ENSTROM
HELICOPTER CORPORATION

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Menominee, Michigan
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Enstrom TH-28/480 Series Maintenance Manual

Revision 26 Changed Pages
May 8, 2020

Revision 26, dated Feb 28/2020, 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.

Remove Pages	Insert Pages
i through ii	i through ii
v through xlviii	v through xlviii
MM-1-1 through MM-1-4	MM-1-1 through MM-1-4
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* Blank page included for double-sided printing.

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****** Do not discard pages MM-6-118.1 through MM-6-118.2

******* Do not discard pages MM-11-10.1 through MM-11-10.4

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***** Do not discard MM-12-86.1 through MM-12-86.4

****** Do not discard MM-13-20.1 through MM-13-20.2

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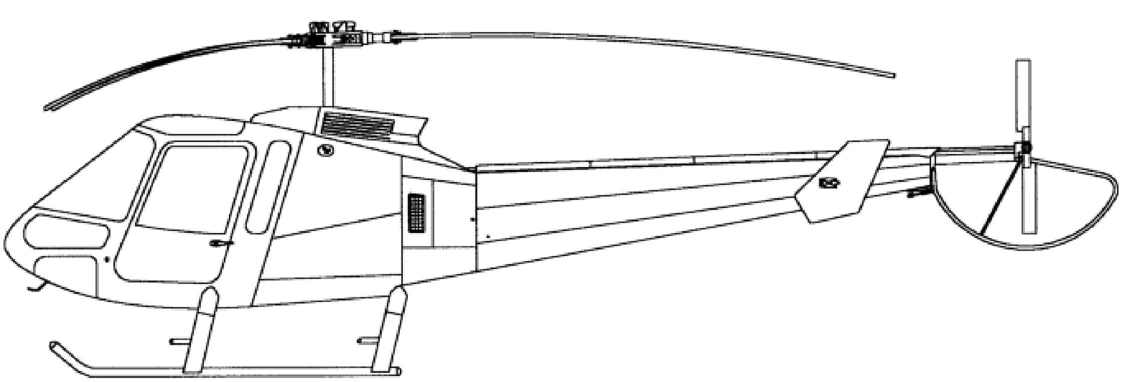
ENSTROM TH-28/480 SERIES MAINTENANCE MANUAL



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.

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MM-8-56	Feb 28/2020
MM-8-57	Apr 25/13
MM-8-58	Jun 25/14
MM-8-59	Jun 25/14
MM-8-60	Jun 25/14
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MM-8-72	Jun 25/14
MM-8-73	Apr 25/13
MM-8-74	Apr 25/13
MM-8-74.1	Apr 25/13
MM-8-74.2	Jul 3/15
MM-8-75	Feb 9/01
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MM-9-30	Apr 25/13
MM-9-31	Feb 28/2020
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MM-9-54	Feb 9/01
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MM-9-75	Feb 9/01	MM-9-111	Feb 9/01
MM-9-76	Feb 9/01	MM-9-112	Feb 9/01
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MM-9-82	Feb 9/01	MM-9-118	Feb 9/01
MM-9-83	Feb 9/01	MM-9-119	Jul 3/15
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MM-11-10.4	Apr 25/13	MM-11-56	Feb 28/2020
MM-11-11	Feb 28/2020	MM-11-57	Feb 28/2020
MM-11-12	Feb 28/2020	MM-11-58	Feb 9/01
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MM-12-71	Feb 28/2020	MM-12-113	Feb 28/2020
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MM-12-78	Jun 25/14	MM-13-4	Feb 28/2020
MM-12-79	Apr 25/13	MM-13-5	Apr 25/13
MM-12-80	Apr 25/13	MM-13-6	Apr 25/13
MM-12-81	Feb 28/2020	MM-13-7	Apr 25/13
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MM-12-89	Feb 28/2020	MM-13-19	Feb 28/2020
MM-12-90	Feb 9/01	MM-13-20	Jul 3/15
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MM-12-94	Feb 9/01	MM-13-22	Feb 28/2020
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MM-13-32	Jul 3/15	MM-13-64.4	Nov 15/10
MM-13-33	Jul 3/15	MM-13-64.5	Oct 20/09
MM-13-34	Jul 3/15	MM-13-64.6	Oct 20/09
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MM-13-52.6	Jul 3/15	MM-14-14	Feb 9/01
MM-13-52.7	Jul 3/15	MM-14-15	Feb 9/01
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MM-13-52.9	Jul 3/15	MM-14-17	Feb 9/01
MM-13-52.10	Jul 3/15	MM-14-18	Feb 9/01
MM-13-53	Jul 3/15	MM-14-19	Feb 9/01
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MM-13-55	Jul 3/15	MM-14-21	Feb 9/01
MM-13-56	Jul 3/15	MM-14-22	Feb 9/01
MM-13-57	Nov 15/10	MM-14-23	Feb 9/01
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INTRODUCTION

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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 optional equipment which requires a maintenance manual supplement. The following optional 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 17, Dated: May 23/19.
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.

SECTION 2

GENERAL INFORMATION

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GENERAL INFORMATION

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maintenance on the seats or the cockpit area. Both seats use a composite bucket mounted on a pedestal assembly. A four point restraint system with adjusters in the lap and shoulder belts and an inertia reel mounted on the back of the seat pedestal are an integral part of the seat.

2. Passenger Seats: The passenger seats are mounted to the cabin backwall and fold up to the stowed position when not in use and use a combination diagonal shoulder harness and lap belt restraint system.

C. Inertia Reel Shoulder Harness: An inertia reel and shoulder harness is incorporated in all seats. There is no independent control to manually lock the harness. With the shoulder straps properly adjusted, the reel strap will extend to allow the occupant to lean forward; however, the reel automatically locks when the helicopter encounters an impact force of 2 to 3 "G" deceleration. To release the lock, it is necessary to lean back slightly to release tension on the lock.

2-11. Engine Assembly

A. The TH-28/480 series helicopters are equipped with a Rolls-Royce 250-C20W free turbine, turboshaft engine rated at 420 SHP (313 kW); however, engine power is limited depending on model and drive system configuration of the helicopter (Refer to Table 2-1). Refer to the Rolls-Royce 250-C20 Operation and Maintenance Manual (10W2) for a complete description of the engine assembly and its sub-components.

Table 2-1. Engine Power Limitations

Helicopter Model	Takeoff Rating (5 minute maximum)	Maximum Continuous Power
TH-28 and 480	285 SHP (213 kW)	256 SHP (191 kW)
480 equipped with Increased Rotor Speed Kit (P/N 4230002)	290 SHP (216 kW)	268 SHP (200 kW)
480B	305 SHP (227 kW)	277 SHP (206 kW)

2-12. Engine Compartment Cooling

A. The engine compartment is convection cooled and augmented by air movement created by the airfoil shaped spokes in the upper pulley.

B. 480B serial number 5114 and subsequent are equipped with fuselage panels/cowls that have additional holes to increase the cooling efficiency of the engine compartment and can be equipped with Engine Access Panels, P/N 4220150, to allow aircraft operation at an increased maximum ambient temperature limit. 480B serial numbers 5087 through 5113 can be equipped with the Increased Cooling Kit, P/N 4230031, for operation at the increased maximum ambient temperature limit.

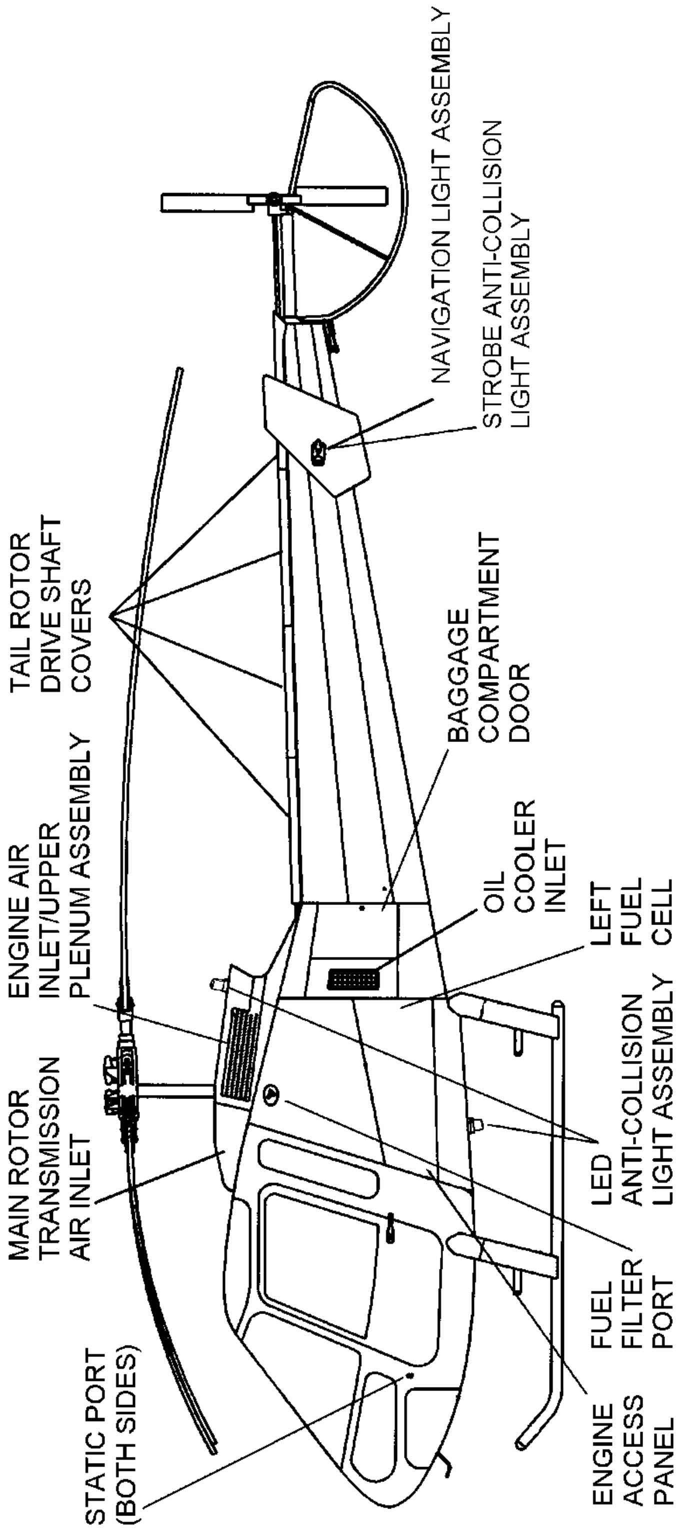

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Figure 2-1. General Arrangement

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*	TSP-1728-20-17SP100	Marathon Power Technologies P.O. Box 8233 Waco, TX 76712-8233 Tel: (254) 776-0650 http://www.mptc.com/
Battery**	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”	Aerotech 8354 Secura Way Santa Fe Springs, CA 90670 Tel: (562) 696-1128 http://www.aerotechservicesinc.com/

Table 2-2. Vendor Contact Information

Component	Part Number	Manufacturer
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

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

** This is the standard battery for the 480B. Refer to the correct publication if an optional or special battery is installed.

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 2-13.

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

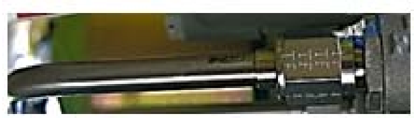
[1] Refer to (para. 8-70.A).
[2] Torque for oversize bolts: 140 in-lbs/15.8 Nm maximum.

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 INSTAL-LATION (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

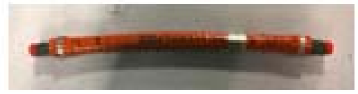
Aluminum Alloy Tubing



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 2-7. Fittings, Hose Assemblies



Flexible Hose or Tube Fittings (excluding nylon pitot static lines) Measurements based on Hose Inside Diameter or Fitting Size						
Fitting Size	Tube Size (inches)	Thread	Flex Hose and 6061-T6 Aluminum Alloy Torque Limits (in-lb)		Steel (Torque Limits (in-lb)	
			Min	Max	Min	Max
-3	3/16	3/8-24	30	70	90	140
-4	1/4	7/16-20	70	120	135	185
-5	5/16	1/2-20	70	120	180	230
-6	3/8	3/4-16	130	180	270	345
-8	1/2	3/4-16	300	400	450	525
-10	5/8	7/8-14	430	550	650	750
-12	3/4	1-1/6-12	650	800	900	1,100

Table 2-8. Fittings

AN924 Nut
Flared Tube

AN814
Plug and Bleeder

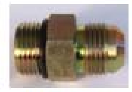
AN6289 Nut (Undercut)
Flared Tube

Nominal Tube O.D. (inches)	Fitting Thread Size	Torque Limits (inch-pounds)									
		For Gasketed Aluminum or Steel Fittings*						For Jamnuts and Fittings Without Gaskets* *			
		AN924 Nut AN815 Union		AN814 Plug		AN6289 Nut		Aluminum		Steel	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1/8	5/16-24	25	35	10	16	25	35	35	50	-	-
3/16	3/8-24	50	75	30	40	50	75	65	80	70	90
1/4	7/16-20	55	80	40	65	75	100	90	105	110	130
5/16	1/2-20	75	100	60	80	90	120	105	125	140	160
3/8	9/16-18	100	150	80	120	150	200	125	145	225	275
1/2	3/4-16	180	230	150	200	200	250	240	280	400	450
5/8	7/8-14	250	350	200	350	275	400	330	370	550	650
3/4	1-1/6-12	420	600	300	500	450	650	540	660	800	960

* For use with O-rings and aluminum, asbestos, leather, Teflon, gaskets, or washers.
* * For combinations of materials (either jamnut, fittings, or boss), use the lowest applicable values shown.

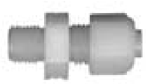
Table 2-9. Steel Fittings Using Jam Nuts or Straight Thread O-Ring Boss

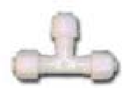

AN814
Plug and Bleeder
(Steel)


MS51525
Flared AN to Straight Pipe
Thread Male Adapter

Tube Size	Thread Size (inches)	Torque Limits (inch-pounds)	
		Min	Max
-02	5/16-24	72	84
-03	3/8-24	95	105
-04	7/16-20	155	180
-05	1/2-20	170	180
-06	9/16-18	275	290
-08	3/4-16	480	515
-10	7/8-14	515	575

Table 2-10. Pitot Static System Nylon Fittings


268N04X02: Adapter


264N04: Union Tee


269N04X02: Male Elbow

Nominal Tube O.D. (inches)	Thread Size (inches)	Torque Limits (inch-pounds)	
		Min	Max
1/4	7/16-20	7	10

Table 2-11. Pipe Plugs


MS20822
90° AN to Pipe
Fitting


MS20823
45° AN to
Pipe Fitting


AN816
Nipple, Flared
Tube and Pipe
Thread


AN932 Plug


MS20913
Plug, Square
Head

Thread Size (inches)	Torque Limits (inch-pounds)
1/16-27 NPT	40 to 44
1/8-27 NPT	40 to 44
1/4-18 NPT	85 to 94
3/8-18 NPT	110 to 121
1/2-14 NPT	160 to 176
3/4-14 NPT	230 to 252
1-11-1/2 NPT	315 to 347

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.

Measuring thread pitch with thread gauges

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.

2-23. Consumable Parts List

A. Table 2-14 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 2-14. Consumable Parts List

Item	Part Number †	Quantity
50 Hour Service		
1. Grease	MIL-PRF-81322 and MIL-G-25537	As Required
2. Silicon Oil	L-45 or SF96-20	As Required
3. Oil	I	As Required
4. Oil	MIL-PRF-23699	As Required
5. O-ring	NAS1612-2	7 EA *
100 Hour Service/Inspection		
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	MIL-PRF-23699	6 QTS
6. Oil	MIL-PRF-2105/API GL-5	7 PTS
7. O-ring	NAS1612-2	2 EA*
8. O-ring	NAS1612-8	4 EA*
9. O-ring	MS28778-6	1 EA*♦
200 Hour Service/Inspection		
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*
7. Oil (ORC)	MIL-PRF-23699	7 OZ
300 Hour Service/Inspection		
1. Same as 100 hour requirements	--	--
2. Fuel Filter Kit	1743645-02	1 EA**
3. Gasket	28-13107-15	1 EA*

NOTES:
- * Replace on condition
- ** The external fuel filter is optional equipment and might not be installed on the aircraft.
- † Verify configuration, part number and quantity with latest revision of illustrated parts catalog, service letters, and service bulletins as required.
- I Any grade internal combustion engine motor oil.
- ♦ Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2) for engine oil change requirements.

2-24. Taper Pin Size Chart

Table 2-15 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 2-15. 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

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SECTION 4

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 thru 4-7.1 and Figure 4-1 for approved fuels, oils, lubricants, intervals, and locations.

Table 4-1. Fuels, Lubricants, Specifications, and Capacities

SYSTEM/COMPONENT	SPECIFICATION	CAPACITY
Fuel - Standard	ASTM D1655, Jet A or A1 *(C-1) ASTM D6615, Jet B MIL-T-5624, JP-4 or JP-5 MIL-DTL-83133, Grade JP-8 (See Note 1)	91.7 U.S.Gals (90.0 usable) 347.08 Liters (340.65 usable) (See Note 6)
Fuel - Crashworthy	ASTM D1655, Jet A or A1 *(C-1) ASTM D6615, Jet B MIL-T-5624, JP-4 or JP-5 MIL-DTL-83133, Grade JP-8 (See Note 1)	90.0 U.S.Gals (89.7 usable) 340.65 Liters (339.51 usable) (See Note 6)
Engine Oil	MIL-PRF-7808 or *(C-2) MIL-PRF-23699 (See Note 2)	12.0 U.S. Pints 5.7 Liters
Overrunning Clutch	MIL-PRF-7808 (See Table 4-4) or MIL-PRF-23699 *(C-2) (See Table 4-5)	3.8 U.S. Ounces 110 ml
Overrunning Clutch with Vented Clutch Oil Reservoir (If Equipped)	MIL-PRF-7808 (See Table 4-4) or MIL-PRF-23699 *(C-2) (See Table 4-5)	6.5 U.S. Ounces 192 ml

Table 4-1. Fuels, Lubricants, Specifications, and Capacities

SYSTEM/COMPONENT	SPECIFICATION	CAPACITY
Main Rotor Transmission	MIL-PRF-2105/API GL-5 *(C-3) (See Note 5)	Dry - 6 U.S.Pints 2.84 Liters Reservicing - 5.5 U.S. Pints 2.6 Liters
Main Rotor Transmission (Equipped with oil filter and cooling installation)	MIL-PRF-2105/API GL-5 *(C-3) (See Note 5)	Dry - 6.5 U.S.Pints 3.1 Liters Reservicing - 6.0 U.S. Pints 2.84 Liters
Tail Rotor Transmission	MIL-PRF-2105/API GL-5 *(C-3) (See Note 5)	5 U.S.Ounces 150 ml
Main Rotor Dampers	L-45 or SF96-20 Silicone Oil *(C-4) (See Note 8)	Until Full
Main Rotor Blade Grips	MIL-G-25537 or MIL-PRF-81322 (See Notes 7, 9, 12) *(C-8 or C-5)	As Required
Main Rotor Lead-Lag Bearings	MIL-G-25537 or MIL-PRF-81322 (See Notes 7, 10, 12) *(C-8 or C-5)	As Required
Main Rotor Flapping Bearings (Grease Lubricated)	MIL-G-25537 or MIL-PRF-81322 (See Notes 7, 10, 12) *(C-8 or C-5)	As Required
Main Rotor Flapping Bearings (Oil Lubricated)	MIL-PRF-23699 *(C-2) (See Table 4-5)	As Required
Pitch Change Bellcrank Pivot Bearings	MIL-G-25537 or MIL-PRF-81322 (See Note 7, 10, 12) *(C-8 or C-5)	As Required
Upper Pulley Bearing	MIL-PRF-81322 (See Note 7) *(C-5)	As Required
Lower Pulley Bearings (Grease Lubricated)	MIL-PRF-81322 *(C-5) (See Note 7)	As Required (See Note 3)
Lower Pulley Bearings (Oil Lubricated)	MIL-PRF-23699 *(C-2) (See Table 4-5)	.27 U.S. Ounces Dry - 8 ml Reservicing - 6 ml
Blower Assembly Bearings	MIL-PRF-81322 (See Note 7) *(C-5)	As Required (See Note 11)
Tail Rotor Drive Shaft Bearings	MIL-PRF-81322 (See Note 7) *(C-5)	As Required
Tail Rotor Pitch Control Bearing	MIL-PRF-81322 (See Note 7) *(C-5)	As Required
Tail Rotor Feathering Bearings	MIL-G-25537 or MIL-PRF-81322 (See Notes 7, 10, 12) *(C-8 or C-5)	As Required

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

SYSTEM / COMPONENT	FREQUENCY	METHOD	LOCATION (Fig. 4-1) & ** C-#
Fuel	As required		1 / C-1
Engine Oil	100 Hrs / As Required	Oil Can	2 / C-2
Overrunning Clutch	25 Hrs / As Required (See Notes 4, 5 & 6)	Oil Can / Syringe	3 / C-2
Main Rotor Transmission	100 Hrs / As Required	Oil Can	4 / C-3
Tail Rotor Transmission	100 Hrs/ As Required	Oil Can	5 / C-3
Main Rotor Dampers	50 Hrs / As Required	Tool T-2896	6 / C-4
Main Rotor Blade Grips	50 Hrs	Grease Gun	7 / C-5
Main Rotor Lead-Lag Bearings	50 Hrs	Grease Gun	8 / C-5
Main Rotor Flapping Bearings (Grease Lubricated)	50 Hrs	Grease Gun	9 / C-5
Main Rotor Flapping Bearings (Oil Lubricated)	600 Hrs / As Required	Oil Can	9 / C-2
Pitch Change Bellcrank Pivot Bearing	50 Hrs	Grease Gun	10 / C-5
Upper Pulley Bearing	100 Hrs	Grease Gun	11 / C-5
Lower Pulley Bearings (Grease Lubricated) (See Note 3)	100 Hrs	Grease Gun	12 / C-5
Lower Pulley Bearing (Oil Lubricated)	100 Hrs	Syringe	12 / C-2
Blower Assembly Bearings (See Note 7)	300 Hrs	Syringe	13 / C-5
Tail Rotor Drive Shaft Bearings	50 Hrs	Grease Gun	14 / C-5
Tail Rotor Pitch Control Bearing	100 Hrs	Syringe	15 / C-5
Tail Rotor Feathering Bearings	25 Hrs (See Note 8) 50 Hrs	Grease Gun	16 / C-5
Tail Rotor Teeter Bearings	50 Hrs	Grease Gun	17 / C-5
Collective Guidetube Bearing	50 Hrs	Grease Gun	18 / C-5
Cyclic Swashplate Bearing	50 Hrs	Grease Gun	19 / C-5
Tail Rotor Control Pivot Points	100 Hrs	Oil Can	20 / C-6
Pitch Change Bellcrank Inboard Pivot Points	50 Hrs	Oil Can	21 / C-6
Collective Walking Beam Pivot Strap Bushings	100 Hrs	Oil Can	22 / C-6
Lateral Push/Pull Rod	50 Hrs	Oil Can	23 / C-6
Trim Motor Attachment Points	50 Hrs	Oil Can	24 / C-6

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

SYSTEM / COMPONENT	FREQUENCY	METHOD	LOCATION (Fig. 4-1) & ** C-#
Tail Rotor Pedal Pivot Points	100 Hrs	Oil Can	25 / C-6
Landing Gear Oleos	100 Hrs / As Required		26 / C-7
Battery	(See Note 1)	(See Note 1)	27 (See Note 2)
Ground Handling Wheel Bearings	As Required	Hand Pack	28 / C-5

** C-# refers to the fuel or lubricant in Table 4-1.

NOTE 1. Service in accordance with manufacturer's instructions.

NOTE 2. 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.

NOTE 3. Do not purge lubricate the lower pulley bearings. Refer to paragraph 4-33.

NOTE 4. If the overrunning clutch (ORC) cover is equipped with a sight glass, service the ORC when oil does not fill the sight glass.

NOTE 5. 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.

NOTE 6. 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.

NOTE 7. Do not purge lubricate the blower assembly bearings. Refer to paragraph 4-39.2.

NOTE 8. Applicable for helicopters operating with infrequent inputs to the tail rotor pitch control system (for example: extended flight with unchanging blade pitch).

Table 4-6. Approved Domestic Commercial Oils

for MIL-PRF-2105/API GL-5

MANUFACTURER	MANUFACTURER'S DESIGNATION
Exxon Mobil Corp.	Mobil 1 Synthetic Gear Lubricant LS 75W-90 Mobil Delvac 1[1] Synthetic Gear Oil 75W-90 Mobilube HD LS 80W-90 Mobilube HD Plus 80W-90
Shell Oil Company	Shell Helix Racing Gear Oil 75W-90 Shell Spirax HD 80W90
BP Lubricants USA, Inc.	Castrol Syntrax Limited Slip 75W-90 (Syntec Gear Oil)

Table 4-7. Approved Commercial Greases

for MIL-PRF-81322

MANUFACTURER	MANUFACTURER'S DESIGNATION
Anderol Specialty Lubricants	Royco 22CF
Shell Oil Company	Aeroshell 22, 22CF

Table 4-7.1. Approved Commercial Greases

for MIL-G-25537

MANUFACTURER	MANUFACTURER'S DESIGNATION
Shell Oil Company	AeroShell Grease 14

[1] Mobil Delvac 1 75W-90 supersedes Mobil Delvac 75W-90 and Mobil SHC 75W-90.

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D. If the transmission is equipped with the oil filtration/cooling system, 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.

4-13. Draining - Main Rotor Transmission

A. Open the left side engine access panel.

NOTE

The chip detector is located on the front side of the oil filter housing if the transmission is equipped with the oil filter and cooling installation.

NOTE

Transmissions equipped with an oil filter may be drained by removing the oil filter (para. 4-14).

B. Place a trough under the chip detector located by the aft left side transmission mount and use a suitable container to collect the oil.

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

NOTE

Tool T-0198-11 may be inserted in the base of the chip detector to drain the oil.

D. Remove the quick disconnect receptacle from the transmission or the oil filter housing to drain the oil.

E. When the transmission is drained, replace the crush washer on the receptacle and reinstall until finger tight. Tighten an additional 90° and lockwire the receptacle.

F. Reinstall the chip detector.

4-13.1 Flushing - Main Rotor Transmission

A. Install the ground handling wheels and lower the wheels.

B. Set 1-1/2”/38 mm blocks under the left and right forward skid shoes and raise the left side wheel.

C. Remove the upper plenum (para. 13-28).

D. Drain the oil from the gearbox (para. 4-13). (The oil may be drained by removing the filter.)

E. Remove the oil filter from the gearbox.

F. Remove the pinion inspection plate from the transmission.

G. Inspect the gears in accordance with SIL T-064 paragraph 6.1 (C).

H. Use a syphon sprayer with kerosene, mineral spirits or equivalent oil based solvent to spray down the interior of the gearbox. Direct the aim of the sprayer around the inside of the gearbox and the ring gear and carrier while turning the gearbox. (The objective is to introduce sufficient volume of solvent to flush any debris out of the gearbox and drain it out the oil filter housing.)

I. Allow the gearbox (main rotor) to drain completely.

NOTE

The previously installed oil filter may be reinstalled.

J. Reinstall the gearbox (main rotor) oil filter and hand tighten.

K. Add 4 quarts/3.9 l of the gear lube that is currently being used in the gearbox.

L. Rotate the gearbox (main rotor) by hand 7-10 revolutions.

M. Remove the oil filter and drain the gearbox while rotating the gearbox.

N. Allow gearbox (main rotor) to drain completely.

O. Inspect and clean the chip plug.

P. Install and secure the pinion cover plate in accordance with SIL T-064 paragraph 6.1 (E).

Q. Install a new oil filter (para. 4-14).

R. Service the gearbox (para. 4-12).

S. Remove the blocks and the ground handling wheels.

T. Install the upper plenum (para. 13-31).

4-14. Oil Filter Replacement - Main Rotor Transmission

NOTE

The following maintenance procedures only apply to aircraft equipped with the main rotor transmission oil filter/cooling system.

A. Drain the oil from the transmission.

B. Remove the lockwire from the oil filter and remove the oil filter.

C. Lubricate the seal on the replacement filter with oil (MIL-PRF-2105).

D. Install the filter until the seal contacts the seal surface on the filter housing. Turn the filter an additional ¾ turn and lockwire (.025) the filter to the chip detector assembly.

E. Service the transmission.

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)

4-16. Servicing - Tail Rotor Transmission

NOTES

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

When the tail rotor transmission is properly serviced (5 oz./.147 l), the sight glass will be completely full. The transmission oil level is serviceable until the oil level is at the center of the sight glass.

A. Check the oil level of the transmission by using the sight plug located in the aft side of the transmission. The transmission is serviceable until the oil level is at the center of the sight glass. Raise and lower the tail to change the attitude of the aircraft to verify the level of the oil in the transmission if a bubble is present in the sight glass.

NOTE

Check the transmission for leaking seals if servicing is required between periodic inspections.

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

C. Add 5 oz./.147 l of oil if servicing the transmission after draining or slowly add oil until oil flows from the filler port.

D. Install new O-ring and install the filler plug (10-16 in-lb/1.1-1.8 Nm) and lockwire (.032) to the chip detector receptacle and the sight glass.

4-17. Draining - Tail Rotor Transmission

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 (paragraph 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 one-half quart of the gear lube 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 new O-ring and secure the sight plug (20-60 in-lb/2.3-6.8 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).

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4-28. Battery

4-29. Servicing - Battery

A. Service the battery I/A/W the manufacturer's instructions.

4-30. Lubrication

4-31. Description - Lubrication

A. Lubrication of the TH-28/480 is normally accomplished at specified hourly intervals. Operators should take into consideration the environmental conditions and determine whether more frequent lubrication intervals are necessary. Refer to Tables 4-1 to 4-5 and Figure 4-1 for approved lubricants, intervals, and locations.

B. Purge lubricate all bearings and remove the excess grease before performing the post maintenance ground run. Follow the procedures listed below for lubricating the lower pulley, main rotor blade grips, main rotor flapping bearings, and the tail rotor pitch control bearing.

(1) For tail rotor feathering bearing lubrication, refer also to paragraph 4-39.4.

C. Lubricate the flight control pivot points sparingly to prevent the accumulation of dirt.

D. Remove the following panels and covers as required to service and lubricate the aircraft:

(1) Keel access panels.

(2) Engine access panels.

(3) Transfer duct access panel.

(4) Tail rotor drive shaft covers.

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 4-11.1).

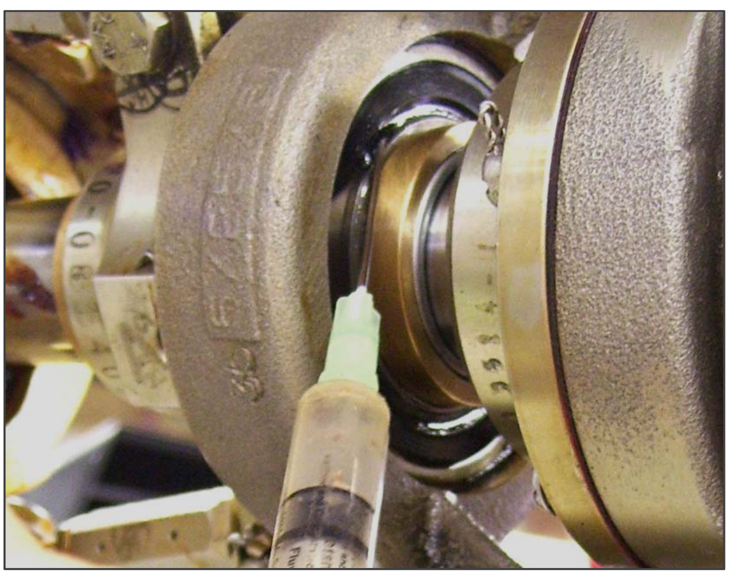

Figure 4-11.1. Tail Rotor Pitch Control Bearing Lubrication

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* Not Authorized	1,200 Hrs 1,200 Hrs* Not Authorized	Not Authorized Not Authorized 1,200 Hrs**
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)	Δ	Δ	Δ

* 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.

** 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.

Δ 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.

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

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100 HOUR/ANNUAL INSPECTION CHECKLIST	
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**
5. LANDING GEAR ASSEMBLY	
A. Inspect the landing gear and crosstubes for:	
1) Damage or cracks	________
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	________
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	________
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	________
2) Proper tension (2,500 - 1,750 pounds)	________
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	________
4) Condition and security of the "H" strut	________
5) Condition and security of the flex packs	________
6) Condition and security of attaching hardware	________

100 HOUR/ANNUAL INSPECTION CHECKLIST	
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**
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	________
E. Inspect the overrunning clutch for evidence of oil leakage	________
F. Drain the overrunning clutch and vented oil clutch reservoir (if equipped), inspect the drained oil for metal flakes, and service.	
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)	________
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	________
C. Inspect the oil cooler, blower, inlet, and exhaust ducting for condition and security	________
D. Inspect the blower shaft bearings for security of installation, excessive wear, and discoloration of the bearing mounts	________
E. Remove and inspect the flex packs for cracks (ref. para. 13-75 and 13-77)	________
F. Condition and security of the taper and roll pins and the flex packs	________
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 (ref 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 (ref. para. 13-39)	________
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	________
2) Proper security to the pylon	________

100 HOUR/ANNUAL INSPECTION CHECKLIST	
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**
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	________
4) Security of the pillow blocks	________
C. Inspect the horizontal and vertical stabilizers for:	
1) Damage or cracks	________
2) Loose rivets	________
3) Security of attachment	________
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	________
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	________
2) Condition and security of the mounting screws	________
3) Evidence of a cracked or damaged housing	________
4) Condition and security of the plugs and sight gauge	________
B. Drain the transmission and inspect the chip detector for the presence of magnetic particles	________
C. Service the transmission	________
D. Inspect the tail rotor pitch controls for:	
1) Worn bushings at the pivot points	________
2) Slider assembly for freedom of operation and wear	________
3) Condition and security of the control hardware	________

100 HOUR/ANNUAL INSPECTION CHECKLIST	
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**
11. TAIL ROTOR ASSEMBLY	
A. Inspect the tail rotor assembly for:	
1) Cracks, nicks, dents, scratches, and bends	_______
2) Evidence of bond separations, corrosion, and bond line corrosion	_______
3) Loose tip rivets	_______
4) Condition and security of the teeter bearings	_______
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	_______
7) Fretting of the blades and grips at the attachments	_______
12. MAIN ROTOR TRANSMISSION	
A. Inspect the main rotor transmission for:	
1) Evidence of leakage	_______
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)	_______
B. Drain the transmission and inspect the chip detector and (if applicable) the oil filter for the presence of metal particles	_______
C. Replace the oil filter (if applicable)	_______
D. (If applicable) Condition and security of heat exchanger, filter housing, pressure switch, oil lines, drain line, fittings, oil pump, and mounting brackets	_______
E. Service the transmission	_______
13. MAIN ROTOR ASSEMBLY	
A. Inspect the main rotor blades for:	
1) Cleanliness and evidence of corrosion	_______
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	_______

100 HOUR/ANNUAL INSPECTION CHECKLIST	
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	INITIAL
B. Inspect the main rotor retention assemblies for:	
1) Condition of the up and down stops	_______
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	_______
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	_______
2) Evidence of leakage	_______
3) Condition (corrosion (see SDB T-058), corrosion protection (para. 9-30, S)) and security of the rod end bearing	_______
4) Proper security at the attachment points	_______
5) Proper security of all hardware	_______
E. Inspect the center hub section for:	
1) Evidence of cracks	_______
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:	
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	_______
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:	
1) Looseness of the universal points (Refer to paragraph 12-78, A)	________
2) Looseness of the push rod dogleg bearings	________
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:	________
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	________

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**
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) Proper spring-back of the Lamiflex bearings	_______
3) Evidence of Lamiflex bearing deterioration (see SDB T-054)	_______
4) Condition of the Lamiflex nylatron straps	_______
5) Remove the retention assembly dust cover and inspect the T-T strap retention block and pin assembly for condition and security.	
6) Evidence of O-ring leakage	_______
7) Security of the spindle retention nut	_______
8) Evidence of a sheared roll pin at the hinge pin	_______
9) Evidence of ratcheting or binding of the flapping bearings	_______
10) Proper preload setting of the retention assemblies in the flapping axis (Does not apply to retention assemblies installed I/A/W paragraph 9-19,A	_______
11) Proper security of the hinge pin locking tang washer	_______

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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
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	________
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 I/A/W 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	________
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	________
4) Clamps attaching the tail rotor guard	________
5) Isolator on the oil tank support	________

SPECIAL SCHEDULED INSPECTION CHECKLIST	
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**
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.	________

4-49. Special Inspections

4-50. General Information - Special Inspections

NOTE

Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual for special inspections applicable to the engine.

A. This section contains guidelines for performing the required inspections, by qualified maintenance personnel, after experiencing any of the following occurrences: main rotor blade and/or tail rotor strikes, hard landings, main rotor overspeed, over torque, engine overspeed, or engine TOT exceeds the limits. It should be emphasized that other parts and/or adjacent components not listed may also be damaged, depending on the severity of the incident. Therefore, this guide should not be considered absolute and should be expanded as required by the inspecting maintenance personnel, as the occurrence may require, per the appropriate sections of this manual.

B. All aluminum and steel components must be inspected by the following processes after visual inspection has revealed a possible defect or as noted in the special inspections:

(1) Aluminum machined or cast components are to be inspected by liquid penetrant inspection (ASTM E165 or equivalent).

(2) Aluminum sheet metal components are to be inspected by liquid penetrant inspection (ASTM E165 or equivalent).

(3) Steel components are to be inspected by magnetic particle inspection (ASTM E1444 or equivalent).

C. All parts and components that may be affected by the specific occurrence are to be given a complete inspection for possible damage.

NOTE

The following inspections are mandatory.

4-51. Main Rotor Blade Strike/Sudden Stoppage (Minor) - Special Inspection

A. Blade damage does not exceed damage as defined in paragraph 9-35, and shows no visible kinks, ripples in the skin or the trailing edge. Perform the following:

(1) Repair the blade I/A/W paragraph 9-36.

(2) Inspect the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

B. Blade damage exceeds limits of paragraph 9-35, but has not contacted the airframe or other rigid object and shows no visible kinks, ripples in the skin or trailing edge. Perform the following:

(1) Replace the blade(s).

(2) Inspect the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

(3) Check the main rotor shaft run out (paragraph 11-34). Maximum allowed is .012 inches/.305 mm FIM.

(4) Inspect the tail rotor driveshaft taper pins, taper pin holes and flex packs I/A/W paragraphs 11-71 & 11-80.

NOTE

If the main rotor shaft run out, taper pins, or flex packs do not meet inspection requirements, proceed to paragraph 4-52.

4-52. Main Rotor Blade Strike/Sudden Stoppage (Major) - Special Inspection

A. Obvious blade damage exceeding the limits of paragraph 9-35. Perform the following:

(1) Replace the damaged blade(s) and inspect the remaining blade(s).

(2) Remove the main rotor transmission including the upper pulley and tail rotor drive shaft hub and return to Enstrom Helicopter Corporation for inspection and overhaul/replacement.

(3) Remove the main rotor hub and inspect by liquid penetrant method (ASTM E165 or equivalent and in accordance with the inspection tables (Table 9-1) or return to Enstrom Helicopter Corporation for inspection and overhaul/replacement.

(4) Inspect all flight control push-pull rods and torque tubes for sheared/damaged rivets at the fittings, damaged rod ends, or sheared/damaged roll pins.

(5) Inspect all flight control bellcranks for buckling and elongated bolt holes.

(6) Inspect the lower swashplate for warped or cracked casting and for bent or damaged guidetubes in the upper swashplate. Inspect the tie rod and universal rod for straightness. Inspect the bolt holes for elongation.

(7) Replace all tail rotor driveshaft taper pins.

(8) Inspect the tail rotor driveshafts for damage at the taper pin holes.

(9) Magnetic particle inspect the tail rotor driveshafts (ASTM E1444 or equivalent).

(10) Inspect the pylon structure at the gearbox mounting areas for broken or bent tubes. Check the trueness of the four gearbox attachment points.

(11) Remove the overrunning clutch and return to Enstrom Helicopter Corporation for inspection and overhaul/replacement.

(12) Inspect all components of the drive system.

(13) Inspect the engine I/A/W the Rolls-Royce 250-C20 Series Operators and Maintenance Manual (10W2).

4-53. Tail Rotor Blade Strike/Sudden Stoppage - Special Inspection

A. Strike tab missing but no physical damage to the tail rotor blade(s).

(1) Inspect the tail rotor driveshafts for damage at the forward and aft coupling taper pin locations.

(1) Inspect the taper pins, flex packs, and drive shaft hubs at the forward and aft coupling locations I/A/W paragraphs 11-71 & 11-80.

(3) If no damage is found, make a log book entry and notify Enstrom Helicopter Corporation to order replacement strike tabs.

(4) If damage is found, proceed to the following paragraph for additional inspection procedures.

B. Obvious physical damage to the tail rotor blade. Perform the following:

(1) Remove the tail rotor transmission with the tail rotor controls and the input drive hub and the tail rotor assembly

a. Remove the tail rotor pitch controls and inspect in accordance with the inspection tables (Table 12-4).

b. Return the tail rotor transmission to Enstrom Helicopter Corporation for inspection and overhaul/replacement.

c. Inspect the tail rotor assembly in accordance with the inspection tables (Table 9-5).

(2) Replace all tail rotor driveshaft taper pins.

(3) Inspect the tail rotor driveshafts for damage at the forward and aft taper pin holes.

(4) Inspect the taper pin hole in the main rotor transmission pinion for complete or partial failure. If damage is found, return the main rotor transmission to Enstrom Helicopter Corporation for overhaul/replacement.

(5) Inspect all coupling hubs and the pinion shaft by liquid penetrant method.

(6) Magnetic particle inspect the tail rotor driveshafts (ASTM E1444 or equivalent).

(7) Inspect the hangar bearing housings and attachments.

(8) Inspect the tail rotor control cables and pulley attachments.

(9) Inspect the tail rotor pedal push-pull rods and bellcranks.

(10) Inspect the engine I/A/W the Rolls-Royce 250-C20 Series Operators and Maintenance Manual (10W2).

4-54. Hard Landing - Special Inspection

A. In the event of a hard landing which may or may not be associated with a main or tail rotor strike, perform the following:

(1) Inspect the forward and aft crosstube for bends or bowing. Replace the crosstube if bent or bow is greater than 0.5 inches/13 mm. It will be necessary to hoist the aircraft or remove the crosstubes to obtain a measurement.

(2) Inspect the landing gear leg assemblies for distortion or deformation. Inspect all fittings and bolt holes for elongation. Inspect all welds and gussets for cracks.

(3) Inspect the skid tubes for damage and straightness. Inspect all hardware attachment holes for elongation or tears.

(4) Inspect the oleos for damage, freedom of movement, and leakage.

(5) Inspect the tailcone to pylon, main rotor transmission to pylon, engine to pylon, crosstube to pylon, and cabin to pylon attachment points for deformation or hardware failures.

(6) Inspect the keel structure edges, beams, lightening holes, and intercostals for buckling or deformation. Closely inspect the keel structures for interference or contact with flight control mechanisms (torque tube, collective, etc.) or with the landing gear clamps.

(7) Check the main rotor shaft run out (paragraph 11-34). Maximum allowed is .012 inch/.305 mm FIM.

(8) Check the main rotor transmission mount bolt torque. If torque is lost, replace the hardware or remove and inspect the hardware using Magnetic Particle Inspection (ASTM E1444).

(9) Inspect the main rotor transmission mount lugs using Visible Dye Liquid Penetrant Inspection (ASTM E165).

(10) Inspect the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

4-55. Main Rotor Overspeed - Special Inspection

A. Overspeeds from 385-405 rpm for 5 seconds or less. No inspection required.

NOTE

If any damage is found, remove the main rotor hub and return to Enstrom Helicopter Corporation for inspection and overhaul/replacement.

B. Overspeeds from 385-405 rpm for more than 5 seconds or overspeeds from 406-420 rpm. Perform the following:

(1) Remove the main rotor blades and inspect flapping axis for proper drag, notchiness, and freedom of movement.

(2) Inspect the main rotor blade retention for any deformation.

(3) Inspect the lamiflex bearings for deformation, proper thickness, delamination or extruded brass. Inspect the nylatron strap for any damage or unusual wear.

(4) Inspect the main rotor spindles for pulled or distorted threads. (Lamiflex installation only)

(5) Inspect the tension-torsion straps and pins I/A/W paragraph 9-16.

C. Overspeeds exceeding 420 rpm. Perform the following:

(1) Remove the main rotor hub and return to Enstrom Helicopter Corporation for inspection and overhaul/replacement.

4-56. Overtorque - Special Inspection

A. Overtorques from 68-75 psi (TH-28 & 480) or 69-75 psi (480s equipped with the Increased Rotor Speed and Torque Limits Modification) or 73-79 psi (480B) for 3 seconds or less. No inspection required.

B. Overtorques from 68-75 psi (TH-28 & 480) or 69-75 psi (480s equipped with the Increased Rotor Speed and Torque Limits Modification) or 73-79 (480B) for more than 3 seconds or above 75 psi or 79 psi as applicable. Perform the following:

NOTE

Check the aircraft inspection records for any annotations about the condition of the main rotor transmission ring and pinion gears.

(1) Visually inspect the main rotor transmission ring and pinion gears for cracks, excessive pitting, excessive spalling, or a "hard wear" line.

4-57. Main Rotor or Tail Rotor Transmission Chip Indication - Special Inspection

NOTE

New or recently overhauled transmissions will often make a magnetic "fuzz" which will collect on the magnetic plug as gray sludge. This is normal and may be cleaned off the plug. The plug may then be reinstalled and the helicopter returned to service. If any main rotor transmission chips are found which are larger than 1/16 inch/1.59 mm in cross-section or if any tail rotor transmission chips are found which are larger than .035 inch/.9 mm in cross-section, contact Enstrom Customer Service Department and discontinue use until further instructions are received from Enstrom Customer Service Department.

A. Main rotor transmission chip indication. Perform the following:

(1) Inspect the chip detector for accumulation of metal particles as follows:

a. Main rotor transmission metal particles, flakes, or slivers exceeding 1/16 inch/1.59 mm: Contact Enstrom Customer Service Department and discontinue use until further instructions are received from Enstrom Customer Service Department.

NOTE

Sludge normally will not cause a chip indication by itself. There is normally a small particle, flake, or sliver on the detector also.

b. Sludge (a mixture of oil and fine metal particles resulting from normal gear operation): Clean the detector and return the transmission to service.

(2) If the indication was caused by sludge or a particle, flake, or sliver not exceeding the maximum size, annotate the chip indication and results in the aircraft maintenance records.

(3) Return the transmission to service.

B. Tail rotor transmission chip indication. Perform the following:

(1) Inspect the chip detector for accumulation of metal particles as follows:

a. Tail rotor transmission metal particles, flakes, or slivers exceeding .035 inch/.9mm: Contact Enstrom Customer Service Department and discontinue use until further instructions are received from Enstrom Customer Service Department.

NOTE

Sludge normally will not cause a chip indication by itself. There is normally a small particle, flake, or sliver on the detector also.

b. Sludge (a mixture of oil and fine metal particles resulting from normal gear operation): Clean the detector and return the transmission to service.

(2) If the indication was caused by sludge or a particle, flake, or sliver not exceeding the maximum size, annotate the chip indication and results in the aircraft maintenance records.

(3) Return the transmission to service.

C. Three main rotor transmission chip indications occur within 10 flying hours. Perform the following:

NOTE

Check the aircraft inspection records for any annotations about the condition of the main rotor transmission ring and pinion gears.

(1) Drain the oil from the transmission and inspect the ring and pinion gears for cracks, excessive pitting, excessive spalling, or "hard wear" lines.

(2) Inspect the chip detector for accumulation of metal particles in accordance with para. 4-57, A, (1) and (2).

(3) If none of the above conditions are found, flush and service the main rotor transmission (para. 4-13.1) and return to service.

(4) If two chip indications occur within the next 10 flying hours, repeat the flush and servicing procedure. If two additional indications occur within the next 10 flying hours, contact Enstrom Helicopter Corporation for further instructions.

D. Two tail rotor transmission chip indications occur within 10 flying hours. Perform the following:

NOTE

Check the aircraft inspection records for any annotations about the condition of the tail rotor transmission input and output gears.

