

TAIL ROTOR HUB AND FORK MAINTENANCE PRACTICES

1. Tail Rotor Hub and Fork

(Ref. Figure 201) This section covers maintenance of the hub, strap pack and fork as an assembled unit. For all other maintenance instructions pertaining to hub and fork assembly, and the hub assembly, strap pack and fork assemblies as separately-maintainable components, Ref. COM.

CAUTION When blades are removed from hub, exposed ends of strap pack should be protected with covering (Ref. Sec. 64-10-00). Hub and fork should be handled carefully to avoid damage to strap pack.

2. Tail Rotor Hub and Fork Replacement

A. Tail Rotor Hub and Fork Removal

(Ref. Figure 202 and Figure 203)

Special Tools (Ref. Section 91-00-00)	
Item	Nomenclature
ST607	Adapter, torque wrench

WARNING On four-bladed tail rotor system, there is strong spring pressure in installed tail rotor linkage. Disconnect the in-line bungee before beginning disassembly. Failure to disconnect the bungee can result in personal injury and/or parts damage.

- (1). On four-bladed tail rotor, disconnect in-line bungee (Ref. Sec. 67-20-10) if tail rotor is installed on helicopter.

CAUTION

- Whenever blades and hub are removed as an assembly, or whenever pitch control links are disconnected, do not allow blade pitch to exceed **30 degrees** from neutral pitch position. This is equal to blade pitch control arm movement of approximately

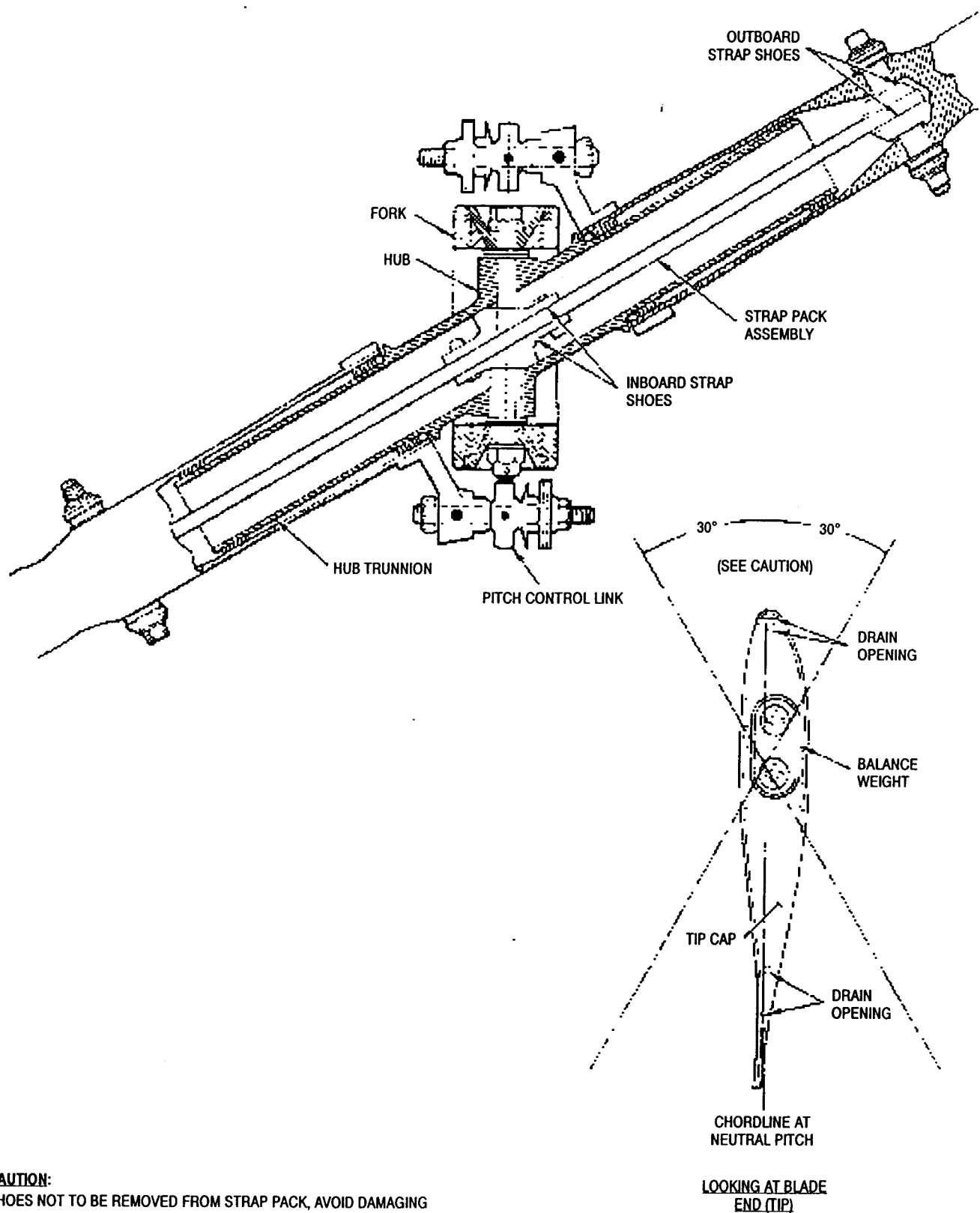
one inch in either direction. Unrestricted rotation of blades on hub can excessively bend or stretch strap pack and cause undetected damage to strap pack and an out-of-balance tail rotor when reassembled.

