## CHAPTER 9

### Rotor Systems

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CHAPTER 9

ROTOR SYSTEMS

9.000 Rotor Systems

The main rotor has two all-metal blades mounted to the hub by coning hinges. The hub is mounted to the shaft by a teeter hinge. The coning and teeter hinges use self-lubricated bearings. Droop stops for the main rotor blades provide a teeter hinge friction restraint which normally prevents the rotor from teetering while starting or stopping. Pitch change bearings for each blade are enclosed in a housing at the blade root. The housing is filled with oil and sealed with an elastomeric boot. Each blade has a thick stainless steel spar at the leading edge which is resistant to corrosion and erosion. The skins are bonded to the spar approximately one inch aft of the leading edge. Blades must be refinished if the paint erodes to bare metal at the skin-to-spar bond line. Bond may be damaged if bond line is exposed.

The tail rotor has two all-metal blades and a teetering hub with a fixed coning angle. The pitch change bearings have self-lubricated liners. The teeter hinge bearings are elastomeric. The tail rotor blades are constructed with aluminum skins and forged aluminum root fittings.

9.100 Main Rotor

Refer to R44 Illustrated Parts Catalog (IPC) Chapter 62.

9.110 Main Rotor Blades

<table>
<thead>
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<tr>
<td>Due to potentially destructive results, use of blade tape (anti-erosion tape) is prohibited.</td>
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9.111 Main Rotor Blade Removal

Refer to Figure 9-1. Four people will be required to remove the blades. One person must support the blade approximately 2/3 its length from the root while another supports the root and removes or installs the attachment bolt.

FIGURE 9-1 SUPPORTING MAIN ROTOR BLADES DURING BLADE REMOVAL OR INSTALLATION
9.111 Main Rotor Blade Removal (continued)

1. Mark one main rotor blade and its corresponding hub location, pitch link, and retaining nut & bolt with “X” using a marker or grease pencil. Mark opposite blade and its hub location, pitch link, and retaining nut & bolt with “O”.

2. Measure and record coning hinge axial gaps per Figure 9-7.

3. Remove hardware securing main rotor pitch links to blade pitch horns.

4. Remove cotter pins and loosen blade coning hinge retaining nuts until finger tight.

   **CAUTION**

   After removing one blade, support installed blade in a level position until it is removed.

5. Remove nut, thrust washer, and trailing-edge shims (if used) from one blade. Cone blade as required to position spindle tusk off of droop stop. Supporting blade at root, rotate pitch horn down, and remove hinge bolt and thrust washer.

   **CAUTION**

   Do not drop journals (inside hub bearings) which can slide out when removing blade bolt.

   **NOTE**

   Blade installation hardware is specific to each blade, each blade’s leading and trailing edge, and each blade’s location in hub. It is good practice after blade removal to install hardware in hub finger tight exactly as removed.

6. Place blade on a cushioned surface to prevent damage to skins.

7. Remove opposite blade per steps 5 and 6.
9.112 Main Rotor Blade Installation

1. Check teeter hinge friction and adjust as required per § 9.124.

2. If coning hinge axial gap recorded during blade removal was beyond tolerance, or if corresponding hub bearing(s) or spindle was replaced, perform coning hinge journal and shim calculation per § 9.123.

3. Level hub and insert journals in hub bearings. Install thrust washer on blade bolt.

4. Insert main rotor blade spindle in hub and align spindle and journal bores. Cone blade as required to position tusk off of droop stop. Rotate pitch horn down and install hinge bolt at leading-edge side.

   **NOTE**
   
   A bolt may be inserted from trailing-edge side to align spindle and journal bores (it is pushed out as coning hinge bolt is installed).

5. Install trailing-edge shims (if used) and thrust washer. Apply light coat A257-9 anti-seize to bolt threads and nut face. Install nut finger tight.

   **NOTE**
   
   Do not allow anti-seize to contact journals, shims, or hub bearing areas. These areas must be clean and dry.

   **CAUTION**
   
   After installing one blade, support blade in a level position until opposite blade is installed.

6. Install opposite blade per steps 3 thru 5.

7. Tighten nut on coning hinge bolt until journals and thrust washer are firmly seated. Loosen nut until both thrust washers can be freely rotated.

8. Refer to Figure 9-2. Install MT122-6 main rotor bolt stretch tool on hinge bolt. Zero dial indicator by rotating dial face and lock dial. Remove tool.

9. Using wrenches with at least 600 ft-lb torque capacity, tighten nut until drilled holes in nut and bolt align. Install MT122-6 tool and measure bolt stretch:

   a. If bolt stretch is between 0.020–0.022 inch, remove tool and install a new cotter pin wet with epoxy primer.

   b. If bolt stretch is not between 0.020–0.022 inch, remove old nut and old bolt and install a new bolt and a new nut. Stretch new bolt per § 1.330, and drill new nut and bolt per § 9.116. Install a new cotter pin wet with epoxy primer.

   **WARNING**
   
   Do not under-stretch or over-stretch teeter or coning hinge bolts to obtain proper clamping force. Under-stretching or over-stretching can cause failure.
9.112 Main Rotor Blade Installation (continued)

10. Install hardware securing main rotor pitch link to pitch horn. Standard torque hardware per § 1.320 and torque stripe per Figure 2-1.

11. Perform steps 7 thru 10 on opposite blade. If different blades are being installed or if blade pitch bearing housing has recently been serviced perform steps 12 thru 16.

12. Position cyclic and collective controls mid-travel and apply frictions.

13. Refer to Figure 9-3. Insert two MT549-1 spacers between hub and blade boot with gaps at top and bottom. Spacers should fit in recess of boot. Hold spacers in place against boot and insert MT549-2 plate from top between hub and spacers. Push plate down until it contacts spindle.

14. Remove bottom B289-2 bolt from pitch horn and allow oil to flow. Place a finger over hole as soon as oil flow decreases to a drip to prevent air from being sucked inside pitch bearing housing.