(1) Drain the oil from the transmission and inspect input and output gears (through the inspection port) for cracks, excessive pitting, excessive spalling, or "hard wear" lines.

(2) Remove the tail rotor assembly from the tail rotor transmission output shaft and the aft tail rotor drive shaft flex plate assembly. Turn the tail rotor transmission output shaft by hand. If indications of a rough bearing are felt, the transmission must be replaced.

NOTE

If the gearbox is to be returned to Enstrom Service, do not clean the metal from the chip detector.

(3) Inspect the chip detector for accumulation of metal particles in accordance with para. 4-57, B, (1) and (2).

(4) If none of the above conditions are found, flush and service flush and service the tail rotor transmission (para. 4-17.1) and return to service.

(5) If two chip indications occur within the next 10 flying hours, repeat the flush and servicing procedure. If two additional indications occur within the next 10 flying hours, contact Enstrom Helicopter Corporation for further instructions.

4-58. Engine Overspeed - Special Inspection

NOTE

Perform the appropriate main rotor overspeed inspection if required.

A. Inspect the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual if the engine operating limitations are exceeded.

4-59. Engine Overtemp - Special Inspection

A. Inspect the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual if the engine operating limitations are exceeded.

4-60. Maintenance Ground Run

A. General

(1) Perform a maintenance ground run after conducting a periodic inspection or maintenance action that will require operation of the aircraft to verify satisfactory performance of the aircraft.

(2) The periodic inspection or maintenance action will determine the extent of the post maintenance ground run.

B. Perform the maintenance ground run as follows:

(1) Perform a preflight inspection.

NOTE

The maintenance performed on the flight control systems should determine the extent of the rigging check.

(2) Verify flight control rigging if any maintenance was performed on the flight controls.

(3) Position lateral and fore/aft trim motors to the neutral position.

(4) Move the cyclic stick around the cyclic stop in the floor. The stick must remain against the stop through the circle. If binding or interference is detected, re-check the basic rigging.

(5) Move the fore/aft trim to full forward position and move the cyclic stick full aft. Stick should contact the cyclic stop. Reverse the trim motor and stick positions and check that stick contacts the cyclic stop.

(6) Repeat step (5) using the lateral trim motor and moving the stick in the lateral direction.

(7) Check the rigging of the throttle controls.

(8) Check the rigging of the droop compensator.

WARNING

The following checks are to be performed by authorized personnel.

(9) Run-up the aircraft I/A/W the Rotorcraft Flight Manual.

(10) With the engine at ground idle, collective full down, and pedals neutral, check the following instruments:

a. N_1 - 59-65%

b. Torque - 8-10 psi

c. Rotor RPM - approximately 215 rpm

d. All other instruments - normal range

(11) Slowly apply approximately 1 inch of left pedal. Check for an increase in the torque indication and corresponding aircraft movement. Neutralize the pedals.

WARNING

Clear all personnel from the tip path plane area as the blades may dip as low as 5 feet during this test.

(12) Slowly move the cyclic stick forward until there is a slight bumping of the rotor stops. Observe the position of the cyclic stick in relation to the cyclic stop ring. Repeat this check by bringing the cyclic stick aft, then right and left. The distance that the cyclic fitting is from the stop should be equal. If a noticeable difference exists, adjust the length of the push-pull rods located between the bellcranks in the engine compartment. The right side push-pull rod controls fore/aft movement and the left side push-pull rod controls the lateral movement.

(13) With the collective full down, cyclic centered, and pedals neutral, slowly increase the throttle to full throttle.

(14) Check the operation of the power turbine governor linear actuator. The minimum operating range is from 88% - 92% N_2. Maximum operating range is 100% - 103% N_2.

(15) Set the N_2 rpm to 98% and check the torque indication. For aircraft without blade leading edge protection tape, the torque indication should be 15 - 18 psi to assure adequate rotor rpm during autorotation. The torque indication for aircraft equipped with blade leading edge protection tape should be 17 - 21 psi. Shorten the main rotor pitch change links to increase the torque indication and lengthen the pitch change links to decrease the torque indication. The maintenance test flight will determine what additional adjustments will be required.

WARNING

Clear all personnel from the tip path plane area as the blades may dip as low as 5 feet/1.52 meters during this test.

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

(17) 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.

(18) Decrease the throttle to ground idle and shut the aircraft down I/A/W the Rotorcraft Flight Manual.

(19) Correct any discrepancies found.

NOTE

If required to determine proper operation of the aircraft, perform a maintenance test flight (para. 4-61).

(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%, 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 Check:

(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.

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

(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.

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 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. 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).

SECTION 5

WEIGHT AND BALANCE

5-1. Maintenance Manual Arrangement

The aircraft empty weight and empty weight c.g. for this aircraft are found on Form F-511-2, Helicopter Weight And C.G. Calculation (Figure 5-3) or other similar form. Approved optional equipment installed by Enstrom Helicopter Corporation will be recorded on Form F-511-3, Enstrom TH-28, 480, 480B Optional Equipment List (Figure 5-4), and Form F-511-4, Enstrom TH-28, 480, 480B Optional Equipment List Continued (Figure 5-5). Removal or installation of approved optional equipment will change the aircraft empty weight and empty weight c.g. These changes will be recorded on Form F-511-5, Basic Weight and Balance Record (Figure 5-6) or other similar form. Repair or alteration of the aircraft may also change the aircraft empty weight and empty weight c.g. If the repair or alteration does change the empty weight and the new empty weight and empty weight c.g. can be mathematically calculated, the change can be recorded on Form F-511-5 or other similar form. The aircraft will have to be re-weighed if the change cannot be mathematically calculated. Removal or addition of minor items of equipment such as nuts, bolts, rivets, washers, and similar standard parts of insignificant weight do not require a weight and balance check.

NOTE

Forms F-511-1, F-511-2, F-511-3, F-511-4, and F-511-5 may vary in format depending on the time of printing.

5-2. Preparing the Aircraft for Weighing

A. Clean the aircraft.

NOTE

The operator's manual is required to be carried in the aircraft I/A/W FAA Regulations. Consult the owner/operator about including the operator's manual as part of the aircraft empty weight.

B. Remove the loose equipment from the cockpit (maps, pubs, charts, flashlights, etc.).

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

D. Service the engine oil reservoir full (para. 4-7).

NOTE

The main rotor blades do not need to be removed if the maximum capacity of the weighing devices (scales or load cells) will not be exceeded while weighing the aircraft.

E. Remove the main rotor blades (para. 9-34).

F. Inventory the aircraft against Form F-511-3, Form F-511-4 and Form F-511-5 or other similar forms.

5-3. Weighing the Aircraft with Mechanical Scales

NOTE

TH-28, S/N 3007 & subsequent; 480, S/N 5003 & subsequent; and all 480B’s can be weighed using electrical scales (load cells). Contact Enstrom Helicopter Corporation for more information.

NOTE

The hangar doors should be closed and, if practical, the hangar heating/ ventilation system should be turned off while weighing the aircraft.

NOTE

The two main scales must have a 1000 pound capacity and the third scale must have a 100 pound capacity.

A. Hoist or jack the aircraft (para. 4-68 or 4-69) to a height that will allow the scales to fit under the skid tubes.

B. Place a pipe nipple in the center of the left and right main scales. Place the scales under the skid tubes so that the pipe nipples will contact the skid tubes at the weighing location on the skid tubes. The weighing location is 24.9 inches forward of the aft end of the skid tubes (identified by a rivet (STA 143.40) in the skid tube of later S/N helicopters).

C. Place a suitable tripod onto the center of the third scale. Place the scale under the right side of the tail rotor transmission so that the end of the tripod contacts the transmission in-line with the center line of the tail rotor output shaft.

CAUTION

Use a suitable maintenance stand to remove the hoisting sling and have someone securing the end of the tailcone.

D. Remove the load from the hoist or jacks. Ensure that the hoisting sling is removed from the hub.

E. Level the aircraft (para. 4-67) by raising or lowering the tail for longitudinal leveling and raising or lowering one of the skid tubes for lateral leveling.

F. Check the positioning of the scales and reposition as required. Recheck the levelness of the aircraft and adjust as required. Repeat this step until the scales are in the correct positions and the aircraft is level.

G. Read the weights from the scales and record the results on Form F-511-1, Weight Sheet, (Figure 5-2) or other similar form. Double check the weights and recordings on the form.

SECTION 6

ELECTRICAL SYSTEM

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6-60. Start Switch

6-61. Description – Start Switch

NOTE

Aircraft S/N 5136 and subsequent are equipped with dual collective engine start and idle stop controls. The start switch is located on both of the pilot and copilot collective sticks.

The start switch (SW9), located on the pilot's collective control stick, or the start switch (SW87) located on the copilot's collective control stick, is used to energize the starter relay during the engine start cycle. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-62. Generator Control Unit (GCU)

6-63. Description – Generator Control Unit (GCU)

The GCU is located on the bottom right hand side of the oil cooler/blower shelf or on the right side of the keel assembly in later production aircraft. At flight idle RPM and above, the voltage regulator portion of the GCU maintains the correct generator output voltage by varying the generator field current. When the Thales Avionics/Auxilec GCU senses an overvoltage condition, the GCU causes current to flow in the trip coil of the generator control switch (CB/SW3), which trips the switch to the OFF position. This removes the current from the generator field and power from the generator relay (RL4) actuating coil disconnecting the starter/generator (M6) from the main electrical bus. The reverse current portion of the Thales Avionics/Auxilec GCU de-energizes the generator relay when the generator output voltage falls below the battery voltage. The overcurrent protection circuitry will cause current to flow in the trip coil of the generator control switch when the generator maximum output current rating is continuously exceeded for 10 seconds ± 2 seconds. The circuitry in the Thales Avionic/Auxilec GCU will illuminate the generator caution light (DC GEN) in the caution panel any time the generator voltage is less than the battery voltage, the generator switch is OFF, or the generator is not connected to the main electrical bus. The GCU will also flash the generator field circuitry if required. When APC GCU senses an overvoltage condition, an internal latching relay opens in the GCU, which removes power from the generator field and the actuating coil of the generator relay. When the power is removed from the generator field, the actuating coil of the generator off light relay (RL19) de-energizes and connects the ground potential to the caution segment circuit, which illuminates the DC GEN segment in the caution panel. The generator control switch must be manually positioned to the RESET position momentarily to reset the GCU. The reverse current portion of the APC GCU de-energizes the generator relay when the generator output voltage falls below the battery voltage.

6-64. Removal – Generator Control Unit

A. Ensure electrical power is turned off and disconnect the battery.

B. Remove the right side aft cowling and the aft bottom cowling or the right side keel access panel.

C. Disconnect the electrical connector from the GCU.

D. Remove the hardware securing the GCU to the bottom of the shelf or the mounting bracket on the keel and remove the GCU.

6-65. Inspection – Generator Control Unit

A. Inspect the GCU I/A/W the manufacturer's instructions.

6-66. Repair – Generator Control Unit

A. Repair the GCU I/A/W the manufacturer's instructions.

6-67. Installation – Generator Control Unit

A. Position the GCU onto the bottom of the oil cooler/blower shelf or the mounting bracket on the keel and install the mounting hardware.

B. Connect the electrical connector to the GCU and safety wire with .020 lockwire.

C. Reconnect the battery and install the right aft side cowling and the aft bottom cowling or the keel access panel.

6-68. Adjustment – Generator Control Unit (Voltage Regulator)

WARNING

The following steps are to be performed by authorized personnel.

A. Run up the aircraft I/A/W the operator's manual (RFM). If available, use an external power source to start the aircraft.

B. Bring the generator system on line and turn on all of the communications, navigation, and instrument systems.

NOTE

Use a voltmeter with a DC voltage scale accuracy of 1 percent.

C. Connect the positive probe of a voltmeter to one of the terminals on the generator shunt. Connect the negative probe to any convenient aircraft ground.

D. Read and record the voltage.

(1) The voltage setting for the NICAD batteries should be 28.2 ±.3 Vdc

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
< 30	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.

6-79. Battery Bus

6-80. Description – Battery Bus

Aircraft prior to S/N 5134: In the event of the main electrical terminal strip (T1) failure, the battery terminal strip (T11, TH-28 only) provides emergency power to the N_2/N_R tachometer and if installed to the "active" TOT and N_1 indicating systems. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

Aircraft S/N 5134 and subsequent: In the event of the electrical bus failure, emergency power, controlled by the N1-N2-NR-TOT switch, can be supplied to the gas producer tachometer (N_1), dual tachometer (N_2/N_R), and TOT indicator. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-81. N_2/N_R Switch

NOTE

If the N_2/N_R switch (SW20) is inadvertently left in the BATT position, the battery can be completely discharged.

6-82. Description – N_2/N_R Switch

The N_2/N_R switch (SW20), located in the instrument panel (See Figure 6-1), is used to connect emergency battery power to the dual tachometer and if installed the "active" TOT and N_1 indicating systems in the event of a main electrical terminal strip (T1) failure. The switch is normally in the NORMAL or BUS position. To apply emergency power, place the switch in the BATT position. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-82.1. N1-N2-NR-TOT Switch

NOTE

If the N1-N2-NR-TOT switch (SW45/SW53) is inadvertently left in the BATT position, the battery can be completely discharged.

6-82.2. Description – N1-N2-NR-TOT Switch

The N1-N2-NR-TOT switch (SW45/SW53) is located at the top right side of the instrument panel. It controls the emergency electrical power circuits that provide power to the gas producer (N1) tachometer, the dual (N2/NR) tachometer, and the TOT indicator in case of a complete electrical system failure. Emergency power is supplied directly from the battery to the indicators by moving the switch from the BUS position to the BATT position. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-83. Lighting Provisions

6-84. Description – Lighting Provisions

The lighting provisions include all the equipment necessary for the illumination of the instruments, switches, circuit breakers, and interior and exterior of the aircraft for night operations.

6-85. Interior Lighting Systems

6-86. Description – Interior Lighting Systems

The internal lighting systems consist of the instrument lights, instrument panel flood lights, and cockpit/map lights.

6-87. Instrument Lights

6-88. Description – Instrument Lights

The panel lighting is divided into three groups: engine instruments (this group includes the circuit breaker and electrical switch panels), avionic/radio equipment, and flight instruments. Each group consists of a potentiometer, dimmer assembly, balance card, lamps, wiring, and circuit breaker. The potentiometers, located in the electrical switch panel (See Figure 6-1), adjust the output voltage of the dimmer assemblies, thus varying the intensity of the lighting. The balance cards (harmonizing cards) use fixed resistors to equalize the light intensity of each lamp in a lighting group (TH-28 Option). The dimmer assemblies, located outboard on the keel assembly beneath the cabin floor, are solid state units and continuously powered when the PNL LTS switch is on. Four different types of lighting are utilized for the instrument lights. Post type or illuminated panel lighting is used for the circuit breaker and switch panels and for any instrument that does not have an internal lighting source. Most of the flight instruments use a light tray assembly for instrument lighting. The instruments must be removed to replace the light tray assembly or the lamps installed in them. Most of the navigation and engine instruments, radios, and avionics have internal lighting. These components must be returned to an authorized repair facility to have unserviceable internal lighting repaired. Refer to paragraphs 6-12 through 6-15 for maintenance procedures.

6-89. Instrument Panel Flood Lights (480/B Option)

6-90. General Description – Instrument Panel Flood Lights

Three blue-white instrument panel flood lights, located on the bottom side of the instrument panel glare shield, furnish secondary illumination for the instrument panel should the instrument lighting in any or all of the groups fail. These lights are activated and controlled by a three position switch (SW6) labeled FLOOD. With the switch (SW6) in the up position, the flood lights are activated at the maximum intensity. With the switch (SW6) in the down position, the lights are activated at the factory preset dim condition. 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

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 or the caution panel test/dim switch is placed in the test position. 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

Table 6-3. List of Diagrams - Continued

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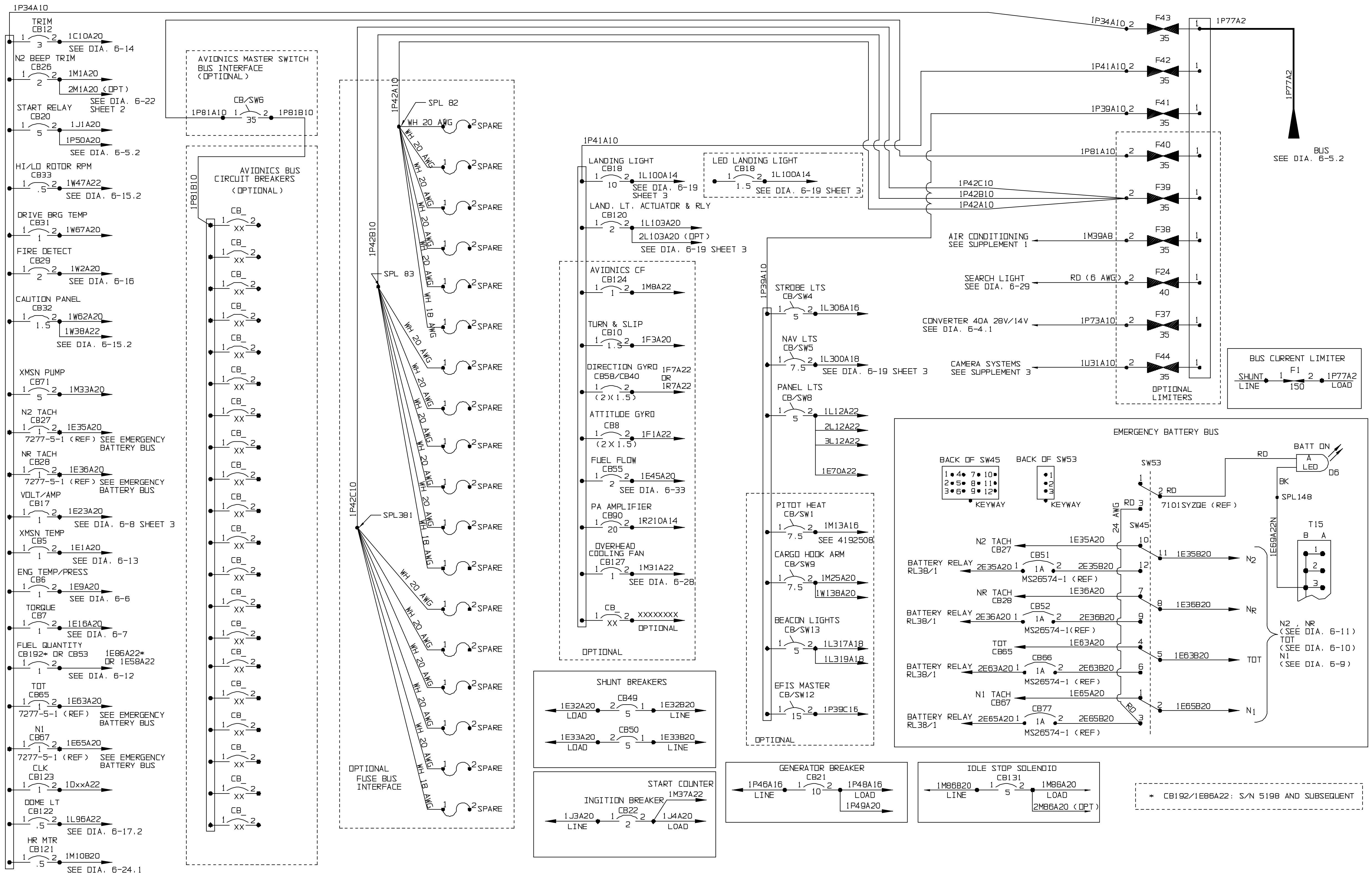
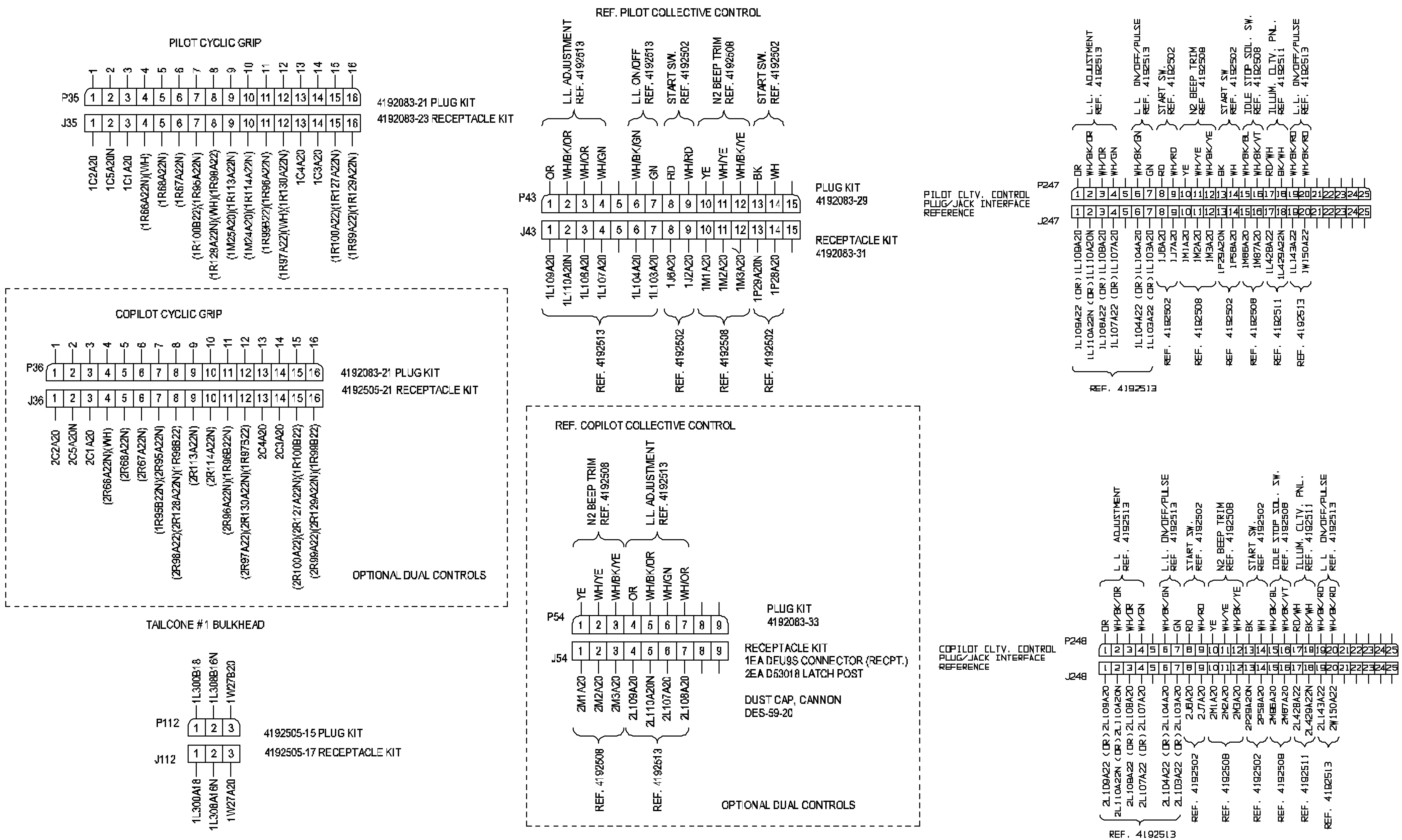


480B Serial Numbers: 5136 and Subsequent

Diagram 6-1.2. Power Distribution


PILOT CYCLIC GRIP
P35
J35
4192083-21 PLUG KIT
4192083-23 RECEPTACLE KIT
COPILOT CYCLIC GRIP
P36
J36
4192083-21 PLUG KIT
4192505-21 RECEPTACLE KIT
OPTIONAL DUAL CONTROLS
TAILCONE #1 BULKHEAD
P112
J112
4192505-15 PLUG KIT
4192505-17 RECEPTACLE KIT
REF. PILOT COLLECTIVE CONTROL
P43
J43
PLUG KIT
4192083-29
RECEPTACLE KIT
4192083-31
REF. COPILOT COLLECTIVE CONTROL
P54
J54
PLUG KIT
4192083-33
RECEPTACLE KIT
1EA DEUSS CONNECTOR (RECPT.)
2EA D53018 LATCH POST
DUST CAP, CANNON
DES-59-20
OPTIONAL DUAL CONTROLS
PILOT CLTV. CONTROL
PLUG/JACK INTERFACE
REFERENCE
P247
J247
COPILOT CLTV. CONTROL
PLUG/JACK INTERFACE
REFERENCE
P248
J248

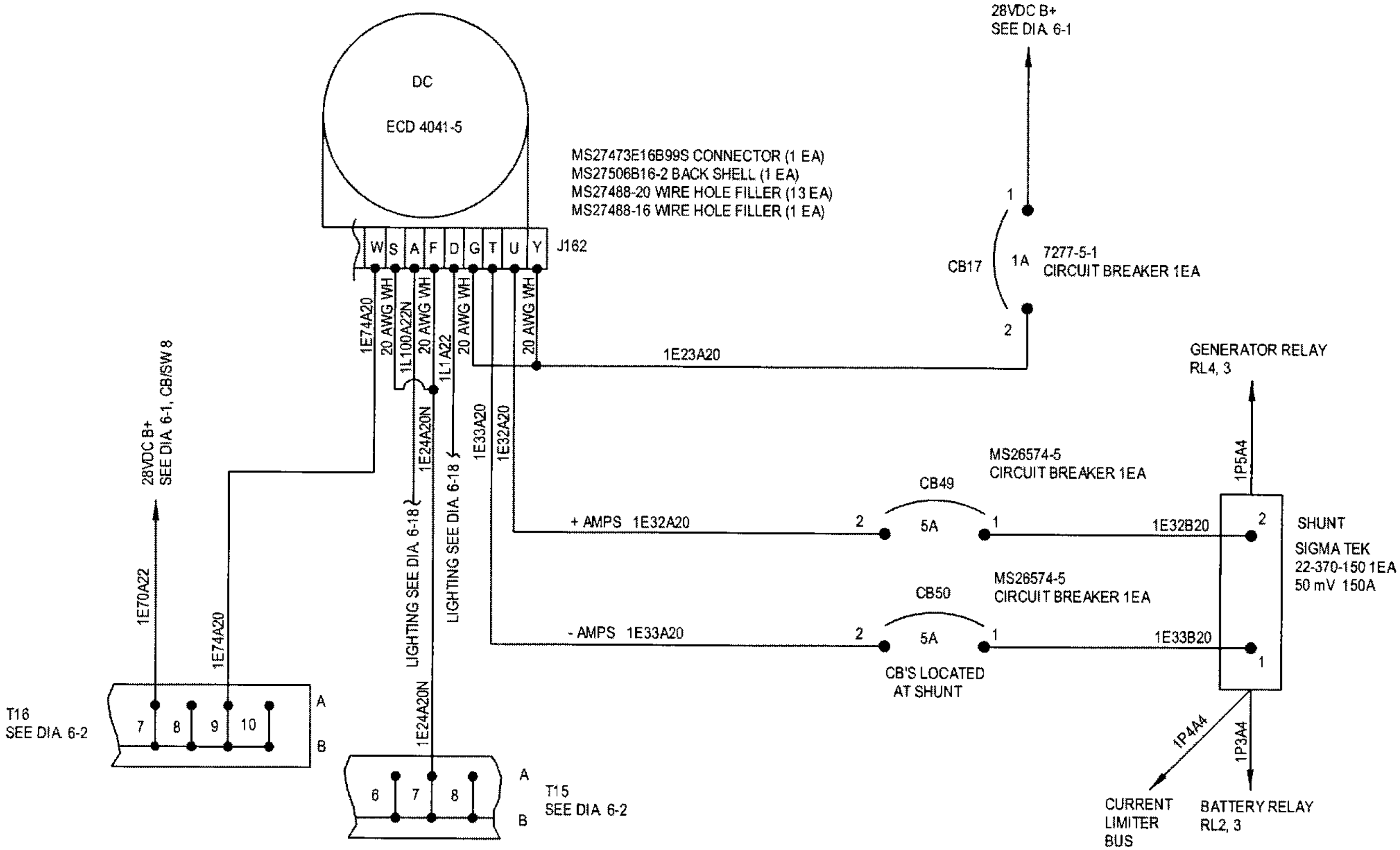


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Diagram 6-8. D.C. Volt/Amp System

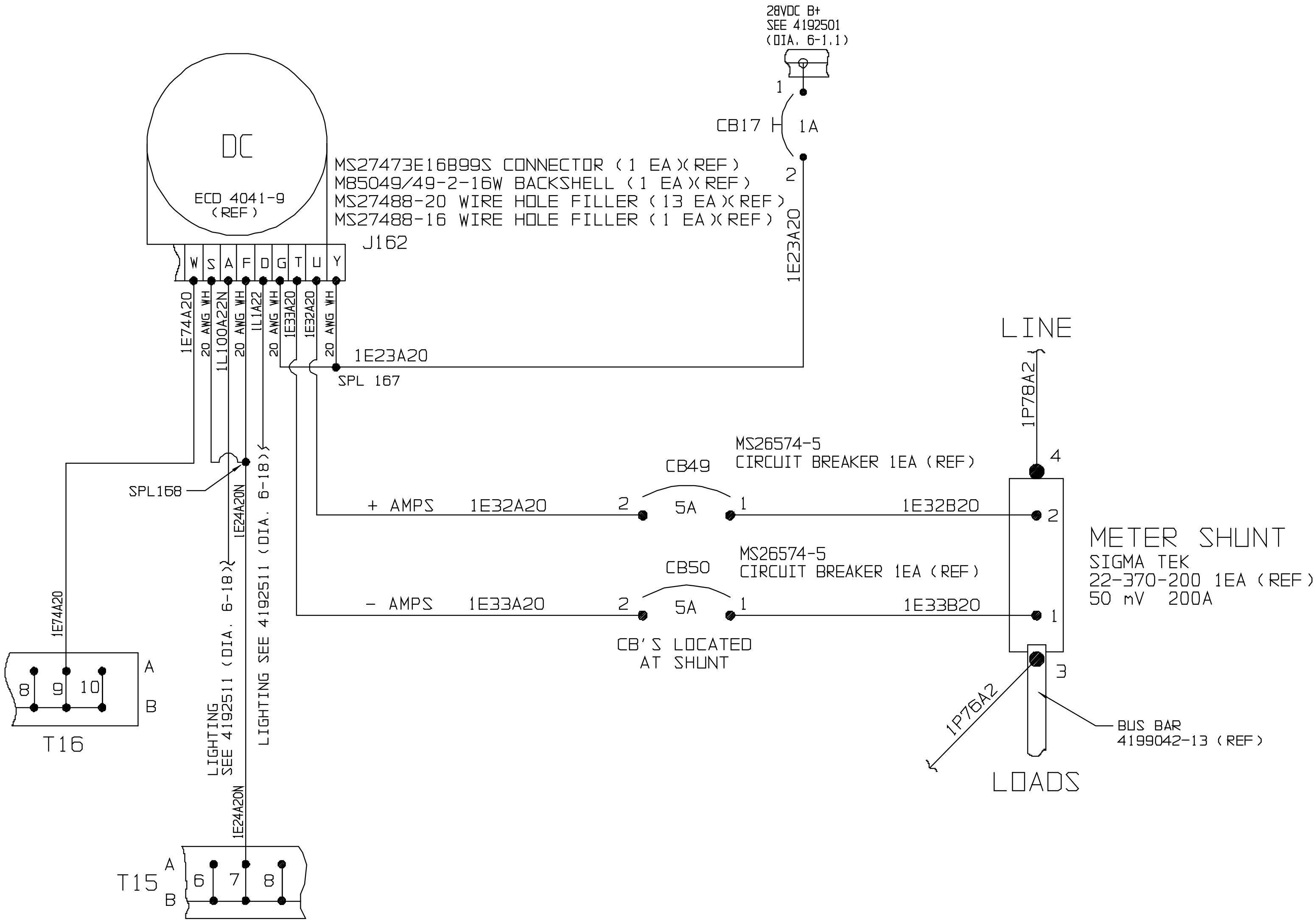

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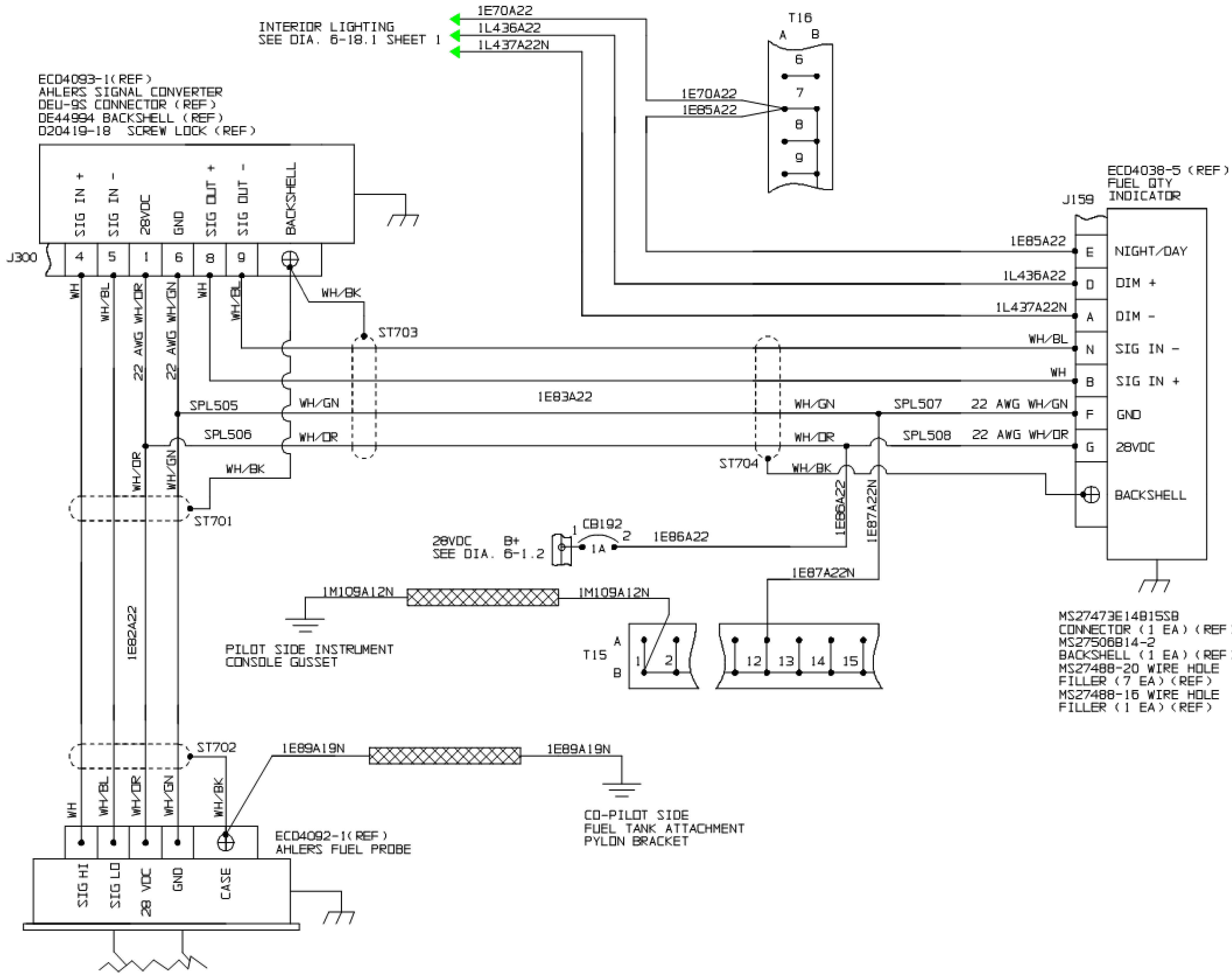
Diagram 6-8. D.C. Volt/Amp System


INTERIOR LIGHTING
SEE DIA. 6-18.1 SHEET 1
1E70A22
1L436A22
1L437A22N
T16
ECD4093-1(REF)
AHLERS SIGNAL CONVERTER
DEU-9S CONNECTOR (REF)
DE44994 BACKSHELL (REF)
D20419-18 SCREW LOCK (REF)
SIG IN +
SIG IN -
28VDC
GND
SIG OUT +
SIG OUT -
BACKSHELL
J300
1E85A22
ECD4038-5 (REF)
FUEL QTY
INDICATOR
J159
NIGHT/DAY
DIM +
DIM -
SIG IN -
SIG IN +
GND
28VDC
BACKSHELL
ST703
ST704
ST701
ST702
SPL505
SPL506
SPL507
SPL508
1E83A22
22 AWG WH/GN
22 AWG WH/OR
28VDC B+
SEE DIA. 6-1.2
CB192
1A
1E86A22
1E87A22N
1E82A22
1M109A12N
PILOT SIDE INSTRUMENT
CONSOLE GUSSET
T15
MS27473E14B15SB
CONNECTOR (1 EA) (REF)
MS27506B14-2
BACKSHELL (1 EA) (REF)
MS27488-20 WIRE HOLE
FILLER (7 EA) (REF)
MS27488-16 WIRE HOLE
FILLER (1 EA) (REF)
1E89A19N
CO-PILOT SIDE
FUEL TANK ATTACHMENT
PYLON BRACKET
ECD4092-1(REF)
AHLERS FUEL PROBE
SIG HI
SIG LO
28 VDC
GND
CASE

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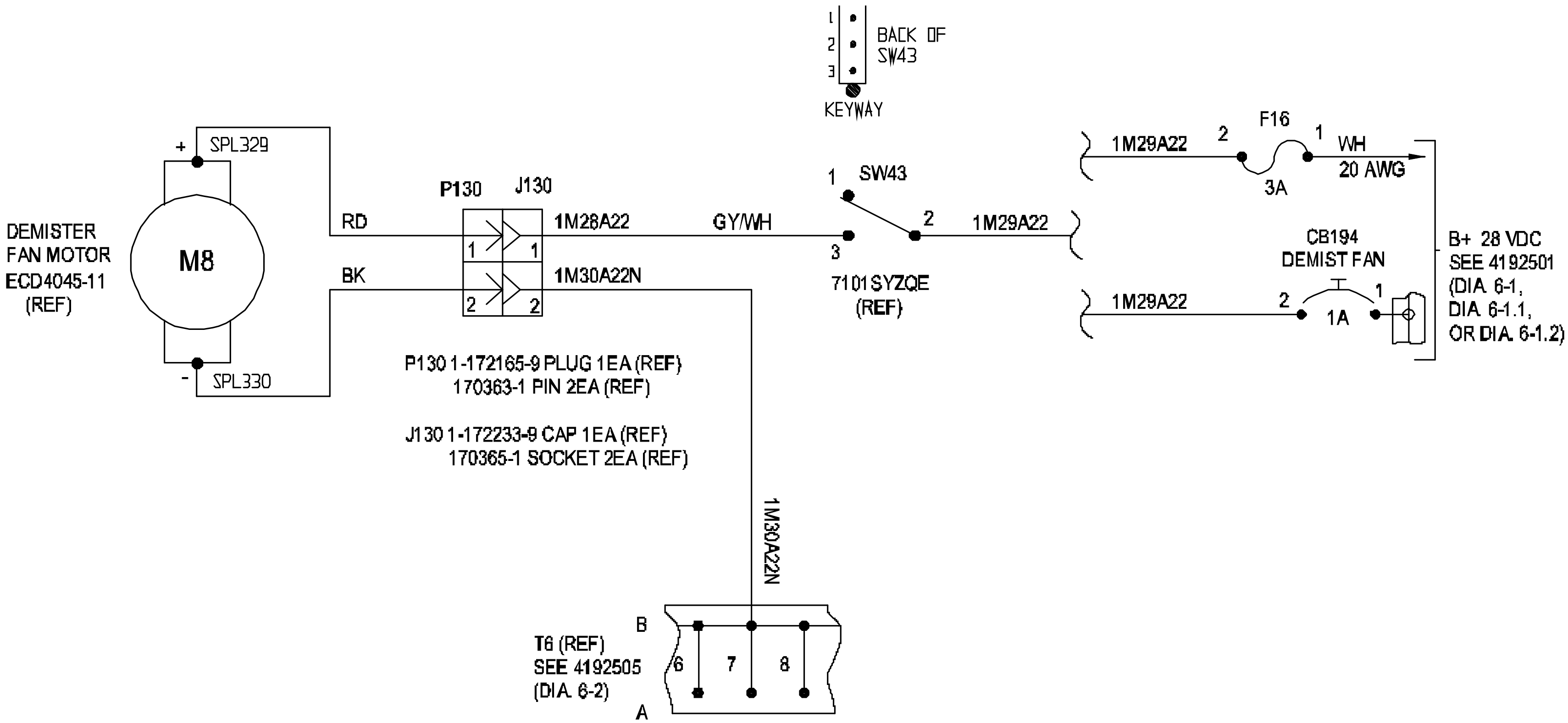

Diagram 6-23. Windshield Demister Fan

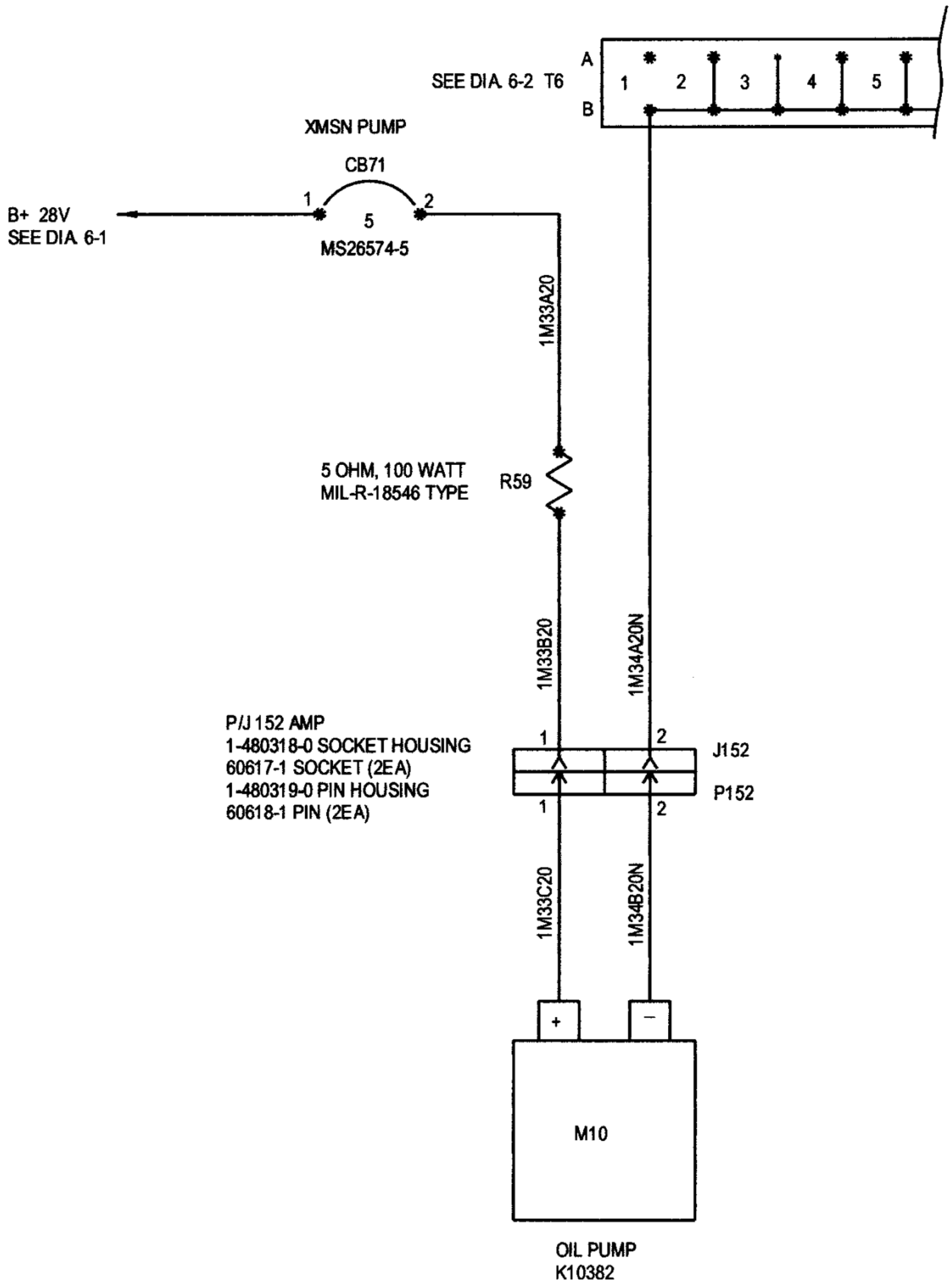

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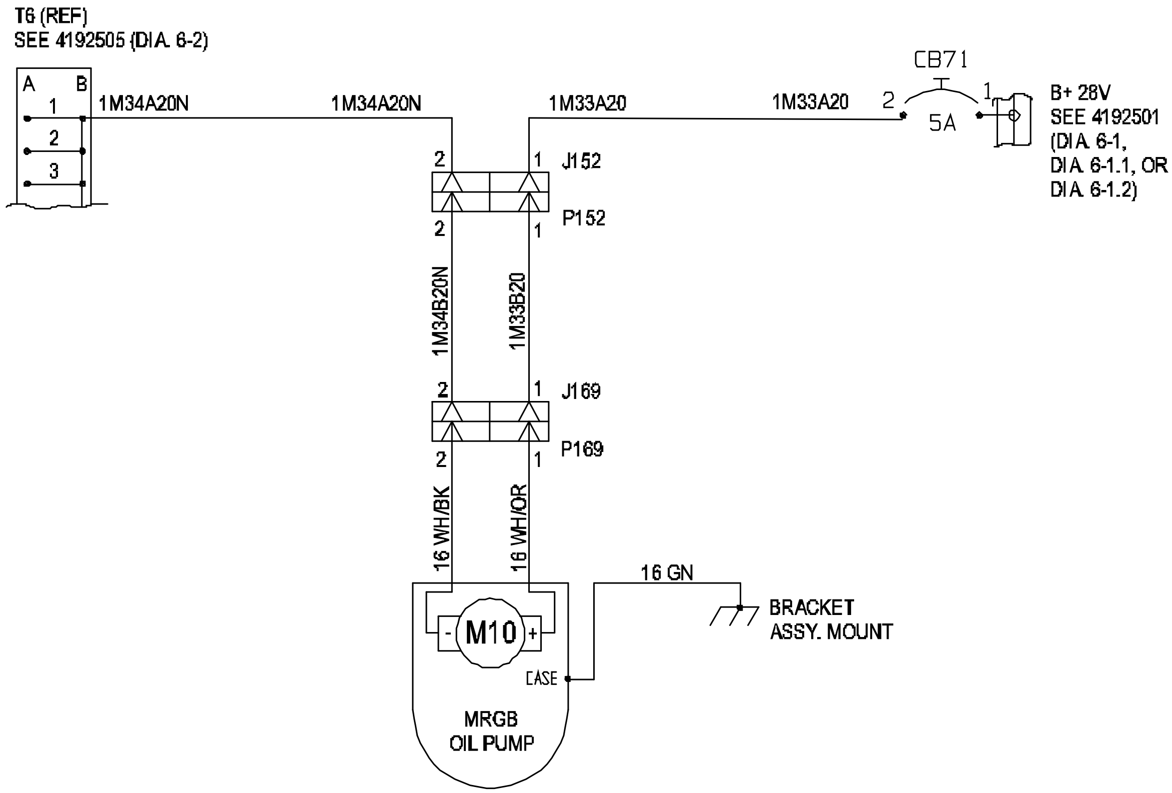
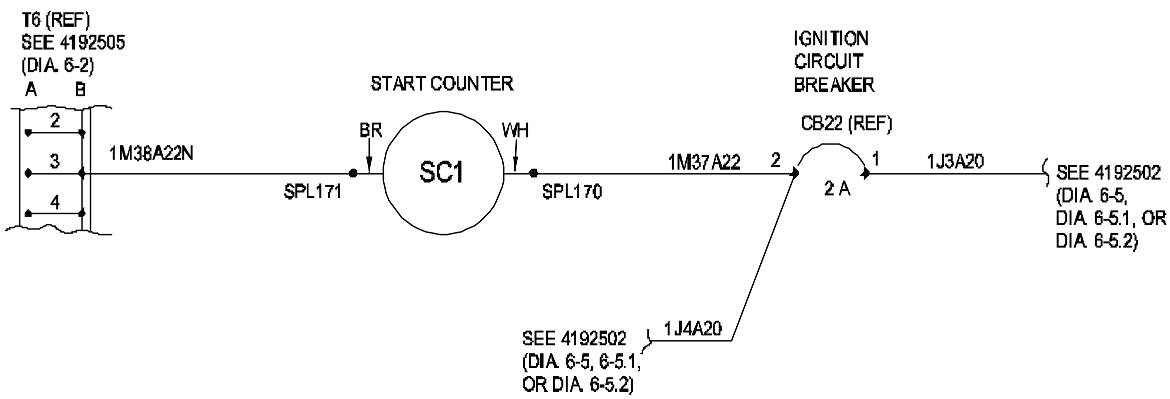
Diagram 6-25. M/R Transmission Filtration/Cooling System



