

CHAPTER 71 — POWER PLANT

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SECTION 1 POWER PLANT (MODEL 250-C18) **A**

71-1-1. POWER PLANT.

The 206A helicopter is powered by an Allison model 250-C18 turboshaft engine. The engine consists of a single-stage axial-centrifugal-flow compressor, a single combustion chamber, a two-stage gas producer turbine, and a two-stage power turbine.

The power plant (engine) assembly is horizontally mounted aft of the transmission and above the fuselage. The engine is supported by three bipod mounts attached to the service deck and is coupled to the transmission through the freewheeling unit and main driveshaft (figure 71-1-1).

71-1-2. TROUBLESHOOTING ENGINE.

1. Refer to Allison 250-C18 Series Operation and Maintenance Manual 5W2 for engine troubleshooting procedures.

2. Torsional oscillation.

a. When the response or following time of the engine speed control system is the same as the natural harmonic frequency of the power train system, a torsional oscillation (or oscillation in power output) can occur. A torsional oscillation can be caused by one or more of the following:

(1) Leakage of fittings of engine fuel control air lines

(2) Dirty or malfunctioning double-check valve

(3) Malfunction of fuel control or power governor.

b. After an engine component change involving the fuel control system, it is recommended that the helicopter be checked for torsional oscillation. This check shall be performed as follows:

WARNING

DO NOT EXCEED HELICOPTER
LIMITATIONS.

(1) Load helicopter as much as possible up to gross weight. This check must be performed at a minimum of 85 percent torque.

(2) Fly helicopter up to the maximum power limitations for the engine as specified in the Flight Handbook. This can be done best by climbing the helicopter.

(3) While at the high power setting, quickly rotate the twist grip approximately 15 to 20 degrees off toward the flight idle stop and quickly return the grip to the maximum open position. At this time, torsional oscillation may be noted. If the system is functioning properly, the torsional oscillations should be completely dampened within 6 to 10 oscillations. These oscillations may be felt in the fuselage as well as observed on the torquemeter and N2 tachometer. The engine sound will also be changed during oscillations.

(4) If the torsional oscillations are not dampened within 6 to 10 oscillations, or if they intensify, turn twist grip toward the flight idle stop until oscillations stop. The twist grip may be opened slowly to restore engine power.

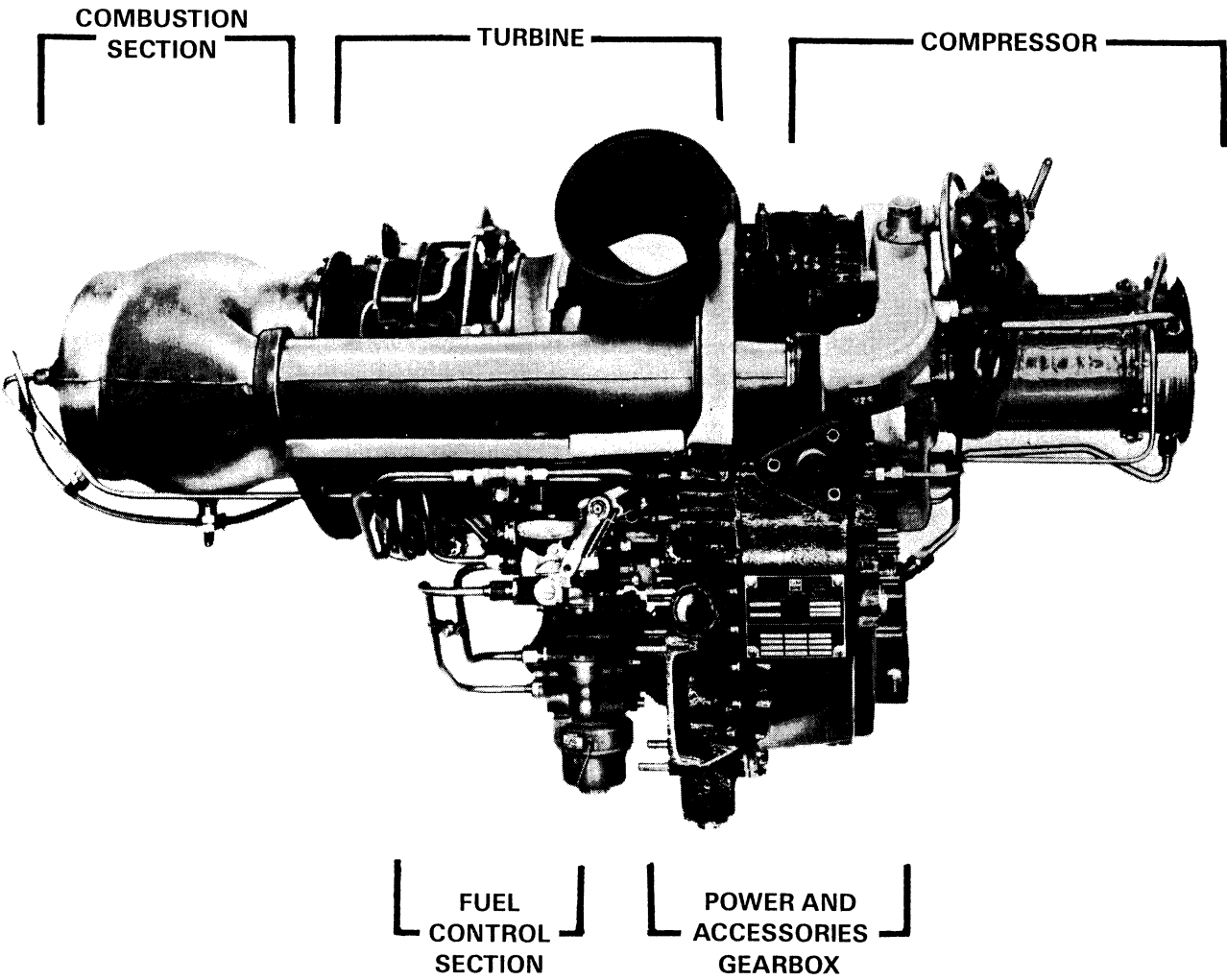
c. If torsional oscillations exceed the limits specified in preceding steps, corrective action must be taken. Correct the oscillations in the sequence shown. If step c.(1) procedures do not correct the problem, proceed to step c.(2), etc.

(1) Check fuel control air lines for loose connections and air leaks.

(2) Clean double-check valve. Refer to Allison 250-C18 Series Operation and Maintenance Manual 5W2.

(3) Replace double-check valve.

(4) Replace fuel control and/or N2 governor.



ENGINE RIGHT SIDE VIEW

206A/BS-M-71-1-1

Figure 71-1-1. Engine major components — model 250-C18

71-1-3. OPERATIONAL CHECK.**CAUTION**

AFTER ENGINE CHANGE AND/OR DISCONNECTING THE ENGINE OIL INLET HOSE, OIL PUMP PRIMING SHALL BE ACCOMPLISHED PRIOR TO ENGINE START.

1. Refer to Allison 250-C18 Series Operation and Maintenance Manual 5W2 for oil pump priming.

CAUTION

DO NOT EXCEED STARTER LIMITATION WHILE MOTORING ENGINE.

2. Prior to initial engine starting, motor engine until oil pressure is indicated. Do not exceed starter limitations. Refer to applicable flight manual. If an indication of oil pressure is not seen in 30 seconds, stop and determine cause.
3. Perform engine check run. (Refer to Allison 250-C18 Series Operation and Maintenance Manual 5W2.) Operation of helicopter shall be in accordance with applicable JetRanger Flight Manual.

NOTE

If a new engine is being installed or if a new turbine outlet temperature (TOT) harness is installed on the engine at any time, check the TOT circuit in the helicopter for an 8 plus or minus 0.05 ohms (Chapter 98). An instrument which will measure the resistance in the range and accuracy of this requirement is available from Wheatstone Bridge Model RN-1, Crockett Engineering Co., P.O. Box 47287, Dallas, Texas 75247.

NOTE

After test flight, check oil filter for contamination.

71-1-4. POWER PLANT (Helicopters S/N 44 through 660 and 672 through 715).

The power plant should be disconnected and removed from the airframe as a quick-change assembly using the following procedures as a guide.

71-1-5. REMOVAL.**SPECIAL TOOLS REQUIRED**

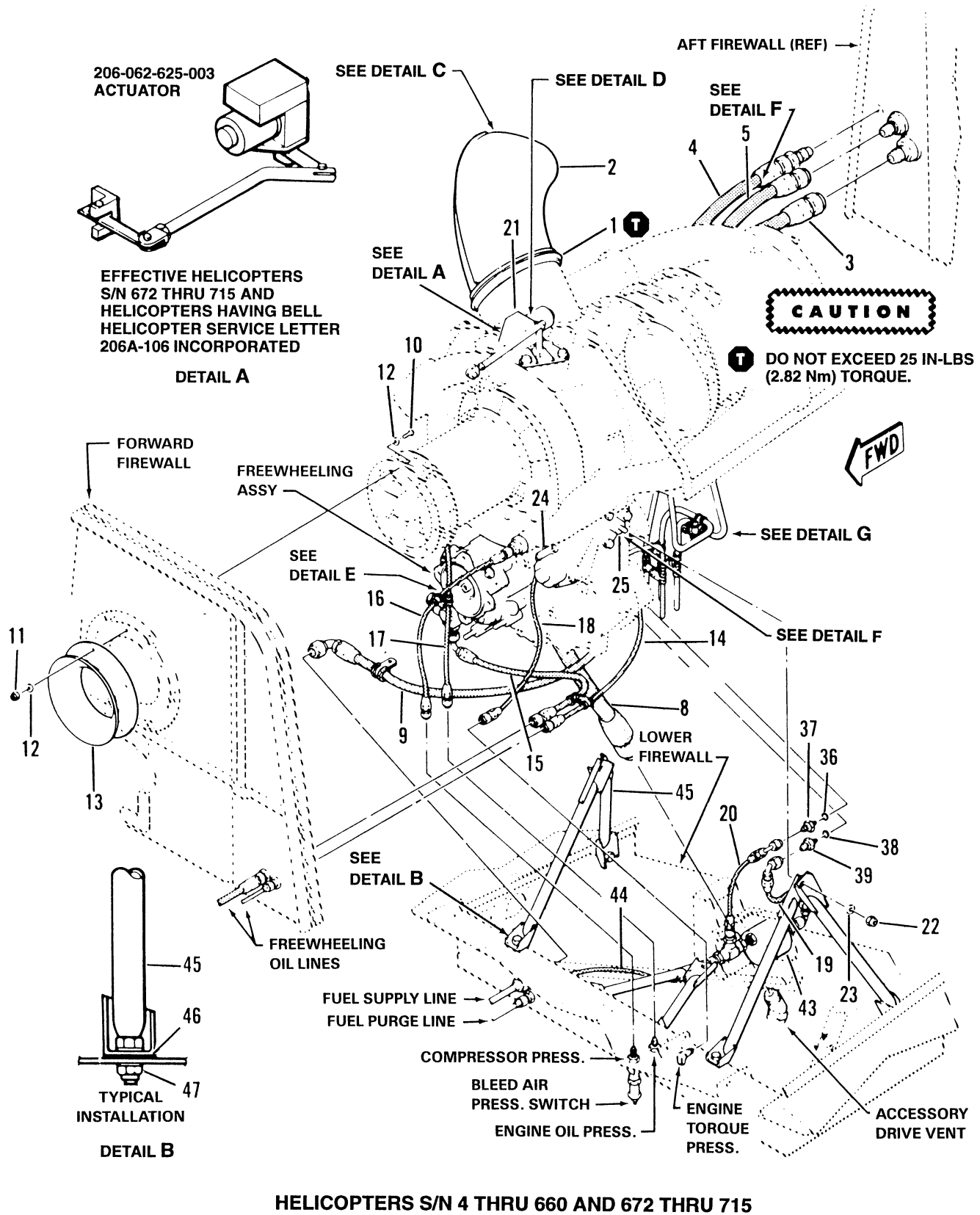
NUMBER	NOMENCLATURE
—	Hoist, 600 Lb (272 Kg) Capacity, minimum
6796963	(Allison) Lift Assembly Tool
SWE13872	(Allison) Engine Stand
SWE13872-10	(Allison) Engine Adapter

1. Disconnect battery and external power.
2. Raise engine cowl panels (paragraph 71-1-11) and remove clamps (1, figure 71-1-2) from exhaust stacks (2). Remove stacks and install covers on engine exhaust ports. Remove vent hose (8, detail C) if installed on exhaust stack.
3. Remove engine cowlings (paragraph 71-1-11).
4. Disconnect electrical connectors (2 and 3, figure 71-1-3).
5. Disconnect starter-generator connector (1).
6. Disconnect fuel filter connector (4) and governor actuator connector (5).
7. Disconnect connector on anti-ice valve (21, figure 71-1-2).

CAUTION

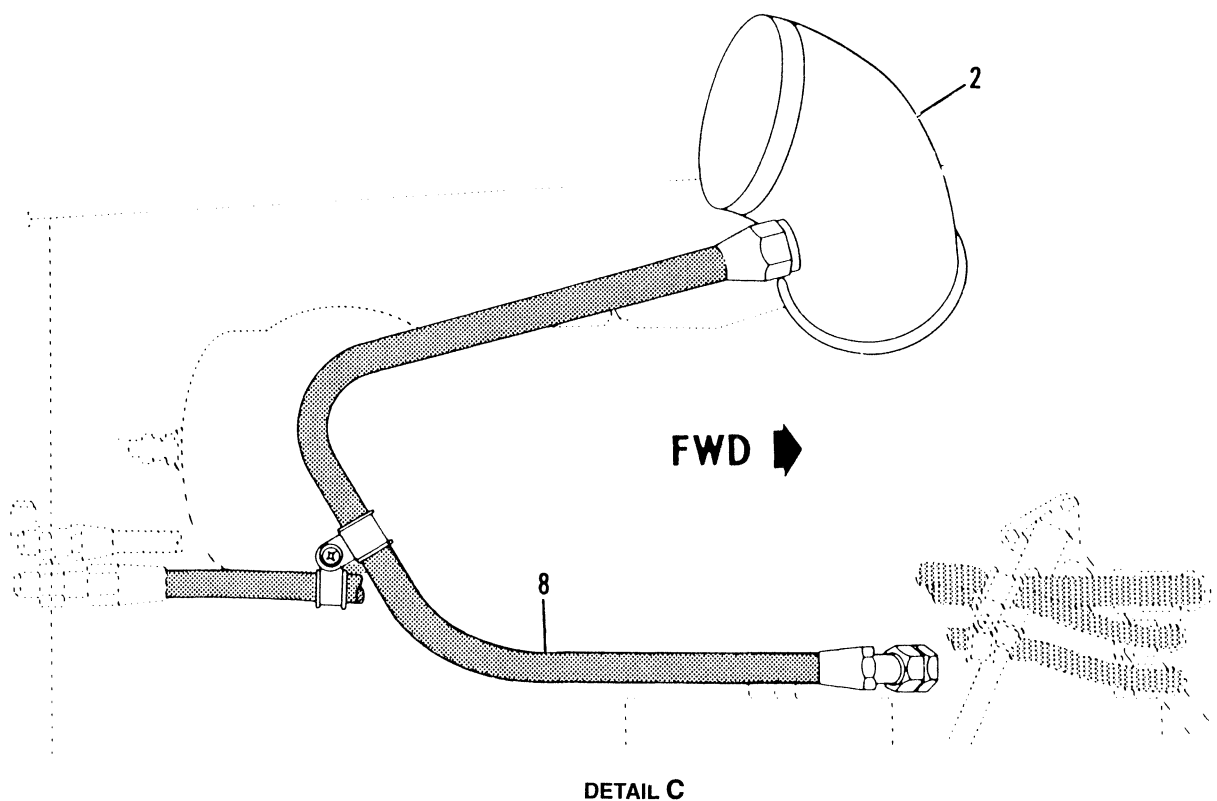
STARTER-GENERATOR SHALL BE SUPPORTED WHEN MOUNTING CLAMP IS LOOSENED. FAILURE TO SUPPORT STARTER-GENERATOR WILL RESULT IN PREMATURE FAILURE OF SHAFT.

8. Remove starter-generator (26) (paragraph 71-1-25).
9. Remove engine-to-transmission driveshaft, disconnect tail rotor driveshaft, and remove (Chapter 66).
10. Drain engine oil reservoir. Disconnect engine oil inlet hose (3), outlet hose (4), and vent hose (5) at aft firewall. Disconnect clamps (6 and 7, detail F) securing oil hoses to engine and mount leg.

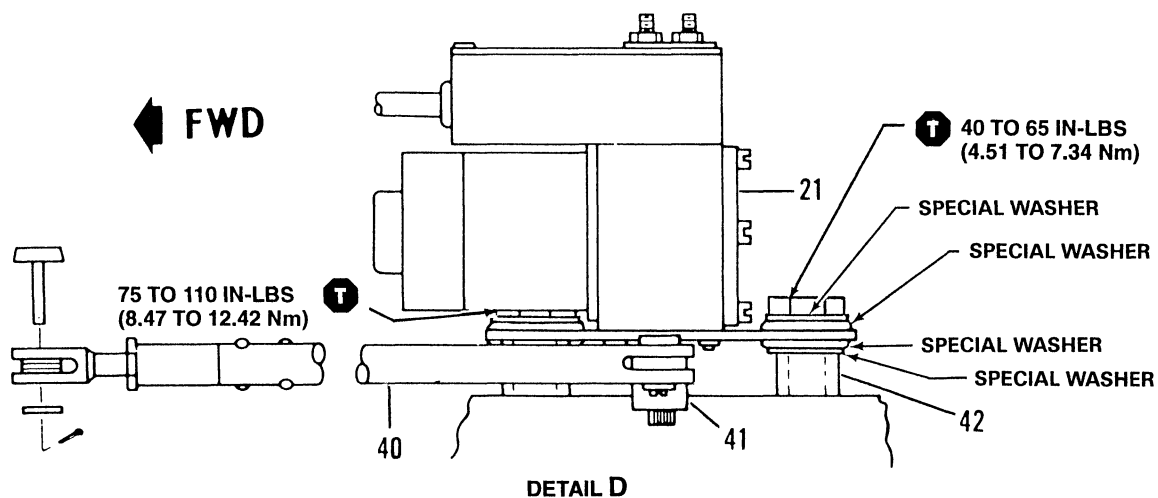


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Figure 71-1-2. Engine installation — model 250-C18 (Sheet 1 of 4)



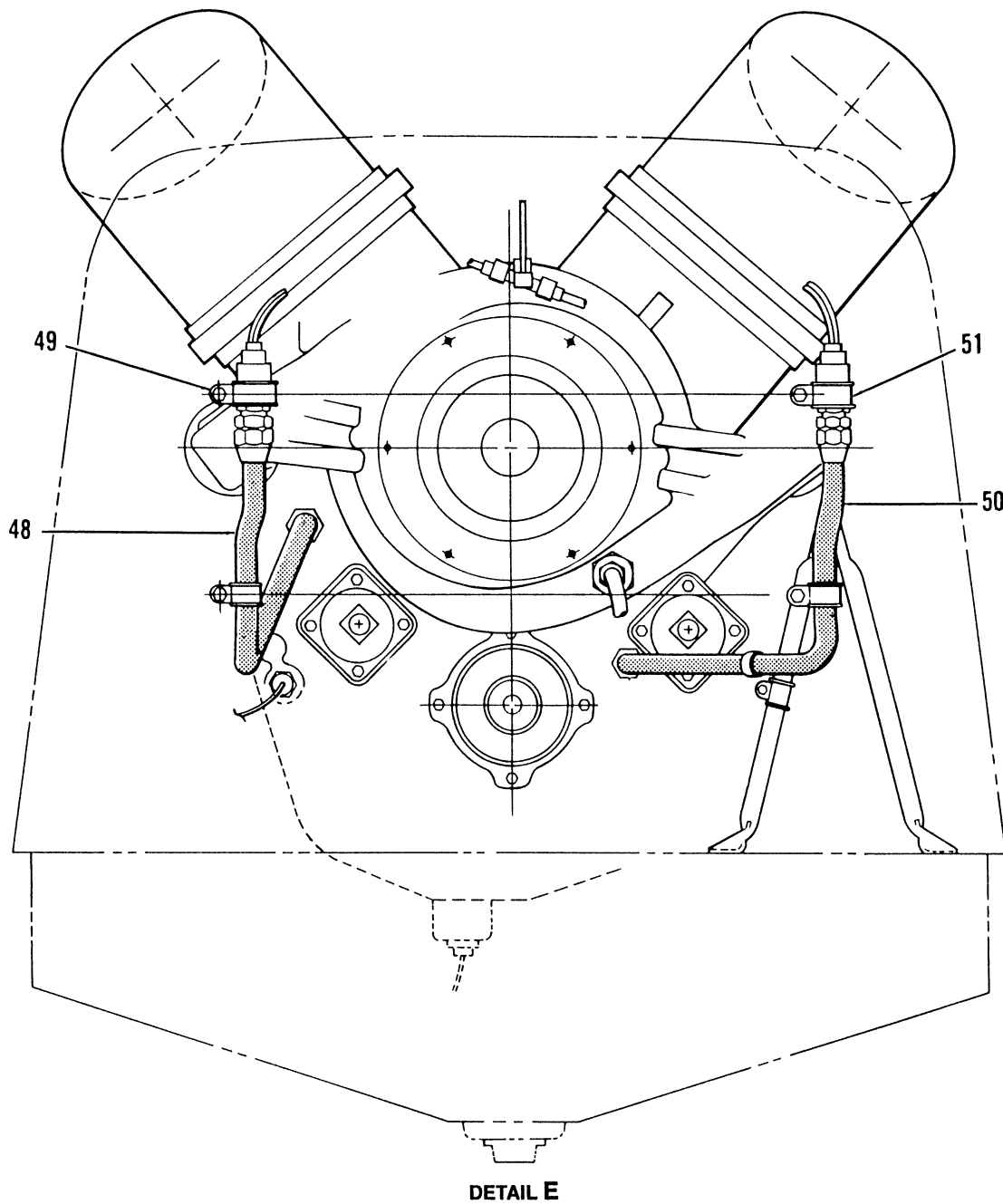
HELICOPTERS S/N 154 THRU 660 LOOKING INBOARD RIGHT SIDE



HELICOPTERS S/N 154 THRU 660

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Figure 71-1-2. Engine installation — model 250-C18 (Sheet 2)

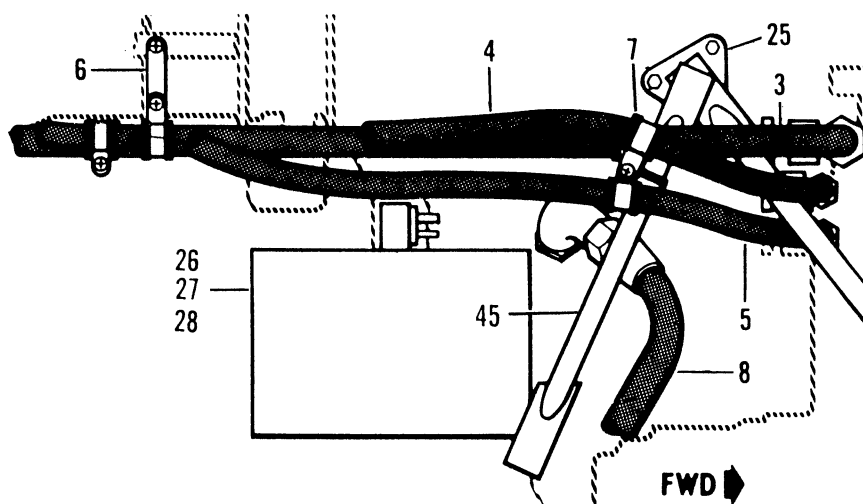


**ENGINE — FRONT VIEW
HELICOPTERS S/N 254 THRU 660
AND 672 THRU 715**

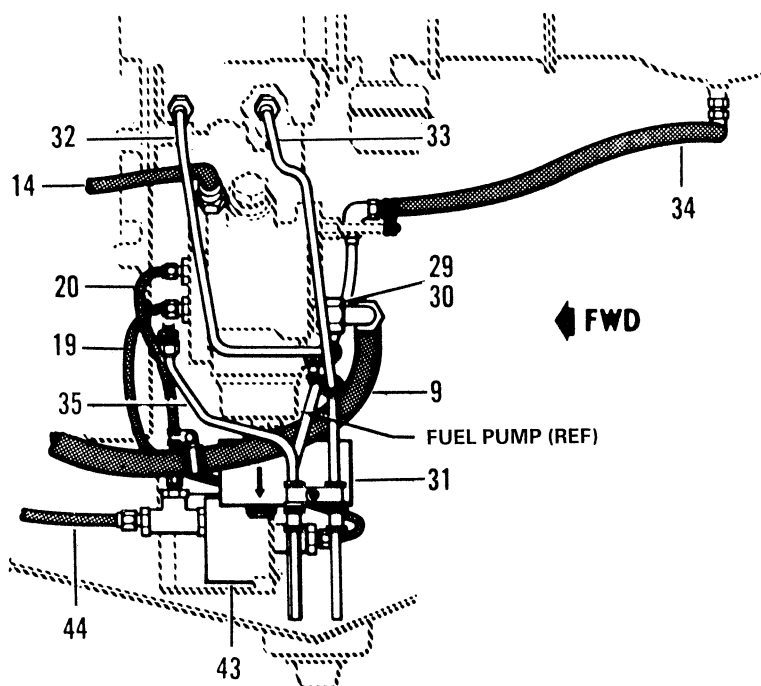
206A/BS-M-71-1-2-3

Figure 71-1-2. Engine installation — model 250-C18 (Sheet 3)

1. Clamp
2. Exhaust stack
3. Oil inlet hose
4. Outlet hose
5. Vent hose
6. Clamp
7. Clamp
8. Vent hose
9. Fuel inlet hose
10. Screw
11. Nut
12. Washer
13. Bellmouth assembly
14. Freewheeling hose
15. Freewheeling hose
16. Compressor pressure hose
17. Engine oil pressure hose
18. Engine torque pressure hose
19. Hose
20. Hose
21. Anti-ice control valve
22. Nut
23. Washers
24. Tachometer generator, power turbine, left gas producer, right
25. Fitting
26. Starter-generator
27. Adapter
28. Clamp
29. Reducer
30. Packing
31. Filter drain valve
32. Exhaust collector drain
33. Heat shield drain
34. Combustion chamber drain
35. Fuel pump seal drain
36. Packing
37. Union
38. Packing
39. Reducer
40. Tube assembly
41. Actuator lever
42. Spacer
43. Fuel filter pressure switch
44. Purge hose
45. Mount



LOOKING INBOARD RIGHT SIDE
DETAIL F

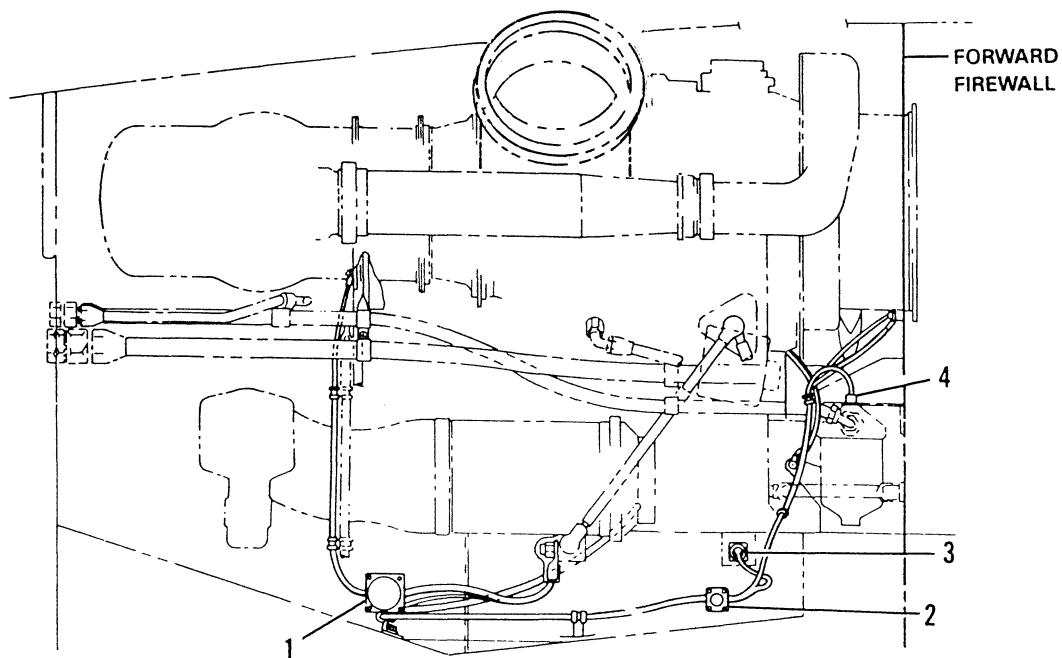


LOOKING INBOARD LEFT SIDE
DETAIL G

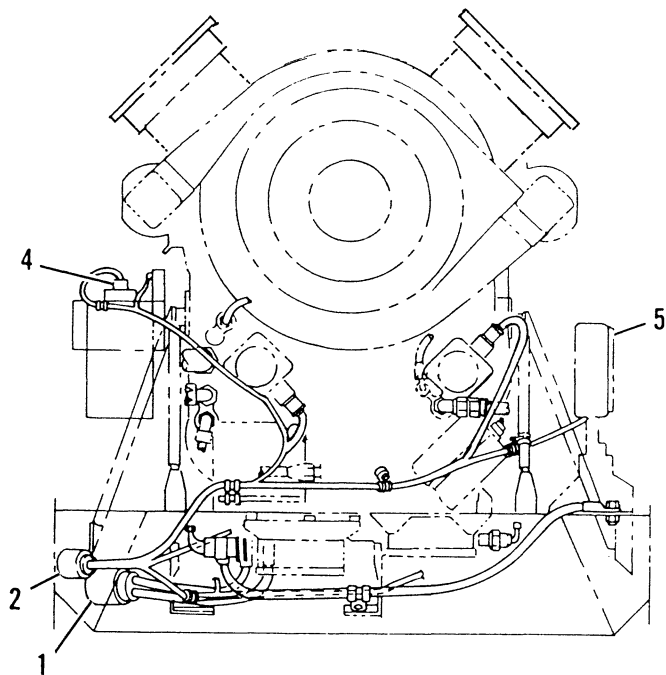
46. Shim
47. Nut
48. Engine oil pressure hose
49. Transducer
50. Engine torque pressure hose
51. Transducer

206A/BS-M-71-1-2-4

Figure 71-1-2. Engine installation — model 250-C18 (Sheet 4)



VIEW OF RIGHT SIDE



VIEW LOOKING AFT

1. Starter-generator connector (2P1)
2. Engine electrical connector (1P1)
3. Engine electrical connector (1P4)
4. Fuel filter connector (1S5P1)
5. Governor actuator (1B1)

206A/BS-M-71-1-3

Figure 71-1-3. Engine electrical

11. On helicopters S/N 4 through 153 only, disconnect vent hose (8) at lower firewall.

NOTE

On helicopters with S.I. 206-65 incorporated, disconnect fuel inlet hose at fuel filter.

12. Disconnect engine fuel inlet hose (9) at forward firewall and disconnect clamp at lower mount.

NOTE

Index bellmouth flex coupling to forward firewall to facilitate reassembly.

13. Remove screws (10), nuts (11), and washers (12) attaching bellmouth (13) to engine adapter flange located on forward end of compressor section.

14. Disconnect gas producer control lever on right side of engine (Chapter 76).

15. Disconnect freewheeling hoses (14 and 15) at forward firewall. Cap off firewall fittings to prevent gravity drain of transmission and entry of foreign material. On forward engine deck, disconnect compressor pressure hose (16), engine oil pressure hose (17), and engine torque pressure hose assembly (18).

NOTE

On helicopters S/N 254 through 660 and 672 through 715, disconnect engine oil pressure hose (48) at transducer (49) and engine torque pressure hose (50) at transducer (51, Detail E).

16. Disconnect two fuel differential pressure hoses (19 and 20) from forward side of fuel pump.

17. Disconnect droop compensator control lever on left side of engine (Chapter 76).

18. Remove anti-icing control valve (21) from pad at top of engine and install lift assembly tool (6796963 or equivalent) on pad. Connect hoist to lifting tool and take up slack.

