



R22 MAINTENANCE MANUAL and INSTRUCTIONS FOR CONTINUED AIRWORTHINESS RTR 060 VOLUME I

Production Certificate Number 424WE

Type Certificate Number H10WE



Robinson Helicopter Company
2901 Airport Drive
Torrance, California 90505-6115
United States of America

Phone: (310) 539-0508
Fax: (310) 539-5198
Web: <https://robinsonheli.com>

OFFICE HOURS

Monday through Friday, 6:00 a.m. to 6:00 p.m., Pacific Time.

CUSTOMER SUPPORT AND SPARES ORDERS

Please visit our website <https://robinsonheli.com/support> for the latest customer support contact information. You can also find a map of our global dealers and service centers that will be able to assist at <https://robinsonheli.com/dealers-and-service-centers>.

PUBLICATIONS

Viewing RHC Maintenance Manuals (MMs) and Illustrated Parts Catalogs (IPCs) online at <https://robinsonheli.com/publications> is recommended to ensure use of current data. Viewing MMs and IPCs offline via paper or digital download requires verification that the data is current. Refer to the online MM or IPC Revision Log for the list of current pages.

SUBSCRIPTION ORDER AND RENEWAL FORMS

Subscription order and renewal forms are located at <https://robinsonheli.com>.

WARRANTY INFORMATION

Helicopter and parts warranty information is located at <https://robinsonheli.com>.

TRADEMARK ACKNOWLEDGMENTS

All trademarks and registered trademarks are the property of their respective owners. Reference to any specific commercial products, process, or service by trade name, trademark, or manufacturer does not necessarily constitute or imply its endorsement.

NOTE

Failure to include the ® or ™ symbols or to capitalize specific brand names within the body of this manual does not constitute a waiver of the trademark rights by the respective owners.

- CherryMAX® is a registered trademark of Cherry Aerospace.
- Heli-Coil® is a registered trademark of Böllhoff Group.
- Loctite®, Alodine®, and BONDERITE® are registered trademarks of Henkel AG & Co. KGaA.
- LPS® is a registered trademark of ITW Pro Brands.
- Molykote® is a registered trademark of DuPont Specialty Products USA, LLC.
- Palnut® is a registered trademark of A. Raymond Tinnerman.
- Scotch-Brite™ is a trademark of 3M Company.
- Teflon™ is a trademark of The Chemours Company FC, LLC.
- Ty-Rap® is a registered trademark of ABB Installation Products.

1.009 Assembly Instructions for R22-series Helicopter Crated for Export (continued)

21. During level flight typical cruise altitude (if possible, deviate as required for weather and regulations), MCP, with right trim and governor on:
 - a. Verify longitudinal and lateral cyclic control forces are neutralized (no tendency of cyclic to creep longitudinally or laterally).
 - b. Verify collective control forces are neutralized (no tendency of collective to creep up or down).
 - c. Verify throttle correlation. Set MAP to 22 inches and turn governor off. Without twisting throttle, lower collective to 12 inches MAP then raise it to 22.5 inches MAP. RPM must stay in green arc.
22. Evaluate roughness at minimum power-on RPM, takeoff power per placard, and V_{ne} per placard.
23. Check all instruments, gauges, and avionics for proper operation.
24. During autorotation at 50 KIAS and 90% rotor RPM, perform 30° right yaw to check for adequate directional control.

TABLE 1 SCHEDULED INSPECTIONS Consult latest revision of listed publications for specific applicability.	First 25 hours	First 100 hours	Every 50 hours	Every 100 hours	Every 300 hours	Every 500 hours	Every 800 hours	Every 2200 hours	Every 4 months	Every 12 months	Every 4 years	Every 5 years	Every 12 years
Perform inspection per Lycoming Operator's Manual.*	•		•	•	•								
Perform Lycoming SB 480 <i>I. Oil & Filter Change & Screen Cleaning / II. Oil Filter/Screen Content Inspection.</i> <i>NOTE: Oil filters on D723-1 adapters do not require safety wire.</i>	•		•						•				
Perform Lycoming SI 1129 <i>Methods of Checking DC Alternator and Generator Belt Tension.</i>	•			•									
Perform Lycoming SB 301* <i>Maintenance Procedures and Service Limitations for Valves.</i>		•			•								
Perform Lycoming SB 388* (also applies to replacement cylinders) <i>Procedure to Determine Exhaust Valve and Guide Condition.</i>		•			•								
Perform Lycoming SB 366, as applicable <i>Carburetor Throttle Body Screw Inspection.</i>			•										
Perform Lycoming SI 1191 <i>Cylinder Compression.</i>				•									
Perform CMI SB 643, as applicable <i>Maintenance Intervals for All CMI/TCM/Bendix Magnetos & Related Equipment.</i>				•		•						•	•
Perform 100-hour/annual inspection per § 2.400.				•						•			
Perform main rotor blade tip maintenance per § 26-60.				•						•			
Lubricate A181-4 Revision K, L, and M bearings per § 22-42.					•					•			
Lubricate A184 bearing per § 22-41.					•					•			
Clean gearbox chip detectors per §§ 22-11 & 22-21.						•				•			
Weigh B381-1 or -4 fire extinguisher per § 15-62A.										•			
Perform CMI SB 663 <i>Two-Wire Magneto Tach. Breaker Contact (Points) Assy. P/N 10-400507.</i>						•							
Perform clutch assembly lubricant inspection & servicing per § 22-30.						•							
Drain and flush gearboxes per §§ 22-13 & 22-23.						•							
Perform FAA AD 88-26-01 R2 (A158-1 spindles only).						•							
Lubricate A181-4 Revision N and subsequent bearings per § 22-42.							•				•		
Perform 2200-hour/12-year inspection per § 2.600.								•					•

* Gray square indicates a shorter interval than published on referenced document.

1.100 Helicopter Servicing

1.101 Scheduled Maintenance and Inspections

Required maintenance and inspection intervals are given in Table 1. Publications listed are subject to revision.

Also consult the following for specific applicability, as some aircraft may require maintenance and inspections in addition to the requirements in Table 1:

- Aircraft maintenance records
- Manufacturers' Service Bulletins (SBs)
- Aviation regulations
- Airworthiness Limitations
- Airworthiness Directives (ADs)

Preventive maintenance is required between scheduled inspections. Fluid leaks, discoloration, fretting, galling, chafing, nicks, scratches, dents, cracks, and corrosion all warrant further investigation. Unairworthy items must be replaced or repaired as allowed by RHC.

1.102 Additional Component Maintenance

NOTE

RHC-manufactured parts not listed in § 1.102 as requiring additional component maintenance, or replacement per § 3.300, are "on condition".

A. 12 YEARS

Remove the following components when they have accumulated 12 years time in service and less than 2200 hours time in service since new, since last overhaul, or since last 12-year maintenance, and perform action indicated:

Part Number	Description	Action
A005-4	A154-1 Main Rotor Hub & Bearing Assembly	Perform inspection and repair per MM § 2.610, return to RHC for inspection and repair, or replace with new.
A005-12	B370-1 Main Rotor Hub & Bearing Assembly	
A005-6	A016-4 Main Rotor Blade & A158-1 Spindle Assembly	Submit to RHC-authorized component maintenance facility for 12-year maintenance, or replace with new or overhaul exchange. 12-year maintenance includes blade replacement (as required), spindle bearing replacement (as required), pitch horn screw replacement, boot and O-ring replacement, and inspection.
A005-7	A016-6 Main Rotor Blade & A158-1 Spindle Assembly	
A005-14	A016-6 Main Rotor Blade & A158-3 Spindle Assembly	
A006-1 & -6	Main Rotor Gearbox Assembly	Submit to RHC-authorized component maintenance facility for 12-year maintenance, or replace with new or overhaul exchange. 12-year maintenance includes pinion seal replacement, O-ring replacement, sealed bearing replacement, rubber mount replacement, additional bearings replacement (as required), and inspection.
A007-3, -5 or -6	Fanshaft Assembly	Replace with new A007-6 fanshaft assembly.
A008-2 or -4	Tail Rotor Assembly	Disassemble. Replace hub and/or blades as required. Remove bushings and teeter hinge bearings. Inspect hub; verify no fretting or corrosion. Fluorescent penetrant inspect hub if corrosion found. Replace teeter hinge bearings. Or replace with new A008-4 tail rotor assembly.
A014-8	Landing Gear Assembly originally installed on R22 S/N 0002 thru 0487.	Replace with new.
A017-2	Swashplate Assembly	Replace with new or overhaul exchange. 12-year maintenance includes inspection and repair as necessary.

2.410 Inspection Procedures and Checklist (continued)**11. Open Mast Faring (11) (continued)**

Main Rotor Drive Shaft: Inspect condition of accessible portion. Verify no corrosion.

