

CHAPTER 64

TAIL ROTOR

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CHAPTER 64

TAIL ROTOR

64-00 Description

The R66 tail rotor assembly is a conventional, two-bladed teetering rotor system.

Tail rotor blades are constructed of a wrap-around aluminum skin, bonded to aluminum honeycomb and a forged aluminum root fitting. Self-lubricating spherical bearings in the root fitting allow blades to change pitch.

Tail rotor blades are assembled to the hub with a fixed precone angle.

The tail rotor aluminum hub mounts to the gearbox output shaft by teeter hinge. Elastomeric bearings in the hub allow the rotor to teeter. The tail rotor hub teetering stop is a urethane bumper, attached to the output shaft.

64-10 Tail Rotor Assembly

Refer to R66 Illustrated Parts Catalog (IPC) Figure 64-1.

A. Removal

1. Refer to Figure 64-1. Tag each pitch link with corresponding blade serial number for reinstallation. Remove hardware securing pitch links to tail rotor blades, noting hardware removed.

NOTE

Tail rotor pitch link-to-blade attach bolts may be different lengths and/or have different washers installed under nut for dynamic balancing. Reinstall hardware as removed.

2. Remove nut and A141-14 washer securing C119-2 bumper to tail rotor gearbox output shaft.
3. Remove teeter hinge bolt, then slide tail rotor assembly and bumper off of shaft.

NOTE

Protect tail rotor assembly from damage when maintenance is performed on workbench.

