ENSTROM HELICOPTER CORPORATION
2209 22nd Street | Menominee, MI 49858
EnstromHelicopter.com | 906.863.1200

March 20, 2025

Enstrom TH-28/480 Series Maintenance Manual

Revision 27 Change Pages

Revision 27, dated 27 Jan 2025, applies to the Enstrom TH-28/480 Series Maintenance Manual, 2001 Edition. Place this cover sheet behind the “Record of Revisions” card after removing and inserting the pages listed below.

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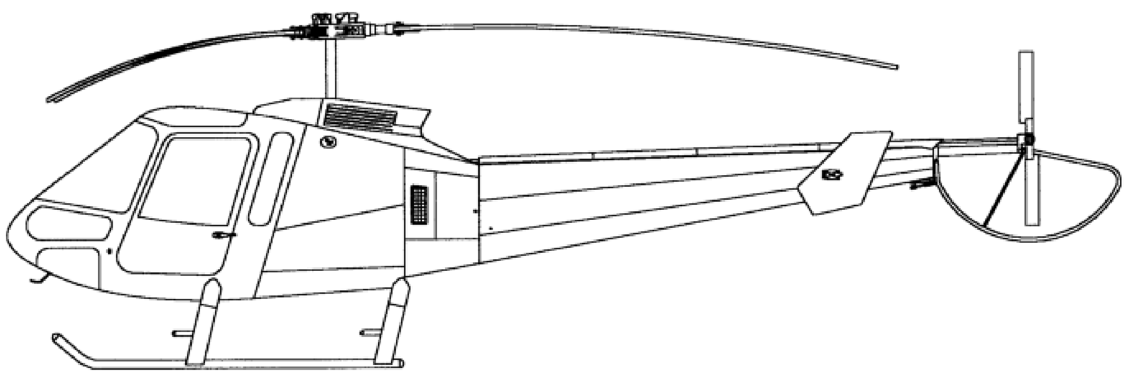

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For EASA approval, this Airworthiness Limitations section is approved and variations must also be approved.

The Enstrom Helicopter Corporation
2209 22nd Street
Menominee, Michigan 49858-3515

Telephone: 906-863-1200
Fax: 906-863-6821
www.enstromhelicopter.com

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RECOMMENDED CHANGE REPORT

This maintenance manual is prepared and distributed by The Enstrom Helicopter Corporation and is intended for use by personnel responsible for maintaining Enstrom TH-28, 480, and 480B helicopters. This manual is periodically revised. If, in the opinion of the user, any information has been omitted or requires clarification, please direct your comments to Enstrom via this form (duplicate of this page), or via the Enstrom Helicopter website, or other similar form.

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Manual Identification: Enstrom TH-28/480 Series Maintenance Manual
Manual Date: February 9, 2001
Revision Number and Date: ______________________
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MM-11-55	Apr 25/13
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MM-11-57	Feb 28/2020
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MM-11-59	Feb 28/2020
MM-11-60	Feb 28/2020
MM-11-61	Jun 25/14
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MM-12-19	Nov 15/10	MM-12-62.4	Feb 28/2020
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SECTION 1

INTRODUCTION

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SECTION 1

INTRODUCTION

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SECTION 1

INTRODUCTION

1-1. Maintenance Manual Arrangement

The maintenance manual sections divide the aircraft into major systems and related subsystems to provide maintenance procedures required for proper system function and optimum component service life. Each section details the following maintenance functions for the associated subsystems and components, if applicable:

General Description
Troubleshooting
Adjustment/Rigging
Removal
Disassembly
Inspections (other than Periodic Inspections)
Repair
Assembly
Installation

1-2. Aircraft Effectivity

The maintenance data presented in this manual is applicable to all TH-28, 480, and 480B model Enstrom helicopters with standard equipment. Optional equipment maintenance procedures are included in the TH-28/480 Series Maintenance Manual for common optional equipment that is installed before aircraft delivery (This does not include avionics installations).

1-3. Maintenance Manual Supplements

Maintenance procedures for optional equipment may be provided in maintenance manual supplements. These supplements are part of the TH-28/480 Series Maintenance Manual when an aircraft is equipped with equipment which requires a maintenance manual supplement. The following equipment supplements are applicable to the TH-28/480 Series Maintenance Manual.

Supplement 1:	Air Conditioning System, P/N 4220176-( ), Revision 8, Dated: May 1/17.
Supplement 2:	Emergency Pop-Out Floats, P/N 4220091-1 and 4220091-3, Revision 3, Dated: Mar 21/16.
Supplement 3:	Gyrocam Dual or Triple Sensor Camera System, Dated: Feb 8/08.
Supplement 4:	Chelton Flightlogic EFIS System, Revision 1, Dated: Nov 9/10.
Supplement 5:	Avionic Systems, Revision 18, Dated: Apr 30/20.
Supplement 6:	Partial Wide Instrument Panel, Dated: Nov 15/10.
Supplement 7:	Bambi Bucket Interface Kit, Dated: Apr 30/13.
Supplement 8:	G1000H Integrated Flight Control System, Revision 2, Dated: Oct 18/19.

1-4. Maintenance Manual Changes and Revisions

Subsequent to the publication of the initial issue of this manual, changes in equipment, support concepts and procedures, as well as information developed by experience may affect the contents of this manual. To ensure that coverage in the manual continues to reflect such changes, revised information is released by one of the following methods:

1. Revision - A revision alters portions of the manual by replacement, addition, and/or removal of pages.

2. Reissue - A reissue of this manual will occur when the amount of changes warrants complete reissue.

3. Service Directive Bulletins - Used to direct the owner/operator and/or maintenance personnel to make mandatory changes, improvements, or inspections to the aircraft applicable to the entire fleet or a segment of the fleet that are typically safety/airworthiness related. The information provided in the Service Directive Bulletins will be incorporated in the maintenance manual as needed at a later date. At the time of incorporation, the Service Directive Bulletin is superseded by the maintenance manual, and accomplishment or sign-off of the Service Directive Bulletin in the maintenance records book is no longer required. A detailed entry should be made in the maintenance records to indicate that the Service Directive Bulletin is superseded by the maintenance manual.

4. Service Information Letters - Used to transmit information, recommendations, and general service instructions to the aircraft owner/operator and/or maintenance personnel applicable to the entire fleet or a segment of the fleet. The information provided in the Service Information Letters will be incorporated into the maintenance manual as needed at a later date.

5. Service Instructions – Used to provide the owner/operator and/or maintenance personnel with information that is applicable to specific aircraft and does not meet the criteria of a Service Information Letter or Service Directive Bulletin. Service Instructions will not be distributed to the entire fleet.

Enstrom distributes maintenance manual revisions and reissues in electronic form via the Enstrom Helicopter website: www.enstromhelicopter.com (follow the applicable link under the Technical Publications section of the Technical Support page). Revision update notices are sent via email to owners and operators who are registered with Enstrom. Registration to receive publication mailing notifications can be coordinated through the Enstrom Technical Publications Administrator. A complete manual hardcopy may be ordered through Enstrom Customer Service.

Service Information Letters and Service Directive Bulletins incorporated into the maintenance manual are logged in the Service Information Letter Index or the Service Directive Bulletin Index (as appropriate) located on the Enstrom Helicopter website: www.enstromhelicopter.com (follow the applicable link under the Technical Publications section of the Technical Support page). Each index numerically lists all Service Information Letters and Service Directive Bulletins, respectively, and identifies those which have been incorporated into the maintenance manual. All Service Information Letters and Service Directive Bulletins are also located under the Technical Publications section of the website.

Notice of recently released Service Information Letters and Service Directive Bulletins is provided via email notification. Registration to receive publication mailing notifications can be coordinated through the Enstrom Technical Publications Administrator.

1-5. Application of Warnings, Cautions, and Notes

Warnings, Cautions, and Notes emphasize important and critical instructions and are used for the following conditions.

WARNING

Calls attention to use of materials, processes, methods, or procedures that must be followed to avoid personal injury or loss of life.

CAUTION

Calls attention to methods and procedures which must be followed to avoid damage to the aircraft or equipment.

NOTE

Calls attention to information essential to highlight for clarification of procedures.

1-6. Definitions and Abbreviations

Table 1-1. List of Definitions

Airframe	Means the fuselage, stabilizers, tailcone, cowlings, fairings, rotors, and landing gear of the helicopter and their accessories and controls.
Annually	With respect to an annual inspection, annually means within the preceding 12 calendar months.
Approved	Unless used with reference to another person, means approved by the FAA or any person to whom the FAA has delegated its authority in the matter concerned, or approved under the provisions of a bilateral agreement between the United States and a foreign country or jurisdiction.
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.
FAR	Means the Federal Aviation Regulations (FARs) prescribed by the Federal Aviation Administration (FAA). The FARs comprise Title 14 of the Code of Federal Regulations (14 CFR).
Life-Limited Component	Any part for which a mandatory replacement limit is specified in the type design, the Instructions for Continued Airworthiness, or the maintenance manual. (Refer to Section 3, *Airworthiness Limitations*, Table 3-1.)

Table 1-2. List of Abbreviations

A/R	As Required
AC	Advisory Circular
AGL	Above Ground Level
ALT	Altitude
APU	Auxiliary Power Unit
ASTM	American Society for Testing and Materials
B.L.	Butt Line
C	Celsius
CAS	Calibrated Airspeed
cc	Cubic centimeter
CCW	Counterclockwise
CFR	Code of Federal Regulations
C.G.	Center of Gravity
C.L.	Center Line
cm	Centimeter
CPC	Corrosion Prevention Compound
°	Degree
EA	Each
EASA	European Union Aviation Safety Agency
EFIS	Electronic Flight Instrument System
EMI	Electromagnetic Interference
F	Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
Fig.	Figure
FIM	Full Indicator Movement
FLT	Flight
FPM	Feet per Minute
FSII	Fuel System Icing Inhibitor
ft	Foot
ft-lb or *ft-lbs*	Foot-Pound (Force)
ft/min	Feet per Minute
FWD	Forward
gal	Gallon
gal/hr	Gallon per Hour
GCU	Generator Control Unit
GW	Gross Weight
hr or hr(s)	Hour(s)
Hz	Hertz (Cycles per Second)

Table 1-2. List of Abbreviations - Continued

I/A/W or *IAW*	In Accordance With
IAS	Indicated Airspeed
I.D.	Inner Diameter
in or ”	Inch
in-lb or *in-lbs*	Inch-Pound (Force)
in Hg	Inches of Mercury
IVSI	Instantaneous Vertical Speed Indicator
Kg	Kilogram
KIAS	Knots Indicated Airspeed
km	Kilometer
KT	Knot
kW	Kilowatt
l or L	Liter
LH	Left Hand
lb	Pound
lb/hr	Pound per Hour
LED	Light Emitting Diode
m	Meter
MAX	Maximum
MB	Millibars
ml or *mL*	Milliliter
MIN	Minimum
MIN	Minute
MM	Maintenance Manual
mm	Millimeter
mv	Millivolt
N_1	Gas Producer Turbine Speed
N_2	Power Turbine Speed
NICAD	Nickel Cadmium
NO.	Number
NM	Nautical Mile
Nm	Newton Meter
N_R	Rotor Speed (measured in RPM)
OAT	Outside Air Temperature
O.D.	Outer Diameter
ORC	Overrunning Clutch
oz	Ounce
P/N	Part Number

Table 1-2. List of Abbreviations - Continued

Para.	Paragraph
pt	Pint
PTO	Power Take-Off
PRESS	Pressure
psi	Pounds per Square Inch
psig	Pounds per Square Inch Gauge
R/S	Right Side
Ref.	Reference
Rev.	Revision
RFI	Radio Frequency Interference
RFM	Rotorcraft Flight Manual
RH	Right Hand
RPM	Revolutions per Minute
S/N	Serial Number
SDB	Service Directive Bulletin
SHP	Shaft Horsepower
SIL	Service Information Letter
STA	Station
sq ft	Square Feet
STC	Supplemental Type Certificate
TEMP	Temperature
TOT	Turbine Outlet Temperature
TRQ	Torque
TT or *T-T*	Tension-Torsion
VDC	Volts, Direct Current
V_H	Velocity Maximum Speed (Level Flying Condition under Maximum Power)
V_{NE}	Velocity Never Exceed (Airspeed Limitation)
WT	Weight
XMSN	Transmission

SECTION 2

GENERAL INFORMATION

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SECTION 2

GENERAL INFORMATION

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2-13. Flight Controls

A. The flight controls include three primary systems: the collective, cyclic, and anti-torque/directional controls. The flight control systems are not hydraulically boosted. The aircraft also has fixed horizontal and vertical stabilizers mounted on the tailcone to provide additional stability and attitude control during high speed flight.

2-14. Power Train (Figure 2-3)

A. The power train includes the main rotor transmission, upper pulley, "H" - strut, drive belt, lower pulley, lower pulley drive shaft, overrunning clutch, power output drive shaft, short tail rotor drive shaft, long tail rotor drive shaft, and the tail rotor gearbox.

2-15. Main Rotor Assembly

A. The main rotor assembly is a three bladed, high inertia, fully articulated rotor system.

2-16. Tail Rotor Assembly

A. The tail rotor assembly is a two bladed, wide cord, teetering, delta hinged rotor assembly.

2-17. Heating and Ventilation

A. Cabin ventilation is provided by pop-out vents, sliding vent windows, or an optional ram air ventilation system. Cabin heating and windshield defrosting can be provided by an optional bleed air type system. Air conditioning can be provided by an optional air conditioner installation. Refer to the TH-28/480 Series Maintenance Manual Supplement 1 for air conditioning maintenance procedures.

2-18. Operating Limitations and Restrictions

A. Refer to the TH-28, 480, or 480B Rotorcraft Flight Manual for the aircraft operating limitations and restrictions.

1. If available, refer to the applicable rotorcraft flight manual supplement for aircraft operating limitations and restrictions if the aircraft is equipped with an installation configuration or equipment option not covered by the basic rotorcraft flight manual.

a. A listing of available rotorcraft flight manual supplements can be found on the Enstrom Helicopter website. Navigate to the *SUPPORT* drop-down menu at the top of the web page, locate the *Technical Publications* information, and select link, *Enstrom Optional Equipment Supplement Publications Status.*

2-19. Placards

A. Refer to the TH-28, 480, or 480B Rotorcraft Flight Manual or relevant rotorcraft flight manual supplement for the required placards.

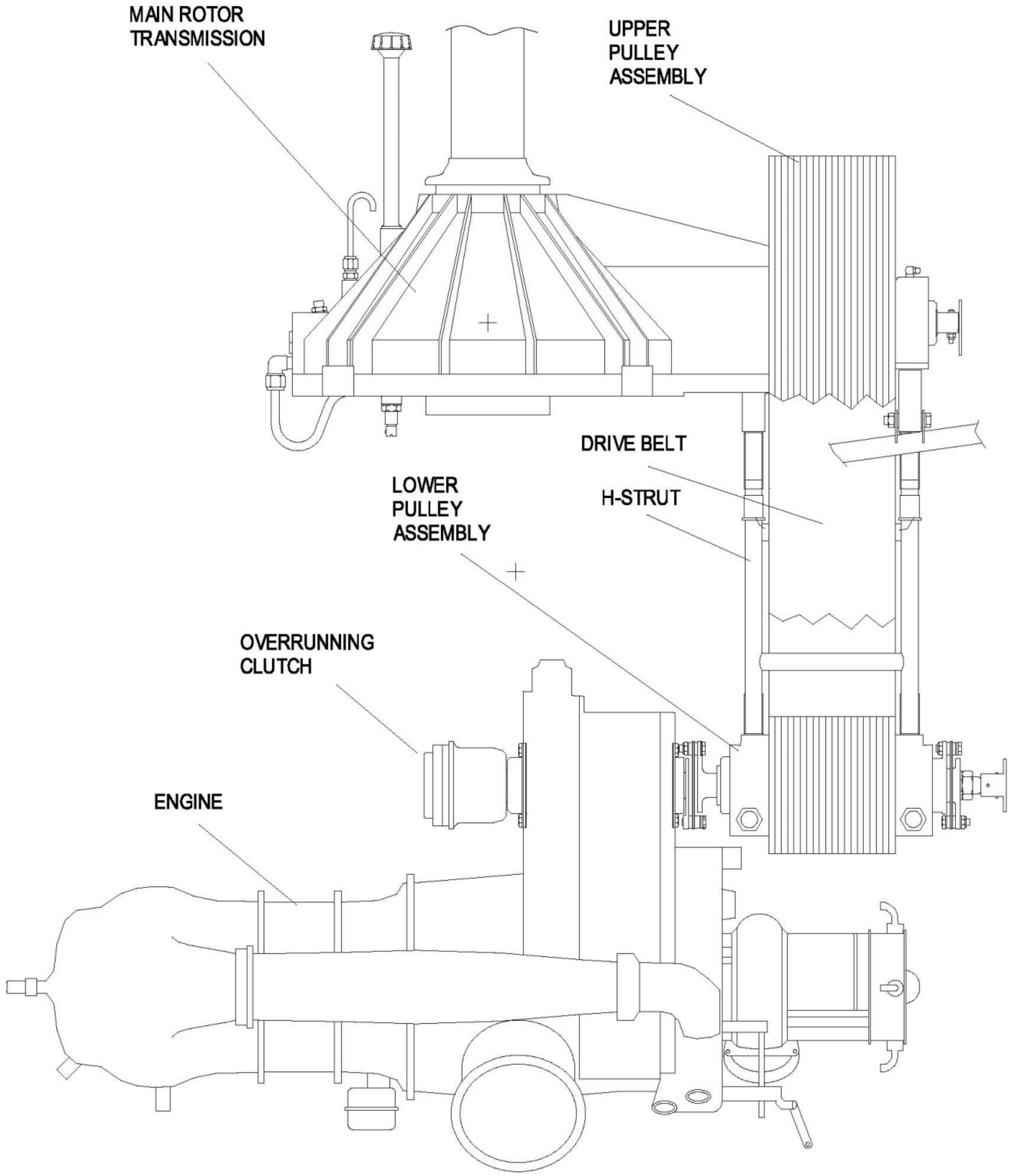

Figure 2-3. Power Train (Simplified)

2-20. Vendor Information

A. The following components listed in Table 2-2 are to be maintained I/A/W the manufacturer's instructions to ensure the continued airworthiness of the aircraft.

B. The owner/operator is responsible for ensuring that current maintenance publications are available to ensure continued airworthiness of the aircraft.

Table 2-2. Vendor Contact Information

Component	Part Number	Manufacturer
Engine	250-C20W	Rolls-Royce 450 S. Meridian Street Indianapolis, IN 46206 Tel: (317) 230-2000 http://www.rolls-royce.com/
Starter/Generator	524-080	Thales Avionics Inc. (Auxilec) 140 Centennial Avenue Piscataway Township, NJ 08854 Tel: (732) 494-6300 https://customeronline.thalesgroup.com/en
Starter/Generator	150SG117Q-3-1 150SG117Q-4-1	Skurka Aerospace, Inc. 4600 Calle Bolero Camarillo, CA 93011 Tel: (805) 484-8884 http://www.skurka-aero.com/
Generator Control Unit (GCU)	VR1528-11B	Thales Avionics Inc. (Auxilec) 140 Centennial Avenue Piscataway Township, NJ 08854 Tel: (732) 494-6300 https://customeronline.thalesgroup.com/en
Generator Control Unit (GCU)	GCSG501-2	Avionic Instruments, LLC 1414 Randolph Avenue Avenel, NJ 07001 Tel: (732) 388-3500 http://www.avionicinstruments.com/
Battery[(1)]	TSP-1728-20-17SP100	Marathon Power Technologies P.O. Box 8233 Waco, TX 76712-8233 Tel: (254) 776-0650 http://www.mptc.com/
Battery[(2)]	G-641	Teledyne Battery Products (Gill Batteries) 840 West Brockton Avenue Redlands, CA 92374 Tel: (800) 456-0070 Tel: (909) 793-3131 http://www.gillbatteries.com/
Fuel Cells (Standard)	4122052-“X”	Floats & Fuel Cells, Inc. 4010 Pilot Drive, Suite 103 Memphis, TN 38118 Tel: (800) 647-6148 https://www.ffcfuelcells.com)

Table 2-2. Vendor Contact Information

Component	Part Number	Manufacturer
Fuel Cells (Standard)	4122052-“X”	United Fuel Cells Corporation 853 Adams Road Eagle River, WI 54521 Tel: (715) 479-6149 https://unitedfuelcells.com/contact/
Fuel Cells	4122009-“X”	Zodiac Aerazur Caudebec 4, rue Lesage-Maille Caudebec 76320, France Tel: +33 (1) 6486-6922 http://www.zodiacaerospace.com/en/zodiac-aerosafety-systems-elastomer
Fuel Cell Crossover	500123	
Vent Crossover	500122	Zodiac Aerazur Caudebec 4, rue Lesage-Maille Caudebec 76320, France Tel: +33 (1) 6486-6922 http://www.zodiacaerospace.com/en/zodiac-aerosafety-systems-elastomer
Tension-Torsion (TT Strap) (STC SR03465CH)	AA-ECD-084-480	Airwolf Aerospace LLC 15369 Madison Rd. Middlefield, OH 44062-8404, U.S.A. Tel: (440) 632-1687 / Fax: (440) 632-1685 www.airwolfaerospace.com / info@airwolfaerospace.com
Cargo Hook (option)	2A20B-17149-2	Breeze-Eastern Corporation 35 Melanie Lane Whippany NJ, 07981 U.S.A. (800) 929-1919 / (973) 602-1083 / (973) 602-1090 Fax: (973) 739-9344 customerserives@breeze-eastern.com www.breeze-eastern.com
	528-023-01	Onboard Systems International, Inc. 13915 NW 3rd Court Vancouver, WA 98685 U.S.A. Tel: (800) 275-0883 / (360) 546-3072 Fax: (360) 546-3073 www.onboardsystems.com

Notes:

1. This is the standard battery for the TH-28 and 480. Refer to the correct publication if an optional or special battery is installed.
2. This is the standard battery for the 480B. Refer to the correct publication if an optional or special battery is installed.

Table 2-3. Special Tools

Part Number	Nomenclature
T-0203-1	Seal Puller Assembly
T-1575	Swashplate Centering Tool
T-1656-3	Main Rotor Blade Plug Tool
T-1709	Guidetube Bearing Collar Tool
T-1758	Guidetube Clamps
T-2889	Tail Rotor Transmission Rigging Tool
T-2893	Tail Rotor Needle Teeter Bearing Removal/Installation Tool Kit
T-2896-1	Damper Bleeding/Servicing Tool (2 Required)
RBT18560[(2)]	Seal Removal Tool (Double Lip Seal)
([1])	Engine Stand
([1])	Main Rotor Transmission Stand
([1])	Main Rotor Hub Stand

Notes:

1. Contact the Enstrom Helicopter Product Support for assistance in obtaining these tools.
2. Available from Dart Helicopter Services

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2-22. Torque Data

A. Unless specified in Table 2-4 and/or in this manual's maintenance procedures or as called out in the component manufacturer's specifications, all hardware should be torqued to the recommended torque values listed in Tables 2-5 through 2-14.

NOTE

The following table does not contain all of the special torque values found in this maintenance manual.

Table 2-4. Special Torque Values

	Location	Torque Value
1.	**Airframe**	
	a. Tailcone Attachment Bolts	240 in-lb/27.3 Nm
	b. Landing Gear Oleo Pivot Points (all)	([1])
	b. Landing Gear Leg/Drag Strut Pivot Points (all)	40-60 in-lb/4.5-6.8 Nm
2.	**Flight Controls**	
	a. Dogleg to Lower Swashplate Nut	40-60 in-lb/4.5-6.8 Nm
	b. Dogleg to Push/Pull Rod Nut	130-140 in-lb/14.7-15.8 Nm
	c. Upper Swashplate Guidetube Nuts	240 in-lb/27.3 Nm
3.	**Main Rotor Transmission**	
	a. Mast Nut	450 ft-lb/613.6 Nm
	b. Attachment Bolt Nuts	240 in-lb/27.3 Nm
	c. Pinion Nut	250 ft-lb/340.9 Nm
	d. Tail Rotor Coupling Bolt	100-140 in-lb/11.3-15.8 Nm
	e. Magnetic Pick-up	60-65 in-lb/6.8-7.3 Nm
4.	**Main Rotor Hub**	
	a. Blade Attachment Nut	50 ft-lb/68.2 Nm
	b. Damper Pivot Nut	190 in-lb/21.6 Nm
	c. Drag Link Nut	140 in-lb/15.8 Nm
	d. Flapping Bearing Reservoir Cap	10-20 in-lb/1.1-2.3 Nm
	e. Flapping Pin Nut	150-175 ft-lb/204.5-238.6 Nm
	f. Lamiflex Bearing Retention Nut	5-15 in-lb/0.6-1.7 Nm
	g. Lower U-block Nut	50 ft-lb/67.8 Nm
5.	**Tail Rotor**	
	a. Assembly Retention Bolt	300 in-lb/34.1 Nm
	b. Blade Grip Bolts[2]	75 in-lb/8.5 Nm
	c. Driveshaft Taper Pins	25 in-lb/2.8 Nm
	d. Pitch Change Plate to Grip Attachment Bolts	50-70 in-lb/5.7-8.0 Nm
	e. Thrust Bearing Retention Nut	80-90 ft-lb/109.1-122.7 Nm

1 Inch-Pound = 0.113 Newton Meter
1 Newton Meter = 8.851 Inch-Pound
1 Foot-Pound = 1.3558 Newton Meter
1 Newton Meter = 0.7376 Foot-Pound

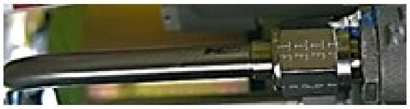
[1] Refer to (para. 8-70.A).
[2] Torque for oversize bolts: 140 in-lbs/15.8 Nm maximum.

Table 2-5. Torque Values for Nuts and Bolts

CAUTION THE FOLLOWING TORQUE VALUES ARE DERIVED FROM OIL FREE CADMIUM PLATED THREADS.				
	TORQUE LIMITS RECOMMENDED FOR INSTALLATION (BOLTS LOADED PRIMARILY IN SHEAR) (inch-pounds)		MAXIMUM ALLOWABLE TIGHTENING TORQUE LIMITS (inch-pounds)	
Thread Size	Tension type nuts MS20365 and AN310 (40,000 psi in bolts)	Shear type nuts MS20364 and AN320 (24,000 psi in bolts)	Nuts MS20365 and AN310 (90,000 psi in bolts)	Nuts MS20364 and AN320 (54,000 psi in bolts)
FINE THREAD SERIES				
8-36	12-15	7-9	20	12
10-32	20-25	12-15	40	25
1/4-28	50-70	30-40	100	60
5/16-24	100-140	60-85	225	140
3/8-24	160-190	95-110	390	240
7/16-20	450-500	270-300	840	500
1/2-20	480-690	290-410	1100	660
9/16-18	800-1000	480-600	1600	960
5/8-18	1100-1300	600-780	2400	1400
3/4-16	2300-2500	1300-1500	5000	3000
7/8-14	2500-3000	1500-1800	7000	4200
1-14	3700-5500	2200-3300*	10,000	6000
1-1/8-12	5000-7000	3000-4200*	15,000	9000
1-1/4-12	9000-11,000	5400-6600*	25,000	15,000
COARSE THREAD SERIES				
8-32	12-15	7-9	20	12
10-24	20-25	12-15	35	21
1/4-20	40-50	25-30	75	45
5/16-18	80-90	48-55	160	100
3/8-16	160-185	95-100	275	170
7/16-14	235-255	140-155	475	280
1/2-13	400-480	240-290	880	520
9/16-12	500-700	300-420	1100	650
5/8-11	700-900	420-540	1500	900
3/4-10	1150-1600	700-950	2500	1500
7/8-9	2200-3000	1300-1800	4600	2700
The above torque values may be used for all cadmium-plated steel nuts of the fine or coarse thread series which have approximately equal number of threads and equal face bearing areas. * Estimated corresponding values.				

Table 2-6. Fittings, Tubing


Aluminum Alloy Tubing


Steel Tubing

Fitting Size	Tubing OD (inches)	6061-O & 5052-O Aluminum-Alloy Tube: Fitting or Nut Torque (in-lb)	Steel Tube: Fitting or Nut Torque (in-lb)
-2	1/8	20-30	75-85
-3	3/16	25-35	95-105
-4	1/4	50-65	135-150
-5	5/16	70-90	170-200
-6	3/8	110-130	270-300
-8	1/2	230-260	450-500
-10	5/8	330-360	650-700
-12	3/4	460-500	900-1000

Table 2-12. Crush Type Gaskets

NOTE

Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.

Thread Pitch On Part to be Tightened (Threads per Inch)	Angle of Turn	
	Aluminum	Copper
8	135°	67°
10	135°	67°
12	180°	90°
14	180°	90°
16	270°	135°
18	270°	135°
20	270°	135°
24	360°	180°
28	360°	180°

Table 2-13. Minimum Prevailing Torque Values for Re-used Self-Locking Nuts

Bolt, or Screw Thread Size (inches)	Seating Torque (in-lb ±10%)	Prevailing Torque Max. On or Off (in-lb)	Prevailing Torque Min. On or Off (in-lb)
4-40	8	5	0.5
6-32	15	8	1.0
8-32	28	12	1.5
AN3	45	18	2.0
AN4	110	40	3.0
AN5	190	85	5.0
AN6	345	110	9.0
AN7	545	150	12.0
AN8	850	220	16.0

If not listed in Table 2-13, a self-locking nut can be reused as long as a wrench is required to turn it on the bolt.

Table 2-14 Brass Bolts

Bolt Thread Size (Inch)	Coarse Thread	Bolt Thread Size (Inch)	Fine Thread
2-56	2 in-lb	2-64	2.5 in-lb
4-40	4.3 in-lb	4-48	5.4 in-lb
5-40	6.3 in-lb	5-44	7.7 in-lb
6-32	7.9 in-lb	6-40	9.9 in-lb
8-32	16.2 in-lb	8-36	18.0 in-lb
10-24	18.6 in-lb	10-32	25.9 in-lb
1/4”-20	61.5 in-lb	1/4"-28	77 in-lb
5/16”-18	107 in-lb	5/16”-24	116 in-lb
3/8”-16	16.0 ft-lb	3/8”-24	17.7 ft-lb
7/16”-14	26.4 ft-lb	7/16”-20	27.3 ft-lb
1/2”-13	35.2 ft-lb	1/2"-20	37 ft-lb
5/8”-11	76 ft-lb	5/8”-18	85 ft-lb
3/4”-10	104 ft-lb	3/4”-16	102 ft-lb
7/8”-9	159 ft-lb	7/8”-14	158 ft-lb
1”-8	235 ft-lb	1”-14	212 ft-lb

2-23. Consumable Parts List

A. Table 2-15 lists the consumable parts and lubricants that are normally used during servicing or periodic inspection of the aircraft. The quantities listed reflect normal inspection intervals; however, they may need to be adjusted if adverse operating conditions require more frequent servicing or inspections.

B. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2) and the Rolls-Royce 250-C20 Series Illustrated Parts Catalog (10W4) for the consumable parts required for servicing or periodic inspection of the engine.

NOTE

Obtain engine parts through the Rolls-Royce Parts Distribution System. Enstrom does not stock engine parts for customer service use.

Table 2-15. Consumable Parts List

Interval	Item		Part Number (Notes 1, 2)	Quantity
50 Hour (Note 3)	1.	Grease	C008, C011	As Required
	2.	Silicon Oil	C007	As Required
	3.	Oil	C009	As Required
	4.	Oil	C005	As Required
	5.	O-ring	NAS1612-2	7 EA (Note 4)
100 Hour (Note 5)	1.	Same as 50 hour requirements	--	--
	2.	Crush Washer	AN900-8 or MS35769-9	1 EA
	3.	Crush Washer	AN900-10 or MS35769-11	1 EA
	4.	Oil Filter	HP-1003	1 EA
	5.	Oil (engine)	C004, C005	6 QT (US)
	6.	Oil	C006	7 PT (US)
	7.	Oil (TRGB)	C006	5 FL OZ (US)
	8.	O-ring	NAS1612-2	2 EA (Note 4)
	9.	O-ring	NAS1612-8	4 EA (Note 4)
	10.	O-ring	MS28778-6	1 EA (Notes 4, 6)
200 Hour (Note 5)	1.	Same as 100 hour requirements	--	--
	2.	Filter Element – APM	AC-B283F-107	1 EA
	3.	O-ring – APM	M83248/1-138	1 EA
	4.	Filter Element – Purolator/Facet	038088-08	1 EA
	5.	Seal Kit – Purolator/Facet	1741125	1 EA
	6.	O-ring	NAS1612-2	3 EA (Note 4)
	7.	Oil (ORC)	C004, C005	7 FL OZ (US)
300 Hour (Note 5)	1.	Same as 100 hour requirements	--	--
	2.	Fuel Filter Kit	1743645-02	1 EA (Note 7)
	3.	Gasket	28-13107-15	1 EA (Note 4)

NOTES:

1. Verify configuration, part number, and quantity with latest revision of illustrated parts catalog, service letters, and service bulletins as required.
2. Refer to Table 4-1 for C-00# index listing.
3. Service only.
4. Replace on condition.
5. Service and inspection.
6. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2) for engine oil change requirements.
7. The external fuel filter is optional equipment and might not be installed on the aircraft.

2-24. Taper Pin Size Chart

Table 2-16 lists information pertaining to taper pin part numbers and physical properties.

NOTES

Always check the condition and security of taper pins at every inspection.

The dash number of the 28-16323 series taper pins is vibro-etched on the head of the taper pin.

Table 2-16. Taper Pin List

Old Enstrom P/N	Current Enstrom P/N	Head Diameter	Grip Length
AN386-2-7A [1]	AN386-2-7A [1]	0.296 in / 7.5 mm	1.00 in / 25.4 mm
AN386-2-8A [1]	AN386-2-8A [1]	0.302 in / 7.6 mm	1.12 in / 28.4 mm
AN386-2-9A [1]	AN386-2-9A [1]	0.308 in / 7.8 mm	1.26 in / 32 mm
28-13600-3 [2]	28-13623-25 [2]	0.302 in / 7.6 mm	1.00 in / 25.4 mm
28-13600-4 [2]	28-13623-27 [2]	0.307 in / 7.7 mm	1.00 in / 25.4 mm
28-13600-5 [2]	28-13623-29 [2]	0.314 in / 7.9 mm	1.00 in / 25.4 mm
NA	28-13623-31 [2]	0.316 in / 8 mm	1.00 in / 25.4 mm
28-13600-7 [3]	28-13623-13 [3]	0.310 in / 7.8 mm	1.12 in / 28.4 mm
28-13600-8 [3]	28-13623-17 [3]	0.318 in / 8 mm	1.12 in / 28.4 mm
NA	28-13623-15 [3]	0.315 in / 8 mm	1.12 in / 28.4 mm
28-13600-6 [3]	28-13623-11 [3]	0.305 in / 7.7 mm	1.12 in / 28.4 mm

[1] Standard
[2] Tail Rotor Transmission
[3] Main Rotor Transmission

SECTION 3

AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For EASA approval, this Airworthiness Limitations section is approved, and variations must also be approved.

FAA APPROVED BY Joseph H McGarvey DATE 4-30-01

for MANAGER
CHICAGO AIRCRAFT CERTIFICATION OFFICE
CENTRAL REGION
FEDERAL AVIATION ADMINISTRATION

SECTION 3
LOG OF REVISIONS

Rev. Num.	Rev. Date	Pages Affected	Approval Date	FAA Approved
1	Oct 10/03	MM-3-2, MM-3-40, MM-3-41	Oct 28/03	Joe McGarvey
2	Jun 2/04	MM-3-2, MM-3-5, MM-3-13, MM-3-14, MM-3-40	Sep 8/04	Joe McGarvey
3	Oct 13/04	MM-3-2, MM-3-11 thru MM-3-18, MM-3-40	Nov 09/04	Gregory Michalik
4	Mar 15/05	MM-3-2, MM-3-8, MM-3-33, and MM-3-40	Mar 25/05	Gregory Michalik
5	Aug 4/06	MM-3-2, MM-3-7, MM-3-8, MM3-31 thru MM-3-36	Aug 30/06	Shawn Malekpour
6	Apr 16/07	MM-3-2, MM-3-15 thru MM-3-18, MM-3-31 thru MM-3-36, MM-3-39 thru MM-3-42	Apr 24/07	Shawn Malekpour
7	Feb 20/08	MM3-1 through MM-3-8	Oct 2/08	Gregory Michalik
8	N/A	None	N/A	N/A
9	Dec 12/08	MM-3-7 through MM-3-8	Mar 3/09	Gregory Michalik
10	N/A	None	N/A	N/A
11	Dec 21/09	MM-3-1, MM-3-2, MM-3-5 thru MM-3-8	Jan 6/10	Gregory Michalik
12	N/A	None	N/A	N/A
13	N/A	None	N/A	N/A
14	N/A	None	N/A	N/A
15	N/A	None	N/A	N/A
16	N/A	None	N/A	N/A
17	Jun 24/11	MM-3-6	Jul 15/11	Gregory Michalik
18	N/A	None	N/A	N/A
19	Dec 10/12	MM-3-6	Jan 10/13	Gregory Michalik
20	Apr 25/13	MM-3-1, MM-3-2, MM-3-6, MM-3-7	May 9/13	Gregory Michalik
21	Apr 30/14	None	N/A	N/A
22	Jun 25/14	None	N/A	N/A
23	Jul 3/15	None	N/A	N/A
24	Dec 4/15	MM-3-2 through MM-3-10	Dec 15/15	Gregory Michalik
25	Aug 22/16	MM-3-2, MM-3-3	Aug 26/16	Gregory Michalik
26	Feb 28/20	None	N/A	N/A
27	27 Jan 2025	MM-3-1 through MM-3-3, MM-3-5, MM-3-9	25 Feb 2025	Boubacar Felix T. Diakhite

SECTION 3
EASA LOG OF REVISIONS

Rev. Number	Date	EASA Approved
1	May 29/05	2005-4678
2	May 29/05	2005-4678
3	May 29/05	2005-4678
4	Sep 16/10	EASA 10031817
5	Sep 16/10	EASA 10031817
6	Sep 16/10	EASA 10031817
7	Sep 16/10	EASA 10031817
8	N/A	N/A
9	Sep 16/10	EASA 10031817
10	N/A	N/A
11	Mar 9/11	EASA 10033495, Rev. 1
12	N/A	N/A
13	N/A	N/A
14	N/A	N/A
15	N/A	N/A
16	N/A	N/A
17	May 8/14	EASA 10044744
18	N/A	N/A
19	Apr 1/14	FAA/EASA T.I.P.,FAA Approved on Behalf of EASA by G. Michalik*
20	Apr 1/14	FAA/EASA T.I.P.,FAA Approved on Behalf of EASA by G. Michalik*
21	May 24/17	EASA 10061805
22	N/A	N/A
23	N/A	N/A
24	Jun 22/17	FAA/EASA T.I.P.,FAA Approved on Behalf of EASA by M. Javed♦
25	N/A	N/A
26	N/A	N/A
27	25 Feb 2025	FAA/EASA T.I.P.▼

* T.I.P., Rev. 3 dated April 23, 2013, Section 3.2.11
♦ T.I.P., Rev. 5 dated September 15, 2015, Section 3.2.11
▼T.I.P., Rev. 7 dated October 19, 2023, Sections 3.3 and 3.5.12.4

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SECTION 3

AIRWORTHINESS LIMITATIONS

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Table 3-2. Mandatory Inspection Items

PART NUMBER	COMPONENT	INSPECTION CYCLE (Hours)		
		TH-28	480	480B
4130060 (All dash numbers)	Main Rotor Transmission	Not Applicable	Not Applicable	600*

* Temporary restriction pending data analysis from the component tear-down inspections. Components must be returned to Enstrom Helicopter Corporation for the tear-down inspection **or** field-inspected in accordance with Service Information Letter (SIL) T-064.

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SECTION 4

SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS, AND GENERAL MAINTENANCE

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SECTION 4

SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS, AND GENERAL MAINTENANCE

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SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS, AND GENERAL MAINTENANCE

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SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS, AND GENERAL MAINTENANCE

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SECTION 4

SERVICING, RECOMMENDED OVERHAUL CYCLES, INSPECTIONS, AND GENERAL MAINTENANCE

4-1. Servicing

4-2. Description - Servicing

Servicing of the TH-28 and 480/B is normally accomplished at specified hourly intervals. Operators should take into consideration the environmental conditions and determine whether more frequent servicing intervals are necessary. Refer to Tables 4-1 and 4-2 and Figure 4-1 for approved fuels, oils, lubricants, intervals, and locations.

Table 4-1. Index – Fuels, Lubricants, Specifications

NOTE

Refer to Table 4-2 for system capacities and approved product codes.

Code	Nomenclature	Specification	Commercial Description	Notes
C001	Fuel, kerosene	ASTM D1655	Grade Jet A	(1)
		ASTM D1655	Grade Jet A-1	
		ASTM D6615	Grade Jet B	
		MIL-DTL-5624	Grade JP-4	
		MIL-DTL-5624	Grade JP-5	
		MIL-DTL-83133	Grade JP-8	
C004	Lubricating oil, turbine engine, synthetic base	MIL-PRF-7808	American PQ Lubricant 689 Brayco 880 Eastman Chemical ETO 2389 Exxon Turbo Oil 2389 Mobil Avrex S Turbo 256 Mobil RM-201A Mobil RM-184A Stauffer Jet I	(2, 3)
C005	Lubricating oil, turbine engine, synthetic base	MIL-PRF-23699	Aeroshell Turbine Oil 500 Royco Turbine Oil 500 American PQ Lubricant 6700 BPTO 2380 Caltex RPM Jet Engine Oil 5 Castrol 5050 Chevron Jet Engine Oil 5 Eastman Chemical ETO 2380 ExxonMobil MJO II Mobil Jet Oil II Stauffer Jet II (Castrol 205) Turbonycoil 600 Mobil Jet Oil 254 and Mobil Jet Oil 291 (HTS Oil) Royco 560 (HTS Oil) Aeroshell Turbine Oil 560 (HTS Oil) Eastman Chemical ETO 2197 BPTO 2197	(2, 3)

Table 4-1. Index – Fuels, Lubricants, Specifications - continued

Code	Nomenclature	Specification	Commercial Description	Notes
C006	Lubricant, gear	MIL-PRF-2105/API GL-5	Mobil 1 Synthetic Gear Lubricant LS 75W-90 Mobil Delvac 1 Synthetic Gear Oil 75W-90 Mobilube HD LS 80W-90 Mobilube HD Plus 80W-90 Shell Helix Racing Gear Oil 75W-90 Shell Spirax HD 80W90 Castrol Syntrax Limited Slip 75W-90 (Syntec Gear Oil)	(4)
C007	Lubricant	Silicone Oil/Fluid	SF96-20 L-45	(5)
C008	Grease, general purpose	MIL-PRF-81322	Royco 22CF Aeroshell 22 Aeroshell 22CF	(6)
C009	Engine oil			(7)
C010	Hydraulic fluid	MIL-PRF-5606	Aeroshell Fluid 41	
C011	Grease	MIL-G-25537	Aeroshell Grease 14	
C012	Fuel system icing inhibitor	MIL-DTL-85470	Prist Hi-Flash Hi-Flo	(1)
C013	Corrosion prevention compound	MIL-PRF-81309, Type II or III	ACF-50 Corrosion X Aviation	

NOTES

1. At ambient temperatures below 4°C (40°F), all fuels used shall contain fuel system icing inhibitor (FSII) additive (C012) conforming to MIL-DTL-85470. The FSII additive shall be added to all commercial fuel not already containing a FSII additive during refueling operations. Refueling operations shall be accomplished in accordance with accepted commercial procedures. Refer also to the 480B Rotorcraft Flight Manual and the Rolls-Royce M250-C20 Series Operation and Maintenance Manual (10W2) for FSII additive requirements.

   WARNING: ENGINE FLAMEOUT COULD RESULT FROM FAILURE TO USE ANTI-ICE PROTECTION AT AMBIENT TEMPERATURES BELOW 4°C (40°F).

2. CAUTION: REFER TO THE ROLLS-ROYCE M250-C20 SERIES OPERATION AND MAINTENANCE MANUAL (10W2) FOR INFORMATION CONCERNING USE AND MIXING OF APPROVED TURBINE ENGINE OILS IN THE ROLLS-ROYCE M250-C20W ENGINE.
3. Reference Special Airworthiness Information Bulletin (SAIB) NE-14-30 regarding former BP products.
4. Mobil Delvac 1 75W-90 supersedes former products Mobil Delvac 75W-90 and Mobil SHC 75W-90.
5. SF96-20 replaces L-45. Oils may be mixed.
6. Enstrom advises against using Mobilgrease 28.
7. Any grade internal combustion engine motor oil.

Table 4-2. Servicing Intervals, Methods, and Locations

System	Location	Consumable Identification	Frequency (hr) 25	50	100	Other	As Required	Capacity	Method
Fuel, Standard (P/N 4122052)	1	C001					X	91.7 gal (US) (90.0 gal (US) usable) 347.08 L (340.65 L usable) (Note 1)	
Fuel, Aerazur (P/N 4122009)	1	C001					X	90.0 gal (US) (89.7 gal (US) usable) 340.65 L (339.51 L usable) (Note 1)	
Engine Oil	2	C004 (Note 2) C005 (Note 2)			X		X	6.0 qt (US) 5.7 L	Oil can
Overrunning Clutch	3	C004 C005	X (3) (4)			X (3) (4)	X	3.8 fl oz (US) 110 mL	Oil can Syringe
Overrunning Clutch with Vented Clutch Oil Reservoir	3	C004 C005	X (5)			X (5)	X	6.5 fl oz (US) 192 mL	Oil can Syringe
Main Rotor Transmission	4	C006			X		X	6 pt (US) 2.8 L (dry) / 5.5 pt (US) 2.6 L (reservicing)	Oil can
Main Rotor Transmission (equipped with oil filter and cooling installation)	4	C006			X		X	6.5 pt (US) 3.1 L (dry) / 6.0 pt (US) 2.8 L (reservicing)	Oil can
Tail Rotor Transmission	5	C006			X		X	5 fl oz (US) 0.15 L	Oil can
Main Rotor Dampers	6	C007		X			X	Until full	Tool T-2896
Main Rotor Blade Grips (T-T strap)	7	C011 primary C008 alternate (Note 6)		X				As required	Grease gun
Main Rotor Blade Grips (lamiflex)	7	C008		X				As required	Grease gun
Main Rotor Lead-Lag Bearings	8	C011 primary C008 alternate (Note 6)		X				As required	Grease gun
Main Rotor Flapping Bearings (grease-lubricated)	9	C011 primary C008 alternate (Note 6)		X				As required	Grease gun

Table 4-2. Servicing Intervals, Methods, and Locations - continued

System	Location	Consumable Identification	Frequency (hr) 25	50	100	Other	As Required	Capacity	Method
Main Rotor Flapping Bearings (oil-lubricated)	9	C005				X (7)	X	As required	Oil can
Pitch Change Bellcrank Pivot Bearing	10	C011 primary C008 alternate (Note 6)		X				As required	Grease gun
Upper Pulley Bearing	11	C008			X			As required	Grease gun
Lower Pulley Bearings (grease-lubricated)	12	C008			X			As required (Note 8)	Grease gun
Lower Pulley Bearings (oil-lubricated)	12	C005			X			0.27 fl oz (US) 8 mL (dry) 6 mL (reservicing)	Syringe
Blower Assembly Bearings	13	C008				X (9)		As required (Note 10)	Syringe
Tail Rotor Drive Shaft Bearings	14	C008		X				As required	Grease Gun
Tail Rotor Pitch Control Bearing	15	C008			X			As required	Syringe
Tail Rotor Feathering Bearings	16	C011 primary C008 alternate (Note 6)	X (11)	X				As required	Grease Gun
Tail Rotor Teeter Bearings	17	C011 primary C008 alternate (Note 6)		X				As required	Grease Gun
Collective Guidetube Bearing	18	C008		X				As required	Grease Gun
Cyclic Swashplate Bearing	19	C008		X				As required	Grease Gun
Tail Rotor Control Pivot Points	20	C009			X			As required	Oil Can
Pitch Change Bellcrank Inboard Pivot Points	21	C009		X				As required	Oil Can
Collective Walking Beam Pivot Strap Bushings	22	C009			X			As required	Oil Can

Table 4-2. Servicing Intervals, Methods, and Locations - continued

System	Location	Consumable Identification	Frequency (hr) 25	50	100	Other	As Required	Capacity	Method
Lateral Push/Pull Rod	23	C009		X				As required	Oil Can
Trim Motor Attachment Points	24	C009		X				As required	Oil Can
Tail Rotor Pedal Pivot Points	25	C009			X			As required	Oil Can
Landing Gear Oleos	26	C010			X		X	As required	Oil Can
Battery	27 (Note 12)	(Note 13)				X			(Note 13)
Ground Handling Wheels	28	C008					X	As required	Hand pack
Main Rotor Blades	29	C013				X (14)		As required	Pump or Aerosol

NOTES

1. Differences in the open cell foam (standard) and baffle (Aerazur) fuel bladder systems will result in a slight variance in total fuel capacity between aircraft (refer to Paragraph 10-2 for serial number effectivity).

2. Recommended oil for the specified average daily temperatures:

Outside Temperature	Recommended Oil
-40°C (-40°F) and above	MIL-PRF-23699 (C005) or MIL-PRF-7808 (C004)
-40°C (-40°F) and below	MIL-PRF-7808 (C004)

3. If the overrunning clutch (ORC) cover is equipped with a sight glass, service the ORC when oil does not fill the sight glass.

4. If the overrunning clutch (ORC) cover is equipped with a sight glass and oil completely fills the sight glass, the servicing interval can be extended to 100 hours. If the ORC cover is equipped with a sight glass and the ORC requires servicing after less than 10 flight hours, inspect the ORC bearing housing seal and power output shaft seal for leaks and replace the seal(s) as required. If the ORC bearing housing and power output shaft seals are not leaking, replace the double lip seals (2 each) in the engine gearbox assembly at or before the next 100 hour/annual inspection.
5. If the overrunning clutch (ORC) is equipped with a vented clutch oil reservoir, the servicing interval can be extended to 100 hours. Service the vented clutch oil reservoir if oil does not fill the reservoir sight glass. The oil level between the reservoir sight glass and the ORC cover sight glass should be the same. Service the reservoir until the oil level is just below the reservoir service port. Allow sufficient time for the oil to flow into the ORC.
6. Do not mix alternate greases unless component is purged of existing grease.
7. 600 hr
8. Do not purge lubricate the lower pulley bearings. Refer to Paragraph 4-33.
9. 300 hr
10. Do not purge lubricate the blower assembly bearings. Refer to Paragraph 4-39.2.
11. Applicable for helicopters operating with infrequent inputs to the tail rotor pitch control system (for example: extended flight with unchanging blade pitch).
12. The battery is located in the right side of the engine compartment in a TH-28 and 480/B. An alternate location is in the baggage box.
13. Service in accordance with manufacturer's instructions.
14. Refer to Paragraph 4-48, 6.

Table 4-3. [Deleted]

NOTE

Content previously contained in Table 4-3 has been incorporated into Table 4-1.

Table 4-4. [Deleted]

NOTE

Content previously contained in Table 4-4 has been incorporated into Table 4-1.

Table 4-5. [Deleted]

NOTE

Content previously contained in Table 4-5 has been incorporated into Table 4-1.

Table 4-6. [Deleted]

NOTE

Content previously contained in Table 4-6 has been incorporated into Table 4-1.

Table 4-7. [Deleted]

NOTE

Content previously contained in Table 4-7 has been incorporated into Table 4-1.

Table 4-7.1. [Deleted]

NOTE

Content previously contained in Table 4-8 has been incorporated into Table 4-1.

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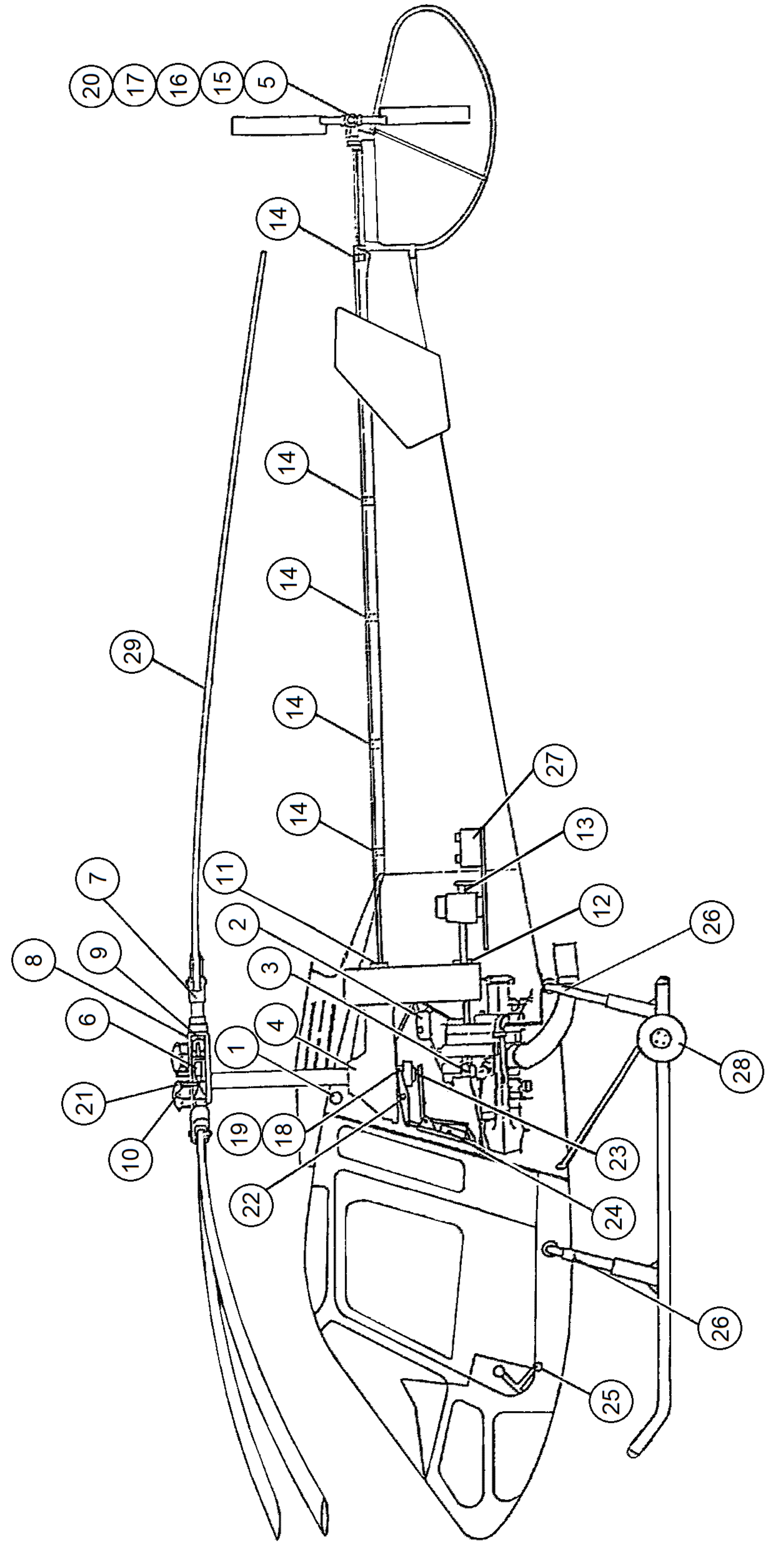


1. Fuel
2. Engine Oil
3. Overrunning Clutch
4. Main Rotor Transmission
5. Tail Rotor Transmission
6. Main Rotor Dampers
7. Main Rotor Blade Grips
8. Main Rotor Lead-Lag Bearings
9. Main Rotor Flapping Bearings
10. Pitch Change Bellcrank Pivot Bearing
11. Upper Pulley Bearing
12. Lower Pulley Bearings
13. Blower Assembly Bearings
14. Tail Rotor Drive Shaft Bearings
15. Tail Rotor Pitch Control Bearing
16. Tail Rotor Feathering Bearings
17. Tail Rotor Teeter Bearings
18. Collective Guidetube Bearing
19. Cyclic Swashplate Bearing
20. Tail Rotor Control Pivot Points
21. Pitch Change Bellcrank Inboard Pivot Points
22. Collective Walking Beam Pivot Strap Bushings
23. Lateral Push/Pull Rod
24. Trim Motor Attachment Points
25. Tail Rotor Pedal Pivot Points
26. Landing Gear Oleos
27. Battery
28. Ground Handling Wheels
29. Main Rotor Blades

Figure 4-1. Servicing Locations

4-3. Fuel System

4-4. Servicing - Fuel System

NOTE

Refer to Table 4-1 for system capacity and approved fuels.

WARNING

In the event of a major spillage of fuel, all powered equipment must be shut down. All personnel should leave the vicinity and be positioned to prevent any sources of possible ignition from entering the area. The appropriate authorities should be notified to contain and disperse the spill.

A. Ground the aircraft, truck, and fuel nozzle.

B. Remove the fuel cap.

C. Position the nozzle into the fuel cell filler port.

D. Fill to the required amount.

E. Remove the nozzle and replace the fuel cap.

F. Disconnect the nozzle ground and rewind the hose.

G. Disconnect the truck and helicopter grounds.

4-5. Draining - Fuel System

WARNING

In the event of a major spillage of fuel, all powered equipment must be shut down. All personnel should leave the vicinity and be positioned to prevent any sources of possible ignition from entering the area. The appropriate authorities should be notified to contain and disperse the spill.

A. Pull fuel shutoff handle "OFF".

B. Open the left side engine access panel.

CAUTION

Cap all open lines/fittings to prevent contamination of the systems.

F. Turn the battery switch on and check the system for oil leaks and proper operation of the oil pump and pressure switch. If required, prime the oil pump by disconnecting the oil line between the pressure switch tee and the pump inlet and filling the line with oil. Reconnect the line and check the oil pump and pressure switch for proper operation.

4-15. Tail Rotor Transmission (See Figure 4-4)

4-15.1 Oil Level Check – Tail Rotor Transmission

NOTES

If the helicopter is undergoing scheduled or unscheduled maintenance, proceed to paragraph 4-16 to service the gearbox.

During routine maintenance checks and prefight inspections, check the tail rotor gearbox oil level in accordance with the following procedure.

The tailcone of the helicopter should be approximately level when servicing the tail rotor gearbox.

The sight glass should be transparent and free of any bubbles for the oil level check.

A. Check oil level by using the sight glass located in the aft side of the tail rotor gearbox.

(1) If the sight glass is dirty, opaque, or cloudy:

a. Remove, clean, and reinstall the sight glass (torque 60 in-lb/6.8 Nm).

b. Proceed to paragraph 4-16 to service the gearbox.

(2) If bubbles are present in the sight glass, raise and lower the tail to change the attitude of the helicopter to clear any bubbles from the sight glass.

(3) The minimum required oil level is when the oil fills half the sight glass.

a. If the oil level fills half or more than half of the sight glass, the gearbox is adequately filled for operation.

b. If the oil level fills less than half of the sight glass, proceed to paragraph 4-16 to service the gearbox.

4-16. Servicing – Tail Rotor Transmission

NOTES

“Servicing”, as used in this procedure, means “topping off” or filling the gearbox to capacity.

Service the tail rotor gearbox if oil level is low, as indicated by a check of the sight glass (paragraph 4-15.1), and any time the helicopter is undergoing scheduled or unscheduled maintenance.

NOTES

Refer to Table 4-1 for system capacity and approved oils. It may require less than 5 fl oz (US)/(0.15 L) to service the gearbox because the oil might not drain completely. A small amount of residual oil remaining in the gearbox is not a cause for concern.

The tailcone of the helicopter should be approximately level when servicing the tail rotor gearbox.

A. Remove the filler port located directly above sight glass.

B. Add oil until the oil begins to flow from the filler port.

NOTE

The sight glass should be free of any air bubbles.

C. Install a new O-ring (MS28778-2).

D. Install the filler plug (torque 20 in-lb/2.3 Nm).

E. Lockwire (MS20995C32) the filler plug to the magnetic plug/chip detector and the sight glass.

4-17. Draining - Tail Rotor Transmission

NOTES

Draining the tail rotor gearbox is required for the 100 hour/annual inspection, gearbox flushing, and when returning the helicopter to service after a six-month or longer storage period.

Refer to paragraph 4-16 for servicing the tail rotor gearbox.

A. Remove the chip detector from the quick disconnect receptacle.

B. Place a suitable container under the receptacle.

C. Remove the quick disconnect receptacle and drain the transmission.

D. When the transmission is drained, replace the crush washer and secure magnetic plug/chip detector (finger tight plus 135° but not to exceed 35 in-lb/4 Nm) and lockwire the receptacle/magnetic plug to the sight glass and the filler plug after the transmission has been serviced.

(1) Apply lubricant (MIL-PRF-2105) to the threads the chip detector prior to installation.

E. Reinstall the chip detector.

4-17.1 Flushing - Tail Rotor Transmission

A. Drain the oil (para. 4-17).

B. Remove the filler plug, sight glass, and top visual inspection plug (if not already removed) from the gearbox.

C. Inspect the gears closely for cracked or missing teeth and the gearbox for damage.

D. Use a syphon sprayer with kerosene, mineral spirits, or equivalent oil-based solvent to spray down the interior of the gearbox and flush any debris out of the gearbox. Direct aim the sprayer around the inside of the gearbox to flush the input and output bearings, while rotating the gearbox.

E. Loosely install the bottom drain plug, sight glass, and fill plug.

F. Add oil that is currently used in the gearbox (Table 4-1).

G. Rotate the gears at least ten times to circulate the oil.

H. Remove the drain plug and drain the gearbox while rotating the gears.

I. Allow the gearbox to drain completely.

J. Install sight glass (60 in-lb/6.8 Nm).

K. Install new crush washer and secure magnetic plug/chip detector (finger tight plus 135° but not to exceed 35 in-lb/4 Nm).

L. Service the gearbox (para. 4-16).

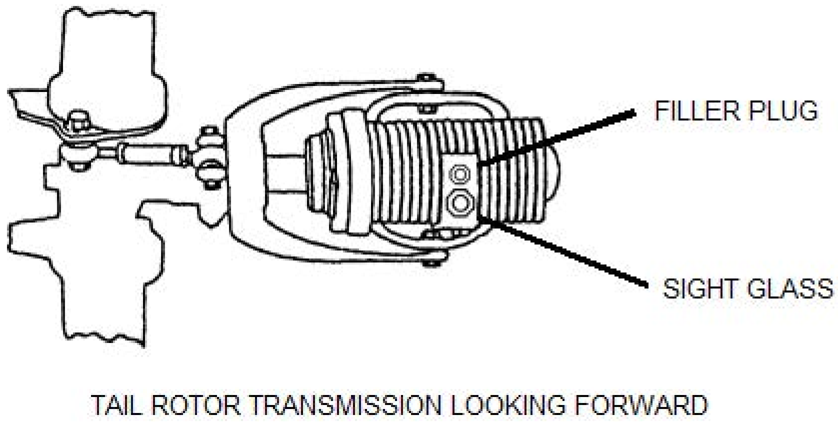


Figure 4-4. Tail Rotor Transmission Servicing Location

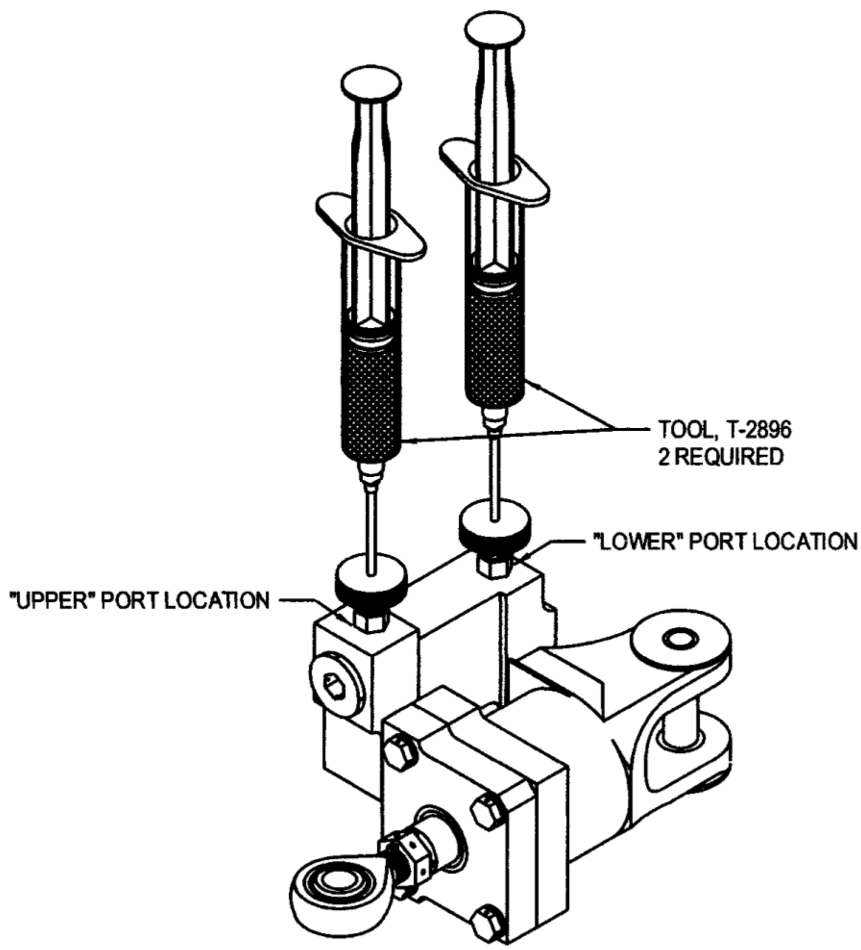


Figure 4-5. Main Rotor Damper Servicing

4-18. Main Rotor Dampers (See Figure 4-5)

4-19. Servicing - Main Rotor Dampers

NOTE

Refer to Table 4-1 for system capacity and approved oil.

NOTE

The dampers may be serviced installed on or removed from the aircraft.

A. Servicing the dampers with tools T-2896 (Figure 4-5):

(1) Fill the tools approximately half full with L-45/SF96-20 Silicone Oil.

(2) Remove the reservoir plugs and replace the O-rings as required.

(3) Install the tools into the reservoir.

(4) Slowly cycle the plungers until all the air bubbles are purged from the damper.

(5) Remove the tool from the “lower” port of the reservoir and install the plug.

(6) Remove the tool from the “upper” port of the reservoir and completely fill the reservoir before installing the plug.

(7) Tighten and lockwire (.025) the plugs.

B. Alternate method of servicing the dampers:

NOTE

Do not cycle the blades back and forth during this procedure as it will mix any air that is in the reservoirs and distribute it through the damper.

(1) **Slowly** cycle the three blades in one direction until the damper piston is fully compressed.

(2) Remove all of the caps from the reservoirs and fill the reservoirs to the top of the port. Reinstall the caps.

(3) **Slowly** cycle the three blades in the other direction until the damper piston is fully extended.

(4) Remove all of the caps from the reservoirs and fill the reservoirs to the top of the port. Reinstall the caps.

(5) Perform this procedure three times or until the reservoirs show full when the caps are removed.

(6) Install the reservoir plugs and lockwire (.025). Replace the plug O-rings as required.

4-20. Main Rotor Flapping Bearings (See Figure 4-6)

4-21. Servicing - Main Rotor Flapping Bearings

NOTE

Refer to Table 4-1 for system capacity and approved oil. Refer to paragraph 4-37 if the main rotor hub assembly is equipped with grease lubricated flapping bearings.

A. Remove the reservoir cap and replace the O-ring or seal as required.

B. Fill the reservoir until the reservoir is half (1/2) to three quarters (3/4) full.

CAUTION

Do not over tighten the reservoir caps. Damage to the reservoirs will result.

