CHAPTER 1

GENERAL

1.000 Introduction

The R44 Maintenance Manual contains instructions necessary for proper maintenance, servicing, and handling of R44-series helicopters. The R44 Instructions for Continued Airworthiness (ICA) includes the R44 Maintenance Manual (MM), R44 Illustrated Parts Catalog (IPC), R44 Service Bulletins (SBs), R44 Service Letters (SLs), Lycoming O-540-series and IO-540-series Operator's Manuals, applicable Lycoming technical publications, and applicable component manufacturer technical publications.

Service Bulletins are issued by Robinson Helicopter Company (RHC), Lycoming, and component manufacturers. RHC Service Bulletin compliance is mandatory; comply with other applicable Service Bulletins as directed. RHC technical publications are available online at www.robinsonheli.com. Recent technical publications are available from Lycoming at www.lycoming.com, and from Continental Motors, Inc. (CMI) at www.continentalmotors.aero.

Kit instructions are issued for field installation of either optional or mandatory (due to Service Bulletin or parts obsolescence) equipment upgrades, or provisions for upgrades. Kit instruction issued by RHC either implement approved type design data, or are approved as type design data.

A list of chapters is located in the *Introduction*. Chapters are separated by tab dividers and chapter contents are listed in the chapter front pages.

CAUTION

Always read instructions completely before performing a task.

1.001 RHC Maintenance Manual and Illustrated Parts Catalog Updates

RHC Maintenance Manuals (MMs) and Illustrated Parts Catalogs (IPCs) are available digitally at www.robinsonheli.com, under the Publications tab. Access to these publications does not require an account and is free of charge.

Viewing MMs & IPCs online is recommended to ensure use of current data.

Viewing MMs & 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.

Sign up for free email notification of revisions to MMs & IPCs by sending an email to subscriptions@robinsonheli.com with "Subscribe email" in the subject line. Within the email, include name, email address, physical address, and helicopter model(s) of interest.

1.002 R44 Maintenance Authorization

Only appropriately certificated mechanics who have successfully completed an R44 factory-sponsored maintenance course, or are under direct supervision of the above-stated mechanic, may perform maintenance, repairs, or inspections on R44-series helicopters. Annual inspections of U.S.-registered light helicopters must be performed by holders of an Inspection Authorization (IA) or by repair stations certificated by the Federal Aviation Administration (FAA). The daily preflight and some preventive maintenance may be performed by the above-stated mechanics, or by the pilot/owner after receiving appropriate instruction in accordance with the R44/R44 II/R44 Cadet Pilot's Operating Handbook and applicable aviation regulations.

1.003 Component Maintenance Authorization

Only appropriately certificated mechanics who have successfully completed both a factory-sponsored maintenance course and component maintenance course, and who possess technical data supplied by RHC, are authorized to perform maintenance specified in the Component Maintenance Manual (CMM). Component maintenance may only be performed at an RHC-authorized Service Center that has required Component Maintenance special tools (ref. R44 SL-67) and holds a Repair Station certificate (or foreign equivalent).

1.004 Maintenance Record

Blank, digital Airframe Maintenance Record forms are available online at www.robinsonheli.com.

Airframe Maintenance Record blank PDF forms may be used for R22-series, R44-series, and R66 Turbine helicopters. Component Record blank PDF forms may be used for life-limited or TBO components. Blank paper copies are available for purchase (P/N R8478 Airframe Maintenance Record and P/N R8479 Component Record [pack of 20]).

A Component Record is a maintenance record of the removals, installations, or maintenance performed on a life-limited or TBO component. When a life-limited or TBO component is installed in the helicopter, the Component Record card is inserted in the Airframe Maintenance Record. When a life-limited or TBO component is removed from the helicopter, remove the Component Record card and keep the card with the Component. Major assemblies may contain one or more life-limited or TBO component.

RHC encourages operators to utilize Component Record cards to assist in tracking time on interchangeable parts since service lives may be different between models.

RHC does not create Component Record cards for spares; however, operators may create their own.

RHCs Repair Station does not require a Component Record card in order to perform work on a component, unlike a Component/Return Authorization form.

RHC recommends using a toner-based laser, or a pigment-based inkjet, color printer and 65 lb white (96 bright) premium card stock for Maintenance Record or Component Record card production. Maintenance Record binders and tab sets are available separately (P/N R8656 Maintenance Record Binder and P/N R8650 Maintenance Record Tabs).

1.005 Notations

The following notations will be found throughout the manual:

NOTE

A NOTE provides emphasis or supplementary explanation.

CAUTION

Equipment damage can result if a **CAUTION** is not followed.

WARNING

Personal injury or death can result if a WARNING is not followed.

1.006 RHC Maintenance Manual and Illustrated Parts Catalog References

Maintenance Manual and Illustrated Parts Catalog Section and Figure references are subject to relocation and renumeration. Effort will be made at the time of RHC technical document revisions to correct superseded references, however, certain documents may not otherwise require revision and superseded references may remain. A keyword or part number search in online documents (Ctrl + F [PC] or Command + F [Mac]) may help to locate applicable data.

1.007 Definitions and Abbreviations

Refer to R44/R44 II/R44 Cadet Pilot's Operating Handbook (POH) Section 1, as applicable, for additional definitions and abbreviations.

A. Definitions

14 CFR § 27.602 Critical Part: C016-x main rotor blades & C029-x tail rotor blades are critical parts as defined by 14 CFR § 27.602 and are subject to special inspection requirements & reporting described in this manual. Contact RHC Technical Support if questions arise concerning special inspection or reporting requirements.

12 years: With respect to a 12 year inspection or life-limit, 12 years means 12 years from the date of the:

- factory-issued airworthiness certificate,
- factory-issued authorized release certificate (FAA Form 8130-3, Airworthiness Approval Tag), or
- last 12-year inspection.

Annually: With respect to an annual inspection, annually means within the preceding 12 calendar months.

Datum: An imaginary vertical plane from which all horizontal measurements are taken for balance purposes with the aircraft in level flight attitude. Refer to § 16-20 for R44 datum location.

Empty Weight: Empty Weight includes the weight of the airframe, powerplant, required and installed equipment, fixed ballast, unusable fuel, and gearbox oil. Refer to R44-series Type Certificate Data Sheet (TCDS) in Chapter 3. Refer to Equipment List/Weight and Balance Data Sheet (RF 134) and Weight and Balance Record in R44/R44 II/R44 Cadet POH Section 6, as applicable, for installed equipment.

Life-Limited Part: Refer to Chapter 3. Any part for which a mandatory replacement limit is specified in the type design, the Instructions for Continued Airworthiness, or the maintenance manual.

Time in Service: With respect to maintenance time records, time in service means the time from the moment an aircraft leaves the surface of the earth until it touches it at the next point of landing.

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TABLE 1 SCHEDULED INSPECTIONS Consult latest revision of listed publications for specific applicability.	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 4 years	Every 12 years	Every 15 years
Perform inspection per Lycoming Operator's Manual.*	●	●		●	●	●									
Perform **Lycoming SI 1129** *Methods of Checking DC Alternator and Generator Belt Tension.*		●			●										
Perform **Lycoming SI 1191** *Cylinder Compression.*					●										
Perform **Lycoming SI 1080** *Maintenance Items for Special Attention.*				●	●										
Perform **Lycoming SB 301*** *Maintenance Procedures and Service Limitations for Valves.*			●			●									
Perform **Lycoming SB 366, as applicable** *Carburetor Throttle Body Screw Inspection.*				●											
Perform **Lycoming SB 342 (IO-540 Only)** *Fuel Line (Stainless Steel Tube Assy.) and Support Clamp Inspection & Installation. Reference AD 2015-19-07.*					●										
Perform **Lycoming SB 388*** (also applies to replacement cylinders) *Procedure to Determine Exhaust Valve and Guide Condition.*			●			●									
Perform **Lycoming SB 480 (and R44 SL-83, as applicable)** *I. Oil & Filter Change & Screen Cleaning / II. Oil Filter/Screen Content Inspection. NOTE: Oil filters on D723-1 adapters do not require safety wire.*		●		●					●						
Perform **CMI SB 643, as applicable** *Maintenance Intervals for All CMI/TCM/Bendix Magnetos & Related Equipment.*					●		●						●	●	
Perform **CMI SB 658, as applicable** *Distributor Gear Maintenance.*					●		●						●		
Perform **CMI SB 663** *Two-Wire Magneto Tach. Breaker Contact (Points) Assy. P/N 10-400507.*							●						●		
Perform **CMI SB 670** *Replacement and maintenance of Magneto Distributor Block.*							●						●		
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 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.										●					
Inspect ELT per 14 CFR § 91.207 (U.S.-registered helicopters only).										●					
Perform pop-out float leak check per § 5.630.										●					
Test and inspect transponder per 14 CFR § 91.413 (U.S.-registered helicopters only).											●				
Perform pop-out float inflation check per § 5.640.												●			
Perform pop-out float pressure cylinder hydrostatic test (per U.S. DOT reg).*												●			
Pop-out float pressure cylinder maximum life.															●

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

1.100 Helicopter Servicing

1.101 Scheduled Inspections

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

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

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

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

NOTE
If a component or an inspection is scheduled for hourly and calendar intervals, comply with whichever requirement comes first, then reset interval unless otherwise specified.

1.102 Additional Component Maintenance

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

A. 12 YEARS

Perform action indicated on the following components when they have accumulated 12 years calendar time and less than 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, since last overhaul, or since last 12-year maintenance:

Part Number	Description	Action
A120-3	Tail Rotor Bellcrank Assembly	Replace with new.
A130-48	Spacer	Replace with new, per R44 SL-80.
A190-3	V-Belt Set	Replace with new.
A336-6 or -9	Push-Pull Tube, Throttle (R44 II)	Visually inspect. If exterior corrosion is evident, record length, disassemble, and inspect tube interior. Repair or replace as required.
A462-4	Fitting (mixture control arm)	Visually inspect. Replace if worn or corroded.
A650-2 or -4	Fitting (MRGB mount)	Visually inspect, including bore. Replace if worn or corroded.
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.
A785-32	Hose (alternator cooling)	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 (bonded)	Visually inspect with 10x magnification. Replace if any bonded washer evidences separation (8 places). Replace if corrosion is evident.

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.
C258-1	Main Rotor Pitch Link Assembly	Replace with new C258-5 link assembly.

1.102 Additional Component Maintenance (continued)

A. 12 YEARS (continued)

Part Number	Description	Action
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)	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.
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).

1.102 Additional Component Maintenance (continued)

A. 12 YEARS (continued)

Part Number	Description	Action
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.
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.

1.102 Additional Component Maintenance (continued)

A. 12 YEARS (continued)

Part Number	Description	Action
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.
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	Yoke – Clutch Shaft Forward (1.43-inch dia. center hole)	Replace with new C907-1 or -2 Revision H or subsequent yoke.
C907-1 or -2 Revision H or subsequent	Yoke – Clutch Shaft Forward (1.471-inch dia. bore)	Replace with new, or: Remove paint per § 23-71, visually inspect using 10x magnification for obvious damage, magnetic particle inspect per § 23-41, and prime & 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.
D730-8	Brace (fuel control)	Replace with new.

1.102 Additional Component Maintenance (continued)

B. 2200/2400 Hours (continued)

Part Number	Description	Action
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.

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1.115 Chip Detector Cleaning

NOTE

During normal operation of gearboxes using A257-2 oil, an insulating film of varnish can accumulate on a chip detector's magnet which could prevent metallic debris from illuminating the chip warning light. Proper cleaning of chip detectors per the following steps is critical to chip detector function.

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.

1. Remove and discard safety wire, if applicable, securing chip detector. Disconnect chip detector wiring from airframe harness at connectors. For tail gearbox, place suitable drain container below gearbox to catch oil and remove chip detector.
2. Clean chip detector using a toothbrush and approved solvent (refer to § 23-72). Remove debris using compressed air or masking tape; do not use a magnet. Dry chip detector using compressed air or a lint-free cloth. Inspect condition.
3. Connect chip detector wiring to airframe harness at connectors. Turn battery switch on. Touch detector's magnet to airframe and verify appropriate gearbox caution light illuminates. Turn battery switch off. Disconnect chip detector wiring from airframe harness at connectors.
4. Install chip detector. Special torque threaded-type chip detector per § 23-33; install safety wire as required (refer to R44 SL-45). Connect chip detector wiring to airframe harness at connectors.
5. Turn battery switch on. Depress push-to-test button(s) and verify appropriate gearbox caution light illuminates. Turn battery switch off.

1.120 Main Rotor Gearbox Drain And Flush

1. Run-up helicopter for approximately five minutes at 60–70% RPM per applicable Pilot's Operating Handbook (POH) Section 4 as required to warm oil and expedite draining.
2. Disconnect chip detector wiring from airframe harness at connectors. Remove chip detector from housing.
3. Check for oil leaking from chip detector housing. Leakage indicates housing is defective and must be replaced. If leakage occurs, immediately install main rotor gearbox drain assembly to minimize oil spillage.

CHAPTER 2

INSPECTION

CHAPTER 2

INSPECTION (Continued)

2.410 Inspection Procedures and Checklist (continued)

5. Remove Aft Seat Back Assemblies (5)

Wiring: Verify security, proper installation, and no deterioration. _____

Pitot and Static Lines: Check for security, chafing, and kinks. _____

Air Conditioning Refrigerant Lines (if installed): Verify security & no damage. _____

Evaporator Drain Tubes and Valve (if installed): Verify tubes are unobstructed. Place a container under sediment-tube protruding from bottom of tee-fitting into right-aft baggage compartment. Remove plug from sediment tube and allow any accumulated moisture and debris to drain. Reinstall plug. Simultaneously squeeze drain tube and sediment tube near tee-fitting and verify check-valve ball moves up momentarily. _____

Strobe Power Supply & Alternator Control Unit: Verify security. Inspect wiring. Inspect mounting panels for cracks. _____

Blind Encoder & Governor Controller: Verify security. Inspect wiring. Inspect mounting panels for cracks. _____

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

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

Vertical Firewall: Inspect vertical firewall condition, especially around structural attachment points, verify no cracks, buckling or wrinkles. _____

Fuse(s) and Fuse Holder(s) (if installed on vertical firewall): Verify security and no corrosion. Verify correct fuses: -66 wire requires AGC-3 fuse, -1601/-1602 wires require AGC-5 fuse. If installed, -1226 wire requires AGC-3 fuse. _____

Wiring: Verify security, proper installation, and no deterioration. _____

Electric Fuel Pump (IO-540 only): Verify security, proper installation, unobstructed drain tube, and no leakage. _____

Fuel Line & Hose(s): Inspect condition. Verify security, proper installation, no leakage, & (IO-540 only) good condition of spirap insulation on fuel line between firewall & gascolator. If deteriorated, replace MS3367-5-9 ty-raps securing fuel hoses to clamps (reference R44 SB-67). _____

Lower Steel Tube Frames: Thoroughly inspect lower steel tube structure for corrosion and inspect all welds for cracks. Ensure frames are not chafed by wires, hoses, clamps, etc. _____

Engine Cooling Panels: Inspect cooling panels for cracks and missing fasteners. _____

Oil Cooler(s): Inspect oil cooler(s) and fittings for damage, leaks, cleanliness, and security. Check oil cooler mounting area(s) for cracks. _____

2.410 Inspection Procedures and Checklist (continued)

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

Oil Lines: Inspect entire length of all oil lines and verify no cracks, abrasion, or broken clamps. Verify clearance; wires, ty-raps, and structure must not contact lines. _____

Gascolator: With fuel valve off, remove and clean gascolator bowl and filter screen. Verify no deterioration of gasket. If gascolator bowl is secured by threaded collar and ring, lightly lube threads and ring with A257-6 grease. Reassemble and turn fuel valve on. Safety wire after ensuring no leaks occur. Verify drain valve is secure and torque-striped. _____

Mixture Control: Verify mixture control moves mixture control arm stop to stop. Inspect condition and verify security of mixture control cable clamps on bracket; push and pull cable housing to ensure it does not slip in clamps. Inspect condition and verify security of mixture control cable inner wire attachment to mixture control arm. Ensure freedom of rotation between mixture control arm and inner wire retention fitting (bolt) when arm moves. Verify mixture control safety spring is properly installed (so spring force holds mixture control arm at full-rich position if inner wire breaks). _____

Throttle Correlation Rigging: Check per § 10.150 and adjust as required. _____

Full-Throttle Switch Rigging: Check per § 37-70 and adjust as required. _____

Throttle Control Linkage: Inspect condition. Verify throttle control operating clearance to installed equipment and adjacent structure. Verify proper installation and security. _____

Air Box & Alternate Air Door: Ensure carburetor heat slider valve (if applicable) moves fully from stop to stop. Replace air filter (lubricating IO-540 air filter rubber with A257-8 rubber lubricant will facilitate sealing). Check air box for condition and security. Verify spring-loaded alternate air door opens without binding and closes completely. _____

Engine Air Inlet Hose: Verify no rips, holes, or collapsed areas. Remove hose from fuel-injected R44 II. Visually inspect inside of hose to verify no separation between outer and inner layers. Also, flex the hose in all directions and listen for a crinkling sound, which is an indication of separation. (An airworthy hose does not make a crinkling sound when flexed.) Replace any hose with any indication of separation. Install hose on fuel-injected R44 II. Verify correct installation & security. Ensure hose is not chafing frame. _____