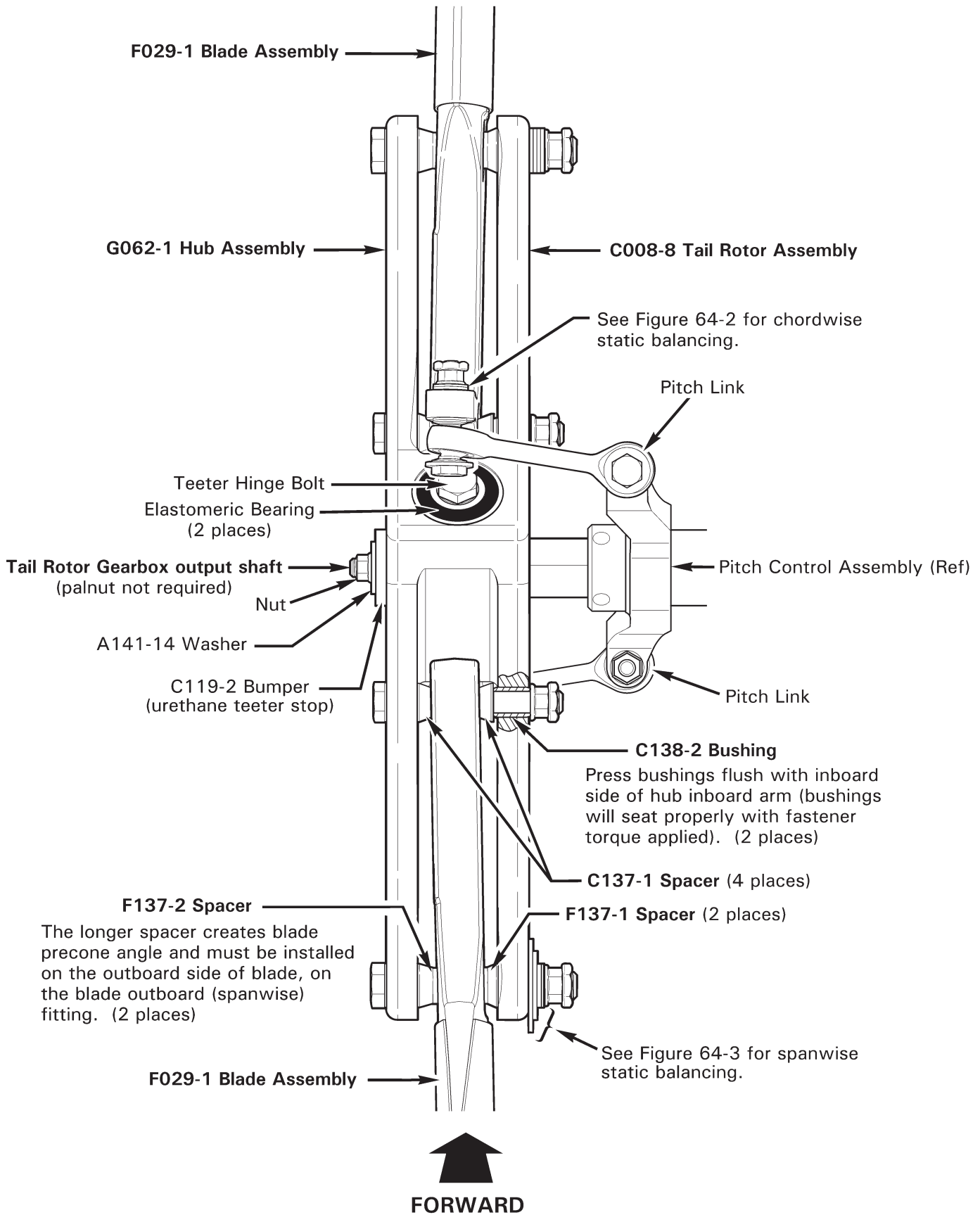


FIGURE 64-1 TAIL ROTOR INSTALLATION

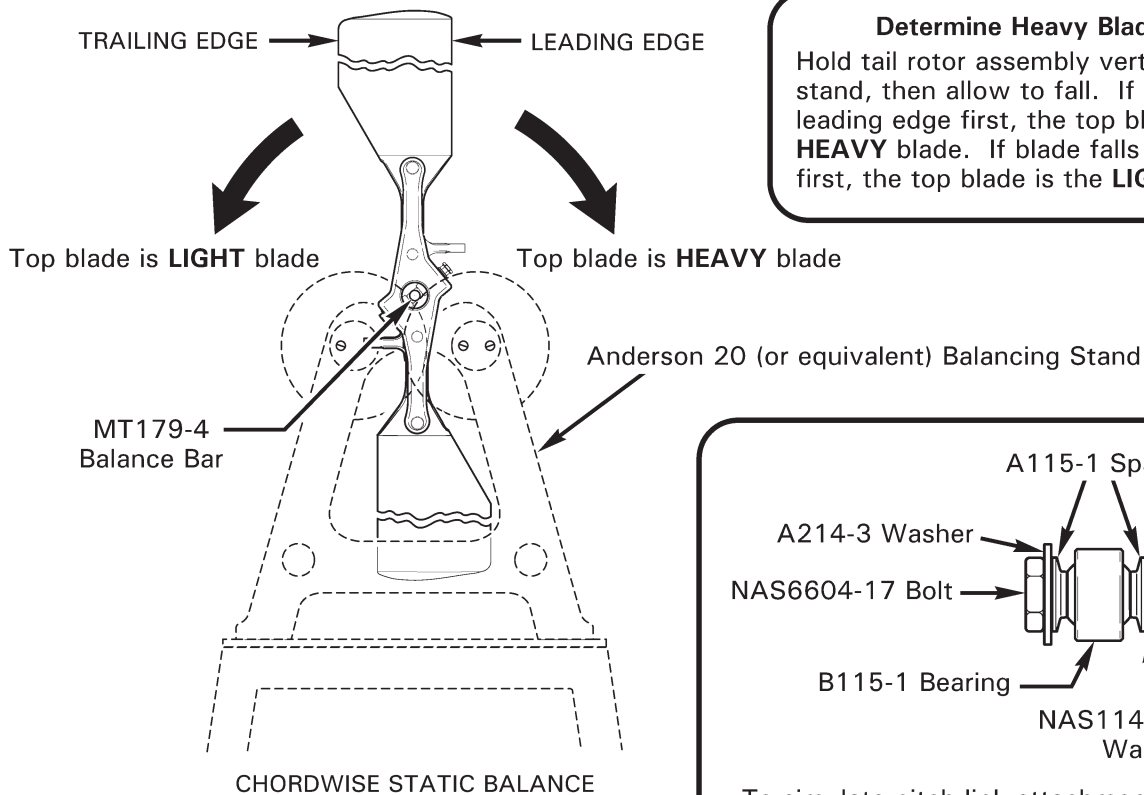
64-10 Tail Rotor Assembly (continued)**B. Installation**

1. Refer to Figure 64-1. Position tail rotor assembly on tail rotor gearbox output shaft. Verify tail rotor is installed for clockwise rotation when viewed from left side of aircraft. Verify blades cone toward tail rotor gearbox.
2. Remove tags, and match tail rotor blade serial number to corresponding pitch link. Install teeter hinge bolt; tighten nut until elastomeric bearing metal spacers contact output shaft, but do not torque.
3. Install dynamic balancing hardware securing tail rotor blades to pitch links, as removed. Standard torque nuts & palnuts per Section 20-32, and torque stripe per Figure 5-1.

