TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

ORGANIZATIONAL

FUEL SYSTEM

A-7D

5

LTV AEROSPACE AND DEFENSE COMPANY
N00019-67-C-1043
F34601-88-D-1917

This change incorporates T.O. 1A-7D-2-6TP-1 dated 1 May 1989.

DISTRIBUTION STATEMENT – Distribution authorized to the Department of Defense and U.S. DoD contractors only, Administrative or Operational use, 15 October 1989. Other requests shall be referred to SM-ALC/MMDDCC, McClellan AFB, CA 95652-5609.

WARNING – This document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751 *et seq*.) or the Export Administration Act of 1979, as amended (Title 50, U.S.C., App. 2401 *et seq*.). Violations of these export laws are subject to severe criminal penalties.

HANDLING AND DESTRUCTION NOTICE – Handle in compliance with the distribution statement and destroy by any method that will prevent disclosure of the contents or reconstruction of the document.

Published under authority of the Secretary of the Air Force.

1 FEBRUARY 1986
Change 12 — 15 May 1990

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Extensively changed illustrations are indicated by a miniature pointing hand symbol pointing to the words MAJOR CHANGE.

Dates of issue for original and changed pages are:

Original 0	1 Feb 1986	Change 5	1 Aug 1987	Change 10	14 Apr 1989
Change 1	1 May 1986	Change 6	15 Sep 1987	Change 11	15 Oct 1989
Change 2	1 Jul 1986	Change 7	1 Jul 1988	Change 12	15 May 1990
Change 3	1 Oct 1986	Change 8	15 Oct 1988		
Change 4	15 Oct 1986	Change 9	15 Feb 1989		

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 490 CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.
Title	12	1-68.2 Blank	8	5-68 thru 5-77	0	FP-10 Blank	0
A	12	1-69 thru 1-91	0	5-78	3	FP-11	0
B	12	1-92	8	5-79 thru 5-87	0	FP-12 Blank	0
C Blank	2	1-92.1	8	5-88 Blank	0	FP-13	0
i	0	1-92.2 Blank	8	6-1	0	FP-14 Blank	0
ii thru iv	4	1-93 thru 1-131	0	6-2	4	FP-15	0
v thru viii	0	1-132	1	6-3	4	FP-16 Blank	0
ix	3	1-133 thru 1-135	0	6-4 thru 6-10	0	FP-17	0
x Blank	0	1-136 thru 1-138	2	6-10.1	11	FP-18 Blank	0
xi	0	1-139 thru 1-145	0	6-10.2 Blank	11	FP-19	0
xii	0	1-146	3	6-11	11	FP-20 Blank	0
xii.1	12	1-147	3	6-12 thru 6-37	0	FP-21	0
xii.2 Blank	12	1-148	7	6-38	6	FP-22 Blank	0
xiii	12	2-1 thru 2-31	0	6-39	10	FP-23	0
xiv	12	2-32	9	6-40	10	FP-24 Blank	0
xv	0	2-33	0	Glossary-1	0	FP-25	0
xvi	0	2-34	9	Glossary-2	0	FP-26 Blank	0
xvii	12	2-34.1	9	Index-1 thru Index-3	0	FP-27	0
xviii	12	2-34.2 Blank	9	Index-4	1	FP-28 Blank	0
1-1 thru 1-9	0	2-35 thru 2-38	0	Index-5 thru Index-7	0	FP-29	0
1-10	10	3-1 thru 3-5	0	Index-8	10	FP-30 Blank	0
1-11 thru 1-25	0	3-6	12	Index-9 thru Index-11	0	FP-31	12
1-26	8	3-6.1	12	Index-12 Blank	0	FP-32 Blank	0
1-26.1	8	3-6.2 Blank	12	FP-1	0	FP-33	1
1-26.2 Blank	8	3-7 thru 3-10	0	FP-2 Blank	0	FP-34 Blank	1
1-27 thru 1-49	0	4-1 thru 4-12	0	FP-3	0	FP-35	0
1-50	8	5-1	0	FP-4 Blank	0	FP-36 Blank	0
1-50.1	8	5-2	4	FP-5	0	FP-37	0
1-50.2 Blank	8	5-3 thru 5-7	0	FP-6 Blank	0	FP-38 Blank	0
1-51 thru 1-67	0	5-8	12	FP-7	0	FP-39	0
1-68	8	5-9 thru 5-66	0	FP-8 Blank	0	FP-40 Blank	0
1-68.1	8	5-67	5	FP-9	0	FP-41	0

*Zero in this column indicates an original page.