480/B S/N 5114 and subsequent

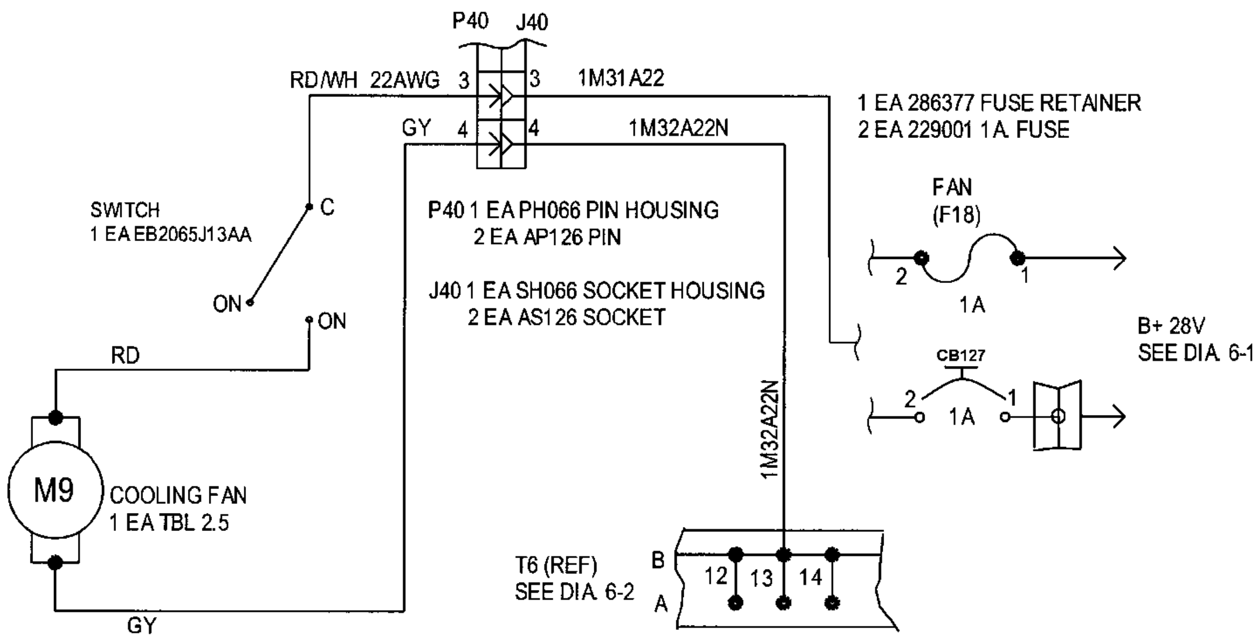
Sheet 2 of 2

Diagram 6-25. M/R Transmission Filtration/Cooling System



480B Serial Numbers: 5048 and Subsequent

Diagram 6-27. Start Counter



Sheet 1 of 2
480B Serial Numbers: All except 5136 and Subsequent

Diagram 6-28. Overhead Cooling Fan

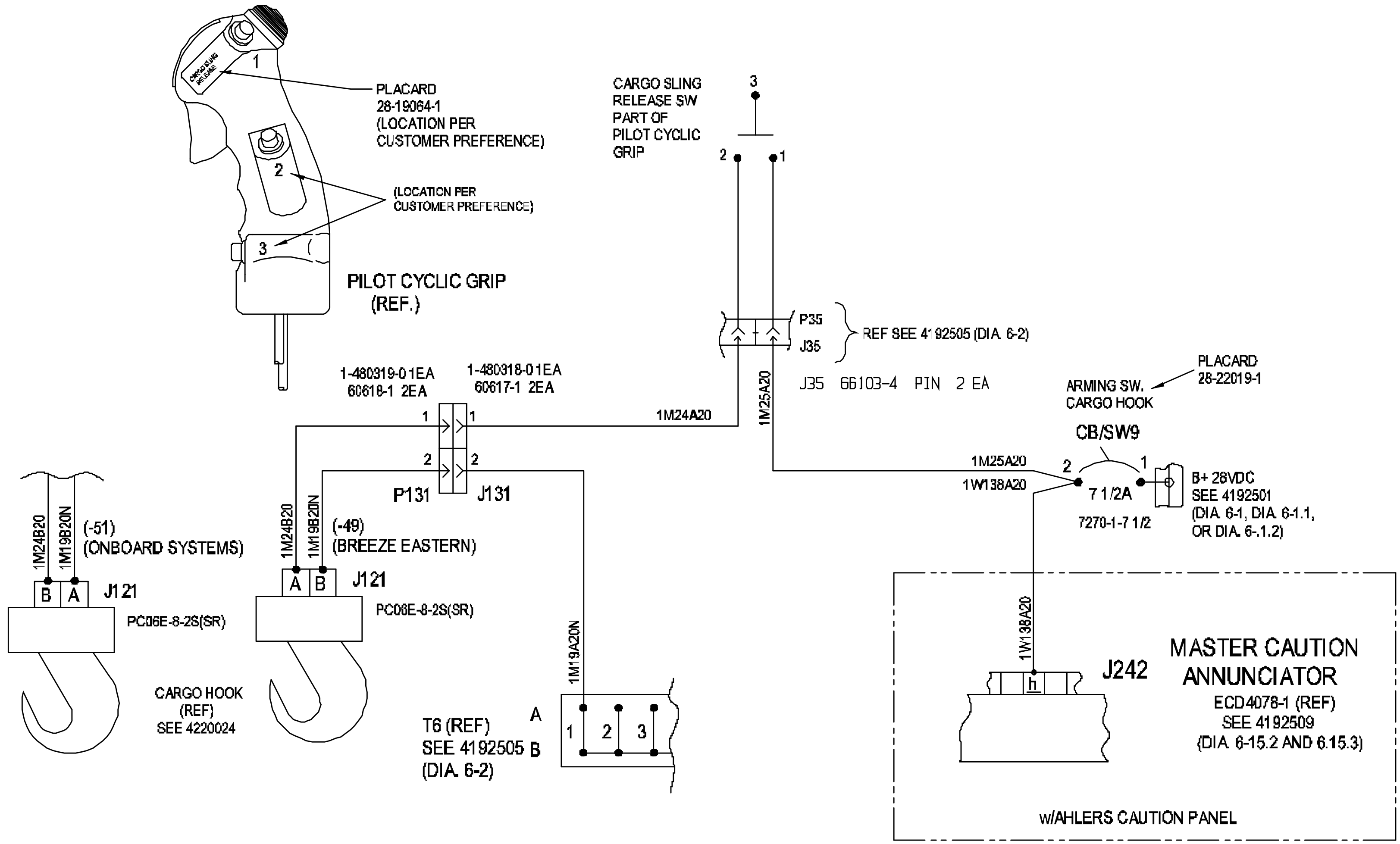
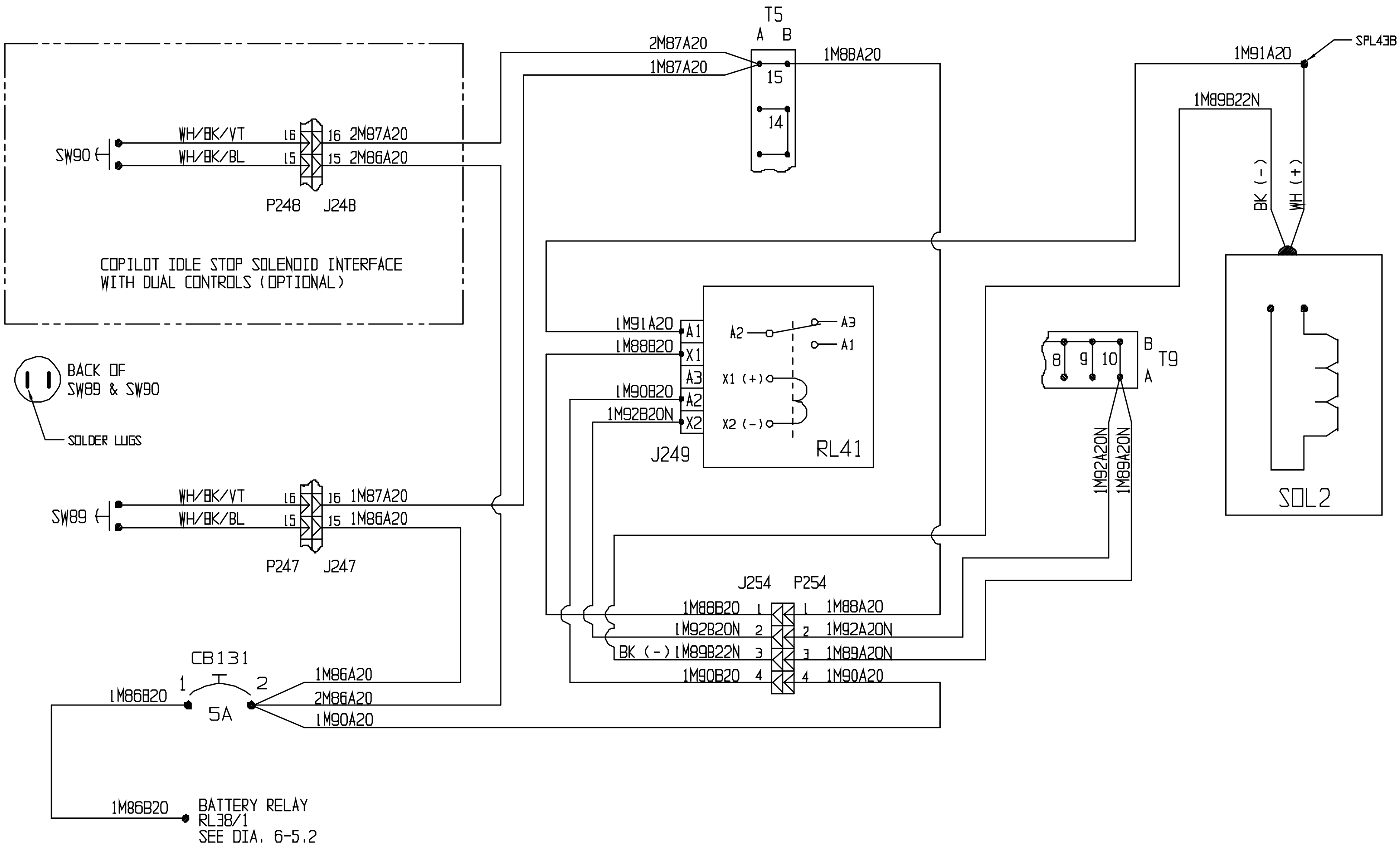
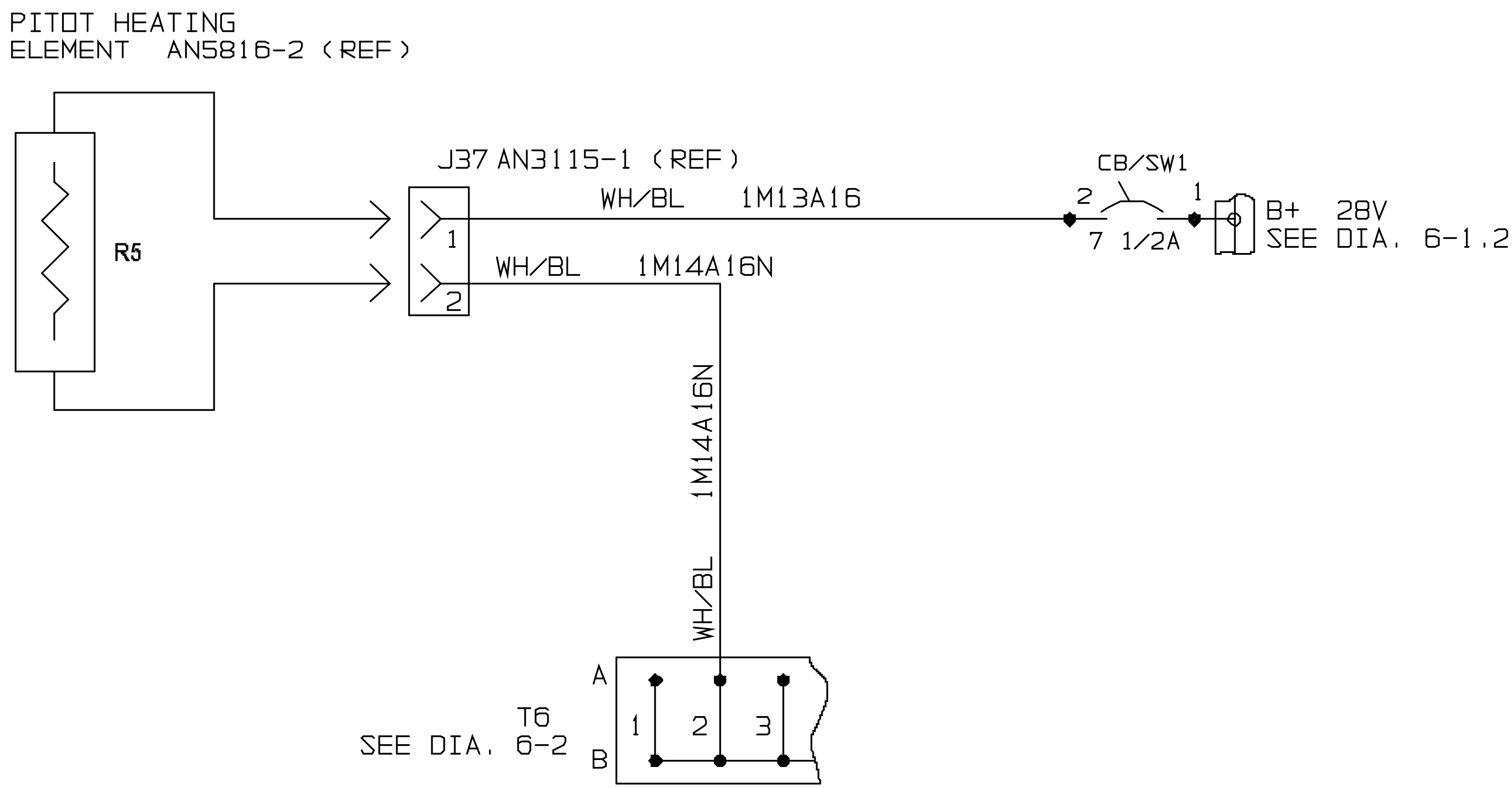


Diagram 6-30. Cargo Hook Sling Release



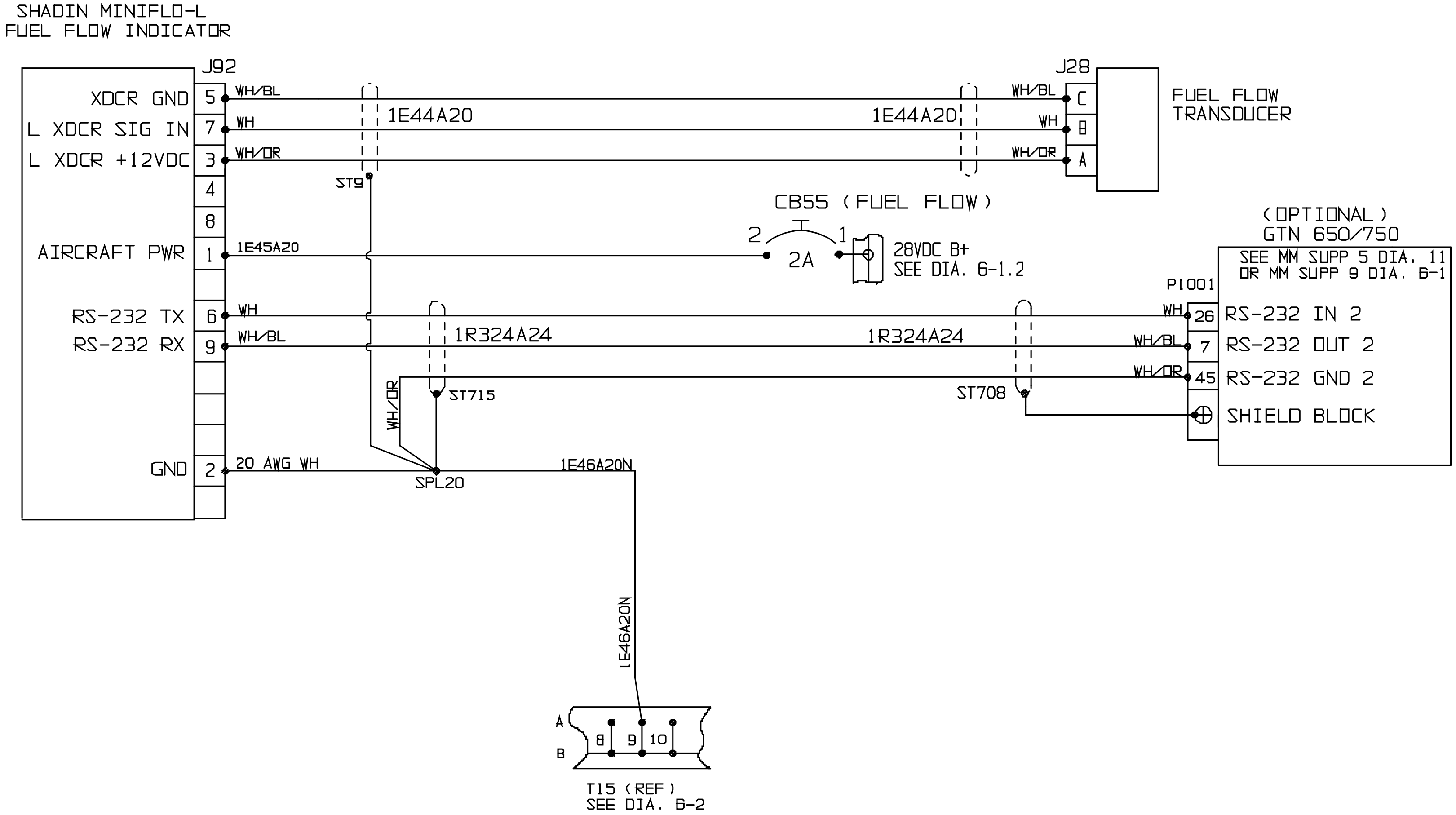
480B S/N 5136 and Subsequent

Diagram 6-31. Engine Idle Stop



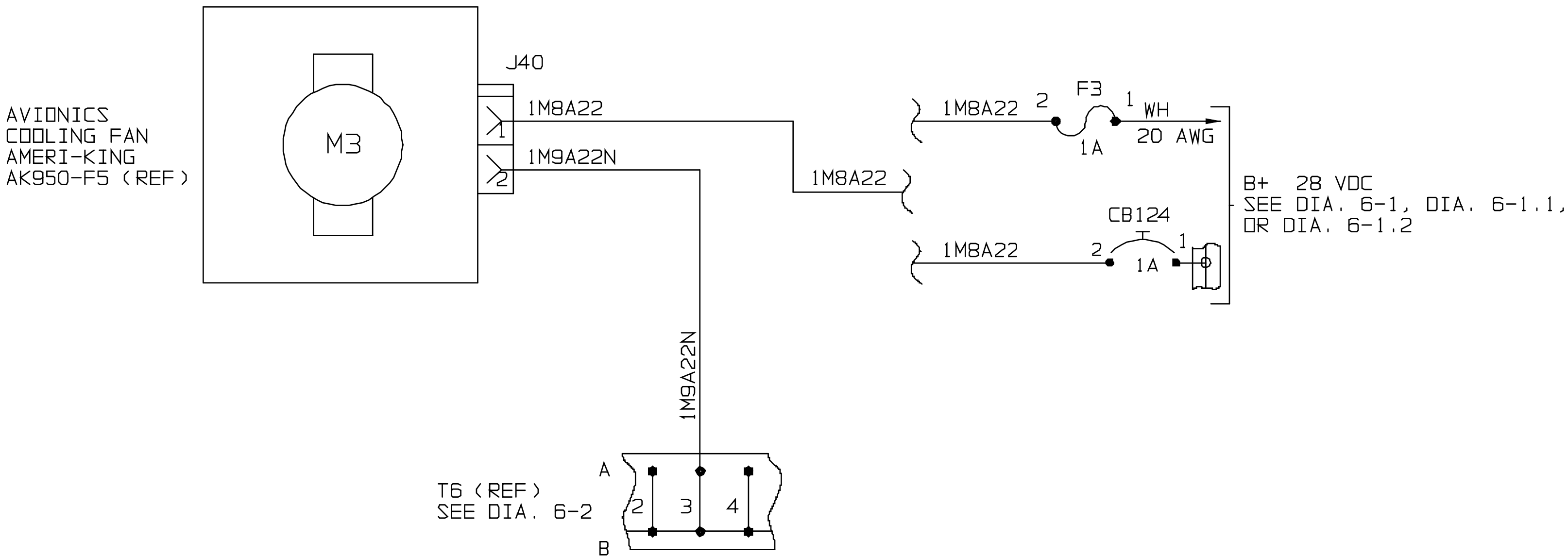
TH-28/480 Series Option (All S/N)

Diagram 6-32. Heated Pitot System Interface



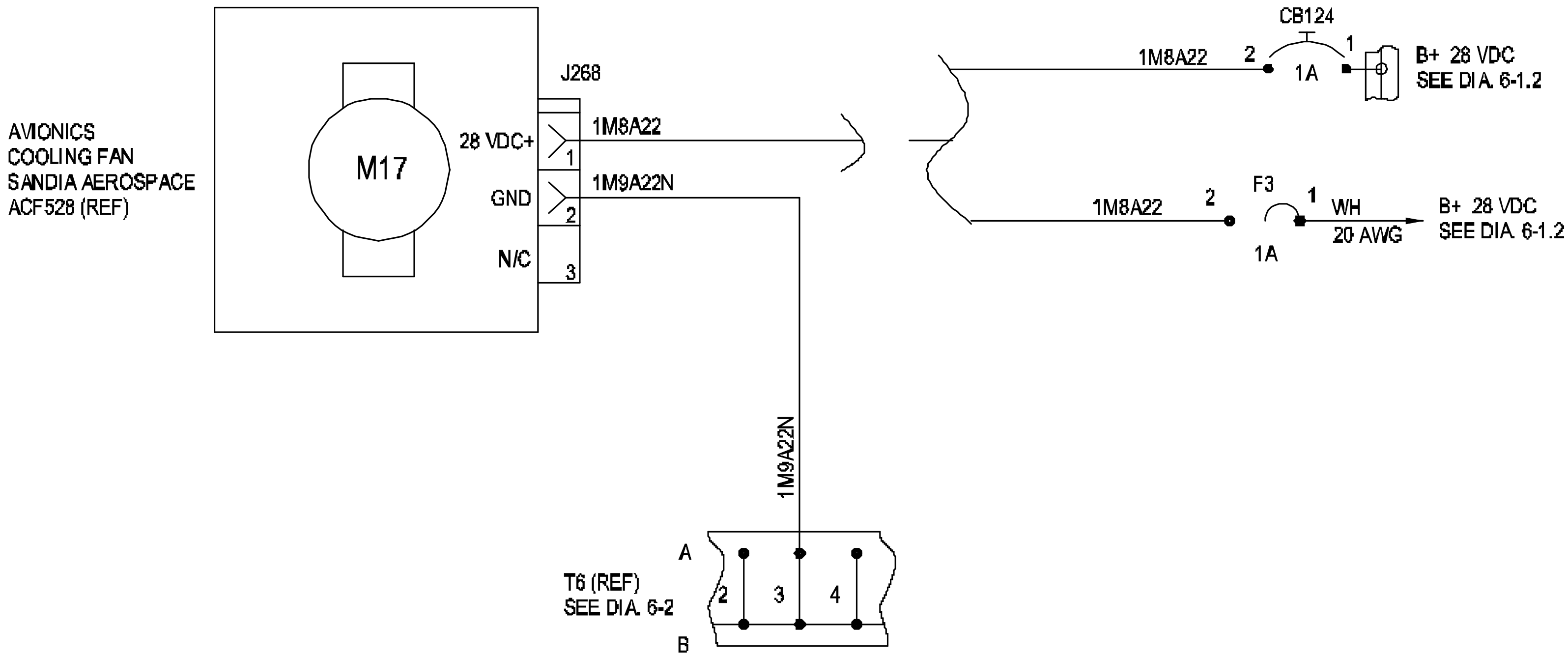
480/B Option (All S/N)

Diagram 6-33. Fuel Flow System



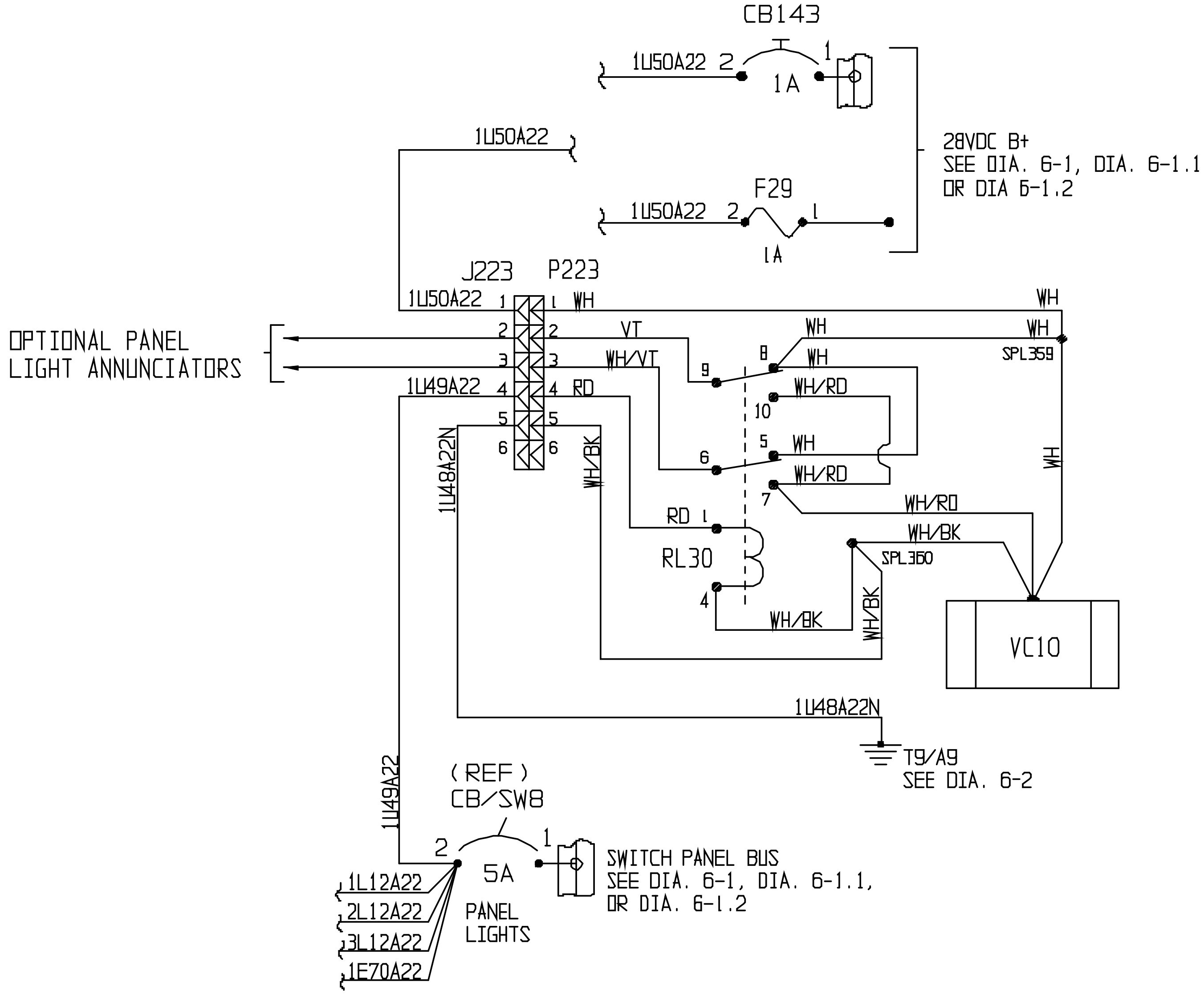
480/B Option (S/N 5238 and prior)
Sheet 1 of 2

Diagram 6-34. Avionics Cooling Fan



480/B Option (S/N 5239 and subsequent)
Sheet 2 of 2

Diagram 6-34. Avionics Cooling Fan



480/B Option (All S/N)

Diagram 6-35. Day/Night Panel Annunciator Lamp Power

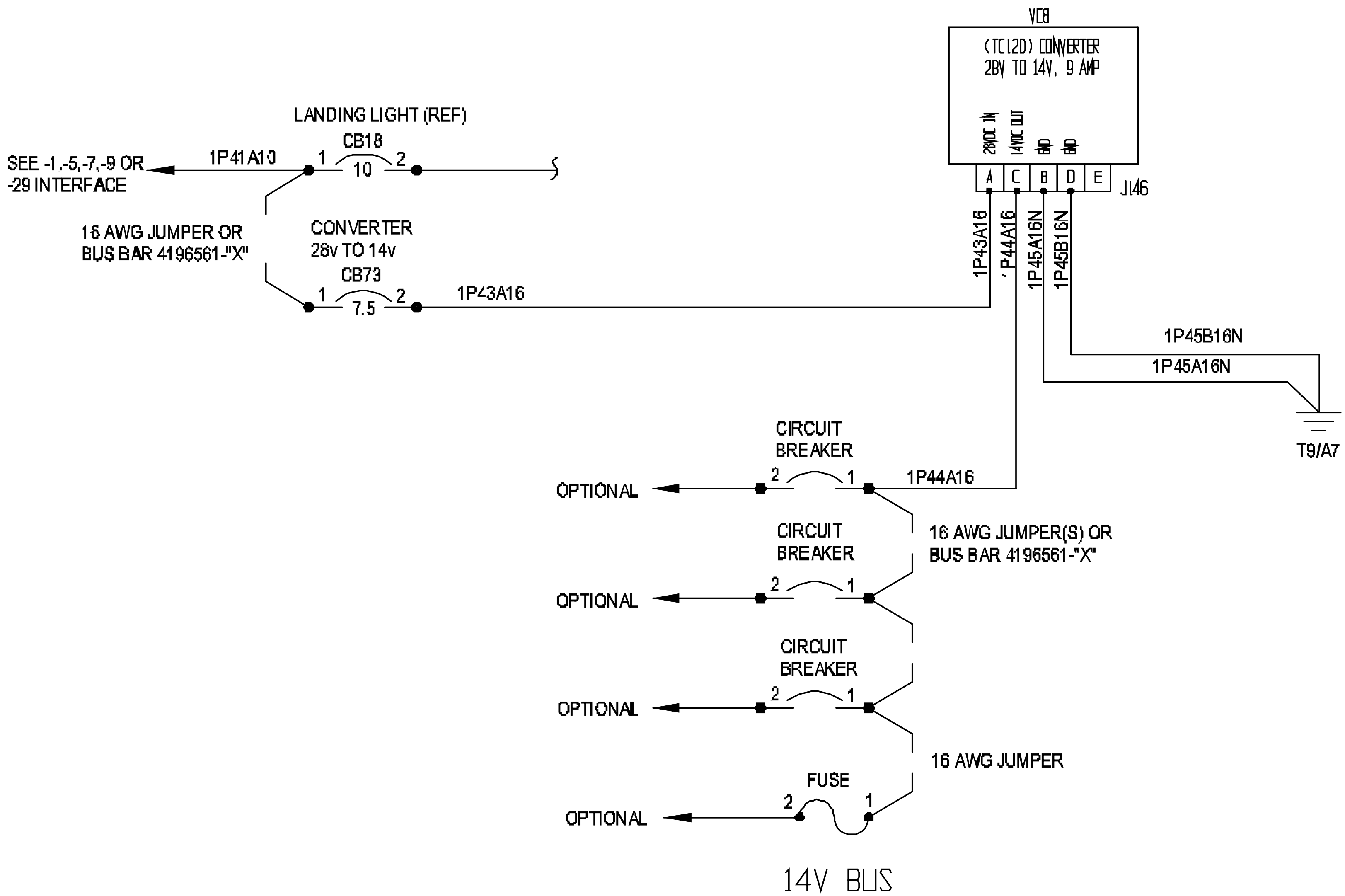


Diagram 6-36. 28V to 14V 9A Converter

(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.

(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 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).

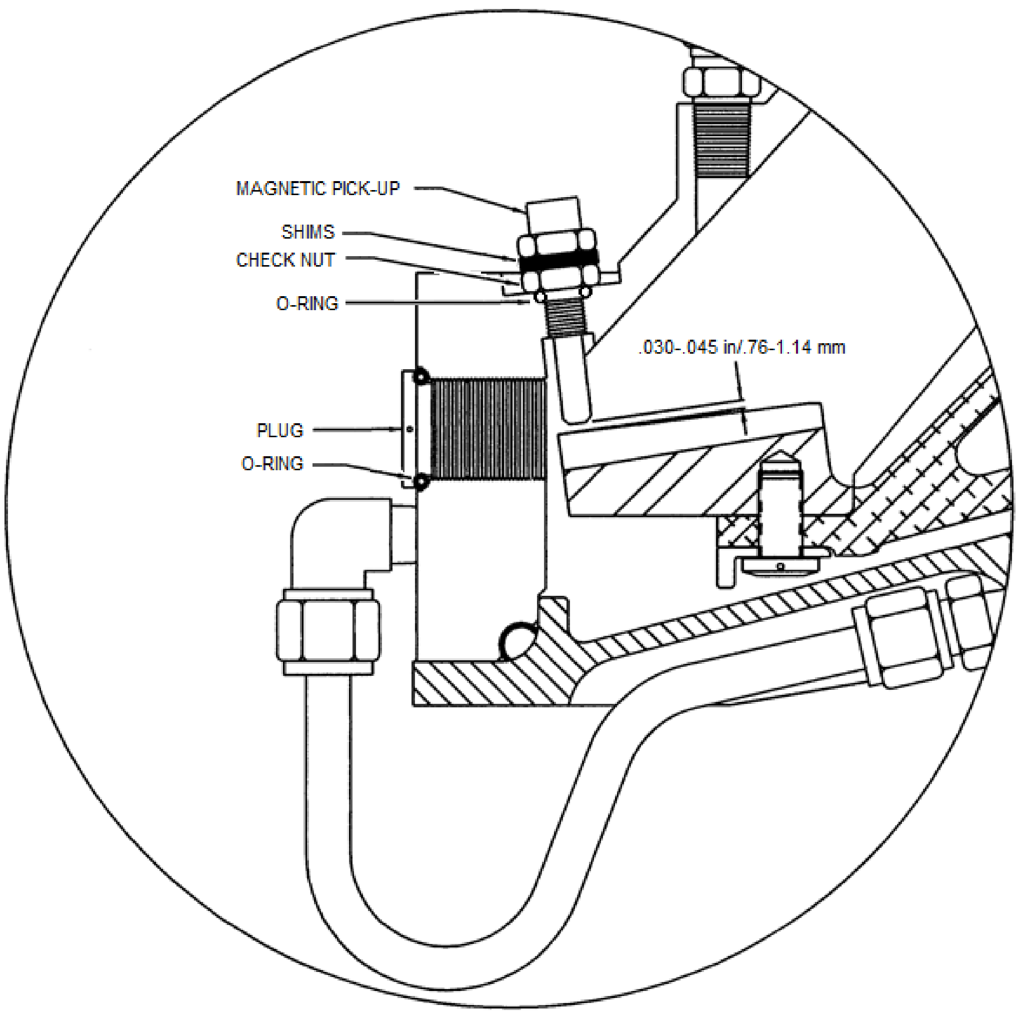


Figure 7-2. Magnetic Pick-up Installation

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.

CAUTION

Use a backing wrench when removing the temperature bulb to prevent from damaging the engine oil reservoir.

C. Remove the lockwire and remove the temperature bulb from the engine oil reservoir.

D. Remove the gasket from the temperature bulb.

7-34. Inspection – Engine Oil Temperature Bulb

A. Inspect the temperature bulb for cracks, leaks, security, and proper installation.

B. Inspect the electrical connector for damaged or bent pins and cracked inserts

7-35. Repair – Engine Oil Temperature Bulb

A. Repair damaged electrical connectors.

B. Replace the gasket.

C. Replace the temperature bulb if cracked or damaged.

7-36. Installation – Engine Oil Temperature Bulb

A. Lubricate the gasket and bulb threads with MIL-PRF-23699 and install the gasket onto the temperature bulb.

CAUTION

Use a backing wrench when installing the temperature bulb to prevent from damaging the engine oil reservoir.

B. Install the temperature bulb into the engine oil reservoir and lockwire using .032 wire.

C. Connect the electrical connector and lockwire with 0.020 lockwire.

D. Service the engine oil reservoir (para. 4-7).

7-37. Engine Oil Pressure Transducer

7-38. General Description – Engine Oil Pressure Transducer

The engine oil pressure transducer, located on the right side of the pylon assembly just aft of the engine, monitors engine oil pressure and transmits voltage signals to the engine oil temperature and pressure indicator.

7-39. Removal – Engine Oil Pressure Transducer

A. Open the right side engine access panel.

B. Disconnect the electrical connector and the oil pressure line from the engine oil pressure transducer. Cap, plug, and cover the open line, port, electrical connections.

C. Loosen the hardware securing the transducer in the mounting clamps and remove the transducer.

7-40. Inspection – Engine Oil Pressure Transducer

A. Inspect the transducer for cracks, security, and the mounting clamps do not cover the static ports in the middle area of the transducer.

B. Inspect the oil line for leaks and proper operation.

C. Inspect the electrical connector for damaged or bent pins and cracked inserts.

7-41. Repair – Engine Oil Pressure Transducer

A. Repair damaged electrical connectors.

B. Tighten loose oil line fittings.

C. Replace defective or damaged oil lines.

D. Replace the pressure transducer if cracked or damaged.

E. Reinstall a improperly mounted pressure transducer.

7-42. Installation – Engine Oil Pressure Transducer

A. Install the pressure transducer into the mounting clamps and position so the static ports are not obstructed by the clamps. Tighten the securing hardware.

B. Remove the caps, plugs, and covers. Reconnect the oil pressure line and the electrical connector.

7-43. Turbine Outlet Temperature (TOT) Indicator

7-44. General Description – Turbine Outlet Temperature (TOT) Indicator

The turbine outlet temperature (TOT) indicator indicates the turbine outlet temperature in degrees Celsius (°C). Two different type TOT indicator systems are used in the TH-28/480. The "passive" indicator system operates on electrical potential from the engine thermocouple harness via a thermocouple lead spool resistor. The "active" indicator system is powered by the aircraft electrical system and converts the electrical potential from the engine thermocouple

SECTION 8

STRUCTURES

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Paragraph	Description	Page

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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 The 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.

8-17. Installation – Access Panels, Covers, and Cowlings

Install the following access panels, covers, and cowlings using the procedures listed for each panel, cover, or cowling.

A. Forward Landing Gear Leg Panel(s):

(1) Install by reversing the removal instructions.

B. Keel Access Panel(s):

CAUTION

Support the keel access panel(s) during the installation process to prevent from damaging the antenna leads before the panels are installed.

(1) Install by reversing the removal instructions.

C. Engine Access Panel(s):

(1) Install by reversing the removal instructions.

D. Bottom Access Panel:

(1) Install by reversing the removal instructions.

E. Fuel Cell Cover(s):

NOTE

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

CAUTION

Use extreme caution to prevent from damaging the cover, fuel cell, fuel cell structure, or injuring yourself while removing the old sealant.

(1) Remove the old sealant from the fuel cell covers, the fuel cell support structures, and possibly the fuel filler port if the left side cover is removed.

NOTE

Do not install the sealant for the fuel cell covers until all troubleshooting, adjusting, and/or repairs have been made to the fuel cells, the fuel quantity system, or the low fuel warning system.

NOTE

Follow the mixing instructions on the sealant container or the sealant may not properly cure.

(2) Using a sealant meeting AMS-S-8802 Type II Class B, apply a bead on all interfacing fuel cell support structures – cowl ring, cabin structure, fuel shelf structure. Ensure the sealant is on the inboard side of the hardware used to secure the cell covers and apply more sealant in areas where needed to ensure proper sealing (lower forward corner for example).

(3) Place the cover in position and install the hardware along the bottom edge of the cover.

NOTE

Step (4) below only applies to TH-28s and 480s equipped with the Aerazur fuel bladder system.

CAUTION

Do not over inflate the fuel cells to prevent from damaging the fuel cell structure or the fuel cells.

(4) Install the hardware securing the fuel cells to the covers. Inflating the fuel cells might be required to perform this task. To inflate the fuel cells, ensure the fuel shutoff valve is "OFF", the sump drain and low point drain valves are closed, and that the fuel filler port is installed or the port in the fuel cell is taped over. Using filtered, dry, low pressure compressed air, inflate the fuel cells via the overboard vent line. Remove the air source after installing the hardware.

NOTE

Early model TH-28/480s may have had sealant installed between the fuel cell and the fuel cell cover at the filler port and may also have had sealant between the filler port assembly and the fuel cell cover. If your aircraft has had sealant installed in these areas, the sealant does not need to be installed when reinstalling the cover provided the old sealant is removed and the filler port area seals when reassembled.

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. Damage to the decorative vinyl tape (P/N 70-0160-1056-6) which covers the paint line may be repaired by removing the damaged portion 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.

(6) 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) Place the replacement windshield into position and verify it will properly fit. Mark areas of interference and trim the windshield using a belt sander. Ensure the cabin door upper hinge post cutout in the replacement windshield is large enough.

(8) Drill the mounting holes in the replacement windshield using a pointed dull #11 drill bit if “-10" screws are used to secure the windshield or a pointed dull #15 drill bit if “-8" screws are used to secure the windshield by temporarily taping the replacement windshield into place and back drilling the mounting holes through the cabin shell and center support.

CAUTION

Use extreme caution while using an awl or other suitable device to prevent from damaging the aircraft or injuring yourself.

NOTE

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

(9) Prepare the adhesive (PR-1425-B2 or equivalent) following the manufacturer's instructions and apply a coating approximately .0625 in/1.6 mm thick to the center support.

(10) 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.

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 sealant (Phenoseal 102 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 sealant (Phenoseal 102) 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 and cheek windows as follows:

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).

(1) 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.

(2) 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.

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

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

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

(6) Using a marker, mark the cabin hole locations.

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

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

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

(10) Using a pointed dull #17 (4.4 mm) drill bit, drill the replacement window at the marked locations.

(11) Sand the hole edge.

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

(13) 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.

(14) 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.

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

(16) Remove the mechanical fasteners (clecos).

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

(18) Paint the outer edges of the window.

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

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

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).

(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.

(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:

(1) 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.

(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.

(3) Separate the window from the cabin shell with a putty knife.

(4) Remove the residual tape or adhesive from the window recess and wipe the recess area clean with acetone or equivalent.

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

(6) Using a pointed dull #41 drill bit, drill as many holes as required through the window around the edges for mechanical fasteners (clecos) as required to secure window while the adhesive cures.

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

(8) 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.

(9) 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.

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

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

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

(13) Install the pop-out vent window.

(14) Paint the outer edges of the window.

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:

CAUTION

Protect the plexiglass window from damage.

(1) Remove the cabin door.

(2) Remove the handle from the sliding window and remove the window from the track.

(3) Remove the hardware securing the window track to the door window and remove the window track.

(4) Remove any residual tape from the cabin door window and the sliding vent track if the track is going to be reused.

NOTE

If a replacement track is installed and the cabin window is drilled for the installation, proceed to step (8). If the track is going to be reused and the cabin door window is not drilled, proceed to step (9). If the track or the window is not drilled for the installation, use as much of the damaged track and damaged cabin door window as possible for a template and the hole pattern.

(5) Tape the replacement track onto the cabin door window and Back drill through the window using a pointed dull #28 drill bit for the mounting holes.

(6) Tape the track into position and install the four screws in the forward edge of the track. Drill the remaining holes in the window using a pointed dull #28 drill bit. Turn the door over and carefully drill the four holes for the air deflector mounting blocks.

CAUTION

Use extreme caution while using an awl or similar tool to prevent from damaging the aircraft or injuring yourself.

(7) Remove the track from the window and apply double backing tape (3M brand # 4910-50) to the track. Perforate the tape at the rivet holes using an awl or other suitable device.

CAUTION

Do not over tighten the hardware for the window track.

(8) Install the track into position and press firmly against the window. Install the mounting hardware.

(9) Install the sliding window and the handle.

(10) Install the cabin door.

8-48. Landing Gear Assembly (Figures 8-5 & 8-6)

8-49. Description – Landing Gear Assembly

The landing gear assembly consists of two cross tubes, four landing gear legs, four air/oil oleos, two drag struts and two skid tubes. The cross tubes, which distribute the weight of the aircraft to the landing gear assembly, are sleeved aluminum tubes with clamps and end caps used to attach the gear legs and oleos. The aft cross tube is mounted to the bottom of the pylon assembly and the forward cross tube is mounted in the keel assembly. The gear legs are tubular steel and attach the skid tubes to the cross tubes. The oleos, connected between the ends of the oleos and just above were the landing gear legs attach to the skid tubes, cushion ground contact during landing. The oleos have a step attached to the lower portion to aid in entering and exiting the cockpit and performing inspections or maintenance in the aft fuselage area. The drag struts are tubular steel and used to give the gear stability and strength and to prevent fore and aft movement during ground contact maneuvers. The skid tubes are aluminum tubes which are used to distribute the weight of the aircraft onto the landing surface. Replaceable hardened steel skid shoes are installed on the skid tubes to protect against skid tube wear on hard surfaces. Attaching bolts or brackets for the ground handling wheels are also installed in the skid tubes. (Refer to SIL T-066, latest revision, for additional ground handling wheel bracket installation information.) All attachment points of the landing gear assembly except the cross tubes to pylon/keel assemblies and the gear legs to the skid tubes are pivoting attachments.