Carburetor Heat Scoop and Hose (O-540 engines only): Inspect for condition and security. _____

Heater Hose: Inspect for condition and security. _____

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 or left-side engine compartment): 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. _____

MRGB Input Yoke: Inspect condition. Verify security and operating clearance. Verify security of magnets. _____

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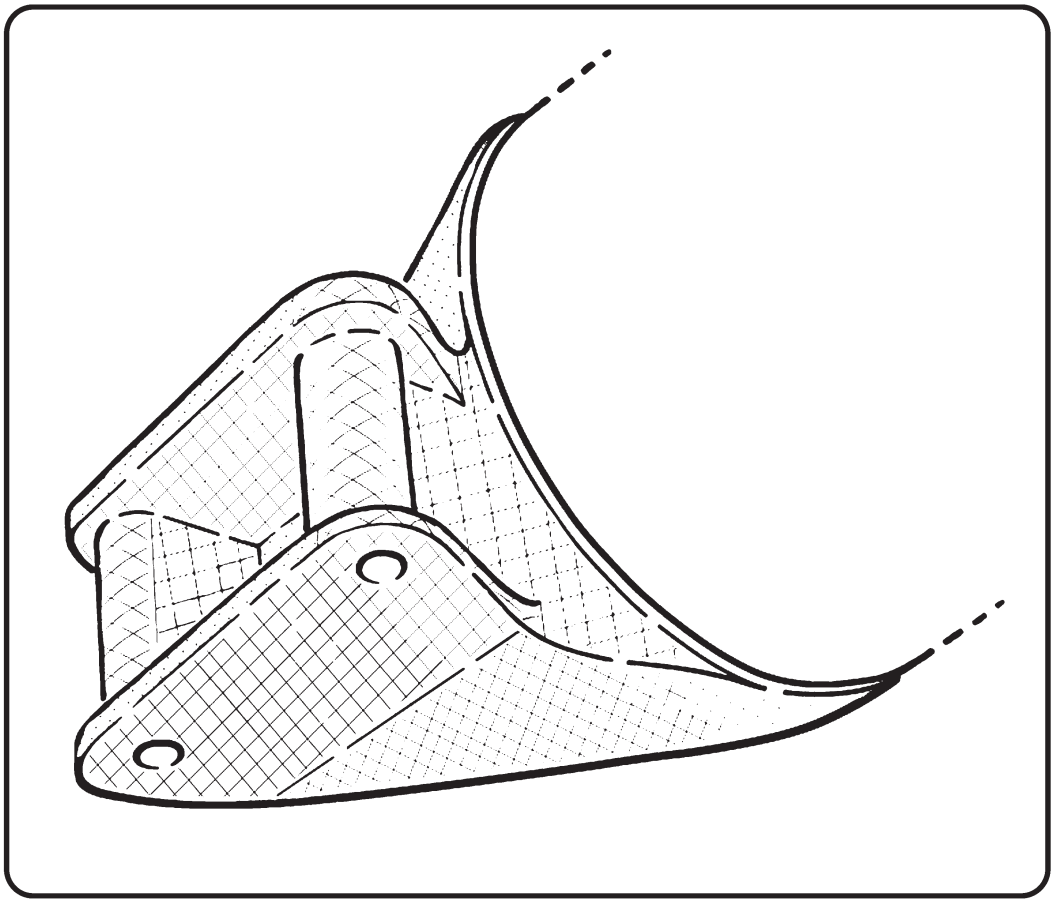

FIGURE 2-14A TAILCONE CASTING BOTTOM FWD VIEW

DYE PENETRANT INSPECT DESIGNATED AREAS AFTER PAINT REMOVAL

2.510 Tail Skid Strike (continued)

5. Inspect horizontal stabilizer as follows:
   a. Visually inspect horizontal stabilizer attach points for elongated holes (0.386-inch diameter maximum) loose rivets or buckling. _____
   b. Disassemble lower vertical stabilizer from horizontal and visually inspect attach points on vertical and horizontal stabilizers for elongated holes (0.266-inch diameter maximum), buckling, cracks or loose rivets. Buckling and cracks are cause for replacement of the unit. Loose rivets may be drilled out and replaced. _____
   c. Remove tail rotor guard. Remove paint from forward and aft attachment points and dye penetrant inspect using instructions provided by manufacturer of dye penetrant inspection kit. Remove guard mount from tailcone by removing four 10-32 screws and dye penetrant inspect same as above step. _____

2.520 Tail Rotor Strike

Tail rotor strike inspection is listed in two parts, A and B. Part A concerns damage received by a tail rotor blade due to contact with a small stone, tall grass, or some small object contacting rotor blade in free air. Part B is concerned with sudden stoppage of tail rotor due to ground or solid object contact causing bending or shearing of a tail rotor blade or blades.

A. Inspect per § 9.220 and complete part B item 1.

B. If one or both tail rotor blades contact ground or a solid object causing bending or shearing of blades a tail rotor sudden stoppage inspection must be performed. Inspect per following procedure:
   1. For D196-1 aluminum shaft assembly only (if installed): Replace (next higher assembly) D224-2 shaft assembly. _____
   2. For C196-1 steel shaft assembly only (if installed):
      a. Check tail rotor drive shaft run-out per § 7.340. If run-out exceeds 0.025 inch at any location the shaft must be replaced. _____
      b. Visually inspect drive shaft for evidence of twisting, nicks, dents or scratches. Nicks and scratches may be polished out to a maximum of 0.003 inches deep. Evidence of twisting or dents is cause for replacement of the drive shaft. _____
      c. Strip paint back at least 2 inches from welds at forward end of drive shaft and magnetic particle inspect (refer to § 23-41) stripped area; replace shaft if cracked. _____
   3. Return tail rotor and tail rotor gearbox to RHC for repair. _____
   4. Replace aft and intermediate flex plates. _____
   5. Visually inspect tailcone & empennage for evidence of a tail rotor blade strike. _____
   6. Visually inspect main rotor system. _____

2.540 Rotor/Engine Overspeed (continued)

4. Visually inspect hub and dye penetrant inspect any areas suspected of having cracks. Dye penetrant inspections are performed using instructions supplied by manufacturer of penetrant kit.

5. Reinstall blades and check balance. If a change in balance is evident, rotor system should be returned to an approved RHC overhaul facility for inspection and/or repair.

C. Determine percent engine overspeed from engine tachometer indication using following formula:

$$\text{Percent engine overspeed} = \frac{\text{Engine tachometer indication x 2665}}{2800} - 100$$

NOTE
102% engine tach indication equals 2718 actual engine RPM. The engine is rated at 2800 RPM.

Refer to Lycoming Service Bulletin 369 (current revision) for engine overspeed inspection requirements.

2.550 Hard Landing

The hard landing inspection is listed in two parts: A and B. Part A concerns yielding (bending) of the cross tubes due to hard landing such as hovering autorotations or run-on landings that do not apply side loads to the landing gear. Part B is concerned with hard landings that, in addition to yielding of cross tubes, has yielding of steel tube frames or fuselage primary structure.

NOTE
Side loads show up in the airframe as buckles and bent steel tube structure.

2.550 Hard Landing (continued)

A. Yielding of cross tube due to hard landing with no side loads:

1. Check tail rotor drive shaft run-out per § 7.340.
2. Visually inspect main rotor blades for oil canning of skins and buckling. See § 9.130 for inspection and repair of main rotor blades.
3. Check landing gear cross tubes for yielding beyond serviceable limit. Place rotorcraft on level ground, and measure from tip of tail skid to ground. If less than 30 inches, one or both cross tubes must be replaced.
4. Check and adjust sheave alignment per § 7.230.
5. Inspect front seat structure for yielding.
6. Inspect aft seat structure for yielding. Open aft seat bottoms and verify no gap around foam spacer at aft end of seat bottom structure.

B. If yielding of steel tube frame(s) OR fuselage has occurred, inspect rotorcraft as follows:

1. Perform Part A inspections.
2. Visually inspect steel tube frames for yielding. Using 10X magnification, visually inspect frames within 1 inch of welds for cracks. Pay particular attention to aft vertical strut members of lower steel tube structure. Replace cracked or yielded frame(s).

NOTE

No frame yielding is allowed.

3. Visually inspect fuselage, landing gear attach points, and firewalls for buckling or cracks.

NOTE

Vertical firewall attach points for engine mount struts are susceptible to cracks due to hard landings.

4. Visually inspect tailcone for buckling or loose rivets.
5. Visually inspect landing gear skid tube-to-strut attach points for bending and cracks.
6. Hard landings can be accompanied by tail skid strikes, tail rotor strikes, main rotor blade strikes, etc. To inspect for these conditions, refer to the appropriate portion of § 2.500. Minor sheet metal repairs to cabin are permitted. Any cracks, yielding or buckling in steel tube structure or tailcone are cause for replacement. Major defects may be factory-repaired by replacement of parts and assemblies.

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2.560 [Reserved.]

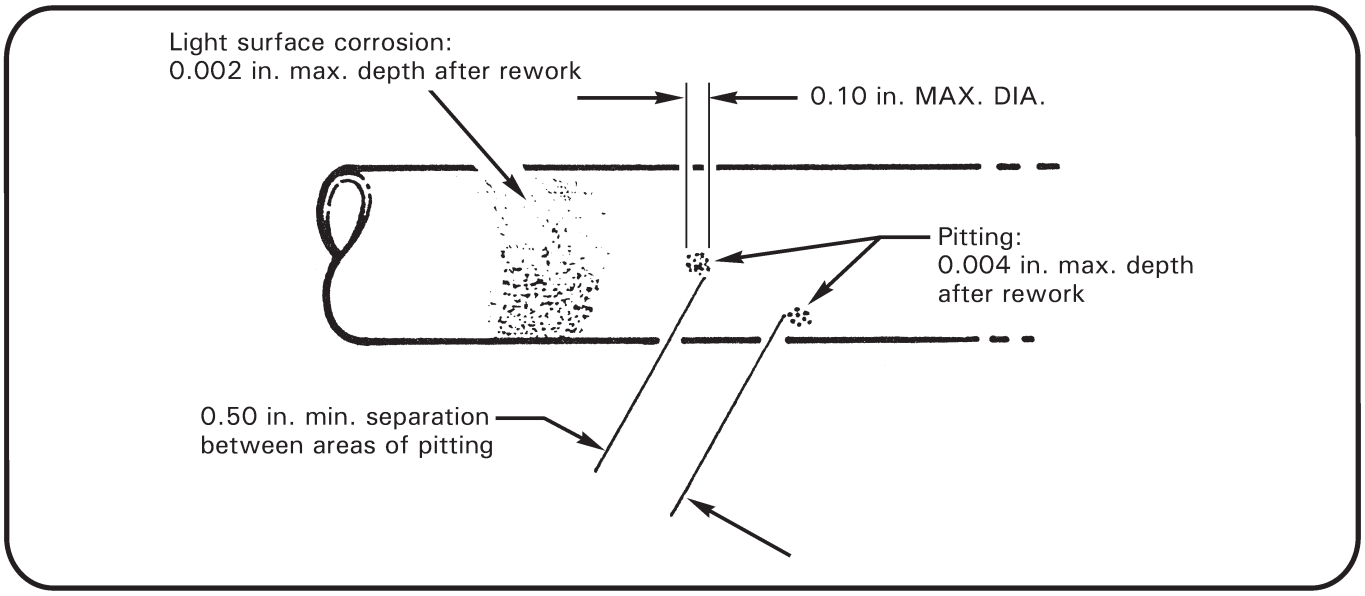

FIGURE 2-16 UPPER FRAME CORROSION REMOVAL LIMITATIONS

2.561 Corrosion on C020 Upper Steel Tube Frame

1. Polish out corrosion on steel frame tube members.
   a. Polish out light surface corrosion on frame members using Scotchbrite or 400 grit wet-or-dry sandpaper subject to dimensional limitations shown in Figure 2-16.
   b. Polish out corrosion pitting using 320-grit wet-or-dry sandpaper subject to dimensional limitations shown in Figure 2-16.

NOTE
For large areas of corrosion, it may be necessary to remove entire upper frame from aircraft and strip off paint to adequately determine extent of damage.

2. Prime bare metal with a good quality zinc chromate or epoxy primer.
3. Refinish area with gray epoxy top coat or equivalent.

2.595 Inspection After Stabilizer Damage

For damage to an installed C042-1 upper vertical stabilizer, C043-1 lower vertical stabilizer, and/or C044-1 horizontal stabilizer that results in denting, tearing, or cracking of stabilizer metal:

1. On associated tailcone's aft casting, strip paint from cross-hatched surfaces shown in Figure 2-18.
2. Fluorescent penetrant inspect (ref. § 23-42) stripped surfaces. Replace tailcone if crack is indicated.
3. Prime & paint stripped surfaces per § 23-60.

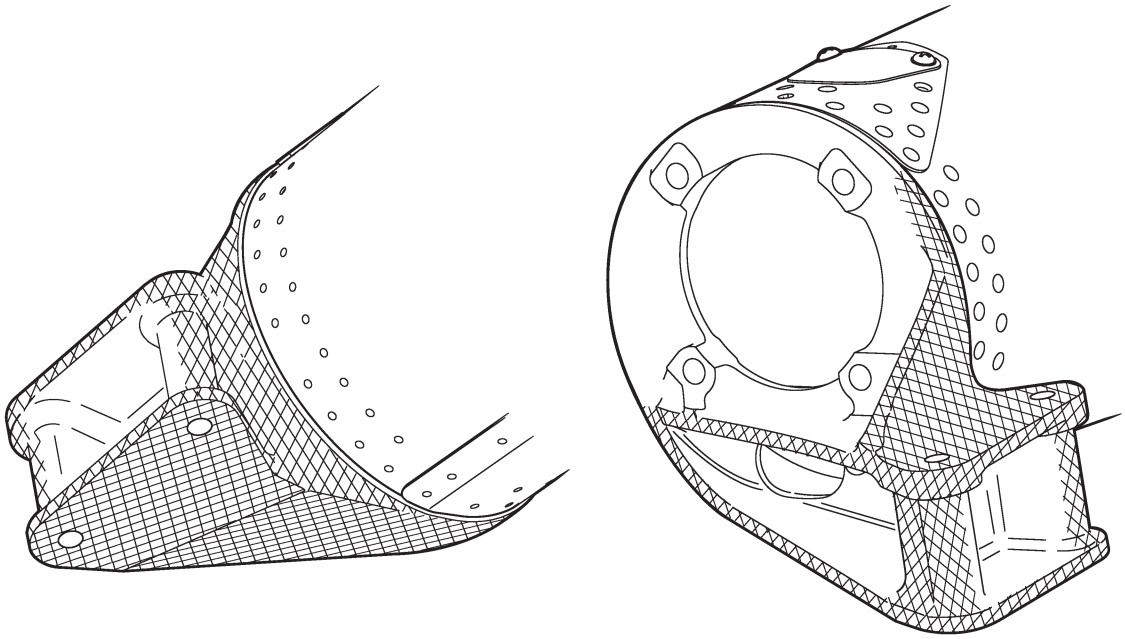

FIGURE 2-18 CROSS-HATCHED SURFACES OF TAILCONE'S AFT CASTING

2.600 2200-Hour/2400-Hour/12-Year Inspection

NOTE

KI-4402 (for R44 Raven I & Clipper I Helicopters) 2200-Hour (2400-Hour for Cadet) Inspection Kit contents and KI-4403 (for R44 Raven II & Clipper II Helicopters) 2200-Hour Inspection Kit contents are available online at www.robinsonheli.com for review.

NOTE

12-Year Inspection is only required for helicopters that have accumulated 12 years calendar time and less than 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, since last 2200-hour/2400-hour inspection, or since last 12-year inspection.

1. Refer to helicopter maintenance records and § 3.300; replace life-limited parts, or next higher assemblies, as required.
2. Refer to helicopter maintenance records and § 1.102; perform additional component maintenance, as required.
3. Remove engine, engine cooling panels, fanwheel, scroll, air induction system, carburetor heat system, oil lines, and all hoses. Overhaul or inspect, as required, magnetos, alternator, and carburetor per appropriate manufacturer's maintenance publications and service bulletins.
4. Remove horizontal and vertical stabilizers per §§ 4.410 & 4.420, and replace as required. If replacement is not required, visually inspect stabilizers and verify no cracks, corrosion, loose rivets, dents, or deformation. Fluorescent penetrant inspect any suspect areas per § 23-42. Install stabilizers per §§ 4.410 & 4.420.
5. Inspect cross tubes per § 5.210. Remove landing gear per § 5.110.
6. Remove steel tube frames per § 4.200, and replace as required. If replacement is not required, proceed per § 1.102 Part A or B, as appropriate. Install frames per § 4.200.
7. Visually inspect cyclic stick for corrosion. If corrosion is evident: remove cyclic stick per § 8.111. Remove wiring harness. Remove paint via dry media blasting. Visually inspect and verify no cracks or corrosion. Magnetic particle inspect per § 23-41. Clean, prime, and paint per § 23-60. Install wiring harness. Install cyclic stick per § 8.111.