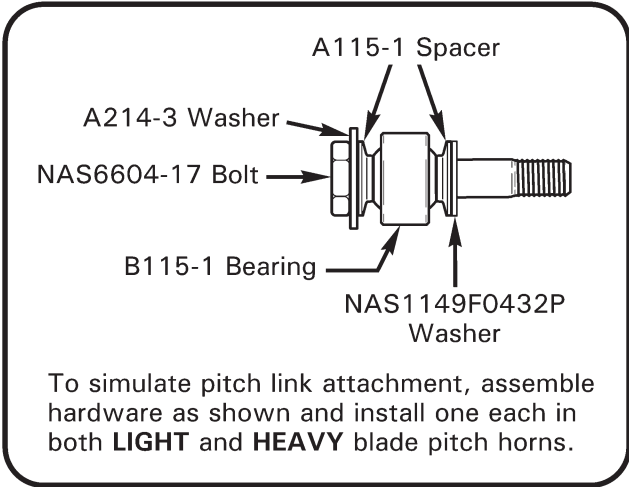
NOTE

If dynamic balancing hardware information is unknown, install standard hardware for initial dynamic check.

4. Fabricate a tracking aid using 1x12-inch aluminum sheet; make a 90° bend 2 inches from one end. With tail rotor horizontal, tape tracking aid to tailcone near blade tip.
5. Rotate tail rotor drive shaft and mark tracking aid where each blade tip drain hole passes. Adjust (teeter) tail rotor until both blade tips pass the same point within 0.125 inch. Special torque teeter hinge bolt per Section 20-33. Recheck track. Repeat step until blades are tracked.
6. Install palnut, standard torque per Section 20-32, and torque stripe per Figure 5-1. Remove tracking aid.
7. Teeter tail rotor back and forth. Verify teeter hinge bolt, bearing metal spacers, washers, and nuts remain stationary when tail rotor is teetered.
8. Install C119-2 bumper, A141-14 washer, and nut. Standard torque nut per Section 20-32 and torque stripe per Figure 5-1.
9. Dynamically balance tail rotor per Section 18-20.



Determine Heavy Blade
 Hold tail rotor assembly vertically on stand, then allow to fall. If blade falls leading edge first, the top blade is the **HEAVY** blade. If blade falls trailing edge first, the top blade is the **LIGHT** blade.



To simulate pitch link attachment, assemble hardware as shown and install one each in both **LIGHT** and **HEAVY** blade pitch horns.

**NAS1149F0432P/F0463P,
 NAS1149D0432J/D0463J,
 A141-14, or A214-3 Washers**

Select a combination of washers as required (one minimum) to balance tail rotor assembly chordwise.

NAS6604-17 thru -22 Bolt

Select bolt length to balance tail rotor assembly chordwise, and to meet torque requirements per Section 20-30.

