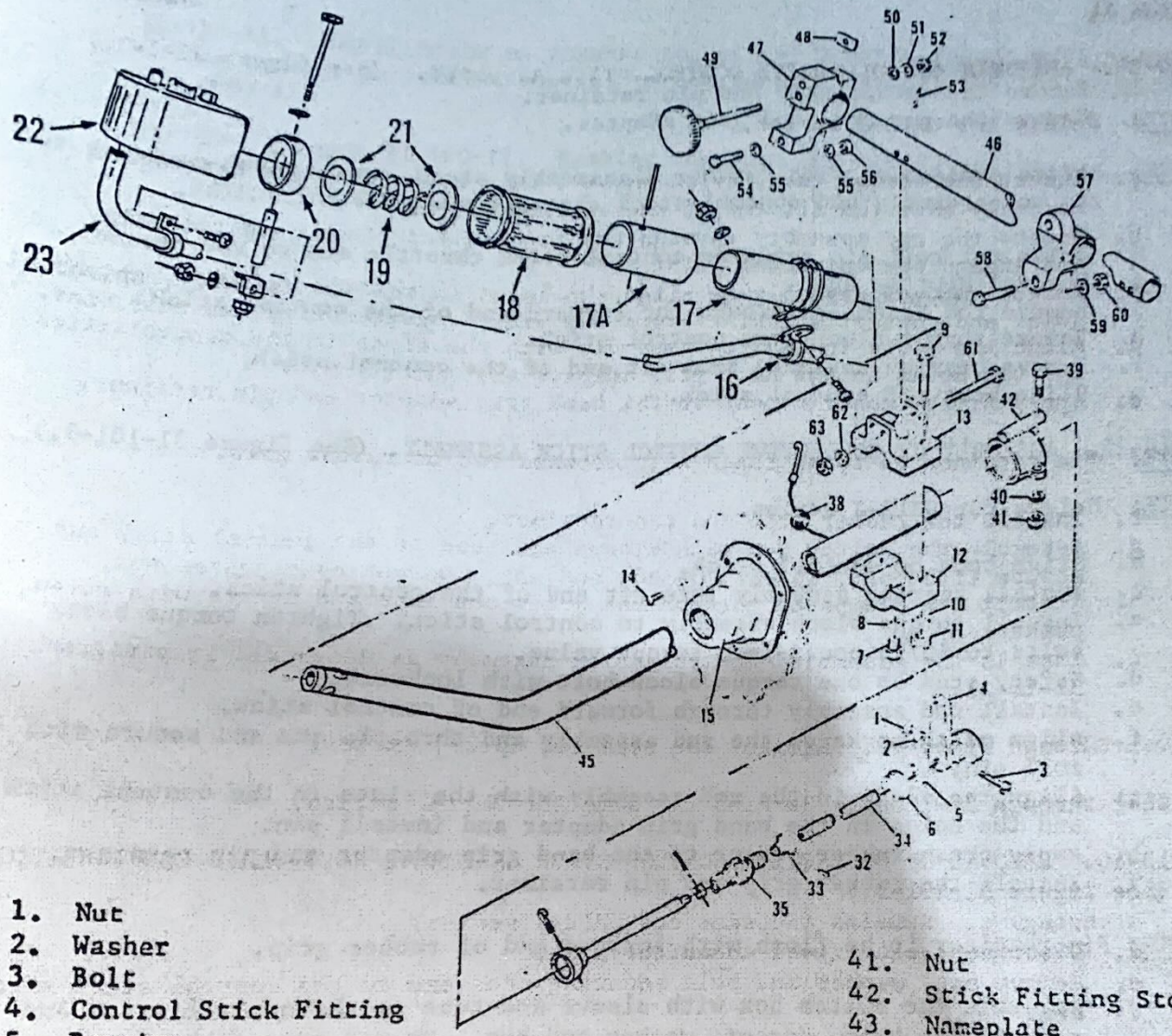


1. Nut
2. Washer
3. Bolt
4. Control Stick Fitting
5. Bearing
6. Bearing Retainer
7. Locking Stud
8. Washer
9. Bolt
10. Washer
11. Nut
12. Torque Block Cap
13. Torque Block Base
14. Screw
15. Boot
16. Clamp
17. Adapter
18. Grip
19. Spring
20. Sleeve
21. Washer
21A. Spacer
22. Switch Box
23. Conduit
24. Rivet
25. Plunger Spring
26. Starter Lead Plunger
27. Insulation Plug
28. Torque Tube Plug
29. Rivet
30. Fitting
31. Forward Torque Tube
32. Rivet
33. Bushing
34. Aft Torque Tube
35. Universal Joint
36. Insulator
37. Torque Tube Terminal
38. Grommet
39. Bolt
40. Washer
41. Nut
42. Stick Fitting Stop
43. Nameplate
44. Rivet
45. Inboard Control Stick
46. Collective Control Tube
47. Friction Bearing Support Block
48. Friction Shim
49. Friction Knob Assembly
50. Washer
51. Washer
52. Nut
53. Cotter Pin
54. Bolt
55. Washer
56. Nut
57. Inboard Bearing Block
58. Bolt
59. Washer
60. Nut
61. Bolt
62. Washer
63. Nut

Figure 31-1-3 (Revised). Collective Control Stick Assembly

31-110-20. (Continued)

f. Remove the rubber grip and pin retainer.
g. Remove the pin and hand grip adapter.

NOTE: Before proceeding with further disassembly steps, apply match-markings to the rod assembly and control stick throttle arm. DO NOT SCRIBE.

H. Drive out roll pin securing control stick throttle arm to rod assembly.
i. Remove throttle arm.
j. Remove rod assembly through thr forward end of the control stick.
k. Remove torque block from control stick.
l. Remove bearing assembly from aft end of the control stick.
m. Slide boot off control stick.

31-110-21. ASSEMBLY OF COLLECTIVE CONTROL STICK ASSEMBLY. (See figure 31-101-3.)

NOTE: Delete for UH12-J series.

a. Slide boot on control stick.
b. Install bearing assembly into aft end of the control stick.
c. Install torque block assembly to control stick. Tighten torque block bolts to 10/15 pound-inch torque value.
d. Safety stud to one torque block bolt with lockwire.
e. Install rod assembly through forward end of control stick.
f. Align match-marks on the rod assembly and throttle arm and secure with roll pin.
g. Align the slots in the rod assembly with the slots in the control stick and the holes in the hand grip adapter and install pin.
h. Apply fresh rubber cement to the hand grip adapter and pin retainer.
i. Install the rubber grip and pin retainer.

NOTE: Pin retainer to be flush with forward end of rubber grip.

j. Assemble the switch box with sleeve and tube to the control stick and secure with bolt, spacer, washer and nut. Do not over tighten nut.
k. Install the clamps on the control stick and tube and secure with screw, washer and nut.
l. Install the assembled control stick assembly as described in paragraph 31-101-11.

31-120-1. Remains the same for UH12-J series.

31-120-10. Remains the same for UH12-J series.

a. Proceed with steps a. through g. of paragraph 31-110-10.
b. Remains the same for UH12-J series.
c. Delete for UH12-J series.

NOTE: Delete for UH12-J series.

d. Remains the same for UH12-J series.
e. Remains the same for UH12-J series.
f. Remove bolts securing arm assembly to torque tube. Slide arm assembly off torque tube.

31-120-11. INSTALLATION OF FORWARD COLLECTIVE CONTROL TORQUE TUBE. Installation of forward collective control torque tube is essentially the reverse order of removal.

31-130-1 through 31-140-11. Remains the same for UH-12J series.

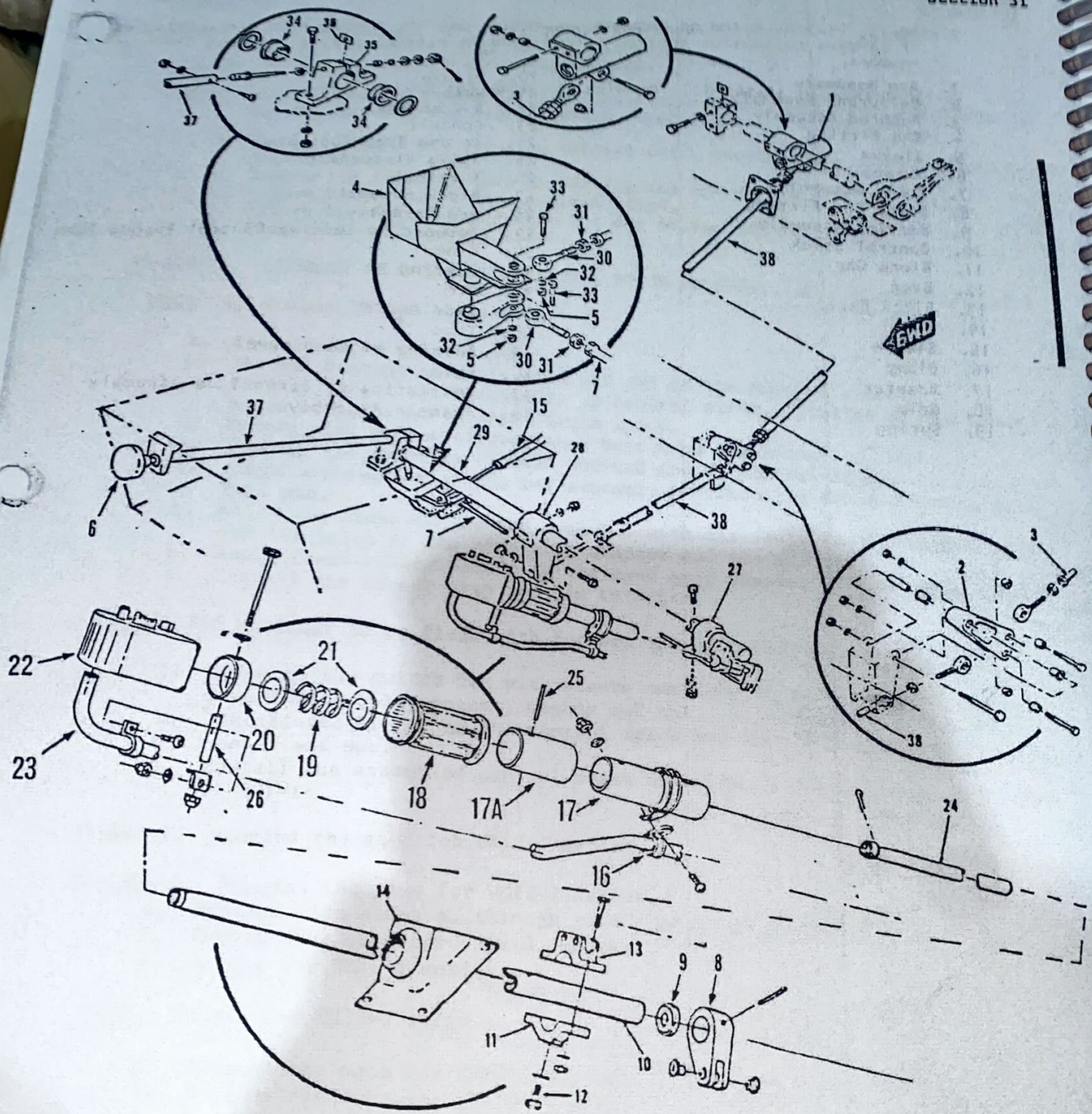


Figure 31-101-3 (Revised).
Collective Control Installation, Four-Place Configuration, (Exploded View)

Group 30
Section 31

INDEX FOR FIGURE 31-101-3

1. Arm Assembly
2. Bellcrank Assembly
3. Pushrod Assembly
4. End Fitting
5. Sleeve
6. Turnbarrel
7. Cable Assembly
8. Stick End Fitting
9. Bearing Assembly
10. Control Stick
11. Block Cap
12. Stud
13. Block Base
14. Boot
15. Sleeve
16. Clamp
17. Adapter
18. Grip
19. Spring
20. Sleeve
21. Washer
22. Switch Box
23. Conduit
24. Torque Tube Assembly
25. Knife Disconnect
26. Terminal
27. Block Assembly
28. Arm Assembly
29. Forward Collective Control Torque Tube
30. Clamp
31. Bearing
32. Arm
33. Bearing
34. Tube
35. Bearing Block Assembly
36. Shim
37. Collective Friction Tube Assembly
38. Pushrod Assembly

Group 30
Sections 32, 33, 34,
36, 37 and 38

Group 30
Sections 32, 33, 34,
36, 37 and 38

Remains the same for UH12-J series.

Remains the same for UH12-J series.

THIS PAGE LEFT BLANK INTENTIONALLY

Group 60
Section 61

BASIC BODY SECTION

61-1-1. BASIC BODY

61-1-2. DESCRIPTION. The basic body corresponds to the fuselage of a conventional fixed-wing aircraft. The forward section of the basic body supports the cabin enclosure. The aft section of the basic body contains the fuel tank. The landing gear attaches to the underside of the basic body. Except for the fuel tank and the access and inspection panels, the basic body is a single all-metal, stressed-skin structure.

a and b. Remains the same for UH12-J series.

61-101-1 and 61-101-2. Remains the same for UH12-J series.

Group 60
Section 62

TAIL BOOM

62-1-1. Remains the same for UH12-J series.

Figure 62-1-1. Revised for UH12-J series.

62-1-2. Remains the same for UH12-J series.
a. Delete for UH12-J series.
b. Remains the same for UH12-J series.

62-1-10 through 62-20-1. Remains the same for UH12-J series.

WARNING: Remains the same for UH12-J series.

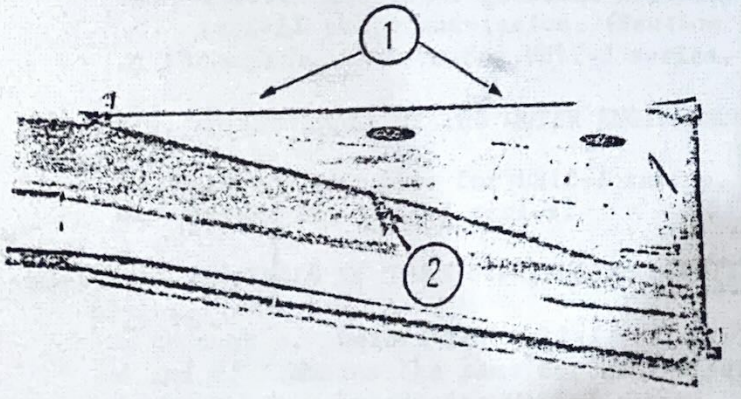
62-101-1. Remains the same for UH12-J series.

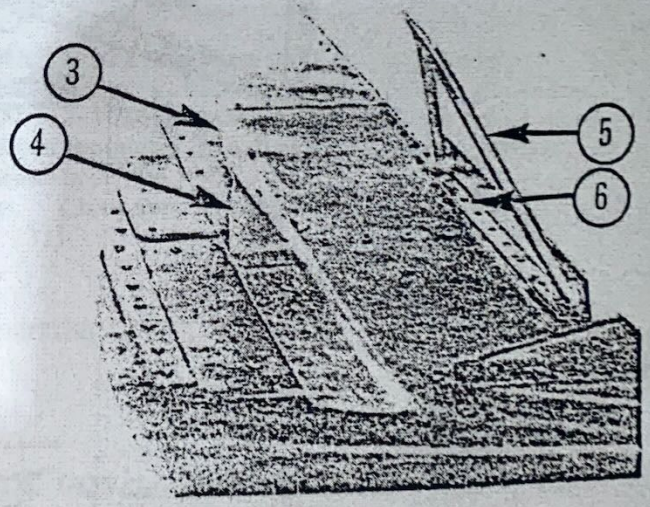
62-101-2.. Remains the same for UH12-J series.
a and b. Remains the same for UH12-J series.
c. Delete for UH12-J series.
d. Remains the same for UH12-J series.

62-101-10. through 62-101-13. Remains the same for UH12-J series.

*Figure 62-1-1A. Tail Boom Deck Assembly

1-Tail Boom Deck Assembly
2-Edge
3-Bracket, Aft Oil Cooler
4-Bracket
5-Forward Oil Cooler Bracket
6-Angle

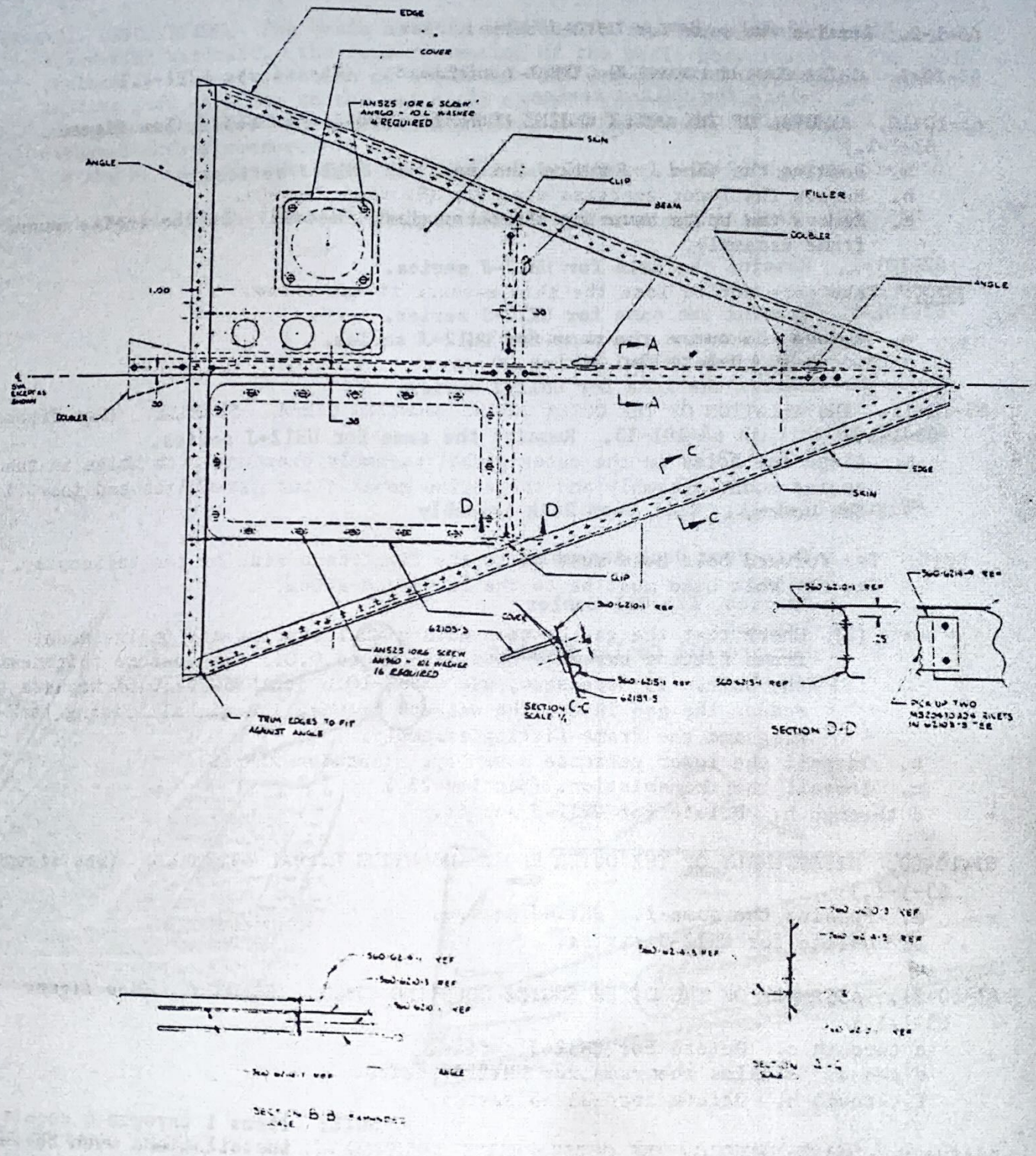




*NOTE: Items 1 through 6 required on installations with Engine Oil Cooler Blower installed.

Items 1 and 2 required on installations with Ejector Oil Coolings Assembly installed.

Figure 62-101-1A. Tail Boom Assembly, UH12-J5



ENGINE MOUNT INSTALLATION

63-1-1. OUTER ENGINE MOUNTING GIMBAL ASSEMBLY, ENGINE MOUNT ASSEMBLIES AND ENGINE SNUBBER ASSEMBLIES.

63-1-2. Remains the same for UH12-J series.

63-10-1. OUTER ENGINE MOUNTING GIMBAL ASSEMBLIES. (See figure 63-1-1.)

63-10-10. REMOVAL OF THE OUTER ENGINE MOUNTING GIMBAL ASSEMBLY. (See figure 63-1-1.)

a. Remains the same for UH12-J series.
b. Remove the lower gearcase assembly (Section 23-560).
c. Remove the bolts securing the outer gimbal assembly to the engine mount frame assembly.

NOTE: Take care not to lose the shim washers if installed.

d. Remove the outer gimbal assembly.
e. through i. Delete for UH12-J series.

63-10-11. INSTALLATION OF THE OUTER ENGINE MOUNTING GIMBAL ASSEMBLY. (See figure 63-1-1.)

a. Align the holes in the outer gimbal assembly bearings with holes in the engine mount assembly and the engine mount strut assemblies and install the bolts.

NOTE: The forward bolt head must be to the right-hand side of the helicopter. The aft bolt head must be to the left-hand side.

(1) Check that the gap between each gimbal bearing and engine mount frame fitting assembly does not exceed 0.015 inch before thightening the bolt. If necessary, use AN960-1016 or AN960PD-1016L washers to reduce the gap insert the washers between the gimbal bearing lock-ring and the frame fitting assembly.

b. Install the lower gearcase assembly. (Section 23-560)
c. Install the transmission. (Section 23.)
d through h. Delete for UH12-J series.

63-10-20. DISASSEMBLY OF THE OUTER ENGINE MOUNTING GIMBAL ASSEMBLY. (See figure 63-1-1.)

a. Remains the same for UH12-J series.
b. Delete for UH12-J series.

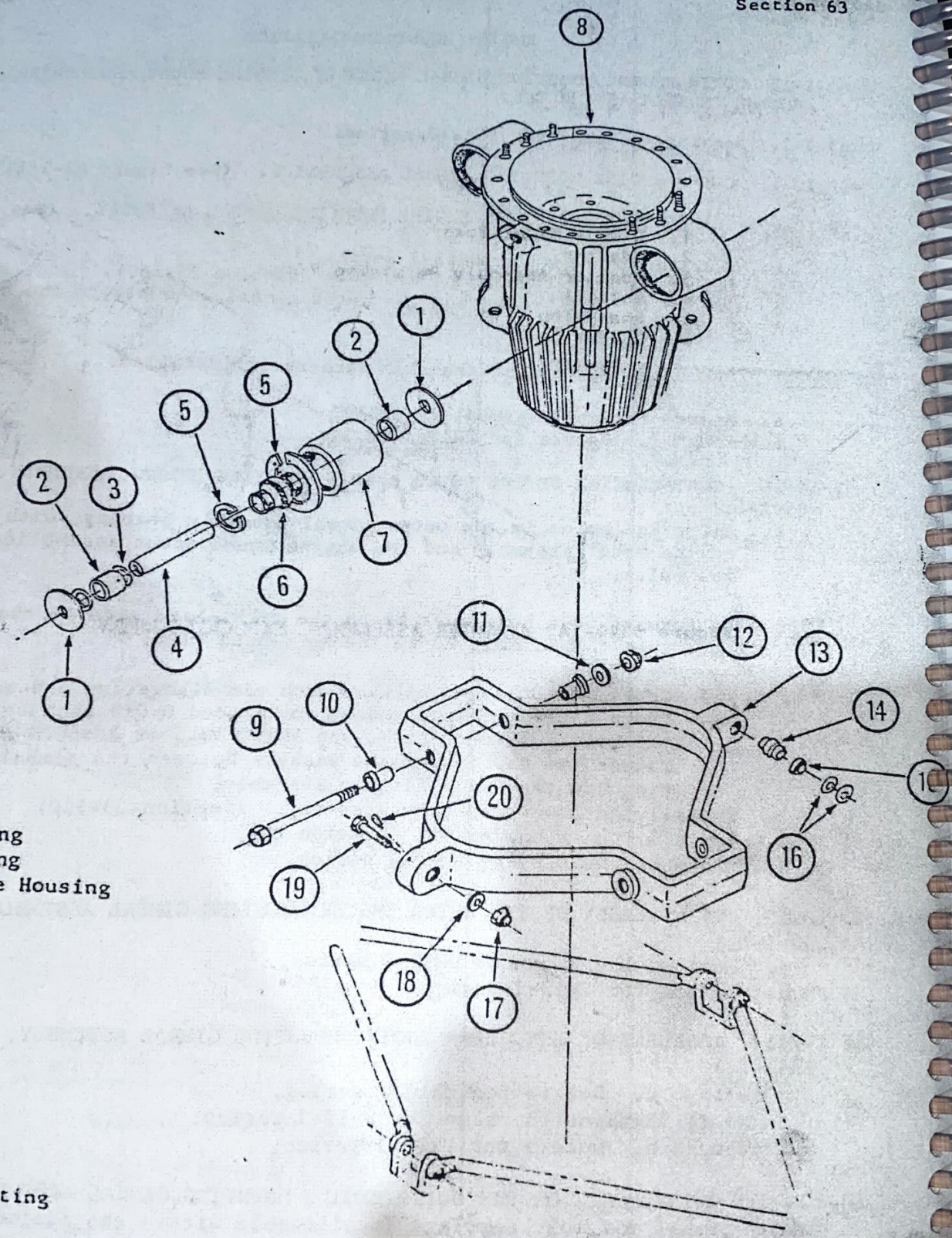
63-10-21. ASSEMBLY OF THE OUTER ENGINE MOUNTING GIMBAL ASSEMBLY. (See figure 63-1-1.)

a through c. Delete for UH12-J series.
d and e. Remains the same for UH12-J series.
f through h. Delete for UH12-J series.

63-10-40. MAINTENANCE OF THE OUTER ENGINE MOUNTING GIMBAL ASSEMBLY. Wear of the outer gimbal assembly bearings is allowable within the following limitations:

NOTE: Remains the same for UH12-J series.

a and b. Remains the same for UH12-J series.



1. Washer
2. Spacer
3. Shim
4. Spacer
5. Snap Ring
6. Uniball Bearing
7. Adapter Housing
8. Lower Gearcase Housing
9. Bolt
10. Bushing
11. Washer
12. Nut
13. Outer Gimbal
14. Bearing
15. Locking Ring
16. Washer
17. Nut
18. Washer
19. Bolt
20. Lubrication Fitting

Figure 63-1-1 (Revised). Engine Mounting Gimbal Assemblies

1. Gimble Mount Boss
2. Adapter
3. Adapter Assembly Retaining Ring
4. Uniball
5. Snap-Ring
6. Spacer

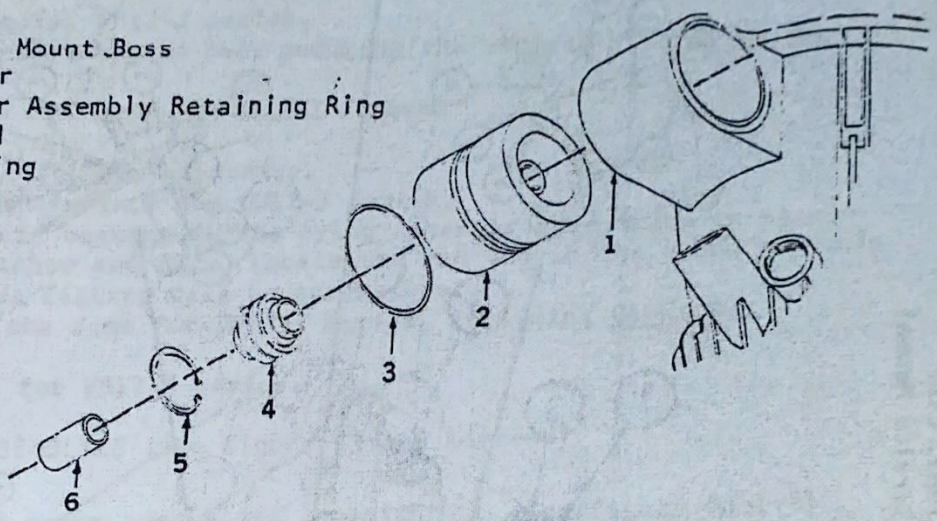
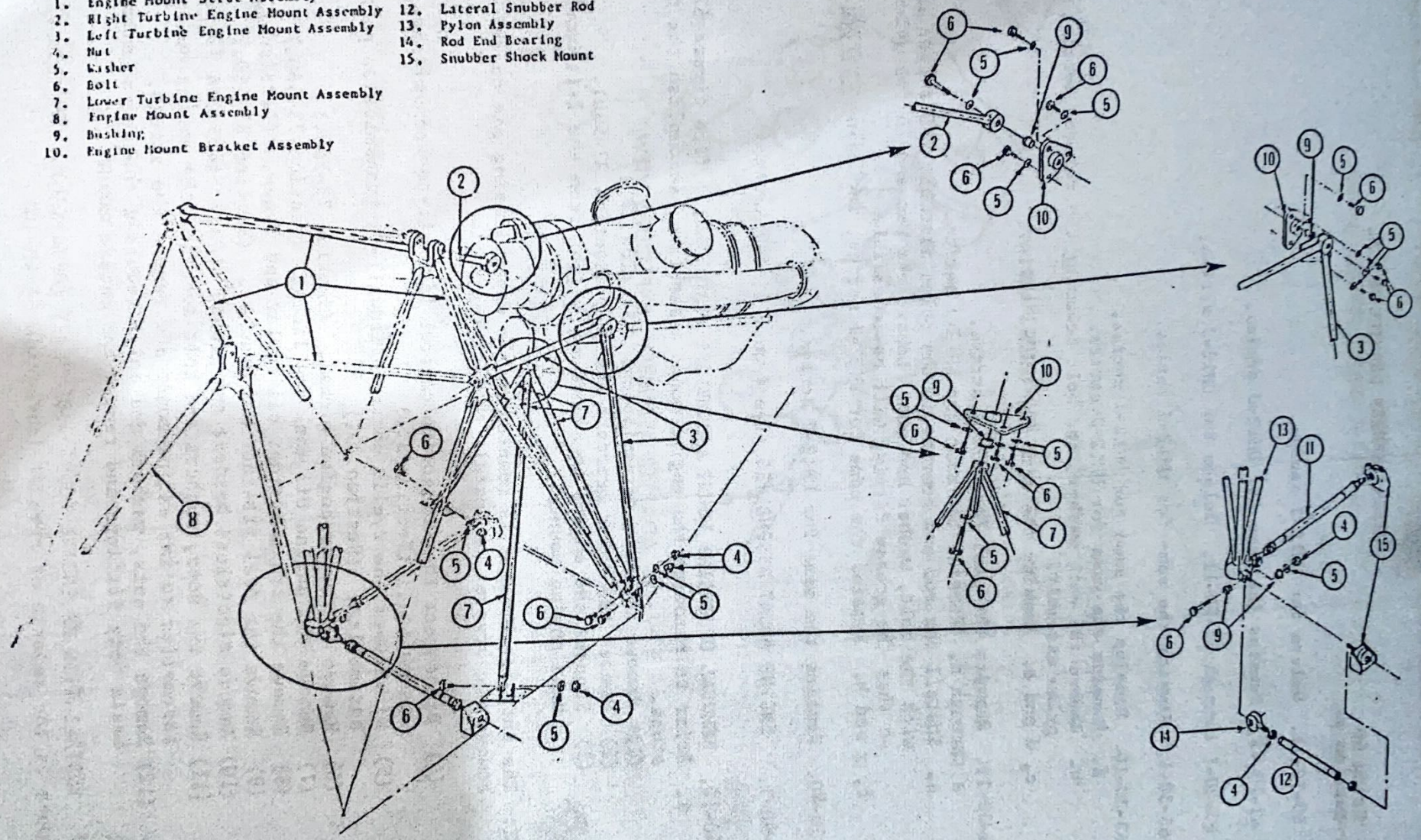


Figure 63-1-1A. ADAPTER ASSEMBLY, EXPLODED VIEW

Figure 63-1-2 (Revised). Engine Mount Assembly

1. Engine Mount Strut Assembly
2. Right Turbine Engine Mount Assembly
3. Left Turbine Engine Mount Assembly
4. Nut
5. Washer
6. Bolt
7. Lower Turbine Engine Mount Assembly
8. Engine Mount Assembly
9. Bushing
10. Engine Mount Bracket Assembly
11. Longitudinal Snubber Rod
12. Lateral Snubber Rod
13. Pylon Assembly
14. Rod End Bearing
15. Snubber Shock Mount



63-10-41. Delete for UH12-J series.

