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F-111 DEPOT FUSELAGE FUEL TANK DESEAL/RESEAL PROCEDURES.(U)
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# F-111 DEPOT FUSELAGE FUEL TANK DESEAL/RESEAL PROCEDURES

(10) Philip / Steinweg

PREPARED BY: (11) 29 Apr 77

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FORT WORTH DIVISION
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Sealant Reversion

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The original EC5106 sealant in F-111 aircraft fuel tanks was deteriorating, resulting in unacceptable leaks. To correct this problem, the tanks were to be desealed and resealed with MIL-S-83430 polysulfide sealant. However, laboratory tests indicated that the MIL-S-83430 sealant alone would be attacked by the reverted EC5106 sealant to the extent that the deseal/reseal process would be required again in about five years. It is impossible to remove all the reverted sealant. The Physical Sciences Laboratory Section of the Sacramento ALC Industrial Products Division determined by testing that

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Block 20. Abstract

EC2216 epoxy, added as a barrier, would prevent damage to the MIL-S-83430 sealant for at least ten years. The report establishes procedures to accomplish the complete desealing and resealing of F-111D aircraft, assuring a positive seal throughout all of the fuselage integral fuel tanks. Disassembly/removal of components and operational/functional checkouts, with cross references to A, E, F and FB aircraft are included.

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1.0 INTRODUCTION

1.1 These instructions establish the procedures for accomplishing complete desealing and resealing of F-111D aircraft to provide and assure a positive seal throughout all of the fuselage integral fuel tanks. These instructions also establish a listing of parts and components required to be removed and/or disassembled in order to accomplish the desealing and resealing and subsequent close-up and operational/functional checkouts to be performed. A cross reference has been included in the appendix for A, E, F, and FB aircraft.

1.2 When using these instructions, such adjectives as left and right, upper and lower, front and rear, forward and aft, and clockwise and counterclockwise, refer to the aircraft as viewed from the rear, on the centerline, looking forward. All dimensions are given in inches.

1.3 Quality requirements: When the work specified herein is accomplished by the Sacramento Air Logistics Center, the quality assurance requirements shall be in accordance with AFLCR 74-2 and Figure 1.3-1 of these procedures.

F-111 Fuel Tank Deseal-Reseal Process Flow Chart

| | |
|---|---|
| Task 1<br>Location<br>Reference<br>Insp Types | Disassembly for deseal<br>Mod Center<br>12AEI-200-1060( ), para 2.0<br>5 and 8 |
| Task 2<br><br>Location<br>Reference<br>Insp Types | Prepare aircraft for washrack (installation of temporary covers, lines capped, etc.)<br>Mod Center<br>12AEI-200-1060( ), para 3.0<br>2, *3, 5 and 8 |
| Task 3<br>Location<br>Reference<br>Insp Types | 36 hour inspection of tanks, deseal process<br>Washrack<br>12AEI-200-1060( ), para 5.0<br>2, *3, 5 and 8 |
| Task 4<br>Location<br>Reference<br>Insp Types | 48 hour inspection of tanks, deseal process<br>Washrack<br>12AEI-200-1060( ), para 5.0<br>2, *3, 5 and 8 |
| Task 5<br>Location<br>Reference<br>Insp Types | Final inspection of cleaning operation<br>Washrack<br>12AEI-200-1060( ), para 5.0<br>2, *3, 5 and 8 |
| Task 6<br>Location<br>Reference<br>Insp Types | Fuel tank void inspection (rough clean)<br>Mod Center<br>12AEI-200-1060( ), para 5.6<br>2, *3, 5 and 8. Blacklight inspection |

Figure 1.3-1 (Sheet 1 of 3)

F-111 Fuel Tank Deseal-Reseal Process Flow Chart

| | |
|---|---|
| Task 7<br>Location<br>Reference<br>Insp Types | Final tank cleaning: okay to apply EC2216 epoxy<br>Mod Center<br>12AEI-200-1060( ), para 5.7<br>2, *3, 5 and 8. Blacklight inspection |
| Task 8<br>Location<br>Reference<br>Insp Types | Final inspection of EC2216 application: voids, fillets, and faying surface seams<br>Mod Center<br>12AEI-200-1060( ), para 5.6 and 5.7<br>2, *3, 5 and 8. Blacklight inspection |
| Task 9<br>Location<br>Reference<br>Insp Types | Prepare tanks for MIL-S-83430 sealant application: okay to apply<br>Mod Center<br>12AEI-200-1060( ), para 5.8<br>2, *3, 5 and 8. Blacklight inspection |
| Task 10<br>Location<br>Reference<br>Insp Types | Final inspection of MIL-S-83430 application<br>Mod Center<br>12AEI-200-1060( ), para 5.8<br>2, *3, 5 and 8. Blacklight inspection |
| Task 11<br>Location<br>Reference<br>Insp Types | Install fuel plumbing and hardware, fuel system check-out (fuel-lines)<br>Mod Center<br>12AEI-200-1060( ), para 4.3 and 12AEI-46-4005B<br>3, 5 and 8 |
| Task 12<br>Location<br>Reference<br>Insp Types | Final tank air pressure test<br>Mod Center<br>12AEI-200-1060( ), para 5.10<br>5 and 8 |

Figure 1.3-1 (Sheet 2 of 3)

F-111 Fuel Tank Deseal-Reseal Process Flow Chart

| | |
|---|---|
| Task 13<br>Location<br>Reference<br>Insp Types | Vapor seal leak test<br>Mod Center<br>12AEI-200-1060( ), para 6.3.9 and 12AEI-200-1057<br>3, 5 and 8 |
| Task 14<br>Location<br>Reference<br>Insp Type | Final tank inspection: okay to close<br>Mod Center<br>F-111 technical orders<br>3, 5 and 8 |
| Task 15<br>Location<br>Reference<br>Insp Type | Wet check<br>Fuel area<br>12AEI-200-1060( ), para 5.10.1.3<br>3, 5 and 8 |

NOTES: (Applicable to Fig 1.3-1)

1. Reference AFLCR 74-2 for quality related definitions.

2. Type 2 inspection will be applied to identify initial process element requirements and prove workers capabilities for complying with technical data requirements.

*3. Type 3 inspection: Each process will be individually evaluated by Quality Assurance to determine the effectiveness of the Quality Assurance Program. When each process meets acceptability standards a valid sampling plan (Type 3) will be established.

Figure 1.3-1 (Sheet 1 of 3)

1.4 The following publications, of the specified issue (or later issue and/or change) shall form a part of this AEI to the extent specified herein: Although these instructions refer only to F-111D technical orders, these instructions apply to all models of U.S. Air Force F-111 aircraft. In preparing the planning documents necessary to accomplish this work, it will be necessary to translate these F-111D technical order references to the appropriate technical orders.

OVERHAUL AND MAINTENANCE INSTRUCTION MANUALS

| | |
|---|---|
| T.O. 1F-111D-2-1 | General Aircraft Information |
| T.O. 1F-111D-2-2-1 | Air Frame and Related Systems |
| T.O. 1F-111D-2-4-1 | Flight Control Systems |
| T.O. 1F-111D-2-6-1 | Power Plant and Related Systems |
| T.O. 1F-111D-2-7-1 | Hydraulic and Pneumatic Power Systems |
| T.O. 1F-111D-2-8-1 | Fuel and In-Flight Refueling Systems |
| T.O. 1F-111D-2-11-1 | Armament Systems |
| T.O. 1F-111D-2-15-1 | Environmental Systems |
| T.O. 1F-111D-3 | Structural Repair Instructions |
| T.O. 1F-111-36 | Nondestructive Inspection of Aircraft Structure and Components |

ILLUSTRATED PARTS BREAKDOWN MANUALS

| | |
|---|---|
| T.O. 1F-111D-4-1 | Airframe and Related Systems |
| T.O. 1F-111D-4-4 | Fuel and Inflight Refueling Systems |
| T.O. 1F-111D-4-7 | Environmental Systems |
| T.O. 1F-111D-4-8 | Flight Control Systems |
| T.O. 1-1-3 | Preparation, Inspection, and Repair of Aircraft Fuel, Oil and Water Alcohol Cells and Integral Fuel Tanks |

GENERAL DYNAMICS AEROSPACE ENGINEERING INSTRUCTIONS

| | |
|---|---|
| 12AEI-46-1042<br>2 July 1970<br>Chg 4, dated<br>22 Jan 1971 | Air to Fuel Heat Exchanger Fuel Support System Inspection Pressure Test |
| 12AEI-46-4006B<br>29 May 1973 | Final Check of Fuel System With Air Pressure |
| 12AEI-46-4028<br>11 Sept 1974 | Aft Fuselage Fuel System Inspection and Leakage Pressure Tests |
| 12AEI-46-1018B<br>6 Nov 1970<br>Chg 11, dated<br>13 Aug 1973 | Flushing and Operational Check-Out of Fuel System |
| 12AEI-46-1028<br>28 Sept 1967 | Refuel Line Inspection and Leakage Pressure Test |
| 12AEI-46-1039<br>4 Feb 1969<br>Chg 2, dated<br>31 Aug 1972 | Fuel System Cleanliness Inspection |
| 12AEI-46-4005B | Forward Fuel Tank System Inspection and Pressure Tests |
| 12AEI-200-1057<br>26 July 1974 | Leak Check Procedure and Repair of Engine Bay Vapor Seals - Engines and Insulation Blankets Removed |

GENERAL DYNAMICS NONDESTRUCTIVE TEST STANDARDS

| | |
|---|---|
| NDTS 50.37 | Nondestructive Testing of Composite Structures Using the 210 Bond Tester |
| NDTS 60.01 | Nondestructive Testing of Composite Structures Using the Convair Ultrasonic Bond Tester |
| NDTS 60.02 | Nondestructive Testing of Composite Structures Using the Coinda Scope Model 101, 101A or 101B |
| NDTS 60.03 | Nondestructive Testing of Composite Structures Using the Reflectoscope Model UM715 or UM721 |
| NDTS 60.04 | Nondestructive Testing of Composite Structures Using the Fluoroscope |
| NDTS 60.05 | Tap Inspection of Bonded Composite Structures |

2.0 AIRCRAFT PREPARATION

2.1 Drain and Purge Fuel Tanks

2.1.1 Prepare the aircraft for maintenance per T.O. 1F-111D-2-1.

2.1.2 Drain and defuel the aircraft fuel tanks and systems per T.O. 1F-111D-2-1, Section III.

2.1.3 Purge the aircraft tanks per T.O. 1F-111D-2-8-1, Sections II and XI.

2.2 Removal of Engines.

2.2.1 Preserve the engines per T.O. 1F-111D-2-6-1, paragraphs 3-59 through 3-61.

2.2.2 Remove the engines per T.O. 1F-111D-2-6-1, paragraphs 3-68 through 3-70.

2.2.3 Remove the engine nacelle fire detection sensing elements and connector cables per T.O. 1F-111D-2-6-1, paragraphs 16-23 through 16-25c, except omit the note in paragraph 16-25, and use only the caution note in paragraph 16-25.a.

2.3 Removal of Insulating Liners.

2.3.1 Insulating liners are located in the top of the engine nacelles from the front of the engine to the extreme aft section of the nacelles. Reference Figure 2.3-1. Insulation used in the liners is of a fibrous asbestos material.

2.3.2 Remove upper forward insulating liner as follows:

a. Remove screws and washers around outer edge of liner.

b. Remove screws and washers which secure liner interior.

c. Remove liner by sliding aft from beneath adjacent liner.

d. Remove liner from aircraft.

2.3.3 Remove lower forward insulating liner as follows:

a. Remove screws and washers around outer edge of liner.

b. Remove screws and washers which secure liner interior.

c. Remove liner by sliding down and aft from adjacent overlapping liners.

d. Remove liner from aircraft.

2.3.4 Remove underwing deck insulating liner as follows:

a. Remove screws and washers around outer edge of liner.

b. Remove screws and washers which secure liner interior.

c. Remove screws and washers which secure insulating liner support and remove support.

d. Remove liner from aircraft.

2.3.5 Remove upper aft insulating liner as follows:

a. Remove screws and washers around outer edge of liner.

b. Remove screws and washers which secure liner interior.

c. Remove liner from aircraft.

2.3.6 Remove lower aft insulating liner as follows:

a. Remove screws and washers around outer edge of liner.

b. Remove screws and washers which secure liner interior.

c. Remove liner by sliding down and aft from adjacent liners.

d. Remove liner and doubler from aircraft.

2.3.7 Remove wing closure beam insulating liner as follows:

a. Remove screws and washers which secure liner to aircraft.

b. Remove liner from aircraft.

2.3.8 Remove side panel insulating liner as follows:

a. Remove screws and washers securing liner to aircraft.

b. Remove liner from aircraft.

2.3.9 Remove engine insulating liner fairing as follows:

a. Remove screws and washers along edge of lower aft insulating liner.

b. Remove remaining screws and washers securing fairing to aircraft structure.

c. Remove fairing from aircraft.

2.4 Removal of Heat Shields.

2.4.1 Heat shields are located in the top of the engine nacelles from the front of the engine to the extreme aft section of the nacelles. Reference Figure 2.3-1.

2.4.2 Remove aft inboard engine mount heat shield as follows:

a. Remove screws and washers securing doubler to aircraft structure.

b. Remove lower aft insulating liner.

c. Remove screws from lower shield assembly.

d. Remove screws from upper shield assembly.

e. Remove upper and lower shield assemblies from aircraft.

2.4.3 Remove upper aft engine mount heat shield as follows:

a. Remove upper aft panel insulating liner.

b. Remove screws and washers securing heat shield to aircraft.

c. Remove heat shield from aircraft.

2.4.4 Remove forward engine mount heat shield as follows:

a. Remove screws and washers along lower edge of under wing deck insulating liner.

b. Remove engine mount pivot fitting (if installed).

c. Remove screws and washers securing heat shield to aircraft.

d. Remove heat shield.

2.4.5 Remove lower inboard longeron forward shroud as follows:

a. Remove screws and washers along lower edge of lower forward insulating liner.

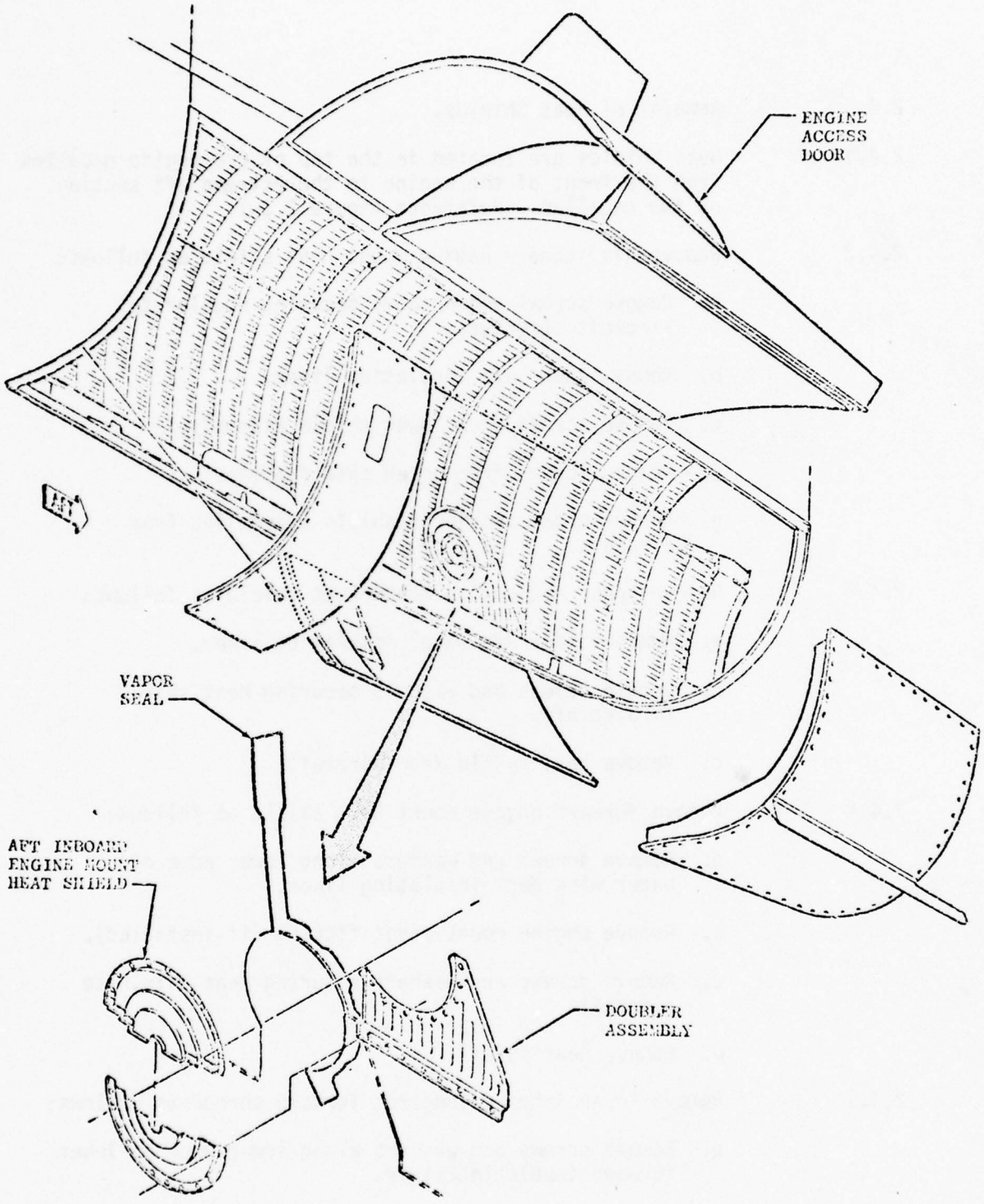



Figure 2.3-1 Engine Insulating Liners, Heat Shields and Vapor Seals (Sheet 1)

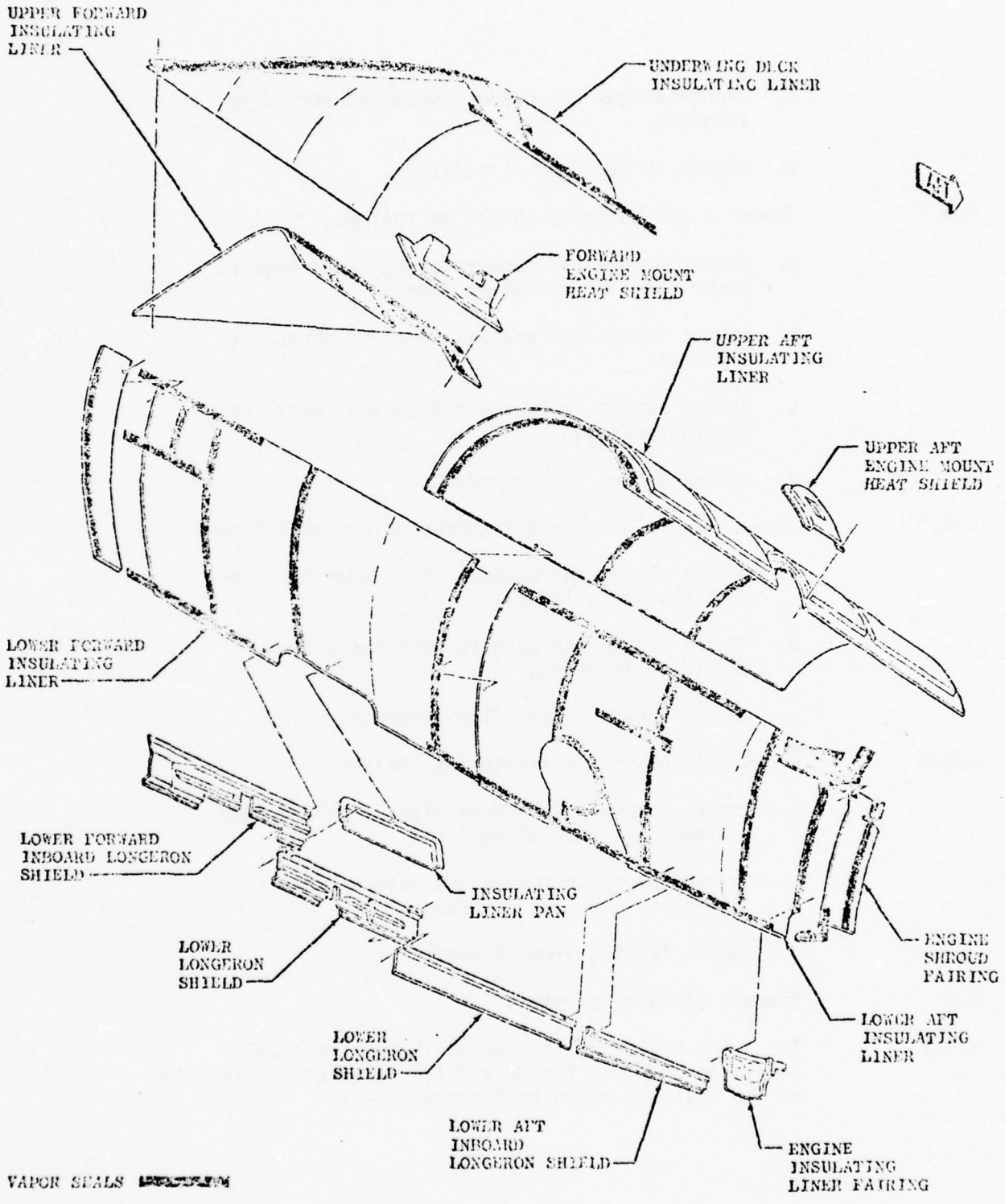



Figure 2.3-1 Engine Insulating Liners, Heat Shields and Vapor Seals (Sheet 2)

b. Remove screws and washers securing shroud to longeron.

c. Remove shroud from aircraft.

2.4.6 Remove lower longeron shield as follows:

a. Remove screws and washers along lower edge of lower forward insulating liner.

b. Remove screws and washers securing shroud to longeron.

c. Remove screws and washers securing shroud to adjacent shrouds.

d. Remove shroud from aircraft.

2.4.7 Remove lower longeron aft shroud shield as follows:

a. Remove screws and washers along edge of lower aft insulating liner.

b. Remove screws and washers securing shroud shield to longeron.

c. Remove shroud shield from aircraft.

2.4.8 Remove engine shroud fairing as follows:

a. Remove screws and washers along trailing edge of lower aft insulating liner.

b. Remove remaining screws and washers securing fairing to aircraft structure.

c. Remove fairing from aircraft.

2.5 Removal of Vapor Barriers

2.5.1 The vapor seals are located on the engine nacelle panels as shown in Figure 2.3-1. Detailed construction of the seals is shown in Figures 2.5-1.

2.5.2 Remove the vapor seals as follows:

NOTE

The vapor seals (barriers) must be removed to allow removal of any external fillet sealant, removal of injection hole screws, to permit better leak source detection during the air leak checks required as part of this work, and to allow resealing of the vapor seals with non-reverting MIL-S-83430 sealant.

a. Drill off the head of the fasteners holding the length of strip in place leaving fastener shank in place.

b. Push a thin edge plastic tool along the edge of the strip and adhesive to break the edge bond loose from the aluminum nacelle skin panel. Continue this process for the entire length and width of the vapor seal strip.

CAUTION

Exercise extreme care in removing the vapor seals because they can be damaged very easily.

2.5.3 Reference Engineering drawing 12P9225. Remove 12P9209 -11/-12; 12P9215-11/-12, -13/-14, -15/-16, -21/-22; and 12P10209-7/-8 stiffeners. Retain stiffener and attaching hardware (except rivets) for reinstallation.

2.6 Jacking Aircraft

2.6.1 Jack and shore the airplane per Figure 2.6-1. Shoring is not mandatory. The aircraft shall be shored if difficulty is encountered in removing and/or reinstalling saddle tank and finger tank panel fasteners.

2.7 Removal of Overwing Fairing

2.7.1 Remove covers 3431, 3432, 3433, and 3434 and fairings and 3464 ref T.O. 1F-111D-2-2-1, paragraphs 3-251 thru 3-252, and Figure 3-2.

2.7.2 Bag and attach all fasteners and attaching hardware with each cover.

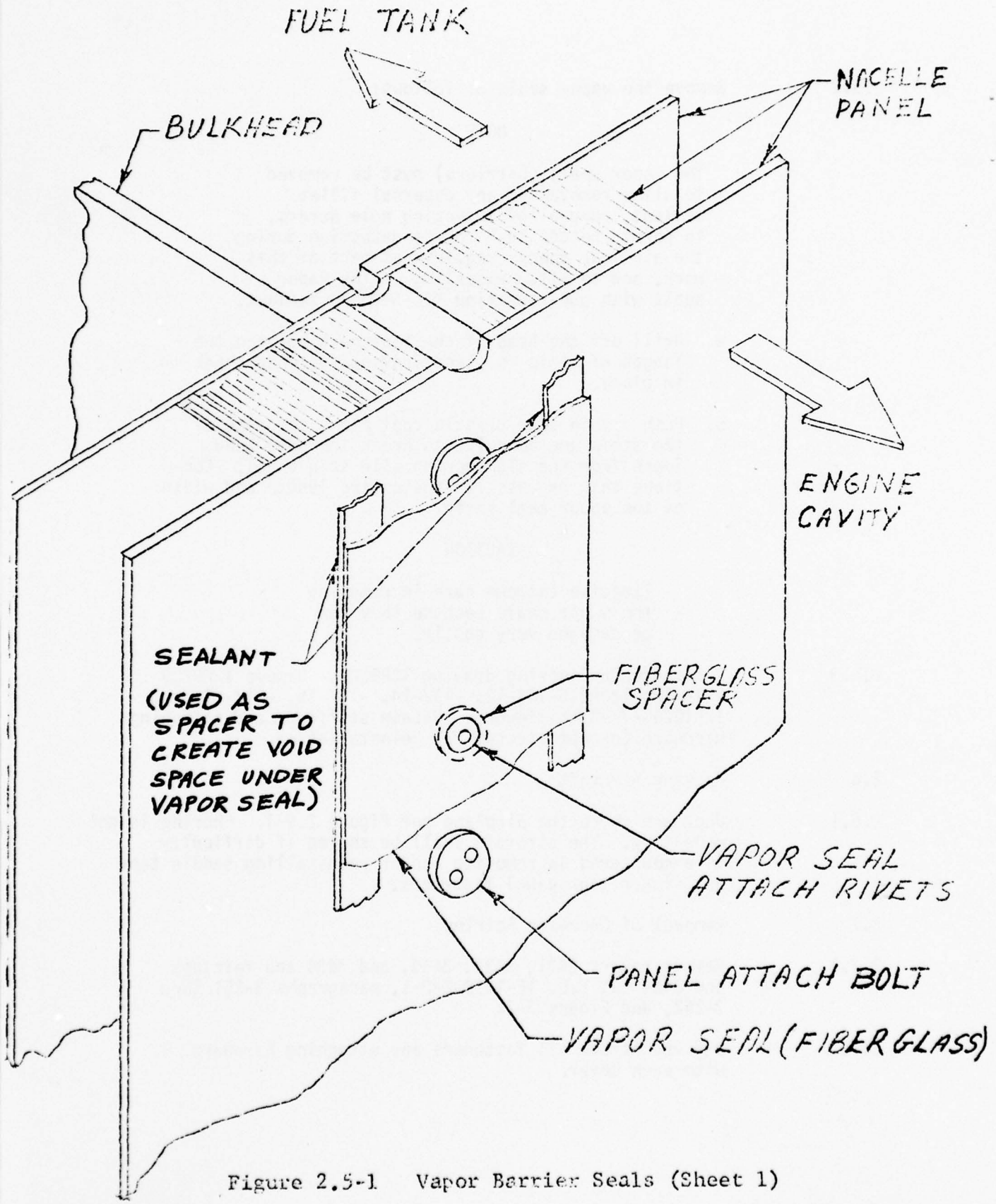



Figure 2.5-1 Vapor Barrier Seals (Sheet 1)

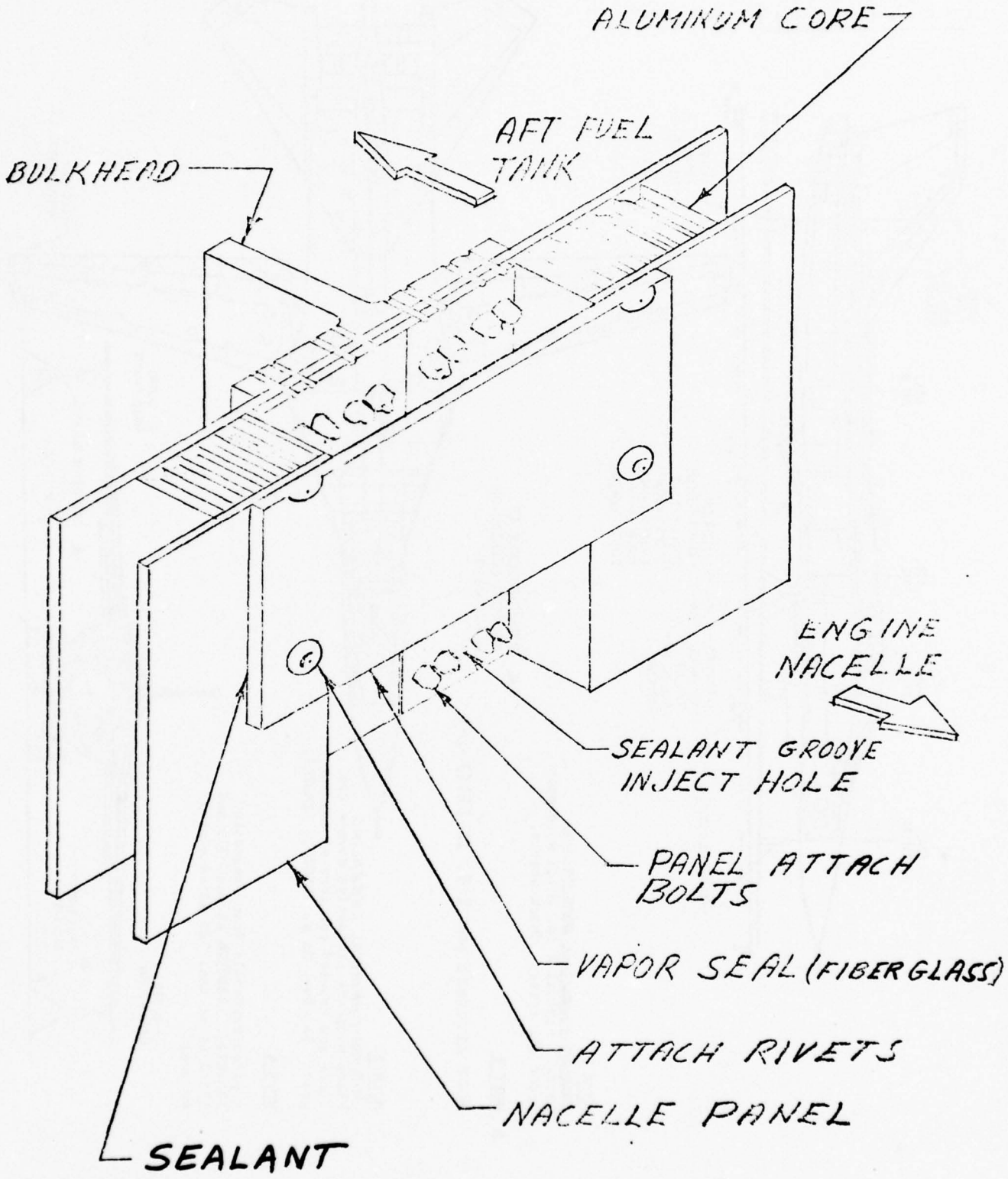



Figure 2.5-1 Vapor Barrier Seals (Sheet 2)

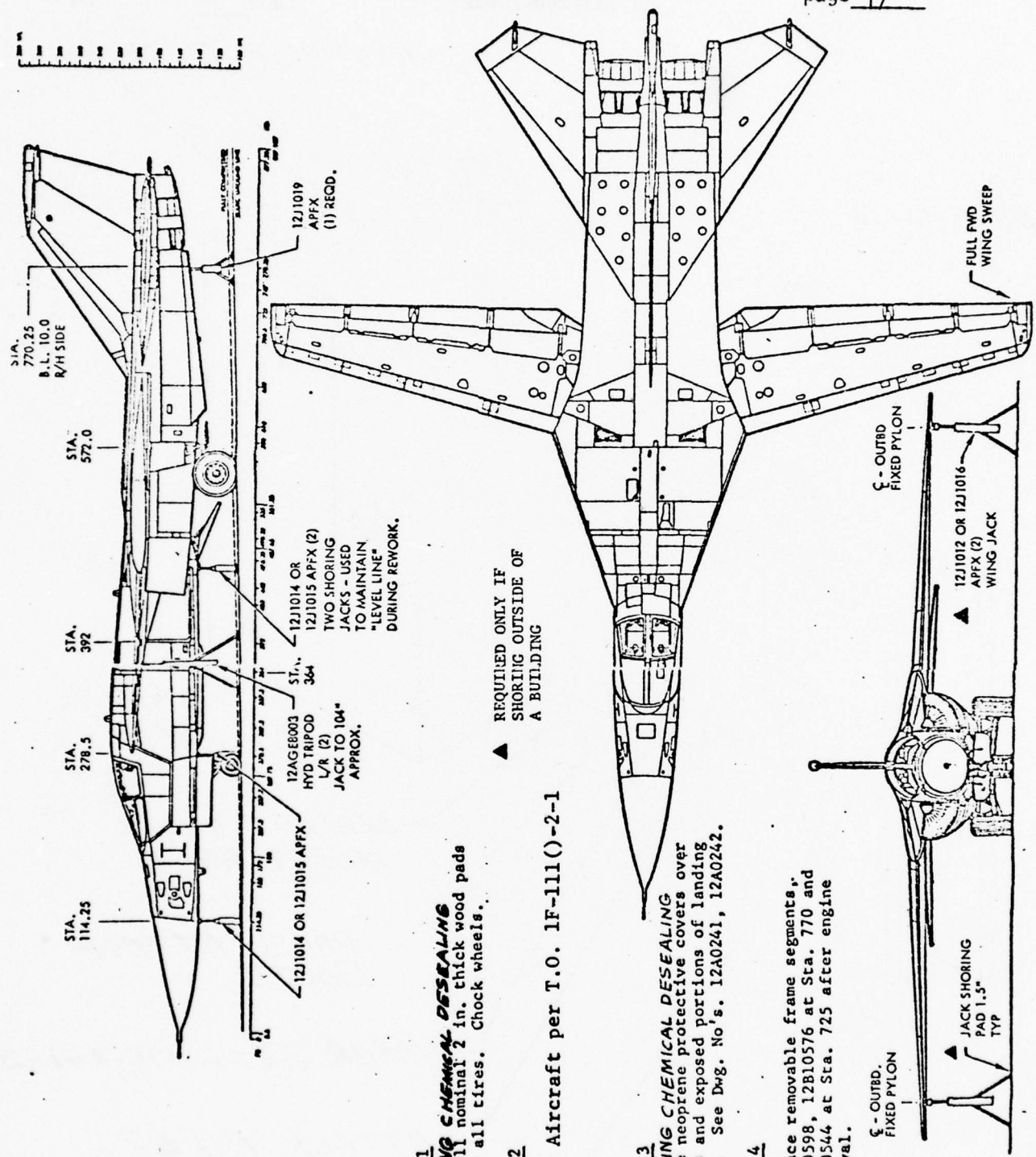



Figure 2.6-1 Jacking for Deseal/Reseal Program

2.8 Removal of Wing-Fuselage Lower Side Seal.

2.8.1 Remove seals per T.O. 1F-111D-2-2-1, paragraphs 3-197 through 3-200, and Figures 3-37 and 3-38.

2.8.2 Bag and attack all fasteners and attaching hardware with each unit.

3.0 FUEL TANK PREPARATION

3.1 General Notes.

3.1.1 Visually inspect all components, panels, access doors, and parts prior to reinstallation for damage or non-conformance of quality.

3.1.2 All components removed from the aircraft will be tagged and identified by aircraft numb er.

3.1.3 All reusable fasteners removed during deseal/reseal operations are to be bagged and attached to the corresponding component.

3.2 F-1 Tank Preparation and Restoration

3.2.1 Preparation

3.2.1.1 Remove covers 2421 and 2422 ref T.O. 1F-111D-2-2-1, Figure 3-1.

3.2.1.2 Remove cover 2205 ref T.O. 1F-111D-2-2-1, Figure 3-3.

3.2.1.3 Remove 12B7720 truss components shown in T.O. 1F-111D-4-1, Figure 45.

3.2.1.4 Bag and attach all fasteners and attaching hardware with each panel or component.

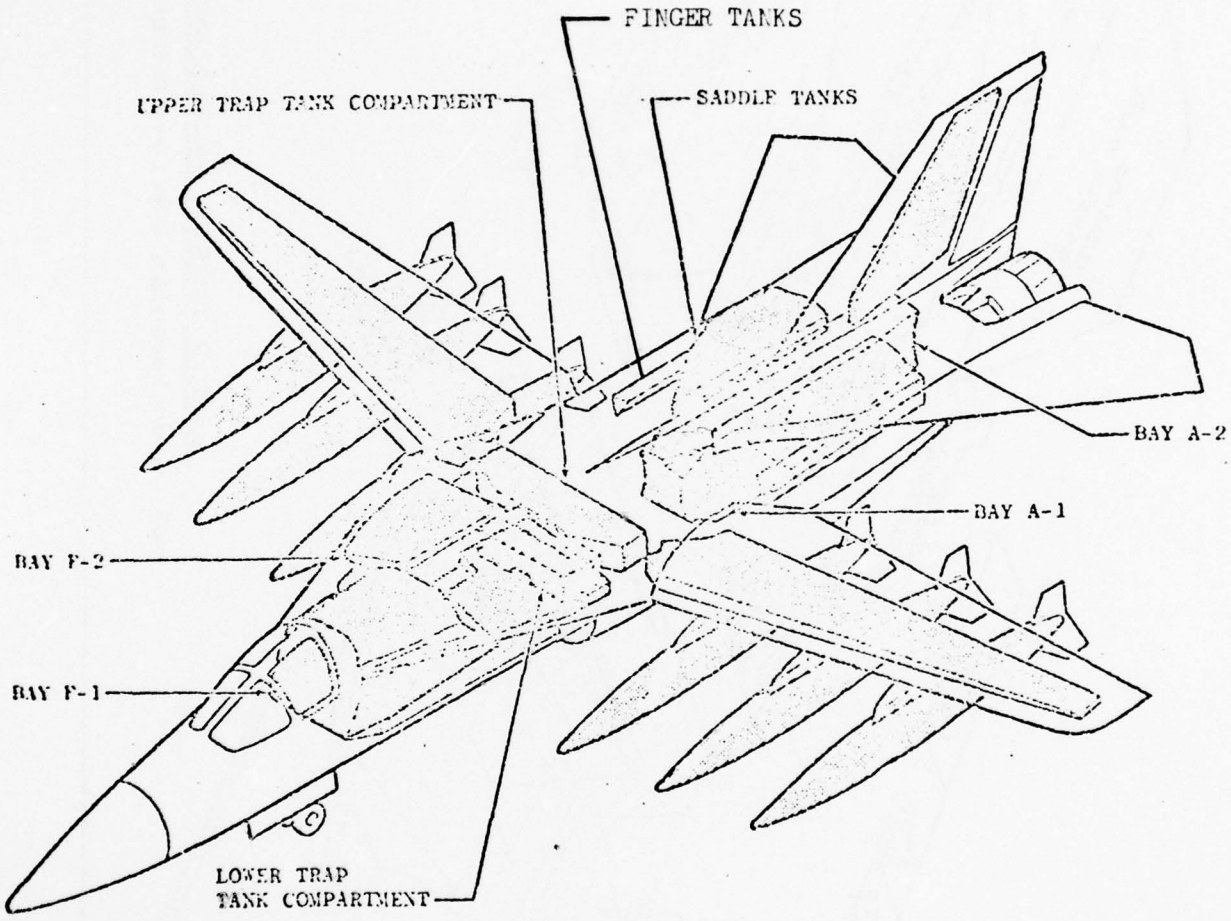



Figure 3.1-1 Fuselage Fuel Tanks

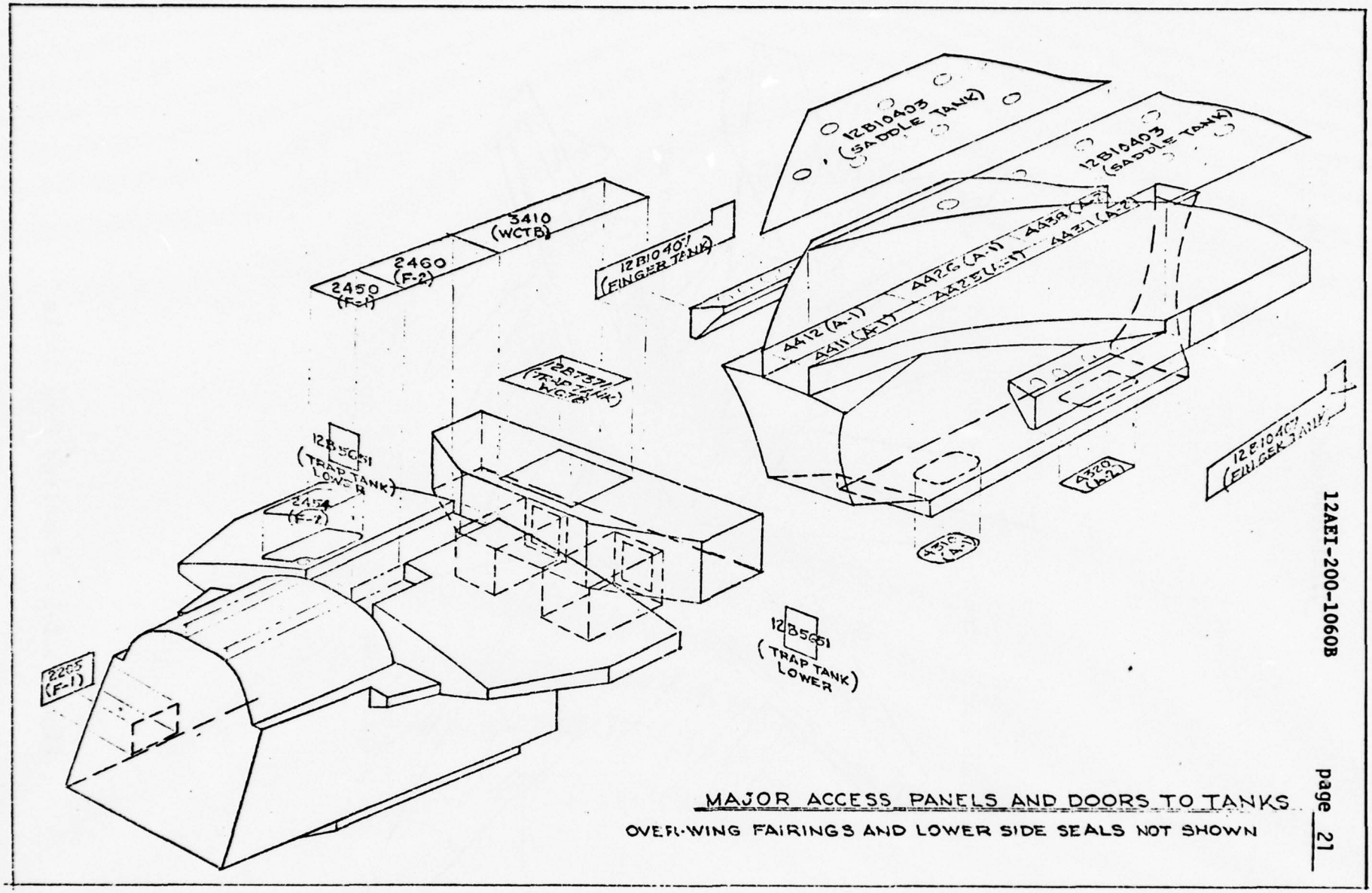

12B10403
(SADDLE TANK)
12B10403
(SADDLE TANK)
3410
(WCTB)
2460
(F-2)
2450
(F-1)
12B10401
(FINGER TANK)
12B10401
(FINGER TANK)
4412 (A-1)
4411 (A-1)
4422 (A-1)
4421 (A-1)
4423 (A-2)
4431 (A-2)
4320
(A-2)
4310
(A-1)
12B7371
(TRAP TANK
WCTB)
12B5651
(TRAP TANK
LOWER)
2454
(F-2)
2205
(F-1)
12B5651
(TRAP TANK
LOWER)
MAJOR ACCESS PANELS AND DOORS TO TANKS
OVER-WING FAIRINGS AND LOWER SIDE SEALS NOT SHOWN
12AEI-200-1060B
page 21

Figure 3.1-2

3.2.2 Restoration.

3.2.2.1 Reinstall 12B7720 truss components shown in T.O. 1F-111D-4-1, Figure 45.

3.2.2.2 Reinstall covers 2421 and 2422 ref T.O. 1F-111D-2-2-1, Figure 3-1.

3.2.3 Reinstall cover 2205 ref T.O. 1F-111D-2-2-1, Figure 3-3.

3.3 F-2 Tank Preparation and Restoration.

3.3.1 Preparation.

3.3.1.1 Remove covers 2454 and seal, 2450, 2451, 2453, 2460, 3411, 3412, 3413, and 3414 ref T.O. 1F-111D-2-2-1, Figure 3-1.

3.3.1.2 Bag and attach all fasteners and attaching hardware with each cover.

3.3.1.3 Remove 12B7721 and 12B7722 truss components shown in T.O. 1F-111D-4-1, Figure 45.

3.3.1.4 For A and C models only, see appendix I.

3.3.2 Restoration.

3.3.2.1 For A and C models only, see appendix I.

3.3.2.2 Reinstall 12B7721 and 12B7722 truss components shown in T.O. 1F-111D-4-1, Figure 45.

3.3.2.3 Reinstall covers 2454 and seal, 2450, 2451, 2453, 2460, 3411, 3412, 3413, and 3414 ref T.O. 1F-111D-2-2-1, Figure 3-1.

3.4 Upper Trap Tank (Wing Carry Through Box - WCTB) Preparation and Restoration.

3.4.1 Preparation.

3.4.1.1 Remove covers 3410, 3411, 3412, 3413, 3414, 3423, 3424, 3425, and 3426 ref T.O. 1F-111D-2-2-1, Figure 3-1.

3.4.1.2 Remove 12B7371 access door and seal shown in T.O. 1F-111D-4-1, Figure 50. Reference 4.1.2.2, 4.1.2.3, and 4.2.2.1.1 through 4.2.2.1.3.

3.4.1.3 Remove 12B7372, 12B7374 and 12B7375 truss components shown in T.O. 1F-111D-4-1, Figure 50.

3.4.1.4 Bag and attach all fasteners and attaching hardware with each component.

3.4.2 Restoration

3.4.2.1 Reinstall 12B7372, 12B7374 and 12B7375 truss components shown in T.O. 1F-111D-4-1, Figure 50.

3.4.2.2 Reinstall 12B7371 access door and seal shown in T.O. 1F-111D-4-1, Figure 50. Reference paragraph 4.1.3.1.

3.4.2.3 Reinstall covers 3410, 3411, 3412, 3413, 3414, 3423, 3424, 3425, and 3426 ref T.O. 1F-111D-2-2-1, Figure 3-1.

3.5 Lower Trap Tank Preparation and Restoration

3.5.1 Preparation

3.5.1.1 Remove 12B5651 pump access door, left and right shown in T.O. 1F-111D-4-1, Figure 40.

3.5.1.2 Bag and attach all fasteners and attaching hardware to each door.

3.5.2 Restoration

3.5.2.1 Reinstall the 12B5651 pump access door, left and right, shown in T.O. 1F-111D-4-1, Figure 40.

3.6 A-1 Tank Preparation and Restoration

3.6.1 Preparation

3.6.1.1 Remove covers 3460, 3461, 3462, 3465, 3466, 4411, 4412, 4425, 4426, 4437, 4438, 4451, and 4452 ref T.O. 1F-111D-2-2-1, Figure 3-2.

3.6.1.2 Remove cover 4310 ref T.O. 1F-111D-2-2-1, Figure 3-4.

3.6.1.3 Bag and attach all fasteners and attaching hardware with each cover.

3.6.2 Restoration

3.6.2.1 Reinstall cover 4310 ref T.O. 1F-111D-2-2-1, Figure 3-4.

3.6.2.2 Reinstall covers 3460, 3461, 3462, 3465, 3466, 4411, 4412, 4425, 4426, 4437, 4438, 4451, and 4452 ref T.O. 1F-111D-2-2-1, Figure 3-2.

3.7 A-2 Tank Preparation and Restoration.

3.7.1 Preparation

3.7.1.1 Remove 12B10217-9 fairing shown in T.O. 1F-111D-4-1, Figure 74. Note: 12E2961-7 cover plate need not be removed from 12B10217-9 fairing.

3.7.1.2 Remove cover 4320 ref T.O. 1F-111D-2-2-1, Figure 3-4.

3.7.2 Restoration

3.7.2.1 Reinstall cover 4320 ref T.O. 1F-111D-2-2-1, Figure 3-4.

3.7.2.2 Reinstall 12B10217-9 (and attached 12E2961-7 cover plate) fairing shown in T.O. 1F-111D-4-1, Figure 74.

3.8 Saddle/Finger Tanks (Left and Right) Preparation and Restoration.

3.8.1 Preparation

3.8.1.1 Remove covers 12B10380 (2 pieces), 12B10030 (4 pieces), and C404 (1 piece) to gain access to 12B10403 panel.

3.8.1.2 Remove 12B10403 panel per 5.4.

3.8.1.3 Deleted (see appendix G)

3.8.1.4 Remove 12B9747-1 (2 pieces) and 12B9747-11 (2 pieces) finger tank access covers to allow for inspection of finger tank cavity.

NOTE

Engines must be removed prior to removal of these panels.

3.8.2 Restoration

NOTE

Prior to reinstalling finger tank access covers, accomplish rework specified in section 7.1.

3.8.2.1 Reinstall 12B10403 panel per 5.9.

3.8.2.2 Reinstall 12B10380 (2 pieces), 12B10030 (4 pieces) and C404 (1 piece) on 12B10403 panel.

3.8.2.3 Deleted (see appendix G)

3.8.2.4 Reinstall 12B9747-1 (2 pieces) and 12B9747-11 (2 pieces). (See note following 3.8.2.)

4.0 SYSTEMS (Removal-Reinstallation-Checkout)

4.1 Flight Control

4.1.1 General Procedures

4.1.1.1 Observe the maintenance procedures and precautions in T.O. 1F-111D-2-4-1, Section III.

4.1.2 Component Removal

4.1.2.1 Refer to T.O. 1F-111D-2-4-1, Section III (Installation of Rod End Bolts and Bearing Alignment), for types of mechanical connections used in the flight control system.

4.1.2.2 Remove the control linkage over the upper trap tank as follows: (Reference Figure 4.1.1.)

a. Remove access panels numbers 3410, 3465, and 3466.

b. Remove push-pull tube assemblies 12C950-893, 12C950-897, and 12C951-97. Tag tube assemblies noting aircraft tail number and store.

4.1.2.3 Remove the rudder cables as follows:

a. Remove access panel 1206 and block tension regulator in rudder feel assembly to allow cables to become slack. Reference Figure 4.1-2.

b. Remove two cables guard pins and remove cables from rudder pulley in the 12C502 yaw feel assembly. Reference Figure 4.1-3.

c. Move the rudder cables forward for slack to provide clearance with the forward fuel tank cover.

NOTE

It may be necessary to remove the 12C481 fair leads in order to obtain sufficient slack (Reference Figure 4.1-4).

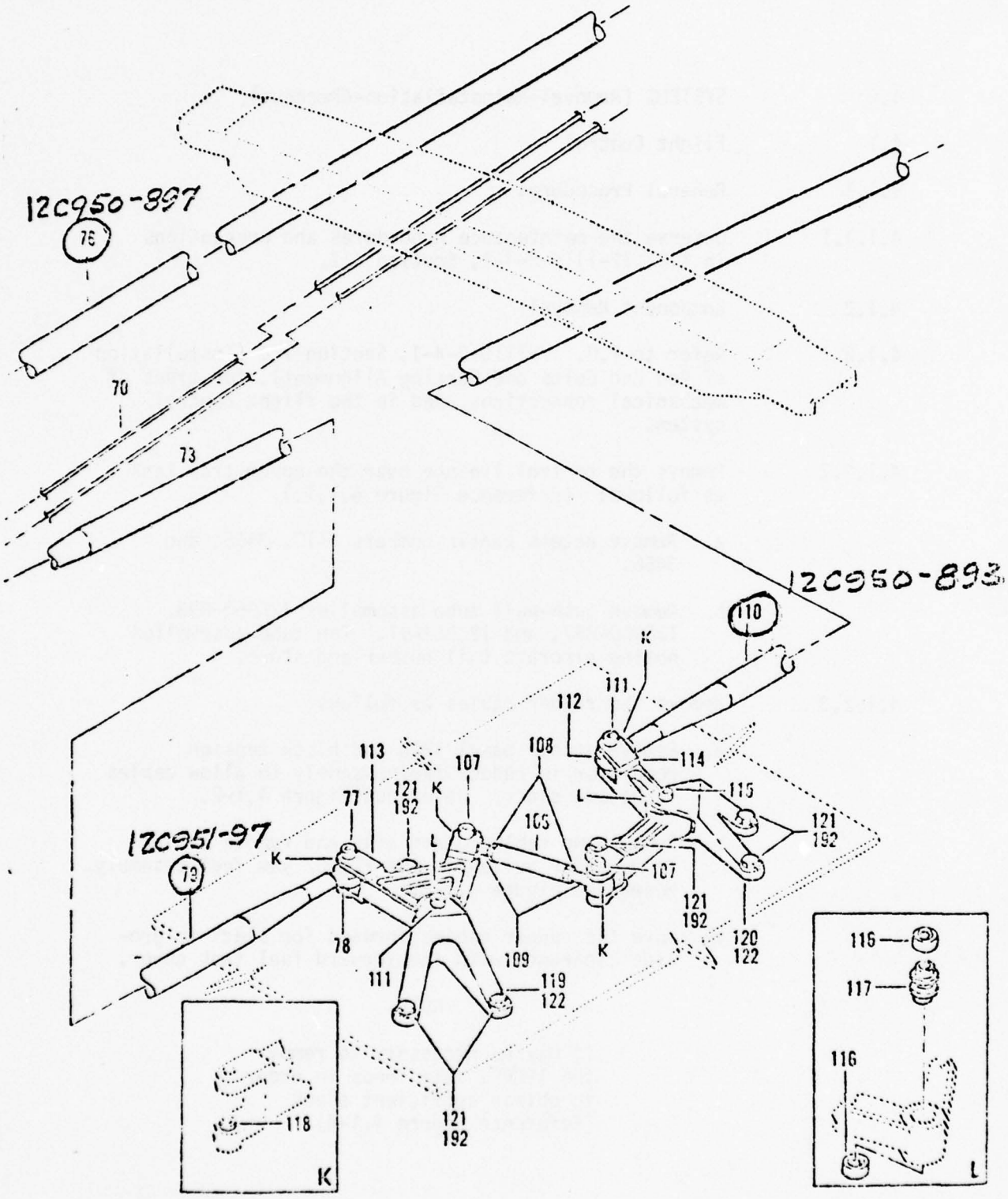
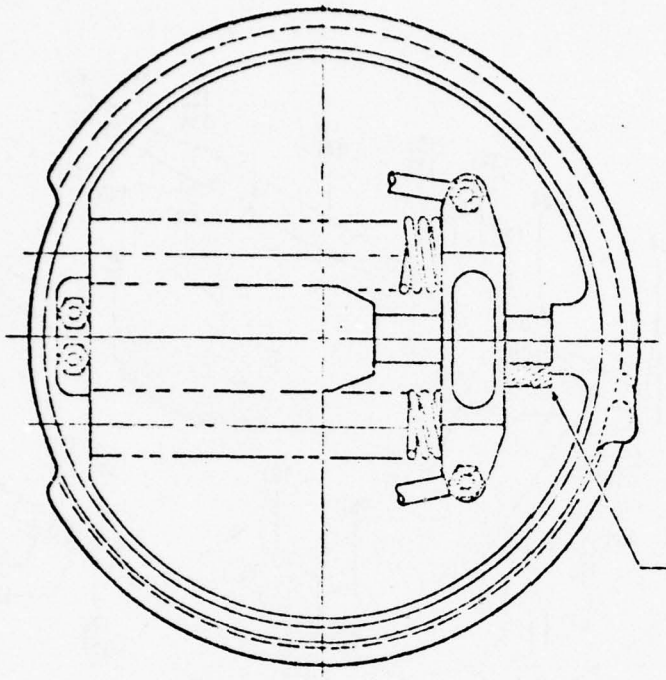

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12C951-97
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120
122
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K
116
117
116
L

Figure 4.1-1




VIEW TENSION REGULATOR
SHOWING USE OF BLOCK

**CAUTION**

Screwdrivers or other tools shall not be used to compress spring. Failure to comply can cause damage to regulator.