C. Install the cap until the O-ring or seal on the cap contacts the reservoir. Tighten the O-ring equipped cap an additional one half (1/2) turn **maximum** by hand (Figure 4-6, Sheet 1). Torque the seal equipped cap 10-20 in-lb/1.1-2.3 Nm or tighten an additional one sixteenth (1/16) turn **maximum** by hand (Figure 4-6, Sheet 2).

D. Lockwire (.025) the cap to the appropriate screw in the reservoir cover.

NOTE

Replace defective O-rings and/or seals if the reservoir is empty after less than four (4) hours of flying.

4-22. Draining - Main Rotor Flapping Bearings

A. Remove the reservoir cap and replace the O-ring as required.

B. Place a suitable container under the drain plug location.

C. Remove the drain plug and replace the O-ring as required.

D. Reinstall the drain plug after draining the oil from the universal block. Service the universal block and reservoir (para. 4-21). Reinstall the reservoir cap. Do not lockwire the caps until after the maintenance ground run.

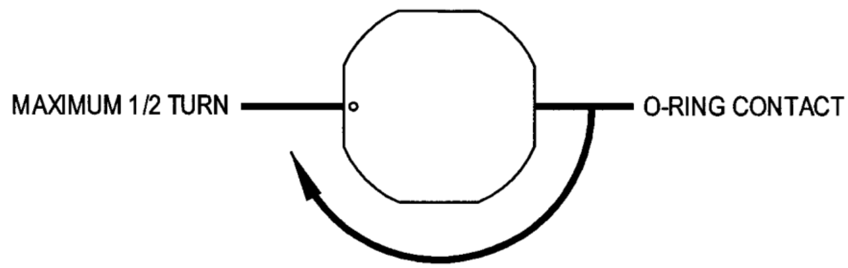
NOTE

The universal block will self-bleed during the ground run causing the oil level to decrease.

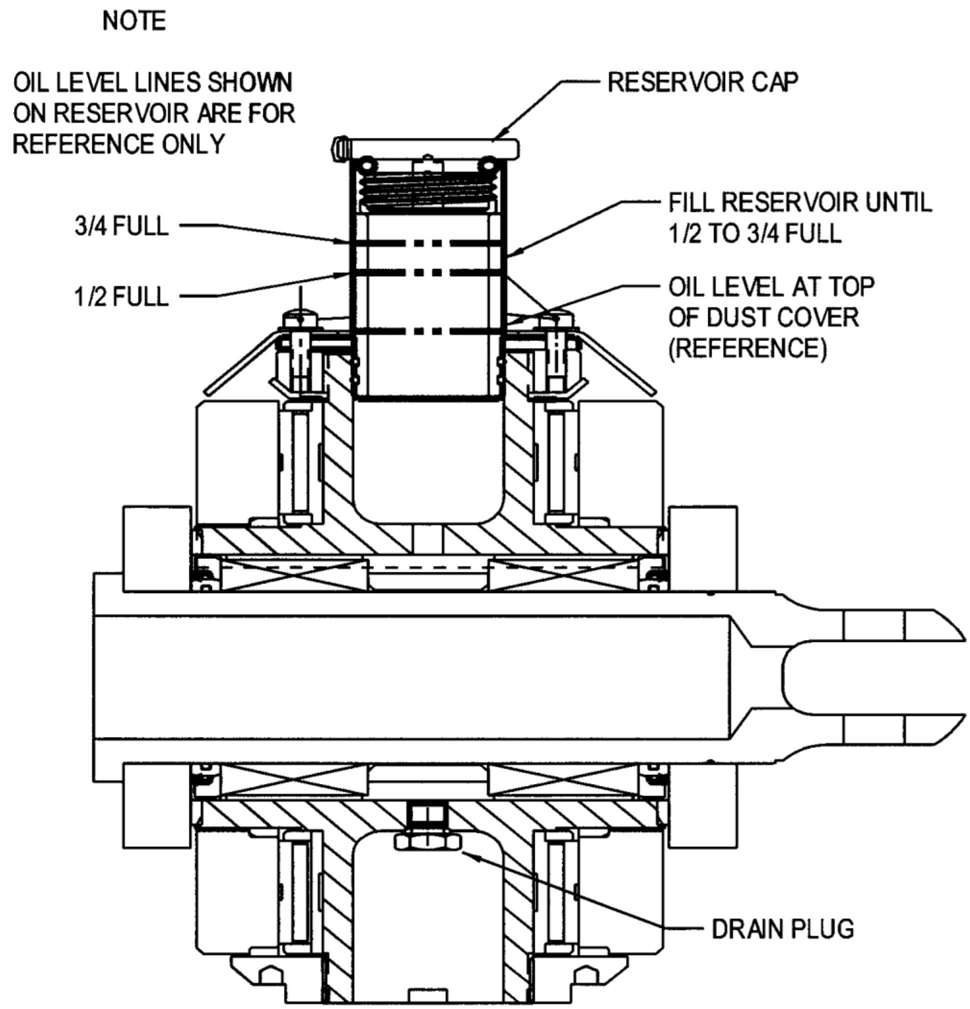
E. Perform a ground run for 10 minutes to allow the reservoirs to self-bleed.

F. Service the oil reservoirs (para. 4-21).

G. Reinstall the reservoir cap and lockwire (0.025).



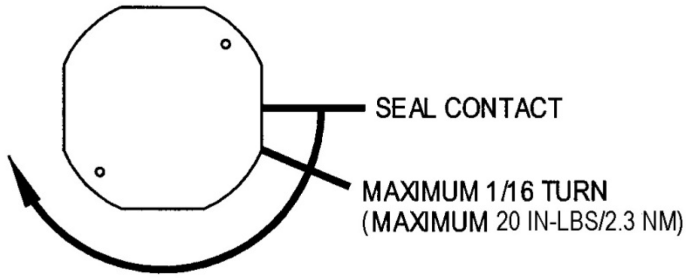
OIL RESERVOIR CAP INSTALLATION



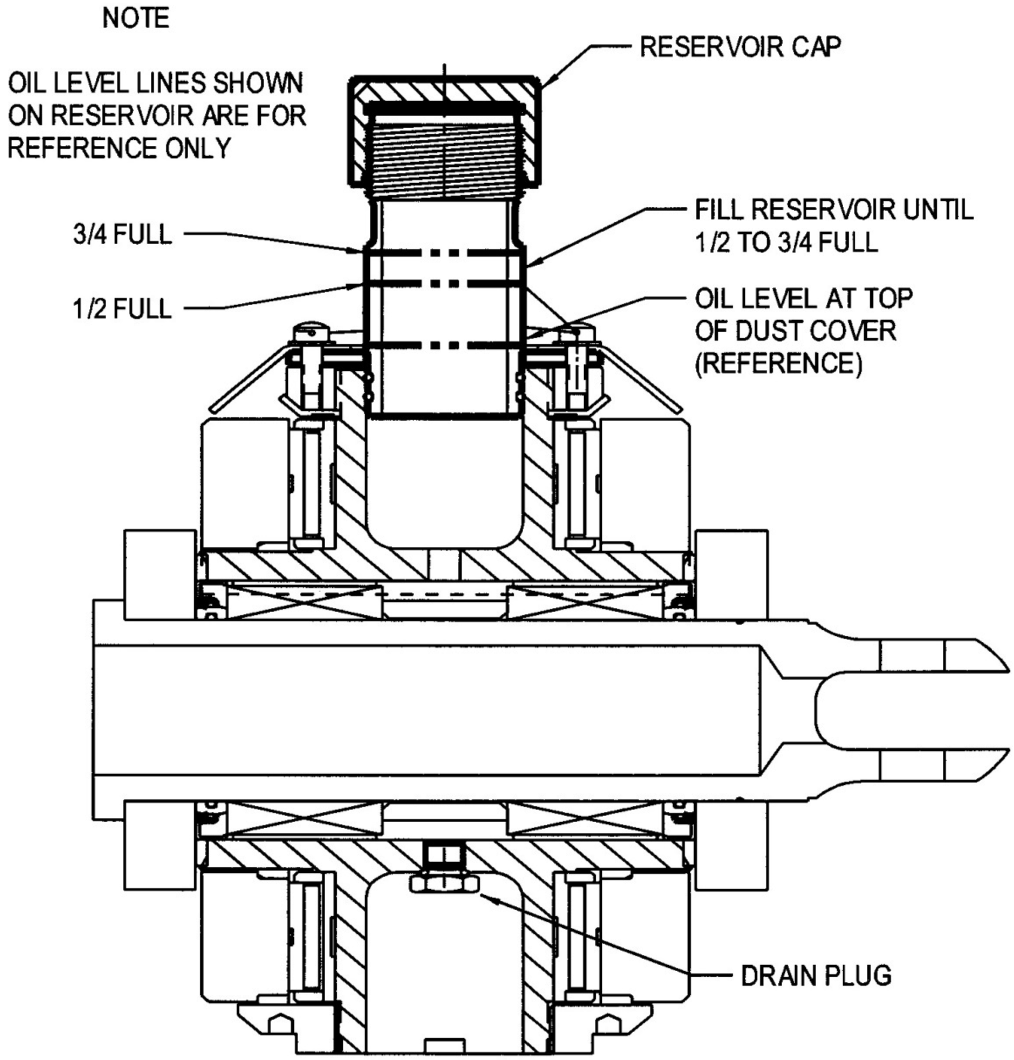
CUT AWAY VIEW OF OIL LUBRICATED FLAPPING BEARING RESERVOIR AND DRAIN PLUG

Internal Thread Oil Reservoirs — Sheet 1 of 2

Figure 4-6. Oil Lubricated Main Rotor Flapping Bearings



OIL RESERVOIR CAP INSTALLATION



CUT AWAY VIEW OF OIL LUBRICATED FLAPPING BEARING RESERVOIR AND DRAIN PLUG

External Thread Oil Reservoirs Sheet 2 of 2

Figure 4-6. Oil Lubricated Main Rotor Flapping Bearings

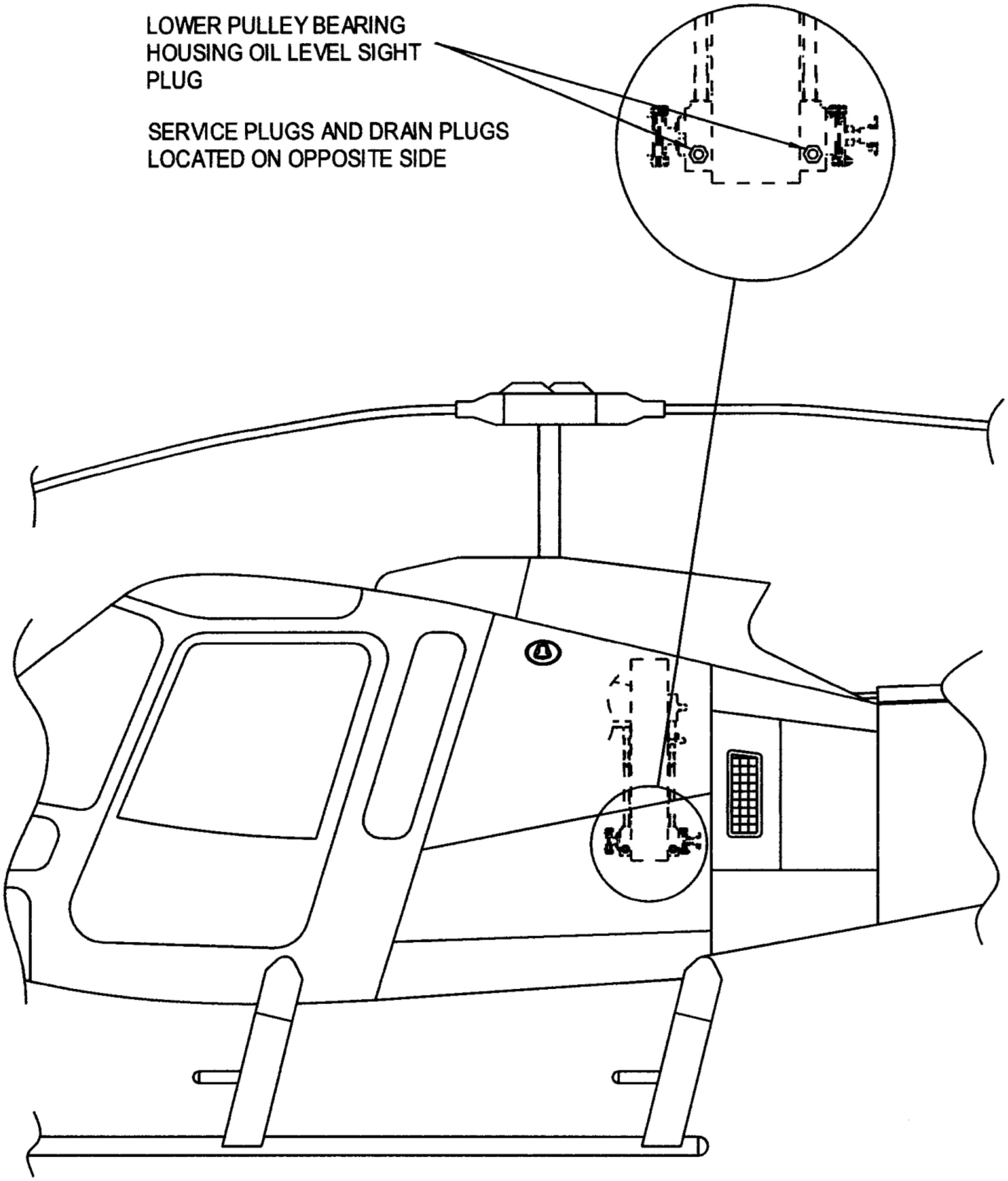


Figure 4-7. Oil Lubricate Lower Pulley Bearings

4-23. Lower Pulley Bearings (See Figure 4-7)

NOTE

The following procedures only apply to aircraft equipped with oil lubricated lower pulley bearings. Refer to paragraph 4-33 for grease lubricated lower pulley bearings.

4-24. Servicing - Lower Pulley Bearings

NOTE

Refer to Table 4-1 for system capacity and approved oil.

NOTE

The lower pulley bearings do not require servicing if the oil level is in the lower half of the sight glass.

NOTE

Servicing procedures are the same for both of the lower pulley bearings.

A. Open the right side engine access panel.

B. Remove the service plug from the bearing housing.

C. Using a syringe or other suitable device, **slowly** service the lower pulley bearing. The lower pulley bearing is properly serviced when the oil level is in the middle of the sight glass.

D. Replace the O-ring on the service plug as required. Install the service plug to the drain plug.

E. Close the right side engine access panel.

4-25. Draining - Lower Pulley Bearings

NOTE

Draining procedures are the same for both of the lower pulley bearings.

A. Open the left side engine access panel.

B. Place a suitable container under the lower pulley bearing assembly and remove the sight plug.

C. Replace the O-ring on the sight plug as required. Install the sight plug.

D. Inspect the sight plugs for staining. Remove and clean or replace the sight plugs as required.

E. Replace the O-ring on the sight plug as required. Install the sight plug and torque (150 in-lbs/17 Nm). Install a torque slippage mark.

4-26. Oleos

4-27. Servicing - Oleos

NOTE

Check the serviceability of the oleos by rocking the aircraft to distribute the weight of the aircraft evenly. The oleos are serviceable if 3/4"(19 mm) to 2"(51 mm) of the chromed piston extends past the seal retainer (Figure 4-8, Dimension "A").

NOTE

If the oleos are not installed on the aircraft or the aircraft is jacked or hoisted off the ground, pressurize the front oleos to 250 lbs and the aft oleos to 550 lbs.

NOTE

The oleo struts should be serviced as pairs such that either both front or both aft oleos are serviced at the same time.

A. Service the oleos using the following procedure:

(1) Remove the screw(s) securing the top landing gear fairing on the oleo and allow the fairing to slide down exposing the servicing valve and the piston.

NOTE

The use of nitrogen is recommended for servicing, as it has no moisture content.

(2) Sling or jack the helicopter. The helicopter may be jacked from the jack points or from the individual cross tubes if the oleos are to be serviced individually.

(3) Remove the valve cap and connect the servicing equipment pressure line to the oleo valve. Set the nitrogen tank regulator pressure to 250 psi for the front oleos or 550 for the aft oleos.

WARNING

The oleo may extend when the valve is opened.

(4) Slowly open the oleo valve.

(5) After the pressure in the oleo has equalized to the regulator pressure, close the oleo valve.

(6) Turn off the nitrogen tank and set the regulator pressure back to zero.

(7) Disconnect the service equipment and install the valve cap.

(8) Slide the landing gear fairing into position and install the retaining screws.

(9) Remove the helicopter from the sling or the jacks, as necessary.

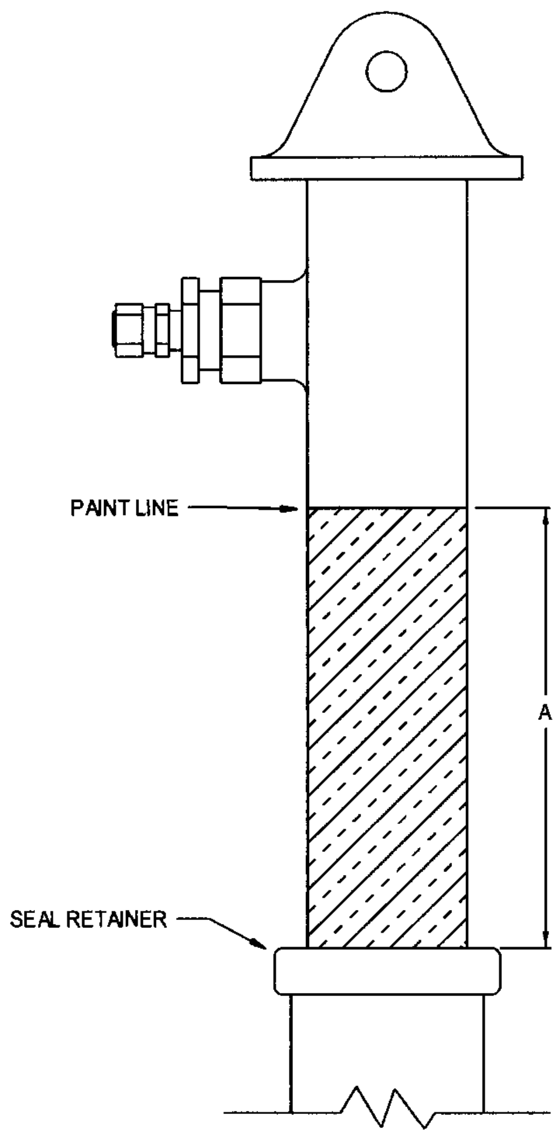


Figure 4-8. Oleo Serviceability

4-36. Main Rotor Flapping Bearings (See Figure 4-10)

4-37. Lubrication - Main Rotor Flapping Bearings

NOTE

Refer to paragraphs 4-20 through 4-22 if the main rotor hub assembly is equipped with oil lubricated flapping bearings.

A. Purge lubricate the main rotor flapping bearings using the grease fitting located in the recess of the inboard side of the universal block (See Figure 4-10).

4-38. Tail Rotor Pitch Control Bearing

4-39. Lubrication, Preferred Method – Tail Rotor Pitch Control Bearing

NOTE

Purge the needle prior to each use and lubricate the external surface of the needle with grease to prevent seal damage.

A. Using a 6 cubic centimeter (cc) medical syringe and an 18 gauge hypodermic needle, inject .5cc of grease into the bearing in two places, approximately 180° apart. Carefully insert the tip of the needle under the lip of the seal where it contacts the inner race of the bearing. The tip of the needle can be worked under the lip of the seal and into the bearing between the balls. If the needle does not penetrate between the balls, the needle can be withdrawn and inserted in another position on the bearing (Figure 4-10.1).

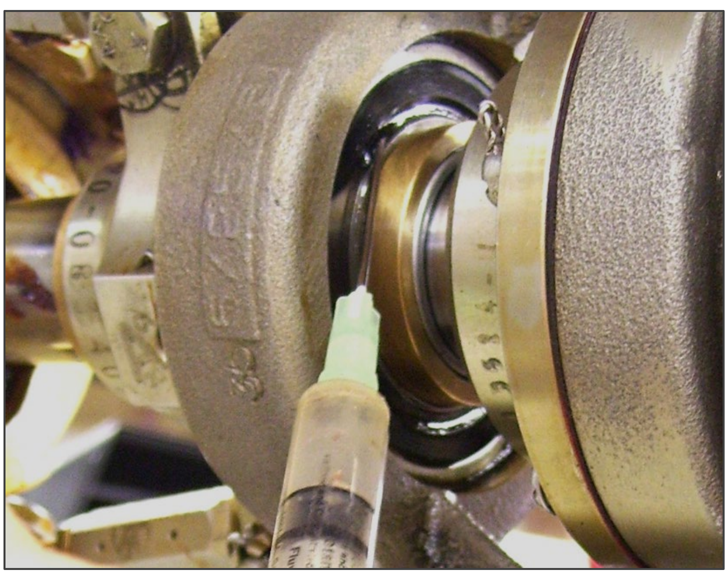


Figure 4-10.1. Tail Rotor Pitch Control Bearing Lubrication

B. Wipe the excess grease from the surface of the seal as necessary.

4-39.1. Lubrication, Alternate Method – Tail Rotor Pitch Control Bearing

WARNING

Use extreme caution when removing the seal to prevent from injuring yourself or damaging the tail rotor pitch controls.

A. Using a small flat-blade screwdriver or small knife blade, remove the seal from the inboard side of the bearing.

B. Hand pack the bearing with grease.

C. Reinstall the seal. Ensure it is properly seated.

4-39.2. Blower Assembly Bearing

4-39.3. Lubrication – Blower Assembly Bearing

A. Wipe the seal clean on the accessible side of the bearing to reveal the four (4) servicing locations. These locations will either be a small holes in the metal seal or small raised rings in the non-metal seal.

NOTE

Purge the needle prior to each use and lubricate the external surface of the needle with grease to prevent seal damage.

B. Using a 6 cubic centimeter (cc) medical syringe and an 18 gauge hypodermic needle, inject 0.5 cc of grease into the bearing. Inject the grease into one of the holes in the seal. If the hypodermic needle does not fully enter the seal and bearing, remove the needle and rotate the blower assembly slightly to clear the bearing cage and reinsert the needle and inject the grease into the bearing.

C. Wipe excess grease from the exterior of the bearing and repeat the procedure on the other blower assembly bearing.

4-39.4. Tail Rotor Feathering Bearing

4-39.5. Lubrication – Tail Rotor Feathering Bearing

A. Disconnect the pitch change links from the tail rotor assembly (para. 12-121, A).

B. Lubricate the tail rotor blade and grip assemblies. Purge lubricate the blade and grip assembly at the normal 50 hour or 25 hour service interval, as applicable.

C. Rotate (one complete rotation on the feathering axis) the tail rotor blade grip assemblies eleven times.

D. Lubricate the tail rotor blade and grip assemblies again.

E. Reconnect the pitch change links to the tail rotor assembly (para. 12-126, C).

4-40. Recommended Overhaul Cycles

A. Refer to Table 4-8 for components with recommended overhaul cycles established by Enstrom Helicopter Corporation and other component manufacturers.

NOTE

Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual for the overhaul cycle items associated with the engine.

B. Overhaul cycle components authorized for installation on the TH-28,480, and 480B must use the shorter overhaul cycle for the duration of the component overhaul cycle if the component is removed from one model of aircraft and installed on a model with a different overhaul cycle.

Table 4-8. Recommended Overhaul Cycles

COMPONENT	ITEM	OVERHAUL CYCLE TH-28	OVERHAUL CYCLE 480	OVERHAUL CYCLE 480B
524-080 150SG117Q-3-1 150SG117Q-4-1	Starter/Generator	1,200 Hrs Not Authorized Not Authorized	1,200 Hrs 1,000 Hrs 1,000 Hrs	1,200 Hrs 1,000 Hrs 1,000 Hrs
20306-2	Valve Assembly (Optional Pop-Out Floats)	Not Authorized	3 years to coincide with hydrotesting of reservoir cylinder or after valve activation	3 years to coincide with hydrotesting of reservoir cylinder or after valve activation
28-13525-9	Tail Rotor Transmission	1,000 Hrs	1,200 Hrs	1,000 Hrs
4130020 (All dash numbers) 4130030-1 4130060 (All dash numbers)	Main Rotor Transmission	1,200 Hrs 1,200 Hrs (1) Not Authorized	1,200 Hrs 1,200 Hrs (1) Not Authorized	Not Authorized Not Authorized 1,200 Hrs (2)
4131001-101 4131001-105 4131001-131	Overrunning Clutch	2,400 Hrs 2,400 Hrs 2,400 Hrs	2,400 Hrs 2,400 Hrs 2,400 Hrs	2,400 Hrs 2,400 Hrs 2,400 Hrs
2A20B-17149-2 528-023-01	Cargo Hook (Optional)	(3)	(3)	(3)

Notes:

1. These Main Rotor Transmissions can only be installed if the aircraft has been modified for installation of main rotor transmissions equipped with the oil filtration/cooling system.

2. Requires a 600 Hour Mandatory Inspection. This is a temporary restriction pending data analysis from the component tear-down inspections. Refer to paragraph 3-2 and Table 3-2 for more information.

3. Refer to the manufacturer's maintenance publications (See Table 2-2).

4-41. Periodic Inspections

4-42. General Information

A. Periodic Inspection Checklists are set forth in paragraphs 4-44 through 4-48. These inspection checklists are intended to be used in conjunction with more detailed procedures presented in other sections of this manual, optional equipment maintenance manual supplements, or vendor manuals. Special inspections are set forth in paragraphs 4-49 through 4-59. These special inspections are required following such occurrences as a main rotor and/or tail rotor blade strike, a hard landing, or a rotor overspeed.

(1) The time extension for the periodic inspections is as follows:

a. 100, 200, and 300 hour periodic inspections – 10 hours.

(2) If the extension is used, the next scheduled inspection is due at the time applicable prior to using the extension. For example, if a 100 hour periodic inspection is due at 100 hours, but is performed at 108 hours, the next periodic 100 hour inspection is due at 200 hours not 208 hours.

(3) If the periodic inspection is performed early, the next periodic inspection is due based on when the inspection was performed. For example, if the periodic inspection was performed at 98 hours instead of 100 hours, the next periodic inspection is due at 198 hours, not 200 hours.

(4) The 10 hour extension does not apply to life limited components.

B. Mandatory component replacement times in flight hours are specified in paragraph 3-2.

C. Recommended component overhaul cycles are specified in paragraph 4-40.

4-43. Daily Inspection

The Enstrom TH-28, 480, or 480B do not require a mandatory daily (maintenance) inspection. Owner/Operators opting to have maintenance personnel check the aircraft should perform a preflight check I/A/W the TH-28, 480, or 480B Rotorcraft Flight Manual.

4-44. Periodic Inspection Checklists

A. These inspection checklists are intended for aircraft operating under normal conditions. More frequent inspections may be required should adverse operations be encountered.

B. For more detailed inspection procedures and tolerances, refer to the appropriate section in the maintenance manual, optional equipment maintenance manual supplements, or vendor manuals.

C. Perform a 100 hour inspection, as a minimum, to meet the requirements for an Annual Inspection (as required by 14 CFR Part 91).

NOTE

Check with applicable certifying authorities for the region of operation for additional scheduled or special scheduled inspection requirements.

D. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual for the specific inspection requirements for continued airworthiness of the engine.

4-45. 100 Hour/Annual Inspection - Periodic Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

100 HOUR/ANNUAL INSPECTION CHECKLIST INITIAL EACH ITEM AFTER ACCOMPLISHMENT	INITIAL	REF
1. GENERAL INSPECTION		
A. Inspect the aircraft records and discrepancy sheets	________	
B. Check the aircraft and engine records for TBO and Retirement Life items	________	
C. Check for special airframe or engine inspections	________	
D. Check compliance with applicable Service Information Letters, Service Directive Bulletins, and Airworthiness Directives	________	
E. Inspect the aircraft for evidence of fuel and oil leaks	________	
F. Clean the aircraft thoroughly	________	
G. Remove the following cowling, access panels, and components:		
1) Keel access panels	________	
2) Engine access panels	________	
3) Bottom engine access panel	________	
4) Aft side access panels	________	
5) Bottom aft access panel	________	
6) Horizontal stabilizer spar access panels	________	
2. AIRCRAFT STRUCTURE & FUSELAGE		
A. Inspect the structure and fuselage for:		
1) Cleanliness & corrosion	________	
2) Evidence of damage	________	
3) Cracks, tears, or buckling of skins	________	
B. Inspect the fuel system for:		
1) Condition and security of the crossover, vent, and supply line	________	Fig. 10-3
2) Proper operation of the drain valves and the fuel shutoff valve	________	Fig. 10-3
3) Scupper drain lines for obstructions	________	Fig. 10-3
4) Condition and security of the fuel quantity and low fuel warning electrical connectors and fuel system electrical grounding connections	________	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
5) Verify fuel quantity at the indicator. If indication does not correlate to the fuel level, perform fuel quantity transmitter calibration check.	________	Para. 7-85
6) Condition and security of the external fuel filter (if applicable)	________	Para. 10-53
7) Condition of the fuel cell cap O-ring and proper operation of the cap	________	
NOTE Step 8) below applies only to aircraft having an EMI/RFI shielding system (S/N 5134, 5136 through 5197).		
8) Transmit for 10 seconds on 136 MHz and observe the fuel gauge for movement.	________	Para. 8-74 Para. 10-49,D
3. COMPONENTS (Equipment not specifically listed in this checklist)		
A. Inspect components for:		
1) Security of installation	________	
2) Cleanliness and evidence of corrosion	________	
3) Evidence of damage	________	
4) Cracks, nicks, and scratches	________	
4. ENGINE		
Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2), for the specific inspection requirements and procedures for the engine assembly.		
NOTE **The procedure for bleeding the engine oil system in the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2) covers only top-mounted filters. Refer to paragraph 13-58.1 for bleeding the oil system.**		
A. Inspect the pylon for cracks and corrosion	________	
B. Inspect the engine mounts for cracks, bends, corrosion, or wear marks and check the condition of the engine mount bolt torque stripes on the side mounts	________	SDB T-038
C. Inspect the fuel control and power turbine governor controls for proper rigging, worn or loose connections, and freedom of operation	________	Para. 13-109
D. Inspect the exhaust stacks and the eductor for condition, proper installation, and security	________	Para. 13-8 Para. 13-19
E. Inspect the engine fire detector for condition, chaffing, and security	________	
F. Inspect the engine panels for:		
1) Damage or chafing	________	
2) Security of the hinges and fasteners	________	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
3) Condition and security of the fire curtain	________	
5. LANDING GEAR ASSEMBLY		
A. Inspect the landing gear and crosstubes for:		
1) Damage or cracks	________	SDB T-062
2) Condition of the skid shoes	________	
3) Security of attachments	________	
4) Condition of the end caps	________	
5) Condition of the non-skid tape/paint	________	
6) Condition of the ground handling wheel mounts	________	
B. Inspect the landing gear oleos for:		
1) Evidence of corrosion	________	
2) Evidence of leakage	________	
3) Proper extension	________	Para. 4-27
4) Security of attachments	________	
5) Security of the steps	________	
6. DRIVE BELT SYSTEM		
A. Inspect the upper pulley for:		
1) Evidence of roughness or looseness of the aft bearing or discoloration of the bearing housing	________	
2) Condition and security of the taper pin and flex pack	________	
3) Proper torque on the transmission pinion nut (250 ft-lbs)	________	
4) Condition of the pulley	________	Para. 11-49
5) Security and condition of the bearing support truss and attaching hardware	________	
6) Condition of the pylon	________	
B. Inspect the drive belt for:		
1) Cracked or missing sections	________	Para. 11-28
2) Proper tension (2,500 - 1,750 pounds)	________	SDB T-046
C. Inspect the lower pulley for:		
1) Evidence of roughness or looseness of the bearings or discoloration of the bearing housings	________	
2) Evidence of bearing seal leakage	________	
3) Condition of the pulley	________	Para. 11-21
4) Condition and security of the "H" strut	________	SDB T-018

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
5) Condition and security of the flex packs	________	Para. 11-21
6) Condition and security of attaching hardware	________	
D. Perform the following tasks if the aircraft is equipped with oil lubricated lower pulley bearing assemblies.		
1) Drain the oil from the lower pulley bearing	________	
2) Inspect the sight plugs for cleanliness and staining. Remove and clean or replace the sight plugs as required.	________	
3) Service the lower pulley bearing assemblies	________	Para. 4-23
E. Inspect the overrunning clutch for evidence of oil leakage	________	SDB T-022 SDB T-027
F. Drain the overrunning clutch and vented oil clutch reservoir (if equipped), inspect the drained oil for metal flakes, and service.		Para. 4-9
G. Inspect the vented clutch oil reservoir (if equipped) for evidence of oil leakage	________	
H. Service the ORC or the vented clutch oil reservoir (if equipped)	________	Para. 4-10
7. OIL COOLING SYSTEM		
A. Inspect the oil cooler for:		
1) Security of installation	________	
2) Evidence of oil leakage or cracks	________	
B. Inspect the scavenge/external oil filter assembly, oil lines, and fittings for condition and security of installation	________	Para. 13-71
C. Inspect the oil cooler, blower, inlet, and exhaust ducting for condition and security	________	SDB T-016
D. Inspect the blower shaft bearings for security of installation, excessive wear, and discoloration of the bearing mounts	________	Para. 13-78,E
E. Remove and inspect the flex packs for cracks	________	Para. 13-75 Para. 13-77 SDB T-013
F. Condition and security of the taper and roll pins and the flex packs (torque 25 in-lb/2.8 Nm)	________	
8. AIR INTAKE SYSTEM		
A. Inspect the upper plenum/ air inlet for cleanliness, condition, and security, and inspect for clearance between the drive belt and the upper plenum.	________	Para. 13-31
B. Inspect the transfer ducts for cracks, cleanliness, and condition/bonding of duct boots.	________	
C. Inspect the lower plenum for cleanliness, condition, security, and bonding of inlet seal and inspect the protective shield for condition and security).	________	Para. 13-39

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
D. Inspect air particle separator perimeter for gasket condition, security, and seal.	________	
9. TAIL CONE ASSEMBLY		
A. Inspect the tail cone for:		
1) Cracks in the tail cone mount fittings	________	SDB T-033
2) Proper security to the pylon	________	
3) Cracked or damaged bulkheads or doublers	________	
4) Legibility of decals and markings	________	
B. Inspect the tail rotor drive shaft for:		
1) Rough or worn bearings	________	
2) Position of the rubber inserts	________	
3) Condition and security of the taper pins and flex packs (torque 25 in-lb/2.8 Nm)	________	
4) Security of the pillow blocks	________	
C. Inspect the horizontal and vertical stabilizers for:		
1) Damage or cracks	________	SDB T-004
2) Loose rivets	________	
3) Security of attachment	________	SDB T-031
D. Inspect the tail rotor guard for:		
1) Damage and loose rivets	________	
2) Security of attachment	________	
E. Inspect the stinger tube for:		
1) Evidence of loose rivets at the aft bulkhead	________	SDB T-064
2) Security of mounting	________	
F. Inspect the vibration absorber assembly for condition and security (if installed).	________	
10. TAIL ROTOR TRANSMISSION		
A. Inspect the tail rotor transmission for:		
1) Evidence of leakage at the seals	________	SDB T-012
2) Condition and security of the mounting screws	________	
3) Evidence of a cracked or damaged housing	________	
4) Condition and security of plugs and sight gauge		
B. Drain the transmission and inspect the chip detector for the presence of magnetic particles	________	Para. 4-17 Para. 4-57,B,(1)

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
C. Service the transmission	________	Para. 4-16
D. Inspect the tail rotor pitch controls for:		
1) Worn bushings at the pivot points	________	Table 12-4
2) Slider assembly for freedom of operation and wear	________	
3) Condition and security of the control hardware	________	
11. TAIL ROTOR ASSEMBLY		
A. Inspect the tail rotor assembly for:		
1) Cracks, nicks, dents, scratches, and bends	________	Para. 9-47
2) Evidence of bond separations, corrosion, and bond line corrosion	________	
3) Loose tip rivets	________	
4) Condition and security of the teeter bearings a) Purge lubricate the needle bearings (ref. Table 4-2)	________	
5) Condition and security of the pitch change bearing	________	
6) Inspect the pitch change links for condition, worn rod end bearings, proper hardware, and security of installation	________	Para. 12-123 Para. 12-124
7) Fretting of the blades and grips at the attachments	________	SDB T-055
12. MAIN ROTOR TRANSMISSION		
A. Inspect the main rotor transmission for:		
1) Evidence of leakage	________	SDB T-002
2) Cleanliness and corrosion	________	
3) Cleanliness of the sight glass	________	
4) Condition and security of the mounting bolts and plugs	________	
5) Condition of the main rotor mast	________	
6) Condition of the pylon assembly (transmission area)	________	SDB T-065
B. Drain the transmission and inspect the chip detector and (if applicable) the oil filter for the presence of metal particles	________	Para. 4-13
C. Replace the oil filter (if applicable)	________	Para. 4-14
D. (If applicable) Condition and security of heat exchanger, filter housing, pressure switch, oil lines, drain line, fittings, oil pump, and mounting brackets	________	Para. 11-42
E. Service the transmission	________	Para. 4-12
13. MAIN ROTOR ASSEMBLY		
A. Inspect the main rotor blades for:		
1) Cleanliness and evidence of corrosion	________	Para. 9-35
a) Review records for date of last CPC application. Re-apply, if required.	________	Para. 4-48,6 Para. 4-88

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
2) Condition of the blade tape, if installed	________	
3) Nicks, dents, or scratches	________	
4) Evidence of bond line separation	________	
5) Condition and security of the trim tabs	________	
6) Evidence of loose rivets in the drag link attachment fittings	________	
7) Proper security of the blades	________	SDB T-029
B. Inspect the main rotor retention assemblies for:		
1) Condition of the up and down stops	________	Table 9-2
2) Condition and security of the pitch horn and planipetal weight, if installed.	________	
C. Inspect the universal block assemblies for:		
1) Condition of the lead/lag stops	________	Table 9-3
2) Proper security of the lower nuts	________	
3) Condition of flapping bearing oil seals (if applicable)	________	
D. Inspect the hydraulic main rotor dampers for:		
1) Radial wear in the rod end bearing	________	Table 9-4
2) Evidence of leakage	________	
3) Condition (corrosion, corrosion protection and security of the rod end bearing	________	SDB T-058 Para. 9-30,S
4) Proper security at the attachment points	________	
5) Proper security of all hardware	________	
E. Inspect the center hub section for:		
1) Evidence of cracks	________	Table 9-1
2) Fretting at the upper and lower spline adapters	________	
3) Inspect the torque stripe indicators on the mast nut. If the indicators show loss of torque on the mast nut or are not installed, check the torque on the mast nut	________	
F. Inspect the pitch change bellcranks for:		SDB T-003 Para. 12-89
1) Evidence of cracks in the mounting brackets	________	
2) Proper bearing operation and wear at the pivot points	________	
3) Condition and security of the pitch change link rod end bearings	________	
4) Proper security of all hardware	________	
G. Inspect the upper control push-pull rods for:		
1) Evidence of loose rivets	________	SDB T-025
2) Evidence of damage	________	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	
14. SWASHPLATE CONTROL SYSTEM		
A. Inspect the swashplate assembly for:		SDB T-007
1) Looseness of the universal points	________	Para. 12-78
2) Looseness of the push rod dogleg bearings	________	SDB T-024
3) Roughness in the cyclic bearing	________	
4) Condition of the rod ends and the fitting on the push-pull rods at the cyclic bearing housing	________	
5) Proper security of all hardware	________	
B. Inspect the collective guide tube assembly for:	________	Table 12-3
1) Radial wear of the DU bushings	________	
2) Roughness in the collective bearing	________	
3) Wear in the collective walking beam at the bushings in the straps at the transmission attachment and at the bearings in the collective bearing housing	________	
4) Proper security of all hardware	________	
15. CABIN SECTION	________	
A. Inspect the cabin exterior for:		
1) Proper operation of the doors	________	
2) Cleanliness, cracks or crazing of the door and cabin plexiglass	________	
3) Obstructed or bent pitot tube	________	
B. Inspect the cabin interior for:		
1) Cleanliness and evidence of corrosion	________	
2) Presence and legibility of decals and placards	________	
3) Condition and security of the seats	________	
4) Deterioration of the seat cushions	________	
5) Condition, operation, and security of attachment of the safety belts and shoulder harnesses	________	
6) Date of the last inspection and security of the fire extinguisher	________	
C. Inspect the instrument console for:		
1) Condition and security of all instruments	________	
2) Condition and security of the console shrouds	________	
3) Legibility of all decals and placards	________	
D. Inspect the keel structure for:		
1) Cleanliness and corrosion	________	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
2) Evidence of loose rivets	_______	
3) Condition of the bulkheads	_______	
E. Inspect the cabin environmental control system for:		
1) Condition and security of the ducting	_______	
2) Obstruction of the outlets	_______	
3) Proper operation of the control valves and cable	_______	
16. FLIGHT CONTROLS		
A. Inspect the cyclic flight controls for:		
1) Proper range of travel (para. 4-60,B,4 through para. 4-60,B,6)	_______	Para. 4-60, B,4 through Para. 4-60, B,6
2) Freedom of operation	_______	
3) Condition and security of all rod ends, push-pull rods, bellcranks, and vibration absorber assemblies (if installed) forward of the swashplate.	_______	
4) Proper security at all connections forward of the swashplate	_______	
5) Condition and security of the trim assemblies	_______	Para. 12-71
B. Inspect the collective flight controls for:		
1) Proper range of travel (collective contacts up stop and down stop of the collective slider)	_______	
2) Freedom of operation	_______	
3) Proper operation of the collective friction	_______	Para. 12-30 Para. 12-32
4) Condition and security of the torque tube and push-pull rods	_______	
5) Condition and security of the spring capsule	_______	Para. 12-36
6) Proper operation, condition, and security of the droop compensator system	_______	Para. 13-105 Para. 13-111
7) Proper security at all connections	_______	
C. Inspect the tail rotor controls and cables for:		
1) Proper cable tension and correct range of travel	_______	Para. 12-99
2) Evidence of binding or ratcheting	_______	
3) Cable wear at the pulleys and fairleads	_______	Para. 12-103
4) Condition and security of all rod ends, push- pull rods, and bellcranks	_______	
5) Condition and security of the pedal assemblies	_______	
6) Proper security at all connections	_______	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
17. BATTERY AREA		
A. Inspect the battery as required in accordance with the manufacturer's instructions	________	
B. Inspect the preservation of the surrounding area	________	
C. Inspect the condition of the battery cables, case, and hold down	________	
D. Inspect for corrosion at the cable connections	________	
E. Inspect the electrical components and wiring for condition and security	________	
F. Inspect the battery vent tubes for condition, security, and clear of obstructions	________	
18. ELECTRICAL SYSTEMS		
A. Inspect the starter/generator systems for:		
1) Condition and security of the wiring	________	
2) Condition and security of the relays, generator shunt, and the current limiter	________	
3) Condition and security of the GCU	________	
4) Condition and security of the starter/generator	________	
5) Condition of the starter/generator brushes (Refer to Paragraph 13-120)	________	
6) Condition and security of starter/generator cooling duct installation and drain hole unobstructed in rigid air duct (480B S/N 5114 and subsequent & any 480B equipped with Cooling Kit 4230031)	________	
B. Inspect the external power system for:		
1) Condition and security of the wiring	________	
2) Condition and security of the external power receptacle and relay	________	
C. Inspect the electrical bus or terminal strips for condition, security, loose connections, and evidence of arcing	________	
D. Inspect the cockpit/map and instrument lighting systems for:		
1) Condition and security of the systems components and wiring	________	
2) Operation of the cockpit/map light and instrument lighting	________	
E. Inspect the landing, anti-collision, and position light systems for:		
1) Condition and security of the systems components and wiring	________	
2) Operation of the landing, anti-collision, and position lights	________	
F. Inspect the caution and warning systems for:		
1) Condition and security of the systems components and wiring	________	
2) Perform a functional test of the caution system	________	
3) Perform a functional test of the warning system	________	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
G. Inspect the power turbine governor trim system for:		
1) Condition and security of the wiring for the linear actuator	________	
2) Operation of the linear actuator using the governor increase/ decrease switch(es)	________	
H. Inspect the cyclic trim system for:		
1) Condition and security of the trim switch units and wiring	________	SDB T-039
2) Operation of the trim actuators using the cyclic trim switch(es)	________	
I. Inspect the idle stop system for: (S/N 5136 and subsequent)		
1) Condition and security of the switches, relay, solenoid and wiring	________	
2) Operation of the idle stop using the idle stop switch(es)	________	
J. Inspect all optional electrically powered instruments not covered in the checklist for operation	________	
K. Inspect the switches, fuses, and circuit breakers for:		
1) Condition and security	________	
2) Cycle the switches and circuit breakers	________	
L. Inspect the pylon tabs at grounding hardware attachment for corrosion and condition.	________	
19. EQUIPMENT WITH MAINTENANCE MANUAL SUPPLEMENTS		
A. Air Conditioning System:		
1) Inspect the air conditioning system I/A/W Maintenance Manual Supplement 1, Paragraph 4-4	________	
B. Emergency Pop-Out Floats:		
1) Inspect the emergency pop-out floats I/A/W Maintenance Manual Supplement 2, Paragraph 4-12	________	
C. Gyrocam Dual or Triple Sensor Camera System:		
1) Inspect the Gyrocam Dual or Triple Sensor Camera System I/A/W Maintenance Manual Supplement 3, Paragraph 4-6	________	
D. Chelton Flightlogic EFIS System:		
1) Inspect the Chelton Flightlogic EFIS System I/A/W Maintenance Manual Supplement 4, Paragraph 4-5	________	
E. Avionic Systems:		
1) Inspect the applicable Avionic System(s) I/A/W Maintenance Manual Supplement 5, Paragraph 3-3	________	
F. Partial Wide Instrument Panel:		
1) Inspect the partial wide instrument panel I/A/W Maintenance Manual Supplement 6, Paragraph 4-2	________	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
G. Bambi Bucket Interface Kit:		
1) Inspect the bambi bucket interface I/A/W Maintenance Manual Supplement 7, Paragraph 4-2	________	
H. G1000H Integrated Flight Deck:		
1) Inspect the G1000H I/A/W Maintenance Manual Supplement 8, Paragraph 1.3.3	________	
20. POST INSPECTION		
A. Lubrication and servicing:		
1) Ensure all required items have been lubricated and serviced per the maintenance manual lubrication and servicing charts	________	Para. 4-30
B. Correct all discrepancies and install all cowling, access panels, doors, and other items removed for this inspection	________	
C. Operation Check	________	
1) Engine Run-Up:		
Check engine/post flight requirements in the Rolls-Royce 250-C20 Series Operation and Maintenance Manual. Run the aircraft I/A/W the Enstrom TH-28, 480, or 480B Rotorcraft Flight Manual. Check the engine instruments, fuel quantity and flow systems for proper operation.	________	
2) Flight Control Check:		
Whenever disassembly of the flight controls, especially the removal of the main rotor hub, has been accomplished, it is recommended that a test flight be performed. See the Enstrom TH-28/480 Series Maintenance Manual for full details.	________	
WARNING		
Test flight to be performed by authorized personnel only.		
3) Avionics and Flight Instruments: Check operation.	________	
D. Post Operation Check:		
1) Inspect the engine compartment for oil and fuel leaks	________	
E. Enter the inspection compliance in the airframe and engine logbooks as applicable	________	
F. Perform a maintenance test flight		
WARNING	________	
Test flight to be performed by authorized personnel only.		

4-46. 200 Hour Inspection - Periodic Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

200 HOUR INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
1. GENERAL INSPECTION		
A. Perform a complete 100 Hour/Annual Inspection	________	
2. OIL COOLING SYSTEM		
A. Inspect and replace the scavenge/external oil filter element	________	
3. MAIN ROTOR ASSEMBLY		
A. Inspect the main rotor retention assemblies for:		
1) Evidence of ratcheting or binding in the feathering bearings	________	
2) Remove the retention assembly dust cover.		Fig. 9-7,(18)
a) Inspect the T-T strap retention block and pin assembly for condition and security	________	Fig. 9-7.1, (29)
b) Inspect for evidence of O-ring/seal leakage	________	
3) Evidence of a sheared roll pin at the hinge pin	________	
4) Evidence of ratcheting or binding of the flapping bearings	________	
5) Proper security of the hinge pin locking tang washer	________	Fig. 9-6,(5)

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4-47. 300 Hour Inspection - Periodic Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

300 HOUR INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
1. GENERAL INSPECTION		
A. Perform a complete 100 Hour/Annual Inspection	________	
B. Remove the following components:		
1) Upper plenum/air inlet assembly	________	
2. AIRCRAFT STRUCTURE & FUSELAGE		
A. Replace the airframe mounted fuel filter element (if applicable)	________	
3. MAIN ROTOR TRANSMISSION		
A. Inspect the ring and pinion gears for wear and spalling	________	

INTENTIONALLY LEFT BLANK

4-48. Special Scheduled Inspection - Periodic Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

SPECIAL SCHEDULED INSPECTION CHECKLIST INITIAL EACH ITEM AFTER ACCOMPLISHMENT	INITIAL	REF
1. MAIN ROTOR TRANSMISSION		
A. Retorque the aft pinion nut 20-25 hours after installation	________	
2. DRIVE BELT SYSTEM		
A. Inspect the alignment of the Lower Pulley Drive System in accordance with paragraph 11-17 every 12 months	________	Para. 11-17
B. Inspect the individual elements of the flex packs, P/N ECD4024-1, for cracks and general condition every 12 months	________	
C. Inspect the drive belt every 50 hours for the following:		
1) Contact with the upper plenum/air inlet	________	Para. 13-29, B
2) Protruding cord on both the forward and aft edges of the drive belt around the circumference of the lower pulley	________	
3) Condition of the belt that has been edge-sealed	________	SDB T-046
3. OIL COOLING SYSTEM		
A. Perform bypass indicator functional test on the Purolator/Facet scavenge/external oil filter assembly in accordance with paragraph 13-71.1 every 600 hours	________	Para. 13-71.1
B. For aircraft operated in dusty environments, inspect the blower impeller for dirt accumulation every 200 hours and clean as required	________	
4. NEOPRENE COMPONENTS		
A. Inspect components comprised of neoprene materials when helicopter has been in temperatures below -20° C (-4 °F). Visually examine components for breaks, chips, cracks or other deteriorating indications and replace as needed. Neoprene locations:		
1) Vibration dampening pad in tailcone structure	________	
2) Gasket installed between fuel bladder skin and spacer in installation of fuel cap assembly	________	
3) Rubber absorber between drag link and pylon mount location in drive assembly	________	

SPECIAL SCHEDULED INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
4) Clamps attaching the tail rotor guard	________	
5) Isolator on the oil tank support	________	
5. TAIL ROTOR TRANSMISSION		
A. For aircraft used in agricultural operations (see SIL T-049):		
1) Inspect the tail rotor transmission gears for cracked or broken teeth every 50 hours.	________	
2) In the event of a tail rotor transmission chip indication, inspect the chip detector for the presence of metal particles.	________	Para. 4-57,B Para. 4-57,D
6. MAIN ROTOR BLADES		
A. Perform reapplication of corrosion prevention compound at a minimum once every two years. Shorter intervals may apply to aircraft operating in moderate and severe corrosion environments, as identified in SIL T-035.	________	Para. 4-88 SIL T-035

(8) Slowly move the cyclic forward, aft, right, and left and check for the proper response of the main rotor tip path.

(9) Trim the cyclic stick to neutral and release the cyclic grip. Visually watch the cyclic stick for motion. The cyclic stick should remain centered and still. Move the cyclic fore and aft without trimming and check for smoothness. No hard vibrations should be present.

NOTE

If hard vibrations are present or the cyclic wanders, either the aircraft will have to be tracked or a problem exists in the main rotor control system.

C. Hover Checks:

(1) With the N_2 set at 97% ±1%, release the collective friction and slowly increase collective pitch. While making minor adjustments to the controls, watch for proper response as the aircraft becomes light on the skids. Check that the N_2 increased to 102% ±1%. Adjust the N_2 to 103%.

(2) Bring the aircraft to a hover. Check that the cyclic rigging appears normal for the wind, weight, and center of gravity conditions. Compare the torque indication to the predicted hover torque in the performance charts in the Rotorcraft Flight Manual.

(3) Check the flight controls as follows:

a. Hover into the wind.

b. Check all flight controls for the correct response using small inputs to each axis.

c. The cyclic position should be centered laterally and longitudinally with two personnel onboard.

d. The pedals should be nearly neutral, with the right pedal maybe only ½ inch forward of the left pedal.

(4) Check the engine and transmission instruments for normal operation indications.

(5) Check the flight instruments for normal operation indications.

D. Engine Power Assurance Check:

NOTE

For the most accurate data, an engine power assurance check should be performed with the compressor bleed valve closed. If a higher TOT (higher than what is depicted in Figure 4-10 of the *480B Rotorcraft Flight Manual*) is required in a hover, refer to *Rolls-Royce M250-C20 Series Operation and Maintenance Manual*, Figure 22, *Compressor Bleed Control Valve Operation*, to verify the bleed valve was closed at the time of the check. In some instances, the helicopter may need to be at max gross weight to obtain a high enough N_1 operation to close the valve.

(1) Establish a stable hover.

(2) Record the pressure altitude, OAT, torque, and TOT.

(3) Compare the actual TOT with the TOT determined from the power assurance check chart (480 Rotorcraft Flight Manual, Figure 4-10, or 480B Rotorcraft Flight Manual, Figure 4-7, as applicable).

(4) Record the N_1 speed at the time of the power assurance check. Refer to the *Rolls-Royce M250-C20 Series Operation and Maintenance Manual*, Figure 22*, Compressor Bleed Control Valve Operation*.

E. Before Takeoff:

(1) N_2 - 103%

(2) Systems - Check engine, transmission, electrical, and fuel systems indications.

(3) Communications and navigation radios - Set.

(4) Transponder - ON and squawking altitude.

(5) Crew and unused seats - Check seat belts and shoulder harnesses fastened.

F. [Deleted]

G. Slow Speed Cruise Checks:

(1) Stabilize at 60 KIAS for 1 minute with the aircraft in trim. Record the N_2, torque, TOT, N_1, fuel flow and fuel remaining (optional equipment), pressure altitude, and OAT.

(2) The cyclic should be centered laterally and slightly forward of neutral longitudinally. The right pedal may be approximately neutral to ½ inch forward.

(3) Check the airspeed indicators. The difference should not be more than 5 KIAS (TH-28).

(4) Note any abnormal vibration level.

H. High Speed Cruise Checks:

(1) Increase power to the Maximum Continuous Torque Limit. Do not exceed V_{NE}.

(2) Stabilize for 1 minute with the turn needle and ball centered. Record the N_2, torque, TOT, N_1, fuel flow, fuel remaining, pressure altitude, and OAT.

(3) The cyclic should be centered laterally and should have at least 1 inch of travel remaining longitudinally before contacting the stop ring at the base of the cyclic stick. The right pedal may be approximately 1 inch forward. The collective should have at least ¾ inch of slider gap remaining before the collective contacts the up stop on the slider.

(4) Check the airspeed indicators. The difference should not be more than 5 KIAS (TH-28).

(5) Note and record the pitch attitude. The V_H pitch attitude should not exceed 6° nose down as referenced to the moveable attitude reference symbol in the attitude indicator (optional equipment) when it is positioned at the zero pitch reference line.

(6) Note any abnormal vibration level.

I. Autorotation Checks:

NOTE

Perform the autorotation check with as light a gross weight as possible, i.e., pilot and minimum fuel.

(1) Climb to an altitude 1000 feet above the cruise altitude. Level off and stabilize at 60 KIAS.

NOTE

Perform the autorotation rpm check at an altitude that will allow for power recovery before reaching 500 feet AGL. Have a suitable forced landing area within range.

CAUTION

If the rotor rpm exceeds 385, adjust the collective to maintain rotor rpm below 385.

(2) Lower the collective full down and establish a stabilized 60 KIAS low power descent.

(3) Retard the throttle to ground idle.

(4) Record the stabilized autorotation rpm and fuel remaining (optional equipment 480) when passing through the target (cruise) altitude.

(5) Check the airspeed indicators (TH-28). The difference should not be more than 5 KIAS.

(6) Note any abnormal vibration level.

(7) Advance the throttle to full ON and make a power recovery.

(8) Compare the autorotation rpm to the Autorotational RPM Correction Chart (Figure 4-11). The autorotation rpm should be within ±5 rpm as indicated on the chart.

J. Post Test Flight:

(1) Shut the aircraft down I/A/W the Rotorcraft Flight Manual.

(2) Perform a postflight inspection.

(3) Record any discrepancies found during the test flight and notify maintenance personnel for corrective action.

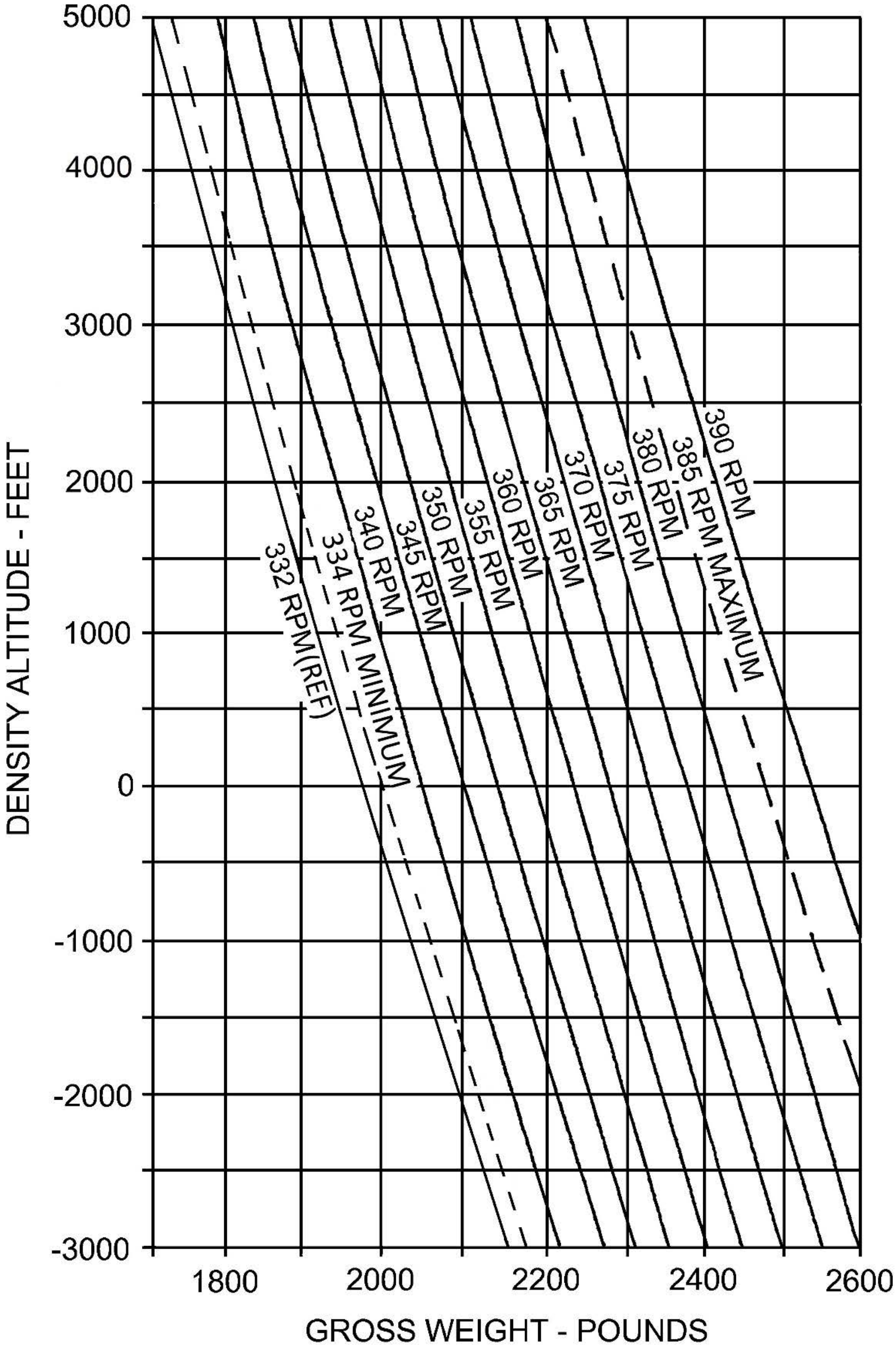

Figure 4-11. Autorotational RPM Correction Chart

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4-70. Cleaning

4-71. Exterior - Cleaning

NOTE

The exterior of the aircraft is painted with a high quality paint. Proper maintenance of this finish will provide corrosion protection as well as an attractive finish.

NOTE

Do not wash the aircraft using pressure washing equipment.

A. Wash the exterior as follows:

(1) Check the security of all doors and access panels before starting the washing operation.

(2) Flush the entire aircraft free of dirt.

NOTE

Avoid direct spraying of the main rotor hub, tail rotor assembly, and tail rotor driveshaft bearings to prevent the loss of lubricant. These areas should be purged with grease after washing to eliminate any moisture.

(3) Using a soap and water solution and a soft cloth pad, wash a specific area using a circular motion.

(4) Flush the washed area immediately.

(5) Repeat steps c and d until the entire aircraft is clean.

(6) Rinse with clear water and dry with a chamois.

B. Wax the exterior as follows:

(1) Clean the aircraft exterior as described in the washing procedure.

(2) Using a soft cloth, apply a good quality paste wax to the painted exterior using a circular motion.

(3) Polish the waxed area to a high luster using a clean and dry soft cloth.

4-72. Interior - Cleaning

NOTE

Do not use a solvent type cleaner to clean the inside of the cabin shell.

A. Clean the interior as follows:

(1) Clean the dirt and dust from the cabin using a small broom or brush.

(2) Vacuum the interior to remove any remaining dirt.

(3) Use a good quality upholstery cleaner to remove dirt and grease from the seat cushions and the floor covering.

4-73. Plexiglass - Cleaning

A. Wash the plexiglass using your bare hand or a clean, soft cloth and a mild soap and water solution. Rinse with clean water.

B. Dry the surface with a soft, clean cloth or tissue and polish it with a windshield cleaner especially approved for use on aircraft transparent plastics.

CAUTION

Do not use coarse abrasive type soaps as they can cause fine scratches in the plexiglass.

C. Removal of fine scratches from the plexiglass is accomplished by polishing and waxing the glass using Meguiar's Mirror Glaze - Plastic Cleaner MGH-17.

4-74. Aircraft Preservation and Storage

4-75. General - Aircraft Preservation and Storage

A. Aircraft that see low usage or are stored for extended periods exhibit an accelerated rate of corrosion damage. Special attention should be given to aircraft inactive in a corrosive atmosphere (coastal, high humidity, air pollution, or sandy areas) to assure components remain in a serviceable condition.

B. The following maintenance procedures are categorized in terms of aircraft with low usage and those scheduled to be inactive for an extended period. This information is intended to cover both hangered and outdoor conditions unless otherwise noted and is subject to owner/operator judgment regarding the helicopter's operating environment and should be considered in addition to the normal servicing requirements.

NOTES

Wash and wax the helicopter prior to any type of storage.

For fuel cell longevity, maintain a full fuel level during periods of low usage or extended storage.

4-76. Low Usage - Aircraft Preservation and Storage

NOTE

Aircraft flown for short periods several times a month.

NOTE

Preserve the engine compressor I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual if warranted by local corrosive conditions.

A. Ground run the aircraft every 14 days until normal operating temperatures for the engine are obtained.

B. Position the main rotor blades so that the tail rotor assembly is horizontal to the ground. Tie down the main rotor blades with the collective locked halfway up to relieve the steady load on the lamiflex bearings or T-T straps, as applicable.

C. Install the main rotor hub and tail rotor assembly covers.

D. Protect the windshields and interior equipment with suitable dust covers and/or solar shields.

NOTE

If the interior temperature of the cabin exceeds 150°F/66°C, ventilate the cabin by opening the doors or vents.

E. Cover the pitot and static air vents.

F. Wash and wax the aircraft monthly to remove contaminants.

G. Prior the next flight, complete the following:

(1) Remove all covers and tiedowns.

(2) Perform a preflight inspection.

NOTE

When inspecting oil levels, inspect for evidence of water contamination.

(3) If preserved, depreserve the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

4-77. Storage Up to 45 Days - Aircraft Preservation and Storage

A. Complete steps A through F of paragraph 4-76.

B. Disconnect the battery.

C. Remove the main rotor blades.

NOTE

Store the main rotor blades in a horizontal position on wood racks cut out to the contour of the leading edge of the blades. Use care in handling the blades to prevent damage to the blades and trim tabs.

D. Return the aircraft to service using the following procedures:

(1) Remove all covers and tiedowns.

(2) Connect the battery.

(3) Install the main rotor blades.

(4) Perform a preflight inspection.

NOTE

When inspecting oil levels, inspect for evidence of water contamination.

(5) Lubricate the aircraft I/A/W the 50 Hour requirements.

(6) Depreserve the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

4-78. Storage from 45 Days to 6 Months - Aircraft Preservation and Storage

A. Complete steps A through C of paragraph 4-77.

B. Remove the battery and store in a cool dry area. Clean the battery shelf if required (AC 43.13-1B).

NOTE

The aircraft may require an annual inspection.

C. Return the aircraft to service following the procedures in step D of paragraph 4-77.

4-79. Storage For Longer Than 6 Months - Aircraft Preservation and Storage

A. Complete steps A and B of paragraph 4-78.

B. Hangar the aircraft.

C. Return the aircraft to service using the following procedures:

(1) Remove all covers, tiedowns, and shields.

(2) Service the battery I/A/W the manufacturer's instructions. Install and connect the battery.

(3) Install the main rotor blades.

(4) Perform a 100 hour periodic inspection and lubricate I/A/W the 100 hour requirements.

NOTE

The aircraft may require an annual inspection.

(5) Depreserve the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

4-80. Preventive Maintenance for Corrosion Control

4-81. General Information - Preventive Maintenance for Corrosion Control

The airframe is fabricated of high strength aluminum and steel alloys and should be inspected regularly for signs of corrosion. Any areas where the protective finishes may have been scuffed, scratched, chipped, or worn off should be treated temporarily to control the onset of corrosive action. Then at the earliest convenience a permanent refinish of the area should be accomplished. Another very important step in any corrosion prevention program is regularly scheduled washing and waxing of the aircraft surfaces.

It is extremely important that the main rotor and tail rotor blade coatings be maintained and protected against oxidation, erosion, and atmospheric residues which are continually attacking these components during their service life. Once this coating is breached and corrosive action is allowed to propagate unchecked, premature bond line corrosion will occur resulting in early retirement of these components. Refer to paragraph 4-88 for the corrosion prevention compound application procedure for the main rotor blades. Refer to the appropriate paragraphs in Section 9 of this manual for the inspection and repair procedures for the main and tail rotor blades. In coastal areas or wherever the air has a high moisture content, blade tape can be installed on the leading edge of the main rotor blades to help prevent the leading edge and bond line corrosion from occurring. In coastal areas, it is recommended that the blade tape be installed when the aircraft is placed into service.

4-82. Scheduled Field Preventive Maintenance Program

NOTE

This procedure is intended for the complete helicopter; however, give special attention given the main and tail rotor blades.

NOTE

Aircraft based in or near heavy industrial and/or metropolitan areas with heavy atmospheric pollution should use procedure "A" below.

NOTE

Do not wash the aircraft using pressure washing equipment.

A. Aircraft that are operated over salt water or coastal regions. Use the following procedures:

(1) Thoroughly flush the aircraft with fresh water daily.

(2) Wash the aircraft with mild soap and fresh water weekly.

NOTE

Use a good quality paste wax.

(3) Wax the aircraft every second week.

B. Aircraft that are operated in tropical or semi-tropical high humidity regions. Use the following procedures:

(1) Wash the aircraft with mild soap and fresh water weekly.