63-10-42. Remains the same for UH12-J series.

63-20-1 through 63-20-11. Delete for UH12-J series.

63-30-1. Remains the same for UH12-J series.

63-30-10. Remains the same for UH12-J series.
a. Remains the same for UH12-J series.
b. Remove the nut, washer, and bolt securing the rod end bearing to the pylon assembly.
c, d and e. Remains the same for UH12-J series.

63-30-11. Remains the same for UH12-J series.
a through d. Remains the same for UH12-J series.
e. Install the rod end bearing in the pylon assembly and secure in place with the bolt, washer and nut. Locate the rod end in the pylon assembly so that the grease fitting will be accessible.
f, g and h. Remains the same for UH12-J series, including CAUTION.

63-30-40. Remains the same for UH12-J series.

63-40-1. ENGINE MOUNT ASSEMBLIES (See figure 63-1-2 Revised).

63-40-10. REMOVAL OF ENGINE MOUNT ASSEMBLIES (ORIGINAL). (See figure 63-1-2)
a. Prior to removing the engine mount assemblies, accomplish the following steps.
(1) Remove the main transmission. (Section 23)
(2) Remove the lower gearcase assembly (Section 23-560).
(3) Support the engine to remove any weight from the left-hand and right hand engine mounts.

NOTE: The anti-ice bracket is mounted on the upper lifting pan on the engine, remove the bracket to install the lifting tool.

(4) Disconnect the collective control firewall-to-transmission push rod assemblies. (Section 31.)
(5) Disconnect the cyclic control firewall-to-transmission push rod assemblies. (Section 33.)
(6) Remove the outer engine gimbal. (Section 73-560.)
(7) Remove the engine oil tank and lines. (Section 73-560.)
(8) Remove the transmissions oil cooler and lines. (Section 73-560.)
(9) Remove the fuel strainer and bracket. (Section 73-560.)
(10) Remove electrical harness and ground strap. (Section 83-560.)
(11) Remove the nuts, washers and bolt securing the engine mount strut assemblies to the engine mount and remove the struts.
(12) Remove the nuts, washers and bolts securing the engine mount to the basic body fittings and remove the engine mount.

63-40-11. INSTALLATION OF ENGINE MOUNT ASSEMBLIES (ORIGINAL). The installation procedure is the reverse of removal (paragraph 63-40-10).

63-40-40. Remains the same for UH12-J series.

63-560-1. TURBINE ENGINE MOUNT ASSEMBLIES.

Group 60
Section 63

63-560-2. DESCRIPTION. The turbine engine mount assemblies includes the folowing; right, left and lower mount assemblies, which are welded structures of type 4130 steel tubing and machined fittings. The mounts are attached to the basic structures through welded and machined steel brackets which are riveted and bolted to the basic structure.

63-560-3. REMOVAL OF THE TURBINE ENGINE MOUNT ASSEMBLIES.

a. Prior to removing the turbine engine mounts, accomplish the following steps.
   (1) Remove the forward tail rotor drive shaft. (Section 24.)
   (2) Remove the engine inlet duct and screen assembly. (Section 76-560)
   (3) Remove the main transmission coupling assembly. (Section 24-560.)
   (4) Remove the anti-ice control bracket from the upper engine lifting pad.
   (5) Install a lifting tool and support the engine.

b. Remove the right turbine engine mount as follows.
   (1) Remove the clamps securing the resistor block and oil lines.
   (2) Remove the lockwire and bolt securing engine mount to engine mount bracket.
   (3) Remove the nut and washer securing the engine mount to the engine strut assembly, remove the engine mount and reinstall the washer and nut.

c. Remove the left turbine engine mount as follows.
   (1) Remove the clamps securing the N_2 cable bracket and anti-ice cable.
   (2) Remove the lockwire and bolt securing engine mount to engine mount bracket.
   (3) Remove the nut, washer and bolt securing the fork to the fitting.
   (4) Remove the nut and washer securing the engine mount to the engine strut assembly, remove the engine mount and reinstall the washer and nut.

d. Remove the lower turbine engine mount as follows.
   (1) Remove the clamps securing the electrical harnesses and tubing.
   (2) Remove the lockwire and bolt securing the engine mount to engine mount bracket.
   (3) Remove the nuts, washers and bolt securing the engine mount to the fitting.
   (4) Remove the mount.

e. Remove lockwire, bolts, washers and bracket from the engine gearbox housing assembly.

63-560-4. INSTALLATION OF THE TURBINE ENGINE MOUNT ASSEMBLIES. The installation of the turbine engine mounts is the reverse of removal.

CABIN ENCLOSURE

This section remains the same for UH12-J series.

Group 70
Section 70

POWER PLANT AND RELATED SYSTEMS

Delete this section for UH12-J series.

TURBINE ENGINE AND RELATED SYSTEMS

70-560-1. TURBINE ENGINE AND RELATED SYSTEMS.

70-560-2. DESCRIPTION. The turbine engine and related systems are located over the transistion section of the tail boom. The installation includes the following: Turbine engine, engine mounts; intake, exhaust, fuel, oil and electrical systems.

70-560-3. REMOVAL OF THE TURBINE ENGINE.

a. Remove the turbine engine as follows:

(1) If the engine is in operating condition preserve in accordance with the Allison Operation and Maintenance Manual.

CAUTION: Disconnect any external power and turn master switch off.

(2) Disconnect battery.
(3) Disconnect lubrication lines from the engine. Drain residual oil from engine, cap lines and fittings.
(4) Disconnect fuel lines from the engine. Drain residual fuel from engine, cap lines and fittings.
(5) Remove forward tail rotor drive shaft. (Section 24)
(6) Remove the engine inlet duct and screen assembly. (Section 76-560)
(7) Remove the engine coupling shaft. (Section 24-560)
(8) Disconnect the anti-ice cable and remove the anti-ice control bracket from the upper engine lifting pad. (Section 75-560)
(9) Install a lifting tool and support the engine.
(10) Disconnect burner drain valve line.

NOTE: IF THE ENGINE IS BEING RETURNED FOR OVERHAUL OR REPAIR, REMOVE THE BURNER DRAIN VALVE AND THE THREADED PLUG INSTALLED IN THE FORWARD BURNER DRAIN POSITION, PLUG OPENINGS PRIOR TO SHIPMENT. RETAIN THESE ITEMS TO BE INSTALLED IN THE REPLACEMENT ENGINE. THESE ITEMS ARE USED ONLY ON THE UH12-J SERIES.

(11) Disconnect torque pressure line and cap the line and fitting.
(12) Disconnect the electrical connections from the starter generator and ignition exciter.
(13) Disconnect the electrical plug connectors from the following: N_1 and N_2 tachometer generators, engine oil temperature bulb and the two chip detectors.
(14) Disconnect the N_1 control cable and bracket.
(15) Disconnect the N_2 control cable.
(16) Remove clamps securing electrical harness to engine.
(17) Remove exhaust ejectors and clamps. (Section 76-560)
(18) Remove the electrical ground cable.
(19) Lift the engine sufficiently to take its weight off the bolts securing the engine mounts to the engine.
(20) Remove the lockwire and the bolts securing the engine mounts to the engine.
(21) Lift engine to clear engine mounts and helicopter.
(22) Remove the lockwire, bolts and brackets from the engine gearbox assembly housing.
(23) Refer to 70-560-5.

70-560-4. INSTALLATION OF THE TURBINE ENGINE.

Installation of the turbine engine is the reverse of removal. In addition, accomplish the following:

a. Torque the bolts securing the engine mount brackets to the engine to 100/120 pound inch torque value.

b. Torque the bolts securing the engine mounts to the engine mount brackets to 250 inch lbs. plus drag torque.

CAUTION

REFER TO PARTS MANUAL FOR CORRECT LOCATION OF ENGINE MOUNT ATTACH BOLTS.

c. Reroute ignitor plug lead to clear N_2 arm.

d. Check engine for the following:

(1) Short burner drain valve installed in aft position.

(2) Threaded plug installed in forward burner drain position to attach ignitor plug lead bracket.

(3) For Bendix and CECO fuel controls, adjust max fuel flow stop to 235 pph. Refer to Allison Operations and Maintenance Manual.

70-560-5. REMOVAL OF COMPONENTS FROM THE TURBINE ENGINE.

1. Remove the starter-generator.
2. Remove the tachometer generators.
3. Remove the three engine mount brackets.
4. Remove the fuel lines and fittings.
5. Remove the lubrication lines and fittings.
6. Remove engine through shaft.

NOTE: PLUG OR COVER ALL OPENINGS.

70-560-6. INSTALLATION OF COMPONENTS ON THE TURBINE ENGINE.

Installation of components on the turbine engine is the reverse of removal. Install engine through shaft. Torque nut to 180 in. lbs. plus drag torque of nut. Safety nut with .041 lockwire.

70-560-7. TROUBLE SHOOTING THE ENGINE.

Refer to Allison Operations and Maintenance Manual.

Remains the same for UH12-J series.

Figure 70-560-3. Turbine Engine and Related Systems

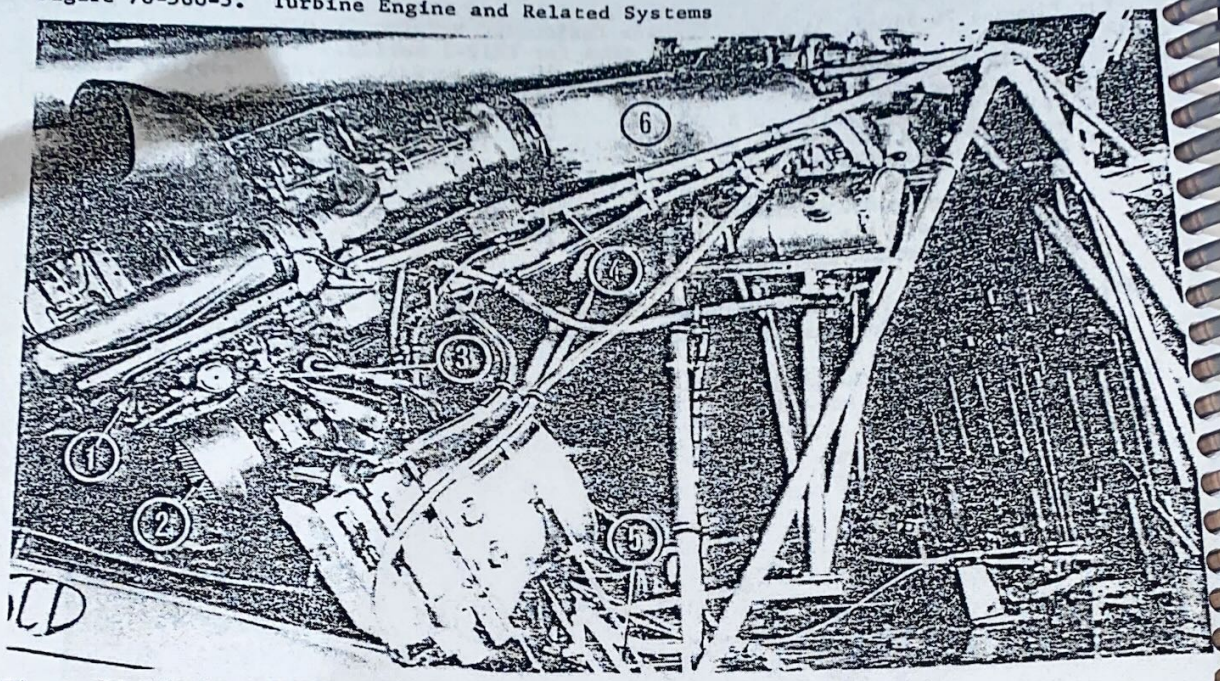
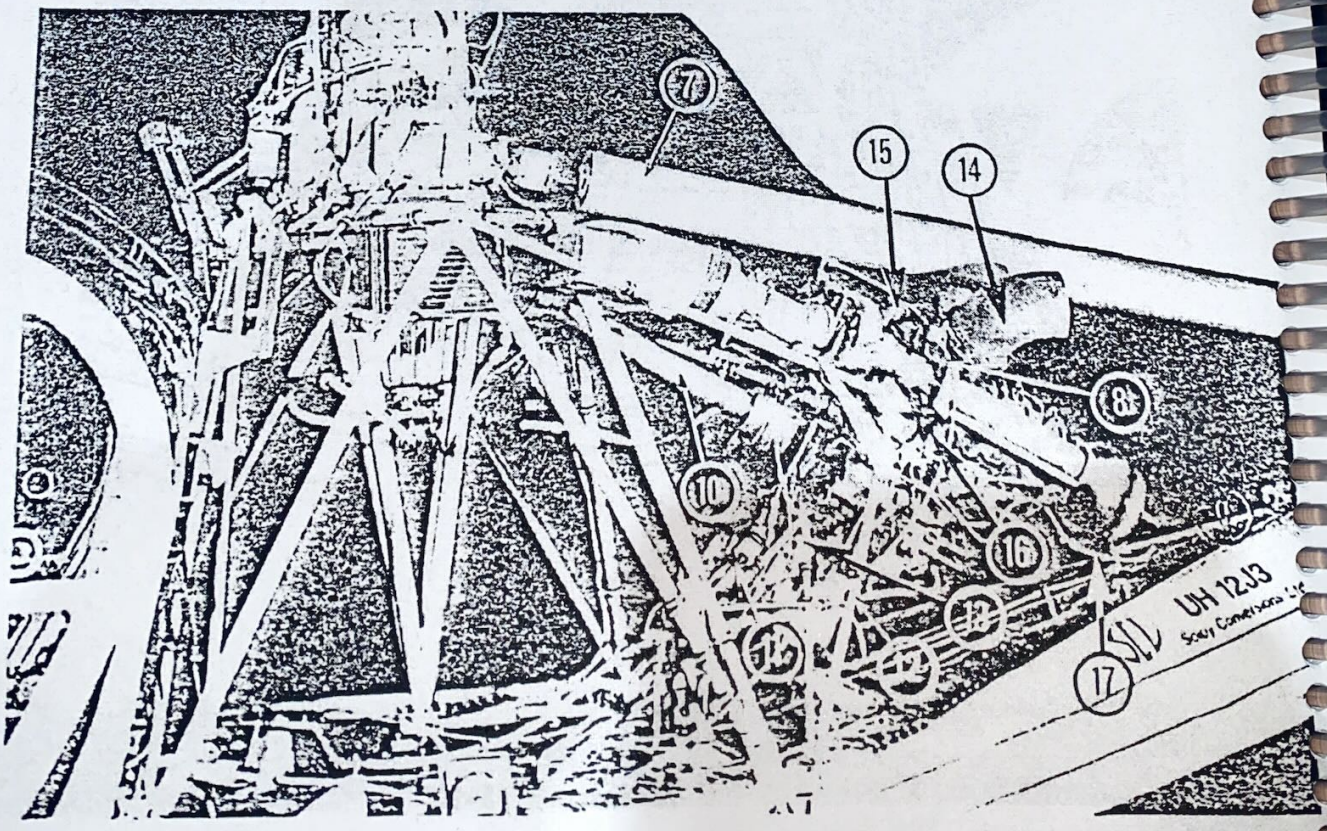


Figure 70-560-3A.. Turbine Engine and Related Systems

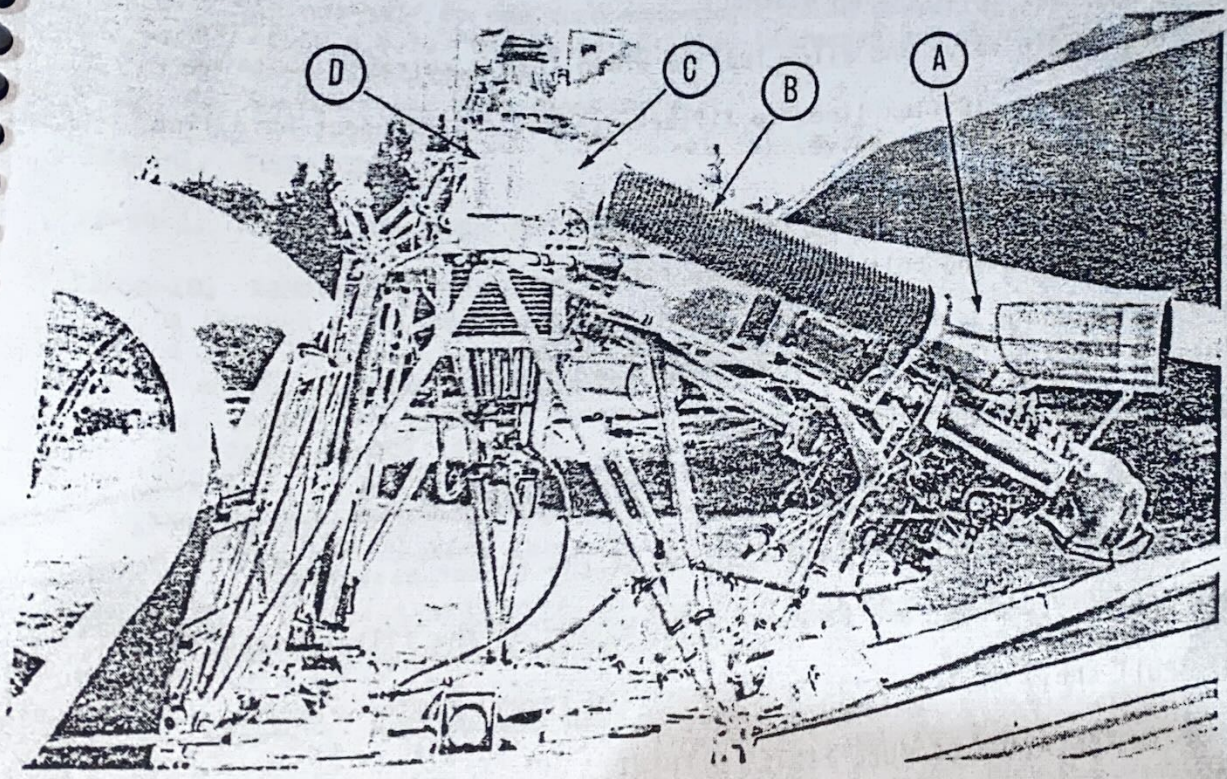


For Figures 70-560-3, 3A & 4. Turbine Engine and Related Systems

1. Ignition Exciter
2. Starter Generator
3. N_1 Control Cable and Bracket
4. Turbine Right Engine Mount
5. Electrical Ground Cable
6. Inlet Duct
7. Tail Rotor Drive Shaft
8. Anti-Ice Cable
9. Burner Drain Valve
10. Main Transmission Coupling Assembly
11. Torque Pressure Line
12. Turbine Left Engine Mount
13. Turbine Lower Engine Mount
14. Exhaust Ejectors
15. Upper Lifting Pad
16. N_2 Control Cable
17. Ignitor Plug Lead

Figure 70-560-4. Turbine Engine and Related Systems For Installation with Ejector Oil Cooling Assembly.

18. Ejector Oil Cooling Assembly
    (A) Ejector Assembly
    (B) Duct
    (C) Transition
    (D) Oil Cooler



FUEL SYSTEM

72-1-1. FUEL SYSTEM

72-1-2. DESCRIPTION. The fuel system may consist of either a standard fuel system or a standard fuel system plus an auxiliary fuel system kit installation. The standard fuel system includes: An engine driven fuel pump, filter, shut off valve, electrically operated auxiliary fuel pump and a 46 gallon capacity bladder type fuel cell. The fuel system instrumentation consists of a fuel quantity and a fuel pressure indicating system. (Refer to 72-101-1 for auxiliary fuel system fit installation maintenance instructions).

72-1-40. PRESSURE CHECK OF FUEL SYSTEM

a. Check the fuel system pressure with the auxiliary pump on for a minimum of 10 p.s.i.

b. Check all fuel lines and connections for evidence of leakage. Replace all defective fittings or lines.

72-10-1 through 72-20-30. Delete for UH12-J series.

72-30-10. REMOVAL OF FUEL FILTER ASSEMBLY.

a. Open drain valve and allow fuel to drain into a suitable container.

b. Remove and cap flex lines to filter assembly. Disconnect hard line connected to drain valve.

c. Cut safety wire and remove cannon plug.

d. Remove mounting bolts and remove filter assembly.

72-30-11. INSTALLATION - FUEL FILTER.
Install the fuel strainer in the reverse order of removal.

72-30-20. REMOVAL OF FUEL FILTER ELEMENT.

a. Open drain valve and allow fuel to drain into a suitable container.

b. Remove drain valve from the bottom of the filter assembly.

c. Cut safety wire, and remove nut on bottom of the filter assembly.

d. Pull shell of filter assembly down and remove filter element.

72-30-21. INSTALLATION OF FUEL FILTER ELEMENT.
Install the element in the reverse order of removal. Tighten base nut to 25-50 inch.lbs.

72-40-1. AUXILIARY FUEL PUMP

72-40-2. DESCRIPTION. The electrically operated auxiliary fuel pump is incorporated in the fuel system to maintain a constant fuel pressure to the engine driven fuel pump. The pump end assembly is a direct drive, positive displacement, cam-type metering pump. It is controlled by the fuel pump switch on the protection panel.

72-40-10. REMOVAL OF AUXILIARY FUEL PUMP
a. Disconnect and plug the lines.
b. Cap all openings.
c. Disconnect the electrical plug.
d. Remove the four mounting bolts and washers.

72-40-11. Remains the same for UH12-J series.

72-40-30. ADJUSTMENT OF AUXILIARY FUEL PUMP (See Figure 72-1-9).

NOTE: Adjust the auxiliary fuel pump with engine stopped.

a. Remove the lockwire for the adjusting screw.
b. While the pump is operating, adjust the relief valve adjusting screw in one-half to one turn increments to an operating pressure of a minimum of 10 p.s.i. Clockwise rotation increases and counter-clockwise decreases pressure.
c. Lockwire the adjustment screw.

72-50-1. FUEL CELL

72-50-2. Remains the same for UH12-J series.

72-50-10. REMOVAL OF FUEL CELL
a through c. Remains the same for UH12-J series.
d and e. Delete for the UH12-J series.
f and i. Remains the same for UH12-J series.
j. Loosen the locknuts securing the following cables to the engine deck cable support assembly..
1. On the 3 place the anti-ice cable.
2. On the 4 place the anti-ice and the N_1 cable.
k through o. Remains the same for UH12-J series.

NOTE: Lift the right-hand side of the fuel cell cover plate upward and outward to clear the control cable assemblies.

p through x. Remains the same for UH12-J series.

CAUTION: Remains the same for UH12-J series.

72-50-11 through 72-120-30. Remains the same for UH12-J series.

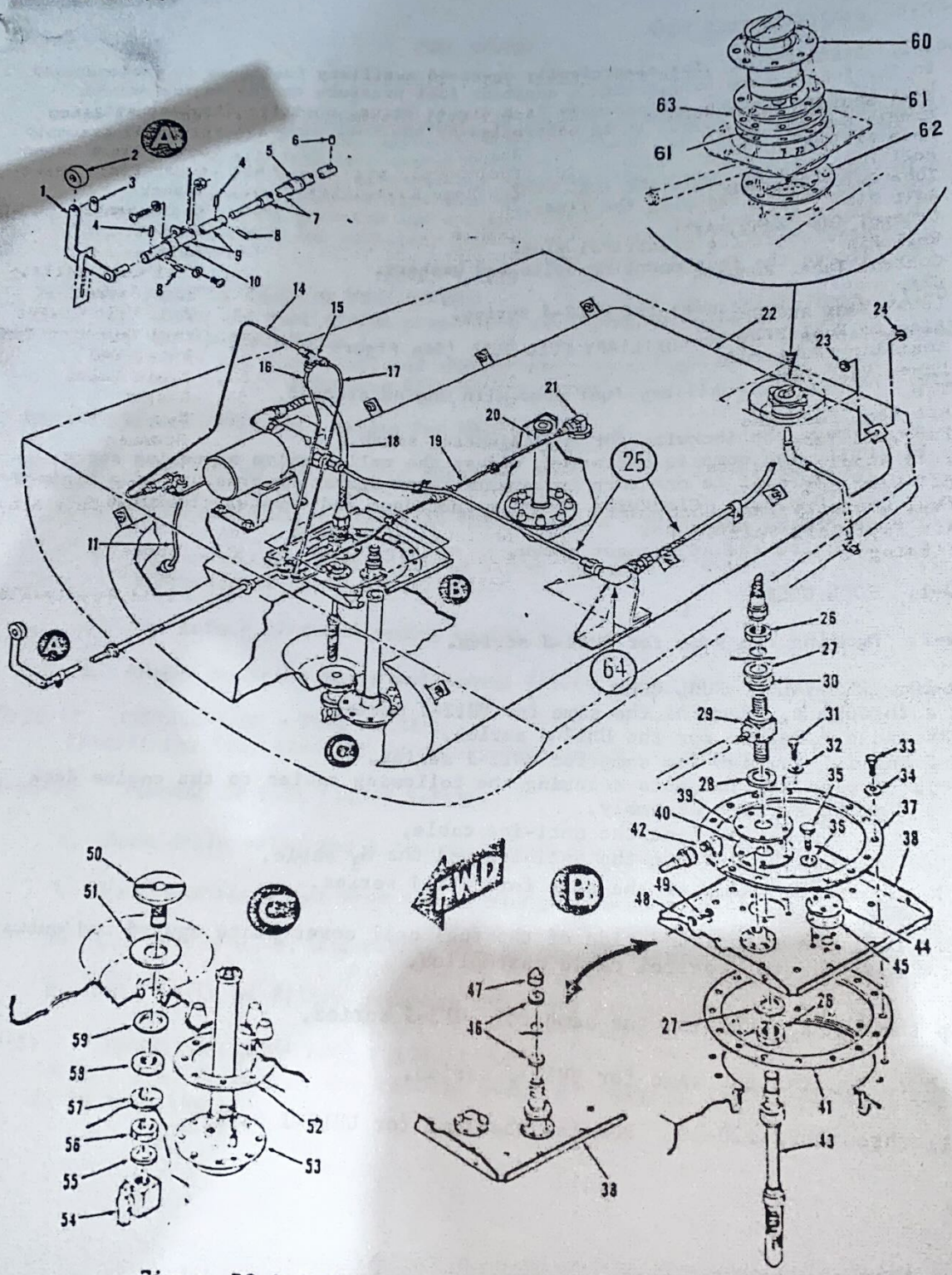


Figure 72-1-1 (Revised). Forward Fuel System

Group 70
Section 72

INDEX FOR FIGURE 72-1-1 (Revised)

1. Fuel Shutoff Valve Handle
2. Handle Control Knob
3. Knob Filler
4. Roll Pin
5. Tube Guide Bearing
6. Roll Pin
7. Control Tube Assy, Aft
8. Roll Pin
9. Control Tube, Forward
10. Clip
11. Lower Vent and Drain Line
12. Line to Fuel Filter
13. Auxiliary Fuel Pump
14. Upper Vent Line
15. Tee
16. Aft Vent Fwd Tube
17. Fwd Vent Tube
18. Fuel Supply Hose Assy
19. Aft Vent Aft Tube
20. Fuel Quantity Tank Unit, Aft
21. Aft Fuel Cell Vent 40. fitting
22. Fuel Cell Assembly
23. Eyelet
24. Washer
25. Fuel Supply Line and Hose Assemblies
26. Nut
27. Washer
28. Strainer and Valve Flange Gasket
29. Fuel Shutoff Valve
30. Washer
31. Bolt
32. Washer
33. Bolt
34. Washer
35. Bolt
36. Washer
37. Retainer
38. Fuel Cell Cover Plate Assembly
39. Shutoff Valve Plate
40. Fuel Cell Cover Plate Gasket
42. Vent Tube Elbow
43. Strainer Assembly
44. Cover Plate Gasket
45. Cover Plate Gasket
46. Washer
47. Cap Assembly
48. Washer
49. Bolt
50. Fuel Cell Fitting
51. Sump Gasket
52. Tank Unit Gasket
53. Fuel Quantity Tank Unit, Fwd
54. Drain Valve
55. Gasket
56. Nut
57. Grommet
58. Nut
59. Washer
60. Filler Unit Assy
61. Gasket
62. Gasket
63. Spacer
64. Fuel Supply Elbow

Group 70
Section 72

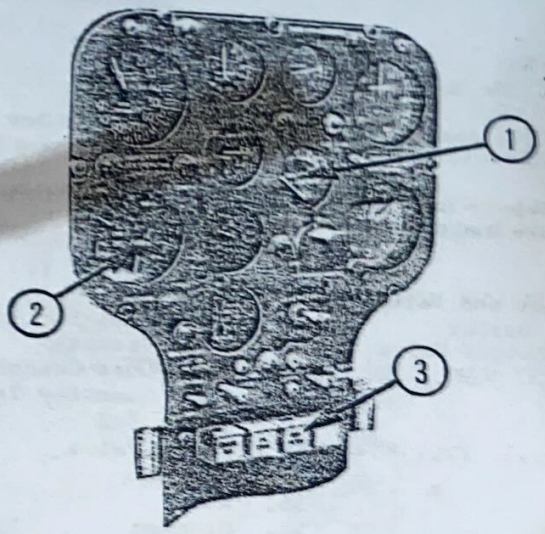


Figure 72-1-2. Fuel System Instrumentation

1. Fuel Quantity Gauge
2. Fuel Pressure Gauge
3. Fuel Filter Warning Light

Figure 72-1-3. Fuel System

1. Electric Fuel Pump
2. Fuel Filter
3. Fuel Filter Drain Valve
4. Fuel Pressure Return Line
5. Fuel Filter Overboard Drain Line

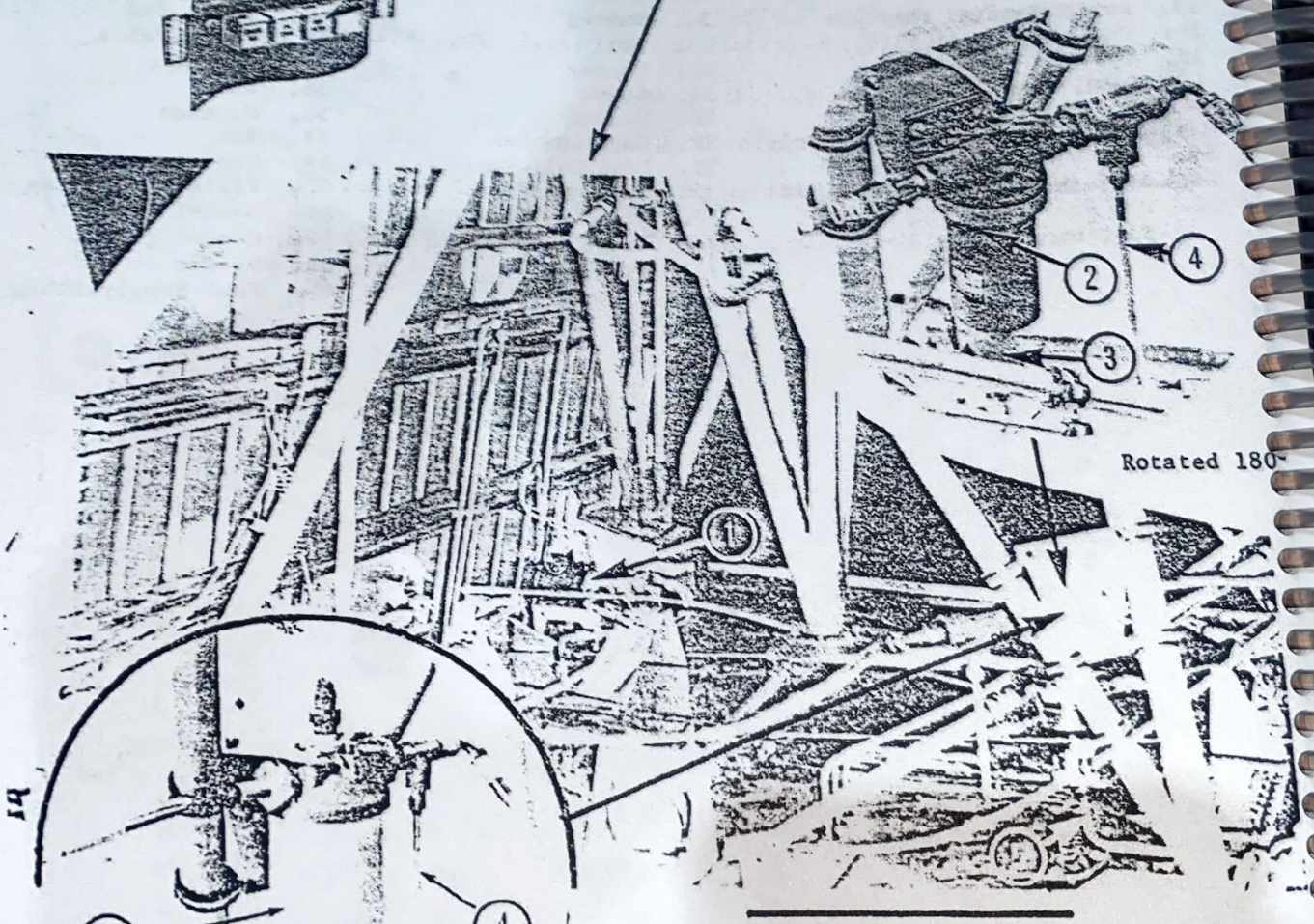


Figure 72-1-2A. Fuel Filter Assembly, Late Configuration

2. Fuel Filter
3. Fuel Filter Drain Valve
4. Fuel Pressure Return Line

LUBRICATION SYSTEM

73-1-1 through 73-1-30. Delete for UH12-J series.