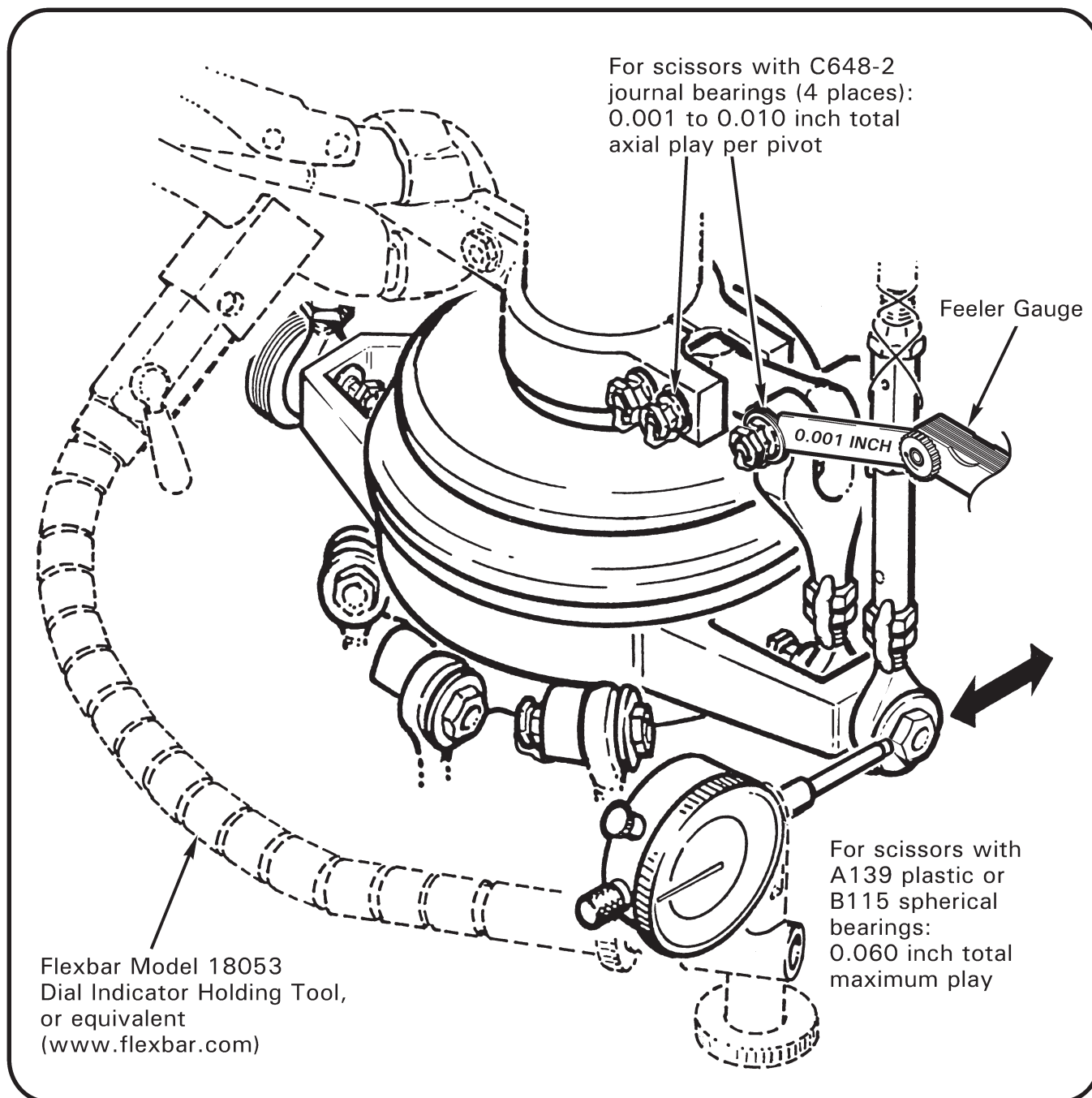


FIGURE 2-8 MEASURING UPPER SWASHPLATE SCISSORS PLAY
(Identify scissors bearing type and measure as shown)

2.410 Inspection Procedures and Checklist (continued)

12. Rotor Hub and Hinge Bolts

Hub: Inspect condition. Verify no nicks, scratches, gouges, or corrosion. If main rotor imbalance is suspected, check teeter and coning hinge friction per § 26-32. Verify no brown or black residue (indicates bearing wear). _____

Hinge Bolts (three): Inspect condition; corrosion is prohibited. Verify cotter pins are in place and secure. Verify bolt heads and nuts are torque striped to thrust washers. _____

Pitch Links and Rod Ends: Inspect condition. Inspect rod ends per § 2.120, including centering. Verify security, including jam nut tightness and proper safety wiring. _____

Fasteners & Torque Stripes: Inspect condition and verify security of all fasteners. Renew deteriorated torque stripes per Figure 2-1. _____

13. Main Rotor Blades

Blade Boots: Inspect condition. Verify no boot damage or oil leakage. Verify proper boot position and security. Verify sufficient clearance from hub assembly through full control travel. _____

Blade Spindles & Root Fittings: Inspect area for damage per § 26-43. Comply with FAA Airworthiness Directive 88-26-01 (current revision) as required (A158-1 spindles only). Verify proper installation and security of visible fasteners. Renew deteriorated torque stripes per Figure 2-1. _____

Main Rotor Blade Leading Edge Care: Perform main rotor blade leading edge care per § 26-53. _____

Main Rotor Blade Tip Maintenance: Perform main rotor blade tip maintenance per § 26-60. _____

Main Rotor Blade Inspection: Inspect skins and doublers for scratches and corrosion per § 26-41. Inspect blades for dents and local deformations per § 26-42 and for voids per § 26-44. As required, wax blades with soft cleaning cloths using carnauba-type wax (such as SC Johnson® Paste Wax). Ensure tip cover and blade tip drain holes are unobstructed. _____

WARNING

Structural damage may occur if compressed air is applied to blade tip drain holes.

2.410 Inspection Procedures and Checklist (continued)**14. Cabin**

General: Verify no loose equipment that might interfere with controls. _____

Seat Belts: Inspect condition. Verify no fraying, broken stitching, holes, or rotting. Verify no significant discoloration due to UV damage. Check inertia reels for proper operation. Check buckles for proper operation. Verify security. _____

NOTE

TSO tag not required on factory-installed harnesses.

Windows: Inspect condition. Verify no significant UV damage (yellowing). Minor defects or imperfections that do not impair pilot's visibility are considered acceptable. Acceptable defects include:

One nick, no more than 0.010 inch deep and no larger than 0.25 by 0.50 inch per square foot. _____

Scratches no more than 0.010 inch deep and 5 inches long. _____

Any surface defect such as small spots or stains that can be removed with light polishing. _____

For cracks and crazing adjacent to windshield edges refer to § 25-20. _____

Yaw String: Inspect condition. Minimum 3 inches long each side. Verify security. _____

Exterior: Inspect condition. Verify no cracks, corrosion, or damage. Verify no loose rivets. Loose rivets may be indicated by cracked paint and/or black residue around heads. _____

Left and Right Navigation Lights: Inspect condition. Verify red left, green right, lens cleanliness, and security. _____

Doors: Inspect condition. Verify no structural cracks around hinges or door latches. Check door vents for operation. Ensure door hinge pins are secured with cotter pins. Check tightness of hinge mounting screws. Verify proper operation of door latching and locking mechanisms. _____

Fasteners & Torque Stripes: Inspect condition and verify security of all fasteners. Renew deteriorated torque stripes per Figure 2-1. _____

2.410 Inspection Procedures and Checklist (continued)**15. Landing Gear**

Skid Tubes and Shoes: Inspect condition. Verify no more than 0.5 inch wide flat area on underside of skid tube due to wear. Verify longitudinal scratches are not more than 0.030 inch deep, and circumferential scratches are not more than 0.030 inch deep & are less than 0.50 inch long. Verify drain holes are open (not applicable to float landing gear). Verify security of rain caps. Verify minimum 0.05 inch shoe thickness.

Strut Assemblies or Weldments: Inspect condition. Verify no cracks or corrosion, especially where joined and in weld areas. Verify security. If helicopter routinely performs running landings, torque check strut-to-skid tube bolts.

Cross Tubes: Inspect condition. Verify minimum tail skid height per § 5.210. Verify no corrosion. Verify security of rain caps. If a rain cap is loose, verify no internal corrosion. Verify no cracks or evidence of fretting at all cross tube-to-strut junctions (ref. Figure 2-9). Fretting may be indicated by dark gray residue at interface; if fretting is indicated, mark cross tube approximately 1 inch inboard from strut junction, then remove cross tube per § 5.210 and fluorescent penetrant inspect cross tube end(s) outboard of marked area.

Landing Gear Attach Points: Inspect condition. Verify no loose fasteners, cracks, buckling, or fretting. Inspect mounts and verify no loose swages or worn bearings.

Floats (if installed): Perform relief valve and bulkhead tests per § 2.580 (2) and (3). Verify proper inflation pressure per R22 POH. Inspect condition. Verify security.