2.600 2200-Hour/2400-Hour/12-Year Inspection (continued)

8. For C121 push-pull tube assemblies not addressed in § 1.102: Visually inspect and verify no corrosion. If corrosion is detected, remove push-pull tube, record assembled length, remove rod ends, remove paint, and repair or replace as required. After repair, fluorescent penetrant inspect per § 23-42. Clean, prime, and paint per § 23-60. Install rod ends to previously recorded assembled length. Install push-pull tubes per Chapter 8.
9. Inspect airframe wiring condition. Verify no corrosion, insulation deterioration, or other damage. Verify correct wires attached to correct circuit breakers.
10. Remove main and aux tank fuel bladders per § 12-11 and § 12-21. Visually inspect; verify no cracking or delamination of rubber and rubber-to-metal joints. Visually inspect threaded inserts and fittings for damage. Pressurize to 1 psi max and check for leaks with mild soap & water mixture. Visually inspect tank structures for evidence of bladder leakage. Install bladders per § 12-11 and § 12-21.
11. Perform clutch sheave alignment per § 7.230 and intermediate flex plate shimming per § 7.330.
12. Perform main rotor flight control and blade angle rigging per § 10.110 and § 10.120.
13. Perform tail rotor flight control and blade rigging per § 10.130 and § 10.140.
14. Perform 100-hour/annual inspection per § 2.400.
15. Weigh helicopter per § 1.230.

NOTE

Extended low-power operation with new piston rings may prevent proper piston ring seating.

16. Balance tail rotor per § 10.240. Track and balance main rotor per § 10.230. Perform ground check, run up, and flight checks per §§ 2.205, 2.210, & 2.220.
17. Drain and flush main and tail rotor gearboxes per §§ 1.120 & 1.130.
18. Make appropriate maintenance record entries. Enter maintenance performed (such as part replacement, equipment adjustments, weighing, servicing, and lubrication) and inspection data. Data must include a description of (or reference to data acceptable to the Administrator) the work performed, date, helicopter total time in service, signature, certificate type and certificate number of person approving aircraft return to service.

2.610 Tail Rotor Gearbox 12-Year Maintenance

1. If installed, drain and flush C021-1 tail rotor gearbox assembly per § 1.130 steps 1 thru 11.
2. If installed, remove tail rotor gearbox per § 7.410.
3. Remove hardware securing C116-1 yoke to C545 input gear. Visually inspect yoke and replace yoke if damaged. Visually inspect input gear splines; return gearbox to RHC if splines are damaged, including wear steps. Replace input shaft seal per § 7.450 steps b) thru l).
4. Remove sight gage and clean glass. Visually inspect gear set; return gearbox to RHC if corrosion or other damage is detected. Install sight gage and special torque gage per § 23-33.
5. Replace output shaft seal per § 7.440 steps b) thru g).
6. Install tail rotor gearbox per § 7.420 steps a) thru g).
7. Remove filler-plug. Fill gearbox to center of sight gage using correct gearbox oil (refer to R44 Service Letter SL-73). Rotate rotor system by hand for several revolutions. Check gearbox oil level and adjust as required; install filler-plug and special torque per § 23-33.
8. Connect tail light and chip detector wiring to airframe harness at connectors. Turn battery on. Verify tail light illuminates with position lights turned on. Depress push-to-test TR CHIP button and verify TR CHIP caution light illuminates. Turn battery off.
9. Install tail rotor per § 30-10 Part A or B, as applicable.

2.620 Fanwheel 12-Year Maintenance

1. If installed, remove D174-2 fanwheel assembly per § 6.210.
2. Mark fanwheel assembly parts, including balancing hardware, for identical reassembly.
3. Refer to Figure 2-19. Loosen bolts securing C187-3 cone assembly and C186-1 hub to fanwheel. Verify hub axial play does not exceed 0.020 inch with hub bolts loose and NAS6603 bolts tight.
4. Remove hardware securing cone assembly, hub, and C178-2 spacer(s) to fanwheel and remove parts, noting relative locations for identical reassembly.
5. Visually inspect all components for obvious damage. Verify no elongation of fastener holes. Replace parts as required.
6. Assemble fanwheel wet with approved primer (chromate primer preferred; refer to § 23-75) between all clamping surfaces; while primer is wet, special torque D210 nuts per § 23-33. Apply B270-21 protectant to threads and tip of B660-1 bolts, if installed.

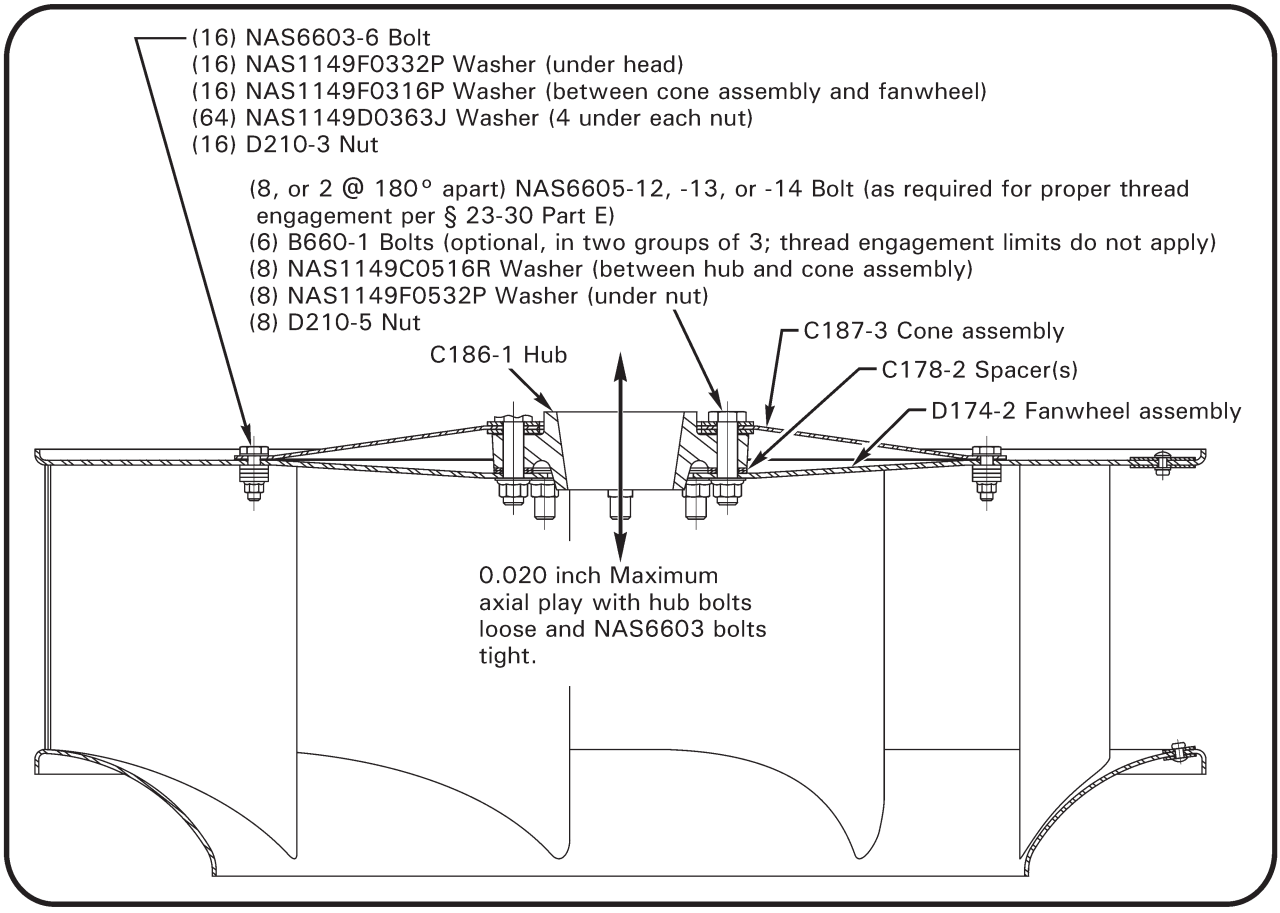

FIGURE 2-19 D174-2 FANWHEEL ASSEMBLY

2.630 C258-5 Main Rotor Pitch Link Assembly Inspection

1. Temporarily mark each pitch link and associated swashplate ear with unique color. Record overall lengths of both links.
2. Remove pitch links.
3. R44 Service Letter SL-58 refers. Disassemble pitch links, keeping parts from each link separate from the other.
4. Evaluate rod ends per § 2.122 and replace as required.
5. Visually inspect parts with 10X magnification for obvious damage. Replace damaged parts.
6. Visually inspect interior of barrels with borescope for obvious damage. Replace damaged barrels.
7. Assemble pitch links using a light coat of A257-2 or -22 oil on threads and adjust to recorded lengths. Torque jam nut & adjacent palnut per § 23-32. Special torque self-locking 21FKF-813 jam nut per § 23-33.
8. Install pitch links to associated swashplate ear and, if installed, main rotor blade. Torque fasteners per § 23-32 and torque stripe per Figure 2-1.

2.640 Swashplate Assembly 12-Year Inspection

1. Remove swashplate assembly per § 8.411.
2. Remove both pitch links and upper A205-7 fork assembly from swashplate.
3. a. If swashplate is P/N C017-6 Rev AD or subsequent, proceed to step 4.
   b. If swashplate is P/N C017-4, or is P/N C017-6 Rev AA, AB, or AC, AND
   —"B900-13 MOD" is marked adjacent to swashplate data plate, proceed to step 4.
   —"B900-13 MOD" is NOT marked adjacent to swashplate data plate, perform R44 Service Letter SL-76A.
4. Refer to Figure 1-2B. Remove (10) NAS1352 screws (with washers) securing C206-2 & C200-3 retainers to upper swashplate. Remove both retainers and C219-3 spacer and set aside.
5. Remove inner screws securing sleeve to lower swashplate. Remove sleeve, shims, and ball and set aside.
6. Using a 0.006 inch feeler gage, gently pry up outer edge of upper C217-1 seal and expose top ball bearing. Discard upper seal.
7. Clean all parts, including C203-5 yokes.
8. Visually inspect cleaned parts with 10X magnification, to include blind screw-holes in upper & lower swashplates, for obvious damage. Replace swashplate assembly if damage is detected on either upper or lower swashplate. Replace damaged parts.
9. Perform swashplate tilting friction adjustment per § 8.413 step 4.
10. Lubricate swashplate bearings per § 1.195 steps 7 thru 11. Install new upper seal during procedure.
11. Remove rod end from upper fork. Using non-metallic tools, remove majority of sealant in threaded hole of fork. Visually inspect parts with 10X magnification for obvious damage. Replace damaged parts. Assemble upper fork assembly and adjust pivots' center-to-center dimension to 3.85 ± 0.03 inches. Standard torque jam nut & palnut per § 23-32 and torque stripe per Figure 2-1. Fill exposed cavity with B270-13 sealant.
12. Remove lower A205-7 fork assembly from non-rotating scissors and clean. Remove rod end from lower fork. Visually inspect parts with 10X magnification for obvious damage. Replace damaged parts. Assemble lower fork assembly and adjust pivots' center-to-center dimension to 3.70 ± 0.03 inches. Standard torque jam nut & palnut per § 23-32 and torque stripe per Figure 2-1. Install lower fork on C204-2 arm and standard torque bolt per § 23-32. Install palnut, standard torque per § 23-32, and torque stripe per Figure 2-1.
13. Install swashplate assembly per § 8.412.

2.650 Landing Gear Assembly Inspection

A. 12 Year Inspection

1. Remove left skid tube, and remove rain cap and skid extension from tube.
2. Remove fasteners securing struts to cross tubes. Using a twisting motion, remove left struts from cross tubes.
3. Remove right skid tube, and remove rain cap and skid extension from tube.
4. Using a twisting motion, remove right struts from cross tubes.
5. Clean cross tubes, struts, and skid tubes.
6. Visually inspect interior of struts with borescope (or similar) for obvious damage. Visually inspect exterior of struts using minimum 3X magnification for obvious damage. Any corrosion on, or adjacent to, a weld requires corrosion & paint removal followed by MPI. Upon favorable MPI results, apply § 23-76 powder coat.
7. Refer to § 5.300. Visually inspect interior of skid tube with borescope (or similar). Visually inspect exterior of parts using minimum 3X magnification. As required, touch-up coatings with § 23-75 primers and § 23-77 paints.
8. Visually inspect interior of cross tubes with borescope (or similar) for obvious damage. Visually inspect exterior of cross tubes using minimum 3X magnification for obvious damage. As required, touch-up coatings with § 23-75 primers and § 23-77 paints.
9. Assemble landing gear.
10. Install landing gear per § 5.120.

B. 2200-Hour/2400-Hour Inspection

1. Remove left skid tube, and remove rain cap and skid extension from tube.
2. Remove fasteners securing struts to cross tubes. Using a twisting motion, remove left struts from cross tubes.
3. Remove right skid tube, and remove rain cap and skid extension from tube.
4. Using a twisting motion, remove right struts from cross tubes.
5. Remove exterior paint from cross tubes, struts, and skid tubes.
6. Magnetic particle inspect steel struts and fluorescent penetrant inspect aluminum cross tubes, elbows, and skid tubes per §§ 23-41 and 23-42. Clean, prime, and paint per § 23-60.
7. Assemble landing gear.
8. Install landing gear per § 5.120.

6.200 Cooling System

6.210 Fanwheel and Scroll Removal

NOTE

If same fanwheel will be reinstalled then orient starter ring gear support to magneto timing position and mark fanwheel at split line of scroll; this will minimize need for new balance weights. See Figure 6-4.

1. Ensure clutch is fully disengaged. Pull open CLUTCH START circuit breaker and turn battery switch off.
2. Remove engine aft cowling.
3. Remove cooling hoses from lower and upper halves of scroll.
4. Disconnect tail pipe straps from lower scroll. Note shim stack on mounting screws.
5. If installed, disconnect air conditioning condenser from lower scroll and temporarily secure it to a frame.
6. Remove two vertical bolts attaching scroll to C181-3 bearing.
7. Cut safety wire and remove roll pin securing fanwheel retaining nut. Remove retaining nut. Remove washers. Install retaining nut 3 full revolutions (to prevent scroll & unseated fanwheel from dropping).

NOTE

An air- or electric-impact wrench may be used only to remove nut.

8. Install MT092-3 spacers directly on each of 6 long B660-1 bolts (if installed; nuts remain in place). Alternately, use a half-inch open-end wrench to hold fanwheel hub bolt heads and remove 6 of 8 nuts & washers (see Figure 6-3) and replace nuts with MT092-3 spacers.
9. Back out MT592-1 fanwheel puller's center bolt, lubricate bolt tip & threads with A257-9 anti-seize, and attach puller to the MT092-3 spacers (see Figure 6-4).

NOTE

Fanwheel may come off tapered shaft with a loud pop.

10. An air-or electric-impact wrench may be used to tighten fanwheel puller's center bolt & unseat fanwheel. Alternately, securely attach MT091-1 starter ring gear holding tool and immobilize tool so ring gear remains stationary (see Figure 6-4).
11. Tighten fanwheel puller's large center bolt against fanshaft until fanwheel is unseated.
12. Remove fanwheel puller. Remove fanwheel retaining nut, fanwheel, and scroll.
13. If removed, reinstall nuts & washers on fanwheel hub bolts and special torque nuts per § 23-33.

6.220 Fanwheel and Scroll Installation

1. Evaluate drive belts, alternator belt, and C181 bearing condition; replace as required. Clean tapered shaft and fanwheel hub mating surfaces with solvent and dry. Inspect shaft and hub for damage; replace as required.
2. As required, repair scroll per R44 Service Letter SL-61A. Place scroll upper half on fanwheel and install fanwheel on tapered shaft. Secure scroll upper half to engine cooling panels.
3. Using A257-9 anti-seize, coat threaded portion only of C007 shaft and clamping surfaces of MS20002-24 washer, NAS1149F2432P washers (use as many as will fit), and castellated nut. Install hardware with MS20002-24 washer against hub.

NOTE

If installing original fanwheel, ensure starter ring gear support is at magneto timing position and align marks on fanwheel with scroll split line.

4. Secure MT091-1 ring gear holding tool to engine ring gear support and hold stationary. Special torque C182-1 nut per § 23-33 until slot in castellated nut aligns with hole in fanshaft, but do not install spring pin.

NOTE

If slot in castellated nut does not align with hole in fanshaft throughout torque range, remove or add NAS1149F2432P washers under nut.

5. Position lower scroll and insert two AN3-41A bolts through bearing mounting bracket, actuator bearing block, and bearing mounting bracket nut plates on upper scroll. If required, align upper mount bracket nutplate by inserting a screwdriver into notch in bracket. Standard torque bolts per § 23-32 and torque stripe.
6. Install screws, washers, and nuts around scroll perimeter.
7. Verify D229 lip-to-fanwheel inlet clearance is 0.010–0.090 inch. If necessary, adjust lip clearance by elongating lip mounting holes.
8. Connect tail pipe to C173 straps. See § 6.520 for shimming requirements.
9. Connect muffler and MRGB cooling hoses to scroll. Ensure MRGB cooling hoses cross and clear tail rotor push-pull tube thru full range of travel.
10. If applicable, install air conditioning condenser and condenser heat shield on lower scroll.
11. Balance fanwheel per § 6.240.

CAUTION

Fanwheel balance must be checked upon installation; fanwheel imbalance can cause damage.

