

# ROBINSON HELICOPTER COMPANY

## R44 MAINTENANCE MANUAL AND INSTRUCTIONS FOR CONTINUED AIRWORTHINESS RTR 460 VOLUME I

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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>

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Monday through Friday, 7:30 a.m. to 4:30 p.m., Pacific Time.  
Lunch hour is 11:30 a.m. to 12:30 p.m.

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Viewing RHC Maintenance Manuals (MMs) and Illustrated Parts Catalogs (IPCs) online at <https://robinsonheli.com> 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.

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**CHAPTER 1**

**GENERAL**

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**TABLE 1 SCHEDULED INSPECTIONS**

Consult latest revision of listed publications for specific applicability.

Recurring inspection not to exceed given interval.

	First 10 hours	First 25 hours	First 100 hours	Every 50 hours	Every 100 hours	Every 300 hours	Every 500 hours	Every 2200/2400 hours	Every 4 months	Every 12 months	Every 24 months	Every 3 years	Every 5 years	Every 12 years	Every 15 years
Perform inspection per Lycoming Operator's Manual.*	•	•		•	•	•									
Perform <b>Lycoming SI 1129</b> <i>Methods of Checking DC Alternator and Generator Belt Tension.</i>		•			•										
Perform <b>Lycoming SB 301*</b> <i>Maintenance Procedures and Service Limitations for Valves.</i>			•			•									
Perform <b>Lycoming SB 342 (IO-540 Only)</b> <i>Fuel Line (Stainless Steel Tube Assy.) and Support Clamp Inspection &amp; Installation. Reference AD 2015-19-07.</i>					•										
Perform <b>Lycoming SB 388*</b> (also applies to replacement cylinders) <i>Procedure to Determine Exhaust Valve and Guide Condition.</i>			•			•									
Perform <b>Lycoming SB 480 (and R44 SL-83, as applicable)</b> <i>I. Oil &amp; Filter Change &amp; Screen Cleaning / II. Oil Filter/Screen Content Inspection. NOTE: Oil filters on D723-1 adapters do not require safety wire.</i>		•		•					•						
Perform <b>CMI SB 643, as applicable</b> <i>Maintenance Intervals for All CMI/TCM/Bendix Magnetos &amp; Related Equipment.</i>					•	•								•	
Perform <b>CMI SB 663</b> <i>Two-Wire Magneto Tach. Breaker Contact (Points) Assy. P/N 10-400507.</i>						•							•		
Perform 100-hour/annual inspection per § 2.400.					•					•					
Perform main rotor blade tip maintenance per § 28-60.					•					•					
Lubricate C181-3 bearing per § 1.140.						•						•			
Replace hydraulic filter per § 1.170.						•									
Drain and flush gearboxes per §§ 1.120 & 1.130.							•								
Clean gearbox chip detectors per § 1.115.							•		•						
Perform clutch assembly lubricant inspection & servicing per § 7.210.							•								
Verify magneto (or EIS) drive cushion pliability (must tolerate 180° bend).							•						•		
Perform 2200-hour/2400-hour/12-Year inspection per § 2.600.								•						•	
Perform pressure relief valve leakage check per § 12-83.										•					
Perform pop-out float leak check per § 5.630.										•					
Perform pop-out float inflation check per § 5.640.												•			
Perform pop-out float pressure cylinder hydrostatic test (per U.S. DOT-SP 10915).													•		
Pop-out float pressure cylinder maximum life.															•

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

1.102 Additional Component Maintenance (continued)

**A. 12 YEARS (continued)**

Part Number	Description	Action
B173-2, -3, or -6	V-Belt – Alternator	Replace with new.
B173-4	V-Belt – A/C Compressor Drive	Replace with new.
B283-1	Hose Assembly (oil pressure sender)	Replace with new.
B283-3	Hose Assembly (fuel; various)	Replace with new.
B283-7	Hose Assembly (fuel control to flow divider)	Replace with new.
B283-10	Hose Assembly (engine-driven pump to fuel control)	Replace with new.
B283-11	Hose Assembly (fuel return)	Replace with new.
C005-4	Main Rotor Hub (C154-1) & Bearing Assembly	Perform inspection and repair per § 28-22, return to RHC for inspection and repair, or replace with new.
C005-12	C016-7 Main Rotor Blade & C158-1 Spindle Assembly	Submit to RHC-authorized component maintenance facility for 12-year service, or replace with new or overhaul exchange. 12-year maintenance includes blade replacement (as required), pitch horn screw replacement, boot and O-ring replacement, and inspection.
C006-3, -6, or -8	Main Rotor Gearbox Assembly	Submit to RHC Repair Station for 12-year service, or replace with new or overhaul exchange. 12-year maintenance includes pinion seal replacement, O-ring replacement, sealed bearing replacement, rubber mount replacement, and inspection.
C007-5	Fanshaft Assembly	Inspect C181-3 bearing per § 2.502 step 3. Lubricate per § 1.140.
C008-4	Tail Rotor Assembly	Replace with new C008-9 tail rotor assembly.
C008-9	Tail Rotor Assembly	Disassemble. Remove bushings and teeter hinge bearings. Inspect hub; verify no fretting or corrosion. Fluorescent penetrant inspect hub. Replace blades as required. Replace teeter hinge bearings and blade attach bolts.
C011-2 & -3	Arm Assembly – Throttle (forward & aft, R44)	Visually inspect. Replace with D756 if corrosion is evident. Verify bearing rotates smoothly without noise.
C014-X	Landing Gear Assembly	Perform 12-year service per § 2.650 Part A.
C015-1	Cabin Assembly	Remove B270-1 sealant from aft-side of aluminum C259 panels at junction of steel horizontal firewall and inspect panels for corrosion. Repair as required. Replace sealant.
C017-4	Swashplate Assembly	Perform 12-year service per § 2.640, or replace with new or overhaul exchange C017-6 swashplate.

1.102 Additional Component Maintenance (continued)

**A. 12 YEARS (continued)**

Part Number	Description	Action
C017-6	Swashplate Assembly	Perform 12-year service per § 2.640, or replace with new or overhaul exchange.
C018-2 or -3	Clutch Assembly (C166-4 shaft)	Replace with new or overhaul exchange C018-4 or -5 clutch assembly.
C018-4 or -5	Clutch Assembly (C166-5 shaft)	Submit to RHC-authorized component maintenance facility, or replace with new or overhaul exchange. 12-year maintenance includes plug, seal and O-ring replacement, C184 bearing lubrication, and inspection.
C020-1 or -2	C020-1 (standard) or C020-2 (tie-down provisions) Upper Frame Assembly	Visually inspect for corrosion. If corrosion is found, remove paint per § 23-71 and MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
C021-1	Tail Rotor Gearbox Assembly	Perform 12-year service per § 2.610, or replace with new or overhaul exchange.
C031-1	Tail Rotor Pitch Control	Replace with new.
C041-11	Bearing Assembly – TRDS Damper	Replace with new.
C046-1, -19, -21, or -23	Lower Frame Assembly – LH	Visually inspect for corrosion. If corrosion is found, remove paint per § 23-71 and MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
C046-2	Lower Frame Assembly – RH	Visually inspect for corrosion. If corrosion is found, remove paint per § 23-71 and MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
C051-1 or -2	Clutch Actuator Assembly	Submit to RHC Repair Station for 12-year service, or replace with new or overhaul exchange.
C119-2	Bumper – Tail Rotor	Replace with new.
C121-1, -3 or -30, -19, & -24 or -28	Push-Pull Tube Assembly – Main Rotor	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
C121-9, -15, & -17	Push-Pull Tube Assembly – Tail Rotor	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
C121-21	Push-Pull Tube Assembly – Throttle	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
C121-25 or -31	Push-Pull Tube Assembly – Swashplate	Measure & record overall length. Remove rod ends and visually inspect, including tube interior. Replace if corrosion is evident.
C169-3, -32, -36, or -38	Muffler Assembly	Visually inspect muffler interior; verify no obvious damage and no loss of material.
C174-1 Revision A thru F	Support (engine mount at prop governor pad; constant 0.5-inch dia. vertical tube)	Replace with new C174-1 Revision G or subsequent.



1.102 Additional Component Maintenance (continued)
**A. 12 YEARS (continued)**

Part Number	Description	Action
C174-1 Revision G or subsequent	Support (engine mount at prop governor; vertical tube lower portion is 0.562 inch dia.)	Remove rod ends and visually inspect, including tube interiors. Replace if corrosion is evident.
C258-1	Main Rotor Pitch Link Assembly	Replace with new C258-5 link assembly.
C258-5	Main Rotor Pitch Link Assembly	Perform inspection per § 2.630, or replace with new.
C315-9	Support Weldment – Lower Aft Flight Controls	Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Repair or replace as required.
C319-5	Torque Tube – Cyclic	Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Repair or replace as required.
C334-4	Bellcrank Assembly (Collective)	Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Repair or replace as required. Verify bearings rotate smoothly without noise.
C336-1	Push-Pull Tube Assembly, Throttle (R44)	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
C339-1 or -10	Jackshaft Weldment	Visually inspect. Repair or replace as required.
C343-1*, -9, & -11 (*R44 SL-43 refers)	Push-Pull Tube Assembly – Tail Rotor	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
C343-8	Tube – Aft Servo	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
C348-1	Anchor Assembly – Collective Stop	Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Repair or replace as required.
C348-5	Anchor Assembly – Seat Belt (Forward)	Replace if seat buckle attaching lugs are less than 0.073 inch thick. Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Repair or replace as required.
C480-1	Swashplate Boot	Replace with new.
C608-1	Support Weldment – Throttle Bellcrank	Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Repair or replace as required.
C649-1	Oil Cooler	Replace with new or overhauled C649-2 oil cooler.
C649-2 & -3	Oil Cooler	Flush & 400-psi pressure test or overhaul or replace with new.
C792-4 or -5	Dual Tachometer	Submit to RHC Repair Station for 12-year service, or replace with new or overhaul exchange.

1.102 Additional Component Maintenance (continued)

**A. 12 YEARS (continued)**

Part Number	Description	Action
C907-1 or -2 Revision A thru G (weldment)	Yoke – Clutch Shaft Forward (1.43-inch dia. center hole between arms)	Replace with new C907-1 or -2 Revision H or subsequent yoke.
C907-1 or -2 Revision H or sub- sequent (forging)	Yoke – Clutch Shaft Forward (1.471-inch dia. bore)	Visually inspect using 10x magnification for obvious damage; replace yoke if damaged.
C918-15	Elastic Cord – Collective	Replace with new A918-20 cord.
C947-1 & -3	Flex Plate Assembly (bonded)	Visually inspect with 10x magnification. Replace if corrosion is evident. Replace if any bonded washer evidences separation (8 places).
D046-1 & -2	Strut Weldment – LH	Visually inspect for corrosion. If light corrosion is found, remove corrosion & paint per § 23-71 and MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
D046-3	Strut Weldment – RH	Visually inspect for corrosion. If light corrosion is found, remove corrosion & paint per § 23-71 and MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
D151-2	Stop (teeter, 2 each)	Replace with new.
D174-2	Fanwheel	Perform 12-year service per § 2.620, or replace with new or overhaul exchange.
D201-5	Support Assembly – Hydraulic Servos (fwd)	Replace with new D201-6 support assembly. Use NAS6604H16 bolt & NAS1149F0432P washer and safety wire (4 places) to secure servos.
D203-1	Support Assembly – LH (aft servo)	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
D204-8	Support Assembly – RH (aft servo)	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
D207-1	Strut Weldment – Jackshaft, Forward	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
D208-1	Strut Weldment – Jackshaft, Aft	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
D211-1 or -2	Hydraulic Reservoir	Perform 12-year service per § 2.660, or replace with new or overhaul exchange.
D212-1	Hydraulic Servo Actuators	Remove upper clevis, scissor, and D200-3 washer from servo, as applicable. Visually inspect threaded bore in piston shaft with borescope. Replace servo if corrosion is evident.
D224-1 or -2	Tail Rotor Drive Shaft	Remove yoke(s) and inspect shaft interior using borescope. Replace shaft if corrosion is evident.

1.102 Additional Component Maintenance (continued)
**A. 12 YEARS (continued)**

Part Number	Description	Action
D278-1 or -2	Governor Controller	Submit to RHC Repair Station for 12-year service, or replace with new or overhaul exchange.
D321-1	Valve – Pressure Relief (Fuel)	Replace with new or overhaul exchange.
D731-1	Bellcrank Assembly – Throttle, R44 II	Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Verify bearings rotate smoothly without noise. Repair or replace as required.
D731-9	Bellcrank Assembly – Throttle, R44 II (fuel control)	Visually inspect. Replace if corrosion is evident. Verify bearing rotates smoothly without noise.
D756-1	Bellcrank Assembly (forward, R44 II)	Visually inspect. Replace if corrosion is evident. Verify bearing rotates smoothly without noise.
D756-3 & -4	Bellcrank Assembly (forward & aft, R44)	Visually inspect. Replace if corrosion is evident. Verify bearing rotates smoothly without noise.
D778-1	Cartridge – Air Conditioning Pulley Drive (R44 II or Cadet only)	Replace with new or overhaul exchange.
D918-1 & -2	Elastic Cords – Cyclic	Replace with new.
NAS1149E0363R	Washer (corrosion resistant, mixture arm, 2 each)	Replace with new C141-26 washers, per R44 SL-80.
21FKF-518	Nut (exhaust riser, 12 each)	Replace with new.
21FKF-813	Jam Nut (MR pitch link, 2 each)	Replace with new.

1.102 Additional Component Maintenance (continued)

**B. 2200/2400 Hours**

Perform action indicated on the following components when they have accumulated 2200 hours (R44 S/Ns 0001 thru 9999 & R44 II S/Ns 10001 thru 29999) or 2400 hours (R44 Cadet S/Ns 30001 & subsequent) time in service since new or since last overhaul:

Part Number	Description	Action
A120-3	Tail Rotor Bellcrank	Replace with new.
A130-21	Spacer (at R44 and R44 Cadet powerplant controls)	Replace with new.
A130-48	Spacer	Replace with new, per R44 SL-80.
A190-3	V-Belt Set	Replace with new.
A336-6, -9	Push-Pull Tube – Throttle (R44 II)	Replace with new.
A462-4	Fitting	Replace with new.
A522-7	Control Cable – Mixture (carburetor)	Replace with new.
A522-13	Control Cable – Mixture (fuel control)	Replace with new.
A595-1	Seal – Vertical Firewall (neoprene)	Replace with new.
A595-2	Seal – Vertical Firewall (Teflon®)	Replace with new.
A650-2 or -4	Fitting – MRGB Mount	Visually inspect, including bore. Replace if worn or corroded. Magnetic particle inspect per § 23-41.
A729-33	Tube (aux fuel pump drain)	Replace with new.
A785-6	Hose (bulkhead to MRGB)	Replace with new.
A785-7	Hose (alternator cooling)	Replace with new.
A785-10	Hose (carb heat scoop to airbox)	Replace with new.
A785-11	Hose (engine LH cowling to airbox)	Replace with new.
A785-12	Hose (scroll to muffler shroud)	Replace with new.
A785-13	Hose (muffler shroud to cabin heat inlet)	Replace with new.
A785-16	Hose (scroll to MRGB)	Replace with new.
A785-17	Hose (scroll to bulkhead)	Replace with new.
A785-19	Hose (magneto cooling)	Replace with new.
A785-28	Hose (bulkhead to hydraulic reservoir)	Replace with new.
A785-31	Hose (R44 II engine air intake)	Replace with new.
A918-1 thru -8	Elastic Cord – Tail Rotor	Replace with new. Dash number is selected during flight test evaluation.
A947-2	Flex Plate Assembly (intermediate)	Replace with new.
B173-2, -3, or -6	V-Belt – Alternator	Replace with new.
B173-4	V-Belt – A/C Compressor Drive	Replace with new.
B277-024	Clamp	Replace with new.
B277-036	Clamp	Replace with new.

1.102 Additional Component Maintenance (continued)

**B. 2200/2400 Hours (continued)**

Part Number	Description	Action
B283-1	Hose Assembly (oil pressure sender)	Replace with new.
B283-3	Hose Assembly (fuel; various)	Replace with new.
B283-7	Hose Assembly (fuel control to flow divider)	Replace with new.
B283-9 or -11	Hose Assembly (fuel return)	Replace with new B283-11 hose assembly.
B283-10	Hose Assembly (engine-driven pump to fuel control)	Replace with new.
B345-4	Pitch Link (tail rotor)	Replace with new.
B350-3	Spring Pin (fanwheel retaining nut)	Replace with new.
C005-4	C154-1 Main Rotor Hub Assembly	Replace with new.
C005-12	C016-7 Main Rotor Blade & C158-1 Spindle Assembly	Replace with new or overhaul exchange C005-12 main rotor blade & spindle assembly, as required.
C006-3, -6, or -8	Main Rotor Gearbox Assembly	Replace with new or overhaul exchange C006-8 main rotor gearbox assembly.
C007-5	Fanshaft Assembly	Replace with new.
C008-4 or -9	Tail Rotor Assembly	Replace with new C008-9 tail rotor assembly.
C014-X	Landing Gear Assembly	Perform 2200-Hour/2400-Hour service per § 2.650 Part B.
C017-4 or -6	Swashplate Assembly	Replace with new or overhaul exchange C017-6 swashplate assembly.
C018-2 or -3	Clutch Assembly (C166-4 shaft)	Replace with new or overhaul exchange C018-4 or -5 clutch assembly.
C018-4 or -5	Clutch Assembly (C166-5 shaft)	
C020-1	Upper Frame Assembly (standard)	Replace with new.
C020-2	Upper Frame Assembly (with tie-downs)	Replace with new.
C021-1	Tail Rotor Gearbox Assembly	Replace with new or overhaul exchange.
C031-1	Tail Rotor Pitch Control	Replace with new.
C046-1, -19, -21, or -23	Lower Frame Assembly – LH	Remove paint per § 23-71 and MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
C046-2	Lower Frame Assembly – RH	Remove paint per § 23-71 and MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
C051-1 or -2	Clutch Actuator Assembly	Replace with new or overhaul exchange.
C106-X	Journal, Main Rotor Hub	Replace with new, or: Visually inspect using 10x magnification for obvious damage; magnetic particle inspect per § 23-41.

1.102 Additional Component Maintenance (continued)

**B. 2200/2400 Hours (continued)**

Part Number	Description	Action
C119-2	Bumper (tail rotor)	Replace with new.
C121-17	Push-Pull Tube (tailcone)	Replace with new.
C121-25 or -31	Push-Pull Tube Assembly – Swashplate	Disassemble, remove paint per § 23-71, fluorescent penetrant inspect per § 23-42, and replace as required. Clean, prime, & paint per § 23-60.
C152-1	Thrust Washer	Replace with new, or: Visually inspect using 10x magnification for obvious damage; magnetic particle inspect per § 23-41.
C169-1 or -35	Exhaust Muffler Assembly	Replace with new C169-35 assembly.
C169-31 or -37	Exhaust Muffler Assembly	Replace with new C169-37 assembly.
C174-1 Revision A thru F	Support (engine mount at prop governor pad; constant 0.5-inch dia. vertical tube)	Replace with new C174-1 Revision G or subsequent.
C174-1 Revision G or subsequent	Support (engine mount at prop governor; vertical tube lower portion is 0.562 inch dia.)	Magnetic particle inspect support.
C182-1	Nut (fanwheel retaining)	Replace with new.
C189-14	Nut (MR hub bolt)	Replace with new.
C258-1	Main Rotor Pitch Link Assembly	Replace with new C258-5 link assembly.
C258-5	Main Rotor Pitch Link Assembly	Replace with new, or perform inspection per § 2.630 and magnetic particle inspect barrel.
C339-1 or -10	Jackshaft Weldment	Visually inspect. Repair or replace as required.
C343-1*, -9, & -11 (*R44 SL-43 refers)	Push-Pull Tube Assembly – Tail Rotor	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
C348-5	Anchor Assembly – Seat Belt (Forward)	Replace if seat buckle attaching lugs are less than 0.073 inch thick. Visually inspect. If exterior corrosion is evident, remove and inspect tube interior. Repair or replace as required.
C480-1	Swashplate Boot	Replace with new.
C522-7	Control Cable – Carburetor Heat	Replace with new.
C568-1	Scoop Assembly (carburetor heat)	Replace with new.
C615-1	Gasket (airbox-to-carburetor)	Replace with new.
C627-4, -5, or -6	4-/5-point Harness Assembly	Replace with new.
C628-5, -6, -7, or -8	Connector Assembly	Replace with new.
C749-1	Nozzle Assembly (MRGB cooling)	Replace with new.
C792-4 or -5	Dual Tachometer	Replace with new or overhaul exchange.

1.102 Additional Component Maintenance (continued)

**B. 2200/2400 Hours (continued)**

Part Number	Description	Action
C907-1 or -2 Revision A thru G (weldment)	Yoke – Clutch Shaft Forward (1.43-inch dia. center hole between arms)	Replace with new C907-1 or -2 Revision H or subsequent yoke.
C907-1 or -2 Revision H or sub- sequent (forging)	Yoke – Clutch Shaft Forward (1.471-inch dia. bore) Yoke is heat-treated steel & cadmium-plated; do not remove gold-colored cadmium plating.	Replace with new, or: Liquid-strip paint using § 23-71 approved materials only. Visually inspect using 10x magnification for obvious damage; replace yoke if damaged or if cadmium plating is absent. Magnetic particle inspect per § 23-41. Chromate- epoxy prime, & topcoat non-clamping areas with white epoxy paint per § 23-60.
C918-15	Elastic Cord (collective)	Replace with new A918-20 cord.
C947-1 & -3	Flex Plate Assembly (forward & aft)	Replace with new.
D046-1 & -2	Strut Weldment – LH	Remove paint per § 23-71. MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
D046-3	Strut Weldment – RH	Remove paint per § 23-71. MPI per § 23-41. Powder coat per § 23-76 (preferred), or prime & paint per §§ 23-75 & 23-77.
D079-1	Tail Rotor Guard Assembly	Replace with new.
D082-1	Tube Assembly (weldment, TR guard)	Replace with new, or: liquid-strip paint per § 23-71, MPI per § 23-41, & prime per § 23-60.
D174-2	Fanwheel	Replace with new or overhaul exchange.
D201-5	Support Assembly – Hydraulic Servos (fwd)	Replace with new D201-6 support assembly. Use NAS6604H16 bolt & NAS1149F0432P washer and safety wire (4 places) to secure servos.
D203-1	Support Assy, LH – Aft Hydraulic Servo	Remove paint per § 23-71. MPI per § 23-41. Clean, prime, & paint per § 23-60.
D204-8	Support Assy, RH – Aft Hydraulic Servo	Remove paint per § 23-71. MPI per § 23-41. Clean, prime, & paint per § 23-60.
D211-1 or -2	Hydraulic Reservoir	Replace with new or overhaul exchange.
D212-1	Hydraulic Servo Actuators	Replace with new or overhaul exchange.
D224-1 & -2	Tail Rotor Drive Shaft Assembly	Replace with new.
D270-1	Governor Controller (with EMU)	Replace with new or overhaul exchange.
D278-1 or -2	Governor Controller	Replace with new or overhaul exchange.
D321-1	Valve – Pressure Relief (Fuel)	Replace with new or overhaul exchange.
D333-3	Fitting (carb heat control cable)	Replace with new.
D500-1	Hydraulic Pump	Replace with new or overhaul exchange.
D543-2	Spacer (fuel control throttle bellcrank)	Replace with new.

1.102 Additional Component Maintenance (continued)

**B. 2200/2400 Hours (continued)**

Part Number	Description	Action
D730-8	Brace (fuel control)	Replace with new.
D735-1	Sleeve – Fuel Control Inlet Fitting (orange, insulated)	Replace with new.
D743-1, -2, -3 or -4	Pump – Fuel (electric)	Replace with new D743-3 pump. For helicopter S/N 13158 and prior equipped with D743-1, -2, or -4 aux fuel pump, also order KI-206-3 Provisions Kit.
D778-1	Cartridge – Air Conditioning Pulley Drive (R44 II or Cadet only)	Replace with new or overhaul exchange.
D918-1 & -2	Elastic Cords – Cyclic	Replace with new.
D930-1	Mixture Spring (fuel control)	Replace with new.
F628-1	Connector Assembly	Replace with new.
F628-3	Connector Assembly	Replace with new.
F628-7	Buckle Assembly	Replace with new.
KI-6604	C017-5 Swashplate Installation Parts Kit Instructions	Replace existing parts with kit parts.
21FKF-518	Nut (exhaust riser, 12 each)	Replace with new.
AN3-41A	Bolt (oil cooler retaining)	Replace with new.
AN3-44A	Bolt (oil cooler retaining)	Replace with new.
AN735-4	Clamp (mixture cable-to-C577-2 bracket)	Replace with new.
MS16562-4	Spring Pin (in D333-3 fitting)	Replace with new.
MS20002-24	Washer (thick, fanwheel retaining nut)	Replace with new.
NAS1149E0363R	Washer (corrosion resistant, mixture arm, 2 each)	Replace with new C141-26 washers, per R44 SL-80.
NAS1149F2432P	Washer (thin, fanwheel retaining nut)	Replace with new.
NAS634-105	Bolt (MR hub)	Replace with new.

**C. Engine Maintenance**

Refer to latest revisions of Textron Lycoming Service Instruction No. 1009 and Lycoming Service Bulletin No. 240.

**D. Airframe and Engine Accessory Maintenance**

Refer to accessory manufacturer’s instructions for continued airworthiness for accessory maintenance. Remove accessories per R44 Maintenance Manual or accessory manufacturer’s instructions as required.



1.240 Fixed Ballast Installation

1.241 Nose Ballast

**NOTE**

Maximum allowable nose ballast is 15.00 lb.