(2) Wax the aircraft every second week.

C. Aircraft that are operated in arid, moderate, or cold regions. Use the following procedures:

NOTE

This procedure may be suspended during cold or winter months if step 3 was accomplished prior to the cold season.

(1) Flush with fresh water weekly.

(2) Wash the aircraft with mild soap and fresh water monthly.

(3) Wax the aircraft every second month.

4-83. Component Preservation and Storage

4-84. Main Rotor Transmission

NOTE

This procedure applies to an uninstalled main rotor transmission.

A. Service the main rotor transmission (para. 4-12), or alternatively, completely fill the transmission. Refer to Table 4-1 for system capacity and approved oils (30 weight engine oil is acceptable for storage).

B. Plug or cap the breather tube.

C. Plug the fitting on the pinion cover if the oil pump is removed.

D. Place the transmission in storage with the mast upright or placed sideways.

E. Every 90 days, move the transmission to allow oil to flow to all internal surfaces.

(1) Tip the transmission to horizontal or vertical, as appropriate, approximately 90° from its storage position.

(2) Tip the transmission back to storage position.

F. Turn the pinion approximately three times completely lubricate all moving parts.

G. Prior to returning the main rotor transmission to service:

(1) Remove the breather tube plug or cap, if installed.

(2) Install the oil pump, if removed.

(3) Drain the oil (para. 4-13).

(4) Service the main rotor transmission (para. 4-12).

4-85. Tail Rotor Transmission

NOTE

This procedure applies to an uninstalled tail rotor transmission.

A. Completely fill the transmission. Refer to Table 4-1 for system capacity and approved oils.

B. Bag the gearbox with a desiccant pack and store in a position as it would be installed on the aircraft.

C. Rotate the gearbox 10 rotations every month to maintain lubrication on all wear surfaces of the gearbox.

D. Prior to returning the tail rotor transmission to service:

(1) Drain the oil (para. 4-17).

(2) Service the tail rotor transmission (para. 4-16).

4-86. Main Rotor Blades – Application of Corrosion Prevention Compound

4-87. General Information

Several factors may lead to bond line separation and corrosion of the blades. During operational service, the polyurethane topcoat applied to the blade may gradually wear away due to erosion from airborne particulate matter or precipitation. Special care should be taken to prevent nicking or chipping of the paint in the bond lines. Also, operation of the main rotor blades in wet or high humidity environments can also significantly accelerate bond line separation and the onset of corrosion through moisture intrusion into the blade. Improper storage of the blades for extended periods of time can foster corrosion.

Proper use of effective corrosion control products is central to all corrosion prevention programs. This procedure identifies a Corrosion Prevention Compound (CPC) compatible with the Enstrom main rotor blade. Enstrom recommends the application of MIL-PRF-81309, Type II or III water displacing soft film CPC (Table 4-1). The water displacing CPC acts on contact by spreading across the exterior blade surfaces, displacing any moisture present, and leaving behind a residue to act as a further barrier after the carrier solvent has evaporated.

Application of the CPC identified in this procedure will not affect the surface finish of the painted/waxed blade if the manufacturer’s recommendations for application and the instructions in this procedure are followed.

WARNING

The CPC's listed in Table 4-1 do not affect the bonding agent in the main rotor blade. Enstrom does not recommend any other CPC's because their effect on the bonding agent is unknown.

NOTE

Blades delivered after March 5, 2010, have been treated with CPC during initial production and require repetitive CPC treatment (para. 4-88). Blades delivered before March 5, 2010, require an initial treatment of CPC (para. 4-88), the addition of the AN526C1032R6 screw, as well as repetitive CPC treatment (reference Table 4-2 and para. 4-48, 6).

4-88. Application of CPC

A. Remove the blades from the aircraft, if not already removed, and arrange them on a rack.

B. Prepare a P/N AN526C1032R6 screw, or equivalent, for insertion in the hole at the tip of each blade, 2.75" (69.9 mm) from the leading edge. (If a screw is presently installed, remove the screw.) Apply MIL-PRF-81309 Type II or III CPC (Table 4-1) to the threads of the screw and in the 1032 UNF tapped hole prior to torquing the screw. Standard torque values apply.

C. Remove the tip weight assemblies from the outboard end of each blade using the Main Rotor Blade Plug Tool (Enstrom P/N T-1656-3, or equivalent). Mark each assembly to designate its position as either the forward or aft location and which blade the assemblies were removed from.

D. Following the manufacturer's recommendations, using a pump or aerosol sprayer, spray a coating of CPC on the entire interior surface (i.e., interior blade cavity) of each blade.

E. Rotate or position the spray wand to coat all interior areas of the blade with particular attention given to the interior trailing edge structure.

F. Rotate and flip the blade to introduce a sloshing effect with the excess CPC. Ensure all interior areas of the blade are coated with the CPC.

G. Drain excess CPC from the blade.

NOTE

The CPC may produce toxic vapors. Use only in well ventilated areas. Avoid contact with skin and eyes. Avoid inhalation and ingestion. Follow the manufacturer's warning and safety recommendations.

Do not use synthetic wiping cloths or rags during application or clean up. The CPC will dissolve the fabric.

H. Reinstall the tip weight assemblies making sure they are installed in the same location from which they were removed.

I. Wipe off dirt or excess moisture from the exterior blade surface.

J. Following the manufacturer's recommendations, apply a coating of CPC over the entire exterior surface of the blades including the trailing edge seam.

4-89. Storage of CPC

NOTE

Unless otherwise specified, do not store the CPC at temperatures greater than 50°C (120°F).

WARNING

Keep the CPC away from open flames, heat, or sparks as they may be flammable.

A. Follow the recommendations provided by the manufacturer.

SECTION 5

WEIGHT AND BALANCE

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SECTION 5

WEIGHT AND BALANCE

TABLE OF CONTENTS

Paragraph	Description	Page

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NOTE

Pay particular attention to the algebraic signs when computing the weights, moments, and c.g.

D. Enter the weight of the change and the arm (the arm may be determined by using Figure 5-1 and measuring from a known datum point) into the correct blocks (Weight Added + / Weight Removed -).

E. Multiply the weight of the change by the arm and enter the information into the moment block. Ensure the correct algebraic sign is used.

F. Add or subtract the weight and moment of the change to or from the basic aircraft weight and enter the information into the "Running Basic Total" blocks.

G. Divide the moment by the weight and enter the information into the "Arm" block. This is the new or running "Basic Aircraft Weight".

H. To find the actual aircraft empty weight and c.g., subtract the engine oil information found on Form F-511-2 and recalculate the empty weight c.g.

Table 5-1. Weight and Balance Data - Engine Oil
(Engine Oil Reservoir Full - 12.0 Pints/6 Quarts)

Type Oil	Weight	Arm	Moment
MIL-PRF-7808	11.25 lb	153"	1721.3
MIL-PRF-23699	12.6 lb	153"	1927.8

NOTES

Refer to Enstrom Type Certificate Data Sheet for unusable fuel data for the TH-28 and 480 aircraft.

Fuel weight is based on the weight of Jet A fuel. The weight will vary for other fuel types.

Table 5-2. Weight and Balance Data - Unusable Fuel

Fuel System Type	Weight (lb)	Arm (in)	Moment (in-lb)
Standard (P/N 4122052)	11.4	143.4	1634.8
Aerazur Fuel Bladder (P/N 4122009)	2.0	143.4	286.8
Equipment Option: External Fuel Filter (P/N 4220035)	1.3	132.8	172.6

Table 5-3. Weighing Location Arms
(Mechanical Scales)

Weighing Location	Arm
Landing Gear, Left and Right	143.4"
Tail Rotor Transmission	369.7"

Table 5-4. Standard Equipment Locations

Item	Arm
Main Rotor Blades Installed on the Main Rotor Hub	143.4"

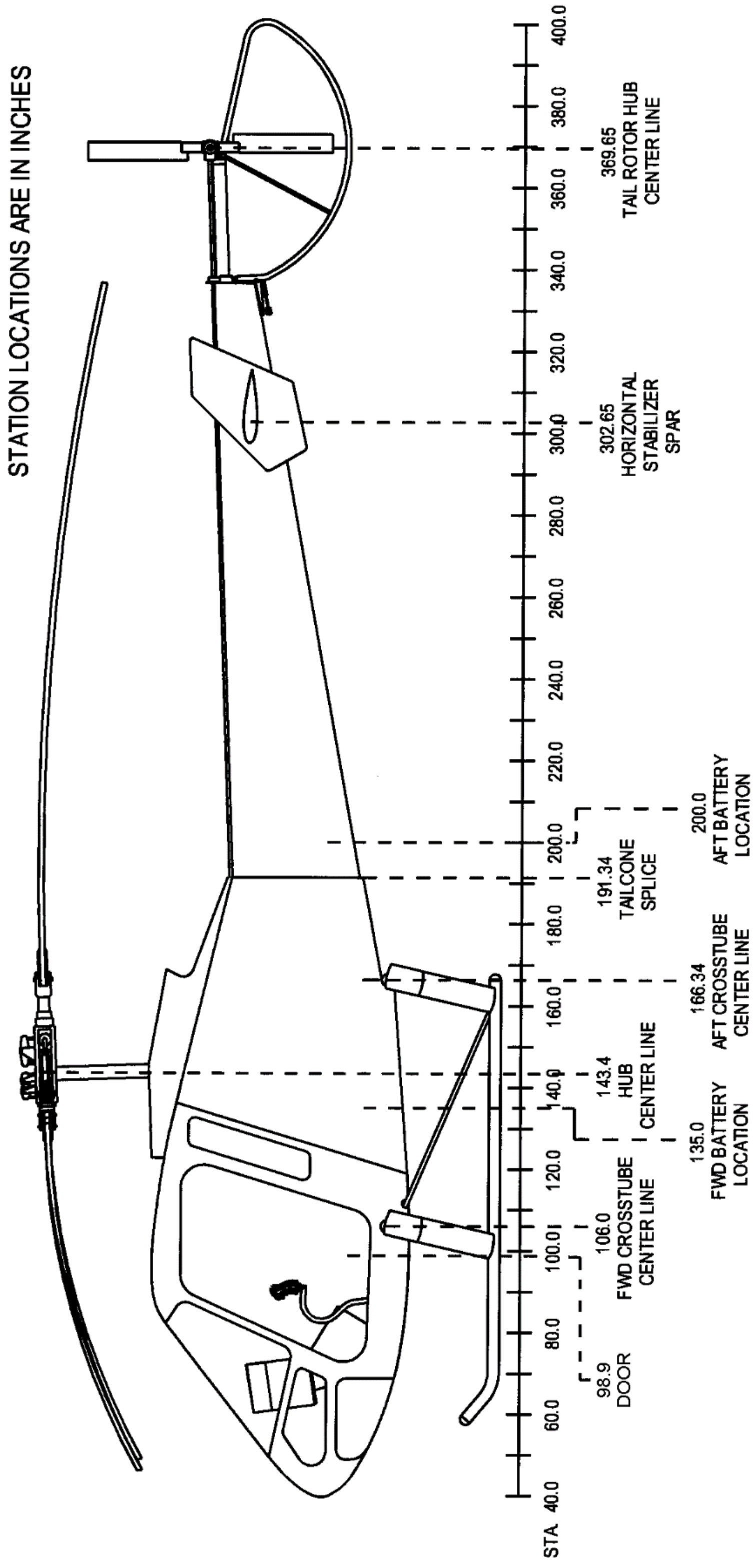

Figure 5-1. Aircraft Station Diagram

WEIGHT SHEET

MODEL ______ SERIAL NO. ________ REG. NO. _______ Date ________

WEIGHT POINT	SCALE-LBS.	TARE	NET. WT.	ARM	MOMENT IN. LBS.
LEFT GEAR			(W_L)	143.4	
RIGHT GEAR			(W_R)	143.4	
TAIL			(W_T)	369.7	
TOTAL	XXX	X		X	

LATERAL MOMENT					
LEFT GEAR				-48.0	
RIGHT GEAR				48.0	
TOTAL					

$$LCG = \frac{W_T\ (369.7) + (W_L + W_R)\ (143.4)}{W_T + W_L + W_R} = \text{-----------------}$$

$$= \text{---------------------} \text{IN.}$$

Date____________________ WEIGHED BY __________________________

F511-1

Figure 5-2. Form F-511-1

NOTE

Refer to Table 5-2 and Enstrom Type Certificate Data Sheet for unusable fuel data for the TH-28 and 480/B aircraft.

MODEL: 480B	SERIAL NO.:	REG. NO.:	DATE:	
AIRCRAFT WEIGHT AND BALANCE COMPUTATION				
		WEIGHT LBS.	ARM IN.	MOMENT IN-LB.
WEIGHT (AS WEIGHTED)				
PLUS: MISSING STD. EQUIPMENT - net			X	
LESS: OPT & SURPLUS WT. (next page)			X	
LESS: ENGINE OIL				
PLUS: UNUSABLE FUEL (per TCDS)				
WEIGHT				
	ACTUAL			
PLUS: ENGINE OIL			X	
PLUS: OPTIONAL EQUIPMENT (next page)			X	

ITEMIZED MISSING STD. EQUIP:	WEIGHT LBS.	ARM IN.	MOMENT IN-LB.

Notes: A/C weighed/calculated C.G. using the following data:
Oil: MIL-L-7808 is 7.74 lbs/gal, MIL-L-23699 is 8.4 lbs/gal.
Fuel Wt: Jet A: 6.7 lbs/gal
A/C weighed as a 3 place with dual controls, battery in forward location and operator's manual on shelf behind pilot's seat.

TOTAL BASIC WEIGHT AND C.G.			

Figure 5-3. Form F-511-2

ENSTROM TH-28 and 480 EQUIPMENT LIST

SERIAL NO.:

REG. NO.: DATE:

NO.	ITEM	ITEM WT.	ARM STD. PANEL	ARM OPT. PANEL
INSTRUMENTS – REQUIRED (STD EQUIPMENT)				
Airspeed Indicator		.7	70.7	70.6
Altimeter		1.10	69.9	69.8
Clock		.5	72.0	*
Compass		.75	68.5	68.5
O.A.T.		.13	86.5	86.5
Dual Tachometer		1.6	69.1	70.0
Torque Indicator		1.0	69.9	70.8
N1 Indicator		1.8	70.0	70.0
T.O.T. Indicator		1.0	70.9	70.9
Fuel Qty Indicator		1.0	70.1	71.4
Transmission Oil Temp.		1.0	69.4	69.8
Engine Oil Temp./Pressure		1.0	69.9	70.2
AMP/Volt		1.0	70.3	70.6
NO.	OPTIONAL EQUIPMENT	WT.	ARM	MOMENT IN-LB
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
	TOTAL		**X**	

* Varies per inst.

TH-28, 480: All Serial Numbers
Sheet 1 of 2

Figure 5-4. Form F-511-3

SECTION 6

ELECTRICAL SYSTEM

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ELECTRICAL SYSTEM

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SECTION 6

ELECTRICAL SYSTEM

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B. Both of the trim switches will not operate one of the trim actuators.

(1) Remove the trim switch units (TSU1 and TSU2) and reinstall the units in the other's location. Test the system by checking the same axis that did not work.

Replace the trim switch unit (TSU1 or TSU2) if the trim actuator that previously worked does not work with the trim switch unit connected to it. If the trim actuator does work, test the other axis of the system. If the trim actuator does not work, proceed to the next step.

(2) Determine if the microswitch assembly on the trim actuator is functioning properly.

Replace the trim actuator assembly if defective.

(3) Determine if the trim actuator motor is defective.

Replace the trim actuator assembly if defective.

6-9.1. Engine Idle Stop System – Troubleshooting

A. The idle stop pin fails to retract when the IDLE STOP circuit breaker is closed and either of the idle stop switches (SW89 or SW90) is closed.

(1) Determine if the collective wire harness is disconnected.

Connect the collective wire harness.

NOTE

If the idle stop can be operated with one of the switches but not the other, replace the switch if defective.

(2) Determine if the IDLE STOP circuit breaker is defective.

Replace the circuit breaker if defective.

(3) Determine if the idle stop relay (RL41) on the idle stop mechanism is functioning properly.

Replace the relay if defective.

(4) Determine if the solenoid (SOL2) is defective.

Replace the solenoid if defective.

6-10. Miscellaneous Electrical Components

6-11. Description – Miscellaneous Electrical Components (See Figure 6-1)

The miscellaneous electrical components consists of resistors, diodes, leads and wiring, panel lights, connectors, relays, potentiometers, shunts and terminal strips, switches, terminal boards, current limiters, fuses, solenoids, and LED illuminated components (Figure 6-3).

6-12. Removal – Miscellaneous Electrical Components

WARNING

Before removing or adjusting any electrical component, ensure all electrical power is off and the battery is disconnected.

A. Remove the attaching hardware, clamps, connectors, leads, or wiring.

B. Identify the connectors, leads, or wiring.

C. Remove the component.

6-13. Inspection – Miscellaneous Electrical Components

A. Inspect the potentiometers for security, corrosion, cracks, and correct resistance.

B. Inspect the switches for weak detents, security, corrosion, faulty operation, and continuity in the ON position and infinity in the OFF position.

C. Inspect the plugs, connectors and receptacles for security, contact corrosion, damaged contacts, broken wires, faulty contacts, insert cracks, and faulty insulation.

D. Inspect the leads and wiring for loose terminals, chafing, corrosion or deteriorated condition, faulty or damaged insulation, excessive mechanical stress, broken strands, damaged shielding, shorted shielding, routing and mounting conditions.

(1) Inspect the pylon grounding tabs for corrosion and presence of paint under the mounting hardware.

E. Inspect the shunts and terminal strips for corrosion, security, deep scratches, physical damage, deformity, and discoloration (indicating excessive overload).

F. Inspect the relays for loose connections, damaged or broken terminals, damage to the case, and evidence of corrosion, pits, or discoloration (indicating arcing due to loose connections, internal shorting, or excessive overload).

G. Inspect the terminal boards for crack, corrosion, and security.

H. Inspect the panel lights for faulty bulbs, security, and corrosion.

I. Inspect the resistors for loose connections, security of mounting, and apparent damage. Inspect for correct resistance value using an ohmmeter.

J. Inspect the diodes for loose connections and broken leads. Check suspected faulty diode front to back conductivity ratio with an ohmmeter.

K. Inspect the current limiter for loose connections, security of mounting, and apparent damage. Inspect the current limiter for continuity with an ohmmeter.

L. Remove the fuses from the holders to visually inspect for a blown fuse or check the continuity of the fuses using a multimeter (480 only).

M. Inspect the solenoids for security, corrosion, cracks, damage, and mechanical stress.

N. Inspect the LED switches, lights, or panels for security and failed circuits.

6-14. Repair – Miscellaneous Electrical Components

A. Tighten loose terminal connectors, mounting hardware, and electrical component attachments.

B. Replace miscellaneous electrical components that fail to meet the inspection requirements.

C. Clean corrosion from the connectors and receptacles with contact cleaner.

D. Remove corrosion and paint, if present, under the mounting hardware at the pylon grounding tabs.

6-15. Installation – Miscellaneous Electrical Components

A. Install the electrical component and secure with the attaching hardware, clamps, or cable ties.

B. Connect the identified terminals and/or connectors.

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NOTE

Some battery manufacturers may specify a different voltage setting for operations in certain temperature environments. Consult the battery manufacturer's manual for additional guidance.

(2) The setting for a Gill G-641 lead acid battery should be as follows:

Operating Temperature (°F)	Minimum	Nominal	Maximum
120	27.1	27.5	27.8
90	27.6	28.0	28.3
60	28.1	28.5	28.8
30	28.6	29.0	29.3
< 0	29.1	29.5	29.8

(3) The setting for a 7641-20 VRLA battery should be 28.6 Vdc.

E. If required, remove the rubber plug (Thales Avionics/Auxlec) or open the access cover (APC) from the front side of the GCU and adjust the voltage regulator.

F. Turn off the communications, navigation, and instrument systems. Read and record the voltage. The voltage should be the same as was set in step D or E. If the voltage varies more than ± 0.5 Vdc between a load and no load condition, replace the GCU.

6-69. Generator Relay

6-70. Description – Generator Relay

The generator relay (RL4 or RL40), located on the right side of the cockpit bulkhead in the engine compartment, connects generator power to the electrical bus and is controlled by the GCU. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-71. Generator Switch

6-72. Description – Generator Switch

The generator switch (CB/SW3) installed in the Thales Avionics/Auxilec Starter/Generator System is a magnetic circuit breaker with a shunt trip element. The generator control switch (SW62) installed in the APC Starter/Generator System is a 2 pole, 3 position switch. The generator control switch (CB/SW3 or SW62) controls the power to the GCU. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-72.1 Generator Off Light Relay

6-72.2 Description – Generator Off Light Relay

The generator off light relay (RL19), located below the cockpit floor in the right side of the keel assembly, next to terminal strip T5, removes the ground potential from the caution segment circuit of the generator system when the system is operating properly. The relay is energized when the generator switch (SW62) is turned ON and electrical power is applied to the relay's actuating coil. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-73. Generator Shunt

6-74. Description – Generator Shunt

The generator shunt, located on the right side of the cockpit bulkhead in the engine compartment, shares a proportional current flow with the ammeter. The proportional current flow is used to drive the ammeter portion of the dual volt/ammeter. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

NOTE

Aircraft prior to S/N 5134 have a 110 ampere system. Aircraft S/N 5134 and subsequent have a 150 ampere system.

6-74.1 Bus (150 Amp Electrical System)

6-74.2 Description – Bus

The electrical bus distributes the electrical power to the electrically powered systems. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-75. Main Electrical Terminal Strip (110 Amp System)

6-76. Description – Main Electrical Terminal Strip

The main electrical terminal strip (T1) distributes the electrical power to the electrically powered systems with the exception of the hour meter. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-77. Current Limiter

6-78. Description – Current Limiter

On aircraft prior to S/N 5134, the current limiter (F1), located on the right side of the cockpit bulkhead in the engine compartment, is a 100 ampere fusible link and protects the main electrical terminal strip (T1) from overloads. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

On aircraft S/N 5134 and subsequent, the current limiter (F1), located on the right side of the cockpit bulkhead in the engine compartment, is a 150 ampere fusible link and protects the electrical bus from overloads. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

ENG CHIP	MAIN XMSN CHIP	TAIL CHIP
ENG OIL TEMP	MAIN XMSN HOT	DRIVE BRG HOT
ENG OIL PRESS	BATT HOT	SPARE
ENG INLET AIR	BATT TEMP	DC GEN
FUEL FILTER	FUEL LOW	ENG ANTI-ICE

TH-28/480 Standard Configuration

ENG CHIP	MAIN XMSN CHIP	TAIL CHIP
ENG OIL TEMP	MAIN XMSN HOT	DRIVE BRG HOT
ENG OIL PRESS	MRGB PRESS	SPARE
ENG INLET AIR	SPARE	DC GEN
FUEL FILTER	FUEL LOW	ENG ANTI-ICE

480: S/N 4042 and Subsequent
480B: Prior to S/N 5136

ENG CHIP	MAIN XMSN CHIP	TAIL CHIP	FUEL FILTER
ENG OIL TEMP	MAIN XMSN HOT	DRIVE BEARING HOT	A/F FUEL FILTER
ENG OIL PRESS	MAIN XMSN PRESS	BATT TEMP	FUEL LOW
ENG INLET AIR	DC GEN	BATT HOT	SPARE
ENG ANTI-ICE	LDG LIGHT ON	LDG LIGHT PULSE	CARGO HOOK ARMED

Note: The wording layout of an individual segment may vary from that shown above.

480B: S/N 5136 and Subsequent

Figure 6-4. Caution Panel

Table 6-1. Caution Panel Segments

SEGMENT	COLOR	DESCRIPTION OF FAULT
ENG CHIP	**AMBER**	Engine scavenge oil has ferrous metal fragments
MAIN XMSN CHIP	**AMBER**	Main transmission chip detector has detected ferrous metal fragments
TAIL CHIP	**AMBER**	Tail rotor transmission chip detector has detected ferrous metal fragments
FUEL FILTER	**AMBER**	Pressure drop in the fuel filter exceeds 1.3 psi and filter bypass is impending
ENG OIL TEMP	**AMBER**	Engine oil temperature is above 107°C
MAIN XMSN HOT	**AMBER**	Main transmission oil temperature is above 107°C
DRIVE BRG HOT	**AMBER**	Either the forward or aft lower pulley bearings are above 120°C
A/F FUEL FILTER	**AMBER**	Airframe fuel filter bypass is impending
ENG OIL PRESS	**AMBER**	Engine N_1 RPM is above 78.5% and engine oil pressure is below 90 psi. (P/N ECD4078 caution panel: Engine N_1 RPM is above 78.5% and anytime engine oil pressure is below 50 psi or above 130 psi)
MAIN XMSN PRESS	**AMBER**	Pump inlet pressure is less than 4.4-5.9 psi/30.2-40.7 kPa of vacuum
BATT TEMP	**AMBER**	Battery temperature is at or above 63°C
FUEL LOW	**AMBER**	Fewer than 5 gallons/19 liters remaining
ENG INLET AIR	**AMBER**	Engine inlet particle separator partially blocked
DC GEN	**AMBER**	DC generator system failure
BATT HOT	**RED**	Battery temperature is at or above 71°C
SPARE	**AMBER**	Spare segment
ENG ANTI-ICE	**GREEN**	Engine anti-ice is activated
LDG LIGHT ON	**GREEN**	Landing light is activated
LDG LIGHT PULSE	**GREEN**	Pulse landing light is activated
CARGO HOOK ARMED	**GREEN**	Cargo hook electric release is armed

(2) Close the CAUT PNL circuit breaker. Check that the MASTER CAUTION annunciator/switches are flashing at a 2 Hz rate and the following segment lights in the caution panel are illuminated and flashing: ENG CHIP, MAIN XMSN CHIP, TAIL CHIP, ENG OIL PRESS, MAIN XSMN PRESS (MRGB PRESS, S/N 5135 and earlier), DC GEN, and FUEL LOW.

NOTE

The ENG CHIP, MAIN XMSN CHIP, and TAIL CHIP segments should only be illuminated for approximately 5 seconds and then extinguish due to programmed continuity sensors (PCS1, PCS2, and PCS3) in each detector circuit.

NOTE

The FUEL LOW segment should only illuminate if there is approximately 5-8 gallons or less of fuel in the aircraft fuel cells.

(3) Reset the MASTER CAUTION annunciator/switches by pressing in on the annunciator/switch. Check that the MASTER CAUTION annunciator/switches extinguish and the illuminated caution panel segments are in a steady bright condition.

(4) S/N 5135 and earlier: Place the TEST/CAUT PNL/DIM switch (SW14) in the TEST position. Check that the MASTER CAUTION annunciator/switch is illuminated and flashing and that all the caution panel segment lights are illuminated and with the exception of the ENG OIL PRESS, DC GEN, ENG ANTI-ICE, and possibly the FUEL LOW, all the segments are flashing. Release the switch and reset the MASTER CAUTION annunciator/switches.

(5) S/N 5136 and subsequent: Place the TST/BRT/DIM switch in the TST position. Check that the MASTER CAUTION annunciator/switch is illuminated and flashing and that all the caution panel segment lights are illuminated and with the exception of the ENG OIL PRESS, DC GEN, ENG ANTI-ICE, LDG LIGHT ON, LDG LIGHT PULSE, CARGO HOOK ARMED, and possibly the FUEL LOW, all the segments are flashing. Release the switch and reset the MASTER CAUTION annunciator/switches.

(6) S/N 5135 and earlier: Place the TEST/CAUT PNL/DIM switch (SW14) in the DIM position. Check that the ENG OIL PRESS, DC GEN, and possibly the FUEL LOW segments are in a steady dim condition. Jumper the tail rotor transmission chip detector to ground. Check that the MASTER CAUTION annunciator/switches and the TAIL CHIP segment are illuminated in a flashing bright condition and that the ENG OIL PRESS, DC GEN, and possibly the FUEL LOW segments are in a steady dim condition. Reset the MASTER CAUTION annunciator/ switches and check that the ENG OIL PRESS, DC GEN, TAIL CHIP, and possibly the FUEL LOW segments are in a steady dim condition. Place the TEST/CAUT PNL/DIM switch in the center position and check that the segment lights return to a steady bright condition. Remove the jumper from the tail rotor transmission.

(7) S/N 5136 and subsequent: Place the TST/BRT/DIM switch in the DIM position. Check that the ENG OIL PRESS, DC GEN, and possibly the FUEL LOW segments are in a steady dim condition. Jumper the tail rotor transmission chip detector to ground. Check that the MASTER CAUTION annunciator/switches and the TAIL CHIP segment are illuminated in a

flashing bright condition and that the ENG OIL PRESS, DC GEN, and possibly the FUEL LOW segments are in a steady dim condition. Reset the MASTER CAUTION annunciator/switches and check that the ENG OIL PRESS, DC GEN, TAIL CHIP, and possibly the FUEL LOW segments are in a steady dim condition. Place the TST/BRT/DIM switch in the BRT position and check that the segment lights return to a steady bright condition. Remove the jumper from the tail rotor transmission.

B. Engine, Main and Tail Rotor Transmission Chip Detector Lights:

(1) Because of the programmed continuity sensors (PCS1, PCS2, and PCS3) installed in the chip detector wiring, this portion on the caution panel circuitry is tested every time the BATT switch (SW10) is turned on. Also, for aircraft so equipped (S/N 5135 and prior and S/N 5256 and subsequent (if equipped with the legacy instrument panel)), the caution panel circuitry is tested when the caution panel test/dim switch is placed and held in the test position for 3 seconds or longer. If the segment lights do not illuminate when the BATT switch (SW10) is turned on or the caution panel test/dim switch is placed in the test position, there is a problem with the detector wiring. If the segments do not extinguish after approximately 5 seconds, there is a problem with that circuit's continuity sensor or the chip detector.

C. Engine Oil Temperature Light:

(1) Disconnect the electrical connector (J16 or J161) from the engine oil pressure/ temperature gauge and jumper pin A or pin J, as applicable, to ground. Check that the ENG OIL TEMP segment is illuminated.

(2) Remove the jumper and check that the ENG OIL TEMP segment is extinguished. Reconnect the electrical connector.

D. Main Rotor Transmission Oil Temperature Light:

(1) Disconnect the electrical connector (J14 or J164) from the transmission oil temperature gauge and jumper pin A to ground. Check that the MAIN XMSN HOT segment is illuminated.

(2) Remove the jumper and check that the MAIN XMSN HOT segment is extinguished. Reconnect the electrical connector.

E. Lower Pulley Bearing Temperature Light:

(1) Disconnect the electrical connector (J64 or J166) from the bearing temperature warning unit and jumper pin J to ground. Check that the DRIVE BRG HOT segment is illuminated.

(2) Remove the jumper and check that the DRIVE BRG HOT segment is extinguished. Reconnect the electrical connector.

F. Engine Oil Pressure Light:

(1) Close the ENG/TEMP PRESS circuit breaker. Connect a pressure source to the engine oil pressure transducer and apply pressure. The ENG OIL PRESS segment should extinguish at 50 psig increasing pressure and illuminate at 50 psig decreasing pressure.

(2) Remove the pressure source from the transducer and open the ENG TEMP/PRESS circuit breaker.

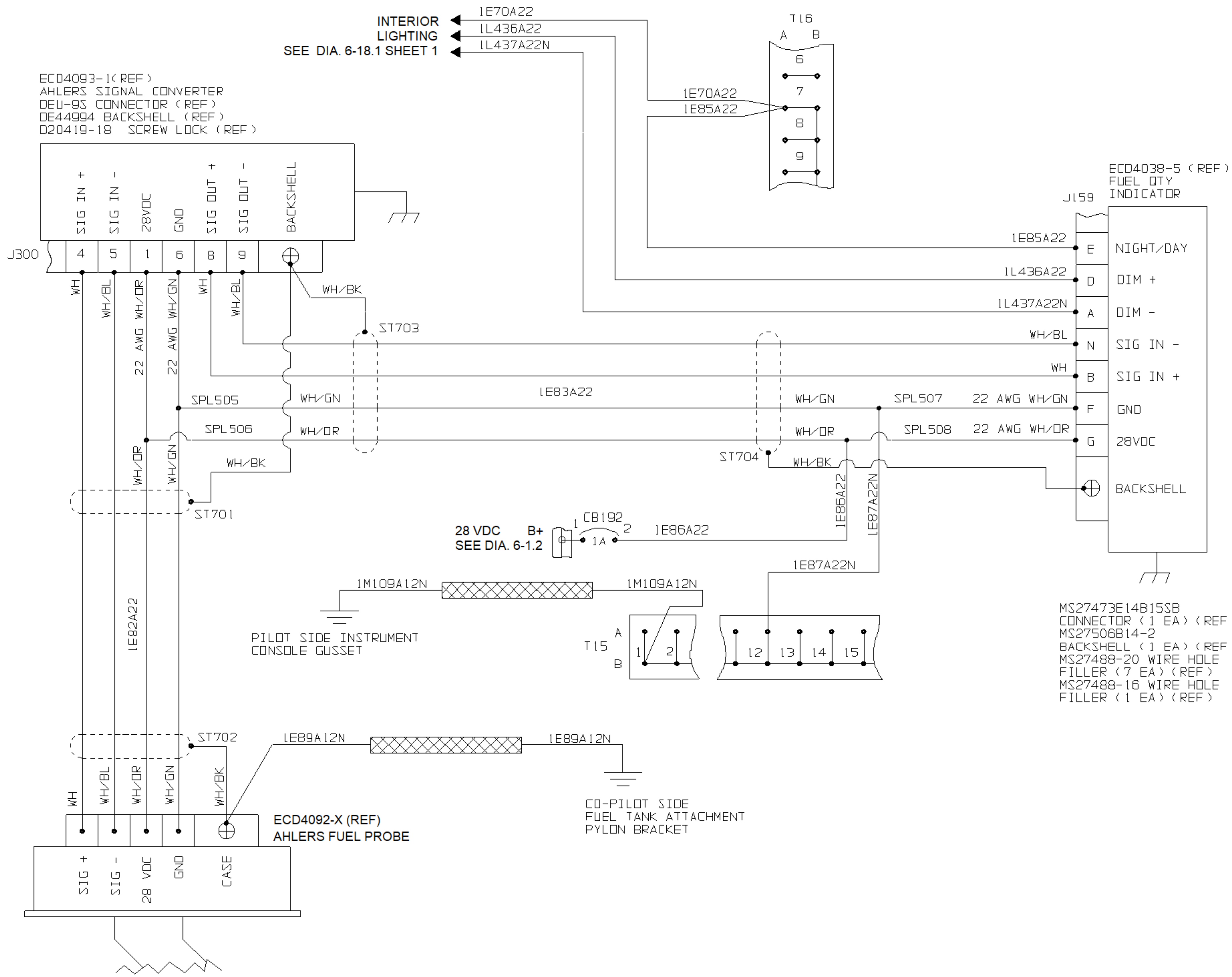
6-224. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Cable ties	Cable ties, Panduit Brand	SST1M-MP
Cable ties	Cable ties, Panduit Brand	SST1.5I-MP
Cable ties	Cable ties, Panduit Brand	SST2S-MP
Cable ties	Cable ties, Panduit Brand	ILT2S-M
Cable ties	Cable ties, Panduit Brand	CBR1M-M
Cable ties	Cable ties, Panduit Brand	CBR2M-M
Cable ties	Cable ties, Panduit Brand	CBR3I-M
Cable ties	Cable ties, Panduit Brand	CBR3S-M
Cleaner	Contact Cleaner (any brand)	
Connector rings	Connector rings, Panduit Brand	CR2-M

6-225. Schematic Diagrams

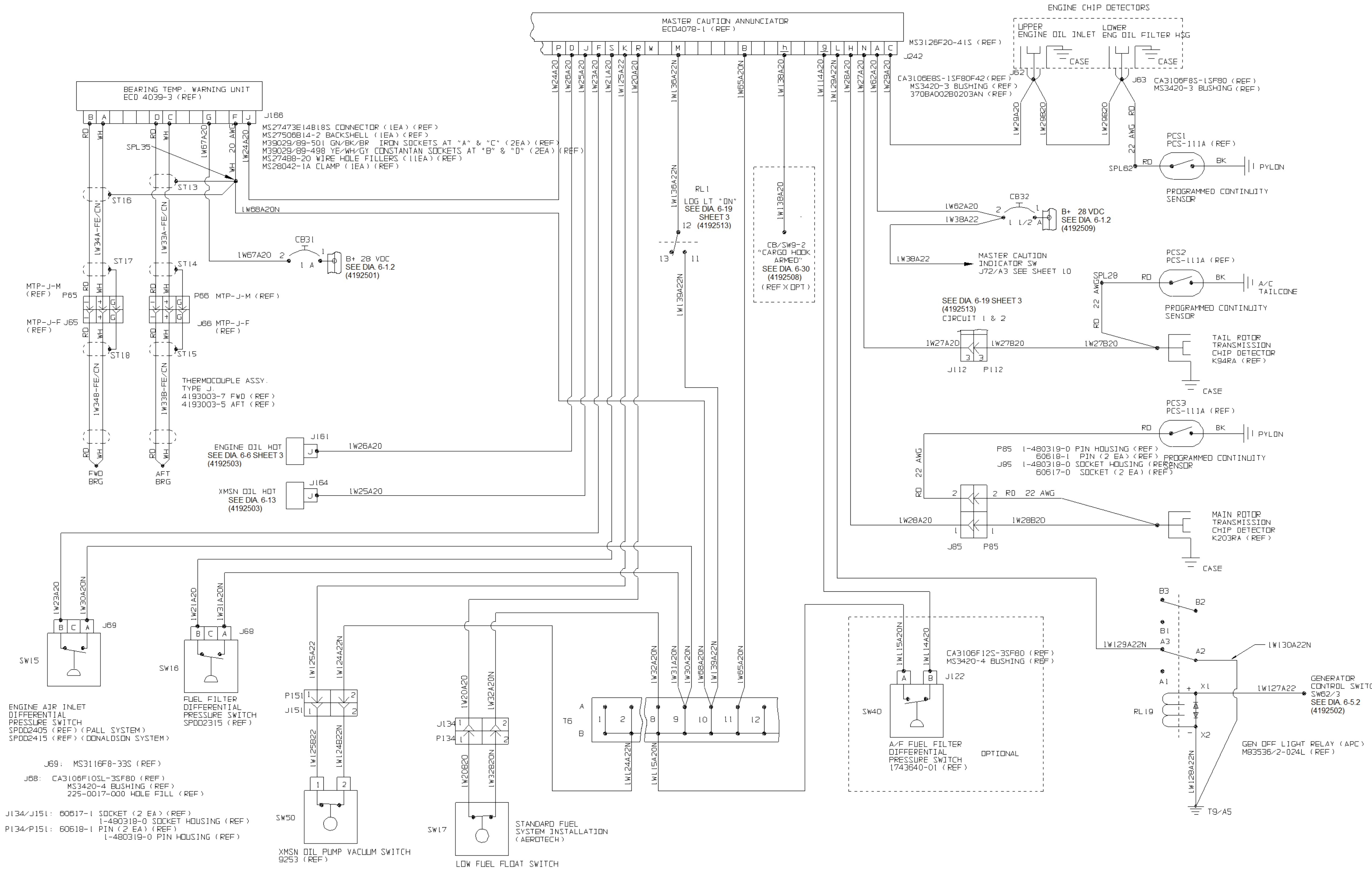
The following schematic diagrams are for standard equipped 480s and 480Bs. While some information concerning optional equipment is provided in the schematics, the majority of the schematic information for any optional equipment, especially customer specified avionics installations, is provided in a separate schematic package.

Table 6-3. List of Diagrams



Sheet 5 of 5
480B Serial Numbers: 5198 and Subsequent

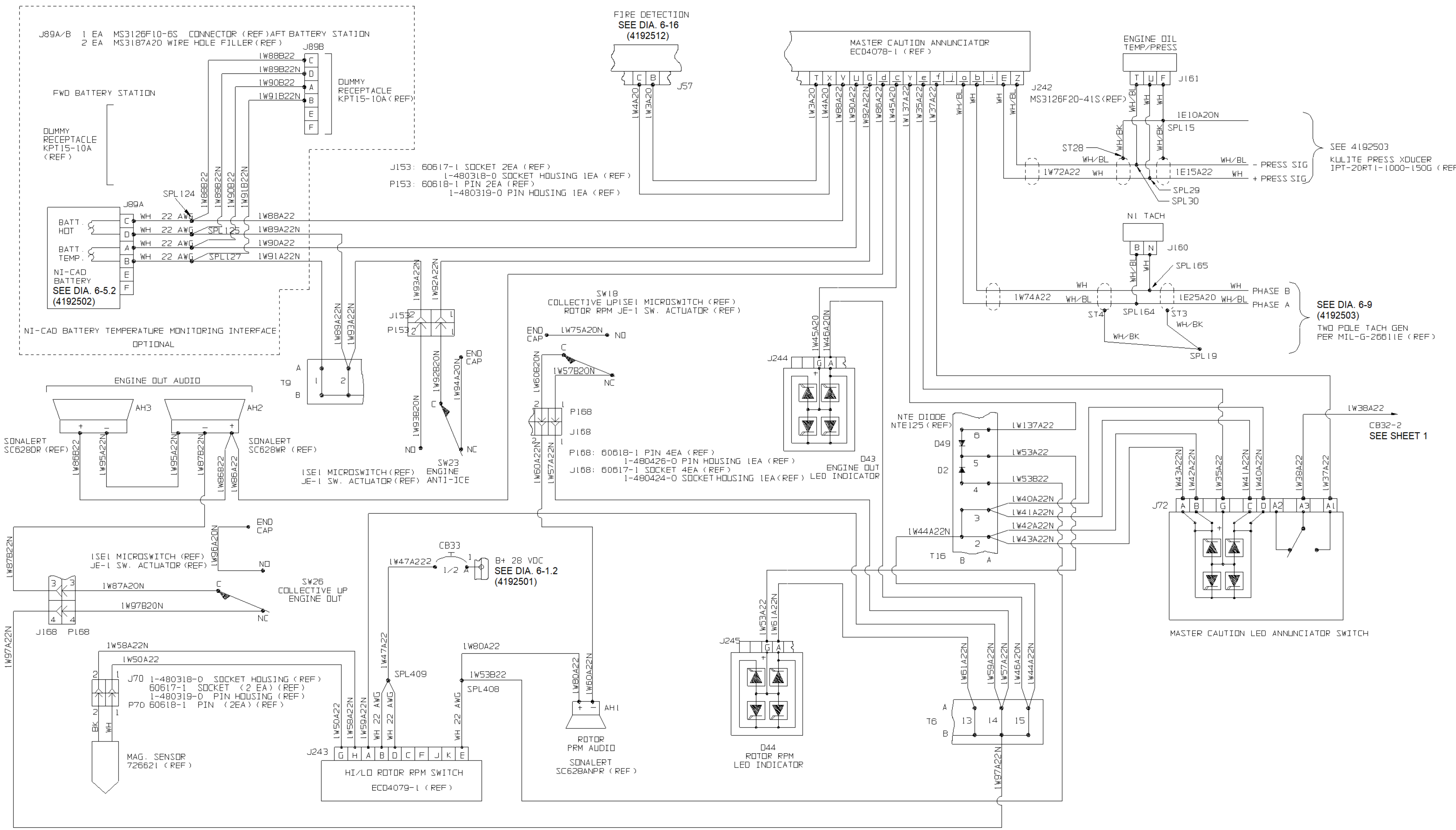
Diagram 6-12. Fuel Quantity System (Ref. 4192504 Rev. K)



Sheet 1 of 2

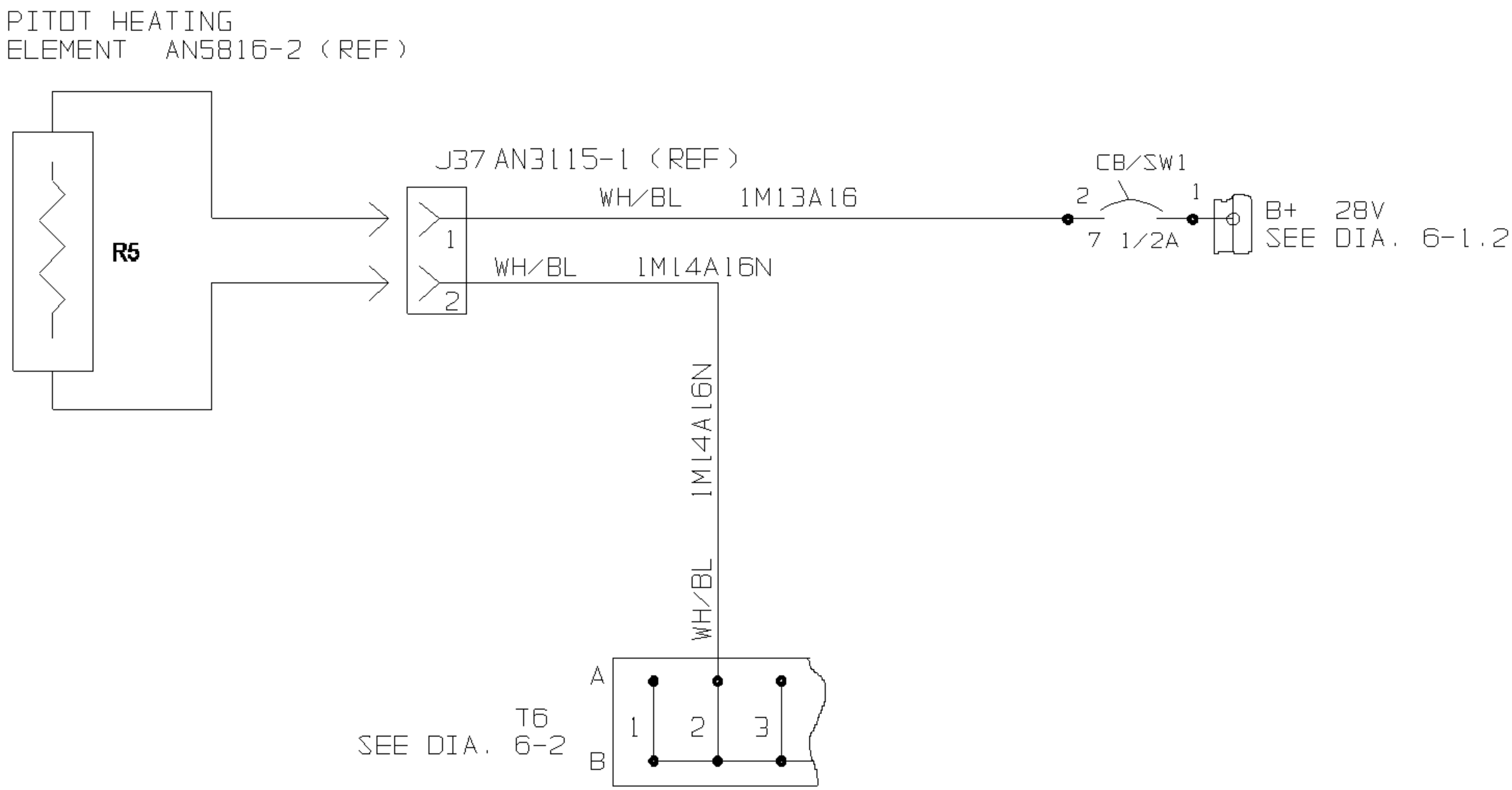
480B Serial Numbers: 5155 and Subsequent

Diagram 6-15.3. Caution/Warning System (Ref. 4192509 Rev. H)



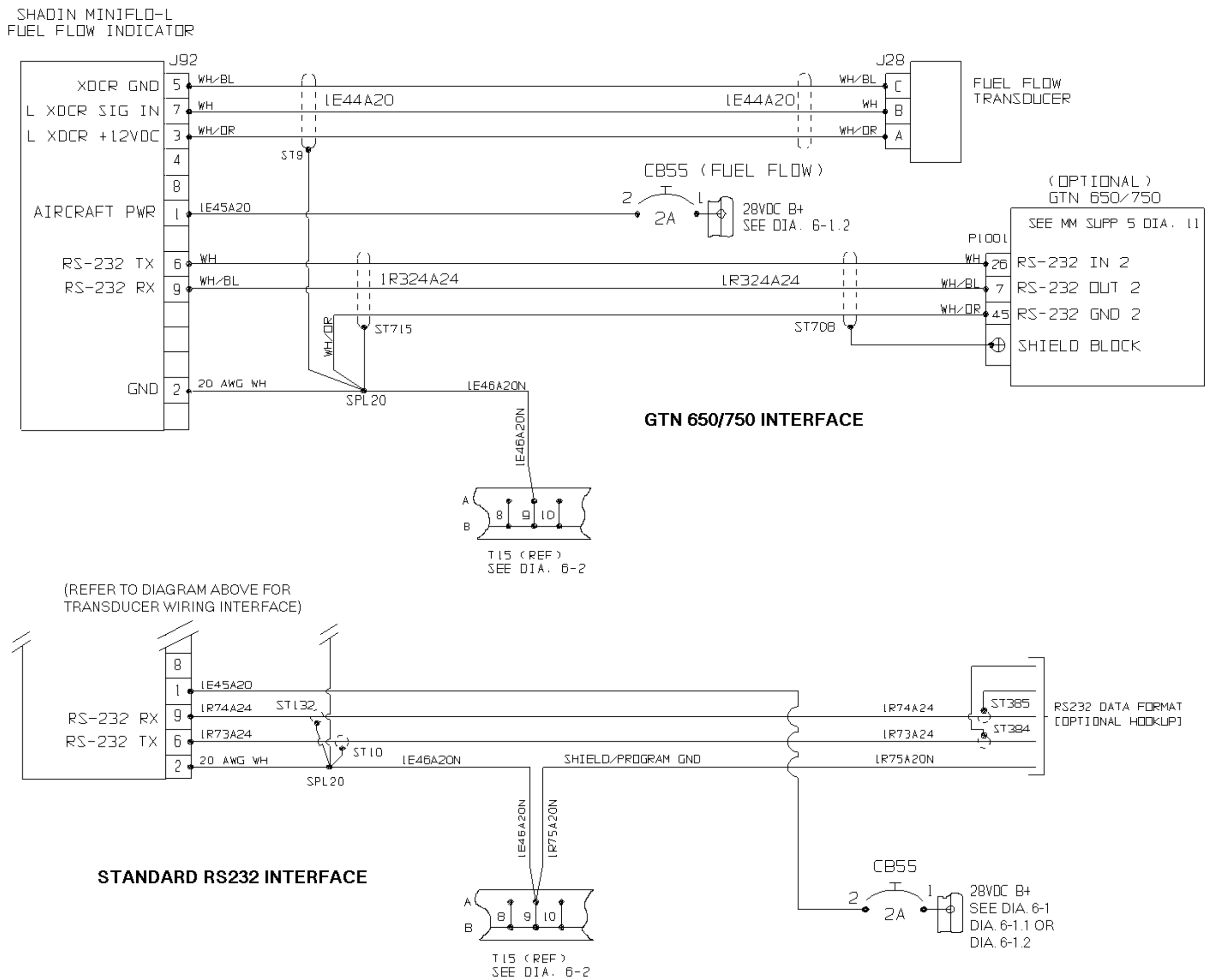
480B Serial Numbers: 5155 and Subsequent

Diagram 6-15.3. Caution/Warning System (Ref. 4192509 Rev. H)



TH-28/480 Series Option (All S/N)

Diagram 6-32. Heated Pitot System Interface



480/B Option (All S/N)

Diagram 6-33. Fuel Flow System

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INSTRUMENTS

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(7) Altimeter:

Test the altimeter following the instructions for performing a pitot/static system leak check (paragraph 7-68).

7-13. Repair – Instrument Maintenance

A. Replace any required decals which are missing or not clearly legible.

B. Replace any instrument if the cover glass is loose, cracked, broken, or when the instrument is found to be unserviceable.

7-14. Installation – Instrument Maintenance

A. Position the instrument into the panel. Install the mounting screws or tighten the screw of the mounting clamp.

B. Remove the protective caps or covers as necessary, and connect the electrical connectors and/or hoses to the instrument.

C. Check the instrument for operation.

NOTE

See Figure 7-1 for instrument location in the instrument panels. Optional equipment instruments are not shown.

7-15. Rotor and Power Turbine Tachometer (Dual Tach)

7-16. General Description – Dual Tach

The rotor and power turbine tachometer (Dual Tach) is powered by the aircraft 28-volt electrical system and driven by a tachometer generator for the power turbine section and a magnetic pick-up mounted in the main rotor transmission for the rotor section. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-17. Power Turbine Tachometer Generator

7-18. Description – Power Turbine Tachometer Generator

The power turbine tachometer generator is mounted on the N_2 tach pad on the left side of the engine accessory drive gearbox and is connected to the dual tach. Refer to paragraphs 13-129 through 13-132 for maintenance procedures.

7-19. Rotor RPM Magnetic Pick-up

7-20. Description – Rotor RPM Magnetic Pick-up

The rotor rpm magnetic pick-up, located in the forward portion of the main rotor transmission, is used to generate pulses used to drive the rotor rpm portion of the dual tach.

7-21. Removal – Rotor RPM Magnetic Pick-up

A. Drain the oil from the main rotor transmission (para. 4-13).

B. Remove the upper plenum/air inlet assembly (para. 13-28).

C. Disconnect the magnetic pick-up electrical connector.

D. Remove the magnetic pick-up from the main rotor transmission. If replacing the magnetic pick-up, remove any shims installed on the pick-up.

7-22. Inspection – Rotor RPM Magnetic Pick-up

A. Inspect the magnetic pick-up for security of installation and condition and security of the electrical wires and connectors.

B. Using a multi-meter, check for 270-330 ohms across the leads.

7-23. Repair – Rotor RPM Magnetic Pick-up

A. Repair damaged wiring or electrical connectors.

B. Replace the magnetic pick-up if the ohm check is outside the 270-330 ohm range or if inspection of the system components and wiring isolates the problem to the magnetic pick-up.

7-24. Installation – Rotor RPM Magnetic Pick-up

A. Remove the inspection magnetic pick-up inspection plug located on the front of the main rotor transmission.

B. Turn the gearbox until a gear tooth is directly under the center of the magnetic pick-up installation hole.

C. Install the magnetic pick-up into the main rotor transmission (Figure 7-2).

(1) Insert a 0.030 feeler gauge through the access plug hole.

(2) Install any shims, P/N 28-16524-( ), from the old pick-up onto the replacement magnetic pick-up between the check nut and the top base of the magnetic pick-up.

(3) Replace the O-ring on the magnetic pick-up.

(4) Screw the magnetic pick-up in until it touches the feeler gauge.

(5) Adjust the amount of shims (.002-.500 inch max.) as required to set the final clearance between the magnetic tip of the pick-up and the gear tooth to .030-.045 inch/.76-1.14 mm.

(6) Torque the magnetic pick-up to 60-65 in-lb/6.8-7.3 Nm.

D. Install the inspection plug.

(1) Replace the O-ring on the plug and reinstall the plug in the front of the transmission.

(2) Torque the plug and lockwire (.032) the magnetic pick-up to the plug.

E. Reconnect the electrical connector

F. Service the main rotor transmission (para. 4-12).

G. Install the upper plenum/air inlet assembly (para. 13-31).

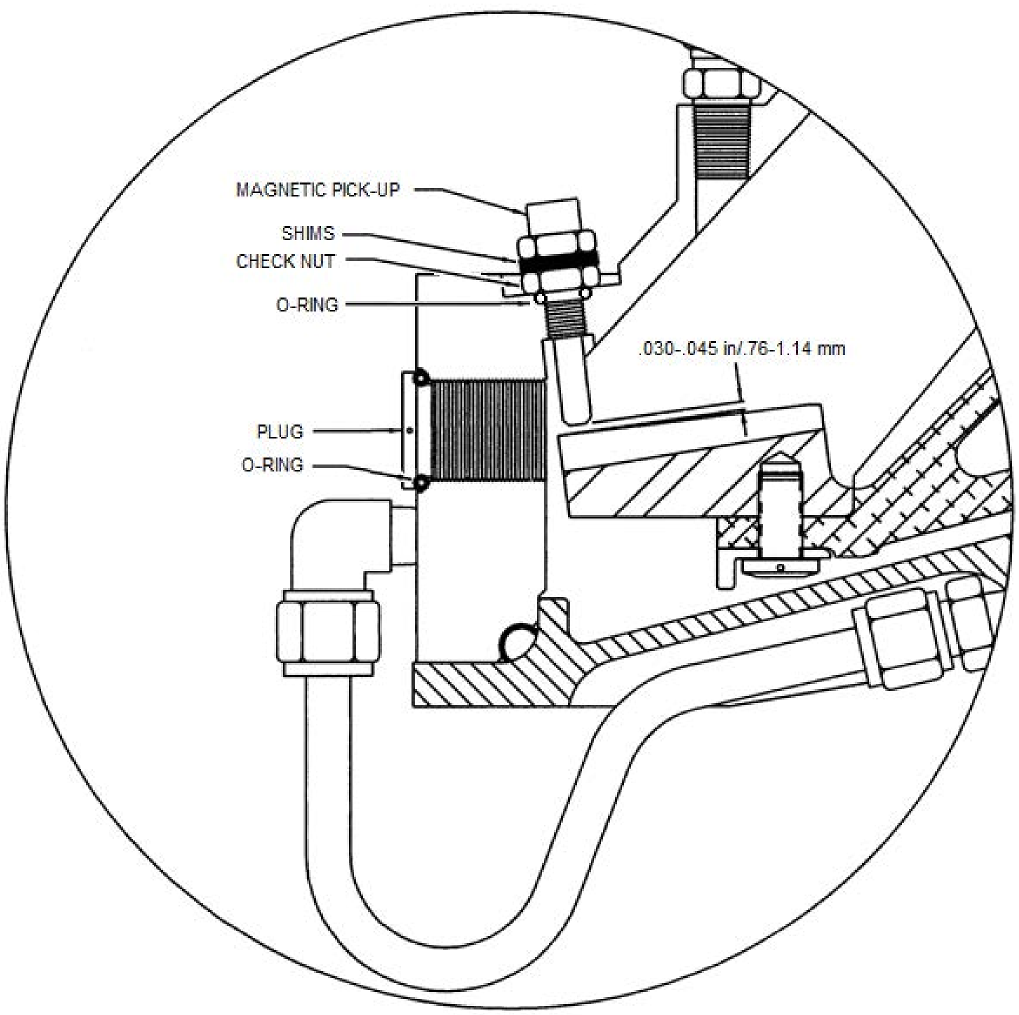

Figure 7-2. Magnetic Pick-up Installation

7-25. Gas Producer Tachometer

7-26. General Description – Gas Producer Tachometer

The gas producer tachometer (N_1) provides an indication in percent rpm of the engine gas producer (N_1) section by connection to a tachometer generator mounted on the engine accessory gearbox. Two different type N_1 Tach systems are used in the TH-28/480. The "passive" system uses an indicator that is powered by the signal from the tachometer generator. The "active" system uses an indicator that is powered by the aircraft electrical system and uses a micro processor to convert the signal from the tachometer generator. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-27. Gas Producer Tachometer Generator

7-28. General Description – Gas Producer Tachometer Generator

The gas producer tachometer generator is mounted on the N_1 tach pad on the right side of the engine accessory drive gearbox and is connected to the N_1 tach. Refer to paragraphs 13-129 through 13-132 for maintenance procedures.

7-29. Engine Oil Temperature and Pressure Indicator

7-30. General Description – Engine Oil Temperature and Pressure Indicator

The engine oil temperature and pressure indicator is a dual indicator which uses a temperature bulb located in the engine oil reservoir for engine oil temperature indications and a pressure transducer connected to the engine oil pressure line on the engine. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-31. Engine Oil Temperature Bulb

7-32. General Description – Engine Oil Temperature Bulb

The engine oil temperature bulb, installed on the engine oil reservoir is a resistance type temperature bulb which monitors the engine oil temperature and transmits varying voltage signals to the engine oil temperature and pressure indicator.

7-33. Removal – Engine Oil Temperature Bulb

A. Drain the engine oil reservoir (para. 4-8).

B. Remove the lockwire and disconnect the electrical connector.

A. Fuel Quantity Transmitter, P/N ECD4092-1 (480B S/N 5198 and subsequent)

(1) Completely defuel (para. 4-5).

(2) Position the aircraft 6° nose down (longitudinally).

(3) Service fuel system with 0.7 gallons/2.65 l of fuel from a graduated cylinder and wait 10 minutes. This amount represents an empty tank (unusable fuel).

(4) Apply 28 VDC power to the aircraft. Ensure FUEL QTY and CAUT PNL circuit breakers are set.

(5) Set the Zero Fuel (“Empty”) indication as follows. (Remove the screw to access the adjustment potentiometer; retain for reinstallation.)

a. Push and hold the push button switch. The LED should be off. If not, turn the potentiometer CCW until LED extinguishes. NOTE: If the empty adjustment is rotated too far in the CCW position, the LED will illuminate. In the case of over adjusting, rotate potentiometer CW until the LED extinguishes.

b. While holding the switch down, adjust the potentiometer CW until the LED just illuminates. Release the switch and the LED will extinguish. The “Empty” has been reset.

(6) Remove aircraft power.

(7) Service the fuel system with the amount of fuel that represents a full tank and wait 10 minutes.

(8) Apply aircraft power.

(9) Set the “Full” Fuel indication as follows.

a. Push and hold the push button switch. The LED may momentarily blink, but must remain off. If not, turn the potentiometer CW until LED extinguishes.

b. While holding the switch down, adjust the potentiometer CCW until the LED just illuminates. Release the switch and the LED will extinguish. The “Full” has been reset.

(10) Reinstall the sealing screws over the empty and full adjustment potentiometers.

(11) Perform bonding check using a milliohm meter. (Clean bonding and grounding surface thoroughly before performing bonding check.)

a. Check the resistance from the mounting flange of the fuel level transmitter to the aircraft ground. Resistance shall be 2.5 milliohms or less.

b. Check the resistance from the converter case to aircraft ground. Resistance shall be 2.5 milliohms or less.

(12) Install the fuel quantity probe cover (para. 10-51, A, 8).

(13) Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual.

B. Fuel Quantity Probe, P/N ECD4037

(1) Completely defuel the aircraft (para. 4-5).

(2) Level the aircraft (para. 4-67).

(3) Supply external 28 VDC electrical power to the aircraft.

(4) Ensure FUEL QTY and CAUT PNL circuit breakers are set.

NOTE

Steps (5) through (7) only apply to fuel quantity indicator, P/N ECD4038-5, manufactured by Horizon Aerospace/Ultra Electronics.

(5) Place BATT switch to ON.

(6) Verify the fuel quantity indicator passes self-tests (red LED illuminates, needle swings full scale, red LED changes to green and needle drops to “0”).

(7) Place BATT switch to OFF.

NOTE

If the optional fuel filter is installed, service the fuel system with 0.9 gallons/ 3.41 l of fuel.

(8) Service fuel system with 0.7 gallons/2.65 l of fuel from a graduated cylinder and wait 10 minutes.

(9) Place BATT switch to ON.

(10) Connect multimeter to yellow (+) and black (-) leads of the fuel probe.

(11) P/N ECD4038-5 (Horizon indicator): Set the Zero Fuel indication as follows:

a. Adjust low potentiometer on fuel probe to read + 0.33 VDC on the multimeter.

b. Verify the fuel quantity indicator reads 0 ± 0 lbs and log the result.

(12) P/N ECD4038-5 (Ahlers indicator): Set the Zero Fuel indication as follows:

a. Adjust low potentiometer on fuel probe until the fuel quantity indicator reads 0 ± 0 lbs.

b. Verify the voltage reading on the multimeter is between +.251 and +.437 VDC. Log the result.

(13) Remove power, place BATT switch to OFF.

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STRUCTURES

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SECTION 8

STRUCTURES

8-1. Cabin Section

8-2. Description – Cabin Section

The cabin section, which forms the cockpit/passenger compartment, consists of a cabin shell, cockpit bulkhead, and cockpit floor. The cabin shell is an all composite shell with reinforcing where necessary to add structural stiffness and is mounted to the cockpit bulkhead and the cockpit floor. The pitot tube, static air ports, windshields and windows, and cockpit doors are mounted on the cabin shell. Two access panels on the bottom of the cabin shell allow for access to the keel assembly and the aircraft systems installed below the cockpit floor. The cockpit bulkhead and cockpit floor are made of a honeycomb composite material that is self-extinguishing. The cockpit bulkhead is mounted to the pylon and supports the passenger seats, the cabin shell, and is the forward portion of the fuel cell support structure. The cockpit floor is mounted to the keel assembly and supports the cabin shell, pilot and copilot/passenger seats, and the collective control system.

8-3. Inspection – Cabin Section

A. Inspect the cabin shell for obvious damage, cracks, and the condition and security of the hardware securing the cabin shell to the cockpit bulkhead and cockpit floor.

B. Inspect the cockpit bulkhead and cockpit floor for obvious damage, loose inserts, and the condition and security of the hardware securing the bulkhead to the pylon and the cockpit floor to the keel structure.

8-4. Repair – Cabin Section

NOTE

Refer to the appropriate section of the TH-28/480 Maintenance Manual for removal procedures of components/systems that may be required to be removed to allow for repair of the cabin section.

A. Replace damaged or missing hardware.

B. Repair damage to the cabin shell, cockpit bulkhead, or the cockpit floor I/A/W AC 43.13-1B. Contact The Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations.

8-5. Keel Assembly

8-6. Description – Keel Assembly

The keel assembly consists of two longitudinal beams with transverse bulkheads and is attached to the pylon. The keel assembly supports the cockpit floor, the cyclic and tail rotor control systems, the instrument panel, and the forward crosstube of the landing gear.

8-7. Inspection – Keel Assembly

A. Inspect the keel assembly for corrosion, cracks, deformation, evidence of working rivets, and damaged or loose/missing hardware.

B. Inspect the keel to pylon attachments for corrosion, damage, proper security of and damage to the attachment hardware.

8-8. Repair – Keel Assembly

NOTE

Refer to the appropriate section of the TH-28/480 Maintenance Manual for removal procedures of components/systems that may be required to be removed to allow for repair of the keel assembly.

A. Replace damaged or missing hardware.

B. Repair damage to the keel assembly I/A/W AC 43.13-1B. Contact The Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations.

8-9. Pylon Assembly

8-10. Description – Pylon Assembly

The pylon assembly is a welded steel tubular truss structure that forms the supporting structure for the cabin section, keel assembly, fuel cells, transmission, engine, aft crosstube of the landing gear, and the tailcone.

8-11. Inspection – Pylon Assembly

A. Inspect the pylon assembly for bends, corrosion, cracks, dents, condition of the epoxy primer finish, and security of all weldments.

B. Inspect the pylon grounding tabs for corrosion, condition, and free of paint under grounding hardware. (See also para. 6-13 and 6-14.)

8-12. Repair – Pylon Assembly

NOTE

Do not apply paint to the pylon grounding tabs under the mounting hardware.

A. Remove minor surface corrosion and paint the area using MIL-PRF-23377 primer or equivalent. Repair limit ≤ 10% wall thickness (e.g., .0035” for a .035” thick wall).

B. Touch up areas of the epoxy primer finish using MIL-PRF-23377 primer or equivalent.

C. Repair damage to the pylon assembly I/A/W AC 43.13-1B. Contact Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations.

8-13. Access Panels, Covers, and Cowlings

8-14. Removal – Access Panels, Covers, and Cowlings

Remove the following access panels, covers, and cowlings using the procedures listed for each panel, cover, or cowling. Refer to Figure 8-1 for access panel locations.

A. Forward Landing Gear Leg Panel(s):

(1) Remove the screws securing the access panel(s) to the keel access panels and remove the panel(s).

B. Keel Access Panel(s):

CAUTION

Support the keel access panel(s) during the removal process to prevent from damaging the antenna leads before they are disconnected.

(1) Remove the forward landing gear leg panel(s).

(2) Remove the screws securing the panel(s) to the cabin and the outboard screws securing the forward landing gear leg panel(s) to the keel access panel(s).