15. Remove finger from hole and quickly install bolt. Special torque bolt per § 1.330 and torque stripe per Figure 2-1.

16. Remove plate and spacers. Repeat on opposite blade.

17. Track and balance main rotor blades per § 10.230.
9.113 Boot Removal

1. Remove main rotor blades per § 9.111.

2. Place a suitable drain container below pitch horn. Remove two B289-2 bolts and drain fluid.

3. Remove outer boot clamp and hold boot back to expose inner boot clamp. Remove inner clamp and peel boot from spindle. Boot inner portion may be sealed to spindle with B270-1 sealant.

4. As required, use a plastic scraper and vacuum cleaner to remove old B270-1 sealant from spindle area to be covered by boot inner lip. Avoid contaminating spindle bearings with old sealant.

   **WARNING**

   Use only plastic scrapers to remove old sealant; chemical removal is prohibited.

9.114 Boot Installation

1. Visually inspect and verify boot is undamaged. Carefully stretch new boot over spindle.

2. Solvent-clean surfaces clamped by boot inner lip. Properly position boot inner lip; install C165-1 (inner) clamp assembly and tighten clamp to 2.850 ± 0.005 inch outside diameter. Rotate spindle and verify adequate clearance between clamp assembly and pitch horn. Wipe off excess sealant and allow to cure in accordance with sealant manufacturer’s recommendations.

   **NOTE**

   When installing inner clamp, ensure that shoulder of boot inner lip is not wedged beneath clamp or clamp may loosen in service. Inspect boot interior and verify no cuts or punctures.

3. Stretch boot outer lip over pitch horn flange. Rotate spindle and align pitch horn bolt hole with spindle bolt hole per Figure 9-4. Install C165-2 (outer) clamp assembly and tighten clamp. Verify security.

4. Fill pitch bearing housing per § 9.115.
FIGURE 9-4  FILLING PITCH BEARING HOUSING

- **MT147-1 Bleed tool**: Includes supply container, hose assemblies, and bleed fittings.
- **Supply container**
- **Plastic valve**
- **Drain hose assembly**
- **Secure drain hose to bleed fitting with lockwire.**
- **Main rotor blade and spindle assembly**
- **MT147-2 (Top) Bleed fitting**
- **Align spindle bolt hole centerline and pitch horn bolt hole centerline prior to tightening boot clamp.**
- **Spindle**
- **MT147-2 (Bottom) Bleed fitting**
- **Fill hose assembly**
- **Brass compression sleeve**
- **Brass valve**
- **Drain container**
9.115 Filling Pitch Bearing Housing

NOTE
MT147-1 Main rotor blade spindle air bleed tool includes supply container, hose assemblies, and bleed fittings.

WARNING
Refer to appropriate Material Safety Data Sheet (MSDS) and take necessary safety precautions when working in proximity to hazardous materials.

1. Remove main rotor blades per § 9.111.

2. Refer to Figure 9-4. Place a suitable drain container below main rotor pitch horn. Remove two B289-2 bolts from pitch horn and drain fluid.

3. Install MT147-2 bleed fittings into pitch horn openings. Attach drain hose assembly to (top) bleed fitting, secure with two wraps of lockwire. Position drain hose into drain container.

4. Place supply container with sufficient A257-4 fluid approximately 3 feet above spindle. Route fill hose assembly into drain container and open brass valve. Open supply container plastic valve and purge air from fill hose. Close valves.

5. Connect brass valve to (bottom) bleed fitting by tightening brass compression sleeve.

6. Open valves and fill spindle housing until no air bubbles are visible in drain hose assembly. Massage spindle boot, oscillate spindle, and raise blade tip up & down to remove trapped air.

7. Remove drain hose assembly and (top) bleed fitting, and install B289-2 bolt. Roll the blade over. After five minutes, inspect the boot for leaks. If no leaks are found, close valves, remove fill hose assembly brass valve and (bottom) bleed fitting, and install other bolt.

8. Torque B289-2 bolts per § 1.330 and torque stripe per Figure 2-1.

9. Repeat steps for opposite blade.

9.116 Drilling Main Rotor Hub Bolts

NOTE
Protect hub from damage due to chuck contact by wrapping chuck and/or covering hub edge with several layers of tape.

New bolts and nuts must be installed and bolts stretched per § 1.330 prior to drilling.

Using a six-inch long 0.156-inch diameter Cobalt twist-drill and cutting oil, drill a hole through nut and bolt using an accessible pre-drilled hole in nut. The MT569-2 drill guide assembly will facilitate drilling a perpendicular hole. If a pre-drilled hole is inaccessible, completely loosen nut, slightly rotate bolt to favorable position, then special torque per § 1.330. Protect adjacent area from drilling debris.
9.120 Main Rotor Hub

9.121 Main Rotor Hub Removal

1. Remove main rotor blades per § 9.111.

2. Refer to Figure 9-5. Mark rotor hub using a grease pencil, tape, or soft marker as follows:
   a. Indicate nut side of teeter bolt.
   b. Indicate chord arm side of drive shaft.

3. If same hub will be installed, measure teeter hinge friction per Figure 9-8 and record value.

4. Remove cotter pin, nut, C152 thrust washers, C117 shims, C106 journals, and bolt. Rotate hub as required and remove hub. Do not drop thrust washers or journals.

5. Reinstall bolt, thrust washers, shims, journals, and nut in rotor hub exactly as removed.

   **CAUTION**

   Main rotor chordwise balance is adjusted using C106 journals and C117 shims. If assembly stack-up is altered, an out-of-balance condition can occur.

9.122 Main Rotor Hub Installation

1. Clean and dry teeter hinge hardware using approved solvent per § 1.400. Inspect journals and thrust washers for chipping of chrome plating, corrosion, and/or wear grooves extending through chrome plating (0.0006 inch maximum wear). Replace journal or thrust washer if any of these conditions exist.

2. If teeter hinge friction recorded during hub removal was less than 5 ft-lb or more than 20 ft-lb, if teeter hinge hub bearing(s) was replaced, or if previous installation information is unavailable, perform teeter hinge journal and shim calculation per § 9.123 Part A.

3. Refer to Figure 9-5. Line up mark on hub with chord arm on drive shaft. Install teeter hinge bolt, thrust washers, shims, and journals (if previous installation information is available, install parts exactly as removed).

4. Coat nut face and bolt threads with A257-9 anti-seize compound, install and tighten nut, then loosen nut until both thrust washers can be freely rotated. Ensure journals do not “pinch” droop stops and fully contact drive shaft.