8-50. Removal – Landing Gear Assembly (Figures 8-5 & 8-6)

A. Remove the keel access panels.

B. Hoist up the aircraft (para. 4-68).

C. Remove the oleos (para. 8-65).

D. Remove the bolts securing the forward gear legs to the forward cross tube.

E. Remove the bolts securing the aft gear legs to the aft cross tube and remove the gear legs and skid tubes.

F. Remove the bolts securing the aft cross tube to the pylon and remove the cross tube.

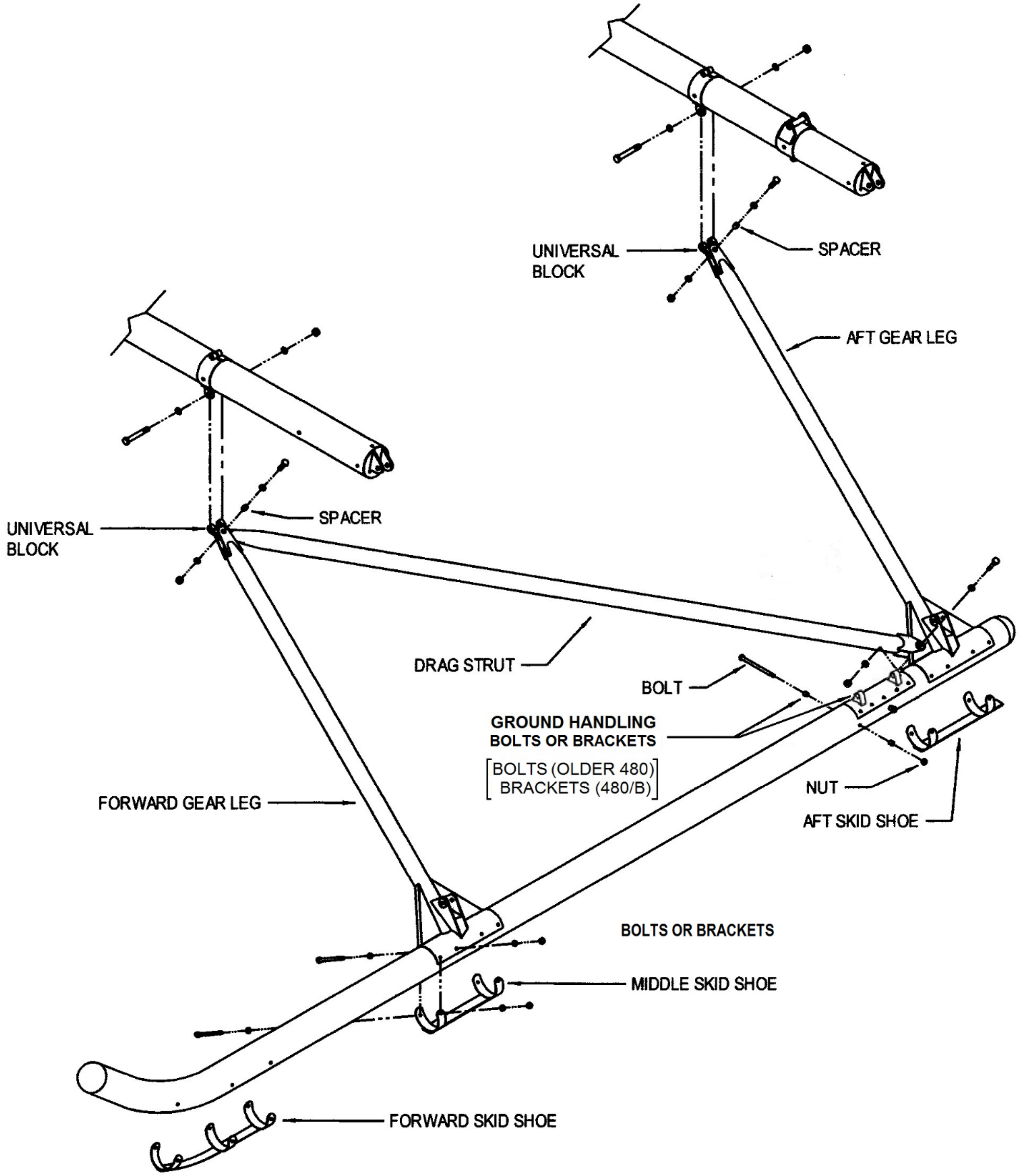
G. Remove the forward cross tube as follows:

(1) Remove the hardware from one of the end caps.

(2) Loosen the clamping hardware and remove the positioning hardware from both gear leg attachment clamps.

(3) Remove the hardware securing the cross tube in the keel assembly.

(4) Slide the cross tube out the side of the aircraft opposite of the end cap with the hardware removed. Remove the gear leg attachment clamps as they clear the end of the cross tube.



Sheet 2 of 2

Figure 8-6. Landing Gear Assembly

8-51. Disassembly – Landing Gear Assembly

NOTE

Disassembly of the landing gear is the same for both sides.

A. Remove the hardware and spacer attaching the universal blocks to the ends of the gear legs.

B. Remove the hardware attaching the drag strut to the aft gear leg and remove the strut.

C. Remove the hardware attaching the skid shoes and gear legs to the skid tube and remove the gear legs.

D. Remove the hardware attaching the forward skid shoe to the skid tube and remove the skid shoe.

E. Remove the attachment bolts or brackets, as applicable, for the ground handling wheels.

NOTE

Disassembly of the cross tubes is the same except as noted.

F. Remove the hardware securing the end caps into the cross tubes and remove the end caps.

G. Loosen the clamping hardware and remove the positioning hardware from the gear leg and the pylon attachment clamps and remove the clamps from the aft cross tube.

8-52. Inspection – Landing Gear Assembly

A. Inspect the cross tubes for bends, bows, corrosion, and cracks. Inspect the pylon attachment (aft cross tube) and the gear leg attachment clamps for corrosion, cracks, evidence of elongated bolt holes, and security of the attaching hardware.

B. Inspect the landing gear legs and drag struts for any deformation, distortion, all fittings and bolt holes for elongation, and all welds and gussets for cracks and corrosion.

C. Inspect the skid tubes for bends, bows, corrosion, cracks, dents, wear, and hardware attachment holes for elongation. Inspect the ground handling wheel attachment lugs for damage and security.

D. Inspect the skid shoes for wear (para. 8-62).

E. Inspect the oleos for damage, leakage, proper extension, and freedom of movement (para. 8-67).

F. Inspect all skid tube bolts for corrosion, especially if the helicopter is operated with the skids submerged, such as with floats.

8-53. Repair – Landing Gear Assembly

A. Cross Tubes:

(1) Cross tubes with bows up to 0.5 inches/12.7mm are serviceable. Replace cross tubes with bends, cracks, or elongated bolt holes.

(2) Replace end caps that are cracked or the bolt holes are elongated. Repair pylon attachment (aft cross tube) or gear leg attachment clamps that are cracked by welding I/A/W AC 43.13-1B. Replace pylon attachment (aft cross tube) or gear leg attachment clamps that have elongated bolt holes.

B. Landing Gear Legs and Drag Struts:

(1) Landing gear legs and drag struts that are bent, bowed, or cracked may be repaired I/A/W AC 43.13-1B. Contact The Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations.

(2) Replace landing gear legs with elongated bolt holes. Replace drag struts that have deformed, distorted, cracked, or elongated bolt holes (> 0.465 inch in any direction) of the forward attachment plate.

C. Skid Tubes:

(1) Skid tubes that are bent, bowed, dented, or have holes in them are repairable I/A/W AC 43.13-1B. Contact The Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations.

(2) Replace skid tubes with elongated bolt holes.

8-54. Assembly – Landing Gear Assembly

NOTE

Assembly of the cross tubes is the same except as noted.

A. Install the gear leg clamps and the pylon attachment clamps onto the aft cross tube. Ensure all of the clamps are oriented properly.

(1) Line the holes up between the P/N 4174013-903 clamp and the cross tube.

NOTE

Perform step 2 only if installing a new replacement aft cross tube and/or clamps.

(2) Ream the holes using a 5/16 Chicago-Latrobe type 405 Chucking Reamer.

(3) Lubricate the attachment bolts with a light coat of MIL-PRF-81322 grease.

NOTE

Eductor must be aligned IAW para. 13-14 before tightening the aft clamp bolts.

(4) Install and tighten the positioning and clamping bolts.

B. Install the end caps into the aft cross tube and in one side of the forward cross tube. Tighten the hardware.

NOTE

Assembly of the landing gear is the same for both sides.

C. Install the ground handling wheel attachment bolts or brackets, as applicable.

D. Install the forward skid shoe onto the skid tube.

E. Install the gear legs onto the skid tube. Install the two center bolts in the gear legs. Install the skid shoes into place and install the remaining hardware and tighten.

F. Attach the drag strut to the aft gear leg. Torque the hardware to 40-60 in-lbs/4.5-6.8 Nm.

G. Install the universal blocks onto the ends of the gear legs. Do not torque at this time.

8-55. Installation – Landing Gear Assembly

A. Install the forward cross tube as follows:

NOTE

Perform step 1 only if installing a new replacement forward cross tube.

(1) Ream the holes for the installation of the cross tube to the keel and the clamps to the cross tube using a 5/16 Chicago-Latrobe type 405 Chucking Reamer.

(2) Install the cross tube from the opposite side of the aircraft that the end cap is not installed in. Install the gear leg attachment clamps as the cross tube is installed into the keel assembly.

(3) Lubricate the attachment bolts with a light coat of MIL-PRF-81322 grease.

(4) Install the hardware securing the cross tube in the keel assembly and tighten.

(5) Install the positioning and clamping hardware into the gear leg attachment clamps and tighten.

(6) Install the end cap and tighten the hardware.

B. Install the aft cross tube onto the pylon and tighten the hardware.

C. Place the landing gear into position and install the hardware attaching the aft gear leg to the attachment clamp on the aft cross tube.

D. Install the hardware attaching the forward gear leg to the attachment clamp on the forward cross tube. Torque the gear leg and universal block attachment hardware to 40-60 in-lbs/4.5-6.8 Nm.

B. Assemble the guide shaft assembly (5) as follows:

(1) Press the brass guide (4) into position if previously removed.

(2) Install the wiper (3) into the brass guide (4).

(3) Install the O-ring (6) on the O.D. of the guide shaft (threaded end).

CAUTION

The concave side of the back-up ring must face toward the O-ring.

(4) Install the back-up ring (7) and then the O-ring (8) into the groove in the I.D. of the guide shaft (threaded end).

C. Lubricate both ends of the guide shaft assembly with hydraulic fluid (MIL-PRF-5606) and install the guide shaft assembly onto the piston shaft (2).

CAUTION

The flanged end of the spacer faces towards the threads of the guide shaft assembly.

D. Install the spacer (9) onto the piston shaft (2).

CAUTION

The notches in the rebound rings must be staggered.

E. Install the rebound rings (5 each) (10) on to the piston shaft (2).

F. Align the flow passage port on the inner edge of the piston assembly (12) to the flow passage hole in the piston shaft (2) and install the piston assembly.

CAUTION

The ends of the dowel pin must be seated below the O.D. surface of the piston to prevent possible binding on installation in the cylinder assembly.

G. Secure the piston assembly to the piston shaft with the dowel pin (11).

CAUTION

The notches in the rebound rings must be staggered.

H. Slide the guide shaft assembly (5) and the rebound rings (10) up against the piston assembly (12).

CAUTION

Do not clamp the cylinder in the vise by the ears at the bottom of the cylinder. Use tool T-0169-1.

I. Clamp the cylinder assembly (13) in a vise using tool T-0169-1 in an upright position. Fill the cylinder to the base of the threads with hydraulic fluid (MIL-PRF-5606).

CAUTION

The notches in the rebound rings must be staggered.

NOTE

The piston must be inserted into the cylinder assembly slowly to allow the hydraulic fluid to work through the staggered notches of the rebound rings and the flow passage in the piston assembly.

J. Install the piston and guide shaft assembly. Insert piston and guide assembly into the base of the cylinder assembly.

K. Hand tighten the guide shaft assembly to the cylinder assembly. Make an index mark from the guide shaft assembly (5) to the cylinder assembly (13).

L. Torque the guide assembly using tool T-0169-1. Using the index mark from step K above, torque the guide assembly to the cylinder assembly by turning the index mark on the cylinder assembly approximately 1/4 in/6 mm past the index mark on the guide assembly.

M. Install and secure oleo valve (1) and torque to 170-180 in-lb/19.2-20.3 Nm. Safety (0.032) the valve to the mount flange of the piston shaft. Loosen the air valve.

N. Attach one end of a clear plastic hose to the oleo valve and the other end in a container of MIL-PRF-5606. Open the oleo valve. Slowly pump the strut in and out until the hose is free of air bubbles when compressing the oleo assembly. Fully collapse the strut, tighten the air valve, and remove the hose.

O. Torque the guide assembly using T-0169-1. Using the index mark, torque the guide assembly to the cylinder assembly by turning the index mark on the cylinder assembly approximately ¼ inch past the index mark on the guide assembly.

NOTE

The oleo may be pressurized before or after installation in the helicopter.

P. Connect the nitrogen pressure line to the oleo valve. Set the nitrogen pressure regulator to 550 psig/3790 kPa for the aft oleos and 250 psig/1720 kPa for the forward oleos. Remove oleo from the vise and remove tools T-0035 and T-0169-1.

<u>WARNING</u>

The piston shaft will extend when the oleo valve is opened.

Q. **Slowly** open the oleo valve and allow the oleo to fill until the piston shaft is fully extended and the oleo pressure has equalized to the regulator pressure. Close the oleo valve.

R Close the nitrogen tank valve, set the regulator pressure back to zero, and disconnect the nitrogen pressure line from the oleo valve.

S. Install the valve cap.

T. Inspect the oleo for leaks.

8-70. Installation – Oleos (See Figure 8-7)

NOTE

If required, install the oleo condition placard (para. 8-70.2) prior to lowering the aircraft.

Use the following procedures to install any of the oleos.

Refer to SIL T-028 to facilitate oleo fairing installation. If SIL T-028 has not been complied with, install the fairings for the oleos while installing the oleos.

A. Install the top and bottom universal block to the oleo assembly.

NOTES

The P/N 4174027-11 bolt used to attach the universal to the oleo is a special bolt with the head thickness and thread length decreased. Install the bolt so that the nut will be facing outward when the oleo is installed on the aircraft.

Install the bolt attaching the forward oleos to the crosstube with the bolt head facing aft.

Lubricate the attach bolt hardware with LPS 2, ACF 50, or MIL-PRF-81322 grease and install while wet.

(1) Place a light washer on each side of the universal link and install the link between the mounting ears of the cross tube. Secure using a bolt, heavy washers, and a nut.

(2) Install the oleo with the valve facing aft to the top cross tube.

(3) Connect a spring scale to the bottom hole in the bottom universal link and torque the top attachment hardware until it requires 2 lb force to swing the oleo strut assembly in and out and fore and aft.

(4) Use a beam type in/lb torque wrench to record the torque on the nut that is installed on the bolt facing aft.

(5) Place a light washer on each side of the universal link and connect the bottom universal block to the landing gear leg.

(6) Remove the hardware connecting the top of the oleo to the cross tube. Set the hardware aside in the same position and order for installation.

(7) Connect the spring scale to the top hole in the top universal link and torque the attachment hardware at the bottom universal block connections with a required 2 lb drag as in step 3 above.

(8) Reinstall the top universal link to the cross tube. Ensure the hardware is installed in the position and order as previously installed.

(9) Tighten the nut to the torque setting recorded in step 4.

B. Pressurize the oleos in accordance with para. 8-70, steps O through S if not pressurized previously.

C. Lower the aircraft.

D. Check the oleos for proper extension and adjust as required.

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).

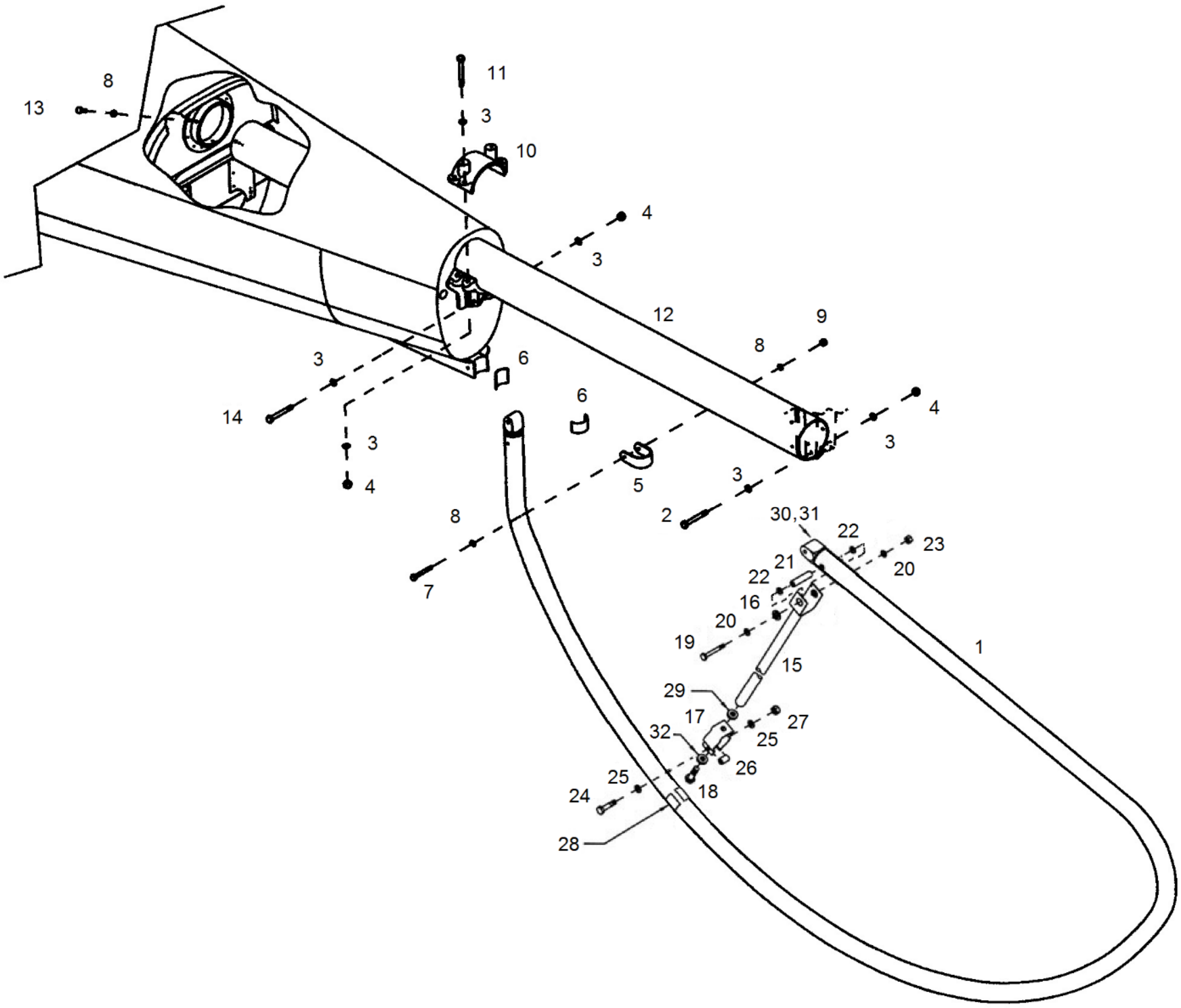
8-113. Tail Rotor Guard (Figure 8-11)

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.

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 of 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 Atuned@ 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
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[1] (06701)
Grease	Grease	MIL-PRF-81322
Hydraulic Fluid	Hydraulic Fluid	MIL-PRF-5606[2]
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[3]
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	Vinyl Sealant Glouchester Co., Inc. P.O. Box 428, Franklin, MA 02038	Phenoseal 102
Sealant	Fire Barrier Sealant, 3M Brand	CP25WB+
Shielding Coating	EMI/RFI Shielding Coating, Acheson Brand	Electrodag 437

[1] MIL-PRF-81322 is an acceptable alternate.
[2] AeroShell Fluid 41 (Shell Oil), Royco 756 (Anderol), or Phillips X/C 5606H (Phillips 66)
[3] 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	Double Sided, Foam 1", 3M Brand	4016-1
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[4]
Thread Sealant	Thread Sealant, Vibra-Tite Brand	VC-3

[4] Acceptable alternate to VC-3.

SECTION 9

ROTOR SYSTEMS

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ROTOR SYSTEMS

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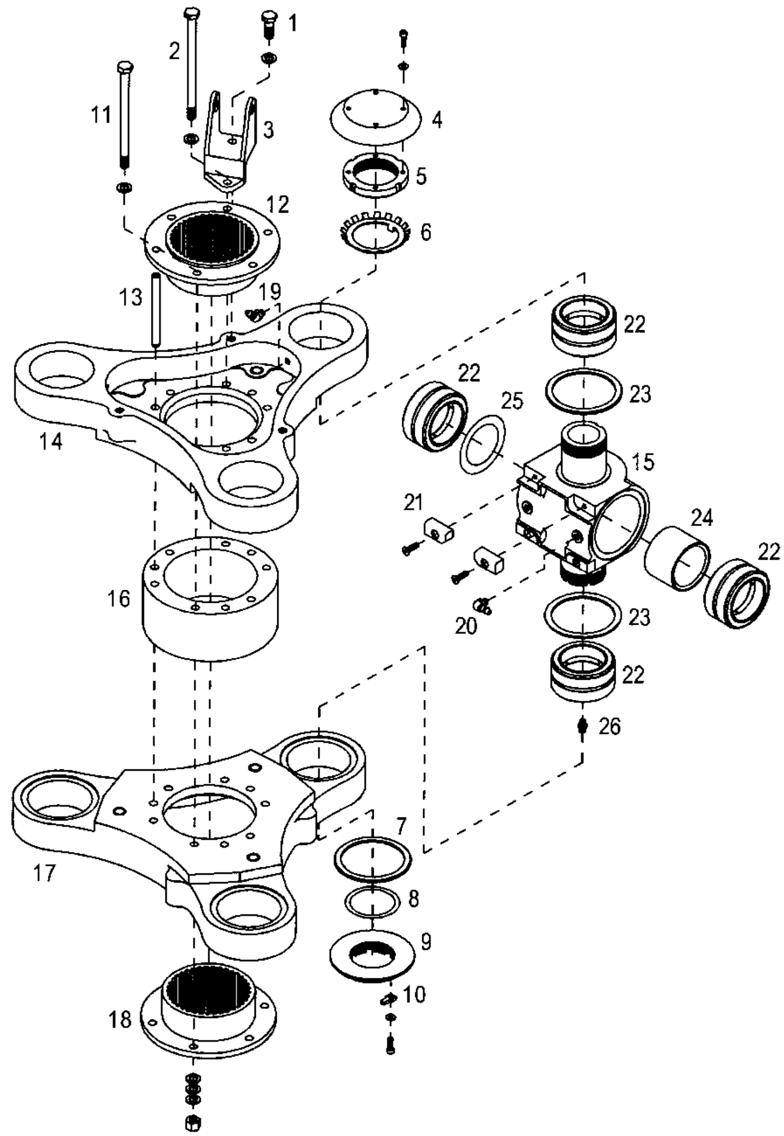
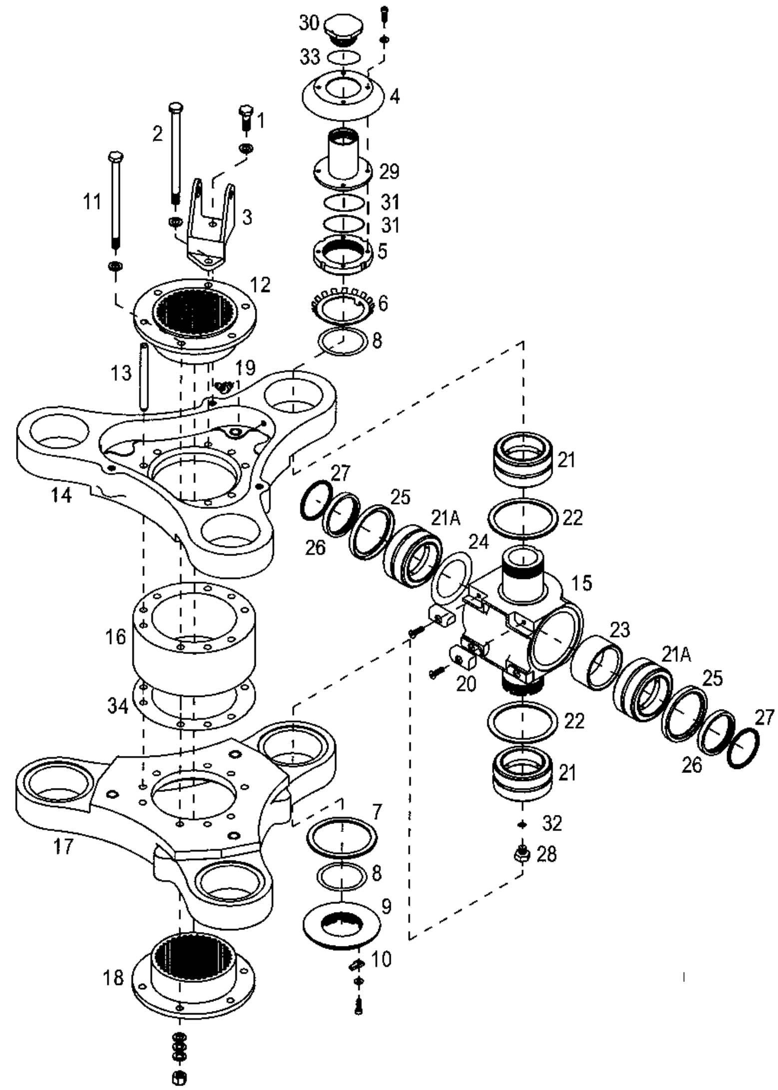


1.	Bolt	14.	Upper Hub Plate
2.	Bolt	15.	Universal Block
3.	Bracket	16.	Center Spacer
4.	Dust Cover	17.	Lower Hub Plate
5.	Retaining Nut	18.	Lower Spline Adapter
6.	Lock Washer	19.	Grease Fitting
7.	DU Washer	20.	Grease Fitting
8.	Shim	21.	Stop Pad
9.	Retaining Nut	22.	Bearing
10.	Lock Key	23.	DU Washer
11.	Bolt	24.	Spacer
12.	Upper Spline Adapter	25.	Shim
13.	Dowel Pin	26.	Grease Fitting

Figure 9-4. Main Rotor Hub Assembly with Grease Lubricated Flapping Bearings



1.	Bolt	19.	Grease Fitting
2.	Bolt	20.	Stop Pad
3.	Bracket	21.	Bearing
4.	Dust Cover	21A.	Bearing
5.	Retaining Nut	22.	DU Washer
6.	Lock Washer	23.	Spacer
7.	DU Washer	24.	Shim
8.	Shim	25.	Seal
9.	Retaining Nut	26.	Sleeve
10.	Lock Key	27.	O-Ring
11.	Bolt	28.	Plug
12.	Upper Spline Adapter	29.	Reservoir
13.	Dowel Pin	30.	Reservoir Cap
14.	Upper Hub Plate	31.	O-Ring
15.	Universal Block	32.	O-Ring
16.	Center Spacer	33.	Seal
17.	Lower Hub Plate	34.	Shim
18.	Lower Spline Adapter		

Figure 9-5. Main Rotor Hub Assembly with Oil Lubricated Flapping Bearings

M. Heat the upper hub plate to approximately 250°F/121°C and lift the hub plate from the universal blocks (15). Tap with a plastic mallet if necessary.

N. Heat the lower hub plate to approximately 250°F/121°C and tap the universal blocks from the hub plate.

(1) Remove center spacer (16) and shim (34), if installed.

O. Remove the grease fittings (19) from the hub plates.

9-9. Inspection – Main Rotor Hub

A. See Table 9-1 for detailed inspection of the main rotor hub assembly.

9-10. Repair – Main Rotor Hub

A. Repair or replace components of the main rotor hub as indicated in Table 9-1.

9-11. Assembly – Main Rotor Hub (Figure 9-4 or 9-5)

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.

NOTE

The upper hub plate has heli-coil inserts in the outer bosses for the walking beam mount brackets. The lower hub plate bosses are solid.

A. Heat the upper hub plate (14) and the lower hub plate (17) to approximately 250°F/121°C.

B. Place the lower hub plate on 2" X 4" wood blocks. Lubricate the bearing bores with MIL-PRF-81322.

NOTE

Ensure the DU washers have been installed on the U-blocks with the chamfered side facing the hub plates. The DU washers must be seated in the recessed area of the hub plate.

C. Install the U-block (universal block) assemblies (15) into the bearing bore of the hub plate with the threaded notched end of the U-blocks down (3 places).

Table 9-1. Main Rotor Hub Assembly

Inspection Requirements

P/N	Fig. 9-4, 9-5 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
28-14202-1	3	Walking Beam Bracket	Deformed or cracked ears	None Allowed	Not Repairable	Replace Bracket
			Security of the bushings in the bracket	No Play Allowed	Not Repairable	Replace Bracket
			Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth
28-14227-1, -11	5 Fig. 9-6, 6	Nut	Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut
W-09	6	Lockwasher	Tangs (deformed or cracked)	None Allowed	Not Repairable	Replace Lockwasher
28-14236-1	7	DU Washer	Flatness	.005	Not Repairable	Replace Washer
			Thickness .090 to .093	-.003	Not Repairable	Replace Washer
28-14256-1	9	Nut	Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut
28-14224-1, -3, -5	12 & 18	Spline Adapters	Inboard face of adapter perpendicular to the O.D.	.0025 FIM	Not Repairable	Replace Adapter
			O.D. 3.6235 to 3.6245	-.0005	Not Repairable	Replace Adapter
			Spline pitting	.003 deep	Not Repairable	Replace Adapter
			Spline corrosion	None Allowed	Surface corrosion	Remove with wire brush

Table 9-1. Main Rotor Hub Assembly

Inspection Requirements

P/N	Fig. 9-4, 9-5 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
28-14224-1, -3, -5	12 & 18	Spline Adapters (Cont'd)	Spline wear	.0015 on side	Not Repairable	Replace Adapter
			Nicks, scratches, or corrosion	.010 deep	≤ .010 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Adapter
28-14280-1, -3, -5	14	Upper Hub	Spline Adapter Bore 3.624 to 3.625	+.0005	Not Repairable	Replace Upper Hub
			U Block Bearing Bores 2.4986 to 2.4994	+.0008	Not Repairable	Replace Upper Hub
			Recesses for the DU washers parallel to the upper surface within .001	+.0005	Not Repairable	Replace Upper Hub
			Damper Bolt Bushing Dia. .3747 to .3757	+.0005	Not Repairable	Replace Bushing
			Threads for walking beam brackets (crossed or missing)	None Allowed	Not Repairable	Replace Heli coil
			Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Upper Hub

Table 9-1. Main Rotor Hub Assembly

Inspection Requirements

P/N	Fig. 9-4, 9-5 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
28-14223-1	16	Spacer	Dowel Hole Dia. .3125	+.0005	Not Repairable	Replace Spacer
			Bolt Hole Dia. .313 to .318	+.002	Not Repairable	Replace Spacer
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Spacer
28-14281-1, -3, -5	17	Lower Hub	Spline Adapter Bore 3.624 to 3.625	+.0005	Not Repairable	Replace Lower Hub
			U Block Bearing Bores 2.4986 to 2.4994	+.0008	Not Repairable	Replace Lower Hub
			Recesses for the DU washers parallel to the lower surface within .001	+.0005	Not Repairable	Replace Lower Hub
			Damper Bolt Bushing Dia. .3747 to .3757	+.0005	Not Repairable	Replace Bushing
			Nicks, scratches, or corrosion	None Allowed	≤ 0.10 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Lower Hub

* All dimensions are in inches.

D. Place the spacer (16) and shim (34), if installed, on the lower hub plate and align the bolt holes.

NOTE

Ensure the DU washers are seated in the recessed areas of the upper hub plate.

E. Lubricate the bearing bores of the upper hub plate and install the upper hub plate onto the U-blocks.

F. Lubricate the dowel pins (13) and install by tapping them into the center hole of the 3-hole bolt pattern. Install the pins until they are slightly recessed from the surface of the hub plate.

NOTE

The upper spline adapter has the wider flat surface on top side of the splines while the lower adapter has a rib extending from the lower end of the splines.

CAUTION

The phasing marks on the upper spline adapter must be aligned with one of the pitch change bellcrank mount brackets. Using a felt marker, mark a line on the outboard edge of the hub plates in line with the spline phasing marks to aid in installing the lower spline adapter.

G. Insert bolts in the upper spline adapter (12) as guides and install the adapter onto the upper hub plate.

H. Carefully turn the hub assembly over and position on wood blocks.

I. Install the lower spline adapter (18) and align the phasing mark with the upper adapter phasing marks.

J. Turn the hub assembly over and install the center hub bolts (11) in the holes adjacent to the pitch change bellcrank mount bracket holes. Install the washers and nuts and torque the hardware.

K. Install the pitch change bellcrank mount brackets (3). Torque the through bolts (2). Torque and lockwire (.032) the other bolts (1).

L. Set the rotational drag of the U-blocks as follows:

(1) Place the hub assembly on a hub stand with the lower end of the U-blocks up.

(2) Install a DU washer (7) into the recess of the hub plate with the chamfer in board toward the hub plate.

(3) Install shims (8) approximately .025 inch/0.6 mm thick and the lower U-block nut (9). Tighten the nut using tool (T-0003).

(4) Rotate the U-block to one of the stops and install a hinge pin into the retention pin hole until the inside edge of the flange is 7.1 inches/18 cm from the center of the universal block.

(5) Place a wire loop around the hinge pin against the flange. Attach a spring scale to the wire loop and pull to check the drag. The drag tolerance with the nut torqued is 4-10 pounds/1.8-4.5 kg.

(6) Add or subtract shims as required to obtain the proper drag.

(7) Place the locking key (10) into the slot on the nut that is aligned with the notch in the U-block and secure with the washer and screw.

M. Turn the hub assembly over on the stand.

N. Install the upper U-block nuts (5) as follows:

NOTE

If the hub is equipped with oil lubricated flapping bearings, shims may be required between the bearing and the lock washer to prevent the universal block from protruding above the nut. The oil reservoir flange must seat flush against the nut.

(1) Install the lock washer (6) and nut on the U-block.

(2) Torque the nut to 20 ft-lbs/27.3 Nm using tool (T-0051).

(3) Tap down on the upper nut with a plastic mallet and re-torque the nut to seat the bearing. Repeat the process until the nut will not move while being re-torqued.

(4) Bend the tab on the lock washer that aligns with the recess in the nut into the nut.

(5) If the main rotor hub assembly is equipped with grease lubricated flapping bearings, install the dust cover (4) and secure.

(6) If the main rotor hub assembly is equipped with oil lubricated flapping bearings:

a. Install new O-rings (31) on the reservoir (29). Lubricate the O-rings with MIL-PRF-23699 and (Figure 9-5, 29).

b. Install the reservoir (29) onto the universal block (15) using a twisting motion until the base of the reservoir seats flat against the universal block.

CAUTION

Ensure the reservoir is fully seated into the universal block before installing the screws. Do not attempt to seat the reservoir into the universal block by using the screws. The reservoir will distort and crack.

c. Install the dust cover (4) and secure.

9-15. Disassembly – Retention Assembly (Figure 9-7)

NOTE

If replacing the tension-torsion straps only, proceed to paragraph 9-19.1.

NOTE

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.

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.

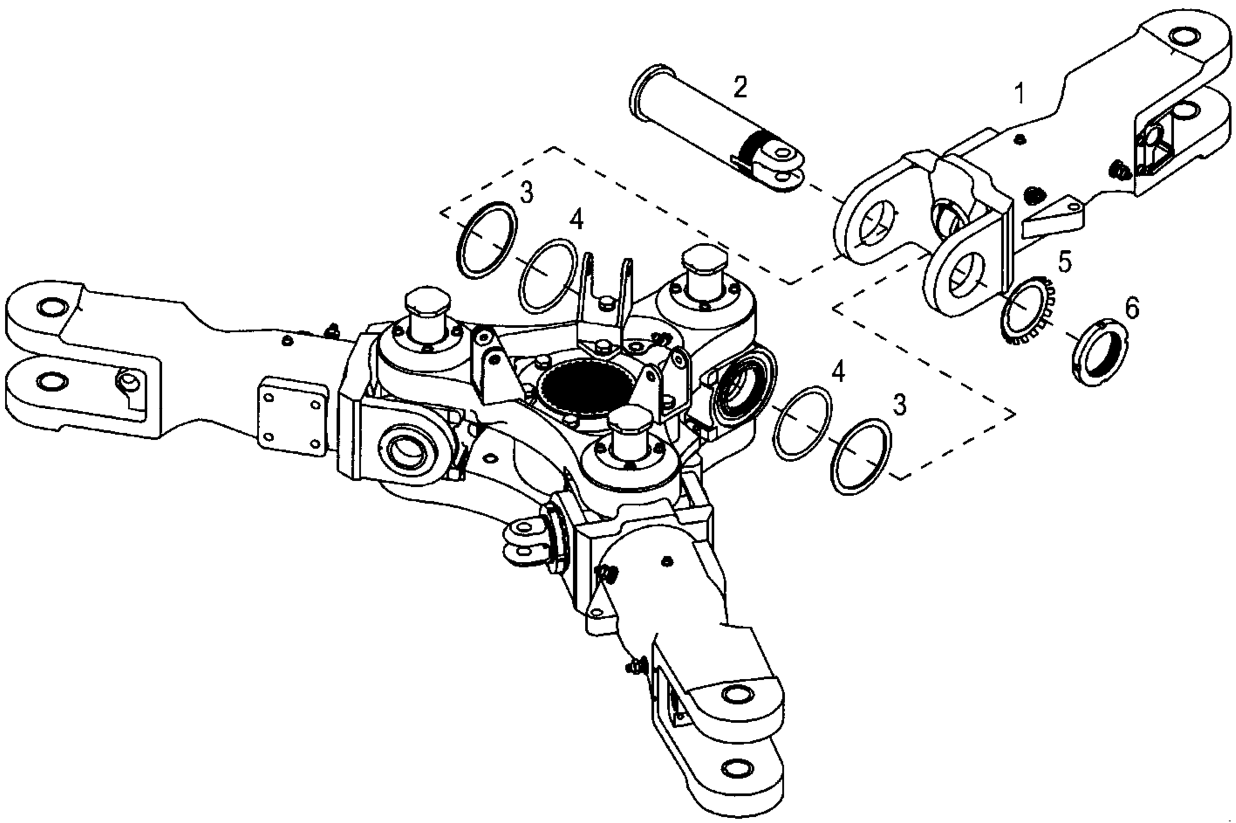
CAUTION

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

Figure 9-6. Retention Assembly Installation

(10) Remove the hinge pin alignment pin from the ear of the spindle using a small punch.

(11) Install a press tool between the seal (6) and the bearing (7) on the spindle. Using a hydraulic press, press the bearings (7 & 9) and spacer (8) from the spindle.

(12) Remove the seal (6).

NOTE

Removal/replacement of the retention stops are necessary only if the stops are damaged or the adhesive has loosened.

(13) Remove the retention stops (1 & 4).

(14) Remove the cap from the bore of the spindle (2).

(15) Remove the planipetal weight (22) and the pitch horn (21) from the blade grip.

B. Tension-Torsion Strap equipped aircraft:

NOTE

There are two different Tension-Torsion Strap Retention Assemblies used on the TH-28/480 Series. The 28-14381-1 Retention Assembly uses an O-ring at the outboard end of the spindle assembly to prevent grease leakage from the retention assembly. The 28-14381-3 Retention Assembly uses a seal installed in the blade grip to prevent grease leakage from the retention assembly.

NOTE

If equipped with STC SH03465CH tension-torsion straps, refer to Table 2-2 for manufacturer installation instructions and instructions for continued airworthiness.

(1) Remove the retention assembly from the main rotor hub (para. 9-14).

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.

(3) Remove the dust cover (18) from the blade end of the retention assembly.

(4) Remove one of the retaining rings (31) securing the pin in the lug at the outboard end of the retention assembly. Remove the pin (30) and the remaining retaining ring.

(5) Pull the blade grip (28) from the spindle.

NOTE

Only remove the seal from the blade grip if replacing a defective seal or blade grip.

(6) Remove the O-ring (27) from the spindle (28-14381-1 Retention Assembly). Remove the seal (33) from the grip (28-14381-3 Retention Assembly).

NOTE

The pin used to secure the tension-torsion strap at the inboard end is not secured with retaining rings.

(7) Remove the spindle from the vise and push the tension-torsion strap (25) back through the spindle.

(8) Remove the pin (23) from the cylinder (24) and separate the tension-torsion strap from the cylinder.

(9) Remove the retaining ring (10) from the spindle.

NOTE

Do not remove the cylinder alignment pin from the spindle unless required.

(10) If required, remove the flapping pin alignment pin from the ear of the spindle and the cylinder alignment (32) pin using a small punch.

(11) Install a press tool between the seal (6) and the bearing (7) on the spindle. Using a hydraulic press, press the bearings (7 & 9) and spacer (8) from the spindle.

(12) Remove the seal (6).

NOTE

Removal/replacement of the retention stops are necessary only if the stops are damaged or the adhesive has loosened.

(13) Remove the retention stops (1 & 4).

(14) Remove the hardware securing the lug to the blade grip and remove the lug (29).

(15) Remove the pitch horn (21) from the 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
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)	Not Repairable	Replace Bearing
			External to internal tab angle 15°	±.5°	Not Repairable	Replace Bearing
			Column separations (see Note and also SDB T-054)	None Allowed	Not Repairable	Replace Bearing
28-14335-1	16	Nut	Thrust face for flatness	.0015	Not Repairable	Replace Nut
			Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut

Note: 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.

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.

Table 9-2. Retention Assembly

Inspection Requirements*

P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14007-1 &-3	19	Blade Retention Bolt	O.D. .8738 to .8745	-.0002	Not Repairable	Replace Bolt
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Bolt
			Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Bolt
28-14283-1	20	Drag Link	Distance between blade grip ears .748	∀ 001	Not Repairable	Replace Link
			Distance between blade root ears .564 to .566	± .0005	Not Repairable	Replace Link
			Retention bolt hole Dia. (2 places) .3745 to .3750	+.0002	Not Repairable	Replace Link
			Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Link

Table 9-2. Retention Assembly

Inspection Requirements*

P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14278-1	21	Pitch Arm	Pitch change link bolt and mount bolt hole Dia. (5 places) .312 to .315	+.001	Not Repairable	Replace Arm
			Nicks, scratches, or corrosion	None Allowed	≤ 0.10 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Arm
4143010-5	22	Planipetal Weight	Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Planipetal Weight
28-14382-19,& -21	23, 30	Retention Pin	O.D. .747 to .749	-.002	Not Repairable	Replace Pin
			Nicks, scratches, or corrosion	None Allowed	≤ .005 deep	Blend and polish out smooth
			Cracks	None Allowed	None Allowed	Replace Pin

Table 9-2. Retention Assembly

Inspection Requirements*

P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14383-13, & -15	24	Cylinder	O.D. 2.101 to 2.100	-.002	Not Repairable	Replace Cylinder
			Pin bore .750 to.751	-.002	Not Repairable	Replace Cylinder
			Index groove width .125 to .129	+.005	Not Repairable	Replace Cylinder
			Nicks, scratches, or corrosion	None Allowed	≤ .005 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Cylinder
ECD084-1	25	Tension-Torsion Strap	Broken wires	None Allowed Notify Enstrom	Not Repairable	Replace Strap
			Strap bulge	Notify Enstrom		
			Cracks in urethane coating	Notify Enstrom		
			Delamination of urethane coating	Notify Enstrom		
			Swelling from grease contamination	None Allowed	Not Repairable	Replace strap if swollen. Clean strap with denatured alcohol
			Cracks in strap bushings	None Allowed	Not Repairable	Replace Strap

Table 9-2. Retention Assembly

Inspection Requirements*

P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
ECD084-1	25	Tension-Torsion Strap (Cont'd)	Fretting corrosion on bushing flange	.002 deep over 25% of total flange area	Not Repairable	Replace Strap
			Fretting corrosion in bushing bore	.002 deep over 25% of bore area	Not Repairable	Replace Strap
AA-ECD-084-480	25	Tension-Torsion Strap	Refer to manufacturer's instructions for continued airworthiness (ref. Table 2-2)			
28-14385-11, -13 & -15	26	Spindle	Cylinder bore Dia. 2.102 to 2.106	+.003	Not Repairable	Replace Spindle
Inspect remainder of spindle following the inspection criteria listed earlier in this table						
28-14386-1 & -3	28	Blade Grip	O-ring bore Dia. 2.016 to 2.018	+.002	Not Repairable	Replace Blade Grip
Inspect the remainder of the blade grip following the inspection criteria listed earlier in this table						
28-14386-5	28	Blade Grip	Seal bore Dia. 2.249 to 2.250	+.002	Not Repairable	Replace Blade Grip
Inspect the remainder of the blade grip following the inspection criteria listed earlier in this table						
28-14384-13	29	Lug	Pin bore Dia. .750 to .751	+.002	Not Repairable	Replace Lug
			Nicks, scratches, or corrosion	None Allowed	≤ .005 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Lug

Table 9-2. Retention Assembly

Inspection Requirements*

P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14384-15	29	Lug	Pin bore Dia. .750 to .751	+.002	Not Repairable	Replace Lug
			Nicks, scratches, or corrosion	None Allowed	≤ .005 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Lug

* All dimensions are in inches.

(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 DU washer (11) with the chamfered side of the washer facing the bearings.

(10) Install the O-ring (12) on the spindle and seat against the DU washer.

(11) Install tool (T-0036) behind the seal with the chamfered side of the tool toward the large radius of the spindle.

(12) Lubricate (MIL-PRF-81322) the bore of the blade grip and install the grip (13) on the spindle. Tap the grip onto the spindle with a plastic mallet until the seal in seated in the grip.

(13) Remove tool (T-0036) and tap the blade grip until fully seated on the spindle.

(14) Install the nylatron strap (5) inside the lamiflex bearing (14). Ensure that the ends of the nylatron do not overlap.

(15) Install the lamiflex bearing (14) and nylatron strap (5) onto the spindle. Install the tabs on the bearing into the notches in the spindle and the grip.

(16) Install the nut (16) and torque until the grip is fully seated on the spindle. Release the torque on the nut.

(17) Shim (15) the nut until the cotter pin hole in the nut aligns with the hole in the spindle when the nut is tightened (5-15 in-lbs/0.6-1.7 Nm).

NOTE

Add or subtract shims until the cotter pin hole in the nut aligns with the hole in the spindle when the nut is tightened finger tight. Do not under tighten the nut to align the holes. Do not over tighten the nut to align the holes.

CAUTION

The shims must be installed with the O.D. of the shims concentric to the O.D. of the nut and the lamiflex bearing. Improper alignment of these shims can cause wear to the inner surfaces of the main rotor blade grip (Figure 9-9).

(18) Install the nut on the spindle and tighten until finger tight.

(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[7] 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[7] 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-0149-11) with the open face against the tool.

b. Place the blade grip over the seal installation tool.

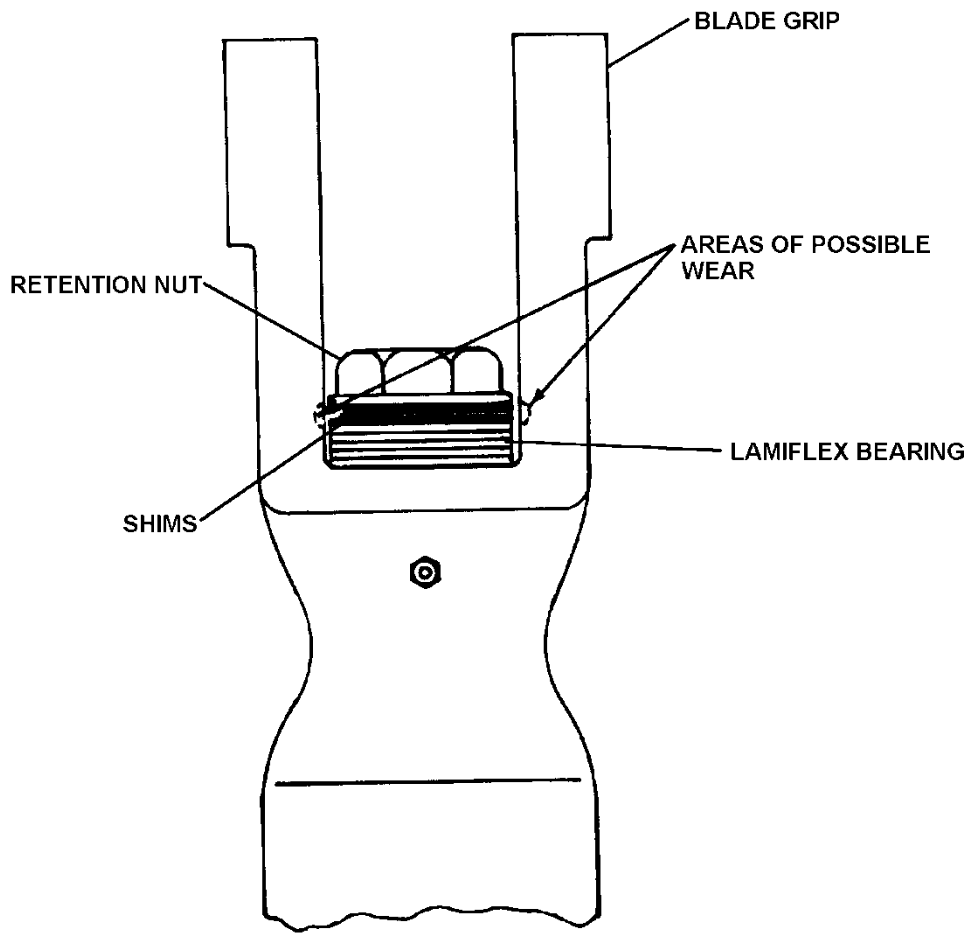


Figure 9-9. Lamiflex Bearing Shim Installation

c. Place tool T-0149-13 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 and lug (not shown in Figure 9-8) using the following procedure:

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[7] 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.

(10) Install the retaining ring (10).

(11) Install tool (T-0036) behind the seal with the chamfered side of the tool toward the large radius of the spindle.