- To prevent balance problems at reassembly of parts and hardware, mark exact number, locations and positions of all items before removal for correct reinstallation.
- On **two-bladed** tail rotor system do not remove hub-to-drive fork hinge bolt to remove tail rotor assembly. On **four-bladed** tail rotor system hub-to-drive fork hinge bolt removal is required. This bolt should only be removed according to instructions Ref. COM. Damage to strap pack may occur if any other procedure is used.

- (2). Disconnect pitch control links from blade pitch control arms.
- (3). Pull rotating boot out of groove in fork.
- (4). On **four-bladed** tail rotor system remove inboard and outboard blades and hubs to access fork tang washer and nut.

NOTE: Helicopters Serial Nos. D0003 thru D1024 had a two-piece retaining nut and stop support. Helicopters subsequent to D1024 have a one-piece retaining nut and stop support.

- (5). Straighten tang of tang washer.
- (6). Using torque wrench adapter (ST607), loosen retaining nut and slide tail rotor outward on output shaft of tail rotor transmission to remove blade stop and stop support.
- (7). Remove nut, tang washer, tapered ring, and split-ring halves that fit into recess at inboard end of fork.



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Figure 201. Tail Rotor Hub and Strap Pack

CAUTION Tail rotor tang washer must not be reused.

NOTE: Placing grease pencil mark on drive fork to key it to transmission output shaft enables subsequent installation of tail rotor assembly at same position.

Application of small painted matchmark next to centerline splined groove on both pitch control assembly and tail rotor drive fork aids reassembly at same position on transmission shaft.

One spline groove of fork is located directly on centerline passing through centers of the two fork bearings while, at opposite side of spline bore, same centerline passes through a spline tooth. A similar condition exists with respect to swashplate splines, except that reference centerline originates between swashplate arms.

For illustrations showing matchmarks and additional information, Ref. COM.

- (8). Slide tail rotor assembly off output shaft.

B. Tail Rotor Hub and Fork Installation

(Ref. Figure 202 and Figure 203)

Consumable Materials (Ref. Section 91-00-00)	
Item	Nomenclature
CM115	Grease, oscillating bearing
CM318	Primer
CM702	Lockwire CRES

Special Tools (Ref. Section 91-00-00)	
Item	Nomenclature
ST607	Adapter, torque wrench

- (1). Attach rotating boot; attach to pitch control assembly using safety wire (CM702).
- (2). Install split ring on output shaft of transmission.

CAUTION It is possible for pitch control swashplate to be misaligned to one-half spline in relation to drive fork. Make sure drive fork, pitch links and swashplate are in exact alignment with transmission shaft centerline. If incorrectly assembled, swashplate will be misaligned approximately 10 degrees from drive fork. To correct this condition, remove tail rotor assembly (leaving pitch control assembly installed), rotate tail rotor assembly 180 degrees and reinstall it.