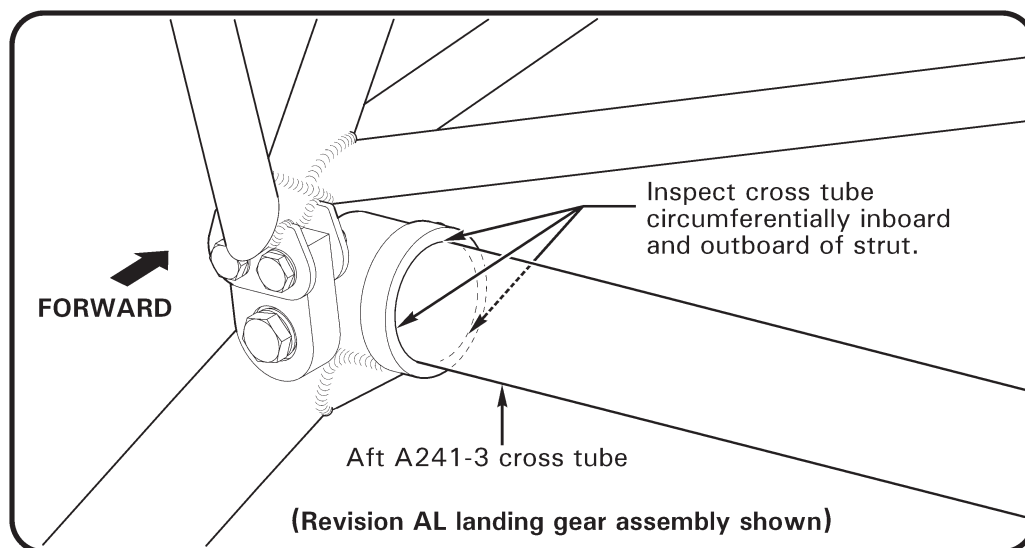


FIGURE 2-9 CROSS TUBE-TO-STRUT INSPECTION

2.410 Inspection Procedures and Checklist (continued)**15. Landing Gear (continued)**

Float Skid Tubes (if installed): Remove drain plugs at aft end of skid extensions. With ground handling wheels installed, pull down on tailcone to drain any trapped moisture. Install drain plugs. _____

Fasteners & Torque Stripes: Inspect condition and verify security of all fasteners. Renew deteriorated torque stripes per Figure 2-1. _____

16. Life-Limited Parts, Additional Limitations, ADs, & SBs

Life-Limited Parts: Refer to helicopter maintenance records and § 3.300. Replace life-limited parts as required. Verify components installed have sufficient time remaining for projected operations. _____

Airworthiness Directives: Verify applicable airframe, engine, and accessory Airworthiness Directives (ADs) have been performed according to AD compliance procedures. Some aircraft may be affected by ADs that require recurring inspections at less than 100-hour or annual intervals. Recent U.S. Airworthiness Directives are available online at www.faa.gov. _____

Service Bulletins: Verify applicable airframe, engine, and accessory Service Bulletins (SBs) have been complied with according to manufacturers' instructions. Some aircraft may be affected by SBs that require recurring inspections at less than 100-hour or annual intervals. RHC Service Bulletins are available online at <https://robinsonheli.com>, under the Publications tab. _____

17. Required Documents and Placards

Documents: Check that required documents (Airworthiness Certificate, Registration, applicable Radio Station License, Pilot's Operating Handbook, Equipment List/Weight & Balance Data) are on board, legible, and current. _____

Placards: Verify required placards are properly installed, legible, and current. Refer to Pilot's Operating Handbook Section 2 for placard requirements. _____

18. Inspection and Access Covers

Foreign Objects Removed: Verify all tools, loose hardware, rags, and other foreign objects are removed from helicopter. _____

Covers Closed and Secure: Install/close all inspection and access covers removed in preceding steps. Verify security of all access covers. _____

Mariner Airbox Sealed: Ensure air box cover perimeter is sealed with aluminum tape (Mariner models only). _____

2.410 Inspection Procedures and Checklist (continued)**19. Maintenance Records**

Maintenance Records: Verify maintenance records are accurate, legible, and complete. Enter maintenance performed (such as part replacement, equipment adjustments, servicing, and lubrication) and inspection data. Data must include a description of (or reference to data acceptable to the Administrator) the work performed, date, helicopter total time in service, signature, certificate type and certificate number of person approving aircraft for return to service. _____

SHEAVE ALIGNMENT LEFT: _____ **ENGINE HEIGHT:** _____

SHEAVE ALIGNMENT RIGHT: _____ **CLUTCH ANGLE:** _____

TRDS RUNOUT: _____

CHECKLIST COMPLETE:

Mechanic's signature: _____ Date: _____

2.550 Hard Landing**A. Yielding of Cross Tubes Due to Hard Landings Without Side Loads****NOTE**

Side loads are indicated by buckling and bending of steel tube frame or sheet metal.

1. Visually inspect steel tube frames. Verify no yielding or cracks. Pay particular attention to lower steel tube frame aft vertical struts.
2. Check tail rotor drive shaft run-out per § 7.340.
3. Visually inspect main rotor blades per § 26-40.
4. Place rotorcraft on level ground and measure from tail skid or bottom of float stabilizer to ground. Replace aft cross tube per § 5.200 if dimension is less than:

24 inches for Standard or HP.

34 inches for Alpha, Beta, Beta II, Mariner, or Mariner II measured from tail skid.

37 inches for Mariner or Mariner II, measured from float stabilizer.

Replace forward cross tube per § 5.200 if cross tube contacts cross tube cover.

5. Check and adjust upper and lower sheave alignment per § 7.230.

B. Hard Landings That May Impose Side Loads on Landing Gear**NOTE**

Side loads are indicated by buckling and bending of steel tube frame or sheet metal.

1. Perform inspection per Part A.
2. Visually inspect fuselage landing gear attach points, vertical firewall, and horizontal firewall. Verify no buckling or cracks. Pay attention to engine mount strut-to-vertical firewall attach points.
3. Remove tailcone per § 4.311.
4. See Figure 2-12. Using an approved paint stripper (ref. § 23-71), remove paint from and within 2 inches of tailcone attach points on upper frame. Fluorescent penetrant inspect (ref. § 23-42) upper steel tube frame at tailcone attach points.
5. Visually inspect tailcone. Verify no buckling or loose rivets.
6. Visually inspect landing gear elbows. Verify no yielding, nicks, or cracks.

2.550 Hard Landing (continued)

B. Hard Landings That May Impose Side Loads on Landing Gear (continued)

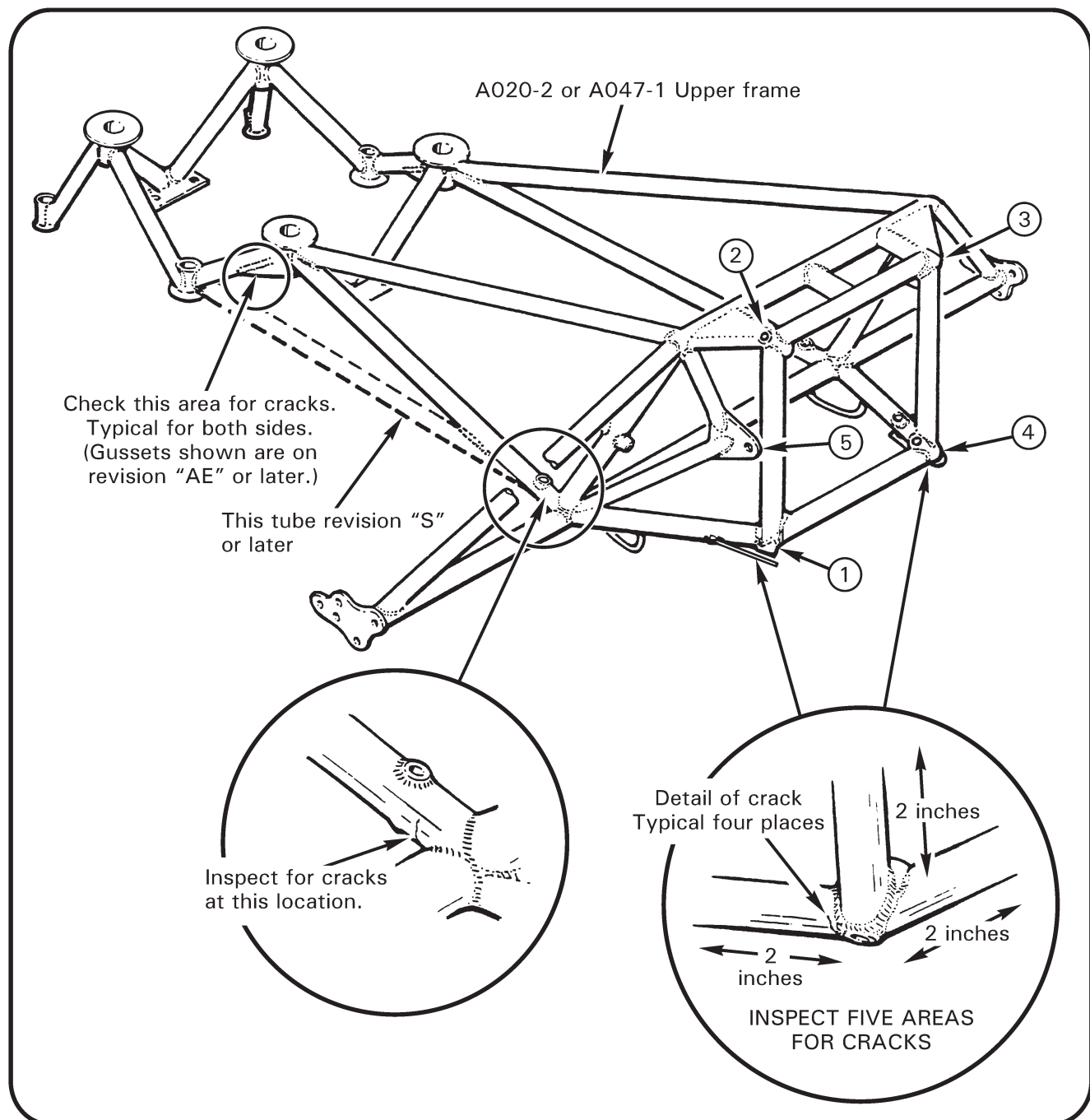


FIGURE 2-12 UPPER FRAME CRACK INSPECTION

CHAPTER 5

LANDING GEAR

<u>Section</u>	<u>Title</u>	<u>Page</u>
5.000	Landing Gear	5.1
5.001	Introduction	5.1
5.002	Description	5.1
5.100	Landing Gear Assembly	5.2
5.110	Landing Gear Removal	5.2
5.120	Landing Gear Installation	5.2
5.200	Cross Tubes	5.3
5.210	Cross Tube Removal	5.3
5.220	Cross Tube Installation	5.4
5.300	Skid Tubes	5.5
5.310	Skid Tube Removal	5.5
5.320	Skid Tube Installation	5.5
5.330	Skid Shoe Removal and Replacement	5.5
5.340	Ground Handling Wheel Support Removal and Replacement	5.8
5.400	Preventive Maintenance	5.8
5.500	Float Ship Landing Gear	5.9
5.510	Float Landing Gear Removal	5.9
5.520	Float Landing Gear Installation	5.10
5.530	Float Tube Removal	5.11
5.540	Float Tube Installation	5.11
5.550	Float Tube Repair	5.13

Intentionally Blank

CHAPTER 5

LANDING GEAR

5.000 Landing Gear

5.001 Introduction

This section covers removal and reinstallation of the landing gear assembly, cross tubes, skid tubes, skid shoes, and ground handling wheel supports.