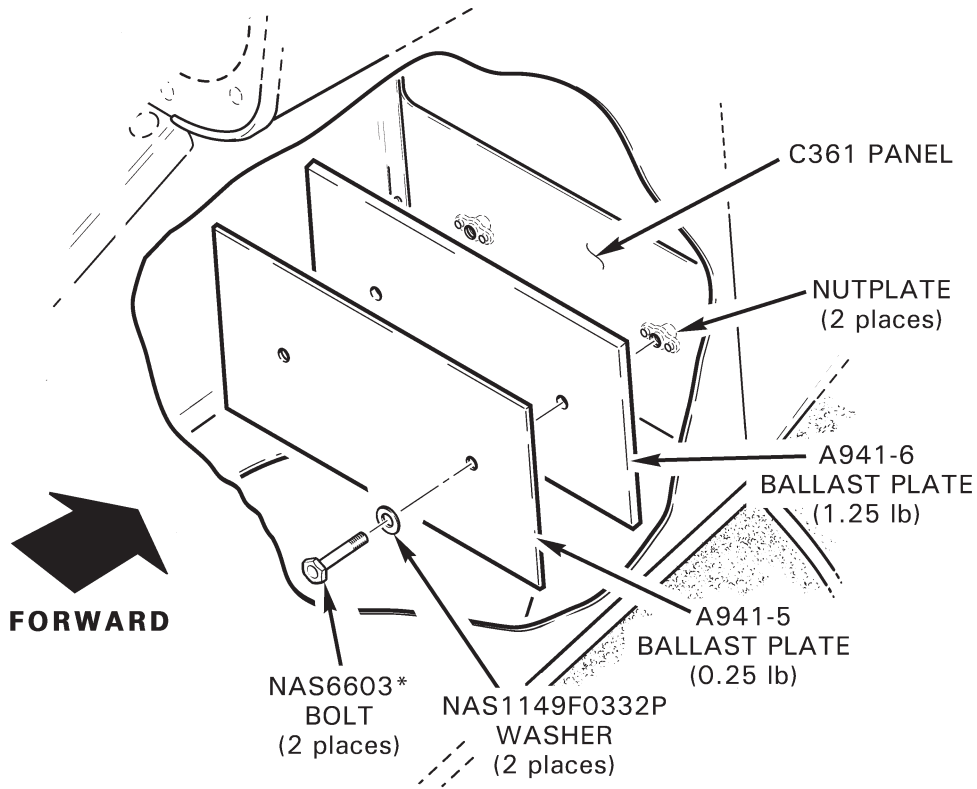
**CAUTION**

Changing fixed ballast amount affects helicopter empty weight & center of gravity (CG). If helicopter empty weight & CG historical data is suspect, weigh helicopter per § 1.230.

1. Open or remove console assembly per § 13-80.
2. Refer to Figure 1-8 (or 1-8A). If installed, remove hardware securing A941-5 or -6 (or -2 or -3) ballast plate(s) to C361-1 panel.
3. Remove or install ballast plates per calculations performed in § 1.231. Select NAS6603 (or NAS428-3A) bolt length per Figure 1-8 (or 1-8A). Install hardware, standard torque bolts per § 23-32, and torque stripe per Figure 2-1.
4. Install or close console assembly per § 13-80. Verify security.
5. Reweigh and/or calculate basic empty weight and CG per § 1.231.
6. Revise Weight and Balance Record in applicable Pilot's Operating Handbook (POH) Section 6 to reflect ballast removal or installation using the following data:

Item	Weight	Longitudinal Arm	Longitudinal Moment	Lateral Arm	Lateral Moment
Nose ballast	0–15.00 lb	7.0 in.	Variable	0.00 in.	0.00 in.-lb

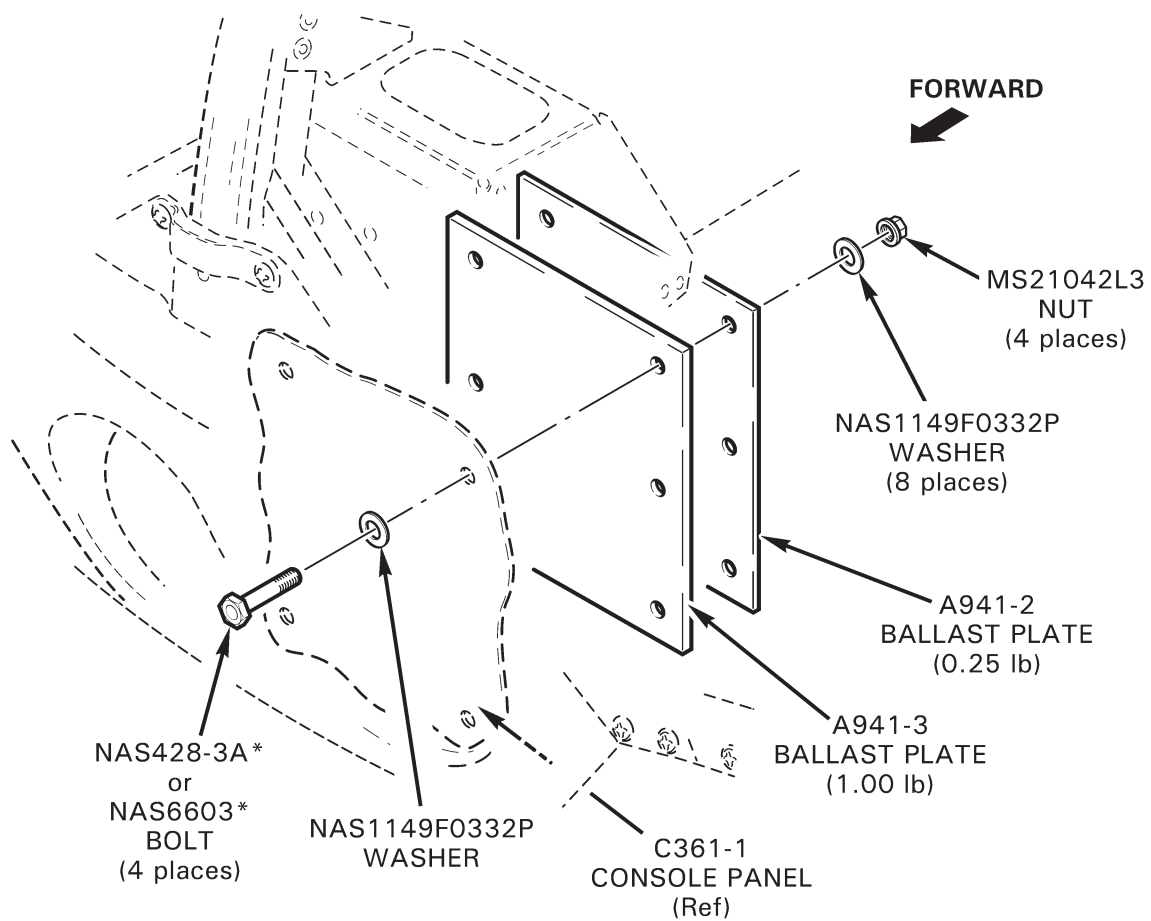
| 1.241 Nose Ballast (continued)



\*Bolt length as required for 2-4 threads beyond nutplate.

| **FIGURE 1-8 NOSE BALLAST INSTALLATION**  
(with 2-hole ballast plates, required with H.I.D. landing lights)

1.241 Nose Ballast (continued)



\*Select NAS428-3A bolt length as required for 2 threads minimum beyond nut.  
 Select NAS6603 bolt length as required for 2 to 4 threads beyond nut.

**FIGURE 1-8A NOSE BALLAST INSTALLATION**  
 (with 4- or 6-hole ballast plates)

1.242 Empennage Ballast**NOTE**

Approved materials are listed in § 23-70.

**CAUTION**

Changing fixed ballast amount affects helicopter empty weight & center of gravity (CG). If helicopter empty weight & CG historical data is suspect, weigh helicopter per § 1.230.

**A. Removal****CAUTION**

Maximum allowable empennage ballast is 3.00 lb.

1. Remove D079-1 tail rotor guard per § 4.430.
2. Leaving NAS6606-78 bolts installed in C004-2 empennage assembly, remove palnuts, nuts, washers, and lower D301-2 ballast weight from empennage.
3. Remove one bolt then rotate upper ballast weight to expose empty bolt hole. Install NAS6606-47 bolt and associated hardware in exposed hole, finger tight (install [1] or [2] NAS1149F0663P washers as required under nut to meet torque requirements per § 23-30 Part E).
4. Remove second bolt & upper ballast weight from empennage assembly. Install NAS6606-47 bolt and associated hardware (install [1] or [2] NAS1149F0663P washers as required under nut to meet torque requirements per § 23-30 Part E). Standard torque bolts securing empennage to C148-5 bulkhead per § 23-32. Install palnuts and standard torque per § 23-32, do not torque stripe at this time.
5. As required, solvent-clean upper & lower surfaces of empennage assembly around and between attach bolts. Apply light coat zinc-chromate or epoxy primer to noted surfaces and hardware. Apply topcoat as desired.
6. Apply torque stripe to hardware per Figure 2-1.
7. Install tail rotor guard per § 4.430.
8. As required, weigh helicopter or calculate basic empty weight & CG per § 1.230.
9. Revise Weight and Balance Record in applicable Pilot's Operating Handbook (POH) Section 6 to reflect ballast removal using Table 8-1.

1.242 Empennage Ballast (continued)

**B. Installation**

**CAUTION**  
Maximum allowable empennage ballast is 3.00 lb.

1. Remove C004-2 empennage assembly per § 4.400.
2. Solvent-clean around and between 0.375 inch diameter holes on upper & lower surfaces of C044-1 horizontal stabilizer, as applicable.
3. Temporarily position two D301-2 weights on horizontal stabilizer using two NAS6606-78 bolts & associated hardware finger tight.
4. Trace outline of weights onto horizontal stabilizer upper & lower surfaces using felt-tip marker or tape. Remove weights.
5. Remove paint within traced outlines on horizontal stabilizer using approved stripper (ref. § 23-71), or by block sanding (to maintain flatness) using 320-grit or finer aluminum-oxide abrasive sandpaper.
6. Remove tracing tape, if installed. Solvent-clean bare metal on horizontal stabilizer and weight clamping surfaces. Conversion coat upper & lower bare metal surfaces of horizontal stabilizer per § 23-51.
7. Apply approved chromated-epoxy primer (ref. § 23-77) per § 23-60 to bare metal clamping surfaces of weights and horizontal stabilizer. While primer is still wet, install empennage assembly per § 4.400.
8. As required, apply primer and topcoat to exposed hardware.
9. Weigh helicopter or calculate basic empty weight and CG per § 1.230.
10. Revise Weight and Balance Record in applicable Pilot’s Operating Handbook (POH) Section 6 to reflect ballast installation using Table 8-1.

Item	Weight	Longitudinal Arm	Longitudinal Moment	Lateral Arm	Lateral Moment
Empennage Ballast	3.0 lb	325.4 in.	976.2 in.-lb	4.45 in.	13.35 in.-lb

TABLE 8-1 EMPENNAGE BALLAST WEIGHT AND BALANCE

### 1.300 Fastener Torque Requirements

Fastener torque requirement information has been moved to Chapter 23.

Standard torques, previously located in § 1.320, are now located in § 23-32.

Special torques, previously located in § 1.330, are now located in § 23-33.

### 1.400 Approved Materials

Approval materials information has been moved to Chapter 23.

### 1.500 (Reserved)

### 1.600 Part Interchangeability

Refer to R44 Illustrated Parts Catalog for part interchangeability information (ref. § 23-81).

2.410 Inspection Procedures and Checklist (continued)

**6. Remove Engine Aft (6D), Belly (6C), and both side (6A & 6B) Cowlings (continued)**

**Lead-Acid Battery Installations (under left front seat, left-side engine compartment, or mounted to tailcone):** Refer to § 37-11. Inspect condition. Verify no cracks or corrosion on or near battery terminals. As required, perform capacity test per manufacturer’s instructions or replace battery. Verify battery cable security. Verify no corrosion in surrounding structure. \_\_\_\_\_

**Lithium-Ion Battery Installation (if equipped; under left front seat or left-side engine compartment):** Refer to § 37-12. Inspect condition. Verify no cracks or corrosion on or near battery terminals. Verify vent hose, comm connector wiring, and battery cable security. Perform scheduled maintenance as required. Verify no corrosion in surrounding structure. \_\_\_\_\_

**7. Open Cowling Doors (7A), Remove Tailcone Cowling (7B) & Mast Fairing (9)**

**Cowling Door:** Inspect hinges and latches for condition and security. \_\_\_\_\_

**Tailcone cowling:** Verify no cracks, air inlet obstructions, or loose rivets. \_\_\_\_\_

**Electrical and Antenna Wires:** Inspect condition. Verify security and no chafing, kinks or tight bends. \_\_\_\_\_

**Emergency Locator Transmitter (ELT; if installed):** In accordance with local regulation, test per ELT manufacturer instructions. If 406 Mhz ELT, confirm programming tag matches helicopter registration. If RHC installation, inspect condition of both primary hook & loop strap and secondary buckle strap or ty-rap; replace strap(s) if damaged or deteriorated. Verify ELT security and clearance to drive train. \_\_\_\_\_

**MRGB Input Yoke:** Inspect condition. Verify security and operating clearance. Verify security of magnets. \_\_\_\_\_

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2.410 Inspection Procedures and Checklist (continued)

**7. Open Cowling Doors (7A), Remove Tailcone Cowling (7B) & Mast Fairing (9) (cont'd)**

**Fuel Caps:** Inspect condition, to include gasket. Verify security when closed. Verify alignment marks on cap and tank align when cap is fully closed. \_\_\_\_\_

**Nuts and Bolts:** Inspect all nuts and bolts in this area for movement and looseness. \_\_\_\_\_

**Cabin Bulkhead & Forward Hydraulic Servo Mounts:** Inspect bulkhead and servo mounts (if installed) for corrosion, loose rivets, deformation and cracks. \_\_\_\_\_

**Clutch Assembly:** Inspect ends of drive shaft and seals on sheave for oil leakage. Inspect shaft for corrosion, especially at shaft-to-seal junctures. Remove any light surface corrosion at shaft-to-seal junctures, and apply a suitable corrosion-inhibitor. \_\_\_\_\_

**Upper Sheave:** Inspect sheave grooves. Replace any sheave showing corrosion pitting or flaking of metalized or anodized coatings, wear through anodized coatings, roughness, or sharp ridges. \_\_\_\_\_

**Drive V-Belts (see Section 2.507):** Inspect V-belts. Verify no breakage, deterioration of rubber, cuts, fraying, oil, grease, or foreign objects. \_\_\_\_\_

**Actuator Fuses & Holders:** Inspect condition. Verify no corrosion. Verify correct fuses (14-volt systems require AGC-3 fuses while 28-volt systems require AGC-1 ½ fuses). Verify twist-to-lock function and security. \_\_\_\_\_

**Actuator Upper Bearing and Strut:** Inspect seals on both sides of bearing for damage. Inspect strut, including both rod ends, and check witness holes. Check for fretting between bearing inner races and clutch shaft. Bearing inner races should be torque striped to clutch shaft. If stripes are broken or misaligned, shaft is unairworthy. Check bearing Telatemp. Perform bearing inspection per § 2.503 if Telatemp indication has increased without corresponding increase in ambient temperature. \_\_\_\_\_

**Actuator Lower Bearing:** Inspect as much of bearing as can be seen. Inspect fiberglass scroll area at bearing attachment brackets for signs of cracking. Check bearing seals for evidence of deterioration. Inspect lower bearing brackets for looseness or wear. Inspect bearing per § 2.502 if discrepancies are found. \_\_\_\_\_

**Intermediate Flex Plate and Forward End of Tail Rotor Drive Shaft (see Figure 2-5):** Inspect flex plate for cracks and fretting. Inspect yoke-to-drive shaft weld for cracks (steel shafts). \_\_\_\_\_

**Tailcone Attachment:** Thoroughly inspect all welds in this area for cracks, corrosion, and security of attaching fasteners. Inspect tailcone mounting area for cracks. \_\_\_\_\_

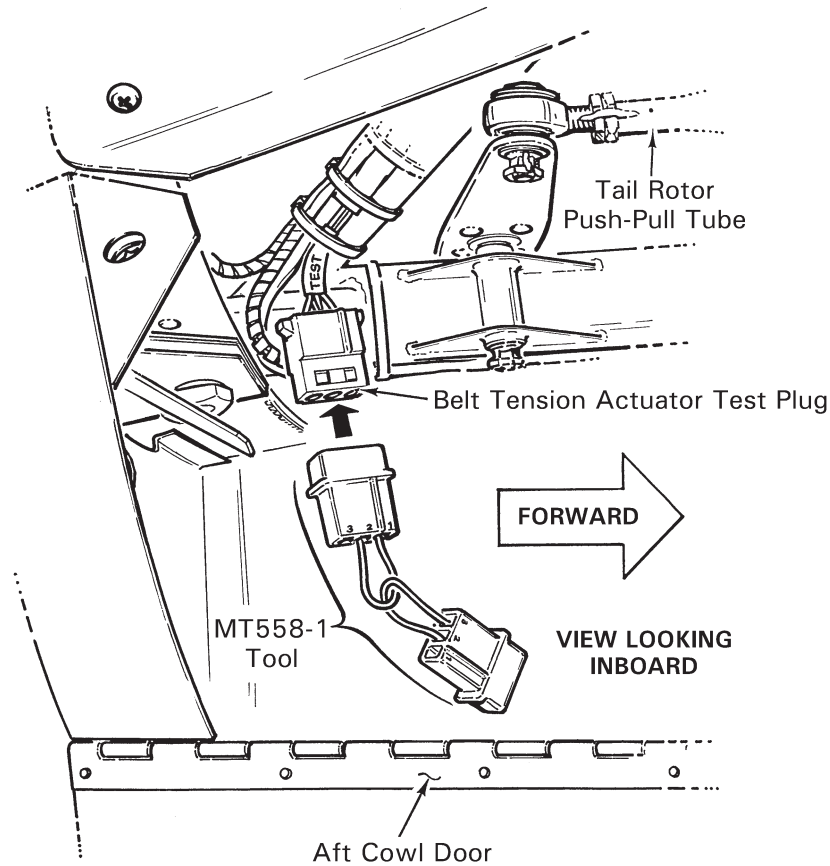


FIGURE 2-6 MT558-1 TOOL INSTALLATION

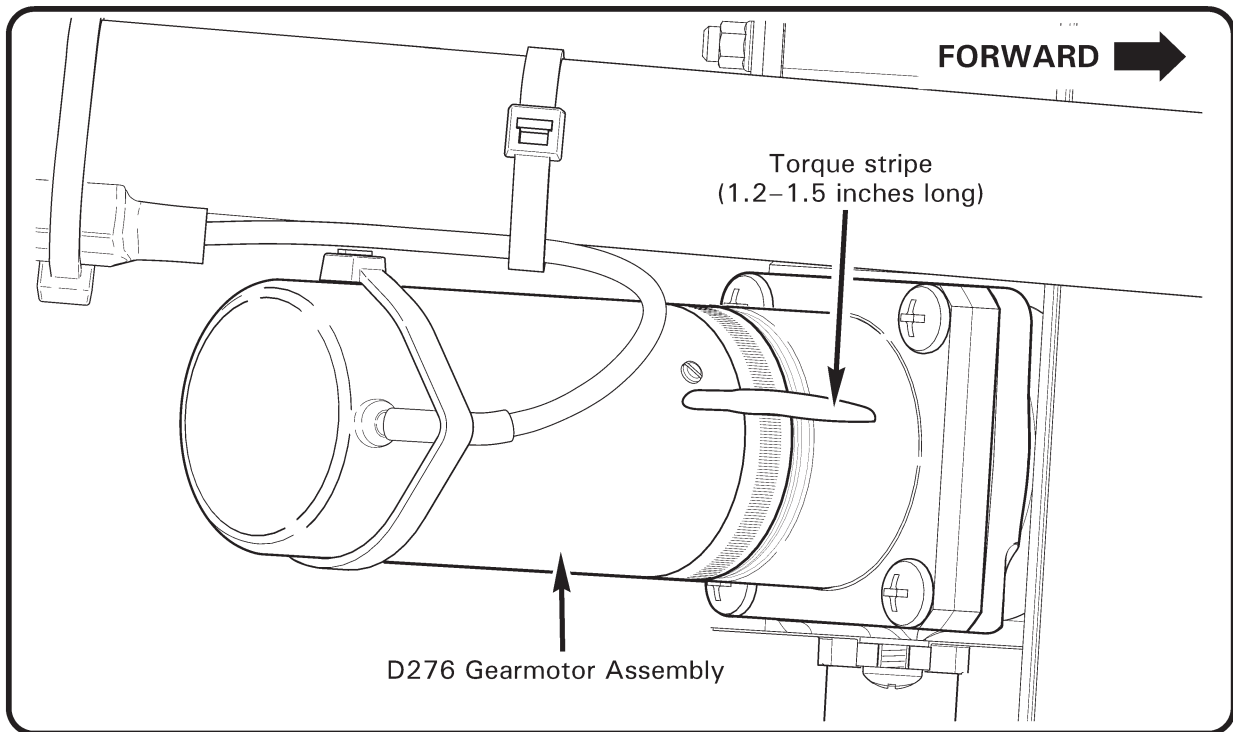


FIGURE 2-6A GEARMOTOR ASSEMBLY TORQUE STRIPE

2.410 Inspection Procedures and Checklist (continued)

**7. Open Cowling Doors (7A), Remove Tailcone Cowling (7B) & Mast Fairing (9) (cont'd)**

**Actuator (CO51):** Verify clearance to structure and drive train when fully disengaged. Turn master switch on and engage clutch switch. While actuator is engaging, depress extension limit switch lever (refer to Figure 7-15) and verify gearmotor stops; release lever and verify gearmotor resumes running. Verify integrity of activating cable for extension limit switch. Use an inspection mirror to observe column springs at end of belt-tensioning cycle; springs should snap outward simultaneously. Verify maximum engaged extension limit per Figure 7-15 is not exceeded. Verify clearance to structure and drive train when fully engaged. Verify down-limit stop screw jam nut is tight.

Check actuator for failed-closed spring switch as follows (actuator electrical harness must be equipped with "Test" plug per Figure 2-6):

- a. With BATTERY switch on and actuator fully engaged, connect one end of MT558-1 tool to actuator test plug and verify gearmotor remains off.

**CAUTION**

If gearmotor activates when installing MT558-1 tool then a spring switch has failed in closed position; immediately remove MT558-1 to prevent actuator damage.

- b. Disconnect MT558-1 tool, connect opposite end to actuator test plug, and verify gearmotor remains off.
- c. Disengage clutch and turn BATTERY switch off.
- d. MT558-1 pins 1 & 2 jumper tests wire 98 spring switch; pins 2 & 3 jumper tests wire 91 spring switch (see Figure 14-1D). Replace any malfunctioning switch per § 7.551 before further flight.

**Gearmotor Assembly Torque Stripe:** Refer to Figure 2-6A. Verify torque stripe is not broken or missing. Renew deteriorated torque stripe as required.

2.410 Inspection Procedures and Checklist (continued)

**7. Open Cowling Doors (7A), Remove Tailcone Cowling (7B) & Mast Fairing (9) (cont'd)**

**Lower Drive Sheave:** Inspect lower sheave. Replace any sheave showing corrosion pitting or flaking of metalized coating, wear grooves, roughness, or sharp ridges.

**Sheave Alignment:** Verify sheave alignment per § 7.230. Adjust as required.

**Hydraulic Reservoir:** Inspect condition. Verify security and no significant leakage. If required by § 1.101, replace filter per § 1.170. Drain and flush hydraulic system per § 1.180 if oil has turned dark or emits bad odor. Add fluid as required.

**CAUTION**

Cleanliness of hydraulic fluid is vital to proper system operation. Use only clean fluid from sealed containers and avoid contamination from dirty funnels, tubing, etc.

**Hydraulic Reservoir Cooling Hose:** Inspect condition. Verify hose is secure and is directed at center of reservoir cooling fins.

**Hydraulic Pump:** Inspect condition. Pump temperature indication should not exceed gearbox temperature indication. Verify security and no significant leakage.

**Forward Hydraulic Servos:** Inspect condition. Inspect rod ends per § 2.120. Verify security and no significant leakage. Verify servo input rod end/clevis area is clean; cleanse area with non-residue, non-alcoholic solvent as required. Verify approximately 0.040 inch total free-play at servo valve input. Verify valve clearance to surrounding structure while flight controls are moved through full range of travel. Inspect condition and verify security of scissors at upper clevis of servos.

**CAUTION**

Use LPS PreSolve to clean hydraulic parts. Do not use alcohol.

**Aft Hydraulic Servo:** Inspect condition. Inspect rod ends per § 2.120. Verify security and no significant leakage. Verify servo input rod end/clevis area is clean; cleanse area with non-residue, non-alcoholic solvent as required. Verify approximately 0.040 inch total free-play at servo valve input. Verify valve clearance to surrounding structure while flight controls are moved through full range of travel.