(12) Remove the spindle from the vise and insert the grip installation pilot tool (T-0149-12) into the spindle.

(13) Lubricate (MIL-PRF-81322) the seal surface on the adapter in the outboard end of the spindle.

(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. Remove the pilot tool (T-0149-12) and the seal tool (T-0036) from the spindle.

(15) 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.

(16) 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) when the tension-torsion strap is installed in the spindle and install the retention pin (23).

(17) Lubricate (MIL-PRF-81322) the portion of the inner spindle bore (3) that contacts the O.D. of the cylinder (24).

(18) Install the tension-torsion strap into the spindle and ensure the groove in the cylinder engages the pin in the spindle.

(19) 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.

(20) Install the dust cover (18).

(21) 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.

(22) Install the flapping pin alignment pin into the spindle ear if it was removed.

(23) Install the retention assembly onto the main rotor hub assembly (para. 9-19).

(24) 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.

(25) Service the blade grip.

a. Purge lubricate the retention assembly (para. 4-35).

b. Ensure the seal (6) is not dislocated from the blade grip. If it has moved, remove the purge screw from the top of the blade grip. Insert the blade of a flathead screwdriver between the seal and the spindle. Carefully work the seal back into the grip. It is normal if grease is displaced out of the purge hole as the seal is pushed back into place. Reinstall the purge screw.

9-19. Installation – Retention Assembly (Figure 9-6)

NOTES

Grease bearings (grease lubricated) prior to installation through the small hole in the bearing. When reinstalling removed bearings, purge old grease and refill the bearings with new grease.

480, S/N 5003, 5014 and subsequent, have flapping bearings installed in the universal blocks using the shimming procedure in paragraph 9-24, B or C.

A. Use the following procedure to install a retention assembly if the flapping bearings are installed in the universal blocks using the shimming procedure in paragraph 9-24, B or C.

NOTE

Installing a pilot (Refer to Figure 9-13) will keep the spacer and shims in the proper location while installing the hinge pin.

(1) Lubricate the O.D. of the hinge pin (2) (MIL-PRF-81322, grease lubricated flapping bearings; MIL-PRF-23699, oil lubricated flapping bearings).

(2) Install the sleeves into the seals if equipped with oil lubricated flapping bearings.

NOTE

Install the shims (if installed) behind the DU washers in the same position as previously installed.

NOTE

If new parts are installed in the flapping axis, begin with a 0.005” shim and follow the shimming procedure in para. (7)a.

(3) Install the shims (4) and DU washers (3) on each side of the U-block with the chamfered side inboard toward the U-block.

NOTE

Ensure that the correct retention assembly is being installed on the universal block.

(4) Carefully slide the retention assembly into position over the DU washers and U-block.

NOTE

The pilot tool (Figure 9-13) will be pushed out as the hinge pin is pushed into the assembly while keeping the shims in the correct place.

(5) Install the hinge pin through the spindle and U-block. Align the roll pin slot in the hinge pin with the roll pin and seat the hinge pin. Tap the roll pin flush with the hinge pin if it protrudes from the hinge pin.

(6) Lightly lubricate (MIL-PRF-81322; MIL-PRF-23699) the back of nut (6) and install the lock washer (5) and nut (6) on the hinge pin.

CAUTION

Excessive torque could shear the roll pin installed in the head of the hinge pin.

(7) Insert a long punch into the damper-rod end attach holes in the flapping pin. Torque the nut (6) using tool (T-0051-3) to 150 ft-lb/204.5 Nm. The nut may be torqued to 175 ft-lb/238.6 Nm for aligning one of the lock washer tabs. While torqueing the nut, pull against the punch to avoid shearing off the roll pin that locates the head of the pin against the spindle arm side of the retention assembly.

NOTE

If new parts are installed in the flapping axis, follow the shimming procedure in para. (7)a below.

a. Check the flapping bearing drag resistance at the flapping pin. Initially, the grip should not stay up. If the retention assembly stays up, remove shims in 0.005-inch increments until the retention assembly will drop with no resistance when nut is torqued.

(8) Bend one of the tabs on the lock washer into a slot in the nut.

(9) Install the main rotor damper (para. 9-31), connect the pitch change link to the pitch change bellcrank and the pitch horn (para. 12-96), and install the main rotor blade (para. 9-38).

(10) Lubricate the U-block lead lag and flapping bearings (if the flapping bearings are grease lubricated) (para. 4-31).

(11) Lubricate the retention assembly (para. 4-35).

(12) Service the flapping bearing reservoir if equipped with oil lubricated flapping bearings (para. 4-21).

(13) Perform a maintenance test flight (para. 4-61).

B. Use the following procedure to install a retention assembly **until** the flapping bearings are installed in the universal blocks using the shimming procedure in paragraph 9-24,B or C.

(1) Lubricate the O.D. of the hinge pin (2) (MIL-PRF-81322, grease lubricated flapping bearings; MIL-PRF-23699, oil lubricated flapping bearings).

(2) Install the DU washers (3) on each side of the U-block with the chamfered side inboard toward the U-block.

(3) Carefully slide the retention assembly into position over the DU washers and U-block.

(4) Install the hinge pin through the spindle and U-block. Align the roll pin slot in the hinge pin with the roll pin and seat the hinge pin. Tap the roll pin flush with the hinge pin if it protrudes from the hinge pin.

(5) Install the lock washer (5) and nut (6) on the hinge pin.

CAUTION

Excessive torque could shear the roll pin installed in the head of the hinge pin.

(6) Torque the nut to 50-100 ft-lbs/68.2-136.4 Nm using tool (T-0051-3). Ensure the retention assembly does not remain in the up-stop position.

a. Check the flapping bearing drag resistance at the flapping pin. Initially, the grip should not stay up. If the retention assembly stays up, remove shims in 0.005-inch increments until the retention assembly will drop with no resistance when nut is torqued.

NOTE

Shims may be installed as required on the inboard side of the DU washers to avoid excessive torque in obtaining the flapping preload. All three retention assemblies should have an equal flapping preload.

(7) Lubricate the U-block lead lag and flapping bearings (para. 4-35) and re-check the retention assembly in accordance with para. 9-19, B, (6). Reshim and retorque the nut, if required.

(8) Bend one of the tabs on the lock washer into a slot in the nut when the proper preload has been obtained.

(9) Install the main rotor damper (para. 9-31), connect the pitch change link to the pitch change bellcrank and the pitch horn (para. 12-96), and install the main rotor blade (para. 9-38).

(10) Lubricate the retention assembly (para. 4-35).

(11) Perform a maintenance test flight (para. 4-61).

9-19.1 Tension-Torsion Strap (Figure 9-7)

9-19.2 Tension-Torsion Strap – Removal

NOTE

The following procedure is performed for changing the tension-torsion straps. The blade grip does not need to be removed from the spindle when changing the tension-torsion straps.

A. Remove the retention assembly from the main rotor hub (para. 9-14).

B. Remove the dust cover (18) from the blade end of the retention assembly.

C. Remove one of the retaining rings (31) securing the pin in the lug at the outboard end of the retention assembly. Remove the pin (30) and the remaining retaining ring.

D. Using a non-metallic scraper remove the silicone sealant from the cylinder (24) and the spindle.

NOTE

The pin used to secure the tension-torsion strap at the inboard end is not secured with retaining rings.

E. Push the tension-torsion strap (25) back through the spindle.

F. Remove the pin (23) from the cylinder (24) and separate the tension-torsion strap from the cylinder.

9-19.3 Tension-Torsion Strap – Installation

A. 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) when the tension-torsion strap is installed in the spindle and install the retention pin (23).

B. Lubricate (MIL-PRF-81322) the portion of the inner spindle bore (3) that contacts the O.D. of the cylinder (24).

C. Install the tension-torsion strap into the spindle and ensure the groove in the cylinder engages the pin in the spindle.

D. 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.

E. Verify proper installation of both retaining rings (31) Install the dust cover (18).

F. 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. Reinstall Retention assembly (para. 9-19).

9-20. Universal Block

9-21. Disassembly – Universal Block (Figure 9-4 or 9-5)

A. Remove the upper and lower bearings and DU washers from the universal block (U-block).

B. Remove the sleeves and seals from the flapping bearing bore if equipped with oil lubricated flapping bearings.

NOTE

Flapping bearings can be removed from the universal blocks using the Flapping Bearing Removal/Installation Tool (Grease Lubricated), T-0151-1, or Flapping Bearing Removal/Installation Tool (Oil Lubricated), T-0162-1, when the universal blocks are installed on the aircraft.

C. Press the flapping bearings, spacer, and shims from the bore of the U-block.

D. Remove the screws and stop pads if visual damage appears on the blocks.

E. Remove the grease fittings if equipped with grease lubricated flapping bearings.

F. Remove the drain plug if equipped with oil lubricated flapping bearings.

9-22. Inspection – Universal Block

A. See Table 9-3 for the detailed inspection requirements of the universal block assemblies.

9-23. Repair – Universal Block

A. Repair or replace the components of the universal block assembly as required in accordance with Table 9-3.

9-24. Assembly – Universal Block (Figure 9-4 or 9-5)

A. If removed, install the stop blocks (21).

NOTE

Index mark the universal blocks and retention assemblies (spindles) as sets.

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. 2.4988 to 2.4996	+.0002	Not Repairable	Replace U-Block
			Bearing Surface O.D. 1.7488 to 1.7494	-.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. 1.7488 to 1.7494	-.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.

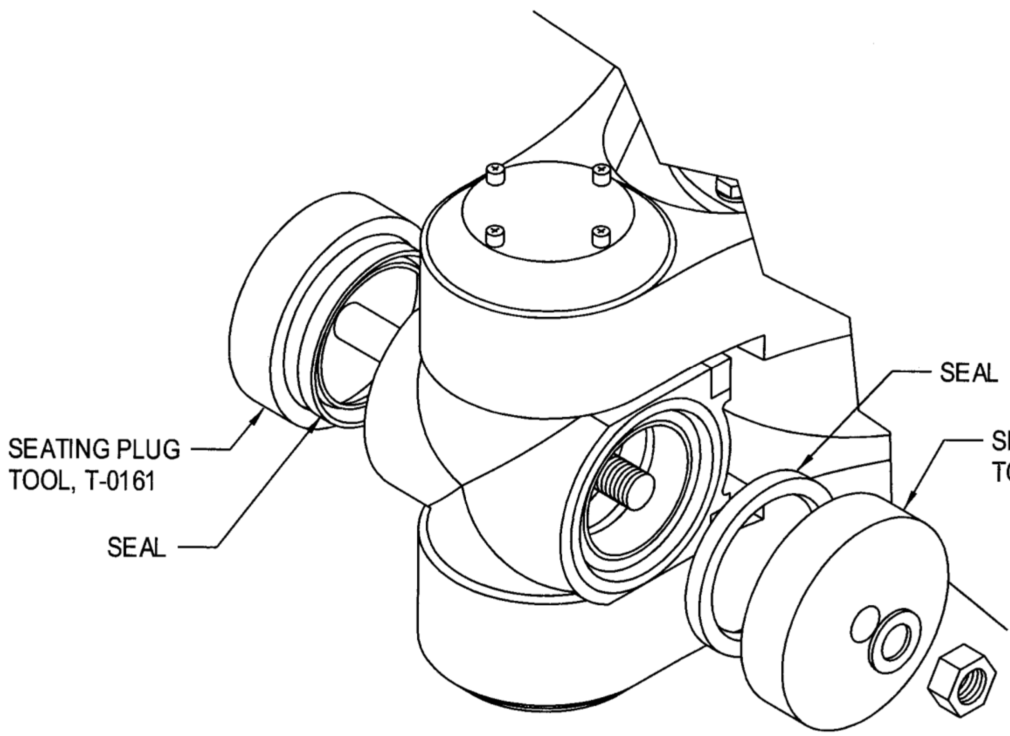


Figure 9-15. Flapping Bearing Seal Installation

9-25. Dampers

9-26. Removal – Dampers (Figure 9-16)

A. Remove the bolt (5) connecting the damper to the retention assembly.

B. Pivot the damper and remove the spacers (7) from between the damper bearing and the hinge pin.

NOTE

If the center bolt head in the pitch change bellcrank is orientated over the inboard pivot bolt, hardware removal is not necessary.

C. If required, remove the nut and washers from the pitch change bellcrank center pivot bolt. Remove the bolt until the end is flush with the mounting bracket.

D. Remove the inboard pivot bolt (1) from the hub and remove the damper.

9-27. Disassembly – Dampers (Figure 9-17)

NOTE

The following procedure only applies to the hydraulic main rotor dampers, P/N 28-14375-“X”.

A. Secure the damper assembly in a vise.

B. Insert a punch through the rod end (20) hole. Pull on the punch to pull the rod end assembly to expose 1.0 inch/25 mm of the piston shaft (6) and install tool T-0005.

C. Reposition the damper in the vice so that the vice jaws grip tool T-0005.

D. Remove the lockwire from the locking tab (18) and loosen the jam nut (19) and back it out as far as the threads on the rod end (20) will allow which will withdraw the locking tab from the piston shaft (6).

NOTE

If the rod end was <u>not</u> previously assembled with epoxy, but there is evidence of threadlocker (Loctite Red 271, or equivalent) it may be necessary to heat the rod end assembly to remove the jam nut.

<u>WARNING</u>

Use protective gloves when handling heated parts.

D. If required, heat the rod end assembly (250°F/121°C). Remove the rod end.

E. Remove the damper from the vice.

F. Remove the reservoir plugs (26) and pour the fluid from the reservoir (21).

G. Remove the hardware (16) and (28) securing the reservoir to the damper and remove the reservoir.

H. Remove the sleeves (27) and O-rings (25).

CAUTION

The relief valves are adjusted and set at the factory. Return defective valves to the factory.

I. If removal of the valve assemblies (22) is required, place the reservoir back in a vise. Remove the valve caps (23) and remove the valves.

CAUTION

Remove all burrs from the piston shaft to prevent damage to the brass sleeve and seals during end cap removal.

J. Remove the hardware (16) and (17) that secures the end cap (10) to the damper housing (1). Rotate the end cap approximately 45° using a plastic mallet and remove the end cap by tapping outward on its corners.

K. Pour the fluid from the damper housing.

L. Tap the piston (6) out of the housing using a nylon drift and remove the O-ring or Seal Pack (9) from the piston.

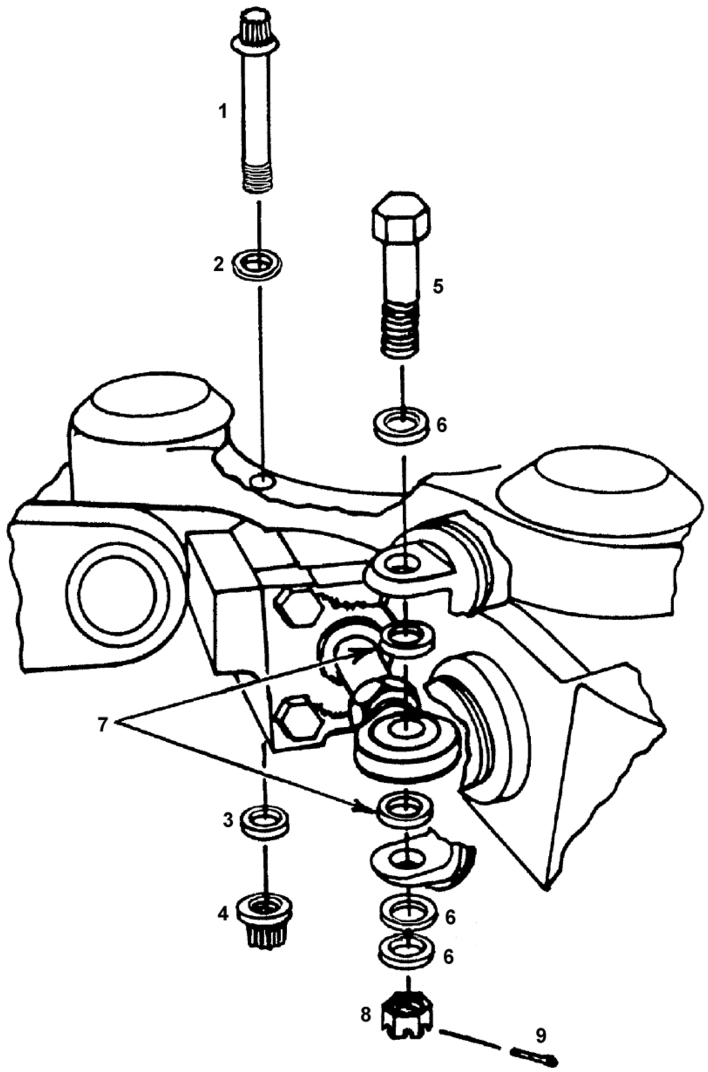
CAUTION

Do not damage the I.D. of the sleeves during seal and wiper removal.

M. Remove the seals (14) and wipers (15) from the brass sleeves (5 & 12) in the end cap and damper housing.

N. Install tool (T-0095) between the ears of the damper housing and press the bushing (3) out using a suitable size drift.

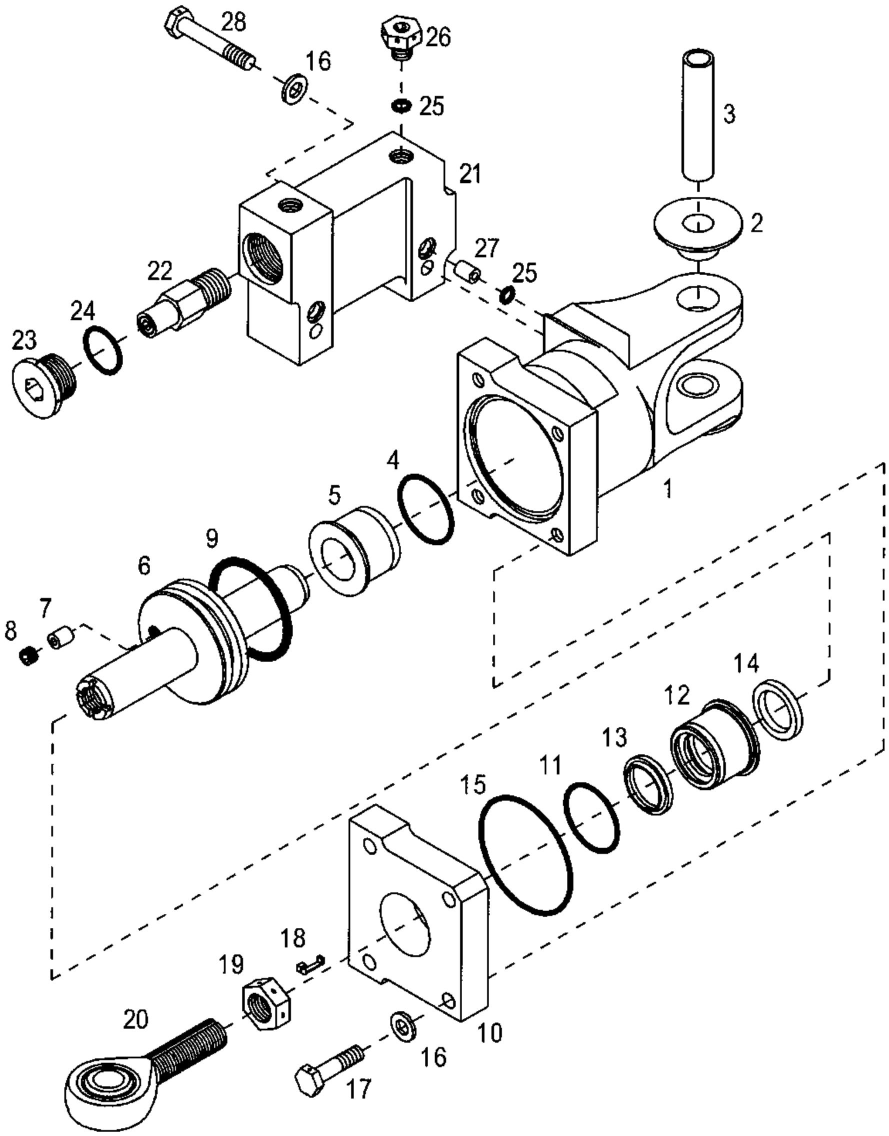
O. Inspect the bushing faces (2) for fretting and wear. Do not remove the bushings (2) unless replacement is required.



1.	Inboard Pivot Bolt	6.	Washer
2.	Chamfered Washer	7.	Spacer
3.	Washer	8.	Nut
4.	Nut	9.	Cotter Pin
5.	Bolt		

Hydraulic Damper, P/N 28-14375-“X”

Figure 9-16. Hydraulic Damper Assembly



1.	Damper Housing	15.	O-Ring
2.	Bushing	16	Washer
3.	Bushing	17.	Bolt
4.	O-Ring	18.	Lock Key
5.	Sleeve	19.	Nut
6.	Piston	20.	Damper Bearing
7.	Restrictor Sleeve	21.	Reservoir
8.	Set Screw	22.	Valve Assembly
9.	O-Ring or Seal Pack	23.	Cap Plug
10.	End Cap	24.	O-Ring
11.	O-Ring	25.	O-Ring
12.	Sleeve	26.	Plug
13.	Wiper	27.	Sleeve
14.	Seal	28.	Bolt

Figure 9-17. Hydraulic Damper Assembly

9-28. Inspection – Dampers

A. See Table 9-4 for the detailed inspection requirements for the damper assemblies.

9-29. Repairs – Dampers

A. Replace leaking seals or O-rings on hydraulic dampers as required.

B. Repair or replace the detailed parts of the hydraulic damper assembly as required in accordance with Table 9-4.

9-30. Assembly – Dampers (Figure 9-17)

NOTE

The following procedure only applies to the hydraulic main rotor dampers, P/N 28-14375-"X".

CAUTION

Do not damage the I.D. of the sleeves during seal and wiper installation.

A. Install the seals (14) and wipers (13) into the end cap and damper housing as follows:

(1) Install the seals in the inboard groove of the brass sleeves (5 &12) with the O-ring side toward the piston. Ensure the seal has the O-ring installed in it.

(2) Install the wiper in the outboard groove of the brass sleeves with the lip of the wiper facing outboard.

B. If the bushings (2) where removed, install tool (T-0095) between the ears of the damper housing (1). Using an arbor press, install the bushings into the housing. If new bushings are installed, they must be line reamed with a ½ in. line reamer.

C. Lubricate (L-45/SF96-20) the O.D. of the bushing (3). With tool (T-0095) installed, press the bushing into the housing.

D. Place the damper housing in a vise with the bore up.

NOTE

Ensure the components are free of dirt and contamination prior to assembly.

CAUTION

Do not damage the O-rings or seals during the assembly process.

E. Lubricate (L-45/SF96-20) the bore of the housing.

F. Install the O-ring or Seal Pack using the following procedure:

(1) If O-ring is installed, lubricate (L-45/SF96-20) the O-ring (9) and install on the piston (6).

(2) If seal pack is installed, install the seal pack onto the piston using tool T-0160-1. Using wood blocks or other suitable devices to protect the piston shaft from damage, clamp the piston vertically in a vise. Install the installation sleeve (T-0160-3) onto the piston. Lubricate (L-45/SF96-20) the seal ring and install on the piston using the expanding sleeve and pilot (T-0160-9). Remove the tools.

G. Install the piston into the damper housing (1) using the following procedure:

(1) Clamp the damper housing vertically in a vice. Install the installation collar tool T-0610-7 onto the damper housing. Install the piston into the collar with the threaded end up and tap with a plastic mallet until the seal pack is into the damper housing. Remove the collar and tap the piston with the plastic mallet until the piston is bottomed in the housing.

H. Fill the housing with damper oil (L-45/SF96-20) and install the O-ring (9) into the recess in the damper housing.

I. Lubricate (L-45/SF96-20) the seal and wiper in the end cap (10). Install the end cap on the piston shaft and gently tap the cap to seat it onto the damper housing.

J. Install the hardware (16 & 17) securing the end cap to the housing. Torque the bolts in a cross pattern.

K. If the relief valves (22) have been removed for cleaning or replacement, install the valves in the reservoir and torque to 350 in-lbs/39.8 Nm.

L. Install new O-rings (24) onto the valve caps (23) and install the valve caps.

M. Reposition the damper to the horizontal position with the reservoir ports up.

N. Install new O-rings (25) on the sleeves and install the sleeves (27) into the reservoir ports in the damper housing.

O. Align the ports in the reservoir (21) with the sleeves in the damper housing and install the reservoir. Install the securing hardware and torque.

P. Temporarily install the damper bearing (20) and place the damper in the damper fixture (T-0057). Position the piston approximately .5 inches/13 mm. from the bottomed position.

Q. Fill the reservoir with damper oil (L-45/SF96-20). Install the servicing/bleeding tools (T-2896) (Refer to Figure 4-5) and cycle the tools until the entrapped air is removed. Remove the servicing/bleeding tools and install the reservoir plugs (26) with new O-rings (25) installed.

R. Remove the damper from the fixture and wipe down to remove the damper oil.

S. Install the damper rod end bearing assembly.

NOTE

The rod end bearing assembly may have been previously treated with ACF-50 or MIL-PRF-23377 Type I Class 2C or Class N epoxy primer corrosion inhibitor per SDB T-058. If continuing use of ACF-50, removal of prior ACF-50 application is unnecessary. If changing from ACF-50 to epoxy primer, ACF-50 residue must be removed before reinstallation. For helicopters S/N 5242 and subsequent, the rod ends are treated with epoxy primer at the time of manufacture.

(1) Remove the nut.

(2) For new epoxy primer application, remove any ACF-50 residue from the threads of the rod end and the interior threads of the piston with a suitable solvent.

(3) If applying a touch-up of epoxy primer, remove any loose epoxy primer residue from the threads of the rod end and the interior threads of the piston with a brush and a small amount of solvent.

CAUTION

Do not allow the epoxy primer to dry prior to assembly of the rod end.

CAUTION

Mask the bearing area prior to applying epoxy primer to avoid damaging the bearing.

NOTE

Follow the manufacturer's instructions for corrosion inhibitor application.

(4) Apply the applicable corrosion inhibitor to the entire thread length of the rod end, as required.

NOTE

Installing the nut will tend to wipe away corrosion inhibitor that was freshly applied. Re-apply to ensure complete coverage.

(5) Install the jam nut.

(6) Re-apply corrosion inhibitor to the threads below the jam nut, as required.

(7) Install the damper rod end bearing assembly until the distance between the outboard edge of the jam nut (19) and the center line of the damper bearing equals 1.050 in. ± .005 in./26.7 mm ± .13 mm (Figure 9-20).

(8) Re-apply corrosion inhibitor to the threads above the jam nut, as required.

NOTE

The locking key must be aligned with the piston slots for the jam nut to seat against the piston shaft.

T. Hold the damper bearing with a wrench and tighten the jam nut when the correct position is set. Lockwire (.032) the jam nut to the locking key (18). Position the locking key towards the top of the damper.

U. Lockwire (.032) the end cap bolts (17) in pairs and the valve caps (23) to the reservoir bolts (28) in pairs. Lockwire (.025) the bleed plugs (26) in a pair.

9-31. Installation – Dampers (Figure 9-16)

A. Install the damper onto the main rotor hub.

B. Install the chamfered washer (3) onto the inboard pivot bolt (2) with the chamfer against the bolt head.

C. Install the inboard pivot bolt through the hub plates and damper. Install the washer (3) and nut (4) but do not torque.

CAUTION

On hydraulic dampers, the locking key in the piston shaft must be on the top side to prevent interference with the hinge pin.

D. Install the spacers (7) on each side of the damper bearing and slide the damper bearing into the hinge pin.

E. Align the damper bearing and spacers with the hinge pin. Install a washer (6) on the bolt (5) and install the bolt. Install two washers (6) and the nut (8). Torque to 450-500 in-lbs/45.5-56.8 Nm and install a cotter pin (9).

F. Torque the inboard pivot bolt to 190 in-lbs/21.6 Nm.

G. If the washers and nut were removed from pitch change bellcrank center bolt in accordance with step C, remove the center pivot bolt, turn the bolt 180°, and reinstall the bolt and install washers and nut. Torque to 40 in-lbs/4.5 Nm and cotter pin.

H. Perform a maintenance test flight (para. 4-61).

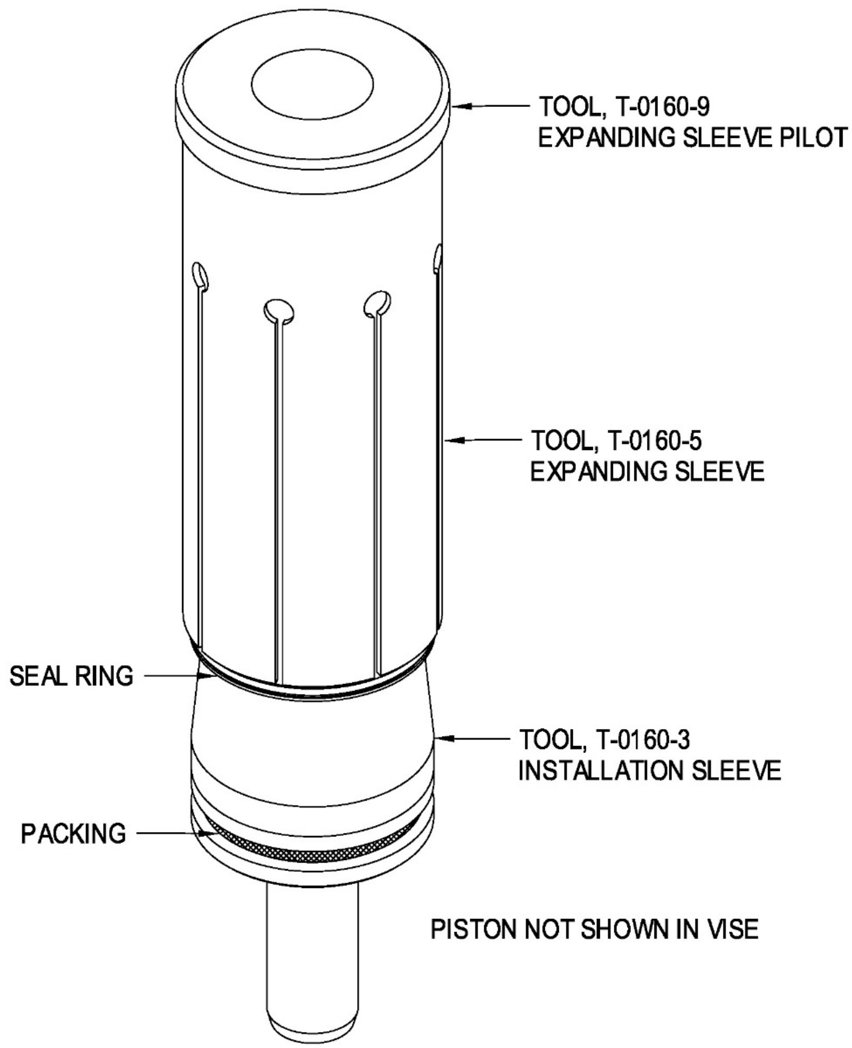


Figure 9-18. Seal Ring Installation

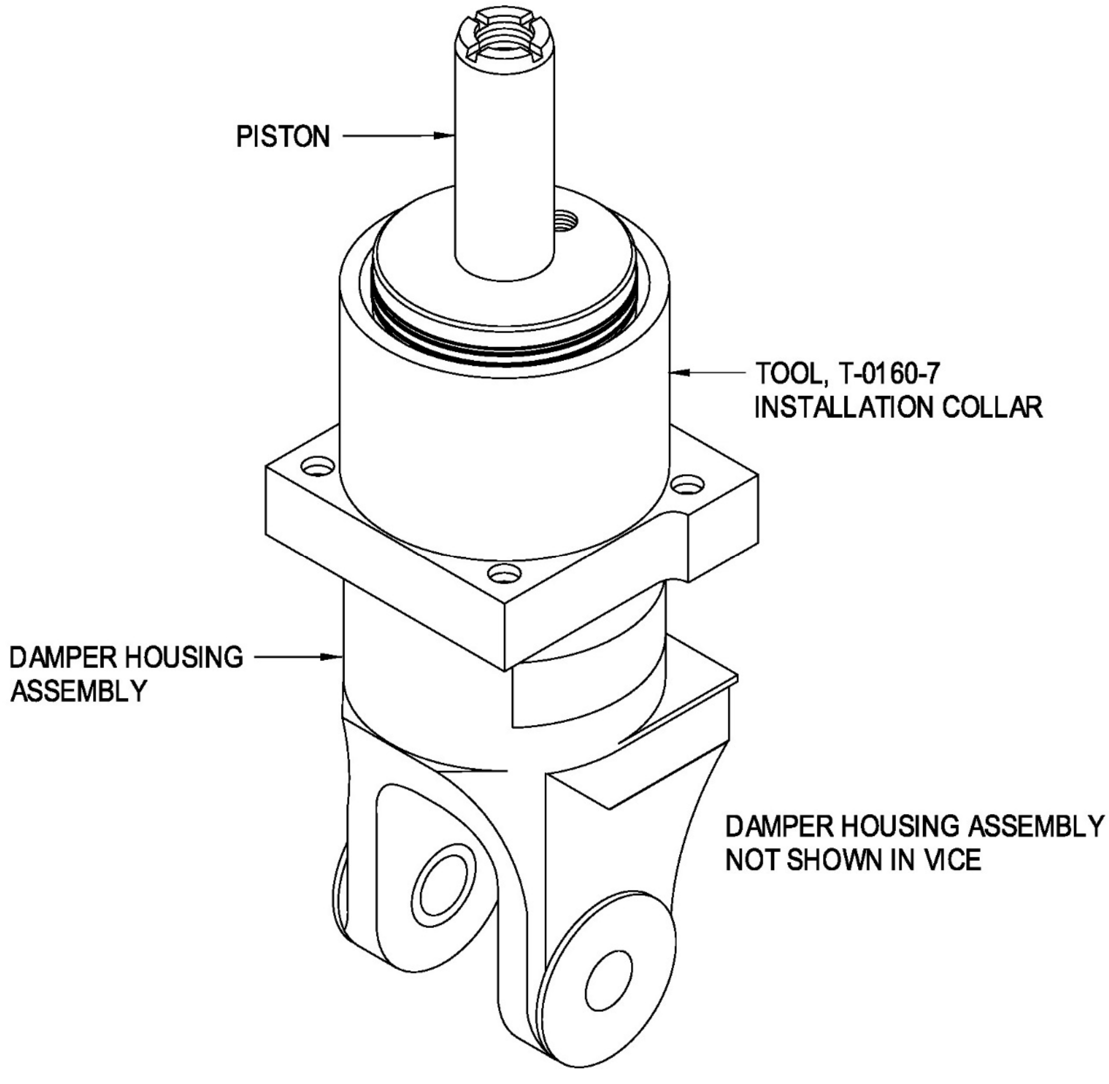


Figure 9-19. Piston Installation

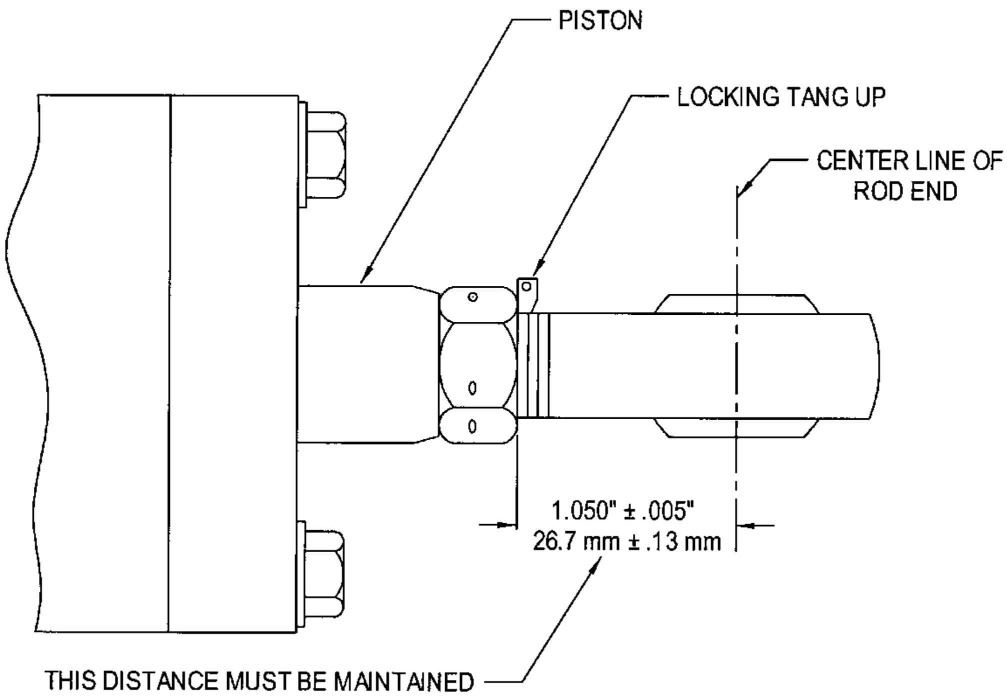


Figure 9-20. Damper Rod End Installation

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Table 9-4. Hydraulic Damper Assembly

Inspection Requirements*

P/N	Fig. 9-17 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14357-3 or -5	1	Housing	Sleeve bore Dia. 1.1250 to 1.1255	+.0002	Not Repairable	Replace Housing
			Flanged bushings in the ears for excessive fretting	1/3 of total face light fretting	2 of total face light fretting	Blend and polish to remove
			Obstructions in the flow ports	None Allowed		Clear with compressed air
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Housing
			Security of the chrome sleeve in the bore of the housing	No movement allowed	Not Repairable	Replace Housing
			Surface scratches	None Allowed	≤ .020 deep	Blend and polish out smooth
28-14277-1 or 28-14359-17	3	Bushing	O.D. .4995 to .5005 (28-14277-1) O.D. .4994 to .4999 (28-14359-17)	-.0005	Not Repairable	Replace Bushing
			I.D. .3747 to .3757 (28-14277-1) I.D. .3765 to .3775 (28-14359-17)	+.0005	Not Repairable	Replace Bushing
			Nicks and scratches	.005 deep	≤ .005 deep	Blend and polish out smooth

Table 9-4. Hydraulic Damper Assembly

Inspection Requirements*

P/N	Fig. 9-17 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-14356-3 or -5	5 & 12	Sleeve	O.D. 1.1260 to 1.1265	-.0002	Not Repairable	Replace Sleeve
			Piston shaft bore Dia. .749 to .751	+.002	Not Repairable	Replace Sleeve
28-14356-3 or -5	5 & 12	Sleeve (Cont=d)	O.D. to I.D. concentricity	.002 FIM	Not Repairable	Replace Sleeve
28-14370-15, -17	6	Piston	Piston shaft O.D. .746 to .748	-.001	Not Repairable	Replace Piston
			Nicks or scratches in surface	None Allowed	≤ .5" long and ≤ .005 deep	Blend and polish out smooth
			Obstruction in the flow restrictor	None Allowed		Clear with compressed air
			Concentricity	.001 FIM	Not Repairable	Replace Piston
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Piston
28-14265-3	10	End Cap	Sleeve bore Dia. 1.1250 to 1.1255	+.0002	Not Repairable	Replace Cap
			Obstructions in the fluid port	None Allowed		Clear with compressed air
			Nicks, scratches, or corrosion	None Allowed	≤ .020 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Cap
ECD091-1	20	Damper Bearing	Radial Play	.007	Not Repairable	Replace Bearing
			Axial Play	.005	Not Repairable	Replace Bearing

Table 9-4. Hydraulic Damper Assembly

Inspection Requirements*

P/N	Fig. 9-17 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
ECD091-1	20	Damper Bearing (Cont'd)	Threads (crossed or missing)	None Allowed	Not Repairable	Replace Rod End
			Threads (damage or corrosion)	None Allowed	Not Repairable	Replace Rod End
28-14366-1	21	Reservoir	Obstructions in the flow ports	None Allowed		Clear with compressed air
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Reservoir
			Nicks, scratches, or corrosion	.020 deep	≤ .020 deep	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Reservoir
			If the valves are removed, valve threads and ports for contamination	None Allowed		Flush with cleaning solvent and dry with compressed air
28-14368-1, -2	23	Plug	Threads (crossed or missing)	None Allowed	Not Repairable	Replace Plug
28-14369-1	27	Sleeve	O.D. and I.D. for nicks or scratches	None Allowed	Not Repairable	Replace Sleeve
AN814-2DL	26	Plug	Threads (crossed or missing)	None Allowed	Not Repairable	Replace Plug
		O-Rings, Wiper, and Seals	Inspect for obvious defects	None Allowed	Not Repairable	Replace as required

* All dimensions are in inches.

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9-32. Main Rotor Blades

9-33. Description – Main Rotor Blades (Figure 9-21)

The main rotor blades are of hollow construction. Upper and lower skins are bonded to the extruded leading edge spar which is twisted 7.25°. Doublers are bonded to the root end of the blade for retaining the blades to the main rotor hub. The blades are retained by a single retention pin to the blade grip and a non-adjustable drag brace connected to the trailing edge of the blades. Provisions for spanwise and chordwise balance weights are provided in the tip caps that are bonded in the tip end of the blades. Two tracking tabs are riveted to the trailing edge of each blade.

9-34. Removal – Main Rotor Blades (Figure 9-22)

NOTE

Lifting the tip of the blade until the blade is parallel to the retention assembly will allow the retention bolt and the drag brace bolt to be easily removed and will allow the blade to be removed from the blade grip without spreading the ears of the grip.

A. Remove the bolt (1) securing the drag link to the rotor blade.

B. Remove the blade retention bolt (2).

C. Carefully slide the blade from the grip.

D. Place the blade into a blade rack or on a suitable device that will prevent the blades from being damaged.

E. Repeat the process for the other 2 blades.

Table 9-5. Tail Rotor Assembly

Inspection Requirements*

P/N	Figure 9-36 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-150076-15	4	Journal	Journal I.D. .4995 to .4998	+.0002	Not Repairable	Replace Journal
			Journal O.D. .7509 to .7511	-.0002	Not Repairable	Replace Journal
B-1210	5	Needle Bearing	Bearing O.D. 1.000	-.0002	Not Repairable	Replace Bearing
			Visible wear of the needles	None Allowed	Not Repairable	Replace Bearing
28-150076-13	7	Thrust Bumper	Thickness .123 to .125	-.002	Not Repairable	Replace Bumper
28-150060-11	11	Pitch Change Plate	Nicks in edge of plate	None Allowed	# .005 deep	Polish and blend locally not to exceed .008
			Pitch link bolt hole Dia. .250 to .251	+.0005	Not Repairable	Replace pitch change plate
			Corrosion	None Allowed		Return to the factory for inspection and replating, or replace pitch change plate
			Cracks	None Allowed	Not Repairable	Replace pitch change plate
28-150063-11, -13	12	Sleeve	Sleeve I.D. .7878 to .7882	+.0002	Not Repairable	Replace Sleeve
			Sleeve I.D. .7872 to .7876 (-13)	+.0002	Not Repairable	Replace Sleeve
			Sleeve O.D. 1.1245 to 1.1250	-.0002	Not Repairable	Replace Sleeve

Table 9-5. Tail Rotor Assembly

Inspection Requirements*

P/N	Figure 9-36 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
ECD001-11	13	Bearing	Bearing O.D. 1.6250	+.0000 -.0005	Not Repairable	Replace Bearing
			Visible wear of the rollers	None Allowed	Not Repairable	Replace Bearing
28-150055-1, -13, -15	14	Retainer	Retainer I.D. 1.6250 to 1.6255	+.0005	Not Repairable	Replace Retainer
			Retainer I.D. 1.6240 to 1.6247 (-15)	+.0005	Not Repairable	Replace Retainer
			Retainer O.D. 2.043 to 2.044	-.001	Not Repairable	Replace Retainer
ECD002-11, -13, -15, -17	15	Bearing	Bearing O.D. 2.0467 to 2.0472	-.0002	Not Repairable	Replace Bearing
			Bearing Bore Dia. .7870 to.7874	+.0002	Not Repairable	Replace Bearing
			Preload to the thrust side and check for roughness or ratcheting	None Allowed	Not Repairable	Replace Bearing
SL61N-5P	16	Nut	Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut
			Nicks and burrs on O.D.	None Allowed	≤ .10 deep	Blend and polish out smooth
			Rounded or burred locking tabs	Max. 2 slightly rounded tabs	To allow use of the locknut wrench	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Nut

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).

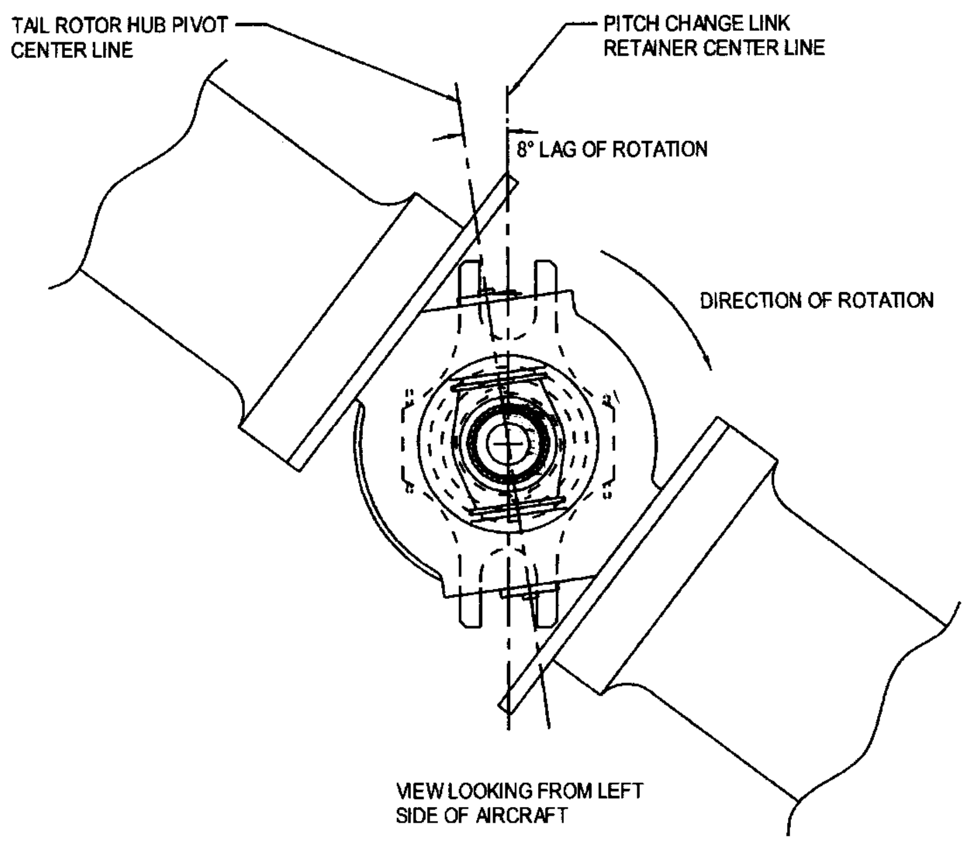

Figure 9-38. Tail Rotor Installation Orientation

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	10013, 10032
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]
Oil	Any grade internal combustion engine motor oil	
Oil	Silicon oil	L-45 or SF96-20

[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.

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.

B. Inspect the fittings and inserts for damage and security.

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) Remove the screws that secure the fuel fitting assembly to the fuel cell.

2) Partially separate the fuel fitting assembly from the fuel cell to access the syphon tube assembly nut coupling.

3) Loosen the nut coupling, then pivot the syphon tube toward the fuel strainer.

4) 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.)

5) Position the fuel fitting assembly onto the replacement fuel cell such that the sump drain valve it is orientated 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/ Nm).

6) Install the screws to secure the fuel fitting assembly to the fuel cell and torque to 25-30 in-lbs/2.8-3.4 Nm.

7) Remove the hardware securing the fuel quantity probe mounting flange to the fuel cell (fuel quantity probe still installed on the mounting flange). Note the position of the fuel quantity probe and install the mounting flange on the replacement fuel cell. Torque the hardware to 25-30 in-lbs/2.8-3.4 Nm.

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.

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) 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 25-30 in-lbs/2.8-3.4 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). Install the cover for the fuel quantity probe after determining that the system is operating properly.

15) 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.

SECTION 11

POWER TRAIN

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SECTION 11

SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS,
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Paragraph	Description	Page

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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).

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.

(5) 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).

(6) 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.