(3) Disconnect the ground wire from the antenna ground plane and disconnect the antenna lead from the antenna.

(4) Remove the panel(s).

C. Engine Access Panel(s):

(1) Unlock the turn lock fasteners at the bottom edge of the access panel(s).

WARNING

The pneumatic springs have approximately 25 pounds/11.4 kg of pressure. Use extreme caution when removing the pneumatic springs.

(2) If installed, disconnect and remove the pneumatic spring door opener.

(3) Remove the hinge pin securing the access panel hinge half to the hinge half installed on the airframe and remove the panel(s).

D. Bottom Engine Access Panel:

(1) Disconnect the engine and the engine fire pan drain lines.

(2) Remove the screws securing the access panel to the left and right side cowlings, the cabin shell, and the bottom edge of the left and right side engine fire curtain.

(3) Slide the access panel to one side and pull the opposite edge of the panel from under the side cowling and remove the panel.

E. Fuel Cell Cover(s):

NOTE

Procedures for removing the covers are the same for both sides except as noted in the instructions.

(1) Defuel the aircraft (para. 4-5).

(2) Remove the upper plenum/air inlet (para. 13-28).

(3) Remove the air deflector from the top of the cabin.

(4) Remove the hardware securing the filler port to the fuel cell cover on the left side fuel cell.

NOTE

TH-28 S/N 3007 and subsequent and 480 S/N 5011 and subsequent have a fuel quantity probe cover and gasket installed on the right fuel cell cover.

(5) Remove the hardware securing the cell to the cover (Aerazur fuel bladder system), the fuel quantity probe cover, and the fuel cell cover to the cell structure.

CAUTION

All or a portion of the fuel cell covers and possibly the filler port assembly are sealed with sealant to prevent fuel leaks. A putty knife or other suitable tool may be required to separate the cover from the cell structure and the filler port. Use extreme caution to prevent from damaging the cover, fuel cell, fuel cell structure, or injuring yourself while removing the cell cover.

(6) Remove the fuel cell cover.

CAUTION

Do not apply any downward load to the passenger seats in the down position while the seat legs are not attached to the floor track.

(2) Install the seats into position and install the hardware securing the mounting brackets to the cockpit bulkhead.

(3) Connect the restraint system to the outboard side of the right bench seat.

(4) Install the pilot and copilot/passenger seats.

C. Passenger Seat – 2+2 Configuration:

(1) If required, install the restraint system inertia reels and swivel mounts onto the cockpit bulkhead. Connect the restraint systems to the mounting fixtures and install the belt covers. Do not attach the restraint systems located at the center of the seat at this time.

(2) If required, install the seat and arm rest mounting fixtures.

(3) Install the arm rest(s) on the mounting fixture(s) and lock the quarter turn fastners.

CAUTION

Do not apply any downward load to the passenger seat while the seat legs are not attached to the floor mount.

(4) Position the seat on the mounting fixtures and install the hardware.

(5) Position the seat legs on the floor mounting fixtures and install the hardware.

(6) Route the ends of the restraint systems through the center of the seat and attach to the mounting fixtures.

(7) Install the seat cushion.

WARNING

The leg guard must be installed when operating the aircraft with the copilot’s controls installed.

(8) Install the leg guard into position and install the hardware.

(9) Install the hardware attaching the leg guard to the seat.

(10) Position the aft mounting slots on the foot rest over the shoulder bolts. Lower the foot rest and slide forward to engage the slots.

(11) Install the hardware in the forward side of the foot rest.

(12) Install the pilot and copilot/passenger seat.

8-36. Cabin Doors

8-37. Description - Cabin Doors

The cabin doors are all composite structures with plexiglass windows in the upper section of the doors. Positive retention door latches are used to secure the doors in the closed position and key operated locks in the door handles are used to secure the aircraft. Optional pneumatic springs are available to hold the doors open and an emergency jettison system is available for the TH-28 and 480 prior to serial numbers 3007 and 5027 respectively.

8-38. Removal - Cabin Doors

NOTE

Removal procedures are the same for removing either cabin door.

CAUTION

Support the cabin door when removing the hinge pins to prevent from damaging the doors or the door hinges.

A. Open the door and hold it in the open position.

WARNING

The pneumatic springs have approximately 45 pounds/20.5 kg of pressure. Use extreme caution when removing the pneumatic springs.

B. If equipped, remove the retaining clip from the upper end of the pneumatic spring and disconnect the spring from the door.

C. If equipped, pull the door jettison handle and remove the door.

D. If equipped, disconnect the restraint strap from the cabin.

E. Remove the hinge pins and remove the door.

8-39. Disassembly - Cabin Doors

NOTE

Disassembly of the cabin doors is the same for either door.

CAUTION

Protect the plexiglass window from damage during disassembly of the door.

A. Remove the hardware securing the hinge halves to the cabin door and remove the hinge halves. If required remove the hinge halves attached to the cabin shell.

B. Remove the hardware securing the door restraint strap and the closure pull strap.

C. Remove the hardware securing the storage pouch to the cabin door.

D. Remove the hardware securing the door catch to the aft side of the door.

E. Remove the hardware securing the door strikers to the cabin shell.

F. Remove the door latching system as follows:

(1) Remove the hardware securing the upper and lower latch assemblies to the door.

(2) Loosen the latch bellcrank pivot screw and remove the cable and retainer from between the latch bellcrank halves. Remove the assemblies from the door.

(3) Remove the roll pin securing the internal door handle and remove the handle.

(4) Remove the screws securing the door handle assembly cover. Remove the cover.

(5) Loosen the set screw securing the cable pulley to the door handle pin. Remove the cable pulley and cables.

(6) Remove the screws securing the door handle assembly. Remove the door handle assembly.

(7) Remove the cables from the cable pulley by removing the solder slugs from the end of the cables, loosening the retainer set screws and pulling the cables through the retainers.

G. Disassembly the door latch assemblies as follows:

(1) Remove the pivot screw securing the latch bellcranks to the latch assembly.

(2) Remove the clevis pin that secures the latch operating rod to the latch bellcranks.

(3) Disconnect the return spring.

8-40. Inspection – Cabin Doors

A. Inspect the cabin doors and hinges for condition, damage, and security.

B. Inspect the door latching assembly for condition, damage, and proper operation.

C. Inspect the window and pop-out vent for condition, damage, and security.

8-41. Repair – Cabin Doors

A. Repair the door I/A/W AC 43.13-1B. Contact The Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations.

B. Replace the seal strips around the door if deteriorated or damaged. Attach the new seal using trim adhesive (8031, 3M).

C. Replace components of the door latching assembly that are unserviceable.

8-42. Assembly – Cabin Doors

NOTE

Assembly of the cabin doors is the same for either door.

CAUTION

Protect the plexiglass window from damage during assembly of the door.

NOTE

If the hinges have been replaced, shimming may be required to properly align the doors for proper sealing and operation of the latches.

A. Install the hinges on the door and cabin shell.

B. Assemble the latch assemblies as follows:

(1) Connect the return spring to the outboard (as installed in the door) latch bellcrank half.

(2) Position the operating rod between the bellcranks and install the clevis pin, washer, and cotter pin.

(3) Place an AN960-416 washer between the bellcranks as a spacer. Insert the pivot screw and washer into the bellcranks. Lightly coat the screw threads with Vibra-tite and install the screw.

NOTE

References to top, bottom, outboard, inboard, forward, and aft are as the door is installed on the aircraft.

C. Install the door latching system as follows:

(1) Install the cables so that the bottom latch (short) cable is installed on the outboard groove of the pulley from bottom to top and the retainer is in the top forward hole. The upper latch (long) cable is installed in the inboard groove of the pulley from top to bottom and the retainer is in the bottom forward hole.

(2) Install the retainers on the latch assembly ends of the cables. Adjust the retainer until 0.25 inches of cable extend from the end of the retainer and solder the end to form a solder slug.

(3) Install the cables and pulley into the door.

(4) Install the door handle assembly onto the door.

(5) Install the cable pulley onto the door handle pin and tighten the set screw in the pulley.

(6) Connect the cable ends to the latch assemblies by loosening the latch bellcrank pivot screw and positioning the cable retainer between the bellcranks and tightening the pivot screw. Do not over tighten the pivot screws.

(7) Install the latch assemblies on to the door.

(8) Operate the door handle and observe the upper and lower latches. If the latches do not retract at the same time, adjust the latch cables at the pulley until they retract at the same time.

(9) Install the door handle assembly cover and bushing.

(10) Install the internal door handle and the roll pin.

D. Install the storage pouch onto the cabin door.

E. Install the door catch onto the aft side of the door.

F. Install the door restraint strap and the closure pull strap.

G. Install the door strikers onto the cabin shell.

8-43. Installation – Cabin Doors

A. If equipped, Position the door on the hinges and insert the jettison pins in the hinges and in the restrain strap on the inside of the door. Ensure the jettison handle is correctly positioned in the handle retainer. Lockwire the hinge jettison pins to the hinges using breakaway lockwire (MS20995CY20 or equivalent).

B. Position the door on the hinges installed on the cabin shell and install the hinge pins and secure.

C. Install the pin securing the restraint strap to the cabin and secure.

WARNING

The pneumatic springs have approximately 45 pounds/20.5 kg of pressure. Use extreme caution when installing the pneumatic springs.

NOTE

Install the pneumatic springs with the piston rod oriented down to prevent the seals from drying out and subsequent loss of gas pressure.

D. Install the pneumatic spring onto the fitting located on the cabin floor and install the retaining clip. Install the upper end of the pneumatic spring onto the door fitting and install the retaining clip.

E. Check the door assembly for proper fit and the latching system for proper operation. If required, adjust the door hinges by shimming or the latching system by adjusting the strikers.

8-44. Windshields and Windows

8-45. Inspection – Windshields and Windows

A. Inspect the windshields and windows for cracks, crazing, pits, and scratches.

8-46. Repair – Windshields and Windows

A. Damage to the windshields and windows which does not interfere with pilot's line of sight during normal flight and landing attitudes or damage that does not impair structural integrity may be repaired by stop drilling or patching I/A/W AC 43.13-1B; however, the windshield or window should be replaced at the earliest opportunity.

B. If installed, decorative vinyl tape (P/N 70-0160-1056-6), which covers the paint line, may be repaired by removing damaged portions and applying new tape. Use a cotton glove and apply firm pressure while installing the tape. Do not stretch the tape when applying.

8-47. Replacement – Windshields and Windows

A. Replace the windshields as follows:

NOTE

Replacement procedures are the same for both windshields.

NOTE

All replacement windshields are now the "blown" version. Replace both windshields if replacing a "flat" windshield with a "blown” windshield.

(1) Remove the cabin doors.

(2) If equipped, disconnect the defroster from the supply line and remove the hardware securing it to the cabin shell.

(3) Remove the center strip from the windshields.

(4) Remove the hardware securing the windshield to the cabin shell.

CAUTION

Use extreme care while removing the windshield with a putty knife to prevent from damaging the cabin shell or injuring yourself.

CAUTION

Use extreme care when using a portable heat gun to prevent from damaging the paint finish due to excessive heat.

(5) Heat the edge of the windshield and adhesive using a portable heat gun and separate the windshield from the cabin shell and center support with a putty knife.

NOTE

Tape application for the windshield installation was discontinued for S/N 5238 and subsequent. All windows have since been installed with adhesive from the factory.

(6) If applicable, remove the residual foam tape or adhesive from the windshield recess in the cabin shell and the center support. Clean the recess with acetone or equivalent.

(7) Fit the replacement windshield to the cabin.

a. Place the replacement windshield into position over the opening and tape and/or clamp it into position.

b. Apply 1/4-inch masking tape following the windshield recess in the cabin to mark the windshield size for cutting.

CAUTION

Do not undercut the outline. If too much acrylic is removed, the replacement windshield may have to be scrapped.

CAUTION

Do not allow the cut tail to bend or pull away during cutting. Excess strain at the head of the cut can cause cracking into the window area.

CAUTION

Use extreme caution while using power tools or other suitable devices to prevent from damaging the aircraft or injuring yourself.

c. Carefully cut or trim the outline (leaving the window slightly oversized for the opening).

1 Use a die grinder with a 1/16-inch cutoff wheel or an oscillating saw for cutting and trimming.

2 Support the cut tail of the acrylic while cutting to prevent sagging and potential breakage and cracking into the prime window area.

d. Fit the window into the cabin and continue cutting, filing, and/or sanding as necessary to create a proper fit.

1 Ensure the cabin door upper hinge post cutout in the replacement windshield is large enough.

2 Sand the edge with a belt sander.

(8) Drill holes for the attachment hardware.

a. Tape the window in place.

b. Mark the hole locations from the outside of the window with a fine marker or equivalent. Remove the window.

CAUTION

Drilling acrylics is best accomplished using a drill manufactured or modified specifically for drilling acrylics.

c. Drill the holes with a small bit (#40). Support the back of the window with a block of wood (approximately a 1-inch square block) to prevent the drill bit from cracking the window when it exits the acrylic. (Cracks are commonly caused by the drill bit if a backup material is not used.)

d. Open the hole to finish size with #19 drill bit.

e. Final finish the hole with #16 relief bit.

f. Deburr the hole edges.

1 Use a rotary grinding stone to polish the hole interior surface.

2 Use a sanding block with 100 grit sandpaper to round the outside hole edges.

(9) Prepare for bonding.

a. Mask off the area inside the window at the edge of the bondline.

b. Lightly sand (120 grit) the area to be bonded and wipe clean with acetone or equivalent.

c. Mask off the area around the windshield on the outside of the aircraft and place protective coverings inside the aircraft to prevent damage from excess adhesive.

d. Prepare the adhesive (PR-1425-B2 or equivalent) following the manufacturer's instructions.

(10) Apply the prepared adhesive to the center support and in the cabin shell recess. Coating thickness is approximately .0625 in/1.6 mm.

CAUTION

Do not over tighten the mounting screws for the windshields.

(11) Position the windshield in place. Temporarily install and tighten the mounting hardware. Allow the adhesive to cure for 24 hours.

(12) Remove the mounting hardware and using a plastic scraper, remove the excess adhesive.

(13) Apply a small bead of vinyl adhesive caulk (Phenoseal or equivalent) on each side of the windshield center strip and at the top and bottom and place into position. Apply a small amount of vinyl adhesive caulk (Phenoseal or equivalent) onto the shanks of the windshield mounting hardware and install the mounting hardware. Do not over tighten the mounting hardware.

(14) Paint the outer edges of the windshield(s).

(15) Install the defroster(s).

(16) Install the cabin doors.

B. Replace the overhead, opera, and cheek windows as follows:

(1) (Opera window only) Remove the pop-out vent window.

NOTE

Rivets and foam tape were used to secure the opera windows only in early production TH-28/480 aircraft.

NOTE

Overhead and cheek windows for late production 480 aircraft had putty-filled cleco holes. Rivets are used in early (TH-28/480) and current production aircraft (480B).

NOTE

Replacement window installations using a MS20604AD4WX rivet must include a washer under the head and under the tail of the rivet. If using CR91484-4-X rivet, a washer is only required under the tail of the rivet.

(2) Drill out the existing rivets.

CAUTION

Use extreme care while removing the windows with a putty knife to prevent from damaging the cabin shell or injuring yourself.

CAUTION

Use extreme care when using a portable heat gun to prevent from damaging the paint finish due to excessive heat.

(3) Heat the edge of the window and adhesive using a portable heat gun and separate the window from the cabin shell with a putty knife.

(4) Remove the residual adhesive from the window recess while it is still warm.

(5) Remove any remaining adhesive by sanding and wipe the recess area clean with acetone or equivalent.

(6) Place the replacement window on the cabin and verify it will properly fit. Mark areas of interference and trim the window.

a. Apply 1/4 (0.25) inch masking tape following the window recess in the cabin to mark the window size for cutting.

b. Remove the window and cut to size using a die grinder with a 1/16-inch cutting wheel or a bone saw and sand the edges on a belt sander.

(7) Check the fit of the window and re-sand the edges as necessary.

(8) Drill holes for the attachment hardware.

a. Using a marker, mark the cabin hole locations.

b. Remove the window.

CAUTION

Drilling acrylics is best accomplished using a drill manufactured or modified specifically for drilling acrylics.

c. Drill the marked hole locations with a small bit (#40). Support the back of the window with a block of wood (approximately 1-inch square) to prevent the drill bit from cracking the window when it exits the acrylic. (Cracks are commonly caused by the drill bit if a backup material is not used.)

d. Open the hole to finish size with #30 drill bit.

e. Final finish the hole with #16 relief bit.

f. Deburr the hole edges.

1 Use a rotary grinding stone to polish the hole interior surface.

2 Use a sanding block with 100 grit sandpaper to round the outside hole edges.

(9) Clean the recess in the cabin shell.

(10) Lightly sand the bonding edges of the window and wipe clean with acetone or equivalent.

(11) Mask off the area around the window on the outside of the aircraft and place protective coverings inside the aircraft to prevent damage from excess adhesive.

(12) Prepare the adhesive (PR-1425-B2 or equivalent) following the manufacturer's instructions and apply a coating approximately .0625 in/1.6 mm thick in the cabin shell recess.

(13) Install the window into position and press firmly against the adhesive. Install the mechanical fasteners (clecos). Allow the adhesive to cure for 24 hours.

(14) Remove the mechanical fasteners (clecos).

(15) Remove excess adhesive from around the window using a plexiglass scraper made from the damaged window.

(16) Install rivets and washers, as required.

(17) Apply sealant (732-RTV or equivalent) to the washers and rivets upon installation.

(18) Apply sealant (732-RTV or equivalent) between the window and the cabin shell.

(19) (Opera window only) Install the pop-out vent window.

(20) Paint the outer edges of the window.

C. Replace/Remove the chin windows as follows:

NOTE

TH-28, S/N 3007 and subsequent, and 480/480B, S/N 5039 and subsequent, are equipped with removable chin windows. Refer to paragraph 8-47, B, for aircraft not equipped with removable chin windows.

(1) Remove the screws securing the chin window.

CAUTION

Use extreme care while removing the windows with a putty knife to prevent from damaging the cabin shell or injuring yourself.

(2) Using a putty knife, carefully break the seal around chin window and remove the chin window.

(3) If required replace the foam tape (4516-75).

(4) If required, replace any damaged Rivnuts.

(5) Place the replacement window on the cabin and tape into position.

(6) Apply 0.25 inch/6 mm masking tape following the window recess in the cabin to mark the window size for cutting.

(7) Remove the window and cut to size using a fine tooth bandsaw and sand the edges on a belt sander.

(8) Check the fit of the window and re-sand the edges as necessary.

(9) Place the replacement window on the cabin and tape into position.

CAUTION

Drilling acrylics is best accomplished using a drill manufactured or modified specifically for drilling acrylics.

(10) Using a pointed dull #30 drill bit, carefully drill the mounting pilot holes in the window using the Rivnuts as guides.

(11) Remove the window from the cabin and open the pilot holes with a pointed dull #15 drill bit.

CAUTION

Do not over tighten the mounting screws for the chin windows.

(12) Place the window on the cabin and install the mounting screws but do not tighten. Apply sealant (Phenoseal 102 or equivalent) under the screw heads and tighten the screws until the screw head contacts the window.

(13) Apply sealant around the seam between the chin window and the cabin. Remove excess sealant from the seam and the screw heads as required.

(14) Paint the outer edges of the window.

D. Replace the opera windows as follows:

NOTE

Previous content was incorporated into para. 8-47.B.

E. Replace the cabin door window as follows:

(1) Remove the cabin door.

(2) Remove the upper hinge half from the door.

(3) Remove the pop-out vent window or the sliding vent window.

CAUTION

Use extreme care while removing the windows with a putty knife to prevent from damaging the cabin shell or injuring yourself.

CAUTION

Use extreme care when using a portable heat gun to prevent from damaging the paint finish due to excessive heat.

(4) Heat the edge of the window and adhesive using a portable heat gun and separate the window from the cabin shell with a putty knife.

(5) Remove the residual adhesive from the window recess while it is stall warm.

(6) Remove any remaining adhesive by sanding and wipe the recess area clean with acetone or equivalent.

(7) Place the replacement window into position and verify it will properly fit. Mark areas of interference and trim the window using a belt sander.

NOTE

Avoid drilling holes in the area of the upper hinge half and the forward edge of the sliding vent window installation.

(8) Tape the window into position and drill approximately 20 to 25 holes using a pointed dull #41 drill bit through the window around the edges for mechanical fasteners (clecos).

(9) Remove the window and clean the recess in the cabin shell.

(10) Lightly sand the bonding edges of the window and wipe clean with acetone or equivalent.

NOTE

Mask off the area around the window on the outside of the aircraft and place protective coverings inside the aircraft to prevent damage from excess adhesive.

(11) Prepare the adhesive (PR-1425-B2 or equivalent) following the manufacturer's instructions and apply a coating approximately .0625 in/1.6 mm thick in the cabin shell recess.

(12) Install the window into position and press firmly against the adhesive. Install the mechanical fasteners (clecos). Allow the adhesive to cure for 24 hours.

(13) Remove the mechanical fasteners (clecos) and fill the holes with glazing putty (Bondo 801 or equivalent).

(14) Remove excess adhesive from around the window using a plexiglass scraper made from the damaged window.

(15) Paint the outer edges of the window.

(16) Back drill the holes for the upper hinge half using a pointed dull #11 drill bit and Back drill the holes for the forward edge of the sliding vent window frame using a pointed dull #28 drill bit.

(17) Install the pop-out vent window or the sliding vent window.

(18) Install the upper hinge half.

(19) Install the cabin door.

F. Replace the sliding vent window as follows:

8-71. Fuel Cell Support Structures

8-72. Description – Fuel Cell Support Structures

The fuel cell support structures, which are mounted to the pylon assembly and the cowl ring, are made of composite honeycomb panels and conform to the shape of the fuel cells.

8-73. Removal – Fuel Cell Support Structures

A. Defuel the aircraft (para. 4-5).

NOTE

Do not remove both fuel cells if only one support structure is going to be removed.

B. Remove the fuel cells (para. 10-4).

NOTE

Note the location and thickness of any shims and retain for reinstallation.

C. Remove the hardware securing the support structure(s) to the mounting brackets on the cockpit bulkhead, aft cowl ring, pylon assembly, and the support structure/engine access panel mounting bracket.

D. Remove the support structure from the aircraft.

8-74. Inspection – Fuel Cell Support Structures

A. Inspect the fuel cell support structure for obvious damage, loose inserts, and the condition and security of the hardware securing the support structure to the pylon and mounting supports.

B. The right hand fuel cell support structure in aircraft serial numbers 5134, 5136 through 5197 has an EMI/RFI shielding coating. Inspect the coating for cracks, blisters, or any areas exhibiting a lack of adhesion.

8-75. Repair – Fuel Cell Support Structures

A. Replace damaged or missing hardware.

B. Repair damage to the fuel cell support structure I/A/W AC 43.13-1B. Contact The Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations.

C. Reference paragraph 8-76 for making repairs to the shielding coating.

8-76. Installation – Fuel Cell Support Structures

NOTE

Steps A, B, and G below apply to aircraft having an EMI/RFI shielding coating on the surfaces of the right hand fuel cell structure (S/N 5134, 5136 through 5197).

A. The pylon mounting surface must be clean and free of paint. If required, apply Kopr-Shield #CP8-TB to the pylon surface before installing mounting washer.

B. If required, apply Kopr-Shield #CP8-TB to the washer surface that is in contact with the shielding coating.

C. Install the support structure into the aircraft.

NOTE

Install any shims found during disassembly. If the support structure was replaced, check the areas where the shims were installed and reshim if required.

D. Install the mounting hardware and tighten.

E. If not installed, install the gaskets for the sump drain and fuel supply lines. Use sealant meeting AMS-S-8802 Type II Class B as the adhesive.

NOTE

Use sealant meeting AMS-S-8802 Type II Class B. Follow the mixing instructions for the sealant. Allow the sealant to cure for 24 hours.

F. Seal the seams between the support structure and the mounting brackets on the cockpit bulkhead, the support structure and the support structure/engine access panel mounting bracket, and the mounting hardware in the support structure.

NOTE

The right hand support structure has an EMI/RFI shielding coating applied on the fuel cell side of the support structure at the time of manufacture.

G. If the shielding coating has been removed due to repair or inspection, touch-up or apply a new coat of Electrodag 437 to the support structure.

1) Lightly sand the structure surface and wipe off the residue. The surface must be dry prior to applying the coating.

8-110. Inspection - Extension Tube

A. Inspect the extension tube for corrosion, cracks, dents, nicks, scratches, elongated bolt holes, condition and security of the nutplates installed in the end of the tube, and security of the installation.

B. Inspect the extension tube mounting clamp for condition, damage, and security.

8-111. Repair – Extension Tube

A. Corrosion, nicks, and scratches not exceeding 0.008 inch/.2 mm may be polished out. Replace damaged nut plates. Replace the extension tube if cracked, damage exceeds 0.008 inch/.2 mm, or the tail rotor transmission screw holes are elongated.

B. Replace the mounting clamp if cracked or damage makes it unserviceable.

8-112. Installation – Extension Tube

A. Lightly coat the end of the extension tube with Lubriplate 630-AA (MIL-PRF-81322). Note the orientation of the tube and install the tube into the tailcone.

B. Install and tighten the hardware securing the tube to its mount in the tailcone. Install the aft tailcone/horizontal spar access panels.

NOTE

The top half of the extension tube clamp is not symmetric. If there is interference between the clamp and the bulkhead, turn the clamp 180°.

C. Install the top half of the extension tube clamp. Ensure clearance with the bulkhead. Install the clamping bolts and torque (50-70 in-lb/5.6-7.9 Nm). Check that the difference between the gap on both sides of the clamp is within 0.010 inch/.25 mm, adjust as required.

D. Install and tighten the bolts securing the aft tail rotor drive shaft bearing pillow block. Safety wire with .032 wire and install the aft tail rotor drive shaft cover.

E. Install the tail rotor transmission (para. 11-92). If removed from the tail rotor transmission, install the tail rotor assembly (para. 9-51).

F. Install the tail rotor guard.

G. Check the tail rotor control cable tension and rigging (para. 12-99 and 12-100).

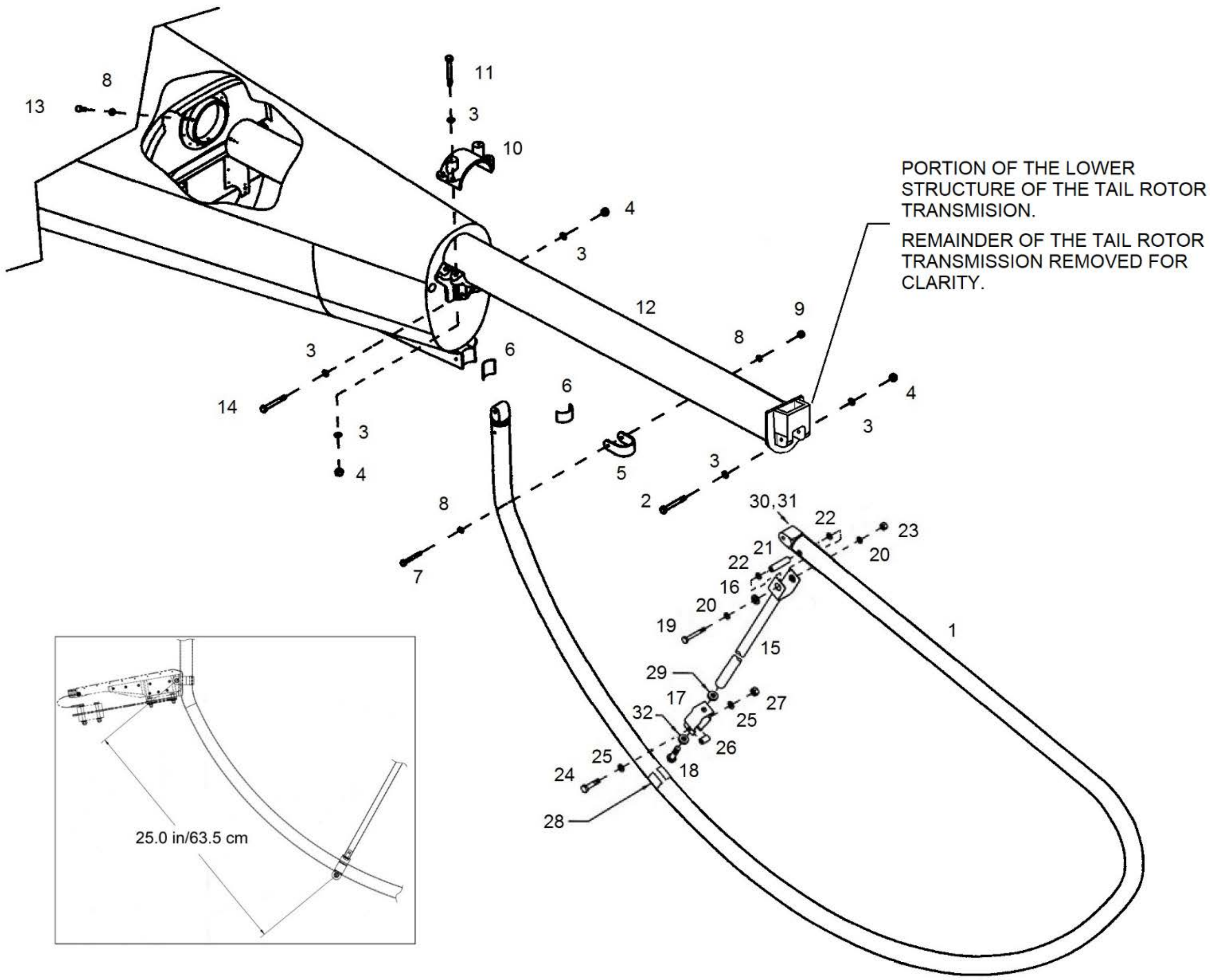
8-113. Tail Rotor Guard (Figure 8-11)

8-114. Removal - Tail Rotor Guard

A. Remove the hardware from the mounting clamp on the tailcone.

B. Remove the hardware securing the tail rotor guard to the extension tube clamp and the tail rotor transmission.

C. Remove the tail rotor guard.



1. Tail Rotor Guard
2. Bolt
3. Washer
4. Nut
5. Clamp
6. Pad
7. Bolt
8. Washer
9. Nut
10. Clamp
11. Bolt
12. Extension Tube
13. Bolt
14. Bolt
15. Strut
16. Bushing
17. Clamp
18. Bolt
19. Bolt
20. Washer
21. Bushing
22. Washer (if equipped)
23. Nut
24. Bolt
25. Washer
26. Spacer
27. Nut
28. Pad (bonded to clamp (17))
29. Spacer
30. Fitting (plug)
31. Rivet

Figure 8-11. Tail Rotor Guard & Extension Tube Installation

8-115. Inspection - Tail Rotor Guard

A. Inspect the tail rotor guard for cracks and wear or damage associated with ground contact.

B. Inspect the end fittings for loose or sheared rivets and elongated bolt holes.

C. Inspect the tail rotor guard tube and plug fitting joint for looseness.

D. Inspect the securing hardware for damage and the anti-chaffing pads for condition and security.

E. Verify a dimension of 25.0 in/63.5 cm from the vibration absorber clamp assembly bolt (7) to the strut clamp assembly bolt (24) (see Figure 8-11).

8-116. Repair - Tail Rotor Guard

A. Replace tail rotor guard if cracked or extensively damaged from ground contact.

NOTE

If the tail rotor guard is worn due to ground contact but is not worn through the guard, install a piece of tape over the area as a contact indicator.

B. Replace sheared or working rivets in the end fittings. Replace the end fittings if the bolt holes are elongated.

C. Install washer (22) (Figure 8-11) between tail rotor guard tube and strut if plug fitting joint is loose.

D. Replace damaged hardware and worn anti-chaffing pads.

8-117. Installation - Tail Rotor Guard

NOTE

Shimming may be required at the extension tube clamp or tail rotor transmission locations.

A. Apply grease (MIL-PRF-81322) to the inside surface of the ears of the extension tube clamp. Place the tail rotor guard into position and install the hardware attaching the guard to the extension tube clamp.

B. Install the clamp half and hardware onto the fitting at the bottom of the tailcone.

C. Apply grease (MIL-PRF-81322) to the inside surface of the ears of the tail rotor gearbox assembly. Install the tail rotor guard fitting into the tail rotor transmission and install the attaching hardware. Tighten all the attaching hardware.

8-118. Vibration Absorber (Figure 8-12)

NOTE

The vibration absorber can only be installed on aircraft equipped with Tailcone Assembly, P/N 4112000-103, or after modification of the tailcone in accordance with Vibration Absorber Kit, P/N 4230018-1, 4230018-3, or 4230018-5.

8-119. Removal - Vibration Absorber

A. Disconnect the lanyard (10) from the tailcone tab.

B. Remove the hardware (3, 4) attaching the beam (1) to the tailcone and remove the backing plate (2) and beam (1).

8-120. Disassembly - Vibration Absorber

NOTE

Removing/moving the weights from a tuned vibration absorber will require absorber tuning when the vibration absorber is reinstalled.

A. Remove the hardware (7, 4, 8, 9) attaching the lanyard (10) and weights (6) to the beam and remove the weights (6).

8-121. Inspection - Vibration Absorber

A. Inspect the beam, weights, and support brackets for cracks, nicks, scratches, corrosion and security of installation.

B. Inspect the mounting hardware for damage.

C. Inspect the lanyard for condition.

8-122. Repair - Vibration Absorber

A. Replace the beam if cracked or damage exceeds a depth of .020 inches/.51 mm. Polish out damage to a maximum depth of .020 inches/.51 mm.

B. Replace cracked support brackets or brackets with damage exceeding .020 inch/.51 mm in depth. Polish out damage to a maximum depth of .020 inches/.51 mm.

C. Replace damaged hardware or the lanyard as required.

8-123. Assembly - Vibration Absorber

A. Install the weights (6) and lanyard (10) on the beam (1) and secure with the hardware (7, 4, 8, 9). Position the weights 0.3 inches/7.6 mm from the end of the beam and torque the bolts (7) to 75 in-lbs/8.5 Nm.

8-125. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Acetone	Acetone Solvent	
Adhesive	Trim Adhesive, 3M Brand	8031
Adhesive	Window/Windshield Adhesive, Courtaulds Aerospace	PR-1425-B2
Caulk (vinyl adhesive)	Phenoseal Does It All[1] - Translucent (10 fl. oz/296 mL cartridge)	051136 00006 (UPC)
Compound	Anti-Corrosion, Conductive Compound, Kopr-Shield Brand	CP8-TB
Compound	ACF-50 Anti-Corrosion/Lubricant, Lear Chemical Research	10013
Fabric	Fire Curtain, Nextel Brand	Enstrom P/N 400-006
Grease	Grease, Lubriplate Brand	630-AA[2] (06701)
Grease	Grease	MIL-PRF-81322
Hydraulic Fluid	Hydraulic Fluid	MIL-PRF-5606[3]
Lockwire	Lockwire Copper .020”	MS20995CY20
Lockwire	Lockwire.032”	MS20995C32
Lubricant	LPS 2 Heavy Duty Lubricant, LPS Laboratories	00216
Nitrogen	Nitrogen	
Paint, Touch-Up	Flat Black, Spray Can	
Primer	Epoxy Primer	MIL-PRF-23377[4]
Putty	Glazing and Spot Putty, Bondo	801
Sealant	Fuel Resistant Coating, 3M Brand	EC 776
Sealant	Fuel Resistant, AMS-S-8802 Type II Class B	
Sealant	Silicone Sealant, Dow Corning Brand	732-RTV
Sealant	Fire Barrier Sealant, 3M Brand	CP25WB+
Shielding Coating	EMI/RFI Shielding Coating, Acheson Brand	Electrodag 437

[1] Previously branded as 102 Phenoseal.
[2] MIL-PRF-81322 is an acceptable alternate.
[3] AeroShell Fluid 41 (Shell Oil), Royco 756 (Anderol), or Phillips X/C 5606H (Phillips 66)
[4] Example: PRC-DeSoto Brand 513x390/activated by 910x624; or equivalent.

ITEM	DESCRIPTION	PART NUMBER
Solder	“44” Resin Solder	
String	Cotton String	
Tape	Transparent, 3M Brand	5430
Tape	Tape, Masking 1“	
Tape	Double Sided, Foam .50”, 3M Brand	4910-50
Tape	Single Sided, Foam .75”, 3M Brand	4516-75
Tape	Vinyl, Black .25”, 3M Brand	70-0160-1056-6
Thread	Sewing Thread Metalized, 0.020”	Enstrom P/N 300-093 (MT13)
Thread Sealant	Thread Sealant, Loctite Brand	Threadlocker Blue 242[5]
Thread Sealant	Thread Sealant, Vibra-Tite Brand	VC-3

[5] Acceptable alternate to VC-3.

SECTION 9

ROTOR SYSTEMS

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SECTION 9

ROTOR SYSTEMS

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C. Tabbing Out Feedback

Cyclic feedback is a pulsing felt in the cyclic stick at main rotor 1/rev frequency. Tabbing out cyclic feedback is the most difficult and the most important procedure in achieving optimum ride in Enstrom helicopters with minimum cyclic vibration. Less than optimum outboard tabbing will result in excessive inboard tab to achieve a smooth ride and also excessive cyclic stick vibration. Unfortunately there is no reliable method of determining the correct outboard tab other than trial and error.

(1) Create a chart such as the one shown below to record the results of the tabbing runs.

Tab	Result
1 Up	
1 Down	
2 Up	
2 Down	
3 Up	
3 Down	

(2) Operate the helicopter on the ground at full flat pitch blade RPM (96%-98%).

(3) Move the cyclic six to eight inches in a forward and aft movement at approximately one cycle per second and feel for feedback in the cyclic motion.

NOTE

Feedback will not necessarily be indicated by cyclic stick shake, although stick shake will result from significant feedback.

NOTE

In the 480 series helicopters, it is typical to have some slight mechanical feedback that gives the appearance of blade tab feedback but is not. It helps to pull a bit of collective pitch and allow the helicopter to rise slightly to extend the landing gear oleos a bit. This will eliminate the mechanical feedback and allow the pilot or technician to feel the blade feedback.

(4) Stop the blades and add two degrees up to the #1 blade outboard tab.

(5) Run the helicopter again using the same procedures and again check the cyclic for feedback. The purpose of this procedure is to check the magnitude of the cyclic feedback in the current blade tab configuration with the original and with the previous tab settings. The severity of the feedback will stay the same, get better or get worse. Record this result in the table above.

(6) If the feedback is eliminated, this procedure is finished. If the magnitude of the cyclic feedback either stays the same, or worsens, then change the setting on the same outboard tab to two degrees down. If the feedback gets better but is still present, add one more degree. Do not use more than 5° in any tab.

(7) Run the helicopter again and using the same procedure, compare the magnitude of the cyclic feedback. Again, it should either be eliminated, stay the same or get worse. If it stays the same or gets worse, then set the #1 blade outboard tab back to zero, and add two degrees up to the #2 blade outboard tab.

(8) Continue this procedure until each blade has been checked for both up and down tab, or until the feedback has been eliminated.

(9) By following this procedure it should be possible to eliminate the cyclic feedback with one outboard tab adjustment on one blade.

D. Using pitchlinks, re-track the hover to less than 0.2 ips. If the above procedure is followed, once the hover has been tracked smooth, the cyclic feedback should not reoccur.

E. Forward flight is tracked using the inboard blade tabs.

(1) Fly the helicopter at normal cruise settings (50 psi for TH-28/480) (58 psi for 480B) and record the ips reading and the clock angle.

(2) Using the same polar chart (Figure 9-2) adjust the forward flight to less than 0.2 ips with the inboard tabs.

NOTE

If addition of inboard tab affects the hover, take that tab out again and try opposite tab on the other two blades.

NOTE

If a tab change does not improve the ips reading, it is advised to take the tab adjustment out again and try adjusting the inboard tab on another blade. Failure to follow this procedure will result in excessive tab amounts on all the blades.

(3) Continue this procedure until the forward flight ips reading is 0.2 or less.

F. Clock Angle Corrections

NOTE

Clock angle corrections are related to how well the balance equipment matches the helicopter so most helicopters will use the same clock angle correction when they are balanced using the same balance equipment.

9-15. Disassembly – Retention Assembly (Figure 9-7)

NOTES

If replacing the tension-torsion straps only, proceed to paragraph 9-19.1.

For Lamiflex equipped aircraft, the blade grip, lamiflex bearing, and lamiflex bearing shims can be removed with the retention assembly installed on the hub assembly.

Lamiflex bearings are discontinued. If the Lamiflex bearings must be replaced, the aircraft must be switched to a T-T strap retention assembly. Refer to Table 9-2 or Enstrom TH-28/480 Series Illustrated Parts Catalog, Figure 8-3 for parts.

A. Lamiflex equipped aircraft:

(1) Remove the main rotor blade (para. 9-34) and disconnect the pitch change link from the pitch change bellcrank (para. 12-93) if the retention assembly is installed on a hub assembly.

CAUTION

Use brass protector plates in the vise jaws to prevent from damaging the retention assembly.

(2) Clamp the retention assembly vertically in a vise if removed from the hub assembly.

(3) Remove the dust cover (18) from the blade end of the retention assembly. Inspect for brass residue (chips or flakes) from the lamiflex bearing, if equipped.

(4) Remove the cotter pin (17) from the retention nut (16) and remove the nut. Use tool (T-0013) if the nut cannot be removed by hand.

(5) Remove the shims (15), lamiflex bearing (14), and nylatron strap (5), if not bonded to the spindle, from the spindle (3).

(6) Pull the blade grip (13) from the spindle. If required, tap the grip with a plastic mallet to aid in removal.

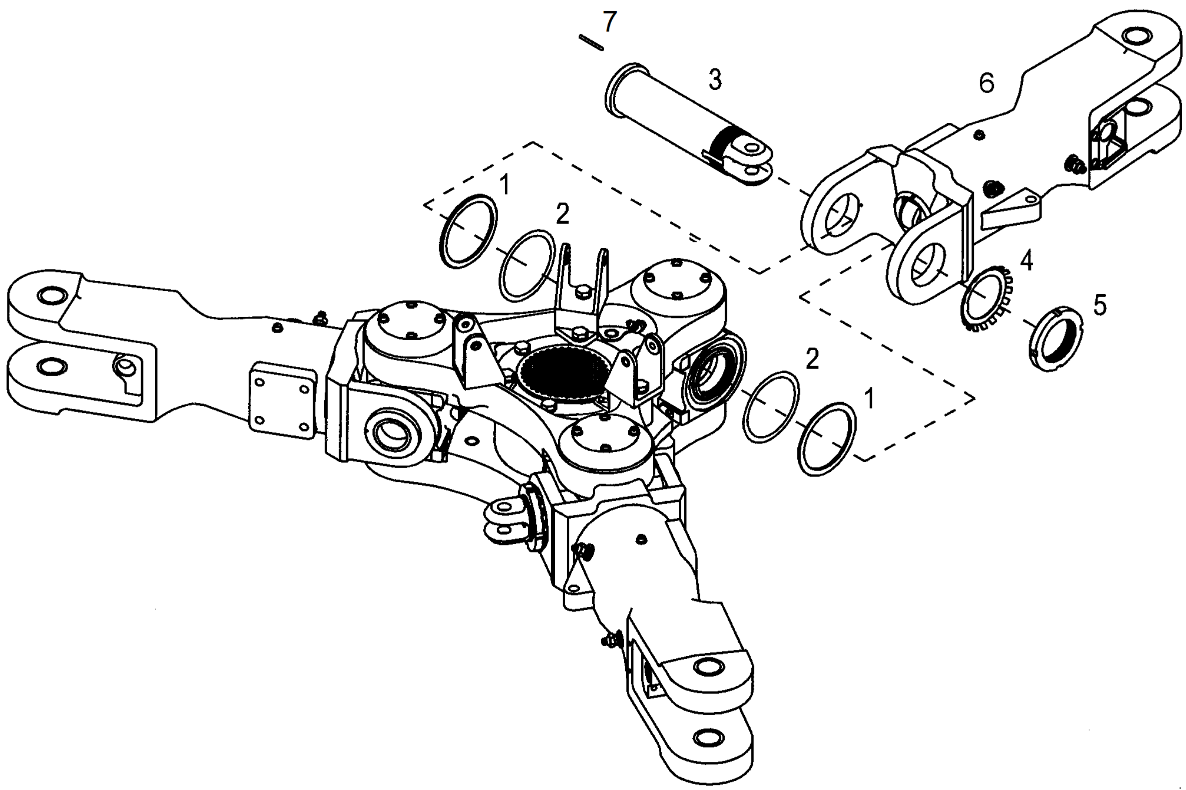
CAUTION

If the lamiflex bearing wears through the nylatron strap, inspect the spindle for damage. The maximum depth allowed is .020"/0.51 mm. Blend the damage out before installing a new nylatron strap.

(7) Peel the nylatron strap (5) from the spindle if bonded to the spindle.

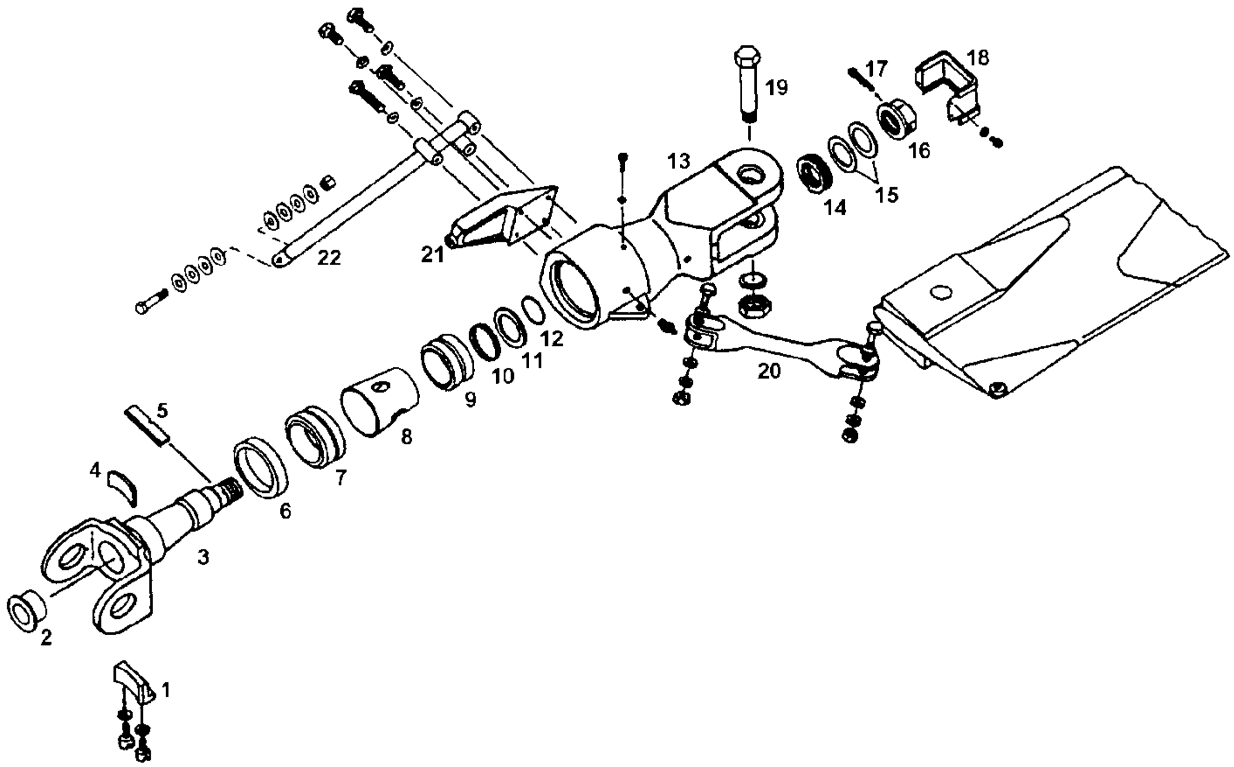
(8) Remove the O-ring (12) and DU washer (11) from the spindle.

(9) Remove the retaining ring (10) from the spindle.



1. Retention Assembly
2. Flapping Hinge Pin
3. DU Washer
4. Shim
5. Lock Washer
6. Nut
7. Pin

Figure 9-6. Retention Assembly Installation



NOTE

Lamiflex bearings are discontinued.

1.	Droop Stop	12.	O-Ring
2.	Dust Cap	13.	Blade Grip
3.	Spindle	14.	Lamiflex Bearing
4.	Flapping Stop	15.	Shim
5.	Nylatron Strap	16	Retaining Nut
6.	Seal	17.	Cotter Pin
7.	Bearing	18.	Dust Cover
8.	Spacer	19.	Blade Retention Pin
9.	Bearing	20.	Drag Link
10.	Retaining Ring	21.	Pitch Horn
11.	DU Washer	22.	Planipetal Weight

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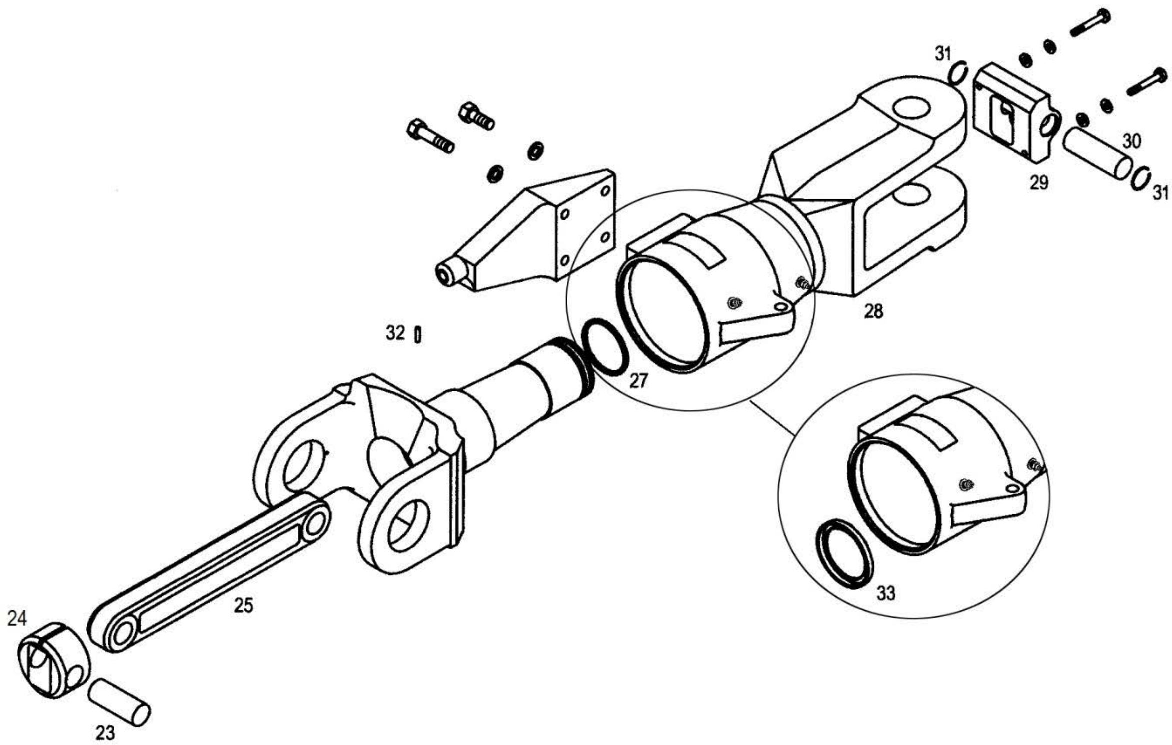
Figure 9-7. Retention Assembly



23.	Pin	29.	Lug
24.	Cylinder	30.	Pin
25.	Tension-Torsion Strap	31.	Retaining Ring
26.	Spindle	32.	Indexing Pin
27.	O-Ring (omitted if (33) is used)	33.	Seal (omitted if (27) is used)
28.	Blade Grip		

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Figure 9-7. Retention Assembly

Table 9-2. Retention Assembly

Inspection Requirements*

P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
40NBC20-52YZP	7	Bearing	O.D. 3.2492 to 3.2500	No Tolerance Allowed	Not Repairable	Replace Bearing
			I.D. 2.4993 to 2.5000	No Tolerance Allowed	Not Repairable	Replace Bearing
			Ratcheting or roughness	None Allowed	Not Repairable	Replace Bearing
28-14261-1	8	Spacer	Length 3.061 to 3.062	-.001	Not Repairable	Replace Spacer
			Ends parallel	Within .0012 FIM	Not Repairable	Replace Spacer
32NBC20-44YZP	9	Bearing	O.D. 2.7494 to 2.7500	No Tolerance Allowed	Not Repairable	Replace Bearing
			I.D. 1.9993 to 2.0000	No Tolerance Allowed	Not Repairable	Replace Bearing
			Ratcheting or roughness	None Allowed	Not Repairable	Replace Bearing
28-14313-1	11	DU Washer	Thickness .090 to.093	-.003	Not Repairable	Replace Washer
28-14279-3	13	Blade Grip	Blade retention bolt bore Dia. .875 to .876	+.0005	Not Repairable	Replace Blade Grip
			Large bearing bore Dia. 3.2512 to 3.2522	+.0018	Not Repairable	Replace Blade Grip
			Small bearing bore Dia. 2.7511 to 2.7519	+.0011	Not Repairable	Replace Blade Grip

Table 9-2. Retention Assembly

Inspection Requirements*

P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14279-3	13	Blade Grip (Cont'd)	Thru bore Dia. 1.5145 to 1.5165	+.0015	Not Repairable	Replace Blade Grip
			Drag link ear width .745 to .747	-.001	Not Repairable	Replace Blade Grip
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Blade Grip
			Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Blade Grip
28-14320-15	14	Lamiflex Bearing	Thickness .770 to .790	(See Note 1)	Not Repairable	(See Note 3)
			External to internal tab angle 15°	±.5°	Not Repairable	(See Note 3)
			Column separations (see Note 2 and also SDB T-054)	None Allowed	Not Repairable	(See Note 3)
28-14335-1	16	Nut	Thrust face for flatness	.0015	Not Repairable	Replace Nut
			Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut

Notes:

1. Lamiflex bearings that are found swelled from grease contamination should be cleaned with denatured alcohol and checked for delamination. If the bearing is swelled beyond the limits (.790” thick), they may still be serviceable if they can be reinstalled in accordance with para. 9-18 and do not cause binding in the controls.
2. Any bearing that shows evidence of bulging around the outer circumference of the elastomer segments, excessive axial swelling, visual delamination of the segments or the expulsion of shim fragments on the outside diameter, should be replaced by an airworthy bearing prior to the next flight.
3. Lamiflex bearings are discontinued. If the Lamiflex bearings must be replaced, the aircraft must be switched to a T-T strap retention assembly. Refer to Enstrom TH-28/480 Series Illustrated Parts Catalog, Figure 8-3 for parts.

(19) Install the cotter pin after the nut has been properly shimmed and torqued. Bend the cotter pin ends to secure.

CAUTION

To prevent lamiflex bearing damage, do not over-rotate the grip with the pitch change links disconnected.

(20) Install the dust cover (18).

(21) Install the flapping pin alignment pin into the spindle ear if it was removed.

(22) Install the pitch arm and Planipetal weight onto the blade grip. Install the hardware and torque to 75 in-lbs/8.5 Nm. Lockwire the hardware (.032) in horizontal pairs.

(23) If the retention assembly is installed on the hub assembly, connect the pitch change link to the pitch change bellcrank (para. 12-96) and install the main rotor blade (para. 9-38).

(24) Perform a maintenance test flight (para. 4-61).

B. Tension-Torsion Retention Assembly, P/N 28-14381-1

(1) If installing new retention stops (1 & 4), follow the procedures in paragraph 9-18,A,1.

CAUTION

Use brass protector plates in the vise jaws to prevent from damaging the retention assembly.

(2) Clamp the spindle in a vise in the vertical position.

(3) If removed, apply a small amount of Loctite 635 (green) to the alignment pin (32) and press the alignment pin into the spindle until the end is slightly recessed from the seal surface.

(4) Lubricate (MIL-PRF-81322) the seal surface of the spindle and install the seal (6) with the spring side facing toward the ears of the spindle.

(5) Lubricate (MIL-PRF-81322) the bearing surface and install the bearing (7) using a plastic mallet.

(6) Install the spacer (8).

(7) Lubricate (MIL-PRF-81322) the bearing surface and install the bearing (9) using a plastic mallet.

NOTE

Ensure the bearings are seated firmly against the spindle shoulders.

(8) Install the retaining ring (10).

(9) Install the tension-torsion strap (25) into the cylinder (24) so that the chamfer on the cylinder is facing inboard (center of main rotor hub) and install the retention pin (23).

(10) Install the tension-torsion strap into the spindle and ensure the groove in the cylinder engages the pin in the spindle.

(11) Install the O-ring (27) on the spindle.

(12) Install tool (T-0036) behind the seal with the chamfered side of the tool toward the large radius of the spindle.

(13) Install the lug (29) onto the end of the blade grip. Apply Loctite 222MS to the threads of the hardware and install the hardware and torque.

(14) Lubricate (MIL-PRF-81322) the bore of the blade grip and install the grip (28) on the spindle. Tap the grip onto the spindle with a plastic mallet until the seal in seated in the grip.

(15) Remove tool (T-0036) and tap the blade grip until fully seated on the spindle.

(16) Install one of the retaining rings (31) into the lug. Align the tension-torsion strap to the lug and install the retention pin (30). Install the other retaining ring.

(17) Install the dust cover (18).

(18) Apply a bead of silicone sealant (732-RTV) around the perimeter of the cylinder assembly (24) to form a seal between the cylinder and the spindle.

(19) Install the flapping pin alignment pin into the spindle ear if it was removed.

(20) Install the retention assembly onto the main rotor hub assembly (para. 9-19).

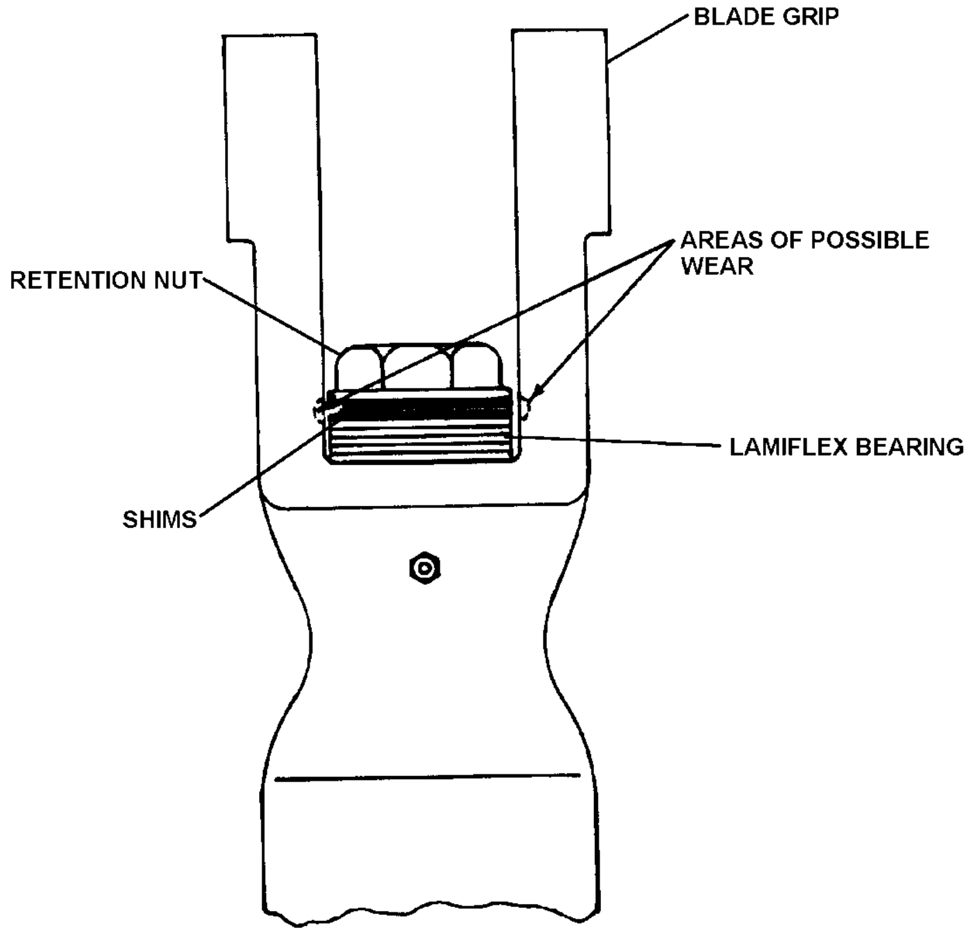
(21) Install the pitch arm onto the blade grip. Install the hardware and torque to 75 in-lbs/8.5 Nm. Lockwire the hardware (.032) in horizontal pairs.

C. Tension-Torsion Retention Assembly, P/N 28-14381-3

(1) If removed, install the grease seal (33) into the blade grip using the following procedure:

a. Place the replacement seal on the seal installation tool (T-0149-13) with the open face against the tool.

b. Place the blade grip over the seal installation tool.



NOTE

Lamiflex bearings are discontinued.

Figure 9-9. Lamiflex Bearing Shim Installation

c. Place tool T-0149-11 onto the blade grip and using a press or other suitable device, press the seal into the blade grip seal bore.

d. Remove the installation tools.

(2) If required, bond the covers for the cylinder (24) and lug (29) using the following procedure (Figure 9-7):

a. Remove residual adhesive from the cover and cylinder/lug as required.

b. Slightly abrade the bonding surfaces of the cover and cylinder/lug.

NOTE

Follow the mixing and application instructions for the DP420 adhesive or the DP420 will not cure or adhere properly.

c. Bond the cover to the cylinder/lug using DP420 adhesive. Allow the DP420 adhesive to cure for 24 hours.

d. Apply a light bead of silicone sealant (732-RTV) around the cover.

(3) If installing new retention stops (1 & 4), follow the procedures in paragraph 9-18,A,1.

CAUTION

Use brass protector plates in the vise jaws to prevent from damaging the retention assembly.

(4) Clamp the spindle in a vise in the vertical position.

(5) If removed, apply a small amount of Loctite 635 (green) to the alignment pin (32) and press the alignment pin into the spindle until the end is slightly recessed from the seal surface.

(6) Lubricate (MIL-PRF-81322) the seal surface of the spindle and install the seal (6) with the spring side facing toward the ears of the spindle.

(7) Lubricate (MIL-PRF-81322) the bearing surface and install the bearing (7) using a plastic mallet.

(8) Install the spacer (8).

(9) Lubricate (MIL-PRF-81322) the bearing surface and install the bearing (9) using a plastic mallet.

NOTE

Ensure the bearings are seated firmly against the spindle shoulders.

Table 9-3. Universal Block Assembly

Inspection Requirements*

P/N	Fig. # Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14251-1 & -2	Fig. 9-4, 21 Fig. 9-5, 20	Stop Pad	Visual damage (cracks, chips, etc.)	None Allowed	Not Repairable	Replace Stop(s)
ECD092-1 ECD092-3	Fig. 9-4, 22 Fig. 9-5, 21 Fig. 9-5, 21A	Bearing	O.D. 2.4994 to 2.5000	No Tolerance Allowed	Not Repairable	Replace Bearing
			I.D. 1.7493 to 1.7500	No Tolerance Allowed	Not Repairable	Replace Bearing
			Ratcheting or roughness	None Allowed	Not Repairable	Replace Bearing
28-14236-1	Fig. 9-4, 23 Fig. 9-5, 22	DU Washer	Flatness	.005	Not Repairable	Replace Washer
			Thickness .090 to.093	-.003	Not Repairable	Replace Washer
28-14117-11 or -13	Fig. 9-4, 15 or Fig. 9-5, 15	U-Block	Bore Dia. 2.4996 to 2.4998	+.0002	Not Repairable	Replace U-Block
			Bearing Surface O.D. 1.7492 to 1.7498	-.0002	Not Repairable	Replace U-Block
			Bearing Surfaces concentric	.001 FIM	Not Repairable	Replace U-Block
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace U-Block
			Nicks, scratches, or corrosion	None allowed at the radius of the bearing spindle	≤ .030 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace U-Block

Table 9-3. Universal Block Assembly

Inspection Requirements*

P/N	Fig. # Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14235-1	Fig. 9-4, 24	Spacer	Ends parallel	.0015 FIM	Not repairable	Replace Spacer
28-14233-2	Fig. 9-6, 2	Flapping Pin	Threads (crossed or missing)	None Allowed	Not Repairable	Replace Pin
			Damper bolt hole Dia. .5005 to .5015	+.0015	Not Repairable	Replace Pin
			O.D. 1.7486 to 1.7492	-.0005	Not Repairable	Replace Pin
			Longitudinal scores or scratches	.011 deep	≤ .011 deep	Blend and polish out smooth
			Radial Scores	None Allowed	Not Repairable	Replace Pin
28-14233-3	Fig. 9-6, 2	Flapping Pin	O.D. 1.7483 to 1.7493	-.0005	Not Repairable	Replace Pin
Inspect the remainder of the flapping pin following the inspection criteria listed for the -2 flapping pin						
W-09	Fig. 9-6, 5	Lock Washer	Tangs (deformed or cracked)	None Allowed	Not Repairable	Replace Washer
N-09	Fig. 9-6, 6	Nut	Threads (crossed or missing)	None Allowed	Not Repairable	Replace Nut
4143011-11	Fig. 9-5, 23	Spacer	Ends parallel	.0015 FIM	Not Repairable	Replace Spacer
4143011-13	Fig. 9-5, 26	Sleeve	Ends parallel	.0015 FIM	Not Repairable	Replace Spacer

* All dimensions are in inches.

9-35. Inspection – Main Rotor Blades

A. Inspect the paint finish of the blades for blistering, erosion, cracking, chipping, peeling, and overall oxidation.

B. Inspect the main rotor blade spar (especially on blades that have erosion of the paint finish) for slivering or flaking of the exposed spar surface, and for a grainy surface appearance (Figure 9-24).

C. Inspect the spar bond lines for raised sections or voids, dark deposits, corrosion, and bubbly or scaly paint (Figure 9-25). Use the coin tap method to inspect suspect areas for voids.

D. Inspect the trailing edge bond lines for voids or openings, dark deposits, corrosion, and bubbly or scaly paint (Figure 9-25). Use the coin tap method to inspect suspect areas for voids. Use only plastic shim stock (.001"/.025 mm) for determining the depth of voided areas.

E. Inspect the bond lines at the root doubler and retention plate edges for paint cracking or scaling, dark deposits, corrosion, and void in the fairing compound (Figure 9-25). Use the coin tap method to inspect suspect areas for voids. Use only plastic shim stock (.001"/.025mm) for determining the depth of the voided areas.

F. Inspect the main rotor blade spar (Figure 9-26 and Figure 9-27), skins, trim tabs, retention plates, drag link fittings, and root doublers for nicks, scratches, dents, and cracks.

G. Inspect the blade tip rib, trim tabs and drag link fittings for loose rivets.

NOTE

Normal service life for the blade tape is 200 - 300 hours: however, if the aircraft is operated in rain, service life for the tape can be considerably shortened.

NOTE

Visually inspect the blade tape for security and damage after the aircraft is operated in rain.

H. If installed, inspect the main rotor leading edge blade tape (Figure 9-30.1) for security of installation, tears or punctures, and bubbles or lumpy surface.