   **WARNING**

   Do not allow anti-seize compound to contaminate drive shaft, journals, shims, or thrust washer inner faces. Contamination prevents proper joint clamp-up and may cause failure.

5. Refer to Figure 9-2. Install MT122-6 main rotor bolt stretch tool on teeter bolt. Zero dial indicator by rotating dial face and lock dial. Remove tool.
9.122 Main Rotor Hub Installation (continued)

6. Using wrenches with at least 600 ft-lb torque capacity, tighten nut until drilled holes in nut and bolt align. Install MT122-6 tool and measure bolt stretch:

   a. If bolt stretch is between 0.020–0.022 inch, remove tool and verify correct teeter hinge friction per § 9.124 Part A. Adjust teeter hinge friction as required.

   b. If bolt stretch is not between 0.020–0.022 inch, remove old nut and old bolt and install a new bolt and a new nut. Stretch new bolt per § 1.330 and verify correct teeter hinge friction per § 9.124 Part A. Adjust teeter hinge friction as required. Drill new nut and bolt per § 9.116.

   **WARNING**
   Do not under-stretch or over-stretch teeter or coning hinge bolts to obtain proper clamping force. Under-stretching or over-stretching can cause failure.

7. Install a new cotter pin wet with epoxy primer.

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<td>C106-2</td>
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</tr>
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<td>C106-3</td>
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<td>C106-6</td>
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<td>C117-10</td>
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**TABLE 9-1 C106 JOURNAL LENGTHS AND C117 SHIM SIZES**
9.123 Main Rotor Hub Journal and Shim Calculations

Refer to Table 9-1 and Figures 9-5 and 9-6.

A. Teeter Hinge Calculation

1. Measure main rotor hub width across the teeter hinge bearing faces: _____ in.

2. Subtract measured width of C251 driveshaft at teeter hinge bolt hole: – _____ in.
   
   Calculated empty space: = _____ in.

3. Use one C106-5 or C106-6 journal and a selection of C117 shims to create a combined length of approximately 1.835 inches. Use as many different size shims as possible. Place thrust washer, shims, and journal under teeter bolt head; shims must be placed between thrust washer and journal.
   
   Subtract combined measured thickness of selected journal and shims: – _____ in.
   
   Difference: = _____ in.

4. Subtract measured length of C106-5 journal to be used on nut-side: – _____ in.
   
   Difference: = _____ in.

CAUTION

Initial teeter hinge hardware stack-up must be adjusted to 0.005/0.008 inch greater than calculated empty space. A smaller initial stack-up could damage thrust washers and hub bearings during installation.

5. To accommodate dimensional change due to clamping force, add: + 0.005/0.008 in.

   Initial C117 shim stack between nut-side journal & thrust washer: = _____ in.

6. Adjust shim stack as required to meet teeter hinge friction requirements (5-20 ft-lb; 8-12 ft-lb is ideal). Use as many different size shims as possible to facilitate head shifting during balancing.
Using a feeler gage, measure the gap between thrust washer and bearing face at the blade bolt head and nut. Verify 0.002-0.006 inch total gap per hinge.

FIGURE 9-7  MEASURING CONING HINGE AXIAL GAP

FIGURE 9-8  MEASURING TEETER HINGE FRICTION
9.123 Main Rotor Hub Journal and Shim Calculations (continued)

B. Coning Hinge Calculation

1. Measure main rotor hub width across the coning hinge bearing faces: ______ in.

2. Subtract measured width of blade spindle at coning hinge bolt hole: – ______ in.

   Calculated empty space: = ______ in.

   **CAUTION**
   
   Initial coning hinge hardware stack-up must be adjusted to 0.012/0.016 inch greater than calculated empty space. A smaller initial stack-up could damage thrust washers and hub bearings during installation.

3. To accommodate dimensional change due to clamping force, add: + 0.012/0.016 in.

   Sum: = ______ in.

4. Perform step a or step b:
   
   a. Subtract combined measured length of (2) C106-7 journals from Sum: – ______ in.

      Initial C117 shim stack between trailing-edge journal & thrust washer: = ______ in.

   b. Select a combination of C106-1, -2, -3, or -4 journals whose combined measured lengths equal Sum. The same journal dash number must be used under the head of both coning hinge bolts to maintain symmetry.

5. Adjust journal combination or shim stack as required to meet coning hinge axial gap requirement per Figure 9-7 and to maintain teeter friction requirement as follows: It must be possible to manually cone each blade without teetering the hub when blades are held up off the droop stops and lifted at tip.

9.124 Adjusting Hinge Friction

A. Teeter Hinge Friction Adjustment

1. Remove main rotor blades per § 9.111.

2. Refer to Figure 9-5 and Table 9-1. Remove cotter pin, nut, thrust washer, and nut-side C117 shims. Adjust teeter hinge friction by changing nut-side shim stack thickness in small increments; reducing shim stack thickness increases friction, increasing shim stack thickness reduces friction. Install shims, thrust washer, and nut.
9.124 Adjusting Hinge Friction (continued)

A. Teeter Hinge Friction Adjustment (continued)

3. Refer to Figure 9-8. While torquing teeter hinge bolt per § 1.330, check teeter hinge friction frequently. To check friction, install MT354 teeter friction tool into coning hinge bearings on one side of main rotor hub and measure moving force (not breakaway force) required to teeter main rotor hub with a spring scale.

   **NOTE**
   
   Do not exceed 20 ft-lb teeter friction. If bolt cannot be torqued per § 1.330 without exceeding friction limit, increase shim stack thickness per step 2.

4. Install a new bolt and nut per § 9.122.

B. Coning Hinge Friction Adjustment

1. Refer to Figure 9-6 and Table 9-1. Remove cotter pin, nut, thrust washer, and nut-side C117 shims (or journal). Adjust coning hinge friction by changing nut-side shim stack thickness (or journal length) in small increments; reducing shim stack thickness (or using a shorter journal) increases friction, increasing shim stack thickness (or using a longer journal) reduces friction. Coning hinge friction is zero when there is a measurable axial gap per Figure 9-7. Install shims (or journal), thrust washer, and nut.