2.410 Inspection Procedures and Checklist (continued)**7. Open Cowling Doors (7A), Remove Tailcone Cowling (7B) & Mast Fairing (9) (cont'd)**

**Aft Hydraulic Servo:** Inspect rod ends per § 2.120. Inspect attachment to sheet metal, verify no cracks. Verify security. \_\_\_\_\_

**Hydraulic Lines & Fittings:** Inspect condition. Verify valve clearance to surrounding structure while flight controls are moved through full range of travel. Verify security and no leakage. Verify minimum 0.25 inch clearance between pump hoses and aux fuel tank. \_\_\_\_\_

**Fasteners and 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)

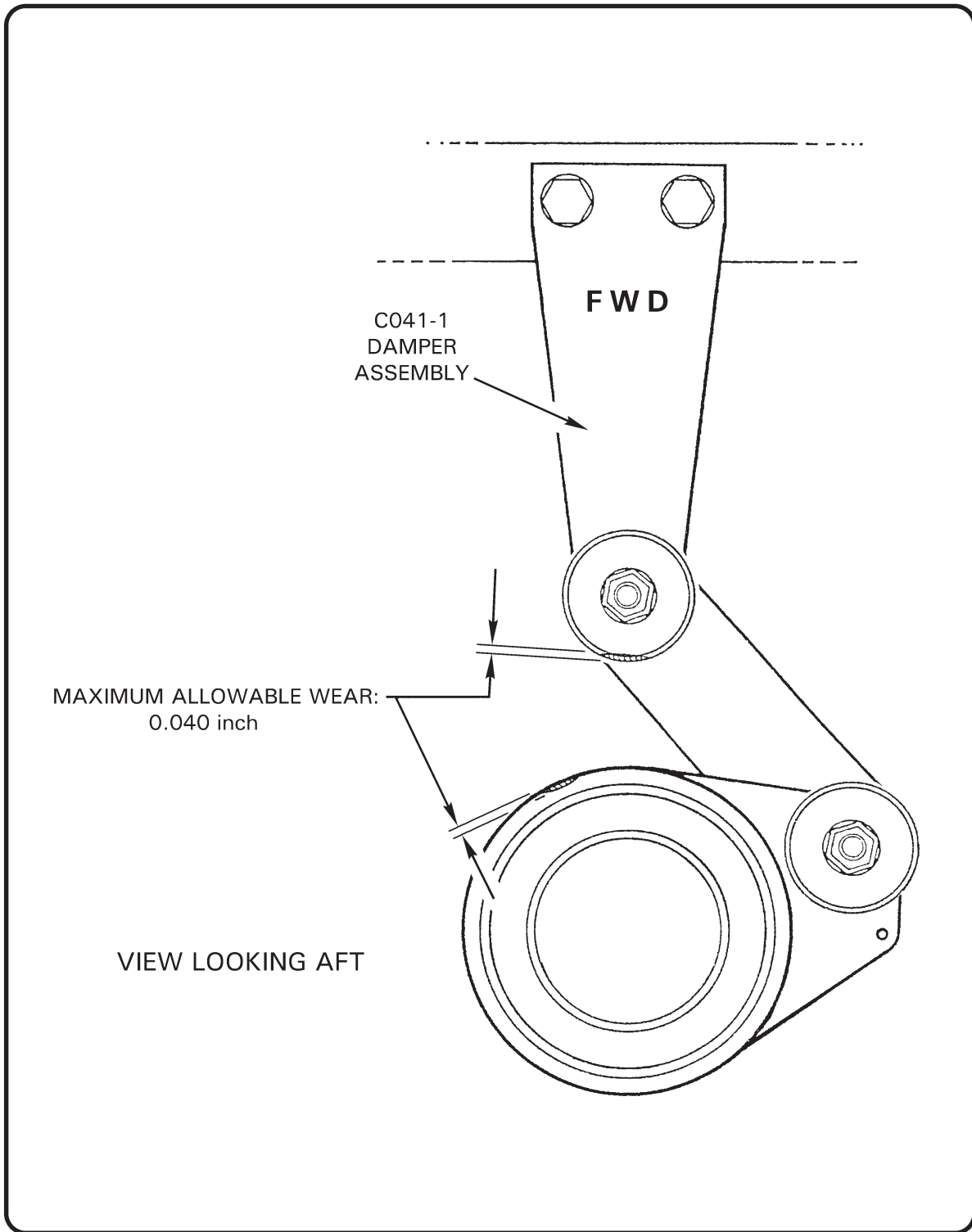


FIGURE 2-8 TAIL ROTOR DRIVE SHAFT DAMPER BEARING INSPECTION

2.410 Inspection Procedures and Checklist (continued)

**8. Remove Tailcone Plugs (8A) & Aft Plastic Cover (8B)**

**NOTE**

Aft plastic cover (8B) is secured with two MS27039C0806 screws on Rev L and subsequent tailcones. On Rev K and prior tailcones ensure screws securing plastic cover are short enough to prevent interference in aft flex plate area.

**Tail Rotor Drive Shaft Assembly:** Examine accessible portion through inspection holes with inspection light and mirror. Verify no cracks, corrosion, or fretting in fore and aft bonded sleeves. Verify no evidence of drive shaft contact with tailcone bays. Verify no bends, bowing, dents, cracks, or corrosion. Perform tail rotor drive shaft runout per § 7.340. Verify proper installation, security, and operating clearance.

**CAUTION**

Bends, bowing, dents, cracks and corrosion are cause for immediate replacement of tail rotor drive shaft.

**Tail Rotor Push-Pull Tube & Forward Bellcrank:** Examine accessible portion through inspection holes with inspection light and mirror. Inspect condition per § 2.121. Verify no nicks, scratches, dents, cracks, or corrosion. Inspect rod end bearings per § 2.122; verify rod ends are centered and palnut and jam nut are tight. Check witness holes for proper thread engagement. Inspect bellcrank and bellcrank mount for nicks, scratches, dents, cracks, or corrosion. Inspect spherical bearings per § 2.122. Verify proper installation, security, and operating clearance. Verify tail rotor guard mounting screw shanks clear push-pull tube.

**Tail Rotor Drive Shaft Damper Assembly:** Inspect condition. Inspect bearing and housing for cracks, corrosion, wear (see Figure 2-8), and bearing seal deterioration. Inspect arms and bearings for cleanliness, cracks, bends and corrosion. Inspect bearing's inner race-to-drive shaft torque stripe.

**Aft Flex Plate (See Figure 2-5):** Inspect flex plate for cracks, fretting, and distortion. If fretting is detected, contact RHC Technical Support. Inspect security of flex plate fasteners.

**Tail Rotor Drive Shaft Aft Yoke:** Using inspection hole, check yoke for cracks, fretting, and corrosion.

**Tailcone Interior:** Inspect condition. Verify no nicks, scratches, dents, cracks, corrosion, fretting or loose rivets. Verify no cracks where damper assembly mounts to tailcone. Verify no excessive wear in bulkhead bushings from push-pull tubes. Retrieve and discard trapped debris.

2.410 Inspection Procedures and Checklist (continued)

**8. Remove Tailcone Plugs (8A) & Aft Plastic Cover (8B)**

**Tailcone Exterior:** Inspect condition. Refer to § 4.310. Inspect tailcone exterior for nicks, scratches, dents, cracks, corrosion, fretting or loose rivets. Verify no obstructions in drain hole at forward edge of each bay (except forward bay). Inspect tailcone for cracks in vicinity of antenna mounts and battery (if installed on tailcone). \_\_\_\_\_

**Strobe light:** Inspect lens and strobe light mount for cracks, loose rivets, and security. If split red/clear lens is installed, verify clear half of lens faces aft. \_\_\_\_\_

**Antennas:** Inspect condition. Verify no cracks where antennas mount to tailcone. Verify security. \_\_\_\_\_

**Tailcone Battery (if installed):** Inspect condition. Verify no debris between battery box cover and tailcone. Verify security. \_\_\_\_\_

**Tailcone Attachment:** Inspect condition and security of four bolts attaching tailcone to upper frame. \_\_\_\_\_

**Empennage:** Inspect entire empennage and attachment points for damage, cracks, and loose fasteners. Check tail skid for evidence of tail strike. If evidence of tail strike is found, refer to special inspection section. \_\_\_\_\_

**Float Stabilizer (if installed):** Inspect condition and security. \_\_\_\_\_

**Tail Rotor Guard:** Inspect for security. Check forward mount for cracks around welded area. Inspect area around aft mount for cracking and fretting. \_\_\_\_\_



2.580 Windshield Inspection

This section has been moved to Chapter 27 Doors and Windows.

### 2.590 Lightning Strike

Lightning strikes are extremely rare for helicopters operating in VFR conditions.

If a lightning strike does occur, RHC recommends performing a 100-hour inspection per § 2.400 and following recommendations for aircraft struck by lightning per Lycoming Service Bulletin No. 401.

High voltage that is well conducted through the aircraft structure will dissipate and cause minimal damage. High voltage that is not well conducted through the aircraft structure can result in excessive heat, which can bake, burn, char, or even melt certain materials. Heat damage may or may not be detectable by visual inspection. A component may not exhibit obvious damage, but temperatures above 300° F can alter the strength of some materials and thus affect a component's service life and airworthiness.

Visually inspect main rotor blades, landing gear, drive train, airframe, and flight controls thoroughly for obvious damage such as electrical arcing or burns, pitting, or cracking. Particular attention should be given to rod ends, journals, etc., where the conductive path is most susceptible. If obvious damage is detected in any of the above-mentioned systems, additional components may require replacement. Contact [RHC Technical Support](#) with detailed documentation for further guidance prior to approving aircraft for return to service.

**CHAPTER 4**

**AIRFRAME**

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## CHAPTER 4

## AIRFRAME

4.000 Description

The R44 I & R44 II are both a four-place (R44 Cadet version is two-place, refer to Chapter 36), single-main-rotor, single-engine helicopter constructed primarily of metal and equipped with skid-type landing gear.

Primary structure is welded steel tubing and riveted aluminum. The tailcone is a monocoque structure in which aluminum skins carry most of the primary loads. Fiberglass and thermoset plastics are used in the secondary structure of the cabin, engine cooling system, and in various other ducts and fairings.

Cabin doors are removable. Four hinged cowl doors on right side provide access to main rotor gearbox, drive system and engine. A hinged cowl door on left side provides access to engine oil filler, dip stick, and battery (if installed here). For additional access to controls and other components, there are removable panels between seat cushions and seat backs, on each side and aft of engine compartment, under cabin and forward of tailcone.

The instrument console hinges up and aft for access to wiring and instrument connections and battery (if installed here). Small removable plug buttons are located on tailcone for internal inspection.

One stainless steel vertical firewall is forward of the engine and a stainless steel horizontal firewall is above the engine.

4.100 Cabin Assembly

The cabin assembly is a non-field-replaceable assembly.

4.110 Repair

1. Vertical firewall repairs may be accomplished in accordance with U.S. FAA Advisory Circular 43.13-1B paragraph 4-59. Firewall material is 0.016-inch thick, type 301, one-quarter hard corrosion-resistant (CRES) steel.
2. Keel panel replacement must be performed at the factory in a jig. Keel panel repairs may be accomplished in accordance with U.S. FAA Advisory Circular 43.13-1B. Keel panel material is 0.025-inch thick, 2024-T3 clad aluminum sheet.
3. To preserve crashworthiness, repairs to seat structure are limited to replacement of damaged components only.

4.120 Windshield Assembly

| This section has been moved to Chapter 27 Doors and Windows.

4.130 Door Removal and Installation

| This section has been moved to Chapter 27 Doors and Windows.

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#### 4.140 Fairing, Cowling, and Inspection Panels

##### 4.141 Engine Cowling

Engine cowling includes left-hand and right-hand cowling assemblies, belly cowling assembly, and the aft cowling assembly.

The lower edge of both engine cowling assemblies are supported by removable channels. The air intake hose is attached to right engine side panel assembly, which may be removed or connected through door in panel. Lower left slat in aft cowling assembly may be removed for access to clean out anything that may have fallen through slats.

##### 4.142 Mast Fairing

**CAUTION**

Mast fairing must be installed for flight.

The C261 mast fairing upper rib is mounted to main rotor gearbox at swashplate tube assembly. Lower rib is clamped to main rotor gearbox mast assembly.

The pitot tube is mounted on lower front of mast fairing.

The fuel tank vents are installed through grommets in lower rib and attach to middle rib of mast fairing. The C665-2 guide assembly for C121-5 push-pull tube is mounted to center rib. It should be adjusted to minimize preload on push-pull tube.

##### 4.143 Upper Cowling

Cowling above horizontal firewall includes D042 doors behind and below auxiliary tank, C347 panels around mast tube, and C706-1 tailcone cowling.

**CAUTION**

All cowlings must be installed for flight.

**CHAPTER 7**

**DRIVE TRAIN**

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**CHAPTER 7**

**DRIVE TRAIN (Continued)**

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### 7.230 Clutch Sheave Alignment

Checking sheave alignment:

1. Engage clutch.
2. Adjust length of lateral centering strut, if required, to center upper sheave in steel tube frame. If length was adjusted, standard torque attach bolts, jam nuts, and palnuts per § 23-32 and torque stripe per Figure 2-1.
3. Hold MT331-4 Sheave Alignment Bar against aft face of lower sheave extending bar upward to horizontal center line of upper sheave.
4. Measure left and right gaps per Figure 7-6. Average of both gaps must be within noted limits.

If average gap exceeds maximum limit then upper sheave is too far forward and must be moved aft by:

- Shimming forward flex plate, and/or
- Adjusting C907 yoke length.

Shimming is accomplished by installing a maximum of one NAS1149F0632P washer between C947-1 flex plate and both arms of C907 and/or C908 yoke; NAS1149F0632P washers installed on either yoke will decrease gap an amount equal to washer thickness. Each C907 yoke has two sets of mounting holes which change the effective yoke length by 0.120 inch. The C907-2 yoke is either 0.120 inch or 0.240 inch longer than the long position of the C907-1 yoke. Gap will decrease by 0.120 inch with each 0.120 inch increase in C907 yoke length.

If average gap is smaller than minimum limit then upper sheave is too far aft and must be moved forward by:

- Removing shims (if installed) at forward flex plate, and/or
- Adjusting C907 yoke length.

Removing NAS1149F0632P washers from between C947-1 flex plate and both arms of C907 and/or C908 yoke will increase gap an amount equal to washer thickness. Each C907 yoke has two sets of mounting holes which change the effective yoke length by 0.120 inch. The C907-1 yoke is either 0.120 inch or 0.240 inch shorter than the short position of the C907-2 yoke. Gap will increase by 0.120 inch with each 0.120 inch decrease in C907 yoke length.

5. Check intermediate flex plate shimming per § 7.330 if shim washers were added or removed at C947-1 flex plate or if C907 yoke length was altered.
6. Rotate drive train by hand. Verify operating clearance with belt tension actuator disengaged, and with belt tension actuator engaged.

### 7.240 Clutch Shaft Angle

No check of the clutch shaft angle is required.

### 7.250 [Reserved.]

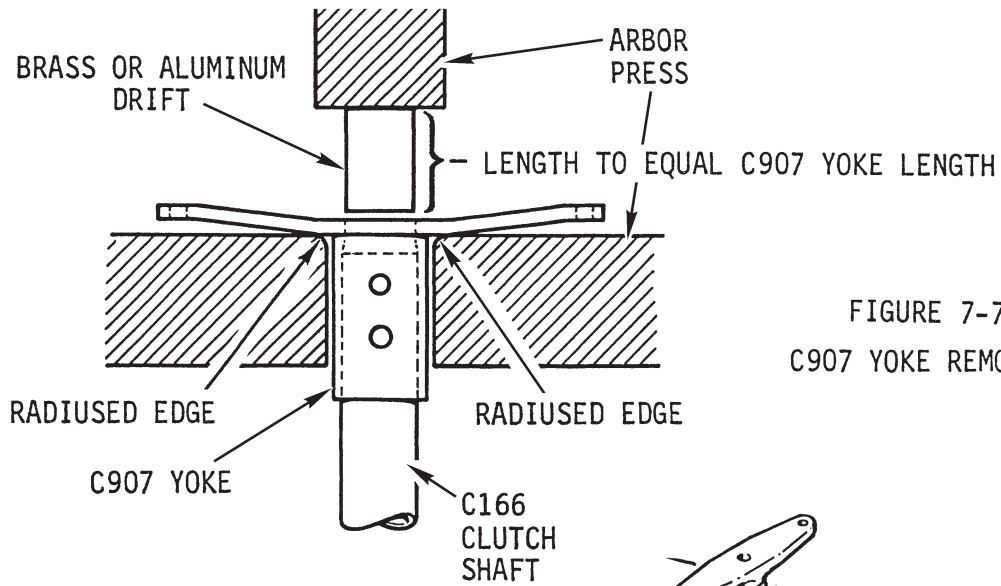
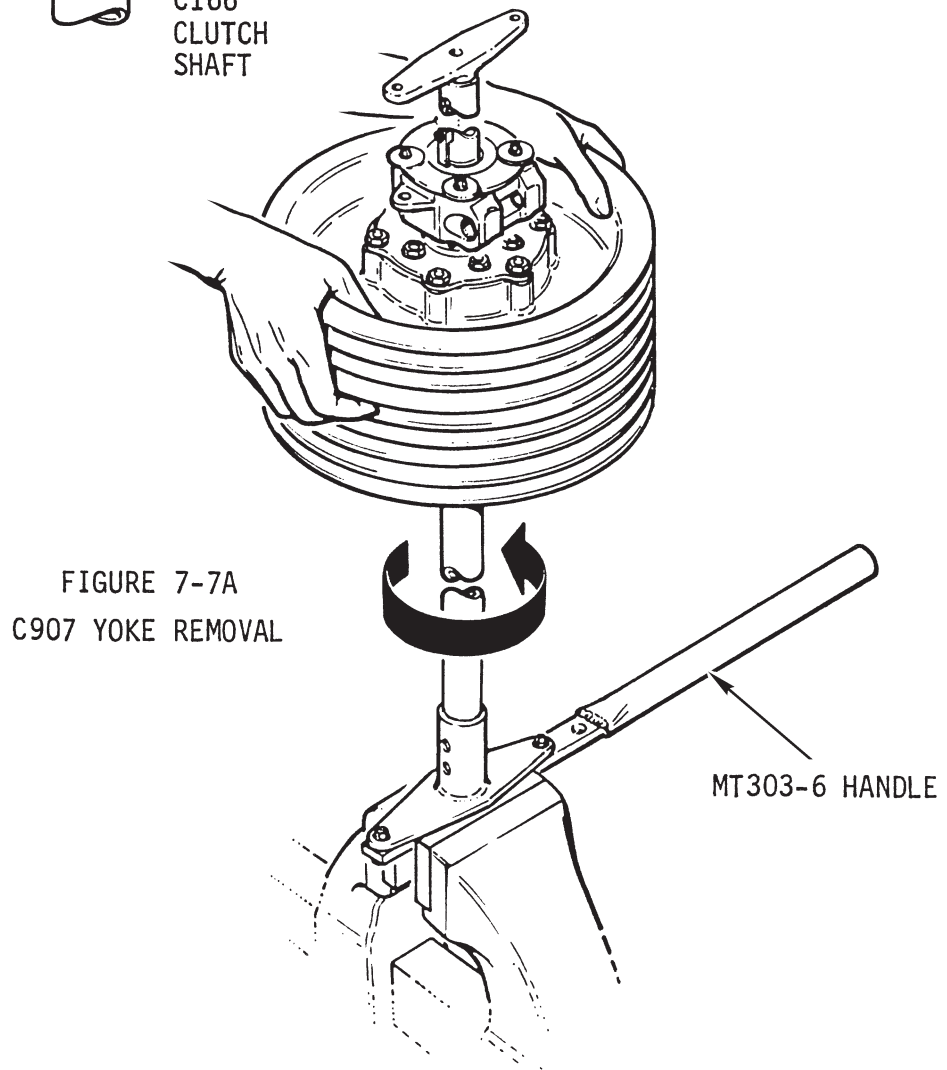


FIGURE 7-7  
C907 YOKE REMOVAL



## 7.260 C907 Yoke Removal and Installation

### **A. Removal**

1. Remove the clutch assembly per § 7.210.
2. Remove bolts and clamping blocks securing C907 yoke to clutch shaft. Mark which set of yoke attachment holes are used.
3. Remove C907 yoke:
  - a. (Preferred method). If press is available, position clutch assembly in press per Figure 7-7. Ensure brass or aluminum drift fits against outer rim of clutch shaft and not against inner spacer. Press clutch shaft out of yoke.

**CAUTION**

Ensure clutch assembly does not fall when yoke is removed.

- b. If a press is not available, tightly secure C907 yoke arms to MT303-6 handle using NAS6606 bolts. Refer to Figure 7-7A. Clamp handle in a vise and twist clutch shaft out of yoke by turning upper sheave. Apply penetrating oil to yoke-shaft juncture as required. If difficulty is encountered, remove handle and arrange to use a press as described in preceding step.

**CAUTION**

Avoid bending loads on clutch shaft when handle is clamped in vise as C907 yoke can be damaged.

### **B. Installation**

1. Remove loose paint and clean mating area on shaft with non-residue solvent. |
2. Coat inside of C907 yoke and mating portion of clutch shaft with zinc-chromate or epoxy primer. While primer is still wet, install yoke on clutch shaft and align marked holes on yoke (if applicable) with clutch shaft holes.
3. Secure yoke to shaft with clamping blocks and bolts. Standard torque bolts per § 23-32 and torque stripe per Figure 2-1. |

7.270 C195 Yoke Removal and Installation**A. Removal****NOTE**

Yoke may be removed without clutch removal.

1. Remove intermediate flex plate.
2. Remove bolts and clamping blocks securing C195 yoke to clutch shaft.
3. Twist yoke out of clutch shaft.

**B. Installation**

1. Remove loose paint and clean mating area inside shaft with non-residue solvent.
2. Coat inside of clutch shaft and shank of C195 yoke with zinc-chromate or epoxy primer. While primer is still wet, slide yoke into clutch shaft and align holes.
3. Install clamping blocks and bolts. Standard torque bolts per § 23-32 and torque stripe per Figure 2-1.
4. Install intermediate flex plate per § 7.330.

**CAUTION**

There must be (1) NAS1149F0432P or (1) NAS1149F0463P washer between each arm of C195 yoke and A947-2 flex plate. Refer to § 7.330.



### 8.232 Governor Controller Installation

**CAUTION**

Earlier R44-series helicopters that are not equipped with D270-1 governor controller / engine monitoring unit use a D278 governor controller. R44 helicopters require the D278-1 controller; R44 II helicopters require the D278-2 controller.

1. Turn battery switch off & pull out GOV (2 amp) circuit breaker on circuit breaker panel.
2. Install hardware securing D270-1 or D278 governor controller to C679-3 (LH) cover. Verify security.
3.
  - a. D270-1 Governor controller: Connect airframe harness connector to governor controller and tighten screws; connect 1598-01C cable to governor controller. Connect MAP line to governor controller and install ty-raps. Cinch ty-raps until snug without overtightening and trim tips flush with heads.
  - b. D278 Governor controller: Connect airframe harness connector to D278 governor controller.
4. Push in GOV (2 amp) circuit breaker on circuit breaker panel.
5. Install left hand, aft backrest.

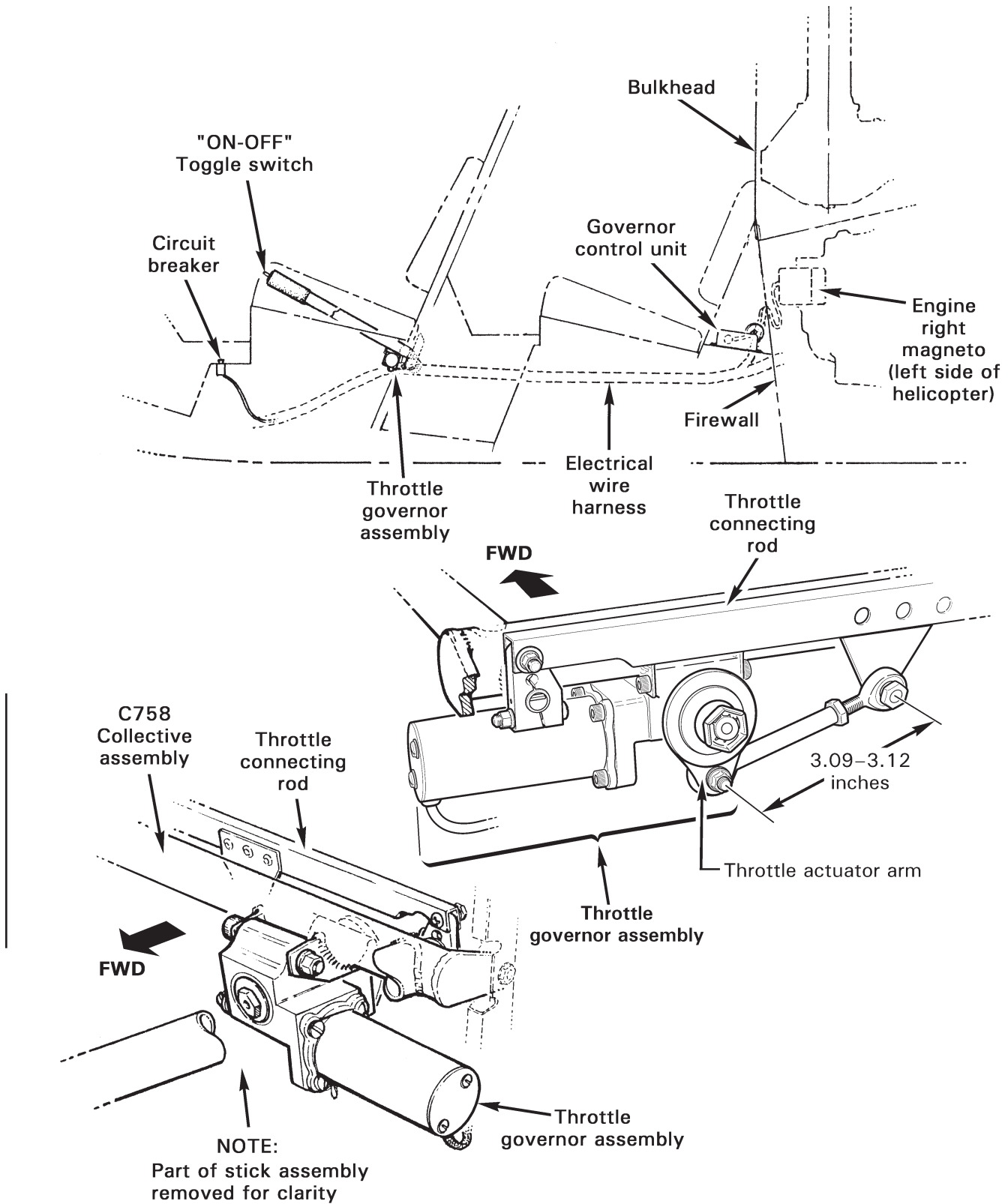


FIGURE 8-8A THROTTLE GOVERNOR INSTALLATION

### 8.233 Governor Assembly Removal

The governor assembly is attached to the collective stick behind the left forward seat.