11-9. Power Output Shaft

11-10. Description - Power Output Shaft

The power output shaft transmits engine power from the overrunning clutch to the lower pulley drive shaft. The power output shaft is installed on the power output pad on the rear side of the accessory gearbox. The shaft has a splined interface with the overrunning clutch (ORC) and is coupled to the lower pulley drive shaft by a flex pack coupling.

11-11. Removal - Power Output Shaft (Figure 11-1.1)

CAUTION

Prior to removing the power output shaft assembly, inspect the gearbox housing for a decal indicating that an offset bearing housing is installed. Maintenance records may also indicate if an offset bearing housing is installed. If a decal is present or maintenance entries indicate that an offset bearing housing is installed, visually verify that the notches in the bearing housing are orientated in accordance with the maintenance entry.

NOTE

The engine access panels do not need to be removed if the optional panel openers are installed.

A. Remove the left and right side engine access panels and the left and right aft side cowlings.

B. Disconnect the battery.

C. Remove the lower pulley assembly (para. 11-19).

D. Remove the safety from the service plugs (18) in the ORC cover (16). Place a suitable container under the clutch cover, remove one of the service plugs and drain the oil from the clutch by rotating the open port to the 6 o'clock position.

E. Remove the clutch cover retaining ring (21) and the clutch cover (16).

F. Remove the retaining ring (14), spacer (12), and shims (13) from the end of the power output shaft (22).

G. Remove the special bolts (32) and washers (33) securing the power output shaft bearing housing (23) to the accessory gearbox.

H. Using a suitable plastic hammer, remove the power output shaft assembly from the accessory gearbox by tapping the end of the shaft in the ORC. When the gasket and o-ring release, remove the power output shaft assembly from the accessory gearbox.

I. Remove the gasket (30) from the bearing housing assembly.

NOTE

Cover the open overrunning clutch and rear power output pad on the engine.

11-12. Inspection - Power Output Shaft

A. Inspect the power output shaft for cracks, corrosion, bending, nicks, scratches, and spline wear.

B. Inspect the bearing and bearing housing for roughness, excessive wear, and seal leakage.

11-13. Repair - Power Output Shaft

A. See Table 11-1 for damage limit and repair criteria for the power output shaft (22) and the bearing housing (23).

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.

B. Replace the bearing housing seal (24) and bearing (27) as follows:

(1) Remove the power output shaft (para. 11-11).

(2) Remove the retaining ring (29) from the power output shaft.

(3) Place the drive shaft assembly in the T-0186-11 and T-0186-9 tool. Press the shaft from the bearing housing assembly (23) (Figure 11-1.3a).

(4) Remove the retaining ring (28) from the bearing housing assembly.

(5) Place the bearing assembly in the T-0186-11 and T-0186-9 tool. Using tool T-0186-15, press the bearing from the bearing housing assembly (Figure 11-1.3b).

(6) Remove the seal (24) by inserting a small screw driver or pick under the seal and prying it out.

C. Assemble a new seal and bearing into the bearing housing.

(1) Place a new seal (24) on the stepped end of T-0186-3. Press the seal into the bearing housing (23) (Figure 11-1.3c and Figure 11-1.3d).

(2) Determine the amount of shims required for assembly.

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Table 11-1. Overrunning Clutch and Power Output Shaft Assemblies

Inspection Requirements*

P/N	Fig. 11-1 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
4131002	1	Splined Outer Shaft	Bearing Housing Seal Surface Dia. 1.495 to 1.505	-.002	Not Repairable	Replace Shaft
			Support Bearing Surface Dia. 1.3781 to 1.3785	-.0005	Not Repairable	Replace Shaft
			Cracks	None Allowed	Not Repairable	Replace Shaft
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
4131006	3	Bearing Housing	Seal Bore Dia. 1.918 to 1.922	+.002	Not Repairable	Replace Housing
			Bearing Bore Dia. 2.1648 to 2.1654	+.0003	Not Repairable	Replace Housing
			Cracks	None Allowed	Not Repairable	Replace Housing
			Nicks, scratches, or pits	.030 deep	≤ .030 deep	Blend out smooth
ECD4014	6	Bearing	Roughness, spalling, pits, or corrosion	None Allowed	Not Repairable	Replace Bearing
4131003	22	Splined Drive Shaft	Seal and Support Bearing Surface Dia. .9844 to .9849	-.0003	Not Repairable	Replace Shaft

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).

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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.

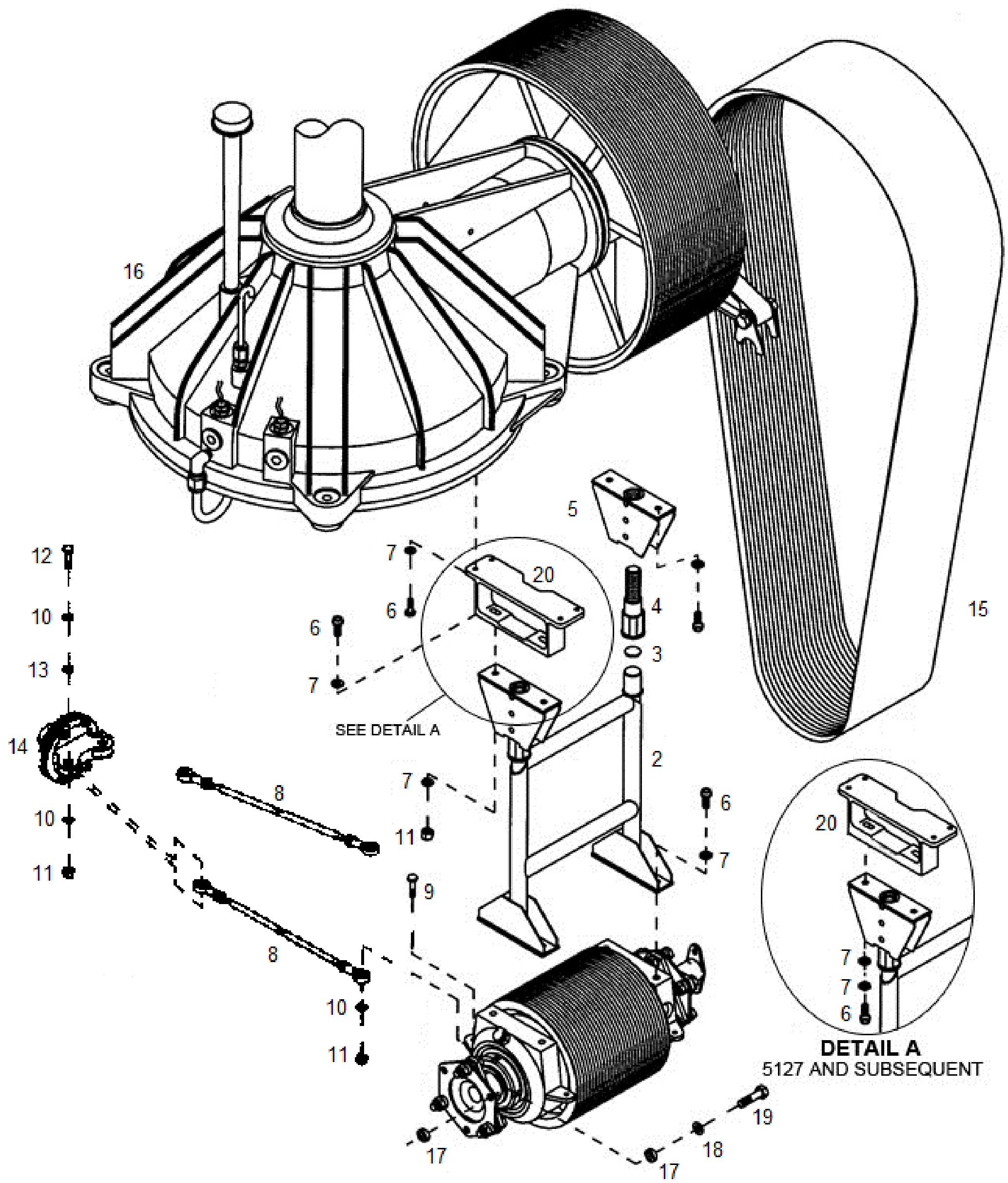
(2) Remove the upper plenum/air inlet (para. 13-28).

(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

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) Recheck the vertical and lateral alignment of the shafts. Readjust the positioning links or engine shims as required until the shafts are aligned.

(5) 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. 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.

Table 11-2. Lower Pulley Assembly

Inspection Requirements*

P/N	Fig. 11-6 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
4130508-13	10 (Sheet 1) 13 (Sheet 2)	Pulley Driven Shaft (Cont'd)	Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
			Threads (rolled or missing)	None Allowed	Not Repairable	Replace Shaft
			Bent Flanges	.002	Not Repairable	Replace Shaft
4130513-13	11 (Sheet 1) 14 (Sheet 2)	Spacer	Seal Surface Dia. 2.684 to 2.692	-.0003	Not Repairable	Replace Spacer
			Pulley Surface Dia. 2.499 to 2.500	-.001	Not Repairable	Replace Spacer
			I.D. 2.1598 to 2.1604	+.0003	Not Repairable	Replace Spacer
			Cracks	None Allowed	Not Repairable	Replace Spacer
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
4130510-17 or 4130510-19	12 (Sheet 1) 15 (Sheet 2)	Lower Pulley	Spacer and Pilot Bores Dia. 2.498 to 2.499	+.001	Not Repairable	Replace Pulley
			Cracks	None Allowed	Not Repairable	Replace Pulley
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
			Depth of grooves	≥.176	Not Repairable	Replace Pulley
			Nicks and gouges in belt grooves	None Allowed	≤ .25 long and ≤ .025 deep	Blend out smooth

Table 11-2. Lower Pulley Assembly

			Inspection Requirements*			
P/N	Fig. 11-6 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
4130512-13, -17	13 (Sheet 1) 16 (Sheet 2)	Bearing Retainer	Sleeve Surface Dia. 2.1604 to 2.1610	-.0003	Not Repairable	Replace Retainer
			Bearing Inner Race Surface Dia. 2.1654 to 2.1660	-.0003	Not Repairable	Replace Retainer
			Inner Seal Surface Dia. 2.684 to 2.690	-.002	Not Repairable	Replace Retainer
			Spline Pilot Surface Dia. 2.499 to 2.500	-.0005	Not Repairable	Replace Retainer
			(-13) I.D. 1.7800 to 1.7805	+.0003	Not Repairable	Replace Retainer
			(-17) I.D. 1.7806 to 1.7810	+.0003	Not Repairable	Replace Retainer
			Cracks	None Allowed	Not Repairable	Replace Retainer
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
4130517-13	14 (Sheet 1) 17 (Sheet 2)	Sleeve	O.D. 2.415 to 2.422	-.002	Not Repairable	Replace Sleeve
			I.D. 2.1598 to 2.1604	+.0003	Not Repairable	Replace Sleeve
			Cracks	None Allowed	Not Repairable	Replace Sleeve
			Nicks, scratches, or corrosion	.030 deep	≤ .030 deep	Blend out smooth
4130524-13	15 (Sheet 1) 18 (Sheet 2)	Nut	Threads (rolled or missing)	None Allowed	Not Repairable	Replace Nut
			Cracks	None Allowed	Not Repairable	Replace Nut

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	Cracked Elements	None Allowed	Not Repairable	Replace Flex Pack
			Nicks, scratches, or corrosion	.001 Deep	≤ .001 deep	Blend out smooth and polish
			Bent Elements	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.

11-22. 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.

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.

G. Heat the sleeve to approximately 250°F/121°C. Install the sleeve onto the lower pulley driven shaft and seat against the bearing retainer.

H. Install the pulley adapter (Figure 11-5) the lower pulley driven shaft and place the pulley assembly vertically in a vise.

I. Install the retaining nut and torque to 190-200 ft-lbs/259.1-272.7 Nm using tool T-0051. Allow the pulley assembly to cool and retorque the retaining nut. Install two safeties (.032 lockwire) between the lower pulley bearing retaining nut and the pulley drive shaft. Secure the wire tails under the wire wrap.

J. Install the grease fittings and vents in the grease lubricated bearing housings. Install the drain plugs and sight plugs in the oil lubricated bearing housings. Torque the sight plugs to 150 in-lbs/17 Nm and install a torque slippage mark.

K. Using a standard grease gun, lubricate the grease lubricated bearing assemblies with 6-8 pumps/squirts of grease (MIL-PRF-81322). Refer to paragraph 4-33 for lubrication procedures to use during normal scheduled servicing. Service each oil lubricated bearing assembly with .27 U.S. Ounces/8 ml of oil (MIL-PRF-23699). Install the service plugs. Refer to paragraph 4-24 for servicing procedures to use during normal scheduled servicing.

L. Remove the pulley assembly from the vise and remove the pulley adapter.

NOTE

Ensure the spacers are installed with the beveled face toward the flex pack coupling.

NOTE

Place the thick spacers between the flex pack coupling and the lower pulley and lower pulley drive shaft hub flanges.

M. Install the aft flex pack coupling on the pulley drive shaft hub.

CAUTION

Ensure the hardware in the aft flex pack coupling does not contact the lower pulley bearing housing.

N. Attach the aft flex pack coupling/drive shaft hub to the lower pulley driven shaft.

O. Install the lower pulley adapter on the lower pulley drive shaft and place the shaft vertically in a vise.

P. Apply a light coat of grease (MIL-PRF-81322) to the splines of the lower pulley drive shaft. Place the lower pulley assembly on the lower pulley drive shaft. Install the drive shaft hub onto the splines of the lower pulley drive shaft. Install the washer (P/N C148740) and retaining nut and torque to 90-100 ft-lbs/122.0-135.6 Nm.

Q. Install the intermediate oil cooler blower drive shaft hub on the lower pulley drive shaft and install the roll pins/taper pin. Install the oil cooler blower drive shaft hub wet with epoxy primer. If installing new roll pins, it is permissible to trim the roll pins after they are installed. Install a safety (.032 lockwire) from the retaining nut to the roll pins/taper pin.

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.

R. Install the forward flex pack coupling on the lower pulley drive shaft.

S. Install the "H"- strut onto the lower pulley bearing housings.

T. Install the bearing temperature thermocouples into the bearing housings.

11-24. Installation – Lower Pulley Assembly (Figure 11-2)

A. Install the positioning links onto their fittings.

B. Install the lower pulley assembly into the drive belt.

C. Rotate the pulley so the "H"- strut is toward the left side of the aircraft. Install the load bearing plugs (older “H”-strut assemblies) and the flat bearing (DU side up) into the "H"- strut and install the tensioning assemblies onto the "H"- strut.

D. Rotate the "H"- strut into position and attach the tensioning assemblies to the main rotor transmission and the aft pinion bearing support truss.

E. Align the lower pulley drive system (para.11-17).

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.

CAUTION

The bolts connecting the forward flex pack to the power output shaft are special bolts that have shortened thread grip lengths. Do not replace with standard hardware.

CAUTION

Do not allow the pitch change bellcranks to drop onto the edge of the main rotor mast when disconnecting the pitch change links.

(1) Disconnect the pitch change links from the pitch change bellcranks.

(2) Block up the pitch change bellcranks so the main rotor control tubes are in the maximum upper position.

(3) Install the sling so the arms are between the pitch arm and the blade retention assembly, over the lead/lag retaining nut, and outboard of the main rotor damper rod-end. The sling arms are long enough to be double wrapped if preferred (Figure 4-10).

Q. Remove the main rotor transmission from the aircraft using the following procedures:

NOTE

If the lifting device is in a fixed location, install the ground handling wheels and move the aircraft to remove the transmission.

(1) Attach a suitable lifting device to the lifting eye or sling.

(2) Install the ground handling wheels and lower the tail of the aircraft to provide more clearance at the pylon while removing the transmission.

(3) Lift the transmission off of the pylon mounts enough to start moving the transmission toward the rear of the aircraft. Lift the transmission higher as clearance around the transmission allows.

(4) If the lifting eye is installed, push the main rotor control tube rod-ends (dog legs) up to clear the aft pylon tubes. If the sling is installed, monitor the dog leg clearance as they pass the pylon tubes.

R. Place the transmission on a transmission stand. Remove the lifting eye or sling.

11-33. Disassembly – Main Rotor Transmission Assembly

NOTE

Maintenance requirements will determine what components will have to be removed from the transmission.

NOTE

Omit the steps listed below that have been accomplished during the transmission removal.

A. Remove the main rotor hub (para. 9-7).

B. Remove the upper pulley (para. 11-46).

C. Remove the collective walking beam (para. 12-40).

D. Remove the upper swashplate and the main rotor controls (para. 12-82).

E. Remove the oil filtration/cooling system (para. 11-41).

11-34. Inspection – Main Rotor Transmission Assembly

A. Inspect the main rotor transmission and mast for cracks, corrosion, nicks, scratches, and seal leakage.

B. Inspect the pinion for cracks, corrosion, nicks, scratches, damaged key recess, damaged threads, and elongated or cracked taper pin hole.

C. Remove the inspection plate from the transmission and inspect the ring and pinion for abnormal gear pattern and excessive wear (refer also to SIL T-064).

D. Inspect the chip detector for accumulation of metal particles as follows:

(1) Metal particles, flakes, or slivers exceeding 1/16 inch/1.6 mm: contact Enstrom Customer Service Department and discontinue use until further instructions are received from Enstrom Customer Service Department.

(2) Sludge (a mixture of oil and fine metal particles resulting from normal gear operation): Clean the detector and return the transmission to service.

NOTE

New or recently overhauled transmissions will often make a magnetic "fuzz" which will collect on the magnetic plug as gray sludge. This is normal and may be cleaned off the plug. The plug may then be reinstalled and the helicopter returned to service. If any chips are found which are larger than 1/16 inch/1.6 mm in cross-section, contact Enstrom Customer Service Department and discontinue use until further instructions are received from Enstrom Customer Service Department.

E. Inspect the filtration/cooling system for general condition, leaks, and security of installation.

F. Inspect the runout of the main rotor shaft (Figure 11-8) after a main rotor blade strike or hard landing. Maximum indication is .012"/0.3 mm.

(6) Reinstall the main rotor hub.

B. Replace the pinion seal as follows:

(1) Remove the upper pulley assembly.

(2) Raise the aircraft using the ground handling wheels. Block the aft end of the skid tubes so the aircraft will not rock back onto the tail rotor guard.

NOTE

Later production transmissions incorporate a seal retainer with a retaining ring to secure the pinion seal. Transmissions returned to Enstrom for overhaul/repair will have the new seal retainer incorporated.

(3) Remove the retaining ring and pinion seal from the seal retainer.

NOTE

Wrap a piece of shim stock around the bearing adapter in the pinion assembly to protect the seal from damage during installation.

(4) Lubricate the lip of the new seal (MIL-PRF-81322). Install the seal onto the pinion shaft and install the seal into the seal retainer. Tap as required to seat the seal in the retainer and install the retaining ring. If not equipped with a retaining ring, use RTV-732 Sealant to secure the seal.

C. Replace the lower mast seals as follows:

NOTE

It is recommended to remove the main rotor transmission from the aircraft to replace the lower mast seals. If the main rotor transmission is not to be removed, install the lifting sling onto the main rotor hub assembly and hoist the aircraft until the skids are lightly touching ground before removing the seal retainer from the main rotor transmission.

(1) Drain the main rotor transmission.

(2) Remove the lower swashplate assembly.

(3) Remove the upper swashplate and guidetube assembly.

CAUTION

Use extreme care when removing the nuts that secure the seal retainer. The transmission will have to be returned for repair if any of the retaining bolts are pushed into the transmission.

(4) Remove the nuts securing the seal retainer and remove the retainer.

(5) Remove the seals from the retainer.

(6) Install the new seals in the retainer.

NOTE

Wrap a piece of shim stock around the mast retaining nut to protect the seal from damage during installation.

(7) Lubricate the lips of the new seals (MIL-PRF-81322). Apply a bead of sealant (Loctite 587) to the seal retainer flange.

(8) Install the seal retainer. Install the retaining nuts and torque in a crossing pattern to standard torque.

(9) Service the main rotor transmission.

(10) Install the upper swashplate and guidetube assembly.

(11) Install the lower swashplate assembly.

11-39. Oil Filtration/Cooling System

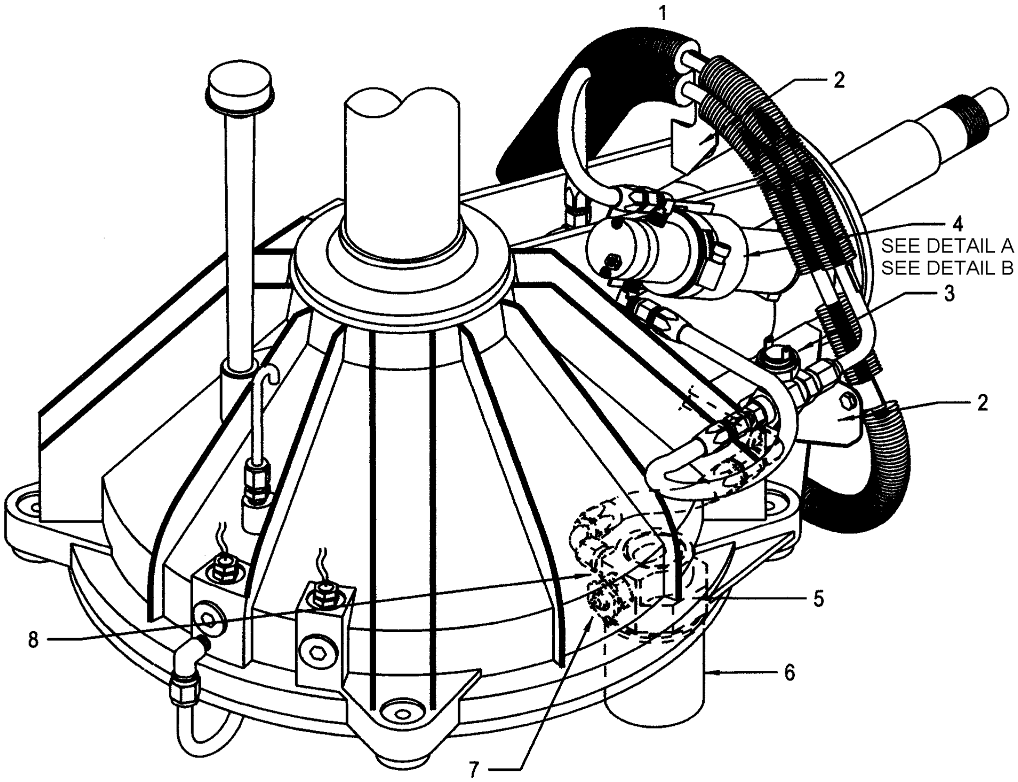
11-40. Description – Oil Filtration/Cooling System (Figure 11-9)

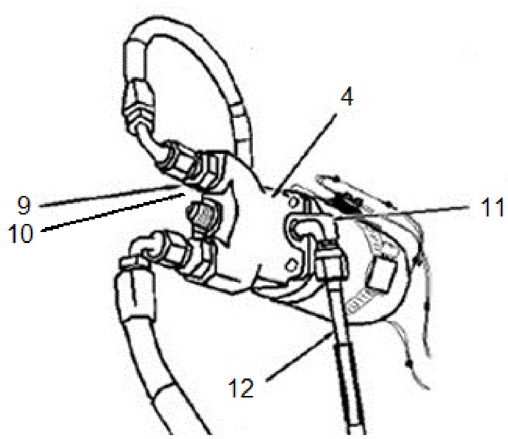
Starting with 480 Serial Number 5042 and all 480Bs, the main rotor transmission is equipped with an oil filtration/cooling system. This system consists of a heat exchanger, an electric pump, a pressure switch, a filter assembly, connecting oil lines, and the mounting brackets and hardware. For aircraft S/N 5114 and subsequent, the electric pump includes a drain line assembly. The heat exchanger is located on the transmission forward of the upper pulley assembly. The electric pump is a 24 Vdc unit located on the left side of the pinion area of the transmission. The pressure switch is installed between the heat exchanger and the inlet port of the pump. The pressure switch controls a segment light in the caution panel that indicates when the pump pressure is below 4.4-5.9 psi/30.2-40.7 kPa of vacuum. The filter assembly, located at the left aft area on the bottom of the transmission, incorporates a 10-12 micron spin-on oil filter. The filter assembly also incorporates the chip detector and a check valve that is used to prevent loss of oil in the transmission due to a break in the system between the filter housing outlet and the pump inlet. The oil filtration/cooling system does not provide pressure lubrication for the main rotor transmission; failure of the pump does not adversely affect the lubrication of the ring and pinion or the bearings in the main rotor transmission.

11-41. Removal – Oil Filtration/Cooling System (Figures 11-9 & 11-10)

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

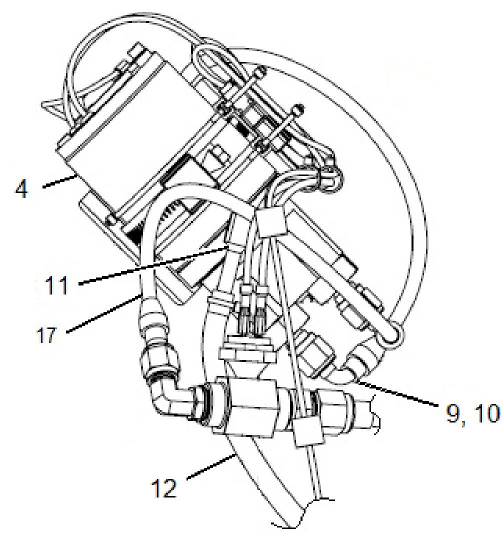
B. Remove the upper pulley assembly (para. 11-46).





DETAIL A

(S/N 5114 THROUGH S/N 5245 OR S/N MODIFIED PER SIL T-063, ORIGINAL ISSUE)

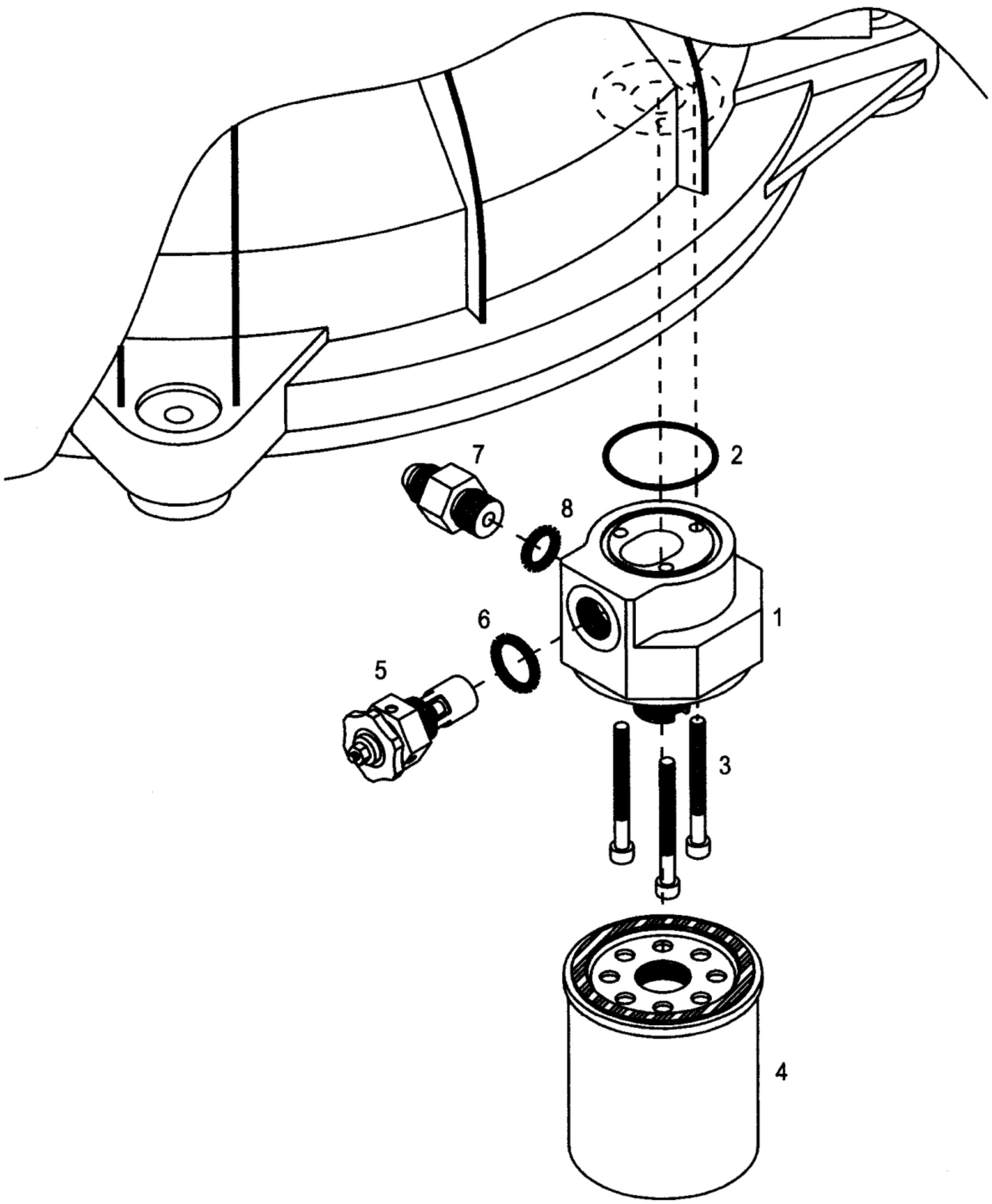


DETAIL B

(S/N 5246 AND SUBSEQUENT, AND EARLIER S/N MODIFIED PER SIL T-063 OR SIL T-070, LATEST REVISION)

1.	Heat Exchanger	7.	Chip Detector
2.	Mounting Brackets	8.	Check Valve
3.	Pressure Switch	9.	Straight Fitting
4.	Electric Pump	10.	O-Ring
5.	Filter Housing	11.	Elbow
6.	Filter	12.	Drain Line

Figure 11-9. Oil Filtration/Cooling System



1.	Filter Housing	5.	Chip Detector
2.	O-Ring	6.	Gasket
3.	Mounting Screws	7.	Check Valve
4.	Oil Filter	8.	O-Ring

Figure 11-10. Oil Filter Assembly Installation

C. Disconnect the electrical leads from the oil pump, pressure switch, and chip detector.

D. Remove the heat exchanger using the following procedure:

(1) Disconnect the oil lines from the heat exchanger.

(2) Remove the hardware securing the heat exchanger to the mount brackets and remove the heat exchanger.

(3) Remove the heat exchanger mounting brackets from the main rotor transmission.

E. Remove the filter assembly using the following procedure:

(1) Remove the oil filter from the housing.

(2) Disconnect the oil line from the outlet port.

(3) Remove the three screws securing the filter housing to the main rotor transmission and remove the filter housing.

a. If required, remove the chip detector assembly and the check valve from the filter housing.

F. Remove the electric pump using the following procedure:

(1) Disconnect the oil lines from the inlet and outlet ports.

(2) Disconnect the drain line, if equipped.

(3) Remove the safety wire from the clamp, loosen the clamp, and remove the pump.

a. If required, remove the elbow(s) and straight fittings, as applicable, from the pump.

(4) Remove the hardware securing the mounting bracket to the main rotor transmission and remove the mounting bracket.

G. Remove the pressure switch from the tee adapter.

11-42. Inspection – Oil Filtration/Cooling System

A. Inspect the heat exchanger for kinks, cracks, bent cooling fins, and general condition.

B. Inspect the filter housing for general condition. Cut open the oil filter and inspect the filter element for metal particles, flakes, or slivers exceeding 1/16 inch/1.6 mm. If metal particles, flakes, or slivers exceeding 1/16 inch/1.6 mm are found, contact Enstrom Customer Service Department and discontinue use until further instructions are received from Enstrom Customer Service Department.

C. Inspect the oil pump for general condition.

D. Inspect the pressure switch for general condition.

E. Inspect the oil lines, drain line (if equipped), fittings, and mounting brackets for general condition.

11-43. Repair – Oil Filtration/Cooling System

A. Replace the heat exchanger if cracked, kinked, or the oil line fittings are damaged beyond repair. Straighten bent cooling fins as required.

B. Replace the oil filter housing if the threads on the chip detector port, check valve port, and/or the filter stem are damaged beyond repair. Replace the filter housing if the filter seal surface is damaged and will not seal after repair.

C. Replace the oil pump if inoperable or leaking from the housing seams. Repair/ Replace wire harness as required.

D. Replace the pressure switch if inoperable. Repair/Replace the wire harness as required.

E. Replace the oil lines, drain line (if equipped), fittings, and mounting brackets if damaged beyond repair.

11-44. Installation – Oil Filtration/Cooling System (Figures 11-9 & 11-10)

A. Apply a light coat of thread sealant to the pressure switch and install the switch into the tee adapter.

B. Install the electrical pump using the following procedure:

NOTE

Note the orientation of the pump for the P/N specified.

(1) Install the pump mounting bracket onto the transmission.

(2) If required, apply a light coat of thread sealant to the elbow fitting(s) and straight fittings (as required), and install the fittings into the pump.

a. If required, install new O-rings when installing the fittings.

(3) Install the pump onto the mounting bracket.

a. P/N 8116-B: Inlet/Outlet ports forward with the outlet port up.

b. P/N 4130039-1: Inlet/Outlet ports aft with the inlet port up.

(4) Tighten and lockwire (.025") the clamp.

(5) Connect the inlet and outlet oil lines.

(6) Connect the drain line (if equipped).

(7) Apply torque stripes to the fittings, as required.

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	1	Pulley	I.D. 4.2490 to 4.2495	+.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	3	Pulley Hub	O.D. 2.188 to 2.189	-.001	Not Repairable	Replace Hub
			I.D. 1.5582 to 1.5587	+.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	Bearing Adapter	O.D. 1.5746 to 1.5749	-.0002	Not Repairable	Replace Adapter
			I.D. 1.3116 to 1.3118	+.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.

(2) Install the sleeve (T-0068A) on the output shaft. Install the spacer (T-0068B) and torque the bolt to 300 in-lbs/34.1 Nm.

(3) Position a height gauge and dial indicator with the indicator arm on the outboard diameter of the sleeve (T-0068A).

(4) Zero the dial indicator and rotate the input shaft. Note the output shaft FIM.

(5) If the runout exceeds .005"/.127 mm FIM, Return the transmission for overhaul.

D. Inspect the input and output shaft seals for leakage. Replace the seals if leaking (para. 11-93).

E. Inspect the chip detector for accumulation of metal particles as follows:

(1) Metal particles, flakes, or slivers exceeding .035 inch/.9 mm: Contact Enstrom Customer Service and discontinue use until further instructions are received from Enstrom Customer Service Department.

(2) Sludge (a mixture of oil and fine metal particles resulting from normal gear operation): Clean the detector and return the transmission to service.

NOTE

New or recently overhauled transmissions will often produce a sludge with slightly larger metal particles. This is normal and may be cleaned from the detector and the transmission returned to service; however, if metal particles, flakes, or slivers larger than .035 inch/.9 mm in cross section are found, contact Enstrom Customer Service and discontinue use until further instructions are received from Enstrom Customer Service Department.

11-91. Assembly – Tail Rotor Transmission

A. Install the tail rotor pitch control assembly (para. 12-119).

11-92. Installation – Tail Rotor Transmission

A. Apply Lubriplate 630-AA (MIL-PRF-81322) to the transmission mount.

B. Insert the chip detector lead through the hole in the transmission mount.

C. Install the transmission in the extension tube. Install the mounting bolts and torque to 25 in-lbs/2.8 Nm. Lockwire (.032”) the bolts.

D. Connect the flex pack coupling to the drive hub (para. 11-81).

E. Connect the electrical lead to the chip detector.

F. Connect the tail rotor guard to the transmission.

G. Connect the tail rotor control cables to the pitch control assembly (para. 12-108).

H. Install the tail rotor assembly (para. 9-51).

NOTE

Omit steps I and J if the transmission and tail rotor control assembly being installed are the same ones that were removed.

I. Check the tail rotor control cable tension (para. 12-99).

J. Check the tail rotor control rigging (para. 12-100).

11-93. Seal Replacement – Tail Rotor Transmission (Figure 11-17)

A. Replace the input shaft seal using the following procedure:

NOTE

If the transmission is not installed on an aircraft, omit steps 1-4.

(1) Remove the bolts securing the flex pack coupling to the aft drive hub (23). Index mark the drive hub and the flex plate coupling so that flex pack coupling is installed in the identical position as previously installed.

(2) Disconnect the aft three drive shaft bearing assemblies (ref. Figure 11-12, Item (3)) from the tail cone.

NOTE

Failure to align the index marks or to return the shims to the original position will require realignment of the tail rotor drive shaft.

a. Mark the drive shaft bearing assemblies and the tail cone with an index mark so that the bearing assemblies are installed in the identical lateral positions as previously installed.

b. Remove the hardware securing the aft three drive shaft bearing assemblies to the tail cone (ref. Figure 11-12, Items (4), (5), (6)).

c. Tape the shims and hardware to the tail cone to facilitate reinstallation of the drive shaft bearing assemblies in the same position (returns the tail rotor driveshaft to the same position vertically).

(3) Remove the aft taper pin (24) (closest to the transmission) with tool T-0092-5.

CAUTION

Displace the tail rotor drive shaft the minimum amount necessary as damage to the drive shaft may result.

(4) Carefully displace and secure the tail rotor drive shaft to one side to permit removal of the hub (23) from the tail rotor transmission input shaft.

(5) Drain the oil from the tail rotor transmission.

(6) Remove the hub (23) and the sleeve (22) from the input shaft using tool (T-0092-5).

(7) Remove the slinger (18).

NOTE

Earlier version gearboxes will have two tab washers (16) securing the input seal into the gearbox housing. Later manufactured gearboxes use a retaining ring (15).

(8) Remove the retaining ring (15) or the two tab washers (16) that secure the seal (14) into the gearbox, as applicable.

(9) Using an awl or small screw driver, carefully pry the input shaft seal (14) out of the gearbox housing.

CAUTION

Do not remove the retaining screws that secure the bearing housing to the gearbox housing. Do not remove the lead seal from the input shaft assembly. Removal of the seal will void the warranty on the tail rotor transmission.

(10) Clean the tail rotor transmission seal surface and the O.D of the new seal.

(11) Install the seal.

a. Apply a small amount of MIL-PRF-2105 to the O.D. and I.D. of the seal and the seal lip.

b. Wrap stainless steel shim stock around the input shaft nut to protect the seal lip during installation.

c. Use a soft plastic or rubber hammer or other suitable press tool to tap the seal into place.

(12) Install the retaining ring (15) or the retaining tab washers (16), as applicable.

a. Torque the tab washer screws (17) to 25 in-lb/2.8 Nm and lockwire if using the retaining tabs.

(13) Install the slinger (18).

NOTE

Install the drive hub (23) and flex pack coupling to the index marks (as previously installed). If not properly marked for reinstallation, the tail rotor assembly will require balancing.

(14) Install the drive hub (23) and taper pin (24). Torque to 25 in-lb/2.8 Nm.

(15) Install the flex pack coupling (para. 11-81) to the drive hub (23). Ensure all flex pack hub assemblies, hardware, spacers, and washers are installed in the same position as previously installed.

(16) Install the three drive shaft bearing assemblies.

NOTE

Install the bearing assemblies to the index marks (as previously installed). If not properly marked for reinstallation, the tail rotor drive shaft will require alignment.

a. Use the same shims, spacers, and bolts (retained in place with tape) for each bearing assembly.

b. Align the bearing assemblies laterally to the index marks.

c. Torque the bolts to 35 in-lb/4.0 Nm.

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

B. Replace the output shaft seal using the following procedure (Figure 11-17):

NOTE

If the transmission is not installed on an aircraft, omit steps 2 and 3.

(1) Drain the oil from the tail rotor transmission.

(2) Remove the tail rotor assembly (para. 9-44; omit step D).

(3) Remove the pitch control bearing assembly (Figure 12-27).

a. Disconnect the bearing housing (7) from the pivot brackets (1) and (2) by removing bolts (5), washers (6) and (8), nut (9), and cotter pin (10).

b. Index mark the position of the sleeve (21) as installed on the output shaft.

NOTE

Resistance will be felt when removing the pitch change bearing retention assembly as the seal (12) and seal retainer (13) must be forced out of the bearing (7).

c. Slide the pitch control assembly off of the sleeve (21) of the tail rotor transmission output shaft.

d. Remove the keys (11), seal (12), and seal retainer (13).

(4) Remove the retaining ring (20) from the output shaft seal (19) (Figure 11-17).

NOTE

As the seal (19) is removed from the output shaft, the sleeve (21) will also be removed with it. Wrapping the end of the output shaft with masking tape may help prevent the sleeve from being displaced when the seal is removed. Clean the area prior to applying tape.

Otherwise, mark the sleeve spline to the output shaft spline so as to install the sleeve in the same location on the output shaft on reassembly.

(5) If preferred, wrap the end of the output shaft with masking tape, otherwise clean the spline edges of the output shaft and sleeve and apply a paint stripe across the splines.

(6) Using an awl or small screw driver, carefully remove the seal (19).

(7) Install the new seal (19).

NOTE

It may be necessary to chamfer the inboard edge of the new seal using 200 grit sandpaper, or equivalent, for ease of installation.

a. Clean the tail rotor transmission seal surface and the O.D. of the new seal.

b. Lubricate (MIL-PRF-2105) the O.D. and inside lip of the new seal (19).

c. Use a soft plastic or rubber hammer or other suitable press tool to tap the seal (19) into place.

NOTE

Positioning the sleeve on the output shaft in a location different than previously installed may affect the runout (TIR) and negatively affect the rail rotor balance. Output shaft runout may be checked in accordance with para. 11-90, C.

(8) If required, install the sleeve (21). Match the spline mark of the sleeve to the spline mark on the output shaft.

a. Lubricate (MIL-PRF-2105) the seal end of the sleeve (21).

b. Use a bushing driver or equivalent press tool, push the sleeve (21) into the seal (19). The seal (19) seats in a groove of the sleeve (21).

(9) Install the retaining ring (20).

(10) Place the seal retainer (13) and the seal (12) onto the output shaft.

(11) Install the two keys (17) into the key slots in the sleeve (21).

a. Lubricate (MIL-PRF-81322) the keys (17) during installation and prior to installing the pitch control assembly.

NOTE

Take care to align the pitch control assembly to the index marks. If the pitch control assembly cannot be realigned to the original index marks, the tail rotor assembly must be dynamically balanced.

(12) Install the pitch control assembly (Figure 12-27).

a. Align the pitch control assembly to the index marks on the sleeve and slide the assembly onto the tail rotor transmission output shaft.

b. Insert the seal (12) into the groove in the pitch control bearing (14).

CAUTION

Be gentle when inserting the seal retainer (13). Excessive force will damage the seal retainer.

c. Use tool T-0140 to install seal and retainer. If T-0140 is not available, use a small straight screwdriver or punch and a small hammer to tap the seal retainer (13) into the groove in the pitch control bearing (14).

(13) Install the pivot brackets (Figure 12-27).

NOTE

Washer (6) must be installed between the upper pivot bracket (1) and the bearing housing (7).

a. Install the bolts (5), washers (6) and (8), and nut (9).

b. Torque the nuts to 60-85 in-lb/6.8-9.6 Nm and install the cotter pin (10).

NOTE

If the tail rotor components are installed in the exact position as removed, the dynamic balance step (para. 9-51, F) may be omitted.

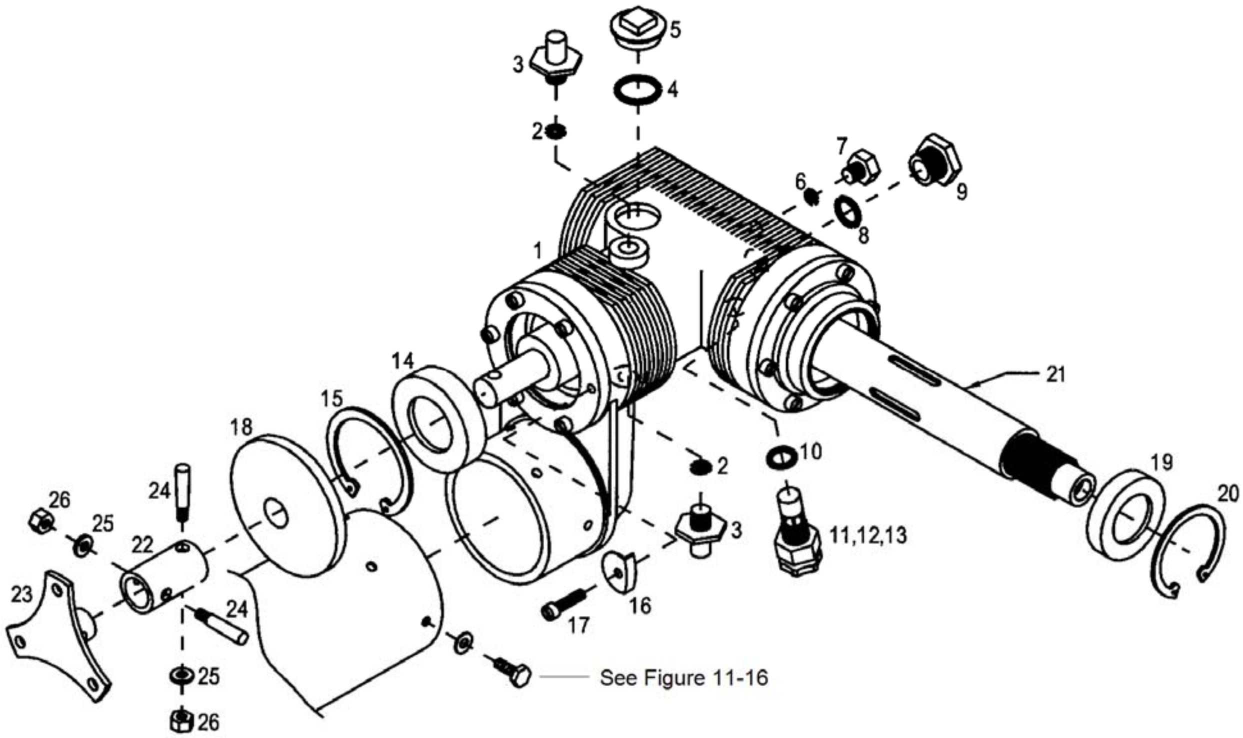
NOTE

If the tail rotor components are not installed in the exact position as removed, the tail rotor must be balanced.

(14) Install the tail rotor assembly (para. 9-51).

(15) Cycle the tail rotor pitch full travel in both directions to ensure that the pitch change system operates correctly.

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



1.	Tail Rotor Gearbox Assembly	14.	Seal
2.	O-Ring	15.	Retaining Ring
3.	Bolt	16.	Tab (omitted if (15) is used)
4.	O-Ring	17.	Screw
5.	Plug	18.	Slinger
6.	O-Ring	19.	Seal
7.	Plug	20.	Retaining Ring
8.	O-Ring	21.	Spacer
9.	Sight Plug	22.	Sleeve
10.	Gasket	23.	Hub
11.	Chip Detector	24.	Taper Pin
12.	O-Ring	25.	Washer
13.	Nut	26.	Nut

Figure 11-17. Tail Rotor Transmission Assembly

11-94. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Adhesive	Adhesive, Loctite Fixmaster Flex 80 Putty Brand	97422/97423
Grease	Grease, Lubriplate Brand	630-AA[1] (06701)
Grease	Grease	MIL-PRF-81322
Liquid Soap	Soap, Joy Brand	
Lockwire	Lockwire, .032”	MS20995C32
Lockwire	Lockwire, .041”	MS20995C41
Marking dye	Machinist’s marking dye, Devcon Brand	DYKEM 80400
MEK	Solvent, MEK	
Oil	Oil, Gear	MIL-PRF-2105
Oil	Oil, Turbine Engine	MIL-PRF-23699
Oil	Any grade internal combustion engine motor oil	
Sealant	Retaining Compound, Loctite Brand	635
Solvent	Citra-Safe, Inland Technology Incorporated	6850-01-378-( )
Solvent	Extreme Simple Green, Sunshine Makers, Inc.	13440
Solvent	Solvent, Toluene	
Tape	Masking Tape, 1-Inch	
Thread Sealant	Thread Sealant, Loctite Brand (277)	27731
Thread Sealant	Thread Sealant, Loctite Brand Threadlocker Blue 242[2]	24200
Thread Sealant	Thread Sealant, Permatex Brand	Form-A-Gasket No.3[3]
Thread Sealant	Thread sealant, Vibra-Tite Brand	VC-3

[1] MIL-PRF-81322 is an acceptable alternate.
[2] Acceptable alternate for Vibra-Tite VC-3.
[3] Acceptable alternate where thread sealant is required.