73-1-40 and 73-1-41. Remains the same for UH12-J series.

73-1-42. DECONTAMINATION OF LUBRICATION SYSTEM. Whenever the transmission requires replacement due to internal failure decontaminate the affected lubrication system as follows.

a. Remains the same for UH12-J series.
b. Remove the oil cooler for flushing (73-560-13a).
c. Remains the same for UH12-J series.

CAUTION: USE ADEQUATE PRECAUTION AGAINST FIRE WHEN USING FLUSHING SOLUTION.

d. Remains the same for UH12-J series.
e. After flushing, reinstall oil cooler(s) (73-560-13b).

73-1-60. Remains the same for UH12-J series.

73-10-1 through 73-30-11. Delete for UH12-J series.

73-40-1 through 73-41-40. Remains the same for UH12-J series.

73-50-1 through 73-101-40. Delete for UH12-J series.

LUBRICATION SYSTEM

73-560-1. LUBRICATION SYSTEM

73-560-2. DESCRIPTION. (See figure 73-560-1 through 73-560-4A). The turbine engine and the transmission/lower gearcase oil systems are independent of each other and each oil system requires a different type of lubricant as described in section 10.

73-560-3. THE TURBINE ENGINE LUBRICATION SYSTEM (See figures 73-560-1, 2 & 2A).

(a) The turbine engine lubrication system includes the following: Oil tank; radiator type cooler and either a blower or an ejector oil cooling assembly; integral engine oil pump and filter; gearcase breather and pressure and drain lines. A thermostat and a pressure relief valve are included in the oil cooler.

(b) In the engine oil system oil is drawn from the tank to the pump and distributed under pressure through the engine internal oil provisions and returned by the scavenger pump from the oil sump through the oil cooler and into the tank. The oil pressure gage is connected by instrument plumbing to the pressure fitting on the engine. The engine oil temperature bulb is installed in the special engine "oil in" tee fitting. The oil tank is vented to the engine gearbox.

73-560-4. TROUBLESHOOTING THE TURBINE ENGINE LUBRICATION SYSTEM. Refer to the Allison Operations and Maintenance Manual and the following conditions. (Table 73-560-1.)

73-560-5. REMOVAL OF THE TURBINE ENGINE LUBRICATION SYSTEM COMPONENTS. Remove engine lubrication system components in accordance with the procedures indicated in the following referenced paragraphs, in any convenient sequence.

a. Oil pump and filter. Refer to Allison Operations and Maintenance Manual.
b. Oil lines (73-560-10)
c. Oil cooler (73-560-13a)
d. Oil tank (73-560-14a)

73-560-6. INSTALLATION OF THE TURBINE ENGINE LUBRICATION SYSTEM COMPONENTS. Install lubrication system components in accordance with the procedures indicated in the following referenced paragraphs, in any convenient sequence.

a. Oil tank (73-560-14b)
b. Oil cooler (73-560-13b)
c. Oil lines (73-560-11)
d. Oil pump and filter. Refer to Allison Operations and Maintenance Manual.

73-560-7. TURBINE ENGINE OIL PRESSURE ADJUSTMENT. Engine oil pressure is adjusted in accordance with procedures outlined in the Allison Operations and Maintenance Manual.

73-560-8. SERVICING THE TURBINE ENGINE LUBRICATION SYSTEM. (Refer to section 10.)

73-560-9. DECONTAMINATION OF THE TURBINE ENGINE LUBRICATION SYSTEM. Refer to The Allison Operations and Maintenance Manual.

Group 70
Section 73-560

73-560-10. REMOVAL OF TURBINE ENGINE OIL LINES.

a. Drain the lubrication system (Refer to section 10) if required.
b. Disconnect upper end of oil line and loosen lower end to allow oil in line to drain for a few seconds.
c. Disconnect oil line lower end and remove oil line assembly.
d. Cap all open fittings and oil line assemblies.

73-560-11. INSTALLATION OF TURBINE ENGINE OIL LINES.

a. Check that threads of all orifices, nuts and fittings are undamaged, and that orifices, inlets, fittings and oil line passages are clean and unobstructed.
b. Apply a thin coating of engine oil to all threaded connections.
c. Connect lower end of oil line and then the upper end to the fittings.
d. Check oil lines for kinks, uniformity of diameter and interference with other components or with the helicopter structures.
e. Tighten both ends of oil lines.

73-560-12. ENGINE GEARBOX BREATHER INSTALLATION.

a. A reducer fitting is installed in the gearbox housing. A flex hose is installed on the fitting and is connected to a tube that is installed between the basic body and tail boom.
A. Remove and install the breather hose and lines as outlined in paragraphs 73-560-10 and 73-560-11.

73-560-13. TURBINE ENGINE OIL COOLER (See figure 73-560-1)

The engine oil cooler is a flat radiator type with a thermostatic and pressure relief valve to control oil flow through the cooler. When oil is cold the bypass port is open to permit oil flow through the bypass tube of the cooler. When oil temperature rises, the thermostat expands, causing the bypass port to begin closing at approximately 52° C (125° F). When the bypass port is closed oil circulates through the oil cooler core.

a. Removal of the oil cooler.
1. Disconnect lower oil cooler line and drain cooler and line into suitable container.
2. Remove upper oil cooler line.
3. Remove nuts, washers and bolts securing oil cooler and remove oil cooler.
4. Cap fittings and lines.
b. Installation of the oil cooler. Installation of the oil cooler is essentially the reverse order of removal, in addition accomplish the following.
1. Ground run engine for leak check, add oil as required (Refer to section 10).

73-560-14. TURBINE ENGINE OIL TANK

The oil tank assembly is a welded aluminum alloy tank with a capacity of 4.0 U.S. quarts. The tank is located on the right aft side of the engine/rotor mount. The assembly which is attached in the engine mount tubes with cushioned clamps.

a. Removal of the oil tank.
1. Drain the oil tank.
2. Disconnect the hose assemblies and cap all fittings and hoses.
3. Remove the nuts from the retaining clamps and remove the tank.
b. Installation of the oil tank. The installation of the oil tank is the reverse order of the removal.

73-560-14A. EXHAUST EJECTOR-ENGINE OIL COOLING SYSTEM.

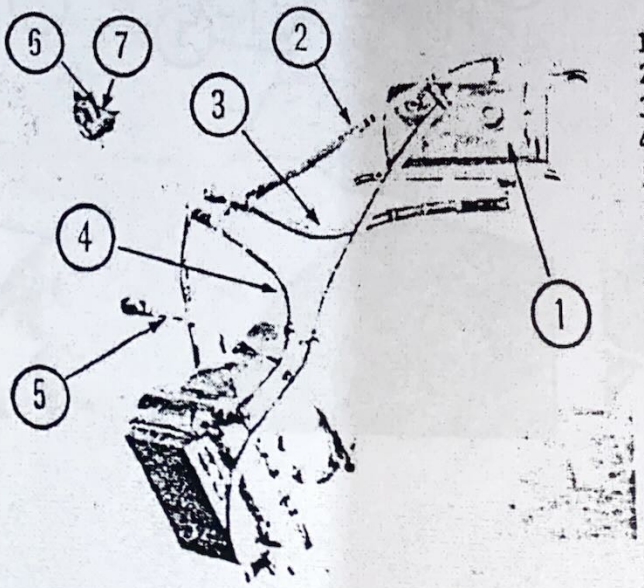
73-560-14B. DESCRIPTION. The exhaust ejector-engine oil cooling system consists of: Oil cooler support assembly; oil cooler; oil cooler transition assembly; flexible duct; ejector assembly support tubes; clamps and attachment hardware.

a. Removal and installation of the exhaust ejector-engine oil cooling system is similar to the blower oil cooling system except for the obvious ejector and blower differences. The remainder of the systems are the same.

ABLE 73-560-1. TROUBLESHOOTING THE TURBINE ENGINE LUBRICATION SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
igh oil temperature	Insufficient oil supply	Fill oil tank with specified oil. (Refer to Section 10)
	Defective oil cooler valve	Replace oil cooler or valve.
	Restricted air flow through cooler	Inspect oil cooler core for foreign particles. Clean or replace cooler.
	Defective oil temperature indicator	Replace defective temperature indicator.
gh oil pressure	Defective or obstructed oil pressure relief valve	Clean and inspect valve Replace defective parts.
	Defective oil pressure indicator	Replace defective pressure indicator.
w oil pressure	Dirt in oil filter	Clean oil filter
	Restricted oil flow	Inspect oil system for clogged strainers and damaged lines. Verify oil pump discharge pressure. Replace defective parts.
	Defective or obstructed oil pressure relief valve	Clean and inspect valve. Replace defective parts.
	Defective oil pressure indicator	Replace defective pressure indicator.

Figure 73-560-1. Turbine Engine Lubrication System



1. Engine Oil Tank
2. Engine Oil Tank Vent Tube
3. Engine Oil Line, to Engine
4. Engine Oil Return Line
5. Engine Gearcase Vent Tube
6. Engine Oil Filter
7. Integral Engine Oil Pump
8. Engine Oil Cooler To Tank Line

NOTE: For installation with Engine Oil Cooler Blower installed

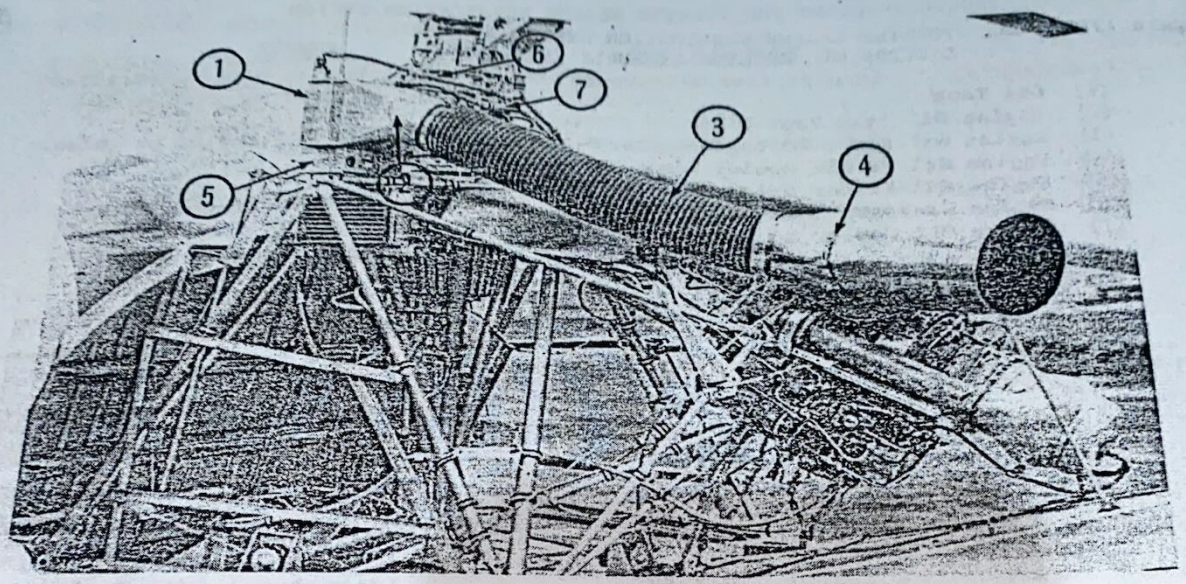
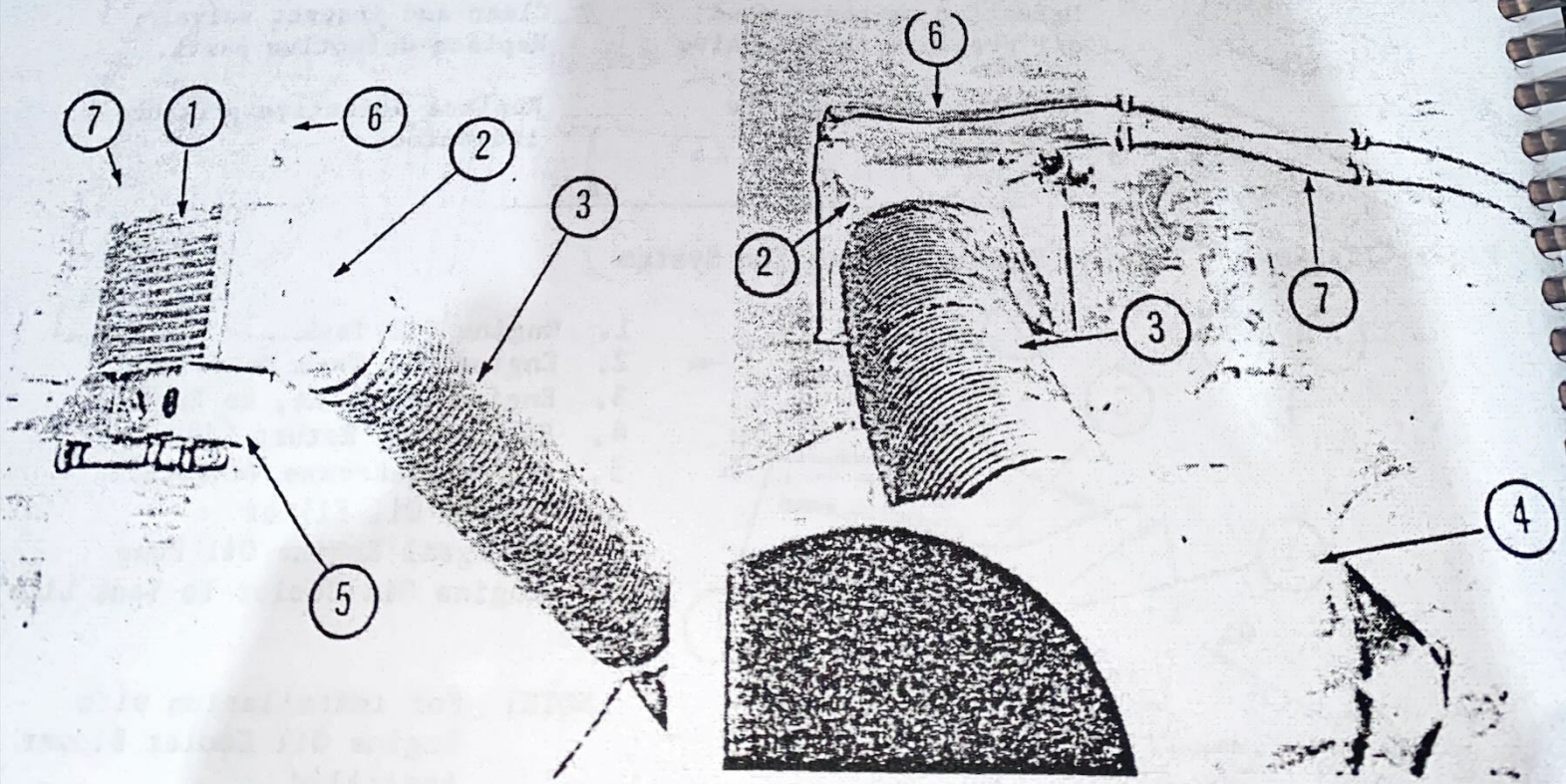


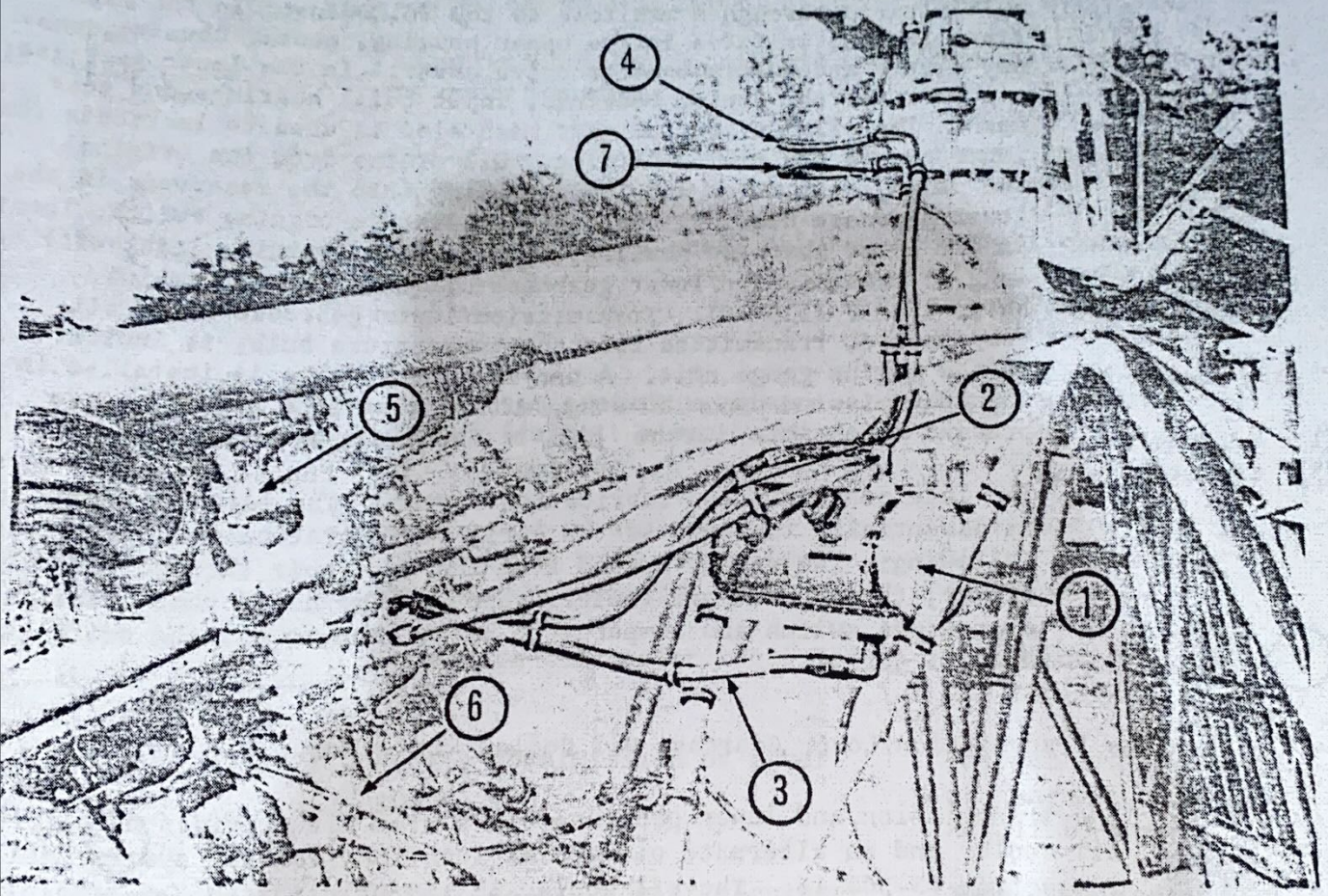
Figure 73-560-2. Turbine Engine Lubrication System
Ejector Oil Cooling Assembly Installed

(1) Oil Cooler (2) Transition (3) Duct (4) Ejector Assembly
(5) Support Assembly (6) Engine Oil Line, from engine (7) Engine Oil Line, to oil tar



igure 73-560-2A. TURBINE ENGINE LUBRICATION SYSTEM
EJECTOR OIL COOLING ASSEMBLY INSTALLED.

(1) Oil Tank
(2) Engine Oil Tank Vent Line
(3) Engine Oil Line, to engine
(4) Engine Oil to Oil Cooler Line
(5) Engine Oil Filter & Integral Engine Oil Pump
(6) Engine Gearcase Vent Tube
(7) Engine Oil Cooler to Tank Line



Group 70
Section 73-560

73-560-15. THE TRANSMISSION/LOWER GEARCASE LUBRICATION SYSTEM (See figures 73-560-3, 3A, 4 and 4A)

a. The transmission/lower gearcase lubrication system includes the following: Radiator type cooler; oil pump; oil filter; relief valve; pressure and drain lines. The oil reservoir is in the lower gearcase housing. Two different lubrication systems may be installed on the UH12D or UH12E helicopters. The difference will be explained in subsequent paragraphs. (See figures 73-560-4 and 4A)

1. The early configuration lubrication system. The oil is pumped from the reservoir through the oil cooler into an instrument and fitting assembly, that contains the transmission oil pressure warning switch and temperature bulb, through the transmission oil filter; through a manifold to the following: In the main transmission; orifices in the upper housing, center housing, one-way clutch and the tachometer drive cover. In the lower gearcase; oil jets for the duplex bearings, input quill bearings, and gear mesh. The oil jet for the gear mesh also is used to lubricate the inner end of the pinion bearing. Oil drains from the original fan drive, tail rotor and lower housing into the reservoir in the lower gearcase housing. The oil temperature warning switch, located in the lower gearcase housing, remains open (warning light off) as long as transmission/lower gearcase oil temperature remains below 275° F (135° C). Transmission/lower gearcase inlet oil temperature, transmitted from the temperature bulb, is indicated on the engine gauge unit. A one-way check valve is installed in the transmission upper housing, with a vent line and filter to prevent a possible vacuum lock in the drain system.

2. The late configuration lubrication system. The late configuration is essentially the same as the early configuration except for the following: The oil is pumped from the reservoir through the oil filter, through the oil cooler, through a manifold that contains a pressure switch and temperature bulb, then to all the orifices and oil jets.

b. The Transmission/Lower Gearcase Oil Cooler Kit

1. The transmission and lower gearcase oil cooler kit provides an alternate oil cooler and an alternate oil cooler location from the system outlined in section 73-560-15. The oil cooler is the original UH12-E transmission oil cooler and is mounted in a vertical position on the two aft legs of the pylon assembly. When utilized in conjunction with the early and late upper transmission lubrication configurations, the statements made in section 73-560-15 a1 and 2 above will be true with the following revisions:

73-560-15 a1. Remains the same.

73-560-15 a2. The late configuration lubrication system. The late configuration is essentially the same as the early configuration except for the following: The oil is pumped from the reservoir through the oil cooler, through the oil filter, through a manifold that contains a pressure switch and temperature bulb, then to all the orifices and oil jets.

73-560-16. TROUBLESHOOTING THE TRANSMISSION/LOWER GEARCASE LUBRICATION SYSTEM.

TABLE 73-560-2. TROUBLESHOOTING THE TRANSMISSION/LOWER GEARCASE LUBRICATION SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Oil temperature warning light on or temperature gage reading high	Insufficient oil in reservoir	Fill to correct level.
	Insufficient air flow through cooler	Inspect cooler core for foreign particles. Clean or replace cooler.
	Restricted return lines	Remove and clean.
	Incorrect orifice installed in upper housing	Install correct orifice.
	Restricted transmission vent tube or valve	Remove and clean tube or valve.
	Transmission vent check valve reversed	Install check valve with flow direction arrow pointing downward.
	Faulty temperature warning switch (contact close below 275° F (135° C)	Replace switch
	Engine and transmission temperature bulb connections reversed at selector switch	Reconnect wiring per wiring diagrams (Section 83).
	Defective oil cooler regulator valve	Repair or replace oil cooler
	Faulty transmission or lower gearcase	Inspect transmission or gearcase interior. Repair or overhaul.
Low oil temperature	Defective oil cooler regulator valve	Repair or replace oil cooler
Metal particles in transmission/gearcase oil filter	Faulty transmission or gearcase	Inspect transmission or gearcase interior. Repair or overhaul.
Transmission oil pressure warning light on	Insufficient oil in reservoir	Fill to correct level.
	Incorrect or defective pressure warning switch	Replace switch
	Defective oil pump	Repair or replace pump

73-560-17. REMOVAL OF THE TRANSMISSION/LOWER GEARCASE LUBRICATION SYSTEM COMPONENTS
Remove the lubrication system components in accordance with the procedures indicated in the following referenced paragraphs, in any convenient sequence.

1. Oil Pump (73-560-19)
2. Oil Filter (73-40-10)
3. Oil Cooler (73-560-13a)
4. Transmission vent tube, check valve and filter (73-41-10)
5. Oil Lines (73-560-10)

73-560-18. INSTALLATION OF THE TRANSMISSION/LOWER GEARCASE LUBRICATION SYSTEM COMPONENTS
Install the lubrication system components in accordance with the procedures indicated in the following referenced paragraphs, in any convenient sequence.

1. Oil Pump (73-560-19)
2. Oil Filter (73-560-11)
3. Oil Cooler (73-560-13b)
4. Transmission Vent Tube, Check Valve and Filter
5. Oil Lines (73-560-11)

73-560-19. TRANSMISSION/LOWER GEARCASE OIL PUMP
The oil pump is a gear type pump installed on the bottom of the gearcase housing. The relief valve, installed in the pump outlet fitting, is adjusted to 30-45 p.s.i. by inserting a $\frac{1}{4}$" hexwrench. Turning the wrench clockwise increases pressure, counterclockwise decreases pressure.

a. Removal of transmission/gearcase oil pump
   1. Drain oil from reservoir
   2. Disconnect inlet and outlet lines and cap.
   3. Remove safety wire, bolts, washers securing pump to the housing and remove the pump.
   4. Remove nut, washers, bolt and shaft from pump.

b. Installation of transmission/gearcase oil pump.
   The installation of the oil pump is essentially the reverse order of removal. Install a new gasket when installing pump.

Group 70
Section 73-560

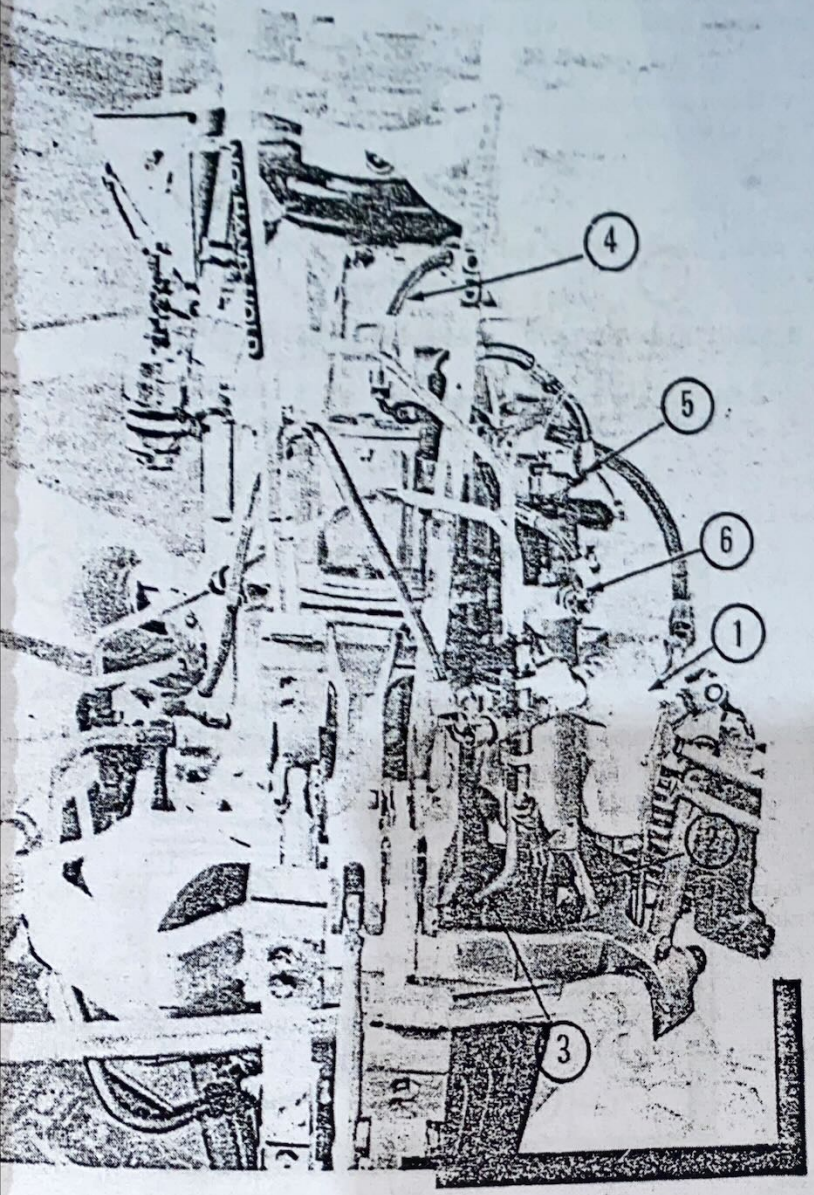


Figure 73-560-3. Transmission and Lower Gearcase Lubrication System, Right View.