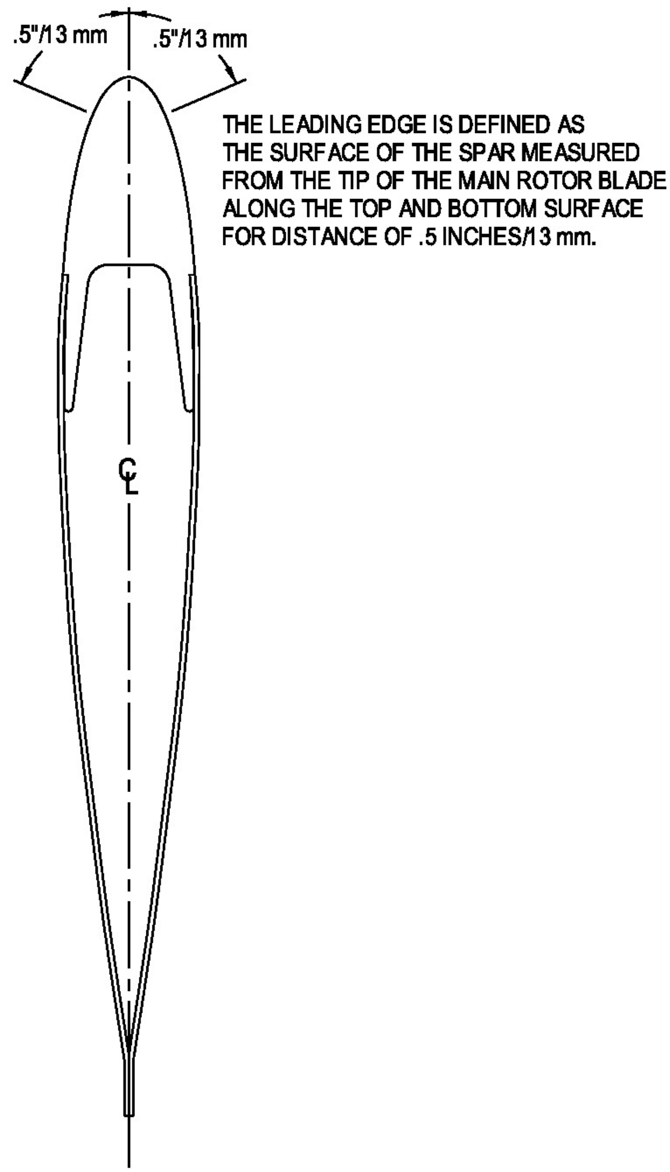


Figure 9-23. Main Rotor Blade Leading Edge Definition

9-36. Repair – Main Rotor Blades

A. Repair small areas of the paint finish using the following:

NOTE

Refinish the blades equally if refinishing a larger area (outboard leading edge for example) to maintain the continuity of the weight between the blades.

(1) Work the area lightly with medium grit aluminum oxide abrasive paper/cloth.

(2) Wash the area with mild soap and water.

WARNING

Acetone and Methylethylketone (MEK) are toxic and must be used with extreme caution. Make sure adequate ventilation is provided. Repeated or prolonged contact with the skin should be avoided. A low-volatile substitute, such as Extreme Simple Green, is a preferred solvent.

(3) Degrease the area with denatured alcohol, Extreme Simple Green, or equivalent.

NOTE

Application of the chemical conversion coating is only required if the bare metal is exposed on the main rotor blade.

WARNING

Use the proper protective equipment when working with the metal prep. Observe the precautionary information and instructions provided with the metal prep.

(4) Treat the repaired area of the blade with a metal prep. Flush thoroughly with fresh water and allow to dry.

WARNING

Use the proper protective equipment when working with the chemical conversion coating. Observe the precautionary information and instructions provided with the chemical conversion coating.

(5) Treat the blade as required with a chemical conversion coating complying with MIL-DTL-5541/MIL-DTL-81706 or equivalent.

(6) Clean the area with Extreme Simple Green or equivalent.

(7) Apply a coat of MIL-PRF-23377 primer or equivalent and allow to dry.

(8) Finish the area with a flat acrylic aerosol paint.

B. Repair blade spars with flaking or slivering less than .032"/0.8 mm in depth or a light grainy surface as follows:

NOTE

Contour the reworked area evenly along the blade and rework the blade set equally to maintain the blade weight continuity of the blade set.

NOTE

Use care when removing the corrosion contamination to prevent from contaminating other areas or blades.

(1) Remove the surface corrosion from the area using medium grit aluminum oxide abrasive paper/cloth or an aluminum oxide flapping wheel.

(2) Wash the reworked area thoroughly with mild soap and water, flush thoroughly.

WARNING

Use the proper protective equipment when working with the metal prep. Observe the precautionary information and instructions provided with the metal prep.

(3) Treat the repaired area of the blade with a metal prep. Flush thoroughly with fresh water and allow to dry.

WARNING

Use the proper protective equipment when working with the chemical conversion coating. Observe the precautionary information and instructions provided with the chemical conversion coating.

(4) Treat the blade as required with a chemical conversion coating complying with MIL-DTL-5541/MIL-DTL-81706 or equivalent.

(5) Refinish the area either using the small area repair in paragraph 9-36, A, or if the entire blade needs refinishing, use paragraph 9-37.

CAUTION

Refinished main rotor blades will require retracking the main rotor system. Refer to paragraph 9-5.

Refinished tail rotor blades will be required to be statically and dynamically rebalanced. Contact Enstrom Product Support about the availability of a main rotor balance tool to aid blade rebalancing if tracking problems occur after blade refinishing work.

C. Repair blade spars with flaking or slivering exceeding .032"/0.8 mm in depth but not the limits in Figure 9-24 as follows:

(1) Apply corrosion inhibitor to the affected area daily.

(2) Contact the Enstrom Customer Service Department for further instructions.

NOTE

Main rotor blades with intergranular spar corrosion (exfoliation) exceeding the limits of Figure 9-24 must be rejected as unairworthy.

D. Repair voids in the spar to skin bond lines that do not exceed the limits of Figure 9-25 as follows:

NOTE

Bond separations (voids) in the main rotor blade bond joints cannot be repaired/rebonded. The following repair provides corrosion treatment and sealing of the voided area until the void exceeds the allowable limits and the main rotor blade must be rejected as unairworthy.

(1) Remove the paint and or surface corrosion from the voided area with aluminum oxide abrasive paper.

(2) Degrease the area with denatured alcohol, Extreme Simple Green, or equivalent.

CAUTION

Do not heat the bond line to more than 250°F/121°C.

(3) Warm the area to approximately 180°-200°F/82°-93°C to evacuate any residual moisture.

(4) Apply corrosion inhibitor and allow to dry for 30 minutes.

(5) Wipe the area with denatured alcohol, Extreme Simple Green, or equivalent.

(6) Seal the area with Hysol Type EA 9309.2NA epoxy sealant.

(7) Refinish the area in accordance with paragraph 9-36, A, above or paragraph 9-37 depending on the paint condition of the rest of the blade.

CAUTION

Refinished main rotor blades will require retracking the main rotor system. Refer to paragraph 9-5.

CAUTION

Refinished tail rotor blades will be required to be statically and dynamically rebalanced. Contact Enstrom Product Support about the availability of a main rotor balance tool to aid blade rebalancing if tracking problems occur after blade refinishing work.

(8) Enter into the maintenance log book the main rotor blade serial number and the location of the repair.

(9) Visually inspect the repaired area for further growth of the bond separation during the preflight check or daily inspection. Inspect the repaired area for further growth of the bond separation using the coin tap method at 25 hour intervals.

E. Repair voids in the trailing edge bond lines not exceeding the limits in Figure 9-25 using the procedure in paragraph 9-36, D, except for the following:

(1) Inspect repairs outboard of Sta. 101 using the coin tap method at the normal periodic inspection interval.

(2) Inspect repairs inboard of Sta. 101 using the coin tap method at 25 hour intervals.

F. Repair voids in the root doubler and retention plate edge bond lines not exceeding the limits in Figure 9-25 using the procedure in paragraph 9-36, D.

G. Damage to the blade spar not exceeding the limits in Figures 9-26 and Figure 9-27 must be repaired I/A/W Figure 9-28 and Figure 9-29. Reject any blades that have damage exceeding the limits in Figures 9-26 and Figure 9-27.

H. Reject blades with the following blade skin damage:

(1) Punctures in the blade skin.

(2) Sharp dents with a width to depth ratio less than 3:1 and deeper than .020"/.51 mm.

(3) Smooth dents which have resulted in permanent skin deformation greater than .060"/1.5 mm in depth.

(4) Nicks and scratches in the chordwise direction greater than .010"/.25 mm in depth.

(5) Nicks and scratches orientated within ± 30° of the spanwise direction greater than .020"/.51 mm in depth.

(6) Trailing edge chordwise dents or nicks deeper than .20"/5.1 mm.

(7) Trailing edge flapwise kinks extending more than .20"/5.1 mm.

(8) Cracks.

I. Repair blade skins with damage not exceeding the limits in paragraph 9-36, H, above as follows:

(1) Buff out all light scratches.

(2) Polish out nicks, scratches, and sharp dents and blend the area to approximately .50"/13 mm around the damaged area.

(3) Repair damage to the trailing edge in accordance with Figure 9-30.

(4) Smooth dents that do not exceed the damage limits are acceptable and no repair is required.

NOTE

Refinish the repaired area in accordance with paragraph 9-36, A, or paragraph 9-37 depending on the condition of the rest of paint finish.

J. Reject blades with the following root doubler damage:

(1) Nicks, scratches, and sharp dents in the chordwise direction greater than .010"/.25 mm in depth.

(2) Nicks, scratches, and sharp dents orientated within ± 30° of the spanwise direction greater than .020"/.51 mm in depth.

(3) Smooth dents deeper than .020"/.51 mm.

(4) Cracks.

K. Repair blade doublers with damage not exceeding the limits in paragraph 9-36, J, as follows:

(1) Buff out all light scratches.

(2) Polish out nicks, scratches, and sharp dents and blend the area to approximately .50"/13 mm around the damaged area.

(3) Smooth dents that do not exceed the damage limits are acceptable and no repair is required.

NOTE

Refinish the repaired area I/A/W paragraph 9-36, A, or paragraph 9-37 depending on the condition of the rest of paint finish.

L. Reject blades with the following blade retention plate damage:

(1) Nicks, scratches, and sharp dents greater than .050"/1.3 mm in depth.

(2) Cracks.

M. Repair blade retention plates with damage not exceeding the limits in paragraph 9-36, L, as follows:

(1) Buff out all light scratches.

(2) Polish out nicks, scratches, and sharp dents and blend the area to approximately 2.0"/5.1 cm diameter area.

NOTE

Refinish the repaired area I/A/W paragraph 9-36, A, or paragraph 9-37 depending on the condition of the rest of paint finish.

NOTE

Do not paint the blade grip mating surface of the retention plates.

N. Repair or replace trim tabs as follows:

(1) Repair:

a. Flatten dents or kinks and polish out scratches and nicks.

b. Drill out and replace loose rivets.

(2) Replace:

a. Drill out rivets and remove the trim tab.

b. Open pilot holes in the replacement trim tab with a #40 drill.

c. Position the trim tab on the main rotor blade and install the rivets.

O. Reject blades with the following drag link fitting damage:

(1) Nicks or scratches greater than .010"/.25 mm deep.

(2) Cracks.

(3) Loose rivets.

P. Repair drag link fittings with damage not exceeding the limits in paragraph 9-36, O, as follows:

(1) Buff out all light scratches.

(2) Polish out nicks, scratches, and sharp dents.

NOTE

Refinish the repaired area I/A/W paragraph 9-36, A, or paragraph 9-37 depending on the condition of the rest of paint finish.

NOTE

Do not paint the drag link mating surface of the drag link fittings.

Q. Reject blades that have a cracked tip rib. Replace loose rivets.

R. Install the leading edge blade tape as follows (for blade tape repairs, go to step S):

NOTE

Prior to installation of the blade tape, the spar should be inspected according to paragraph 9-35, B.

CAUTION

New blade tape should not be installed without proper leading edge preparation and paint cover (paragraph 9-36, A or B). Do not install blade tape on blades with leading edge/spar corrosion without first treating the corrosion.

(1) Clean the blade with a mild soap and water solution, and rinse with fresh water.

(2) Allow the blade to dry.

(3) Coat the area to be taped with MIL-PRF-23377 epoxy primer or equivalent or quality top coat paint such as Sherwin-Williams “Acry Glo” or similar.

(4) Mark and mask the non-blade tape area as follows:

NOTE

The blade surface area adjacent to the taped area must be masked to avoid sanding the non-taped area.

a Measure 108.4” from the end of the blade tip, mark with a pencil, and apply masking tape at this measurement from the spar edge to at least 0.100” beyond the spar seam. Measure, mark, and mask the bottom side of the blade as well.

b. Apply masking tape along the blade length from the blade tip to the pencil marks at a distance of 0.100” from the spar seam.

(5) Sand the exposed area to be taped with 400 grit sand paper or Scotch Brite 7447B to produce a smooth surface. Remove the masking tape after sanding is completed. Wipe blade clean.

NOTE

The blade tape is installed in three 36-inch long sections.

(6) Mark the area for blade tape as follows:

a. Measure a distance of 0.100” from the blade tip. This marks the start of the blade tape.

b. Measure a distance of 108.4” from the blade tip. This marks the end of the blade tape.

c. Measure from the leading edge of the blade back on the topside of the airfoil ½ the distance of the width of the tape (2 ½ inches) and mark the surface with a pencil. Do this at the tip of the blade and toward the root end of the blade at the 108.4” mark.

(7) Above the marks, stretch a length of masking tape from the blade tip to the 108.4” mark to create a straight reference line.

(8) Butt the top edge of three 8681HS tape sections against the masking tape reference line applied in step (7) above and use 1 inch long tabs of masking tape to hold it in place. Maintain a 0.100” gap between each section of 8681HS tape.

(9) Apply another 1 inch wide strip of masking tape along the entire top edge of the 8681HS tape to form a soft hinge (Figure 9-31.1, a).

(10) Fold the 8681HS tape back onto the top of the blade (Figure 9-31.1, b).

(11) Apply 3M Adhesion Promoter # 86A to the entire area that will be covered by 8681HS tape. Use pre-wetted wipes or the adhesion promoter P/N 86 A and clean cheese cloth to apply the 86A and rubber gloves to protect hands. Apply only enough to wet the surface, so it appears shiny. Wipe off any excess to ensure no runs or drips. Allow to dry for 10 to 20 minutes or until the surface does not appear shiny.

(12) Spray the surface of the treated area of the blade with a previously prepared solution of water, isopropyl alcohol, and detergent.

a. Solution: Mix 70% water with 30% isopropyl alcohol in a 1 pint spray bottle. Add 4 drops of a non-ionic detergent such as Joy brand dish detergent.

(13) Beginning at the edge of the blade tape, remove a portion of the first protective liner strip from the blade tape nearest the soft hinge. Spray the sticky side of the tape with a heavy coat of solution from step 12(a). There are four protective liner strips for each 36-inch long section. Fold the tape down onto the blade and allow it to float into its favored location (Figure 9-31.1, c).

(14) Use a soft plastic squeegee to force the liquid out from behind the tape, starting at the hinge corner and working forward (Figure 9-31.1, d). Carefully work to the end of the tape section. Repeat steps (13) and (14) for the remaining three protective liner strips.

a. Avoid touching the exposed adhesive tape surface.

b. Use a dry towel to mop up excess solution on the back edge.

c. Carefully work around the leading edge and around toward the trailing of the tape on the other side.

d. If a bubble of liquid or air is trapped under the tape, pull the tape back up to free the bubble, re-spray the area and squeegee to make it smooth and bubble free. DO NOT puncture bubbles to relieve entrapped air or liquid, especially on the leading edge.

NOTE

A smooth, continuous taped surface is necessary for optimal blade performance.

e. Repeat the process for the remaining two 36-inch long tape sections.

(15) Remove the “hinge” tape on the top edge and squeegee out excess fluid, while mopping excess up with a dry towel. Minute quantities of fluid which may be trapped, such as around fasteners, dissipate quickly.

(16) Seal the space between the ends of the sheets and the trailing edges with 3M DP190 epoxy adhesive using the following procedure:

a. Mask off both sides of the 8681HS tape approximately 1/16” from the edge with “3M Fine Line” tape.

b. Apply sealant between the masked off area and use a stiff applicator to screed off the excess. Remove the strips of masking tape within a few minutes, before complete gelling has occurred, to allow the sealant to flow to a nice tapered edge. DP190 will gel in 90 minutes at 72°F and full cure will be achieved in about 8 hours. It will cure faster in warmer temperatures, slower in cooler temperatures. In warm weather it helps to allow the top surface to cure before turning the blade over to seal the second side so that the sealer does not form a bulge.

c. After the sealant is cured, inspect the sealant bead at the tape joints and the trailing edge.

(17) Lightly sand excess sealant to match the blade contour.

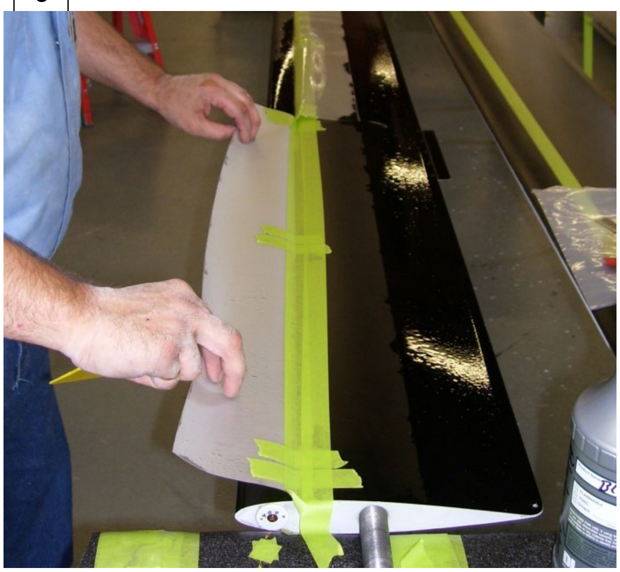
NOTE

A sealant bead flush with the blade contour is necessary for optimal blade performance.

a. Mask the sealant line around the area to be sanded. Lightly sand the contour using 3M 214U 80 grit and then 3M 214U 150 grit to blend the edges.

b

c



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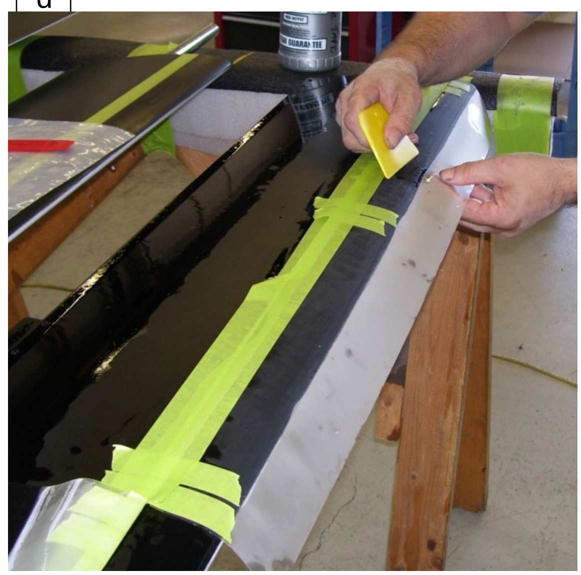

Photo a: Applying masking tape to provide the soft hinge (step 9).

Photo b: Folding the blade tape back (step 10) in preparation for blade surface treatment (steps 11 and 12).

Photo c: Positioning the blade tape for application (step 13).

Photo d: Applying blade tape to the blade top side and using a squeegee to remove liquid from under the tape as the tape is applied around the forward edge of the blade (step 14).

Figure 9-31.1. Blade Tape Installation

(14) Seal the space between the patch and the older pre-existing leading edge tape, and the trailing edges of the patch with the DP190 epoxy adhesive using the following procedure (Figure 9-31.2, c):

a. Mask off both sides of the edge of the patch, all the way around the patch, with masking tape approximately 1/16 inch (.157 cm) from the edge of the patch. Use fine line tape or equivalent.

b. Apply sealant between the masked off area and use a stiff applicator, or your finger, to screed off the excess sealant. Immediately remove the strips of masking tape to allow the sealant to flow to a nice tapered edge. DP190 will gel in 90 minutes at 72° and full cure will be achieved in about 8 hours. It will cure faster in warmer temperatures and slower in colder temperatures.

(15) After full cure, check the sealant to see how much bulge remains. If the bulge is higher than the sealer at the aft edge of the original tape, use a sharp blade to scrape the top of the bulge down so it is flush with the existing sealer.

9-37. Refinishing – Main Rotor Blades

WARNING

Use the proper protective equipment when working with the paint stripper. Observe the precautionary information and instructions provided with the paint stripper.

NOTE

The main rotor blades are treated with a chemical conversion coating (alodine) during the manufacturing process. Attempt to preserve the coating as much as possible during the paint removal process.

CAUTION

Refinished main rotor blades will require retracking the main rotor system. Refer to paragraph 9-5.

Refinished tail rotor blades will be required to be statically and dynamically rebalanced. (Tip weight changes must be made to keep 75% of the blade tip weight in the forward pocket to maintain the chordwise balance.)

A. Apply Eldorado PR-3500 paint stripper or other suitable stripper to the blade. Remove the paint residue with a plastic (body putty) spatula when the paint starts to wrinkle. Apply additional stripper as required. Finish cleaning the main rotor blade using water and a Scotch-Brite™ Pad (7447B).

B. Inspect the blade I/A/W paragraph 9-35 (tail rotor blade para. 9-47).

C. Repair the blade I/A/W paragraph 9-36 (tail rotor blade para. 9-48).

D. Wash the blade with mild soap and water and flush thoroughly.

WARNING

Use the proper protective equipment when working with the metal prep. Observe the precautionary information and instructions provided with the metal prep.

E. Treat the repaired area of the blade with a metal prep. Flush thoroughly with fresh water and allow to dry.

WARNING

Use the proper protective equipment when working with the chemical conversion coating. Observe the precautionary information and instructions provided with the chemical conversion coating.

F. Treat the blade as required with a chemical conversion coating complying with MIL-DTL-5541/MIL-DTL-81706.

G. Wipe the blade with Extreme Simple Green or equivalent using clean rags.

NOTE

Do not paint the drag link mating surface of the drag link fittings.

H. Apply MIL-PRF-23377 primer or equivalent suitable epoxy primer as follows:

NOTE

Apply the primer in thin, even coats.

NOTE

It is important that the trailing edges of the main and tail rotor blades have good coverage.

(1) Apply two coats to the spar and feather the coats past the spar to skin bond lines. Apply two coats to the trailing edge straight on. Apply the third coat to the whole blade.

(2) The application is the same for the tail rotor blades except that the whole blade gets all three coats.

I. Paint the finish coat with any good quality flat or satin finish polyurethane paint.

J. Track the main rotor system (para. 9-5).

K. Statically and dynamically rebalance the main rotor blades. Contact Enstrom Product Support regarding the availability of a main rotor balance tool to aid blade rebalancing if tracking problems occur after blade refinishing work.

9-38. Installation – Main Rotor Blades (Figure 9-22)

WARNING

Do not align the holes in the grip and blade by placing your finger in the retention bolt hole.

NOTE

Lifting the tip of the blade so the blade is parallel to the retention assembly will allow easy installation of the blade into the blade grip, installation of the blade bolt, and the drag brace bolt. If desired, use the main rotor blade bolt guide bullet, T-0009, to aid installation of the blade bolts.

A. If required, apply corrosion prevention compound to each blade (para. 4-88).

B. Install the root end of the blade into the blade grip.

C. Align the retention bolt hole in the grip with the hole in the blade. Install the bolt (2), washer, and nut. Torque the nut to 600 in-lbs/68.2 Nm.

D. Connect the drag link to the trailing edge of the blade and secure with the hardware (1). Torque the nut to 140 in-lbs/15.9 Nm.

E. Repeat the process for the other blades.

F. Perform a maintenance test flight if maintenance was performed on the main rotor blades.

9-39. Tail Rotor Assembly

9-40. Description – Tail Rotor Assembly (Figure 9-32)

The tail rotor assembly is a two bladed, wide cord, teetering, delta hinged rotor system. The tail rotor assembly consists of two blade and grip assemblies mounted on a common spindle by a pair of matched DT ball bearings and one needle bearing per blade and grip assembly. This assembly is teeter-mounted on a center hub by needle bearings. The center hub is splined to match the tail rotor transmission output shaft for positive mounting and driving. The control of this assembly is accomplished through cables up to a sliding pivot yoke. Pitch change links, installed between the sliding pivot yoke and the blades grips, simultaneously adjust the blade pitch of both blades.

9-41. Troubleshooting – Tail Rotor Assembly

A. High Frequency Vibration

(1) A high frequency vibration is felt in the tail rotor pedals or airframe (tail rotor frequency).

a. Tail rotor improperly lubricated.

Properly lubricate the tail rotor.

b. Excessive axial play in the hub teeter bearings.

Reshim or replace the teeter bearings.

c. Tail rotor out of balance.

Balance the tail rotor.

d. Tail rotor transmission mounting bolts loose.

Retorque the bolts and lockwire.

e. Tail rotor guard loose at the tail rotor transmission.

Retorque the bolt at the tail rotor transmission or repair the guard if the transmission fitting is working in the tail rotor guard.

B. Controllability

(1) Tail rotor pedals are binding.

a. Pivot bolts in the pitch control assembly are over-torqued.

Loosen the nuts and retorque.

b. The pitch change links are incorrectly connected to the pitch arms.

Correctly connect the pitch change links to the pitch arms.

c. The tail rotor was incorrectly indexed to the transmission output shaft during installation.

Remove the tail rotor and correctly install.

d. The tail rotor cable tension is incorrect.

Correctly set the tail rotor cable tension.

e. The tail rotor retention bushing and output shaft spacer are worn.

Replace the bushing and the output shaft spacer.

f. The tail rotor grip bearings are worn.

Replace the tail rotor grip bearing set.

9-50. Assembly – Tail Rotor Assembly (Figure 9-36)

A. Install the hub (2) into the spindle (1) using the following procedure:

(1) Install one of the washers (3) onto the hub with the chamfer toward the center of the hub.

(2) Apply a light coating of Loctite® 277 (red) to the inside diameter of one of the journals (4). Install the journal onto the hub with the large chamfer outboard. Remove any excess Loctite®.

NOTE

Use ultra fine crocus cloth to eliminate interference fit between the hub journal and the bearing journal.

(3) Install the hub into the spindle and install the other washer and journal in the same manner.

NOTE

Install the bearing into the spindle to a depth of .191/.193 inches if not using tool kit T-2893.

(4) Position one of the needle bearings (5) at the teeter bearing bore of the spindle and using the installation tool from the tool kit T-2893 press the bearing into the spindle.

CAUTION

Ensure the hub and journal are aligned with the remaining needle bearing during installation to prevent any damage.

(5) Turn the spindle over and insert the hub into the bearing that was just installed. Install the remaining bearing.

(6) Check that the hub rotates freely (smoothly and without resistance) in the bearings. Determine the cause if the hub does not rotate freely.

(7) Install the seal (6), thrust bumper (7) with the lubrication grooves toward the hub, end cap (9), and retaining ring (10) in both sides of the spindle.

(8) Determine the amount of shims (8) required to remove the end play from the hub. Add an additional .004 to .005 inch/0.10 to 0.13 mm of shims to each side for preload.

(9) Remove the retaining rings and caps from the spindle. Divide the shims into two equal amounts. Install the shims between the thrust bumpers (7) and the end caps (9). Reinstall the end caps and retaining rings. If the caps or retaining rings do not seat properly in the spindle, use a pair of non-marring pliers to rotate the cap to seat it properly.

(10) Check 12-16 oz/0.34-45 kg preload applied at 6 in/15.2 cm from the teeter hub. The hub should still be able to be rotated.

(11) Purge lubricate the teeter bearings (ref. Table 4-2).

NOTE

The installation procedures are the same for both blade and grip assemblies.

CAUTION

Use brass protector plated in the vise jaws to prevent from damaging the tail rotor spindle.

B. Place the spindle into a vise so that the blade and grip assemblies can be rotated when installed.

C. Install the pitch change plate (11) on the spindle with the machined clearance surface of the pitch arm facing outboard.

D. Install the bearing sleeve (12) onto the spindle.

NOTE

The closed end of the retainer faces outboard toward the thrust bearings.

E. Press the bearings (13) into the bearing retainer (14) and install on the bearing sleeve.

F. Install the thrust bearings (15) in matched sets with the closed side of the bearing facing inboard toward the hub. This side of the bearing will also have the word "thrust" imprinted on the face of the outer race. Most of these bearing sets will be scribed with a "V" on the outer races pointing toward the center hub.

G. Install the retaining nuts (16) using tool T-0056 and torque to 80-90 ft-lbs/109.1-122.7 Nm.

H. Align and install the lock washer (17).

I. Clean the surface of the bumper (18) and the end of the spindle with acetone or equivalent. Apply a small amount of adhesive (Loctite® 4205 or equivalent) to the bumper and attach it to the end of the spindle. Ensure the bumper is centered and secure.

J. Lubricate (MIL-PRF-81322) the O.D. of the bearings. Apply a small amount of Lubriplate 630-AA onto the end of the bumper.

WARNING

Use extreme caution when removing or installing the blade and grip assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

K. Using a heat gun, heat the blade grip (19) to approximately 250°F/121°C.

L. Lubricate (MIL-PRF-81322) the bore of the blade grip. Quickly slide the blade and grip assembly onto the spindle. Align the pitch link hole in the pitch change plate to the leading edge of the blade. Align the dowel pins to the center holes in the pitch change plate (the holes are located in sets of three).

NOTE

Alternately tighten the bolts 1 to 2 turns to pull the pitch change plate and grip straight together.

M. Start three bolts (25) into the grip and tighten to pull the grip and the pitch change plate together.

N. Install the rest of the bolts (25). After the blade and grip assembly has cooled, torque the bolts to 50-70 in-lbs/5.7-8.0 Nm and safety wire (.032) in pairs.

O. Re-heat the blade grip and tap outboard to assure maximum CF (centrifugal force) position.

P. Torque the blade retention bolt nuts to 75 in-lbs/8.5 Nm (140 in-lbs/15.9 Nm if the blade and grip assembly has been factory repaired and 5/16 inch bolts installed) after the blade grip has cooled.

Q. Install the grease fitting into the grip and lubricate the grip (para. 4-39.4) until grease purges from the pitch change plate from around the spindle.

R. If required, install the opposite blade and grip assembly.

S. Statically balance the tail rotor (para. 9-42).

T. Install the bolts (26), washers (27), and nuts (28) onto the pitch arms if not installed.

9-51. Installation – Tail Rotor Assembly

A. Start a .041 wrap of safety wire around one side of the tail rotor hub.

NOTE

The tail rotor assembly may be rotated 180° or the center hub may be pivoted 180° to obtain the proper installation position of the tail rotor assembly.

NOTE

See Figure 9-38. A line drawn through the grease fittings of either end of the teetering hub (Figure 9-36, 2) (tail rotor hub pivot center line) should align with the lagging ears of the pitch link retainer. If the tail rotor hub pivot centerline is centered between the ears of the pitch link retainer, rotate the teeter trunnion 180° to obtain the correct 8° alignment.

B. Install the tail rotor assembly onto the transmission output shaft. Ensure the center line of the tail rotor hub pivot axis aligns with the inboard side of the pitch change link retainer ear that lags in the direction of rotation (Figure 9-38).

C. Feed the safety wire through the hole in the teeter stop and install the teeter stop so that the rubber bumpers align with the flats of the spindle.

D. Install the washer and retaining bolt. Torque the retaining bolt to 300 in-lbs/34.1 Nm and complete the safety.

E. Connect the pitch change links to the pitch change plates (para. 12-126).

F. Dynamically balance the tail rotor (para. 9-43).

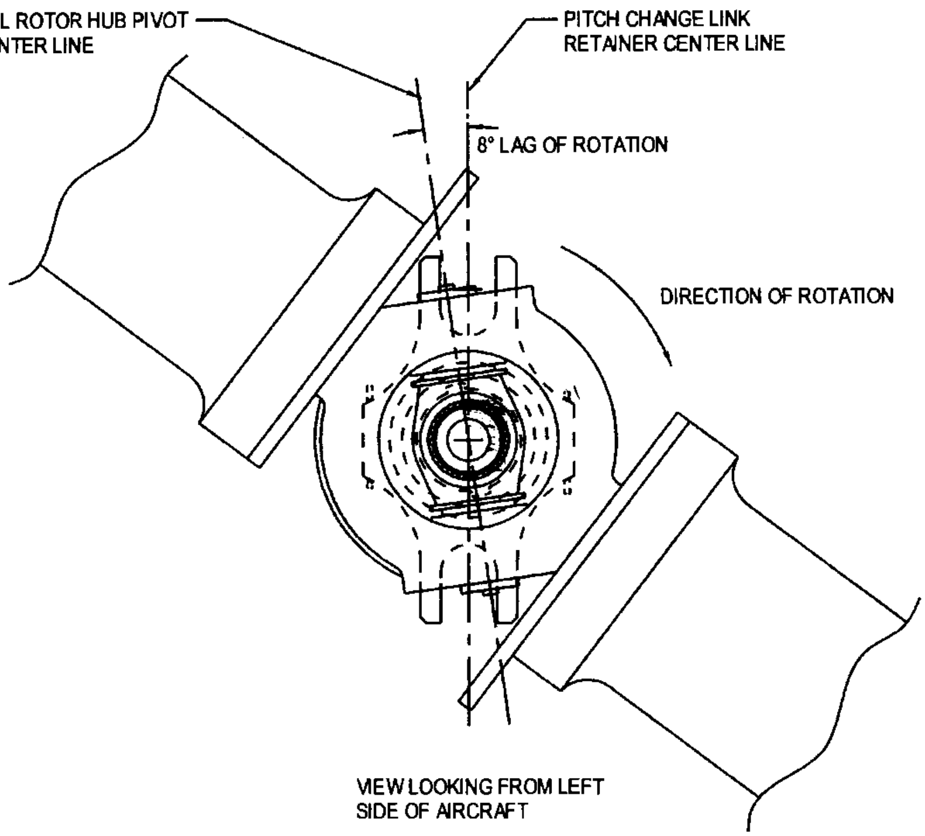

Figure 9-38. Tail Rotor Installation Orientation

9-52. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Abrasive pad	Pad, 3M Brand (Scotch-Brite)	7447B
Acetone	Acetone solvent	
Adhesion promoter (primer)	Adhesion promoter, 3M Brand	86A
Adhesive	Epoxy adhesive, 3M Brand	DP190
Adhesive	Epoxy adhesive, 3M Brand	DP420
Adhesive	Adhesive, Loctite Brand (4205)	28028
Adhesive	Adhesive, Loctite Brand (635)	63531
Aluminum oxide paper or cloth	Aluminum oxide paper or cloth, medium and fine grit, 3M Brand or equivalent	
Chemical coating	Iridite solution, Allied-Kelite Brand	14-4A[1]
Corrosion inhibitor	ACF-50, Lear Chemical Research Brand	MIL-PRF-81309, Type II or III
Corrosion inhibitor	Corrosion X – Aviation, Corrosion Technologies Corporation	MIL-PRF-81309, Type II or III
Denatured alcohol	Denatured alcohol	
Epoxy sealant	Epoxy adhesive, Hysol Brand	EA 9309.2NA
Grease	Grease, Lubriplate Brand	630-AA[2] (06701)
Grease	Grease	MIL-PRF-81322
Grease	Aeroshell 22 (Shell)	
Isopropyl alcohol	Isopropyl alcohol	
Lockwire	Lockwire, .025”	MS20995C25
Lockwire	Lockwire, .032”	MS20995C32
Lockwire	Lockwire, .041”	MS20995C41
Lubricant	LPS 2 Heavy Duty Lubricant, LPS Laboratories	00216
MEK	MEK solvent	
Metal Etch	Aluminum etching compound, Semco Brand	Pasa-Jell 105[3]

[1] Complies with MIL-DTL-5541/MIL-DTL-81706 (formerly MIL-C-5541/MIL-C-81706).
[2] MIL-PRF-81322 is an acceptable alternate.
[3] Acceptable material where metal prep is required.

ITEM	DESCRIPTION	PART NUMBER
Oil	Any grade internal combustion engine motor oil	
Oil	Silicon oil	L-45 or SF96-20
Paint	Acrylic aerosol touch up paint, flat black or flat light grey	
Paint	Any quality brand urethane paint	
Paint Stripper	Paint stripper, PPG Aerospace Brand	Eldorado PR-3500
Primer	Epoxy primer	MIL-PRF-23377[4]
Sandpaper	Sandpaper 80 grit, 3M Brand or equivalent	214U
Sandpaper	Sandpaper 150 grit, 3M Brand or equivalent	
Sandpaper	Sandpaper 400 grit, 3M Brand or equivalent	
Sealant	Silicone Sealant, Dow Corning Brand	732-RTV
Soap	Soap, Joy Brand	
Solvent	Extreme Simple Green, Sunshine Makers, Inc.	13440
Tape	Fine line tape, 3M Brand	218 or 471
Tape	Masking tape, 3M Brand	233+[5]
Tape	Polyurethane tape, 3M Brand	8681HS
Thread sealant	Loctite Brand (Threadlocker 222MS)	22221
Thread sealant	Loctite Brand (Threadlocker Red 271)[6]	27100
Thread sealant	Thread sealant, Loctite Brand (277)	27731
Thread sealant	Thread sealant, Loctite Brand Threadlocker Blue 242[7]	24200
Thread sealant	Thread sealant, Vibra-Tite Brand	VC-3
Wipes	Adhesion promoter wipes, 3M Brand	86A

[4] Example: PRC-DeSoto Brand 513x390/activated by 910x624, or equivalent.
[5] One half inch to two inch widths.
[6] Acceptable alternate for Loctite 222MS.
[7] Acceptable alternate for Vibra-Tite VC-3.

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SECTION 10

FUEL SYSTEM

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SECTION 10

FUEL SYSTEM

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10-1. Fuel System

10-2. Description – Fuel System (Figure 10-1)

The fuel system consists of two 45 gallon/170 liter bladder type fuel cells mounted on either side of the main rotor transmission. Each cell is housed in a composite fuel cell structure and is interconnected to the other fuel cell through a 2 inch/51mm fuel crossover line in the lower one third (⅓) of the fuel cell and a .5 inch/13mm overboard vent crossover line located at the top of each fuel cell. The .75 inch/19mm main fuel supply lines, located at the lowest point in each fuel cell, interconnect at a “tee” to supply fuel to the engine equally from each fuel cell. The main fuel shutoff valve is incorporated onto the “tee” and is manually operated from the cockpit. Each fuel cell is equipped with sump drains plus the system is equipped with a low point drain at the fuel shutoff valve. A capacitance fuel quantity probe and a low fuel warning switch are mounted in the right hand fuel cell. The refueling port is located in the top of the left hand fuel cell. The right hand fuel cell is filled by cross-feeding action during refueling. Fuel management is accomplished with the use of a fuel flow system (optional equipment - 480/480B) and a fuel quantity system. The fuel quantity system consists of a capacitance probe or transmitter, a signal conditioning unit (TH-28 Serial Number 3006 and 480 Serial Numbers 5001-5010) or a signal converter unit (480B Serial Numbers 5198 and Subsequent), and a quantity indicating gauge.

NOTES

The standard fuel system pertains to the P/N 4122054 (Aerotech) fuel bladder, which is filled with open cell foam, and is applicable to aircraft S/N 5013 and subsequent. Prior to S/N 5013, aircraft were manufactured with P/N 4122009 fuel bladders (Aerazur).

Use of unauthorized fuels or additives may cause fuel cell rubber deterioration. Refer to Table 4-1 for the listing of approved, alternate, and emergency fuels and as well as approved anti-icing additives.

Terms that are used interchangeably include: fuel cell/fuel bladder, fuel cell cover/fuel cell skin, fuel fitting/flange plate, and probe/transmitter.

10-3. Fuel Cells

10-4. Removal – Fuel Cells

A. **Standard Fuel System** (Figures 10-2 and 10-3)

NOTES

When possible, remove the fuel cells when the ambient temperature is at least 70°F/21°C.

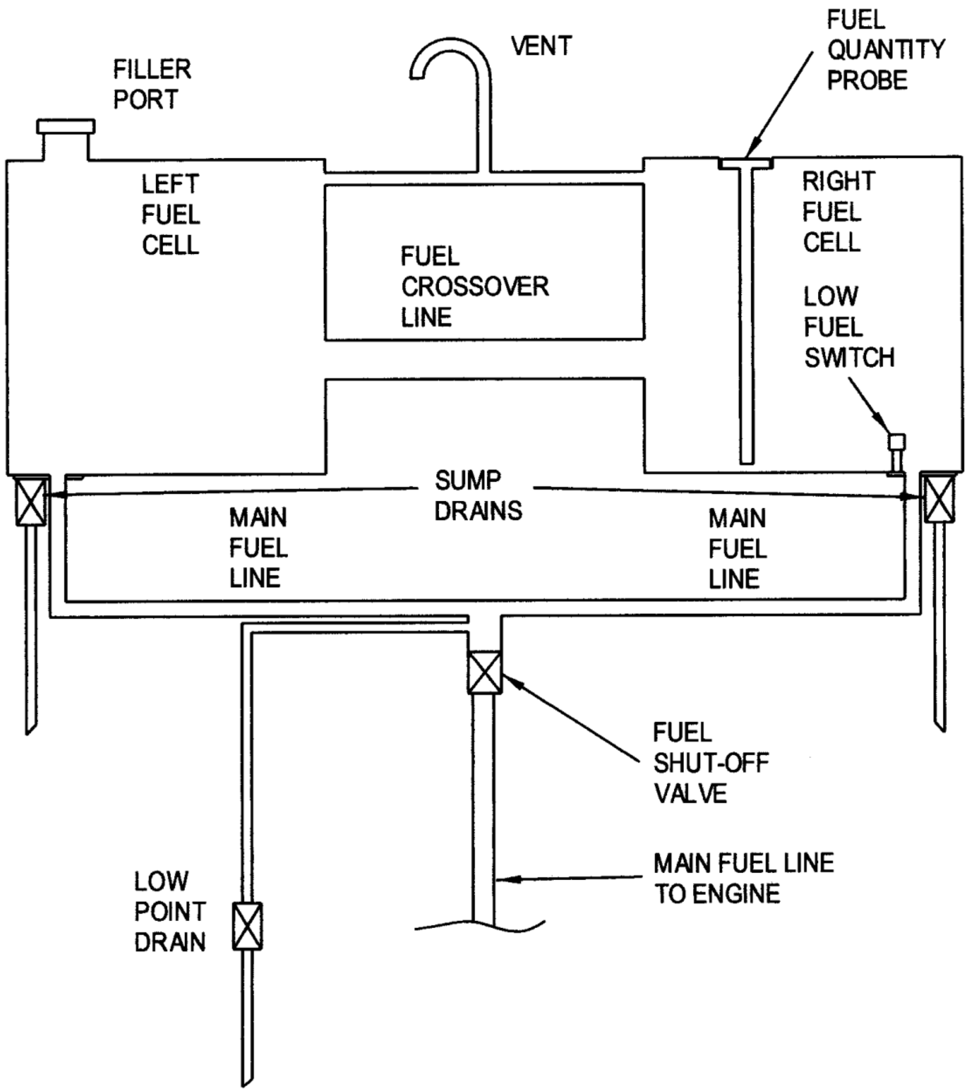
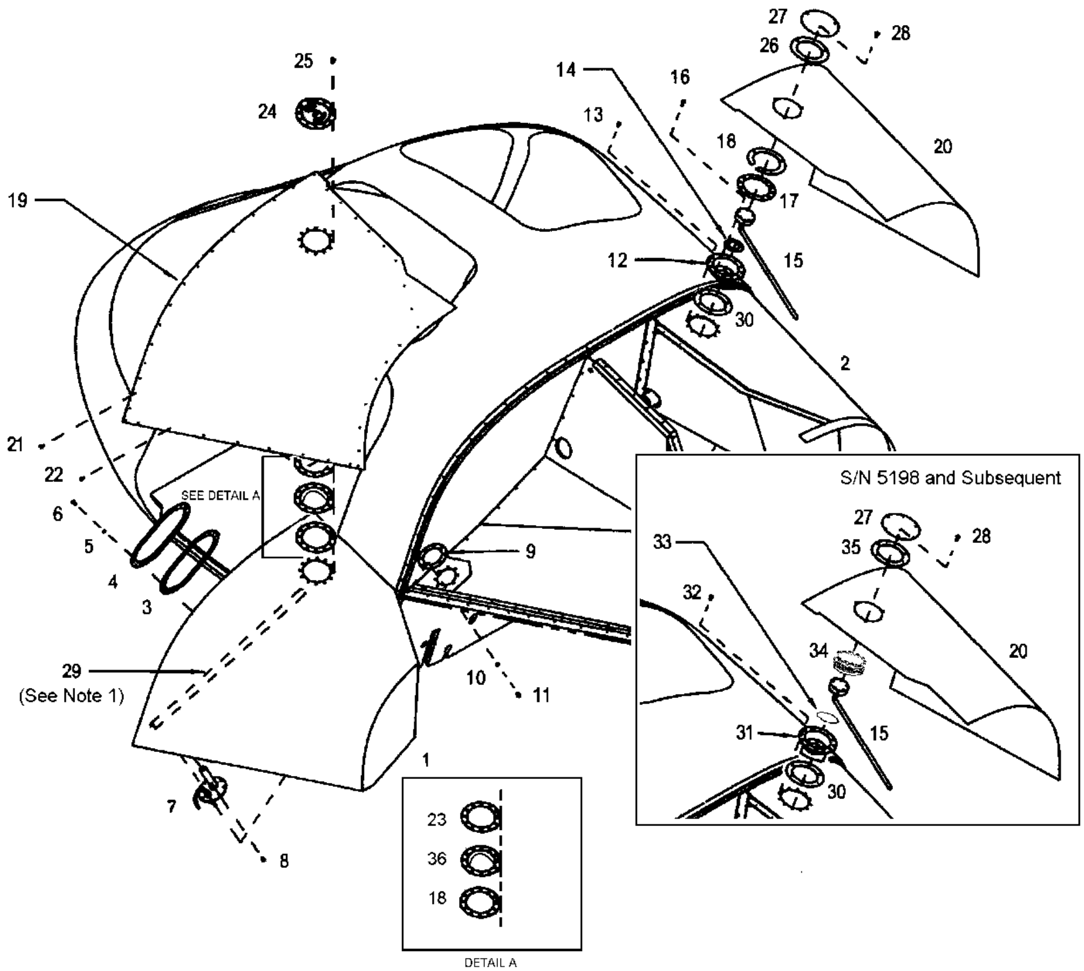


Figure 10-1. Simplified Fuel System Schematic Diagram



1.	Left Fuel Cell	19.	Left Fuel Cell Cover
2.	Right Fuel Cell	20.	Right Fuel Cell Cover
3.	Gasket	21.	Screw
4.	Oval Flange Plate	22.	Screw
5.	Washer	23.	Gasket
6.	Screw	24.	Fuel Cap Assembly
7.	Sump/Fuel/Flange Fitting Assembly	25.	Screw
8.	Screw	26.	Gasket
9.	Gasket	27.	Cover Plate
10.	Washer	28.	Screw
11.	Bolt	29.	Dip Stick Tube (See Note 1)
12.	Flanged Mount Plate	30.	Gasket
13.	Screw	31.	Flanged Cup Assembly
14.	Gasket	32.	Bolt
15.	Fuel Quantity Probe (Transmitter)	33.	O-Ring
16.	Screw	34.	Spanner Nut
17.	Gasket	35.	Gasket, Conductive
18.	Spacer	36.	Flange

Note 1: S/N 5231 and subsequent and helicopters that have incorporated SIL T-062 are not equipped with Item 29.

Figure 10-2. Standard Fuel Cell Installation

NOTE

Removal procedures are the same for both fuel cells unless noted.

(1) Defuel the aircraft (para. 4-5).

(2) Remove the upper plenum/air inlet (para. 13-28).

(3) Remove the air deflector from the top of the cabin.

(4) Remove the fuel cell cover (para. 8-14).

5) Disconnect the electrical connectors for the fuel quantity probe and the low fuel warning switch from the right side fuel cell.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

6) Disconnect the fuel crossover line (para. 10-15).

7) Loosen the clamps on the lines and allow the rubber to relax.

NOTE

Fuel cell nipples may be softened by applying a hot, moist cloth to ease removal.

8) Disconnect the overboard vent crossover line (para. 10-15).

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

9) Disconnect the supply line from the fuel cell fitting.

10) Disconnect the sump drain line from the drain valve.

11) Remove the bolts and washers from the plate that secures the fitting assembly to the fuel cell structure.

12) Remove the fuel cell from the fuel cell structure.

13) Once the fuel cell is removed, wipe out any fuel residue and miscellaneous hardware from the cavity of the fuel cell structure.

14) Do not apply oil to the fuel bladder if moving the fuel cell to long term storage. Store removed fuel cells in a bag or box to protect the rubber from UV, ozone, heat, and/or humidity.

B. **Aerazur Fuel Bladder System**

NOTES

When possible, remove the fuel cells when the ambient temperature is at least 70°F/21°C.

Removal procedures are the same for both fuel cells unless noted.

1) Defuel the aircraft (para. 4-5).

2) Remove the upper plenum/air inlet (para. 13-28).

3) Remove the air deflector from the top of the cabin.

4) Remove the fuel cell cover (para. 8-14).

5) Disconnect the electrical connectors for the fuel quantity probe and the low fuel warning switch from the right side fuel cell.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

6) Disconnect the fuel crossover line (para. 10-15).

7) Disconnect the overboard vent crossover line (para. 10-15).

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

8) Disconnect the supply line from the fuel cell fitting.

9) Disconnect the sump drain line from the drain valve.

10) Unlace the fuel cell from the supports.

11) Remove the fuel cell from the fuel cell structure.

10-5. Inspection – Fuel Cells

A. Inspect the fuel cells for loose seams, cuts, abrasions, scuffed surfaces, tears, blisters, and for any area that appears to have become soaked with fuel.

1) Before removing a fuel cell, isolate areas of possible leaks by tracing the wetness or staining as far as visibly possible.

B. Inspect fittings, flanges, access doors, and inserts for damage and security.

C. Check gaskets for tightness and ensure no gasket cement has been used.

D. Check all hose clamped connections for tightness, damage, and leaks.

10-6. Repair – Fuel Cells

A. Repair the fuel cells I/A/W the manufacturer's instructions.

B. Replace fittings that are damaged beyond repair.

C. Repair inserts I/A/W the manufacturer's instructions.

10-7. Replacement – Fuel Cells

A. **Standard Fuel System**

NOTES

Replacement procedures are the same for both fuel cells unless noted. Replace all used packings/O-rings.

Cover all open ports and lines to prevent contamination of the fuel system.

The foam assembly is installed in the replacement fuel cells.

1) Prepare the replacement fuel cell (1 or 2, Figure 10-2) as follows:

a) If installing a new foam assembly, refer to SIL T-054, latest revision. Prior to installing the foam, inspect the bladder cavity for debris.

b) Ensure that the captive nut plate threads are free of debris or sealant and ensure that the sealing surfaces are clean and dry.

c) Install oval flange plate (4):

1 Install a new gasket (3). If needed, install 2 to 4 studs, hand tight, into the flange ring to hold the gasket in place on the fuel cell. (The studs are made by removing the heads from appropriate length AN4-XXA bolts and deburring the cut shank.)

2 Install the oval flange plate (4) (raised surface forward) with bolts (6) and washers (5). Torque (25-30 in-lb/2.8-3.4 Nm) in a crisscross torque pattern (for 24 bolts), making three full rounds to ensure proper gasket seating. Remove the studs as required when installing the bolts and washers.

3 Ensure that there is no movement of the washers. If there is movement, back out the bolt and recheck the threads for debris or sealant. Re-install and torque.

2) Remove the screws (8) that secure the fuel fitting assembly (7) to the fuel cell (1 or 2).

3) Partially separate the fuel fitting assembly from the fuel cell to access the syphon tube assembly nut coupling.

4) Loosen the nut coupling, then pivot the syphon tube toward the fuel strainer.

5) Remove the fuel fitting assembly from the fuel cell. The low fuel warning switch will be mounted on the fuel fitting assembly for the right fuel cell.

6) Position the fuel fitting assembly onto the replacement fuel cell such that the sump drain valve it is oriented toward the low corner of the fuel cell. Pivot the end of the syphon tube to the low corner. Torque the nut coupling (50-65 in-lb/5.6-7.3 Nm).

7) Install the screws to secure the fuel fitting assembly to the fuel cell and torque to 25-30 in-lb/2.8-3.4 Nm.

8) Remove the hardware securing the fuel quantity probe mounting flange (12 or 31) to the fuel cell and remove the fuel quantity probe mounting flange and probe. (The fuel quantity probe remains installed on the mounting flange.) Note the position of the fuel quantity probe.

9) Install new gasket (30) and install the mounting flange (12 or 31) on the replacement fuel cell. Torque the hardware to 25-30 in-lbs/2.8-3.4 Nm.

10) Allow several hours (preferably overnight) after installation of the oval flange plate (4), fuel fitting assembly and mounting flange components and retorque the hardware.

11) Safety wire as required.

B. **Aerazur Fuel Bladder System**

1) Remove the drain valve from the fuel cell. Clean the threads on the drain valve. Coat the threads with sealant (Permatex #1C) and install the valve into the replacement fuel cell.

2) Remove the supply line fitting from the fuel cell. Replace the packing and install the fitting into the replacement fuel cell.

3) Remove the access plates (zippers) from the fuel cell.

4) Remove the strainer assembly installed in the bottom of the fuel cell over the supply line outlet and install in the replacement fuel cell.

5) Remove the fuel quantity probe and the low fuel warning switch from the right fuel cell and install into the replacement fuel cell (para. 10-48 and 10-51).

NOTE

Ensure that the lacing cord used to secure the internal baffles in the bladder does not interfere with the access plates (zipper) during installation of the plates (zipper). The plates (zipper) will not seal if this occurs.

6) Reinstall the access plates (zippers) and torque the installation hardware to 40-50 in-lbs/4.5-5.7 Nm.

10-8. Installation – Fuel Cells

A. **Standard Fuel System**

NOTES

Installation procedures are the same for both fuel cells unless noted.

Replace all used packings/O-rings.

1) Apply a light coat of corn starch (or equivalent) to the inside surface of the fuel cell support structure to allow the fuel cell to be adjusted for final fit.

2) Install the fuel cell into the support structure.

3) Position the gasket between the fitting assembly the support structure. Install the bolts and washers that secure the fitting assembly to the support structure and torque to 25-30 in-lbs/2.8-3.4 Nm. Lockwire bolts with 0.020" lockwire.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

4) Connect the sump drain line to the drain valve.

5) Connect the supply line to the fuel cell fitting.

NOTE

Prior to connecting the overboard vent crossover line (3, Figure 10-3) and crossover line (9), inspect the nipples for restrictions and damage.

6) Connect the overboard vent crossover line (para. 10-18).

7) Connect the crossover line (para. 10-18).

8) Connect the electrical connectors for the fuel quantity probe and the low fuel warning switch in the right side fuel cell.

9) Allow several hours (preferably overnight) after the fuel cell has been completely installed and retorque the hardware.

10) Safety wire as required.

11) Install the fuel cell covers (para. 8-17).

12) Install a filler port gasket between the fuel cell the fuel cell cover and one between the fuel cell cover and the filler port. Install the hardware and torque to 25-30 in-lbs/2.8-3.4 Nm.

13) Install the air deflector on the top of the cabin.

14) Install the upper plenum/air inlet (para. 13-31).

15) Service the fuel cells (para. 4-4) and check for leaks.

16) Check for proper operation of the fuel quantity system (para. 7-85) and the lower fuel warning system (para. 10-41). Install the cover for the fuel quantity probe after determining that the system is operating properly.

17) Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

B. **Aerazur Fuel Bladder System**

NOTES

Installation procedures are the same for both fuel cells unless noted.

Replace all used packings/O-rings.

1) Apply a light coat of corn starch (or equivalent) to the inside surface of the fuel cell support structure to allow the fuel cell to be adjusted for final fit.

2) Install the fuel cell into the support structure.

3) Lace the top edge of the fuel cell to the support mounts.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

4) Connect the sump drain line to the drain valve.

5) Connect the supply line to the fuel cell fitting.

6) Connect the overboard vent crossover line (para. 10-18).

7) Connect the crossover line (para. 10-18).

8) Connect the electrical connectors for the fuel quantity probe and the low fuel warning switch in the right fuel cell.

9) Install the fuel cell covers (para. 8-17).

10) Install a filler port gasket between the fuel cell the fuel cell cover and one between the fuel cell cover and the filler port. Install the hardware and torque to 40-50 in-lbs4.5-5.7 Nm.

11) Install the air deflector on the top of the cabin.

12) Install the upper plenum/air inlet (para. 13-31).

13) Service the fuel cells (para. 4-4) and check for leaks.

14) Check for proper operation of the fuel quantity system (para. 7-85) and the lower fuel warning system (para. 10-41). If applicable, install the cover for the fuel quantity probe after determining that the fuel quantity system is operating properly.

15) Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-9. Lines and Hoses (Figure 10-3)

10-10. Removal – Lines and Hoses

NOTE

The following procedures apply to the fuel supply, sump drain, scupper drain, and the vent lines. Ensure the lines are identified and the installation routing is understood before removal.

NOTE

Only defuel the aircraft if removing the fuel supply lines or the sump drain line from the shutoff valve.

A. Defuel the aircraft (para. 4-5).

10-18. Installation Crossovers

A. Standard Fuel System

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

NOTE

Use a lubricant (ACF-50, or equivalent) to aid installation of the crossover if required.

CAUTION

When installing clamps (4 and 7, Figure 10-3), do not over torque. Allow the rubber about an hour to relax, then retorque (18 in-lb/2 Nm). Over torquing will result in damage and leaks.

NOTE

Prior to connecting the overboard vent crossover line and crossover line, inspect the fuel cell nipples for restrictions and damage.

(1) Insert the crossover into the fuel cell fittings approximately 1.5 inch/38 mm. If installing the overboard vent, orientate the "tee" up.

(2) Install the retaining clamps onto the fuel cell fittings (inboard of the crossover bead) and tighten (torque 18 in-lb/2 Nm).

(3) Connect the vent line if installing the overboard vent crossover.

(4) Service the aircraft (para. 4-4) and check for leaks.

(5) Install the upper plenum/air inlet (para. 13-31).

(6) If the aircraft was defueled, bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

B. Aerazur Fuel Bladder System

(1) Install the packing on one end of the crossover and install the crossover on one of the fittings (orientate the "tee" in the vent crossover up).

(2) Install the split clamps onto the flange of the fittings and secure with the retaining clamp.

(3) Install the opposite end using the same procedures.

(4) Install the clamp that secures the crossover to the transmission standoff bracket or a cable tie to secure the crossover to the bracket on the backwall.

(5) Connect the vent line if installing the overboard vent crossover.

(6) Service the aircraft (para. 4-4) and check for leaks.

(7) Install the upper plenum/air inlet (para. 13-31).

(8) If the aircraft was defueled, bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-19. Sump Drain Valves

10-20. Removal – Sump Drain Valves

A. Defuel the aircraft (para. 4-5).

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

B. Disconnect the drain lines from the valves.

C. Remove the valves.

10-21. Inspection – Sump Drain Valves

A. Inspect the valves for damage, leaks, and proper operation.

10-22. Repair – Sump Drain Valves

A. Replace valves that leak or fail to operate properly after resealing the threads for leaks around the threads or flushing the valve to attempt to remove possible debris from a sticky or leaking valve.

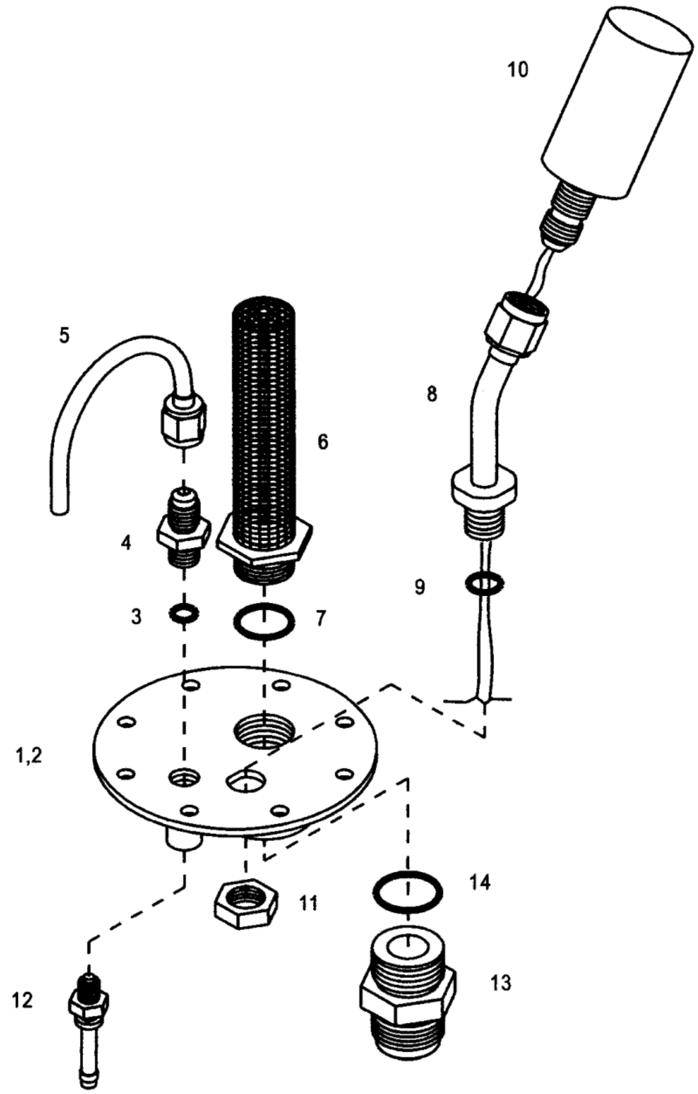
10-23. Installation – Sump Drain Valves

A. Apply sealant (Permatex #1C, Loctite 569) to the valve threads and install the valves.

B. Connect the drain lines to the valves.

C. Service the aircraft (para. 4-4) and check for leaks.

D. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.



1.	Flange Plate (Left Side)	8.	Support Tube Assembly (R/S Only)
2.	Flange Plate (Right Side)	9.	O-Ring (R/S Only)
3.	O-Ring	10.	Low Fuel Switch (R/S Only)
4.	Sump Fitting	11.	Nut
5.	Syphon Tube Assembly	12.	Sump Drain Valve
6.	Fuel Strainer Assembly	13.	Fitting
7.	O-Ring	14.	O-Ring

Figure 10-4. Sump Assembly – Standard System

10-24. Fuel Shutoff Valve Assembly (Figure 10-5)

10-25. Removal – Fuel Shutoff Valve Assembly

A. Defuel the aircraft (para. 4-5).

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

B. Disconnect the fuel supply and the drain lines from the shutoff valve assembly.

C. Disconnect the shutoff cable from the valve.

D. Remove the hardware securing the shutoff valve assembly mount to the pylon. Remove the valve assembly.

10-25.1 Disassembly – Fuel Shutoff Valve Assembly

CAUTION

Perform disassembly in a clean area to prevent contamination.

NOTE

If leakage is detected, the plug valve O-rings (12) may be faulty. The following procedure disassembles the fuel shutoff valve assembly to access the plug valve O-rings.

NOTE

The following procedure is applicable to the fuel shutoff valve assembly configuration depicted in Figure 10-5.1.

A. Remove screws (6) and washers (7) to remove the tee (8).

B. Remove screws (21) and washers (22) to remove the valve body fitting (20).

C. Remove retaining ring (23).

D. Grasp the valve body arm (24). With a slight rotation motion, carefully pull up the valve plug arm to remove the plug valve (13).

10-26. Inspection – Fuel Shutoff Valve Assembly

A. Inspect the valve assembly for damage, leaks, and proper operation.

10-27. Repair – Fuel Shutoff Valve Assembly

A. Replace the valve assembly if not operating properly.

B. Remove minor nicks, scratches, or corrosion.

10-27.1 Assembly – Fuel Shutoff Valve Assembly (Figure 10-5.1)

NOTE

Perform assembly in a clean area to prevent contamination.

NOTE

The following procedure is applicable to the fuel shutoff valve assembly configuration depicted in Figure 10-5.1.

A. Install the plug valve (13):

1) Lubricate (Jet A) new O-rings (12) and mating surfaces of the valve body (11).

CAUTION

Use care to prevent the O-rings (12) from being pinched or torn during assembly.

2) Install plug valve (13) with O-rings (12) into the valve body (11). Carefully twist and push the plug valve into the valve body. Press the middle O-ring securely against the plug valve to prevent the O-ring from deforming during installation.

3) Install the retaining ring (23).

B. Lubricate (Jet A) new O-ring (10) and install valve body fitting (20) with screws (21) and washers (22). Torque 12-15 in-lb/1.4-1.7 Nm and lockwire (0.025 inch).

C. Lubricate (Jet A) new O-ring (10) and install tee (8) with screws (6) and washers (7). Torque 12-15 in-lb/1.4-1.7 Nm and lockwire (0.025 inch).

10-28. Replacement – Fuel Shutoff Valve Assembly (Figure 10-5 or Figure 10-5.1)

A. Remove the hardware securing the valve (11) to the tee (8) and to the mounting bracket (1) in accordance (refer to para. 10-25.1). Separate the valve from the tee. Discard the O-ring (10).

B. S/N 5001-5032 only: If replacing the tee (8), remove the drain line elbow (9). Clean the threads and using sealant (Permatex #1C or Loctite 569), install the replacement tee.

C. Install a new O-ring (10) between the valve body (11) and the tee (8).

D. Install the hardware (6) (7) securing the mounting bracket (1) to the valve body (11) and tee (8). Torque 12-15 in-lb/1.4-1.7 Nm and lockwire (0.025 inch).

10-29. Installation – Fuel Shutoff Valve Assembly

A. Install the shutoff valve assembly into position and install the hardware (4) (5) securing it to the pylon.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

B. Connect the supply and drain lines to the valve assembly.

C. Ensure the position of the valve body arm (24) corresponds with the position of the control cable. Connect the cable to the valve body and rig so when the valve is full on there is a small amount of cushion at the control cable knob.

D. Service the aircraft (para. 4-4) and check for leaks. If leaks are present, disassemble (para. 10-25.1) the plug valve (13) from the valve body (11) and check condition of O-rings (12).

E. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-30. Fuel Shutoff Valve Control Cable (Figure 10-6)

10-31. Removal – Fuel Shutoff Control Cable

NOTE

Before removing the cable, be thoroughly familiar with the cable routing (Refer to Figure 10-6).

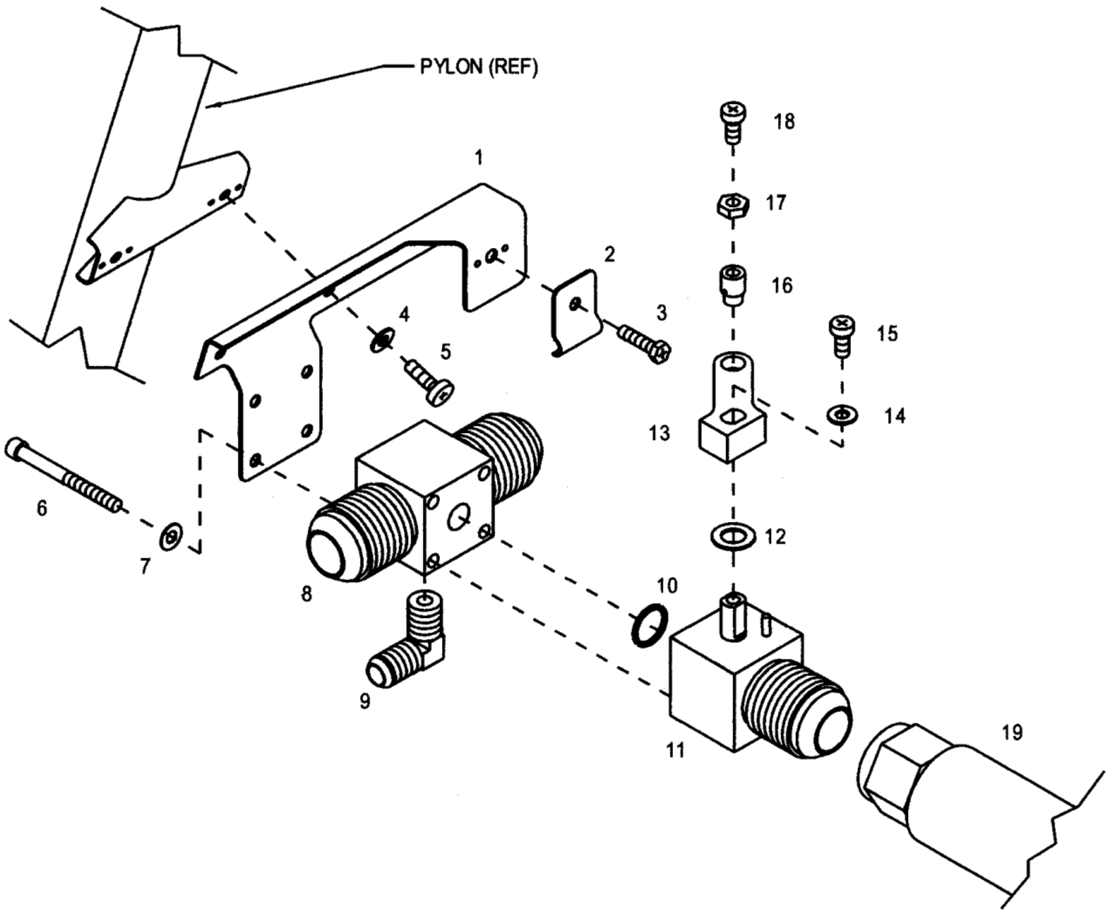
A. Remove the right side keel access panel.