SECTION 12

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).

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.

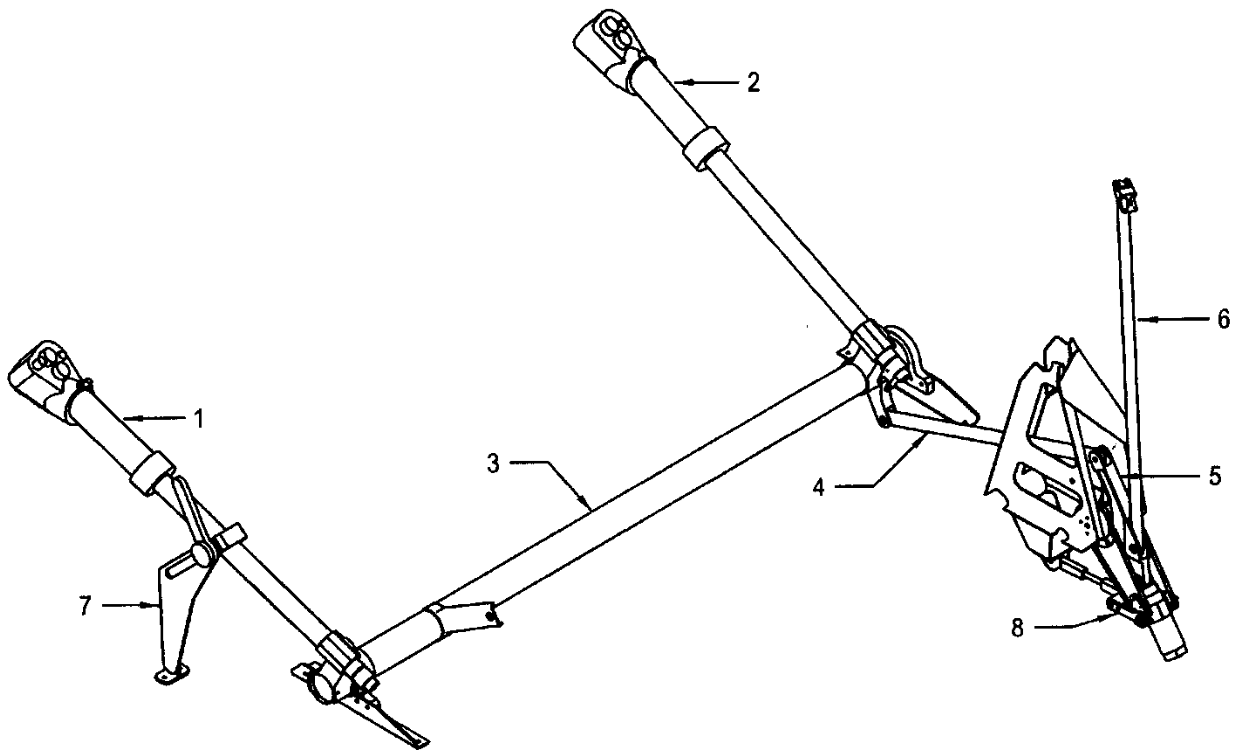
F. Check for the .025 inches/.6 mm clearance between the collective bearing housing spacer and the swashplate mount flange.

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.

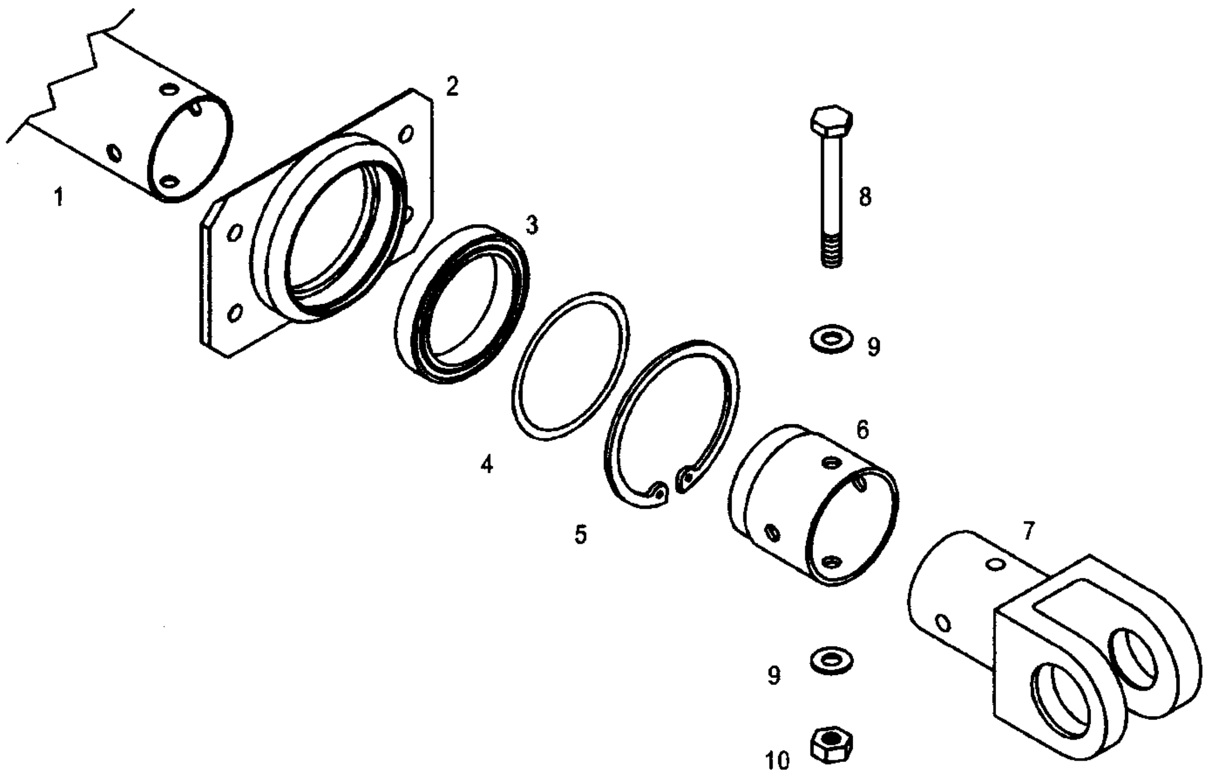
C. Test fly the aircraft and note the collective stick loads.



1. Pilot's Collective (480/B)
2. Copilot's Collective (480/B)
3. Collective Torque Tube
4. Push-Pull Rod
5. Collective Bellcrank
6. Push-Pull Rod
7. Collective Friction Assy.
8. Collective Trim Assy.

Sheet 1 of 3

Figure 12-2. Collective Control System



1.	Torque Tube	6.	Sleeve
2.	Retainer	7.	Clevis
3.	Bearing	8.	Bolt or Rivet
4.	Shim (If Required)	9.	Washer
5.	Retaining Ring	10.	Nut

Figure 12-14. Cyclic Torque Tube Bearing Installation

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.

C. Repair elongated roll pin holes using the following procedures:

(1) Remove the roll pin.

(2) Using a #5 drill, 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 “-06" CherryMAX® rivets.

NOTE

Only one repair authorized per roll pin/rivet hole.

D. Remove minor surface corrosion from the torque tube assembly and apply a light coat of corrosion preventive compound such as PAR-AL-KETONE (Black Bear) or equivalent (MIL-C-52, Type 1).

12-56. Installation – Cyclic Torque Tube Assembly

A. Install the torque tube assembly. Install the hardware securing the bearing housing brackets to the keel structure and the hardware securing the gussets to the keel structure.

(1) Assemble the right and then the left side brackets; do not tighten the hardware.

(2) Torque the hardware securing the right side bracket.

(3) Measure the gap between the left side bracket and the bulkhead.

(4) Install the corresponding P/N 4166053 shim(s) and torque remaining hardware.

B. Connect the push-pull rod to the torque tube arm.

C. Install the cyclic stick (para. 12-51).

D. If the torque tube was replaced, check the cyclic control rigging (para. 12-45).

E. Install the left and right side keel access panel.

F. Perform a limited maintenance test flight (para. 4-61).

12-63. Disassembly – Cyclic Vibration Absorber

NOTE

The vibration absorber assemblies are "tuned" at the factory. Note which beam is installed on which bellcrank before removing the beam assembly from the bellcrank.

A. Remove the hardware securing the beam to the bellcrank and remove the beam.

12-64. Inspection – Cyclic Vibration Absorber

A. Inspect the bellcrank in accordance with paragraph 12-11.

B. Inspect the beam and weights for security of installation, corrosion, cracks, nicks, and/or scratches.

C. Inspect the lanyard for condition and security of installation.

12-65. Repair – Cyclic Vibration Absorber

A. Replace the beam assembly if the beam or weights are cracked, damage or corrosion on the beam exceeds .010 inch/.25 mm in depth, or damage or corrosion on the weights exceeds .050 inch/1.3 mm. Polish out damage or corrosion not exceeding the damage limits.

B. Replace the lanyard if damaged.

C. Replace the hardware as required.

12-66. Assembly – Cyclic Vibration Absorber

NOTE

Ensure that the beam assembly is installed on the bellcrank noted before disassembly.

A. Install the beam assembly and plate onto the bellcrank. Install the hardware. Torque the nuts (25 in-lb/2.8 Nm) and install slippage marks.

12-67. Installation – Cyclic Vibration Absorber

A. Install the vibration absorber assembly into the pylon mount and install the hardware. Torque (30-40 in-lb/3.4-4.5 Nm) the nut and install the cotter pin.

B. Connect the push-pull rods to the vibration absorber assembly. Torque (30-40 in-lb/3.4-4.5 Nm) the nuts and install the cotter pins.

C. Connect the lanyard to the pylon.

12-68. Trim Actuator Assembly

12-69. Removal – Trim Actuator Assembly

NOTE

Maintenance procedures are the same for the longitudinal and the lateral trim actuators.

NOTE

Prior to removal, if a trim actuator assembly contain shims (Figure 12-17.1), the distance from the motor housing to the bottom of the spring capsule should be measured to assist the spring housing travel check (step N). The distance is measured with the motor fully extended. Record the measurement. Then, set the trim actuator assembly to a neutral position (mid-travel) and proceed with removal.

A. Open the left or right side engine access panel.

B. Disconnect the trim actuator from the electrical harness.

C. Disconnect the trim actuator from the longitudinal or lateral bellcrank.

D. Disconnect the trim actuator from the mounting bracket on the cabin bulkhead. Remove the trim actuator.

E. Remove the spacers from the trim actuator pivot points.

12-70. Disassembly – Trim Actuator Assembly (Figure 12-16)

A. Remove the hardware attaching the switch assembly to the trim actuator. Remove the switch assembly. Retain the shims installed under the switch assembly, if installed.

B. Rotate the spring capsule assembly to remove it from the acme shaft assembly.

C. Remove the hardware securing the motor to the gear housing. Remove the motor.

D. Remove the coupling and retaining ring from the end of the worm assembly in the gear housing.

E. Remove the remaining hardware from the acme shaft assembly. Tap the cover to one side and pull on the acme shaft to remove the acme shaft assembly.

F. Gently tap the gear housing against the work bench to remove the worm assembly.

G. Disassemble the spring capsule assembly using the following procedure (Figure 12-17):

(1) Remove the three screws securing the actuator to the housing and the acme nut in the bottom of the spring capsule. Remove the acme nut.

(2) Remove the spring and shaft assembly from the housing.

(3) Place a rod that will fit into the spring and shaft assembly vertically in a vise.

(4) Place the spring and shaft assembly onto the rod in the vertical position.

(5) Push down on the spring retainer closest to the rod-end. Remove the retaining ring from the groove in the shaft and move it up to the rod-end.

(6) Remove the spring and shaft assembly from the rod. Turn the assembly over and remove the other retaining ring.

(7) Remove spring retainers and spring from the shaft.

(8) Remove the retaining ring from the shaft.

12-71. Inspection – Trim Actuator Assembly

A. Inspect the components of the actuator assembly for corrosion, cracks, nicks, scratches, and excessive wear.

B. Inspect the micro switches for proper operation.

C. Inspect the electrical wiring for fraying or broken wires or connectors.

12-72. Repair – Trim Actuator Assembly

A. Replace defective micro switches or damaged wiring.

B. Replace the acme nut in the spring capsule if excessively worn as follows:

(1) Remove the nut from the spring capsule assembly (para. 12-70).

(2) Bond a new bumper onto the replacement nut using adhesive ("Hot Stuff" HS-3 or equivalent).

(3) Install the replacement nut with the bumper facing away from the capsule.

C. Replace the acme shaft assembly, the worm assembly, and the motor as complete units if they require replacement.

12-73. Assembly – Trim Actuator Assembly

A. Install the worm assembly into the gear housing until the aft bearing is aligned with the bearing seat in the housing. Do not install the bearing into the seat at this time.

B. Pack the outer walls of the gear housing and the worm with grease (MIL-PRF-81322).

C. Install the acme shaft assembly onto the gear housing with the cover turned to one side exposing the worm.

D. With the cover seated against the gear housing, push the worm assembly seating the bearings in place. Install the retaining ring.

E. Rotate the cover into position and install the two screws and washers in the cover holes located opposite the worm assembly.

F. Rotate the worm assembly with a screwdriver to check for binding in the gears.

NOTE

Install the coupling with the proper size opening matched with the worm assembly shaft and the motor shaft.

G. Install the coupling onto the slotted end of the worm assembly.

H. Align the slots in the motor with the coupling and install the motor onto the gear housing. Install the hardware and lockwire (.032”).

I. Assembly the spring capsule assembly using the following procedure:

(1) Install one of the retaining rings onto the shaft and position it against the rod-end.

NOTE

The shorter spring retainer is installed toward the rod-end.

(2) Install the spring retainers and spring onto the shaft.

(3) Position the spring retainers and spring against the rod-end. Install the retaining ring on the opposite end of the shaft. Ensure the retaining ring is positioned correctly in the ring groove in the shaft.

(4) Place a rod that will fit into the spring and shaft assembly vertically in a vise. Place the spring and shaft assembly onto the rod in the vertical position.

(5) Push down on the spring retainer closest to the rod-end. Install the retaining ring into the groove in the shaft. Ensure the retaining ring is positioned correctly in the ring groove in the shaft.

(6) Lubricate the spring and shaft assembly with grease (Lubriplate 630-AA or MIL-PRF-81322).

(7) Install the spring and shaft assembly into the housing.

(8) Install the acme nut (recess orientated toward the shaft) with bumper facing away from the rod-end.

(9) Firmly grasp the gear housing, and pull the shaft assembly to check for looseness. If a click is felt and the retaining ring moves slightly, remove the acme nut and install 4166032 shims, as required, to occupy any gap between the spring housing and the acme nut. Reinstall the nut and check the shim effectiveness.

(10) Install the actuator on the housing so the actuator is flush with the bottom of the housing. Install the retaining screws and lockwire (.025").

J. Lubricate (Lubriplate 630-AA or MIL-PRF-81322) the threads of the acme shaft assembly. Turn the spring capsule assembly onto the shaft until the rubber bumper is approximately one inch from the cover.

K. Turn the actuator on the spring capsule so it will align with the slot in the switch assembly. Install the switch assembly and securing hardware and lockwire (.025).

L. Install shim(s), if required, switch assembly, secure hardware and lockwire (.025"), and install the electrical connectors.

NOTE

Set the trim actuator assembly on a portable table near the aircraft to electrically test the actuator.

N. Check the spring housing travel and adjust the switch positions to ensure that the retracted and extended spring housing travel are within the limits specified as noted below. An additional person is required to assist with cyclic operation.

(1) Install and connect the battery, if required.

(2) If no shims are installed:

a. The retracted travel (minimum stroke) limit is 0.125" +0.05"/-0.00".

b. The extended travel (maximum stroke) limit is 1.95" +0.00"/-0.05".

(3) If a shim is installed (Figure 12-17.1):

a. The retracted travel (minimum stroke) limit 'Min' is the difference between this dimension and 1.825" +0.05"/-0.00"

b. The extended travel (maximum stroke) limit is the 'Max' dimension measured in paragraph 12-69 (+0.00"/-0.05").

CAUTION

To prevent damage to the switch assembly, immediately stop applying trim to the cyclic if the actuator will run out beyond the length allowed by the bracket slot.

(3) To adjust the spring housing travel, loosen the switch mounting hardware to set the switch position(s) as necessary to bring the spring housing travel within limits. For example, to shorten the spring housing extension, loosen the switch mounting hardware for the extending switch and adjust the switch position inward (Figure 12-17.2).

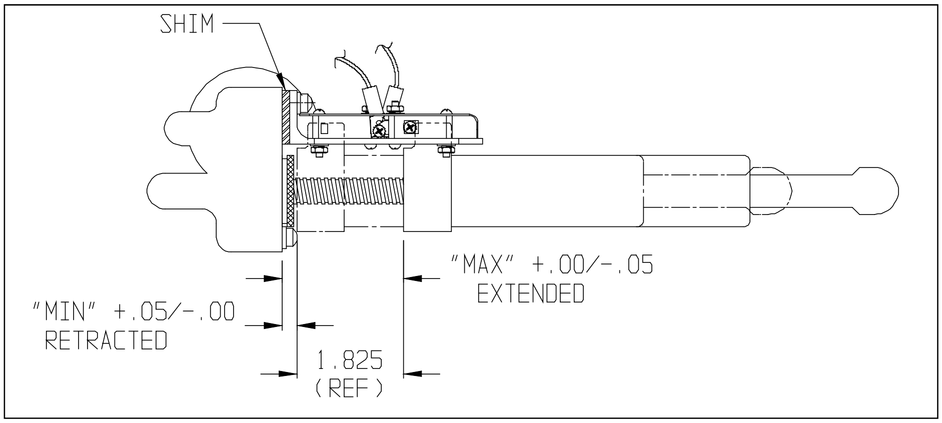


Figure 12-17.1. Trim Actuator Limits with Shim(s) Installed

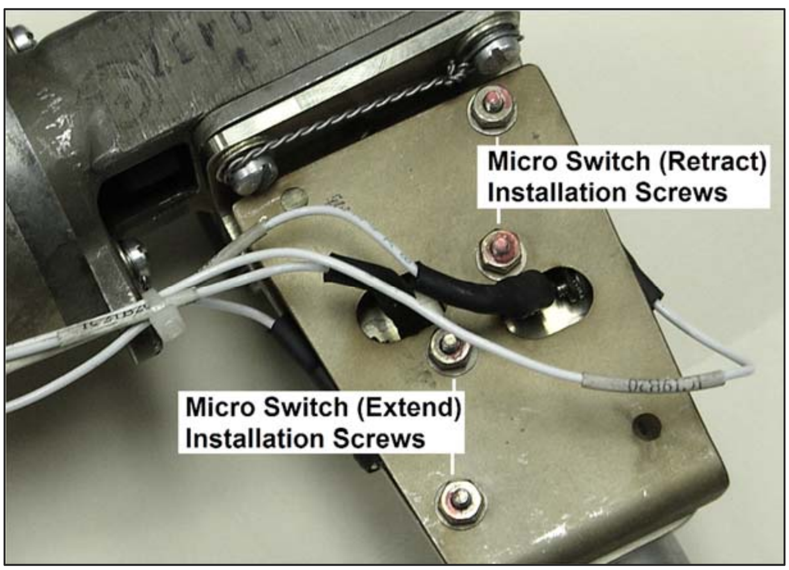


Figure 12-17.2. Switch Plate Assembly Micro Switch Screws
(trim actuator assembly removed for clarity)

NOTE

If is not possible to achieve the limits after adjusting the switch positions, either the bracket slot or the switch screw slots may be filed to achieve the travel limits. The maximum amount that the bracket slot may be filed is 0.040”.

(4) Check the spring housing travel to verify that proper adjustment was made.

(5) When the switch adjustments are complete, apply VC-3 Vibra-Tite to the exposed screw threads and nut face.

(6) Disconnect and remove the battery, as required.

12-74. Installation – Trim Actuator Assembly

A. Install the spacers in the trim actuator assembly pivot points.

B. Install the trim actuator assembly in the mount bracket on the cabin back wall. Install the hardware, torque and cotter pin.

C. Attach the trim actuator assembly to the longitudinal or lateral bellcrank, torque and cotter pin.

D. Connect the trim actuator assembly to the electrical harness.

E. Install the battery and apply power.

F. Check for clearance between the spring housing and the cyclic bellcrank.

(1) Extend the actuator to full travel (trim full forward or full left) and move the cyclic full aft/right. Verify clearance.

(2) If there is contact, remove the shims between the switch assembly and the actuator. Install the switch assembly and re-safety.

(3) Repeat step (1) and step (2), as required.

(4) If the spring housing contacts the bellcrank, and there are no shims, check the travel in accordance with preceding step N.

(5) If the travel is correct and the spring housing contacts the bellcrank, contact Enstrom Product Support.

G. Close the left or right side engine access panel.

12-75. Lower Swashplate Assembly

12-76. Removal – Lower Swashplate Assembly (Figure 12-18)

A. Open the left and right side engine access panels.

B. Remove the longitudinal and lateral push-pull tubes from between the uni-ball assembly and the longitudinal and lateral bellcranks in the engine compartment.

C. Disconnect the three rod-ends (doglegs)from the lower swashplate.

D. Remove the hardware securing the lower swashplate to the upper swashplate.

E. Remove the lower swashplate by pulling down on the uni-ball bearing housing.

12-77. Disassembly – Lower Swashplate Assembly

A. Install tool T-0016 in the end of the tie rod (19). Place a wrench on the tool T-0016 to prevent the tie rod from rotating and remove the cotter pin (10), nut (11), washer (12), DU washer (13), and shims (14) from the tie rod.

B. Tap the tie rod out of the bushings (15) using an aluminum drift. Separate the lower universal housing (7) from the upper universal housing (18). Remove the spacers (20) from inside the bushings (15) in the housing.

C. Remove the shims (14) and the DU washer (13) from the tie rod.

D. Temporarily install the tie rod in the universal shaft (17) to prevent it from rotating and remove the cotter pins, nuts, spacers, DU washers, and shims from both ends of the shaft (17).

E. Tap the end of the shaft with an aluminum drift to remove the shaft and sleeve (16) from the lower universal housing.

F. Tap the opposite sleeve to remove it from the lower universal housing.

G. Tap the sleeves from the upper universal housing using an aluminum drift.

H. Hold the uni-ball shaft (1) with a wrench and remove the cotter pin, nut, and washer. Separate the uni-ball assembly (4) from the lower universal housing.

I. Remove the spacer (5) from the uni-ball shaft.

J. Remove the shaft from the uni-ball assembly.

K. Rotate the uni-ball until it is aligned with the recesses in the bearing outer race and remove the uni-ball.

L. Remove the retaining ring (2) from the uni-ball.

WARNING

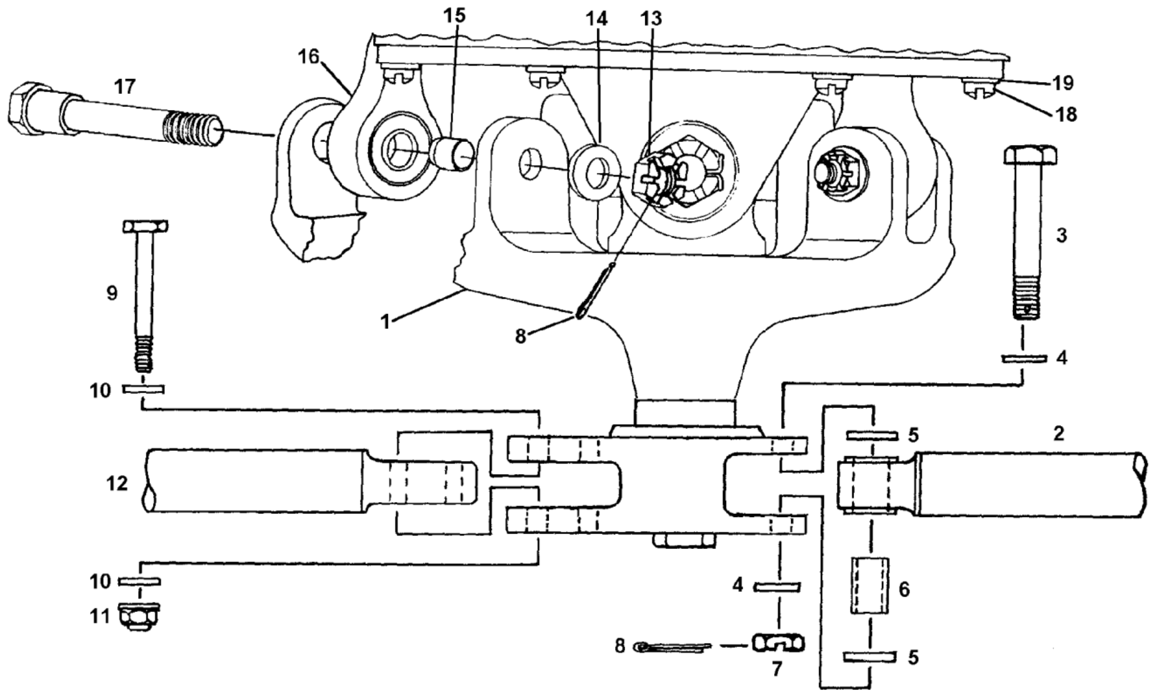
Use extreme caution when removing or installing heated parts and assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

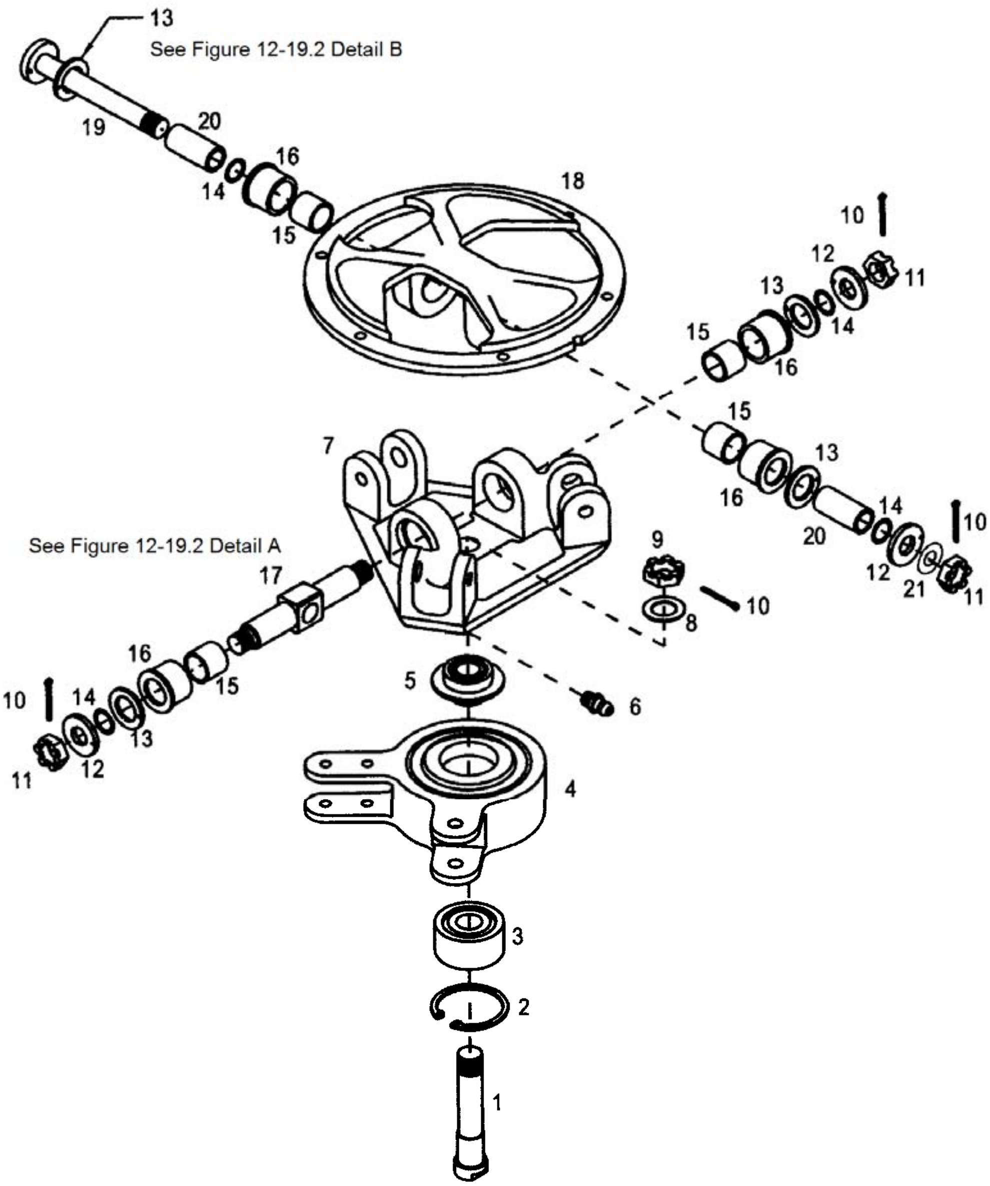
M. Heat the uni-ball to approximately 250°F/121°C. and remove the bearing (3) from the uni-ball.

N. Press the DU bushings (15) from the sleeves (16).



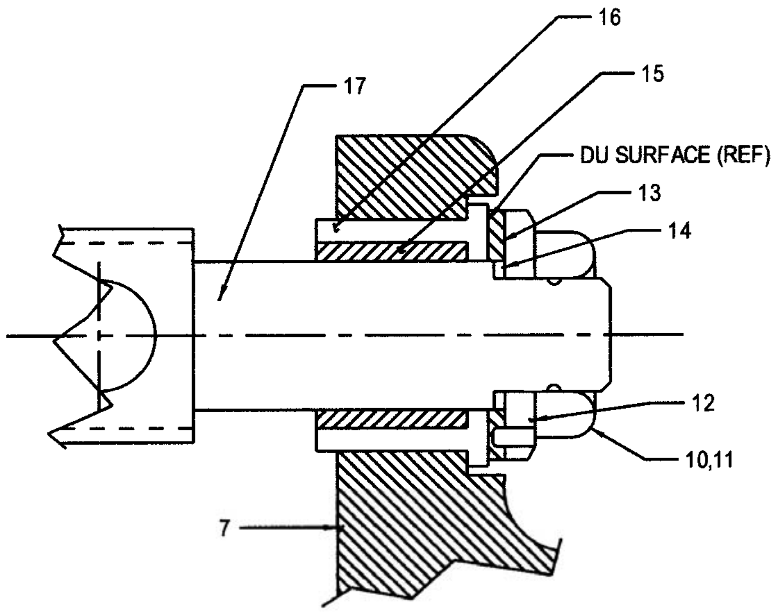
1.	Lower Swashplate Assy.	11.	Nut
2.	Lateral Push-Pull Rod	12.	Longitudinal Push-Pull Rod
3.	Bolt	13.	Nut (P/N AN320-4)
4.	Washer	14.	Washer
5.	1/4 Harper Washer	15.	Spacer
6.	Spacer	16.	Rod End (Dog Leg)
7.	Nut	17.	Bolt
8.	Cotter Pin	18.	Screw
9.	Bolt	19.	Washer
10.	Washer		

Figure 12-18. Lower Swashplate Installation



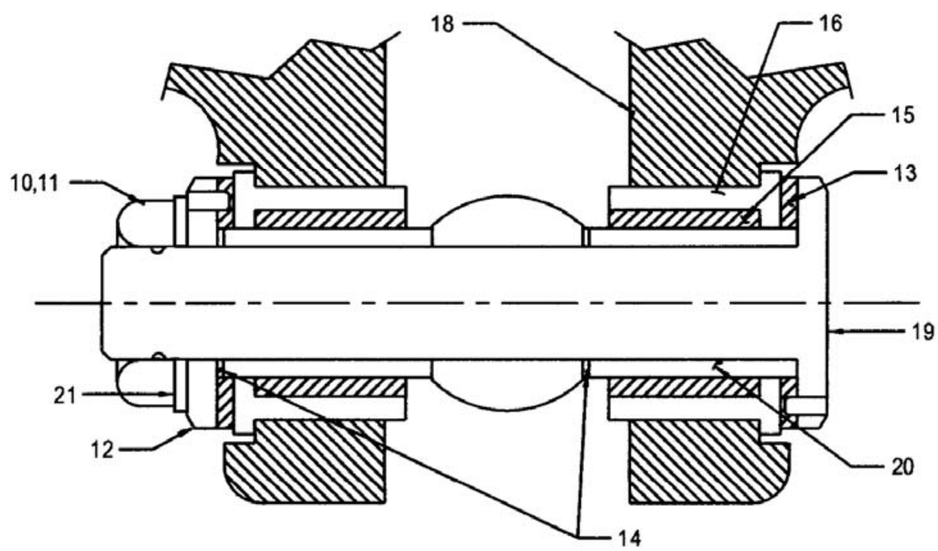
1.	Bolt	12.	Washer
2.	Retaining Ring	13.	DU Washer
3.	Bearing	14.	Shim
4.	Bearing Housing Assembly	15.	DU Bushing
5.	Spacer	16.	Sleeve
6.	Lube Fitting	17.	Universal Shaft
7.	Lower Housing	18.	Upper Housing
8.	Washer	19.	Tie Rod Assembly
9.	Nut	20.	Spacer
10.	Cotter Pin	21.	Light Washer
11.	Nut		

Figure 12-19.1. Lower Swashplate Assembly



DETAIL A

UNIVERSAL SHAFT TO LOWER HOUSING
(TYPICAL BOTH ENDS)



DETAIL B

TIE ROD TO UPPER HOUSING

Figure 12-19.2. Lower Swashplate Installation

12-78. Inspection – Lower Swashplate Assembly

A. Use the following procedure to inspect the lower swashplate assembly during periodic inspections (100 Hour/Annual):

(1) Remove both side panel cowls.

(2) Disconnect the pitch change bellcranks located on the main rotor hub from the main rotor push-pull rods located in the mast and from the pivot brackets.

(3) With the aid of an assistant, remove the collective friction and move the collective up and down throughout the range and wiggle the cyclic stick (movement of the collective and cyclic stick does not have to occur simultaneously). Observe and ***carefully*** feel the lower swashplate assembly for any looseness (e.g. vertical play at the universal joint or end play along the universal shaft and tie rod axes). Any looseness is most noticeable with a collective control reversal and/or reversal of the cyclic controls. NOTE: Vertical looseness may also be evident at the collective stick as a sudden change in stick force or may exhibit itself as a clinking sound. Using a 9/16 inch crows foot and torque wrench set to 60 in-lb/6.8 Nm, check that the torque required to rotate the tie rod assembly at the nut on the end of the tie rod assembly is more than 60 in-lb/6.8 Nm. Do not remove the cotter pin from the nut during the check and stop the torque check if 60 in-lb/6.8 Nm is reached without the tie rod assembly rotating. Any rotation of the tie rod with less than 60 in-lb/6.8 Nm of torque is unacceptable.

(4) If neither looseness nor loss of torque is evident, reconnect the pitch change bellcranks and return the aircraft to service.

(5) If any looseness or loss of torque is found, remove the lower swashplate assembly from the aircraft and perform the following additional inspections:

a. Inspect the universal joint for looseness/play by twisting and pushing and pulling the upper and lower housings of the lower swashplate against each other.

b. Inspect the tie rod and universal shaft axis for end play by attempting to move the upper and lower housings against each other along the tie rod and universal shaft axes.

c. Check the pre-load of the tie rod and universal shaft axis. The pre-load should be between 0.5 and 2.0 pounds (.23 and .91 kg) using a spring scale, with no noticeable end play.

(6) Disassemble the lower swashplate assembly and inspect the detail parts in accordance with Table 12-2.

NOTE

Contact Enstrom Product Support to procure an overhauled lower swashplate assembly.

(7) Replace unserviceable parts as required and reassemble the lower swashplate in accordance with paragraph 12-79.

(8) Reinstall the lower swashplate assembly and reconnect the pitch change bellcranks.

B. See Table 12-2 for the detailed inspection requirements for the lower swashplate assembly.

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Table 12-2. Lower Swashplate Assembly

Inspection Requirements*

P/N	Fig. 12-19 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
4140531-13	1	Bolt	Bearing surface Dia. .4723 to .4726	-.0002	Not Repairable	Replace Shaft
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Shaft
ECD009-11	3	Bearing	O.D. 1.2595 to 1.2598	No Tolerance Allowed	Not Repairable	Replace Bearing
			I.D. .4722 to .4724	No Tolerance Allowed	Not Repairable	Replace Bearing
			Ratcheting or roughness	None Allowed	Not Repairable	Replace Bearing
4140526-3, -7	4	Bearing Assembly	Bolt holes in pivot ears for elongation	None Allowed	Not Repairable	Replace Housing
			Surface nicks or scratches	None Allowed	≤ .010 deep	Blend and polish out smooth
			Security of the uni-ball race in the housing	No Movement Allowed	Not Repairable	Replace Housing
			Cracks	None Allowed	Not Repairable	Replace Housing
			Uni-ball race for scoring or scratches	None Allowed	≤ .002 deep	Polish out smooth

Table 12-2. Lower Swashplate Assembly

Inspection Requirements*

P/N	Fig. 12-19 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
4140526-3, -7	4	(Cont'd) (Uni-ball Bearing)	Bearing bore Dia. 1.2598	+.0006 -.0000	Not Repairable	Replace Uni-ball
			Surface scoring or scratches	None Allowed	≤ .002 deep	Polish out smooth
4140534-11	5	Spacer	Nicks or galling on the I.D.	None Allowed	≤ .003 deep	Polish out smooth
4140535-11,-13 28-16119-3, -5	7	Housing	Bushing bores Dia. .7500 to .7505 (-11,-13,-3) .7495 to .7500 (-5)	+.0005	Not Repairable	Replace Housing
			Center bolt bore Dia. .4375 (-11,-13) .4370 to .4380 (-3, -5) (no galling allowed in this bore)	+.0005	Not Repairable	Replace Housing
			Large bolt bore Dia. in the pivot ears .375 to .376	+.0005	Not Repairable	Replace Housing
			Small bolt bore Dia. in the pivot ears .250 to .251	+.0005	Not Repairable	Replace Housing
			Cracks	None Allowed	Not Repairable	Replace Housing
28-16227-3	12	Washer	Nicks and gouges	None Allowed	Not Repairable	Replace Spacer

Table 12-2. Lower Swashplate Assembly

Inspection Requirements*

P/N	Fig. 12-19 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-16263-5	13	DU Washer	Thickness .0585 to .0605	-.008	Not Repairable	Replace washer
08GDU08	15	DU Bushing	**I.D. .4992 to .5019	+.0025	Not Repairable	Replace bushing
28-16226-5	16	Sleeve	O.D. .7503 to .7508	-.0003	Not Repairable	Replace Sleeve
			I.D. .5937 to .5941	+.0002	Not Repairable	Replace Sleeve
28-16223-19	17	Universal Shaft	O.D. .4991 to .4995	-.0003	Not Repairable	Replace Shaft
			Tie Rod Bore .3750 to .3752	+.0005	Not Repairable	Replace Shaft
			Concentricity	.0015 FIM	Not Repairable	Replace Shaft
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Shaft
28-16116-1, -11	18	Housing	Bushing bores Dia. .7500 to .7505	+.0005	Not Repairable	Replace Housing
			Cracks	None Allowed	Not Repairable	Replace Housing
28-16224-5	19	Tie Rod Assembly	O.D. .3748 to .3750	-.0005	Not Repairable	Replace Tie Rod
			Concentricity	.002 FIM	Not Repairable	Replace Tie Rod
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Tie Rod

Table 12-2. Lower Swashplate Assembly

Inspection Requirements*

P/N	Fig. 12-19 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-16225-19	20	Spacer	O.D. .4991 to .4995	-.0003	Not Repairable	Replace Spacer
			†Length 1.037 to 1.036	-.001	Not Repairable	Replace Spacer

* All dimensions are in inches.

** Inspect DU Bushing I.D. with the bushing installed in the sleeve, P/N 28-16226-5.

† Measure length at several locations to check for uneven wear.

Table 12-3. Upper Swashplate Assembly

Inspection Requirements*

P/N	Fig. 12-21 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-16108-2, -11	8	Bearing Housing	Bearing bore Dia. 3.9365 to 3.9371	No Tolerance Allowed	Not Repairable	Replace Housing
			Pivot bolt holes for galling or wear	None Allowed	Not Repairable	Replace Housing
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Housing
28-16386-1	10	Rain Slinger	Check for deformation	None Allowed	Not Repairable	Replace Slinger
28-16106-2	11	Spacer	Guide tube holes for galling	None Allowed	Not Repairable	Replace Spacer
16-DU-12	12	Bushing	O.D. 1.125	+.0000 -.0005	Not Repairable	Replace Bushing
			I.D. 1.000	+.0005 -.0000	Not Repairable	Replace Bushing
4140530-11	13	Control Housing	Bushing bore Dia. 1.1250 to 1.1256	+.0004	Not Repairable	Replace Housing
			O.D. 2.6465 to 2.6470	-.0003	Not Repairable	Replace Housing
			O.D. for galling	.001 deep	≤ .005 deep	Polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Housing

Table 12-3. Upper Swashplate Assembly

			Inspection Requirements*			
P/N	Fig. 12-21 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-16260-1	15	Guide Tube Assembly	Sheared or worn rivets	None Allowed	If rivet is sheared with no other damage to the assembly	Replace Rivet
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Guide Shaft in the retainer
			Looseness of guide shaft in the retainer	No movement allowed	Not Repairable	Replace Assembly
			Guide shafts for galling	.001 deep	≤ .005 deep and ≤ 1.0" long	Blend and polish out smooth
			Cracks	None Allowed	Not Repairable	Replace Assembly

* All dimensions are in inches.

12-86. Installation – Upper Swashplate Assembly (Figure 12-20)

A. Lubricate (MIL-PRF-81322) the bore of the main rotor mast at the lower end.

B. Align the slot in the control housing with the locking pin in the lower end of the mast. Install the upper swashplate into the mast. Gently tap the swashplate into position by sliding the swashplate assembly up and down on the guide tubes.

C. Install the hardware securing the swashplate. Torque the bolts and lockwire (.025).

NOTE

Rotate the upper collective bearing assembly with the swashplate in the full up position and ensure the lockwire does not interfere with the collective bearing housing.

D. Install the collective walking beam (para. 12-42).

E. Install the main rotor push-pull rods (para. 12-86.4).

F. Install the lower swashplate (para. 12-80).

G. Install the left and right side engine access panels.

H. Perform a limited maintenance test flight (para. 4-61).

12-86.1. Main Rotor Push-Pull Rods

12-86.2. Removal – Main Rotor Push-Pull Rods

A. Open the left and right side engine access panels.

B. Remove the lower swashplate assembly (para. 12-76).

NOTE

The rod ends (doglegs) are match taper reamed to the push-pull rods.

C. Index mark the rod ends (doglegs) to their respective push-pull rod.

D. Remove the cotter pins and the nuts from the push-pull rods.

E. Install the puller tool T-0045 over the dogleg with the center of the tool aligned with the push-pull rod, and remove the doglegs.

F. Disconnect the upper end of the push-pull rods from the pitch change bellcranks on the main rotor hub.

G. Remove the hardware securing the pitch change bellcranks to their brackets. Lift the pitch change bellcranks from their brackets and separate the push-pull rods from the pitch change bellcranks.

NOTE

Secure the spacers in the push-pull rods and the pitch change bellcranks with a piece of lockwire when disassembled or removed.

H. Remove the push-pull rods through the upper end of the mast.

12-86.3. Inspection – Main Rotor Push-Pull Rods

A. Inspect the main rotor push-pull rods in accordance with Table 12-3.1.

12-86.4. Installation – Main Rotor Push-Pull Rods

A. Install the push-pull rods into the mast from the upper end and through the guide tubes in the upper swashplate.

NOTE

Stuff a shop cloth into the upper end of the mast to prevent anything from being dropped into the mast when connecting the push-pull rods to the pitch change bellcranks. Remember to remove the shop cloth when installation is complete.

WARNING

If anything is dropped into the mast it must be removed prior to moving the flight controls.

B. Install the spacers into the push-pull rods and the pitch change bellcranks (para. 12-91).

C. Connect the push-pull rods to the pitch change bellcranks. Torque the nuts to 40 in-lbs/4.5 Nm and cotter pin (para. 12-91).

D. Connect the pitch change bellcranks to the mounting brackets. Torque the nuts to 40 in-lbs/4.5 Nm and cotter pin (para. 12-91).

E. Install the rod ends (doglegs) onto the push-pull rods using the following procedures:

NOTE

The doglegs must be installed on the respective push-pull rod they were removed from.

NOTE

If a new dogleg is installed, it must be reamed with a #5 Brown and Sharpe High Speed Steel Finish Reamer.

(1) Install the doglegs on the push-pull rods and install the nuts finger tight.

(2) Install the special tool T-0054 on the bell housing of the upper swashplate assembly while aligning the dogleg parallel to its respective pitch change bellcrank on the main rotor hub. Install the screws to hold the tool in place. Place a spacer on each side of the bearing in the dogleg and install the bolt to position the dogleg on the tool (Figure 12-22).

NOTE

If the nut is over torqued when aligning with the cotter pin hole, do not loosen the nut to re-align. Instead, back the nut off completely and retorque.

(3) Torque the nut to 140 in-lbs/15.9 Nm and cotter pin.

(4) Repeat steps (2) and (3) for each dogleg.

F. Install the lower swashplate (para. 12-80).

G. Install the left and right side engine access panels.

H. Perform a limited maintenance test flight (para. 4-61).

12-87. Pitch Change Bellcranks

12-88. Removal – Pitch Change Bellcranks

CAUTION

Foreign objects dropped down the mast <u>must</u> be immediately removed to prevent damaging the flight controls.

A. Index mark the pitch change bellcranks for reinstallation.

CAUTION

Do not over rotate the blade grips when the pitch change links are not connected to the pitch change bellcranks or the pitch change bellcranks are not installed in the mounting brackets.

B. Remove the hardware connecting the pitch change bellcranks to the push-pull rods in the mast.

C. Remove the hardware connecting the pitch change bellcranks to the pitch change links.

D. Remove the center pivot bolts from the pitch change bellcranks. Lift the pitch change bellcranks from the mounting brackets.

NOTE

Install tie wraps to hold the pivot spacers in the pitch change bellcranks and the push-pull rods.

12-89. Inspection – Pitch Change Bellcranks

A. Inspect the pitch change bellcranks for nick, scratches, corrosion, cracks, worn bushings, worn bearings, and security of installation.

12-90. Repair – Pitch Change Bellcranks

A. Blend out nicks, scratches, and corrosion not exceeding .010"/.25 mm deep.

B. Replace the pitch change bellcrank if cracked or the inboard bushings come out of the pitch change bellcrank.

C. Replace the pitch change bellcrank if the bushing bores are elongated.

D. Replace the bearings (5) if ratcheting or roughness is felt or if radial play with the spacer (6) installed exceeds .005"/.13mm.

12-91. Installation – Pitch Change Bellcranks (Figure 12-23)

CAUTION

Foreign objects dropped down the mast must be immediately removed to prevent damaging the flight controls.