1. Transmission Oil Filter
2. Lower Gearcase, Upper Bearing Oil Jet and Line
3. Lower Gearcase Vent Line
4. Upper Housing Orifice and Line
5. Center Housing Orifice and Line
6. Tachometer and Fan Drive Orifice Line

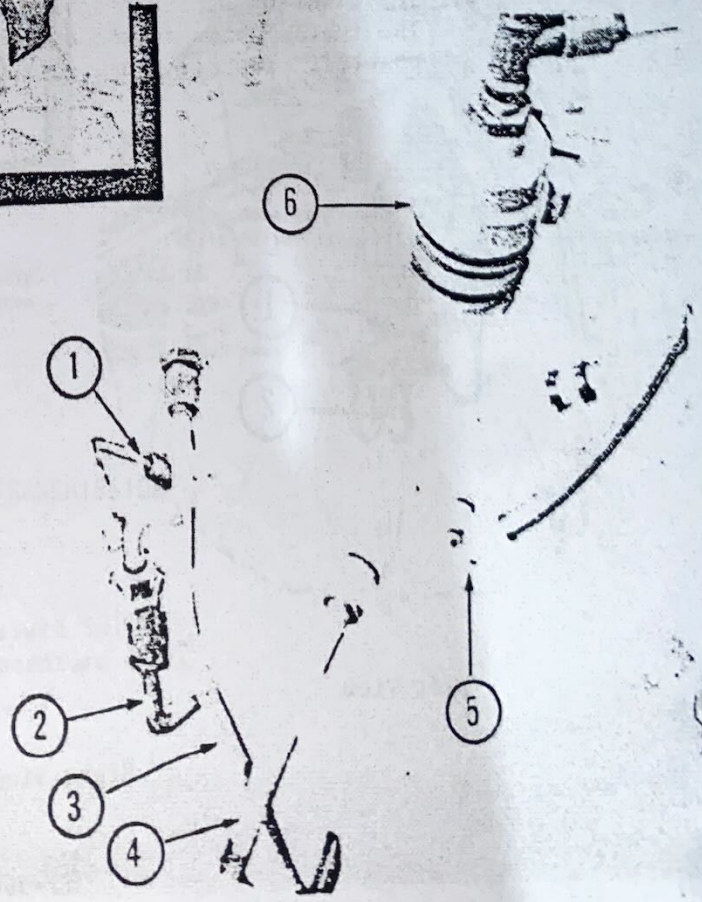


Figure 73-560-3A. Transmission and Lower Gearcase Lubrication System, Right View.

1. Input Quill Oil Jet and Line.
2. Input Gear Mesh and Bearing Jet and Line
3. Tail Rotor Drive Oil Drain Line
4. Lower Housing Oil Drain Line
5. One Way Clutch Orifice and Line
6. Vent Filter

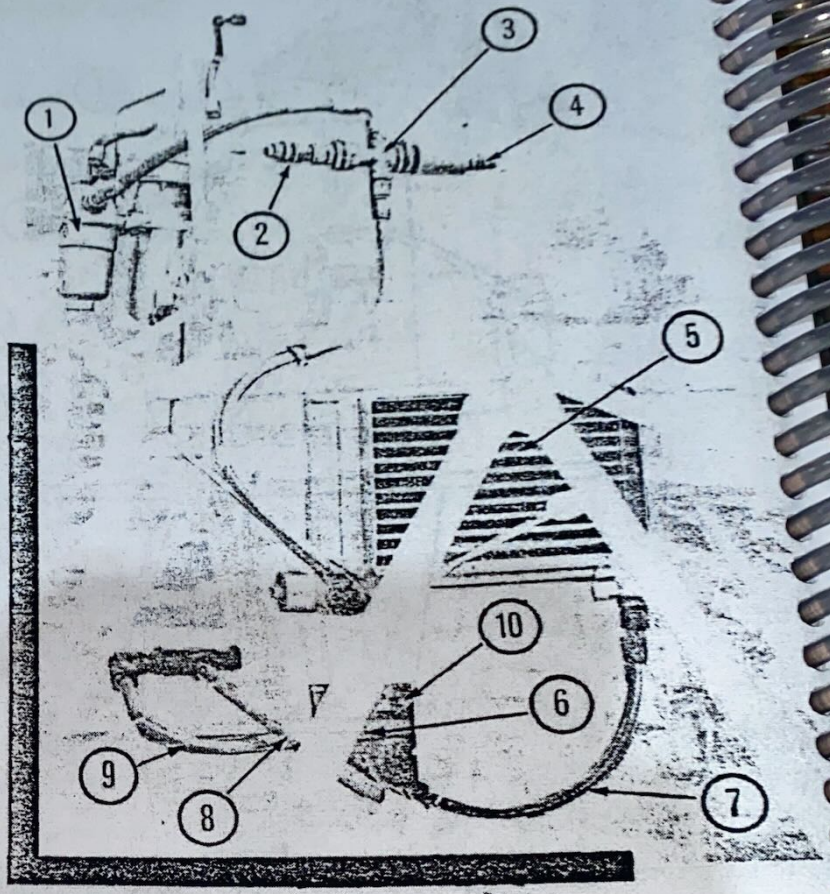
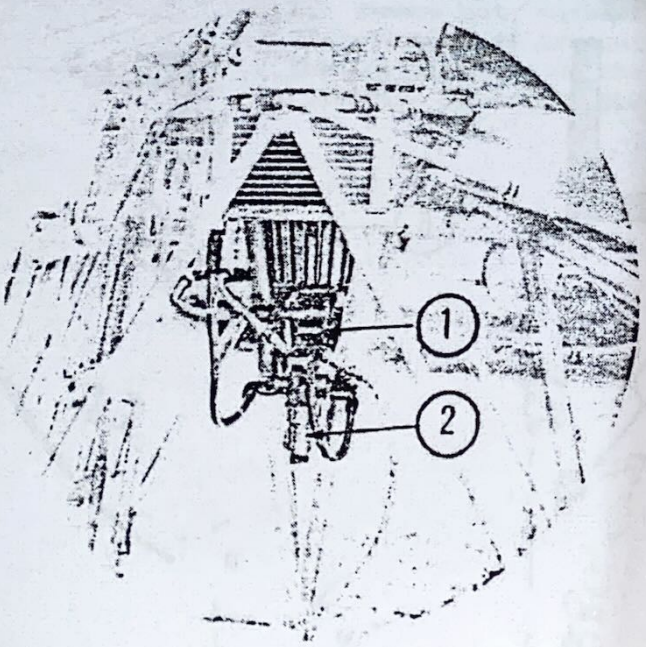


Figure 73-560-4. Upper and Lower Transmission Lubrication Systems, Left View.

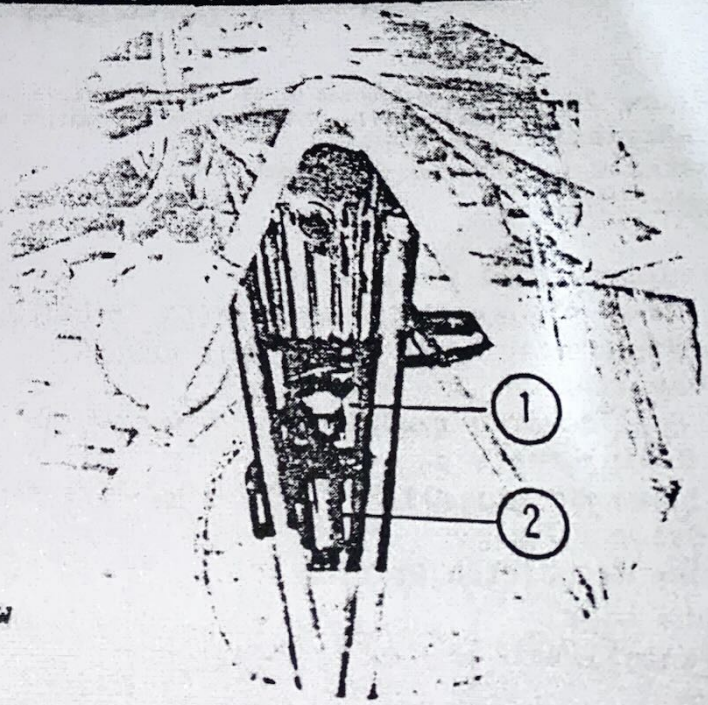
1. Oil Filter
2. Temperature Bulb
3. Instrument and Fitting Assembly
4. Pressure Switch
5. Oil Cooler
6. Pressure Relief Valve
7. Pressure Supply Line
8. Oil Pump Supply Line
9. Bypass Oil Line
10. Oil Pump

Figure 73-560-4A. Transmission and Lower Gearcase Lubrication System, Left and Right View. (Late Configuration Transmission Oil Filter Location)

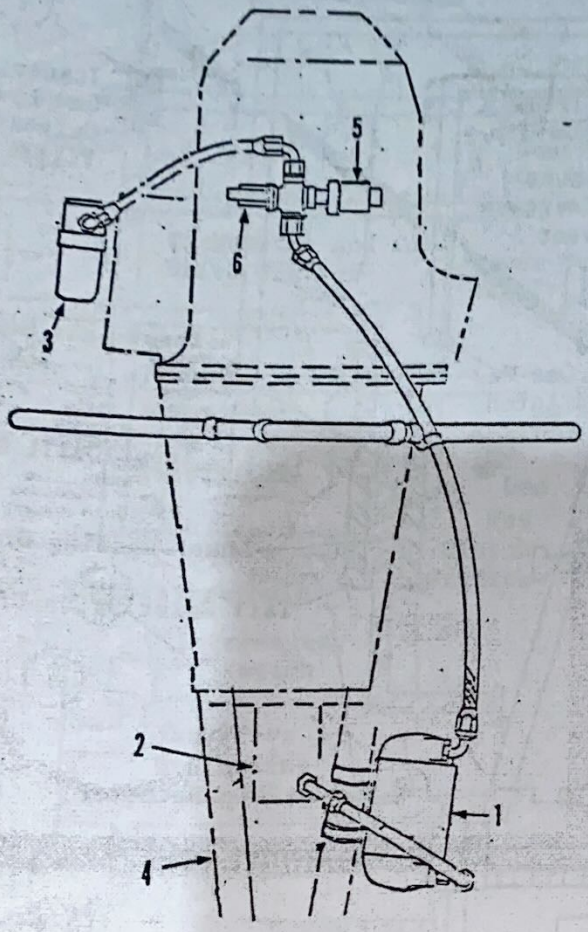
(1) Transmission Oil Pump
(2) Transmission Oil Filter



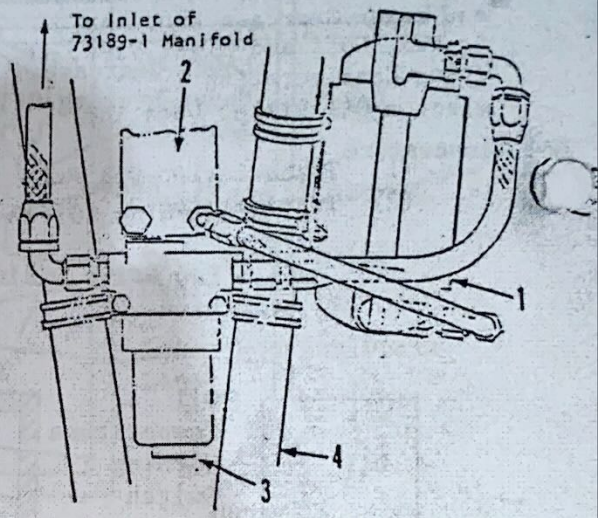
Left View



Right View



Pylon Mounted Transmission Oil Cooler, Early Style Hiller Transmission Lubrication System



Pylon Mounted Transmission Oil Cooler, Late Style Hiller Transmission Oil Lubrication System

Figure 73-560-4B. PYLON MOUNTED TRANSMISSION OIL COOLER.

1. Oil Cooler
2. Oil Pump
3. Oil Filter
4. Pylon
5. Oil Pressure Switch
6. Oil Temperature Bulb

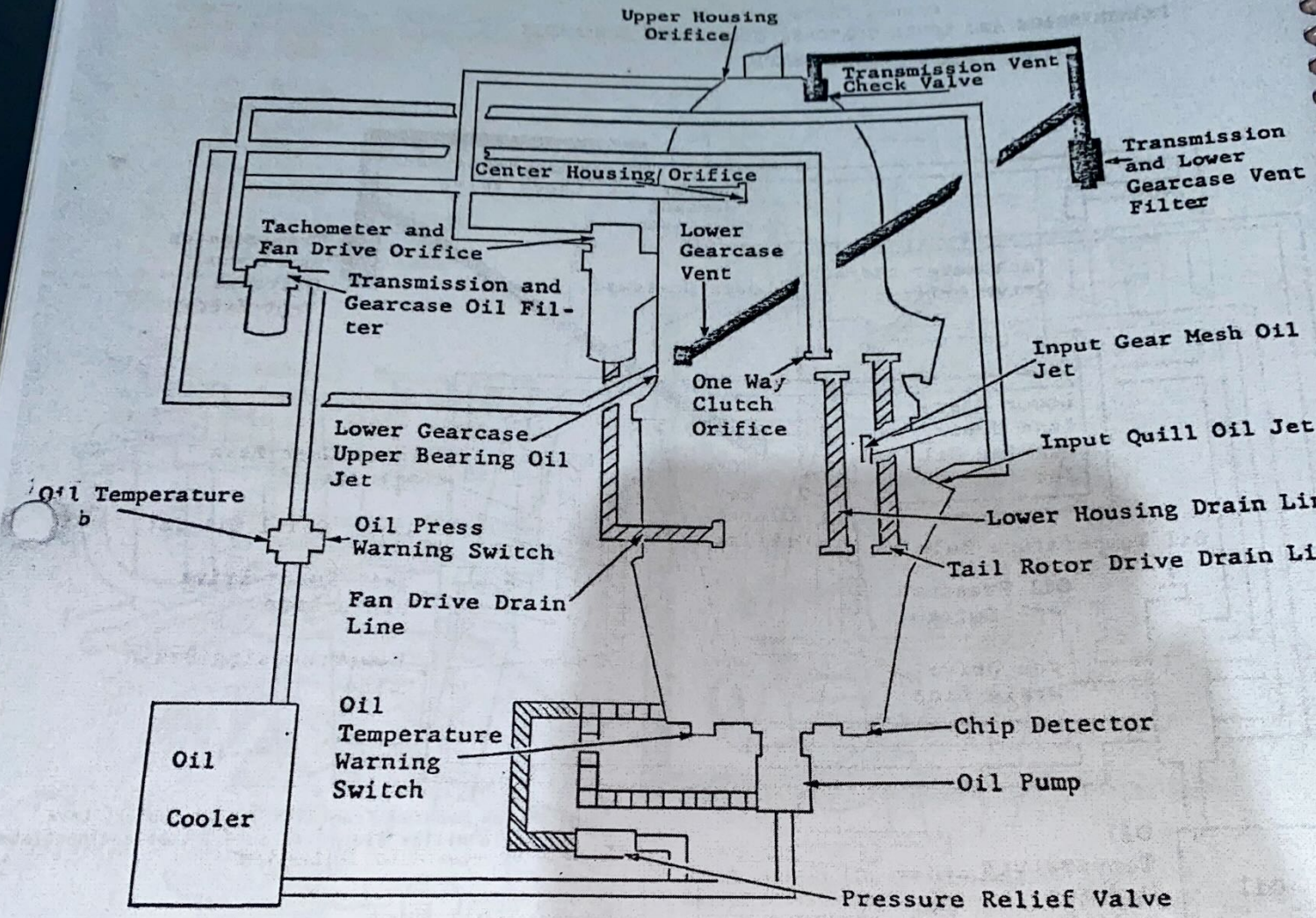


Figure 73-560-5.
TRANSMISSION AND LOWER GEARCASE OIL SYSTEM SCHEMATIC
EARLY CONFIGURATION

LEGEND

Oil Pressure

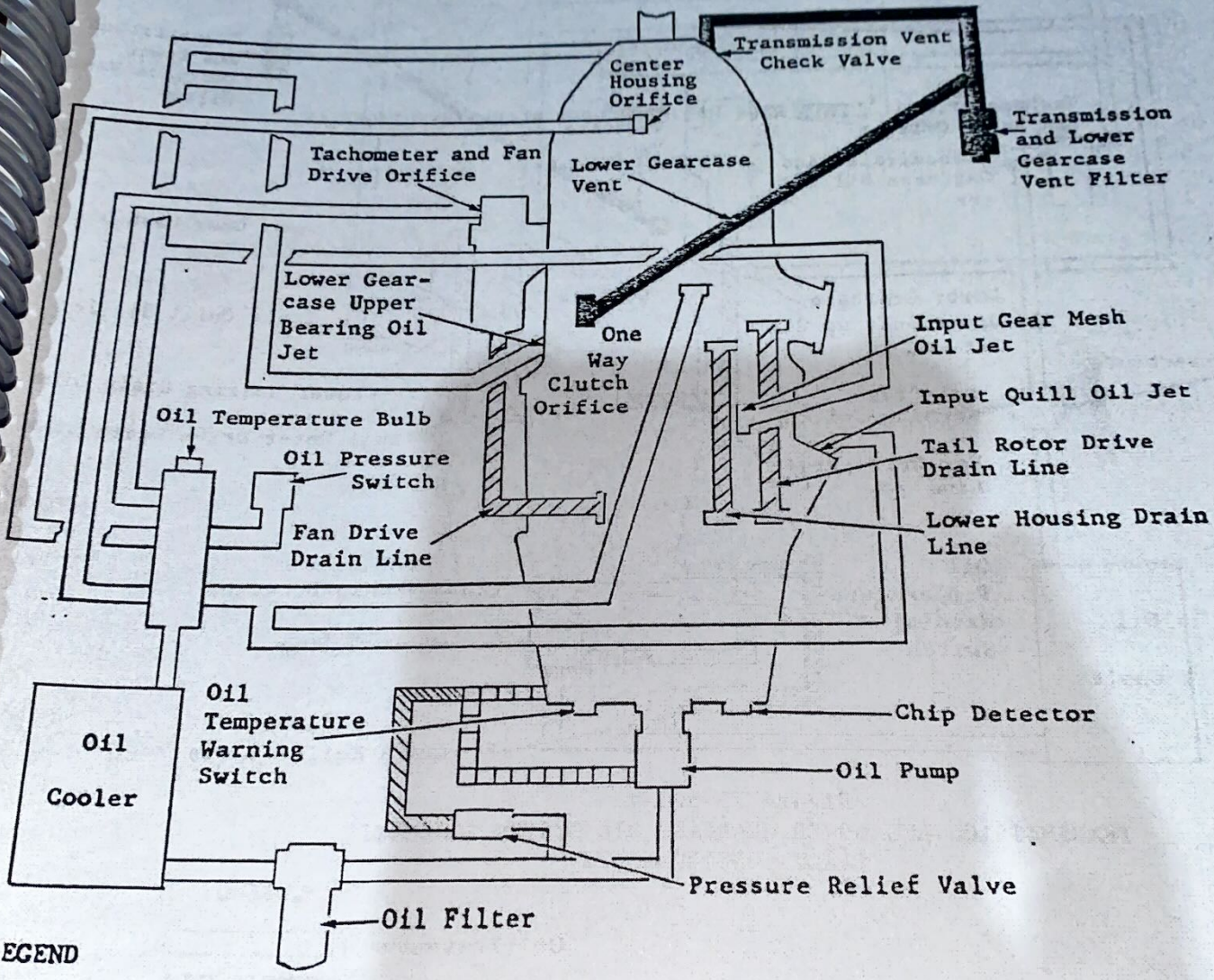
Bypass Oil

Oil Reservoir Return (Gravity)

Oil Pump Supply

Vent

Figure 73-560-6.
TRANSMISSION AND LOWER GEARCASE OIL SYSTEM SCHEMATIC
LATE CONFIGURATION



ENGINE COOLING SYSTEM

74-1-1 thru 74-40-41. Delete for UH12-J series.

75-560-1. ANTI ICE CONTROL SYSTEM.

The anti-ice control cable is actuated by the pilot to inject compressor discharge air into the compressor inlet in icing conditions. The system consists of a control quandrant; cable assembly; bracket; bellcrank and mount assembly; rod; terminals and spring.

a. Removal of the anti-ice control.

1. Remove the right hand seat cushion, seat belts and seat deck.
2. Remove auxiliary fuel pump inlet line and cover plate nut.
3. Remove gas producer N_1 controls (paragraph 75-560-2a).
4. Remove rudder pulley bracket assemblies from aft end of large cover plate and remove cover plate.
5. Remove the left hand access plate from the instrument pedestal tunnel. Disconnect the control cable clevis from the quadrant lever by removing the cotter pin, washer and clevis pin. Remove the clevis fitting and checknut from the cable assembly.
6. At the engine remove the cotter pin, washer and clevis pin from the cable terminal and bell crank. Remove the terminal and checknut from the cable assembly.
7. Remove the engine deck cable support.
8. Remove the locknuts from the cable housing at the forward and aft ends and at the engine deck support.
9. Remove the attaching clamps, and grommets and withdraw the cable assembly to the rear of the helicopter.

CAUTION

EXCESSIVE SHARP BENDING OF THE CABLE ASSEMBLY WILL INTRODUCE KINKS IN THE WIRE SHAFT, MAKING THE CABLE UNSUITABLE FOR CONTINUED SERVICE.

10. Remove the cotter pins, washers and clevis pins from the ends of the rod-terminal and spring assembly and remove the rod assembly.
11. Remove the safety wire, bolts and washers securing the mount and bellcrank assembly.

b. Installation of the anti-ice control.

Installation of the anti-ice control is the reverse order of removal.

75-560-2. ANTI-ICE CONTROL QUADRANT ASSEMBLY.

a. Removal of the quadrant assembly.

1. Remove the cover plates from the left and right hand sides of the instrument pedestal tunnel.
2. Remove the cotter pin, washer and clevis pin used to secure the forward end of the anti-ice cable to the quadrant lever.
3. Remove the nuts bolts and washers securing the quadrant to the support.
4. Lift the quadrant upward and out of the tunnel.

b. Installation of the anti-ice control quadrant assembly is the reverse order of removal.

75-560-3. RIGGING THE ANTI-ICE CONTROL.

With the anti-ice quadrant control lever in the closed position (aft) and engine anti-ice control arm closed, adjust the terminal, on the engine end of the cable, to compress the spring .09 ($\pm$ .03).

75-560-4. ENGINE CONTROLS.

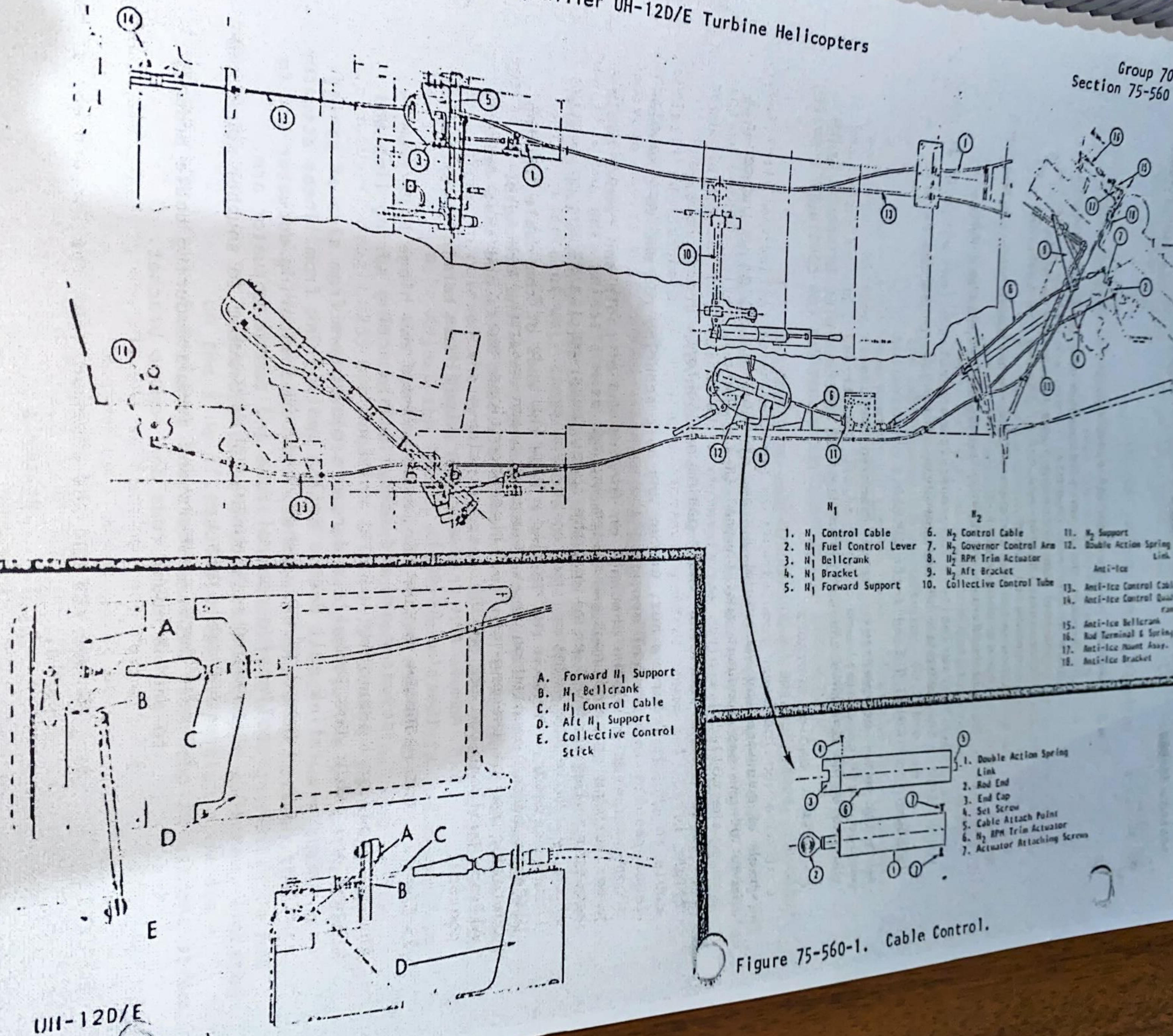
Control of engine power requirements is provided by the collective pitch lever, which is connected by mechanical linkage and flexible cables to the control lever of the gas producer fuel control (N_1). The twist grip, mounted on the end of the collective pitch lever, controls the position of the gas producer fuel control which has three basic positions; cutoff, ground idle, and flight idle. The power turbine governor lever (N_2), is connected by flexible cable to the collective pitch torque tube. Movement of the collective pitch lever results in a repositioning of the governor lever. This action provides droop compensation to prevent rpm variations as power changes are made. The power turbine governor control system incorporates a spring link and a linear actuator. The spring link allows the continued operation of the collective pitch system in the event of governor and/or control cable binding. The linear actuator, which is controlled electrically by a RPM trim INCRease DECRease switch mounted on the collective pitch control lever, regulates the operating rpm of the engine. Refer to Operations and Maintenance manual, Allison publications No. 10W2 for description and operation of engine fuel control.

75-560-5. GAS PRODUCER N_1 CONTROL (Figure 75-560-1).

The gas producer N_1 control includes a rod assembly, bellcrank, supports, bracket and cable assembly.

a. Removal of the gas producer N_1 control system.

1. Remove nut washer and bolt securing rod end to the fuel control lever.
2. Remove the nut washer and bolt securing the rod end to the bellcrank.
3. Loosen the locknuts at the aft end of the cable housing and slide cable from bracket.
4. Remove rod end and checknut from the forward end of the cable.



UH-12D/E
(Three Place Only)

Figure 75-560-1. Cable Control.

5. Remove the locknut from the forward end of the cable housing and remove the cable.
6. Remove the nuts, washers and bolts securing the rod ends of the rod assembly, to the arm on the collective stick and the bellcrank, and remove rod assembly.
7. Remove nut, washer and bolt securing the bellcrank assembly to the forward support.
8. Remove screws attaching supports on basic body engine deck and remove supports.
9. Loosen nuts on starter generator adapter and remove N_1 engine bracket.

b. Installation of the gas producer N_1 control is the reverse order of removal.

CAUTION

EXCESSIVE SHARP BENDING OF THE CABLE ASSEMBLY WILL INTRODUCE KINKS IN THE WIRE SHAFT, MAKING THE CABLE UNSUITABLE FOR CONTINUED SERVICE

75-560-6. POWER TURBINE N_2 CONTROL (Figure 75-560-1).

The power turbine N_2 control includes: Actuator arm, double acting spring link electric RPM trim actuator, cable assembly and brackets.

a. Removal of the power turbine N_2 control.

1. Remove nut, washer and bolt securing rod end to governor control arm.
2. Loosen checknut on forward end of cable and remove cable threaded end from actuator.
3. Remove the checknut and rod end from the aft end of the cable.
4. Remove the locknuts from the ends of the cable housing and remove the cable assembly from the brackets.
5. Remove the left hand seat, seat belts and seat deck. (Section 85).
6. Remove RPM trim actuator wires from terminal strip. (Section 83-560).
7. Remove cotter pin, nut, washers and hinge bolt from actuator arm and remove double acting spring link and actuator.
8. Cut lockwire and remove two screws from side of spring link pull double acting spring link from linear actuator.
9. Remove nuts, washers and bolts securing actuator arm to collective control tube and remove actuator arm.
10. Remove bolts securing cable bracket to snubber mount and remove cable bracket.
11. Remove nuts, washers and screws securing cable bracket to engine mount rods and remove bracket.

75-560-7. RIGGING ENGINE CONTROLS (CECO).

a. Rigging of gas producer fuel control.

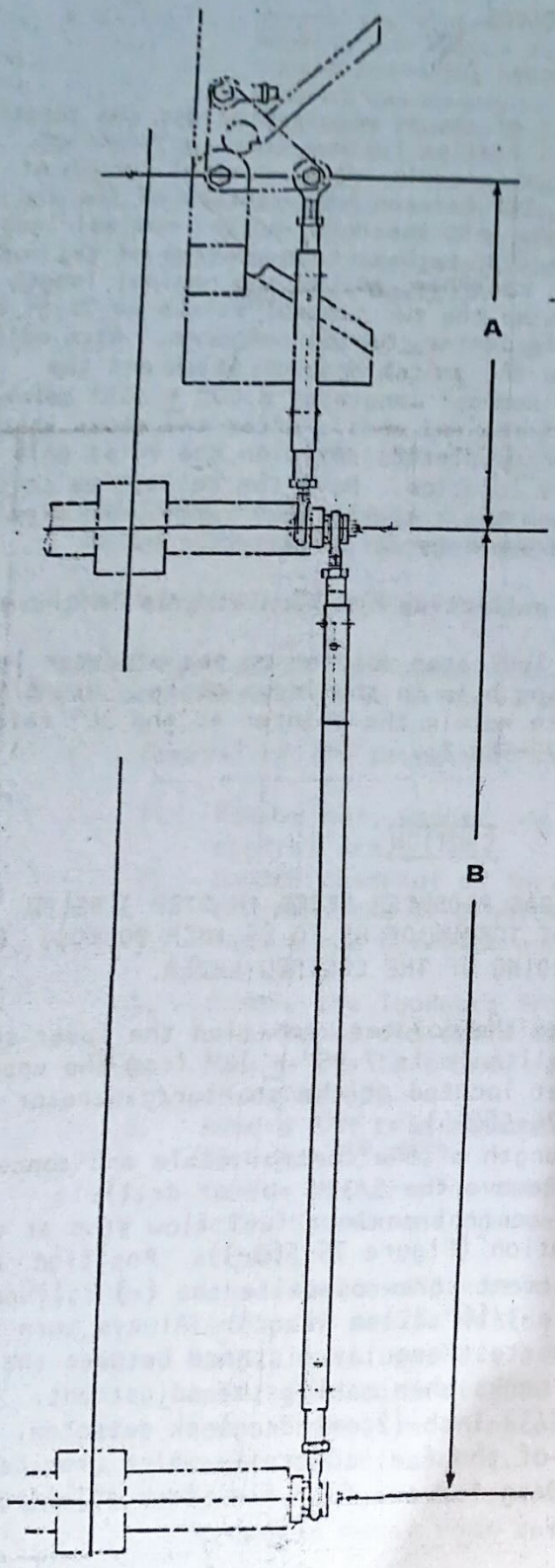
NOTE: Before the start of the N_1 rigging, adjust the length of the push-pull rods as follows (Figure 75-560-2). For single center controls adjust nominal length of rod to 8.00" ± .02" between hole centers of the rod ends. For single left controls, adjust nominal length of rod to 30" ± .03" between hole centers of the rod ends. For dual controls, adjust the nominal length of the rod between the two control sticks to 22.31 ± .03 between hole centers of the rod ends. Also adjust the rod between the center control stick and the bellcrank to a nominal length of 8.00" ± .03" between hole centers of the rod ends. After the above instructions have been completed, position the twist grip into the flight idle location. Move the collective control lever(s) through their operational range. No binding of the rod end bearings is permitted.