#### WARNING

**No adjustment of the friction clutch is permitted. No replacement of the gear motor is permitted. If the friction setting is incorrect, or the gear motor operates incorrectly, remove the complete assembly and return to RHC.**

- a) Remove collective stick assembly per § 8.211.
- b) Remove the NAS6603-6 bolt from the connecting rod.
- c) Remove on NAS1351-4-28P screw and NAS1291-4 nut.
- d) Cut safety wire and remove two AN503-8-4 screws.
- e) Remove B247-5 governor assembly.

### 8.234 Governor Assembly Installation

- a) Connect the connecting arm to the governor assembly.

#### NOTE

DO NOT change the length on the connecting rod. The rod ends center-to-center distance should be 3.09–3.12 inches.

- b) Install two AN960-10L washers, one between rod end and governor motor arm and one under the nut. Torque nut and palnut per § 23-32.
- c) Install the NAS1351-4-28P screw and torque per § 23-32.
- d) Install the two AN503-8-4 screws and torque to 27 in.-lb and safety wire with 0.020 inch diameter safety wire.
- e) Install collective stick per § 8.212.

## 8.239 Governor Troubleshooting

### A. D278-1 & D278-2 Governor Controllers

The majority of governor problems are caused by the engine-right (helicopter left side) magneto's tachometer contact assembly (points) being out of adjustment or faulty. Refer to TCM Master Service Manual for tachometer contact assembly installation and adjustment.

#### NOTE

When checking contact assembly gap, always check gap twice (i.e. with cam follower resting at each cam lobe apex). If allowable gap tolerance cannot be maintained at each cam lobe apex, submit magneto to an authorized repair facility.

When switched on, the governor is active from 80% to 112% engine rpm. Below 80% and above 112% engine rpm the governor will take no action.

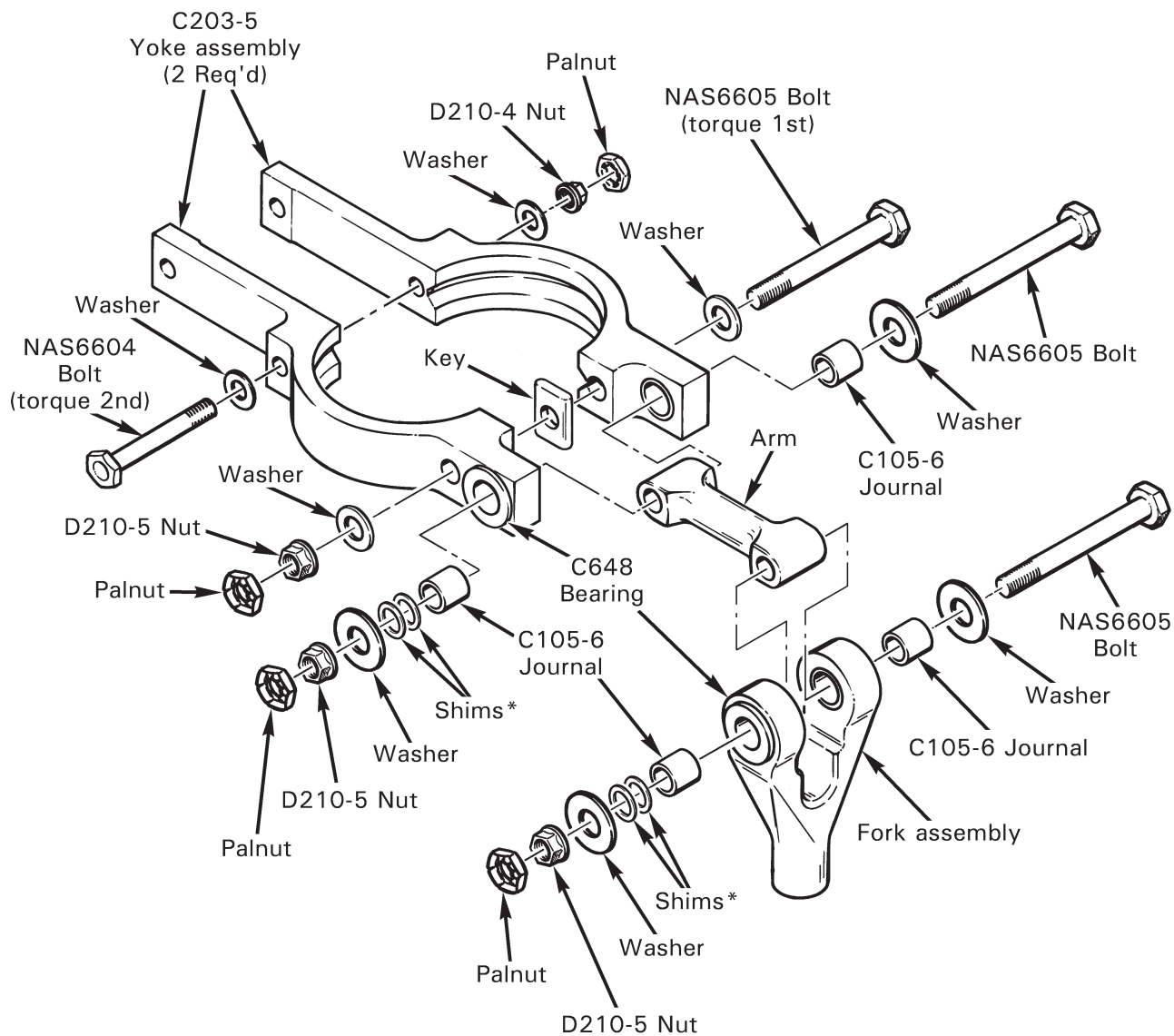
When operating in the active range, the governor will attempt to maintain engine rpm at approximately 102%  $\pm$  0.5% (D278-1 controller) or  $\pm$  0.75% (D278-2 controller). The edges of this governed rpm window – called a “deadband” – may be detected when the helicopter is in stable (no gusts), straight and level flight as follows:

1. Gently hold throttle and very slowly increase rpm (do not exceed 104%). Note and record engine rpm indication when governor input (subtle throttle resistance) is encountered.
2. Gently hold throttle and very slowly decrease rpm (do not go below 99%). Note and record engine rpm indication when governor input (subtle throttle resistance) is encountered.
3. Subtract second reading from first reading. Result should be approximately 1% (D278-1) or 1½% (D278-2).

A deadband not centered on 102% is indicative of a governor controller problem.

A wider-than-normal deadband, but still centered on 102%, is usually indicative of excessive throttle linkage friction and/or insufficient governor friction.

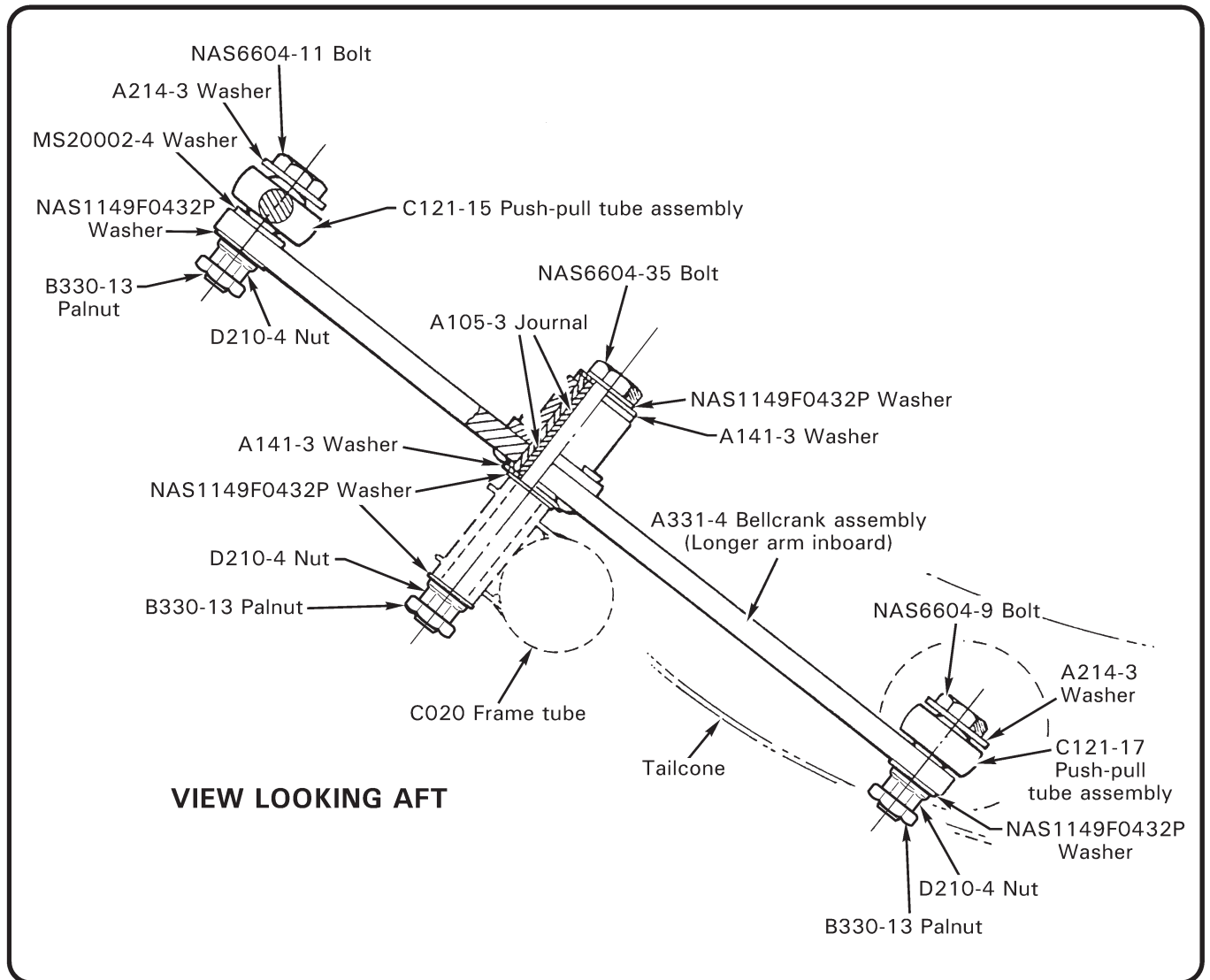
Check throttle friction by disconnecting overtravel spring assembly upper rod end from C341/C342 arm and attaching a spring scale to the rod end. With throttle arm in idle position, slowly pull up overtravel spring assy with spring scale and note maximum 4 pounds moving friction prior to full open throttle. Excessive throttle linkage friction can be caused by binding rod ends, control interference, carburetor throttle shaft bushing elongation, or binding carburetor accelerator pump (typically binds in one direction only).



\*Select a combination of C117-67, -68, and/or -69 shims to provide 0.001–0.010 inch axial play in joint. Refer to Figure 2-9.


**FIGURE 8-13B R44 II & R44 LATE REVISION CHORD ARM YOKE INSTALLATIONS**

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**FIGURE 8-14 A331-4 BELLCRANK INSTALLATION**

**CORRECT ALIGNMENT**




**INCORRECT ALIGNMENT**



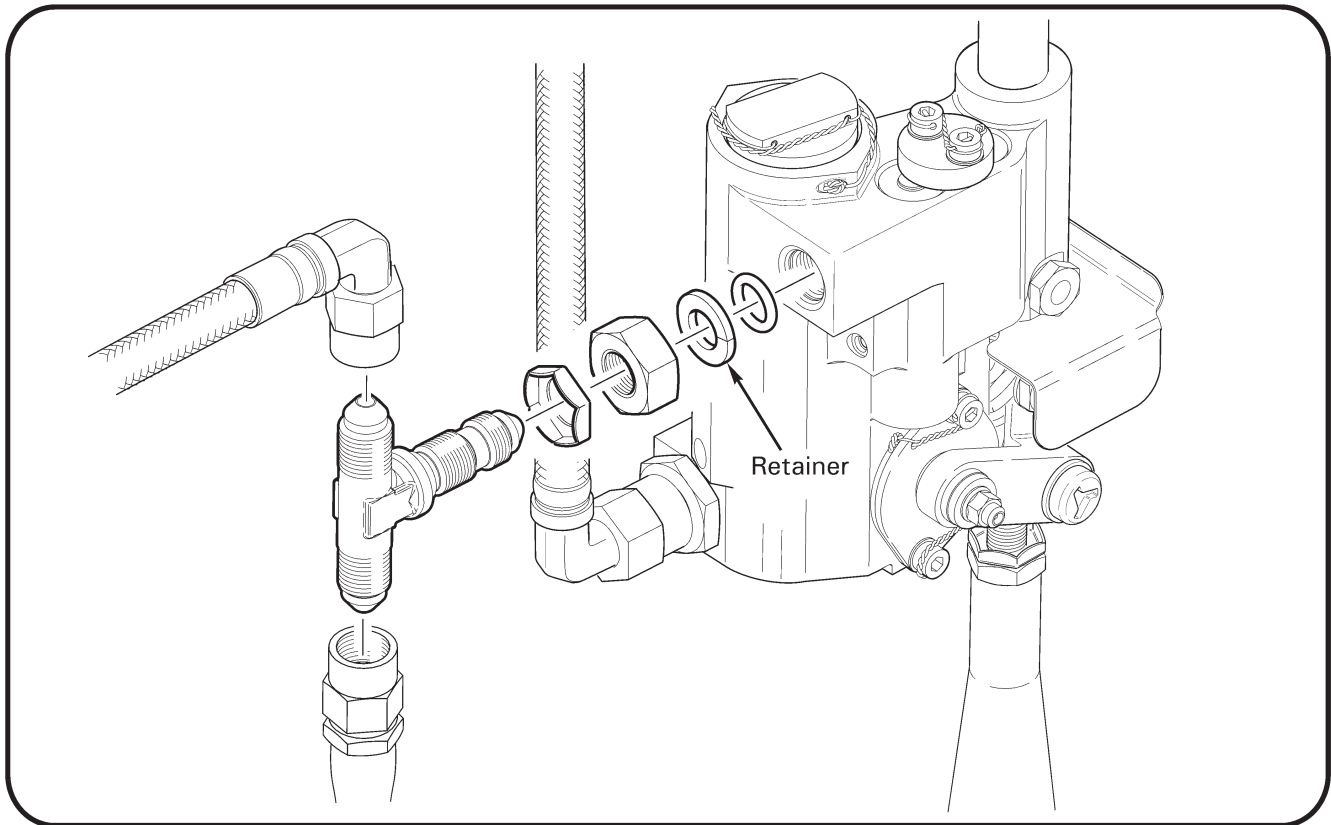
**MS28773 Retainers**  
(Diagonal split)

MS28773 Retainers, installed on hydraulic system fittings, are superseded by D454 Retainers. Verify correct alignment of diagonal split if installing new MS28773 Retainers. MS28773 Retainers ARE NOT reusable.



**D454 Retainers**  
(Straight split)

D454 Retainers, installed on hydraulic system fittings, supersede MS28773 Retainers. D454 Retainers have a straight split to eliminate installation error, and are more rigid for better sealing. D454 Retainers ARE reusable.



**FIGURE 8-16 HYDRAULIC FITTING O-RING RETAINERS**



**CHAPTER 11****ENVIRONMENTAL CONTROL**

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11.220	Cabin Air Vent Cable Installation . . . . .	11.5
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11.333	Compressor Installation . . . . .	11.14
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11.400	Drive Cartridge . . . . .	11.21
11.410	Drive Cartridge Seal Removal . . . . .	11.21
11.420	Drive Cartridge Seal Installation . . . . .	11.21

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## 11.300 Air Conditioning

### NOTE

Air conditioning service procedures and required equipment are generally similar to those for standard R134a automotive systems. In the United States, only personnel with EPA certification under Section 609 of the Clean Air Act may charge the system with refrigerant or work on the refrigerant system once it has been charged. Different requirements may apply in countries other than the United States.

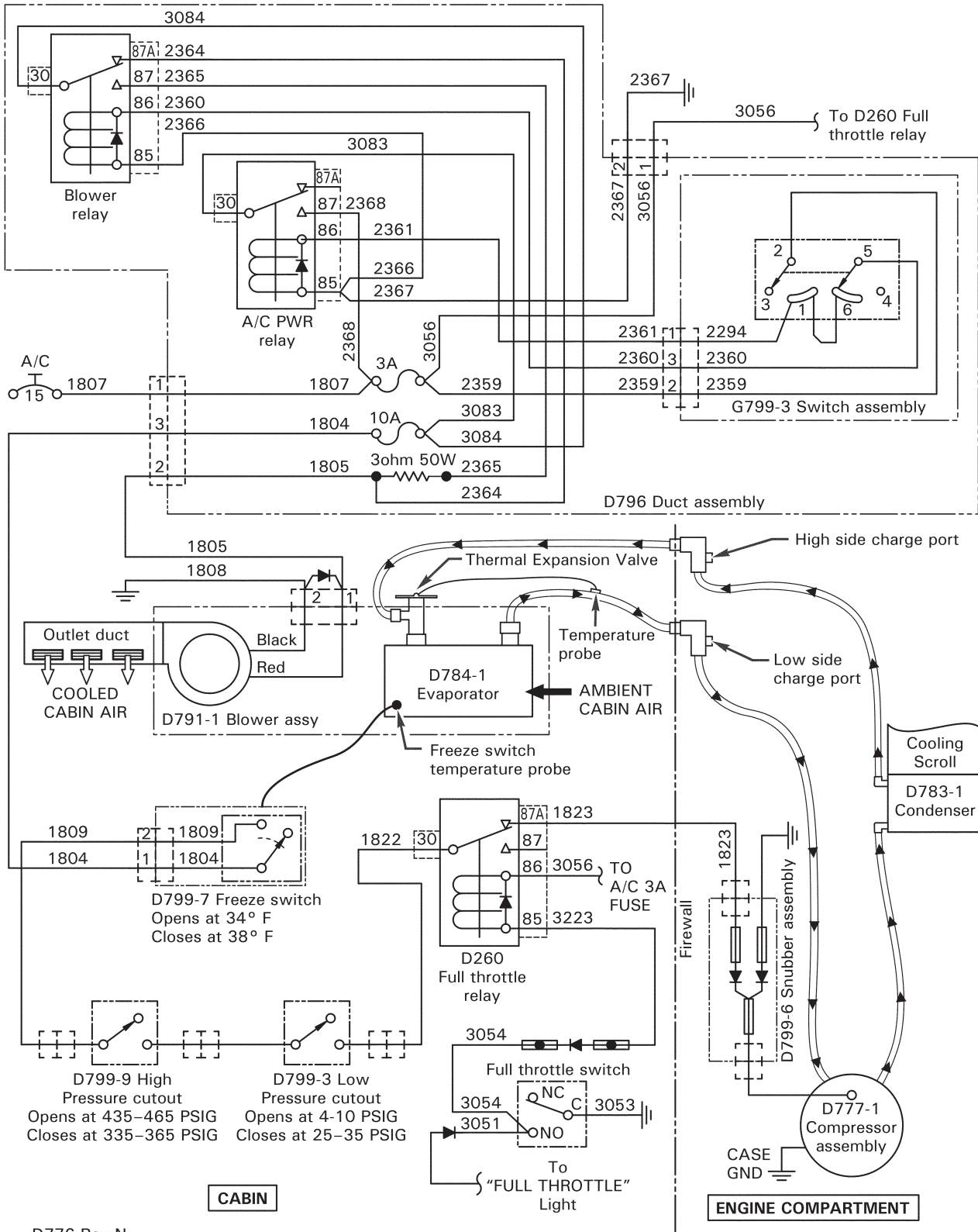
### A. Description

The optional cabin air conditioning system is shown schematically in Figures 11-4 & 11-4A. The system is similar to conventional automotive and light aircraft systems and consists of a compressor accessible through the left engine cowl door, a condenser mounted on the left side of the engine cooling fan scroll, an evaporator and fan assembly mounted to the aft cabin wall, an overhead outlet duct, and interconnecting lines and hoses. The system uses R134a refrigerant.

The compressor is belt-driven from an engine accessory drive cartridge and equipped with an electromagnetic clutch. When the system is off, the compressor clutch is disengaged, allowing the compressor pulley to freewheel.

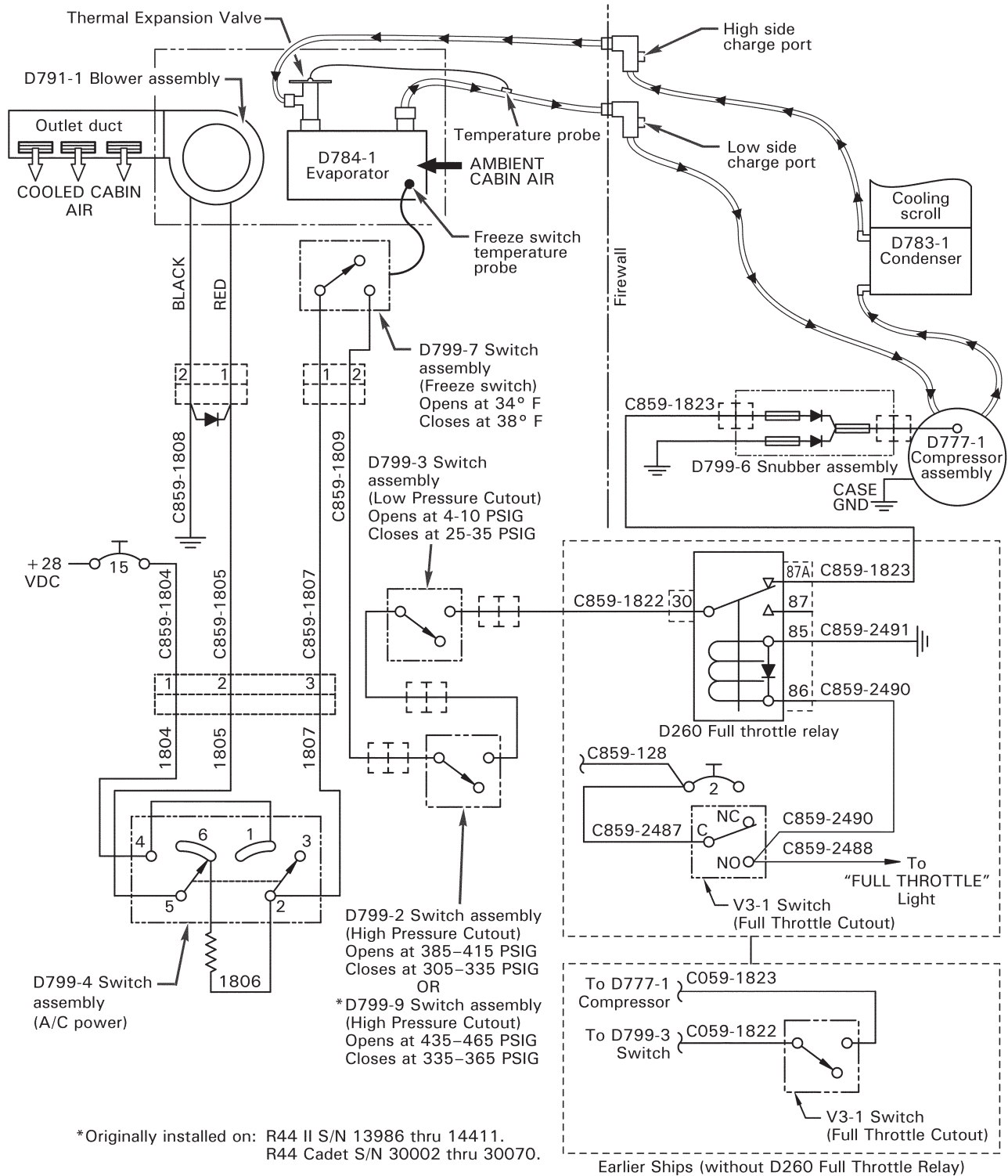
The evaporator fan draws warm cabin air through the evaporator inlet grill and evaporator where it is cooled. Cooled air is drawn through the fan and blown through the overhead duct.

The system is controlled by a toggle switch on the overhead duct which allows selection of off, low, and high fan settings. The compressor is automatically engaged by switching the fan on. A temperature (freeze) switch disengages the compressor when evaporator temperature drops below freezing. Safety (pressure) switches disengage the compressor if excessive refrigerant leakage occurs or if refrigerant pressure is excessive. A full-throttle switch disengages the compressor when the engine is near full throttle to ensure that aircraft performance is not affected. The compressor clutch and fan circuits are protected by the A/C circuit breaker. Later helicopters also have a 3-amp fuse to protect the relays and a 10-amp fuse to protect the compressor circuit.