2. Install a new bolt and nut per § 9.122, steps 7 thru 9. Repeat steps for opposite blade.

3. Check coning hinge friction by lifting blades until spindle tusks clear droop stops. Hold one blade level and cone opposite blade. Rotor hub may not teeter as blade is coned. Repeat check on opposite blade.

4. Using a feeler gage, measure gap between thrust washers and bearing faces at coning hinge bolt head and nut. Verify 0.002-0.006 inch total gap per hinge.


9.125 Shifting the Main Rotor Hub

1. Remove cotter pin, nut, thrust washer, and nut-side C117 shims.

2. Have two people cone the main rotor blades. Push out teeter hinge bolt with another bolt.

3. Move or exchange existing shims from one side of hub to the other as indicated by main rotor balance chart (refer to § 10.230).

4. Install teeter hinge bolt per § 9.122
9.126 Main Rotor Hub Bearing Replacement

1. Refer to Figure 9-9. Verify tooling surfaces are smooth to avoid damaging hub and bearings. Press bearing(s) from hub using a socket (approximately 1.535-1.555 inch outside diameter) and an 8-inch extension.

2. Visually inspect hub bearing bore and verify no scoring or scratches. Polish out fretting or corrosion to 0.001 inch maximum depth (0.005 inch on radius at edge of bore) and 0.25 inch minimum blend radius using 320-grit or finer wet-or-dry sandpaper. Fretting or corrosion that extends beyond repair limit requires hub replacement.

   **NOTE**

   Do not allow epoxy primer to contact bearing’s Teflon liner.

3. Verify bearing mating surfaces are smooth and clean and apply light coat of epoxy primer (refer to § 1.400). If visible, orient coning hinge bearing’s Teflon liner seam toward top of hub. While primer is wet, press in new bearing using MT329-6 plug (and MT643-1 support if replacing coning hinge bearing) until bearing flange is completely seated against hub.

4. Using a syringe, seal between bearing’s outboard flange and hub and bearing’s inboard edge and hub with small fillet of epoxy primer.
Measure blade damage before and after repair to estimate material removed. Use a straight edge and a thickness gage, keeping straight edge parallel with blade’s leading and trailing edges. Use the shortest straight edge possible to span damaged area.

**FIGURE 9-10  MEASURING MAIN ROTOR BLADE DAMAGE**

0.004 inch maximum depth for scratches more than 15° spanwise.

0.006 inch maximum depth for scratches less than 15° spanwise.

C016-7 Main Rotor Blade

0.002 inch maximum depth for scratches more than 15° spanwise.

0.003 inch maximum depth for scratches less than 15° spanwise.

C016-2 or-5 Main Rotor Blade (-5 shown)

**FIGURE 9-11  SCRATCH LIMITS**
9.130 Inspection of Main Rotor Blades

NOTE
Main rotor blades are 14 CFR § 27.602 critical parts. Notify RHC Technical Support when voids exceeding the limits specified in the instructions below are found, providing blade serial number, helicopter serial number, time in service for the rotor blade, and location and size of the voids that exceed the limits.

NOTE
The inspection criteria in this section applies to blade damage that occurs after blade manufacturing (including shipping and handling and time in service). Damage after blade manufacturing usually exhibits paint scuffing, scratches, or freshly-exposed metal in the form of scratches in the finish. If a blade manufacturing irregularity is suspected, 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.

A. Measuring Damage

1. Refer to Figure 9-10. Measure blade damage using a straight edge and a thickness gage. Keep straight edge parallel with the leading and trailing edges.

2. If blades are installed on the helicopter, measure damage using the shortest straight edge possible to span damaged area. Using a straight edge of excessive length will cause a false reading due to natural droop of the blade.

B. Measuring Material Removed After Repair

1. Use calipers or micrometers and compare measurements before and after repair to estimate amount of material removed.

2. Use a straight edge and thickness gage to measure repaired areas less than 2 inches across in the blade skins and spar.

9.131 Scratches and Corrosion on Blade Skins and Doublers

1. Refer to Figure 9-11. Damage may not exceed the following limits after rework:

   **C016-7 Blades:**
   a. 0.004 inch maximum depth for scratches more than 15° from spanwise axis.
   b. 0.006 inch maximum depth for scratches less than 15° from spanwise axis.
   c. 0.012 inch maximum corrosion between RS 174.0 and RS 198.0.
   d. 0.008 inch maximum corrosion between RS 124.0 and RS 174.0.
   e. 0.006 inch maximum corrosion between RS 58.0 and RS 124.0.
   f. 0.010 inch maximum corrosion between RS 18.7 and RS 58.0.

   **C016-2 or -5 Blades:**
   a. 0.002 inch maximum depth for scratches more than 15° spanwise.
   b. 0.003 inch maximum depth for scratches less than 15° spanwise.

2. Refer to § 9.140 for repair procedures for damage within limits. Polish out damage by hand with 0.10 inch blend radius.
FIGURE 9-12  DENTS AND LOCAL DEFORMATIONS

- 0.125 inch dent
- 0.090 inch dent
- 0.030 inch dent
- 0.006 inch dent
- 0.002 inch dent
- 0.060 inch deformation
- 0.015 inch deformation
- 0.020 inch damage
- 0.010 inch damage

C016-7 Main Rotor Blade
C016-2 and -5 Main Rotor Blade
(-5 shown)
9.132 Dents and Local Deformations

**CAUTION**

Tap-test dented areas in honeycomb using an AN970-4 washer or 1965-or-later U.S. quarter dollar coin in good condition. If any voids are found associated with dents, contact RHC Technical Support.

**CAUTION**

Do not repair any dent that has a sharp cut or break in the skin; dent must have 0.060 inch minimum radius. If necessary, locally penetrant inspect, keeping penetrant materials away from bond joints.