Figure 4.1-2

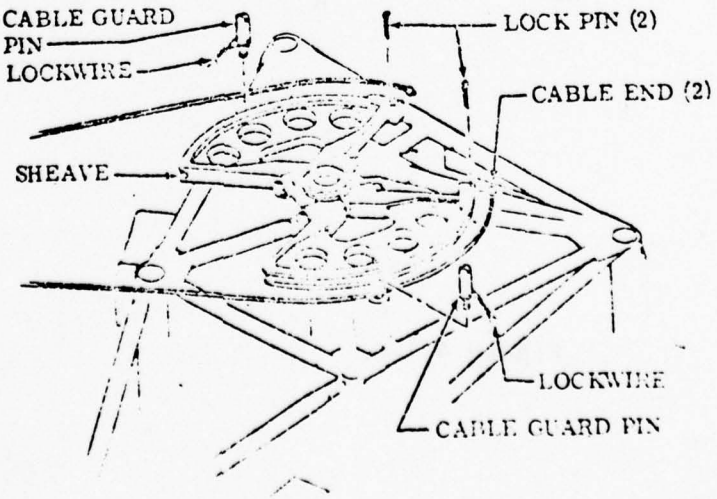



Figure 4.1-3

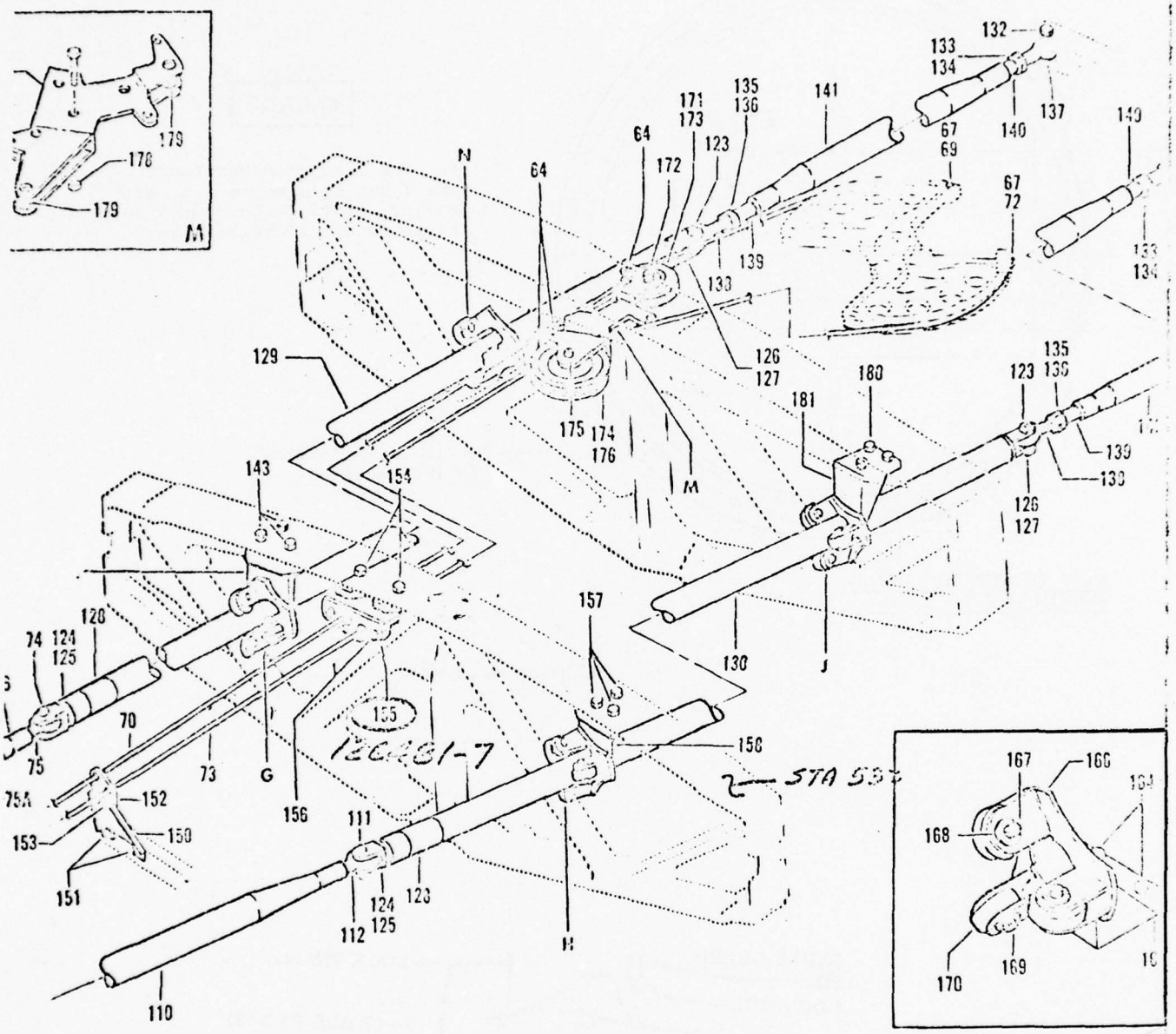

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Figure 4.1-4

d. The forward fuel tank cover can be removed with the control bellcranks attached.

4.1.3 Reinstallation of Components.

4.1.3.1 Reinstall the fuel tank cover with the attached control linkage component. Reference 3.4.2.2.

4.1.3.2 Reinstall push pull tubes. Reference Figure 4.1-1. Observe general maintenance procedures and precautions of T.O. 1F-111D-2-4-1, paragraph 3-1.

4.1.3.3 Reinstall the rudder cables in their fairleads, then secure the aft cable ends in the cable sleeve shown in Figure 4.1-3.

4.1.3.4 Remove the block previously installed in the tension regulator. Reference Figure 4.1-3.

4.1.3.6 Inspect for FOD.

4.1.4 System Check.

4.1.4.1 Apply hydraulic system pressure and electrical power to the aircraft. Refer to Organizational Maintenance Manual, General Aircraft Information (T.O. 1F-111D-2-1).

4.1.4.2 Perform the following flight control system surface motion confidence checks:

During the following checks, the required flight control surface positions will be verified by the control surface position indicator and the ground observer.

a. Slats - Extended.

b. Takeoff trim - Set.

c. Damper switches (3) - OFF.

(1) Place the pitch and roll autopilot/damper and yaw damper switches to OFF and check that the pitch, roll, and yaw damper caution lamps light.

d. Flight Controls - Checked

(1) Move the control stick aft, then left wing down, right wing down; check for freedom of movement and verify that the control surfaces and surface position indicators correspond with control stick movement.

(2) Check that pitch and roll channel caution lights do not light.

(3) Move the control stick full forward, then rapidly full left through the detent to the forward left corner and hold firmly for one second. Verify that the right horizontal stabilizer indicates 12 to 18 degrees down while the stick is held in this extreme position.

(4) Move the control stick rapidly full right through the detent to the forward right corner, firmly holding forward pressure. Verify that the left horizontal stabilizer indicates 12 to 18 degrees down while the stick is firmly held for one second in this extreme position, then release.

(5) Rudder pedals - Check for more than 25 degrees of rudder in each direction.

e. Damper switches (3) - DAMPER.

f. Damper reset button - Momentarily depressed (if necessary).

(1) Check that the pitch, roll, and yaw damper caution lamps go out.

4.1.4.3 Remove hydraulic and electrical power from the aircraft (Reference T.O. 1F-111D-2-1).

4.2 Hydraulic.

4.2.1 General Information.

4.2.1.1 T.O. 1F-111D-2-7-1, paragraphs 3-51 thru 3-56 includes fill, bleed, and check requirements. T.O. 1F-111D-2-1, paragraph 1-395, Figure 1-25 (sheets 1-4) include tubing torque values.

4.2.2 Wing sweep actuator hydraulic system and air refuel system hydraulic and pneumatic systems.

4.2.2.1 Removals

4.2.2.1.1 Remove that portion of the wing sweep actuator hydraulic tubing, shown in Figure 36 of T.O. 1F-111D-4-8, which crosses the upper trap tank access door only using normal maintenance practices and procedures.

NOTE

Assure that both hydraulic systems have been depressurized per procedures of T.O. 1F-111D-2-7-1 paragraphs 3-19 thru 3-24.

4.2.2.1.2 Remove the portion of the air refuel system hydraulic tubing shown in T.O. 1F-111D-4-4, Figure 6, which crosses the upper trap tank access door only using normal maintenance practices and procedures.

4.2.2.1.3 Remove only that portion of the air refueling system emergency pneumatic tube, shown in T.O. 1F-111D-4-4, Figure 7, which crosses the upper trap tank access door using normal maintenance practices and procedures.

NOTE

Assure that the pneumatic pressure has been depressurized prior to removal. See instructions in T.O. 1F-111D-2-7-1, paragraphs 4-7 thru 4-10.

4.2.3 Component Installations

4.2.3.1 Install the wing sweep actuator hydraulic tube sections (shown in T.O. 1F-111D-4-8, Figure 36) using normal maintenance practices and procedures and information contained in 4.2.1.1. Fill, bleed, and leak check system per information in 4.2.1.1.

4.2.3.2 Install the air refuel system hydraulic tube sections shown in T.O. 1F-111D-4-4, Figure 6, using normal maintenance practices and procedures and information in 4.2.1.1. Fill, bleed, and leak check system per information in 4.2.1.1.

4.2.3.3 Install the air refuel system emergency pneumatic tube section shown in T.O. 1F-111D-4-4, Figure 7, using normal maintenance practices and procedures and information contained in 4.2.1.1.

4.2.4 System Check-Out

4.2.4.1 Operationally check the wing sweep actuator per instructions contained in T.O. 1F-111D-2-4-1, paragraph 5-10, "Wing sweep system operational check-out".

4.2.4.2 Operationally check the air refuel system per instructions contained in T.O. 1F-111D-2-8-1, paragraph 9-6, "Operational check-out of aerial refueling system".

4.3 Fuel

4.3.1 General Maintenance Information

4.3.1.1 Reference T.O. 1F-111D-2-8-1, Section III, for general information.

4.3.1.2 The desealing material will attack and adversely affect the fuel tank sealants and some seals, gaskets and O-rings. Therefore the following action is mandatory.

4.3.1.2.1 Remove all flanged manifold tube sections, where manifolds pass thru bulkheads, and their molded in metal type seals.

4.3.1.2.2 Remove all bulkhead and exterior wall fittings. The majority of these fittings will have O-ring seals.

4.3.1.2.3 A number of tubes within the confines of the fuel tank are secured to P075 studs for support and routing and the studs in turn are bonded to tank wall of structure. Due to the desealant effects the P075 studs must be removed.

4.3.1.3 Where possible remove assemblies as a unit to facilitate tank restoration.

Example 1. High level pilot valve housing and integral units.
2. Water drain valve assemblies (housing and core).
3. Engine suction feed valve manifold (remove with thermal expansion valves installed).
4. System press relief valve (do not remove from manifold section to which it attaches).

4.3.1.4 When possible, detach manifold bonding straps from structure and loosely install fasteners to strap. Do not disturb the manifold bonding installation.

4.3.1.5 Do not remove clamps from tubes. Remove fasteners attaching them to support items or structure then loosely install thru their respective clamps. This is especially important for P075 stud support fasteners.

4.3.1.6 When a fitting is removed from a bulkhead or tank wall immediately install the fitting loosely into the tube "B" nut to which it attaches.

4.3.1.7 The large manifold tubes are supported/attached to tank structure, normally, by a two (2) piece bracket. One section is usually attached permanently to tank floor, walls, or structure. Do not remove this half.

4.3.1.8 Tag and identify each tube section, component or unit removed with P/N, tank location, and nomenclature which will facilitate re-installation of same.

4.3.1.9 Be sure to install cover plates, caps, or plugs to all tank openings to assure a leak free tank structure. Reference Figure 5.1-1.

4.3.1.10 The R & L saddle tank upper skins and finger tank (R & L) side skins will be removed prior to desealing of the aircraft. Therefore all components, associated tubing and hardware will be extremely easy to remove and re-install.

4.3.1.11 Three fuel manifolds in the wing sweep actuator area must be removed.

4.3.1.12 Access to the fuel system components within the upper trap tank necessitates the removal of the access door on the top of the WCTB. Removal and installation of this access cover will be accomplished per the instructions contained in 3.4.1.

4.3.1.13 Access to fuel components in the routing tunnel area above tank A-1 and A-2 will require the removal and eventual installation of the large E.C.S. duct, in this area, from approximately F.S. 356 to F.S. 770. Instructions for this task can be found in paragraph 4.4.3.

4.3.1.14 Prior to removal of any fuel system component, within any tank, assure that all fuel quantity probes have been removed from the tanks and their associated harnesses have also been removed.

4.3.1.15 Cap or cover all tube/component openings before storage in racks.

4.3.2 *Engine Fuel Supply Subsystem.*

4.3.2.1 Component Removal.

4.3.2.1.1 Remove dual inlet booster pumps 1, 2, 3, 4, 5, and 6 per T.O. 1F-111D-4-4, Figures 41 and 45 and T.O. 1F-111D-2-8-1, paragraphs 7-68 thru 7-71, Figure 7-13.

4.3.2.1.1.1 Remove the vapor vent fittings for pumps 1 and 3 from bulkhead as well as pumps.

4.3.2.1.1.2 Do not remove upper inlet tube assembly nor stand pipe from pumps 3 and 4 but remove cover and seals thru F2 bulkhead adjacent to upper inlet of pump 1.

If possible do not remove upper trap tank water drain system from boost pump 4, see T.O. 1F-111D-4-4, Figure 42 (sheet 1).

4.3.2.1.1.3 Remove booster pump electrical harnesses, pumps 1-6, from tanks per instructions contained in paragraph 4.5..

4.3.2.1.2 Remove manifold cross feed valve per T.O. 1F-111D-2-8-1, paragraph 7-74 thru 7-77, Figure 7-14, ref T.O. 1F-111D-4-4, Figure 41.

NOTE

Do not remove the pressure sense lines from the valve. Disconnect from adjacent manifolds only.

4.3.2.1.3 Remove pressure switches, shown in T.O. 1F-111D-4-4, Figures 42 and 45, T.O. 1F-111D-2-8-1, paragraphs 7-64 and 7-65, Figure 7-12, except remove switches and tank housings as a unit, do not separate as described. Remove adapter to tank seals.

4.3.2.1.4 Remove antisuction valve shown in T.O. 1F-111D-4-4, Figure 44, and T.O. 1F-111D-2-8-1, paragraph 7-41, and Figure 7-8.

4.3.2.1.4.1 Disconnect pressure sense tube from trap tank only. Do not remove from valve housing. Remove fitting from tank structure and install in tube "B" nut.

4.3.2.1.5 Remove fuel low caution float switch shown in T.O. 1F-111D-4-4, Figure 43, per instructions of T.O. 1F-111D-2-8-1, paragraphs 7-32, 7-33 and 7-34. Figure 7-3. Remove electrical harness per instructions contained in paragraph 4.5..

4.3.2.1.6 Remove engine fuel shut off valves shown in T.O. 1F-111D-4-4, Figure 46, and T.O. 1F-111D-2-8-1, paragraph 7-58 and 7-59, Figure 7-10.

4.3.2.1.7 T.O. 1F-111D-2-8-1, Figure 7-9, and T.O. 1F-111D-4-4, Figure 41, remove system pressure relief valves (1) and thermal relief valves (2) attached to their respective manifold sections. Do not remove separately.

4.3.2.1.8 Remove all engine supply system manifolds, tubes, associated hardware shown in T.O. 1F-111D-4-4, Figures 40 thru 46, per standard shop practice and paragraph 4.3.1

4.3.2.1.8.1 Reference T.O. 1F-111D-4-4, Figure 44. Do not remove entire tube as shown. Remove aft elbow and disconnect the manifold coupling from the rear of the upper trap tank only. The remaining section of tube does not have to be removed.

4.3.2.2 Reinstallation of Components.

4.3.2.2.1 Engine Fuel Supply System.

4.3.2.2.1.1 Install dual inlet booster pumps 1-6 shown in T.O. 1F-111D-4-4, Figures 41 and 45, and T.O. 1F-111D-2-8-1, Figure 7-13 and instructions of paragraph 7-73 as appropriate.

4.3.2.2.1.1.1 Be sure to install vapor vent fittings for pumps 1 and 3 on bulkhead adjacent to pumps and install cover and gasket to tank wall adjacent to upper inlet of pump 1.

4.3.2.2.1.1.2 Install the pump electrical harnesses in tank per instruction contained in paragraph 4.5 so electrical harnesses can be connected to pumps and electrical checks required per instructions of 4.5.4 can be accomplished.

4.3.2.2.1.1.3 Install upper trap tank water drain scavenge system as shown in T.O. 1F-111D-4-4, Figure 42.

4.3.2.2.1.2 Install manifold crossfeed valve shown in T.O. 1F-111D-4-4, Figure 41, per T.O. 1F-111D-2-8-1, paragraph 7-79, Figure 7-14.

4.3.2.2.1.4 Install pressure switch and adapter units to the tank shown in T.O. 1F-111D-4-4, Figures 42 and 45, and T.O. 1F-111D-2-8-1, paragraph 7-65A and B, Figure 7-12.

4.3.2.2.1.4.1 Assure that seals between adapters and tank openings are installed.

4.3.2.2.1.5 Install antisuction valve shown in T.O. 1F-111D-4-4, Figure 44, per the instructions of T.O. 1F-111D-2-8-1, paragraph 7-44, Figure 7-8.

4.3.2.2.1.6 Install sense line fitting into upper trap tank and connect and torque sense line.

4.3.2.2.1.7 Install the fuel low caution float switch shown in T.O. 1F-111D-4-4, Figure 43, and instructions contained in T.O. 1F-111D-2-8-1, paragraphs 7-36 and 7-38, and Figure 7-3, applicable steps.

4.3.2.2.1.8 Install the engine fuel shut off valves shown in T.O. 1F-111D-4-4, Figure 46, per instructions contained in T.O. 1F-111D-2-8-1, paragraph 7-61 and Figure 7-10, applicable steps.

4.3.2.2.1.9 T.O. 1F-111D-2-8-1, Figure 7-9, and T.O. 1F-111D-4-4, Figure 41, shows the location of the engine fuel supply system pressure relief valve (1) and thermal relief valves (2). These items with their manifold sections were removed in accordance with paragraph 4.3.2.1.7. Reinstall them with associated hardware at this time.

4.3.2.2.1.10 Install all engine fuel supply manifolds, tubes, and associated hardware and bracketry shown in T.O. 1F-111D-4-4, Figures 40 thru 46, using common shop practice and information of 4.3.1.

4.3.2.2.1.11 Reference T.O. 1F-111D-4-4, Figure 44, and paragraph 4.3.2.1.8.1 for the installation of the over wheel well fuel system manifold. Install the elbow section to tank structure and aft end of the manifold and install the forward coupling to the trap tank mating manifold.

4.3.3 Refuel and Defuel Subsystem.

4.3.3.1 Component Removals.

4.3.3.1.1 Forward and aft fuselage dual float high level pilot valve (2) and associated piping.

4.3.3.1.1.1 Remove the forward fuselage pilot valve shown in T.O. 1F-111D-4-4, Figure 12, per instructions of T.O. 1F-111D-2-8-1, paragraph 9-61, Figure 9-11, "Removal of forward tank dual - float high level pilot valve" except remove housing and integral assembly as a unit.

4.3.3.1.1.2 Remove the aft fuselage dual float high level pilot valve shown in T.O. 1F-111D-4-4, Figure 18, per instructions of T.O. 1F-111D-2-8-1, paragraph 9-65, Figure 9-11, "Removal of aft tank dual high level pilot valve" except remove housing and integral assembly as a unit with housing seal.

4.3.3.1.1.3 Remove forward tank precheck lines from high level pilot valve to forward tank floor shown in T.O. 1F-111D-4-4, Figure 12, using normal maintenance procedures, precautions, and practices. Remove associated fittings and O-rings from tank floor structure.

4.3.3.1.1.4 Remove control lines and associated hardware from the forward tank high level pilot valve to forward tank refuel valve shown in T.O. 1F-111D-4-4, Figures 12 and 15, using normal maintenance procedures, precautions, and practices.

4.3.3.1.1.5 Remove the aft fuselage high level pilot valve precheck lines from the aft routing tunnel floor to the pilot valve shown in T.O. 1F-111D-4-4, Figure 18, using normal maintenance procedures, precautions, and practices.

4.3.3.1.1.6 Remove the control/sense lines from the aft tank high level pilot valve to the aft tank refuel shut off valve shown in T.O. 1F-111D-4-4, Figure 18, using normal maintenance procedures.

4.3.3.1.2 Remove the wing high level pilot valve precheck lines, shown in T.O. 1F-111D-4-4, Figure 12 (sheet 2), and Figure 15 (sheets 1 thru 3), from tank floor, (Figure 12) to the R & L bulkheads of the upper trap tank using normal maintenance practices, procedures and precautions. Remove all fittings and component seals and gaskets.

4.3.3.1.3 Remove the upper trap water drain lines shown in T.O. 1F-111D-4-4, Figure 15 (sheets 1 and 4), item "U", using normal maintenance procedures and precautions.

4.3.3.1.4 Removal of the air refueling receptacle will not be necessary. Prepare the refueling receptacle as follows:

4.3.3.1.4.1 Remove refuel manifold sections shown in T.O. 1F-111D-4-4, Figure 5 (sheet 3), and drain and pressure lines from drain box to tank floor and manifold. The associated fittings are included.

4.3.3.1.4.2 Plug aerial refuel elbow 12P128-3 shown in T.O. 1F-111D-4-4, Figure 5, Index 106.

4.3.3.1.4.3 Deleted.

4.3.3.1.5 Remove all the refuel manifold tubes, weapons bay tank fuel and air disconnects and drains, shown in T.O. 1F-111D-4-4, Figure 10 (sheet 1 thru 3). Also remove vent manifold shown and its associated hardware.

4.3.3.1.6 Remove the manifolds, housings, bulkhead fittings and associated hardware in the upper trap tank shown in T.O. 1F-111D-4-4, Figure 15 (sheets 1 thru 4). This includes the manifold section and bulkhead fitting in the wing sweep actuator area.

4.3.3.1.7 Remove the refuel shut off valve, T.O. 1F-111D-4-4, Figure 15 (sheet 3), detail "Q" per instructions in T.O. 1F-111D-2-8-1, paragraph 9-49, Figure 9-9, "Removal of forward tank refuel shut off valve."

4.3.3.1.8 Remove the forward tank gravity refuel caps, adapters and associated tubes, nipples, seals, and hardware shown in T.O. 1F-111D-4-4, Figure 11, per instructions in T.O. 1F-111D-2-8-1, paragraphs 3-90, 3-92, Figure 3-12, "Gravity filler caps."

4.3.3.1.9 Remove the forward fuselage tank water drain valves (housings and cores as a unit), associated tubing and hardware shown in T.O. 1F-111D-4-4, Figure 13, per the instructions contained in T.O. 1F-111D-2-8-1, paragraph 3-55, Figure 3-9, "Fuel tank drain valves."

4.3.3.1.10 Remove only the elbow section of the defuel manifold shown in T.O. 1F-111D-4-4, Figure 4. This includes couplings, support and bonding strap.

4.3.3.1.11 Remove the elbow section of the refuel manifold and its associated hardware shown in T.O. 1F-111D-4-4, Figure 3 (sheet 1).

4.3.3.1.11.1 Disconnect the six tubes from the tank floor fittings. Remove fittings from beneath the tank floor shown in T.O. 1F-111D-4-4, Figure 3 (sheet 1).

4.3.3.1.12 Remove the refuel manifold scavenge system tubing, ejector, and associated hardware and fittings inside the tank, shown in T.O. 1F-111D-4-4, Figure 3 (sheet 2).

4.3.3.1.13 Disconnect the drain tubes at the finger tank and aft tank bulkhead only as shown in T.O. 1F-111D-4-4, Figure 14. Remove fittings from tank bulkheads. Remove the drain valve and associated hardware from lower skin of the aft tank.

4.3.3.1.14 Disconnect the wing precheck interconnect, shown in T.O. 1F-111D-4-4, Figure 16 (sheet 1), detail "A", from upper trap tank bulkhead (L & R sides).

4.3.3.1.15 Disconnect the precheck lines, shown in T.O. 1F-111D-4-4, Figure 17 (sheet 1), detail "C", from aft tank structure and remove fitting through the tank skin.

4.3.3.1.16 Remove the elbow section only of the manifold shown in T.O. 1F-111D-4-4, Figure 17, detail "A". Disconnect the forward end of the manifold from the back of the upper trap tank and remove flanged section on trap tank.

4.3.3.1.17 Remove the aft fuselage tank refuel shut off valve shown in T.O. 1F-111D-4-4, Figure 18 (sheet 1), detail "J" (sheet 3), per the instructions contained in T.O. 1F-111D-2-8-1, paragraph 9-49, Figure 9-9, "Removal of fuselage tank refuel shut off valve", except remove housing and integral assembly as a unit.

4.3.3.1.18 Remove dump valve "A" shown in T.O. 1F-111D-4-4, Figure 18 (sheet 1), detail "L", per instructions in T.O. 1F-111D-2-8-1, paragraph 8-100, Figure 8-14, "Removal of fuel dump control valve".

4.3.3.1.19 Remove the manifold shown in T.O. 1F-111D-4-4, Figure 18 (sheet 1), from the forward end to detail "G" of Figure 18. Remove bulkhead fitting shown in detail "G" and first section of manifold shown aft of the aft tank bulkhead.

4.3.3.1.20 Assure that all attaching and associated hardware, fittings, seals, etc of the foregoing system components are removed and attached to their respective components. Assure that all bulkhead seals/gaskets are removed from the structure.

4.3.3.1.21 Remove the aft fuselage tank gravity filler cap and adapter shown in T.O. 1F-111D-4-4, Figure 18, detail "M" per instructions in T.O. 1F-111D-2-8-1, section III, "Gravity filler caps".

4.3.3.2 Component Installations.

4.3.3.2.1 Install the forward and aft tank high level pilot valves, shown in T.O. 1F-111D-4-4, Figure 18, per instructions in T.O. 1F-111D-2-8-1, paragraph 9-67, Figure 9-11, "Installation of aft tank dual-float high level pilot valves".

4.3.3.2.2 Install the forward and aft tank refuel shut off valves, shown in T.O. 1F-111D-4-4, Figure 12 and 18, per instructions in T.O. 1F-111D-2-8-1, paragraph 9-51, Figure 9-9, "Installation of fuselage tank refuel shutoff valves".

4.3.3.2.3 Install dump control valve "A" in the aft tank, shown in T.O. 1F-111D-4-4, Figure 18 (all sheets), per instructions in T.O. 1F-111D-2-8-1, paragraph 8-102, Figure 8-14, "Installation of fuel dump control valves".

4.3.3.2.4 Install the forward and aft tanks gravity filler installations, shown in T.O. 1F-111D-4-4, Figures 11 and 18, per instructions in T.O. 1F-111D-2-8-1, paragraphs 3-91 and 3-92, Figure 3-12, "Gravity Filler Adapters".

4.3.3.2.5 Install the finger tank drain installation bulkhead fittings to the finger and A-1 tank bulkheads and connect and torque the drain lines (R & L) to their respective bulkheads.

4.3.3.2.6 Reinstall the refuel/dump manifold tubes, shown in T.O. 1F-111D-4-4, Figure 18, in the aft tank. This is the manifold from the upper routing tunnel floor to the A-2 aft bulkhead.

4.3.3.2.7 Install the aft tank high level pilot valve precheck lines, shown in T.O. 1F-111D-4-4, Figure 18.

4.3.3.2.8 Install sense/operating lines between aft tank high level pilot valve and its respective refuel shut off valve, shown in T.O. 1F-111D-4-4, Figure 18.

4.3.3.2.9 Install and reconnect the section of dump line aft of the A-2 tank aft bulkhead, shown in T.O. 1F-111D-4-4, Figure 18.

4.3.3.2.10 Install the aft elbow section of the refuel line in the over wheel well area of the fuselage, shown in T.O. 1F-111D-4-4, Figure 17.

4.3.3.2.11 Install the fittings in the aft upper routing tunnel floor for the aft tank high level pilot valve precheck lines, shown in T.O. 1F-111D-4-4, Figure 17, and reconnect precheck lines to these fittings.

4.3.3.2.12 Install the coupling on the forward end of the refuel line, in the over wheel well area of the fuselage, to the aft bulkhead of the upper trap tank shown in T.O. 1F-111D-4-4, Figure 17.

4.3.3.2.13 Install the refuel manifold in the upper trap tank, shown in T.O. 1F-111D-4-4, Figure 15, using normal maintenance procedures and precautions. Install the R & L wing adapters to the outboard bulkheads of the trap tank and connect the manifolds to them. Also connect the refuel line to the forward tank refuel shut off valve. This also includes the installation of the bulkhead fitting on the tank aft bulkhead and attachment of the refuel line to the over wheel well section of the refuel line. See detail "K" & "J" & "M" for detailed installation data.

4.3.3.2.14 Install the precheck lines, for the wing, in the upper trap tank, as described in 4.3.3.2.13 and in T.O. 1F-111D-4-4, Figure 15. See details "C" and "R".

4.3.3.2.15 Install the sense/control lines for the refuel shut off valve in the upper trap tank shown in T.O. 1F-111D-4-4, Figure 15.

4.3.3.2.16 Install the section of refuel manifold, shown in T.O. 1F-111D-4-4, Figure 15 (sheet 4), details "V" and "W" in the wing sweep actuator area.

4.3.3.2.17 Install the upper trap tank water drain system tubes shown in T.O. 1F-111D-4-4, Figure 15, (sheet 4), detail "U".

4.3.3.2.18 Install the section of refuel manifold shown in T.O. 1F-111D-4-4, Figure 5, detail "D" to the outboard aerial refuel well bulkhead.

4.3.3.2.19 Install the aerial refuel receptacle shown in T.O. 1F-111D-4-4, Figure 5, per the instructions in T.O. 1F-111D-2-8-1, paragraph 9-97, Figure 9-16, "Installation of aerial refuel receptacle". Connect all hydraulic and pneumatic tubing described and accomplish all progressive inspections and checks required by these instructions.

4.3.3.2.20 Install the drain tubes from the aerial refuel well to the tank floor shown in T.O. 1F-111D-4-4, Figure 5, (sheet 3).

4.3.3.2.21 Install the aerial refuel system pressure disconnect tubing shown in T.O. 1F-111D-4-4, Figure 5 (sheet 3), between the aerial refuel well and the refuel manifold.

4.3.3.2.22 Install the section of refuel manifold shown in T.O. 1F-111D-4-4, Figure 5 (sheet 3), detail "E".

4.3.3.2.23 Install all refuel and vent manifold tubes shown in T.O. 1F-111D-4-4, Figure 10, and their associated hardware. Use normal maintenance procedures and precautions when installing these manifold sections. This also includes the weapons bay tank disconnects.

NOTE

When installing the vent tube bell-mouth section shown in Figure 10 above, maintain one inch clearance between bellmouth, centerline and aircraft structure.

4.3.3.2.24 Install the precheck lines, shown in T.O. 1F-111D-4-4, Figure 12 (sheet 1 and 2), from the forward tank high level pilot valve and forward tank floor. Install attaching fittings into the floor plate and connect lines to them.

4.3.3.2.25 Install the sense/control lines shown in T.O. 1F-111D-4-4, Figure 12 (sheets 1 and 2), from the tank high level pilot valve to the forward tank refuel shut off valve sections in the upper trap tank (ref. 4.3.3.2.15 of this A.E.I.).

4.3.3.2.27 Install the refuel manifold scavenge system shown in T.O. 1F-111D-4-4, Figure 3 (sheets 1 and 2), between boost pump 3 and the forward tank floor plate adjacent to the ground refuel manifold section. This includes the small ejector pump.

4.3.3.2.28 Install the elbow section of the ground refuel manifold, shown in T.O. 1F-111D-4-4, Figure 3, between the manifold and the tank floor.

4.3.3.2.29 Install the fittings into the lower side of the forward tank floor plate shown in T.O. 1F-111D-4-4, Figure 3, and connect attaching precheck and scavenge lines to them as shown.

4.3.3.2.30 Install the ground defuel manifold elbow section and associated hardware to the task floor and manifold, shown in T.O. 1F-111D-4-4, Figure 4.

4.3.3.2.31 Install the forward and aft tank water drain systems and drain valves shown in T.O. 1F-111D-4-4, Figure 13 and 14. Use instructions contained in T.O. 1F-111D-2-8-1, paragraph 3-56, Figure 3-9, "Fuel tank drain valve". The drain valves were removed as a unit (housing and core) and should be reinstalled in the same configuration.

4.3.3.2.32 Install the fuselage section of the wing precheck interconnect (L & R) shown in T.O. 1F-111D-4-4, Figure 16, detail "A", to the upper trap tank outboard bulkheads per instructions in T.O. 1F-111D-2-8-1, paragraph 8-94, Figure 8-13, "Installation of refuel precheck interconnects".

4.3.3.2.33 All cover plates over tank openings should be removed prior to installations and openings checked for obstructions and cleaned using standard cleaning methods.

4.3.3.2.34 Torque all couplings per T.O. 1F-111D-2-8-1, Figures 3-3 and 3-4.

4.3.3.2.35 Torque all tubing "B" nuts per T.O. 1F-111D-2-1, Section I, "Torque values for tubing and fittings".

4.3.4 Transfer - Dump Fuel Subsystem

4.3.4.1 Component Removals

4.3.4.1.1 Remove forward tank interconnects, shown in T.O. 1F-111D-4-4, Figure 21

4.3.4.1.2 Remove forward tank vent tubes and fitting shown in T.O. 1F-111D-4-4, Figure 10.

4.3.4.1.3 Remove the four (4) bulkhead flapper check valves and seats, as a unit, shown in T.O. 1F-111D-4-4, Figure 21.

4.3.4.1.4 Remove the fuel transfer and external store air pressure manifold tubes, adapters, and bulkhead fittings in the upper trap tank shown in T.O. 1F-111D-4-4, Figure 22.

4.3.4.1.5 Remove the section of fuel transfer manifold and associated bulkhead fittings from the wing actuator area shown in T.O. 1F-111D-4-4, Figure 22, detail "A".

NOTE

The left hand wing sweep actuator will have to be removed to provide access necessary to remove manifold. Reference paragraph 4.1.2.4 of this AEI for removal, installation, and check-out of this actuator.

4.3.4.1.6 Disconnect the fuel transfer and external store air pressure interconnects from the L & R outboard trap tank bulkhead shown in T.O. 1F-111D-4-4, Figure 23, per instructions in T.O. 1F-111D-2-8-1, paragraph 8-82, Figure 8-13, "Removal of wing interconnect". Use only applicable portion. Do not remove interconnect section adjacent to trap tank, just move to side so that a cover plate can be installed over the trap tank opening.

4.3.4.1.7 Remove dump system shut off valves and bulkhead tubes, shown in T.O. 1F-111D-4-4, Figure 35, detail "B", per instructions in T.O. 1F-111D-2-8-1, paragraph 8-112, Figure 8-15, "Removal of dump shutoff valves "B" & "C". Cover tank opening.

4.3.4.1.8 Disconnect the external air pressure line from aft side of trap tank bulkhead and remove bulkhead fitting, shown in T.O. 1F-111D-4-4, Figure 35, detail "A". Cover tank opening.

4.3.4.1.9 Remove the elbow section at the aft end of the transfer manifold where it attaches to the aft tank structure shown in T.O. 1F-111D-4-4, Figure 35, detail "J". Do not disturb the remainder of transfer manifold shown in Figure 35. Disconnect forward section of transfer tube from trap tank bulkhead and remove bulkhead fitting if applicable.

4.3.4.1.10 Remove the Bay A1/A2 standpipe (fill and vent) shown in T.O. 1F-111D-4-4, Figure 36. This includes the interconnect tubes from this manifold to the R & L saddle tank bulkhead. See T.O. 1F-111D-2-8-1, Figures 1-1 thru 1-9, for additional details.

4.3.4.1.11 Remove the saddle tank drain tubes (R & L) from the saddle tank bulkhead to the A1/A2 boundary bulkhead shown in T.O. 1F-111D-4-4, Figure 36. Remove bulkhead fittings and flapper check valves and seats as a unit as shown in Figure 36.

4.3.4.1.12 Remove vent tank pressurization and vent manifold tubes shown in T.O. 1F-111D-4-4, Figure 36. This includes drain valve tube installation shown attached to these manifolds. See T.O. 1F-111D-2-8-1, Figure 1-1 thru 1-9, for further tank component clarification.

NOTE

See T.O. 1F-111D-4-4, Figure 37 for detail information regarding aft fuselage fuel transfer system brackets, jumper assemblies, supports, and cushions. Remove fixed bracket cushions from brackets leaving fixed brackets in the tanks.

4.3.4.1.13 Remove automatic transfer valve per T.O. 1F-111D-2-8-1, paragraph 8-52, Figure 1-4 and 8-9, "Removal of automatic transfer valve".

4.3.4.1.14 Remove auto transfer pilot float valve from F2 tank per instructions in T.O. 1F-111D-2-8-1, paragraph 8-58, Figure 8-10, "Removal of automatic transfer pilot float valve".

4.3.4.1.15 Remove the actuation lines between the auto transfer pilot float valve, auto transfer solenoid valve, and auto transfer valve in the forward, lower trap, and upper trap tank as shown in T.O. 1F-111D-4-4, Figures 42, 43, and 44.

4.3.4.2 Component Installations

4.3.4.2.1 Install the forward tank interconnects/standpipes shown in T.O. 1F-111D-4-4, Figure 21.

4.3.4.2.2. Install the forward tank vent tube and fittings shown in T.O. 1F-111D-4-4, Figure 10.

4.3.4.2.3 Install the four (4) bulkhead flapper check valves shown in T.O. 1F-111D-4-4, Figure 21.

4.3.4.2.4 Install the fuel transfer and external stores air pressure manifold tubes, bulkhead adapters in the upper trap tank shown in T.O. 1F-111D-4-4, Figure 22.

4.3.4.2.5 Install the section of fuel transfer manifold and associated bulkhead fittings and hardware from the wing actuator area shown in T.O. 1F-111D-4-4, Figure 22, detail "A".

4.3.4.2.6 Re-attach the fuel transfer and external tank air pressure interconnects to the R & L outboard trap tank bulkheads shown in T.O. 1F-111D-4-4, Figure 23, per T.O. 1F-111D-2-8-1, paragraph 8-84, Figure 8-13, "Installation of fuel interconnect" appropriate steps.

4.3.4.2.7 Install the dump system shut off valves and associated bulkhead tubes shown in T.O. 1F-111D-4-4, Figure 35, detail "E", per T.O. 1F-111D-2-8-1, paragraph 8-114, Figure 8-15, "Install dump system shut off valves B & C" instructions.

4.3.4.2.8 Install the fitting to the aft bulkhead of the upper trap tank and connect air pressure line to it shown in T.O. 1F-111D-4-4, Figure 35, detail "A".

4.3.4.2.9 Install the elbow section of the aft section of the transfer manifold tube and adjacent tank structure shown in T.O. 1F-111D-4-4, Figure 35, detail "J". Also connect the forward end of this transfer manifold tube to the upper trap tank aft bulkhead. Install bulkhead adapter if applicable.

4.3.4.2.10 Install the bay A1/A2 standpipe (fill and vent) shown in T.O. 1F-111D-4-4, Figure 36. This includes the interconnect tubes from the saddle tank bulkhead to the standpipe. Assure that saddle tank bulkhead fittings are installed first. See T.O. 1F-111D-2-8-1, Figures 1-6 and 1-7, for further details.

4.3.4.2.11 Install the saddle tank drain tubes from saddle tank bulkhead to A1/A2 bulkhead shown in T.O. 1F-111D-4-4, Figure 36. Install bulkhead fittings first and attach drain tubes. Also install the fuel tank bulkhead flapper check valves and seats in the bulkhead A1/A2 intersection. See T.O. 1F-111D-2-8-1, Figures 1-6 and 1-7, for more details.

4.3.4.2.12 Install the vent tank pressurization and vent manifold tubes shown in T.O. 1F-111D-4-4, Figure 36. This includes the tube drain check valves and associated tubing and hardware.

NOTE

See T.O. 1F-111D-4-4, Figure 37, for detail information regarding aft fuselage fuel transfer system brackets, jumper assemblies, supports and cushions. Assure that teflon brackets supports (fixed) are installed.

4.3.4.2.13 Install automatic transfer valve shown in T.O. 1F-111D-4-4, Figure 43, per instructions in T.O. 1F-111D-2-8-1, paragraph 8-54, Figure 8-9, "Installation of automatic transfer valve".

4.3.4.2.14 Install automatic transfer pilot float valve in forward tank shown in T.O. 1F-111D-4-4, Figure 42, per instructions of T.O. 1F-111D-2-8-1, paragraph 8-60, Figure 8-10, "Installation of automatic transfer pilot float valve".

4.3.4.2.15 Install actuation line between the automatic transfer pilot float valve, automatic transfer valve and automatic transfer solenoid valve in the forward, lower trap, and upper trap tank, shown in T.O. 1F-111D-4-4, Figures 42, 43, and 44.

4.3.5 Vent and Pressurization Subsystem.

4.3.5.1 Component Removals.

4.3.5.1.2 Remove pressurization and vent control valve shown in T.O. 1F-111D-4-4, Figure 39, per T.O. 1F-111D-2-8-1, paragraph 10-18, Figure 10-3, "Removal of pressurization and vent control valve".

4.3.5.1.2.1 Disconnect air pressure inlet line at the valve.

4.3.5.1.2.2 Disconnect the tank pressure sense line from the aft tank and remove fitting in aft tank. Do not remove sense line from valve. Remove ambient sense line from valve.

4.3.5.1.3 Remove the two (2) interconnect bellows shown in T.O. 1F-111D-4-4, Figure 39, detail "A", from between the aft tank and vertical fin lower surface per T.O. 1F-111D-2-8-1, paragraph 10-75, Figure 10-10, "Removal of interconnect belows".

4.3.5.1.4 Remove tank pressure gage sense line from forward tank. Remove fitting from tank and cover opening.

4.3.5.1.5 Remove upper trap tank vent and pressurization lines and adapters shown in T.O.1F-111D-4-4, Figure 22.

4.3.5.1.6 Detach the vent and pressurization interconnect fitting from the R & L outboard upper trap tank bulkheads, only. Push the fitting away from the bulkhead only far enough to install a cap over tank openings R & L. See T.O. 1F-111D-2-8-1, paragraph 10-47, Figure 10-8, "Removal of wing pivot fuel, vent, and pressurization interconnects".

4.3.5.2 Component Installations.

4.3.5.2.1 Install the pressurization and vent control valve shown in T.O. 1F-111D-4-4, Figure 39, per T.O. 1F-111D-2-8-1, paragraph 10-20, Figure 10-3, "Installation or pressurization and vent control valve".

4.3.5.2.1.1 Connect air pressure line to the valve.

4.3.5.2.1.2 Install fitting in the aft tank structure and attach tank pressure sense line to it. Reconnect ambient sense line to valve.

4.3.5.2.1.3 Install the two (2) interconnect bellows to the tank and vertical fin structure shown in T.O. 1F-111D-4-4, Figure 39, detail "A", per instructions of T.O. 1F-111D-2-8-1, paragraph 10-77, Figure 10-10, "Installation of interconnect bellows".

4.3.5.2.2 Install tank pressure gage fitting in forward tank structure, torque, and attach sense line to fitting.

4.3.5.2.3 Install upper trap tank vent and pressurization manifolds and adapters shown in T.O. 1F-111D-4-4, Figure 22.

4.3.5.2.4 Install the vent and pressurization interconnect bulkhead fitting to the R & L upper trap tank bulkheads shown in T.O. 1F-111D-2-8-1, paragraph 10-49, Figure 10-8, "Installation of wing pivot fuel, vent, and pressurization interconnect".

4.3.6 Fuel System Check-Out (Pre-Aircraft Tank Closure).

4.3.6.1 A fuel system integrity check-out must be accomplished after the system has been re-installed and prior to closing the tanks (re-installing all tank access covers, doors and panels) and wet checking the aircraft. The checks which are required are as follows.

4.3.6.1.1 Accomplish the "Forward Fuel Tank System Inspection and Pressure Tests" (Fuel Lines) per 12AEI-46-4005B.

4.3.6.1.2 Accomplish the "Aft Fuselage Fuel System Inspection and Leakage Pressure Tests" per 12AEI-46-4028.

4.3.6.1.3 Accomplish the "Final Check of Fuel System with Air Pressure" per 12AEI-46-4006.

4.3.6.2 After the aircraft has been moved outside to the fuel rack and serviced and wet checked the following system check-outs will be accomplished.

4.3.6.2.1 Operationally check the fuel system per the instructions contained in T.O. 1F-111D-2-8-1.

4.3.6.2.2 Accomplish Fuel System Flushing Procedure (see appendix J) and Fuel System Cleanliness Inspection (see Appendix K).

4.4 Environmental System.

4.4.1 General Maintenance Information

4.4.1.1 Reference selected portions of T.O. 1F-111D-2-15-1, Section III.

4.4.2 Air/Fuel heat exchanger system.

4.4.2.1 Removals

4.4.2.1.1 Remove the Air/Fuel heat exchanger fuel lines external to the tank shown in T.O. 1F-111D-4-4, Figure 8, per instructions of T.O. 1F-111D-2-15-1, paragraph 7-128,

*Figure 7-23, "Removal of air to fuel heat exchanger",* to gain access to fuel lines.

NOTE

Do not remove heat exchanger.

4.4.2.1.1.1 Disconnect fuel line couplings from the tank and remove.

4.4.2.1.2 Remove fuel pump shown in T.O. 1F-111D-4-4, Figure 8, per instructions contained in T.O. 1F-111D-2-15-1, paragraph 7-140, Figure 7-26, "Removal of air to fuel heat exchanger fuel pump".

4.4.2.1.3 Remove fuel to air heat exchanger system anti-suction valve shown in T.O. 1F-111D-4-4, Figure 8, per instructions of T.O. 1F-111D-2-15-1, paragraph 7-132, Figure 7-24, "Removal of fuel anti-suction valve".

4.4.2.1.4 Remove fuel pressure switch shown in T.O. 1F-111D-4-4, Figure 8, as a unit (switch, adapter, and seal) per instructions contained in T.O. 1F-111D-2-15-1, paragraph 7-136, Figure 7-25, "Removal of fuel pressure switch".

4.4.2.1.5 Remove pump housing, manifolds and associated hardware, fittings, bracketry, and pressure switch sense tubes shown in T.O. 1F-111D-4-4, Figure 8, per standard maintenance procedures and 4.3.1 of this A.E.I..

4.4.2.2 Installations

4.4.2.2.1 Installation of the Air To Fuel heat exchanger system.

4.4.2.2.2 Install fuel pump housing, associated manifolds, hardware, fittings, seals, bracketry and fuel press switch sense lines shown in T.O. 1F-111D-4-4, Figure 8, per standard maintenance procedures and general maintenance practices of T.O. 1F-111D-2-15-1.

4.4.2.2.3 Install fuel lines between air/fuel heat exchanger and tank shown in T.O. 1F-111D-4-4, Figure 8, per instructions in T.O. 1F-111D-2-15-1, paragraph 7-129, Figure 7-23, "Installation of air to fuel heat exchanger", applicable steps.

Install fuel anti-suction valve shown in T.O. 1F-111D-4-4, Figure 8, per instructions in T.O. 1F-111D-2-15-1, paragraph 7-133, Figure 7-24, "Installation of fuel anti-suction valve".

4.4.2.2.4 Install fuel pump shown in T.O. 1F-111D-4-4, Figure 8, per instructions in T.O. 1F-111D-2-15-1, paragraph 7-141, Figure 7-76, "Installation of fuel boost pump".

4.4.2.3 System Check-out.

4.4.2.3.1 Air to fuel heat exchanger system check-out

NOTE

Progressive checks must be made during system installation see T.O. 1F-111D-2-15-1, Section VII, Component installations for air to fuel heat exchanger systems. It is recommended that installations be deferred until a/c is configured to successfully accomplish these checks.

4.4.2.3.1.1 Accomplish air to fuel heat exchanger system check-out, in addition to those in proceding note, per 12AEI-46-1042.

4.4.2.3.1.2 Perform an operational check of the Air/fuel heat exchanger system and disturbed systems during post modification aircraft check-out per T.O. 1F-111D-2-15-1, paragraph 7-31.

4.4.3 Forced air cooled aft electronic system.

4.4.3.1 Removals.

4.4.3.1.1 Remove the forced air cooled tail electronic system manifold shown in T.O. 1F-111D-4-7, Figure 13, between F.S. 536 and 770, approximately, per standard maintenance procedure and practices. Removal necessary to gain access to several fuel and fuel quantity components in the routing tunnel area located beneath this duct.

4.4.3.2 Installations.

4.4.3.2.1 Install the forced air cooled tail electronic system manifold shown in T.O. 1F-111D-4-7, Figure 13, between F.S. 536 and 770, approximately, per standard maintenance procedures and practices.

4.4.3.2.2 Perform a confidence leak check of the disturbed ducting per T.O. 1F-111D-2-15-1, paragraph 3-63.

4.5 Electrical

4.5.1 General Procedures

4.5.1.1 Electrical components located in the fuselage fuel tanks consist of fuel quantity tank units and their associated cable assemblies and cable assemblies for the fuel booster pumps.

4.5.1.2 Component location and access are shown in T.O. 1F-111D-2-8-1, Figures 3-10 and 5-6.

4.5.1.3 Each tank unit shall be identified and tagged upon removal using the tank unit index on T.O. 1F-111D-2-8-1, Figure 5-6. The tank unit cable assemblies shall be tagged using the associated tank unit identifier. For example, the tank unit located at station 426 R/H will be identified as "A11". The associated cable assembly will also be tagged "A11". The booster pump cable assemblies will be identified by the associated pump number (1 thru 6). These cable assembly installations are shown in T.O. 1F-111D-4-4, Figures 56 and 59.

4.5.2 Component Removal.

4.5.2.1 Tank unit cable assemblies shall be removed per T.O. 1F-111D-2-8-1, paragraphs 3-65 thru 3-69, and Figure 3-10.

4.5.2.2 Dual sensor flange mounted tank units shall be removed per T.O. 1F-111D-2-8-1, paragraphs 5-111 thru 5-113, and Figure 5-17.

4.5.2.3 Flush mounted tank units shall be removed per T.O. 1F-111D-2-8-1, paragraphs 5-115, 5-116, 5-117, and 5-119, and Figure 5-18.

4.5.2.4 Internally mounted tank units shall be removed per T.O. 1F-111D-2-8-1, paragraphs 5-1235 thru 5-127 and Figures 5-21 and 5-22.

4.5.2.5 Remove RE2669 flap/slat test control assembly for access to the lower trap tank door. Reference 3.5 of this A.E.I..

4.5.2.6 Remove coax and wiring harness from support brackets in the upper trough as required to gain access to reseal holes and tank unit A21 and A22. Reference T.O. 1F-111D-2-8-1, Figure 5-6.

CAUTION

During deseal of F-1, F-2 and saddle/finger tanks periodic checks should be made of cheek areas to prevent chemical spray from damaging relay panels and related equipment.

4.5.2.7 Remove booster pump cable assemblies ref T.O. 1F-111D-4-4, Figures 53, 56, and 59.

4.5.2.8 Remove the 12D760 float switch cable assembly ref T.O. 1F-111D-4-4, Figure 53.

4.5.3 Component Reinstallation

4.5.3.1 Reinstall tank unit cable assemblies per T.O. 1F-111D-2-8-1, paragraph 3-70.

4.5.3.2. Reinstall sensor flange mounted tank units per T.O. 1F-111D-2-8-1, paragraph 5-114.

4.5.3.3 Reinstall flush mounted tank units per T.O. 1F-111D-2-8-1, paragraphs 5-118 and 5-120.

4.5.3.4 Reinstall internally mounted tank units per T.O. 1F-111D-2-8-1, paragraphs 5-128 and 5-130.

4.5.3.5 Reinstall RE2669 flap/slat test control assembly. (Removed per paragraph 4.5.2.5).

4.5.3.6 Reinstall coax and wiring harness on support brackets in upper trough (removed per paragraph 4.5.2.6).

4.5.3.7 Reinstall booster pump cable assemblies (removed per paragraph 4.5.2.7).

4.5.3.8 Reinstall the 129760 float switch cable assembly. (Removed per paragraph 4.5.2.8).

4.5.4 System Check-Out.

4.5.4.1 The system confidence check of T.O. 1F-111D-2-8-1, paragraphs 5-64 thru 5-74, 5-76 thru 5-84, 6-10 thru 6-13.1 must be accomplished after deseal/resealing procedures are completed and prior to putting fuel in the fuel tanks.