19. Remove engine mount nuts (22) and washers (23) at fittings (25). Gain access to nuts (47) inside cabin roof through hatbox opening. Loosen hardware

only enough to free mount legs (45) from engine fittings (25).

20. Check engine and airframe to ensure engine is free of all connections to airframe before lifting engine.

21. Lift engine carefully and lower onto a suitable stand.

71-1-6. INSPECTION

1. Inspection of the engine shall be in accordance with Rolls-Royce 250-C18 Series Operation and Maintenance Manual 5W2.

2. Inspect all hose and tube assemblies for leakage, chafing, clamping, and security.

71-1-7. INSTALLATION

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.


NUMBER	NOMENCLATURE
C-405	Lockwire

WARNING

FAILURE TO PROPERLY INSTALL, ALIGN, AND TORQUE FUEL, OIL, AND AIR TUBES AND FITTINGS MAY RESULT IN AN ENGINE FAILURE.

CAUTION

IF A NEW, REPLACEMENT, RENTAL, OR LOANER ENGINE IS BEING INSTALLED, MAKE SURE SINGLE LIP SEALS 6854086 HAVE BEEN REMOVED AND REPLACED WITH DOUBLE LIP SEALS 406-340-104-101 (OR SUBSEQUENT) WITH METAL FACE SIDE OUT. REFER TO ROLLS-ROYCE 250-C18 SERIES OPERATION AND MAINTENANCE MANUAL.



1. Install lift assembly tool (6796963 or equivalent) on anti-icing control valve pad at top of engine.
2. Install engine leg mounts (45, [Figure 71-1-2](#)) if not previously installed ([paragraph 71-1-17](#)).
3. Hoist engine into airframe and align engine left and right side mount fittings (25) with leg mounts (45). Engage leg mounts with studs of fittings and install washers (23) and nuts (22) .
4. Remove lift assembly from engine.
5. Connect droop compensator linear actuator to left mount fitting (25) Refer to [Chapter 76](#) for droop compensator rigging and installation. Secure bolts in fitting with 0.032 inch lockwire.
6. Remove compressor inlet cover and align bellmouth assembly (13) with forward flange of engine inlet and install screws (10), washers (12) (one under screw head and one under nut), and nuts (11).

NOTE

When replacement 206-062-625-003 anti-icing valve is installed, rework 206-061-714-005 tube assembly in accordance with [Service Letter 206-106](#) if not previously accomplished.

NOTE

Refer to [Chapter 75](#) for rigging instructions of engine anti-icing control.

7. Install anti-icing control valve (21) on pad located at top of engine. Install spacers (42) between actuator bracket and engine, with large spacer over forward hole. Install 3/8 inch (9.50 mm) bolt  and washer in forward hole and 5/16 inch (7.90 mm) bolts , washers, and spacers in two aft holes. Secure bolt heads with 0.032 inch lockwire ([C-405](#)).
8. Install tube assembly (40) with clevis over engine valve lever and other end of tube over actuator lever (41). Secure tube with flathead pins, washers, and cotter keys.
9. Install tail rotor driveshaft and engine-to-transmission driveshaft ([Chapter 65](#)).
10. Install starter-generator ([paragraph 71-1-27](#)).

11. Connect oil outlet hose (4), oil inlet hose (3), and vent hose (5) at aft firewall.
12. Connect fuel inlet hose (9) at fitting on forward firewall.
13. Connect accessory drive overboard vent hose (8) to fitting on lower firewall (helicopters S/N 4 through 153).
14. Connect freewheeling assembly hoses (14 and 15) to unions on forward firewall.
15. Connect fuel pressure differential switch hoses (19 and 20) to forward side of fuel pump.

NOTE

On helicopters S/N 254 through 715, connect engine oil pressure hose (48) to transducer (49) and torque pressure hose (50) to transducer (51, Detail E).

16. Connect oil pressure hose (17), engine torque pressure hose (18), and compressor pressure hose (16) to deck fittings.
17. Clamp hoses as illustrated in [Figure 71-1-2](#).
18. Connect connector to anti-ice control valve (21).
19. Connect fuel filter connector (4, [Figure 71-1-3](#)) and governor actuator connector (5).
20. Connector starter-generator connector (1).
21. Connect engine electrical connectors (2 and 3).
22. Connect and rig engine controls ([Chapter 76](#)).
23. Inspect engine installation to ensure that all installations are complete. Check security of installation.




PRIOR TO INSTALLING EXHAUST STACKS, INSPECT ATTACHING FLANGE AREA FOR WARPING, DENTS, CRACKS, AND BURNED SPOTS THAT WOULD CAUSE A LEAKING EXHAUST JOINT.

NOTE

If exhaust stack clamp (1, [Figure 71-1-2](#)) is of the two-piece type, position clamps on stack with studs facing outboard, install nuts finger tight, and torque to 30 inch-pounds (3.38 Nm). Grasp top of stack and shake while lightly tapping around clamp, then check torque. Repeat this procedure until the required torque can be maintained. Secure nuts to clamp. After 30 minutes of engine operation, recheck torque. If check reveals loss of torque, torque to 30 inch-pounds (3.38 Nm), operate engine an additional 30 minutes, and repeat entire procedure. Secure nuts to clamp with 0.032 inch lockwire ([C-405](#)).

NOTE

If right side exhaust stack has the overboard vent hose attachment, install hose after installing exhaust stack and clamp (Detail C).

24. Install cowl ([paragraph 71-1-13](#)). Position exhaust stack (2) and clamp (1) on engine. Tap clamps lightly to seat clamps while tightening clamp nut until clamp is snug on exhaust stack and flange . Do NOT exceed 25 inch-pounds (2.82 Nm) torque. Install opposite exhaust stack in same manner.

25. Connect battery.



AFTER POWER PLANT CHANGE AND/OR DISCONNECTING ENGINE OIL INLET HOSE, OIL PUMP PRIMING SHALL BE ACCOMPLISHED PRIOR TO ENGINE START.

26. Service oil tank and transmission with approved oil ([Chapter 12](#)) and prime engine oil pump ([Chapter 79](#)).

27. Prior to starting, motor engine until oil pressure is indicated. Do not exceed time limits established for energized starter. Refer to applicable JetRanger Flight Manual.

NOTE

If pressure is not indicated within 30 seconds, stop and determine cause.

28. Check for indications of leaks after ground run. If leaks are found, correct and fill reservoir as required.

NOTE

If a new engine is being installed or if a new turbine outlet temperature (TOT) harness is installed on the engine at any time, check the TOT circuit in the helicopter for 8 ± 0.05 ohms ([Chapter 98](#)). An instrument that will measure the resistance in the range and accuracy of this requirement is available from Wheatstone Bridge Model RN-1, Crockett Engineering Co., P.O. Box 47287, Dallas, Texas 75247.

NOTE

After test flight, check engine oil filter for contamination.

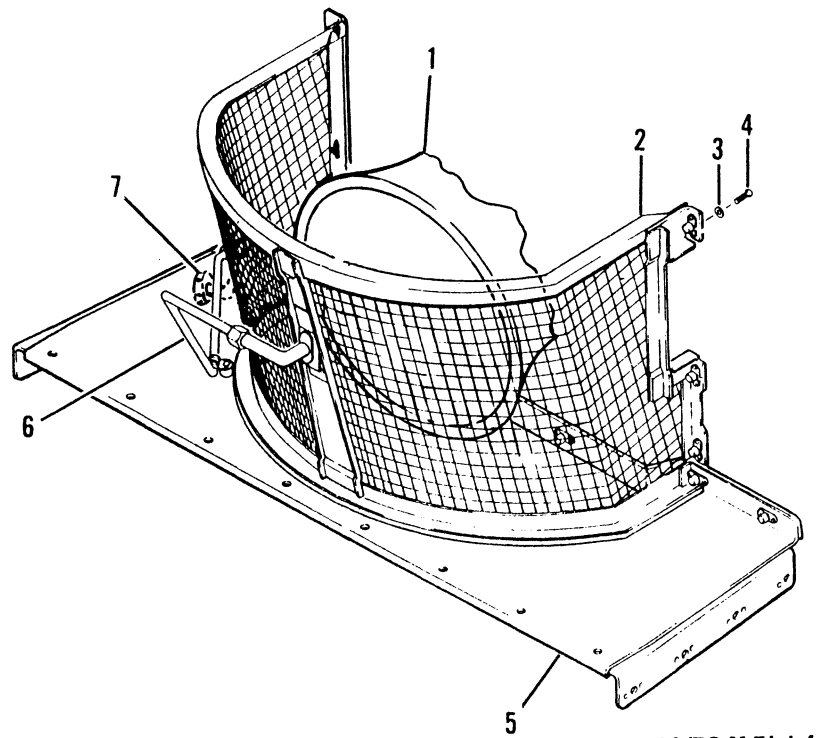
29. Do a torque check of the engine mount attachment hardware at engine and airframe attachment points, 100 flight hours after each installation ([Chapter 5](#)). This includes the engine mount nuts (3, [Figure 71-1-6](#)) and engine support nuts (6).

71-1-8. ENGINE COMPRESSOR WASH

The engine compressor wash provision consists of a right angle fitting, tube, clamp, and plug. The tube and fitting are connected to a bracket on the induction screen and provide a means of washing the engine.

71-1-9. ENGINE COMPRESSOR WASH — WASHING

1. Disconnect main ECU bleed airline and control line, if installed, at scroll and cap.
2. Remove plug (7, [Figure 71-1-4](#)) and connect engine compressor wash unit to tube (6).
3. Connect engine compressor wash unit and perform compressor wash in accordance with procedures listed in Rolls-Royce 250-C18 Series Operation and Maintenance Manual 5W2.



1. Engine bellmouth compressor
2. Induction screen
3. Washer
4. Screw
5. Floor
6. Compressor wash tube
7. Plug

206A/BS-M-71-1-4

Figure 71-1-4. Engine Compressor Wash and Induction Screen

4. Disconnect engine compressor wash unit and install plug (7) in tube (6).
5. Remove caps from main ECU bleed air line and control line, if installed, and connect lines to their respective fittings.

COWLINGS AND FAIRINGS

71-1-10. COWLINGS AND FAIRINGS.

The engine and transmission cowlings consist of four sections: forward fairing, induction fairing, engine cowl assembly, and aft fairing. The cowlings are constructed of aluminum alloy, fiberglass, and honeycomb material and are readily removable for engine and transmission changes. Cowling access panels are provided with snap-open fasteners which permit inspection without removing the cover unit (figure 71-1-5).

NOTE

On helicopters S/N 154 subsequent, forward and aft fairing assemblies are secured with fasteners.

On helicopters prior to S/N 914, the engine cowl side panels and aft fairing contain louvers, and the forward fairing contains a screen for ventilation.

On helicopters 914 and subsequent, the forward fairing does not include a screen, but screens were incorporated into the engine cowl, cowl side panels, and aft fairing.

71-1-11. REMOVAL.



PROTECT COMPRESSOR INLET AND EXHAUST PORT OPENING WHEN COWL IS REMOVED.

1. Remove screws and washers or unfasten fasteners securing the forward fairing (1, figure 71-1-5). Remove fairing.
2. Remove screws and washers or unfasten fasteners securing aft fairing (5). Remove fairing.
3. Unlatch access door on each side of induction fairing (2) and remove screws or unfasten fasteners attaching induction fairing to roof deck. Remove screws

and washers or unfasten fasteners attaching aft end of fairing to forward firewall. Unlatch engine cowl panels to gain access to internal screws.

4. Unlatch engine cowl side panels (7) and remove exhaust stack assemblies (4) (paragraph 71-1-5). Remove screws and washers or unfasten fasteners attaching cowl to forward and aft firewalls. Remove engine cowl.

5. Remove screws and washers or unfasten fasteners from aft fairing (5). Remove fairing.

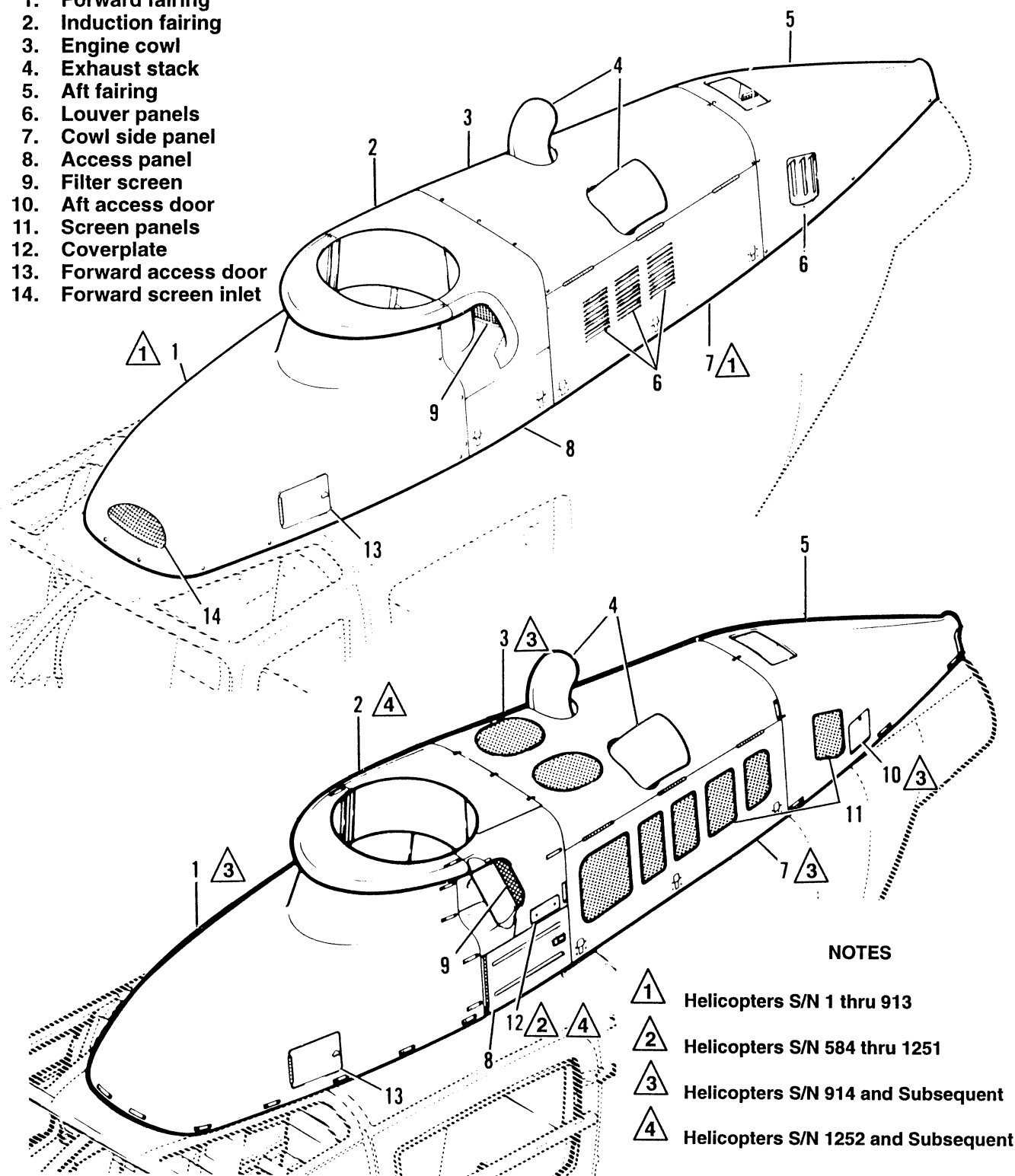
71-1-12. INSPECTION.

1. Inspect hinges, latches, and fittings for wear, damage, and serviceability.
2. Inspect seals for tears, cracks, security, and deterioration.
3. Inspect cowling for cracks, dents, holes and other damage.

71-1-13. INSTALLATION.

1. Position engine cowl (3, figure 71-1-5) over forward and aft firewalls and install screws and washers or fasten fasteners. Install exhaust stack (4) (paragraph 71-1-7).
2. Position aft fairing (5) over aft firewall, align holes, and install screws and washers or fasten fasteners.
3. Install forward fairing (1), align holes with induction fairing (2) and roof deck attachment angle, and install screws and washers or fasten fasteners.
4. Position induction fairing (2) over forward firewall and align mounting holes. Install screws or fasten fasteners securing fairing to roof deck. Install screws and washers or fasten fasteners in forward firewall.
5. Check cowling and fairings for security and lock all access door panel latches.

1. Forward fairing
2. Induction fairing
3. Engine cowl
4. Exhaust stack
5. Aft fairing
6. Louver panels
7. Cowl side panel
8. Access panel
9. Filter screen
10. Aft access door
11. Screen panels
12. Coverplate
13. Forward access door
14. Forward screen inlet



NOTES

- △1 Helicopters S/N 1 thru 913
- △2 Helicopters S/N 584 thru 1251
- △3 Helicopters S/N 914 and Subsequent
- △4 Helicopters S/N 1252 and Subsequent

206A/BS-M-71-1-5

Figure 71-1-5. Engine cowlings and fairings

ENGINE MOUNTS

71-1-14. ENGINE MOUNTS.

The engine is supported on the service deck with three bipod mounts located on the right, left, and lower side of the engine. Shims are provided at each mount leg for engine alignment.



IF THE ENGINE MOUNTS ARE REMOVED, DO NOT REMOVE THE BONDED SHIMS. THESE SHIMS DIRECTLY AFFECT ENGINE-TO-TRANSMISSION ALIGNMENT. IF REMOVAL IS REQUIRED, MARK THE SHIMS TO PREVENT LOSS OR INTERMIXING.

71-1-15. REMOVAL.

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
—	Hoist, 600 Lb (272 Kg) Capacity, Minimum
6796963	(Allison) Lift Assembly

1. Remove engine (paragraph 71-1-5).



WHEN REMOVING SHIMS, INDEX SHIMS TO THEIR POSITION TO ENSURE PROPER ENGINE ALIGNMENT AT INSTALLATION. BOND LOOSE SHIMS IN PLACE WITH ADHESIVE (C-317).

NOTE

Removal procedures for left or right engine mount support are the same.

2. Remove cotter pins (5, figure 71-1-6), nuts (6), washers (7), and bolts (9, 11, or 12) to remove mounts (4, 10, or 13), as required.

71-1-16. INSPECTION.



1. Inspect the tubes assemblies and weld areas of the mount for cracks. If cracks are found, replace the mount.
2. Inspect mount bolts and nuts for thread damage.
3. Thoroughly clean oil and dirt film from engine mount legs (4, 10, 13, and 16, figure 71-1-6).
4. Refer to figure 71-1-7 for repair and damage limits.
5. Polish out nicks and scratches (BHT-ALL-SPM).
6. Apply one coat of zinc chromate primer (C-201) to repaired surfaces and engine mount covers (17, figure 71-1-6).
7. Wrap engine mount legs (16) with bag seal compound (C-236), 0.125 x 0.50 inch (3.17 x 12.70 mm) or fill engine mount cover (17) halves with bag seal compound.

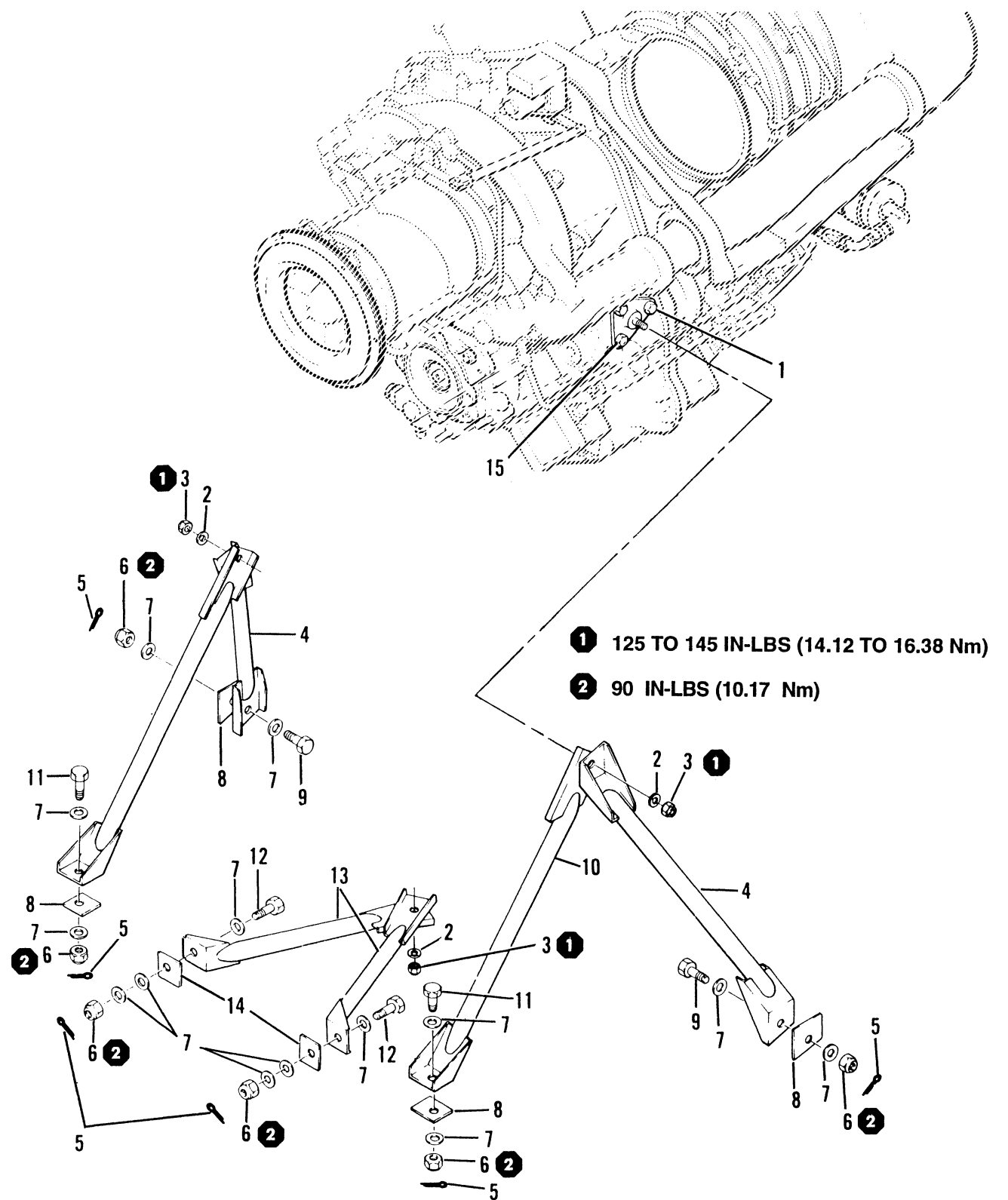
71-1-17. INSTALLATION.

1. Install covers (17, figure 71-1-6) on engine mount legs (16), locating evenly between leg gussets. Remove excessive compound squeeze-out.
2. Apply compound (C-236) to split line and ends of cover (17).



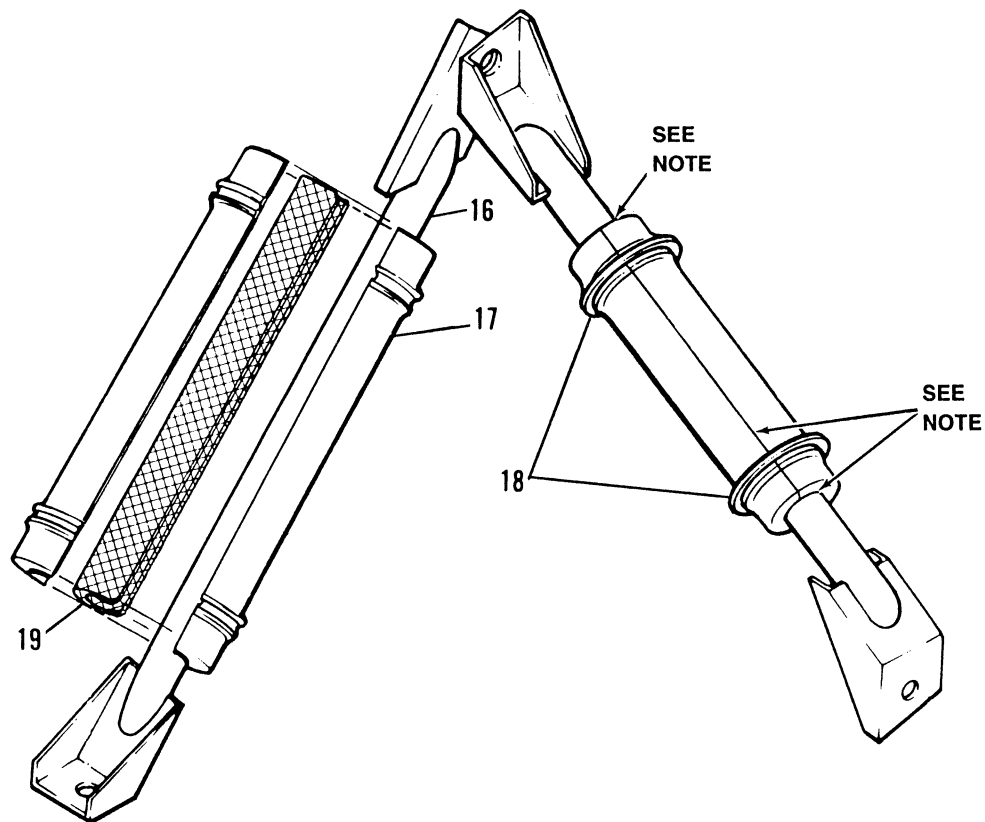
ENSURE THAT CORRECT SHIMS ARE INSTALLED UNDER FITTINGS OF MOUNT LEGS.

3. Install left or right engine mount as follows:
 - a. Position engine mounts (4, 10, and 13) on engine mounting pads.
 - b. Install three washers (2) and three nuts (3) .
4. Position mounts (4, 10, and 13) on airframe and install bolts (9, 11, and 12), washers (7) (one under bolthead, one under nut), and nuts (6) . Install cotter pins (5).
5. Install engine (paragraph 71-1-7).



206A/BS-M-71-1-6-1

Figure 71-1-6. Installation of engine mounts (Sheet 1 of 2)



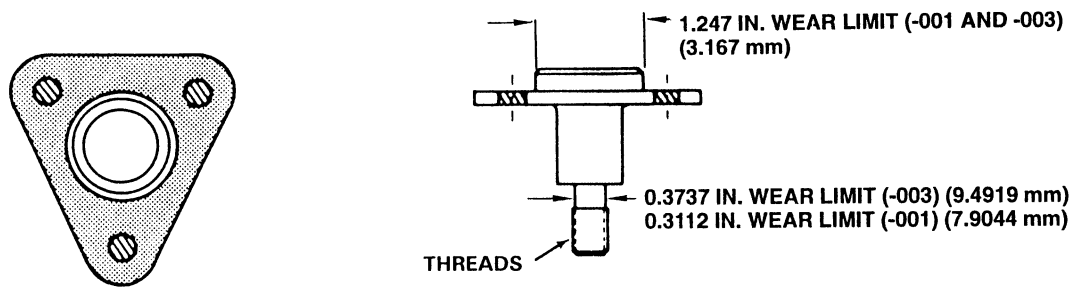
NOTE

Seal ends of cover and split line with proseal sealing compound (C-360).


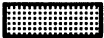

- | | |
|----------------------|--------------------------------------|
| 1. Nut | 11. Bolt |
| 2. Washer | 12. Bolt |
| 3. Nut | 13. Engine mount leg |
| 4. Engine mount leg | 14. Shim |
| 5. Cotter pin | 15. Engine mount fitting |
| 6. Nut | 16. Engine mount leg |
| 7. Washer | 17. Engine mount leg cover |
| 8. Shim | 18. Retaining rings |
| 9. Bolt | 19. Seal compound (typical 2 places) |
| 10. Engine mount leg | |

206A/BS-M-71-1-6-2

Figure 71-1-6. Installation of engine mounts (Sheet 2)



206-061-104-001 AND -003
ENGINE MOUNT FITTING

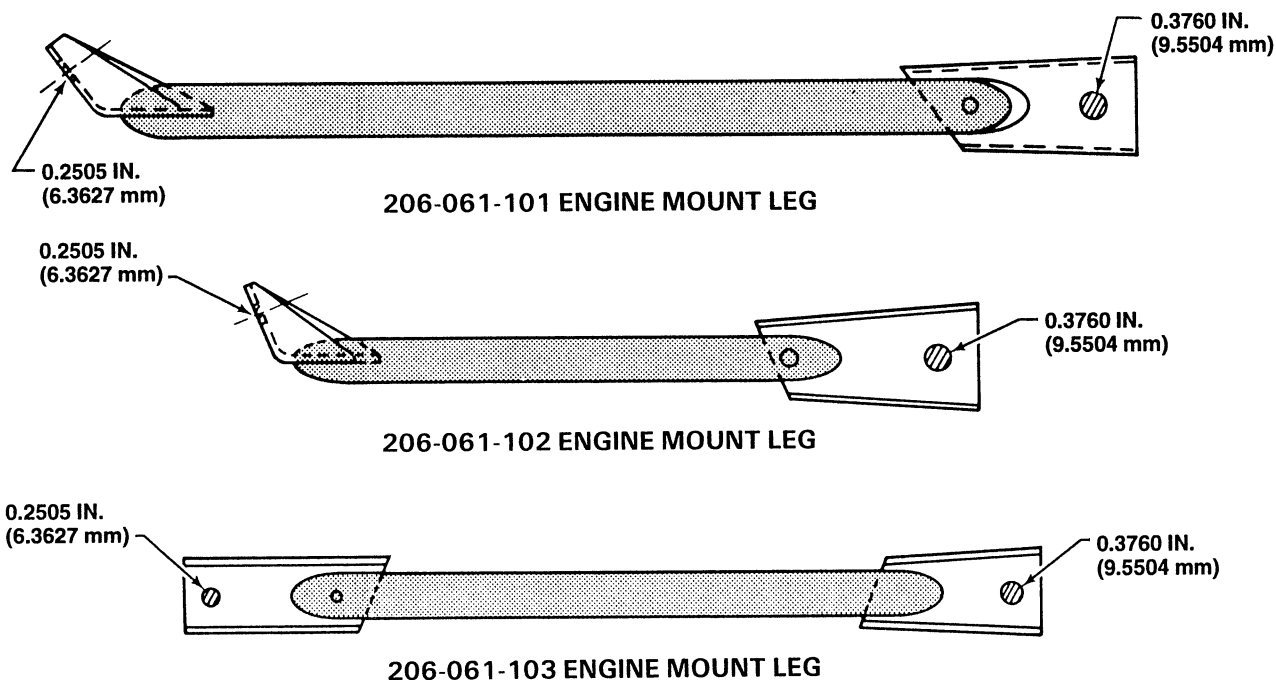
DAMAGE LOCATION SYMBOLS			
TYPE OF DAMAGE	  		
	MAXIMUM DAMAGE AND REPAIR DEPTH		
MECHANICAL BEFORE AND AFTER REPAIR	0.005 In. (0.127 mm)	0.01 In. (0.25 mm)	0.05 In. (1.27 mm)
CORROSION BEFORE AND AFTER REPAIR	0.003 In. (0.076 mm)	0.01 In. (0.25 mm)	0.025 In. (0.635 mm)
MAXIMUM AREA PER FULL DEPTH REPAIR	20% of area	10% of surface area	25% of area
EDGE CHAMFER	0.01 in. (0.25 mm)	0.02 In. (0.50 mm)	0.03 In. (0.76 mm)

NOTES

1. Applicable for both sides of flange threads.
2. Thread damage that does not exceed a depth of one-third of thread and a length of 1/4 inch (1 damage per bolt) is acceptable.

206A/BS-M-71-1-7-1

Figure 71-1-7. Engine mount and engine mount leg — wear and damage limits (Sheet 1 of 2)



DAMAGE LOCATION SYMBOLS



TYPE OF DAMAGE

MAXIMUM DAMAGE AND REPAIR DEPTH

NICK, SCRATCHES
BEFORE AND
AFTER REPAIR

0.005 In. (0.127 mm)

0.002 In. (0.050 mm)

0.02 In. (0.50 mm)

DENTS
BEFORE AND
AFTER REPAIR

0.005 In. (0.127 mm)

0.004 In. (0.101 mm)

0.01 In. (0.25 mm)

CORROSION
BEFORE AND
AFTER REPAIR

0.003 In. (0.076 mm)

0.002 In. (0.050 mm)

0.02 In. (0.50 mm)

MAXIMUM AREA PER
FULL DEPTH REPAIR

20% of area

10% of surface area

25% of area

EDGE CHAMFER

0.01 In. (0.25 mm)

—

0.02 In. (0.50 mm)

NOTE

Nonrepairable limit for smooth dents only. Sharp dents are not acceptable.

