt for a crack at the fabric splice. The belt should be removed if there is any loosening or peeling of the fabric in the splice areas. Examples of fabric splices are depicted in Fig. 11-8.2. Photograph G and Photograph H are examples of a serviceable belt. Photograph I is an example of an unserviceable belt.

(3) Edges of Belt:

(a) Examine the edge of the belt for signs of wear. This does not affect the belt directly but would indicate that there is a tracking or interference problem. An example of light wear (cord fraying) is depicted in Fig. 11-8.3. Examples where the belt comes into close contact with adjacent structures, such as the lower pulley assembly is depicted in Fig. 11-8.4.

1 Replace the belt whenever the operator deems it necessary.

2 The presence of rubber residue at the forward and aft edges of the center pulley may indicate interference and breakdown of the belt. Check belt tracking (Para. 11-5.B).

(b) Examine the forward and aft side belt edges for adhesive-sealed edges and signs of separation or deterioration. Examples of sealed belt edges are depicted in Fig. 11-8.5. Examples of deteriorated sealed belt edges are depicted in Fig. 11-8.6.

1 If the belt edge was previously sealed but the belt edge has deteriorated as shown in Fig. 11-8.6 (damage goes beyond the first “V” groove) or if any loose or protruding cords are found, remove the belt, and send back to Enstrom for warranty.

2 If the belt edge was previously sealed but portions of adhesive are missing, repair the belt in accordance with Para. 11-5.D.1. Continue the belt inspection requirements as follows before proceeding with repairs.

(c) Examine the forward and aft side belt edges for exposed or loose cord. An example of exposed cord is depicted in Fig. 11-8.7. Exposed cord limits are explained in the figure.

1 Replace the belt if it has been determined that cord failure exists.

2 Remove the belt if any portion of exposed cord is greater than 40% of the cross section thickness. Seal those portions of exposed cord in accordance with Para. 11-5, D.1 and return the belt to service.

(d) Examine the belt edge for a cord tail. An example of a cord tail is depicted in Fig. 11-8.9.

1 Remove the belt if it has cord tail. Trim the cord tail, repair the belt in accordance with Para. 11-5.D.1, and return the belt to service.

D.1 Repair – Drive Belt

(1) Authorized materials used in the procedure to seal the belt edge are listed as follows:

Denatured alcohol (solvent)
3M 847 Nitrile High Performance Rubber and Gasket Adhesive
Clean shop cloths

(2) Surface preparation:

(a) Clean the belt surface using a cloth wetted with solvent.

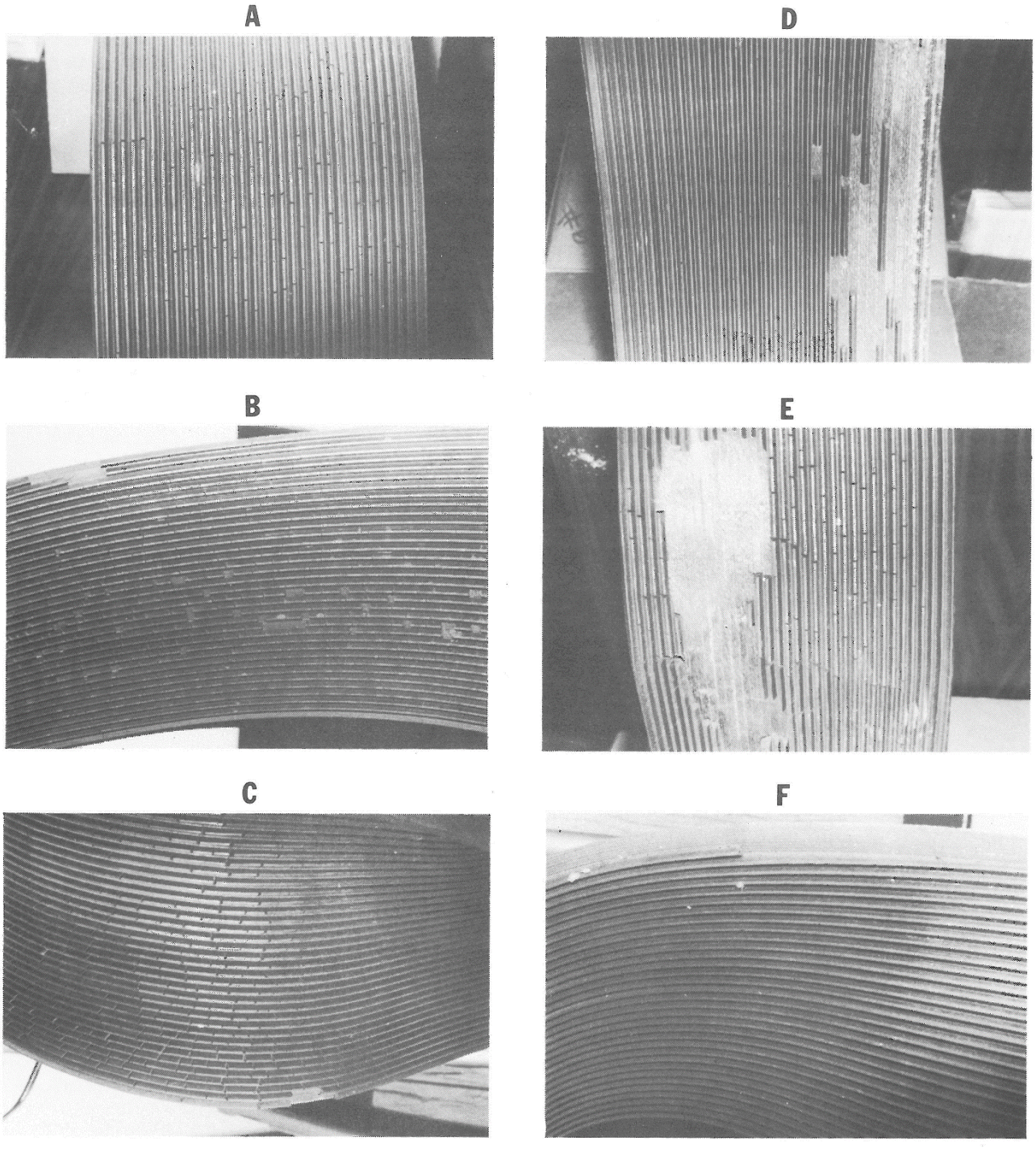
(b) Trim loose fabric threads on fabric backing only.

(3) Adhesive application:

(a) Prepare the 3M 847 adhesive in accordance with the manufacturer’s instructions.

(b) Apply a bead of 3M 847 on the belt edge surface ensuring the exposed Kevlar cord is covered with adhesive.

(c) Remove any adhesive from the rib edge and the back of belt using a clean cloth wetted with solvent.



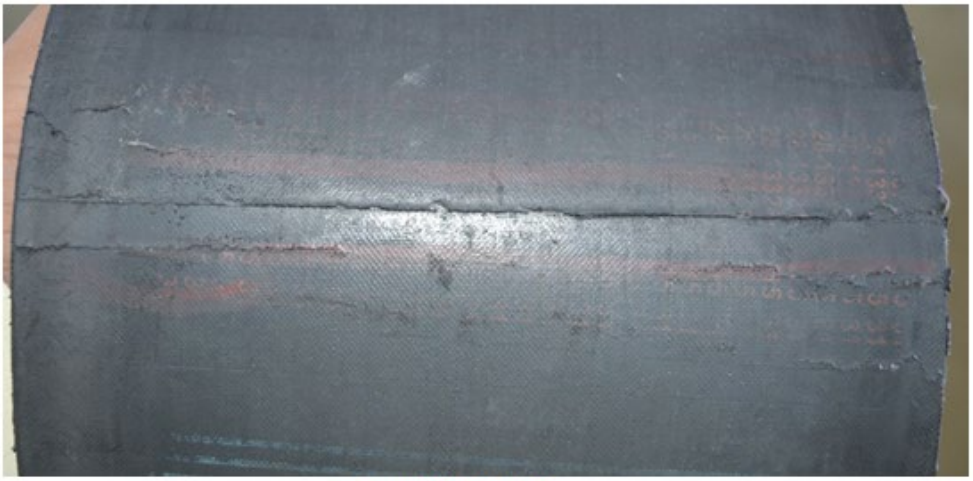
A through C – Serviceable

D through F - Unserviceable

Figure 11-8.1 Drive Belt Visual Inspection – Ribs

G - Serviceable

H - Serviceable, Monitor Every 50 Hours



I - Unserviceable

Figure 11-8.2 Drive Belt Visual Inspection – Fabric Back

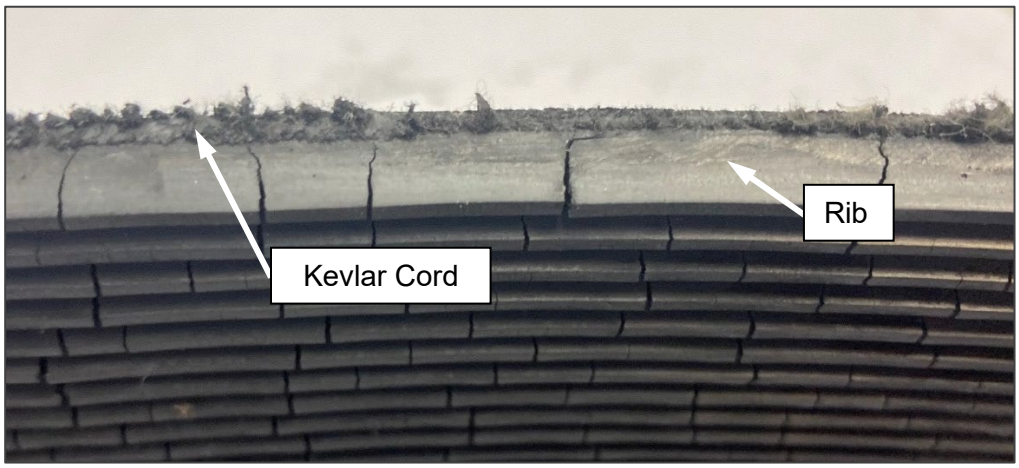
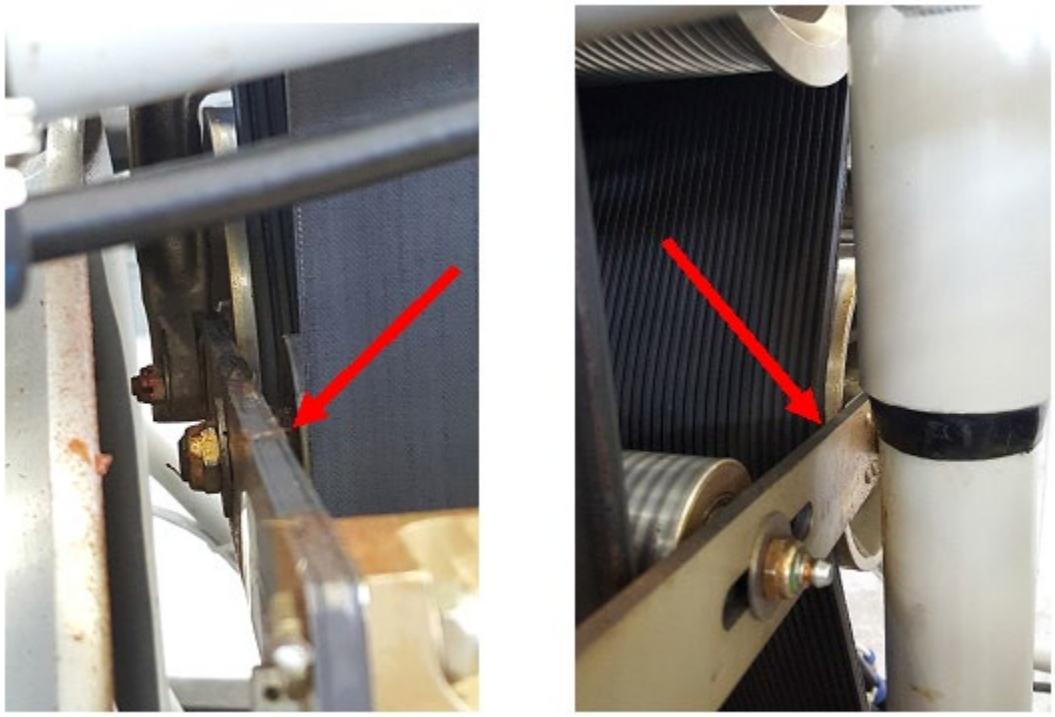


Figure 11-8.3 Drive Belt Visual Inspection – Edge Cord Fraying



Inspection point – Center pulley, forward edge

Inspection point – Center pulley, aft edge

Figure 11-8.4 Adjacent Structure Inspection for Belt Residue

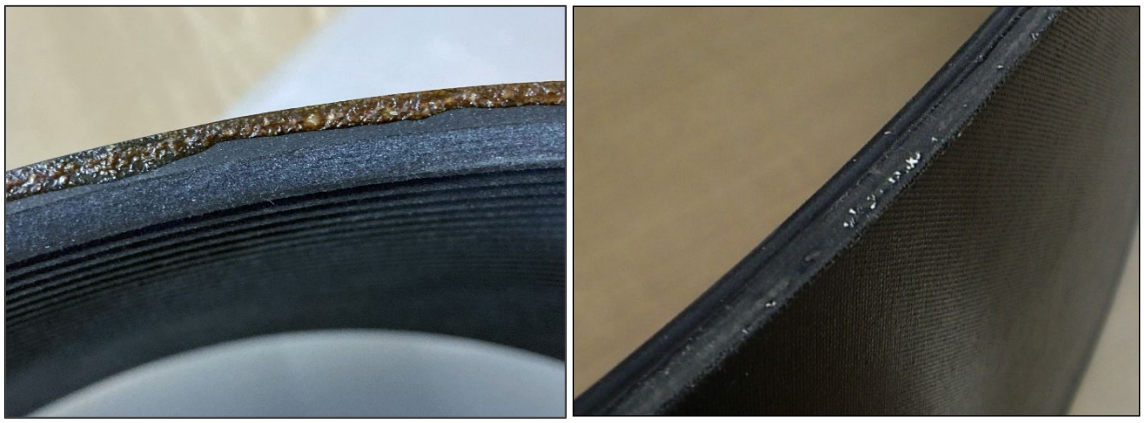
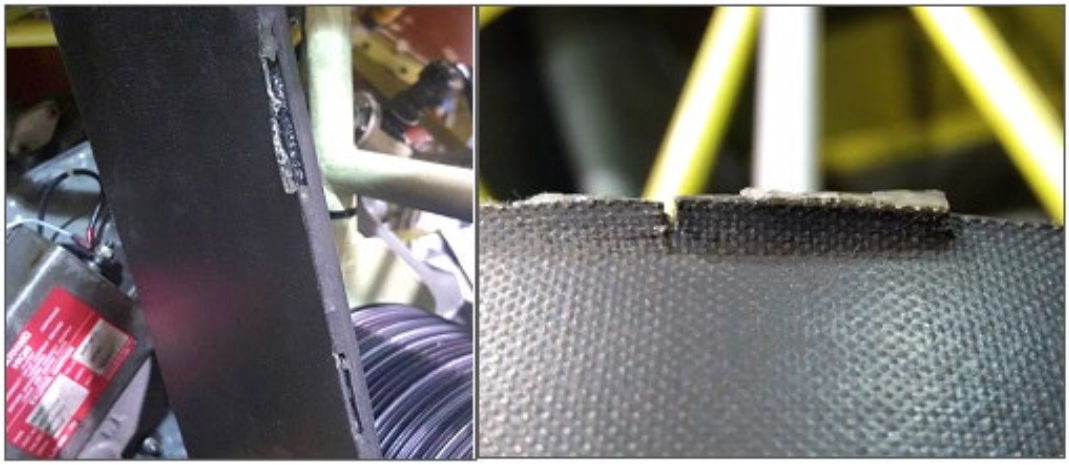