1. Set the prime collective stick twist grip in the ground idle position.
2. Align hole in indicator pointer on gas producer lever with the rigging hole in the index plate. Use a 5/32" rod or drill to retain the pointer at the 30° reference mark (Figure 75-560-3).

CAUTION

WHEN REPOSITIONING THE GAS PRODUCER LEVER IN STEP 3 BELOW, DO NOT EXCEED THE LEVER NUT TORQUE OF 65 TO 85 INCH POUNDS. OVER-TORQUING WILL CAUSE BINDING OF THE CONTROL LEVER.

3. Without moving the pointer, position the lever so the rod end uniball hole is 7.95" ± 12" from the upper face of the bracket located at the starter/generator attach pad (Figure 75-560-4).
4. Adjust the length of the control cable and connect to the lever. Remove the 5/32" rod or drill.
5. Set the fuel control maximum fuel flow stop at the 235 pph location (Figure 75-560-3). Position the line on the adjustment screw opposite the (-) calibration point using a 3/16" allen wrench. Always turn the screw the shortest angular distance between the (+) and the (-) marks when making the adjustment. Do not loosen the 3/32 inch (2 mm) draglock setscrew, (located on the side of the fuel control), which provides frictional drag for the fuel flow stop adjustment screw.



Shown in Ground Idle Position.

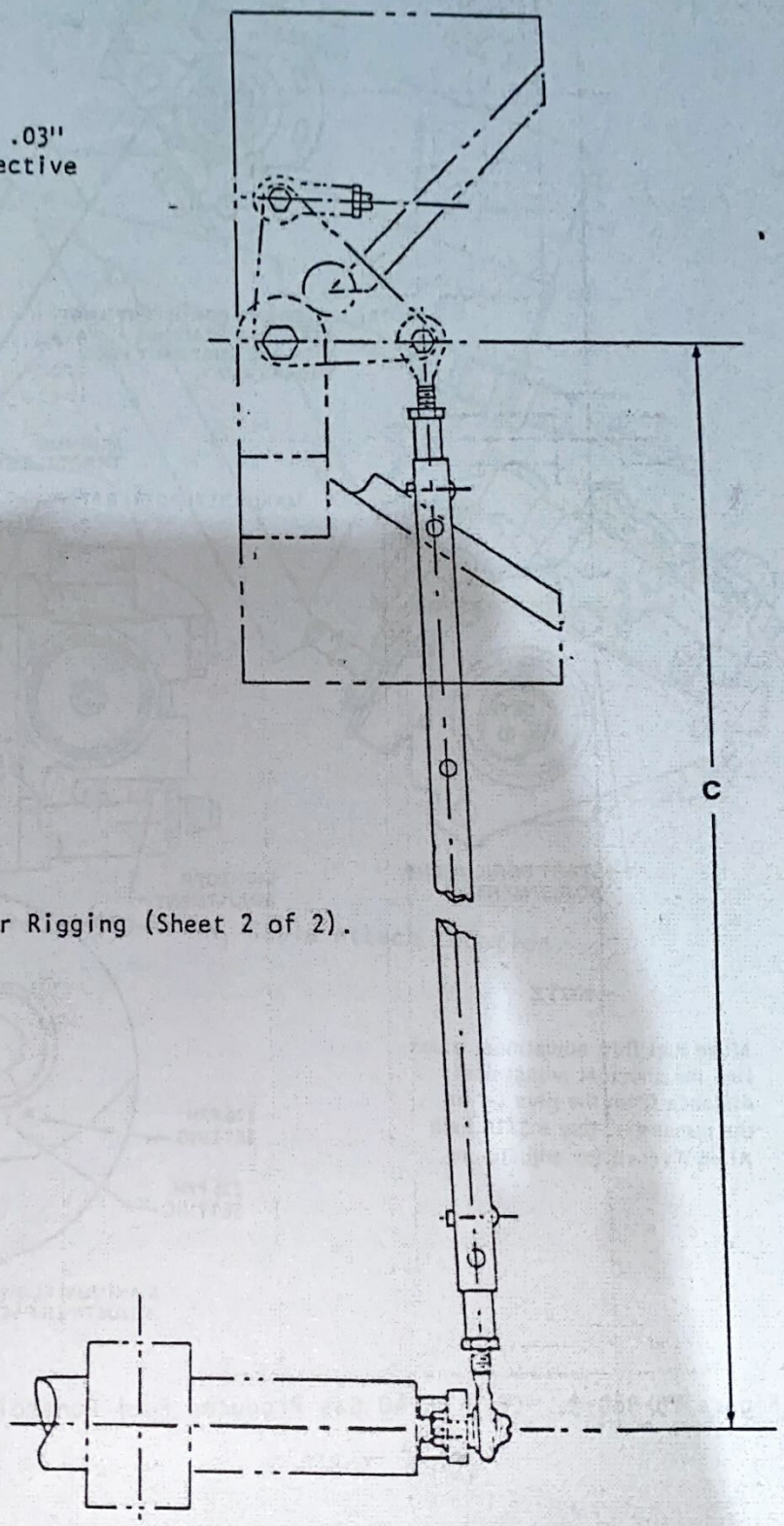
A - Nominal length, 8.00" ± .03" Single center collective installation or dual collective installation.

B - Nominal length 22.5" ± .03" dual collective installation only.

Figure 75-560-2. Gas Producer Rigging (Sheet 1 of 2).

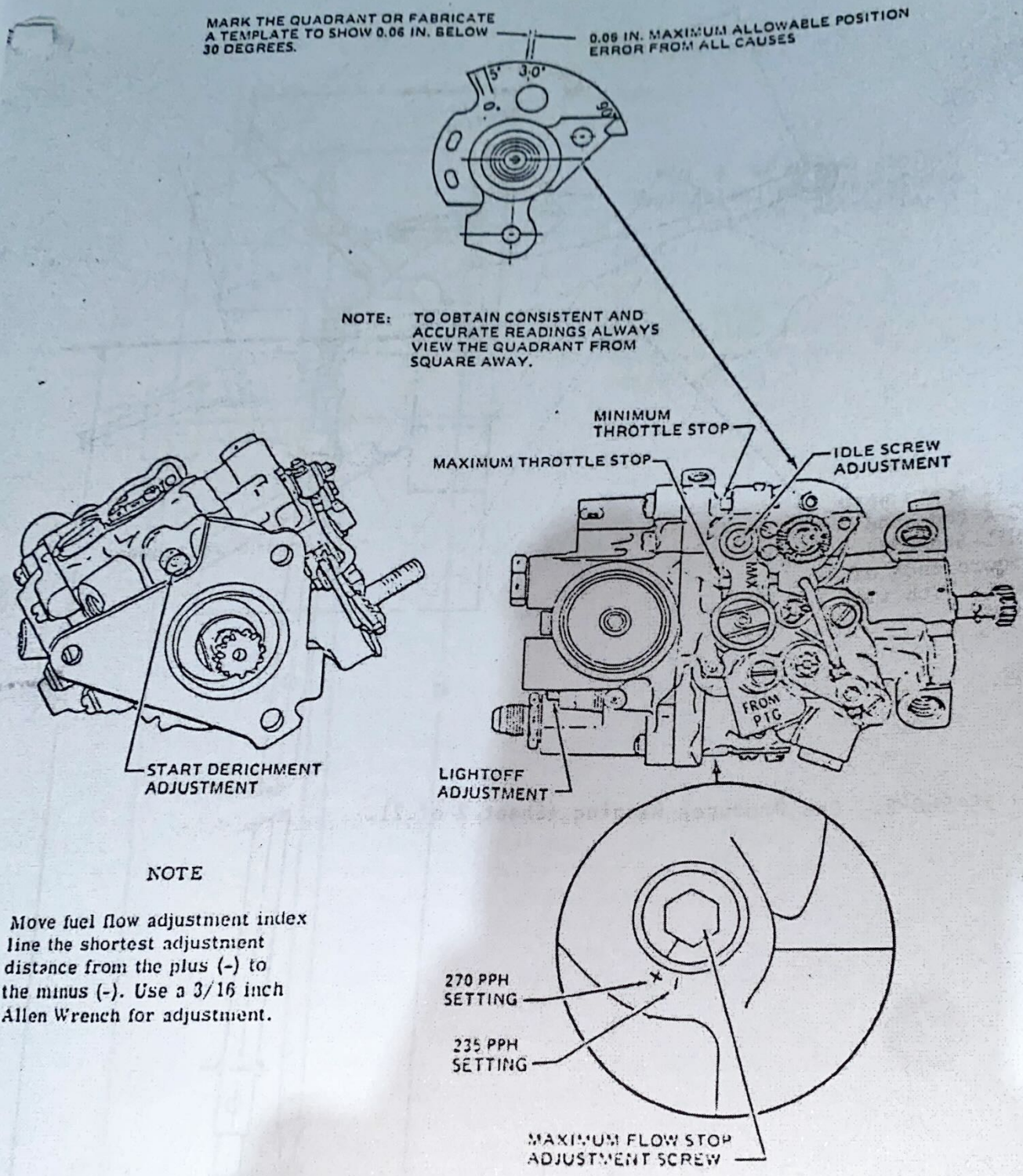
Shown in Ground
Idle Position.

C - Nominal length 30" ± .03"
single outboard collective
installation only.



75-560-2. Gas Producer Rigging (Sheet 2 of 2).

75-560-7



NOTE

Move fuel flow adjustment index line the shortest adjustment distance from the plus (-) to the minus (-). Use a 3/16 inch Allen Wrench for adjustment.

Figure 75-560-3. CECO MC-40 Gas Producer Fuel Control - Model 250-C20 Engine

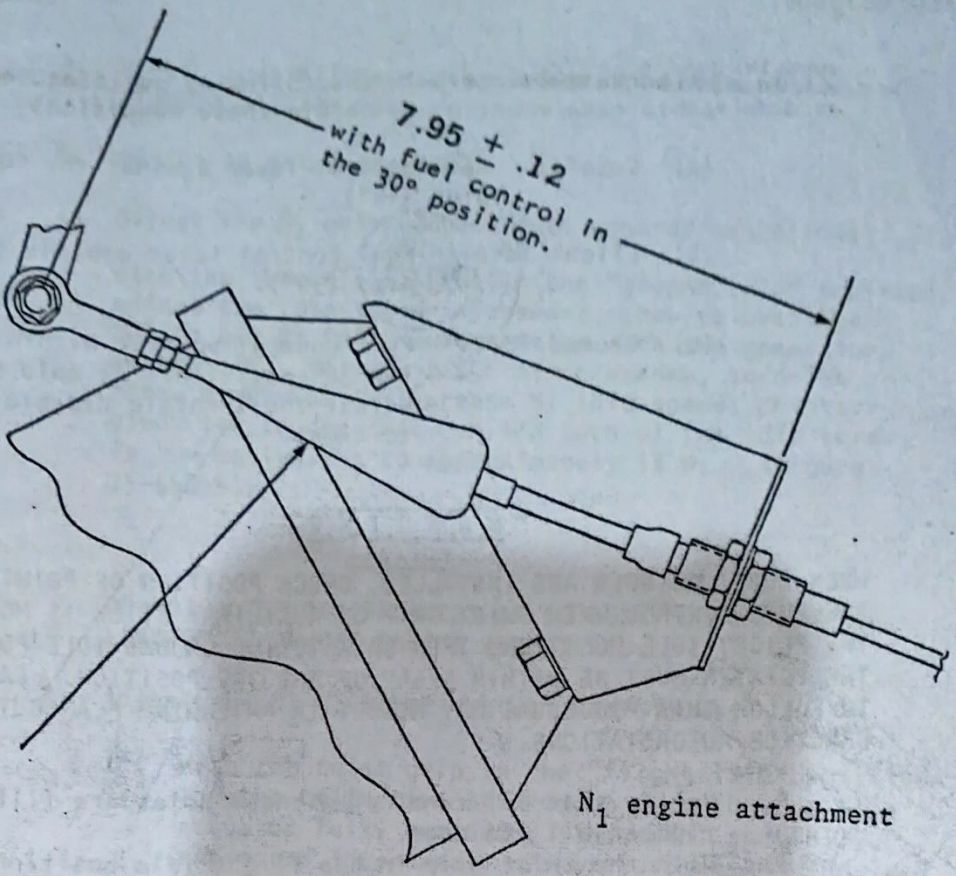


Figure 75-560-4. N_1 Cable Attach Location.

6. With the twist grip in the following position, adjust cable case mounting to obtain these conditions

(a) Cutoff: Fuel control lever against the CO stop (-2°).

(b) Flight idle: Fuel control lever against the MAX stop (90°).

(c) Ground idle: Fuel control pointer within 5/64" of the 30° position. At this time, adjust the throttle disable switch to close.

WARNING

WHEN DUAL CONTROLS ARE INSTALLED, CHECK POSITION OF POINTER ON THE FUEL CONTROL WHEN TWIST GRIP ON AUXILIARY STICK IS MOVED INTO THE FLIGHT IDLE POSITION, THEN BACK TO THE GROUND IDLE POSITION. THE POINTER MUST BE WITHIN 5/64" OF THE 30° POSITION. FAILURE TO FOLLOW THIS PROCEDURE MAY RESULT IN AN ENGINE FLAMEOUT DURING PRACTICE AUTOROTATIONS.

7. Verify that all terminal witness holes are filled and tighten all jam nuts.
8. With the twist grip in the flight idle position, raise-lower the collective stick to maximum and minimum positions. The gas producer fuel control arm shall remain against the maximum throttle stop and there shall be no binding of rod ends.

b. Rigging the power turbine N_2 control (CECO).

1. Set the governor lever pointer at 77° ± 1° on the index plate.
2. Center the threaded portion of the N_2 cable housing in the bracket attached to the engine support rods and tighten jam nuts.

CAUTION

WHEN REPOSITIONING THE GOVERNOR LEVER IN STEP 3 BELOW, DO NOT EXCEED THE LEVER NUT TORQUE OF 65 TO 85 INCH POUNDS. OVERTORQUING WILL CAUSE BINDING OF THE CONTROL LEVER.

3. With the collective stick full up and the rpm trim linear actuator fully extended, (increase position), adjust the N_2 control lever and the rod end to form an angle of 45° to 52° between the control lever and the cable assembly.

Check clearance of maximum stop screw. Minimum clearance is .100" between the stop screw and the control lever.

4. Verify that all terminal witness holes are filled and tighten all jam nuts.

c. Ground run adjustments (CECO).

1. Adjust the N_1 gas producer fuel control as follows:

With the throttle control in the "ground idle" position, adjust the idle speed adjustment screw to obtain a 62% to 65% N_1 idle speed setting with the generator switch off. Using a 5/32" allen wrench, turn the screw clockwise to increase N_1 idle speed, counter-clockwise to decrease. A 1/8 turn of the idle screw is the equivalent to approximately 1% N_1. (Figure 75-560-5).

CAUTION

DO NOT ALTER GAS PRODUCER LEVER POSITION OR CONTROL LINKAGE TO ADJUST ENGINE IDLE SPEED.

2. Adjust the N_2 governor control as follows:

(a) With the twist grip in the "flight idle" position and the collective stick down with the rpm trim actuator fully extended, (increase) and fully, retracted (decrease). Power turbine RPM should be within the following limits. Maximum 101.5% $\pm$ 0.5%, minimum 95% $\pm$ 0.5%.

(b) If the N_2 RPM is not within these limits, adjust the threaded portion of the cable casing in the N_2 cable support bracket to obtain correct RPM. If adjustment of the cable casing does not provide enough RPM change, readjust the governor lever or cable rod end to obtain correct RPM.

NOTE: One full rod end turn will change the RPM approximately 0.3%.

(c) Set the linear actuator to the full increase position, raise the collective to the full pitch position and adjust the maximum stop screw as close to the governor lever as possible but not less than .017 inch.

(d) Verify that all terminal witness holes are filled and tighten all jam nuts.

3. Check the operation of the anti-ice system as follows:

(a) Actuate anti-ice control cable and look for a TOT rise (approximately 10°C).

Group 70
Section 75-560

4. Troubleshooting engine controls.

For troubleshooting information, see Table 75-560-1.

75-560-8. RIGGING ENGINE CONTROLS (BENDIX) ELECTRIC N_2 TRIM. See Paragraph 75-560-14 for manual N_2 Trim Rigging Instructions.

a. Rigging of gas producer fuel control.

NOTE: Before the start of the N_1 rigging, adjust the length of the push-pull rods as follows (Figure 75-560-2). For single center controls adjust nominal length of rod to 8.00" ± .03" between hole centers of the rod ends. For single left controls, adjust nominal length of rod to 30" ± .03" between hole centers of the rod ends. For dual controls, adjust the nominal length of the rod between the two control sticks to 22.31 ± .03 between hole centers of the rod ends. Also adjust the rod between the center control stick and the bellcrank to a nominal length of 8.00" ± .03" between hole centers of the rod ends. After the above instructions have been completed, position the twist grip into the flight idle location. Move the collective control lever(s) through their operational range. No binding of the rod end bearings is permitted.

1. Set the prime collective stick twist grip in the ground idle position.
2. Set the pointer on the fuel control quadrant to the 30° position (Figure 75-560-5).

CAUTION

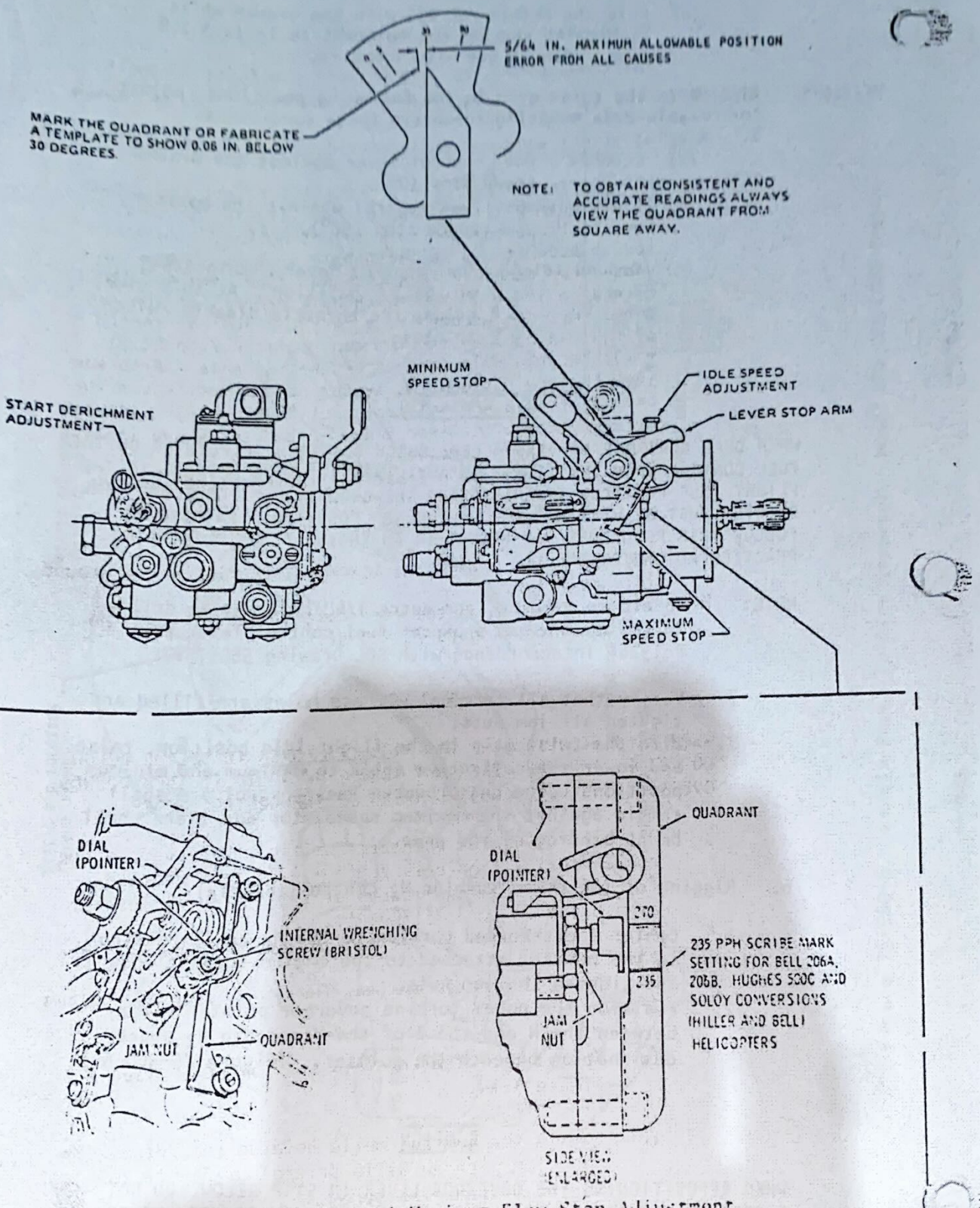
WHEN REPOSITIONING THE GAS PRODUCER LEVER IN STEP 3 BELOW, DO NOT EXCEED THE LEVER NUT TORQUE OF 40 TO 50 INCH POUNDS. OVERTORQUING WILL CAUSE BINDING OF THE CONTROL LEVER.

3. Without moving the pointer, position the lever so the rod end uniball hole is 7.95" ± .12" from the upper face of the bracket located at the starter/generator attach pad (Figure 75-560-4).
4. Adjust the length of the control cable to connect to the lever.
5. Set the fuel control maximum fuel flow stop as follows (Figure 75-560-5).

   (a) Remove the lockwire from the jam nut. (See Figure 3-14.)

   (b) Loosen the jam nut while holding the pointer in position with an S1116 Bristol wrench in the internal wrenching screw.

   (c) Turn the pointer with the Bristol wrench to the 235 scribe mark. Turn in a clockwise direction.



Bendix Fuel Control Maximum Flow Stop Adjustment.

Figure 75-560-5. Bendix Fuel Control Adjustments - Model 250-C20/C20B Engine.

(d) Hold the pointer at 235 with the wrench while tightening the jam nut to 20-25 lb in. (2.3-2.8 N.m). Secure nut with lockwire.

6. With the twist grip in the following positions, adjust cable case mounting to obtain these conditions:

(a) Cutoff: Fuel control lever against the minimum speed stop (0°).

(b) Flight idle: Fuel control against the maximum speed stop (90°).

(c) Ground idle: Fuel control lever within 5/64" of the 30° position. At this time, adjust the throttle disable switch to close.

WARNING

WHEN DUAL CONTROLS ARE INSTALLED, CHECK POSITION OF POINTER ON THE FUEL CONTROL WHEN TWIST GRIP ON AUXILIARY STICK IS MOVED INTO THE FLIGHT IDLE POSITION, THEN BACK TO THE GROUND IDLE POSITION. THE POINTER MUST BE WITHIN 5/64" OF THE 30° POSITION. FAILURE TO FOLLOW THIS PROCEDURE MAY RESULT IN AN ENGINE FLAME OUT DURING PRACTICE AUTOROTATION.

NOTE: To aid in rigging, and extra 1/4" hole may be drilled in the Bendix gas producer fuel control lever pin P-19261 in accordance with SCL Drawing 560-7517.

7. Verify that all terminal witness holes are filled and tighten all jam nuts.
8. With the twist grip in the flight idle position, raise and lower the collective stick to maximum and minimum positions. The gas producer fuel control arm shall remain against the maximum speed stop and there shall be no binding of rod ends.

b. Rigging of the power turbine N_2 control (Bendix).

1. Center the threaded portion of the N_2 cable housing in the bracket attached to the engine support rods and tighten the jam nuts.
2. Position the power turbine governor pointer midway between the N and the 2 of the "Increase N_2 speed" designation beneath the pointer. (Figure 75-560-6.)

CAUTION

WHEN REPOSITIONING THE GOVERNOR LEVER IN STEP BELOW, DO NOT EXCEED THE LEVER NUT TORQUE OF 40 TO 50 INCH POUNDS. OVER-TORQUING WILL CAUSE BINDING OF THE CONTROL LEVER.

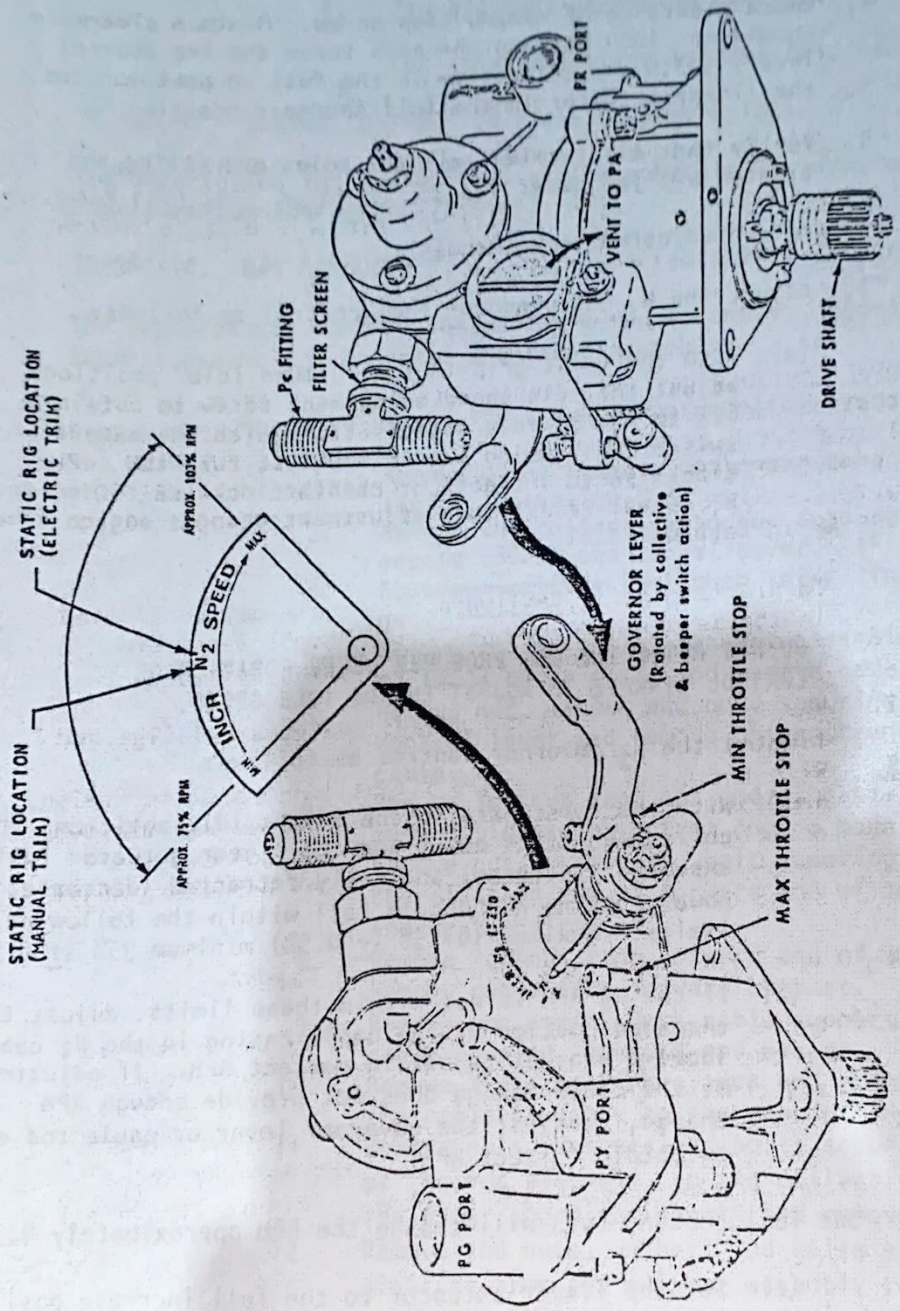


Figure 75-560-6. Bendix Power Turbine Governor - Model 250-C20/C20B Engine.

3. Position the collective stick down, beep the linear actuator down and close the throttle. Without moving the pointer, adjust the N_2 control lever and rod end to form an angle of approximately 70°.

4. Check clearance of maximu stop screw. Minimum clearance should be .100" between the stop screw and the control lever. With the collective in the full up position and the linear actuator in the full increase position.

5. Verify that all terminal witness holes are filled and tighten all jam nuts.

c. Ground run adjustments. (Bendix).

1. Adjust the N_1 gas producer fuel control as follows:

(a) With the twist grip in the "ground idle" position, adjust the idle speed adjustment screw to obtain a 62% to 65% N_1 idle speed setting with the generator switch off. Using wrench 6798292, turn the screw clockwise to increase or counterclockwise to decrease N_1 speed. A 1/8 turn adjustment changes engine speed approximately 5%.

CAUTION

DO NOT ALTER THE GAS PRODUCER LEVER POSITION OR CONTROL LINKAGE TO ADJUST ENGINE IDLE SPEED.

2. Adjust the N_2 governor control as follows:

(a) With the twist grip in the flight idle position, the collective stick down, and the linear actuator fully extended (increase) and fully retracted (decrease), power turbine RPM should fall within the following limits: Maximum 101.5% ($\pm$ 0.5%) minimum 95% ($\pm$ 0.5%).

(b) If the N_2 RPM is not within these limits, adjust the threaded portion of the cable casing in the N_2 cable support bracket to obtain correct RPM. If adjustment of the cable casing does not provide enough RPM change, readjust the governor lever or cable rod end to obtain correct RPM.

NOTE: One full rod end turn will change the RPM approximately 0.3%.

(c) Set the linear actuator to the full increase position, raise the collective to the full pitch position and adjust the maximum stop screw as close to the governor lever as possible but not less than .017 inch.

(d) Verify that all terminal witness holes are filled and tighten all jam nuts.

3. Check the operation of the anti-ice system as follows

(a) Actuate anti-ice control cable and look for a TOT rise (approximately 10°C).

4. Troubleshooting engine controls.

For troubleshooting information, see Table 75-560-1.

75-560-9. ENGINE CONTROLS (4 Place Configuration).

The description for the 4 Place engine controls is identical to the 3 place configuration (paragraph 75-560-7, A).

75-560-10. GAS PRODUCER N_1 (4 Place Configuration) (Figure 75-560-1).

The gas producer control includes: a rod assembly; coordinating arms; support assembly; brackets and cable assembly.

a. Removal of the gas producer control system:

1. Remove pilot's seat, passenger seat and seat deck (Refer to section 85).
2. Remove the collective torque tube cover, cabin floor access covers and tunnel cover. (Figure 85-101-2).
3. Remove auxiliary fuel pump inlet line and cover plate nut.
4. Remove rudder pulley bracket assemblies from aft end of large cover plate and remove cover plate.
5. Remove nut, washer and bolt securing rod end to fuel control lever and remove checknut and rod end from cable.
6. Remove locknut from aft end of cable housing and remove cable assembly from engine mount bracket.
7. Remove nut, washer and bolt securing rod end to upper coordinating arm at forward end of cable and remove checknut and rod end.
8. Remove locknut from forward end of cable housing and remove cable from forward bracket.
9. Remove the engine deck cable support and remove the cable housing locknuts and washer.
10. Remove the attaching clamps and grommets and withdraw the cable assembly to the rear of the helicopter.
11. Remove nuts, washers and bolts securing the rod ends, of the rod assembly, to the collective stick arm and the lower coordinating arm and remove the rod assembly.
12. Remove the nuts, washers and bolts securing the coordinating arms and support assembly to the basic body and remove the support assembly.

b. Installation of the gas producer N_1 control system is the reverse order of removal.