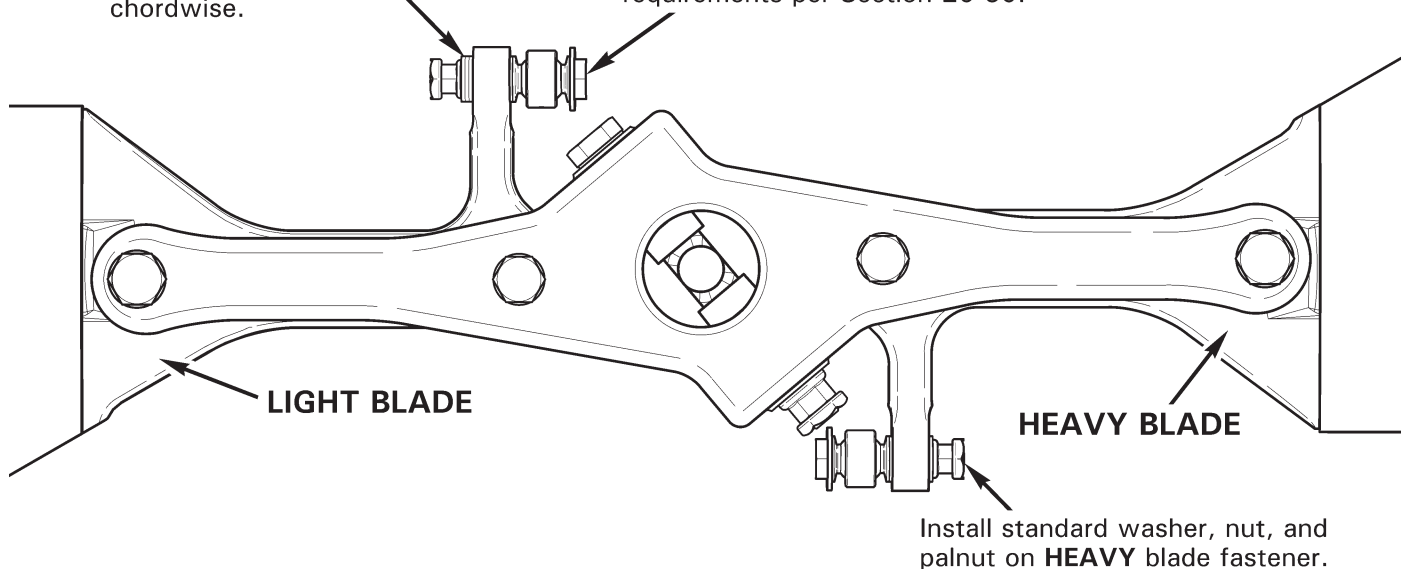


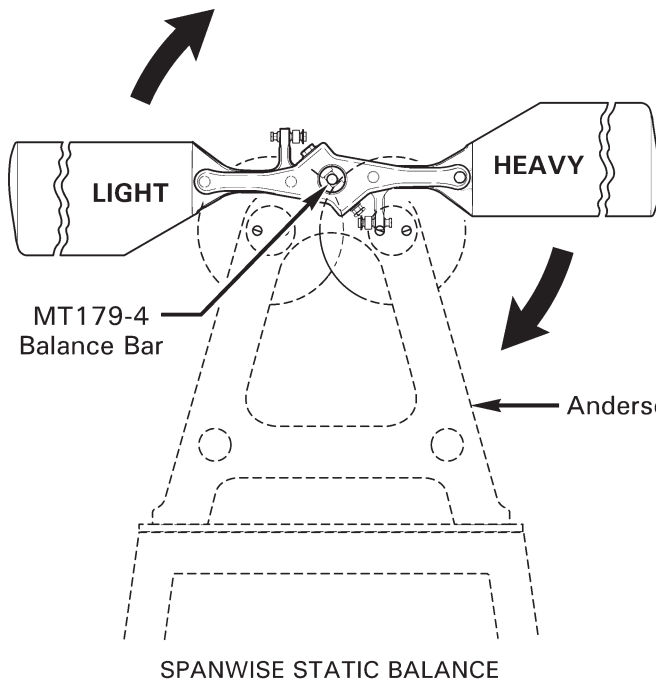
FIGURE 64-2 CHORDWISE STATIC BALANCE

64-11 Static Balance

Refer to R66 Illustrated Parts Catalog (IPC) Figure 64-1.

A. Chordwise Static Balance

1. Refer to Figure 64-2. Install MT179-4 balance bar into tail rotor assembly. Install teeter hinge bolt, and special torque nut to 350 in.-lb. Using a carpenters square, adjust balance bar until approximately perpendicular to hub.
2. Place tail rotor assembly with balance bar on Anderson 20 or equivalent balancing stand. Hold tail rotor assembly vertically, then allow to fall. If the blade falls leading edge first, the top blade is the heavy blade. If the blade falls trailing edge first, the top blade is the light blade.
3. To simulate pitch link attachment, assemble hardware as shown and install in blade pitch horns. Install standard washer, nut, and palnut on heavy blade fastener. Standard torque hardware per Section 20-32.
4. Chordwise balancing is achieved by varying NAS6604 bolt length and nut-side washers on light blade fastener. Select bolt length and washers for balancing, and to meet torque requirements per Section 20-30. Standard torque hardware per Section 20-32, and repeat step 2.
5. Blades are balanced chordwise when blade does not fall when positioned vertically on balancing stand. Repeat step 4, adjusting bolts and washers until blades are balanced.
6. Perform spanwise static balance per Section 64-11 Part B.



Determine Heavy Blade
 Hold tail rotor assembly horizontally on stand, then allow to fall. The falling blade is the **HEAVY** blade; the rising blade is the **LIGHT** blade.

(4) NAS1149F0632P/F0663P,
 NAS1149D0632J/D0663J,
 C141-23, or C141-24 Washers
 Select a combination of four washers to balance tail rotor assembly spanwise. Place largest washers closest to hub assembly.

Install (4) NAS1149D0663J washers under nut of **HEAVY** blade outboard fastener for initial spanwise static balance check.