B. Gain access to the back of the instrument panel (para. 7-3).

C. Remove the right side engine access panel.

D. Disconnect the cable from the shutoff valve.

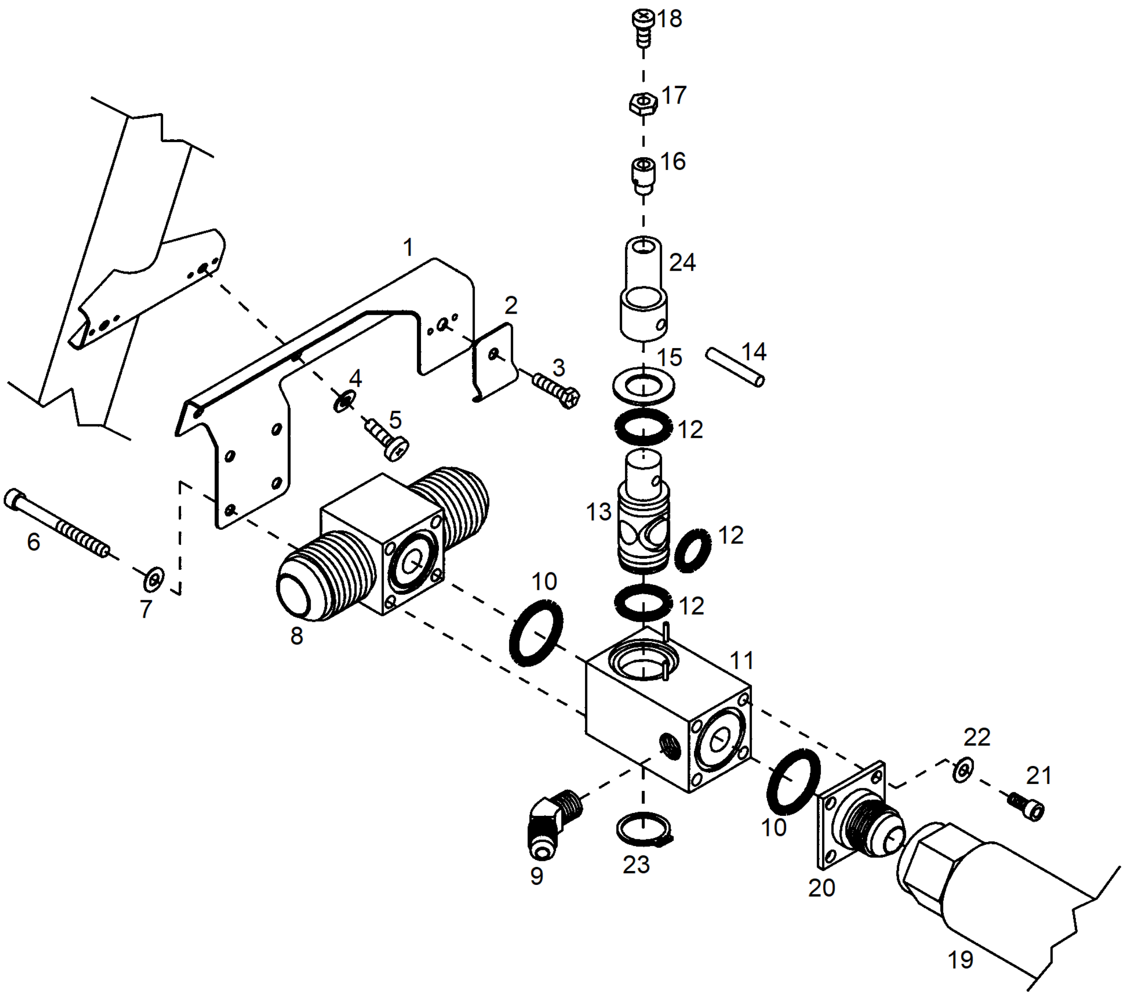
E. Remove the cable from the support clamps.



480: S/N 5001-5032

1.	Bracket Assembly	11.	Valve Body
2.	Clip	12.	Washer
3.	Screw	13.	Arm
4.	Washer	14.	Washer
5.	Screw	15.	Screw
6.	Screw	16.	Swivel
7.	Washer	17.	Washer
8.	Tee	18.	Screw
9.	Elbow	19.	Fuel Line
10.	O-Ring		

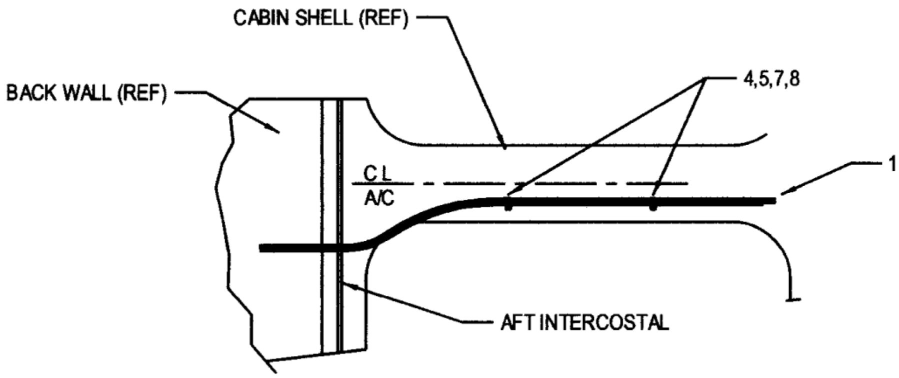
Figure 10-5. Fuel Shutoff Valve



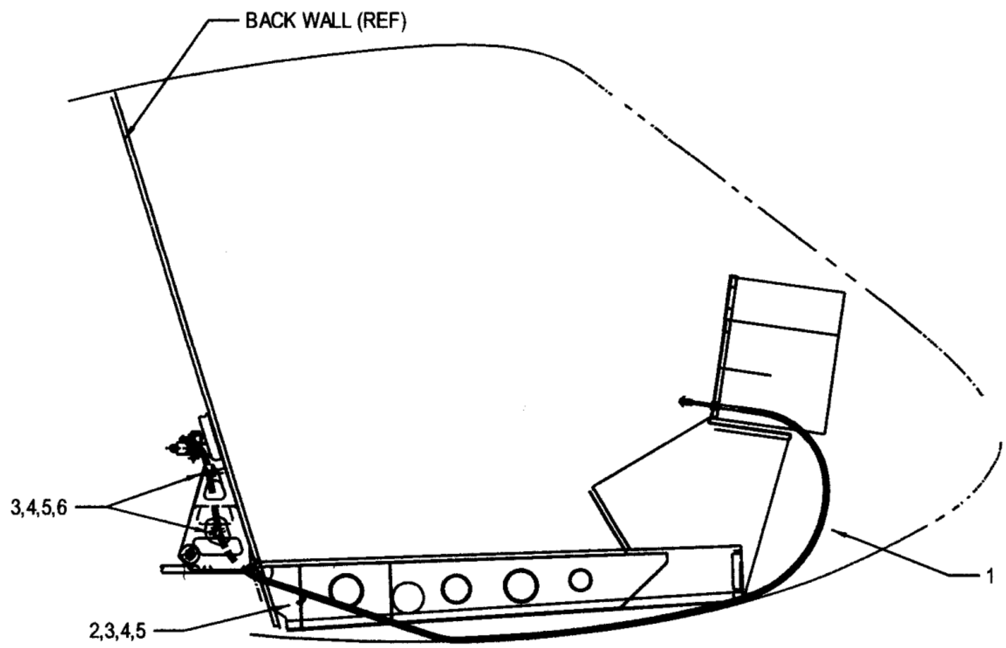
480/480B: S/N 5039 and subsequent

1.	Bracket Assembly	13.	Plug Valve
2.	Clip	14.	Pin
3.	Screw	15.	Washer
4.	Washer	16.	Swivel
5.	Screw	17.	Washer
6.	Screw	18.	Screw
7.	Washer	19.	Fuel Line
8.	Tee	20.	Valve Body Fitting
9.	Elbow	21.	Screw
10.	O-ring	22.	Washer
11.	Valve Body	23.	Retaining Ring
12.	O-ring	24.	Valve Body Arm

Figure 10-5.1 Fuel Shutoff Valve



VIEW LOOKING DOWN AT CABIN BOTTOM



VIEW LOOKING FROM RIGHT SIDE

1.	Shutoff Cable	5.	Nut
2.	Clamp	6.	Clamp
3.	Screw	7.	Clip
4.	Washer	8.	Screw

Figure 10-6. Fuel Shutoff Valve Cable Installation

F. Remove the retaining nut from the cable behind the instrument panel and remove the cable.

10-32. Inspection – Fuel Shutoff Valve Control Cable

A. Inspect the cable for damage, kinks, and proper operation.

10-33. Repair – Fuel Shutoff Valve Control Cable

A. Replace the cable if kinked or binding.

10-34. Installation – Fuel Shutoff Valve Control Cable

A. Install the cable in reverse order of removal.

B. Ensure the position of the valve arm corresponds with the position of the control cable. Connect the cable to the valve and rig so when the valve is full on there is a small amount of cushion at the control cable knob.

10-35. Refueling Port Cap

10-36. Removal – Refueling Port Cap

A. Lift the locking handle and rotate the handle counter clockwise.

NOTE

Only early production TH-28/480's use a retainer attached to the refueling port cap. Later production aircraft have the cap attached to the refueling port mount by a safety clip. An optional hinged refueling port cap may be installed.

B. Remove the cap from the refueling port. Rotate the cap retainer to allow removal from the fuel cell, or disconnect the retention chain from the refueling port and remove the cap from the aircraft, or remove the screws securing the hinge half to the refueling port cap and remove the cap.

10-37. Inspection – Refueling Port Cap

A. Inspect the cap for proper locking and sealing.

B. Inspect the chain and retainer for security, if applicable.

C. Inspect the hinge installation for condition and security, if applicable.

10-38. Repair – Refueling Port Cap

A. Replace the O-ring seal if worn or deteriorated.

10-59. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Corrosion Inhibitor, Lubricant	ACF-50, Lear Chemical Research Corp.	10013 10032
Lockwire	Lockwire, .032”	MS20995C32
Sealant	Thread Sealant, Loctite Brand	569
Thread Sealant	Thread sealant, Permatex Brand	1C
Silicone Sealant	Sealant, Dow Corning	732-RTV

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SECTION 11

POWER TRAIN

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SECTION 11

SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS,
AND GENERAL MAINTENANCE

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Paragraph	Description	Page

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11-6. Inspection - Overrunning Clutch

A. Inspect the ORC for metal flakes, contamination, scratches, nicks, damage, seal leakage, and proper oil level.

B. Inspect the bearings (5) for roughness and excessive wear.

C. Rotate the clutch in the overrunning direction and inspect for roughness or noise.

11-7. Repair - Overrunning Clutch

A. See Table 11-1 for damage limit and repair criteria for the splined outer shaft (1) and the bearing housing (3).

B. The ORC requires overhaul if roughness is felt or noise is heard when the clutch is rotated in the overrunning direction.

NOTE

If replacing a bearing housing seal, the bearings must also be replaced. Pressing the bearings housings from the clutch and power output shaft while removing a seal will damage the bearings. Do not reuse the bearings.

C. Replace a leaking bearing housing seal (2) and bearing (5) as follows:

(1) Remove the ORC from the engine (para. 11-5).

(2) Remove the retaining ring (7) from the splined outer shaft.

(3) Place the clutch assembly in the T-0186-11 tool (Figure 11-1a). Use the T-0186-9 segments to support the bearing housing (3).

WARNING

Use extreme caution when handling heated parts to prevent from injuring personnel. Use protective gloves when handling heated parts.

(4) Push the clutch assembly (shaft) from the bearing housing (3) using a press (hydraulic or arbor) (Figure 11-1b) and remove the shaft. If the shaft will not press out of the bearing housing assembly using moderate pressure, heat the bearing assembly to approximately 250°F/121°C and remove the shaft.

(5) Remove the retaining ring (6).

(6) Place the bearing housing assembly in the T-0186-11 and T-0186-9 tool (Figure 11-1b). Use the T-0186-13 tool to press the bearing set (5) from the bearing housing (3) and remove the bearing.

(7) Retain any shims (4) that are installed under the bearing (5).

(8) Turn the bearing housing (3) over and place in the T-0186-11 and T-0186-9 tool. Use the T-0186-13 tool and press the seal (2) out of the bearing housing (3).

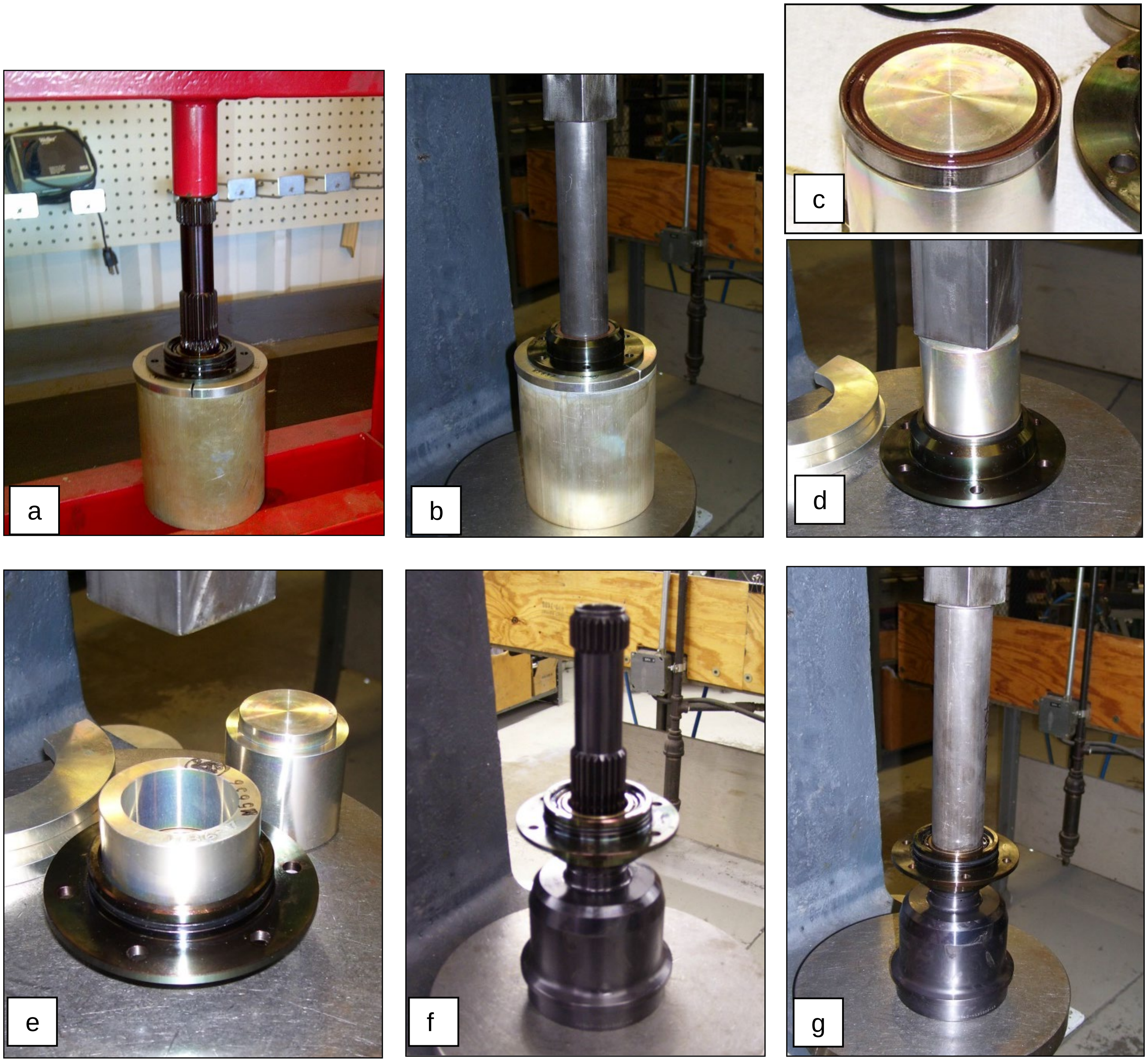


Figure 11-1. Examples of using tool T-0186 for the ORC assembly and ECD4014 bearing: (a) removing the power output shaft from the bearing housing, (b) removing the bearing from the bearing housing, (c,d) installing the seal into the bearing housing, (e) installing the bearing into the bearing housing, and (f,g) installing the bearing housing assembly onto the clutch shaft.

D. Assemble the new seal and bearing into the bearing housing.

(1) Place a new seal (2) on the stepped end of T-0186-5. Press the seal into the bearing housing (3) (Figure 11-1c, d).

(2) Determine the amount of shims required for assembly.

a. Measure the distance from the seating surface in the bearing housing to the bottom of the retaining ring groove in the bearing housing (dimension is etched on newer bearing housings). Measure the height of the new bearing stack-up. Determine the amount of shims required to allow .000/.003 inch (.000/.076 mm) pinch fit between the bearing and the retaining ring.

(3) Install the shim stack-up from step (2) into the bearing housing (3).

CAUTION

When installing the bearing set into the bearing housing, pressure may be applied to only the outer race. Damage to the bearing will occur if pressure is applied to the inner race.

NOTE

The bearing set consists of a pair of bearings. The word THRUST on the face of the outer ring indicates the thrust side of the bearing. Also, on the thrust side will be an * mark on the face of the outer ring and an * mark on the face of the inner ring. When installing the bearing set into the bearing housing, best results will be obtained if the bearing set is positioned thrust sides facing together <u>and</u> with the * marks aligned axially (outer * to outer * and inner * to inner *).

(4) Place the bearing housing with the shims installed in the press. Use T-0186-7 to push the bearing set (5) into the bearing housing (Figure 11-1e).

(5) Install the retaining ring (6).

CAUTION

When installing the clutch assembly, pressure may be applied to only the inner race. Damage to the bearing will occur if pressure is applied to the outer race.

(6) Place the clutch assembly (1) in the press. Carefully place the bearing housing (3) onto the clutch shaft and press the bearing housing onto the clutch shaft (Figure 11-1f, g).

(7) Install the retaining ring (7).

E. If a different engine and/or accessory gearbox has been installed in the aircraft, determine if an offset bearing housing is required in accordance with paragraph 13-117, I and install the correct offset bearing housing on the ORC (para. 11-7. D)

11-8. Installation - Overrunning Clutch

NOTE

Replace all used O-rings/packings and gaskets.

CAUTION

Use a backing wrench to prevent damaging fluid/air lines and fittings.

CAUTION

If an offset bearing housing is installed on the ORC, ensure that the notches in the bearing housing are orientated in accordance with the previous maintenance entry or in accordance with the new orientation for the new engine/accessory gearbox combination from paragraph 13-117, I.

A. Lubricate (MIL-PRF-23699) the O-ring (8) on the ORC bearing housing (3). Install a new gasket (9) on the bearing housing. Install the ORC into the accessory gearbox.

B. Install and torque the mounting nuts (10) and washers (11).

C. Install the power output shaft (para. 11-14), if required.

NOTE

The power output shaft must be installed to perform steps C through E.

D. Install the spacer/shim (12) and/or required amount of shims (13) to have .004" to .006" distance/clearance between the spacer/shims and the retaining ring. Install the retaining ring (14).

NOTE

Install the spacer/shim and/or shims so that the thickest item is against the retaining ring.

E. Install the clutch cover (16), O-ring (15), and retaining ring (21). Replace the service plug O-rings (18) and the sight plug O-ring (19). Torque two of the service plugs and sight plug to 20 in-lbs/2.3 Nm and lockwire (.025") to the cover.

NOTE

Step F is applicable to aircraft equipped with the vented clutch oil reservoir.

F. Connect the vented clutch oil reservoir oil lines.

G. Service the clutch (para. 4-10). Torque the remaining service plug to 20 in-lbs/2.3 Nm and lockwire (.025") to the cover.

H. Check for leaks.

I. Install the Py-Pg pneumatic line between the fuel control and the power turbine governor. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

J. Install the engine fuel pump assembly. Refer to the Roll-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

K. Connect the fuel filter differential pressure lines, fuel pump seal drain line and the fuel supply line to the fuel pump.

11-14. Installation - Power Output Shaft

CAUTION

If an offset bearing housing is installed on the power output shaft, ensure that the notches in the bearing housing are orientated in accordance with the previous maintenance entry or in accordance with the new orientation for the new engine/accessory gearbox combination from paragraph 13-117, I.

NOTE

Replace all used O-rings/packings and gaskets.

A. Lubricate (MIL-PRF-23699) the O-ring (31) on the power output shaft bearing housing (23). Install a new gasket on the bearing housing assembly. Install the power output shaft (22) into the accessory gearbox.

B. Install and torque the special mounting bolts (32) and washers. Tighten and lockwire (.025) in pairs.

C. Install the spacer (12) and/or required amount of shims (13) to have a .004" to .006" distance/clearance between the spacer/shims and the retaining ring. Install the retaining ring (14).

NOTE

Install the spacer/shim and/or shims so that the thickest item is against the retaining ring.

D. Install the clutch cover (16), o-ring (15), and retaining ring (21).

E. Install the lower pulley assembly (para. 11-24).

F. Verify the engine to lower pulley assembly alignment (para. 11-17).

G. Service the overrunning clutch (para 4-10).

H. Install the left and right side engine access panels and the left and right aft side cowlings.

WARNING

The following step to be performed by authorized personnel only.

I. Perform a limited maintenance test flight (para. 4-61).

11-15. Lower Pulley Drive System

11-16. Description – Lower Pulley Drive System (Figure 11-2)

The lower pulley drive system consists of the lower pulley drive shaft and hub, lower pulley, "H"- strut, and flex pack couplings. The lower pulley drive shaft, located in the hollow center of the lower pulley assembly, is connected to the power output shaft and the lower pulley assembly via flex pack couplings. The lower pulley shaft is also used to drive the oil cooler blower fan by a hub attached to the aft end of the lower pulley drive shaft. The lower pulley has two positioning links attached to the right side of the bearing housings. The links are used to laterally align the lower pulley to the engine. Thermocouples are installed in the lower pulley bearing housings to provide temperature input for the drive bearing hot caution panel segment (DRIVE BRG HOT). The "H"- strut, used to tension the drive belt, is connected to the lower pulley at the lower end and to the pinion bearing support truss and the main rotor transmission at the upper end. The flex pack couplings consist of multiple stainless steel plates bolted to the drive flanges. The flex pack couplings will allow up to 1.5° of misalignment between the power output shaft and the lower pulley drive shaft.

11-17. Alignment – Lower Pulley Drive

NOTE

Work Aid Document (WAD) T-001; Aligning the TH-28/480 Series Lower Drive System provides additional reference information for aligning the lower drive system in the TH-28/480 Series helicopters. Use **WAD T-001** as additional reference information for the procedures that follow in this paragraph (para. 11-17).

A. Prepare to align the lower pulley drive system using the following steps:

(1) Remove the left and right side engine access panels, baggage compartment door, forward baggage compartment panels, and oil cooler/step access panel.

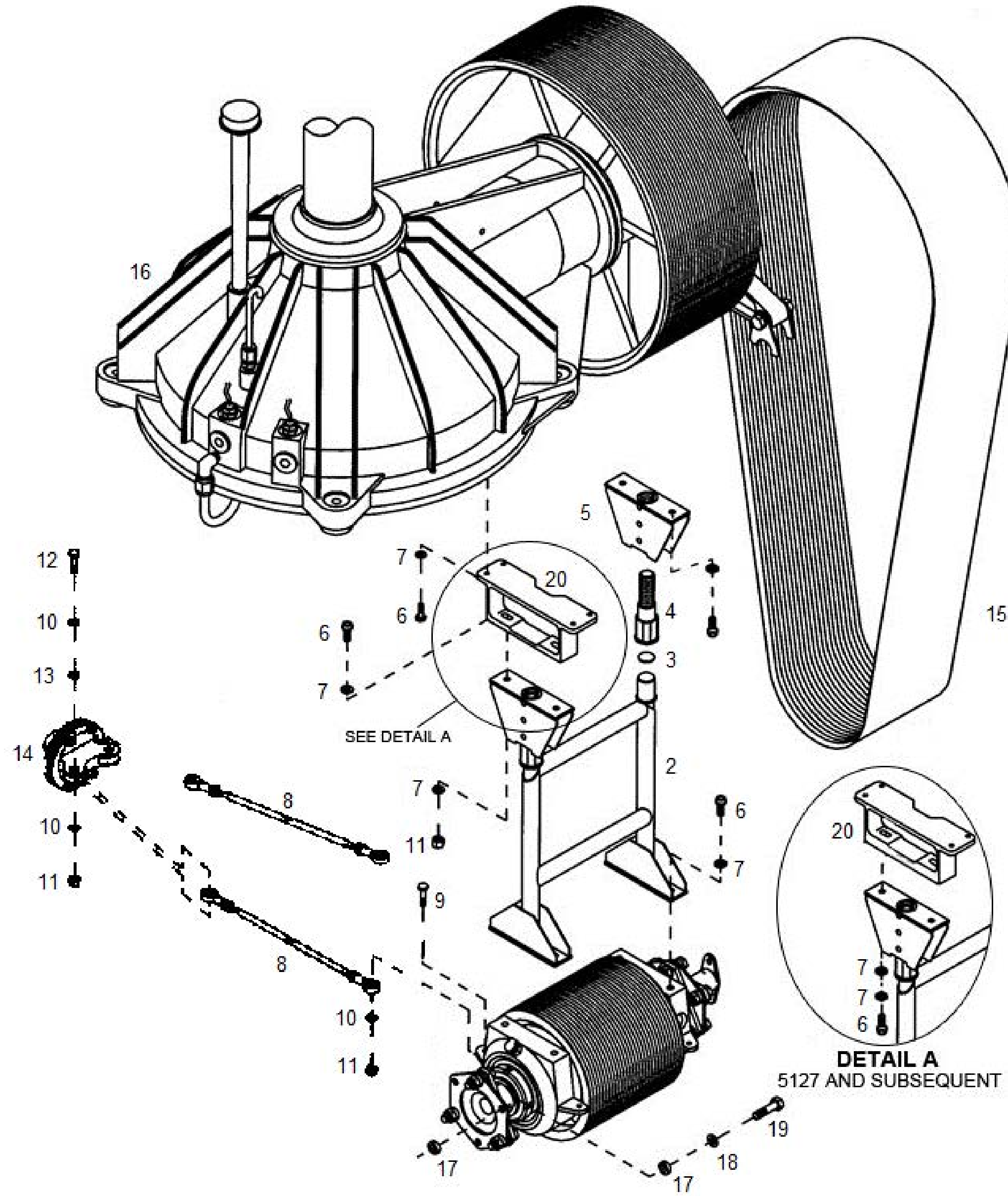
(2) Remove the upper plenum/air inlet (para. 13-28).

(3) Remove the air exit duct center panel from the pylon.

(4) Disconnect the battery. Disconnect the electrical leads from the ignition module. Remove the ignition module from its mounts. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

(5) Remove the intermediate oil cooler blower drive shaft (para. 13-75).

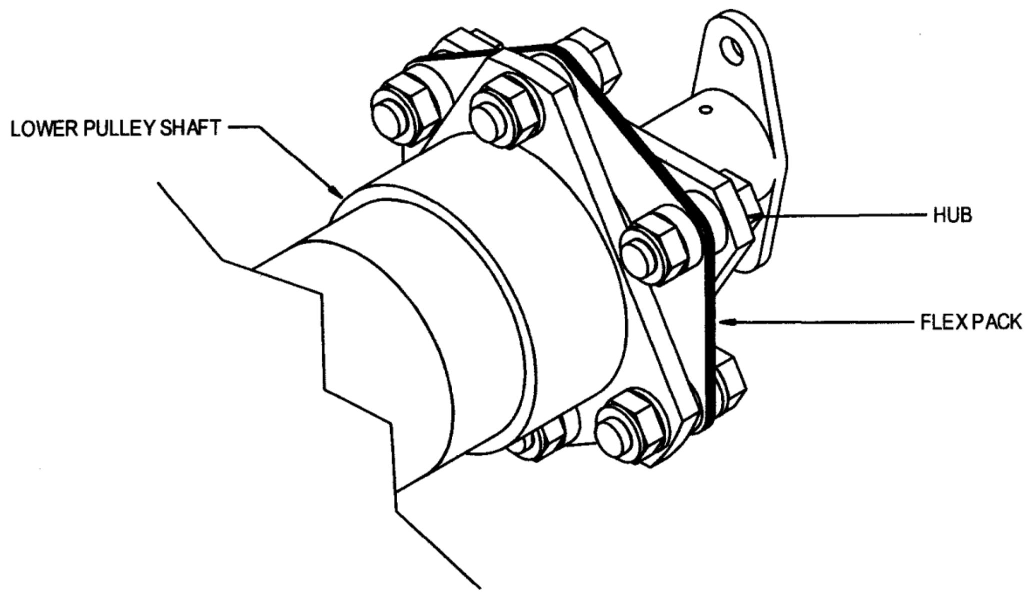
(6) Remove the oil cooler inlet ducting (para. 13-82).



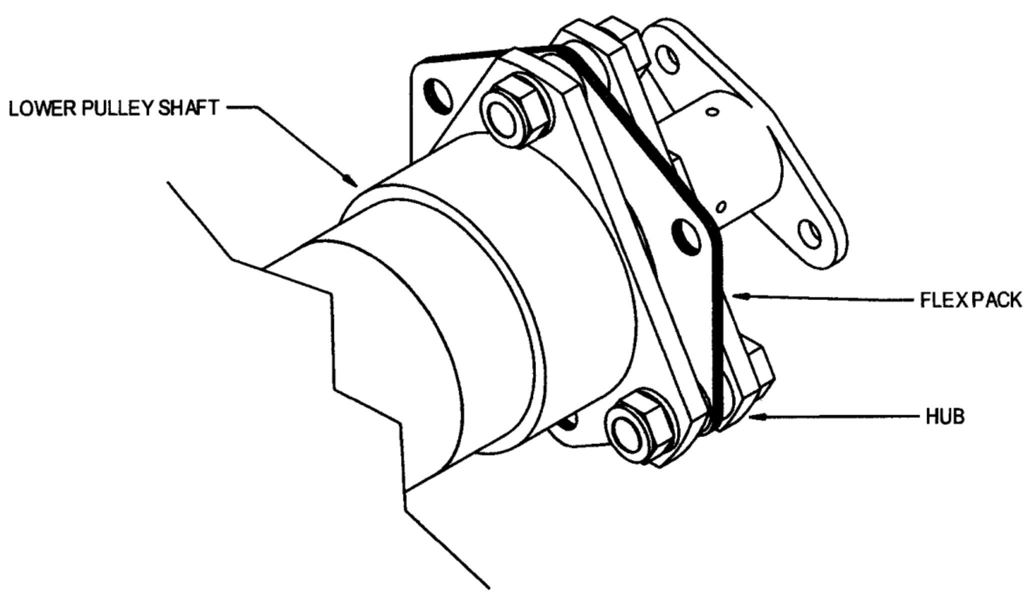
1.	Lower Pulley Assembly	11.	Nut
2.	H-Strut	12.	Bolt
3.	Bearing	13.	Spacer
4.	Jackscrew	14.	Isolation Mount
5.	Tension Mount	15.	Drive Belt
6.	Bolt	16.	Main Rotor Transmission
7.	Washer	17.	Spacer
8.	Tie Rod	18.	Washer
9.	Bolt	19.	Special Bolt
10.	Washer	20.	Fitting

Figure 11-2. Lower Pulley Drive System

NOTE: LOWER PULLEY AND BEARING HOUSINGS
REMOVED FOR CLARITY



NORMAL FLEX PACK INSTALLATION



ALIGNMENT FLEX PACK INSTALLATION

Figure 11-3. Lower Pulley Alignment Preparation

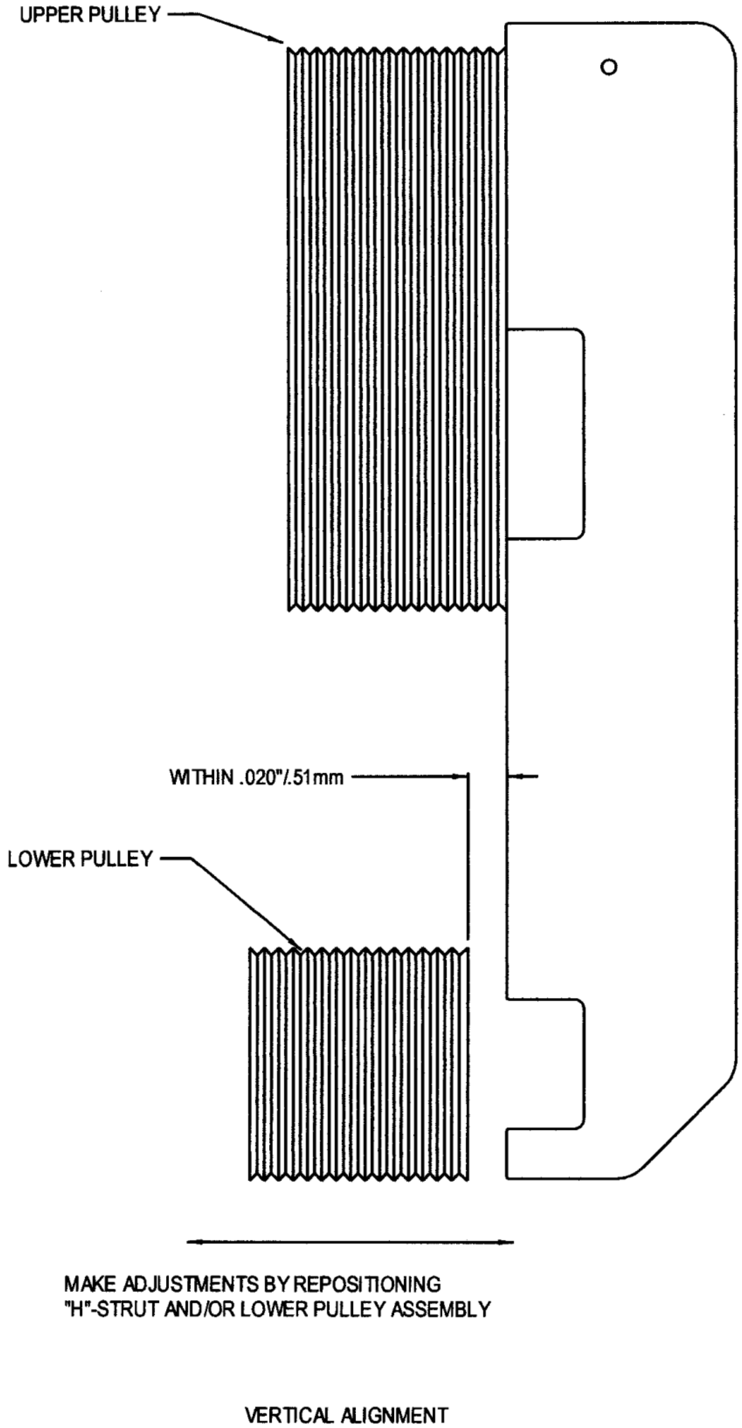


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Figure 11-4. Lower Pulley Alignment

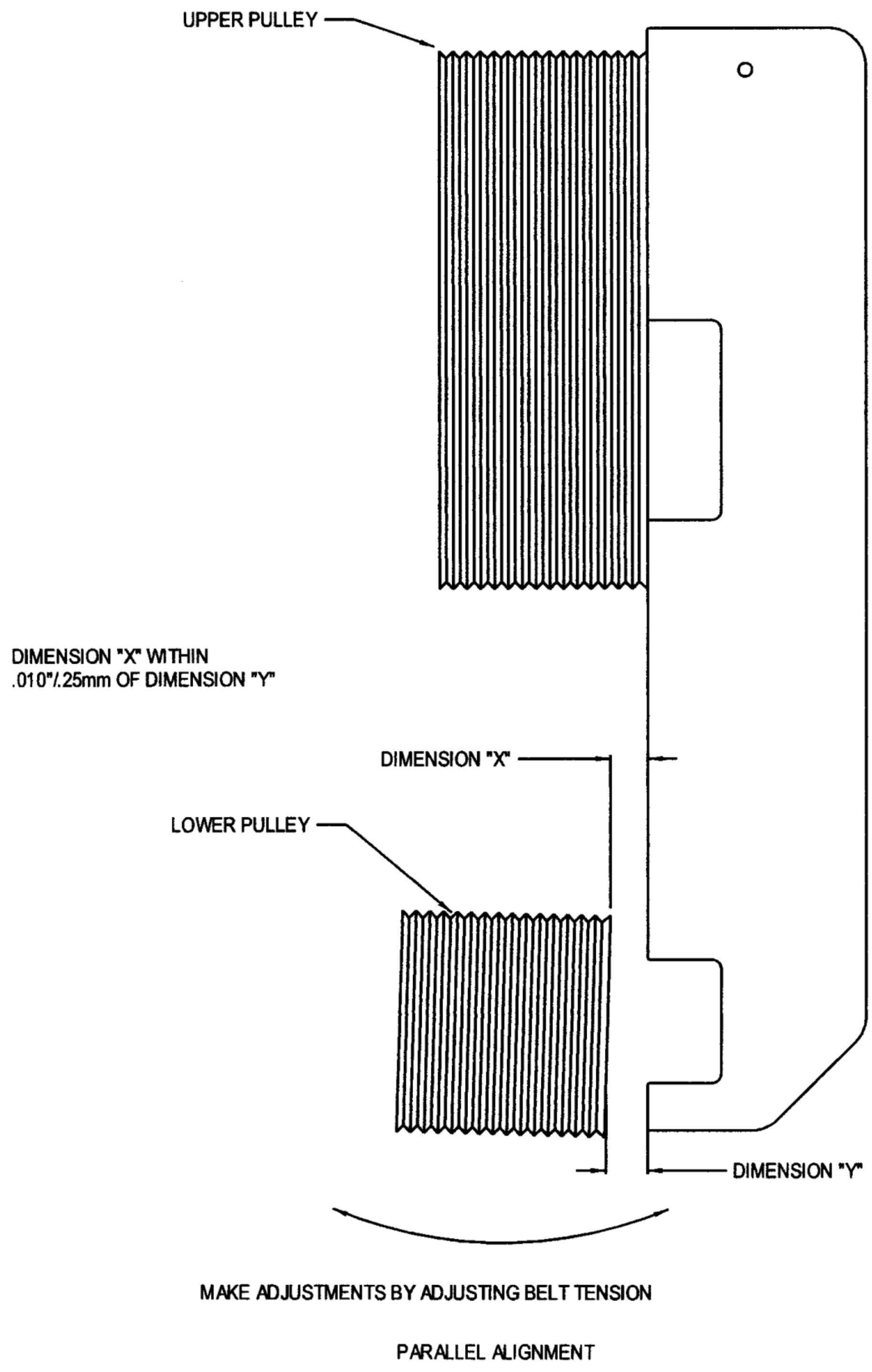

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Figure 11-4. Lower Pulley Alignment

CAUTION

The bolts connecting the forward flex pack to the power output shaft have shortened thread grip lengths. <u>Do not replace with standard hardware.</u>

(7) Disconnect the forward flex pack from the power output shaft. Keep the bolts, washers, and spacers together.

(8) Remove the forward flex pack from the lower pulley drive shaft. Keep the bolts, washers, and spacers together.

(9) Disconnect the lower pulley drive shaft hub from the aft flex pack coupling.

(10) Disconnect the flex pack coupling from the lower pulley shaft.

(11) Install one of the forward flex pack coupling bolts in the forward end of the lower pulley drive shaft.

(12) Reassemble the aft flex coupling so the flex pack coupling is bolted directly to both the lower pulley shaft and the lower pulley drive shaft hub. Install equal thickness spacers between the flex pack and the shaft/hub flanges (Refer to Figure 11-3).

(13) Disconnect the positioning links from the right side of the lower pulley bearing housings.

B. Align the upper and lower pulleys using the following procedure:

(1) Tension the drive belt to the proper tension (para. 11-29,E).

NOTE

"H"-struts have been manufactured with both elongated and non-elongated holes for attaching the "H"-strut to the lower pulley assembly. For non-elongated hole "H"-struts, the vertical misalignment may up to approximately .030"/.76 mm and cannot be adjusted.

(2) Check the alignment of the upper and lower pulleys using the alignment tool (T-0141). The pulleys must be within .020"/.51 mm vertical alignment and within .010 "/.25 mm parallel alignment (Refer to Figure 11-4).

(3) If the alignment is acceptable, proceed to step C. If the vertical alignment is not acceptable, remove the tension from the belt and reposition the lower pulley assembly by loosening the torque on the bolts securing the "H"-strut to the lower pulley assembly or to the main rotor transmission and truss assembly, repositioning the pulley assembly and torque the bolts. Tension the drive belt and recheck the vertical alignment. If the parallel alignment is not acceptable, the tension on the front and/or back side of the belt may be adjusted to bring the alignment within limits. The belt tension range is from 1,750-2,500 lbs.

NOTE

The tension on the front and aft side of the belt does not have to be the same. The maximum difference allowed is 250 lbs.

C. Align the lower pulley drive shaft to the power output shaft using the following procedure:

(1) Attach the positioning links to the right side of the lower pulley bearing housings.

(2) Position the lower pulley drive shaft so that the bolt is at the 12 o'clock position. Rotate the power output shaft so one of its flanges is at the 12 o'clock position. Check the vertical alignment by observing the position of the bolt in relation to the bolt hole in the power output shaft and attempting to install the bolt into the power output shaft using finger pressure. If excessive vertical misalignment is apparent, proceed to step (3). Rotate the bolt to either the 3 or 9 o'clock position and rotate one of the power output shaft flanges to the same position. Observe the lateral alignment of the shafts again by observing the relation of the bolt to the bolt hole in the power output shaft and attempting to install the bolt into the power output shaft using finger pressure. Adjust the positioning links to laterally align the shafts. Recheck the vertical alignment. The alignment of the lower pulley to the power output shaft is correct when the bolt can be installed into the power output shaft using finger pressure. Proceed to step (3) if the engine requires reshimming.

(3) Loosen the jam nut and the mount nut on the top engine mount. Loosen the hardware securing the left and right side engine mounts to the pylon. Add/subtract the required amount of shims to align the power output shaft to the lower pulley drive shaft. Tighten the hardware securing the engine mounts to the pylon. Ensure the washer stack-up is sufficient to prevent the nuts from bottoming on the engine mount bolts. Retighten the top mount nut until it contacts the pylon mount and tighten one more flat. After acceptable alignment has been verified, tighten the jam nut against the mount nut and lockwire the mount nut and jam nut.

(4) If the engine is shimmed, verify the rigging of the droop compensator system (para. 13-109).

(5) Recheck the vertical and lateral alignment of the shafts. Readjust the positioning links or engine shims as required until the shafts are aligned.

(6) Position the power output shaft and lower pulley drive shaft so they both have a flange at the 3 or 9 o'clock position. Using a telescoping gauge and a micrometer or a feeler gage, measure the distance between the shaft flanges. Record the measurement and rotate the shafts 180°. Measure the gap and compare the two measurements. Adjust the aft positioning link until the flange faces are parallel within .010 "/.25 mm. Recheck the vertical and lateral alignment. If the alignment is acceptable, proceed to step D. If the alignment is not acceptable, make adjustments.

D. Align the oil cooler blower shaft to the lower pulley using the following procedure:

(1) If installed, remove the inlet duct and the cover from the back of the impeller shroud on the TH-28. If installed, remove the inlet duct and the forward sheet metal panels from the baggage compartment on the 480/480B.

(2) If installed, remove the intermediate drive shaft from between the blower assembly and the lower pulley. Remove the flex packs from the intermediate drive shaft and the oil cooler blower shaft assembly as applicable. Reconnect the intermediate drive shaft to the drive hub on the lower pulley assembly with the flanges of the drive hubs bolted together through tool T-0166.

(3) Loosen the split clamps (bearing housings) securing the oil cooler blower shaft bearings.

(4) Rotate the shafts so that the flanges are at the 12 and 6 o'clock positions. Using one of the bolts from the flex pack installation, attempt to insert the bolt through both drive hubs. The bolt should fit without having to force it into the hubs ("slip fit" tolerance). Adjust the vertical position of the oil cooler blower shaft assembly by adding/removing shims between the bearing housings and the bearing mounts. After the vertical alignment is complete, measure the distance between the flange faces at the 12 and 6 o'clock position. Add/Remove shims as required until the flange faces are parallel to within .005"/.13 mm. Using one of the bolts from the flex pack installation, attempt to insert the bolt through both drive hubs (intermediate drive shaft and oil cooler blower shaft) with the flanges positioned at 3 and 9 o'clock. The bolt should fit without having to force it into the hubs ("slip fit" tolerance). Adjust the oil cooler blower shaft lateral alignment by repositioning the bearing mounts on the oil cooler shelf. If required, the adjustment slots in the oil cooler bearing housing supports may be elongated to allow for more lateral adjustment of the oil cooler blower assembly. (Refer to Figure 11-5.1 for the slot limits.) After the lateral alignment adjustments are made, measure the distance between the flanges at the 3 and 9 o'clock positions. Adjust the position of the aft bearing mount until the flange faces are parallel to within .005"/.13 mm. Recheck the vertical and lateral alignment and make any adjustments as required.

CAUTION

Ensure the oil cooler blower fan does not contact the blower fan shroud.

(5) Retighten bearing clamps (bearing housings) after shaft alignment is accomplished.

(6) Remove the intermediate drive shaft and tool T-0166.

(7) Install the cover onto the aft side of the impeller shroud on the TH-28. Install the forward sheet metal panels of the baggage compartment on the 480/480B.

E. Reassemble the lower pulley drive system as follows:

(1) Disassemble the aft flex pack coupling.

NOTE

Ensure the spacers are installed with the beveled face toward the flex pack coupling.

NOTE

If components of the lower pulley assembly have been replaced, the thickness of the spacers used on the forward flex pack coupling may have to be changed.

(2) Install the forward flex pack coupling on the lower pulley drive shaft.

NOTE

Place the thick spacers between the flex pack coupling and the lower pulley and lower pulley drive shaft hub flanges.

(3) Install the aft flex pack coupling on the lower pulley drive shaft hub and connect the hub and coupling to the lower pulley shaft.

NOTE

If components of the lower pulley assembly have been replaced, the thickness of the spacers used on the forward flex pack coupling may have to be changed.

CAUTION

The bolts connecting the forward flex pack to the power output shaft have shortened thread grip lengths. <u>Do not replace with standard hardware.</u>

(4) Connect the forward flex pack coupling to the power output shaft and safety wire (.032) (para. 11-24, F).

(5) Install the ignition module on the engine and connect the electrical leads. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

NOTE

Ensure the spacers are installed with the beveled face toward the flex pack coupling.

(6) Install the intermediate oil cooler blower shaft (para. 13-80).

(7) Install the oil cooler inlet ducting (para. 13-85).

(8) Install the upper plenum/air inlet (para. 13-31).

(9) Install the left and right side engine access panels and the left and right aft side cowlings.

F. Perform a limited maintenance test flight (para. 4-61).

11-18. Lower Pulley Assembly

11-19. Removal – Lower Pulley Assembly (Figure 11-2)

A. Remove the left and right side engine access panels and the left and right aft side cowlings.

B. Remove the upper plenum/air inlet (para. 13-28).

C. Disconnect the battery. Disconnect the electrical leads from the ignition module. Remove the ignition module from its mounts. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

D. Remove the intermediate oil cooler blower drive shaft (para. 13-75)

E. Disconnect the positioning links from the right side of the lower pulley bearing housings.

CAUTION

The bolts connecting the forward flex pack to the power output shaft have shortened thread grip lengths. <u>Do not replace with standard hardware.</u>

F. Remove the safety wire from the bolts connecting the forward flex pack coupling to the power output shaft. Disconnect the forward flex pack coupling from the power output shaft.

G. Disconnect the drive bearing thermocouples at the quick disconnects.

H. Release the tension on the drive belt.

I. Remove the hardware that attaches the "H"- strut to the main rotor transmission and the aft pinion bearing support truss.

J. Turn the jackscrews completely into the "H"- strut tension mounts. Rotate the "H"-strut to the left and remove the tension mounts from the "H"- strut. Remove the load bearing plugs from the end of the "H"-strut (older “H”-strut assemblies) and the flat bearings.

K. Lift the lower pulley off of the drive belt and remove it from the aircraft.

L. Remove the positioning links from the attachment fitting on the pylon. Identify the links "fore" and "aft".

11-20. Disassembly – Lower Pulley Assembly (Figure 11-6)

A. Remove the temperature thermocouples from the bearing housings.

B. Remove the "H"- strut from the pulley bearing housings.

C. Remove the intermediate oil cooler blower drive shaft hub from the pulley drive shaft.

D. Remove the forward flex pack coupling from the pulley drive shaft.

E. Install the lower pulley adapter (Refer to Figure 11-5) on the pulley drive shaft. Place the pulley assembly vertically in a vise and remove the pulley drive shaft retaining nut.

F. Lift the pulley assembly off of the pulley drive shaft.

G. Disconnect the aft flex pack coupling from the lower pulley driven shaft. Remove the aft flex pack coupling from the pulley drive shaft hub.

WARNING

Use extreme caution when handling heated parts to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

H. Remove the lower pulley adapter from the lower pulley drive shaft and reinstall the adapter on the lower pulley driven shaft. Place the lower pulley assembly vertically in a vise and remove the lower pulley assembly nut using tool T-0051. Remove the pulley assembly from the vise and remove the lower pulley adapter.

I. Remove the drain plugs from the bearing housings and drain the oil from the lower pulley bearing housings (Oil lubricated lower pulley assemblies only).

J. Heat the lower pulley assembly to approximately 250°F/121°C. Press the lower pulley driven shaft from the pulley using a hydraulic press.

NOTE

The bearing housing assembly and the spacer installed in the aft end of the pulley should come out of the pulley assembly with the drive shaft; however, depending on the amount of expansion from heating the pulley assembly they might remain in the pulley.

K. Press the drive shaft from the bearing housing assembly and the spacer if they came out of the pulley with the drive shaft.

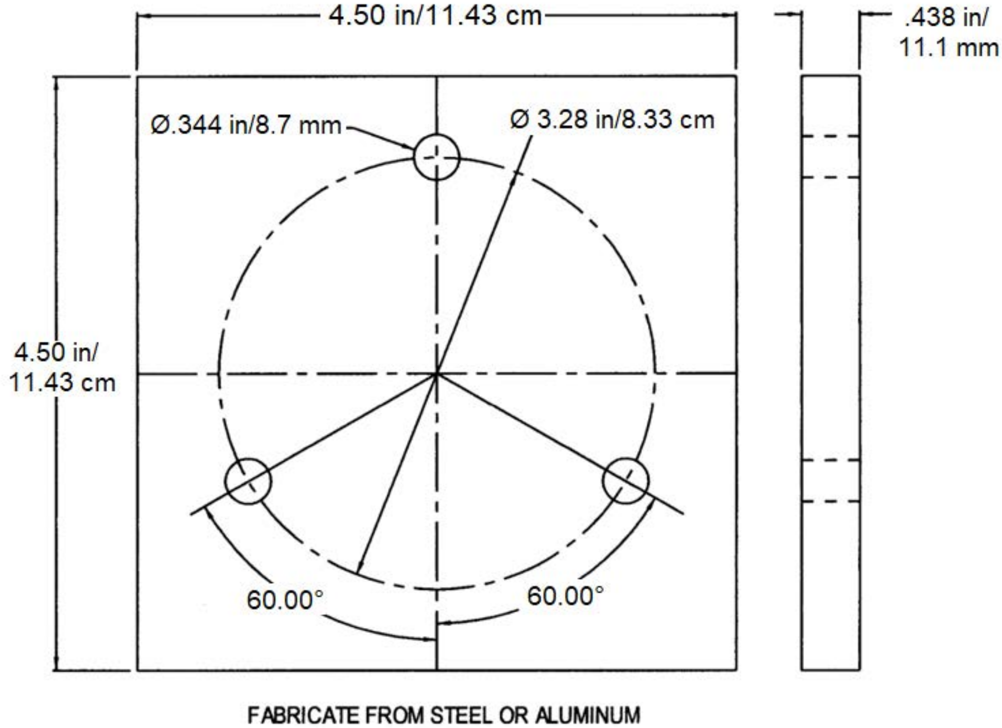


Figure 11-5. Lower Pulley Adapter

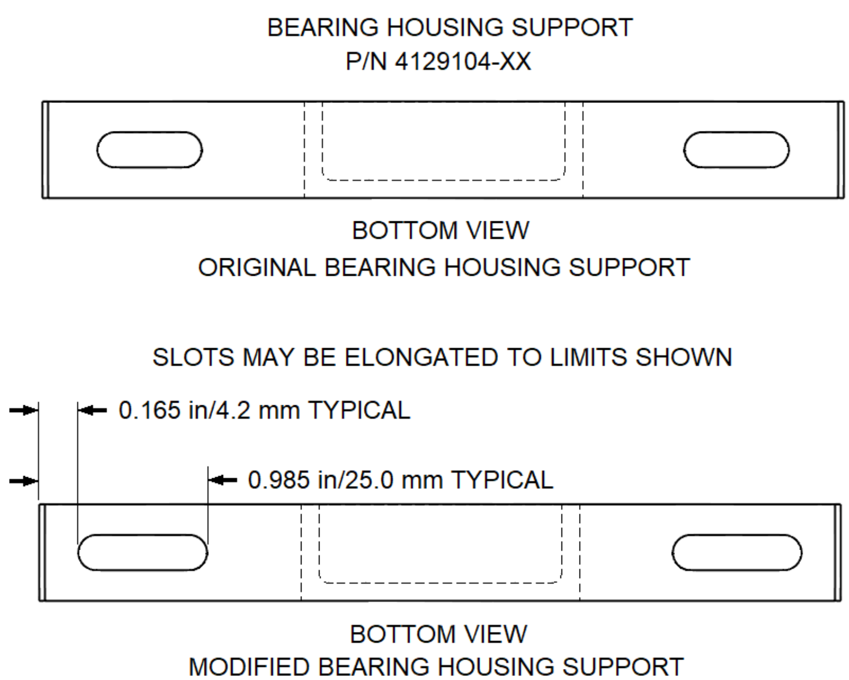
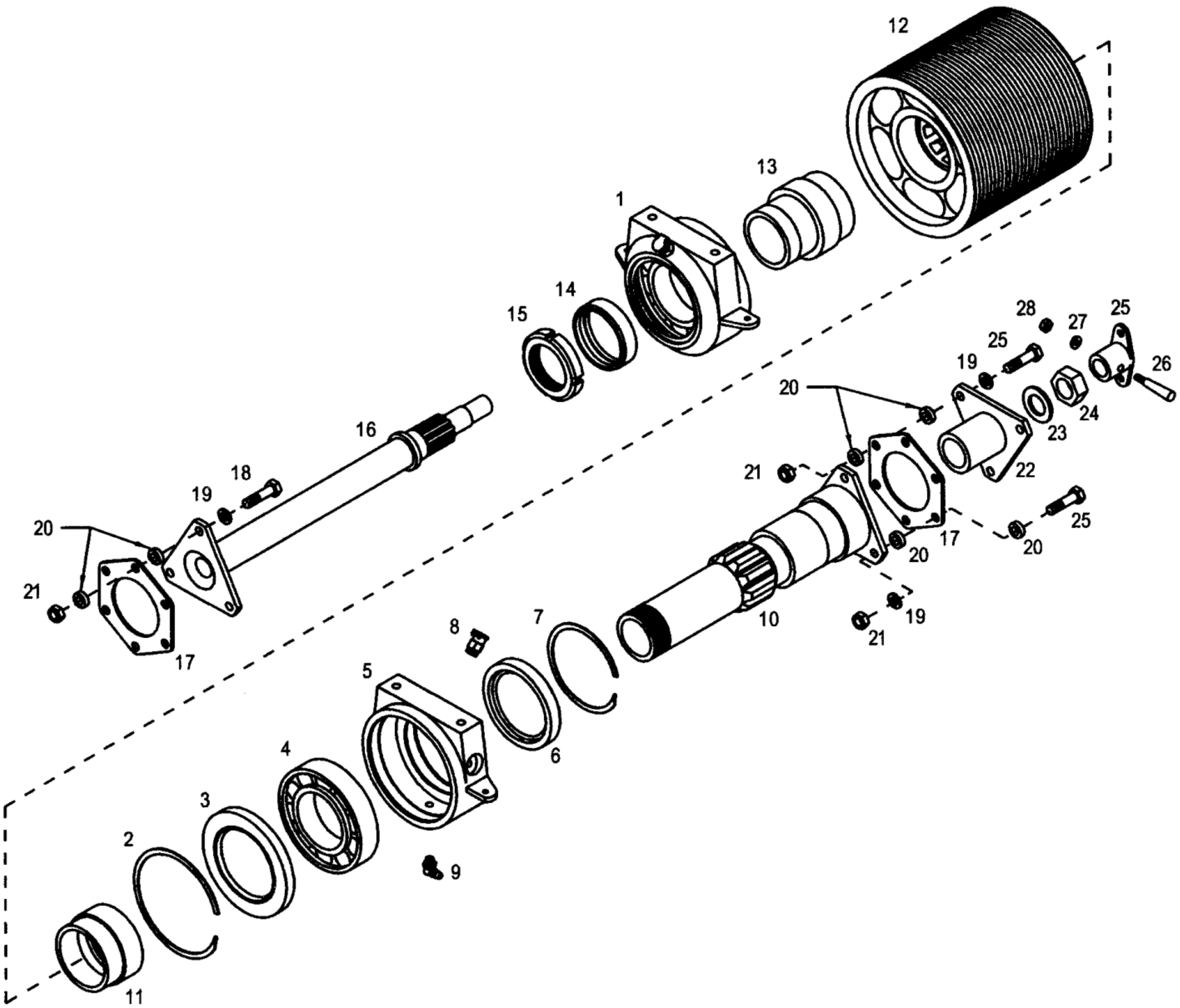


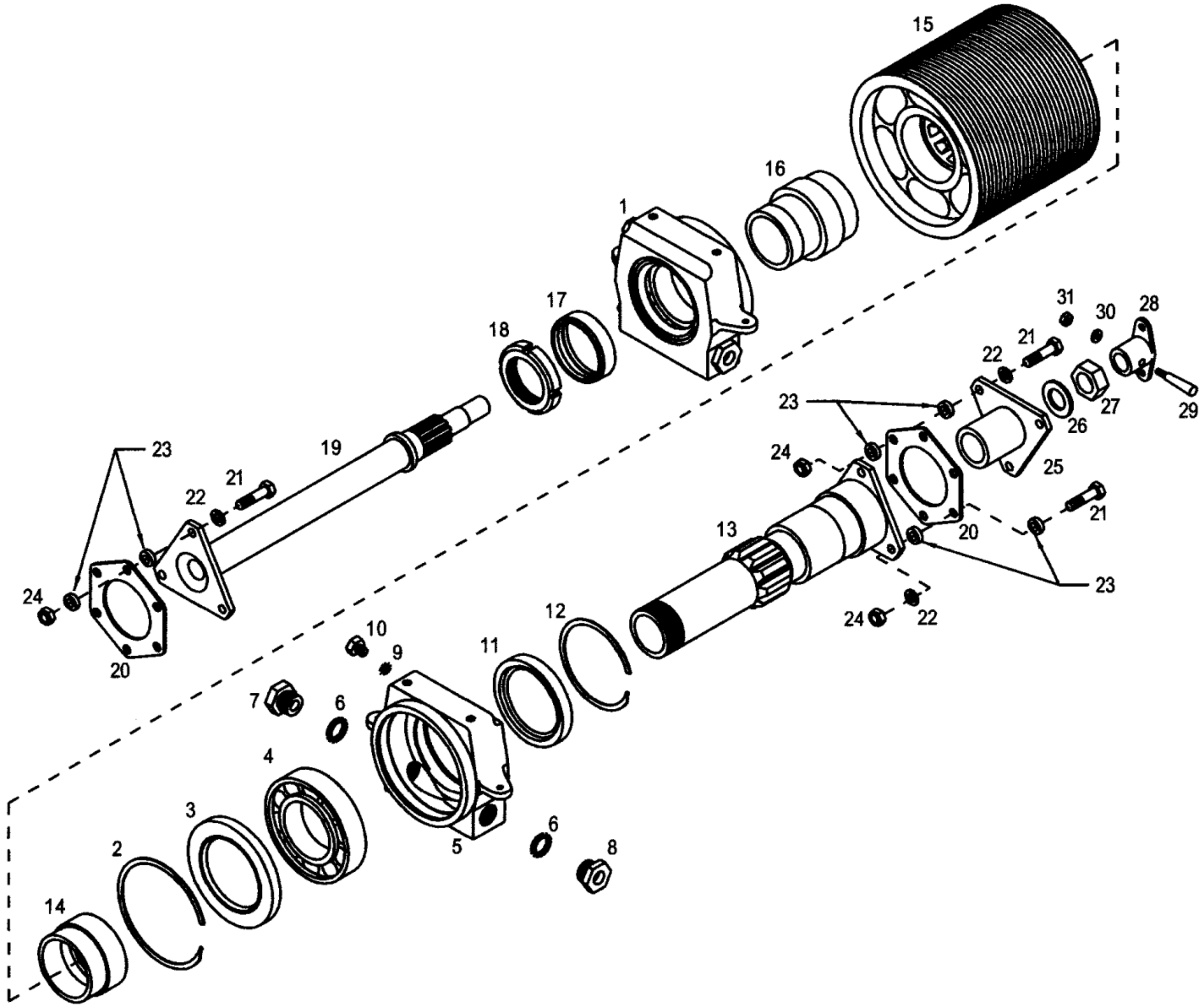
Figure 11-5.1 Modified Bearing Housing Support



1.	Bearing Housing Assembly	15.	Nut
2.	Retaining Ring	16.	Lower Pulley Drive Shaft
3.	Seal	17.	Flex Pack
4.	Bearing	18.	Bolt
5.	Bearing Housing	19.	Washer
6.	Seal	20.	Spacer
7.	Retaining Ring	21.	Nut
8.	Vent	22.	Drive Shaft Hub
9.	Grease Fitting	23.	Washer
10.	Lower Pulley Driven Shaft	24	Drive Shaft Retaining Nut
11.	Spacer	25.	Oil Cooler Blower Shaft Hub
12.	Lower Pulley	26.	Taper Pin
13.	Bearing Retainer	27.	Washer
14.	Sleeve	28.	Nut

Sheet 1 of 2

Figure 11-6. Lower Pulley Assembly (Grease Lubricated)



1. Bearing Housing Assembly
2. Retaining Ring
3. Seal
4. Bearing
5. Bearing Housing
6. O-Ring
7. Drain Plug
8. Sight Plug
9. O-Ring
10. Service Plug
11. Seal
12. Retaining Ring
13. Lower Pulley Driven Shaft
14. Spacer
15. Lower Pulley
16. Bearing Retainer
17. Sleeve
18. Nut
19. Lower Pulley Drive Shaft
20. Flex Pack
21. Bolt
22. Washer
23. Spacer
24 Nut
25. Drive Shaft Hub
26. Washer
27. Drive Shaft Retaining Nut
28. Oil Cooler Blower Shaft Hub
29. Taper Pin
30. Washer
31. Nut

Sheet 2 of 2

Figure 11-6. Lower Pulley Assembly (Oil Lubricated)

L. Press the bearing housing assembly and the bearing retainer out of the other end of the pulley.

M. Remove the sleeve and press the bearing retainer from the bearing housing retainer. Remove the spacer from the other bearing housing assembly.

N. Disassemble the bearing housing assemblies as follows:

(1) Remove the grease fitting and the vent from the grease lubricated bearing housings. Remove the service plug, drain plug, and sight plug from oil lubricated bearing housings.

(2) Remove the seal retaining rings.

WARNING

Use extreme caution when handling heated parts to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

(3) Heat the bearing housing assembly to approximately 250°F/121°C and press the bearing and the inboard seal from the assembly.

(4) Remove the outboard seal from the other side of the housing.

11-21. Inspection – Lower Pulley Assembly

A. Inspect the lower pulley and bearing housings for corrosion, cracks, damage, nicks, scratches, and security.

B. Inspect the lower pulley bearings for roughness, excessive wear, and seal leakage.

C. Inspect the pulley drive shaft and hub for bends, cracks, corrosion, elongated bolt holes, nicks, scratches, spline wear, and elongated roll pin holes.

D. Inspect the flex pack coupling for correct number of plates, bends, cracks, corrosion, elongated bolt holes, nicks, scratches, and security.

(1) Any of the three following methods may be used to count the number of elements. The number of elements must be eight.

a. Use a borescope or a magnifying glass with a suitable light source and count the number of elements in each flex pack.

b. Use a bright light source and a high resolution digital camera and photograph the flex packs. View the pictures on the camera or download the pictures to a suitable computer software program and count the number of elements.

c. Fabricate a gage having a 0.110” wide slotted opening. Align the slot of the gage with the edge of the flex pack. If the flex pack fits in the slot, the pack contains fewer than eight elements. If the flex pack does not fit in the slot, the flex pack contains eight elements.

(2) A detailed inspection of the flex packs for cracks is as follows:

a. Mark one edge of the flex pack with a magic marker to maintain disassembly order or secure with a loose-fitting cable tie or equivalent device.

b. Using a ten power glass, inspect each flex pack element for cracks originating from the bolt holes.

NOTE

Maintain the order of the flex plates in the stack.

c. In no cracks are found, remove the cable tie or equivalent device, and return flex pack to service. If any flex pack elements are found cracked, replace the entire flex pack with a new flex pack.

F. Inspect the "H"- strut for bends, cracks, corrosion, condition of the load plugs, condition of the belt tensioning assemblies, and security.

G. Inspect the positioning links for bends, cracks, corrosion, condition of the rod-end bearings, nicks, scratches, and security.

11-22. Repair – Lower Pulley Assembly

A. See Table 11-2 for damage limit and repair criteria for the components of the lower pulley assembly.

B. Repair damage to the "H"-strut assembly I/A/W AC 43.13-1B. Replace components of the “H”-strut that cannot be repaired.

C. Replace the bearing seals if worn or leaking.

D. Replace worn tie rod bearings and the tie rods if bent or damage is more than .020 inches/.51 mm deep.

E. Elongated roll pin holes in the lower pulley drive shaft and/or oil cooler blower shaft hub are not repairable.

F. A flex pack coupling exhibiting an incorrect number of elements, bent or cracked elements, elongated bolt holes, or deformation requires replacement of the flex pack coupling.