206A/BS-M-71-1-7-2

Figure 71-1-7. Engine mount and engine mount leg — wear and damage limits (Sheet 2)

FIREWALLS

71-1-18. FIREWALLS.

The engine compartment firewalls and engine pan are constructed of titanium. Firewalls are located forward and aft, and below engine.

71-1-19. INSPECTION AND REPAIR OF FIREWALLS AND FIRESEALS.



DO NOT USE CHLORINATED SOLVENTS OR CUTTING FLUIDS ON TITANIUM PARTS.

1. Inspect forward and aft firewalls (22 and 11, figure 71-1-8) for dents, nicks, and scratches (BHT-206A/B-SERIES-CR&O).

a. Negligible damage. Smooth contour dents, nicks, and scratches that do not penetrate the titanium or stainless steel.

b. Repairable damage. Damage that penetrates the titanium or stainless steel shall be repaired or the part shall be replaced (BHT-206A/B-SERIES-CR&O).

2. Inspect forward and aft firewalls (22 and 11) for deterioration of seals and chafing.

3. Strip seals (1 and 6) are cemented to forward and aft firewalls (22 and 11). Cement new strip seals to firewalls with adhesive (C-311).

4. Inspect forward and aft firewalls (22 and 11) for loose fittings, receptacles, and nutplates. Check nutplates for thread damage.

5. Inspect forward and aft firewalls (22 and 11) for loose sealer in bend radii and bend ends. Fill all gaps and voids to a depth of 0.18 inch (4.60 mm) with sealing compound (C-353).

NOTE

Ensure 23052363 placard warning is in excellent condition on forward and aft firewalls.

6. Inspect warning placard (23) on forward and aft firewalls (22 and 11) for legibility.

7. Remove deteriorated placard (23).

8. Clean placard location with methyl-ethyl-ketone (MEK) (C-309) or acetone (C-316).

9. Install placard (Chapter 11).

71-1-20. ENGINE BELLMOUTH.

The engine bellmouth assembly is constructed of aluminum alloy and provides an airfoil inlet for induction air to the engine. The engine bellmouth is fastened to the forward side of forward firewall, and a fireseal is provided by use of a gasket.

71-1-21. REMOVAL.

1. Remove engine upper cowl with engine side cowl (paragraph 71-1-11).

2. Remove forward fairing and air induction cowl (paragraph 71-1-11).

3. Index bellmouth (5, figure 71-1-8) toward forward firewall (22).

4. Remove screws (2) and washers (3) from aft side of forward firewall (22). Remove engine bellmouth (5).

71-1-22. INSPECTION.

1. Inspect engine bellmouth (5, figure 71-1-8) for dents and cracks.

2. Inspect gasket (24) for deterioration of material and cracked or damaged plates.

3. Inspect screws (2) for serviceability.

71-1-23. INSTALLATION.

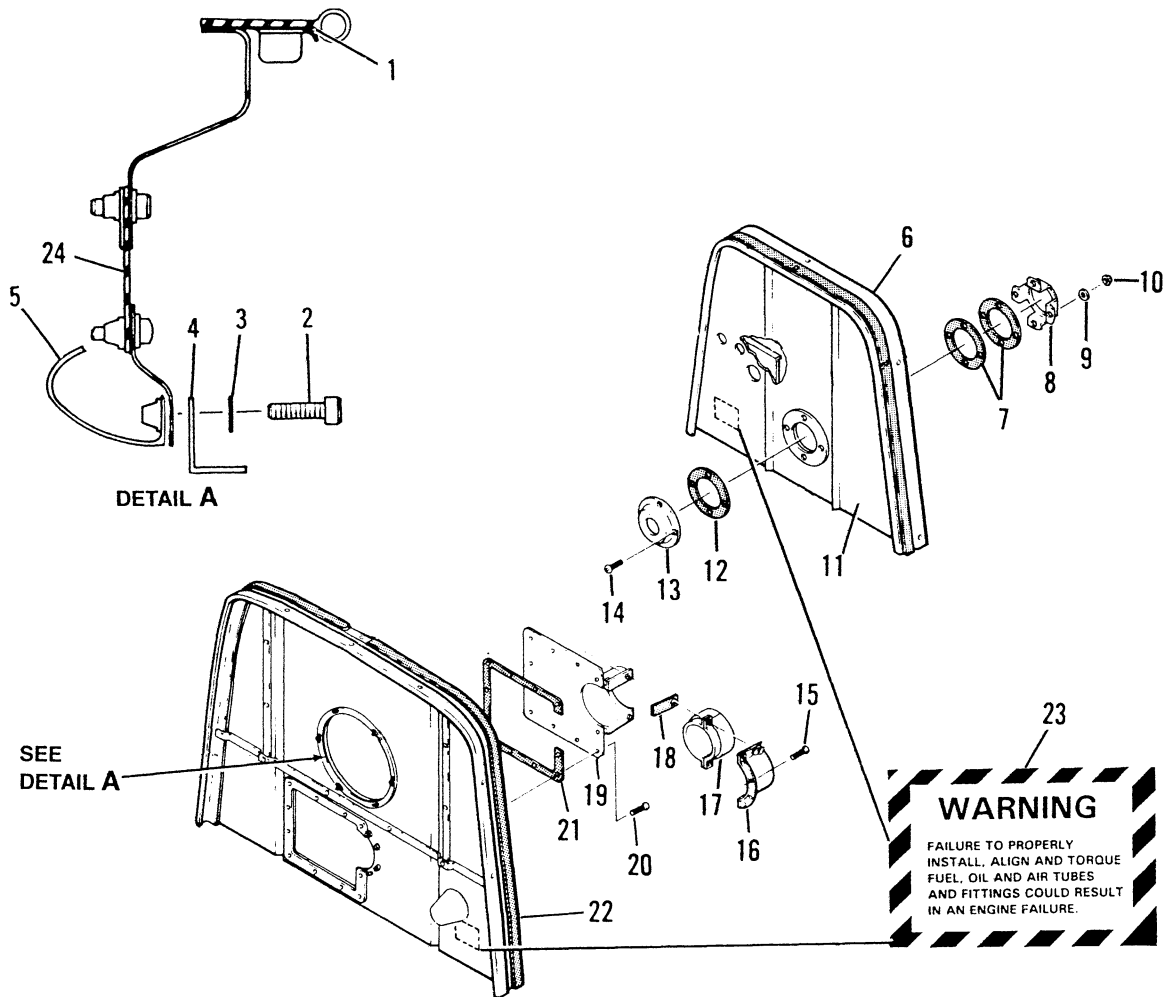
1. Position and align index marks on engine bellmouth (5, figure 71-1-8) on forward firewall (22).

2. Install screws (2) with washers (3) to secure engine to bellmouth (5) to forward firewall (22).

3. Install engine upper cowling with side panels (paragraph 71-1-13).

4. Install engine air induction cowl (paragraph 71-1-13).

5. Install forward fairing (paragraph 71-1-13).



- | | | |
|------------------------|------------------|----------------------|
| 1. Seal | 9. Washer | 17. Cover |
| 2. Screw | 10. Nut | 18. Gasket |
| 3. Washer | 11. Aft firewall | 19. Door |
| 4. Engine inlet flange | 12. Seal | 20. Screw |
| 5. Bellmouth | 13. Cover | 21. Gasket |
| 6. Seal | 14. Bolt | 22. Forward firewall |
| 7. Seal | 15. Screw | 23. Placard |
| 8. Ring | 16. Cone | 24. Gasket |

206A/BS-M-71-1-8

Figure 71-1-8. Forward and aft firewalls

STARTER-GENERATOR

71-1-24. STARTER-GENERATOR.

Starter-generator is located on underside of the engine to right of helicopter centerline. The starter-generator is used to start engine, charge battery, and supply power for operation of dc equipment. The starter-generator is vented with a cooling duct made of fiberglass, and located at right side of engine.

71-1-25. REMOVAL.

1. Ensure electrical power is OFF.
2. Remove starter-generator cooling duct as follows:
 - a. Open right engine side panel (7, figure 71-1-5).
 - b. Loosen band clamp (6, figure 71-1-9) and slide over starter-generator cooling duct (7).
 - c. Loosen screw (9) and remove cooling duct (7) from support clamp (10).
 - d. Remove starter-generator cooling duct (7) and remove spacer (5) from starter-generator (4).
3. Remove starter-generator (4) as follows:
 - a. Disconnect electrical leads. Protect ends of wires with electrical tape.



STARTER-GENERATOR SHALL BE SUPPORTED WHENEVER CLAMP IS LOOSENED. UNIT SHALL NEVER BE ALLOWED TO SUPPORT ITS OWN WEIGHT SOLELY BY DRIVE SPLINE ENGAGEMENT. FAILURE TO HEED THIS CAUTION WILL CAUSE DAMAGE TO THE SHAFT AND SHEAR SECTION.

- b. Loosen nut (3) on T-bolt securing V-clamp (2). Keep starter-generator (4) flush against mounting pad while removing V-clamp.
- c. Slide starter-generator (4) straight aft until splined shaft (11) is clear of engine driveshaft. Do not unnecessarily rotate shaft.

71-1-26. INSPECTION.

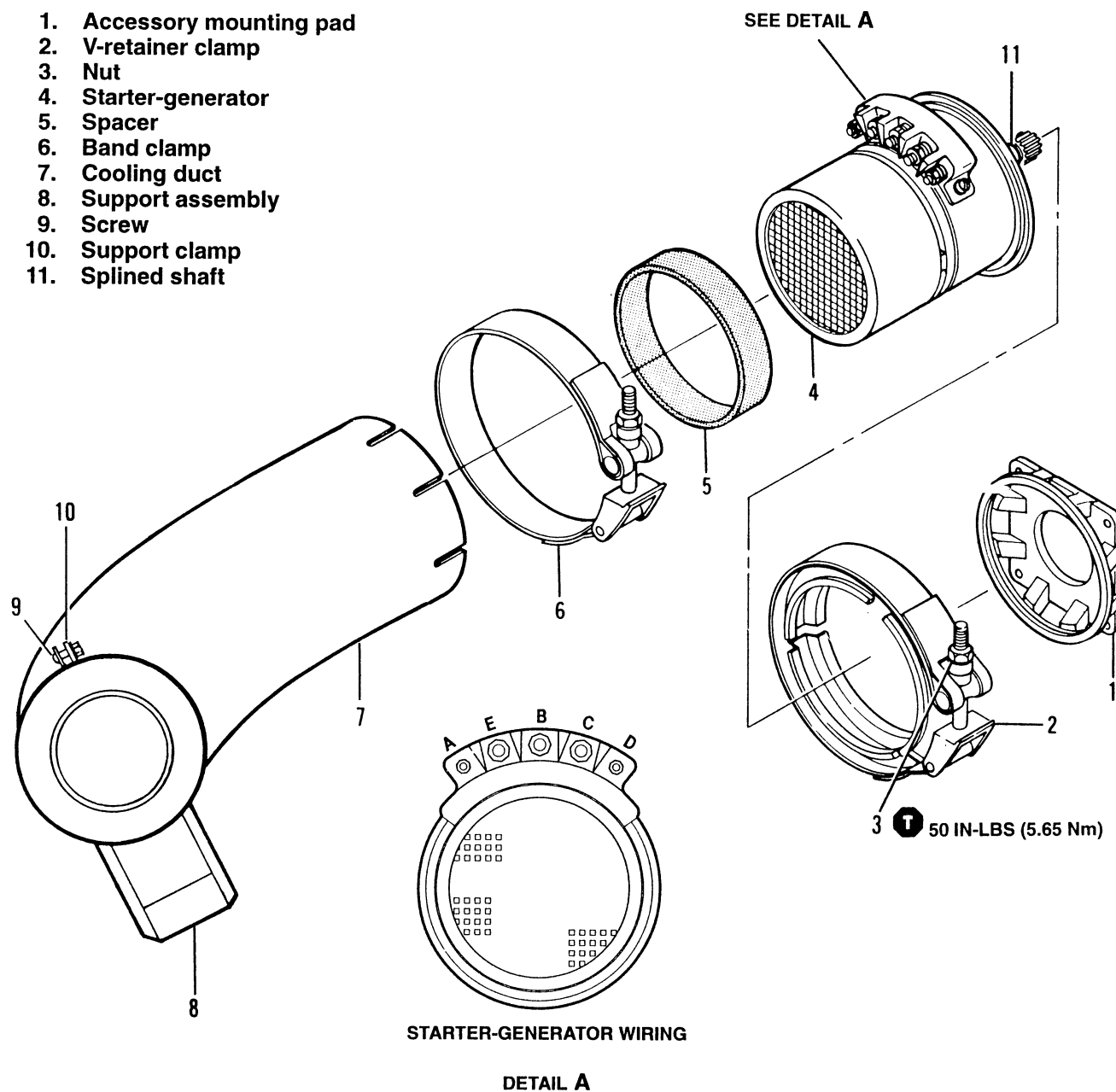
1. Check for warped or cracked terminal board or terminal damage.
2. Check brush cover for dents, loose or bent pins, broken spring, or damaged insulation.
3. Clean exterior of unit with a clean cloth moistened in solvent (C-304) and wipe dry.
4. Inspect starter-generator (Chapter 96).

71-1-27. INSTALLATION.



STARTER-GENERATOR SHALL BE SUPPORTED WHENEVER CLAMP IS LOOSENED. UNIT SHALL NEVER BE ALLOWED TO SUPPORT ITS OWN WEIGHT SOLELY BY DRIVE SPLINE ENGAGEMENT. FAILURE TO HEED THIS CAUTION WILL CAUSE DAMAGE TO THE SHAFT AND SHEAR SECTION.

1. Apply a film of approved lubricating oil to splines of splined shaft (11, figure 71-1-9) and install starter-generator (4) into accessory mounting pad (1).
2. Install V-retainer clamp (2) on starter-generator (4).
3. When tightening V-retainer clamp (2), first tighten nut (3) snugly, then tap V-retainer clamp with a rubber mallet and apply final torque to nut (3) **T**. Secure nut with lockwire.
4. Position spacer (5) on aft end of starter-generator (4). With spacer installed, ends must butt together within 0.06 inch (1.50 mm) maximum gap.
5. Position band clamp (6) on cooling duct (7). Work cooling duct into spacer (5). Tighten band clamp.
6. Position support clamp (10) on cooling duct (7). Tighten clamp.
7. Connect electrical leads (Chapter 98).

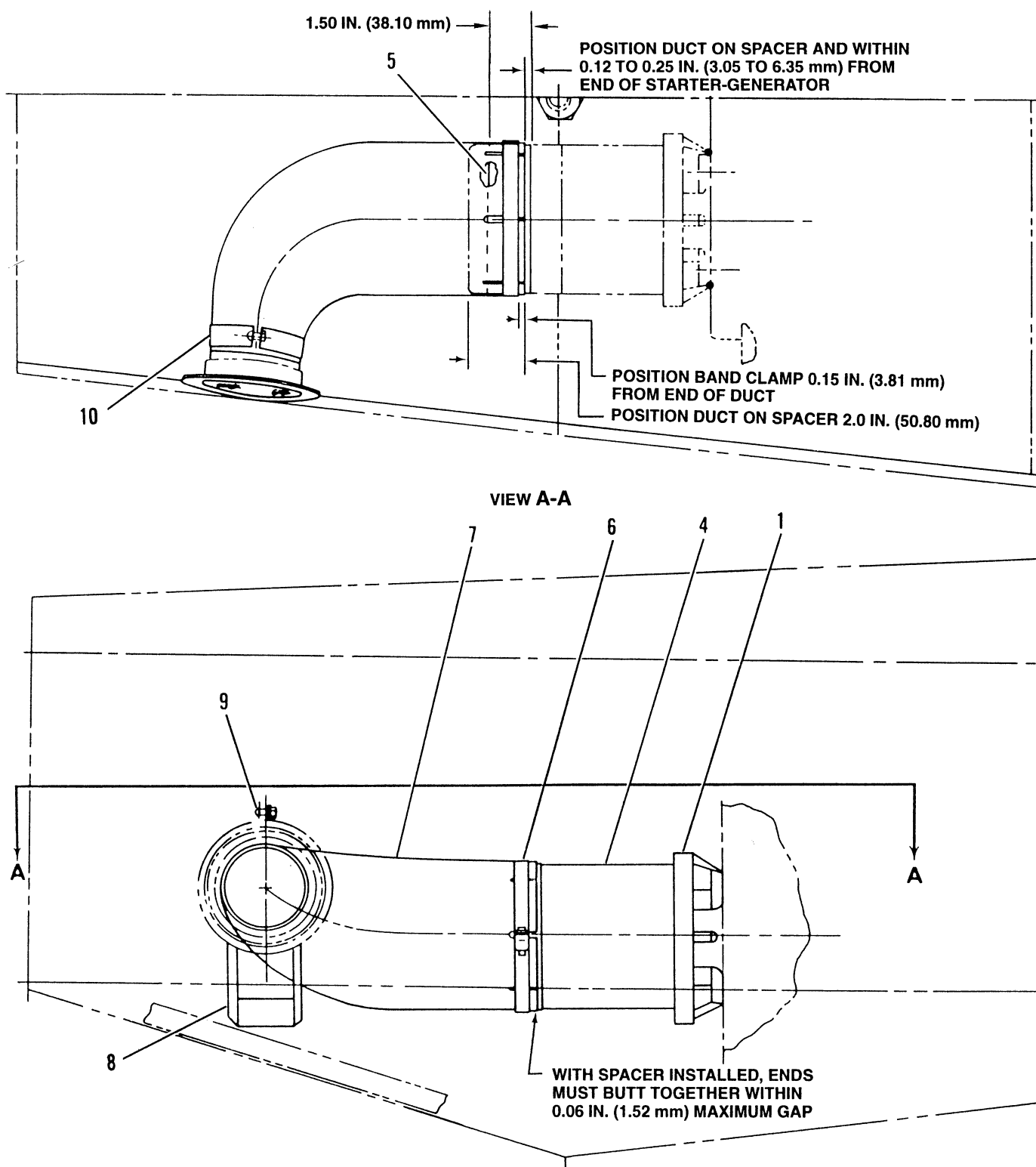


NOTE

Starter rotated to show electrical connectors on top for clarity.

206A/BS-M-71-1-9-1

Figure 71-1-9. Starter-generator (Sheet 1 of 2)



206A/BS-M-71-1-9-2

Figure 71-1-9. Starter-generator (Sheet 2)

SECTION 2 POWER PLANT (MODEL 250-C20) **B**

71-2-1. POWER PLANT.

The helicopter is powered by an Allison model 250-C20 turboshaft engine. The engine consists of a single-stage centrifugal-flow compressor, a single combustion chamber, a two-stage gas producer turbine, and a two-stage power turbine.

The power plant (engine) assembly is horizontally mounted aft of the transmission and above the fuselage. The engine is supported by three bipod mounts attached to the service deck and is coupled to the transmission through the freewheeling unit and main driveshaft (figure 71-2-1).

71-2-2. TROUBLESHOOTING ENGINE.

1. Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2 for engine troubleshooting procedures.

2. Torsional oscillation.

a. When the response or following time of the engine speed control system is the same as the natural harmonic frequency of the power train system, a torsional oscillation (or oscillation in power output) can occur. A torsional oscillation can be caused by one or more of the following:

(1) Leakage of fittings of engine fuel control air lines

(2) Dirty or malfunctioning double-check valve

(3) Malfunction of fuel control or power governor.

b. After an engine component change involving the fuel control system, it is recommended that the helicopter be checked for torsional oscillation. This check shall be performed as follows:

(1) Load helicopter as much as possible up to gross weight. This check must be performed at a minimum of 85 percent torque.

(2) Fly helicopter up to the maximum power limitations for the engine as specified in the Flight Handbook. This can be done best by climbing the helicopter.

(3) While at the high power setting, quickly rotate the twist grip approximately 15 to 20 degrees off toward the flight idle stop and quickly return the grip to the maximum open position. At this time, torsional oscillation may be noted. If the system is functioning properly, the torsional oscillations should be completely dampened within 6 to 10 oscillations. These oscillations may be felt in the fuselage as well as observed on the torquemeter and N2 tachometer. The engine sound will also be changed during oscillations.

(4) If the torsional oscillations are not dampened within 6 to 10 oscillations, or if they intensify, turn twist grip toward the flight idle stop until oscillations stop. The twist grip may be opened slowly to restore engine power.

c. If torsional oscillations exceed the limits specified in preceding steps, corrective action must be taken. Correct the oscillations in the sequence shown. If step c.(1) procedures do not correct the problem, proceed to step c.(2), etc.

(1) Check fuel control air lines for loose connections and air leaks.

(2) Clean double-check valve. (Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2.)

(3) Replace double-check valve.

(4) Replace fuel control and/or N2 governor.

71-2-3. OPERATIONAL CHECK.

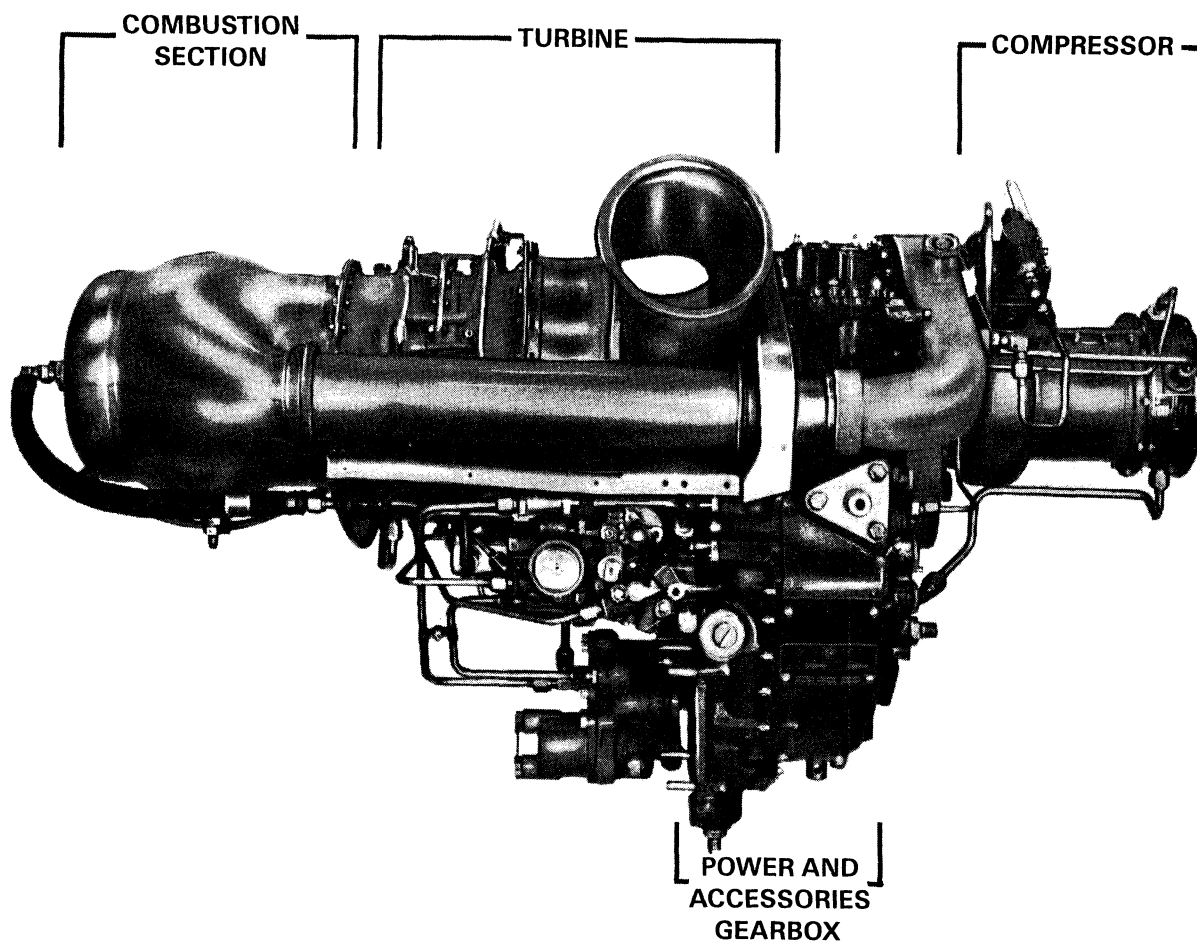


AFTER ENGINE CHANGE AND/OR DISCONNECTING THE ENGINE OIL INLET HOSE, OIL PUMP PRIMING SHALL BE ACCOMPLISHED PRIOR TO ENGINE START.

1. Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2 for oil pump priming.



DO NOT EXCEED STARTER LIMITATION WHILE MOTORING ENGINE.



206A/BS-M-71-2-1

Figure 71-2-1. Engine major components — model 250-C20

2. Prior to initial engine starting, motor engine until oil pressure is indicated. Do not exceed starter limitations. If an indication of oil pressure is not seen in 30 seconds, stop and determine cause. Refer to applicable JetRanger Flight Manual.

3. Perform engine check run. Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2. Operation of helicopter shall be in accordance with applicable JetRanger Flight Manual.

NOTE

If a new engine is being installed or if a new turbine outlet temperature (TOT) harness is installed on the engine at any time, check the TOT circuit in the helicopter for an 8 plus or minus 0.05 ohms (Chapter 98). An instrument which will measure the resistance in the range and accuracy of this requirement is available from Wheatstone Bridge Model RN-1, Crockett Engineering Co., P.O. Box 47287, Dallas, Texas 75247.

NOTE

After test flight, check oil filter for contamination.

71-2-4. POWER PLANT (Helicopters S/N 661 through 671 and 716 through 2211).

The power plant should be disconnected and removed from the airframe as a quick-change assembly using the following procedures as a guide.

71-2-5. REMOVAL.

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
—	Hoist, 600 Lb (272 Kg) Capacity, Minimum
6796963	(Allison) Lift Assembly Tool
SWE13872	(Allison) Engine Stand
SWE13872-10	(Allison) Engine Adapter

1. Disconnect battery and external power.

2. Raise engine cowl panels and remove clamps (1, figure 71-2-2) from exhaust stacks (2). Remove stacks and install covers on engine exhaust ports. Remove vent hose (8, detail C) if installed on exhaust stack.

3. Remove engine cowling (paragraph 71-2-11).

4. Disconnect electrical connectors (2 and 3, figure 71-2-3).

5. Disconnect starter-generator connector (1).

6. Disconnect fuel filter connector (4) and governor actuator connector (5).

7. Disconnect connector on anti-ice valve (21, figure 71-2-2).



STARTER-GENERATOR SHALL BE SUPPORTED WHEN MOUNTING CLAMP IS LOOSENED. FAILURE TO SUPPORT STARTER-GENERATOR WILL RESULT IN PREMATURE FAILURE OF SHAFT.

8. Remove starter-generator (paragraph 71-2-25).

9. Remove engine-to-transmission driveshaft, disconnect tail rotor driveshaft, and remove (Chapters 63 and 65).

10. Drain engine oil tank and cooler (Chapter 79). Position container under helicopter at engine pan drain line to collect fuel and oil spillage.

11. Disconnect engine oil inlet hose (3), outlet hose (4), and vent hose (5) at aft firewall. Disconnect clip (6) and clamp (7) securing oil hoses to engine and mount leg (detail A).

12. Disconnect accessory drive vent hose (8) at engine.

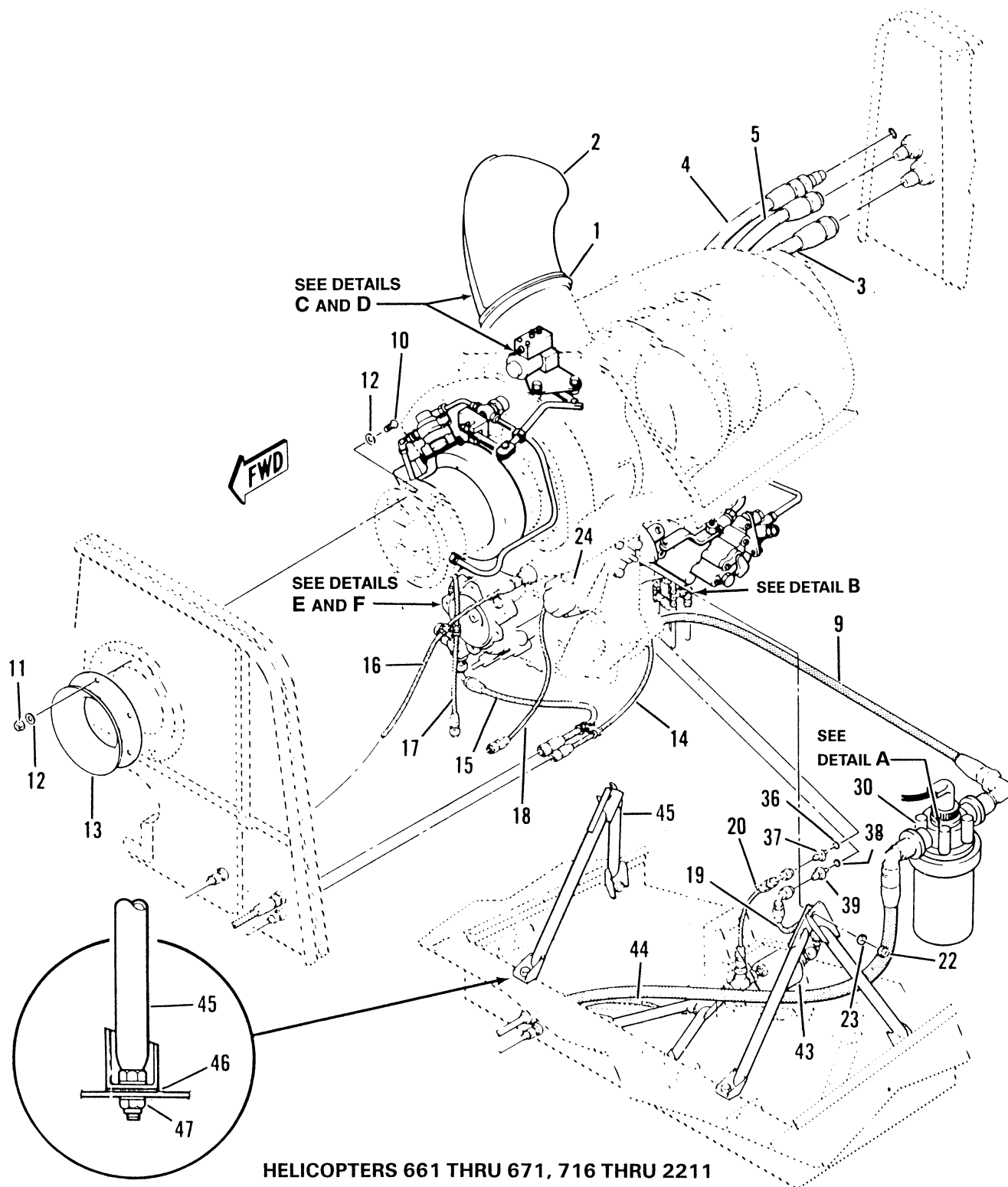
13. Disconnect engine fuel inlet hose (9) at fuel filter.

NOTE

Index bellmouth flex coupling to forward firewall to facilitate reassembly.