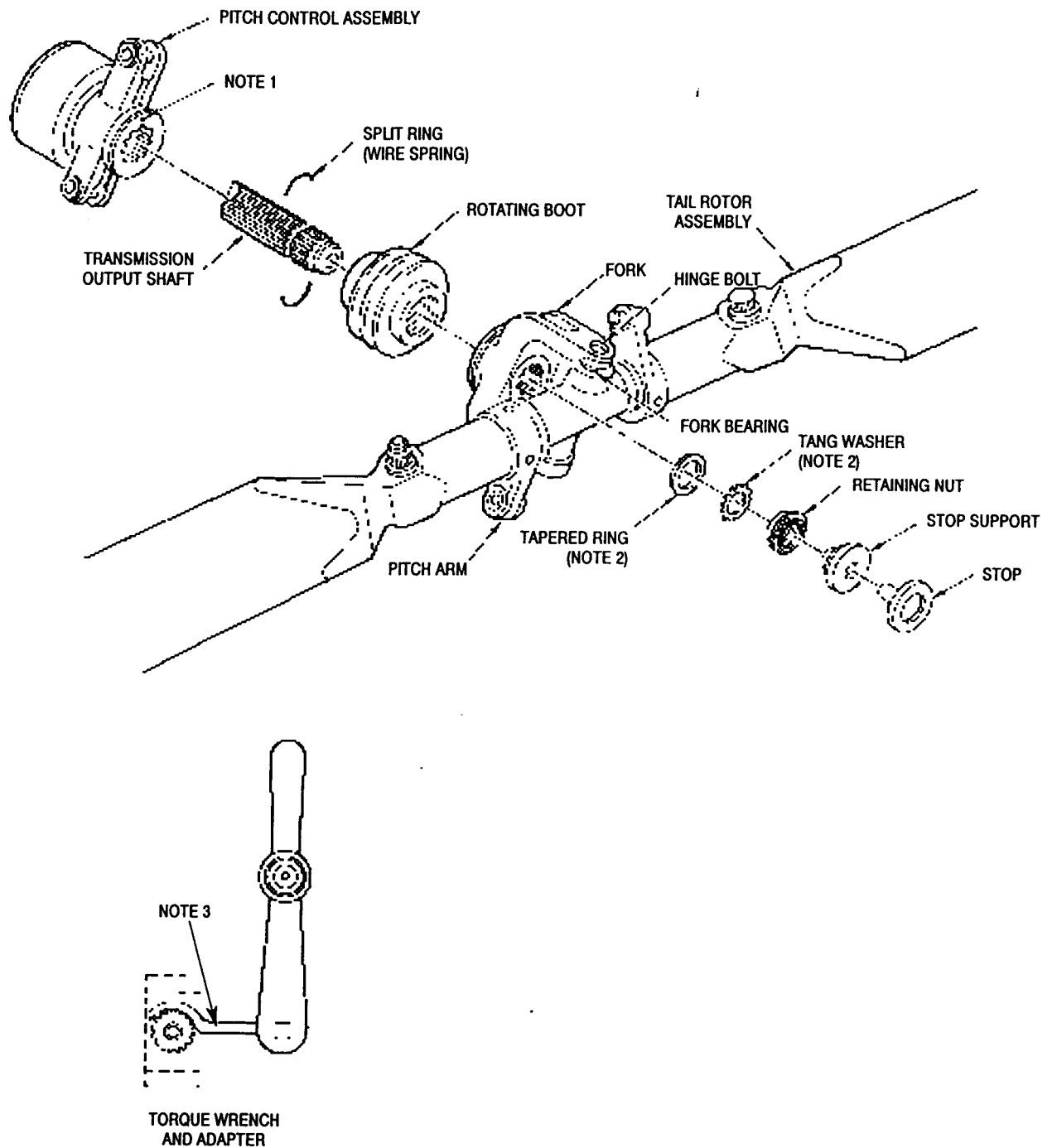
- (3). Slide tail rotor assembly onto shaft with drive fork-to-hub pivot bolt aligned with swashplate lugs. Position tail rotor assembly on shaft so that approximately two threads at shaft end are exposed outboard of drive fork.
- (4). Coat tapered ring with primer (CM318) and install it on shaft, making certain that tapered edge parallels chamfer in fork. Perform the following steps while primer is wet.

NOTE: Pre-assembly of tang washer, nut, stop support and stop as a unit aids in their installation when performing steps (5). thru (7). below. Marking outer tang that is next to inner key on tang washer, before assembly of parts, simplifies alignment with keyway on shaft. Teeter blades to start tang washer on shaft.