4.5.4.2 The system confidence check of T.O. 1F-111D-2-8-1, paragraphs 5-5 thru 5-6, and 6-13m thru 6-13as, shall be accomplished after the fuel tanks have been refueled.

4.6 Armament

4.6.1 Component Removal

4.6.1.1 Remove conveyor assembly per T.O. 1F-111D-2-11-1, paragraphs 6-77 and 6-78. (Ref Figure 6-22).

4.6.1.2 Remove Ammunition drum assembly per T.O. 1F-111D-2-11-1, paragraphs 6-67, 6-68 and 6-68.b. thru 6-68.e. (Ref. T.O. Figure 6-20).

4.6.1.3 Bag all loose hardware and attach bags to applicable components. Tag each component with name and aircraft tail number, and store for reinstallation.

4.6.2 Component installations.

4.6.2.1 Install ammunition drum per T.O. 1F-111D-2-11-1, paragraph 6-69 thru 6-70.e. (Ref. Figure 6-20).

4.6.2.2 Install conveyor assembly per T.O. 1F-111D-2-11-1 paragraph 6-79 thru 6-80.h.

4.6.3 Operational checkout.

4.6.3.1 Perform operational checkout of weapons bay gun system, as required per T.O. 1F-111D-2-11-1, Figure 6-3.

5.0 DESEAL AND RESEAL PROCEDURES

5.1 Desealing the Fuselage Fuel Tanks (Except WCTB).

NOTE

Replacement is not mandatory for the existing light gray colored EC-5123 sealant on fuel tank access doors and on the davis nuts which are on fuel tube bulkhead fittings. However, if this sealant is damaged it shall be repaired.

5.1.1 Preparation for Chemical Desealing

NOTE

If all sealant is to be removed with the high pressure water jet, eliminate steps 5.1.1.1 thru 5.1.4.4 with the exception of step 5.1.1.5. Accomplish 5.1.1.5 and proceed directly to step 5.1.4.5.

5.1.1.1 Before the chemical desealing process for removing sealant from the fuel tanks can begin it will be necessary to complete the defueling and purging processes and remove all fuel system, electrical and hydraulic system components so that the tanks are completely empty of equipment.

NOTE

The chemical desealing process shall not be used in the wing carry through box (WCTB). For procedures to be used in the WCTB see 5.2.

5.1.1.2 Insure that the airplane is properly grounded.

5.1.1.3 Locate the airplane in a diked area to insure control of desealing fluid in the event of major leakage.

5.1.1.4 Prepare the left and right side saddle and finger tank panels in accordance with 5.4.

5.1.1.5 Block all openings in tank walls by installing gaskets and cover plates shown in Figure 5.1-1.

5.1.1.6 Install temporary closure panels containing spray heads and suction lines on the left and right side saddle and finger tanks as shown in Figure 5.1-2.

5.1.1.7 Install distribution lines and spray leads furnished by Eldorado Chemical Co. and attach to the temporary access covers in the F-1, F-2, Lower Trap, A-1 and A-2 fuel tanks.

5.1.1.8 Connect the chemical desealing fluid supply and return lines from the Eldorado Chemical Co. furnished recirculating spray pumping units to the distribution line attach points on each tank.

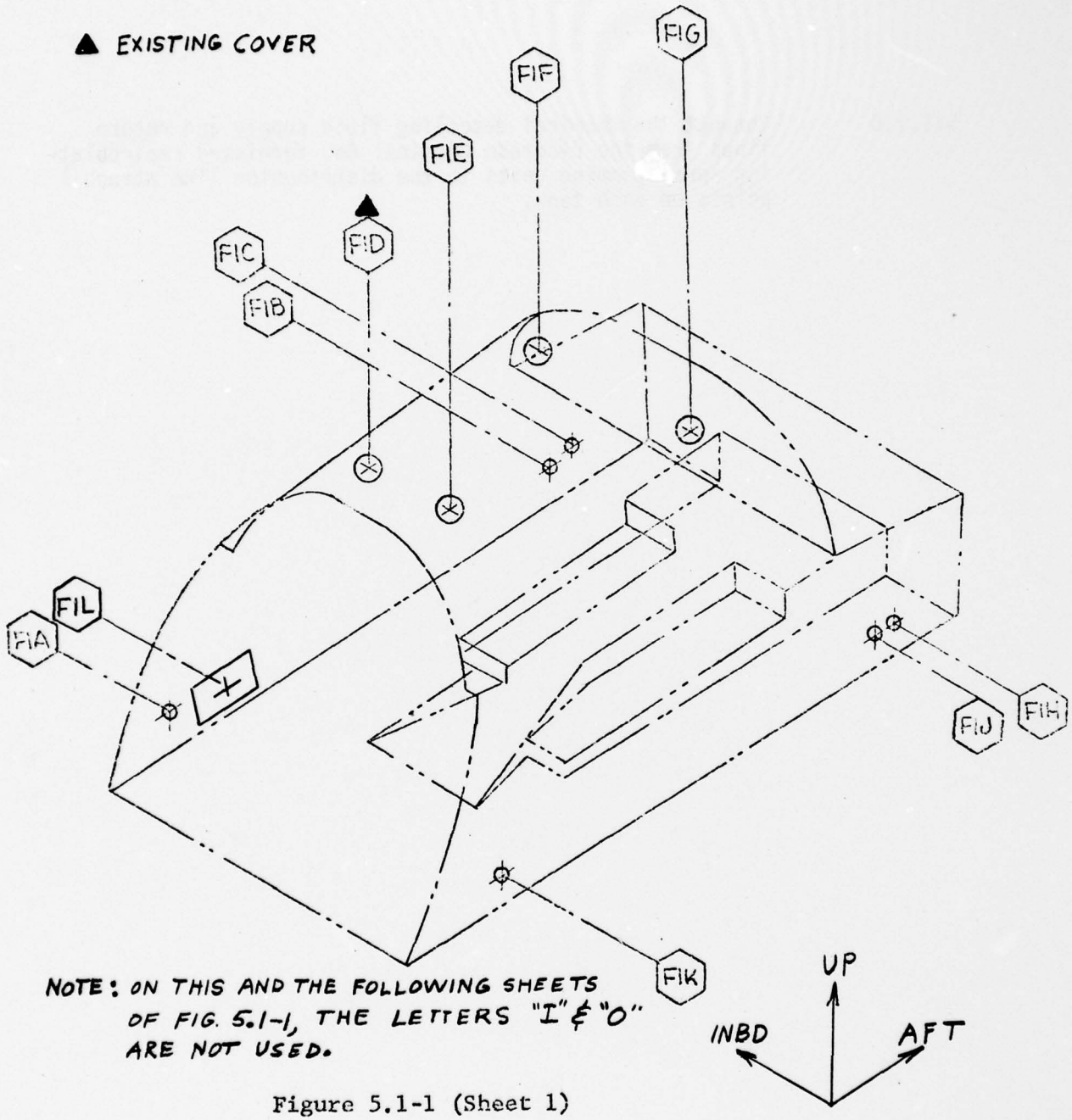



Figure 5.1-1 (Sheet 1)

# F-1 FUEL TANK

SEE T.O. 1F-111(x)-2-8-1 FOR TANK LOCATION

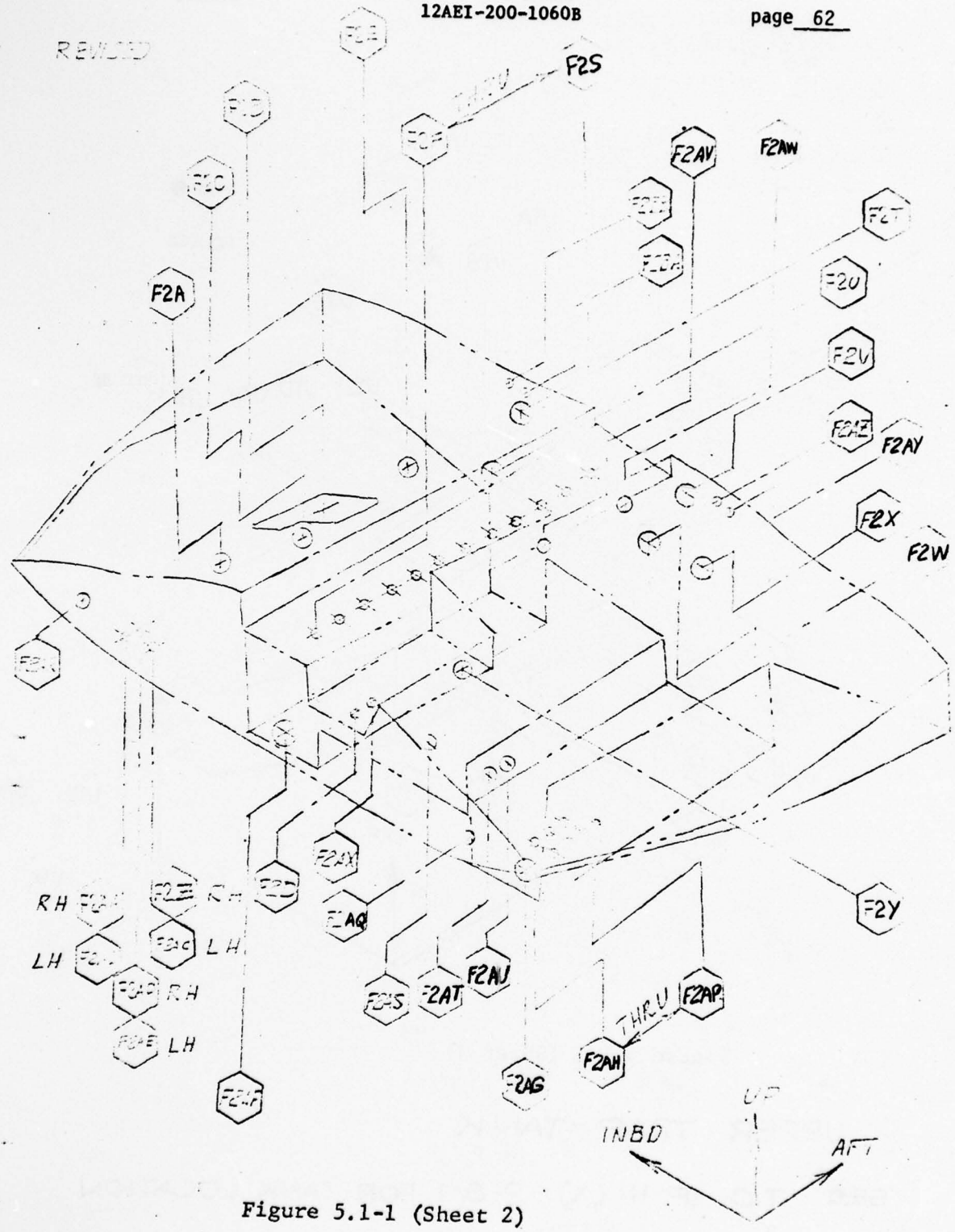



Figure 5.1-1 (Sheet 2)

F-2 FUEL TANK

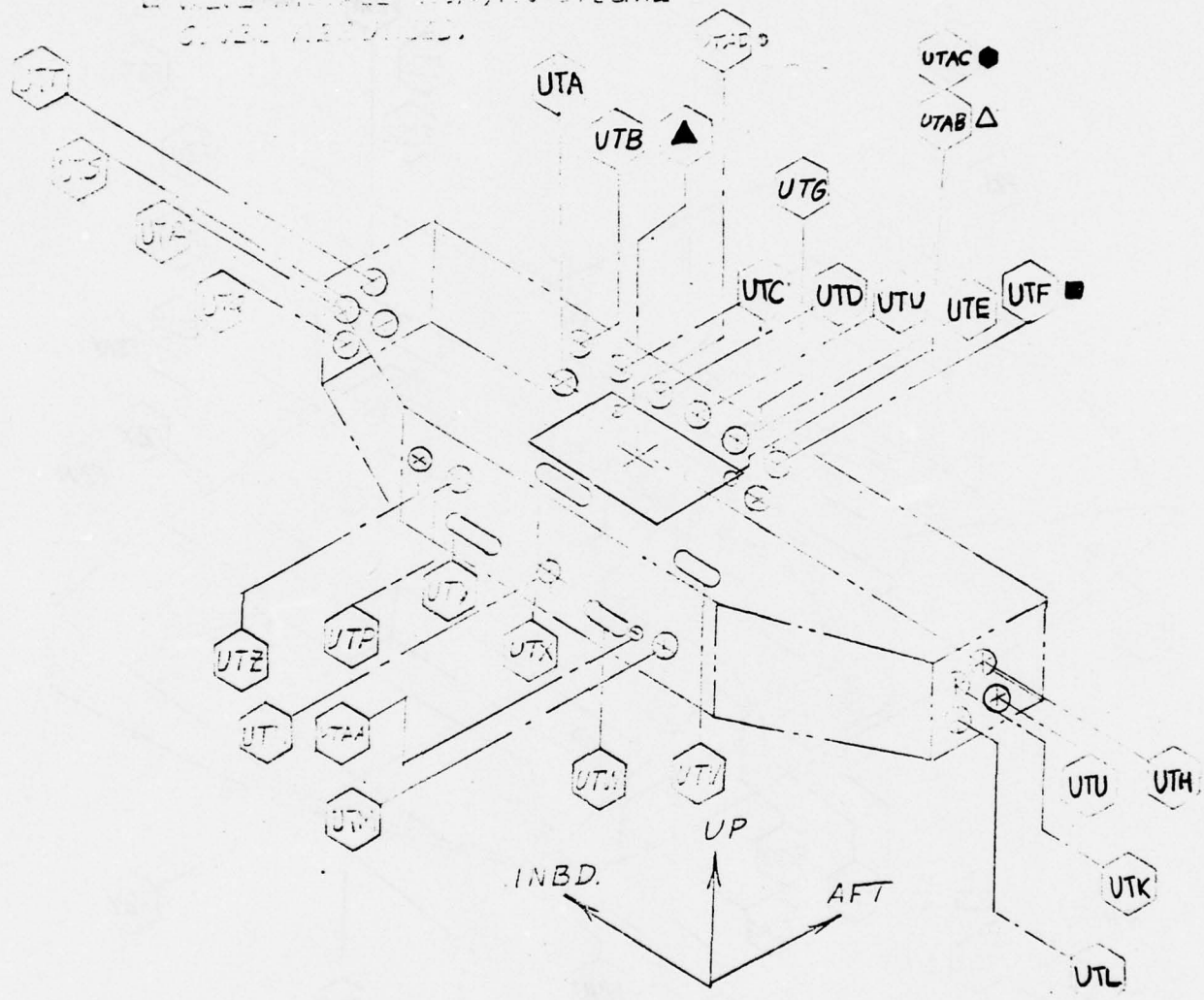
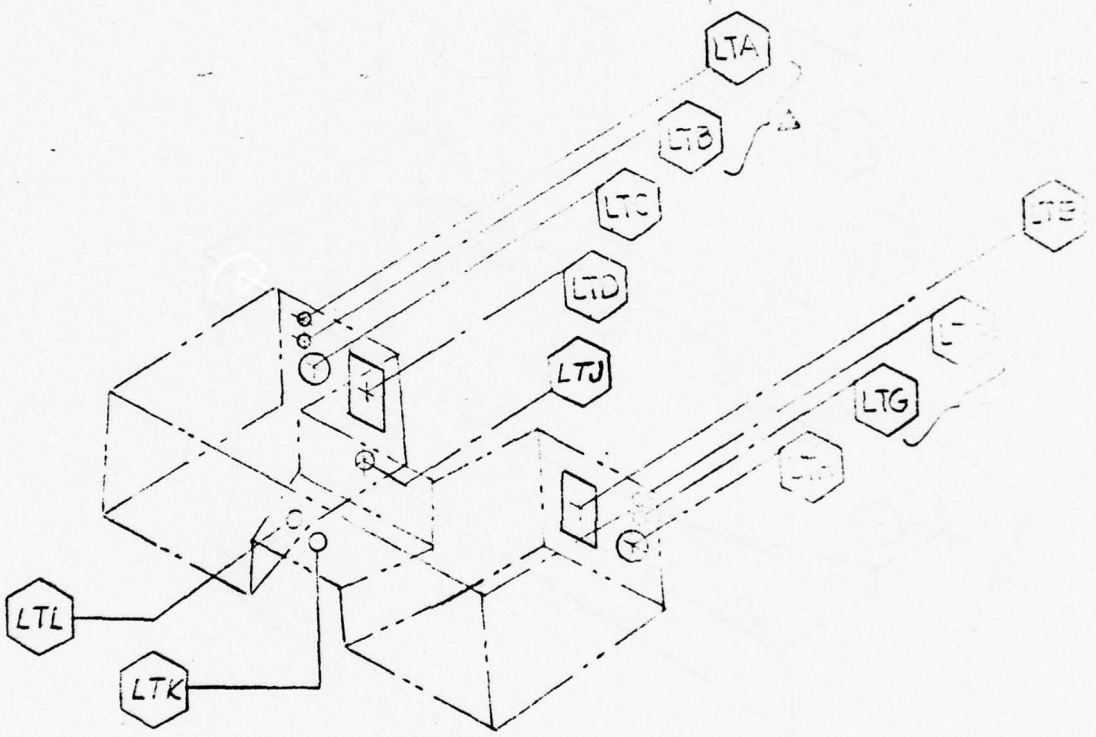



Figure 5.1-1 (Sheet 3)

UPPER TRAP TANK

SEE T.O. 1F-111 (x) - 2-8-1 FOR TANK LOCATION

BEST AVAILABLE COPY




△ LTA & LTB CLOSED WITH THE SAME COVER
□ LTF & LTG CLOSED WITH THE SAME COVER

Figure 5.1-1 (Sheet 4)

LOWER TRAP TANK

SEE T.O. 1F-111(x)-2-8-1 FOR TANK LOCATION

BEST AVAILABLE COPY

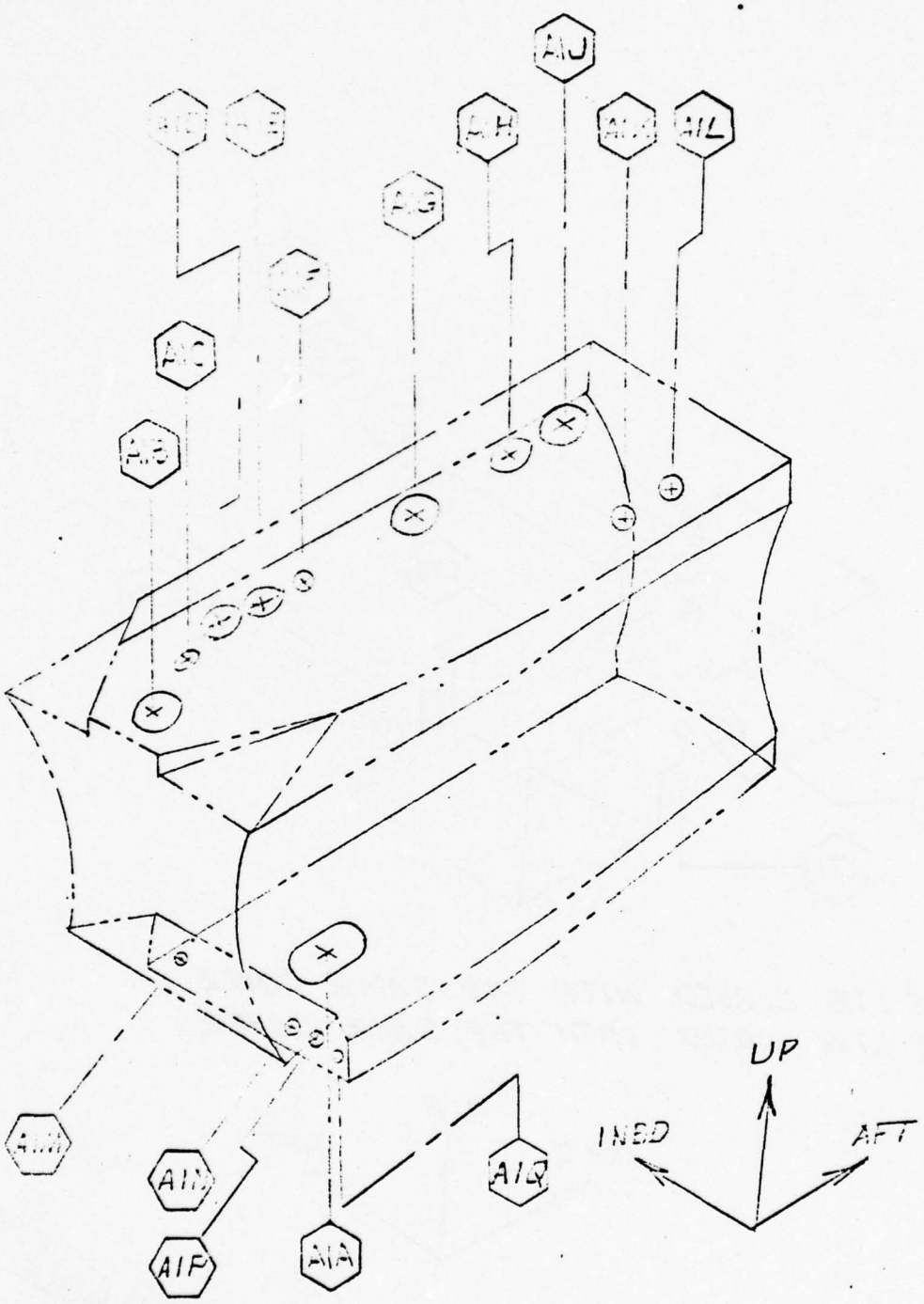



Figure 5.1-1 (Sheet 5)

A-1 FUEL TANK

SEE T.O. 1F-111(X)-2-8-1 FOR TANK LOCATION

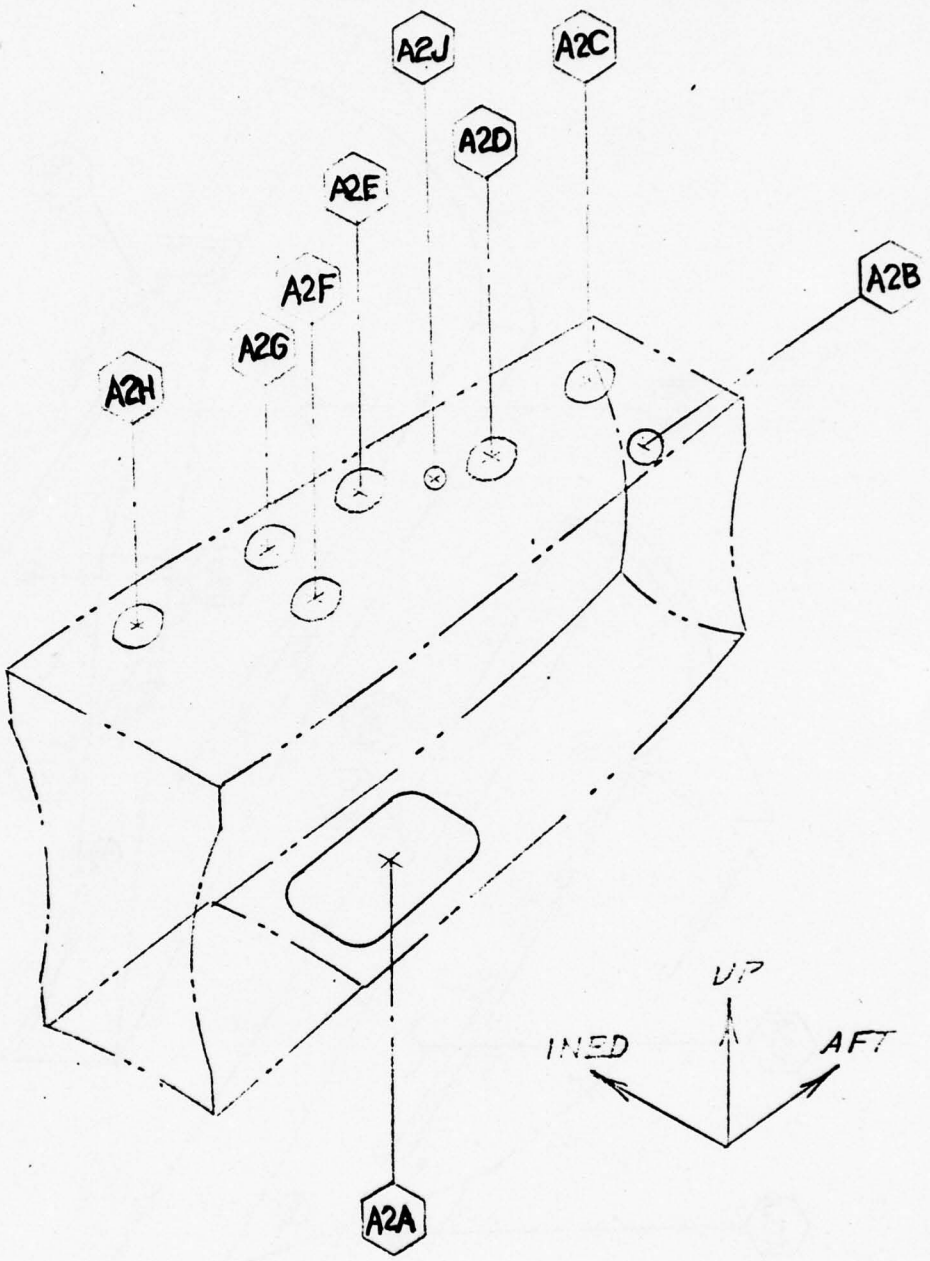



Figure 5.1-1 (Sheet 6)

# A-2 FUEL TANK

SEE T.O. 1F-111(X)-2-8-1 FOR TANK LOCATION

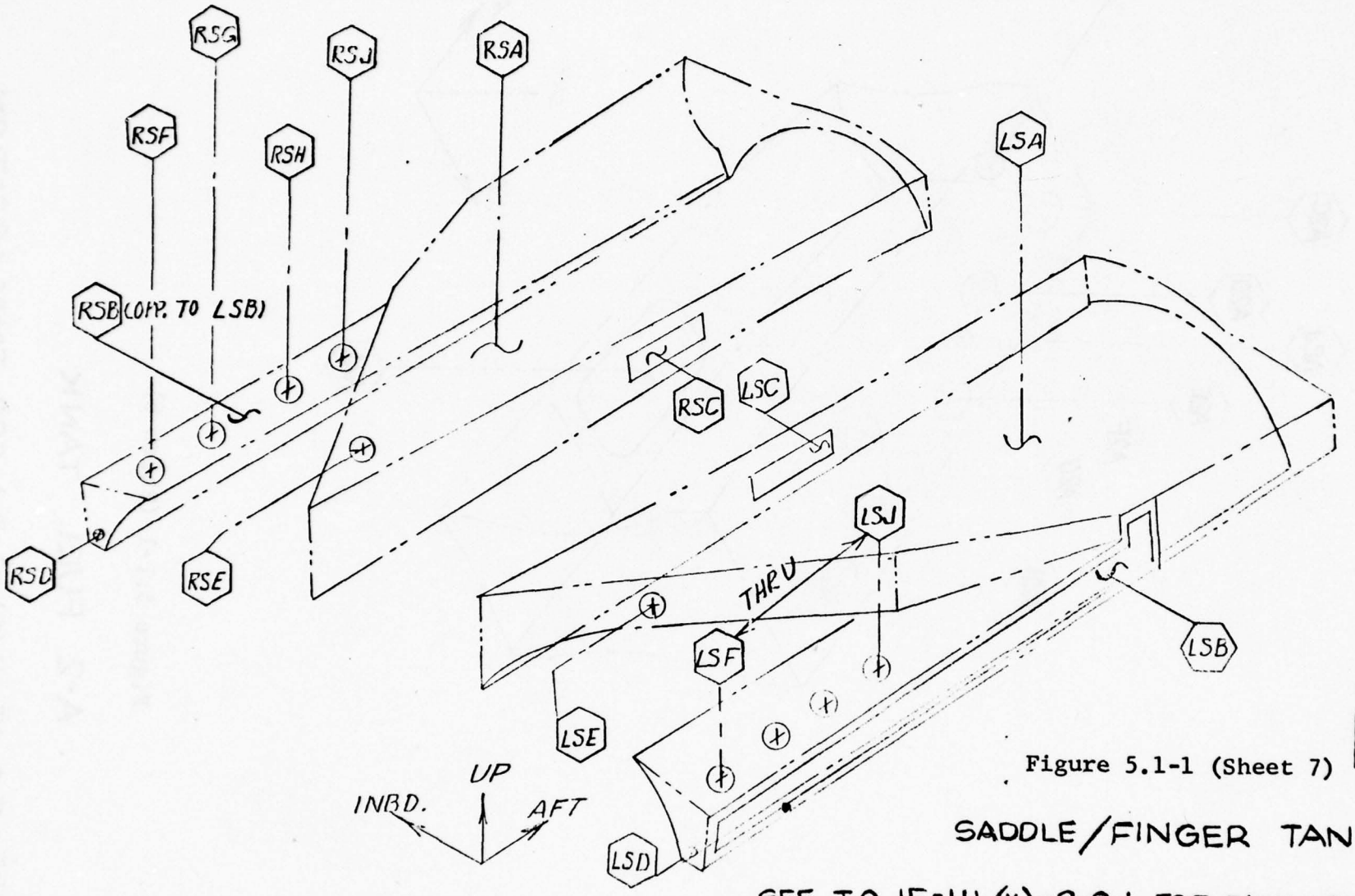



Figure 5.1-1 (Sheet 7)

SADDLE/FINGER TANKS

SEE T.O. 1F-111 (x)-2-8-1 FOR TANK LOCATIONS

CLOSURE COVERS/PLUGS FOR DESEALING
AND PRESSURE TESTING

1. F-1 TANK

F1-A, F1-B, F1-C, F1-H, F1-J, F1-K (6 PLUGS, AN814-16)

F1-D*, F1-E, F1-F, F1-G, F1-L (5 COVERS)

* EXISTING A/C COVER - 12B5236-1

2. F-2 TANK

F2-A, F2-B, F2-C, F2-E, F2-F, F2-G, F2-H, F2-J, F2-K, F2-L, F2-M, (L&M IS ONE COVER), F2-N, F2-P, F2-Q, F2-R*, F2-S, F2-T, F2-U, F2-V, F2-W, F2-X, F2-Y, F2-AD, F2-AE, F2-AQ, F2-AR, F2-AS, F2-AT, F2-AU, F2-AV, F2-AW (30 COVERS)

* EXISTING COVER

F2-AH, F2-AX (2 PLUGS, AN814-5)

F2-D, F2-Z, F2-AA, F2-AB, F2-AC, F2-AJ, F2-AK, F2-AL, F2-AM, F2-AN, F2-AP, F2-AY, F2-AZ, F2-BA, F2-BB (15 PLUGS, AN814-6)

FS-AF, F2-AG (2 CAPS, C018-5-48)

3. UPPER TRAP TANK (WING CARRY THRU BOX)

UTA, UTG, UTAA (3 COVERS FOR PRESSURE TEST ONLY)

UTB & UTC ((1) 2-3/4 DIA. ADJ STOPPER FOR PRESSURE TEST ONLY)
UTD, UTN, UTP ((3) 3-3/4 DIA. ADJ STOPPER FOR PRESSURE TEST ONLY)
UTE & UTU ((1) 3-3/4 DIA. ADJ STOPPER FOR PRESSURE TEST ONLY)
UTM ((1) 3-1/4 DIA. ADJ STOPPER FOR PRESSURE TEST ONLY)
UTK & UTR ((2) 2-3/4 DIA. ADJ STOPPER FOR PRESSURE TEST ONLY)
UTL & UTQ ((2) 2-3/4 DIA. ADJ STOPPER FOR PRESSURE TEST ONLY)
UTH, UTT, UTAB, UTAC ((4) 3/4 DIA. STOPPER FOR PRESSURE TEST ONLY)
UTJ, UTS, UTAD ((3) AN929-6 PLUG FOR PRESSURE TEST ONLY)

UTF (VALVE INSTALLED)

UTV, UTW, UTX, UTY, UTZ (5 COVERS FOR DESEAL ONLY)

FIG 5.1-1 (sheet 8)

4. LOWER TRAP TANK

LT-A, LT-B (A & B IS ONE COVER), LT-C, LT-D, LT-E, LT-F, LT-G (F & G IS ONE COVER), LT-H, LT-J, LT-K (8 COVERS)

LTL (2" DIA. ADJUSTABLE STOPPER)

5. A-1 TANK

A1-A, A1-B, A1-C, A1-D, A1-E, A1-F, A1-G, A1-H, A1-J, A1-K, A1-L, A1-M, A1-N, A1-P (14 COVERS)

A1-Q (PLUG, AN814-20)

6. A-2 TANK

A2-A, A2-B, A2-C, A2-D, A2-E, A2-F, A2-G, A2-H, A2-J (8 COVERS)

7. LH SADDLE/FINGER TANK

LS-A (12FTJ21903-901, 905)
LS-B (12FTJ21903-903, 907)
LS-C (12FTB874-37)
LS-D (12FTB874-29)
LS-E (12FTB874-11)

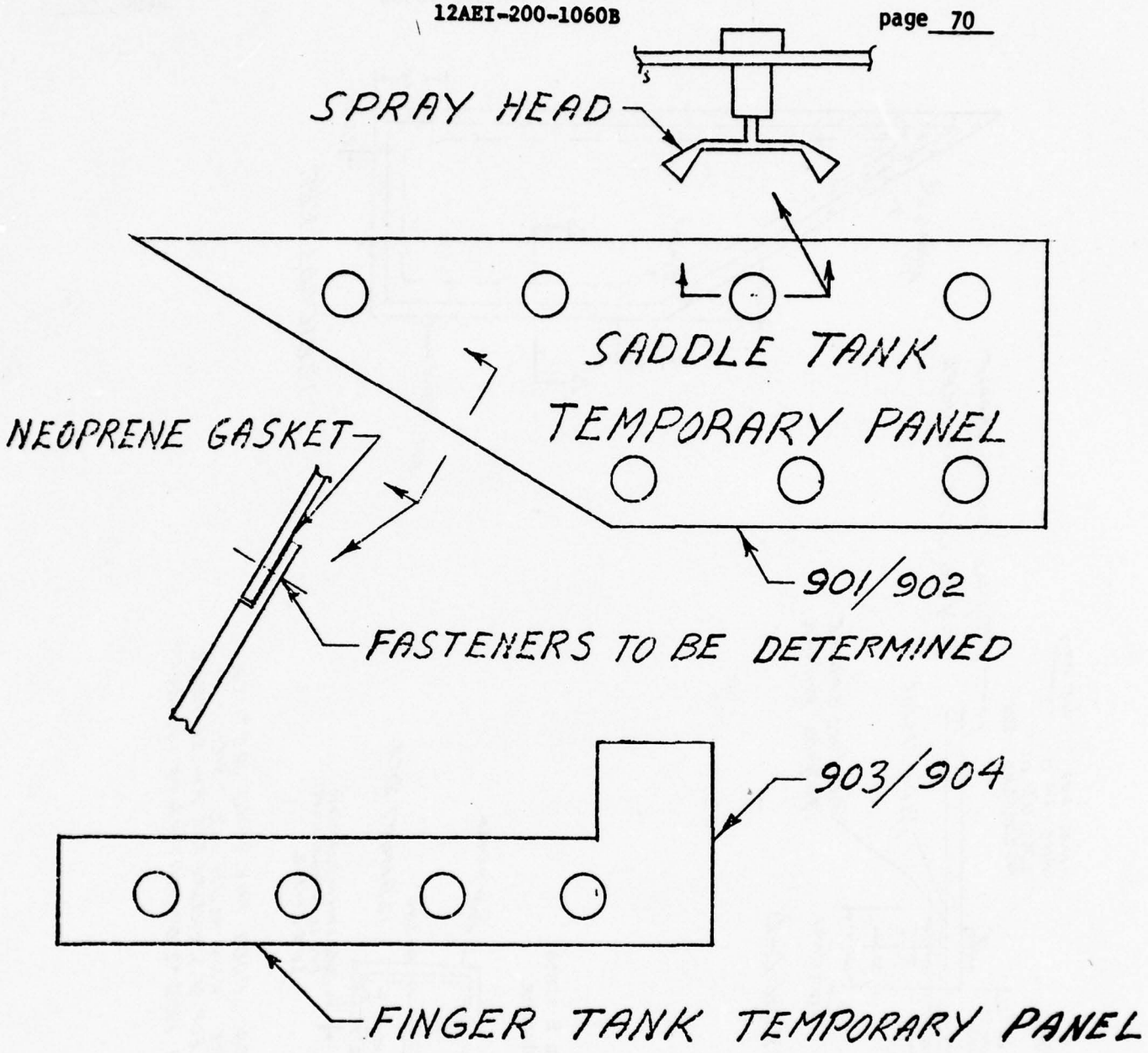
LS-F, LS-G, LS-H, LS-J (4 COVERS, 12FTB874-211) ELDORADO CHEMICAL HAS THESE COVERS.

8. RH SADDLE/FINGER TANK

RS-A (12FTJ21903-902, 906)
RS-B (12FTJ21903-904, 908)
RS-C (12FTB874-37)
RS-D (12FTB874-29)
RS-E (12FTB874-11)

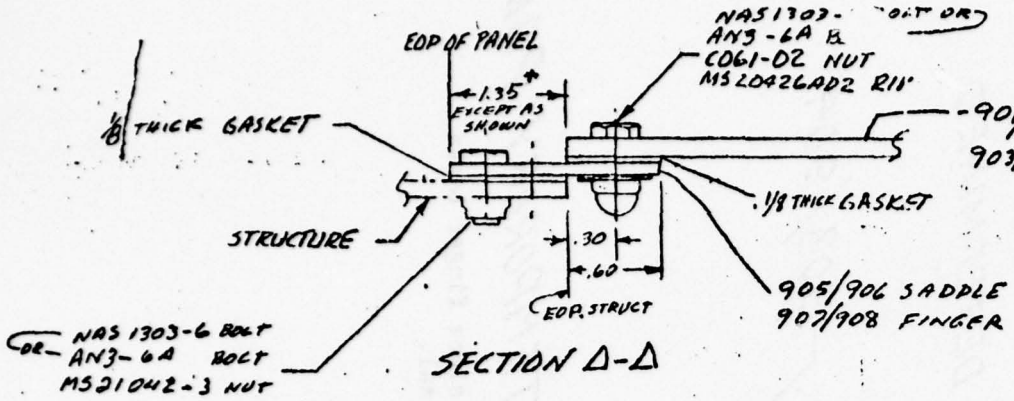
RS-F, RS-G, RS-H, RS-J (4 COVERS, 12FTB874-211) ELDORADO CHEMICAL HAS THESE COVERS

Figure 5.1-1 (sheet 9)

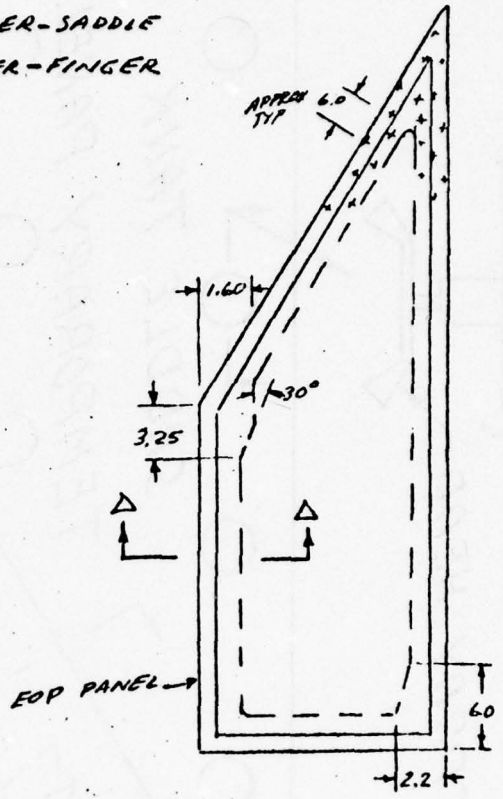



Not required as of revision B since finger tanks are isolated during deseal/reseal.

Figure 5.1-2

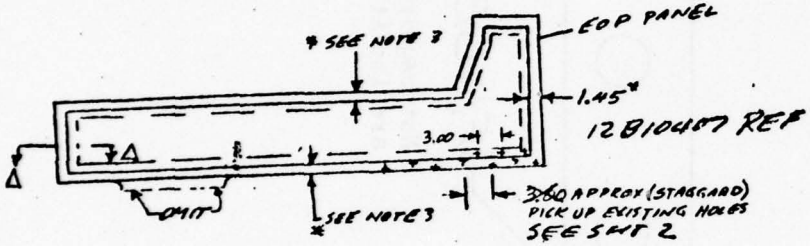



SECTION Δ-Δ




12B10403 REF.

Not required as of revision B since finger tanks are isolated during deseal/reseal.




NOTE. 1. MATL FOR -901 THRU 904 6061 ANY COND .25 THICK
2. MATL FOR -905 THRU 908 ANY ALUM .12 THICK
3. DIM FOR EOP OF PANEL TO EOP OF STRUCTURE FOR FINGER PANEL TO BE DETERMINED FROM F111K*2 OR F111F*46 OR 12B10407

FIGURE 5.1-2 (SHEET 2)

5.1.2 Operation of Desealing Unit

NOTE

It is very important that the temperature of the fluid be monitored closely. During hot weather it may be necessary to cool the fluid because of heat added by the mechanical action of pumping. Monitor the temperature and quality of SR-51 in accordance with MA control process order entitled, "Control of Materials for Desealing F-111 Aircraft Fuel Tanks".

5.1.2.1 Fill the desealant reservoir of each pumping unit with Eldorado Chemical Co. SR-51 desealing fluid.

5.1.2.2 Activate desealant reservoir heater unit to control temperature of the input desealant fluid to the fuel tanks between 100 degrees F to 120 degrees F.

5.1.2.3 Start pumps on desealing unit and continue spraying SR-51 fluid for 24 hours. Monitor temperature of fluid per 5.1.2.2, and clean filters of pumping unit as necessary to insure proper flow of fluid. Rinse filters with water hose.

CAUTION

Assure W.C.T.B. is completely sealed off and isolated from the desealing operation. Leakage into the W.C.T.B. will require otherwise unprogrammed repairs be made in the W.C.T.B.. Observe all supply and drainage lines, temporary cover gaskets, and fuel tank structure for leakage. If leaks occur, stop the recirculating spray unit and make the necessary corrections.

5.1.2.4 When the 24 hour recirculating spray period has been completed drain all SR-51 back into the reservoir tank.

5.1.2.5 Spot check extent of sealant removal by removing a few of the temporary covers in the forward and aft tanks. Continue SR-51 circulation for another 24 hours.

5.1.2.6 All used SR-51 shall be barreled and disposed of by Eldorado Chemical Company, Inc. Reusable SR-51 shall be stored in closed containers.

5.1.2.7 Rinse the reservoir with clean tap water and drain into marked 55 gallon barrels for disposal.

CAUTION

Spillage or leakage of fresh SR-51 in quantities not to exceed 20 gallons per day, or used SR-51 in quantities not to exceed 200 gallons per day, or any combination thereof, may be water flushed to the industrial waste system.

5.1.3 Rinse with Alkaline Cleaner.

5.1.3.1 Fill the pumping unit reservoir tank with 25% (by volume) solution of Eldorado GD -500 alkaline cleaning compound and 75% clean tap water.

5.1.3.2 Pump the alkaline cleaner through the recirculating spray system for a minimum of one hour with the temperature of the fluid controlled at 120 degrees F to 140 degrees F.

5.1.3.3 After completing the alkaline rinse cycle, drain the fluid back into the reservoir tank of the pumping unit. Reusable SR-51 contaminated alkaline rinse fluid shall be stored in closed containers. Batches of SR-51 contaminated alkaline rinse fluids which are no longer usable shall be containerized to be disposed of by Civil Engineering (DEO).

CAUTION

SR-51 contaminated alkaline rinse fluids shall not be released to the industrial waste system. Spillage or leakage of uncontaminated alkaline rinse fluids in quantities not to exceed 125 gallons per day may be water flushed into the industrial waste system.

5.1.4 Rinse with Clean Tap Water.

5.1.4.1 Fill the pumping unit reservoir tank with clean tap water and pump through the recirculating spray system at a temperature of 65 degrees F to 110 degrees F.

5.1.4.2 Pump the clean tap water through the recirculating spray system for a minimum of 30 minutes and continue until a sample of the return water produces a pH reading of 7.0 to 9.0. Refill reservoir with clean tap water if necessary but if return water remains outside of desired range the final rinse shall be made with demineralized water or equivalent. Continue spraying until the rinse water falls within the 7.0 to 9.0 pH range.

5.1.4.3 Drain the rinse water from the reservoir tank into 55 gallon barrels or waste truck for disposal.

CAUTION

The water rinse waste fluids shall be pumped into a government tanker, to be released to the industrial waste system over as many days as possible. The release of this fluid shall not exceed 400 gallons per day.

5.1.4.4 As soon as possible after the tap water rinse, remove all deseal plumbing, manifolds, and sprinkler heads. Remove residual water from low places in tanks with suction hoses in preparation for removal of any sealant remaining on surfaces. This action must be initiated within 4 hours.

CAUTION

If it is not possible to proceed with the final sealant removal and clean-up within a 8 hour period, drying of aircraft must be started in accordance with 5.1.7.

5.1.4.5 After the A-1 tank has been desealed, remove the two 12B10712 beams located at Station 560.5. All cleaning, epoxy barrier and sealant applications in the area behind the beams shall be completed before the beams are reinstalled with MIL-S-83430 sealant because the areas then become inaccessible.

5.1.5 Sealant Removal with the High Pressure Water Jet

CAUTION

If it is not possible to proceed with the high pressure water jet in less than 4 hours, it will be necessary to remove as much residual water from the tanks as possible with a suction hose. If operations will be delayed for more than 8 hours, drying of the tanks must be started in accordance with 5.1.7.

5.1.5.1 After completing the chemical desealing operations with Eldorado SR-51 residual amounts of sealant may remain on fastener heads, along faying surface seams, and in the structural voids. A high pressure water jet gun shall be used to remove any residual sealant adhering to the tanks. Also, it is mandatory that the high pressure water jet be used to clean around all fasteners, along all faying surface seams, and in all structural voids, whether or not sealant is visible, to remove any residual sealant from these areas which may be reverting and cause potential adhesion problems with the epoxy barrier and sealant. The equipment to be used for this purpose is available from the American Water Blaster Co. (a Division of American Aero Inc.) of Houston, Texas, and is Model No. WBE-50 or equivalent. The unit shall have a 50 H.P. explosion proof electric motor, be capable of producing 10,000 PSI and handling two water guns.

5.1.5.2 Water jet nozzle tips may have an orifice size of .025 to .035 inch and angular offsets of 15 degrees to 90 degrees may be used. The maximum operating pressure shall be 7500 psig per nozzle. Clean tap water shall be used with the pumping unit.

WARNING

The water jet stream can cause injury to personnel under 6 feet distance. The person operating the jet spray nozzle will at all times wear protective clothing, a face shield or an air mask and keep all parts of his body behind and away from the spray nozzle. The operators hands shall be at least four inches back from end of spray nozzle when jet gun is in use.

5.1.6 Operation of the Water Jet Gun.

5.1.6.1 Start the water jet power unit and inspect high pressure hoses and all connections to insure that no leaks exist.

5.1.6.2 Before entering tanks operate both guns simultaneously to insure that proper pump out-put pressure is being maintained. With one gun turned off the pumping unit diverter valve should regulate the pressure without excessive pressure fluctuation. Operate by-pass valves on each gun and check correct functioning of the valves. After reducing the pumping unit pressure to 0 psig the operators can enter the tanks or working area and request that pumping unit operating pressure be supplied.

CAUTION

The operator of the water jet gun will brace himself to receive the jet reaction force before turning the nozzle on. The operator will immediately turn OFF the nozzle if his stance or control of the gun is felt to be inadequate.

5.1.6.3 Direct the water jet spray at a 30 degree to 45 degree angle to residual sealant along faying surface seams and direct the spray at varying angles to the fastener heads. Make a special effort at structural voids to completely remove sealant in the void passages. See Figure 5.6-1.

CAUTION!

Avoid directing water jet spray at bonded panel edge members to prevent delamination of bonded panels. See Figure 5.1-3.

5.1.6.4 In places where large amounts of fillet sealant remain such as in the bottom areas of the forward tanks, numerous passes of the water jet gun will be necessary to dislodge the sealant in thick sections.

5.1.6.5 Use a suction hose at low points in the tank to remove excess water and allow more effective use of the water jet spray. Attach a purging machine suction duct to an upper opening on the tank to remove water mist and reduce tank temperatures.

CAUTION

A person shall stand by the water jet pump unit during all water spraying operations and immediately turn OFF the pump if an emergency develops.

5.1.6.6 The operator shall not use the water jet spray nozzle continuously for more than two hours due to possible fatigue. At that time an alternate operator can continue the spraying operations.

5.1.6.7 If the water jet spraying operations are to be stopped for more than four hours but less than eight hours, it will be necessary to remove as much residual water from the tanks as possible with a suction hose. If the operations are to be stopped more than eight hours the tanks must be completely dried in accordance with all of paragraph 5.1.7.

5.1.6.8 Final sealant removal and clean-up will be accomplished by scrubbing residual sealant with a brush using a 25% (by volume) solution of Eldorado GD-500 alkaline cleaning compound and 75% clean tap water. Hose out tanks using clean tap water.

5.1.7 Fuel Tank Drying Procedures.

5.1.7.1 As soon as the residual sealant removal procedures have been completed in each individual tank, the excess water must be removed.

5.1.7.2 Use a suction hose to remove water from puddled areas and then wipe all surfaces of the tank with clean cheesecloth or clean shop cloths to remove all water droplets.

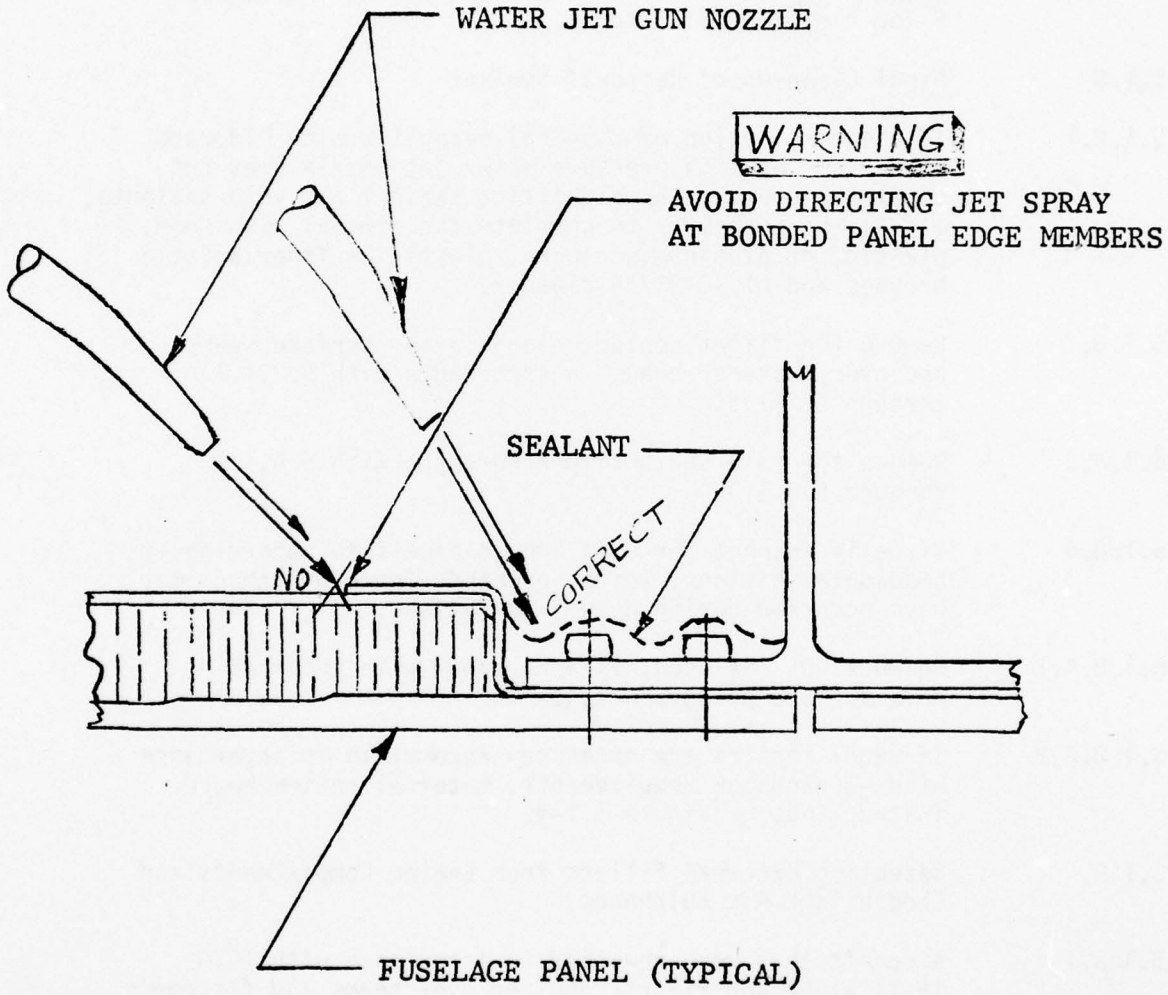

WATER JET GUN NOZZLE
WARNING
AVOID DIRECTING JET SPRAY
AT BONDED PANEL EDGE MEMBERS
SEALANT
NO
CORRECT
FUSELAGE PANEL (TYPICAL)

FIGURE 5.1-3

5.1.7.3 Use an air gun nozzle shop air line (filtered air) to blow water from faying surfaces, voids, and other crevices.

5.1.7.4 As each tank is wiped dry install heat ducts and completely dry tanks with circulating air at 140 degrees F for a minimum of 8 hours.

5.1.8 Final Clean-Up of Residual Sealant

5.1.8.1 If the combination of chemical desealing with Eldorado SR-51 and the high pressure water jet nozzle does not completely remove the old fillet sealant and void sealants, it will be necessary to complete the removal with wood, plastic, or aluminum scrapers, plastic or fiber bristle brushes and MIL-C-38736 cleaner.

5.1.8.2 Remove the fillet sealant along faying surface seams and over fastener heads in accordance with 5.2.1.1 through 5.2.1.3.

5.1.8.3 Remove the void sealant in accordance with 5.6.1.1 through 5.6.1.3.

5.1.8.4 Visually inspect (or NDI) bonded panels to determine if bond delaminations, voids, or other forms of damage may have occurred during deseal operations.