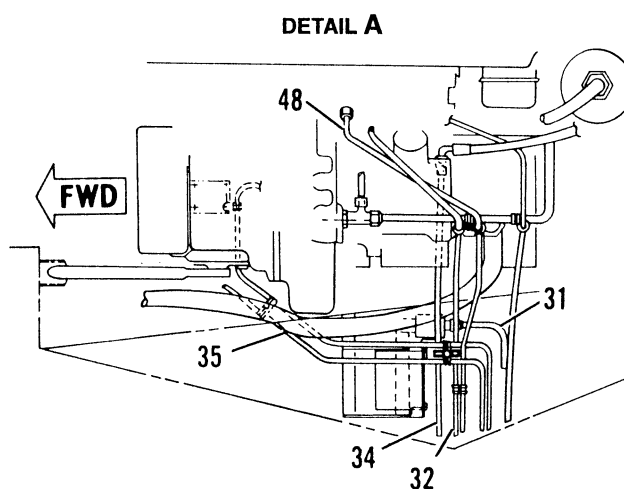
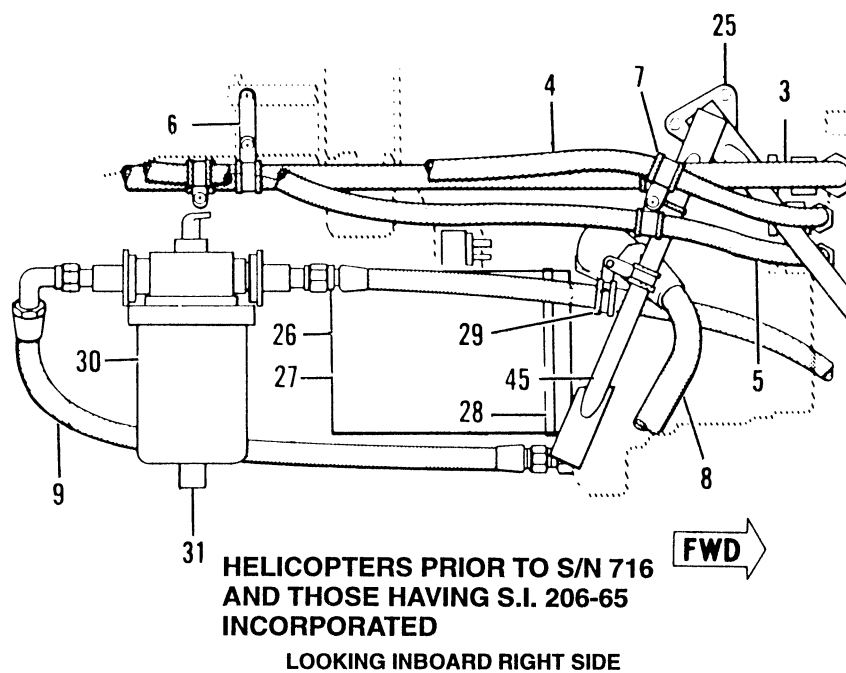
14. Remove screws (10), nuts (11), and washers (12) attaching bellmouth (13) to engine adapter flange located on forward end of compressor section.

15. Disconnect gas producer control lever on right side of engine.

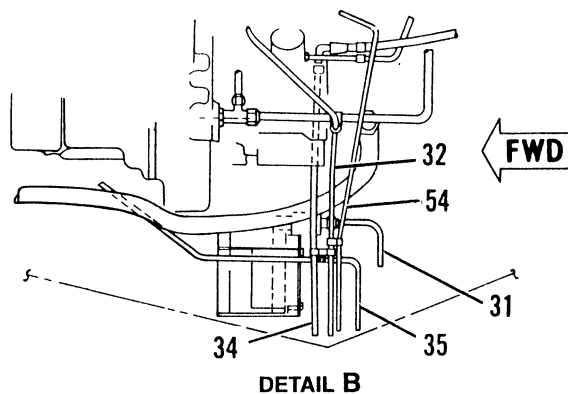


206A/BS-M-71-2-2-1

Figure 71-2-2. Engine installation — model 250-C20 (Sheet 1 of 6)



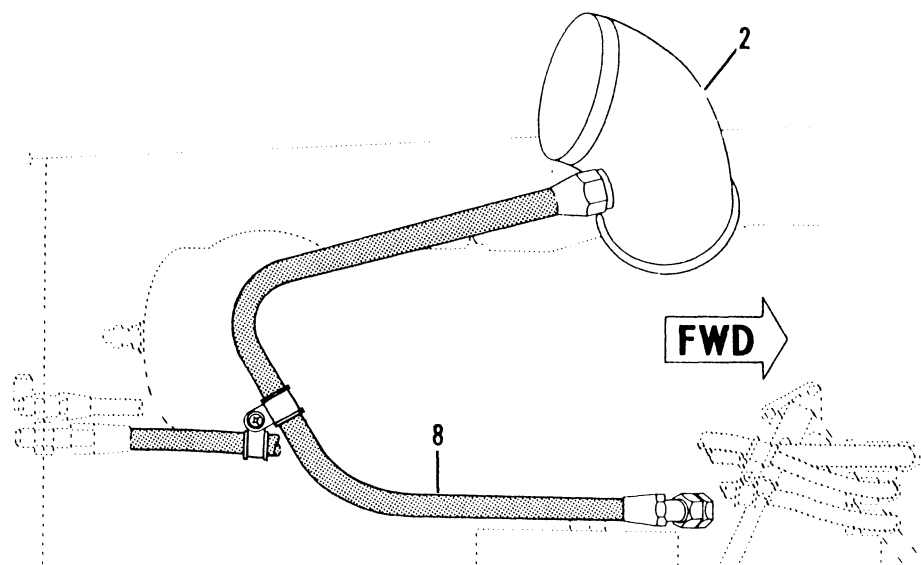
HELICOPTERS S/N 661 THRU 671 AND 716 THRU 913



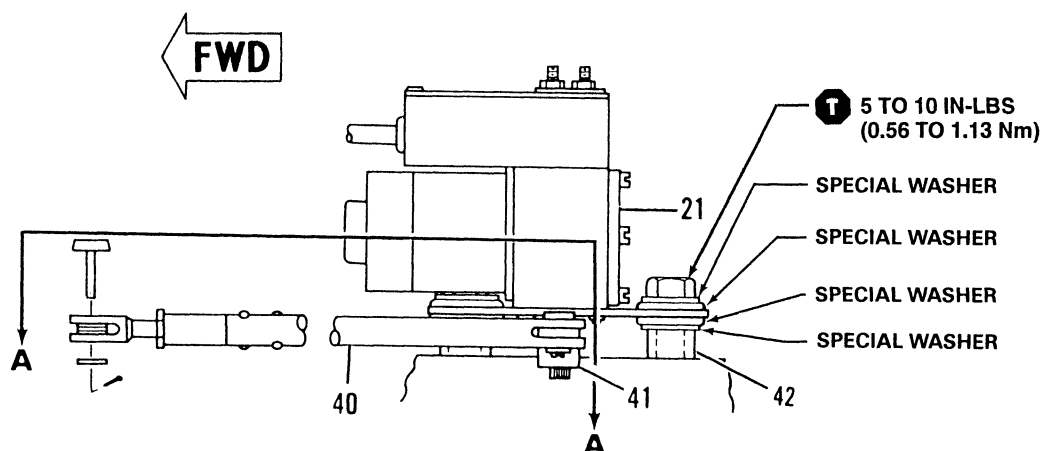
HELICOPTERS S/N 914 THRU 2211

206A/BS-M-71-2-2-2

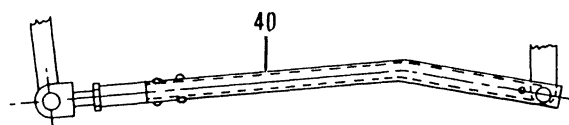
Figure 71-2-2. Engine installation — model 250-C20 (Sheet 2)



DETAIL C
LOOKING INBOARD RIGHT SIDE



DETAIL D
LOOKING INBOARD LEFT SIDE

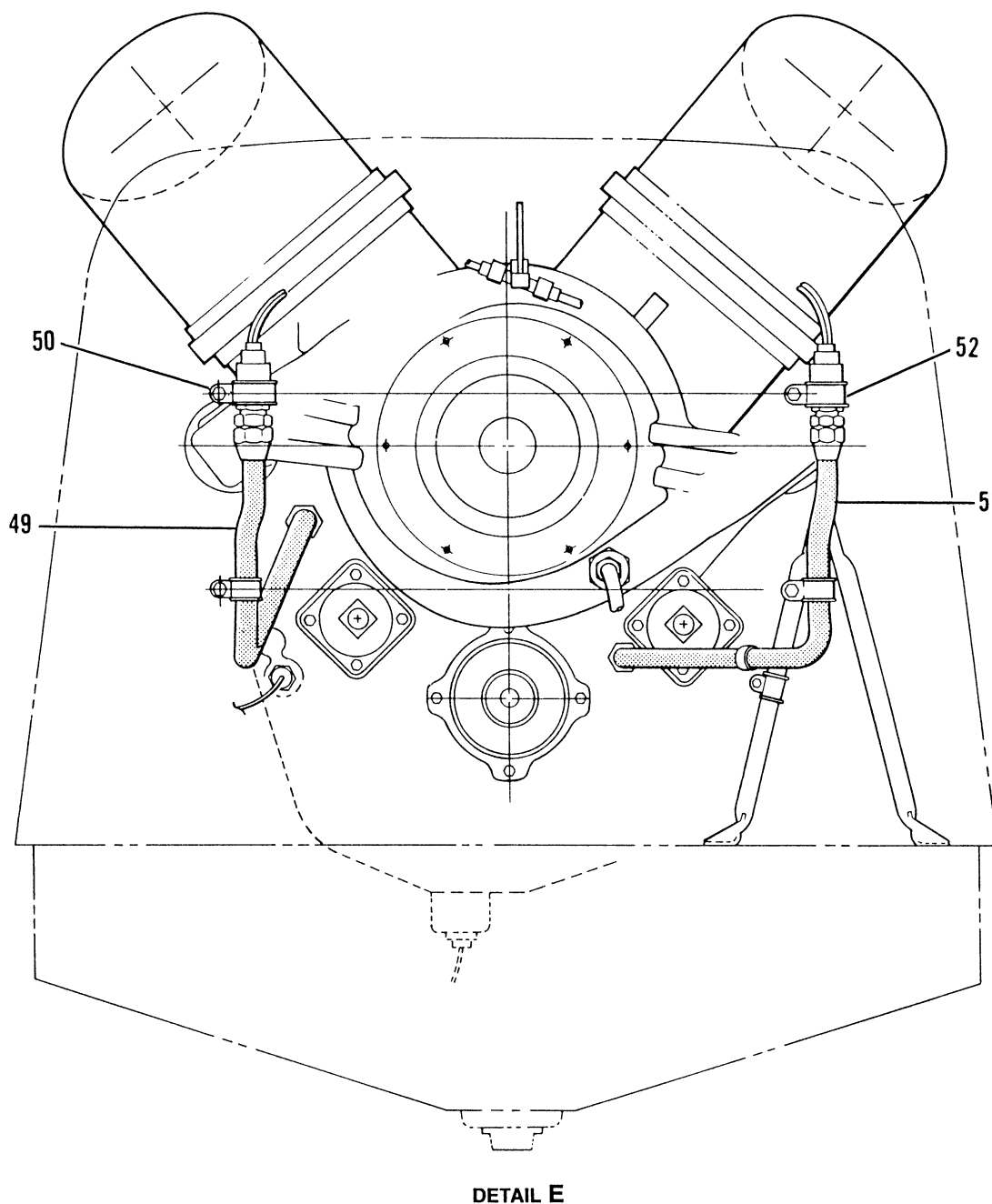


HELICOPTERS S/N 664 THRU 671, 716 THRU 2211
EQUIPPED WITH 206-062-625-003 ACTUATOR.
(REFER TO SERVICE LETTER 206-106).

VIEW A-A

206A/BS-M-71-2-2-3

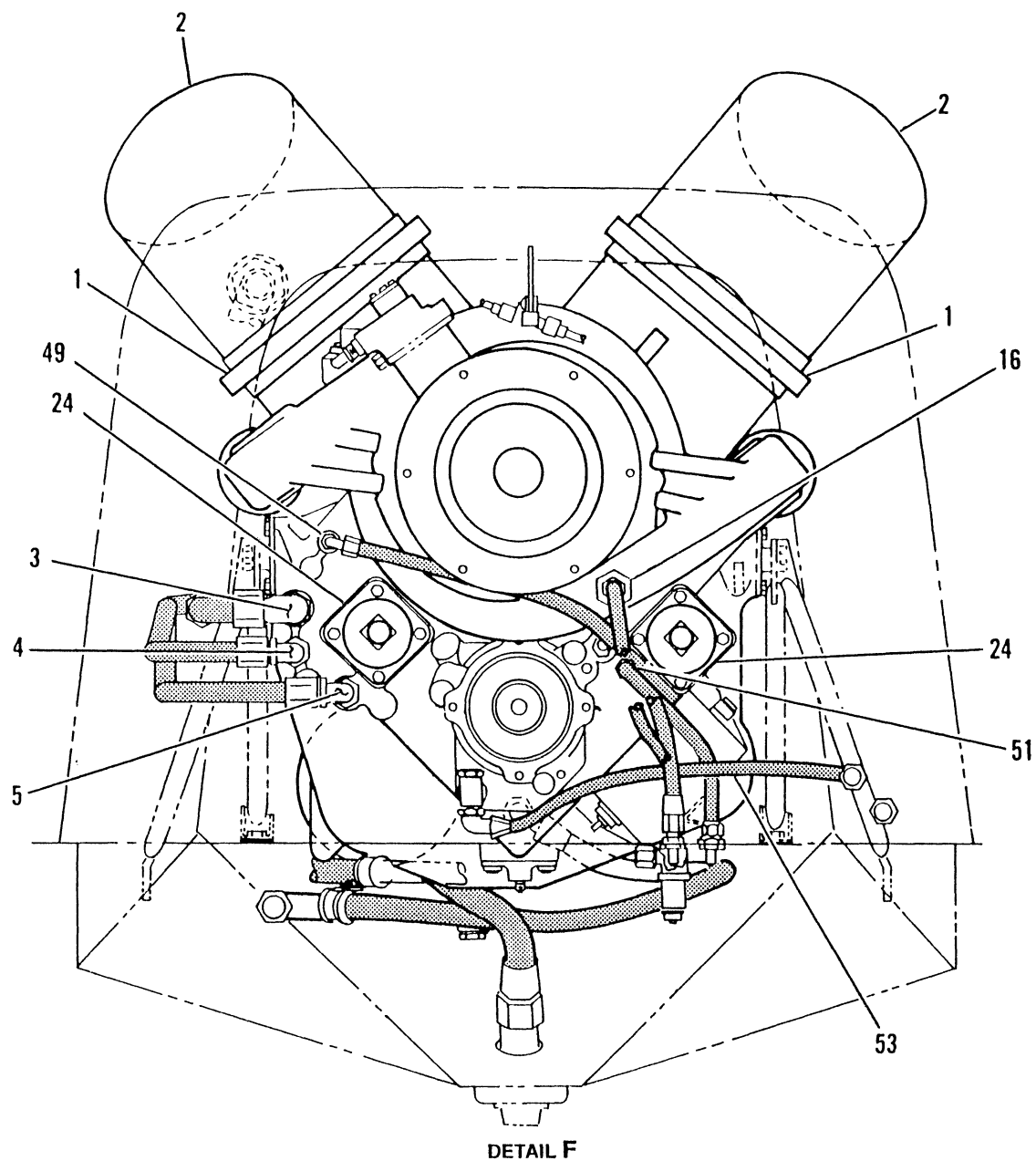
Figure 71-2-2. Engine installation — model 250-C20 (Sheet 3)



ENGINE FRONT VIEW — HELICOPTERS S/N 716 THRU 913

206A/BS-M-71-2-2-4

Figure 71-2-2. Engine installation — model 250-C20 (Sheet 4)



ENGINE FRONT VIEW — HELICOPTERS S/N 914 THRU 2211

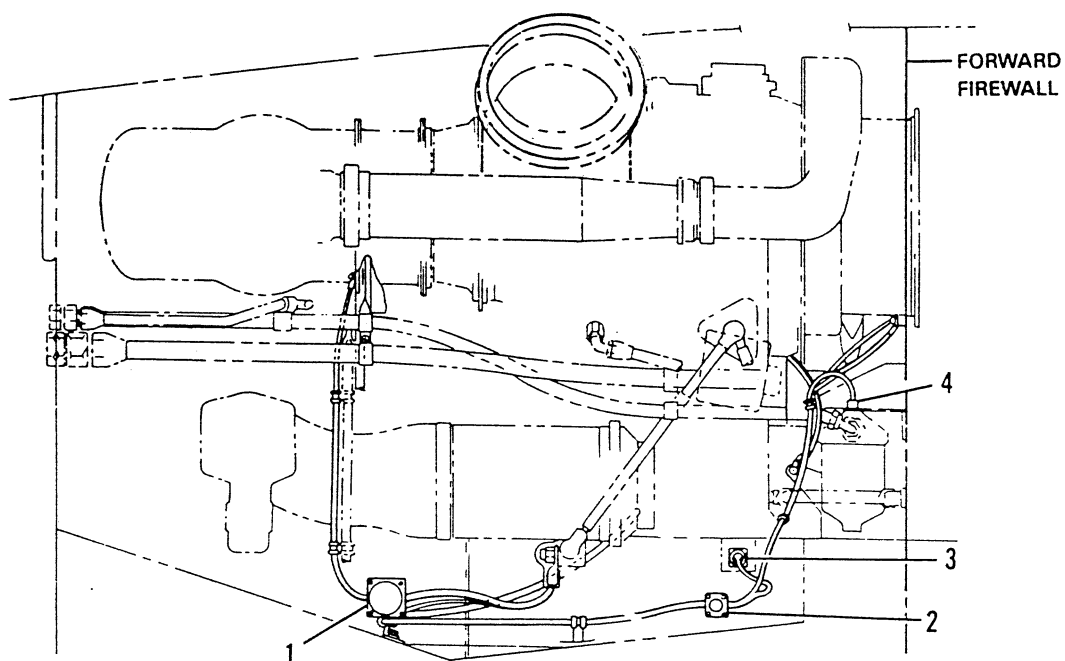
206A/BS-M-71-2-2-5

Figure 71-2-2. Engine installation — model 250-C20 (Sheet 5)

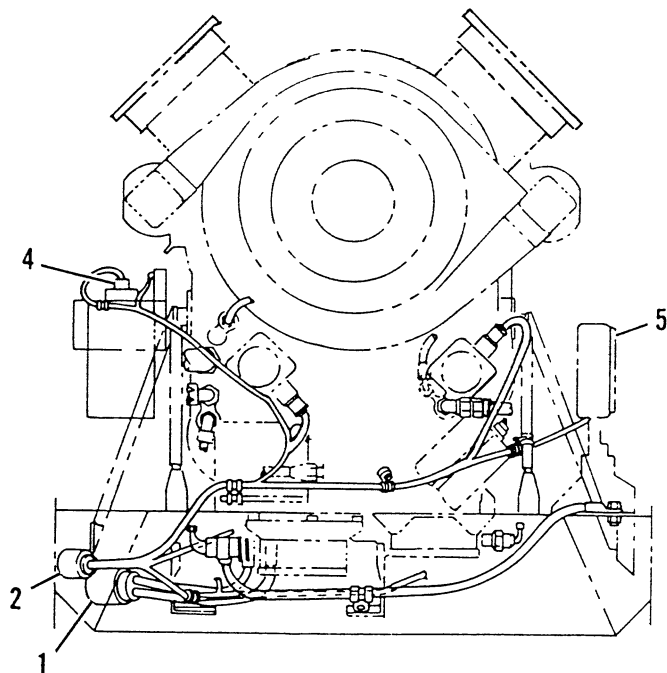
- | | |
|---|--|
| 1. Clamp | 28. Clamp |
| 2. Exhaust stack | 29. Clamp |
| 3. Engine oil inlet hose | 30. Airframe mounted fuel filter |
| 4. Engine oil outlet hose | 31. Filter drain valve |
| 5. Vent hose | 32. Exhaust collector vent |
| 6. Clip | 33. Heat shield drain |
| 7. Clamp | 34. Combustion chamber drain |
| 8. Accessory drive vent hose | 35. Fuel pump seal drain |
| 9. Fuel inlet hose | 36. Packing |
| 10. Screw | 37. Union |
| 11. Nut | 38. Packing |
| 12. Washer | 39. Reducer |
| 13. Bellmouth | 40. Tube |
| 14. Freewheeling oil supply hose | 41. Actuator lever |
| 15. Freewheeling oil return hose | 42. Spacer |
| 16. Compressor pressure hose | 43. Fuel filter pressure switch |
| 17. Engine oil pressure hose | 44. Purge hose |
| 18. Engine torque pressure hose | 45. Mount |
| 19. Hose | 46. Shim |
| 20. Hose | 47. Nut |
| 21. Anti-ice control valve | 48. Tube |
| 22. Nut | 49. Engine oil pressure hose |
| 23. Washers | 50. Transducer |
| 24. Tachometer generator,
power turbine, left
gas producer, right | 51. Engine torque pressure hose |
| 25. Fitting | 52. Transducer |
| 26. Starter-generator | 53. Freewheeling vent hose |
| 27. Adapter | 54. Fireshield and exhaust collector
drain, helicopters S/N 1742
thru 2211 |

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Figure 71-2-2. Engine installation — model 250-C20 (Sheet 6)



VIEW OF RIGHT SIDE



VIEW LOOKING AFT

1. Starter-generator connector (2P1)
2. Engine electrical connector (1P1)
3. Engine electrical connector (1P4)
4. Fuel filter connector (1S5P1)
5. Governor actuator (1B1)

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Figure 71-2-3. Engine electrical

16. Disconnect freewheeling oil supply and return hoses (14 and 15) at forward firewall. Cap off firewall fittings to prevent gravity drain of transmission oil and entry of foreign material.

17. Disconnect compressor pressure hose (16) at lower firewall.

18. At forward engine deck, disconnect engine oil pressure hose (17) and engine torque pressure hose assembly (18).

NOTE

On helicopters S/N 716 through 913, disconnect engine oil pressure hose (49) at transducer connection (50) and engine torque pressure hose (51) at transducer connection (52) (Detail E).

19. Disconnect two fuel differential pressure hoses (19 and 20) from forward side of fuel pump.

20. Disconnect droop compensator control lever on left side of engine ([Chapter 76](#)).

21. Remove anti-icing control valve (21) from pad at top of engine and install lift assembly tool (6796963 or equivalent) on pad. Connect hoist to lifting tool and take up slack.

22. Remove engine mount retention nuts (22) and washers (23) (typical three locations).

23. Check engine and airframe to ensure engine is free of all connections to airframe before lifting engine.

24. Lift engine carefully and lower onto a suitable stand.

**71-2-6. POWER PLANT (HELICOPTERS S/N 661 THROUGH 671 AND 716 THROUGH 2211)
— INSPECTION**

1. Inspection of the engine shall be in accordance with Rolls-Royce 250-C20 Series Operation and Maintenance Manual 10W2.

2. Inspect all hose and tube assemblies for leakage, chafing, clamping, and security.

**71-2-7. POWER PLANT (HELICOPTERS S/N 661 THROUGH 671 AND 716 THROUGH 2211)
— INSTALLATION**

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
6796963	(Rolls-Royce) Lift Assembly Tool

MATERIALS REQUIRED

Refer to [BHT-ALL-SPM](#) for specifications.

NUMBER	NOMENCLATURE
C-405	Lockwire

WARNING



FAILURE TO PROPERLY INSTALL, ALIGN, AND TORQUE FUEL, OIL, AND AIR TUBES AND FITTINGS MAY RESULT IN AN ENGINE FAILURE.

CAUTION

IF A NEW, REPLACEMENT, RENTAL, OR LOANER ENGINE IS BEING INSTALLED, ENSURE SEALS (6854086) HAVE BEEN REMOVED AND REPLACED WITH SEALS (406-340-104-101 OR SUBSEQUENT) WITH METAL FACE SIDE OUT. REFER TO ROLLS-ROYCE 250-C20 SERIES OPERATION AND MAINTENANCE MANUAL.

NOTE

If six engine bipod mount leg nuts (47, [Figure 71-2-2](#)) were loosened during engine removal, refer to [paragraph 71-2-17](#).

1. Install lift assembly tool (6796963 or equivalent) on anti-icing control valve pad at top of engine.
2. Install engine leg mounts (45, [Figure 71-2-2](#)) if not previously installed ([paragraph 71-2-17](#)).
3. Hoist engine into airframe, and align engine left and right side mount fittings (25) with leg mounts (45). Engage leg mounts with studs of fittings and install washers (23) and nuts (22). Torque the nuts .
4. Remove lift assembly from engine.
5. Connect droop compensator linear actuator to left mount fitting (25). Refer to [Chapter 76](#) for droop compensator rigging and installation. Secure bolts in fitting with lockwire ([C-405](#)).
6. Remove compressor inlet cover, align bellmouth assembly (13) with forward flange of engine inlet, and install screws (10). Install washers (12) (under screw head) and nuts (11).
7. Install anti-icing control actuator (Detail D) on pad located at top of engine. Install spacers (42) between actuator bracket and engine, with large spacer over forward hole. Install 3/8 inch (9.53 mm) bolt and washer in forward hole and 5/16 inch (7.94 mm) bolts, washers, and spacers in two aft holes. Torque  and secure bolt heads with lockwire ([C-405](#)).
8. Loosen engine anti-icing valve (21) and rotate 90° to the left so actuator lever (41) is horizontal and toward the left.
9. Install tube assembly (40) with clevis over engine valve lever and other end of tube over actuator lever (41). Secure tube with flathead pins, washers, and cotter keys. Rig anti-icing actuator ([Chapter 76](#)).
10. Install tail rotor driveshaft and engine-to-transmission driveshaft ([Chapters 63 and 65](#)).



THE STARTER-GENERATOR SHALL BE SUPPORTED UNTIL CLAMP IS INSTALLED AND PROPERLY TORQUED 50 INCH-POUNDS (5.64 NM). FAILURE

TO SUPPORT STARTER-GENERATOR WILL RESULT IN PREMATURE FAILURE OF SHAFT.

11. Install starter-generator ([paragraph 71-2-27](#)).
12. Connect oil outlet hose (4), oil inlet hose (3), and oil tank vent hose (5) at aft firewall.
13. Connect fuel inlet hose (9) at fitting on forward firewall.
14. Connect accessory drive overboard vent hose (8) to fitting on lower firewall.
15. Connect freewheel assembly hoses (14 and 15) to unions on forward firewall.
16. Connect fuel pressure differential switch hoses (19 and 20) to forward side of fuel pump.

NOTE

On helicopters S/N 716 through 913, connect engine oil pressure hose (49) to transducer connector (50) and engine torque pressure hose (51) to transducer connector (52) (Detail E).

17. Connect oil pressure hose (17), engine torque pressure hose (18), and compressor hose (16) to deck fittings.
18. Clamp hoses as illustrated in [Figure 71-2-2](#).
19. Connect connector to anti-ice valve (21).
20. Connect fuel filter connector (4, [Figure 71-2-3](#)) and governor actuator connector (5).
21. Connect starter-generator connector (1).
22. Connect engine electrical connectors (2 and 3).

NOTE

On helicopters S/N 716 through 913, connect engine oil pressure hose (49, [Figure 71-2-2](#)) to transducer (50) connector and engine torque pressure hose (51) to transducer (52) connector (Detail E).

23. Connect and rig engine controls ([Chapter 76](#)).

24. Inspect engine installation to ensure that all installations are complete. Check security of installations.



PRIOR TO INSTALLING EXHAUST STACKS, INSPECT ATTACHING FLANGE AREA FOR WARPING, DENTS, CRACKS, AND BURNED SPOTS THAT WOULD CAUSE A LEAKING EXHAUST JOINT.

NOTE

If exhaust stack clamp (1) is of the two-piece type, position clamps on stack (2) with studs facing outboard, install nuts, and torque to 30 inch-pounds (3.38 Nm). Grasp top of stack and shake while lightly tapping around clamp, then recheck torque. Repeat this procedure until the required torque can be maintained. Lockwire ([C-405](#)) nuts to clamp. After 30 minutes of engine operation, check torque. If check reveals loss of torque, torque to 30 inch-pounds (3.38 Nm), operate engine an additional 30 minutes, and repeat entire procedure. Secure clamp nuts to clamp with lockwire ([C-405](#)).

25. Install cowl and exhaust stacks (2) ([paragraph 71-2-13](#)). Position exhaust stack and clamp (1) on engine. Tap clamps lightly to seat clamps while tightening clamp nut until clamp is snug on exhaust stack and flange. Do not exceed 25 inch-pounds (2.82 Nm) torque. Install opposite exhaust stack in same manner.

NOTE

If right side exhaust stack has the overboard vent hose attachment, install hose after installing exhaust stack and clamp ([Figure 71-2-7](#), Detail C).

26. Connect battery.

27. Service oil tank and transmission with approved oil ([Chapter 12](#)).

NOTE

Engine oil pumps will normally prime themselves. However, there have been a few instances where the pumps have continued to run in a dry or unprimed condition following the initial engine start.

28. Prime engine oil pump ([Chapter 79](#)).



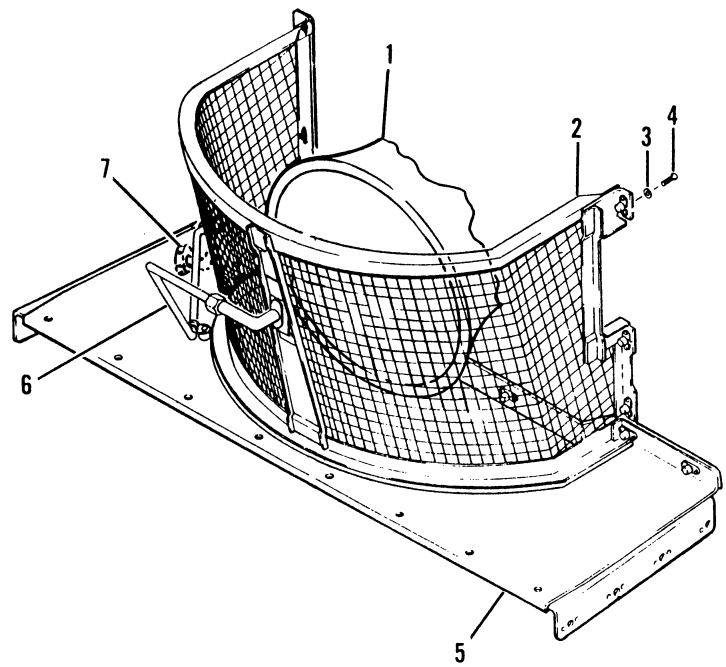
DO NOT EXCEED STARTER LIMITATION WHILE MOTORING ENGINE.

29. Prior to starting, motor engine until oil pressure is indicated. Do not exceed time limits established for energized starter. Refer to applicable JetRanger Flight Manual.

NOTE

If pressure is not indicated within 30 seconds, stop and determine the cause.

30. Check for indications of leaks after ground run. If leaks are found, correct and fill reservoir as required.



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Figure 71-2-4. Engine Compressor Wash and Induction Screen

NOTE

Helicopters prior to S/N 914: If a new engine is being installed or if a new turbine outlet temperature (TOT) harness is installed on the engine at any time, check the TOT circuit in the helicopter for 8 ± 0.05 ohms in accordance with [Chapter 96](#). An instrument that will measure the resistance in the range and accuracy of this requirement is available from Wheatstone Bridge Model RN-1, Crockett Engineering Co., P.O. Box 47287, Dallas, Texas 75247.

Helicopters S/N 914 and subsequent: If a new engine is being installed or if a new turbine outlet temperature (TOT) harness is installed on the engine at any time, check the TOT circuit resistance of not less than 5 ohms and not more than 200 ohms with a Wheatstone bridge. Check indicator at 737°C and 793°C with Jetcal Analyzer or Barfield Tester ([Chapter 96](#)).

NOTE

After test flight, check engine oil filter for contamination.

31. Do a torque check of the engine mount attachment hardware at engine and airframe attachment points, 100 flight hours after each installation ([Chapter 5](#)). This includes the engine

mount nuts (3, [Figure 71-2-6](#)) and engine support nuts (6).

71-2-8. ENGINE COMPRESSOR WASH

The engine compressor wash provision consists of a right angle fitting, tube, clamp, and plug. The tube and fitting are connected to a bracket on the induction screen and provide a means of washing the engine.

71-2-9. ENGINE COMPRESSOR WASH — WASHING

1. Disconnect main ECU bleed air line and control line, if installed, at scroll and cap.
2. Remove plug (7, [Figure 71-2-4](#)) and connect engine compressor wash unit to tube (6).
3. Connect engine compressor wash unit and perform compressor wash in accordance with procedures listed in Rolls-Royce 250-C20 Series Operation and Maintenance Manual 10W2.
4. Disconnect engine compressor wash unit and install plug (7) in tube (6).
5. Remove caps from main ECU bleed air line and control line, if installed, and connect lines to their respective fittings.