Figure 11-8.5 Drive Belt Visual Inspection – Sealed Belt Edges



NOTE: Enstrom Turbine Model Drive System Shown

Figure 11-8.6 Drive Belt Visual Inspection – Deteriorated Sealed Belt Edges

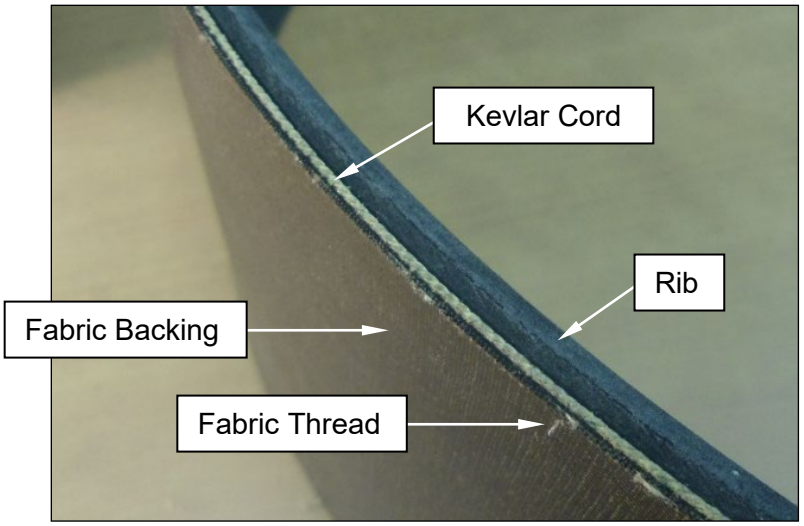


Figure 11-8.7 Drive Belt Visual Inspection – Exposed Cord

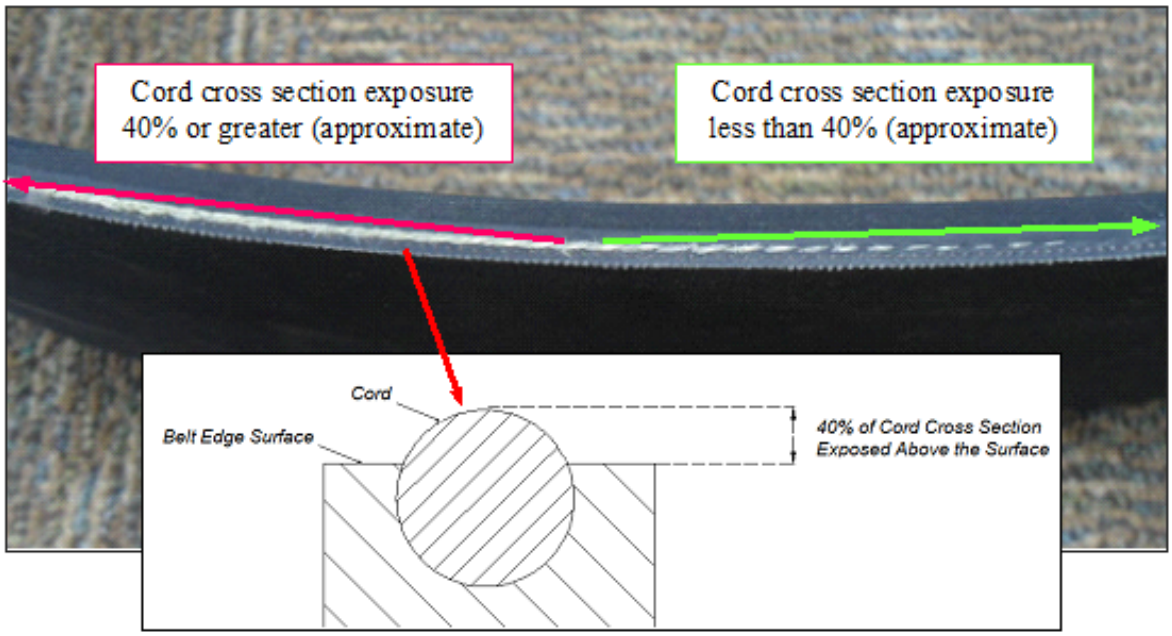


Figure 11-8.8 Drive Belt Visual Inspection – Exposed Cord Limit Criteria

Figure 11-8.9. Drive Belt Visual Inspection – Cord Tail

CAUTION: Failure to remove excess adhesive from the rib edge or from the back of belt may impair smooth belt operation.

(d) Allow the adhesive to dry for three hours, turn over and repeat the application for the edge on the other side of the belt.

(e) Hang the belt on a rack and allow the adhesive to cure for a minimum 12 hours.

NOTE: Finished sealed belt edge surface will appear similar to the sealed edge surface depicted in Fig. 11-8.5 (photograph on the left).

E. Installation – Drive Belt

NOTE: Refer to Fig. 11-14 for numbered items unless stated otherwise.

(1) Slide the belt between the drive shaft and forward coupling half and ease belt on top of the upper pulley.

(2) Pivot aft actuator arm assembly (10) back into position.

(3) Install bolts (19) and (20), washers (21) and (22), and nut (23). Torque (12-15 in-lb/1.4-1.7 Nm) and safety (.032).

(4) Install bolt (24), washer (25), bushing (9) from the inside of the actuator arm assembly (10). Install the aft washer (25) and the nut (27). Torque nut (50-70 in-lb/5.6-7.9 Nm) and install cotter pin (28).

(5) Ensure nut (14) torque (95-110 in-lb/10.7-12.4 Nm).

(6) Return the drive shaft pillow blocks to the original position and install bolts. Use the same shims as originally installed under the block. Torque bolts (20-25 in-lb/2.3-2.8 Nm).

(7) Flex Coupling – Proceed as follows: (see Fig. 11-9)

(a) Align aft coupling hub (1) with flex element (3). With curved side of flex coupling washers (2) against flex element, install mounting hardware.

NOTE: Washers (6) may be used between the flex coupling washers (2) and coupling hub flanges (8) to align and center the flex elements.

(b) Torque the coupling hub bolts (50-70 in-lb/5.6-7.9 Nm).

(8) Install jackstrut and pulley assembly (Para. 11-4).

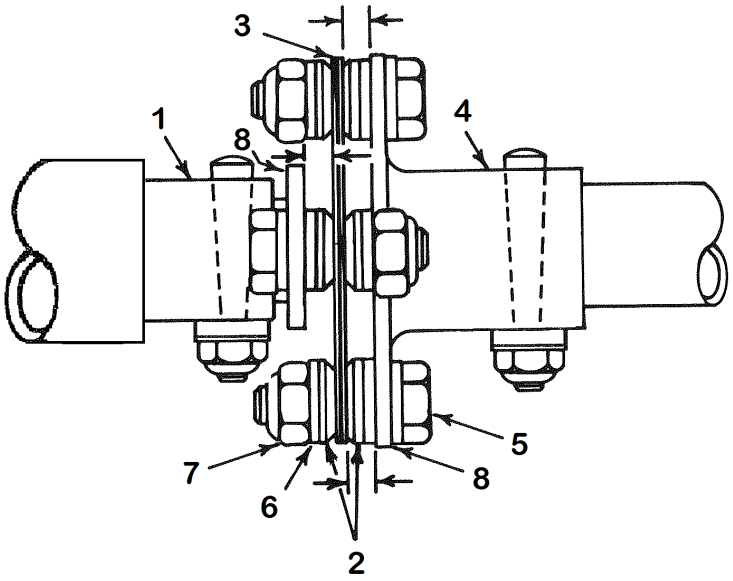
(9) Engage clutch and check rigging (Para. 11-1).

(10) Check belt roller clearance (0.38 inch/9.5 mm) between belt surface and roller.

(11) Track drive belt (Para. 11-5.B).

(12) Inspect entire belt drive system (Para. 11-1.A; Para. 11-8.2; Para. 11-9.E).

(13) Install cowling.



THESE AREAS REQUIRE SHIMMING TO EQUALLY SPACE FLEX ELEMENTS

1.	Pinion Shaft	5.	Bolt
2.	Flex Coupling Washer (Beveled)	6.	Washer
3.	Flex Pack	7.	Nut
4.	Aft Hub	8.	Hub Flange

Figure 11-9. Flex Coupling Installation

11-6 MAIN ROTOR TRANSMISSION

A. General Description

The main rotor transmission (gearbox) is a 90° drive unit powered from the engine by a belt drive system. The internal ring gear and pinion are machined to precision tolerances, heat treated, and shot peened to provide maximum life. Because of the high contact ratio which can be obtained by the spiral angle gear, the overlap of contact contributes to smooth and quiet operation. A wet sump splash system is utilized to provide adequate lubrication to the ring and pinion gears. This eliminates the need for a gear-driven oil pump. A magnetic chip detector is located in the sump, and can be removed to inspect for metallic particles. (Note: The chip detector was not standard for early F-28F helicopter transmissions.) An oil temperature probe is mounted either in the bottom of the gearbox or at the bottom of the pinion case of older transmissions. The probe is connected to a transmission temperature gauge on the instrument panel. Also, a sight gauge is located on the right rear side of the gearbox to check the oil level. The gearbox incorporates an overrunning clutch in the upper pulley assembly which is mounted on the pinion shaft. The overrunning clutch unit provides a disconnect from the engine in the event of a power failure and permits the main and tail rotors to rotate to accomplish safe autorotative landings.

B. Removal – Main Rotor Transmission

NOTE: If the rotor hub is to be removed, it is recommended to break the mast nut torque before removing the main rotor blades (use tool T-0197-7 or digital torque multiplier ATP761).

(1) Remove the main rotor blades (Para. 9-8).

(2) Drain fuel and remove the fuel tanks (Para. 13-10).

(3) Remove the wraparound cowling.

(4) Remove the bulkhead that crosses over the gearbox pinion area.

(5) Remove baggage box (Para. 8-11).

(6) Disconnect the lateral and longitudinal push-pull rods from the lower swashplate (Para. 12-10.A.4 and A.5).

(7) Remove the fiberglass cover above the seat deck inside the cabin and disconnect the collective push-pull rod from the collective walking beam (Para. 12-11.A.4).

(8) Disconnect the following:

(a) Temperature probe adapter from the fitting on bottom of gearbox.

(b) Chip detector.

(c) Low rotor warning magnetic pick-up.

(9) Remove jackstrut and pulley (Para. 11-4).

(10) Remove the idler assembly with the drive belt as follows:

(a) Remove bolt (41) and hardware to disconnect rod end (38) from the bellcrank (Fig. 11-14).

(b) Remove nut (63) and washer (64) from shaft (62) (Fig. 11-16).

(c) Remove bolt (51) and washer (51) to disconnect idler stabilizer strut (49) from the brace assembly (57) (Fig. 11-16).

NOTE: Index the shaft (62) to the main rotor transmission before removal to aid in tracking the belt on reassembly.

NOTE: It may be necessary to rotate the shaft (62) while withdrawing the assembly from the transmission so the idler yoke clears the pylon brace assembly (57).

(d) Remove the idler pulley assembly with shaft (62) and drive belt.

NOTE: The gearbox can be removed by leaving mast nut loosely secured and lifting hub and gearbox as a unit using sling T-0011.

NOTE: If it is preferred to remove the main rotor hub, refer to Para. 9-2.A for hub removal procedures. Tool T-0017 is necessary if this method is used.

(10) Remove mount bolts from the gearbox (4 places).

NOTE: A 7/16" wrench (12 point) will have to be ground thinner for installation on the aft left gearbox mount bolt.

(11) Using a hoist, carefully lift gearbox from pylon mount.

NOTE: For swashplate removal see Section 12, Flight Controls.

NOTE: Gearboxes being returned for overhaul should include the pinion half of the driveshaft coupling, the bearing adapter (2), and the nut (1) (Fig. 11-10). The nut should be torqued against a spacer to protect the gears during shipping.

C. Seal Replacement – Main Rotor Transmission

NOTE: This procedure can be accomplished with the transmission installed.

(1) Upper mast seal replacement:

(a) Remove the main rotor hub (Para. 9-2.A).

(b) Remove the slinger from the mast.

(c) Remove the seal from the transmission housing.

NOTE: Wrap a piece of shim stock around the upper portion of the mast to protect the seal from damage during installation. Reposition the shim stock to the lower end of the mast when installing the seal into the transmission housing.

(d) Lubricate the lip of the new seal (MIL-PRF-81322). Install the seal into the transmission housing. Tap the seal into the housing, as required, to seat the seal.

(e) Install the slinger into position and secure in place using RTV-732 sealant, or equivalent general purpose silicone adhesive.

(f) Install the main rotor hub (Para. 9-2.E).

(2) Pinion seal replacement:

NOTE: This procedure can be accomplished with the transmission installed.

(a) Remove the upper pulley assembly (Para. 11-7.C).

(b) Raise the aircraft using the ground handling wheels. Block the aft end of the skid tubes so the aircraft will not rock back onto the tail rotor guard.

NOTE: Later production transmissions incorporate a seal retainer with a retaining ring to secure the pinion seal. Transmissions returned to Enstrom for overhaul/repair will have the new seal retainer incorporated. If the gearbox does not have the seal installed from the aft side with the retainer ring, contact Enstrom Customer Support.

(c) Remove the retaining ring and pinion seal from the seal retainer.

NOTE: Wrap a piece of shim stock around the bearing adapter in the pinion assembly to protect the seal from damage during installation.

(d) Lubricate the lip of the new seal (MIL-PRF-81322). Install the seal onto the pinion shaft and install the seal into the seal retainer. Tap the seal in the retainer, as required, to seat the seal.

(e) Reinstall retaining ring.

(f) Install the upper pulley assembly (Para. 11-7.H).

(3) Lower mast seal replacement:

NOTE: It is necessary to remove the main rotor transmission from the aircraft to replace the lower mast seals. It is not necessary to remove the hub from the transmission.

(a) Remove the transmission (Para. 11-6.B).

CAUTION: Use extreme care when removing the nuts that secure the seal retainer. The transmission will have to be returned for repair if any of the retaining bolts are pushed into the transmission.

CAUTION: Use extreme care when removing the seal retainer from the bottom of the transmission. If the shims(s) located between the seal retainer and spacer are damage, they must be replaced with the correct thickness of shims.

NOTE: When ordering a replacement, note that the seal and seal retainer must be ordered as a complete assembly and will include a set of shims. (Ref. P/N 28-13122-991)

WARNING: USE EXTREME CAUTION WHEN HANDLING HEATED PARTS TO PREVENT FROM INJURING PERSONNEL. USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.

(b) Disconnect the upper walking beams from the control rods (Para. 12-11.A.10).

(c) Remove walking beam from the pivot straps (Para. 12-11.A.5).

(d) Remove bolts that secure the upper swashplate to the gearbox (Para. 12-11.A.12) and withdraw the upper and lower swashplate as an assembly with control rods and walking beam attached.

(e) Remove the nuts securing the seal retainer.

(f) Heat the seal retainer to weaken the adhesive bond and use a wedge-type tool to pry off the retainer with the old seals from the transmission housing.

(g) Lubricate the lips of the new seals and pack the area between the two seal lips with grease (MIL-PRF-81322). Apply a bead of sealant (Loctite 587, or equivalent) to the seal retainer flange.

(h) Replace any damaged shims with new shims.

NOTE: Wrap a piece of shim stock around the mast retaining nut to protect the seal from damage during installation.

(i) Paint the mating surfaces of the transmission spacer and the seal retainer with Loctite SI 5900, or equivalent.

(j) Install the seal retainer (supplied with new seals).

(k) Install the nuts and torque in a crossing pattern (50-70 in-lb/5.6-7.9 Nm).

(l) Install the swashplate assemblies and control rod assembly (Para. 12-11.F.3), walking beam (Para. 12-11.F.7), and connect walking beams (Para. 12-11.F.9).

(m) Install the main rotor transmission (Para. 11-6.D).

D. Installation – Main Rotor Transmission

(1) If required, install main rotor hub on gearbox (Para. 9-2.E).

CAUTION: Hub must be installed with index marks on spline adapters aligned to properly phased spine on rotor shaft, or serious flight control problems will result.

(2) If required, install the flight control assemblies, as applicable.

(a) Install the swashplate assemblies and control rod assembly (Para. 12-11.F.3), walking beam (Para. 12-11.F.7), and connect walking beams (Para. 12-11.F.9).

(3) Lightly coat the top of the pylon mount pads and the shank of the mount bolts with grease (MIL-PRF-81322).

(4) Using sling T-0011, lift gearbox into position on pylon.

(5) Install gearbox mount hardware (4 places) including the shoulder harness support assembly cables. Torque bolts (240 in-lb/27.1 Nm).

NOTE: Install the shoulder harness support cable attachments between the washers above the nut.

NOTE: Hardware with the self-locking feature may be reused in accordance with Table 2-12.

(6) Install idler assembly with drive belt:

(a) Install the idler pulley assembly (Para. 11-8.F.(3) through (5)).

(b) Install yoke rod end (38) (Para. 11-8.J.(2) and (3)).

(7) Install jackstrut and pulley assembly (Para. 11-4.F).

(8) Connect the following:

(a) Temperature probe adapter to fitting on bottom of gearbox.

(b) Chip detector.

(c) Low rotor warning magnetic pick-up.

(9) Install fiberglass cover above seat deck.

(10) Install baggage box (Para. 8-11).

(11) Install bulkhead over gearbox pinion area.

(12) Install fuel tanks and connect fuel lines (Para. 13-10.B.(2)).