1. Refer to Figure 9-12. Damage may not exceed the following limits:

   a. Honeycomb:
      i. 0.020 inch maximum bulge on opposite side of blade, opposite dent.
      ii. 0.125 inch maximum depth dent between RS 162.90 and RS 198.0.
      iii. 0.090 inch maximum depth dent between RS 94.5 and RS 162.9.
      iv. 0.030 inch maximum depth dent between RS 18.7 and RS 94.5.

   b. Leading edge of doublers: 0.010 inch maximum depth dent.

   c. Supported bond joints:
      C016-7 Blades: 0.006 inch maximum depth dent.
      C016-2 or -5 Blades: 0.002 inch maximum depth dent.

   d. Local deformations:
      C016-7 Blades: Within 0.75 inch forward of trailing edge:
      i. 0.060 inch deformation between RS 58.0 and RS 198.0.
      ii. 0.015 inch deformation between RS 18.7 and RS 58.0.
      C016-2 or -5 Blades: Within 1.0 inch forward of trailing edge:
      i. 0.060 inch deformation between RS 62.0 and RS 198.0.
      ii. 0.015 inch deformation between RS 18.7 and RS 62.0.

   e. Spar: Refer to step 2. Blend damaged areas by hand with a minimum 1.0 inch blend radius. Blending is not allowed within 0.010 inch of spar groove leading edge.
      C016-7 Blades:
      i. 0.020 inch maximum depth damage between RS 94.5 and RS 198.0.
      ii. 0.010 inch maximum depth damage between RS 58.0 and RS 94.5.
      C016-2 and -5 Blades:
      i. 0.020 inch maximum depth damage between RS 94.5 and RS 198.0.
      ii. 0.010 inch maximum depth damage between RS 62.0 and RS 94.5.

2. Refer to § 9.140 for repair procedures for damage within limits. Smooth, round bottom dents with 0.060 inch minimum radius may be filled and faired to an aerodynamic shape.
9.133 Root Fitting Damage

1. Refer to Figure 9-13. Damage may not exceed the following limits:

**C016-7 Blades:**

Refer to step 2. Blend damaged areas by hand with a minimum 0.030 inch blend radius.

a. 0.002 inch maximum depth blending on flange inboard face.

b. 0.005 inch maximum depth, 0.250 inch maximum diameter blending on flange outboard machined face (3 blends maximum). 0.10 inch minimum distance from hole edges.

c. 0.040 inch maximum depth blending on exposed areas of root fitting.

**C016-2 and -5 Blades:**

Refer to step 2. Blend damaged areas by hand with a minimum 0.10 inch blend radius.

i. 0.010 inch maximum depth blending on flange inboard face.

ii. 0.002 inch maximum depth blending on flange outboard machined face.

iii. 0.060 inch maximum depth blending on exposed areas of root fitting.

2. Refer to § 9.140 for repair procedures for damage within limits.
9.134 Voids

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

**CAUTION**
Voids or debonds in doublers are not field repairable. If voids or debonds are detected in doublers which exceed limits, contact [RHC Technical Support](#).

A. Critical Bond Areas

Refer to Figure 9-14. Critical bond areas are areas less than 0.50 inch spanwise and less than 0.30 inch chordwise from the edge of any structural bond joint.

Bond areas not defined as semi-critical or non-critical are considered critical.

Voids separated by less than 0.25 inch are considered continuous.

1. Damage may not exceed the following limits:
   a. 0.10 square inch maximum void.
   b. Area must be at least 90% bonded.

B. Semi-Critical Bond Areas

**C016-7 Blades:**

C016-7 Blades do not have semi-critical bond areas.

**C016-2 and -5 Blades:**

Refer to Figure 9-14. Semi-critical bond areas are areas more than 0.50 inch spanwise or more than 0.30 inch chordwise from the edge of the trim tab.

Voids separated by less than 0.25 inch are considered continuous.

1. Damage may not exceed the following limits:
   a. 0.80 inch diameter circle maximum void.
   b. 1.5 square inches maximum void.
   c. 0.10 square inch maximum of a void extending into a critical bond area.
   d. Area must be at least 80% bonded.

C. Non-Critical Bond Areas

Refer to Figure 9-14. Non-critical bond areas are areas more than 0.50 inch spanwise or more than 0.30 inch chordwise from doubler edges and bonded areas between skin and honeycomb.
Figure 9-14  Bond Areas

- Critical bond area
- Semi-critical bond area
- Non-critical bond area
- No bond in this area

C016-7 Main Rotor Blade

C016-2 and -5 Main Rotor Blade (-5 shown)

0.30 inch (typical)
1.375 inches
0.50 inch (typical)
9.134 Voids (continued)

C. Non-Critical Bond Areas (continued)

C016-7 Blades:

1. Voids in doubler bond joints separated by less than 0.25 inch are considered continuous. Damage in doubler bond joints may not exceed the following limits:
   a. Area must be at least 80% bonded.
   b. 6.0 square inches, 2.0 inches chordwise, & 7.0 inches spanwise maximum void.
   c. 0.10 square inch maximum of a void extending into a critical bond area.
   d. Voids are permissible within 0.30 inch of doubler leading edge where it wraps around spar and root fitting.

2. Voids in honeycomb bond joints separated by less than 0.50 inch spanwise or 1.0 inch chordwise are considered continuous. Damage in honeycomb bond joints may not exceed the following limits:
   a. Area must be at least 80% bonded.
   b. 15.0 square inches, 1.5 inches chordwise, & 20.0 inches spanwise maximum void inboard of RS 121.0.
   c. 15.0 square inches, 2.5 inches chordwise, & 20.0 inches spanwise maximum void outboard of RS 121.0.

C016-2 and -5 Blades:

1. Voids in C934 doubler bond joints may not exceed the following limits:
   a. 6.0 square inches, 2.0 inches chordwise & 7.0 spanwise maximum void.
   b. 0.10 square inch maximum void extending into a critical bond area.
   c. 2.0 inches maximum void from outboard tips (refer to R44 SL-31).

2. Voids in C162 doubler bond joints may not exceed the following limits:
   a. 6.0 square inches, 2.0 inches chordwise, & 7.0 inches spanwise maximum void.
   b. 0.10 square inch maximum void extending into a critical bond area.
   c. 4.0 square inches, 0.50 inch chordwise, & 12.0 inch spanwise maximum void between doubler and spar.
   d. 0.20 inch chordwise maximum void along doubler leading edge where it wraps around spar and root fitting.

3. Voids in honeycomb bond joints inboard of RS 121.0 may not exceed 10.0 square inches, 1.50 inches chordwise, & 20.00 inches spanwise maximum.