5.1.8.4.1 Conduct NDI (if used) in accordance with applicable NDTS's. See paragraph 1.4.

5.1.8.4.2 If panel repairs are necessary accomplish in accordance with -3 handbook requirements, material review board instructions or Figure 5.1-4.

5.1.9 Desealing External Fillets from Engine Compartments and Saddle Tank Aft Bulkheads.

5.1.9.1 Aircraft that were reworked in accordance with TCTO 1F-111-1062 had fillets applied over seams and fasteners under vapor seals in the engine compartments as a leak prevention method. After the vapor seals have been taken off these fillets will be removed with the high pressure water jet.

CAUTION

Install water tight washers such as NAS 1598-3 or 3R over open holes where vapor seal attaching fasteners were removed with Clecos (or equivalent) to prevent water entry into fuselage panels.

A. Preparation of Delaminated Edge Member:

(1) Clean surface using clean cheesecloth moistened with MIL-C-38736 cleaner.

(2) Allow to air dry.

(3) Check for extent of delamination. Insure edge of delamination is known. Indicate edge by marking with ink pencil or equivalent.

(4) Layout .090 diameter hole pattern on centerline of edge member flange at .50 spacing. Extend pattern 1.00 beyond the end(s) of delamination, when practical.

(5) Score each hole location with a few turns of a drill. Do not drill through the edge member into delamination.

(6) Clean area of all debris and markings using clean cheesecloth moistened with MIL-C-38736 cleaner. Allow to air dry.

(7) Drill the .090 hole pattern through the edge member into the delamination. CAUTION: Do not drill through inner skin.

(8) Clean area using trichloroethane 1, 1, 1. Allow to air dry until all odor of trichloroethane 1, 1, 1 can no longer be detected. (NOTE: Area to be cleaned is the bond area for the edge member and inner skin.)

CAUTION: Care must be exercised in using this chlorinated cleaner to assure that none of this liquid is allowed to flow into areas of possible entrapment.

(9) Mask area with protective tape. Apply tape tightly (Free of trapped air.)

(10) Cut holes in tape to match drilled holes. Use a blade that has been cleaned with MIL-C-38736 cleaner or equivalent.

(11) Inspect area.

Figure 5.1-4 (Sheet 1) Edge Member Delamination Repair

B. INJECTION PROCEDURE

(1) Using a Semco Gun, load injection gun with a cartridge containing FMS-1048 adhesive (Aerobond 2199 or Epon 9300).

(2) Inject adhesive into each drilled hole until it flows from adjacent holes or at edge of edge member. Apply a slow steady buildup of pressure to the Semco Gun.

(3) Remove excess adhesive from area using clean cheesecloth.

(4) Clean drill using clean cheesecloth moistened with MIL-C-38736 cleaner or equivalent.

(5) At each of the .090 diameter injection hole locations, drill hole through the inner skin. Clean adhesive from the drill using clean cheesecloth moistened with MIL-C-38736 cleaner.

(6) Cover the area with second layer of protective tape. Allow the tape to extend beyond the edges of the edge member to form a seal and prevent flow out of adhesive during cure application. Apply tape so that it is tight and free of trapped air.

(7) Cut holes in second layer of tape to match holes in first layer of tape using sharp cleaned blade. Clean blade using clean cheesecloth moistened with MIL-C-38736 cleaner or equivalent.

Figure 5.1-4 (Sheet 2) Edge Member Delamination Repair

C. PRESSURE APPLICATION AND CURE CYCLE: (NOTE: Aluminum strip(s) may be fabricated during preparation stage.)

(1) Apply .060 inch thick aluminum strip, width and length as required; 2024T6, QQ-A-250/4 or equivalent.

(2) Pick-up the .090 diameter injection hole pattern at .50 inch spacing on the centerline of the aluminum strip same as drilled through the assembly delaminated edge member and inner skin.

(3) Place the aluminum pressure plate over the injected area. Provide mechanical pressure by attaching plate using clecos or equivalent at each of the drilled .090 diameter holes through edge member and inner skin.

NOTE: A resin release may be applied to the clecos to insure removal after completion of the bond cycle. Apply a thin coat using an .50 inch acid brush or equivalent.

(4) Cure cycle will be eight (8) hours (minimum) at 75 degrees F or greater.

(5) Inspect.

(6) Remove all pressure curing apparatus from the repaired area.

(7) Remove protective tape from the repaired area.

(8) Remove excess adhesive from the repaired area using 120 grit aluminum oxide paper or equivalent.

(9) Clean area of debris using clean cheesecloth moistened with MIL-C-38736 cleaner. Allow to air dry.

(10) Inspect. Visual inspection of repaired area only to insure no convex or dimpled areas exist causing void areas between flange of edge member and bond surface of inner skin.

Figure 5.1-4 (Sheet 3) Edge Member Delamination Repair

D. RIVET INSTALLATION AND FINISH

(1) Draw C2808-4-2 rivets as required for installation in repaired area.

(2) Raise .090 diameter injection holes to .140/.147 to include the (2) .090 holes in 1.00 extend pattern area, if applicable. (Reference paragraph A(4).

(3) Clean off debris from area.

(4) Apply MIL-S-83430 sealant and install the C2808-4-2 rivets in accordance with the procedures shown in FPS-1004 paragraph 5.5. After installation of C2808-4-2 rivets apply seal coat of MIL-S-83430 over the head of each rivet. In repair area apply bead of sealant along faying edge of edge member in accordance with FPS-1004 paragraph 5.3.

(5) Inspect.

(6) Touch-up finish in accordance with FPS-1006-A058 in non-fuel areas; FPS-1006-A059 in fuel areas.

(7) Final Inspection.

Figure 5.1-4 (Sheet 4) Edge Member Delamination Repair

5.1.9.2 Deseal the external fillets in the left and right side engine compartments of the aft fuselage with the high pressure water jet equipment and procedures described in 5.1.5.

5.1.9.3 Dry the excess water in the engine compartments in accordance with paragraphs 5.1.7.2 and 5.1.7.3.

5.1.9.4 Inspect the threaded fasteners located in the splice at Fuselage Station 673.5 L/R (in the engine cavities) and in the L/R finger tank areas for tightness. To accomplish this, when fasteners have hex nuts installed, use a torque wrench and carefully exert pressure to determine if torque level is correct. If bolt shank does not rotate, nut may be torqued to correct level. If break-off collars (C022) were installed instead of hex nuts, insert Allen wrench in recess of bolt shank and carefully exert pressure to determine if bolt shank rotates.

NOTE

If bolt shank rotates in either of the inspection tests, remove bolt and check hole for correct size (Ref. Engineering drawing callout). If hole size is satisfactory, reinstall bolt using AN960C washers (size and thickness as required) and C2950 nut (Part No. H530-"X", vendor code identification 15653 or equivalent) (size as required). If hole is oversize, replace present bolt with oversize pin NAS 1322 thru NAS 1326 or NAS 1292 thru NAS 1296 (size and head style as required). Install C2950 nut as noted above. Torque nut per established procedures (T.O. 1F-111D-3 or T.O. 1-1A-8). If threaded fasteners in other fuel tank areas are found to be loose; through the course of the sealing operations (sealant removal, cleaning resealing, pressure testing etc.); follow the procedures outlined in paragraph 5.1.9.4 and repair in the same manner.

5.1.9.5 Visually inspect (or NDI) bonded panels to determine if bond delaminations, voids, or other forms of damage may have occurred during deseal operations.

5.1.9.5.1 Conduct NDI (if used) in accordance with applicable NDTS's. See paragraph 1.4.

5.1.9.5.2 If panel repairs are necessary, accomplish in accordance with -3 handbook requirements, material review board instructions, or Figure 5.1-4.

5.1.9.6 TCTO 1F-111-1062 also installed sealant fillets over seams and fastners on the aft side of the saddle tank aft bulkheads at fuselage station 725. These fillets shall be removed by hand tools from along the faying surface seams. It is not necessary to remove this sealant from the fasteners.

5.2 Desealing the Wing Carry Through Box (WCTB).

5.2.1 Mechanical Removal Method

5.2.1.1 After the top access cover, necessary structural trusses, and the system components have been removed, use sharpened wood, plastic or aluminum scrapers to remove the bulk of the fillet sealant applied along the faying surface seams and over the ends of the fasteners which have a nominal shank diameter of .75 inch or larger. Reference Figure 5.2-1 for identification of the WCTB fasteners which have a nominal shank diameter of 0.75 inch or larger. It is not required that the sealant be removed from WCTB fasteners with nominal shank diameters less than 0.75 inch provided that this sealant is well bonded to the tank and contains no visual indications of separation, cracks, holes, blow-outs, penetrations, reverted material, or other actual or potential defects. Sealant must be removed for a distance of at least two inches in all directions of each actual or potential defect. Extreme care shall be exercised to avoid damage to the MIL-C-27725 polyurethane corrosion protection coating during the sealant removal process. (See section 5.7, and paragraphs 5.7.2.4, 5.8.1.2, 5.8.2.2.1, and the note following 5.8.2.2.2 for application of epoxy and sealant).

NOTE

F-111A 66-013 through 66-044 were manufactured using EC-1940 fillet sealant which has been determined to be deficient. All fillet sealant must be removed from the inside of the WCTB on these aircraft.

CAUTION

The high strength steel weldments and high strength fasteners used in the WCTB construction makes it mandatory that no water, chemical desealers or other unauthorized fluids be used in this component. It is also mandatory that no steel or other unauthorized metal scrapers or brushes be used.

5.2.1.2 When most of the sealant has been scraped off, remaining amounts in the form of thin films or small amounts around fasteners shall be removed with MIL-C-38736 and fiber or brass bristle brushes or the approved scrapers in 5.2.1.1.

NOTE

The fiber or brass bristle brushes may be of a type that can be installed in an air motor.

5.2.1.3 Apply a small amount of MIL-C-38736 from plastic bottles and then scrape or brush vigorously until the sealant is removed.

NOTE

If it is desired that aircraft be moved, after desealing and prior to resealing, all the requirements of paragraph 8.0 (in their proper sequence) must be complied with; before, during, and after such a move.

F-111A/D/E AND FB-111A

WCTB UPPER PERIMETER BOLTS

REF T.O. 1F-111A-36-1, Figure 4-34 (Sheet 4)

| HOLE NUMBER | |
|---|---|
| LEFT | RIGHT |
| 400 | 526 |
| 401 | 525 |
| 403 | 523 |
| 671 | 545 |

WCTB BOTTOM PLATE

REF T.O. 1F-111A-36-1, Figure 4-27 (sheet 1)

| HOLE NUMBER | |
|---|---|
| LEFT | RIGHT |
| - | 2019 |

NOTE: This figure lists the hole numbers for those fasteners in the WCTB which have a nominal shank diameter of 0.75 inch or larger which must be desealed. See the referenced figures to locate the fasteners.

WCTB FASTENERS TO BE DESEALED

FIGURE 5.2-1 (Sheet 1)

F-111F

WCTB UPPER PLATE PERIMETER BOLTS

REF T.O. 1F-111A-36-1, Figure 4-34 (Sheet 5)

| HOLE NUMBER | | HOLE NUMBER | |
|---|---|---|---|
| LEFT | RIGHT | LEFT | RIGHT |
| F241 | F351 | F266 | F326 |
| F242 | F350 | F267 | F325 |
| F243 | F349 | F453 | F365 |
| F244 | F348 | F451 | F367 |
| F246 | F346 | F449A | F369 |
| F249 | F343 | F446A | F372 |
| F252 | F340 | F443A | F375 |
| F255 | F337 | F440A | F378 |
| F258 | F334 | F447 | F381 |
| F261 | F331 | F444 | F384 |
| F264 | F328 | F441 | F387 |

WCTB BOTTOM PLATE

REF T.O. 1F-111A-36-1, Figure 4-27 (Sheet 2)

| HOLE NUMBER | |
|---|---|
| LEFT | RIGHT |
| F115 | F126 |
| F116 | F127 |
| F124 | F135 |
| F125 | F136 |

WCTB FASTENERS TO BE DESEALED

(FIGURE 5.2-1 (Sheet 2)

AD-A050 819 SACRAMENTO AIR LOGISTICS CENTER MCCLELLAN AFB CA AIR--ETC F/G 1/3
F-111 DEPOT FUSELAGE FUEL TANK DESEAL/RESEAL PROCEDURES.(U)
APR 77 P STEINWEG

UNCLASSIFIED 12AEI-200-1060B NL

2 OF 3
AD
A050819



5.3 Removal and Reseal of Sealing Groove Injection Screws

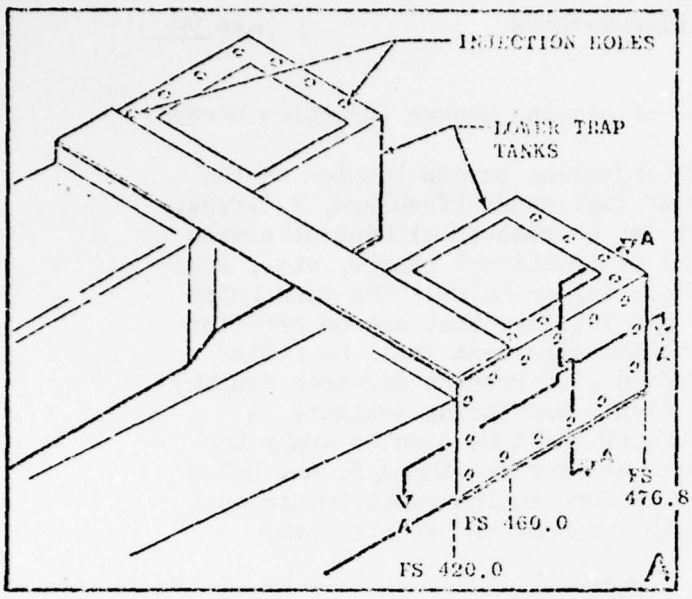
5.3.1 All sealing groove injection screws located on the exterior surfaces of fuel tanks (fuselage, W.C.T.B., wing and fin) that can be removed without otherwise unnecessary removal of additional panels, etc., will be removed from their tapped holes. The open holes of the wing, fin, and fuselage that are on exterior surfaces exposed to the airstream shall be filled flush with the surface with Product Research Company No. 701M (or equivalent) non curing sealant. A plastic or wood scraper shall be used to apply the sealant in the holes and for smoothing flush. Holes in enclosed areas like the engine compartments need not be plugged in this manner and remain open.

NOTE

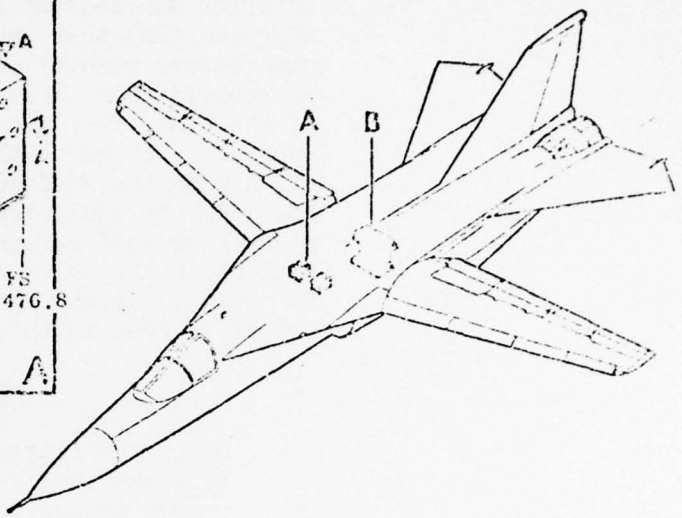
Since the finger tanks are being isolated from the fuel system, there is no need to remove injection screws from the finger tanks. 701M non curing sealant will not be used in the injection holes of the saddle tank panel. Merely wipe off excess MIL-S-83430 B-6 sealant that extrudes from the injection screw holes when the panels are reinstalled (see 5.9). Injection screws will be reinstalled in the saddle tank panels.

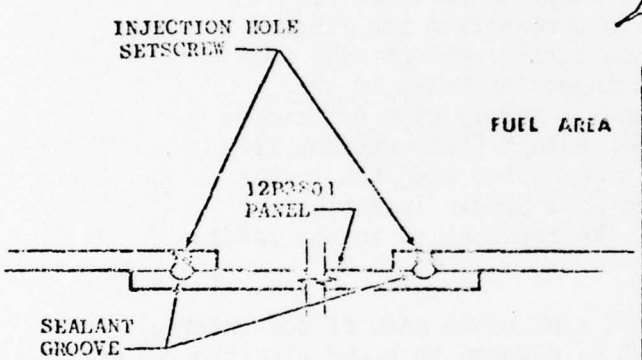
5.3.1.1 The non curing sealant applied in each of the external injection holes shall be painted to blend with the color in adjacent areas.

5.3.2 In a few areas of the fuselage fuel tank boundary structure (see Figure 5.3-1), the sealing groove injection holes are located on the inside of the tanks because external injection holes in these areas are covered by structure and are inaccessible. The area around the injection screw shall be cleaned (see paragraphs 5.7.1.2 through 5.7.1.6) and then have epoxy applied (see paragraph 5.7.2.1 for mixing instructions) over the screw, approximately .06 inch thick and .50 inch dia., followed by a fillet of MIL-S-83430 .20 inch to .25 inch thick, and not less than 1.25 inch in diameter.

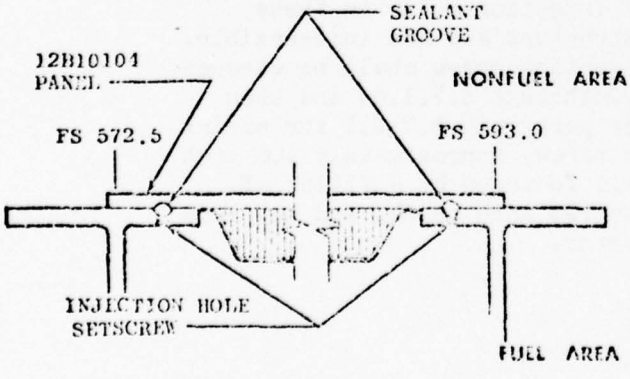



NOTE:
The injection holes shown are inside the fuel tanks.




SECTION A-A
PANEL ADDED FOR CLARITY




SECTION B-B
PANEL ADDED FOR CLARITY

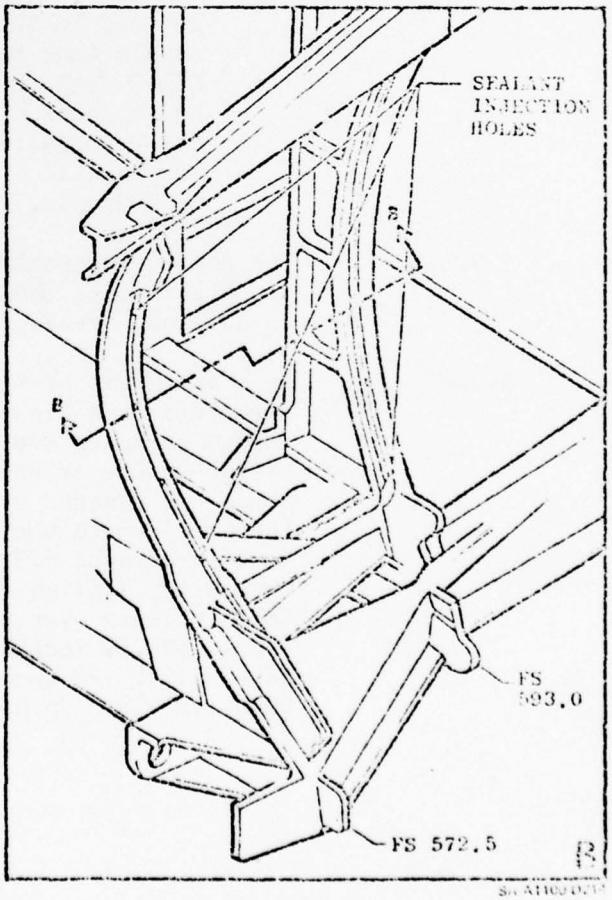



Figure 5.3-1 Internal Injection Holes

5.4 Saddle Tank Panel Removal and Finger Tank Preparation.

5.4.1 Before the desealing operations in the aft fuselage can be started, it will be necessary to remove the saddle tank top panels and temporarily block off the finger tanks.

5.4.1.1 The finger tanks will not be desealed or resealed, but will be isolated from the fuel system as part of revision B to this A.E.I. Preparation for desealing and final isolation is described in appendix C.

5.4.1.1.1 Remove 12B9747-1 (2 pieces) and 12B9747-11 (2 pieces) covers to allow for inspection of finger tank prior to isolation procedure.

5.4.1.1.2 Rework 12B10402 panels per paragraphs 7.1.1 and 7.1.2 Rework 12B9747 covers per paragraphs 7.1.3.

5.4.1.2. Saddle Tank Panel Removal.

5.4.1.2.1 Drill off heads of all rivets. Do not punch rivet shanks through until after sealant base material is injected into injection grooves or after the panels have been removed. Remove all countersunk nuts (Sherman-Martin) attaching panels to intermediate frames.

5.4.1.2.2 Remove circular access covers from saddle tanks and remove nuts inside the tanks from all threaded fasteners attaching the panels to be removed. Remove threaded fasteners from intermediate frames at this time.

5.4.1.2.3 Remove all Allen type screws located in the sealing groove injection holes. Using a Semco Model 507 sealant injection gun, start at the forward end of panel and progressively inject each hole with the base material only (so that it will not cure and adhere) of MIL-S-83430 sealant in an attempt to separate the panel from the understructure. Wood or plastic wedges may be tapped along the edges of the panels during the injection to assist the separation process. The aluminum rivet shanks and other remaining fasteners may be removed when the sealant injection process has been completed.

NOTE

If extensive sealant repair work has been accomplished on the saddle tank cover periphery, it may be necessary to manually remove the recently applied and cured sealant to facilitate panel removal.

5.4.1.2.4 Before removing the saddle tank panel from the aircraft, ream the periphery holes (panel and structure together) for reassembly. (See section 5.9)

5.4.1.2.5 If sealant injection fails to lift the panel, inflatable air bags or inner tubes should be used to aid in lifting the panel. Install loose fitting commercial grade or equivalent threaded fasteners approximately every two feet around the periphery of each panel to restrain panel to .50 inch maximum movement if rapid separation takes place when air bags used in lifting panels are inflated. Install suitable air bags (such as condemned F-111 crew module flotation bags or small tire inner tubes) in the forward two bays of each tank. If flotation bags are used, inflate them slowly with air pressure not to exceed 6 psi. Tir inner tubes may be inflated slowly with air pressure not to exceed 10 psi. When panel separation has taken place, the air bags can be moved to the next compartment aft to progressively lift panel.

CAUTION

Use an air regulator valve on the air supply line to assure against overpressure of the air bags.

5.4.1.2.6 When the panels have been completely separated from the understructure, carefully remove the panels from the airplane and remove the residual sealant with wood, plastic, or aluminum scrapers, brushes, and cheesecloth wet with MIL-C-38736 cleaner or by using the water jet impingement process. See 5.1.5 of this A.E.I.

5.4.2 Panel NDI Test.

.4.2.1 After the sealant has been removed from the panels, NDI each panel to determine if bond delaminations, voids, or other forms of damage may have occured during the removal. Inspect all fastener holes in panels to determine if any have been elongated or otherwise damaged to the extent that oversize fasteners may be needed for reinstallation.

5.4.2.2 Conduct NDI in accordance with T.O. 1F-111-36.

5.4.2.3 If panel repairs are necessary, accomplish in accordance with T.O. 1F-111()-3 structural repair handbook requirements. Reinspect per T.O. 1F-111-36.

5.4.3 Corrosion Coating Repairs.

5.4.3.1 Visually inspect the MIL-C-27725 corrosion protection coating of each panel and determine if coating repairs are necessary. Flaws which will require refinishing shall include blistered, deeply cracked, or deeply scratched or otherwise damaged to the extent that the protective qualities of the coating are impaired.

NOTE

MIL-C-27725 is the polyurethane coating used on the inside of F-111 fuel tanks. FMS 1046 is General Dynamics identification number for MIL-C-27725 - it is one and the same.

5.4.3.1.1 Use explosion proof black light to aid in detecting flaws in the MIL-C-27725 coating. Inspection should be made by holding the black light a maximum of 15 inches from the surface to be inspected. A deep reflective purple indicates defective polyurethane coating. (See Section 9.0)

5.4.3.2 See 5.5 for MIL-C-27725 coating refinishing procedures.

5.4.4 Panel Storage.

5.4.4.1 The panels shall be stored until needed in a manner which will protect the corrosion coating, avoid unnecessary contamination of the surfaces, and prevent structural damage.

5.5 Corrosion Protection Coating Repairs.

5.5.1 If the MIL-C-27725 (PR-1560 or DeSoto 823-011) polyurethane corrosion protection coating surfaces are blistered, cracked, scratched, or otherwise damaged to the extent that the protective qualities are impaired, coating repairs will be necessary.

5.5.2 Because of the difficulty involved in properly replacing polyurethane coating inside the fuel tanks, <u>every care should be taken to minimize damage to existing polyurethane</u>. If the coating repairs are on the fuel tank structure rather than on panels which have been removed, make these repairs in accordance with General Dynamics Process Standard 74.01.06 (see Fig. 5.5-1). If standards presented in P.S. 74.01.06 cannot be met inside the tanks (proper thickness and proper cure, etc.), it becomes preferable not to apply polyurethane under new sealant applications since poorly adhered polyurethane would result in poorly adhered sealant. Epoxy should be applied directly to voids and seams. After the epoxy has cured, the area to receive sealant should be alodined and then the required applications of sealant should be made. After all sealant work is completed, but prior to fuel leak check, polyurethane repairs should be be accomplished.

5.5.3 If the coating repairs are on a panel that has been removed from the structure and only a very localized repair is required, the repair should also be made in accordance with Process Standard 74.01.06 (see Figure 5.5-1). If the repairs are extensive, however, and the panel can be moved to an area where glass bead blasting equipment is available this may be used in lieu of the abrasive material listed in the Process Standard.

NOTE

Glass beads shall be silicone-free and conform with MIL-G-9954A. Blast pressure equipment shall be operated at not more than 45 psi.

5.6 Cleaning and Resealing Structural Voids.

5.6.1 Cleaning Procedure

5.6.1.1 The voids which are formed by the overlap of structural components in the fuel tanks were prepacked during the fabrication of the airframe with EC-5106 polyester sealant. This sealant will be removed and replaced with XA-3598 or EC-2216 epoxy.

5.6.1.2 All of the EC-5106 sealant should have been removed during the fuel tank desealing process. Any remaining amounts will have to be removed by using plastic, hardwood, or aluminum rods of a suitable size for mechanically cleaning the voids. Voids are to be cleaned a minimum of .75 inch deep from both sides. A compilation of the number and location of the voids in the fuselage tank is shown in Figure 5.6-1.

5.6.1.3 MIL-C-38736 cleaner can be used with the tools, described in 5.6.1.2 to flush the voids which can then be wiped with cheesecloth until the EC-5106 residue is removed. Dry with clean cheesecloth and then inspect for polyurethane coating or chemical film damage inside the void. If bare metal is exposed, refinish the area per paragraph 5.5.2. It will **not** be necessary to apply the polyurethane coating inside voids.

NOTE

All loose particles, sticky substances, and soft pieces of sealant shall be removed. Dark stains imbedded in the polyurethane fuel tank coating, that will not come off by wiping with clean cheesecloth dampened with MIL-C-33736, are acceptable. Minute amounts of adhered, cured, fillet sealant on fasteners will be acceptable.

| | | |
|---|---|---|
| PREPARED J.R. Clawson<br>APPROVED<br>AIR FORCE | GENERAL DYNAMICS<br>Fort Worth Division<br>PROCESS STANDARDS | NUMBER P.S. 74.01.05<br>MODEL Special Projects<br>DATE 15 December 1967<br>PAGE 1 OF 4 |

SUBJECT

INTEGRAL FUEL TANKS; INTERIOR REFINISHING OF

Ref. T O 1-1-3

1.0 SCOPE

1.1 This Process Standard gives procedures for applying MIL-C-27725 polyurethane fuel tank coating to integral fuel tank interior surfaces. This procedure is for use on special projects only; production finishing of "new" fuel tanks shall be in accordance with P.S. 74.01-53.

2.0 SURFACE PREPARATION

2.1 Entire Interior Surface

(1) Thoroughly clean all interior surfaces of fuel tank using shop towels saturated with MIL-C-38736 cleaner. Wipe dry with dry shop towels.

2.2 Cadmium Plated Steel Surfaces

(1) brighten using fine Scotchbrite moistened with MIL-C-38736 cleaner.

(2) Examine visually for damaged areas in the cadmium coating. Touch-up, where required, shall be performed by brush plating per P.S. 74.02-18

2.3 Titanium Surfaces

(1) Brighten with fine Scotchbrite moistened with MIL-C-38736 cleaner.

2.4 Aluminum

(1) Abrasive clean all aluminum. Chemical film and/or anodic coatings shall be removed. This may be performed using 320 grit (or finer) sandpaper, Scotchbrite (medium or fine), or equivalent abrasives. Power driven sanding discs, abrasive wheels, wire brushes, etc. shall not be used. Power driven Scotchbrite wheels may, however, be used where feasible. Abrasive cleaning will be complete when the aluminum has a bright, typically metallic, appearance.

(2) Hard rubber wheels and plastic scrapers will be needed to remove sealant from spars and ribs.

2.5 Treatment for Aluminum

(1) After abrasive cleaning, clean aluminum with cheesecloth and MIL-C-38736 cleaner Air dry and brush chemical film all aluminum surfaces. Cadmium and Titanium do not require any surface treatment. Chemical film shall not be purposely applied to Cadmium plated steel or titanium. The chemical film solution will not, however, harm these surfaces. Masking will not be required

(2) The brush chemical film operation is performed by saturating cheesecloth with solution (which must be mixed and issued by Process Control) and swabbing the solution onto the aluminum surface Continue to wet the cheesecloth and to swab the surface for 3-4 minutes without letting the surface dry. At the end of 3-4 minutes treatment, rinse thoroughly with water and allow to air dry. Properly chemical filmed aluminum will have an irridescent yellowish color The color should be fairly even and free of "powdery" areas.

2.6 Entire Interior Surfaces

(1) When Cadmium plated steel, titanium, and aluminum surfaces have been individually brightened clean the entire fuel tank interior using clean cheesecloth or equivalent low lint cloth saturated with MIL-C-38736 cleaner. Wipe dry with clean cheesecloth or equivalent.

(2) Visually examine all surfaces for lint and other loose contamination Remove any found by patting lightly with a tac rag

*ISSUED **REVISED

Figure 5.5-1 (Sheet 1)

GENERAL DYNAMICS
Fort Worth Division

PROCESS STANDARDS

NUMBER P.S 74.01.06
DATE 12-15-67 PAGE 2

SUBJECT

INTEGRAL FUEL TANKS; INTERIOR REFINISHING OF

Ref. T.O. 1-1-3

3.0 MIXING OF POLYURETHANE COATING MATERIAL

3.1 Caution

(1) Ingredients contained in the polyurethane coating material are toxic, irritating, and flammable. When working with this coating, personnel shall wear protective clothing and air supplied respirator approved by the Safety Department. Only properly equipped personnel shall be admitted to the mixing and application area.

(2) Prior to discarding any polyurethane coating materials, deactivate by adding approximately 1/2 pint isopropyl alcohol to each gallon material to be discarded. Discard deactivated material only as directed by the Safety Department.

(3) Do not mix more material than will be used within a 5 hour period.

(4) Material temperature must be 65-80°F at time of mixing.

3.2 Mixing

(1) Combine the two components of polyurethane coating material and stir thoroughly for at least five minutes. Mixing should be performed in a Safety Department approved area.

4.0 APPLICATION OF POLYURETHANE COATING MATERIALS

4.1 Caution

(1) Personnel shall wear protective clothing and air supplied respirator approved by the Safety Department. Uncured polyurethane coatings give off a harmful vapor until they become fully cured. This vapor is heavier than air and is, therefore, prone to linger at ground level much longer than most vapors. During, and for 48 hours following, coating application, only respirator equipped personnel shall be permitted in the work area. The only alternate to this will be the installation of ventilation provisions as described in T.O. 1-1-3, Paragraph 9-56.

4.2 Application

(1) The temperature of the mixed material and the aircraft surface must be within the range 65-80°F at time of application.

(2) Spray apply a light double pass to barely cover the surface. DeVilbiss Model P-MDG-510 with nozzel P/N 704 FX or 45G or equivalent equipment will be required. Use a pressure feed tank with 5 PSIG and an atomizing air pressure of 35 PSIG. Air lines shall be equipped with filters to remove water from lines. Prior to each use, and after each two hours operations, filters shall be drained of moisture. Pressure tanks shall be equipped with an agitator.

(3) Immediately after use paint spray equipment shall be thoroughly cleaned with M.E.K. Deactivate used material and handle same as surplus coating material Ref. 3.1 (2).

(4) The wet film thickness shall be 0.8 - 1.2 mils (0.0008 - 0.0012 inch). Thickness may be checked with a Nordson wet film gauge or equivalent device.

(5) Removable parts such as access doors should be finished and cured as details prior to reinstallation. Upper and lower fuel cell tank areas and all external panels will be removed and treated in detail.

(6) A fine camel's hair brush may be used for touch-up and to reach spots that cannot be covered by spray.

Figure 5.5-1 (Sheet 2)

GENERAL DYNAMICS
*Fort Worth Division*

PROCESS STANDARDS

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SUBJECT

INTEGRAL FUEL TANKS; INTERIOR REFINISHING OF

Ref. T.O. 1-1-3

4.3 Curing

(1) Polyurethane coating will be tack free in four hours at 75 ± 5°F and 50 ± 5% humidity.

(2) Cure may be accelerated after a minimum of 4 hours airdry by adding heat and controlling the humidity as shown in Table I

(3) Coated surfaces will normally cure to handle (not to fuel resistance) in 24 hours at 75 ± 5°F and 50 ± 5% humidity. Lower temperature and/or humidity will increase the time needed to "cure to handle". At GD/FW the coating will most always be cured sufficient to handle at the end of 48 hours.

(4) Although the coating cured per Table I is resistant to aircraft fuel, it is not resistant to methyl ethyl ketone. Approximately 14 days must elapse before the coating is resistant to M.E.K. Exercise caution when using M.E.K. around freshly applied polyurethane coatings.

TABLE 1

CURE TIME CHART FOR JP-4 & AVIATION GASOLINE RESISTANCE

| HUMIDITY | 65°F | 70°F | 75°F | 80°F | 85°F | 90°F | 95°F | 100°F | 105°F | 110°F | 115°F | 120°F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20% | 392 | 228 | 98 | 73 | 58 | 47 | 42 | 37 | 34 | 31 | 29 | 27 |
| 45% | 376 | 212 | 90 | 65 | 47 | 35 | 27 | 21 | 17 | 13 | 10 | 8 |
| 65% | 344 | 184 | 64 | 56 | 39 | 28 | 21 | 16 | 12 | 9½ | 7½ | 6 |
| 100% | 240 | 124 | 55 | 32 | 20 | 14 | 10 | 7 | 5½ | 4½ | 4½ | 4 |

CURE TIME - HOURS

5.0 MATERIALS LIST

5.1 The following materials will be needed:

(1) Shop Towels - Obtain from tool crib

(2) MIL-C-38736 Cleaner - 114851540

(3) Fine Scotchbrite - 115050414

(4) Medium Scotchbrite - 115050413

(5) 320 Grit Sandpaper - Obtain from tool crib

(6) Cheesecloth - 117075425

(7) Tac Rag - 117195677

(8) Alodine 1200 Solution - Obtain from Process Control, Department 77-7

(9) IMS-1046 Polyurethane Coating, (MIL-C-27725):

a. Gallon kit - 145084002
b. Quart kit - 145084003

Figure 5.5-1 (Sheet 3)

GENERAL DYNAMICS
Fort Worth Division

PROCESS STANDARDS

NUMBER P.S. 24.01.06
DATE 12-15-67 PAGE 4

SUBJECT

INTEGRAL FUEL TANKS; INTERIOR REFINISHING OF

Ref. T.O. 1-1-3

6.0 PROCESS SUMMARY

(1) Clean all surfaces with MIL-C-38736.

(2) Brighten cad plate with fine Scotchbrite.

(3) Brighten Titanium with fine Scotchbrite.

(4) Remove anodic/chemical film from aluminum with abrasives.

(5) Brush chem film aluminum.

(6) Clean all surfaces with MIL-C-38736.

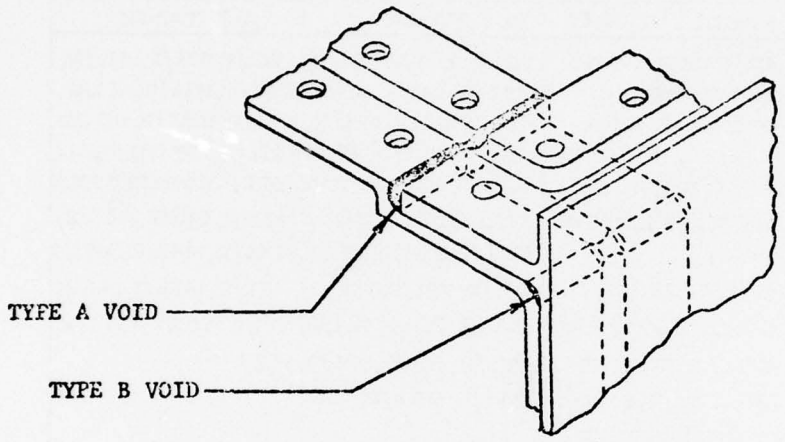
(7) Mix polyurethane coating components (two) together.

(8) Spray polyurethane coating to build 0.8 - 1.2 mil wet film.

(9) Cure.

Figure 5.5-1 (Sheet 4)

VOID DESCRIPTION




TYPICAL SEALING VOID
DETAIL A

VOID LEGEND:

NUMBER INDICATES VOID NUMBER. "R" INDICATES RIGHT SIDE AND "L" INDICATES LEFT SIDE.
LETTER INDICATES VOID TYPE PER DETAIL A.

EXAMPLE:

(A) 1R OR 1R (A) = VOID NO. 1 RIGHT SIDE, TYPE A VOID PER DETAIL A.

PARENTHETICAL NOMENCLATURE INDICATES TANK i.e. (A) 34L, 34R (FINGER)

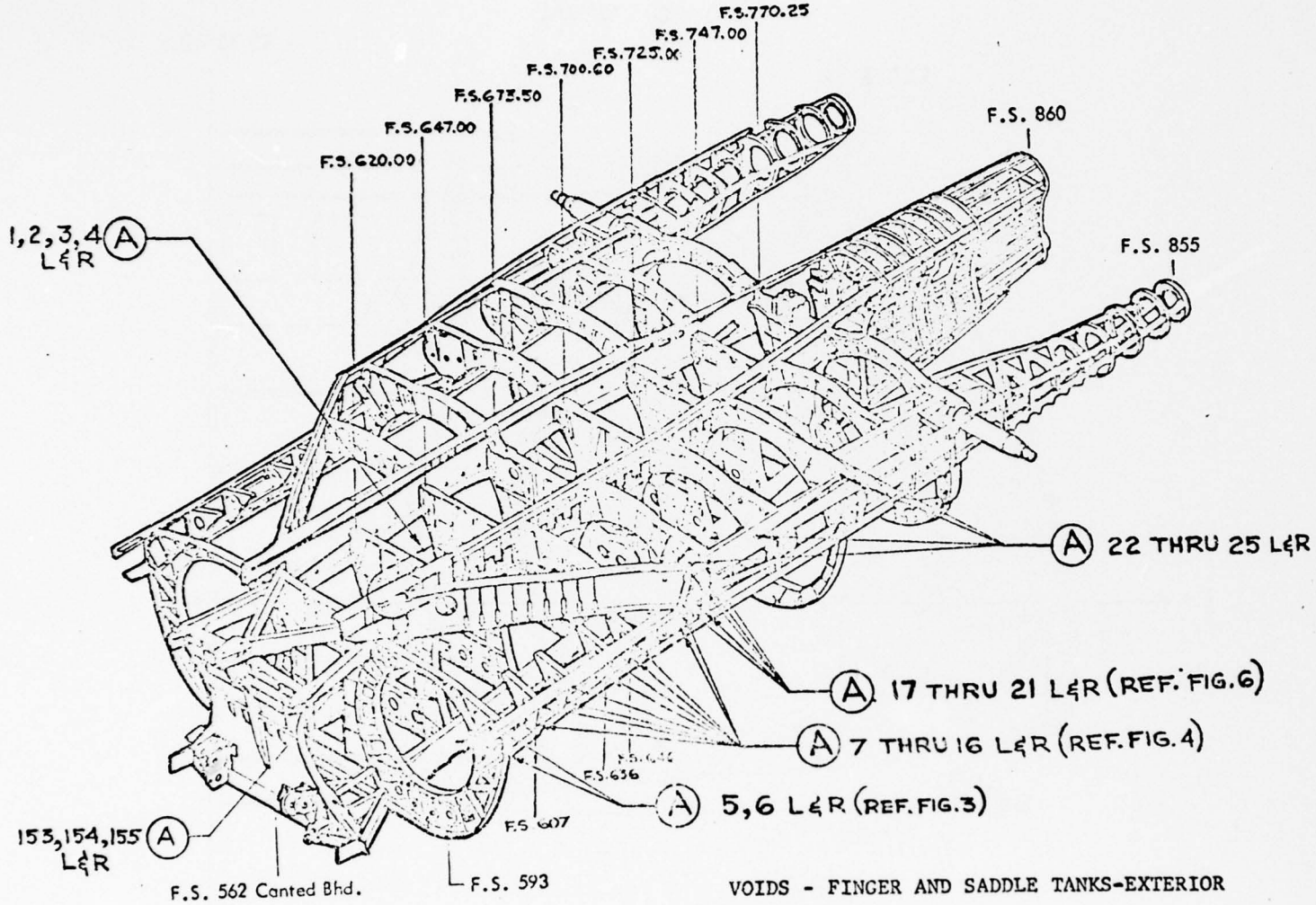
Figure 5.6-1 (Sheet 1)

# LOCATION OF VOIDS BY AREA

## AFT TANKS

| AREA IDENTIFICATION — TANK | | | |
|---|---|---|---|
| FINGER TANKS | SADDLE TANKS | A-1 TANK | A-2 TANK |
| 5 L/R, 6 L/R, 32 L/R, 35 L/R, 36 L/R, 37 L/R, 47 L/R, 48 L/R, 9 L/R, 10 L/R, 52 L/R, 55 L/R, 56 L/R, 60 L/R, 61 L/R, INTERMEDIATE FINGER TANK BHDS AT STA. 607, 636 AND 646 ALSO CONTAIN POINTS 5 L/R, 6 L/R, 32 L/R, 35 L/R, 36 L/R, 37 L/R, 47 L/R AND 48 L/R (REF "A" NOTE ON FIG. 3) EXTERIOR VOIDS IN FINGER TANK AREA NOT SHOWN IN SECTIONS ARE 7 L/R, 8 L/R, 11 L/R, 12 L/R, 13 L/R, 14 L/R, 15 L/R, 16 L/R, 17 L/R, 18 L/R, (REF. FIG. 1) | EXTERIOR VOIDS NOT SHOWN IN SECTIONS ARE 1 L/R, 2 L/R, 3 L/R, 4 L/R, 22 L/R, 23 L/R, 24 L/R, 25 L/R (REF. FIG. 1) 64 L/R, 65 L/R, 66 L/R, 67 L/R, 69 L/R, 70 L/R, 71 L/R, 78 L/R, 79 L/R, 80 L/R, 19 L/R, 20 L/R, 21 L/R, 84 L/R, 85 L/R, 86 L/R, 87 L/R, 88 L/R, 90 L/R, 91 L/R, 92 L/R, 98 L/R, 99 L/R, 100 L/R, 101 L/R, 102 L/R, 103 L/R, 104 L/R, 105 L/R, 106 L/R, 108 L/R, 110 L/R 111 L/R, 112 L/R 121 L/R, 122 L/R, 123 L/R, 124 L/R, 125 L/R, 153 L/R, 126 L/R, 127 L/R, 128 L/R, 129 L/R, 130 L/R, 131 L/R, 132 L/R, 134 L/R 153 L/R, 154 L/R, 155 L/R, 156 L/R, 157 L/R, 158 L/R, 159 L/R | 26 L/R, 27 L/R, 28 L/R, 29 L/R, 30 L/R, 31 L/R, 40 L/R, 41 L/R, 42 L/R, 43 L/R, 44 L/R, 45 L/R, 46 L/R, 49 L/R, 50 L/R, 51 L/R, 57 L/R, 58 L/R, 59 L/R, 62 L/R, 63 L/R, 68 L/R, 72 L/R, 73 L/R, 74 L/R, 75 L/R, 76 L/R, 77 L/R, 89 L/R, 93 L/R, 94 L/R, 95 L/R | 96 L/R, 97 L/R, 107 L/R, 109 L/R, 113 L/R, 114 L/R, 117 L/R, 118 L/R, 119 L/R, 120 L/R, 135 L/R, 136 L/R, 137 L/R, 138 L/R, 139 L/R, 140 L/R, 141 L/R, 142 L/R, 143 L/R, 144 L/R, 145 L/R, 146 L/R, 147 L/R, 148 L/R, 149 L/R, 150 L/R, 151 L/R, 152 L/R |
| 98 | 126 | 64 | 56 |

Figure 5.6-1 (Sheet 2)




VOIDS - FINGER AND SADDLE TANKS-EXTERIOR

Figure 5.6-1 (Sheet 3)

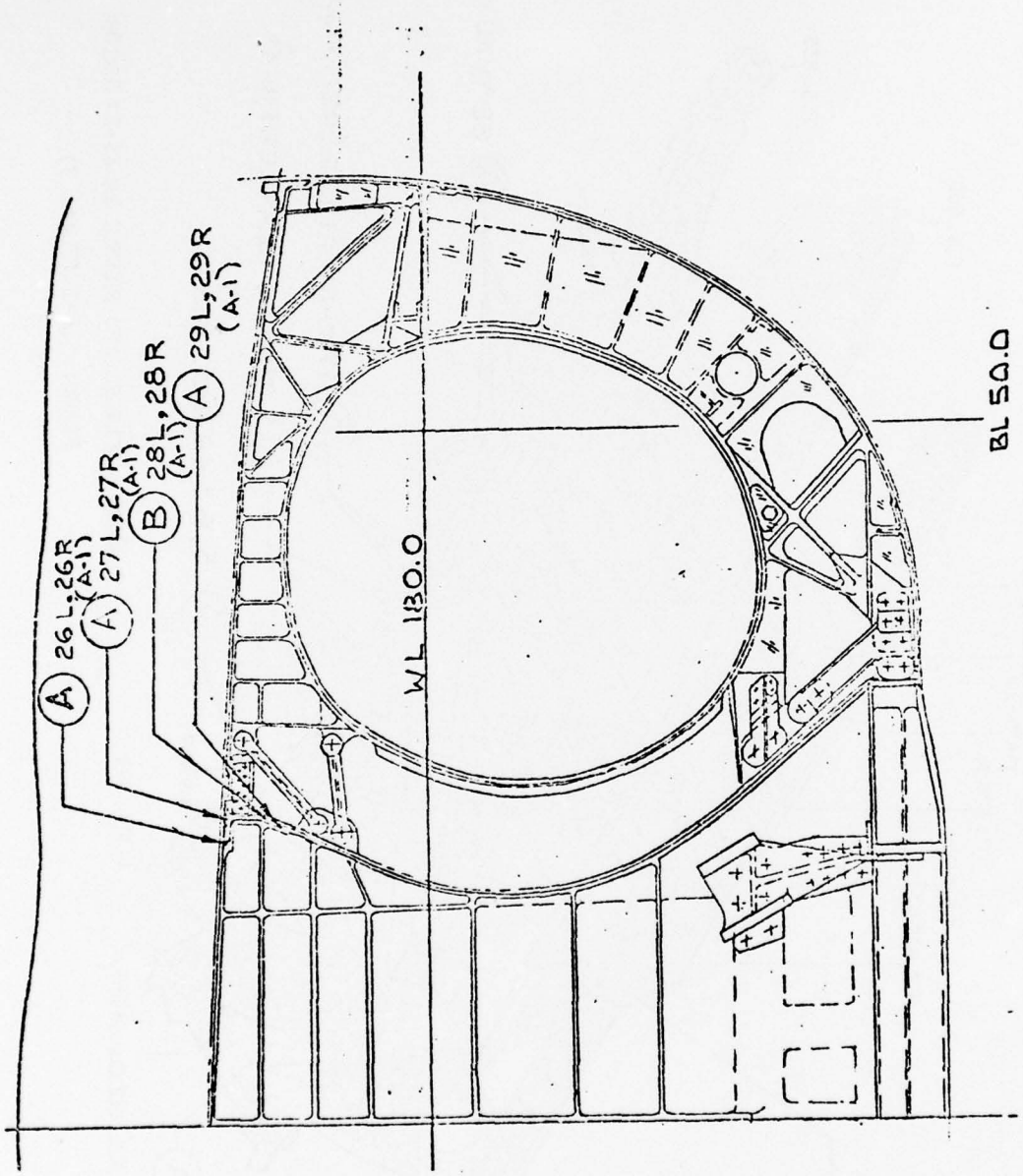



Figure 5.6-1 (Sheet 4)

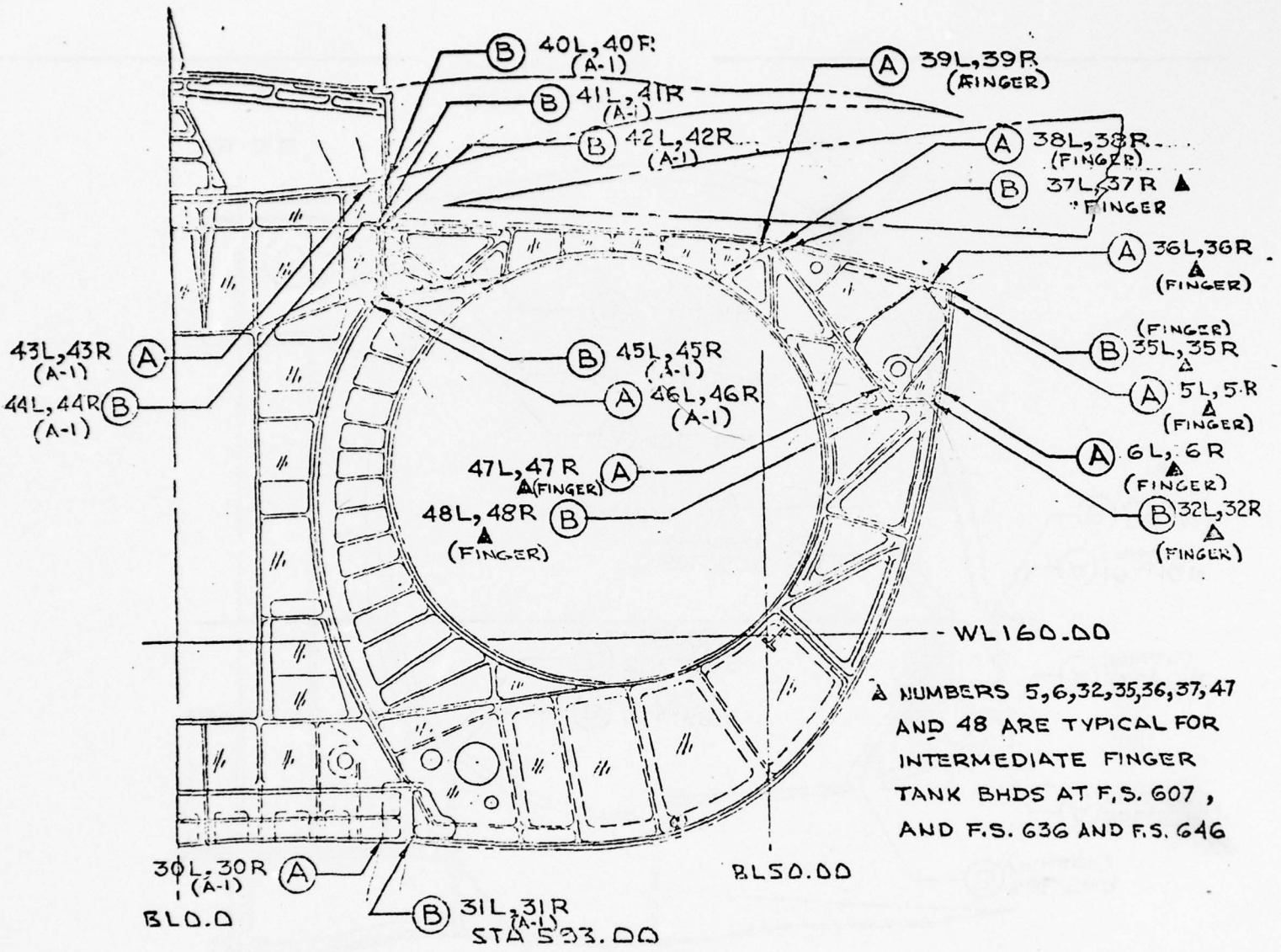



Figure 5.6-1 (Sheet 5)