(13) Service main rotor transmission (Para. 4-12).

(14) Check all connections for security.

(15) Install main rotor blades.

(16) Service the fuel tanks (Para. 4-4).

(17) Track drive belt (Para. 11-5.B).

(18) Install wraparound cowling.

(19) Perform preliminary flight test procedure (Para. 12-13.A).

(20) Track main rotor blades (Para. 12-2).

11-6.1 MAIN ROTOR CHIP DETECTOR

A. Removal – Chip Detector (Fig. 4-1, View E)

NOTE: Later F-28F helicopters and all 280FX helicopters are equipped with the main rotor transmission chip detection system. Refer also to Para. 4-62 for main rotor chip indication procedures.

NOTE: Do not disconnect the wire unless removing the chip plug.

WARNING: DO NOT OPERATE THE HELICOPTER WITH THE CHIP DETECTOR REMOVED AS SEVERE LUBRICATION LOSS MAY OCCUR.

(1) Remove the access panel below the left fuel tank.

(2) Grasp the chip detector plug and push upward.

(3) While holding upward pressure, begin turning the plug counterclockwise.

(4) Turn the plug counterclockwise 1/4 turn.

(5) Pull the plug out of the socket in the base fitting.

(6) Inspect the plug for chips (Para. 4-62.A).

(7) After determining that the transmission is airworthy, clean the magnetic plug with a soft cloth or with a strong magnet attached to a pointed object or use compressed air. Use caution to avoid scratching the magnetic plug.

B. Installation – Chip Detector

(1) Insert the plug into the socket in the base fitting.

(2) Align the lugs in the plug with the slots the base fitting.

(3) Push plug upward while turning plug clockwise (approximately 1/4 turn).

(4) When the plug stops turning, pull downward.

(5) Check the plug to ensure that it is locked in the base and that there is no leakage.

11-7 OVERRUNNING CLUTCH AND UPPER PULLEY ASSEMBLY

A. Troubleshooting – Clutch and Upper Pulley

Problem	Possible Cause	Required Action
Rotor and engine rpm needles do not split when power is cut back.	Overrunning clutch lockup.	Replace clutch.
Erratic needle movement - engine tach seems to climb.	Clutch slipping. Internal clutch malfunction.	Replace clutch.
	Tach drive O-rings (belts) slipping	Clean or replace belts.
	Worn upper or lower belt pulley grooves	Replace pulley.
	Hard bend or pressure on the clutch cable by adjacent components.	Check cable routing for condition and adjust routing and/or secure as required.
Clutch end play exceeding .050 inch.	Internal wear of clutch.	Replace clutch.
Excessive noise on run-down.	Internal wear.	Replace clutch.
Upper pulley TIR exceeding .009 inch. Check while holding pulley stationary and rotating gearbox with clutch disengaged.	Clutch faces worn from loss of pinion nut torque.	Replace clutch.
	NOTE: If excessive TIR still exists after replacing clutch, the problem could be internal wear in main rotor gearbox. Gearbox should be returned to factory or authorized overhaul facility for inspection.	
	Remove upper pulley assembly inspect the condition of the bearing adapter and clutch inner race	Contact Customer Support if galling is evident.

B. Servicing and Inspection – Clutch

CAUTION: Before servicing, determine the type of oil previously used. if unable to determine, It is recommended that the clutch be drained, purged with kerosene and then serviced per instructions. Clutches leaving the factory have been serviced with Aeroshell 560 turbine oil. See Table 4-1 for other approved oil.

(1) Refer to Para. 4-10 for servicing the overrunning clutch.

(2) Overrunning Clutch – Inspection

NOTE: A significant portion of fluid can be lost very quickly through a leaking seal. The clutch area should be looked at frequently to determine if any leaks exist.

(a) Monitor oil level (Para. 4-10).

(b) If clutch has been subjected to rapid or instantaneous rotor engagements or loss of oil is suspected, follow steps below:

(1) Rotate the upper pulley in reverse direction by hand to check for roughness or noise. If abnormality is detected, unit should be replaced.

(2) Maximum clutch axial play is .050 inch.

(3) If clutch is serviceable but has a leaking seal, contact Enstrom Helicopter Customer Service.

(4) Service clutch (Para. 4-10).

(5) Ground run helicopter until normal operating temperatures are reached.

(6) Increase power until the tachometer shows 350 rotor rpm. Split needles and allow rotor RPM to drop to 200. Re-engage normally and repeat a minimum of three times, observing clutch response.

(7) If all functions are normal, inspect for leakage and proper oil level before returning helicopter to service.

C. Removal – Clutch and Upper Pulley

NOTE: While the belt can be changed with only deflecting the TR drive shaft, removal of the jack strut support bearing and the upper pulley assembly require removing the TR driveshaft to prevent bowing or bending the shaft. However, removal of the tail rotor drive shaft is not necessary if the bolts are removed from the first 3 pillow blocks (after marking position of the pillow blocks) and move shaft out of the way.

(1) Remove cowling.

(2) Remove jackstrut and pulley assembly (Para. 11-4.A).

(3) Remove the hardware connecting the drive shaft flex plates from the forward and aft transmission couplings.

(4) Separate coupling halves on forward end of drive shaft.

(a) Flex Couplings – Remove the two bolts connecting forward coupling hub (4) to flex element (3) (Fig. 11-9). Remove forward taper pin from coupling hub (4) and pinion. Remove coupling hub.

(5) Remove tach drive cover and O-rings.

NOTE: The F-28F models may be equipped with a strobe mounted over the drive shaft. Remove the strobe mount, if installed.

NOTE: Use extreme care to avoid causing a bend or bow in the driveshaft. Do not allow it to bend or bow when carrying it.

NOTE: Mark the pillow block location for ease of installation.

(6) Remove the drive shaft assembly from the helicopter and store it so that it is not bowed.

(8) Remove the drive belt (Para. 11-5.C).

(9) Remove nut (1) using an impact wrench to break the torque.

(10) Install tool T-0114 in the end of the pinion.

(11) Install a two-jaw puller with jaws attaching behind face of bearing housing (8) and adjustable shaft located in end of tool T-0114 (Fig. 11-11.a). Hold jaws together with "C" clamp.

(12) Pull the bearing housing (8) from the pinion.

(11) Slide clutch (11) and pulley assembly (12) off pinion.

NOTE: Refer to Para. 11-6.C.(2), for pinion seal replacement procedures.

NOTE: If the clutch (11) will not slide off, install tool T-0114 back in the aft of the pinion. Place the jaws of the puller in the groove of the clutch (11) (Fig. 11-11.b). Clamp in place and pull clutch (11) and pulley assembly (12) from pinion.

(12) Remove key (14) from pinion. If the key was shimmed on assembly, save shim.

D. Disassembly – Clutch and Pulley

NOTE: Refer to Fig. 11-10 for numbered items.

(1) Clutch and Pulley – Disassembly

(a) Remove nuts (13) from bolts (9).

(b) Remove bolts (9) and washers (10).

NOTE: Remove one of the servicing bolts in the clutch to allow clutch oil to seep from hole. Heat expansion causing internal pressure could cause damage to seal if bolt is not removed. Allow clutch and pulley to cool before servicing.

(c) Heat pulley (12) to approximately 250°F/121°C and remove clutch (11).

(d) Clean and inspect components.

E. Cleaning – Clutch and Pulley

(1) Clutch – If clutch is determined serviceable, wash O.D. with kerosene, toluol or equivalent cleaning solvent. Avoid using excessive solvent in seal area. DO NOT vapor degrease clutch as damage could result to seal.

F. Inspection – Clutch and Pulley

(1) See Table 11-2 for detailed inspection requirements of the clutch and pulley assembly.

G. Assembly – Clutch and Pulley

NOTE: Refer to Fig. 11-10 for numbered items.

NOTE: Remove one of the servicing bolts in the clutch to allow clutch oil to seep from hole. Heat expansion causing internal pressure could cause damage to seal if bolt is not removed. Allow clutch and pulley to cool before servicing.

(1) Heat pulley (12) to approximately 250°F/121°C.

(2) Apply grease (MIL-PRF-81322) to the bore of the pulley. Using two bolts (9) for alignment, drop clutch (11) into pulley (12).

(3) Install servicing bolt back into clutch and service clutch (Para. 4-10).

(4) Install bolts (9) through washers (10) and through clutch (11) and pulley (12).

(5) Install washers (10) and nuts (13) on bolts.

(6) Torque nuts (13) (60-85 in-lb/6.8-9.6 Nm), alternating sides during torque process.

(7) Service clutch (Para. 4-10).

H. Installation – Clutch and Pulley

NOTE: Refer to Fig. 11-10 for numbered items.

(1) Before installing key (14) into pinion, check to see that the key slides freely through the keyway in the clutch. If it does not slide through, the key must be filed slightly on one side to allow proper fit. A clearance of 0.0005 inch to 0.001 inch between key and clutch keyway is required. If the key is loose in the pinion keyway, proceed to (a) through (e) below.

(a) Install key (14) in pinion and using a feeler gauge, measure the gap between the side of the key and the pinion keyway.

(b) Divide the measurement in half to get the thickness of the stainless steel shim stock required.

(c) Cut a shim 2 in/51 mm long and 1 1/4 in/32 mm wide.

(d) Wrap the shim around the key and, with the chamfered side of the key down, tap the key and shim into the pinion keyway.

(e) Using a razor knife, trim the shim stock along the sides of key flush with the pinion. The key must be secure in the pinion.

NOTE: Do not allow grease to contaminate the races between the MRGB and the clutch, and the clutch and upper jackstrut bearing. Remove any grease from the forward side of the bearing housing assembly (7).

(2) Apply grease (MIL-PRF-81322) to the bore of the clutch (11) and slide clutch and pulley assembly (12) on the pinion.

(3) Heat (if necessary) the inner race of upper jackstrut bearing (6) and slide the bearing housing assembly (8) on the pinion until it is flush against clutch (11).

(4) Install tool T-0133-1 (Fig. 11-12). The long arm on this tool slides into forward end of pulley and the short arm hooks under the idler arm mount to hold pinion from rotating when applying torque to pinion nut (1). Include a shim on T-0133-1 to avoid damaging the gearbox flange.

(5) Install nut (1) on pinion and torque (250 ft-lb/339.0 Nm) using tool T-0135.

NOTE: The nut should be rechecked after 25 hours of service and at 100 hour intervals thereafter.

(6) Install the drive belt over the upper pulley (12).

(7) Reinstall the tail rotor driveshaft but do not torque mounting bolts.

(8) Slip tach drive O-rings over driveshaft.

(9) Connect coupling halves:

(a) Flex Coupling

1 Install the coupling hub into the pinion and install taper pin. Taper pins must be tapped into place and secured with nut (not seated in place by the nut). Install washer, and nut and torque (25 in-lb/2.8 Nm).

2 Align the forward and aft coupling hub with the flex element (Fig. 11-9). With the curved side of the flex coupling washers (2) against the flex element, install the mounting hardware (bolts (5) and nuts (7)) and torque (50-70 in-lb/5.6-7.9 Nm).

NOTE: Washers (6) may be used between flex coupling washers (2) and coupling hubs to align and center the flex elements.

(10) Return the forward tail rotor drive shaft pillow blocks to the original position and install bolts. Use the same shims as originally installed under the block.

(11) Safety the nut (1) to the coupling taper pin (MS20995C40).

(12) Install O-rings over pulleys and install tach drive cover.

(13) Install jackstrut assembly (Para. 11-4.F).

(14) Check clutch control rigging (Para. 11-1.A).

(15) Service the upper jackstrut bearing (Para. 4-36).

(16) Inspect entire drive system.

(17) Track drive belt (Para. 11-5.B).

(18) Perform a final inspection of the entire drive system.

(19) Replace cowling.

11-7.1 UPPER JACKSTRUT BEARING

A. Removal – Upper Jackstrut Bearing

NOTE: Refer to Fig. 11-10 for numbered items.

(1) Remove housing and bearing assembly (Para. 11-7.C).

(2) Remove retaining ring (3).

(2) Remove seal retainer (4) and seal (5) from bearing housing (8).

(3) Heat bearing housing (8) to 250°F/121°C and gently tap bearing (6) with bearing adapter (2) from the housing.

(4) Remove shield (7) from housing (8).

(5) Press bearing adapter (2) from bearing (6).

(6) Clean (Para. 11-7.1.B) and inspect bearing housing, shield, and seal (Para. 11-7.1.C).

B. Cleaning – Upper Jackstrut Bearing

(1) Upper Jackstrut Bearing – Carefully remove seal from the bearing. Wash and flush old grease from bearing using fresh cleaning solvent, kerosene, toluol or vapor degrease. Apply a light oil (10W) to bearing and spin bearing by hand to determine if it is serviceable. The bearing should rotate smooth with no ratchety feeling. See Table 4-1 for required intervals and grease to repack bearing.

C. Inspection – Upper Jackstrut Bearing

(1) See Table 11-2 for detailed inspection requirements of the clutch and pulley assembly.

D. Installation – Upper Jackstrut Bearing

(1) Lubricate (MIL-PRF-81322) the inside of the bearing housing.

(2) Install shield (7) into bearing housing (8) and center the shield as closely as possible to the inside of the housing.

(3) Lubricate (MIL-PRF-81322) the bore of bearing housing (8) and the O.D. of bearing (6).

(4) Remove the aft side seal from the replacement bearing and pack bearing (6) with grease (MIL-PRF-81322). Do not reinstall the shield that was removed in this step.

WARNING: USE EXTREME CAUTION WHEN HANDLING HEATED PARTS TO PREVENT FROM INJURING PERSONNEL. USE PROTECTIVE GLOVES WHEN HANDLING HEATED PARTS.

(5) Heat bearing housing (8) to approximately 250°F/121°C.

(6) Install bearing (6) into bearing housing (8) with the open side of the bearing facing aft.

(7) If required, press seal (5) into seal retainer (4).

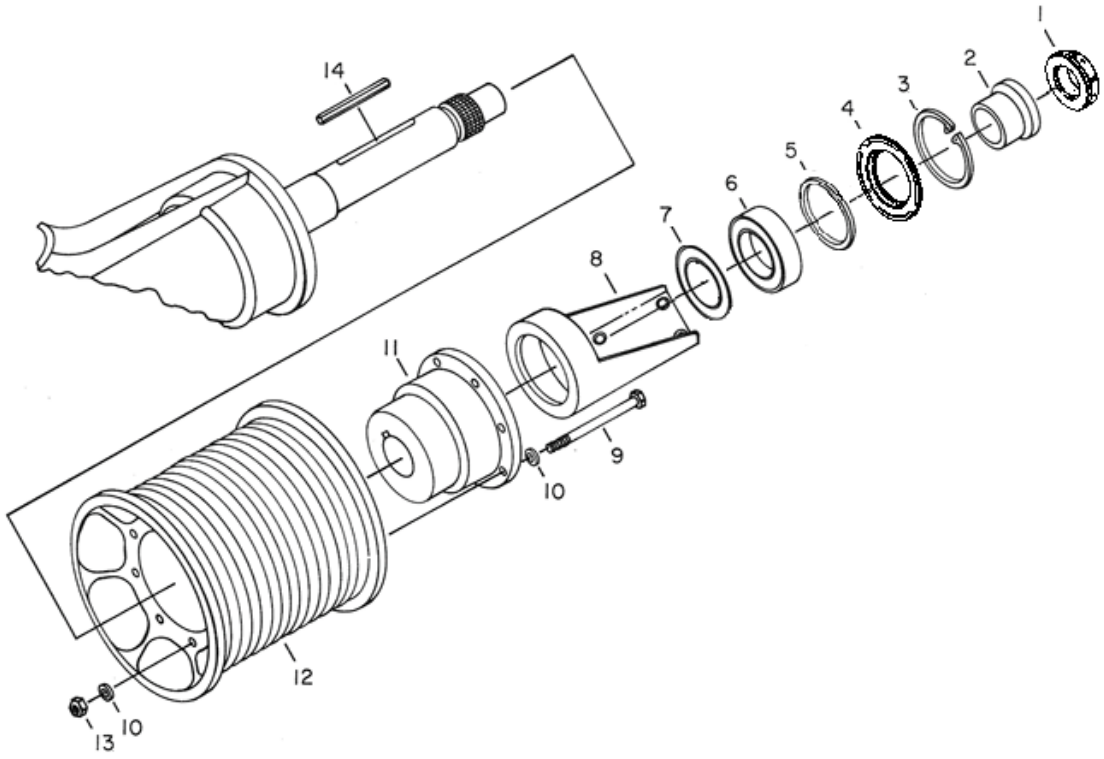
(8) Apply a light coat of grease (MIL-PRF-81322) on the lip side of seal retainer (4) and install with seal (5) facing the open side of bearing (6) (forward).