USAF

LIST OF EFFECTIVE PAGES - CONT

*Zero in this column indicates an original page.

FOREWORD

THIS MANUAL.

This manual contains descriptive material and organizational maintenance instructions for personnel to maintain the fuel system of the A-7D Corsair II airplane. This manual includes maintenance instructions on the following:

Main Fuel System	Section I
Transfer Fuel System	Section II
Fuel Vent and Pressurization System	Section III
External Fuel System	Section IV
Fuel Quantity Indicating System	Section V
Air Refueling Receptacle System	Section VI

Each organizational maintenance manual, with the exception of T.O. 1A-7D-2-1, 1A-7D-2-16, 1A-7D-2-17, and 1A-7D-2-18, is arranged to present organizational system and component maintenance coverage in a standard manner. A table listing A-7D organizational maintenance manuals and specialized manuals is provided herein. Refer to T.O. 1A-7D-2-1 for the introduction to the complete series of A-7D manuals.

ARRANGEMENT AND USE OF THIS MANUAL.

The material and organizational maintenance information presented in this manual are divided into sections, one section for each major system covered.

In the description paragraphs, all major components are described and a brief explanation of their primary functions is provided. All system indicators and controls necessary to operate a system are depicted and their functions described in a controls and indicators illustration. System major components not covered by this controls and indicators illustration are shown in a system arrangement illustration. Controls and indicators are not normally repeated in the system arrangement illustration.

In the operation paragraphs, a complete description of the system's operation is provided. Schematics and diagrams aid in the understanding of system theory. Where a system is complex, a block diagram provides a simplified overview of the system to assist understanding of the detailed descriptions and schematics. Each major component of the system is listed in a components table which summarizes its function and location.

In the operational checkout paragraphs, an operational checkout is provided to determine the operational status of the system. Where reference is made in the checkout to controls and indicators, capital (uppercase) letter of decal nomenclature are used for all test equipment and all airplane placard (decal) switch or control positions. All airplane system controls and indicators are referred to by their descriptive title in lowercase letters. Operational checkout procedural steps, which indicate a mandatory condition or result, are followed by a number or numbers in braces. These numbers are keyed to a system troubleshooting (malfunction) table which suggests corrective actions if a mandatory condition or result is not present. The corrective actions are in order of probable cause. When corrective actions call for the replacement of more than one component, replacement should be made in order of the listing. The operational checkout is usually repeated after each replacement until acceptable performance is obtained.

Removal and installation procedures are provided for each system component. These procedures reference access requirements with step-by-step instructions on how to accomplish the task. Also provided, as applicable, are repair and parts replacement, adjustment, cleaning, draining, or lubrication, extreme environmental condition procedures, and nonroutine servicing. Routine servicing instructions are in T.O. 1A-7D-2-1.

TOOLS AND TEST EQUIPMENT REQUIRED.

Tools and test equipment required for a particular maintenance procedure are listed under Tools Required or Test Equipment Required in the procedure. The list does not include tools and equipment needed for access or common handtools. It does include standard support equipment, such as voltmeters, multimeters, etc.

REFERENCE PUBLICATIONS.

Publications generally related to subject matter contained in this manual or specifically referenced in this manual are listed in the table of reference publications.

TIME COMPLIANCE TECHNICAL ORDERS.

Time compliance technical orders for the systems covered in this manual are listed in a table. The listing, in technical order numerical sequence, includes the T.O. number, basic date, title, ECP number, and date of the latest change, revision, or supplement.

THIS REVISION.

This manual has been revised to incorporate changes resulting from airplane design changes.

LIST OF SYSTEMS MAINTENANCE MANUALS

Publication No.	Title
General Maintenance Manuals	
T.O. 00-25-172	Ground Servicing of Aircraft and Positioning of Equipment Status Grounding/Bonding
T.O. 1-1-3	Preparation, Inspection, and Repair of Aircraft Fuel, Oil, and Water Alcohol Cells and Integral Tanks
T.O. 1-1A-8	Engineering Manual Series, Aircraft and Missile Repair, Structural Hardware