D776 Rev N

**FIGURE 11-4 AIR CONDITIONING SYSTEM SCHEMATIC**  
 R44 II S/Ns 14412 thru 29999  
 R44 Cadet S/Ns 30071 and subsequent



D776 Rev L

**FIGURE 11-4A AIR CONDITIONING SYSTEM SCHEMATIC**  
R44 II S/Ns 10001 thru 14411  
R44 Cadet S/Ns 30002 thru 30070

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**CHAPTER 23**

**STANDARD PRACTICES**

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23-86	B526 Screws and B527-08 Washers . . . . .	23.46

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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 palnut 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.

If, during inspection, the remaining torque stripe on a fastener is insufficient to determine joint integrity, then remove accompanying palnut as required and apply specified torque to fastener. If fastener moves, disassemble joint and inspect parts for damage such as fretting, thread deformation, hole elongation, etc.; replace damaged parts. If fastener does not move, install new palnut as required & standard torque per § 23-32. Torque stripe fastener per § 23-31.

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		10-32	NAS6603	50
		1/4-28	NAS6604	120
		5/16-24	NAS6605	240
		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 AN503 Screws AN509 Screws AN525 Screws MS24694 Screws MS27039 Screws	10-32	A142-1, -3, -4; AN3	37
		1/4-28	AN4	90
		3/8-24	AN6	280
		1/2-20	AN8	795
<b>STAMPED NUTS (PALNUTS)</b> Palnuts are to be used only once and replaced with new when removed.		10-32	B330-7 (MS27151-7)	6-15
		1/4-28	B330-13 (MS27151-13)	11-25
		5/16-24	B330-16 (MS27151-16)	20-40
		3/8-24	B330-19 (MS27151-19)	29-60
		7/16-20	B330-21 (MS27151-21)	42-85
		1/2-20	B330-24 (MS27151-24)	54-110
<b>TAPERED PIPE THREADS</b>		1/8-27	See note 5	60
			Straight fittings only	120
		1/4-18	See note 5	85
			Straight fittings only	170
		3/8-18	See note 5	110
			Straight fittings only	220
		1/2-14	See note 5	160
			Straight fittings only	320
3/4-14	See note 5	230		
	Straight fittings only	460		
<b>ROD END JAM NUTS (AN315 and AN316)</b>		10-32	AN315-3	15
		1/4-28	AN316-4	40
		5/16-24	AN316-5	80
		3/8-24	AN316-6	110

23-33 Special Torques

Special torques supersede standard torques listed in § 23-32.

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.

AREA	(QUANTITY) FASTENER	TORQUE
AIR CONDITIONING	(2) AN824-8D nuts on D792-2 and D793-2 lines at firewall	360 in.-lb
	(3) D782-5 bolt, D782-4 bracket-to-engine	360 in.-lb
	D799-2 or -9 high pressure cutout switch	90 in.-lb
	D799-3 low pressure cutout switch	90 in.-lb
	MS21042L6 nut, compressor drive pulley retaining	300 in.-lb
	(4) nuts (engine mounting), D778-1 cartridge assembly	204 in.-lb
	nut, D792-2 line assy-to-evaporator	150 in.-lb wet w/ A257-20
	nut, D793-2 line assy-to-evaporator	210 in.-lb wet w/ A257-20
	nut, D794-1 hose assy-to-D793-2 line assy	210 in.-lb
	nut, D794-1 hose assy-to-D777-1 compressor assy	300 in.-lb wet w/ A257-20
	nut, D810-1 or -2 line assy-to-D777-1 compressor assy	210 in.-lb wet w/ A257-20
	nut, D810-1 or -2 line assy-to-D783-1 condenser	150 in.-lb wet w/ A257-20
	nut, D811-1 or -2 line assy-to-D783-1 condenser	150 in.-lb wet w/ A257-20
	nut, D811-1 or -2 line assy-to-D793-2 line assy	150 in.-lb
(4) valve cores (on servicing and cutout switches fittings)	4 in.-lb	
CYCLIC STICK	(2) NAS1352-3H14 screws, C683-4 damper (manual-controls)	40 in.-lb
DOOR HINGES AND GAS SPRINGS	(16) MS51861-37C screws, securing door hinge assemblies	36 in.-lb
	(2) 21FKF-518 (or 94830A030) nuts, securing C394-2 ball studs at aft doors	100 in.-lb
	(2) C394-2 ball stud, at forward doors, to frame (B270-10 adhesive on threads)	150 in.-lb
	(2) D575-2 and (2) D575-3 ball joints, at forward door D573-4 rods	37 in.-lb
DRIVE SYSTEM	C182-1 nut (2-inch socket) on C007-5 shaft assembly Note: Shaft assemblies with smaller nuts are obsolete	450–550 ft-lb wet w/ A257-9
	(6) NAS6608-42H bolts, lower sheave	900 in.-lb

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
ELECTRICAL	(2) bolts, lead-acid Concorde battery terminals	70 in.-lb
	(2) bolts, lithium-ion True-Blue battery terminals	65 in.-lb
EMPENNAGE	NAS1352-3-14P screw, D079-1 guard assembly	40 in.-lb
	(8) NAS6604-6 bolts, vertical stabilizer attach	185 in.-lb
FANWHEEL	C182-1 nut – see DRIVE SYSTEM (above)	
	(16) D210-3 nuts, cone-to-fanwheel	70 in.-lb
	(8) D210-5 nuts, hub	300 in.-lb
FLOATS, POP-OUT	(10) inlet check valve base	75–85 in.-lb
	(10) inlet check valve pivot (hose fitting) retainer	110–120 in.-lb
	(22) nuts on D674-1, -2, -3, -4, -5, & -6 hoses	230–260 in.-lb
	(4) nuts on D674-7 hoses	110–130 in.-lb
	D770-1, -2, -3, & -4 valve assemblies	40 in.-lb
FUEL SYSTEM (See also PRIMER SYSTEM)	(1) A457-11 or 6505-04-06-SS adapter nut, gascolator outlet	285 in.-lb
	(1) B254-3 strainer assembly, main tank	200 in.-lb wet w/ A257-9
	(1) B283-3 hose assembly, gascolator-to-carburetor (O-540)	120 in.-lb
	(1) B283-3 hose assembly, mechanical-to-electrical fuel pump (IO-540)	120 in.-lb
	(5) B289-1 screws/bolts, fuel quantity sender, self-sealing	37 in.-lb
	(1) nut, fuel quantity sender, ground wire	9 in.-lb
	(1) nut, fuel quantity sender, center stud	11 in.-lb
	(2) B330-25 palnuts, electrical fuel pump elbows (IO-540)	75 in.-lb
	(1) C595-4 hose assembly, D321-1 valve assembly-to-D453-3 tee (IO-540)	120 in.-lb
	(1) C741-1 line assembly, gascolator-to-fuel valve	285 in.-lb
	(1) D205-28 or D205-38 hose assembly, main tank-to-fuel valve	120 in.-lb
	(1) D205-29 hose assembly or C595-2 or -3 hose assembly, aux tank-to-main tank	120 in.-lb
	(1) D205-30 hose assembly, main tank-to-drain	100 in.-lb
	(1) D205-31 hose assembly or C595-4 hose assembly, D321-1 valve assembly-to-D453-3 tee (IO-540)	120 in.-lb; orient D205-31 hose assy elbow horizontal $\pm 5^\circ$
	(1) D210-4 nut, A455-1 plug-to-gascolator	70 in.-lb
(1) D321-1 valve assembly, aux tank	150 in.-lb; rotate connector so D205-31 hose fitting $80^\circ \pm 5^\circ$ aft, or C595-4 hose fitting is $55^\circ \pm 5^\circ$ aft	

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
FUEL SYSTEM (continued)	(2) D452-6 nuts, electrical fuel pump elbows (IO-540)	150 in.-lb
	(1) D453-4 tee, aux tank	200 in.-lb; orient in line w/D321 valve assembly within 5°
	(1) AN316-7R nut, relief valve connector-to-firewall (IO-540)	150 in.-lb
	(1) AN815-3D union or A880-933 or -963 union, main tank	100 in.-lb
	(1) AN815-6D union or A880-936 or -966 union, main tank	200 in.-lb
	(1) AN924-3D nut or A880-1003 nut, A761-1 drain-to-D255-1 connector	100 in.-lb
	(1) AN924-5D or A880-1005 nut, low fuel switch assy-to-D250-1 cover assy	150 in.-lb
	(1) CAV-110H-4 drain valve, or A761-1 drain valve, 10541 (cad plated steel) bowl, A666-1 gascolator assy	54–66 in.-lb
	(1) CAV-110H-4 drain valve, or A761-1 drain valve, B416-3 (aluminum) bowl, A666-1 gascolator assy	60 in.-lb
	(1) HTM-300 clamp, electrical fuel pump-to-D742-1 support assembly (IO-540)	100 in.-lb
	(1) MS21900D6 adapter or D319-4 fitting, mechanical fuel pump (IO-540)	150 in.-lb
	(1) MS27769D2 plug, gascolator	60 in.-lb
FUSELAGE	(2) NAS1351-6H20P bolts securing B253-2 anchor, with safety wire	150 in.-lb
	(2) NAS1351-6LE20P bolts securing B253-2 anchor, no safety wire	200 in.-lb
	(3) A964-2 eyebolts	250 in.-lb
	(1) D210-5 nut, ground handling ball	240 in.-lb
	(1) B277-072 clamp, mast fairing lower rib to mast tube	50 in.-lb
HYDRAULIC HOSES & FITTINGS	(2) B330-19 palnuts	30 in.-lb
	(3) B330-21 palnuts	45 in.-lb
	(1) B330-25 palnuts	75 in.-lb
	(1) AN820-4 cap, AN834-4D tee at hydraulic pump	60 in.-lb
	(1) AN820-6 cap, AN834-6D tee at hydraulic pump	120 in.-lb
	(2) D452-3 nuts	60 in.-lb
	(3) D452-4 nuts	90 in.-lb
	(1) D452-6 nut	150 in.-lb
	(1) D205-3, (1) -12, (1) -14 hose assemblies & (2) AN815-3D unions	95–105 in.-lb
	(1) D205-7, (1) -11, (2) -16 hose assemblies & (3) AN815-4D unions	135–150 in.-lb
(1) D205-15 hose assembly & (1) AN815-6D union	190–210 in.-lb	

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
HYDRAULIC PUMP	Hydraulic pump-to-gearbox mounting nuts (see MAIN ROTOR GEARBOX)	
HYDRAULIC RESERVOIR	(1) B563-3 sight gage	150 in.-lb
	(1) D487-3 vent assembly	100 in.-lb
	(1) D516-1 cap, filter	150 in.-lb
	(4) NAS1352-4-8P screw, reservoir-to-frame	80 in.-lb
HYDRAULIC SERVOS	MS27039C0806 screw attaching D200-2 scissors	25 in.-lb
	B330-6 palnut on above screw	5–10 in.-lb
LANDING GEAR	(8) B227-28 clamps, strut fairings	15 in.-lb
	(8) HTM-200 clamps, strut fairings	100 in.-lb wet w/ B270-10
	(4) NAS6604-46 bolts, ground handling wheel supports	70 in.-lb
	(4) NAS6607P20 bolts, gear attach (earlier ships) Note: NAS6607-20 bolts are standard torque per § 23-32.	66 ft-lb
MAIN ROTOR BLADE	(2) A722-4 screws, tip balance weight	40 in.-lb wet w/ A257-9
	(2) B289-2 bolts, self-sealing	70 in.-lb
	(1) C165-1 clamp, inner	Tighten to 2.850 ± 0.005 inch outside diameter (OD)
	(2) NAS1351N3-12P screws, tip cover-to-blade	40 in.-lb wet w/ A257-9
MAIN ROTOR FLIGHT CONTROLS	(2) MS35206-324 screws, low rotor RPM horn V3-1 switch	5 in.-lb
	(1) A430-3 tube, governor assembly linkage	20 in.-lb
MAIN ROTOR GEARBOX	(4) A650-4 fittings, gearbox mounting or (4) D210-10 nuts	50 ft-lb wet w/ A257-9, torqued from bolt head or nut
	(1) B563-2 sight gage	150 in.-lb
	(1) B566-1 chip detector housing	150 in.-lb
	chip detector (threaded type)	Approximately 75 in.-lb
	(4) D210-4 nuts, hydraulic pump-to-gearbox (or cover)	40 in.-lb
	(1) AN320-8 nut, gearbox pinion (retains C908 yoke)	35–45 ft-lb
	(1) AN814-8D filler plug	150 in.-lb
	(6) NAS1352-4H screws, end cover (safety wire is required)	120 in.-lb
	(6) NAS1352-4 screws, end cover (safety wire <u>not</u> required)	140 in.-lb
	(6) NAS1352-4H16P screws, sump-to-housing (safety wire is required)	120 in.-lb at head
(6) NAS1352-4-16 screws, sump-to-housing (safety wire <u>not</u> required)	140 in.-lb at head	

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
MAIN ROTOR HUB	(1) NAS634-105 bolt, teeter hinge and (2) NAS634-105 bolts, coning hinges	New bolt: 0.021–0.022 inch elongation, wet w/ A257-9  Used bolt: 0.020–0.022 inch elongation, wet w/ A257-9, and cotter pin holes must align
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p><b>WARNING</b> Scrap bolt &amp; nut if bolt is elongated more than 0.024 inch during tightening.</p> </div>	
PITCH LINKS	21FKF-813 self-locking jam nut, main rotor pitch link	300 in.-lb
POWERPLANT	(4) bolts, air box-to-carburetor	30 in.-lb
	(2) bolts, engine-to-ground strap	96 in.-lb
	(6) bolts, D730-1 manifold weldment-to-engine	96 in.-lb
	(4) engine hardware, securing C592-3 mount assembly	204 in.-lb
	(6) engine nuts, securing C357-1 clips	96 in.-lb
	(1) hardware, securing alternator to B200-3 or D728-1 arm	204 in.-lb
	(4) nuts, carburetor-to-engine (O-540)	96 in.-lb initial, 204 in.-lb final; torque in crisscross pattern
	(1) nut, A457-9 tee	140 in.-lb
	(1) nut, A462 fitting on mixture control arm	27 in.-lb
	(12) spark plugs	420 in.-lb wet w/ A257-16
	(1) A058-10 probe	36–48 in.-lb
	(1) A723-15 line assembly, nuts	40 ft-lb
	(1) B173 v-belt, tension at alternator	150–170 in.-lb initial drag at pulley
	(1) B283-7 hose assembly, nuts	140 in.-lb
	(1) B283-10 hose assembly, nuts	140 in.-lb
	(1) B283-11 hose assembly, nuts	140 in.-lb
	(1) C740-4 line assembly, nuts	30 in.-lb
	(1) D740-1 line assembly, nuts	30 in.-lb
	(1) D753-1 line assembly, nuts	40 ft-lb
	(1) D753-2 line assembly, nuts	40 ft-lb
	(2) MS20074-05-04 bolt, alternator	204 in.-lb
	(1) MS20074-05-11 bolt, alternator	204 in.-lb
	(1) MS20074-06-07 bolt, alternator	280 in.-lb
(4) NAS1352-6H48P screw, securing C593-3 mount assy	280 in.-lb	
(3) STD-1411 nuts, securing C357-3 clips	96 in.-lb	
(12) 21FKF-518 nuts, exhaust flange (draw up evenly prior to torquing)	200–220 in.-lb	
(1) 3080-00038 cylinder head temperature probe	75 in.-lb	

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
PRIMER SYSTEM (See also FUEL SYSTEM)	(1) D101-3, (1) D102-4, (2) D103-3, (1) D104-3, (1) D105-3, (1) D106-3, and (1) D107-3 line assembly, nuts	20–30 in.-lb
	(1) AN894D4-2 Bushing, at gasoclator	50–60 in.-lb
	(1) AN894D6-4 Bushing, at gasoclator	110–130 in.-lb
STEEL TUBE FRAME	(2) C722-2 5/8-inch internal-wrenching screws	120–125 ft-lb wet w/ A257-9
	(2) S14119 screw and (2) A31007 nut	10 in.-lb
SWASHPLATE	(18) AN503-8-8 fillister-head screws	17 in.-lb
	(26) NAS1352-08H8P socket-head screws	30 in.-lb
	(26) NAS1352N08-8 screws	35 in.-lb wet w/ A257-9
	(1) NAS6605-8 bolt clamping C203-1 yoke	190 in.-lb (opposite clamping bolt must be torqued first)
TAIL ROTOR	(1) NAS6606-53 bolt, elastomeric teeter (delta) hinge	420 in.-lb
TAIL ROTOR GEARBOX	(1) A610-1 vent assembly	100 in.-lb
	(1) B563-4 sight gage	150 in.-lb
	(1) B566-2 chip detector	100 in.-lb
	(1) D210-4 nut, securing C119-2 bumper to TRGB output shaft	120 in.-lb
	(1) D210-5 nut, pitch control housing stud	240 in.-lb
	(1) AN320-8 nut, C116-1 input yoke	35–45 ft-lb
	(4) MS20074-04-06 bolts, input cap	60 in.-lb
	(8) MS20074-04-06 bolts, input cartridge and output cap	100 in.-lb
	(4) NAS1352-5H12P drilled-head bolts, gearbox-to-tailcone attaching	200 in.-lb
	(4) NAS1352-5-12P bolts (undrilled), gearbox-to-tailcone attaching	240 in.-lb
WINDSHIELD	(22) AN526C832R12 screw, thru center brace	16 in.-lb
	(66) B526-6 screw, polycarbonate windshield	24 in.-lb



### 23-42 Fluorescent Penetrant Inspection

This specification provides for surface inspection of parts fabricated from nonmagnetic materials to detect discontinuities open to the surface, such as cracks, cold shuts, laps, porosity and other surface defects.

Applicable requirements and limitations of ASTM E1417 shall apply. After inspection is complete, solvent clean parts.

The step-by-step procedure and equipment used to perform the inspection shall be accomplished per ASTM E1417. The following types, methods, and sensitivity levels are recommended:

Type: 1–Fluorescent dye  
Method: A–Water washable  
Sensitivity: Level 2–Medium  
Form: A–Dry powder

#### **A. Inspection Criteria**

Parts inspected by fluorescent penetrant method shall be accepted or rejected on basis of acceptance limits specified. If acceptance limits are not specified, rejectable surface defects and any of the following:

- Cracks
- Seams
- Cold shuts or laps
- Surface inclusions
- In castings, aligned discontinuous surface indications other than cracks, cold shuts and inclusions are rejectable if more than 3/8 inch in length.

### 23-50 Corrosion Control

#### 23-51 Conversion Coat – Aluminum

Use the following procedures to prepare and apply conversion coat to aluminum alloys. Conversion coat improves corrosion resistance and adherence of paint and adhesives.

#### **CAUTION**

Do not allow Bonderite C-IC 33 Aero or M-CR 1201/1132 Aero to contact bonded joints.

#### **A. Procedure**

1. Unless otherwise specified, lightly scuff clean surface with 320-grit aluminum-oxide abrasive paper to remove corrosion or other contaminants.
2. Apply Bonderite C-IC 33 Aero to surface for 2–5 minutes. DO NOT allow Bonderite C-IC 33 Aero to dry; re-apply as required.
3. Rinse thoroughly with clean, potable water.

23-51 Conversion Coat – Aluminum (continued)**A. Procedure (continued)**

4. Apply Bonderite M-CR 1201 Aero to surface for 2–5 minutes (should be light golden brown). DO NOT allow Bonderite M-CR 1201 Aero to dry; re-apply as required.
5. Rinse thoroughly with clean, potable water. Gently wipe with clean & dry cloth, blow dry, or allow to air dry.

**B. Felt Tip Applicator**

Apply Bonderite M-CR 1132 Aero per manufacturer’s recommendations.

23-60 Priming and Painting

This specification outlines preparation and application requirements for primers and topcoat. Primers provide corrosion protection and a final finish or a base for topcoat. Approved materials are listed in § 23-70.

Unless directed, do not prime or paint the following:

- Sliding friction joints.
- Stainless steel parts.
- Swivel joints and adjustable rod ends.
- Plastic, rubber, electrical components and wires or similar materials.
- Bolted joints where torque is a specific requirement for clamping action.
- Bearing press-fit, or close tolerance slip-fit, joints (except where wet primer is part of the assembly procedure).

**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.**

**A. Priming**

1. Preparing Aluminum (for Steel parts see step 2)

Unless otherwise specified, conversion coating per § 23-51 is standard treatment before priming aluminum. If bare aluminum is primed without conversion coating, the following procedure must be used:

- a. Alkaline clean if immersion is practical, otherwise wipe clean with an approved degreasing agent. Do not allow alkaline cleaner to contact bonded joints.
- b. Lightly scuff the surface with Scotch-Brite pads.
- c. Wipe with a tack rag to remove any foreign material or damp wipe with an approved solvent.
- d. Air dry. Do not touch parts with bare hands until primed.

23-60 Priming and Painting (continued)**A. Priming (continued)**

## 2. Preparing Steel (for Aluminum see step 1)

Alkaline clean is the preferred method for cleaning stainless steel. Alternately, stainless steel may be cleaned using an approved solvent. Do not allow alkaline cleaner to contact bonded joints.

Steel parts should only be cleaned using an approved solvent; using an alkaline cleaning process on steel may cause a corrosive reaction.

Where immersion is not practical or for extremely greasy or dirty parts, a preclean in a solvent vapor degreaser may be used.

Air or blow dry using filtered, dry, compressed air.

## 3. Application

Apply primer after mixing per manufacturer's recommendations. Primer coating is not to exceed 0.0005–0.0020 inch thickness per coat. For parts with internal openings, such as tubes, prime the inside as follows:

- a. Thin primer to watery consistency using required reducer.
- b. Pour in primer, slosh around, then drain immediately.
- c. Dry parts at least (6) hours before using.

## 4. Inspection

Inspect for complete coverage and excessive thickness. If primer is excessively thick, strip part and re-prime. Refer to § 23-70 for approved materials.

**NOTE**

Primed areas that have been sanded to bare metal must have conversion coating (if required) and primer re-applied prior to topcoat to restore anti-corrosion properties.

**B. Painting Topcoat**

Prior to liquid topcoat application, ensure surfaces have been cleaned and primed. In general, most parts will be cleaned and primed as detail parts. However, in some cases, such as the gearbox assembly, this is not practical and primer and topcoat are applied on the assembled component.

Previously primed surfaces, or primed surfaces that have completely cured require the following preparation before paint:

1. Lightly sand using 220-grit or finer aluminum-oxide abrasive paper.
2. Lightly scuff with Scotch Brite pads (optional).
3. Wipe with clean cloth and approved solvent.
4. Wipe with tack cloth.
5. Apply topcoat.

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23-70 Approved Materials

The following items are available from the noted manufacturer(s) or their distributor(s). Check with appropriate regulatory authority(s) for allowable usage of materials.

**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**

Follow product manufacturer’s instructions for handling and storage.

23-71 Paint Strippers

**CAUTION**

Use of non-approved liquid-strippers may lead to part failure.

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
Cee-Bee Stripper A-292NC-M	McGean-Rohco: Cee-Bee Division. Downey, CA. <a href="https://Cee-Bee.com">https://Cee-Bee.com</a>	Metal parts, except blades and flex plates. Do not use near mechanically fastened or bonded joints.
Plastic Media Blasting System, AMMO 301 size 20/30, type II (or equivalent polymer media)	Pauli Systems Inc. Fairfield, CA	Metal parts except blades and unsupported sheet metal less than 0.040 inch thick. Blast pressure for steel frames: 40–55 PSI Blast pressure for aluminum parts: 30–40 PSI

23-72 Solvents and Cleaners

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
QSOL 220	Safety-Kleen Systems, Inc. Plano, TX	General use and for cleaning prior to applying primer, topcoat, adhesive, or sealant.
Benzene, 1-Chloro-4 (Trifluoromethyl) PCBTF***	Any	
Acetone***	Any	
220 Low VOC Cleaner	Axalta, Wilmington, DE	
Final Klean 3909S	Du Pont Chemical Los Angeles, CA	
XP Aerospace Prep Surface Cleaner	AkzoNobel, Waukegan, IL	
EM-Citro*	LPS Laboratories, Inc. Tucker, GA	Removing adhesive residue on cabin and polycarbonate & acrylic windshield.
Lacolene (Aliphatic Hydrocarbon)	Any	Windshield and plastic cleaning and general residue removal.
Plexus®	B.T.I. Chemical Co. Oak Park, CA	

23-72 Solvents and Cleaners (continued)

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
Presolve	LPS Laboratories, Inc. Tucker, GA	Hydraulic components only.
Tetrachloroethylene (Perchloroethylene)	Any	Vapor degreaser.
815 GD	Brulin Corporation Indianapolis, IN	Ultrasonic cleaning, general use. **
SF50	L&R Mfg. Co. Kearny, NJ	
#112 Ammoniated or #222 Nonammoniated cleaning solution	L&R Mfg. Co. Kearny, NJ	Ultrasonic cleaning, avionics components only.
#194 rinse solution		
Cleanup Wipe E-4365	Sontara Candler, NC	Cleaning and drying.
Snoop Liquid Leak Detector	Swagelok Salon, OH	Leak detector.

\* May be used on acrylic plastic.

\*\* Mix 5%–20% by volume; titration not required.

\*\*\* Acetone and PCBTF may be mixed 50-50.

23-73 Fillers and Putty

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
05960 Glazing Putty 05860 Dry Guide Coat 31180 Finishing Glaze	3M St. Paul, MN	Minor surface imperfections.
SBF1191 Filler	Gearhead Products Indianapolis, IN	
FE-351 Cream Hardener	Catalyst Systems Gnadenhutten, OH	

23-74 Torque Seal

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
83314 thru 83321 Except 83316 (red)	Dykem Cross-Check ITW Pro Brands	Torque seal.