5.002 Description

A skid-type landing gear is used. Most hard landings will be absorbed elastically. However, in an extremely hard landing, the struts will hinge up and outward as the crosstube yields (becomes permanently bent) to absorb the impact. Slight crosstube yielding is acceptable. Replace forward crosstube when yielding results in contact with underlying cover. Yielding which allows the tail skid to be within 34 inches (24 inches for R22 Standard or HP, 37 inches for Mariner) of the ground when the helicopter is sitting empty on level, hard surface requires crosstube(s) replacement.

Abrasion-resistant wear shoes are mounted on the bottom of the skids. These shoes should be inspected periodically, particularly if autorotation landings with ground contact have been performed.

R22 Mariners have permanently inflated utility floats mounted to skid tubes and incorporate aft skid extensions to support the floats.

5.100 Landing Gear Assembly

5.110 Landing Gear Removal

1. Remove forward cross tube cover.
2. Jack or hoist helicopter per Chapter 17.
3. If installed, disconnect A936-2 ground wire at aft-right strut assembly.
4. Remove two left side landing gear mounting bolts and rest left side landing gear on ground. As required, pull landing gear assembly right to pivot forward right shackle for access to attach bolt.
5. Remove two right side landing gear mounting bolts and place landing gear on ground.
6. If helicopter jacked using contour block, remove either skid tube per § 5.310 and slide landing gear clear of helicopter.

5.120 Landing Gear Installation

NOTE

If replacing revision AH or prior landing gear assembly with revision AI or subsequent, also replace (2) A014-7 support assemblies with (2) A574-2 support assemblies.

1. Refer to Chapter 17. Ensure helicopter is jacked or hoisted to allow sufficient clearance for landing gear assembly installation. If helicopter is jacked using contour block, remove either skid tube per § 5.310 as required.
2. Position landing gear assembly under helicopter. If skid tube was removed, install skid tube per § 5.320 as required.

NOTE

All mounting bolts are installed from aft side. If installing revision AH or prior landing gear assembly, ensure large diameter washers are installed on both sides of each strut assembly to secure A278-1 spacers.

3. Lift landing gear right side and install mounting bolts. Standard torque mounting bolts per § 23-32 and torque stripe per Figure 2-1.
4. Lift landing gear left side. Carefully deflect lower frame as required to align mounting holes and install mounting bolts. Standard torque mounting bolts per § 23-32 and torque stripe per Figure 2-1.
5. As required, attach A936-2 ground wire to aft-right strut assembly below mounting bolt. Standard torque hardware per § 23-32 and torque stripe per Figure 2-1.

5.120 Landing Gear Installation (continued)

NOTE

(2) A574-2 support assemblies are required for proper grounding if A936-2 ground wire is not installed.

6. Verify resistance from left and from right skid tube ground handling supports to cabin structure is less than 5 ohms.
7. Lower helicopter per Chapter 17.

5.200 Cross Tubes

5.210 Cross Tube Removal

Replace cross tube(s) if yielding results in tail skid-to-level ground dimension of less than 24 inches for a Standard or HP, 34 inches for an Alpha/Beta/Beta II, or 37 inches for a Mariner/Mariner II with float stabilizer installed.

NOTE

See § 2.550 for hard landing inspection criteria.

A. A241-3 Cross Tube (Assembled with A239-4 Strut Weldments)

1. Remove landing gear per § 5.110.
2. Carefully tap out strut weldments using a soft-face hammer.
3. Using a soft brass or aluminum drift, carefully tap out spacers installed in cross tube, if desired.

B. A241-2 Cross Tube (Assembled with A014-18 Strut Assemblies)

1. Remove landing gear per § 5.110.
2. Using a soft brass or aluminum drift, carefully tap out spacers securing cross tube in strut assembly and tap strut off cross tube.
3. If difficulty is encountered while removing strut assembly from cross tube:
 - a. Install spacer securing opposite strut assembly to cross tube.
 - b. Remove hardware securing stuck strut assembly to skid tube.
 - c. Place a rigid support under cross tube near stuck strut assembly.
 - d. Rotate stuck strut assembly in both directions on cross tube to break paint bond and remove from cross tube.
 - e. Remove spacer installed in step 3a. and remove cross tube.

5.220 Cross Tube Installation

A. A241-3 Cross Tube (Assembled with A239-4 Strut Weldments)

1. Apply light coat of approved primer (ref. § 23-75) to outside diameter of A243-6 spacers and tap thru cross tube using a soft-face hammer.
2. Apply light coat of approved primer (ref. § 23-75) to cross tube at strut weldment mating surfaces. While primer is wet, install cross tube into strut weldments and align fastener holes.
3. Temporarily install mounting bolts, finger tight.
4. Apply approved primer to all mating-surface junctions to seal assembly.

B. A241-2 Cross Tube (Assembled with A014-18 Strut Assemblies)

1. Apply light coat of approved primer (ref. § 23-75) to cross tube at strut assembly mating surfaces. While primer is wet, install cross tube into strut assemblies and align fastener holes.
2. Apply light coat of approved primer (ref. § 23-75) to outside diameter of A278-1 spacers and tap thru strut assembly & cross tube using a soft-face hammer.
3. Apply approved primer to all mating-surface junctions to seal assembly.

5.300 Skid Tubes

5.310 Skid Tube Removal

Replace skid tubes worn beyond 0.030-inch maximum depth (no length limit) longitudinal scratch, 0.030-inch maximum depth and 0.50-inch maximum length circumferential scratch, or 0.50-inch maximum width flat spot.

1. Raise one side of helicopter by jacking under one end of the aft cross tube, one inch inboard of fitting.
2. Remove 4 bolts at each landing gear strut. Remove skid tube.

5.320 Skid Tube Installation

Place skid tube under fore and aft gear struts and install attach bolts. Standard torque attach bolts per § 23-32 (self-locking nutplate installed inside skid tube).

5.330 Skid Shoe Removal and Replacement

NOTE
--

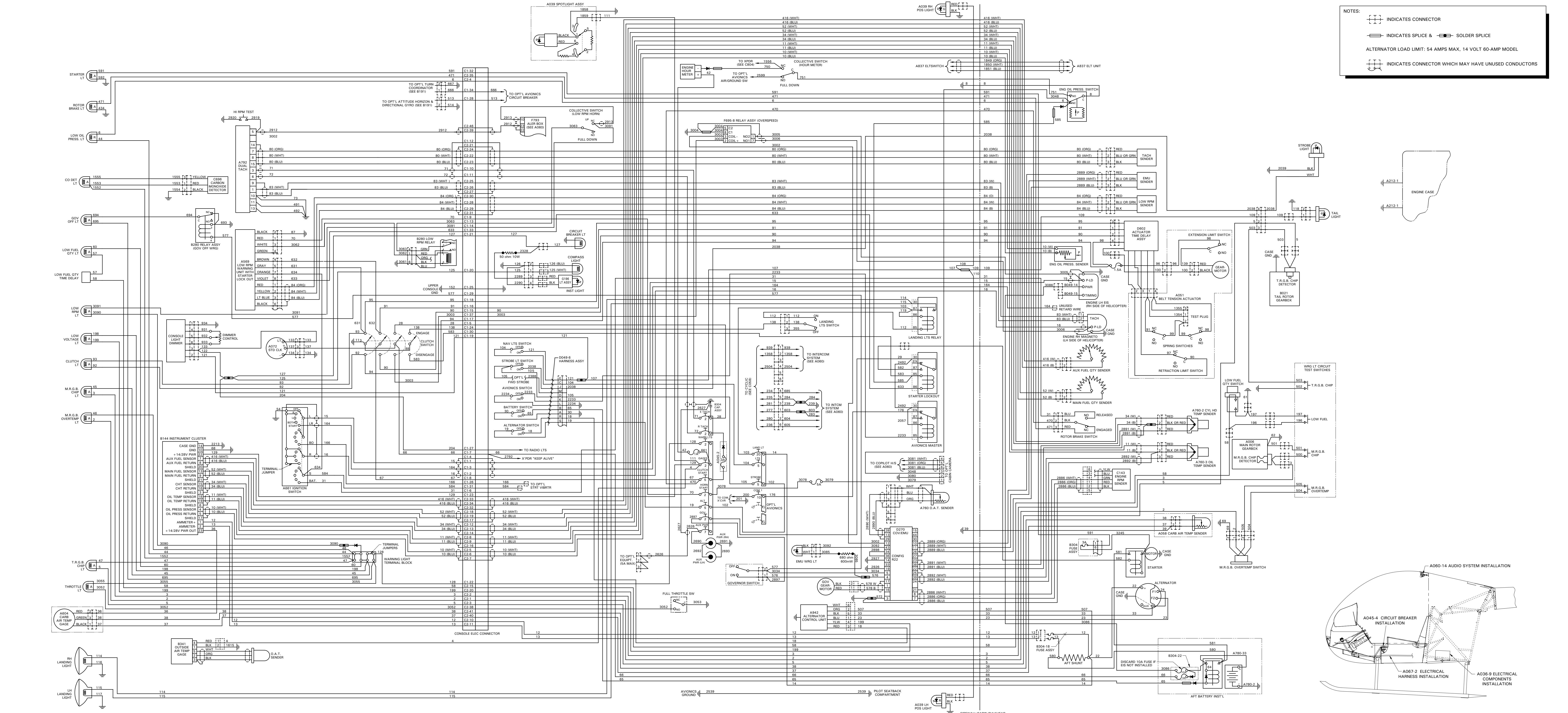
Replace A667-5 and -6 skid shoes less than 0.050 inch thick.