- (5). Slip new tang washer over exposed threads of shaft; key tang must face inboard toward gearbox. Install nut approximately two full turns on shaft threads to verify threads engaged.
- (6). Slide tail rotor assembly outboard against nut. Install stop support by inserting it in drive shaft end.

CAUTION In next step do not force stop into position with screwdriver; this can crack the stop.

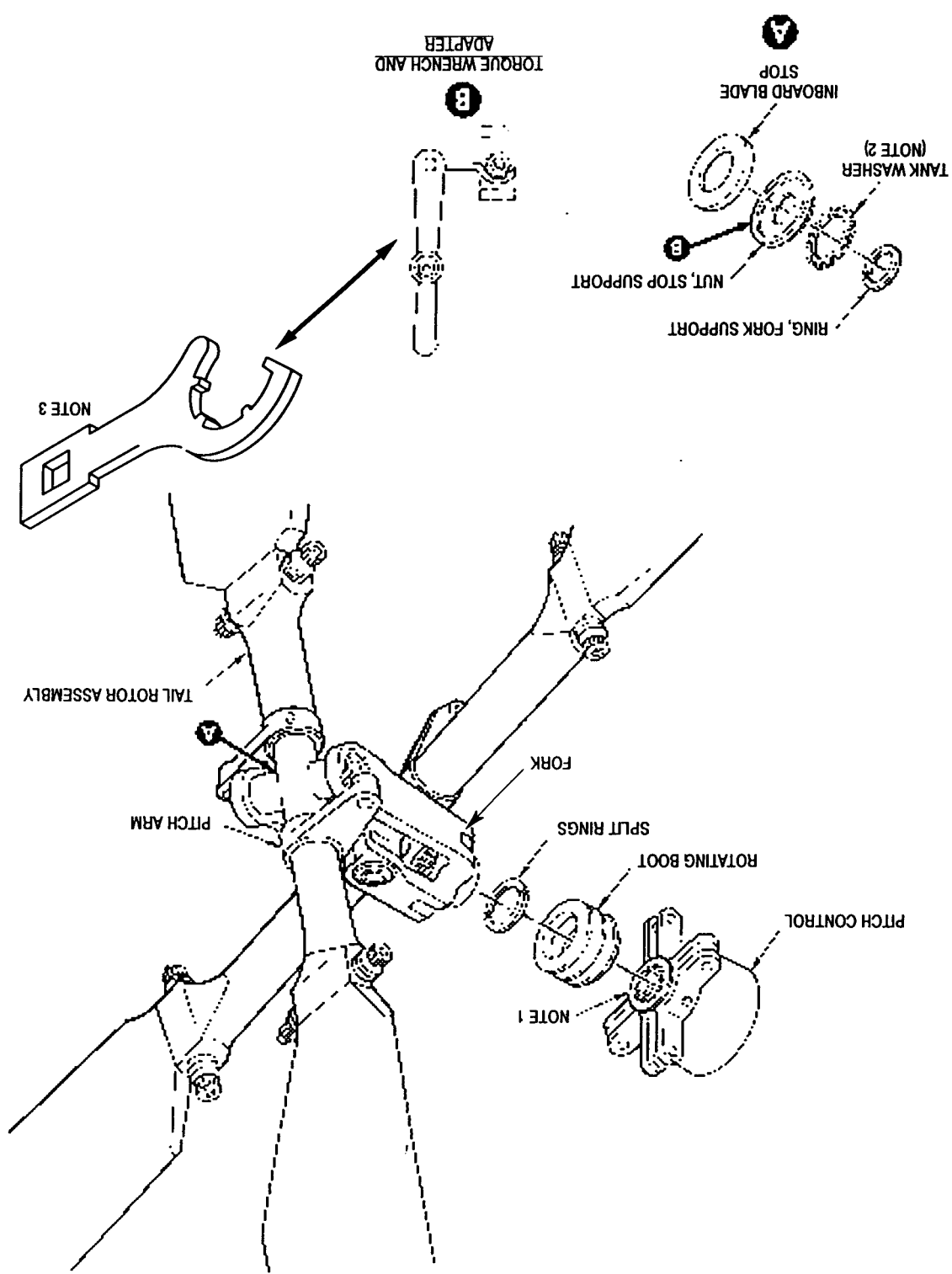
- (7). Coat contacting surfaces of stop with grease (CM115) and insert it in stop support.
- (8). Install split ring halves in shaft groove and slide fork inboard until ring halves are secured by recess in fork.
- (9). Visually align a tang on tang washer with any convenient reference point.