G. A flex pack coupling exhibiting nicks, scratches, or corrosion less than 0.0015 in deep (limit of 2 elements) may be repaired by blending smooth and polishing. Repair is limited to less than or equal to 0.0015 in deep.

Table 11-2. Lower Pulley Assembly

Inspection Requirements

P/N	Fig. 11-6 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
4130509-1 or 4130537-11, -12	5	Bearing Housing	Outboard Seal Bore Dia. 3.249 to 3.253	+.002	Not Repairable	Replace Housing
			Bearing Bore Dia. 3.9354 to 3.9363	+.0003	Not Repairable	Replace Housing
			Inboard Seal Bore Dia. 4.001 to 4.006	+.002	Not Repairable	Replace Housing
			Cracks	None Allowed	Not Repairable	Replace Housing
			Nicks, scratches, or corrosion	.030 Deep	≤ .030 Deep	Blend out smooth
ECD4056-3 ECD4056-5	4	Bearing	Roughness, spalling, pits, or corrosion	None Allowed	Not Repairable	Replace Bearing
4130508-13	10 (Sheet 1) 13 (Sheet 2)	Pulley Driven Shaft	Outer Seal Surface Dia. 2.415 to 2.422	-.002	Not Repairable	Replace Shaft
			Bearing Inner Race Surface Dia. 2.1654 to 2.1660	-.0003	Not Repairable	Replace Shaft
			Spacer Surface Dia. 2.1602 to 2.1608	-.0003	Not Repairable	Replace Shaft
			Bearing Retainer Surface Dia. 1.7800 to 1.7810	-.0005	Not Repairable	Replace Shaft
			Cracks	None Allowed	Not Repairable	Replace Shaft

Table 11-2. Lower Pulley Assembly

Inspection Requirements*

P/N	Fig. 11-6 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
4130506-13, -15	16 (Sheet 1) 19 (Sheet 2)	Lower Pulley Drive Shaft	Hub Surface Dia. .659 to .661	-.0005	Not Repairable	Replace Shaft
			Coupling Surface Dia. 1.0840 to 1.0845	-.0003	Not Repairable	Replace Shaft
			Cracks	None Allowed	Not Repairable	Replace Shaft
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
			Bent Flanges	.002	Not Repairable	Replace Shaft
			Threads (rolled or missing)	None Allowed	Not Repairable	Replace Shaft
ECD4024-1	17 (Sheet 1) 20 (Sheet 2)	Flex Pack	8 Elements	None Allowed	Not Repairable	Replace Flex Pack
			Cracked Elements	None Allowed	None Allowed	Replace Flex Pack
			Nicks, scratches, or corrosion	.0015 Deep on 2 elements	≤ .0015 deep	Blend out smooth and polish
			Bent Elements	None Allowed	Not Repairable	Replace Flex Pack
			Elongated Bolt Holes	None Allowed	Not Repairable	Replace Flex Pack
			Deformation	None Allowed	Not Repairable	Replace Flex Pack
4130504-13	22 (Sheet 1) 25 (Sheet 2)	Lower Pulley Drive Shaft Hub	Inner Shaft Bore Dia. 1.0845 to 1.0850	+.0003	Not Repairable	Replace Hub
			Cracks	None Allowed	Not Repairable	Replace Hub
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
			Bent Flanges	.002	Not Repairable	Replace Hub

Table 11-2. Lower Pulley Assembly

Inspection Requirements*

P/N	Fig. 11-6 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
NAS509-12	24 (Sheet 1) 27 (Sheet 2)	Drive Shaft Retaining Nut	Cracks	None Allowed	Not Repairable	Replace Nut
			Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut
4130516-17	25 (Sheet 1) 28 (Sheet 2)	Oil Cooler Blower Shaft Hub	I.D. .662 to .663	+.0005	Not Repairable	Replace Hub
			Cracks	None Allowed	Not Repairable	Replace Hub
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
			Bent Flanges	≤.010	Not Repairable	Replace Hub

* All dimensions are in inches.

11-23. Assembly – Lower Pulley Assembly (Figure 11-6)

NOTE

Heat is used to aid in assembly of the lower pulley assembly. Using an oven is the preferred method of heating parts. Heat guns can be used to heat parts but temperature control is very difficult to maintain.

WARNING

Use extreme caution when handling heated parts to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

NOTE

Lubricate the splines of the lower pulley and the lower pulley driven shaft upon assembly with grease (MIL-PRF-81322).

NOTE

For 480 model equipped with grease-lubricated lower pulley assemblies, lubricate the seal lips, the inner diameter of the bearing and bearing housing, and the outer diameter of the lower pulley driven shaft with grease (MIL-PRF-81322) upon assembly.

NOTE

For any 480 converted via SIL T-022 and all 480B with oil-lubricated lower pulley assemblies, lubricate the seal lips, the inner diameter of the bearing and bearing housing, and the outer diameter of the lower pulley driven shaft (except splines) with oil (MIL-PRF-23699) upon assembly.

A. Assemble the bearing housing assemblies as follows:

NOTE

Lubricate the seal lips before installation.

(1) Remove the “garter” springs from the seals if assembling oil lubricated lower pulley bearing assemblies.

(2) Heat the bearing housing to approximately 250°F/121°C and install the bearing with the notches facing into the bearing housing and with notch in the outboard race at the bottom of the housing. Install the inboard seal and retaining ring into the housing.

(3) Install the outboard seal and retaining ring into the bearing housing.

NOTE

If using an oven to heat the parts, place all the parts that require heat in the oven at the same time.

NOTE

If required, use a press (manual or hydraulic) and pressing aids to assemble the lower pulley assembly.

NOTE

The lower pulley bearing assemblies used on a grease lubricated lower pulley assembly are interchangeable. Assemble an oil lubricated lower pulley assembly so that the bearing housing sight plugs will be on the left side of the aircraft when the lower pulley assembly is installed.

B. Heat the aft bearing housing to approximately 250°F/121°C. Install the bearing housing assembly that is going on the aft side of the pulley assembly onto the lower pulley driven shaft. Ensure the inner race of the bearing is seated against the driven shaft.

C. Heat the spacer to approximately 250°F/121°C. Install the spacer onto the lower pulley driven shaft and seat against the bearing in the bearing housing assembly.

D. Heat the pulley to approximately 250°F/121°C. Lubricate the lower pulley driven shaft and install the pulley onto the lower pulley driven shaft. Seat the pulley against the spacer.

E. Heat the bearing retainer to approximately 250°F/121°C. Install the bearing retainer onto the lower pulley driven shaft and seat against the pulley.

F. Heat the remaining bearing housing to approximately 250F°/121°C. Install the remaining bearing housing assembly onto the lower pulley driven shaft and seat against the bearing retainer.

D. Install the lower pulley assembly (para. 11-24).

E. Tension the belt in the following manner (tool T-0139-1):

NOTE

Checking or adjusting the belt tension should only be performed when the engine and drive system components are cold (ambient temperature).

(1) Turn the jackscrews in the "H"-strut clockwise (viewed from top) to increase the tension on the belt.

(2) Tension the belt evenly and check the tension with a tension meter (T-0139-1). The belt tension upper limit is 2,500 pounds and the lower limit is 1,750 pounds.

NOTE

When setting belt tension, tension the drive belt to the upper limit. Maintain the tension between the front and aft side of the drive belt within 250 pounds or less without exceeding the upper limit when adjusting for parallel alignment of the upper and lower pulleys.

NOTE

A new (zero-time) belt will require re-tensioning within a few flight hours due to initial wear in of the belt. A one-half turn of the jackscrews in the "H"-strut is allowed without having to realign the lower pulley assembly; however, both jackscrews must be turned equally.

(3) If the belt requires re-tensioning and the jackscrews have already been turned a half turn or the belt tension is not within limits after a half turn, turn the jackscrews to bring the tension within limits. Keep track of the total turns required to bring the belt into limits. For every complete turn of the jackscrew (including the first half turn), add a .050"/1.27 mm shim to each of the side engine mounts and remove the same .050"/1.27 mm from the shims under the oil cooler blower bearing housings.

F. Align the lower pulley assembly (para. 11-17).

G. Lockwire (.025) the jackscrew in the "H"-strut after belt tensioning and lower pulley alignment are complete.

H. Install the upper plenum/air inlet (para. 13-31).

I. Install the left and right side engine access panels and the left and right aft side cowlings.

J. Perform a limited maintenance test flight (para. 4-61).

11-30. Main Rotor Transmission Assembly

11-31. Description – Main Rotor Transmission Assembly

The main rotor transmission assembly consists of the main rotor transmission and the upper pulley. The main rotor transmission is a splash lubricated ring and pinion geared transmission that changes the direction of drive, reduces the rotational speed by a 7.154 to 1 gear ratio, transmits power to the main rotor and tail rotor, and carries all flight loads from the main rotor to the pylon. An oil level sight gage is located on the right rear of the transmission and can be viewed by looking between the spokes of the upper pulley below the right rear of the upper plenum chamber. A filler cap and a bayonet type chip detector installed in the drain plug are incorporated. The transmission also has two magnetic pick-ups (N_R and low rotor warning) and a bayonet type temperature probe installed. Starting with 480 Serial Number 5042 and all 480Bs, the main rotor transmission is equipped with an oil filtration/cooling system. Total oil capacity in the transmission is 6 pints/2.84 liters, total capacity is 6.5 pints/3.1 liters if equipped with the filtration/cooling system. The upper drive pulley is either keyed or splined to the main rotor transmission drive pinion and is designed with internal fan blades providing cooling air to the main rotor transmission from the inlet on the top of the cabin forward of the main rotor mast. 480B serial numbers 5114 and subsequent and 5087 through 5113 equipped with the Increased Cooling Kit, P/N 4230031, do not have the baffle (Fig. 11-7, Item 4) installed underneath the main rotor transmission.

11-32. Removal – Main Rotor Transmission Assembly (Figure 11-7)

A. Remove the main rotor blades (para. 9-34).

B. Remove the left and right side engine access panels and left and right aft side cowlings.

C. Remove the upper plenum/air inlet (para. 13-28).

D. Remove the lower pulley assembly (para. 11-19).

E. Remove the tail rotor drive short shaft (para. 11-63).

NOTE

The bracket (13) for the fuel crossover is not used on later serial number aircraft.

F. Disconnect the fuel crossover from the bracket (13).

G. Disconnect the following electrical connections:

(1) N_R magnetic pick-up.

(2) High-Low rotor warning magnetic pick-up.

(3) Temperature probe.

(4) Chip detector.

B. Using suitable lifting device, position the transmission aft of the pylon mounts.

C. Carefully lower and maneuver the transmission onto its mounts. If the upper swashplate and the main rotor controls are installed, monitor the clearance of the dog legs as they pass over the pylon tubes.

D. Disconnect the lifting device and remove the lifting sling or lifting eye.

CAUTION

Do not reuse the self locking nuts used to secure the main rotor transmission.

E. Install the mounting hardware (2, 3, 5 and 6). Torque the nuts (4) to 240 in-lbs/27.3 Nm and slippage mark.

F. If not installed, install the upper swashplate and main rotor flight controls.

G. Connect the pitch change links to the pitch change bellcranks.

H. Install the lower swashplate (para. 12-80).

I. Connect the following flight controls:

(1) Collective control tube to the collective walking beam.

(2) Lateral control tube to the lower swashplate uni-ball.

(3) Longitudinal control tube to the lower swashplate uni-ball.

J. If not installed, install the upper pulley (para. 11-52).

K. Install the drive belt on the upper pulley.

L. Install the aft pinion bearing support truss (para. 11-52).

M. Install the lower pulley assembly (para. 11-24).

N. Install the short tail rotor drive shaft (para. 11-67).

O. Connect the following electrical connections:

(1) N_R magnetic pick-up.

(2) High-Low rotor warning magnetic pick-up.

(3) Temperature probe.

(4) Chip detector.

(5) Oil pump.

(6) Oil pressure switch.

P. Connect the crossover bracket.

Q. If required, install the oil filter and service the transmission (para. 4-12).

R. Install the upper plenum/air inlet (para. 13-31).

S. If not installed, install the main rotor hub (para. 9-12).

T. Check the rigging of the main rotor flights controls (para. 12-46).

U. Install the left and right side engine access panels and the left and right aft side cowlings.

V. Install the main rotor blades (para. 9-38).

W. Perform a preflight control check (para. 4-60).

X. Check the main rotor track (para. 9-5).

Y. Check the autorotational rpm (para. 9-4).

Z. Perform a maintenance test flight (para. 4-61).

11-38. Seal Replacement – Main Rotor Transmission

A. Replace the upper mast seal as follows:

(1) Remove the main rotor hub.

(2) Remove the slinger from the mast.

(3) Remove the seal from the transmission housing.

NOTE

Wrap a piece of shim stock around the upper portion of the mast to protect the seal from damage during installation. Reposition the shim stock to the lower end of the mast when installing the seal into the transmission housing.

(4) Lubricate the lip of the new seal (MIL-PRF-81322). Install the seal into the transmission housing. Tap the seal into the housing as required to seat the seal.

(5) Install the slinger into position and secure in place using RTV-732 Sealant.

WARNING

Use protective gloves when handling heated parts.

B. Heat the pulley (1) to approximately 250°F/121°C and remove pulley hub (3) and hub adapter (2), if applicable.

11-48. Cleaning – Upper Pulley Assembly

A. Clean all parts with kerosene, toluol or equivalent solvent, or vapor degrease before inspection.

11-49. Inspection – Upper Pulley Assembly

A. See Table 11-3 for the detailed inspection requirements for the upper pulley assembly.

11-50. Repair – Upper Pulley Assembly

A. See Table 11-3 for the damage limits and repair criteria for the components of the upper pulley assembly.

11-51. Assembly – Upper Pulley Assembly (Figure 11-11)

WARNING

Use extreme caution when handling heated parts to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

NOTE

The upper pulley P/N 4130514-17 & 4130538-11 do not use the hub adapter (2).

A. Clean the upper pulley (1), hub adapter (2), if applicable, and the pulley hub (3) with toluene or a similar solvent.

B. Heat the upper pulley (1) to approximately 250°F/121°C.

C. Spread a 1 in/25 mm wide bead of retaining compound (Loctite 635, or equivalent) on the cylindrical end of the pulley hub (3), about 0.5 in/13 mm from the end.

NOTE

The upper pulley assembly is dynamically balanced. If the parts were not index marked for reassembly, the pulley assembly with the key must be dynamically balanced to within .2 inch-ounce.

Table 11-3. Upper Pulley and Aft Pinion Bearing Assemblies

Inspection Requirements*

P/N	Fig. 11-11 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
4130514-15	1	Pulley	I.D. 4.2490 to 4.2495 (4130514-15)	+.0003	Not Repairable	Replace Pulley
4130514-17						
4130538-11			I.D. 2.1866 to 2.1871 (4130517-17, 4130538-11)	+.0003	Not Repairable	Replace Pulley
			Cracks	None Allowed	Not Repairable	Replace Pulley
			Depth of grooves	≤ .176	Not Repairable	Replace Pulley
			Nicks and gouges in belt grooves	None Allowed	≤ .25 long and ≤ .025 deep	Blend out smooth
4142009	2	Hub Adapter	O.D. 4.2497 to 4.2499	-.0002	Not Repairable	Replace Adapter
			I.D. 2.185 to 2.186	+.001	Not Repairable	Replace Adapter
			Cracks	None Allowed	Not Repairable	Replace Adapter
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
4142010-11	3	Pulley Hub	O.D. 2.188 to 2.189	-.001	Not Repairable	Replace Hub
4142010-1		Pulley Hub Assembly	I.D. 1.5630 to 1.5640 (4142010-11)	+.0003	Not Repairable	Replace Hub
			I.D. (bushing) 1.2484 to 1.2489 (4142010-1)	+.0003	Not Repairable	Replace Hub
			I.D. (gearbox side) 1.5004 to 1.5009 (4142010-1)	+.0003	Not Repairable	Replace Hub
			Keyway Width .3105 to .3125	+.0005	Not Repairable	Replace Hub
			Cracks	None Allowed	Not Repairable	Replace Hub
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth

Table 11-3. Upper Pulley and Aft Pinion Bearing Assemblies

Inspection Requirements*

P/N	Fig. 11-11 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-13142	7	Key	Width .3105 to .3125	-.001	Not Repairable	Replace Key
			Visible wear on side of key	None Allowed	Not Repairable	Replace Key
4130501	8	Bearing Housing	I.D. 3.5428 to 3.5434	+.001	Not Repairable	Replace Housing
			Cracks	None Allowed	Not Repairable	Replace Housing
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
608-2RS, ECD014-11	10	Bearing	Roughness, spalling, pits, or corrosion	None Allowed	Not Repairable	Replace Bearing
28-13323-11 (keyed) 4130046-11 (spined)	11	Bearing Adapter	O.D. 1.5746 to 1.5749	-.0002	Not Repairable	Replace Adapter
			I.D. 1.3116 to 1.3118 (28-13323-11)	+.0002	Not Repairable	Replace Adapter
			I.D. 1.2084 to 1.2089 (4130046-11)	+.0002	Not Repairable	Replace Adapter
			Fretting wear on end surfaces	None Allowed	Not Repairable	Replace Adapter
28-13184	16	Nut	Threads (no rolled or missing threads)	None Allowed	Not Repairable	Replace Nut
			Cracks	None Allowed	Not Repairable	Replace Nut

* All dimensions are in inches.

D. Install the six bolts (for alignment) in the pulley hub (3) and the hub adapter (2), if applicable, and install the hub and adapter into the pulley using the following procedure:

(1) Set the pulley (1) in a press with the aft side up.

(2) While the pulley (1) is hot, insert the pulley hub (3) into the pulley (1) and immediately use pressure to ensure that the pulley hub (3) is completely seated in the upper pulley (1).

NOTE

Alternate sides when torqueing the pulley hardware.

(3) Install the remaining hardware into the pulley hub (3) and upper pulley (1). Torque the nuts to standard torque. Alternate sides when torqueing the pulley hardware.

E. Use the following procedure if the pulley assembly has to be dynamically balanced:

(1) Dynamically balance the pulley within .2 inch-ounces; include the key when balancing.

(2) Use Dyna Weight two part epoxy for the balance material.

WARNING

Acetone and Methylethylketone (MEK) are toxic and must be used with extreme caution. Make sure adequate ventilation is provided. Repeated or prolonged contact with the skin should be avoided. Low-volatile substitutes, such as Extreme Simple Green or Citra-Safe, are preferred solvents.

(3) Remove all grease and dirt from the pulley surface using MEK, or equivalent, and rough sand the surface with 150 grit sand paper.

11-52. Installation – Upper Pulley Assembly (Figure 11-11)

A. Before installing the key (7) into the pinion, check that the key slides freely through the keyway in the upper pulley. If it does not slide through, the key must be filed slightly on one side to allow proper fit. A clearance of .0005-.001 inch/.013-.025 mm between the key and the pulley keyway is required. If the key is loose in the pinion keyway, proceed to step 1 below:

(1) Install the key on the pinion and using a feeler gauge, measure the gap between the side of the key and the pinion keyway.

(2) Divide the measurement in half to get the thickness of the stainless steel shim stock required.

(3) Cut a shim 2" long X 1.25" wide.

(4) Wrap the shim around the key. With the chamfered side of the key down, tap the key and shim into the pinion keyway.

(5) Using a razor knife, trim the shim stock along the sides of the key flush with the pinion. The key must be secure in the pinion.

CAUTION

Apply lubricant to the bore of the pulley hub and aft pinion bearing adapter, not to the pinion shaft.

CAUTION

Ensure the aft face of the pinion bearing adapter is clean and does not have lubricant on it.

B. Lubricate (MIL-G-25537 or MIL-PRF-81322) the bore of the pulley hub (3) and install the upper pulley onto the pinion.

C. Lubricate (MIL-G-25537 or MIL-PRF-81322) the bore of the aft pinion bearing adapter (11) and install the aft pinion bearing assembly onto the pinion.

D. Install the bearing retaining nut (16). Do not torque the retaining nut at this time.

E. Install the drive belt on the upper pulley.

F. Install the pinion bearing support truss (20) in the pylon mounts. Install the mounting hardware and torque the nuts to standard torque.

G. Install the hardware attaching the aft pinion bearing housing to the support truss. If required, shim between the bearing housing and support truss to remove any gap (gap tolerance ±.010 in/.25 mm).

(1) Using 2 sets of feeler gauges (one for each end of the bearing housing-truss assembly), insert equal combination of gauge thicknesses between the bottom of the bearing housing and the top beam of the truss up to the bolt hole until the clearance is zero.

(2) The thickness of gauges required to fill the gap equals the required thickness of shims required. Maximum combination of shims must be less than .060 in/1.52 mm.

NOTE

Retorque the aft pinion bearing retaining nut 20-25 hours after installation of a new or overhauled main rotor transmission or after any maintenance requiring removal or replacement of the pinion nut.

H. Torque the aft pinion bearing retaining nut (16) using the following procedure:

(1) Install the upper pulley wrench (T-0164-1) onto the upper pulley and rotate the upper pulley until the wrench contacts the aft pinion bearing support truss (Figure 11-11.1).

(2) Using special tool T-0135-1-SET, torque the aft pinion bearing retaining nut to 250 ft-lb/340.9 Nm.

I. Mount a dial indicator on the support truss and measure the runout of the aft face of the upper pulley. Maximum FIM (Full Indicator Movement) is .005 in/.13 mm. If the FIM is more than maximum allowed, remove the upper pulley and inspect the components for the cause of the runout.

NOTE

(Keyed pinion) If a cup washer is installed, torque to 15-18 in-lb/1.7-2.0 Nm (AN364 nut), otherwise torque to 25 in-lb/2.8 Nm (AN365 nut).

J. (Keyed Pinion) Install the tail rotor drive shaft hub into the pinion shaft. Install the taper pin and torque the nut.

K. (Splined Pinion)

(1) Lubricate (MIL-G-25537 or MIL-PRF-81322) the splines of the main rotor gearbox pinion shaft.

(2) Install the tail rotor drive shaft hub onto the pinion shaft.

(3) Apply a coating of Vibra-Tite VC-3, or equivalent (para. 11-94) to the bolt before installation.

NOTE

P/N 4130533-15 washer is intended to deform on installation, which is normal. The washer may be reused for reinstallation. Reverse the washer so the convex side is toward the bolt head on reinstallation.

(4) Install washer (P/N 4130533-15) and bolt (torque 100-140 in-lb/11.3-15.8 Nm).

K. Lockwire (.041) the pinion bearing retaining nut to the drive shaft hub taper pin or to the bolt (P/N AN4H7A) connecting the tail rotor coupling to the flex pack.

L. Install the short tail rotor drive shaft (para. 11-67).

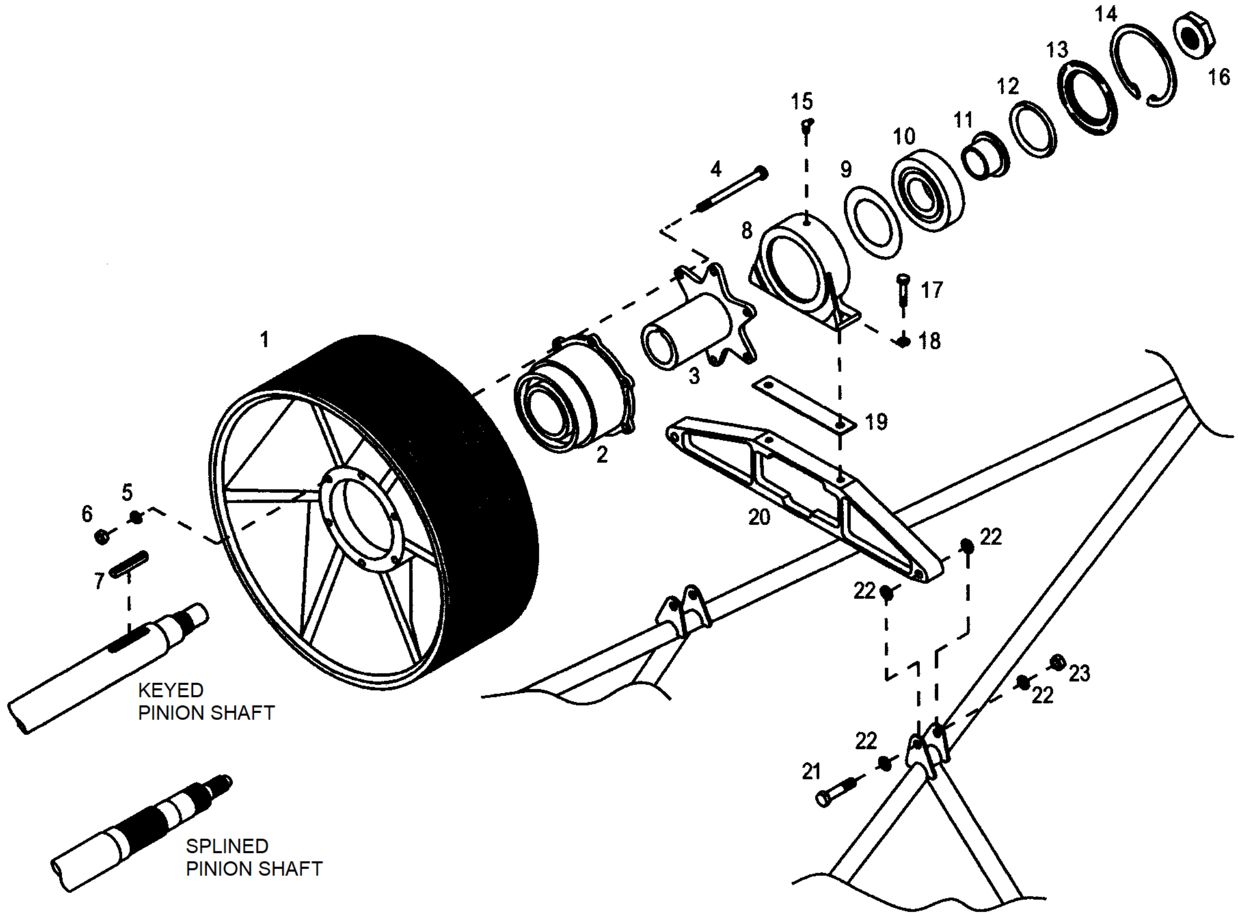
M. Install the lower pulley assembly (para. 11-24).

N. Align the lower pulley drive system (para. 11-17).

O. Install the upper plenum/air inlet (para. 13-31).

P. Install the left and right side engine access and the left and right side access panels.

Q. Perform a limited maintenance test flight (para. 4-61).



1.	Upper Pulley	13.	Seal Retainer
2.	Hub Adapter (Keyed only)	14.	Retaining Ring
3.	Pulley Hub	15.	Grease Fitting
4.	Bolt	16.	Nut
5.	Washer	17.	Bolt
6.	Nut	18.	Washer
7.	Key (Keyed only)	19.	Shim
8.	Bearing Housing	20.	Truss
9.	Shield	21.	Bolt
10.	Bearing	22.	Washer
11.	Bearing Adapter	23	Nut
12.	Seal		

Figure 11-11. Upper Pulley and Aft Pinion Bearing Assemblies
(Keyed and Splined Pinion Configurations)

11-53. Aft Pinion Bearing Assembly

11-54. Disassembly – Aft Pinion Bearing Assembly (Figure 11-11)

A. Remove the retaining ring (14), retainer (13), and seal (12) from the aft side of the bearing housing (8).

WARNING

Use extreme caution when handling heated parts to prevent from injuring personnel. Use protective gloves when handling heated parts.

B. Heat the bearing housing (8) to approximately 250°F/121°C and remove the bearing (10) and forward seal retainer (9) from the housing.

C. Press the bearing adapter (11) from the bearing.

11-55. Cleaning – Aft Pinion Bearing Assembly

A. Clean all parts with kerosene, toluol or equivalent solvent, or vapor degrease before inspection.

11-56. Inspection – Aft Pinion Bearing Assembly

A. See Table 11-3 for the detailed inspection requirements for the aft pinion bearing assembly.

11-57. Repair – Aft Pinion Bearing Assembly

A. See Table 11-3 for the damage limits and repair criteria for the components of the aft pinion bearing assembly.

11-58. Assembly – Aft Pinion Bearing Assembly (Figure 11-11)

A. Press the bearing adapter (11) into the bearing.

WARNING

Use extreme caution when handling heated parts to prevent from injuring personnel. Use protective gloves when handling heated parts.

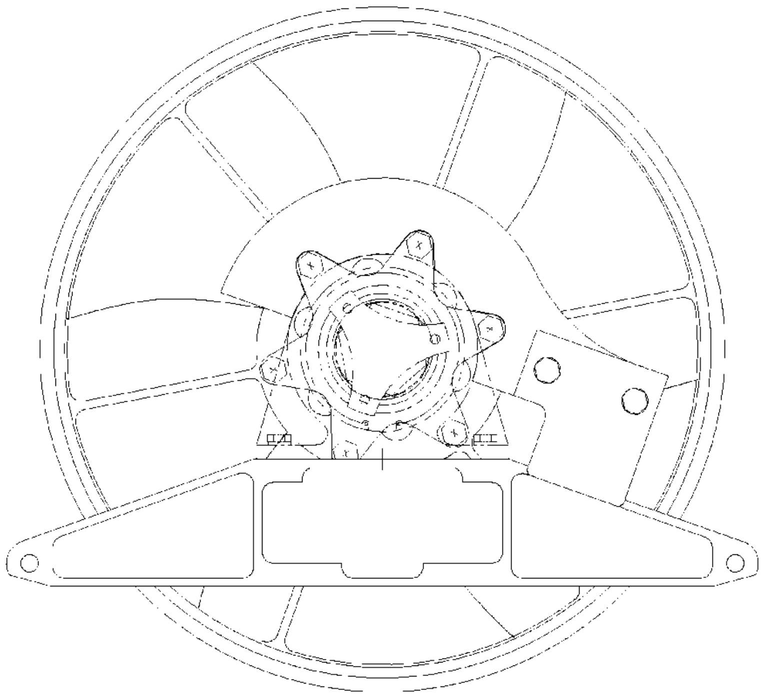
B. Heat the bearing housing (8) to approximately 250°F/121°C.

C. Install shield (9) on forward side of bearing (10).

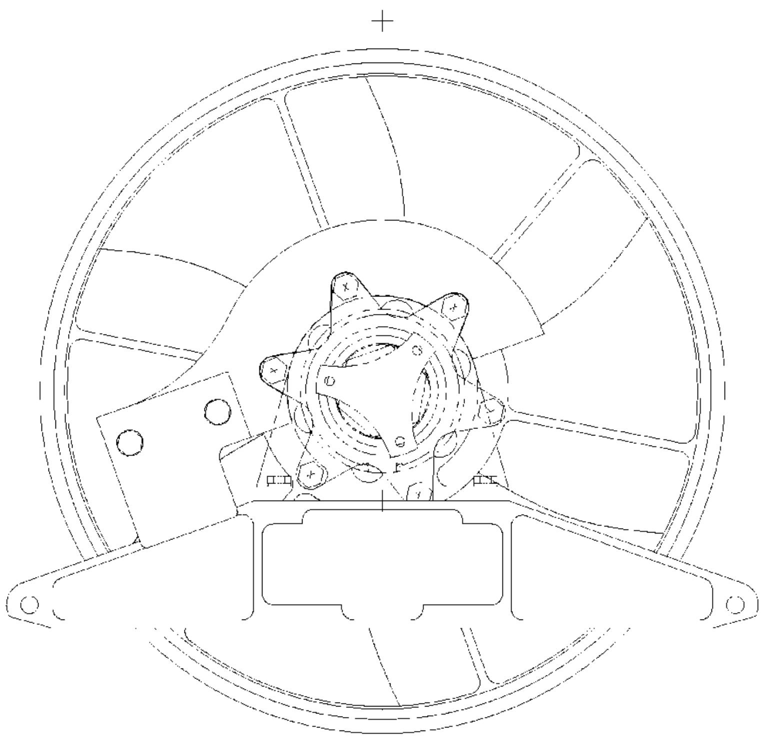
(1) Apply a thin coat of grease (MIL-PRF-81322) and ensure shield is centered over the bearing when installed.

D. Lubricate (MIL-G-25537 or MIL-PRF-81322) O.D. of the bearing and install the bearing (10) in the housing with the bearing adapter (11) and the open side of the bearing facing aft.

E. Install the seal (12), retainer (13), and retaining ring (14).



TORQUING ORIENTATION



LOOSENING ORIENTATION

Figure 11-11.1. Upper Pulley Wrench, Tool T-0164-1

11-86. Tail Rotor Transmission

11-87. Description – Tail Rotor Transmission (Figure 11-16)

The tail rotor transmission, located at the aft end of the tailcone, supports and drives the tail rotor assembly. The transmission utilizes a splash lubrication, non-vented, closed oil system. A filler port and sight gauge are located in the aft end of the transmission. A quick release chip detector is incorporated in the drain plug which is located in the bottom aft portion of the transmission. Refer to Table 4-1 for system capacity and approved oils. An inspection plug, used to visually inspect the transmission gears, is located on the top right side of the transmission. The tail rotor transmission reduction ratio is 1:1.

11-88. Removal – Tail Rotor Transmission

A. Remove the tail rotor assembly (para. 9-44).

B. Disconnect the tail rotor control cables from the transmission.

C. Disconnect the tail rotor guard from the transmission.

D. Disconnect the electrical lead from the chip detector.

E. Remove the hardware securing the aft flex pack coupling from the transmission input drive hub.

F. Remove the screws/bolts securing the transmission to the extension (stinger) tube.

CAUTION

Guide the chip detector lead through the installation hole in the transmission when removing the transmission.

G. Remove the transmission by pulling it aft with a slight rotational motion.

11-89. Disassembly – Tail Rotor Transmission

A. Remove the tail rotor pitch control assembly (para. 12-115).

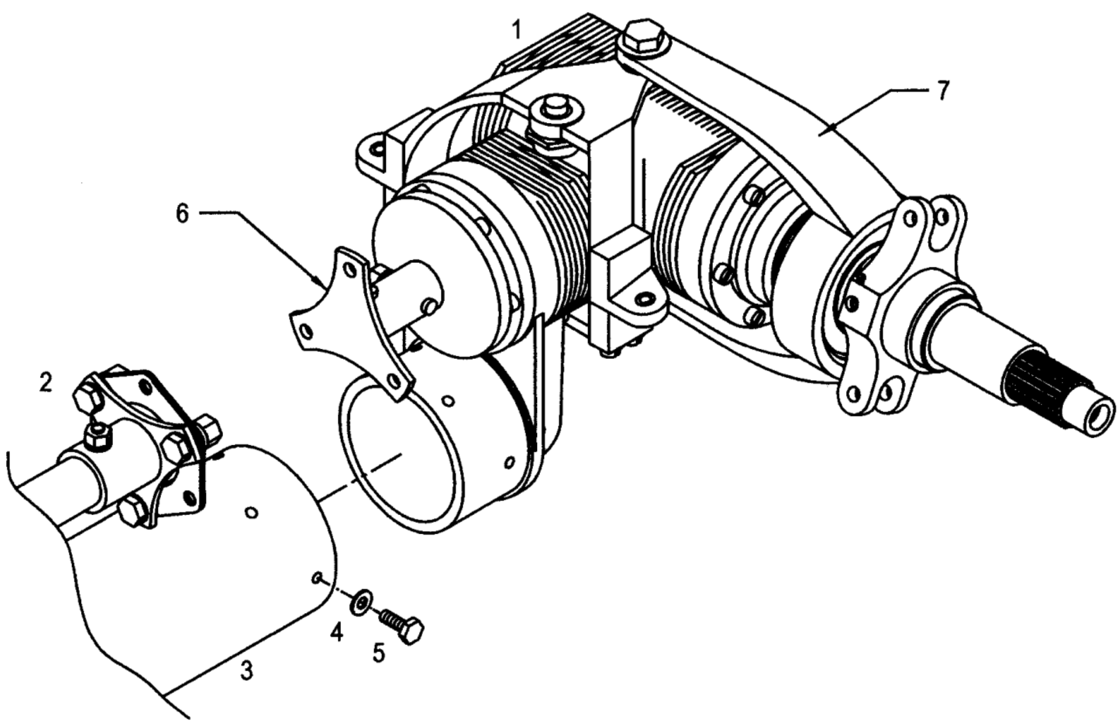
11-90. Inspection – Tail Rotor Transmission

A. Rotate the output shaft and inspect for any bearing roughness; if any roughness, return the transmission for overhaul.

B. Inspect the input shaft taper pin hole for elongation or cracks; return the transmission for overhaul if either condition is found.

C. Check the output shaft FIM (Full Indicator Movement) as follows:

(1) Secure the transmission in a vise.



1. Tail Rotor Transmission Assembly
2. Tail Rotor Drive Shaft Assembly
3. Extension (Stinger) Tube
4. Washer
5. Bolt
6. Input Drive Hub
7. Tail Rotor Rotating Controls

Figure 11-16. Tail Rotor Transmission Installation

SECTION 12

FLIGHT CONTROLS

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FLIGHT CONTROLS

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pointed approximately straight down at the floor. The control may be positioned in any intermediate position for any desired level of friction. The collective friction system is designed so that positive locking of the collective controls cannot be obtained at the maximum friction point. Safety of flight considerations require that the pilot be able to instantly overcome the established friction without any further pilot action to adjust it in the case of engine failure.

Collective control forces are reduced by means of a collective trim system located aft of the collective bellcrank in the engine compartment. The collective trim system consists of a spring capsule, brackets, and an adjusting link.

12-15. Rigging – Collective Control System

CAUTION

Check the rigging of the collective control system if two or more components of the system are replaced (e.g., the friction/stop block and a rod-end bearing, or the walking beam and the collective control bellcrank).

NOTE

The following dimension listed for the stop assembly location is an initial assembly location and is adjusted during the main rotor control rigging.

A. Ensure the friction stop assembly is set at 7.3 ± 0.1 inches/18.5 ± 0.3 cm (measured between the aft edge of the collective friction assembly clamp and the forward edge of the collective stick socket as shown in Figure 12-6).

B. Position the collective stick full down and apply friction.

C. Adjust the length of the push-pull rod (6) until there is .025 inches/.6 mm clearance between the collective bearing housing spacer and the swashplate mount flange (Figure 12-3).

D. Tighten the check nuts on the push-pull rod.

E. Remove the collective friction and move the collective to full up and back to full down. Apply friction.

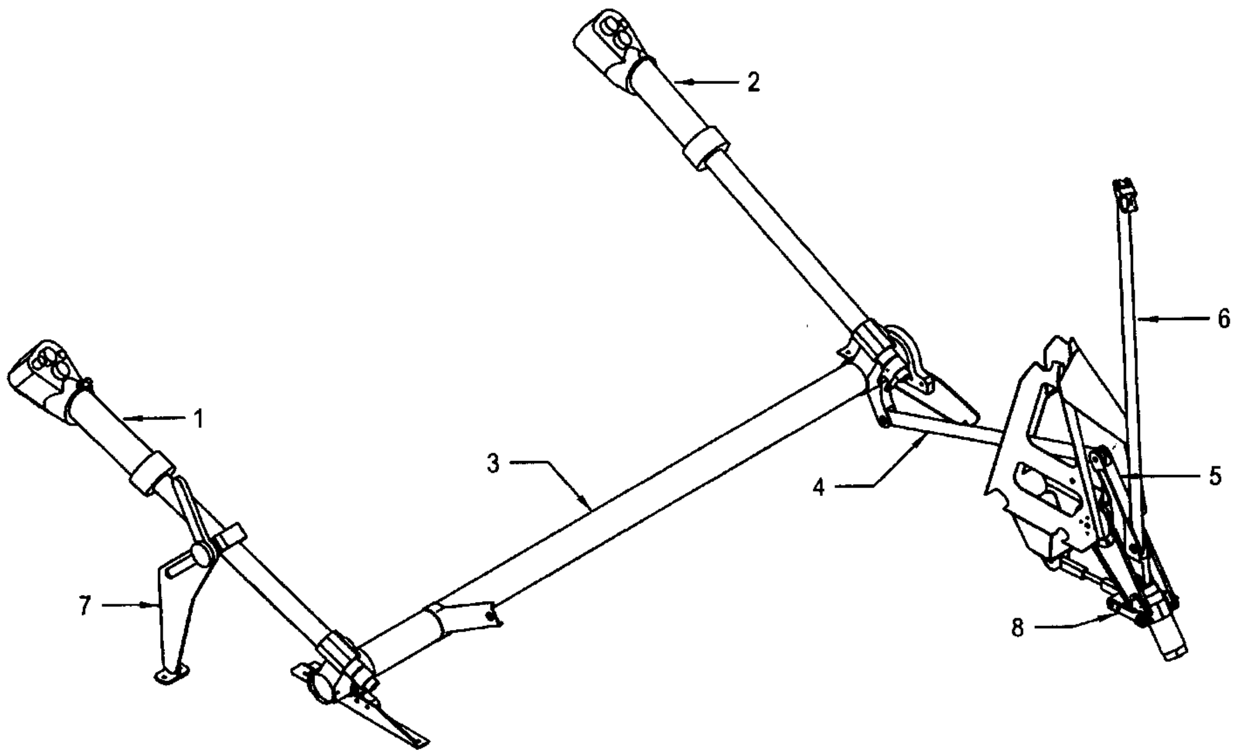
F. Check for the .025 inches/.6 mm clearance between the collective bearing housing spacer and the swashplate mount flange.

12-16. Collective Trim System Rigging – Collective Control System (Figure 12-4)

A. Position the collective controls full down and apply collective friction.

B. Turn the threaded rod in the adjusting link until the bolt connecting the spring capsule to the collective bellcrank is approximately .75 inches/19 mm forward of the spring capsule/pivot retaining strap centerline. Tighten the check nuts.

C. Test fly the aircraft and note the collective stick loads.



1.	Pilot's Collective (480/B)	5.	Collective Bellcrank
2.	Copilot's Collective (480/B)	6.	Push-Pull Rod
3.	Collective Torque Tube	7.	Collective Friction Assy.
4.	Push-Pull Rod	8.	Collective Trim Assy.

Sheet 1 of 3

Figure 12-2. Collective Control System

NOTE

CherryMAX® rivets are used during assembly of the flight control torque tubes starting with TH-28 S/N 3007 and 480 S/N 5003. Reassemble/Repair all torque tube assemblies using standard or oversize CherryMAX® rivets as required.

(2) Remove the roll pins or rivets and remove the bearing assembly from the collective torque tube.

WARNING

Use extreme caution when removing or installing heated parts and assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

(3) Remove the retaining ring from the bearing housing. Heat the bearing housing to approximately 250°F/121°C. Remove the bearing from the housing.

(4) Press the bearing sleeve from the bearing. Remove residual retaining compound from the surface of the sleeve if present.

CAUTION

Use caution to prevent retaining compound from contaminating the bearing.

(5) Apply retaining compound (Loctite 680) onto the outside circumference of the bearing sleeve. Press the bearing sleeve into the replacement bearing until the end of the sleeve is flush with the bearing inner race.

NOTE

The open side of the bearing housing faces the bearing sleeve.

(6) Heat the bearing housing to approximately 250°F/121°C. Install the bearing into the housing and install the retaining ring.

(7) Install the bearing assembly onto the torque tube and align the index marks. Install standard or oversize CherryMAX® rivets as required. Refer to the procedure in subparagraph “B” if replacing roll pins with CherryMAX® rivets.

(8) If required, reinstall the collective stick fitting. Refer to the procedure in subparagraph “C” if replacing roll pins or CherryMAX® rivets with bolt assemblies.

B. Repair elongated roll pin holes in the bearing assemblies using the following procedures:

(1) Remove the roll pin.

(2) Using a #5 drill bit, line drill the fitting and the torque tube.

NOTE

If the roll pin hole is still elongated/damaged after drilling, replace the torque tube assembly.

(3) Install oversize CherryMAX® rivets, P/N CR3243-06-02.

NOTE

Only one repair authorized per roll pin hole.

C. Replace roll pins or rivets used to install the collective stick fittings using the following procedures:

(1) Remove the roll pins or rivets.

(2) Using a #11 drill bit, line drill the stick fitting and torque tube.

(3) Install the bolt assemblies.

12-27. Installation – Collective Torque Tube Assembly

A. Place the torque tube assembly into position. Install the securing hardware and tighten.

B. Connect the push-pull rod to the torque tube arm.

NOTE

Ensure the throttle cable is routed over the torque tube.

C. Install the throttle cable into the mounting bracket.

E. Connect the throttle cable to the throttle arm.

F. Install the collective stick (para. 12-22).

G. Rig the engine power controls (para. 13-93).

H. Check the collective system rigging if the torque tube assembly was replace or the rigging is in question.

I. Install the pilot's and copilot/passenger's seats.

J. Perform a limited maintenance test flight (para. 4-61).

12-28. Collective Friction Assembly

12-29. Removal – Collective Friction Assembly (Figure 12-6)

NOTE

The pilot's controls are on the right side of the aircraft in a TH-28 and on the left side for a 480/480B.

WARNING

Failure to disconnect the collective trim spring capsule from the collective control system or not having a second person restrain the collective stick while the collective friction assembly is disassembled may result in damage to the aircraft or injury to the maintenance personnel working on the aircraft.

A. Disconnect the collective trim spring capsule from the collective control system (para. 12-34) or have a second person restrain the collective stick while the collective friction assembly is disassembled.

B. Remove the hardware securing the stop bracket (4) to the anchor bracket (5) on the cabin floor.

C. Remove the screw (9) and washer(s) (10) in the center of the friction knob/lever assembly (12-14).

D. Turn the friction knob/lever assembly counter-clockwise and remove it from the stop assembly (18). Remove and retain the shims (15) installed between the friction knob/lever assembly and the threaded portion of the stop assembly.

E. Remove the DU washers (16), spring washers (17), and the stop bracket (4) from the stop assembly.

F. Remove the anchor bracket (5) from the cabin floor.

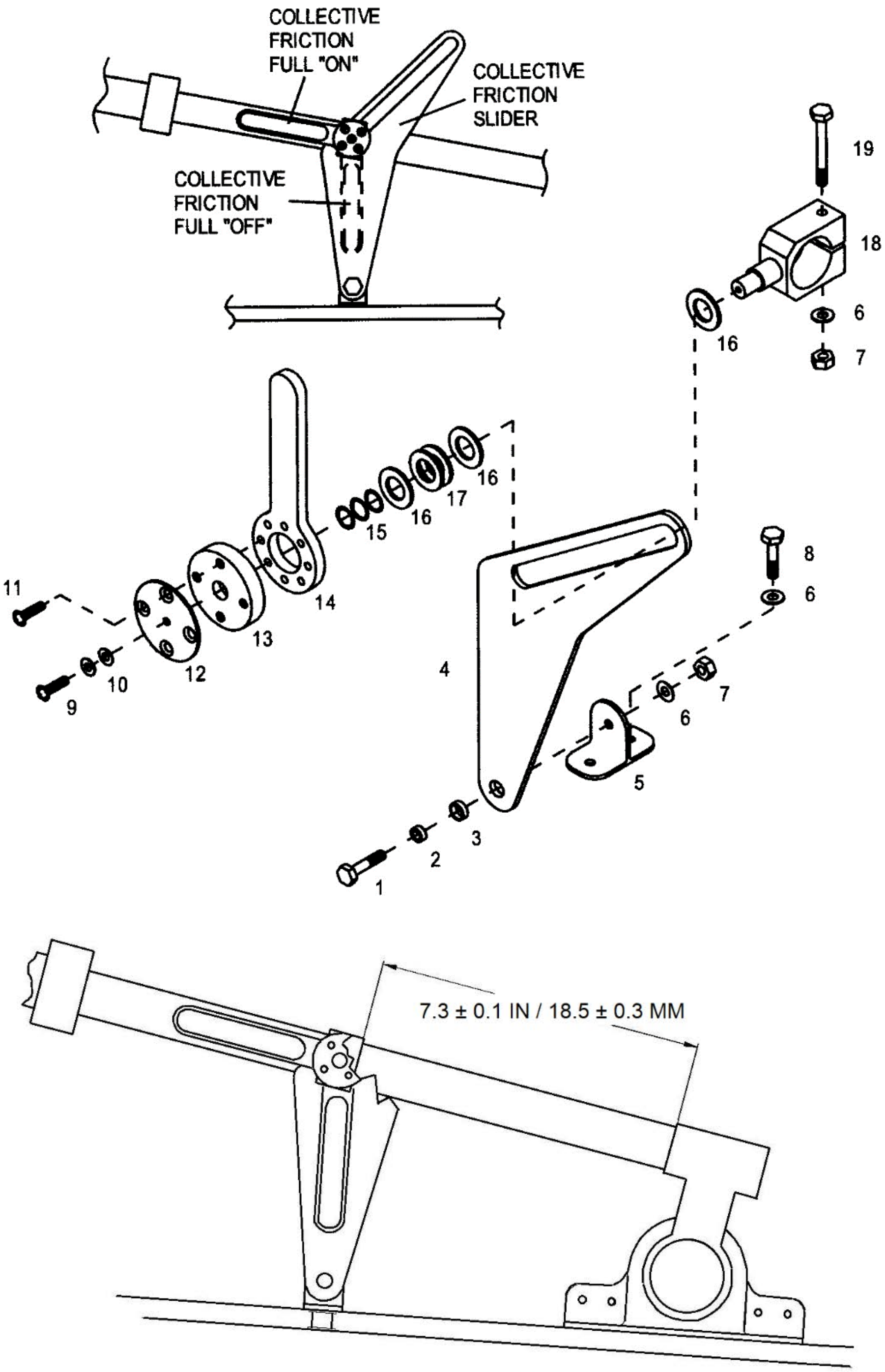
NOTE

Do not remove the collective friction stop assembly from the collective stick unless required.

G. Mark the position of the stop assembly (18) on the collective stick.

H. Remove the collective stick (para. 12-18).

I. Remove the stop assembly from the collective stick.



VIEW LOOKING INBOARD LEFT SIDE

1.	Bolt	8.	Bolt	15.	Shims
2.	Bushing	9.	Screw	16.	DU Washer
3.	Bushing	10.	Washer	17.	Spring Washer
4.	Stop Bracket	11.	Screw	18.	Stop Assembly
5.	Anchor	12.	Plate	19.	Bolt
6.	Washer	13.	Knob		
7.	Nut	14.	Lever		

Figure 12-6. Collective Friction Assembly

12-30. Inspection – Collective Friction Assembly

A. Inspect all of the collective friction assembly parts for corrosion, damage, and wear. Replace damaged or worn parts that affect the proper operation of the collective friction assembly.

12-31. Installation – Collective Friction Assembly (Figure 12-6)

A. Install the stop assembly (18) on the collective stick. Do not tighten at this time.

B. Install the collective stick (para. 12-22).

C. Install the anchor bracket (5) onto the cabin floor.

NOTE

Install the spring washers (17) with the cupped surfaces facing each other.

D. Install the DU washers (16), spring washers (17), and stop bracket(4).

E. Install the shims (15) on the stop assembly and install the friction knob/lever assembly (12-14).

F. Install the screw (9) and washer(s) (10) in the center of the friction knob.

G. Connect the stop bracket to the anchor bracket on the cabin floor.

NOTE

The following dimension listed for the stop assembly location is an initial assembly location and is adjusted during the main rotor control rigging.

H. Position the stop assembly 7.3 inches/18.5 cm from the stick socket or according to the index mark on the collective stick (measured between the aft edge of the collective friction assembly clamp and the forward edge of the collective stick socket as shown in Figure 12-6). Ensure the stop assembly is perpendicular to the stop bracket. Tighten the clamping bolt. Check the friction assembly for any misalignment.

I. Check the operation of the friction assembly. Adjust as required (para. 12-32).

J. If disconnected, connect the collective trim spring capsule to the collective control system (para. 12-38).

K. Perform a limited maintenance test flight (para. 4-61).

12-32. Adjustment – Collective Friction Assembly (Figure 12-6)

WARNING

Failure to disconnect the collective trim spring capsule from the collective control system or not having a second person restrain the collective stick while the collective friction assembly is disassembled may result in damage to the aircraft or injury to the maintenance personnel working on the aircraft.

A. Check the operation of the collective friction assembly using the following procedures:

NOTE

Due to shimming and the location of the holes in the lever, it may not be possible to get the lever exactly in line with the collective stick or the six o'clock position. The lever should be adjusted so it is as close as possible.

(1) Rotate the friction knob/lever assembly clockwise (lever forward) until it stops. Do not force the lever. The lever should be approximately in line with the collective stick.

(2) Attempt to raise and then lower the collective stick. The collective should be able to move.

(3) Rotate the friction knob/lever assembly counter-clockwise until it stops. Do not force the lever. The lever should be at the six o'clock position and no friction should be applied to the collective stick.

B. Adjust the collective friction assembly using the following procedures:

(1) If the knob/lever assembly rotates approximately 100° but does not stop at the correct positions and the collective can be moved when the friction is full on, adjust the position of the lever by removing the four screws (11) in the outboard side of the knob/lever assembly and relocating the lever and installing the screws (11).

(2) If the collective cannot be moved when the friction is full on, remove the knob/lever assembly (para. 12-29) and add shims (15) between the knob/lever assembly and the threaded portion of the stop assembly. Reassemble the friction assembly and check for proper operation.

(3) If not enough friction is applied at the full on position, remove the knob/lever assembly as above and remove shims (15). Reassemble the friction assembly and check for proper operation.

12-35. Disassembly – Collective Trim System

WARNING

When the spring capsule is in the compressed position, the springs exert approximately 180 pounds/82 kg of force. Use extreme caution when handling a compressed spring capsule.

A. Carefully place the spring capsule horizontally between the jaws of a bench vise.

B. Cut the lockwire from the special tool T-0022.

C. Slowly rotate the vise handle to release the spring pressure until all the tension is relieved, remove the capsule from the vise.

D. Remove the spring housing, springs, and washer from the spring retainer.

E. Remove the spring capsule pivot from the spring retainer.

F. Break the torque on the adjusting link jam nuts and turn the link ends from the threaded rod.

12-36. Inspection – Collective Trim System

A. Inspect all the collective trim system parts for bends, corrosion, cracks, nicks, scratches, and wear. Remove corrosion, nicks, and scratches not exceeding .010 inch/.25 mm deep. Replace worn bushings in the pivot retaining and link straps. Replace parts that fail to meet any other inspection requirement.

12-37. Assembly – Collective Trim System

A. Apply grease (Lubriplate 630-AA or MIL-PRF-81322) to the springs and washer.

B. Install the spring capsule pivot on the spring retainer with 3 - 4 threads extended above the spring capsule pivot.

C. Install the washer and springs into the spring retainer.

D. Install the spring housing onto the springs.

WARNING

When the spring capsule is in the compressed position, the springs exert approximately 180 pounds/82 kg of force. Use extreme caution when handling a compressed spring capsule.

E. Install the special tool T-0022 on the spring capsule and carefully compress the capsule in a vise until the lip of the tool locks between the ears of the spring housing. Secure the tool in place with lockwire (.032).

F. Install the jam nuts and link ends onto the threaded rod. Do not tighten the jam nuts at this time.

12-38. Installation – Collective Trim System

WARNING

When the spring capsule is in the compressed position, the springs exert approximately 180 pounds/82 kg of force. Use extreme caution when handling a compressed spring capsule.

A. Connect the adjusting link to the mount bracket below the collective bellcrank bracket.

B. Install the pivot retaining straps onto the collective bellcrank bracket.

C. Install the collective bellcrank.

D. Connect the collective push-pull rods and the droop compensator rod.

E. Connect the spring capsule to the collective bellcrank.

F. Slide the pivot retaining straps in toward the collective bellcrank. Install the ends of the retaining straps onto the capsule pivot.

G. Install the spacer and hardware in the upper end of the pivot retaining straps.

NOTE

The spacer must be able to be turned by hand after tightening to prevent binding in the system.

H. Install the link straps onto the pivot. Install the washers and nuts and tighten.

I. Install the spacers between the adjusting link and the link straps. Install the hardware and tighten.

WARNING

Ensure that the collective friction is on. Failure to do so may result in damage to the aircraft or injury to the maintenance personnel.

J. Remove the lockwire from around the special tool and remove the special tool.

K. Rig the collective trim system (para. 12-16).

L. Install the right side engine access panel.

M. Perform a limited maintenance test flight (para. 4-61).

12-39. Collective Walking Beam

12-40. Removal – Collective Walking Beam (Figure 12-20)

A. Remove the hardware (1) connecting the push-pull rod (2) from the walking beam.

B. Remove the hardware (3) from the walking beam pivot straps (4). Remove the pivot straps.

C. Remove the bolts (6) securing the walking beam to the bearing housing in the upper swashplate. Remove the collective walking beam.

12-41. Inspection – Collective Walking Beam

A. Inspect the walking beam for bends, corrosion, cracks, nicks, and scratches. Repair corrosion, nicks, and scratches less than .010 inch/.25 mm deep. Replace the walking beam if it fails the other inspection requirements.

B. Inspect the bearings for security and excessive play. Replace bearings that have more than .005 inch/.13 mm radial play.

C. Inspect the condition of the bushings in the pivot straps. Replace the bushings if worn.

12-42. Installation – Collective Walking Beam (Figure 12-20)

NOTE

Bearing housing P/N 28-16108-11 requires P/N 28-16109-13 bushings (6) and P/N 28-16109-11 bolts (5); bearing housing P/N 28-16108-2 requires P/N 28-16109-1 bolts (5).

A. Install the collective walking beam into the bearing housing in the upper swashplate. Install the bushings (6) (if required), bolts (5), torque 30-40 in-lb/3.4-4.5 Nm, and lockwire (.032).

B. Install the pivot straps (4) between the walking beam and the mount on the bottom of the main rotor transmission. Install washers, shims, bolt (3), torque nut, and install cotter pin. Liberally apply a coating of Vibra-Tite® VC-3 onto the nut and cotter pin installations.

C. Connect the push-pull rod (1) to the walking beam (2).

D. Check the rigging of the collective control system (para. 12-15) if in question.

E. Perform a limited maintenance test flight (para. 4-61).

12-43 Cyclic Control System

12-44. Description – Cyclic Control System (Figure 12-8)

NOTE

The pilot's controls are on the right side of the aircraft in a TH-28 and on the left side for a 480/480B.

The cyclic control system is a fully mechanical control system which is linked to the swashplate through a series of interconnected push-pull tubes, a torque tube, and bellcranks. Both longitudinal and lateral control systems are totally independent with no intermixing before the individual inputs reach the swashplate. Non-rotating control inputs are transmitted to the rotating controls via a universal joint type swashplate at the base of the transmission. Inputs are mixed at the swashplate and transmitted through a set of three push-pull tubes though the center of the mast to pitch change bellcranks at the top of the hub. The motion is then transmitted through pitch change links to the blade pitch horns located on the leading edge of each blade. The aircraft is equipped with a cyclic stick, located directly in front of the pilot seats. The switches mounted on the cyclic grip assembly are all non-functional (before the installation of optional equipment) except the "coolie hat" four way toggle switch at the top center of the grip, used to control the four way cyclic trim system. The cyclic trim system maintains the position of the cyclic control stick and reduces rotor feedback to zero. The system consists of a cyclic trim switch located at the top of each cyclic grip, a pair of electrically operated jack screw actuators that vary spring tension produced by the longitudinal and lateral trim units, and a pair of trim switch units which reverse the direction of the current operating the actuators. The cyclic trim switches each have five positions which are: normally OFF in the center, and momentary FORWARD, AFT, LEFT, AND RIGHT. Both trim mechanisms include an electrically operated reversible motor and a cylindrical spring assembly connected to the cyclic control linkage and both are mounted on the cabin bulkhead in the upper engine compartment. When a trim switch is moved off of center to any one of the four trim directions, power applied through the TRIM circuit breaker energizes one of the trim motors to apply trim spring force in the desired direction. By momentarily moving the switch, very small trim increments may be obtained. Trim force cannot be applied in two directions simultaneously; when both longitudinal and lateral trim corrections are desired, it is necessary to apply first one and then the other. The cyclic trim system does not limit travel of the cyclic control; the pilot may override the trim forces at any time. The 480B has vibration absorber beams installed on the upper lateral and longitudinal bellcranks located in the engine compartment. These beams reduce the mechanical feedback vibration felt in the cyclic controls caused by the main rotor blades. The vibration absorbers can be installed on the TH-28 and 480. If the aircraft is equipped with elastormeric dampers, a surface effect damper is installed in the longitudinal and lateral cyclic controls to dampen the cyclic system feedback produced by the elastomeric dampers.

C. Replace defective cyclic grip switches or replace the cyclic grip.

D. Replace/Repair the electrical harness as required.

E. Replace the weights if cracked at the mounting holes. Repair the protective coating by re-dipping the weights or brushing on Plasti Dip # 11603 or repainting the weights.

12-51. Installation – Cyclic Stick (Figure 12-12)

A. (Copilot 480/480B Only) Install the cyclic stick into the fitting and secure with the retaining ring.

B. (Copilot 480/480B Only) Connect the electrical harness to the electrical connector on the cockpit floor.

C. Install the cyclic stick into the torque tube clevis using the following procedure:

NOTE

The shim installation procedure is not required for cyclic torque tube assemblies with a floating bearing. If installing P/N 4166009-9 cyclic torque tube assembly, omit steps 1 through 4. If installing a cyclic torque tube assembly that requires shims, follow steps 1 through 5. Refer to paragraph Figure 12-13 to determine the installed cyclic torque tube configuration.

(1) Measure the distance between the inner races of the cyclic pivot bearings.

(2) Measure the thickness of the bearing mating surface on the cyclic stick socket.

(3) Compare the measurements and assemble a shim package to allow for a .000/+.001in. (.00/+.003 mm) pinch fit of the cyclic stick assembly between the pivot bearing inner races.

(4) Install the cyclic stick and install the shim package on the forward side of the cyclic stick assembly.

(5) Install the retaining hardware, torque the nut and install the cotter pin.

NOTE

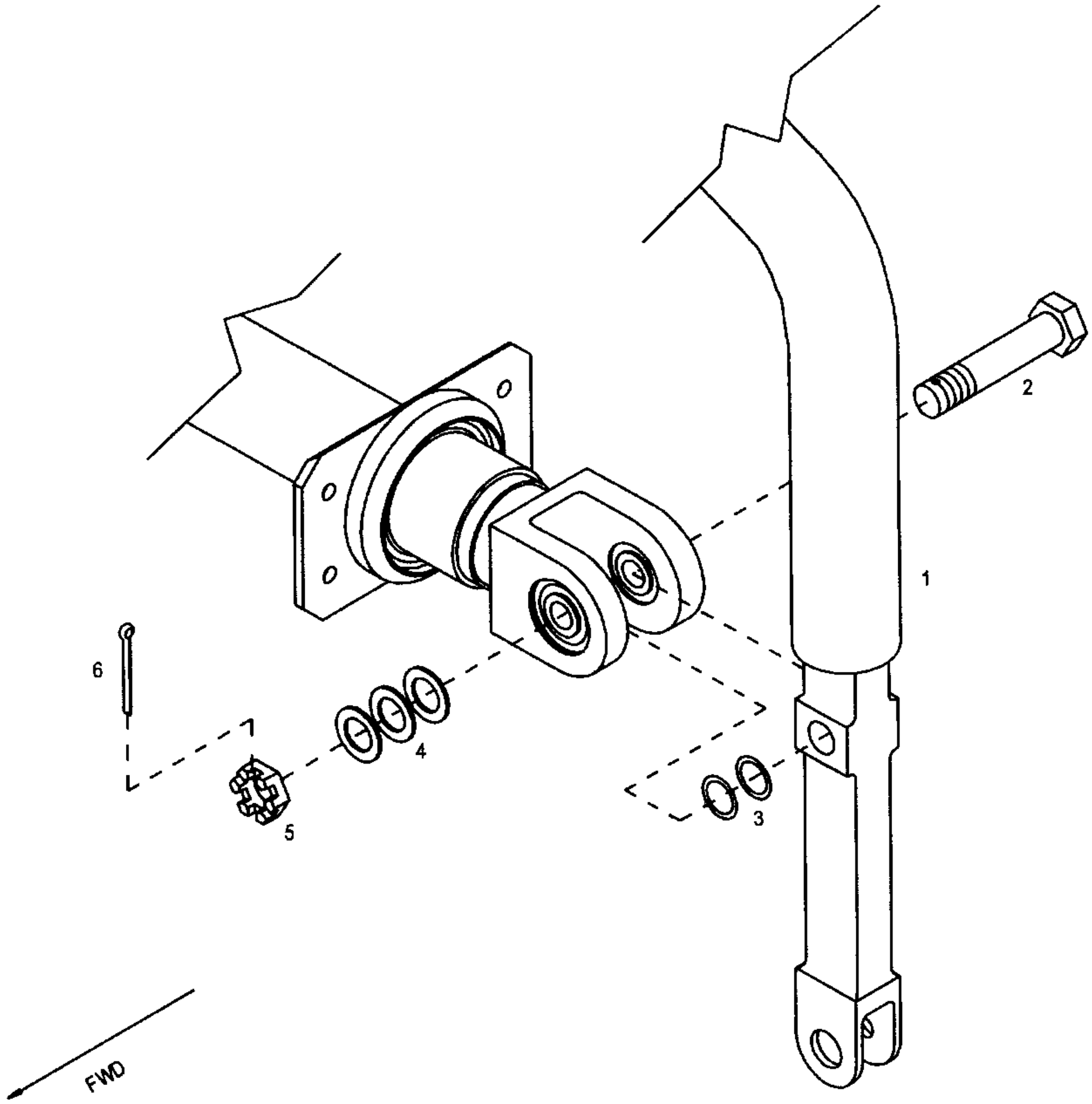
After torquing the hardware, if the “floating” bearing (Figure 12-13, Item 6) has movement, remove and re-install bearing with a thread sealant (Loctite 277 or equivalent).

E. Connect the push-pull rod to the cyclic stick fitting.

F. Connect the electrical harness to the fitting on the cabin floor.

G. Install the keel access panels.

H. Perform a limited maintenance test flight (para. 4-61).



1. Cyclic Stick Assembly
2. Bolt
3. Shims (As required)
4. Washers (As required)
5. Nut
6. Cotter Pin

Figure 12-12. Cyclic Stick Installation

12-52. Cyclic Torque Tube Assembly

12-53. Removal – Cyclic Torque Tube Assembly

A. Remove the left and right side keel access panels.

B. Remove the cyclic sticks (para. 12-48).

C. Disconnect the push-pull rod from the torque tube arm.

D. Remove the hardware securing the torque tube bearing housing brackets to the keel structure and the hardware securing the gussets to the keel structure.

E. Remove the cyclic torque tube.

12-54. Inspection – Cyclic Torque Tube Assembly

A. Inspect the torque tube and fittings for dents, cracks, corrosion, nicks, and scratches. Remove nicks, scratches, or corrosion not exceeding .010 inch/.25 mm depth. Replace if cracked or dented.

NOTE

CherryMAX® rivets are used during assembly of the cyclic control torque tube starting with 480 S/N 5003. Reassemble/Repair all roll pin and CherryMAX® torque tube assemblies using standard or oversize CherryMAX® rivets as required. Starting with TH-28 S/N 3007 & subsequent and 480B S/N 5046 & subsequent, bolt assemblies are used.

B. Inspect the roll pin holes for elongation and cracks. Replace the torque tube if damage exceeds the limits of oversize roll pins.

C. Inspect the bearings for excessive wear and roughness. Replace the bearings as required.

12-55. Repair – Cyclic Torque Tube Assembly (Figures 12-8, 12-13, & 12-14)

A. Replace the bearings in the torque tube clevises using the following procedures:

NOTE

If repairing P/N 4166009-101 (-101) cyclic torque tube assembly, follow steps 1 through 4. If installing P/N 4166009-9 (-9) cyclic torque tube assembly, omit steps as directed. (For other earlier P/N 4166009-(X) configurations, which use shims, follow the steps for P/N 4166009-101. See also Figure 12-13.)

WARNING

Use protective gloves when handling heated parts.