NOTE: Do not use a threadlocker on the inside diameter of bearing adapter or on the threads of pinion retention nut. If threadlocker is used on the outside diameter of the bearing adapter to improve fit into the bearing, ensure the bearing adapter is fully seated into bearing. Any excess residue must be removed prior to curing to preclude improper clamp up of the final assembly stack upon torquing the pinion nut.

(9) Press bearing adapter (2) into the aft side of bearing (6).

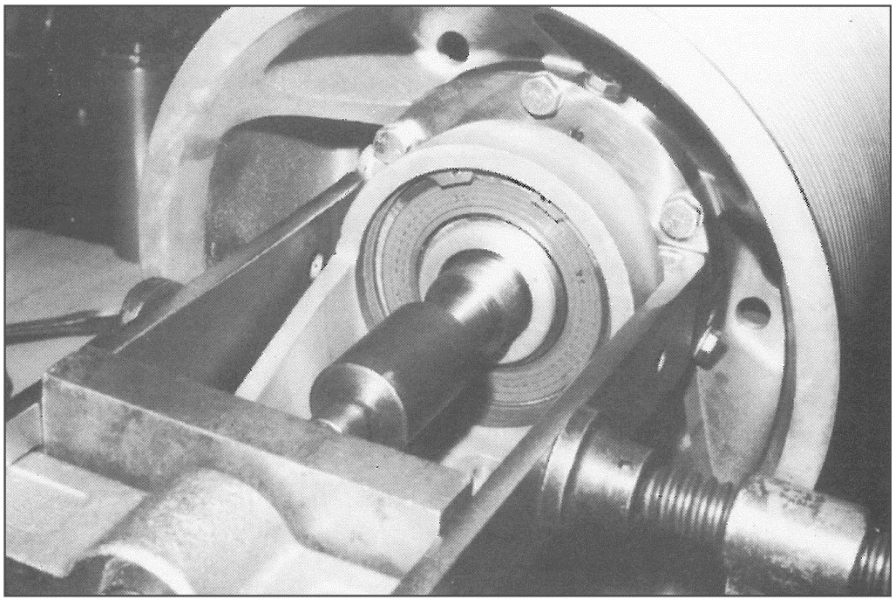
(10) Install retaining ring (3) into bearing housing (8).

(11) Install bearing housing assembly (Para. 11-7.H.(3) to end).

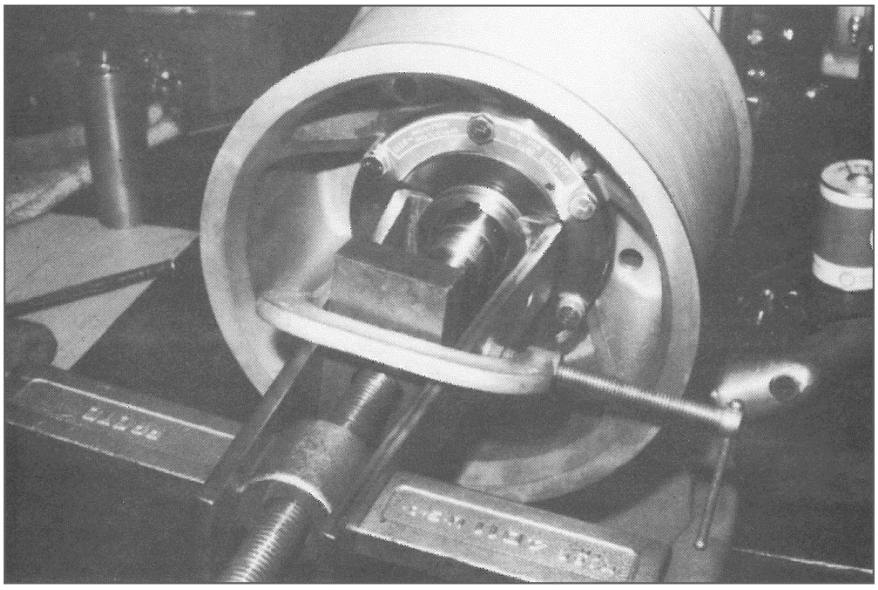


1. Pinion Retention Nut
2. Bearing Adapter
3. Retaining Ring
4. Seal Retainer
5. Seal
6. Bearing
7. Shield
8. Bearing Housing
9. Bolt
10. Washer
11. Clutch
12. Driven Pulley (Upper)
13. Nut
14. Key

Figure 11-10. Clutch and Upper Pulley Assembly



a. Upper Jackstrut Bearing Housing Removal



b. Clutch and Upper Pulley Removal

Figure 11-11

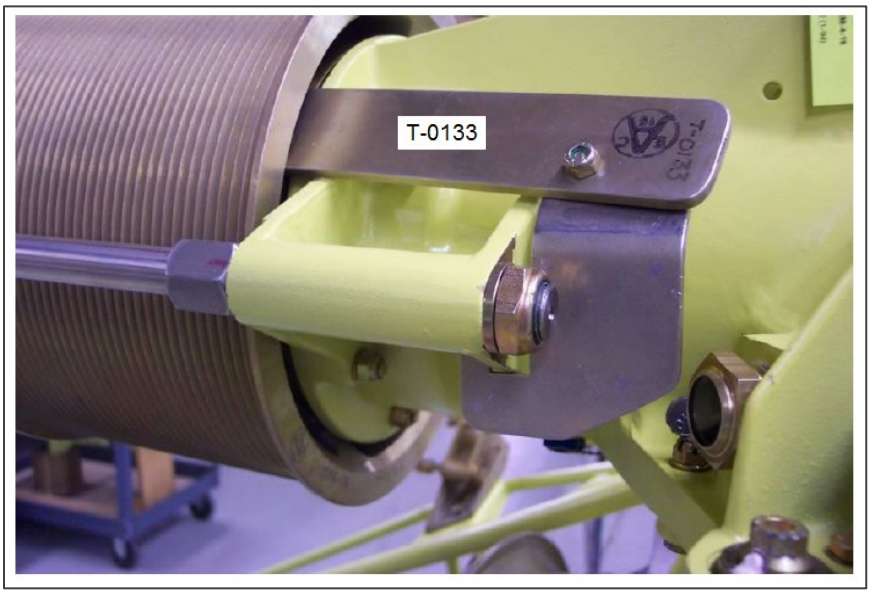


Figure 11-12. Upper Pulley Installation

Table 11-2. Inspection Requirements – Clutch and Upper Pulley Assembly

Part Number	Fig. 11-10 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13184-11	1	Retention Nut	Threads (no rolled or missing threads)	None Allowed	Not Repairable	Replace Nut
			Cracks	None Allowed	Not Repairable	Replace Nut
28-13323-11 28-13129-13	2	Bearing Adapter	(28-13323-11) O.D. 1.5746 to 1.5749	-.0002	Not Repairable	Replace Adapter
			(28-13323-11) I.D. 1.3116 to 1.3118	+.0002	Not Repairable	Replace Adapter
			(28-13129-13) O.D. 1.5740 to 1.5745	-.0005	Not Repairable	Replace Adapter
			(28-13129-13) I.D. 1.3110 to 1.3125	+.0005	Not Repairable	Replace Adapter
			Fretting wear on end surfaces	None Allowed	Not Repairable	Replace Adapter
ECD014-11 ECD014-13	6	Bearing	Roughness, spalling, pits, or corrosion	None Allowed	Not Repairable	Replace Bearing
28-13215-1, -3	8	Bearing Housing	I.D. 3.5428 to 3.5434	+.001	Not Repairable	Replace Housing
			Cracks	None Allowed	Not Repairable	Replace Housing
			Nickes, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
28-13401-2, -4	11	Clutch	O.D. 4.2490 to 4.2500	-.0002	Not Repairable	Replace Clutch
			Bore dia. 1.5630 to 1.5640	+.0003	Not Repairable	Replace Clutch
			Inner race axial play (end play)	.050	Not Repairable	Replace Clutch

(continued next page)

Table 11-2. Inspection Requirements – Clutch and Upper Pulley Assembly

Part Number	Fig. 11-10 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13401-2, -4	11	Clutch	(continued from previous page)			
			Inner race faces perpendicular to bore	.0005 TIR	Can be faced	Contact Enstrom
			Inner race rotation to be smooth with no noise or roughness	None Allowed	Can be rebuilt	Return to Enstrom Factory for Evaluation
			Seal – leakage	None Allowed	None Allowed	Replace Seal
			Oil level			Service (Para. 4-10)
28-13271	12	Pulley	Bore dia. 4.2490 to 4.2495	+.0003	Not Repairable	Replace Pulley
			Cracks	None Allowed	Not Repairable	Replace Pulley
			Concentricity	.001 TIR	Not Repairable	Replace Pulley
			Depth of grooves	≤ .176	Not Repairable	Replace Pulley
			Nicks and gouges in belt grooves	None Allowed	≤ .25 long and ≤ .025 deep	Blend out smooth
28-13142	14	Key	Width .3105 to .3125	-.001	Not Repairable	Replace Key
			No visible wear on side of key	None Allowed	Not Repairable	Replace Key
SLW 3045	15	Locking Ring	Locking tabs not bent or broken	None Allowed	Not Repairable	Replace Locking Ring
SLN 3045	16	Nut	Threads (no rolled or missing threads)	None Allowed	Not Repairable	Replace Nut
			Tightening tabs (not rounded or bent)	None Allowed	Not Repairable	Replace Nut
			Cracks	None Allowed	Not Repairable	Replace Nut

* All dimensions are in inches.

11-8 IDLER PULLEY ASSEMBLY

A. Troubleshooting – Idler Pulley Assembly

Problem	Possible Cause	Action
End play in roller assembly.	Worn bearings.	Replace bearings.
Excessive belt vibration at low power settings.	Improperly adjusted belt roller.	Adjust roller to a 0.38 inch/9.5 mm gap between belt and roller with clutch engaged.
Play in idler actuator arm.	Worn oilite bushings.	Replace bushings.
Play in over-center bellcrank.	Worn oilite bushings in bellcrank.	Replace bushings.
	Worn rod end.	Replace rod end.
Idler pulley rotates by hand.	Ratchety idler bearings.	Replace bearings.
Over-center bellcrank not parallel to shaft with clutch engaged.	Improper rigging.	Check rigging (Para. 11-1.B).

B. Removal – Idler Pulley

NOTE: Refer to Fig. 11-16 for numbered items unless stated otherwise.

(1) Remove baggage compartment top and side cowling. Remove baggage box.

(2) Remove bolts (24) to disconnect the actuator arm assemblies (10) from the pulley yoke assembly (Fig. 11-14).

(3) Remove bolt (50) and washer (51) to disconnect the idler stabilizer strut (49) from the brace assembly (57).

(4) Loosen nut (48) to allow the idler stabilizer strut (49) to pivot.

(5) Remove nut (63) and washer (64).

(6) Push the belt away from the idler pulley (7) and remove the idler pulley assembly with attached stabilizer strut (49) and shaft (62) from the transmission housing.

C. Disassembly – Idler Pulley

NOTE: Refer to Fig. 11-13 for numbered items unless stated otherwise.

(1) Remove cotter pin and nut (6) from shaft (1).

(2) Remove spacer (5) from shaft.

(3) Remove snap rings (2) from yoke (8).

(4) Install tool T-0029B against bearing (3) with head of shaft (1) inside the tool.

(5) Place the pulley assembly (7) in an arbor press and using tool T-0029B-1 against threaded end of shaft (1), press the shaft through the bearings (3) and the pulley. Remove the shaft.

NOTE: Hold tool T-0029B-1 in bearings and pulley to keep pulley from falling out of yoke.

(6) Place assembly on bench and remove tool T-0029B-1. Remove pulley (7) and spacers (4).

(7) Heat pulley yoke (8) to approximately 250°F/121°C and gently tap bearings (3) out.

(8) Carefully remove seals from both sides of the bearings (3).

(9) Clean idler pulley components (Para. 11-8.D).

D. Cleaning – Idler Pulley

(1) Idler Pulley Bearings: Wash and flush old grease from the bearing using fresh cleaning solvent, kerosene, toluol or vapor degrease. Apply a light oil (10-W) to bearing and spin the bearing by hand to determine if it is serviceable. The bearing should rotate smooth with no ratchety feeling. See Table 4-1 for required intervals and grease to repack bearing. Install seals.

E. Inspection – Idler Pulley Assembly

(1) See Table 11-3 for detailed inspection requirements.

F. Assembly – Idler Pulley

NOTE: Refer to Fig. 11-13 for numbered items unless stated otherwise.

(1) Spray bearing bores of yoke (8) and O.D. of bearings (3) with activator (Loctite primer 7649 or equivalent).

(2) Heat bearing area of yoke (8) to approximately 250°F/121°C. Apply a small amount of Loctite 277 to O.D. of bearing (3) and install into yoke (8). Repeat on the opposite bearing.

NOTE: T-0029A-1 can be used if the bearings (3) require pressing into the yoke (8).

(3) Place spacers (4) and pulley (7) in yoke.

NOTE: The small end of the spacer faces against bearings (3).

(4) Install tool T-0029B-1 through bearings (3), spacers (4) and pulley (7).

(5) Place tool T-0029A-1 against aft bearing (3) and install in a press while holding tool T-0029B-1 and pulley in place.

NOTE: Tool T-0029B-1 is used for alignment and will be pressed out while pressing shaft (1) in.

(6) Apply grease (MIL-PRF-81322) to the bearing surface of shaft (1) and carefully press through bearings and pulley.

NOTE: Shaft (1) should be installed with threaded end facing aft when installed on helicopter.

(7) Remove from the press and install retaining rings (2) in the bearing bores.

(8) Install spacer (5) on threaded end of shaft (1) with the chamfer facing inboard.

(9) Install nut (6). Torque (24-34 ft-lb/33-46 Nm).

(10) Install cotter pin through the nut (6).

G. Installation – Idler Pulley Assembly

NOTE: Refer to Fig. 11-16 for numbered items unless stated otherwise.

(1) Install spacer (45) on the long end of shaft (62). The chamfered hole of spacer (45) must be installed against the wrench boss of shaft (62).

(2) Install the yoke (8) over shaft (62) and against the spacer (45).

NOTE: It may be necessary to rotate the pulley rotating shaft as the shaft is inserted into the transmission so the idler yoke will clear the idler support strut.

(3) Insert yoke (8) and shaft (62) into the transmission boss. It may be necessary to rotate the shaft to facilitate installation.

(4) Install the idler stabilizer strut (49) to the brace assembly with bolt (50) and washer (51).

NOTE: It is recommended to torque all hardware installations. If required, loosen and re-torque as required during the tracking process.

(5) Install washer (64) and nut (63). Torque (50-65 ft-lb/68-88 Nm).

(6) Tighten nut (48). Torque (24-34 ft-lb/33-46 Nm).

(7) Connect actuator arm assemblies (10) to pulley yoke (8) with bolts (24), washers (25), and nuts (27) (Fig. 11-14). Torque 30-40 in-lb/3.4-4.5 Nm.

NOTE: Head of bolt and washer are installed from the inboard side of actuator arm assembly. Place washer (25) and nut (27) on outboard end of the bolt (24).

(8) Install cotter pins (28) (Fig. 11-14).

11-8.1 YOKE END ASSEMBLY

A. Removal – Yoke End Assembly

(1) Remove the idler pulley assembly (Para. 11-8.B).

(2) Remove bolt (41) and hardware to disconnect rod end (38) from the over-center bellcrank (Fig. 11-14).

(3) Remove bolts (19) (20) and hardware to disconnect the actuator arm assemblies (10) from the yoke end (15).

B. Disassembly – Yoke End Assembly

(1) Remove shaft (18), nut (17) and washer (16) from yoke end (15) (Fig. 11-14).

(2) If rod end bearing assembly (38) needs replacing, cut safety wire and break torque on nut (37).

(3) Carefully back out the jam nut (37) and withdraw the lock key (36) from the shaft (18).

(4) Remove the rod end bearing assembly (38).

C. Inspection – Yoke End Assembly

(1) See Table 11-4, Table 11-5, and Table 11-6 for detailed inspection requirements.

(2) Inspect idler yoke S/N 14-001-06 to 14-077-06 per SDB 109, latest revision.

NOTE: Unless initially complied with and documented in maintenance records, SDB 0118, latest revision, is still in effect.

D. Assembly – Yoke End

(1) Install the rod end bearing assembly (38) (Fig. 11-14).

NOTE: The rod end bearing assembly (38) may have been previously treated with ACF-50 or MIL-PRF-23377 Type I Class 2C or Class N epoxy primer corrosion inhibitor per SDB 0127. If continuing use of ACF-50, removal of prior ACF-50 application is unnecessary. If changing from ACF-50 to epoxy primer, ACF-50 residue must be removed before reinstallation.