6.230 (Reserved)

CHAPTER 7

DRIVE TRAIN

CHAPTER 7

DRIVE TRAIN (Continued)

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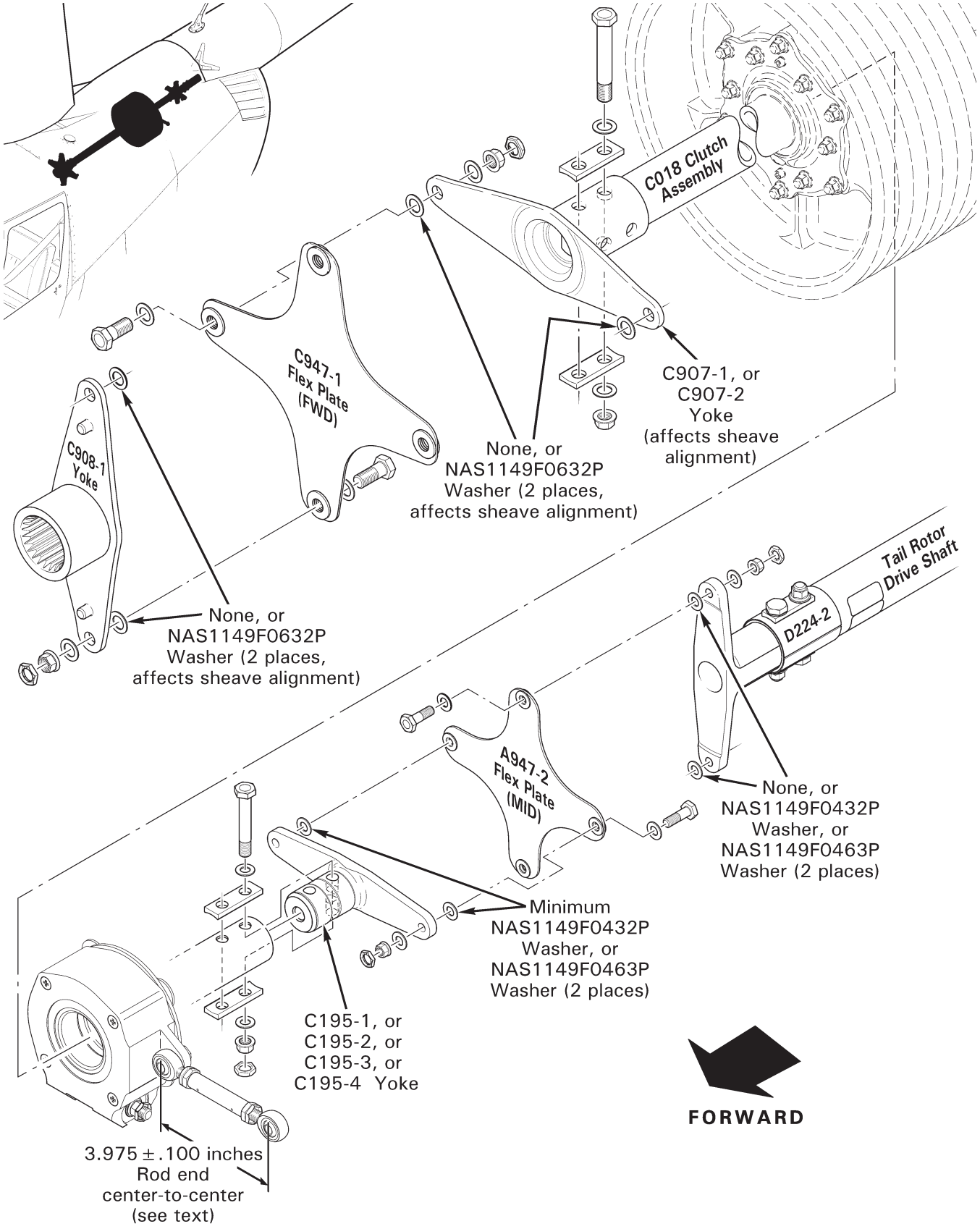

FIGURE 7-4 FORWARD AND INTERMEDIATE FLEX PLATE INSTALLATION

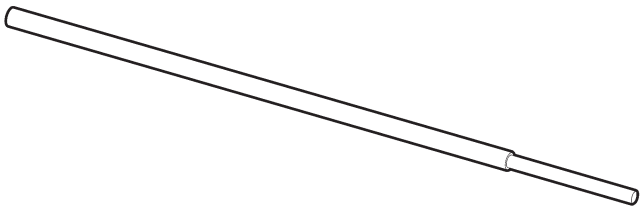

FIGURE 7-5 MT331-4 SHEAVE ALIGNMENT BAR

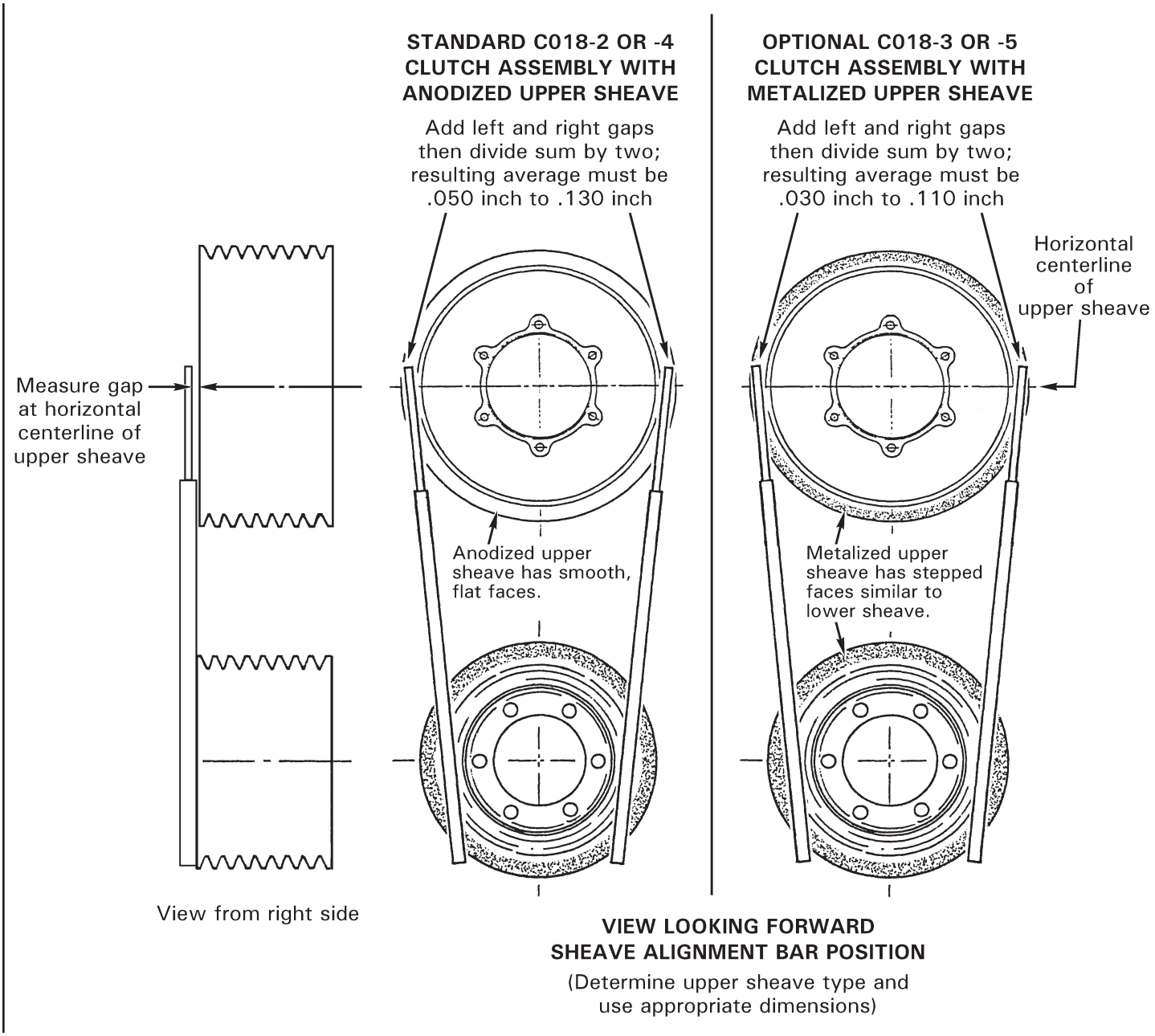

FIGURE 7-6 SHEAVE ALIGNMENT DIMENSIONS

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.]

7.260 C907 Yoke Removal and Installation

To remove yoke:

a. Remove the clutch assembly per § 7.210.

b. Remove bolts and clamping blocks securing C907 yoke to clutch shaft. Mark which set of yoke attachment holes are used.

c. Remove C907 yoke:

1. (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.

2. 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.

To install yoke:

a. Remove loose paint and clean mating area on shaft.

Calculated dimension from § 7.330 (g)	Total shims required between flex plate and clutch shaft's aft C195 yoke	Total shims required between flex plate and TR drive shaft's forward yoke
0.137 inch or more	Measurement is over limit and a longer C195 yoke is required.	Measurement is over limit and a longer C195 yoke is required.
0.136 inch to 0.107 inch	1 each NAS1149F0463P washer substituted for NAS1149F0432P (required 2 places)	1 each NAS1149F0463P washer (required 2 places)
0.106 inch to 0.077 inch	1 each NAS1149F0432P washer (required 2 places)	1 each NAS1149F0463P washer (required 2 places)
0.076 inch to 0.047 inch	1 each NAS1149F0432P washer (required 2 places)	1 each NAS1149F0432P washer (required 2 places)
0.046 inch to 0.017 inch	1 each NAS1149F0432P washer (required 2 places)	No washers for shimming
0.016 inch or less	Shorter C195 yoke is required	Shorter C195 yoke is required

CAUTION

There must be an NAS1149F0432P or NAS1149F0463P washer between each arm of C195 yoke and A947-2 flex plate.

TABLE 7-1 A947-2 INTERMEDIATE FLEX PLATE SHIM TABLE

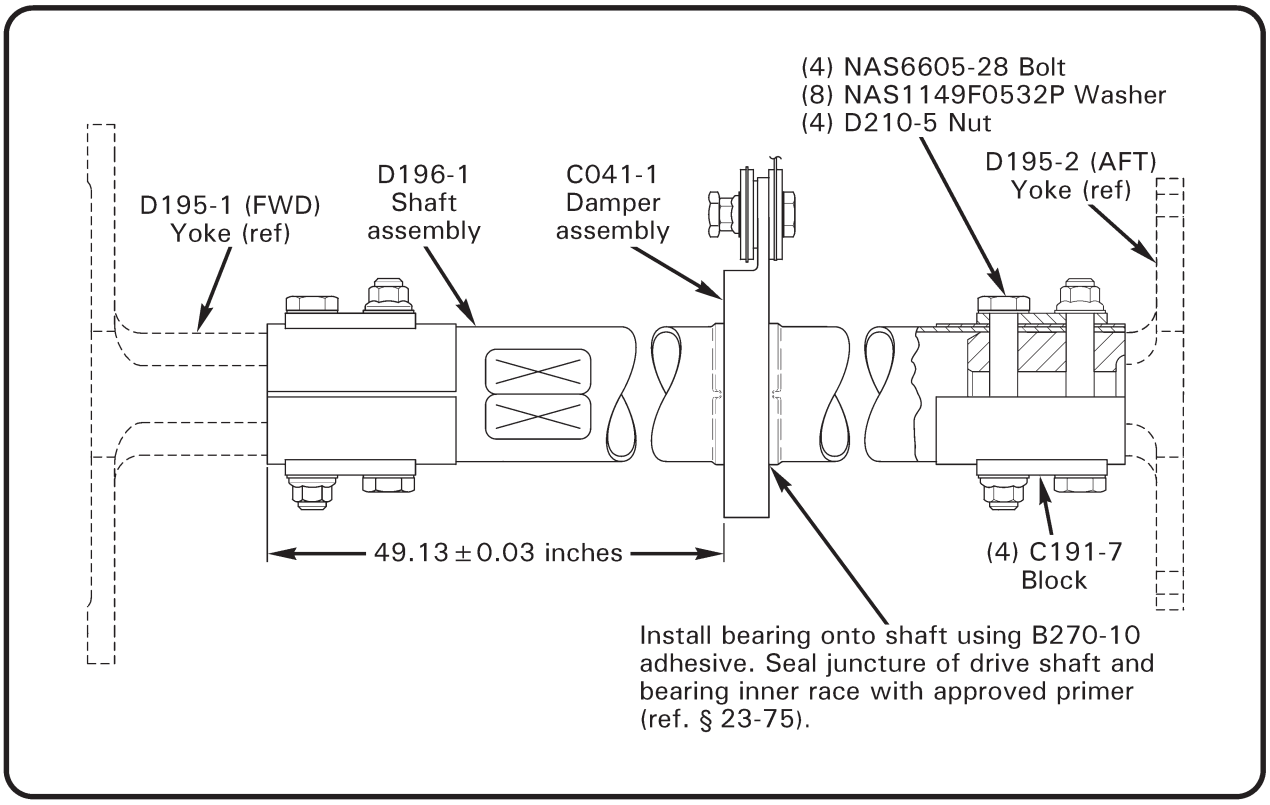

FIGURE 7-12A D196-1 TAIL ROTOR DRIVE SHAFT

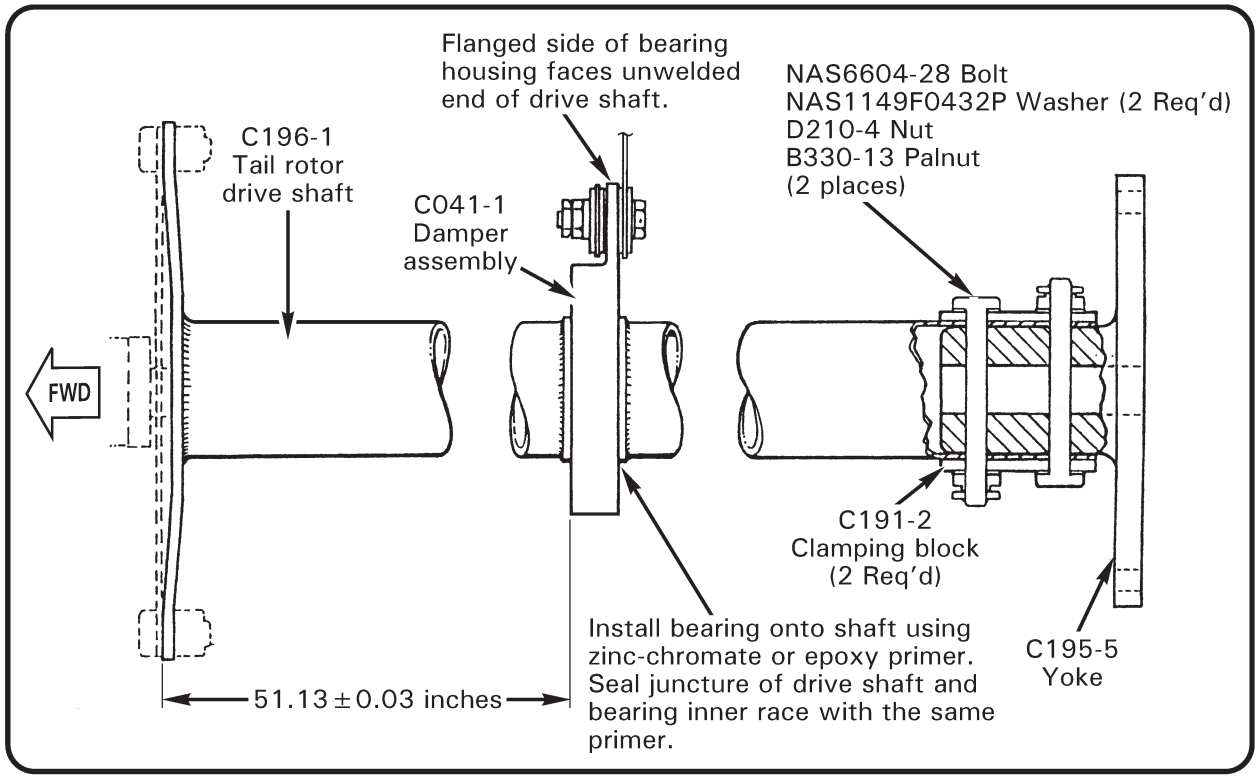

FIGURE 7-12B C196-1 TAIL ROTOR DRIVE SHAFT

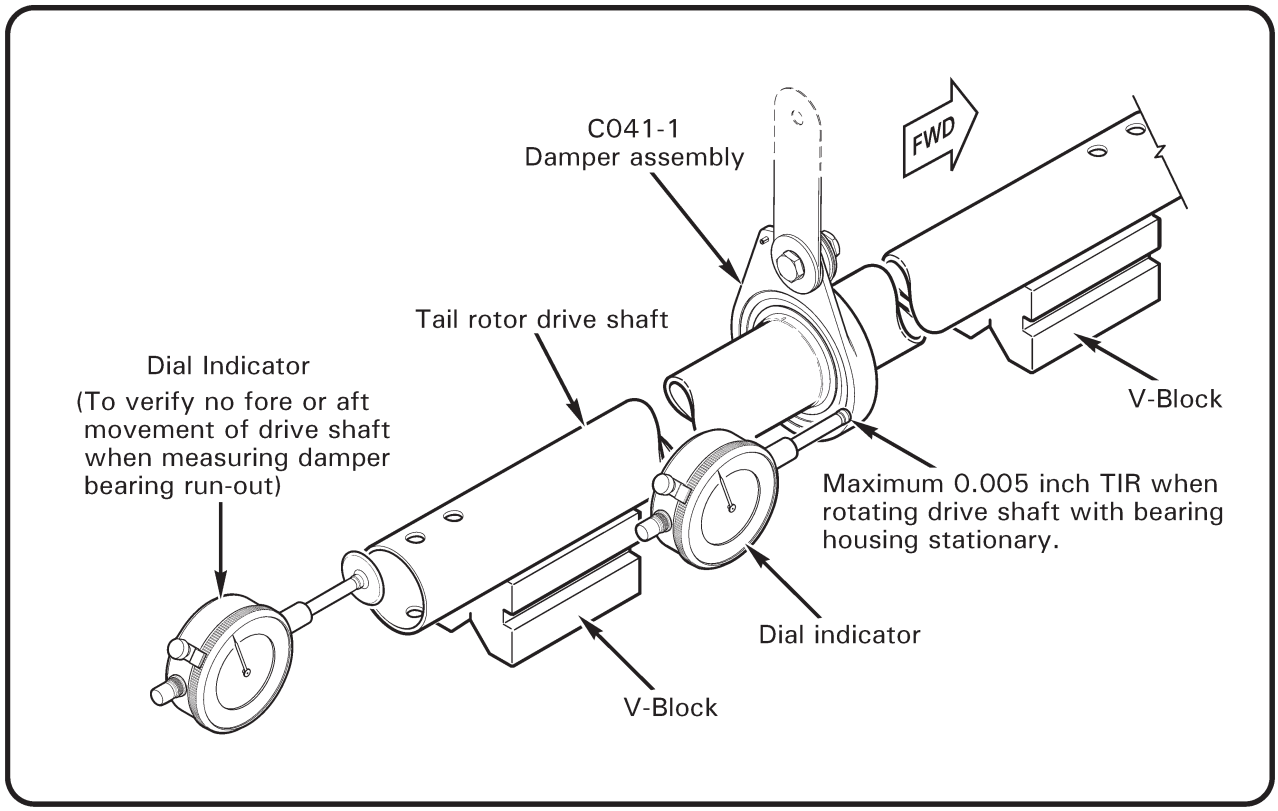

FIGURE 7-12C DAMPER BEARING RUN-OUT INSPECTION

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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 2.90–2.93 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% ± 0.5% (D278-1 controller) or ± 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).