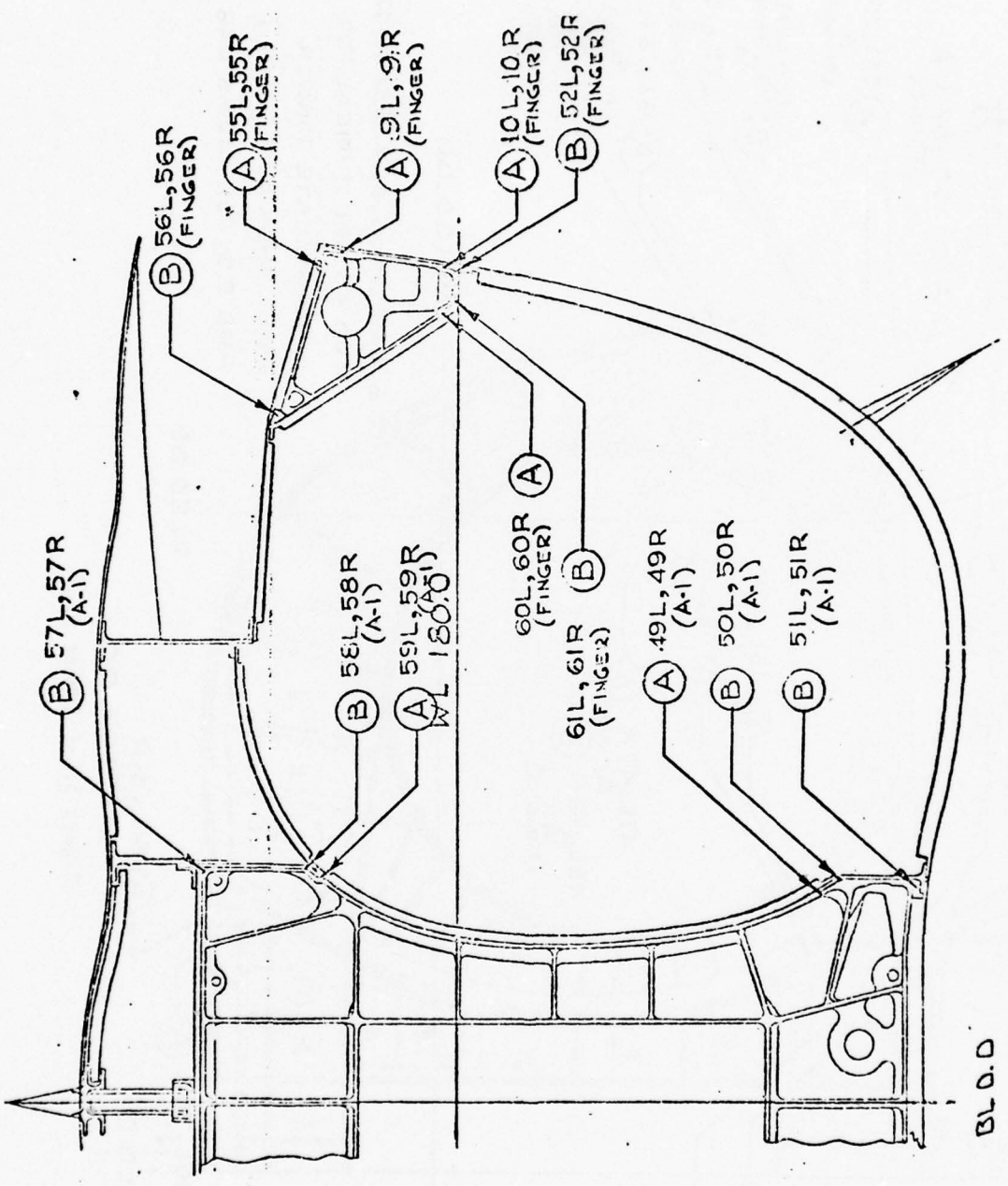



Figure 5.6-1 (Sheet 6)

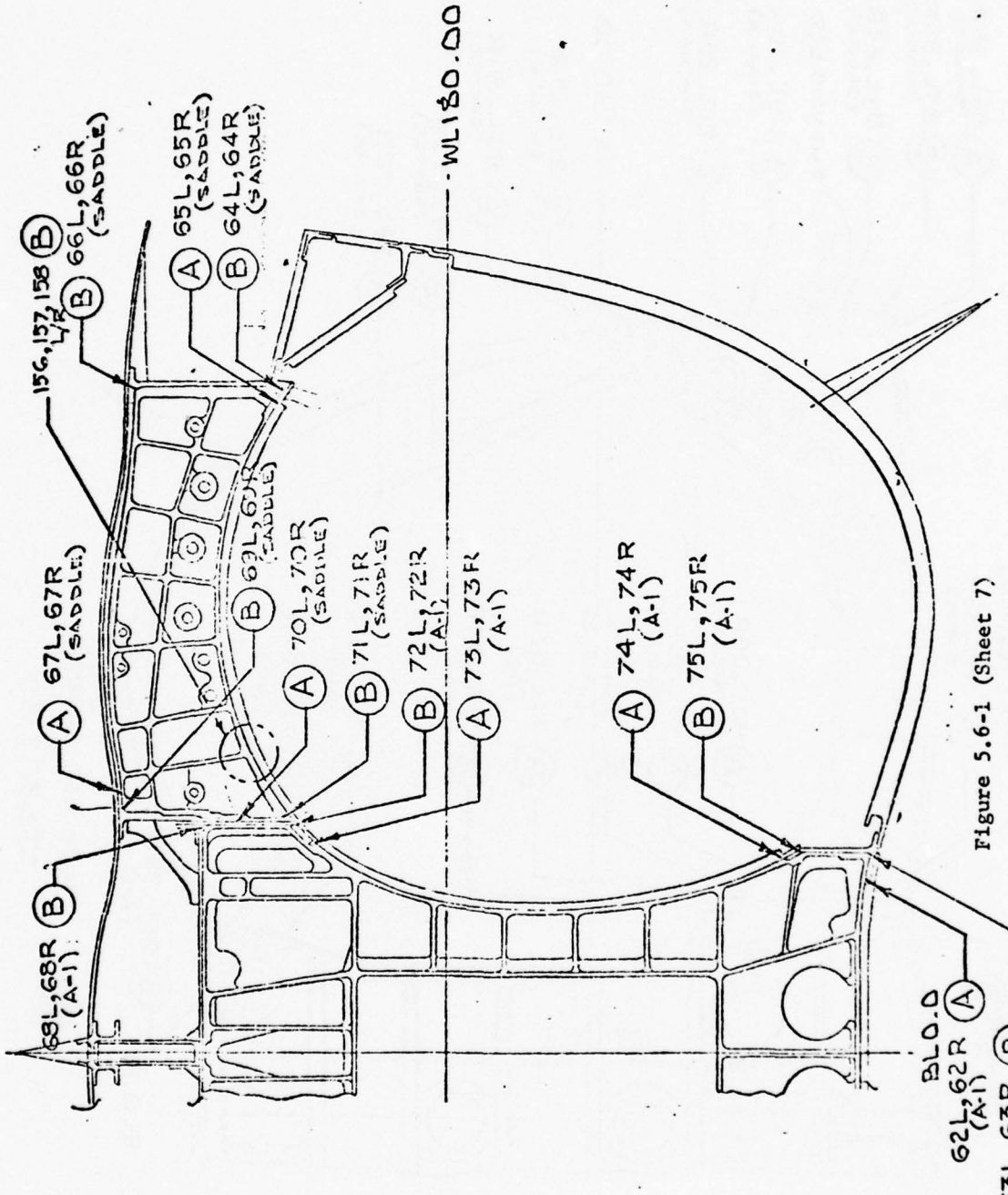



Figure 5.6-1 (Sheet 7)

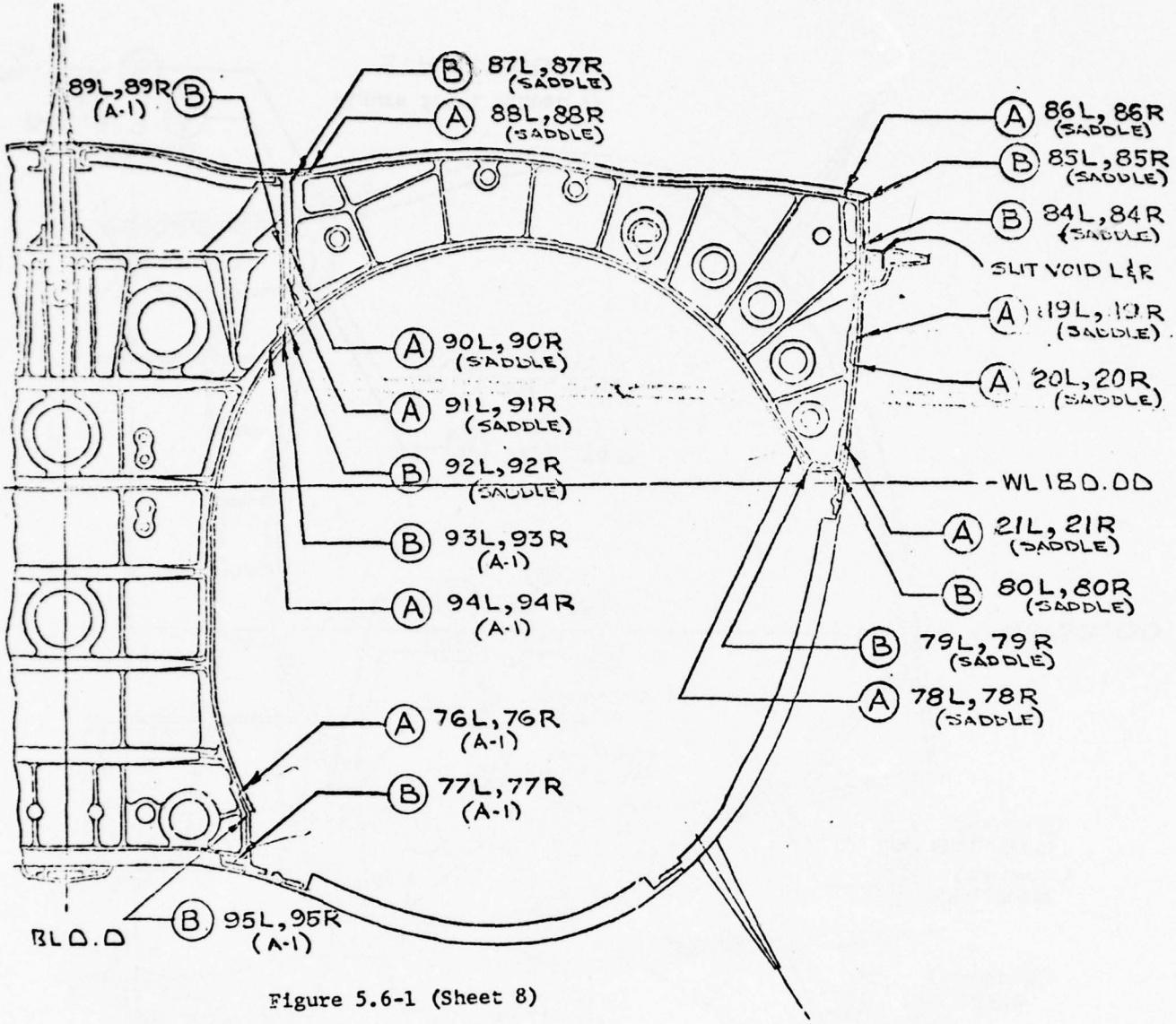



Figure 5.6-1 (Sheet 8)

STA 673.50

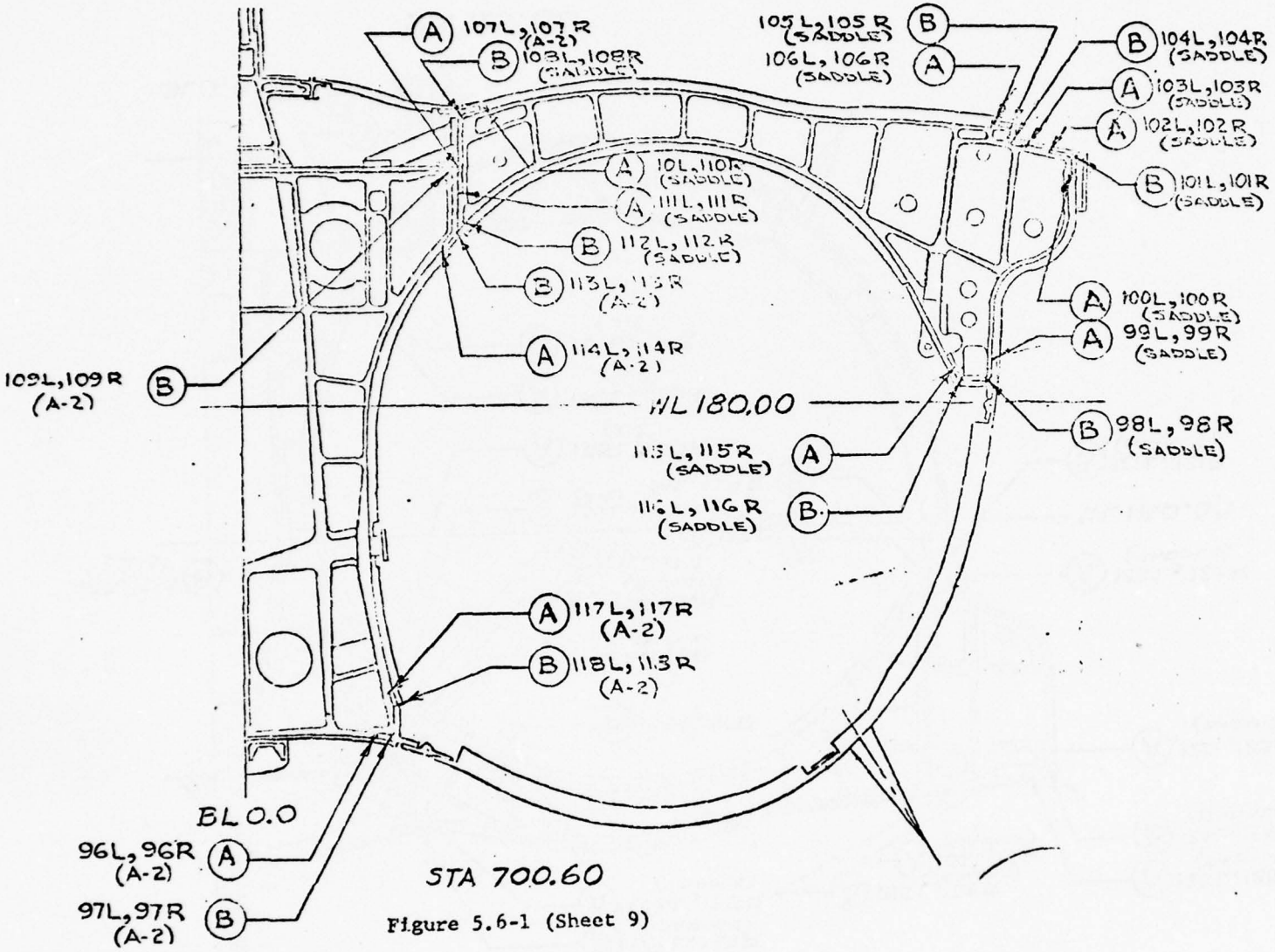
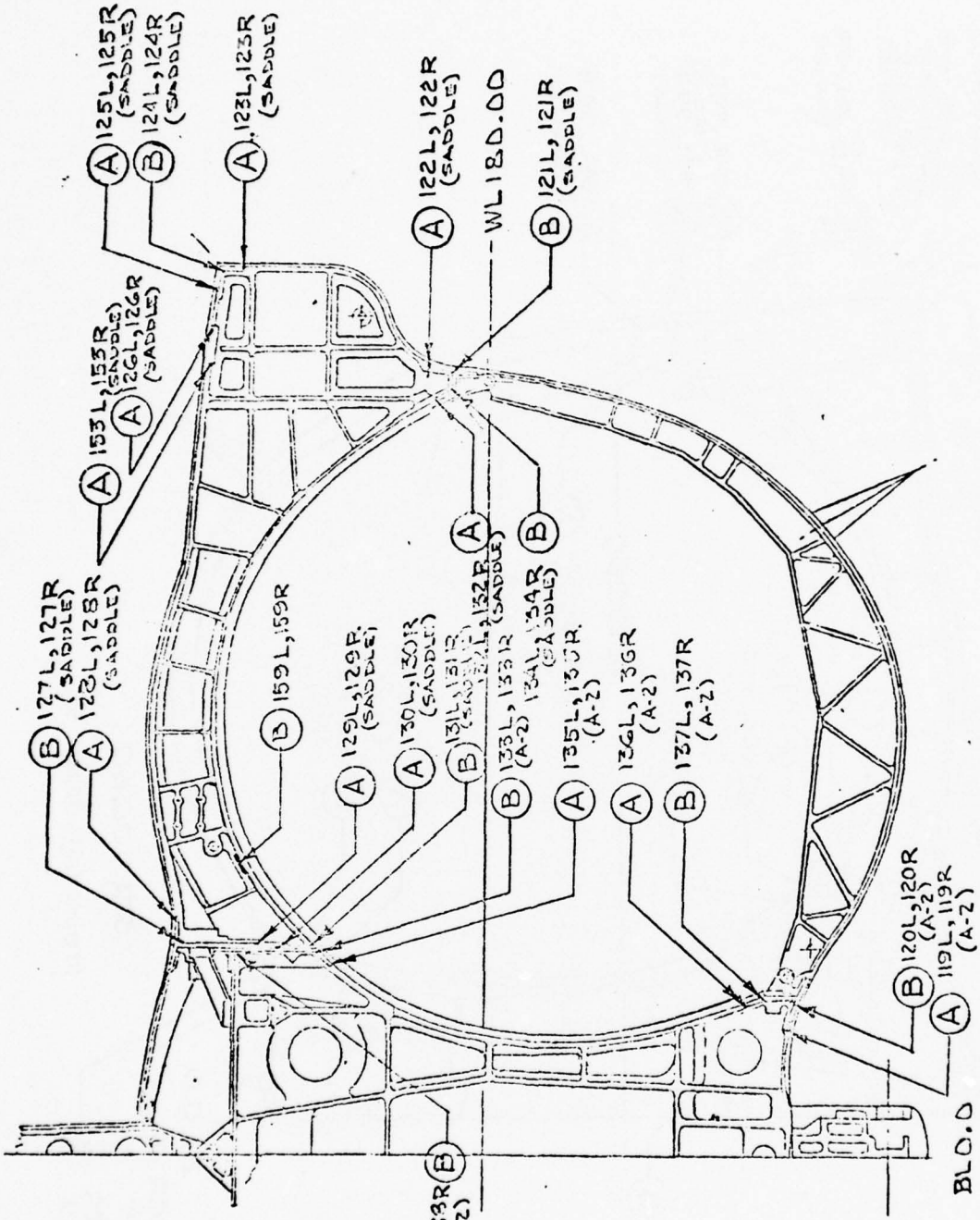



Figure 5.6-1 (Sheet 9)




STA 725.00

Figure 5.6-1 (Sheet 10)

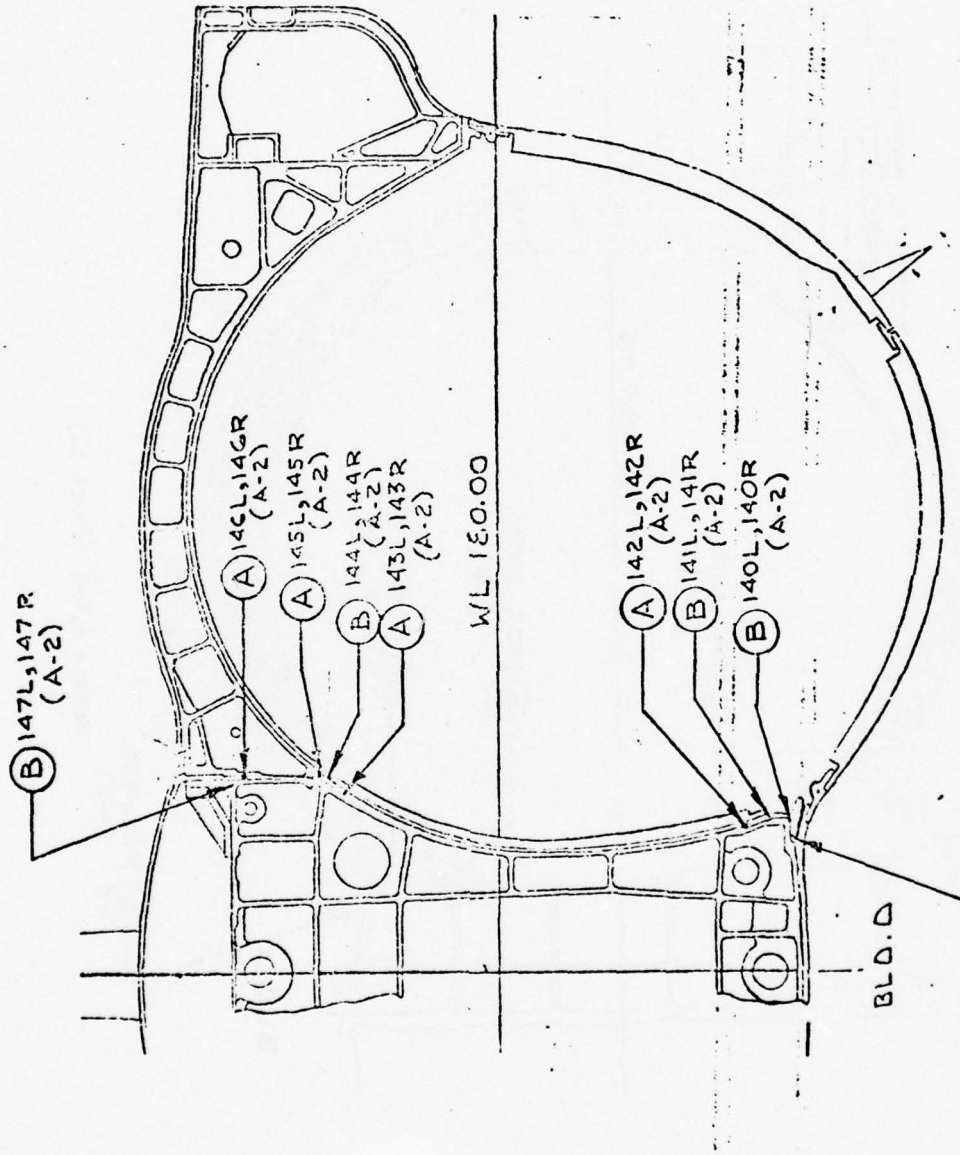



Figure 5.6-1 (Sheet 11)

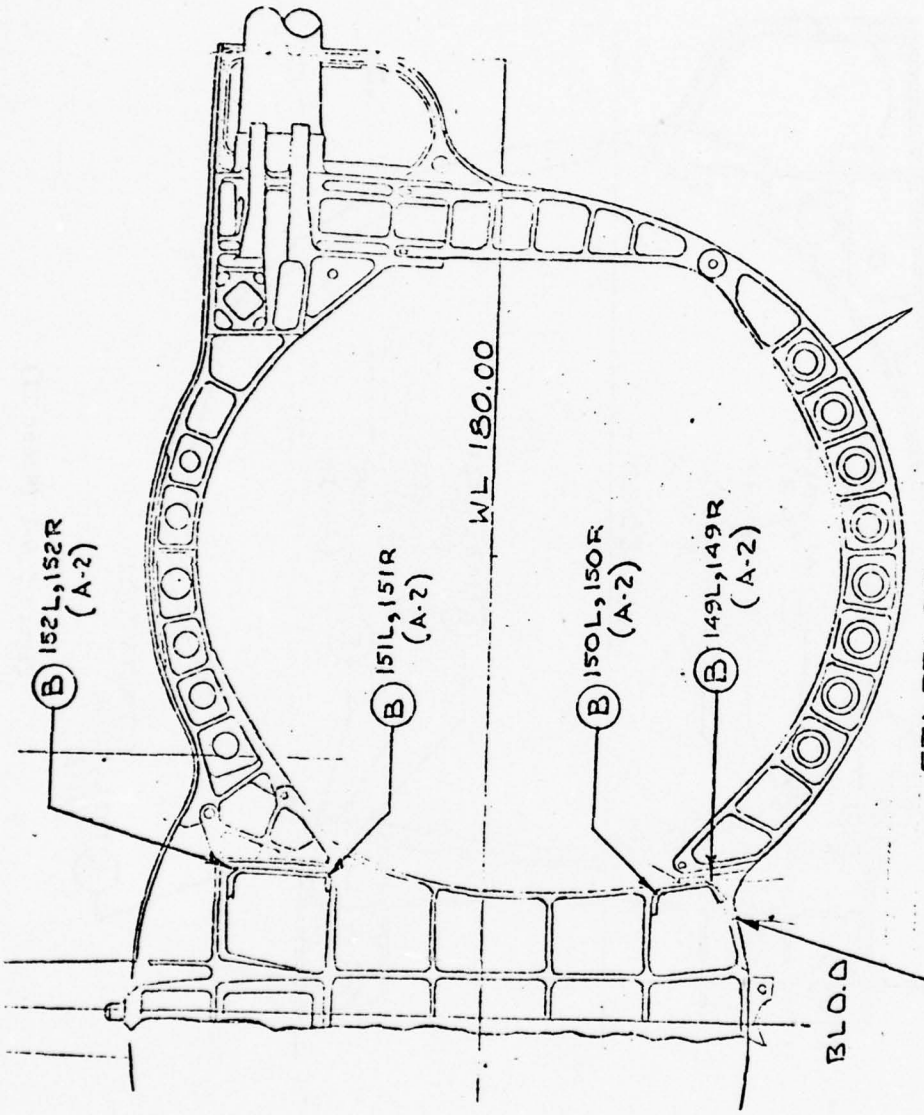



Figure 5.6-1 (Sheet 12)

# LOCATION OF VOIDS BY AREA

## FORWARD TANKS

| AREA IDENTIFICATION - TANK | | |
|---|---|---|
| F-1 TANK | F-2 TANK | LOWER TRAP TANK |
| 1 L/R THRU 60 L/R | 61 L/R THRU 135 L/R ▲ | 136 L/R THRU 144 L/R |

▲ VOIDS 90 L/R THRU 95 L/R EFFECTIVE A1: 12-50 ONLY

Figure 5.6-1 (Sheet 13)

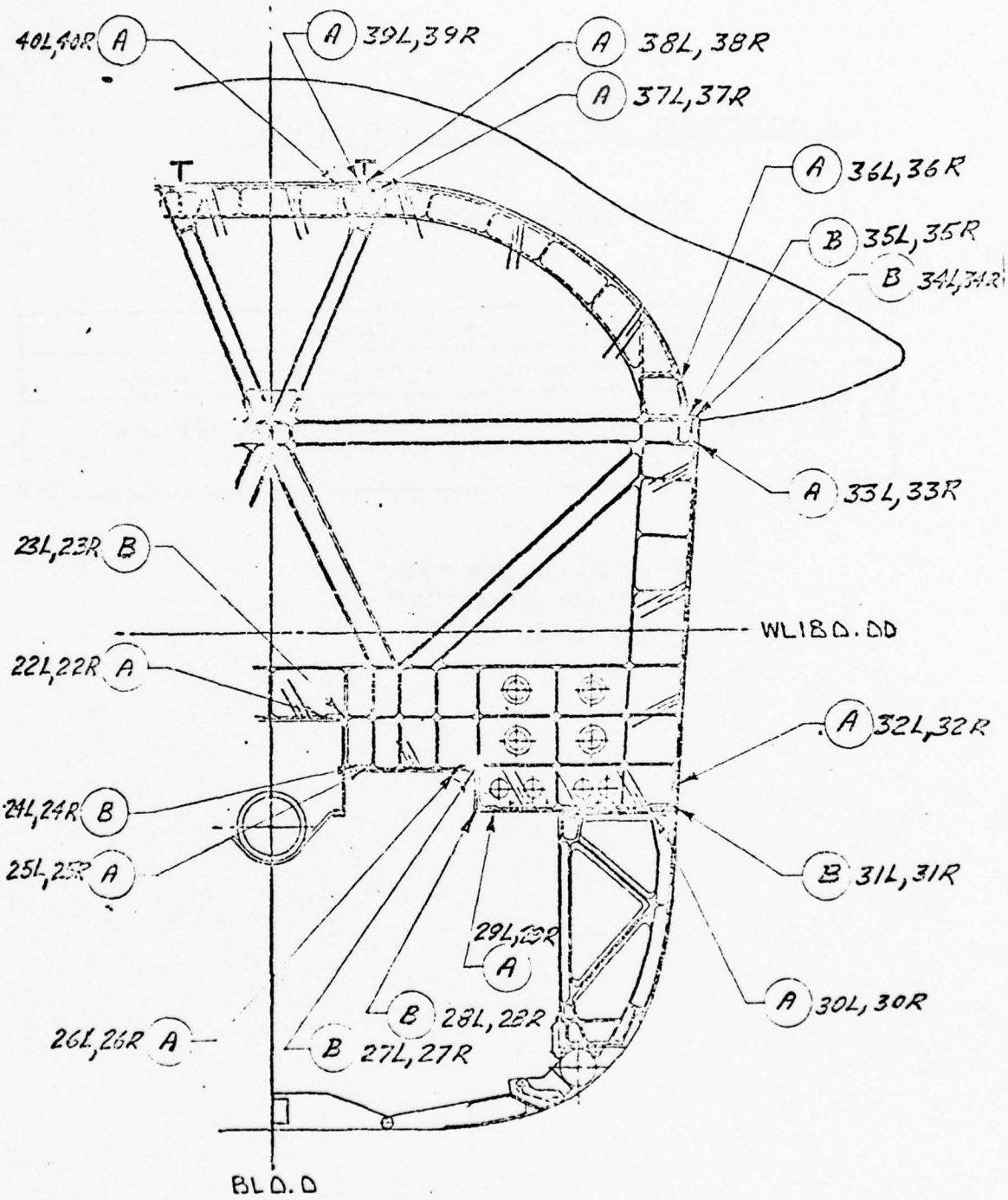



Figure 5.6-1 (Sheet 14)

F-1 TANK

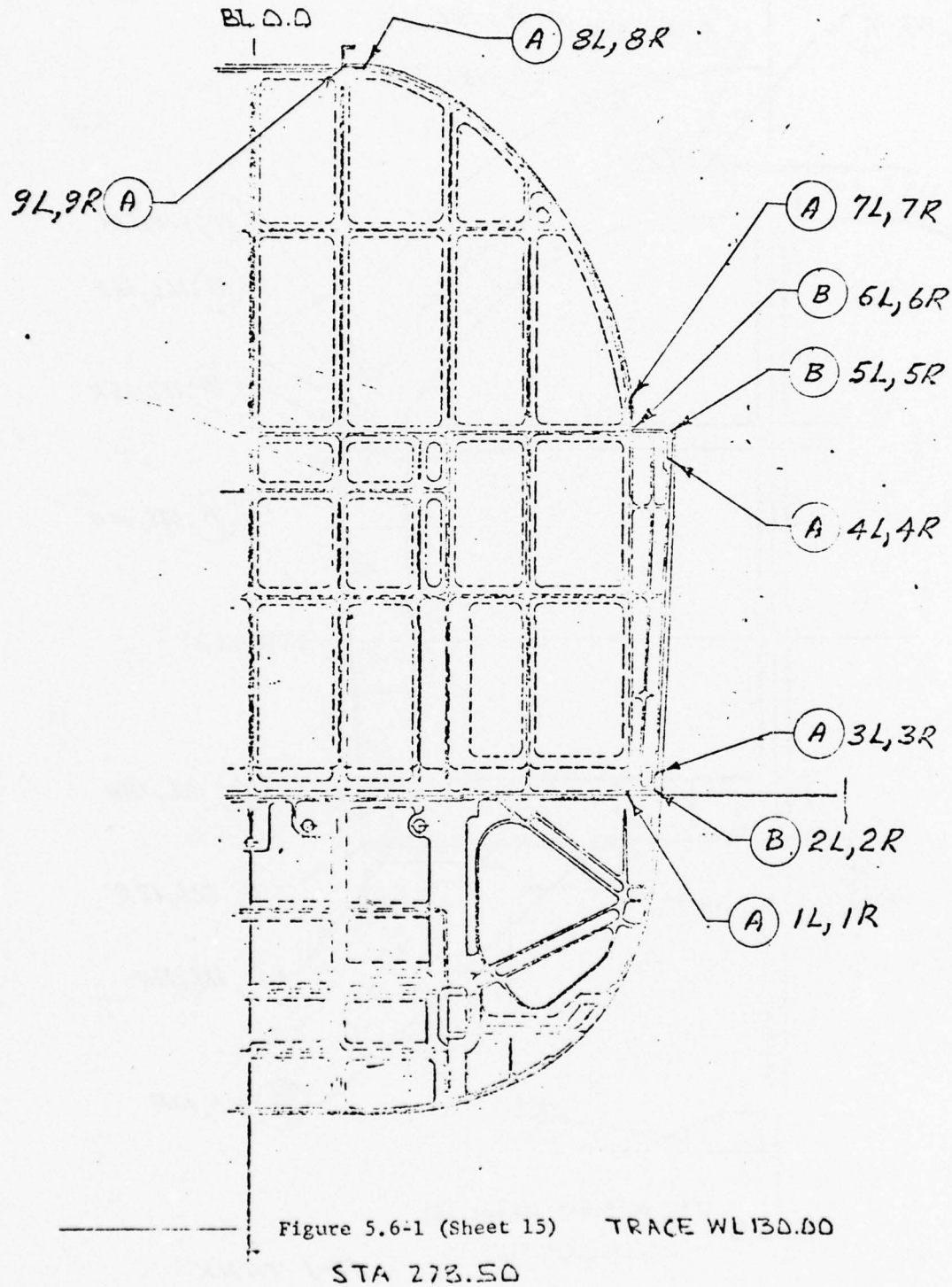



Figure 5.6-1 (Sheet 15) TRACE WL 130.00

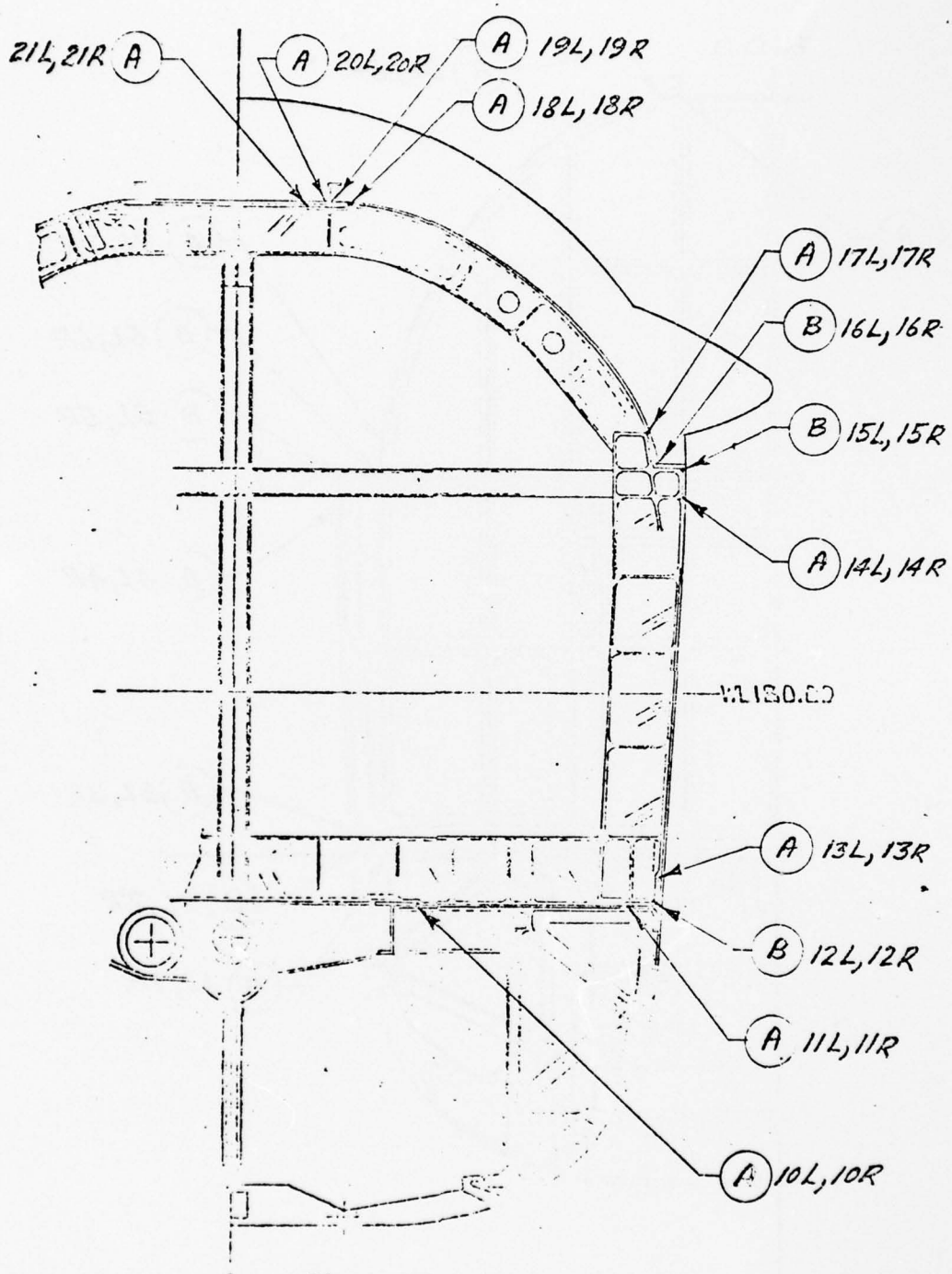



Figure 5.6-1 (Sheet 16)

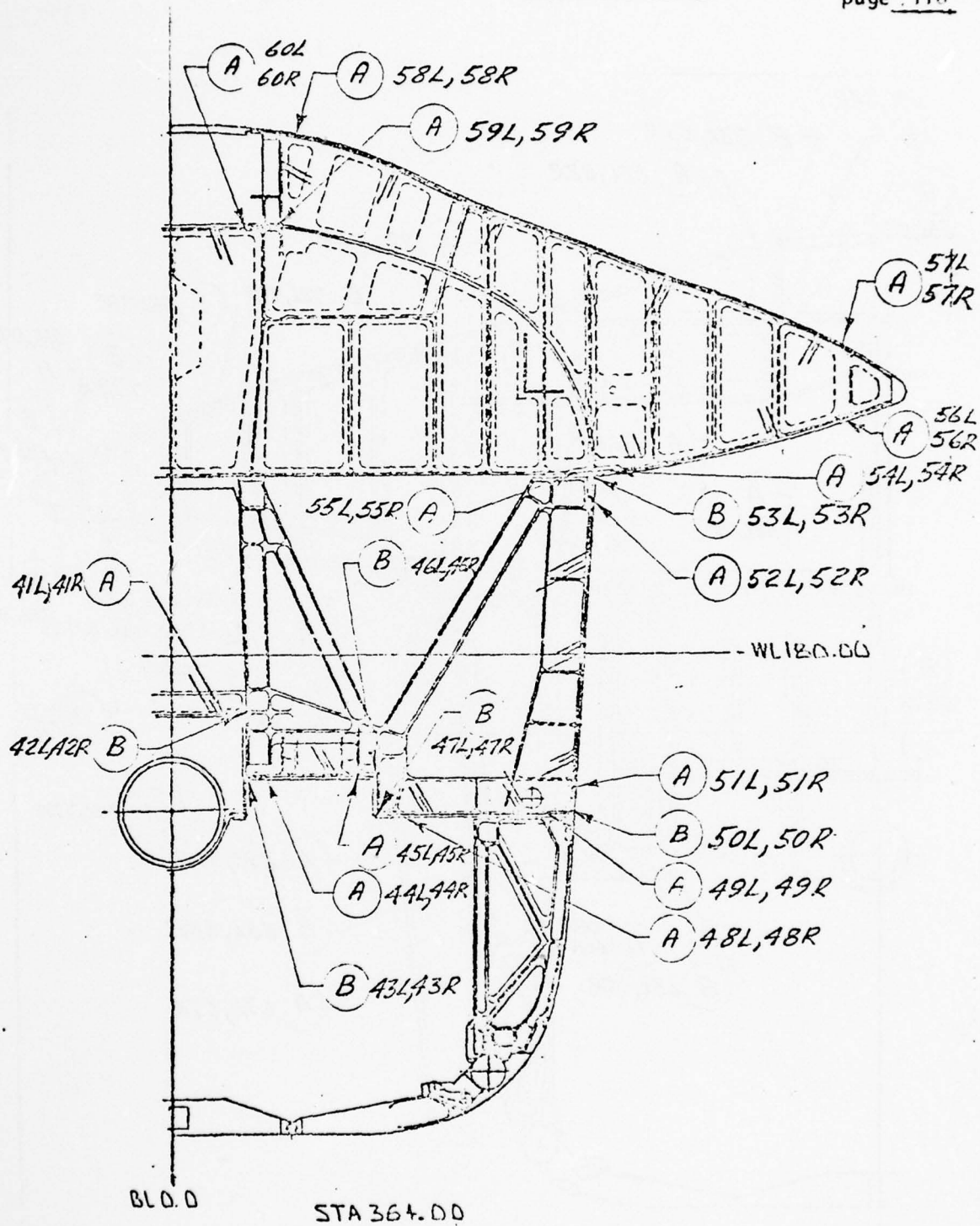



Figure 5.6-1 (Sheet 17)

F-1 TANK

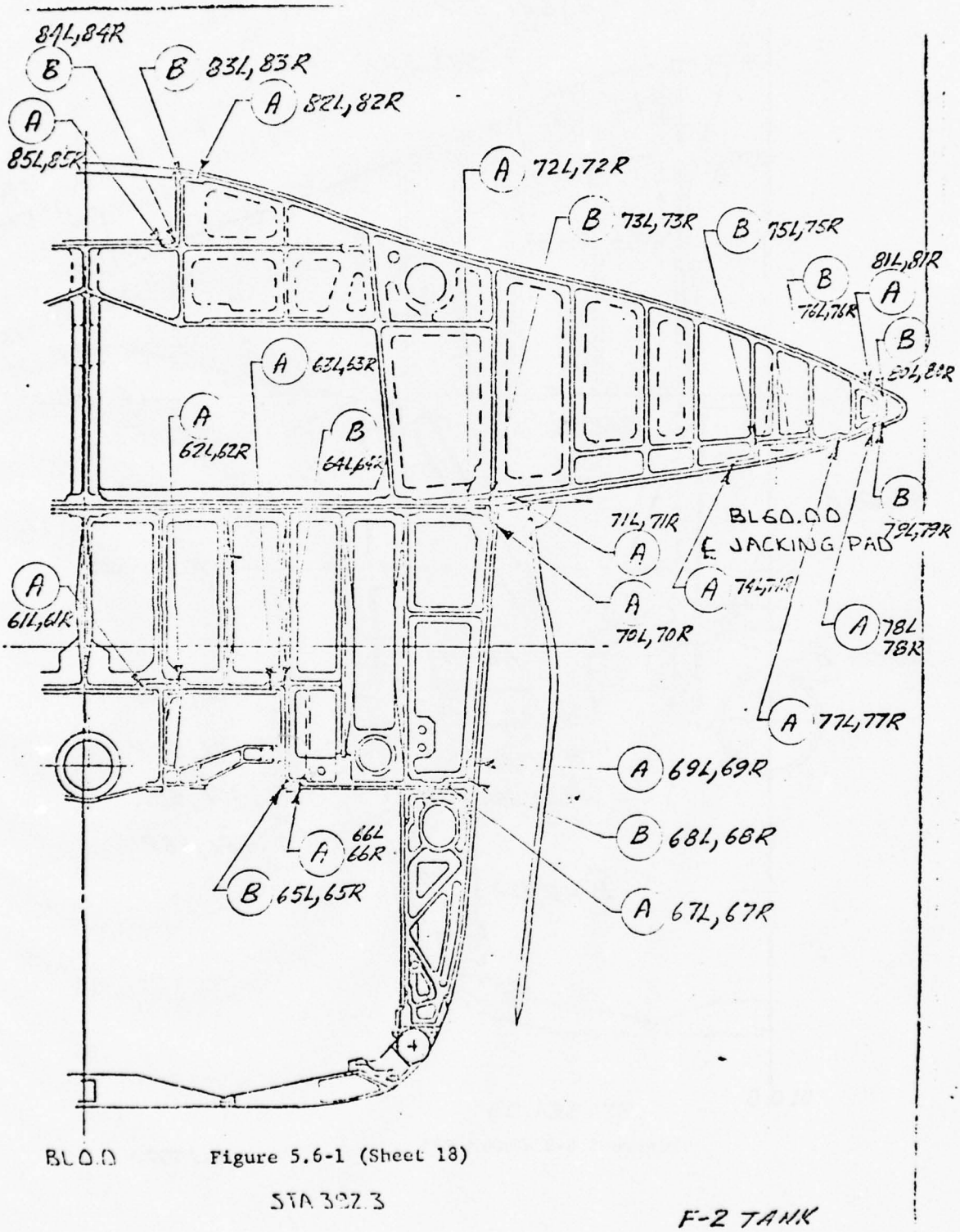



Figure 5.6-1 (Sheet 18)

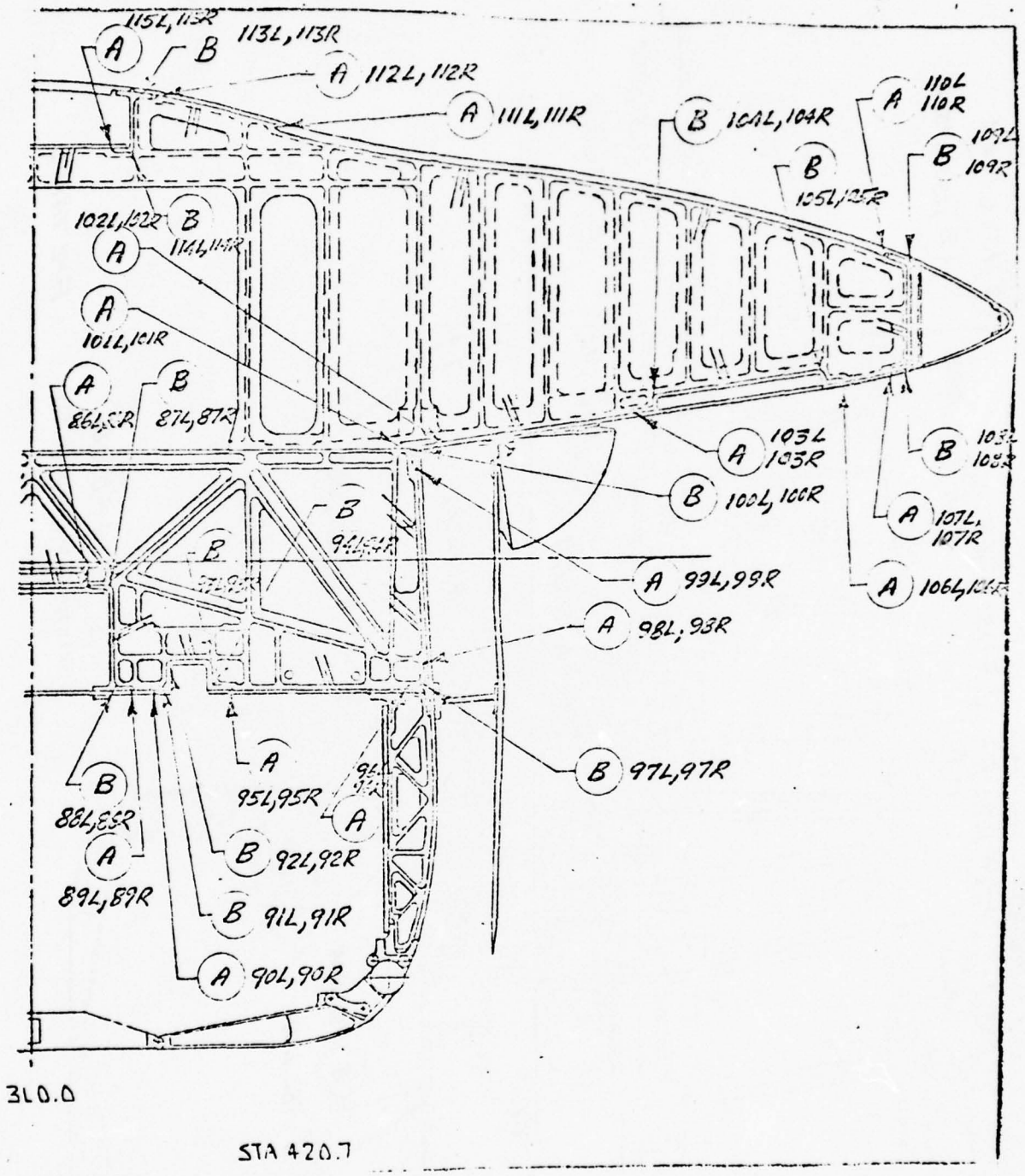



Figure 5.6-1 (Sheet 19)

F-2 TANK

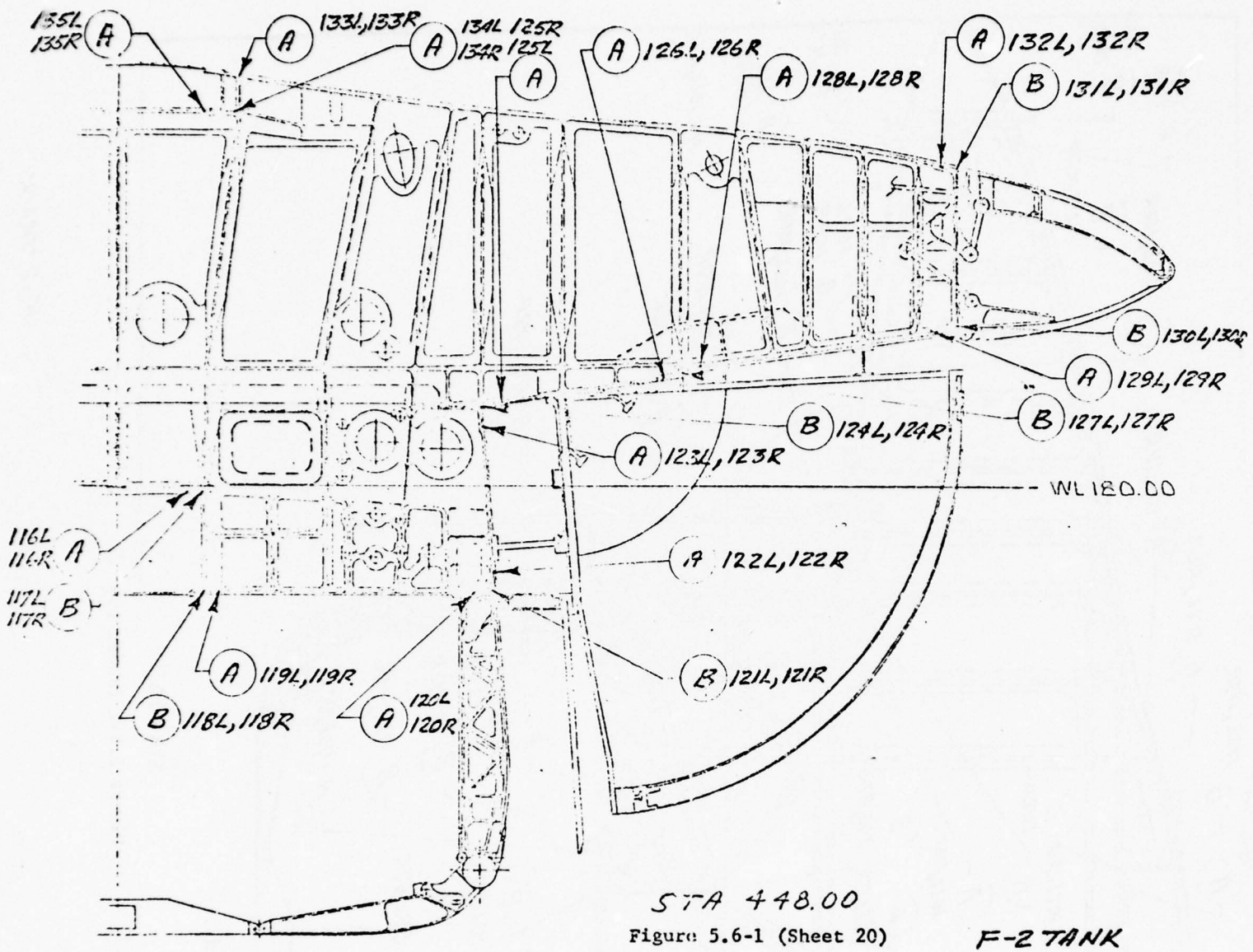



Figure 5.6-1 (Sheet 20)

F-2 TANK

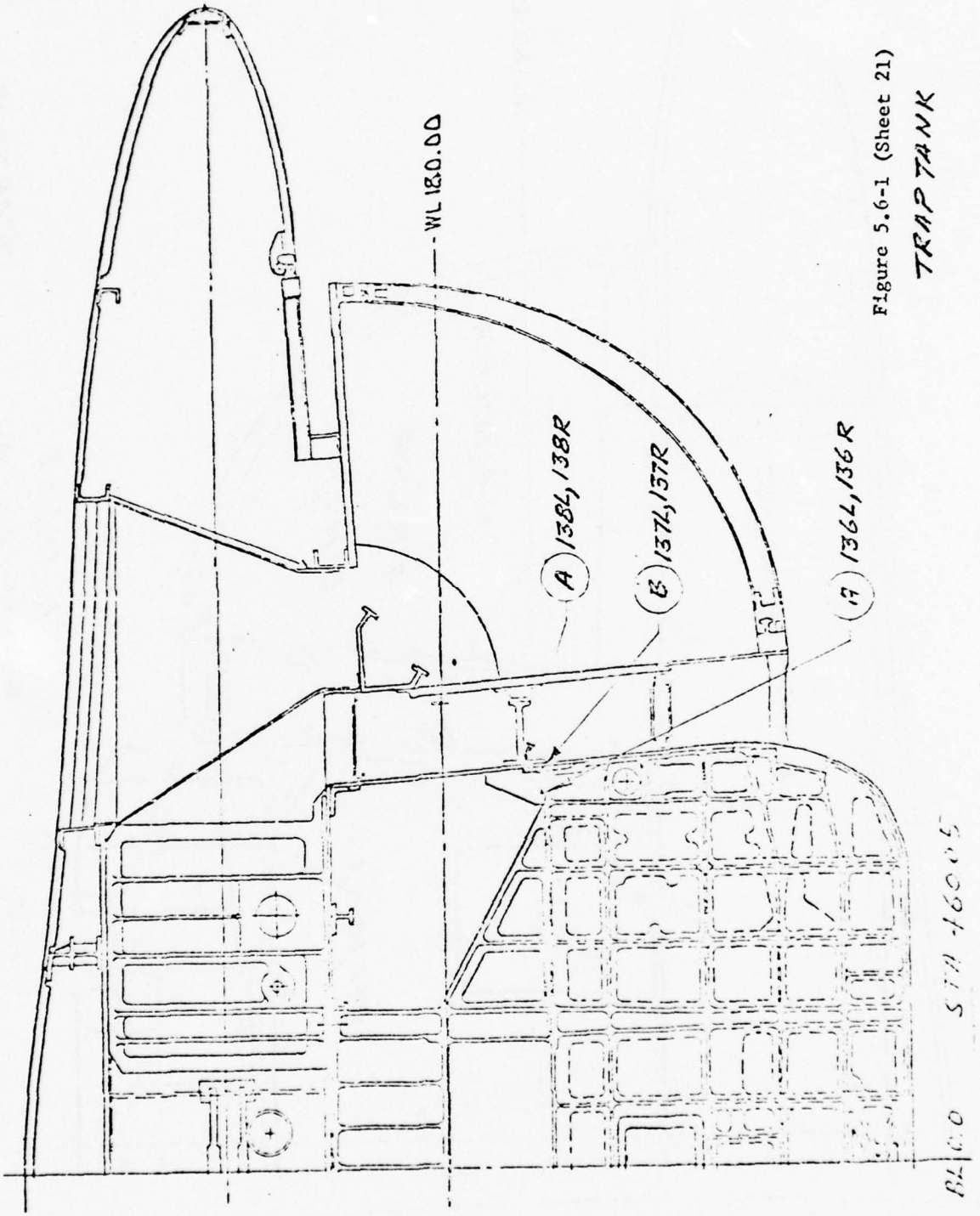



Figure 5.6-1 (Sheet 21)
TRAP TANK

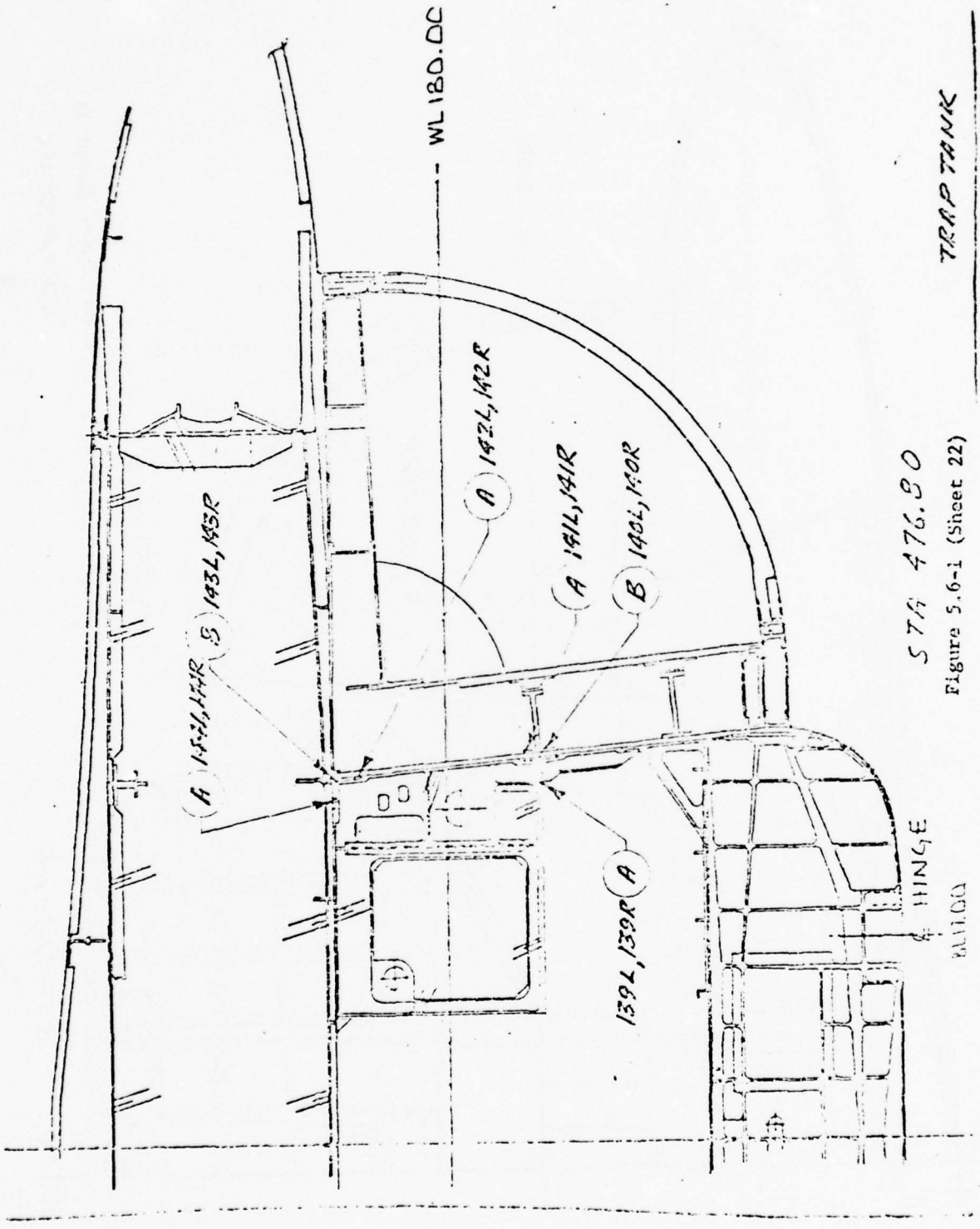



Figure 5.6-1 (Sheet 22)

5.6.1.4 Use explosion proof black light to aid in detecting remaining reverted sealant in voids. Reverted sealant fluoresces with a white color and is not acceptable in voids that can be inspected with the black light. However, if the fluorescence persists after the area has been recleaned four times with MIL-C-38736 cleaner using pipe cleaners, brushes and/or clean cheesecloths, the fluorescence may be disregarded and the area considered to be clean. (See Section 9.0)

NOTE

In some instances, reverted sealant may flow back into the cleaned area in a matter of several hours. If this is the case, special arrangements should be made to clean the area in question, inspect it soon thereafter, and apply the PR 148 and the epoxy before the reverted sealant has a chance to creep back.