4. Voids in honeycomb bond joints outboard of RS 121.0 may not exceed 15.0 square inches, 2.50 inches chordwise, & 20.00 inches spanwise maximum.

5. Voids in honeycomb bond joints between RS 150.0 and RS 166.0 must be at least 1.0 inch forward of honeycomb trailing edge and the skin over void may not move when trim tabs are flexed.

6. Voids in doubler bond joints separated by less than 0.25 inch, less than 0.50 inch spanwise, or less than 1.0 inch chordwise are considered continuous. Area must be at least 80% bonded.
9.140 Repair of Main Rotor Blades

Refer to § 1.400 for approved materials.

**CAUTION**

Do NOT use power tools or chemical paint strippers to repair main rotor blades.

1. Measure damage per § 9.130.

2. Remove damage at trailing edges, trim tab edges, tip cap, and/or tip corner by trimming per § 9.141 as required.

3. Polish out damage using 220 grit or finer wet-or-dry aluminum-oxide or silicon-carbide abrasive paper, and finish with 320 grit or finer wet-or-dry abrasive paper. A fine-toothed file may be used along the spar and trailing edge, provided the area is finished with 320 grit or finer wet-or-dry abrasive paper. Sand or file in spanwise direction. Remove only the material necessary to remove the damage and blend to the radius or dimension specified. Visually inspect and verify damage is removed.


5. Seal or fill as required per the following:
   
   a. Clean area to be sealed or filled using approved solvent (refer to § 1.400).
   
   b. Apply epoxy primer to bond joints with pin holes or other openings. Mix primer per manufacturer’s instructions. Allow a minimum of 24 hours cure time.
   
   c. Using 220-grit or finer wet-or-dry aluminum-oxide or silicon-carbide abrasive paper, hand-sand cured adhesive in spanwise direction to a smooth, aerodynamic finish, congruent with the blade airfoil. Do not remove metal.
   
   d. Hand-sand surrounding painted surface until 25% primer remains. Keep bare metal to a minimum.

6. Paint per § 9.142 as required.

7. Track and balance main rotor per § 10.230 as required.
FIGURE 9-15  TRIM LIMITS

C016-7 and C016-5 Main Rotor Blade

C016-2 Main Rotor Blade
9.141 Trimming

Refer to Figures 9-15 & 9-16. Trimming may be performed on the trailing edge of main rotor blade skins and trim tab edges within limits shown. (Alternately, a trailing edge nick or notch may be blended out 1.0 inch minimum spanwise, each side of nick or notch within limits shown.) Trimming is not permitted on spar or doublers.

Tip cap and tip corner may be trimmed within limits shown.

Finish repair per § 9.140 steps 2 thru 7. File trailing edge or trim tab edges square with skins (do not file into a point). Verify minimum chord dimension.

9.142 Painting

Refer to § 1.400 for approved materials. Refer to paint manufacturer’s recommendations.

CAUTION

If force-drying paint, do not exceed 175°F surface temperature on blade; monitor blade temperature.

1. Remove main rotor blade tip cover(s) as required. Clean the blade(s).

2. Feather edge of paint bordering bare metal by hand-sanding spanwise with 220-grit or finer wet-or-dry aluminum-oxide or silicon-carbide abrasive paper. Do not remove metal.

3. Mask area to prevent overspray contamination.

4. Clean bare metal to be painted with a lint-free cloth dampened with enamel cleaner.

5. Prime bare metal, including bare metal under tip cover(s) as required, with at least two coats epoxy primer. Scuff first coat of primer with 320-grit abrasive paper (or very fine Scotch-Brite), and wipe down with a lint-free cloth dampened with enamel cleaner prior to applying second coat.
9.142 Painting (continued)

6. Refer to Figures 9-17 & 9-18. Apply dark gray, flat black, white, and/or yellow polyurethane enamel, as required, to primed area in accordance with paint manufacturer’s recommendations.

   NOTE

   Allow Imron paint to cure at least 72 hours before flying in erosive conditions (such as drizzle, rain, or dust).

7. Install blade tip cover(s) if removed.

8. Remove masking materials.
9.210 Tail Rotor Assembly Removal

1. Refer to Figure 9-11 or Figure 9-12. Mark or tag each pitch link and corresponding blade 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 balancing.

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, and C130-1 spacers (C030 hubs only), off of shaft.

   **NOTE**

   Protect tail rotor assembly from damage when maintenance is performed on workbench.
FIGURE 9-11  SINGLE-PIECE HUB TAIL ROTOR ASSEMBLY INSTALLATION

- C029 Blade assembly
- Single-piece hub assembly
- See Figure 9-13 for chordwise static balancing.
- Pitch link
- Teeter hinge bolt
- Elastomeric bearing (2 places)
- Tail rotor gearbox output shaft (nut not required)
- Nut
- A141-14 Washer (0.750 inch diameter)
- C119-2 Bumper (urethane teeter stop)
- Pitch control assembly (Ref)
- Pitch link
- Bushing
  - Press bushings flush with inboard side of hub inboard arm (bushings will seat properly with fastener torque applied). (2 places)
- Longer spacer
  - The longer spacer creates blade precone angle and must be installed on the outboard side of blade, on the blade outboard (spanwise) bearing. (2 places)
- Shorter spacer(s) (6 places)
- See Figure 9-14 for spanwise static balancing.

FORWARD
9.220 Tail Rotor Assembly Installation

A. Single-Piece Hub (Elastomeric Bearing) Tail Rotor Assembly

1. Refer to Figure 9-11. Position tail rotor assembly on tail rotor gearbox output shaft, matching tail rotor blades to corresponding pitch links. Verify tail rotor is installed for clockwise rotation when viewed from left side of aircraft.

2. Install teeter hinge bolt and tighten nut until elastomeric bearing metal spacers contact output shaft, but do not torque. Verify blades cone toward tail rotor gearbox.

   **CAUTION**

   If balancing hardware information is unknown, perform static balance per Section 9.230.

3. Remove tags. Install hardware securing tail rotor blades to pitch links as removed, or as determined by static balancing. Standard torque nuts & palnuts per Section 1.320, and torque stripe per Figure 2-1.

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 1.330. Recheck track. Repeat step until blades are tracked.