Group 70
Section 75-560

CAUTION

EXCESSIVE SHARP BENDING OF THE CABLE ASSEMBLY WILL INTRODUCE KINKS IN THE WIRE SHAFT, MAKING THE CABLE UNSUITABLE FOR CONTINUED SERVICE.

75-560-11. POWER TURBINE N_2 CONTROL (4 Place Configuration).

The power turbine control system for the 4 Place configuration is identical to the 3 Place configuration (paragraph 75-560-6).

NOTE: Manual trim not applicable on 4 Place helicopters.

75-560-12. ANTI-ICE CONTROL (4 Place Configuration).

The anti-ice control system in the 4 Place is essentially the same as the 3 Place except as follows: The control cable is longer due to the cabin extension.

a. The removal is accomplished as follows:

1. Remove pilots seat, passenger seat and seat deck and tunnel cover (Refer to Section 85). Then follow instructions in paragraph 75-560-1 a., steps 2, 5, 6, 7, 8, 9, 10, 11 and caution note.

b. Installation of the anti-ice control is the reverse order of removal.

75-560-13. RIGGING OF ENGINE CONTROLS (4 Place Configuration).

a. Rigging the gas producer N_1 controls. (CECO and BENDIX).

NOTE: Before the start of the N_1 rigging procedure, adjust the control rod assembly, which connects the control arm of the collective stick to the lower coordinating arm, to obtain a dimension of 8.31± .03 inches from the forward end of the cable housing bracket to the center of the bolt hole on the upper coordinating arm.

The remainder of the rigging procedures is the same as for the 3 Place configuration beginning with step a., paragraph 75-560-7 3 Place configuration (CECO) or beginning with step 2., paragraph 75-560-8 3 Place configuration (Bendix).

b. Rigging the anti-ice control is exactly the same as the 3 Place configuration. See paragraph 75-560-3 3 Place configuration.

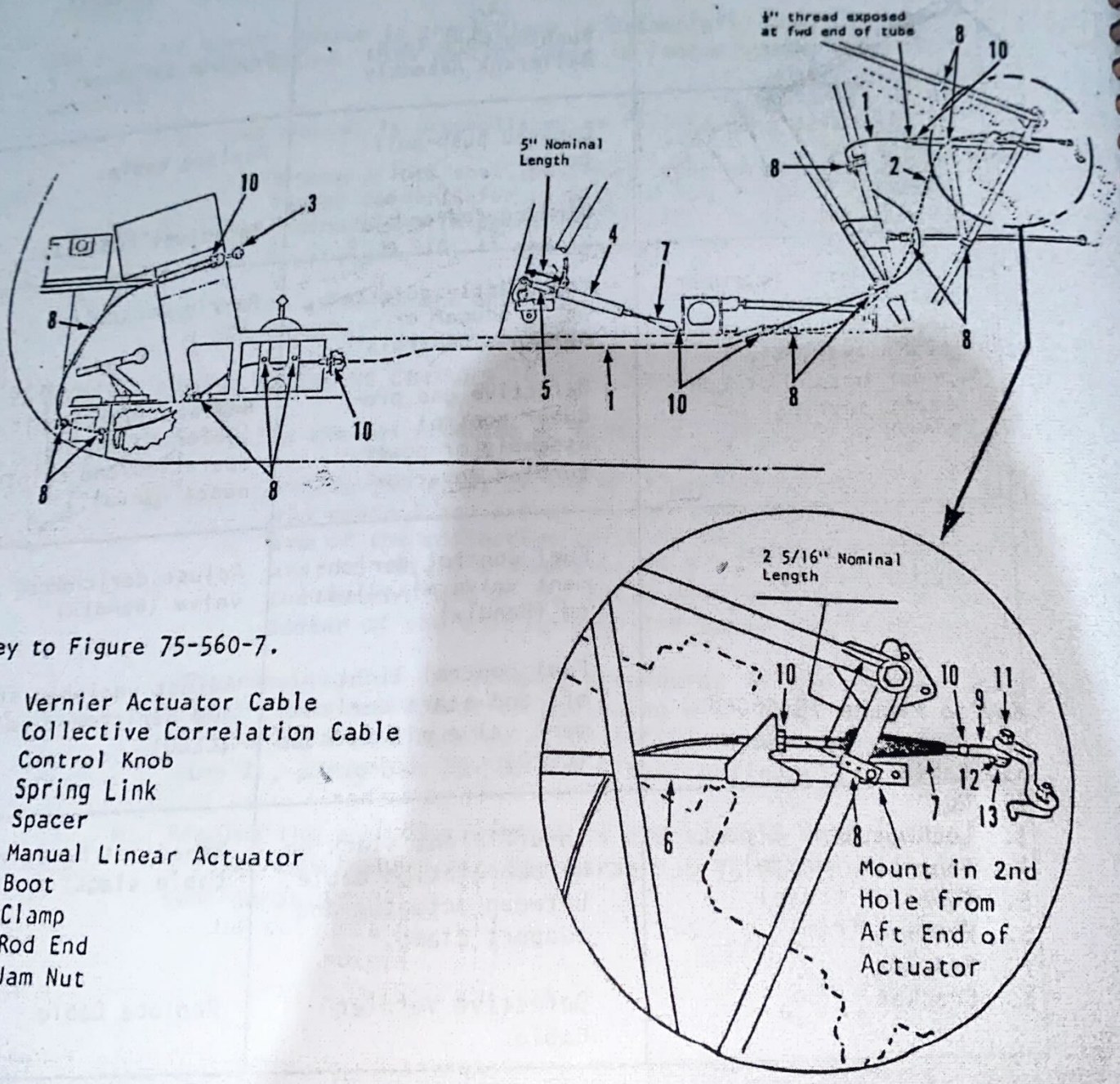
TABLE 75-560-1

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Control movement lags behind twist grip movement.	Worn rod ends, worn bolts	Replace worn parts
	Internal parts worn in collective control stick	Replace worn parts
	Bushing worn in N_1 Bellcrank Assembly	Replace bushings
Stiff twist grip operation	Damaged push-pull cable	Replace cable.
	Binding rod ends	Re-adjust rod ends
Low power; improper idling speed; improper acceleration; variable power output at constant setting	Incorrectly adjusted gas producer or governor controls	Re-rig controls
	Defective gas producer control assembly or power turbine governor	Replace faulty unit (Refer to engine operation and maintenance manual.)
Stagnated or hot engine starts	Fuel control derichment valve misadjusted (Bendix)	Adjust derichment valve (Bendix)
	Fuel control light off and start derichment valve misadjusted (CECO)	Adjust variable start and derichment control (CECO)
Control Knob Binds, not allowing full actuator travel (Manual Trim)	Insufficient slack on N_2 correlation cable, between actuator and support clamp.	Re-adjust N_2 Correlation cable slack.
	Defective Vernier Cable	Replace Cable

Group 70
Section 75-560

75-560-14. 3 PLACE ONLY. MANUAL TRIM POWER TURBINE N_2 CONTROL (Figure 75-560-7 and 75-560-8).

The manual N_2 trim system is comprised of a vernier actuator cable, manual linear actuator, collective correlation cable, spring link, and attaching hardware. N_2 RPM is trimmed by turning the vernier control knob which moves a piston contained inside the linear actuator. Turning the vernier knob clockwise increases N_2 RPM, while turning the knob counter-clockwise decreases N_2 RPM. Connected to the piston in the linear actuator is the bracket which mounts the collective correlation cable to the linear actuator. The collective correlation cable transmits collective control stick movements and linear actuator piston movements to the governor. This system can only be used with engines equipped with Bendix fuel controls.

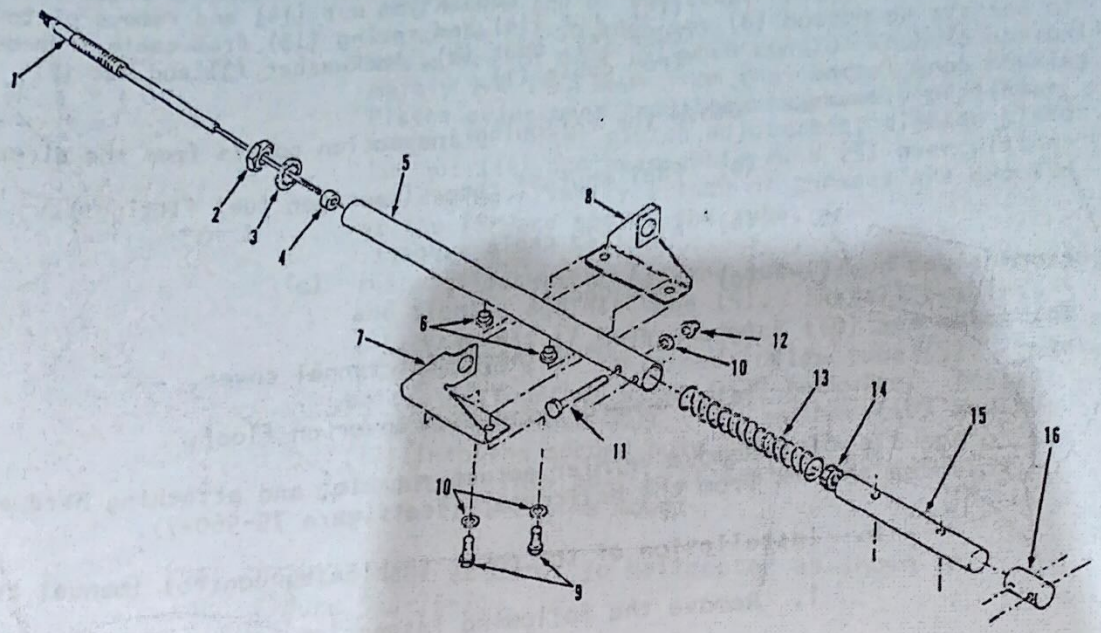


Key to Figure 75-560-7.

1. Vernier Actuator Cable
2. Collective Correlation Cable
3. Control Knob
4. Spring Link
5. Spacer
6. Manual Linear Actuator
7. Boot
8. Clamp
9. Rod End
0. Jam Nut

a. Removal of the power turbine N_2 control (manual trim).

1. Remove nut, washer and bolt securing rod end to governor control arm. Remove rod end and jam nut from collective correlation cable.
2. Loosen lock nut securing N_2 correlation cable to the spring link. Remove rod end, spacer, and spring link from the collective jackshaft.
3. Remove silicone boots from both ends of N_2 correlation cable. Remove cable jam nuts on both ends of the N_2 correlation cable and remove control cable from aircraft.



Key to Figure 75-560-8.

1. Cable
2. Nut
3. Lockwasher
4. Boot
5. Tube
6. Bushing
7. Bracket
8. Bracket
9. Bolt
10. Washer
11. Bolt
12. Nut
13. Spring
14. Piston Jam Nut
15. Piston
16. Plug

4. Remove vernier cable from manual linear actuator as follows: (See Figure 75-560-8)

   (a) Remove linear actuator from engine mounts.

   (b) Remove bolts (9), washers (10), cable support brackets (7 & 8), and bushings (6) from the linear actuator.

   (c) Remove plug (16) from the linear actuator. Loosen nut (2) and slide nut and lockwasher down cable (1). Unscrew tube (5) and slide down cable (1). Loosen jam nut (14) and remove piston (15), nut (14) and spring (13) from cable. Remove tube (5), boot (4), lockwasher (3) and nut (2) from cable (1).

5. Remove the following inspection covers from the aircraft:

   (a) Fuel shutoff cover (cap open fuel fittings).

   (b) 61401-29 cable support.

   (c) Seat decks.

   (d) Left hand instrument tunnel cover.

   (e) Forward inspection cover on floor.

6. Remove vernier actuator cable, and attaching hardware from the helicopter (see figure 75-560-7).

b. Installation of the power turbine N_2 control (manual trim).

1. Remove the following inspection covers from the aircraft:

   (a) Fuel shutoff cover (cap open fuel fittings).

   (b) 61401-29 cable support.

   (c) Seat decks.

   (d) Left hand instrument tunnel cover.

   (e) Forward inspection cover on floor.

2. Install vernier actuator cable and attaching hardware into the helicopter (see Figure 75-560-7).

3. Attach linear actuator to the vernier actuator cable as follows (see figure 75-560-8).

   (a) Install nut (2) and lockwasher (3) onto cable (1) past cable mounting threads so the nut and lockwasher can be moved down the cable. Thread tube (5) onto cable (1) past cable housing threads so that the end of the cable is exposed from the aft end of the tube.

   (b) Install small boot (4), spring (13), nut (14) and piston onto cable. Thread tube (5) onto cable housing threads leaving ½ inch of threads exposed at forward end of the tube. Adjust piston (15) on cable (1) so bushings (6) bottom on aft end of the slots in tube (5) when control knob is approximately 1/8 inch away from the control knob housing. Piston adjustment requires disassembly of linear actuator. After piston adjustment, tighten piston jam nut (14) and reassemble tube (5) over piston and spring. Verify ½ inch of threads are exposed at the forward end of the tube.

   (c) Install lockwasher (3) and nut (2) on cable housing and tighten against tube (5). Install bushings (6), brackets (7 & 8), washers (10) and bolts (9) onto piston (15) contained inside tube (5). Safety bolts (9) together with .032" lockwire. Install plug (16). Place bolt (11), washer (10) and nut (12) into the second hole from the aft end of the actuator. This bolt will fasten the actuator to the left engine mount.

4. Mount linear actuator to helicopter as shown in Figure 560-75-7.

5. Route and connect N_2 collective correlation cable to the linear actuator as shown in Figure 75-560-7. Install boots on both ends of collective cable. Install nut and rod end onto the aft end of the control cable and attach rod end to governor control lever. Adjust linear actuator to give best alignment possible with the governor lever, while maintaining clearance between control cable boot and engine mount.

6. Install rod end, spacer, and spring link to the collective jackshaft and N_2 cable as shown in Figure 75-560-7.

CAUTION

DURING INSTALLATION OF N_2 COLLECTIVE CORRELATION CABLE IN STEP 5 BELOW, PROVIDE SUFFICIENT SLACK BETWEEN LINEAR ACTUATOR AND ATTACHING CLAMP ON FUEL LINE TO ALLOW FULL ACTUATOR TRAVEL.

Group 70
Section 75-560

7. Install the following inspection covers on the aircraft:

   (a) Fuel shutoff cover.

   (b) 61401-29 Cable support.

   (c) Seat decks.

   (d) Left hand instrument tunnel cover.

   (e) Forward inspection cover on floor.

8. Check rigging of N_1 control system in accordance with paragraph 75-560-8.

9. Purge fuel system in accordance with D.D.A. 250-C20/C20B Operation and Maintenance Manual and D.D.A. Commercial Service Letter No. 1081.

c. Rig the power turbine governor statically as follows:

1. Position the threaded portion of the N_2 correlation cable midway in the N_2 cable supports on the lateral snubber mount and on the linear actuator.

2. Adjust nominal length between spring link and the collective jackshaft to 5". (See figure 75-560-7). Position drain holes on spring link down (if provided).

3. Position the power turbine governor pointer on the "N" of the "Increase N_2 Speed" designation beneath the pointer. (See Figure 75-560-6).

CAUTION

WHEN REPOSITIONING THE GOVERNOR LEVER IN STEP 4 BELOW, DO NOT EXCEED THE LEVER NUT TORQUE OF 40-50 INCH POUNDS. OVERTORQUING WILL CAUSE BINDING OF THE CONTROL LEVER.

4. Position the collective stick down, turn the control knob of the linear actuator out (counter clockwise) to the full decrease position and close the throttle. Without moving the pointer, adjust the N_2 control lever and rod end to form an angle of approximately 110°.

5. Check clearance of maximum stop screw. Minimum clearance should be .100" between the stop screw and the control lever with the collective stick full up and the linear actuator control knob turned clockwise (full increase position).

6. Verify that all terminal witness holes are filled and tighten all jam nuts.

d. Ground run adjustments, manual governor control.

1. With the throttle twist grip in full open position, (flight idle), adjust the N_2 operating range to the following limits:

Maximum:	101.5%
Minimum:	95%

RPM adjustments can be accomplished by moving the N_2 collective correlation cable in the support bracket of the linear actuator. If adjustment of the cable casing does not provide enough RPM change, readjust the governor lever or cable rod end to obtain correct RPM. Tighten all jam nuts on the N_2 correlation cable.

NOTE

One full rod end turn will change the RPM approximately 0.3%.

2. Turn linear actuator control knob to the full increase position (clockwise direction), raise the collective to the full pitch position and adjust the maximum stop screw as close to the governor lever as possible but not less than .017 inch.

TURBINE ENGINE AIR INDUCTION AND EXHAUST SYSTEMS

TURBINE ENGINE AIR INDUCTION AND EXHAUST SYSTEMS. (Figure 76-560-1)

76-560-1. The air induction system includes an inlet duct and screen assembly with alternate air doors, a coupling assembly and a duct assembly. The exhaust system includes left and right exhaust ejectors that are clamped to the engine exhaust collector.

a. Removal of the induction system.
   1. Remove the springs from the alternate air doors.
   2. Release the clamps securing the coupling assembly.
   3. Remove the nuts, washers, screws and clamps that secure the inlet duct and screen assembly to the engine mounts and remove the duct.
   4. Remove the nuts, washers and bolts securing the duct to the engine compressor and remove the duct.

CAUTION: AS SOON AS POSSIBLE DURING THE REMOVAL OF THE AIR INDUCTION SYSTEM, COVER THE INLET TO THE ENGINE COMPRESSOR TO PREVENT ANY FOREIGN OBJECTS FROM ENTERING THE COMPRESSOR.

b. Installation of the induction system is the reverse order of removal.

NOTE: Adjust alternate air door spring tension to 2.25 to 2.5 lbs. Safety through middle of spring with tie-cord.

c. Removal of the exhaust ejectors (Figure 76-560-1).
   1. Loosen the attaching clamps and remove ejectors.

CAUTION: COVER THE EXHAUST OPENINGS AFTER REMOVAL OF THE EJECTORS.

d. Installation of the exhaust ejectors is the reverse of removal.

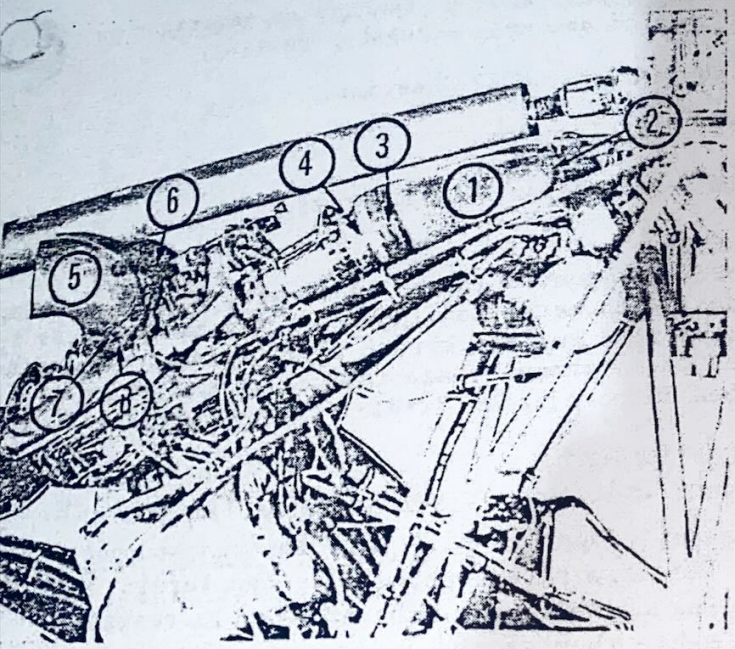


Figure 76-560-1. Turbine Engine and Air Induction and Exhaust System.

1. Inlet Duct and Screen Assembly
2. Alternate Air Doors
3. Coupling Assembly
4. Duct Assembly
5. Right Exhaust Stack
6. Left Exhaust Stack
7. Exhaust Clamps (Both Sides)
8. Engine Exhaust Collector

81-1-1. INSTRUMENTS

81-1-2 through 81-20-61. Remains the same for UH12-J series.

81-30-1. POWER PLANT INSTRUMENTS

81-30-2. DESCRIPTION. All turbine engine instruments are located in the instrument panel. The power plant instruments consist of the N_R-N_2 dual tachometer, N_1 tachometer, turbine outlet temperature indicator, engine gauge unit, engine torque pressure gauge and a voltameter. The instruments are mounted in the instrument panel in the location shown in figures 81-1-1 and 81-1-2. (Revised)

81-31-1. Remains the same for UH12-J series.

81-31-2. DESCRIPTION. The dual tachometer is mounted in the upper left-hand area of the instrument panel. The dual tachometer indicates the main rotor and N_2 rpm by means of two separate concentric scales with an indicating hand for each. The main rotor and N_2 tachometer systems are independent of each other in operation. The tachometer generators generate current in varying amounts proportional to the speed at which they are driven. The tachometer generators are connected by wiring cables to the dual tachometer at the instrument panel. Each indicating hand of the dual tachometer provides an indication proportional to the current generated by the associated tachometer generator. Refer to section 83 for electrical wiring data. The N_2 tachometer generator is mounted on the forward left side of the engine gearbox housing.

81-31-3 through 81-31-40. Remains the same for UH12-J series.

81-32-1 through 81-34-13. Delete for UH12-J series.

TABLES 81-1-V, 81-1-VI, and 81-1-VII. Delete for UH12-J series.

81-560-1. GAS PRODUCER, N_1, TACHOMETER

The gas producer N_1 tachometer is mounted in the upper area of the instrument panel to the right of the dual tachometer and indicates the gas producer rpm. The tachometer generator is mounted on the forward right side of the engine gearbox and the operation of the tachometer and tachometer generator is exactly the same as described in paragraphs 81-31-2 through 81-31-40.

81-560-2. TURBINE OUTLET TEMPERATURE INDICATOR

The turbine outlet temperature indicator is mounted directly below the N_1 tachometer indicator in the instrument panel. This instrument operates as a resistance thermometer. The temperature changes in the turbine are transfered through, the engine thermocouple, the adjustable resister spool, the aircraft thermocouple then to the indicator. The thermocouple harness is made from alumel, chromel thermocouple wire and the total resistance from the engine to the instrument is, 8.0 (± .01) OHMS.

a. Troubleshooting T.O.T. indicator. See Table 81-560-1.

b. Removal of T.O.T. indicator. Refer to paragraph 81-1-10.

c. Installation of T.O.T. indicator. Refer to paragraph 81-1-11.

d. Calibration of T.O.T. Indicator System. Refer to Paragraph 81-560-2A.

81-560-2A. T.O.T. SYSTEM CALIBRATION

Turbine outlet temp. indicating system should be calibrated as follows:

1. Adjust thermocouple resistance as follows:
   A. Make sure that all connections are clean and tight (the thermocouple lead spool is mounted on the right turbine engine mount).
   B. With at least one thermocouple lead disconnected from the temperature indicator, calibrate the system lead resistance to 8 ohms (± .01), with a Barfield turbine temperature indicating system test-set, type 23126, or equivalent.
   C. Reconnect lead to T.O.T. indicator, replace cover on lead spool and safety cover on lead spool with .020 lockwire.

2. Indicator Test
   A. Make certain that indicator to be tested has remained in same temperature environment long enough to have normalized to ambient at which testing is to be accomplished.
   B. Disconnect at least one thermocouple lead from temperature indicator and connect testing system described in 1B. Adjust range with screw on back of indicator.
   C. Compare readings of indicator with limits below.

0° ± 40°	750° ± 10°
200° ± 30°	800° ± 5°
400° ± 25°	900° ± 10°
600° ± 20°	1000° ± 20°
700° ± 15°	

   D. Connect lead wires to T.O.T. Indicator.

TABLE 81-560-1

TURBINE OUTLET TEMPERATURE INDICATOR

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Needle fails to respond	Loose Connection	Check thermocouple connections
	Defective indicator	Replace indicator
	Open in thermocouple lead	Replace lead
High or low reading	Lead not calibrated	Calibrate lead
	Indicator not adjusted	Adjust indicator
	Defective indicator	Replace indicator

81-560-3. ENGINE TORQUE PRESSURE GAUGE

The engine torque pressure gauge indicates the power being delivered by the engine and is mounted to the right of the N_1 tachometer indicator in the instrument panel. The torque gauge is activated by oil pressure from the engine. A special port is identified on the forward left side of the engine gearbox housing and is connected to the gauge through the instrument lines in the helicopter.

a. Troubleshooting the engine torque pressure gage. (See Table 81-560-1)

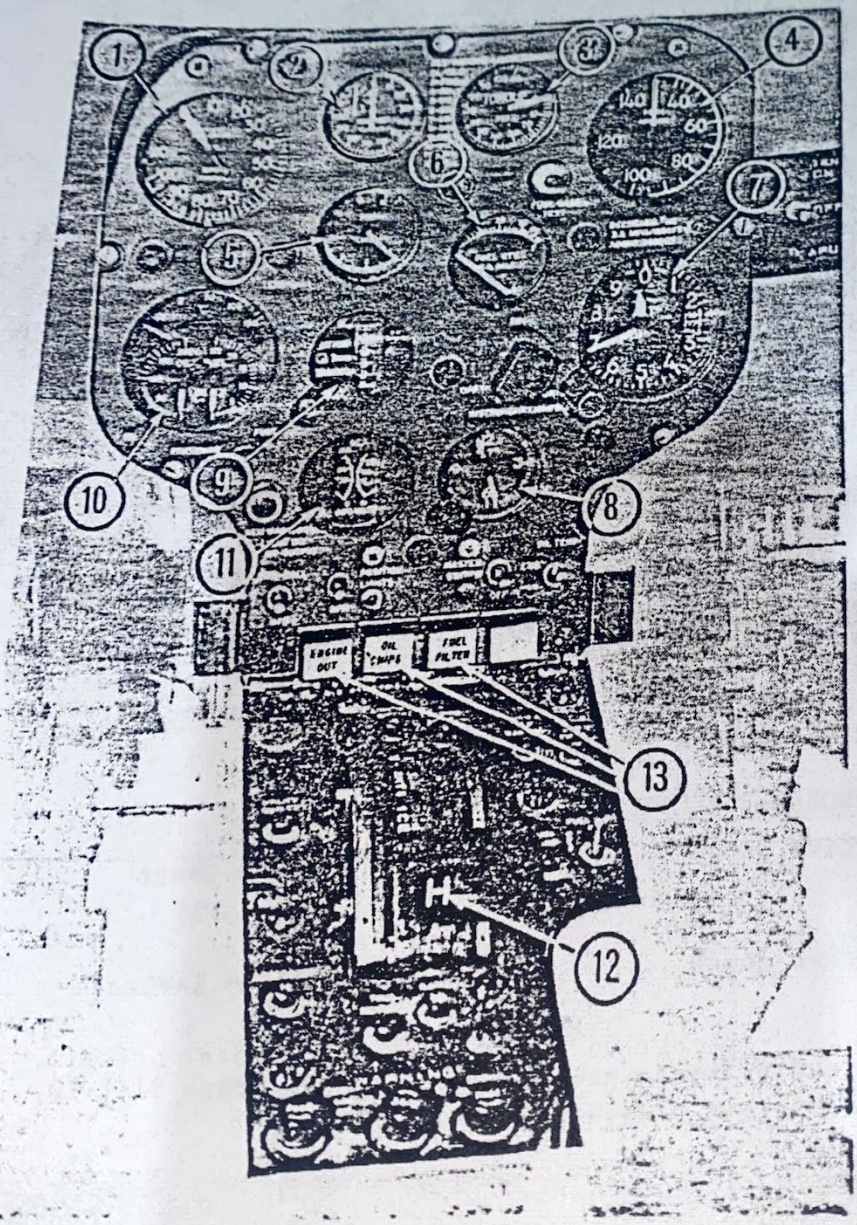
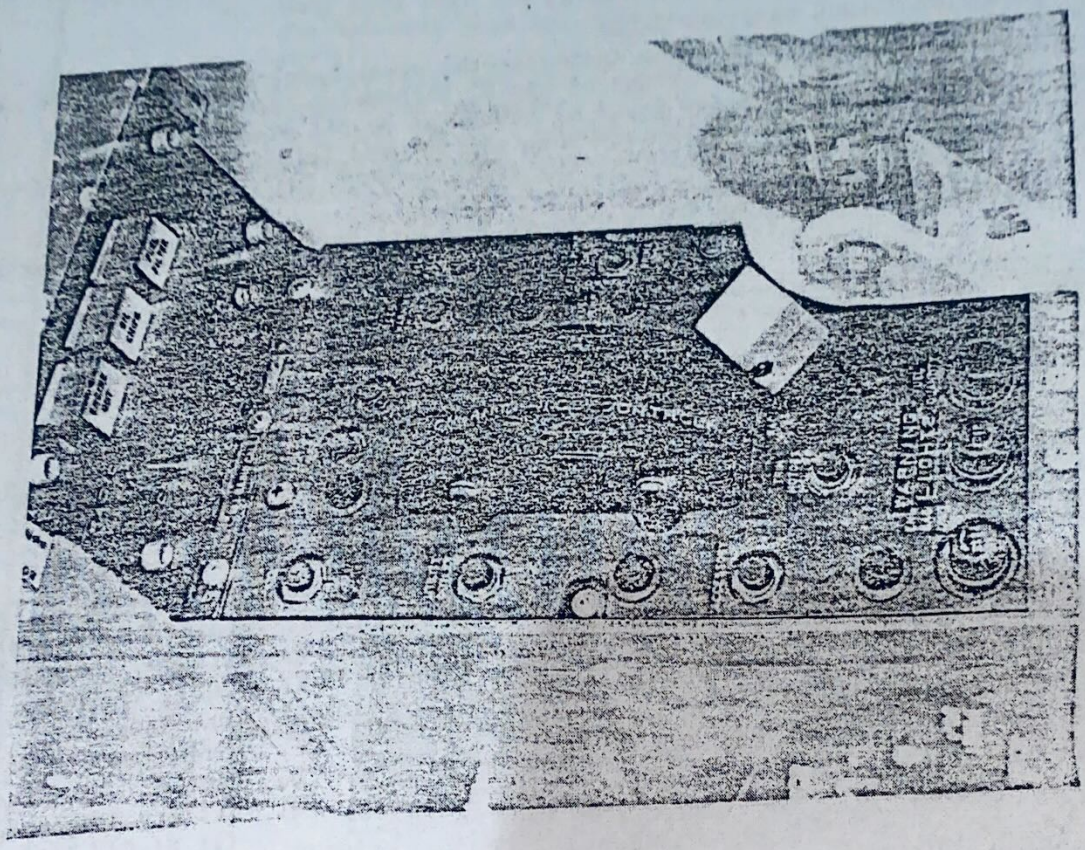


Figure 81-560-1. UH12-J5 Instrument Panel

1. Dual Tachometer
2. Gas Producer N_1 Tachom
3. Engine Torque Indicator
4. Airspeed Indicator
5. T.O.T. Indicator
6. Fuel Gauge
7. Altimeter
8. Clock
9. Battery Temperature Monit
   (If Ni-Cad Battery instal
10. Engine Gauge
11. Voltameter
12. Anti-Ice Control
13. Warning Lights

Group 80
Section 81-560

Figure 81-560-2. UH12-J3 INSTRUMENT PANEL



NOTE: Instrument placement for UH12-J3 same as Figure 81-560-1. Note different placement of warning lights, APU switch and radio switch between UH12-J3 and UH12-J5.

