ROBINSON HELICOPTER COMPANY

R66 MAINTENANCE MANUAL
AND INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
RTR 660 VOLUME I

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OFFICE HOURS

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

HOLIDAYS

Please visit https://robinsonheli.com for a list of holidays and company shutdowns.

CUSTOMER SUPPORT AND SPARES ORDERS

Please visit https://robinsonheli.com for Customer Support contact information. Procure parts from any R66 Dealer or Service Center, or order directly from RHC Customer Service via email, fax, or phone.

PUBLICATIONS

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

SUBSCRIPTION ORDER AND RENEWAL FORMS

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

WARRANTY INFORMATION

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

CHAPTER 1

GENERAL

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1-50 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.

1-55 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 Effort will be made at the time of RHC technical document revisions to correct superseded references, however, certain documents may not otherwise require revision and superseded references may remain.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.

1-60 Definitions and Abbreviations

Refer to R66 Pilot's Operating Handbook (POH) Section 1 for additional definitions and abbreviations.

A. Definitions

14 CFR § 27.602 Critical Part: F016-2 main rotor blades & F029-1 tail rotor blades are critical parts as defined by 14 CFR § 27.602 and are subject to special inspection requirements & reporting described in Chapters 62 & 64. 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 § 6-20 for R66 datum location.

Empty Weight: Standard empty weight of a standard helicopter including unusable fuel, full operating fluids, and full engine oil. Basic empty weight is standard empty weight plus weight of installed optional equipment. Refer to R66 Type Certificate Data Sheet (TCDS) R00015LA at: https://drs.faa.gov. Refer to helicopter's Equipment List/Weight and Balance Data Sheet (RF 134) and Weight and Balance Record in R66 POH Section 6 for installed equipment.

Life-Limited Part: Refer to § 4-10. 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.

1-60 Definitions and Abbreviations (continued)

B. Abbreviations

14 CFR:	Title 14 of the Code of Federal Regulations. The Federal Aviation Regulations (FARs) are part of the CFR.
AOG:	Aircraft on Ground
Assy:	Assembly (component consisting of more than two parts)
ATA-100:	Air Transport Association of America Specification No. 100
BL:	Butt Line Station locations
CRA:	Component Return/Authorization
ELT:	Emergency Locator Transmitter
EMU:	Engine Monitoring Unit
FCU:	Fuel Control Unit
FS:	Fuselage Station locations
GCU:	Generator Control Unit
HID:	High Intensity Discharge
HS:	Horizontal Stabilizer Station locations
ICA:	Instructions for Continued Airworthiness
LBL:	Left Butt Line Station locations
LED:	Light Emitting Diode
LH:	Left-hand
LRU:	Line-Replaceable Unit
MR:	Main Rotor
MRB:	Main Rotor Blade
MRDS:	Main Rotor Drive Shaft
MRGB or MGB:	Main Rotor Gearbox or Main Gearbox
OEM:	Original Equipment Manufacturer
PTG:	Power Turbine Governor
R66 IPC:	R66 Illustrated Parts Catalog
R66 MM:	R66 Maintenance Manual
R66 POH:	R66 Pilot's Operating Handbook
RBL:	Right Butt Line Station locations
RH:	Right-hand
RHC:	Robinson Helicopter Company
RR300 Series OMM:	Rolls-Royce RR300 Series Operation and Maintenance Manual
RS:	Rotor Station locations
SB:	Service Bulletin
SDS:	Safety Data Sheet
SL:	Service Letter
TBO:	Time Between Overhaul
TCDS:	Type Certificate Data Sheet
TIR:	Total Indicator Reading
TR:	Tail Rotor
TRB:	Tail Rotor Blade
TRDS:	Tail Rotor Drive Shaft
TRGB or TGB:	Tail Rotor Gearbox or Tail Gearbox
TS:	Tailcone Station locations
TSN:	Time Since New
TSO:	Time Since Overhaul
WL:	Water Line Station locations

1-70 Service Information

1-71 Part Designation

RHC parts are designated with an alphanumeric part number beginning with letter “A”, “B”, “C”, etc., followed by three digits and a dash number.

A revision letter or letters follow(s) the stamped or ink-marked part number. Revision progression is A thru Z, followed by AA thru AZ, followed by BA thru BZ, etc. Unless otherwise specified, any revision of the same part number is interchangeable, such as “A101-1 A” and “A101-1 D”.

A change in dash number indicates a change in form, fit, and/or function (e.g. part number C339-1 is not interchangeable with part number C339-10 even though both are jackshaft weldments for [hydraulic] R44s). Similarly, part numbers F049-6 and F049-06 are not interchangeable because the dash numbers are different.

1-72 Returning Parts

All parts shipped to RHC must include a signed Component Return/Authorization (CRA) Form available online at https://robinsonheli.com.

1-73 Ordering and Shipping

Procure parts from any R66 Dealer or Service Center, or order directly from assigned RHC Customer Service Representative via email, fax, or phone.

1-74 Warranty Claims

Complete CRA Form (refer to § 1-72) and, in the Warranty Claim section, indicate if rotorcraft or component is under warranty. If claim is for parts or for labor allowance due to a Service Bulletin issued against rotorcraft or component, write in “per SB-XX” adjacent to requested warranty action.

1-75 Customer Support

Please visit https://robinsonheli.com for Customer Support contact information.

1-80 Assembly Instructions for R66 Helicopter Crated for Export (continued)

28. Depreserve the engine after storage per RR300 Series Operation and Maintenance Manual (OMM). Install starter-generator cooling hose. Install engine cowling per § 53-21.
29. Install tail rotor dynamic balance equipment per § 18-21.
30. Perform run-up per § 5-42 steps 2 thru 16.
31. Perform tail rotor dynamic balance per § 18-20.
32. Remove tail rotor dynamic balance equipment. Install main rotor balance equipment per § 18-11.

CAUTION

Mast fairing, cowlings, and panels must be installed for flight.

33. Perform hover checks per § 5-43 step 1. DO NOT proceed into forward flight.
34. Track and balance main rotor per § 18-12.
35. While climbing at maximum continuous torque, 60 KIAS:
    a. Evaluate vibration level and controllability.
    b. Perform momentary 30° left yaw to check for adequate directional control.
36. Level flight at typical cruise altitude (deviate as required for weather and terrain), maximum continuous torque:
    a. Evaluate longitudinal and lateral cyclic control forces.
    b. Evaluate collective control forces.
37. Evaluate vibration level at maximum continuous torque and straight-and-level flight.
38. During autorotation at 50 KIAS and 90% rotor RPM, perform momentary 30° right yaw to check for adequate directional control.
39. Check all instruments, gages, and avionics for proper operation.

TABLE 1 SCHEDULED INSPECTIONS Consult latest revision of listed publications for specific applicability.	First 100 Hours*	100 Hours**	200 Hours**	300 Hours**	400 Hours**	600 Hours**	1000 Hours**	2000 Hours**	12 Months**	24 Months**	3 Years**	5 Years**	6 Years**	12 Years**	15 Years**	3000 Cycles**
Replace main gearbox oil filter per § 12-12.	●					●										
Perform 100-hour / annual inspection per § 5-45.		●							●							
Perform main rotor blade tip maintenance per § 62-60.		●														
As required by RR300 Series Operation and Maintenance Manual (OMM), perform maintenance and inspection.			●		●			●	●							●
Service inlet barrier filter per § 71-21.				●					●							
Replace both 9v back-up batteries under LH front seat (ships with Lithium-ion main battery only).									●							
Replace main gearbox oil per § 12-11.						●										
Drain and flush tail rotor gearbox per § 12-23.						●										
Replace hydraulic filter per § 12-32.						●										
Clean gearbox chip detectors per § 12-13 & 12-22.						●			●							
Lubricate swashplate bearings per § 12-90.							●						●			
Perform 2000-hour/12-year inspection per § 5-50.								●						●		
Perform main gearbox internal visual inspection per § 5-74.									●							
Perform pop-out float leak check per § 32-64 Part A.									●							
Test and inspect transponder per 14 CFR § 91.413. (U.S.-registered helicopters only).										●						
Perform pop-out float inflation check per § 32-64 Part B.											●					
Pop-out float pressure cylinder maximum life.															●	

* One-time maintenance after new or overhauled main rotor gearbox is installed.

** Recurring inspection not to exceed given interval.

CHAPTER 4

AIRWORTHINESS LIMITATIONS

4-10 Life-Limited Components

4-11 Time-In-Service Records

It is the operator's responsibility to maintain a record of time in service for the engine, airframe, and all life-limited components, as well as the number of start cycles for the engine. Two hourmeters are provided: the hourmeter on the console records all run time including ground idle and is provided for reference. The hourmeter located outboard of the pilot's seat is collective-activated and records run time only when the collective is raised off the down stop. Both hourmeters are connected to main rotor gearbox oil-pressure switch. The collective-activated hourmeter may be used to determine time in service for maintenance purposes, including time in service for all life-limited components.

Calendar time in service for the airframe and engine begins on the date of the original RHC-issued Export (or Standard) Certificate of Airworthiness for the helicopter. For spares without a storage limit specified in § 10-20, calendar time in service begins on the date of the RHC-issued Airworthiness Approval Tag (Authorized Release Certificate) issued with the invoice.

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.

Engine life is limited by engine time in service and accumulated start cycles. The engine is equipped with an electronic Engine Monitoring Unit (EMU), which may be used to verify time in service and accumulated start cycles. An official, independent record of start cycles must be maintained by the operator.

When installing a life-limited part or a part with an overhaul requirement, record in the helicopter maintenance record the installation date, part number, part name, serial number, helicopter total time, and time in service accumulated by part since new or since last overhaul, as applicable.

WARNING

Components with mandatory overhaul times or life-limits whose time in service is not reliably documented cannot be considered airworthy and must be removed from service.

4-12 Fatigue Life-Limited Parts

The Airworthiness Limitations Section (ref. § 4-30) lists the mandatory replacement schedule for fatigue life-limited parts.

If a part is fatigue life-limited or has a mandatory overhaul requirement and is interchanged between an R44 and an R66 helicopter, and if the part life-limit or overhaul requirement is different between an R44 and an R66 helicopter, the shorter life-limit or overhaul requirement must be used. If a part is fatigue life-limited or has a mandatory overhaul requirement, and the accumulated cycles and/or time in service are known but the helicopter type is unknown, the shorter life-limit or overhaul requirement must be used.

Listed items (ref. § 4-30) must be removed from the helicopter at the specified intervals and permanently retired from service, preferably by destroying or damaging each part so it cannot inadvertently be returned to service.

4-20 Type Certificate Data Sheet (TCDS)

TCDS R00015LA is available at FAA Dynamic Regulatory System website: https://drs.faa.gov.

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5-32 Push-Pull Tubes

1. Nicks, cuts, or scratches in tube not more than 0.010 inch deep and not more than 1/4 of tube circumference may be polished out in lengthwise direction using 320-grit or finer wet-or-dry abrasive paper to 1-inch minimum blend radius. Replace push-pull tube if depth exceeds these limits.
2. Replace push-pull tube if tube is dented or flattened more than 5% of its diameter in unswaged area; dents or flattening is not permitted in swaged (tapered and threaded) ends of tubes.

5-33 Rod Ends and Spherical Bearings

1. Maximum axial play: 0.020 inch (for A104-4 bearing only: 0.035 inch axial play)
   Maximum radial play: 0.010 inch
2. Looseness between spherical bearing outer race & rod end housing, or between spherical bearing outer race & part, is not permitted.
3. Rod ends not riveted in place must block passage of 0.020-inch diameter wire through witness hole. Refer to Figure 5-1 for maximum rod end extension when no witness hole is provided.
4. Rod end jam nuts and palnuts must be torqued per § 20-32 and torque striped per Figure 5-1 at the most visible position for pre-flight inspection. Torque stripe must extend across nuts to both rod end shank and push-pull tube (or pitch link barrel, yoke, support, strut, etc.). Torque stripes are subject to deterioration and must be periodically renewed.
5. Refer to Figure 5-2. Rod ends must be positioned (centered) to allow as much push-pull tube or link rotational movement as possible without binding.

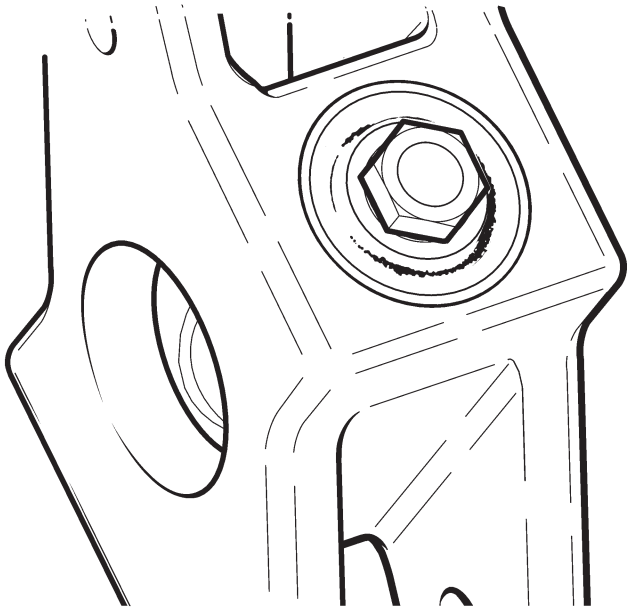
CAUTION

Teflon-lined bearings must not be lubricated or solvent cleaned.

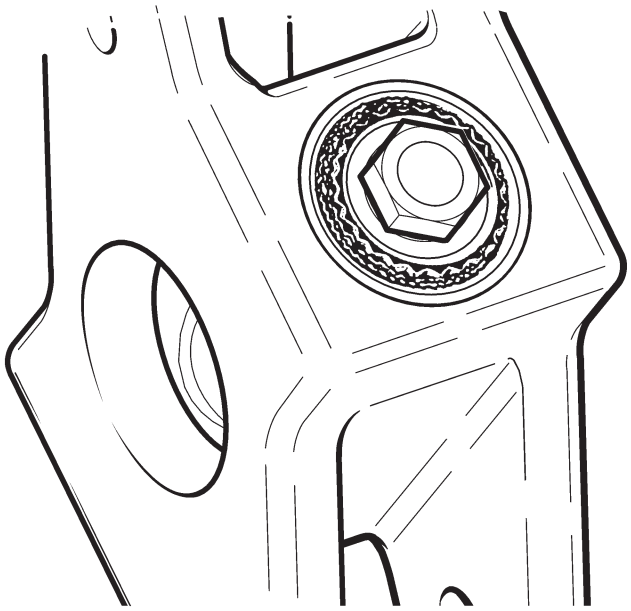
WARNING

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 the installer has assembled.

Elastomer Fatigue



Elastomer Oil Contamination



Elastomer Overload

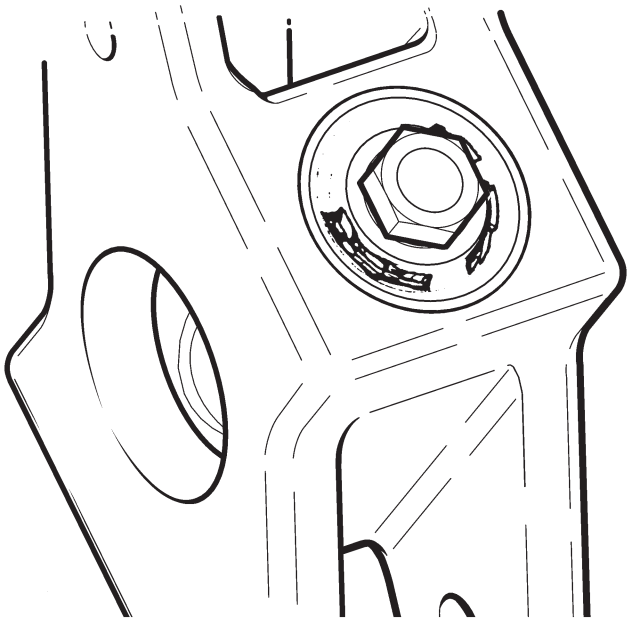


FIGURE 5-3 ELASTOMERIC BEARING DAMAGE

5-45 100-Hour / Annual Maintenance and Inspection

RHC recommends retaining a copy of the most recently performed 100-hour / annual checklist with the aircraft's maintenance records to meet the requirement of 14 CFR § 91.417 (b)(1).

R66 Serial No.: _____ Technician Name: _____

Registration No.: _____

Collective-Activated (Time In Service) Hourmeter Indication: _____ Technician Certificate Number: _____

Helicopter Total Time In Service: _____

_____ **Operation Checks:**
Perform ground and flight checks per § 5-40.

A. Preparation

_____ **Cleaning (required by 14 CFR Part 43, Appendix D, paragraph (a)):**
Note any fluid leakage before cleaning. Clean main and tail rotor blades, hubs, and airframe exterior with a mild soap (pH between 7 & 9) and water solution per Chapter 20.

CAUTION

Do not spray main rotor hub, tail rotor gearbox vent, hydraulic reservoir vent, swashplate area, or bearing seals with high-pressure water or solvent as water or solvent may cause corrosion or breakdown of lubricants. See RR300 Series Operation and Maintenance Manual (OMM) for engine cleaning instructions and precautions.

_____ **Access and Inspection Panels:**
Refer to R66 Illustrated Parts Catalog Chapter 6 for access and inspection panel locations. Remove or open necessary panels, doors, covers, fairings, and cowlings in accordance with 14 CFR Part 43, Appendix D, paragraph (a).

NOTE

If radio antennas are installed on removed panels, disconnect antenna lead and corresponding ground wire. Pull respective radio circuit breaker and tag circuit breaker with "Antenna Removed."

CAUTION

Instrument console removal (§ 95-50) is not required for scheduled inspections. Sufficient access for inspection is gained by removing the chin inspection panel, as well as removal of installed avionics, as required (refer to Chapter 97).

5-45 100-Hour / Annual Inspection (continued)

B. Inspection

CABIN FORWARD FOOTWELLS

_____ **Tail Rotor Pedal Bearing Blocks:**
Remove pedal bearing block covers as required. Examine accessible portion with inspection light and mirror. Inspect condition. Check for looseness or play in pedal bearings. Maximum allowable play is 0.080 inch axially and 0.030 inch radially. Verify bearing block security.

_____ **Adjustable Tail Rotor Pedals:**
Inspect condition. Verify no cracks in welds. Verify locking pins engage holes to secure adjustable pedals. Verify proper operating clearance. Verify no evidence of contact between outboard portion of lateral (torque) tube of RH pedal and under-floor longitudinal stiffener. Verify smooth actuation.

_____ **Co-Pilot Removable Tail Rotor Pedals:**
Inspect condition. Verify no cracks in welds. Verify locking pins engage holes to secure removable pedals. Verify proper operating clearance and smooth actuation.

_____ **Cabin Heater Diffusers:**
Inspect condition. Verify marking legibility. Verify no significant nicks, scratches or dents, or cracks in welds. Verify security.

_____ **Fire Extinguisher and Mount:**
Inspect condition. Inspect fire extinguisher per manufacturer's instructions. Verify no loss of charge or obstructions in extinguisher nozzle. Verify security.

_____ **Map Holders:**
Inspect condition. Verify no defects, tears, or material deterioration. Remove foreign objects and verify security.

_____ **License Holder:**
Inspect condition. Verify no defects, cracks in plastic, or material deterioration. Verify security.

_____ **Cabin Chin and Floor:**
Inspect condition. Verify equipment security. Retrieve and discard trapped debris.

CONSOLE

_____ **Console Assembly:**
Inspect condition. Verify no significant nicks, scratches or dents; verify no cracks, corrosion, or loose rivets in lower console assembly. Verify hinge security.

_____ **HID Landing Lights:**
Inspect condition. Verify proper installation and security of wiring and equipment.

5-45 100-Hour / Annual Inspection (continued)

HORIZONTAL CONTROL TUNNEL (Front seats)

_____ **Covers:**
Inspect condition. Verify marking legibility.

_____ **Antenna Wiring & Connectors:**
Inspect condition. Verify no loose, chafed, frayed, or broken wires. Verify no damaged connectors. Verify neatness, proper routing and installation, and security.

_____ **Cyclic Box Assembly:**
Inspect condition. Verify no nicks, scratches, dents, cracks, corrosion, or loose rivets. Verify no distortion or damage on cyclic stop sheet metal assembly. Verify security.

_____ **Cyclic Stick Assembly:**
Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion. Verify no cracks in welds. If paint has worn thru to metal, touch-up with § 20-75 approved primer. Verify security, proper operating clearance, and smooth actuation. Verify security of removable co-pilot grip and locking pin.

_____ **Cyclic Boot:**
Inspect condition. Verify proper locking function of boot snaps. Verify no defects, tears, or material deterioration. Verify security.

_____ **Cyclic Friction Assembly:**
Inspect condition. Inspect link rod end bearings per § 5-33. Verify no excessive flaring at either end of friction spacer. Verify proper installation, security, and operation.

_____ **Cyclic Pivot:**
Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion. Inspect spherical bearings per § 5-33. Verify proper installation, security, and operating clearance.

_____ **Cyclic Horizontal Torque Tube:**
Examine accessible portion with inspection light and mirror. Verify no nicks, scratches, dents, cracks, or corrosion. Verify no cracks around reinforcement blocks on both ends of torque tube. Verify proper installation, security, and operating clearance.

_____ **Horizontal Push-Pull Tubes:**
Examine accessible portion with inspection light and mirror. Inspect condition per § 5-32. Verify no nicks, scratches, chafing, dents, cracks, or corrosion. Inspect rod end bearings per § 5-33; verify rod ends are centered and palnut and jam nut are tight. Check witness holes for proper thread engagement. Verify proper installation, security, and operating clearance.

5-45 100-Hour / Annual Inspection (continued)

HORIZONTAL CONTROL TUNNEL (Front seats; continued)

_____ **Collective Stick Assembly:**
Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion. Verify no cracks in welds. Verify proper installation, security, and operation of collective micro switches. Verify security, proper operating clearance, and smooth actuation of both flight and throttle controls. Verify over center spring holds twist grip full open or full closed. Verify placard legibility.

_____ **Collective Stick Torque Tube:**
Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion.

_____ **Collective Boot:**
Inspect condition. Verify proper locking function of boot snaps. Verify ty-rap is properly installed (loosely securing boot around collective stick). Verify no defects, tears, or material deterioration. Verify security.

_____ **Fuel Valve Knob and Guard:**
Inspect condition. Verify cable and mounting bezel security. Verify proper adjustment and smooth operation of valve. Verify guard is present.

_____ **Collective Friction & Stop Assembly:**
Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion in stop assembly. Verify no bending or binding of stop through full control travel, with and without friction applied. Measure collective friction per § 67-22. Verify proper installation and security of collective friction lever and stop assembly.

_____ **HeliSAS Autopilot (if installed):**
Inspect condition of associated equipment. Inspect wiring condition. Verify no loose, chafed, or broken wires or terminals. Verify neatness, proper routing and installation, and security.

_____ **Co-Pilot Removable Collective Stick Assembly:**
Remove co-pilot collective stick assembly. Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion. Verify no damage to spring pin and safety wire at coupling. Firmly grasp coupling and rotate twist grip in each direction with opposite hand. Verify no free play of coupling or spacer relative to torque tube. Install removable collective stick in helicopter and verify both locking pins engage holes to secure stick. Verify security, proper operating clearance, and smooth actuation of both flight and throttle controls. Verify placard legibility.

_____ **Co-Pilot Removable Collective Boot:**
Inspect condition. Verify proper locking function of boot snaps. Verify ty-rap is properly installed (loosely securing boot around collective stick). Verify no defects, tears, or material deterioration. Verify security.

5-45 100-Hour / Annual Inspection (continued)

HORIZONTAL CONTROL TUNNEL (Front seats; continued)

_____ **Pitot & Static Lines & Drains:**
Inspect pitot and static lines for obstructions, cracking, chafing, pinching, or kinking. Remove drain plugs from tee fittings in each line and clear any moisture from system. Install drain plugs. Verify integrity of pitot and static line connections. Verify line security.

_____ **Wiring:**
Inspect condition. Verify no loose, chafed, or broken wires or terminals. Verify neatness, proper routing and installation, and security.

_____ **Fasteners & Torque Stripes:**
Inspect condition. Verify proper installation and security of fasteners. Renew deteriorated torque stripes per Figure 5-1.

_____ **Antennas:**
Inspect condition. Verify no cracks where antennas mount to cowling. Verify security.

_____ **Close & Secure:**
Verify foreign objects are removed. Verify equipment security. Verify cleanliness of interior and of inspection and access covers and cowlings. Connect ELT (if installed) wiring at connectors and anti-ice switch wiring terminals under cyclic box cover. Connect antenna leads and ground wires (if installed). Install covers and cowlings removed in preceding steps. Verify security. Verify security of removable and adjustable controls. Fasten cyclic, collective, and removable collective boot snaps.

5-45 100-Hour / Annual Inspection (continued)

HORIZONTAL CONTROL TUNNEL (Aft seats)

_____ **Covers:**
Inspect condition. Verify marking legibility.

_____ **Antenna Wiring & Connectors:**
Inspect condition. Verify no loose, chafed, frayed, or broken wires. Verify no damaged connectors. Verify neatness, proper routing and installation, and security.

_____ **Cyclic Yoke:**
Inspect condition. Verify no cracks, corrosion, or fretting. Inspect spherical bearings per § 5-33. Verify proper installation, security, and operating clearance.

_____ **Cyclic Fork:**
Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion. Inspect rod end bearings per § 5-33. Verify proper installation, security, and operating clearance.

_____ **Cyclic Horizontal Torque Tube:**
Examine accessible portion with inspection light and mirror. Verify no nicks, scratches, dents, cracks, or corrosion. Verify no cracks around reinforcement blocks on both ends of torque tube. Verify proper installation, security, and operating clearance.

_____ **Horizontal Push-Pull Tubes:**
Examine accessible portion with inspection light and mirror. Inspect condition per § 5-32. Verify no nicks, scratches, chafing, dents, cracks, or corrosion. Inspect rod end bearings per § 5-33; verify rod ends are centered and palnut and jam nut are tight. Check witness holes for proper thread engagement. Verify proper installation, security, and operating clearance.

5-45 100-Hour / Annual Inspection (continued)

BAGGAGE COMPARTMENT

_____ **Door:**
Inspect condition. Verify proper operation of micro switch and COWL DOOR warning segment. Inspect hinges and latches for obvious defects. Verify security and proper latching/locking function.

_____ **Carpet:**
Inspect condition. Verify no defects, tears, or material deterioration. Verify proper installation and security.

_____ **Interior:**
Inspect condition. Verify no structural damage. Verify general cleanliness of baggage compartment. Verify any installed equipment or passenger cargo are secure.

_____ **Generator Control Unit (GCU) & Wiring:**
Inspect condition. Verify no exposed, loose, chafed, or broken, wires & terminals. Verify proper installation and security of wiring covers and Generator Control Unit (GCU).

BATTERY

_____ **Lead-Acid Battery Installations:**
Inspect condition. Verify no cracks or corrosion on or near battery cable terminals. As required, perform capacity test or replace battery per manufacturer's instructions. Verify battery cable security. Verify no corrosion in surrounding structure.

_____ **Lithium-Ion Battery Installation (if equipped):**
Refer to § 96-12. Inspect condition. Verify no cracks or corrosion on or near battery terminals. Verify vent hose, comm connector wiring, and battery cable security. Replace both 9v back-up batteries under LH front seat. Perform scheduled maintenance as required. Verify no corrosion in surrounding structure.

AUX FUEL SYSTEM (If equipped)

_____ **Placards:**
Verify placard legibility, proper installation, and security.

_____ **Aux Fuel Tank:**
Examine accessible portion with inspection light and mirror. Inspect condition of exterior and verify no leakage. Check bladder interior for foreign objects or debris. Verify security.

_____ **Aux Fuel Tank Support:**
Examine accessible portion with inspection light and mirror. Inspect condition of exterior; verify no cracks or obvious damage. Verify security.

_____ **Aux Fuel Hoses:**
Inspect condition. Verify no leakage, chafing, or obvious damage to fuel lines. Verify line clearance to installed equipment and surrounding structure. Verify security.

5-45 100-Hour / Annual Inspection (continued)

AUX FUEL SYSTEM (If equipped; continued)

_____ **Aux Fuel Gage Sender & Wiring:**
Inspect condition. Verify no loose, chafed, or broken wires or terminals. Verify proper installation and security of sender and wiring.

_____ **Aux Fuel Pump Wiring:**
Inspect condition. Verify no loose, chafed, or broken wires. Verify proper installation and security of wiring.

_____ **Aux Fuel Cap:**
Inspect condition. Verify no damage or deterioration of gasket. Install cap and verify proper locking function. Verify security.

_____ **Aux Fuel Tank Sump Drain:**
Inspect condition. Verify drain valve opens easily, drains fuel freely, springs closed, and seals completely. Inspect drain hose assembly for defects, tears, or material deterioration. Secure hose at tab near drain valve.

_____ **MT183-1 Tool Kit:**
Inspect condition. Remove kit and verify kit contains loose parts listed in R66 Illustrated Parts Catalog. Clip kit to aux tank and verify security.

PRESSURE FUELING SYSTEM (If equipped)

_____ **Pressure Fueling System (optional):**
Perform scheduled inspections per § 28-67 Part A.

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5-45 100-Hour / Annual Inspection (continued)

MAIN ROTOR GEARBOX COMPARTMENT

_____ **Cowling Doors:**
Inspect condition. Verify proper operation of fasteners.

_____ **Antenna Wiring & Connectors:**
Inspect condition. Verify no loose, chafed, frayed, or broken wires. Verify no damaged connectors. Verify neatness, proper routing and installation, and security. Check grommets for proper installation.

_____ **Placards:**
Verify placard legibility, proper installation, and security. Refer to Chapter 11.

_____ **Fuel Tank:**
Examine accessible portion with inspection light and mirror. Inspect condition of exterior and verify no leakage. Check bladder interior for foreign objects or debris. Verify security.

_____ **Fuel Gage Sender & Wiring:**
Inspect condition. Verify no loose, chafed, or broken, wires or terminals. Verify proper installation and security of sender and wiring.

_____ **Low-Fuel Switch Assembly Warning:**
Turn battery switch on. With a clean wooden dowel, gently depress low-fuel sender float in fuel bladder and verify LOW FUEL warning segment illuminates after approximate 1-second delay. Turn battery switch off.

_____ **Fuel Cap:**
Inspect condition. Verify no damage or deterioration of gasket. Install cap and verify proper locking function. Verify security.

5-45 100-Hour / Annual Inspection (continued)

MAIN ROTOR GEARBOX COMPARTMENT (continued)

_____ **Hydraulic Servos:**

Inspect condition. Inspect rod ends per § 5-33. Verify approximately 0.040 inch total free play at servo valve input. Hydraulic fluid seepage is permissible ("seepage" is evidence of fluids without flow, drips, or runs) provided fluid does not contaminate MRGB rubber mounts. Clean servo input rod end/clevis area with no-residue, non-alcoholic solvent as required. Verify no obvious defects and security of scissors at upper clevis of servos. Verify proper installation and clearance from surrounding structure through full control travel.

CAUTION

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

_____ **Hydraulic Hoses, Lines, & Fittings:**

Inspect condition. Verify no leakage, chafing, or obvious damage to hydraulic lines. Verify integrity of connections. Verify fluid line clearance to installed equipment and surrounding structure and sufficient fluid hose slack available through full control travel. Verify proper installation and security.

_____ **Hydraulic Pump:**

Inspect condition. Inspect Telatemp per § 5-35. Verify no significant leakage. Verify proper installation and security.

_____ **Upper Steel Tube Frame:**

Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion. Verify no chafing where wires, hoses, or clamps attach to frame. Examine each weld for cracks with an inspection light and mirror.

CAUTION

Upper steel tube frame is fatigue loaded and therefore susceptible to fatigue cracks. Inspect all joints thoroughly.

_____ **F908-1 (Tail Rotor Drive) Yoke Assembly:**

Inspect condition. Verify no cracks, corrosion, or fretting. Verify proper installation, security, and operating clearance. Verify security of magnets.

_____ **G779-1 Pulley (Air Conditioning; if installed):**

Inspect condition. Verify no cracks, corrosion, or fretting. Verify no nicks or sharp edges in fins that could damage v-belt. Verify proper installation, security, and operating clearance.

_____ **V-Belt (Air Conditioning; if installed):**

Inspect condition. Replace belt if exhibiting frayed edges, excessive cracking, heat damage, or rubber deterioration. Verify 4.5–5.5 lb of force applied mid-span deflects belt 0.16-inch; adjust as required per § 21-21.

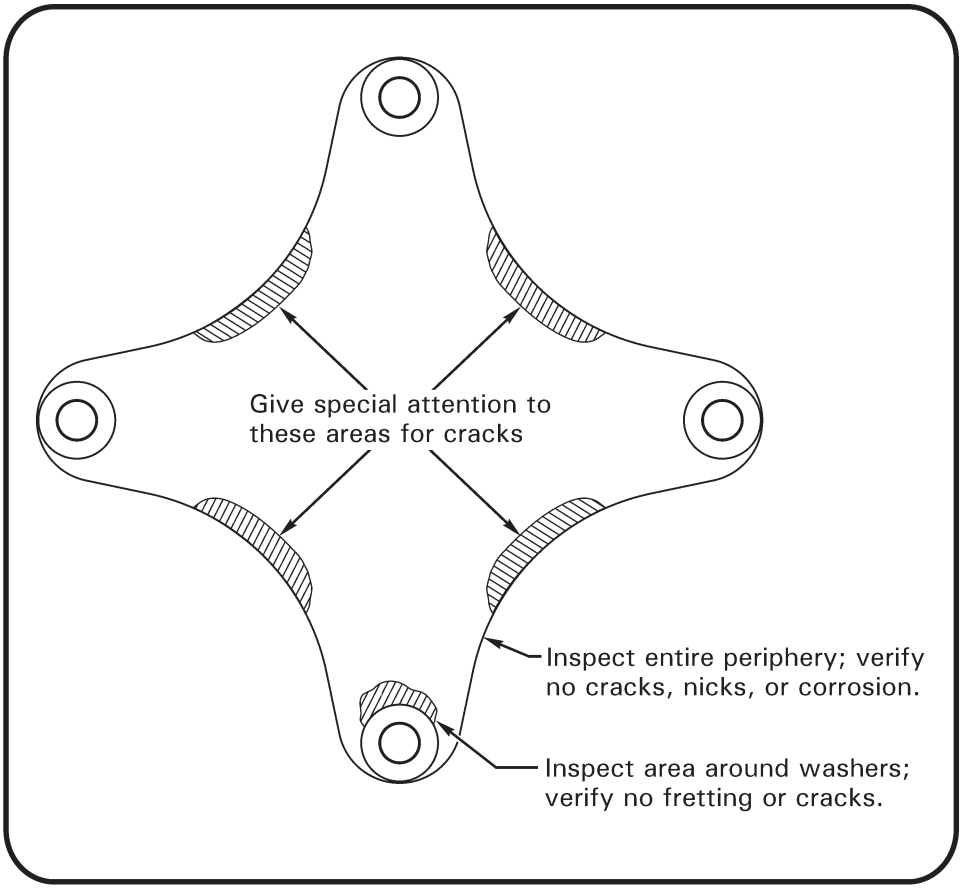


FIGURE 5-4A FLEX PLATE INSPECTION

5-45 100-Hour / Annual Inspection (continued)

MAIN ROTOR GEARBOX COMPARTMENT (continued)

_____ **Compressor Assembly (Air Conditioning; if installed):**
Inspect condition, including integrity of belt-tension slotted plate. Verify security of mounting. Verify no loose, chafed, frayed, or broken wires. Verify proper installation and security of pressure switches, snubber, and refrigerant lines.

_____ **Refrigerant Hose Assemblies (Air Conditioning; if installed):**
Verify security, no damage, and clearance to adjacent structure. Verify dust caps installed on service fittings where lines mount to compressor.

_____ **F196-1 (Tail Rotor Drive) Fan Shaft:**
Inspect condition. Verify no shaft corrosion. Remove any light surface corrosion and apply wax or suitable corrosion inhibitor. Verify no cracks, corrosion, or fretting in fore and aft weldment. Verify proper installation, security, and operating clearance.

5-45 100-Hour / Annual Inspection (continued)

ENGINE

Refer to RR300 Series OMM, and applicable engine component manufacturer's maintenance publications for service and inspection procedures.

Additional service and inspection intervals are specified in § 1-90.

NOTE

For engine-related matters, if there is a conflict between this manual and Rolls-Royce instructions, Rolls-Royce instructions take precedence. Notify RHC of discrepancy.

_____ **Inlet Plenum and Filter Bypass Indication:**
Inspect plenum condition. Verify no foreign object debris or loose items. Turn battery switch on. Verify annunciator panel warning segment illuminates when bypass doors are opened individually, then simultaneously. Turn battery switch off.

_____ **Standard (Foam) Air Filter Assembly:**
Inspect condition. Verify no tears, punctures, or damage to filter media or cage assembly; verify no corrosion, cracks, or distortion to filter assembly components. Service filter as required per § 71-21, Part D. Verify proper installation and security.

_____ **Inlet Barrier Filter (if installed):**
Inspect condition. Verify no tears, punctures, or damage to filter media or cage assembly; verify no corrosion, cracks, or distortion to filter assembly components. Service or replace filter assemblies as required per § 71-21, Part E. Note indication on filter maintenance aid. Verify proper installation and security.

_____ **Engine Hoses:**
Inspect condition. Verify no rips, holes, or collapsed areas (gently squeeze hose with finger tips). Verify proper installation and security.

_____ **Exhaust Pipe:**
Inspect condition. Verify no cracks (illuminating exterior with bright light while viewing interior facilitates crack detection). Inspect condition and security of F173-1 struts. Inspect condition and security of gearbox vent and clamps.

_____ **Starter-Generator & Wiring:**
Inspect condition. Verify no loose, chafed, frayed, or broken wires. Verify no damaged connectors. Verify neatness, proper routing and installation, and security.

_____ **Starter-Generator Hose and Filter:**
Inspect condition. Verify no rips, holes, or collapsed areas in hose (gently squeeze hose with finger tips). Verify no tears, punctures, or damage to filter foam; may be cleaned with mild soap (pH between 7 & 9) and warm water solution.

5-45 100-Hour / Annual Inspection (continued)

ENGINE (continued)

_____ **Engine Oil and Oil Filter:**
Add oil as required per R66 POH Section 8. Change oil and oil filter as required per RR300 OMM. Verify filter security.

_____ **Oil Lines:**
Inspect condition. Verify no leakage where lines connect to tank. Verify no leakage, chafing, or obvious damage to oil lines. Verify line clearance to installed equipment and surrounding structure. Verify security.

_____ **Cooling Duct and Oil Coolers:**
Verify installation security with no cracks in duct or mounting. Verify cooler line connections are tight and coolers have no nicks, dents, cracks, or corrosion. Verify duct and cooler cores are free of debris to allow full airflow.

_____ **Power Turbine Governor (PTG) Control:**
Refer to Figure 76-2. Verify D333-13 fitting in PTG input lever moves in and out slightly with light finger pressure. If D333-13 fitting does not move in response to light finger pressure then follow compliance procedure in R66 Service Bulletin SB-01.

_____ **Fuel Control Unit (FCU) and Control Rigging:**
Verify proper routing and security of throttle and fuel cutoff controls; verify smooth actuation of both controls without binding. Verify FCU throttle arm contacts idle stop with twist grip closed and contacts maximum throttle stop with twist grip open. Verify FCU cutoff lever rests in detent when control is OFF and has 0.030–0.090 inch clearance from maximum fuel stop when control is ON.

_____ **Fuel Filter:**
Inspect condition; service fuel filter per RR300 OMM, as required. Verify proper installation and security of wiring and housing.

_____ **Fuel Hose:**
Inspect condition. Verify no leakage, chafing, or obvious damage to tank-to-engine hose. Verify hose clearance to installed equipment and surrounding structure. Verify security.

_____ **Fuel Flow Meter Transducer (if installed):**
Refer to § 28-23. Visually inspect fuel control unit-to-transducer fuel tube connections, transducer, and reducer connections to transducer & check valve for evidence of leakage. Visually inspect components for any obvious damage; verify proper installation and security. Verify no damaged connectors. Verify wiring neatness, proper routing and installation, and security.

5-45 100-Hour / Annual Inspection (continued)

ENGINE (continued)

_____ **Firewalls:**

Inspect condition. Verify no deformation, buckling, wrinkling, cracks, corrosion, fretting, or loose rivets. Pay particular attention to structural attachment points. Inspect condition of engine-to-firewall seal. Verify no open holes.

WARNING

Open holes in engine-to-firewall seals are potential fire leak paths.

_____ **Engine Mounts:**

Inspect condition. Verify no cracks or corrosion in engine mount weldment. Verify safety wire and security of mounting bolts.

_____ **Lower Steel Tube Frame:**

Inspect condition. Verify no nicks, scratches, dents, cracks, or corrosion. Verify no chafing where wires, hoses, or clamps attach to frame. Examine each weld for cracks with an inspection light and mirror.

_____ **Condenser and Fan Assemblies (Air Conditioning; if installed):**

Inspect condition. Verify security of fans, box assembly, condenser, and firewall supports. Verify security of desiccant cap.

_____ **Refrigerant Line Assemblies (Air Conditioning; if installed):**

Inspect condition. Verify security, no damage, and clearance to adjacent structure.

_____ **Wiring:**

Inspect condition. Verify no loose, chafed, or broken wires or terminals. Check for heat or fluid damage. Verify neatness, proper routing and installation, and security.

_____ **Fasteners & Torque Stripes:**

Inspect condition. Verify proper installation and security of fasteners. Renew deteriorated torque stripes per Figure 5-1.

_____ **Close & Secure:**

Verify foreign objects are removed. Verify equipment security. Verify cleanliness of interior and of cover or cowling. Install/close inspection covers or cowlings removed in preceding steps. Verify security.

5-45 100-Hour / Annual Inspection (continued)

TAILCONE

_____ **Inspection Plugs:**
Inspect condition. Verify proper operation of fasteners.

_____ **Tail Rotor Drive Shaft Assembly:**
Examine accessible portion through inspection holes with inspection light and mirror. Verify no cracks, corrosion, or fretting in fore and aft weldment. Verify no evidence of drive shaft contact with tailcone bays. Verify no bowing, bends, dents, cracks, or corrosion. Perform tail rotor drive shaft runout per § 65-21. Verify proper installation, security, and operating clearance.

CAUTION

Bowing, bends, dents, cracks, or corrosion are cause for immediate replacement of tail rotor drive shaft.

_____ **Tail Rotor Push-Pull Tube & Forward Bellcrank:**
Examine accessible portion through inspection holes with inspection light and mirror. Inspect condition per § 5-32. Verify no nicks, scratches, chafing, dents, cracks, or corrosion. Inspect rod end bearings per § 5-33; verify rod ends are centered and palnut and jam nut are tight. Check witness holes for proper thread engagement. Inspect bellcrank and bellcrank mount for nicks, scratches, dents, cracks, or corrosion. Inspect spherical bearings per § 5-33. Verify proper installation, security, and operating clearance. Verify tail rotor guard mounting screw shanks clear push-pull tube.

_____ **Tail Rotor Drive Shaft Hanger Bearing & Hanger:**
Inspect condition. Inspect bearing for obvious damage. Verify integrity of bearing seals. Verify bearing's inner race-to-drive shaft torque stripe is intact and no evidence of bearing slippage on shaft. Verify no bends, cracks, corrosion, or obvious damage to hanger and hanger mount to tailcone bulkhead. Verify proper installation, security, and smooth operation.

_____ **Tail Rotor Drive Shaft Damper Assembly:**
Inspect condition. Inspect bearing for obvious damage. Verify integrity of bearing seals. Inspect bearing housing for cracks or corrosion. Verify bearing's inner race-to-drive shaft torque stripe is intact and no evidence of bearing slippage. Verify no bends, cracks, corrosion or obvious damage to friction arms and (Teflon) bearings. Verify proper installation, security, and smooth operation.

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

5-45 100-Hour / Annual Inspection (continued)

TAIL ROTOR & TAIL ROTOR GEARBOX (continued)

_____ **Pitch Control Bearing Assembly & Aft Bellcrank:**

Inspect condition. Verify pitch control assembly has less than 0.25 inch rotational play measured at pitch link attach bolt. Verify no leakage at bearing seals. Verify no nicks, scratches, dents, cracks, or corrosion on pitch control housing or bellcrank. Inspect bellcrank spherical bearings per § 5-33. Inspect spherical bearing atop stud protruding from underside of pitch control for cracks. Verify proper installation, security, and smooth actuation without binding.

NOTE

B345-4 tail rotor pitch links can have different shaft diameters (0.250 inch or 0.300 inch). Balance tail rotor per § 18-20 if a different shaft diameter pitch link is installed.

_____ **Pitch Links:**

Inspect condition. Inspect rod ends per § 5-33. Remove and reinstall pitch links with outboard end inboard and inboard end outboard as required to obtain maximum service life; additionally, an optional A215-012 O-ring may be installed on A115-1 spacer under bolt head at pitch control. Reinstall chordwise weights at respective attachment points for balance purposes. Verify proper installation of A115-1 spacers. Verify proper installation, security and operating clearance.

_____ **Tail Rotor Blades:**

Refer to R66 SB-41. Inspect condition. Refer to § 64-30 for damage limits and repair. Verify no looseness between spherical bearing outer races and root fittings. Inspect bearings per § 5-33. Verify no obstructions in blade tip drain holes. Verify proper installation, security, and pitch change operation.

WARNING

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

_____ **Tail Rotor Hub:**

Inspect condition. Verify no nicks, scratches, gouges, dents, cracks, or corrosion. Inspect elastomeric teeter bearings per § 5-34. Teeter rotor hub and verify teeter bearing bolt, spacers, and nuts do not rotate. Verify hub teeters smoothly. Verify proper installation and security of blade bolts.

_____ **Wiring:**

Inspect condition. Verify no loose, chafed, or broken wires or terminals. Verify neatness, proper routing and installation, and security.

_____ **Fasteners & Torque Stripes:**

Inspect condition. Verify proper installation and security of fasteners. Renew deteriorated torque stripes per Figure 5-1.

5-45 100-Hour / Annual Inspection (continued)

MAST FAIRING

_____ **Mast Fairing:**

Inspect condition. Verify no nicks, scratches, dents, cracks, corrosion, fretting, or loose rivets. Verify no yielding or cracking of pitot line and fuel vent restraint assembly.

> NOTE
>
> Yielding can be caused by over tightening screws in restraint nutplates.

_____ **Upper & Lower Ribs:**

Inspect condition. Inspect for cracks especially around mast tube attachments. Verify proper installation and security of ribs and lower rib clamp.

_____ **Vertical Push-Pull Tubes:**

Examine accessible portion with inspection light and mirror. Inspect condition per § 5-32. Verify no nicks, scratches, chafing, dents, cracks or corrosion. Inspect rod end bearings per § 5-33; verify rod ends are centered and palnut and jam nut are tight. Check witness holes for proper thread engagement. Verify proper installation, security, and operating clearance.

_____ **Pitot Tube & Line:**

Inspect pitot lines for obstructions, cracking, chafing, pinching or kinking. Verify integrity of pitot and static line connections. Verify proper routing and security of pitot tube and line. Verify no cracks where pitot tube mounts to mast fairing. Verify no obstructions in pitot tube.

_____ **Fuel Vent Weldment and Tygon® Tubes:**

Inspect condition. Verify no obstructions, cracking, chafing, pinching or kinking in plastic tubes. Inspect vents for cracks or obvious damage. Verify proper installation and security of safety wire.

_____ **Swashplate Upper Scissors:**

Inspect condition. Verify bearing play within limits referenced in § 67-40, steps 9 and 10. Closely examine scissor linkage while a second person raises and lowers collective stick. Verify bolts and washers rotate together through full control travel without binding. Inspect fork assembly rod end bearing per § 5-33; verify rod end is centered and palnut and jam nut are tight. Verify proper installation of all parts, part security, and operating clearance.

5-45 100-Hour / Annual Inspection (continued)

MAST FAIRING (continued)

_____ **Swashplate Lower Scissors:**

Inspect condition. Verify bearing play within limits referenced in § 67-40, steps 9 and 10. Closely examine scissor linkage while a second person raises and lowers collective stick. Verify bolts and washers rotate together through full control travel without binding. Inspect fork assembly rod end bearing per § 5-33; verify rod end is centered and palnut and jam nut are tight. Verify proper installation of all parts, part security, and operating clearance.

_____ **Swashplate Slider Tube:**

Inspect condition. Verify no cracks, corrosion, or loose rivets near tube base flange. Verify no damage or wearing through of anodized coating on tube surface. When viewed under 10X magnification, minute "checkerboarding" of anodized surface is normal.

_____ **Swashplate Interior:**

Remove swashplate boot lower ty-rap. Lift boot from swashplate, and verify no boot defects, tears, or material deterioration. Examine swashplate interior with inspection light and mirror. Verify no corrosion or debris between main rotor drive shaft and inside of slider tube. Install swashplate boot lower ty-rap. Verify proper boot position, security, and operating clearance.

_____ **Swashplate:**

Inspect condition. Verify no nicks, scratches, gouges, dents, cracks, or corrosion. Verify 0.020 inch maximum radial play between swashplate ball and slider tube. Rotate rotor by hand and verify no rough or dry bearings. Verify proper operation.

_____ **Swashplate Shimming:**

Closely examine area between lower swashplate and swashplate ball while a second person slowly raises and lowers collective stick. Verify synchronized movement of swashplate ball with swashplate when swashplate reverses direction.

NOTE
Swashplate shimming is required when swashplate ball lags collective inputs, indicating axial play. Shim swashplate per Chapter 67.

_____ **Fasteners & Torque Stripes:**

Inspect condition. Verify proper installation and security of fasteners. Renew deteriorated torque stripes per Figure 5-1.

_____ **Close & Secure:**

Verify foreign objects are removed. Verify equipment security. Verify cleanliness of interior and of access fairing. Close mast fairing and verify security.

5-45 100-Hour / Annual Inspection (continued)

ROTOR HUB & MAIN ROTOR BLADES

_____ **Teeter Stops & Teeter Stop Brackets:**
Inspect both urethane teeter stops and associated stainless steel brackets. Replace stops if cracked due to weathering. If stops evidence pinching and/or brackets are deformed, excessive MR teetering has occurred; contact RHC Technical Support for further instructions.

_____ **Droop Stops:**
Cone and support both MR blades. Inspect curved bottoms of both aluminum droop stops where spindle tusks contact; replace any droop stop if wear exceeds 0.030 inch.

_____ **Hub:**
Inspect condition. Verify no nicks, scratches, gouges, dents, cracks, or corrosion. Verify no brown or black residue indicating bearing wear. Verify proper installation and security.

_____ **Hinge Bolts:**
Inspect condition. Check blade hinge friction by lifting blades until spindle tusks clear droop stops. Hold one blade level and cone opposite blade; rotor hub must not teeter as blade is coned. Repeat check on opposite blade. Verify cotter pins are installed and secure. Verify bolt heads and nuts are torque striped to thrust washers.

_____ **Pitch Links & Rod Ends:**
Inspect condition. Inspect rod end bearings per § 5-33; verify rod ends are centered and palnut & jam nut torque stripes are acceptable. Verify correct orientation of C115-1 spacers. Check witness holes for proper thread engagement. Verify proper installation of safety wire (if applicable).

_____ **Blade Spindles & Root Fittings:**
Inspect condition. Verify no obvious damage to visible portions of blade spindles and pitch horns. Verify no obvious damage to, and no missing paint from, blade root fittings, especially in area adjacent to inboard edges of blade skin and doublers.

_____ **Blade Boots:**
Inspect condition. Verify no boot defects or oil leakage. Verify boot security. Verify clearance from hub assembly through full control travel.

_____ **Fasteners & Torque Stripes:**
Inspect condition. Verify proper installation and security of fasteners. Renew deteriorated torque stripes per Figure 5-1.

_____ **Main Rotor Blade Tip Maintenance:**
Perform main rotor blade tip maintenance per § 62-60.

5-45 100-Hour / Annual Inspection (continued)

LANDING GEAR

_____ **Landing Gear Strut Fairings:**
Open as required to access landing gear structure for inspection. Inspect condition. Verify no nicks, scratches, dents, cracks, corrosion, fretting, or loose rivets. Verify hose clamp security and acceptable general cleanliness of fairing interior. Close and secure fairings.

_____ **Skid Tubes & Shoes:**
Inspect condition. Verify skid tube and skid shoe wear is within limits specified in §§ 32-30 & 32-31. Verify drain holes are not obstructed. Verify security of rain caps; if rain cap is loose or damaged, verify no internal corrosion. Verify security of ground handling wheel brackets and step(s) if installed.

_____ **Struts Assemblies:**
Inspect condition. Verify no cracks or corrosion, especially at collar and gusset joints and in weld areas at bottom of struts. Torque-check strut-to-skid-tube bolts. Verify security.

_____ **Cross Tubes:**
Inspect condition. With helicopter on level ground, verify minimum tail skid height per § 32-20. Verify no cracks, corrosion, or fretting at elbows. Verify security of (clear plastic) rain caps; if rain cap is loose or damaged, verify no internal corrosion. (Note that one vent hole per cross tube is located near left or right end of tube to prevent pressurization.)

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

_____ **Fasteners & Torque Stripes:**
Inspect condition. Verify proper installation and security of fasteners. Renew deteriorated torque stripes per Figure 5-1.

_____ **D679 Cylinder assembly (Pop-out floats; if installed):**
Inspect condition. Verify security. Verify pressure gage indicates correct pressure for ambient temperature; refer to placard on cylinder for limits.

_____ **Inflation manifold (Pop-out floats; if installed):**
Inspect condition. Verify no chafing or pinching of hoses, especially where hoses pass though structure.

_____ **Float assemblies (Pop-out floats; if installed):**
Inspect condition of stowed floats. Verify no holes, cuts, tears, abrasion through or unraveling of, float covers. If cover damage is found, inflate and inspect floats per § 32-64. Annually apply A257-7 dry-film lubricant to float cover snap mating surfaces. Verify snaps and hook-and-loop fasteners are properly secured. Verify float-to-skid attachment security.

5-45 100-Hour / Annual Inspection (continued)

CABIN

_____ **General Interior:**
Inspect condition. Verify general cleanliness of cabin and seat compartment interior. Verify no loose objects or equipment, which could foul controls or injure occupants in a hard landing. Verify legibility of placards and markings. Verify serviceable condition of switches, knobs, handles, and other controls.

_____ **Seat Belts & Shoulder Harnesses:**
Inspect condition. Verify no fraying or broken stitching of seat belts or shoulder harnesses. Verify no significant UV damage. Check inertia reels for proper operation by pulling harness quickly to verify locking function. Check buckles for proper operation. Check belt and reel attachment points for security. Verify no cracks in seat belt anchor welds. Verify security.

NOTE
TSO tag not required on factory-installed harnesses.

_____ **Cyclic Guard (if installed):**
Inspect condition of cyclic guard. Verify security and proper operation.

_____ **Windshields & Windows:**
Inspect condition. Verify no significant UV damage (yellowing). Minor defects or imperfections that do not impair pilot visibility or indicate impending structural failure are acceptable. Refer to § 52-30 for damage and repair limits. Verify proper installation and security.

_____ **Static Ports:**
Inspect condition. Verify no obstructions.

5-50 2000-Hour/12-Year Inspection

NOTE

Fuel bladder(s) are on condition.

NOTE

KI-6602 2000-Hour Inspection Kit contents are available online at https://robinsonheli.com for review.

NOTE

12-Year Inspection is only required for helicopters that have accumulated 12 years in service and less than 2000 hours time in service since new, since last 2000-hour inspection, or since last 12-year inspection.

1. Refer to helicopter maintenance records and § 4-30; replace life-limited parts, or next higher assemblies, as required.
2. Refer to helicopter maintenance records and § 1-92; perform additional component maintenance, as required.
3. Visually inspect stabilizers. Verify no cracks, corrosion, loose rivets, dents, or deformation.
4. Remove fuel bladder(s) per Chapter 28. Visually inspect interior and exterior. Verify no corrosion, residue, microbial growth, or damage to fabric. Visually inspect adjacent structure for evidence of bladder leakage. Replace roll-over vent valve O-rings and packings per § 28-11. Remove any foreign object debris. Install bladder(s) per Chapter 28.
5. Perform (engine driveline) forward flex plate shimming per § 63-11 and (tail rotor driveline) intermediate flex plate shimming per § 65-30.
6. Fill and bleed hydraulic system per § 12-34 as required.
7. Drain engine oil per § 12-60; utilize a suitable clean container if reuse of oil is intended. Using a borescope or remote camera, inspect oil tank internal baffle and welds for signs of cracking. If cracks are detected, or if a broken baffle is found, replace oil tank per § 79-20. Add engine oil per § 12-60.
8. Perform main rotor flight control and blade angle rigging per §§ 18-30 and 18-40.
9. Perform tail rotor flight control and blade rigging per §§ 18-50 and 18-60.
10. If installed, perform leak check of air conditioning system per § 12-83.
11. Perform 100-Hour / Annual Maintenance and Inspection per § 5-45.
12. Weigh helicopter per § 8-20.

5-50 2000-Hour/12-Year Inspection (continued)

13. Balance tail rotor per § 18-20. Track and balance main rotor per § 18-10. Perform flight checks per § 5-43.

14. Drain and flush tail rotor gearbox per § 12-23.

15. 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.

5-51 C258-5 Main Rotor Pitch Link Assembly Inspection

1. Temporarily mark each pitch link and associated swashplate ear with unique identifiers, such as different colors and/or X & O. Measure and record overall lengths of both links.

2. Remove pitch links.

3. R66 Service Letter SL-20 refers. Disassemble pitch links, keeping parts from each link separate from the other.

4. Evaluate rod ends per § 5-33 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. Apply a light coat of A257-2 or -22 oil to rod end threads and assemble pitch links; adjust to recorded lengths. Torque jam nut & adjacent palnut per § 20-32. Special torque self-locking 21FKF-813 jam nut per § 20-33.

8. Install pitch links to associated swashplate ear and, if installed, main rotor blade. Torque fasteners per § 20-32 and torque stripe per Figure 5-1.

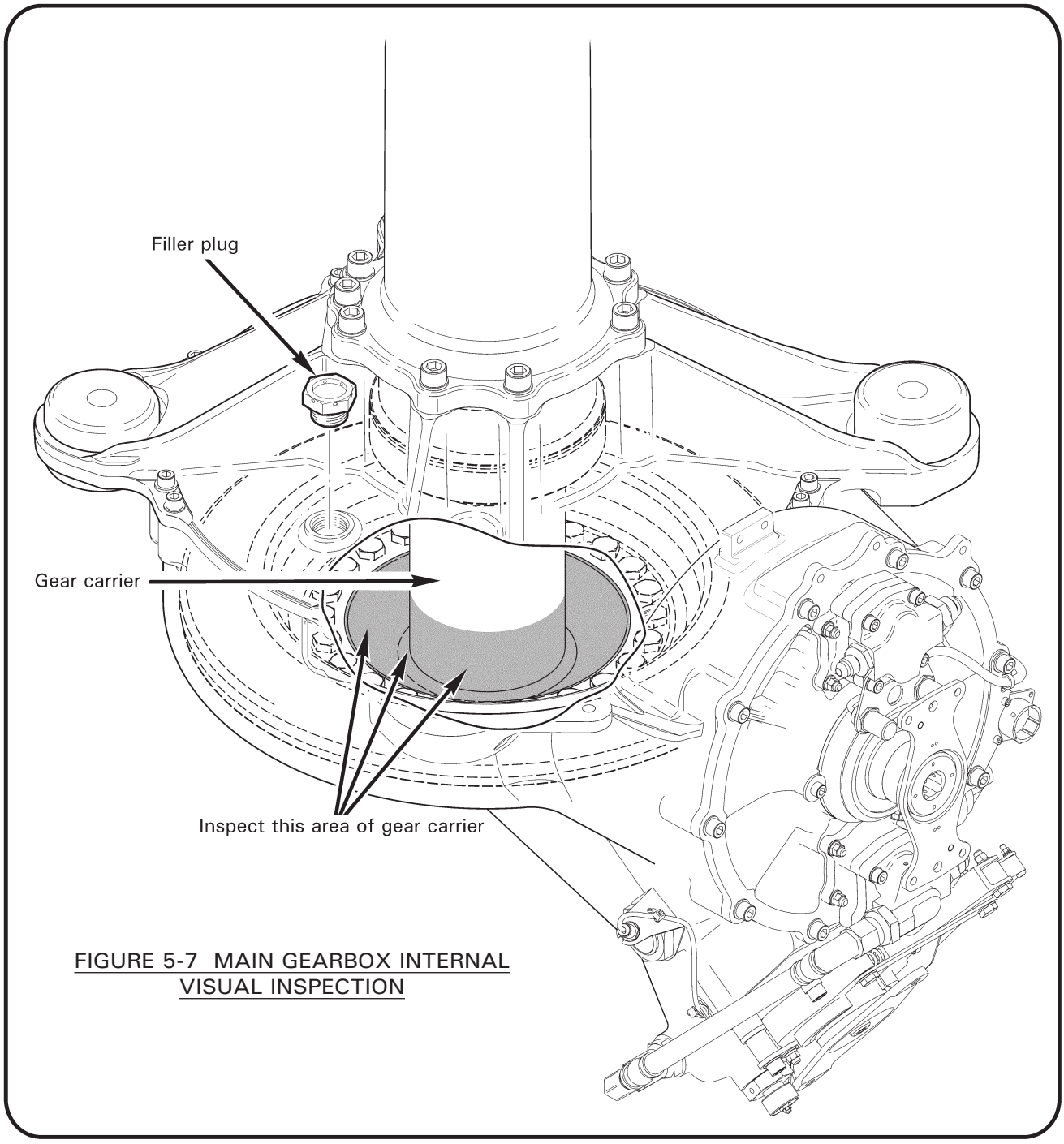


FIGURE 5-7 MAIN GEARBOX INTERNAL VISUAL INSPECTION

5-74 Main Rotor Gearbox Internal Visual Inspection

1. Refer to Figure 5-7. Gain access to and remove main gearbox filler plug.
2. Via filler plug hole and using borescope, miniature camera, or smartphone camera with flash, visually inspect specified area of gear carrier. Rotate gearbox by hand-turning main or tail rotor as required to view entire circumference.
3. If no corrosion or paint bubbling is evident, install filler plug & special torque per § 20-33.
4. If corrosion or paint bubbling is detected, contact RHC Technical Support.

