CHAPTER 62

MAIN ROTOR

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CHAPTER 62

MAIN ROTOR

62-00 Description

The main rotor has two all-metal blades and a forged-aluminum hub. Blades mount to the hub by coning hinge; the hub mounts to the main rotor shaft by teeter hinge. Coning and teeter hinges have self-lubricated bearings inside the hub.

The leading edge of the main rotor blade is a corrosion and erosion resistant stainless-steel spar. Aluminum skins are bonded to the spar approximately one inch aft of the leading edge, to the aluminum honeycomb core, and to the forged-aluminum root fitting.

Each blade has six pitch change bearings that attach to a forged, stainless-steel spindle. The bearings and part of the spindle are submerged in oil inside the root fitting housing. The housing is sealed with an elastic boot. The spindle tusk contacts an aluminum droop stop attached to the main rotor shaft, to minimize teetering when blades are at rest or turning at low RPM.

62-10 Main Rotor Blades

WARNING

Due to potentially destructive results, use of blade tape (anti-erosion tape) is prohibited.

A. Removal

Refer to Figure 62-1. 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 attached bolt. Each F016-2 main rotor blade & spindle assembly weighs approximately 80 pounds.

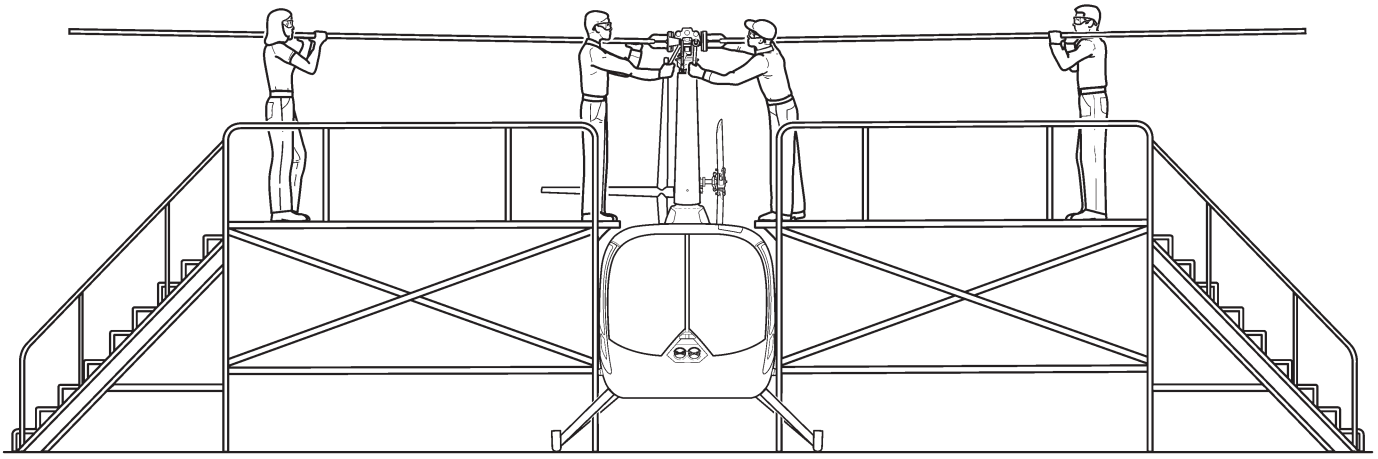

FIGURE 62-1 SUPPORTING MAIN ROTOR BLADES DURING BLADE REMOVAL OR INSTALLATION

62-10 Main Rotor Blades (continued)

A. Removal (continued)

1. Mark one blade and its corresponding hinge nut & bolt, pitch link and rotor head location with a colored marker, such as a grease pencil and, mark as "X". Using a different color marker, mark as "O", on the other blade, nut, bolt, pitch link and rotor head location.
2. Measure and record coning hinge axial gaps per Figure 62-7A.
3. Remove hardware securing pitch links to blade pitch horns.
4. Remove cotter pins and loosen blade coning hinge nuts until finger tight.

CAUTION

Support remaining main rotor blade in a level position during and after removal of opposite blade.

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 & thrust washer.

CAUTION

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

NOTE

Installation hardware is specific to each blade; carefully reinstall all attach hardware including journals into rotor hub, or spindle, exactly as removed.

6. Store rotor blades on a cushioned surface to prevent damage to blade skins.
7. Repeat step 5 to remove remaining blade.

B. Installation

1. If both blades have been removed, measure teeter hinge friction per Figure 62-7B, and adjust as required per § 62-32.
2. If previously installed information is unavailable, select coning hinge journals and shims per § 62-31.
3. With rotor hub level, insert journals into coning hinge bearings. Install thrust washer on coning hinge bolt.

CAUTION

To prevent damage, level and support installed blade until opposite blade is installed.

62-10 Main Rotor Blades (continued)

B. Installation (continued)

4. Position blade in hub until spindle hole aligns with journal bores, coning blade as required to keep tusk away from droop stop. Rotate pitch horn down and install hinge bolt at leading-edge side.

> NOTE
>
> To assist bolt installation, temporarily insert an old bolt from trailing-edge side to align spindle with journals.

5. Install trailing-edge shims (if used) & thrust washer and, prior to installing nut, coat bolt threads and nut face with A257-9 anti-seize compound.

> **CAUTION**
>
> Do not allow anti-seize compound to contact journals or hub bearing areas. These areas must be clean and dry.

6. With installed blade level and supported near tip, install opposite blade per steps 1 thru 5.
7. Tighten nut on hinge bolt until journals and thrust washer are firmly seated. Then loosen nut until both thrust washers can be freely rotated.
8. Install MT122-6 main rotor bolt stretch tool on hinge bolt per Figure 62-2. Zero dial indicator by rotating dial face. Lock dial and remove tool.

> **WARNING**
>
> **Do not under-stretch or over-stretch teeter or coning hinge bolts. Discard bolt and nut if stretched more than 0.024 inch.**

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. Verify stretch is between 0.020–0.022 inch. Check thrust washer-to-hub bearing gap per Figure 62-7A; if gap is correct install a new cotter pin wet with approved primer. If stretch is not between 0.020–0.022 inch, or if thrust washer-to-hub bearing gap is incorrect, discard bolt & nut. Replace with new bolt & nut per step b.
   b. Perform steps 5 thru 9 using new (undrilled) bolt. Stretch bolt to 0.021–0.022 inch; if bolt stretched more than 0.024 inch, discard bolt & nut and replace with new. Check thrust washer-to-hub bearing gap per Figure 62-7A; adjust gap per § 62-32 Part B, as required. Drill bolt & nut per § 62-34 and install a new cotter pin wet with approved primer.
10. Perform steps 8 thru 10 for opposite blade.

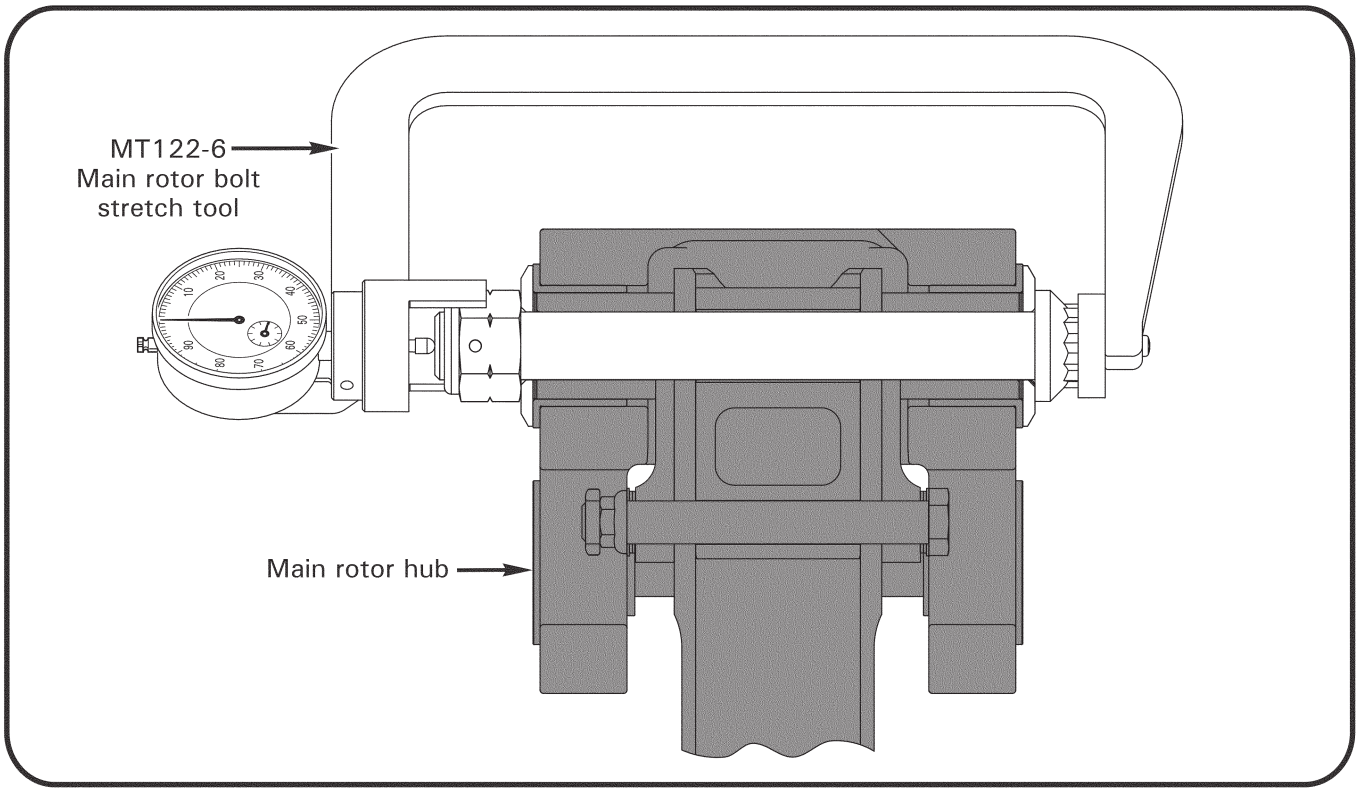

FIGURE 62-2 MEASURING BOLT STRETCH
(Shown on teeter hinge bolt)

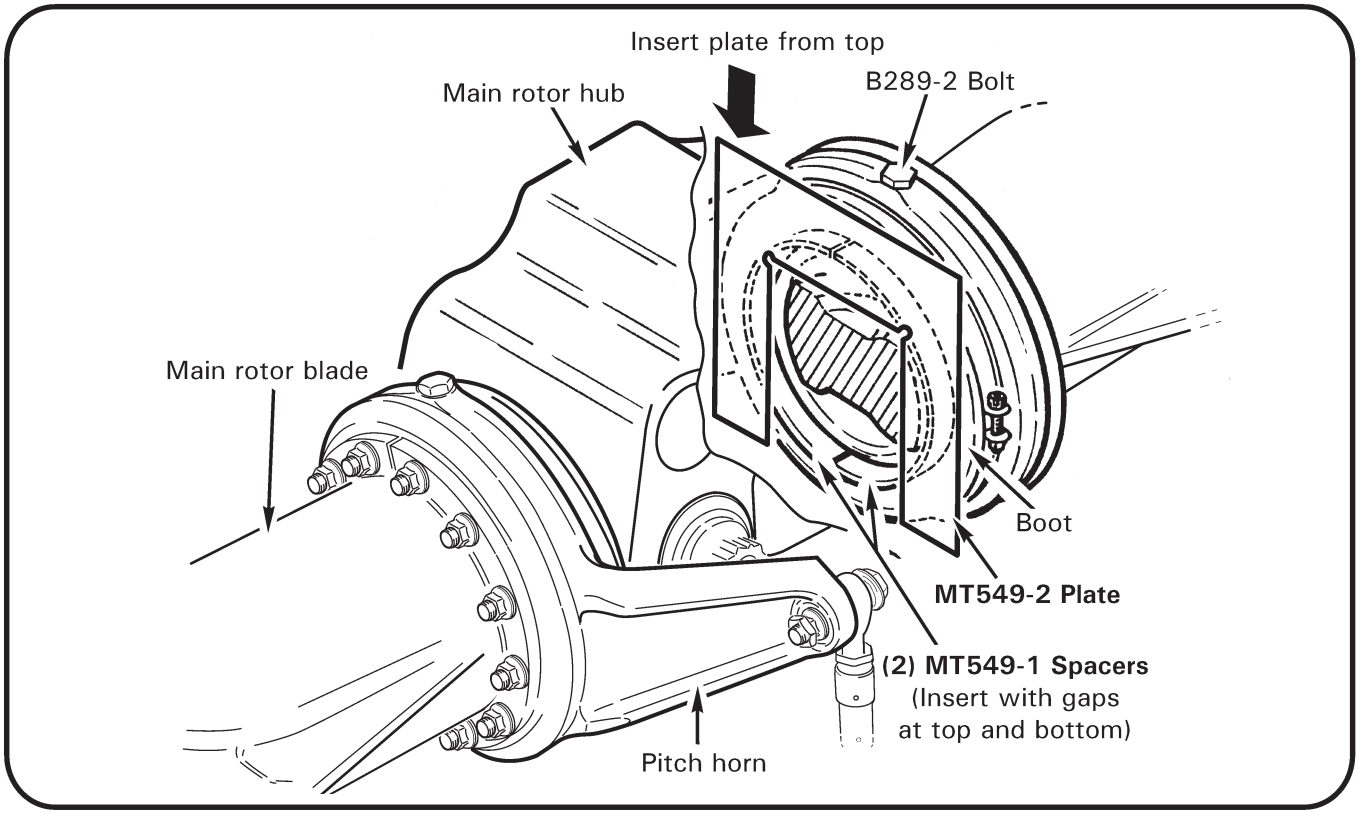

FIGURE 62-3 ADJUSTING BOOT CLEARANCE

62-10 Main Rotor Blades (continued)