ABLE 81-560-1. TROUBLESHOOTING THE ENGINE TORQUE PRESSURE GAGE

TROUBLE	PROBABLE CAUSE	REMEDY
uge gives sluggish adings	Defective gauge	Replace gauge
w readings when lling power	Defective gauge	Replace gauge

b. Removal of engine torque pressure gauge. Refer to paragraph 81-1-10.
c. Installation of engine torque pressure gauge. Refer to paragraph 81-1-11.

83-1-1 through 83-10-1. Remains the same for UH12-J series.

83-10-2. BATTERY DESCRIPTION.

a. UH12-J3. The 24 volt, 18 amp-hr lead acid battery is mounted on the battery rack on the forward side of the instrument pedestal. The battery is clamped to the rack with two rods which bolt to the hold-down cross member on the battery cover. The battery is vented over board, using vent tubes and a vent jar with baking soda.

b. UH12-J5. The 24 volt, 13 amp-hr nickel cadmium battery is mounted on the cabin floor to the right of the pilots seat. The battery is mounted in a removable stainless steel drip pan which contains a felt pad impregnated with boric acid crystals to neutralize any electrolyte spillage. The battery is clamped to the floor with two rods which attach the hold down cross member on the battery cover.

83-10-3. Remains the same for UH12-J series.

83-10-10. Remains the same for UH12-J series.

CAUTION: IF BATTERY ELECTROLYTE IS SPILLED ON THE SKIN, CLOTHING, OTHER MATERIAL OR ON THE HELICOPTER, WASH THE AFFECTED AREA WITH COLD WATER OR A BORIC ACID SOLUTION, IF ANY PAINT HAS BEEN REMOVED, CLEAN AND SPRAY THE AREA WITH TYGON, K-23 BLACK PAINT.

a. Remains the same for UH12-J series.
b. Remove the lockwire from the wing nuts which attach the side rods to the hold-down cross member on top of the battery.
c. Remains the same for UH12-J series.
d. Delete for UH12-J series
e. Remains the same for UH12-J series.

83-10-11. INSTALLATION OF BATTERY

a. Place battery on the battery rack. Engage the rods with the slots on the battery cover.
b. Tighten the wing nuts on the rods, finger tight only.

CAUTION: OVER-TIGHTENING THE WING NUTS WILL DISTORT THE BATTERY COVER, DAMAGING THE SEAL.

c. Remains the same for UH12-J series.
d. Delete for UH12-J series.
e. Remains the same for UH12-J series.

83-10-40. CLEANING THE BATTERY. (FOR NICKEL CADMIUM BATTERY ONLY)

a. Remains the same for UH12-J series.
b. Remains the same for UH12-J series.

83-10-41. MAINTENANCE OF BATTERY.

Remains the same for UH12-J series.

a. Remains the same for UH12-J series.

NOTE: SERVICE WITH DISTILLED WATER ONLY.

83-10-41. (Continued)

b. Remains the same for UH12-J series.

CAUTION: NEVER USE ANY HYDROMETERS OR OTHER TOOLS ON A NICKEL CADMIUM BATTERY WHICH HAVE BEEN USED IN CONNECTION WITH A LEAD ACID BATTERY AND VICE-VERSA.

c. Remains the same for UH12-J series.

d. Remains the same for UH12-J series.

83-10-42 through 83-10-60. Remains the same for UH12-J series.

83-20-1 through 83-30-40. Delete for UH12-J series.

83-31-1. Remains the same for UH12-J series.

83-31-2. DESCRIPTION. In the 3 place configuration the voltage regulator is mounted below the battery on the electrical equipment rack and on the 4 place configuration the voltage regulator is mounted on an electrical rack inside the transition of the tail boom. The voltage regulator contains a variable resistance in the form of a carbon pile. This variable resistance is connected in series with the generator field winding which is supplied by the generator armature output. The carbon pile adjusts the voltage applied to the generator field winding, thereby keeping the armature output voltage constant within 2.5 percent of regulator voltage setting. A manually adjustable variable resistance located in the voltage regulator support permits adjustment of the regulated voltage to the required 28-28.5 volts. The generator armature negative output terminal is grounded to the helicopter structure.

83-31-3. Remains the same for UH12-J series.

83-31-10 through 83-31-11. Remains the same for UH12-J series.

83-31-30. ADJUSTMENT OF VOLTAGE REGULATOR. Adjust the voltage regulatore as follows:

a. Start the helicopter engine. Operate the engine at its normal speed. Turn the MASTER SWITCH to the on position and push the GEN FIELD circuit breaker down to the on position. With generator switch on, allow approximately 15 minutes for the voltage regulator to reach operating temperature.

b. Read the generator output voltage on the voltammeter.

c. Remains the same for UH12-J series.

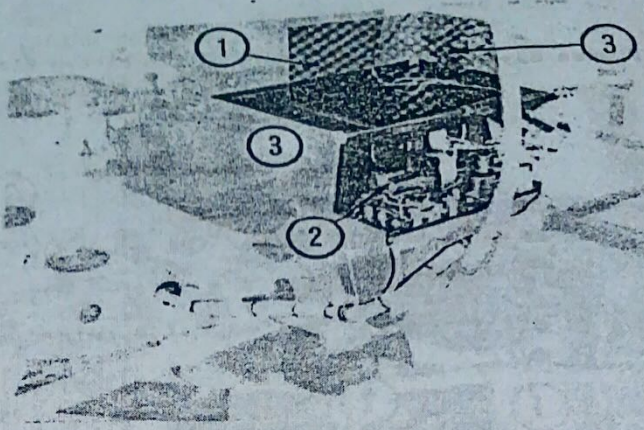
d. The regulated voltage should remain between 27.5 and 28 volts under all load conditions. If the voltage is not in this range, use a screwdriver to turn the voltage regulator adjustment screw as necessary to produce the correct generator output voltage (See figure 83-1-6). Turn the adjustment screw, clockwise to increase the boltage and counterclockwise to decrease the voltage, one notch at a time, allowing several seconds for the voltage to stablilize before making additional corrections.

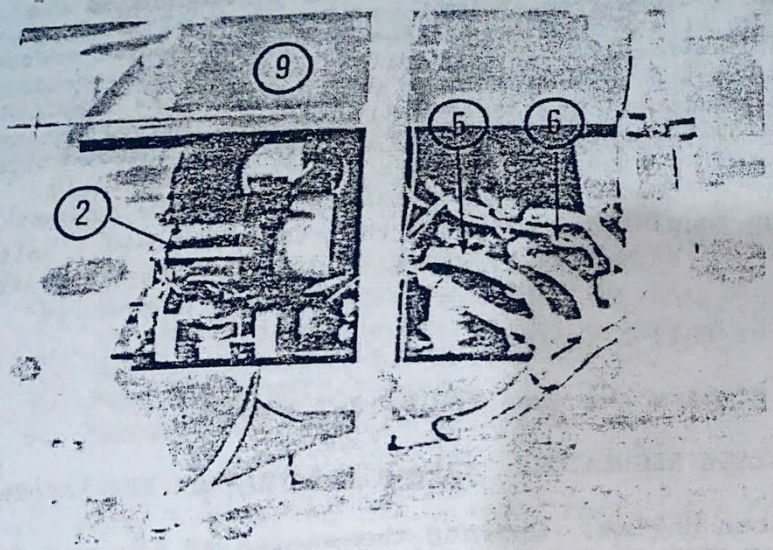
e. Remains the same for UH12-J series.

f. Shut down the engine.

Figure 83-1. UH12-J3 Battery and Related Component Installations.

1. Battery, Lead Acid
2. Voltage Regulator
3. Battery Quick Disconnect





4. Reverse Current Cutout Relay
5. Battery Relay
6. Starter Relay
7. Shunt
8. Fuse Holder
9. Battery Rack

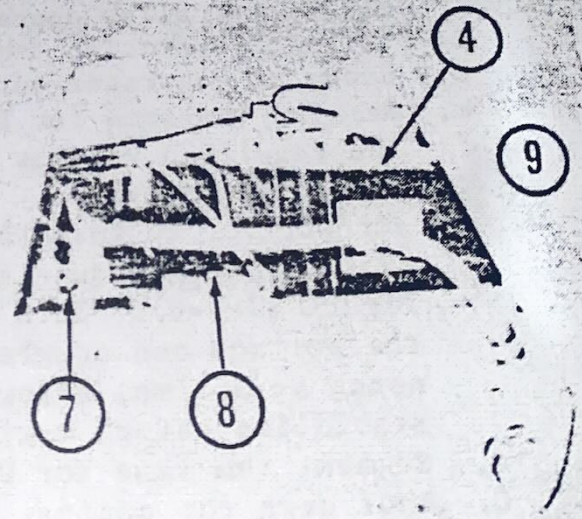
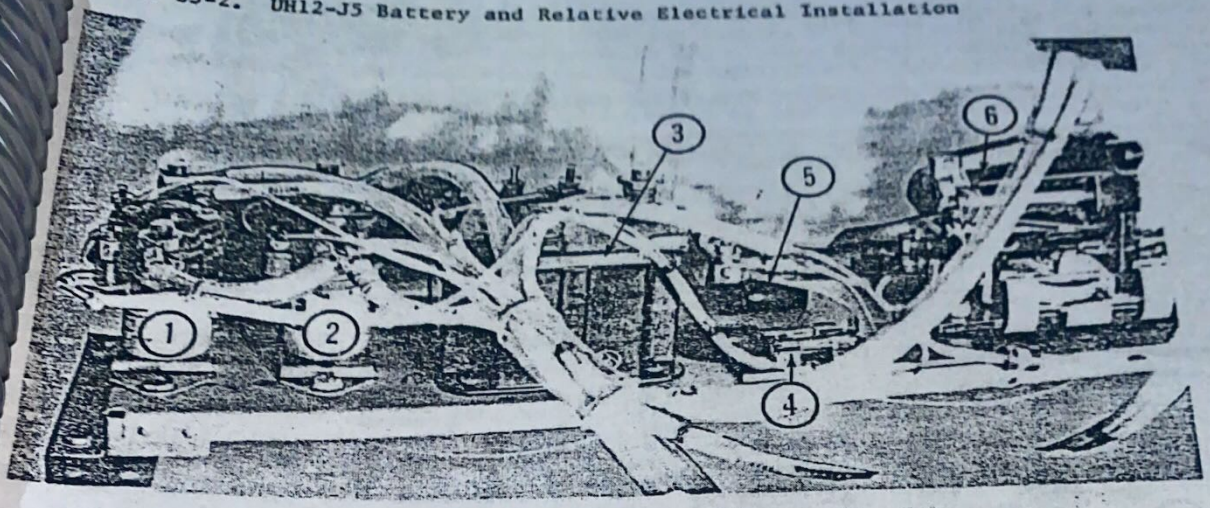


Figure 83-2. UH12-J5 Battery and Relative Electrical Installation



1. Starter Relay
2. Battery Relay
3. Reverse Current Relay
4. Fuse Holder
5. Shunt
6. Voltage Regulator
7. Ni-Cad Battery
8. Battery Quick Disconnect

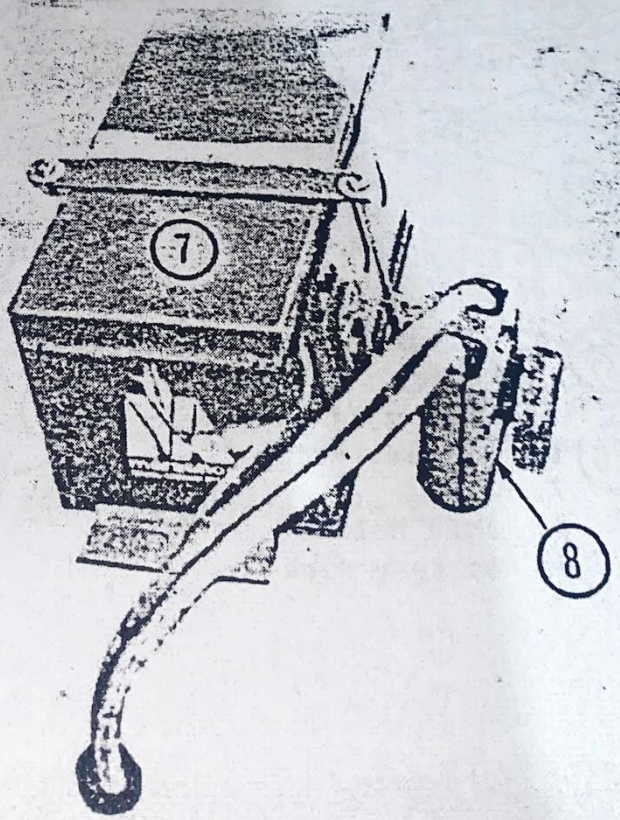
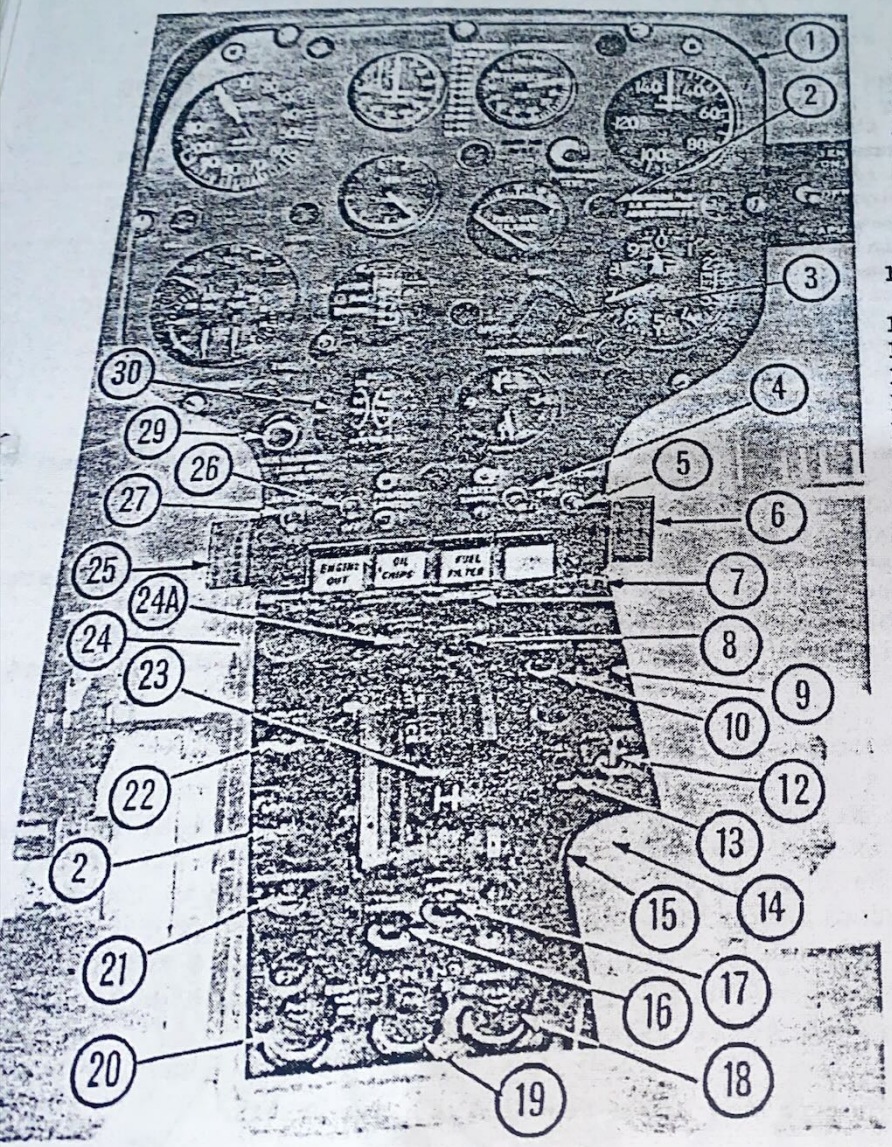


Figure 83-7-7 (Revised). Electrical Controls and Indicators



1. Instrument Panel
2. Panel Light
3. INSTRUMENT LIGHTS knob
4. MASTER SWITCH
5. OIL TEMP INDIC ENG-XMSN Switch
6. XMISSION OIL TEMP Warning Light
7. Hinge Pin
8. LANDING LIGHT Circuit Breaker
9. GEN FIELD Circuit Breaker
10. XMSN & GEN WARNING Circuit Breaker
11. Delete for UH12-J series.
12. FUEL PUMP Toggle Switch
13. FUEL PUMP Circuit Breaker
14. Protection Panel
15. Edgelighted Plastic Panel
16. TRIM MOTORS Circuit Breaker
17. RADIO Circuit Breaker
18. FUEL QUANTITY Fuse
19. WARNING LIGHTS Fuse
20. ENG GAUGE UNIT Fuse
21. ACCESSORY Circuit Breaker
22. UTILITY OUTLET Circuit Breaker
23. Anti-Ice Control Lever
24. AUX Circuit Breaker
24A. Lighting Circuit, Circuit Breaker
25. XMISSION OIL PRESS Warning Light
26.. POSITION LIGHTS Switch
27. ANTI COLL Light Switch
28. Delete for UH12-J series.
29. GEN WARNING LIGHT
30. Voltammeter

83-31-60 through 83-32-1. Remains the same for UH12-J series.

83-32-2. DESCRIPTION. In the three place configuration the reverse current cutout relay is mounted below the battery on the electrical equipment rack and on the four place configuration the reverse current cutout relay is mounted on the electrical rack inside the transition of the tail boom. The mounting screws furnish the ground connection for the unit. The operation of the reverse current cutout relay is described in paragraph 83-560-1.

83-32-3 through 83-33-1.. Remains the same for UH12-J series.

83-33-2. DESCRIPTION. The ammeter shunt is mounted on the electrical equipment rack below the battery in the 3 place configuration and on the electrical equipment rack inside the transition of the tail boom in the 4 place configuration. The ammeter shunt is connected in series with the generator output circuit to the reverse current cutout relay. The ammeter shunt provides a low resistance path for the main portion of the generator output current while a very small proportion of the current is bypassed from the shunt to the ammeter indicator through the ammeter fuses which are mounted just forward of the ammeter shunt. One fuse is provided for each of the two leads to the ammeter.

83-33-3. Remains the same for UH12-J series.

83-34-1. Remains the same for UH12-J series.

83-34-2. DESCRIPTION. The battery relay is mounted on the electrical equipment rack below the battery in the 3 place configuration and on the electrical equipment rack inside the transition section of the tail boom in the 4 place configuration. The contacts of this relay connect power from the battery (or from the external power relay) to the remainder of the power supply system. The input contact of the battery relay is connected to the terminal of the battery relay coil. The circuit through the coil is completed through the MASTER SWITCH to energize the battery relay when the MASTER SWITCH is turned to the on position.

83-34-3 through 83-35-1. Remains the same for UH12-J series.

83-35-2. DESCRIPTION. The starter relay is mounted on the electrical equipment rack below the battery in the 3 place configuration and on the electrical equipment rack inside the transition section of the tail boom in the 4 place configuration. The contacts of this relay is energized through a jumper wire from its input power when the circuit through its coil is completed to ground through the starter button. The starter button is located on the switch box on the end of the collective stick.

83-35-3 through 83-40-1. Remains the same for UH12-J series.

83-40-2. DESCRIPTION. The external power receptacle and the external power relay are attached to the right hand aft side of the firewall, enclosed by the external power receptacle cover assembly. The external power receptacle is the connection point for attaching external power to the helicopter. The external power relay connects the positive input terminal of the external power receptacle to the input terminal of the battery relay, in parallel with the battery. The negative terminal of the external power receptacle is grounded to the helicopter structure. The external power relay is operated by the GENERATOR-EXTERNAL power switch on the instrument panel.

83-40-3 through 83-50-1. Remains the same for UH12-J series.

83-50-2. DESCRIPTION. The power distribution system is centered at the lower section of the instrument panel and in the protection panel. This system provides power to all instrument, equipment and lighting circuits, except for the starter. Power for the starter is provided directly by the power supply system, as described in paragraph 83-560-1 The MASTER SWITCH, three fuses, and seven push-type circuit breakers are provided on the instrument and the protection panels. These circuit breakers distribute the power from the main bus at the protection panel and protect the circuits against overload. Wiring to the protection panel is connected through the protection panel electrical connector in the instrument tunnel at the forward end of the panel. Wiring to the instruments, switches and lights of the instrument panel is connected through the instrument panel electrical connector below the instrument panel on the upper surface of the instrument tunnel. Wiring on the cyclic control grips switch on the cyclic stick is connected through the cyclic control stick electrical connectors in the seat deck structure. Wiring to the various units mounted on the basic body structure under the seat is connected through the underseat terminal block. Spare wiring for radio, auxiliary and accessory equipment is installed in the instrument panel and protection panel electrical connectors to provide simplified wiring installation when additional circuit provisions are required in conjunction with accessory equipment installation.

83-50-3 through 83-51-2. Remains the same for UH12-J series.

83-51-10. REMOVAL OF SWITCHES, CIRCUIT BREAKERS, FUSE HOLDERS AND PANEL LIGHTS FROM THE PROTECTION PANEL ASSEMBLY. Use the following procedure for removal of any of the units from the protection panel:

a. Turn the MASTER SWITCH to the OFF position and disconnect the battery.
b. Remove the screws from the access panel on the left-hand side of the pedestal tunnel, and remove the panel.
c. Disconnect the protection panel plug connector inside the pedestal tunnel at the forward end of the protection panel.
d. Remove the two screws attaching the plastic panel to the protection panel. Remove the caps from the six panel lights and remove the six lights from the protection panel. Then lift the plastic panel away from the protection panel, taking care not to pry against the plastic panel.
e. Remove the ten screws attaching the protection panel to the pedestal tunnel.
f. Remove the pin from the hinge at the forward end of the protection panel.
g. Remove the protection panel by lifting it upward, tilting it as necessary to clear the engine quadrant levers in the center.

83-51-10. (Continued)

h. Disconnect the wiring from the switch, circuit breaker, or fuseholder to be replaced. Identify the wires as necessary. Replacement of any of these units is conventional.

NOTE: Access to some of the switches, circuit breakers, and fuseholders at the protection panel may be obtained without removing the protection panel from the helicopter by removing the access panels from the left and righthand sides of the pedestal tunnel.

83-51-11 through 83-51-41. Remains the same for UH12-J series.

83-52-1 through 83-52-11. Delete for UH12-J series.

TABLE 83-1-IV. Delete for UH12-J series.

83-53-1 through 83-53-2. Remains the same for UH12-J series.

83-54-2. DESCRIPTION. A ground strap is attached between the lower left-hand aft corner of the engine/rotor mount fitting assembly and the corresponding engine/rotor mount. A receptacle for grounding fuel nozzles to the helicopter is located in the skin of the left-hand side of the tail boom transition section.

83-54-40 through 83-60-1. Remains the same for UH12-J series.

83-60-2. DESCRIPTION. The electrically operated equipment includes the starter, trim motors, auxiliary fuel pump, voltammeter, lighting and engine instruments. Electrically operated units are described in the following paragraphs.

83-61-1. Remains the same for UH12-J series.

83-61-2. DESCRIPTION. The engine instrument powered by the electrical system is the oil temperature indicator of the engine gauge unit. The fuel gauge is also electrically operated. The electrical systems associated with these instruments are described with the instruments in section 81.

83-62-1 through 83-62-40. Delete for UH12-J series.

83-63-1 through 83-64-1. Remains the same for UH12-J series.

83-64-2. DESCRIPTION. The auxiliary fuel pump is mounted on the engine deck near the firewall on the right-hand side of the helicopter centerline. The auxiliary fuel pump receives power through the fuel pump circuit breaker and is operated by a switch located in the protection panel. Refer to section 72 for further information regarding the auxiliary fuel pump including removal, installation and troubleshooting.

83-65-1 through 83-65-11. Delete for UH12-J series.

Group 80
Section 83

83-66-1. Remains the same for UH12-J series.

83-66-2. DESCRIPTION. The voltammeter comprises two separate meters in one instrument: One meter is graduated in volts and the other is graduated in amperes.

a. The ammeter section of the voltammeter is connected in parallel with the ammeter shunt, as described in paragraph 83-33-2 and inducates the output current of the generator.

d. Remains the same for UH12-J series.

83-67-1 through 83-67-60. Delete for UH12-J series.

Figure 83-1-8. Delete for UH12-J series.

Figure 83-1-11 through 83-1-13A. Delete for UH12-J series.

Figure 83-1-14. Delete for UH12-J series.

Figure 83-1-16. Delete for UH12-J series.

Figure 83-1-22. Delete for UH12-J series.

Group 83
Section 83-560

83-560-1. STARTER-GENERATOR. The starter-generator is mounted on the aft right-hand side of the engine gearbox and is a self cooled unit. When starting this unit develops 6.0 horse power and 17.5 foot pounds of torque at 1800 RPM. Starting completed the unit becomes a generator and delivers 150 amperes at 100% engine RPM.

a. The starter receives power from the starter relay and is controlled by the starter switch as described in paragraph 83-35-1.

b. The generator output is controlled by the voltage regulator to 27.5v (+0.5, -0.0v). The generator circuit to the electrical system is opened by the reverse current cutout relay when the generator switch is turned off. The field circuit of the generator is protected by the 10 amp generator field circuit breaker. When the generator is operating, the generator switch on, the generator warning light on the instrument panel glows if the generator is not producing satisfactory output. This operation of the generator warning light is controlled by the reverse cutout relay as follows:

1. One terminal of the GEN WARNING LIGHT receives power through the GEN WARNING circuit breaker. This circuit through the light is completed through an 80-ohm resistor to ground. The terminal of the light which is connected to the 80-ohm resistor is also connected to the reverse current cutout relay.
2. When the generator is working properly, the reverse current relay provides this terminal of the light with a voltage equal to that provided the other terminal of the light through the GEN WARNING circuit breaker. These equal voltages at each terminal of the light cancel, extinguishing the light.
3. If the generator output fails or drops to an abnormally low voltage, or if current attempts to flow into the generator from the battery, the generator is disconnected from the rest of the power supply system by the reverse current cutout relay. At the same time the reverse current cutout relay removes the generator voltage from the terminal of the GEN WARNING LIGHT which is connected to the 80-ohm resistor. The GEN WARNING LIGHT receives battery voltage through the GEN WARNING circuit breaker and will be lighted with the circuit completed to ground through the 80-ohm resistor.
4. The GEN WARNING LIGHT can be tested by pushing it on the lens cap thereby grounding the terminal normally connected to the reverse current cutout relay. The generator output current and voltage are indicated on the voltammeter at the instrument panel, as described in paragraph 83-66-1.

83-560-2. TROUBLESHOOTING THE STARTER-GENERATOR

a. For the starter refer to Table 70-1-1.

b. For the generator refer to Paragraph 83-20-3.

83-560-3. REMOVAL OF THE STARTER-GENERATOR

a. Disconnect the wires from the terminals and identify if necessary.

b. Loosen the nut on the quick disconnect clamp and slide the clamp over the starter-generator.

c. Remove the starter-generator.

d. Remove the nuts and washers securing the quadrant to the engine and remove the quadrant.

Group 83
Section 83-560

83-560-4. INSTALLATION OF THE STARTER-GENERATOR

Installation of the starter-generator is the reverse order of removal. When installing the starter-generator the electrical terminals must point down.

83-560-5. CLEANING THE GENERATOR

Clean the exterior of the generator with a cloth slightly moistened with dry cleaning solvent.

83-560-6. MINOR REPAIR OF THE GENERATOR

If it is necessary to perform minor repair on the generator (i.e., replacement of brushes, etc.) instead of replacing the unit, refer to the applicable handbook of service instructions for the generator. Replace the generator if service instructions are not available.