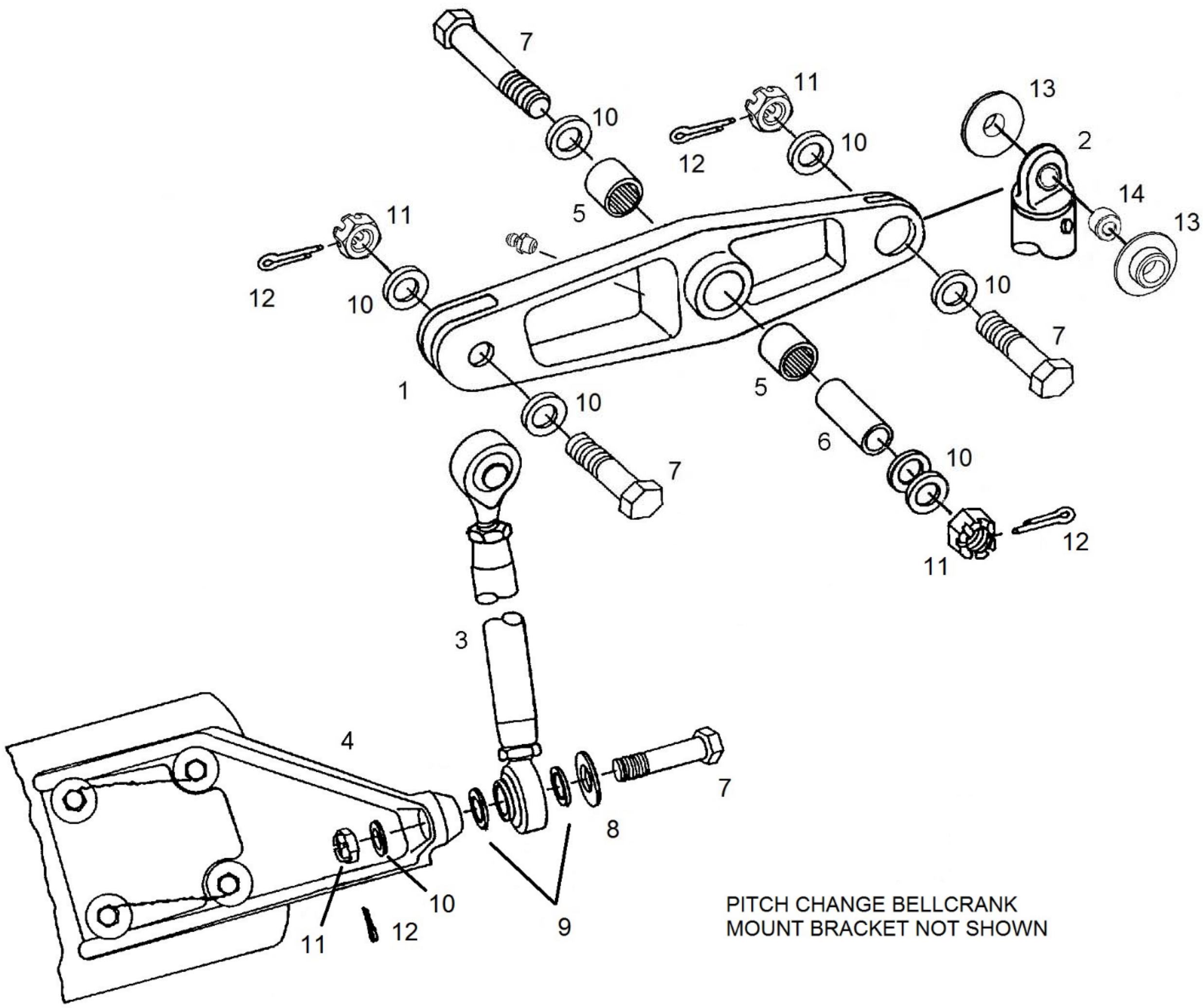
CAUTION

Do not over rotate the blade grips when the pitch change links are not connected to the pitch change bellcranks or the pitch change bellcranks are not installed in the mounting brackets.

A. Connect the pitch change bellcrank to the push-pull rod in the mast. Torque the nut (40 in-lb/4.5 Nm) and cotter pin. Check that the pitch change bellcrank freely pivots at the rod end connection.

B. Install the pitch change bellcrank into the mounting bracket and install the hardware. Torque the nut (40 in-lb/4.5 Nm) and cotter pin.

C. Connect the pitch change link to the pitch change bellcrank and install the hardware. Torque (75 in-lb/8.5 Nm) the nut and cotter pin.



1.	Pitch Change Bellcrank	8.	Harper Washer
2.	Push-Pull Rod (Note 1)	9.	Spacer
3.	Pitch Change Link	10.	Washer
4.	Pitch Horn	11.	Nut
5.	Bearing	12.	Cotter Pin
6.	Spacer	13.	Bushing
7.	Bolt	14.	Bushing

Note 1. Shown with bearing insert installed in push-pull rod fitting.

Figure 12-23. Pitch Change Bellcrank and Pitch Change Link Installation

12-92. Pitch Change Links

12-93. Removal – Pitch Change Links (Figure 12-23)

NOTE

Index marking the pitch change links and measuring the overall length will prevent having to perform a rigging check.

CAUTION

Do not over rotate the blade grips when the pitch change links are not connected to the pitch change bellcranks or the pitch change bellcranks are not installed in the mounting brackets.

A. Index mark the links for reinstallation. Disconnect the upper end of the link from the pitch change bellcrank.

B. Disconnect the lower end from the pitch horn and remove the pitch change links. Measure the overall length of the links and record.

12-94. Inspection – Pitch Change Links

A. Inspect the pitch change links for nicks, scratches, corrosion, cracks, and security of installation.

B. Inspect the rod end bearings for excessive wear.

12-95. Repair – Pitch Change Links

A. Blend out scratches, nicks, and corrosion that are not deeper than .010"/.25 mm.

B. Replace parts that are cracked.

C. Replace rod end bearings that have .005"/.13 mm axial play or greater.

12-96. Installation – Pitch Change Links (Figure 12-23)

CAUTION

Do not over rotate the blade grips when the pitch change links are not connected to the pitch change bellcranks or the pitch change bellcranks are not installed in the mounting brackets.

NOTE

Turn the rod ends into the barrel as equally as possible and check the witness hole for proper thread engagement.

Table 12-4. Tail Rotor Pitch Control Assembly

Inspection Requirements

P/N	Fig.12-27 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
28-16331-1	7	Bearing Housing	Bearing bore 2.6774 to 2.6779	+.0002	Not Repairable	Replace Housing
			Oilite bushing I.D. .3755 to .3765	+.0005	Not Repairable	Replace Housing
			Surface nicks and scratches	None Allowed	≤ .020 deep	Blend and polish out smooth
TS-023	12	Seal	Inspect for cuts or tears	None Allowed	Not Repairable	Replace Seal
28-16394-2, -11	14	Pitch Control Bearing	Bronze O.D. 1.3777 to 1.3787	-.0005	Not Repairable	Replace Bearing
			Bore Dia. 1.079 to 1.081	+.001	Not Repairable	Replace Bearing
			Keyway width .1875 to .1895	+.0005	Not Repairable	Replace Bearing
			Dowel pin holes .2450 to .2470 (-2)	+.003	Not Repairable	Replace Bearing
			Dowel pin holes .2490 to .2495 (-11)	+.0005	Not Repairable	Replace Bearing
			Distortion of the bore	None Allowed	Not Repairable	Replace Bearing

Table 12-4. Tail Rotor Pitch Control Assembly

Inspection Requirements

P/N	Fig.12-27 Item #	Part Name	Inspection*	Serviceable Limits*	Repair Limits	Repair or Action
ECD016-11	15	Bearing	O.D. 2.6772	+.0000 -.0005	Not Repairable	Replace Bearing
			I.D. 1.3780	+.0005 -.0000	Not Repairable	Replace Bearing
			Axial movement of the inner race to the outer race	.002	Not Repairable	Replace Bearing
			Ratcheting or roughness	None Allowed	Not Repairable	Replace Bearing
5002-268-PP	16	Retaining Ring	Check for flatness	No distortion	Not Repairable	Replace Retaining Ring
W-47	17	Wave Spring Washer	Check for wave contour	No flat spots	Not Repairable	Replace Washer
28-16392-13	18	Pitch Link Retainer	Bore 1.3782 to 1.3787	+.0002	Not Repairable	Replace Retainer
			Dowel pin holes .2490 to .2495	+.0002	Not Repairable	Replace Retainer
			Pitch link retaining bolt holes .250 to .251	+.0005	Not Repairable	Replace Retainer
			Surface nicks and scratches	None Allowed	≤ .010 deep	Blend and polish out smooth
28-16397-11	19	Dowel Pin	O.D. .2495 to .2505	-.0005	Not Repairable	Replace Pin

* All dimensions are in inches

12-120. Tail Rotor Pitch Change Links

12-121. Removal – Tail Rotor Pitch Change Links (Figure 12-28, Figure 12-29)

NOTES

Index mark (color code) the pitch change links.

Pitch change links P/N 28-16345-11 or P/N 28-16391-1 must be installed as same part number pairs (either two P/N 28-16345-11 or two P/N 28-16391-1). Pitch change links P/N 28-16391-3 or P/N 28-16391-5 may be installed in combination with each other but not in combination with P/N 28-16345-11 or P/N 28-16391-1. For the barrel type, the pitch change link length and rod end orientation has been set at the factory. Do not disassemble unless the rod ends need replacement.

Paragraphs 12-122 and 12-125 apply to the barrel type pitch change links only.

A. Disconnect the pitch change links from the tail rotor pitch arms. Keep the bolt and washer stack up together for each pitch change link.

B. Remove the hardware securing the pitch change links to the retainer. Remove the pitch change links and spacers from the retainer.

12-122. Disassembly – Tail Rotor Pitch Change Links

A. Loosen the jam nuts from the barrel and remove the rod ends from the barrel.

12-123. Inspection – Tail Rotor Pitch Change Links

A. Inspect the pitch change links for cracks, corrosion, bends, damage, and proper and secure installation.

B. Inspect the rod ends for excessive play.

12-124. Repair – Tail Rotor Pitch Change Links

A. Corrosion, nicks, or scratches in the solid link, barrel, or rod end outer race not exceeding .010"/.25 mm deep may be burnished out. Replace the solid link, barrel, or rod end if cracked or damage is exceeds .010"/.25 mm deep.

B. Replace the rod end if its axial play is exceeds .005"/.13 mm.

C. Correctly install improperly installed pitch change links.

12-125. Assembly – Tail Rotor Pitch Change Links

A. Install the jam nuts onto the rod ends and apply Loctite (VC-3) to the threads of the rod ends.

B. Install the right hand rod end into the barrel until the threads completely cover the witness hole in the barrel.

C. Install the left hand rod end into the barrel until the overall length of the pitch change link measures 4.260” ± 0.005”/10.82 cm ± 0.13 cm. Orientate the rod ends 30° from each other (Figure 12-29).

12-126. Installation – Tail Rotor Pitch Change Links (Figure 12-28, Figure 12-29)

NOTE

If the pitch change links (barrel type) being installed are from the factory or the length and rod end bearing orientation are known to be satisfactory (removed serviceable), or if the pitch change links being installed are the solid type, omit steps A and D through F.

A. Lock the tail rotor control pedals in the neutral position.

NOTE

For aircraft manufactured or modified with P/N 28-16391-3 or 28-16391-5 pitch link assemblies, the rod end labeled “**T/R ↑ BLADE”**, must be installed in the proper orientation as shown in Figure 12-28.

B. Install the left hand thread rod end of the pitch change link and the spacers (3) into the retainer. Install the bolts (1) so that heads are in the direction of rotation, washers (2 & 5), and nuts (6). Torque the nuts and install the cotter pins.

C. Connect the right hand thread rod ends to the pitch arms with the hardware in the following sequence: bolt (1) (bolt head installed in direction of rotation), Harper washer (8), thin spacer (9), O-ring (11), pitch change link rod end (4) (see Note above), thick spacer (10), washer (13), pitch arm, washer(s) (5, 13) (use stack-up retained from para. 12-121,A), and nut (6). Torque the nuts (55-75 in-lb/6.2-8.5 Nm) and install the cotter pins (7). (See also SDB T-055 and SIL T-027, latest revision, respectively.)

NOTE

Omit Steps D and E for aircraft with P/N 28-16391 pitch link assemblies.

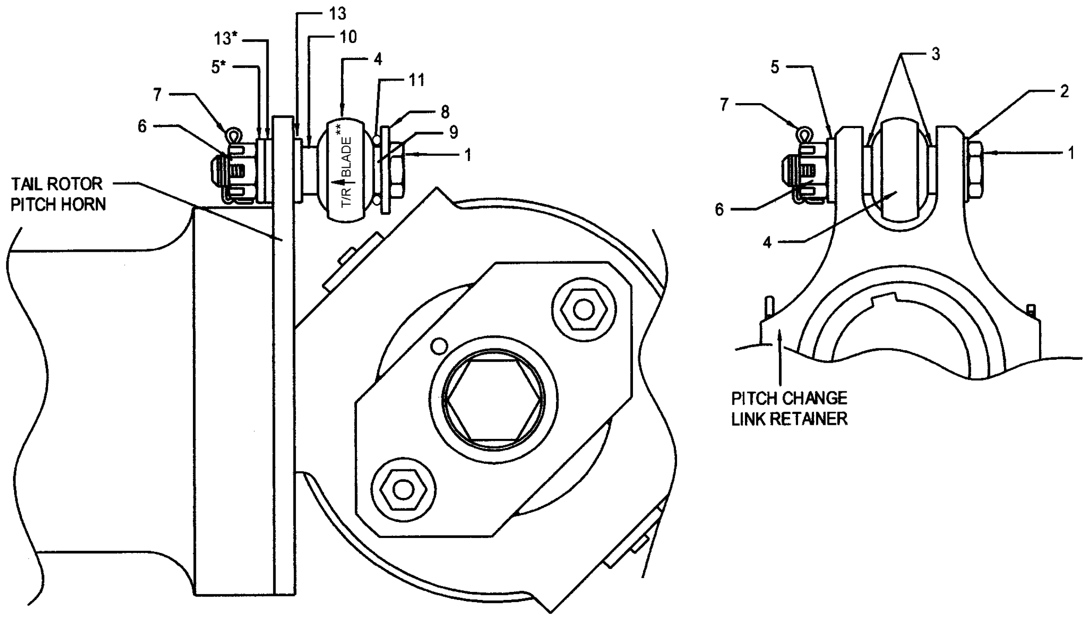
D. Adjust the length of the pitch change link assemblies to 4.26"/10.82 cm and center the rod end bearings referenced to the pitch link retainer and the pitch horn. Tighten the jam nuts against the barrel while holding the barrel with a wrench. Recheck for the correct length (4.26"/10.82 cm) and that the rod ends are still centered, adjust as required.

CAUTION

Ensure the right hand thread rod ends are still turned past the witness holes.

E. Using a piece of safety wire, check to ensure the right hand thread rod ends are still turned past the witness holes, adjust as required.

F. Remove the fixture used to center the tail rotor control pedals.

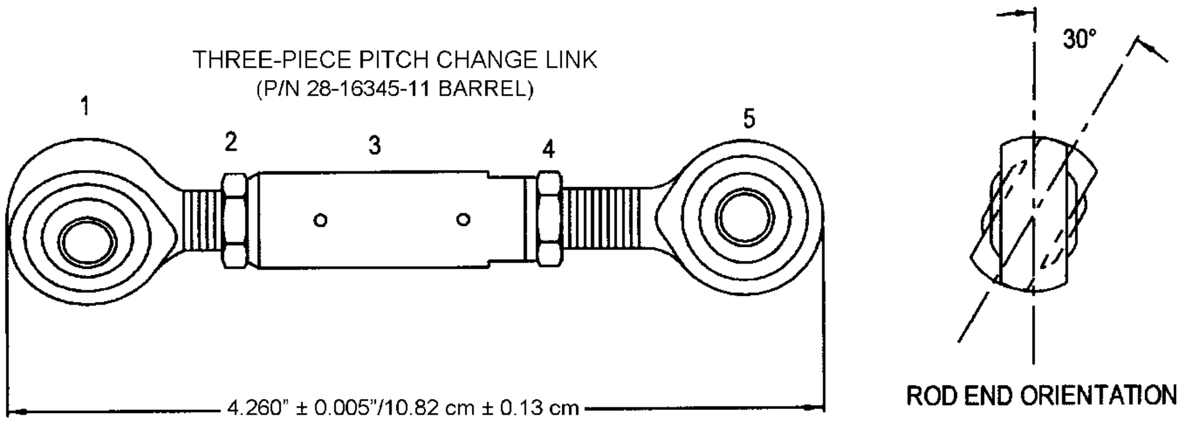


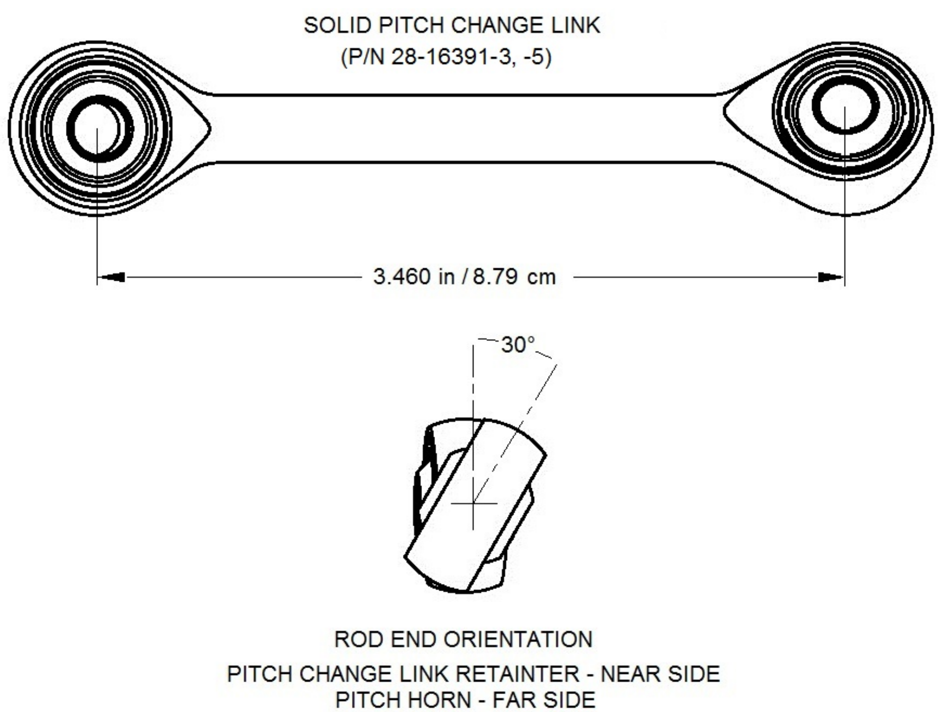
* WASHER THICKNESS AND QUANTITY MAY VARY DEPENDING ON DYNAMIC BALANCE REQUIREMENTS FOR THE TAIL ROTOR ASSEMBLY

** INSTALL PITCH CHANGE LINK ROD END WITH ARROW POINTING TOWARD THE TAIL ROTOR BLADE (APPLICABLE TO AIRCRAFT MANUFACTURED OR MODIFIED WITH P/N 28-16391-3 PITCH CHANGE LINK ASSEMBLY)

1.	Bolt	8.	Harper Washer
2.	Washer	9.	Spacer
3.	Spacer	10.	Spacer
4.	Pitch Change Link Rod End	11.	O-ring
5.	Washer	12.	Pitch Change Link (28-16391-3, -5 shown)
6.	Nut	13.	Washer
7.	Cotter Pin		

Figure 12-28. Tail Rotor Pitch Change Link Installation





1. Rod End Bearing (L/H)
2. Jam Nut (L/H)
3. Barrel
4. Jam Nut (R/H)
5. Rod End Bearing (R/H)

Figure 12-29. Tail Rotor Pitch Change Link

SECTION 13

POWERPLANT

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POWERPLANT

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R. Disconnect the fire curtain from the forward firewall bulkhead.

S. Remove the fire detection system from the mounting clips along the pylon bay tubes and the mounting clips on the engine. Coil the fire detector and position it in the forward-left position of the bay.

T. Disconnect the fuel lines from the fuel flow transducer and their mounting clamps from the pylon (optional equipment).

U. Remove the pylon bay tubes.

V. Remove the bell mouth inlet from the compressor inlet.

NOTE

Install a cover over the compressor inlet to prevent foreign debris from entering the compressor.

W. Install the engine hoist (T-0137) and connect to the top engine mount using the following procedures:

(1) Clamp the hoist onto the left side of the aft crosstube.

NOTE

The use of some older engine removal hoists may require removal of the maintenance step from the aft cross tube.

(2) Install the pulley bracket assembly by removing the nuts and washers from the main rotor transmission aft mounting bolts, install the bracket assembly, and reinstall one washer and nut on the bolts. Route the hoist cable and pulley assembly through the pylon and hook the pulley on the bracket assembly.

(3) Install the end of the hoist cable into the top engine mount and take up the slack in the cable with the hoist.

(4) Place adequate padding under the engine to prevent damage to the engine in the event that the hoist cable breaks.

X. Loosen the top engine to pylon mount nuts.

Y. Remove the left and right side engine to pylon mount nuts, washers, shims, and bolts.

NOTE

Keep the shim stack-ups together to properly position the engine during reinstallation.

Z. Remove the top mount nuts and lower engine to a suitable dolly using the hoist.

AA. Disconnect the hoist cable from the top engine mount and remove the engine hoist from the aircraft.

AB. If the same built up engine is to be reinstalled, refer to paragraph 13-7 (Installation - Engine Assembly). If the engine adapting assembly is to be removed, refer to paragraphs 13-116 and 13-117 (Removal and Installation - Engine Adapting Assembly).

13-7. Installation - Engine Assembly

NOTES

The following instructions are only for a standard aircraft. Additional steps may be required depending on installed optional equipment.

Torque all bolt assemblies and fitting connections to standard torque if the torque is not specified in the instructions.

A. Position the engine under the aircraft.

B. Install the engine hoist (T-0137) and connect to the top engine mount using the following procedures:

(1) Clamp the hoist onto the left side of the aft crosstube.

NOTE

The use of some older engine removal hoists may require removal of the maintenance step from the aft cross tube.

(2) Install the pulley bracket assembly by removing the nuts and washers from the main rotor transmission aft mounting bolts, install the bracket assembly, and reinstall one washer and nut on the bolts. Route the hoist cable and pulley assembly through the pylon and hook the pulley on the bracket assembly.

(3) Route the hoist cable through the top engine mount nut and jam nut and the pylon top engine mount and install the end of the hoist cable into the top engine mount.

(4) Place adequate padding under the engine to prevent damage to the engine in the event that the hoist cable breaks.

C. Lift the engine from the dolly using the hoist, start the top mount through the pylon mount, install the pylon mount nut and jam nut.

D. Install the shim stack-ups, washers, bolts, and nuts in the left and right engine to pylon side mounts; torque the nuts.

CAUTION

Do not overtighten the pylon mount and jam nuts. Stress on the pylon structure and misalignment of the drive and other associated engine systems may result.

E. Turn the top mount nut until it contacts the pylon mount and tighten one more flat (1/6 of a turn). Lower the jam nut against top mount nut, tighten and safety wire (.032).

13-24. Inspection - Transfer Ducts

A. Inspect the ducts for cracks and overall condition.

B. Inspect the duct boots for tears, separation of the boot seams, and security of the bond to the transfer duct.

13-25. Repair - Transfer Ducts

A. Repair damage to the ducts I/A/W AC 43.13-1B.

B. Replace duct boots that are torn. Bond the rubber boots to the transfer duct using the following procedure:

(1) Thoroughly degrease both ends of the transfer duct for 3-4 inches/7.6-10.2 cm and the rubber boots if the old boots are being rebonded.

(2) Lightly sand the ends of the transfer ducts and the rubber boots.

(3) Apply three (3) coats of EC776 3M Adhesive to the ends of the transfer ducts to approximately a width of 1.25 inches/3.2 cm from the end of the ducts. Allow the adhesive to become tacky between coats.

(4) Install the rubber boots onto the transfer duct while the third coat of adhesive is still tacky. Install the boot so that approximately one half (½) of the boot width is bonded on the duct.

C. Rebond boot seams using Scotch-Grip™ 2141 Rubber and Gasket Adhesive.

13-26. Installation - Transfer Ducts

CAUTION

Ensure the covers are removed from the lower plenum openings and inspect inside the lower plenum for FOD before installing the transfer ducts.

A. Install the ducts into position and unroll the rubber boots off of the ducts and onto the seal lips on the upper and lower plenums.

CAUTION

Do not over tighten the clamps used to secure the transfer ducts. If the clamps are over tightened they can cause damage to the seal lips on the upper and lower plenums.

B. Position the clamps above the upper plenum seal lip and below the lower plenum seal lip, ensure enough of the duct boot is past the seal lip to seal the duct and tighten the clamps.

C. Install the left and right aft side cowlings.

13-27. Upper Plenum/Air Inlet

13-28. Removal - Upper Plenum/Air Inlet

A. Remove the transfer ducts (para. 13-23).

B. Remove the air exit ducting the aft end of the upper plenum.

CAUTION

Use a backing wrench when loosening or tightening air/fluid lines and fittings to prevent damage to the lines or fittings.

C. Disconnect the scavenge air line from the upper plenum.

D. Disconnect the anti-collision beacon electrical connector if applicable.

E. Remove the screws attaching the upper plenum to the aircraft.

F. Remove the plenum by slightly lifting it and pulling aft.

G. Place the upper plenum in a location that will prevent the plenum from being damaged.

13-29. Inspection - Upper Plenum/Air Inlet

A. Inspect the upper plenum for cracks, cleanliness, condition of the outlets, security and overall condition of the particle separators and the air lines in the upper plenum/air inlet.

B. Inspect for indications of the drive belt rubbing on the upper plenum/air inlet assembly.

13-30. Repair - Upper Plenum/Air Inlet

A. Repair damage to the upper plenum/air inlet I/A/W AC 43.13-1B. Replace the upper plenum/air inlet if not repairable.

(1) Install new hand-holds in the plenum/air inlet in accordance with the following procedure (Figure 13-1).

a. Remove plenum/air inlet assembly (3).

b. Remove aft access plate (4) and swirl tube assemblies (8).

c. Use a suitable grinder to grind off the bonded flange of the hand-hold assembly from the plenum/air inlet. After grinding off the flange and any excess residue, remove the remainder of the hand-hold from the plenum/air inlet assembly. (The adhesive used to attach the hand-hold is blue or green.)

d. Remove grinding residue from the plenum/air inlet assembly and wipe clean.

e. Bond the replacement hand-hold into the plenum/air inlet with Hysol 9359.3, or equivalent (locally procured).

f. Repair the paint on the plenum/air inlet as necessary.

g. Install the aft access plate (4) and the swirl tube assemblies (8).

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

B. Shim the upper plenum/air inlet assembly to obtain the minimum drive belt clearance using the following procedure:

(1) Remove the upper plenum/air inlet assembly.

(2) Remove the foam tape from the assembly mounting flanges and clean the mounting flanges.

(3) Position a shim, P/N 4120525-11 (.063"/1.6 mm) or 4120525-13 (.125"/3.2 mm), on each mounting flange and trim to fit as required. Determine shim thickness from previous clearance check.

(4) Bond the shims to the mounting flanges using WELD-ON® 45™ or Loctite® H3300™ or equivalent.

(5) Drill through the shims at the hardware locations on the flanges.

(6) Install the upper plenum/air inlet assembly and check for minimum clearance.

13-31. Installation - Upper Plenum/Air Inlet

A. Install the plenum by positioning it with the outlets over the area where the baffling is installed. Lower the plenum until it is about to contact the aircraft, then slide the plenum forward until the outlets are properly positioned under the fuel bladder support structure and the forward edge of the plenum is properly mated with the air deflector on top of the cabin.

B. Install the attaching screws and tighten. Check for .125"/3.2 mm minimum clearance between the drive belt and the upper plenum/air inlet. Refer to the shimming procedure in paragraph 13-30. B. if clearance is less than .125"/3.2 mm.

CAUTION

Use a backing wrench when loosening or tightening air/fluid lines and fittings to prevent damage to the lines or fittings.

C. Connect the anti-collision light electrical connector if applicable.

D. Connect the scavenge air line and tighten.

E. Install the air exit ducting.

(1) Remove old 732 RTV residue with a plastic putty knife, or equivalent.

(2) Apply a bead of 732 RTV between the air exit ducting closeout and the air exit duct assemblies, as required.

F. Install the transfer ducts (para. 13-26).

13-32. Particle Separator

13-33. Removal - Particle Separator

A. Remove the access panel located on the aft side of the upper plenum.

CAUTION

Use a backing wrench when loosening or tightening air/fluid lines and fittings to prevent damage to the lines or fittings.

B. Disconnect and remove the scavenge air lines from the tee and the particle separators.

C. Remove the attachment screws and remove the particle separator from the upper plenum.

D. If required, remove the ejectors by removing the bolts and clamps that attach the ejector to the particle separator.

E. If required, remove the scavenge air line fitting.

13-34. Inspection - Particle Separator

A. Inspect the particle separator for broken swirl tubes, cracks, cleanliness, and overall condition and security of the ejectors.

B. Inspect the scavenge air lines and fittings for dents, nicks, scratches, and security of installation.

13-35. Repair - Particle Separator

A. Contact The Enstrom Helicopter Corporation Customer Service for detailed damage and repair limitations for the particle separators.

NOTE

The following repair procedure only applies to Pall Land and Marine Corp. Centrisep® particle separator, P/N ECD4066-3 & -4 (CE-00902-1L & -1R) .

B. Replace broken swirl tubes in using the following procedure:

NOTE

Replacement of broken swirl tubes is limited to 10% (18 tubes) of the total tubes in a particle separator. Additionally, the replacement tubes must be distributed over a wide area of the particle separator. For example; replace the particle separator if more than nine (9) adjacent tubes must be replaced.

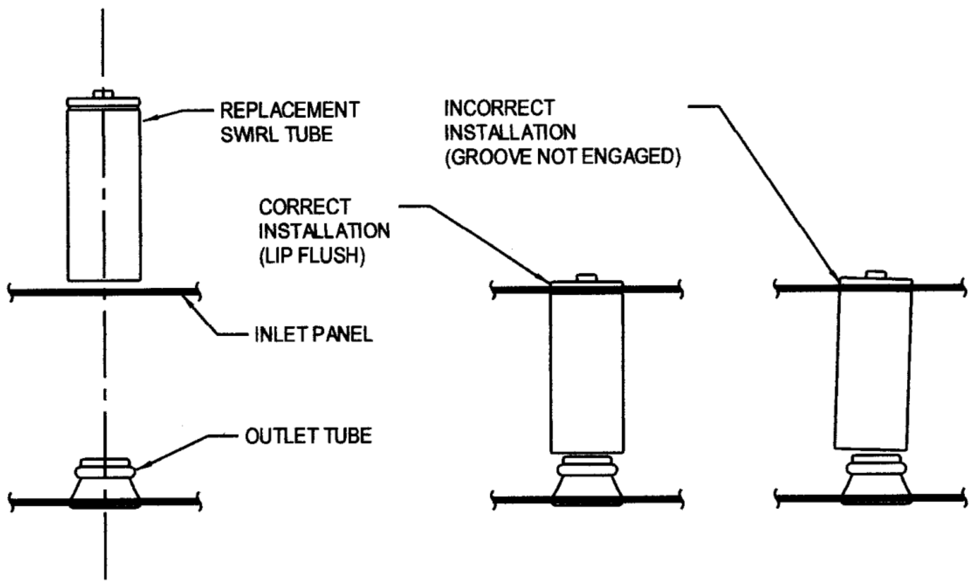

Figure 13-2. Swirl Tube Replacement

CAUTION

Use a backing wrench when loosening or tightening air/fluid lines and fittings to prevent damage to the lines or fittings.

C. Install and tighten the scavenge air line between the particle separator and the tee.

D. Install the access panel on the upper plenum.

13-37. Lower Plenum

13-38. Removal – Lower Plenum

A. Remove the bottom aft cowling.

B. Remove the eductor.

C. Remove the cowling mounting bracket located above the aft crosstube.

D. Remove the transfer ducts (para. 13-23).

NOTE

Removal of the upper plenum (para. 13-28) is not required; however, it would provide more access to the area.

CAUTION

Ensure that all the attachment hardware from the bell mouth is accounted for and that the engine inlet is covered when the bell mouth inlet is removed.

E. Remove the bell mouth inlet from the engine inlet and remove the inlet from the lower plenum via the plenum inlet on the left side.

F. Disconnect the differential pressure air line from the right side of the lower plenum.

G. Disconnect the engine wash line from the aft side of the lower plenum.

H. Remove the hardware from the lower plenum mounting brackets.

CAUTION

Care must be used to prevent damage to the lower plenum during removal.

I. Remove the lower plenum via the bottom of the aircraft.

13-39. Inspection – Lower Plenum

A. Inspect the lower plenum for cracks, damage, cleanliness, condition and security of mounting brackets, condition and security of the protective shield, and differential air pressure line fitting for condition and security. Ensure the drain holes are open and clean.

B. Inspect the bell mouth inlet for cleanliness and cracks.

C. Check the bell mouth inlet seal for condition and loose bonding.

13-40. Repair – Lower Plenum

A. Repair damage to the lower plenum I/A/W AC 43.13-1B.

B. Bond the mounting brackets and the air line fitting to the lower plenum using acrylic adhesive (Magnacryl Brand # 506).

C. Replace the mounting brackets if not repairable.

D. Replace the protective shield double back adhesive tape as required.

E. Replace the bell mouth inlet if cracked.

F. Replace bell mouth inlet seal if worn or damaged. Use the following procedure to replace the seal.

G. Bond the seal to the bell mouth inlet as follows:

WARNING

Methylethylketone (MEK) is 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.

(1) Remove the existing seal and clean the bond surface on the bell mouth inlet with Extreme Simple Green, or equivalent. Lightly abrade the bond surface with 220 grit sandpaper or equivalent. Repeat cleaning the bond surface.

(2) Apply a coat of EC776 3M™ Adhesive or equivalent to the bell mouth bond surface and to the seal bond surface. Allow the adhesive to dry until no longer tacky (approximately 30 minutes). Apply a second coat of adhesive and allow to dry until no longer tacky.

(3) Revive the adhesive on both bond surfaces with Extreme Simple Green, or equivalent, and carefully fit the seal onto the bell mouth. Apply weighted uniform pressure to ensure a good bond and allow two (2) hours curing time before reinstalling the bell mouth inlet. Allow twenty four (24) hours curing time before using the aircraft.

13-41. Installation – Lower Plenum

CAUTION

Care must be used to prevent damage to the lower plenum during installation.

A. Install the plenum in the airframe by reversing the removal procedure (paragraph 13-38).

B. Install the mounting hardware but do not tighten at this time.

CAUTION

Remove the cover from the engine inlet and perform a visual inspection of the inlet before installing the bell mouth inlet.

C. Install the bell mouth inlet through the left side inlet of the plenum. Attach the inlet to the engine and torque the hardware to 10-15 in-lbs/1.1-1.7 Nm.

D. Position the plenum so a good seal is formed between the plenum and the bell mouth inlet, tighten the mounting hardware.

(1) Install spacers (Figure 13-1, 18), as required, between the tab on the pylon and the plenum attachment bracket to ensure contact between the plenum and the bellmouth seal.

E. Connect the differential pressure air line to the plenum fitting. Torque 7-10 in-lb/0.8-1.0 Nm.

F. Connect the engine wash line to the plenum fitting.

G. If removed, install the upper plenum (para. 13-31).

H. Install the transfer ducts (para. 13-26).

I. Install the cowling mounting bracket.

J. Install the eductor.

H. Install bottom aft cowling.

13-42. Scavenge Air Lines

13-43. Removal – Scavenge Air Lines

A. Remove the left and right aft side cowlings.

B. Remove the eductor (para. 13-11).

CAUTION

Use a backing wrench when loosening or tightening air/fluid lines and fittings to prevent damage to the lines or fittings.

13-128. Tachometer Generator

13-129. Removal – Tachometer Generator

NOTE

The procedures for removal, inspection, and installation are the same for both the N_1 and N_2 tach generators.

A. Disconnect the electrical led from the tach generator.

B. Remove the nuts and washers securing the tach generator. Remove the tach generator and gasket.

13-130. Inspection – Tachometer Generator

A. Inspect the tach generator for cracks, corrosion, seal leakage, dents, and security.

B. Inspect the electrical connector for corrosion and condition.

13-131. Repair – Tachometer Generator

A. Replace the tachometer generator if inoperable or damage effects the proper operation of the tachometer generator.

B. Replace the gasket and the tachometer pad seal (Rolls-Royce 250-C20 Series Operation and Maintenance Manual) if oil leakage is evident.

13-132. Installation – Tachometer Generator

NOTE

Replace all used o-rings/packings and gaskets.

NOTE

Refer to the TH-28/480 Series Illustrated Parts Catalog to determine the correct N_2 tach generator for the dual tachometer (N_2/N_R) installed in the instrument panel.

A. Install the tach generator and gasket.

B. Install the electrical lead and safety wire.

13-133. Engine Mounts

13-134. Removal – Engine Mounts

A. Remove the hardware securing the mount and remove the mount.

13-135. Inspection – Engine Mounts

A. Inspect the engine mounts for cracks, corrosion, bends, elongated holes, damaged threads, and security of installation. (See also SDB T-038, latest revision.)

13-136. Repair – Engine Mounts

A. Replace engine mounts that are cracked, bent, have elongated bolt holes, or thread damage that cannot be repaired.

B. Remove minor nicks, scratches, corrosion, or thread damage.

13-137. Installation – Engine Mounts

A. Install the mounts.

CAUTION

The top mount torque requirement is applicable to the three bolts (Figure 13-9, Item 40) used to secure the top engine mount to the engine. This torque requirement does not apply to the pylon mount nut and jam nut (Figure 13-9, Item 42) used to secure the engine to the pylon. Refer to paragraph 13-7, C, E, for the correct pylon mount nut and jam nut tightening procedure.

1) Top mount: torque the hardware to 110 in-lbs/12.5 Nm and lockwire (.032).

2) Side mounts: install the self-locking engine mount bolt, torque hardware to 110 in-lb/12.5 Nm, and apply a thin line of white paint (Torque Seal, or equivalent) on the head of the bolt and engine mount.

13-138. Fuel Filter Differential Pressure Switch

13-139. Removal – Fuel Filter Differential Pressure Switch

CAUTION

If the pressure switch is being removed from an engine installed in an aircraft, pull the fuel shutoff valve to the OFF position.

A. Disconnect the electrical lead from the switch.

CAUTION

Cap or plug all open fluid/air fittings to prevent contamination of the engine.

CAUTION

Use a backing wrench to prevent damaging fluid/air lines and fittings.

B. Remove the lines connecting the switch to the fuel pump housing.

C. Remove the nut securing the pressure switch and clamp to the accessory gearbox. Remove the pressure switch.

D. Remove the fittings from the pressure switch and from the fuel pump housing.

13-140. Inspection – Fuel Filter Differential Pressure Switch

A. Inspect the pressure switch for cracks, corrosion, damage, leaks, and security.

B. Inspect the lines and fittings for bends, cracks, corrosion, damaged threads, leaks, nicks, scratches, and security.

C. Inspect the electrical connector for condition and corrosion.

13-141. Repair – Fuel Filter Differential Pressure Switch

A. Replace the pressure switch if cracked, inoperative, damage to the electrical connector cannot be repaired, or fuel leakage is evident from the switch.

B. Replace lines that are bent, cracked, or have damage to the flares that cannot be polished out. Remove minor nicks, scratches, or corrosion.

C. Replace fittings that have damage to the threads that effect the operation and security of installation for the system or damage to the flares that cannot be polished out.

D. Replace o-rings that are leaking.

13-142. Installation – Fuel Filter Differential Pressure Switch

NOTE

Replace all used o-rings/packings and gaskets.

CAUTION

Use a backing wrench to prevent damaging fluid/air lines and fittings.

A. Install the fittings in the pressure switch and the BF and AF ports of the fuel pump housing.

B. Install the pressure switch into the mounting clamp and attach to the accessory gearbox. Torque the nut to 35-40 in-lbs/4.0-4.5 Nm.

C. Install the lines between the fuel pump housing and the pressure switch.

D. Connect the electrical lead to the pressure switch.

13-143. Customer Bleed Air Lines and Fitting

13-144. Removal – Customer Bleed Air Lines and Fittings

CAUTION

Use a backing wrench to prevent damaging fluid/air lines and fittings.

CAUTION

Cap or plug all open fluid/air fittings to prevent contamination of the engine.

A. Remove the lines connected to the customer bleed air fittings on the compressor scroll.

B. Remove the customer bleed air fittings from the compressor scroll.

13-145. Inspection – Customer Bleed Air Lines and Fittings

A. Inspect the lines and fittings for bends, cracks, corrosion, damaged threads, nicks, scratches, and security of installation.

13-146. Repair – Customer Bleed Air Lines and Fittings

A. Replace lines that are bent, cracked, or have damage to the flares that cannot be polished out. Remove minor nicks, scratches, or corrosion.

B. Replace fittings that have damage to the threads that effect the operation and security of installation for the system or damage to the flares that cannot be polished out.

13-147. Installation – Customer Bleed Air Lines and Fittings

NOTE

Replace all used o-ring/packings and gaskets.

A. Apply anti-seize (MIL-PRF-907) to the threads of the customer bleed air fittings and install the customer bleed air fittings in the compressor scroll.

B. Install and connect the customer bleed air lines to the fittings in the compressor scroll.

13-148. Consumable Materials List

ITEMS	DESCRIPTION	PART NUMBER
Adhesive	Acrylic Adhesive, IPS Corporation	WELD-ON 45
Adhesive	Acrylic Adhesive, Magnacryl Brand[1]	506 with accelerator (#7)
Adhesive	Structural Adhesive, Loctite Brand	EA 9359.3 AERO
Adhesive	Structural Adhesive, Loctite Brand	Loctite H3300
Indicator Paste	Cross-Check™ Torque Seal, Dykem Brand	88314 through 88321 (color options)
Inspection Seal Lacquer	Torque Seal	F-900
Lockwire	Lockwire, .020"	MS20995C20
Lockwire	Lockwire, .032"	MS20995C32
Lubricant	Anti-Seize	MIL-PRF-907
O-ring	O-ring (Oil Reservoir Drain Plug)	MS28778-6
Primer	Loctite 7649	19269
Sealant	Clear Silicone Sealant, Dow Corning Brand	732 RTV
Solvent	Citra-Safe, Inland Technology Incorporated	6850-01-378-( )
Solvent	Extreme Simple Green, Sunshine Makers, Inc.	13440
Thread sealant	Thread sealant, Loctite Brand (222)	21463, 38653
Thread sealant	Thread sealant, Loctite Brand (277)	27731
Thread sealant	Thread sealant, Loctite Brand Threadlocker Blue 242[2]	24200
Thread sealant	Thread sealant, Vibra-Tite Brand	Vibra-Tite VC-3

[1] Trade names Versilok 506 or Hughson 506 are identical to Magnacryl 506.
[2] Acceptable alternate where thread sealant is required.

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14-97. Engine Flush Kit

14-98. Description – Engine Flush Kit

An optional engine flush kit is available for the TH-28, 480, and 480B. The kit consists of a nozzle installed in the lower plenum assembly, a bulkhead connector for attachment of the flush can, and the line that connects the nozzle to the bulkhead. Refer to the Rolls-Royce 250-C20 Operation and Maintenance Manual for the proper maintenance procedures for flushing the engine.

14-99. Removal – Engine Flush Kit

A. Open the left side engine access panel and remove the aft bottom cowling.

B. Disconnect the line from the bulkhead fitting located on the cowl ring and from the nozzle located in the aft side of the lower plenum assembly.

C. Remove the bulkhead fitting from the cowl ring.

NOTE

The nozzle is installed in the lower plenum with adhesive and rivets and is not normally removed.

D. Install a cap on the nozzle.

14-100. Inspection – Engine Flush Kit

A. Inspect the flush kit for damage and security of installation.

14-101. Repair – Engine Flush Kit

A. Replace the flush kit line if damage causes the line to be unserviceable.

B. Replace the bulkhead fitting if damaged.

C. Tighten loose connections.

14-102. Installation – Engine Flush Kit

A. Install the bulkhead fitting into the cowl ring.

B. Remove the cap from the flush nozzle and install the flush kit line. Tighten the connections.

14-103. Nose Positioned Camera Mount

14-104. Description – Nose Positioned Camera Mount

NOTE

Installation of the Nose Positioned Camera Mount Kit does not authorize installation of a camera system. Installation of specific equipment on the mount may require additional authorization from an appropriate certification authority.

An optional nose positioned camera mount is available for 480/B. It provides provisions for mounting a ball/turret type camera under the nose of the aircraft and for mounting a monitor off of the right side of the instrument panel.

The nose mounted camera mount installation consists of an aluminum sheet metal box structure and an external steel sheet metal mount. The aft end of the box structure is attached to the vertical panels that support the instrument panel. The lower portion of the box structure is attached to the cabin between the chin windows. The external steel mount is located on the outside of the cabin at the forward end of the box structure. It is fastened to the box structure through the fiberglass cabin.

The camera mount has been certified, both structurally and in flight test, with equipment weighing 100 lbs/45.5 kg. The frontal area of the equipment was 1.756 ft^2/.163 m^2 with a center of gravity (CG) located 12.0 inches/30.5 cm below the center line of the external mount. Refer to Figure 14-1 for the external mount foot print.

The monitor mount consists of an aluminum angle with gusset supports which is attached to the honeycomb panel on the right side of the instrument panel and was structurally certified with equipment weighing 4.86 lbs/2.21 kg (monitor and articulating arm). The vertical moment arm limit is 7.4 inches/18.8 cm and the horizontal moment arm limit is 10.4 inches/26.4 cm. Refer to Figure 14-2 for the monitor mount foot print.

14-105. Removal – Nose Positioned Camera Mount

A. Remove the external mount using the following procedure:

   (1) Remove the hardware securing the external mount to the aircraft and remove the mount.

B. Remove the camera mount internal box structure using the following procedure:

   (1) Remove the external mount.

   (2) Remove the external mount doubler.

   (3) Remove the instrument panel shroud and the center pedestal trim panels.

   (4) Remove the chin windows as applicable (para. 8-47,C).

B. Remove the SX-5 control box from the aircraft using the following procedure:

(1) Disconnect the control box electrical connector from the copilot's connector box located on the right aft side of the cabin floor and remove the control box. Install the dust cap on the airframe mounted connector.

C. Remove the SX-5 junction box from the aircraft using the following procedures:

(1) Gain access to the extended baggage compartment.

NOTE

The extended baggage compartment is the standard location for the junction box. The junction box may be installed in an alternate location dependent upon other optional equipment installations.

(2) Disconnect the electrical connectors from the junction box.

(3) Remove the hardware securing the junction box and remove the junction box.

D. Remove the searchlight mount (straight mount, P/N 4220060-1 or -3) from the aircraft using the following procedure (Refer to Figure 14-3):

(1) Remove the searchlight/gimbal assembly from the aircraft.

(2) Disconnect the searchlight mount electrical harness from the aircraft. Install the dust cap on the airframe mounted connector.

(3) Remove the inboard bolt from the searchlight mount and the crosstube.

(4) Remove the outboard horizontal bolt from the mount and the crosstube.

(5) Lift up the crosstube step (if installed) and remove the nut and washer(s) from the outboard vertical bolt.

(6) Remove the searchlight mount and reinstall the bolts and hardware. Adjust the amount of washers as required to compensate for removing the searchlight mount.

E. Remove the searchlight mount (elevated mount, P/N 4220067-1 or -9) as follows (Refer to Figure 14-4):

(1) Remove the searchlight/gimbal assembly from the aircraft.

(2) Disconnect the searchlight mount electrical harness from the aircraft. Install the dust cap on the airframe mounted connector.

(3) Remove the hardware attaching the searchlight mount step to the airframe step.

(4) Remove the inboard and outboard bolts from the searchlight mount and the crosstube.

(5) Remove the searchlight mount and reinstall the bolts and hardware in the crosstube. Adjust the amount of washers as required to compensate for removing the searchlight mount.

NOTE

The aft crosstube cover (step), P/N 4174032-12, may be installed after the searchlight mount is removed. Refer to the TH-28/480 Illustrated Parts Catalog (IPC) for the correct hardware configuration.

14-112. Inspection – Searchlight Kit

A. Inspect the airframe searchlight mount for corrosion, nicks, scratches, dents, cracks, and security of installation.

B. Inspect the searchlight/gimbal assembly interface mount and airframe mount interface for damage and/or excessive wear.

C. Inspect the junction box installation for damage to the mounting structure and loose or missing hardware.

D. Inspect the searchlight kit electrical harnesses and connectors IAW paragraph 6-13.

E. Inspect the SX-5 system components IAW with the latest revision of the SX-5 Starburst® Searchlight User's Manual (Doc# 031718).

14-113. Repair – Searchlight Kit

A. Repair the airframe searchlight mount as follows:

(1) Replace damaged or corroded installation hardware as applicable.

(2) Corrosion, nicks, and scratches less than .020"/.51 mm deep can be polished out and a protective coating applied. Replace the mount if damage exceeds .020"/.51 mm deep.

(3) Replace the mount if smooth dents exceed .030"/.76 mm.

(4) Cracks may be repaired IAW the procedures in AC43.13-1B.

(5) Replace the mount if damaged beyond repair or economically unrepairable.