(1) Heat the bearing housing to approximately 250°F/121°C. Remove the bearing from the clevis fittings.

a. (-101 only) Remove the retaining rings from the clevis fittings and remove the pivot bearings and shims if installed.

WARNING

Acetone and Methylethylketone (MEK) are toxic and must be used with extreme caution. Make sure adequate ventilation is provided. Repeated or prolonged contact with the skin should be avoided. Low-volatile substitutes, such as Extreme Simple Green or Citra-Safe, are preferred solvents.

NOTE

Do not soak the pivot bearings in solvent. The pivot bearings are permanently lubricated bearings.

(2) Clean the pivot bearing outer race and clevis fitting bearing surfaces with Extreme Simple Green, or equivalent.

(3) Install the "fixed" cyclic pivot bearing using the following procedure:

a. (-101 Only) Temporarily install the bearing into the clevis and determine the amount of shims required to provide a .000/+.001 in. (.00/+.003 mm) pinch fit with the retaining ring installed.

b. (-101 Only) Remove the retaining ring, shims, and bearing.

c. Clean/Prime the pivot bearing outer race and clevis fitting bearing surface the Loctite® Primer T or equivalent. Follow the instructions provided with the primer.

d. (-101 Only) Install the shims into the clevis fitting.

e. Apply a light coat of retaining compound (Loctite 635 or equivalent) to the pivot bearing outer race and install the bearing into the clevis fitting.

f. Remove any excess retaining compound.

g. (-101 Only) Install the retaining ring.

(4) Install the "floating" cyclic pivot bearing using the following procedure:

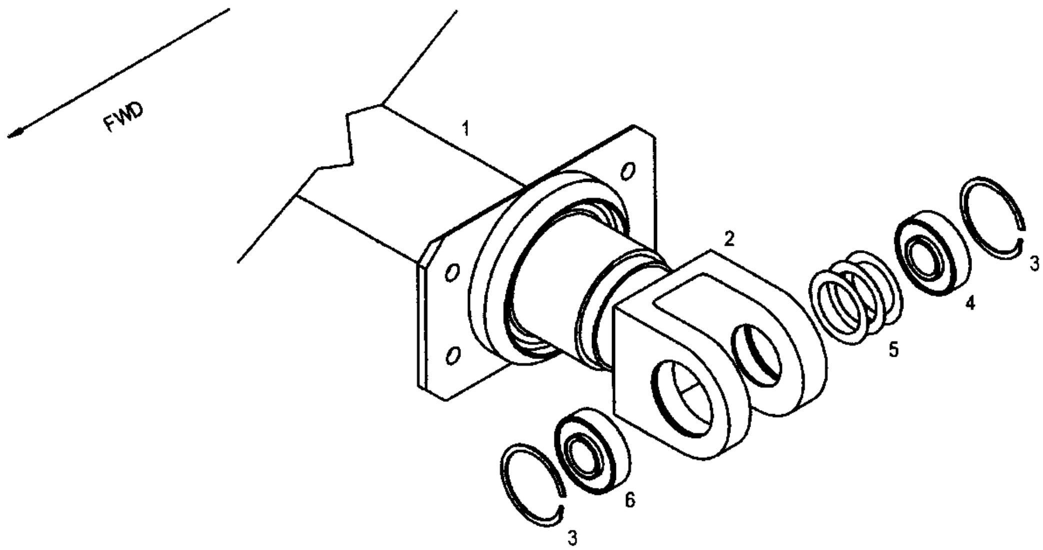
a. (-101 Only) Install the retaining ring into the clevis fitting.

b. Clean/Prime the pivot bearing outer race and clevis fitting bearing surface the Loctite® Primer T or equivalent. Follow the instructions provided with the primer.

c. Apply a light coat of thread sealant (Loctite 277 or equivalent) to the pivot bearing outer race and install the bearing into the clevis fitting.

d. (-101 Only) Seat the bearing against the retaining ring.

e. Remove any excess thread sealant.



NOTE

S/N 5059 and subsequent are equipped with P/N 4166009-9 cyclic torque tube assembly. S/N 5058 and prior are originally equipped with cyclic torque tube assembly which includes items (3) and (5). (Refer to the TH-28/480 Series Illustrated Parts Catalog for S/N effectivity.)

1.	Torque Tube Assembly	4.	“Fixed” Bearing
2.	Clevis Fitting	5.	Shims (As Required) *
3.	Retaining Ring *	6.	“Floating” Bearing

(* Items are not used in P/N 4166009-9 assembly.)

Figure 12-13. Clevis Bearing Installation

B. Replace the torque tube bearings using the following procedures:

(1) Index mark the torque tube clevis and the bearing sleeve on the end of the tube that has the defective bearing.

NOTE

CherryMAX® rivets are used during assembly of the cyclic control torque tube starting with 480 S/N 5003. Reassemble/Repair all roll pin and CherryMAX® torque tube assemblies using standard or oversize CherryMAX® rivets as required. For 480B S/N 5046 through 5052, bolt assemblies were used.

(2) Remove the roll pins, rivets, or bolts from the clevis and the bearing sleeve. Remove the clevis and the bearing assembly from the torque tube.

(3) Remove the sleeve from the bearing.

(4) Remove the retaining ring and shim (if installed) from the bearing housing.

WARNING

Use extreme caution when removing or installing the blade and grip assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

(5) Heat the bearing housing to approximately 250°F/121°C. Remove the bearing from the housing.

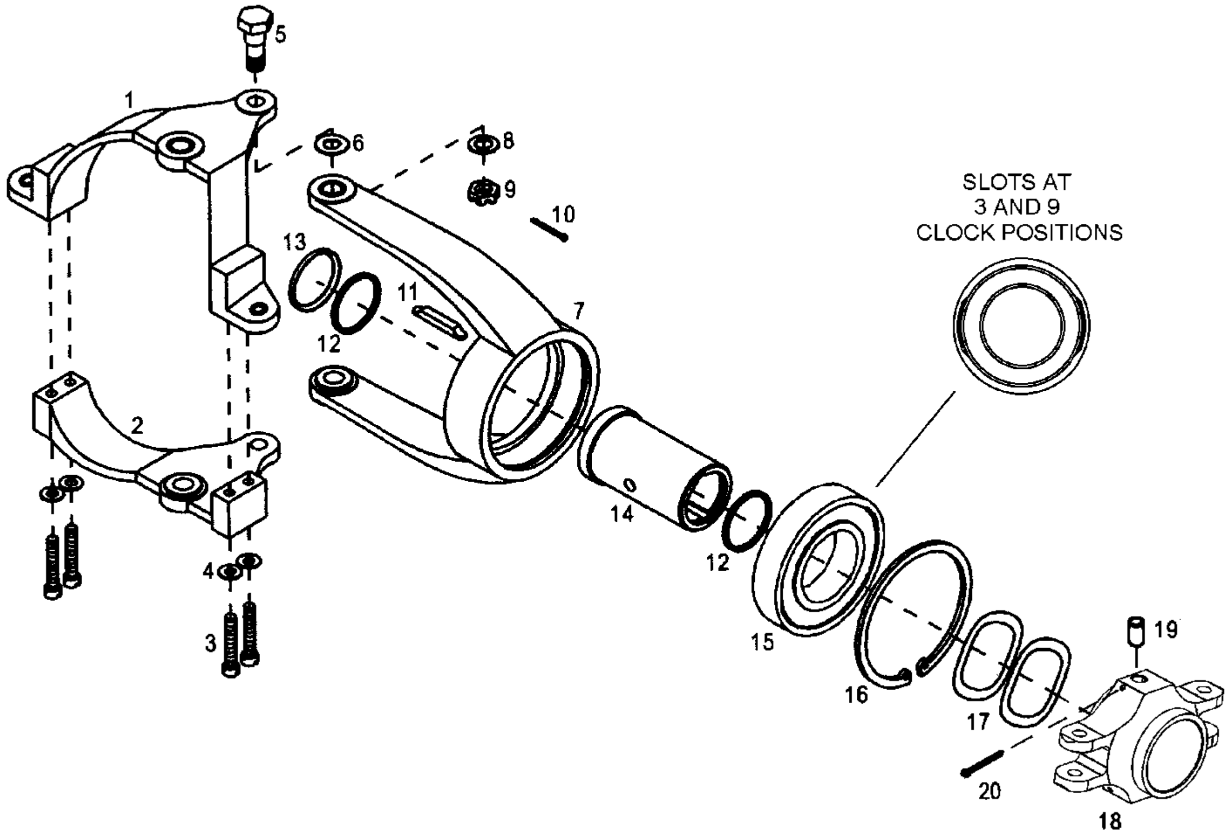
(6) Heat the bearing housing to approximately 250°F/121°C. Install the new bearing into the housing. Install the retaining ring and shim (if required).

(7) Install the sleeve into the bearing.

NOTE

The open side of the bearing housing faces the sleeve.

(8) Apply a light coat of corrosion preventive compound such as PAR-AL-KETONE (Black Bear) or equivalent (MIL-C-52, Type 1) on the mating surfaces of the bearing assembly and clevis. Install the bearing assembly and clevis on the torque tube. Align the index marks. Install the CherryMAX® rivets or bolts. If installing CherryMAX® rivets instead of roll pins, use the repair procedure in subparagraph “C” below.



1.	Upper Bracket	11.	Key
2.	Lower Bracket	12.	Seal
3.	Screw	13.	Seal Retainer
4.	Washer	14.	Pitch Control Bearing
5.	Bolt	15.	Bearing
6.	Washer	16.	Retaining Ring
7.	Bearing Housing	17.	Spring Washer
8.	Washer	18.	Pitch Link Retainer
9.	Nut	19.	Pin
10.	Cotter Pin	20.	Cotter Pin

Figure 12-27. Pitch Control Assembly

12-116. Disassembly – Pitch Control Assembly (Figure 12-27)

A. Remove the cotter pins from the pitch change link retainer.

B. Place the pitch change link retainer in a small arbor press and press the dowel pin through the retainer and the pitch control bearing. Rotate the retainer and remove the opposite dowel pin.

CAUTION

Use a press tool that exactly fits the bronze pitch control bearing or damage will occur to the bearing. Heat the bearing housing (7) and pitch change retainer (12) to 230°F with a heat gun before attempting to press the pitch control bearing from the bearing housing and the pitch change retainer.

C. Gently press the pitch control bearing from the pitch change link retainer, wave spring washers, and the bearing.

D. Remove the seal from the outboard end of the pitch control bearing.

E. Remove the retaining ring from the bearing housing.

WARNING

Use extreme caution when removing or installing the blade and grip assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

F. Heat the bearing housing to approximately 250°F/121°C. Gently tap the bearing from the housing.

12-117. Inspection – Pitch Control Assembly

A. See Table 12-4 for the detailed inspection requirements for the pitch change assembly.

12-118. Assembly – Pitch Control Assembly (Figure 12-27)

WARNING

Use extreme caution when removing or installing the blade and grip assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

A. Heat the bearing housing (7) to approximately 250°F/121°C. Install the bearing (15) into the housing with the slots for removing the inner bearing section facing outboard towards the pitch change link retainer and orientated 90° to the pivot arms of the bearing housing (3 and 9 clock positions) (Figure 12-27).

B. Install the retaining ring (16) with the opening in line with one of the bearing housing pivot arms.

C. Press the pitch control bearing (14) into the bearing in the outboard direction.

D. Install the two wave spring washers (17) onto the pitch control bearing.

NOTE

Assembly of the pitch link retainer and bearing can be facilitated by using alignment pins (0.75 in/1.9 cm max. length) fabricated from 1/4 inch bolts (1.5 in long bolt; head and threads removed).

E. Heat the pitch link retainer (18) to approximately 230°F/110°C and slide it over the bearing (14). Insert the two pins to align the bearing (14) with the pitch link retainer (18). When the retainer has cooled, push the alignment pins into the inside of the bushing to remove.

F. Press the dowel pins into the retainer.

NOTES

Seat the dowel pins into the pitch change link retainer far enough that the cotter pins can be installed. The pins must not extend through the pitch control bearing.

Installation of the dowel pins may distort the bottom surface of the pitch control bearing. Check that the inside bearing surface is free of distortion after installing the pins.

G. Install the cotter pins into the pitch link retainer.

H. Install the pitch change assembly onto the tail rotor gearbox output shaft to ensure that it will slide on the chrome shaft without binding. It is common for the bronze pitch control bearing (5) to be slightly distorted on the inside in the area of the pins. If this is the case, use a fine tooth (1/2) round file to dress the bearing so it will slide freely.

I. Install the seal into the outboard end of the pitch control bearing.

12-119. Installation – Pitch Control Assembly (Figure 12-27)

A. Install the pivot brackets onto the tail rotor transmission. Install the hardware, torque, and lockwire (.025).

CAUTION

The connecting links must pivot freely at the cable connections and at the bellcrank and pitch control assembly connections.

B. Connect the tail rotor control cables to the pivot brackets.

C. Slide the seal retainer and the seal onto the chrome sleeve.

D. Install the keys into the slots in the sleeve.

E. Align the keyways in the pitch control bearing with the keys on the sleeve. Slide the pitch control assembly onto the sleeve.

F. Install the stainless steel washers (6) between the pivot brackets and the arms of the bearing housing.

G. Install the pivot bolts connecting the brackets to the bearing housing. Install the washers and locknuts. Torque the nuts and align the cotter pin holes. Install the cotter pins and cycle the pivot brackets to check for interference.

NOTE

The heads of the pivot bolts must rotate when the control brackets are moved. If they do not move, check for binding in the bushings.

H. Install the seal into the retainer. Install the retainer into the recessed area of the pitch control bearing using tool T-0140. Alternatively, the seal may be installed by tapping it with a small punch.

I. Install the tail rotor assembly (para. 9-51).

J. Connect the pitch change links to the pitch change link retainer (para. 12-126).

NOTE

Omit steps K and L if no major components of the pitch control assembly were replaced.

K. Adjust the tail rotor control cable tension (para. 12-99).

L. Check the tail rotor control rigging (para. 12-100).

12-127. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Adhesive	“Hot Stuff” Brand	HS-3
Cleaner	Contact Cleaner (any brand)	
Corrosion Preventive Compound	Corrosion Preventive Compound, Black Bear Brand	Par-Al-Ketone[1]
Grease	Grease, Lubriplate Brand	630-AA[2] (06701)
Grease	Grease	MIL-PRF-81322
Lockwire	Lockwire, .032”	MS20995C32
Oil	Any grade internal combustion engine motor oil	
Retaining Compound	Loctite 635	63531
Solvent	Citra-Safe, Inland Technology Incorporated	6850-01-378-( )
Solvent	Extreme Simple Green, Sunshine Makers, Inc.	13440
String	Cotton string	
Tape	Double back foam tape, 3M Brand	4016-1
Thread Sealant	Thread sealant, Loctite 277	27731
Thread Sealant	Thread sealant, Loctite Threadlocker Blue 242[3]	24200
Thread Sealant	Thread sealant, Vibra-Tite Brand	VC-3

[1] Or MIL-C-52, Type 1
[2] MIL-PRF-81322 is an acceptable alternate.
[3] Acceptable alternate for Vibra-Tite VC-3.

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SECTION 13

POWERPLANT

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POWERPLANT

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AA. Install the cowl support.

AB. Install the fire curtain aft panel.

AC. Install the exhaust stacks and the eductor (para. 13-19 & 13-14). Ensure the eductor does not contact the engine exhaust stacks.

AD. Install upper plenum/air inlet and transfer ducts (para. 13-31).

AE. Test run the engine I/A/W the Rotorcraft Flight Manual. Check for fuel and oil leaks.

AF. Perform a post installation inspection I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

AG. Install the bottom engine access panel, engine fire pan and burner drain lines, left and right aft side cowlings, baggage compartment forward access panels, co-pilot side belly access panel, and left and right side engine access panels.

AH. Perform a maintenance test flight (para. 4-61).

13-8. Engine Exhaust System

13-9. Description – Engine Exhaust System

The exhaust system consists of two (2) exhaust stacks and clamps and an exhaust eductor. The right side exhaust stack also has a fitting that is attached to the accessory gearbox vent line. The eductor which is mounted to the aft crosstube is used to further direct the exhaust gases coming out of the stacks and to cool the exhaust gases using the surrounding ambient air.

13-10. Eductor

13-11. Removal – Eductor

A. Remove the four screw and nut assemblies attaching the eductor to the mounting clamps and remove the eductor from the aircraft.

13-12. Inspection – Eductor

A. Inspect the eductor and mounting clamps for cracks, dents, and burned out or buckled areas.

13-13. Repair – Eductor

A. Stop drill small cracks in the eductor.

B. Repair larger cracks and burnt out areas of the eductor I/A/W AC 43.13-1B.

C. Replace components of the eductor that are not repairable or economically unrepairable.

13-14. Installation – Eductor

A. Place the eductor into position and install the mounting hardware. Do not tighten the hardware at this time.

B. Position the eductor so that exhaust stacks are centered in the front side of the eductor and the aft side is oriented 7°±1° down in reference to the longitudinal leveling location (Figure 4-13). Ensure a 3/8 in/9.5 mm clearance between the forward, outboard bottom edges of the exhaust stacks and the interior edge of the eductor. Tighten the mounting hardware.

NOTE

Adjust the position of the eductor and/or exhaust stacks if the eductor contacts the exhaust stacks after the mounting hardware is tightened.

13-15. Exhaust Stacks

13-16. Removal – Exhaust Stacks

A. Remove the eductor (para. 13-11).

B. Remove the bottom engine access panel.

C. Disconnect the accessory gearbox vent line from the right side exhaust stack.

D. Remove the exhaust clamps and the exhaust stacks from the mounting flanges on the engine.

13-17. Inspection – Exhaust Stacks

A. Inspect the exhaust stacks for cracks, dents, and burned out or buckled areas. Inspect the exhaust stack flanges for evidence of exhaust gas blow-by.

B. Inspect the exhaust clamps for cracks, dents, corrosion, and nicks.

13-18. Repair – Exhaust Stacks

A. Stop drill cracks and repair I/A/W AC 43.13-1B.

B. Patch burnt out areas I/A/W AC 43.13-1B.

C. Replace exhaust stacks that are not repairable or economically unrepairable.

D. Blend out minor nicks and damage from the exhaust clamps.

E. Replace clamps that are cracked or uneconomically repairable.

13-19. Installation – Exhaust Stacks

A. Position the exhaust stacks on engine flanges and install the exhaust clamps.

B. Position the stacks so the outlets are level and orientated down the aircraft centerline. Ensure a 1/2 in/12.7 mm clearance between the inboard sides of the exhaust stacks.

B. Tighten or replace loose mounting clamps.

C. Repair minor damage to the mounting bracket. Replace if not repairable or economically unrepairable.

13-51. Installation – Scavenge Air Control Cable

A. TH-28/480, S/N 3004 and 3006/5001:

(1) Place the control cable through the opening in the control box and start the retaining nut on the control cable.

(2) Install the cable in the aircraft following the correct routing.

(3) Tighten the retaining nut on the backside of the control box after the cable has been correctly routed and install the control box.

B. All subsequent TH-28, 480, and 480B:

(1) Install the cable in the aircraft following the correct routing.

(2) Install the cable stop into the SCAV AIR slider.

(3) Install the end of the cable into the cable stop, apply thread sealant (VC-3 Vibra-tite) to the engaging threads of the set screw, and tighten the set screw.

(4) Position the cable in the cable clamp and tighten the clamp set screws.

(5) Install the slider control panel on the aft end of the center pedestal.

C. Install the cable in its mounting clamps and tighten the clamps.

D. Ensure the position of the scavenge air valve and the control cable agree and connect the cable to the valve. Check for proper operation of the cable and valve.

E. Install the keel access panels.

F. Close the right side engine access panel.

13-52. Anti-ice Control Cable

13-53. Removal – Anti-ice Control Cable

NOTE

Be thoroughly familiar with the cable routing before removing the cable.

A. Open the left side engine access panel.

B. Remove the left side keel access panel and the bottom engine access panel.

C. Disconnect the control cable from the anti-ice valve.

D. Remove the cable from the mounting clamps.

E. TH-28, S/N 3004 and 3006:

(1) Remove the control box from the aft end of the center pedestal.

(2) Remove the retaining nut from the backside of the control cable and pull the cable out of the aircraft through the control box.

F. 480, S/N 5001:

(1) Remove the control box from the left side of the center pedestal.

(2) Remove the retaining nut from the backside of the control cable and pull the cable out of the aircraft through the control box.

G. All subsequent TH-28, 480, and 480B:

(1) Remove the slider control panel from the aft end of the center pedestal.

(2) Loosen the set screws in the cable clamp and the cable stop for the control cable.

(3) Remove the control cable and the cable stop.

H. Remove the mounting bracket from the bottom of the engine.

13-54. Inspection – Anti-ice Control Cable

A. Inspect the control cable for kinks, breaks, and proper operation and mounting.

B. Inspect the mounting bracket and clamps for condition and security of installation.

13-55. Repair – Anti-ice Control Cable

A. Replace the control cable if damaged or it does not operate properly.

B. Tighten or replace loose mounting clamps.

C. Repair minor damage to the mounting bracket. Replace if at repairable or economically unrepairable.

13-56. Installation – Anti-ice Control Cable

A. Install the cable mounting bracket on the bottom of the engine.

B. TH-28/480, S/N 3004 and 3006/5001:

(1) Place the control cable through the opening in the control box and start the retaining nut on the control cable.

(2) Install the cable in the aircraft following the correct routing.

(3) Tighten the retaining nut on the backside of the control box after the cable has been correctly routed and install the control box.

C. All subsequent TH-28, 480, and 480B:

(1) Install the cable in the aircraft following the correct routing.

(2) Install the cable stop into the ANTI ICE slider.

(3) Install the end of the cable into the cable stop, apply thread sealant (VC-3 Vibra-tite) to the engaging threads of the set screw, and tighten the set screw.

(4) Position the cable in the cable clamp and tighten the clamp set screws.

(5) Install the slider control panel on the aft end of the center pedestal.

D. Install the cable in its mounting clamps and tighten the clamps.

E. Ensure the position of the anti-ice valve and the control cable agree and connect the cable to the valve. Check for proper operation of the cable and valve.

F. Install the keel access panel and the bottom engine access panel.

G. Close the left side engine access panel.

13-57. Engine Oil System

13-58. Description – Engine Oil System (Figures 13-3 & 13-4)

The engine oil system consists of an engine oil reservoir, oil cooler, blower assembly, scavenge oil filter, and connecting lines and fittings. The oil reservoir is located on the right side of the engine compartment and is accessible through the right side engine access panel. The oil cooler is located on the right side of the aircraft and is accessible through the oil cooler access panel. The scavenge oil filter with an integral impending bypass pop-out indicator, located at the bottom of the filter bowl, is located on the right side of the aircraft and is accessible through the step access panel. The blower assembly is located behind the lower drive pulley. The assembly consists of a fan mounted on a drive shaft which is mounted on a platform, a connecting drive shaft between the lower pulley and the fan drive shaft, and air intake and exhaust ducts. A thermal bypass valve is not incorporated in the engine oil system.

13-58.1. Bleeding – Engine Oil System

A. Fill the reservoir with oil.

B. Loosen the oil pressure screen cover to provide an air gap between the cover and the housing.

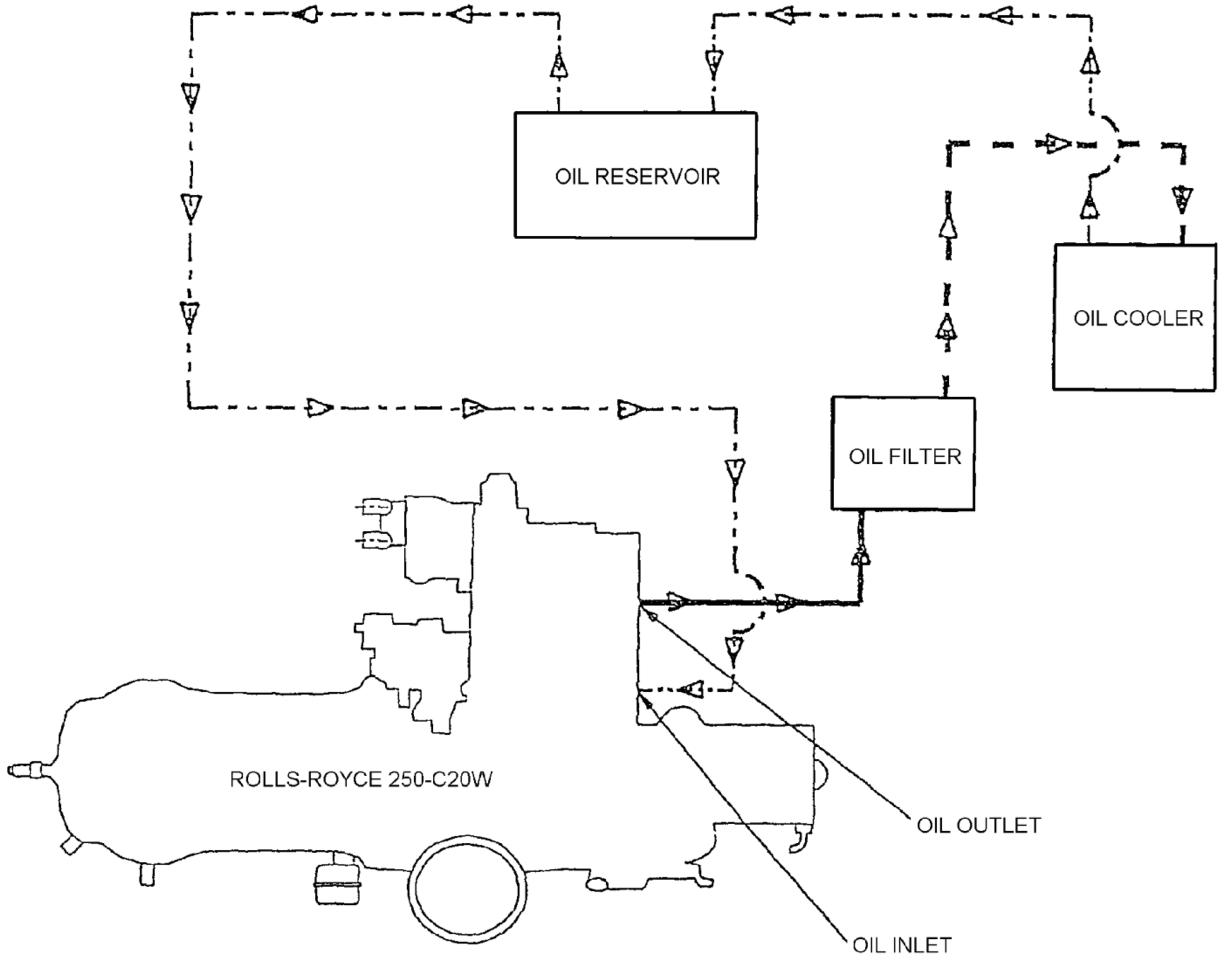


Figure 13-3. Engine Oil System Schematic Diagram

H. Remove the hardware securing the impeller drive shaft bearing housing mounting brackets to the oil cooler shelf.

CAUTION

Place a piece of tape on the blower shaft were the split clamp contacts the shaft during removal of the bearing housing to protect the shaft from damage

I. Loosen the clamping bolt assembly on the aft bearing split clamp (bearing housing). Rotate the split clamp until the recessed area of the clamp is aligned with the outer race of the drive shaft bearing. Remove the clamp and mounting bracket from the drive shaft.

J. Remove the blower assembly through the forward side of the impeller shroud.

13-76. Disassembly – Blower Assembly

CAUTION

The blower assembly is dynamically balanced as an assembly. The bearings may be replaced without having to rebalance the assembly if the parts removed are index marked to be reinstalled in the same position.

A. Remove the roll pins or taper pins securing the drive hub and remove drive hub from the blower assembly.

B. Loosen the clamping bolt assembly and remove the bearing from the forward clamp (bearing housing) and mounting bracket.

C. Remove the retaining rings from the forward and aft bearing collars.

D. Press the bearings off of the bearing collars using an arbor press.

E. Remove the impeller from the drive shaft.

NOTE

Keep the shim stack-ups together for alignment purposes.

F. Remove the split clamps (bearing housings) from the mounting brackets.

13-77. Inspection – Blower Assembly

A. Inspect the condition of the shaft hub, condition of the roll/taper pins, cracks, bends, and any evidence of chaffing.

NOTE

The current production intermediate shaft has hubs that are brazed onto the shaft.

B. Inspect the intermediate shaft condition and parallelism of the shaft hubs, cracks, bends, and any evidence of chaffing, or if the hubs are secured with roll pins.

C. Inspect the impeller for cracks, deformity, and missing blades.

D. Inspect the impeller shaft and intermediate shaft flex packs for scratches, cracks, corrosion, or deformation.

(1) Mark one edge of the flex pack with a marker to maintain disassembly order.

(2) Remove the plastic tie-wraps holding the flex pack together.

(3) Using a ten power glass, inspect each flex pack element for cracks originating from the bolt holes, the bevel washer contact area, and/or the area where the tie-wraps hold the flex pack together.

NOTE

Maintain the order of the flex plates in the stack.

(4) If no damage is found, reassemble the flex packs in the same order and tie-wrap.

E. Inspect the bearings for excessive play, and roughness.

F. Inspect the bearing clamps and mounting brackets for cracks, deformities, scratches, and general condition.

13-78. Repair – Blower Assembly

A. Blend out minor scratches and nicks from all components of the blower assembly.

B. Replace flex packs that are cracked, excessively deformed, or exhibit corrosion, scratches, or other defect with a depth greater than 0.001 in. Fretting, nicks, or scratches less than 0.001 in deep (limited to 2 elements) may be blended smooth and polished. Repair limit is equal to or less than 0.001 in deep.

C. Replace the impeller shaft if the shaft or hub is cracked or bent or the roll/taper pins or holes are worn or damaged.

D. Replace the intermediate shaft if the shaft or hubs are cracked, the parallelism of the hub flanges exceeds .005 in/.13 mm, or the hubs are secured with roll pins.

E. Replace the bearings if worn, rough, or the bearing clamps show indications of bearing over temperature.

F. Replace the impeller if cracked or bent.

G. Replace bearing clamps or mounting brackets that are cracked or bent.

13-79. Assembly – Blower Assembly

CAUTION

If any dynamic part of the blower assembly is replaced except for the bearings, the blower assembly must be dynamically rebalanced.

A. Install the split clamps (bearing housings) on the mounting brackets.

B. Install the impeller on the drive shaft.

C. Install the bearings on the bearing collars using an arbor press.

D. Install the retaining rings onto the bearing collars.

E. Install the bearing into the forward bearing clamp (bearing housing).

NOTE

The current production impeller shaft assembly uses taper pins to secure the drive hub. Enstrom no longer maintains spare/repair parts for impeller shaft assemblies with roll pins.

F. Install the drive hub onto the forward end of the blower assembly. Install the roll pins and lockwire (.020) or install the taper pin and torque the nut to 25 in-lbs/2.8 Nm.

13-80. Installation – Blower Assembly

A. Install the blower assembly through the front side of the impeller shroud.

B. Install the aft bearing clamp (bearing housing) and mounting bracket on the aft bearing.

C. Install the forward and aft mounting bracket hardware. Do not tighten the hardware.

D. Align the blower assembly to the lower drive pulley (para. 11-17).

NOTE

Ensure the spacers are installed in the bearing clamps (bearing housings). Failure to install the spacers can result in improper preload on the bearings and premature removal of the bearings.

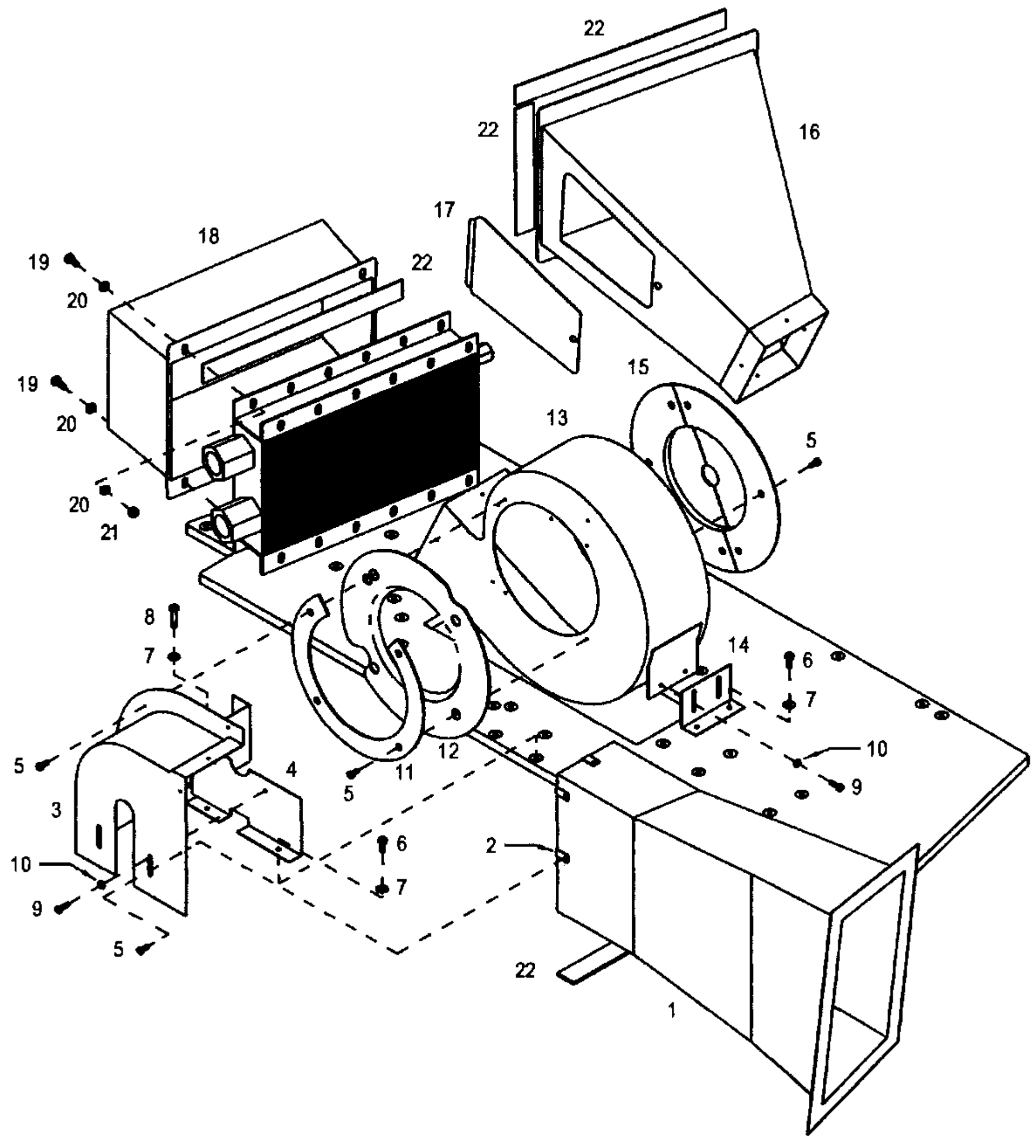
E. Ensure the clamping hardware on the bearing housings are torqued.

F. Install the bell mouth on the front side and the closeout on the aft side of the impeller shroud.

NOTE

Ensure the spacers are installed with the beveled side toward the flex pack.

G. Install the flex packs.



1.	Inlet Duct	12.	Bell Mouth
2.	Nut Plate	13.	Fan Shroud
3.	Center Duct	14.	Angle
4.	Flange	15.	Plate
5.	Screw	16.	Blower Exit Duct
6.	Screw	17.	Access Cover
7.	Washer	18.	Oil Cooler Exit Duct
8.	Screw	19.	Bolt
9.	Screw	20.	Washer
10.	Washer	21.	Nut
11.	Ring	22.	Foam Tape

Figure 13-6. Blower Air Duct Installation

H. Install the intermediate drive shaft.

I. Install the air inlet duct.

J. Install the forward sheet metal panels in the baggage compartment.

K. Install the left and right side aft cowling and baggage compartment door.

13-81. Blower Air Ducts (Figure 13-6)

13-82. Removal – Blower Air Ducts

A. Remove the left and right aft side cowlings.

B. Remove the baggage box.

C. Remove the air inlet duct.

D. Remove the blower assembly (para. 13-75).

E. Remove the oil cooler duct.

F. Remove the impeller shroud.

G. Remove the air outlet from the oil cooler.

13-83. Inspection – Blower Air Ducts

A. Inspect the blower air ducts for cracks, cleanliness, general condition, and security of the mounting hardware.

13-84. Repair – Blower Air Ducts

A. Repair the blower air ducts I/A/W AC 43.13-1B.

13-85. Installation – Blower Air Ducts

A. Install the air outlet duct on the oil cooler.

B. Install the impeller shroud.

C. Install the oil cooler duct.

D. Install the blower assembly (para. 13-80).

NOTE

Ensure the spacers are installed with the beveled side toward the flex pack.

E. Install the intermediate blower shaft.

F. Install air inlet duct.

G. Install the baggage box.

H. Install the left and right aft side cowlings.

13-86. Oil Lines and Fittings

13-87. Removal – Oil Lines and Fittings

A. Remove the right side engine access panel and right aft side cowling.

NOTE

Do not drain the engine oil reservoir if removing only the reservoir vent line.

B. Drain the engine oil reservoir (para. 4-8).

CAUTION

Use a backing wrench when loosening or tightening air/fluid lines and fittings to prevent damage to the lines or fittings.

CAUTION

Cap or plug all open lines or fittings to prevent contamination.

C. Disconnect the oil lines from the oil fittings.

D. Remove the oil lines from the support clamps.

E. If required, remove the oil fittings from the system components.

13-88. Inspection – Oil Lines and Fittings

A. Inspect the oil lines for leaks, kinks, twists, chaffing, and security of installation.

B. Inspect the oil fittings for leaks, damage, and security of installation.

C. Inspect the oil lines for contamination if removed.

13-89. Repair – Oil Lines and Fittings

A. Replace fittings that have thread or flare damage that cannot be repaired or polished out.

B. Replace fitting o-rings if leaking.

C. Replace oil lines that are kinked, leaking, the outer surface is chaffed through, or twisted and repositioning will not remove the twist.

D. Reposition lines that are being chaffed or twisted.

NOTE

Remove the oil lines before flushing to prevent from contaminating other components of the engine oil system.

E. Flush the oil lines with clean engine oil or solvent.

13-90. Installation – Oil Lines and Fittings

CAUTION

Use a backing wrench when loosening or tightening air/fluid lines and fittings to prevent damage to the lines or fittings.

NOTE

Replace all used packing/o-rings.

A. If removed, install the oil fittings.

B. Install the oil lines in the support clamps.

C. Connect the oil lines to the fittings.

D. If required, service the engine oil reservoir (para. 4-7).

WARNING

The following step is to be performed by authorized personnel only.

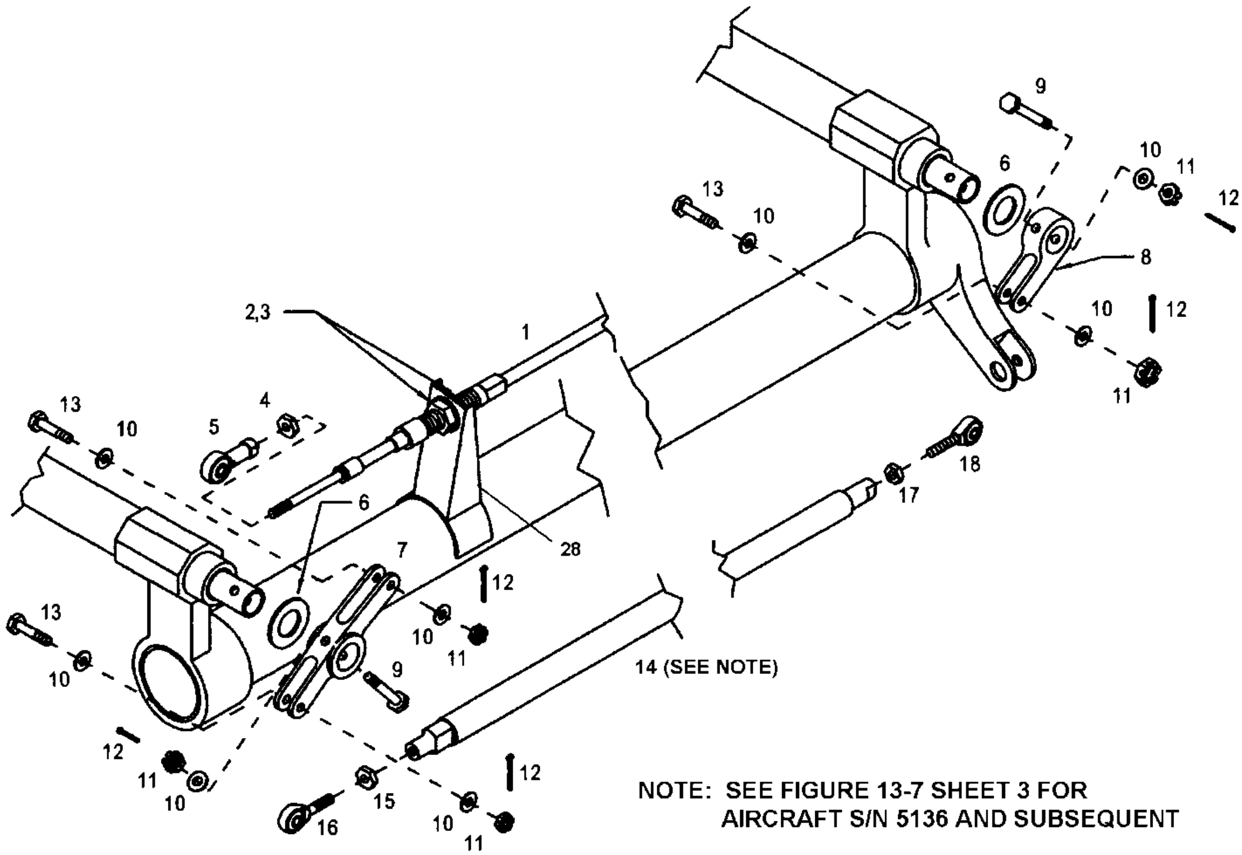
E. Ground run the aircraft and check for oil leaks.

F. Install the right side engine access panel and right aft side cowling.

13-91. Engine Power Controls

13-92. Description – Engine Power Controls (Figure 13-7)

The engine power control system is a mechanical linkage/cable system, actuated by a twist-grip on the collective sticks, which provides manual control of the power lever on the fuel control unit. The idle stop release may be configured one of two ways. For aircraft S/N 5136 and subsequent equipped with dual collective engine start and idle stop controls, the idle stop control is located on both the pilot and copilot collective control head. On aircraft S/N 5135 and earlier, the idle release control is located above the throttle twist grip in the pilot's collective stick. The stop prevents the engine power setting from being reduced below the idle position causing an engine shutdown. The release does not have to be pushed for engine start or run-up but does have to be pushed for engine shutdown. An electrically operated linear actuator operates a lever connected to the power turbine governor to adjust the power turbine (N_2) RPM and is operated via the governor INCR/DECR switch located in the control box on the collective sticks. A droop compensation system is incorporated to stabilize N_2 RPM as the engine load fluctuates with changes in the main rotor pitch.



1.	Control Cable	15.	Nut
2.	Lock Washer	16.	Rod End Bearing (Left-Hand)
3.	Nut	17.	Nut
4.	Nut	18.	Rod End Bearing (Right-Hand)
5.	Rod End Bearing	19.	Throttle Arm
6.	Washer	20.	Nut
7.	Bellcrank	21.	Bolt
8.	Bellcrank	22.	Bushing
9.	Bolt	23.	Washer
10.	Washer	24.	Bracket Assembly
11.	Nut	25.	Washer
12.	Cotter Pin	26.	Bolt
13.	Bolt	27.	Screw
14.	Control Rod (S/N 5135 and Earlier)	28.	Torque Tube Bracket
		29.	Throttle Bracket

Sheet 1 of 3

Figure 13-7. Engine Power Controls

13-106. Repair – Linear Actuator

A. Replace the linear actuator if inoperable or damage interferes with the proper operation of the actuator.

B. Blend out minor cracks, nicks, and corrosion.

C. Replace the rod end bearing if excessively worn, cracked, or binding.

D. Replace the electrical connector if cracked or the pins are bent and cannot be repaired.

13-107. Installation – Linear Actuator (Figure 13-8)

A. Connect the liner actuator to the droop compensation control rod and to the power turbine control arm.

B. Connect the linear actuator cannon plug.

C. Connect the battery. Check the liner actuator for proper operation.

13-108. Droop Compensation System (Figure 13-8, Figure 13-8.1)

13-109. Rigging – Droop Compensation System

NOTE

When the collective is down and the linear actuator is moved to the full decrease position, the kinematics of the system will torsionally load the droop compensator torque rod. When the collective is full up and the linear actuator is moved to the full increase position, the power turbine control arm will hit the max limit stop and torsionally load the droop compensator torque rod. Neither occurrence will occur during normal aircraft operations when the compensator system is properly rigged.

A. Ensure collective is set to flat pitch.

B. (TH-28, early 480 only) Ensure the bracket installed on the collective control bell crank is mounted perpendicular to the bell crank as it is moved through its control arc.

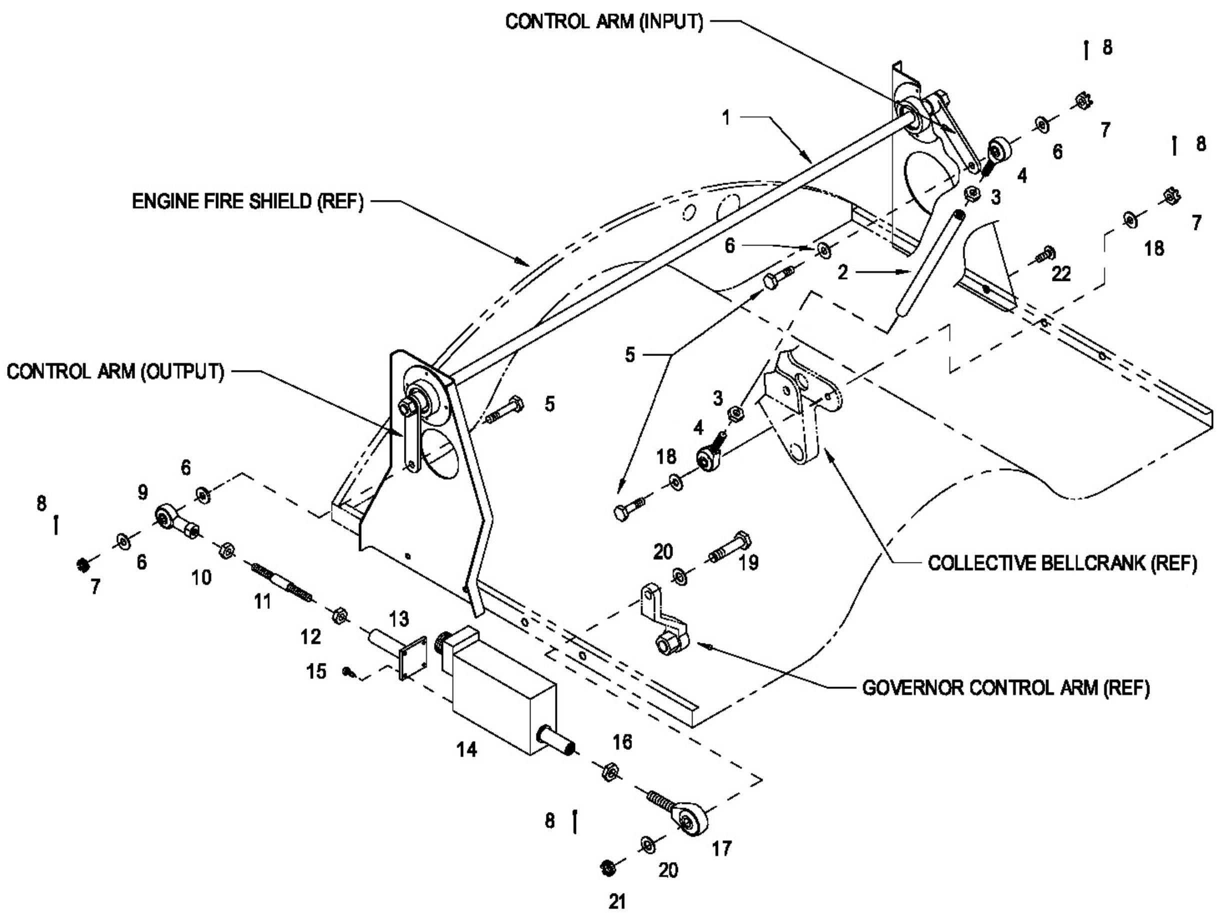
C. Extend the N_2 actuator to full length using the collective switch.

D. Verify the actuator lengths in accordance with Figure 13-8.1.

(1) If the lengths are correct, proceed to step F.

(2) If the lengths are not correct, proceed to step E.

E. Remove the actuator, set proper lengths (Figure 13-8.1), reinstall actuator, and secure.



1.	Rod and Bearing Assembly	13.	End Fitting
2.	Control Rod	14.	Linear Actuator
3.	Nut	15.	Screw
4.	Rod End Bearing	16.	Nut
5.	Bolt	17.	Rod End Bearing
6.	Washer	18.	Bolt
7.	Nut	19.	Washers
8.	Cotter Pin	20.	Bolt
9.	Rod End Bearing	21.	Washer
10.	Nut	22.	Nut
11.	Control Rod	23.	Screw
12.	Nut		

Figure 13-8. Droop Compensator Installation

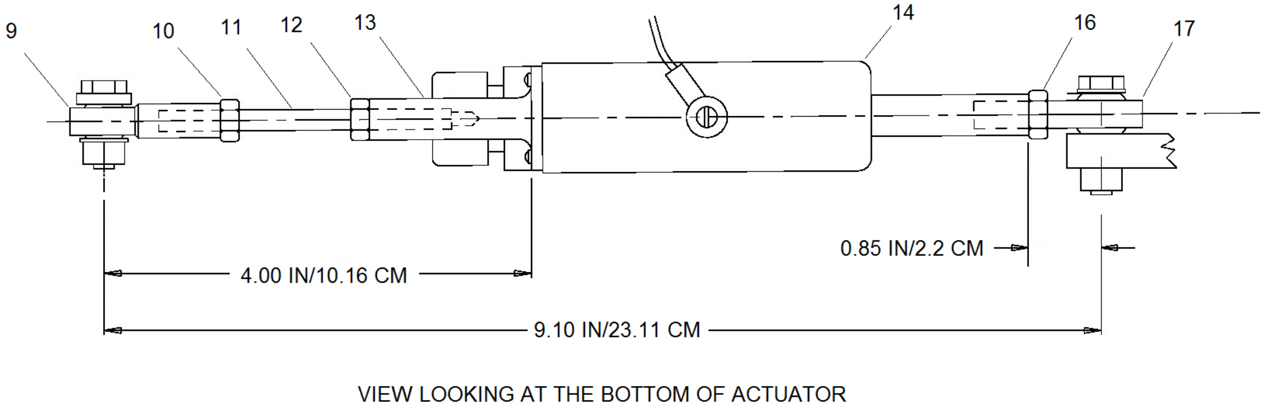


Figure 13-8.1. Droop Compensator Rigging

F. Disconnect the control rod (2) at the control arm (input) (Figure 13-8).

G. Set the control arm (output) at the 6 o'clock position, parallel to the forward edge of the mounting bracket. Lock in place with a device (block, zip tie, tape, or similar).

H. Verify the pointer of the governor is positioned between 60-65%. If not between 60-65%, recheck lengths required from step D.

(1) If installing to a new engine, position the control arm of the power turbine governor one serration forward of the cotter pin securing the pointer and stop to the power turbine governor shaft. Torque the nut to 40-50 in-lb/4.5-5.7 Nm.

I. Adjust the control rod (2) to provide a slip fit of the bolt at the control arm (input), install bolt (5), and secure (Figure 13-8).

J. Remove the locking device from the control arm (output).

K. Raise the collective, verify the pointer of the governor is positioned at 95%.

(1) If adjustment is required to obtain 95%, adjust the rod end (17) (Figure 13-8.1).

(2) Repeat steps F through K.

WARNING

The following step is to be performed by authorized personnel only.

L. Ground run the aircraft and check for the following conditions:

CAUTION

Adjustments to the control rods and the rod-end bearings can be made while the engine is running if the throttle is against the idle stop.

(1) With the collective down, the throttle full ON, and the linear actuator in the full decrease position, the N_2 RPM should be between 88%-92%. If the N_2 RPM is above 92%, shorten the control rod between the linear actuator and the compensator output arm or move the power turbine control arm one serration aft.

(2) With the collective down, the throttle full ON, and the linear actuator in the full increase position, the N_2 RPM should be between 100%-103%. If the N_2 RPM is above 102%, shorten the control rod between the linear actuator and the compensator output arm or move the power turbine control arm one serration aft. If the N_2 RPM is below 100%, lengthen the control rod between the linear actuator and the compensator output arm or move the power turbine control arm one serration forward. Recheck the full decrease N_2 RPM and adjust as required.

(3) Set the N_2 RPM to 97% ±1% and pull in enough collective to make the aircraft light on its skids. The N_2 RPM should be 102% ±1%. Hover the aircraft. If the N_2 RPM is 102% ±1%, the droop compensator is properly rigged.

M. Apply Vibra-Tite VC-3, or equivalent, to the threads of the control rod ends (11) and rod-end bearing (17) after making final adjustments.

13-110. Removal/Disassembly – Droop Compensation System

A. Disconnect and remove the droop compensator control rods.

B. Remove the hardware securing the droop compensator to the engine fire pan. Remove the droop compensator from the aircraft.

C. Remove the collective control bell crank bracket.

D. Remove the nuts from the ends of the torque rod.

E. Remove the roll pins securing the input and output arms on the torque rod. Index mark the input and output arms and remove them from the torque rod.

F. Index mark the bearing housing/mounting brackets to the torque rod and remove the torque rod from the bearing housing/mounting brackets.

13-111. Inspection – Droop Compensation System

A. Inspect the control rods for bends, cracks, corrosion, nicks, and scratches.

B. Inspect the rod-end and torque rod bearings for binding, corrosion, roughness, and excessive wear.

C. Inspect the torque rod for cracks, corrosion, nicks, scratches, bends, damaged threads, and security of the end fittings.

D. Inspect the mounting brackets and control arms for bends, cracks, corrosion, nicks, scratches, and security of installation.

13-112. Repair – Droop Compensation System

A. Replace control rods that are bent or cracked. Remove minor corrosion, nicks, and scratches.

B. Replace bearings that are excessively worn, binding, rough, or corroded.

C. Replace the torque rod if cracked, the threads on the end fittings are damaged and cannot be repaired, the end fittings are loose due to elongation of the roll pin holes, or bent to the extent that the bend interferes with the proper operation of the droop compensation system.

D. Repair cracks in the mounting brackets I/A/W AC 43.13-1B if the repair does not interfere with the installation or operation of the droop compensation system. Remove minor nicks, scratches, or corrosion.

E. Replace the control arms if cracked, bent, or loose on the torque rod due to elongation of the roll pin holes.

13-113. Assembly/Installation – Droop Compensation System

A. Install the torque rod into the input bearing housing/mounting bracket. Install the sleeve and the required amount of washers to align the roll pin holes in the torque rod and the input arm. Aligning the index marks, install the input arm. Install the roll pin and lockwire (.020). Install the nut and the required amount of washers that will allow a cotter pin to be installed when the nut just snug against the washers and cotter pin.

B. Install the required amount of washers on the output end of the torque rod that will allow the roll pin holes in the torque rod and the output arm to be aligned with the bearing housing/mounting bracket installed on the torque rod. Install the bearing housing/mounting bracket. Install the output arm according to the index mark. Install the roll pin and lockwire (.020). Install the nut and the required amount of washers that will allow a cotter pin to be installed when the nut just snug against the washers and cotter pin.

B. Install the required amount of washers on the output end of the torque rod that will allow the roll pin holes in the torque rod and the output arm to be aligned with the bearing housing/mounting bracket installed on the torque rod. Install the bearing housing/mounting bracket. Install the output arm according to the index mark. Install the roll pin and lockwire (.020). Install the nut and the required amount of washers that will allow a cotter pin to be installed when the nut just snug against the washers and cotter pin.

C. Install the droop compensator in the aircraft and secure to the engine fire pan.

D. Install the bracket on the collective control bell crank.

E. Install the control rods.

F. Rig the droop compensation system (para. 13-109).

Number Stamped on Stud	Enstrom Stud P/N
Blank	4120046-11
3	4120046-13
6	4120046-15
9	4120046-17

(3) Install the stud into tool T-0189. Apply a small amount of Loctite® 277 to the stud threads.

(4) Install the studs in the power output pad until tool T-0189 almost touches the face of the pad (do not let the tool touch the pad).

(5) Back off the special tool on the stud and finish tightening.

(6) Remove excess Loctite® 277 from the studs and power output pad.

NOTE

Allow the Loctite® 277 to cure for 1 hour @ 72°F/22°C. Heating the power output pad area to 200°F/93°C will reduce the curing time to 10-15 minutes.

E. Remove the six cubic inch accumulator (P/N 6875224) and install the three cubic inch accumulator kit (P/N 6851488).

F. Install/Replace double lip seals on both sides of the power output shaft using the following procedure:

(1) Remove single lip seals using the appropriate tool from the Seal Replacement Kit, P/N 6796941 (Rolls-Royce), or equivalent.

(2) Remove double lips seals using Seal Removal Tool, P/N RBT18560 (Dart Helicopter Services), Seal Puller Assembly T-0203-1, or equivalent.

(3) Install double lip seals using Seal Installation Tool, T-0172-1, or equivalent. Install the double lip seals with the metal side facing outboard/away from the engine gearbox assembly.

NOTE

Install the following parts in any order found practical using the outlined steps as a guide and checklist.

CAUTION

Cap or plug all open fluid/air fittings to prevent contamination of the engine.

G. Install the N_1 and N_2 tachometer generators (para. 13-132).

NOTE

Position the oil line fittings as observed before the fittings were removed from the replaced engine.

H. Install the following oil line fittings:

(1) Torque pressure

(2) Engine oil pressure

(3) Oil vent

(4) Oil outlet

(5) Oil inlet

CAUTION

Failure to perform the following task could result in premature removal of the ECD4014 and/or ECD4017 Bearings and void any potential warranty.

NOTE

The engine/gearbox assembly power take-off (PTO) shaft bores have been measured on engines installed in 480B serial number 5131 and subsequent. If required, the engines are labeled/tagged and engine log book entries completed for overrunning clutch (ORC) and power output shaft assembly offset bearing housings. 480B serial numbers 5101 and 5114 have been measured and offset bearing housings installed via a FAA Form 337.

I. Measure the engine/gearbox assembly PTO shaft bores with tool kit T-0194-1 (Bore Concentricity Indicator Tool Set). This kit includes P/N 4131001-( ) bore measurement assembly, a dial gauge assembly, clamp assembly, and articulating arm assembly.

(1) Power Output Shaft Assembly (Compressor) side:

a. Assemble, install, and preload the in accordance with the T-0194-1 Installation Instructions included with the tool kit.

b. Move the dial indicator around the bore, clockwise as facing the bore, first to 30°, then in 60° increments (align with the stud hole centers) by hand using the #4 power turbine wheel.

c. At each increment, measure the deviation from .0000” and log the dial indicator readings on the PTO Bore Report Sheet (Figure 13-9.3).

NOTE

Follow the proper sign convention when measuring the bores. A negative (-) number indicates an inward deviation. A positive (+) number indicates an outward deviation.

d. Remove the T-0194-1 tool set from PTO shaft.

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UTILITY SYSTEMS

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14-23. Drain Valve

14-24. Removal - Drain Valve

CAUTION

Use a backing wrench to prevent from damaging fluid/air lines and fittings during removal or installation.

A. Disconnect the pneumatic lines from the drain valve and remove the valve.

14-25. Inspection - Drain Valve

A. Inspect the drain valve for damage, proper operation, and security of installation.

14-26. Repair - Drain Valve

A. Replace the drain valve if it does not close while the engine is running or damage effects the operation of the valve.

B. Tighten loose pneumatic line "B" nuts.

14-27. Installation - Drain Valve

CAUTION

Use a backing wrench to prevent from damaging fluid/air lines and fittings during removal or installation.

A. Install the drain valve into position. Connect and tighten the pneumatic lines.

14-28. Control Cables (TH-28/480, S/N 3007/5002 and subsequent and all 480B)

NOTE

The procedures for removing and installing the control cables for the heater and the defroster are the same.

14-29. Removal - Control Cable

NOTE

Note the routing of the control cable before removal.

A. Remove the cable stop and set screw from the end of the cable at the control valve.

B. Remove the clamps securing the cable into position.

C. Remove control slider panel from the aft end of the center pedestal.

D. Loosen the screws in the cable clamp.

E. Loosen the set screw in the correct cable stop for the cable being removed.

F. Remove the cable.

14-30. Inspection - Control Cable

A. Inspect the control cable for kinks or damage that would affect the proper operation of the valve.

B. Inspect the hardware including the control arm and the slider assembly for damage, missing hardware, and proper installation and operation.

14-31. Repair - Control Cable

A. Replace cables that have damage that effects the operation of the control valve.

B. Replace damaged or missing hardware.

NOTE

The procedures for removing and installing the control cables for the heater and the defroster are the same.

14-32. Installation - Control Cable

A. Install the control cable using the routing noted before removal.

B. Install the cable into the cable clamp on the slider panel and tighten the set screws.

C. Install the cable stop into the correct slider. Install the cable into the cable stop, apply thread sealant (VC-3 Vibra-tite) to the engaging threads of the set screw, and install the set screw.

D. Install the control slider panel onto the aft end of the center pedestal.

E. Secure the cable into position with the clamps.

F. Insert the end of the cable into the stop nut on the control arm and install a cable stop and set screw on the end of the cable.

G. Ensure that the control slider and the control arm are orientated for proper operation and tighten the set screw on the control arm.

14-33. Ventilation System

14-34. General Description - Ventilation System

The aircraft is equipped with 2 types of ventilation systems. The first is a normal flow through type system and for the TH-28 consists of a sliding vent window on both cabin doors (optional equipment 480/480B) and a pop out vent in each opera window. The 480/480B utilizes two pop out vents in each cabin door and a pop out vent in each opera window. The second system is a ram air ventilation system (optional equipment 480/480B) and an optional bleed air system is available.

14-35. Ram Air Ventilation System

14-36. Description - Ram Air Ventilation System

The ram air ventilation system consists of an inlet/valve assembly, control cable, 2 outlet ducts, and 2 outlets. The inlet/valve assembly is located on the cabin shell just in front of the keel assembly. When the control valve is opened using the control cable, a butterfly valve is opened allowing outside ram air to enter the inlet/valve assembly and is discharged into the cabin via the ducting and outlets. The outlets are located on the sides of the instrument panel.

NOTE

Maintenance procedures for the bleed air ventilation system are the same as the ram air system except for the bleed air line used to supply the system. Use the maintenance procedures for the pneumatic lines in the heater and defroster procedures in this section.

14-37. Inlet/Valve Assembly

14-38. Removal - Inlet/Valve Assembly

A. Disconnect the ducting from the inlet/valve assembly.

B. Disconnect the control cable from the inlet/valve assembly.

C. Remove the hardware securing the inlet/valve assembly to the cabin shell.

14-39. Inspection - Inlet/Valve Assembly

A. Inspect the inlet/valve assembly for cracks, damage, proper operation, and security of installation.

14-40. Repair - Inlet/Valve Assembly

A. Repair minor damage to the inlet/valve assembly. Replace the assembly if economically unrepairable.

B. Adjust the control cable if the inlet/valve assembly does not fully open or close.

14-41. Installation - Inlet/Valve Assembly

A. Install the inlet/valve assembly and secure with the mounting hardware.

B. Connect the control cable and rig so that the inlet/valve assembly is closed when the cable is in the closed position and open when the cable is in the open position.

C. Connect the ducting to the inlet/valve assembly.

14-42. Ventilation Ducting and Outlets

14-43. Removal - Ventilation Ducting and Outlets

A. Disconnect the ducting from the inlet/valve assembly.

B. Disconnect the ducting from the 2 outlets located on the sides of the instrument panel and remove the ducts.

C. Remove the hardware securing the outlets and remove the outlets.

14-44. Inspection - Ventilation Ducting and Outlets

A. Inspect the ducting for holes and security of attachment to the outlets.

B. Inspect the outlets for damage, proper operation, and security of installation.

14-45. Repair - Ventilation Ducting and Outlets

A. Repair holes in the ducting using reinforced (100 mph) tape. Replace the ducting if damaged beyond repair.

B. Replace the outlets if they are damaged beyond repair or are economically unrepairable.

14-46. Installation - Ventilation Ducting and Outlets

A. Place the outlets into position and install the mounting hardware.

B. Install the outlet ducts and connect to the outlets and the inlet/valve assembly and secure with the retaining screws and tie-rap (PLT4S CO), as required.

14-47. Ventilation Control Cable

14-48. Removal - Ventilation Control Cable

NOTE

Note the routing of the control cable before removal.

A. Remove the left side keel access panel.

B. Disconnect the cable from the inlet/valve assembly.

C. Detach the cable from the mounting bracket on the cabin shell.

D. TH-28, S/N 3004 and 3006; Remove the retaining nut from the backside of the control mounting bracket located at the bottom of the instrument panel at the right side of the center pedestal. Remove the control cable.

E. 480, S/N 5001; Remove the control cable mounting box from the left side of the center pedestal. Remove the retaining nut from the backside of the cable mounting box and remove the control cable.

G. All subsequent TH-28,480, and 480B; Remove the slider control panel from the aft end of the center pedestal. Loosen the set screws in the cable clamp and the cable stop for the ventilation cable. Remove the cable and the cable stop.

14-49. Inspection - Ventilation Control Cable

A. Inspect the control cable for binding, kinks, proper operation, and security of installation.

14-50. Repair - Ventilation Control Cable

A. Replace the cable if kinked or if the cable is binding and the cause is not from a bend radius being too small.

B. Adjust the cable position in the mounting bracket on the cabin shell if the cable is binding due to the bend radius being too small.

C. Adjust the cable so that the inlet/valve assembly will be opened and closed when the control cable is in the opened and closed position.

D. Tighten loose mounting hardware.

14-51. Installation - Ventilation Control Cable

A. TH-28, S/N 3004 and 3006; Install the control cable through the mounting bracket located at the bottom of the instrument panel at the right side of the center pedestal. Install the retaining onto the control cable and tighten against the mounting bracket.

B. 480, S/N 5001: Install the cable through the mounting box. Install the retaining nut onto the cable and tighten against the backside of the mounting box and install the box onto the center pedestal.

C. All subsequent TH-28,480, and 480B: Install the control cable. Install the cable stop into the correct slider. Install the end of the cable into the cable stop, apply thread sealant (VC-3 Vibra-tite) to the engaging threads of the set screw, and tighten the set screw. Position the cable in the cable clamp and tighten the clamp set screws. Install the slider control panel on the aft end of the center pedestal.

D. Connect the cable to the mounting bracket located on the cabin shell.

E. Connect the cable to the inlet/valve assembly and rig so that the inlet/valve assembly will be opened and closed when the control cable is in the opened and closed position.

14-52. Sliding Vent Windows

Refer to the window replacement portion of maintenance manual for maintenance procedures for the sliding vent windows.

14-53. Pop Out Vents

14-54. Removal - Pop Out Vents

A. Remove the metal spring retainer from the vent.

B. Compress the sides of the vent and work the vent through the opening in the window.

14-55. Inspection - Pop Out Vents

A. Inspect the vent for cracks, crazing, and security of installation.

14-56. Repair - Pop Out Vents

A. Repair minor cracks by stop drilling. Replace the vent if the structural integrity of the vent is in question.

B. Correctly install the vent if improperly installed.

14-57. Installation - Pop Out Vents

A. Compress the sides of the vent and work the vent into the window.

B. Install the spring retainer into the vent.

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EMERGENCY EQUIPMENT

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