5-75 Inspection After Stabilizer Damage

For damage to an installed C042-1 upper vertical stabilizer, C043-1 lower vertical stabilizer, and/or C044 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 5-8.
2. Perform fluorescent penetrant inspection (FPI) per ASTM E 1417 of stripped surfaces. Replace tailcone if crack is indicated.
3. Prime & paint stripped surfaces per §§ 20-60.

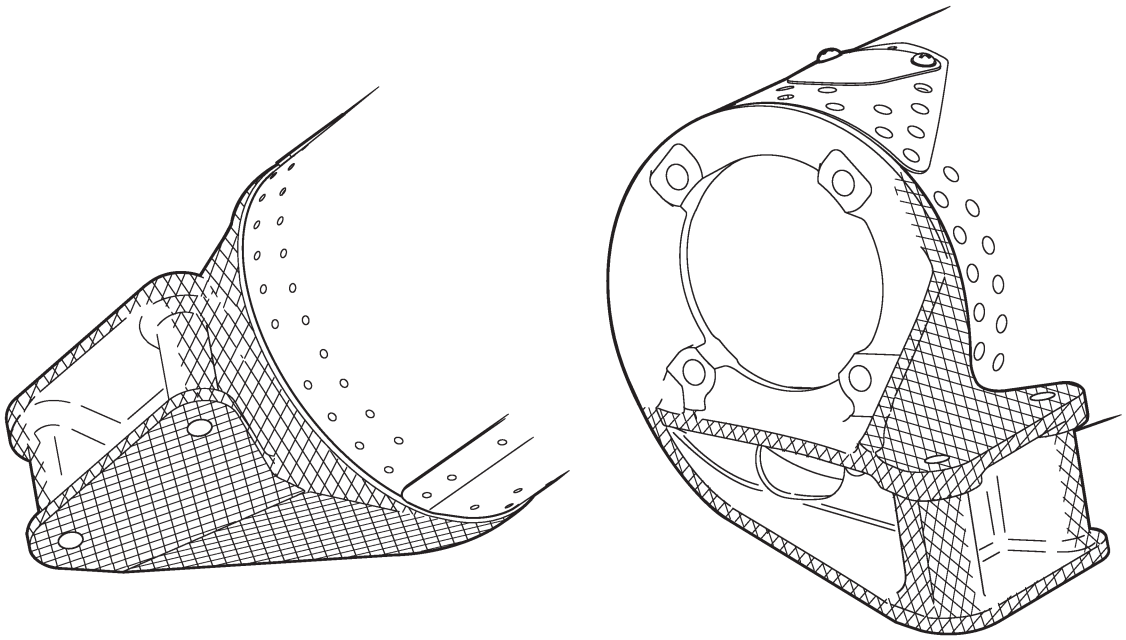


FIGURE 5-8 CROSS-HATCHED SURFACES OF TAILCONE'S AFT CASTING

12-40 Fuel System

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.

WARNING

Always fuel helicopter in a well-ventilated area. No smoking within 100 feet of aircraft during fueling.

12-41 Fueling

NOTE

If helicopter is equipped with pressure fueling system, refer to R66 Pilot's Operating Handbook Section 9 Pressure Fueling Supplement for pressure refueling procedure.

1. Turn battery switch off.
2. a. **Main Fuel System:** Ground helicopter and ground fuel vehicle. Open fueling cowl door and connect fuel vehicle ground cable to helicopter at location identified by decal.

   b. **Auxiliary Fuel System:** Ground helicopter and ground fuel vehicle. Open baggage compartment door and connect fuel vehicle ground cable to aux fuel tank at location identified by decal.
3. Verify proper grade of aviation fuel. See R66 Pilot's Operating Handbook (POH) Section 2 for approved fuel grades and instructions for use of anti-ice additive.
4. Remove fuel cap and fuel helicopter as required.

NOTE

If auxiliary fuel system is installed, press QUANTITY button on aux fuel control panel for aux tank quantity, displayed on fuel quantity gage.

5. a. **Main Fuel System:** Install fuel cap, remove grounding equipment, and close and secure cowl door.

   b. **Auxiliary Fuel System:** Install fuel cap, remove grounding equipment, and close and secure baggage compartment door.

12-42 Defueling

A. Main Fuel System

1. Remove engine cowling per § 53-21.
2. Turn battery switch off. Pull fuel valve control to Off position.
3. Disconnect B283-12 hose at engine and install cap on engine inlet fitting.
4. Position hose into a suitable, grounded drain container.

> NOTE
>
> If desired, perform low-fuel switch assembly check per § 28-22.

5. Push fuel valve control into On position and drain fuel; drain residual fuel via sump valve. Pull fuel valve control to Off position. Perform maintenance tasks as required.
6. Add minimum 5 gallons fuel per § 12-41. Push fuel valve control into On position until fuel flows thru hose without bubbles. Pull fuel valve control to Off position.
7. Remove cap from engine fuel inlet fitting. Connect B283-12 hose, special torque hose nut per § 20-33, and torque stripe per Figure 5-1.
8. Defuel engine as required per RR300 Series Operation and Maintenance Manual (OMM).

B. Auxiliary Fuel System

1. Turn battery switch off. Open baggage compartment door.
2. Release D205-35 (large tank; drain) or D205-37 (small tank; drain) hose assembly from tab. Position hose overboard into a suitable, grounded drain container.
3. Open locking drain valve and drain fuel as required.
4. Close drain valve and secure hose near drain valve at tab. Secure baggage compartment door.

> NOTE
>
> Alternately, and depending on projected operations and main fuel system quantity, fuel may be transferred from the auxiliary fuel tank to the main bladder using the auxiliary fuel pump (use of external power is recommended). After fuel transfer using pump method there will be some fuel remaining in auxiliary tank; to completely drain tank, use drain hose method described above.

12-50 Main Rotor Blades

WARNING

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

12-51 Pitch Bearing Housing

NOTE

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

A. Servicing

1. Remove main rotor blades per § 62-10.
2. Refer to Figure 12-5. Place a suitable drain container below main rotor blade spindle assembly. Remove two B289-2 bolts and drain fluid.
3. Install MT147-1 bleed tool fittings into ports. Attach drain hose assembly to (top) bleed fitting, secure with two wraps 0.032-inch diameter lockwire, and safety tight. Position drain hose into drain container.
4. Place supply container with sufficient A257-4 fluid approximately 3 feet above spindle. Route fill hose assembly into drain container and open brass valve. Open supply container plastic valve and purge air from hose. Close valves.
5. Connect brass valve to (bottom) bleed fitting by tightening brass compression sleeve.
6. Open valves and fill spindle housing until no air bubbles are visible in drain hose assembly. Massage spindle boot, “pitch” blade up & down, and raise blade tip up & down to remove trapped air.
7. Remove drain hose assembly and (top) bleed fitting, and install B289-2 bolt. Roll the blade over. After five minutes, inspect the boot for leaks. If no leaks are found, close valves, remove fill hose assembly brass valve and (bottom) bleed fitting, and install other bolt.
8. Torque B289-2 bolts per § 20-33 and torque stripe per Figure 5-1.
9. Repeat steps for opposite blade.

12-60 Engine Oil Servicing

A. Draining Fluid

1. As required, run-up helicopter two to five minutes at 60-70% RPM per R66 Pilot's Operating Handbook (POH) Section 4 to warm engine oil.
2. Remove engine cowling per § 53-21.
3. Place a suitable drain container below B289-2 bolt in bend of F723-1 line assembly, and below AS5169D04 (drain) fitting in F649-1 oil cooler assembly.
4. Remove line assembly bolt and oil cooler assembly (drain) fitting and drain oil.
5. Service the engine oil system per RR300 Series Operation and Maintenance Manual (OMM).

B. Adding Fluid

NOTE

Do not contaminate engine oil. Service engine oil system with clean fluid from sealed containers, using clean tools.

NOTE

When servicing airframe oil tank, full oil quantity is six quarts; minimum quantity for takeoff is four quarts.

Six quart indication is top of knurled section of dipstick. Four quart indication is bottom of knurled section of dipstick or center of oil tank sight gage.

If shut down for more than 15 minutes, some oil may drain from oil tank to engine giving a false low oil quantity indication. If oil level appears low, turn igniter switch OFF and have a qualified person motor engine with starter for 30 seconds then re-check oil quantity.

1. Install B289-2 bolt in bend of F723-1 line assembly and special torque per § 20-33.
2. Install AS5169D04 (drain) fitting in F649-1 oil cooler assembly and special torque per § 20-33.
3. Install engine cowling per § 53-21.
4. Open access door, remove dipstick, and service airframe oil tank using approved turbine engine oil per R66 Pilot's Operating Handbook (POH) Section 8.
5. Install dipstick and close access door.
6. Perform engine test per RR300 Series Operation and Maintenance Manual (OMM) as required.

12-82 Desiccant Replacement

NOTE

Replace desiccant when condenser or refrigerant system is exposed to air. To eliminate moisture, replace desiccant, then immediately vacuum system for charging per § 12-81.

1. Remove engine cowling per § 53-21.
2. Recover refrigerant per § 12-81, if not previously accomplished. Remove condenser cap and replace desiccant.
3. Install cap, special torque cap per § 20-33, and torque stripe.
4. Charge system with refrigerant per § 12-81.

12-83 Leak Detection

Leaks may be detected using several techniques, depending on equipment available. Leak detection should not be attempted with the aircraft/system running. In addition to safety hazards, leaks are more difficult to detect with the varying pressures and temperatures of an operating system.

An empty system should hold full vacuum (27 to 29 inches mercury vacuum at sea level) with no assistance from the vacuum pump for 20 minutes minimum. If a vacuumed system creeps up in pressure, a leak may be present. The technician should be thoroughly familiar with vacuum equipment to ensure leak is in aircraft system and not in vacuum equipment or connections.

Leaks in a charged system may be detected using a mild soap and water solution applied to lines and fittings in suspected leak areas (bubbles indicate leaks) or using commercially available electronic refrigerant detectors. Follow detector manufacturer's instructions. Large leaks may be detected audibly if area is quiet or by formation of frost in area of leak.

NOTE

Frost does not necessarily indicate a leak. Normal system operation and/or charging procedures can cause frost to accumulate on some components.

NOTE

System pressure is not a reliable indicator of charge state or the presence of leaks. Because R134a is a liquid/vapor mixture with the system at rest, pressure will remain constant as more liquid vaporizes until majority of charge is lost.

12-83 Leak Detection (continued)

Very small leaks can be detected by charging the system with helium gas. Helium molecules are smaller than R134a molecules and will leak more quickly. Charge system to 200 psi maximum. Use commercially available electronic helium detector or soap and water solution to locate leaks.

Leaks are most likely to occur at fittings and crimped transitions between hard line and flexible hose. Concentrate initial leak detection efforts in these areas.

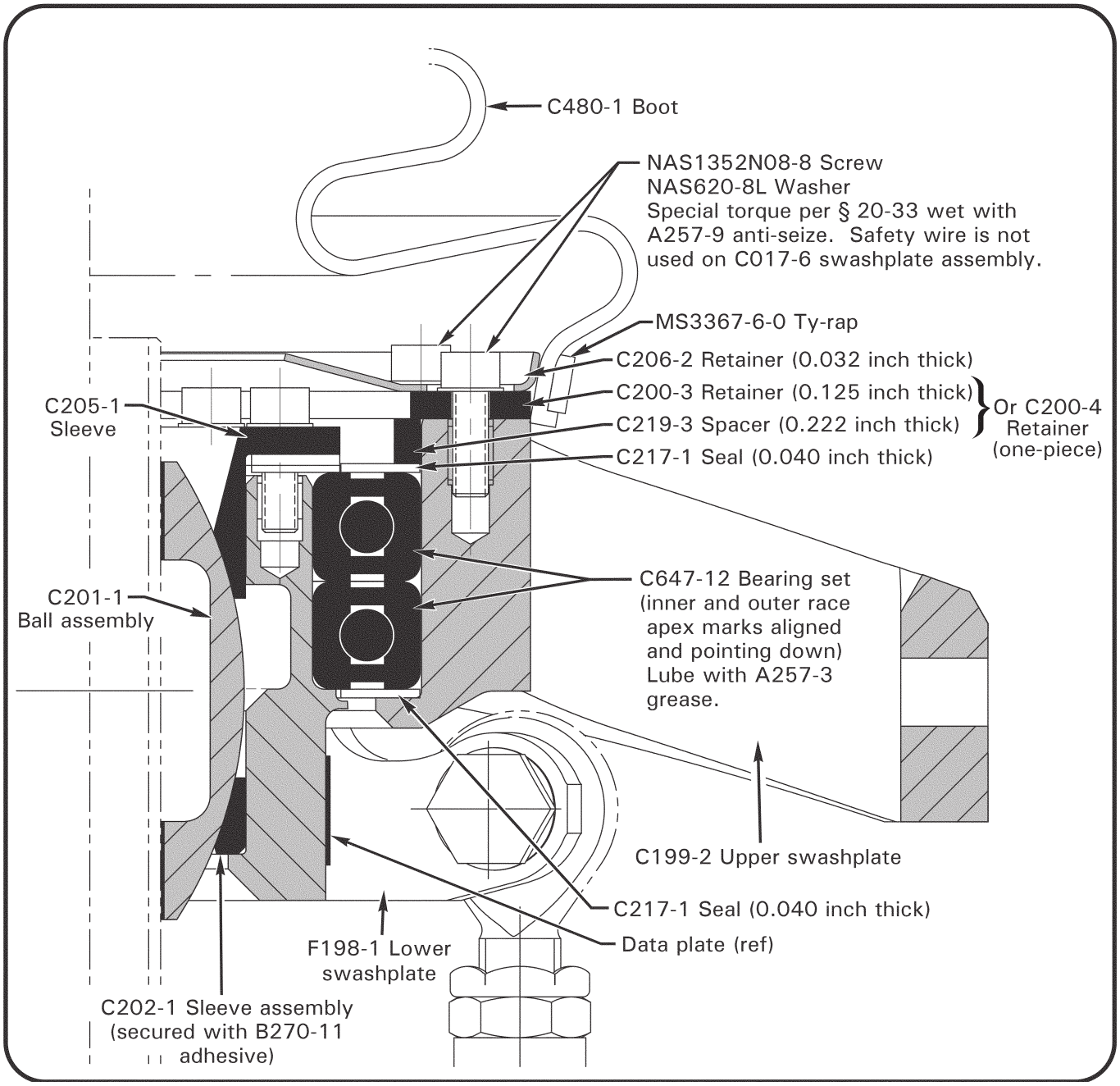


FIGURE 12-7 C017-6 REV AD OR LATER SWASHPLATE ASSEMBLY

12-90 Lubrication of Swashplate Bearings

1. Determine revision ("REV") letters on C017-6 swashplate data plate. If revision letters are "AD" or subsequent, proceed to step 2. If revision letters are "AA", "AB", or "AC", perform R66 Service Bulletin SB-30, if not previously accomplished.
2. Remove ty-rap securing C480 boot to upper (rotating) swashplate.
3. Remove hardware securing lower rod ends of both C258 pitch links to upper swashplate. Temporarily secure boot, upper A205 fork, and both pitch links up & away from swashplate.
4. Rotate upper swashplate by hand; if bearing roughness is detected, replace swashplate or submit swashplate to RHC for repair.
5. Refer to Figure 12-7. Remove (10) NAS1352 screws (with washers) securing C206-2 & C200-3 retainers to upper swashplate. Raise both retainers and C219-3 spacer and either temporarily secure to chord arm (if on helicopter) or set aside (if on workbench).
6. Using a 0.006 inch feeler gage, gently pry up outer edge of upper C217-1 seal and expose top ball bearing.
7. Using a syringe or grease gun, add A257-3 grease into cavity above bearing set until grease is just below top of C205-1 sleeve (approx. 20 ml grease). Do not allow grease into screw holes.
8. Position C217-1 seal atop grease followed by C219-3 spacer, C200-3 retainer, and NAS1352N08-8 screws with NAS620-8L washers. Finger-tighten all screws, then snug any (4) screws that are 90° apart, depressing seal and forcing grease into underlying bearing set. Rotate upper swashplate several revolutions. Wipe off excess grease.
9. Repeat steps 5 thru 8 once, then proceed to step 10.
10. Remove screws & washers and solvent-clean. Raise and clean C200-3 retainer and C219-3 spacer, then reinstall both.
11. Install C206-2 retainer, NAS620-8L washers, and NAS1352N08-8 screws with A257-9 anti-seize. Special torque screws per § 20-33.
12. Refer to IPC Figure 67-41. Connect upper A205 fork rod end and lower rod end of associated C258 pitch link, to interrupter-side swashplate ear; standard torque bolt per § 20-32. Install palnut, standard torque per § 20-32, and torque stripe per Figure 5-1.
13. Attach two A255-3 counterweights, and lower rod end of C258 pitch link, to swashplate ear opposite interrupter; standard torque bolt per § 20-32. Install palnut, standard torque per § 20-32, and torque stripe per Figure 5-1.
14. Verify safety washers (or counterweight) and C115 spacers installed at all rod ends per Figure 5-1.

12-90 Lubrication of Swashplate Bearings (continued)

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 the installer has assembled.

15. While observing swashplate, have someone fully manipulate cyclic and collective controls. Verify swashplate movement corresponds with cyclic and collective movement, and without interference.
16. Position swashplate boot on upper swashplate and secure with MS3367-6-0 ty-rap.
17. With appropriately rated person at controls, start helicopter, run up to 100% N_R, then shutdown.
18. Remove ty-rap, and raise swashplate boot. Wipe off excess grease from swashplate. Position swashplate boot on upper swashplate and secure with MS3367-6-0 ty-rap.

CHAPTER 18

TRACK AND BALANCE

Intentionally Blank

18-11 Preparing Helicopter for Main Rotor Track and Balance

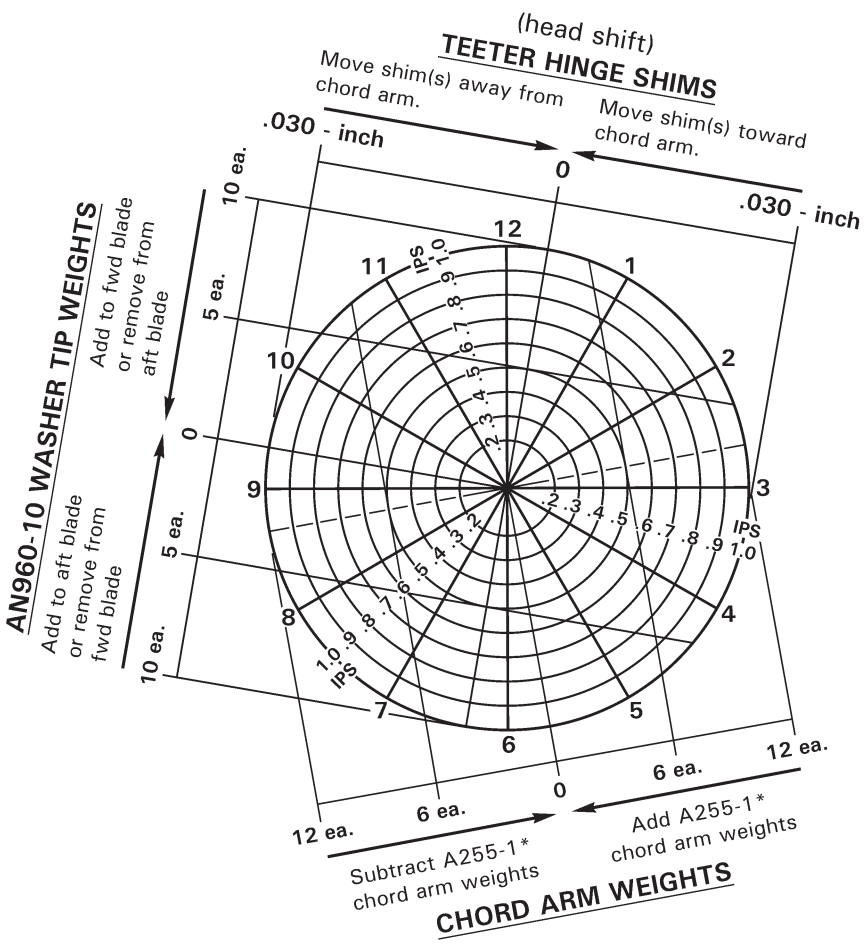
NOTE

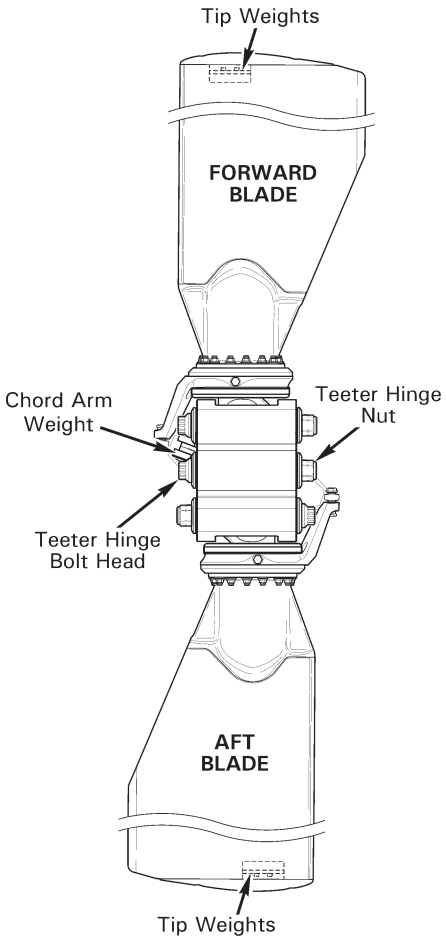
Use the following track & balance procedures in conjunction with approved equipment manufacturer's balancing instructions.

CAUTION

Cable security is critical; helicopter will be flown at V_{NE}.

1. Perform swashplate and rotor hub inspection per § 5-45. Inspect tail rotor rod ends and elastomeric bearings per §§ 5-33 and 5-34.
2. Clean main and tail rotor blades per § 20-10. Install main rotor blade target tape per Figure 18-1.
3. Refer to Figure 18-1. Using appropriate hardware, attach brackets to vibration transducer and attach assembly to F359-1 panel as shown. Remove removable controls.
4. Install magnetic pickup onto swashplate bracket. Set (swashplate-mounted) interrupter-to-pickup gap to 0.030 inch ± 0.010 inch and tighten pickup nuts against bracket. Safety nuts using 0.020-inch diameter lockwire. Recheck gap.
5. Pull collective stick full up, push cyclic stick full left, and apply frictions. Connect proper cable to magnetic pickup. Route cable down seam and to base of mast fairing, across the cabin roof left side, and through aft left door vent door. Attach cable to fuselage using MS21919WDG3 clamps and existing fasteners, or secure cable every 12 inches with duct tape. Release control frictions and verify sufficient cable slack and freedom of controls through full range of travel.
6. Connect proper cable to vibration transducer. Connect transducer, magnetic pickup, and tracker or strobe cables to analyzer. If strobe light is used, battery power may be accessed thru auxiliary power socket located on circuit breaker panel. Neatly stow and secure excess cables.
7. Verify security of installation.





DATE ____________ SERIAL NO. ____________

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CHORD ARM WEIGHTS			
(1) A255-1 Weight	=	(8)	AN970-4 Washers
(1) A255-2 Weight	=	(3)	A255-1 Weights

TIP WEIGHTS			
(1) AN960-10 Washer	=	(2)	AN960-10L Washers
(1) C298-2 Weight	=	(5)	AN960-10 Washers
(1) C298-3 Weight	=	(11)	AN960-10 Washers
(1) C298-4 Weight	=	(4)	C298-3 Weights

TEETER HINGE SHIMS	
C117-8	0.012 inch
C117-9	0.015 inch
C117-10	0.020 inch
C117-11	0.025 inch

BALANCE		TRACK (KNOTS)										
CLOCK	IPS	HOVER	50	60	70	80	90	100	110	120	130	140

Adjustment: ____________

CLOCK	IPS	HOVER	50	60	70	80	90	100	110	120	130	140

Adjustment: ____________

CLOCK	IPS	HOVER	50	60	70	80	90	100	110	120	130	140

Adjustment: ____________

CLOCK	IPS	HOVER	50	60	70	80	90	100	110	120	130	140

FIGURE 18-2 MAIN ROTOR TRACK AND BALANCE CHART

18-12 Flight Checks

NOTE

Run-up and shutdown helicopter throughout procedure as required per R66 Pilot's Operating Handbook (POH) Section 4.

NOTE

Refer to § 18-15 for track & balance troubleshooting procedures.

WARNING

Tail rotor balancing equipment must be removed for flight.

WARNING

Do not exceed V_{NE} of helicopter during flight checks.

1. Prepare helicopter for main rotor track and balance per § 18-11.
2. As required, print Figure 18-2; use copy to record flight data. Check main rotor blade track in a hover and record data. Maximum permissible blade track difference in a hover is 0.25 inch. Adjust track per § 18-13 as required, record change, and recheck blade track in a hover. Repeat step as required until blade track is within limits.
3. Check main rotor balance in a hover and record data. Maximum vibration allowance is 0.2 ips (inches per second). Adjust balance per § 18-14 as required, record data, and recheck balance in a hover. Repeat step as required until main rotor balance is within limits.
4. Fly helicopter at 50 knots then increase in 10-knot increments up to $V_{NE.}$ Check main rotor blade track at each airspeed and record data. Maximum blade spread between airspeeds is 3/8 inch. Adjust trim tab(s) per § 18-13 as required and record data. Repeat step as required until blade track is within limits.
5. Recheck main rotor balance in a hover per step 3.
6. Perform autorotation RPM check per § 18-16. Recheck main rotor balance in a hover per step 3.
7. Evaluate collective trim, longitudinal cyclic trim, and lateral cyclic trim. Replace D918 cord assemblies as required. Recheck main rotor balance in a hover per step 3.
8. Remove track and balance equipment. Torque stripe fasteners per Figure 5-1. Reinstall removable controls, as required.

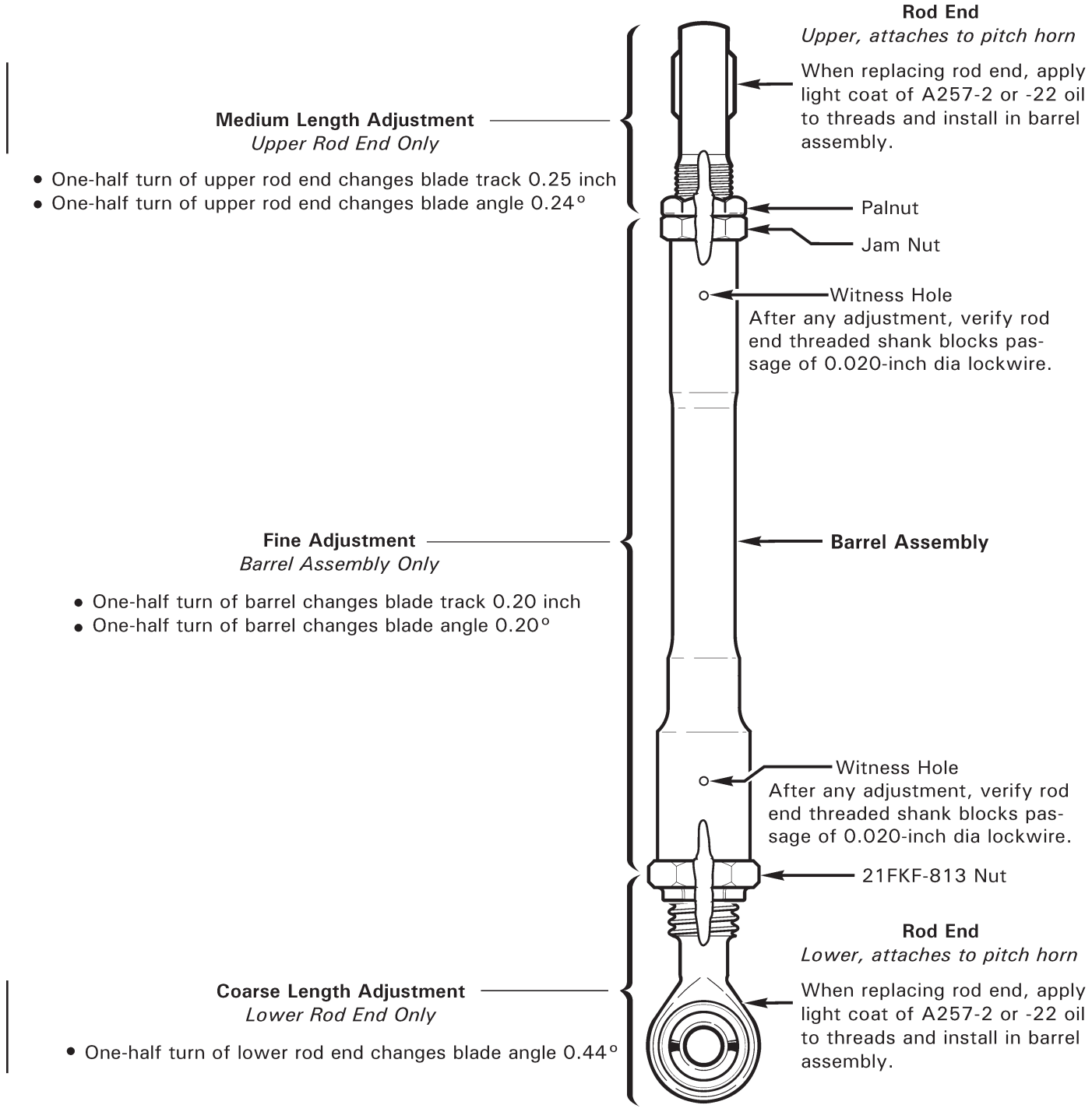


FIGURE 18-3A C258-5 MAIN ROTOR PITCH LINK

18-13 Track Adjustment

A. Main Rotor Blade Pitch Link

NOTE
Shorten high pitch blade when adjusting track in a hover.

NOTE
During rigging, adjust both pitch links exactly the same for collective adjustments.

1. For fine adjustment:

   a. C258-5 Pitch Link: Adjust barrel assembly only per the following steps:

      i. Refer to Figure 18-3A. Using backup wrench on barrel assembly, loosen 21FKF-813 nut at lower rod end, and upper rod end palnut and jam nut.

      ii. Rotate barrel assembly to shorten or lengthen pitch link as required. One-half turn of barrel changes blade track approximately 0.20 inch. One-half turn of barrel changes blade angle approximately 0.20°. For finer adjustment, rotate less than one-half turn as required.

      iii. Refer to Figure 5-1. Verify rod end threaded shank blocks passage of 0.020-inch diameter lockwire through barrel assembly witness holes.

      iv. Position rod ends to allow as much pitch link rotation as possible without binding. Using backup wrench on barrel assembly, special torque 21FKF-813 nut per § 20-33, and standard torque upper rod end jam nut and palnut per § 20-32.

      v. Repeat steps on opposite pitch link as required; torque stripe per Figure 5-1.

   b. C258-1 Pitch Link: Adjust fitting only per the following:

      i. Refer to Figure 18-3B. Cut and discard pitch link assembly safety wire. Using backup wrench on link assembly, loosen 21FKF-813 nut; using backup wrench on fitting, loosen upper rod end palnut and jam nut.

      ii. Rotate fitting to shorten or lengthen pitch link as required. One-half turn of fitting changes blade track approximately 0.20 inch. One-half turn of fitting changes blade angle approximately 0.20°. For finer adjustment, rotate less than one-half turn as required.

      iii. Refer to Figure 5-1. Verify rod end threaded shank blocks passage of 0.020-inch diameter lockwire through pitch link witness holes.

      iv. Using backup wrench on link assembly, special torque 21FKF-813 nut per § 20-33. Using backup wrench on fitting, standard torque upper rod end jam nut and palnut per § 20-32. Safety fitting to link assembly using 0.032-inch diameter lockwire.

      v. Repeat steps on opposite pitch link as required; torque stripe per Figure 5-1.

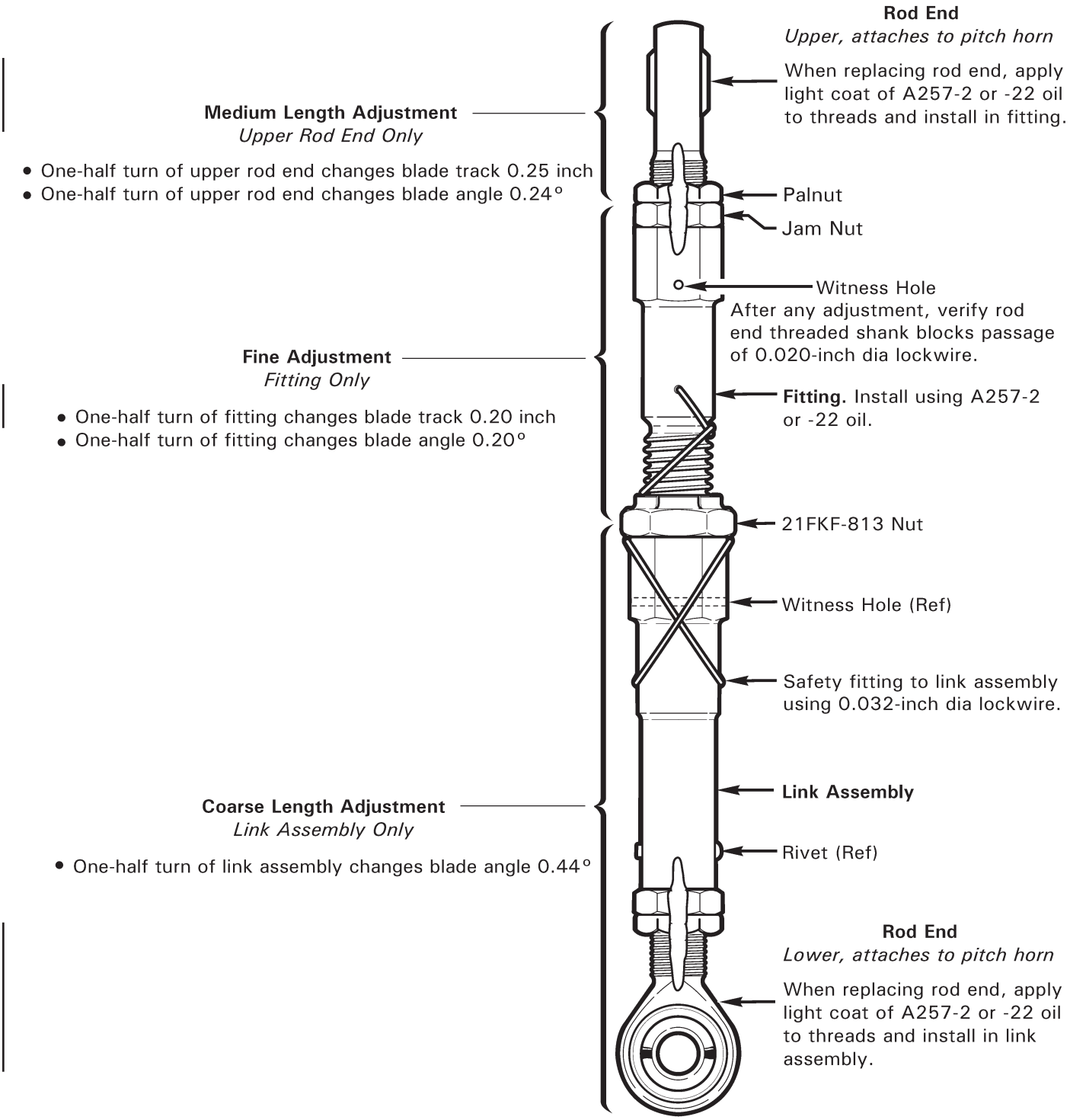


FIGURE 18-3B C258-1 MAIN ROTOR PITCH LINK

18-20 Tail Rotor Dynamic Balance

NOTE

Calibrate track and balance equipment per manufacturer's recommendation, at least once a year, or if equipment is dropped, misused, or calibration is suspect.

NOTE

The Chadwick-Helmuth Vibrex system, the TEC ACES system, the Dynamic Solutions Systems' MicroVib system, or equivalent equipment is required to perform dynamic rotor balancing and in-flight track checks.

18-21 Preparing Helicopter for Tail Rotor Dynamic Balance

NOTE

Use the following balance procedures in conjunction with approved equipment manufacturer's balancing instructions.

WARNING

Ensure cable(s) cannot entangle tail rotor.

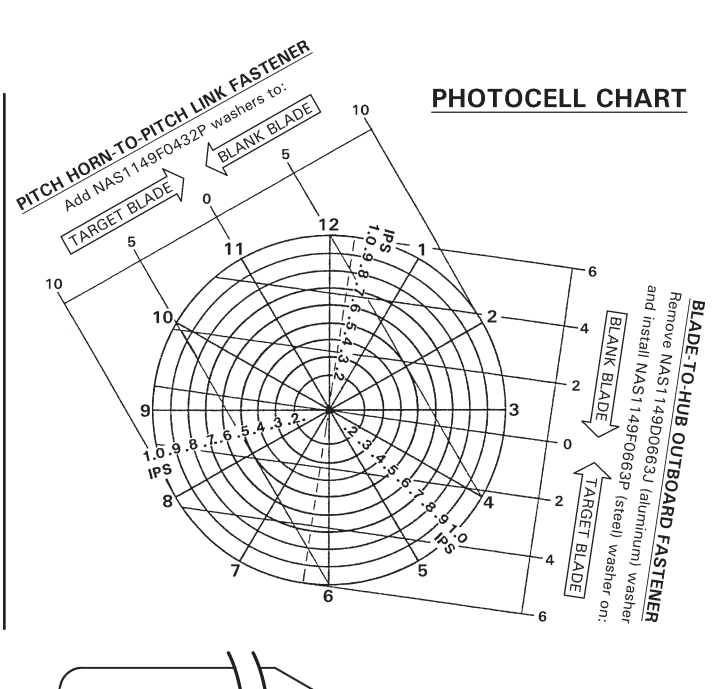
1. Clean tail rotor blades per § 20-10. Inspect tail rotor rod ends and elastomeric bearings per §§ 5-33 and 5-34.
2. Track tail rotor blades per § 64-10.
3. Refer to Figure 18-6. If using photocell to obtain clock angle, install a target tape spanwise on inboard side of one arm of tail rotor hub; if using Strobex, install a target tape spanwise on outboard side of hub.
4. Using appropriate hardware, attach bracket(s) to vibration transducer, and photocell, if used. Secure bracket to tail rotor gearbox output shaft cap at forward, top attachment bolt. Orient vibration transducer vertically.
5. Connect cable(s) to transducer, and photocell, if used. Route cable(s) forward and into cabin; wrap around tailcone several times, and secure with duct tape. If using Strobex, route cable to a position located approximately 20 feet to left of tail rotor. Place sandbags (or similar) on cable to prevent cable movement.
6. Connect cable(s) to balancer. Verify security of installation.

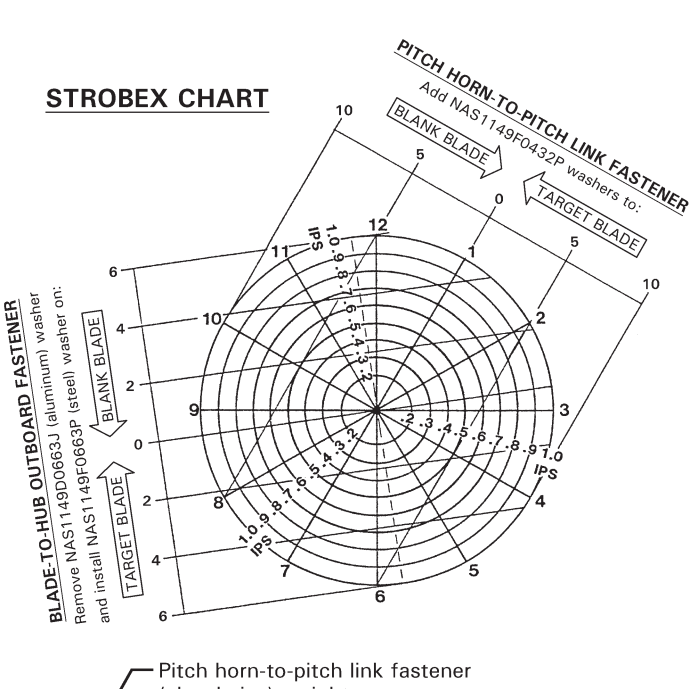
DATE _____ SERIAL NO. _____

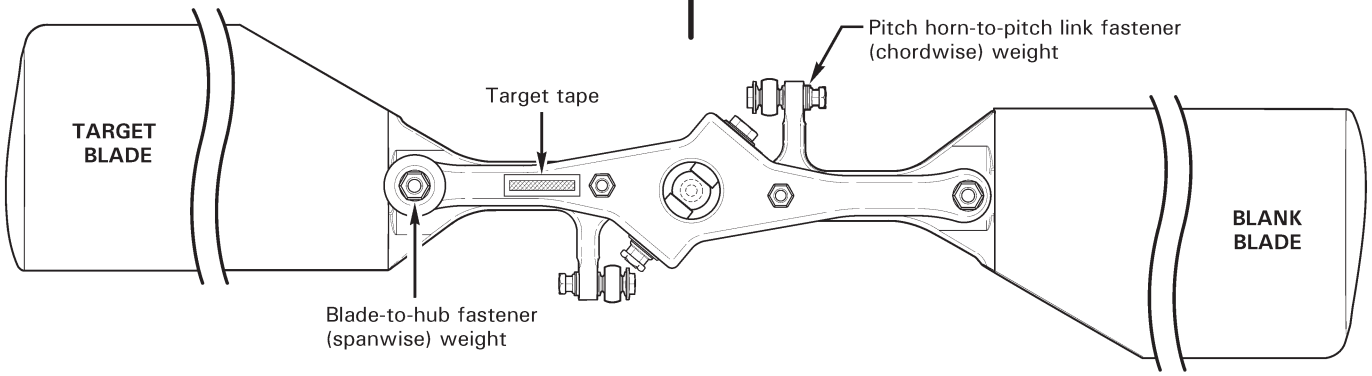
PAGE _____

PITCH HORN-TO-PITCH LINK FASTENER (CHORDWISE) WEIGHTS			
(1) NAS1149F0463P Washer	=	(2)	NAS1149F0432P Washers
(1) A214-3 Washer	=	(3.5)	NAS1149F0432P Washers
(1) A141-14 Washer	=	(5)	NAS1149F0432P Washers

BLADE-TO-HUB OUTBOARD FASTENER (SPANWISE) WEIGHTS			
(1) C141-23 Washer	=	(3.5)	NAS1149F0663P Washers
(1) C141-24 Washer	=	(7)	NAS1149F0663P Washers
(2) NAS1149F0632P		(1)	NAS1149F0663P Washer







BALANCE	
CLOCK	IPS

ADJUSTMENT: _____

CLOCK	IPS

ADJUSTMENT: _____

CLOCK	IPS

ADJUSTMENT: _____

CLOCK	IPS

ADJUSTMENT: _____

FIGURE 18-7 TAIL ROTOR DYNAMIC BALANCE CHART

18-22 Ground Checks

NOTE

Run-up and shutdown helicopter throughout procedure as required per R66 Pilot's Operating Handbook (POH) Section 4.

NOTE

Use the following balancing procedures in conjunction with approved equipment manufacturer's balancing instructions.

WARNING

Tail rotor balancing equipment must be removed for flight.

1. Prepare helicopter for tail rotor dynamic balance per § 18-21.
2. As required, print Figure 18-7; use copy to record ground check data. Check tail rotor balance at 99–101% RPM on ground and record data. Maximum vibration allowance is 0.2 ips (inches per second). (If using Chadwick-Helmuth system, set Function Knob on Balancer to appropriate channel, set balancer RPM Range knob to X10, and set RPM to 231. During ground run, view tail rotor assembly target tape through Strobex and tune Balancer by adjusting RPM dial.)
3. Adjust balance per § 18-23 as required, record change, and recheck balance. Repeat steps 2 and 3 as required until tail rotor balance is within limits.
4. Remove track and balance equipment. Install tail rotor gearbox output shaft cap forward, top attachment bolt and special torque per § 20-33. Install 0.032-inch diameter lockwire securing cap retaining hardware and safety in pairs.

WARNING

A rotor which is smooth after balancing but goes out of balance within a few flights is suspect and must be examined by RHC before further flight.

18-23 Balance Adjustment

Refer to R66 Illustrated Parts Catalog (IPC) Figure 64-1. Refer to § 64-11 for tail rotor assembly static balance procedure.

A. Pitch Horn-to-Pitch Link Fastener (Chordwise Balance Adjustment)

Chordwise dynamic balance is achieved by varying NAS6604 bolt length and nut-side washers on tail rotor blade pitch horn-to-pitch link fastener. Select bolt length and washers as required to balance tail rotor assembly chordwise per Figure 18-7. Standard torque nut and palnut per § 20-32, but do not torque stripe until after correct balance is achieved.

B. Blade-to-Hub Outboard Fastener (Spanwise Balance Adjustment)

Spanwise dynamic balance is achieved by varying nut-side washer size on tail rotor blade-to-hub outboard fastener. Four washers are required under outboard nuts. Select a combination of four washers to balance tail rotor assembly spanwise per Figure 18-7, placing largest washers closest to hub assembly. Standard torque nuts and palnuts per § 20-32, but do not torque stripe until after correct balance is achieved.

18-30 Main Rotor Flight Control Rigging

Cyclic stick travel is limited by A211-4 stop and is not adjustable. Collective stick travel is limited by A333-1 stop and is not adjustable. This procedure ensures blade angles are correct at cyclic stick & collective stick travel limits.

NOTE

Refer to § 5-33, and Figures 5-1 & 5-2 for standard rod end adjustment procedures. Refer to § 18-13 for main rotor pitch link adjustment procedure.

For collective adjustments, both pitch links must be adjusted exactly the same.

Track and balance helicopter per §§ 18-10 & 18-20 as required after adjusting flight controls.

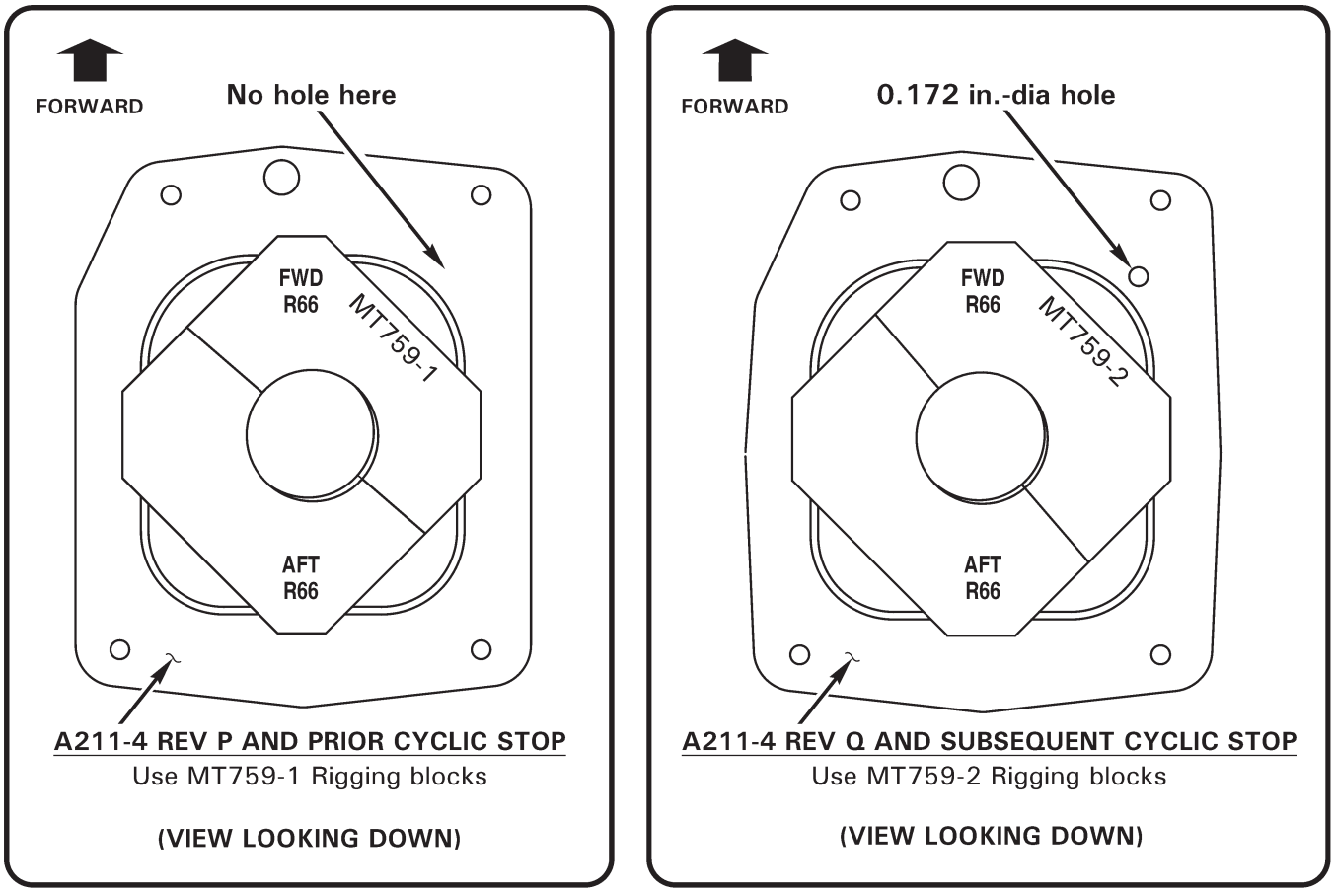


FIGURE 18-7A CYCLIC RIGGING

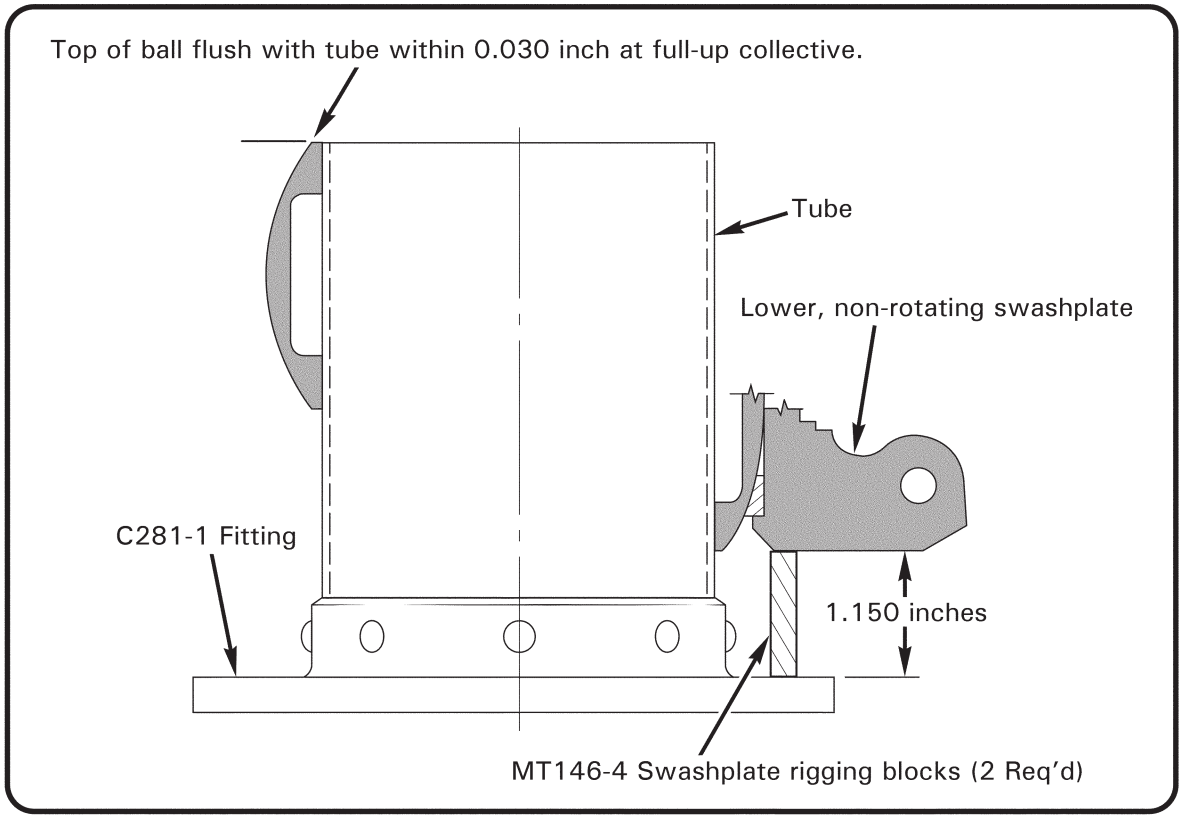


FIGURE 18-8 LOWER SWASHPLATE CLEARANCE

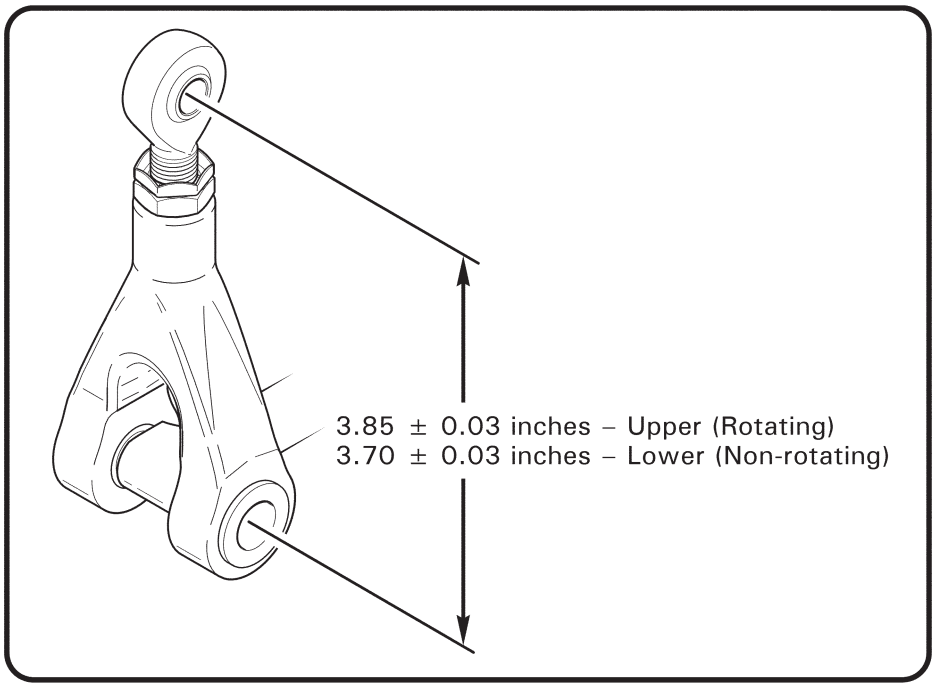


FIGURE 18-9 A205-7 FORK DIMENSIONS FOR SWASHPLATE SCISSORS

18-30 Main Rotor Flight Control Rigging (continued)

1. Refer to Figure 18-9. Adjust swashplate A205-7 lower fork assembly (non-rotating) to 3.70 ± 0.03 inches, and upper fork assembly (rotating) to 3.85 ± 0.03 inches.
2. Adjust the following push-pull tube assemblies and fork assembly, located between keel panels, to the noted rod end centerline-to-centerline dimensions:

PART NUMBER		DIMENSION
C121-1	=	51.13 ± 0.03 inches
F121-1	=	32.26 ± 0.03 inches
G205-1	=	5.40 ± 0.03 inches

3. With collective full up, adjust length of F121-1 tube so there is a 0.50 ± 0.03 inch gap between G205-1 yoke and F334-1 support assembly.
4. Verify hydraulic servo rigging meets Figure 29-3 requirements; adjust per § 29-30 Part B, as required.
5. Refer to Figure 18-7A. Install MT759-1 or MT759-2 rigging blocks inside A211-4 cyclic stop. Apply cyclic stick friction. Raise collective approximately half way.
6. Refer to Figure 18-8. Position MT146-4 swashplate rigging blocks between lower, non-rotating swashplate and C281-1 fitting.
7. Slowly lower collective stick full down or until lower swashplate contacts rigging blocks, whichever occurs first.
8. Disconnect (3) F121-3 push-pull tubes from lower swashplate. Ensure swashplate rests on rigging blocks.

CAUTION

Do not pressurize hydraulic system while any hydraulic system component is disconnected or removed.

9. Pressurize hydraulics per § 12-34 steps 1 thru 3. Position collective stick full down and apply collective stick friction. Turn off hydraulic pump.
10. Adjust each of (3) F121-3 push-pull tube rod ends to lowest/shortest position that allows installing connecting hardware without preload per Figure 5-1, and centered per Figure 5-2. Standard torque per § 20-32 and torque stripe per Figure 5-1.
11. Cut and discard ty-rap securing boot to swashplate.
12. Pressurize hydraulics per § 12-34 steps 1 thru 3. Position collective stick full up and apply collective friction. Turn off hydraulic pump. Verify top of C201-1 ball assembly is flush with top edge of C208-1 tube within 0.030 inch. Adjust push-pull tube rod ends in or out equally to raise or lower swashplate as required.
13. Remove swashplate rigging blocks. Disconnect hydraulic pump per § 12-34.
14. Position boot on swashplate, secure boot with MS3367-6-0 ty-rap, cinch ty-rap until snug without over-tightening, and trim tip flush with head.

