CHAPTER

71

POWERPLANT

LEARJET 35/35A/36/36A
MAINTENANCE MANUAL

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71-70-00	201	Oct 26/84

Insert latest revised pages; destroy superseded or deleted pages.

* Asterisk indicates pages revised, added, or deleted by the current revision. The portion of the text affected by the current revision is indicated by a vertical line in the outer margin of the page.

Record of Temporary Revisions

Revision Number	Status	Date	Location	Insertion Date	Inserter's Initials	Removal Date	Removers Initials
71-1	Inactive	Aug 11/80	71-20-00 Page 202	Aug 11/80	LJ	Apr 30/82 Rev. 27	LJ
71-2	Inactive	Sep 19/80	71-20-00 Page 202	Sep 19/80	LJ	Apr 30/82 Rev. 27	LJ
71-3	Inactive	Mar 6/92	71-20-00 Page 206	Mar 6/92	LJ	Sep 25/92 Rev. 57	LJ
71-4	Inactive	Dec 13/96	71-20-00 Page 204	Dec 13/96	LJ	Jan 12/01 Rev. 70	LJ
71-5	Inactive	Jun 13/97	71-20-00 Page 206	Jun 13/97	LJ	Sep 12/97 TR 71-6	LJ
71-6	Inactive	Sep 12/97	71-20-00 Page 206	Sep 12/97	LJ	Jan 12/01 Rev. 70	LJ

POWER PLANT - DESCRIPTION AND OPERATION

1. Description
   A. The aircraft is equipped with two Garrett TFE 731 Turbofan Engines. Each engine is attached at three attach points. Two attach points are incorporated in the forward engine support and one in the aft engine support. Access to the engines is gained by removing the upper and lower nacelle covers.
   B. Component Description
      (1) The TFE 731 engine is a lightweight, two-spool geared transonic-stage, front-fan, jet propulsion engine. The engine is modularized for ease of maintenance. Design simplicity and inherent sturdiness eliminate the need for aerodynamic inlet guide vanes, variable geometry, and other similar complexities, and thereby minimize inlet icing and reduce noise and weight. In addition to a high-bypass ratio, the engine is designed to minimize engine-generated noise to a level appreciably below that of existing jet engines. The use of a reverse-flow annular combustor diminishes engine length and provides the advantage of the cool-skin concept for the external surfaces of the turbine section.
      (2) A spinner hub and an axial-flow fan are located at the forward end of the engine and are gear-driven by the low pressure spool. The low pressure spool consists of a four-stage low pressure compressor and a three-stage low pressure turbine, both mounted on a common shaft. The high pressure spool consists of a high pressure single-stage centrifugal compressor and a high pressure single-stage turbine. The high pressure compressor and turbine are mounted on a common shaft. The high speed spool drives the accessory section. The spool shafts are concentric, and the low-speed spool shaft passes through the high-speed shaft. An annular duct serves to bypass fan air for direct thrust and also diverts a portion of the fan air to the low pressure compressor.
      (3) The engine weighs approximately 777 pounds and is 53 inches long, 34 inches wide and 39 inches high.
      (4) For further information on the TFE 731 engine, refer to the following:
         (a) Engine Heavy Maintenance Manual (HMM), report no. 72-02-13.
         (b) Engine Light Maintenance Manual (LMM), report no. 72-02-12.
         (c) Service Manual, report no. 72-02-14.

ENGINE - MAINTENANCE PRACTICES

1. Maintenance Precautions

WARNING: ENGINE FUEL PUMP MOTIVE FLOW REGULATOR MUST BE CHECKED AND ADJUSTED WHENEVER ANY OF THE FOLLOWING OCCURS:
(1) ENGINE CHANGE.
(2) ENGINE FUEL PUMP CHANGE.
(3) ENGINE MAJOR PERIODIC INSPECTION (MPI).
(4) UNSCHEDULED MAINTENANCE THAT REQUIRES A MOTIVE FLOW CHECK.

CAUTION: WHENEVER AN ENGINE IS REMOVED OR REPLACED, A RADIO RADIATION INTERFERENCE TEST MUST BE PERFORMED. (REFER TO CHAPTER 23.)

A. The following maintenance precautions should be followed to prolong the life of the engine. Maintenance personnel should read and thoroughly understand these precautions.
(1) Use extreme care to prevent dirt, hardware, tools, or other foreign material from entering engine.
(2) Handle fuel and oil lines carefully to avoid denting or kinking. Be especially careful not to damage threads of fittings and line coupling nuts.
(3) All lines, ducts, and electrical connectors that terminate with open ends should be capped or covered in a suitable manner to exclude the entrance of dirt and other foreign matter.
(4) Caps or covers should not be removed until immediately before the installation.
(5) Prior to installing any part, ensure that it is thoroughly clean.
(6) Do not remove O-rings and gaskets from their packages until needed for assembly.
(7) Clean O-rings and gaskets, if necessary, prior to installation with dry air under pressure or with clean, lint-free rags. Do not use solvents.
(8) Visually inspect all O-rings and gaskets for cuts, nicks, and other flaws prior to installation.
(9) Lubricate O-rings, backup rings, and gaskets with appropriate system fluid prior to installation.
(10) Do not twist hose assemblies when installing. The stripe on the side of the hose will show if any twist exists. A twisted hose under pressure may fail or loosen itself.
(11) It is important to use clamps of the correct size and type when securing various hoses, tubing, and wire bundles directly to the engine or engine brackets. If clamps of insufficient size are used and tightened excessively, the line may be damaged by not being able to slip through the clamp when the engine thermally expands.
(12) Route and clamp all lines and electrical wiring as shown. This will keep chafing to a minimum.
(13) All electrical bonding, grounding, and mating surfaces shall be clean, metal surfaces free of grease, paint, or other high-resistance film. Whenever paint has been removed to make connections, the connection should be refinished to prevent corrosion.
(14) Use safety wire to secure bolts and fittings as required.
(15) Prior to engine wash, ensure that all engine bleed air systems are disconnected/closed off.

2. Removal/Installation

NOTE: The removal and installation procedures for the left and right engines are identical unless otherwise noted.

A. Tools and Equipment

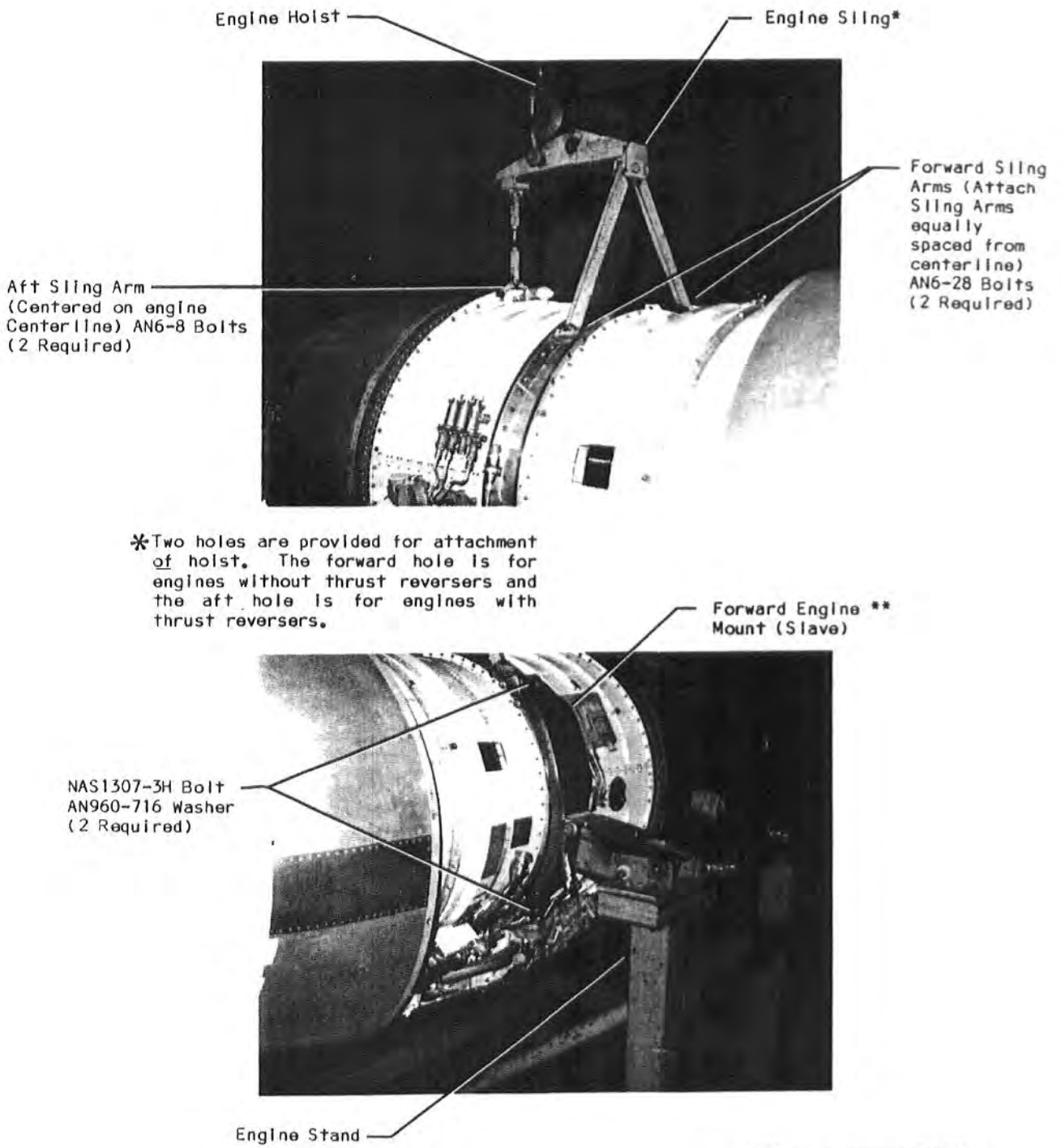
NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Engine Stand	PME 500006	Learjet Inc. Wichita, KS	General.
Engine Hoist	2-136	WARDAERO, Three Rivers, MI - Subsidiary of Medalist Ind.	General.
Engine Sling	OHME 2650000	Learjet Inc. Wichita, KS	General.
LP Bleed Air Block-off Plate	2655100-81	Learjet Inc. Wichita, KS	Replace manufacturer's block-off plate.

B. Remove Engine (See Figures 201 and 202.)
(1) Set Battery Switches to BAT 1 and BAT 2 and pull out the LH and RH FIRE switches on the glareshield to close the fuel and hydraulic firewall shutoff valves. Check that ARMED lights are illuminated.
(2) Set Battery Switches to OFF and pull and tag LH and RH fire extinguisher circuit breakers.
(3) Disconnect aircraft batteries.
(4) Remove nacelle upper and lower cowl assemblies.
(5) Remove pylon upper and lower access covers.
(6) Depressurize the hydraulic system. (Refer to Chapter 29.)
(7) Disconnect and cap or cover the following items. Disconnect at engine instead of pylon firewall.
(a) Hydraulic supply, pressure, and bypass lines.
(b) Fuel supply and motive flow line.
(c) PT2 sense line.
(d) Bleed air duct.
(e) Fire extinguisher duct.
(f) Electrical connectors and wiring.
(g) Power control assembly.
(h) Bonding jumper.
(i) On *Aircraft 35-107, 35-113 and Subsequent and 36-032 and Subsequent*, alcohol anti-ice bleed air line.
(8) Attach engine sling fittings, using existing fasteners, to top of engine.
(9) Attach engine sling to fittings and apply sufficient lift to hoist to remove tension from mounting bolts.
(10) Remove safety wire, attaching bolts, and engine from aircraft.
(11) If engine requires maintenance not covered in this manual, refer to Engine Maintenance Manual.
(12) If engine replacement is required, refer to Engine Accessory Removal and Installation for procedures on equipment to be removed from old engine and installed on new engine.

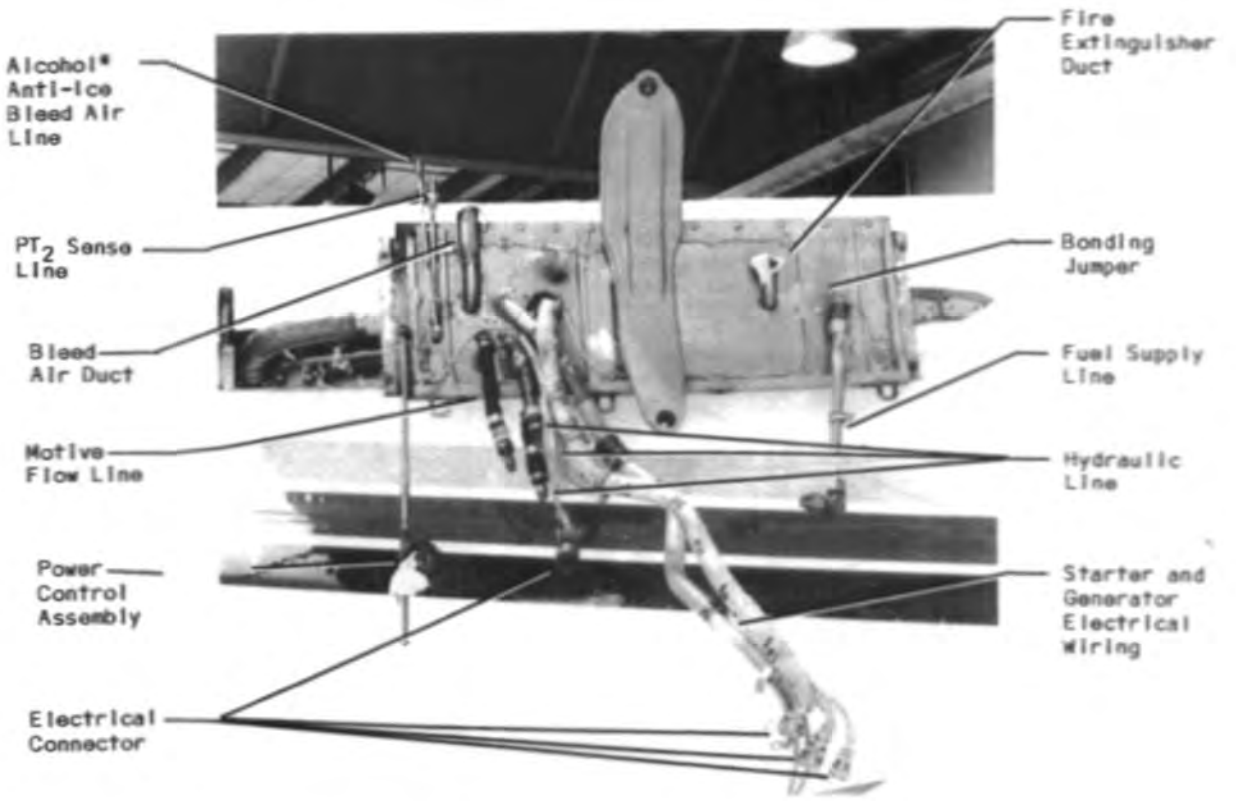
C. Install Engine (See Figures 201 and 202.)

NOTE:
- When installing RH engine, the electrical conduit containing the starter and generator cables must be guided into place as the engine is positioned on the pylon.
- Ensure engine manufacturer's LP bleed air block-off plate at the engine bypass duct is replaced by LP bleed air block-off plate, part number 2655100-81.



ORIGINAL
As Received By ATP

Engine Hoist, Stand, and Sling
Figure 201



*35-107, 35-113 and Subsequent, 36-032 and Subsequent

RH Shown (LH Typical)

ORIGINAL
As Received By
ATP

Firewall Connections After Engine Removed
Figure 202

(1) Using engine hoist, align engine mounting holes and install attaching bolts. Torque forward mount bolts 450 to 500 inch-pounds and safety-wire. Torque isolator assembly mount bolt 50 to 70 inch-pounds plus drag torque of locking nutplate. On *Aircraft 35-002 thru 35-027, 35-029 thru 35-032, and 35-035 and 36-002 thru 36-013, 36-015 and 36-016 not equipped with thrust reverser and not modified per AAK 75-2, "Removable Afterbody Engine Nacelle,"* install safety wire through bolt and shroud installation.

(2) Connect the following items to the engine.
   (a) Hydraulic supply, pressure, and bypass lines.
   (b) Fuel supply and motive flow lines.
   (c) PT2 sense line.
   (d) Bleed air duct.
   (e) Fire extinguisher duct.
   (f) Electrical connectors and wiring. (Torque electrical connectors and safety-wire. Refer to Chapter 76.)
   (g) Power control assembly.
   (h) Bonding jumper.
   (i) On *Aircraft 35-107, 35-113 and Subsequent and 36-032 and Subsequent*, alcohol anti-ice bleed air line.

(3) Connect aircraft batteries and set Battery Switches to BAT 1 and BAT 2.

(4) Depress LH and RH FIRE Switches on the glareshield to open the hydraulic and fuel shutoff valves. ARMED lights shall extinguish.

(5) Reset LH and RH fire extinguisher circuit breakers.

(6) Pressurize hydraulic system and check for leaks.

(7) Using applicable fuel standby boost pump, check for leaks.

(8) Check and adjust engine fuel pump motive flow regulator as follows:
   (a) Install tee with 0-500 psi pressure gage attached.
   (b) Start engine in accordance with FAA Approved Airplane Flight Manual.
   (c) With motive flow valve open, check and adjust motive flow pressure to 300 (±10) psi. (Refer to Engine Maintenance Manual, Chapter 72.)

(9) Install pylon access covers.

(10) Install nacelle upper and lower cowl assemblies.

(11) Perform Radio Radiation Interference Test. (Refer to Chapter 23.)

3. Adjustment/Test

A. For adjustment and test of engine manufacturer components, refer to Engine Maintenance Manual.

WARNING: AIRFLOW INTO THE TFE 731 ENGINE IS SUFFICIENT TO DRAW PERSONNEL AND EQUIPMENT INTO THE ENGINE INLET. PERSONNEL IN PROXIMITY OF THE ENGINE INLET SHOULD MAINTAIN A SAFE DISTANCE AT ALL TIMES DURING ENGINE OPERATION.

4. Approved Repairs

A. Engine Accessory Removal

(1) Place engine in engine stand (P/N PME 500006).

(2) Disconnect and remove all drain lines and drain line fittings.

(3) Loosen and remove clamps securing accessory gear box fire detection element mounting tube to lower portion of accessory box. (Refer to Chapter 26.)

(4) Loosen clamps securing hose to starter and nacelle air inlet assembly. (Refer to Chapter 80.)

(5) Loosen attaching parts and remove starter from engine. (Refer to Chapter 80.)

(6) Loosen clamp securing nacelle anti-ice valve to engine bleed air line. (Refer to Chapter 30.)

(7) Remove attaching parts and engine bleed lines. This will include the high, low, and regulated pressure lines. On *Aircraft 35-505, 35-514 and Subsequent and 36-054 and Subsequent*, remove attaching parts and pressure regulator tube. (Refer to Chapter 36.)

(8) Remove attaching parts and nacelle air inlet assembly from engine.

(9) Remove attaching parts and shutoff and pressure regulator valve from engine. (Refer to Chapter 36.)
(10) Remove generator from engine. (Refer to Chapter 24.)
(11) Remove attaching parts and nacelle afterbody assembly from engine.
(12) Remove attaching parts and bypass section from engine.
(13) Remove attaching parts and exhaust nozzle from engine.
(14) Remove attaching parts securing oil pressure transmitter mounting bracket to engine. (Refer to Chapter 79.)
(15) Remove attaching parts securing oil pressure switch and clamp to engine. (Refer to Chapter 79.)
(16) Remove oil pressure transmitter, oil pressure switch and all associated plumbing from engine.
(17) Remove oil temperature bulb and O-ring. (Refer to Chapter 79.)
(18) Disconnect tube assemblies from fuel flow meter. (Refer to Chapter 73.)
(19) Remove attaching parts, support bracket, tube assembly, and flow meter from engine. (Refer to Chapter 73.)
(20) Remove engine mounts. (Refer to 71-20-00.)

B. Engine Accessory Installation
(1) Install fuel flow meter support bracket and secure with attaching parts. (Refer to Chapter 73.)
(2) Connect existing tube assemblies to fuel flow meter. (Refer to Chapter 73.)
(3) Inspect oil temperature bulb O-ring. Replace if necessary.
(4) Install oil temperature bulb and O-ring. (Refer to Chapter 79.)
(5) Remove existing engine fasteners at location where oil pressure transmitter bracket is to be installed.
(6) Install bracket, with pressure transmitter installed, and secure with existing attaching parts. Torque bolts to 40 inch-pounds.
(7) Install oil pressure switch, clamp and secure with attaching parts.

NOTE: On *Aircraft 35-038 and Subsequent, 36-014 and 36-017 and Subsequent*, the RH oil pressure switch clamp utilizes an existing engine bolt to install clamp. Torque bolt to 40 inch-pounds.

(8) Connect plumbing to engine.

NOTE: On LH engine, oil pressure tube from pressure transmitter to engine runs from LH side of engine to RH side.