COWLINGS AND FAIRINGS

71-2-10. COWLINGS AND FAIRINGS.

The engine and transmission cowlings consist of four sections: forward fairing, induction fairing, engine cowl assembly, and aft fairing. The cowlings are constructed of aluminum alloy, fiberglass, and honeycomb material and are readily removable for engine and transmission changes. Cowling access panels are provided with snap-open fasteners which permit inspection without removing the cover unit. (figure 71-2-5).

NOTE

On helicopters S/N 154 and subsequent, forward and aft fairing assemblies are secured with fasteners.

On helicopters prior to S/N 914, the engine cowl side panels and aft fairing contain louvers, and the forward fairing contains a screen for ventilation.

On helicopters S/N 914 and subsequent, the forward fairing does not include a screen, but screens were incorporated into the engine cowl, cowl side panels, and aft fairing.

71-2-11. REMOVAL.



PROTECT COMPRESSOR INLET AND EXHAUST PORT OPENING WHEN COWL IS REMOVED.

1. Remove screws and washers or unfasten fasteners securing the forward fairing (1, figure 71-2-5). Remove fairing.
2. Remove screws and washers or unfasten fasteners securing the aft fairing (5). Remove fairing.
3. Unlatch access door on each side of induction fairing (2) and remove screws or unfasten fasteners

attaching induction fairing to roof deck. Remove screws and washers or unfasten fasteners attaching aft end of fairing to forward firewall. Unlatch engine cowl panels to gain access to internal screws.

4. Unlatch engine cowl side panels (7) and remove exhaust stack assemblies (4) (paragraph 71-2-5). Remove screws and washers or unfasten fasteners attaching cowl to forward and aft firewalls. Remove engine cowl.

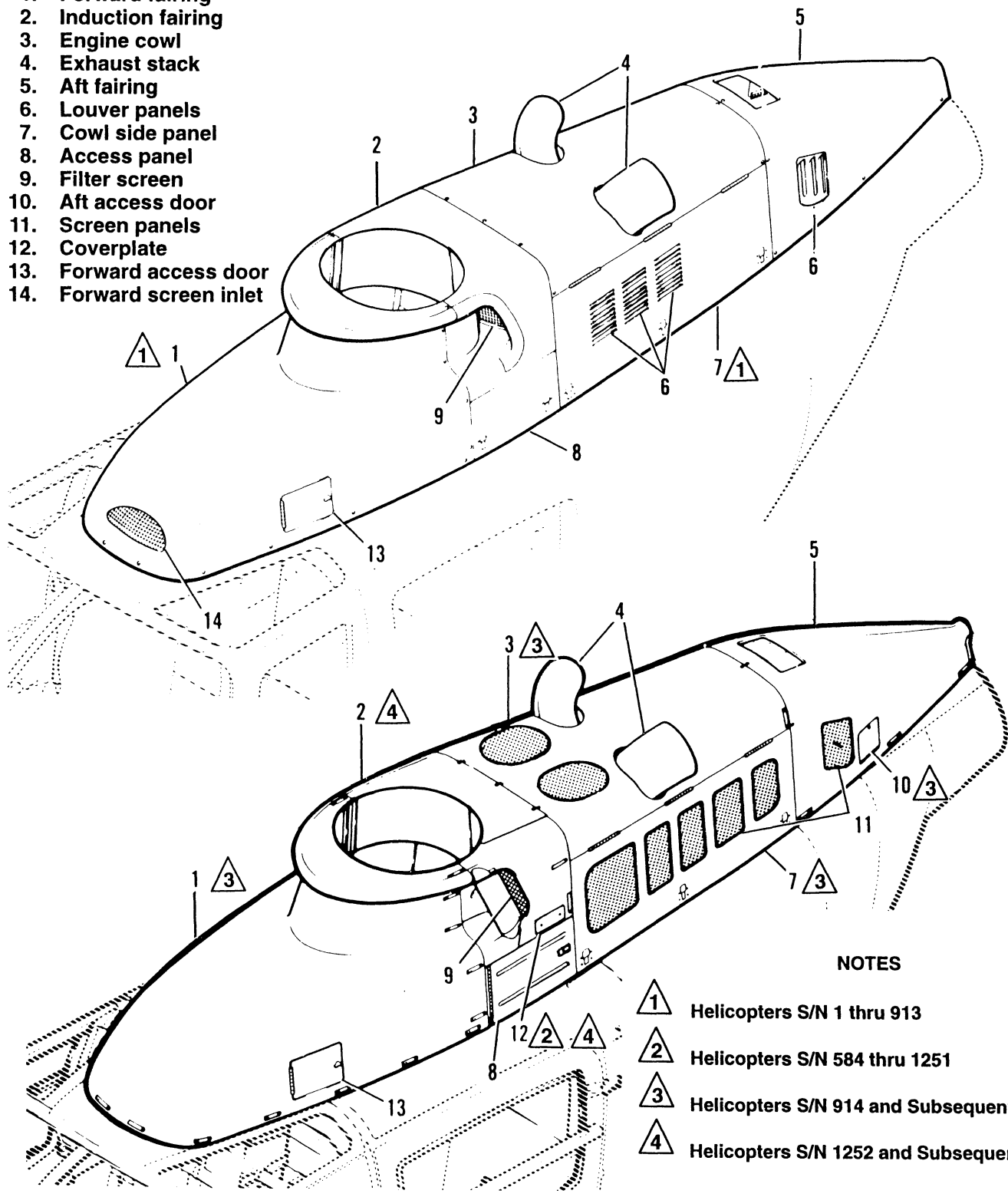
71-2-12. INSPECTION.

1. Inspect hinges, latches, and fittings for wear, damage, and serviceability.
2. Inspect seals for tears, cracks, security, and deterioration.
3. Inspect cowling for cracks, dents, holes, and other damage.

71-2-13. INSTALLATION.

1. Position engine cowl (3, figure 71-2-5) over forward and aft firewalls and install screws and washers or fasten fasteners. Install exhaust stack (4) (paragraph 71-2-7).
2. Position aft fairing (5) over aft firewall, align holes, and install screws and washers or fasten fasteners.
3. Install forward fairing (1), align holes with induction fairing (2) and roof deck attachment angle, and install screws and washers or fasten fasteners.
4. Position induction fairing (2) over forward firewall and align mounting holes. Install screws or fasten fasteners securing fairing to roof deck. Install screws and washers or fasten fasteners in forward firewall.
5. Check cowling and fairings for security and lock all access door panel latches.

1. Forward fairing
2. Induction fairing
3. Engine cowl
4. Exhaust stack
5. Aft fairing
6. Louver panels
7. Cowl side panel
8. Access panel
9. Filter screen
10. Aft access door
11. Screen panels
12. Coverplate
13. Forward access door
14. Forward screen inlet



NOTES

- 1 Helicopters S/N 1 thru 913
- 2 Helicopters S/N 584 thru 1251
- 3 Helicopters S/N 914 and Subsequent
- 4 Helicopters S/N 1252 and Subsequent

206A/BS-M-71-2-5

Figure 71-2-5. Cowlings and fairings

ENGINE MOUNTS

71-2-14. ENGINE MOUNTS.

The engine is supported on the service deck with three bipod mounts located on the right, left, and lower side of the engine. Shims are provided at each mount leg for engine alignment.



IF THE ENGINE MOUNTS ARE REMOVED, DO NOT REMOVE THE BONDED SHIMS. THESE SHIMS DIRECTLY AFFECT ENGINE-TO-TRANSMISSION ALIGNMENT. IF REMOVAL IS REQUIRED, MARK THE SHIMS TO PREVENT LOSS OR INTERMIXING.

71-2-15. REMOVAL.

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
—	Hoist, 600 Lb (272 Kg) Capacity, Minimum
6796963	(Allison) Lift Assembly

1. Remove engine (paragraph 71-2-5).



WHEN REMOVING SHIMS, INDEX SHIMS TO THEIR POSITION TO ENSURE PROPER ENGINE ALIGNMENT AT INSTALLATION. BOND LOOSE SHIMS IN PLACE WITH ADHESIVE (C-317).

NOTE

Removal procedures for left or right engine mount support are the same.

2. Remove three nuts (3, figure 71-2-6) and washers (2). Remove mount from engine mount pad.

71-2-16. INSPECTION.


1. Inspect the tubes assemblies and weld areas of the mount for cracks. If cracks are found, replace the mount.
2. Inspect mount bolts and nuts for thread damage.
3. Thoroughly clean oil and dirt film from engine mount legs (4 and 13, figure 71-2-6).
4. Polish out nicks and scratches.
5. Refer to figure 71-2-7 for wear and damage limits.
6. Apply one coat of zinc chromate primer (C-201) to repaired surfaces and engine mount covers (2, figure 71-2-6).
7. Wrap engine mount legs (16) with bag seal compound (C-236), 0.125 x 0.50 inch (3.17 x 12.70 mm), or fill engine mount cover (17) halves with bag seal compound.

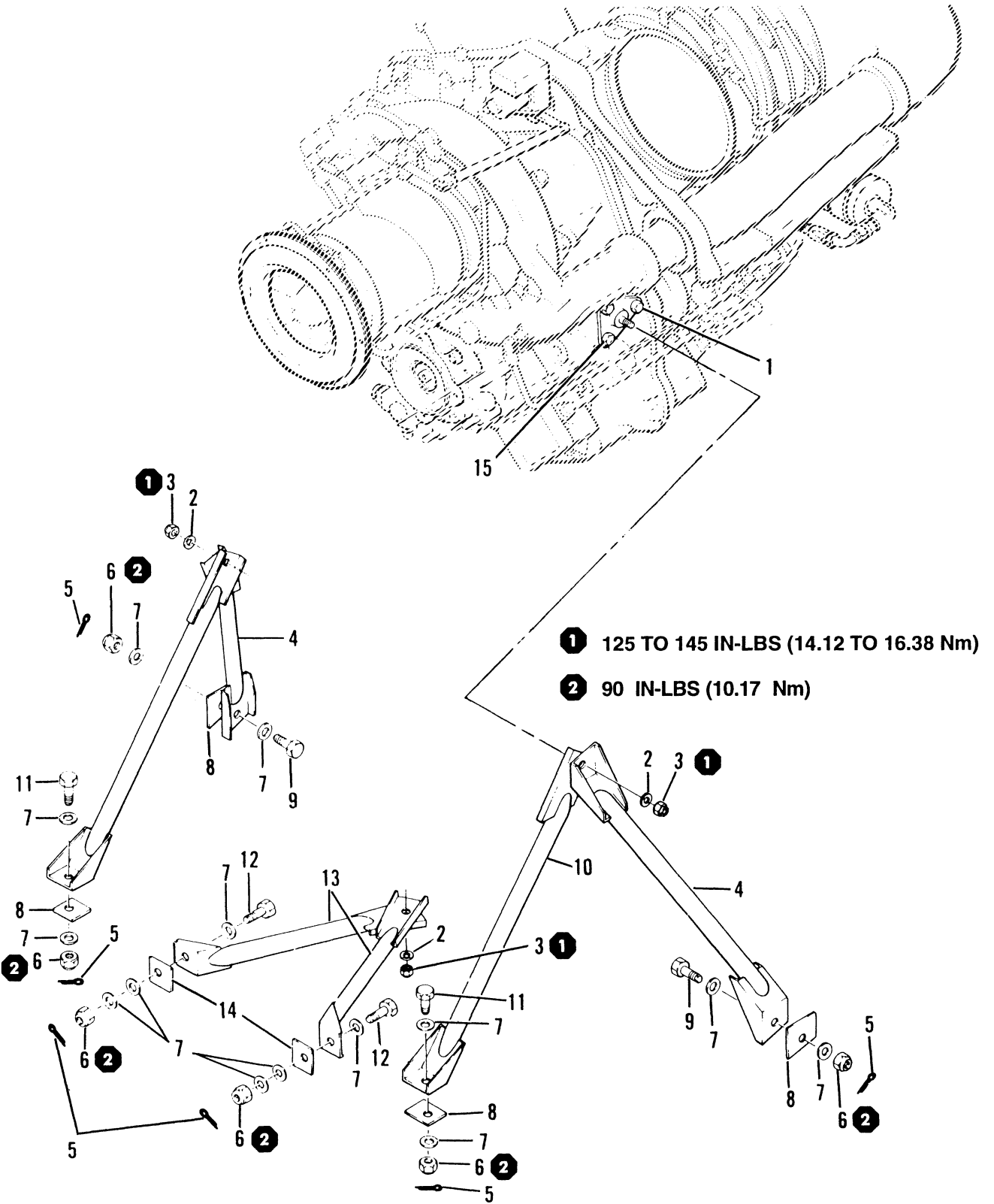
71-2-17. INSTALLATION.

1. Install covers (17, figure 71-2-6) on engine mount legs (16), locating evenly between leg gussets. Remove excessive compound squeeze-out.
2. Apply compound (C-236) to split line and ends of cover (2).



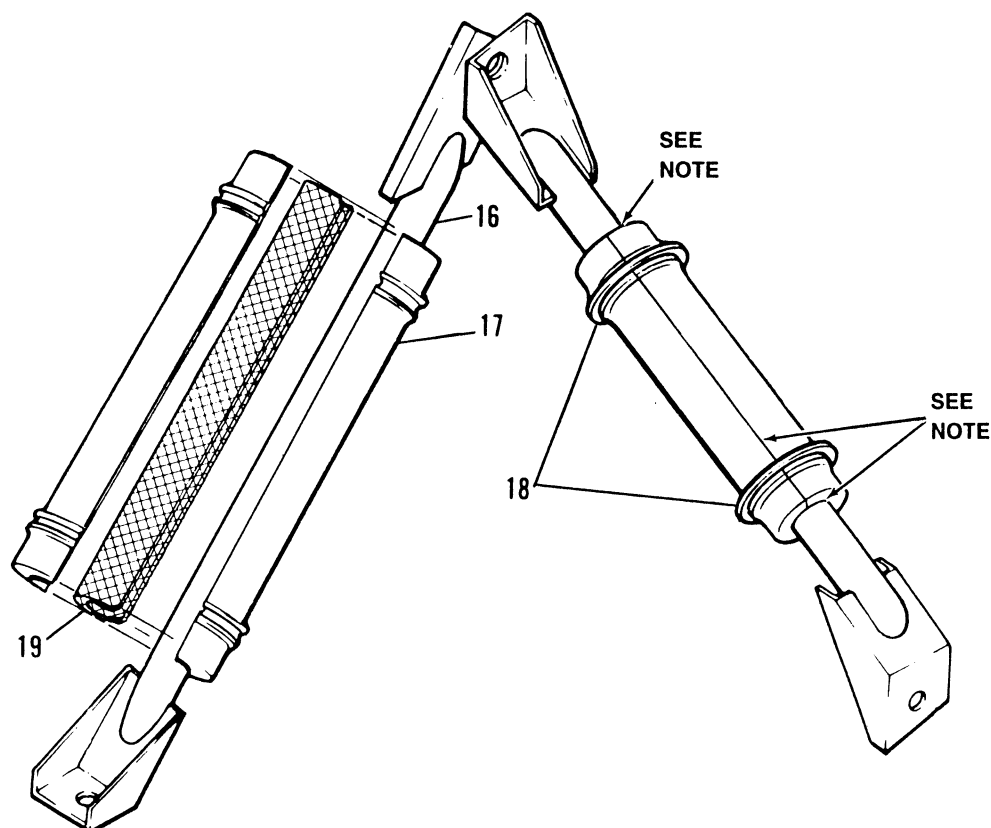
ENSURE THAT CORRECT SHIMS ARE INSTALLED UNDER FITTINGS OF MOUNT LEGS.

3. Install left or right engine mount as follows:
 - a. Position engine mount fitting (15, figure 71-2-6) on engine mounting pad.
 - b. Install three washers (2) and three nuts (1) .
4. Install engine (paragraph 71-2-7).



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Figure 71-2-6. Installation of engine mounts (Sheet 1 of 2)



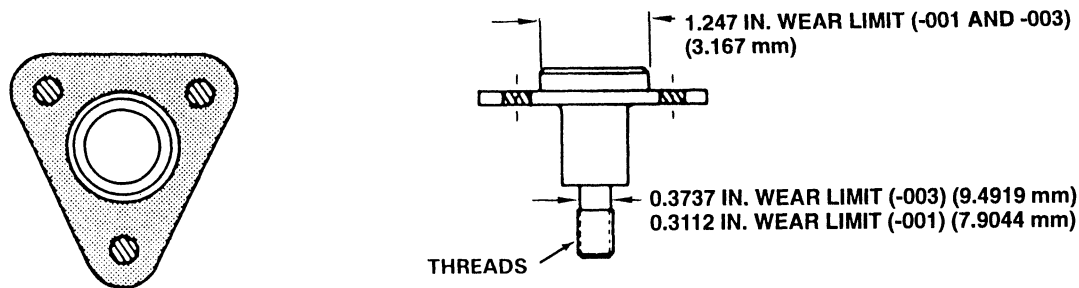
NOTE

Seal ends of cover and split line with proseal sealing compound (C-360).



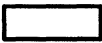
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|----------------------|--------------------------------------|
| 1. Nut | 11. Bolt |
| 2. Washer | 12. Bolt |
| 3. Nut | 13. Engine mount leg |
| 4. Engine mount leg | 14. Shim |
| 5. Cotter pin | 15. Engine mount fitting |
| 6. Nut | 16. Engine mount leg |
| 7. Washer | 17. Engine mount leg cover |
| 8. Shim | 18. Retaining rings |
| 9. Bolt | 19. Seal compound (typical 2 places) |
| 10. Engine mount leg | |

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Figure 71-2-6. Installation of engine mount leg covers (Sheet 2)



206-061-104-001 AND -003
ENGINE MOUNT FITTING

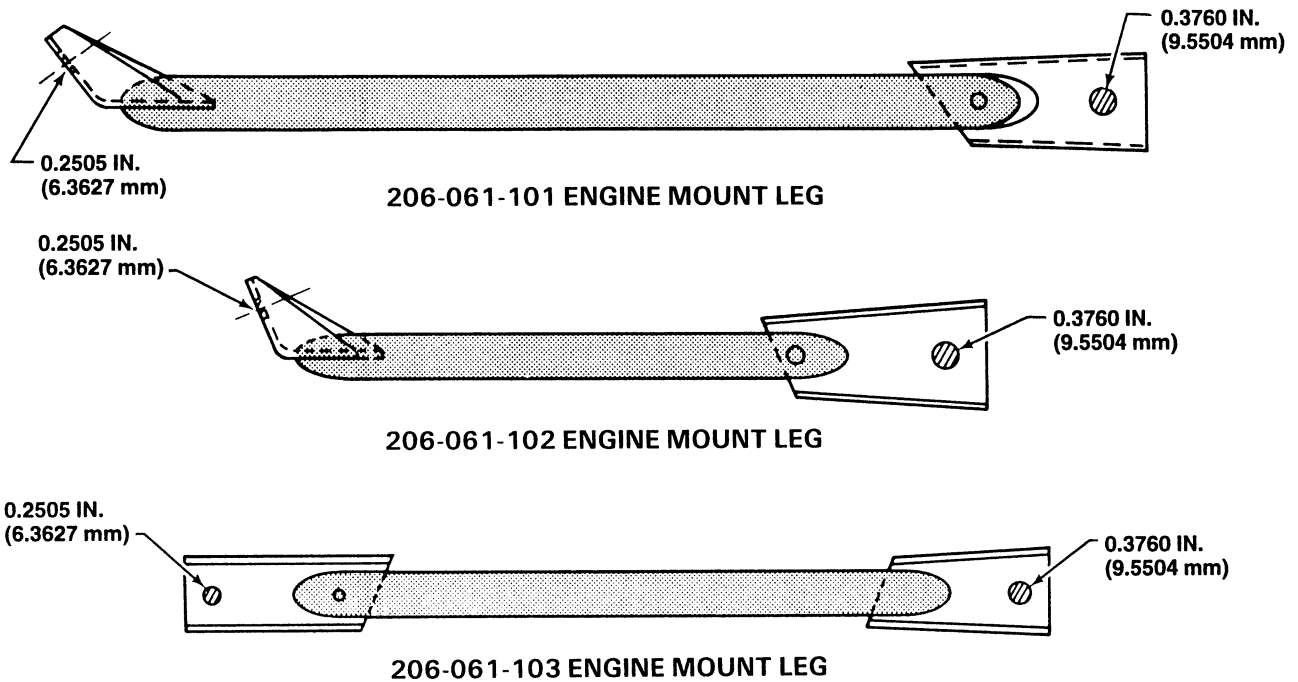
DAMAGE LOCATION SYMBOLS			
TYPE OF DAMAGE	  		
	MAXIMUM DAMAGE AND REPAIR DEPTH		
MECHANICAL BEFORE AND AFTER REPAIR	0.005 In. (0.127 mm)	0.01 In. (0.25 mm)	0.05 In. (1.27 mm)
CORROSION BEFORE AND AFTER REPAIR	0.003 In. (0.076 mm)	0.01 In. (0.25 mm)	0.025 In. (0.635 mm)
MAXIMUM AREA PER FULL DEPTH REPAIR	20% of area	10% of surface area	25% of area
EDGE CHAMFER	0.01 in. (0.25 mm)	0.02 In. (0.50 mm)	0.03 In. (0.76 mm)

NOTES

1. Applicable for both sides of flange threads.
2. Thread damage that does not exceed a depth of one-third of thread and a length of 1/4 inch (1 damage per bolt) is acceptable.

206A/BS-M-71-2-7-1

Figure 71-2-7. Engine mount and engine mount leg — wear and damage limits (Sheet 1 of 2)



DAMAGE LOCATION SYMBOLS



TYPE OF DAMAGE

MAXIMUM DAMAGE AND REPAIR DEPTH

NICKS, SCRATCHES
BEFORE AND
AFTER REPAIR

0.005 In. (0.127 mm)

0.002 In. (0.050 mm)

0.02 In. (1.50 mm)

DENTS
BEFORE AND
AFTER REPAIR

0.005 In. (0.127 mm)

0.004 In. (0.101 mm)

0.01 In. (0.25 mm)

CORROSION
BEFORE AND
AFTER REPAIR

0.003 In. (0.076 mm)

0.002 In. (0.050 mm)

0.02 In. (0.50 mm)

MAXIMUM AREA PER
FULL DEPTH REPAIR

20% of area

10% of surface area

25% of area

EDGE CHAMFER

0.01 In. (0.25 mm)

—

0.02 In. (0.50 mm)

NOTE

Nonrepairable limit for smooth dents only. Sharp dents are not acceptable.

206A/BS-M-71-2-7-2

Figure 71-2-7. Engine mount and engine mount leg — wear and damage limits (Sheet 2)

FIREWALLS

71-2-18. FIREWALLS.

The engine compartment firewalls and engine pan are constructed of titanium. Firewalls are located forward and aft, and below engine.

71-2-19. INSPECTION AND REPAIR OF FIREWALLS AND FIRESEALS.



DO NOT USE CHLORINATED SOLVENTS OR CUTTING FLUIDS ON TITANIUM PARTS.

1. Inspect forward and aft firewalls for dents, nicks, and scratches (BHT-206A/B-SERIES-CR&O).

a. Negligible damage. Smooth contour dents, nicks, and scratches that do not penetrate titanium or stainless steel.

b. Repairable damage. Damage that penetrates titanium or stainless steel shall be repaired or part shall be replaced (BHT-206A/B-SERIES-CR&O).

2. Inspect forward and aft firewalls (22 and 11, figure 71-2-8) for deterioration of seals and chafing.

3. Strip seals (1 and 6) are cemented to forward and aft firewalls (22 and 11). Cement new strip seals to firewalls with adhesive (C-311).

4. Inspect forward and aft firewalls (22 and 11) for loose fittings, receptacles, and nutplates. Check nutplates for thread damage.

5. Inspect forward and aft firewalls (22 and 11) for loose sealer in bend radii and bend ends. Fill all gaps and voids to a depth of 0.18 inch (4.60 mm) with sealing compound (C-353).

NOTE

Ensure 23052363 placard warning is in excellent condition on forward and aft firewalls.

6. Inspect warning placard (23) on forward and aft firewalls (22 and 11) for legibility.

71-2-20. ENGINE BELLMOUTH.

The engine bellmouth assembly is constructed of aluminum alloy and provides an airfoil inlet for induction air to the engine. The engine bellmouth is fastened to the forward side of forward firewall, and a fireseal is provided by use of a gasket.

71-2-21. REMOVAL.

1. Remove engine upper cowl with engine side cowl (paragraph 71-2-11).

2. Remove forward fairing and air induction cowl (paragraph 71-2-11).

3. Index bellmouth (5, figure 71-2-8) toward forward firewall (22).

4. Remove screws (2) and washers (3) from aft side of forward firewall (22). Remove engine bellmouth (5).

71-2-22. INSPECTION.

1. Inspect engine bellmouth (5, figure 71-2-8) for dents and cracks.

2. Inspect gasket (24) for deterioration of material and cracked or damaged plates.

3. Inspect screws (2) for serviceability.

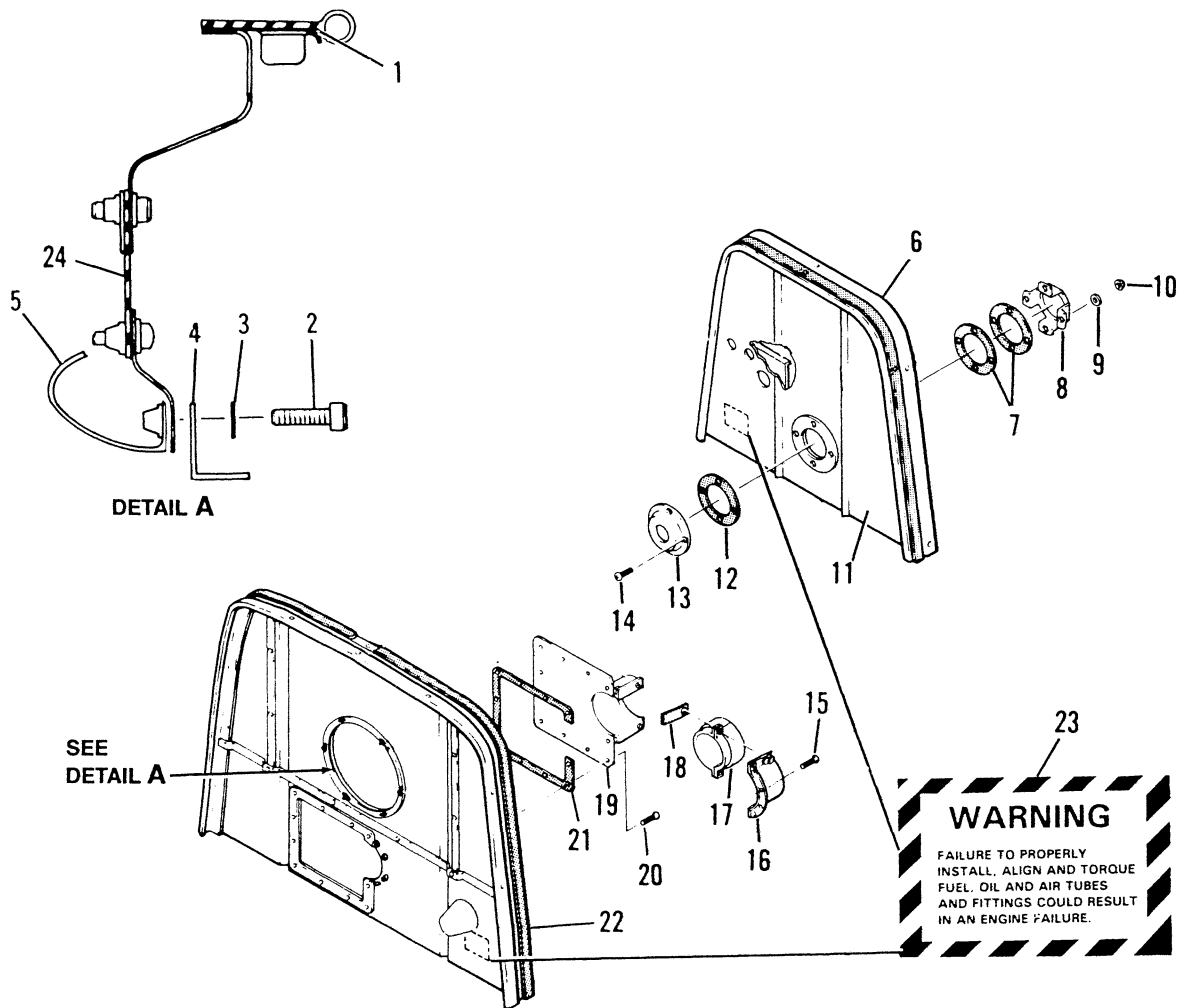
71-2-23. INSTALLATION.

1. Position and align index marks on engine bellmouth (5, figure 71-2-8) on forward firewall (22).

2. Install screws (2) with washers (3) to secure engine to bellmouth (5) to forward firewall (22).

3. Install engine upper cowling with side panels (paragraph 71-2-13).

4. Install engine air induction cowl (paragraph 71-2-13).



- | | | |
|------------------------|------------------|----------------------|
| 1. Seal | 9. Washer | 17. Cover |
| 2. Screw | 10. Nut | 18. Gasket |
| 3. Washer | 11. Aft firewall | 19. Door |
| 4. Engine inlet flange | 12. Seal | 20. Screw |
| 5. Bellmouth | 13. Cover | 21. Gasket |
| 6. Seal | 14. Bolt | 22. Forward firewall |
| 7. Seal | 15. Screw | 23. Placard |
| 8. Ring | 16. Cone | 24. Gasket |

206A/BS-M-71-2-8

Figure 71-2-8. Forward and aft firewalls

STARTER-GENERATOR

71-2-24. STARTER-GENERATOR.

Starter-generator is located on underside of the engine to right of helicopter centerline. The starter-generator is used to start engine, charge battery, and supply power for operation of dc equipment. The starter-generator is vented with a cooling duct made of fiberglass and located at right side of engine.

71-2-25. REMOVAL.

1. Ensure electrical power is OFF.
2. Remove starter-generator cooling duct as follows:
 - a. Open right engine side panel (7, figure 71-2-5).
 - b. Loosen band clamp (6, figure 71-2-9) and slide over cooling duct (7).
 - c. Loosen screw (9) and remove duct (7) from support clamp (10).
 - d. Remove starter-generator cooling duct assembly (7) and remove spacer (5) from starter-generator (4).
3. Remove starter-generator (4) as follows:
 - a. Disconnect electrical leads. Protect ends of wires with electrical tape.



STARTER-GENERATOR SHALL BE SUPPORTED WHENEVER CLAMP IS LOOSENED. UNIT SHALL NEVER BE ALLOWED TO SUPPORT ITS OWN WEIGHT SOLELY BY DRIVE SPLINE ENGAGEMENT. FAILURE TO HEED THIS CAUTION WILL CAUSE DAMAGE TO THE SHAFT AND SHEAR SECTION.

- b. Loosen nut (3) on T-bolt securing V-clamp (2). Keep starter-generator (4) flush against mounting pad while removing V-clamp.
- c. Slide starter-generator (4) straight aft until splined shaft (11) is clear of engine driveshaft. Do not unnecessarily rotate shaft.

71-2-26. INSPECTION.