**CHAPTER 24****AUTOPILOT**

<u>Section</u>	<u>Title</u>	<u>Page</u>
24-00	Description . . . . .	24.1
24-10	(Pitch) Servo Assembly . . . . .	24.7
24-20	(Roll) Servo Assembly . . . . .	24.8
24-30	Flight Control Computer (FCC) . . . . .	24.9
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24-40 Control Panel (continued)**B. Installation****NOTE**

Refer to Table 24-1. Flight control computer (FCC) and control panels for Software Version 51 and Software Version 52 are not interchangeable. Verify part number compatibility prior to installation.

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Carefully plug-in harness to control panel.
3. Tighten quarter-turn fasteners securing control panel to console assembly. Verify security.
4. Push in AUTOPILOT circuit breaker (5 amp) at panel. Perform ground checks as appropriate per § 24-61.

24-50 Cyclic Grip Assembly**A. Grip Angle Adjustment**

1. Loosen cap screws securing pilot's cyclic grip, block assembly, and bar to grip weldment.
2. Rotate grip about weldment to desired angle. Special torque cap screws to 40 in.-lb.

**B. Removal and Installation**

Refer to § 8.121 & 8.122 for cyclic grip assembly removal and installation procedures.

To access grip switches:

1. Remove MS24693-S1 screws securing C214-27 plate to D379-1 grip. Remove switch nuts and lockwashers to free switches from plate.
2. Install switch lockwashers (new) and nuts and tighten switches to plate; verify switch security. Install screws securing plate to grip.
3. Turn battery switch on and perform ground checks as appropriate per § 24-61.

**C. Schematic**

Refer to Figure 14-21 for C024 electrical system schematic.

24-60 Maintenance

24-61 Ground Checks

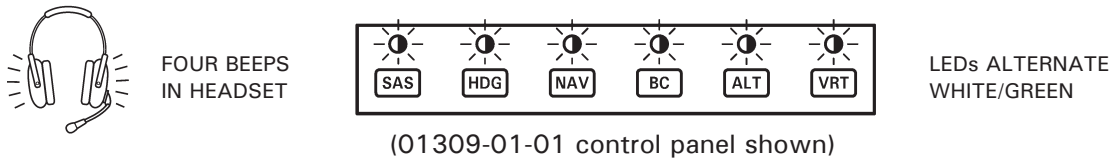
**NOTE**

Perform the following ground checks after component replacement or other repairs have been performed on the autopilot system. Perform ground checks after any incident that may have affected autopilot or related equipment prior to return to service.

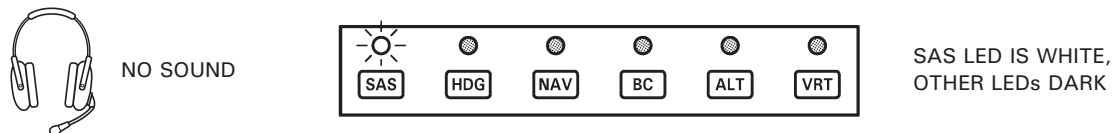
**NOTE**

Refer to § 24-62 for troubleshooting if any of the following ground checks cannot be verified.

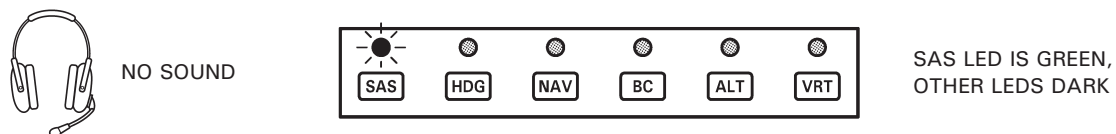
1. Turn battery & avionics switches on. Verify four beeps in headset and control panel LEDs alternate white/green:



2. Verify SAS enters standby mode approximately 6 seconds after PFD aligns. Verify no sound in headset and control panel SAS LED is white, other LEDs are dark:



3. With cyclic friction full off, verify cyclic moves freely within hydraulic servo longitudinal and lateral deadbands.
4. Engage SAS mode (cyclic should feel "energized"). Verify no sound in headset and control panel SAS LED is green, other LEDs are dark:



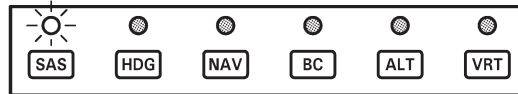
5. With SAS engaged, displace cyclic at least 1 inch from neutral position and verify a vibrating resistance is encountered. Perform check for roll & pitch axes.

24-61 Ground Checks (continued)

6. Refer to step 2. Engage SAS and verify SAS disengages when control panel's SAS button is depressed or when AP OFF button on the cyclic grip is depressed. Verify four beeps in headset and control panel SAS LED is white, other LEDs are dark:



FOUR BEEPS  
IN HEADSET

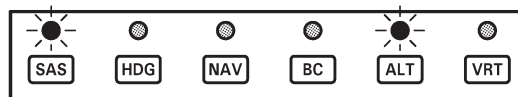


SAS LED IS WHITE,  
OTHER LEDS DARK

7. Perform pitot system leak test per § 13-10 and, while airspeed indicates > 50 knots: Engage SAS and ALT modes. Verify no sound in headset and SAS & ALT LEDs are green, other LEDs are dark:



NO SOUND

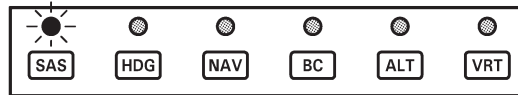


SAS & ALT LEDs ARE  
GREEN, OTHER LEDS  
DARK

8. Disengage ALT mode. Verify no sound in headset and SAS LED is green, other LEDs are dark:



NO SOUND



SAS LED IS GREEN,  
OTHER LEDS DARK

9. Refer to steps 7 & 8. Engage SAS and HDG modes. Verify no sound in headset and SAS & HDG LEDs are green, other LEDs are dark. Disengage HDG mode. Verify no sound in headset and SAS LED is green, other LEDs are dark.
10. Engage SAS, HDG, and ALT modes. Verify no sound in headset and SAS, HDG, and ALT LEDs are green, other LEDs are dark. Press AP OFF button on cyclic grip. Verify no sound in headset and SAS LED is green, other LEDs are dark.
11. Engage SAS, HDG, and ALT modes. Verify no sound in headset and SAS, HDG, and ALT LEDs are green, other LEDs are dark. Press AP OFF button twice on cyclic grip. Verify four beeps in headset and SAS LED is white, other LEDs are dark.

24-62 Troubleshooting

**CAUTION**  
Adjustment to autopilot equipment is not permitted.

PROBLEM	ACTION
Control panel lights do not illuminate or flash when master switch is turned on.	Verify computer is getting power.
	Return computer to RHC.
System does not enter standby-mode (lights flash continuously).	Verify attitude indicator bank angle less than 6 degrees.
	Verify attitude indicator output between 13 and 14 pins is less than 0.3 volts at connector.
	Check wiring between attitude indicator and computer.
	Contact RHC Technical Support.
SAS does not engage when TRIM button depressed for longer than 1.25 seconds; pressing TRIM button does not reset reference attitude; pressing TRIM button does not reset reference altitude in altitude hold.	Check wiring between TRIM button and computer.
	Verify integrity of TRIM button.
	Return computer to RHC.
SAS does not disengage when cyclic grip AP OFF button depressed.	Check wiring between AP OFF button and computer.
	Verify integrity of AP OFF button.
	Return computer to RHC.
SAS does not engage or disengage when control panel buttons pressed.	Engage and/or disengage SAS using cyclic grip buttons. If system responds properly, failure is in control panel or associated wiring to computer.
	Contact RHC Technical Support.
SAS does not hold pitch attitude, but holds roll attitude or vice versa.	Check servo-to-cyclic linkage.
	Check wiring between faulty servo and computer.
	Return faulty servo and computer to RHC.
SAS disengages unintentionally (accompanied by four beeps in headset).	Contact RHC Technical Support.
Autopilot mode disengages unintentionally, and reverts to SAS mode (accompanied by single beep in headset).	Determine if navigation signal may have gone invalid due to operational reason.
	Check wiring between appropriate instrument/avionics and computer.
	Check instrument/avionics for failure flags (steady and intermittent).
Cyclic vibrates erratically, SAS does not disengage.	Manually override SAS, system should disengage automatically.
	Contact RHC Technical Support.
Helicopter enters low frequency pitch oscillation when ALT engaged; helicopter diverges nose-up or nose-down when ALT engaged.	Return computer to RHC.

24-62 Troubleshooting (continued)

<b>PROBLEM</b>	<b>ACTION</b>
ILS glideslope tracking performance is poor.	Check for excessive friction in longitudinal cyclic.
	Check GPS output to computer.
Cyclic force seems higher than normal with SAS disengaged.	Verify servo clutches are disengaged, and clutch arms do not move when SAS is Off or in standby-mode.
No aural warning in headset when SAS is disengaged.	Check wiring to unswitched audio input to audio panel.

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**CHAPTER 27****DOORS AND WINDOWS**

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## CHAPTER 27

## DOORS AND WINDOWS

27-00 Description

The R44 has four passenger (cabin) doors. All four cabin doors may be removed and installed by maintenance personnel or pilots.

Passenger doors are constructed of fiberglass and thermoplastics. Passenger doors, locks, weather seal, gas springs, and door vents and hinges may be replaced, and vent pivot friction may be adjusted.

Two windshield halves are retained in aluminum frames and an aluminum tubular bow oriented vertically along the helicopter's centerline. A standard (acrylic) windshield installation and an impact-resistant (polycarbonate) windshield installation are available. Refer to § 27-30 for detailed description.

27-10 Door Assembly**A. Cleaning**

Refer to § 23-10 Part B for cleaning windows.

**B. Removal**

1. Refer to Figures 27-1 and 27-2. To disconnect door from gas spring mechanism:
  - a. Forward Doors: Pull D573-4 rod up and off of arm assembly ball joint.
  - b. Aft Doors: Insert flat-tip screwdriver and pry up spring clip locking C394-1 gas spring to channel ball joint. Pull gas spring up and off of ball joint.
2. Remove rings from door hinge pins, lift pins up from door frame hinge assemblies, and remove door.
3. Adjust weight and balance per applicable Pilot's Operating Handbook Section 6.

**C. Installation****WARNING**

**Failure to install a ring in each door's two hinge pins may allow door to depart aircraft in flight.**

1. Refer to Figures 27-1 and 27-2. Align and insert door hinge pins in door frame hinge assemblies.
2. Align forward door D573-4 rod with arm assembly ball joint, or aft door C394-1 gas spring with channel ball joint, and push down to lock.
3. Install rings in door hinge pins.
4. Adjust weight and balance per applicable Pilot's Operating Handbook Section 6.

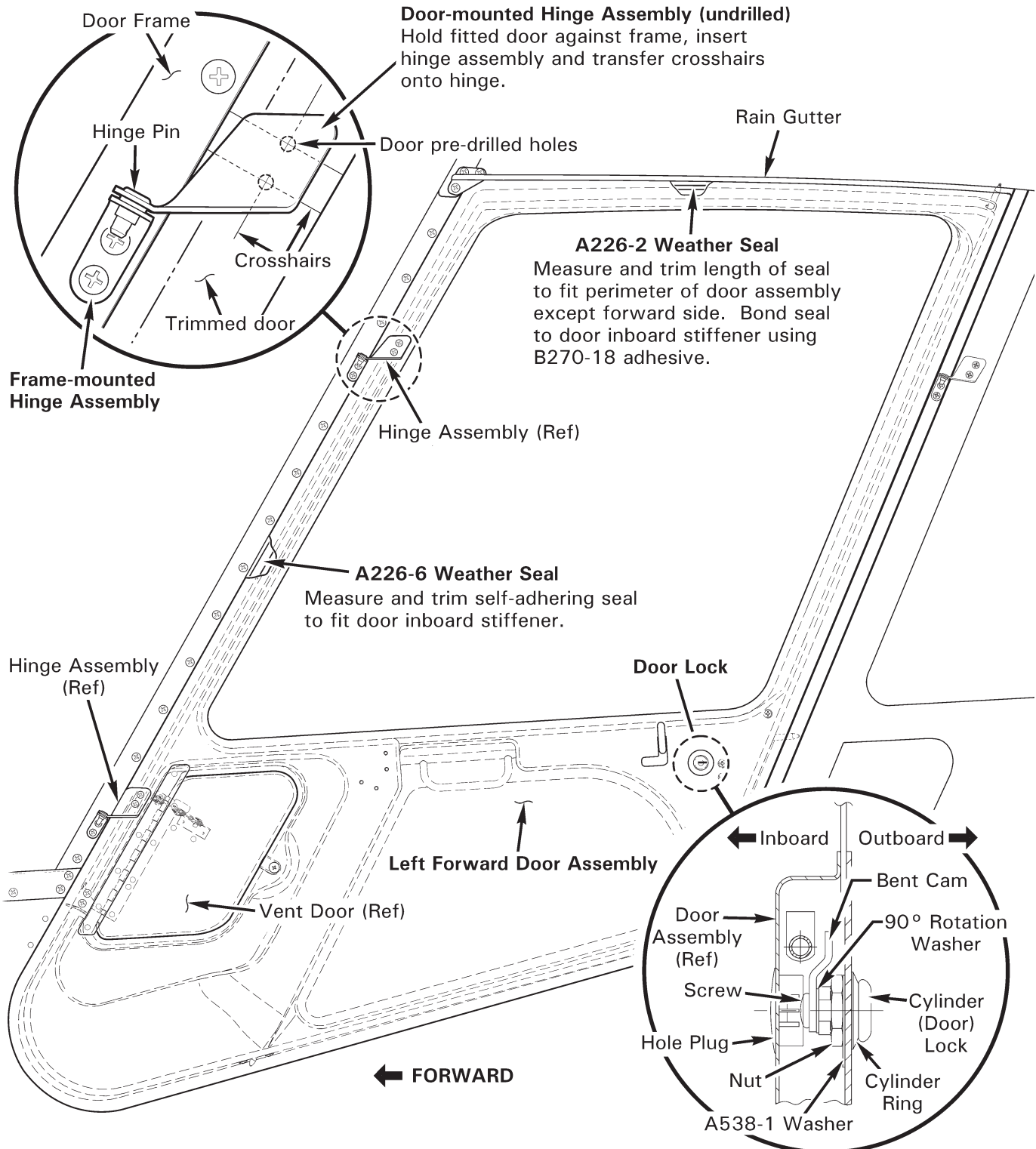


FIGURE 27-1 DOOR ASSEMBLY

27-10 Door Assembly (continued)**D. Replacement****CAUTION**

Use proper respiratory protection when handling fiberglass.

**CAUTION**

Protect door windows and paint from scratches or scuff marks when door maintenance is performed on workbench.

1. Refer to Figure 27-1. As required, lay masking tape on surfaces of door frame, new door hinges, and new door, to mark with soft pencil.
2. Press new door forward and top edge weather seals against door frame recess (rain gutter interferes with top edge until trimmed).
3. Using soft pencil, trace door forward edge onto masked frame, then transfer approximate edge distance to door. From inside cabin, estimate approximate material to be removed from door top edge, then transfer approximate edge distance to door. Remove door.
4. Using 60-grit grinder, trim forward and top door edges. Perform steps 1 thru 3 until weather seals sit approximately even against door frame recess.
5. Using soft pencil and a straight edge, draw cross hairs through (centers of) door upper hinge assembly pre-drilled holes. Hold fitted door against frame, insert new (door-mounted) hinge assembly in frame-mounted hinge assembly, and transfer cross hairs onto hinge. Remove hinge and door.
6. Drill two 0.170-inch diameter holes at cross hair intersections in hinge assembly and deburr. Remove tape, clean up debris, and prepare hinge assembly and door clamping surfaces using approved solvents per § 23-70.
7. Install upper hinge assembly on door and special torque screws per § 23-33.
8. Repeat steps 5 thru 7 for lower door-mounted hinge assembly.
9. Install door. Using 60-grit grinder, trim edges as required for final fitting. Verify doors open and close smoothly and latch correctly. Remove door and bevel edges using 60-grit sandpaper.
10. Prepare surfaces with solvent and touch-up door using approved materials per § 23-70. Install new door per Part C.

27-11 Door Lock Replacement**CAUTION**

Protect door windows and paint from scratches or scuff marks when door maintenance is performed on workbench.

1. Remove door per § 27-10.
2. Refer to Figure 27-1. Remove hole plug opposite key slot on door interior.
3. Remove screw, bent cam, and 90° rotation washer. Remove nut and A538-1 washer. Press and catch cylinder lock and ring through door.
4. Install new cylinder lock and ring in door. Install lock so key is vertical with teeth down in locked position. Apply thin coat B270-10 adhesive on screw threads, install hardware, and tighten screw.
5. Bond hole plug in place using B270-9 adhesive.

27-12 Weather Seal (Door Assembly) Replacement

1. Remove damaged weather seal using plastic wedge or putty knife. Remove hardened adhesive using approved solvent per § 23-70, or 60-grit sandpaper, as required.
2. Refer to Figure 27-1. Measure and trim continuous length of A226-2 seal to fit perimeter of door except forward side, as shown. Neatly bond seal to stiffener using B270-18 adhesive. Wipe away excess adhesive prior to curing.
3. Measure and trim length of A226-6 seal to fit forward side of door. Remove self-adhesive preserving strip and neatly bond seal to stiffener.

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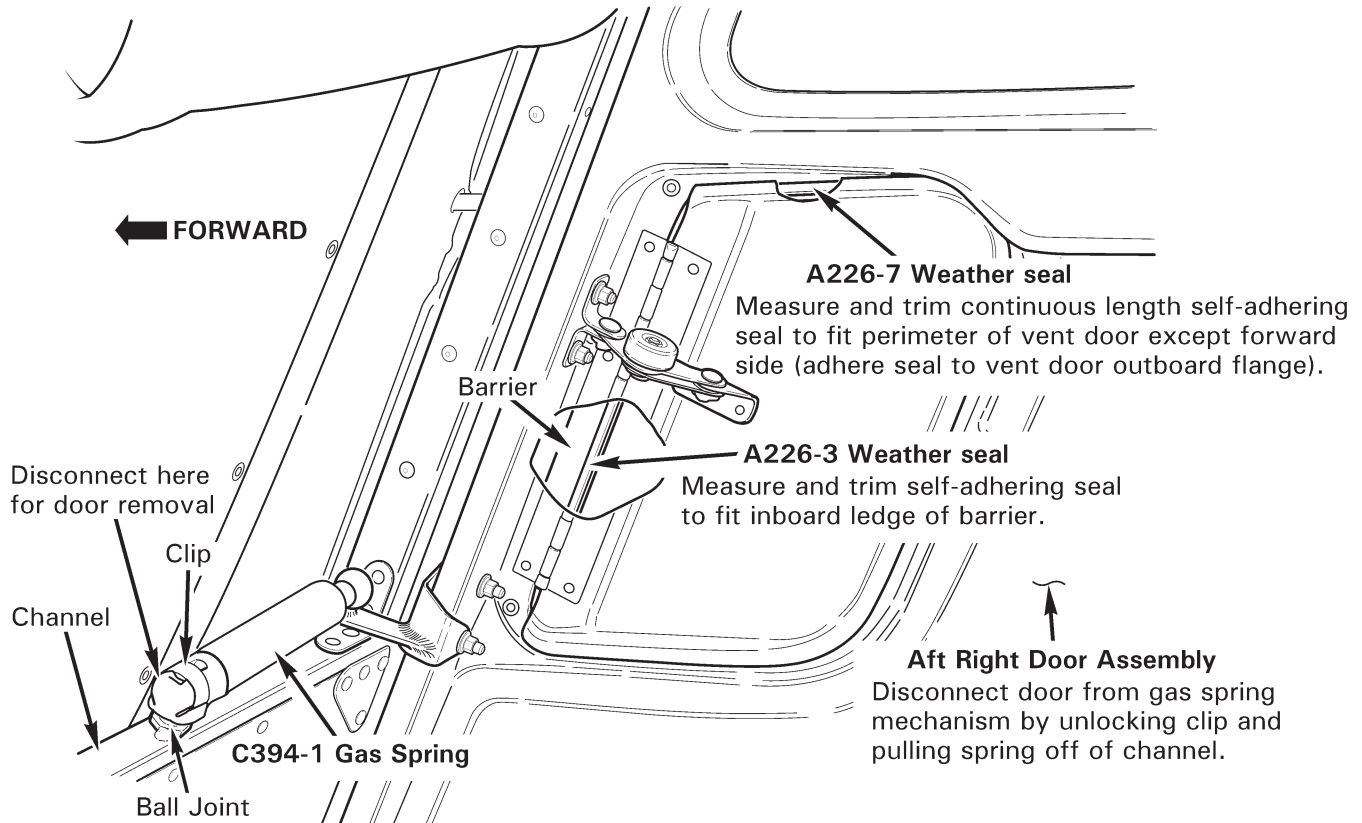
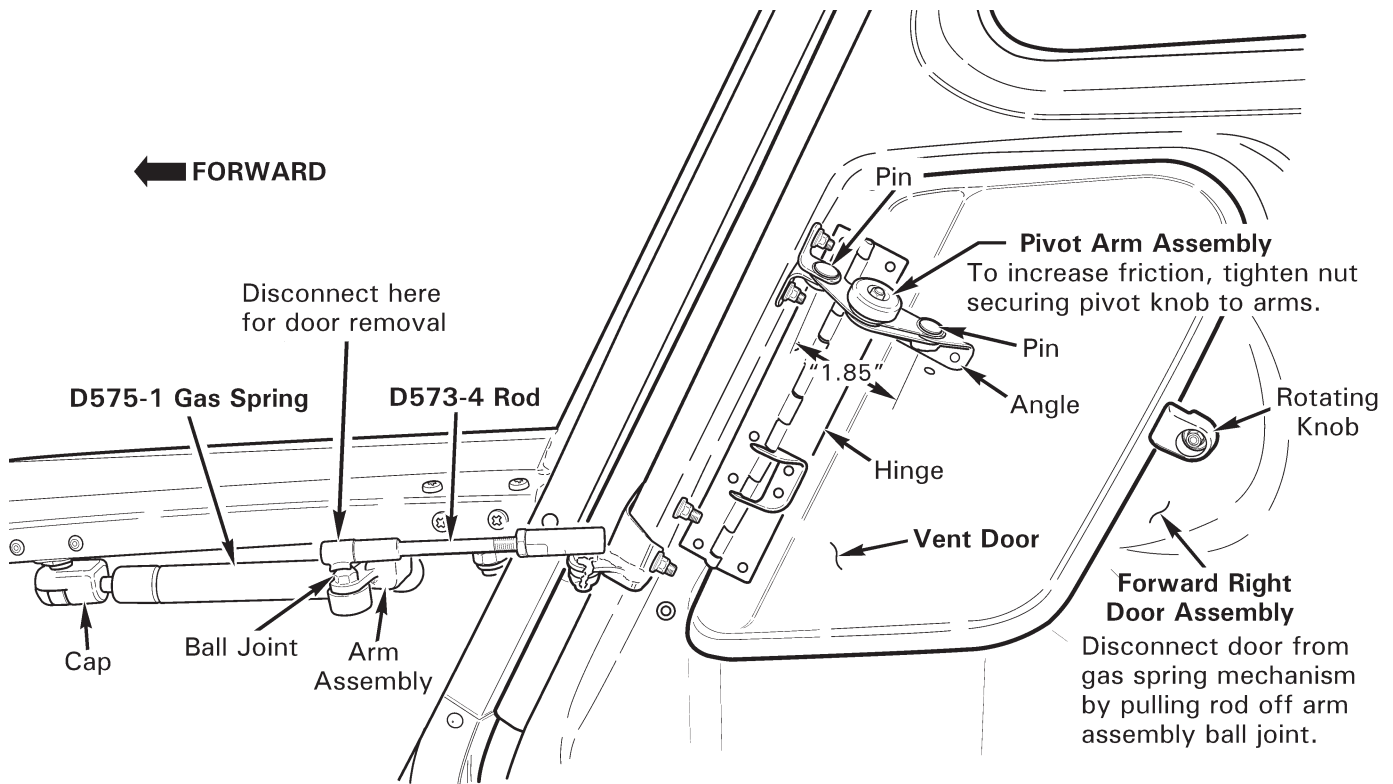


FIGURE 27-2 GAS SPRINGS AND DOOR VENTS

## 27-13 Gas Springs

### **A. Removal**

1. a. Forward Doors: Insert flat-tip screwdriver and pry down on caps to unlock D575-1 gas spring from ball joints. Push gas spring down and off of ball joints.
- b. Aft Doors: Insert flat-tip screwdriver and pry up spring clips to unlock C394-1 gas spring from ball joints. Pull gas spring up and off of ball joints.

### **B. Installation**

1. a. Forward Doors: Unlock D575-1 gas spring caps. Snap gas spring onto ball joints and lock caps.
- b. Aft Doors: Insert flat-tip screwdriver and pry up C394-1 gas spring spring clips. Snap gas spring onto ball joints and release clips.

## 27-20 Door Vent Replacement

### **CAUTION**

Use proper respiratory protection when handling fiberglass.

1. Refer to Figure 27-2. Drill out rivets securing hinge and pivot arm assembly angle to door vent. Rotate knob to unlock and remove door vent.
2. Using 60-grit grinder, trim new vent door forward edge as required to match door recess and smooth corners. Bevel edges using 60-grit sandpaper.
3. Hold fitted door vent in recess and match drill hinge four 0.098-inch diameter holes. Smooth hole edges; clean up debris. Prepare surfaces for clamping using approved solvents per § 23-70. Install rivets securing door to hinge.
4. Extend pivot arm to approximately 1.85 inch between center of pins. Match drill pivot arm assembly angle two 0.098-inch diameter holes. Smooth hole edges; clean up debris. Prepare surfaces for clamping using approved solvents per § 23-70. Install rivets securing door to arm assembly angle. Verify vent door opens and closes smoothly and latches correctly.