LIST OF SYSTEMS MAINTENANCE MANUALS - CONT

Publication No.	Title
T.O. 1-1A-14	Installation Practices, Aircraft Electri · and Electronic Wiring
Organizational Maintenance Manuals	
T.O. 1A-7D-2-1	General Information and Airframe Group
T.O. 1A-7D-2-1CL-1	General Information and Airframe Group - Ground Handling Checklist
T.O. 1A-7D-2-1CL-2	General Information and Airframe Group - Servicing Checklist
T.O. 1A-7D-2-2	Egress and Survival Systems
T.O. 1A-7D-2-2CL-1	Egress and Survival Systems Seat Removal and Installation Checklist
T.O. 1A-7D-2-3	Mechanical Accessories Systems
T.O. 1A-7D-2-4	Pneudraulic Systems
T.O. 1A-7D-2-5	Powerplant Systems
T.O. 1A-7D-2-5CL-1	Powerplant Systems - Engine Removal and Installation Checklist
T.O. 1A-7D-2-5CL-2	Power Loss/Flameout Occurrences Checklist
T.O. 1A-7D-2-5CL-3	Engine Setup Procedures Checklist - TF41-A-1, -1A, or -1B Engine
T.O. 1A-7D-2-6	Fuel System
T.O. 1A-7D-2-7	Landing Gear Systems

LIST OF SYSTEMS MAINTENANCE MANUALS – CONT

Publication No.	Title
T.O. 1A-7D-2-7CL-1	Landing Gear Systems – Rigging Checklist
T.O. 1A-7D-2-7CL-2	Main/Nose Wheel and Tire Assembly Removal and Installation
T.O. 1A-7D-2-8	Flight Control Systems
T.O. 1A-7D-2-8CL-1	Flight Control Systems – Rigging Procedures Checklist
T.O. 1A-7D-2-9	Automatic Flight Control System
T.O. 1A-7D-2-9CL-1	Automatic Flight Control System Checklist
T.O. 1A-7D-2-10	Instrument Systems
T.O. 1A-7D-2-10CL-1	Instrument Systems Statistical Accelerometer Data Collection and Reporting Checklist
T.O. 1A-7D-2-11	Electrical Power and Lighting Systems
T.O. 1A-7D-2-12	Radio Communication and Navigation Systems
T.O. 1A-7D-2-13	Armament Systems
T.O. 1A-7D-2-13CL-1	Armament Systems Checklist
T.O. 1A-7D-2-13CL-2	Accessory Installation: MER-10N, TER-9A, SUU-20 Series Dispenser, LAU-88/A and LAU-117/A Missile Launcher, and AERO-3B Missile Launcher Checklist
T.O. 1A-7D-2-14	Weapon Control Systems
T.O. 1A-7D-2-14CL-1	Weapon Control Systems Checklist

LIST OF SYSTEMS MAINTENANCE MANUALS – CONT

Publication No.	Title
T.O. 1A-7D-2-14-1	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Theory of Operation
T.O. 1A-7D-2-14-3	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Maintenance Procedures
T.O. 1A-7D-2-14-4	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Diagrams
T.O. 1A-7D-2-14-5	AN/AAR-48 Forward Looking Infrared (FLIR) System
T.O. 1A-7D-2-14-6	AN/AAR-48 Forward Looking Infrared (FLIR) System – Diagrams
T.O. 1A-7D-2-15	Electronic Countermeasure Systems (U) (Confidential)
T.O. 1A-7D-2-16	General Wiring Data
T.O. 1A-7D-2-17	Wiring Diagrams
T.O. 1A-7D-2-18-1	Integrated Avionic Systems (Airplanes Before T.O. 1A-7-530), Theory of Operation
T.O. 1A-7D-2-18-1-1	Integrated Avionic System (Airplanes After T.O. 1A-7-530), Theory of Operation
T.O. 1A-7D-2-18-2	Integrated Avionic Systems, Troubleshooting Schematics
T.O. 1A-7D-2-18-3	Integrated Avionic Systems, Debriefing
T.O. 1A-7D-2-18-4	Integrated Avionic Systems Troubleshooting, Tactical Computer /HUD/FLR/ TISL/FLIR/VMS