**NOTES:**

1. CENTERLINE TOOTHSPACE MATCHMARK MUST ALIGN WITH CENTERLINE TOOTH-SPACE MARK ON FORK WHEN ASSEMBLED ON OUTPUT SHAFT.
2. DISCARD USED TANG WASHER; BEND TWO TANGS TO SECURE NUT.
3. TOOL PN 369D29823 (ST607).

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Figure 202. Hub and Fork Assembly Installation (Two-Bladed)



- NOTES:
1. CENTERLINE TOOTHSPACE MATCHMARK MUST ALIGN WITH CENTERLINE TOOTH-SPACE MARK ON FORK WHEN ASSEMBLED ON OUTPUT SHAFT.
 2. DISCARD USED TANG WASHER; BEND TWO TANGS TO SECURE NUT.
 3. TOOL PN 369D29826 (ST607).

Figure 203. Hub and Fork Assembly Installation (Four-Bladed)

- (10). Torque retaining nut, using torque wrench adapter (ST607), to:
 - (a). Torque **two-bladed** retaining nut to **450 - 500 inch-pounds (50.84 - 56.49 Nm)**.
 - (b). Torque **four-bladed** retaining nut to **550 - 600 inch-pounds (62.14 - 67.79 Nm)** and ensure wire-spring split ring halves are firmly imbedded in fork recess.

NOTE: Tang washer movement of more than one tang width is an indication that tang washer inner key tang is sheared. This condition requires replacement of tang washer and reassembly of parts according to initial installation procedure.

- (11). Check that tang has not moved more than one tang width in relation to reference point noted in step (9)..

NOTE: When clearance is less than 0.005 inch (0.127 mm) or clearance does not exist, replace tapered ring and/or fork assembly.

- (12). Bend two tangs on tang washer to lock retaining nut. When bending tangs, do not force-form tang to match nut contour; maintain natural bend radius that develops at tang root.
- (13). Apply torque stripe paint across nut, tang washer and fork assembly in location that can be checked visually.
- (14). Insert edge of rotating boot into groove of drive fork.
- (15). Install pitch control links (Ref. Sec. 64-30-00).
- (16). Position tail rotor pedals in neutral position and recheck that drive fork, pitch links and swashplate are in exact alignment with transmission shaft centerline.
- (17). On **four-bladed** tail rotor system, reconnect bungee (Ref. Sec. 67-20-10).
- (18). Check rigging of tail rotor controls (Ref. Sec. 67-20-10).

3. Tail Rotor Hub and Fork Inspection

(Ref. Figure 201) Hub inspection is accomplished with tail rotor blades removed.

- (1). Inspect areas on hub trunnions that mate with blade pitch bearings for excessive wear and for damage.
- (2). Check hub and fork for axial play or bearing roughness when hub is pivoted from one extreme to the other.
- (3). Check torque of fork hinge bolt. Apply **125 inch-pounds (14.12 Nm)** torque to nut or bolt. If bolt or nut does not rotate, preload is correct. If bolt or nut rotates, retorque. (For repair limit, torquing requirements and replacement criteria, Ref. COM.)
- (4). Check visible areas of strap pack for nicks or scratches on strap laminates, cracked or kinked laminates and sharp bends or permanent twists in laminates. Any one of these defects, except minor outer surface defects that can be removed by abrasive polishing, requires replacement of strap pack. (For information on allowable repairs, serviceability requirements and replacement, Ref. COM.)

4. Conical Bearing Inspection

Visually inspect conical bearings installed in fork assembly, at intervals specified (Ref. Sec. 05-20-00).

- (1). Play is not permitted in conical drive fork bearings.

5. Elastomeric Fork Bearing Inspection

Visually inspect elastomeric bearings installed in fork assembly, at intervals specified (Ref. Sec. 05-20-00) for damage and debonding from fork as follows.

CAUTION Elastomeric materials can be damaged by solvents, grease or oil. If cleaning is necessary, refer to Elastomeric Bearing - Care and Cleaning.