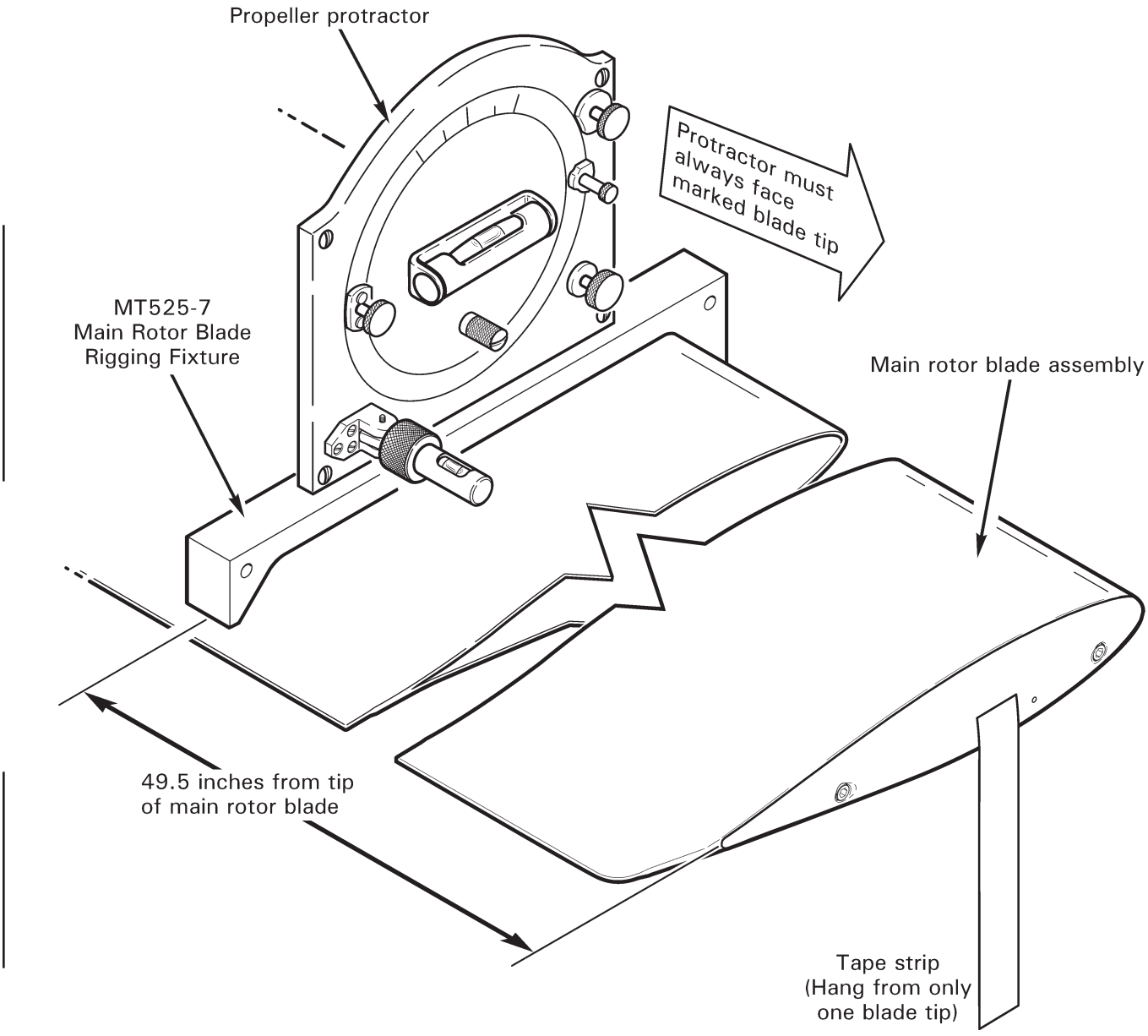


FIGURE 18-10 MAIN ROTOR BLADE RIGGING

18-40 Main Rotor Blade Angle Rigging

A. Procedure

NOTE

Refer to § 5-33, and Figures 5-1 & 5-2 for standard rod end adjustment procedures. Refer to § 18-13 for main rotor pitch link adjustment procedure.

1. Perform main rotor flight control rigging per § 18-30.
2. Level helicopter laterally and longitudinally via main rotor hub per § 8-12.
3. Adjust rotor track per § 18-40 Part B step 1.
4. Perform collective travel rigging per § 18-41 Parts A and B.
5. Perform cyclic travel rigging per § 18-42 Parts A, B, C, and D.
6. Perform track and balance per § 18-10 as required.

B. Measuring Blade Angles

NOTE

Hydraulic flight controls must be pressurized while measuring blade angles.

CAUTION

Do not pressurize hydraulic system while any hydraulic system component is disconnected or removed.

WARNING

Never adjust flight controls while hydraulics are pressurized. Hydraulic forces can cause injury.

1. Adjust rotor track per the following: Rotate blades so pitch links are aligned with helicopter longitudinal axis. Teeter main rotor hub until blade tips are approximately level. Place a tracking stick at end of one blade and mark stick where blade tip passes. Rotate rotor 180° and mark tracking stick where opposite blade passes. Teeter main rotor hub as required until both blade tips pass tracking stick within 1 inch vertically.
2. Refer to Figure 18-10. Using felt tip marker, mark upper surface of both main rotor blades 49.5 inches inboard of seam between blade tip and tip cover. Lay 1-inch wide length of masking tape chordwise on each blade, centered over marking. Mark each rotor blade with a different designation, such as red and blue.
3. Conspicuously mark one blade tip with tape or cardboard for reference. Zero Kell-Strom KS113 propeller protractor (or equivalent) on top of main rotor hub, parallel to teeter hinge bolt, at location marked “LEVEL HERE”. During zeroing, and when taking blade angle readings, always point protractor face toward marked blade.

18-40 Main Rotor Blade Angle Rigging (continued)

B. Measuring Blade Angles (continued)

4. Position MT525-7 fixture on top of the blade's tape at 49.5 inches, and tight against leading edge. Position protractor on top of fixture, point protractor face toward marked blade, and measure blade angle.

18-41 Collective Travel

NOTE

Lengthening pitch links increases blade angles.

NOTE

When making adjustments, keep pitch links as close to neutral (mid-travel) position as possible to preserve the adjustment range for flight checks.

A. Collective Down

1. Refer to Figures 18-7A and 18-8. Install MT759-1 or MT759-2 rigging blocks inside A211-4 cyclic stop. Position collective stick full down and apply friction.
2. Rotate blades so pitch links are aligned with helicopter longitudinal axis.
3. Measure and record blade angles per § 18-40 Part B to determine the values below. Rotate blades 180° and align per step 2 as required.

BLUE BLADE		**RED BLADE**	
Pitch horn forward	_____°	Pitch horn forward	_____°
Pitch horn aft +	_____°	Pitch horn aft +	_____°
=	_____°	=	_____°
÷ 2 =	_____°	÷ 2 =	_____°

4. Blade angles must average between 0.0° and 1.0° for collective down position. (Final blade angle for collective down position is determined during autorotation rpm adjustment.) Adjust main rotor blade pitch links per § 18-13 as required (one full barrel turn = 0.72°) until blade angles, when blades are positioned pitch horn forward, are within 0.2°. Adjust pitch links until blade angles, when blades are positioned pitch horn aft, are also within 0.2°.

NOTE

After making adjustments, position collective stick full up and apply friction. Verify top of swashplate ball is flush with tube within 0.030 inch per Figure 18-8. Adjust all swashplate push-pull tubes exactly the same amount as required (one full turn = 0.48°). Lengthening all push-pull tubes increases blade angles.

18-41 Collective Travel (continued)

B. Collective Up

1. Refer to Figure 18-7A. Install MT759-1 or MT759-2 rigging blocks inside A211-4 cyclic stop. Position collective stick full up and apply friction.
2. Rotate blades so pitch links are aligned with helicopter longitudinal axis.
3. Measure and record blade angles per § 18-40 Part B to determine the values below. Rotate blades 180° and align per step 2 as required.

BLUE BLADE			**RED BLADE**		
Pitch horn forward		_____°	Pitch horn forward		_____°
Pitch horn aft	+	_____°	Pitch horn aft	+	_____°
	=	_____°		=	_____°
	÷ 2 =	_____°		÷ 2 =	_____°

4. For collective up position, blade angles must average between 12.5° and 13.5° more than collective down position average. Adjust main rotor blade pitch links per § 18-13 as required (one full barrel turn = 0.72°) until blade angles, when blades are positioned pitch horn forward, are within 0.2°. Adjust pitch links until blade angles, when blades are positioned pitch horn aft, are also within 0.2°.

NOTE

Remeasure collective down blade angles after making adjustment for collective up blade angles.

NOTE

After making adjustments, position collective stick full up and apply friction. Verify top of swashplate ball is flush with tube within 0.030 inch per Figure 18-8. Adjust all swashplate push-pull tubes exactly the same amount as required (one full turn = 0.48°). Lengthening all push-pull tubes increases blade angles.

18-42 Cyclic Travel

A. Cyclic Left

1. Position collective stick full down. Position cyclic stick in the longitudinal neutral (mid travel) position, and against left stop. Apply control frictions; sandbag cyclic stick as required.
2. Rotate blades so pitch links are aligned with helicopter lateral axis.
3. Measure and record blade angles per § 18-40 Part B to determine the values below. Rotate blades 180° and align per step 2 as required.

BLUE BLADE			**RED BLADE**		
Pitch horn right		_____°	Pitch horn right		_____°
Pitch horn left	+	_____°	Pitch horn left	+	_____°
	=	_____°		=	_____°
	÷ 2 =	_____°		÷ 2 =	_____°

4. Blade angles must average between 7.5° and 8.5° for cyclic left position. Adjust swashplate forward left or right push-pull tube as required (one full turn = 0.6°).

B. Cyclic Right

1. Position collective stick full down. Position cyclic stick in the longitudinal neutral (mid travel) position, and against right stop. Apply control frictions; sandbag cyclic stick as required.
2. Rotate blades so pitch links are aligned with helicopter lateral axis.
3. Measure and record blade angles per § 18-40 Part B to determine the values below. Rotate blades 180° and align per step 2 as required.

BLUE BLADE			**RED BLADE**		
Pitch horn right		_____°	Pitch horn right		_____°
Pitch horn left	+	_____°	Pitch horn left	+	_____°
	=	_____°		=	_____°
	÷ 2 =	_____°		÷ 2 =	_____°

4. Refer to Figure 18-7A. Blade angles must average 6.0° minimum for A211-4 Rev P and prior cyclic stops, and 7.0° minimum for A211-4 Rev Q and subsequent cyclic stops. Adjust swashplate forward left or right push-pull tube as required (one full turn = 0.6°).

> NOTE
>
> Remeasure cyclic left blade angles after making adjustment for cyclic right blade angles.

18-60 Tail Rotor Blade Rigging

1. Level helicopter laterally, and longitudinally via main rotor hub, per § 8-12.
2. Place left (or right) pedal against its stop. Position tail rotor blades parallel with tailcone axis.
3. Refer to Figure 18-11. Tape a tracking stick to tailcone at blade tip. A tracking stick can be made using a 1″ x 12″ strip of aluminum with a 90° bend 2 inches from one end.
4. Rotate tail rotor shaft weldment and mark tracking stick where each blade tip drain hole passes. Adjust (teeter) tail rotor hub on output shaft until both blade tips pass the same point on the tracking stick.
5. Using felt tip marker, mark inboard surface of both tail rotor blades 7.25 inches from each blade tip. Lay 1-inch wide strip of masking tape chordwise on each blade, centered over marking. Mark each blade with a different color designation, such as red or blue.
6. Have a second person hold one blade tip at left pedal track mark with left pedal against its stop. Position MT525-9 rigging fixture on aft blade, against inboard surface. Position propeller protractor against fixture, measure blade angle, and record data below. Rotate tail rotor 180°, and record opposite blade angle.

	Pedals Full Left
Blue Blade	_____ °
Red Blade +	_____ °
=	_____ °
÷ 2 =	_____ ° (18.5/19.0° required)

7. Difference between blue and red blade angles may not exceed 0.4°. If blade angles exceed this limit, remove tail rotor assembly per § 64-10, rotate assembly one-half revolution, and install assembly per § 64-10. Repeat previous steps. If blade angles still exceed relative limit, contact RHC Technical Support for replacement blade assistance.
8. Adjust C121-17 push-pull tube rod ends per § 5-33 and Figures 5-1 & 5-2 as required to obtain blade angle between 18.5° and 19.0°. One full turn of the rod end will change the blade angle 0.33°.
9. Have a second person hold one blade tip at right pedal track mark with right pedal against its stop. Position MT525-9 rigging fixture on aft blade, against inboard surface. Position propeller protractor against fixture, measure blade angle, and record data below. Rotate tail rotor 180°, and record opposite blade angle.

	Pedals Full Right
Blue Blade	_____ °
Red Blade +	_____ °
=	_____ °
÷ 2 =	_____ ° (15.5/16.5° required)

10. Adjust C121-17 push-pull tube rod ends per § 5-33 and Figures 5-1 & 5-2 as required to obtain blade angle between 15.5° and 16.5°. If adjusted, recheck left pedal blade angles per previous steps.

18-60 Tail Rotor Blade Rigging (continued)

11. If the blade angle range for left and right pedal settings cannot be obtained using the preceding steps, pedal total travel is either too great or too small. Use the following procedure to check and adjust pedal travel:

    a. Add right and left pedal blade angles together. If total is less than 34.0°, pedal total travel is too small. If total is greater than 35.5°, pedal total travel is too great.

    b. If pedal total travel is too small, increase C343-11 push-pull tube length and/or decrease C343-13 push-pull tube length.

    c. If pedal total travel is too great, decrease C343-11 push-pull tube length and/or increase C343-13 push-pull tube length.

    d. Recheck left and right pedal blade angles per previous steps.

12. Balance tail rotor per § 18-20.

18-70 Fan Shaft and Engine Shaft Balancing

NOTE

Calibrate track and balance equipment per manufacturer's recommendation, at least once a year, or if equipment is dropped, misused, or calibration is suspect.

NOTE

The Chadwick-Helmuth Vibrex system, the TEC ACES system, the Dynamic Solutions Systems' MicroVib system, or equivalent equipment is required to perform dynamic rotor balancing and in-flight track checks.

18-71 Preparing Helicopter for Fan Shaft and Engine Shaft Balancing

NOTE

Use the following balance procedures in conjunction with approved equipment manufacturer's balancing instructions.

1. Remove tailcone cowling per § 53-23. Clean F196-1 fan shaft weldment, G174-1 fanwheel assembly, and F642 shaft weldment. Inspect condition of flex plates, weldment flanges, and adjacent yokes. Verify proper fastener installation and unbroken torque stripe.
2. Refer to Figure 18-12.
   a. Fan Shaft: Using a #8 screw, attach vibration transducer and photocell (cables pointed up) to mounting bracket(s). Secure bracket(s) to top of tailcone at the forward nutplate, aiming photocell toward center of shaft.
   b. Engine Shaft: Using appropriate hardware, attach photocell (cable pointed outboard toward access door) to mounting bracket. Secure bracket to F020-1 frame assembly using MS21919WDG16 clamp and associated hardware, aiming photocell toward center of shaft.
3. Install a target tape on each shaft weldment and align tape with a flange arm. Verify photocell beam will hit target tape. (Tape becomes the 12 o'clock position.)
4. Route cable(s) forward into cabin; secure cables to cabin with duct tape.
5. Connect cable(s) to balancer. Verify security of installation.

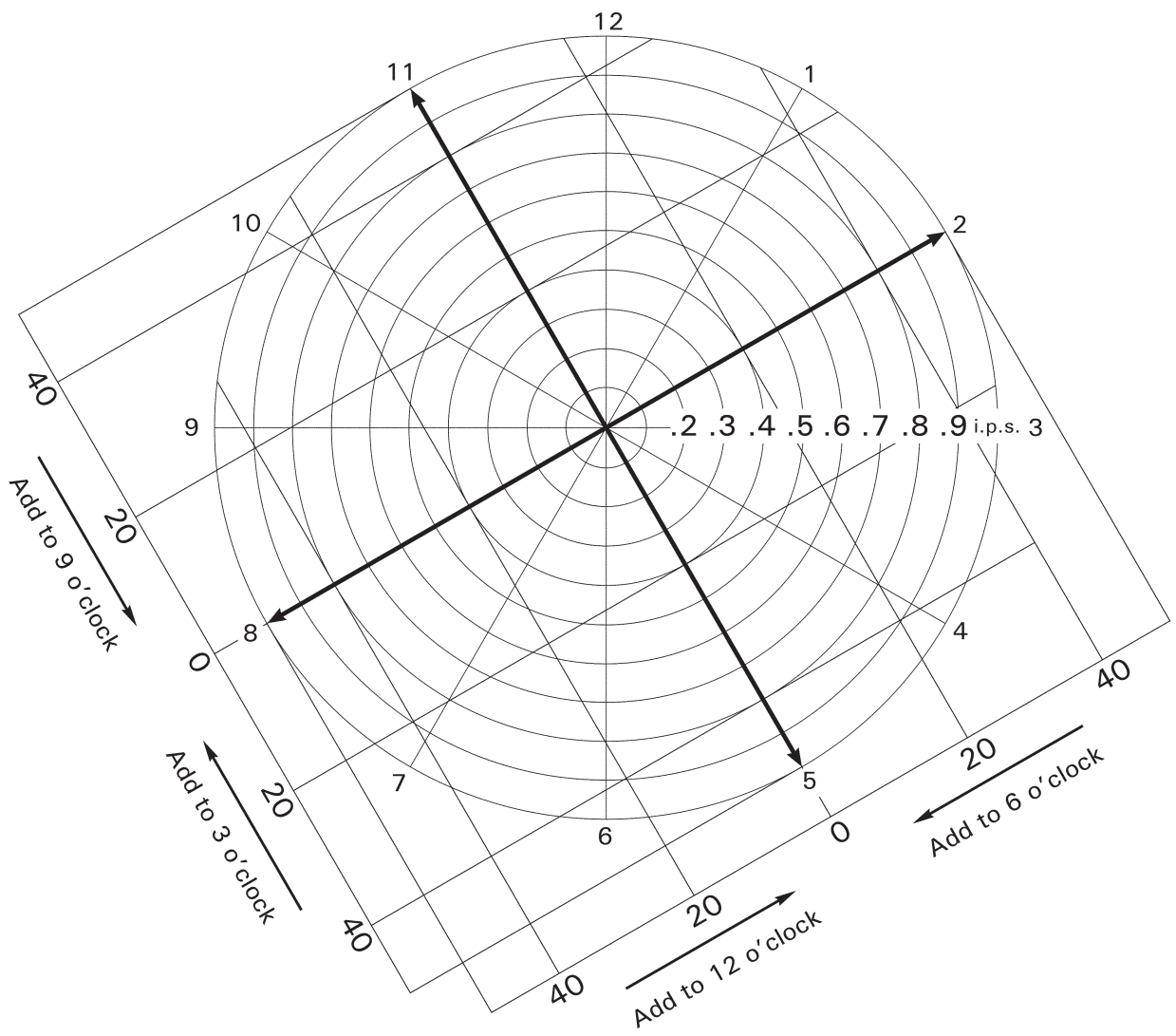


FIGURE 18-13 FAN SHAFT BALANCING CHART

18-72 Ground Checks

A. Balancing Procedure

NOTE

Run-up and shutdown helicopter throughout procedure as required per R66 Pilot's Operating Handbook (POH) Section 4.

NOTE

Use the following balancing procedures in conjunction with approved equipment manufacturer's balancing instructions.

WARNING

Fan shaft and engine shaft balancing equipment must be removed for flight.

1. Prepare helicopter for fan shaft and engine shaft balance per § 18-71.
2. Configure balance equipment per manufacturer's instructions.
3. Ground run helicopter at 100% RPM (2114 fan shaft RPM and 6016 engine shaft RPM). Verify cyclic stick and tail rotor pedals are in neutral position.
4. Determine vibration level per balance equipment manufacturer's instructions. Maximum vibration allowance is 0.2 IPS (inches per second). If reading is over 0.2 IPS, adjust balance per Part B. Repeat Part A steps 3 and 4 as required until balance is within limits.
5. Remove balance equipment. Standard torque fasteners per § 20-32 and torque stripe per Figure 5-1.
6. Install tailcone cowling per § 53-23.

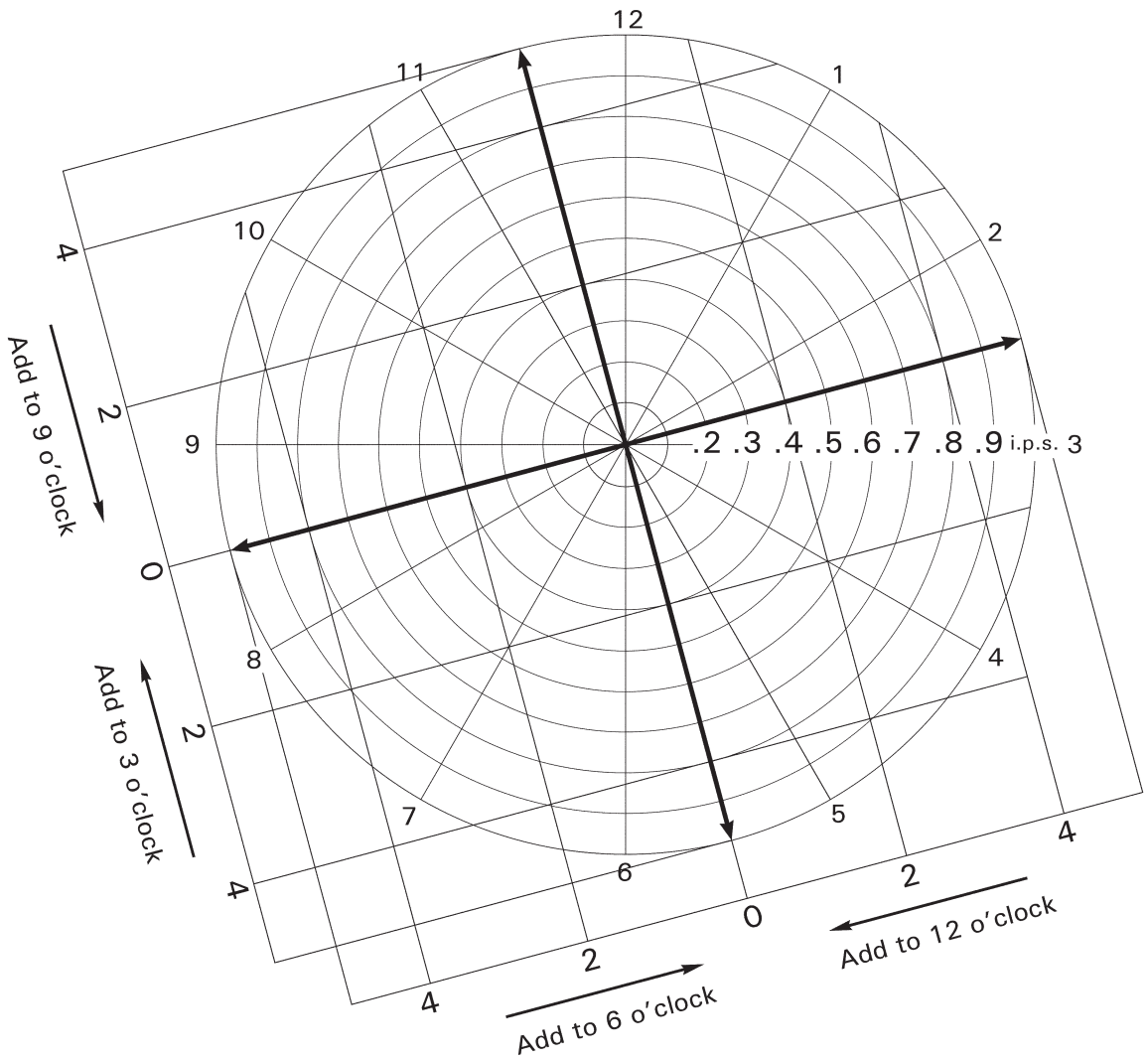


FIGURE 18-14 ENGINE SHAFT BALANCING CHART

18-72 Ground Checks (continued)

B. Balance Adjustments

1. Fan Shaft: Refer to Figure 18-13. Adjust balance by selecting one or more NAS1149D0463J, NAS1149F0432P, NAS1149F0463P, A214-3, or A141-14 washers as required and install under one nut of intermediate flex plate (tail rotor driveline) fastener. Standard torque fasteners per § 20-32, but do not torque stripe.

> NOTE
>
> If a large diameter washer is installed at a shaft flange, also install one NAS1149F0432P washer against flange to provide clearance between flange & edge of large diameter washer (not required for flat flange). Additionally, an NAS6604-5, -6, -7, or -8 bolt may be used as a flex plate fastener to accommodate balance washers; verify thread engagement meets torque requirements per § 20-30.

2. Engine Shaft: Refer to Figure 18-14. Adjust balance by selecting one or more NAS1149D0463J, NAS1149F0432P, NAS1149F0463P, A214-3, or A141-14 washers as required and install under one nut of aft flex plate (engine driveline) fastener. After first adjustment, if engine shaft does not respond correctly to balance weight, verify runout of F018 clutch housing's largest diameter; radial runout must not exceed 0.005 inch TIR (rotate TR backwards by hand to rotate clutch housing) before making further weight changes. If runout exceeds TIR limit, contact RHC Technical Support. Standard torque fasteners per § 20-32, but do not torque stripe.

> NOTE
>
> If a large diameter washer is installed at a shaft flange, also install one NAS1149F0432P washer against flange to provide clearance between flange & edge of large diameter washer (not required for flat flange). Additionally, an NAS6604-5, -6, -7, or -8 bolt may be used as a flex plate fastener to accommodate balance washers; verify thread engagement meets torque requirements per § 20-30.

> NOTE
>
> Large diameter balance washer(s) used to balance F642 engine shaft can sometimes cause a "humming" sound at 100% RPM. If hum is encountered, disconnect shaft at engine flex plate, rotate shaft 180 degrees, then reconnect shaft & secure to flex plate without large diameter washer(s) before resuming balancing.

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CHAPTER 20

STANDARD PRACTICES

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CHAPTER 20

STANDARD PRACTICES

20-10 Cleaning

WARNING

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

A. Cleaning Exterior Surfaces

NOTE

Remove turbine exhaust stains from engine cowling, tailcone, empennage, and tail rotor blades after every flight to prevent permanent discoloration.

CAUTION

Refer to § 20-10 Part B for cleaning windshield and windows.

CAUTION

Never use high-pressure spray to clean helicopter. Never blow compressed air into main or tail rotor blade tip drain holes, pitot tube, or static ports.

CAUTION

Wash helicopter exterior surfaces with mild soap (pH between 7 & 9) and water. Harsh abrasives, alkaline soaps, or detergents can scratch painted or plastic surfaces, or cause corrosion of metal. Protect areas where cleaning solution could cause damage.

1. Rinse away loose dirt and debris from exterior surface with clean water.
2. Apply mild soap (pH between 7 & 9) and clean warm water solution to exterior surface using a clean, soft cloth, sponge, or soft bristle brush. Use caution near antennas and sensitive equipment.
3. Remove oil and grease using a cloth wetted with aliphatic naphtha.
4. Rinse all surfaces thoroughly.
5. If desired, polish painted surfaces with a good quality automotive wax using soft cleaning cloths, or a chamois cloth, free of abrasive debris.

20-10 Cleaning (continued)

B. Cleaning Windshield and Windows

1. Remove dirt, mud, and other loose particles from exterior surfaces with clean water.
2. Wash with mild soap (pH between 7 & 9) and warm water or with aircraft plastic cleaner. Use a soft cloth or sponge in a straight back and forth motion. Do not rub harshly.
3. Remove oil and grease with a cloth moistened with isopropyl alcohol (rubbing alcohol) or aliphatic naphtha.

CAUTION

Do not use gasoline, other alcohols, benzene, carbon tetrachloride, thinner, acetone, or window (glass) cleaning sprays.

4. After cleaning plastic surfaces, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion.

CAUTION

Windshield surface must be water-repellent for good visibility in rain. When using a new cleaning or polishing product on windshield, verify water beads on surface before flying.

5. On acrylic windows (standard windshield), scratches can be removed by rubbing with jeweler's rouge followed by hand polishing with commercial plastic polish. Use a figure eight motion with polishing.

NOTE

Impact-resistant windshields are made from polycarbonate with a protective hardcoat and cannot be polished.

C. Cleaning Seat Assemblies and Back Rests

1. Vacuum and brush, then wipe with damp cloth. Dry immediately.
2. Soiled upholstery, except leather, may be cleaned with a good upholstery cleaner suitable for the material. Follow manufacturer's instructions. Avoid soaking or harsh rubbing.
3. Leather should be cleaned with saddle soap or a mild hard soap and water.

D. Cleaning Carpet

Remove loose dirt with a whisk broom or vacuum. For soiled spots and stains, use nonflammable dry cleaning liquid.

20-10 Cleaning (continued)

E. Cleaning or Rinsing RR300 Engine

Follow published Rolls-Royce guidance (subject to revision) to maximize RR300 engine corrosion prevention:

- RR300 Operation and Maintenance Manual (OMM) Task 05-50-00-100-801, Clean the Engine after Operation in a Corrosive Environment, and
- NTO (Notice To Operators) No. RR300-020, RR300 Engine Wash Procedures.

Refer to § 12-71 for drainage spotface inspection during cleaning or rinsing of RR300 engine.

20-20 Lubrication

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.

All R66 bearings are sealed or self-lubricating and do not require periodic lubrication.

The engine oil tank, the main and tail rotor gearboxes, and the hydraulic reservoir require servicing when indicated by sight gage level. Additionally, change engine, gearbox, or hydraulic oil and clean respective sight gage when oil becomes so dirty its level cannot be determined. Change hydraulic oil if notedly odorous.

When installing a new or overhauled main rotor gearbox, replace filter at first 100-hour inspection after installation. Thereafter, replace filter at scheduled intervals per § 1-90. When installing a new or overhauled tail rotor gearbox, drain and flush after first 4 hours of flight or first chip light, whichever occurs first. Thereafter, drain and flush gearbox at scheduled intervals per § 1-90.

Servicing procedures are located in Chapter 12.

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20-30 Torque Requirements

A. Tool Calibration

Dimensions and tolerances given in this manual are critical. Calibrate measuring tools per manufacturers recommendation at least once a year, when tool is dropped, misused, or calibration is suspect. This includes torque wrenches, micrometers, calipers, dial indicators, and spring scales.

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.

B. Torque Value

Torque fasteners to standard dry values listed in § 20-32 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 NAS1305 bolt used with a NAS1068 nutplate is determined as follows:

NAS1305 bolt (5 indicates 5/16 inch size) dry torque per § 20-32	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 secondary locking mechanisms in most areas on the helicopter, and are torqued per § 20-32. The R66 Illustrated Parts Catalog (IPC) lists secondary locking mechanisms for specific fasteners.

D. Critical Fastener

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.

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 the installer has assembled.

Given	Symbols
Y = Unknown	Y = Torque wrench setting
T = 135 in.-lb	T = Torque applied to fastener
L = 10 in.	L = Length of torque wrench
A = 1.5 in.	A = Length of adapter

When using an adapter that lengthens torque wrench effective length, calculate torque wrench setting using the formula below:

EXAMPLE

$$\textbf{Solve for Y} = \frac{\textbf{T x L}}{\textbf{L + A}} = \frac{\textbf{135 x 10}}{\textbf{10 + 1.5}} = \frac{\textbf{1350}}{\textbf{11.5}} = \textbf{117.39}$$

Set torque wrench to 117 in.-lb to torque fastener to 135 in.-lb.

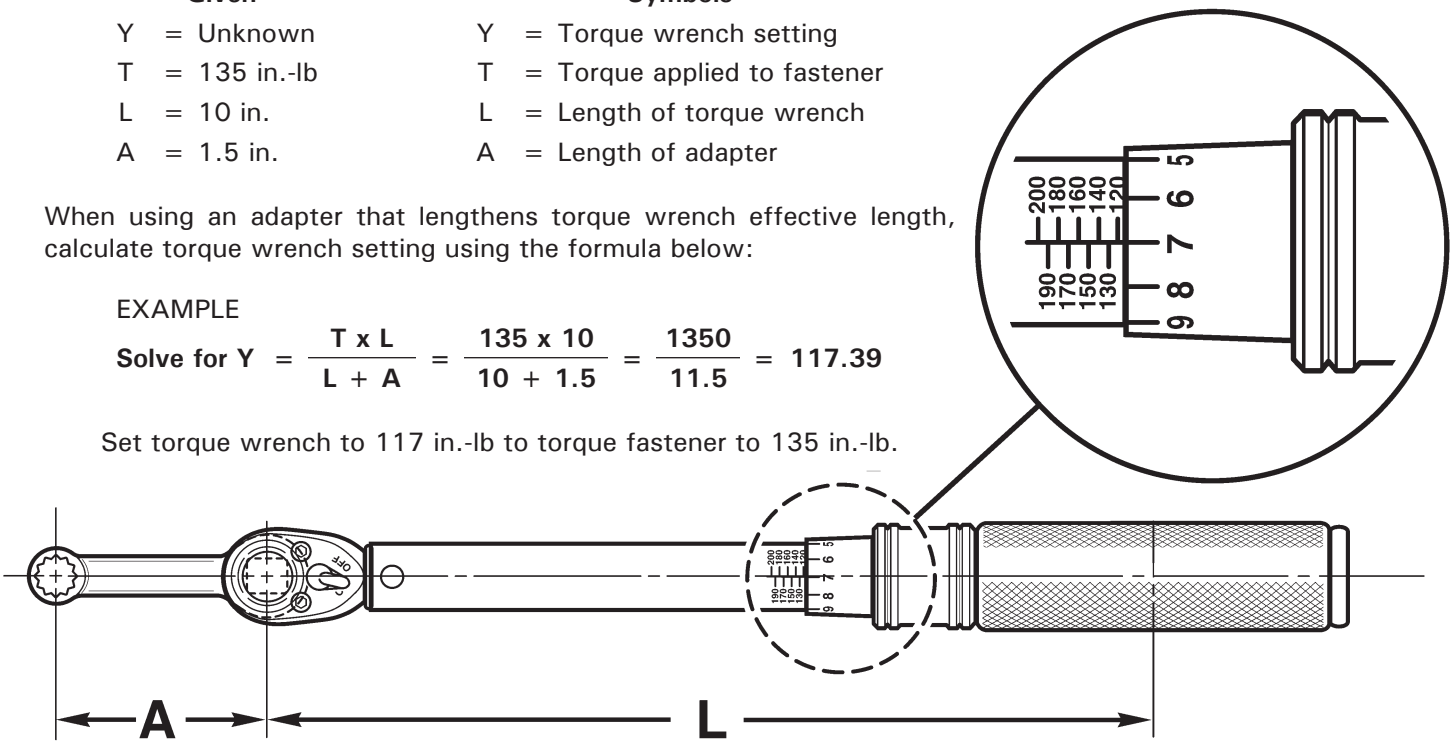


FIGURE 20-1 LENGTHENING TORQUE WRENCH EFFECTIVE LENGTH

Given	Symbols
Y = Unknown	Y = Torque wrench setting
T = 135 in.-lb	T = Torque applied to fastener
L = 10 in.	L = Length of torque wrench
A = 1.5 in.	A = Length of adapter

When using an adapter that shortens the torque wrench effective length, calculate torque wrench setting using the formula below:

EXAMPLE

$$\textbf{Solve for Y} = \frac{\textbf{T x L}}{\textbf{L – A}} = \frac{\textbf{135 x 10}}{\textbf{10 – 1.5}} = \frac{\textbf{1350}}{\textbf{8.5}} = \textbf{158.82}$$

Set torque wrench to 159 in.-lb to torque fastener to 135 in.-lb.

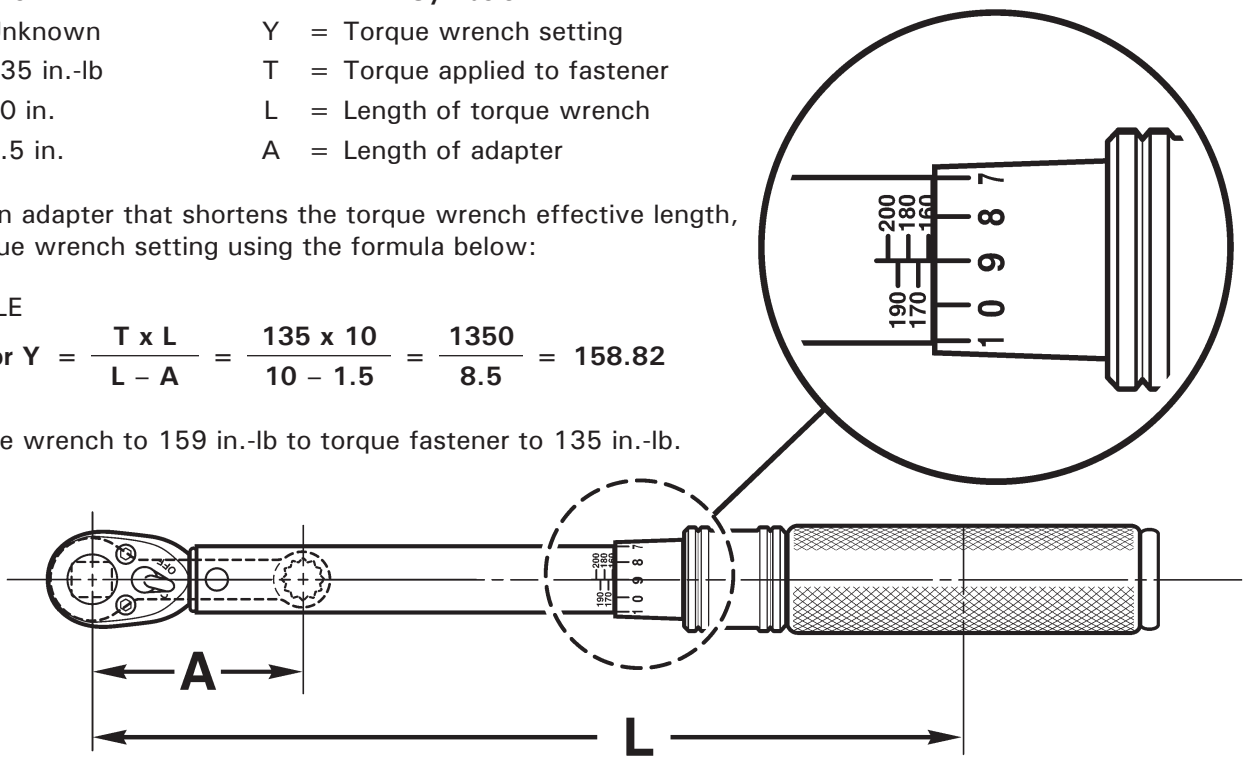


FIGURE 20-2 SHORTENING TORQUE WRENCH EFFECTIVE LENGTH

20-30 Torque Requirements (continued)

E. Torque Requirements

CAUTION

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

1. Any self-locking nut whose drag has deteriorated appreciably must be replaced. Damaged hardware must be replaced.
2. Bolt and nut are to be clean and dry except when assembly procedure specifies anti-seize or thread-locking compound.
3. If chattering or jerking occurs, disassemble and re-torque fastener.
4. If special adapters which change effective length of torque wrench are used, final torque value must be calculated using formulas in Figures 20-1 and 20-2.
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.

20-31 Torque Stripe

WARNING

Refer to Safety Data Sheet (SDS) and observe precautions when working in proximity to hazardous materials.

Refer to Figure 5-1. Apply lacquer-paint Torque Seal® to all critical fasteners after palnut installation in a stripe ("torque stripe") extending from the fastener's exposed threads across both nuts and onto the component. Subsequent rotation of the nut or bolt can be detected visually. Position torque stripes for maximum visibility during preflight inspections. Approved Torque Seal® is listed in § 20-74.

If, during inspection, the remaining torque stripe on a fastener is insufficient to determine joint integrity, then remove accompanying palnut as required and apply specified torque to fastener. If fastener moves, disassemble joint and inspect parts for damage such as fretting, thread deformation, hole elongation, etc.; replace damaged parts. If fastener does not move, install new palnut as required & standard torque per § 20-32. Torque stripe fastener per Figure 5-1.

20-32 Standard Torques

NOTE

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

FASTENER SERIES		SIZE	EXAMPLE FASTENER	TORQUE (IN.-LB)
NAS6603 thru NAS6608 Bolts NAS1303 thru NAS1308 Bolts NAS623 Screws NAS1351 & NAS1352 Screws NAS600 thru NAS606 Screws		10-32	NAS6603	50
		1/4-28	NAS6604	120
		5/16-24	NAS6605	240
		3/8-24	NAS6606	350
		7/16-20	NAS6607	665
		1/2-20	NAS6608	995
A142 screws AN3 Bolts AN4 Bolts AN6 Bolts AN8 Bolts	AN502 Screws AN503 Screws AN509 Screws AN525 Screws MS24694 Screws MS27039 Screws	10-32	A142-1, -3, -4; AN3	37
		1/4-28	AN4	90
		3/8-24	AN6	280
		1/2-20	AN8	795
STAMPED NUTS (PALNUTS) Palnuts are to be used only once and replaced with new when removed.		10-32	B330-7 (MS27151-7)	6–15
		1/4-28	B330-13 (MS27151-13)	11–25
		5/16-24	B330-16 (MS27151-16)	20–40
		3/8-24	B330-19 (MS27151-19)	29–60
		7/16-20	B330-21 (MS27151-21)	42–85
		1/2-20	B330-24 (MS27151-24)	54–110
TAPERED PIPE THREADS		1/8-27	See note 5	60
			Straight fittings only	120
		1/4-18	See note 5	85
			Straight fittings only	170
		3/8-18	See note 5	110
			Straight fittings only	220
		1/2-14	See note 5	160
			Straight fittings only	320
		3/4-14	See note 5	230
			Straight fittings only	460
ROD END JAM NUTS (AN315 and AN316)		10-32	AN315-3	15
		1/4-28	AN316-4	40
		5/16-24	AN316-5	80
		3/8-24	AN316-6	110

20-33 Special Torques

Special torques supersede standard torques listed in § 20-32.

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	FASTENER	TORQUE (IN.-LB)
AIR CONDITIONING (OPTIONAL EQUIPMENT)	(1) D795-8 line assembly, B-nuts	150
	(1) D799-2 switch assembly	90
	(1) D799-3 switch assembly	90
	(1) D799-9 switch assembly	90
	(1) G783 condenser, dessicant cap	100
	(1) G784-1 evaporator assembly, inlet B-nut to TXV	210
	(1) G794-1 hose assembly, B-nuts	210
	(1) G794-2 hose assembly, B-nuts	210
	(1) G794-3 hose assembly, B-nuts	150
	(1) G810-1 line assembly, B-nuts	210
	(1) G811-1 line assembly, B-nuts	150
	(2) AN924-8D nuts	360
	(8) MS27039C1-07 screws at condenser fans	20
	(2) 91292A135 screws (apply one drop B270-20 adhesive to threads)	70
COOLING SYSTEM (ENGINE AND MAIN ROTOR GEARBOX OILS)	(1) B289-2 bolt, drain	70
	(1) B563-2 sight gage	150
	(1) D205-19 hose assembly, B-nuts	200
	(1) D205-20 hose assembly, B-nuts	200
	(1) F723-1 line assembly, B-nuts	675
	(1) F723-2 line assembly, B-nuts	245
	(1) F723-3 line assembly, B-nuts	245
	(1) F723-4 line assembly, B-nuts	245
	(1) F724-1 line assembly, B-nuts	120
	(1) F724-2 line assembly, B-nuts	285
	(1) F724-3 line assembly, B-nuts	285
	(2) AN815-8D unions, on F649-1 oil cooler	300
	(2) AN832-8D unions, at firewall	230-260

20-33 Special Torques (continued)

AREA	FASTENER	TORQUE (IN.-LB)
COOLING SYSTEM (ENGINE & MAIN GEARBOX OILS) (Cont'd)	(1) AN832-10D union, at firewall	330-360
	(2) AN924-8D nuts, at firewall	150
	(1) AN924-10D nut, at firewall	180
	(2) AN924-6D nuts, securing F823-1 thermostat assembly to firewall	120
	(2) AS5169D04L fitting, on F649-1 oil cooler	58
	(1) MS28034-1 oil temperature sender, to tank	120
DOOR HINGES AND GAS SPRINGS	(16) MS51861-37C screws, securing door hinge assemblies	36
	(2) 21FKF-518 (or 94830A030) nuts, securing G904-1 gas spring ball studs at baggage compartment door	100
	(2) 21FKF-518 (or 94830A030) nuts, securing D575-1 gas spring ball studs at aft doors	100
	(2) C394-2 ball stud, at forward doors, to frame (B270-10 on thds)	150
	(2) D575-2 and (2) D575-3 ball joints, at forward doors' D573-4 rods	37
DRIVE SYSTEM	(2) F650-1 bolt, forward main rotor gearbox and G201 frame mounts	50 FT-LB, wet Bolt head or nut
	(2) F650-2 bolt, aft main rotor gearbox and G201 frame mounts	50 FT-LB, wet Bolt head or nut
ELECTRICAL SYSTEM	(2) MS21044B5 nut, securing A780 cable to B415-2 relay	80
	(1) NAS6605-3 bolt, securing B237-8 battery ground cable to G131-5 terminal assembly	70
EMPENNAGE	(8) NAS6604-6 bolts, securing vertical stabilizers to upper horizontal stabilizer	185
	(1) NAS1352-3-14P screw, securing guard assembly blocks to lower vertical stabilizer	40
ENGINE CONTROLS	(1) Fuel control unit (FCU) lever nut	40-50
	(1) Power turbine governor (PTG) lever nut	40-60
	(4) MS21042L3 nut, securing control wires	25-30
ENGINE INDUCTION	(1) A457-16 fitting, IBF filter FMA line	20
	(1) A457-17 fitting, IBF filter FMA line	60
	(1) A457-18 fitting, IBF filter FMA line	3
	(1) G738-1 nozzle, compressor service	30
	(1) AN316-7R nut, compressor service line	150
	(1) AN929-4 cap, compressor service line	60
FUEL SYSTEM	(1) A761-2 valve, sump (B270-6 sealant on threads)	60
	(1) B254-3 strainer, fuel bladder outlet	150
	(1) B283-12 hose assembly, fuel valve to fuel pump inlet, B-nuts	110-130
	(5) B289 bolts, fuel sender	37
	(1) F550 fuel sender center stud nut	11
	(1) B330-6 palnut at fuel sender center stud	9

20-33 Special Torques (continued)

AREA	FASTENER	TORQUE (IN.-LB)
FUEL SYSTEM (Cont'd)	(1) F550 fuel sender ground stud nut	9
	(1) B330-5 palnut at fuel sender ground stud	9
	(1) D205-21 hose assembly, fuel bladder outlet to fuel valve, B-nuts	110-130
	(1) G254-8 (or G254-2) fitting, vent assembly	200
	(1) G254-6 retainer, vent assembly	200
	(1) A880-1005 or AN924-5D nut, low fuel warning switch assembly	150
	(1) D210-3 nut, securing control wire	27
AUXILIARY FUEL SYSTEM	(5) B289-4 bolts, fuel sender	37
	(1) D205-35 hose assembly, nuts (large tank; drain)	120
	(2) D205-36 hose assembly, nuts	120
	(1) D205-37 hose assembly, nuts (small tank; drain)	120
	(1) A761-2 valve (B270-6 sealant on threads)	60
	(2) G764-5 fittings	200
	(1) G768-11 sensor assembly	Finger tighten only
	(1) G768-3 sensor assembly	85
	(1) F550 fuel sender center stud nut	11
	(1) B330-6 palnut at fuel sender center stud	9
	(1) F550 fuel sender ground stud nut	9
	(1) B330-5 palnut at fuel sender ground stud	9
	(2) AN806-6D plugs (when tank assembly removed)	120
	(4) 90825A146 screw	10
	(2) A880-906 or AN815-6D fitting	200
PRESSURE FUELING SYSTEM	(1) A880-1005 nut, A521-6 low fuel switch assy (single)	150
	(1) A880-1005 nut, A521-7 low fuel switch assy (dual)	150
	(1) D205-44 hose assembly, nuts	500
	(1) D205-45 hose assembly, nuts	500
	(2) D745-7 switch assembly, fuel pressure	120
	(1) G989-6 fitting, at G239-1 panel	500
	(1) G990-4 (proximity) sensor assembly, hex nut	60
	(2) G992-1 valve assemblies, shut-off	500
	(4 per valve) G992-1 valve assembly, hex head screws	60
	(2) 10228 fittings (B270-6 or A701-11 pipe threads only)	650
	(1) 10375 adapter (B270-6 or A701-11)	500
FUEL FLOW METER INSTALLATION	(1) 564601 tube assembly, at AS4824N08 seal	325
	(1) 564601 tube assembly, at AS4824N04 seal	145
	(1) SS6565-8-4 fitting, at AS4824N08 seal	325
	(1) SS6565-8-4 fitting, at AS4824N04 seal	145
	(1) AS5178J04 nut, at G155-1 (aft) bracket	145

20-33 Special Torques (continued)

AREA	FASTENER	TORQUE (IN.-LB)
FUSELAGE	(1) D210-5 nut, ground handling ball	240
HEATER	(1) G391-1 line assembly B-nuts (apply A257-9 to upper nut threads)	245 wet
	(1) G391-2 line assembly B-nuts	100
	(1) G391-3 line assembly B-nuts	100
	(1) G391-4 line assembly B-nuts	100
	(1) G391-5 line assembly B-nuts	230-260
	(2) G392-3 diffuser assembly B-nuts	100
	(1) D210-3 nut, securing control wire	25–30
HYDRAULIC HOSES & FITTINGS	(2) AN815-3D union	95–105
	(2) AN815-4D union	135–150
	(1) AN820-4 cap, on reservoir AN804D4 T-fitting	60
	(1) AN820-6 cap, on reservoir AN834-6D T-fitting	120
	(2) D452-3 nuts, on aft and left hand servos	60
	(3) D452-4 nuts, on aft and left hand servos and on reservoir	90
	(1) D452-6 nut, on reservoir	150
	(2) B330-19 palnut, on aft and left hand servos	30
	(3) B330-21 palnut, on aft and left servos and on reservoir	45
	(1) B330-25 palnut, on reservoir	75
	(1) D205-14 line assembly B-nuts	95–105
	(1) D205-17 line assembly B-nuts	95–105
	(1) D205-18 line assembly B-nuts	135–150
	(1) D205-22 line assembly B-nuts	95–105
	(1) D205-23 line assembly B-nuts	135–150
	(1) D205-24 line assembly B-nuts	135–150
	(2) F902-1 line assembly B-nuts	135–150
	(2) F902-2 line assembly B-nuts	110–130
HYDRAULIC RESERVOIR	(1) D487-3, filler-vent	100
	(1) D516-1, filter cap	150
	(1) B563-2, sight gage	150
	(1) D507-2 solenoid	100
HYDRAULIC SERVOS	(1) D210-08 nut, attaching D200-2 scissors	25
	(1) B330-6 palnut on D200-2 scissor apex fastener	5-10
LANDING GEAR	(4) NAS6604-46 bolts, securing ground handling wheel support weldments to skid tubes	70
	(4) NAS6607P20 bolt, securing landing gear to fuselage supports and shackles	66 FT-LB
	(2) NAS6607P44 bolt, securing shackles to fuselage	66 FT-LB
	(4) B277-28 clamp, securing fairings to struts	15

20-33 Special Torques (continued)

AREA	FASTENER	TORQUE (IN.-LB)
POP-OUT FLOATS (OPTIONAL EQUIPMENT)	(2) D674-2 hose assembly, B-nuts	245
	(4) D674-6 hose assembly, B-nuts	245
	(2) D674-7 hose assembly, B-nuts	120
	(1) D674-9 hose assembly, B-nuts	245
	(2) D674-10 hose assembly, B-nuts	245
	(2) D674-11 hose assembly, B-nuts	245
	(1) D674-12 hose assembly, B-nuts	245
	(1) D674-13 hose assembly, B-nuts	245
	(2) D770-1 valve assembly	40
	(2) D770-2 valve assembly	40
	(2) D770-3 valve assembly	40
	(2) D770-4 valve assembly	40
	(2) D770-5 valve assembly	40
	(2) D770-6 valve assembly	40
	(1) D757-1 valve assembly	40 FT-LB
MAIN ROTOR BLADE	(2) B289-2 bolts, per blade, self-sealing	70
	(2) A722-4 screws, per blade, tip balance weight	40 wet
	(2) NAS1351N3-12P screws, per blade, tip cover	40 wet
MAIN ROTOR FLIGHT CONTROLS	(2) MS35206-324 screws, low rotor RPM horn V3-1 switch	4-5
MAIN ROTOR GEARBOX	(1) B254-3 strainer, main rotor gearbox sump	200
	(1) B563-2 sight gage	150
	(1) B566-1 chip detector, main rotor gearbox	150
	(1) D205-25 hose assembly, sump to pump B-nuts	120
	(8) D210-3 nuts, securing D500-2 (hydraulic) and D500-3 (main gearbox oil) pumps to main gearbox	37
	(1) F904-1 pinion plug, securing tail rotor output yoke to main gearbox	60 FT-LB, wet
	(1) A880-1208 or AN814-8D plug, main rotor gearbox filler plug	150
	(1) MS21245L8 nut, securing input yoke to main gearbox	40 FT-LB
	(2) nuts securing 103SR13A-3 sender	50
	(1) chip detector wire terminal nut	5
MAIN ROTOR HUB	(1) NAS634-105 bolt, teeter hinge and (2) NAS634-105 bolt, coning hinges **WARNING** **Scrap bolt & nut if bolt is elongated more than 0.024 inch during tightening.**	New bolt: 0.021-0.022 inch elongation, wet Used bolt: 0.020-0.022 inch elongation, wet, and cotter pin holes must align

20-33 Special Torques (continued)

AREA	FASTENER	TORQUE (IN.-LB)
MAST TUBE	(1) B277-064 clamp, lower rib to mast tube	50
PITCH LINKS	(2) 21FKF-813 or 27FKF-813 self-locking jam nuts, main rotor pitch links	300
POWERPLANT	(1) D745-3 (pressure) switch assembly	65
	(1) D38999/26FB98SA plug, N1 speed sensor connector	150
	(1) F170 fitting, engine gearbox vent	100
	(1) F727-1 line assembly, fuel pump drain	50-65
	(1) F727-2 line assembly, horizontal turbine-firewall shield assembly drain	50-65
	(1) F741-1 line assembly, fuel differential pressure switch	80
	(1) G426-1 (fuel differential pressure) switch assembly	100
	(2) nuts, securing harness wire to MGT thermocouple studs, engine-supplied	20
	(2) nuts, securing harness wires to starter-generator small terminals, starter-generator supplied	20
	(2) nuts, securing harness wires to starter-generator large terminals, starter-generator supplied	180
	(1) nut, securing harness wire to ignition exciter box, engine-supplied	15
	(2) nuts, securing harness and (2) MS21919WCH4 clamps to engine accesory gearbox, engine-supplied	40
	(2) nuts, securing F577-1 bracket assembly, engine-supplied	40
	(2) nuts, securing F577-3 bracket, engine-supplied	40
	(2) tee bolts, securing F173-1 struts to engine, engine-supplied	35-40
	(2) A880-908 or AN815-8D unions, engine oil outlet & oil tank vent	250
	(1) A880-910 or AN815-10D union, engine oil inlet	375
	(1) AN919-0D reducer and (1) AN919-2D reducer	100
	(2) NAS6605-3 bolt, securing G200-1 lug to engine (optional)	110
	(6) NAS6605H3 bolts, securing (2) F593-1 support assemblies to engine	110
	(2) NAS6605H4 bolts and (1) NAS6605H2 bolt, securing F174-1 weldment and F593-3 plate to engine	110
	(1) CV26-77 check valve, engine oil outlet (superseded; early R66s)	250
	(1) G732-4 bolt (clutch retaining)	130
SWASHPLATE	(26) NAS1352N08-8 screws, securing spacers, sleeve assembly, shield, and retainers	35 wet
	(2) NAS1352N08-4 screws, securing B769-2 bracket	35
TAIL ROTOR	(1) D210-4 nut, securing C119-2 bumper	120
	(1) NAS6606-53 bolt, teeter hinge	420
TAIL ROTOR FLIGHT CONTROLS	(1) D210-4 nut, outboard of F316-1 bellcrank assembly	90

20-33 Special Torques (continued)

AREA	FASTENER	TORQUE (IN.-LB)
TAIL ROTOR GEARBOX	(1) A610-1 vent assembly	100
	(1) B563-4 sight gage	150
	(1) B566-2 chip detector	100
	(1) Nut, securing C049-4 harness assembly to chip detector	5
	(1) D210-5 nut, pitch control housing	240
	(1) AN320-8 nut, input yoke	35-45 FT-LB
	(4) MS20074-04-06 bolts, input cap	60
	(8) MS20074-04-06 bolts, input housing and output cap	100
	(4) NAS1352-5-12P bolts (undrilled), gearbox-to-tailcone attachment	260
TAIL ROTOR GUARD	(1) NAS1352-3-14P screw, securing block assembly to stabilizer	40
WINDSHIELD	(23) AN526C832R12 screw, thru center brace	16
	(74) B526-6 screw, polycarbonate windshield fasteners	24
	(4) B526-8 screw, polycarbonate windshield fasteners	24
	(24) NAS1352-08-12P screw, polycarbonate windshield fasteners, with wire strike provisions	30

Intentionally Blank

20-42 Fluorescent Penetrant Inspection

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

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

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

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

A. Inspection Criteria

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

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

20-50 Corrosion Control

20-51 Conversion Coat – Aluminum

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

CAUTION

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

A. Procedure

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

20-51 Conversion Coat – Aluminum (continued)

A. Procedure (continued)

4. Apply Bonderite M-CR 1201 Aero to surface for 2–5 minutes (should be light golden brown). DO NOT allow Bonderite M-CR 1201 Aero to dry; re-apply as required.

5. Rinse thoroughly with clean, potable water. Gently wipe with clean & dry cloth, blow dry, or allow to air dry.

B. Felt Tip Applicator

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

20-60 Priming and Painting

This specification outlines preparation and application requirements for primers and topcoat. Primers provide corrosion protection and a final finish or a base for topcoat. Use only approved materials listed in § 20-70.

Do not prime or paint with a topcoat finish the following areas (unless directed):

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

WARNING

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

A. Priming

1. Preparing Aluminum

Unless otherwise specified, conversion coating per § 20-51 is standard treatment before priming aluminum. If bare aluminum is primed without conversion coating, the following procedure must be used:

a. Alkaline clean if immersion is practical, otherwise wipe clean with an approved degreasing agent. Do not allow alkaline cleaner to contact bonded joints.

b. Lightly scuff the surface with Scotch-Brite pads.

c. Wipe with a tack rag to remove any foreign material or damp wipe with an approved solvent.

d. Air dry. Do not touch parts with bare hands until primed.

20-60 Priming and Painting (continued)

A. Priming (continued)

2. Preparing Steel

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

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

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

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

3. Application

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

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

4. Inspection

Inspect for complete coverage and excessive thickness. If primer is excessively thick, strip part and re-prime. Refer to § 20-70 for approved materials.

NOTE

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

B. Painting

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

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

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

20-70 Approved Materials

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

WARNING

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

CAUTION

Follow product manufacturer's instructions for handling and storage.

20-71 Paint Strippers

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

20-72 Solvents and Cleaners

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
QSOL 220	Safety-Kleen Systems, Inc. Plano, TX	General use for cleaning prior to applying primer, topcoat, adhesive, or sealant.
Benzene, 1-Chloro-4 (Trifluoromethyl) PCBTF***	Any	
Acetone***	Any	
220 Low VOC Cleaner	Axalta, Wilmington, DE	
Final Klean 3909S	Du Pont Chemical Los Angeles, CA	
XP Aerospace Prep Surface Cleaner	AkzoNobel, Waukegan, IL	
EM-Citro*	LPS Laboratories, Inc. Tucker, GA	Removing adhesive residue on cabin and polycarbonate & acrylic windshield.
Lacolene (Aliphatic Hydrocarbon)	Any	Windshield and plastic cleaning and general residue removal.
Plexus®	B.T.I. Chemical Co. Oak Park, CA	
Exhaust Cleaner	Pacific Products, Inc. Sutter Creek, CA	Removing exhaust residue. Do not use on TR blades, TR hub, or TR gearbox, or on bonded joints or bearings.

20-72 Solvents and Cleaners (continued)

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

* May be used on acrylic plastic.
** Mix 5%–20% by volume; titration not required.
*** Acetone and PCBTF may be mixed 50–50.

20-73 Fillers and Putty

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

20-74 Torque Seal

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

20-75 Primers

A. Non-chromate Primers

	Corlar 13580S*	Desoprime CA7502*	Desoprime CA7422*
Manufacturer	Axalta	PPG	PPG
Base	Corlar 13580S Epoxy Primer	CA7502A	CA7422A
Activator	Corlar 13180S Epoxy Activator	CA7502B	CA7422B
Reducer	13756S VOC-Exempt Reducer	CA7502C	CA7422C
Base: Activator: Reducer	4:1:1	4:4:1	4:4:1
Viscosity	17-21 sec in Zahn #2	15-19 sec in Zahn #2	15-19 sec in Zahn #2
Induction time	30 minutes	2 hours at 55–70°F 1 hour at 71–80°F 30 minutes > 70°F	2 hours at 55–68°F 1 hour at 69–95°F
Pot life	8 hours at 70°F	4 hours at 70°F	4 hours at 70°F
Flash off time	None	30 minutes	30 minutes
Dry time	2 hours at 70°F 1 hour at 130°F	3 hours at 70°F 30 minutes at 120°F	3 hours at 70°F 30 minutes at 120°F
Recoat window	48 hours	48 hours	48 hours

* Shelf life per manufacturer's recommendation.