B. Installation (continued)

11. Lift both blades off droop stops by raising blade tips; independently cone each blade and verify hub does not teeter.
12. Install hardware securing each pitch link to correct pitch horn. Standard torque hardware per § 20-32 and torque stripe per Figure 5-1.
13. Position cyclic and collective at approximately mid-travel positions to minimize wrinkles in boots.
14. Refer to Figure 62-3. Insert (2) MT549-1 spacers between hub and 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.
15. Place a suitable container beneath pitch horn's lower B289-2 bolt. Remove lower 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 blade.
16. Remove finger from hole and quickly install drain B289-2 bolt. Special torque per § 20-33 and torque stripe per Figure 5-1.
17. Remove plate and spacers. Repeat on second blade.
18. Track and balance main rotor blades per § 18-10.

CAUTION

When fitting replacement main rotor blade(s), remove both main rotor blade tip covers after initial run-up and clean out debris.

62-11 Blade Boots

A. Removal

1. Remove main rotor blades per § 62-10.
2. Place a suitable drain container below main rotor blade spindle assembly. 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.

B. Installation

NOTE

C156-1 (Black) blade boots are standard; C156-2 (grey) boots are optional for use in sub-freezing temperatures.

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.

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 arm bolt hole with spindle bolt hole centerlines. Install C165-2 (outer) clamp assembly and tighten clamp. Verify security.
4. Fill pitch bearing housing per § 12-51.

62-20 Main Rotor Hub

A. Removal

1. Remove main rotor blades per § 62-10.
2. Refer to Figure 62-6A. Mark rotor hub using a grease pencil or soft marker as follows:
   a. Indicate nut side of teeter bolt.
   b. Indicate chord arm side of drive shaft.
3. Remove cotter pin, nut, thrust washers, C117 shims, C106 journals, and bolt. Rotate hub as required and remove hub. Do not drop C152 thrust washers or C106 journals.
4. Reinstall bolt, thrust washers, shims, journals, and nut in rotor hub exactly as removed.

CAUTION

Main rotor chordwise balance can be affected by changing C106 journals and/or C117 shims. If previous hardware stackup is altered more than 0.012 inch perform static balance per § 62-35.

B. Installation

1. Clean and dry teeter hinge hardware using approved solvent per § 20-70. 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. Line up mark on hub with chord arm on rotor shaft.
3. Refer to Figure 62-6A. Reinstall teeter hinge bolt, thrust washers, shims, and journals exactly as removed. If previously installed information is unavailable, perform teeter hinge journal and shim calculation per § 62-31. Ensure journals fully contact drive shaft and do not pinch upper edge of droop stops.
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.

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. Position MT122-6 main rotor bolt stretch tool on teeter bolt per Figure 62-2. Zero and lock dial indicator. Remove tool.

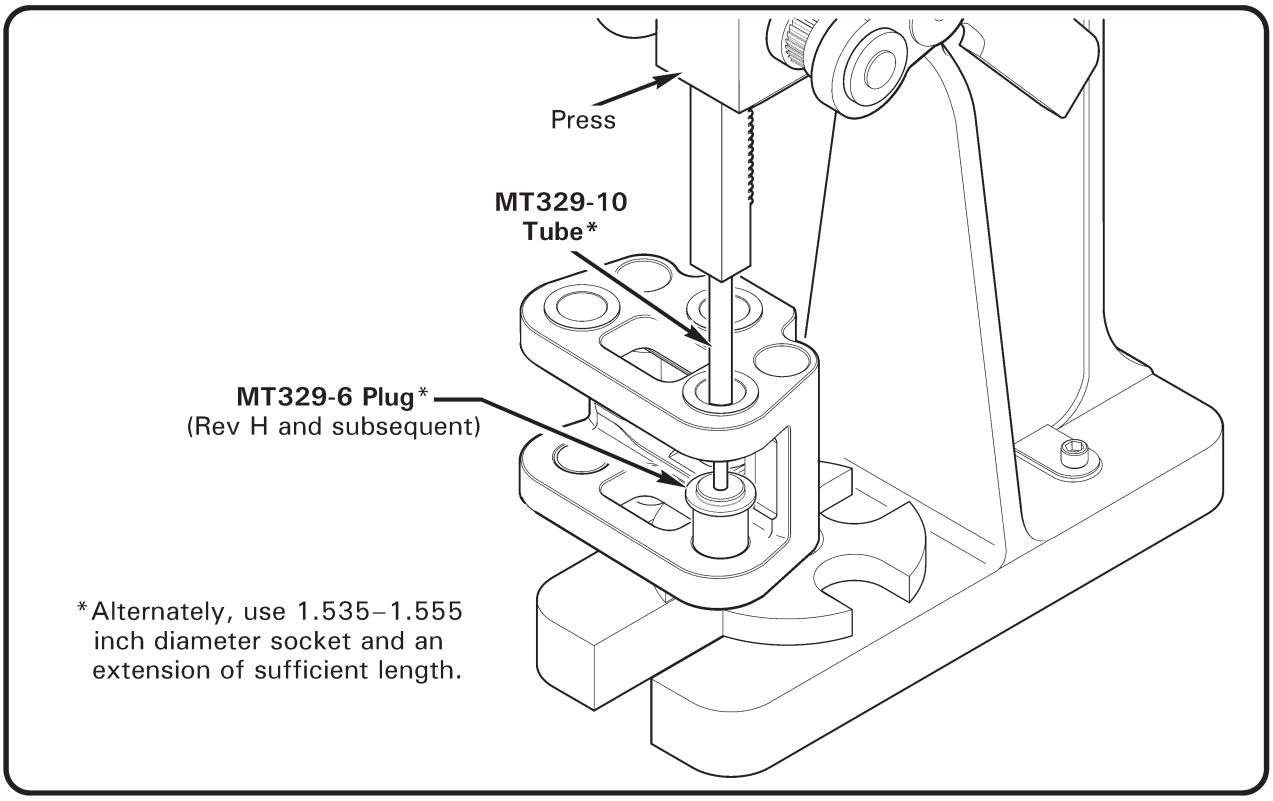

FIGURE 62-4A MAIN ROTOR HUB BEARING REMOVAL

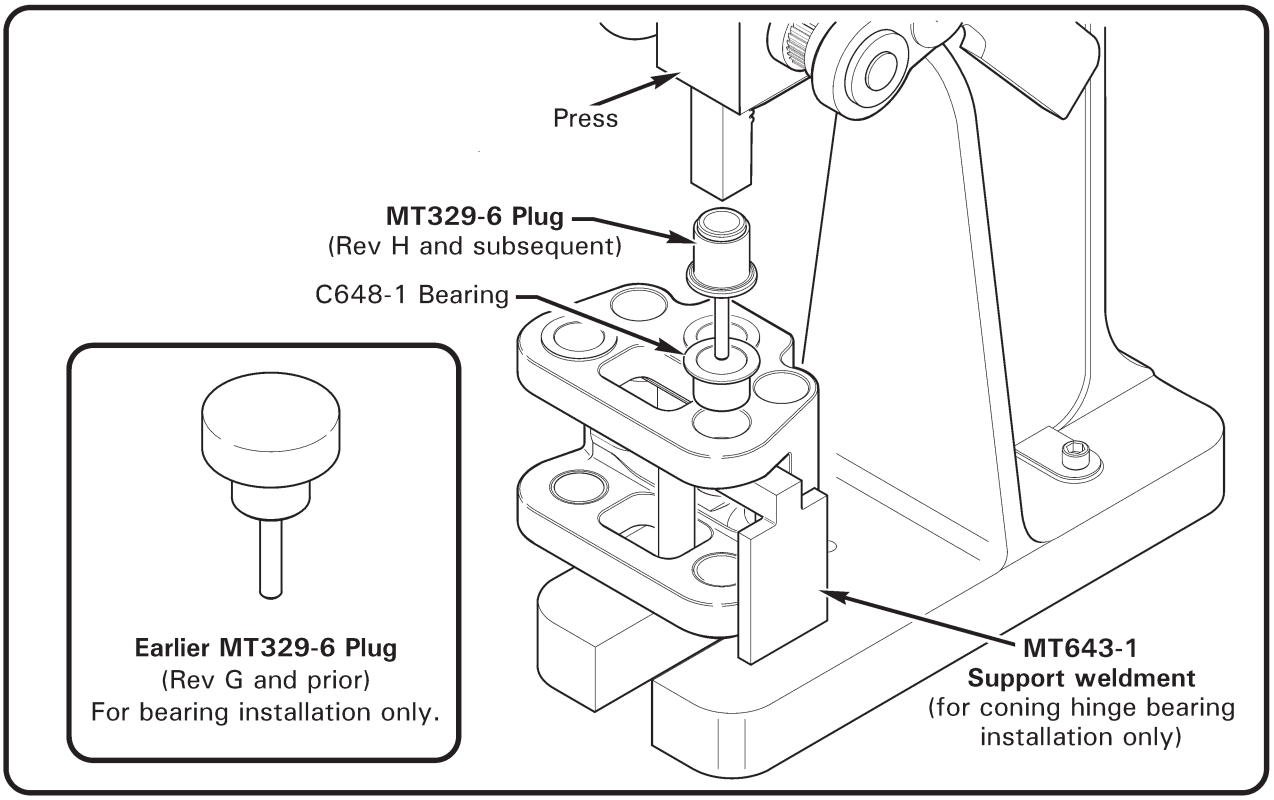

FIGURE 62-4B MAIN ROTOR HUB BEARING INSTALLATION

62-20 Main Rotor Hub (continued)

B. Installation (continued)

WARNING

Do not under-stretch or over-stretch teeter or coning hinge bolts. Discard bolt and nut if stretched more than 0.024 inch.

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. Verify stretch is between 0.020–0.022 inch, remove tool and install a new cotter pin wet with approved primer. Verify correct teeter hinge friction per Figure 62-7B. If bolt stretch is not between 0.020–0.022 inch, or if teeter hinge friction is incorrect, discard bolt and nut; replace with new per step b.

   b. Stretch (undrilled) bolt to 0.021–0.022 per § 20-33. If bolt stretched to 0.024 inch, discard bolt and nut; replace with new. Verify correct teeter hinge friction per Figure 62-7B; adjust as required. Drill bolt and nut per § 62-34 and install a new cotter pin wet with approved primer.

62-21 Bearing Replacement

1. Remove main rotor hub per § 62-20.
2. Refer to Figure 62-4A. Verify tooling surfaces are smooth to avoid damaging hub and bearings. Press old bearing(s) out of hub using MT329-6 (Rev H or subsequent) plug & MT329-10 tube. Alternately, use 1.535–1.555 inch diameter socket and an extension of sufficient length.
3. Visually inspect hub bearing bore(s) per § 62-22 step 3a.