1. Install ground handling wheels.
2. Push down on tail and place a wooden block approximately 4 inches ahead of intermediate skid shoes. (See Figure 5-3.)
3. Remove bolts attaching forward and intermediate shoes to skids. Discard worn shoes and screws.
4. Install new skid shoes and screws. Standard torque screws per § 23-32.

NOTE
--

Some early R22's had forward skid shoes attached using aluminum blind rivets (MS20600AD6-4). These can be removed by drilling off head and punching out shank.

Intentionally Blank



15-60 Emergency Equipment

15-61 Emergency Locator Transmitter (ELT)

A. Description

The ELT activates when subjected to a significant change in velocity (as in an accident), by remote control switch located on the cyclic control panel, or by a switch on the ELT transmitter. Refer to § 33-80 for system description.

Refer to Kannad Aviation AF Integra / AF-H Integra or 406 AF-Compact/406 AF-Compact (ER) ELT Installation and Operation Manual for maintenance requirements and procedures. Refer to § 1.101 for scheduled maintenance and inspections.

Register an ELT when first purchased, when contact information changes, or when aircraft ownership, or tail number changes. Registration information is available online at: www.cospas-sarsat.org.

Dongles contain a memory chip that must be programmed with aircraft-specific information prior to installation for the ELT to function. The dongle may be removed and shipped to RHC or a Kannad Service Center for reprogramming. Kannad Aviation's Programming Data Sheet is available online at: <https://robinsonheli.com>.

B. Transmitter

Removal

1. Release D693-4 strap assembly or B359-2 (reusable) ty-rap.
2. Release Velcro strap; disconnect dongle and antenna wiring from transmitter at connectors and remove transmitter.

Installation

1. Connect dongle and antenna wiring to transmitter at connectors. Verify security.
2. Position transmitter on mounting bracket and secure with Velcro strap. Secure D693-4 strap assembly or install B359-2 (reusable) ty-rap around transmitter and bracket. Verify security.

C. Dongle

Removal

Cut and discard ty-raps as required, disconnect dongle from transmitter and airframe harness at connectors, and remove dongle.

Installation

1. Connect programmed dongle to transmitter and airframe harness at connectors.
2. Install ty-raps as required. Cinch ty-raps until snug without over-tightening, and trim tips flush with heads. Verify security.

15-62 Fire Extinguisher**CAUTION**

Fire extinguisher operating and storage temperature range is -40°F to 120°F (-40°C to 49°C). If conditions expose extinguisher to temperatures outside this range (e.g. long-term parking in direct sunlight in hot climates), remove extinguisher from helicopter and store it within the specified temperature range.

A. Inspection

1. Remove B381-1 or B381-4 fire extinguisher from helicopter.
2. Visually inspect extinguisher for damage or corrosion and ensure nozzle is unobstructed and tamper seal is intact.
3. Ensure G654-15 or G654-23 decal (maintenance log) is legible; replace decal if required.
4. Measure extinguisher weight using a 1-gram resolution (or better) scale and record weight on maintenance log; remove extinguisher from service if total weight falls below minimum allowable weight specified on decal.
5. Remove B381-1 fire extinguisher from service at end of 12th year from date of manufacture (labeled on bottom), as required.

B. Bracket Removal

1. Unlatch fire extinguisher bracket and remove extinguisher.
2. Remove hardware securing bracket to cabin and remove bracket.

C. Bracket Installation

1. Install hardware securing fire extinguisher bracket to cabin. If installing bracket to inside of chin, select screw length as required to provide 0.00–0.06 inch thread exposure. Verify security.
2. Position fire extinguisher on mounting bracket and latch bracket.

23-30 Torque Requirements (continued)**E. Torque Requirements****CAUTION**

Never substitute AN bolts for NAS bolts. NAS bolts have higher tensile strength.

1. Any self-locking nut whose drag has deteriorated appreciably must be replaced. Damaged hardware must be replaced.
2. Bolt and nut are to be clean and dry except when assembly procedure specifies anti-seize or thread-locking compound.
3. If chattering or jerking occurs, disassemble and re-torque fastener.
4. If special adapters which change effective length of torque wrench are used, final torque value must be calculated using formulas in Figures 23-1 and 23-2.
5. Unless otherwise specified, proper thread engagement requires:
 - a. If stamped nut is not required, one to four threads exposed beyond primary nut. |
 - b. If stamped nut is required, two to four threads exposed beyond primary nut.
 - c. For B526-8 screws, one to five threads exposed beyond primary nut. |

WARNING

Proper thread engagement ensures proper locking of fastener. Exceeding maximum thread exposure beyond primary nut may allow nut to seat against unthreaded shank, resulting in insufficient joint clamping.

6. Refer to Part A. Torque wrenches must be calibrated annually, when dropped, or when a calibration error is suspected.

23-31 Torque Stripe**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.

Refer to Figure 2-1. Lacquer-paint Torque Seal® is applied to all critical fasteners after stamped nut installation in a stripe ("torque stripe") extending from the fastener's exposed threads across both nuts and onto the component. Subsequent rotation of the nut or bolt can be detected visually. Position torque stripes for maximum visibility during preflight inspections. Approved Torque Seal® is listed in § 23-74.

23-32 Standard Torques

NOTE

1. Torque values are in inch-pounds unless otherwise specified.
2. Torque values include nut self-locking torque.
3. Increase torque values 10% if torqued at bolt head.
4. Wet indicates threads lubricated with A257-9 anti-seize.
5. For elbow and tee fittings which require alignment, torque to indicated value, then tighten to desired position.
6. Tolerance is $\pm 10\%$ unless range is specified.
7. Unless otherwise specified, thread sizes 8-32 and smaller are not used for primary structure and do not require control of torques.

FASTENER SERIES		SIZE	EXAMPLE FASTENER	TORQUE (IN.-LB)
NAS6603 thru NAS6608 Bolts NAS1303 thru NAS1308 Bolts NAS623 Screws NAS1351 & NAS1352* Screws NAS600 thru NAS606 Screws *Coarse threads.		10-24* & 10-32	NAS6603	50
		1/4-20* & 1/4-28	NAS6604	120
		5/16-18* & 5/16-24	NAS6605	240
		3/8-16* & 3/8-24	NAS6606	350
		7/16-20	NAS6607	665
		1/2-20	NAS6608	995
A142 screws AN3 Bolts AN4 Bolts AN6 Bolts AN8 Bolts	AN502 Screws	10-32	A142-1, -3, -4, AN3	37
	AN503 Screws	1/4-28	AN4	90
	AN509 Screws	3/8-24	AN6	280
	AN525 Screws MS24694 Screws MS27039 Screws	1/2-20	AN8	795
STAMPED NUTS (PALNUTS) Stamped nuts are to be used only once and replaced with new ones when removed.		10-32	B330-7 (MS27151-7)	6
		10-24	B330-8 (MS27151-8)	12
		1/4-20	B330-12 (MS27151-12)	25
		1/4-28	B330-13 (MS27151-13)	18
		5/16-18	B330-15 (MS27151-15)	35
		5/16-24	B330-16 (MS27151-16)	30
		3/8-24	B330-19 (MS27151-19)	45
		7/16-20	B330-21 (MS27151-21)	62
		1/2-20	B330-24 (MS27151-24)	85
TAPERED PIPE THREADS *Straight fittings. **Elbow and tee fittings; See note 5.		1/8-27	—	120* or 60**
		1/4-18	—	170* or 85**
		3/8-18	—	220* or 110**
		1/2-14	—	320* or 160**
		3/4-14	—	460* or 230**
ROD END JAM NUTS (AN315 and AN316)		10-32	AN315-3	15
		1/4-28	AN316-4	40
		5/16-24	AN316-5	80
		3/8-24	AN316-6	110