## 27-21 Weather Seal (Door Vent) Replacement

1. Remove damaged weather seal using plastic wedge or putty knife. Remove hardened adhesive using approved solvent per § 23-70, or 60-grit sandpaper, as required.
2. Refer to Figure 27-2. Measure and trim continuous length of A226-7 seal to fit perimeter of vent door except forward side, as shown. Remove self-adhesive preserving strip and neatly bond seal to stiffener.
3. Measure and trim length of A226-3 seal to fit ledge of barrier. Remove self-adhesive preserving strip and neatly bond seal to stiffener.

27-22 Door Vent Hinge Replacement**CAUTION**

Protect door windows and paint from scratches or scuff marks when door maintenance performed on workbench.

1. Remove door per § 27-10.
2. Refer to Figure 27-2. Drill out rivets securing hinge to door assembly and door vent. Remove hinge.
3. Smooth hole edges; clean up debris. Prepare surfaces for clamping using approved solvents per § 23-70.
4. Refer to § 27-20. Verify proper vent door fit; install rivets securing hinge to door assembly and door vent. Prepare surfaces and touch-up rivet heads and hinge using approved materials per § 23-70.

27-23 Pivot Friction Adjustment

To increase pivot arm assembly friction, tighten nut securing pivot knob to arms. Do not overtighten screw. No thread exposure required beyond nut.



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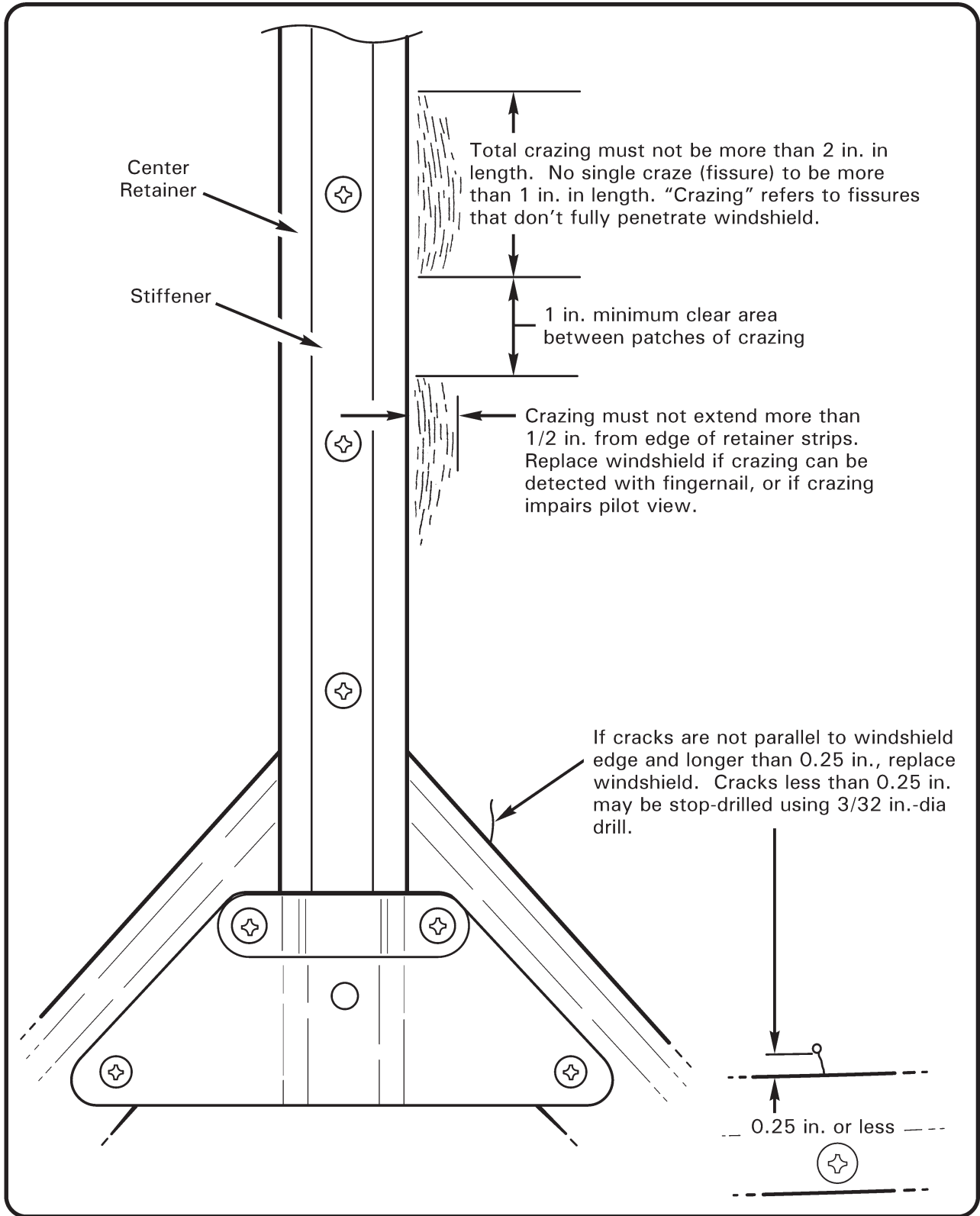


FIGURE 27-3 WINDSHIELD INSPECTION (ACRYLIC WINDSHIELD SHOWN)

## 27-30 Windshield Installation

### 27-31 Standard (Acrylic) Windshield Installation

#### **A. Description**

Acrylic windshields are sandwiched between thin aluminum retainers that are screwed to the door and windshield frames. An adhesive/sealant is applied between the retainers and the windshields for security and weatherproofing.

#### **B. Cleaning**

Refer to § 23-10 Part B for cleaning windshield.

#### **C. Inspection**

Inspect both windshields for cracks and crazing adjacent to retainers per Figure 27-3. If cracks exceed these limits, replace damaged windshield per § 27-31 Part F.

Minor defects or imperfections that do not impair pilot visibility or indicate impending structural failure are acceptable.

#### **D. Removal**

1. Remove forward door assembly per § 27-10 Part B. Remove hardware securing A228 (upper) and C228 (lower) hinge assembly to door frame and remove hinges.

#### **NOTE**

If windshield is to be reinstalled, prior to removal, tape protective paper or film to the inside and outside of the windshield to prevent damage.

2. Remove hardware securing C238-27 or C238-28 (side) retainer to door frame and remove retainer.
3. Install upper hinge assembly, and install door assemblies for cabin structure support with windshield removed.
4. Support windshield. With a second person inside cabin to remove nuts, latch forward doors. Remove hardware securing C238-29 (upper) retainer, B409-5 gusset, D805-2 restraint, C366-5 bracket, C366-8 retainer, C367 (lower) retainers, B295-1 clip with yaw string, C367-12 stiffener, and C367-10 (center) retainer to cabin and remove parts. Remove windshield.
5. Remove sealant from cabin and parts.
6. If windshield is to be reinstalled, remove sealant from windshield.
7. Repeat steps to remove opposite-side windshield, as required.

27-31 Standard (Acrylic) Windshield Installation (continued)**E. Installation****NOTE**

Prior to installation, if not previously accomplished, tape protective paper or film to the inside and outside of the windshield to prevent damage.

1. Verify sealant has been removed from cabin, parts, and windshield.
2. Position windshield on helicopter and cleco retainers to frames.
3. Attach 1/2"-wide masking tape to windshield along edge of retainers to catch sealant squeeze-out during retainer installation.
4. Remove C238-27 or C238-28 (side) retainer and install A228 (upper) and C228 (lower) door hinge assemblies. Install forward door assemblies for cabin structure support during windshield installation.
5. Remove C367-10 (center) retainer. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing center retainer and C367-12 stiffener (do not install B295-1 clip) to cabin; special torque screws per § 23-33. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
6. Remove C367 (lower) retainers. Run a bead of B270-26 sealant along entire edge of tape line. With a second person inside cabin to tighten nuts, latch forward doors. Install hardware securing lower retainers, C366-8 retainer, and C366-5 bracket to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
7. Remove C238-29 (upper) retainer. Run a bead of B270-26 sealant along entire edge of tape line. With a second person inside cabin to tighten nuts, latch forward doors. Install hardware securing upper retainer and B409-5 gusset to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
8. Remove door and hinge assembly. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing side retainer and D805-2 restraint to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
9. Reinstall hinge assembly, and install door assembly per § 27-10 Part C.
10. Ensure all fasteners are tight. Wipe off excess sealant with cheesecloth wet with lacolene.
11. Allow sealant to dry according to manufacturer's instruction.
12. Remove protective paper or film from inside and outside of the windshield.
13. Repeat steps to install opposite-side windshield, as required.
14. Install B295-1 clip and yaw string per § 27-33 Part B.

27-31 Standard (Acrylic) Windshield Installation (continued)**F. Replacement****NOTE**

Prior to installation, if not previously accomplished, tape protective paper or film to the inside and outside of the windshield to prevent damage.

1. Verify sealant has been removed from cabin and parts.
2. Cleco retainers to frames, checking for proper alignment. Remove retainers, except C238-27 or C238-28 (side) retainer.
3. Install A228 (upper) and C228 (lower) door hinge assemblies, and install forward door assemblies for cabin structure support during windshield installation.
4. Lay out masking tape on frames to identify location for windshield edge (estimate edge where side retainer is clecoed to frame). Hold oversized windshield in place by hand and verify it overlaps masking tape on all frames and retainer. When satisfied with alignment, lay out masking tape on windshield for trimming.

**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.**

5. A band saw with a blade containing at least 24 teeth per inch is recommended for initial trimming. Tape cardboard to band saw table to prevent scratching of windshield. Trim windshield carefully to prevent binding of saw blade and cracking windshield. Finish initial cut using an orbital sander, as required.
6. Hold windshield in place and check for fit. Re-trim as necessary.
7. After windshield is fitted, use sanding block with 100-grit paper to smooth edges. Finish edge and bevel corners using a triangular machinist's scraping tool. Verify all edges are clean and free of notches.
8. Remove trimming debris from windshield and cabin.
9. Install windshield per § 27-31 Part E.

## 27-32 Impact-Resistant (Polycarbonate) Windshield Installation

### **A. Description**

The polycarbonate windshield installation is similar to the acrylic windshield installation, but the windshields fasten to the door and windshield frames via small stainless steel straps.

While polycarbonate has superior strength and flexibility properties when compared with acrylic, it is also more susceptible to ultraviolet (UV) degradation, and has a low scratch resistance. A hardcoat is applied during manufacturing to protect against UV damage and scratching, however, further effort must be made by the operator to maximize windshield service life. Follow instructions closely to avoid scratching windshield during cleaning (refer to § 23-10 Part B). Exposure to incompatible cleaning agents or solvents can result in embrittlement or crazing. Use a cabin cover when parking helicopter outdoors, or store helicopter in hanger when possible.

### **B. Cleaning**

Refer to § 23-10 Part B for cleaning windshield.

### **C. Inspection**

Inspect both windshields for cracks and crazing adjacent to retainers per Figure 27-3. Also inspect areas adjacent to fasteners and stainless steel straps for cracks and crazing. If cracks exceed these limits, replace damaged windshield per § 27-31 Part F.

Inspect windshields for any significant discoloration or cloudiness. Minor defects or imperfections that do not impair pilot visibility or indicate impending structural failure are acceptable.

### **D. Removal**

1. Perform § 27-31 Part D steps 1 thru 3.
2. Support windshield. With a second person inside cabin to remove nuts and washers, latch forward doors. Remove hardware securing G367 ties and straps to windshield near center bow (all other hardware installed in windshield may remain in place during windshield removal). Taking care not to bend ties and straps, remove sealant as required, and remove ties & straps from windshield.
3. Remove hardware securing C238-29 (upper) retainer, B409-5 gusset, D805-2 restraint, C366-5 bracket, C366-8 retainer, C367 (lower) retainers, B295-2 clip with trim string, C367-12 stiffener, and C367-10 retainer to cabin and remove parts. Taking care not to bend ties and straps, remove windshield.
4. Remove sealant from cabin and parts.
5. If windshield is to be reinstalled, remove sealant from windshield but leave hardware and G367 ties, straps, pads, and tabs installed. If replacing windshield, remove hardware and, without deforming, remove G367 ties, straps, pads, and tabs, as required.
6. Repeat steps to remove opposite-side windshield, as required.

27-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)**E. Installation****NOTE**

Prior to installation, if not previously accomplished, tape protective paper or film to the inside and outside of the windshield to prevent damage.

**NOTE**

Inspect condition of G367 ties, straps, pads, and tabs to be installed. Verify no obvious damage, deformation, or stretching. If windshield is being replaced due to bird strike or other impact which could deform ties, straps, pads, or tabs, replacement of these items is recommended.

**NOTE**

Refer to R44 Illustrated Parts Catalog Chapter 52. Note location of G367 ties, straps, pads, and tabs on work table or by marking on tape at fasteners to facilitate installation.

1. Verify sealant has been removed from cabin, parts, and windshield.
2. Position windshield on helicopter and cleco G367 ties, straps, tabs, and retainers to frames. Also, cleco G367 ties, straps, and tabs to windshield at center bow, if drilled.
3. Install A228 (upper) and C228 (lower) door hinge assemblies. Install forward door assemblies for cabin structure support during windshield installation.
4. If windshield is drilled and has hardware, G367 ties, straps, pads, and tabs installed:
  - a. With a second person inside cabin to tighten nuts, latch forward doors. Remove clecoes and install hardware securing G367 ties and straps to windshield at center bow; special torque screws per § 23-33.
  - b. Attach 1/2"-wide masking tape to windshield along edge of retainers to catch sealant squeeze-out during retainer installation.
  - c. Remove C367-10 (center) retainer. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing center retainer and C367-12 stiffener (do not install B295-2 clip) to cabin; special torque screws per § 23-33. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
  - d. Perform § 27-31 Part E steps 6 thru 13.
  - e. Paint (or touch up) windshield trim per § 27-32 Part G.
  - f. Install B295-2 clip and yaw string per § 27-33 Part B.

27-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)**E. Installation (continued)**

5. Align G367 ties and straps perpendicular to retainers within 2°. Install C367-12 stiffener and special torque screws per § 23-33. Match drill #40 pilot holes through windshield and install clecos.
6. At center bow:
  - a. Remove C367-12 stiffener and C367-10 (center) retainer. Remove G367 ties and straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Apply B270-26 sealant to G367 tabs and pads and position on windshield. Run a bead of B270-26 sealant along entire edge of windshield. Install hardware securing center retainer, C367-12 stiffener (do not install B295-2 clip) to cabin. Special torque screws per § 23-33.
  - c. With a second person inside cabin to tighten nuts, latch forward doors and install hardware securing G367 ties and straps to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.
7. At lower retainers:
  - a. Remove C367 (lower) retainers. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Apply B270-26 sealant to G367-12 tabs and position on windshield. Run a bead of B270-26 sealant along entire edge of windshield. With a second person inside cabin to tighten nuts, latch forward doors, and install hardware securing lower retainers, C366-8 retainer, and C366-5 bracket to cabin. Install hardware securing G367 straps to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.
8. At upper retainer:
  - a. Remove C238-29 (upper) retainer. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Run a bead of B270-26 sealant along entire edge of windshield. With a second person inside cabin to tighten nuts, latch forward doors, and install hardware securing upper retainer and B409-5 gusset to cabin. Install hardware securing G367 straps and ties to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.



27-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)**E. Installation (continued)**

9. At door frame:
  - a. Remove door and hinge assembly. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Run a bead of B270-26 sealant along entire edge of windshield. Install hardware securing side retainer and D805-2 restraint to cabin. Install hardware securing G367 straps and ties to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.
10. Reinstall hinge assembly, and install door assembly per § 27-10 Part C.
11. Ensure all fasteners are tight. Wipe off excess sealant with cheesecloth wet with lacolene.
12. Allow sealant to dry according to manufacturer's instruction.
13. Repeat steps to install opposite-side windshield, as required.
14. Paint (or touch up) windshield trim per § 27-32 Part G.
15. Install B295-2 clip and yaw string per § 27-33 Part B.

**F. Replacement****NOTE**

Do not use this procedure to upgrade acrylic to polycarbonate windshields.

1. Perform § 27-31 Part F steps 1 thru 4.

**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.**

2. A band saw with 20°–30° clearance angle, 0–5° rake angle, 600–1000 m/min rotation speed, and 1.5–4 mm tooth spacing is recommended for initial trimming. Tape cardboard to band saw table to prevent scratching of windshield. Trim windshield carefully to prevent binding of saw blade and cracking windshield. Finish initial cut using an orbital sander, as required.
3. Hold windshield in place and check for fit. Re-trim as necessary.
4. After windshield is fitted, use sanding block with 100-grit paper to smooth edges. Verify all edges are clean and free of notches.
5. Remove trimming debris from windshield and cabin.
6. Install windshield per § 27-32 Part E.

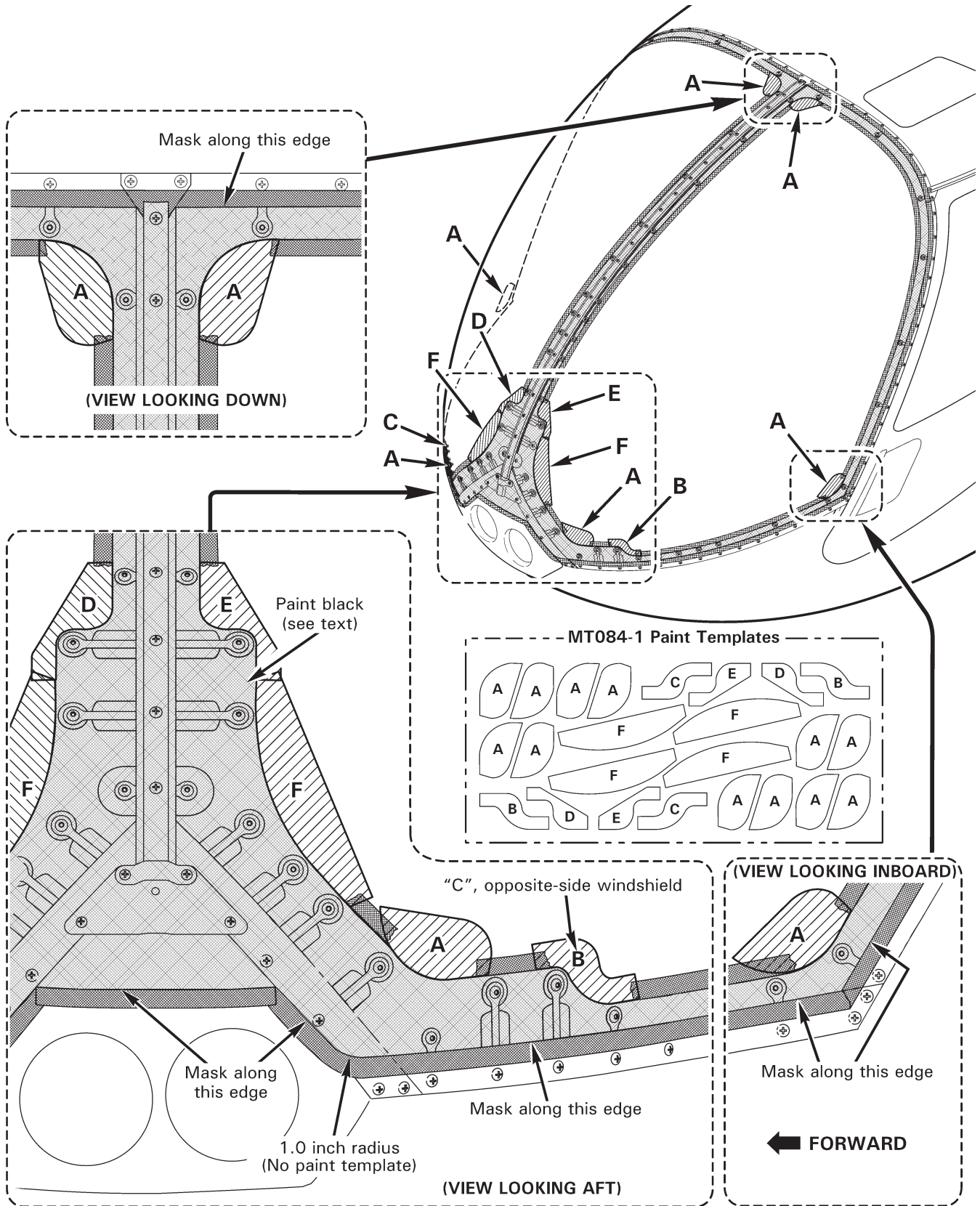


FIGURE 27-4 PAINT TEMPLATE LAYOUT

27-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)**G. Trim Paint**

1. Remove B295-2 clip and yaw string from bow assembly and reinstall screw.
2. Trim any excess sealant around perimeter of windshield using plastic razor blades; remove sealant residue using cheesecloth wet with lacolene.
3. Clean surface of windshield to be masked for paint using cheesecloth wet with lacolene.

**NOTE**

Cleaning surface of windshield prior to masking will prevent paint from "bleeding," or seeping, under tape.

4. Refer to Figures 27-4 and 27-5. Using 3M vinyl tape (or equivalent), apply masking ("Tape 1" and "Tape 2") to windshield as shown. Apply MT084-1 paint templates on windshield as shown.
5. Refer to Figure 27-4. Using 3M vinyl tape (or equivalent), apply masking to windshield retainer edges, area near landing lights, and between MT084-1 paint templates as shown.
6. Protect windshield and cabin from paint overspray.
7. Using 320-grit sandpaper and scotch-brite, lightly scuff surfaces to be painted. Avoid damaging masking edges; replace any damaged masking per steps 4 and 5 as required.
8. Remove debris using compressed air.
9. Clean scuffed surfaces to be painted using a lint-free cloth wet with Final Klean 3909S.
10. Conversion coat bare aluminum per § 23-51, as applicable.
11. Refer to § 23-77. Apply black paint to windshield trim prepared surfaces per Figure 27-4.
12. Allow paint to cure. Remove MT084-1 paint templates and masking. Clean windshield per § 23-10 Part B.
13. Install B295-2 clip and yaw string per § 27-33 Part B.

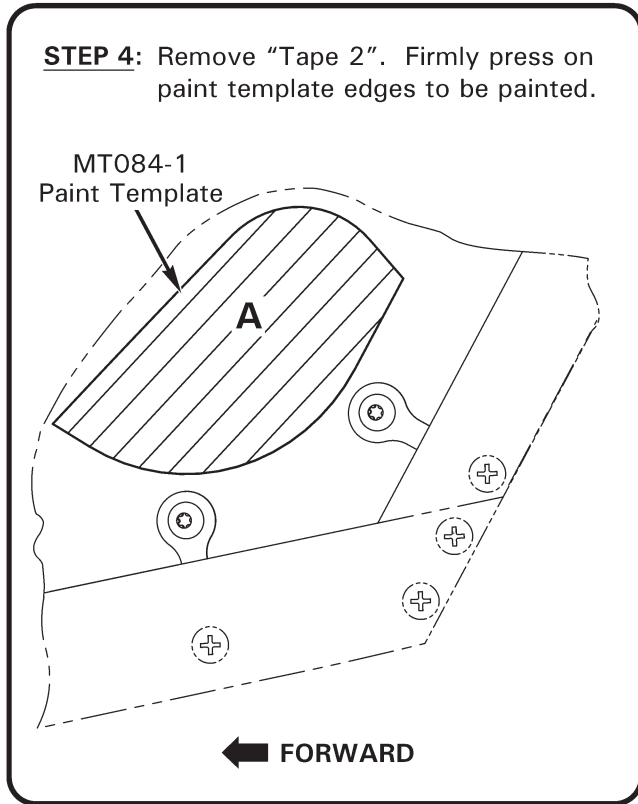
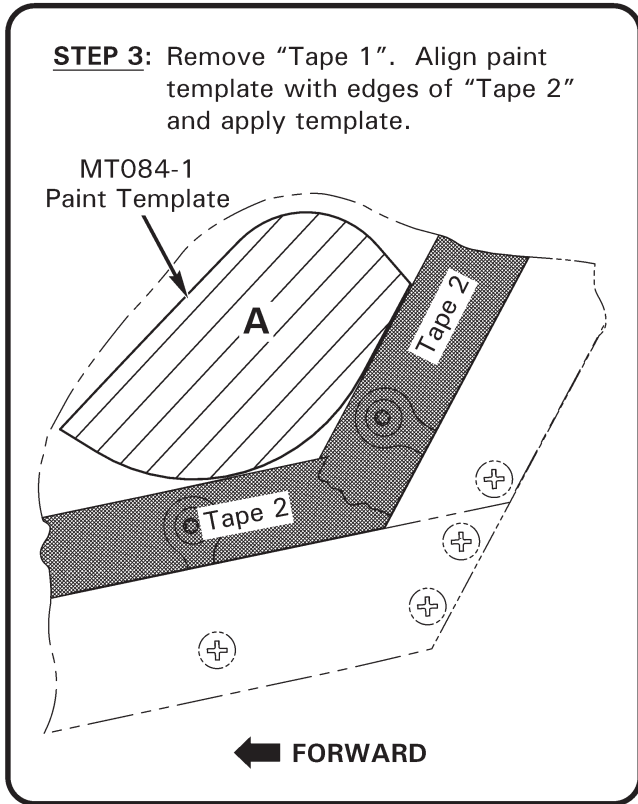
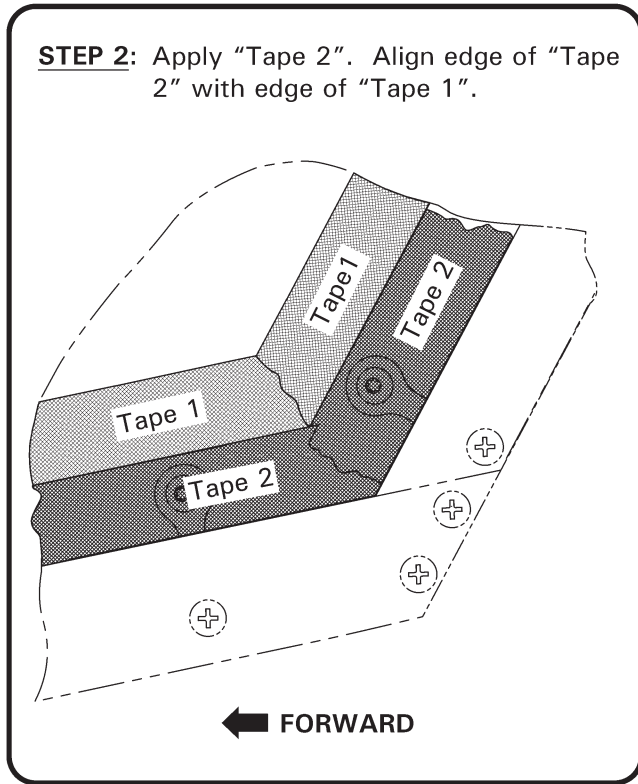
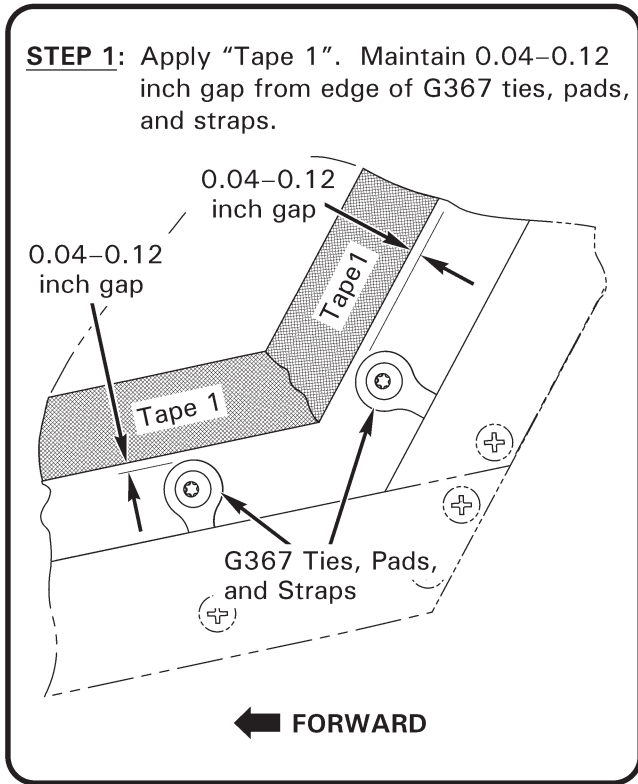


FIGURE 27-5 PAINT TEMPLATE LAYOUT PROCESS

27-33 Yaw String**A. Removal**

Remove screw securing B295-1 or B295-2 clip; remove clip and yaw string.