NOTE

Do not allow primer to contact bearing's Teflon® liner.

4. Refer to Figure 62-4B. Verify bearing mating surfaces are smooth and clean and apply light coat of § 20-75 approved primer (chromate primer preferred). 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.
5. Using a syringe, seal between bearing's outboard flange and hub and bearing's inboard edge and hub with small fillet of approved primer.
6. As required, perform shim calculation(s) per § 62-31 upon reinstallation.

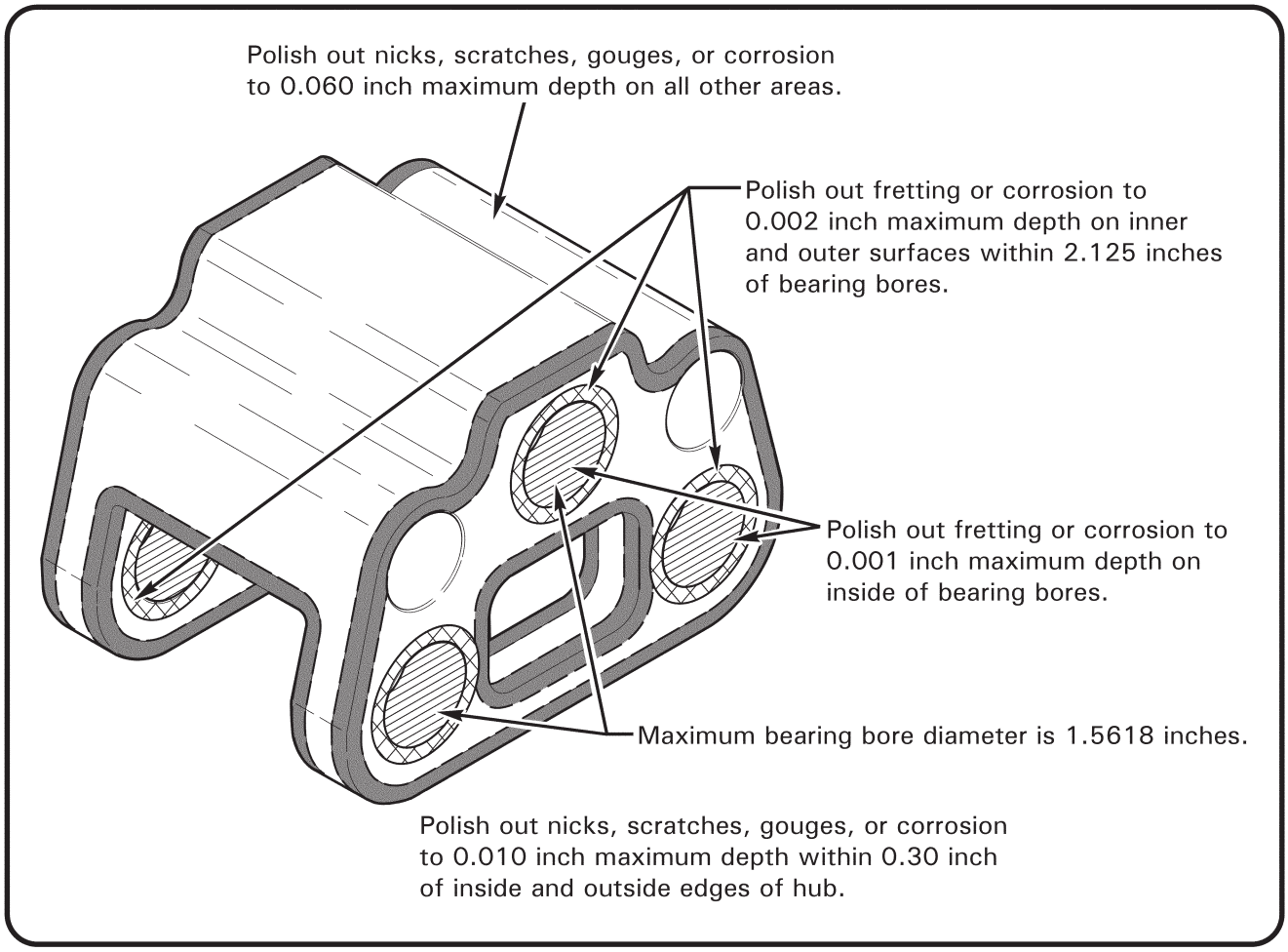

FIGURE 62-5 MAIN ROTOR HUB REPAIR LIMITS

62-22 Inspection and Repair

1. Remove main rotor hub bearings per § 62-21 steps 1 & 2.
2. Remove hub paint by dry media blasting.
3. Refer to Figure 62-5. If required, polish surfaces using 320-grit or finer wet-or-dry aluminum oxide abrasive paper to 0.25 inch minimum blend radius.
   a. Visually inspect hub bearing bores and verify no scoring, scratches, or other obvious damage. Polish out fretting or corrosion to 0.002 inch maximum depth on inner and outer surfaces within 2.125 inches of bearing bores. Polish out fretting or corrosion to 0.001 inch maximum depth on inside of bearing bores; maximum bearing bore diameter is 1.5618 inches.
   b. Visually inspect all other areas of hub for obvious damage. Polish out nicks, scratches, gouges, or corrosion to 0.010 inch maximum depth within 0.30 inch of inside and outside edges of hub. Polish out nicks, scratches, gouges, or corrosion to 0.060 inch maximum depth on all other areas.
4. Fluorescent penetrant inspect hub per § 20-42.
5. Prime hub per § 20-60.
6. Install bearings per § 62-21 steps 4 & 5.
7. Mask bearings and topcoat hub assembly per § 20-60.
8. When top coat has sufficiently cured, remove masking.

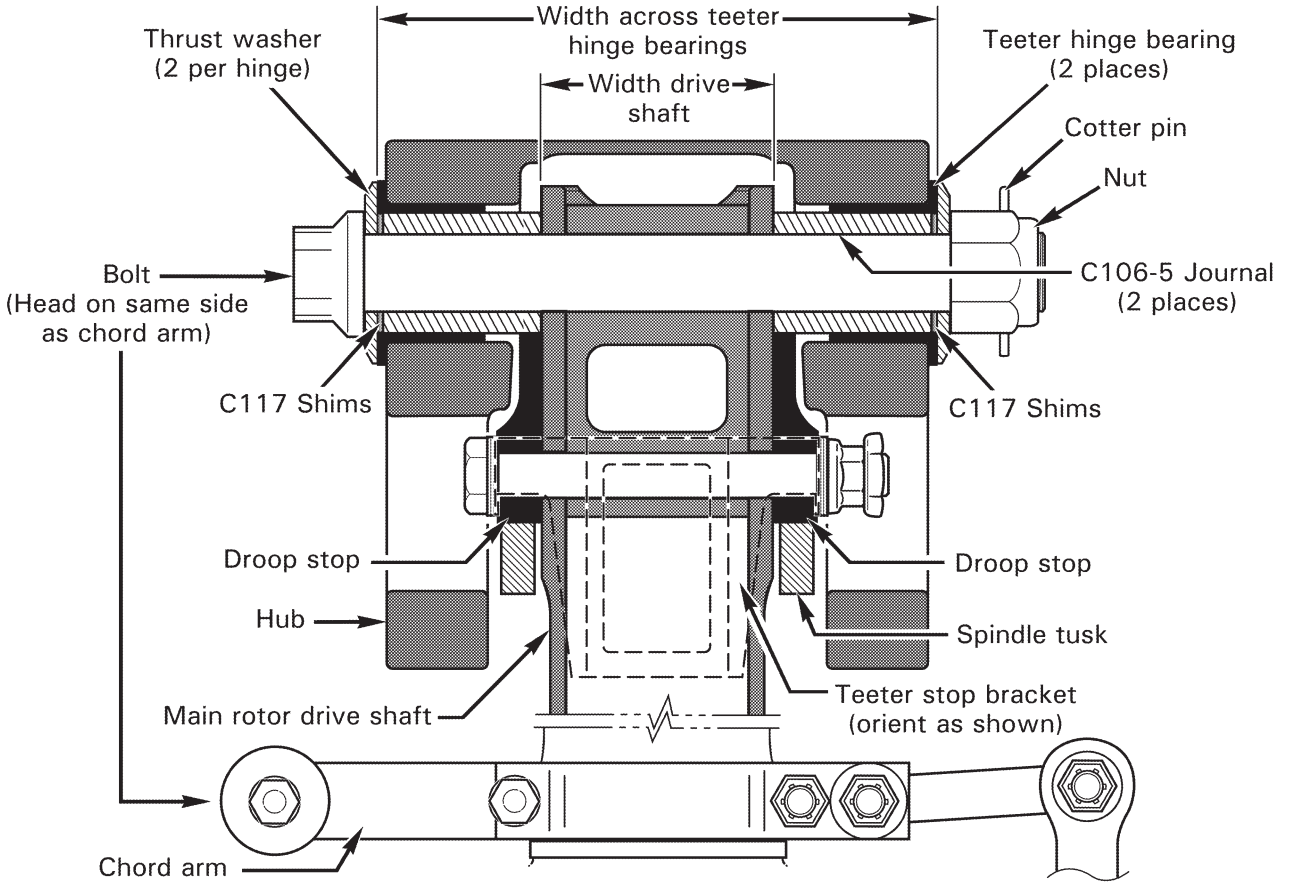

FIGURE 62-6A TEETER HINGE (HUB INSTALLATION)

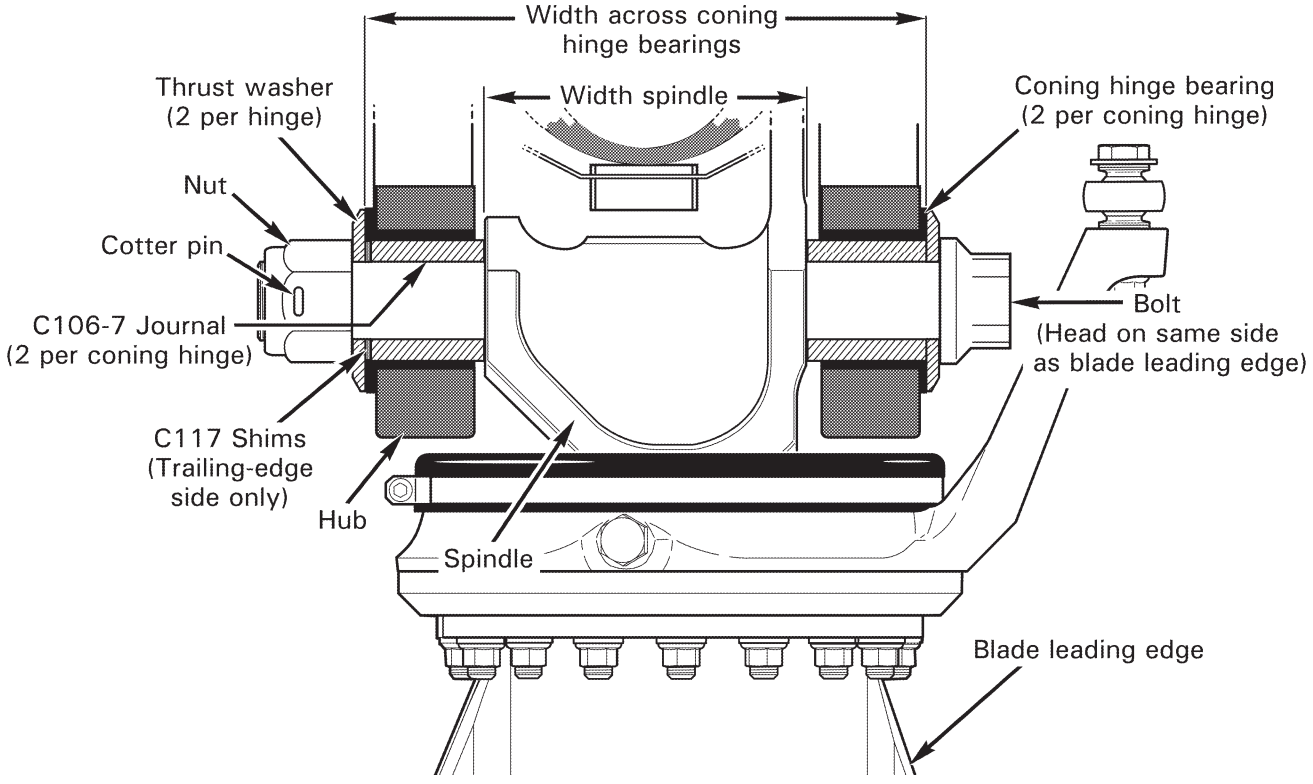

FIGURE 62-6B CONING HINGE (BLADE INSTALLATION)

62-30 Main Rotor Assembly

62-31 Journal and Shim Calculations

Refer to Figures 62-6A and 62-6B.