(9) Wrap flexible portion of ITT lead with Varglas non-fray sleeving, type HO (mfd. by Varglas, Rome, NY) and Temp-R-Tape fiberglass tape, type GV (mfd. by Connecticut Rubber Co., New Haven, CT). No. 363 aluminum foil glasscloth tape (mfd. by 3M Co.) may be used as an alternate to the Temp-R-Tape fiberglass tape. Ensure that ITT lead is routed and clamped to maintain maximum clearance from the engine hot section.
(10) Install exhaust nozzle and secure with attaching parts. Torque bolts 20 to 25 inch-pounds.
(11) Install engine bypass section and secure with attaching parts.
(12) Install nacelle aft body assembly and secure with attaching parts.
(13) Install generator. (Refer to Chapter 24.)
(14) Install shutoff and pressure regulator valve and secure with attaching parts. (Refer to Chapter 36.)
(15) Install engine inlet assembly and secure with attaching parts.
(16) Install engine bleed lines. On *Aircraft 35-505, 35-514 and Subsequent and 36-054 and Subsequent*, install pressure regulator tube. (Refer to Chapter 36.)
(17) Install clamp securing anti-ice valve to bleed air regulator. (Refer to Chapter 30.)
(18) Install starter. (Refer to Chapter 80.)
(19) Install hose, between starter and nacelle, and secure with attaching parts. (Refer to Chapter 80.)
(20) Install fire detection element mounting tube and secure. (Refer to Chapter 26.)

(21) Install drain fittings and drain lines.
(22) Install engine mounts. (Refer to 71-20-00.)
(23) Install engine on aircraft.

C. Usage of Conical Spinner Engines

(1) Operators of aircraft configured for elliptical spinner engines (*Aircraft 35-002 thru 35-244 and 36-002 thru 36-044*) may install and operate a conical spinner engine (AMC S/N P74694 and Subsequent or S/N prior to P74694 and modified per AMC Service Bulletin TFE731-72-3085) opposite an elliptical spinner engine (AMC S/N prior to 74694 and not modified per Service Bulletin TFE 731-72-3085) providing the unused aircraft electrical components are properly capped and stowed. The unused aircraft electrical components consist of the engine pressure switch wiring and connector and the engine anti-ice solenoid wiring and connector. Cockpit anti-ice warning indications for the conical spinner engine will function normally.

WARNING:
- **OPERATORS OF AIRCRAFT EQUIPPED WITH ENGINES MODIFIED PER AMC SERVICE BULLETIN TFE 731-72-3085 MAY INSTALL AND OPERATE ELLIPTICAL SPINNER ENGINES PROVIDED THE AIRCRAFT ENGINE ANTI-ICING WIRING IS RECONNECTED AND THE FOLLOWING NACELLE HEAT GROUND CHECK PERFORMED.**
- **ON *AIRCRAFT 35-245 AND SUBSEQUENT AND 36-045 AND SUBSEQUENT*, DO NOT REPLACE CONICAL SPINNER ENGINES WITH ELLIPTICAL SPINNER ENGINES. CONICAL SPINNER ENGINES DO NOT REQUIRE ANTI-ICING CAPABILITIES WHICH IS REQUIRED FOR ELLIPTICAL SPINNER ENGINES.**

(2) Cycle NAC HT Switch and note that light flickers and extinguishes.

NOTE: The light may not extinguish at idle power, but should extinguish as RPM is increased. Light shall extinguish before 60% N1.

(3) The switch shall be ON for a maximum of 10 seconds when the OAT is above 40°F.

5. Cleaning/Painting

A. Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Blocking Plates	(See Figure 203.)	Manufactured Locally	Block off bleed air system components.
Water source (clean tap water of drinking purity, capable of supplying water at 25 to 126 psig at an approximate rate of 2-1/2 gpm)			
Gas Path Cleaner	B & B 3100	B & B Chemical Co., Inc. Hialeah, FL	Compressor wash.

NAME	PART NUMBER	MANUFACTURER	USE
Jet Engine Compressor Cleaner (alternate for gas path cleaner [B & B 3100])	Turco 5884	Purex Corporation Turco Products Division Carson, CA	Compressor wash.
Spray Mix Applicator	Model 299C	B & B Chemical Co., Inc. Hialeah, FL	Compressor wash.

B. Engine Compressor Wash (See Figure 203.)

NOTE:
- This procedure is effective in cleaning oil, dirt, salt and other foreign materials which adhere to fan rotor, compressor blades, and vane surfaces, and should be performed in conjunction with each major periodic inspection. Intervals applicable to adverse operating environment should be determined by each individual operator. Perform procedure at any time visible contamination exists or after exposure to salt spray. This procedure may be used as frequently as required without detrimental effects to the engine. Cleaning can be accomplished on engines installed on aircraft.

- Since compressor corrosion damage may result before contamination is observed, periodic cleaning is recommended for all operators. The frequency or desirability of a periodic chemical cleaning (wash) program should be determined by each individual operator, since environmental conditions vary widely among operators.

- Engine compressor wash procedures are identical for both engines.

(1) Fabricate engine bleed air system blocking plates. (See Figure 203.)
(2) Position aircraft facing into wind in order to carry exhaust discharge away from aircraft.
(3) Close all bleed systems (anti-ice valves, cabin pressurization/air condition, etc.) and install protective covering over starter/generator prior to performing cleaning procedure.
(4) Remove upper and lower engine nacelle cowl assemblies. (Refer to 71-10-00.)
(5) Disconnect P3 tube at fuel control P3 pressure limiter valve fitting. Leave tube end open to atmosphere. Cap fuel control P3 pressure limiter valve fitting. (See Figure 204.)
(6) Place protective cover (or tape) over inlet pressure and temperature sensor (located at engine inlet).
(7) Remove attaching parts securing bleed air elbow assembly (low-pressure) and gasket to low pressure bleed air port. Slip applicable blocking plate between gasket and elbow assembly, and secure with attaching parts.
(8) Remove attaching parts securing bleed air (high-pressure) tube assembly to high-pressure elbow assembly. Slip applicable blocking plate between gasket and tube assembly, and secure with attaching parts.

NOTE: Do not remove high-pressure elbow assembly from engine. If removed, a nutplate holder will drop down and rest on the engine core. Engine afterbody removal will be required to reinstall the elbow assembly.

(9) Prepare equipment and materials for compressor liquid cleaning procedure as follows:

NOTE: Prior to connecting delivery (siphon) hose of the spray mix applicator, flush to remove any foreign contaminates that may be in the hose.

(a) Attach delivery (siphon) hose to spray mix applicator. Insert delivery (siphon) hose in gas path cleaner (a minimum of one gallon is required). Turn cleaner (chemical) control valve to ON position (straight up or down).
(b) Turn water control valve to off and attach supply of clean tap water (of drinking purity) to spray mix applicator inlet.

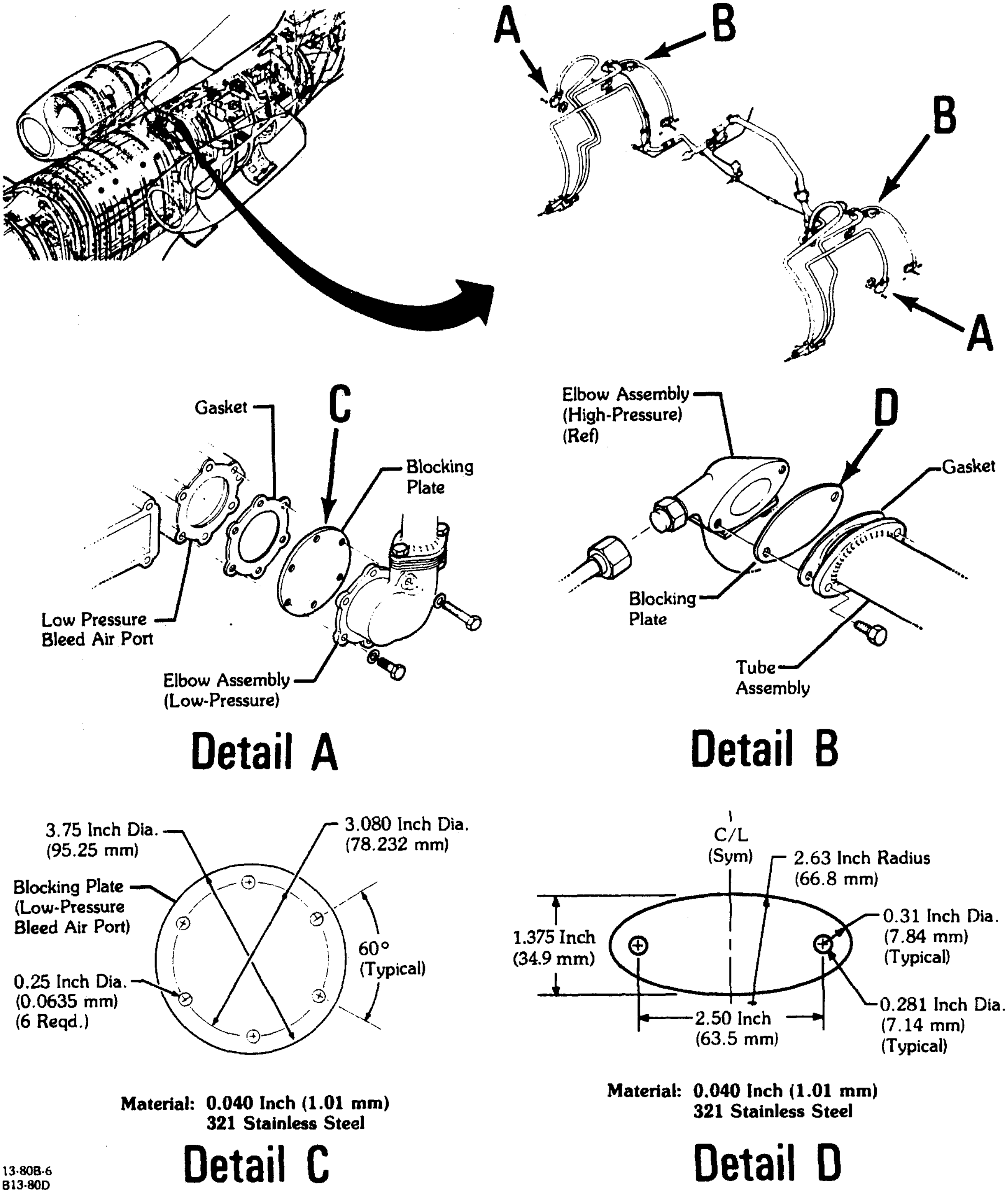
CAUTION:
- **ALLOW THE ENGINE TO COOL APPROXIMATELY ONE HOUR OR UNTIL ITT INDICATOR READS 100°C OR LESS.**
- **CAUTION SHOULD BE EXERCISED DURING COLD WEATHER (BELOW 0°C [32°F]), SINCE EQUIPMENT HAS NO PROVISIONS TO PREVENT FREEZING.**

(10) Perform Compressor Liquid Cleaning Procedure as outlined in appropriate Garrett AirResearch TFE731 Light Maintenance Manual.
(11) Restore engine to operational status as follows:
(a) Remove protective cover (or tape) from inlet pressure and temperature sensor and starter/generator.
(b) Reverse blow compressed air (approximately 50 psig) through disconnected P3 tubes removed from fuel control P3 pressure limiter valve fitting.
(c) Remove cap, previously installed, from fuel control P3 pressure limiter valve fitting. Connect P3 tube to fuel control P3 pressure limiter valve fitting.
(12) Perform dry-out procedure of engine immediately following compressor liquid cleaning and restoration of engine to operational status.

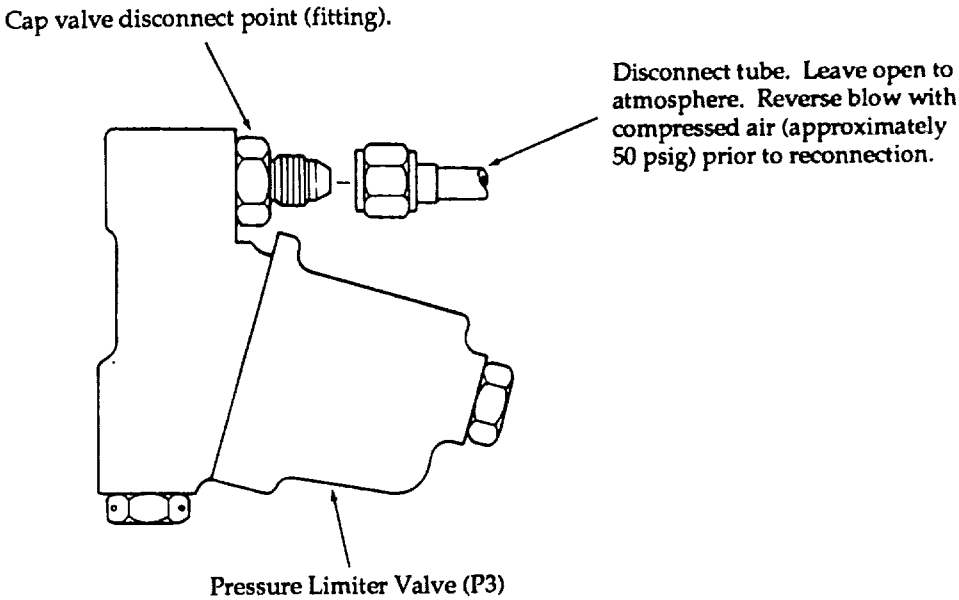
WARNING: **AREAS IN PROXIMITY OF ENGINE INLET AND EXHAUST ARE EXTREMELY HAZARDOUS TO PERSONNEL WHEN ENGINES ARE OPERATING. PERSONNEL SHALL CLEAR THESE AREAS DURING ENGINE START AND OPERATION TO AVOID INJURY.**

NOTE: When performing engine dry-out portion of cleaning procedure, leave blocking plates installed.

(a) Perform normal engine start.
(b) Operate engine at idle speed for approximately ten minutes.
(c) Perform normal engine shutdown.
(13) Remove previously installed blocking plates and, using new gaskets, reassemble bleed air elbow assemblies to engine. (Refer to Chapter 36.)
(14) Install upper and lower engine nacelle cowl assemblies. (Refer to 71-10-00.)
(15) Restore aircraft to normal.



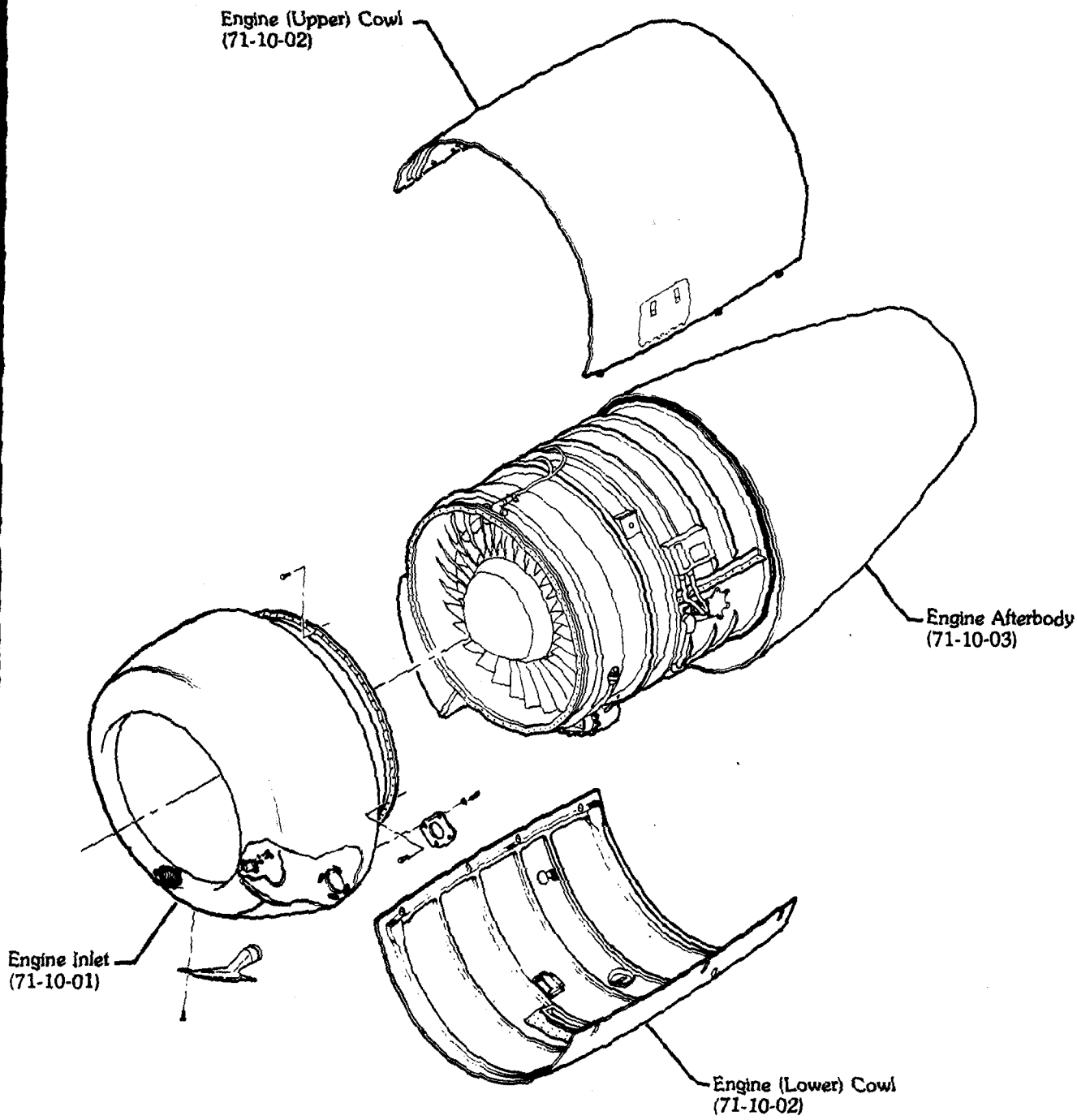
Engine Bleed Air System Blocking Plate Fabrication and Installation
Figure 203



Fuel Control P3 Pressure Limiter Valve Disconnect Point
Figure 204

NACELLES - DESCRIPTION AND OPERATION

1. **Description**
   A. Each engine nacelle is made up of an engine inlet, upper and lower engine cowlings, and an engine afterbody assembly that attach around the perimeter of the engine to form a completely enclosed nacelle. The nacelles protect the engines and accessories, as well as provide a smooth, unrestricted airflow around the engine during flight.
      (1) The engine inlet (71-10-01) mounts on the forward end of the engine, and is utilized in directing airflow into the engine. The forward edge of the engine inlet is heated to prevent icing. Engine inlet anti-icing is accomplished by engine bleed air directed through a nacelle anti-ice shutoff valve and diffuser duct located inside the engine inlet. An inlet scoop, located on a door, bottom centerline of the inlet, is utilized in providing ram air cooling to the starter/generator. For additional information pertaining to nacelle anti-ice, refer to Chapter 30. For additional information pertaining to the starter/generator refer to Chapter 24.
      (2) The engine upper and lower cowlings (71-10-02) cover the engine between the engine inlet and afterbody assembly. The upper cowling attaches to the top edge of the pylon firewall by means of quick-attach fasteners. The lower cowling attaches to the bottom edge of the pylon firewall and to the upper cowling, with quick-release cowl-latch fasteners. The upper cowl incorporates a hinged oil filler access door to provide quick access for engine oil servicing. On *Aircraft 35-028, 35-031 and Subsequent, and prior Aircraft modified per AAK 76-1, Installation of Engine Nacelle Inspection Doors for Bypass Valve Indicator Pins,"* the lower cowl incorporates two spring-loaded push-in type doors that allow access for inspection of the engine oil and fuel delta P (bypass valve) indicators.
      (3) The engine afterbody (71-10-03) mounts on the aft end of the engine, and is utilized in directing engine bypass-air out of the engine. Igniter plug access doors, located on the bottom side of the afterbody, provide quick access to the engine igniters. Access doors located on the inboard side of the afterbody provide a closeout for, and access to the engine aft mount and ITT terminal post installation.



Engine Nacelles Components Locator
Figure 1

ENGINE INLET - MAINTENANCE PRACTICES

1. Removal/Installation

A. Removal of the Engine Inlet (See Figure 201.)

NOTE: If replacement of engine nose inlet skin is required, refer to SSK-992, "Replacement of Engine Nose Inlet Skin."

(1) Remove electrical power from aircraft.
(2) Remove applicable engine upper and lower cowlings. (Refer to 71-10-02.)
(3) Loosen clamp securing cooling hose to starter/generator and disconnect hose.
(4) Disconnect engine inlet anti-ice bleed air plumbing and electrical connections.
(5) Disconnect engine fire extinguishing plumbing from engine flange.
(6) Supply support for the engine inlet.
(7) Remove attaching parts securing engine inlet to engine flange and remove the engine inlet from the engine. Record the locations of the attaching parts during the removal of the engine inlet so that they can be installed in the correct location when the engine inlet is installed.