6. Install palnut on teeter hinge bolt, standard torque per Section 1.320, and torque stripe per Figure 2-1. Remove tracking aid.

7. Teeter tail rotor hub 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 1.320 and torque stripe per Figure 2-1.

FIGURE 9-12  THREE-PIECE HUB TAIL ROTOR ASSEMBLY INSTALLATION

C029 Blade assembly

C129-1 Plate

C129-2 Plate

See Figure 9-13 for chordwise static balancing.

Pitch link

Teeter hinge bolt

Spherical bearing (2 places)

C130-1 Spacer (2 places)

Tail rotor gearbox output shaft
(palnut not required)

Nut

A141-14 Washer
(0.750 inch diameter)

C119-2 Bumper
(urethane teeter stop)

C128-1 Hub

Pitch control assembly (Ref)

Pitch link

Bushing
Press bushings flush with inboard side of hub inboard arm (bushings will seat properly with fastener torque applied). (2 places)

Shorter spacer(s) (6 places)

Longer spacer
The longer spacer creates blade precone angle and must be installed on the outboard side of blade, on the blade outboard (spanwise) bearing. (2 places)

C029 Blade assembly

FORWARD
9.220 Tail Rotor Assembly Installation (continued)

B. Three-Piece Hub (Spherical Bearing) Tail Rotor Assembly

1. a. Verify C130-1 spacer faces are not worn.

   b. Verify tail rotor gearbox output shaft flats are not worn. Verify output shaft
teepter hinge bolt hole is not elongated.

2. Refer to Figure 9-12. Position C130-1 spacers inside hub and install tail rotor
assembly on tail rotor gearbox output shaft, matching tail rotor blades to
 corresponding pitch links. Verify tail rotor is installed for clockwise rotation when
 viewed from left side of aircraft.

3. Install teeter hinge bolt, standard torque nut & palnut per Section 1.320, and
torque stripe per Figure 2-1. Verify blades cone toward tail rotor gearbox.

   **WARNING**

   Failure to check tail rotor bearing for proper installation per the
   following step can result in failure of teeter hinge bolt and loss
   of tail rotor.

4. a. Mark a line on exposed portion of each bearing ball using a felt pen or grease
   pencil.

   b. While teetering tail rotor, observe marked line in relation to output shaft.
   Verify bolt, nut, bearing balls, and spacers remain stationary in relation to
   output shaft. Teeter tail rotor and verify bearing outer races do not move
   inside hub.

   c. If bearing outer races rotate within hub bore, insufficient clamp-up is indicated.
   Replace tail rotor hub.

5. Install hardware securing tail rotor blades to pitch links as removed, or as
determined by static balancing. Standard torque nuts & palnuts per Section
1.320, and torque stripe per Figure 2-1.

6. Install C119-2 bumper, A141-14 washer, and nut. Standard torque nut per
Section 1.320 and torque stripe per Figure 2-1.

7. Dynamically balance tail rotor per Section 10.240.
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.

MT179-4 Balance Bar

Anderson 20 (or equivalent) Balancing Stand

A115-1 Spacer
A214-3 Washer
NAS6604-17 Bolt
NAS1149F0432P Washer
B115-1 Bearing

To simulate pitch link attachment, assemble hardware as shown and install one each in both 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. Install palnut.

NAS6604-17 thru -22 Bolt
Select bolt length to balance tail rotor assembly chordwise, and to meet thread exposure requirements per Section 1.300.

Install standard washer and palnut on HEAVY blade fastener.
9.230 Static Balance

A. Chordwise Static Balance

1. Refer to Figure 9-13. Install MT179-4 balance bar into tail rotor assembly. Install teeter hinge bolt, tighten until bearing spacers firmly clamp bar, and install palnut finger-tight. Using a carpenter’s square, adjust balance bar until approximately perpendicular to hub.

2. Place tail rotor assembly with balance bar on Anderson 20 or equivalent balancing stand. Adjust pitch of both blades so they are similar. 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 and palnut on heavy blade fastener.

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 thread exposure requirements per Section 1.300. 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 within one thin washer.

6. Perform spanwise static balance per Section 9.230 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 9-14 SPANWISE STATIC BALANCE
9.230  Static Balance (continued)

B. Spanwise Static Balance

CAUTION

Verify four washers installed under nut of outboard (spanwise) blade fastener prior to tail rotor assembly installation or dynamic balance.

1. Refer to Figure 9-14. Install standard hardware for initial spanwise static balance check. Standard torque fasteners per Section 1.320.

2. Install MT179-4 balance bar into tail rotor assembly. Install teeter hinge bolt, tighten until bearing spacers firmly clamp bar, and install palnut finger tight. Using a carpenter’s 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 1.320, 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 chordwise and spanwise balance. Tail rotor assembly must be statically balanced within one thin washer. Remove MT179-4 balance bar.

7. Touch-up bolt heads using approved paint (see Section 1.400).
9.300 Tail Rotor Blades

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

9.310 Tail Rotor Blade Removal


2. Refer to Figure 9-11 or Figure 9-12. Mark three-piece tail rotor hub assembly across the hub and plates for reinstallation.

3. Remove hardware securing tail rotor blades to hub assembly. Remove blades, spacers, and hardware. Remove bushings if required.

9.320 Tail Rotor Blade Installation

CAUTION
C029 tail rotor blades are a matched set from RHC. If only one blade is being replaced, contact RHC Customer Service with airworthy blade serial number for a matching replacement blade.

1. Inspect tail rotor hub per Section 9.530, as required.

2. Refer to Figure 9-11 or Figure 9-12. If removed, apply light coat of approved primer (see Section 1.400) to outer surface of bushings; while primer is wet, press bushings flush with inboard side of hub inboard arm (bushings will seat properly with fastener torque applied).

CAUTION
The longer 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. Standard torque bolts per Section 1.320, and torque stripe inboard bolts per Figure 2-1.

FIGURE 9-15  TAIL ROTOR BLADE INSPECTION CRITERIA

NOTE
See text for additional inspection criteria.