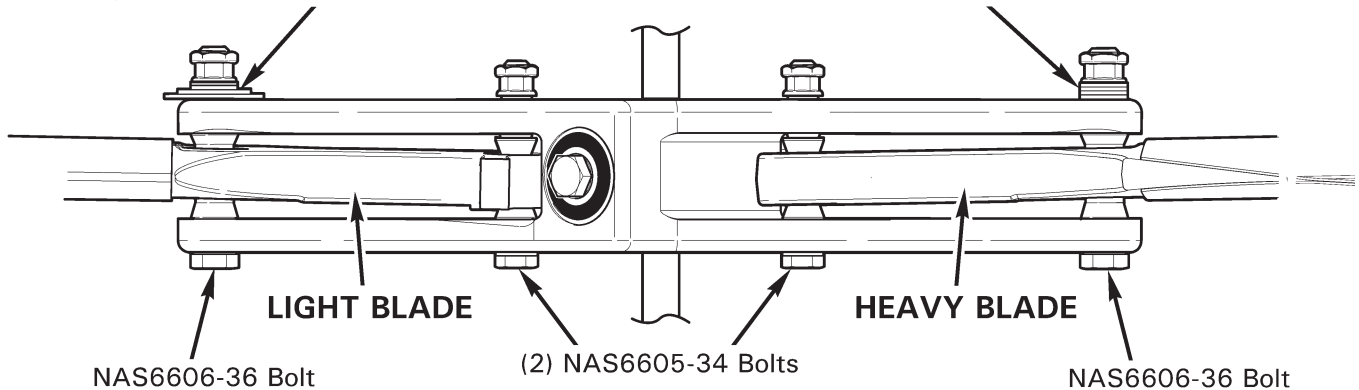


FIGURE 64-3 SPANWISE STATIC BALANCE

64-11 Static Balance (continued)

Refer to R66 Illustrated Parts Catalog (IPC) Figure 64-1.

B. Spanwise Static Balance**CAUTION**

Verify four washers installed under each outboard blade fastener prior to tail rotor assembly installation or dynamic balance.

1. Refer to Figure 64-3. Install standard hardware for initial spanwise static balance check. Standard torque fasteners per Section 20-32.
2. Install MT179-4 balance bar into tail rotor assembly. Install teeter hinge bolt, and special torque nut to 350 in.-lb. Using a carpenters square, adjust balance bar until approximately perpendicular to hub.
3. Place tail rotor assembly with balance bar on Anderson 20 or equivalent balancing stand. Hold tail rotor assembly horizontally, then allow to fall. The falling blade is the heavy blade; the rising blade is the light blade.
4. Spanwise balancing is achieved by varying nut-side washer size on light blade outboard fastener. Four washers are required under outboard fastener nuts; place largest washers closest to hub assembly. Select washers for balancing, standard torque hardware per Section 20-32, and repeat step 3.
5. Blades are balanced spanwise when blade does not fall when positioned horizontally on balancing stand. Repeat step 4, adjusting outboard fastener washers until blades are balanced.
6. Recheck chord and spanwise balance. Tail rotor assembly must be statically balanced within 4 inch-grams. Remove MT179-4 balance bar.

64-20 Tail Rotor Blades

Refer to R66 Illustrated Parts Catalog (IPC) Figure 64-1.

NOTE

Protect tail rotor assembly from damage when maintenance is performed on workbench.

A. Removal

1. Remove tail rotor assembly per Section 64-10.
2. Refer to Figure 64-1. Remove hardware securing F029-1 blade assemblies to G062-1 hub assembly. Remove blades, spacers, and hardware; do not remove C138-2 bushings unless required.

B. Installation**CAUTION**

F029-1 tail rotor blades are a matched set from RHC. If only one blade is being replaced, contact RHC Technical Support with airworthy blade serial number for a matching replacement blade.

1. Inspect tail rotor hub per Section 64-30, as required.
2. Refer to Figure 64-1. If removed, apply light coat of approved primer per Section 20-70 to outer surface of C138-2 bushings; while primer is wet, press bushings flush with inboard side of hub inboard arm (bushings will seat properly with fastener torque applied).

CAUTION

F137-2 spacer creates blade precone angle and must be installed on the outboard side of blade, on the blade outboard (spanwise) fitting.

3. Install tail rotor blades and spacers in hub. Assemble blades (if viewed from left side of aircraft) for clockwise rotation, to cone toward tail rotor gearbox. Install hardware securing blades to hub; install standard hardware on outboard fasteners for initial tail rotor assembly static balance check. Tighten fasteners, but do not torque.
4. Touch-up bolt heads using approved paint per Section 20-70.
5. Perform tail rotor assembly static balance per Section 64-11.

64-30 Tail Rotor Blade Inspection and Repair

This blade repair procedure outlines the repair limits, methods and materials used for repairing tail rotor blades. Repairs are limited to blending out scratches, dents, nicks, removing corrosion, and refinishing the blades. The inspections, repairs and limitations contained herein refer to damage sustained in service, including damage during shipping and handling (manufacturing irregularities are treated separately by the factory). In-service damage will generally exhibit paint scuffing or scratches and often times freshly-exposed metal in the form of scratches in the finish. If there are any questions as to the possibility of a manufacturing irregularity, contact RHC Technical Support.

CAUTION

A blade may be repaired more than one time. However, in no case can more than the maximum material be removed or the maximum dent depth be exceeded in any one location.

Refer to Section 62-40 for measuring blade damage.