8.239 Governor Troubleshooting (continued)

A. D278-1 & D278-2 Governor Controllers (continued)

Check governor friction with collective down, collective friction on, overtravel spring assy upper rod end disconnected from C341/C342 arm, and arm positioned horizontally. Attach a spring scale to hole in the arm and, with scale held tangential to arm, slowly pull on scale and note both the breakaway and the moving frictions. Breakaway friction is typically 0–0.5 pound greater than moving friction. Breakaway friction 1 pound or greater than moving friction may indicate damaged or contaminated governor friction clutch. Moving friction must be minimum 8 pounds until arm stops moving. Insufficient moving friction can be caused by wear, contamination, or loss of spring rate.

Proper governor operation requires a minimum 2:1 ratio of governor friction-to-throttle linkage friction.

Erratic operation is usually indicative of wiring damage or tachometer point problems. Wiring damage may be evidenced by crushing, pinching, or abrasion, all of which can result in grounding of one or both center wire conductor(s) to the shielding or to structure. Tachometer point problems may be caused by contamination (due to over-lubrication of magneto cam follower felt), oxidation (such as from an obstructed vent plug or leaking magneto drive seal), or loose contact(s), in addition to installation or assembly errors.

When flying in turbulence, or if the engine is lightly “loaded” (drive train almost freewheeling) a fluctuating MAP indication is expected.

Any loose connection in throttle linkage (including worn carburetor throttle shaft bushings) will result in both RPM & MAP oscillations.

8.300 Jackshaft and Support Struts

8.310 Jackshaft (See Figure 8-9)

8.311 Jackshaft Removal

NOTE
Rigging check is not necessary if jackshaft support strut rod ends and push-pull tube rod ends are not moved.

a) Disconnect the push-pull tubes from the jackshaft.

b) Disconnect the two jackshaft support bolts at the upper support rod ends.

c) Remove jackshaft.

8.312 Jackshaft Installation

a) Install jackshaft to strut rod ends. Aft support rod end requires a C141-1 safety washer between the rod end ball and bolthead.

b) Torque nuts per § 23-32 and install palnut.

c) Connect the C121-3 and -5 push-pull tubes to jackshaft. Both push-pull tube attach boltheads point forward. The forward C121-3 push-pull tube rod end requires a C141-1 safety washer and C115-1 spacer between the rod end and bolthead. The aft C121-5 push-pull tube rod end requires a C141-1 safety washer between the rod end and bolthead.

d) Torque nuts per § 23-32 and install palnut.

e) Verify no binding or interference with control system exists throughout flight control travel.

8.320 Strut Assembly (Jackshaft Support)

8.321 Jackshaft Strut Removal

a) Remove jackshaft per § 8.311.

b) Remove the support struts from the main rotor gearbox fittings. Disconnect the aft vertical strut upper rod end to release the aft strut from the C345-1 strut weldment.

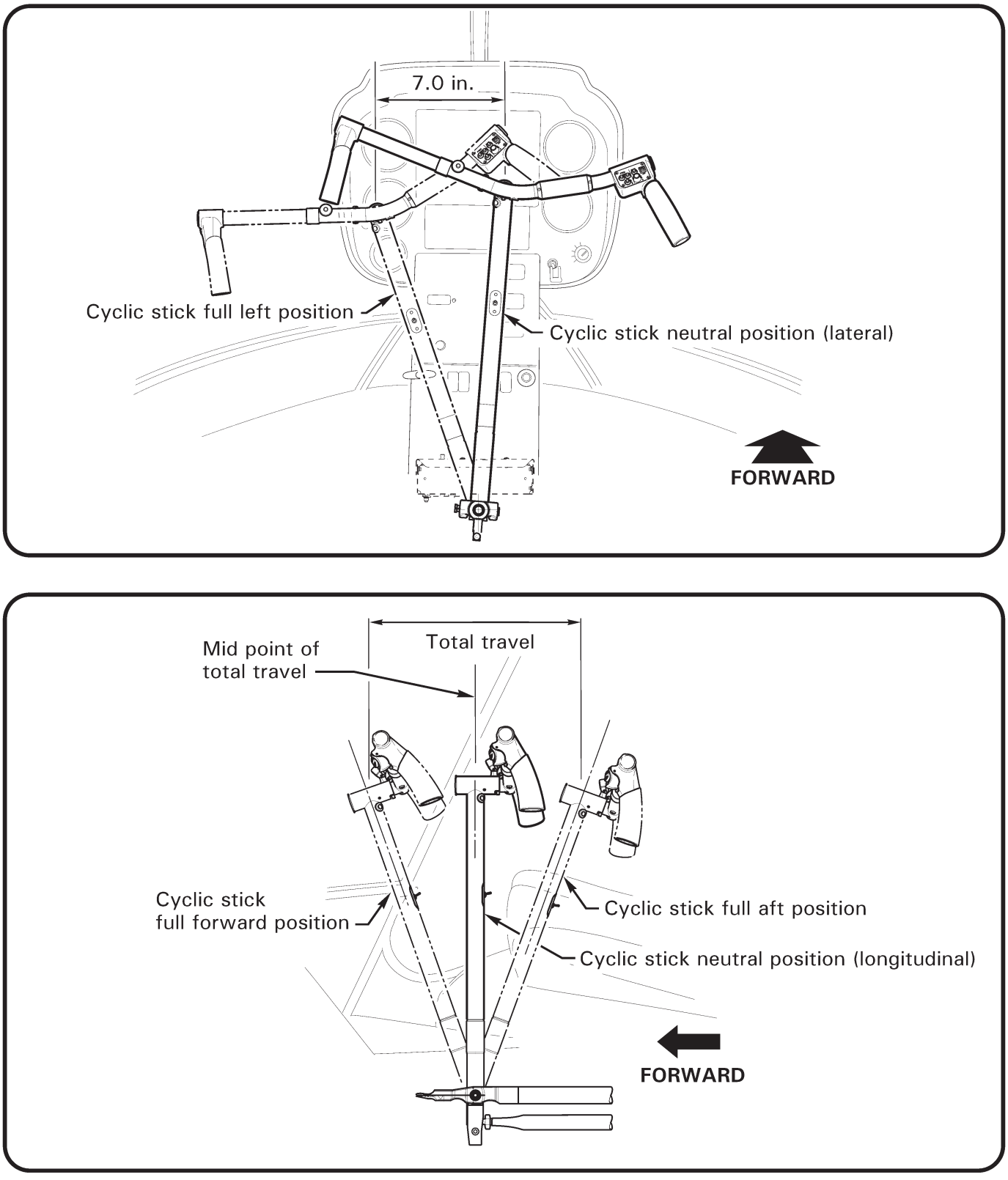


FIGURE 10-1 CYCLIC STICK NEUTRAL POSITION

10.112 Swashplate

1. With cyclic and collective controls locked in position per § 10.111, adjust C121-31 (or C121-25) push-pull tubes to obtain a constant clearance from flange of C281-1 fitting per Figure 10-2. A pair of swashplate rigging blocks may be used as a spacer to set the required clearance.
2. Pressurize hydraulics per § 1.190 steps 1 thru 3 and re-check clearance as required, adjust push-pull tubes to meet required clearance.

10.113 Collective Control

Since the collective slider stop is non-adjustable, this check is to ensure full control travel is obtained and does not interfere with the swashplate travel.

1. Lift the swashplate boot so the ball and slider tube may be observed.
2. With hydraulics pressurized per § 1.190 steps 1 thru 3, raise collective control full up. Swashplate ball must be flush with top of slider tube within 0.03 inch. If ball is not flush with top of tube, lengthen or shorten C121-31 (or C121-25) push pull tubes equally as required to raise or lower swashplate & ball.

10.120 Main Rotor

The main rotor is rigged by determining the average blade angle. Blade angle measurements are taken at the 0.75 radius of the main rotor (or 49.5 inches in from the blade tip).

The main rotor blade angles are measured using the MT525-1 rigging fixture and a Kell-Strom KS113 propeller protractor or a comparable protractor (see Figure 10-4). Use the following procedure to set up for rigging:

1. Initially, adjust both pitch links to 7.54 inches length between rod end centers.
2. Verify that the A205-7 forks at the swashplate are set to the proper length (see Figure 10-3). Measuring to bolt center lines, the lower fork assembly should be 3.70 ± 0.03 inches and the upper fork assembly should be 3.85 ± 0.03 inches.
3. Level the rotorcraft per § 1.220 (Method 2, Main Rotor Hub).
4. Place a tracking stick at the end of one rotor blade and mark the height of the blade tip. Rotate the rotor 180° and mark the height of the opposite blade tip. Teeter the main rotor as necessary to obtain a main rotor track of ± 1 inch.
5. Zero the propeller protractor to the main rotor hub at the location marked “Level Here”. The protractor must be placed parallel to the teeter hinge bolt.
6. Pressurize hydraulics per § 1.190 steps 1 thru 3.

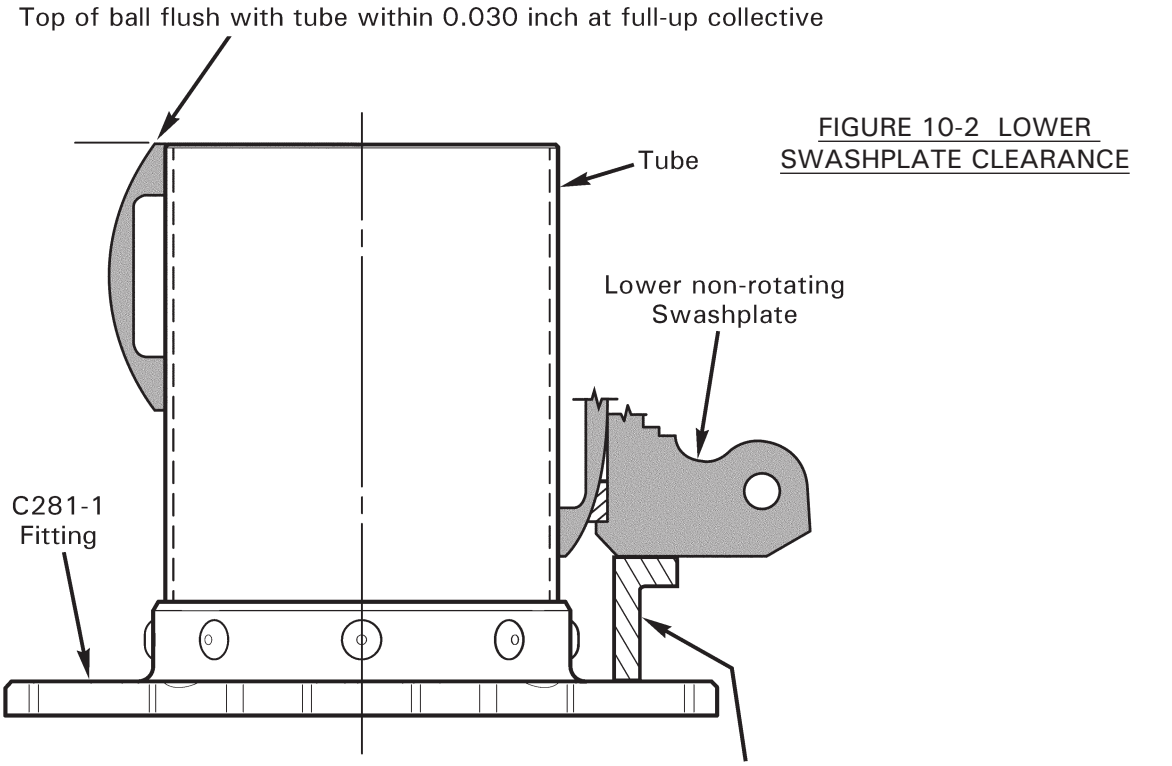


FIGURE 10-2 LOWER SWASHPLATE CLEARANCE

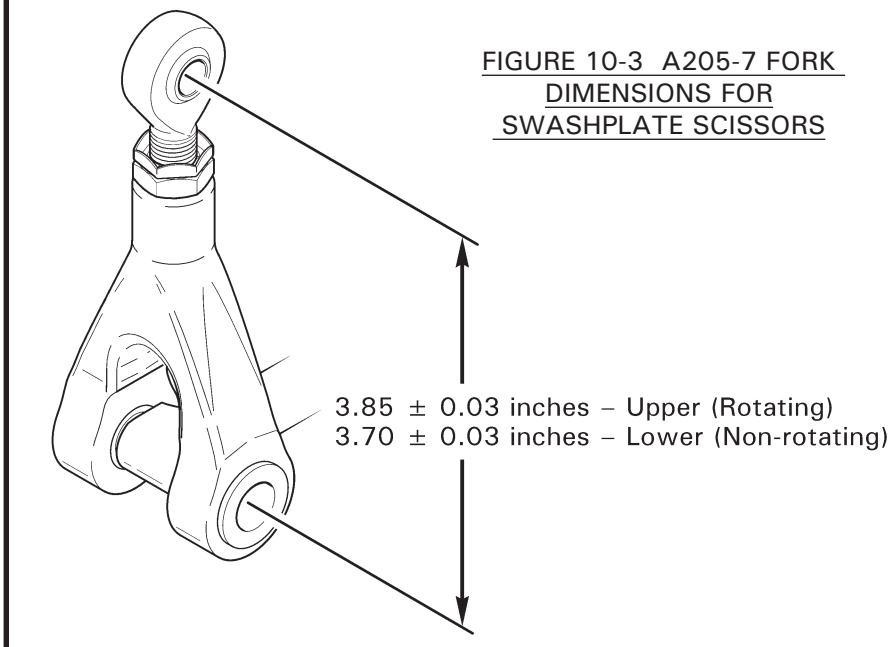


FIGURE 10-3 A205-7 FORK DIMENSIONS FOR SWASHPLATE SCISSORS

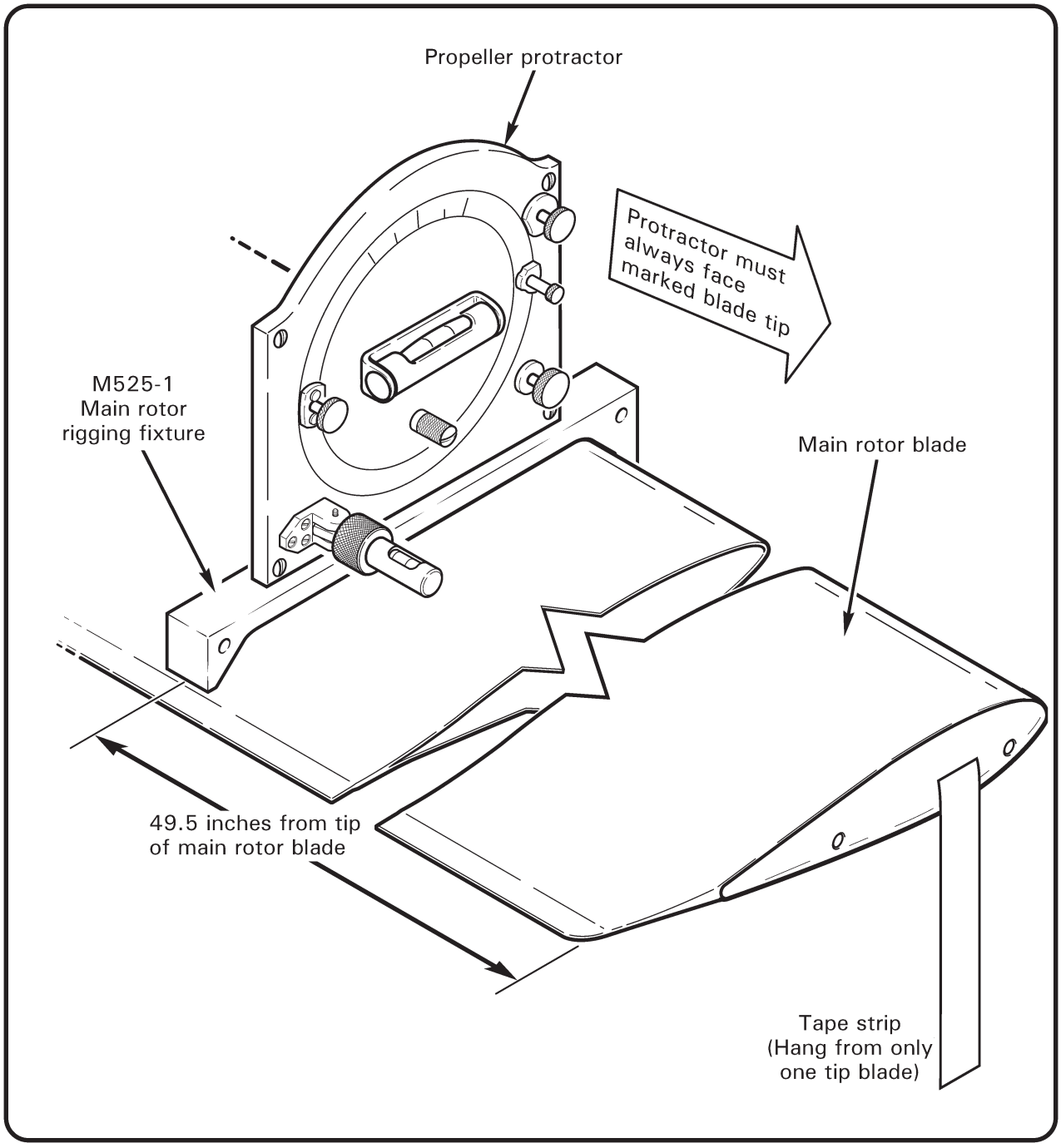


FIGURE 10-4 PLACEMENT OF PROTRACTOR

10.250 Autorotational RPM Adjustment

Use the following procedure for checking and adjusting autorotational RPM:

WARNING

Failure to properly adjust autorotational RPM (RPM too low) may prevent the rotorcraft from achieving proper RPM at low gross weights.

NOTE

Weight onboard = combined weight of fuel, people, & cargo onboard the helicopter.

1. Perform autorotation RPM check at less than 1900 lb gross weight. Calculate the weight onboard of the helicopter. Record the time on the hourmeter.

   Weight onboard at take-off _____

   Take-Off hourmeter reading _____

2. Set the altimeter to 29.92" Hg (1013.2 millibars) prior to performing the autorotation. Autorotate with the collective control firmly held against the down stop with an airspeed of 50 KIAS.

WARNING

Do not allow the rotor to overspeed when performing autorotation checks. Progressively lengthen both main rotor pitch link rod ends until full down collective can be obtained without overspeeding the rotor.

Take at least 3 RPM readings at 500 to 1000 foot altitude intervals. Record the following in-flight data:

Test No.	1	2	3	4	5
Hourmeter Reading					
OAT					
Pressure Altitude					
Test %RPM					

10.250 Autorotational RPM Adjustment (continued)

3. After test flight, refer to Figure 10-17 chart and determine following:

Test No.	1	2	3	4	5
Elapsed Time (in-flight hourmeter reading minus take-off hourmeter reading)					
lbs of Fuel Consumed (elapsed time x 93 lb/hr)					
Weight onboard (take-off weight onboard minus fuel consumed)					
Test Longitudinal Center of Gravity					
Chart % RPM					
Test % RPM (from in-flight data)					
RPM Correction (chart % RPM minus Test % RPM)					

* Chart Instructions:

a. Start at outside air temperature, and draw a vertical line up to pressure altitude.
b. Draw a horizontal line from pressure altitude to weight onboard at time of autorotation.
c. Draw a vertical line down from weight onboard to required auto RPM.

Note: Increase rotor RPM 0.75% for every inch that CG is forward of FS 100.0.

4. Adjust pitch links based on average RPM correction required. Lengthen both pitch links to decrease RPM if test RPM is greater than chart RPM; shorten both pitch links to increase RPM. One full turn of upper rod end will change RPM approximately 3½%. Adjust both pitch links exactly the same so track will not be affected.

5. Repeat steps 1 thru 4 as required until the RPM correction is ± 1% of chart RPM.

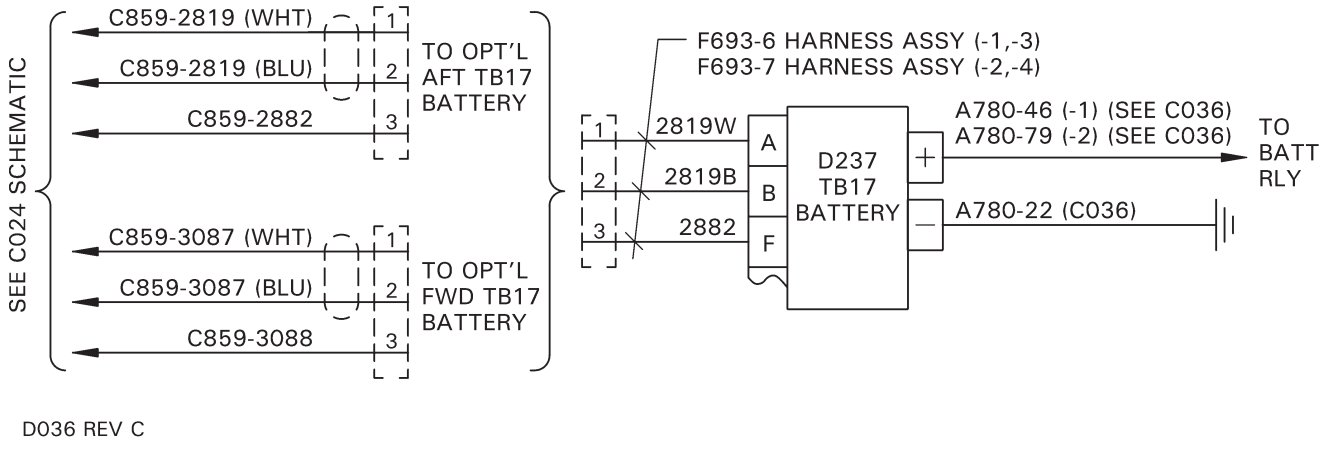


FIGURE 14-31A D036 LITHIUM-ION BATTERY INSTALLATION

Intentionally Blank

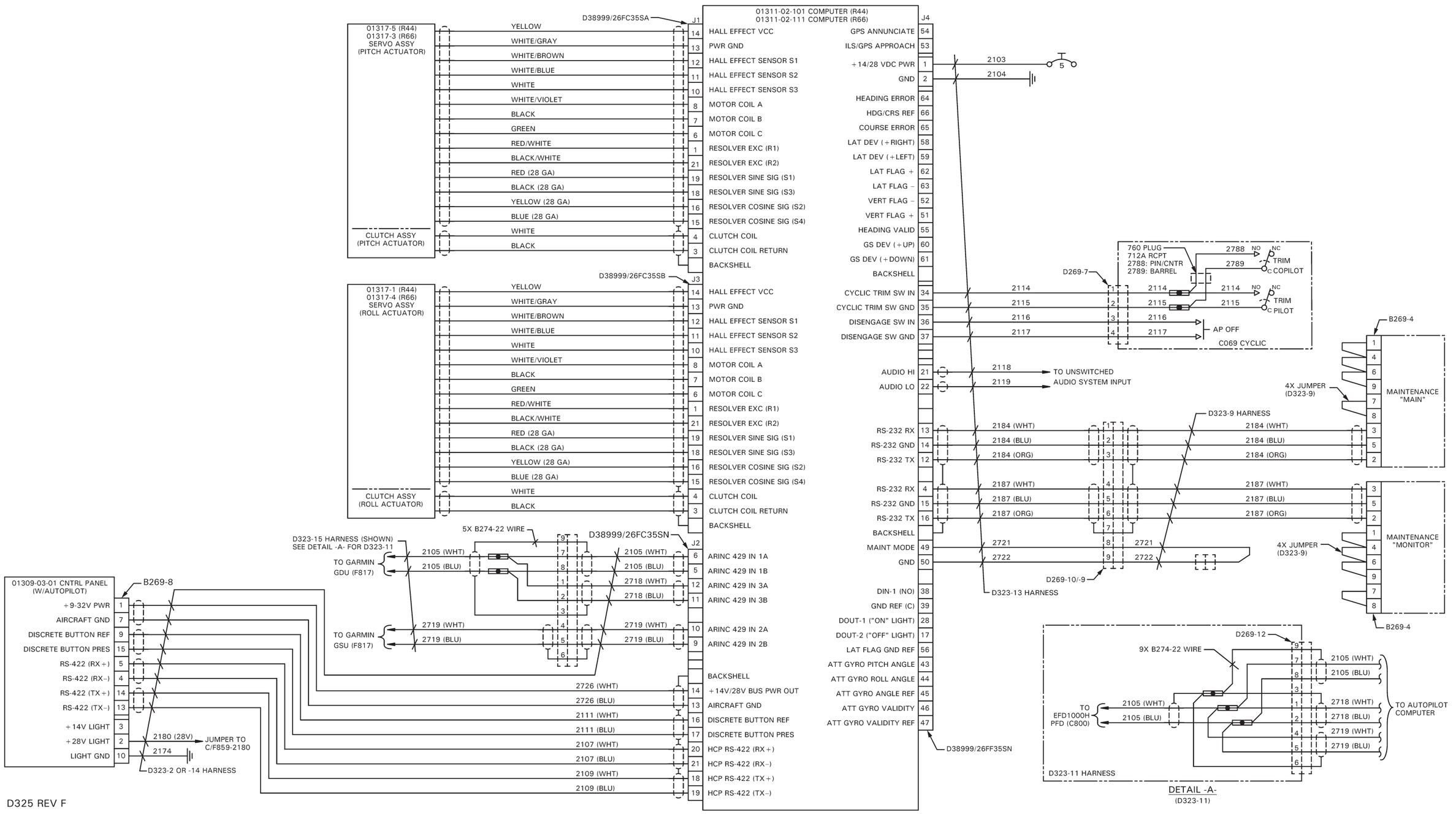


FIGURE 14-32A D325-1 AUTOPILOT (HELISAS, WITHOUT BC MODE) SCHEMATIC

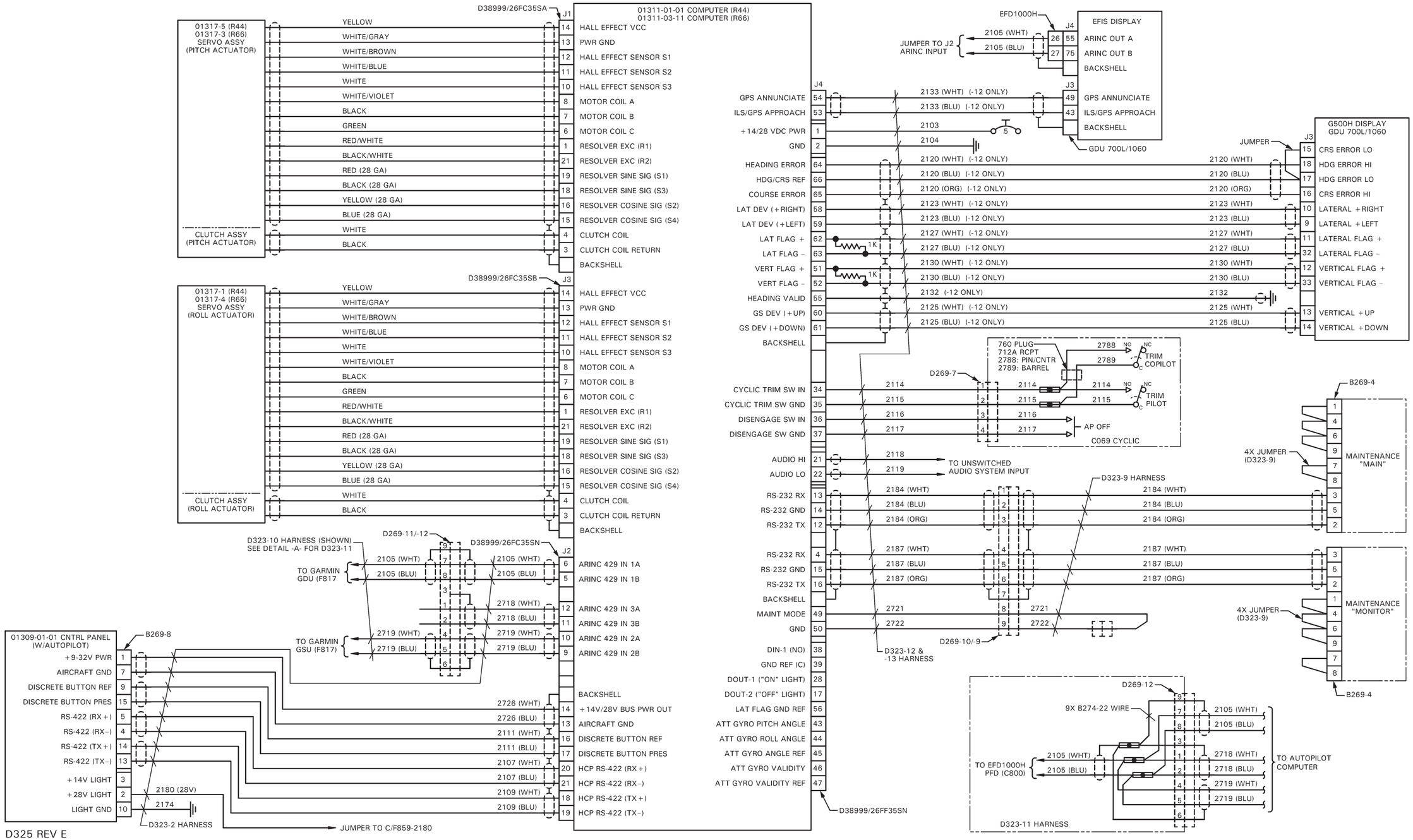


FIGURE 14-32B D325-1 AUTOPILOT (HELISAS, WITH BC MODE) SCHEMATIC

23-30 Torque Requirements

WARNING

Proper torque is critical. Always use calibrated wrenches and undamaged, properly lubricated (where applicable) hardware. Ensure clamping surfaces are clean, and clamp only bare metal or wet-primed surfaces. Improper torque or dirty or painted clamping surfaces may result in loss of clamp-up, hardware or part damage, and premature failure.

A. Tool Calibration

Dimensions and tolerances given in this manual are critical. Calibrate measuring tools per manufacturer's recommendation at least once a year, when tool is dropped, misused, or calibration is suspect. Measuring tools include torque wrenches, micrometers, calipers, dial indicators, spring scales, protractors, and balancing equipment.

B. Torque Value

Torque fasteners to standard dry values listed in § 23-32 unless otherwise specified. If torque is applied by rotating bolt, increase torque value by 10% to account for higher friction at bolt head and shank.

For example, the torque wrench setting for an NAS6605 bolt used with an MS21075 nutplate is determined as follows:

NAS6605 bolt (5 indicates 5/16 inch size) dry torque per § 23-32	240 in.-lb
Add 10% because torque must be applied at bolt head	+ 24 in.-lb
Torque wrench setting	264 in.-lb

C. Secondary Locking Mechanism

A secondary locking mechanism is required on all critical fasteners. B330 stamped nuts (palnuts) serve as the secondary locking mechanism in most areas on the helicopter, and are torqued per § 23-32. Palnuts must be replaced when removed. The R44 Illustrated Parts Catalog (IPC) lists secondary locking mechanisms for specific fasteners.

23-30 Torque Requirements (continued)

D. Critical Fastener

CAUTION

D210-series nuts, which supersede MS21042L-series and NAS1291-series nuts, are required on critical fasteners.

WARNING

Assembly of flight controls is critical and requires inspection by a qualified person. If a second person is not available, RHC recommends the installer take a 5-minute break prior to inspecting flight control connections installer has assembled.

A critical fastener is one which, if removed or lost, would jeopardize safe operation of the helicopter. This includes joints in the primary control system, and non-fail-safe structural joints in the airframe, landing gear, and drive system.

E. Torque Requirements

CAUTION

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

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

WARNING

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

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

23-33 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 ± 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
CABIN	(2) NAS1351-6H20P bolts securing B253-2 anchor	150 in.-lb
CYCLIC STICK	(2) NAS1352-3H14 screws, C683-4 damper (manual-controls)	40 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
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

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
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 ± 5°
	(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° ± 5° aft, or C595-4 hose fitting is 55° ± 5° aft
	(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

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
FUEL SYSTEM (continued)	(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
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
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 asembly	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

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
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 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 not 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 not required)	140 in.-lb at head
MAIN ROTOR HUB	(1) NAS634-105 bolt, teeter hinge and (2) NAS634-105 bolts, coning hinges **CAUTION** Scrap bolt & nut if bolt is elongated more than 0.024 inch during tightening.	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
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

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
POWERPLANT (continued)	(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
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

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
TAIL ROTOR GEARBOX (continued)	(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

CHAPTER 24

AUTOPILOT

24-00 Description

The HeliSAS autopilot system consists of two electric servomotors, a flight control computer, an autopilot control panel, and control buttons on the cyclic grip. One servomotor controls pitch and is installed in the control tunnel forward of the cyclic stick. The other servomotor controls roll and is installed under the pilot's seat. The servomotors are connected to the cyclic through electromagnetic clutches.