B. Chromate Primers

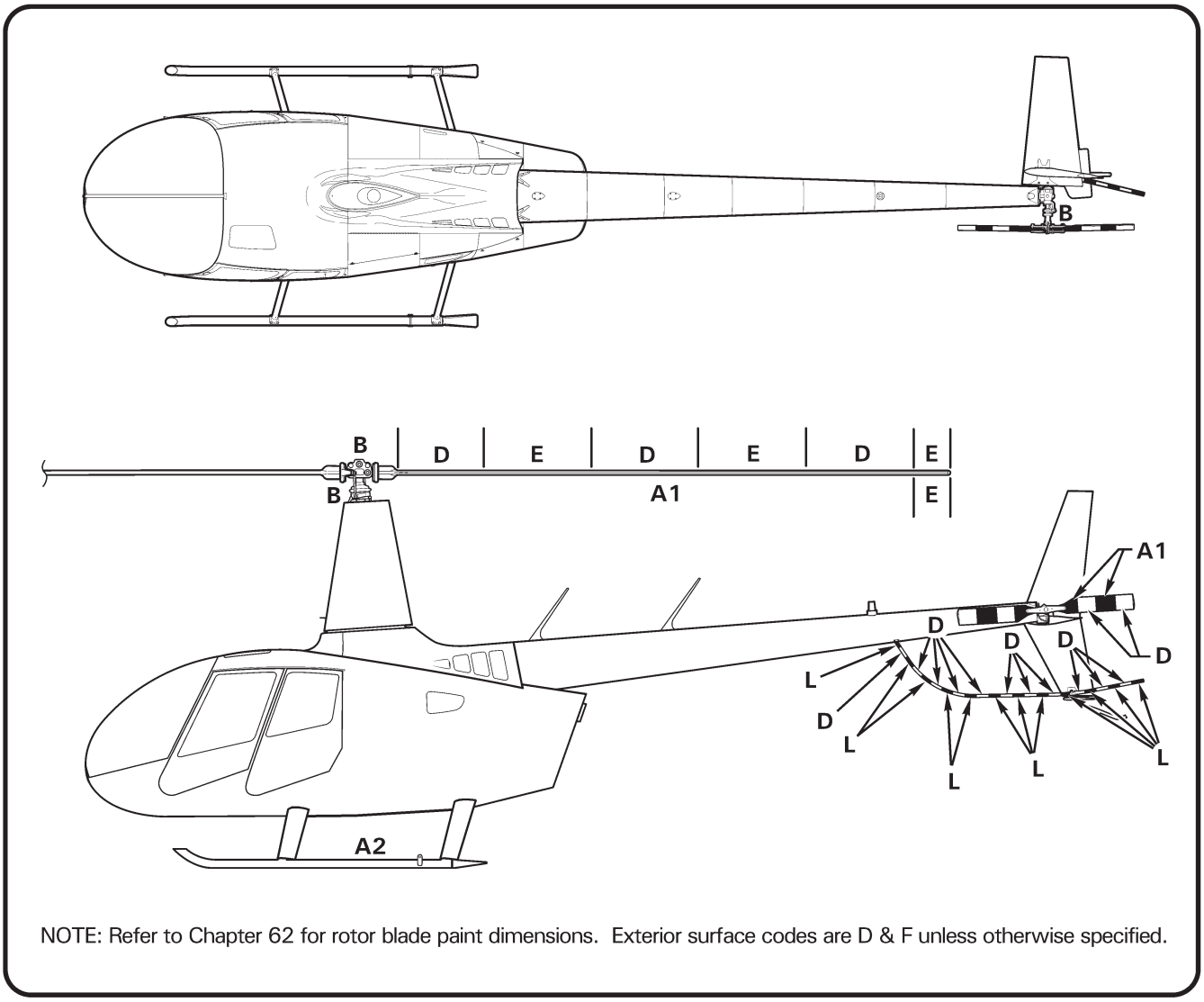
	44GN007*	10P20-44*
Manufacturer	PPG	AkzoNobel
Base	44GN007	10P20-44
Activator	44GN007CAT	EC-265 or EC-273
Reducer	Distilled or deionized water	TR-114 or TR-102
Base: Activator: Reducer	3:1:8	3:1:1
Viscosity	18–22 seconds in Zahn #2	13–19 seconds in Zahn #2
Induction time	None	None
Pot life	4 hours at 70°F	4 hours at 77°F
Flash off time	15 minutes	30 minutes
Dry time	2 hours at 70°F 45 minutes at 120°F	30 minutes at 140°F
Recoat window	24 hours	24 hours

* Shelf life per manufacturer's recommendation.

20-76 Powder Coat

PRODUCT	MANUFACTURER
Interpon 100-AL101QF Gray Zinc Rich Epoxy Powder*	AkzoNobel Santa Fe Springs, CA
81-2158 Vitralon Grey Zinc Rich Epoxy Powder*	Pratt & Lambert Chemical Coatings Buffalo, NY
39/80020 Smooth Matte Black Polyester Topcoat Powder*	Tiger Drylac USA Cucamonga, CA
49/72460 Smooth Glossy Gray RAL 7043 Polyester Topcoat Powder*	Tiger Drylac USA Cucamonga, CA
49/22460 Smooth Glossy Yellow RAL 1028 Polyester Topcoat Powder*	Tiger Drylac USA Cucamonga, CA
PFWF104S9 White Polyester Topcoat Powder*	Dupont Co. Wilmington, DE

* Shelf life is 12 months from date of manufacture at ambient temperature.



NOTE: Refer to Chapter 62 for rotor blade paint dimensions. Exterior surface codes are D & F unless otherwise specified.

FIGURE 20-3 PAINT CODES

20-77 Paints

Refer to Figures 20-3 & 20-4 for paint code application. Paint codes for specific helicopter serial numbers are listed on the inside cover of Airframe Maintenance Record (logbook).

FINISH CODE	MATERIAL*	ADDITIVES	MANUFACTURER	RHC PART NO.	APPLICATION
A1	Flat Black 18BK006	18BK006CAT Catalyst	PPG Aerospace; Irvine, CA	18BK006	Blade black
	Abrasion Resistant 23T3-90 Black	PC-216 Curing Solution	AkzoNobel; Waukegan, IL	23T3-90	
A2	FR2-55 Mat Topcoat	Thinner: water	Mapaero; Pamiers, France	557Z7038B005K	Interior, skid tube, windshield and window trim black
	Aerofine 8250 Topcoat	Thinner: water	AkzoNobel; Waukegan, IL	A8250/F9007	

20-77 Paints (continued)

FINISH CODE	MATERIAL*	ADDITIVES	MANUFACTURER	RHC PART NO.	APPLICATION
A3	Cardinal A-2000 Flat Black		Cardinal; Cleveland, OH	A-2000-BKE30903	Interior, skid tube, windshield and window trim touch up (Aerosol)
	Krylon 1613 Semi-Flat Black		Krylon; Colombus, OH	1613	
B	Dark Gray Imron AF400/AF700	13100S Activator 13110S Activator	Axalta; Wilmington, DE	DS020EP	Dark grey
D	White Imron AF400/AF700	13100S Activator 13110S Activator	Axalta; Wilmington, DE	N0774EP	White
E	Yellow Imron AF400/AF700	13100S Activator 13110S Activator	Axalta; Wilmington, DE	N0680EP	Yellow
F	Imron AF400/AF700 Colors	13100S Activator 13110S Activator	Axalta; Wilmington, DE	Refer to Airframe Maintenance Record	Exterior
G	Clear Imron AF740	13100S Activator 13110S Activator 13930S Reducer	Axalta; Wilmington, DE	AF740	Clear coat
	1311 Matte Clear Coat		Krylon; Columbus, OH	1311	Clear coat aerosol
J	White Imron 2.1 FT	9T00-A Activator D-121 Tint D-101 Tint 2100-P 2.1 Binder 9T20 Flattener	Axalta; Wilmington, DE	9T00-A D121 D101 2100P 9T20	Floats
K	Printcolor White Ink 750-9005 Printcolor Black Ink 750-8005 Printcolor Maize Yellow Ink 750-1205 Printcolor Carnation Red 750-3005	Printcolor Glass Hardener 700 Gensolve Thinner GS-017 Slow Retarder 10-03432	Deco; Orange, CA	7509005 7508005 7501205 7503005	Silkscreen
L	Red Imron AF400/AF700	13100S Activator 13110S Activator	Axalta; Wilmington, DE	N0759EP	Red
O	Light Gray Imron AF400/AF700	13100S Activator 13110S Activator	Axalta; Wilmington, DE	N0020	Baggage compartment
P	Silver Bullet AM Tracer Black 20-452AM-F1	16-CURE-F1 Activator	Burke; Ridgefield, WA	20-452AM-F1	R66 Middle seat
Q	ProtectaClear		Everbrite; Rancho Cordova, CA	Protecta	Optional on bare area of main rotor spar, refer to R66 SL-37

* Shelf life per manufacturer's recommendation.

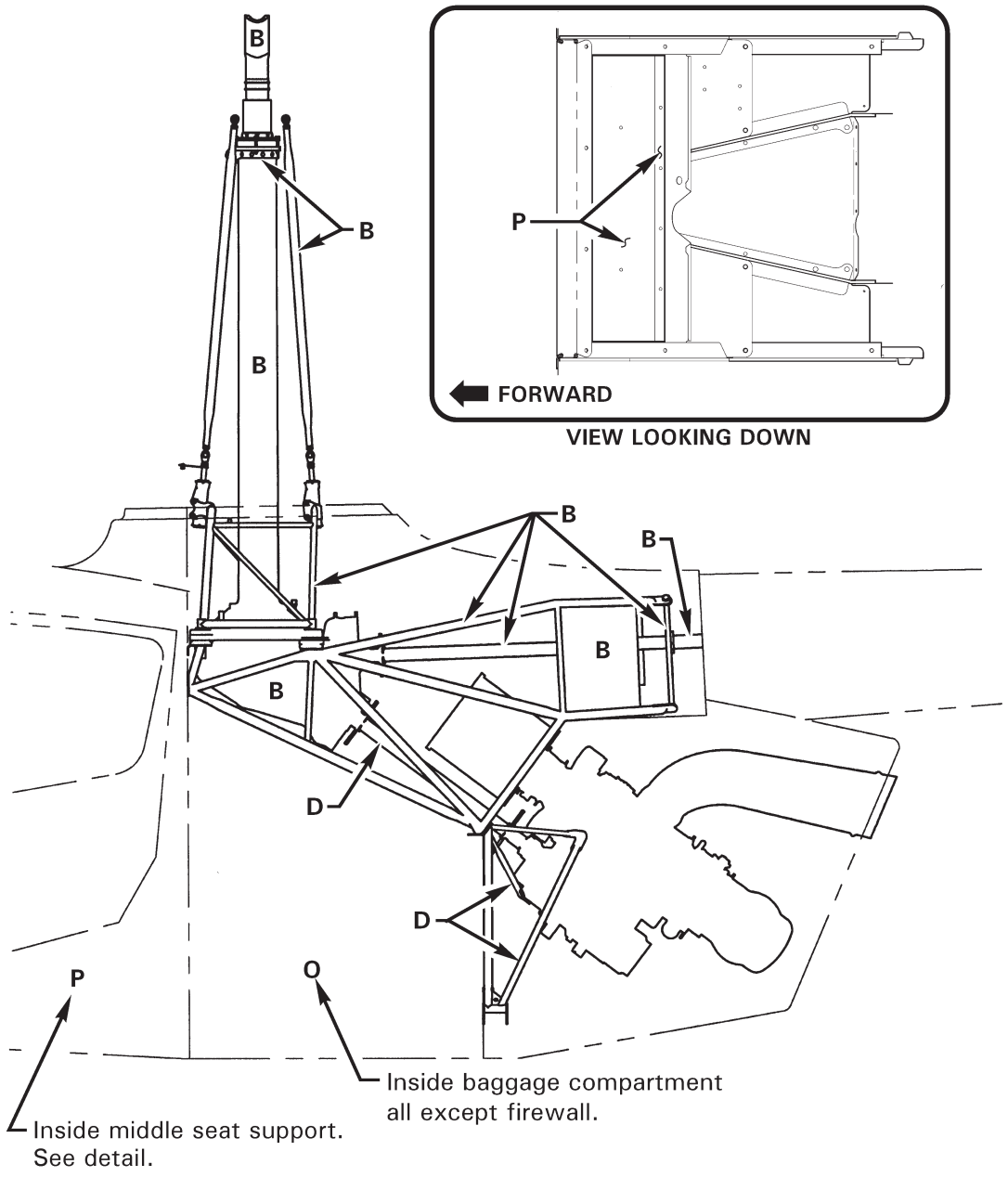


FIGURE 20-4 PAINT CODES

CHAPTER 22

AUTOPILOT

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CHAPTER 22

AUTOPILOT

22-00 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 140 KIAS.

22-00 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 140 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.

22-00 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.

22-00 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.

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.

22-00 Description (continued)

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 140 KIAS due to excess power when flying a precision approach glideslope. 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

On later aircraft, 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 98-8A & 98-8B for D325-1 autopilot (HeliSAS) electrical schematic.

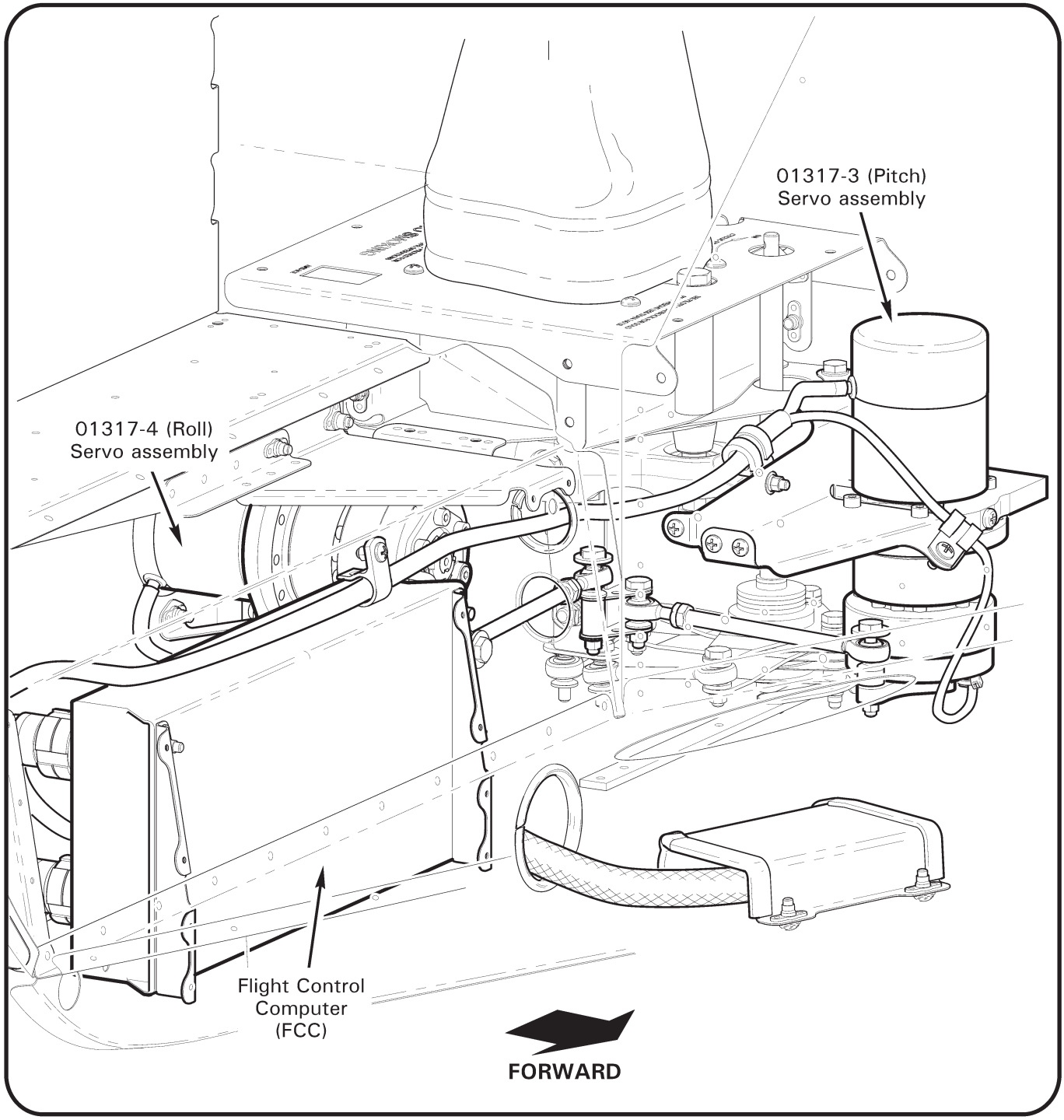


FIGURE 22-1 HELISAS AUTOPILOT SYSTEM

22-10 (Pitch) Servo Assembly

A. Removal

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Remove F680-3 and F445 collective covers and F444-1 cyclic cover. Hinge front right seat forward. Remove G702 cover assembly under pilot's seat.
3. Remove avionics and avionics trays as required from lower console.

CAUTION

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

4. Position cyclic stick full aft and apply cyclic friction. Remove hardware (and C130-50 spacer) securing 01317-3 (pitch) servo assembly arm to A336-8 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 01317-3 (pitch) servo assembly in control tunnel and install hardware securing servo's brace to cyclic box. Standard torque bolts per § 20-32 and torque stripe per Figure 5-1. 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 (and C130-50 spacer) securing servo arm to A336-8 push-pull tube's rod end. Standard torque bolt per § 20-32 and torque stripe per Figure 5-1. Verify security.
5. Verify length of A336-8 push-pull tube assembly connected to pitch 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. 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 § 22-61.
9. Install G702 cover assembly under pilot's seat. Install F444-1 cyclic cover, and F445 and F680-3 collective covers. Verify security.

22-20 (Roll) Servo Assembly

A. Removal

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Remove F680-3 and F445 collective covers. Remove G702 cover assembly under pilot's seat.

CAUTION

For roll servo, adjust length of A336-8 push-pull tube assembly to 4.30 ± 0.03 inches between rod end centers.

3. Position cyclic stick full left and apply cyclic friction. Remove hardware securing 01317-4 (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 brace 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 01317-4 (roll) servo assembly under pilot's seat and install hardware securing servo's block assembly to keel panel and brace 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 § 20-32 and torque stripe per Figure 5-1. Verify security.
5. Verify length of A336-8 push-pull tube assembly connected to roll servo is 4.30 ± 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 § 22-61.
8. Install G702 cover assembly under pilot's seat. Install F445 and F680-3 collective covers. Verify security.

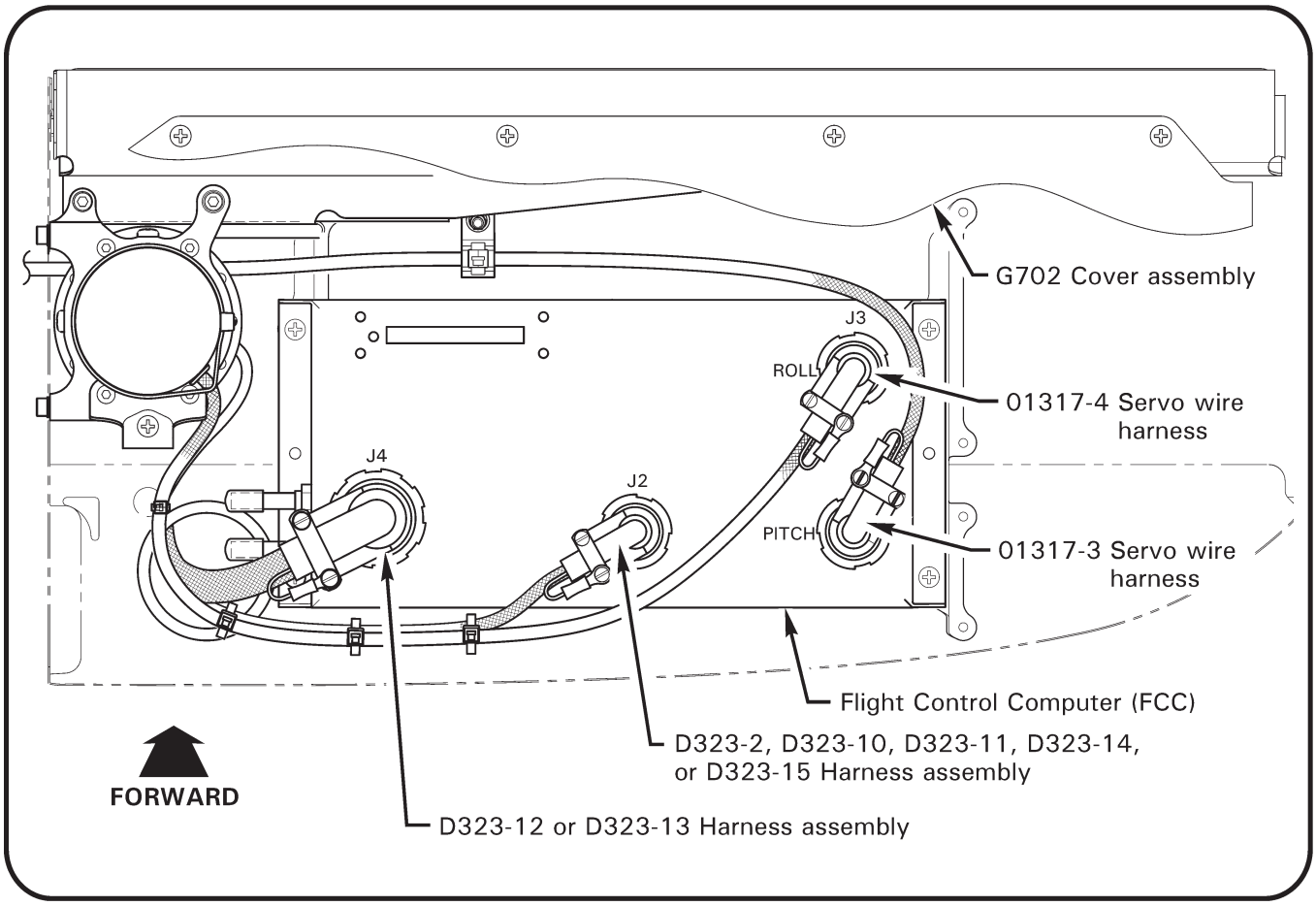


FIGURE 22-2 FLIGHT CONTROL COMPUTER

Version 51	
FCC part number	01311-03-11
Control panel part number	01309-01-01

Version 52	
FCC part number	01311-02-111
Control panel part number	01309-03-01

TABLE 22-1 SOFTWARE VERSIONS AND EQUIPMENT PART NUMBERS

22-30 Flight Control Computer (FCC)

NOTE

Refer to Table 22-1. 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.

22-30 Flight Control Computer (FCC; continued)

A. Removal

1. Turn battery & avionics switches off and pull out AUTOPILOT (5 amp) circuit breaker at panel.
2. Remove G702 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. Support computer and remove screws securing computer to D358 support assemblies. Carefully remove computer from under pilot's seat.

B. Installation

NOTE

Prior to installation, verify affected FCCs were upgraded per R66 SB-37.

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 D358 support assemblies. Tighten screws. Verify security.
3. Ensure pitot and static ports on FCC are capped.
4. Connect D323 harness assemblies and 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 § 22-61.
7. Install G702 cover assembly under pilot’s seat.

22-40 Control Panel

NOTE

Refer to Table 22-1. 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.

22-40 Control Panel (continued)

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.

B. 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 § 22-61.

22-50 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

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 § 22-61.

C. Schematic

Refer to Figure 98-1 for F024 electrical system schematic.

22-60 Maintenance

22-61 Scheduled Inspections

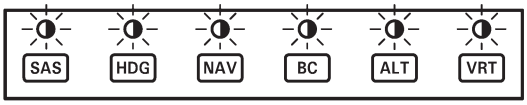
A. Ground Checks

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

NOTE
Refer to § 22-62 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

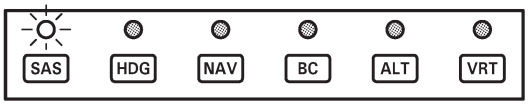


LEDs ALTERNATE WHITE/GREEN

(01309-01-01 control panel shown)

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

NO SOUND

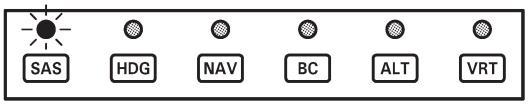


SAS LED IS WHITE, OTHER LEDs DARK

3. With cyclic friction full off, verify cyclic moves freely within hydraulic servo longitudinal and lateral deadbands.

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

NO SOUND



SAS LED IS GREEN, OTHER LEDS DARK

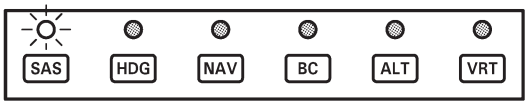
5. With SAS engaged, displace cyclic at least 1 inch from neutral position and verify a vibrating resistance is encountered. Perform check for roll & pitch axes.

22-61 Scheduled Inspections (continued)

A. Ground Checks (continued)

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

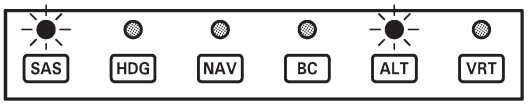

FOUR BEEPS IN HEADSET



SAS LED IS WHITE, OTHER LEDS DARK

7. Perform pitot system leak test per § 95-10 and, while airspeed indicates > 50 knots: Engage SAS and ALT modes. Verify no sound in headset and SAS & ALT LEDs are green, other LEDs are dark:

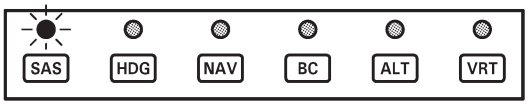

NO SOUND



SAS & ALT LEDs ARE GREEN, OTHER LEDS DARK

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


NO SOUND



SAS LED IS GREEN, OTHER LEDS DARK

9. Refer to steps 7 & 8. Engage SAS and HDG modes. Verify no sound in headset and SAS & HDG LEDs are green, other LEDs are dark. Disengage HDG mode. Verify no sound in headset and SAS LED is green, other LEDs are dark.

10. Engage SAS, HDG, and ALT modes. Verify no sound in headset and SAS, HDG, and ALT LEDs are green, other LEDs are dark. Press AP OFF button on cyclic grip. Verify no sound in headset and SAS LED is green, other LEDs are dark.

11. Engage SAS, HDG, and ALT modes. Verify no sound in headset and SAS, HDG, and ALT LEDs are green, other LEDs are dark. Press AP OFF button twice on cyclic grip. Verify four beeps in headset and SAS LED is white, other LEDs are dark.

B. Scheduled Inspections

Every 100-hour or annual inspection:

1. Inspect condition of associated equipment. Verify proper installation and security of equipment.

2. Inspect wiring condition. Verify no loose, chafed, or broken wires or terminals. Verify neatness, proper routing and installation, and security.

3. Perform ground checks per Part A.

22-62 Special Inspections

A. Troubleshooting

CAUTION

Adjustment to autopilot equipment is not permitted.

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

22-62 Special Inspections (continued)

A. Troubleshooting (continued)

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

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CHAPTER 25

FURNISHINGS

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CHAPTER 25

FURNISHINGS

25-00 Description

The seats are not adjustable but the pilot-side pedals are adjustable. Each helicopter is supplied with a removable back cushion to position the pilot farther forward. This allows shorter pilots to reach the pedals, the cyclic grip in its most forward position, and the controls on the center console.

Refer to § 25-24 for description of optional heated seats.

Each seat is equipped with a combined lap belt and inertia reel shoulder strap. The inertia reel is normally free but will lock if there is sudden movement as would occur in an accident.

Five-point harnesses are optional for the front seats. The lap belts on these harnesses should be adjusted to eliminate slack. The lower strap should be adjusted as necessary to ensure that the buckle does not interfere with the cyclic grip at aft cyclic. The harness is equipped with a webbing stop located above the inertia reel. The stop limits shoulder strap retraction and should be adjusted so the straps are comfortable without excessive slack.

Optional anchor loops located in the cabin ceiling above the door posts provide attachment points for a safety tether for equipment or occupants during doors-off operation.

Refer to § 25-90 for description of optional cyclic guard.

The main baggage compartment is located between the cabin and the engine compartment. It is accessed via a large door on the aircraft right side. The cowl door annunciator illuminates to warn the pilot when the door is not latched. A light illuminates the compartment when the battery switch is ON. Tie down anchors are provided for securing items in the baggage compartment. Observe placarded weight limits. Placard locations and illustrations are given in Chapter 11.

Additional compartments are located under each seat except the center rear seat. Seat cushions hinge forward for access to these compartments. Do not load these compartments above the maximum fill lines. The lines indicate required crush space for the seats in an accident. Baggage compartment dimensions are given in Chapter 6.

WARNING

Never repair or modify seat assemblies, including seat assembly fabric, seat pans, or hook and loop tape (Velcro) securing fabric to seat pans. Seat assembly energy-absorption design is critical to occupant safety. To preserve crashworthiness, maintenance is limited to seat assembly replacement.

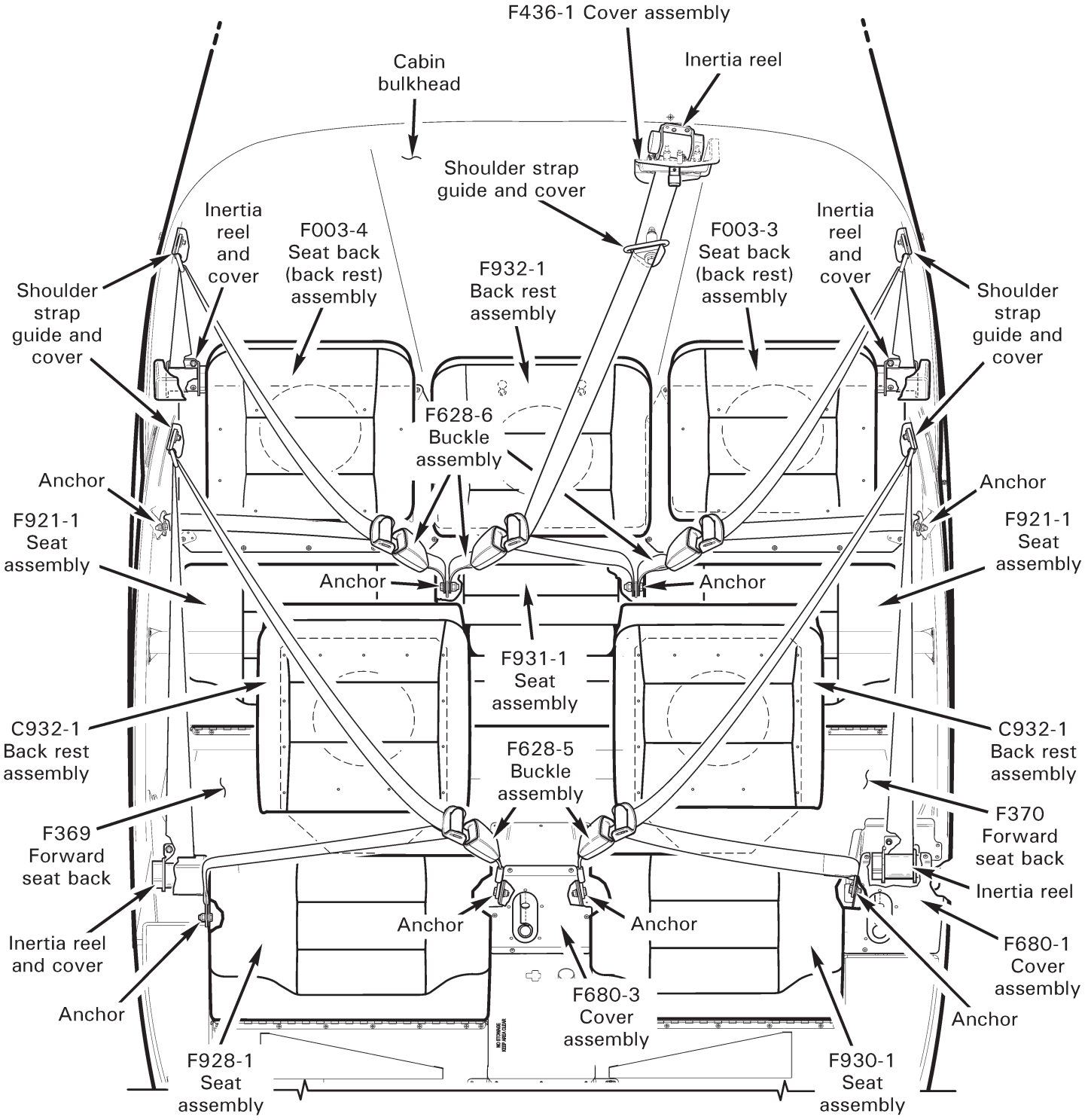

FIGURE 25-1 SEAT HARNESSES, SEAT ASSEMBLIES, AND BACK RESTS

25-70 Cargo Hook Installation

25-71 Description

See R66 Pilot's Operating Handbook Cargo Hook Supplement (Section 9) for complete system description.

The cargo hook installation includes a cargo hook, electric release buttons on left and right side cyclic, mechanical release knobs at left and right front seat, hydraulic and radio buttons and switches on left side cyclic, a start button on left side collective, a load meter, gas temperature gauge, and torque meter at left front seat, and provisions for remote control of external load equipment on left and right side cyclic. Optional equipment includes forward doors with large bubble windows and skid-mounted mirrors.

Doors with large bubble windows are designed such that pilots may lean their head into the bubble in order to look straight down at an external load. The left door contains a second, lower window that allows the pilot to look back inside at the load meter, gas temperature gauge, and torque meter. Each door contains an electric fan to aid with defogging.

A padded elbow rest is provided above the left side collective. This allows the left-side pilot to brace against the elbow rest for stability while leaning out to see external loads. The elbow rest is adjustable up and down via a friction knob.

A cabin interior hardpoint installation is for use with safety harnesses.

The cargo hook is suspended from a hard point on the helicopter belly. For overhaul requirements for the cargo hook itself, refer to Onboard Systems overhaul manual (refer to § 25-73 Part D).

The load weigh system consists of a load cell incorporated in the hook attaching hardware and a load meter installed at left front seat.

25-72 Configurations

See R66 Pilot's Operating Handbook Cargo Hook Supplement (Section 9) for approved flight configurations.

25-73 Cargo Hook

A. Schematic

Refer to Figure 98-29 for cargo hook wiring schematic.

B. Removal

1. Turn battery switch off and pull out (10 amp) HOOK RELEASE and (10 amp) EXT LOAD (if installed) circuit breaker(s) on circuit breaker panel.
2. Disconnect G140-6 (installations without load cell) or G140-7 (installations with load cell) harness assembly from 528-029-00 cargo hook at hook connectors.
3. Remove cotter pin, castellated nut, washers, and bolt (G132-1) or load cell (G132-2 or G132-4) securing hook to hard point's D136-2 support. Remove hook.
4. Remove screws securing (mechanical release) cover to hook and remove cover. Disconnect D676-3 (control) cable assembly's ball from mechanical release's fork.
5. Loosen jam nut and unthread hook from cable assembly.
6. Configure helicopter for flight with hook removed per Part F as required.

C. Installation

1. Turn battery switch off and pull out (10 amp) HOOK RELEASE and (10 amp) EXT LOAD (if installed) circuit breaker(s) on circuit breaker panel.
2. Configure helicopter for flight with hook installed per Part F as required.
3. Loosen jam nut and thread 528-029-00 cargo hook onto D676-3 cable assembly. Verify threads protrude beyond plate flange.
4. Insert bolt and washer (G132-1) or load cell (G132-2 or G132-4) securing hook to hard point's D136-2 support. Install washers and castellated nut, and tighten nut finger tight (back off as required to align cotter pin holes, but do not install cotter pin). Verify security.

CAUTION

Overtightening castellated nut can damage load cell.

5. Rig mechanical release control per § 25-75.
6. Install cotter pin at hook-to-hard point fastener.
7. Connect G140-6 (installations without load cell) or G140-7 (installations with load cell) harness assembly to hook at hook connectors. Verify security.

25-79 Skid-Mounted Mirrors (continued)

D. Configurations for Flight (continued)

2. Configuration for Flight with Skid-Mounted Mirror(s) Installed

a. Remove screws from skid tube(s) and install skid-mounted mirror(s) per Part B.

b. Revise Weight and Balance Record in R66 Pilot's Operating Handbook (POH) Section 6 to incorporate the following data:

Right Skid-Mounted Mirror Add:

Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
0.80 lb	32.00 in.	25.60 in.-lb	41.00 in.	32.80 in.-lb

Left Skid-Mounted Mirror Add:

Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
0.80 lb	32.00 in.	25.60 in.-lb	–41.00 in.	–32.80 in.-lb

25-80 Cabin Interior Hardpoint Installation

A. Removal

Peel back headliner and remove hardware securing G949-2 ring to F087-1 frame; remove ring.

B. Installation

Peel back headliner and install hardware securing G949-2 ring to F087-1 frame. Standard torque fasteners per § 20-32 and torque stripe per Figure 5-1. Position seam of grommet at top of hole, in-line with middle fastener.

25-81 Arm Rest

NOTE

Flight with G135-7 support assembly & 2454K71KNOB removed is permissible. No change to helicopter weight and balance.

A. Removal

Remove 2454K71KNOB knob. Remove hardware securing G135-7 support assembly to G135-8 cover assembly and remove support.

B. Installation

Position G135-7 support assembly on G135-8 cover assembly and install hardware; verify security. Install 2454K71KNOB knob. Verify proper operation; position support as desired and tighten knob.

25-90 Cyclic Guard

NOTE

Flight with handle assembly & mounting hardware removed or with handle in either position is permissible.

A. Description

The optional cyclic guard is a bar that extends from the inboard corner of the left front seat to the instrument console. It is intended to act as a barrier to help prevent inadvertent interference with the cyclic control. The guard also provides a hand grip for a passenger's right hand.

In order to access the under seat compartment with the guard installed, pull the silver spring knob at the forward end of the guard and allow the aft end to rotate down away from the seat hinge. To re-secure the guard, lift the aft end and allow the spring knob to lock back in place.

It is recommended that the guard be installed whenever a non-pilot passenger occupies the left front seat. A pilot flying from the left seat may find that the guard contacts the right leg when feet are on the pedals. The guard should be removed prior to flight if the pilot finds it objectionable.

B. Removal

1. Extend G721-1 guard assembly into upper position and remove hardware securing guard to left hand forward seat. Pull plunger and slide guard forward out of G722-6 plate.
2. Open console assembly (ref. § 95-50). Remove hardware securing plate to lower console and remove plate.

C. Installation

1. Open console assembly (ref. § 95-50). Position G722-6 plate on lower console and install hardware; verify security. Close and secure console.
2. As required, install 56-99-196-20 plunger in G721-1 guard assembly; install supplied sleeve wet with B270-11 adhesive and special torque to 25 in.-lb.
3. Pull plunger, insert guard assembly in plate and slide aft. Extend guard assembly into upper position and install hardware securing G722-5 mounts to left hand forward seat. Verify security.
4. Actuate guard assembly and verify proper operation. As required, adjust set screw in plate to reduce forward/aft play (plunger must fully engage).

D. Scheduled Inspections

Refer to § 5-45 100-Hour/Annual Inspection.

CHAPTER 28

FUEL SYSTEM

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CHAPTER 28

FUEL SYSTEM

28-00 Description

A single bladder-type crash-resistant fuel cell supplies fuel via gravity flow to the engine. The fuel cell incorporates vent fittings, a filler port, a fuel gage sender, a low-fuel sender, a sump drain, and a finger strainer at the fuel outlet.

The low-fuel sender is a float switch which activates the LOW FUEL annunciator, indicating approximately five gallons of usable fuel remaining. On later aircraft, a second float switch activates the <12 GAL FUEL annunciator, indicating approximately 12 gallons of usable fuel remaining. At moderate to high power settings, the 12 gallon annunciator will illuminate approximately 15 to 20 minutes prior to the LOW FUEL annunciation.

> NOTE
>
> Due to fuel tank geometry, the level at which the <12 GAL FUEL annunciator illuminates varies with helicopter pitch and roll attitude and is therefore affected by helicopter CG. 12 gallon annunciation is accurate in a level attitude but may be inaccurate by as much as four gallons if helicopter is loaded to CG limits. Aft, left loadings cause annunciation with less than 12 gallons remaining and forward, right loadings cause annunciation with more than 12 gallons remaining.

The fuel cell is secured inside an aluminum structure. The filler cap is located under a cowl door. The left and right vent fittings are interconnected and are vented though two risers within the mast fairing. The vent fittings each have a rollover valve to prevent fuel leakage in any attitude. A fuel valve is located on the forward side of the firewall and is controlled by a push-pull cable control at the base of the pilot's collective stick.

The engine incorporates a fuel pump assembly with an inlet filter. A differential pressure switch illuminates the FUEL FILTER annunciator if the filter becomes contaminated.

A single drain allows fuel sampling from the low point in the fuel cell. The drain tube is accessible via a left side cowl door. The drain is opened by extending the plastic tube clear of the aircraft and pushing up on the drain. On later helicopters, a glass tube stowed inside the upper left cowl door is provided which may be used to catch fuel samples.

Refer to § 28-50 for optional aux fuel tank installation system description.

Refer to § 28-60 for optional pressure fueling system installation system description.

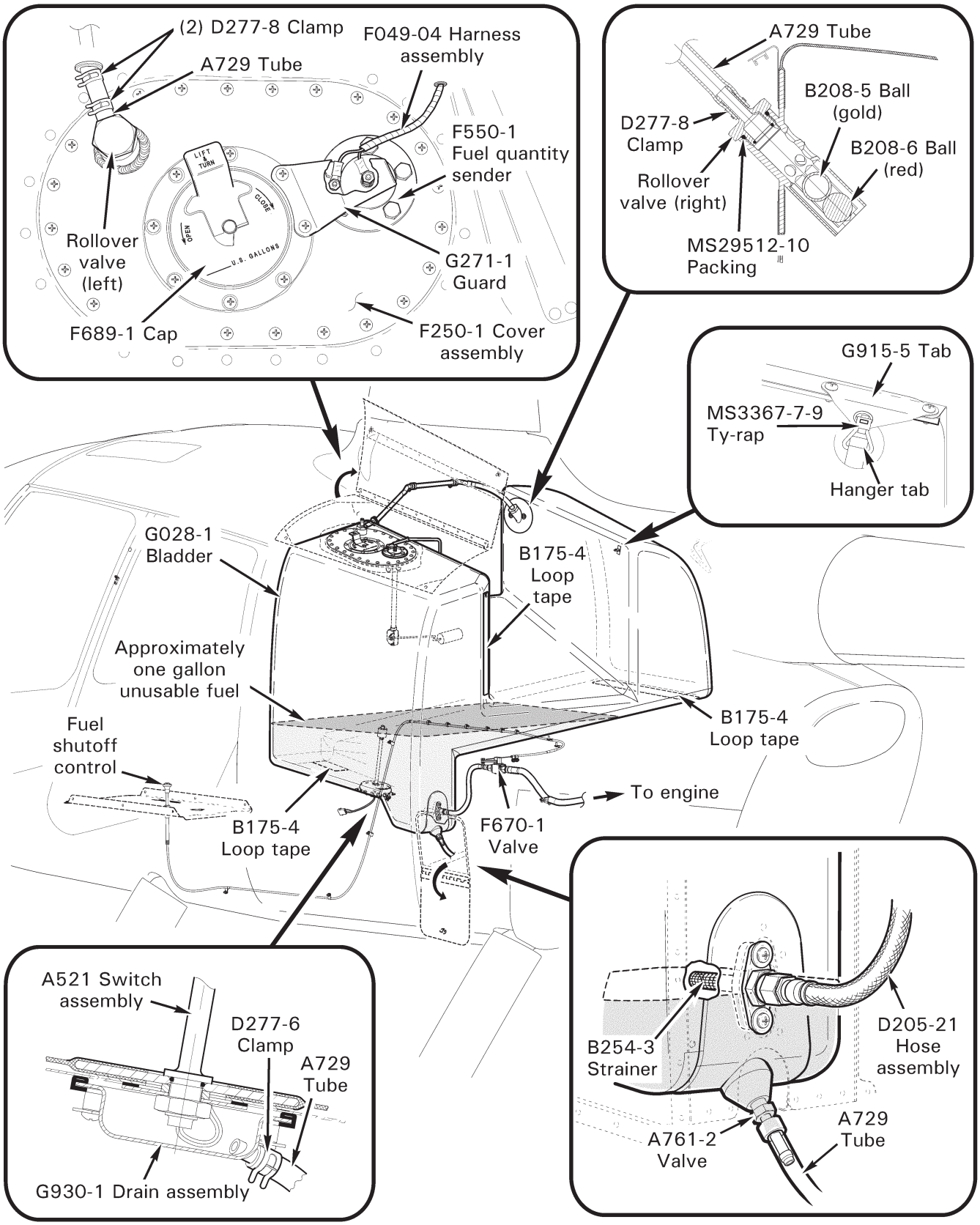

FIGURE 28-1 MAIN FUEL SYSTEM (STANDARD)

28-60 Pressure Fueling System

A. Description

The pressure fueling system consists of a fueling port on the right side of the fuselage, two shut-off valves in series just downstream of the port, a hose from the valves to an inlet at the top of the fuel tank, fuel tank level and pressure sensors, and a control panel on the instrument panel. The fueling port is compatible with an Emco Wheaton J71 dry-break coupler (recommended Emco Wheaton part no. J71C-AVN1-E004, which fits a fuel hose with a one inch male NPT threaded fitting).

Two shut-off valves are used to provide redundant protection against overfueling. Both valves must be open to allow fuel to flow. Each valve is connected to an independent float switch in the fuel tank to close the valve when the tank is full as well as an independent pressure switch to close the valve if fuel tank overpressure is detected. One of the valves is also connected to a second float switch to shut off at 40 gallons (151 liters).

The pressure fueling control panel includes a power switch, a quantity selector switch, a VALVE OPEN light, and a TANK PRESSURE warning light with two test buttons for testing the overpressure warning circuits. The power switch enables refueling by providing power to open the two shut-off valves. If the helicopter is running, the collective must be on the down stop for the valves to operate. The VALVE OPEN light illuminates when both shut-off valves are open, indicating the system is ready to accept fuel. The TANK PRESSURE light illuminates when excessive pressure is detected in the fuel tank. Excessive pressure will latch a shut-off valve closed until power to the system is cycled.

The pressure fueling system feeds fuel to the top of the main fuel tank. The system cannot be used for defueling and it will not add fuel to the optional auxiliary tank in the baggage compartment. Maximum allowable pressure for ground equipment connected to the fueling port is 50 psi (3.5 bar), which provides approximately 50 gallons per minute (190 liters per minute) fuel flow. Approximate flow rates at lower pressures are 30 gpm at 20 psi, 20 gpm at 10 psi, and 100 lpm at 1 bar.

The fueling port and recommended Emco Wheaton coupler are both dry-break fittings, allowing the external fueling equipment to be connected or disconnected without fuel spillage regardless of whether the shut-off valves are open or closed. A cap is provided which may be installed on the fueling port when the system is not in use.

An optical sensor near the fueling port will detect a fuel hose if the hose is connected to the port. If the collective is raised off the down stop while a hose is connected, a “fuel hose” audio alert will repeat in the headsets. The alert is muted 15 seconds after the collective is raised to prevent a distraction in case of a false alert.

CAUTION

The audio alert is only an aid. Do not rely on audio alert to verify hose is disconnected. Pilots must visually confirm fuel hose is disconnected and area is clear before takeoff.

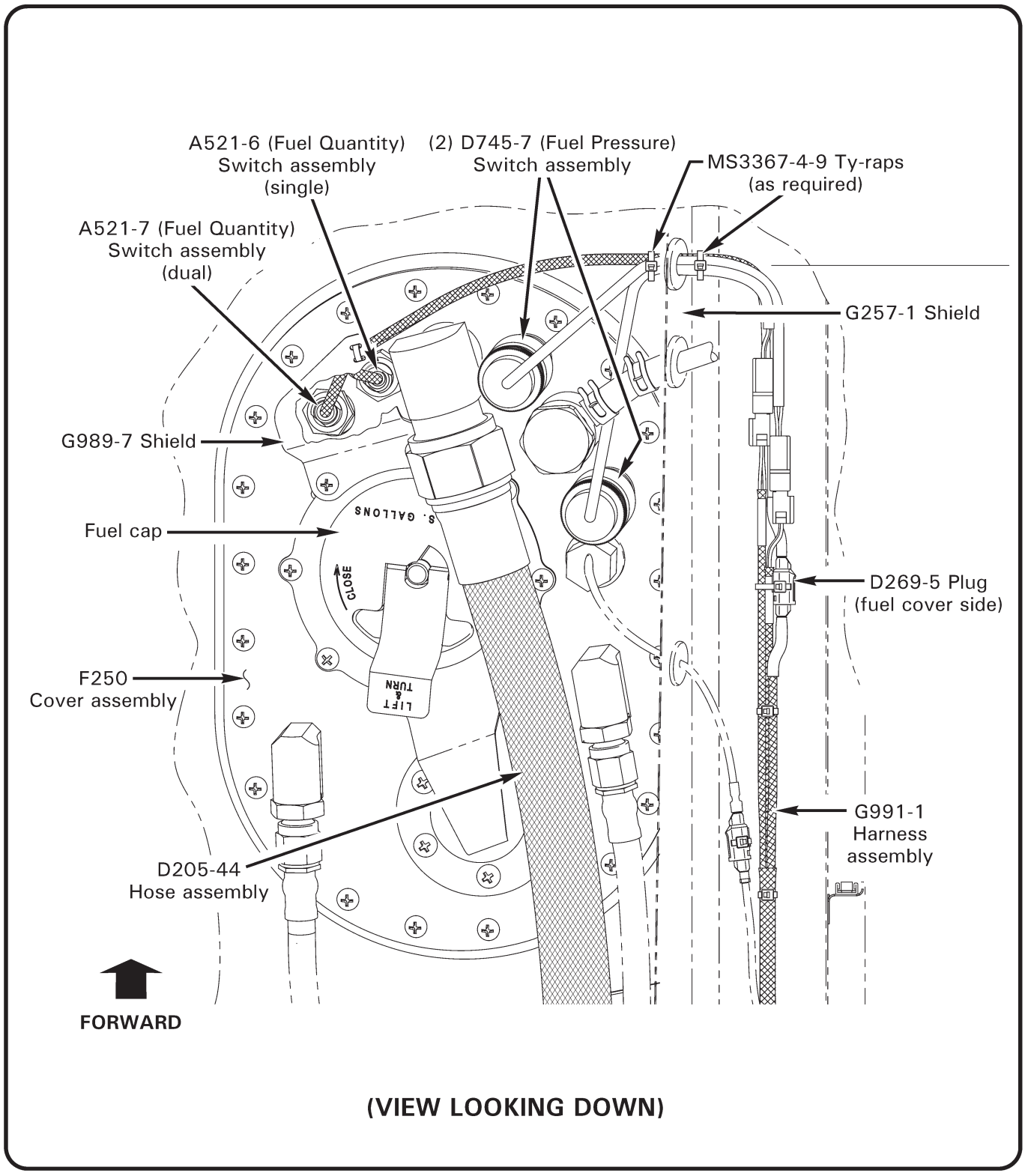

FIGURE 28-8 MAIN FUEL PORT (SHOWN WITH OPTIONAL AUX FUEL TANK)

28-61 A521 (Fuel Level) Switch Assemblies

CAUTION

Avoid contaminating bladder interior. Cover arms with sleeves and use lint-free gloves when working inside bladder.

A. Schematic

Refer to Figure 98-34 for pressure fueling system installation schematic.

B. Removal

1. Defuel helicopter per § 12-42.
2. Turn battery & avionics switches off and pull PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel.
3. Remove tailcone cowling per § 53-23.
4. Refer to Figure 28-8. Open (main) fueling port door. Cut and discard ty-raps as required and disconnect A521 & D745-7 switch assembly wire harnesses from G991-1 harness assembly at connectors.
5. Using appropriate pin extractor, extract pins from switch assembly wire harness connectors; pull grommet and wires thru G257-1 shield.
6. Carefully pull A521 switch assembly wires through grommet, taking care not to damage other wire insulation or grommet.
7. Remove ty-rap as required, and remove screws securing G989-7 shield to F250 cover assembly. Remove shield.
8. Remove fuel cap. Carefully capture A521-6 (single) or A521-7 (dual) switch assembly body with gloved hand.
9. Remove nut securing switch assembly to F250 cover assembly; carefully route wires thru (switch) opening, inside bladder.
10. Carefully pull switch assembly through (fuel cap) opening, avoiding fuel sender. Install fuel cap and protect F250 cover assembly opening.

28-61 A521 (Fuel Level) Switch Assemblies (continued)

C. Installation

1. Lubricate (new) MS29512-05 packing with A257-6 grease and install packing over A521-6 (single) or A521-7 (dual) switch assembly threads.
2. Refer to Figure 28-8. Open (main) fueling port door and remove fuel cap. With gloved hand, route switch assembly and wiring through (fuel cap) opening inside of bladder. Route wires thru switch assembly opening and install nut securing switch assembly to F250 cover assembly. Special torque nut per § 20-33 and torque stripe per Figure 5-1.
3. Install B266-8 sleeving over switch assembly wires, as required.
4. Carefully pull A521 switch assembly wires through grommet, taking care not to damage other wire insulation or grommet.
5. Pull A521 & D745-7 switch assembly wires and grommet thru G257-1 shield and install grommet.
6. As required, install pins on wires per the following: strip 0.18-inch insulation from wires. Crimp M39029/58-360 pin onto each wire. Using 10X magnification, inspect crimps per § 20-94. Verify no nicked or broken conductors (wire strands), and no insulation damage. As required, gently pry locking lance with fingernail so lance protrudes (lance will not lock in housing unless it protrudes).
7. Install wires in housings per schematic (see Part A). Connect switch assembly wire harnesses to airframe harness at connectors; verify security.
8. Secure switch assembly wiring to G989-7 shield using MS3367-4-0 ty-rap (locate head under shield); lock D269 plug and receptacle and secure to wiring using MS3367-4-9 ty-rap; install MS3397-4-X ty-raps as required to secure wiring. Cinch ty-raps until snug without overtightening and trim tips flush with heads.
9. Apply A257-9 anti-seize to screw threads and install screws securing G989-7 shield to F250 cover assembly.
10. Close (main) fueling port door. Install tailcone cowling per § 53-23.

D. Operation Check

1. Defuel helicopter per § 12-42, as required.
2. Push in PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel. Turn battery switch on.
3. Remove main tank fuel cap. Carefully capture A521-6 (single) or A521-7 (dual) switch assembly float with gloved hand. Have a second person turn on power and set quantity to 40 GAL at pressure fueling control panel; verify VALVE OPEN light is illuminated. Verify light extinguishes when actuating each float individually.
4. Turn off power at pressure fueling control panel. Turn battery switch off.

28-62 D745-7 (Pressure) Switch Assemblies

A. Schematic

Refer to Figure 98-34 for pressure fueling system installation schematic.

B. Removal

1. Turn battery & avionics switches off and pull PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel.
2. Remove tailcone cowling per § 53-23.
3. Refer to Figure 28-8. Open (main) fueling port door. Cut and discard ty-raps as required and disconnect D745-7 & A521 switch assembly wire harnesses from airframe harness at connectors.
4. Using appropriate pin extractor, extract pins from D745-7 switch assembly wire harness connectors; pull grommet and wires thru G257-1 shield.
5. Carefully pull D745-7 switch assembly wires through grommet, taking care not to damage other wire insulation or grommet.
6. Remove switch assembly from F250 cover assembly. Protect F250 cover assembly opening.

C. Installation

1. Refer to Figure 28-8. Apply B270-6 sealant or A701-11 tape to D745-7 switch assembly threads and install switch in F250 cover assembly. Special torque switch per § 20-33 and torque stripe per Figure 5-1.
2. Carefully pull D745-7 switch assembly wires thru grommet, taking care not to damage other wire insulation or grommet.
3. Pull D745-7 & A521 switch assembly wires and grommet thru G257-1 shield and install grommet.
4. Install wires in housings per schematic (see Part A). Connect switch assembly wire harnesses to airframe harness at connectors; verify security.
5. Refer to figure and install MS3367-4-9 ty-raps as required to lock D269 plug and receptacle and to secure wiring. Cinch ty-raps until snug without overtightening and trim tips flush with heads.
6. Close (main) fueling port door. Install tailcone cowling per § 53-23.

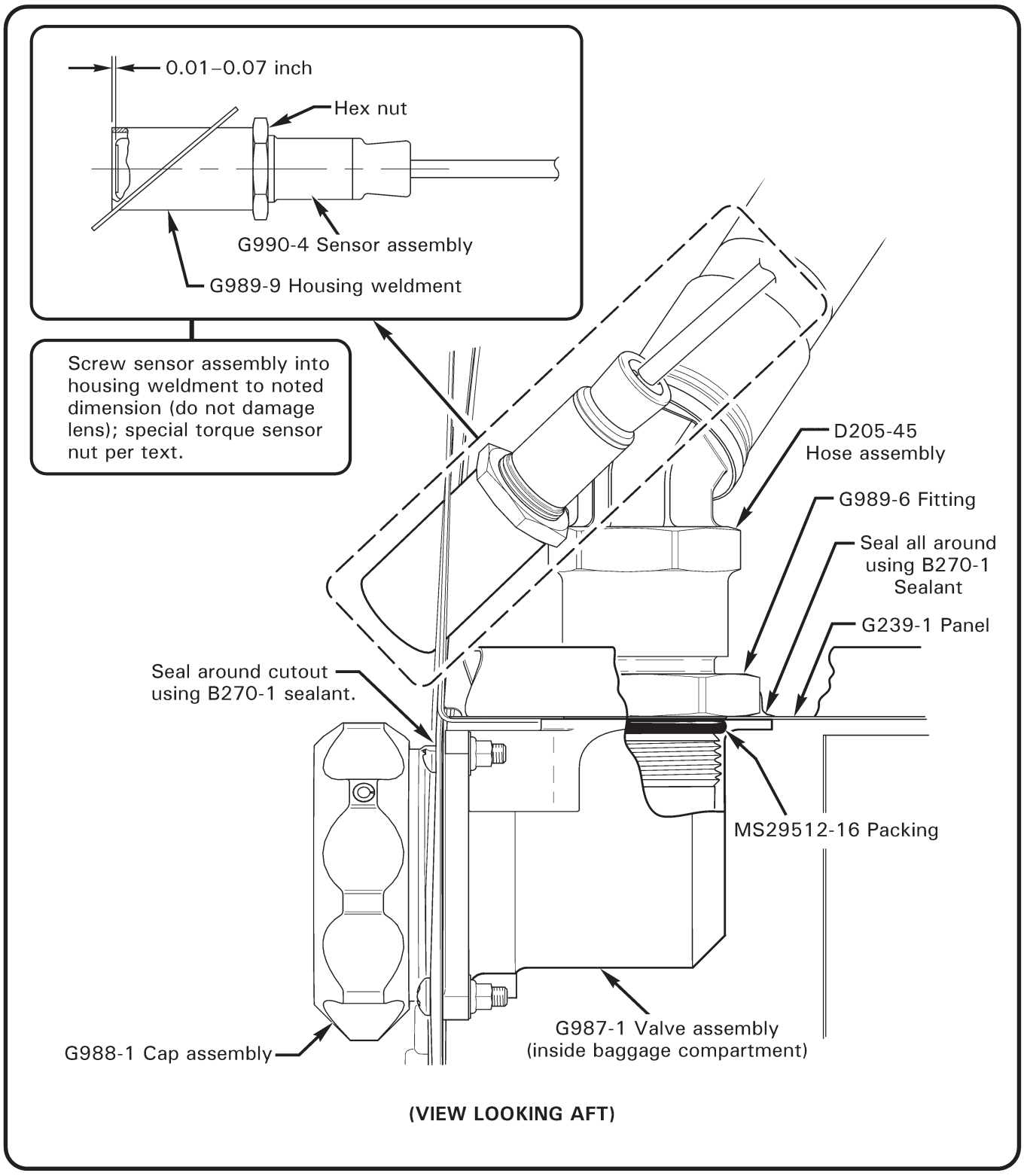

FIGURE 28-9 PRESSURE FUEL PORT

28-63 G987-1 (Fuel Port) Valve Assembly

A. Removal

1. Remove residual fuel from system per § 28-66, as required.
2. Remove tailcone cowling per § 53-23.
3. Refer to Figure 28-10. Open right-side engine cowling door. Remove hardware securing G989-8 brackets to firewall. Cut and discard ty-raps as required.
4. Refer to Figure 28-9. Using backup wrench, disconnect D205-45 hose assembly from G989-6 fitting. Cap hose.
5. Remove G989-6 fitting from G987-1 valve assembly.
6. Remove G988-1 cap assembly. Open baggage compartment door. Remove hardware securing valve to aft cabin skin and firewall; remove valve. Install fuel cap and protect valve opening.
7. Remove residual B270-1 sealant from G239-1 panel and parts.