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 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.

62-31 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. Subtract combined measured length of both C106-7 journals to be installed: – _____ in.

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

5. Adjust shim stack as required to meet coning hinge axial gap requirement per Figure 62-7A 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. Increasing shim stack-up decreases hinge friction.

C106 Journal Lengths		
Part No.	Length	Location
C106-5	1.775	Teeter hinge (two per hinge)
C106-7	1.284	Coning hinge (two per hinge)

C117 Shim Sizes		
Part No.	Thickness	Location (Between thrust washer and journal)
C117-8	0.012	Teeter hinge; Coning hinge trailing-edge side
C117-9	0.015	Teeter hinge; Coning hinge trailing-edge side
C117-10	0.020	Teeter hinge; Coning hinge trailing-edge side
C117-11	0.025	Teeter hinge; Coning hinge trailing-edge side

TABLE 62-1 HINGE FRICTION JOURNALS AND SHIMS
(Journal length and shim thickness values given in inches)

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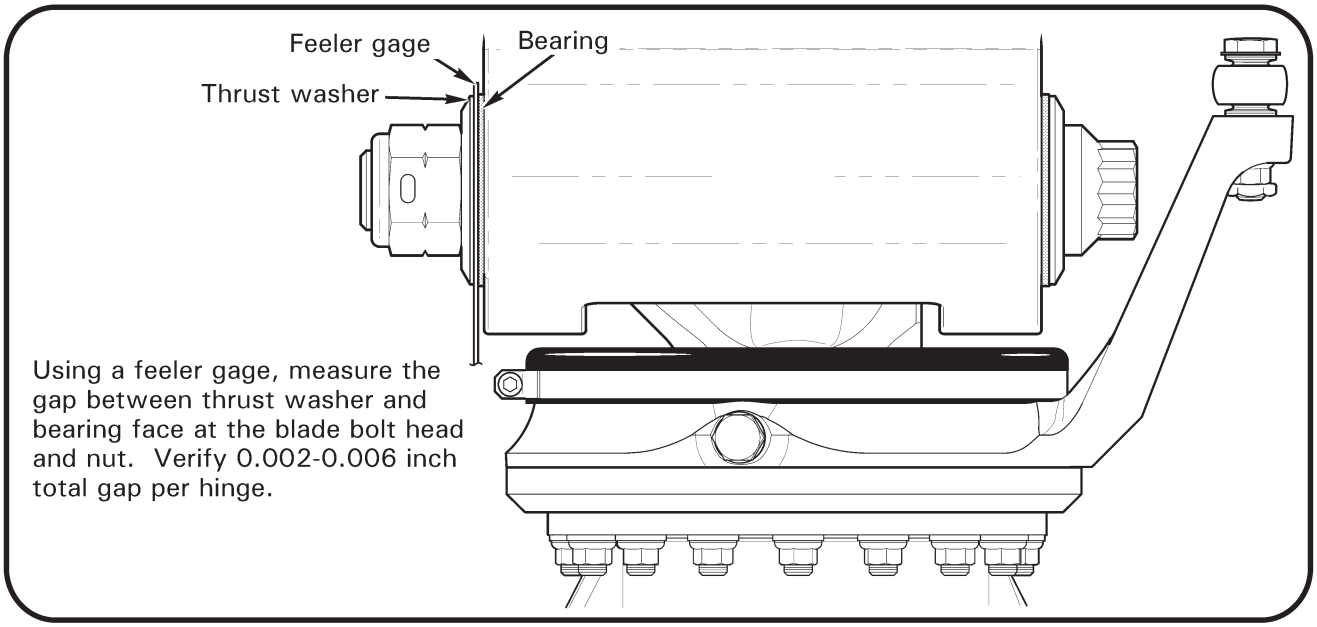

FIGURE 62-7A MEASURING CONING HINGE AXIAL CLEARANCE

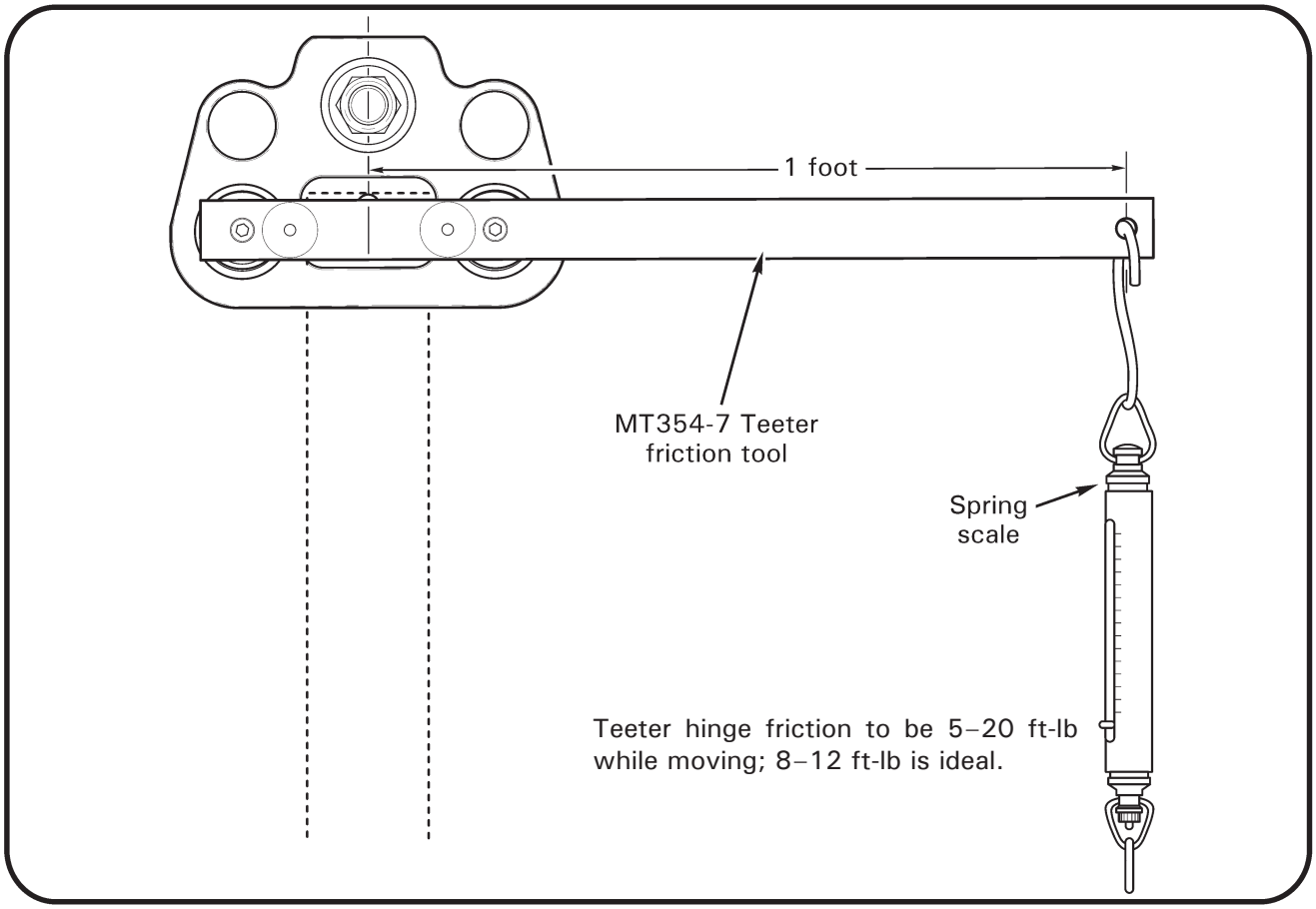

FIGURE 62-7B MEASURING TEETER HINGE FRICTION

62-32 Adjusting Hinge Friction

A. Teeter Hinge Friction Adjustment

1. Remove main rotor blades per § 62-10.
2. Refer to Figure 62-6A and Table 62-1. 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.
3. While stretching teeter hinge bolt, check teeter hinge friction frequently per Figure 62-7B. To check friction, install MT354-7 teeter friction tool into coning hinge bearings on one side of main rotor hub and measure lowest 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 stretched without exceeding friction limit, increase shim stack thickness per step 2.

4. Install a new bolt and nut per § 62-20.

B. Coning Hinge Friction Adjustment

1. Refer to Figure 62-6B and Table 62-1. Remove cotter pin, nut, thrust washer, and nut-side C117 shims. Adjust coning hinge axial clearance by changing nut-side shim stack thickness in small increments; reducing shim stack thickness decreases axial clearance, increasing shim stack thickness increases axial clearance. Install shims, thrust washer, and nut.
2. Install a new bolt and nut per § 62-10, steps 5 thru 9. Repeat steps for opposite blade, as required.
3. Check coning hinge friction by lifting blade tips until spindle tusks clear droop stops. Hold one blade level and cone opposite blade. Rotor hub must 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.
5. If not previously accomplished; drill nut and bolt per § 62-35. Install a new cotter pin wet with approved primer.

62-33 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 § 18-10).
4. Install teeter hinge bolt per § 62-20.

62-34 Drilling Main Rotor Hub Bolts

New bolts and nuts must be installed and bolts stretched to § 20-33 limits prior to drilling. Nuts have three blind holes pre-drilled into every other nut flat to be used as drilling guides.

Using a six inch long 0.156-inch diameter Cobalt twist-drill, drill a hole through nut and bolt using an accessible pre-drilled hole in nut. If a shorter length drill is used, protect hub from damage due to chuck contact by wrapping chuck and/or covering hub edge with several layers of tape. Prevent chips from contaminating other mechanisms.

NOTE

If none of the predrilled holes in nut are accessible for use as a guide after stretching bolt, loosen nut and reposition bolt and nut. Restretch bolt per § 20-33.

CAUTION

Due to loss of cross-sectional area, drilling a second hole thru main rotor hub bolts is prohibited.