NOTE: For helicopters S/N 833 (F-28F) and subsequent and S/N 2157 (280FX) and subsequent, the rod ends are treated with epoxy primer at the time of manufacture.

(a) For new epoxy primer application, remove any ACF-50 residue from the threads of the rod end and the interior threads of the piston with a suitable solvent.

(b) If applying a touch-up of epoxy primer, remove any loose epoxy primer residue from the threads of the rod end and the interior threads of the piston with a brush and a small amount of solvent.

CAUTION: Do not allow the epoxy primer to dry prior to assembly of the rod end.

CAUTION: Mask the bearing area prior to applying epoxy primer to avoid damaging the bearing.

NOTE: Follow the manufacturer's instructions for corrosion inhibitor application.

(c) Apply a coat of corrosion inhibitor to the top 0.50 in/13 mm of threads of the bearing (closest to the uni-ball bearing).

NOTE: Installing the nut will tend to wipe away corrosion inhibitor that was freshly applied. Re-apply to ensure complete coverage.

(d) Install the lock pin (36) and the jam nut (37) and position as close as possible to the uni-ball bearing.

(e) Apply corrosion inhibitor to the remaining threads below the jam nut (37).

(f) Install rod end bearing assembly (38) into shaft (18).

(2) Turn the rod end bearing assembly (38) into the shaft until the measurement from the end of the shaft to centerline of the rod end ball is 6.75 inches.

(3) Torque (300 in-lb/34 Nm) jam nut and safety wire the locking key (36) to the jam nut (37).

(4) Re-apply corrosion inhibitor to the threads above the jam nut (37), as required.

(5) Install nut (17) and washer (16) on shaft (18) (Fig. 11-14).

(6) Apply lubrication (MIL-G-25537 or MIL-PRF-81322) to the threads of the shaft (18) and turn into yoke (15) until approximately 1/2 inch of the threads extend beyond the jam nut.

(7) Torque nut (17) (40-45 ft-lbs/4.5-5.1 Nm).

E. Installation – Yoke End Assembly

(1) Place yoke end (15) between actuator arm assemblies (10) and install mount bolts (19) and (20) and washers (21) and (22), and nuts (23). Torque (12-15 in-lb/1.4-1.7 Nm) (Fig. 11-14).

(2) Install spacer (40) in rod end bearing assembly (38) and place spacers (39) on each side of the rod end (Fig. 11-14).

(3) Insert rod end (38) with spacers (39) into over-center bellcrank and install bolt (41), washers (42) and nut (43), and partially tighten. Torque (30-40 in-lb/3.4-4.5 Nm) and install cotter pin (44) after belt tension is rigged.

(4) Install the idler pulley assembly (Para. 11-8.G).

(5) Verify belt clutch adjustment (Para 11-1.A).

11-8.2 ACTUATOR ARM ASSEMBLY AND SNUBBER ROLLER ASSEMBLY

A. Removal – Snubber Roller

NOTE: It is not necessary to remove the forward actuator arm assembly if only removing the "snubber" roller.

NOTE: Refer to Fig. 11-14 for numbered items.

(1) Remove the yoke end assembly (Para. 11-8.1.A).

NOTE: If the belt roller assemblies are installed in the helicopter, it is only necessary to remove the aft strap assembly (10) to remove the snubber roller

(2) Disconnect actuator arm assemblies (10) from yoke end (15) and from the pulley yoke (8) by removing bolts (19), (20), and (24). Remove spacers (9), washers (21) and (25), and nuts (27).

(3) Remove nuts (14) and washers (13) to remove roller assembly (11) from the actuator arm assemblies. Remove spacers (12).

B. Disassembly – Snubber Roller

(1) Using a plastic mallet, tap end of shaft (33) to remove bearing housing (30) and bearing (31) from one end of roller (Fig. 11-14).

(2) Reinstall shaft (33) in opposite bearing and tap to remove bearing.

(3) Remove shaft (33) and sleeve (32). Save shims (34) located behind bearing for reassembly.

(4) Press bearings (31) from bearing housings (30).

(5) Clean roller assembly components in accordance with Step C.

C. Cleaning – Actuator Arm Assembly and Snubber Roller

(1) Parts should be washed in toluene, kerosene, or an equivalent solvent. They may also be vapor degreased before inspection.

(2) Do not submerge the roller assembly into cleaning solvent as a unit. Clean the outer surfaces of the roller with a cleaning brush and solvent. If the unit is disassembled, clean the bearings in accordance with Step D.

D. Inspection – Actuator Arm Assembly and Snubber Roller

(1) See Table 11-4 and Table 11-5 for detailed inspection requirements.

(2) Inspect the edges of the washer (13) area (inside the groove) on the actuator arm assembly for cracks and inspect the outside edges of the actuator arm above and below the washer (13) area (Fig. 11-15).

(3) Inspect the interior aluminum plate of the actuator arm assembly for damage.

E. Assembly – Snubber Roller

NOTE: Parts identified in steps (1)-(3) are installed with 277 Loctite (red). Use only a small amount.

(1) Apply a small amount of 277 Loctite to bearings (31) and press bearings (31) into end caps (30) (Fig. 11-14).

(2) Apply a small amount of 277 Loctite to one end cap (30) and press one end cap (30) into roller (29).

(3) Apply a small amount of 277 Loctite to sleeve (32) and install sleeve (32) into I.D. of roller (29) and align into end cap (30) assembled in step 2.

NOTE: Parts identified in steps (4)-(5) are installed with Aeroshell 22 (MIL-PRF-81322). Do not use Loctite.

(4) Lubricate (MIL-PRF-81322) and install shaft (33) into roller (29) and bearing (31).

(5) Lubricate (MIL-PRF-81322) and press opposite end cap (30) into roller (29).

(6) While holding roller (29) stationary in vertical position, install dial indicator on end of shaft (33) and move shaft up and down to check end play.

NOTE: Shimming is required to remove end play and preload bearings. Shaft end play measurement plus .002 equals shims required.

Example: End play .022 + .002 = .024 (shims required).

(7) Using a plastic mallet, tap end of shaft (33) to remove bearing (31) from the cap with the (MIL-PRF-81322).

(8) Reinstall shims (34) on bearing surface of shaft (33).

(9) Press bearing (31) into end cap (30).

(10) Rotate shaft (33). The inner race of bearings (31) should rotate with the shaft and no end play should exist.

NOTE: If the inner race of the bearing does not turn with the shaft or if end play still exists, there is not enough preload on the bearings. Install additional shims as required. Recheck assembly.

F. Installation – Actuator Arm Assembly and Snubber Roller

(1) If required, install forward actuator arm assembly (10) (Fig. 11-14).

(a) Install mount bolts (19) and (20) and washers (21) and (22), and nuts (23). Torque (12-15 in-lb/1.4-1.7 Nm).

(b) Safety wire bolt (20) and one of the (19) bolts that attach the forward actuator arm assembly to yoke end (15) with 0.032 wire.

(c) Install bolt (24), washers (25), and nut (27). Torque 30-40 in-lb/3.4-4.5 Nm.

NOTE: Head of bolt and washer are installed from the inboard side of actuator arm assembly. Place washer (25) and nut (27) on outboard end of the bolt (24).

NOTE: Actuator arm assemblies are to be installed with the flange of oilite bushing (26) facing outboard. The roller assembly (11) is installed with grease fitting end of roller facing aft as installed on helicopter.

(2) Install spacers (12) and washers (13) on roller assembly (11).

(3) Install roller assembly (11) onto forward actuator arm assembly (10). Loosely install forward washers (13) and nut (14).

(4) Install aft actuator arm assembly (10) on roller assembly (11) against the inboard washers.

(5) Loosely install outboard washers (13) and nuts (14) on the roller (11).

(6) Install mount bolts (19) and (20) and washers (21) and (22), and nuts (23). Torque (12-15 in-lb/1.4-1.7 Nm).

(7) Safety wire bolt (20) and one of the (19) bolts that attach the forward actuator arm assembly to yoke end (15) with 0.032 wire.

(8) Install spacers (9) into oilite bushings (26) of aft actuator arm assembly (10).

(9) Install bolt (24), washers (25), bushing (9), and nut (27). Torque 30-40 in-lb/3.4-4.5 Nm.

(10) Install cotter pin (28) in actuator arm assembly pivot bolt (24), as applicable.

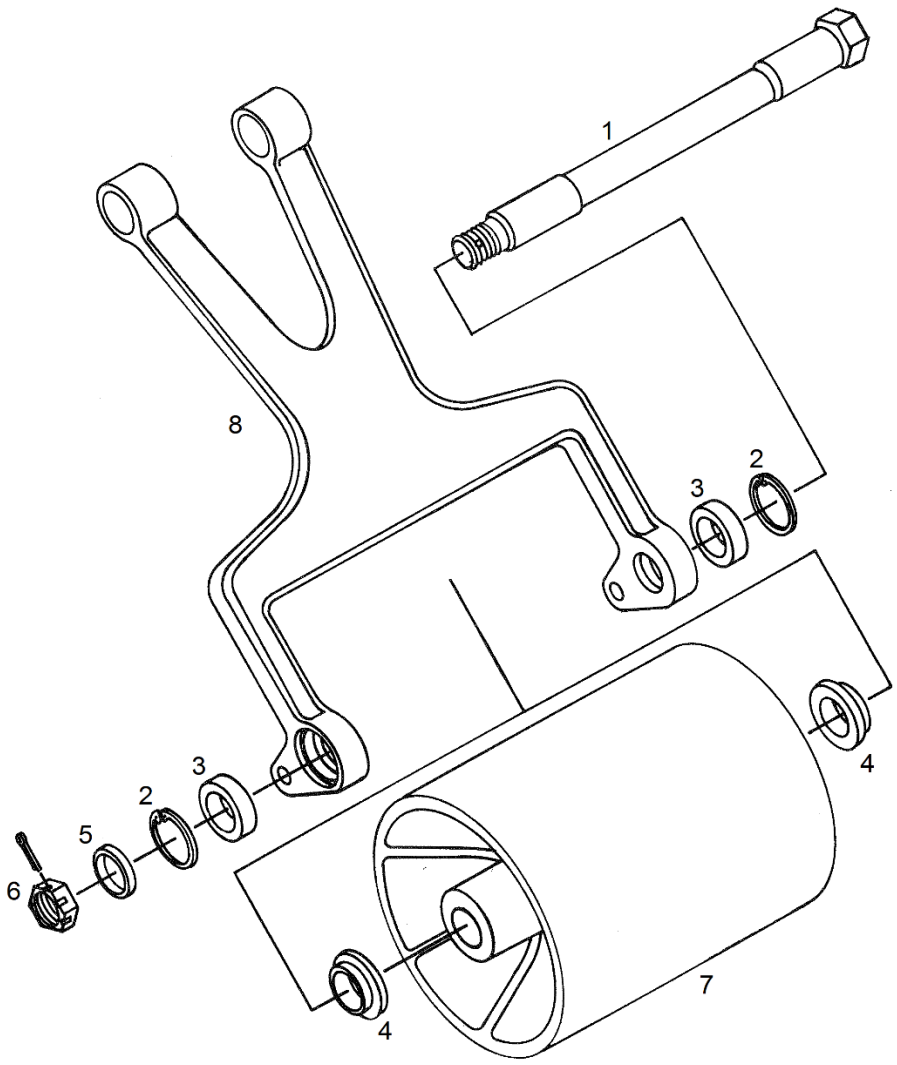
(11) Adjust snubber roller to 0.38 inch/9.5 mm clearance and parallel to the back side of the belt.

(12) Torque nuts (14) (95-110 in-lb/10.7-12.4 Nm).

(13) Service the roller assembly.

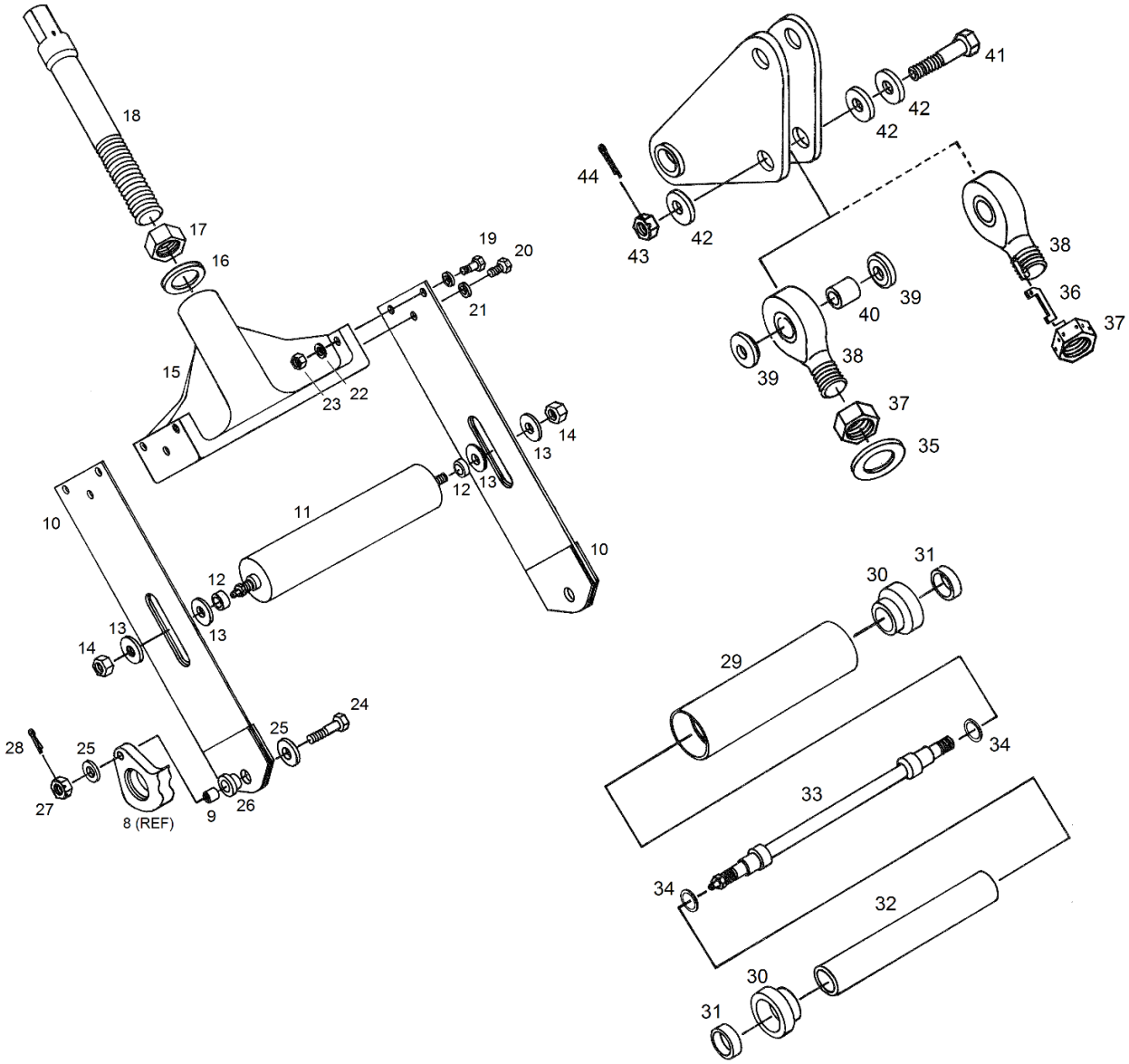
(14) Ground run helicopter and verify snubber roller clearance and parallel to the drive belt.

NOTE: After final adjustment of the idler pulley track, loosen the aft nut on the “snubber” roller and allow the roller to self-align on the idler straps. Torque the aft nut to 95-110 in-lb/10.8-12.5 Nm.