B. Installation

1. Refer to Figure 28-9. Open baggage compartment door and right-side engine cowling door. Remove G988-1 cap assembly and position G987-1 valve assembly between G239-1 panel and aft cabin skin. Install hardware securing valve to skin and firewall; verify security.
2. Lubricate new MS29512-16 packing with A257-6 grease and install on G989-6 fitting, as required, and install fitting thru panel in valve. Special torque fitting per § 20-33 but do not torque stripe.
3. Connect D205-45 hose assembly nut to fitting but do not tighten. Rotate assembled valves to minimize preload on G989-8 brackets and install hardware securing brackets to firewall. Verify security.
4. Using backup wrench, special torque hose nut per § 20-33 but do not torque stripe. Install ty-raps per Figure 28-10. Cinch ty-raps snug without over tightening and trim tips flush with heads
5. Seal all around cutout and fitting using B270-1 sealant; torque stripe fitting and hose nut per Figure 5-1.
6. Install tailcone cowling per § 53-23.

28-64 G990-4 (Proximity) Sensor Assembly

A. Schematic

Refer to Figure 98-34 for pressure fueling system installation schematic.

B. Removal

1. Turn battery & avionics switches off and pull PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel.
2. Refer to Figure 28-9. Cut and discard ty-raps as required and disconnect G990-4 sensor assembly wire harness from airframe harness at connectors.
3. Loosen sensor assembly hex nut at G989-9 housing weldment and unscrew sensor from housing.

C. Installation

1. Turn battery & avionics switches off and pull PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel.
2. Refer to Figure 28-9. Screw G990-4 sensor assembly into G989-8 housing weldment to noted dimension (use care when measuring with calipers not to damage lens). Special torque sensor hex nut to 60 in.-lb.
3. Connect sensor assembly wire harness to airframe harness at connectors; verify security. Install MS3367-4-9 ty-rap to lock connector; install MS3367-5-9 ty-raps as required to secure wiring. Cinch ty-raps until snug without overtightening and trim tips flush with heads.

D. Operation Check

1. Connect external fueling equipment (dry-break coupler) to pressure fueling port. Push in PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel.
2. With appropriately rated person at controls, run-up helicopter to stabilized idle per R66 Pilot's Operating Handbook (POH) Section 4.
3. Turn on power at pressure fueling control panel. Lift collective stick slightly (valve open light will extinguish) and verify "fuel hose" audio alert sounds in headset for approximately 15 seconds and then ceases. Lower collective.
4. Turn off power at pressure fueling control panel. Shut down helicopter per R66 POH Section 4.
5. Disconnect external fueling equipment (dry-break coupler).

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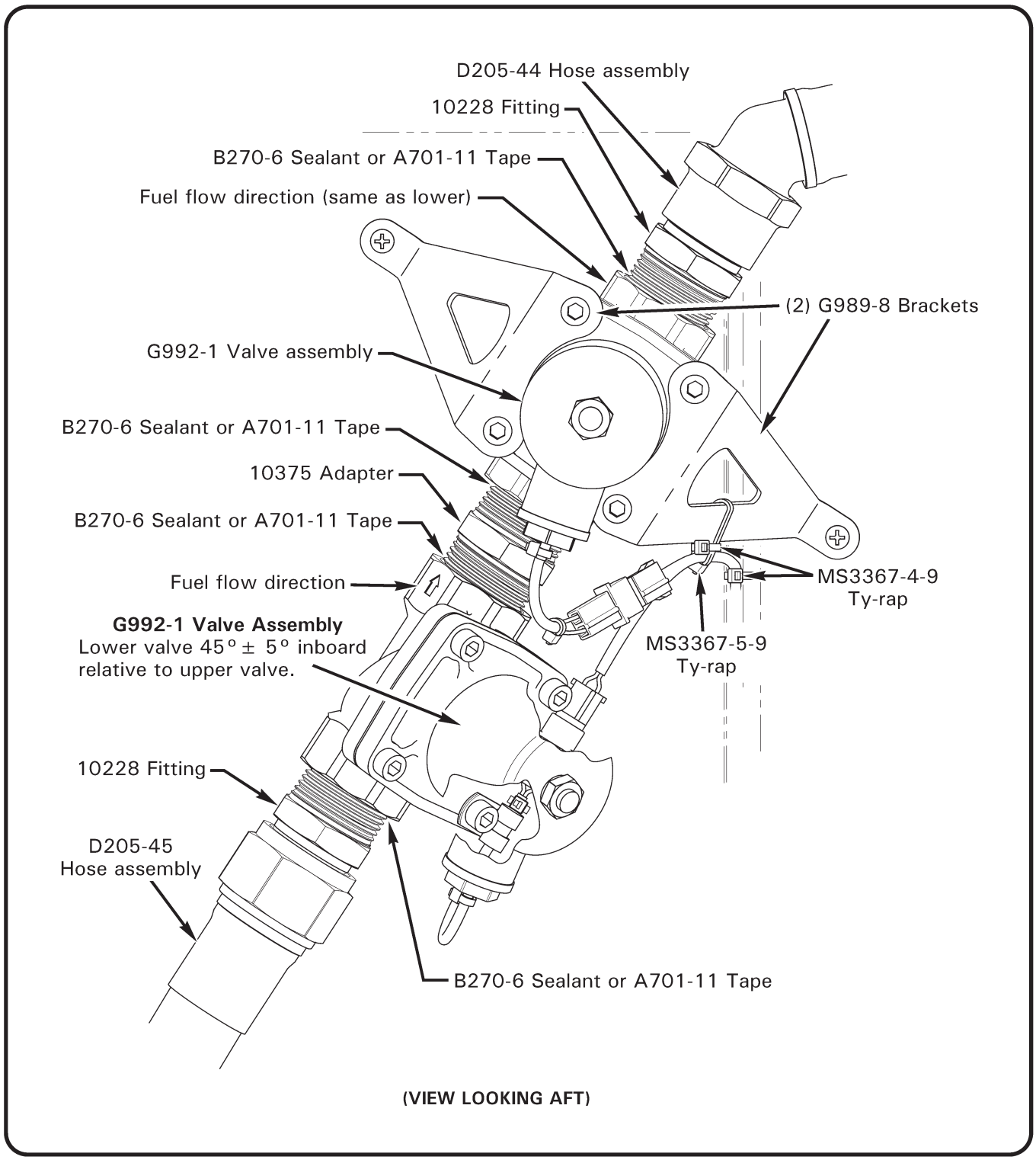

FIGURE 28-10 PRESSURE FUEL SYSTEM SHUT-OFF VALVE ASSEMBLIES

28-65 G992-1 Shut-off Valve Assemblies

A. Schematic

Refer to Figure 98-34 for pressure fueling system installation schematic.

B. Removal

1. Remove residual fuel from system per § 28-66, as required.
2. Remove tailcone cowling per § 53-23.
3. Turn battery & avionics switches off and pull PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel.
4. Refer to Figure 28-10. Cut and discard ty-raps as required and disconnect G992-1 valve assembly wire harnesses from G991-1 harness assembly at connectors.
5. Using backup wrench, loosen D205-44 and D205-45 hose assembly nuts from 10228 fittings.
6. Remove hardware securing G989-8 brackets to firewall, and remove assembled G992-1 valve assemblies, brackets, fittings, and 10375 adapter. Cap or plug open fittings.
7. As required, remove brackets from upper valve assembly and reinstall screws in valve. As required, disassemble fittings and adapter from valve(s). Cap or plug open fittings.

28-65 G992-1 Shut-off Valve Assemblies (continued)

C. Installation

1. Turn battery & avionics switches off and pull PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel.
2. Progressively remove caps and plugs; apply B270-6 sealant or A701-11 tape to 10375 adapter threads.
3. Refer to Figure 28-10. Assemble upper and lower G992-1 valve assemblies and 10375 adapter. Special torque valves and adapter to 500 in.-lb. Tighten valves to align lower valve to 45° ± 5° inboard relative to upper valve and torque stripe per Figure 5-1.
4. Apply B270-6 sealant or A701-11 tape to 10228 fittings (valve side threads only).
5. Install 10228 fittings using backup wrench, special torque fittings per § 20-33 and torque stripe per Figure 5-1.
6. If removed, install screws securing G989-8 brackets to upper valve; special torque screws per § 20-33 and torque stripe per Figure 5-1.
7. Position assembled valves in helicopter and connect D205-44 & D205-45 hose assembly nuts to fittings; do not tighten nuts.
8. Rotate assembled valves to minimize preload on brackets and install hardware securing brackets to firewall. Verify security.
9. Using backup wrench, special torque hose nuts per § 20-33 and torque stripe per Figure 5-1.
10. Connect valve assemblies to G991-1 wire harness at connectors; verify security. Install MS3367-4-9 or MS3367-5-9 ty-raps per figure to secure wiring; cinch ty-raps until snug without overtightening and trim tips flush with heads.
11. Install tailcone cowling per § 53-23.

D. Operation Check

1. Push in PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel. Turn battery switch on. Turn on power at the pressure fueling panel; verify "VALVE OPEN" light is illuminated.
2. Via the right side access door, hold lower G992-1 valve assembly. Verify a valve actuates while a second person presses "PRESSURE CIRCUIT TEST" button 1; verify a valve actuates while a second person presses "PRESSURE CIRCUIT TEST" button 2.
3. Turn off power at pressure fueling control panel. Turn battery switch off.

28-66 Residual Fuel Removal

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.

Remove residual fuel in pressure fueling system per the following:

1. Push in PRESS. FUELING circuit breaker (5 amp) at circuit breaker panel. Turn battery switch on.
2. Turn on power and set quantity to FULL at pressure fueling control panel. With collective stick lowered, verify VALVE OPEN light is illuminated.
3. Remove G988-1 cap assembly.
4. Using a suitable, grounded drain container and protective gloves, depress retainers at G987-1 fueling port valve assembly and drain fuel.
5. Release retainers and reinstall cap as required.

28-67 Maintenance

A. Scheduled Inspections

Every 100-hour or annual inspection:

1. Visually inspect condition of associated equipment. Verify proper installation and security of equipment. Verify no fuel leaks.
2. Visually inspect wiring condition. Verify no loose, chafed, or broken wires or terminals. Verify neatness, proper routing and installation, and security.

B. Special Inspections

Hard Landing:

1. Perform hard landing inspection per § 5-65, as required.
2. Perform scheduled inspections check per Part A.
3. Examine integrity of installed equipment's surrounding structures.
4. Refer to § 53-11 for cabin repairs.

Lightning strike:

1. Perform lightning strike inspection per § 5-72, as required.
2. Perform scheduled inspection checks per Part A.
3. Visually inspect wiring, connectors, and installed equipment for obvious damage such as electrical arching or burns. If obvious damage is detected, additional components may require replacement. Contact RHC Technical Support with detailed documentation for further guidance prior to approving aircraft for return to service.

32-63 Float Installation

WARNING

D679 Cylinder contents are under extreme pressure. Install MT545-1 pin assembly in D757-1 valve assembly during maintenance to prevent cylinder discharge.

A. Removal

NOTE

Floats are subject to damage during removal. Remove floats if necessary for repairs.

1. Refer to Figure 32-5. Hinge right aft seat assembly forward. Install MT545-1 pin assembly in D757-1 valve assembly.
2. Disconnect D674-12 hose assembly from T-fitting near float. Cap fittings to prevent foreign object contamination.
3. Refer to Figure 32-7. Detach float cover hook and loop tape inboard of skid and loosen lacing.
4. Remove hardware securing float to skid tube, and skid extension.
5. Use care when removing C944 retainer strips from girts, and when separating girts from skid tube and skid extension. Repeat steps for opposite float.

B. Installation

1. Refer to Figure 32-7. Verify (outboard) bolt heads securing struts to skids are covered with B270-1 sealant. Apply additional sealant as required.
2. Position deflated float over skid tube and skid extension. Align holes in C944 retainer strips, float covers, float girts, and skid and install hardware. Special torque nuts per § 20-33.
3. Inflate float with filtered, oil-free, dry air to 3.0 psig via topping valves.
4. Remove protective caps and connect D674-12 hose assembly to T-fitting near float. Orient connection as required to minimize preload. Special torque hose B-nut per § 20-33, apply B270-22 protectant to exposed aluminum surfaces on hose B-nut and T-fitting, and torque stripe per Figure 5-1. Repeat steps for opposite float.
5. Pack floats per § 32-63 Part C.

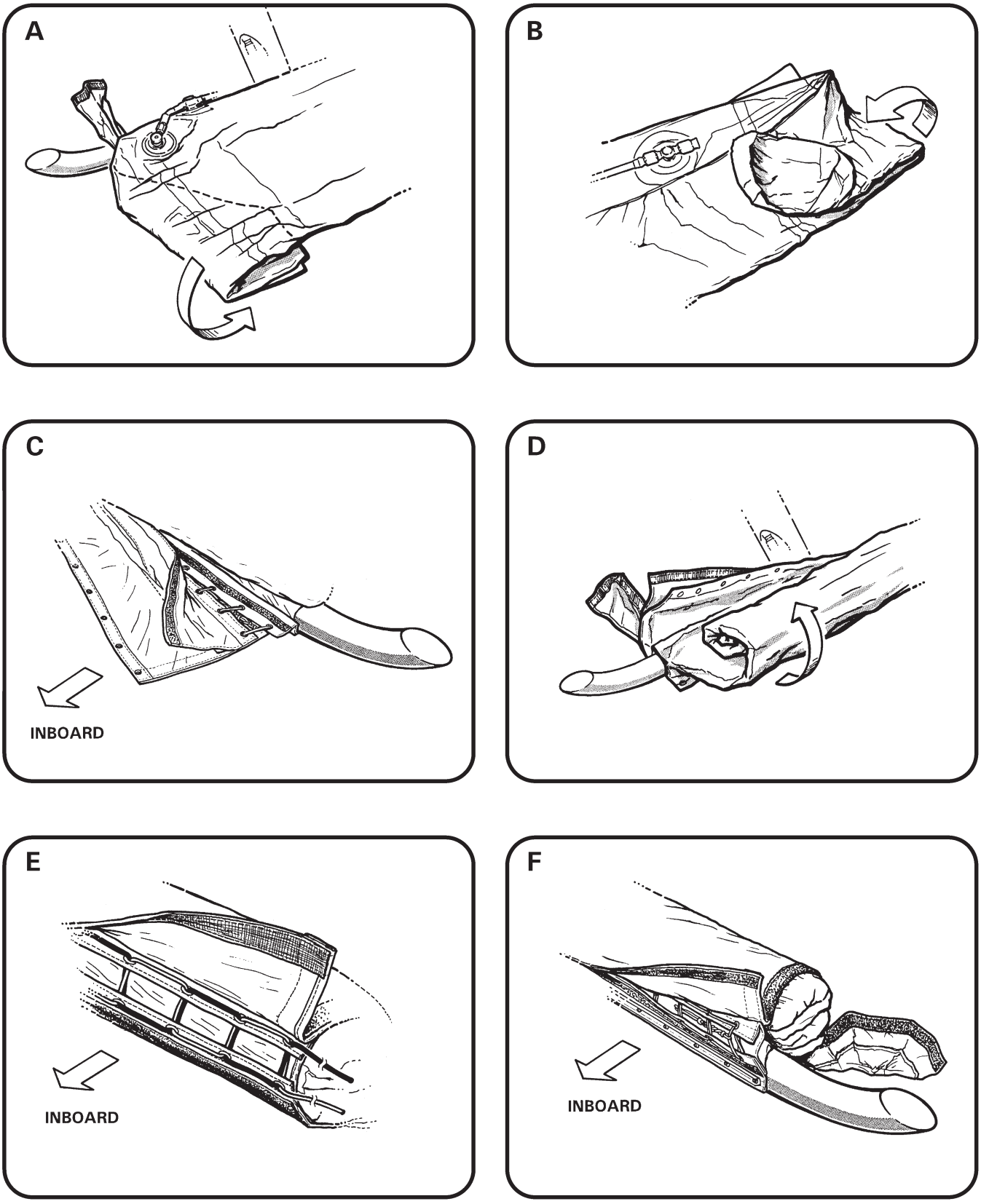

FIGURE 32-8 POP-OUT FLOATS FLOAT PACKING

32-63 Float Installation (continued)

C. Packing

1. Install floats per § 32-63 Part B.
2. With float inflated, verify tees are oriented to minimize preload on hoses. Deflate float. Verify float is properly secured to skid and all hoses are properly connected and covered with heat shrink.
3. Spread deflated float outboard of skid tube. Vacuum as much air as possible from each float chamber through topping valves. Smooth out wrinkles.
4. Lightly dust float and inside float cover with talcum powder.
5. Refer to Figure 32-7 and Figure 32-8 Detail A. At girt forward edges, fold float perpendicular to skid tube; tuck material under and aft of float as shown.
6. Refer to Figure 32-8 Detail B. At girt aft edges, fold float perpendicular to skid tube; lay material over and forward of float as shown.
7. Refer to Figure 32-8 Detail C. Loosen lacing cords securing float cover to inboard girt. Detach, align, and secure inboard hook and loop fasteners.

NOTE
If possible, roll float into cover with the assistance of six or seven people.

8. Refer to Figure 32-8 Detail D. Align hoses and valve cover flaps. Roll float from outboard edge toward skid tube, as tightly as possible. Hold float on top of skid.
9. Apply A257-7 lubricant to mating surfaces of float cover and (outboard) girt snaps. Button snaps, and secure hook and loop fasteners.
10. Refer to Figure 32-8 Detail E. Verify lacing cords are installed in cover grommets in crossover ("ladder" lacing) method shown. Tighten cords starting at the aft skid extension working forward: at each segment, pull cords tight or until material edges join, but do not overtighten near valves. Tie cord ends in double square knots (4 alternating overhand knots).
11. Refer to Figure 32-8 Detail F. Tuck-in cord ends and secure hook and loop fasteners. Secure hook and loop fasteners at end caps.
12. Verify all fasteners are properly secured. Verify floats are rolled tight, with no lumps or loose areas.

32-64 System Maintenance

A. Leak Check

WARNING

D679 Cylinder contents are under extreme pressure. Install MT545-1 pin assembly in D757-1 valve assembly during maintenance to prevent cylinder discharge.

1. Disconnect D674-9 hose assembly from presssure cylinder valve. Install protective cap on cylinder valve fitting. Cover D674-9 hose fitting to prevent contamination, but do not install an air-tight seal (D674-9 hose fitting must be allowed to leak to verify check valve function at each float chamber).
2. Unfasten hook-and-loop fasteners along inboard sections of float cover to expose lacing. Loosen, but do not remove, lacing.
3. Unfasten outboard sections of float cover and unroll float to expose valves.
4. Inflate floats with filtered, oil-free, dry air to 2.0 psig via topping valves.
5. Allow float air temperature to stabilize for 5 minutes minimum then record OAT and pressure in each float chamber.
6. One to two hours after initial pressure check, again record OAT and pressure in each float chamber. Allowable chamber pressure drop from initial measurement is 0.2 psig adjusted for any temperature change. Pressure will change by 0.06 psig per degree C temperature change. For example, float chamber pressure will decrease 0.6 psig if temperature drops 10 degrees C.
7. If leaks are detected, repair float with supplied repair kit and repeat steps 4, 5, & 6.
8. Connect D674-9 hose assembly to cylinder valve and torque per § 20-33.
9. Pack float per § 32-63 Part C.

NOTE

Annually apply A257-7 dry-film lubricant (see § 20-78) to float cover snap mating surfaces.

CHAPTER 52

DOORS AND WINDOWS

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Intentionally Blank

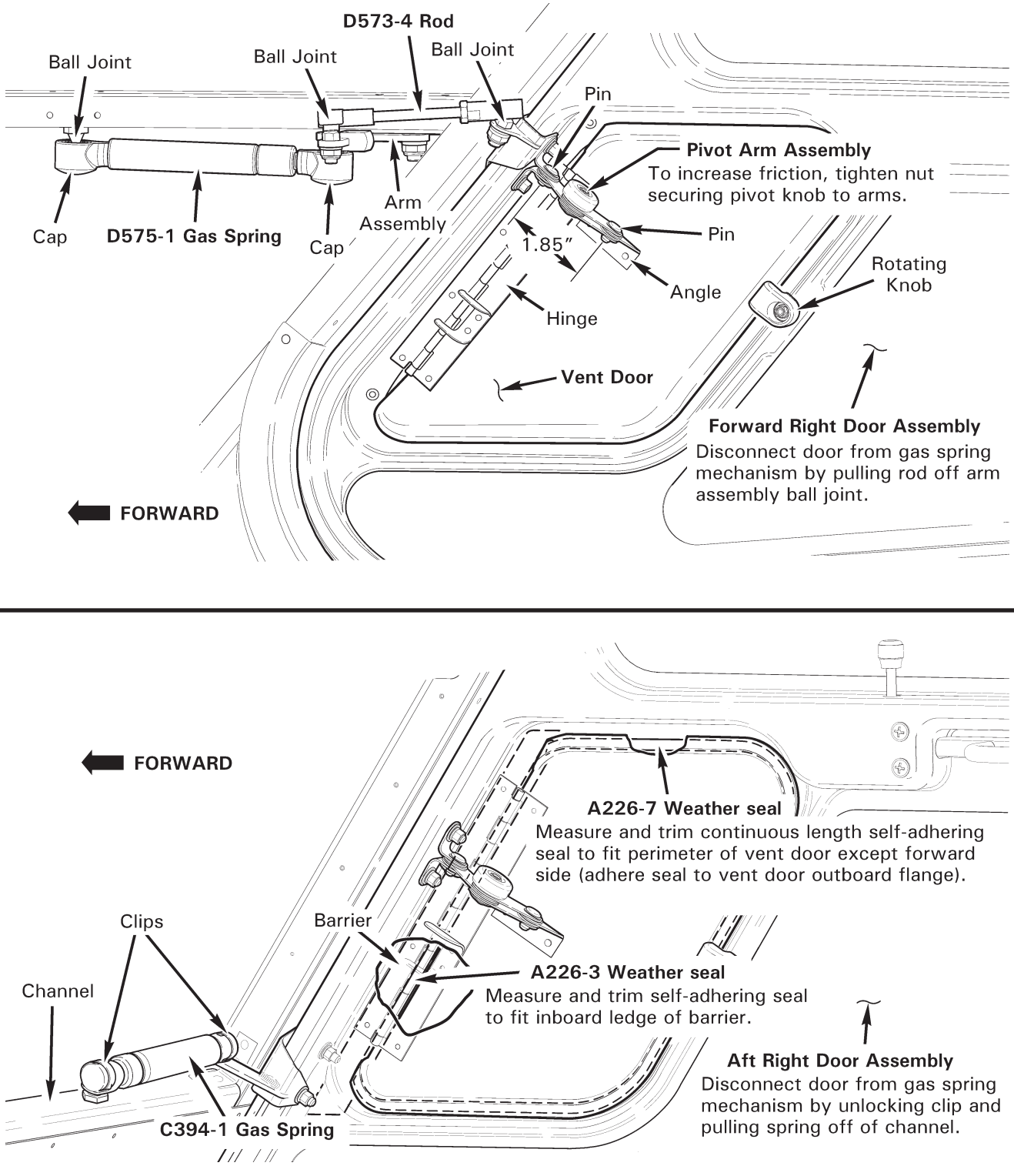


FIGURE 52-2 GAS SPRINGS AND DOOR VENTS

52-30 Windshield Installation

52-31 Standard (Acrylic) Windshield Installation

A. Description

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

B. Cleaning

Refer to § 20-10 Part B for cleaning windshield.

C. Inspection

Inspect both windshields for cracks and crazing adjacent to retainers per Figure 52-3. If cracks exceed these limits, replace damaged windshield per § 52-31 Part F.

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

D. Removal

1. Remove forward door assembly per § 52-10 Part B. Remove hardware securing C228-4 (upper) hinge assembly to door frame and remove hinge.

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

2. Remove hardware securing C238-27 or C238-28 (side) retainer to door frame and remove retainer.
3. Install upper hinge assembly, and install door assemblies for cabin structure support with windshield removed.
4. Support windshield. With a second person inside cabin to remove nuts, latch forward doors. Remove hardware securing F238-4 (upper) retainer, B409-5 gusset, D805-2 restraint, C366-5 bracket, C366-8 retainer, F367 (lower) retainers, B295-1 clip with yaw string, F367-12 stiffener, and F367-10 (center) retainer to cabin and remove parts. Remove windshield.
5. Remove sealant from cabin and parts.
6. If windshield is to be reinstalled, remove sealant from windshield.
7. Repeat steps to remove opposite-side windshield, as required.

52-31 Standard (Acrylic) Windshield Installation (continued)

E. Installation

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

1. Verify sealant has been removed from cabin, parts, and windshield.
2. Position windshield on helicopter and cleco retainers to frames.
3. Attach 1/2"-wide masking tape to windshield along edge of retainers to catch sealant squeeze-out during retainer installation.
4. Remove C238-27 or C238-28 (side) retainer and install C228-4 (upper) door hinge assembly. Install forward door assemblies for cabin structure support during windshield installation.
5. Remove F367-10 (center) retainer. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing center retainer and F367-12 stiffener (do not install B295-1 clip) to cabin; special torque screws per § 20-33. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
6. Remove F367 (lower) retainers. Run a bead of B270-26 sealant along entire edge of tape line. With a second person inside cabin to tighten nuts, latch forward doors. Install hardware securing lower retainers, C366-8 retainer, and C366-5 bracket to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
7. Remove F238-4 (upper) retainer. Run a bead of B270-26 sealant along entire edge of tape line. With a second person inside cabin to tighten nuts, latch forward doors. Install hardware securing upper retainer and B409-5 gusset to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
8. Remove door and hinge assembly. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing side retainer and D805-2 restraint to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
9. Reinstall hinge assembly, and install door assembly per § 52-10 Part C.
10. Ensure all fasteners are tight. Wipe off excess sealant with cheesecloth wet with lacolene.
11. Allow sealant to dry according to manufacturer's instruction.
12. Remove protective paper or film from inside and outside of the windshield.
13. Repeat steps to install opposite-side windshield, as required.
14. Install B295-1 clip and yaw string per § 52-33 Part B.

52-31 Standard (Acrylic) Windshield Installation (continued)

F. Replacement

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

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

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

5. A band saw with a blade containing at least 24 teeth per inch is recommended for initial trimming. Tape cardboard to band saw table to prevent scratching of windshield. Trim windshield carefully to prevent binding of saw blade and cracking windshield. Finish initial cut using an orbital sander, as required.
6. Hold windshield in place and check for fit. Re-trim as necessary.
7. After windshield is fitted, use sanding block with 100-grit paper to smooth edges. Finish edge and bevel corners using a triangular machinist's scraping tool. Verify all edges are clean and free of notches.
8. Remove trimming debris from windshield and cabin.
9. Install windshield per § 52-31 Part E.

52-32 Impact-Resistant (Polycarbonate) Windshield Installation

A. Description

The polycarbonate windshield installation is similar to the acrylic windshield installation, but the windshields fasten to the door and windshield frames via small stainless steel straps. If a wire strike provisions kit is installed, a different stainless steel strap configuration secures the polycarbonate windshields to a strengthened bow.

While polycarbonate has superior strength and flexibility properties when compared with acrylic, it is also more susceptible to ultraviolet (UV) degradation, and has a low scratch resistance. A hardcoat is applied during manufacturing to protect against UV damage and scratching, however, further effort must be made by the operator to to maximize windshield service life. Follow instructions closely to avoid scratching windshield during cleaning (refer to § 20-10 Part B). Exposure to incompatible cleaning agents or solvents can result in embrittlement or crazing. Use a cabin cover when parking helicopter outdoors, or store helicopter in hanger when possible.

B. Cleaning

Refer to § 20-10 Part B for cleaning windshield.

C. Inspection

Inspect both windshields for cracks and crazing adjacent to retainers per Figure 52-3. Also inspect areas adjacent to fasteners and stainless steel straps for cracks and crazing. If cracks exceed these limits, replace damaged windshield per § 52-31 Part F.

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

D. Removal

1. Perform § 52-31 Part D steps 1 thru 3.
2. Support windshield. With a second person inside cabin to remove nuts and washers, latch forward doors. Remove hardware securing G367 ties and straps to windshield near center bow (all other hardware installed in windshield may remain in place during windshield removal). Taking care not to bend ties and straps, remove sealant as required, and remove ties & straps from windshield.
3. Remove hardware securing F238-4 (upper) retainer, B409-5 gusset, D805-2 restraint, C366-5 bracket, C366-8 retainer, F367 (lower) retainers, B295-2 clip and yaw string, F367-12 stiffener (or G933-2 bow assembly), and F367-10 retainer (or G935-2 retainer) to cabin and remove parts. Taking care not to bend ties and straps, remove windshield.
4. Remove sealant from cabin and parts.
5. If windshield is to be reinstalled, remove sealant from windshield but leave hardware and G367 ties, straps, pads, and tabs installed. If replacing windshield, remove hardware and G367 ties, straps, pads, and tabs, as required.
6. Repeat steps to remove opposite-side windshield, as required.

52-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)

E. Installation

NOTE

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

NOTE

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

NOTE

Refer to R66 Illustrated Parts Catalog Chapter 52. Note location of G367 ties, straps, pads, and tabs on work table or by marking on tape at fasteners to facilitate installation.

1. Verify sealant has been removed from cabin, parts, and windshield.
2. Position windshield on helicopter and cleco G367 ties, straps, tabs, and retainers to frames. Also, cleco G367 ties, straps, and tabs to windshield at center bow, if drilled.
3. Install C228-4 (upper) door hinge assembly. Install forward door assemblies for cabin structure support during windshield installation.
4. If windshield is drilled and has hardware, G367 ties, straps, pads, and tabs installed:
   a. With a second person inside cabin to tighten nuts, latch forward doors. Remove clecoes and install hardware securing G367 ties and straps to windshield at center bow; special torque screws per § 20-33.
   b. Attach 1/2″-wide masking tape to windshield along edge of retainers to catch sealant squeeze-out during retainer installation.
   c. Remove F367-10 (center) retainer (or G935-2 retainer). Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing center retainer, F367-12 stiffener (or G933-2 bow assembly) to cabin (do not install B295-2 clip); special torque screws per § 20-33. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
   d. Perform § 52-31 Part E steps 6 thru 13.
   e. Paint (or touch up) windshield trim per § 52-32 Part G.
   f. Install B295-2 clip and yaw string or G935-7 plate per § 52-33 Part B.

52-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)

E. Installation (continued)

5. Align G367 ties and straps perpendicular to retainers within 2°. Install F367-12 stiffener (or G933-2 bow assembly) and special torque screws per § 20-33. Match drill #40 pilot holes through windshield and install clecos.

6. At center bow:

   a. Remove F367-12 stiffener (or G933-2 bow assembly) and F367-10 (center) retainer (or G935-2 retainer). Remove G367 ties and straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.

   b. Apply B270-26 sealant to G367 tabs and pads and position on windshield. Run a bead of B270-26 sealant along entire edge of windshield. Install hardware securing center retainer, F367-12 stiffener (or G933-2 bow assembly) to cabin (do not install B295-2 clip); special torque screws per § 20-33.

   c. With a second person inside cabin to tighten nuts, latch forward doors and install hardware securing G367 ties and straps to windshield; special torque screws per § 20-33. Wipe off excess sealant with cheesecloth wet with lacolene.

7. At lower retainers:

   a. Remove F367 (lower) retainers. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.

   b. Apply B270-26 sealant to G367-12 tabs and position on windshield. Run a bead of B270-26 sealant along entire edge of windshield. With a second person inside cabin to tighten nuts, latch forward doors, and install hardware securing lower retainers, C366-8 retainer, and C366-5 bracket to cabin. Install hardware securing G367 straps to windshield; special torque screws per § 20-33. Wipe off excess sealant with cheesecloth wet with lacolene.

8. At upper retainer:

   a. Remove F238-4 (upper) retainer. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.

   b. Run a bead of B270-26 sealant along entire edge of windshield. With a second person inside cabin to tighten nuts, latch forward doors, and install hardware securing upper retainer and B409-5 gusset to cabin. Install hardware securing G367 straps and ties to windshield; special torque screws per § 20-33. Wipe off excess sealant with cheesecloth wet with lacolene.

52-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)

E. Installation (continued)

9. At door frame:
   a. Remove door and hinge assembly. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
   b. Run a bead of B270-26 sealant along entire edge of windshield. Install hardware securing side retainer and D805-2 restraint to cabin. Install hardware securing G367 straps and ties to windshield; special torque screws per § 20-33. Wipe off excess sealant with cheesecloth wet with lacolene.
10. Reinstall hinge assembly, and install door assembly per § 52-10 Part C.
11. Ensure all fasteners are tight. Wipe off excess sealant with cheesecloth wet with lacolene.
12. Allow sealant to dry according to manufacturer's instruction.
13. Repeat steps to install opposite-side windshield, as required.
14. Paint (or touch up) windshield trim per § 52-32 Part G.
15. Install B295-2 clip and yaw string or G935-7 plate per § 52-33 Part B.

F. Replacement

NOTE

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

1. Perform § 52-31 Part F steps 1 thru 4.

WARNING

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

2. A band saw with 20°–30° clearance angle, 0–5° rake angle, 600–1000 m/min rotation speed, and 1.5–4 mm tooth spacing is recommended for initial trimming. Tape cardboard to band saw table to prevent scratching of windshield. Trim windshield carefully to prevent binding of saw blade and cracking windshield. Finish initial cut using an orbital sander, as required.
3. Hold windshield in place and check for fit. Re-trim as necessary.
4. After windshield is fitted, use sanding block with 100-grit paper to smooth edges. Verify all edges are clean and free of notches.
5. Remove trimming debris from windshield and cabin.
6. Install windshield per § 52-32 Part E.

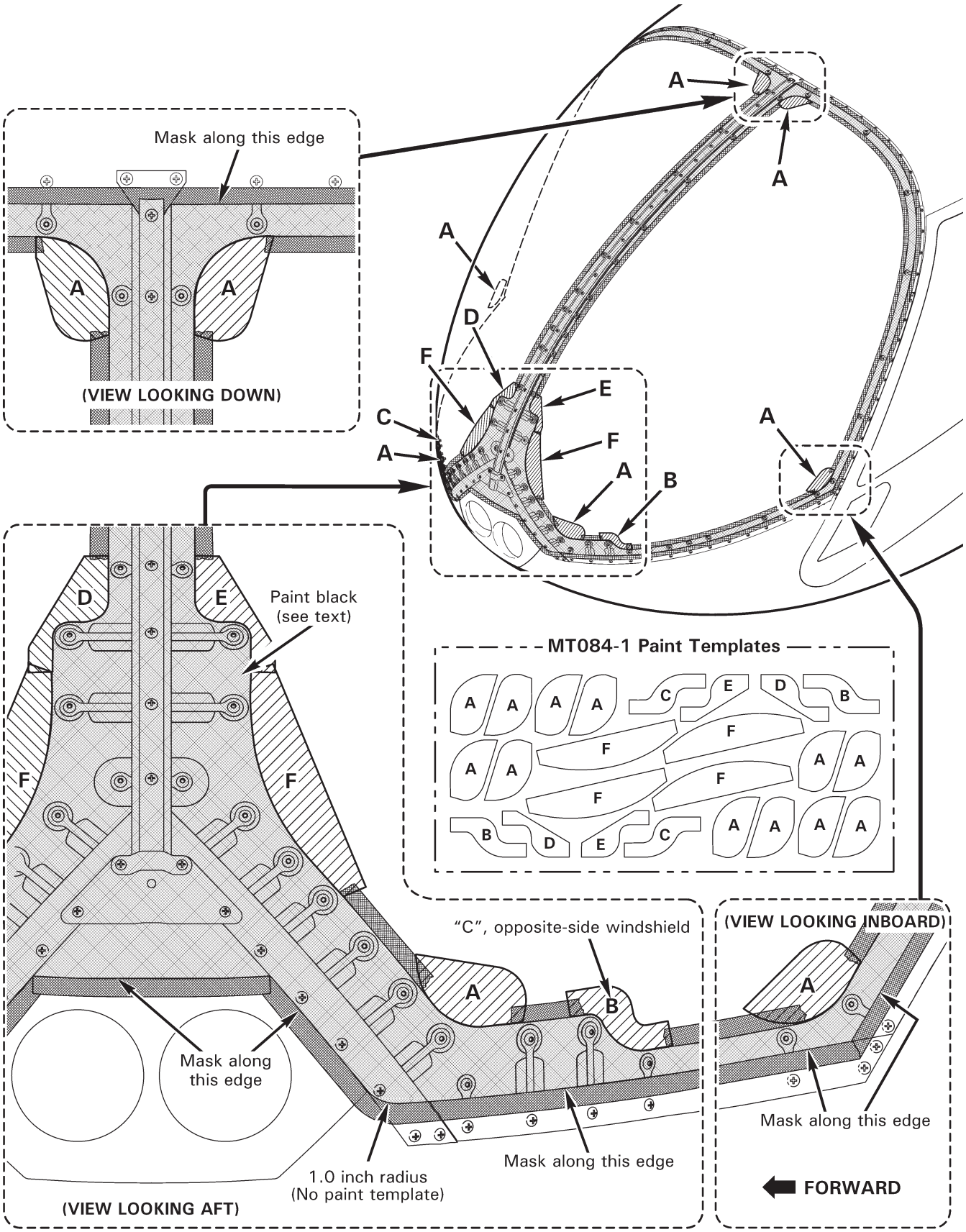


FIGURE 52-4 PAINT TEMPLATE LAYOUT

52-32 Impact-Resistant (Polycarbonate) Windshield Installation (continued)

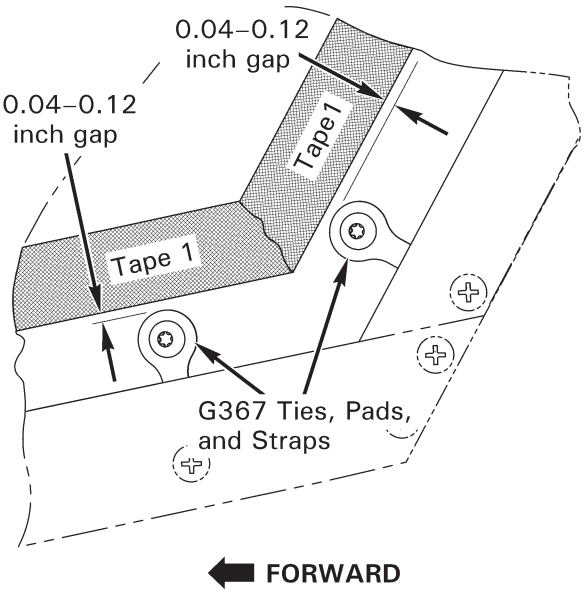
G. Trim Paint

1. Remove B295-2 clip and yaw string from bow assembly and reinstall screw. If G935-7 plate is installed, remove per § 52-33 Part A.
2. Trim any excess sealant around perimeter of windshield using plastic razor blades; remove sealant residue using cheesecloth wet with lacolene.
3. Clean surface of windshield to be masked for paint using cheesecloth wet with lacolene.

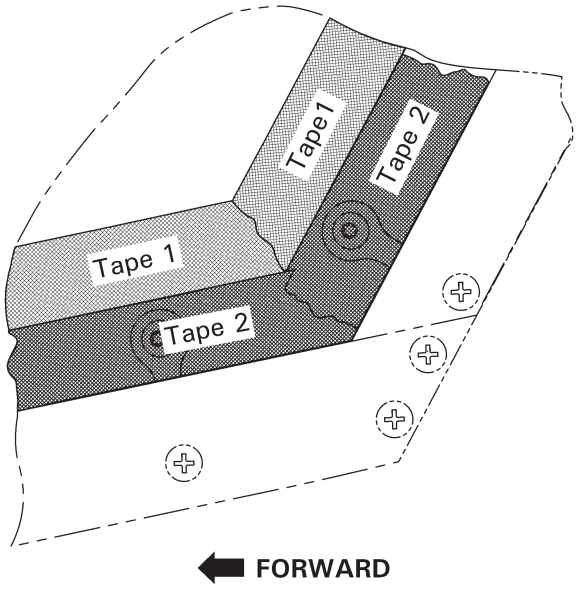
> NOTE
>
> Cleaning surface of windshield prior to masking will prevent paint from "bleeding," or seeping, under tape.

4. Refer to Figures 52-4 and 52-5. Using 3M vinyl tape (or equivalent), apply masking ("Tape 1" and "Tape 2") to windshield as shown. Apply MT084-1 paint templates on windshield as shown.
5. Refer to Figure 52-4. Using 3M vinyl tape (or equivalent), apply masking to windshield retainer edges, area near landing lights, and between MT084-1 paint templates as shown.
6. Protect windshield and cabin from paint overspray.
7. Using 320-grit sandpaper and scotch-brite, lightly scuff surfaces to be painted. Avoid damaging masking edges; replace any damaged masking per steps 4 and 5 as required.
8. Remove debris using compressed air.
9. Clean scuffed surfaces to be painted using a lint-free cloth wet with Final Klean 3909S.
10. Conversion coat bare aluminum per § 20-51, as applicable.
11. Refer to § 20-77. Apply black paint to windshield trim prepared surfaces per Figure 52-4.
12. Allow paint to cure. Remove MT084-1 paint templates and masking. Clean windshield per § 20-10 Part B.
13. Install B295-2 clip and yaw string or G935-7 plate per § 52-33 Part B.

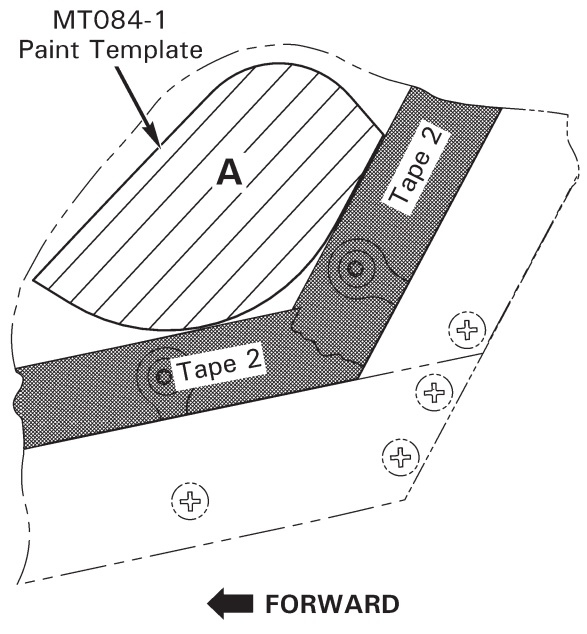
STEP 1: Apply "Tape 1". Maintain 0.04–0.12 inch gap from edge of G367 ties, pads, and straps.



STEP 2: Apply "Tape 2". Align edge of "Tape 2" with edge of "Tape 1".



STEP 3: Remove "Tape 1". Align paint template with edges of "Tape 2" and apply template.



STEP 4: Remove "Tape 2". Firmly press on paint template edges to be painted.

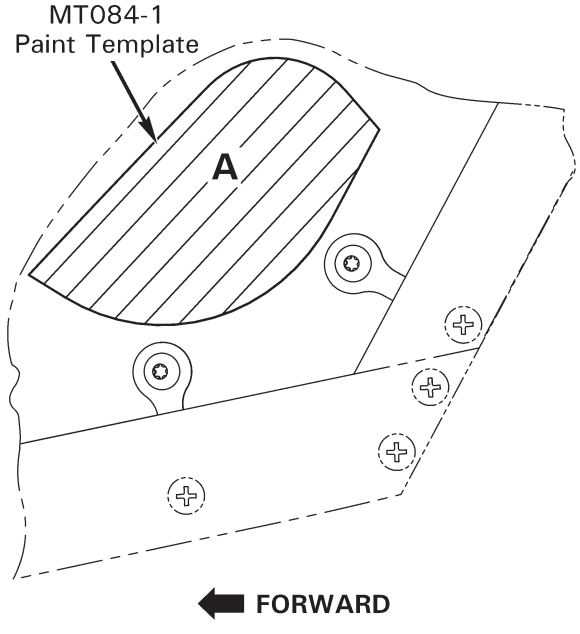


FIGURE 52-5 PAINT TEMPLATE LAYOUT PROCESS

52-33 Yaw String

A. Removal

1. Remove screw securing B295-1 or B295-2 clip; remove clip and yaw string.
2. If G935-7 plate is installed, drill out rivets securing plate. Remove plate and retain (4) NAS620-5 washers.

B. Installation

B295-1 and B295-2 Clip

1. Locate 10th screw up from bottom of F367-12 stiffener and remove screw.
2. Position yaw string on stiffener just above hole location; install screw securing B295 clip, finger tight. Verify 3 inches string, each side of clip; special torque screw to 16 in.-lb. Cut replacement string to 3 inches from clip, if applicable.

G935-7 Plate (Optional Wire Strike Only)

1. Refer to Figure 52-6. Locate (2) 0.128-inch diameter holes adjacent to 11th screw up from bottom of G933-2 bow assembly.
2. Assemble B204-2 rivets, G935-7 plate, and NAS620-5 washers, and position on bow; install rivets.
3. As required, install yaw string(s) on G935-7 plate to dimension shown; install hardware and standard torque per § 20-32. Trim string(s) as required.

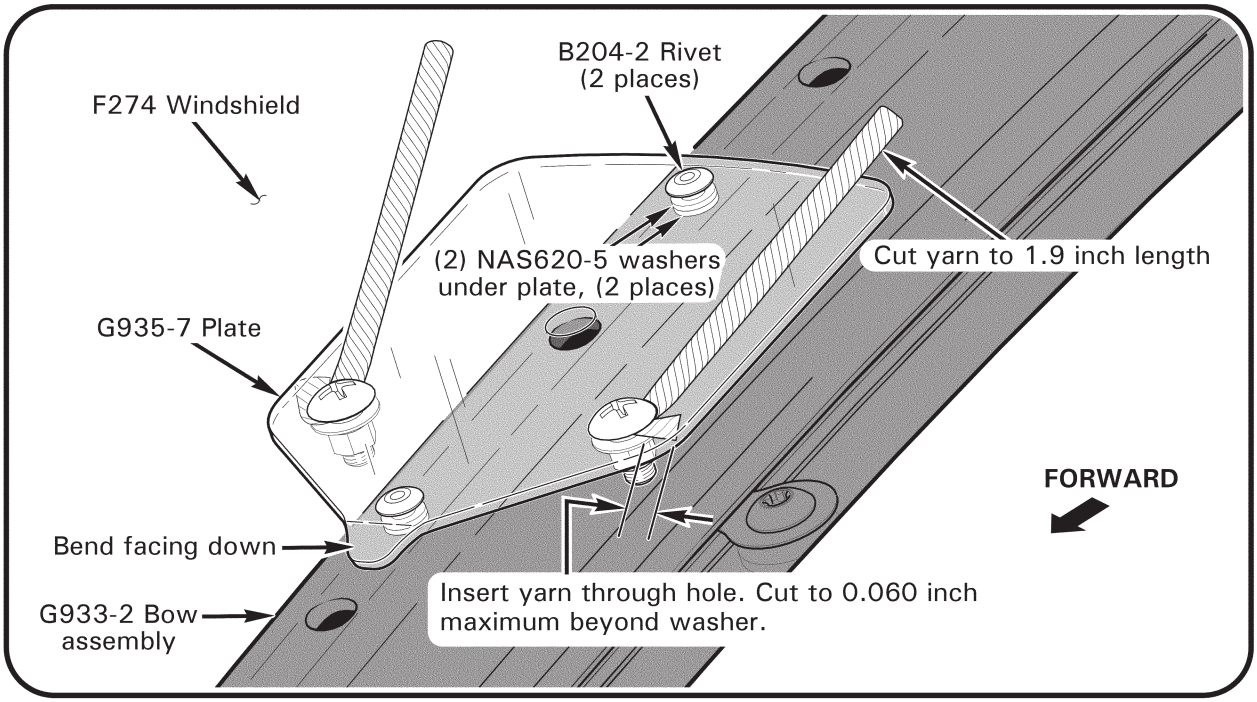


FIGURE 52-6 G935-7 PLATE INSTALLATION

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CHAPTER 62

MAIN ROTOR

Intentionally Blank

CHAPTER 62

MAIN ROTOR

62-00 Description

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

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

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

62-10 Main Rotor Blades

WARNING

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

A. Removal

Refer to Figure 62-1. Four people will be required to remove the blades. One person must support the blade approximately 2/3 its length from the root while another supports the root and removes or installs the attached bolt. Each F016-2 main rotor blade & spindle assembly weighs approximately 80 pounds.

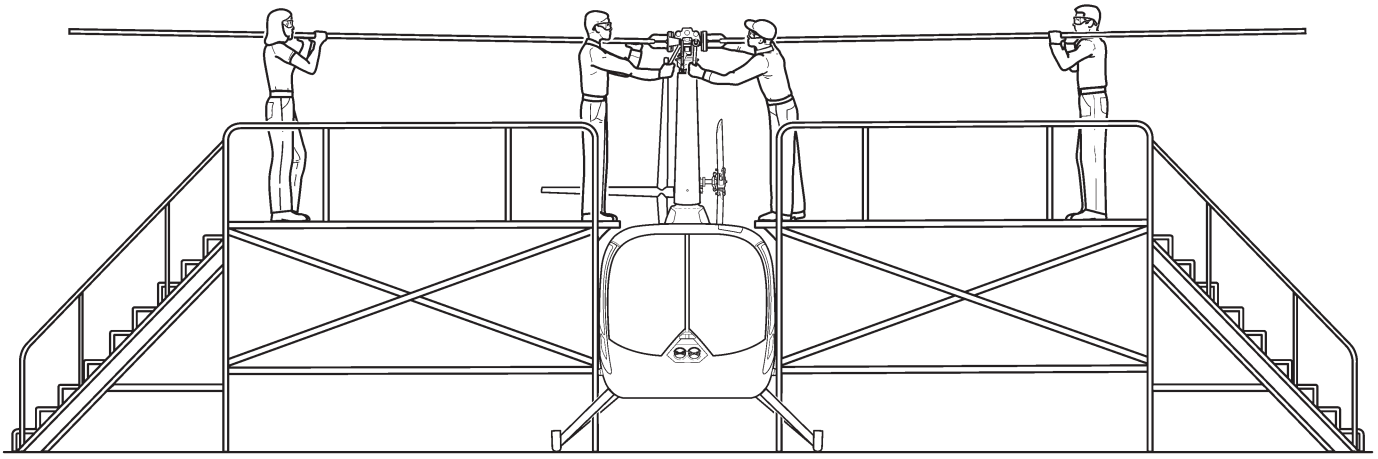

FIGURE 62-1 SUPPORTING MAIN ROTOR BLADES DURING BLADE REMOVAL OR INSTALLATION

62-10 Main Rotor Blades (continued)

A. Removal (continued)

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

CAUTION

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

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

CAUTION

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

NOTE

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

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

B. Installation

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

CAUTION

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

62-10 Main Rotor Blades (continued)

B. Installation (continued)

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

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

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

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

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

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

9. Using wrenches with at least 600 ft-lb torque capacity, tighten nut until drilled holes in nut and bolt align. Install MT122-6 tool and measure bolt stretch:
   a. Verify stretch is between 0.020–0.022 inch. Check thrust washer-to-hub bearing gap per Figure 62-7A; if gap is correct install a new cotter pin wet with approved primer. If stretch is not between 0.020–0.022 inch, or if thrust washer-to-hub bearing gap is incorrect, discard bolt & nut. Replace with new bolt & nut per step b.
   b. Perform steps 5 thru 9 using new (undrilled) bolt. Stretch bolt to 0.021–0.022 inch; if bolt stretched more than 0.024 inch, discard bolt & nut and replace with new. Check thrust washer-to-hub bearing gap per Figure 62-7A; adjust gap per § 62-32 Part B, as required. Drill bolt & nut per § 62-34 and install a new cotter pin wet with approved primer.
10. Perform steps 8 thru 10 for opposite blade.

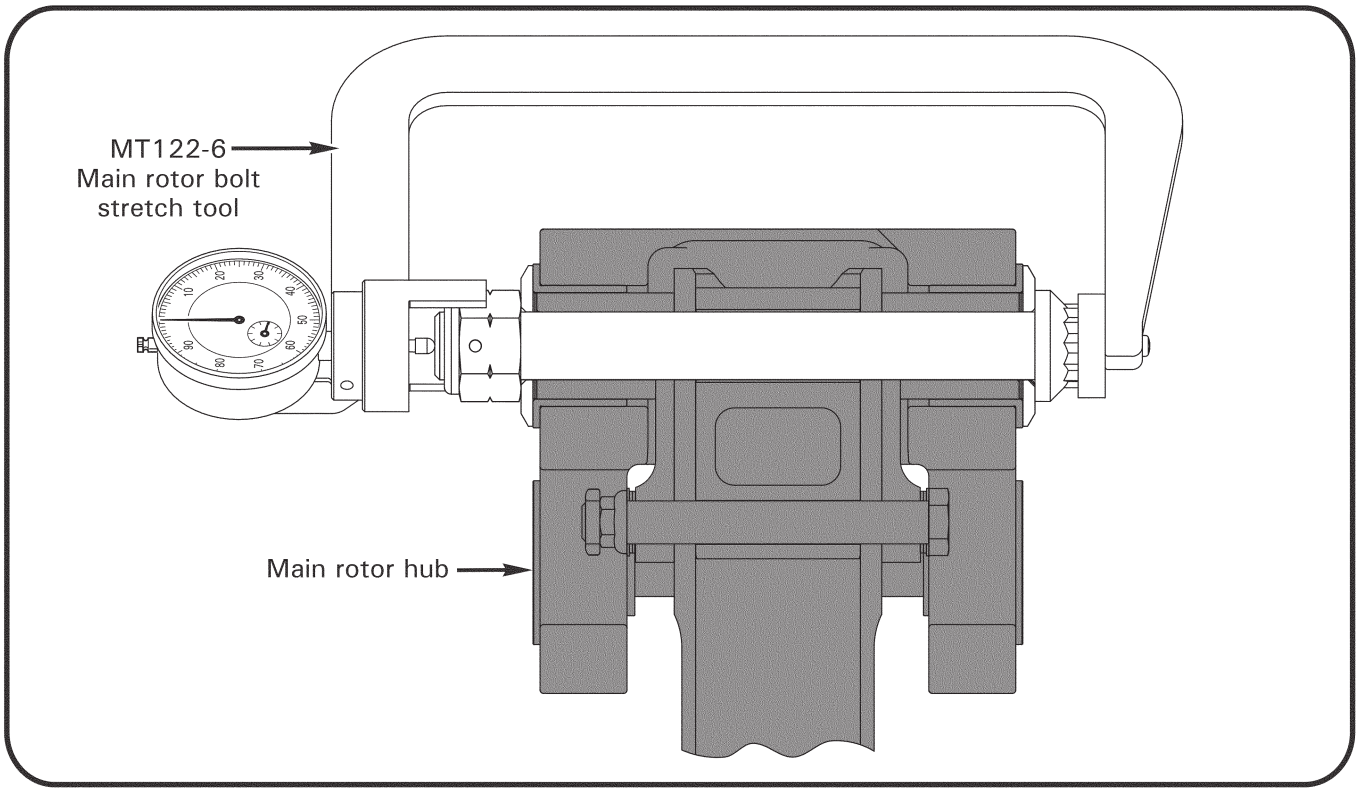

FIGURE 62-2 MEASURING BOLT STRETCH
(Shown on teeter hinge bolt)

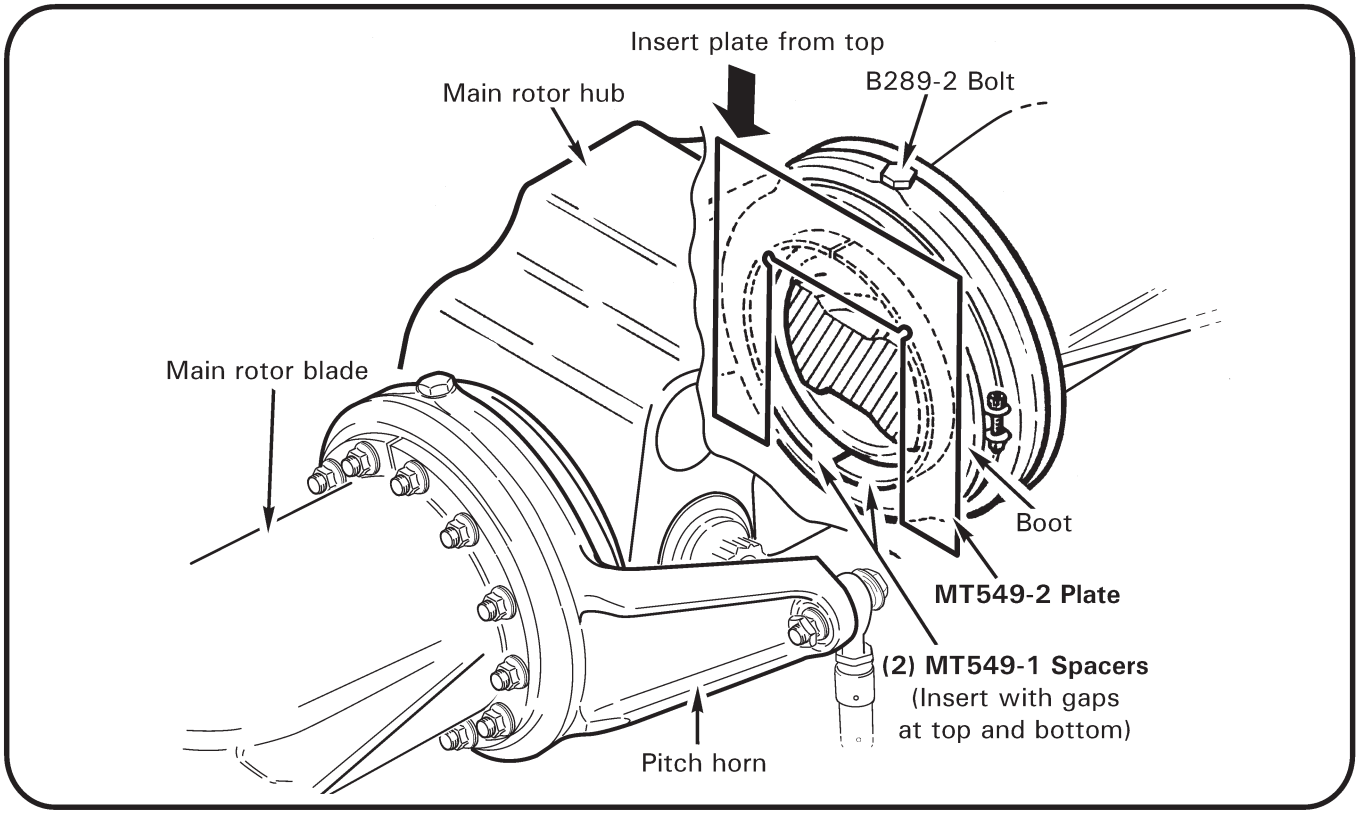

FIGURE 62-3 ADJUSTING BOOT CLEARANCE

62-10 Main Rotor Blades (continued)

B. Installation (continued)

11. Lift both blades off droop stops by raising blade tips; independently cone each blade and verify hub does not teeter.
12. Install hardware securing each pitch link to correct pitch horn. Standard torque hardware per § 20-32 and torque stripe per Figure 5-1.
13. Position cyclic and collective at approximately mid-travel positions to minimize wrinkles in boots.
14. Refer to Figure 62-3. Insert (2) MT549-1 spacers between hub and boot with gaps at top and bottom. Spacers should fit in recess of boot. Hold spacers in place against boot and insert MT549-2 plate from top between hub and spacers. Push plate down until it contacts spindle.
15. Place a suitable container beneath pitch horn's lower B289-2 bolt. Remove lower bolt from pitch horn and allow oil to flow. Place a finger over hole as soon as oil flow decreases to a drip to prevent air from being sucked inside blade.
16. Remove finger from hole and quickly install drain B289-2 bolt. Special torque per § 20-33 and torque stripe per Figure 5-1.
17. Remove plate and spacers. Repeat on second blade.
18. Track and balance main rotor blades per § 18-10.