5.6.1.5 Flush void with PR-148 adhesive promoter and wipe off excess with clean cheesecloth. Allow to dry a minimum of 30 minutes before applying epoxy. If more than 4 hours elapse before void epoxy can be applied, or if surfaces become contaminated, the PR-148 application shall be repeated.

5.6.2 Resealing the Voids.

NOTE

Seal voids in hard to reach areas with epoxy prior to running fillet seal. Do not apply fillet seal then try to fill void.

5.6.2.1 Fill all voids (reference Figure 5.6-1) with epoxy, using a Semco Model No. 250 fillet gun or a Semco Model No. 507 sealant injection gun or equivalent equipment. If size of void is approximately .06 by .06 the EC-2216 epoxy may be used in lieu of XA-3598 to obtain better flow into the void. In overhead areas or where uncured epoxy may tend to sag, commercial grade tape may be used to prevent flow from the void. There shall be no visable air bubbles or other defects in the epoxy when it is cured to a firm condition. See paragraph 5.7.2.1 for epoxy preparation.

5.6.2.2 Epoxy void compound must be cured to a firm condition before any air pressure tests can be conducted on the fuel tank but epoxy barrier compounds may be applied over the ends of voids while the void compound is still uncured.

5.6.3 Deleted

5.7 Application of Epoxy Barrier.

5.7.1 Cleaning for Epoxy Barrier.

NOTE

Epoxy is to be applied to areas to retard the effects of reverted EC-5106 sealant. Components such as fuel line fittings and electrical connectors which utilize gasket type seals do not require epoxy application.

5.7.1.1 Using a brush or vacuum cleaner remove all dust, old sealant and other foreign material from fuel tank areas where the barrier will be applied.

5.7.1.2 Thoroughly clean all surfaces to which epoxy is to be bonded with clean cheesecloth dampened with MIL-C-38736 cleaner. Discard used cheesecloth.

NOTE

All loose particles, sticky substances, and soft pieces of sealant shall be removed. Dark stains imbedded in the polyurethane fuel tank coating, that will not come off by wiping with clean cheesecloth dampened with MIL-C-33736, are acceptable. Minute amounts of adhered, cured, fillet sealant on fasteners will be acceptable.

5.7.1.3 Wipe area dry with clean dry cheesecloth before the MIL-C-38736 evaporates. Discard used cheesecloth.

5.7.1.4 Use explosion proof black light to aid in detecting any reverted sealant prior to applying epoxy to seams and voids. Reverted sealant will fluorescence with a white color. Any fluorescence within one inch of the area in which epoxy is to be applied will be cause for recleaning. If the fluorescence persists after the area has been re-cleaned four times with MIL-C-38736 cleaner and clean cheesecloth, the fluorescence may be disregarded and the area considered to be clean. (See Section 9.0)

5.7.1.5 Wipe all surfaces to which epoxy will be applied with clean cheesecloth dampened with PR-148.

5.7.1.6 Wipe PR-148 lightly with clean dry cheesecloth to remove excess. Discard used cheesecloth.

5.7.1.7 Allow any traces of PR-148 to dry for a minimum of 30 minutes before epoxy barrier is applied. If more than 4 hours elapse before epoxy can be applied, or if surfaces become contaminated, the PR-148 application shall be repeated.

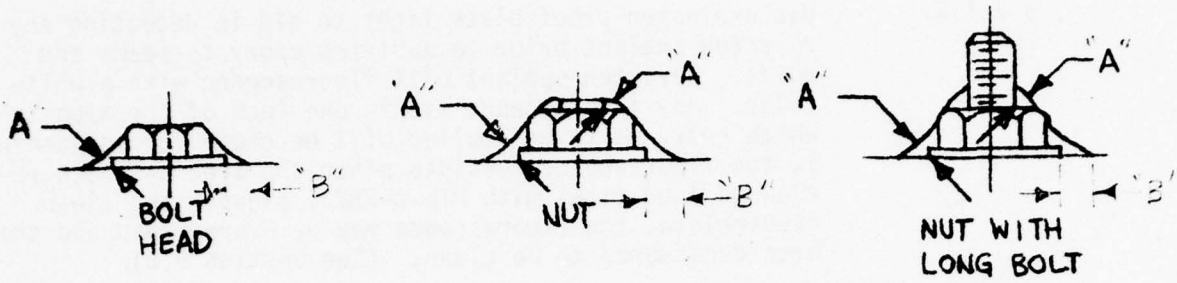
5.7.2 Application of EC-2216 and XA-3598 Epoxy.

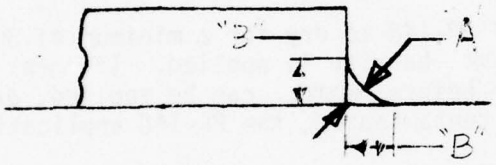
5.7.2.1 EC-2216 and XA-3598 (3M Co.) are two part epoxy compounds and should be mixed in accordance with the manufacturers instructions. The EC-2216 and XA-3598 materials shall be mixed in a vacuum container and placed in plastic tubes suitable for use in a Semco Model No. 250 fillet gun or mixed, centrifuged to remove air bubbles, and then placed in the plastic tubes.

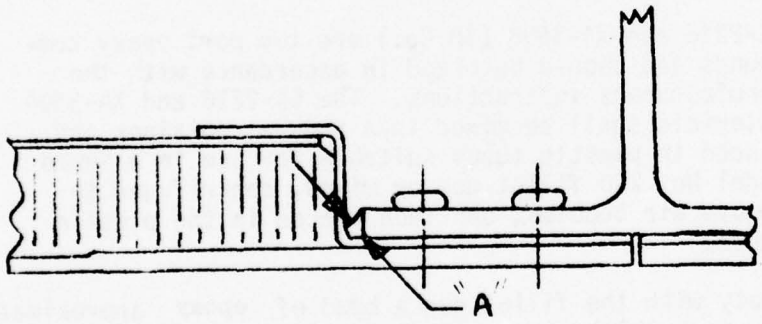
5.7.2.2 Apply with the fillet gun a bead of epoxy approximately .06 inch thick along all faying surface seams that were previously sealed with EC-5106 polyester sealant. Smooth down and work into seams with a spatula to fill any gaps. Additional epoxy may be required if there is a large gap between the faying surfaces.

NOTE

Seal voids in hard to reach areas with epoxy prior to running fillet seal. Do not apply fillet seal then try to fill voids.




NOTES:
1. DIM "A" = .04 - .08 INCH
2. DIM "B" = .06 - .12 INCH
3. DO NOT APPLY EPOXY TO FLOATING NUTPLATES.

FIGURE 5.7-1

EPOXY APPLICATION AREAS

5.7.2.3 The bead of epoxy shall be continuous along the seams and shall, therefore, extend over the ends of the structural voids (see 5.6.2) which were resealed with epoxy.

5.7.2.4 Also apply a bead of EC-2216 or XA-3598 epoxy to fasteners that have a shank diameter of .75 inch or larger if the opposite end of the fastners are not in a fuel tank area. Reference Figure 5.7-1 for epoxy thickness.

5.7.2.5 In some areas, particularly on vertical or overhead surfaces, the epoxy compound may drip or run excessively at fasteners or along seams. If this occurs, the excessive amount shall be trimmed off with a sharpened plastic scraper. Trimming should be accomplished before epoxy becomes firmly cured, which usually means that it should be done within a 24 hour period after application.

5.7.3 Curing the Epoxy Barrier.

5.7.3.1 Cure the epoxy for a minimum of 24 hours at 75 degrees F (+ 5 degrees F). The cure may be accelerated by heating for 3 hours at 150 degrees F after application. There shall be no visible air bubbles or other defects in the epoxy when it is cured to a firm condition.

5.7.4 Use explosion proof black light to aid in detection of voids and misses in the epoxy barrier. The epoxy barrier material, EC2216 or XA-3598will appear as a light fluorescent blue under the black light. No pinholes, voids, or missed areas are permitted. Any evidence of reverted EC5106 (white fluorescence) protruding from under the epoxy requires recleaning and application of additional epoxy to contain reverted sealant. (See Section 9.0) Fluorescence previously determined to be stains is not grounds for removal.

5.8 Application of New Fillet Sealant.

NOTE

Do not inject sealant into sealing groove injection holes.

5.8.1 Cleaning for Sealant.

5.8.1.1 Remove dust or foreign material that may have collected in the fuel tank after the application and curing of the epoxy barrier.

5.8.1.2 Certain fasteners in the WCTB will not be desealed on most aircraft. Reference paragraph 5.2.1.1. However, MIL-S-83430 sealant will be applied over this existing sealant. Except as otherwise stated, the application of new sealant over this existing sealant shall be treated just as if the new sealant is being applied to the tank surface. Thoroughly wipe all surfaces to which MIL-S-83430 sealant is to be applied with clean cheesecloth dampened with MIL-C-38736 cleaner. Discard used cheesecloth.

5.8.1.3 Wipe area dry with clean dry cheesecloth before the MIL-C-38736 evaporates. Discard used cheesecloth.

NOTE

All loose particles, sticky substances, and soft pieces of sealant shall be removed. Dark stains imbedded in the polyurethane fuel tank coating, that will not come off by wiping with clean cheesecloth dampened with MIL-C-33736, are acceptable. Minute amounts of adhered, cured, fillet sealant on fasteners will be acceptable.

5.8.1.4 Wipe all surfaces on which MIL-S-83430 will be applied with clean cheesecloth dampened with PR-148. Remove gloss from epoxy barrier by rubbing the surface with the cheesecloth dampened with PR-148. Continue rubbing the surface until it is no longer glossy. Discard used cheesecloth.

5.8.1.5 Wipe PR-148 lightly with clean dry cheesecloth to remove excess. Discard used cheesecloth.

5.8.1.6 Allow any traces of PR-148 to dry for a minimum of 30 minutes before sealant is applied. If more than 4 hours elapse before sealant is applied, or if surfaces become contaminated, the PR-148 application shall be repeated.

5.8.2 Application of Sealant.

NOTE: Components such as fuel line fittings and electrical connectors which utilize gasket type seals do not require sealant applications. Do not seal floating nut plates.

5.8.2.1 Pro-Seal 899 (Coast Pro-Seal) and PR-1750 (Products Research) are two part polysulfide sealants conforming to MIL-S-83430. They should be mixed in accordance with the manufacturers instructions.

If sealant cannot be mixed in a Semco (or equivalent) batch mixer it will be necessary to centrifuge the plastic tubes after the sealant has been poured in so that the air bubbles can be minimized. A Semco Model No. 250 fillet gun shall be used for the application.

5.8.2.2 The sealant shall be applied as follows:

5.8.2.2.1 In the WCTB on the fasteners which were not desealed, apply only MIL-S-83430 B-2 or B-6 sealant. Using a small stiff brush the sealant shall be worked onto the existing sealant and onto the tank surface for a distance of .50 inch beyond the edge of the existing sealant. Immediately after this sealant is applied additional B-2 or B-6 sealant shall be applied and built up to a thickness of .25 to .30 inch. A spatula may be used to smooth the sealant to the desired configuration.

CAUTION

MIL-S-83430 Class A sealant shall not be applied over original sealant because the higher solvent content of Class A sealant may cause debonding of the original sealant.

5.8.2.2.2 In all other areas where sealant is to be applied, first apply a coat of MIL-S-83430 A-2 sealant sufficiently thick to assure complete coverage of all fasteners, epoxy filled voids, and seams. This sealant shall extend .45 inches beyond all epoxy barrier applications. A-2 sealant is the same as B-2 sealant except that it has a higher solvent content which allows it to flow into crevices and "wet" the surface better. To promote adhesion, A-2 sealant will be worked onto all surfaces and over all fasteners with small stiff brush. Allow this sealant to cure for at least 24 hours at 70 degrees F or warmer. This sealant must be tack-free before applying MIL-S-83430 B2 or B6 over it.

NOTE

MIL-S-83430 A-2 sealant will not be used at the WCTB top aft corner seam because it is not possible to apply A-2 sealant at this seam without also covering, and thereby possibly debonding, part of the original sealant on the adjacent fasteners. Use only MIL-S-83430 B-2 or B-6 sealant in this area.

5.8.2.2.3 If more than 96 hours elapse after the MIL-S-83430 A-2 sealant was applied, it will be necessary to remove the glaze from the A-2 sealant before applying additional A-2 or B-2 sealant. To remove glaze rub sealant with cheesecloth dampened with MIL-C-38736. Wipe excess cleaner away with clean dry cheesecloth. Discard used cheesecloth. If less than 96 hours have elapsed, this cleaning/glaze breaking will not be necessary unless the surface has become contaminated. Wipe with clean cheesecloth dampened with PR-148 adhesion promoter then wipe with clean, dry cheesecloth to remove excess. Proceed with applying the MIL-S-43430 B-2 or B-6 sealant as follows:

5.8.2.2.4 Using a fillet gun, apply a fillet of MIL-S-83430 B-2 or B-6 sealant over all areas previously coated with A-2 sealant. It is not necessary to entirely cover the A-2 sealant so long as fillets conform to the size and shape shown in Figure 5.8-1.

5.8.2.2.5 Multiple applications of sealant will be necessary to obtain the thickness specified. This will be accomplished as follows:

a. When sealant is tack-free and firm to the touch, wipe with clean cheesecloth dampened with PR-148 adhesion promoter. Discard used cheesecloth.

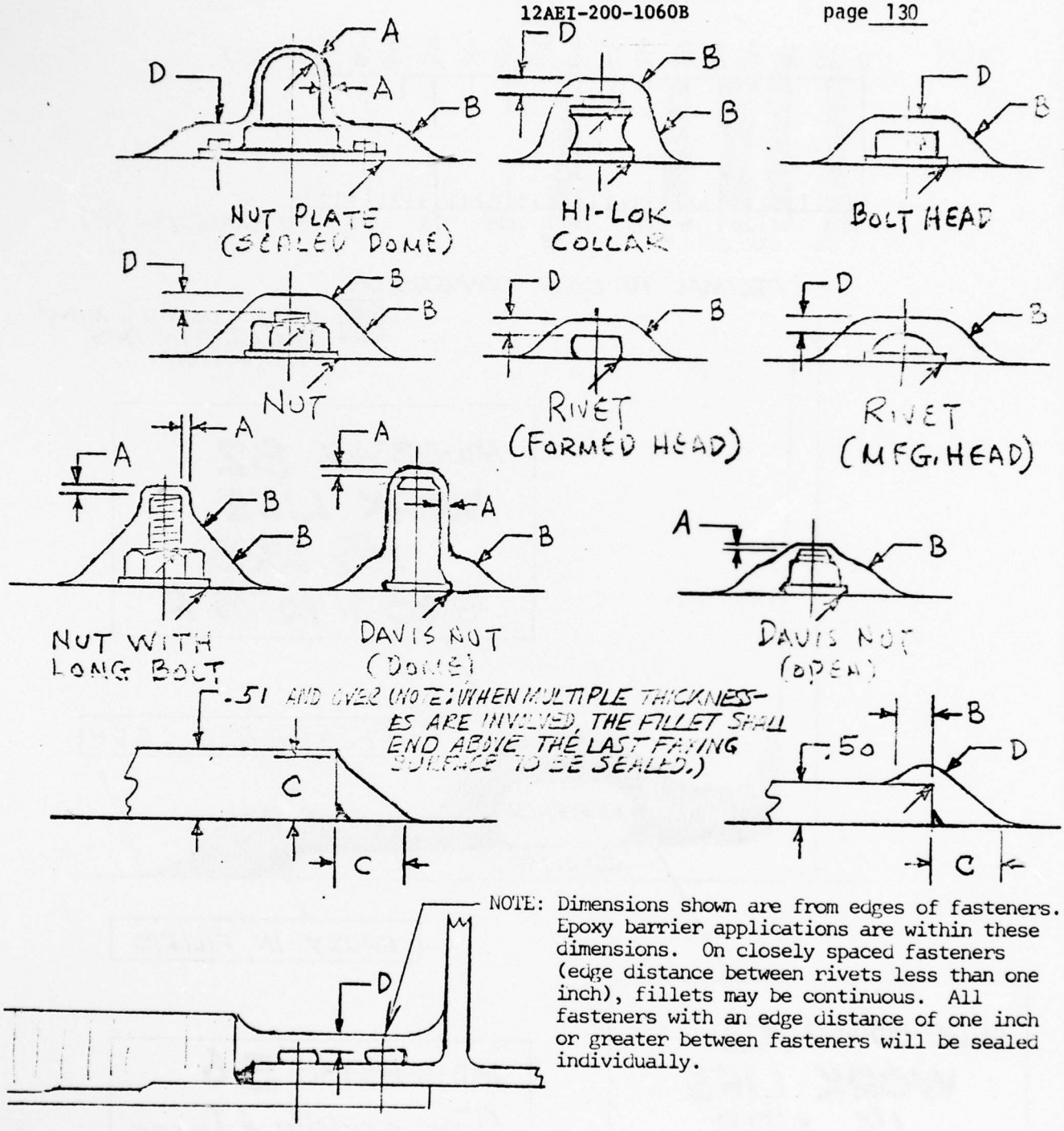
b. Wipe PR-148 lightly with clean, dry cheesecloth to remove excess.

c. Allow any traces of PR-148 to dry for a minimum of 30 minutes before sealant of either Class, A or B, is applied.

d. If more than 4 hours elapse before the sealant can be applied, or if surfaces become contaminated, the PR-148 application shall be repeated.

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NOTE: Dimensions shown are from edges of fasteners. Epoxy barrier applications are within these dimensions. On closely spaced fasteners (edge distance between rivets less than one inch), fillets may be continuous. All fasteners with an edge distance of one inch or greater between fasteners will be sealed individually.

| DIM. | THICKNESS (IN.) | |
|---|---|---|
| | MIN. | MAX. |
| A | .03 | .15 |
| B | .25 | .30 |
| C | .50 | .55 |
| D | .10 | .15 |

MIL-S-83430 SEALANT FILLET DIMENSIONS

Figure 5.8-1 (Sheet 1)

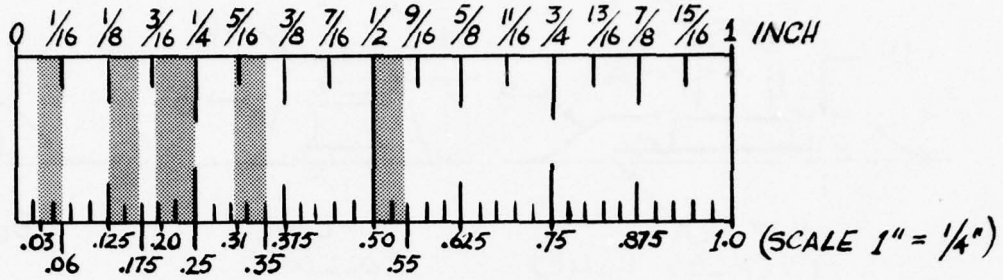
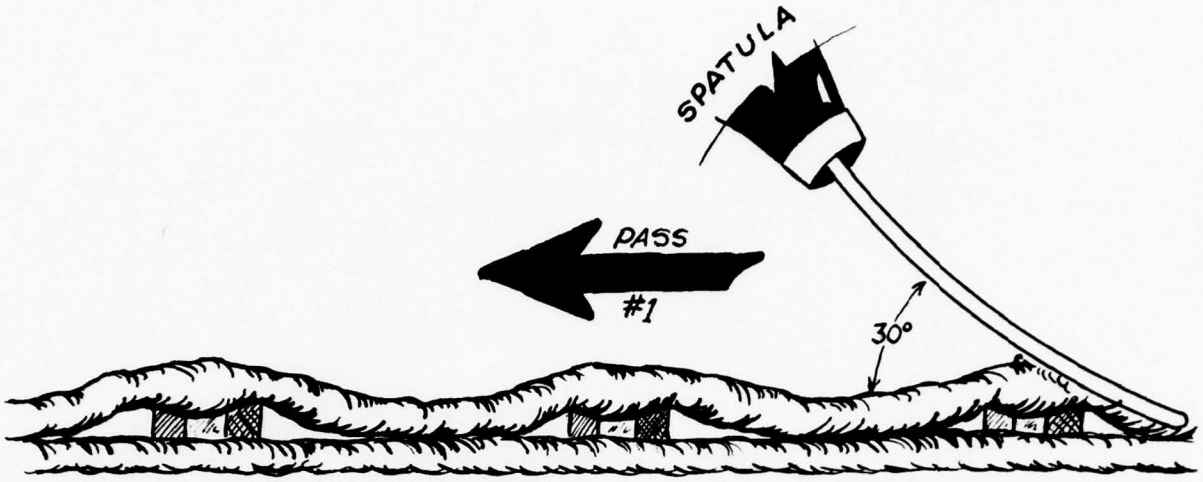
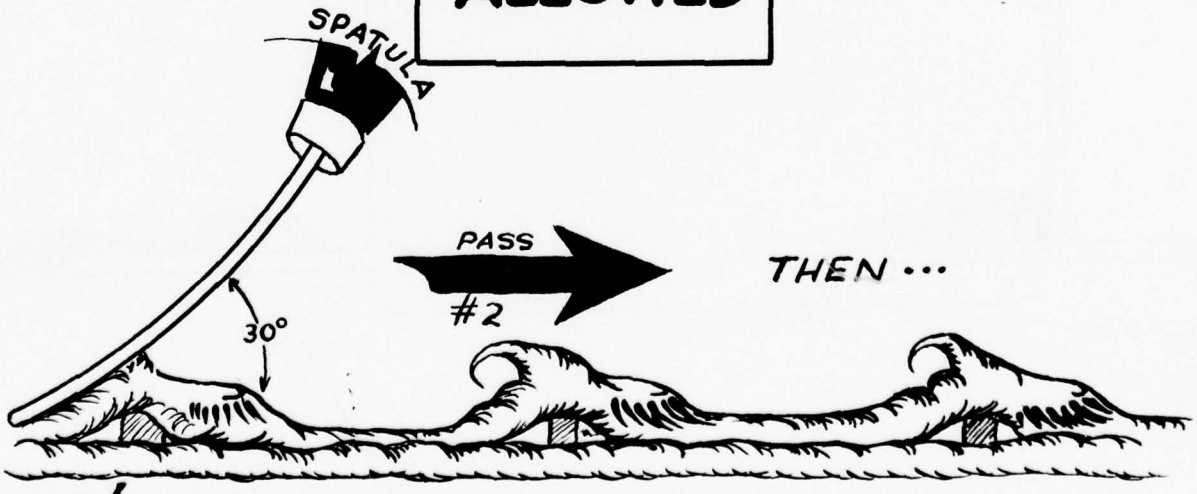



Fig 5.8-1 (Sheet 2)




PRESS SEALANT TO FORCE AIR TO SURFACE.

NO HOLES OR VOIDS ALLOWED




STOP! TOUCH UP PIN HOLES, DEEP CRATERS AND VOIDS AS SOON AS SEALANT IS TACK FREE OR YOU ARE ABLE TO RE-ENTER TANK.

NOTE: UNEVEN SEALANT IN OVERHEAD AND BLIND AREAS IS UNAVOIDABLE. DO NOT, HOWEVER, ATTEMPT TO ADD SEALANT TO GAIN SMOOTHNESS.

Fig 5.8-1 (Sheet 3)

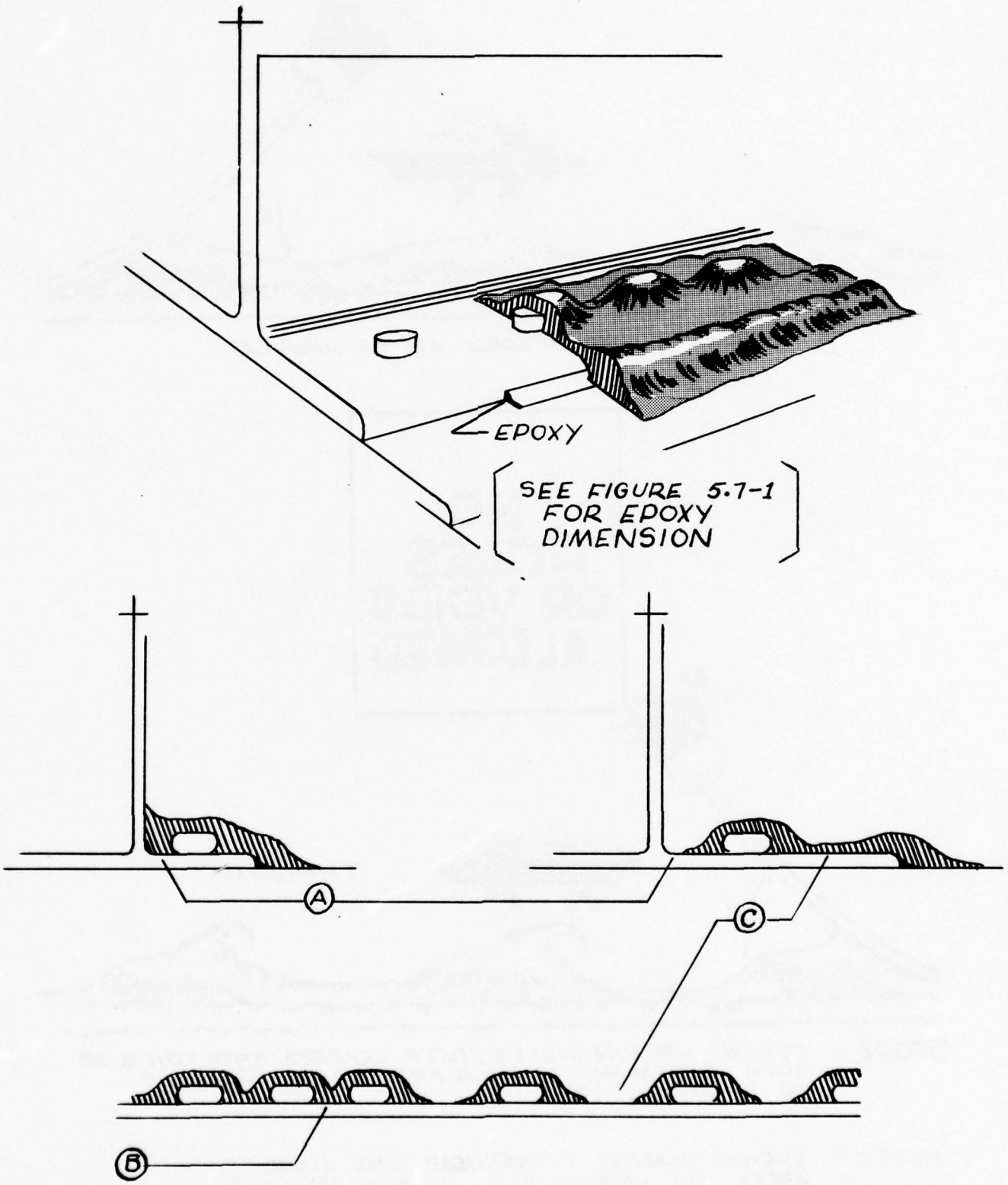
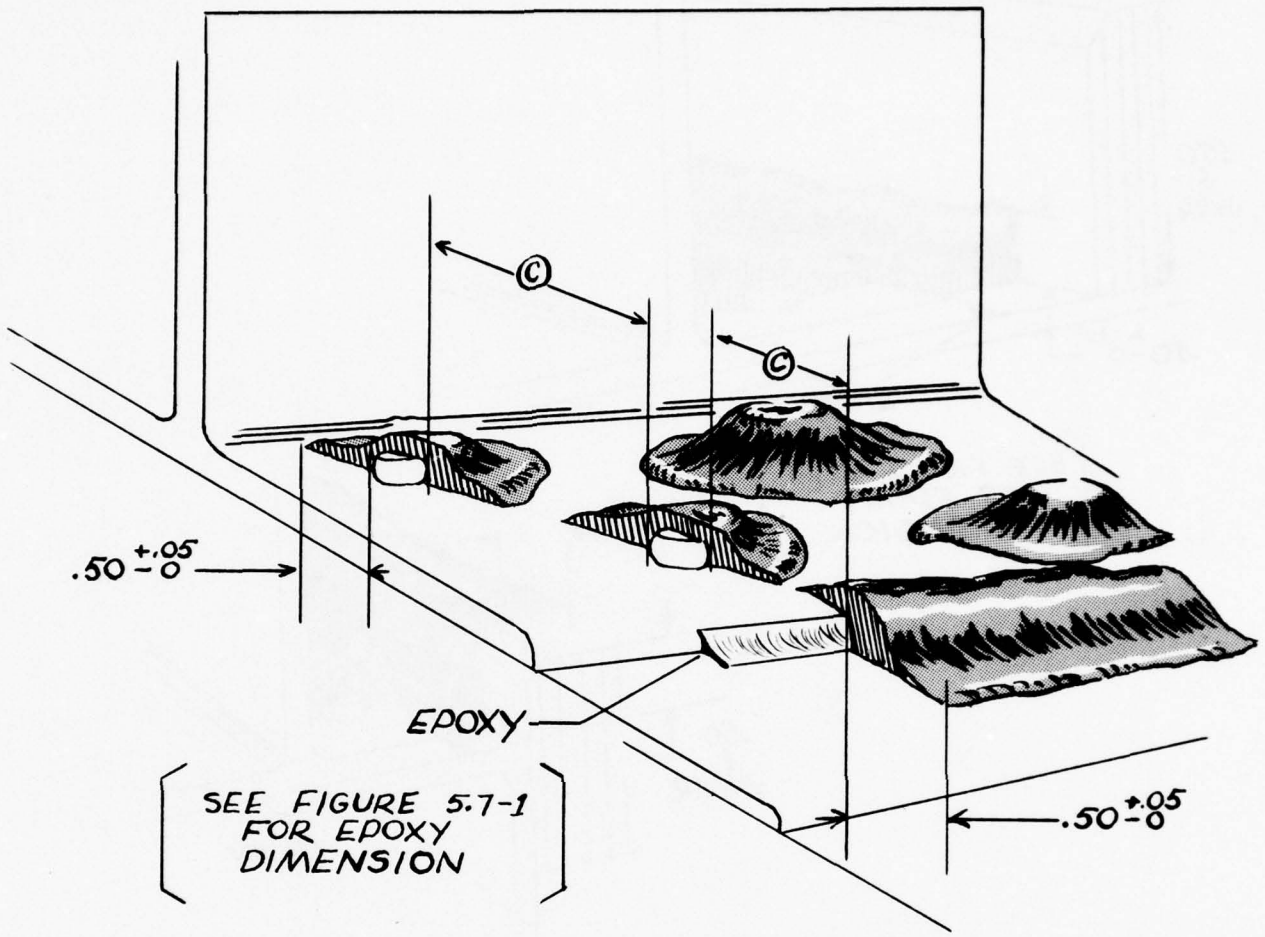



Fig 5.8-1 (Sheet 4)



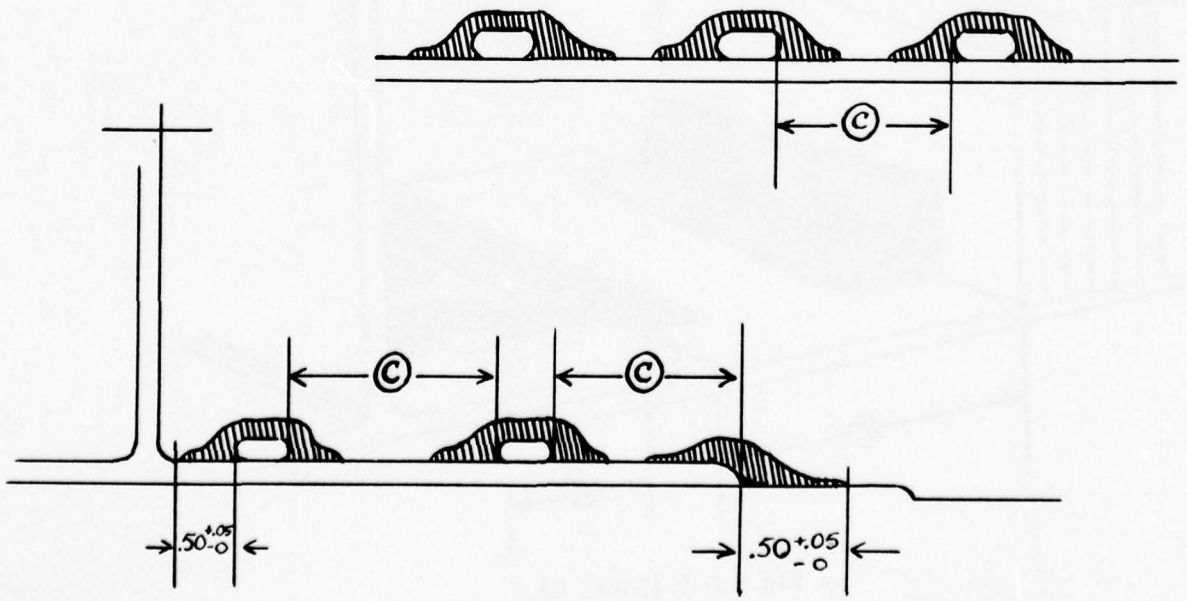




Fig 5.8-1 (Sheet 5)

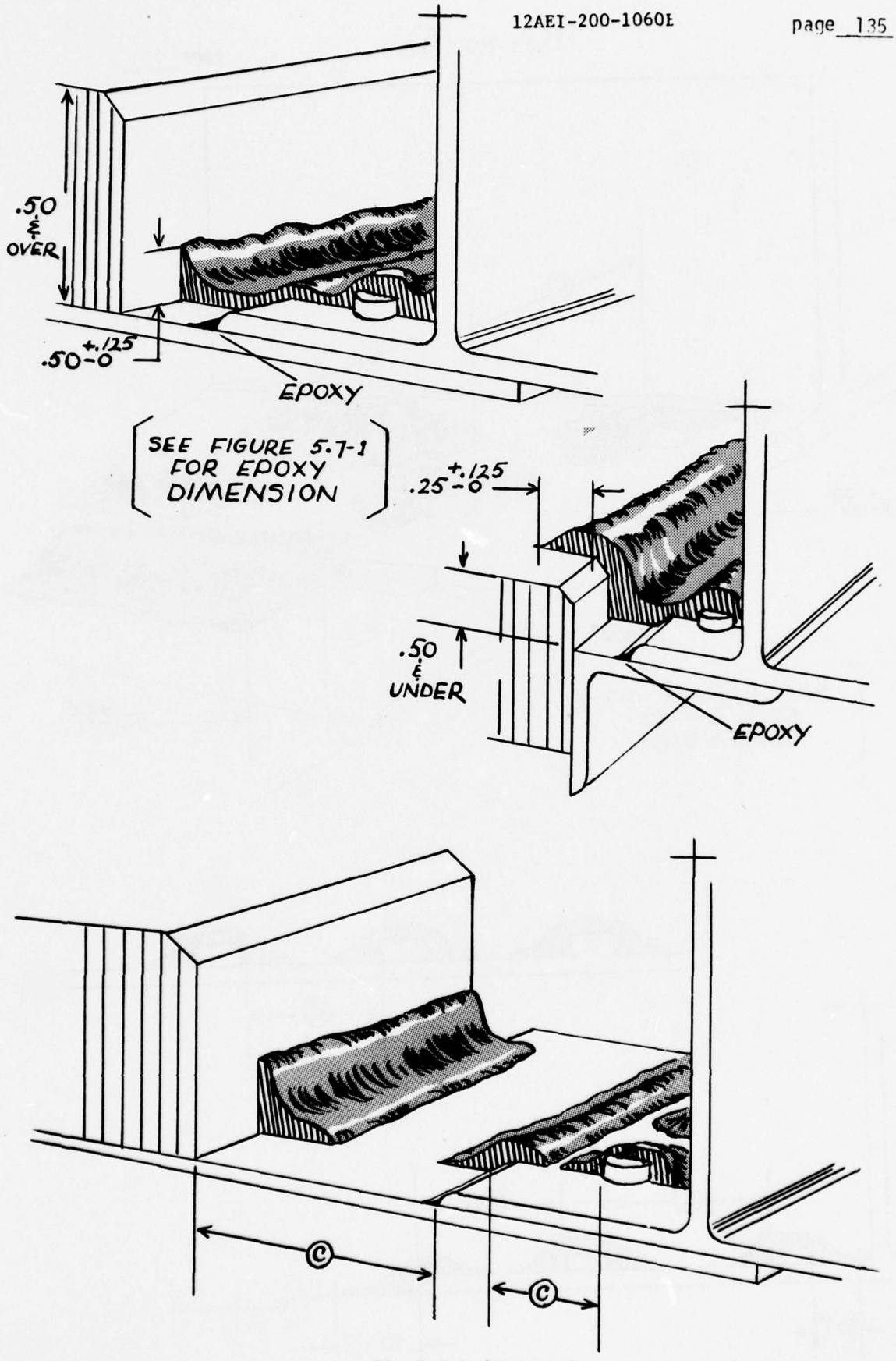
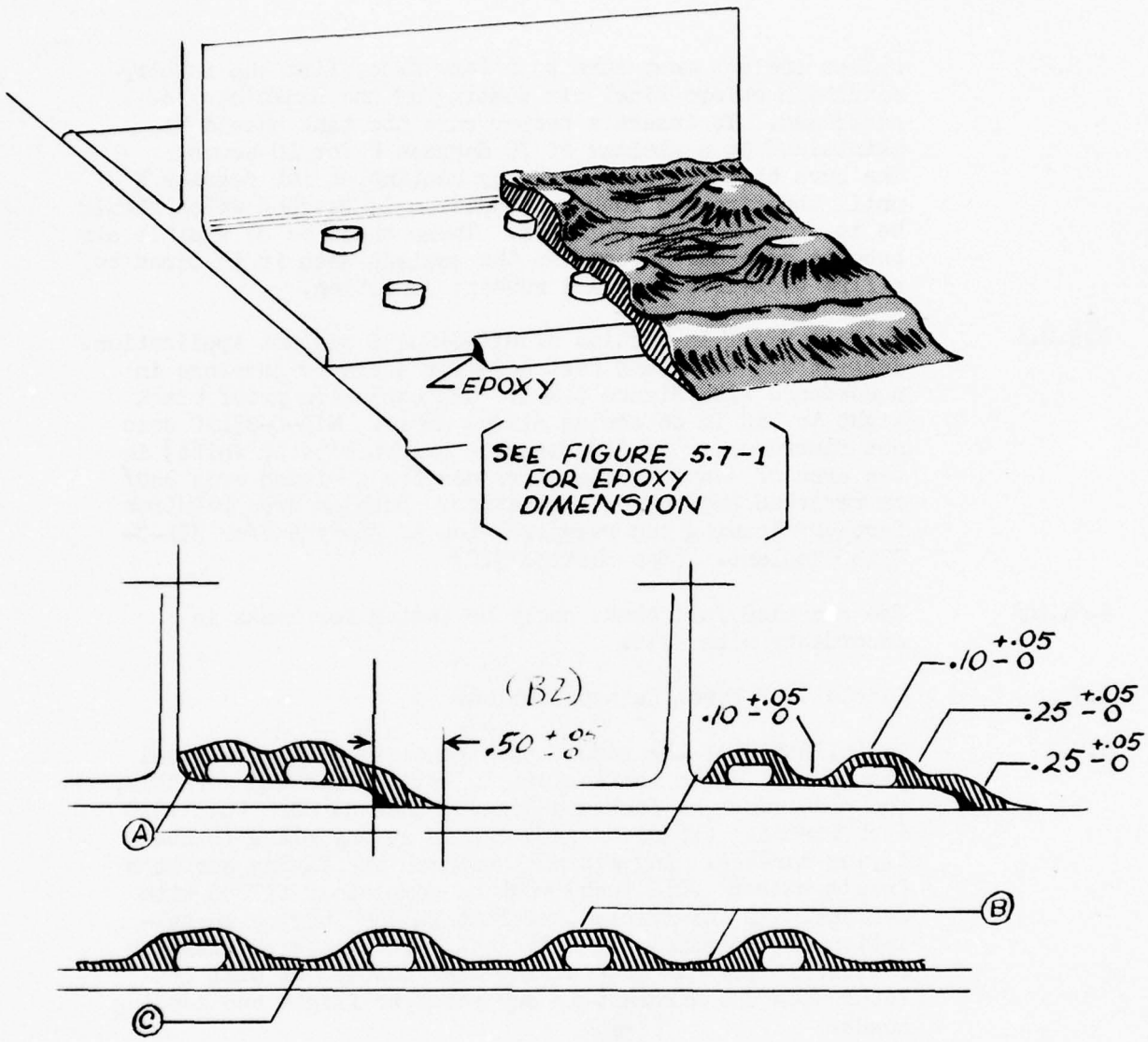



Fig 5.8-1 (Sheet 6)




**A** If "fastner from vertical plane" distance is sufficient, filling sealant to vertical is not recommended as long as thickness around fastner and in fillet is maintained.

**B** Excessive build up should be avoided and normal sag can be expected as long as minimum thicknesses are maintained.

**C** Sealant must not span more than 1" edge distance between fasteners or 1" edge distance between fasteners and seams. Distances less than 1" can be "gang" sealed.

Fig 5.8-1 (Sheet 7)

5.8.2.3 Fillet sealant must cure to a tack-free, firm and rubbery condition before final air testing of the tanks can be performed. To insure a proper cure the tank should be maintained at a minimum of 70 degrees F for 40 hours. The cure time can be reduced by heating at 140 degrees F until the firm and rubbery condition is reached which should be in approximately 20 hours. There shall be no visible air bubbles or other defects in the sealant when it is cured to a firm tack-free firm and rubbery condition.

5.8.2.4 Perform final inspection of MIL-S-83430 sealant application. Inspect all seams and fasteners for adequate coverage in accordance with Figure 5.8-1. Use explosion proof black light to aid in detecting missed areas. MIL-S-83430 does not fluoresce. Any fluorescence (light blue or white) in the area of seams or fasteners denotes a missed area and/or reverted sealant contamination. Such an area requires further cleaning and reapplication of epoxy and/or MIL-S-83430 sealant. (See Section 9.0)

5.8.2.5 The resealed fuel tanks shall be tested for leaks in accordance with 5.10.

5.9 Saddle Tank Panel Reinstallation.

5.9.1 Installation of the saddle tank panel is a time critical procedure. While the sealant is still fluid and workable, the panel must be fastened down so that no more than .010 inch mismatch (space or gap) exists at any place in the faying surface. Any mismatch between the faying surfaces (not to exceed .010 inch) must be completely filled with sealant. If insufficient sealant is used during installation of the panel, it will leak. If excessive mismatch exists, it may not leak during leak tests, but will leak later when the aircraft is subjected to flight and landing loads.

5.9.2 Preparing for Panel Reinstallation.

5.9.2.1 After the left and right saddle tank panels have been inspected and refinished (see 5.4.2 and 5.4.3) they will be ready to prepare for reinstallation.

5.9.2.2 Place the panel on the aircraft (without sealant) and assure that panel repair has not caused any mismatch. Verify that all fastener holes line up.

5.9.2.3 Clamp the panel down with temporary fasteners. Identify which holes will receive screws and which will receive rivets and/or other blind fasteners. (Holes should have been reamed in accordance with one of the following pre-established patterns prior to removal from the aircraft. See 5.4.1.2.4)

a. Double screws will be spotted every sixth hole around the periphery. This pattern should take into account obstructions within the saddle tank. Blind fasteners, rivets or screws may be used to fill in between the paired screws. (Clecos will be used during reinstallation.) See 5.9.5.2.

b. Double screws will be spotted every fourth hole around the periphery. Again, this pattern should take into account obstructions within the saddle tank. Blind fasteners, rivets or screws may be used to fill in between the paired screws. (Clecos need not be used during reinstallation.) See 5.9.5.2.

5.9.2.4 Measure each hole for the length and type fastener required and annotate this information on the panel. Remove the panel from the aircraft. Clean all holes on the panel and the structure and prime them.

5.9.3 Cleaning for Panel Reinstallation.

5.9.3.1 After the left and right saddle tank panels have been prepared in accordance with 5.9.2, they will be ready to clean and reinstall with sealant.

5.9.3.2 Thoroughly clean all surfaces where MIL-S-83430 will be applied as faying surface and fillet sealant with clean cheesecloth dampened with MIL-C-38736 cleaner. Discard used cheesecloth.

5.9.3.3 Wipe area dry with clean dry cheesecloth before the MIL-C-38736 evaporates. Discard used cheesecloth.

NOTE

Take extra care to completely clean out voids 1, 2, 3, 4 T&R shown in Figure 5.6.1, sheet 3.

5.9.3.4 Wipe the same area with clean cheesecloth dampened with PR-148. Wipe PR-148 lightly with clean dry cheesecloth to remove excess. Discard used cheesecloth.

5.9.3.5 Allow any traces of PR-148 to dry for a minimum of 30 minutes before sealant is applied.

5.9.4 Application of Faying Surface Sealant and Panel Installation.

5.9.4.1 Installation and pull down of the panel should be accomplished in three hours or less to take advantage of the B6 sealant in its most fluid condition.

5.9.4.2 Rebond tapered shims to longeron at forward tip of saddle tanks with MIL-S-83430B6. If these shims are left out, an effective seal cannot be accomplished.

5.9.4.3 Apply MIL-S-83430 B-6 on boundary structure faying surfaces containing the sealing grooves with the fillet gun and spread over the area in an amount sufficient to provide a continuous extrusion of sealant along the edges when the panels are pulled down with set-up bolts or fasteners. At the same time, apply a .25-.38 inch bead of sealant on the inner corner of the periphery of the panel. Although it is preferable to use sealant on the intermediate frames, sealant should not be applied to them if the cover cannot be pulled down to them (C692 studs every third hole alternating) within the same initial three hour period.

5.9.4.4 Set the panel in place and install Clecos and screws if pattern 5.9.2.3a is used or screws only if pattern 5.9.2.3.b is used. After paired fasteners are installed and torqued, wait 30 minutes and retorque the paired fasteners (and installed C692 studs if applicable).

NOTE

From start of sealant application to final torquing of paired fasteners (including 30 minute wait) should consume no more than 3 hours.

5.9.5 Fastener Installation.

5.9.5.1 All permanently installed fasteners will be dipped and the counter sink on the panel will be coated with sealant before the fastener is installed.

5.9.5.2 MS90353 or NAS1670 blind fasteners may be used in lieu of conventional type fasteners between the paired screws specified in 5.9.2.3. (This does not apply to where C692 and C693 Sherman Martin fasteners are required.)

5.9.5.3 All fasteners except NAS1670 used for attachment of the panels shall be cleaned in bulk quantities in MIL-C-38736

and then be blown dry or wiped dry with clean cheesecloth. NAS1670 fasteners have a special preservative lubricant on the threads which soaking in MIL-C-38736 would remove. Accordingly, wipe them clean with cheesecloth dampened with MIL-C-38736.

5.9.5.4 Final fastener installation (between the tightened sets of screws) may occur at any time but is best done before the sealant cures. If the sealant is allowed to cure before final fasteners are installed around the periphery, the extra step of cleaning sealant off the bottom of the holes before fastener installation will be necessary.

5.9.5.5 Install Sherman-Martin fasteners by dipping C692 stud, installing it, and torquing tight before the sealant cures. Then fill the cavity with sufficient sealant to extrude as the cap is installed.

5.9.6 Application of Fillet Sealant.

5.9.6.1 Apply fillets of MIL-S-83430 B-2 sealant to the forward tip of the panels for approximately 24 inches along the longitudinal faying surface seam, and for approximately 12 inches along the diagonal seam. The other three corners should have fillets applied for approximately 4 inches in both directions.

5.9.7 Appendix H is a detailed, step-by-step instruction for the installation of 12B10403 panels. It meets the requirements contained in this section.

5.10 Leak Testing.

5.10.1 Leak testing is a three step procedure. First, the tanks are pressurized with air or air/gas mixture and all identifiable leaks are repaired. Second, the fuel system is subjected to a pressure drop test. Third, the aircraft is fueled and subjected to a wet check. Although it is not mandatory, steps one and two may be accomplished after the aircraft has been completely sealed with brush coat A-2 but before B-2 fillets are added. This can make leak detection and repair a simpler process. Regardless of when pressure tests one and two are accomplished, a 100 percent visual inspection of the sealant should be accomplished before the aircraft is subjected to the wet check.

5.10.1.1 Pressure Test

5.10.1.1.1 The importance of identifying and repairing as many of the leaks as possible during this step must be stressed. Pressure test as follows:

a. Close tanks and maintain air (air-gas mixture) pressure of 5 ($\pm \frac{1}{2}$) psig for duration of leak test.

b. Apply bubble fluid and/or use electronic gas and/or ultrasonicleak detectors at all potential leak points including seams, fasteners, voids, etc. (Process Order MAN-77-001, F-111 Aircraft Fuel Tank Leak Testing provides a detailed step-by-step process for detecting leaks.)

c. Immediately upon completion of leak test use clean cheesecloth saturated with clean tap water to clean all surfaces to which bubble fluid has been applied. Wipe dry with clean cheesecloth.

5.10.1.2 Pressure Drop Test.

5.10.1.2.1 This test determines the ability of the integral tank structure to maintain pressure over a period of time. Fuel system components and other equipment which will interfere with performing the pressure drop test on the tank structure may be removed or covered with temporary airtight covers.

a. Tightly cover all tank openings.

b. Apply an internal air pressure of 5 ($\pm$ .50) psig to tank and maintain that pressure with air supply off for a period of 45 minutes. Any change in pressure shall be measured with a water manometer with a .50 inch inside diameter clean transparent tube.

NOTE

After a fuel tank has been initially pressurized, a slight drop in pressure may occur as a result of the stabilization of the air temperature within the tank. Therefore, it is recommended that the pressure drop test not be started until after the internal pressure has been adjusted to compensate for the effect of temperature stabilization. Since some of the forward and

aft tank areas are inaccessible, i.e., behind crew modules and engine air inlets it becomes impractical to reach all areas with leak detecting equipment. Therefore, it will be permissible to proceed to the wet check even though a small amount of pressure drop leakage is indicated. During the 45 minute test period of the initial (sealant applied but all plumbing and equipment not installed) pressure drop test, a pressure drop of 2 inches of water is allowable <u>if all available means have been exhausted in attempting to locate and repair the leakage</u>. Similarly, during the final (all fuel system plumbing and equipment installed) 45 minute pressure drop test, a pressure drop of 4 inches of water is allowable <u>if all available means have been exhausted in attempting to locate and repair the leakage</u>.