B. Installation of the Engine Inlet (See Figure 201.)
(1) Set the engine inlet at its correct location on the engine.

CAUTION: MAKE SURE THAT A WASHER IS INSTALLED UNDER EACH BOLT HEAD AS SHOWN IN FIGURE 201. IF THE WASHER IS NOT INSTALLED, THE ENGINE INLET LIP CAN BE DAMAGED WHEN THE BOLTS ARE TIGHTENED.

(2) Install the attaching parts (bolt and washer) that attaches the engine Inlet to the engine. (See Figure 201, Detail A.)
(3) Torque bolts 20 to 25 inch-pounds [2.2 to 2.8 Nm].
(4) Connect engine fire extinguishing plumbing at engine inlet.
(5) Connect engine inlet anti-ice bleed air plumbing and electrical connectors.
(6) Connect cooling hose to starter/generator and secure with attaching clamp.
(7) Install engine upper and lower cowlings. (Refer to 71-10-02.)
(8) Check the engine inlet for the correct fit. (Refer to 71-10-01.)
(9) Connect electrical power to the aircraft.

2. Repairs

A. Repair of the Engine Inlet (See Figure 202 and Figure 203.)

CAUTION: **THIS REPAIR PROCEDURE IS EXTREMELY CRITICAL. UNPROFESSIONAL WORKMANSHIP CANNOT BE TOLERATED. SLOPPY REPAIRS CAN ADVERSELY AFFECT ENGINE PERFORMANCE.**

THIS REPAIR PROCEDURE IS LIMITED TO AN AREA OF 3 SQUARE INCHES [7.6 SQ CM] OR LESS IN THE PERFORATED INNER SKIN AND CORE OF THE ENGINE INLET ASSEMBLY. IF THE REPAIR AREA IS LARGER THAN 3 SQUARE INCHES [7.6 SQ CM] THE ENGINE INLET MUST BE REPLACED.

(1) Acquire the necessary tools and equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Solvent (Methyl Propyl Ketone) (MPK)		Commercially Available	Cleaning.
Clean Cotton Cloth or Cheese Cloth		Commercially Available	Cleaning.
Ultrasonic Inspection Equipment			Inspecting the damaged area.
Air Motor		Commercially Available	Routing and surface machining.
Vacuum Cleaner		Commercially Available	Cleaning.
Masking Tape		Commercially Available	Masking off damaged area.
Brown Wrapping Paper		Commercially Available	Masking off damaged area.
Adhesive	Hysol EA9330.3	Hysol Division of the Dexter Corp. Pittsburg, CA	Filling the repaired area.
Abrasive Nylon Pad	Scotchbrite	3M Co. St. Paul, MN	Polishing.
Abrasive Paper	220 Grit Aluminum Oxide	Commercially Available	Sanding.
Filtered, Compressed Air Source			Drive the air motor.
Extrusion Gun, Cartridge, Nozzle	950	Pyles Ind., Inc. Detroit, MI	Applying the adhesive.

NAME	PART NUMBER	MANUFACTURER	USE
Permanent Ink Marker		Commercially Available	Marking the damaged area.

(2) Visually inspect and, using ultrasonic equipment, coin tap test, or other suitable non-destructive testing methods, examine the damage area for skin fracture or deformation, core fracture, crippling, or bond fracture, and de-bond of skin and core.
(3) Outline the damage area with a permanent ink marker.
(4) Mask off all the perforated inner skin except for 0.25 inch [6.3 mm] around the outlined damaged area.
(5) Determine the size of the damaged area that was masked off.
  (a) If the damage area is greater than 3 square inches [7.6 sq. cm], replace engine inlet assembly.
  (b) If the damage area is 3 square inches [7.6 sq. cm] or less, continue to step (6).
(6) Using an air motor, machine out damage area per Figure 202.
(7) Make sure that all of the fractured and/or de-bonded core and perforated skin material is removed.

NOTE: The core does not have to be cut out completely down to the opposite skin.

Crippled core does not have to be removed providing the adhesive bond is still secure.

(8) Use vacuum to remove all cuttings and debris.
(9) Using a clean cotton cloth or cheese cloth dampened with solvent, thoroughly scrub remaining unmasked skin around damage area.
(10) Using an abrasive nylon pad or abrasive paper, rough the skin around the damage area. Clean the area with vacuum.
(11) Clean around the damaged area with a clean cotton cloth or cheese cloth dampened with solvent.

CAUTION: DO NOT ALLOW THE SOLVENT TO AIR DRY ON THE SURFACE OF THE ENGINE INLET. SOLVENT THAT IS ALLOWED TO AIR DRY WILL LEAVE A RESIDUE ON THE SURFACE AND WILL PREVENT CORRECT BONDING OF THE ADHESIVE.

(12) Remove the solvent from surface by wiping with clean cotton cloth or cheese cloth. Do not allow solvent to air dry.
(13) Add 33 parts by weight of EA 9330.3 Part B (light yellow) into 100 parts by weight of EA 9330.3 Part A (gray) and thoroughly mix until components blend into a uniform, gray paste.

NOTE: Mix no more material than can be used within 20 minutes.

Stop mixing as soon as paste color is uniform; overmixing will accelerate cure and reduce application time.

(14) Transfer mixed material to an extrusion gun polyethylene cartridge and install cartridge in extrusion gun.

(15) Using nozzle as required, inject adhesive into the damaged area. Start at the center of the cutout and work in an expanding circle until entire bottom skin surface and any remaining core in cutout are completely coated with adhesive. (See Figure 203, Detail A.)
(16) Apply masking tape to cover complete work area, overlapping previously applied masking material.
(17) Make a hole in center of tape large enough for the nozzle.
(18) Insert nozzle through hole and continue extruding adhesive until routed area is overfilled. (See Figure 203, Detail B.)

NOTE: If there is insufficient material to allow repaired area to be machined to contour, following cure, the entire process must be repeated.

CAUTION: DO NOT EXCEED 175°F [79°C] CURE TEMPERATURE LIMIT. TEMPERATURES IN EXCESS OF 175°F [79°C] CAN DAMAGE BONDED ASSEMBLY.

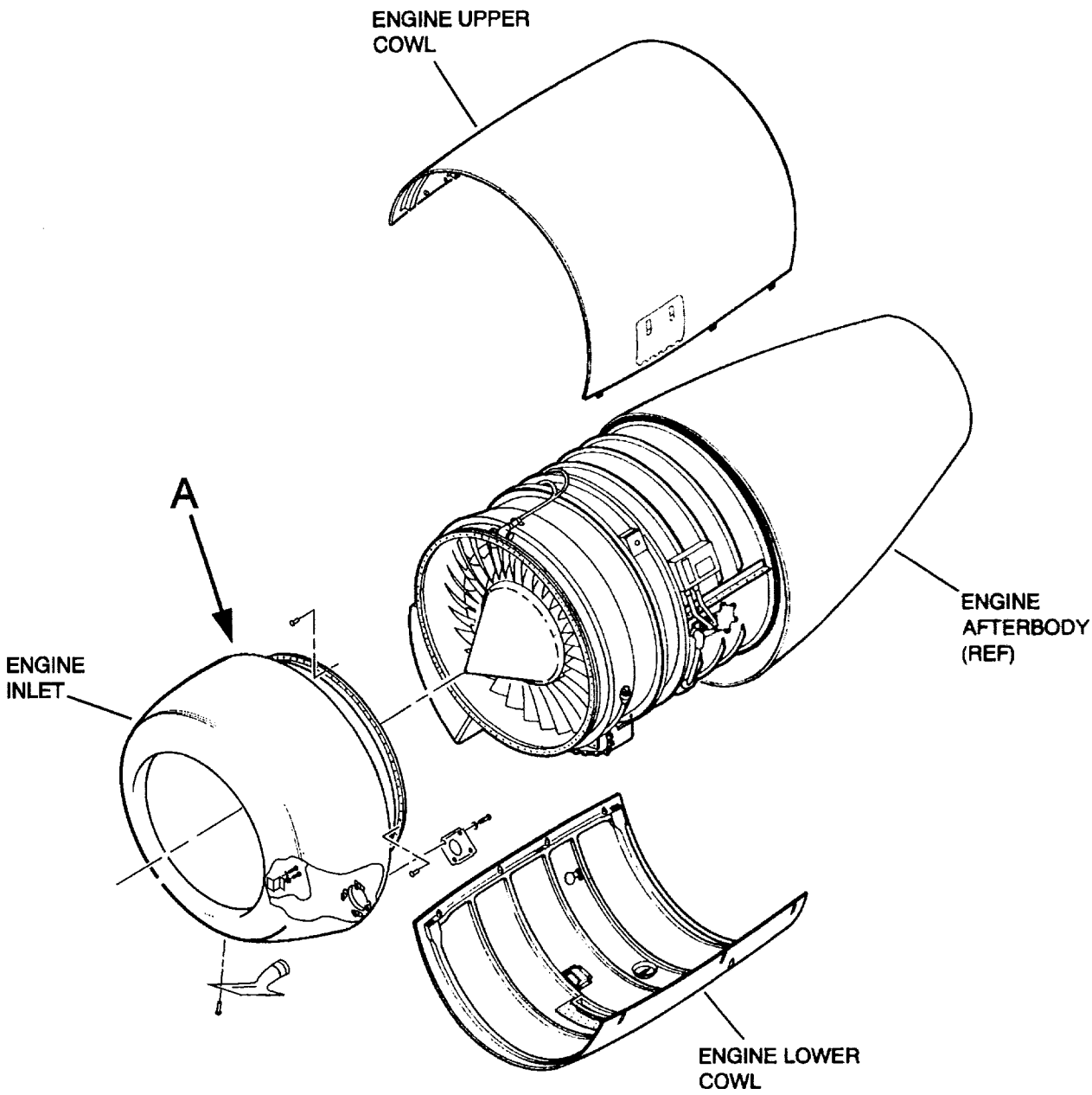
(19) Allow the adhesive to cure at room temperature 77°F [25°C] for 24 hours or accelerate cure at 150 to 175° F [66 to79° C] for 4 hours.

CAUTION: REMOVING TOO MUCH ADHESIVE WILL NECESSITATE REPEATING ENTIRE REPAIR PROCESS.

(20) Machine the adhesive surface flush (±0.006 inch [±0.152 mm]) with the adjacent skin.

3. Inspection/Check

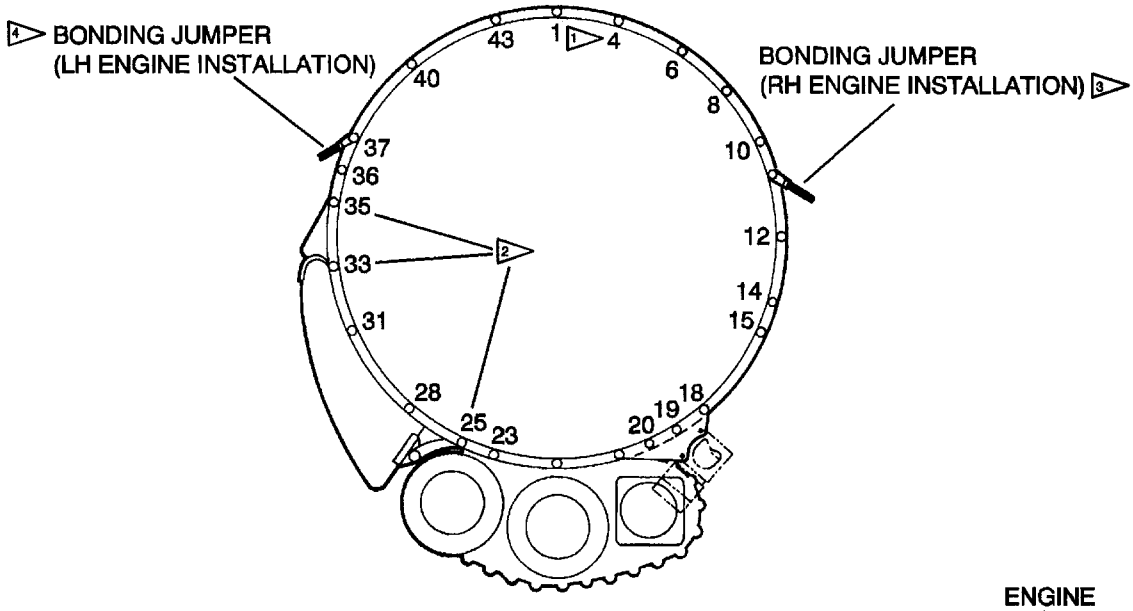
A. Check Engine Inlet for Proper Fit (See Figure 204.)
(1) Make sure that the contour around aft edge of engine inlet matches contour of engine upper and lower cowlings.
(2) The maximum allowable mismatch, perpendicular to airstream, shall not exceed 0.020 inch [0.5 mm], around the engine inlet circumference.
(3) Make sure that the gap around the aft edge of engine inlet to the forward edge of engine upper and lower cowlings is constant, and is not more than 0.040 inch [1.0 mm].
(4) If required, adjust the engine cowling. (Refer to 71-10-02.)



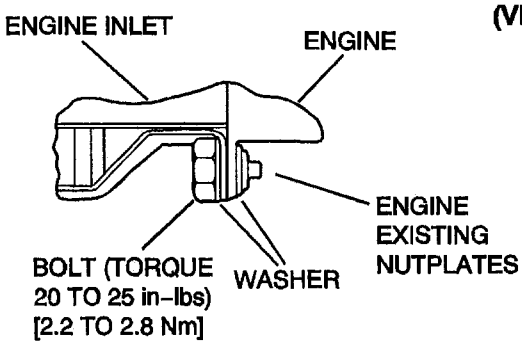
(LH SHOWN, RH TYPICAL)

M31-711001-201-01

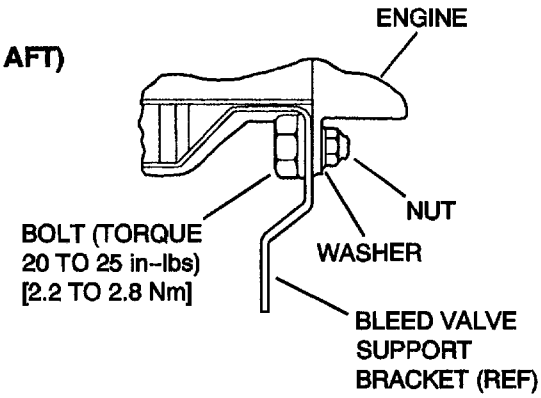
Engine Inlet Installation
Figure 201 (Sheet 1 of 2)



(VIEW LOOKING AFT)



(POSITIONS NO. 23, 25, 28, AND 31)



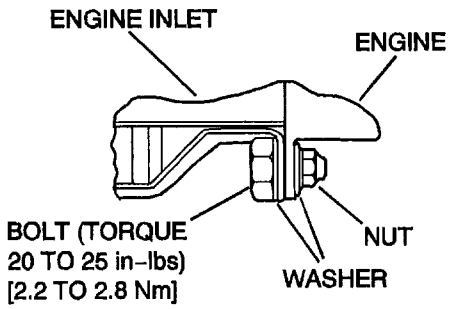
(POSITIONS NO. 18, 19, AND 20)

1 FASTENERS ARE INSTALLED AT NUMBERED LOCATIONS. FASTENERS ARE NOT REQUIRED AT REMAINING LOCATIONS.

2 PICK UP EXISTING ENGINE FASTENER LOCATIONS.

3 PICK UP EXISTING ENGINE FASTENER LOCATION. (RH ENGINE INSTALLATION)

4 PICK UP EXISTING ENGINE FASTENER LOCATION. (LH ENGINE INSTALLATION)

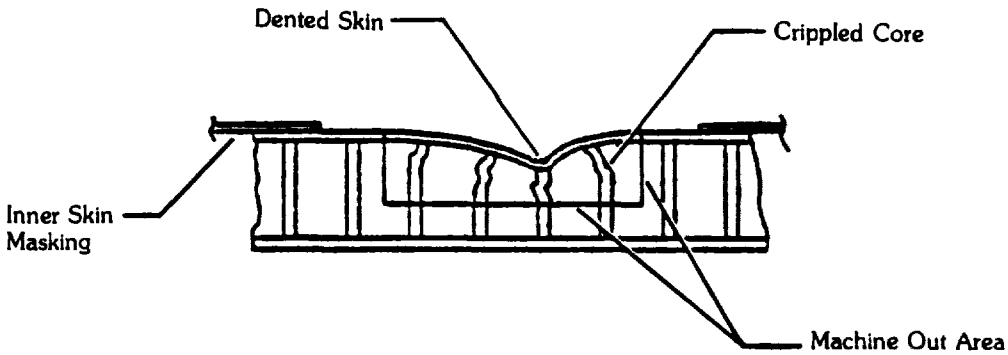


(POSITIONS NO. 1, 4, 6, 8, 12, 14,15, 36, 37, 40, AND 43)

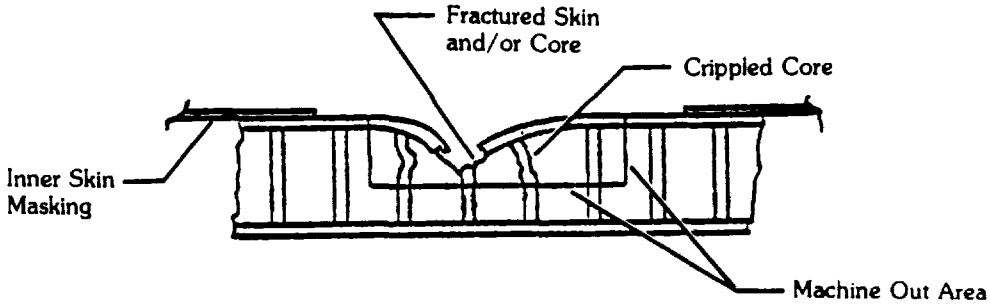
Detail A

M31-711001-201-02

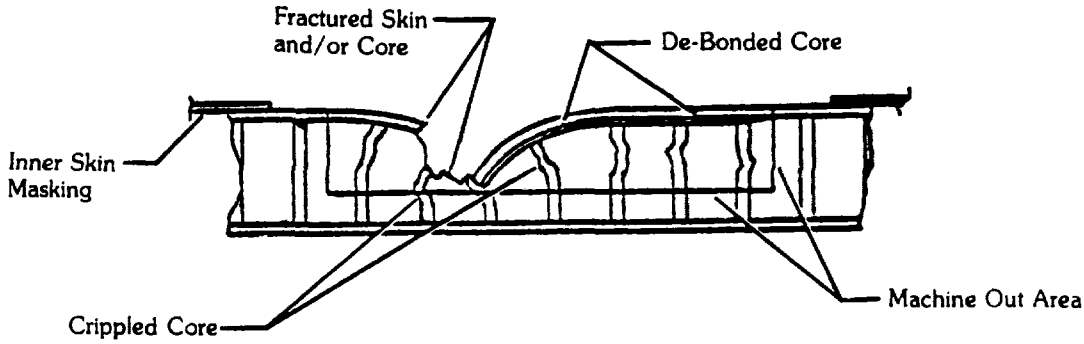
Engine Inlet Installation
Figure 201 (Sheet 2 of 2)