23-78 Lubricants

RHC PART NO.	LUBRICANT TYPE	MANUFACTURER'S PART NO.	MANUFACTURER
A257-1	Grease (general purpose)	101	Southwestern Petroleum Corp. Fort Worth, TX
A257-2	Gear oil	201 SAE 90	Southwestern Petroleum Corp. Fort Worth, TX
A257-3	Grease	Aero Shell 14 MIL-G-25537	Shell Oil Co.
A257-4	Oil (automatic transmission fluid)	Dexron II or Dexron II/Mercon or Dexron III/Mercon or Dex/Merc	Any
A257-6	Grease (fuel resistant)	Fuelube	Fleet Supplies Inc. Cleveland, OH
		EZ Turn	United-Erie Div. of Interstate Chemical Co. Erie, PA
A257-7	Dry film lubricant	Lubri-Kote Type A 1040 CR	Mealey Ind. Lubricants Cleveland, OH
A257-8	Rubber lubricant	P-80	International Products Corp. Trenton, NJ
A257-9	Anti-seize	Silver Grade	Loctite Corp. Newington, CT
A257-10	Substitute A257-16		
A257-12	Grease	MobilGrease 28 MIL-PRF-81322	Exxon Mobil Corp., Fairfax, VA
A257-16	Engine Oil Approved for 0–90° F ambient). Substitute A257-24 as required.	SAE 20W-50, SAE J1966	Any
A257-17	Substitute A257-19		
A257-19	Valve lubricant and sealant compound	111	Dow Corning Corp. Midland, MI
A257-22	Gear oil, synthetic	Mobil SHC 629	Exxon Mobil Corp., Fairfax, VA
A257-24	Engine oil (Approved for > 60°F ambient)	SAE 50, SAE J1966	Any
A257-25	Oil (automatic transmission fluid)	Dexron VI	Any

23-79 Adhesives and Sealants

RHC PART NO.	DESCRIPTION	COLOR	MFR. PART NO.	MANUFACTURER
B270-1	Sealant – manganese-cured, fuel resistant (2-part)	Gray	AC-730 B-*	3M Co. St. Paul, MN
B270-2	Substitute B270-1			
B270-4	Substitute B270-13			
B270-5	Sealant – synthetic rubber putty (1-part)	White Light Gray	Q4-2805 94-031	Dow Corning Corp. Midland, MI
B270-6	Sealant & lubricant – thread (1-part)	Gray	80631, 80632, 80633	Permatex, Inc. Solon, OH
			Titeseal 55	Radiator Spec. Co. Charlotte, NC
B270-7	Substitute B270-14			
B270-8	Adhesive – rubber, nitrile/acetone (1-part)	Tan	C 160	Stabond Corp. Gardena, CA
		Dark Brown	847	3M Co. St. Paul, MN
B270-9	Adhesive – epoxy, structural, flexible (2-part)	Gray	2216 B/A	3M Co. St. Paul, MN
B270-10	Adhesive/sealant – threadlocker, anaerobic, tight-fits (1-part)	Red	271	Henkel Loctite Corp. Rocky Hill, CT
B270-11	Adhesive/sealant – threadlocker, anaerobic, loose-fits (1-part)	Red	277	Henkel Loctite Corp. Rocky Hill, CT
B270-12	Sealant – electrical potting (1-part epoxy)	Gray	50-3122RGR15 (1-qt can) 50-3122RGR33 (syringe)	Epoxies Etc., Cranston, RI
B270-13	Sealant – silicone rubber, noncorrosive (1-part)	Translucent	3145	Dow Corning Corp. Midland, MI
B270-14	Substitute B270-8			
B270-15	Adhesive – plastic, for vinyl (1-part)	Clear	2262	3M Co. St. Paul, MN
B270-16	Substitute B270-14			
B270-17	Adhesive – cyanoacrylate, instant (1-part)	Clear	Super Bonder 495	Henkel Loctite Corp. Rocky Hill, CT
B270-18	Adhesive – weatherstrip (1-part)	Black	051135-08008	3M Co. St. Paul, MN
B270-19	Adhesive – epoxy structural, rigid (2-part)	Green	1838 B/A	3M Co. St. Paul, MN
B270-20	Adhesive/sealant – threadlocker, anaerobic, non-permanent (1-part)	Purple	222 or 222MS	Henkel Loctite Corp. Rocky Hill, CT

REVISION LOG

AUG 2026

The R22 Maintenance Manual (MM) list of effective pages and effective dates are given below. If a previously issued page is not listed below, it is no longer an effective page and must be discarded. The issue or revision date is in bold at the top of each revision log page.

Please visit <https://robinsonheli.com> to verify the issue or revision date is current.

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
i	AUG 2026	2.5	OCT 2018	2.37	AUG 2026
ii	AUG 2026	2.6	OCT 2018	2.38	AUG 2026
iii	OCT 2018	2.7	OCT 2018	2.39	AUG 2026
iv	OCT 2018	2.8	OCT 2018	2.40	AUG 2026
v	OCT 2018	2.9	APR 2007	2.41	OCT 2018
vi	OCT 2018	2.10	JUN 2006	2.42	OCT 2018
		2.11	JUN 2006	2.43	NOV 2020
1.i	NOV 2020	2.12	JUN 2006	2.44	NOV 2020
1.ii	NOV 2020	2.13	NOV 2020	2.45	NOV 2020
1.1	NOV 2020	2.14	NOV 2020	2.46	NOV 2020
1.2	NOV 2020	2.15	JUN 2006	2.47	DEC 2022
1.3	JUN 2024	2.16	JUN 2006	2.48	DEC 2022
1.4	JUN 2024	2.17	NOV 2020	2.49	NOV 2020
1.5	JUN 2024	2.18	NOV 2020	2.50	NOV 2020
1.6	JUN 2024	2.19	OCT 2018	2.51	AUG 2026
1.7	DEC 2022	2.20	OCT 2018	2.52	AUG 2026
1.8	DEC 2022	2.21	OCT 2018	2.53	NOV 2020
1.9	AUG 2026	2.22	OCT 2018	2.54	NOV 2020
1.10	AUG 2026	2.23	OCT 2018	2.55	NOV 2020
1.11	AUG 2026	2.24	OCT 2018	2.56	NOV 2020
1.12	AUG 2026	2.25	NOV 2020	2.57	NOV 2020
1.13	NOV 2024	2.26	NOV 2020	2.58	NOV 2020
1.14	NOV 2024	2.26A	NOV 2020	2.59	DEC 2022
1.15	NOV 2024	2.26B	NOV 2020	2.60	DEC 2022
1.16	NOV 2024	2.27	NOV 2020	2.61	NOV 2020
1.17	JUN 2024	2.28	NOV 2020	2.62	NOV 2020
1.18	JUN 2024	2.29	JUN 2024	2.63	NOV 2020
		2.30	JUN 2024	2.64	NOV 2020
2.i	NOV 2020	2.31	JUN 2024	2.65	NOV 2020
2.ii	NOV 2020	2.32	JUN 2024	2.66	NOV 2020
2.1	JUN 2024	2.33	DEC 2022	2.67	JUN 2024
2.2	JUN 2024	2.34	DEC 2022	2.68	JUN 2024
2.3	OCT 2018	2.35	NOV 2020		
2.4	OCT 2018	2.36	AUG 2026	3.i	DEC 2024

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
3.ii	DEC 2024	4.29	JUN 2024	6.12	NOV 2024
3.1	DEC 2023	4.30	JUN 2024	6.13	NOV 2024
3.2	DEC 2023	4.31	JUN 2024	6.14	NOV 2024
3.3	DEC 2024	4.32	JUN 2024	6.15	NOV 2024
3.4	DEC 2024	4.33	JUN 2024	6.16	NOV 2024
3.5	DEC 2024	4.34	JUN 2024	6.16A	7 AUG 92
3.6	DEC 2024	4.35	JUN 2024	6.16B	JAN 2005
		4.36	JUN 2024	6.16C	7 AUG 92
4.i	JUN 2024			6.16D	7 AUG 92
4.ii	JUN 2024	5.i	AUG 2026	6.17	APR 2007
4.1	OCT 2018	5.ii	AUG 2026	6.18	APR 2007
4.2	OCT 2018	5.1	AUG 2026	6.19	APR 2007
4.3	OCT 2018	5.2	AUG 2026	6.20	APR 2007
4.4	OCT 2018	5.3	AUG 2026	6.21	NOV 2020
4.5	NOV 2020	5.4	AUG 2026	6.22	NOV 2020
4.6	NOV 2020	5.5	AUG 2026	6.22A	NOV 2020
4.7	5/22/87	5.6	AUG 2026	6.22B	NOV 2020
4.8	5/22/87	5.7	5/22/87	6.23	MAR 2004
4.9	5/22/87	5.8	28 JUL 89	6.24	MAR 2004
4.10	JAN 2005	5.9	28 JUL 89	6.24A	NOV 2020
4.11	5/22/87	5.10	28 JUL 89	6.24B	NOV 2020
4.12	APR 2007	5.11	28 JUL 89	6.25	APR 2007
4.13	5/22/87	5.12	JUN 2000	6.26	APR 2007
4.14	29 MAR 93	5.13	28 JUL 89	6.27	APR 2007
4.15	JUN 2024			6.28	APR 2007
4.16	JUN 2024	6.i	NOV 2024	6.29	APR 2007
4.17	JUN 2024	6.ii	NOV 2024	6.30	APR 2007
4.18	JUN 2024	6.1	OCT 2014		
4.19	JUN 2024	6.2	OCT 2014	7.i	OCT 2018
4.20	JUN 2024	6.3	APR 2007	7.ii	OCT 2018
4.21	JUN 2024	6.4	APR 2007	7.1	OCT 2014
4.22	JUN 2024	6.5	NOV 2020	7.2	OCT 2014
4.23	JUN 2024	6.6	NOV 2020	7.3	JUN 2006
4.24	JUN 2024	6.7	NOV 2020	7.4	5/22/87
4.25	JUN 2024	6.8	NOV 2020	7.5	NOV 2020
4.26	JUN 2024	6.9	NOV 2024	7.6	NOV 2020
4.27	JUN 2024	6.10	NOV 2024	7.7	OCT 2018
4.28	JUN 2024	6.11	NOV 2024	7.8	OCT 2018