64-31 Scratches and Corrosion

1. Refer to Figure 64-4. Verify damage does not exceed the following limits:
 - a. 0.008 inch maximum damage between RS 18.00 and RS 30.00.
 - b. 0.005 inch maximum damage more than 15° spanwise between RS 18.00 and inboard.
 - c. 0.008 inch maximum damage less than 15° spanwise between RS 18.00 and inboard.
2. Refer to Section 62-50 (main rotor) for repair procedures for damage within limits. Blend out scratches or corrosion on skins with a 0.10 inch blend radius.

64-32 Dents

CAUTION

Tap-test dented areas in honeycomb. If any voids are found associated with dents, contact RHC Customer Service.

Tap-test voids, debonds, and dents in blades using an AN970-4 washer or 1965 or later U.S. quarter dollar coin in good condition.

CAUTION

When dented areas are found, inspect opposite side of the blade for a bulge. Replace blade with a bulge greater than 0.010 inch opposite a dent.

CAUTION

Do not repair any dent that has a sharp cut or break in the skin. If necessary, locally penetrant inspect, keeping penetrant materials away from bond joints.

WARNING

Any damaged tail rotor blade that cannot be repaired within the limits of this section must be removed from service immediately and marked "scrap."

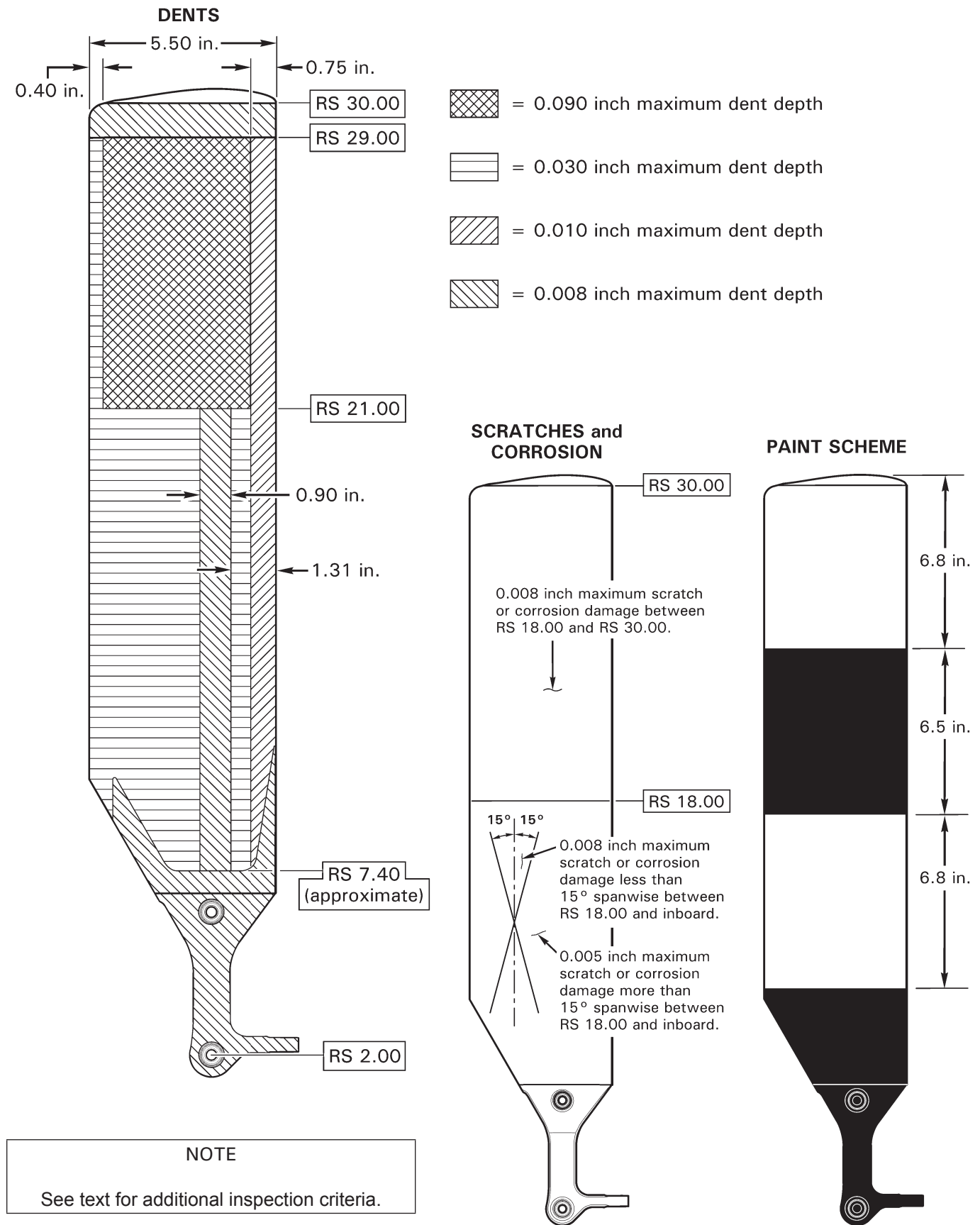


FIGURE 64-4 TAIL ROTOR BLADE INSPECTION CRITERIA

64-32 Dents (continued)**A. Skins**

1. Refer to Figure 64-4. Smooth, round bottom dents with 0.060 inch minimum radius may be repaired when damage does not exceed the following limits:
 - a. 0.010 inch maximum depth between leading edge and 0.75 inch aft (chordwise).
 - b. 0.75 inch aft (chordwise) of leading edge:
 - i. 0.090 inch maximum dent depth between RS 21.00 and RS 29.00.
 - ii. 0.030 inch maximum dent depth between RS 21.00 and inboard.
 - c. 0.030 inch maximum depth between trailing edge and 0.40 inch forward (chordwise).
 - d. 0.008 inch maximum depth between RS 29.00 and RS 30.00.
 - e. 0.008 inch maximum depth over the skin-to-root fitting bond joint and carbon fiber bonded area.
2. Refer to Section 62-50 (main rotor) for repair procedures for damage within limits.

64-33 Erosion

Replace any blade where erosion has caused deformation or ripples in the leading edge.

64-34 Root Fitting Damage

1. Verify damage does not exceed the following limits:
 - a. No repairs permitted within 1.5-inch diameter circle from center of spherical bearing.
 - b. 0.040 inch maximum depth on other root fitting exposed areas.
2. Refer to Section 62-50 (main rotor) for repair procedures for damage within limits. Blend out root fitting damage with a minimum 1.0 inch blend radius.

64-35 Nicks and Notches**A. Trailing Edge**

1. Verify damage does not exceed the following limits:
 - a. 0.050 inch maximum in the extreme trailing edge.
2. Refer to Section 62-50 (main rotor) for repair procedures for damage within limits. Blend out nicks and notches in blade trailing edge for 1.0 inch minimum each side of nick or notch.

64-36 Painting

Refer to Figure 64-4. See Section 62-52 (main rotor) for painting procedures.