Skin Dent and Crippled Core

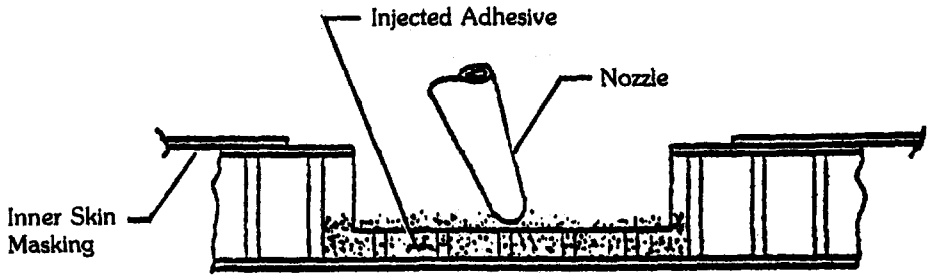


Skin Fracture and Crippled Core

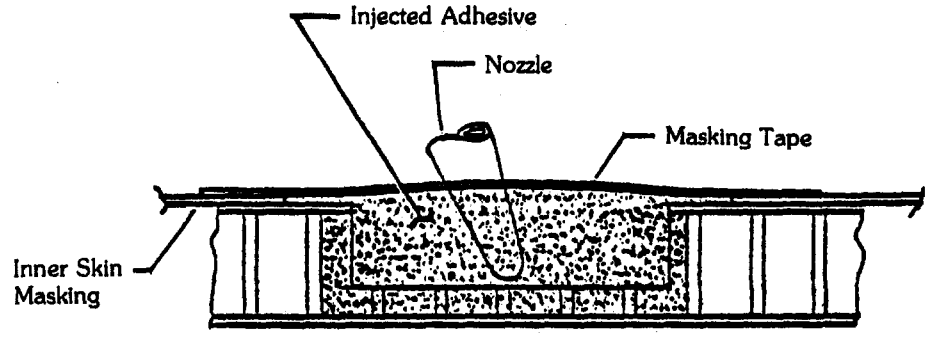


Skin Fracture and Fractured, Crippled, and/or De-Bonded Core

Examples of Damage to Bonded Engine Inlet
Figure 202



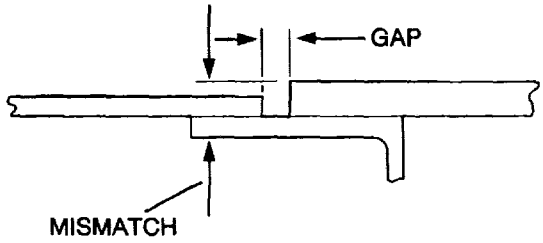
Detail A

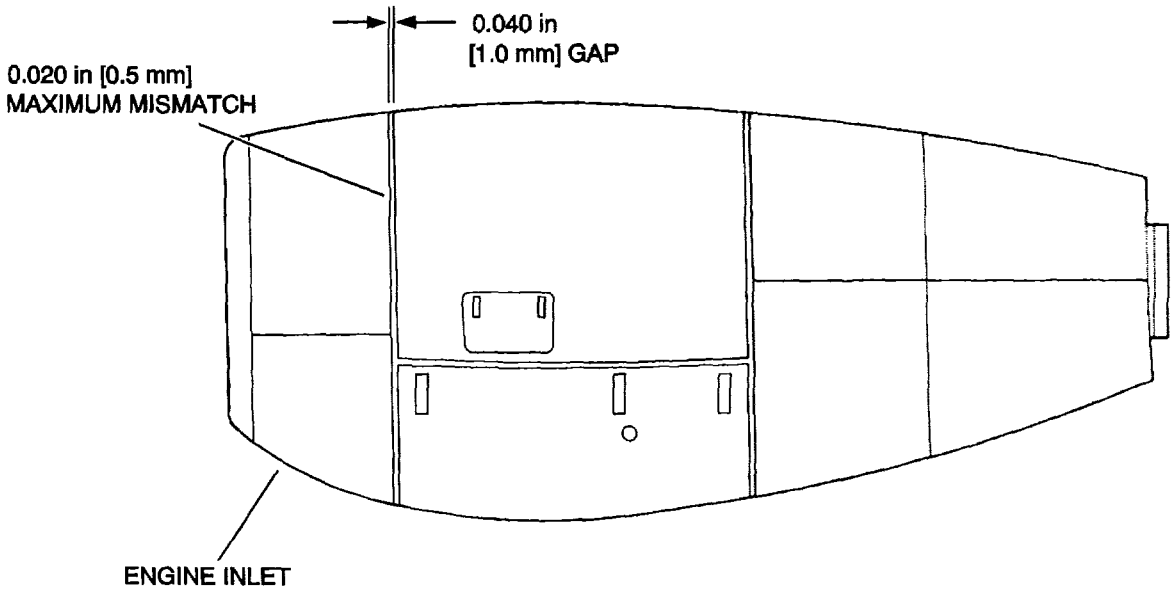


Detail B

Applying Adhesive to Bonded Engine Inlet
Figure 203

GAP AND MISMATCH SHALL BE
MEASURED AS SHOWN:





(TYPICAL)

M31-711001-204-01

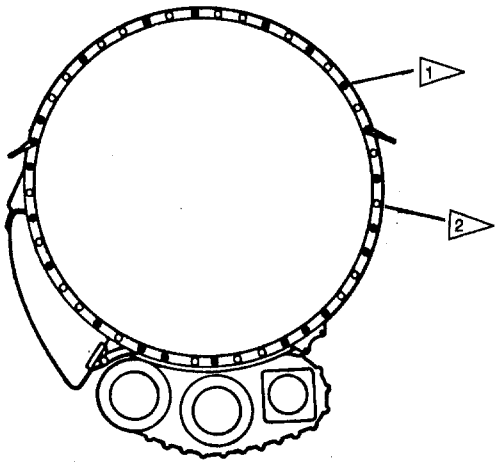
Engine Inlet Fit Tolerance
Figure 204

1. **Removal/Installation**
   A. Remove Engine Nacelle Cowl Assemblies. (See Figure 201.)
      (1) Support nacelle lower cowl assembly and release quick-attach fasteners.
      (2) Remove nacelle lower cowl assembly from aircraft.
      (3) Release Camloc fasteners securing inboard side of nacelle upper cowl assembly to firewall.
      (4) Remove nacelle upper cowl assemblies.
   B. Install Engine Nacelle Cowl Assemblies. (See Figure 201.)
      (1) Position nacelle upper cowl assembly on engine. Secure Camloc fasteners.
      (2) Position nacelle lower cowl assembly on engine. Secure inboard side quick-attach fasteners. Secure outboard side quick-attach fasteners.

      NOTE: All quick-attach fasteners shall latch with approximately the same amount of force.

2. **Adjustment/Test**
   A. Adjust Nacelle Cowl Assembly Quick-Attach Fasteners. (See Figure 201, Detail D.)
      (1) Loosen jam nut and adjust remaining nut to lengthen or shorten U-bolt to dimension shown in Detail D.
         (a) On *Aircraft 35-002 thru 35-659; 36-002 thru 36-059, 36-062, 36-063, when equipped with upper engine nacelles P/N 2652023-116 and prior*, gaps between upper and lower nacelles and firewall (gaps parallel to airstream) may be 0.120 (+0.000; -0.090) inch with a maximum variance of 0.030 inch over any 18 inch section.
         (b) On *Aircraft 35-660 and Subsequent; 36-060, 36-061, 36-064 and Subsequent and prior aircraft when equipped with upper engine nacelles P/N 2652023-127 and subsequent*, gaps between upper and lower nacelles and firewall (gaps parallel to airstream) may be 0.060 (±0.030) inch with a maximum variance of 0.030 inch over any 18 inch section.
      (2) Tighten jam nut when proper length on U-bolt is attained.

      NOTE:
      - Fasteners shall latch with a minimum force of 15 pounds.
      - All quick-attach fasteners shall latch with approximately the same amount of force.

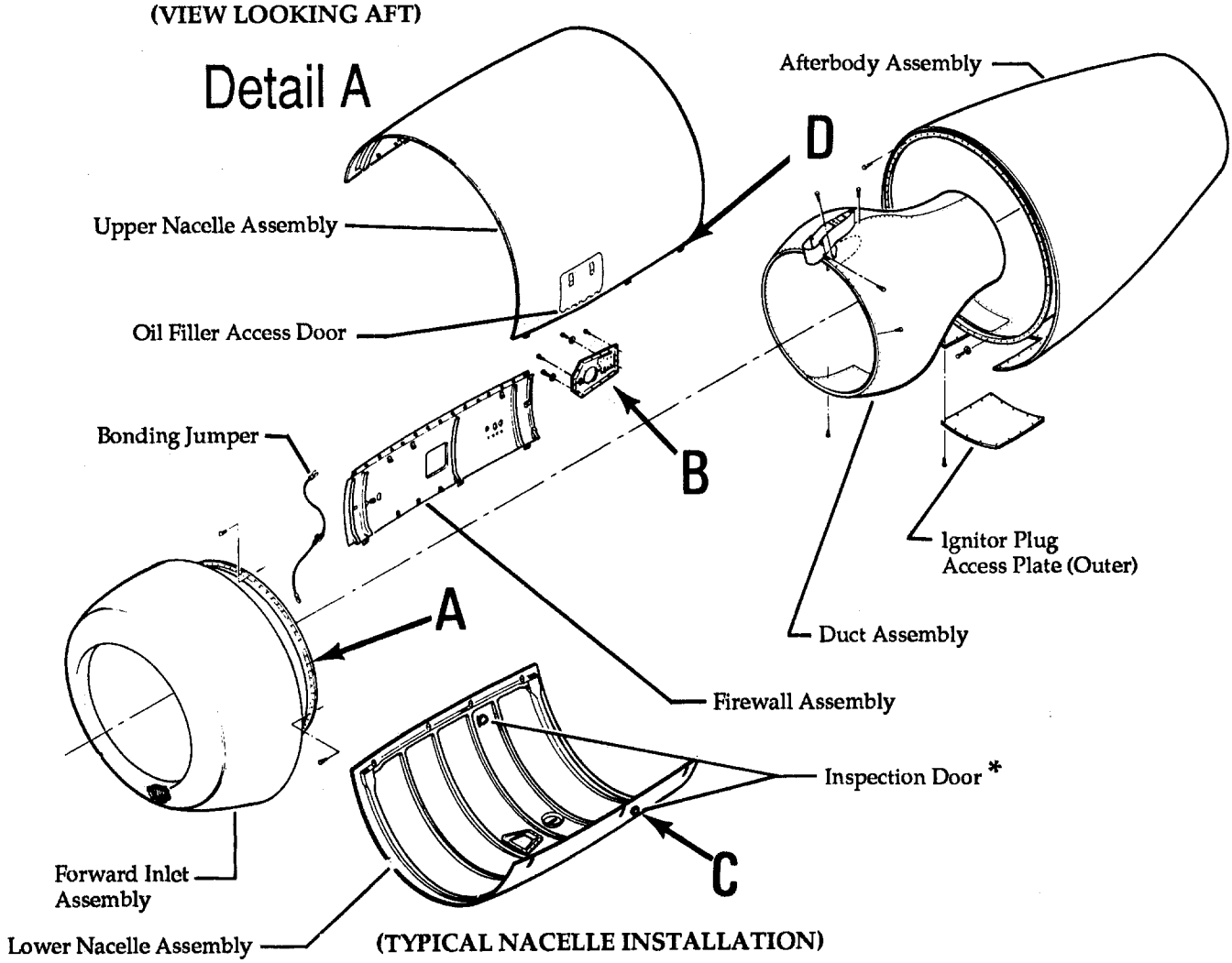


(VIEW LOOKING AFT)

To facilitate maintenance on *Aircraft 35-002 thru 35-019 and 36-002 thru 36-012*, it is permissible to omit some of the attachment bolts securing the inlet nacelle to the engine. Detail A indicates which bolts must be installed and which may be omitted.

1 ● Indicates bolt location
2 O Indicates open hole

* *Effective on Aircraft 35-028, 35-031 and Subsequent, 36-014, 36-017 and Subsequent, and Prior Aircraft Modified per AAK 76-1, "Installation of Engine Nacelle Inspection Doors for Bypass Valve Indicator Pins"*

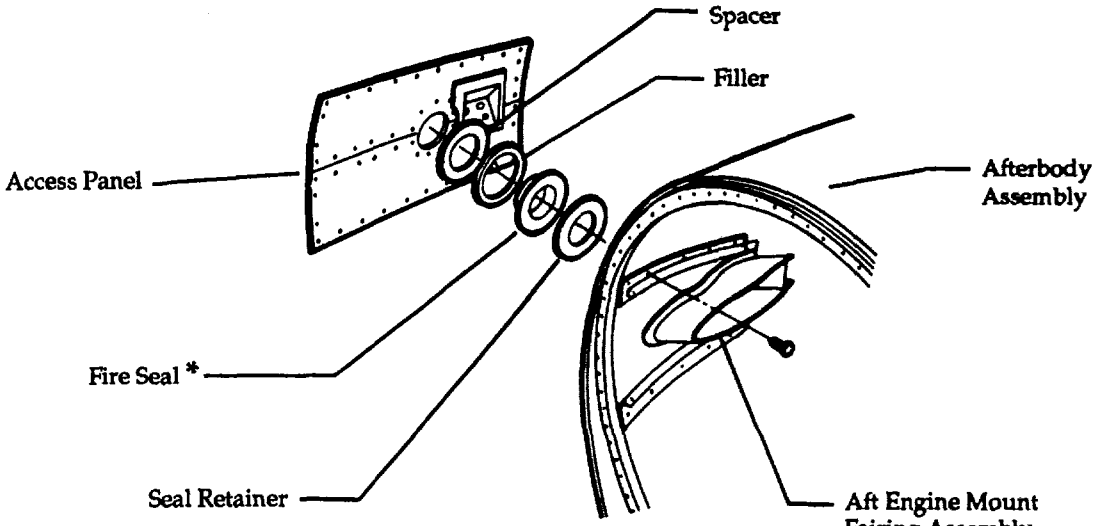


(TYPICAL NACELLE INSTALLATION)

(LH SIDE SHOWN)

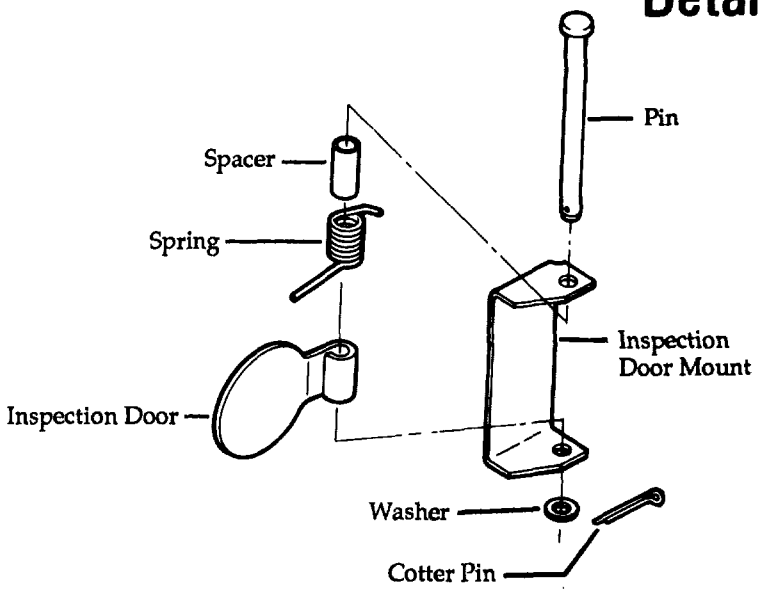
Nacelle Installation
Figure 201 (Sheet 1 of 2)

* *On Aircraft not equipped with thrust reversers*, ensure that fire seal is installed with flange of seal toward the aircraft centerline. *On Aircraft equipped with thrust reversers*, ensure that fire seal is installed with flange of seal toward the engine centerline.

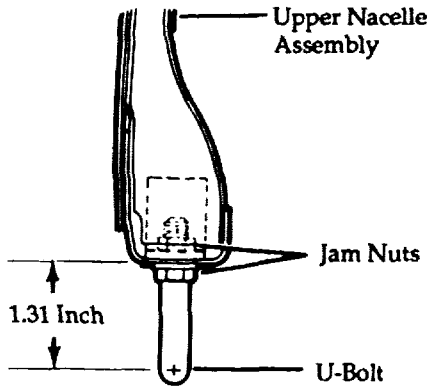


(AIRCRAFT NOT EQUIPPED WITH THRUST REVERSERS SHOWN)

Detail B



Detail C



Detail D

B3-11B
C7-30C
D3-10A

Nacelle Installation
Figure 201 (Sheet 2 of 2)

NOTES:

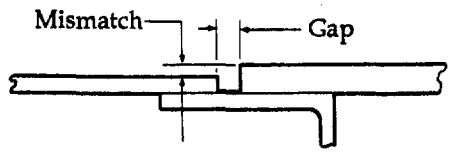
1. Maximum variance is 0.30 inch (0.712 mm) along any 18 inch (457.2 mm) area.

2. These gaps may range from 0.0 at either gap to 0.080 inch (2.03 mm) at opposite end. The total dimension from both gaps may not exceed 0.080 inch (2.03 mm).

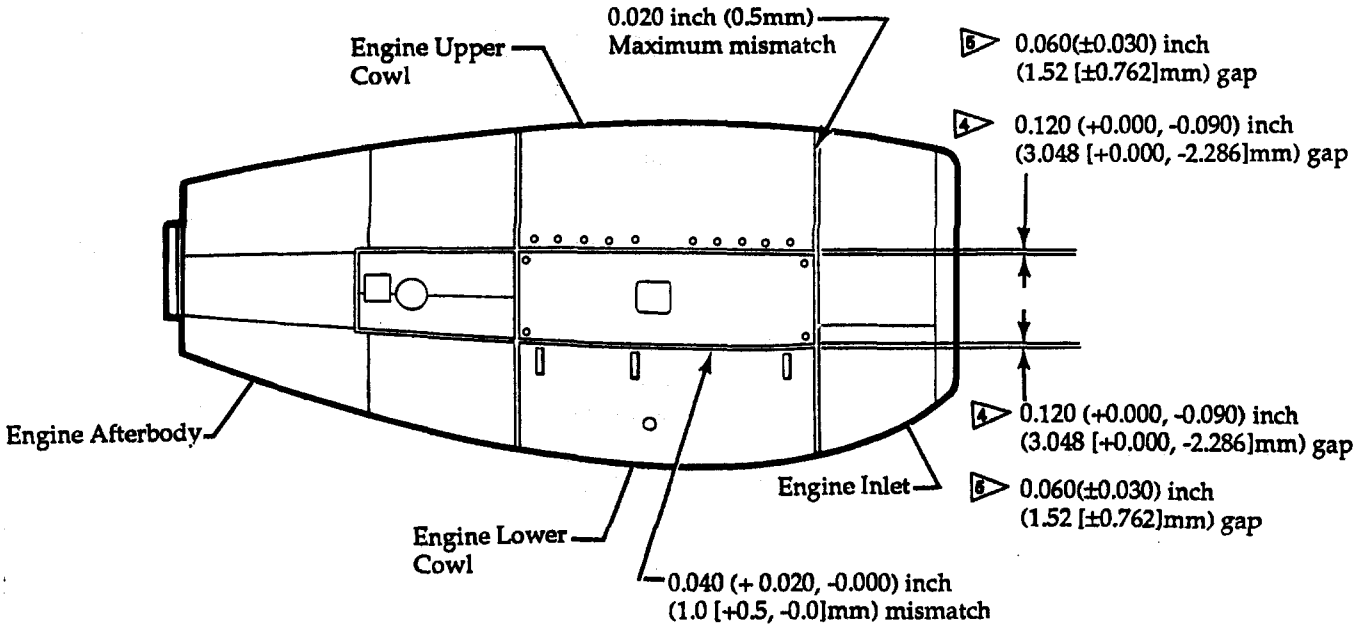
3. Mismatch at the upper 7 inches (17.8 cm) on both sides of the aft end of the lower cowl may be up to an additional 0.020 inch (0.5 mm) extended into airstream.