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
7.9	NOV 2020	7.39	19 SEP 97	8.11	JUN 2024
7.9A	NOV 2020	7.40	19 SEP 97	8.12	JUN 2024
7.9B	19 SEP 97	7.41	19 SEP 97	8.13	JUN 2024
7.10	JUN 2000	7.42	19 SEP 97	8.14	JUN 2024
7.11	5/22/87	7.43	19 SEP 97	8.15	JUN 2024
7.12	3 MAR 99	7.44	19 SEP 97	8.16	JUN 2024
7.13	3 MAR 99	7.44A	4/15/88	8.17	JUN 2024
7.14	JUN 2000	7.44B	5 JUL 90	8.18	JUN 2024
7.15	OCT 2018	7.44C	26 JUL 96	8.19	JUN 2024
7.16	OCT 2018	7.44D	7 AUG 92	8.20	JUN 2024
7.17	APR 2005	7.45	OCT 2018	8.21	5/22/87
7.18	MAR 2004	7.46	OCT 2018	8.22	5/22/87
7.19	OCT 2018	7.47	DEC 2022	8.23	5/22/87
7.20	OCT 2018	7.48	DEC 2022	8.24	5/22/87
7.21	OCT 2018	7.48A	NOV 2020	8.25	JUN 2024
7.22	OCT 2018	7.48B	NOV 2020	8.26	JUN 2024
7.23	OCT 2018	7.49	OCT 2018	8.27	JUN 2024
7.24	OCT 2018	7.50	OCT 2018	8.28	JUN 2024
7.25	NOV 2020	7.51	OCT 2018	8.29	JUN 2024
7.26	NOV 2020	7.52	OCT 2018	8.30	JUN 2024
7.27	OCT 2018	7.53	OCT 2018	8.31	JUN 2024
7.28	OCT 2018	7.54	OCT 2018	8.32	JUN 2024
7.29	NOV 2020	7.55	OCT 2018	8.33	JUN 2024
7.29A	NOV 2020	7.56	OCT 2018	8.34	JUN 2024
7.29B	NOV 2020	7.57	31 JAN 89	8.34A	JUN 2024
7.30	NOV 2020			8.34B	JUN 2024
7.31	OCT 2018	8.i	JUN 2024	8.35	5/22/87
7.32	OCT 2018	8.ii	JUN 2024	8.36	5/22/87
7.33	NOV 2020	8.1	JUN 2024	8.37	JUN 2006
7.33A	NOV 2020	8.2	JUN 2024	8.38	JUN 2006
7.33B	MAR 2004	8.3	JUN 2024	8.39	OCT 2018
7.34	5/22/87	8.4	JUN 2024	8.40	OCT 2018
7.35	26 JUL 96	8.5	JUN 2024	8.41	OCT 2018
7.36	MAR 2004	8.6	JUN 2024	8.42	OCT 2018
7.37	26 JUL 96	8.7	JUN 2024	8.43	OCT 2018
7.38	26 JUL 96	8.8	JUN 2024	8.44	OCT 2018
7.38A	26 JUL 96	8.9	JUN 2024	8.45	OCT 2018
7.38B	26 JUL 96	8.10	JUN 2024	8.46	OCT 2018

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
8.47	19 SEP 97	10.13	5/22/87	10.39	JAN 2005
8.48	26 JUL 96	10.14	5/22/87	10.40	JAN 2005
8.49	MAR 2004	10.15	APR 2007		
8.50	5/22/87	10.16	APR 2007	11.i	OCT 2018
8.51	5/22/87	10.17	5/22/87	11.ii	OCT 2018
8.52	5/22/87	10.18	5/22/87	11.1	OCT 2018
8.53	5/22/87	10.19	5/22/87	11.2	OCT 2018
8.54	5/22/87	10.20	MAR 2004	11.3	OCT 2018
8.55	JAN 2005	10.21	OCT 2018	11.4	OCT 2018
8.56	JAN 2005	10.22	OCT 2018	11.5	OCT 2018
8.57	5/22/87	10.23	28 JUL 89	11.6	OCT 2018
8.58	5/22/87	10.24	30 JUN 99		
8.59	JUN 2006	10.25	5/22/87	12.i	OCT 2018
8.60	JUN 2006	10.25A	28 JUL 89	12.ii	OCT 2018
8.61	22 JAN 93	10.25B	28 JUL 89	12.1	OCT 2018
8.62	22 JAN 93	10.26	28 JUL 89	12.2	OCT 2018
8.63	APR 2005	10.26A	JUN 2006	12.3	OCT 2014
8.64	APR 2005	10.26B	JUN 2006	12.4	OCT 2014
		10.27	NOV 2020	12.5	OCT 2014
9.i	DEC 2022	10.28	NOV 2020	12.6	OCT 2014
9.ii	DEC 2022	10.29	NOV 2020	12.7	OCT 2014
9.1	DEC 2022	10.30	NOV 2020	12.8	OCT 2014
9.2	DEC 2022	10.31	NOV 2020	12.9	OCT 2018
		10.32	NOV 2020	12.9A	OCT 2018
10.i	NOV 2020	10.32A	NOV 2020	12.9B	OCT 2018
10.ii	NOV 2020	10.32B	NOV 2020	12.10	OCT 2018
10.1	NOV 2020	10.32C	NOV 2020	12.11	OCT 2014
10.2	NOV 2020	10.32D	NOV 2020	12.12	OCT 2014
10.3	5/22/87	10.32E	NOV 2020	12.13	NOV 2020
10.4	5/22/87	10.32F	NOV 2020	12.14	NOV 2020
10.5	DEC 2023	10.32G	NOV 2020	12.15	OCT 2014
10.6	DEC 2023	10.32H	NOV 2020	12.16	OCT 2014
10.7	JUN 2024	10.33	5/22/87	12.17	OCT 2014
10.8	JUN 2024	10.34	5/22/87	12.18	OCT 2014
10.9	JUN 2024	10.35	JAN 2005		
10.10	JUN 2024	10.36	JAN 2005	13.i	NOV 2020
10.11	DEC 2023	10.37	JAN 2005	13.ii	NOV 2020
10.12	DEC 2023	10.38	JAN 2005	13.1	OCT 2018

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
13.2	OCT 2018	14.17B	12 JAN 90	14.27	5 JUL 90
13.3	OCT 2018	14.17C	12 JAN 90	14.28	5/22/87
13.4	OCT 2018	14.17D	12 JAN 90	14.28A	5 JUL 90
13.5	OCT 2018	14.18	5/22/87	14.28B	5 JUL 90
13.6	OCT 2018	14.18A	30 JUN 99	14.29	5/22/87
13.7	NOV 2020	14.18B	30 JUN 99	14.30	5/22/87
13.8	NOV 2020	14.19	OCT 2018	14.31	5/22/87
13.9	OCT 2018	14.20	OCT 2018	14.32	5/22/87
13.10	OCT 2018	14.20A	OCT 2018	14.33	5/22/87
13.11	OCT 2018	14.20B	OCT 2018	14.34	5/22/87
13.12	OCT 2018	14.21	30 JUN 99	14.35	5/22/87
13.13	OCT 2018	14.21A	30 JUN 99	14.36	5/22/87
13.14	OCT 2018	14.21B	30 JUN 99	14.37	5/22/87
13.15	OCT 2018	14.22	5/22/87	14.38	5/22/87
13.16	OCT 2018	14.23	OCT 2018	14.39	28 JUL 89
13.17	OCT 2018	14.23A	OCT 2018	14.40	5/22/87
13.18	OCT 2018	14.23B	OCT 2018	14.40A	JUN 2000
13.19	OCT 2018	14.23C	OCT 2018	14.40B	JUN 2000
13.20	OCT 2018	14.23D	OCT 2018	14.40C	JUN 2000
13.21	NOV 2020	14.23E	OCT 2018	14.40D	JUN 2000
13.22	NOV 2020	14.23F	OCT 2018	14.41	9/25/87
13.23	NOV 2020	14.23G	OCT 2018	14.42	9/25/87
13.24	NOV 2020	14.23H	OCT 2018	14.43	5/22/87
		14.24	OCT 2018	14.44	5/22/87
14.i	OCT 2018	14.25	NOV 2020	14.45	5/22/87
14.ii	OCT 2018	14.26	NOV 2020	14.46	5/22/87
14.1	OCT 2018	14.26A	NOV 2020	14.47	5/22/87
14.2	OCT 2018	14.26B	NOV 2020	14.48	5/22/87
14.11B	OCT 2018	14.26C	NOV 2020	14.49	9/25/87
14.12	OCT 2018	14.26D	NOV 2020	14.50	5/22/87
14.13	5/22/87	14.26E	JUN 2000	14.51	7 AUG 92
14.14	5/22/87	14.26F	JUN 2000	14.52	5/22/87
14.15	5/22/87	14.26G	JUN 2000	14.53	5/22/87
14.16	12 JAN 90	14.26H	JUN 2000	14.54	4/22/87
14.16A	12 JAN 90	14.26I	JUN 2000	14.55	5/22/87
14.16B	12 JAN 90	14.26J	JUN 2000	14.56	5/22/87
14.17	12 JAN 90	14.26K	MAR 2004	14.57	5/22/87
14.17A	12 JAN 90	14.26L	MAR 2004	14.58	5/22/87