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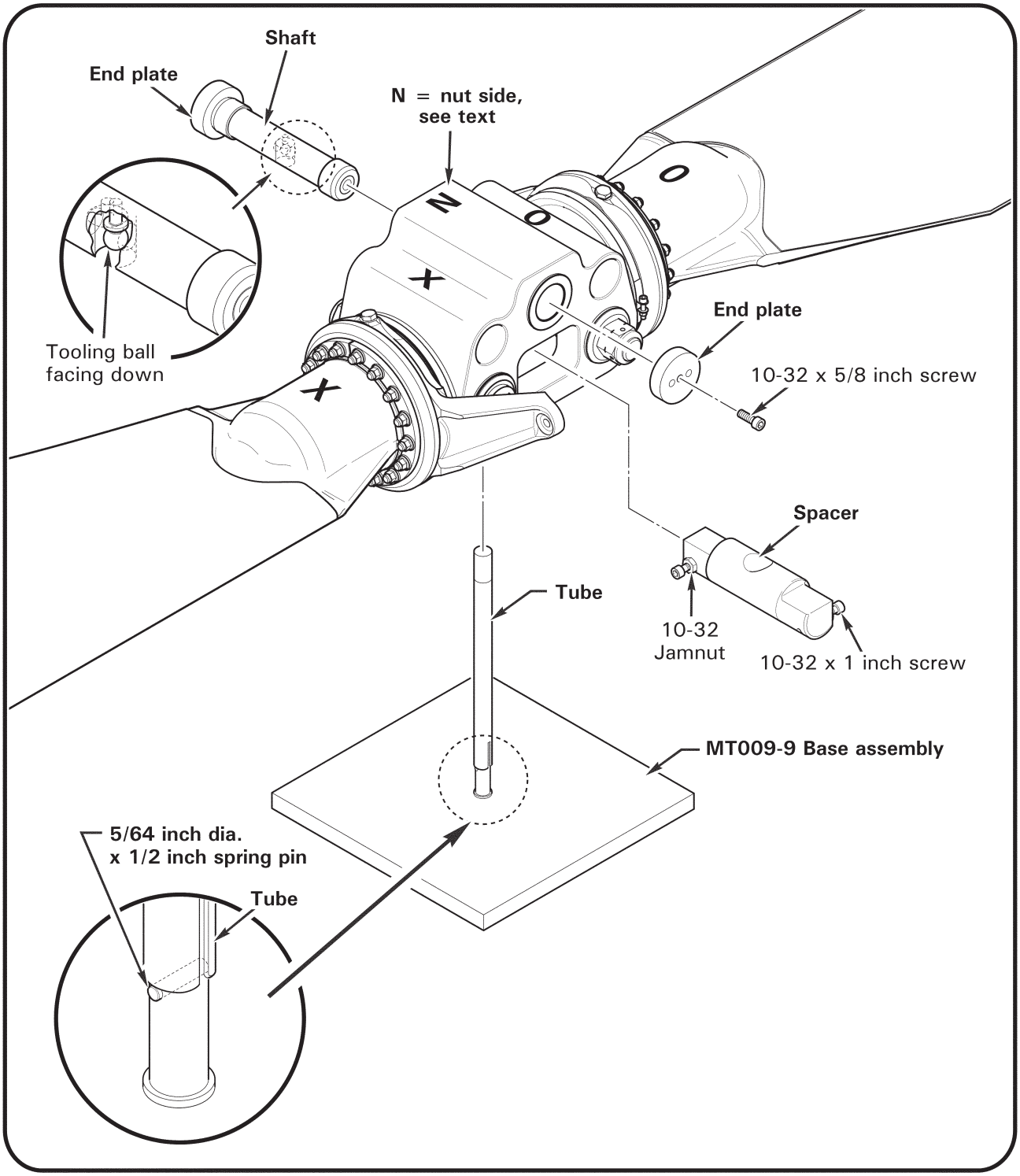

FIGURE 62-8A MT524-2 MAIN ROTOR STATIC BALANCE COMPONENTS ASSEMBLY INSTALLATION
[MT524-2 components assembly includes: (2) end plates, shaft, spacer, and screws.]

62-35 Static Balance

CAUTION

Ensure surfaces contacting blade skins and trailing edges are sufficiently cushioned to prevent blade damage.

1. Refer to § 62-31 Part B and Table 62-1. Assemble main rotor blade & spindle assemblies to main rotor hub by selecting a combination of C106-7 coning hinge journals and C117 coning hinge shims to obtain correct axial clearance.
2. Install nuts on hinge bolts dry and tighten just enough to prevent thrust washer rotation with fingers. Ensure total axial clearance at both blade hinges is on trailing-edge side only; push on blade(s) leading edge as required to move blade aft within hub.
3. Refer to Figure 62-8A. Install shaft in hub teeter-hinge bearings approximately centered, tooling ball facing down. Install screws securing (2) end plates on shaft finger tight.
4. Have a second person raise one blade tip. Insert spacer thru hub opening below shaft on leading edge side of raised blade and adjust screws as required to keep spacer parallel with shaft. Slowly lower raised blade while ensuring spacer is properly seated between spindle tusks and hub.
5. Hoist main rotor assembly sufficiently to position MT009-9 base assembly under hub. Lift & guide tube through spacer and into shaft, then slowly lower rotor assembly onto base assembly. Rest tube on spring pin.
6. Refer to Figure 62-8B. Adjust pitch horns to dimension shown and verify blade pitch angles are approximately equal. If blade pitch angles are not equal, then pitch horn(s) are not correctly installed.
7. Place a spirit level chordwise atop main rotor hub parallel with hinge bolts. Rotate tube so slots align with spring pin and lower tube onto base plate. Level rotor assembly chordwise by adjusting screws in end plates, but do not overtighten screws.
8. Refer to Figure 62-8B. Insert depth micrometer (or depth gauge) thru either hole of end plate; measure depth from end plate to shaft, repeat on opposite side of hub. Determine side of hub with smaller measured distance and mark top of hub with letter "N" to indicate nut-side of teeter hinge bolt.
9. Place a spirit level spanwise atop main rotor hub perpendicular to hinge bolts. Place tip cover, tip cover attach screws, and two A722-4 screws atop blade as close to tip as possible. Level rotor system by adding C298 balance strips, NAS1149F0332P washers, and/or NAS1149F0363P washers as required. Final spanwise balance to be within one NAS1149F0332P washer.
10. Apply light coat A257-9 anti-seize to screw threads and secure tip weights in blade tips; special torque screws to 40 in.-lb. Apply light coat A257-9 anti-seize to screw threads and secure tip covers to blades; special torque screws to 40 in.-lb. Recheck spanwise and chordwise balance; adjust as required.
11. Conspicuously mark rotor assembly with colored "X" and "O" on hub, blade roots, and coning bolts (consistent marking on each side of hub) as reference for correct assembly on helicopter. Disassemble main rotor assembly.

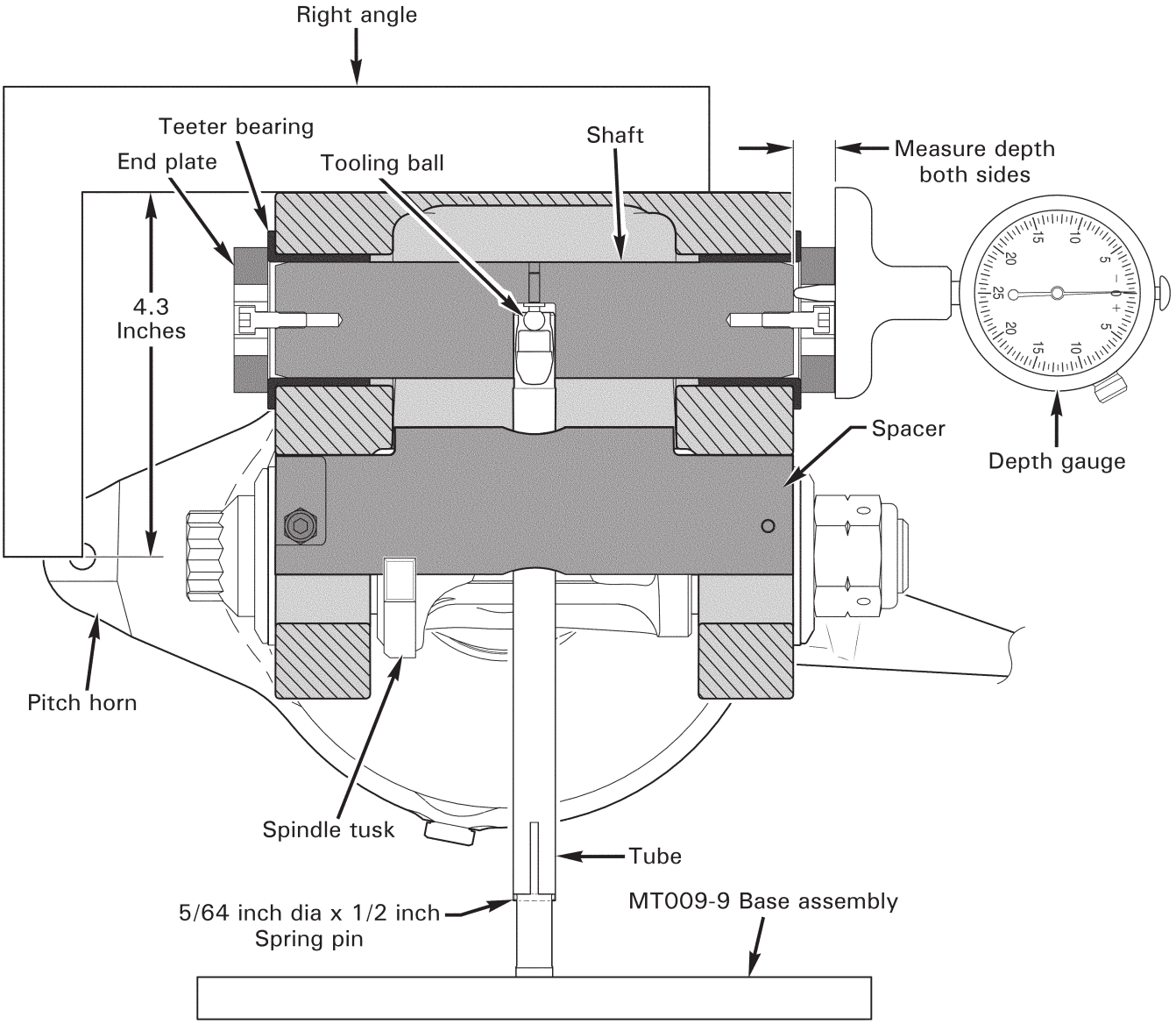

FIGURE 62-8B MEASURING GAP BETWEEN THRUST WASHER AND HUB BEARING

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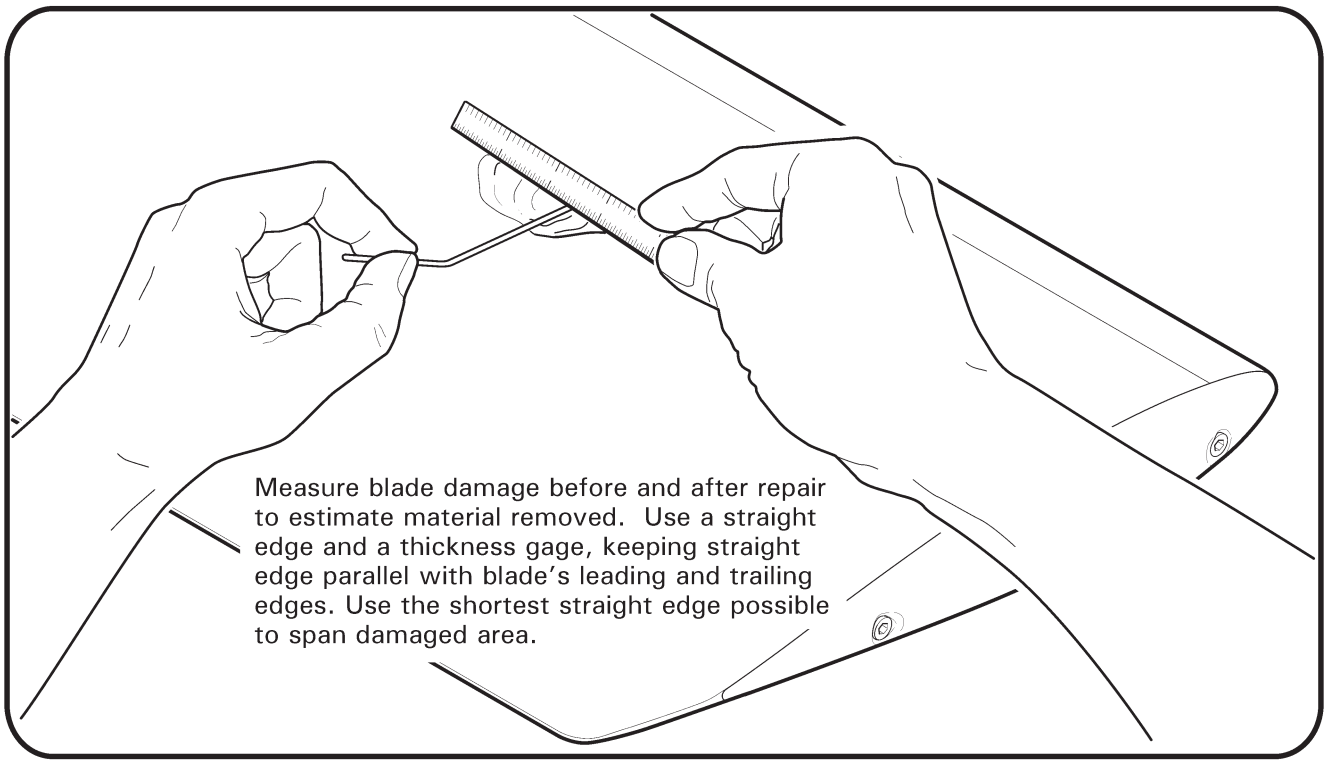


FIGURE 62-9 MEASURING MAIN ROTOR BLADE DAMAGE

62-40 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.