4. On *Aircraft 35-002 thru 35-659; 36-002 thru 36-059, 36-062, 36-063, when equipped with upper engine nacelles P/N 2652023-116 and prior.*

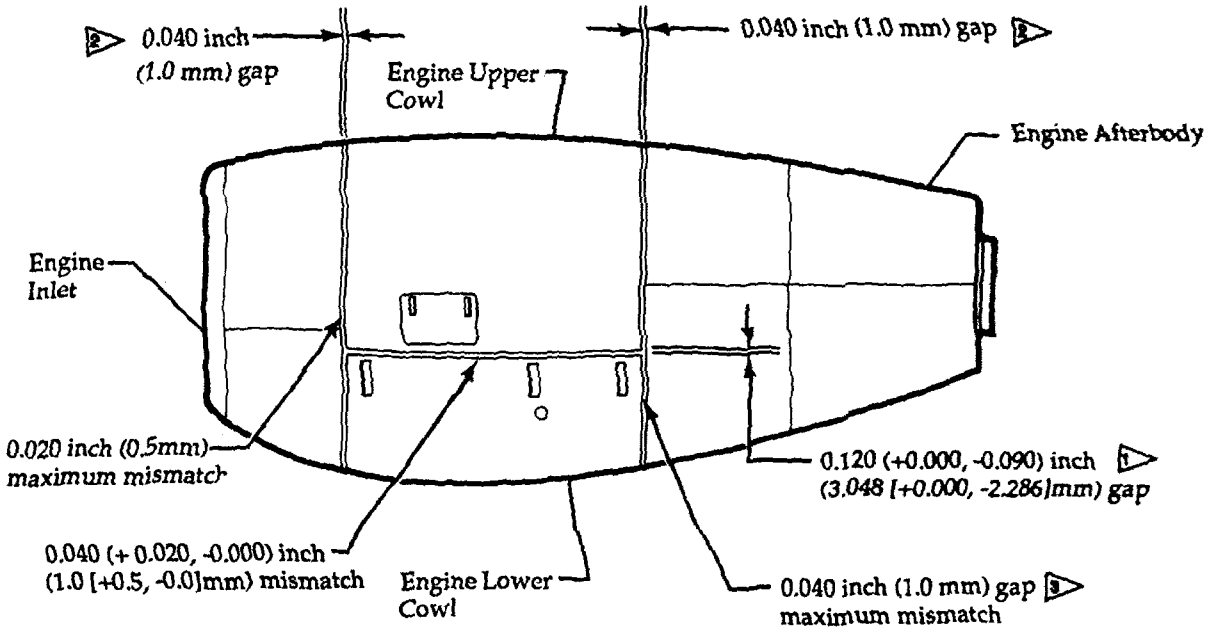
5. On *Aircraft 35-660 and Subsequent; 36-060, 36-061, 36-064 and Subsequent and prior aircraft when equipped with upper engine nacelles P/N 2652023-127 and subsequent.*



Gap and mismatch shall be measured as shown:



Engine Cowling Fit Tolerance
Figure 202 (Sheet 1 of 2)



(TYPICAL)

Engine Cowling Fit Tolerance
Figure 202 (Sheet 2 of 2)

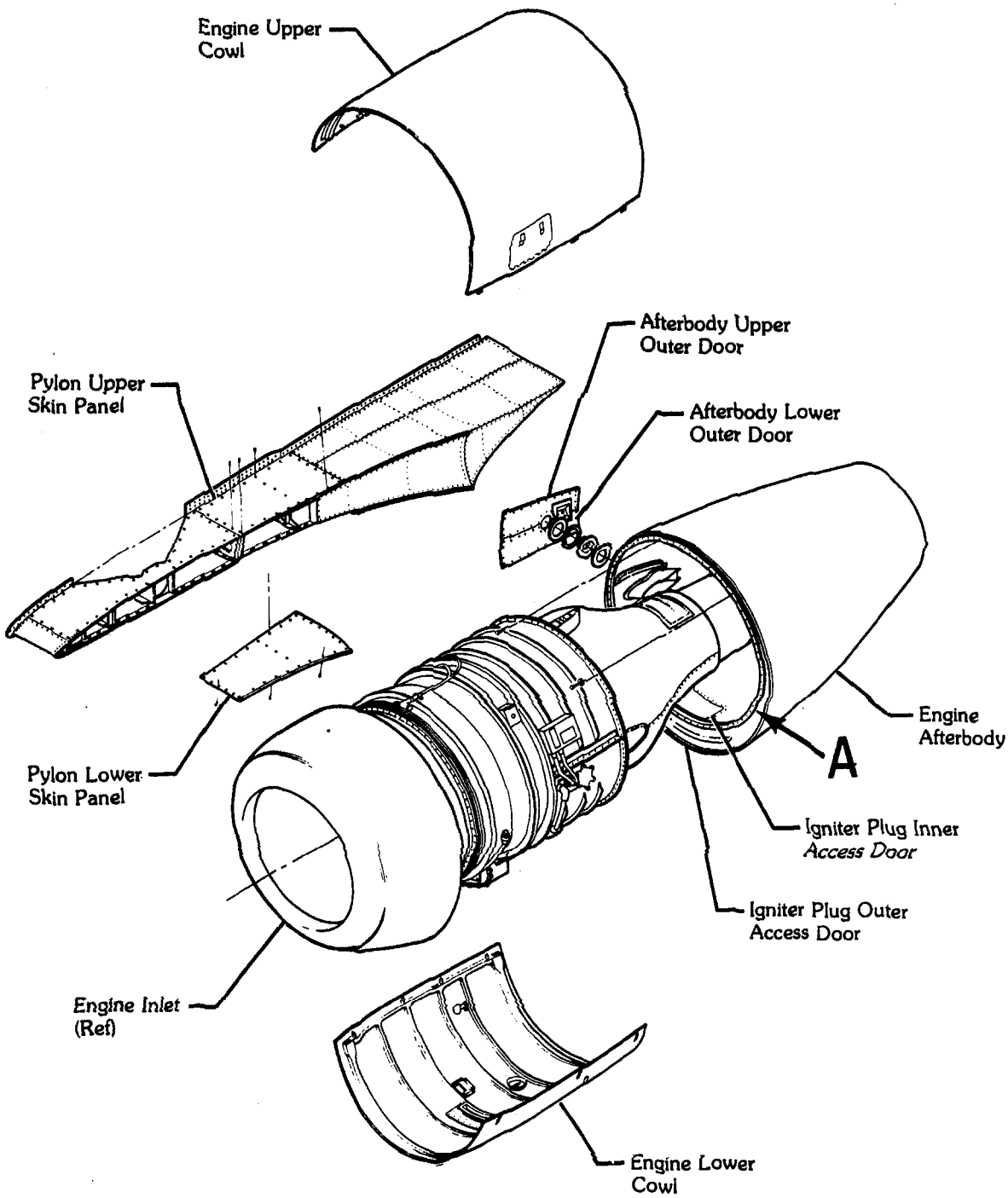
ENGINE AFTERBODY - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE:
- Removal and installation procedures for both engine afterbody assemblies are identical.
- Ensure proper support is provided for engine afterbody during removal and installation.

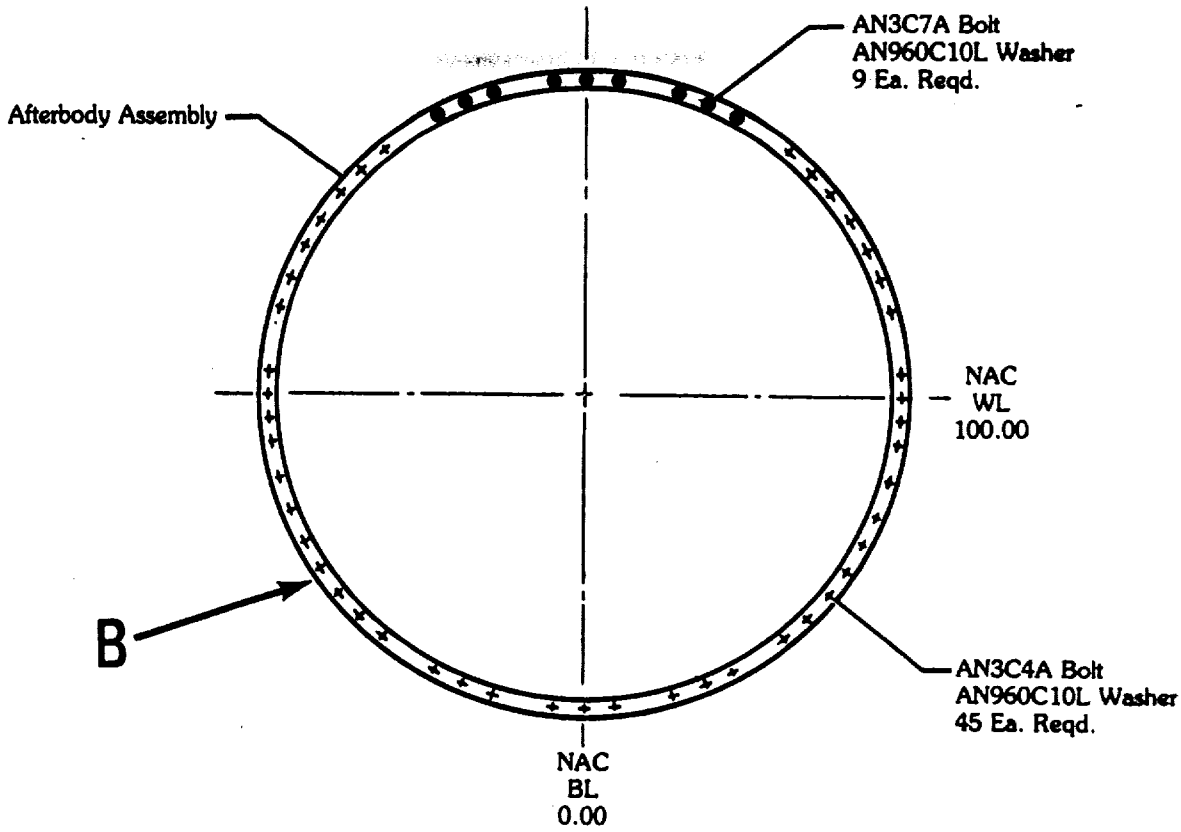
A. Remove Engine Afterbody (See figure 201.)
   (1) Open tailcone access door and disconnect both battery quick-disconnects.
   (2) Remove applicable engine upper and lower cowlings.
   (3) Remove pylon aft upper and lower skin panels.
   (4) Remove afterbody upper and lower outer doors.
   (5) Disconnect electrical wiring harness clamps from engine flange.
   (6) Remove attaching parts securing engine afterbody to structure at aft engine mount.
   (7) Remove attaching parts securing engine afterbody to engine flange; carefully remove afterbody.

B. Install Engine Afterbody (See figure 201.)
   (1) Position engine afterbody at its appropriate location on engine and secure with attaching parts. Torque bolts 20 to 25 inch-pounds (2.2 to 2.8 N.m).
   (2) Install attaching parts securing afterbody assembly to aft engine mount structure.
   (3) Install attaching parts securing electrical wiring harness clamps to engine flange.
   (4) Install afterbody upper and lower outer doors.
   (5) Install pylon aft upper and lower skin panels.
   (6) Install engine upper and lower cowlings.
   (7) Connect both battery quick-disconnects and close tailcone access door.
   (8) Restore aircraft to normal.

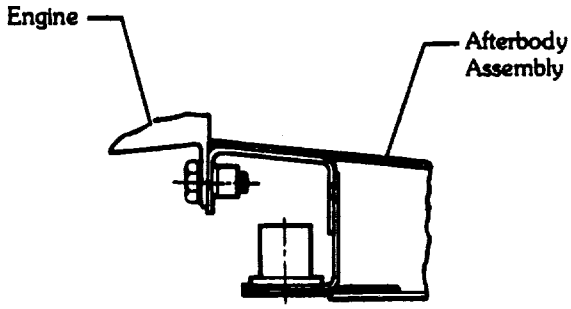


(LH SHOWN, RH TYPICAL)

Engine Afterbody Installation
Figure 201 (Sheet 1 of 2)



Detail A



(TYPICAL)

Detail B

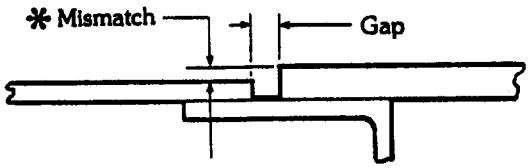
Engine Afterbody Installation
Figure 201 (Sheet 1 of 2)

2. **Inspection/Check**
   A. Check Engine Afterbody for Proper Fit (See figure 202.)
      (1) Verify that contour around forward edge of engine afterbody matches contour of engine upper and lower cowlings. Maximum allowable mismatch between contours, perpendicular to airstream, shall not exceed 0.040 inch (1.0 mm), along entire circumference.

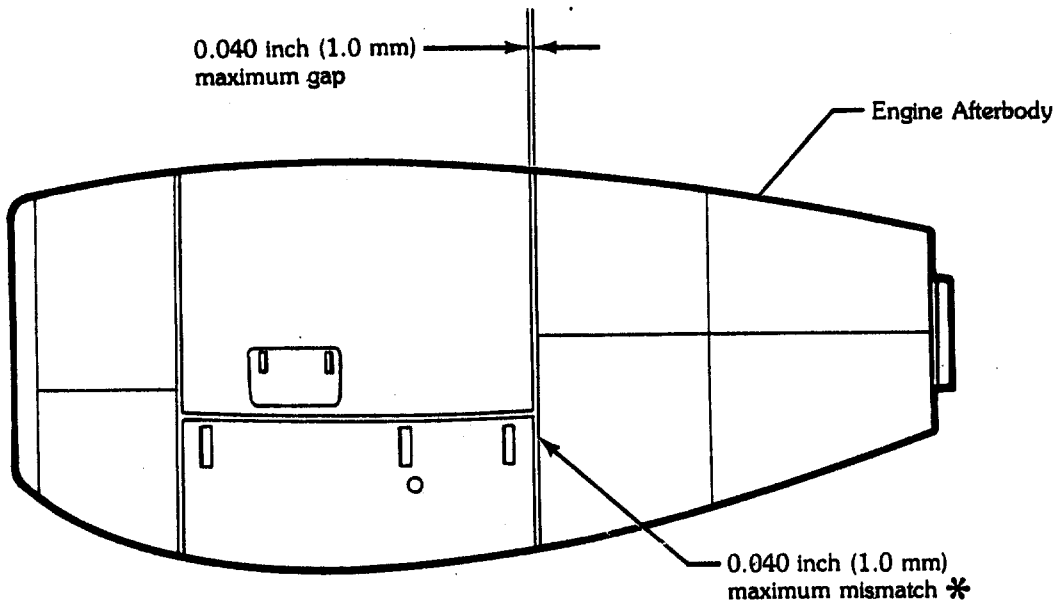
      NOTE: Mismatch at the upper 7 inches (17.8 cm) on both sides of the aft end of the lower cowl may be up to an additional 0.020 inch (0.5 mm) extended into airstream.

      (2) Verify that gap around forward edge of engine afterbody to engine upper and lower cowlings is consistent, and does not exceed 0.040 inch (1.0 mm).
      (3) If required, adjust engine cowling in accordance with procedures outlined in 71-10-02.

Gap and mismatch shall be measured as shown:



* Mismatch at the upper 7 inches (17.8 cm) on both sides of the aft end of the lower cowl may be up to an additional 0.020 inch (1.0 mm) extended into airstream.



Engine Afterbody Fit Tolerance
Figure 202

MOUNTS - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE: Two (2) forward shock mounts and an aft isolator are installed to provide a means of attaching the engine to the mounts. The shock mounts and isolator minimize transfer of engine vibration to fuselage structure.

CAUTION: THE ENGINE MUST BE SUPPORTED BY ENGINE HOIST BEFORE ANY MOUNT BOLTS ARE LOOSENED OR REMOVED. THIS APPLIES EVEN IF ENGINE IS NOT COMPLETELY REMOVED FROM AIRCRAFT. IF ENGINE IS NOT SUPPORTED, DAMAGE TO THE ENGINE, MOUNT, OR SUPPORT STRUCTURE COULD RESULT.

A. Remove Forward Shock Mount Assembly (See Figure 201.)
   (1) Remove engine from aircraft. (Refer to 71-00-01.)

   NOTE: To change forward shock mounts, engine must be supported in engine hoist.

   (2) Remove safety wire from shock mount bolts.
   (3) Remove attaching bolts, washers, and forward shock mounts from engine.

B. Install Forward Shock Mount Assembly (See Figure 201.)
   (1) Acquire the necessary tools and equipment.

   NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Torque Wrench		Commercially Available	Torque bolts.
Safety Wire	MS20995C47	Commercially Available	Safety forward mount bolts.
Lubricant	Liqui-Moly	NV Lockrey Co. Southhampton, NY	Lubricate bolts.

   (2) Install forward shock mount assembly and secure with attaching bolts and washers.
   (3) Torque bolts 160 to 190 inch-pounds [18.1 to 21.4 Nm].
   (4) Install safety wire on the bolts.

C. Remove Isolator Assembly (See Figure 201.)
   (1) Remove engine from aircraft. (Refer to 71-00-01.)

   NOTE: To change isolator assemblies, engine must be supported in engine hoist.

   (2) Remove cotter pin, nuts, washers, and bolts securing isolator assembly to aft mount.

D. Install Isolator Assembly (See Figure 201.)
   (1) Position isolator assembly in aft mount.
   (2) Add shims as required to obtain 0.002 inch [0.0508 mm] clearance as shown in Figure 201, Detail A.
   (3) Secure isolator assembly to aft mount with attaching parts and torque bolts 100 to 140 inch-pounds [11.3 to 15.8 Nm]. Install cotter pins.

E. Remove Forward Mount (See Figure 201.)
   (1) Remove engine from aircraft. (Refer to 71-00-01.)
   (2) Remove safety wire from forward mount nuts.

   NOTE: Removal and installation of forward mount nuts may require a 3/4 inch [19 mm], 12 point, deep well socket or a 13/16 inch [20 mm], 12 point, deep well socket.

   (3) Remove attaching parts and forward mount from aircraft. Retain shims.

F. Install Forward Mount (See Figure 201.)
   (1) Acquire the necessary tools and equipment.

   NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Torque Wrench		Commercially Available	Torque Bolts.
Safety Wire	MS20995C47	Commercially Available	Safety the forward mount bolts.
Firewall Sealant	*Dapcocast 18-4*	*D. Aircraft Product Co. Anaheim, CA*	*Sealing the firewall.*
Silicone Rubber Primer	Dapco 1-100	D. Aircraft Product Co. Anaheim, CA	Priming the firewall.
Sealant Cutting and Fairing Tools	3170023-1 thru 3170023-7	Learjet Inc. Wichita, KS or Local Manufacture, *refer to* 20-10-00	Shaping the sealant.
Extrusion Gun	950	Pyles Ind., Inc. Detroit, MI	Applying the sealant.
Cleaning Solvent		Refer to 20-12-00	Clean forward mount and closeout plate.
Loctite (Screw Locking)		Refer to 20-21-00	Attaching the closeout plate screws.
Cotton Cloth		Commercially Available	Clean parts.

(2) *On Aircraft that are equipped with a forward engine mount which incorporates a coverplate*, make sure that the closeout plate is installed on the back of the forward mount. If the closeout plate is to be installed, do the steps that follow:

NOTE: If the forward mount was removed for maintenance other than inspection or replacement, proceed with step (3).

(a) Solvent clean the edge of the closeout plate that will come in contact with the forward mount. Wipe dry with a clean cloth.
(b) Solvent clean the area of the forward mount that will contact with the closeout plate. Wipe dry with a clean cloth.
(c) Using firewall sealant, apply a fayseal to the cleaned area of the closeout plate and the forward mount.
(d) Install the closeout plate on the forward mount.
(e) Apply Loctite to the closeout plate attaching parts.
(f) Install the attaching parts that attach the closeout plate to the forward mount.
(g) Using cleaning solvent, clean off any squeezed out sealant from the edge of the closeout plate. (Refer to 20-12-00.)

(3) Remove any old sealant from forward mount and firewall seal. If sealant was present, thoroughly clean previously sealed area by scrubbing with a clean, white, cotton cloth dampened with cleaning solvent. Wipe area dry with another clean cloth.

CAUTION: FORWARD MOUNTING BOLTS 2651026-3 AND 2651026-4 ARE DIFFERENT LENGTHS (5.777 AND 6.077 INCHES) AND ARE NOT INTERCHANGEABLE (SEE FIGURE 201.) ENSURE PROPER ATTACHING HARDWARE IS INSTALLED WITH EACH BOLT. FAILURE TO DO SO WILL RESULT IN IMPROPER TORQUING AND POSSIBLE PRELOADING OF FORWARD SUPPORT FITTING .

THREE SIDES OF THE RADIUS WASHER, THAT ARE LOCATED UNDER THE BOLT HEAD AND THE NUT, ARE ROUNDED. YOU MUST MAKE SURE THAT THE ROUNDED SIDE IS AGAINST THE FORWARD SUPPORT MOUNT WHEN THEY ARE INSTALLED. IF THEY ARE NOT INSTALLED CORRECTLY, THE FORWARD SUPPORT MOUNT CAN BE DAMAGED.

(4) Set the forward mount on forward support fitting. and secure with attaching parts. Torque nuts to 10 to 25 inch-pounds [1.1 to 2.8 Nm] plus drag torque.
(5) Install the attaching bolts that attach the forward mount to the forward support mount. Shim as required to obtain an overall clearance between the forward mount and support fitting of 0.001 inch [0.025 mm]. Make sure that the radius is in its correct position.
(6) Install the radius washers and nuts on the bolts. Make sure that the radius is in its correct position.

(7) Torque the nuts 10 to 25 inch-pounds [1.1 to 2.8 Nm] plus drag torque.

NOTE: It is acceptable to increase the torque on the nut to a maximum of 150 inch-pounds [16.9 Nm] (including drag torque), if required, to clear the safety wire hole in the bolts.

Removal and installation of forward mount nuts may require a 3/4 inch [19 mm], 12 point, deep well socket or a 13/16 inch [20 mm], 12 point, deep well socket.

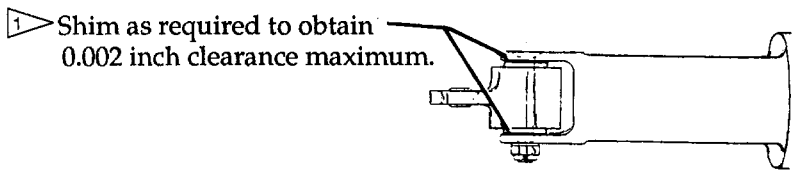
(8) Install safety wire on forward mount nuts per double twist method.
(9) Check gap between fire seal and forward mount. If gap is greater than 0.032 inch [0.812 mm], seal gap with firewall sealant as follows:
  (a) Weigh into a clean container amount of base material desired.
  (b) Add accelerator to base material at a ratio of seven (7) parts by weight of accelerator to 100 parts by weight of base.
  (c) Stir as required to thoroughly mix to uniform color and viscosity. Seal container.
  (d) Perform a final cleaning of surfaces to be sealed immediately prior to application of sealant by scrubbing with a clean, white, cotton cloth (folded to enclose raw edges and reduce lint) dampened with solvent and drying with another clean cloth before the solvent evaporates.
  (e) Brush a uniform, thin coat of silicone rubber primer on surfaces to be sealed. Allow primer to air dry for at least 1 hour at room temperature or until a dull red color develops.
  (f) Apply sealant using an extrusion gun or spatula. Shape fillet seal with fairing tools. (Refer to 20-10-00.)
  (g) Allow firewall sealant to air-dry for at least 72 hours at room temperature before applying heat.
(10) Install engine. (Refer to 71-00-01.)