CAUTION

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

62-11 Blade Boots

A. Removal

1. Remove main rotor blades per § 62-10.
2. Place a suitable drain container below main rotor blade spindle assembly. Remove two B289-2 bolts and drain fluid.
3. Remove outer boot clamp and hold boot back to expose inner boot clamp. Remove inner clamp and peel boot from spindle. Boot inner portion may be sealed to spindle with B270-1 sealant.
4. As required, use a plastic scraper and vacuum cleaner to remove old B270-1 sealant from spindle area to be covered by boot inner lip. Avoid contaminating spindle bearings with old sealant.

WARNING

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

B. Installation

NOTE

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

1. Visually inspect and verify boot is undamaged. Carefully stretch new boot over spindle.
2. Solvent-clean surfaces clamped by boot inner lip. Properly position boot inner lip; install C165-1 (inner) clamp assembly and tighten clamp to 2.850 ± 0.005 inch outside diameter. Rotate spindle and verify adequate clearance between clamp assembly and pitch horn.

NOTE

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

3. Stretch boot outer lip over pitch horn flange. Rotate spindle and align pitch horn arm bolt hole with spindle bolt hole centerlines. Install C165-2 (outer) clamp assembly and tighten clamp. Verify security.
4. Fill pitch bearing housing per § 12-51.

62-20 Main Rotor Hub

A. Removal

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

CAUTION

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

B. Installation

1. Clean and dry teeter hinge hardware using approved solvent per § 20-70. Inspect journals and thrust washers for chipping of chrome plating, corrosion, and/or wear grooves extending through chrome plating (0.0006 inch maximum wear). Replace journal or thrust washer if any of these conditions exist.
2. Line up mark on hub with chord arm on rotor shaft.
3. Refer to Figure 62-6A. Reinstall teeter hinge bolt, thrust washers, shims, and journals exactly as removed. If previously installed information is unavailable, perform teeter hinge journal and shim calculation per § 62-31. Ensure journals fully contact drive shaft and do not pinch upper edge of droop stops.
4. Coat nut face and bolt threads with A257-9 anti-seize compound, install and tighten nut, then loosen nut until both thrust washers can be freely rotated.

WARNING

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

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

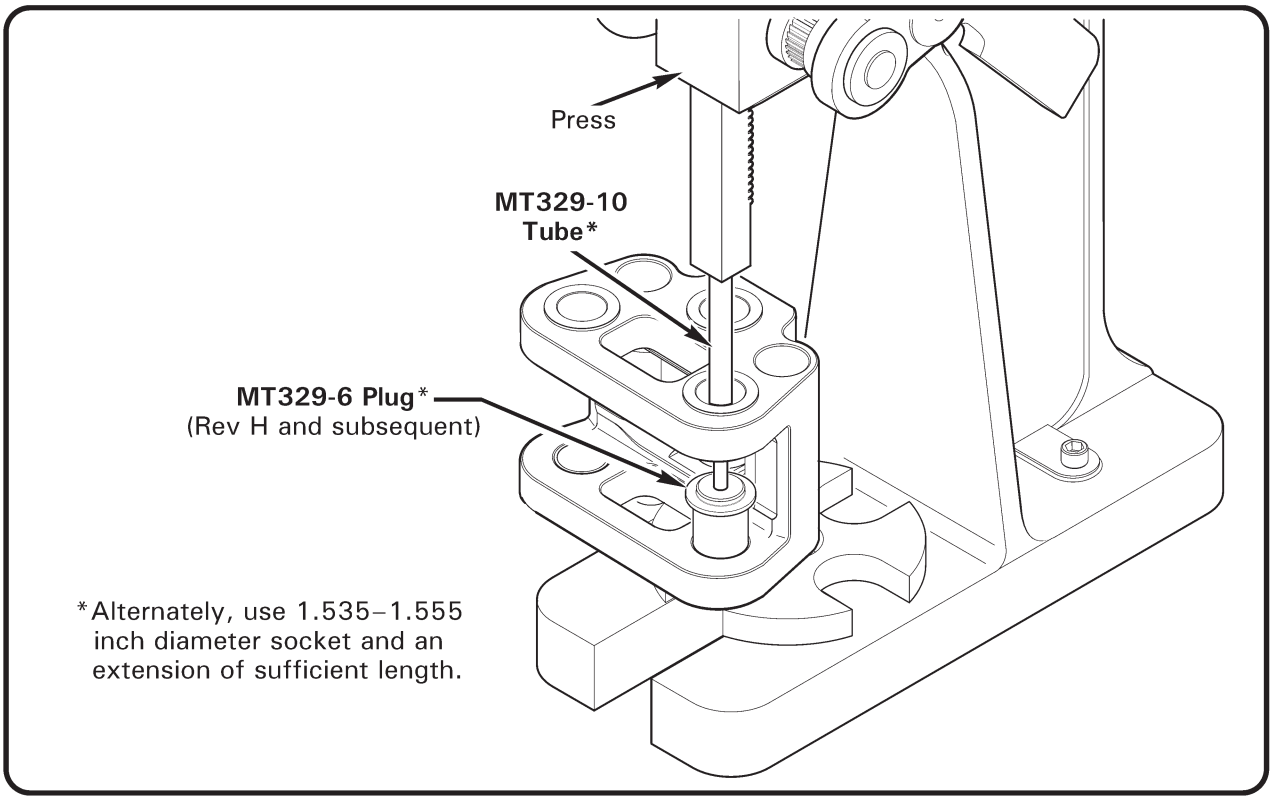

FIGURE 62-4A MAIN ROTOR HUB BEARING REMOVAL

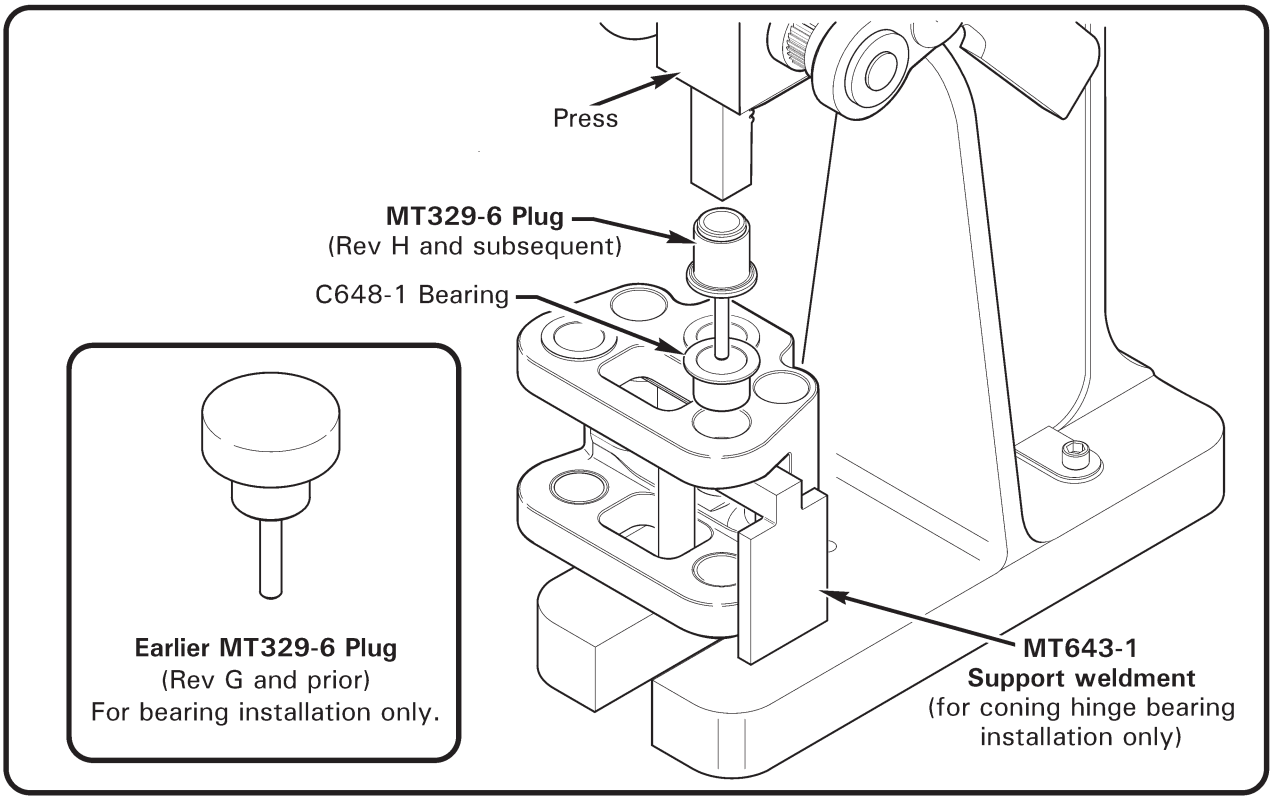

FIGURE 62-4B MAIN ROTOR HUB BEARING INSTALLATION

62-20 Main Rotor Hub (continued)

B. Installation (continued)

WARNING

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

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

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

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

62-21 Bearing Replacement

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

NOTE

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

4. Refer to Figure 62-4B. Verify bearing mating surfaces are smooth and clean and apply light coat of § 20-75 approved primer (chromate primer preferred). If visible, orient coning hinge bearing's Teflon® liner seam toward top of hub. While primer is wet, press in new bearing using MT329-6 plug (and MT643-1 support if replacing coning hinge bearing) until bearing flange is completely seated against hub.
5. Using a syringe, seal between bearing's outboard flange and hub and bearing's inboard edge and hub with small fillet of approved primer.
6. As required, perform shim calculation(s) per § 62-31 upon reinstallation.

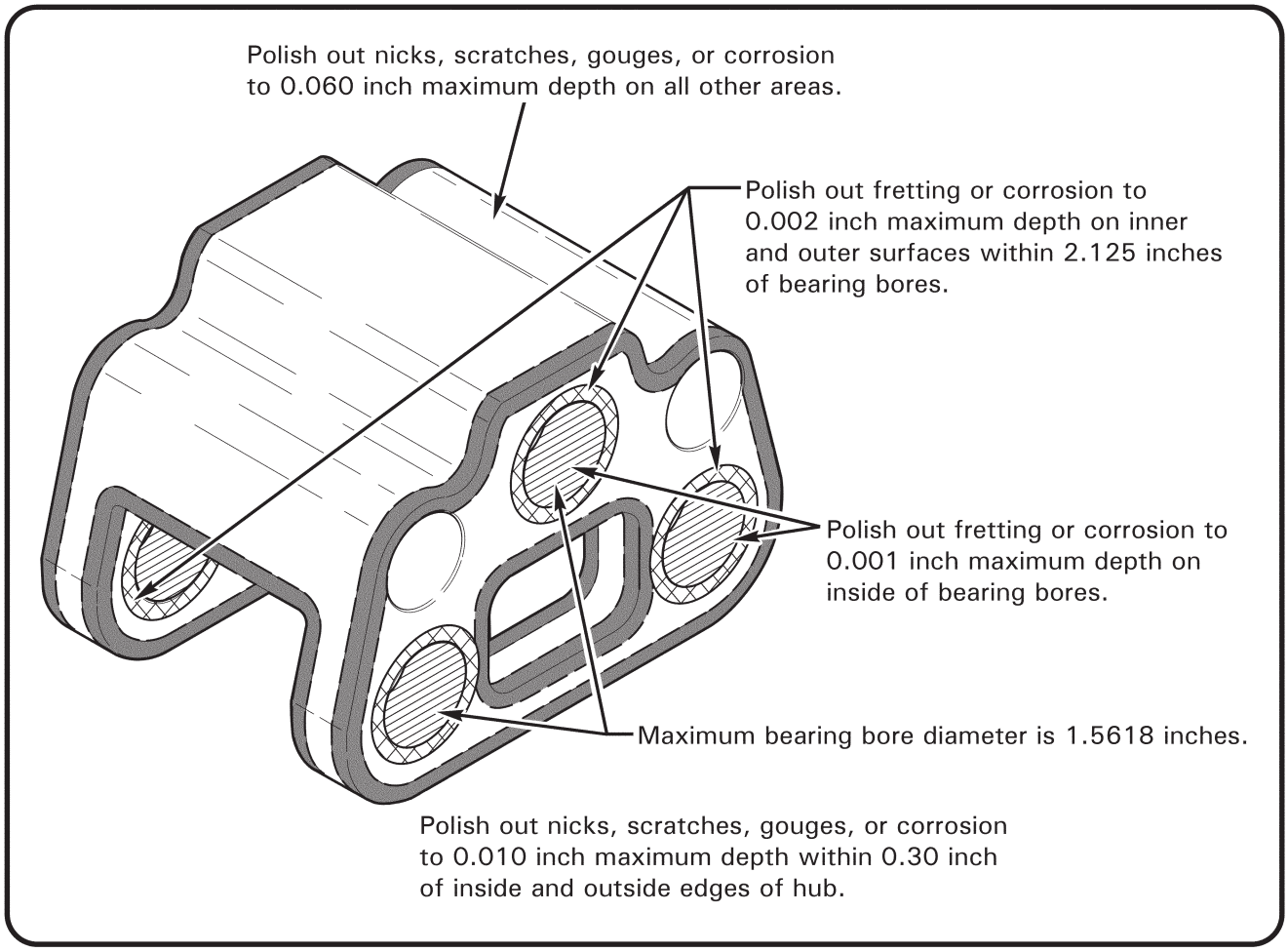

FIGURE 62-5 MAIN ROTOR HUB REPAIR LIMITS

62-22 Inspection and Repair

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

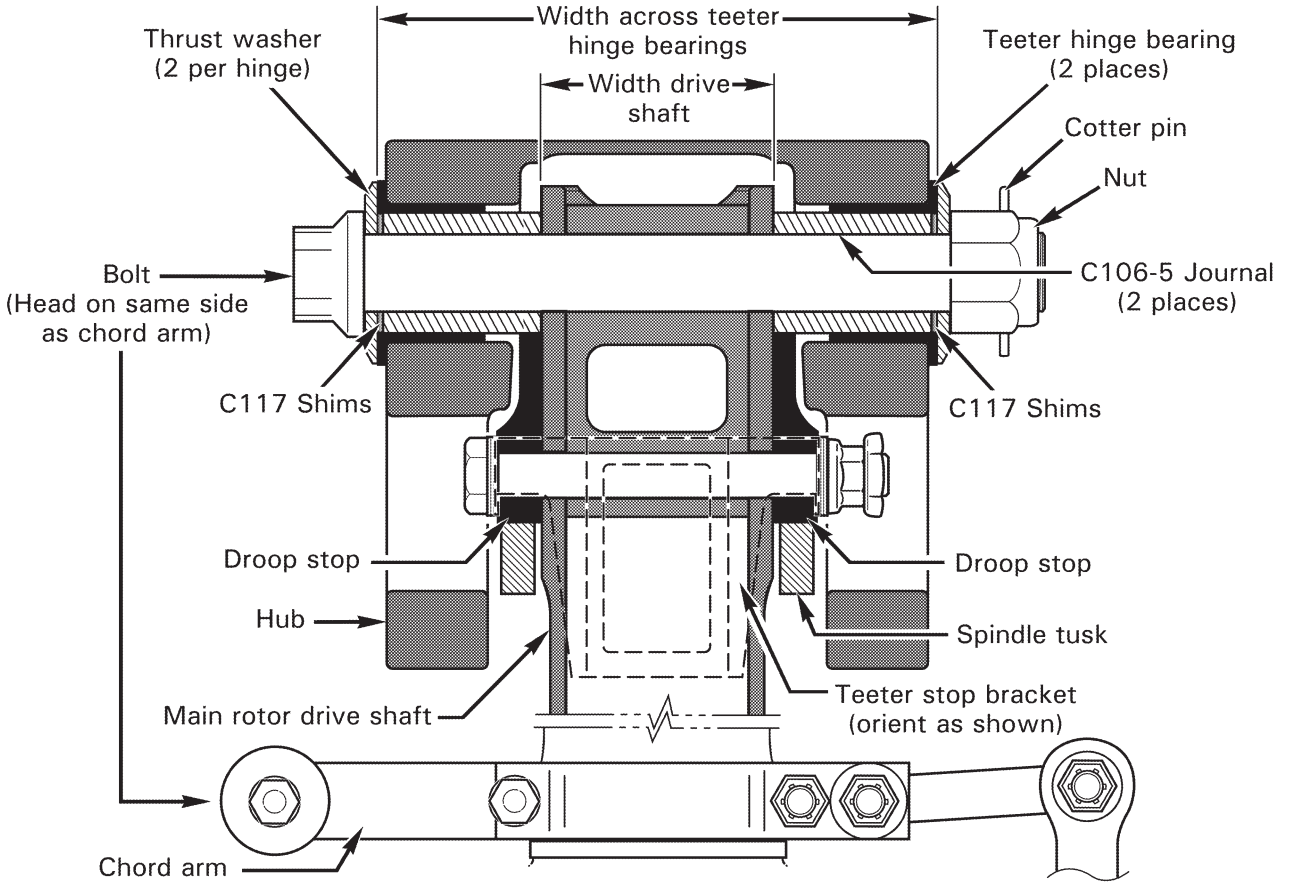

FIGURE 62-6A TEETER HINGE (HUB INSTALLATION)

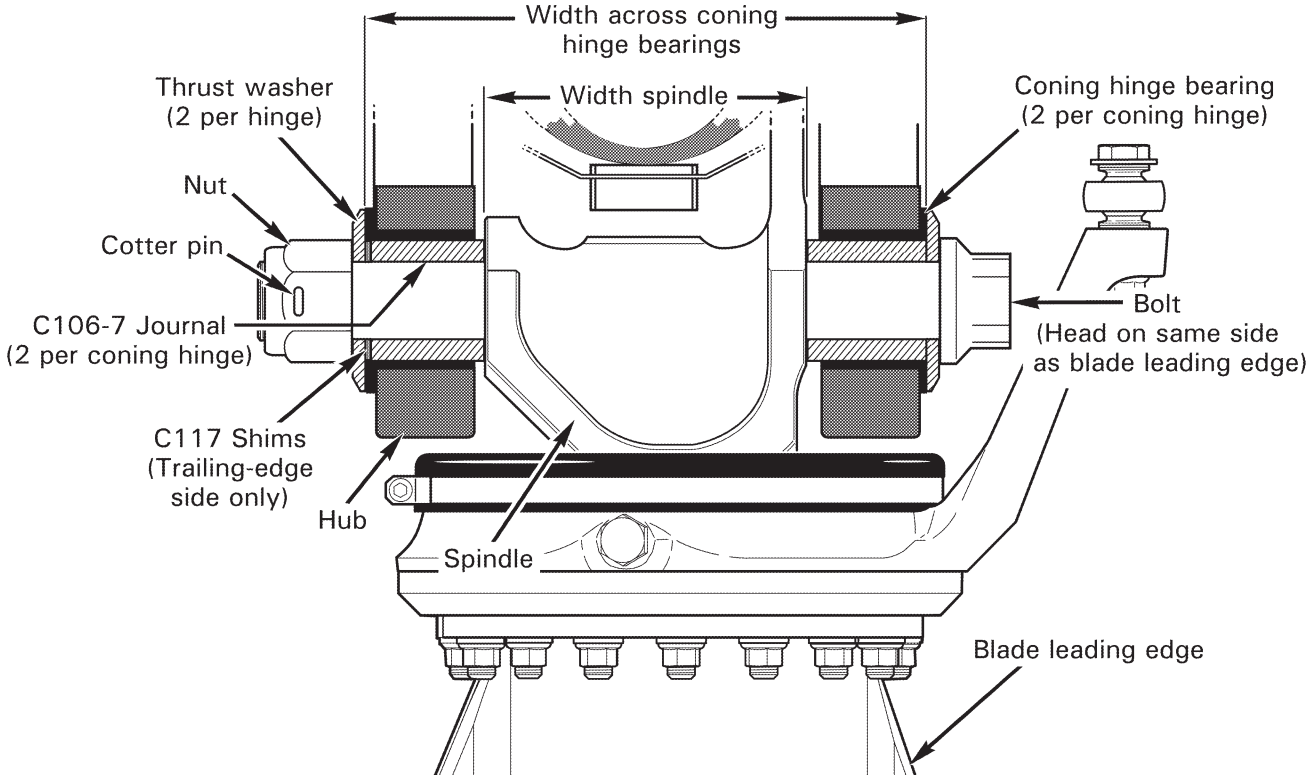

FIGURE 62-6B CONING HINGE (BLADE INSTALLATION)

62-30 Main Rotor Assembly

62-31 Journal and Shim Calculations

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

A. Teeter Hinge Calculation

1. Measure main rotor hub width across the teeter hinge bearing faces: _____ in.
2. Subtract measured width of C251 driveshaft at teeter hinge bolt hole: – _____ in.

   Calculated empty space: = _____ in.
3. Use one C106-5 journal and a selection of C117 shims to create a combined length of approximately 1.835 inches. Use as many different size shims as possible. Place thrust washer, shims, and journal under teeter bolt head; shims must be placed between thrust washer and journal.

   Subtract combined measured thickness of selected journal and shims: – _____ in.

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

   Difference: = _____ in.

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

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

   Initial C117 shim stack between nut-side journal & thrust washer: = _____ / _____ in.
6. Adjust shim stack as required to meet teeter hinge friction requirements (5–20 ft-lb; 8–12 ft-lb is ideal). Use as many different size shims as possible to facilitate head shifting during balancing.

62-31 Journal and Shim Calculations (continued)

B. Coning Hinge Calculation

1. Measure main rotor hub width across the coning hinge bearing faces: _____ in.
2. Subtract measured width of blade spindle at coning hinge bolt hole: – _____ in.

Calculated empty space: = _____ in.

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

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

Sum: = / in.

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

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

5. Adjust shim stack as required to meet coning hinge axial gap requirement per Figure 62-7A and to maintain teeter friction requirement as follows: It must be possible to manually cone each blade without teetering the hub when blades are held up off the droop stops and lifted at tip. Increasing shim stack-up decreases hinge friction.

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

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

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

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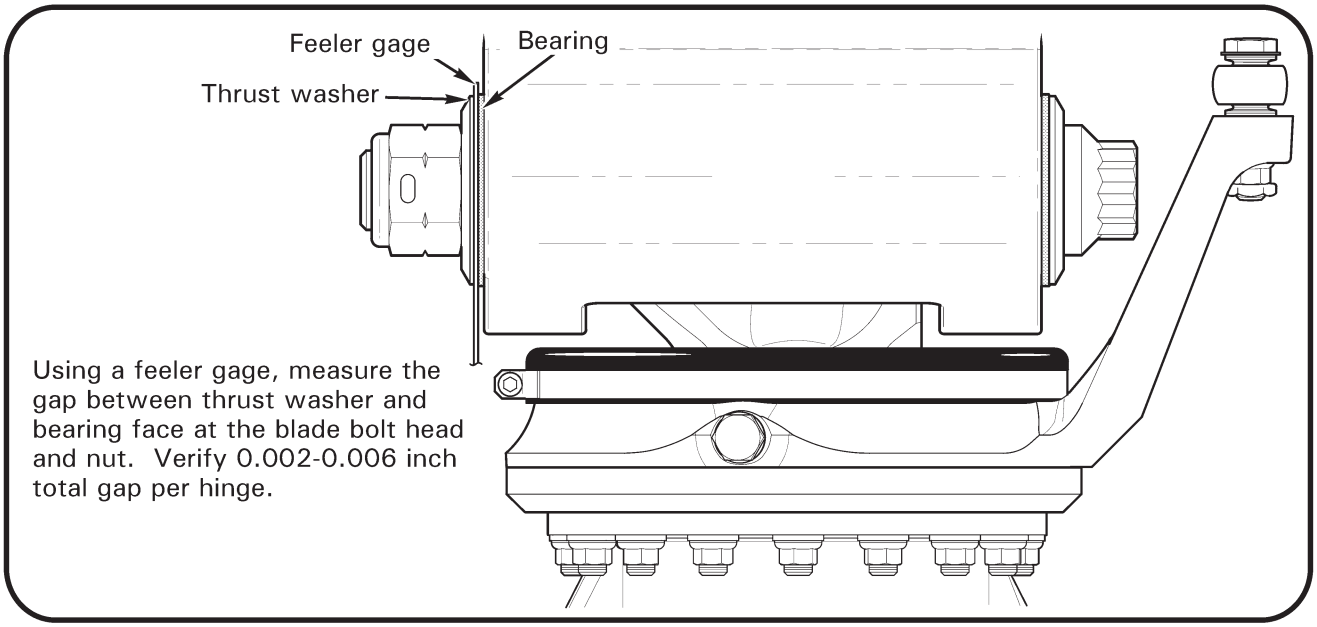

FIGURE 62-7A MEASURING CONING HINGE AXIAL CLEARANCE

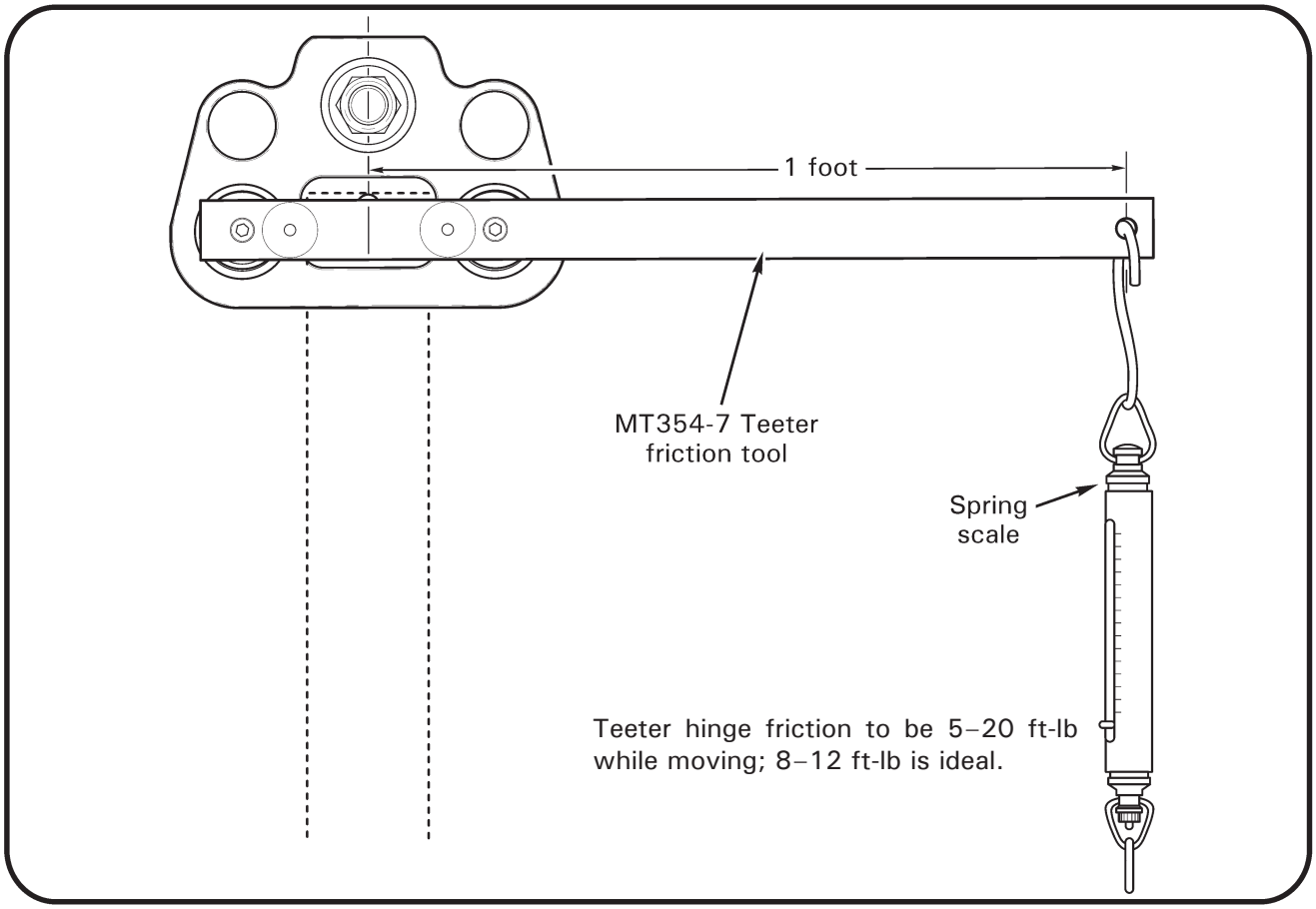

FIGURE 62-7B MEASURING TEETER HINGE FRICTION

62-32 Adjusting Hinge Friction

A. Teeter Hinge Friction Adjustment

1. Remove main rotor blades per § 62-10.
2. Refer to Figure 62-6A and Table 62-1. Remove cotter pin, nut, thrust washer, and nut-side C117 shims. Adjust teeter hinge friction by changing nut-side shim stack thickness in small increments; reducing shim stack thickness increases friction, increasing shim stack thickness reduces friction. Install shims, thrust washer, and nut.
3. While stretching teeter hinge bolt, check teeter hinge friction frequently per Figure 62-7B. To check friction, install MT354-7 teeter friction tool into coning hinge bearings on one side of main rotor hub and measure lowest moving force (not breakaway force) required to teeter main rotor hub with a spring scale.

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

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

B. Coning Hinge Friction Adjustment

1. Refer to Figure 62-6B and Table 62-1. Remove cotter pin, nut, thrust washer, and nut-side C117 shims. Adjust coning hinge axial clearance by changing nut-side shim stack thickness in small increments; reducing shim stack thickness decreases axial clearance, increasing shim stack thickness increases axial clearance. Install shims, thrust washer, and nut.
2. Install a new bolt and nut per § 62-10, steps 5 thru 9. Repeat steps for opposite blade, as required.
3. Check coning hinge friction by lifting blade tips until spindle tusks clear droop stops. Hold one blade level and cone opposite blade. Rotor hub must not teeter as blade is coned. Repeat check on opposite blade.
4. Using a feeler gage, measure gap between thrust washers and bearing faces at coning hinge bolt head and nut. Verify 0.002–0.006 inch total gap per hinge.
5. If not previously accomplished; drill nut and bolt per § 62-35. Install a new cotter pin wet with approved primer.

62-33 Shifting the Main Rotor Hub

1. Remove cotter pin, nut, thrust washer, and nut-side C117 shims.
2. Have two people cone the main rotor blades. Push out teeter hinge bolt with another bolt.
3. Move or exchange existing shims from one side of hub to the other as indicated by main rotor balance chart (refer to § 18-10).
4. Install teeter hinge bolt per § 62-20.

62-34 Drilling Main Rotor Hub Bolts

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

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

NOTE

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

CAUTION

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

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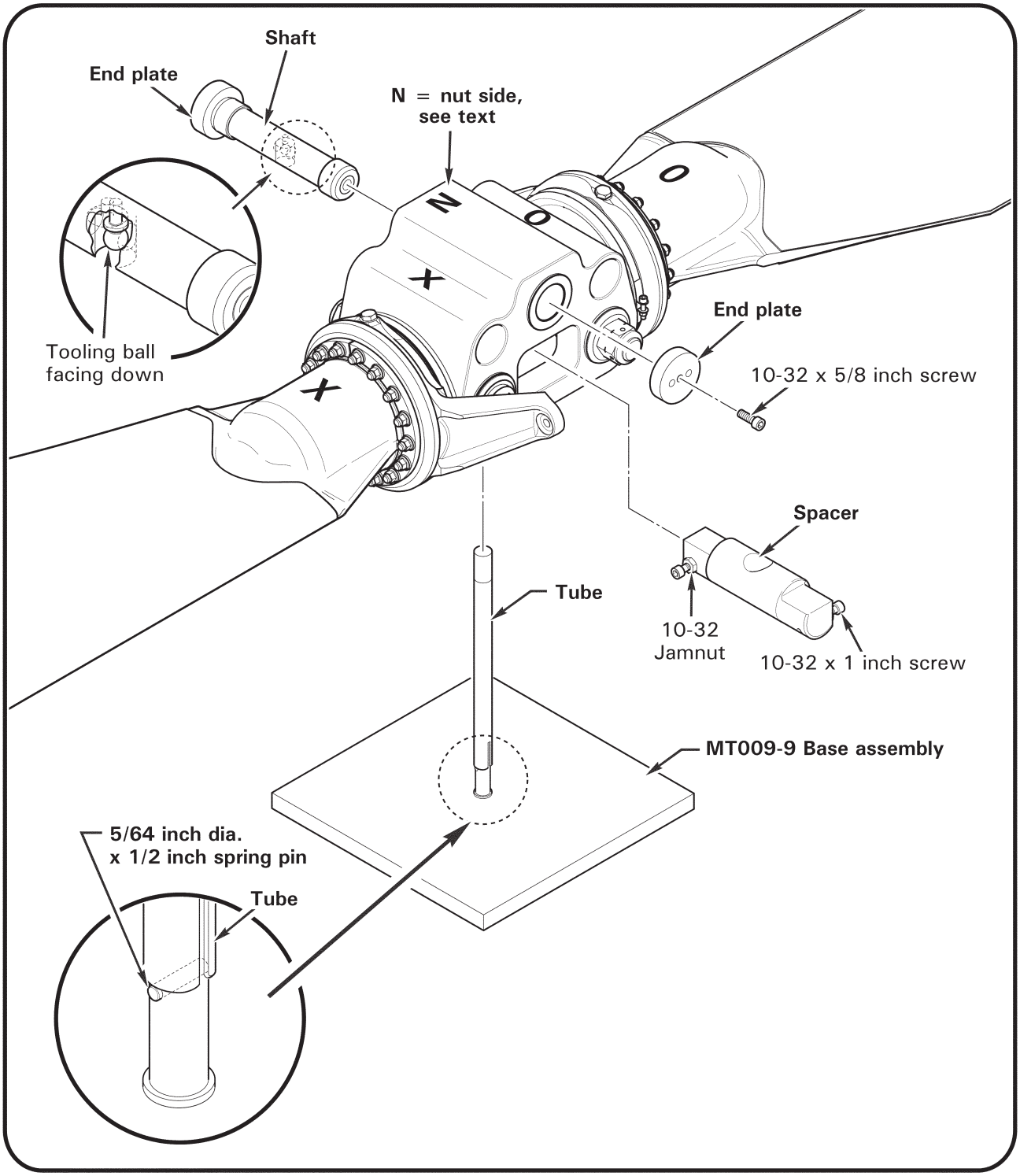

FIGURE 62-8A MT524-2 MAIN ROTOR STATIC BALANCE COMPONENTS ASSEMBLY INSTALLATION
[MT524-2 components assembly includes: (2) end plates, shaft, spacer, and screws.]

62-35 Static Balance

CAUTION

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

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

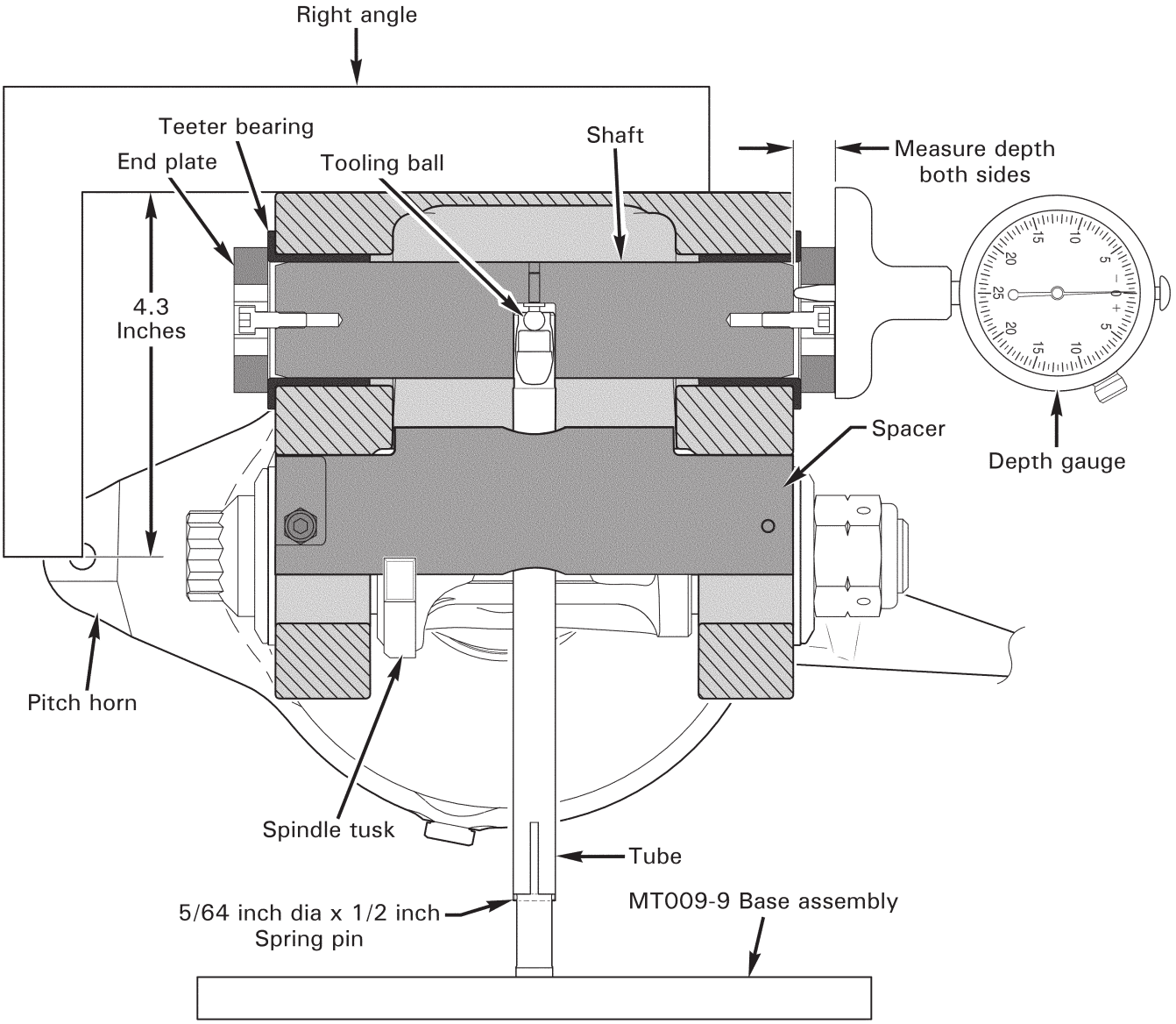

FIGURE 62-8B MEASURING GAP BETWEEN THRUST WASHER AND HUB BEARING

63-12 Clutch Assembly

A. Removal

1. Remove engine shaft weldment per § 63-10.
2. Refer to Figure 63-1. Mark F906 yoke assembly and A947-2 plate assembly, to facilitate installation. Remove plate assembly, noting hardware removed.
3. Remove bolt securing G732 cap and spacer (if installed). Remove clutch assembly.

B. Installation

1. Refer to Figure 63-1. Lubricate F018-1 clutch assembly splines and clamping face using A257-1, -9, or -12 before installing.
2. Insert clutch assembly in engine. Install spacer (earlier R66s), G732 cap, and bolt at rear PTO pad. Use bolt to rotate combined clutch-PTO gear and measure runout of clutch housing at largest diameter; runout must not exceed 0.005 inch TIR. Standard torque NAS6604 bolt per § 20-32 or special torque G732-4 bolt per § 20-33 and torque stripe per Figure 5-1.
3. Install A947-2 plate assembly, as noted during removal. Standard torque fasteners per § 20-32, and torque stripe per Figure 5-1.
4. Install engine shaft weldment per § 63-10.

63-20 Main Rotor Gearbox Assembly

A. Removal

1. Remove main rotor blades per § 62-10.
2. Remove tailcone cowling assembly per § 53-23.
3. Disconnect (pitot system) 15-4-N-O union near G201-1 (servo support) frame assembly. Cap fitting and plug line.
4. Refer to Figure 63-1. Remove hardware securing F908-1 and F910-1 yoke assemblies to plate assemblies, leaving plates attached to shaft weldments. Note hardware removed.
5. Place cyclic stick approximately vertical and apply cyclic friction. Fully raise collective stick and apply collective friction. Remove hardware securing F121-7 push-pull tube assembly to F339-1 jackshaft weldment, and remove hardware securing F121-5 push-pull tube assemblies to D212-5 servo assemblies. Fully lower collective stick.
6. Detach cable assembly from (rotor brake assembly) B112-3 spring.
7. Using back-up wrench, disconnect D205-19 and D205-20 hose assemblies from F006-1 main rotor gearbox and D500-3 oil pump. Cap and plug fittings and hoses.
8. Disconnect F059-01 cabin harness assembly plug from F049-01 gearbox harness assembly receptacle. Remove hardware securing A936-3 (ground) wire assembly to F560-1 bulkhead assembly.
9. Remove D277-8 clamp or cut and discard safety wire securing Tygon® tube to G254-1 (fuel) vent assembly, and clear tubing from workspace.
10. Install hoisting equipment per § 7-20, Part A, steps 1 thru 4; remove hoist slack.
11. Remove hardware securing F252-1 strut to F020-1 upper frame assembly. Remove (mounting bolt) nuts and washers securing gearbox to upper frame. Remove aft mounting bolts securing F235-13 strut assemblies to servo support frame, hardware securing struts to upper frame, and struts.
12. Hoist gearbox (with hydraulic installation, servo support frame, and mast fairing assembled) up and away from helicopter.

CHAPTER 64

TAIL ROTOR

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CHAPTER 64

TAIL ROTOR

64-00 Description

The R66 tail rotor assembly is a conventional, two-bladed teetering rotor system.

Tail rotor blades are constructed of a wrap-around aluminum skin, bonded to aluminum honeycomb and a forged aluminum root fitting. Self-lubricating spherical bearings in the root fitting allow blades to change pitch.

Tail rotor blades are assembled to the hub with a fixed precone angle.

The tail rotor aluminum hub mounts to the gearbox output shaft by teeter hinge. Elastomeric bearings in the hub allow the rotor to teeter. The tail rotor hub teetering stop is a urethane bumper, attached to the output shaft.

64-10 Tail Rotor Assembly

A. Removal

1. Refer to Figure 64-1. Tag each pitch link with corresponding blade serial number. Disconnect pitch links from tail rotor blades; keep associated hardware with each link.

NOTE
Tail rotor pitch link-to-blade attachment bolts may be different lengths and/or have different washers installed under nut for dynamic balancing.

2. Remove nut and A141-14 washer securing C119-2 bumper to tail rotor gearbox output shaft.
3. Mark hub with teeter hinge bolt orientation for reinstallation. Remove teeter hinge bolt, then slide tail rotor assembly and bumper off of shaft.

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

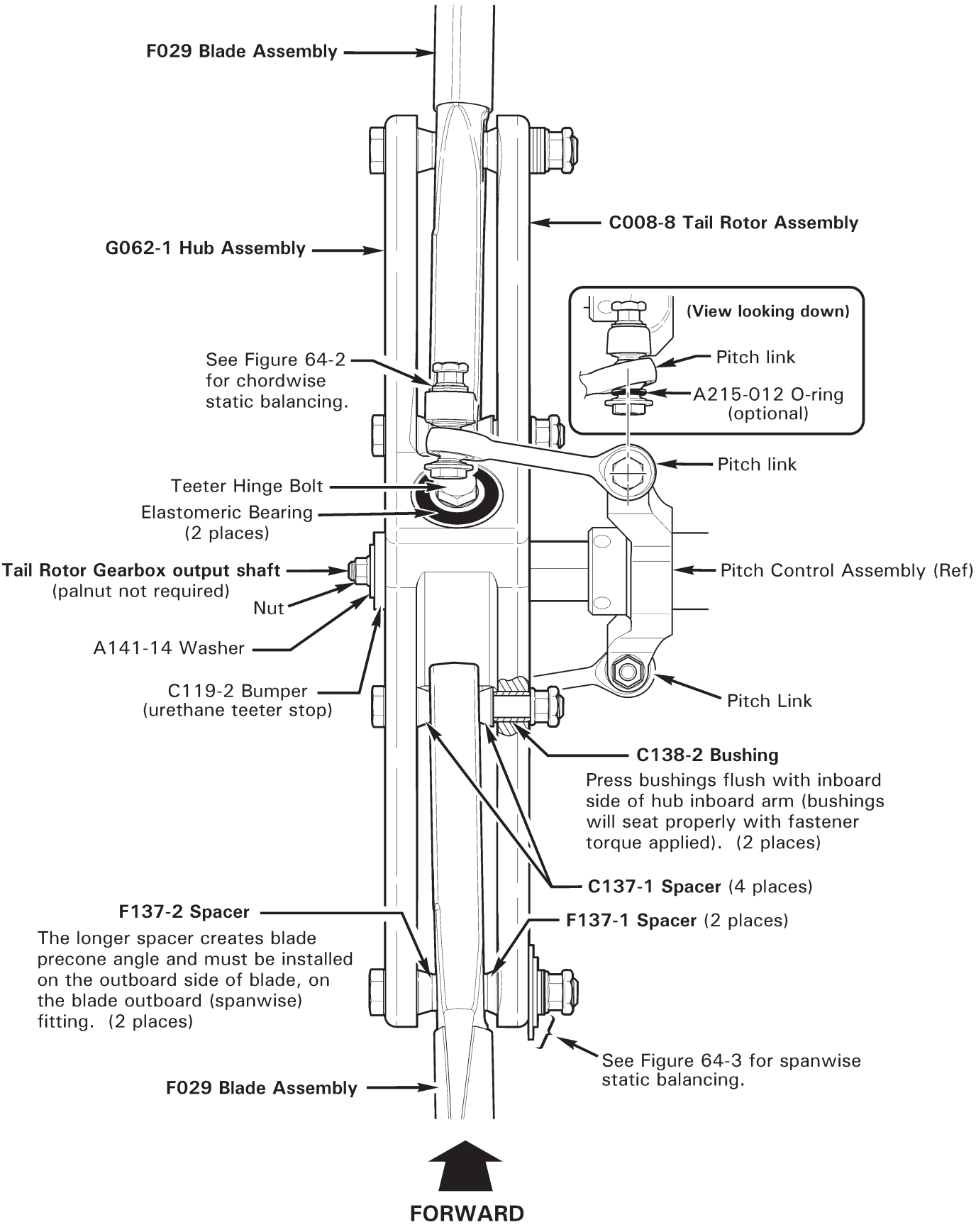


FIGURE 64-1 TAIL ROTOR INSTALLATION

64-10 Tail Rotor Assembly (continued)

B. Installation

1. Perform static balance per § 64-11 if balancing hardware information is unknown, if blades were replaced, or if any rework has changed mass of rotor assembly.
2. Clean tail rotor gearbox output shaft and elastomeric bearing spacer clamping surfaces with lint-free cloth dampened with acetone.
3. Refer to Figure 64-1. Position tail rotor assembly on tail rotor gearbox output shaft, matching tail rotor blades to corresponding pitch links. Verify tail rotor is installed for clockwise rotation when viewed from left side of aircraft.
4. Install teeter hinge bolt and hardware; tighten nut until elastomeric bearing metal spacers contact output shaft, but do not torque. Verify blades cone toward tail rotor gearbox.

CAUTION

If balancing hardware information is unknown, perform static balance per § 64-11.

5. Remove tags. Install hardware securing tail rotor blades to pitch links as removed, or as determined by static balancing. Standard torque nuts & palnuts per § 20-32, and torque stripe per Figure 5-1.
6. Fabricate a tracking aid using 1x12-inch aluminum sheet; make a 90º bend 2 inches from one end. With tail rotor horizontal, tape tracking aid to tailcone near blade tip.
7. Rotate tail rotor drive shaft and mark tracking aid where each blade tip drain hole passes. Adjust (teeter) tail rotor until both blade tips pass the same point within 0.125 inch. Special torque teeter hinge bolt per § 20-33. Recheck track. Repeat step until blades are tracked.
8. Install palnut on teeter hinge bolt, standard torque per § 20-32, and torque stripe per Figure 5-1. Remove tracking aid.
9. Teeter tail rotor hub back and forth. Verify teeter hinge bolt, bearing metal spacers, washers, and nuts remain stationary when tail rotor is teetered.
10. Install C119-2 bumper, A141-14 washer, and nut. Special torque nut per § 20-33 and torque stripe per Figure 5-1.
11. Dynamically balance tail rotor per § 18-20.

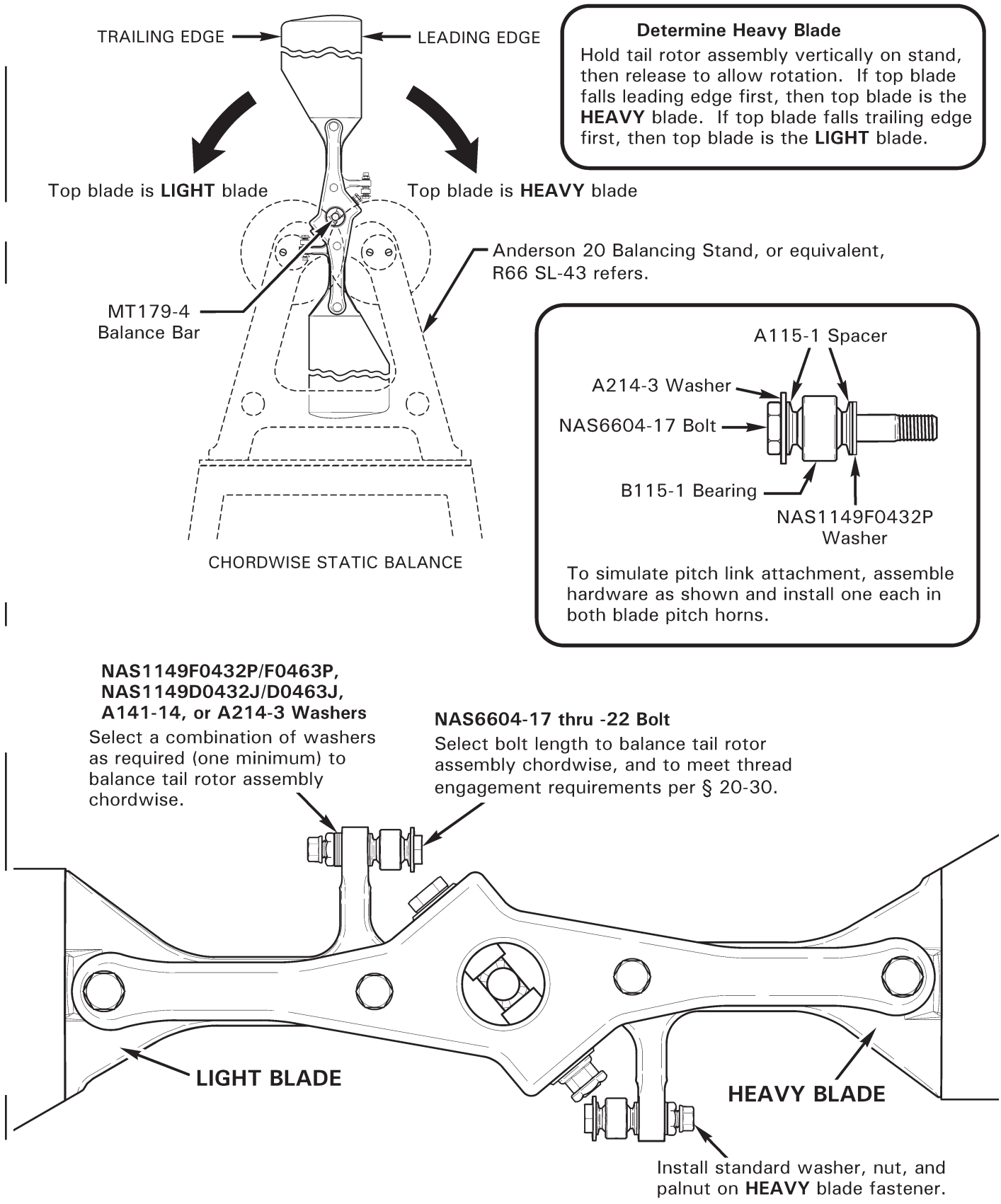
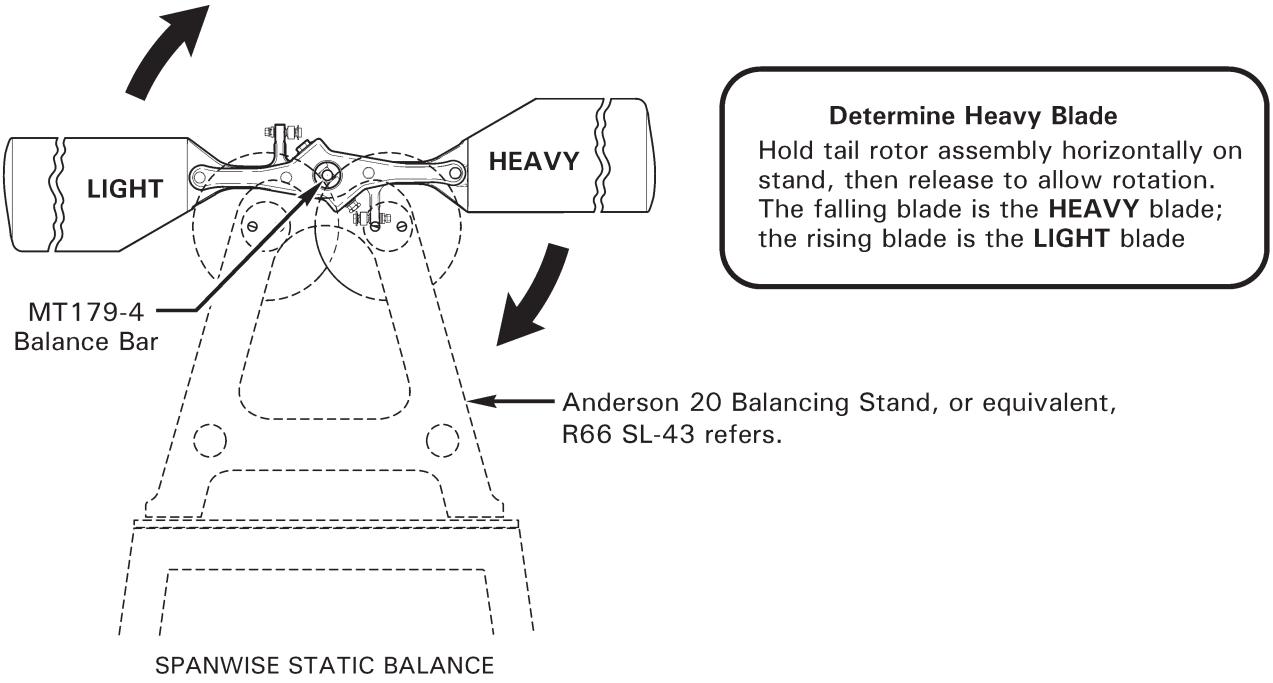


FIGURE 64-2 CHORDWISE STATIC BALANCE

64-11 Static Balance

> NOTE
>
> Tail rotor assemblies received from RHC are static balanced at factory. Perform static balance in calm-air environment.

1. Refer to Figure 64-2. Install MT179-4 balance bar into tail rotor assembly. Install teeter hinge bolt thru larger hole, install nut and tighten until elastomeric bearing metal spacers contact bar. Using a protractor or square, adjust balance bar until approximately perpendicular to hub. While maintaining perpendicularity, special torque nut per § 20-33; install palnut finger-tight. Mark hub with teeter hinge bolt orientation for reinstallation.
2. Using NAS6604-17 bolts, assemble hardware as shown in blade pitch horns using bearing to simulate pitch link. Install standard washer, palnut, and nut on each bolt hand-tight.
3. Place tail rotor assembly, with balance bar, vertically on balancing stand. Adjust pitch of both blades so they are similar. Hold tail rotor assembly vertically, then release to allow rotation. If top blade falls leading edge first, then top blade is the heavy blade. If top blade falls trailing edge first, then top blade is the light blade.
4. Chordwise balancing is achieved by varying NAS6604 bolt length and nut-side washers at light blade pitch horn. Select bolt length & washers for balancing, and to meet thread engagement requirements per § 20-30 Part E step 5, and install hand-tight.
5. Repeat steps 3 & 4 until top blade does not fall (or falls very slowly) when tail rotor is positioned vertically on balancing stand. Balance within one thin steel washer.
6. Refer to Figure 64-3. Place tail rotor assembly, with balance bar, horizontally on balancing stand. Hold tail rotor horizontally, then release to allow rotation. The falling blade is the heavy blade; the rising blade is the light blade.
7. Spanwise balancing is achieved by varying nut-side washer mass on light blade's outboard blade-to-hub attach bolt. Four washers are required under nut on outboard blade-to-hub attach bolt; place largest washers closest to hub. Select washers for balancing, standard torque hardware per § 20-32, and repeat step 6.
8. Repeat steps 6 & 7 until tail rotor does not rotate (or rotates very slowly) when positioned horizontally on balancing stand. Balance within one thin aluminum washer.
9. From each blade pitch horn, remove A214-3 washer, two A115-1 spacers, & B115-1 bearing from bolt; install palnut & nut finger-tight to retain bolt and washer(s) in the correct pitch horn.
10. Remove MT179-4 balance bar. Install teeter hinge bolt & washers in hub, and install palnut & nut finger-tight on bolt.
11. As required, touch-up bolt heads using § 20-77 approved paint.



Determine Heavy Blade

Hold tail rotor assembly horizontally on stand, then release to allow rotation. The falling blade is the **HEAVY** blade; the rising blade is the **LIGHT** blade

(4) NAS1149F0632P/F0663P, NAS1149D0632J/D0663J, C141-23, or C141-24 Washers

Select a combination of four washers to balance tail rotor assembly spanwise. Place largest washers closest to hub assembly.

Install (4) NAS1149D0663J washers under nut of **HEAVY** blade outboard fastener for initial spanwise static balance check.

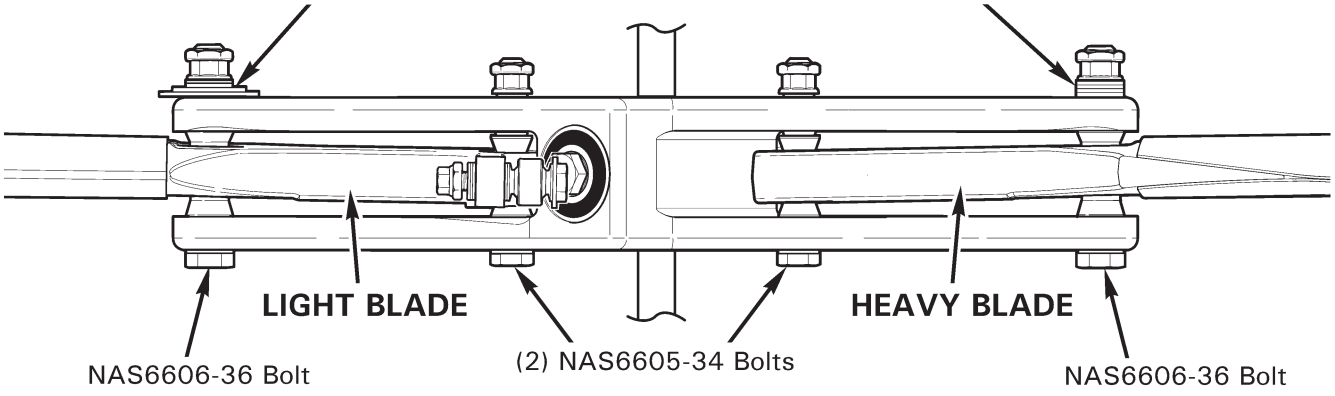


FIGURE 64-3 SPANWISE STATIC BALANCE

64-20 Tail Rotor Blades

NOTE

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

A. Removal

1. Remove tail rotor assembly per § 64-10.
2. Refer to Figure 64-1. Remove hardware securing F029 blade assemblies to G062-1 hub assembly. Remove blades, spacers, and hardware; do not remove C138-2 bushings unless required.

B. Installation

CAUTION

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

1. Refer to Figure 64-1. If removed, apply light coat of approved primer per § 20-70 to outer surface of C138-2 bushings; while primer is wet, press bushings flush with inboard side of hub inboard arm (bushings will seat properly with fastener torque applied).