**B. Installation**

1. Locate 7th screw (8th screw for helicopters equipped with 10 hole console assemblies) up from bottom of C367-12 stiffener and remove screw.
2. Position yaw string on stiffener just above hole location; install screw securing B295-1 or -2 clip, finger tight. Verify 3 inches string, each side of clip; special torque screw per § 23-33. Cut replacement string to 3 inches from each side of clip, if applicable.

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### 36-10 Access Panels

#### **A. Dimensions**

R44 Cadet access panels are similar to R44 Raven I installation. Refer to R44 Illustrated Parts Catalog (IPC) Figure 94-1 for R44 Cadet configuration.

#### **B. Control Tunnel Access**

1. Refer to Figure 36-2. Open C703-1 cover assemblies, remove screws securing C474-4 (horizontal) cover to cabin, and remove cover.
2. Remove screws securing D670-6 trim to C465 panels and remove trim.
3. Remove screws securing C474-1 (vertical) cover to cabin and remove cover.

#### **C. Bulkhead Access**

1. Refer to Figure 36-2. Remove screws securing D670-6 trim to C465 panels and remove trim.
2. Lift up insulation as required, remove screws securing C465 panels to cabin, and remove panels.

### 36-20 Placards and Markings

#### **A. Description**

R44 Cadet paint, marking, and decal installation is similar to R44 Raven I installation. Refer to R44 Illustrated Parts Catalog (IPC) Figure 94-1 for R44 Cadet configuration.

#### **B. Removal**

Start at corners and slowly peel off decal by hand or using a plastic wedge. Avoid damaging or removing paint or primer from surfaces. Remove decal entirely.

#### **C. Installation**

Verify surfaces are clean and dry before attaching decals. Use a clean cloth wet with acetone or mild soapy water to clean surfaces. Press decal to surface and verify security.

<p style="text-align: center;"><b>CAUTION</b></p>
---

<p>Use caution when using acetone near silk-screened lettering. Acetone can smudge or remove silk-screened letters.</p>
---

#### **D. Scheduled Maintenance**

Inspect placards every 100-hour/annual inspection per § 2.400.

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**36-30 Environment Control****A. Description**

R44 Cadet air conditioning installation is similar to R44 Raven II installation. Refer to R44 Illustrated Parts Catalog Figure (IPC) 94-1 for R44 Cadet configuration.

**B. Maintenance**

Refer to § 11.300 for maintenance procedures.

**C. Schematic**

Refer to Figures 11-4 & 11-4A for air conditioning schematic. |

**D. Scheduled Maintenance**

Inspect air conditioning components every 100-hour/annual inspection per § 2.400.

**E. Special Maintenance**

Refer to § 11.310 for air conditioning system troubleshooting.

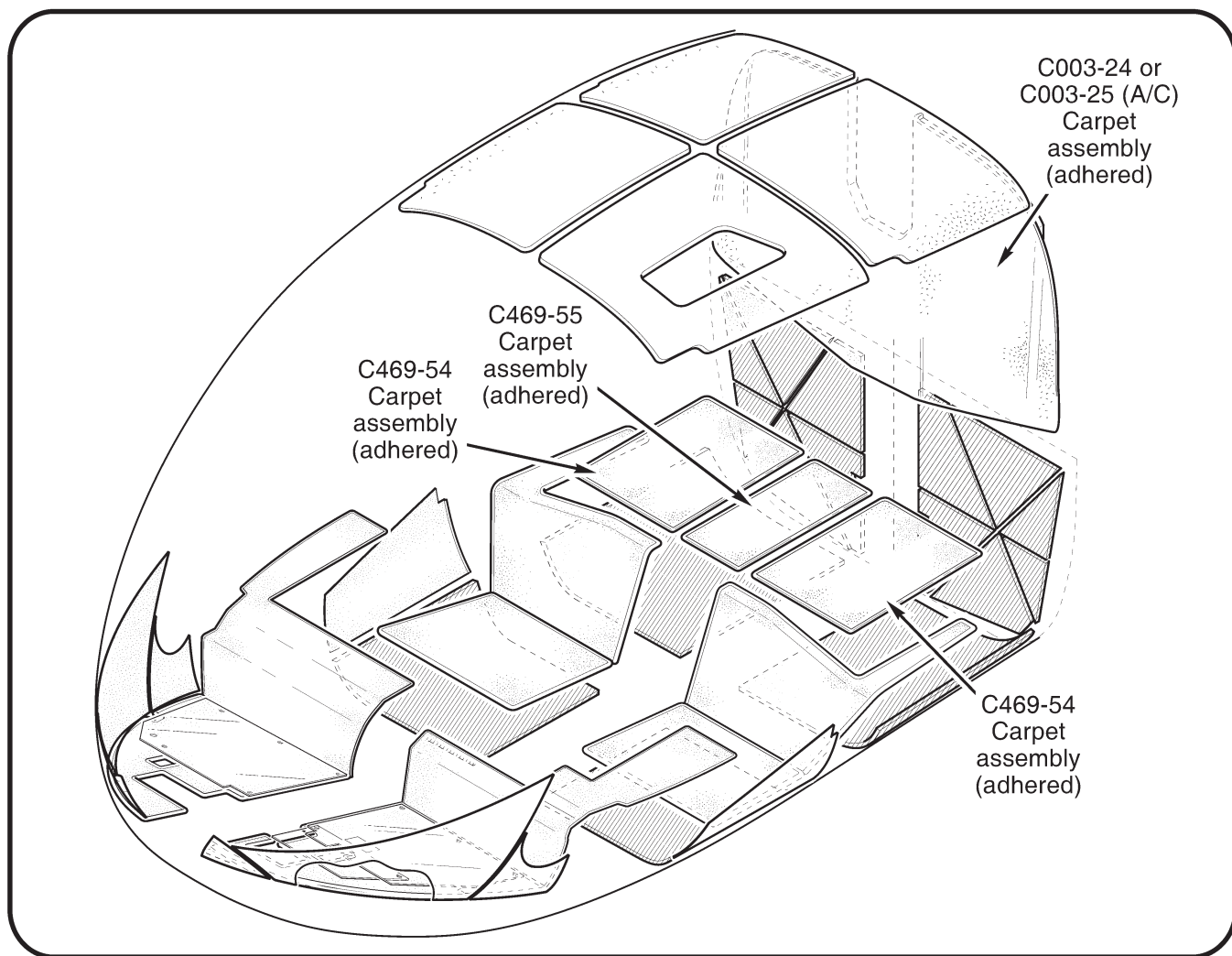


FIGURE 36-4 CARPET AND INSULATION

37-00 Description (continued)

E.N.G. and Police versions each have an additional, right-side circuit breaker panel on the ledge just forward of the pilot's seat containing all circuit breakers for the optional E.N.G. or police equipment. The forward row of circuit breakers is connected to a 28-volt bus. The aft row of circuit breakers is connected to a 14-volt bus on E.N.G. versions while on police versions the outboard section of the aft row of circuit breakers is connected to a 14-volt bus. The 14-volt bus is powered by a 28- to 14-volt converter. A separate Master switch on the left side of the circuit breaker panel controls power to all E.N.G. or police equipment.

## 37-10 Battery

### 37-11 Lead-Acid Battery Installation

**NOTE**

Refer to Concorde Battery Corporation's Owner/Operator's Manual, and Instruction for Continued Airworthiness for battery maintenance procedures.

**CAUTION**

Use insulated tools when performing maintenance near battery.

**CAUTION**

To minimize risk of electrical discharge: When disconnecting battery, disconnect negative (ground) cable from battery first, then the positive cable. When connecting battery, connect positive cable to battery first, then the negative (ground) cable.

#### **A. Disconnecting and Removing Battery**

1. Turn battery switch off.
  - a. Aft Battery: Remove engine left-hand side cowling. Loosen clamp securing cooling hose to battery cover assembly and disconnect hose. Remove cotter rings and wing nuts to release rods attaching battery cover to lower frames. Remove battery cover.
  - b. Under-seat battery: Pivot forward left-hand seat forward and remove C748-5 cover assembly. Remove hardware securing D144-6 hold-down assembly to cabin and remove hold-down assembly.
  - c. Tailcone-mounted battery: Remove screws securing D540-3 or -5 box and remove box from tailcone. Loosen but do not remove (4) NAS6604-3 bolts securing D362-10 straps. While holding battery, pull (forward) strap forward and slowly tilt battery to gain access to terminals.
2. Remove hardware securing negative (ground) cable to battery negative terminal.
3. Remove hardware securing positive cable to battery positive terminal. Carefully remove battery.

37-11 Lead-Acid Battery Installation (continued)**B. Installing and Connecting Battery**

1. Turn battery switch off.
2. Aft Battery: Verify installation and good condition of G405-2 bumpers (or D832-1 neoprene strips, if installed) on C046-26 lower frame.
3. Position battery in helicopter and connect positive cable to battery first, then connect the negative (ground) cable. Special torque terminal bolts per § 23-33 and torque stripe per Figure 2-1. Position positive cable's nipple over terminal.
4. Under-seat battery: Install hardware securing D144-6 hold-down assembly to cabin so it just contacts top of battery (holes are slotted; adjust as required). Standard torque bolt per § 23-32 and torque stripe per Figure 2-1.
5.
  - a. Aft Battery: Position battery cover assembly on battery and install wing nuts and cotter rings to secure rods attaching battery cover to lower frames. Connect cooling hose to battery cover and tighten clamp. Verify security. Install engine left-hand side cowling.
  - b. Under-seat battery: Install C748-5 cover assembly and pivot forward left-hand seat aft.
  - c. Tailcone-mounted battery: Position D362-10 straps under battery, standard torque (4) NAS6604-3 bolts securing straps. Position D540-3 or -5 box on tailcone and install screws, verify security.

### 37-12 Lithium-Ion Battery Installation

#### **A. Description**

A 17 amp-hour lithium-ion battery replaces the standard 24-volt lead-acid main battery. The lithium-ion battery includes built-in circuitry that monitors temperature, voltage, and current draw and manages battery charge and discharge. The circuitry automatically disables charge and/or discharge if any electrical or thermal problems are detected. The circuitry will also interrupt power if a start is attempted with insufficient charge to prevent permanent battery damage. The battery uses lithium-iron-phosphate chemistry which is less susceptible to thermal runaway than some other lithium battery chemistries.

The metal battery case is designed to contain any heat or gases generated within the battery and is vented overboard. No venting should occur during normal operation.

Two annunciator panel segments, BATT FAULT and BATT HEATER, show battery status. The annunciator panel test button should cause these segments to illuminate along with the rest of the annunciator panel. The segments will also illuminate briefly when the battery switch is turned on after several hours of inactivity.

BATT FAULT illuminates if the battery has an over- or under-voltage condition, an over-temperature condition, or if current draw exceeds limits. A flashing light indicates a recoverable fault. The light may go out if the fault corrects itself (e.g. temperature decrease) or may go out as a result of a power cycle at the next landing. A steady light indicates battery maintenance or replacement may be required. The emergency procedure for a fault light (flashing or steady) is to land as soon as practical. The alternator will continue to supply electrical power during the landing.

The battery incorporates an internal heater for cold weather operation. The heater attempts to maintain a battery temperature of at least 50°F (10°C). When the battery is switched ON, BATT HEATER illuminates while the heater is warming the battery and extinguishes when the battery is warm enough to attempt an engine start. On very cold days, the heating cycle may take 10 minutes or more. The heater light is disabled while the engine is running but the heater will continue to function as long as the battery switch is ON.

Nominal charging voltage for the lithium-ion battery is 28.8 volts. Some lead-acid chargers may not provide enough voltage to fully charge the battery. Ensure charging equipment is compatible with lithium-ion batteries.

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11.8 .....	SEP 2023	12.20 .....	DEC 2021	13.22 .....	AUG 2019
11.8A .....	SEP 2023	12.21 .....	DEC 2021	13.23 .....	AUG 2019
11.8B .....	SEP 2023	12.22 .....	DEC 2021	13.24 .....	AUG 2019
11.9 .....	OCT 2006	12.23 .....	DEC 2021	13.25 .....	AUG 2019
11.10 .....	OCT 2006	12.24 .....	DEC 2021	13.26 .....	AUG 2019
11.11 .....	OCT 2006	12.25 .....	DEC 2021	13.27 .....	AUG 2019
11.12 .....	OCT 2006	12.26 .....	DEC 2021	13.28 .....	AUG 2019
11.13 .....	OCT 2006	12.27 .....	DEC 2021	13.29 .....	AUG 2019
11.14 .....	JUL 2008	12.28 .....	DEC 2021	13.30 .....	AUG 2019
11.15 .....	OCT 2006	12.29 .....	DEC 2021	13.31 .....	AUG 2019
11.16 .....	OCT 2006	12.30 .....	DEC 2021	13.32 .....	AUG 2019
11.17 .....	OCT 2006	12.31 .....	DEC 2021	13.33 .....	AUG 2019
11.18 .....	JUL 2008	12.32 .....	DEC 2021	13.34 .....	AUG 2019
11.19 .....	OCT 2006	12.33 .....	DEC 2021	13.35 .....	AUG 2019
11.20 .....	JUL 2008	12.34 .....	DEC 2021	13.36 .....	AUG 2019
11.21 .....	JUL 2008			13.37 .....	DEC 2021
11.22 .....	JUL 2008	13.i .....	DEC 2021	13.38 .....	DEC 2021
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14.2	AUG 2019	14.20Q	JUN 2014	14.56	AUG 2019
14.3	AUG 2019	14.20R	JUN 2014	14.57	AUG 2019
14.3A	AUG 2019	14.21	JUL 2021	14.58	AUG 2019
14.3B	JUN 2014	14.22	JUL 2021	14.59	AUG 2019
14.3C	JUN 2014	14.23	JUL 2021	14.60	AUG 2019
14.3D	JUN 2014	14.24	JUL 2021	14.61	AUG 2019
14.3E	JUN 2014	14.25	AUG 2019	14.62	AUG 2019
14.3F	JUN 2014	14.26	AUG 2019	14.62A	AUG 2022
14.3G	JUN 2014	14.27	11 Jun 93	14.62B	AUG 2022
14.3H	JUN 2014	14.28	11 Jun 93	14.63	AUG 2022
14.3I	JUN 2014	14.29	15 Jun 98	14.64	AUG 2022
14.17	OCT 2006	14.30	11 Jun 93	14.65	AUG 2019
14.17A	OCT 2006	14.31	11 Jun 93	14.66	AUG 2019
14.17B	OCT 2006	14.32	11 Jun 93	14.67	AUG 2019
14.18	OCT 2006	14.33	11 Jun 93	14.68	AUG 2019
14.18A	OCT 2006	14.34	11 Jun 93	14.69	AUG 2019
14.18B	OCT 2006	14.35	11 Jun 93	14.70	AUG 2019
14.18C	JUL 2008	14.36	12 Dec 94	14.71	AUG 2019
14.18D	OCT 2006	14.37	11 Jun 93	14.72	AUG 2019
14.19	JUL 2004	14.38	11 Jun 93	14.73	AUG 2019
14.19A	JUL 2004	14.39	1 Jun 97	14.74	AUG 2019
14.19B	JUL 2004	14.40	1 Jun 97	14.75	AUG 2019
14.20	11 Jun 93	14.40A	OCT 2006	14.76	AUG 2019
14.20A	18 MAR 99	14.40B	OCT 2006	14.77	JAN 2021
14.20B	15 Jun 98	14.41	JUL 2021	14.78	JAN 2021
14.20C	18 MAR 99	14.42	JUL 2021		
14.20D	15 Jun 98	14.43	AUG 2019	15.i	DEC 2021
14.20E	JUL 2004	14.44	AUG 2019	15.ii	DEC 2021
14.20F	18 MAR 99	14.45	AUG 2019	15.1	DEC 2021
14.20G	JUL 2004	14.46	AUG 2019	15.2	DEC 2021
14.20H	JUL 2004	14.47	AUG 2019	15.3	JAN 2021
14.20I	DEC 2011	14.48	AUG 2019	15.4	JAN 2021
14.20J	DEC 2011	14.49	AUG 2019	15.5	JAN 2021
14.20K	JUN 2014	14.50	AUG 2019	15.6	JAN 2021
14.20L	JUN 2014	14.51	AUG 2019	15.7	JAN 2021
14.20M	JUN 2014	14.52	AUG 2019	15.8	JAN 2021
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15.12 .....	JAN 2021	21.1 .....	AUG 2019	23.30 .....	SEP 2023
15.13 .....	JAN 2021	21.2 .....	AUG 2019	23.31 .....	SEP 2023
15.14 .....	JAN 2021			23.32 .....	SEP 2023
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16.i .....	DEC 2021	22.2 .....	AUG 2019	23.36 .....	DEC 2021
16.ii .....	DEC 2021			23.37 .....	DEC 2021
16.1 .....	AUG 2019	23.i .....	SEP 2023	23.38 .....	DEC 2021
16.2 .....	AUG 2019	23.ii .....	SEP 2023	23.39 .....	DEC 2021
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16.4 .....	AUG 2019	23.2 .....	DEC 2021	23.41 .....	DEC 2021
16.5 .....	DEC 2021	23.3 .....	DEC 2021	23.42 .....	DEC 2021
16.6 .....	DEC 2021	23.4 .....	DEC 2021	23.43 .....	DEC 2021
16.7 .....	AUG 2019	23.5 .....	AUG 2022	23.44 .....	DEC 2021
16.8 .....	AUG 2019	23.6 .....	AUG 2022	23.45 .....	DEC 2021
		23.7 .....	SEP 2023	23.46 .....	DEC 2021
17.i .....	AUG 2019	23.8 .....	SEP 2023		
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17.1 .....	AUG 2019	23.10 .....	SEP 2023	24.ii .....	SEP 2023
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18.1 .....	AUG 2019	23.15 .....	DEC 2021	24.5 .....	AUG 2022
18.2 .....	AUG 2019	23.16 .....	DEC 2021	24.6 .....	AUG 2022
		23.17 .....	DEC 2021	24.7 .....	AUG 2022
19.i .....	AUG 2019	23.18 .....	DEC 2021	24.8 .....	AUG 2022
19.ii .....	AUG 2019	23.19 .....	DEC 2021	24.9 .....	AUG 2022
19.1 .....	AUG 2019	23.20 .....	DEC 2021	24.10 .....	AUG 2022
19.2 .....	AUG 2019	23.21 .....	DEC 2021	24.11 .....	SEP 2023
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20.ii .....	AUG 2019	23.24 .....	DEC 2021	24.14 .....	SEP 2023
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26.ii	AUG 2019	28.9	DEC 2021	29.1	AUG 2019
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26.2	AUG 2019	28.11	DEC 2021		
		28.12	DEC 2021	30.i	DEC 2021
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27.ii	SEP 2023	28.14	DEC 2021	30.1	DEC 2021
27.1	SEP 2023	28.15	DEC 2021	30.2	DEC 2021
27.2	SEP 2023	28.16	DEC 2021	30.3	DEC 2021
27.3	SEP 2023	28.17	DEC 2021	30.4	DEC 2021
27.4	SEP 2023	28.18	DEC 2021	30.5	DEC 2021
27.5	SEP 2023	28.19	DEC 2021	30.6	DEC 2021
27.6	SEP 2023	28.20	DEC 2021	30.7	DEC 2021
27.7	SEP 2023	28.21	DEC 2021	30.8	DEC 2021
27.8	SEP 2023	28.22	DEC 2021	30.9	DEC 2021
27.9	SEP 2023	28.23	DEC 2021	30.10	DEC 2021
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27.15	SEP 2023	28.29	DEC 2021	30.16	DEC 2021
27.16	SEP 2023	28.30	DEC 2021	30.17	DEC 2021
27.17	SEP 2023	28.31	DEC 2021	30.18	DEC 2021
27.18	SEP 2023	28.32	DEC 2021	30.19	DEC 2021
27.19	SEP 2023	28.33	DEC 2021	30.20	DEC 2021
27.20	SEP 2023	28.34	DEC 2021	30.21	DEC 2021
27.21	SEP 2023	28.35	DEC 2021	30.22	DEC 2021
27.22	SEP 2023	28.36	DEC 2021	30.23	DEC 2021
		28.37	DEC 2021	30.24	DEC 2021
28.i	DEC 2021	28.38	DEC 2021		
28.ii	DEC 2021	28.39	DEC 2021	31.i	AUG 2019
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32.ii	AUG 2019	37.2B	SEP 2023	38.2	AUG 2019
32.1	AUG 2019	37.2C	AUG 2022	38.3	AUG 2019
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33.i	AUG 2019	37.4	AUG 2019	38.6	AUG 2019
33.ii	AUG 2019	37.5	AUG 2019	38.7	AUG 2019
33.1	AUG 2019	37.6	AUG 2019	38.8	AUG 2019
33.2	AUG 2019	37.7	DEC 2021	38.9	AUG 2019
		37.8	DEC 2021	38.10	AUG 2019
34.i	AUG 2019	37.9	JAN 2021	38.11	AUG 2019
34.ii	AUG 2019	37.10	JAN 2021	38.12	AUG 2019
34.1	AUG 2019	37.11	AUG 2019	38.13	AUG 2019
34.2	AUG 2019	37.12	AUG 2019	38.14	AUG 2019
		37.13	AUG 2019	38.15	AUG 2019
35.i	AUG 2019	37.14	AUG 2019	38.16	AUG 2019
35.ii	AUG 2019	37.15	AUG 2019	38.17	AUG 2019
35.1	AUG 2019	37.16	AUG 2019	38.18	AUG 2019
35.2	AUG 2019	37.17	DEC 2021	38.19	AUG 2019
		37.18	DEC 2021	38.20	AUG 2019
36.i	AUG 2019	37.19	AUG 2019	38.21	AUG 2019
36.ii	AUG 2019	37.20	AUG 2019	38.22	AUG 2019
36.1	AUG 2019	37.21	AUG 2019	38.23	AUG 2019
36.2	AUG 2019	37.22	AUG 2019	38.24	AUG 2019
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36.4	SEP 2023	37.24	AUG 2019	38.26	AUG 2019
36.5	SEP 2023	37.25	AUG 2019	38.27	AUG 2019
36.6	SEP 2023	37.26	AUG 2019	38.28	AUG 2019
36.7	JAN 2021	37.27	AUG 2019	38.29	AUG 2019
36.8	JAN 2021	37.28	AUG 2019	38.30	AUG 2019
36.9	AUG 2019	37.29	AUG 2019		
36.10	AUG 2019	37.30	AUG 2019	39.i	AUG 2019
		37.31	AUG 2019	39.ii	AUG 2019
37.i	AUG 2022	37.32	AUG 2019	39.1	AUG 2019
37.ii	AUG 2022	37.33	AUG 2022	39.2	AUG 2019
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