G. Remove Aft Mount (See Figure 201.)
  (1) Remove engine from aircraft. (Refer to 71-00-01.)
  (2) *On Aircraft 35-002 thru 35-027, 35-029 thru 35-032, and 35-035, 36-002 thru 36-013, 36-015, and 36-016 not equipped with thrust reversers and not modified per AAK 75-2, "Removable Afterbody Engine Nacelle,"* remove attaching parts and upper and lower aft mount shrouds.
  (3) Remove attaching parts and aft mount from aircraft. Remove sealant from parts as required.

H. Install Aft Mount (See Figure 201.)
  (1) *On Aircraft not equipped with thrust reversers,* ensure that fire seal is installed with flange of fire seal toward fuselage centerline.
  (2) *On Aircraft equipped with thrust reversers*, ensure that fire seal is installed with flange of fire seal toward engine centerline.
  (3) Install aft engine mount through seal retainer, fire seal, filler, spacer, and access plate and secure with attaching parts, shimming as required to obtain 0.002 inch [0.0508 mm] clearance between aft engine mount and aft engine beam. Tighten until cotter pin can be installed while maintaining overall clearance.
  (4) *On Aircraft 35-002 thru 35-027, 35-029 thru 35-032, and 35-035 and 36-002 thru 36-013, 36-015, and 36-016 not equipped with thrust reversers and not modified per AAK 75-2, "Removable Afterbody Engine Nacelle,"* install upper and lower aft mount shroud on aft mount and secure with attaching parts. Seal perimeter of shrouds and access plate per instructions in 1.F.(9) above.

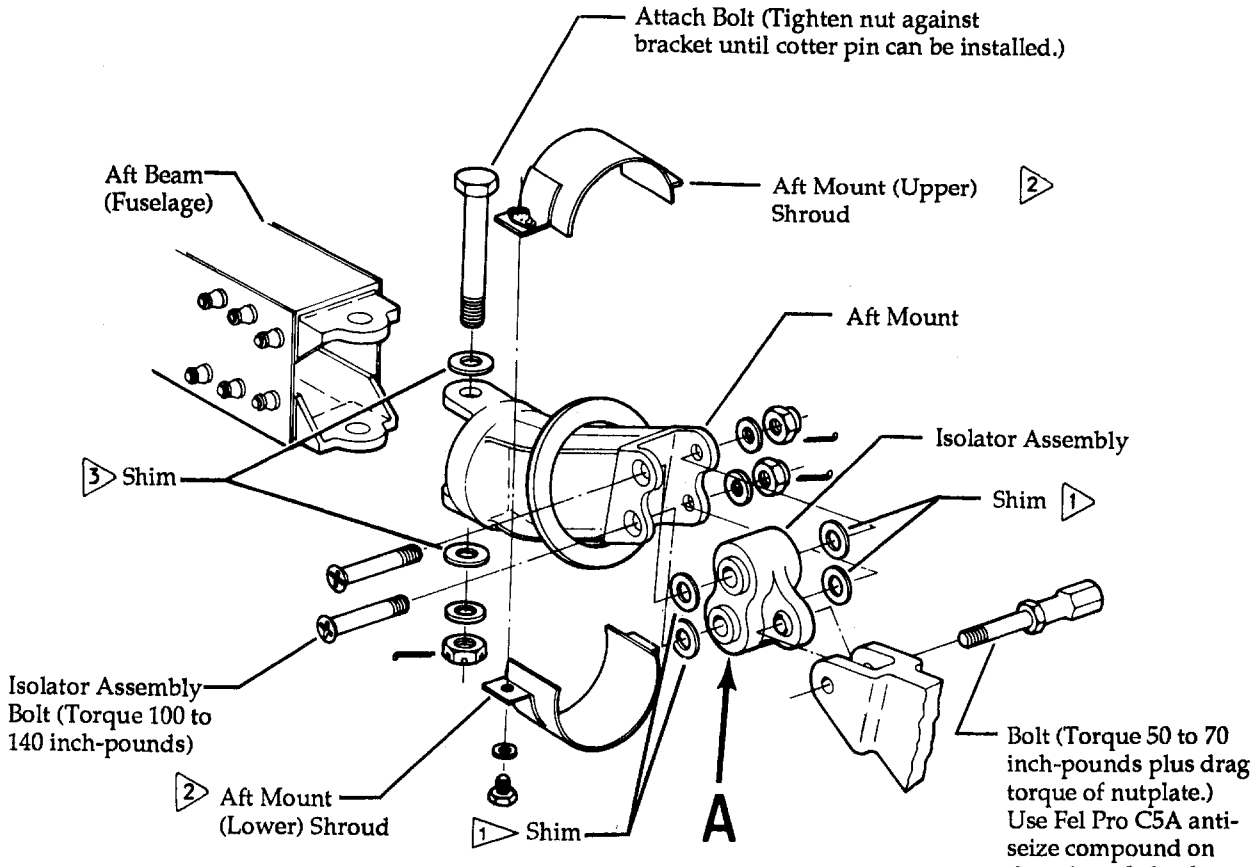
(5) *On Aircraft 35-028, 35-033, 35-034, 35-036 and Subsequent; 36-014, 36-017 and Subsequent and prior aircraft equipped with thrust reversers or modified per AAK 75-2, "Removable Afterbody Engine Nacelle,"* seal between mount and access plate seal per instructions in 1.F.(9) above.

(6) Install the engine. (Refer to 71-00-01.)



2 Apply sealant (Dapocast 18-4) to perimeter of shrouds and access plate assembly after shrouds are installed.

3 Shim as required to obtain overall gap of 0.001 inch maximum.



(Aircraft 35-002 thru 35-027, 35-029 thru 35-043, and 35-035; 36-002 thru 36-013, 36-015 and 36-016 not equipped with thrust reversers and not modified per AAK 75-2 "Removable Afterbody Engine Nacelle".)

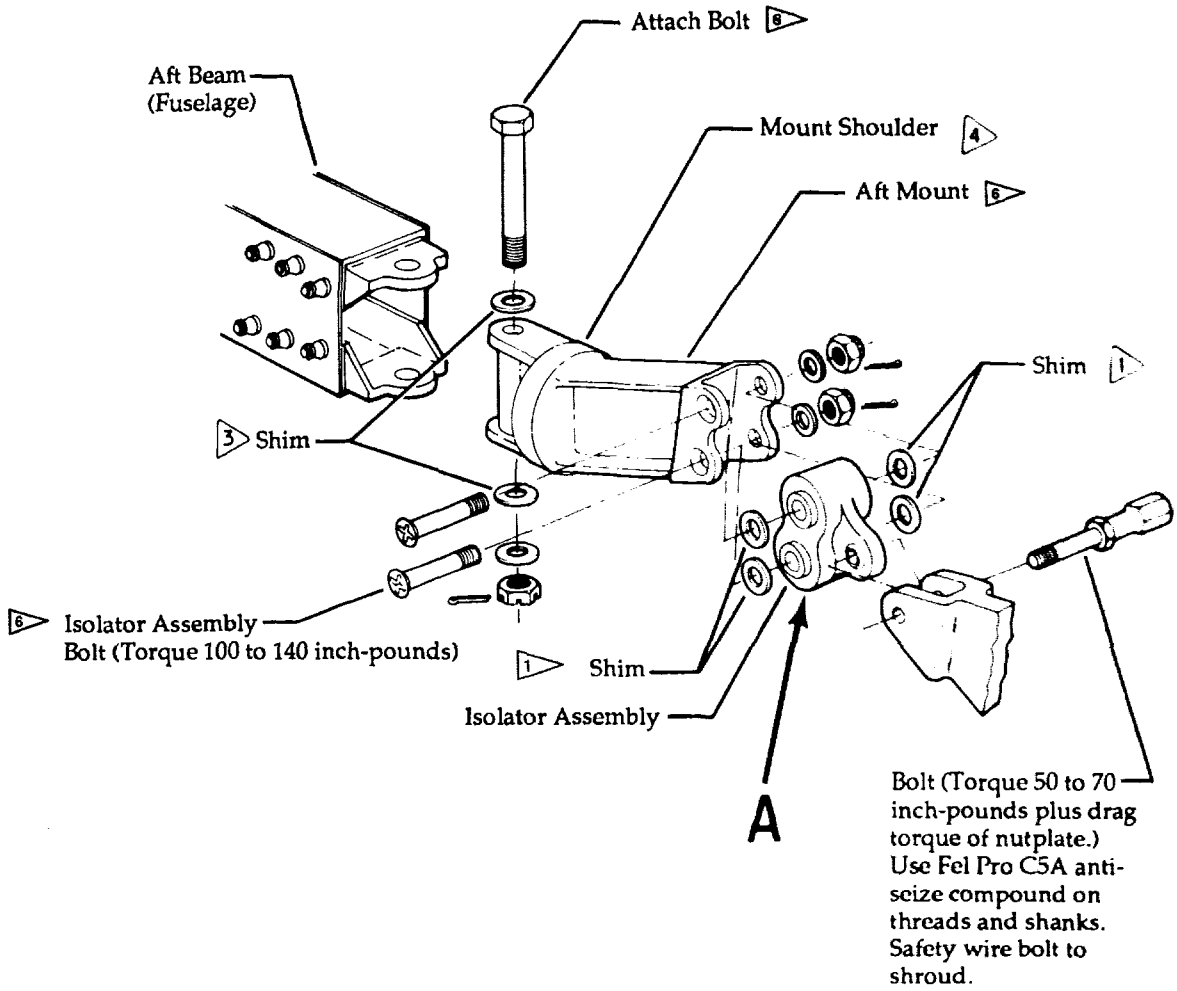
7-29A
7-29C-1

Engine Mount Installation
Figure 201 (Sheet 1 of 3)

1 **Shim as required to obtain 0.002 inch clearance maximum.**

3 **Shim as required to obtain overall gap of 0.001 inch maximum.**

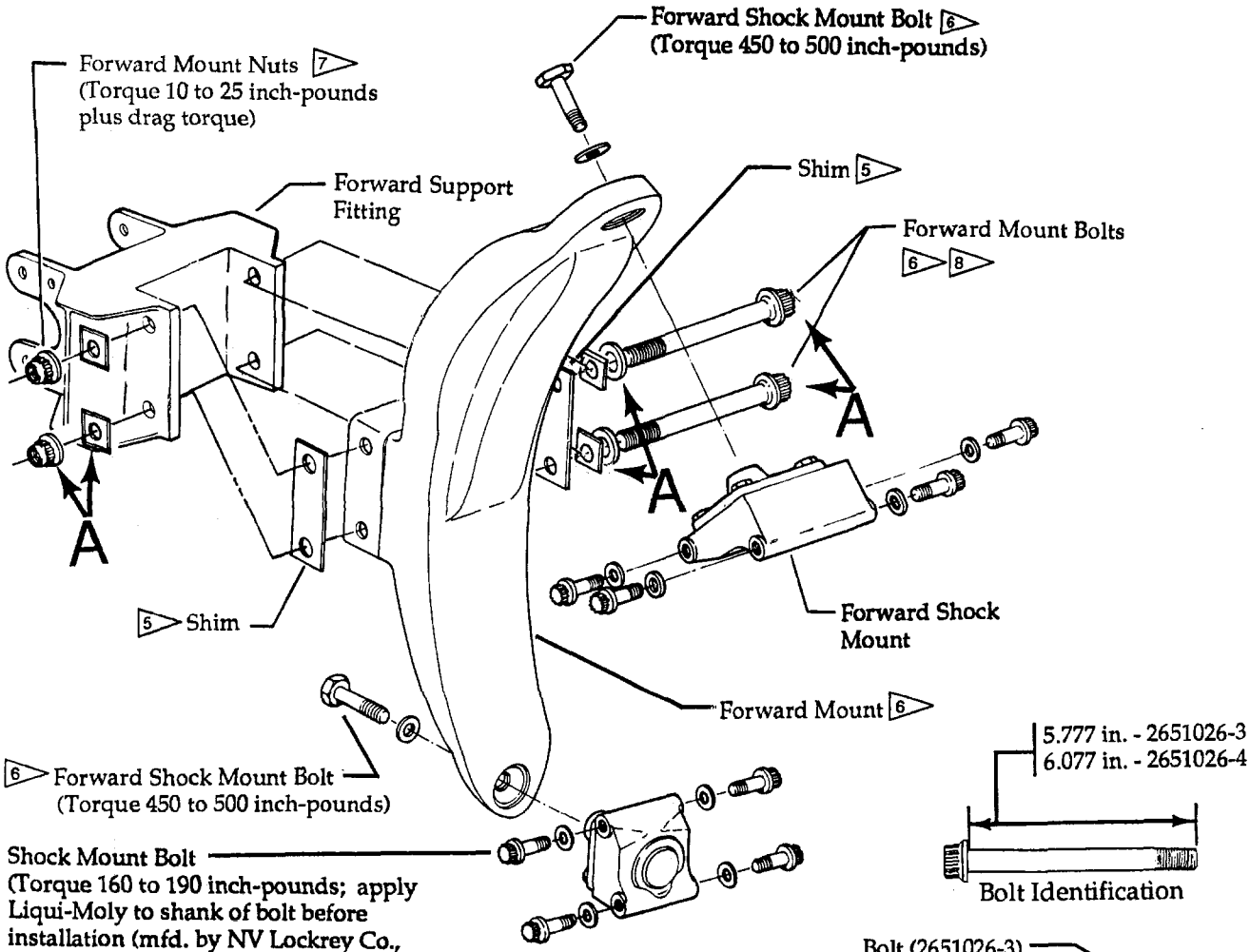
4 **Apply sealant (Dapocast 18-4) to perimeter of mount shoulder and access plate assembly.**

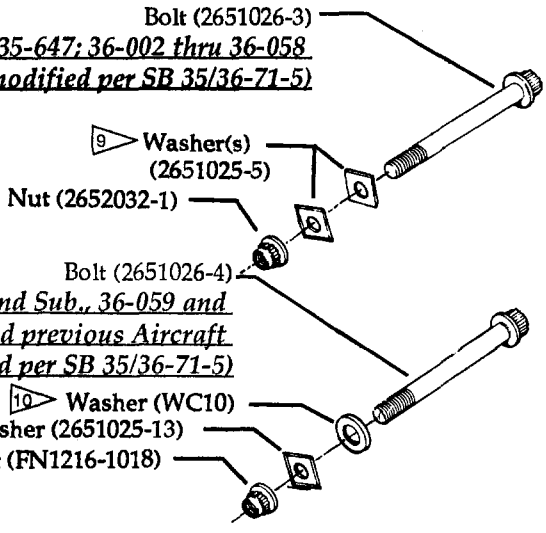


(Aircraft 35-028, 35-033, 35-034, 35-036 and Subsequent; 36-014, 36-017 and Subsequent; and prior aircraft equipped with thrust reversers or modified per AAK-75-2, "Removable Afterbody Engine Nacelle").

7-29A
7-29C-1

Engine Mount Installation
Figure 201 (Sheet 2 of 3)





5 Shim as required to obtain overall gap of 0.001 inch maximum. (Shim must be installed between engine beam socket and forward engine mount.)

6 Magnetic particle inspect in accordance with the current inspection interval specified in Chapter 5.

7 Removal and installation of these nuts may require a 3/4 inch, 12 point, deep well socket or a 25/32 (20 mm), 12 point, deep well socket.

8 When installing bolts 2651026-3, use (2) washers 2651025-5 and nut 2652032-1. When installing bolts 2641026-4, use washer WC-10, washer 2651025-13 and nut FN 1216-1018. Failure to do so will result in improper tightening of mount bolt.

9 Check for proper positioning of radius washers.

10 Position washers with camphered edge of hole facing bolt head.

Engine Mount Installation
Figure 201 (Sheet 3 of 3)

Bolt Configuration
Detail A

2. Inspection/Check

A. General

(1) At each Major Periodic Inspection (MPI) or Compressor Zone Inspection as dictated in the Engine Maintenance Manual, or during an unscheduled engine change, visually inspect the forward shock mounts and aft isolator assemblies. Inspect for loose bolts or cracks in the metal elastomer. *On Aircraft with 6600309-005 isolator assembly installed,* check for broken wires in aft isolator assembly.

(2) At the 4,200 hour overhaul, inspect forward engine shocks in accordance with step 2.B and aft isolator assembly in accordance with steps 2.C or 2.D. If the housings (LM-833-2 and LM-833-30), mounting assembly (LM-833-1), bonded joint (LM-833-16) or aft isolator assembly (6600309-005) meet these inspection requirements, they may be retained in service until the next 4,200 hour overhaul provided they are visually inspected at each engine MPI.

(a) Inspect mounting assembly per step 2.B and bonded joint per step 2.C or wire mesh per step 2.D.

(b) Visually inspect housing for cracks and check threads.

(c) Cover plate (LM-833-3) and bolts (NAS1304-1H) must be replaced at each 4,200 hours.

NOTE: *On Aircraft with 6600309-005 isolator assembly installed,* the aft isolator assembly is not field repairable. If either the housing or the wire mesh fail the inspection requirements, the isolator assembly shall be replaced.

(3) Inspect forward engine mount assembly in accordance with the current inspection interval specified in Chapter 5. (Refer to step 2.E.)

(4) At each Major Periodic Inspection or Compressor Zone Inspection as dictated in the Engine Maintenance Manual, perform magnetic particle inspection of forward engine mount assembly. (Refer to step 2.F.)

B. Inspect Forward Shock Mount Assembly (See Figure 202.)

(1) Remove forward shock mount assembly. (Refer to Removal/Installation, this section.)

(2) Cut safety wire and remove bolts and cover plate.

(3) Remove mounting assembly from housing.

CAUTION: DO NOT USE CLEANING SOLVENT ON BONDED RUBBER PARTS.

(4) Wipe all oil and dirt from mounting assembly with a clean cloth dampened with isporoply alcohol. Wash unbonded metal parts in cleaning solvent. (Stoddard P-D-680 or equivalent.)

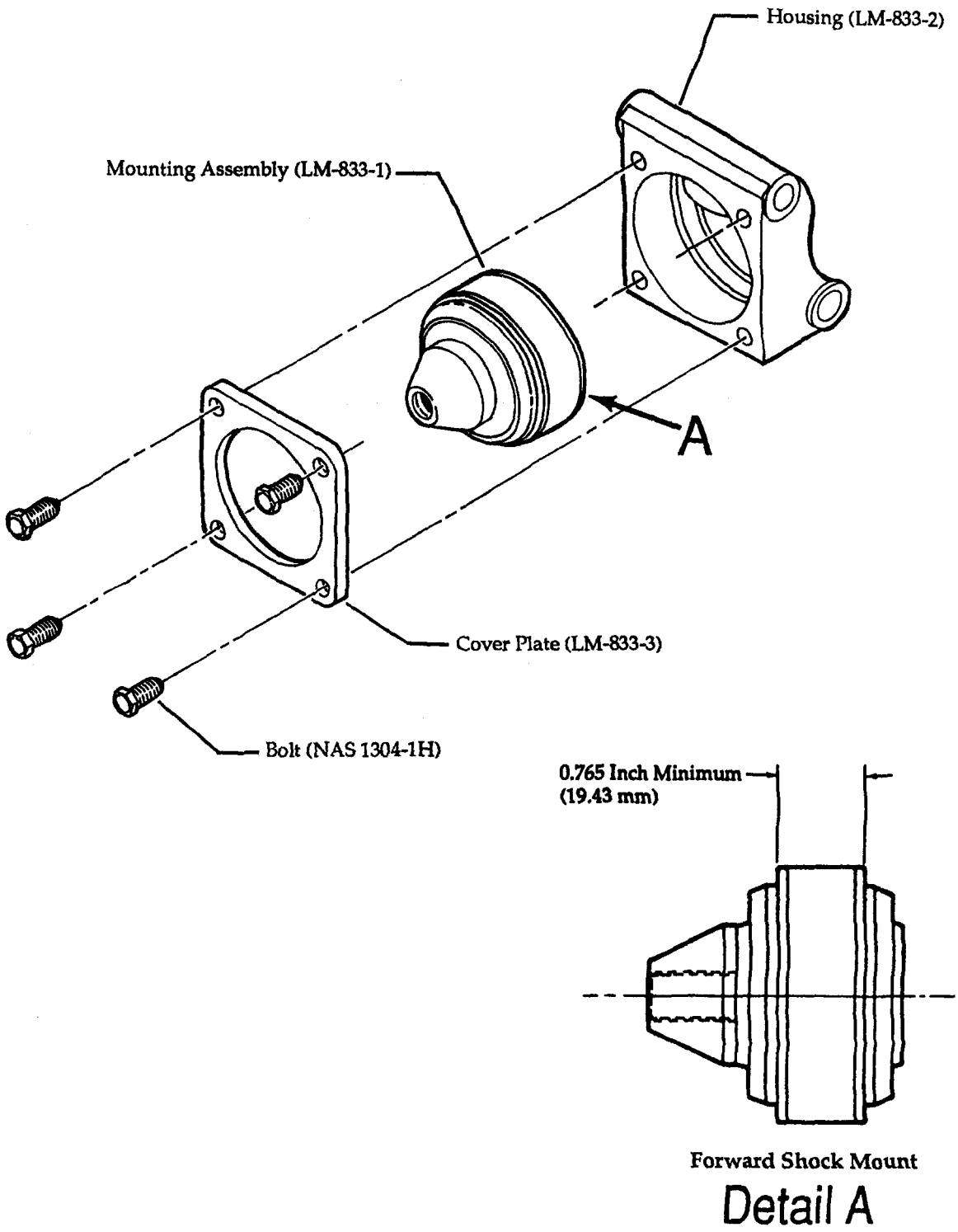
(5) Inspect mounting assembly as follows:

(a) Check mounting assembly for rubber-to-metal bond separation. If bond separation has reached a depth greater than 0.06 inch [1.52 mm], replace mounting assembly.