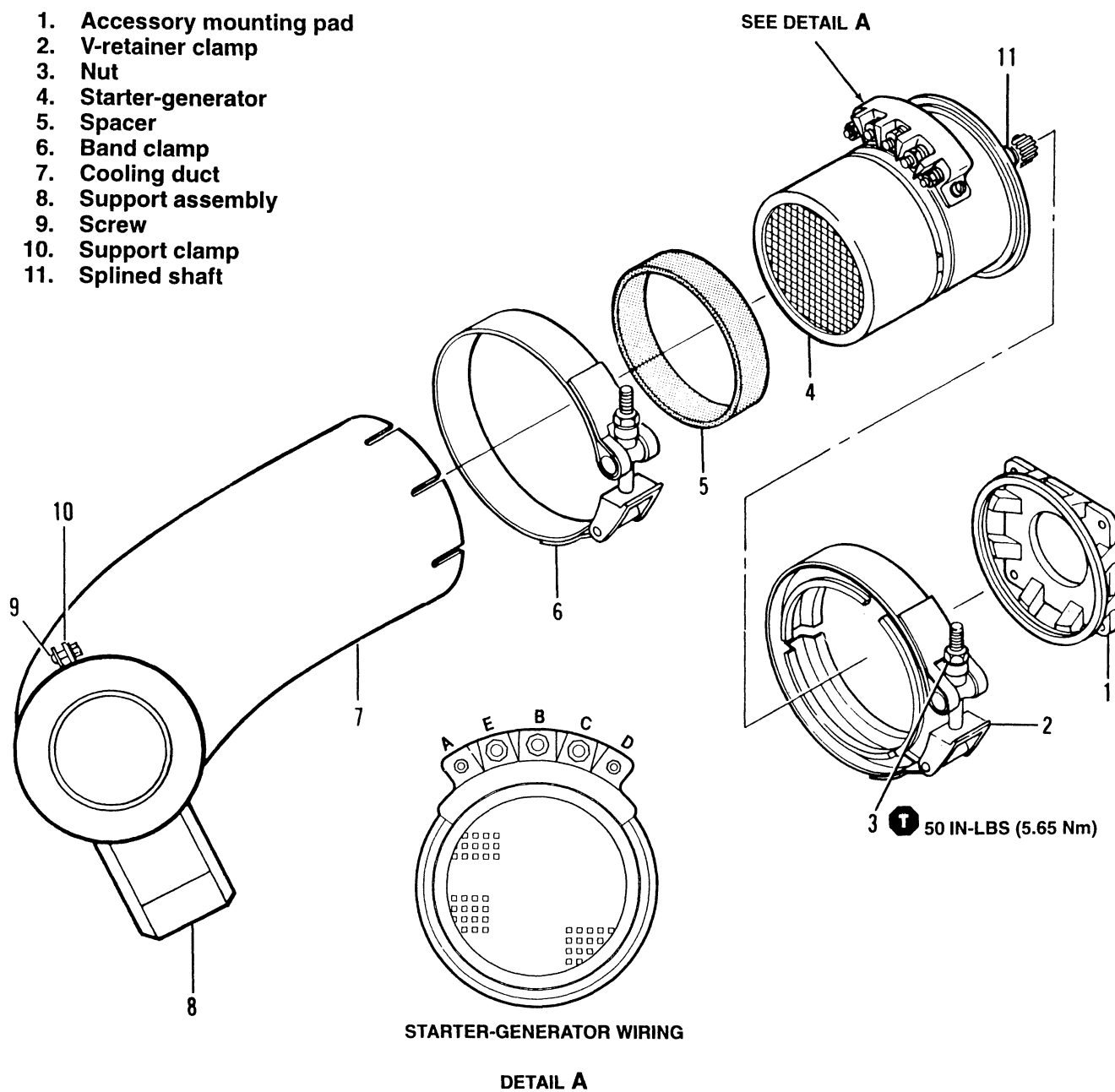
1. Check for warped or cracked terminal board or terminal damage.
2. Check brush cover for dents, loose or bent pins, broken spring, or damaged insulation.
3. Clean exterior of unit with a clean cloth moistened in solvent (C-304) and wipe dry.
4. Inspect starter-generator (Chapter 96).

71-2-27. INSTALLATION.



STARTER-GENERATOR SHALL BE SUPPORTED WHENEVER CLAMP IS LOOSENED. UNIT SHALL NEVER BE ALLOWED TO SUPPORT ITS OWN WEIGHT SOLELY BY DRIVE SPLINE ENGAGEMENT. FAILURE TO HEED THIS CAUTION WILL CAUSE DAMAGE TO THE SHAFT AND SHEAR SECTION.

1. Apply a film of approved lubricating oil to splines of splined shaft (11, figure 71-2-9) and install starter-generator (4) into accessory mounting pad (1).
2. Install V-retainer clamp (2) on starter-generator (4).
3. When tightening V-retainer clamp (2), first tighten snugly, then tap V-retainer clamp with a rubber mallet and apply final torque **T**. Secure clamp with lockwire.
4. Position spacer (5) on aft end of starter-generator (4). With spacer installed, ends must butt together within 0.06 inch (1.50 mm) maximum gap.
5. Position band clamp (6) on cooling duct assembly (7). Work cooling duct assembly into spacer (5). Tighten band clamp.
6. Position support clamp (10) on cooling duct assembly (7). Tighten clamp.
7. Connect electrical leads (Chapter 96).

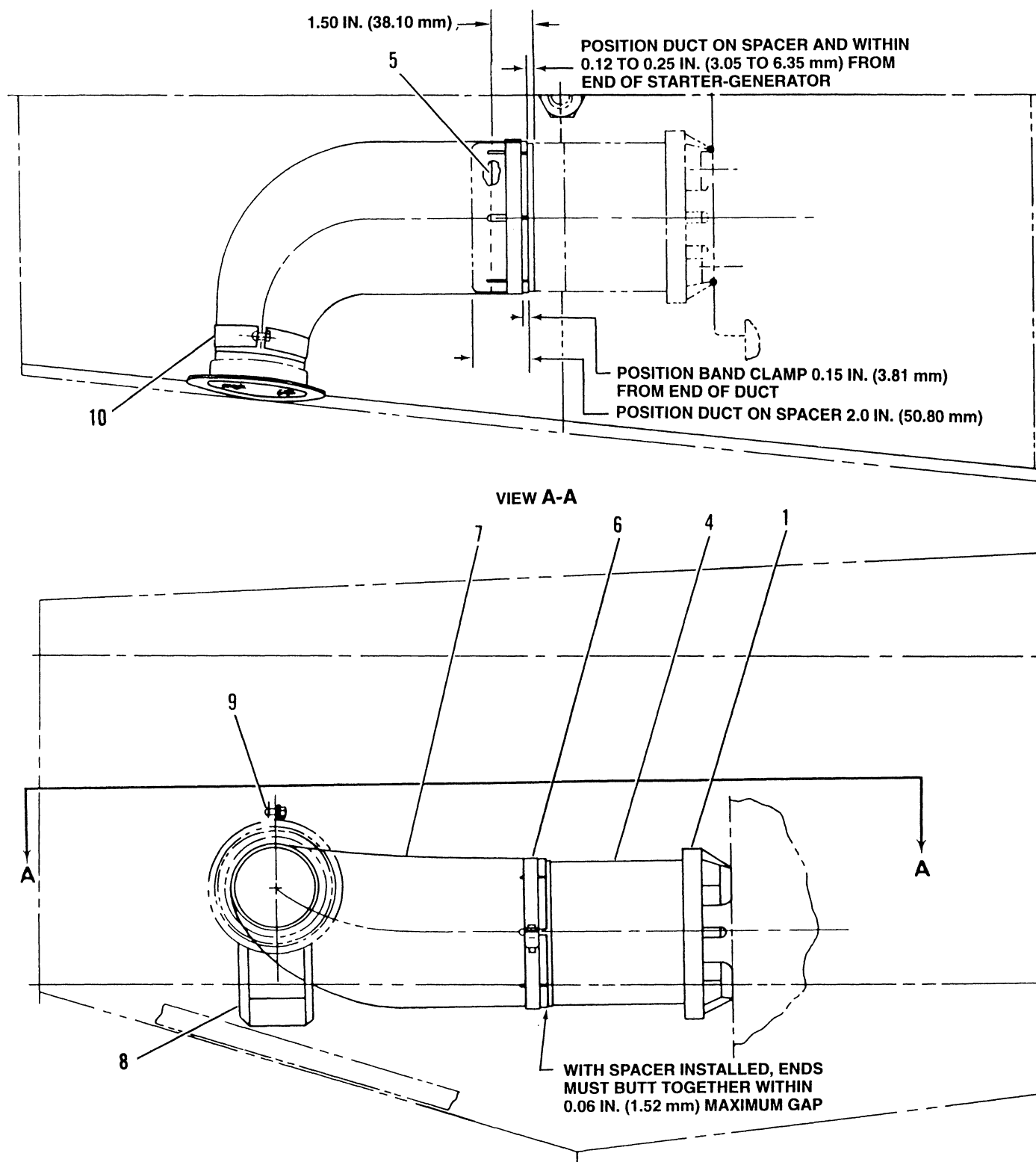


NOTE

Starter rotated to show electrical connectors on top for clarity.

206A/BS-M-71-2-9-1

Figure 71-2-9. Starter-generator (Sheet 1 of 2)



206A/BS-M-71-2-9-2

Figure 71-2-9. Starter-generator (Sheet 2)

SECTION 3 POWER PLANT (MODEL 250-C20B AND 250-C20J) **B B3**

71-3-1. POWER PLANT SYSTEM.

The Allison Model 250-C20B and 250-C20J turboshaft engines are installed in the 206B and 206B3 helicopters. The engines consist of a single-stage centrifugal-flow compressor, a single combustion chamber, a two-stage gas producer turbine, and a two-stage power turbine.

The power plant assembly is mounted horizontally aft of the transmission and above the fuselage. The engine is supported by three bipod mounts attached to the service deck and is coupled to the transmission through the freewheeling unit and main driveshaft.

71-3-2. TROUBLESHOOTING ENGINE.

1. Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2.

2. Torsional oscillation.

a. When the response or following time of the engine speed control system is the same as the natural harmonic frequency of the power train system, a torsional oscillation (or oscillation in power output) can occur. A torsional oscillation can be caused by one or more of the following:

(1) Leakage of fittings of engine fuel control air lines

(2) Dirty or malfunctioning double-check valve

(3) Malfunction of fuel control or power governor.

b. After an engine component change involving the fuel control system, it is recommended that the helicopter be checked for torsional oscillation. This check shall be performed as follows:

WARNING

DO NOT EXCEED HELICOPTER
LIMITATIONS.

(1) Load helicopter as much as possible up to gross weight. This check must be performed at a minimum of 85 percent torque.

(2) Fly helicopter up to the maximum power limitations for the engine as specified in the Flight Handbook. This can be done best by climbing the helicopter.

(3) While at the high power setting, quickly rotate the twist grip approximately 15 to 20 degrees off toward the flight idle stop and quickly return the grip to the maximum open position. At this time, torsional oscillation may be noted. If the system is functioning properly, the torsional oscillations should be completely dampened within 6 to 10 oscillations. These oscillations may be felt in the fuselage as well as observed on the torquemeter and N2 tachometer. The engine sound will also be changed during oscillations.

(4) If the torsional oscillations are not dampened within 6 to 10 oscillations, or if they intensify, turn twist grip toward the flight idle stop until oscillations stop. The twist grip may be opened slowly to restore engine power.

c. If torsional oscillations exceed the limits specified above, corrective action must be taken. Correct the oscillations in the sequence shown. If step c.(1) procedures do not correct the problem, proceed to step c.(2), etc.

(1) Check fuel control air lines for loose connections and air leaks.

(2) Clean double-check valve. Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2.

(3) Replace double-check valve.

(4) Replace fuel control and/or N2 governor.

71-3-3. OPERATIONAL CHECK.

AFTER ENGINE CHANGE AND/OR DISCONNECTING THE ENGINE OIL INLET HOSE, OIL PUMP PRIMING SHALL BE ACCOMPLISHED PRIOR TO ENGINE START.

1. Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2 for oil pump priming.



DO NOT EXCEED STARTER LIMITATION WHILE MOTORING ENGINE.

2. Prior to initial engine starting, motor engine until oil pressure is indicated. Do not exceed starter limitations. Refer to applicable flight manual. If an indication of oil pressure is not seen in 30 seconds, stop and determine cause.
3. Perform engine check run. (Refer to Allison 250-C20 Series Operation and Maintenance Manual 10W2.) Operation of helicopter shall be in accordance with applicable JetRanger Flight Manual.

NOTE

If a new engine is being installed or if a new turbine outlet temperature (TOT) harness is installed on the engine at any time, check the TOT circuit in the helicopter for an 8 plus or minus 0.05 ohms (Chapter 98).

NOTE

After test flight, check oil filter for contamination.

NOTE

For engine build-up procedures mentioned in this chapter, refer to BHT-206B3-CR&O manual.

71-3-4. REMOVAL.**SPECIAL TOOLS REQUIRED**

NUMBER	NOMENCLATURE
—	Hoist
6796963	(Allison) Lift Tool

Disconnect and remove the power plant with adapting parts attached to the engine. Disconnect all fuel and oil lines at firewall connections. If a replacement engine is to be installed, reduce the removed engine to a basic configuration and use the removed parts to build up the replacement engine. Cap openings to preclude entry of foreign material and remove parts in any practical order, using the following steps as a guide.

NOTE

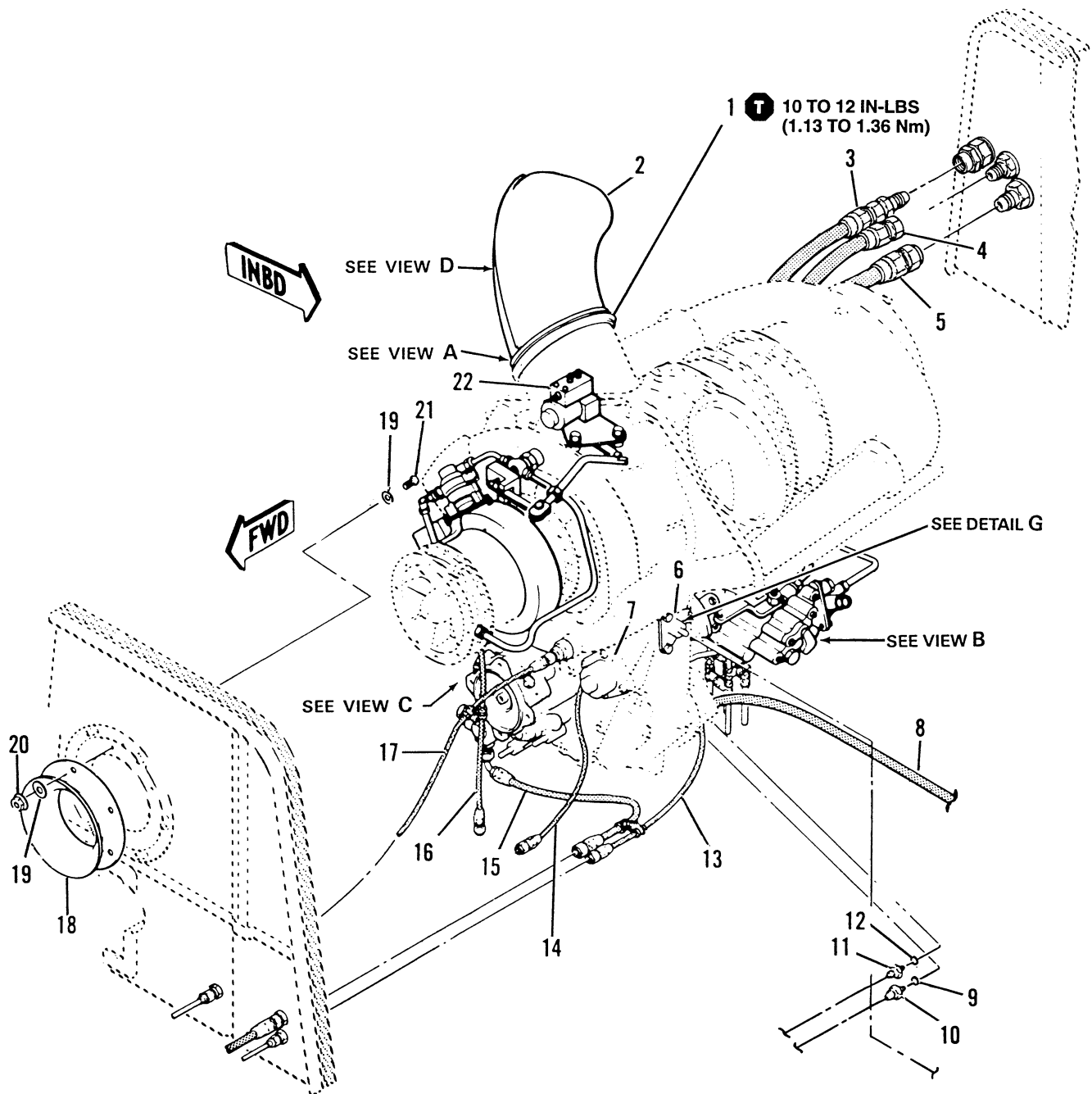
Separate and identify all parts removed. Record removal procedures for use as a guide to buildup and installation.

1. Disconnect battery.
2. Raise engine cowl (paragraph 71-3-10). Remove vent hose (69, figure 71-3-1, view D) from right exhaust stack (68).
3. Cut lockwire and remove exhaust stack clamps (1) and remove exhaust stacks (2 and 68).
4. Remove engine cowling (paragraph 71-3-10).
5. Remove electrical cable assembly (32) from engine using step a. or step b.
 - a. Disconnect electrical cable assembly (32) at engine disconnect (30), clamp (31), and filter disconnect (39 or 44). Check electrical cable assembly carefully for additional attachment that would interfere with power plant removal.
 - b. Disconnect the following electrical connections: temperature indicating harness, anti-ice control actuator, governor actuator, power turbine tachometer, gas producer tachometer, and ignition exciter. Remove clamps that secure electrical cables to engine (Chapter 96).



STARTER-GENERATOR SHALL BE SUPPORTED WHEN MOUNTING CLAMP IS LOOSENED. FAILURE TO SUPPORT STARTER-GENERATOR WILL RESULT IN PREMATURE FAILURE OF SHAFT.

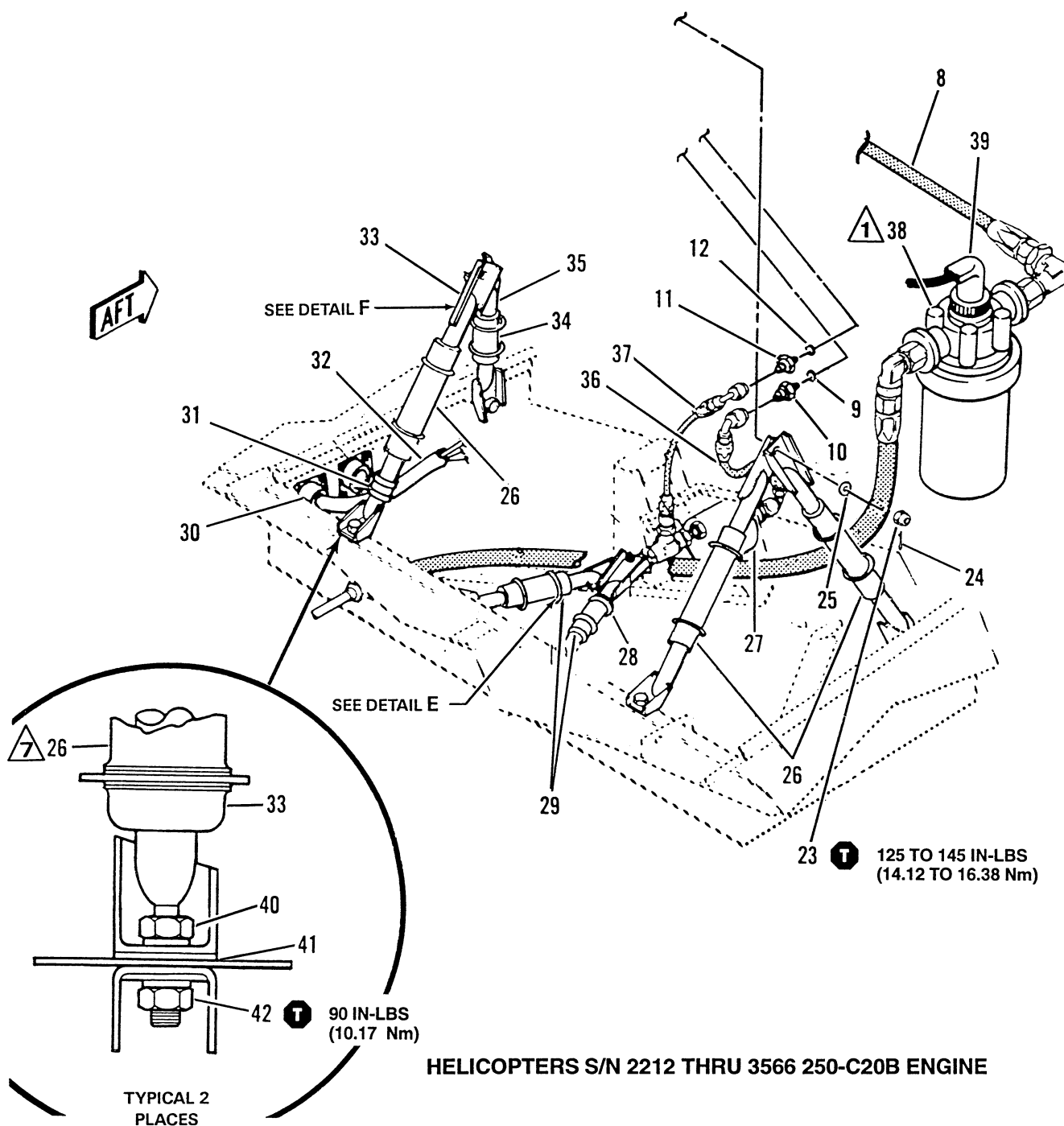
6. Remove starter-generator (58, view A) (paragraph 71-3-31).



HELICOPTERS S/N 2212 THRU 3566 250-C20B ENGINE

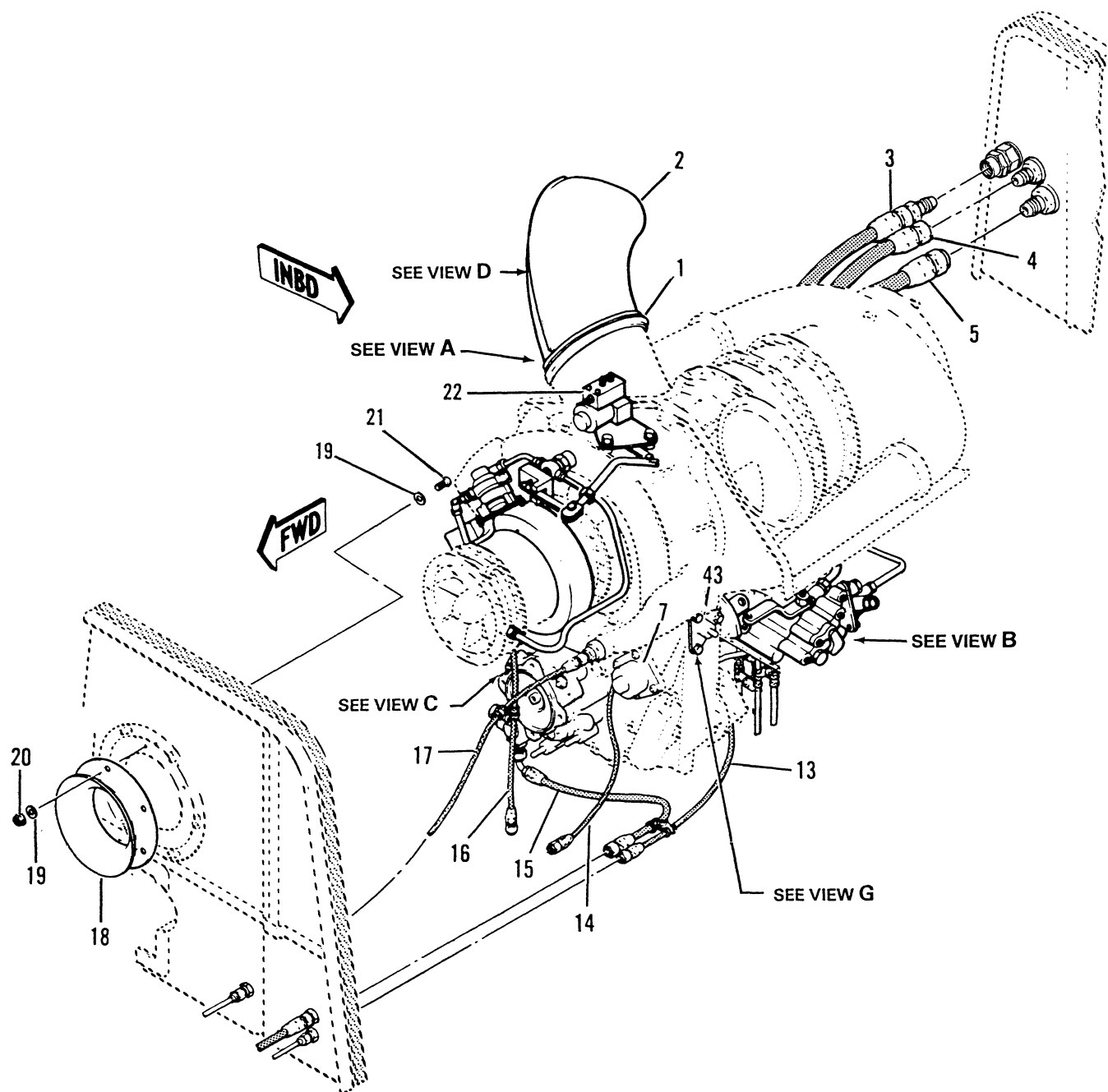
206A/BS-M-71-3-1-1

Figure 71-3-1. Engine removal/installation (Sheet 1 of 9)



206A/BS-M-71-3-1-2

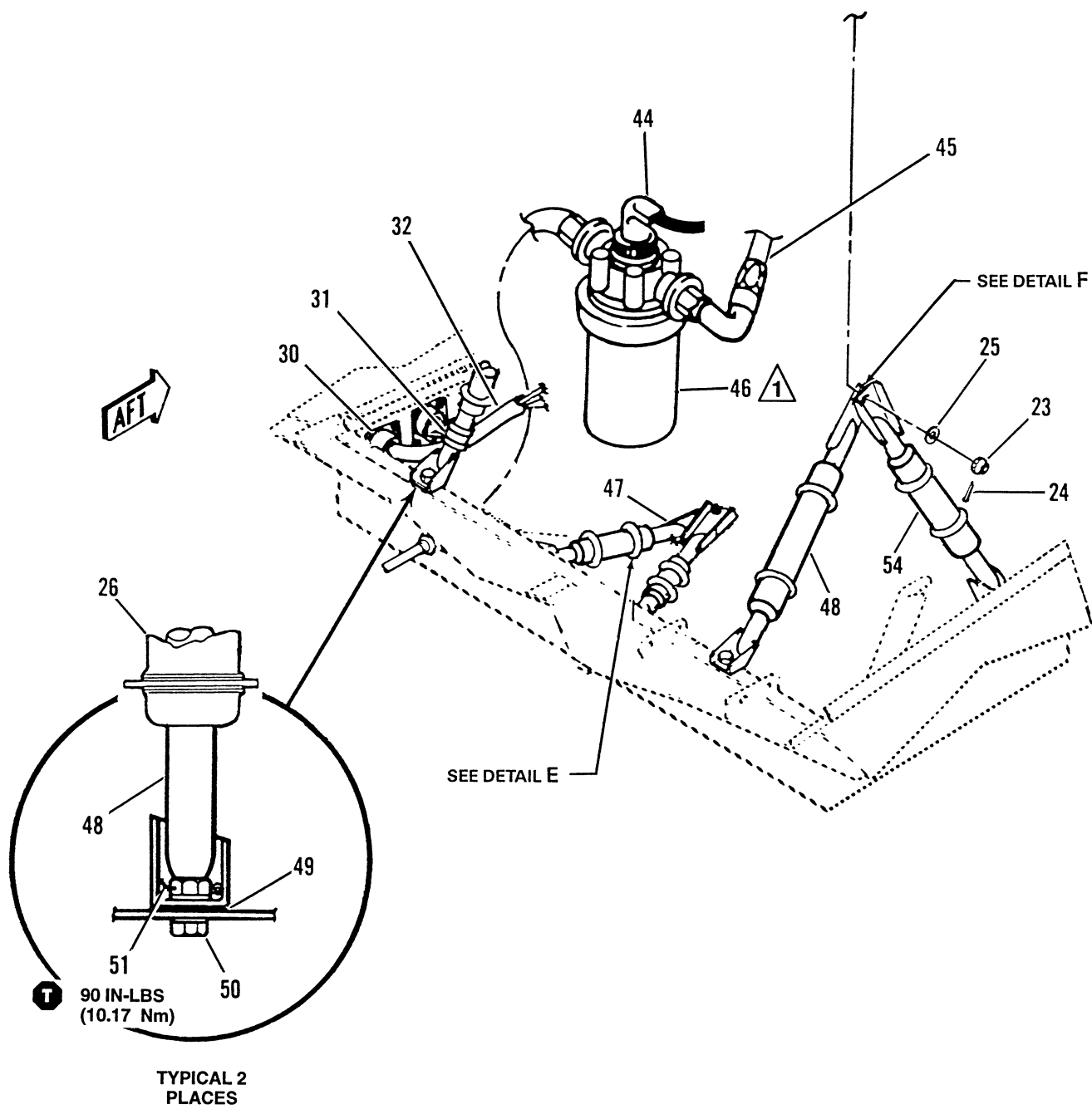
Figure 71-3-1. Engine removal/installation (Sheet 2)



HELICOPTERS S/N 3567 AND SUBSEQUENT 250-C20J ENGINE

206A/BS-M-71-3-1-3

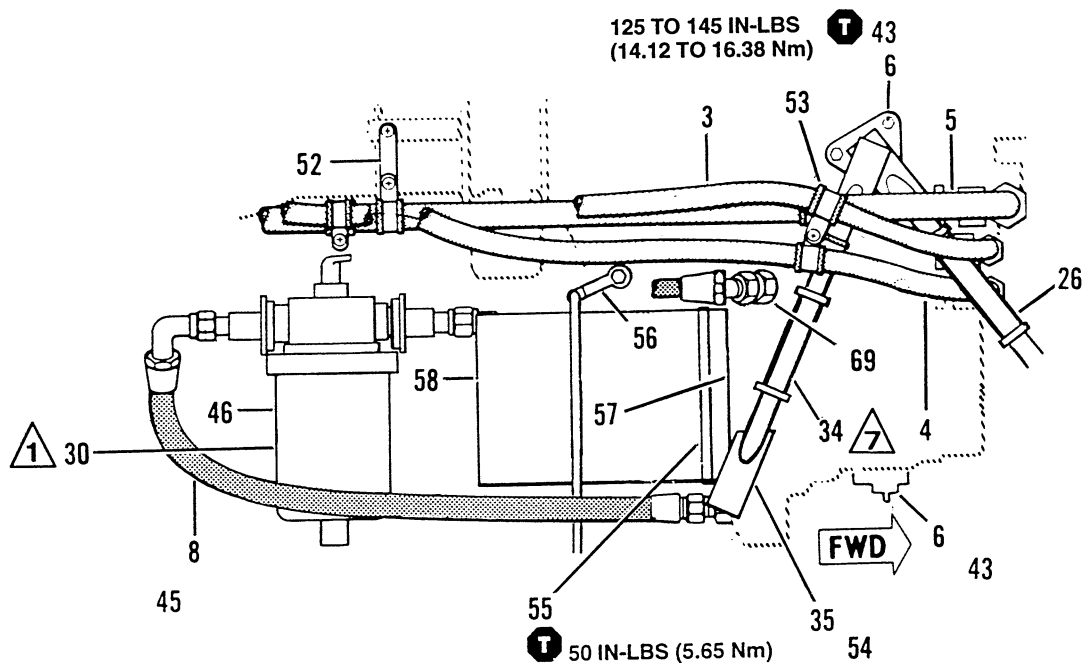
Figure 71-3-1. Engine removal/installation (Sheet 3)



HELICOPTERS S/N 3567 AND SUBSEQUENT 250-C20J ENGINE

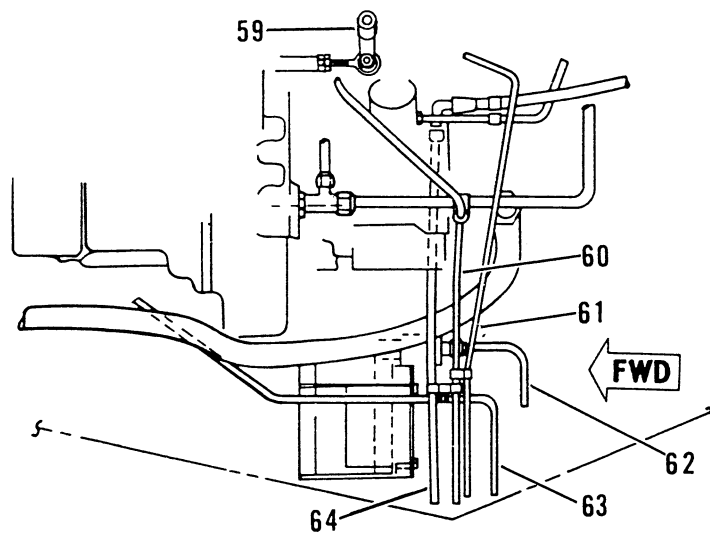
206A/BS-M-71-3-1-4

Figure 71-3-1. Engine removal/installation (Sheet 4)