62-40 Inspection of Main Rotor Blades (continued)

A. Measuring Damage

1. Refer to Figure 62-9. 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.

62-41 Scratches and Corrosion

A. Skins and Doublers

1. Refer to § 62-50 for repair procedures. Polish out damage by hand with a 0.10 inch minimum blend radius.
2. Refer to § 62-40 for measuring damage and measuring material removed after repair. Repair may not exceed the following limits:
   a. 3.0 inch maximum diameter.
   b. 3.0 inch minimum distance from another repaired area.
   c. 0.012 inch maximum depth between RS 174.0 and RS 198.0.
   d. 0.008 inch maximum depth between RS 18.7 and RS 174.0.
3. When recording repair(s), indicate upper or lower blade surface, diameter, depth, and rotor station location (span and chord).

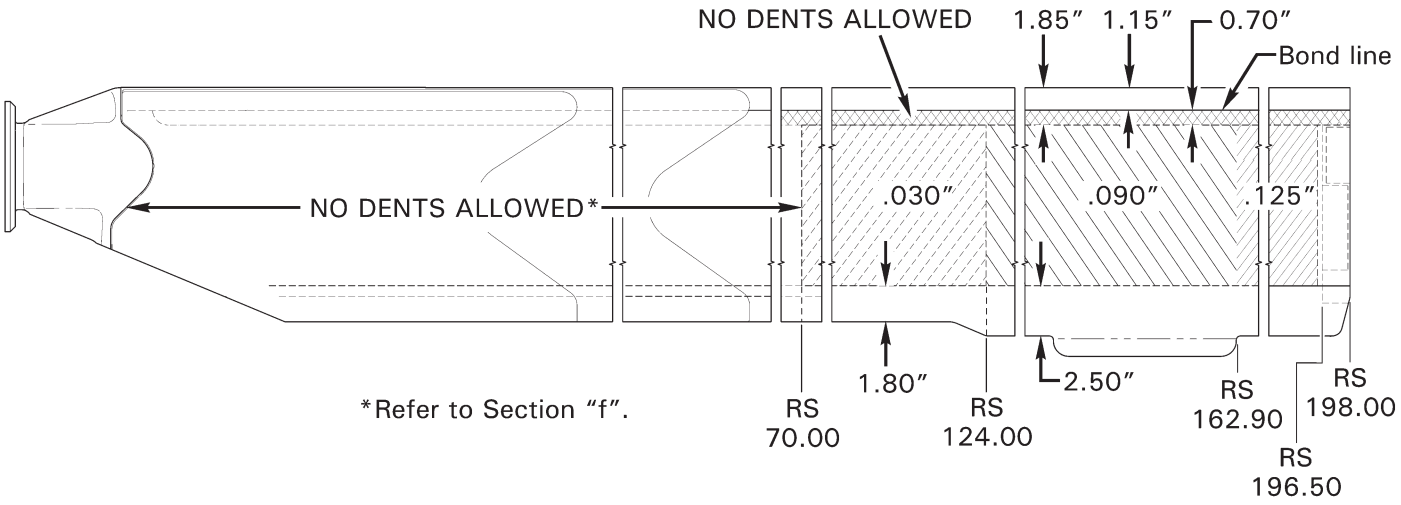


FIGURE 62-11 DENTS ON SKINS AND DOUBLERS – DAMAGE LIMITS (TOP AND BOTTOM OF BLADE)

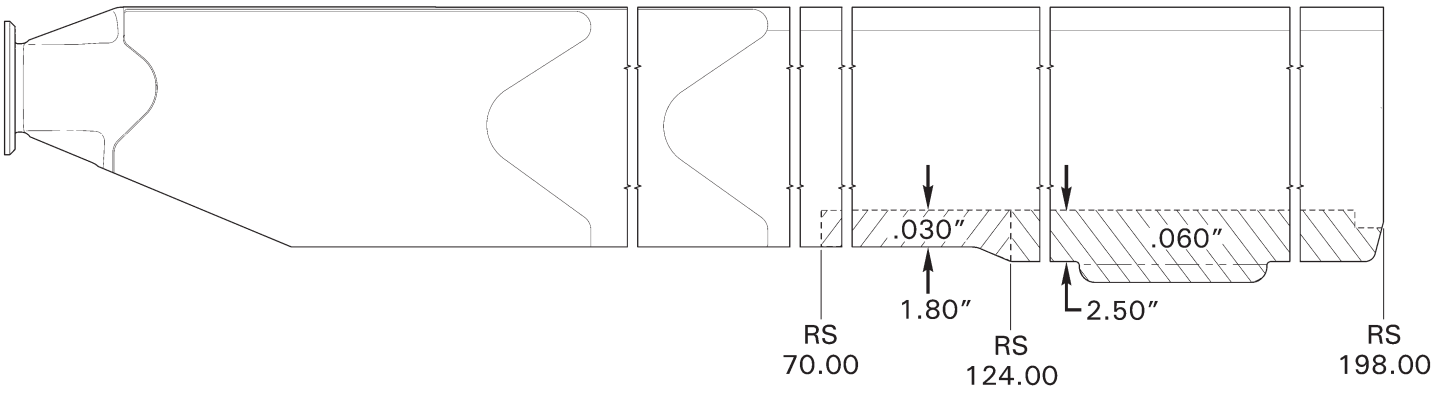


FIGURE 62-12 DENTS ON TRAILING EDGE BOND JOINTS – DAMAGE LIMITS (TOP AND BOTTOM OF BLADE)

62-42 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.

62-42 Dents (continued)

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.

A. Skins and Doublers

1. Refer to Figure 62-11. Smooth, round bottom dents with 0.060 inch minimum radius that occur in honeycomb and unsupported areas of the blade as listed below may be repaired when damage does not exceed the following limits:

   a. 0.125 inch maximum depth dent between RS 162.90 and RS 196.50
   b. 0.090 inch maximum depth dent between RS 124.00 and RS 162.90.
   c. 0.030 inch maximum depth dent between RS 70.00 and RS 124.00.
   d. Maximum area of any dent or dents is 12 square inches and maximum length is 2.0 inches between RS 70.00 and RS 162.90.
   e. Maximum area of any dent or dents is 24 square inches and maximum length is 4.0 inches between RS 162.90 and RS 196.50.
   f. Replace blade with any dent in 0.7 inch area immediately aft of skin-to-spar bond line.
   g. For dents in skins and/or doublers inboard of RS 70.00, contact RHC for repair procedures.

2. Refer to Part C for leading edge cap damage. Refer to § 62-50 for repair procedures for damage within limits.

B. Trailing Edge Bond Joints

1. Refer to Figure 62-12. Verify damage does not result in an edge void and does not exceed the following limits:

   a. 0.030 inch maximum damage between RS 70.00 and RS 124.00.
   b. 0.060 inch maximum damage between RS 124.00 and 198.00.
   c. Refer to Part A, step 1(d).

2. Refer to § 62-50 for repair procedures for damage within limits. Blend out dents in trailing edge bond joints with a 0.10 inch blend radius.

C. Leading Edge Cap

1. Verify damage does not result in a crack or tear and dent depth does not exceed 0.020 inch.

2. Dents do not require blending or filling. Dents may be blended with a 0.10 blend radius.

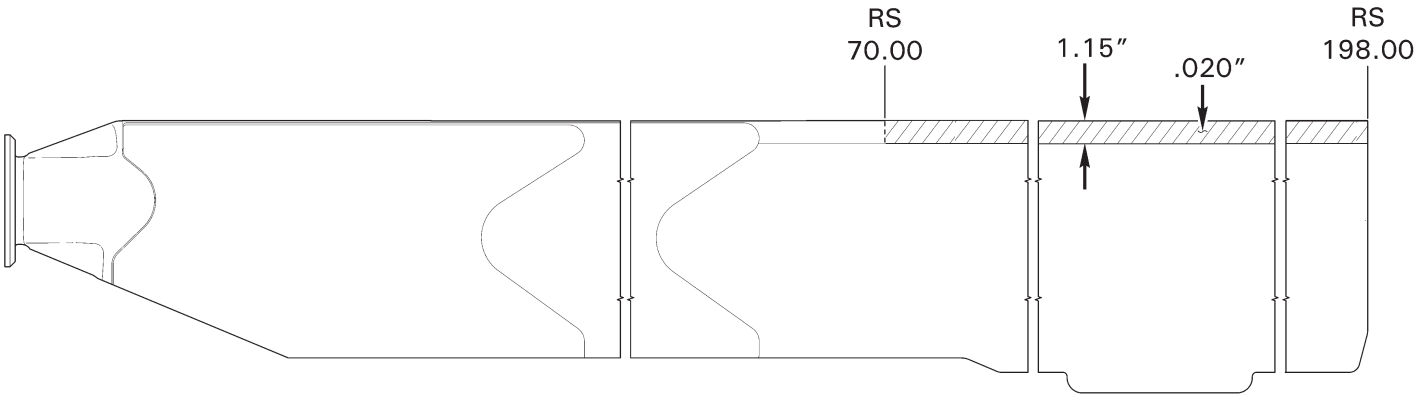


FIGURE 62-13 SPAR DAMAGE

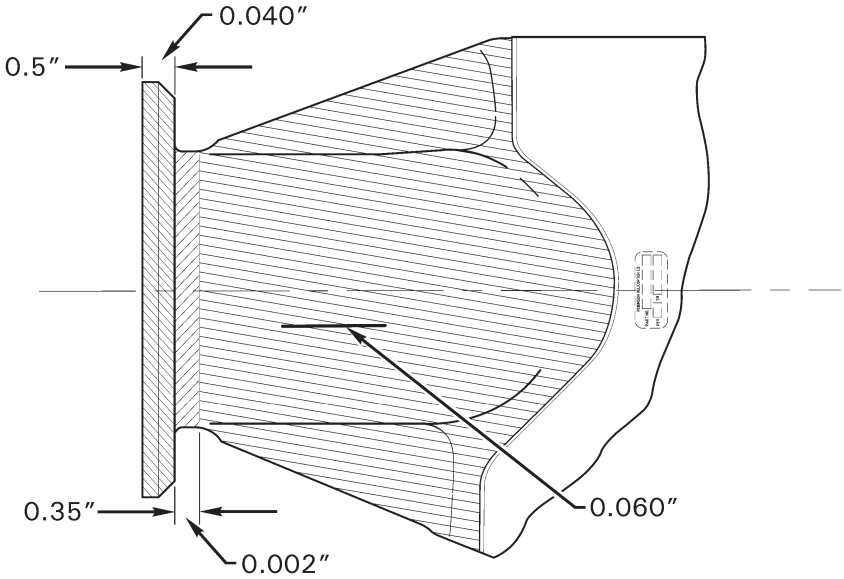


FIGURE 62-14 ROOT FITTING DAMAGE

62-43 Spar Damage

1. Refer to Figure 62-13. Spar damage limits exclude leading edge cap. Verify damage does not exceed the following limits:
   a. 0.020 inch maximum depth between RS 70.00 and RS 198.00.
   b. Replace blade if erosion has reduced thickness at spar leading edge to 0.040 inch.
   c. Replace blade if erosion has cause ripples in or deformation to spar leading edge.
2. Refer to § 62-50 for repair procedures for damage within limits. Blend out spar damage with a minimum 1.0 inch blend radius.

62-44 Root Fitting Damage

1. Refer to Figure 62-14. Verify damage does not exceed the following limits:

   a. 0.040 inch maximum depth on outside diameter of flange.
   b. 0.002 inch maximum depth on area 0.35 inch outboard of flange.
   c. 0.060 inch maximum depth on other root fitting exposed areas.

2. Refer to § 62-50 for repair procedures for damage within limits. Blend out root fitting damage with a minimum 1.0 inch blend radius.