LIST OF SYSTEMS MAINTENANCE MANUALS – CONT

Publication No.	Title
T.O. 1A-7D-2-18-5	Integrated Avionic Systems Troubleshooting, IMS/ Doppler/ Radar Altimeter/PMDS
T.O. 1A-7D-2-18-6	Integrated Avionic Systems, Weapon Delivery and Release Troubleshooting
T.O. 1A-7D-2-18-7	Integrated Avionic Systems Troubleshooting, HMS/ ADC/AOA
T.O. 1A-7D-2-18-8	Integrated Avionic Systems, Operational Test Program Troubleshooting
T.O. 1A-7D-2-18-9	Integrated Avionic Systems, Grooming
T.O. 1A-7D-2-19	Cross Servicing Guide for A-7D Aircraft
T.O. 1A-7D-2-20	Testing and Troubleshooting Transmission Lines, Coaxial Cables, and Antennas
Specialized Manuals	
T.O. 1A-7D-06	Work Unit Code Manual

LIST OF SYSTEMS MAINTENANCE MANUALS – CONT

Publication No.	Title
T.O. 1A-7D-3	Structural Repair Instructions
T.O. 1A-7D-4-1	Illustrated Parts Breakdown Introduction
T.O. 1A-7D-4-2	Illustrated Parts Breakdown Numerical Index
T.O. 1A-7D-4-6	Illustrated Parts Breakdown, Fuel System
T.O. 1A-7D-6	Inspection Instructions, Aircraft Scheduled Inspection and Maintenance Requirements
T.O. 1A-7D-33-1-2	Nonnuclear Munitions Loading Procedures
T.O. 1A-7D-35	Nonmunitions Accessories Installation, Checkout, and Removal Procedures

REFERENCE PUBLICATIONS

Publication No.	Title
AFR 127-101	Ground Accident Prevention Handbook
T.O. 31Z-10-4	Electromagnetic Radiation Hazards

RECORD OF TIME COMPLIANCE TECHNICAL ORDERS

T.O. Number	Date	Title	Change/Revision Date
1A-7-530		Installation of Forward Looking Infrared System on A-7 Aircraft (ECP 622)	15 Oct 1986

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS - CONT

LIST OF ILLUSTRATIONS - CONT

LIST OF TABLES

SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are precautions that personnel must know and use during many phases of fuel system work. Personnel should also be familiar with and observe all requirements of AFR 127-101.

RESUSCITATION

Personnel working with or near highly toxic chemicals and electrically powered equipment should be familiar with modern methods of resuscitation. Contact Base Medical Services for instructions and information.

WORKING ALONE

Never enter or reach into small compartments and tight spaces to make repairs without another person standing by to give help in case of emergency.

ELECTRICAL SHOCK AND EXPLOSION HAZARD

Use only electrical equipment and tools which are properly grounded. Use nonsparking, explosion-proof electrical equipment when working where fumes and vapors could be ignited.

LIFTING AND MOVING HEAVY OBJECTS

Do not lift or move heavy objects in awkward positions alone. Get help or use equipment such as dollies, hoists, and forklifts.

FIRE HAZARD

Observe all fire prevention regulations. Comply with all local fire regulations issued by the Base Fire Chief. Dispose of flammable materials (rags, used chemicals, etc.) in the proper manner using safety containers.

UNAUTHORIZED PERSONNEL

Do not allow visitors, spectators, or unauthorized personnel to enter the work area.

PROTECTIVE CLOTHING AND EQUIPMENT

Even if not specified in a procedure, always wear protective clothing, goggles, gloves, respirators, hearing protectors, etc., when in doubt about the safety of a job procedure.

TOOLS, EQUIPMENT, AND WORKSTANDS

Always use the correct tools and equipment for the job. Use workstands for climbing and reaching high places.

SAFETY SUMMARY - CONT

LIST OF WARNINGS AND CAUTIONS

The following warnings and cautions appear in the text in this manual, and are repeated here for emphasis.

WARNING

If fueling/defueling procedures are not accomplished in accordance with T.O. 1A-7D-2-1, a correct indication of usable fuel remaining may not be obtained when the fuel low light comes on (page 1-12).

WARNING

Fire or explosion may occur causing injury to personnel and damage to equipment if improper ground is used. Ensure that airplane, fueling equipment, and fueling nozzle are properly grounded (T.O. 1A-7D-2-1).

Observe fuel servicing precautions listed in T.O. 1A-7D-2-1 (page 1-16, 6-13).

WARNING

Observe all safety precautions given in T.O. 1-1-3.