VIEW A

LOOKING INBOARD RIGHT SIDE



VIEW B

LOOKING INBOARD LEFT SIDE

206A/BS-M-71-3-1-5

Figure 71-3-1. Engine removal/installation (Sheet 5)

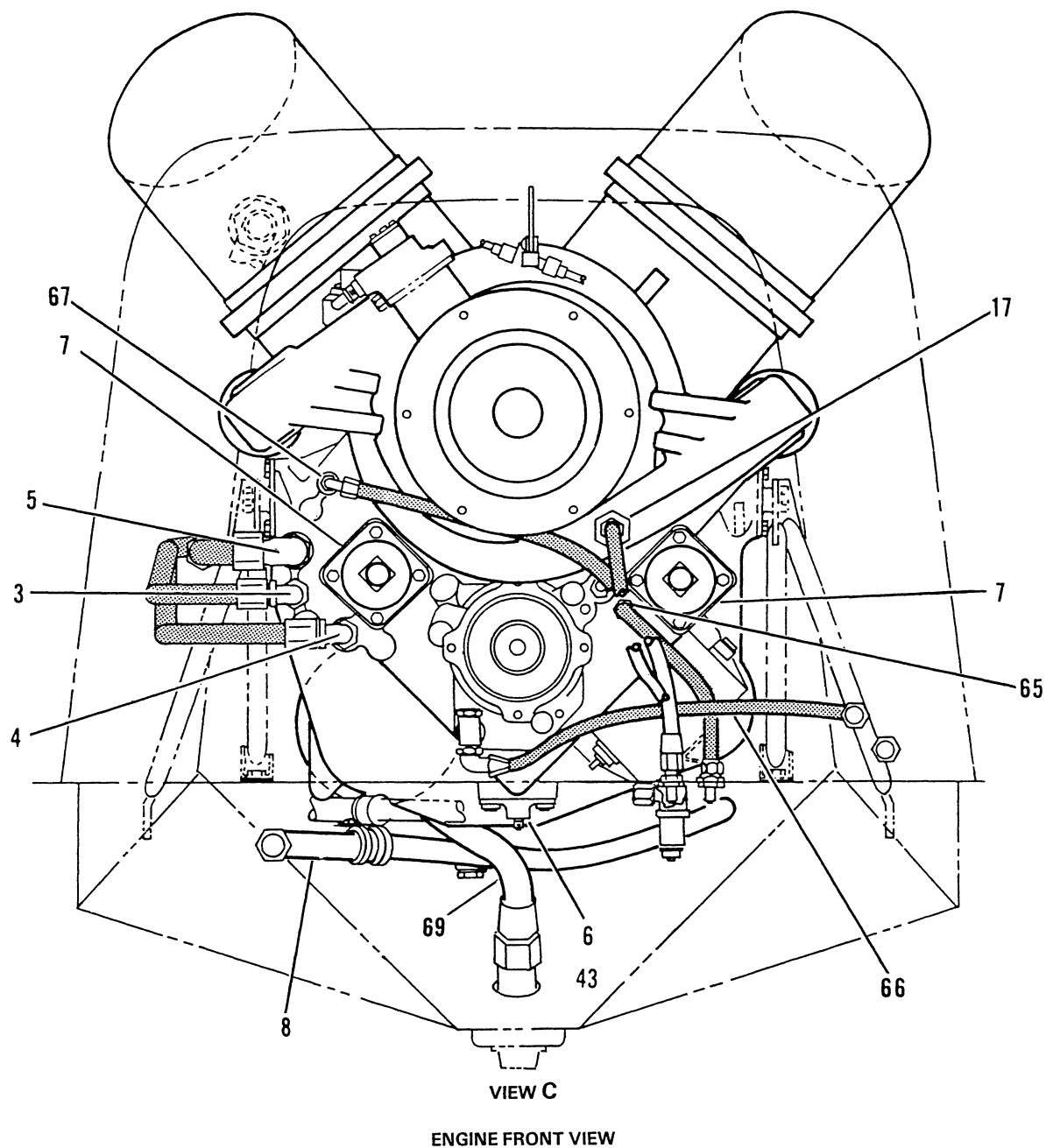
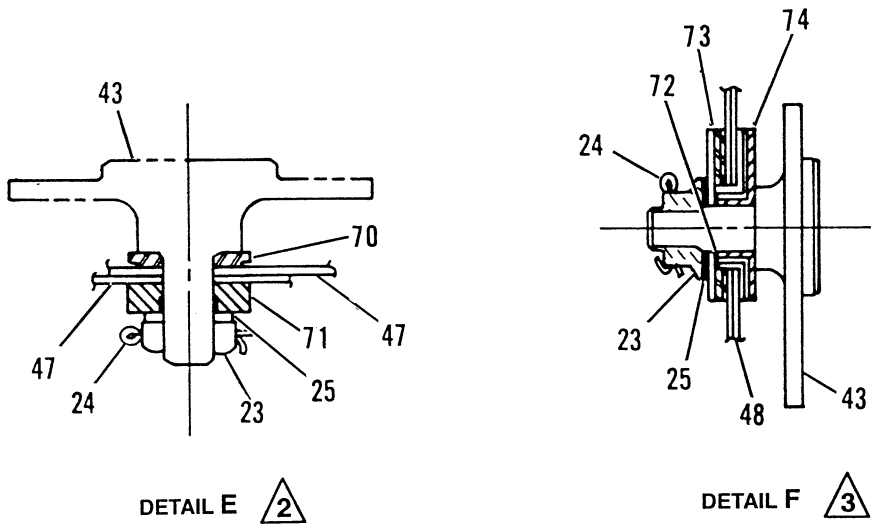
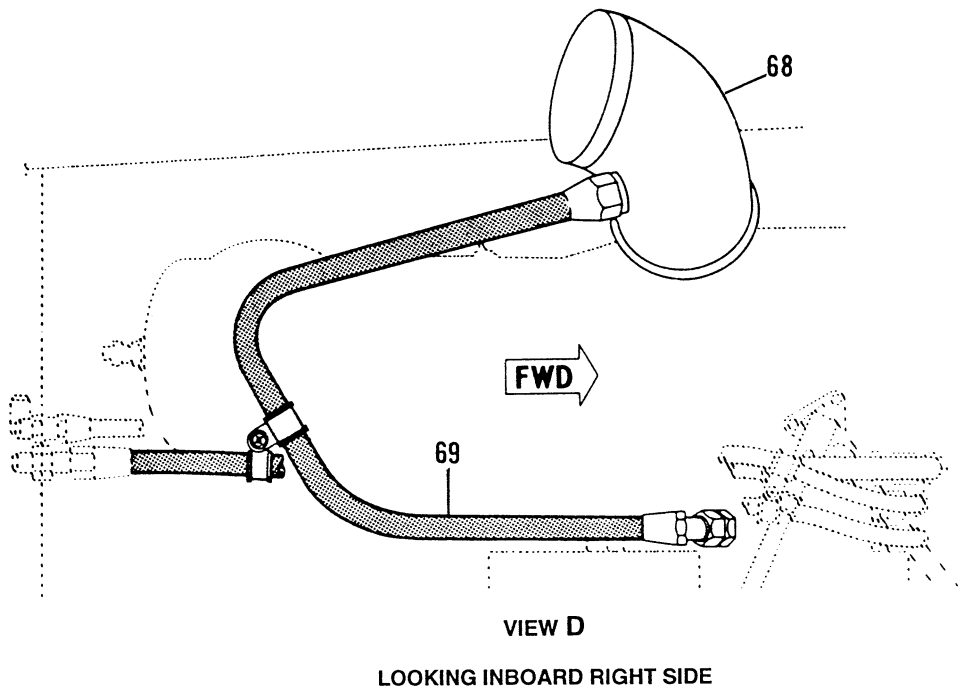
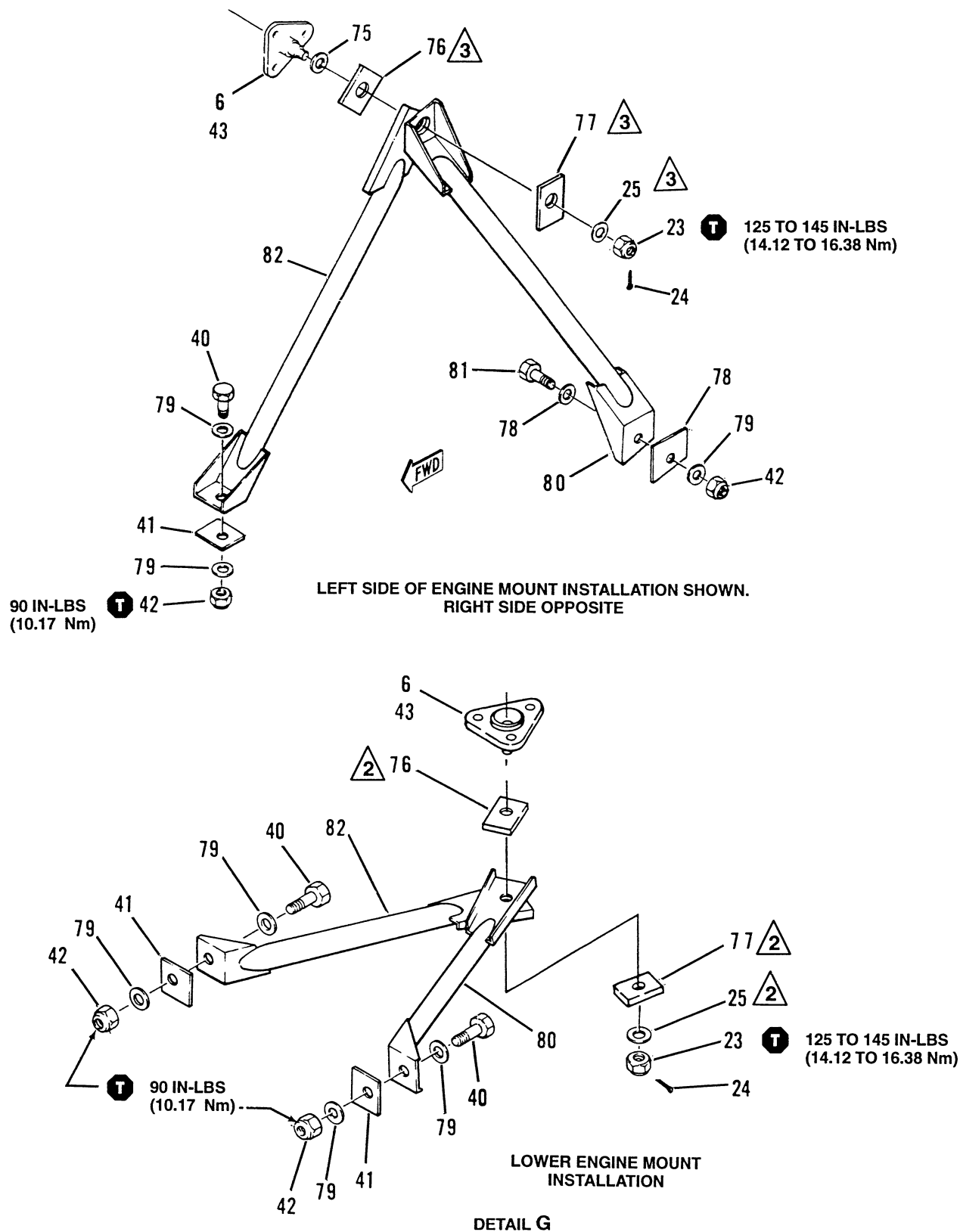


Figure 71-3-1. Engine removal/installation (Sheet 6)



206A/BS-M-71-3-1-7

Figure 71-3-1. Engine removal/installation (Sheet 7)



206A/BS-M-71-3-1-8

Figure 71-3-1. Engine removal/installation (Sheet 8)

1. Clamp	29. Clamshell damper cover	57. Adapter
2. Exhaust stack	30. Disconnect	58. Starter-generator
3. Engine oil outlet hose	31. Clamp	59. Droop compensator
4. Oil tank vent hose	32. Electrical cable assembly	control lever
5. Engine oil inlet hose	33. Support leg	60. Exhaust collector drain
6. Fitting	34. Clamshell damper cover	61. Fireshield drain
7. Tachometer generator, power turbine, left gas producer, right	35. Support leg	62. Engine fuel filter drain
8. Fuel supply hose	36. Hose	63. Fuel pump seal drain
9. Packing	37. Hose	64. Combustion chamber drain
10. Reducer	38. Airframe mounted fuel filter	65. Engine torque pressure restrictor
11. Union	39. Filter disconnect	66. Freewheeling vent hose
12. Packing	40. Bolt	67. Engine oil pressure restrictor
13. Freewheeling oil supply hose	41. Shim	68. Exhaust stack
14. Engine torque pressure hose	42. Nut	69. Accessory drive vent hose
15. Freewheeling oil return hose	43. Fitting	70. Acoustic bushing
16. Engine oil pressure hose	44. Filter disconnect	71. Acoustic spacer
17. Compressor pressure hose	45. Fuel supply hose	72. Laminated shim
18. Bellmouth	46. Airframe mounted fuel filter	73. Acoustic washer
19. Washer	47. Lower mount	74. Acoustic bushing
20. Nut	48. Support leg	75. Bevelled washer (140-007-27-J48C3)
21. Screw	49. Shim	76. Bushing (206-061-108-101)
22. Anti-ice actuator	50. Bolt	77. Spacer (206-061-109-101)
23. Nut	51. Nut	78. Shim
24. Cotter pin	52. Clip	79. Washer
25. Washer	53. Clamp	80. Support leg
26. Clamshell damper cover	54. Support leg	81. Bolt
27. Fuel filter differential pressure switch	55. Clamp	82. Support leg
28. Mount	56. Gas producer control lever	

NOTES

 Fuel filter mounted on airframe BL 3.75 and STA 154.66

 Post T.B. 206-82-76

 Pre T.B. 206-82-76

206A/BS-M-71-3-1-9

Figure 71-3-1. Engine removal/installation (Sheet 9)

7. Remove the engine-to-transmission driveshaft (Chapter 63) and the tail rotor drive forward short shaft (Chapter 65).

NOTE

Index bellmouth flex coupling to forward firewall to facilitate reassembly.

8. Drain engine oil reservoir. Disconnect the engine oil inlet hose (5), engine oil outlet hose (3), and oil tank vent hose (4) at the aft firewall. Disconnect clamps (53, view A) securing oil hoses to engine mount aft support leg (35 or 54).

9. Disconnect the accessory drive overboard vent hose (69, view A) at engine.

10. Disconnect the engine fuel supply hose (8 or 45) at engine driven fuel pump.

11. Remove screws (21), nuts (20), and washers (19) attaching the bellmouth (18) to the engine adapter flange located on the forward end of the compressor section.

12. Disconnect gas producer control lever (56, view A) on right side of engine (Chapter 76).

13. Disconnect freewheeling oil supply and oil return hose assemblies (13 and 15) at forward firewall. Cap off the firewall fittings to prevent gravity drain of transmission oil and entry of foreign material. Disconnect the engine oil pressure hose (16) and engine torque pressure hose (14) at forward engine deck.

14. Disconnect two fuel differential pressure hoses (36 and 37) from forward side of engine fuel pump (helicopters S/N 2212 through 3566 only).

15. Disconnect droop compensator control lever (59, view B) on left side of engine (Chapter 76).

16. Remove anti-ice actuator (22) from pad at top of engine and install 6796963 lift tool (or equivalent) on pad (Chapter 75). Connect hoist to lift tool and take up engine weight from mount support legs (33 and 35, or 48 and 54).



FAILURE TO LOOSEN ATTACHING HARDWARE AND/OR FORCING ENGINE MOUNT SUPPORT LEG OUT OF POSITION MAY RESULT IN OVERSTRESSING AND SUBSEQUENT CRACKING OF SUPPORT STRUCTURE.

17. For helicopters without acoustic (clamshell damper) engine mounts, remove engine mount nuts (23) and washers (25) at fittings (6 or 43). Loosen nuts (42 or 51) only enough to free mount support legs (33 or 48) and (35 or 54, view A) from engine fittings (6).

18. Repeat the procedures of step 17., removing and loosening parts on right and lower fitting (6 or 43).

19. For helicopters that have engine mounts modified to hard mount configuration (acoustic mounts replaced) per T.B. 206-82-76, remove cotter pin (24, detail G), engine mount nuts (23), washers (25), and spacers (77) at fittings (6 or 43). Loosen nuts (42) only enough to free mount support legs (80 and 82) from engine fittings (6 or 43).

20. Repeat the procedures of step 19., removing parts on right and lower fitting (6 or 43).

21. For helicopters equipped with acoustic (clamshell damper) engine mounts (details E and F), the following steps are applicable.

a. Remove cotter pin (24), engine mount nut (23), washer (25), spacer (71), and bushing (70) from lower fitting (43, detail E).

b. Loosen nuts (51) only enough to free mount support legs (48) from engine fittings (6 or 43).

c. Remove engine mount nut (23), washer (25), bushing (74), washer (73), and shim (72) from fittings (43) at side mount locations (detail F). Keep shim, bushing, and washer together and with support leg (54, view A). If parts are replaced or become mixed, a new shim (72, detail F) thickness must be determined (paragraph 71-3-6, step 4.c.).

22. Check engine and airframe to ensure engine is free of all connections to airframe before lifting engine.

23. Lift engine carefully and place on a suitable stand.

71-3-5. POWER PLANT SYSTEM — INSPECTION

1. Inspection of the engine shall be in accordance with the Rolls-Royce 250-C20 Series Operation and Maintenance Manual 10W2.



IF INTERNAL ENGINE FAILURE OR METAL CONTAMINATION HAS OCCURRED THAT MIGHT CONTAMINATE COOLER, REMOVE AND INSTALL NEW COOLER AND FLUSH CONNECTING LINES, FITTINGS, AND OIL TANK.

2. Inspect engine mounts (paragraph 71-3-14, paragraph 71-3-15, and paragraph 71-3-21).

3. Inspect airframe engine support attaching points for elongation of holes and cracks. Refer to BHT-206-SRM for damage limits.

4. Inspect all hose and tube assemblies for leakage, chafing, clamping, and security. Inspect hose assemblies for proper routing. Check for presence of chafing or leakage.

71-3-6. POWER PLANT SYSTEM — INSTALLATION

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
6796963	(Rolls-Royce) Lift Assembly Tool
—	Hoist

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-001	Grease
C-304	Drycleaning Solvent

MATERIALS REQUIRED (Cont)

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-405	Lockwire

WARNING

FAILURE TO PROPERLY INSTALL, ALIGN, AND TORQUE FUEL, OIL, AND AIR TUBES AND FITTINGS MAY RESULT IN AN ENGINE FAILURE.



IF A NEW, REPLACEMENT, RENTAL, OR LOANER ENGINE IS BEING INSTALLED, ENSURE SEALS 6854086 HAVE BEEN REMOVED AND REPLACED WITH SEALS 406-340-104-101 OR SUBSEQUENT WITH METAL FACE SIDE OUT. REFER TO ROLLS-ROYCE 250-C20 SERIES OPERATION AND MAINTENANCE MANUAL.

NOTE

Verify that double-check valve and accumulator have been installed in accordance with BHT-206A/B-SERIES-CR&O Manual.


1. Prepare power plant for installation by building up the replacement engine from basic configuration to the configuration of the removed engine in accordance with BHT-206A/B-SERIES-CR&O Manual. Cap or cover openings to preclude entry of foreign material. For helicopters that have engine mounts modified to hard mount configuration (acoustic mounts replaced) per TB 206-82-76, proceed to step 3. For helicopters equipped with acoustic and clamshell damper engine mounts, proceed to step 4.

2. Install lift assembly tool (6796963 or equivalent) on pad at top of engine.

a. Connect hoist and carefully lower engine into the airframe, aligning the engine fittings (6 or 43, Figure 71-3-1) with the left, right, and lower engine mount support legs (33, 35, and 28, Sheet 2).

b. Engage the left and right engine mount support legs (33 and 35) with studs on fittings (6 or 43) and install washers (25) and nuts (23).

c. Engage the lower engine mount support legs (28) with studs on fittings (6 or 43) and install washers (25) and nuts (23).

d. Torque nuts (23) .

e. Torque engine support nuts (42 or 51) .

f. Remove hoist and lift assembly. Secure nuts (23) on fittings (6) with cotter pins (24).

3. For helicopters that have engine mounts modified to hard mount configuration (elastomeric fittings replaced) per [TB 206-82-76](#), proceed as follows:

NOTE

The long end of bushing (76) (Detail G) (end with maximum edge distance from hole center) shall be oriented up. Bevelled edge surfaces on both the bushing and spacer (77) shall be installed to face the support legs (80 and 82).


a. Remove anti-icing actuator (22) from engine top pad if installed ([Chapter 76](#)).

b. Install lift assembly tool (6796963 or equivalent) on pad at top of engine.

c. Connect hoist and carefully lower engine into the airframe, aligning the engine fittings (6 or 43) with the support legs (80 and 82).

d. Install bevelled washers (75) and bushings (76) on side fittings (6 or 43) only.

e. Engage the support legs (80 and 82) with studs on fittings (6 or 43) and install spacers (77), washers (25), and nuts (23).

f. Torque nuts (23) .


g. Torque support nuts (42) .

h. Repeat step d through step g on right and lower fitting (6 or 43).

i. Remove hoist and lift assembly. Secure nuts (23) on fittings (6 or 43) with cotter pins (24).

4. For helicopters equipped with acoustic (clamshell damper) engine mounts, the following steps are applicable.

a. Remove anti-ice actuator (22) from engine top pad and install lift tool (6796963 or equivalent) ([Chapter 76](#)). Connect hoist and carefully lower engine into the airframe. Align engine fittings (43) (Detail E) with engine mounts (47). Engage mount legs (48) with studs on fittings.

b. Install bushing (70) on lower mount (47). Long end of bushing shall be oriented aft. With fitting (43) engaging mount and bushing, install spacer (71) with chamfered edges against mount, washer (25), and nut (23). Torque the nut  and install cotter pin (24, Detail E).

c. To determine thickness of shim (72) at each side of fitting (43):


(1) Measure thickness of the mount support legs (48 and 54), in thousandths, at the attaching point. Record this number.


(2) Press acoustic bushing (74) and washer (73) together, measure gap between inner surfaces, and subtract this value from mount thickness (Detail F).

(3) From the remainder of step (2), subtract 0.020 inch (0.508 mm). This determines thickness of shim (72) at fitting (43).

d. Install acoustic bushing (74) on left fitting (43). Position long end of bushing up. Fit forward and aft mount legs (48) on bushing. Install washer (73) and required shim (72). Add washer (25) and nut (23) to hold parts together, but do not torque.



e. Repeat the procedure of step d, installing parts on right fitting (43).

f. Gain access to bolts (50) inside cabin roof and install nuts (51) ([paragraph 71-3-17](#)). Torque the nuts .

g. Torque nuts (23)  and secure with cotter pins (24) (Detail F). Do not overtorque; damage to elastomeric elements may occur.

h. Visually inspect for contact between fitting (43) bolt head and engine mount leg (48). If contact is evident, remove washer (25) from under affected bolthead or add a washer onto shank of mount fitting.

i. Disconnect hoist and remove lift tool from engine pad.

j. Examine hardware attaching side engine mount support legs (48 and 54) for security. Torque nuts (42) . Effective on helicopters S/N 3567 and subsequent, retorque nut , and install cotter pin (24).

5. Remove compressor inlet cover and align the bellmouth assembly (18) with the forward flange of engine inlet and install screws (21), washers (19) (one under screw head and one under nut), and nuts (20).

6. Install anti-ice actuator (22) (Chapter 76).

7. Install tail rotor drive forward short shaft (Chapter 65) and the engine-to-transmission driveshaft (Chapter 63).



THE STARTER GENERATOR SHALL BE SUPPORTED UNTIL CLAMP IS INSTALLED AND PROPERLY TORQUED (50 INCH-POUNDS) (5.65 NM). FAILURE TO SUPPORT STARTER GENERATOR WILL RESULT IN PREMATURE FAILURE OF SHAFT.

8. Check starter generator (58) (View A) to determine that the torsional damper members of starter generator are in hard contact with each other so as to provide effective damping. Refer to Chapter 96 for routing and clamping.

a. Clean male and female splines of starter generator (58), adapter (57), and accessory drive with drycleaning solvent (C-304).

NOTE

On dry-spline drives (helicopters S/N 2212 through 3566), lubricate the splines with grease (C-001).

b. Install starter generator (58) (paragraph 71-3-33).

9. Make electrical connections at the following: temperature indicating harness, anti-ice valve actuator, power turbine tachometer, gas producer tachometer, ignition exciter, and fuel pressure differential switch if present. Refer to Chapter 96 for routing and clamping.


10. Connect the following hose assemblies: engine oil outlet hose (3), engine oil inlet hose (5), and oil tank vent hose (4) at the aft firewall; engine fuel supply hose (8 or 45) at fitting on airframe mounted fuel filter (38 or 46); freewheel assembly oil supply and oil return hoses (13 and 15) to unions on forward firewall; engine oil pressure hose (16) to engine deck fitting; engine torque pressure hose (14) to deck fitting; and compressor pressure hose (17) lower firewall. Clamp hose assemblies as illustrated in Figure 71-3-1. Effective on helicopters S/N 2212 through 3566, connect fuel pressure differential switch hoses (36 and 37) to forward side of engine fuel pump.

11. Connect and rig engine controls (Chapter 76).

12. Inspect engine installation to ensure that all installations are complete. Check security of installations.



PRIOR TO INSTALLING EXHAUST STACKS, INSPECT ATTACHING FLANGE AREA FOR WARPING, DENTS, CRACKS, AND BURNED SPOTS THAT COULD CAUSE A LEAKING EXHAUST JOINT.

13. Install cowl and exhaust stacks (2 and 68). (Refer to paragraph 71-3-12 for cowl installation instructions.) Position exhaust stack (2) and clamp (1) on engine. Tap clamps lightly to seat clamps while tightening clamp nut  until clamp is snug on exhaust stack and flange. Do not exceed 25 inch-pounds (2.83 Nm) torque. Install opposite exhaust stack (68) in the same

manner. Install 0.032 inch lockwire (C-405) on clamp nuts and fasteners

14. Connect overboard vent hose (69) on right exhaust stack (68) fitting.

15. Connect battery.



AFTER POWER PLANT CHANGE AND/OR DISCONNECTING ENGINE OIL INLET HOSE, OIL PUMP PRIMING SHALL BE ACCOMPLISHED PRIOR TO ENGINE START.

16. Service engine oil reservoir (Chapter 12). Service transmission to replace oil lost in freewheel unit and lines (Chapter 12) to prevent possible damage to engine.

NOTE

Engine oil pumps will normally prime themselves; however, there have been a few instances where pumps have continued to run in a dry or unprimed condition following the initial engine start.

17. Prime engine oil pump (Chapter 79).



DO NOT EXCEED STARTER LIMITATIONS WHILE MOTORING ENGINE.

18. Prior to starting, motor engine until oil pressure is indicated. Do not exceed time limits established for energized starter. Refer to applicable JetRanger Flight Manual.

NOTE

If pressure is not indicated within 30 seconds, stop and determine the cause.

19. Check for indications of leaks after ground run. If leaks are found, correct and refill reservoir as required (Chapter 12).

NOTE

If a new engine is being installed or if a new turbine outlet temperature (TOT) harness is installed on engine at any time, check TOT circuit resistance for not less than 5 ohms and not more than 200 ohms with a Wheatstone bridge. Check indicator for 738°C and 810°C with an appropriate test set (Chapter 96).

NOTE

After test flight, check engine oil filter for contamination.

20. Do a torque check of the engine mount attachment hardware at engine and airframe attachment points, 100 flight hours after each installation (Chapter 5). This includes the engine mount nuts (23, Figure 71-3-1) and engine support nuts (42 or 51).

71-3-7. ENGINE COMPRESSOR WASH

The engine compressor wash provision consists of a right angle fitting, tube, clamp, and plug. The tube and fitting are connected to a bracket on the induction screen and provide a means of washing the engine.

71-3-8. ENGINE COMPRESSOR WASH — WASHING

1. Disconnect main ECU bleed air line and control line, if installed, at scroll and cap.

2. Remove plug (7, Figure 71-3-2) and connect engine compressor wash unit to tube (6).

3. Connect engine compressor wash unit and perform compressor wash in accordance with procedures listed in Rolls-Royce 250-C20 Series Operation and Maintenance Manual 10W2.

4. Disconnect engine compressor wash unit and install plug (7) in tube (6).

5. Remove caps from main ECU bleed air line and control line, if installed, and connect lines to their respective fittings.

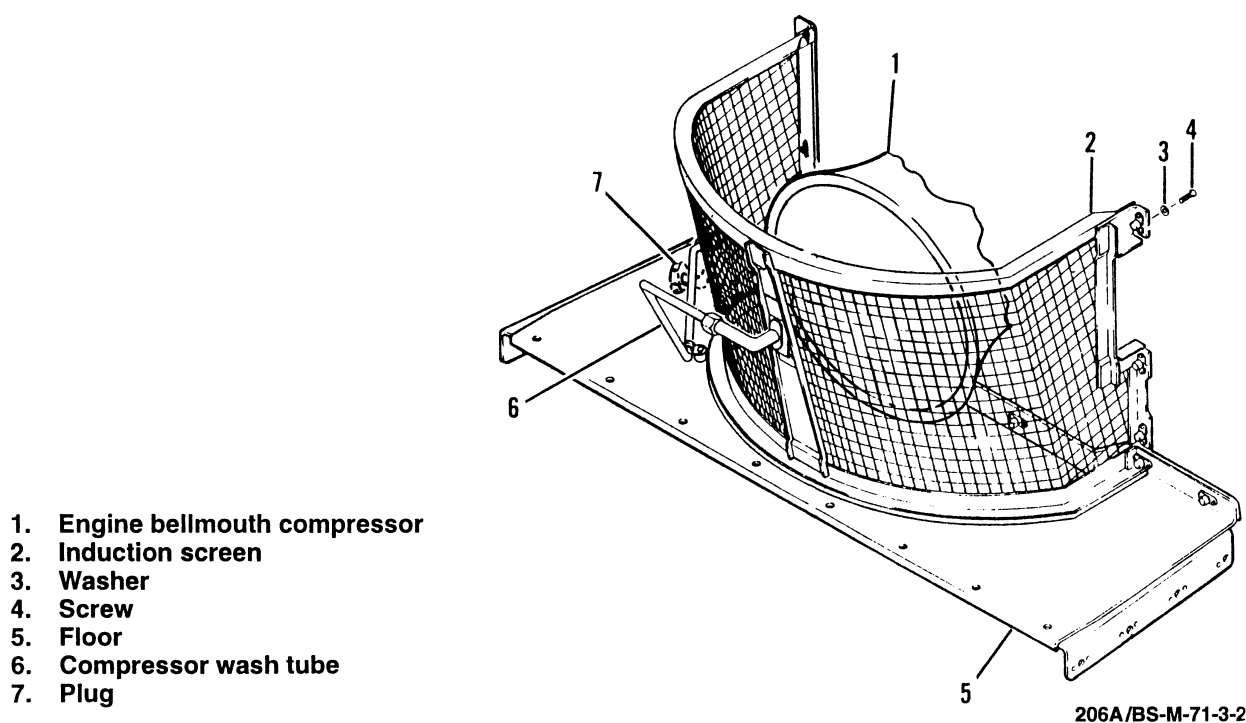


Figure 71-3-2. Engine Compressor Wash and Induction Screen

COWLING AND FAIRINGS

71-3-9. COWLING AND FAIRINGS.