CAUTION

F137-2 spacer creates blade precone angle and must be installed on the outboard side of blade, on the blade outboard (spanwise) bolt.

2. Install tail rotor blades and spacers in hub. Assemble blades for clockwise rotation when viewed from left side of aircraft, and so blades will cone toward tail rotor gearbox. Install hardware securing blades to hub; standard torque per § 20-32, and torque stripe inboard nuts only.
3. Perform tail rotor assembly static balance per § 64-11.

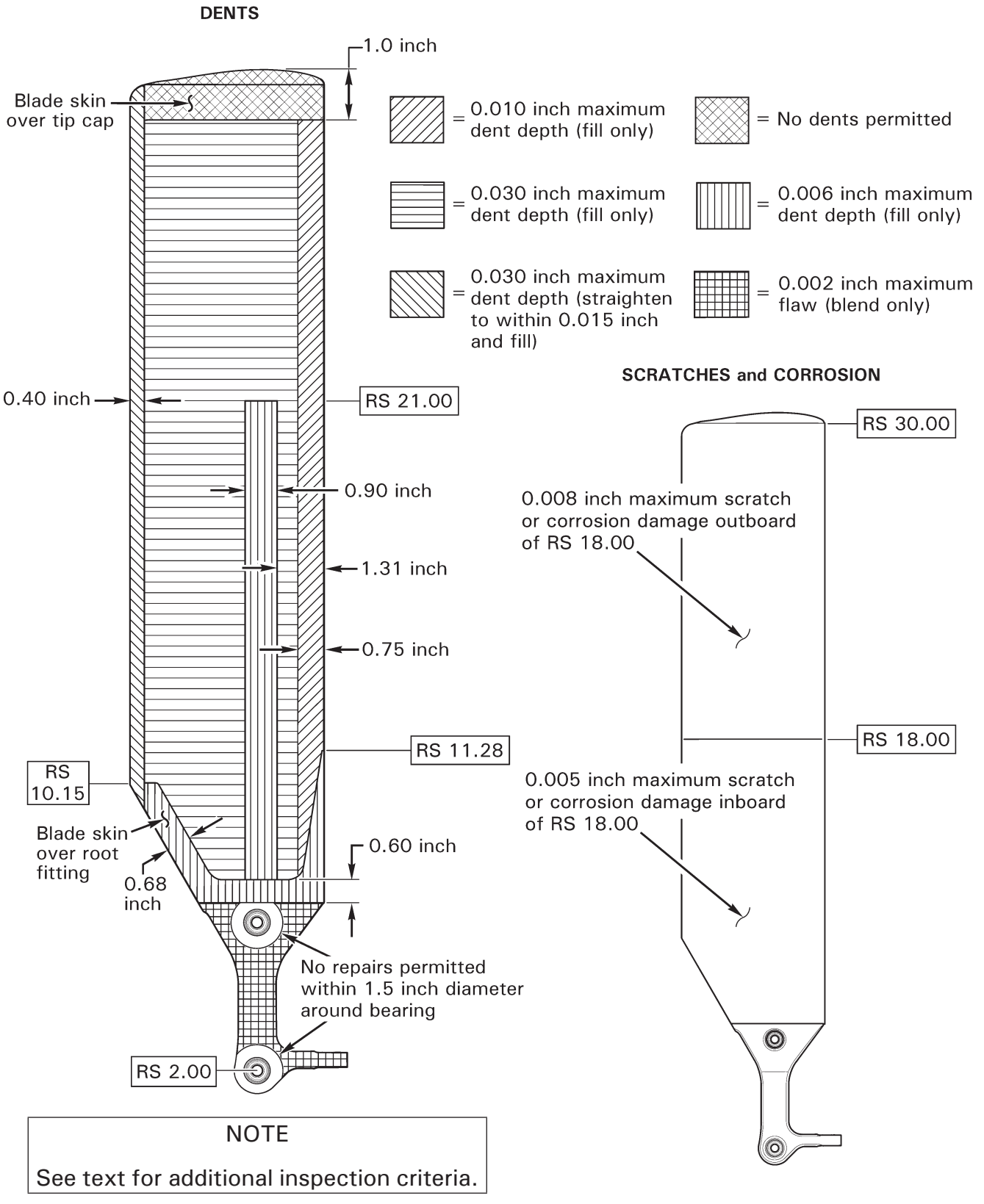


FIGURE 64-4 F029-1 BLADE INSPECTION CRITERIA

64-30 Tail Rotor Blade Inspection and Repair

CAUTION

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

This blade repair procedure outlines the repair limits, methods and materials used for repairing tail rotor blades. Repairs are limited to blending out scratches, dents, nicks, removing corrosion, and refinishing the blades. The inspections, repairs and limitations contained herein refer to damage sustained in service, including damage during shipping and handling (manufacturing irregularities are treated separately by the factory). In-service damage will generally exhibit paint scuffing or scratches and often times freshly-exposed metal in the form of scratches in the finish. If there are any questions as to the possibility of a manufacturing irregularity, contact RHC Technical Support.

CAUTION

A blade may be repaired more than one time. However, in no case can more than the maximum material be removed or the maximum dent depth be exceeded in any one location.

64-31 Scratches and Corrosion

A. Limits

1. Refer to Figure 64-4. Measure damage in blade skins per § 62-40; verify damage does not exceed the following limits:
   a. 0.005 inch maximum damage inboard (spanwise) of RS 18.00.
   b. 0.008 inch maximum damage outboard (spanwise) of RS 18.00.
2. If damage is within limits, repair blade skins per Part B.

B. Repair

1. Blend out scratches or corrosion on blade skins in spanwise direction with a 0.10 inch blend radius minimum. Use 220-grit or finer wet-or-dry aluminum-oxide abrasive paper, and finish with 320-grit or finer wet-or-dry abrasive paper.
2. Measure material removed per § 62-40; verify repair does not exceed limits per Part A.
3. Refinish blade repairs per § 64-36.

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64-32 Dents

CAUTION

Tap-test dented areas in honeycomb. If any voids are found associated with dents, contact RHC Technical Support.

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

CAUTION

When dented areas are found, inspect opposite side of the blade for a bulge. Replace blade with a bulge greater than 0.010 inch opposite a dent.

CAUTION

Do not repair any dent that has a sharp cut or break in the skin. If necessary, locally fluorescent penetrant inspect, keeping penetrant materials away from bond joints.

WARNING

Any damaged tail rotor blade that cannot be repaired within the limits of this section must be removed from service immediately and marked "scrap."

A. Limits

1. Measure dents in blade skin per § 62-40.
2. Refer to Figure 64-4. Smooth, round bottom dents with 0.060 inch minimum radius may be repaired when damage does not exceed the following limits:
   a. Forward of 0.75 inch (chordwise) from leading edge:
      i. 0.010 inch maximum dent depth.
   b. Aft of 0.75 inch (chordwise) from leading edge, and forward of 0.40 inch (chordwise) from trailing edge:
      i. 0.030 inch maximum dent depth (except noted area).
      ii. 0.006 inch maximum dent depth 0.90 inch wide aft of 1.31 inch from leading edge, inboard of RS 21.00.
   c. Aft of 0.40 inch (chordwise) from trailing edge:
      i. 0.030 inch maximum dent depth (repair: straighten to within 0.015 inch depth before fill).
   d. Dents over the skin-to-root fitting bond joint:
      i. 0.006 inch maximum dent depth.
3. No dents are permitted on visible portion of tip cap or on blade skin within 1.0 inch of blade tip.
4. If damage is within limits, repair blade skins per Part B.

64-32 Dents (continued)

B. Repair

1. Using 10X magnification, visually inspect blade skin dented area for cracked metal; remove blade from service if metal is cracked.
2. Remove cracked paint by hand-sanding spanwise with 220-grit or finer wet-or-dry aluminum-oxide abrasive paper, and finishing with 320-grit or finer wet-or-dry abrasive paper. Avoid removing metal.
3. Refinish dented area per § 64-36.

64-33 Erosion

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

64-34 Root Fitting Damage

A. Limits

1. Measure damage in root fitting per § 62-40.
2. Refer to Figure 64-4. All damage must be repaired within the following limits:
   a. No repairs permitted within 1.5 inch diameter centered around spherical feathering bearings.
   b. Pitch horn clamping surfaces:
      i. 0.002 inch deep each side (may only be repaired one time).
      ii. Parallel to each other within 0.002 inch.
      iii. Perpendicular to 0.250 inch diameter hole within 0.002 inch.
   c. 0.250 inch diameter hole may be reamed to 0.252 inch diameter maximum.
   d. 0.002 inch maximum depth on other root fitting exposed areas.
3. If damage is within limits, repair root fitting per Part B.

B. Repair

1. All damage on root fitting must be hand-blended spanwise using a 0.10 inch blend radius minimum within Part A limits.
2. Use 220-grit or finer wet-or-dry aluminum-oxide abrasive paper, and finish with 320-grit or finer wet-or-dry abrasive paper. Remove minimum material necessary for damage removal.
3. Conversion coat and prime (chromated epoxy primer preferred) bare aluminum per § 20-60. Do not allow conversion coat chemical to contact blade bond joint.
4. Paint root fitting per § 64-37.

64-35 Nicks and Notches (Trailing Edge)

A. Limits

1. Refer to Figure 64-5. Verify damage (or repair) does not exceed following limits:
   a. 0.050 inch maximum depth (chordwise) in trailing edge.
   b. Overall chord length 5.450 inches minimum.
   c. Blended area to extend 1.0 inch minimum to each side of damage with a 2.0 inch radius minimum.
2. If damage is within limits, repair blade skins per Part B but do not exceed limits.

B. Repair

1. Refer to Figure 64-5. Trailing edge must remain square with skins; skin must not taper.
2. Polish out blade damage using 220-grit or finer wet-or-dry aluminum-oxide abrasive paper, and finish with 320-grit or finer wet-or-dry abrasive paper. Hand-sand in spanwise direction.
3. A fine-toothed file may be used along trailing edge, provided the area is finished with 320-grit or finer wet-or-dry abrasive paper. Hand-sand or file in spanwise direction only.
4. Remove only the material necessary to reach the bottom of the damage, and to blend the reworked area to the radius or dimension required. Visually inspect and verify all damage is removed.
5. Measure reworked area and verify material removed and/or new chord dimension is permissible per Part A.
6. Apply B270-27 sealant to exposed bond joints.
7. Refinish blade per § 64-36, as required.

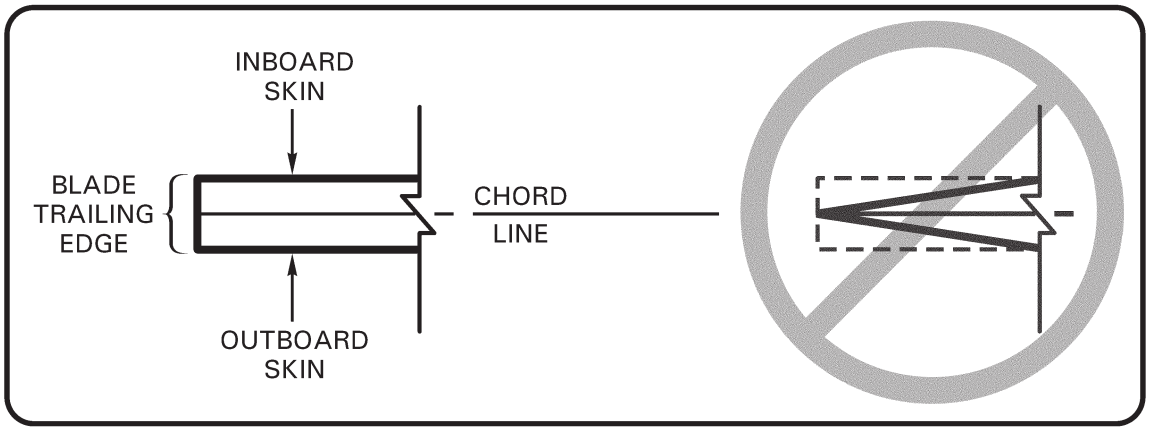

FIGURE 64-5 REPAIRS TO BLADE TRAILING EDGE

64-36 Blade Refinishing

1. Using 320-grit or finer wet-or-dry aluminum-oxide abrasive paper, feather existing paint around blade repairs. Do not remove metal.
2. Conversion coat and prime (chromated epoxy primer preferred) bare aluminum per §§ 20-51 & 20-60.
3. In areas where damage or repair has affected blade airfoil, apply layers of Corlar 13580S Epoxy Primer (or equivalent high-build primer) to build up airfoil.
4. Hand-sand cured epoxy primer (or block sand) in spanwise direction to a smooth, aerodynamic finish, congruent with blade airfoil.
5. Paint blade per § 64-37.

64-37 Painting

1. Perform § 64-36 as required.
2. Apply two coats of Desoprime CA7502 epoxy primer (or equivalent) to required areas. Scuff primer prior to applying second coat. Time limits are 10 minutes minimum, 8 hours maximum between coats. If 8 hours is exceeded, scuff with 600-grit wet-or-dry aluminum oxide abrasive paper in a spanwise direction, QSOL 220 wipe and mist primer before applying next coat.
3. Reference § 20-77. Apply white Imron polyurethane enamel or equivalent paint to required areas. Allow to dry before masking for trim stripes.
4. Refer to Figure 64-6. Apply masking to bearings and white trim stripes. Apply black paint to black trim stripes and root fitting.
5. Remove all masking materials.

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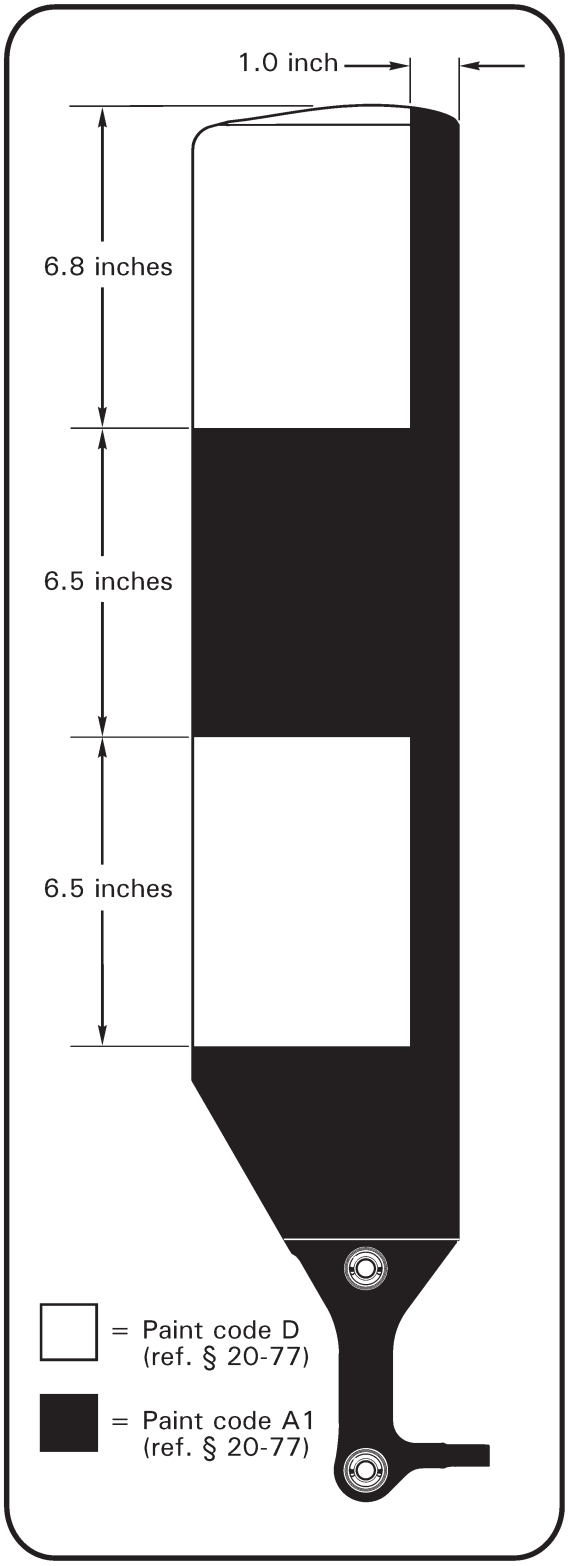

FIGURE 64-6 F029-1 BLADE PAINT SCHEME

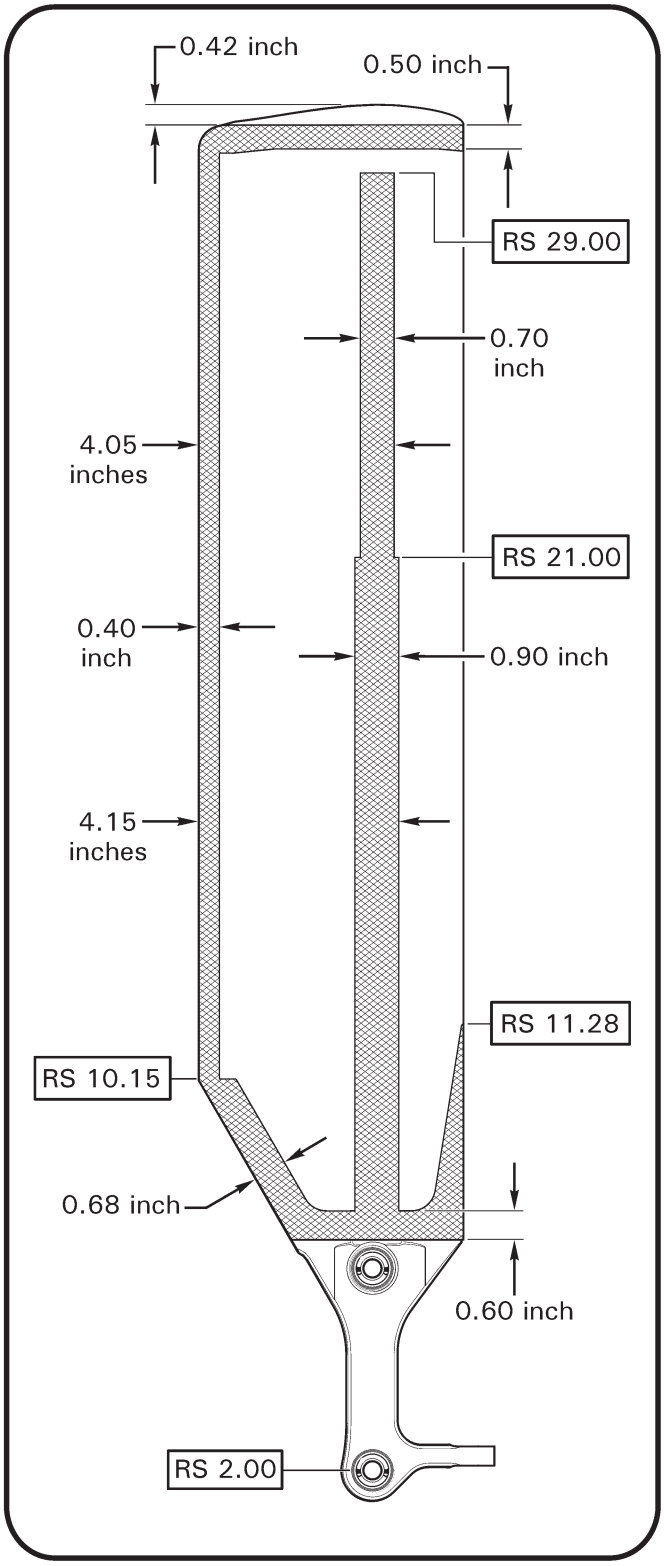

FIGURE 64-7 F029-1 BLADE BONDED AREAS

64-38 Tail Rotor Blade Condition and Care

Regular preventive maintenance of tail rotor blades is imperative for continued safe operation. Leading edge pitting or degradation of the bond at the tip cap can result if regular preventive maintenance is not performed; additional care may be required in corrosive environments such as coastal or shipboard operations. The following maintenance is recommended to prevent and mitigate the effects of corrosion:

1. Bubbled paint can be an indication of underlying corrosion. If bubbled paint is observed at or adjacent to tip cap bond line, or if bond line is exposed, perform following maintenance prior to further flight.

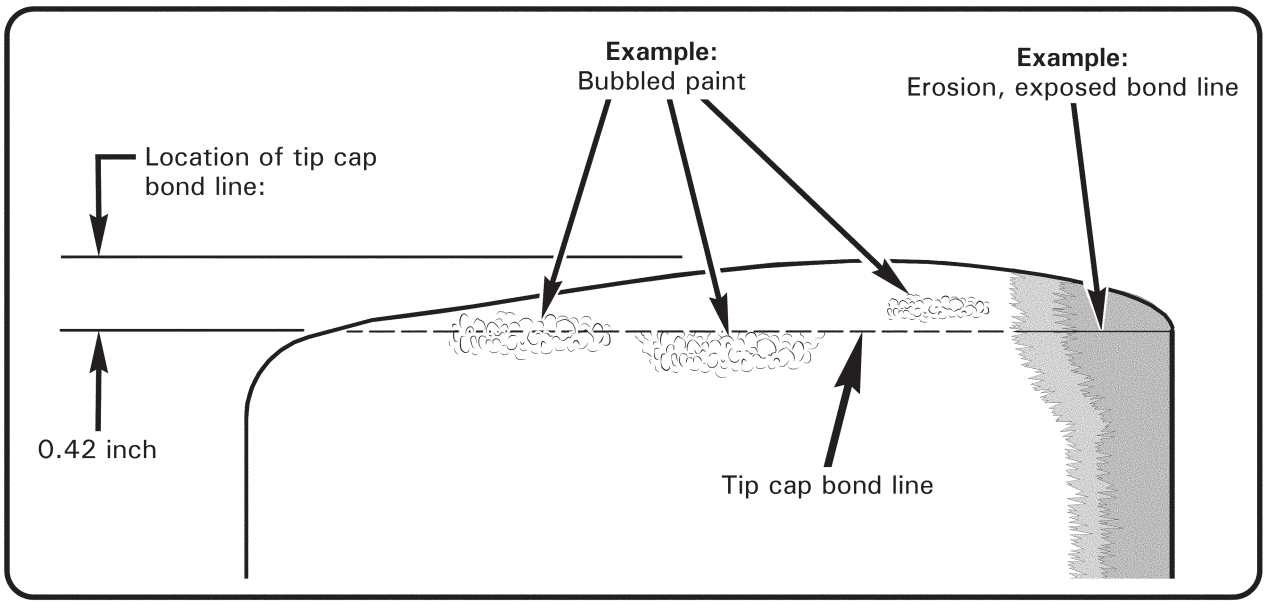

FIGURE 64-8 F029-1 BLADE TIP CAP BOND LINE

2. Maintain blade condition as follows:

   a. At, or adjacent to, tip cap bond line: Remove loose or bubbled paint with fingernail or plastic scraper. Using minimum 10X magnification, examine bond line for both presence of adhesive & no corrosion (white powder and/or pitting). Metal-to-metal contact of tip cap to skin is permissible, but any gaps in remaining bond line due to missing blue (or brown) adhesive requires blade replacement. Any evidence of corrosion at bond line requires blade replacement. If blade(s) require replacement, contact RHC Technical Support with part number & serial number of affected and opposite blades.

   b. At areas away from tip cap bond line: Remove any corrosion, and bubbled or loose paint, by hand-sanding in a spanwise direction using 220-grit aluminum-oxide abrasive paper and minimum 0.1 inch blend radius; finish sand with 320-grit aluminum-oxide abrasive paper. Remove only material necessary to eliminate corrosion; any hole that completely penetrates blade skin requires blade replacement.

64-38 Tail Rotor Blade Condition and Care (continued)

2. c. Feather edge of paint bordering any bare metal by hand-sanding spanwise with 320-grit or finer wet-or-dry aluminum-oxide abrasive paper. Do not remove bare metal when feather sanding.

   Preferred blade condition is with fully painted leading edge. Use two coats of Desoprime CA7502 epoxy primer (or equivalent). Scuff primer prior to applying second coat. Use Imron polyurethane enamel or equivalent paint. Refer to § 20-77 for specific paint codes. Blades with striped leading edges may be painted with solid black leading edge (ref. Figure 64-6) if desired for ease of application.

   Paint offers the best protection against leading edge corrosion. If painting blades is impractical, at least a single coat of primer on leading edges provides some protection.

3. Balance tail rotor per § 18-20 after any corrosion removal or painting.

4. When operating in a corrosive environment, clean tail rotor daily per POH section 8, Cleaning Helicopter (mild soap means a pH between 7 & 9). If waxing blades is impractical, wipe blade leading edges with standard WD-40® brand light oil or equivalent; do not use ACF-50® lubricant or “Specialist” versions of WD-40® on blades, and do not use Salt-Away®.

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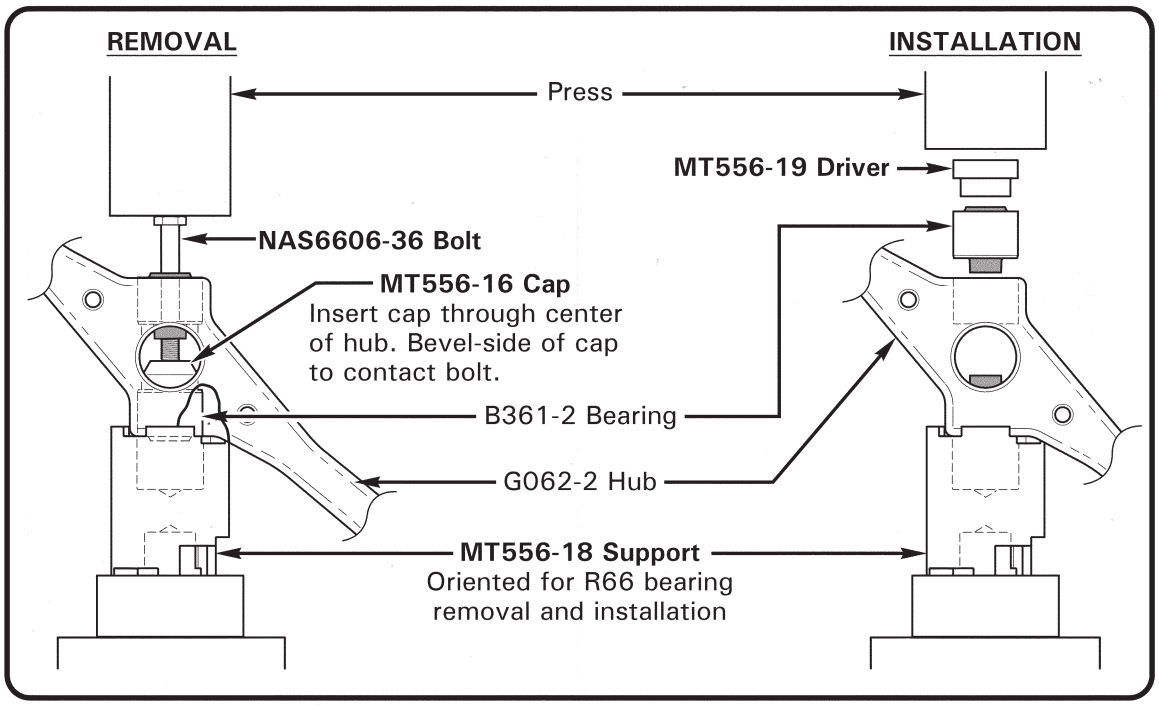

FIGURE 64-9 MT556-17 (ALL-MODEL) TAIL ROTOR HUB BEARING REPLACEMENT TOOL KIT

(Kit includes [1] MT556-6 Cap [R22], [1] MT556-16 Cap [R44 & R66], [1] MT556-18 Support, [1] MT556-19 Driver, [1] NAS6604-26 Bolt [R22], and [1] NAS6606-36 Bolt [R44 & R66])

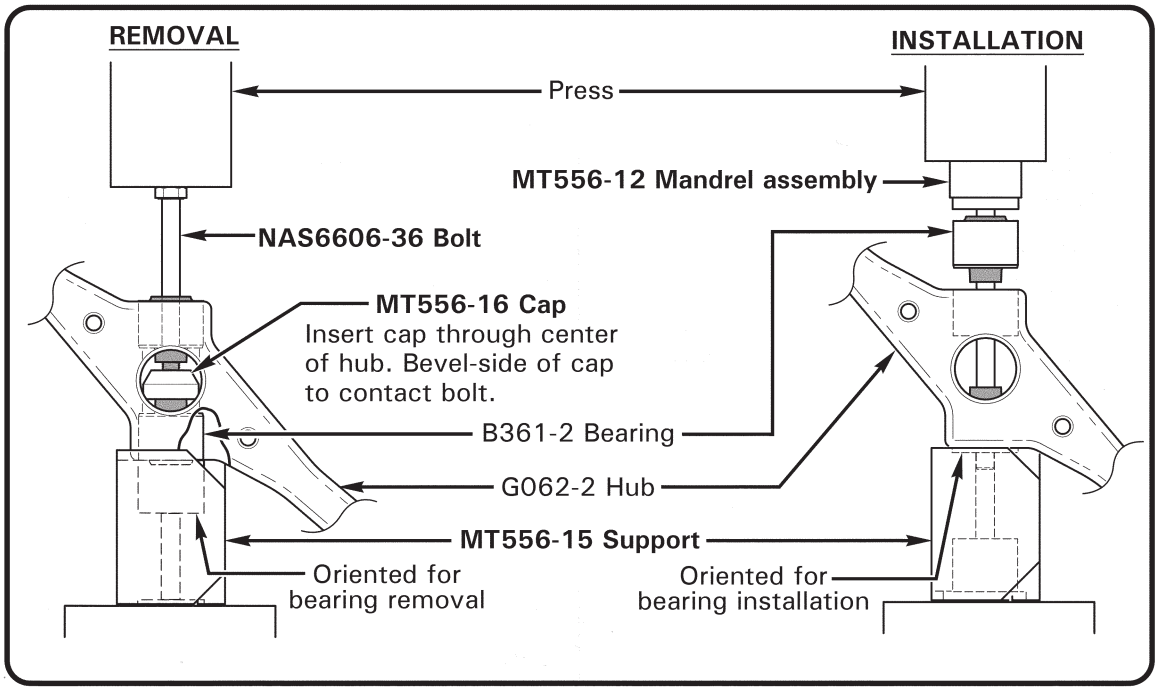

FIGURE 64-10 (EARLIER) MT556-11 (R44 & R66) TAIL ROTOR HUB BEARING REPLACEMENT TOOL KIT

(Kit includes [1] MT556-12 Mandrel assembly, [1] MT556-15 Support, [1] MT556-16 Cap, and [1] AN6-34A Bolt)

64-40 Tail Rotor Hub

64-41 Bearing Replacement

A. Removal

1. Remove tail rotor assembly per § 64-10.
2. Remove tail rotor blades per § 64-20.
3. Refer to Figures 64-9 and 64-10, as applicable. Press bearing(s) from hub using MT556-17 or MT556-11 bearing replacement tools as shown.

B. Installation

1. Inspect tail rotor hub per § 64-42.

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

2. Refer to Figures 64-9 and 64-10, as applicable. Using a cotton or foam tipped applicator, apply light coat of approved primer per § 20-70 to bottom of hub bearing bore. Apply a thin line of primer to center of bearing outside diameter. While primer is wet, press bearing(s) into hub using MT556-17 or MT556-11 bearing replacement tools as shown. Wipe away excess primer.

64-42 Inspection

1. Remove tail rotor blades per § 64-20, and inspect blades per § 64-30.
2. Remove elastomeric bearings per § 64-41.
3. Clean G062-2 tail rotor hub using approved solvent per § 20-70.
4. Visually inspect for indications of damage, wear, nicks, dings, and corrosion. Check arms for straightness, bolt holes for elongation, and bearing bores for fretting or galling. Corrosion is not permitted on clamp-up surfaces.
5. For suspect areas, locally remove paint from hub using approved paint stripper per § 20-70; fluorescent penetrant inspect per § 20-40.
6. Touch-up bare metal using approved materials per § 20-70.
7. Install elastomeric bearings per § 64-41.
8. Install tail rotor blades per § 64-20.

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71-11 Preparing Engine for Rolls-Royce Maintenance Facility

> NOTE
>
> Cap and plug Rolls-Royce engine model 250-C300/A1 engine fluid ports, electrical connectors, etc., and in removed components, progressively during procedure to prevent foreign object contamination.

1. Refer to Figures 71-1 and 71-2. Remove hardware securing MS21919WCH clamp(s) to engine vertical firewall and F577-5 bracket (earlier R66s). Loosen B277 clamp(s) and remove A729-68 tubes (if installed), breather hose/tube, and F170 fitting. Install plug.
2. Refer to Figure 76-1. Remove D930-2 spring from fuel control unit.
3. Refer to Figure 71-4. Remove hardware securing F169-2 base (and F577-5 bracket, if installed) to exhaust collector. Remove base (and bracket) and install exhaust collector cover.
4. To remove (engine) electrical harness:
   a. Disconnect engine harness's plug from engine magnetic plug on bottom of engine accessory gearbox.
   b. Remove hardware securing harness wire terminal to ignition exciter box stud.
   c. Cut and discard ty-raps as required, and disconnect G426-1 (fuel differential pressure) switch assembly wire from harness at connectors. Cut and discard stand-off ty-raps at switch wire and F741-1 line assembly.
   d. Remove hardware securing (2) MS21919WCH4 clamps to (bottom of) engine gearbox.
   e. Disconnect harness plugs from anti-ice valve assembly solenoid, anti-ice pressure switch assembly, and N_1 speed pick-up assembly.
   f. Remove hardware securing (2) MS21919WCH4 clamps to (2) engine-supplied MS9592-050 brackets.
   g. Remove hardware securing harness wire terminals to measured gas temperature (MGT) thermocouple studs.
   h. Disconnect harness plug from engine magnetic plug near oil line unions.
   i. Cut and discard ty-raps as required, and disconnect D745-3 pressure switch assembly from harness at connectors.
   j. Remove hardware securing F577-1 and F577-3 bracket assemblies to (right side of) engine gearbox. Remove harness.
5. Remove engine inlet bellmouth per § 71-23 Part A steps 2 and 3.

71-11 Preparing Engine for Rolls-Royce Maintenance Facility (continued)

6. Disconnect F741-1 line assembly from G426-1 switch assembly and fuel pump's AN919-0D reducer and remove line.
7. Disconnect F727-1 line assembly from fuel pump's AN919-2D reducer. Disconnect F727-2 line assembly from engine fireshield's drain fitting. Remove hardware securing MS21919WCH4 clamp the combustion section's plug flange and remove lines.
8. Remove AN919-0D and AN919-2D reducers, and G426-1 switch assembly, from fuel pump.
9. Remove hardware securing F593-3 plate to bottom of engine gearbox and remove plate.
10. Remove bolt, spacer (if installed), and G732 cap securing F018-1 clutch assembly in engine gearbox and remove clutch assembly.
11. Remove AN815-8D union from engine gearbox TANK VENT port, AN815-8D union or CV26-77 check valve (early R66s) from OIL OUTLET port, and AN815-10D union from OIL INLET port. Remove D745-3 pressure switch assembly from engine gearbox.
12. Cut and discard safety wire (if present) and remove hardware securing G200-1 engine lifting lug and G200-2 cover to engine gearbox, if installed. Remove lug, cover, and any residual B270-1 sealant.

NOTE
Removal of RHC-installed fuel-flow transducer (optional equipment) is not required, but may be desired for use in spare engine. Refer to § 28-23.

71-12 Preparing Engine for Helicopter Installation

NOTE

Remove protective caps and plugs progressively during procedure to prevent foreign object contamination.

1. Refer to Figures 71-1 and 71-2. Position G200-1 engine lifting lug on top of engine gearbox, as desired (optional). Install (2) NAS6605-3 bolts and (2) NAS1149F0532P washers, special torque bolts per § 20-33, and torque stripe per Figure 5-1.
2. Install D745-3 pressure switch assembly on front of engine gearbox, special torque switch per § 20-33, and torque stripe per Figure 5-1.
3. Install NAS617-10 packing on union and install union in engine gearbox OIL INLET port. Special torque union per § 20-33 and torque stripe per Figure 5-1.
4. Install NAS617-8 packing on engine-side of either union or CV26-77 check valve (early R66s) and install union or check valve (flow arrow to point away from engine) in engine gearbox OIL OUTLET port. Special torque union or check valve per § 20-33 and torque stripe per Figure 5-1.

CAUTION

Installing CV26-77 check valve incorrectly can damage oil tank.

5. Install NAS617-8 packing on union and install union in engine gearbox TANK VENT port. Special torque union per § 20-33 and torque stripe per Figure 5-1.
6. Install F018-1 clutch per § 63-12. |
7. Position F593-3 plate on bottom of engine gearbox and install aft bolt, finger tight.
8. Install G426-1 switch assembly in fuel pump BF (before filter) port. Special torque switch per § 20-33 and torque stripe per Figure 5-1.
9. Install MS29512-3 packing on AN919-0D reducer and install reducer in fuel pump AF (after filter) port. Special torque reducer per § 20-33 and torque stripe per Figure 5-1.
10. Install MS29512-3 packing on AN919-2D reducer and install reducer in fuel pump DRAIN port. Special torque reducer per § 20-33 and torque stripe per Figure 5-1. |
11. Connect F727-1 line assembly to fuel pump's AN919-2D reducer. Connect F727-2 line assembly to engine fireshield's drain fitting. Install one MS21919WCH4 clamp around each line, install hardware securing lines to combustion section's plug flange, and tighten screw. Special torque F727-1 line assembly nut at reducer per § 20-33 and torque stripe per Figure 5-1; special torque F727-2 line assembly at fireshield's drain fitting and torque stripe per Figure 5-1. Verify security. | |

71-12 Preparing Engine for Helicopter Installation (continued)

12. Connect F741-1 line assembly to G426-1 switch assembly and fuel pump's AN919-0D reducer. Special torque nuts per § 20-33 and torque stripe per Figure 5-1.

13. Install engine inlet bellmouth per § 71-23 Part B steps 1 & 2. Install bellmouth cover.

14. To install (engine) electrical harness:

    a. Position F577-1 bracket assembly on engine harness's D38999-20FC connector so connector's main keyway will face outboard. Install and tighten hardware; verify security. Install bracket on (right side of) engine gearbox, special torque nuts per § 20-33, and torque stripe per Figure 5-1.

    b. Install MS21919WCH8 clamp around harness assembly and install clamp on F577-3 bracket assembly. Install and tighten hardware. Install bracket on (right side of) engine gearbox, special torque nuts per § 20-33, and torque stripe per Figure 5-1.

    c. Connect harness to D745-3 pressure switch assembly at connectors. Verify security. Install (2) MS3367-7-9 ty-raps to secure plug. Cinch ty-raps until snug without overtightening and trim tips flush with heads.

    d. Connect harness plug to engine magnetic plug near oil line unions. Verify plug security.

    e. Install harness wire terminals (white-to-white, green-to-green) on measured gas temperature (MGT) thermocouple studs. Install hardware, special torque nuts per § 20-33, and torque stripe per Figure 5-1.

    f. Verify (2) engine-supplied MS9592-050 brackets are installed on engine lube oil filter assembly per Rolls-Royce SB RR300-72-014. Install (2) MS21919WCH4 clamps around harness assembly and install clamps on brackets. Install and tighten hardware; verify security.

    g. Remove engine supplied O-ring installed in N_1 speed sensor connector and replace with new 1182N111 O-ring. Connect harness plugs to anti-ice valve assembly solenoid, anti-ice pressure switch assembly, and N_1 speed sensor assembly. Special torque D38999/26FB98SA plug at N_1 per § 20-33 (Amphenol® plug only).

NOTE
Amphenol® D38999/26FB98SA plug is standard for F049-012 harness assembly Rev Q thru S but may have been used on prior revisions. MT640-2 open-end crow foot is available for use with Amphenol® plugs.

CHAPTER 76

ENGINE CONTROLS

76-00 Description

A twist grip throttle control is located on each collective stick. The controls are interconnected and actuate the Rolls-Royce engine model 250-C300/A1 fuel control input lever via a push-pull cable. The throttle is normally not used for control but is set either fully closed (idle position) or fully open.

The engine incorporates a hydromechanical governor which attempts to maintain 100% engine output shaft RPM when the throttle is in the open position. A linkage provides the power turbine governor with collective inputs to help anticipate changing power demands.

Large power changes or varying environmental conditions may cause the governor RPM setting to vary by a few percent. A momentary toggle switch (beep switch) on the collective stick is provided to trim, or "beep", the governor setting to the desired RPM. The switch controls an actuator which adjusts the linkage between the collective and power turbine governor. Holding the beep switch up or down will change rotor RPM approximately one percent per two seconds.

The governor controls RPM under normal conditions. It may not prevent over- or under-speed conditions generated by aggressive flight maneuvers or rapid power changes.

Other engine controls include a push-pull fuel cutoff control on the console face, a start button on the pilot's collective, a key-type igniter switch, and an anti-ice switch.

76-10 Fuel Control Unit (FCU)

A. Removal

1. Pull fuel valve OFF. Remove engine cowling assembly per § 53-21.
2. Refer to Figure 76-1. Remove fasteners securing C522-10 throttle and A522-10 fuel cutoff control inner wires to FCU throttle and fuel cutoff levers.
3. Remove fasteners securing control housings and AN742-4 clamps to F577 bracket assemblies, as required.
4. Remove FCU per RR300 Series Operation and Maintenance Manual (OMM).
5. If sending FCU to repair facility, remove D930-2 spring.

B. Installation

1. If removed, install D930-2 spring.
2. Install FCU per RR300 Series Operation and Maintenance Manual (OMM).
3. Perform throttle control rigging per § 76-11.
4. Perform fuel cutoff control rigging per § 76-12.
5. Push fuel valve ON.

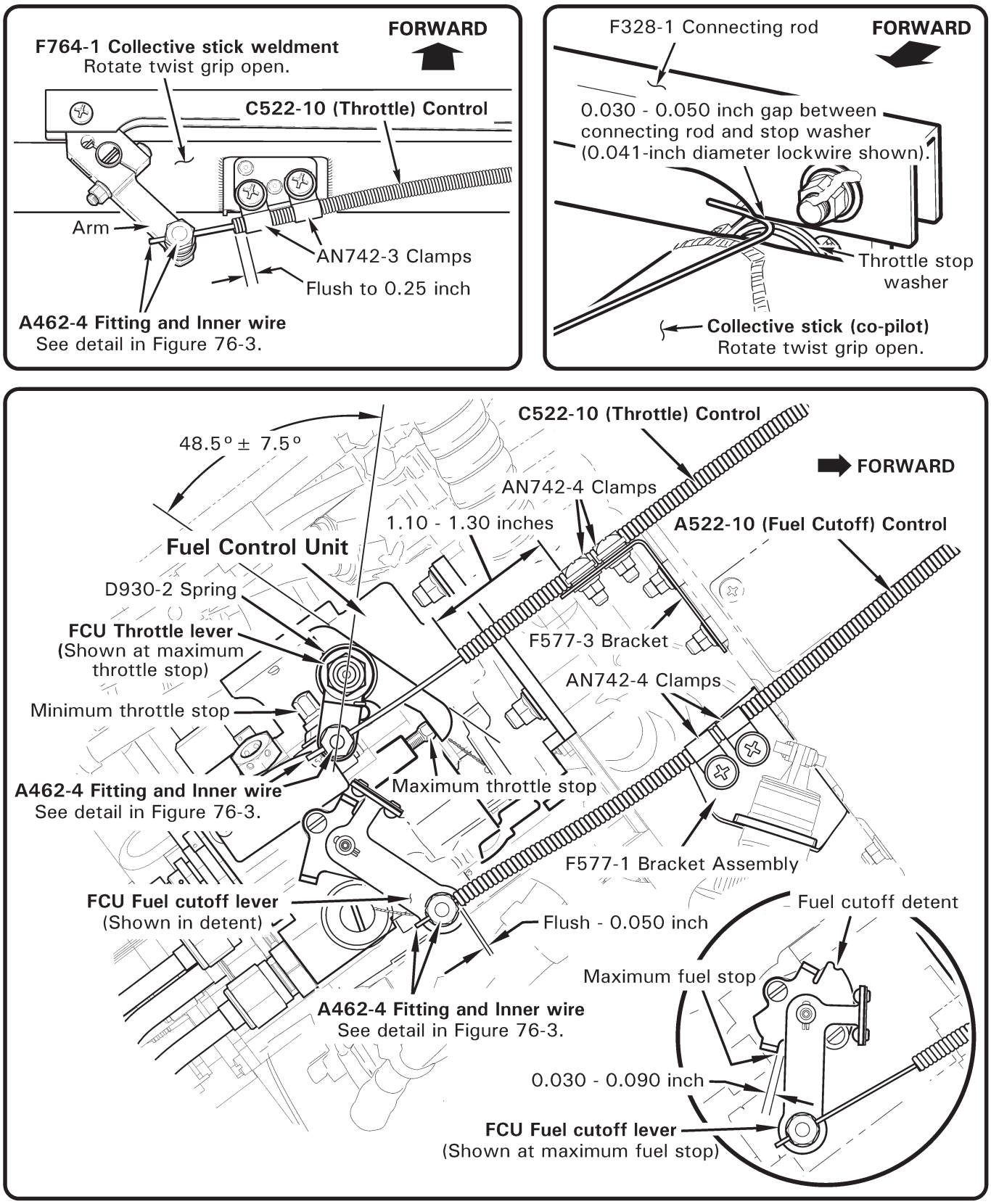

FIGURE 76-1 FUEL CONTROL UNIT

CHAPTER 96

ELECTRICAL SYSTEM

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96-11 Lead-Acid Battery Installations (continued)

B. Installing and Connecting Battery (continued)

1. b. If B237-8 battery was removed and B237-7 battery is being installed: Remove G131-2 plate and install G131-4 plate as shown; verify security. Carefully install B237-7 battery.

   c. If battery being installed is same part number as battery removed: Verify installation and security of parts. Carefully install battery.

2. Verify G131-2 or G131-4 plate just contacts top of battery (holes are slotted). Adjust as required; verify security.

3. Verify negative (ground) cable is attached to airframe and routed as shown. Adjust as required.

4. Verify battery terminal is clean and install positive cable on battery positive terminal. Special torque bolt per battery decal and torque stripe per Figure 5-1. Slide insulating nipple over attached terminal.

5. Verify battery terminal is clean and install negative (ground) cable on battery negative terminal (B237-7 battery) or G131-5 terminal assembly (B237-8 battery), routing negative (ground) cable as shown. Special torque bolt per battery decal and torque stripe per Figure 5-1.

6. Install G248-8 cover assembly; verify security. Install auxiliary fuel tank per § 28-51, as required. Close baggage compartment door.

7. a. If B237-7 battery was removed and B237-8 battery was installed: Revise Weight and Balance Record in R66 Pilot's Operating Handbook (POH) Section 6 to incorporate the following data:

Subtract:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-7 Battery	42.00 lb	96.88 in.	4068.96 in.-lb	-20.87 in.	-876.54 in.-lb

Add:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-8 Battery	52.00 lb	96.88 in.	5037.76 in.-lb	-21.73 in.	-1129.96 in.-lb

   b. If B237-8 battery was removed and B237-7 battery was installed: Revise Weight and Balance Record in R66 Pilot's Operating Handbook (POH) Section 6 to incorporate the following data:

Subtract:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-8 Battery	52.00 lb	96.88 in.	5037.76 in.-lb	-21.73 in.	-1129.96 in.-lb

Add:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-7 Battery	42.00 lb	96.88 in.	4068.96 in.-lb	-20.87 in.	-876.54 in.-lb

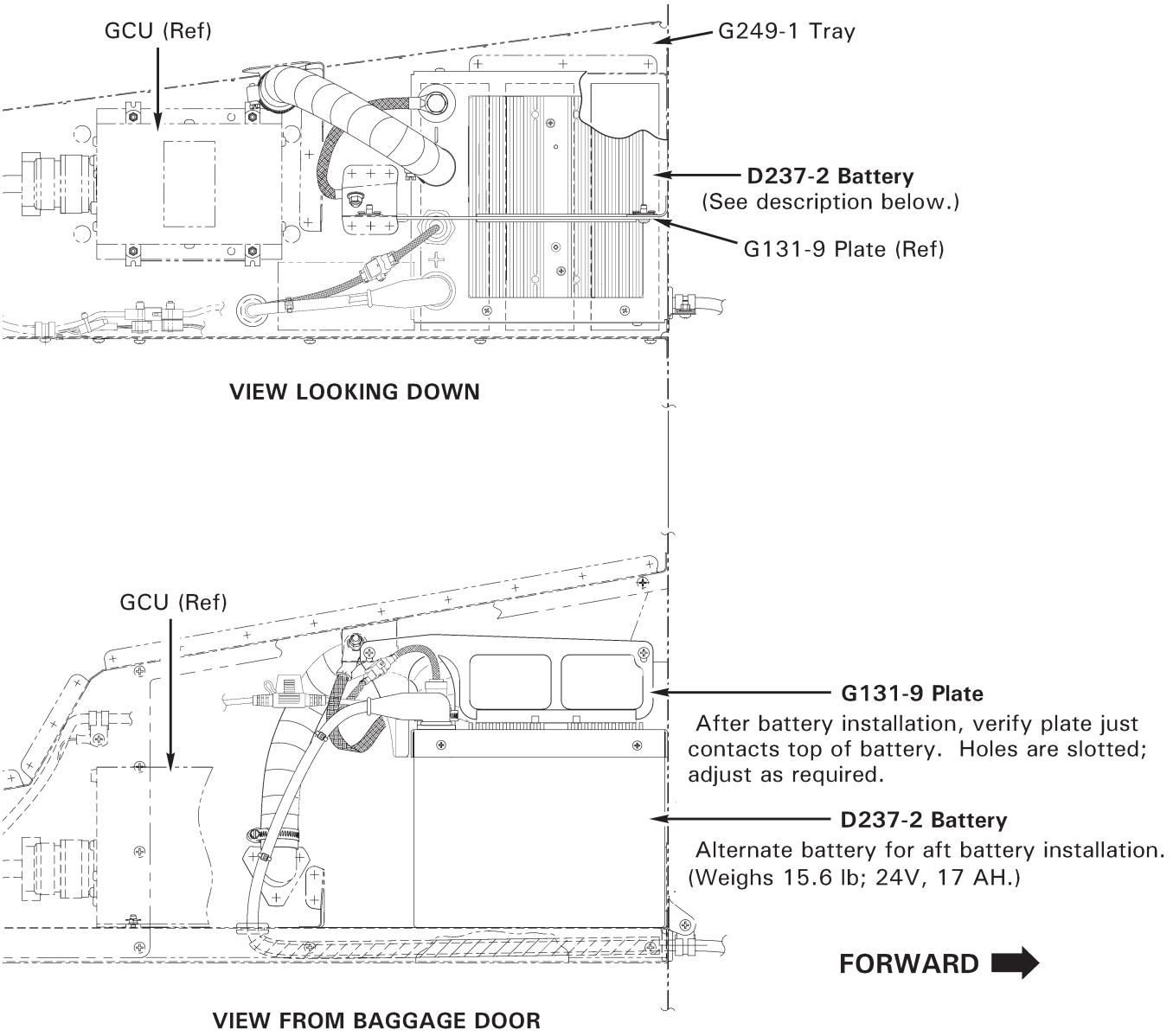

FIGURE 96-2 LITHIUM-ION BATTERY INSTALLATION

96-12 Lithium-Ion Battery Installation

A. Description

An optional 17 amp-hour lithium-ion battery replaces the lead-acid main battery. The 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 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 on the left side of the aircraft. No venting should occur during normal operation.

Two annunciator panel segments, BATT FAULT and BATT HEATER, indicate battery status. Earlier aircraft have two indicator lights located to the left of the annunciator panel.

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 generator 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.

If a start is attempted with insufficient charge, the battery's safety monitors may interrupt power. In the event of a power interruption, a small backup power supply will allow the MGT and N_1 gages as well as the Engine Monitoring Unit to continue functioning. The backup power supply also provides power to the map light. The backup power supply consists of two 9-volt batteries installed in the compartment under the left front seat. The 9-volt batteries are non-rechargeable and should be replaced every 12 months.

NOTE

Backup batteries will discharge if battery switch is ON and main battery is discharged or disconnected. Backup batteries should be replaced if battery switch was left ON without main battery power.

96-12 Lithium-Ion Battery Installation (continued)

A. Description (continued)

NOTE

Refer to True Blue Power Installation Manual and Operating Instructions for battery maintenance procedures.

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. Remove auxiliary fuel tank per § 28-51, if installed.
2. Turn battery switch off. Open baggage compartment door.
3. Remove hardware securing G248-8 cover assembly and remove cover.
4. Loosen clamp securing vent hose to battery and pull hose off of battery.
5. Disconnect airframe wiring plug from battery's comm connector.
6. Remove hardware securing negative (ground) cable to battery negative terminal.
7. Slide nipple away from battery positive terminal and remove hardware securing positive cable to battery positive terminal. Carefully remove battery.

96-12 Lithium-Ion Battery Installation (continued)

C. Installing and Connecting Battery

1. Remove auxiliary fuel tank per § 28-51, if installed.
2. 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.
3. Turn battery switch off. Open baggage compartment door.
4. Refer to Figure 96-2. Verify security, proper orientation, and installation of G131-9 plate. Carefully install battery.
5. Verify G131-9 plate just contacts top of battery (holes are slotted). Adjust as required.
6. 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 as noted on battery label, and torque stripe per Figure 5-1. Slide nipple over terminal.
7. Install negative (ground) cable to battery negative terminal and install battery hardware. Special torque terminal bolt as noted on battery label, and torque stripe per Figure 5-1.
8. Install G248-8 cover assembly and install hardware. Verify security. Close and latch baggage compartment door.

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 12 months: Replace two, non-rechargeable, 9-volt batteries mounted under the co-pilot's seat every annual inspection.

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.

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96-100 Electrical Load Analysis (continued)

COMPONENT	QTY	CONTINUOUS AMPS EACH	INTERMITTENT AMPS EACH	CONTINUOUS TOTAL	INTERMITTENT TOTAL
TACH BUS					
N_2 TACH (INCL REG)	1	0.022[1]	0.022[1]	0.022[1]	0.022[1]
N_2 TACH @ 13.75V	1	0.035	0.035		
ROTOR TACH (INCL REG)	1	0.022[1]	0.022[1]	0.022[1]	0.022[1]
ROTOR TACH @13.75V	1	0.035	0.035		
SUBTOTAL (TACH BUS)				0.044	0.044
COMPONENT	QTY	CONTINUOUS AMPS EACH	INTERMITTENT AMPS EACH	CONTINUOUS TOTAL	INTERMITTENT TOTAL
OTHER EQUIPMENT					
TACH RELAY	1	0.060	0.060	0.060	0.060
CLOCK (DIGITAL)	1	0.003	0.003	0.003	0.003
BATTERY RELAY	1	0.250	6.000	0.250	6.000
START/GEN RELAY	1	0.250	6.000	0.250	6.000
GEN LT RELAY	1	0.010	0.010	0.010	0.010
GEN CONTROL UNIT	1	0.200[4]	2.000[5]	0.200	2.000
IGNITION EXCITER	1	---	1.500	0.000	1.500
EXTERNAL PWR RELAY[2]	1	0.250	6.000	---	---
BAGGAGE COMPARTMENT LT[2]	1	0.020	0.020	---	---
SIGHT GLASS LED[2]	2	0.020	0.020	---	---
LATCHING START RELAY[3]	1	0.060	0.060	---	---
STARTER-GENERATOR[3]	1	---	231.06	---	---
SUBTOTAL (OTHER)				0.773	15.573
TOTAL (MAIN + LIGHTS + AVIONICS + TACH + OTHER)				26.70	67.357
STARTER-GENERATOR MARGIN (160-AMP MAX)				+133.30	+92.657

96-110 Audio Alerts

All R66 helicopters have a low-RPM horn which sounds when rotor RPM is below 95%. The horn is muted when the collective is fully down. On aircraft S/N 1006 and prior, the horn is provided by speakers in the side of the instrument console. On aircraft S/N 1007 and subsequent, a tone generator in the audio system provides the horn through crew headsets.

Aircraft S/N 1007 and subsequent also have audio alerts in the headsets for high rotor RPM and high engine torque/MGT. For high RPM, a warble tone (high/low tone) indicates rotor RPM is approaching 106%. For high engine torque/MGT, a beeping tone indicates torque above 100% or MGT above 782°C (5-minute limits). High torque is indicated by four beeps per second, increasing to 12 beeps per second if torque exceeds 108%. High MGT is indicated by 12 beeps per second. The beep tone will also come on during start if MGT exceeds 860°C, indicating an abnormally hot start.

Test buttons on the instrument panel permit pre-flight or in-flight tests of the high RPM and high torque/MGT tones. For high torque/MGT, depressing the test button give four beeps per second for two seconds followed by 12 beeps per second.

Additional audio alerts may be provided in the headsets depending on optional equipment installed (such as pressure fueling, terrain warnings, traffic warnings, autopilot modes, etc.)

96-120 Cockpit Camera

An optional video camera may be installed in the cabin ceiling. The camera records 4K video, intercom/comm audio, and GPS position both internally and to a removable flash drive inserted in the front of the camera housing. The internal memory retains only recent video and is not user accessible. Recording starts automatically when the helicopter battery is switched on and stops when it is switched 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. 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 and wait for the blue light to stop flashing.

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 recorded on the flash drive can be viewed on a Windows PC or Mac computer. 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 optionally displayed in the video and are also recorded separately to files labeled HELICAM_xxxx.GPX. A 128 GB flash drive (as supplied with helicopter) will record approximately 10 hours of video. When full, the earliest video file is overwritten with the last recording.

96-120 Cockpit Camera (continued)

NOTE

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

Complete instructions are provided in the Cockpit Camera User Guide on the Robinson website https://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.