1. Idler Shaft
2. Retaining Ring
3. Bearing
4. Spacer
5. Washer
6. Nut
7. Idler
8. Pulley Yoke Assembly

Figure 11-13. Idler Pulley and Pulley Yoke Assembly



9.	Spacer	21.	Washer	33.	Shaft
10.	Actuator Arm Assembly	22.	Washer	34.	Shim
11.	Roller Assembly	23.	Nut	35.	Lock Washer
12.	Spacer	24.	Bolt	36.	Lock Key
13.	Washer (Harper)	25.	Washer	37.	Nut
14.	Nut	26.	Bushing	38.	Rod End Assembly
15.	Yoke End	27.	Nut	39.	Washer
16.	Washer	28.	Cotter Pin	40.	Spacer
17.	Nut	29.	Roller	41.	Bolt
18.	Shaft Assembly	30.	End Cap	42.	Washer
19.	Bolt	31.	Bearing	43.	Nut
20.	Bolt	32.	Sleeve	44.	Cotter Pin

Figure 11-14. Actuator Arm, Yoke End, and Belt Roller Assemblies

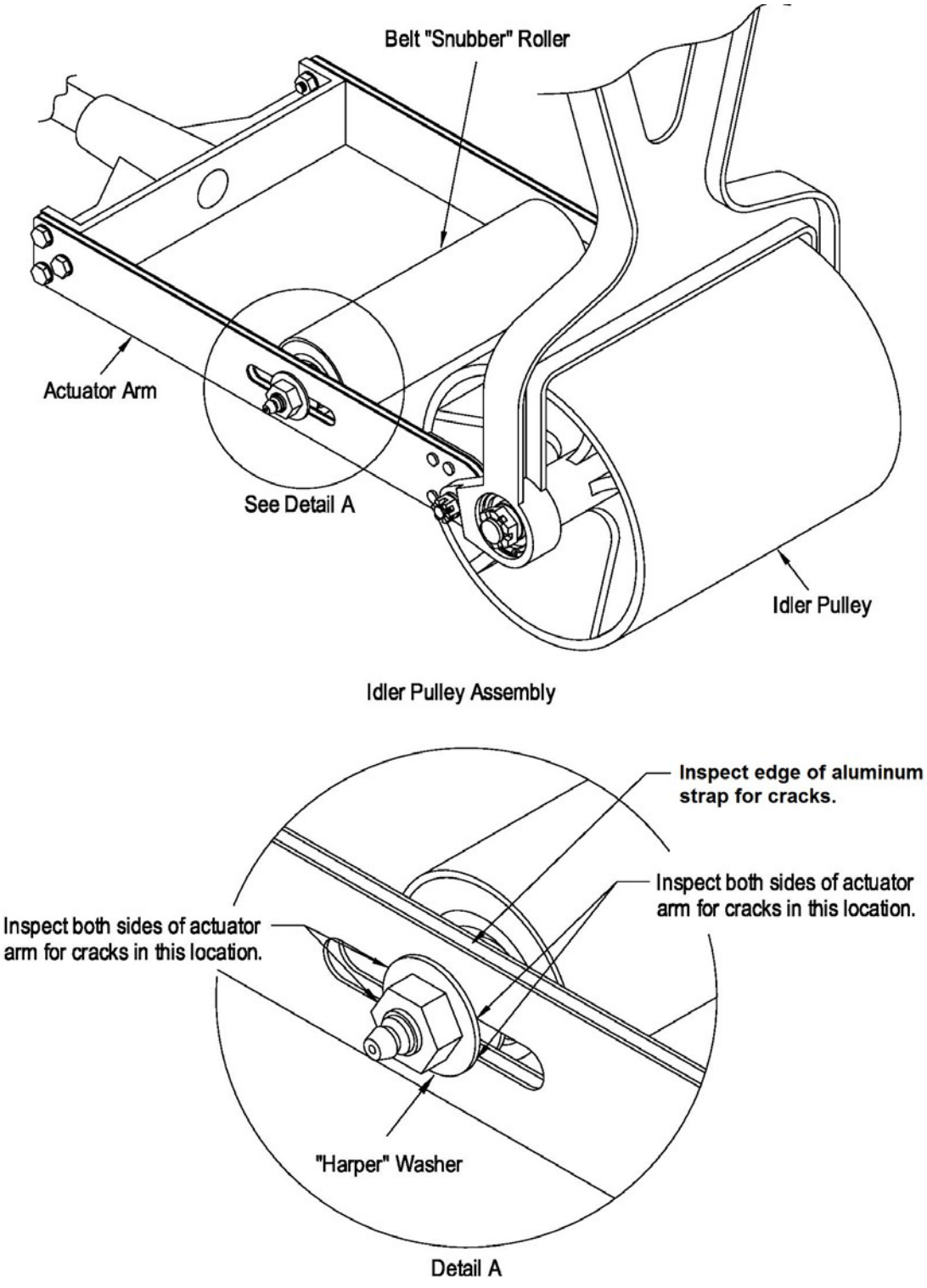
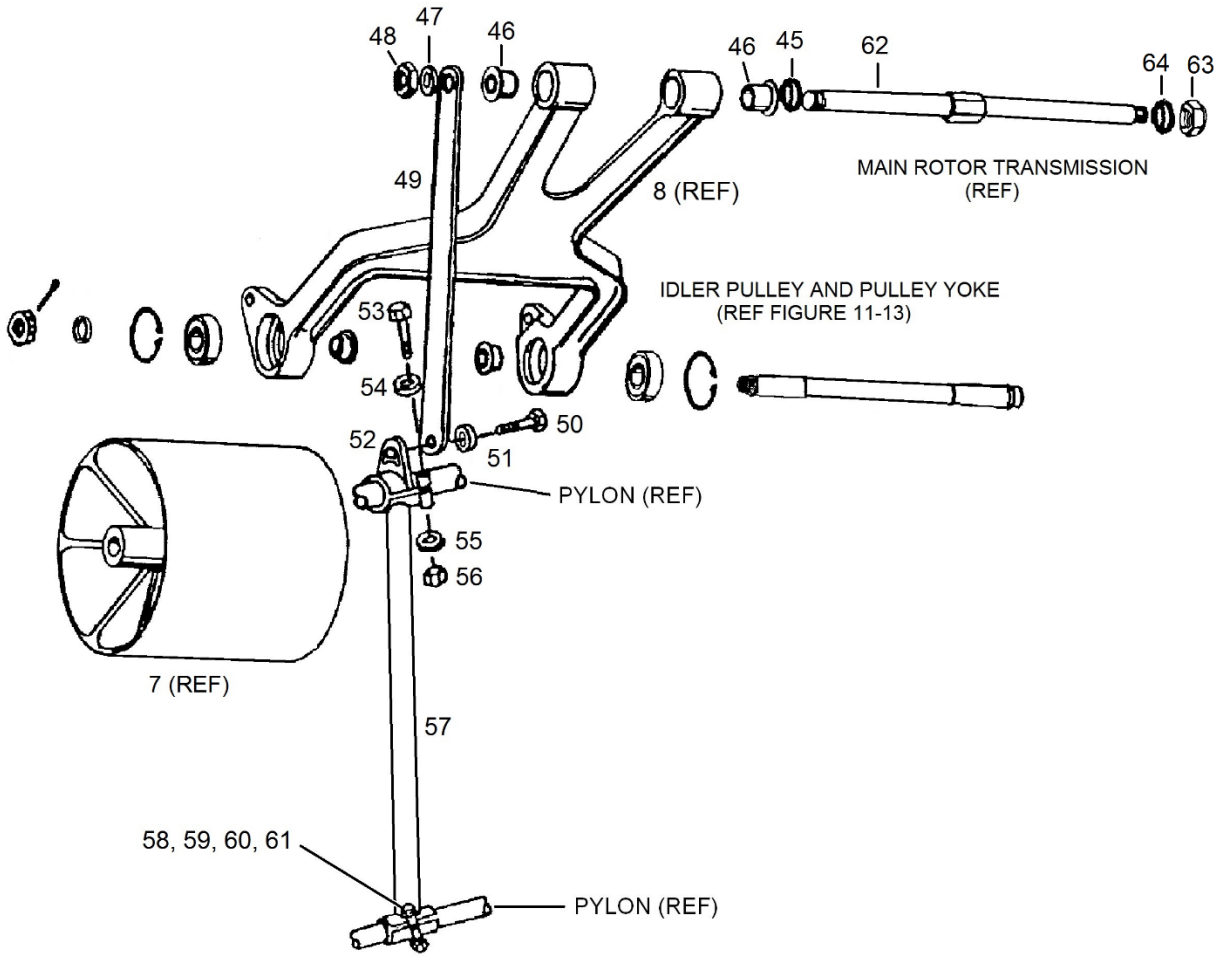


Figure 11-15. Actuator Arm Inspection



45.	Spacer	54.	Washer
46.	Bearing (Part of Yoke Assembly)	55.	Washer
47.	Washer	56.	Nut
48.	Nut	57.	Brace Assembly
49.	Idler Stabilizer Strut	58.	Bolt
50.	Bolt	59.	Washer
51.	Washer	60.	Washer
52.	Clamp Half	61.	Nut
53.	Bolt	62.	Shaft

Figure 11-16. Idler Pulley and Support Assembly

Table 11-3. Inspection Requirements – Idler Pulley and Yoke Assembly

Part Number	Fig. 11-13 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13230	1	Shaft	Bearing surface dia. .5908 to .5903	-.0002	Not repairable	Replace Shaft
			Concentricity	.001 TIR	Not repairable	Replace Shaft
			Threads (no crossed or rolled threads)	None Allowed	Not repairable	Replace Shaft
N5000-137-S-PP	2	Snap Ring	Visual flatness check	None allowed	Not repairable	Replace Snap Ring
ECD018-11	3	Bearing	Bearing O.D. 1.3780	+.0000/-.0005	Not Repairable	Replace Bearing
			Bearing I.D. .5906	+.0000/-.0003	Not Repairable	Replace Bearing
			Rotate (no ratchety feeling)	None Allowed	Not Repairable	Replace Bearing
			Hours – Limited life bearing 600 hours	None allowed		Replace Bearing
28-13233	4	Spacer	Width .250	±.003	Not Repairable	Replace Spacer
28-13234	5	Washer	Width .125	±.005	Not Repairable	Replace Washer
28-13229	7	Idler Pulley	Shaft bore .5898 to .5908	+.0002	Not Repairable	Replace Pulley
			Shaft bore to O.D. concentricity	.001 TIR	Not Repairable	Replace Pulley
			Belt wear in O.D.	.020 deep	Maximum .040 deep	Replace Pulley
			Cracks	None Allowed	Not Repairable	Replace Pulley

Table 11-3. Inspection Requirements – Idler Pulley and Yoke Assembly

Part Number	Fig. 11-13 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13292	8	Pulley Yoke	Bearing bore dia. 1.3781 to 1.3786	+.0002	Not Repairable	Replace Yoke
			Nicks and scratches	None Allowed	Maximum .008 deep	Polish to remove. Finish with #180 Emery cloth
			Brass bushing bore dia. .627 to .628	+.0005	Not Repairable	Replace bushings and line ream to size
			Actuator arm assembly mount hole dia. .250 to .251	None Allowed	Not Repairable	Replace Yoke
			Cracks	None Allowed	Not Repairable	Replace Yoke

* All dimensions are in inches.

Table 11-4. Inspection Requirements – Idler Actuator Arm Assembly and Roller Assembly

Part Number	Fig. 11-14 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-132008-11	9	Spacer	Length .350 to .353	-.0005	Not Repairable	Replace Spacer
			Bore dia. .250 to .254	+.0005	Not Repairable	Replace Spacer
			Ends perpendicular to bore within .001	None Allowed	Not Repairable	Replace Spacer
28-13318-7	10	Actuator Arm Assembly	Inspect for belt wear on side of arm	None Allowed	Not Repairable	Replace Arm
			Slot width .380 ± .010	+.003	Not Repairable	Replace Arm
			Notch worn in roller slot	.015 deep	Not Repairable	Replace Arm
			Brass bushing bore .3755 to .3765	+.001	Not Repairable	Replace Bushing
			Cracks	None Allowed	Not Repairable	Replace Arm
28-13245-901	11	Roller Assembly	Bearings (rotate free with no ratchety feeling)	None Allowed	Not Repairable	Replace Bearings
			Shaft (no end play)	None Allowed	.030 end play	Disassemble and shim to preload bearings
			Shaft threads (no crossed or missing threads	None Allowed	Not Repairable	Replace Shaft
28-13278	12	Spacer	Length. .260 +.000/-.005	None Allowed	Not Repairable	Replace Spacer
			O.D. .62 ± .015	None Allowed	Not Repairable	Replace Spacer
			I.D. .472 +.005/-.000	None Allowed	Not Repairable	Replace Spacer

Table 11-4. Inspection Requirements – Idler Actuator Arm Assembly and Roller Assembly

Part Number	Fig. 11-14 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13299-1, -3	15	Belt Tension Assembly Yoke	Shaft threads (no crossed or missing threads)	None Allowed	Not Repairable	Replace Yoke
			Bolt holes .191 diameter	± .005	Not Repairable	Replace Yoke
			Cracks	None Allowed	Not Repairable	Replace Yoke
28-132005-11	18	Shaft	Threads – I.D. and O.D. (no crossed or missing threads)	None Allowed	Not Repairable	Replace Shaft

* All dimensions are in inches.

Table 11-5. Inspection Requirements – Belt Roller Assembly

Part Number	Fig. 11-14 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13297	29	Roller	End cap bore dia. 1.8115 to 1.8120	None Allowed	Not Repairable	Replace Roller
			Nicks and scratches in O.D.	None Allowed	.005 deep	Polish to remove
28-13296	30	End Cap	O.D. dia. 1.8120 to 1.8125	None Allowed	Not Repairable	Replace End Cap
			Bearing bore dia. 1.2591 to 1.2586	None Allowed	Not Repairable	Replace End Cap
			Tube bore dia. 1.004 to 1.006	None Allowed	Not Repairable	Replace End Cap
ECD036-11	31	Bearing	Bore .4724, +.0000/-.0003	None Allowed	Not Repairable	Replace Bearing
			O.D. 1.2598, +.0000/-.0005	None Allowed	Not Repairable	Replace Bearing
			Check bearing for smooth rotation (no ratchet feeling)	None Allowed	Not Repairable	Replace Bearing
28-13248	32	Sleeve	Length 5.525	±.005	Not Repairable	Replace Sleeve
28-13246	33	Shaft	Bearing surface .469 to .471	-.0003	Not Repairable	Replace Shaft
			Threads (no crossed or missing threads)	None Allowed	Not Repairable	Replace Shaft
			All radii to be free of nicks and scratches	None Allowed	Not Repairable	Replace Shaft

* All dimensions are in inches.

Table 11-6. Inspection Requirements – Upper Bellcrank Assembly

Part Number	Fig. 11-14 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
ECD091-1, 09455-01-824-08E-011, MTK8, ASMK8T, 01-824-08E-011, M81935/1-08K, MS21242S8K, MXJKR-8R, or 01-691-08	38	Rod End Bearing Assembly	Threads (no crossed or missing threads)	None Allowed	Not Repairable	Replace Rod End
			Threads (corrosion)	None Allowed	Not Repairable	Replace Rod End
			Axial play of swivel ball	.007 clearance	Not Repairable	Replace Rod End
28-132009-11	39	Spacer	Bore .500 to .505	None Allowed	Not Repairable	Replace Spacer
			Width .090	±.005	Not Repairable	Replace Spacer
28-132006-11	40	Spacer	Length .765 to .785	None Allowed	Not Repairable	Replace Spacer
			O.D. .4935 to .4965	-.0003	Not Repairable	Replace Spacer

* All dimensions are in inches.

11-9 BELT TENSION ASSEMBLY

A. Troubleshooting – Belt Tension Assembly

Problem	Possible Cause	Action
Clutch lever sticks when releasing from engaged position.	Notches worn in lower end of in brackets, causing nylon bushings to stick in slots.	Notches which do not exceed .050 inch deep may be polished and blended until clutch releases smoothly. Replace brackets if notch exceeds .050 inch deep.
Excessive play in slider bolt area (bottom bolt through spring capsule). Maximum play .025 inch.	Nylon bushings worn. (Check by holding each end of bolt and pulling in and out.)	Replace bushings. (Tighten nuts until there is a slight amount of drag in the movement of the nylon bushing in the slots).
Excessive side play in spring capsule piston.	Worn DU bushing in capsule end cap.	Remove belt tension assembly and remove spring capsule. Replace bushing.
Excessive play in over-center bellcrank	Worn oilite pivot bushings in bellcrank.	Replace bushings.
Excessive play at spring capsule end cap (clutch engaged)	Worn bushing	Replace bushing. (Para. 11-9.1.B)

B. Removal – Belt Tension Assembly (Fig. 11-17)

NOTE: Refer to Fig. 11-17 for numbered items unless stated otherwise.

(1) Remove left side aft cowling.

(2) Disconnect the micro-switch wiring.

(3) Remove bolt (1) and hardware that secures spring capsule rod end (5) to bellcrank (3).

(4) Remove bolt (8) and hardware that secures clutch cable rod end (12) to bellcrank (14).

(5) Remove bolts (12) and hardware that secures mount block (14) to belt tension assembly brackets (9) (Fig. 11-18).

(6) Remove bolts (15) and hardware that secures the belt tension assembly to the pylon (2 places).

(7) Remove the belt tension assembly.