The engine and transmission cowl (figure 71-3-3) consists of four sections: forward fairing, induction fairing, engine cowl assembly, and aft fairing. The cowl is constructed of aluminum alloy, fiberglass, and honeycomb material and is readily removable for engine and transmission changes. Cowling access panels are provided with snap-open fasteners which permit inspection without removing the cover unit. The forward and aft fairing assemblies are secured with fasteners.

71-3-10. REMOVAL.



PROTECT COMPRESSOR INLET AND EXHAUST PORT OPENING WHEN COWL IS REMOVED.

1. Unfasten fasteners securing forward fairing (1, figure 71-3-3) and remove fairing.

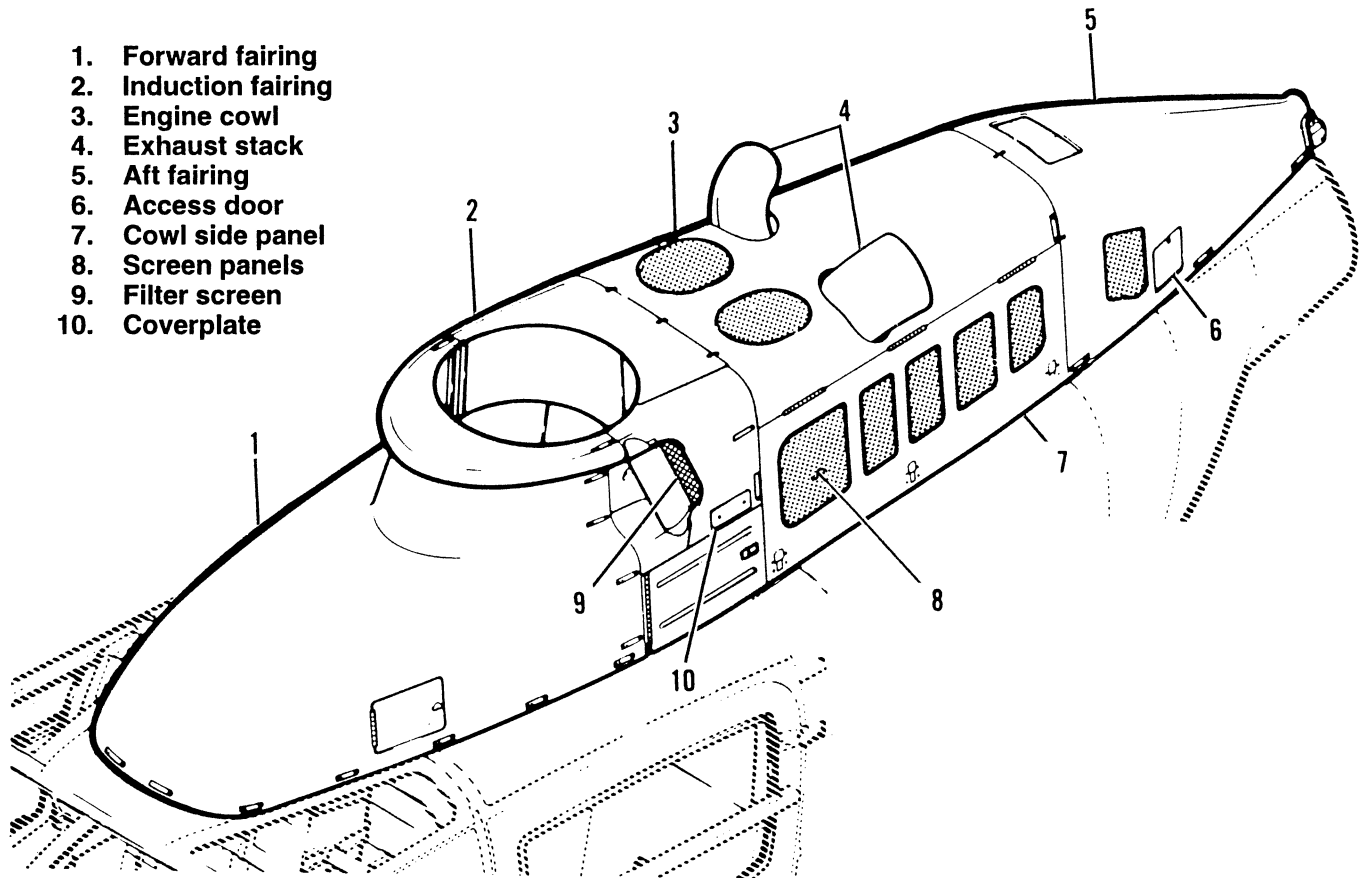
2. Unfasten fasteners securing aft fairing (5) and remove fairing.

3. Unlatch access door on each side of induction fairing (2) and unfasten fasteners attaching induction fairing to roof deck. Unfasten fasteners attaching aft end of fairing to forward firewall.

4. Unlatch engine cowl side panels (7) and remove exhaust stack assemblies (4) (paragraph 71-3-2). Unfasten fasteners attaching cowl (3) to forward and aft firewalls and remove engine cowl.

71-3-11. INSPECTION.

1. Inspect hinges, latches, and fittings for wear, damage, and serviceability.



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Figure 71-3-3. Engine cowl and fairings

BHT-206A/B-SERIES-MM-9

2. Inspect seals for tears, cracks, security, and deterioration.

3. Inspect cowling for cracks, dents, holes, and other damage.

71-3-12. INSTALLATION.

1. Install exhaust stack assembly (4, figure 71-3-3) through engine cowling (3).

2. Position cowling (3) over forward and aft firewalls and fasten fasteners.

3. Position aft fairing (5) over aft firewall and fasten fasteners.

4. Position forward fairing (1) to align holes with induction fairing (2) and roof deck attachment angle and fasten fasteners.

5. Position induction fairing (2) over forward firewall and fasten fasteners securing fairing to roof deck and to forward firewall.

6. Check cowling (3) and fairings (1, 2, and 5) for security and close and latch all access panels.

ENGINE MOUNTS

71-3-13. ENGINE MOUNTS.

The engine is supported on the service deck by three bipod mounts located on the right, left, and lower side of engine. Shims are provided at each mount leg for engine alignment. For maintenance and inspection of engine mount clamshell dampers (paragraph 71-3-21).



IF MOUNTS ARE REMOVED, DO NOT REMOVE BONDED SHIMS. IF REMOVAL IS REQUIRED, INDEX SHIMS AND REINSTALL IN EXACT POSITION AS BEFORE REMOVAL. THESE SHIMS AFFECT ENGINE-TO-TRANSMISSION ALIGNMENT.

71-3-14. INSPECTION.

1. Inspect tubes assemblies and weld areas of mount for cracks. If cracks are found, replace mount.
2. Inspect mount bolts and nuts for thread damage.
3. Inspect engine mount and engine mount leg for nicks, scratches, and cracks (BHT-206A/B-SERIES-CR&O).

71-3-15. INSPECTION (ELASTOMERIC ENGINE MOUNTS).

NOTE

For helicopters equipped with acoustic engine mounts, the following is applicable.

1. Inspect washers (73, figure 71-3-1, detail F) and bushings (74) for abnormal bulges, evidence of elastomer separation, bond line separation, cracks, discoloration, and/or deterioration.
2. Any evident damage to the elastomer, or separation of the elastomer, necessitates replacement.

71-3-16. REMOVAL.

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
—	Hoist
6796963	(Allison) Lift Tool

1. Remove engine (paragraph 71-3-4).
2. Remove bolts, washers, and nuts securing mounts to the airframe.

71-3-17. REPLACEMENT (ENGINE LOWER ACOUSTIC MOUNT ELASTOMERIC COMPONENTS).

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
—	Hoist
6796963	(Allison) Lift Tool

1. Prepare helicopter for maintenance. Disconnect battery and/or electrical power supply.
2. Raise engine cowl side panels and secure. Disconnect accessory drive vent hose (69, figure 71-3-1) to right exhaust stack (28). Cut lockwire and remove both exhaust stack clamps (1). Remove stacks (2 and 68) and engine cowlings.
3. Disconnect anti-ice actuator tube (22). Remove hardware attaching actuator to engine and move actuator to one side (Chapter 75). Install 6796963 engine lift tool, or equivalent, to engine pad (paragraph 71-3-4).
4. Connect hoist to 6796963 engine lift tool. Raise hoist only enough to remove engine weight from support legs (80 and 82) and fittings (6).

NOTE

To prevent undue loads on engine attachment points with support legs disconnected, remove and reassemble one set of legs at a time.

5. Remove hatbox upholstery from rear of cabin to gain access to engine lower support legs (47) attaching hardware in roof.

6. Disconnect lower support legs (48) from engine fitting (43) by removing cotter pin (24), nut (23), and washer (25).

7. Loosen hardware attaching the lower support legs (82) to fuselage at the forward ends. Gain access to nuts (42) inside cabin roof through hatbox opening. Loosen hardware only enough to free the legs from the engine fitting. Remove the elastomeric washer, shims, and elastomeric bushing from aft end of support legs (82) and fitting (43).

NOTE

It is recommended that removed elastomeric washer, bushing, and shims be retained, if serviceable, for spares replacement at the two side mount locations.

8. Install bushing (70) on engine fitting (43), two lower support legs (48), spacer (71), washer (25), and nut (23). Tighten nut only enough to hold parts in place at this time.

NOTE

Long end of bushing (6) (end with maximum edge distance from hole center) shall be oriented aft.

9. Secure forward ends of the two lower support legs (48) to fuselage with hardware loosened in step 7. Tighten nuts (42) **T**.

NOTE

Retorque nut (23) 125 to 145 inch-pounds (14.12 to 16.38 Nm) at the next 100 hour inspection.

10. Secure aft ends of the two support legs (48) to engine fitting (43) by tightening nut (23) **T**. Install cotter pin (24).

11. Lower the hoist, and disconnect and remove engine lift tool.

12. Install anti-ice actuator (22) to engine (Chapter 75) and connect control tube.

13. Install engine cowlings and both exhaust stacks. Connect vent hose. Close and latch engine side panels. (Refer to paragraph 71-3-6, steps 14. and 15.)

14. Install hatbox upholstery in rear of cabin.

15. Connect battery and prepare helicopter for flight operations.

71-3-18. REPLACEMENT (ENGINE SIDE ACOUSTIC MOUNT ELASTOMERIC COMPONENTS).

1. Gain access to engine. Refer to paragraph 71-3-10 for removal of engine cowling.



IF ENGINE MOUNTS ARE REMOVED, DO NOT REMOVE BONDED SHIMS. THESE SHIMS AFFECT ENGINE-TO-TRANSMISSION ALIGNMENT.

NOTE

To prevent undue loads on engine attachment points with support legs disconnected, remove and reassemble one set of legs at a time.

2. Disconnect left side engine mount support legs (48, figure 71-3-1) from engine fitting (43). Refer to paragraph 71-3-4 and perform steps 21.b. and 21.c.



DISCONNECT MOUNT LEGS FROM ONE SIDE OF ENGINE AT A TIME TO MAINTAIN SUPPORT AND ALIGNMENT OF ENGINE.

3. Determine thickness of new shim (72) for this joint. Refer to paragraph 71-3-6, step 4.c.

4. Install acoustic bushing (74) and washer (73). Refer to paragraph 71-3-6, step 4.d.

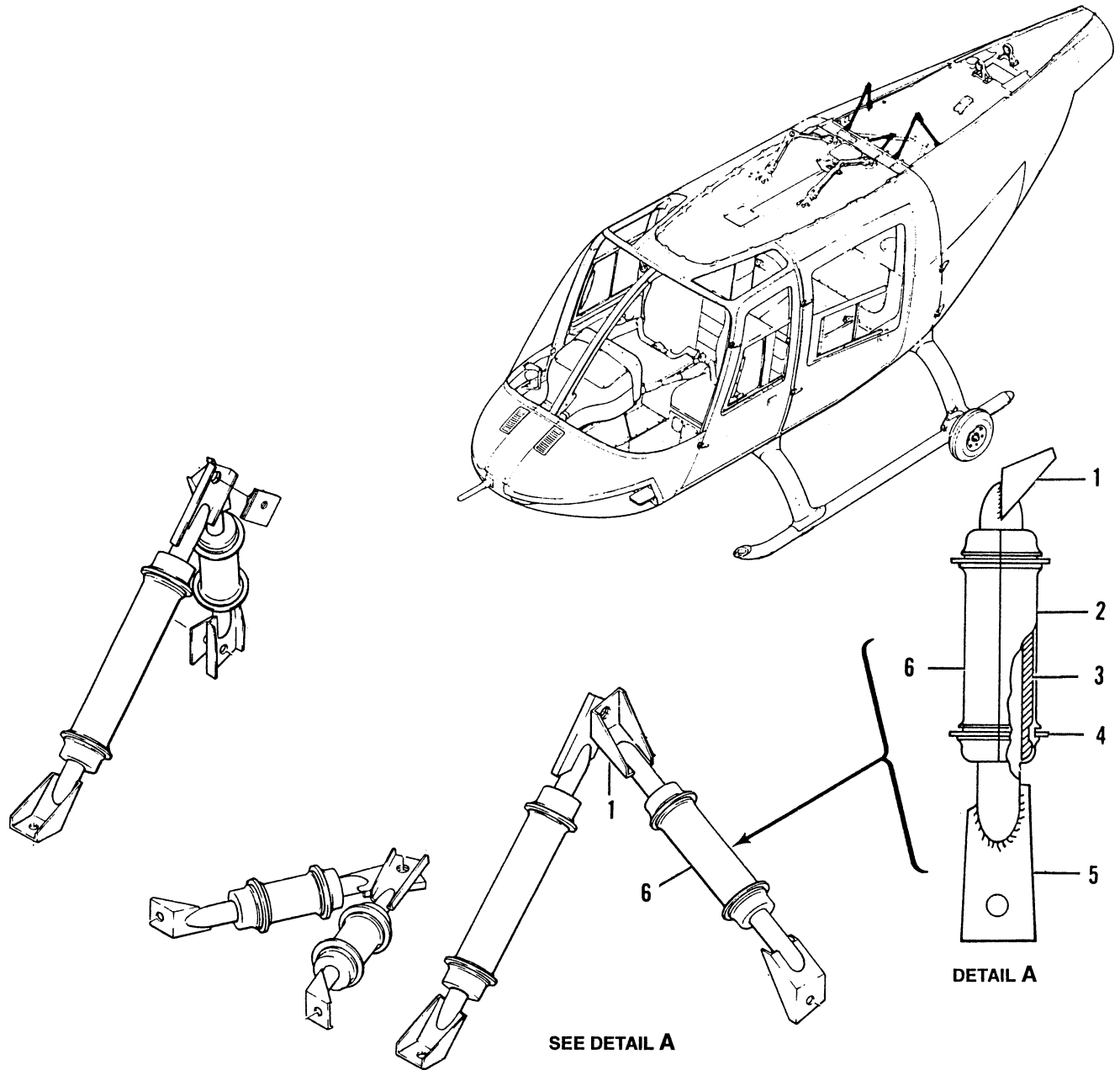
5. Install nuts (42) and tighten. Refer to paragraph 71-3-6, step 4.f.

NOTE

Effective on helicopters S/N 3567 and subsequent, install cotter pin (24).

6. Tighten nut (23) **T** (paragraph 71-3-6, step 4.g.).

7. Perform preceding steps 2. through 6. for right side engine mount components.



HELICOPTERS S/N 3217 AND SUBSEQUENT

1. Engine mount leg
2. Cover half
3. Bag seal compound
4. Ring
5. Gusset
6. Clamshell damper

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Figure 71-3-4. Acoustic (clamshell damper) engine mounts (typical)

71-3-19. INSTALLATION.



CHECK FOR PRESENCE OF BONDED SHIMS. REFER TO PARAGRAPH 71-3-15.

1. Position support leg (82, figure 71-3-1) on airframe and install bolts (40), washers (79) (one under bolthead, one under nut), and nuts (42 or 51).
2. Torque nuts (42) **T**.
3. Effective on helicopters S/N 3567 and subsequent, tighten nut (51) **T** and install cotter pin (24).

NOTE

Torque nuts (42 or 51) at next 100 hour inspection.

4. Install engine (paragraph 71-3-6).

71-3-20. ENGINE MOUNT CLAMSHELL DAMPERS.

Effective on helicopters S/N 3217 and subsequent, clamshell cover halves (2, figure 71-3-4) are installed on mount leg assemblies (1). Contained within the cover halves is a compound for acoustic damping. The cover halves are permanently sealed on the tube of engine mount leg with adhesive (C-308).

71-3-21. INSPECTION.

1. Inspect sealant joint between clamshell damper (6, figure 71-3-4) and engine mount leg (1) for security. If there is an indication of corrosion, or sealant joint is separated, part is unserviceable.
2. Inspect exposed surfaces of engine mount leg (1) (paragraph 71-3-16).

71-3-22. REMOVAL.

1. Remove two rings (4, figure 71-3-4).
2. Remove both halves of cover (2).
3. Use plastic scraper to remove bag seal compound (3).

71-3-23. INSTALLATION.

1. Place halves of cover (2, figure 71-3-4) in position on engine mount leg (1) evenly between gussets (5).
2. Fill cavity between O.D. of engine mount leg (1) and I.D. of cover with bag seal compound (C-236).
3. Apply adhesive (C-308) to voids between halves of cover (2) and around engine mount leg (1).
4. Install two rings (4).
5. Use plastic scraper and remove sealant squeeze-out from clamshell damper (6).

FIREWALLS

71-3-24. ENGINE FIREWALLS.

The engine compartment firewalls and engine pan are constructed of titanium. Firewalls are located forward and aft, and below engine.

71-3-25. INSPECTION AND REPAIR OF FIREWALLS AND FIRESEALS.

1. Inspect forward and aft firewalls (22 and 11, figure 71-3-5) for dents, nicks, and scratches (BHT-206A/B-SERIES-CR&O).

a. Negligible damage. Smooth contour dents, nicks, and scratches that do not penetrate the titanium or stainless steel.

b. Repairable damage. Damage that penetrates the titanium or stainless steel shall be repaired or the part shall be replaced (BHT-206A/B-SERIES-CR&O).

2. Inspect forward and aft firewalls (22 and 11) for deterioration of seals and chafing.

3. Strip seals (1 and 6) are cemented to forward and aft firewalls (22 and 11). Cement new strip seals to firewalls with adhesive (C-311).

4. Inspect forward and aft firewalls (22 and 11) for loose fittings, receptacles, and nutplates. Check nutplates for thread damage.

5. Inspect forward and aft firewalls (22 and 11) for loose sealer in bend radii and bend ends. Fill all gaps and voids to a depth of 0.18 inch (4.60 mm) with sealing compound (C-353).

NOTE

Ensure 23052363 placard warning is in excellent condition on forward and aft firewalls.

6. Inspect warning placard (23) on forward and aft firewalls for legibility.

71-3-26. ENGINE BELLMOUTH.

The engine bellmouth assembly is constructed of aluminum alloy and provides an airfoil inlet for induction air to the engine. The engine bellmouth is fastened to the forward side of forward firewall, and a fireseal is provided by use of a gasket.

71-3-27. REMOVAL.

1. Remove engine upper cowl with engine side cowl (paragraph 71-3-10).

2. Remove forward fairings and air induction cowl (paragraph 71-3-10).

3. Index bellmouth (5, figure 71-3-5) toward forward firewall (22).

4. Remove screws (2) and washers (3) from aft side of forward firewall (22). Remove engine bellmouth (5).

71-3-28. INSPECTION.

1. Inspect engine bellmouth (5, figure 71-3-5) for dents and cracks.

2. Inspect gasket (24) for deterioration of material and cracked or damaged plates.

3. Inspect screws (2) for serviceability.

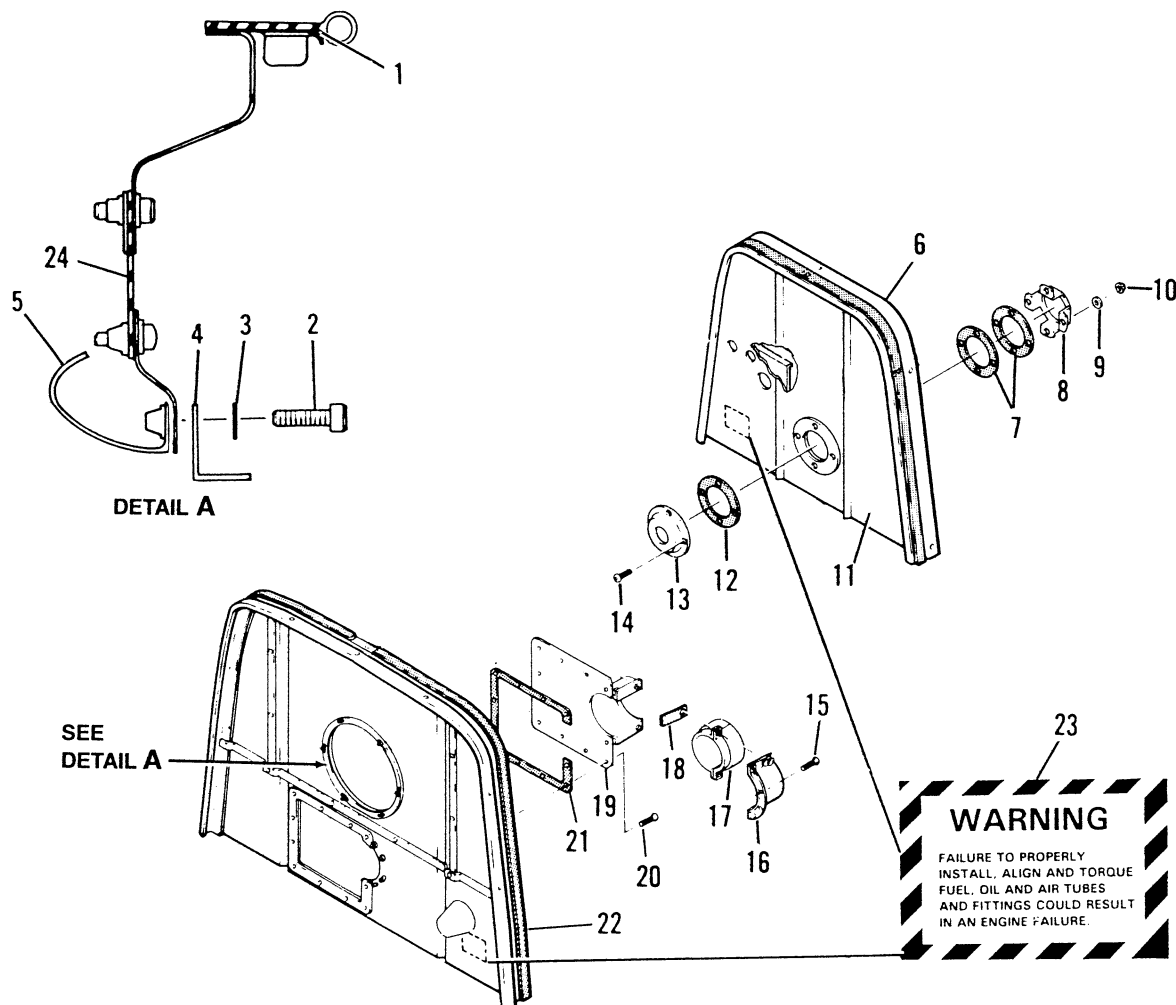
71-3-29. INSTALLATION.

1. Position and align index marks on engine bellmouth (5, figure 71-3-5) on forward firewall (22).

2. Install screws (2) with washers (3) to secure engine to bellmouth (5) to forward firewall (22).

3. Install engine upper cowling with side panels (paragraph 71-3-12).

4. Install engine air induction cowl (paragraph 71-3-12).



- | | | |
|------------------------|------------------|----------------------|
| 1. Seal | 9. Washer | 17. Cover |
| 2. Screw | 10. Nut | 18. Gasket |
| 3. Washer | 11. Aft firewall | 19. Door |
| 4. Engine inlet flange | 12. Seal | 20. Screw |
| 5. Bellmouth | 13. Cover | 21. Gasket |
| 6. Seal | 14. Bolt | 22. Forward firewall |
| 7. Seal | 15. Screw | 23. Placard |
| 8. Ring | 16. Cone | 24. Gasket |

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Figure 71-3-5. Forward and aft firewalls

STARTER-GENERATOR

71-3-30. STARTER-GENERATOR.

The starter-generator is located on the underside of the engine to the right of the helicopter center. The starter-generator is vented with a cooling duct made of fiberglass and located at right side of engine.



IF THE ALLISON MODEL 250-C20J ENGINE IS INSTALLED AS AN ALTERNATE TO THE ALLISON 250-C20B ENGINE, THE STARTER-GENERATOR SHALL BE CONVERTED TO A WET SPLINE DRIVE IN ACCORDANCE WITH LEAR-SIEGLER STARTER-GENERATOR BULLETIN NUMBER 23032-05 OR AIRCRAFT PARTS CORPORATION STARTER-GENERATOR BULLETIN NUMBER 150SG-1178.

71-3-31. REMOVAL.

1. Remove starter-generator cooling duct as follows:
 - a. Open right engine side panel (7, figure 71-3-3).
 - b. Loosen band clamp (6, figure 71-3-6) and slide over starter-generator air duct (7).
 - c. Disconnect duct assembly (7) from support assembly (10) by removing two screws (9) and two washers (8).
 - d. Remove starter-generator cooling duct assembly (7) and remove spacer (5) from starter-generator (4).
2. Remove starter-generator as follows:
 - a. Disconnect electrical leads (Chapter 98). Protect ends of wires with electrical tape.



IT IS MANDATORY THAT STARTER-GENERATOR BE SUPPORTED BY WHATEVER MEANS NECESSARY WHENEVER CLAMP IS LOOSENED OR UNTIL CLAMP HAS BEEN INSTALLED AND PROPERLY TORQUED 45 TO 55

INCH-POUNDS (5.08 TO 6.21 NM). UNIT SHALL NEVER BE ALLOWED TO SUPPORT ITS OWN WEIGHT THROUGH DRIVE SPLINE ENGAGEMENT. IF CAUTION IS NOT OBSERVED, DAMAGE TO SHAFT WILL RESULT, CAUSING PREMATURE FAILURE OF SHEAR SECTION.

b. Loosen nut (3) on V-retainer clamp (2), keeping starter-generator (4) flush against mounting pad (1). Remove V-retainer clamp.

c. Slide starter-generator (4) aft until splined shaft is clear of engine driveshaft. Do not unnecessarily rotate shaft.

71-3-32. INSPECTION.

1. Inspect cooling duct (7, figure 71-3-6) for cracks and excessive wear.
2. Inspect spacer (5) for deterioration of rubber. With spacer installed, butt ends of spacer together and check for 0.06 inch (1.50 mm) maximum gap.
3. Inspect support assembly (10) for visible cracks, damage, and security of hardware.
4. Inspect packing (11) for deterioration and wear.
5. For inspection of starter-generator (4), refer to Chapter 96.

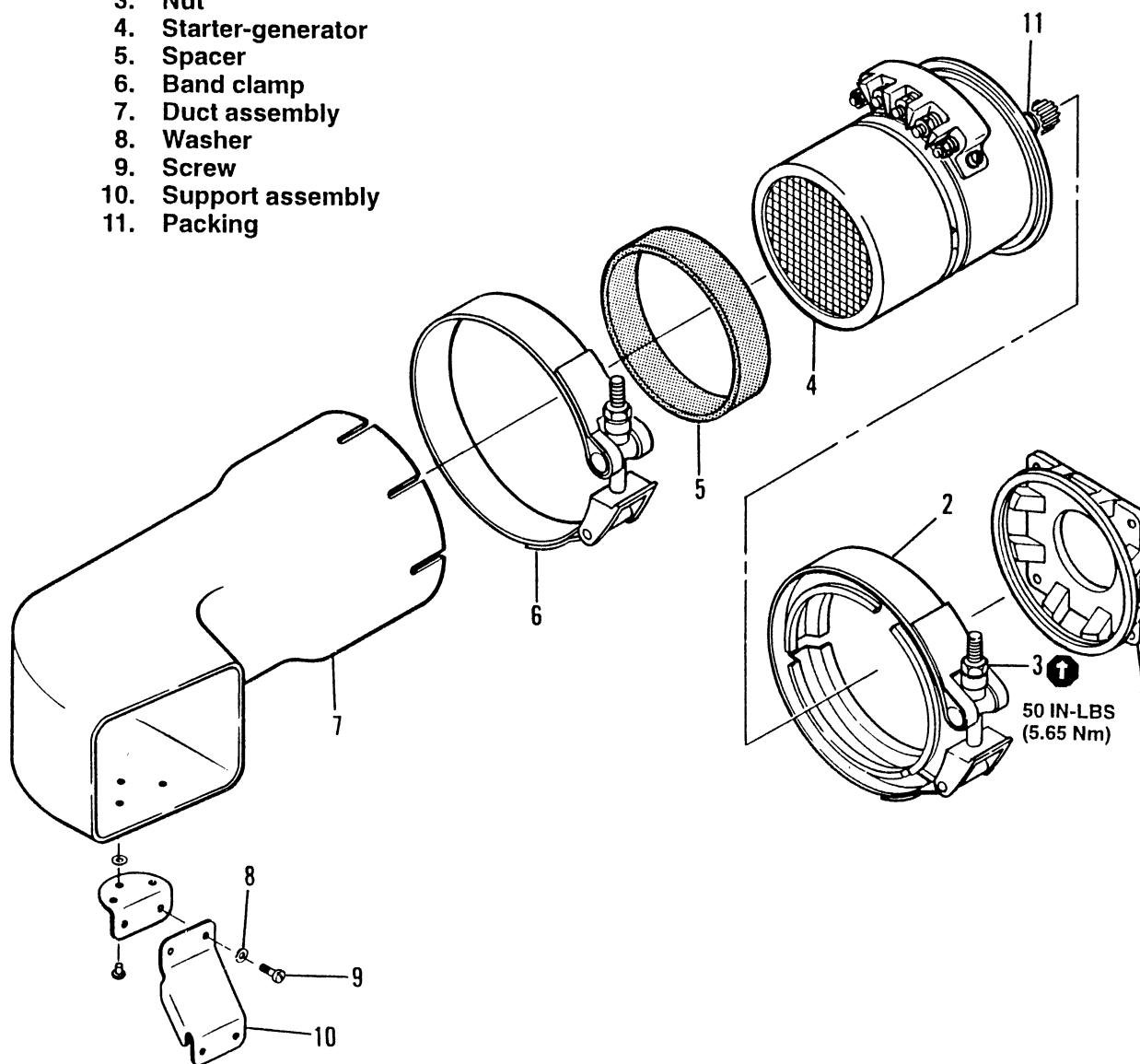
71-3-33. INSTALLATION.



IT IS MANDATORY THAT STARTER-GENERATOR BE SUPPORTED BY WHATEVER MEANS NECESSARY UNTIL CLAMP HAS BEEN INSTALLED AND PROPERLY TORQUED 45 TO 55 INCH-POUNDS (5.08 TO 6.21 NM). UNIT SHALL NEVER BE ALLOWED TO SUPPORT ITS OWN WEIGHT THROUGH DRIVE SPLINE ENGAGEMENT. IF CAUTION IS NOT OBSERVED, DAMAGE TO SHAFT WILL RESULT, CAUSING PREMATURE FAILURE OF SHEAR SECTION.

1. Apply a film of approved lubricating oil to splines of splined shaft and install starter-generator (4, figure 71-3-6) into accessory mounting pad (1).

1. Accessory mounting pad
2. V-retainer clamp
3. Nut
4. Starter-generator
5. Spacer
6. Band clamp
7. Duct assembly
8. Washer
9. Screw
10. Support assembly
11. Packing



NOTE

Starter-generator rotated to show electrical connectors on top for clarity.

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Figure 71-3-6. Starter-generator

- 2.** Install V-retainer clamp (2) on starter-generator (4) with wet zinc chromate primer (C-201) applied to inside of clamp.
- 3.** When tightening V-retainer clamp (2), first tighten snugly, then tap V-retainer clamp with a rubber mallet and apply a final torque of 50 inch-pounds (5.65 Nm). Secure clamp with lockwire.
- 4.** Position spacer (5) on aft end of starter-generator (4). With spacer installed, ends must butt together within 0.06 inch (1.50 mm) maximum gap.
- 5.** Position band clamp (6) on cooling duct assembly (7). Work cooling duct assembly onto spacer (5). Tighten band clamp and screws (9).
- 6.** Connect electrical leads (Chapter 98).