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
14.59	5/22/87	15.8	AUG 2026	19.ii	OCT 2018
14.60	5/22/87			19.1	OCT 2018
14.61	5/22/87	16.i	OCT 2018	19.2	OCT 2018
14.62	5/22/87	16.ii	OCT 2018	19.3	OCT 2018
14.63	5/22/87	16.1	JUN 2024	19.4	OCT 2018
14.64	19 SEP 97	16.2	JUN 2024	19.5	OCT 2018
14.65	AUG 2026	16.3	JUN 2024	19.6	OCT 2018
14.65A	AUG 2026	16.4	JUN 2024	19.7	OCT 2018
14.65B	JUN 2024	16.5	JUN 2024	19.8	OCT 2018
14.65C	JUN 2024	16.6	JUN 2024		
14.65D	JUN 2024	16.7	JUN 2024	20.i	OCT 2018
14.65E	JUN 2024	16.8	JUN 2024	20.ii	OCT 2018
14.66	NOV 2020			20.1	OCT 2018
14.66A	NOV 2020	17.i	OCT 2018	20.2	OCT 2018
14.67	OCT 2018	17.ii	OCT 2018	20.3	DEC 2022
14.68	OCT 2018	17.1	OCT 2018	20.4	DEC 2022
14.69	OCT 2018	17.2	OCT 2018		
14.70	OCT 2018	17.3	OCT 2018	21.i	OCT 2018
14.71	OCT 2018	17.4	OCT 2018	21.ii	OCT 2018
14.72	OCT 2018	17.5	OCT 2018	21.1	OCT 2018
14.73	NOV 2020	17.6	OCT 2018	21.2	OCT 2018
14.73A	NOV 2020				
14.74	NOV 2020	18.i	JUN 2024	22.i	OCT 2018
14.74A	NOV 2020	18.ii	JUN 2024	22.ii	OCT 2018
14.75	OCT 2018	18.1	OCT 2018	22.1	NOV 2020
14.76	OCT 2018	18.2	OCT 2018	22.1A	NOV 2020
14.77	OCT 2018	18.3	NOV 2020	22.1B	NOV 2020
14.78	OCT 2018	18.4	NOV 2020	22.2	NOV 2020
		18.5	OCT 2018	22.3	NOV 2020
15.i	OCT 2018	18.6	OCT 2018	22.4	NOV 2020
15.ii	OCT 2018	18.7	OCT 2018	22.5	NOV 2020
15.1	NOV 2020	18.8	OCT 2018	22.6	NOV 2020
15.2	NOV 2020	18.9	JUN 2024	22.7	NOV 2020
15.3	OCT 2018	18.10	JUN 2024	22.8	NOV 2020
15.4	OCT 2018	18.11	JUN 2024	22.9	OCT 2018
15.5	OCT 2018	18.12	JUN 2024	22.10	OCT 2018
15.6	OCT 2018			22.11	OCT 2018
15.7	AUG 2026	19.i	OCT 2018	22.12	OCT 2018

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
22.13	OCT 2018	23.32	JUN 2024	26.3	OCT 2018
22.14	OCT 2018	23.33	NOV 2020	26.4	OCT 2018
23.i	DEC 2023	23.34	NOV 2020	26.5	NOV 2020
23.ii	DEC 2023	23.35	JUN 2024	26.6	NOV 2020
23.1	JUN 2024	23.36	JUN 2024	26.7	OCT 2018
23.2	JUN 2024	23.37	JUN 2024	26.8	OCT 2018
23.3	NOV 2020	23.38	JUN 2024	26.9	OCT 2018
23.4	NOV 2020	23.39	AUG 2026	26.10	OCT 2018
23.5	NOV 2020	23.40	AUG 2026	26.11	NOV 2020
23.6	NOV 2020	23.41	NOV 2020	26.12	NOV 2020
23.7	AUG 2026	23.42	NOV 2020	26.13	JUN 2024
23.8	AUG 2026	23.43	JUN 2024	26.14	JUN 2024
23.9	JUN 2024	23.44	JUN 2024	26.15	JUN 2024
23.10	JUN 2024	24.i	OCT 2018	26.16	JUN 2024
23.11	JUN 2024	24.ii	OCT 2018	26.17	OCT 2018
23.12	JUN 2024	24.1	OCT 2018	26.18	OCT 2018
23.12A	JUN 2024	24.2	OCT 2018	26.19	NOV 2020
23.12B	JUN 2024	24.3	OCT 2018	26.20	NOV 2020
23.13	NOV 2020	24.4	OCT 2018	26.21	OCT 2018
23.14	NOV 2020	25.i	NOV 2020	26.22	OCT 2018
23.15	NOV 2020	25.ii	NOV 2020	26.23	NOV 2020
23.16	NOV 2020	25.1	NOV 2020	26.23A	NOV 2020
23.17	NOV 2020	25.2	NOV 2020	26.23B	NOV 2020
23.18	NOV 2020	25.3	NOV 2020	26.24	NOV 2020
23.19	NOV 2020	25.4	NOV 2020	26.25	OCT 2018
23.20	NOV 2020	25.5	NOV 2020	26.26	OCT 2018
23.21	NOV 2020	25.6	NOV 2020	26.27	OCT 2018
23.22	NOV 2020	25.7	NOV 2020	26.28	OCT 2018
23.23	NOV 2020	25.8	NOV 2020	26.29	OCT 2018
23.24	NOV 2020	25.9	NOV 2020	26.30	OCT 2018
23.25	NOV 2020	25.10	NOV 2020	26.31	NOV 2020
23.26	NOV 2020	26.i	NOV 2024	26.32	NOV 2020
23.27	DEC 2023	26.ii	NOV 2024	26.33	NOV 2024
23.28	DEC 2023	26.1	OCT 2018	26.34	NOV 2024
23.29	DEC 2023	26.2	OCT 2018	26.35	NOV 2024
23.30	DEC 2023			26.36	NOV 2024
23.31	JUN 2024			26.37	NOV 2024
				26.38	NOV 2024

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>	<u>Page</u>	<u>Date</u>
27.i	OCT 2018	31.i	OCT 2018	33.27	NOV 2020
27.ii	OCT 2018	31.ii	OCT 2018	33.28	NOV 2020
27.1	OCT 2018	31.1	OCT 2018	33.29	NOV 2020
27.2	OCT 2018	31.2	OCT 2018	33.30	NOV 2020
				33.31	NOV 2024
28.i	DEC 2022	32.i	OCT 2018	33.32	NOV 2024
28.ii	DEC 2022	32.ii	OCT 2018	33.33	NOV 2024
28.1	DEC 2022	32.1	OCT 2018	33.34	NOV 2024
28.2	DEC 2022	32.2	OCT 2018		
28.3	JUN 2024			34.i	OCT 2018
28.4	JUN 2024	33.i	NOV 2024	34.ii	OCT 2018
28.5	DEC 2022	33.ii	NOV 2024	34.1	OCT 2018
28.6	DEC 2022	33.1	NOV 2020	34.2	OCT 2018
28.7	JUN 2024	33.2	NOV 2020	34.3	OCT 2018
28.8	JUN 2024	33.3	OCT 2018	34.4	OCT 2018
28.9	DEC 2022	33.4	OCT 2018	34.5	OCT 2018
28.10	DEC 2022	33.5	OCT 2018	34.6	OCT 2018
28.11	JUN 2024	33.6	OCT 2018	34.7	OCT 2018
28.12	JUN 2024	33.7	OCT 2018	34.8	OCT 2018
28.13	DEC 2022	33.8	OCT 2018	34.9	OCT 2018
28.14	DEC 2022	33.9	OCT 2018	34.10	OCT 2018
28.15	JUN 2024	33.10	OCT 2018		
28.16	JUN 2024	33.11	OCT 2018	35.i	OCT 2018
28.17	DEC 2022	33.12	OCT 2018	35.ii	OCT 2018
28.18	DEC 2022	33.13	OCT 2018	35.1	OCT 2018
28.19	DEC 2022	33.14	OCT 2018	35.2	OCT 2018
28.20	DEC 2022	33.15	OCT 2018		
		33.16	OCT 2018	36.i	OCT 2018
29.i	OCT 2018	33.17	OCT 2018	36.ii	OCT 2018
29.ii	OCT 2018	33.18	OCT 2018	36.1	OCT 2018
29.1	OCT 2018	33.19	OCT 2018	36.2	OCT 2018
29.2	OCT 2018	33.20	OCT 2018	36.3	OCT 2018
		33.21	OCT 2018	36.4	OCT 2018
30.i	OCT 2018	33.22	OCT 2018	36.5	OCT 2018
30.ii	OCT 2018	33.23	NOV 2020	36.6	OCT 2018
30.1	OCT 2018	33.24	NOV 2020	36.7	NOV 2024
30.2	OCT 2018	33.25	NOV 2020	36.8	NOV 2024
		33.26	NOV 2020	36.9	OCT 2018

REVISION LOG

AUG 2026

<u>Page</u>	<u>Date</u>
36.10	OCT 2018
37.i	NOV 2020
37.ii	NOV 2020
37.1	AUG 2026
37.2	AUG 2026
37.3	AUG 2026
37.4	AUG 2026
37.5	AUG 2026
37.6	AUG 2026
37.7	AUG 2026
37.8	AUG 2026
37.9	AUG 2026
37.10	AUG 2026

Intentionally Blank