C. Disassembly – Belt Tension Assembly

NOTE: Refer to Fig. 11-18 for numbered items.

(1) Remove bolt (20) from brackets (9) and remove spacers (21), (22) and (23).

(2) Remove bolts (16) and spacers (19) from pivot straps (3).

(3) Remove bellcranks (18) and spacers (17).

(4) Remove bolt (1) from spring capsule (6) and remove pivot straps (3), spacers (4) and spacer (5).

(5) Remove nuts (7), washers (11) and nylon washers (10) from spring capsule slider bolt.

(6) Remove bolts (12) from brackets (9) and clutch cable mount block (14). Remove block (14).

(7) Remove brackets (9) from spring capsule (6).

D. Cleaning – Belt Tension Assembly

(1) Parts should be washed in toluene, kerosene, or an equivalent solvent. They may also be vapor degreased before inspection.

NOTE: The nylon bushings and washers may be deformed from the heat of a vapor degreaser and should be cleaned separately.

E. Inspection – Belt Tension Assembly

(1) See Table 11-7 for detailed inspection requirements of the belt tension assembly.

(2) Visually inspect the pylon area adjacent to the belt tensioning assembly mounting bracket for cracks, wear caused by interference with the bottom of the capsule (14) Fig. 11-19), and other damage.

(3) Replace bushing (5), if wear exceeds 0.020 inch/0.5 mm.

F. Repair – Belt Tension Assembly

(1) If contact between anchor (14) (Fig. 11-19) and pylon is observed, the bottom edge of the anchor may be chamfered (0.050 inch/1.3 mm maximum).

G. Assembly – Belt Tension Assembly

NOTE: Refer to Fig. 11-18 for numbered items.

(1) Install spacer (5) into ear of spring capsule assembly (6).

(2) Install bolt (1) through washer (2), strap (3), spacer (4), strap (3), and washer (2).

(3) Insert bolt through spacer (5) in the spring capsule assembly with the head of the bolt facing forward as installed in the helicopter.

(4) Install another washer (2), strap (3), spacer (4), strap (3), washer (2), and nut (7). Tighten nut to remove side play but do not torque at this point.

(5) Install nylon guide (8) on threaded shaft of spring capsule. Repeat on the opposite side.

(6) Install brackets (9) on spring capsule with nylon guide (8) extending through the slots in the bracket.

(7) Install nylon washer (10) on nylon guide (8) flush against bracket (9).

(8) Install washer (11) and nut (7) on threaded shaft against the nylon washer. Partially tighten nuts until approximately two threads extend beyond the nut.

(9) Place mount block (14) between brackets (9) and install bolts (12) with washers (13) and nuts (15). Tighten bolts but do not torque at this time.

(10) Install spacer (17) in the center hole of bellcrank (18).

(11) Place bellcrank between straps (3) and insert bolt (16) through the straps and bellcrank with the head of the bolt inboard.

(12) Install washer (2), spacer (19), another washer (2) and nut (7) on bolt (16). Torque bolt (30-40 in-lb/3.4-4.5 Nm).

(13) Repeat steps 10 through 12 on opposite bellcrank (18).

NOTE: Straps (3) and bellcrank (18) should pivot freely at this point.

(14) Place spacer (22) between bellcranks (18) and insert spacer (23) through both bellcranks and spacer (22).

(15) Install spacers (21) on outboard ends of spacer (23).

(16) Place spacer stack-up between brackets (9) and insert bolt (20) through brackets and spacers using washers (2) and nut (7). The head of the bolt should be forward as installed in the helicopter. Partially tighten nut.

(17) Place unit on a flat surface so brackets (9) are standing flat and parallel to each other. Torque all bolts at pivot points and at mount block (14).

(a) AN4 bolts (1) and (20): 30-40 in-lb/3.4-4.5 Nm

(b) AN3 bolts (12): 12-15 in-lb/1.4-1.7 Nm

NOTE: Do not overtorque nuts against nylon washer and guide as spring capsule will not slide freely. You should be able to rotate the Harper washer (11) by hand after torque of nut. No side play should exist between nut and washer.

(18) Holding brackets (9) by hand, slide spring capsule assembly back and forth. Unit should slide with noticeable drag yet not bind in the pivot points or bracket slider.

(19) Place spacers (24) on each side of rod end and install bellcrank (28).

(20) Insert bolt (25) through bellcrank (28), spacers (24) and rod end using washers (26) and nuts (27).

(21) Install spacer (29) into bellcrank oilite bushings.

H. Installation – Belt Tension Assembly

NOTE: The heads of all bolts in the belt tension assembly and bellcrank connections should be facing forward with the nuts on the aft side.

(1) Install belt tension assembly to the pylon mounts (Fig. 11-17):

(a) Install washers (16) between pylon mounts and belt tension brackets (18). Insert bolts (15) with washers (16) through the brackets and pylon mounts.

(b) Install washers (16) and nuts (17) and torque (12-15 in-lb/1.4-1.7 Nm).

(2) Install clutch cable mount block (14) (Fig. 11-18):

(a) Slide clutch cable and retention block (14) into the belt tension brackets (9) and install bolts (12) (Fig. 11-18).

(b) Install washers (13) and nuts (15) and torque (12-15 in-lb/1.4-1.7 Nm).

(3) Install the clutch cable rod end (12) (Fig. 11-17):

(a) Install washer (9) on bolt (8) and slide bolt through bellcrank arms (14), washers (10), spacer (11), and rod end (12).

(b) Install washer (9) and nut (13) and torque (30-40 in-lb/3.4-5.6 Nm).

(4) Install the rod end (5) of the spring capsule (7) (Fig. 11-17):

(a) Install washer (2) on bolt (1) and slide bolt through bellcrank arms (3), spacers (4), and rod end (5).

(b) Install washer (2) and nut (6) and torque (30-40 in-lb/3.4-5.6 Nm).

(5) Inspect the clutch control and belt tension mechanism rigging (Para. 11-1.A).

(6) Inspect all connections for security and check that all cotter pins are installed in double-locking hardware.

(7) Connect wiring for the micro-switch.

(8) Install left side aft cowling.

I. Replacement – Spring Capsule Bushing

(1) Spring Capsule Disassembly and Assembly

NOTE: The bushing (5) (Fig. 11-19) in the top of the spring capsule is a normal wear item. If the bushing is allowed to wear through the Teflon coating it will damage the adapter (3) requiring replacement of both the bushing and adapter.

NOTE: This procedure is written with the belt tension assembly installed.

NOTE: Ensure that the belt clutch is disengaged.

(a) Remove the left side cowling.

(b) Remove hardware (24), (25), (26), and (27) (Fig. 11-18) connecting the spring capsule rod end (1) (Fig. 11-19) to the bellcrank (28) (Fig. 11-18).

(c) Remove screws (12) and washers (11) from the spring housing (13) (Fig. 11-19).

(d) Withdraw spring assembly (1) through (10) from spring housing (13).

(e) Remove the cotter pin through the rod end bearing (1) and loosen the two check nuts (2).

(f) Insert a flat screwdriver blade into the bottom end cap (8) to prevent nut (10) from turning and remove rod end (1) and the two check nuts (2) from the shaft (7).

(g) Measure the length of the exposed threads on rod (7) for reassembly.

(h) Remove adapter (3).

(i) Press the bushing (5) from the top of end cap (4).

(j) Insert a new 07DU08 bushing (5) into the top of end cap (4).

(k) Measure the adapter (3) to verify that it is within limits (Table 11-8).

(l) Install the adapter (3) and set it back to the same measurement obtained in step (g).

(m) Insert the two check nuts (2).

(n) Install the rod end (1). Line up the cotter pin hole and install the cotter pin.

(o) Apply grease (MIL-PRF-81322) liberally to the spring (6).

(p) Insert the spring assembly (1) through (10) back into the spring housing (13).

(q) Install the screws (12) and washers (11). Torque screws (20-25 in-lb/2.3-2.8 Nm).

(r) Safety wire the screws as a set of three around the outboard edge of the capsule. Do not run the safety wire around the inboard side of the capsule as the safety wire will contact the pylon when the clutch is engaged.

(s) Install spring capsule rod end attachment hardware (24) through (27) (Fig. 11-18). Torque nut (27) (50-70 in-lb/5.6-7.9 Nm) and install cotter pin (27).

(t) Verify that the clutch adjustment is correct (Para. 11-1).

(u) Torque jam nuts (2) (30-40 in-lb/4.3-4.5 Nm).

(v) Install cowling.

J. Assembly – Spring Capsule Assembly

NOTE: Refer to Fig. 11-19 for numbered items.

(1) Press anchor (14) on spring housing (13) while aligning holes for shaft (15).

(2) Press retainer (16) into spring housing (13) while aligning holes for the shaft.

(3) Press shaft (15) through anchor, housing, and retainer until threads of shaft are equally spaced in the housing.

(4) Install lock nut (10) on shaft (7) until slot in the lock nut aligns with the cotter pin hole in the shaft. Install cotter pin.

(5) Install washer (9) and retainer (8) on shaft (7) with recess in the retainer covering nut (10).

(6) Install spring (6) over shaft (7) and seat on the retainer.

(7) Press bushing (5) into end cap (4).

(8) Install adapter (3) through end cap and bushing (5).

(9) Turn adapter (3) onto shaft (7) and compress spring until unit will slide into spring housing (13) without bottoming against retainer (16).

(10) Apply grease (MIL-PRF-81322) to spring and to wall of spring housing (13) and insert spring assembly into housing assembly.

(11) Insert screws (12) through washers (11). Turn into end cap (4). Torque screws (20-25 in-lb/2.3-2.8 Nm).

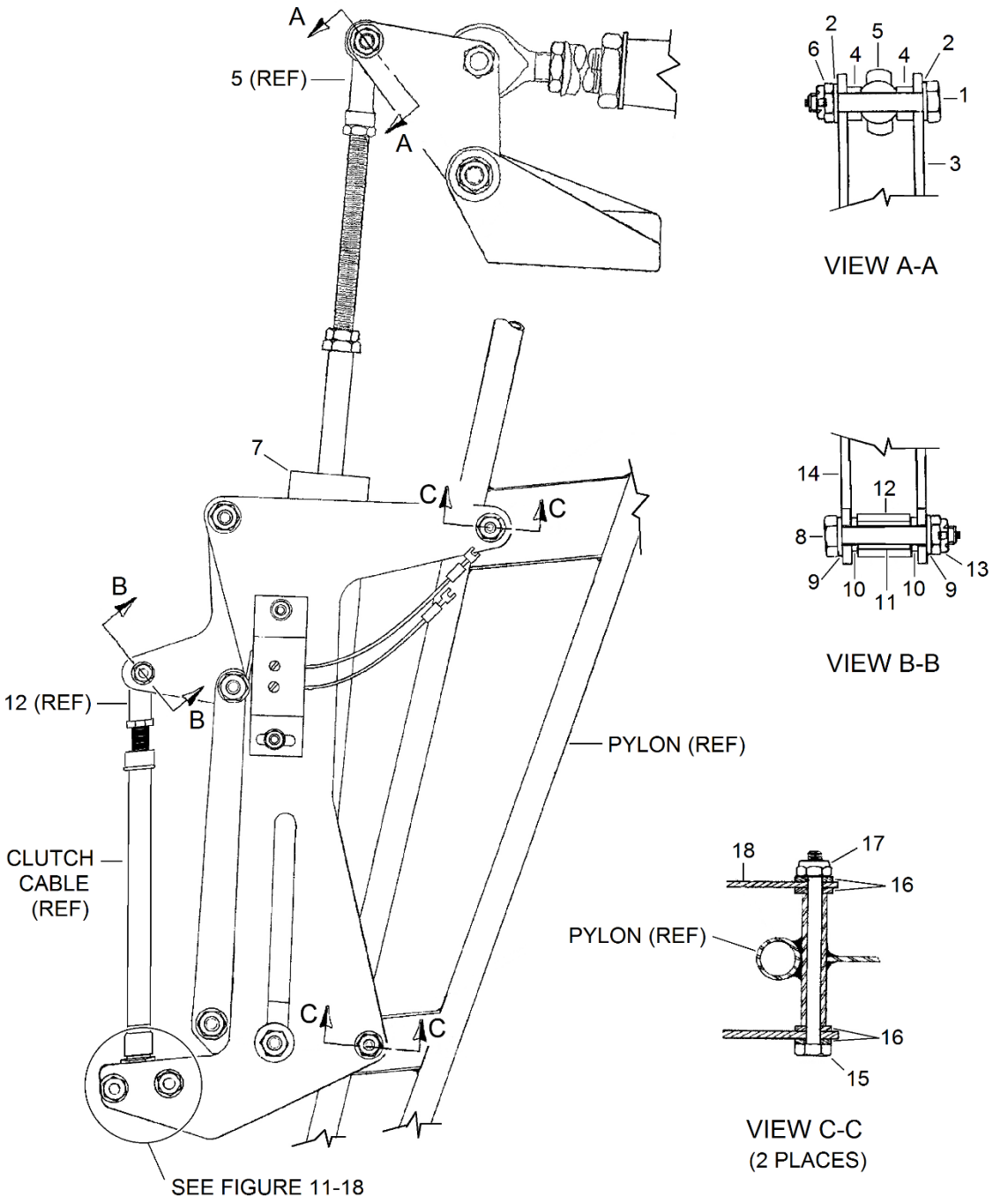
(12) Safety wire screws in set of three with 0.032 wire.

(13) Install both jam nuts (2) on shaft (7).

(14) Install rod end (1) on shaft (7) until hole in rod end aligns with hole in shaft.

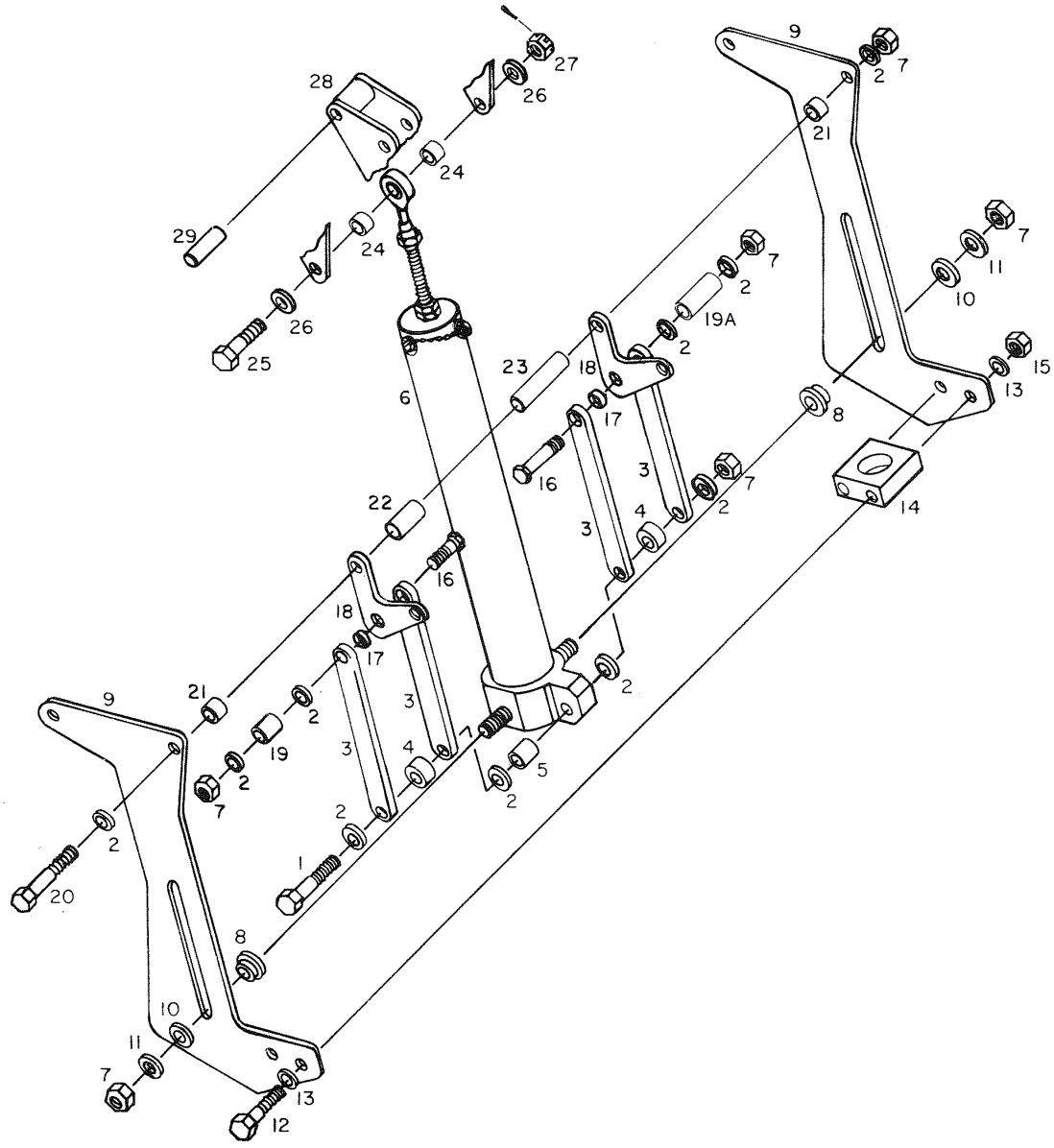
(15) Install cotter pin through rod end.