The flight control computer is installed on the forward panel under the pilot's seat, and the autopilot control panel is installed in the avionics stack.

The autopilot senses aircraft attitude using a combination of sensors in the flight control computer and an independent onboard attitude source such as the Attitude Heading Reference System (AHRS) for the Primary Flight Display (PFD). The computer then sends signals to the servomotors which are connected to the bottom of the cyclic in the control tunnel.

The primary autopilot mode is Stability Augmentation System (SAS) mode which maintains a steady helicopter attitude by applying corrective inputs to the cyclic. This is felt as a light cyclic centering force. Additional modes may be layered on top of SAS mode and are described below. The pilot can override as desired for maneuvering without disengaging the system. Only a few pounds of force at the cyclic are required for override, and the system will not disconnect due to pilot cyclic inputs.

The control panel has a row of buttons to control autopilot modes and annunciators to indicate mode status. A dark annunciator indicates that a mode is off, a white annunciator indicates that a mode is armed or on standby, and a green annunciator indicates that a mode is active.

When the avionics master is switched on, the autopilot performs a self-test and then enters SAS standby mode. All of the control panel indicators flash alternating white and green during the self-test. Four headset beeps occur at the beginning of the self-test as a check of the aural warning function. The SAS annunciator on the control panel turns steady white when the self-test is complete.

NOTE
Autopilot will not enter standby mode if attitude indicator is not functioning or indicated bank angle is greater than 6 degrees.

The autopilot SAS mode is engaged either by pressing the SAS button on the control panel or by pressing the TRIM button on the cyclic for more than 1.25 seconds. Additional modes are engaged by pressing the appropriate button on the control panel. The additional modes are disabled and will not engage at airspeeds below 44 KIAS or above 130 KIAS.

24-00 Description (continued)

To disengage any mode, push the appropriate button on the control panel.

NOTE

Disengaging SAS mode will also disengage all other modes.

Modes may also be disengaged using the AP OFF button on the cyclic. If only SAS mode is engaged, push the AP OFF button once to disengage. If additional modes are engaged, push the AP OFF button once to disengage all modes except SAS and a second time to disengage SAS mode, or push and hold the AP OFF button to disengage all modes including SAS.

NOTE

SAS disengagement should always be accompanied by four beeps in the headset. If beeps do not occur, maintenance is required.

Safety monitors automatically disengage individual modes or the entire system if a fault is detected. Automatic disengagement of SAS mode (or the entire system) is indicated by four beeps in the headset. Automatic disengagement of any mode other than SAS is indicated by a single beep in the headset. There is no audio indication for intentional disengagement of modes other than SAS.

NOTE

The system also automatically reverts to SAS mode at airspeeds below 44 KIAS or above 130 KIAS, accompanied by a single beep. The high speed limit is not intended to provide V_{ne} protection. It is the pilot's responsibility to observe V_{ne} limits.

The TRIM button is used to re-set the target attitude (to re-trim) while in SAS mode. Use a small amount of force to override the autopilot and then push and release the TRIM button at the new desired condition. If the force to override is objectionable, the TRIM button may be held down during maneuvers. The system will re-trim to the attitude at which the TRIM button is released. For Version 52, stick forces felt during override will gradually wash out to near zero without use of TRIM button if override is maintained.

NOTE

The system will not re-trim to angles more than approximately 10° in pitch or roll.

24-00 Description (continued)

> NOTE
>
> When engaging SAS mode from standby, for angles of less than approximately 10° in pitch and roll, SAS holds the current angles. If either pitch or roll is larger than approximately 10°, the system assumes an unusual attitude and gently levels the helicopter.

The autopilot is protected by a dedicated circuit breaker on the avionics bus (autopilot is not powered with the avionics master switch off).

Heading Mode (HDG) – maintains the heading selected by the heading bug on the directional gyro or Horizontal Situation Indicator (HSI) display. Aircraft can be steered using the heading bug.

Altitude Mode (ALT) – maintains altitude at the time of engagement or of last TRIM button release. The target altitude is reset each time the TRIM button is pressed and released.

> NOTE
>
> The autopilot uses pitch attitude to maintain altitude or follow an approach glidepath. It does not have any control of power setting. The pilot must manage power with the collective to control speed and rate of climb or descent. Make small, smooth power changes to allow the system to adjust to new power settings.

Navigation Mode (NAV) – tracks the active GPS or VLOC course displayed on the Course Deviation Indicator (CDI). If no CDI is installed, NAV will only track the active GPS course displayed on the GPS.

NAV may be armed prior to intercepting the active course. NAV annunciator is white when NAV is armed and turns green at course intercept. If HDG is active when NAV is armed, the autopilot will fly the selected heading until course intercept. If HDG is not active, the autopilot will select a 45° intercept angle.

24-00 Description (continued)

Vertical Navigation Mode (VRT) – tracks an ILS glideslope or GPS approach vertical guidance. Arm VRT (annunciator turns white when armed) prior to intercepting the glidepath. VRT annunciator will turn green at glidepath intercept.

NOTE

Pushing the ALT button while VRT is armed or active will turn off VRT. VRT must be re-armed or re-engaged as desired.

NOTE

Reducing power to approach setting just prior to glidepath intercept is recommended.

Speed Mode (SPD) (Version 52 only)

Speed mode uses cyclic pitch to control airspeed. Exact behavior varies with configuration of airspeed and altitude bugs on the PFD as described below.

The altitude bug is displayed above the altitude tape and the airspeed bug is displayed above the airspeed tape. The appearance of all dashes or a blank field indicates a bug is not set.

If an airspeed bug is not set, selecting SPD holds the current airspeed. The target speed is reset each time the trim button is pressed and released.

If an airspeed bug is set, selecting SPD holds airspeed at the bug setting. Changing the bug will change the target airspeed.

If an altitude bug is set, selecting SPD will also arm ALT (ALT LED white) for altitude capture. The mode will switch from SPD to ALT if the selected altitude is crossed. There will be a brief period in capture mode with the ALT LED flashing white/green.

NOTE

Do not change the selected altitude during ALT capture (ALT LED flashing white/green). System may pitch up or down to chase bug and may not capture altitude.

24-00 Description (continued)

> NOTE
>
> Different brands of PFD behave differently in terms of bug settings at power up and how bugs are manually set. Refer to PFD manufacturer's documents for proper use. Verify desired bug settings before engaging SPD mode.

Backcourse Mode (BC) (Version 51 only) – reverse CDI sensing for backcourse approaches. Course on HSI should be set so that tail of course pointer points toward runway (set to inbound front course).

Airspeed Protection (Version 52 only) – Minimizes the possibility of the ALT mode to fly the helicopter to an airspeed below 44 KIAS due to insufficient power, or the VRT mode to fly the helicopter to an airspeed above 130 KIAS due to excess power when flying a precision approach glidescope. When triggered, it causes the longitudinal mode to change from ALT (at low airspeed) or VRT (at high airspeed) to SAS mode with a commanded pitch attitude of 2 degrees nose down. Since the mode change is not commanded by the pilot, a single warning beep is annunciated.

A. Removable Flight Controls

Disconnect the electrical connector for the left-hand trim button located near the quick release pin before removing the left cyclic grip. Reconnect the connector when installing the left cyclic grip.

B. Schematic

Refer to Figures 14-32A & 14-32B for autopilot (HeliSAS) electrical schematic.

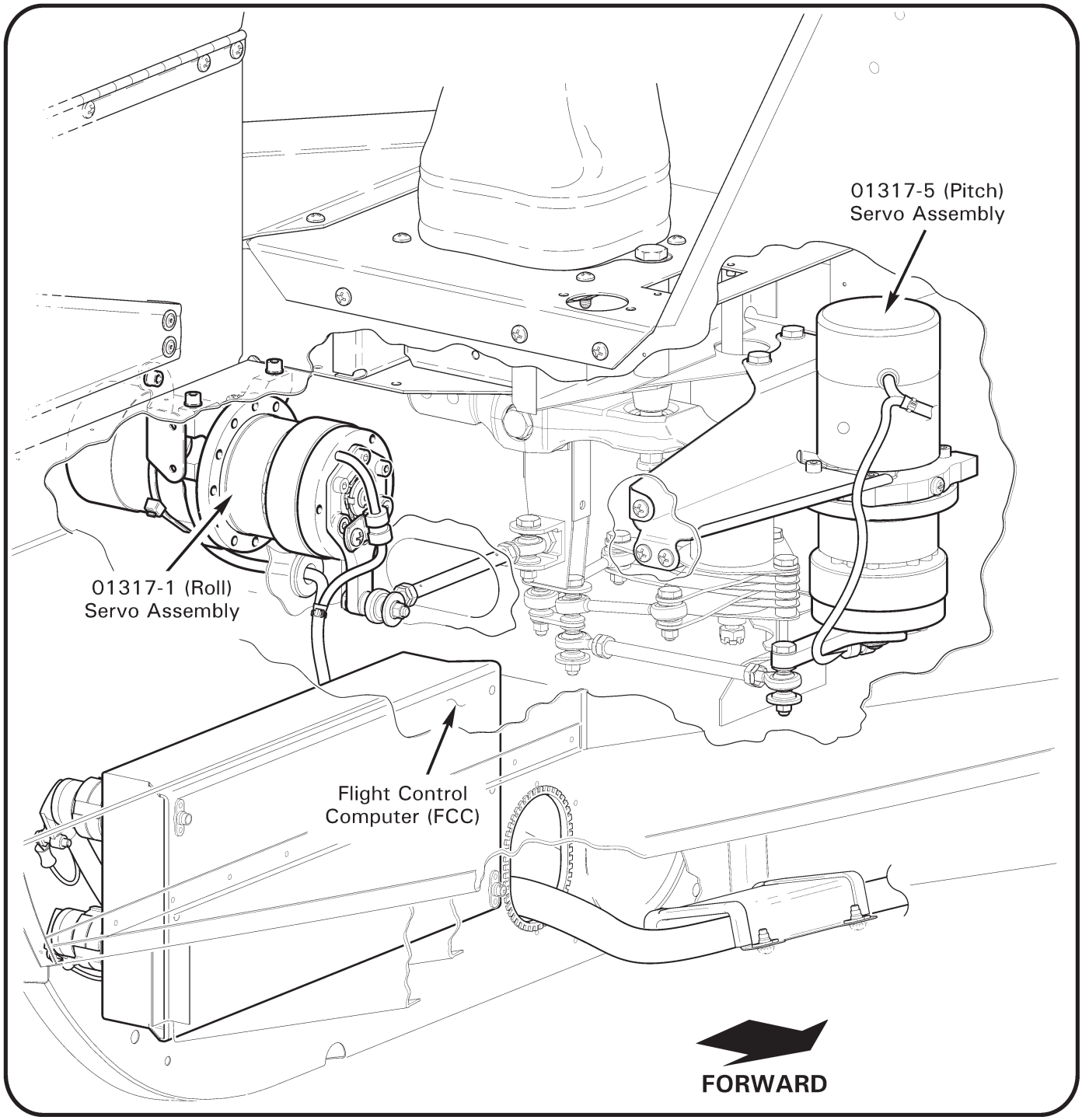


FIGURE 24-1 HELISAS AUTOPILOT SYSTEM

24-10 (Pitch) Servo Assembly

A. Removal

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Remove C680-5 and C445 collective covers and C444 cyclic cover. Hinge front right seat forward. Remove C748-6 cover assembly under pilot's seat.
3. Remove avionics and avionics trays as required from lower console.

CAUTION

For pitch servo, adjust length of A336-7 push-pull tube assembly to 5.00 ± 0.03 inches between rod end centers.

4. Position cyclic stick full aft and apply cyclic friction. Remove hardware securing 01317-5 (pitch) servo assembly arm to A336-7 push-pull tube's rod end.
5. Disconnect servo harness from flight control computer's J1 PITCH receptacle. Cut and discard ty-rap(s) securing harness to M23190/1-2 clamp(s) and pull harness through access holes into control tunnel.
6. Support servo and remove hardware securing servo's brace to cyclic box and keel panels. Carefully remove servo from control tunnel.

B. Installation

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel. Position cyclic stick full aft and apply cyclic friction.
2. Position 01317-5 (pitch) servo assembly in control tunnel and install hardware securing servo's brace to cyclic box. Standard torque bolts per § 23-32 and torque stripe per Figure 2-1. Install screws securing brace to keel panels. Verify security.
3. Route servo harness through access holes and connect harness to flight control computer's J1 PITCH receptacle. Install ty-rap(s) securing harness to M23190/1-2 clamp(s). Cinch ty-raps until snug without over-tightening, and trim tips flush with heads. Verify harness security.
4. Install hardware securing servo arm to A336-7 push-pull tube's rod end. Standard torque bolt per § 23-32 and torque stripe per Figure 2-1. Verify security.
5. Verify length of A336-7 push-pull tube assembly connected to pitch servo is 5.00 ± 0.03 inches between rod end centers.
6. Verify freedom of flight controls through full travel with and without friction applied.
7. Install avionics trays and avionics if removed. Verify security.
8. Push in AUTOPILOT circuit breaker (5 amp) at panel. Perform ground checks as appropriate per § 24-61.
9. Install C748-6 cover assembly under pilot's seat. Install C444 cyclic cover, and C445 and C680-5 collective covers. Verify security.

24-20 (Roll) Servo Assembly

A. Removal

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Remove C680-5 and C445 collective covers. Remove C748-6 cover assembly under pilot's seat.

CAUTION

For roll servo, adjust length of A336-8 push-pull tube assembly to 4.20 ± 0.03 inches between rod end centers.

3. Position cyclic stick full left and apply cyclic friction. Remove hardware securing 01317-1 (roll) servo assembly arm to A336-8 push-pull tube's rod end.
4. Disconnect servo harness from flight control computer's J3 ROLL receptacle. Cut and discard ty-raps securing servo harness to autopilot harnesses.
5. Support servo and remove hardware securing servo's block assembly to keel panel and cabin assembly. Carefully remove servo from under pilot's seat.

B. Installation

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel. Position cyclic stick full left and apply cyclic friction.
2. Position 01317-1 (roll) servo assembly under pilot's seat and install hardware securing servo's block assembly to keel panel and cabin assembly. Tighten screws. Verify security.
3. Connect servo harness to flight control computer's J3 ROLL receptacle. Install ty-raps securing servo harness to autopilot harnesses as required. Cinch ty-raps until snug without over-tightening, and trim tips flush with heads. Verify harness security.
4. Install hardware securing servo arm to A336-8 push-pull tube's rod end. Standard torque bolt per § 23-32 and torque stripe per Figure 2-1. Verify security.
5. Verify length of A336-8 push-pull tube assembly connected to roll servo is 4.20 ± 0.03 inches between rod end centers.
6. Verify freedom of flight controls through full travel with and without friction applied.
7. Push in AUTOPILOT circuit breaker (5 amp) at panel. Perform ground checks as appropriate per § 24-61.
8. Install C748-6 cover assembly under pilot's seat. Install C445 and C680-5 collective covers. Verify security.