Once a fuel tank is opened, a continuous air purge shall be maintained until all baffles are removed to ensure a firesafe and healthsafe condition. To prevent contamination and reduce fire hazard, removed baffles must be stored in clean polyethylene or canvas bags. Remove baffles from the repair area. For extended storage, the baffles should be dry of fuel. This prevents fuel vapors from forming an explosive hazard or a nauseating environment. Drying of the baffles may be achieved by static exposure to air in a dust- and dirt-free area or by blowing warm air through the baffles. To reduce possibility of static electricity building up, remove baffles slowly from fuel tank (page 1-18, 1-108).

WARNING

Conductivity of MIL-F-38299 purge fluid or JP-5 shall be 100 to 700 conductivity units (CU), to prevent possible fuel tank fires from electrostatic buildup during purging (page 1-18).

WARNING

The external electrical power source and airplane battery shall remain disconnected while fuel tank is open (page 1-19).

SAFETY SUMMARY - CONT

WARNING

To prevent possible fire or explosion, bond blower duct to airplane prior to starting blower (page 1-20, 1-22).

WARNING

To prevent possible fire or explosion, use only equipment approved in T.O. 1-1-3 for purging (page 1-20, 1-22).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance (page 1-24, 1-26, 1-41, 1-43, 1-50, 1-59, 1-68, 1-77, 1-80, 1-92.1, 1-105, 1-114, 1-116, 1-119, 1-120, 1-121, 1-122, 1-123, 1-126, 1-131, 1-132, 1-133, 1-134, 1-136, 2-18, 2-20, 2-24, 2-26, 2-28, 2-30, 4-10, 5-45, 5-50, 5-53, 5-55, 5-60, 5-63, 6-18, FP-3, FP-5).

WARNING

To prevent vapors from creating an explosive hazard or a nauseating environment, the foam baffles must be dry of fuel before installation (page 1-113).

WARNING

To prevent hot airflow burns, wear asbestos gloves and use small cloth flags to check for bleed air leaks (page 1-116).

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames (page 1-126, 2-24, 2-26, 5-28, 5-34, 5-38, 5-42, 5-49, 5-50, 5-55, 5-58, 5-62, 5-63).

SAFETY SUMMARY - CONT

WARNING

Fluid in fuel boost pump motor filter will be hot if system has been in operation. Escaping fluid may injure personnel (page 1-141, 1-143).

WARNING

To prevent possible injury to personnel or equipment damage, leave protective covers installed on test cable connectors not used in test setups (page 2-13, 5-9).

WARNING

To prevent injury to personnel and/or equipment damage, ensure area around air refueling receptacle door is clear before operation (page 4-10, 6-11, 6-15, 6-16, 6-19, 6-23, 6-26, 6-27, 6-30, 6-31, 6-35, 6-39).

WARNING

Trichlorotrifluoroethane is toxic to respiratory tract. Use only in a well ventilated area. Avoid prolonged breathing of vapors. Breathing vapors can be fatal. Eye protection (goggles/faceshield) is required. Avoid skin contact. Keep away from open flame or hot surfaces (page 5-8).

SAFETY SUMMARY - CONT

WARNING

Do not use a standard megger to perform insulation resistance checks on tank probes or associated circuitry. To do so may result in insulation and/or dielectric breakdown. The voltage output of the megger is sufficient to produce heat or an arc which could result in fire or an explosion. The megohmmeter section of the GTF-6 or TF-20-1 test set should be used to perform insulation resistance checks (page 5-28, 5-34, 5-38, 5-42).

WARNING

To prevent spilled fuel and reduce fire hazard when troubleshooting a fueled airplane, defuel airplane (T.O. 1A-7D-2-1) before performing repairs inside any fuel tank (page 5-28, 5-34, 5-38, 5-42).

WARNING

Failure to ground the TF-20-1 or GTF-6 fuel quantity gage test set to both aircraft and earth ground could result in damaged airplane and personnel injury (page 5-28, 5-34, 5-38, 5-42, 5-71, 5-77).

WARNING

P-D-680, Type II solvent is readily combustible and toxic to skin, eyes, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames (page 5-59).

WARNING

Ensure air refueling test nozzle is restrained before pressing disconnect switch and before fueling airplane (page 6-11).

WARNING

The receptacle main seal is seated against the poppet under spring tension. To prevent personnel injury and damage to the seating surface of the seal, the replacement procedure should be carefully observed (page 6-19).

SAFETY SUMMARY - CONT

WARNING

Receptacle door will close when hydraulic power is applied. To prevent injury to personnel or equipment damage, ensure area around door is clear before operation (page 6-34).