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CHAPTER 98

WIRING DIAGRAMS

CHAPTER 98

WIRING DIAGRAMS (Continued)

FIGURE 98-1 R66 ELECTRICAL SYSTEM (REVISION X)

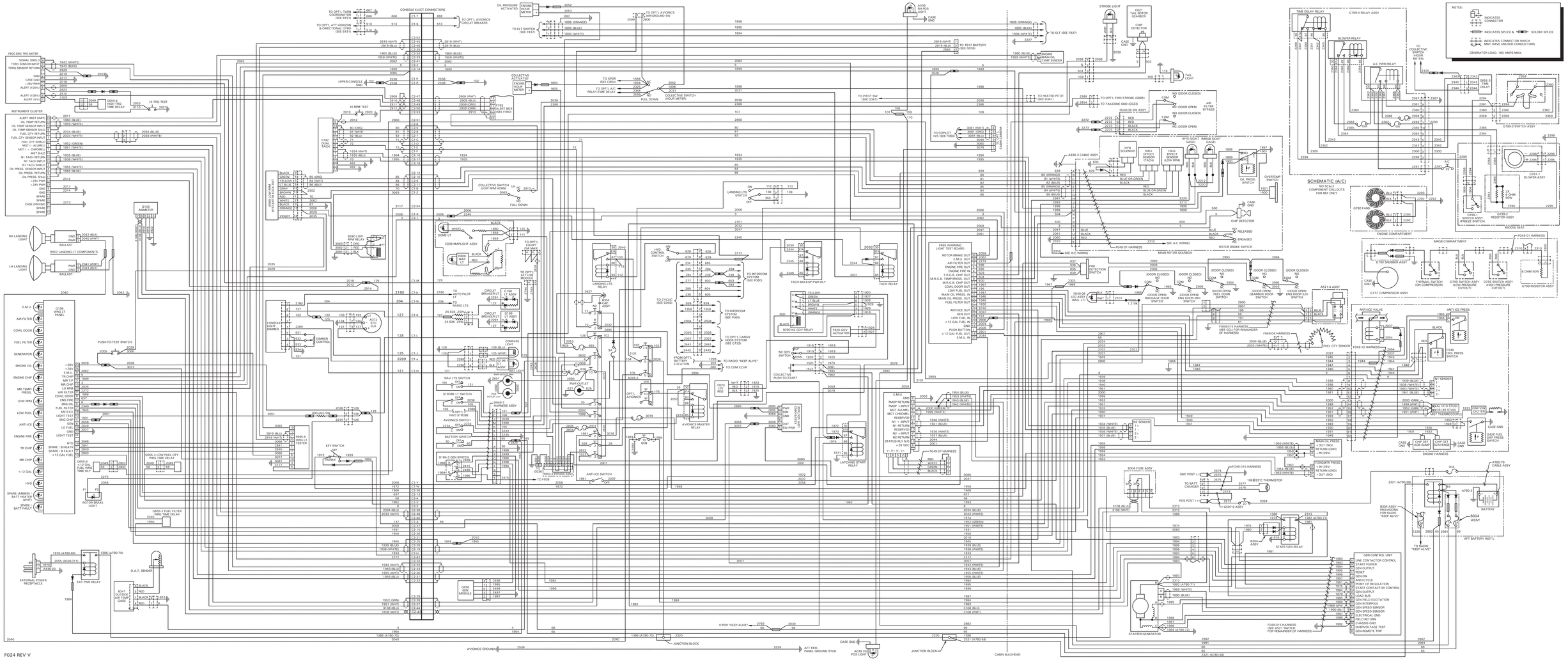

FIGURE 98-1A R66 ELECTRICAL SYSTEM (REVISION V)

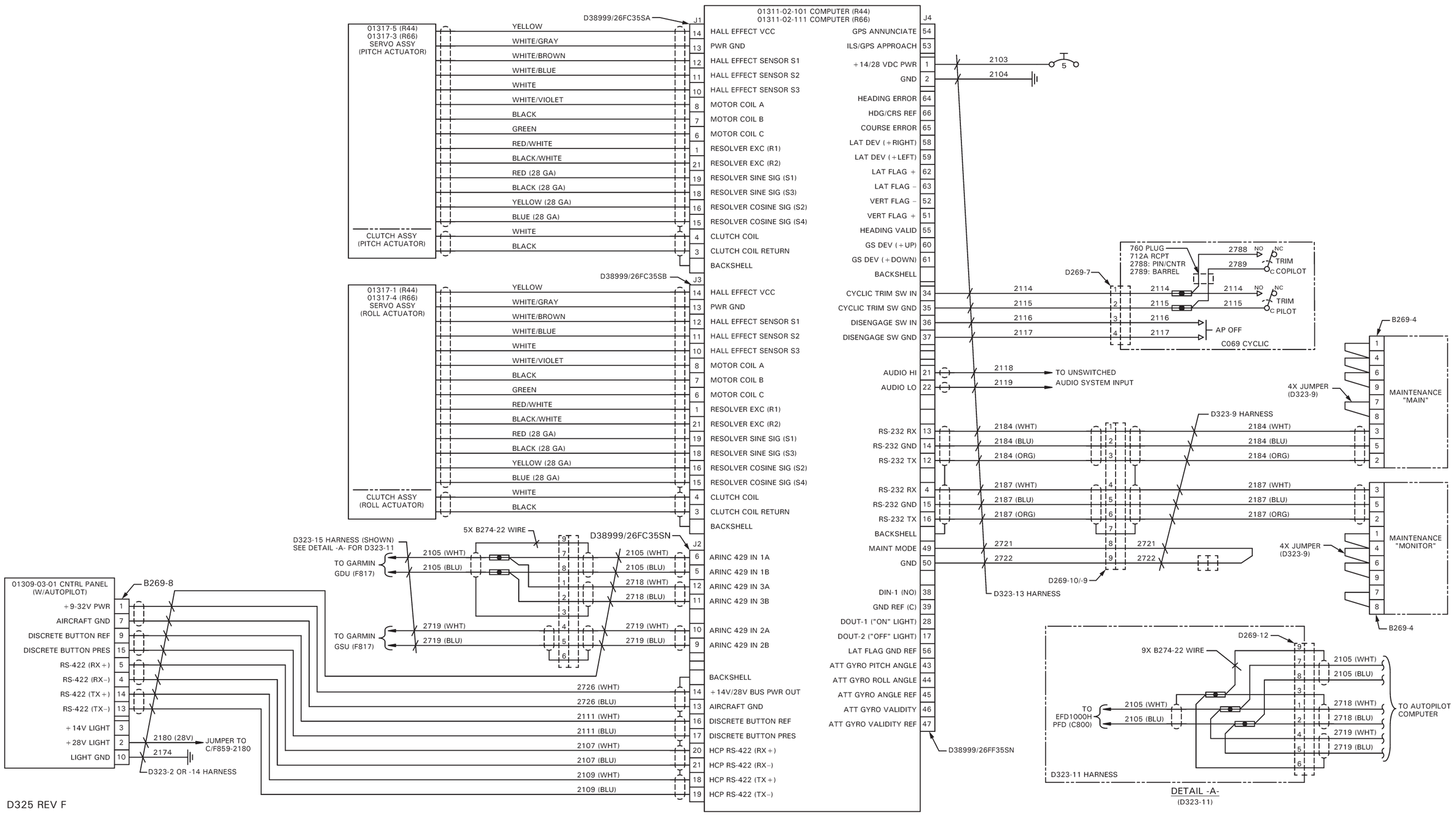

FIGURE 98-8A D325-1 AUTOPILOT (HELISAS, WITHOUT BC MODE) SCHEMATIC

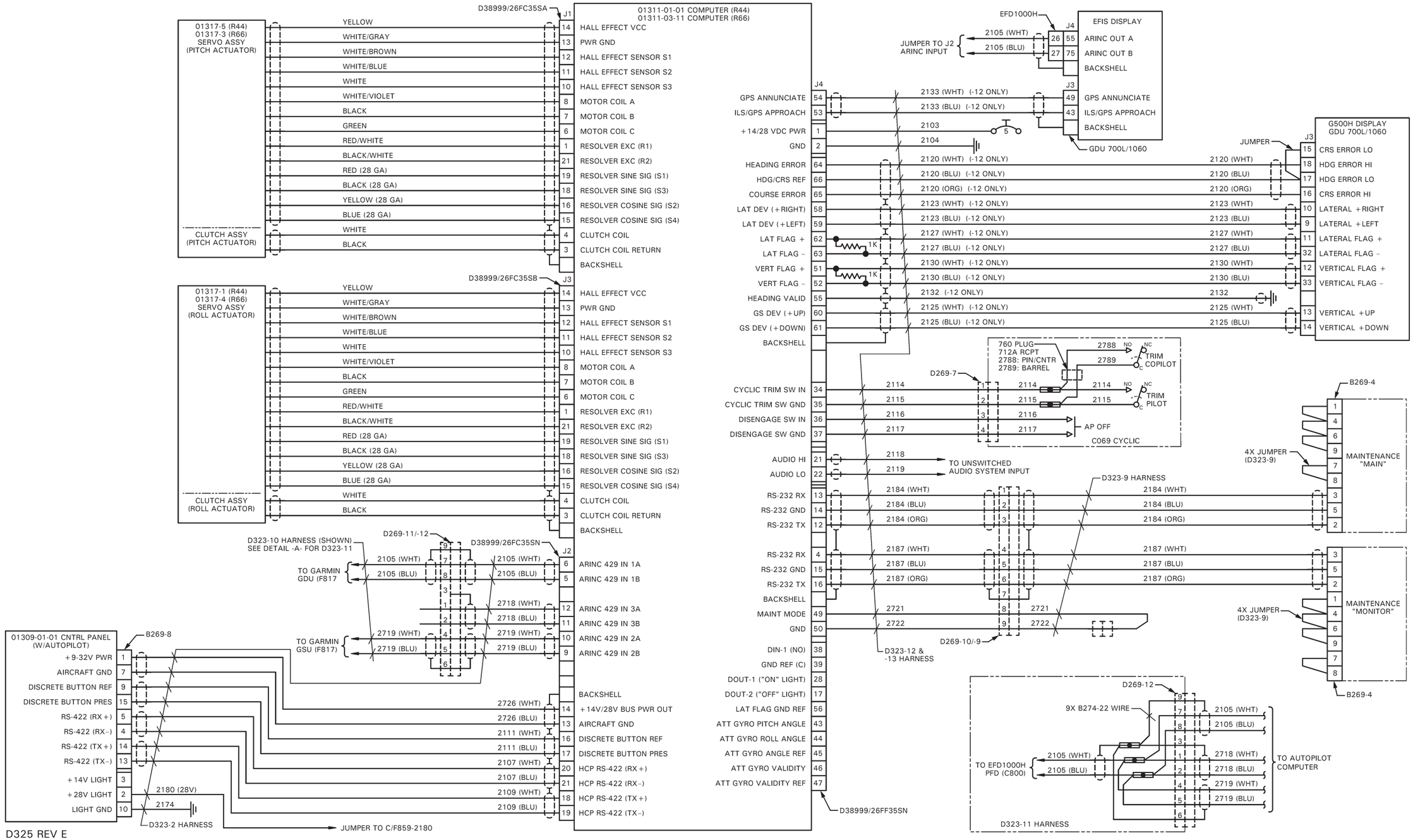

FIGURE 98-8B D325-1 AUTOPILOT (HELISAS, WITH BC MODE) SCHEMATIC

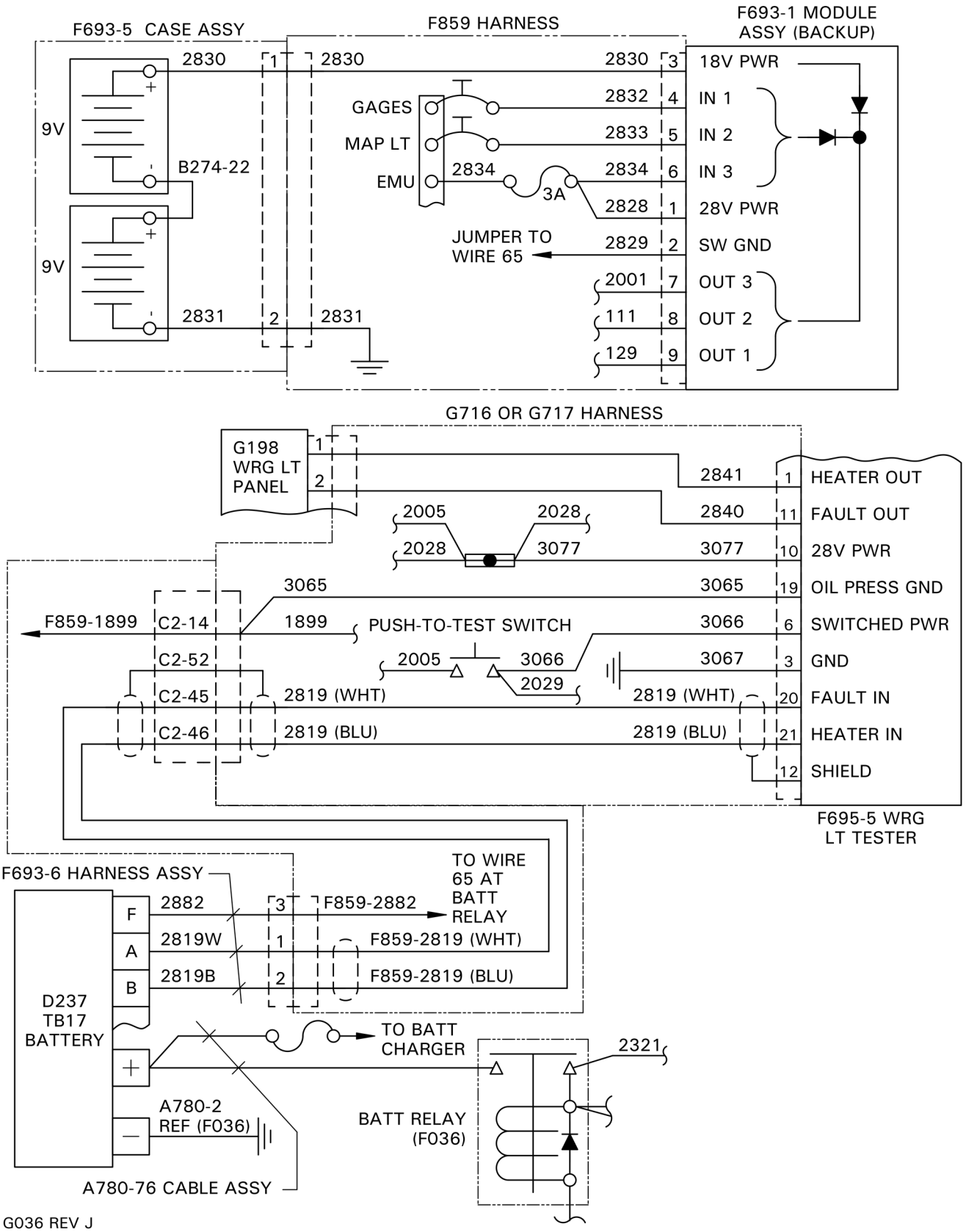

FIGURE 98-26 LITHIUM-ION BATTERY INSTALLATION
(Ships equipped with G198-7 warning light panel.)

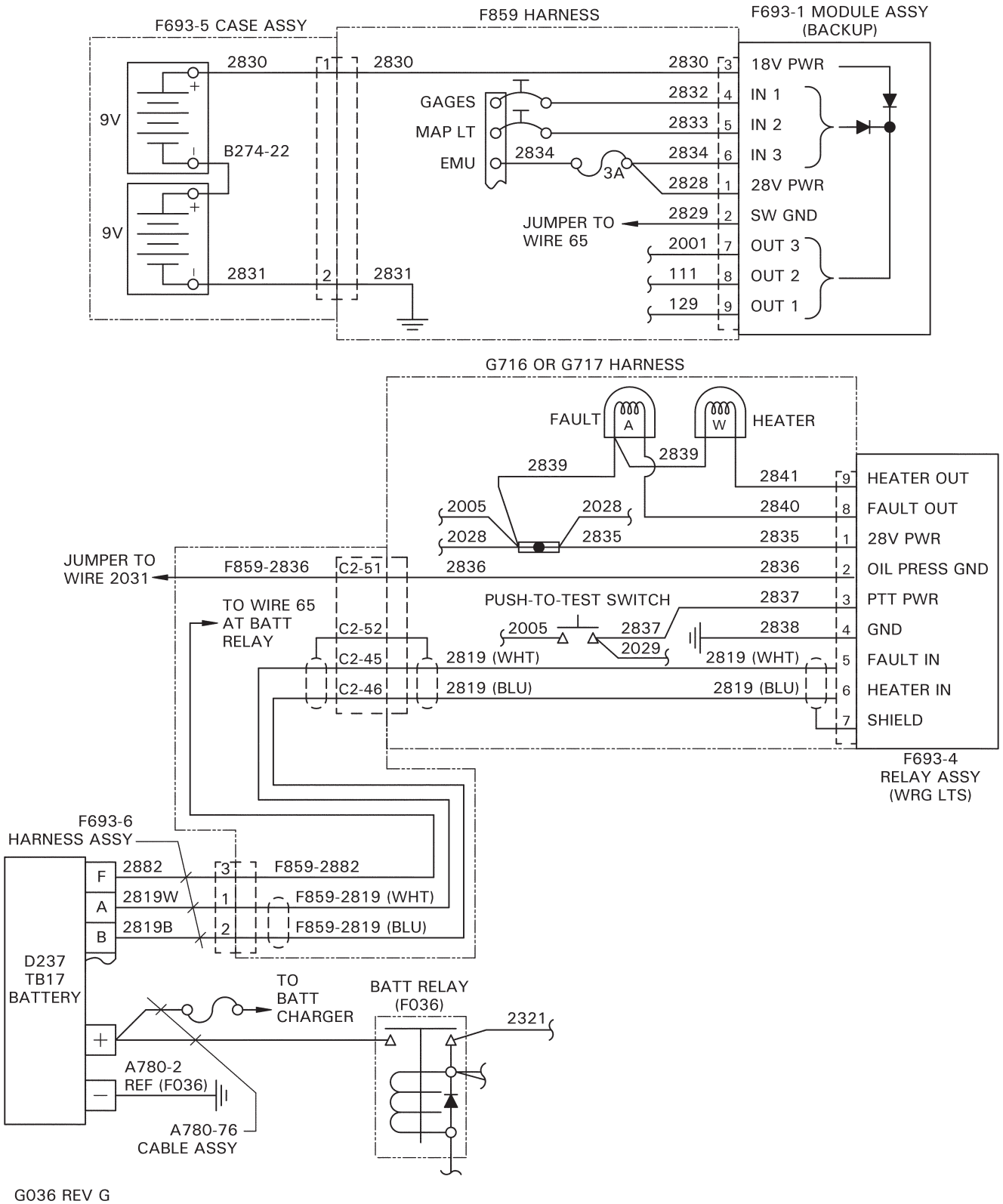

FIGURE 98-26A LITHIUM-ION BATTERY INSTALLATION
(Ships equipped with G198-1 warning light panel.)

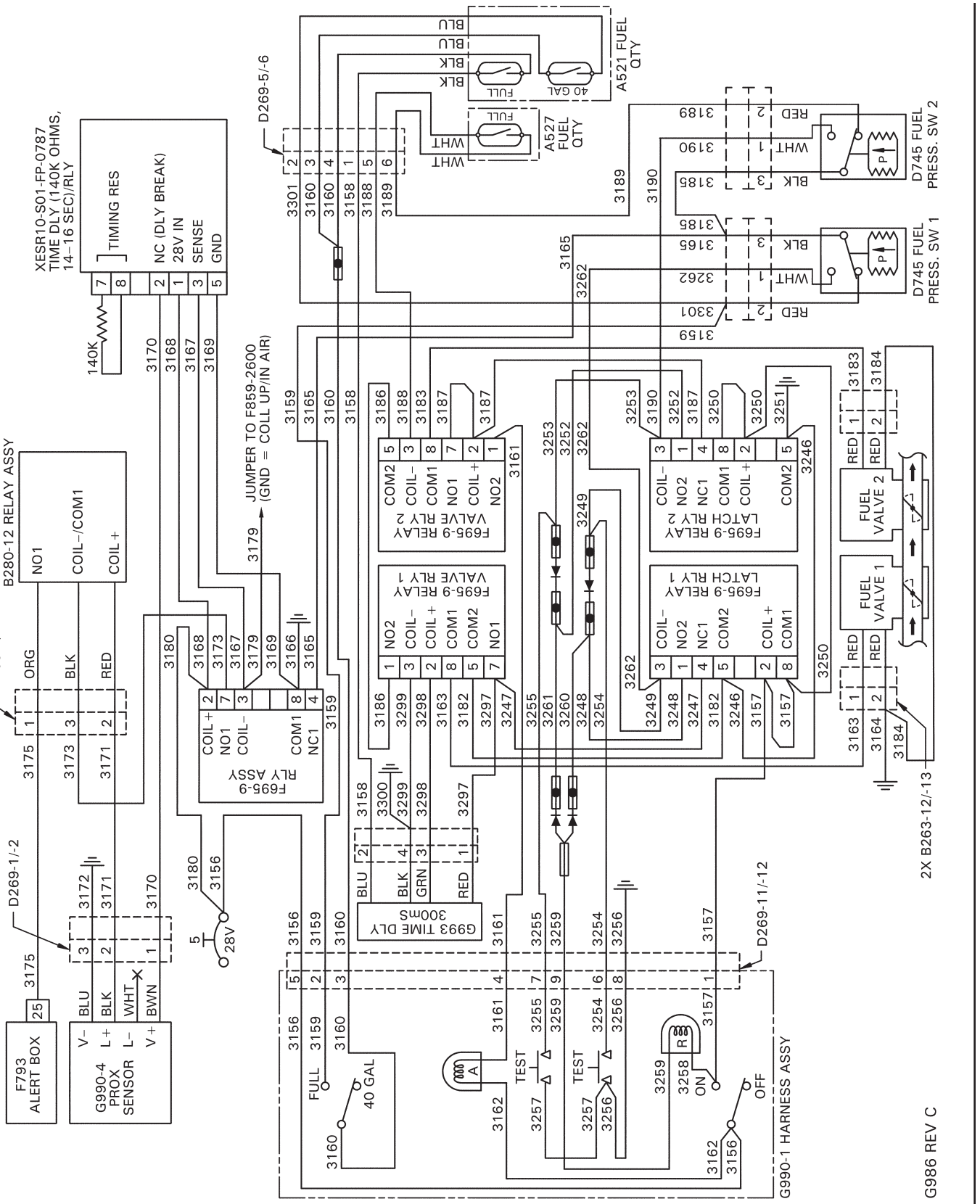

FIGURE 98-34 PRESSURE FUELING SYSTEM INSTALLATION (OPTIONAL)

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CHAPTER 99

SPECIAL TOOLS

99-10 Special Tools

The following is a list of Robinson R66 special tools.

R66 special tools are to be used in conjunction with the applicable instructions for continued airworthiness, for their designated maintenance task.

99-20 Illustrations and Tasks

Refer to Figure 99-1.

Item	Part Number	Description
1	MT054-1	Main Gearbox Drain Assembly
2	MT122-6	Micrometer Assembly – Main Rotor Hub, Bolt Stretch
3	MT146-4	Blocks – Swashplate Rigging (set of 2)
4	MT147-1	Bleed Tool – Main Rotor Blade Spindle [includes (2) MT147-2 fittings]
5	MT179-4	Balancing Bar – Tail Rotor Assembly Static Balance
6	MT260-6	Tail Rotor Drive Shaft Runout Attachments Kit
7	MT329-6	Plug – Main Rotor Hub Bearing Installation/Removal
8	MT329-10	Tube – Main Rotor Hub Bearing Removal

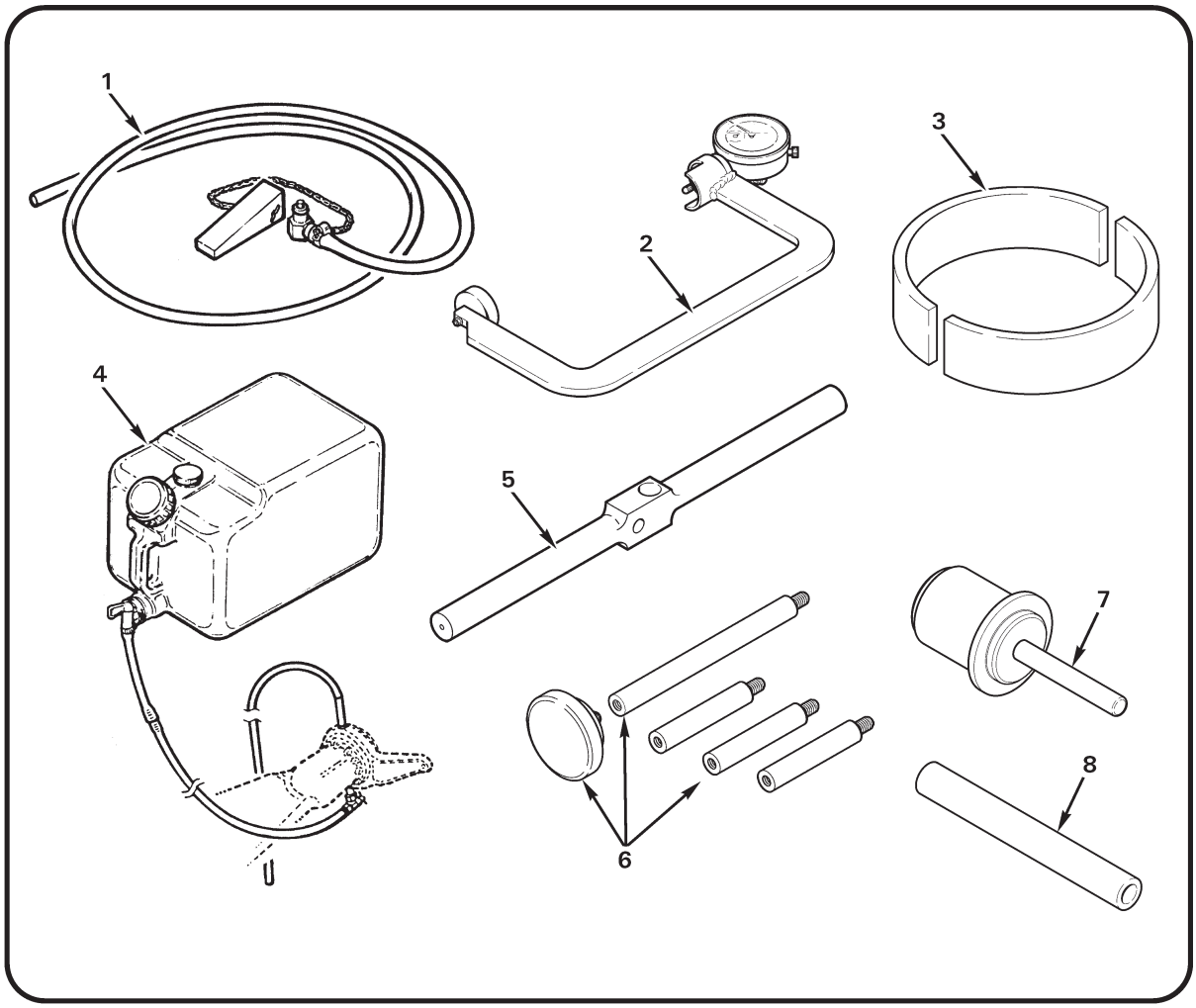

FIGURE 99-1 SPECIAL TOOLS

99-20 Illustrations and Tasks (continued)

Refer to Figure 99-2.

Item	Part Number	Description
1	MT352-1	Main Rotor Blade Trim Tab Gage
2	MT354-4 or -7	Teeter Moment Tool
3	MT357-2	0.375-inch diameter Reamer
4	MT357-3	0.156-inch diameter Cobalt Steel Drill
5	MT357-4	Hex Driver (Snap-On Part No. FABL8)
6	MT357-5	Torque Adapter (Snap-On Part No. FRDH101)
7	MT359-1	Spring Scale (0-30 lb)

* Ream bore after installation of A139-1 bearing to 0.376-0.375 inch diameter.

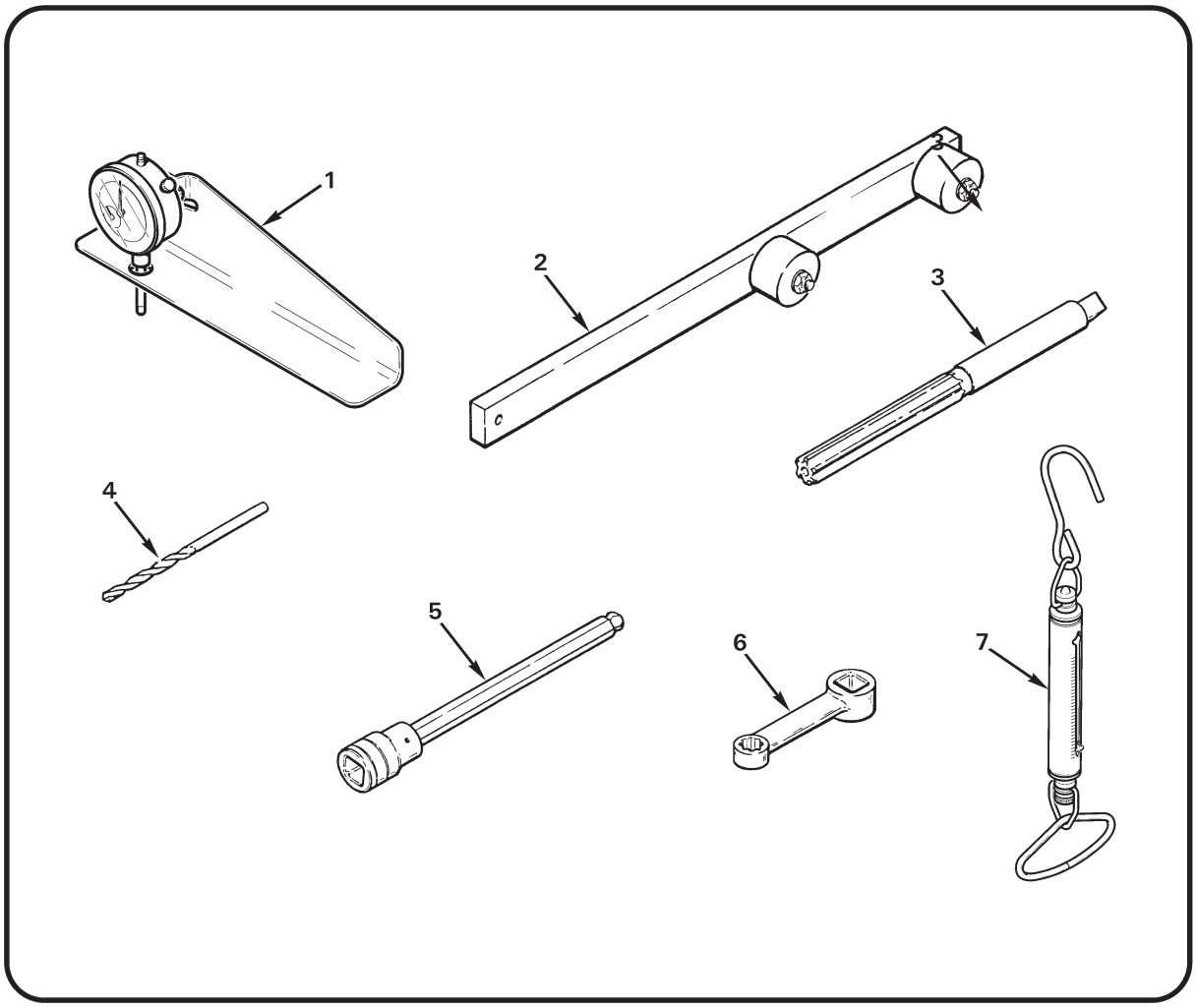

FIGURE 99-2 SPECIAL TOOLS

99-20 Illustrations and Tasks (continued)

Refer to Figure 99-3.

Item	Part Number	Description
1	MT384-1	Hydraulic Test Pump (U.S / Canada / Mexico – 110 V)
2	MT384-2	Hydraulic Test Pump (Outside North America – 220 V)
3	MT524-1	Main Rotor Static Balancing Fixture (Incl 4 and 5)
4	MT524-2	Balancing Fixture Components Without Base
5	MT009-9	Main Rotor Static Balancing Fixture Base

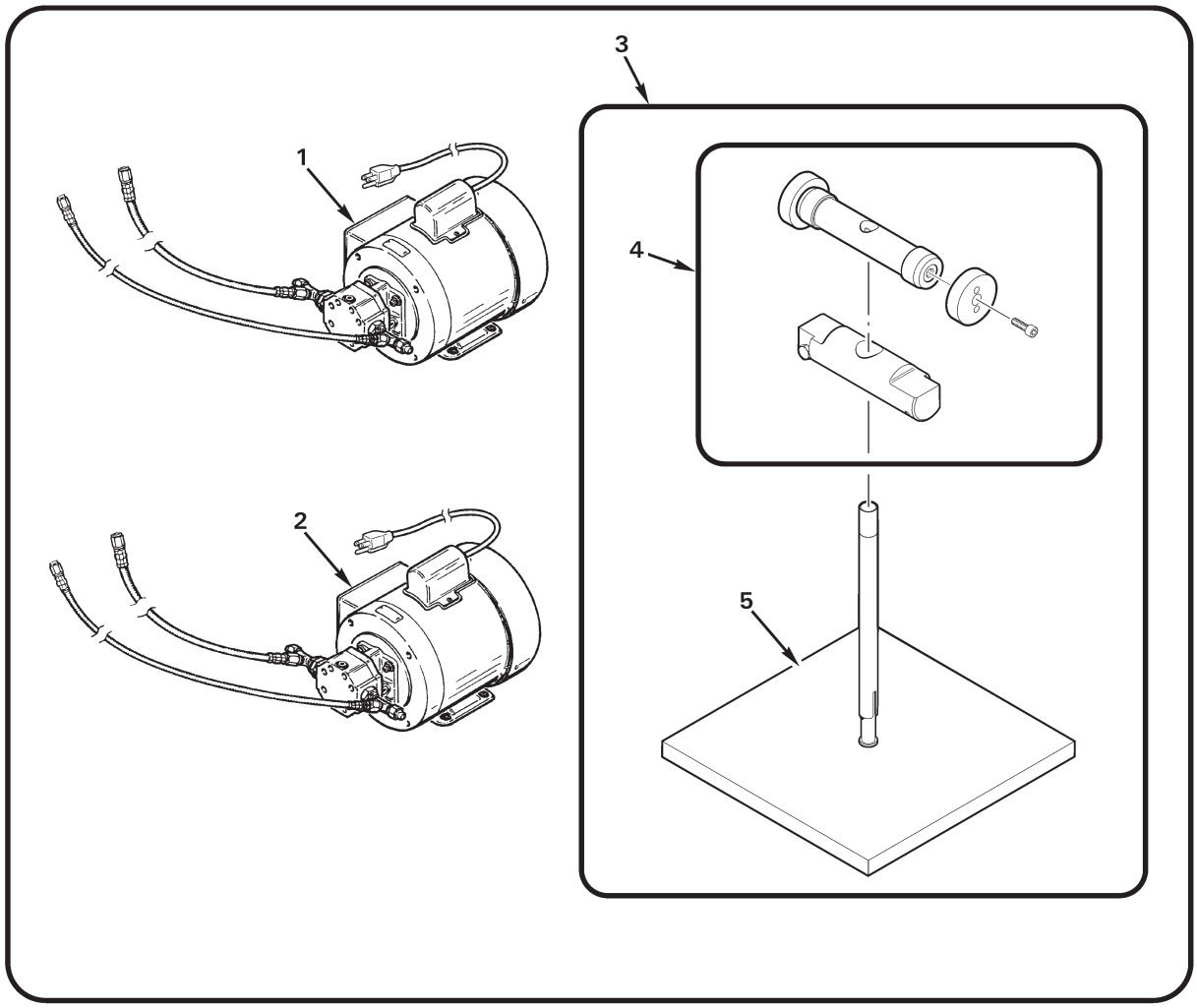

FIGURE 99-3 SPECIAL TOOLS

99-20 Illustrations and Tasks (continued)

Refer to Figure 99-4.

Item	Part Number	Description
1	MT525-7	Main Rotor Blade Rigging Fixture
2	MT525-9	Tail Rotor Blade Rigging Fixture
3	MT526-8	Bender Assembly – Trim Tab, Main Rotor Blade (aluminum)
4	MT527-1	Helicopter Lifting Fixture
5	MT548-8	Fitting (engine hoist adapter)

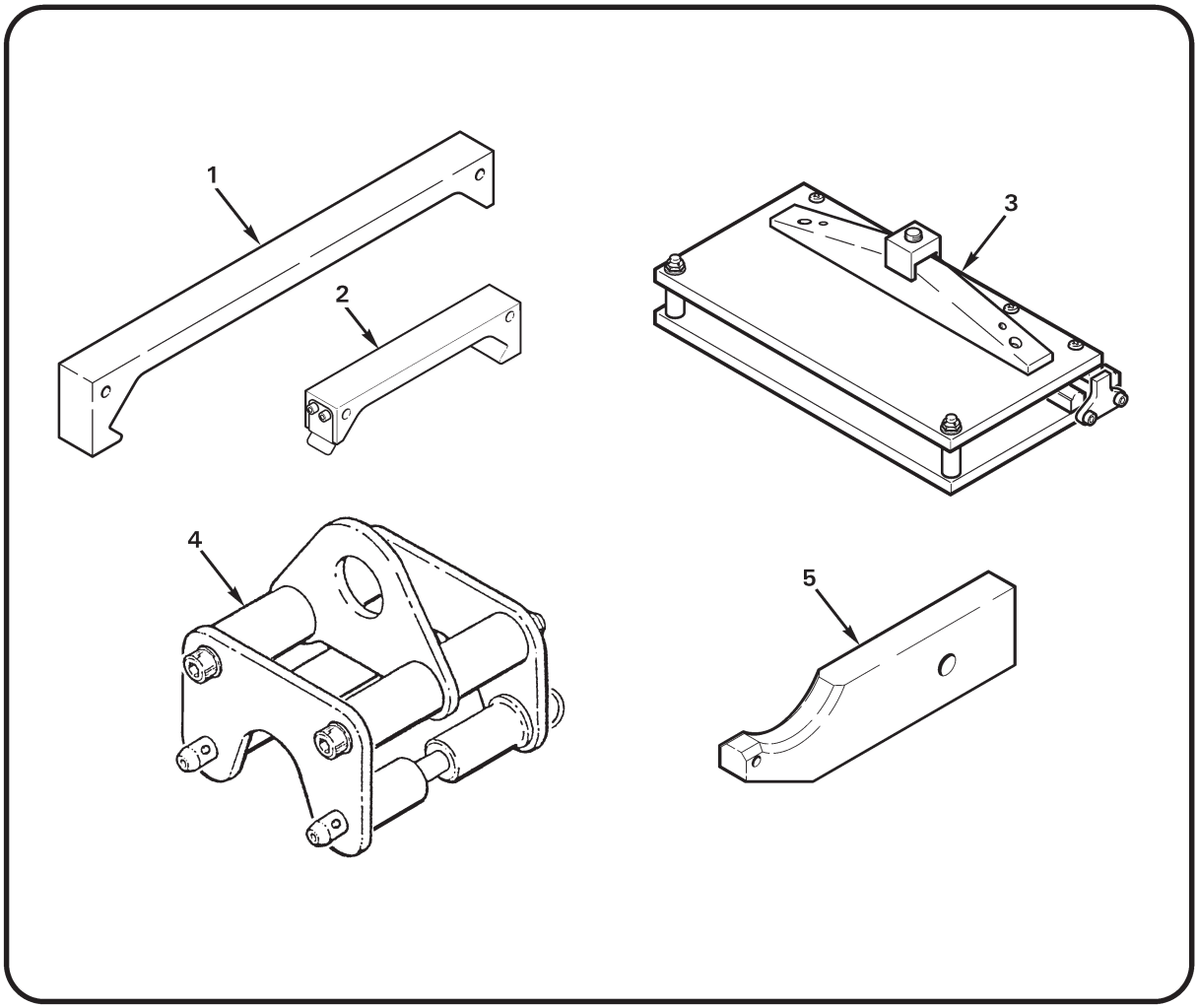

FIGURE 99-4 SPECIAL TOOLS

99-20 Illustrations and Tasks (continued)

Refer to Figure 99-5.

Item	Part Number	Description
1	MT549-1	Spacer – Spindle Boot (set of 2)
2	MT549-2	Plate – Spindle Boot
3	MT556-11	Kit Tools – Tail Rotor Hub Bearing Replacement
4	MT569-2	Guide Assembly – Drill (main rotor hub nut)
5	MT640-2	Open-End Crowfoot Wrench (N1 Plug)
6	MT643-1	Support Weldment – Main Rotor Hub Bearing Installation
7	MT759-1	Blocks – Cyclic Rigging (see Figure 18-7A)
	MT759-2	Blocks – Cyclic Rigging (see Figure 18-7A)

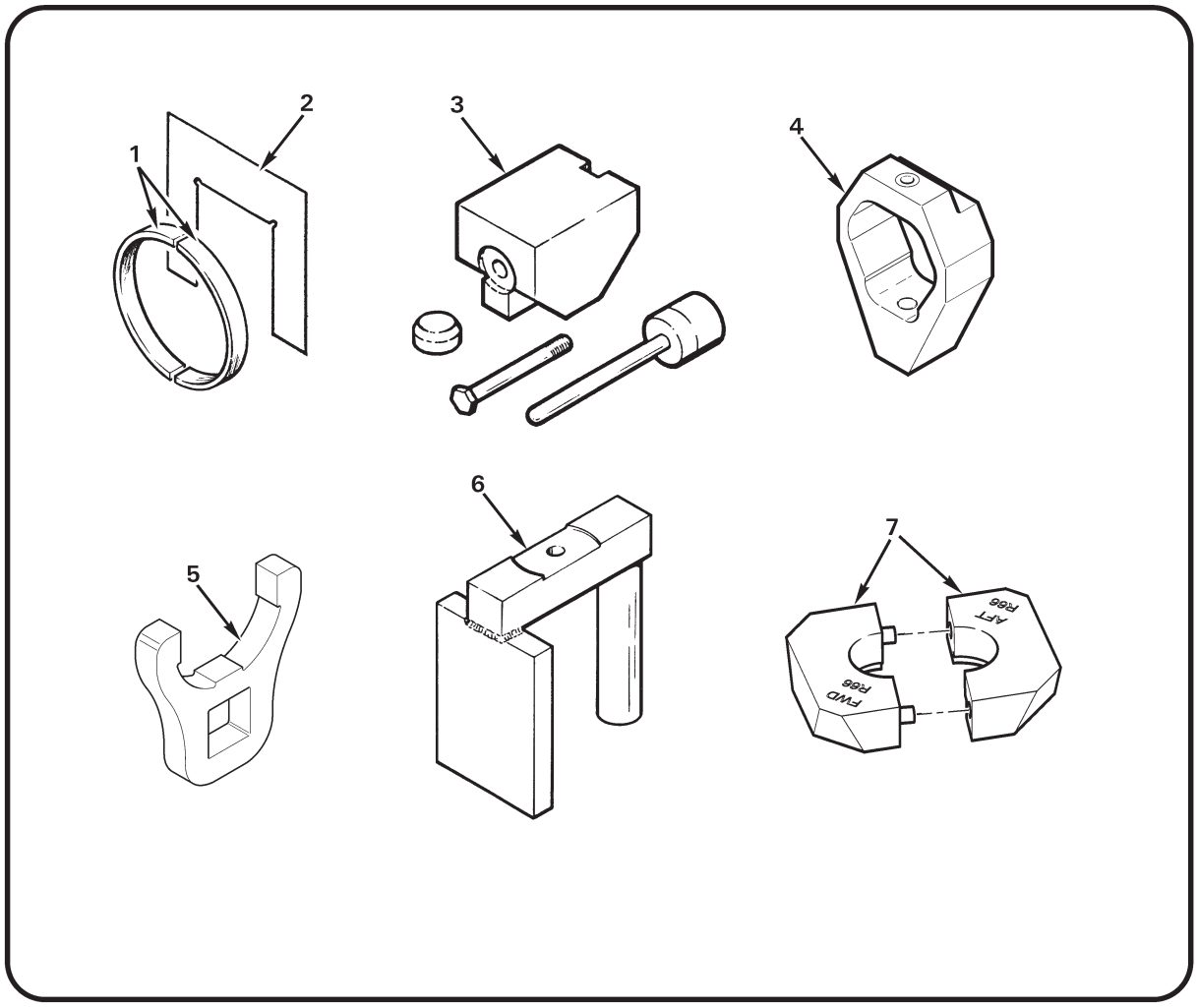

FIGURE 99-5 SPECIAL TOOLS

99-20 Illustrations and Tasks (continued)

Refer to Figure 99-6.

Item	Part Number	Description
1	MT850-1	Engine Stand Assembly (RR300)
2	AN970-4*	Washer – Tap Test Tool
3	MT990-1 MT990-2	Charger Assembly (BatteryMinder – 24 VDC, 120 VAC, 50/60 Hz) Charger Assembly (BatteryMinder – 24 VDC, 240 VAC, 50/60 Hz)
4	2020HR	ACES Probalancer Analyzer (or equivalent dynamic balancer)

* Or 1965 or later U.S. quarter dollar coin in good condition.

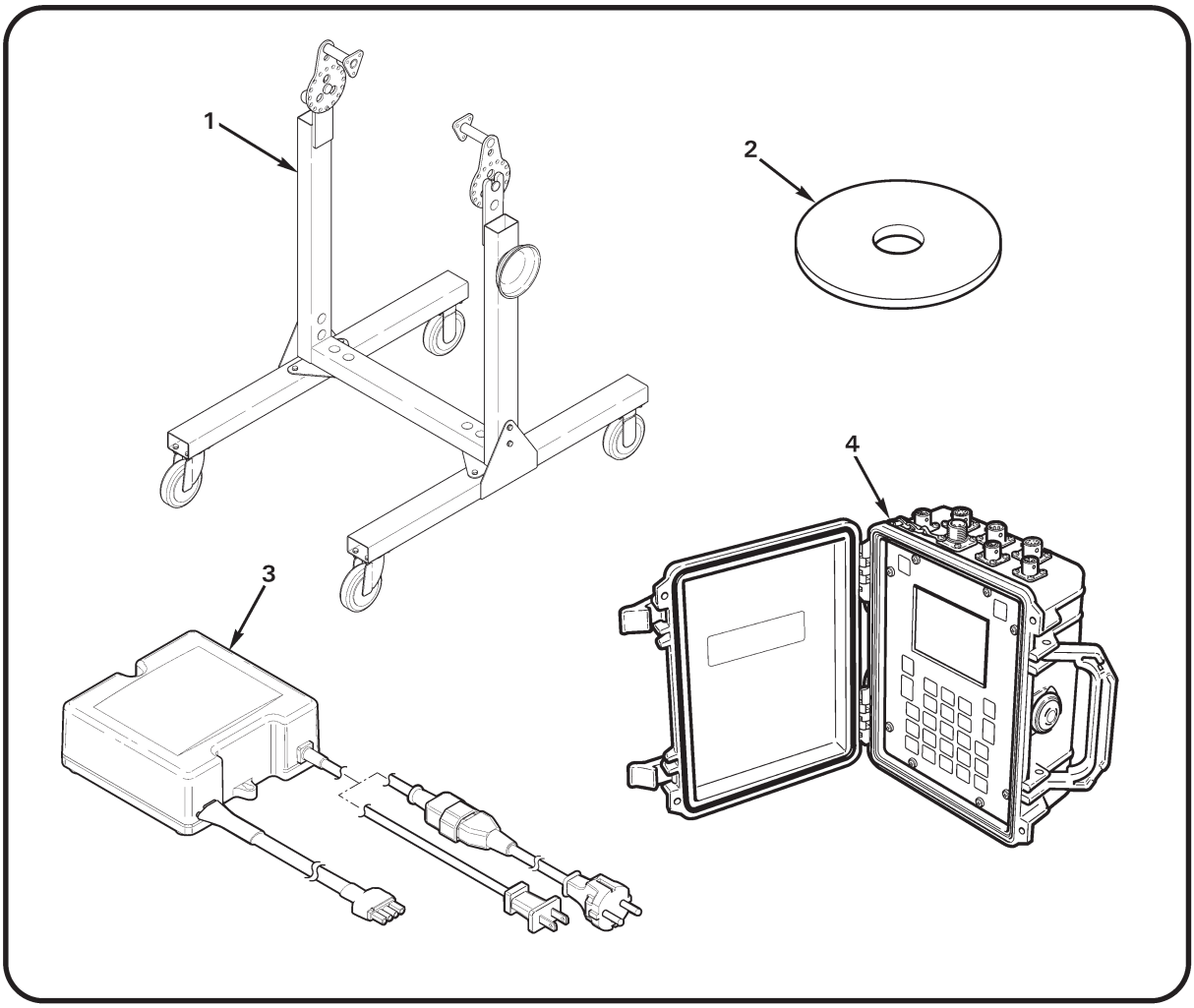

FIGURE 99-6 SPECIAL TOOLS

99-20 Illustrations and Tasks (continued)

Refer to Figure 99-7.

Item	Part Number	Description*
1	R6683	Tow Cart Crate (31 in. x 38 in. x 66.50 in.)
2	R5387	Windshield Box (21.75 in. x 40 in. x 66 in.; cardboard. Holds up to four windshields.)
3	R5352	Main Rotor Blade Crate (21.75 in. x 17 in. x 206.50 in.)
4	R5385	Push-Pull Tube/Tail Rotor Drive Shaft Crate (10.25 in. x 11.50 in. x 192 in.)

* Dimensions are approximate and expressed in inches. Dimensions are provided in height x width x length.

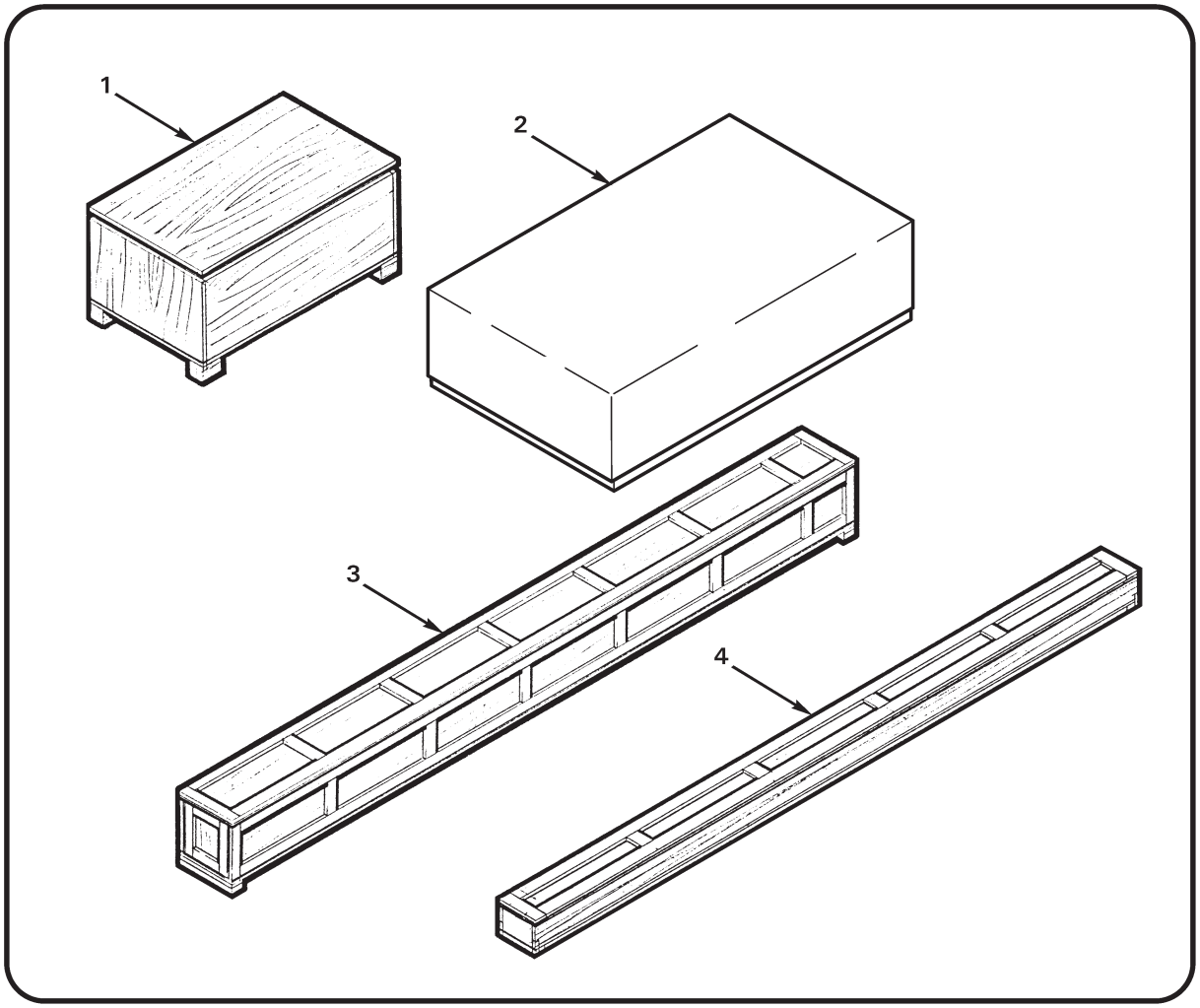

FIGURE 99-7 SHIPPING CRATES

99-20 Illustrations and Tasks (continued)

Refer to Figure 99-8.

Item	Part Number	Description*
1	R5386	Cabin Door Crate (23.75 in. x 34 in. x 60 in.; holds [1] bubble or [2] regular doors)
2	R5388	Tailcone Crate (27.25 in. x 24 in. x 192 in.)
3	R5702	Main Rotor Blade/Tailcone Crate (28 in. x 30 in. x 208 in.)
4	R7982	Main Rotor Gearbox Crate (27 in. x 28.75 in. x 89.50 in.)

* Dimensions are approximate and expressed in inches. Dimensions are provided in height x width x length.

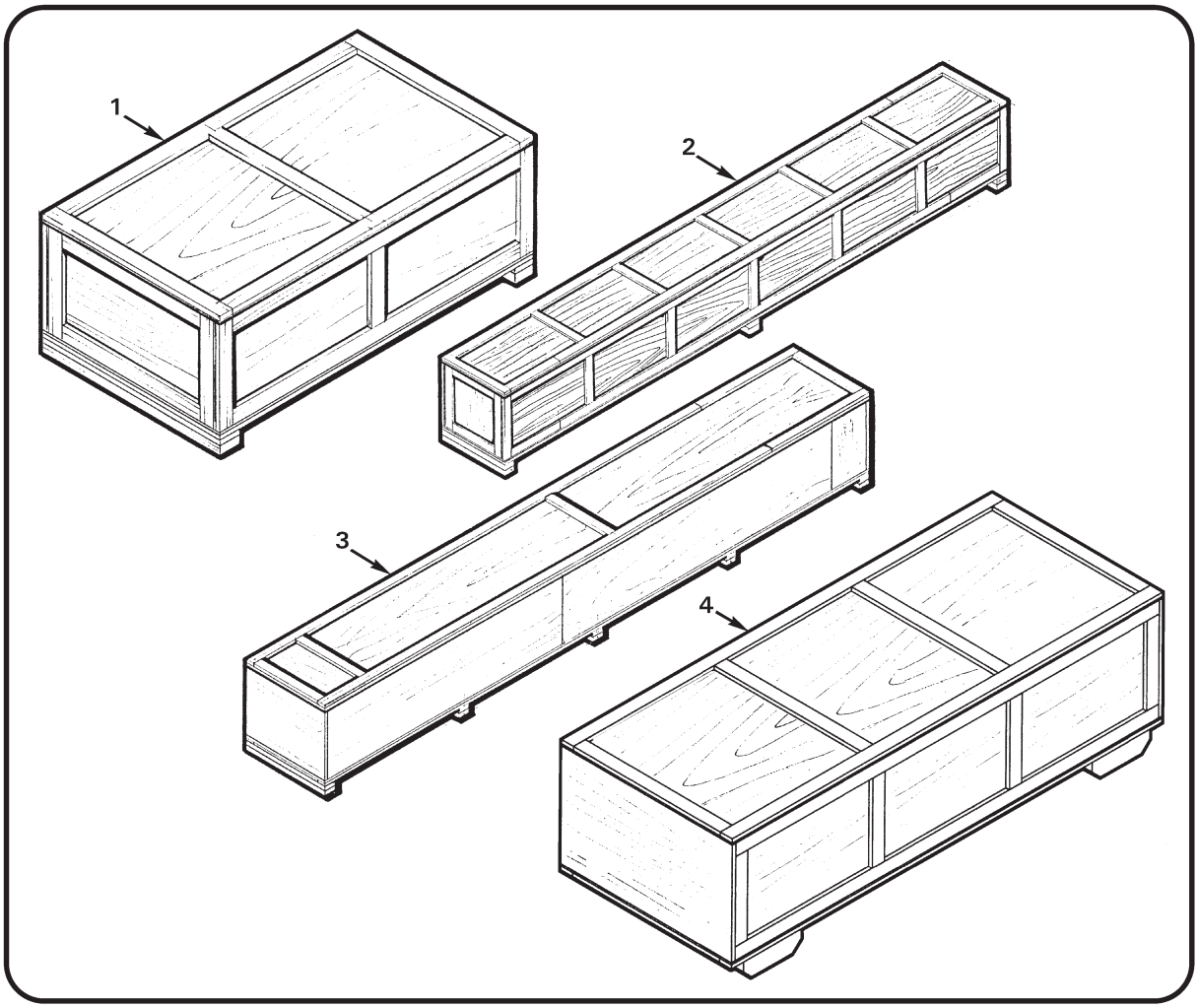

FIGURE 99-8 SHIPPING CRATES

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1.8	MAY 2015	5.7	JUL 2020	5.28B	JUL 2023
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53.13	MAY 2015
53.14	MAY 2015
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53.18	MAY 2021
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63.10	JUL 2020	65.6	MAY 2015	71.6	JUL 2020
63.11	APR 2017	65.7	MAY 2015	71.7	JUL 2023
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92.18	JUL 2020	92.54	JUL 2020	95.21	JUL 2020
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92.23	JUL 2020	92.59	JUL 2020	95.26	APR 2019
92.24	JUL 2020	92.60	JUL 2020	95.27	APR 2019
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92.36	JUL 2020	95.3	APR 2017	96.4B	JUL 2023
92.37	JUL 2020	95.4	APR 2017	96.5	JUL 2023
92.38	JUL 2020	95.5	APR 2017	96.6	JUL 2023
92.39	JUL 2020	95.6	APR 2017	96.7	JUL 2023
92.40	JUL 2020	95.7	APR 2019	96.8	JUL 2023
92.41	JUL 2020	95.8	APR 2019	96.9	APR 2017
92.42	JUL 2020	95.9	APR 2019	96.10	APR 2017
92.43	JUL 2020	95.10	APR 2019	96.11	APR 2017
92.44	JUL 2020	95.11	APR 2017	96.12	APR 2017
92.45	JUL 2020	95.12	APR 2017	96.13	APR 2017
92.46	JUL 2020	95.13	APR 2017	96.14	APR 2017
92.47	JUL 2020	95.14	APR 2017	96.15	APR 2017
92.48	JUL 2020	95.15	APR 2017	96.16	APR 2017
92.49	JUL 2020	95.16	APR 2017	96.17	JUL 2023
92.50	JUL 2020	95.17	APR 2017	96.18	JUL 2023
92.51	JUL 2020	95.18	APR 2017	96.19	JUL 2023

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96.20	JUL 2023	98.2	JUL 2023	98.34	APR 2017
		98.2A	JUL 2020	98.35	APR 2017
97.i	APR 2019	98.2B	JUL 2020	98.36	APR 2017
97.ii	APR 2019	98.3	APR 2017	98.37	APR 2017
97.1	APR 2019	98.4	APR 2017	98.38	APR 2017
97.2	APR 2019	98.5	APR 2017	98.39	APR 2017
97.3	APR 2019	98.6	APR 2017	98.40	APR 2017
97.4	APR 2019	98.7	APR 2017	98.41	APR 2017
97.5	APR 2019	98.8	APR 2017	98.42	APR 2017
97.6	APR 2019	98.9	APR 2017	98.43	APR 2017
97.7	APR 2019	98.10	APR 2017	98.44	APR 2017
97.8	APR 2019	98.11	APR 2017	98.45	JUL 2020
97.9	APR 2019	98.12	APR 2017	98.45A	JUL 2020
97.10	APR 2019	98.13	JUL 2023	98.45B	JUL 2020
97.11	APR 2019	98.14	JUL 2023	98.46	JUL 2020
97.12	APR 2019	98.15	APR 2019	98.47	JUL 2023
97.13	APR 2019	98.16	APR 2019	98.48	JUL 2023
97.14	APR 2019	98.17	APR 2017	98.49	APR 2019
97.15	APR 2019	98.18	APR 2017	98.50	APR 2019
97.16	APR 2019	98.19	APR 2017	98.51	APR 2019
97.17	JUL 2020	98.20	APR 2017	98.52	APR 2019
97.18	JUL 2020	98.21	APR 2017	98.53	APR 2019
97.19	APR 2019	98.22	APR 2017	98.54	APR 2019
97.20	APR 2019	98.23	APR 2017	98.55	APR 2019
97.21	APR 2019	98.24	APR 2017	98.56	APR 2019
97.22	APR 2019	98.24A	JUL 2020	98.57	APR 2019
97.23	APR 2019	98.24B	JUL 2020	98.58	APR 2019
97.24	APR 2019	98.24C	JUL 2020	98.59	APR 2019
97.25	APR 2019	98.24D	JUL 2020	98.60	APR 2019
97.26	APR 2019	98.25	APR 2017	98.61	JUL 2020
97.27	APR 2019	98.26	APR 2017	98.62	JUL 2020
97.28	APR 2019	98.27	APR 2017	98.63	JUL 2023
97.29	APR 2019	98.28	APR 2017	98.64	JUL 2023
97.30	APR 2019	98.29	APR 2017		
		98.30	APR 2017	99.i	APR 2017
98.i	JUL 2023	98.31	APR 2017	99.ii	APR 2017
98.ii	JUL 2023	98.32	APR 2017	99.1	JUL 2023
98.1	JUL 2023	98.33	APR 2017	99.2	JUL 2023

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Page	*Date*
99.3	JUL 2023
99.4	JUL 2023
99.5	JUL 2023
99.6	JUL 2023
99.7	JUL 2023
99.8	JUL 2023
99.9	JUL 2023
99.10	JUL 2023
100.i	MAY 2021
100.ii	MAY 2021
100.1	JUL 2023
100.2	JUL 2023
100.3	JUL 2023
100.4	JUL 2023
100.5	JUL 2023
100.6	JUL 2023
100.7	JUL 2023
100.8	JUL 2023
100.9	JUL 2023
100.10	JUL 2023