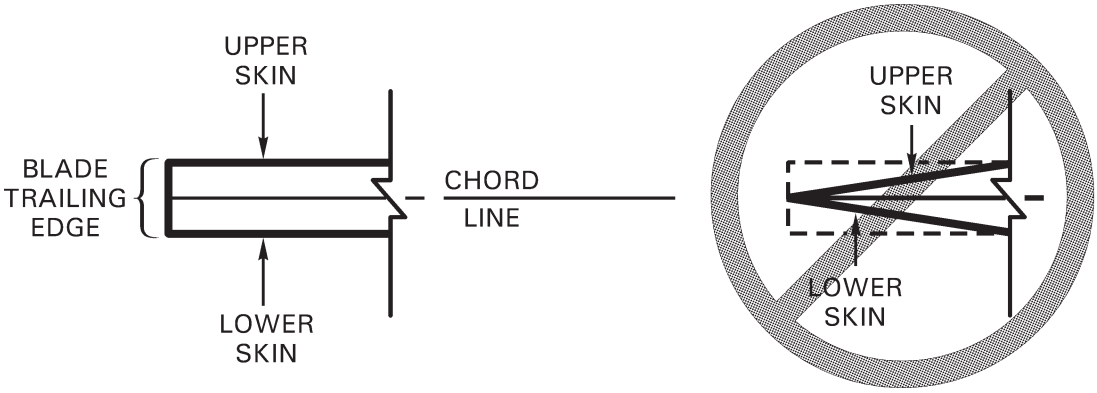


FIGURE 62-15 REPAIRS TO BLADE AND TRIM TAB TRAILING EDGES

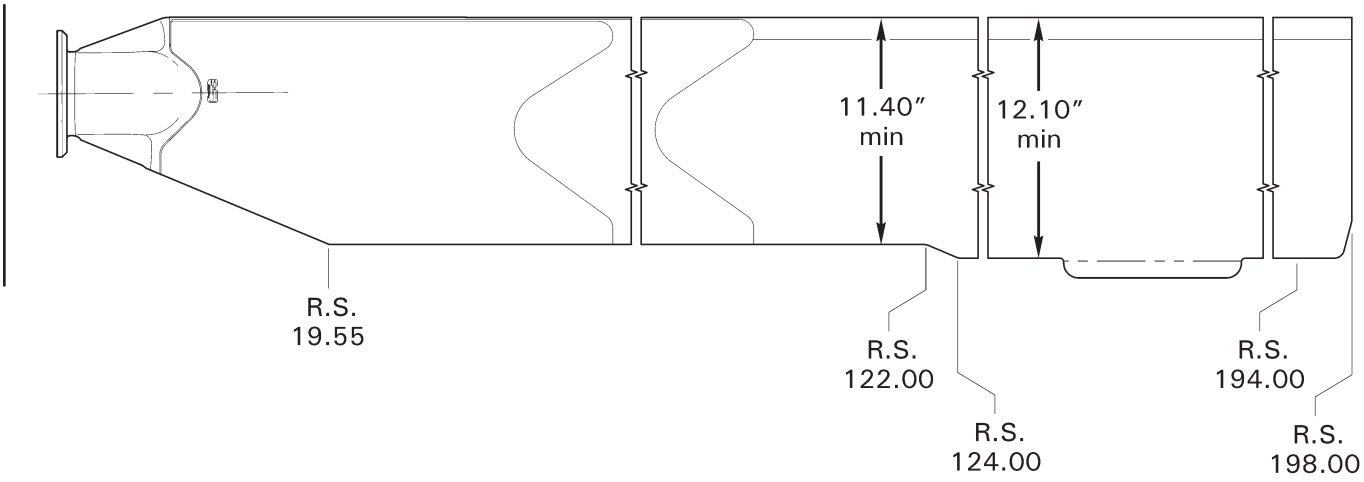


FIGURE 62-16 MINIMUM CHORD AFTER BLADE AND TRIM TAB TRAILING EDGE REPAIRS

62-45 Nicks and Notches

A. Blade Trailing Edge (see also Blade Tip)

1. Refer to Figure 62-15 and § 62-50 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 (with a minimum 12 inch blend radius).
2. Refer to Figure 62-16. After repair, verify minimum chord is within the following limits:
   a. 12.10 inch minimum chord between RS 124.00 and RS 194.00.
   b. 11.40 inch minimum chord between RS 19.55 and RS 122.00.
3. See § 62-42 for additional inspection criteria.

B. Blade Tip

1. Refer to Figure 62-17. Using a fine-toothed hand file, file in spanwise or chordwise direction, within limits indicated. Remove file marks using 220 grit or finer aluminum oxide abrasive paper.
2. File trailing edge to maintain square edge at skins, perpendicular to chord line, per Figure 62-15. Seal exposed trailing edge bond joint.
3. Track and Balance Main Rotor per Chapter 18.

C. Trim Tab Trailing Edge

1. Verify damage does not exceed 0.050 inch chordwise or 0.30 inch spanwise.
2. Refer to Figure 62-15 and § 62-50 for repair procedures for damage within limits. Blend out nicks & notches in trim tab trailing edges, 1.0 inch minimum each side of nick or notch (with a minimum 12 inch blend radius) keeping edge parallel with blade trailing edge.

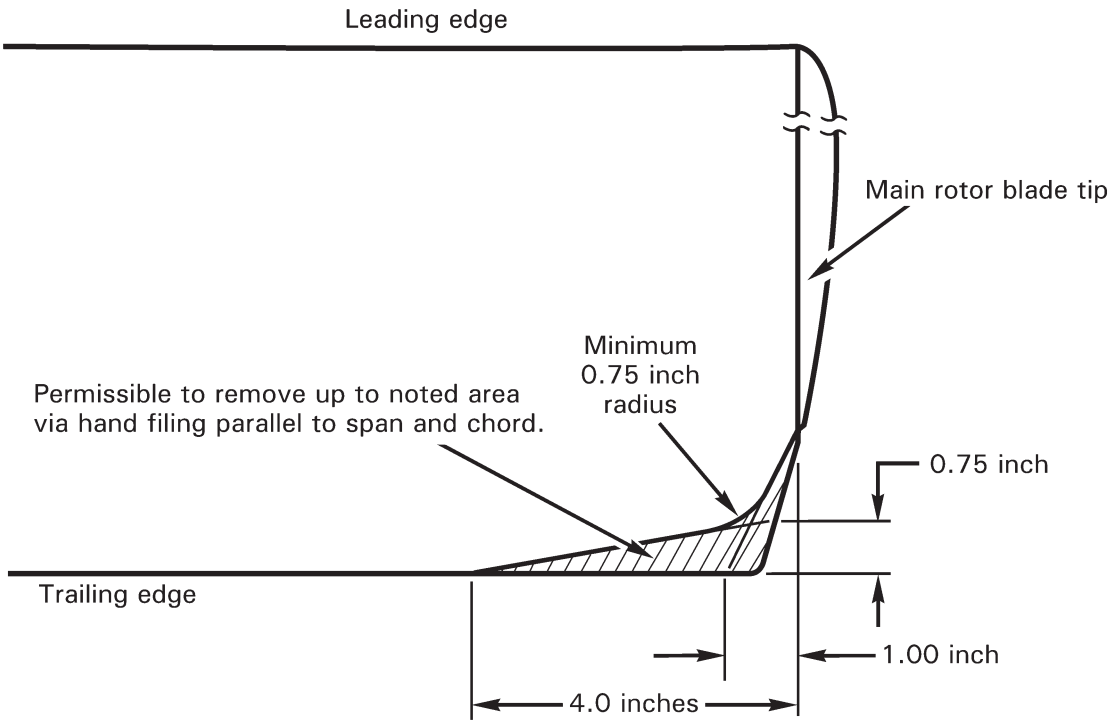


FIGURE 62-17 BLADE TIP REPAIR LIMITS

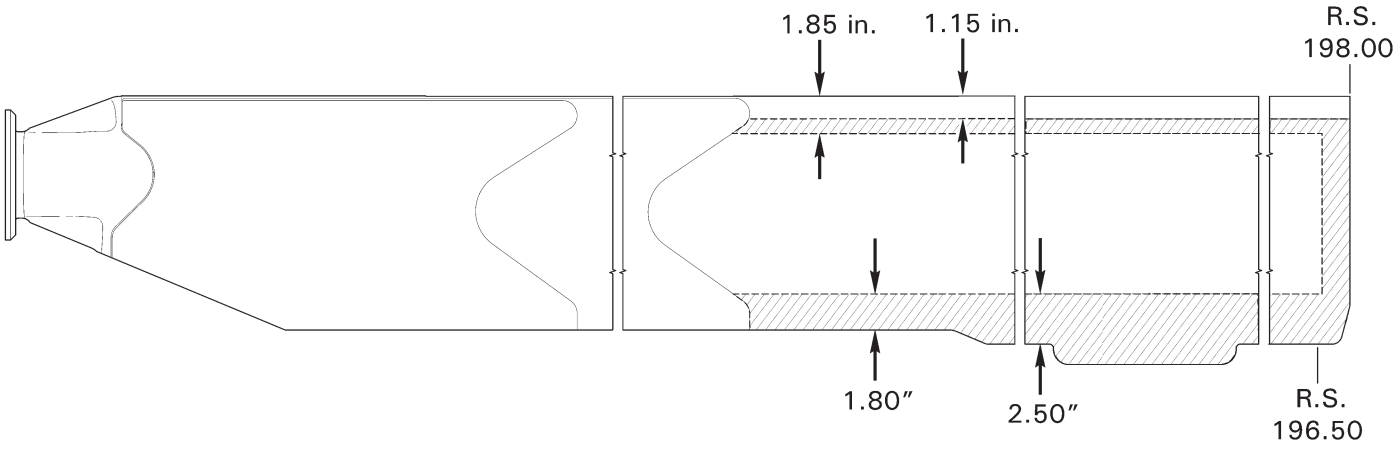


FIGURE 62-18 TIP CAP, SPAR, AND TRAILING EDGES - VOID AND DEBOND LIMITS

62-46 Voids and Debonds

WARNING

Voids or debonds in rotor blades are not field repairable. 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.

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.

A. Tip Caps, Spars, and Trailing Edges

1. Refer to Figure 62-18. Verify no continuous void larger than 0.10 square inch. 90% of the area must be securely bonded. Voids separated by 0.25 inch or less spanwise are considered continuous.

B. Doublers

1. Refer to Figure 62-19. Voids or debonds in doublers are not field-repairable.
   a. Critical Areas: Area less than 0.50 inch spanwise and less than 0.30 inch chordwise from edge of doubler. Verify no individual void larger than 0.10 square inch except at the doubler finger tips. The finger tips may be debonded from the outboard tip to 1.0 inch inboard. Voids that are separated by less than 0.25 inch shall be considered continuous.
   b. Non-Critical Areas: Area more than .50 inch spanwise or more than .30 inch chordwise from doubler edges. Verify void does not exceed 2.0 inches chordwise by 7.0 inches spanwise maximum continuous void. Voids that are separated by less than 0.25 inch shall be considered continuous. Total area of any void may not exceed 6.0 square inches.
2. If voids or debonds are beyond limit, contact RHC Technical Support.

C. Honeycomb

1. Refer to Figure 62-20. Verify damage does not exceed the following limits:
   a. 1.50 inch chordwise or 20.00 inch spanwise maximum continuous void between RS 121.00 & inboard. Total area of any void may not exceed 15.0 square inches.
   b. 2.50 inch chordwise or 20.00 inch spanwise maximum continuous void between RS 121.00 & RS 196.50. Total area of any void may not exceed 15.0 square inches.