DENTS

- $0.090$ inch maximum dent depth
- $0.030$ inch maximum dent depth
- $0.010$ inch maximum dent depth
- $0.008$ inch maximum dent depth

SCRATCHES and CORROSION

- $0.008$ inch maximum scratch or corrosion damage between RS 18.00 and RS 30.00.
- $0.008$ inch maximum scratch or corrosion damage less than $15^\circ$ spanwise between RS 18.00 and inboard.
- $0.005$ inch maximum scratch or corrosion damage more than $15^\circ$ spanwise between RS 18.00 and inboard.

RS 29.00
RS 28.00
RS 21.00
RS 7.40 (approximate)
RS 2.00
9.400 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.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

Refer to Section 9.130 for measuring blade damage.

9.410 Scratches and Corrosion

1. Refer to Figure 9-15. Verify damage does not exceed the following limits:
   a. 0.008 inch maximum damage between RS 18.00 and RS 29.00.
   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 9.130 (main rotor) for repair procedures for damage within limits. Blend out scratches or corrosion on skins with a minimum 0.10 inch blend radius.

9.420 Dents

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tap-test dented areas in honeycomb. If any voids are found associated with dents, replace blade.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any damaged tail rotor blade that cannot be repaired within the limits of this section must be removed from service immediately and marked &quot;scrap.&quot;</td>
</tr>
</tbody>
</table>
9.420 Dents (continued)

A. Skins

1. Refer to Figure 9-15. 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 28.00 and RS 29.00.
   
   e. 0.008 inch maximum depth over the skin-to-root fitting bond joint and inboard honeycomb.

2. Refer to Section 9.130 (main rotor) for repair procedures for damage within limits.

9.430 Erosion

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

9.440 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 9.130 (main rotor) for repair procedures for damage within limits.
   Blend out root fitting damage with a minimum 1.0 inch blend radius.

9.450 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 9.130 (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.
FIGURE 9-16  TAIL ROTOR BLADE PAINT SCHEME

- White Stripe
- Black Semi-Gloss
9.460 Painting

1. Clean with QSOL 220 and wipe lint-free with a tack rag.

2. Apply a 2 to 3-inch wide strip of epoxy primer along all exposed bond joints.

3. Apply two full coats of epoxy primer to all exterior surfaces. Time limits are 10 minutes minimum, 8 hours maximum between coats. If 8 hours is exceeded, scuff with 600 grit wet-or-dry aluminum oxide or silicon carbide abrasive paper in a spanwise direction, QSOL 220 wipe and mist primer before applying next coat.

4. Spray white all over and allow to dry before masking for trim stripes. See Figure 9-16.

5. Spray finish coat semi-gloss black stripes and root fitting.

6. Remove all masking materials.
FIGURE 9-17 ELASTOMERIC BEARING REMOVAL

AN6-34A Bolt
MT556-11 Kit includes bolt, cap, support, and mandrel assembly.

MT556-16 Cap
Insert cap through center of hub. Bevel-side of cap to contact bolt.

MT556-15 Support
Orient support so deep bore will catch pressed-out bearing.

FIGURE 9-18 ELASTOMERIC BEARING INSTALLATION

Press

MT556-12 Mandrel Assembly

B361-2 Elastomeric Bearing

G062-1 Hub Assembly

MT556-15 Support
Orient support so shallow bore assists with bearing positioning during installation.
9.500 Tail Rotor Hub

9.510 Tail Rotor Hub Elastomeric Bearing Replacement

A. Removal

2. Remove tail rotor blades per Section 9.310.
3. Refer to Figure 9-17. Press bearing(s) from hub using MT556-11 bearing removal (and installation) tools.

B. Installation

1. Inspect tail rotor hub per Section 9.530.

    CAUTION

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 9-18. Using Q-tip, apply light coat of approved primer (see Section 1.400) 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.
FIGURE 9-20  SPHERICAL BEARING INSTALLATION

Press

NAS6606 or AN6 Bolt
Threaded portion of bolt centers bolt in bearing ball to prevent damaging hub bore during bolt removal.

C128-1 Hub

AN315 or AN316 Nut
Grind or file off nut corners so nut clears hub bore.

D115-1 Spherical Bearing

Press plate

FIGURE 9-19  SPHERICAL BEARING REMOVAL

Press

MT252-3 Shaft Assembly
MT252-1 Pressing Tool includes shaft and base assemblies.

D115-1 Spherical Bearing

C128-1 Hub

MT252-2 Base Assembly

FIGURE 9-20  SPHERICAL BEARING INSTALLATION
9.520  Tail Rotor Hub Spherical Bearing Replacement

A. Removal
   2. Remove tail rotor blades per Section 9.310.
   3. Refer to Figure 9-19. Press bearing(s) from hub as shown.

B. Installation
   1. Inspect tail rotor hub per Section 9.530.

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

   NOTE
   Heat tail rotor hub to 170° F maximum as required to facilitate bearing installation and help prevent installation damage.

   NOTE
   Immediately install tail rotor assembly before bearing-bore primer cures.

   NOTE
   If spherical bearings are installed too far into hub, spacers and hub will not fit over gearbox output shaft.

   2. Refer to Figure 9-20. Using Q-tip, apply light coat of approved primer (see Section 1.400) to bottom of hub bearing bore. Apply a thin line of primer to center of bearing outside diameter. While primer is wet, press bearing flush with top of hub using MT252-1 bearing installation tools. Wipe away excess primer.

   3. Repeat steps for second bearing, as required.

   4. Align marked line and install hub between hub plates as removed. Install hardware, standard torque nuts & palnuts per Section 1.320, and torque stripe per Figure 2-1.

   5. Install tail rotor blades per Section 9.320.
9.530 Tail Rotor Hub Inspection

1. Remove tail rotor blades per Section 9.310, if not previously accomplished. Inspect blades per Section 9.400.

2. Remove teeter bearings per Section 9.510.

3. Clean tail rotor hub using approved solvent (see Section 1.400). Remove old primer and/or metal shavings from hub which might prevent new bearings from seating properly.

4. Visually inspect for indications of damage, wear, nicks, dings, and corrosion. Verify arm straightness, no elongation of bolt holes, and no fretting or galling of bearing bores. Corrosion is not permitted.

5. Touch-up bare metal using approved materials (see Section 1.400).

6. Install new teeter bearings per Section 9.510.

7. Install tail rotor blades per Section 9.320.