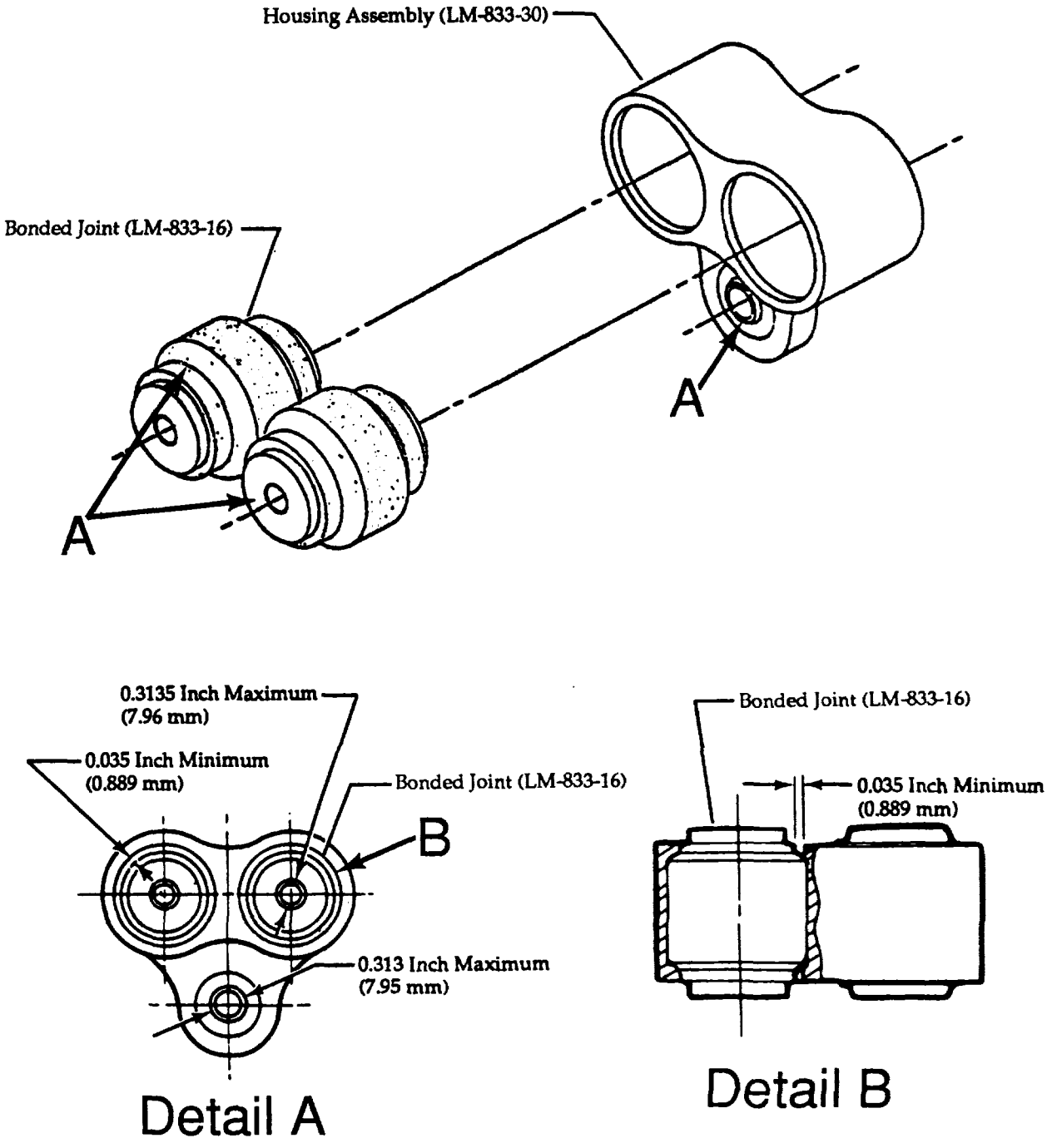
(b) Check mounting assembly for flex cracks. If flex cracks have progressed inward to a depth greater than 0.06 inch [1.52 mm], replace mounting assembly.

(c) Measure dimension shown for forward shock mount in Figure 202. If measurement is less than the minimum shown, replace mounting assembly.

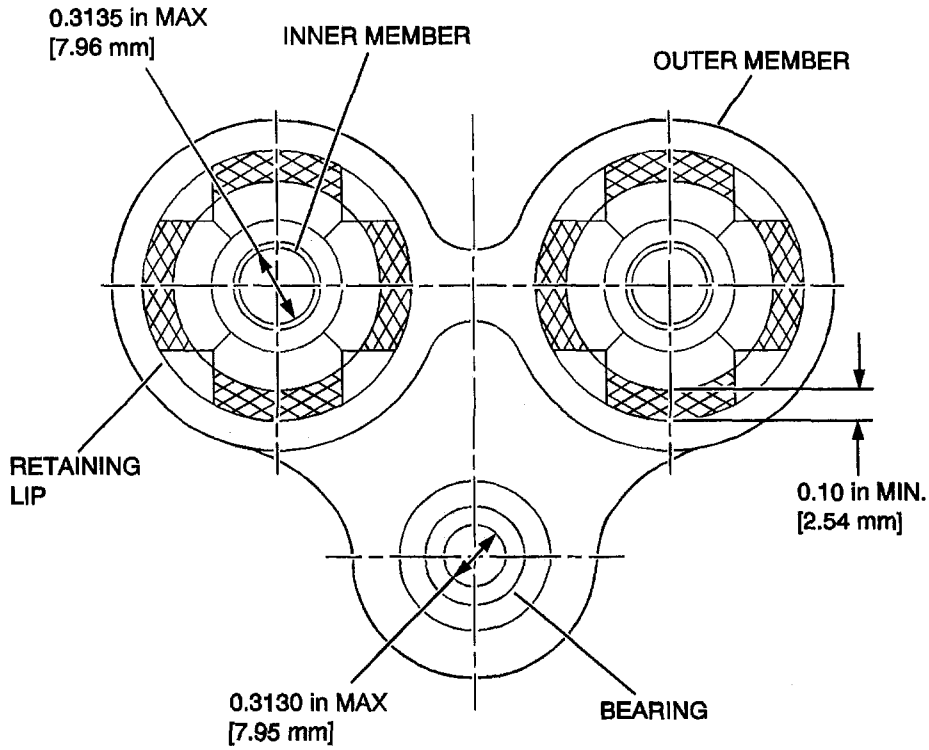
(d) Inspect metal parts of mounting assembly for cracks. If cracks are found, replace mounting assembly.

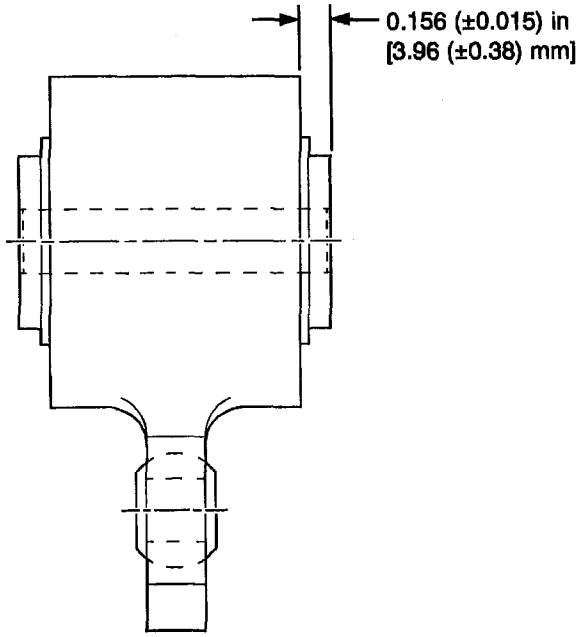


Forward Engine Shock Mount Assembly
Figure 202 (Sheet 1 of 3)



Aft Engine Isolator
Figure 202 (Sheet 2 of 3)





Aft Engine Isolator
Figure 202 (Sheet 3 of 3)

(e) Check threaded hole of mounting assembly with 7/16-20 UNF-3-B thread gauge. If thread is not a class 3B fit, replace mounting assembly.

(6) Inspect forward shock mount housing as follows:

(a) Fluorescent penetrant inspect forward shock mount housing for cracks. If cracks are found, replace forward shock mount housing.

(b) Inspect forward shock mount housing for nicks or gouges. If nicks or gouges are found that exceed 0.010 inch [0.25 mm] depth, replace forward shock mount housing. If nicks or gouges are less than 0.010 inch depth [0.25 mm], they can be polished out.

(c) Measure four counterbored holes in forward shock mount housing. If any hole diameter exceeds 0.3940 inch [10 mm], replace forward shock mount housing.

(d) Inspect threaded holes of forward shock mount housing with 3/8-24 UNF-2B or 1/4-28 UNF-3B thread gauge. If thread is not correct fit, replace forward shock mount housing.

(7) Insert mounting assembly into housing and position cover over mounting assembly.

(8) Using four (4) bolts, secure cover and torque bolts 50 to 70 inch-pounds [5.6 to 7.9 Nm].

(9) Safety wire bolts.

(10) Install forward shock mount assembly. (Refer to 71-20-00.)

C. Inspect Aft Isolator Assembly. (P/N 6600309-3) (See Figure 202.)

(1) Remove aft isolator assembly. (Refer to (Refer to 71-20-00.)

CAUTION: DO NOT USE CLEANING SOLVENT ON BONDED RUBBER PARTS.

(2) Without disassembling aft isolator assembly, wipe all oil and dirt from bonded joints using a clean cloth dampened with isopropyl alcohol. Wipe all oil and dirt from housing using a clean cloth dampened with cleaning solvent.

(3) Inspect aft isolator assembly housing as follows:

(a) Fluorescent penetrant inspect housing for cracks. If cracks are found, replace housing.

(b) Inspect housing for nicks or gouges. If nicks or gouges are found that exceed 0.015 inch [0.381 mm] depth, replace housing. If nicks or gouges are less than 0.015 inch [0.381 mm] depth, they can be polished out.

(c) Measure inside diameter of hole in spherical bearing. If hole diameter exceeds 0.3130 inch [7.95 mm], replace housing.

(4) Inspect bonded joints as follows:

(a) Inspect bonded joints for rubber-to-metal bond separation. If bond separation has reached a depth greater than 0.06 inch [1.52 mm], replace bonded joints.

(b) Inspect bonded joints for flex cracks. If flex cracks have progressed inward to a depth greater than 0.06 inch [1.52 mm], replace bonded joints.

(c) Measure dimension shown for aft isolator assembly in Figure 202. If measurement is less than the minimum shown, replace bonded joints.

(d) Measure inside diameter of through hole in metal part of bonded joints. If hole diameter exceeds 0.3135 inch [7.96 mm], replace bonded joints.

(5) If aft isolator assembly fails inspection and disassembly is necessary, proceed with steps (6) thru (8). If aft isolator assembly passes inspection, perform step (8).

(6) Disassemble aft isolator assembly as follows:

(a) Support aft isolator assembly housing on a sleeve of 1.25 inch [31.75 mm] I.D. x 1.50 inch [38.1 mm] min. O.D. x 2.00 inch [50.8 mm] min. long as shown in Figure 203.

(b) Using a press with a 0.75 inch to 1.00 inch [19.05 to 25.4 mm] diameter ram, press bonded joint out of housing.
(c) Repeat for second bonded joint.

(7) Using Lord tool LT17-1 or other suitable means, assemble aft isolator assembly as follows:
(a) Place one end of 1.22 inch [30.988 mm] diameter socket of housing over 1.199/1.97 [30.455/50.038] diameter of base assembly of Lord tool LT17-1 as shown in Figure 203. Hold in place.
(b) Place tapered end of funnel of Lord tool LT17-1 over opposite end of 1.22 inch [30.988 mm] diameter socket.
(c) Lubricate rubber surfaces of center bonded joints with rubber lubricant or soap and water.
(d) Insert bonded joints over 0.310 inch [7.874 mm] diameter rod and into funnel.
(e) Place 0.313 inch [7.950 mm] diameter hole in ram of Lord tool LT17-1 over 0.310 inch [7.874 mm] diameter rod.
(f) Press bonded joint into housing so that end of joint protrudes 0.17/0.14 inch [4.318/3.556 mm] from end of socket in housing.
(g) Repeat steps (7)(a) thru (7)(f) for bonded joint at other end of aft isolator assembly housing.

(8) Install aft isolator assembly. (Refer to 71=20-00.)

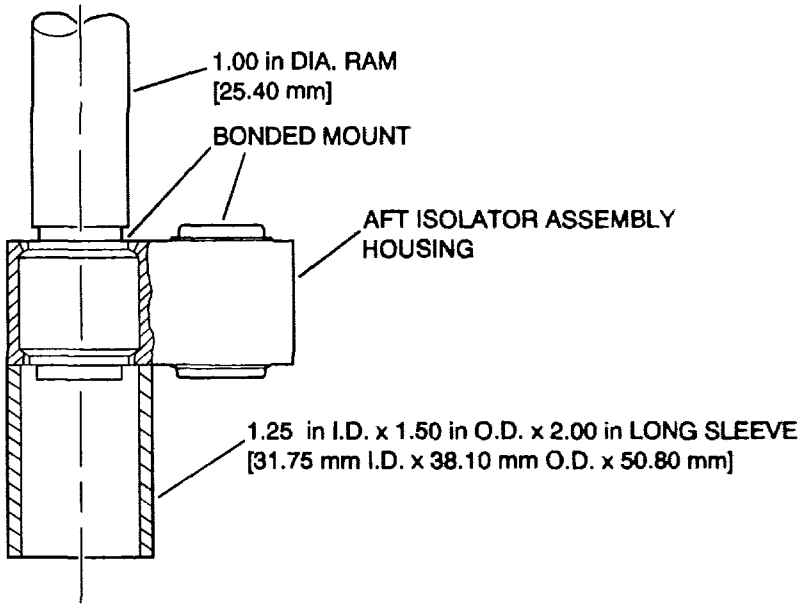
D. Inspect Aft Isolator Assembly (P/N 6600309-005)
(1) Remove aft isolator assembly (Refer to 71-20-00.)
(2) Wipe all oil and dirt from housing using a clean cloth dampened with dry cleaning solvent. (Stoddard P-D-680 or equivalent.)
(3) Inspect aft isolator assembly housing as follows:

CAUTION: BRUSH PENETRANT FLUID ON HOUSING TO AVOID CONTACT WITH WIRE MESH. ALL RESIDUAL PENETRANT MATERIALS MUST BE REMOVED.

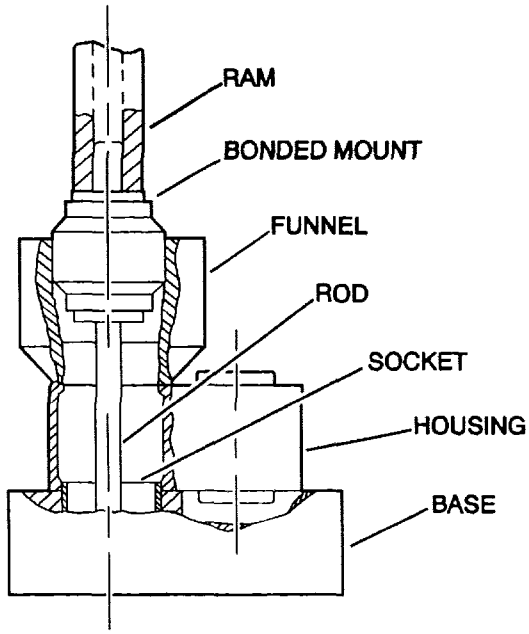
(a) Check for cracks in the housing using flourescent penetrant methods.
(b) Check for nicks or gouges in the housing that exceed 0.015 inch [0.381 mm] depth. If nicks or gouges are less than 0.015 inch [0.381 mm] depth, they may be polished out.
(c) Check inside diameter of hole in spherical bearing does not exceed 0.3130 inch [7.95 mm].
(d) Check bearing is not damaged such that ball is loose or immobile, or ball does not turn freely without slop.
(e) Check broken wires or deterioration of wire mesh is not over 10% of exposed wires.

CAUTION: AFT ISOLATOR ASSEMBLY (P/N 6600309-005) IS MANUFACTURED WITH ASYMMETRIC DIMENSIONS. ENSURE THAT MEASUREMENT OF 0.10 INCH [2.54 MM] MINIMUM DISTANCE BETWEEN INNER AND OUTER MEMBERS IS TAKEN ON THE SIDE WITHOUT THE RETAINING LIP. (SEE FIGURE 202.)

(f) Check that any radial distance between inner member and outer member (not including the retaining lip) is not less than 0.10 inches [2.54 mm]. Check that distance between faces of inner member and outer member is 0.156 (±0.015) inches [3.96 (±0.38) mm]. (See Figure 202.)
(g) Check that inside diameter of through hole in inner member does not exceed 0.3135 inch [7.963 mm].



(REMOVING BONDED JOINT FROM HOUSING)



(USING LT-17-1 TO ASSEMBLE AFT ISOLATOR ASSEMBLY)

Aft Isolator Assembly Repair
Figure 203

(4) If aft isolator assembly fails inspection, replace isolator assembly. If aft isolator assembly passes inspection, install aft isolator assembly. (Refer to Removal/Installation, this section.)

E. Visually Inspect of the Forward Engine Mount (Casting) Assembly (P/N 2651011 or 2681060) (See Figure 204.)

NOTE: Inspect forward engine mount (casting) assembly in accordance with the current inspection interval specified in Chapter 5.

(1) Remove engine upper and lower nacelle cowls.
(2) Using a flashlight and inspection mirror, inspect forward engine mount (casting) assembly in the areas as shown.
(3) If no cracks are found, return aircraft to service.
(4) If cracks are found, disposition as follows:
(a) For total visible crack lengths (forward plus aft) of 1.0 inch [2.54 cm] or more, the engine mount(s) casting must be replaced. Alternately, conduct magnetic particle inspections, and disposition, in accordance with step F. prior to further flight.

NOTE: A total visible crack length of 1.00 inch [2.54 cm] plus uninspectable crack length, based on crack propagation characteristics, will equal a crack approximately 3 inches [76.2 mm] long when crack is subsequently inspected by a magnetic particle check.

(b) For total visible crack lengths (forward plus aft) less than 1.0 inch [2.54 cm], the engine mount(s) must be replaced at the next engine removal, engine hot section inspection, or within 420 flight hours, whichever occurs first.
(5) Install upper and lower engine nacelle cowls.

F. Magnetic Particle Inspection Forward Engine Mount (Casting) Assembly (P/N 2651011 or 2681060) (See Figure 205.)

NOTE: Magnetic particle inspection forward engine mount (casting) assembly (P/N 2651011 or 2681060) in accordance with the current inspection interval specified in Chapter 5.

(1) Remove engines from aircraft. (Refer to 71-00-00.)
(2) Remove engine mounts assemblies from aircraft. Tag engine mounts so that they can be installed at the same location.
(3) Perform magnetic particle inspection in accordance with instructions contained in the NDI Manual, Part 6.
(4) If test indicates a possible crack, it is permissible to degrease mount, lightly sand removing a maximum of 0.010 inch [0.25 mm] of material, and repeat magnetic particle inspection.
(5) If no cracks are found, install engine mount assembly and return aircraft to service.
(6) If cracks are found, disposition as follows:
(a) For total crack lengths (forward plus aft) of 3.0 inches [7.62 cm] or more, the engine mounts must be replaced.

(b) For total crack lengths (forward plus aft) of less than 3.0 inches [7.62 cm], the engine mount must be replaced at the next engine removal, engine hot section inspection, or within 420 flight hours, whichever occurs first.

G. Visually Inspect of the Forward Engine Mount (Casting) Assembly (P/N 2651034) (See Figure 206.)

NOTE: This inspection is to be done in accordance with the current inspection interval specified in Chapter 5.