5.10.1.3 Wet Check.

NOTE

It is recommended that vapor barrier, heat shields and engines not be installed until <u>after</u> all leaks have been found and repaired.

5.10.1.3.1 When a repair has been completed and the affected fuel tank has been pressure tested and pressure drop tested, the tank shall be wet checked after curing type sealants used in the repair have become firm and rubbery.

a. Completely fill tank with fuel.

b. Apply an internal air pressure of $5\frac{1}{2}$ ($\pm \frac{1}{2}$) psig and maintain that pressure for a minimum of 6 hours.

c. Examine tank structure periodically for evidence of leakage.

d. If any leakage occurs, apply leak detecting powder to determine exact point of leakage.

5.10.2 If leaks are found during the leak testing, repair them in accordance with the following:

NOTE

After the fuselage fuel tanks have been desealed, sealing groove injection may be performed only on the saddle tank top panels, part number 12B10403.

5.10.2.1 Fastener Leaks - Remove leaking fasteners and reinstall with wet MIL-S-83430 B-2 or B-½ sealant. See paragraph 5.9.3 for installation procedure. Replace fillets per paragraph 5.7.2.4 and 5.9.4.

5.10.2.2 Faying Surfaces - Remove epoxy barrier and MIL-S-83430 fillet sealant in faulty area. Replace EC-2216 and MIL-S-83430 in accordance with 5.3, 5.7, and 5.8.

5.10.2.3 Void Leaks - Reinject EC-2216 or XA-3598 epoxy directly into leaking voids (not into adjacent sealing groove injection holes) in accordance with paragraph 5.6.2.1. If epoxy barrier and sealant fillets were removed, reinstall per 5.7 and 5.8.

6.0 AIRCRAFT RESTORATION.

6.1 Remove the airplane from jacks (if applicable), reference Figure 2.6-1.

6.2 *Reinstall stiffeners previously removed per paragraph* 2.5.3.

6.2.1 Remove all excess sealant from stiffeners.

6.2.2 Position stiffeners on airframe and trace the outline of the stiffeners on the structure.

6.2.3 Remove stiffeners and clean the faying surfaces, of both the stiffeners and structure, as specified in paragraphs 5.9.1.2 thru 5.9.1.5.

6.2.4 Plug sealant injection holes, along lower edge of tank walls with sealant injection hole screws.

6.2.5 Apply MIL-S-83430 sealant per paragraphs 5.9.2.1 and 6.3.5.

6.2.6 Position stiffeners on airframe; using nuts, clecos, clamps, etc. Remove any excess extruded sealant, inside vapor barrier area, and wipe clean with solvent. Retain sealant beads on external sides of stiffeners.

6.2.7 Check for satisfactory seal per paragraph 6.3.7 of this A.E.I.

6.2.8 Reinstall B/P fasteners (in stiffeners).

6.2.9 Remove sealant injection hole screws. (See 5.3.1)

6.3 Reinstall Vapor Barriers only after new drain provisions specified in paragraph 7.3 have been installed (reference Figures 6.1-1 and 6.1-2).

NOTE

T.O. 1F-111-840 should be accomplished prior to installing the vapor barriers.

6.3.1 Remove all excess sealant from the nacelle inner skin in the area of the vapor seal which was removed.

6.3.2 Remove all excess sealant from the vapor seal panel which was removed.

6.3.3 Carefully push the fastener shank which is left inside the core area to the side - to clear the hole in the skin.

6.3.4 Cleaning will be accomplished in the following manner:

a. Predrilled vapor seals will be positioned on the airframe. Parts will be held in place with cleco fasteners.

b. The outline of the vapor seal will be traced on he structure and the vapor seal will be removed.

c. Sand faying surface area of reinforced plastic components with 320 grit sandpaper.

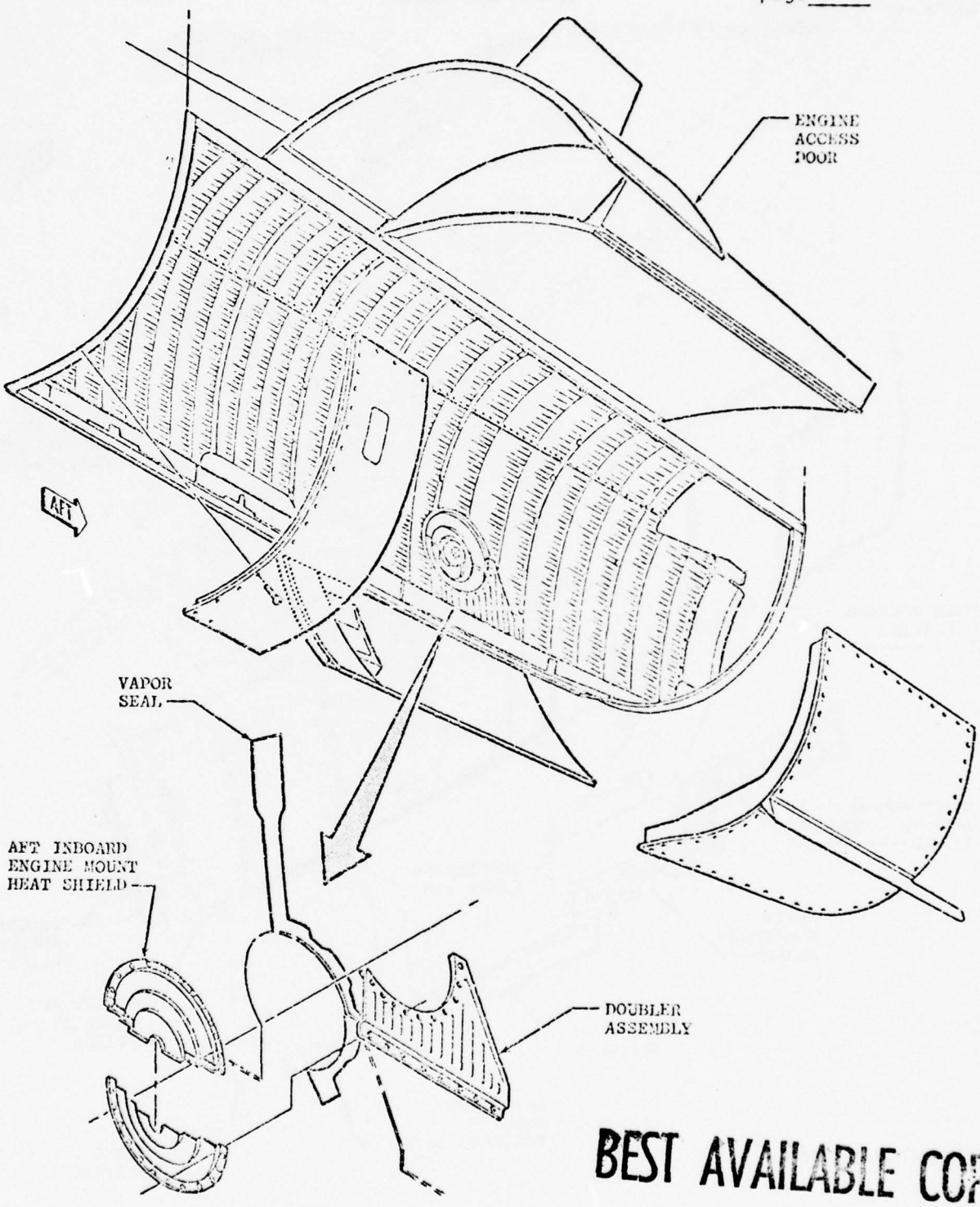
d. Clean the faying surface (vapor seal and structure) as specified in 5.9.1.2 thru 5.9.1.5.

6.3.5 Apply MIL-S-83430 B-6 sealant as specified in 5.9.2.1 to both faying surfaces. The pot life of the mix is approximately 6 hours at room temperature and parts in the process of being installed shall have pressure applied within this time period for any given mix.

NOTE

Check that all vapor barrier drain tubes are not blocked by sealant or debris prior to installing the barriers. When installing the barriers, exercise care to prevent fresh sealant from blocking the drain tube openings. Also be careful to not let the fresh sealant block the flow passages between adjacent vapor barriers.

6.3.6 Position vapor seals on the airframe utilizing pre-drilled holes and cleco fasteners until NAS 1398C4-3 rivets have been installed. Remove any excess extruded sealant and wipe clean with solvent.




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Figure 6.1-1 Engine Insulating Liners, Heat Shields and Vapor Seals (Sheet 1)

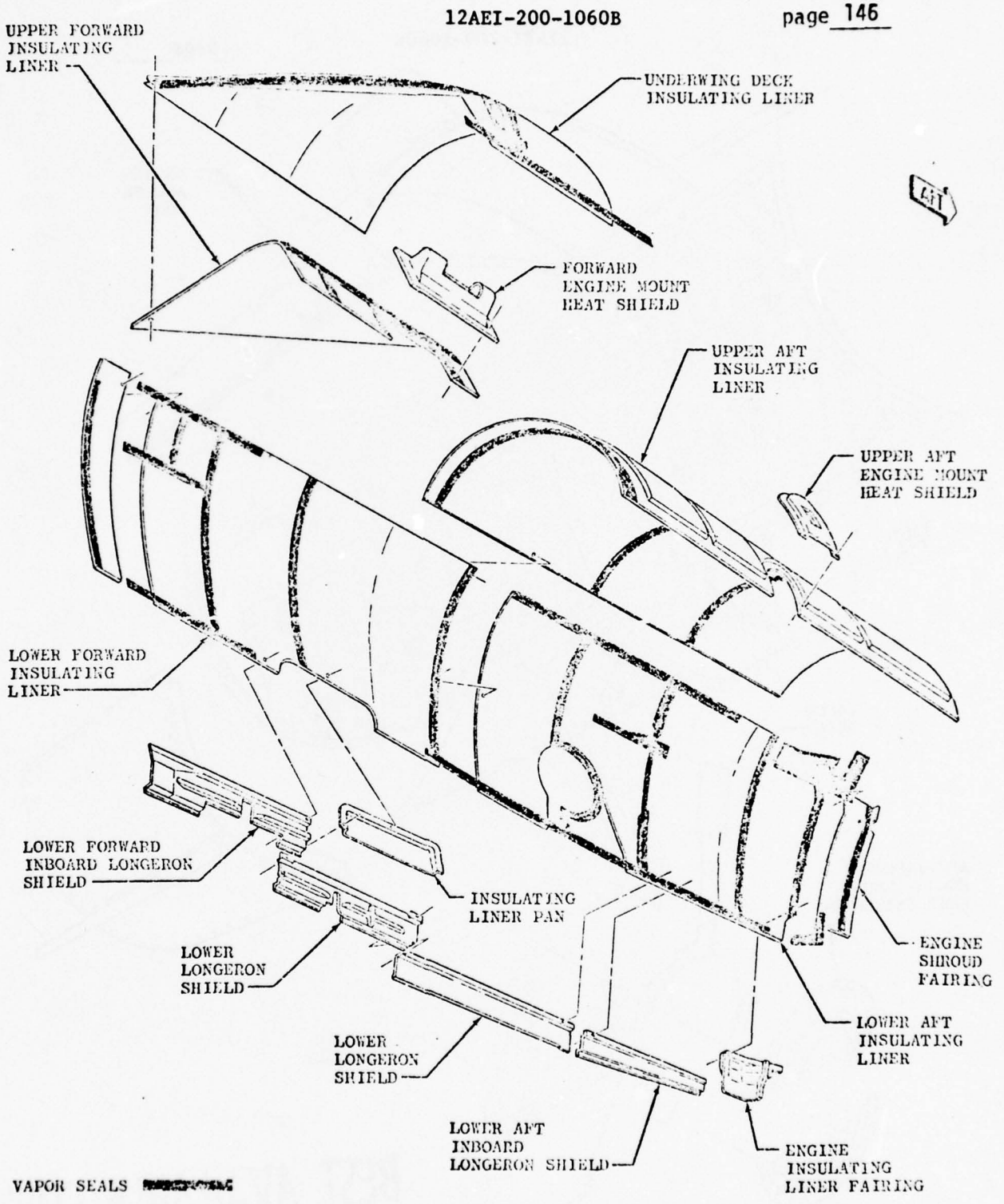



Figure 6.1-1 Engine Insulating Liners, Heat Shields and Vapor Seals (Sheet 2)

6.3.7 Ascertain by visual inspection that a satisfactory seal exists on all faying surfaces. If any gaps or spaces exists, apply pressure and/or additional sealant to close the gap.

6.3.8 Clamping is sometimes necessary to prevent deflection or sag of the vapor seal strips during the cure operation of the adhesive. These clamps may be made from .060 thick aluminum sheet cut into 1 inch or 2 inch wide strips approximately 5 inches long. For typical areas (Figure 6.1-2 (sheet 1)) drill hole in the center of each strip to use as straight or diagonal clamps under the clecos. For typical areas (Figure 6.1-2 (Sheet 2)) drill a hole in each end to fit diagonally or straight across the vapor seal to be used as clamps under the clecos. The vapor barrier sealant shall cure for at least 16 hours at 70 degrees F or greater and must be tack free before proceding with the vapor seal leak test.

6.3.9 Perform vapor seal leak test per 12AEI-200-1057.

6.4 Reinstall Heat Shields (Reference Figure 6.1-1).

6.4.1 Install aft inboard engine mount heat shield as follows:

a. Locate upper and lower shield assemblies around engine mount.

b. Insert lower shield between straps and edge of upper shield.

c. Install screws securing upper and lower shields to aircraft.

d. Position lower aft insulating liner on aircraft.

e. Install screws and washers.

f. Position doubler on aircraft.

g. Install screws and washers.

6.4.2 Install upper aft engine mount heat shield as follows:

a. Position heat shield on aircraft.

b. Install screws and washers.

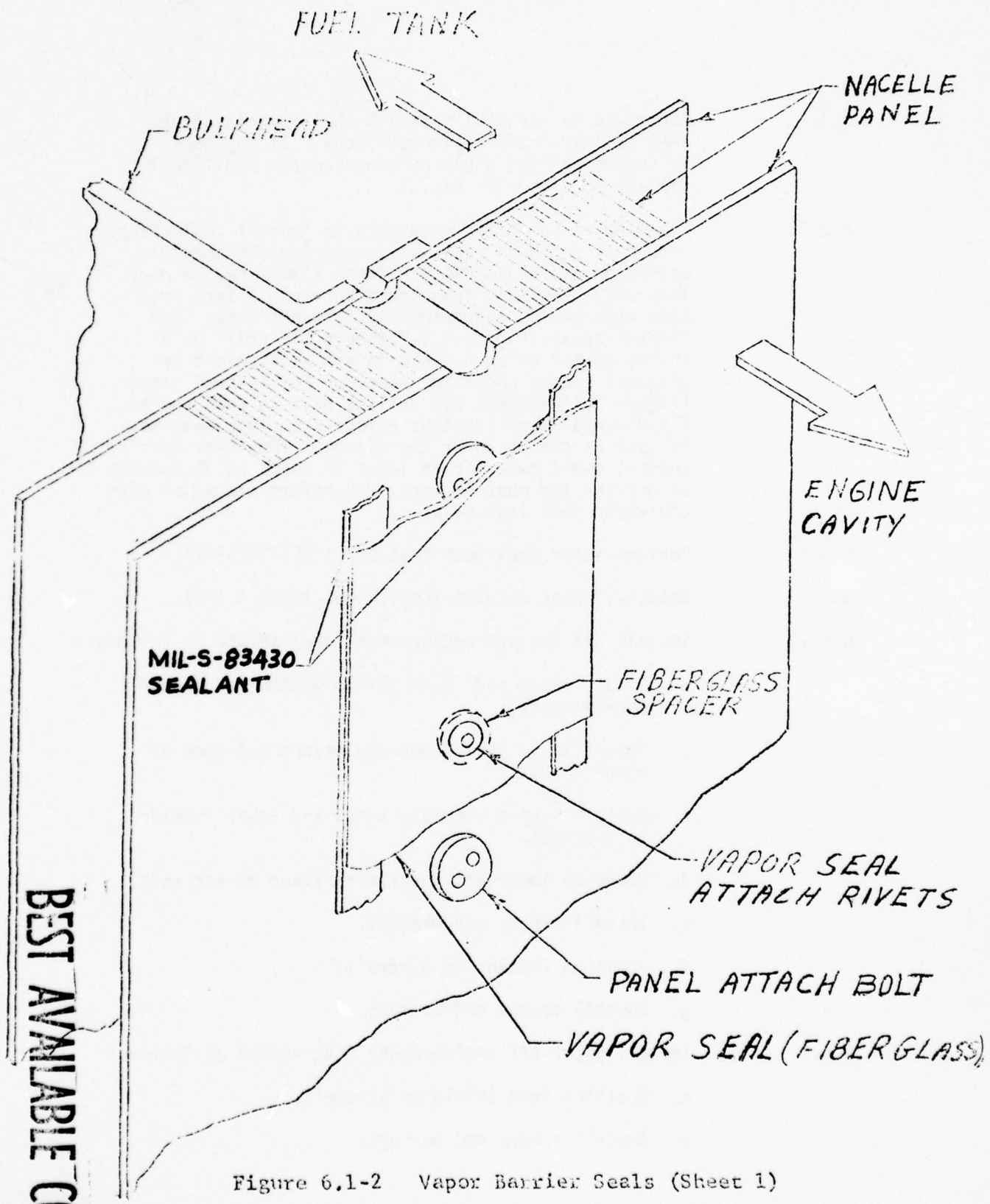



Figure 6.1-2 Vapor Barrier Seals (Sheet 1)

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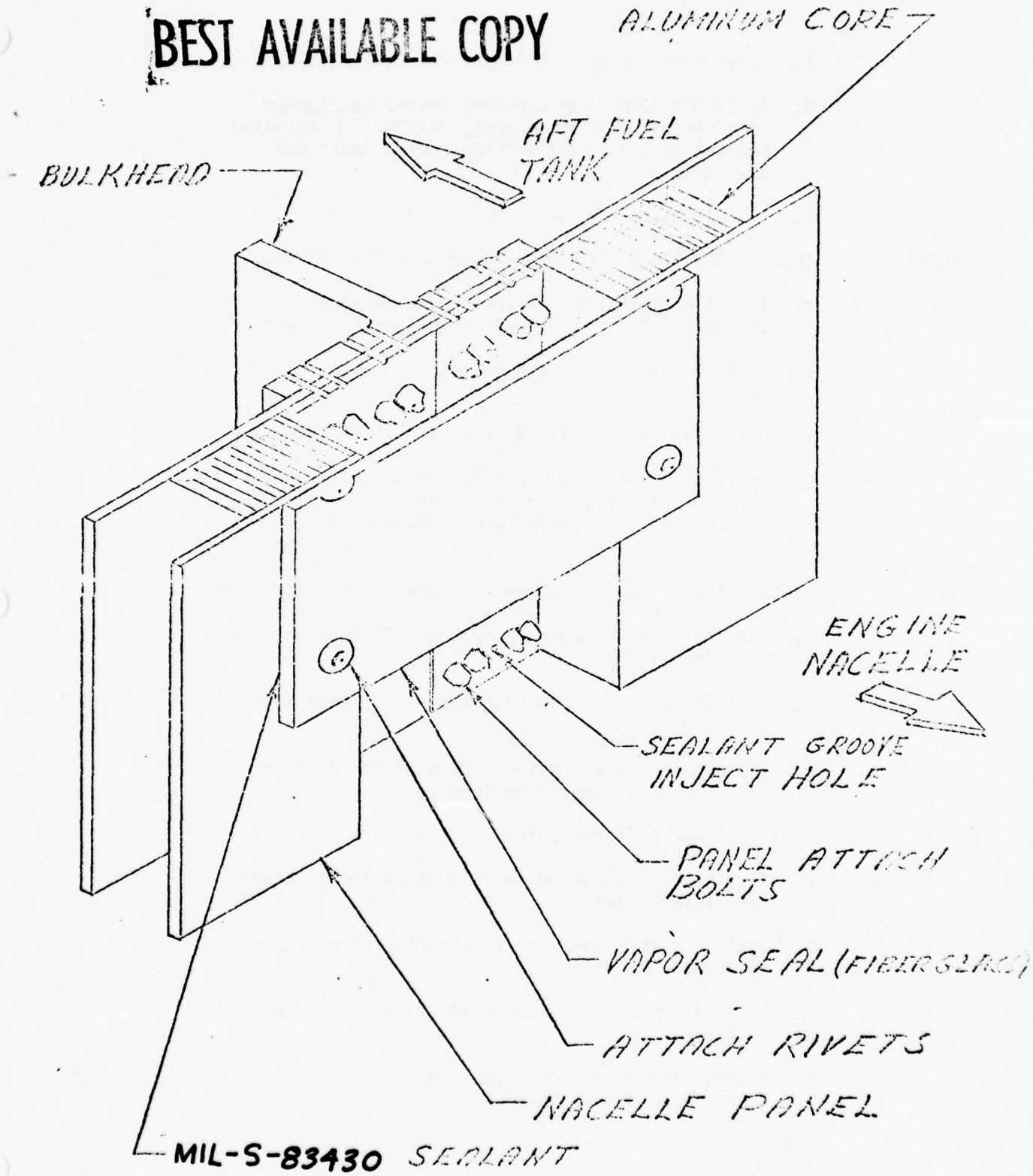



Figure 6.1-2 Vapor Barrier Seals (Sheet 2)

c. Clean area to be sealed with MIL-C-38736 cleaner.

d. Apply RTV 1200 (Dow Corning) primer to cleaned area and air-dry; then apply 94-009 (Dow Corning) sealant to close gap between engine mount and heat shield.

e. Install upper aft panel insulating liner.

6.4.3 Install forward engine mount heat shield as follows:

a. Insert heat shield beneath underwing deck insulating liner and over forward engine mount.

b. Install screws and washers securing heat shield to structure.

c. Clean area to be sealed with MIL-C-38736 cleaner.

d. Apply RTV 1200 (Dow Corning) primer to cleaned area and air-dry; then apply 94-009 (Dow Corning) sealant to close gap between engine mount and heat shield.

6.4.4 Install lower inboard longeron forward shroud as follows:

a. Position shroud under lower edge of lower forward insulating liner.

b. Install screws and washers securing shroud to longeron.

c. Install screws and washers along lower edge of lower forward insulating liner.

6.4.5 Install lower longeron shield as follows:

a. Position shroud under lower edge of lower forward insulating liner.

b. Install screws and washers securing shroud to adjacent shrouds.

c. Install screws and washers securing shroud to longeron.

d. Install screws and washers along lower edge of lower forward insulating liner.

6.4.6 Install lower longeron shroud shield as follows:

a. Position shroud shield under lower edge of lower aft insulating liner.

b. Install screws and washers securing shroud shield to forward shroud.

c. Install screws and washers securing shroud shield to longeron.

d. Install screws and washers along lower edge of lower aft insulating liner.

e. Install screws and washers along lower forward insulating liner edge.

6.4.7 Install lower longeron aft shroud shield as follows:

a. Position shroud shield under lower edge of lower aft insulating liner.

b. Install screws and washers securing shroud shield to forward shroud.

c. Install screws and washers securing shroud to longeron.

6.4.8 Install engine shroud fairing as follows:

a. Position fairing on aircraft.

b. Install screws and washers along trailing edge of lower aft insulating liner.

c. Install remaining screws and washers securing fairing to aircraft.

6.5 Reinstall Insulating Liners (Reference Figure 6.1-1)

6.5.1 Install upper forward insulating liner as follows:

a. Position liner to aircraft and beneath adjacent liner.

b. Align mounting holes of liner with mounting holes of adjacent liner.

c. Install screws and washers around outer edge of liner.

d. Install screws and washers securing liner interior.

6.5.2 Install lower forward insulating liner as follows:

a. Position liner to aircraft and beneath adjacent liner.

b. Align mounting holes of liner with mounting holes of adjacent liners.

c. Install screws and washers around outer edge of liner.

d. Install screws and washers securing liner interior.

6.5.3 Install underwing deck insulating liner as follows:

a. Position liner on aircraft.

b. Install screws and washers around outer edge of liner.

c. Install insulating liner support, using screws and washers.

d. Install screws and washers, securing liner interior.

6.5.4 Install upper aft insulating liner as follows:

a. Position liner on aircraft.

b. Install screws and washers around outer edge of liner.

c. Install screws and washers securing liner interior.

6.5.5 Install lower aft insulating liner as follows:

a. Position liner and doubler on aircraft.

b. Align mounting holes of liner with mounting holes of adjacent liners.

c. Install screws and washers around outer edge of liner.

d. Install screws and washers securing liner interior.

6.5.6 Install wing closure beam insulating liner as follows:

a. Position liner on aircraft.

b. Install screws and washers.

6.5.7 Install side panel insulating liner as follows:

a. Position liner on aircraft.

b. Install screws and washers.

6.5.8 Install engine insulating liner fairing as follows:

a. Position fairing on aircraft.

b. Install screws and washers along edge of lower aft insulating liner.

c. Install remaining screws and washers securing fairing to aircraft.

6.6 Reinstall Engines.

6.6.1 Install the engine nacelle fire detection sensing elements and connector cables per T.O. 1F-111D-2-6-1, paragraph 16-26.

6.6.2 Perform checkout of the engine nacelle fire detection system per T.O. 1F-111D-2-6-1, paragraphs 16-1 through 16-9.

6.6.3 Install engines previously removed in the same left and right positions per T.O. 1F-111D-2-6-1, paragraph 3-71 and 3-72.

6.6.4 Install air inlet F.O.D. screens.

NOTE

Depreserve the engines per T.O. 1F-111D-2-6-1, paragraph 3-62 prior to conducting step 18 of paragraph 3-72.

6.7 Reinstall Overwing Fairing.

6.7.1 Reinstall the overwing fairing per T.O. 1F-111D-2-2-1, paragraph 3-253 thru 3-258.

6.7.2 Reinstall covers 3431, 3432, 3433, and 3434 and fairings 3463 and 3464 per T.O. 1F-111D-2-2-1, Figure 3-2.

6.8 Reinstall Wing-Fuselage Lower Side Seal.

6.8.1 Reinstall the wing-fuselage lower side seal per T.O. 1F-111D-2-2-1, paragraphs 3-201 thru 3-204 and Figure 3-38.

6.9 Prepare for Flight.

6.9.1 Upon completion of the restoration of the aircraft the following shall be accomplished.

a. Weigh aircraft and record.

b. Check out fuel system per 4.3.6.2.

c. Prepare aircraft for functional check flight and delivery.

d. Accomplish a functional check flight (FCF) in accordance with T.O. 1F-111D-6CF-1. During the FCF the following additional item will be accomplished to enhance the opportunity for collecting fuel tank contaminants on the special in-line fuel filters which are temporarily installed: Following the 20,000 feet checks, after item 17, maneuvering flight stall warning check, accomplish the following item:

Dislodge Fuel Tank Contaminants.

(a) Level 1G flight.

(b) Push over to indicate -1G for 2 seconds.

(c) Release and pull to +1G status and enter and complete a wings level 60 degree/second roll. Enter the roll within 5 seconds after releasing the negative G.

e. Make an AFTO Form 95, "Significant Historical Data", entry stating this aircraft has had the fuselage fuel tanks and engine bay vapor barriers desealed and resealed in accordance with 12AEI-200-1060(). Also, enter the date this work is completed.

7.0 IMPROVEMENTS TO FUEL AND VAPOR BARRIER SYSTEMS

7.1 Reinstall finger tank access covers with bolts in lieu of rivets.

7.1.1 (NOTE: This change to be made at Fus. Sta. 613.526, BL 57.780 L/R; and Fus. Sta. 628.40, BL 57.750 L/R); at above noted locations, ream out holes in 12B10402 panels to .2570/.2550 dia. (17 holes at each of 4 locations). If hole discrepancies are noted - contact Engineering.

7.1.2 Install C584-10 nutplates (4 places). Rivet nutplates to panels with (8 each) C088-3 rivets. Reference 12B10376, Sheet 2, Zone D-22, Section S-S.

7.1.3 Rework 12B9747-11 covers (4) by reaming out existing holes (17 places each cover) to .255/.257 dia. if hole discrepancies are noted, contact Engineering.

7.1.4 Reinstall reworked 12B9747 covers (4 places) using NAS654V6 bolts (17 per cover).

7.2 Deleted.

7.3 Add drain provisions per USAF drawings 7540999 and 7541000. This must be accomplished before the paragraph 6.3 work begins.

8.0 MOVING AIRCRAFT

8.1 At any time during this work the aircraft may be safely moved without reinstalling any systems; fuel lines, valves, etc.; control cables, linkages, etc.; or ECS valves, ducts, etc., provided that the following preparations are made:

8.2 The following structural parts must be temporarily reinstalled, using B/P fasteners; however, threaded fasteners need only be torqued sufficient enough to ensure that no threads are in bearing. Cotter keys, safety wire, etc., need not be installed.

8.2.1 12B7720 truss components. Ref. paragraph 3.2.2.1.

8.2.2 12B7721, 12B7722 truss components. Ref. paragraph 3.3.2.1.

8.2.3 Cover #2205 (reference paragraph 3.2.3, install every third fastener) or the F11 temporary cover (reference Figure 5.1-1, sheet 1) provided that all fasteners are installed and properly torqued.

8.2.4 12B5651 access covers (L & R, reference paragraph 3.5.2.1, install every third fastener) or the LTD and LTE temporary covers (reference figure 5.1-1, sheet 4) provided that all fasteners are installed and properly torqued.

8.2.5 12B10712 beams (L & R). Install all fasteners.

8.2.6 12B10598, 12B10576, 12B10544, frame segments. Reference Figure 2.6-1, Note 4.

8.3 Engine Cavity doors and/or covers need not be installed; however, if they are, secure them closed. Reference T.O. 1F-111D-2-1, paragraph 3-51.o.

8.4 Prepare aircraft for towing, per T.O. 1F-111D-2-1, paragraph 3-49, "Towing Preparation". CAUTION: Install cover 3325, reference T.O. 1F-111D-2-1, paragraph 5-51.e.

8.5 Deshore aircraft (if applicable).

8.6 Tow aircraft to new position, using nose gear tow. Tow only over smooth surface, using minimum speed.

8.7 Reshore aircraft (if applicable). Reference Figure 2.6-1.

NOTE: It might be necessary to check hole alignment and fit of the saddle tank top panels and finger tank side panels and adjust jacking and shoring to secure proper fit and alignment.

8.8 Remove all items which were temporarily reinstalled.

9.0 BLACK LIGHT INSPECTION OF FUEL TANK INTERIOR

9.1 This procedure applies to F-111 aircraft fuel tanks that are being rehabilitated by removal of reverted EC5106 sealant and installation of epoxy barrier and MIL-S-83430 sealant.

9.1.1 This procedure is designed to confirm the degree of cleanliness preparatory to application of the epoxy barrier (EC2216 or XA-3598), aid inspection of the epoxy barrier and verify complete coverage with MIL-S-83430 polysulfide sealant. It is intended to supplement normal visual inspections.

9.1.2 Equipment to be used in black light inspections consist of:

(a) Fluorescent black light, explosion proof with a wavelength of 3600 angstrom units, a maximum intensity of 100 watts, and a filter that transmits only black light and excludes visible light.

(b) Mercury vapor black light, explosion proof, with an intensity of 800 $\mu W$ per $cm^2$ at nine inches.

(c) Aircraft marking pencils, MIL-P-83953 (Black, NSN 7510-00-537-6928; Red, NSN 7510-00-537-6935).

9.1.3 When conducting black light inspections, check the tank(s) for vapors with an LEL meter in accordance with established procedures and limits. Purge until the LEL level is acceptable for safe operation. Verify black light operation as follows:

(a) The intensity of explosion proof black light (fluorescent or mercury vapor) must be checked every 500 hours of use.

(b) The external temperature of the explosion proof housing must not exceed 140 degrees F.

(c) Inspect housing for explosion proof on a 30-day basis.

9.2 Inspection Prior to Application of Epoxy Barrier.

9.2.1 Inspection of Polyurethane Protective Coating.

9.2.1.1 Inspect the interior part of the fuel tank by holding the black light a maximum of 15 inches from the inspected surface. A deep reflective purple color indicates defective polyurethane protective coating.

9.2.1.2 Repair defective areas in accordance with section 5.5

9.2.2 Inspection for reverted sealant in areas to receive epoxy barrier.

9.2.2.1 Inspect the interior part of the fuel tank by holding the black light a maximum of 15 inches from the inspected surface. Reverted sealant will fluoresce with a white color.

9.2.2.2 Any fluorescence within one inch of the area in which epoxy or sealant is to be applied will be cause for recleaning. If the fluorescence persists after the area has been re-cleaned four times with MIL-C-38736 cleaner and cheesecloth, the fluorescence may be disregarded and the area considered to be clean.

NOTE

A thin line of white fluorescence is acceptable along seams since it is impossible to remove all reverted sealant in faying surface seams. Also, permanent stains on polyurethane coating caused by traces of residual EC5123 poly-sulfide are acceptable if they persist after four cleaning operations with MIL-C-38736.

9.2.2.3 White fluorescence (reverted sealant) is not acceptable in voids that can be inspected with the black light. However, if the fluorescence persists after the area has been recleaned four times with MIL-C-38736 cleaner, using pipe cleaners, brushes and/or clean cheesecloths, the fluorescence may be disregarded and the area considered to be clean.

9.2.3 Denote the presence of reverted EC5106 sealant or defective polyurethane protective coating by marking with a red or black pencil complying with MIL-P-83953.

9.2.4 After the defects in the polyurethane coatings and contaminates of reverted EC5106 sealant have been identified and marked, remove the black light from the fuel tank.

9.2.5 After defects in the polyurethane coating have been repaired, and reverted EC5106 sealant removed, reinspect in accordance with section(s) 9.2.1 and 9.2.2.

9.3 Inspection Prior to Application of MIL-S-83430.

9.3.1 The main purpose of this inspection is to confirm that the epoxy barrier was applied properly and that all reverted EC5106 has been contained.

9.3.2 Holding the black light a maximum of 15 inches from surface to be inspected, look for incomplete epoxy application and any reverted sealant that may not have been contained by the epoxy application.

9.3.2.1 The epoxy barrier material, EC-2216 and XA-3598 will appear as a light fluorescent blue under the black light. No pinholes, voids, or missed areas are permitted.

9.3.2.2 Any evidence of reverted EC5106 (white fluorescent material) protruding from under the epoxy requires recleaning and application of additional epoxy to insure that all reverted sealant is contained by the epoxy barrier.

9.3.3 Denote defects in the epoxy barrier and the presence of reverted EC5106 sealant by marking with a red or black pencil complying with MIL-P-83953.

9.3.4 After the defects in the epoxy application have been identifed and marked, remove the black light from the fuel tank and accomplish necessary repairs.

9.4 Inspection After Application of MIL-S-83430 Sealant.

9.4.1 The purpose of this inspection is to aid in detecting any areas that may have been missed when applying MIL-S-83430 polysulfide sealant.

9.4.1.1 MIL-S-83430 sealant will not fluoresce. It appears black under the black light. Therefore, white fluorescence that appears to be issuing from under the MIL-S-83430 will be cause for removing sealant and epoxy in that area and reaccomplishing the epoxy barrier and sealant application. Light blue fluorescence indicates an area that has not had MIL-S-83430 sealant applied over the epoxy barrier. This must be accomplished.

10.0 REPAIR OF FUEL LEAKS ON DE/RESEALED AIRCRAFT

NOTE

The instructions contained in this section are applicable to F-111 aircraft that have been through the depot deseal/reseal program rework. They are valid in this document until such time as they are incorporated into the 1F-111( )-3 T.O..

10.1 Leak Detection.

10.1.1 Leak detection techniques will remain unchanged. The use of the pink powder, soap solution and blow-back procedures will assist in determining leak sources.

10.2 Elimination of External Injection.

10.2.1 External injection of MIL-S-83430 sealant is not authorized on aircraft that have had the depot deseal/reseal program rework. All leaks must be repaired from the inside of the tank at the leak source. The allen head injection screws have been removed on aircraft undergoing the depot deseal/reseal program to provide a means of relieving the pressure generated by reverting EC5106 sealant. It is known that some channels are already filled with MIL-S-83430 polysulfide sealant, but in order to make the multiple barrier of epoxy and sealant perform effectively it is necessary to provide as much pressure relief as possible to the outside of the tanks.

10.3 Removal of Defective Sealant/Epoxy at Leak Source.

10.3.1 After making a safe tank entry and locating leak source, it will first be necessary to remove the defective sealant/epoxy. Plastic, wood or aluminum scrapers are to be used to remove all defective sealant/epoxy. It is important to remove all loose, cracked or deteriorated sealant/epoxy in the area of the leak source.

10.3.2 The sealant/epoxy is to be removed down to the yellow-green polyurethane corrosion coating in the tank.

10.3.3 If the polyurethane coating is damaged it must be repaired before the area is resealed to prevent corrosion (see 5.5).

10.4 Tank Cleaning and Adhesion Promoter (PR-148) Application.

10.4.1 After paragraph 3 has been completed and all defective sealant/epoxy has been removed, clean area to be resealed with clean cheesecloth dampened with MIL-C-38736 cleaner. Discard used cheesecloth. Use clean dry cheesecloth to wipe up MIL-C-38736 before it has time to evaporate. Discard used cheesecloth.

10.4.2 Apply PR-148 using clean cheesecloth dampened with PR-148. Wipe up excess PR-148 with clean dry cheesecloth. Discard used cheesecloth.

10.4.3 Allow PR-148 to dry for 30 minutes before applying sealant or epoxy.

10.5 Application of Epoxy to Seams.

10.5.1 EC-2216 and XA-3598 (3M Co.) are two part epoxy compounds and should be mixed in accordance with the manufacturers instructions. The EC-2216 and XA-3598 materials shall be mixed and placed in plastic tubes suitable for use in a Semco Model No. 250 fillet gun.

10.5.2 Apply with the fillet gun a bead of EC-2216 approximately .06 inch thick along all faying surface seams that were previously sealed with EC-5106 polyester sealant. Smooth down and work into seams with a spatula to fill any gaps. Additional epoxy may be required if there is a large gap between the faying surfaces.

10.5.3 The bead of epoxy shall be continuous along the seams and shall, therefore, extend over the ends of the structural voids which were resealed with epoxy.

10.5.4 Cure the epoxy for a minimum of 24 hours at 75 degrees F (± 5 degrees F). The cure may be accelerated by heating for 3 hours at 150 degrees F after application.

10.6 Application of MIL-S-83430 Sealant Over Epoxy.

10.6.1 Scuff surface of epoxy with clean cheesecloth dampened with PR-148 until gloss is removed. Allow PR-148 to dry for 30 minutes.

10.6.2 Pro-Seal 899 (Coast Pro-Seal) and PR-1750 (Products Research) are two part polysulfide sealants conforming to MIL-S-83430. They should be mixed in accordance with the manufacturers instructions.

10.6.3 Apply a thick bead (.20 to .25 inch thick) of MIL-S-83430 overlapping the epoxy .45 to .55 inch. Allow B-2 to cure for 72 hours or B-1/2 for 24 hours before refueling.

10.7 Application of MIL-S-83430 over Fasteners.

NOTE

Fastener heads under 3/4 inch shank diameter have been sealed only with MIL-S-83430 sealant, except on F-111D 68-086, 68-088, and 68-112; and FB-111 68-254 and 68-285 which have EC2216/XA3517 epoxy applied around all fastener heads.

10.7.1 Prepare surface as outlined in paragraphs 10.3 and 10.4.

10.7.2 Pro-Seal 899 (Coast Pro-Seal) and PR-1750 (Products Research) are two part polysulfide sealants conforming to MIL-S-83430. They should be mixed in accordance with the manufacturers instructions.

10.7.3 Apply thick bead of MIL-S-83430 B-1/2 over fasteners. Cure for minimum of 24 hours at 70 degrees F before refueling.

10.8 Resealing of Structural Voids.

10.8.1 Mechanically remove any deteriorated or defective epoxy.

10.8.2 Flush void with PR-148 adhesive promoter and wipe off excess with clean cheesecloth. Allow to dry a minimum of 30 minutes before applying epoxy. If more than 4 hours elapse before void epoxy can be applied, or if surfaces become contaminated, the PR-148 application shall be repeated.

10.8.3 Fill voids with XA-3517 epoxy, using a Semco Model No. 250 fillet gun or a Semco Model No. 507 sealant injection gun or equivalent equipment. If size of void is approximately .06 by .06 the EC-2216 epoxy may be used in lieu of XA-3517 to obtain better flow into the void. In overhead areas or where uncured epoxy may tend to sag, commercial grade tape may be used to prevent flow from the void.

APPENDIX A

SUMMARY OF "A" REVISION CHANGES TO 12AEI-200-1060

The significant changes of revision "A" to 12AEI-200-2060 are summarized as follows:

| Paragraph | Change |
|---|---|
| 3.8.1.4 | Added note on engine removal. |
| 5.1.2 | Added note referencing MA control process order entitled, "Control of materials for Desealing F-111 Aircraft Fuel Tanks." |
| 5.1.2.3 | Added caution to isolate W.C.T.B. during chemical deseal. |
| 5.1.2.5 | Removed reference to 650 P.S.I. rinse. |
| 5.1.2.7 | Added caution specifying allowable leak and/or spill rates. |
| 5.1.3.3 | Reworded paragraph and added caution to specify disposition, and allowable leak and spill rates. |
| 5.1.4.3 | Added caution specifying allowable leak and spill rates. |
| 5.1.4.4<br>5.1.4.5 | Made paragraphs consistent by calling for depuddling after four hours of work stoppage, and drying after eight hours of work stoppage. |
| 5.2.1.1 | Added specifics to note regarding aircraft to receive W.C.T.B. work. |
| 5.3.1 | Added note doing away with requirement to replace injection screws in finger and saddle tank covers. |
| 5.4.1 | Revised wording to make it clear that drilled fasteners will not be punched out until after panel has been removed. |

| | |
|---|---|
| 5.4.3.1.1 | Added paragraph calling for black light inspection. |
| 5.6.1.2 | Added cleaning dimension for voids. |
| 5.6.1.3 | Added black light inspection and advisory note. |
| 5.7.1.4 | Added black light inspection. |
| 5.7.4 | Added black light inspection. |
| 5.8.2.2.2 | Changed A-2 thickness requirement. Changed other dimensions to agree with fig 5.8.1. Added note regarding use of A-2 in W.C.T.B. |
| 5.8.2.2.4 | Added sentence clarifying extent to which B-2 must cover A-2 sealant. |
| 5.8.2.2.5 | Deleted option to add additional sealant while initial coat is still pliable. |
| 5.8.2.4 | Added general inspection note. |
| 5.9.2.2 | Added sentence authorizing injection as the saddle and finger tanks are being installed BEFORE faying surface sealant has reached the end of its working life. |
| 5.9.4.1 | Fillet dimensions under saddle tank now conform to fig 5.8.1. Fig 5.8.2 was deleted for the sake of standardization. |
| 5.10.1.3 | Added advisory note on vapor barrier installation. |
| 9. | Added black light inspection section. |
| 10. | Added de/reseal repair instructions. |

# APPENDIX B

## SUMMARY OF "B" REVISION CHANGES TO 12AEI-200-1060

The significant changes of Revision "B" to 12AEI-200-1060 are summarized as follows:

| Paragraph | Change |
|---|---|
| 1.1 | Added cross reference, Appendix F, is mentioned in this paragraph. |
| Fig 1.3-1 | Redone, however, no basic change. |
| 1.4 | Added reference T.O. 1F-111-36. |
| Fig 2.6-1 | Changed note 2, was: Moor aircraft per T.O. 1F-111D-2-1 Fig 3-5 (sheet 1) for nose gear and Fig 3-8 (sheet 1) for glove, main gear and tail bumper. |
| 3.3 | Added 3.3.1.4 and 3.3.2.1 for A and C models only. |
| 3.8 | Deleted paragraphs 3.8.1.3, 3.8.1.4, 3.8.2.3, 3.8.2.4, and the note following 3.8.2. Finger tanks are no longer repaired but are isolated during the deseal/reseal process. |
| 4.3.3.1.4 | Deleted the requirement to remove the air refueling receptacle for the purpose of deseal/reseal. 4.3.3.1.4.1 through 4.3.3.1.4.3 were changed accordingly. |
| 4.3.6.2.2 | Added appendices J & K which spell out the flushing procedure and cleanliness inspection conducted at Sacramento ALC subsequent to deseal/reseal. 12AEI-47-1039 and 12AEI-46-1018 remain as reference documents in the index at the front of this AEI. |
| 5.1.4.1 | Reduced rinse water lower temperature limit from 95°F to 65°F. |
| 5.1.4.5 | Was Eldorado ED-500. |
| 5.1.9.4 | Removed torque reference to T.O. 1F-111D-2-( ). |

| Paragraph | Change |
|---|---|
| 5.2.1.1 | Added cross-reference at end of paragraph. Also deleted portion of note which read, "F-111D and FB-111A aircraft for which the desealing is started between 1 May 76 and 30 Sep 77 will not have the WCTB desealed at this time provided it is determined that the sealant is well bonded to the tank and contains no visual indications of separation, cracks, holes, blow-outs, penetrations , reverted material, or other actual or potential defects. Sealant must be removed for a distance of at least 2 inches in all directions of each actual or suspected defect."<br><br>As of revision "B", all aircraft will have their W.C.T.B. resealed during deseal/reseal. |
| 5.3.1 | Was: "All sealing groove...fin) shall be removed from their tapped holes. The open...and remain open."<br><br>Was: "The filling of injection screw holes described in 5.3.1 does not apply to the saddle and finger tank panels. Merely wipe off excess MIL-S-83430 B-6 sealant that extrudes from the injection screw holes when the panels are installed (see 5.9). Injection screws will not be reinstalled in the saddle and finger tank panels." |
| 5.3.2 | Deleted requirement to remove, clean, and replace sealant injection screws within the fuel tanks before sealing over them. |
| 5.4.1 | Rewrote entire section 5.4.1. Significant changes include:<br><br>a. Finger tank panel no longer removed, finger tank merely isolated before desealing operation.<br><br>b. Saddle tank removal procedure remains essentially the same, however, sequence of events was clarified. |

| Paragraph | Change |
|---|---|
| 5.4.1 (continued) | c. Added note after 5.4.1.2.3 dealing with sealant added by T.C.T.O. 1F-111-1062. |
| | d. Deleted requirements of original 5.4.1.7 and 5.4.1.8 since finger tank panels are no longer removed. |
| 5.4.2.2 | Was: "Conduct NDI IAW applicable NDTSs. See paragraph 1.4." Paragraph 1.4 still remains, however, as reference material. |
| 5.5.1 | Was 5.5.1.1. |
| 5.5.2 | Was 5.5.1.2. Added epoxy - alodine - sealant - polyurethane sequence. |
| 5.5.3 | Was 5.5.1.3. |
| 5.6.3 | Called for installation of fuel barriers around engine bracket bay in finger tanks. Not necessary when deleting finger tanks. |
| 5.7 | Because of overuse of XA-3517 epoxy, deleted it as an option and substituted XA-3598 which is made up of EC-2216 base material and XA-3517 catalyst. XA-3598 may be used anywhere EC-2216 or XA-3517 was previously specified. Anywhere XA-3517 was mentioned throughout this document, XA-3598 or the word epoxy has been substituted. XA-3598 and/or EC-2216 may be used interchangeably anywhere on the aircraft. XA-3598 is the thicker material. |
| Fig 5.7-1 | Dim "A" was: .06 ± .02 inch.<br>Dim "B" was: .12 ± .02 inch.<br>Removed unnecessary sketch from face of figure. |
| 5.8.2.2.3 | Added PR-148 application to this step. |
| Fig 5.8-1 | Added sealant over Open Davis Nut.<br>Changed Dim "A", was: .10 - .15. |

| Paragraph | Change |
|---|---|
| 5.9 | Retitled and rewrote entire section. Was: "Saddle and Finger Tank Panel Reinstallation." Significant changes include:<br><br>a. Requirement that panels be measured for fasteners before any sealant is spread.<br><br>b. Requirement that paired sets of screws be placed at least every six holes, and that they be retorqued before any blind fasteners are installed.<br><br>c. Requirement that no more than three hours elapse before completion of retorquing.<br><br>d. Potting in the Sherman-Martin cavities on the saddle tank cover.<br><br>e. The requirement to add a fillet inside the saddle tank cover after it has been installed was deleted (except as noted in paragraph 5.9.6.1). |
| 5.10 | Added authority to conduct leak check after A2 but before B2 sealant was applied. |
| 5.10.1.1.1 | Added reference to Sacramento ALC P.O. MAN-77-001. |
| 7.2 | Isolated the engine bracket bay in the center of the finger tanks. No longer necessary. |
| 9.1.2 | Added (b). |
| 9.1.3 | Added 30-day inspection requirement and changed intensity inspection from 1000 hours to 500 hours. |

| PARAGRAPH | D | A | E | F | FB |
|---|---|---|---|---|---|
| 2.1.1 | 1F-111D-2-1 | 1F-111A-2-1 | 1F-111E-2-1 | 1F-111F-2-1 | 1F-111B(A)-2-1 |
| 2.1.2 | 1F-111D-2-1<br>Sec III | 1F-111A-2-1<br>Sec III | 1F-111E-2-1<br>Sec III | 1F-111F-2-1<br>Sec III | 1F-111B(A)-2-1<br>Sec III |
| 2.1.3 | 1F-111D-2-1<br>Sec II & XI | 1F-111A-2-1<br>Sec II & XI | 1F-111E-2-1<br>Sec II & X | 1F-111F-2-1<br>Sec II & XI | 1F-111B(A)-2-1<br>Sec II & X |
| 2.2.1 | 1F-111D-2-6-1<br>para 3-59,3-61 | 1F-111A-2-6-1<br>para 3-54,3-55 | 1F-111E-2-6-1<br>para 3-59,3-61 | 1F-111F-2-6-1<br>para 3-59,3-61 | 1F-111B(A)-2-6-1<br>para 3-59, 3-60 |
| 2.2.2 | 1F-111D-2-6-1<br>para 3-68 - 3-70 | 1F-111A-2-6-1<br>para 3-62<br>fig 3-16 | 1F-111E-2-6-1<br>para 3-68<br>fig 3-18 | 1F-111F-2-6-1<br>para 3-68<br>fig 3-16 | 1F-111B(A)2-6-1<br>para 3-67<br>fig 3-18 |
| 2.2.3 | 1F-111D-2-6-1<br>para 16-23 - 16-25C | 1F-111A-2-6-1<br>para 17-23 | 1F-111E-2-6-1<br>para 16-23 | 1F-111F-2-6-1<br>para 16-23 | 1F-111B(A)2-6-1<br>para 16-23 |
| 2.7.1 | 1F-111D-2-2-1<br>para 3-251,3-252<br>fig 3-2 | 1F-111A-2-2-1<br>para 3-305<br>fig 3-2 | 1F-111E-2-2-1<br>para 6-254<br>fig 6-2 | 1F-111F-2-2-1<br>para 3-261<br>fig 3-2 | 1F-111B(A)2-2-1<br>para 15-77<br>fig 3-2 |
| 2.8.1 | 1F-111D-2-2-1<br>para 3-197 - 3-200<br>fig 3-37, 3-38 | 1F-111A-2-2-1<br>Sec III<br>fig 3-40,3-41,3-42 | 1F-111E-2-2-1<br>Sec VI<br>fig 6-36,6-37 | 1F-111F-2-2-1<br>Sec III<br>fig 3-34,3-37,3-38 | 1F-111B(A)-2-21<br>Sec XV |
| 3.2.1.1 | 1F-111D-2-2-1<br>fig 3-1 | 1F-111A-2-2-1<br>fig 3-1 | 1F-111E-2-2-1<br>fig 6-1 | 1F-111F-2-2-1<br>fig 3-1 | 1F-111B(A)-2-2-1<br>fig 3-1 |
| 3.2.1.2 | 1F-111D-2-2-1<br>fig 3-3 | 1F-111A-2-2-1<br>fig 3-3 | 1F-111E-2-2-1<br>fig 6-3 | 1F-111F-2-2-1<br>fig 3-3 | 1F-111B(A)2-2-1<br>fig 3-3 |
| 3.2.1.3 | 1F-111D-4-1<br>fig 45 | 1F-111A-4-1<br>fig 48 | 1F-111E-4-1<br>fig 46 | 1F-111F-4-1<br>fig 46 | 1F-111B(A)-4-1<br>fig 49 |
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| 3.2.3 | 1F-111D-2-2-1<br>fig 3-3 | 1F-111A-2-2-1<br>fig 3-3 | 1F-111E-2-2-1<br>fig 6-3 | 1F-111F-2-2-1<br>fig 3-3 | 1F-111B(A)-2-21<br>fig 3-3 |
| 3.3.1.1 | 1F-111D-2-2-1<br>fig 3-1 | 1F-111A-2-2-1<br>fig 3-1 | 1F-111E-2-2-1<br>fig 6-1 | 1F-111F-2-2-1<br>fig 3-1 | 1F-111B(A)-2-2-1<br>fig 3-1 |
| 3.3.1.3 | 1F-111D-4-1<br>fig 45 | 1F-111A-4-1<br>fig 48 | 1F-111E-4-1<br>fig 46 | 1F-111F-4-1<br>fig 46 | 1F-111B(A)-4-1<br>fig 49 |