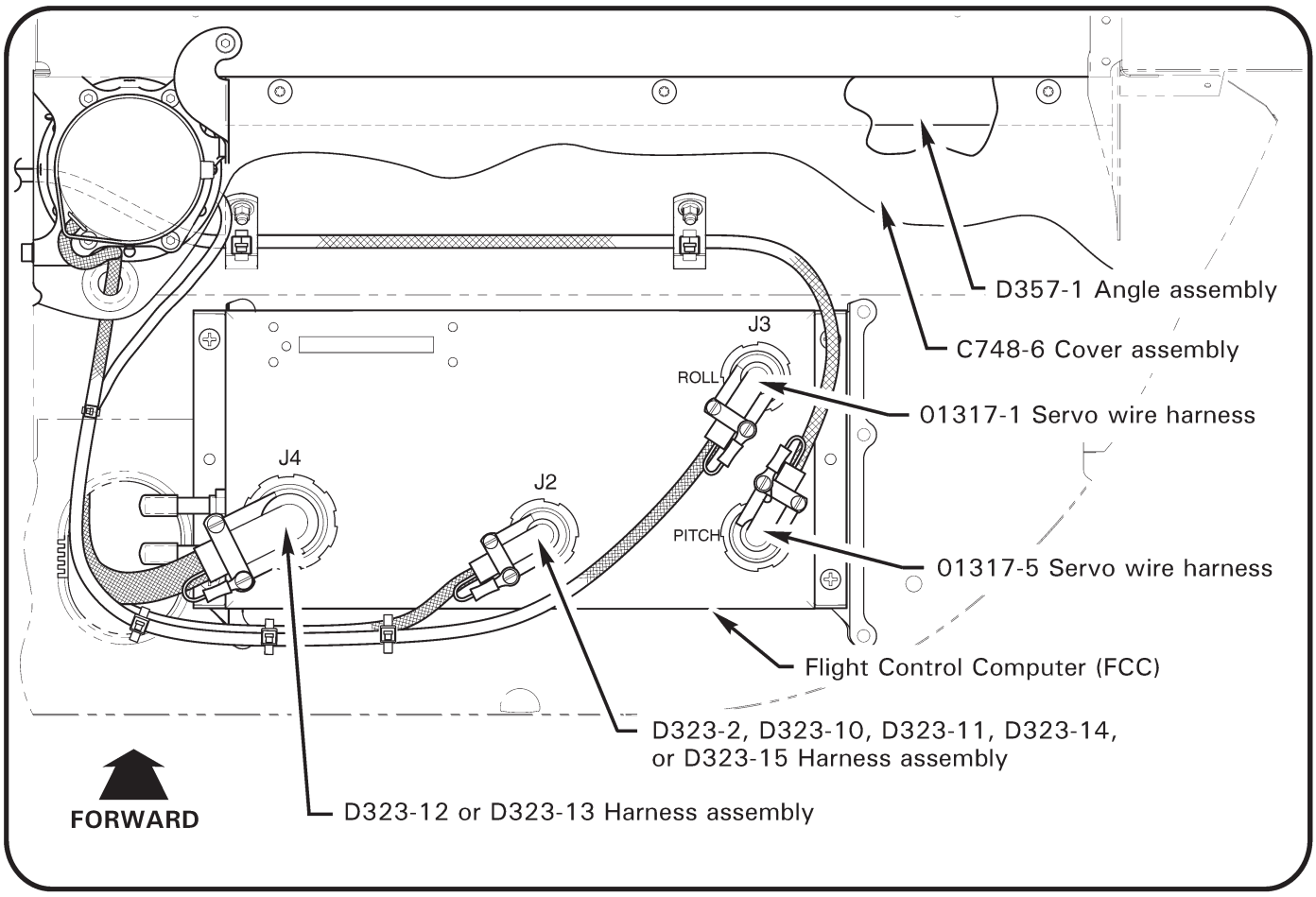


FIGURE 24-2 FLIGHT CONTROL COMPUTER

Version 51	
FCC part number	01311-03-01
Control panel part number	01309-01-01

Version 52	
FCC part number	01311-02-101
Control panel part number	01309-03-01

TABLE 24-1 SOFTWARE VERSIONS AND EQUIPMENT PART NUMBERS

24-30 Flight Control Computer (FCC)

A. Removal

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Remove C748-6 cover assembly under pilot's seat.
3. Disconnect D323 harness assemblies and servo assembly harnesses from flight control computer's J1 PITCH, J2, J3 ROLL, and J4 receptacles.
4. If installed, disconnect pitot and static tubes from computer. Plug elbows and tubes.
5. Support computer and remove screws securing computer to cabin assembly. Carefully remove computer from under pilot's seat.

24-30 Flight Control Computer (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. Position flight control computer under pilot's seat and install screws securing computer to cabin assembly. Tighten screws. Verify security.
3. If installed, remove plugs and connect pitot and static tubes to computer. Perform pitot and static system leak checks per § 13-10.
4. Connect D323 harness assemblies and D354 servo assembly harnesses to computer's J1 PITCH, J2, J3 ROLL, and J4 receptacles. Install ty-raps securing harnesses as required. Cinch ty-raps until snug without over-tightening, and trim tips flush with heads. Verify harness security.
5. Verify freedom of flight controls through full travel with and without friction applied.
6. Push in AUTOPILOT circuit breaker (5 amp) at panel. Perform ground checks as appropriate per § 24-61.
7. Install C748-6 cover assembly under pilot's seat.

24-40 Control Panel

A. Removal

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Loosen quarter-turn fasteners securing control panel to console assembly.
3. Carefully unplug harness from control panel and remove panel.

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 Scheduled Maintenance and Inspections

A. Ground Checks

NOTE

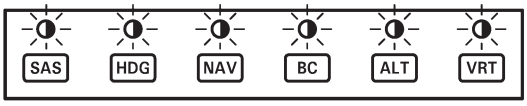
Perform the following ground checks after component replacement or other repairs have been performed on the autopilot system. Perform ground checks after an accident or incident that may have affected autopilot or related equipment prior to return to service.

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:

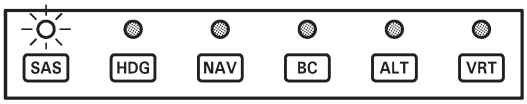
FOUR BEEPS IN HEADSET



LEDs ALTERNATE WHITE/GREEN

2. Verify SAS enters standby mode approximately 6 seconds after attitude indicator caging flag exits window (pull and release caging knob if instrument bank angle exceeds 6 degrees). Verify no sound in headset and control panel SAS LED is white, other LEDs are dark:

NO SOUND

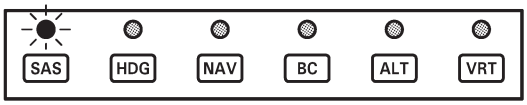


SAS LED IS WHITE, OTHER LEDs DARK

3. Visually verify servo assembly arms do not move when moving cyclic.

4. Engage SAS mode (cyclic should feel "energized). Verify no sound in headset and control panel SAS LED is green, other LEDs are dark:

NO SOUND



SAS LED IS GREEN, OTHER LEDS DARK

5. Install & activate hydraulic test pump (to simulate hydraulics-on operation) per § 1.180.

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

CHAPTER 37

ELECTRICAL SYSTEM

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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.
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.

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.

37-12 Lithium-Ion Battery Installation

A. Description (continued)

NOTE

Refer to True Blue Power Installation Manual and Operating Instructions 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.

B. 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 D144-10 hold-down assembly to cabin and remove hold-down assembly.
2. Loosen clamp securing vent hose to battery and pull hose off of battery.
3. Disconnect F693 harness assembly from battery's comm connector.
4. Remove hardware securing negative (ground) cable to battery negative terminal.
5. Remove hardware securing positive cable to battery positive terminal. Carefully remove battery.

37-12 Lithium-Ion Battery Installation (continued)

C. Installing and Connecting Battery

1. Perform pre-installation inspection and completely charge battery per True Blue Power Installation Manual and Operating Instructions. If battery is new, also perform visual inspection, charging, capacity check, and return to service per True Blue Power Installation Manual and Operating Instructions.
2. Turn battery switch off. Position battery in helicopter.
3. Verify battery terminal surfaces are clean to ensure electrical conductivity. Install positive cable on battery positive terminal and install battery hardware. Special torque terminal bolt per § 23-33 and torque stripe per Figure 2-1. Slide nipple over terminal.
4. Install negative (ground) cable on battery negative terminal and install battery hardware. Special torque terminal bolt per § 23-33 and torque stripe per Figure 2-1.
5. Connect F693 harness assembly to battery's comm connector.
6. Connect vent hose to battery outlet and tighten clamp. Verify security.
7. 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 hardware securing D144-10 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. Install C748-5 cover assembly and pivot forward left-hand seat aft.

D. Scheduled Maintenance and Inspections

Every 6 Months: If battery is unused for more than 6 months, either installed in helicopter or in storage, completely charge battery per True Blue Power Installation Manual and Operating Instructions.

Every 24 Months: Perform visual inspection, charging, capacity check, and return to service per True Blue Power Installation Manual and Operating Instructions every 24 months from date of aircraft delivery or subsequent new battery installation.

E. Special Maintenance and Inspections

No other battery maintenance other than routine maintenance specified by True Blue Power is permitted.

Operators are encouraged to review important safety information regarding handling, shipping, storage instructions, estimated unit life, and disposal instructions provided in True Blue Power Installation Manual and Operating Instructions.

Note: In accordance with industry and regulatory standards, the TB17 Lithium-ion battery will be shipped with a state of charge (SOC) not to exceed 30% of rated capacity.

37-130 Audio Alerts

All R44 helicopters have a low-RPM horn which sounds when rotor RPM is below 97%. The horn is muted when the collective is fully down. On earlier aircraft, the horn is provided by speakers in the side of the instrument console. On later aircraft, a tone generator in the audio system provides the horn through crew headsets.

Later aircraft include a high rotor RPM alert through the headsets. A warble tone (high/low tone) indicates rotor RPM is approaching 108%. A test button on the instrument panel permits pre-flight or in-flight testing of the high-RPM alert.

Additional audio alerts may be provided in the headsets depending on optional equipment installed, such as terrain warnings, traffic warnings, and autopilot modes.

37-140 Cockpit Camera

An optional video camera may be installed in the cabin ceiling. The camera records 4K video, intercom audio and radio communications, and GPS position both internally and to a removable flash drive inserted in the front of the camera housing. The internal memory retains only the most recent 3 hours of video and is not user-accessible. Recording starts automatically when the battery switch is turned on and stops when it is turned off.

Recording to the flash drive can be stopped or audio muted using the record and audio switches on the front of the camera housing. A switch in the down position turns off the associated function. Do not remove the flash drive while a recording is in progress as this will corrupt the video file. To remove a flash drive when the helicopter battery switch is on, first stop the recording using the record switch.

A blue flashing light on the camera housing indicates video is being recorded to the flash drive. A green steady light indicates the camera is powered and operating normally. The green light will change to an amber flashing light if an internal camera fault is detected, in which case video may not be recorded.

Video can be viewed on a Windows PC or Mac by removing the flash drive from the camera, inserting it into a USB port on a computer, and double clicking on the desired video file. Video is recorded in sequential 4 GB files with each file approximately 25 minutes in length. Video files are labeled HELICAM_xxxx.MP4, where xxxx is a sequential number. GPS position and altitude are recorded to files labeled HELICAM_xxxx.GPX on the flash drive, and are optionally displayed in the upper left hand corner of the video. A 128 GB flash drive (one supplied with each helicopter) will record approximately 13 hours of video. When full, the earliest video file is overwritten with the latest recording.

NOTE

Flash drives used with the camera must meet the criteria described in the Cockpit Camera User Guide in order to function reliably.

37-140 Cockpit Camera (continued)

Complete instructions are provided in the Cockpit Camera User Guide on the Robinson website www.robinsonheli.com. The guide also provides additional playback suggestions, instructions for visualizing GPS data, setting user preferences, and updating camera software, and video post-processing and troubleshooting tips. User options include on screen display of time & date and/or GPS position, time zone and daylight saving time status, and units for on screen display of GPS altitude.

37-150 Overspeed Protection

An engine start-up overspeed protection circuit is standard electrical equipment on R44 ship S/N 2625 & subsequent, R44 II ship S/N 14364 and 14412 & subsequent, and R44 Cadet ship S/N 30061 and 30071 & subsequent.

Engine start-up overspeeds typically occur if a start is initiated with the throttle open.

The start-up overspeed protection circuit is only active if the following 3 statements are true:

- C792 Engine rpm is above 90 ± 3%
- C792 Rotor rpm is below 50 ± 10%
- Clutch switch is Disengage i.e. wire 66 is routing power to wire 3003; refer to C024 Revision AS (or subsequent) schematic.

Start-up overspeed protection occurs when the C792-5 dual tachometer [internally] grounds pin 2 for 3s-5s, activating the F695-9 overspeed relay's coil and in turn grounding both magnetos' p-leads.

During flight, the start-up overspeed relay is disabled because the clutch switch is in the Engage position.

No periodic maintenance of the start-up overspeed protection circuit is required.

The start-up overspeed protection circuit cannot prevent all engine overspeeds.

REVISION LOG

AUG 2022

The R44 Maintenance Manual (MM) list of effective pages and effective dates are given below. If a previously issued page is not listed below, it is no longer an effective page and must be discarded. The issue or revision date is in bold at the top of each revision log page.

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6.7	AUG 2022
6.8	AUG 2022
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6.23	JUN 2014
6.24	JUN 2014
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7.ii	AUG 2022
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7.2	DEC 2011
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7.4	12 Dec 94
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7.6	JUL 2008
7.7	15 Jun 98
7.8	18 MAR 99
7.8A	DEC 2011
7.8B	DEC 2011
7.9	DEC 2011
7.9A	DEC 2011
7.9B	DEC 2011
7.9C	DEC 2011
7.9D	DEC 2011
7.10	DEC 2011
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7.12	12 Dec 94
7.13	DEC 2011
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7.36	15 Jun 98
7.37	1 Jun 97
7.38	12 Dec 94
7.39	AUG 2022
7.40	AUG 2022
7.40A	AUG 2022
7.40B	AUG 2022
7.41	06 Dec 99
7.42	12 Dec 94
7.43	11 Jun 93
7.44	12 Dec 94
7.45	12 Dec 94
7.46	1 Jun 97
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7.48	1 Jun 97
7.49	JUL 2008
7.50	JUL 2008
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7.53	12 Dec 94
7.54	12 Dec 94
8.i	DEC 2011
8.ii	DEC 2011
8.iii	DEC 2011
8.iv	DEC 2011
8.1	DEC 2021
8.1A	DEC 2021
8.1B	06 Dec 99
8.2	FEB 2003
8.3	FEB 2003
8.3A	06 Dec 99
8.3B	JUL 2004
8.4	15 Jun 98
8.5	15 Jun 98
8.6	15 Jun 98
8.7	11 Jun 93
8.8	06 Dec 99
8.9	1 Jun 97

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Page	Date	Page	Date	Page	Date
8.10	15 Jun 98	8.45	JUL 2004	10.6	AUG 2022
8.11	15 Jun 98	8.46	11 Jun 93	10.7	JUL 2008
8.12	15 Jun 98	8.47	11 Jun 93	10.8	FEB 2003
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8.17	15 Jun 98	8.52	5 May 95	10.13	11 Jun 93
8.18	12 Dec 94	8.53	OCT 2006	10.14	11 Jun 93
8.19	15 Jun 98	8.54	OCT 2006	10.15	OCT 2006
8.20	15 Jun 98	8.55	OCT 2006	10.16	JUL 2008
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8.22	06 Dec 99	8.56A	JUL 2008	10.18	JUL 2008
8.23	12 Dec 94	8.56B	OCT 2006	10.18A	JUL 2008
8.24	11 Jun 93	8.57	OCT 2006	10.18B	JUL 2008
8.25	JUL 2004	8.58	OCT 2006	10.19	JUL 2008
8.26	JUL 2004	8.59	APR 2012	10.20	FEB 2003
8.27	JUL 2004	8.60	APR 2012	10.21	12 Dec 94
8.28	JUL 2004	8.61	APR 2012	10.22	18 MAR 99
8.29	JUL 2004	8.62	APR 2012	10.23	2 Jul 93
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8.31	AUG 2019	8.64	APR 2012	10.25	FEB 2003
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8.32B	AUG 2019	8.67	APR 2012	10.28	DEC 2021
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8.33B	AUG 2022	9.i	DEC 2021	10.31	DEC 2021
8.34	AUG 2022	9.ii	DEC 2021	10.32	DEC 2021
8.35	12 Dec 94	9.1	DEC 2021	10.33	DEC 2021
8.36	JUL 2004	9.2	DEC 2021	10.34	DEC 2021
8.37	JUL 2008			10.35	DEC 2021
8.38	JUL 2008	10.i	DEC 2021	10.36	DEC 2021
8.39	JUL 2008	10.ii	DEC 2021	10.37	DEC 2021
8.40	JUL 2008	10.1	DEC 2021	10.38	DEC 2021
8.41	JUL 2004	10.2	DEC 2021	10.39	DEC 2021
8.42	JUL 2004	10.3	AUG 2022	10.40	DEC 2021
8.43	11 Jun 93	10.4	AUG 2022	10.41	DEC 2021
8.44	JUL 2004	10.5	AUG 2022	10.42	DEC 2021

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10.45	DEC 2021	12.6	DEC 2021	13.8	AUG 2019
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11.ii	DEC 2011	12.14	DEC 2021	13.16	AUG 2019
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11.3	1 Jun 97	12.17	DEC 2021	13.19	AUG 2019
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11.7	OCT 2006	12.21	DEC 2021	13.23	AUG 2019
11.8	OCT 2006	12.22	DEC 2021	13.24	AUG 2019
11.9	OCT 2006	12.23	DEC 2021	13.25	AUG 2019
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11.19	OCT 2006	12.33	DEC 2021	13.35	AUG 2019
11.20	JUL 2008	12.34	DEC 2021	13.36	AUG 2019
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11.22	JUL 2008	13.i	DEC 2021	13.38	DEC 2021
		13.ii	DEC 2021		
12.i	DEC 2021	13.1	AUG 2019	14.i	JUL 2021
12.ii	DEC 2021	13.2	AUG 2019	14.ii	JUL 2021
12.1	DEC 2021	13.3	AUG 2019	14.1	AUG 2019
12.2	DEC 2021	13.4	AUG 2019	14.2	AUG 2019
12.3	DEC 2021	13.5	AUG 2019	14.3	AUG 2019

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Page	Date	Page	Date	Page	Date
14.3A	AUG 2019	14.21	JUL 2021	14.58	AUG 2019
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14.3C	JUN 2014	14.23	JUL 2021	14.60	AUG 2019
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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
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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
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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
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14.20B	15 Jun 98	14.41	JUL 2021	14.78	JAN 2021
14.20C	18 MAR 99	14.42	JUL 2021		
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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
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14.20R	JUN 2014	14.57	AUG 2019	15.13	JAN 2021

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15.15	DEC 2021
15.16	DEC 2021
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18.1	AUG 2019
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26.ii	AUG 2019
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26.2	AUG 2019
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Page	Date
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