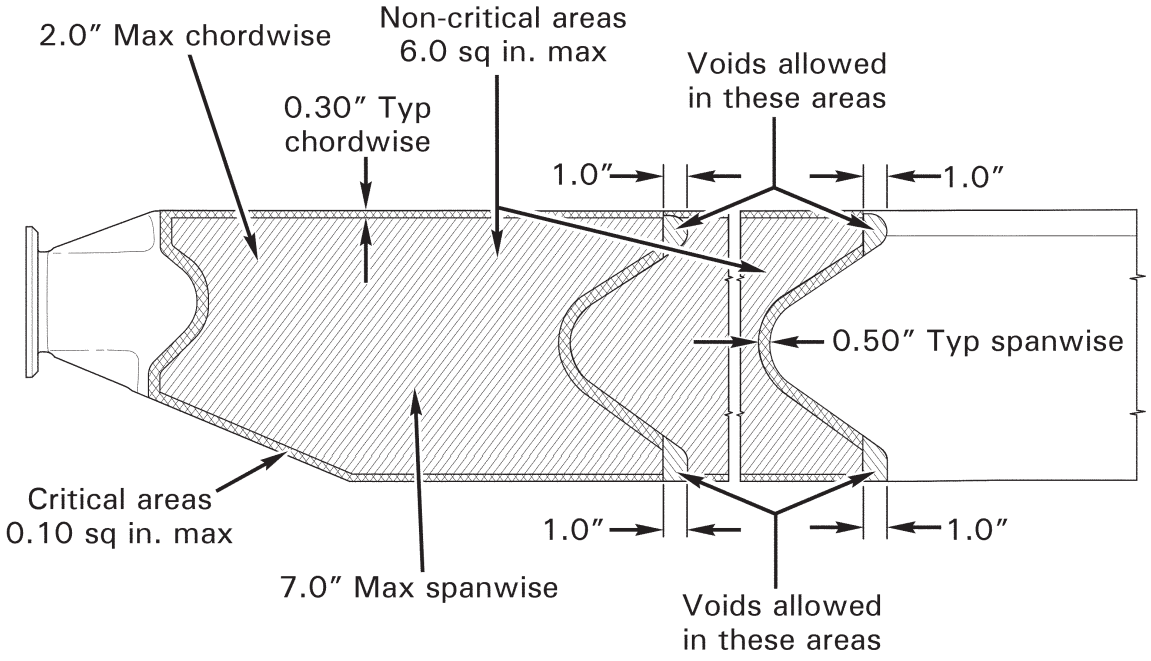


FIGURE 62-19 DOUBLERS - VOID AND DEBOND LIMITS

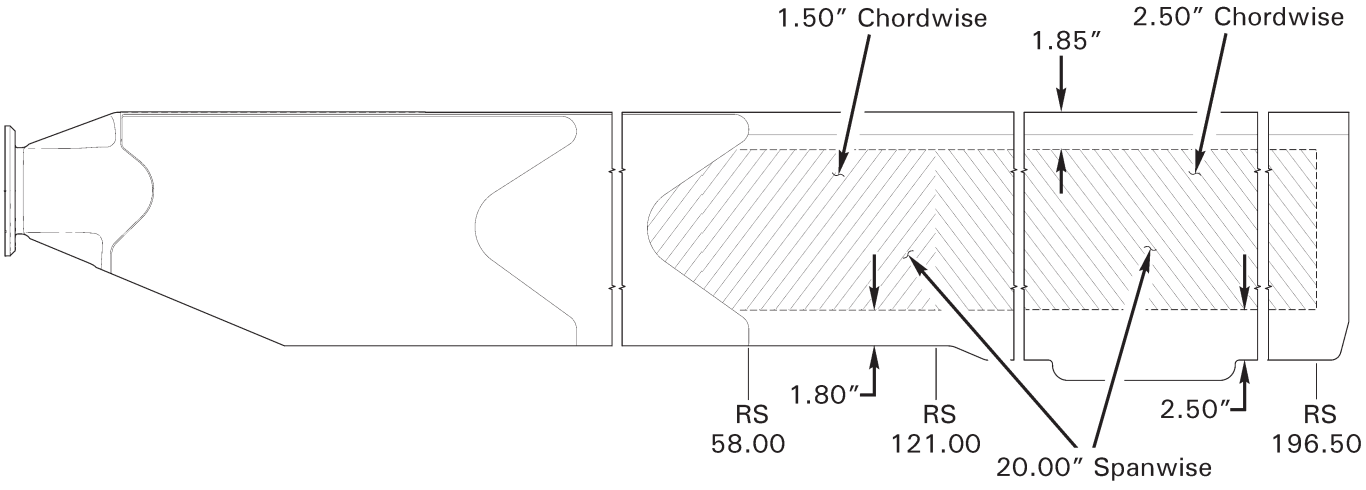


FIGURE 62-20 HONEYCOMB - VOID AND DEBOND LIMITS

62-50 Repair of Main Rotor Blades

WARNING

Unauthorized repairs to rotor blades have caused fatal crashes.

CAUTION

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

NOTE

Refer to § 20-70 for approved materials.

1. Measure damage per § 62-40.
2. Polish out blade damage using 220 grit or finer wet-or-dry aluminum-oxide abrasive paper, and finish with 320 grit or finer wet-or-dry abrasive paper. Hand-sand in spanwise direction.
3. 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. Hand-sand or file in spanwise direction.
4. Remove only the material necessary to reach the bottom of the damage, and to blend the reworked area to the radius or dimension required. Visually inspect and verify all damage is removed.
5. Measure reworked area and verify material removed and/or new chord dimension is permissible per § 62-40.
6. Seal and fill per § 62-51, as required. Paint per § 62-52, as required.
7. Track and balance main rotor per Chapter 18, as required.

62-51 Sealing, Filling, and Fairing

1. Clean area needing sealing, filling, and fairing with QSOL 220.
2. a. Apply B270-27 adhesive to seal all exposed bond joints except at tip of blade and 4–6 inches of outboard end of skin/spar joint; remove excess adhesive.

   b. Apply B270-1 sealant to seal tip of blade and 4–6 inches of outboard end of skin/spar joint; remove excess sealant. Cure for 2–3 hours at 125° ± 25° or air dry for 72 hours minimum.
3. Using 240 grit or finer wet-or-dry aluminum-oxide abrasive paper, hand-sand cured adhesive in spanwise direction to a smooth, aerodynamic finish, congruent with the blade airfoil. Do not remove metal.
4. Hand-sand surrounding painted surface until 25% primer remains. Keep bare metal to a minimum.

62-52 Painting

CAUTION

If force-drying paint, do not exceed 175°F surface temperature on blade; monitor blade temperature by temporarily installing P/N 110-2 Telatemp on blade skin.

1. Mask area to prevent overspray contamination.
2. Clean bare metal to be painted with a lint-free cloth dampened with enamel cleaner (see Approved Materials, § 20-70).
3. Prime bare metal with at least two coats of 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 new coat.

NOTE

Best results are achieved if primer is allowed to air-dry for 12 hours prior to top coat application.

4. Refer to Figure 62-21. Apply dark gray, flat black, white, and/or yellow Dupont Imron polyurethane enamel (or equivalent; see Approved Materials, § 20-70), 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).

5. Remove masking materials.

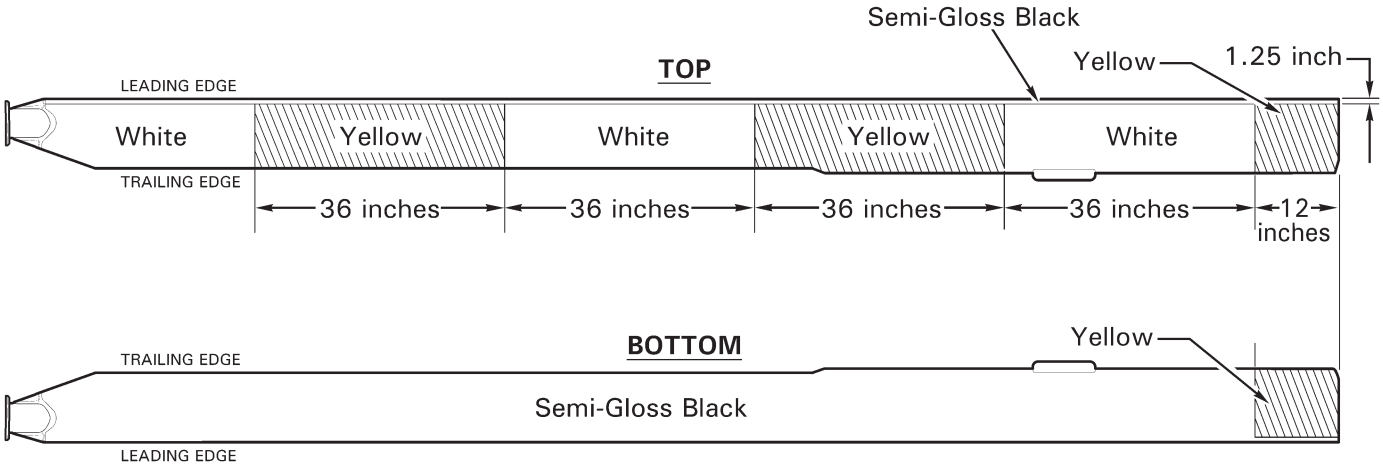


FIGURE 62-21 MAIN ROTOR BLADE PAINT SCHEME

62-60 Main Rotor Blade Tip Maintenance

After removing rounded tip covers, use 10X magnification when visually inspecting blade tip to verify no loose or blistered paint, white-powder corrosion products, or pitting of skins aft of skin-to-spar bond lines (upper & lower). If bare metal (other than spar leading edge) or corrosion is detected, proceed as follows:

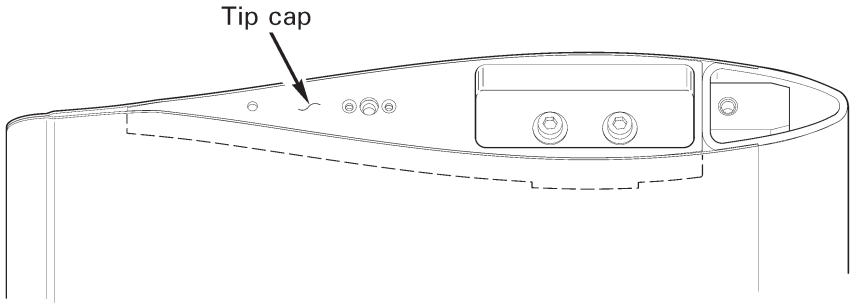
WARNING

Review appropriate Safety Data Sheet (SDS) when working in proximity to hazardous materials. Specific recommendations for use of personal protective equipment are located in the SDS.

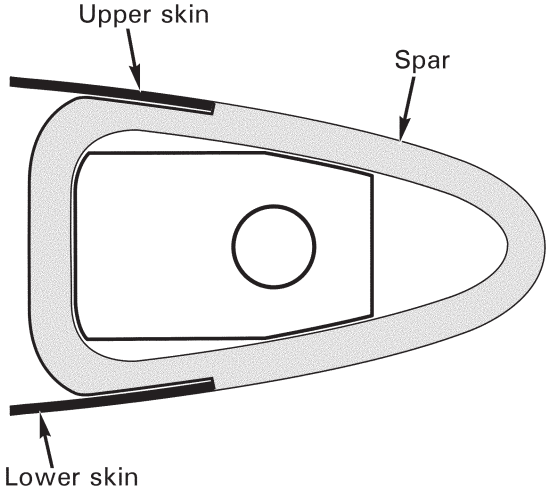
CAUTION

Do NOT use power tools or chemical paint strippers to remove blade paint.

1. Remove any corrosion and loose paint on tip cap and outboard edges of blade skins by hand-sanding vertical surface in a chordwise direction; use a hard, flat block with 220-grit aluminum-oxide abrasive paper, then finish sand with 320-grit aluminum-oxide abrasive paper. Remove only material necessary to eliminate corrosion.



2. Remove any corrosion and loose paint from skins on upper or lower surface of blade, aft of skin-to-spar bond joint, by hand-sanding in a spanwise direction using 220-grit aluminum-oxide abrasive paper and minimum 0.1 inch blend radius; finish sand with 320-grit aluminum-oxide abrasive paper. Remove only material necessary to eliminate corrosion.



62-60 Main Rotor Blade Tip Maintenance (continued)

3. Clean bare metal area with lint-free cloth dampened with acetone and allow to dry.
4. Seal exposed bond joints, including bond joints on vertical surfaces, with smooth layer of B270-1 sealant (poly-sulfide, refer to § 20-79) and allow to cure.
5. Prime remaining exposed metal with two coats of epoxy primer (chromated epoxy preferred).
6. Apply yellow paint topcoat within 2 – 48 hours of primer application. For best performance, allow paint to cure 48 hours before flight.
7. Install tip covers and special torque screws to 40 in.-lb wet with A257-9 anti-seize; ensure cover edges are flush with blade profile.