| PARAGRAPH | D | A | E | F | FB |
|---|---|---|---|---|---|
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| 3.3.2.2 | 1F-111D-2-2-1<br>fig 3-1 | 1F-111A-2-2-1<br>fig 3-1 | 1F-111E-2-2-1<br>fig 6-1 | 1F-111F-2-2-1<br>fig 3-1 | 1F-111B(A)-2-2-1<br>fig 3-1 |
| 3.4.1.1 | 1F-111D-2-2-1<br>fig 3-1 | 1F-111A-2-2-1<br>fig 3-1 | 1F-111E-2-2-1<br>fig 6-1 | 1F-111F-2-2-1<br>fig 3-1 | 1F-111B(A)-2-2-1<br>fig 3-1 |
| 3.4.1.2 | 1F-111D-4-1<br>fig 50 | 1F-111A-4-1<br>fig 53 | 1F-111E-4-1<br>fig 51 | 1F-111F-4-1<br>fig 51 | 1F-111B(A)-4-1<br>fig 53A |
| 3.4.1.3 | 1F-111D-4-1<br>fig 50 | 1F-111A-4-1<br>fig 53 | 1F-111E-4-1<br>fig 51 | 1F-111F-4-1<br>fig 51 | 1F-111B(A)-4-1<br>fig 53A |
| 3.4.2.1 | 1F-111D-4-1<br>fig 50 | 1F-111A-4-1<br>fig 53 | 1F-111E-4-1<br>fig 51 | 1F-111F-4-1<br>fig 51 | 1F-111B(A)-4-1<br>fig 53A |
| 3.4.2.2 | 1F-111D-4-1<br>fig 50 | 1F-111A-4-1<br>fig 53 | 1F-111E-4-1<br>fig 51 | 1F-111F-4-1<br>fig 51 | 1F-111B(A)-4-1<br>fig 53A |
| 3.4.2.3 | 1F-111D-2-2-1<br>fig 3-1 | 1F-111A-2-2-1<br>fig 3-1 | 1F-111E-2-2-1<br>fig 6-1 | 1F-111F-2-2-1<br>fig 3-1 | 1F-111B(A)-2-2-1<br>fig 3-1 |
| 3.5.1.1 | 1F-111D-4-1<br>fig 40 | 1F-111A-4-1<br>fig 43 | 1F-111E-4-1<br>fig 41 | 1F-111F-4-1<br>fig 41 | 1F-111B(A)-4-1<br>fig 44 |
| 3.5.2.1 | 1F-111D-4-1<br>fig 40 | 1F-111A-4-1<br>fig 43 | 1F-111E-4-1<br>fig 41 | 1F-111F-4-1<br>fig 41 | 1F-111B(A)-4-1<br>fig 44 |
| 3.6.1.1 | 1F-111D-2-2-1<br>fig 3-2 | 1F-111A-2-2-1<br>fig 3-2 | 1F-111E-2-2-1<br>fig 3-2 | 1F-111F-2-2-1<br>fig 3-2 | 1F-111B(A)-2-2-1<br>fig 3-2 |
| 3.6.1.2 | 1F-111D-2-2-1<br>fig 3-4 | 1F-111A-2-2-1<br>fig 3-4 | 1F-111E-2-2-1<br>fig 6-4 | 1F-111F-2-2-1<br>fig 3-4 | 1F-111B(A)-2-2-1<br>fig 3-4 |
| 3.6.2.1 | 1F-111D-2-2-1<br>fig 3-4 | 1F-111A-2-2-1<br>fig 3-4 | 1F-111E-2-2-1<br>fig 6-4 | 1F-111F-2-2-1<br>fig 3-4 | 1F-111B(A)-2-2-1<br>fig 3-4 |
| 3.6.2.2 | 1F-111D-2-2-1<br>fig 3-2 | 1F-111A-2-2-1<br>fig 3-2 | 1F-111E-2-2-1<br>fig 3-2 | 1F-111F-2-2-1<br>fig 3-2 | 1F-111(B)A-2-2-1<br>fig 3-2 |
| 3.7.1.1 | 1F-111D-4-1<br>fig 74 | 1F-111A-4-1<br>fig 80 | 1F-111E-4-1<br>fig 74 | 1F-111F-4-1<br>fig 74 | 1F-111B(A)-4-1<br>fig 80 |
| 3.7.1.2 | 1F-111D-2-2-1<br>fig 3-4 | 1F-111A-2-2-1<br>fig 3-4 | 1F-111E-2-2-1<br>fig 6-4 | 1F-111F-2-2-1<br>fig 3-4 | 1F-111B(A)-2-2-1<br>fig 3-4 |

| PARAGRAPH | D | A | E | F | FB |
|---|---|---|---|---|---|
| 3.7.2.1 | 1F-111D-2-2-1<br>fig 3-4 | 1F-111A-2-2-1<br>fig 3-4 | 1F-111E-2-2-1<br>fig 3-4 | 1F-111F-2-2-1<br>fig 3-4 | 1F-111B(A)-2-2-1<br>fig 3-4 |
| 3.7.2.2 | 1F-111D-4-1<br>fig 74 | 1F-111A-4-1<br>fig 80 | 1F-111E-4-1<br>fig 74 | 1F-111F-4-1<br>fig 74 | 1F-111B(A)-4-1<br>fig 80 |
| 3.8.1.3 | 1F-111D-4-1<br>fig 75 | 1F-111A-4-1<br>fig 81 | 1F-111E-4-1<br>fig 75 | 1F-111F-4-1<br>fig 75 | 1F-111B(A)-4-1<br>fig 81 |
| 3.8.2.3 | 1F-111D-4-1<br>fig 75 | 1F-111A-4-1<br>fig 81 | 1F-111E-4-1<br>fig 75 | 1F-111F-4-1<br>fig 75 | 1F-111B(A)-4-1<br>fig 81 |
| 4.1.1.1 | 1F-111D-2-4-1<br>Sec III | 1F-111A-2-4-1<br>Sec III | 1F-111E-2-4-1<br>Sec III | 1F-111F-2-4-1<br>Sec III | 1F-111B(A)-2-4-1<br>Sec III |
| 4.1.2.1 | 1F-111D-2-4-1<br>Sec III | 1F-111A-2-4-1<br>Sec III | 1F-111E-2-4-1<br>Sec III | 1F-111F-2-4-1<br>Sec III | 1F-111B(A)-2-4-1<br>Sec III |
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| 4.1.4.1 | 1F-111D-2-1 | 1F-111A-2-1 | 1F-111E-2-1 | 1F-111F-2-1 | 1F-111B(A)-2-1 |
| 4.1.4.3 | 1F-111D-2-1 | 1F-111A-2-1 | 1F-111E-2-1 | 1F-111F-2-1 | 1F-111B(A)-2-1 |
| 4.2.1.1 | 1F-111D-2-7-1<br>para 3-51 - 3-56 | 1F-111A-2-7-1<br>para 3-49 - 3-54 | 1F-111E-2-7-1<br>para 3-49 - 3-55 | 1F-111F-2-7-1<br>para 3-51 - 3-57 | 1F-111B(A)-2-7-1<br>para 3-50 - 3-56 |
| | 1F-111D-2-1<br>para 1-395, Fig 1-25 | 1F-111A-2-1<br>para 1-405 | 1F-111E-2-1<br>para 1-501 | 1F-111F-2-1<br>para 1-363 | 1F-111B(A)-2-1<br>para 1-549 |
| 4.2.2.1.1 | 1F-111D-4-8<br>fig 36 | 1F-111A-4-8<br>fig 49 | 1F-111E-4-8<br>fig 37 | 1F-111F-4-8<br>fig 36 | 1F-111B(A)-4-8<br>fig 35 |
| | F-111D-2-7-1<br>para 3-19 - 3-24 | 1F-111A-2-7-1<br>para 3-19 - 3-24 | 1F-111E-2-7-1<br>para 3-19 - 3-24 | 1F-111F-2-7-1<br>para 3-19 - 3-24 | 1F-111B(A)-2-7-1<br>para 3-19 - 3-24 |
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| | 1F-111D-2-7-1<br>para 4-7 - 4-10 | 1F-111A-2-7-1<br>para 4-7 - 4-10 | 1F-111E-2-7-1<br>para 4-7 - 4-10 | 1F-111F-2-7-1<br>para 4-7 - 4-10 | 1F-111B(A)-2-7-1<br>para 4-7 - 4-10 |

| PARAGRAPH | D | A | E | F | FB |
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| 4.2.3.1 | 1F-111D-4-8<br>fig 36 | 1F-111A-4-8<br>fig 49 | 1F-111E-4-8<br>fig 37 | 1F-11F-4-8<br>fig 36 | 1F-111B(A)-4-8<br>fig 35 |
| 4.2.3.2 | 1F-111D-4-4<br>fig 6 | 1F-111A-4-4<br>fig 6 | 1F-111E-4-4<br>fig 6 | 1F-111F-4-4<br>fig 33 | 1F-111B(A)-4-4<br>fig 40 |
| 4.2.3.3 | 1F-111D-4-4<br>fig 7 | 1F-111A-4-4<br>fig 6A | 1F-111E-4-4<br>fig 7 | 1F-111F-4-4<br>fig 34 | 1F-111B(A)-4-4<br>fig 41 |
| 4.2.4.1 | 1F-111D-2-4-1<br>para 5-10 | 1F-111A-2-4-1<br>para 5-10 | 1F-111E-2-4-1<br>para 5-10 | 1F-111F-2-4-1<br>para 5-10 | 1F-111B(A)-2-4-1<br>para 5-10 |
| 4.2.4.2 | 1F-111D-2-8-1<br>para 9-6 | 1F-111A-2-8-1<br>para 8-6 | 1F-111E-2-8-1<br>para 8-6 | 1F-111F-2-8-1<br>para 9-6 | 1F-111B(A)-2-8-1<br>para 8-6, 8-9 |
| 4.3.1.1 | 1F-111D-2-8-1<br>Sec III | 1F-111A-2-8-1<br>Sec III | 1F-111E-2-8-1<br>Sec III | 1F-111F-2-8-1<br>Sec III | 1F-111B(A)-2-8-1<br>Sec III |
| 4.3.2.1.1 | 1F-111D-4-4<br>fig 41 & 45 | 1F-111A-4-4<br>fig 38 & 42 | 1F-111E-4-4<br>fig 39 & 43 | 1F-111F-4-4<br>fig 9 & 18 | 1F-111B(A)-4-4<br>fig 16 & 25 |
| | 1F-111D-2-8-1<br>para 7-68 - 7-71<br>fig 7-13 | 1F-111A-2-8-1<br>para 6-68<br>fig 6-13 | 1F-111E-2-8-1<br>para 6-73<br>fig 6-13 | 1F-111F-2-8-1<br>para 7-64<br>fig 7-13 | 1F-111B(A)-2-8-1<br>para 6-73<br>fig 6-12 |
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| 4.3.2.1.2 | 1F-111D-2-8-1<br>para 7-74 - 7-77<br>fig 7-14 | 1F-111A-2-8-1<br>para 6-74<br>fig 6-14 | 1F-111E-2-8-1<br>para 6-79<br>fig 6-14 | 1F-111F-2-8-1<br>para 7-70<br>fig 7-14 | 1F-111B(A)-2-8-1<br>para 6-79<br>fig 6-13 |
| | 1F-111D-4-4<br>fig 41 | 1F-111A-4-4<br>fig 38 | 1F-111E-4-4<br>fig 39 | 1F-111F-4-4<br>fig 9 | 1F-111B(A)-4-4<br>fig 16 |
| 4.3.2.1.3 | 1F-111D-4-4<br>fig 42 & 45 | 1F-111A-4-4<br>fig 39 & 42 | 1F-111E-4-4<br>fig 40 & 43 | 1F-111F-4-4<br>fig 9 & 18 | 1F-111B(A)-4-4<br>fig 16 & 25 |
| | 1F-111D-2-8-1<br>para 7-64 & 7-65<br>fig 7-12 | 1F-111A-2-8-1<br>para 6-58<br>fig 6-12 | 1F-111E-2-8-1<br>para 6-64<br>fig 6-12 | 1F-111F-2-8-1<br>para 7-58<br>fig 7-11 | 1F-111B(A)-2-8-1<br>para 6-64<br>fig 6-11 |
| 4.3.2.1.4 | 1F-111D-4-4<br>fig 44 | 1F-111A-4-4<br>fig 41 | 1F-111E-4-4<br>fig 42 | 1F-111F-4-4<br>fig 12 | 1F-111B(A)-4-4<br>fig 19 |

| PARAGRAPH | D | A | E | F | FB |
|---|---|---|---|---|---|
| 4.3.2.1.4 (cont) | 1F-111D-2-8-1<br>para 7-41<br>fig 7-8 | 1F-111A-2-8-1<br>para 6-41<br>fig 6-9 | 1F-111E-2-8-1<br>para 6-41<br>fig 6-9 | 1F-111F-2-8-1<br>para 7-41<br>fig 7-8 | 1F-111B(A)-2-8-1<br>para 6-41<br>fig 6-8 |
| 4.3.2.1.5 | 1F-111D-4-4<br>fig 43 | 1F-111A-4-4<br>fig 40 | 1F-111E-4-4<br>fig 41 | 1F-111F-4-4<br>fig 10 (sh 6) | 1F-111B(A)-4-4<br>fig 17 (sh 6) |
| | 1F-111D-2-8-1<br>para 7-32 - 7-34<br>fig 7-3 | 1F-111A-2-8-1<br>para 6-33<br>fig 6-3 | 1F-111E-2-8-1<br>para 6-33<br>fig 6-3 | 1F-111F-2-8-1<br>para 7-33<br>fig 7-3 | 1F-111B(A)-2-8-1<br>para 6-33<br>fig 6-4 |
| 4.3.2.1.6 | 1F-111D-4-4<br>fig 46 | 1F-111A-4-4<br>fig 43 | 1F-111E-4-4<br>fig 44 | 1F-111F-4-4<br>fig 13 | 1F-111B(A)-4-4<br>fig 20 |
| | 1F-111D-2-8-1<br>para 7-58, 7-59<br>fig 7-10 | 1F-111A-2-8-1<br>para 6-52<br>fig 6-11 | 1F-111E-2-8-1<br>para 6-58<br>fig 6-11 | 1F-111F-2-8-1<br>para 7-52<br>fig 7-10 | 1F-111B(A)-2-8-1<br>para 6-58<br>fig 6-10 |
| 4.3.2.1.7 | 1F-111D-2-8-1<br>fig 7-9 | 1F-111A-2-8-1<br>fig 6-10 | 1F-111E-2-8-1<br>fig 6-10 | 1F-111F-2-8-1<br>fig 7-9 | 1F-111B(A)-2-8-1<br>fig 6-9 |
| | 1F-111D-4-4<br>fig 41 | 1F-111A-4-4<br>fig 38 | 1F-111E-4-4<br>fig 39 | 1F-111F-4-4<br>fig 9 | 1F-111B(A)-4-4<br>fig 16 |
| 4.3.2.1.8 | 1F-111D-4-4<br>fig 40 - 46 | 1F-111A-4-4<br>fig 37 - 43 | 1F-111E-4-4<br>fig 38 - 44 | 1F-111F-4-4<br>fig 9,10,12,13,18 | 1F-111B(A)-4-4<br>fig 16,17,19,20,25 |
| 4.3.2.1.8.1 | 1F-111D-4-4<br>fig 44 | 1F-111A-4-4<br>fig 41 | 1F-111E-4-4<br>fig 42 | 1F-111F-4-4<br>fig 12 | 1F-111B(A)-4-4<br>fig 19 |
| 4.3.2.2.1.1 | 1F-111D-4-4<br>fig 41, 45 | 1F-111A-4-4<br>fig 38,42 | 1F-111E-4-4<br>fig 39,43 | 1F-111F-4-4<br>fig 9,18 | 1F-111B(A)-4-4<br>fig 16,25 |
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| PARAGRAPH | D | A | E | F | FB |
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# APPENDIX G

## ISOLATION OF FINGER TANKS DURING DESEAL/RESEAL

1. Preparation for Desealing.

   a. The finger tank side panel WILL NOT be removed in preparation for the desealing process.

   b. Remove the finger tank aft access cover.

   c. After the saddle tank panel has been removed (in preparation for desealing), the five 1 inch dia holes and one .75 inch dia hole in the saddle/finger tank interface will be temporarily plugged to minimize the leakage of deseal chemicals into the finger tank cavity.

   d. Install 7540546 (or depot optional 7732535) metal filler as shown in view F-F of A. F. Dwg 7540539. This is installed on the saddle tank side of the saddle/finger tank interface. It will be necessary to remove sealant in the area under the longeron in preparation for metal filler installation. Apply structural adhesive such as Loctite 312 to hold filler in place while drilling hole through bulkhead. Filler should be installed in contact with the bottom surface of horizontal flange of longeron. (It is OK to custom trim the metal filler to effect maximum closure of the longeron opening; however, assure improper fit is not a result of unremoved sealant.)

   e. Fillet seal the periphery of the saddle/finger tank interface FROM THE FINGER TANK SIDE. Make sure the longeron opening is completely sealed. Sealing this interface on the finger tank side will minimize leakage of deseal chemicals into the finger tank cavity as a result of direct sprinkler erosion.

   f. Also, fillet (on the aft side) the bottom half of the intermediate frame located F.S. 646. This seal will restrict to the aft bay any deseal chemicals or water that may leak into the finger tank cavity during the desealing process (or fuel when in service). NOTE - The fillets added by this step and the preceding step should be put in at least 5 days prior to putting the aircraft through the desealing process. This will give the sealant time to cure.

   g. Remove a single fastener from the bottom of the finger tank panel approximately 26 inches from its aft end (see detail B, Air Force Dwg 7540539) to provide a drain for any desealing chemicals that might leak into the aft finger tank bay. Remove all debris from the finger tank aft bay and assure the drain hole is unobstructed.

h. Replace finger tank aft access cover temporarily.

i. Remove panels 3322 and 3325 to expose lower portion of finger tank drain lines attached to the forward bulkhead of A-1 tank.

j. Disconnect flanged nipples (12P202-3) at the A-1 tank bulkhead (FS 593). Retain bolts. Remove and discard flanged nipple seal P/N 40172.

k. Temporarily install (without sealant) 7732594 plate in place of seal 40172. Reconnect flanged nipples.

l. During the desealing process, probe the drain hole occasionally to verify that it has not become clogged. If it has become clogged, remove the aft finger tank access cover and remove the debris.

m. During the water jet process, exercise special care at the saddle/finger tank interface, especially at the bottom and the top where the longeron comes through. Too much water directed at these points will break through the sealant in the finger tank allowing it to flood excessively, requiring cleaning and drying.

2. Isolation of Finger Tanks.

a. Remove the aft finger tank access cover and clean out any chemicals and water that may have leaked into the aft bay of the finger tank. It will not be necessary to remove the previously applied sealant dams.

b. Remove the six temporary plugs from the finger/saddle tank interface. Clean the surface area around the six round holes and in the longeron/metal filler area with MIL-C-38736. Apply adhesion promoter PR-148 around the six holes and let dry for 30 minutes before installing cover discs.

c. Install cover discs over six round holes as shown in view G-G of Air Force Dwg 7540539 in the following manner:

(1) Apply sealant to grip and shoulder of bolt and slide appropriate cover disc onto bolt.

(2) Apply sealant to both sides of appropriate spacer disc and seat it firmly against the cover disc.

(3) Install this subassembly into the appropriate hole from the finger tank side making sure the spacer disc centers in the hole. Hold in place with a wrench or socket.

(4) Apply sealant to contacting surface of appropriate cover disc, install it on bolt, and torque nut to approximately 38 inch pounds.

d. After epoxy has been applied to the saddle tank, the saddle/finger tank interface periphery will be sealed from the saddle tank side as usual. Extra care should be taken to assure the longeron/metal filler is well sealed with B2 sealant. At this time seal over the six cover discs on the saddle tank side as shown in view G-G of Air Force Dwg 7540539.

e. Remove the 7732594 plate installed in step 1k of this procedure. Clean it and the seal face on the A-1 tank with MIL-C-38736 cleaner. Apply PR-148 to both sides of plate and to the seal face on the A-1 tank. Apply MIL-S-83430 B-2 sealant to both sides of the plate and to the A-1 tank seal face. Reinstall the plate and the flanged nipple.

3. Blocking the finger tank drain line where it enters the A-1 tank makes it unnecessary to remove the 12P393-3(LH) and 12P393-9(RH) tube assemblies. Accordingly, 7540561 plugs are not required.

4. Isolation of the finger tanks eliminates the requirement to seal off the bay containing the engine mounting bracket. Accordingly, paragraph 5.6.3, the note following 5.9.3.3, and paragraph 7.2 have been deleted.

MABEAB - 01 PROCEDURE

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Date

Aircraft

SADDLE TANK PANEL

REINSTALLATION

(SCREWS & JO-BOLTS)

PROCEDURES

F-111 DESEAL/RESEAL

PROGRAM

DECEMBER1976

F-111 ENGINEERING/PLANNING MABEAB

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A. CONVERSION OF SADDLE TANK AND PANEL FASTENER HOLES FOR JO-BOLTS INSTALLATION.

1. Conversion of the fastener holes will be accomplished prior to the removal of panel from aircraft for storage or routing for repair.

2. C792-3 screws and FF200 Jo-Bolts will be used around the periphery of the panels during the panel installation operation. Screws will be installed in at least every sixth hole, except at the panel corners and both sides of the intermediate frames (refer to screw installation pattern drawing). The FF200 Jo-Bolts will be inserted in the remaining holes around the panel.

3. Clamp panel to tank, using set-up bolts or equivalent to prevent the panel from creeping out of position and to assure metal to metal contact.

4. Mark the holes for the screws with lay-out ink or equivalent to facilitate the location of the screw holes during the reaming and fastener installation operations. First - Mark the corner holes, Second - Mark the holes near the base of the intermediate frames, and, Last - Mark the sixth holes.

5. Ream the unmarked holes around the panel with a #7(.~~200~~) reamer for Jo-Bolt installation.

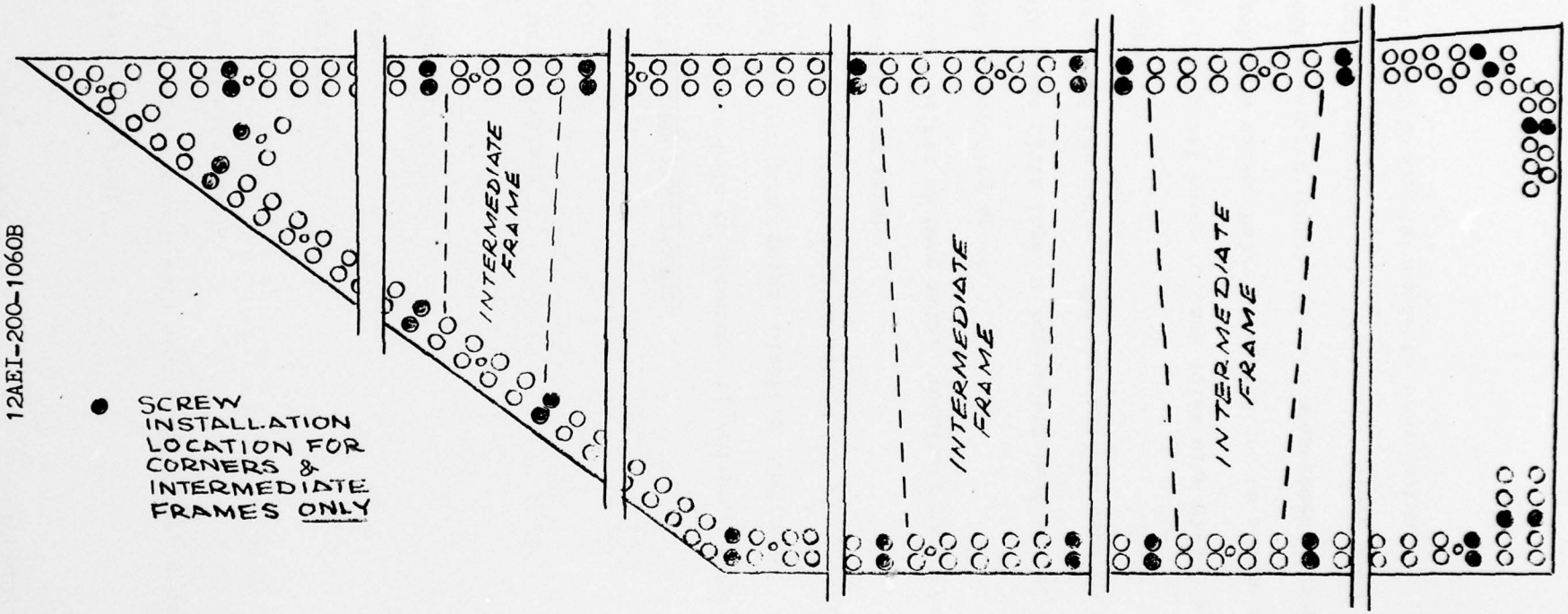
6. Deburr and countersink all Jo-Bolt holes in the panel and deburr all Jo-Bolt holes in the tank.

7. Do not alter the fastener holes identified for the C792-3 screw installation and the fastener holes on the intermediate frames.

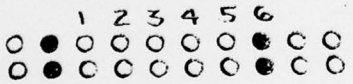
# SCREW INSTALLATION PATTERN
## SADDLE TANK PANEL








● SCREW INSTALLATION LOCATION FOR CORNERS & INTERMEDIATE FRAMES ONLY




SCREW INSTALLATION PATTERN AROUND PANEL (EXCEPT CORNERS & INTERMEDIATE FRAMES)

EVERY SIXTH HOLE.



SEALANT INJECTION HOLE

TOOLS

1. Set up bolts or equivalent.

2. Pneumatic (air) impact wrench with slotted 9/32 deep socket (home-made for tightening wing nuts).

3. Vise grip plier.

4. Pneumatic (air) drill.

5. #7 (.~~289~~) reamer.

6. 3/16 countersink bit with stop.

MATERIAL

1. Lay-out ink or equivalent.

2. Ink applicator.

B. SADDLE TANK PANEL FASTENER MEASUREMENT.

1. Inspect saddle tank panels to determine if required refinishing have been accomplished and for paint chips, blisters, and deep scratches. Clean the fastener holes located around the panel periphery and countersink areas with wire brush.

2. Apply MIL-P-23377 primer on bare metal, resulting from cleaning the fastener holes and surrounding areas.

3. Lay a 3" width white cloth tape or equivalent next to the inner row of fastener holes around the panel. The tape will be used to note fastener type and length.

4. Position and align panel holes to tank holes with C793-3 screws and clamp panel to tank with set-up bolts or equivalent to assure metal to metal contact to obtain proper fastener length measurements (remove any obstruction preventing a metal to metal contact). Also, check the alignment of the panel holes to the intermediate frame holes.

5. Measure each fastener hole with a grip gauge and note on the tape, next to the hole, the type and length of fasteners required. Use "S" for C792-3 screws and leave blank for FF200 Jo-Bolts for notation of fastener type.

6. Remove set-up bolts or equivalent and move panel from tank to work table near aircraft after fastener measurements have been completed.

TOOL

1. Set-up bolts or equivalent.

2. Pneumatic (air) impact wrench with slotted 9/32 socket (home-made for tightening wing nuts on set-up bolts).

3. Vise grip plier.

4. Pneumatic (air) drill.

5. Wire brushes.

6. Grip gauge.

MATERIAL

1. MIL-P-23377 primer, container and applicator.

2. Three inch width white cloth tape or equivalent.

3. Ball point pen or equivalent.

4. C792-3 screws.

C. CLEANING FOR PANEL REINSTALLATION.

1. Conduct FOD inspection, clean and prepare saddle tank cavity (bays) area for panel installation.

2. Thoroughly clean all surfaces, panel and tank where MIL-S-83430 B-6 will be applied as faying surface and fillet sealant with clean cheesecloth dampened with MIL-C-38736 cleaner. Discard used cheesecloth.

3. Wipe area dry with clean, dry cheesecloth before the MIL-C-38736 evaporates. Discard used cheesecloth.

4. Wipe the same area with clean cheesecloth dampened with PR-148 adhesive promoter. Wipe PR-148 lightly with clean dry cheesecloth to remove excess. Discard used cheesecloth.

5. Allow any traces of PR-148 adhesive promoter to dry for a minimum of 30 minutes before sealant is applied.

MATERIAL

1. MIL-C-38736 (TURCO) cleaner.
2. PR-148 adhesive promoter.
3. Cheesecloth.
4. Rubber gloves or equivalent.

D. SADDLE TANK PANEL REINSTALLATION PREPARATION. Ref: CAUTION Note, Page14.

1. Obtain the appropriate number of fasteners, type and length, required for the panel reinstallation as noted on cloth tape adhered to the panel.

2. Bulk clean all fasteners including nuts, washers, plugs, studs and screws, except the Jo-Bolts with MIL-C-38736 solvent and blow dry with clean air or wipe dry with clean cheesecloth.

3. Clean FF200 Jo-Bolts using the individual fastener cleaning technique to preserve the lubrication on the pull pin. Clean only the shank and head of each fasteners using cheesecloth saturated with MIL-C-38736 cleaning solvent. Wipe fasteners dry with clean cheesecloth before cleaner dries.

4. Gather and position all tools, materials and hardware on aircraft for immediate use during the panel reinstallation.

5. Fasteners shall be segregated by type and length prior to cleaning. Cleaned fasteners shall be placed in separate containers, such as aluminum pans and containers marked clearly to indicate fastener size/length.

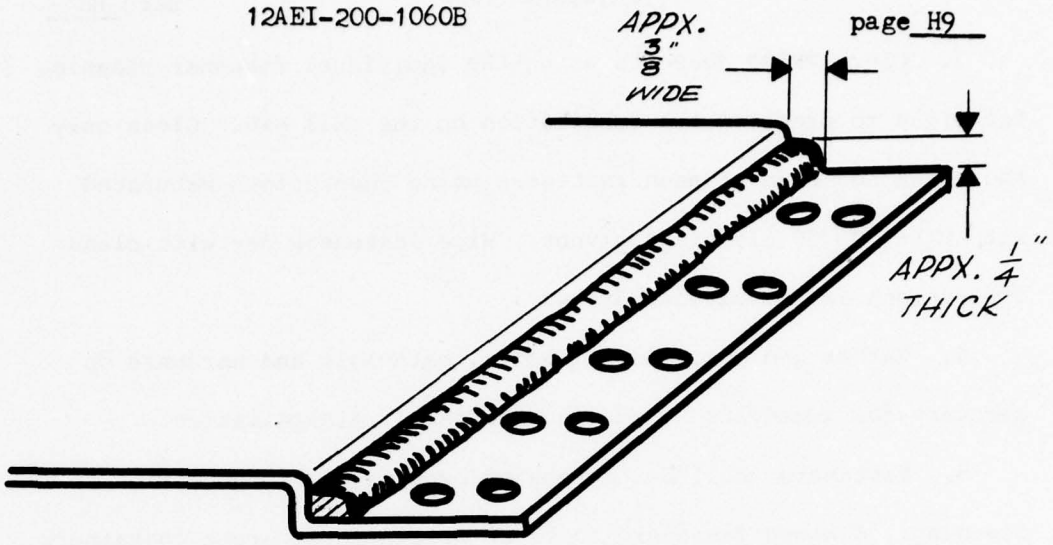
MATERIAL

1. MIL-C-38736 (TURCO) cleaner.
2. Cheesecloth.
3. Aluminum pans or equivalent.
4. C792-3 Screws.
5. AN960PD10 washers.
6. MS21042L3 nuts.
7. FF200 Jo-Bolts.
8. Rubber gloves or equivalent.

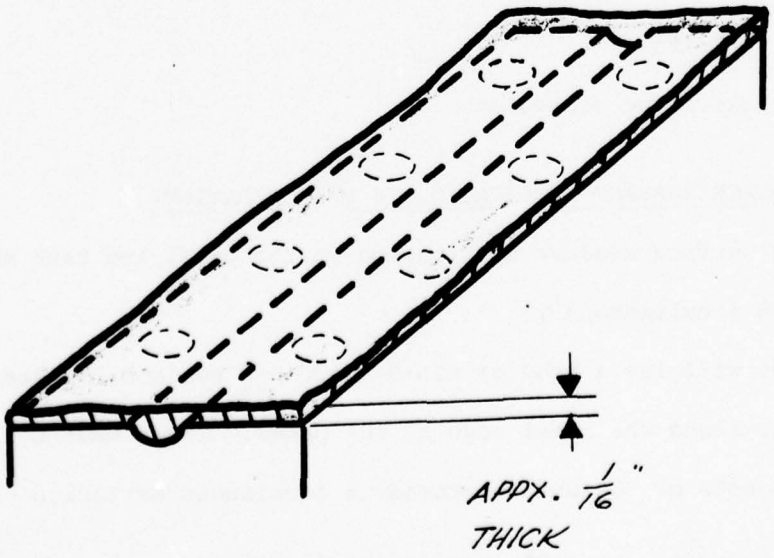
E. FAYING SURFACE SEALANT APPLICATION (4 MEN OPERATION).

1. Faying surface sealant application on the panel and tank shall be accomplished simultaneously.

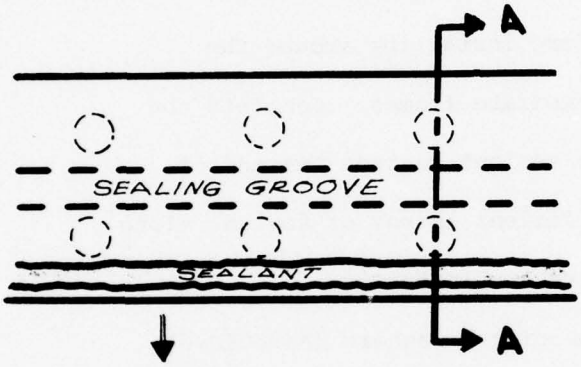
2. One man will lay a bead of MIL-S-83430 B-6 sealant, at least 1/4 inch thick, along the inner edge of the panel. There must be sufficient amounts of sealant to provide a continuous extrusion of sealant along the edges when the panel is pulled down.



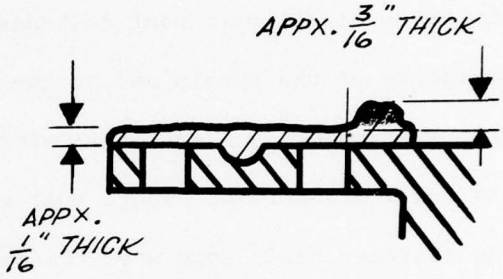

3. Two men will lay MIL-S-83430 B-6 sealant along the tank's boundary faying surfaces and in the sealing grooves. The third man, using a spatula or equivalent, will spread and level the sealant to fill the sealing grooves and to cover the boundary faying surfaces with sealant approximately 1/16 inch thick. The laying and leveling of the sealant should be performed alternately to ensure proper and sufficient application of sealant.



4. After sealant has been layed and levelled on the tank's boundary faying surface, lay a bead of MIL-S-83430 B-6 sealant approximately 3/16 inch thick, right next to the outer row of fastener holes and not over the fastener holes. There must be sufficient amount of sealant to provide a continuous extrusion of sealant along the edges when the panel is pulled down.




TOP VIEW




SECTION VIEW A-A

5. Sealant will not be applied to the intermediate frames.

TOOL

1. Semco sealant gun, air pressure, 6" - three each.

2. Spatula or putty knife.

MATERIAL

1. MIL-S-83430 B-6 sealant - approximately five tubes (2 tubes for panel and 3 tubes for tank).

2. Rubber gloves or equivalent.

F. FASTENER INSTALLATION (4 MEN OPERATION).

1. NOTE:

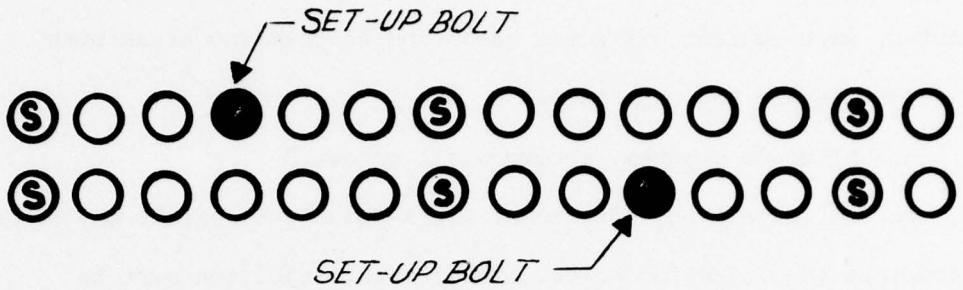
a. C792-3 screws, AN960PD10 washers, MS21042L3 nuts and FF200 Jo-Bolts or equivalents shall be used to fasten the panels boundary faying surfaces. Sherman-Martin 2112 studs, N5 plugs and applicable nuts and washers shall be used to fasten the panel to the intermediate frames.

b. Apply MIL-S-83430 B-6 sealant on the shanks and under the heads of all permanent fasteners before installing around the periphery of the panels and at the intermediate frames. Complete the installation of each fastener before the sealant reaches the end of its application time. There must be sufficient amount of sealant along the fastener heads edge when the fasteners are installed.

c. The C792-3 screws and its associated washers (AN960PD10) and nuts (MS21042L3) must be installed and torqued within three hours after the start of the MIL-S-83430 B-6 sealant application on the panel and tank. The three hours include the 30 minutes settling time requied before the final torquing of the screws.

2. Move panel from worktable to aircraft and position panel on saddle tank. Apply MIL-S-83430 B-6 sealant on approximately 20 C792-3 screws. Insert the screws in the outer row of fastener holes for screws and in appropriate positions to align the panel holes to the tank holes.

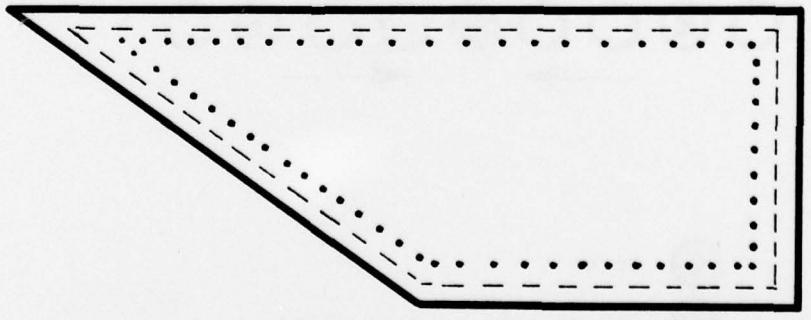
3. Install set-up bolts or equivalent midway between the screw holes in a staggered pattern around the panel and tighten bolts with air gun or equivalent.




4. Using two teams, two people/team install the C792-3 screws and its associated nuts and washers in the following sequence. Teams should start in positions directly opposite to each other and move in a direction around the panel to avoid interference.

a. First - install and tighten screws in the outer row around the panel.

b. After the outer row is completed, install and tighten screws in the inner row around the panel.



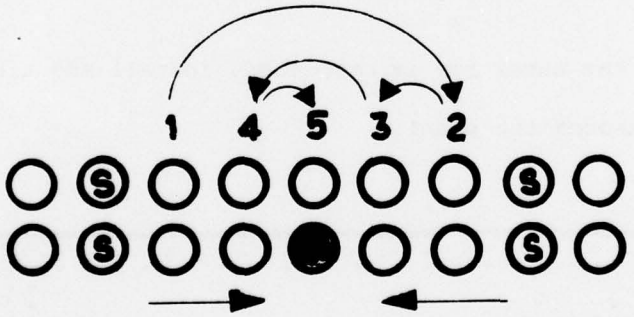
c. Upon completion of the screw installation around the panel, allow 30 minutes for sealant and panel to settle. During the 30 minutes, wipe sealant off screw heads and surrounding areas with MIL-C-38736 cleaner and cheesecloth.

d. After 30 minutes, retorque all screws.

5. To aid in sealing, additional MIL-S-83430 B-6 sealant may be injected into the injection holes. The sealant injection must be accomplished before the faying surface sealant has reached the end of its application time and not before the screws have been retorqued.

6. Using two teams, two people/teams, install FF200 Jo-Bolts in the remaining open holes around the panel.

a. Install Jo-Bolts between two sets of screws by alternating left to right, or right to left moving toward the set-up bolt located midway between the screws.




S Screw

Set-up bolt or equivalent

Installation direction

1 2 Alternating pattern, left to right or right to

left, working toward the set-up bolt located midway between the screws. Numbers and arrows only indicate possible sequence of Jo-Bolt installation.

b. One person applies/dips Jo-Bolts in MIL-S-83430 B-6 sealant and inserts Jo-Bolts and the other person installs Jo-Bolts with a gun.

c. To prevent FOD, collect and deposit Jo-Bolt stems in a container or equivalent as Jo-Bolts are installed.

d. Wipe sealant off Jo-Bolt heads and surrounding areas with MIL-C-38736 cleaner and cheesecloth.

e. Jo-Bolts should be installed before the faying surface sealant has reached the end of its application time, within six hours after sealant is first applied on the boundary faying surfaces of the panel and tank. If this is not possible and the faying surface sealant has reached the end of its' application time, scrape the sealant off fastener holes and surrounding areas from the inside of the tank prior to the insertion of "wet" Jo-Bolts.

7. Install Sherman-Martin 2112 studs, N5 plugs and applicable nuts and washers in the intermediate frames. Brush on or dip the studs in MIL-S-83430 B-6 sealant prior to installation. After the installation and tightening of the studs and prior to the installation of the plugs, inject sufficient amount of MIL-S-83430 B-6 sealant in the fastener holes to provide an extrusion of sealant along the plugs edge when the plug is screwed down. Wipe sealant off the Sherman-Martin plug heads and surrounding areas with MIL-C-38736 cleaner and cheesecloth.

TOOLS - two each, except Set-up bolts and sealant injection gun

1. Pneumatic (air) drill.
2. Screw bit for C792-3 screw.
3. Ratcheting box wrench for MS21042L3 nuts.
4. Combination wrench for nuts.
5. Grip guage.
6. Set-up bolts or equivalent. (Cleco clamp, 3/16, type WNX - approximately 80 each).
7. Pneumatic (air) impact wrench with slotted 9/32 socket (home-made for tightening wing nut or cleco clamp).
8. Vise grip plier.
9. Rawhide faced hammer or equivalent.
10. Tubular metal punch to drive Jo-Bolts.
11. Flashlight or lamp.
12. Mirror.
13. Magnet.
14. Air hoses.
15. Pneumatic (air) Jo-Bolt gun.
16. Screw bit for Sherman-Martin plugs.
17. Semco sealant gun, air pressure, 6".
18. Semco sealant injection gun, #507, air pressure - one each.

MATERIAL

1. MIL-S-83430 B6 sealants.
2. Aluminum pans for sealant and sealant application brush.

3. C792-3 screws.

4. MS21042L3 nuts.

5. AN960PD10 washers.

6. FF200 Jo-Bolts.

7. Sherman-Martin N5 plugs.

8. Sherman-Martin 2112 studs and applicable nuts and washers.

9. MIL-C-38736 (TURCO) cleaner.

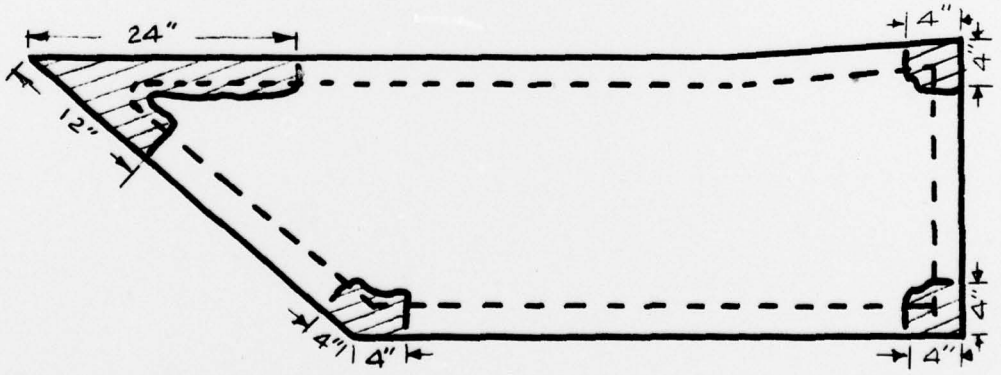
10. Cheesecloth.

11. Rubber gloves.

12. FOD containers.

G. FILLET SEALANT APPLICATION ALONG SEAMS AND FASTENERS.

1. Apply fillets of MIL-S-83430 B-2 sealant along all faying surface seams and over all fasteners located inside the forward portion and corners of the saddle tank, as shown below:




Sealant application area.

2. When the fillet sealant has cured, the round access covers shall be reinstalled.

TOOL

1. Sealant application tools, i.e., spatula, brush, etc.

2. Semco sealant gun, air pressure, 6".

MATERIAL

MIL-S-83430 B-2 sealant.

CAUTION NOTE: REF: Page 4, Sect D.

Assure epoxy inside tank bays is covered completely with MIL-S-8343Ø B-2 Sealant before panel is installed.

# APPENDIX I

## REMOVAL AND REPLACEMENT OF 12B2766 AND 12B2767 BULKHEADS

1. Rescinded T.C.T.O. F-111A-1380 removed 12B2744 and 12B2753 supports from the R & L glove area of the F2 fuel tank, replacing them with larger and stronger 12B2766-7-8 and 12B2767-7-8 bulkheads. Affected aircraft are as follows:

F-111A - 66-013 thru 66-016, 66-018 thru 66-021, 66-023, 66-025 thru 66-031, 66-033 thru 66-039, 66-041, 66-044 thru 66-056, 66-058, 67-032 thru 67-042, 67-044 thru 67-048, 67-050 thru 67-114, and

F-111C - A8-125 thru A8-148.

2. Deseal/reseal of the aforementioned aircraft requires removal of 12B2766 and 12B2767 bulkheads (R & L) prior to the desealing operation and replacement <u>after</u> the glove area has been completely resealed and <u>air</u> pressure checked (access to the glove area is extremely limited once the bulkhead is installed).

3. During the desealing process, temporary closure plates should be installed where the bulkhead attachment screws exit the upper side of the glove (R & L). Screws and washers suffice, however, any other means of blocking the holes that does not result in damage to the holes or the aircraft structure is acceptable.

4. After the aircraft has been resealed, the holes must be once again temporarily blocked (this time air tight) in preparation for air leak check and pressure drop check. After it is verified that <u>no</u> leaks exist outboard of where the 12B2766 and 12B2767 bulkheads will be installed, they may be installed.

5. When reinstalling the bulkheads, use sufficient MIL-S-83430 sealant in the faying surface to assure squeeze-out all around the interface. All fasteners must be dipped before they are installed. All fasteners should be retorqued at least once before faying surface sealant reaches the end of its working life.

# FUEL SYSTEM FLUSHING PROCEDURE

1-2 SCOPE

The following provides procedures for fuel line and tank flushing. The external fuel tanks, weapons bay tanks, and aerial refuel system are not included.

1-3 Safety Requirements

1-4 Comply with all safety and servicing precautions per T.O. 1F-111( ) ( )-2-1 "General Aircraft Information." Grounding cables shall be used between fueling unit and aircraft during the entire fueling and defueling operation.

1-5 System Preparation

1-6 Fuel system flushing requires that certain associated systems be checked out and operative before performing the flushing. The following shall have been checked out and found to be operative.

a. Fuel gaging system

b. Associated electrical circuits.

1-15 AEROSPACE GROUND EQUIPMENT REQUIRED

| PART NO. | AGERD NO. | ALTERNATE | DESCRIPTION |
|---|---|---|---|
| A/M32A-60 | 8123 | Equivalent | Generator Set |
| A/S32F-5 | 8601 | Equivalent | Truck-Tank Servicing 500 Gal |
| MC-2A | 8109 | Equivalent | Air Compressor (Low Pressure) |
| 12A1010-1 | 1010 | Equivalent | Adapter-Pressure Test |
| ——— | ——— | Equivalent | 100 Mesh Filter Unit |
| AN/PSM-6 | 7010 | Equivalent | Multimeter |
| 1009KG | 7893 | Equivalent | Liquid Pressure Gage Calibrated to 50 psig (2 required) |
| 12A0897-1 | 0897 | Equivalent | Wing Adapter Assembly |

1-16 Flushing

1-17 Unless otherwise specified, all operations and tests shall be conducted with the wings in 16° position.

1-18 CONTROL PANEL SETTINGS

Set all switches on the fuel system control panel in positions shown below. The switches are to remain in these positions unless specfically stated otherwise in the procedures.

a. DUMP. . . . .. . OFF

b. TRANS AND ENG FEED. . . .OFF

c. TANK PRESS . . . . . AUTO

d. AERIAL REFUEL. . . . . CLOSE

1-28 FLUSH CONTAMINANTS FROM WING TANKS

1-29 Flushing of the wing tanks and lines shall be accomplished by filling and emptying tanks several times and checking the 100 mesh filter each time for contaminant. The wing is fueled through the ground refuel receptacle, and fuel is extracted through the wing defuel adapter. The wing flushing operation is performed as follows:

a. Sweep wings to 72° - 30' position.

b. Fill wings by positioning wing precheck selectors to REFUEL.

c. Connect 100 mesh filter and defueling hose to the wing defuel adapter.

d. Position TRANS switch to WING.

e. When both wing tanks are empty psotion TRANS switch to OFF.

f. Inspect the 100 mesh fuel filter for contamination and clean the unit.

g. Repeat steps b through f until either of the following contamination quantities are retained by the filter:

1. Number of visible contaminant particles is less than 5 for each of 2 consecutive cycles during first 7 flushings.

2. Number of visible contaminant particles is less than 10 for each of 2 consecutive cycles when number of flushings exceed 7.

h. Sweep wings to 16° position.

1-31 FLUSH CONTAMINANTS FROM FUSELAGE TANKS

1-32 Flushing of the fuselage tanks and lines is accomplished by filling and emptying the tanks several times, checking the filter each time for contaminant. Fuel is applied through the ground refuel (left side) receptacle and extracted through the defuel (right side) receptacle and through the engine line drain valves.

1-33 FLUSHING-FORWARD AND AFT FUSELAGE TANKS AND ENGINE FEED LINES

a. Fill the forward and aft fuselage tanks by positioning the FWD TANK and AFT TANK precheck selectors to REFUEL and applying 50 psi maximum at the refuel receptacle.

b. Remove pressure from refuel receptacle.

c. Open engine fuel line drain valves (hoses attached for continuous flow during defueling). Defuel the aft tank by positioning the ENGINE FEED selector to AFT.

d. When aft tank is empty position ENGINE FEED select switch to OFF.

e. Inspect the 100 mesh fuel filter for contamination and clean the unit.

f. Repeat the AFT tank portion of step a and steps b through e until either of the following contamination quantities are retained by the filter.

1. Number of visible contaminant particles is less than 5 for each of 2 consecutive cycles during first 7 flushings.

2. Number of visible contaminant particles is less than 10 for each of 2 consecutive cycles when number of flushings exceed 7.

g. With the aft fuselage tank empty, defuel forward tank by positioning the ENGINE FEED select switch to FWD.

h. When forward tank is empty position ENGINE FEED select switch to OFF.

i. Inspect the 100 mesh fuel filter for contamination and clean unit.

j. Refuel forward tank by positioning the FWD TANK precheck selector to REFUEL and all others to PRI or CHK as applicable.

k. Repeat step f. for the FORWARD tank only and steps g through j.

Model F-111/FB-111
16 July 1975

# FUEL SYSTEM CLEANLINESS INSPECTION

## 1-0 SCOPE

### 1-1 This Document

a. Establishes an inspection test procedure for determining that the contamination level in the fuel system is at an acceptable level.

b. Establishes the replacement frequency requirement for the temporary filter screen assemblies.

### 1-2 SAFETY

a. Observe normal safety precautions during removal, installation and leakage inspection, i.e., comply with all safety precautions per T.O. 1F-111 ( ) ( )-2-1 "General Aircraft Information."

b. When removing the filter screen assemblies, care should be used to prevent fuel from entering adjacent equipment.

### 1-3 REFERENCES

a. Fuel System Flushing Procedure (Proposed) per T.O. 1F-111 ( ) ( )-2-1, "General Aircraft Information."

b. Air Force Dwg 7540614 - Filter Instl - Engine Supply Line.

c. GD/FW Dwg 12FTP388 - Filter, Engine Supply Line, Assy.

d. Directorate of Maintenance Operating Instruction (MAOI) xxx-x (Proposed), same subject.

## 2-0 FUEL SYSTEM CLEANLINESS INSPECTION

### 2-1 Engine Ground Runs

a. Prior to the first engine green run install LH and RH 12FTP388-21 Screen assemblies per drawing 7540614 (reference b) and reference d.

b. Inspect installation for leakage per note 4 of drawing 7540614 (reference b).

c. After engine trim runs are complete perform the following:

(1) Remove LH and RH 12FTP388-21 fuel filter screen assemblies. Use care not to lose any of the contamination on the screens or in the housing.

(2) Wrap the screen assemblies and contamination in clean polyethlene film. TAG each assembly to indicate L.H. or R.H. engine.

(3) Complete the Contamination Record Part "A" of Figure 1 and send the TAGGED filter screen assemblies to Physical Sciences Laboratory Analytical Laboratory Section, Building 368.

2-2 FLIGHT TEST

a. Prior to the first pre-flight inspection, but after engine trim runs are complete, replace L.H. and R.H. 12FTP388-21 fuel filter screen assemblies, with clean filter screen assemblies.

b. Inspect installation for leakage per note 4 of drawing 7540614 (reference b).

c. After each flight perform the same procedure as in 2-1 c items (1), (2) and (3). Replacing the L.H. and R.H. 12FTP388-21 fuel filter screen assemblies with clean screens.

2-3 ANALYTICAL LABORATORY WORK

a. The Analytical Lab Section shall collect the contaminant from each screen assembly, dry and weigh the contaminant, and complete the analysis, part "B", of Figure 1.

b. A complete analysis of the contamination shall be made only if the contaminant rate exceeds an Acceptance Standard of 10 grams per thousand lbs. of fuel used. MAGCB shall notify Flight Prep Unit/MABPDE Bldg 770, if the filter does not satisfy the requirements of this Acceptance Standard.

c. Contamination samples shall be retained at least until the airplane is delivered. Consideration should be given to retaining those samples that exceed the Acceptance Standard by the method suggested in T.O. 42B-1-1, paragraph 5-83 Record of Laboratory Results.

d. The filter screen assemblies shall be cleaned, inspected for evidence of damage, tagged and returned to the Flight Prep Unit.

2-4 ACCEPTANCE STANDARD

If the contamination rate exceeds the Acceptance Standard on either one or both of the filter screen assemblies, Service Engineering/Fluid Systems Section/MMEMF/Bldg 250F will be notified and the fuel system cleaned per reference a, prior to any reflight of the contaminated aircraft.

3-0 FILTER CHANGING REQUIREMENT

The fuel filter screen shall be replaced after each flight regardless of whether or not the aircraft has satisfied the requirements of the Acceptance Standard.

4-0 FUEL FILTER ELEMENT CLEANING AND INSPECTION

a. Upon receipt of the fuel filter screen assemblies, 12FTP388-21, the element shall be cleaned in the ultrasonic cleaning unit.

b. When the unit is clean it shall be removed and visually inspected Evidence of broken wire, cut screen, or handling damage shall be cause for rejection.

c. Place the unit in a protective, contaminant free, container, tag and return to the Flight Prep. Unit Bldg 770.

5-0 RETURN AIRCRAFT TO NORMAL CONFIGURATION

a. After the last functional check flight and before the delivery flight, remove the L.H. & R.H. temporary filter screen assemblies P.N 12FTP388-801 and reinstall 12P301-5 and 12P302-9, C018-11-48(2) and C007-338(4) per drawing 7540614.

b. Inspect for leakage per note 4 of Drawing 7540614.

(Part "A") FUEL SYSTEM CONTAMINATION RECORD

A/C NO._____ Date_____
Flt NO_____ Flt Duration_____
Fuel Used Prior to Flt_____lbs.
Fuel Used During Flt_____lbs.

---

(Part "B") CONTAMINATION ANALYSIS

L. H. Eng Filter Wt_____gm

Analysis:

R. H. Eng Filter Wt_____gm

Analysis:

Total Wt Of Contamination_____gm

Total amount of fuel used_____lbs

CONTAMINANT RATE_____ grams of contaminant / thousand lbs. fuel

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Figure 1, FUEL SYSTEM CONTAMINATION RECORD & ANALYSIS