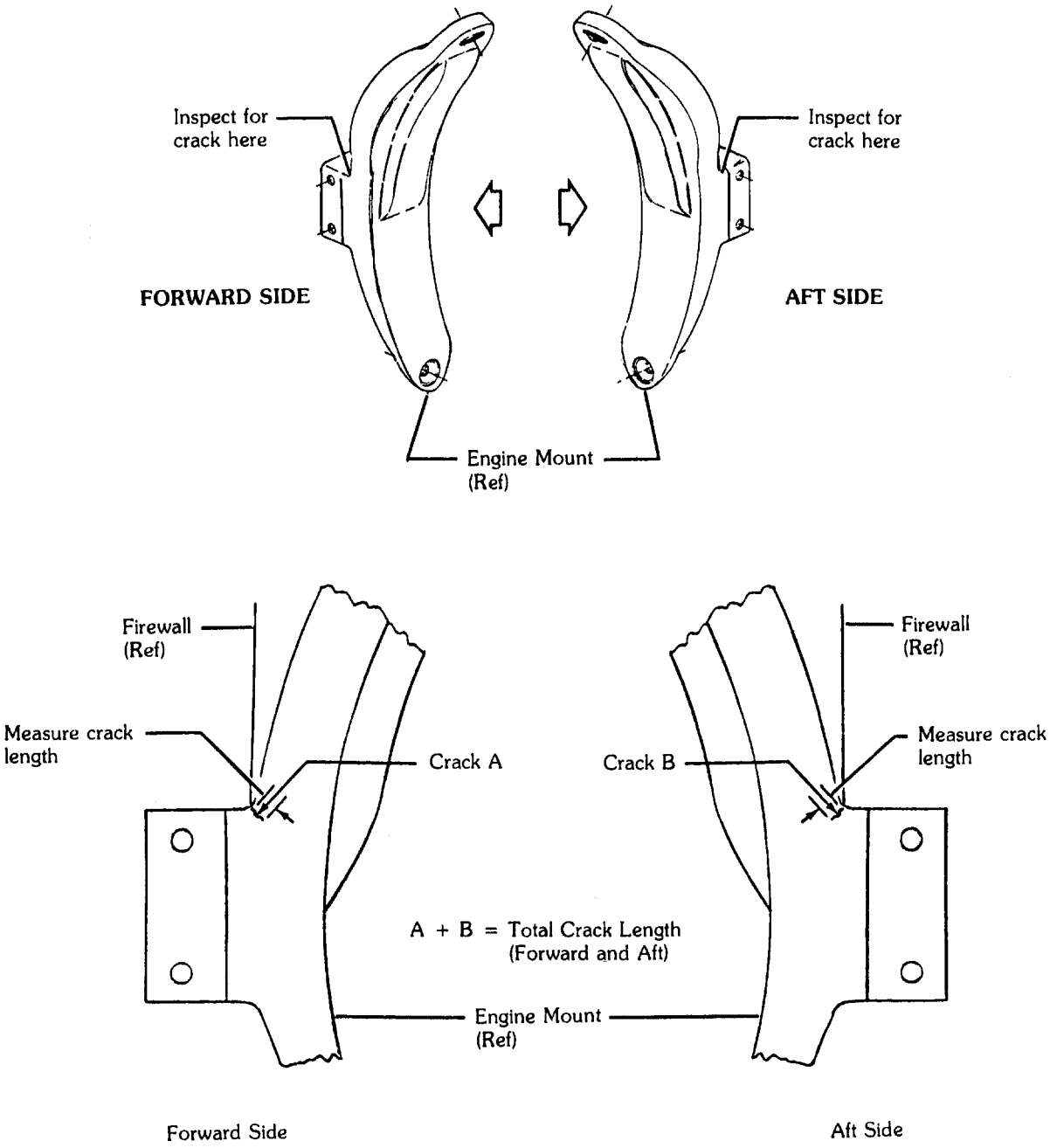
(1) Remove engine upper and lower nacelle cowls.
(2) Using a flashlight and inspection mirror, inspect forward engine mount (casting) assembly in the areas as shown.
(3) If no cracks are found, return aircraft to service.
(4) If any crack(s) are found, the engine mount must be replaced. (Refer to 71-20-00.)

3. Engine Shock Mount and Aft Isolator Replacement

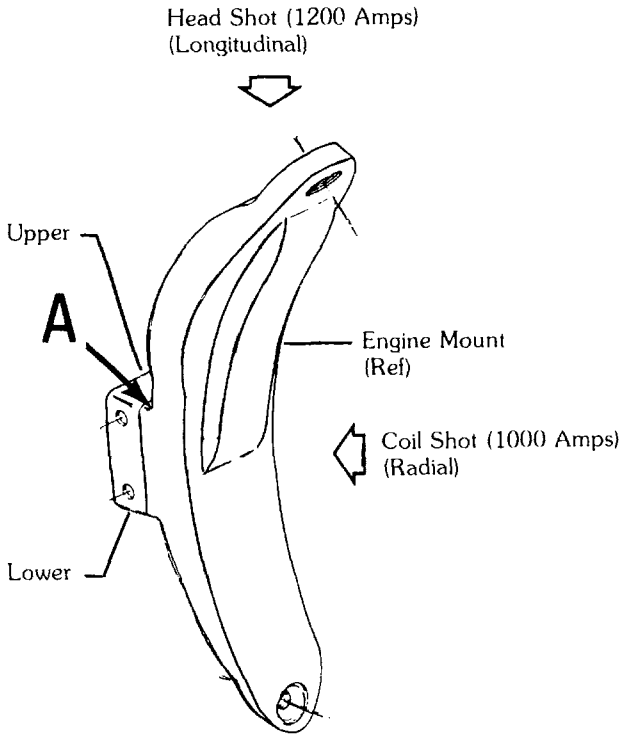
A. In accordance with Chapter 5, Replacement Schedule, replace the forward engine shock mount and aft engine isolator assemblies as follows:

B. Forward Shock Mount Assembly
(1) Remove forward shock mount assembly. (Refer to Removal/Installation.)
(2) Cut safety wire and remove bolts and coverplate; discard bolts.
(3) Remove bonded mount from housing and discard bonded mount.
(4) Wash unbonded metal parts in a dry cleaning solvent.
(5) Inspect unbonded metal parts for nicks, scratches, gouges, or cracks and if any flaw exceeds 0.010 inch [0.25 mm] depth, replace part. If any nicks, etc. are less than 0.010 inch [0.25 mm] depth, they may be polished out.
(6) Insert new bonded mount into housing and position coverplate over bonded mount.
(7) Using new bolts, secure coverplate and torque bolts 50 to 70 inch-pounds [5.6 to 7.9 Nm].
(8) Safety wire bolts.
(9) Install forward shock mount assembly. (Refer to Removal/Installation.)

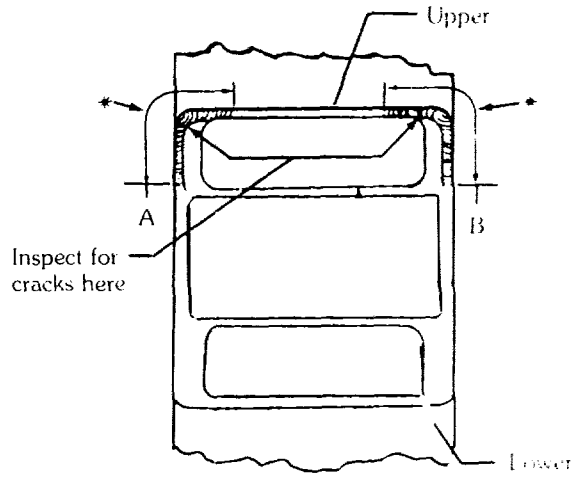
C. Aft Isolator Assembly
(1) Remove aft isolator assembly. (Refer to Removal/Installation.)
(2) Discard isolator assembly.
(3) Install new aft isolator assembly. (Refer to Removal/Installation.)



Forward Engine Mount Assembly (Casting) Visual Inspection
Figure 204

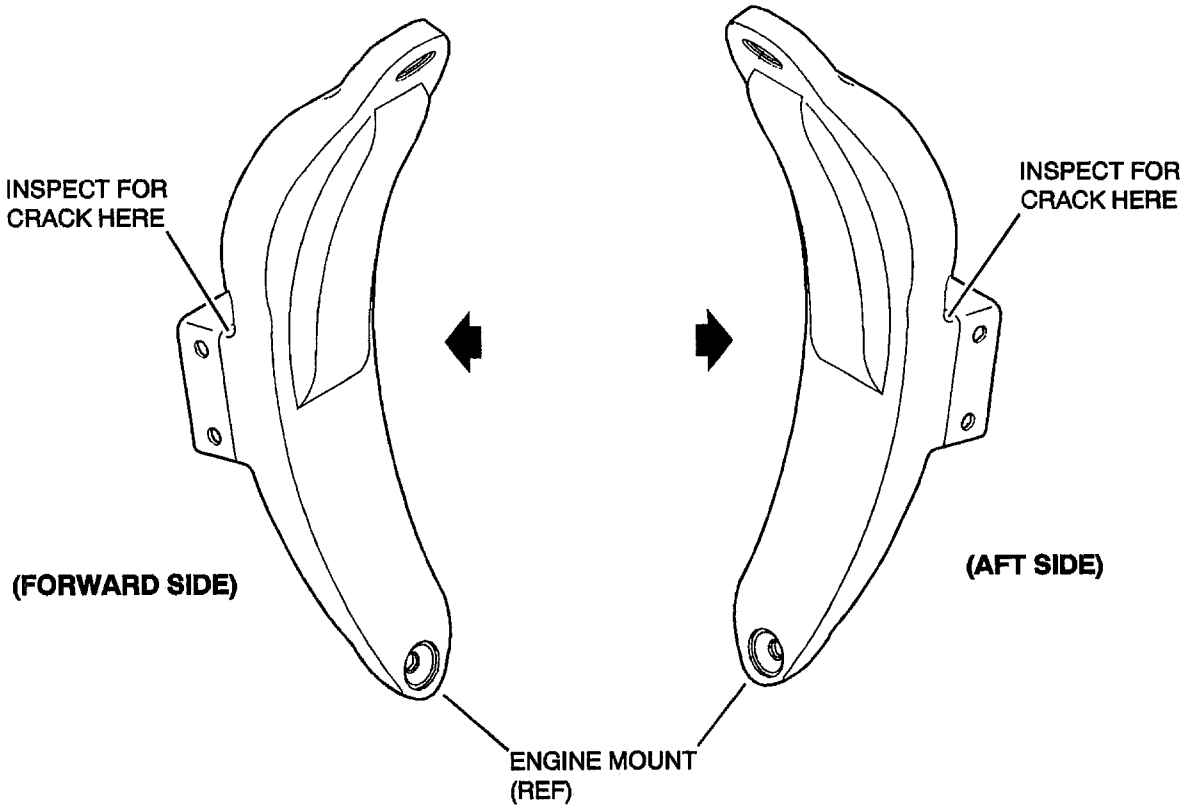


* Inspect upper radii for cracks. If crack(s) are noted measure length of each crack and add both values. (A + B = Total Length)



Detail A

Magnetic Particle Inspection of Forward Engine Mount (Casting) Assembly
Figure 205



Visual Inspection of the Forward Engine Mount (Casting) Assembly
Figure 206

FIRESEALS - DESCRIPTION AND OPERATION

1. DESCRIPTION

A. The pylon firewall and fittings are made of annealed stainless steel. The fittings include conduits for electrical wiring and engine controls. The conduits, firewall, and closeouts are sealed with a fire- and heat-resistant sealant. The firewall and sealant are installed to prevent spread of heat and/or fire into the pylon and fuselage.

FIRESEALS - MAINTENANCE PRACTICES

1. FIREWALL SEALING

NOTE: ° Whenever the engine is removed, the firewall seals and sealant shall be inspected for damage and deterioration. Damaged seals shall be replaced. Deteriorated sealant shall be removed and replaced.

° When the firewall is detached from the pylon, conduit seals will have been broken. These seals shall be removed and replaced when the firewall is installed.

A. Tools and Equipment

NOTE: Equivalent substitutes can be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Firewall Sealant	Dapcocast 18-4	D. Aircraft Products Co., Anaheim, CA	Sealing
Silicone Rubber Primer	Dapco 1-100		Priming
Sealant Cutting & Fairing Tools	Refer to Chapter 20		Shaping Sealant
Extrusion Gun	950	Pylons Ind., Inc. Detroit, Michigan	Applying Sealant

B. Clean Area To Be Sealed

(1) Remove any old sealant from conduits and other surfaces using sealant cutting tools per Chapter 20.

(2) Thoroughly clean previously sealed area by scrubbing with a clean, white, cotton cloth dampened with MEK. Wipe area dry with another clean cloth.

C. Apply Sealant (See figure 201.)

(1) Weigh into a clean container amount of base material desired.

(2) Add accelerator to base material at a ratio of seven parts by weight of accelerator to 100 parts by weight of base.

(3) Stir as required to thoroughly mix to uniform color and viscosity. Seal container.

(4) Perform a final cleaning of surfaces to be sealed immediately prior to application of sealant by scrubbing with a clean, white, cotton cloth (folded to enclose raw edges and reduce lint) dampened with MEK and drying with another clean cloth before MEK evaporates.

(5) Brush a uniform, thin coat of silicone rubber primer on surfaces to be sealed. Allow primer to air dry for at least one hour at room temperature or until a dull red color develops.

(6) Seal wire bundle feed-thru conduit as follows:

(a) With both halves of conduit removed, cleaned, and primed, pack sealant into conduit halves using an extrusion gun or spatula.

NOTE: Fiberglass tape wrapped around wire harness shall terminate between the open ends of the conduit.

(b) Fay seal conduit flange surfaces that join together and surface that contacts firewall.

(c) Apply sealant directly to wire bundle to assure full sealant penetration.

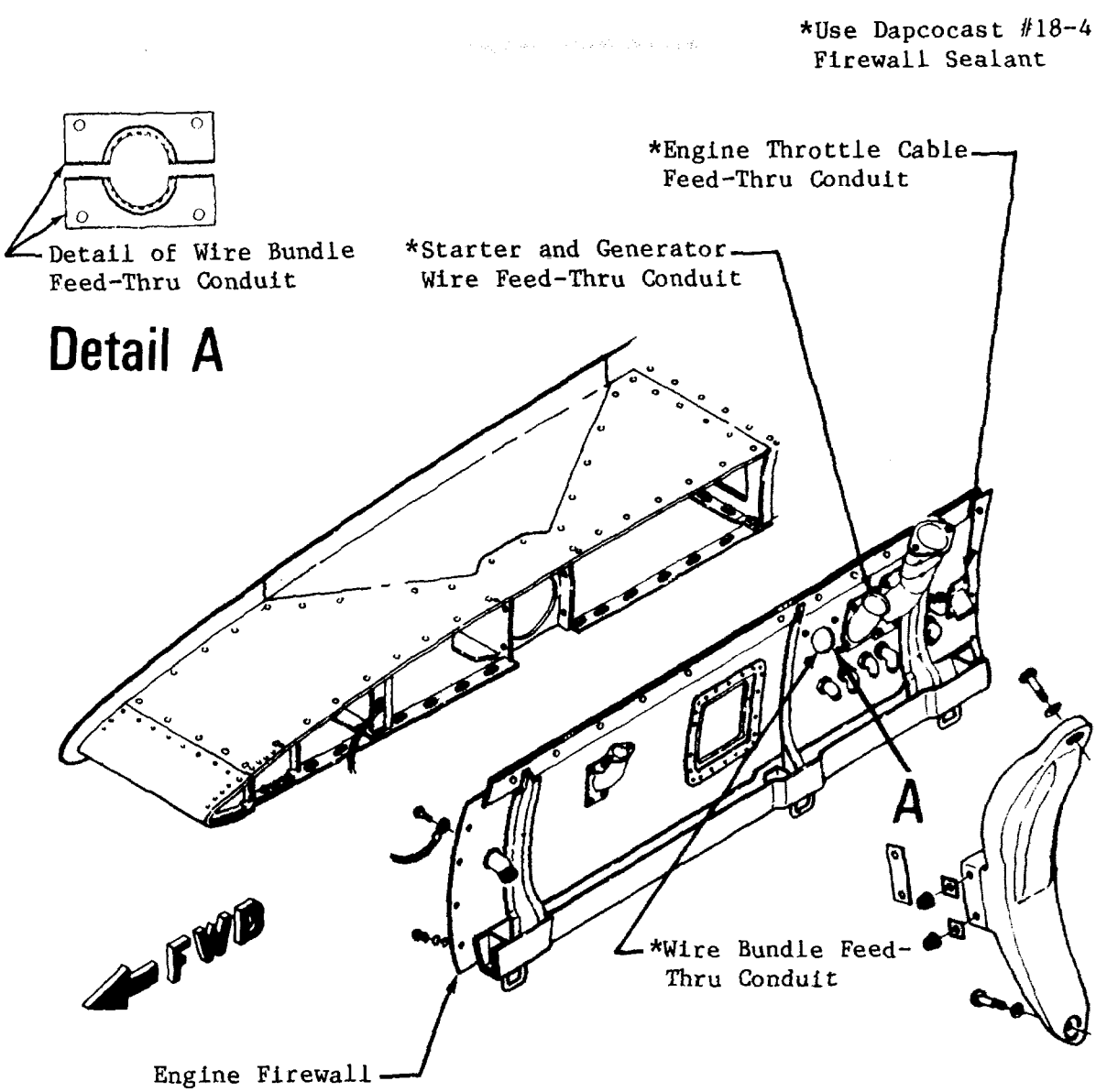
(d) There shall be no voids in conduit.

(e) Install conduit halves to firewall using existing fasteners.

(7) Seal starter and generator electrical wire feed-thru conduit and throttle cable feed-thru conduit by injecting sealant using an extrusion gun and suitable nozzle. Completely fill conduit with sealant.

(8) Allow firewall sealant to air dry for at least 72 hours at room temperature before applying heat.

NOTE: Refer to 71-20-00 for sealing of engine mounts.



LH ENGINE PYLON SHOWN - RH OPPOSITE

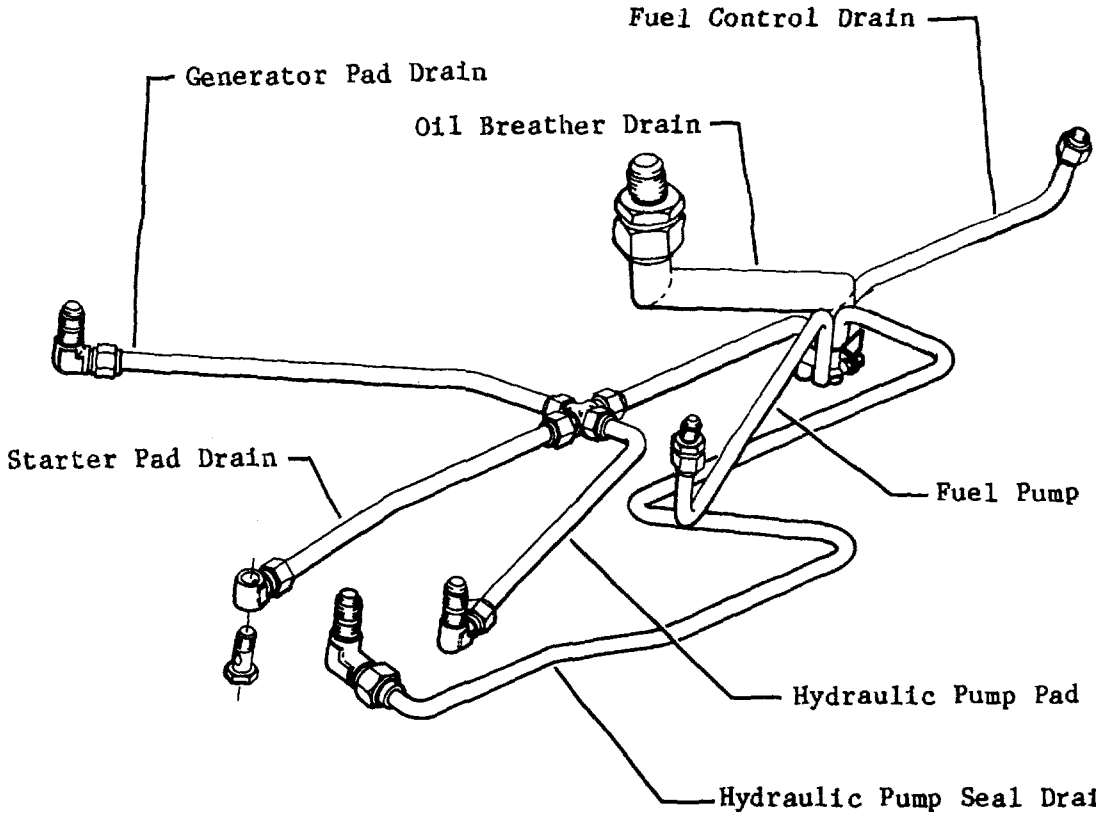
Firewall Sealing
Figure 201

ENGINE DRAINS - MAINTENANCE PRACTICES

1. INSPECTION/CHECK

NOTE: Engine drain lines are installed to vent normal leaking of liquids overboard.

A. Maintenance practices consist of assuring that these drain lines are open.



(Typical Each Engine)

Drain Lines Installation
Figure 201