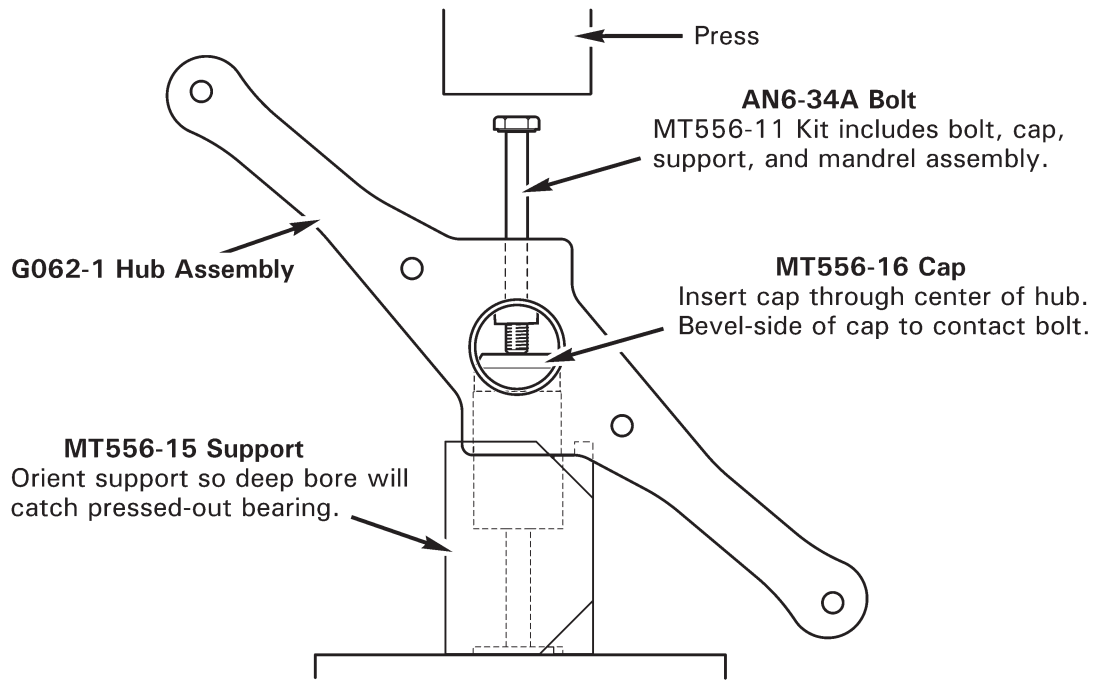


FIGURE 64-5 ELASTOMERIC BEARING REMOVAL

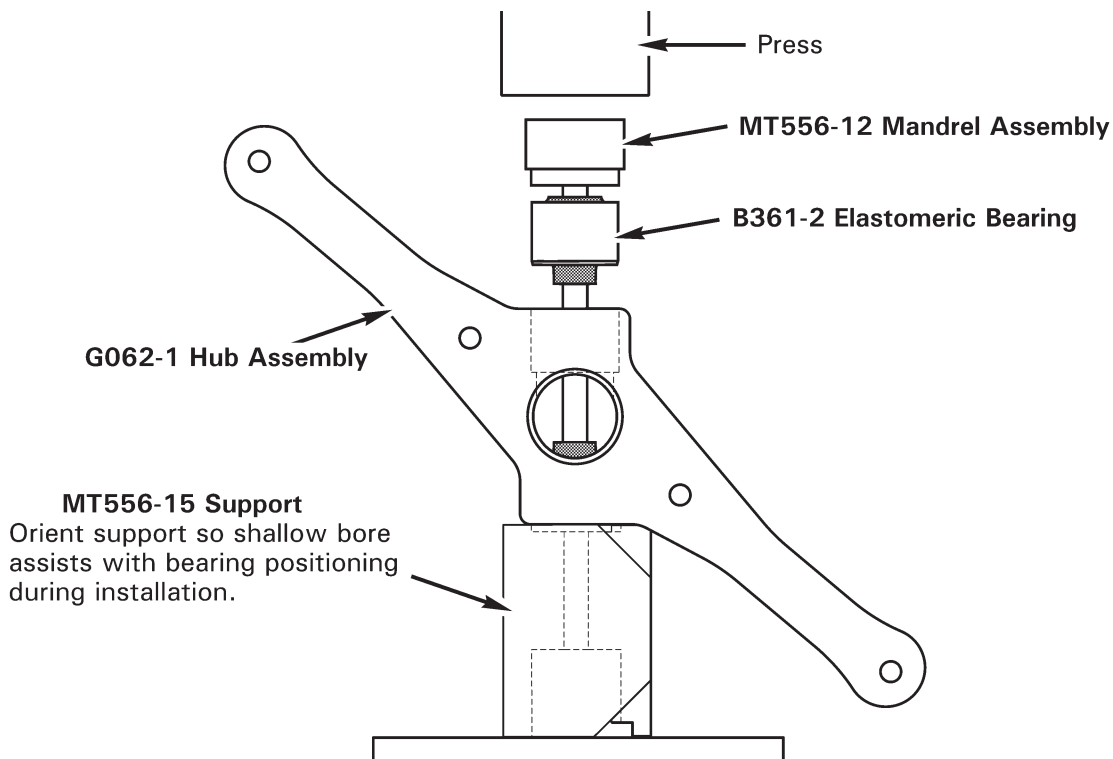


FIGURE 64-6 ELASTOMERIC BEARING INSTALLATION

64-40 Tail Rotor Hub

64-41 Bearing Replacement

Refer to R66 Illustrated Parts Catalog (IPC) Figure 64-1.

A. Removal

1. Remove tail rotor assembly per Section 64-10.
2. Remove tail rotor blades per Section 64-20.
3. Refer to Figure 64-5. Press bearing(s) from hub using MT556-11 bearing removal (and installation) tools.

B. Installation

1. Inspect tail rotor hub per Section 64-42.

CAUTION

Elastomeric bearings are a slight press fit in tail rotor hub bores. Inspect bores for fretting; if fretting is detected, hub is unairworthy.

2. Refer to Figure 64-6. Using Q-tip, apply light coat of approved primer per Section 20-70 to bottom of hub bearing bore. Apply a thin line of primer to center of bearing outside diameter. While primer is wet, press bearing into hub using MT556-11 bearing removal and installation tools. Wipe away excess primer.
3. Repeat steps for second bearing, as required.

64-42 Inspection

1. Remove tail rotor blades per Section 64-20, and inspect blades per Section 64-30.
2. Remove elastomeric bearings per Section 64-41.
3. Clean G062-1 tail rotor hub using approved solvent per Section 20-70.
4. Visually inspect for indications of damage, wear, nicks, dings, and corrosion. Check arms for straightness, bolt holes for elongation, and bearing bores for fretting or galling. Corrosion is not permitted on clamp-up surfaces.
5. For suspect areas, locally remove paint from hub using approved paint stripper per Section 20-70; dye penetrant or fluorescent penetrant inspect per Section 20-40.
6. Touch-up bare metal using approved materials per Section 20-70.
7. Install elastomeric bearings per Section 64-41.
8. Install tail rotor blades per Section 64-20.

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