(16) Lock upper jam nut (2) against rod end (1).



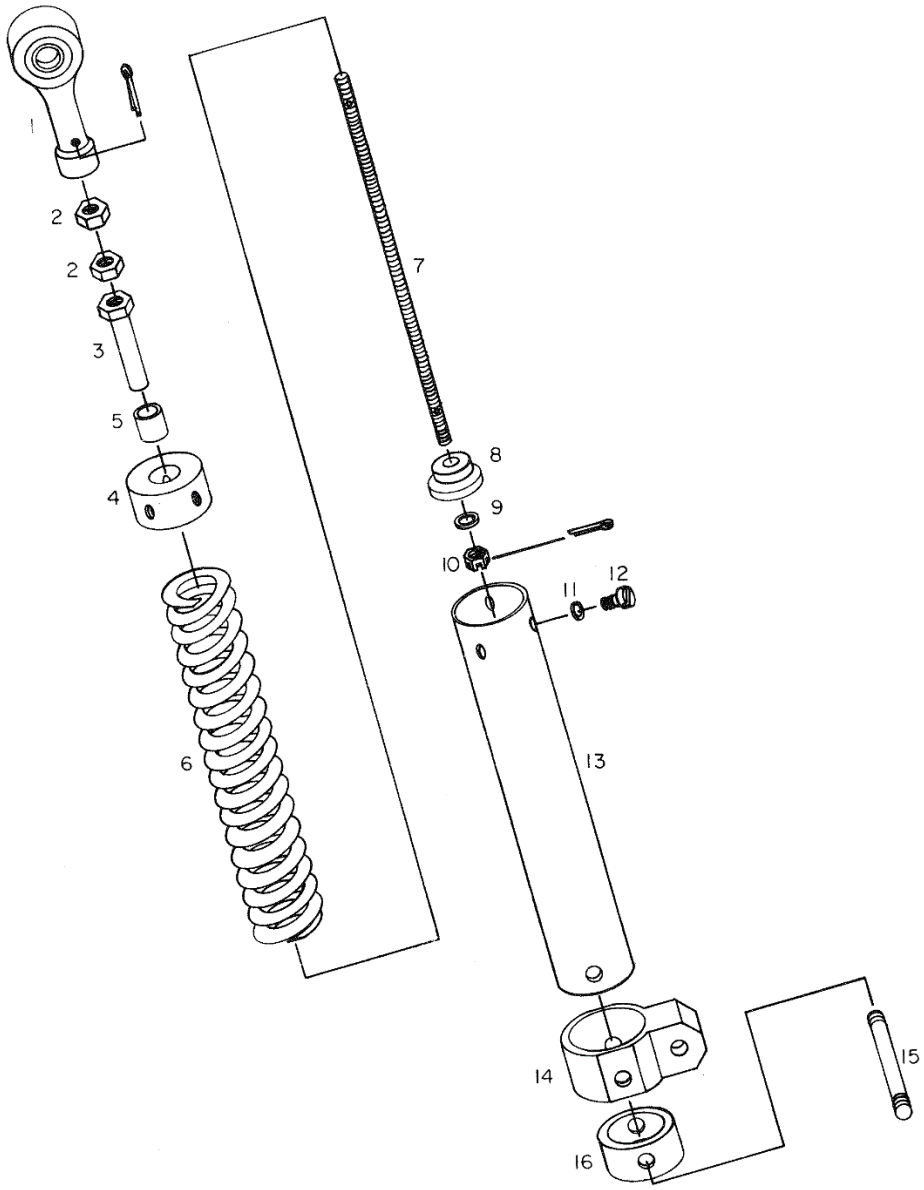
1.	Bolt	7.	Spring Capsule Assembly	13.	Nut
2.	Washer	8.	Bolt	14.	Bellcrank
3.	Bellcrank	9.	Washer	15.	Bolt
4.	Spacer	10.	Washer	16.	Washer
5.	Rod End (Spring Capsule)	11.	Spacer	17.	Nut
6.	Nut	12.	Rod End (Clutch Cable)	18.	Bracket

Figure 11-17. Belt Tension Assembly Installation



1.	Bolt	11.	Washer (1/4 Harper)	20.	Bolt
2.	Washer	12.	Bolt	21.	Spacer
3.	Strap	13.	Washer	22.	Spacer
4.	Spacer	14.	Mount Block	23.	Spacer
5.	Spacer	15.	Nut	24.	Spacer
6.	Spring Capsule Assembly	16.	Bolt	25.	Bolt
7.	Nut	17.	Spacer	26.	Washer
8.	Nylon Guide	18.	Bellcrank	27.	Nut
9.	Bracket	19.	Spacer	28.	Bellcrank Assembly
10.	Nylon Washer	19A.	Spacer	29.	Spacer

Figure 11-18. Belt Tension Assembly



1.	Rod End	9.	Washer
2.	Jam Nut	10.	Nut
3.	Adapter	11.	Washer
4.	End Cap	12.	Screw
5.	Bushing	13.	Spring Housing
6.	Spring	14.	Anchor
7.	Shaft	15.	Shaft
8.	Cap	16.	Retainer

Figure 11-19. Spring Capsule Assembly

Table 11-7. Inspection Requirements – Belt Tension Assembly

Part Number	Fig. 11-18 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13268	3	Strap	Bolt hole dia. .257	±.005	Not Repairable	Replace Strap
			Nicks and scratches	None Allowed	Not Repairable	Replace Strap
28-13277	4	Spacer	Width .125 to .130	None Allowed	Not Repairable	Replace Spacer
			I.D. .257	±.005	Not Repairable	Replace Spacer
28-13285-6	5	Spacer	Length .434 to .440	None Allowed	Not Repairable	Replace Spacer
			O.D. .3745 to .3755	None Allowed	Not Repairable	Replace Spacer
28-13264	8	Nylon Guide	I.D. .250 to .251	None Allowed	Not Repairable	Replace Nylon Guide
			Sliding surface, O.D. .3730 to .3740 .355 minimum	-.020	Not Repairable	Replace Nylon Guide
			Wear (sliding surface)	No flat areas allowed	Not Repairable	Position to non-flat area
28-13283	9	Bracket	Slot width .376 to .378	None Allowed	Not Repairable	Replace Bracket
			Notch wear in bottom end of slot	None Allowed	Notch .050 deep maximum	Polish and blend to remove deep radius into notch.
			Bolt hole dia. .191	None Allowed	Not Repairable	Replace Bracket
			Bolt hole dia. .249 to .251	None Allowed	Not Repairable	Replace Bracket
			Nicks and scratches in bracket	None Allowed	.005 deep max.	Polish and blend to remove
28-13265	10	Nylon Washer	Width .058 to .063	None Allowed	Not Repairable	Replace Washer
			I.D. .374 to .376	+.001	Not Repairable	Replace Washer
28-13269	14	Mount Block	Bore dia. .72	±.010	Not Repairable	Replace Block
			Bolt hole dia. .191	+.006	Not Repairable	Replace Block
28-13285-7	17	Spacer	Length .130 to .135	None Allowed	Not Repairable	Replace Spacer
			Bore dia. .3745 to .3755	None Allowed	Not Repairable	Replace Spacer

Table 11-7. Inspection Requirements – Belt Tension Assembly

Part Number	Fig. 11-18 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13274	18	Bellcrank	Spacer hole dia. .376 to .378	+.0005	Not Repairable	Replace Bellcrank
			Bolt hole dia. .257	±.0005	Not Repairable	Replace Bellcrank
28-13267-1,	19	Spacer	(-1) Length .40	±.010	Not Repairable	Replace Spacer
28-13267-11	19A		(-11) Length 1.13 to 1.14	None Allowed	Not Repairable	Replace Spacer
			I.D. .250 to .252	±.001	Not Repairable	Replace Spacer
28-13280-3	21	Spacers	-3 Length .365 to .370	None Allowed	Not Repairable	Replace Spacer
28-13280-4	22		-4 Length .750 to .755	None Allowed	Not Repairable	Replace Spacer
			I.D. (both spacers) .376 to .380	+.001	Not Repairable	Replace Spacer
28-13285-5	23	Spacer	Length 1.750	None Allowed	Not Repairable	Replace Spacer
			I.D. .257	±.005	Not Repairable	Replace Spacer
28-16520	24	Spacer	Length .192 to .195	None Allowed	Not Repairable	Replace Spacer
			I.D. .249 to .250	±.001	Not Repairable	Replace Spacer
28-13260-1	28	Bellcrank	Bushing dia. .3755 to .3770	None Allowed	Not Repairable	Replace bushings and line ream to size
			Security of bellcrank sides to center spacer	No Looseness Allowed		Remove loose side and apply Loctite 277 to spacer. Replace bellcrank side. Note: Place ¼" bolts through holes for proper alignment.
28-13284	29	Spacer	Length 1.243 to 1.248	None Allowed	Not Repairable	Replace Spacer
			O.D. .3745 to .3755	None Allowed	Not Repairable	Replace Spacer

* All dimensions are in inches.

Table 11-8. Inspection Requirements – Spring Capsule Assembly

Part Number	Fig. 11-19 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
02-691-04	1	Rod End	Axial clearance	.007	Not Repairable	Replace Rod End
			Threads (no crossed or missing threads)	None Allowed	Not Repairable	Replace Rod End
28-13263	3	Adapter	O.D. .4360 to .4370	-.020	Not Repairable	Replace Adapter
			Threads (no crossed or missing threads)	None Allowed	Not Repairable	Replace Adapter
			Radial wear between Item 3 and Item 5	-.020		
28-13255	4	End Cap Assembly	O.D. 1.315 to 1.318	-.0005	Not Repairable	Replace End Cap
			Threads (no crossed or missing threads)	None Allowed	Not Repairable	Replace End Cap
			Bushing wear (See Item 5 below)			
07DU08	5	Bushing	O.D. .530	±.005	Not Repairable	Replace Bushing
28-13279	6	Spring	Free length 12.4 to 12.6	None Allowed	Not Repairable	Replace Spring
			Visual inspect side of spring for wear caused by rubbing.	.010	Not Repairable	Replace Spring
28-13256	7	Shaft	Threads (no rolled or missing threads)	None Allowed	Not Repairable	Replace Shaft
			Straightness (check with straight edge)	None Allowed	Not Repairable	Replace Shaft
28-13252	8	Spring Cap	O.D. 1.280	±.005	Not Repairable	Replace Cap
			Note: This dimension wears oval-shaped from rubbing against the housing walls.	Maximum .005 out of round	Not Repairable	Replace Cap

Table 11-8. Inspection Requirements – Spring Capsule Assembly

Part Number	Fig. 11-19 Item Number	Part Name	Inspection*	Serviceable Limits*	Repair Limits*	Repair or Action
28-13253	13	Spring Housing	Ends of housing bored for end cap assembly, bore dia. 1.319 to 1.320	+.0002	Not Repairable	Replace Housing
			Housing wall thickness .030 to .040, inspect for wear in the I.D.	Max. .005 wear allowed		
			Shaft hole dia. .249 to .251	+.0005	Not Repairable	Replace Housing
28-13250-1, -11	14	Anchor	Bushing hole dia. .377 to .378	+.0003	Not Repairable	Replace Anchor
			Shaft hole bore dia. 1.376 to 1.380	+.0005	Not Repairable	Replace Anchor
			Bottom edge (nearest to the pylon)		.050 (1.3 mm)	Chamfer as required for clearance with pylon
28-13254	15	Shaft	Shaft O.D. .250	±.0005	Not Repairable	Replace Shaft
			Threads (no crossed or missing threads)	None Allowed	Not Repairable	Replace Shaft
28-13251	16	Retainer	O.D. 1.315 to 1.318	None Allowed	Not Repairable	Replace Retainer
			Shaft hole dia. .249 to .250	+.0005	Not Repairable	Replace Retainer

* All dimensions are in inches.

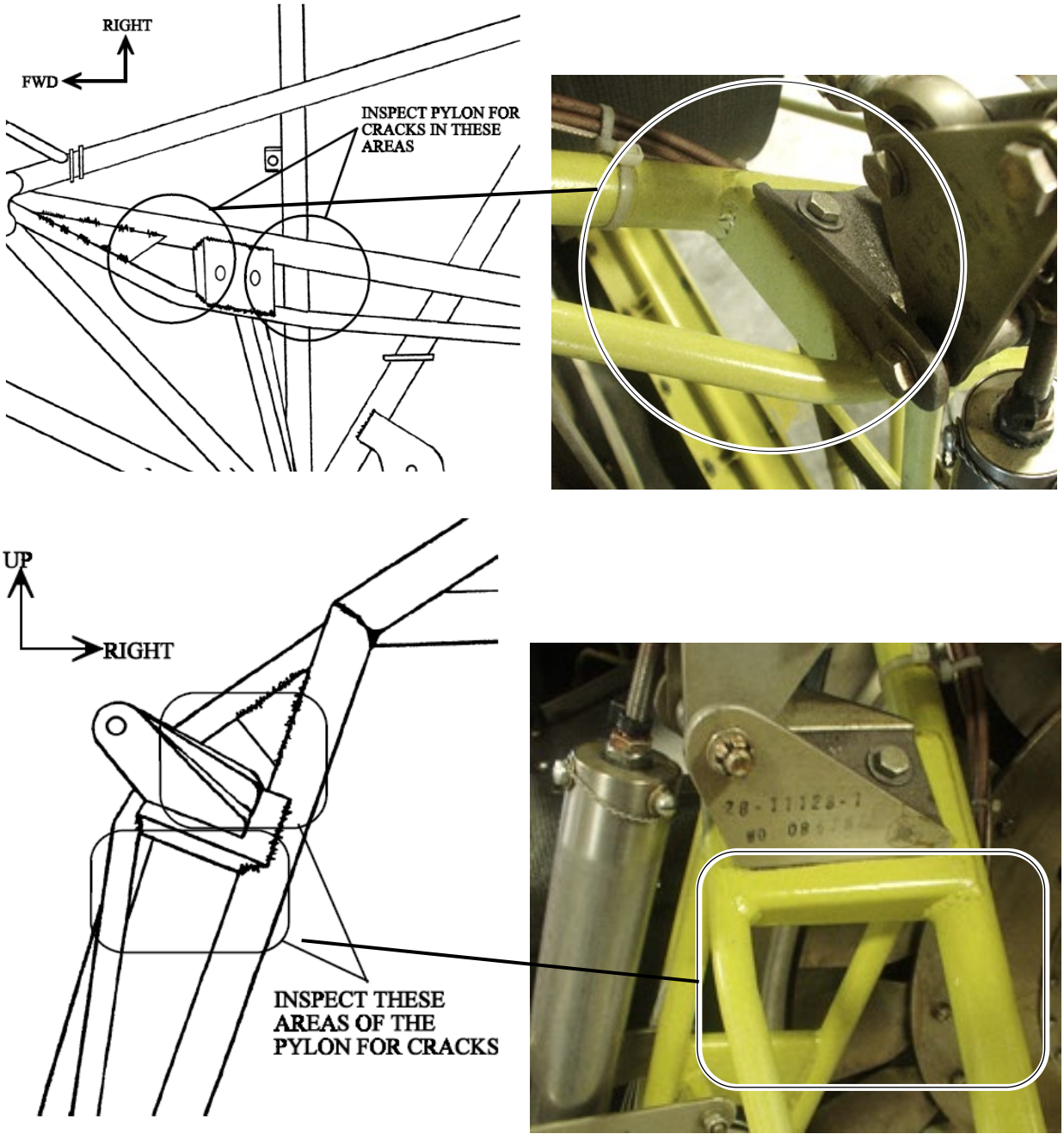


Figure 11-20. Belt Tension Assembly Pylon Mount Inspection Areas

SECTION 20

[RESERVED]

NOTE: Content previously contained in this section has been incorporated into Section 11.

INTENTIONALLY LEFT BLANK

SECTION 25

[RESERVED]

NOTE: Content previously contained in this section has been incorporated into Section 4 and Section 10.

INTENTIONALLY LEFT BLANK