Figure 83-560-1. Electrical Installation - UH12-J3

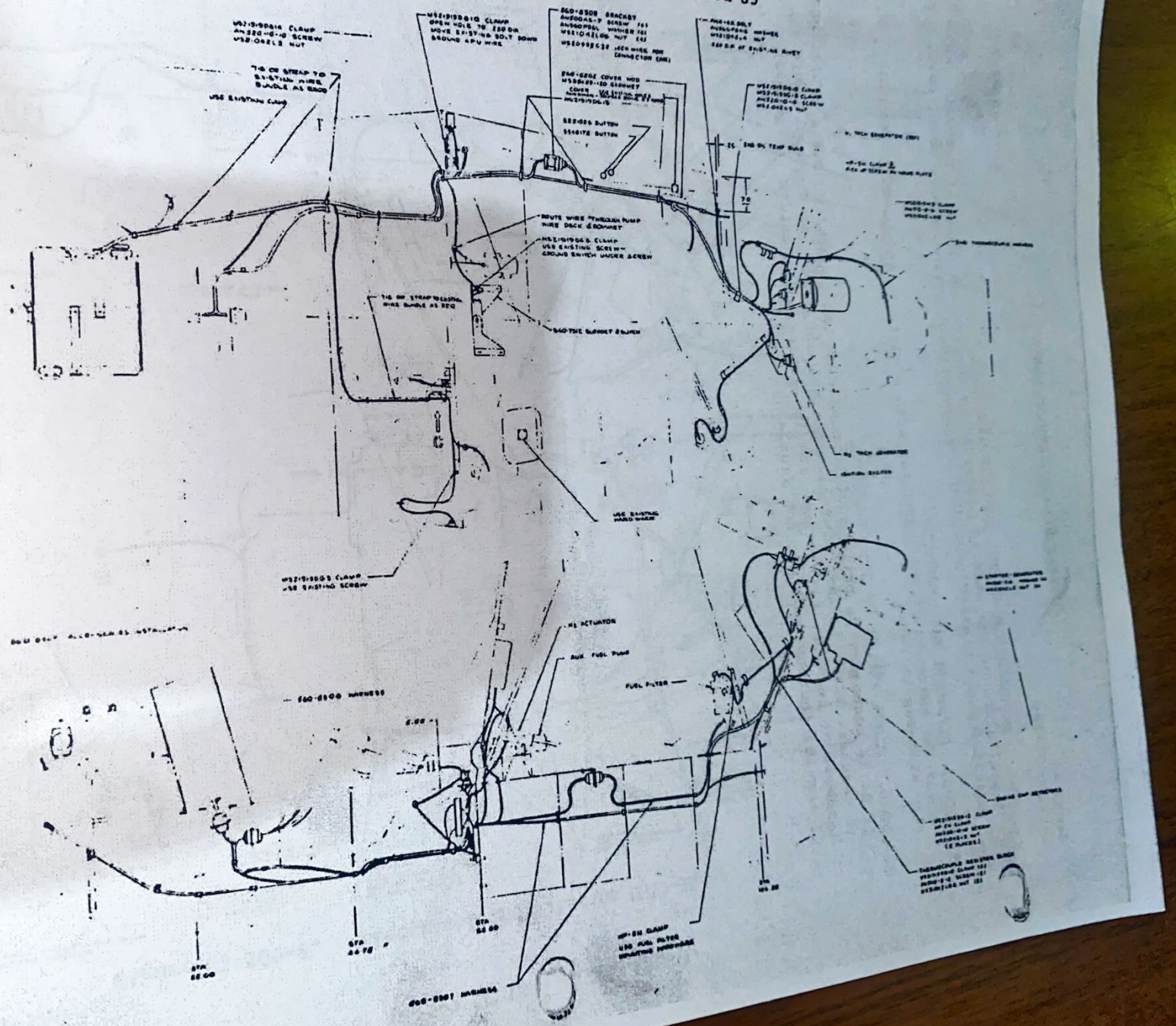
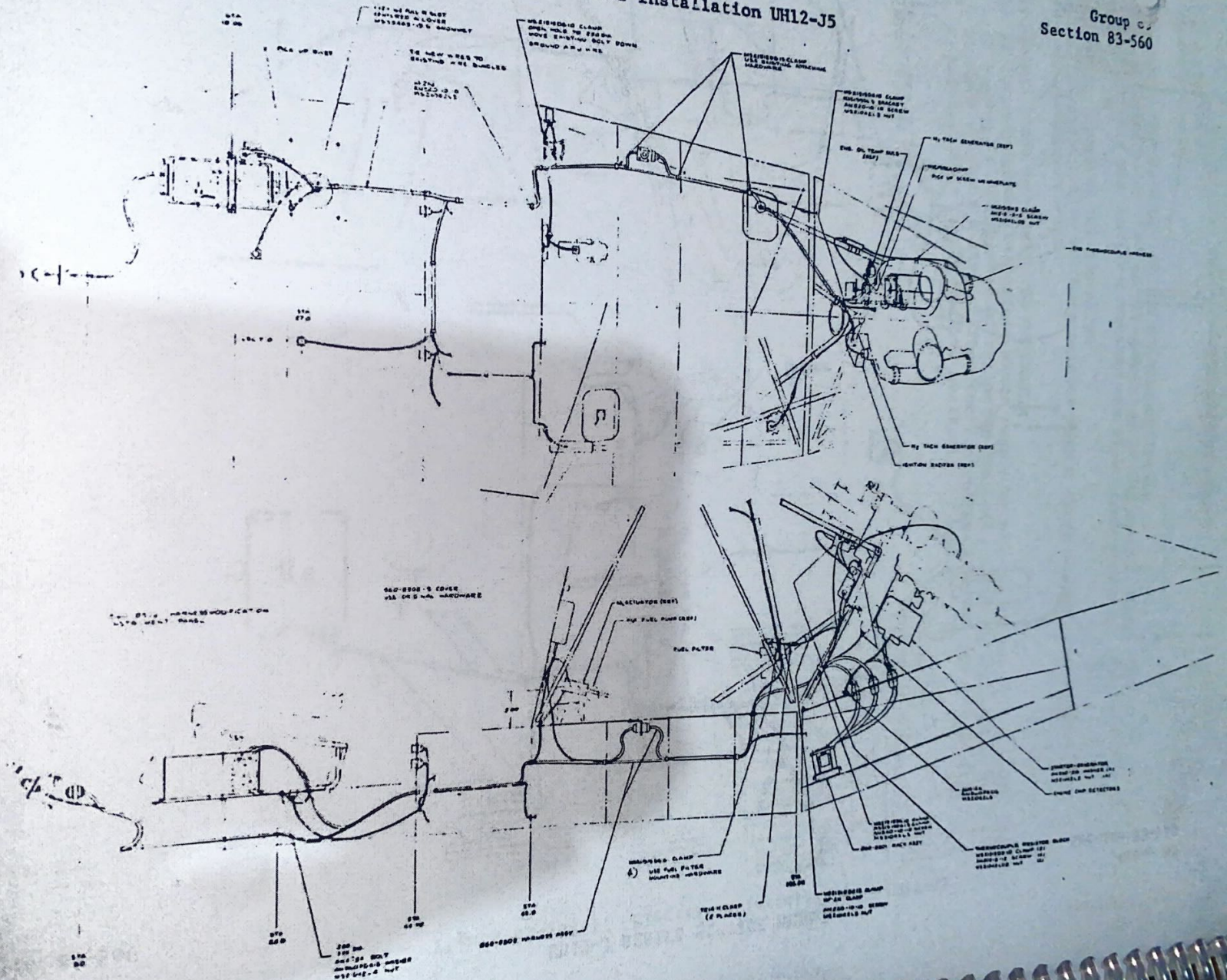
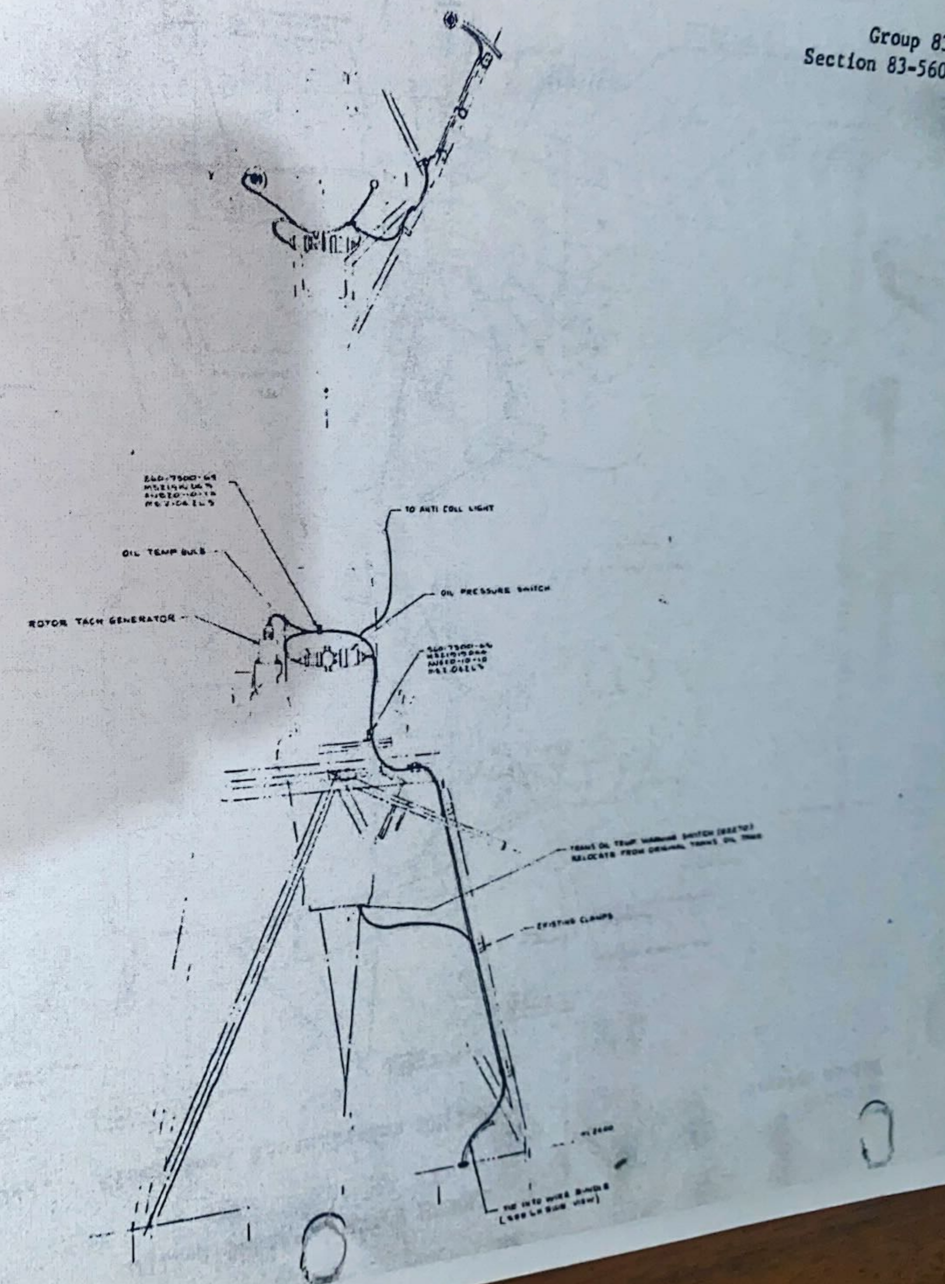


Figure 83-560-2. Electrical Installation UH12-J5




TO ANTI COLL LIGHT
OIL PRESSURE SWITCH
OIL TEMP BULB
ROTOR TACH GENERATOR
EXISTING CLAMPS

Group 80
Section 88-560

88-560-1. CABIN HEAT KIT INSTALLATION

88-560-2. DESCRIPTION

The cabin enclosure is heated by a forced air system driven by a fan located on the back of the firewall. The fan creates a low pressure area beneath a shroud partially covering the engine power turbine support and exhaust collector support. Outside temperature air is drawn over the shrouded portion of the engine and is warmed. It passes through a flexible duct to the fan, and from the fan to the diffuser located in the canopy.

88-560-3. TROUBLESHOOTING THE CABIN HEATING SYSTEM.

Table 88-560-1. TROUBLESHOOTING THE CABIN HEATING SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Insufficient or erratic flow of heated air into cabin	Leaks in flexible tubing	Replace damaged or defective tubing.
	Improper operation of cabin heat duct assembly	Check to be certain that valve gate is safetied in open position.
	Broken or defective gasket between fan inlet and fan	Replace gasket.
	Leakage between duct and diffuser	Remove diffuser and wrap forward end of duct with friction tape. Install diffuser to duct.
Exhaust gases detected in cabin	Cracks or leaks in engine exhaust collector	Replace exhaust collector.

88-560-4. REMOVAL OF CABIN HEATING SYSTEM

a. Loosen the clamps securing the flexible ducts to the cabin heat duct assembly, fan and engine shroud.

b. Remove the clamps securing the flexible ducts to the engine mount assembly.

c. Remove the flexible ducts.

d. Remove the diffuser from the cabin heat duct assembly.

e. Remove the cabin heat duct assembly from the canopy.

1. Remove the transition assembly from the cabin heat duct assembly.

f. Remove the fan from the firewall.

1. Remove the inlet assembly from fan.

2. Remove and retain rubber gasket.

g. Remove the forward and aft shroud assemblies from the engine.

h. Remove wiring and switch as necessary.

88-560-5. INSTALLATION OF CABIN HEATING SYSTEM
Installation of the cabin heating system is the reverse of removal.

CAUTION: ALL SCREWS ATTACHING THE CABIN HEAT DUCT ASSEMBLY TO THE CANOPY MUST BE STARTED BEFORE ANY ARE TIGHTENED. TIGHTEN SCREWS UNIFORMLY UNTIL SNUG. AVOID EXCESSIVE TIGHTENING TO PREVENT CRACKING OF CANOPY PLEXIGLASS.

CAUTION: WHEN ATTACHING GASKET AND INLET ASSEMBLY TO FAN, BE CERTAIN SCREWS DO NOT CONTACT FAN BLADES.

88-560-6. MINOR REPAIR AND CLEANING OF CABIN HEATING SYSTEM.
Wash all metal parts of the cabin heating system in dry-cleaning solvent. Wash the flexible tubing with mild soap and water. A small amount of lubricating graphite on the valve crank will insure smooth operation of the cabin heat duct assembly.

88-560-7. CABIN HEAT KIT INSTALLATION, FOUR-PLACE CONFIGURATION.

88-560-8. DESCRIPTION.
The cabin heat kit installation for the four-place configuration helicopter is essentially the same as for the standard configuration helicopter except that the four-place helicopter cabin heat diffuser assembly is attached to the canopy head. Refer to paragraphs 88-560-1 through 88-560-6 for trouble-shooting, removal, installation and minor repair instructions.

NOTE: If the diffuser assembly is not installed, a cover plate is installed in its place.

Group 90
Section 97-560

Table 97-560-1. TROUBLESHOOTING THE AUTOMATIC REIGNITION SYSTEM, (Con'd.)

TROUBLE	PROBABLE CAUSE	REMEDY
Reignition fails to occur immediately when torque pressure falls below 35 psi	Torque pressure lines not adequately bled	Bleed lines at torque pressure indicator and at high and low pressure switch assembly
Engine cycle counter registers auto-reignition cycle	Diodes defective	Replace diodes as required
Normal ignition does not occur with start switch, but the engine can be started by activating the auto-reignition system.	Diodes defective	Replace diodes as required

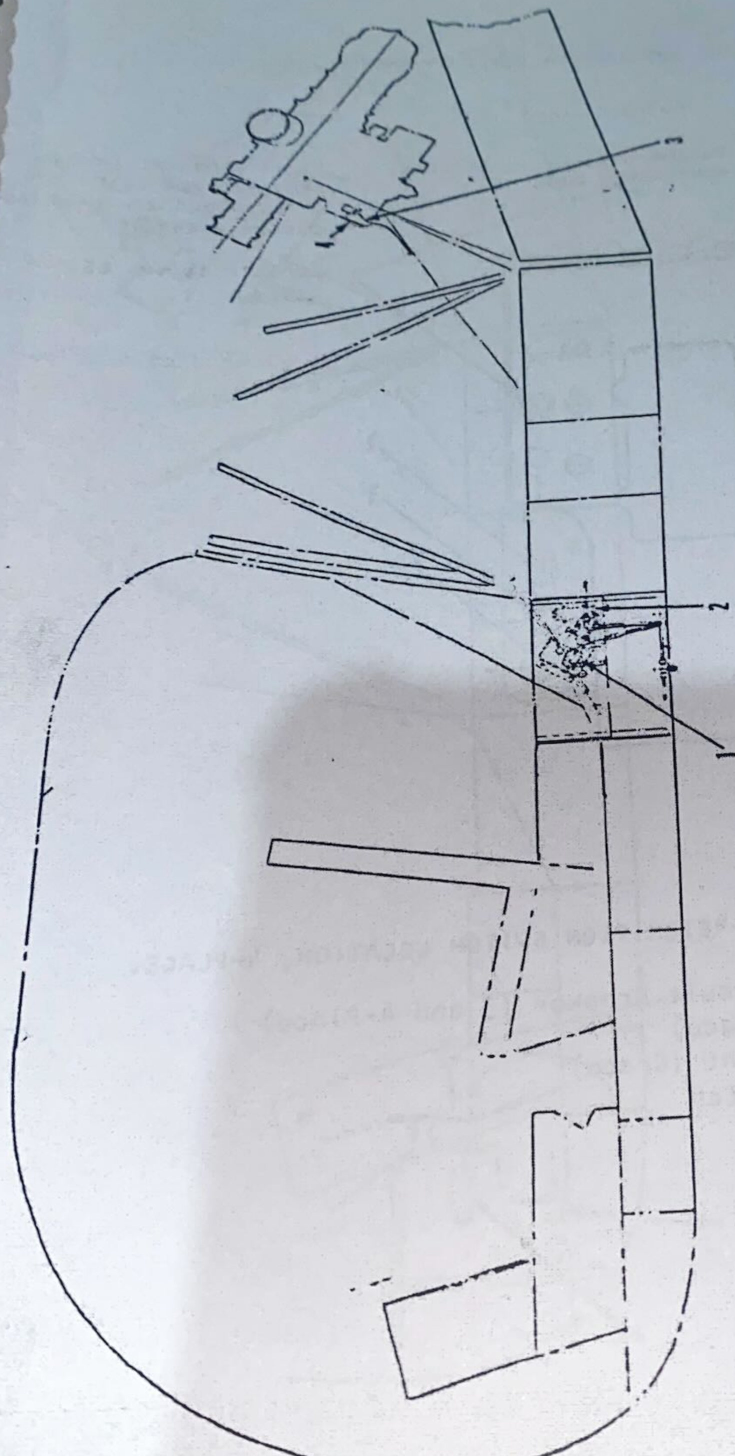


Figure 97-560-1. AUTO-REIGNITION COMPONENT LOCATION (4-PLACE).

1. Pressure Switches
2. Relay
3. Cycle Counter
4. Ignition Exciter

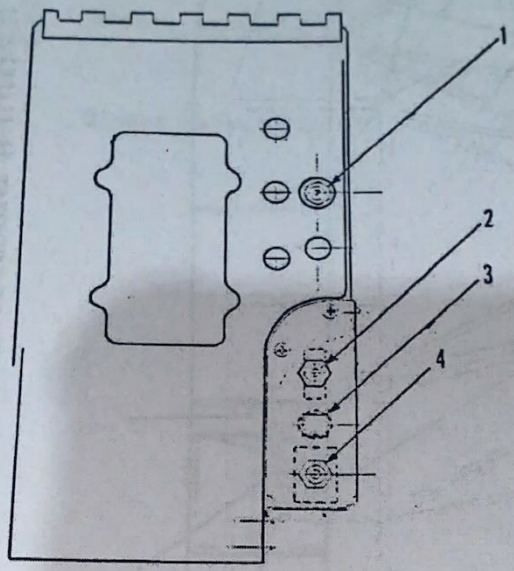


Figure 97-560-2. AUTO-REIGNITION SWITCH LOCATION, 4-PLACE.

1. Auto-Reignition Circuit Breaker (3 and 4-Place)
2. Heater Switch (4-Place)
3. Re-Ignition Arm Light (Green)
4. Re-Ignition Arm Switch

Group 90
Section 97-560

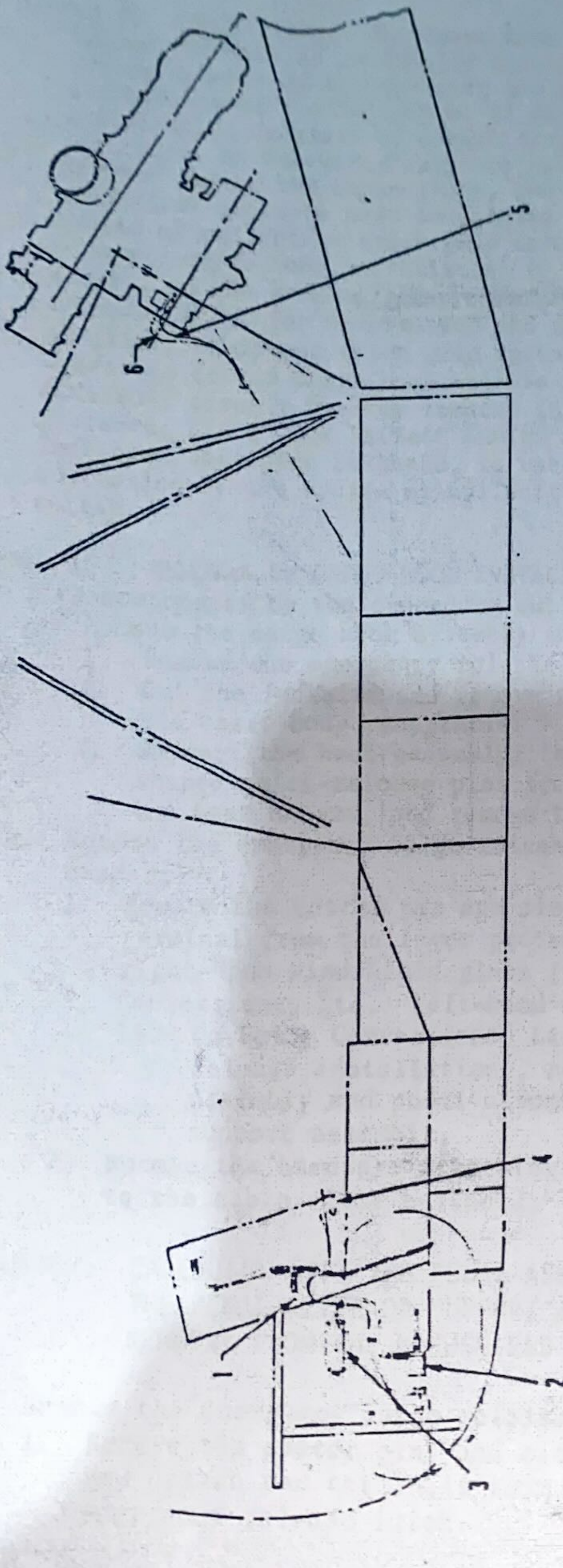


Figure 97-560-3. AUTO-REIGNITION COMPONENT LOCATION (3-PLACE).

1. Torque Oil Pressure Line
2. Pressure Switches
3. Time Delay Relay
4. Arm Switch
5. Cycle Counter
6. Exciter

91-560-1. CARGO HOOK INSTALLATION. (See figure 91-560-1.)

91-560-2. DESCRIPTION. The cargo hook installation provides the helicopter with an externally mounted, easily attached load carrying devide capable of transporting any load within the gross weight limitations of the helicopter (1,250 lb. maximum). The cargo hook installation consists of a hook assembly suspended beneath the body structure, an emergency cargo release pedal assembly mounted to the forward end of the cabin floor, and the associated electrical and mechanical controls used to release the hook. An auxiliary equipment cyclic or collective stick grip installation is required in conjunction with the cargo hook installation to provide the normal means for control of the hook release. (Refer to Section 33, Model UH-12E Service Manual for information and instructions pertaining to the auxiliary equipment stick grip installation.) Power for electrical operation of the cargo hook release is provided through the ACCESSORY circuit breaker located in the protection panel. A guard-protected CARGO HOOK RELEASE ARMING SWITCH, located on the face of the left-hand seat deck bulkhead, is used to isolate the release circuit controlled by the cyclic or collective stick grip cargo hook release switch.

91-560-3. REMOVAL OF CARGO HOOK INSTALLATION. Remove cargo hook installation components by the procedure outlined below.

a. Remove the cargo hook assembly in the following manner:
   1. Remove the emergency release contol cable.
   2. Cut the lockwire and remove the cargo hook harness plug from the basic body receptacle.
   3. Support the hook assembly; then release and disengage the L-shaped quick-release pins from the hook assembly clevises and the beam hanger, and remove the cargo hook from the beam hanger.

b. Remove the emergency cargo release pedal assembly in the following manner:
   1. Remove the cotter pin and clevis pin and detach the cable terminal from the lever protruding through the slot in the lower right-hand windshield glass (left-hand windshield glass if Soloy Conversions, Ltd. left-hand emergency cargo hook release is used).
      1A. On Soloy Conversions, Ltd. left-hand emergency cargo hook release installations, remove roll pins connecting lever assembly and pedal assembly and withdraw lever assembly from support assembly.
   2. Remove the hardware attaching the pedal or support assembly bracket to the cabin floor bulkhead.

CAUTION: CAREFULLY LIFT THE PEDAL ASSEMBLY FROM ITS MOUNTING. CHECK THAT THE PEDAL LEVER OR SUPPORT ASSEMBLY IS NOT COCKED DURING THE REMOVAL FROM THE WINDSHIELD GLASS SLOT.

c. Remove the emergency cargo release cable in the following manner:
   1. Remove the cotter pins and clevis pins from the cable terminals and detach the terminals from the pedal assembly lever and the emergency release latch.

91-560-4. REMOVAL OF CARGO HOOK INSTALLATION (Continued)

2. Remove the terminal and the small and large rubber boots from the cable end. Loosen and remove the nut securing the cable to the hook assembly cable bracket. (Do not remove the cable from the bracket until the electrical harness is separated from the cable.)
3. Cut the ties and/or tape securing the harness to the cable; then remove the screws, washers and clamps securing the cable to the basic body.
4. Remove the screws, nuts and washers used to secure the cable clip to the forward cable support bracket.
5. Slide the cable forward to remove the aft end from the hook assembly cable bracket.

91-560-5. INSTALLATION OF CARGO HOOK. Installation of cargo hook components is essentially the reverse of removal. Check that the emergency release control cable is rigged in accordance with paragraph 91-101-30.

91-560-6. RIGGING EMERGENCY CARGO RELEASE CONTROL CABLE. (See figure
a. Check that the emergency release pedal is in the nonactuated position.
b. Check the clearance between the edge of the emergency release latch and the cargo hook release lever spring pin. The latch-to-pin clearance should be 0.010-inch minimum to 0.080-inch maximum.
c. To increase the clearance between the pin and latch, increase the effective length of the emergency release cable by unscrewing the cable terminal of either end of the cable.
d. To decrease the pin-to-latch clearance, shorten the effective cable length.

91-560-7. MANUAL CARGO HOOK RELEASE KIT INSTALLATION

91-560-8. DESCRIPTION.
The manual cargo hook release kit consists of a cargo release pedal assembly mounted to the forward end of the cabin floor and extends down through the lower left hand bubble.

91-560-9. REMOVAL OF MANUAL CARGO HOOK RELEASE.
Remove manual cargo hook release components by the procedure outlined below:

a. Remove the nut and bolt attaching release cable to arm assembly
b. Remove two roll pins attaching pedal assembly to arm shaft. Remove pedal assembly and arm assembly.
c. Remove two screws and spacer washers attaching support plate to cabin. Remove support plate.
d. Remove three screws and two nuts attaching support assembly to the cabin floor. Remove support assembly.

91-560-10. INSTALLATION OF MANUAL CARGO HOOK RELEASE.
Installation of manual cargo hook release is reverse of removal.

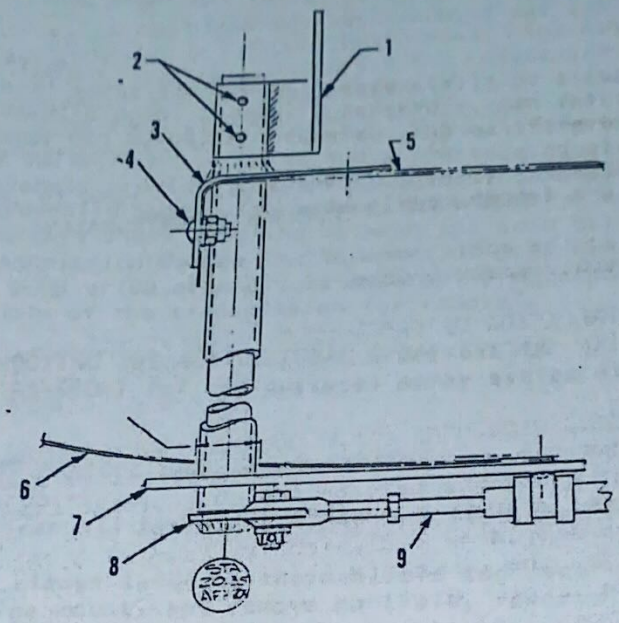


Figure 91-560-1. MANUAL CARGO RELEASE, UH-12D/E & E-4.

1. Kick Pedal
2. Drive Pins
3. Bracket
4. Screw & Nut
5. Floor
6. Chin Bubble
7. Plate
8. Torque Tube
9. Push-Pull Cable

AGRICULTURAL SPRAY SYSTEM

93-560-1. AGRICULTURAL SPRAY KIT INSTALLATION (See Figure 93-560-1)

93-560-2. DESCRIPTION.

The agricultural spray kit consists essentially of a hydraulic pump drive assembly, hydraulic pump, hydraulic reservoir, manifold and support, interconnecting hoses and mounting hardware. The manifold includes a solenoid valve, relief valve, control value and a pressure gauge. The hydraulic pump drive assembly provides the speed conversion required for proper operation of the hydraulic pump. The hydraulic pump drive assembly is a single stage drive, with a shear coupling between the pump drive unit and pump to prevent transmission damage in the event of pump binding or overloading. The hydraulic pump drive assembly is externally mounted and does not require major disassembly of the transmission for removal.

93-560-3. TROUBLESHOOTING THE AGRICULTURAL SPRAY SYSTEM

Refer to Table 93-560-1 for agricultural spray system troubleshooting data.

93-560-4. REMOVAL OF AGRICULTURAL SPRAY SYSTEM.

a. Drain reservoir.
b. Remove and cap all hydraulic lines and fittings from manifold, reservoir and pump.
c. Remove the clamps securing the manifold and reservoir mounting plate to the engine mount, and remove manifold, reservoir and mounting plate as an assembly.
d. Remove nuts and washers attaching hydraulic pump drive assembly to transmission.
e. Remove hydraulic pump drive assembly from transmission.
f. Install suitable cover plate over hydraulic pump drive mounting flange on the transmission.

93-560-5. INSTALLATION OF AGRICULTURAL SPRAY SYSTEM.

Installation of the agricultural spray system is the reverse of removal.

TABLE 93-560-1 TROUBLESHOOTING THE AGRICULTURAL SPRAY SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Motor does not operate.	Solenoid stuck open	Check wiring to solenoid.
	Relief valve stuck open.	Replace solenoid
		Replace relief valve
No system pressure.	Faulty pressure gauge	Replace gauge
	Severed shear coupling caused by hydraulic pump internal failure	Replace pump and shear coupling
	Severed shear coupling caused by overloading the pump	Replace shear coupling readjust relief valve and flow control

Group 90
Section 93-560

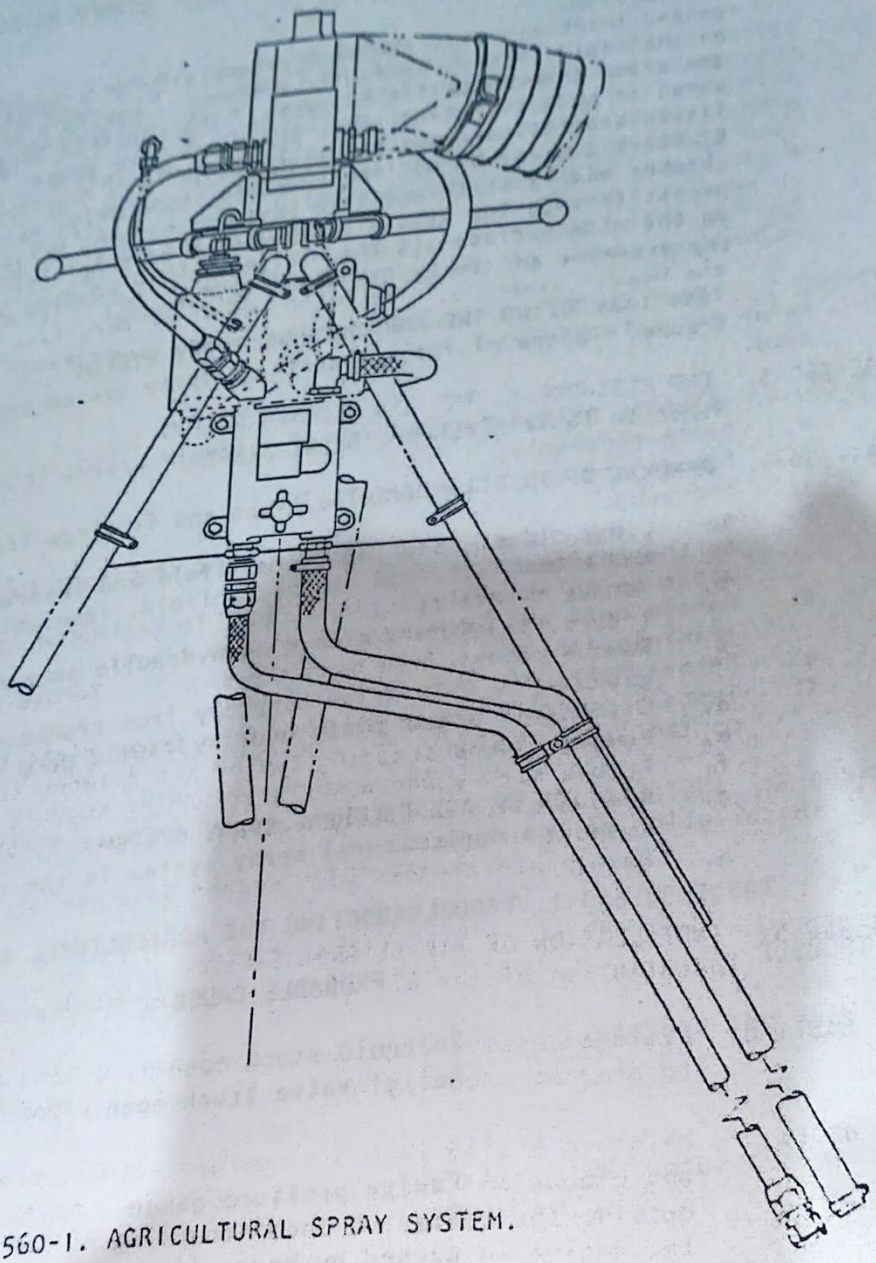


Figure 93-560-1. AGRICULTURAL SPRAY SYSTEM.