- (1). Apply teetering force by hand to rotor blades (stop-to-stop). Check for fork-to-bearing bond failure. Failure is indicated by any motion between outer

bearing cage and fork (bearing turns in fork). If failure is noted, remove bearing and rebond in fork according to instructions in the COM.

- (2). Teeter blades stop-to-stop. Observe four radial molded ridges on each bearing as teetering takes place. If ridges assume continuous curved shape, bearings are intact. Discontinuity in molded ridges indicates bearing failure and bearing must be replaced.
- (3). Check bearing for general condition. Replace bearing if damaged. Evidence of light swelling, pock marks and crumbs are surface conditions and are not indications of bearing failure.
- (4). Elastomeric bearings are suspected of being unserviceable if visual inspection reveals rubber deterioration or separation, or a vibration is reported. Perform following steps to check blade flapping resistance measurement to determine if suspected elastomeric bearing has failed.
- (5). To perform measurement, remove rubber blade stop between tail rotor hub and fork on inboard hub. The outboard tail rotor assembly can be checked without any disassembly.

CAUTION Do not remove hub-to-drive fork hinge bolt to remove 2-bladed tail rotor assembly. This bolt should only be removed according to instructions in the COM. Damage to strap pack may occur if any other procedure is used.

- (6). The rubber blade stop must be removed. Reassemble tail rotor with rubber blade stop removed.
- (7). Measure flapping resistance of blades using spring scale attached within 1.00 inch (2.54 cm) for 369D/E or 2.00 inch (5.08 cm) for 369FF inboard of blade tip (Ref. Figure 204). Block or hold tail rotor pedal in neutral position. While pulling 90 degrees from plane of rotation, record spring scale value when blade tip is 3.00 inches (7.62 cm) inboard and outboard from no-load position. Scale must indicate 1.5-5.0

- pounds (6.672-22.24 N). If load is not within specified limit, replace bearing.
- (8). Reinstall rubber blade stop.

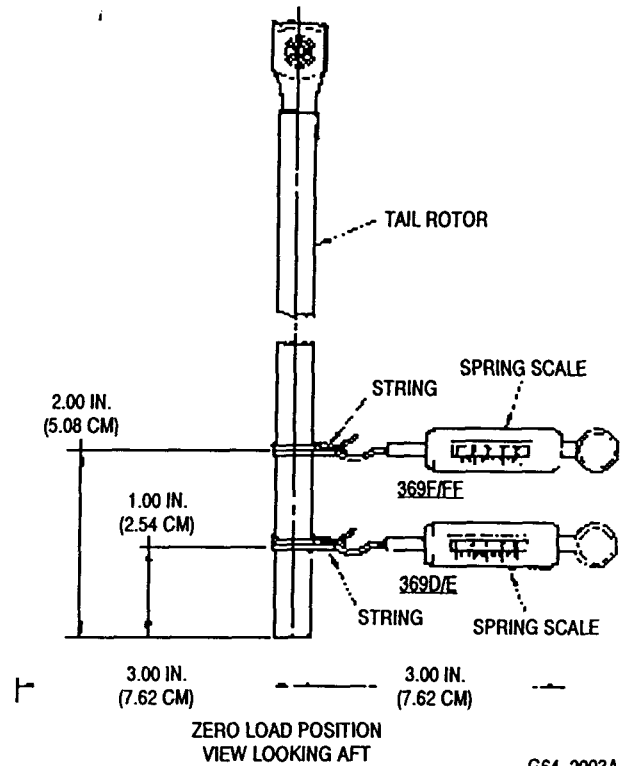


Figure 204. Blade Flapping Resistance Check

6. Elastomeric Bearing Care and Cleaning

Elastomeric bearings are not inherently resistant to grease, oils or solvents if immersed. They are, however, somewhat resistant to occasional splash or spoilage of these materials if exposed on an occasional basis. If elastomeric materials do come in contact with these fluids, the elastomer surface should be immediately cleaned. If cleaning is accomplished properly, the effect of greases, oils or solvents on the performance of the elastomeric material will be minimal. If replacement of elastomeric bearing is required, refer to COM.

- (1). If greases, oils or solvents come in contact with the elastomeric material, wipe immediately with clean, dry rag.
- (2). If wiping is not sufficient (oil or grease is too thick), clean the affected area of the elastomer with a soft bristle brush and a solution of pure soap and water.
- (3). Rinse with tap water.