CAUTION

Complete fueling of airplane with a faulty float valve or pressure shutoff valve will result in large fuel spillage from vent mast and possible fuel tank bladder damage (page 1-17).

CAUTION

To prevent possible damage to battery charger, open CB401 and CB402 before disconnecting battery. Always disconnect both battery cables (page 1-19).

CAUTION

Do not drain oil purging fluid into storage tank containing unused or refined fluid (page 1-20).

CAUTION

To prevent tank damage, remove lower fuel vent tube before removing access panel from tank (page 1-41).

CAUTION

To prevent damage to tank, be careful when installing tank components (page 1-34, 1-51, 1-69, 1-94).

CAUTION

To prevent clamps from shorting to transmitter, check that insulators under fuel tank transmitter clamps are properly aligned (page 1-37, 1-72, 5-49, 5-50).

CAUTION

To avoid damage to sump tank, do not allow access to drop to bottom of tank when final bolt is removed (page 1-50).

CAUTION

To prevent scoring of inner sealing surfaces of tank adapter, be careful not to bind adapters on bolts (page 1-65).

SAFETY SUMMARY - CONT

CAUTION

To avoid damage to compensator insulators, do not overtighten nuts on mounting studs (page 1-72, 5-53).

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel (5213-1) (page 1-77, 1-132, 2-16, 2-28, 2-30, 2-34, 2-36, 2-38).

CAUTION

Cotton gloves should not be worn when handling fuel tank baffles. The lint produced by cotton material will contaminate the foam (page 1-108).

CAUTION

Correct positioning and total installation of baffles in fuel tanks is extremely important to maintain required clearances around fuel components and prevent static charge generation (page 1-113).

CAUTION

To ensure proper operation of system, flow arrow on fueling pressure shutoff valve shall point aft when valve is installed in airplane (page 1-122).

CAUTION

To prevent possible interference with landing gear tire, install fuselage defuel check valve forward coupling with female half of coupling forward (page 1-123).

CAUTION

To prevent damage to controlex unit, observe controlex handling precautions (T.O. 1A-7D-2-1) during removal and installation of control (page 1-127, 2-32, 6-28).

CAUTION

To prevent damage to push-pull control, do not use force when removing from airplane (page 1-127).

SAFETY SUMMARY - CONT

CAUTION

To prevent chafing of the manual fuel shutoff push-pull control on the aft wing attach casting, ensure that the assembly is routed through the fiberglass tubing at fuselage station 480.0 (page 1-129, 2-32).

CAUTION

Do not allow push-pull control assembly to turn when adjusting rod end or tightening checknuts (page 1-130).

CAUTION

To prevent chafing of fuel boost pump fuel tube against PC 3 vent line, ensure clamps are installed back to back in area where chafing would occur (page 1-138).

CAUTION

To prevent damage to brazed fitting or tubing, jamnut on fitting must be loosened before fitting is loosened (page 1-138, 1-141, 1-143).

CAUTION

To ensure that the valve is in the full-open position, depress spring lock when placing the manual shutoff handle in the open position (page 1-140).

CAUTION

Be careful not to damage retaining ring on fuel boost pump drive shaft (page 1-141).

CAUTION

Fuel management panel mounting screws incorporate a captive feature. Loosen and engage all screws in sequence, no more than three turns at a time. More than three turns of screws will damage the captive feature or panel components (page 1-144, 3-6.1, 5-60).

CAUTION

To prevent rotation of push-pull control assembly, use wrench flats for backup when adjusting rod end and tightening checknuts (page 2-36).

SAFETY SUMMARY - CONT

CAUTION

Lockwire on alternate fuel feed switch must be flat against the inside of the lever housing to prevent interference with lever movements (page 2-38).

CAUTION

Failure to comply with fuselage leak check procedures could result in catastrophic damage to the aircraft (page 3-6).

CAUTION

To ensure proper operation, vent line check valve must be correctly positioned during installation (page 3-8, 3-10).

CAUTION

Do not use C-clamp to actuate gear up-and-locked switch. Excessive pressure will damage switch. An MS21919 clamp, or equivalent, hand formed to provide sufficient pressure, can be used to actuate switch (page 4-9, 4-12).

CAUTION

To prevent the inadvertent entrance of foreign objects into the fuel tanks, all fuel tank accesses should be securely covered immediately after probe is removed (page 5-58).

CAUTION

Do not handle receptacle slipway lamp with bare fingers after cleaning. Lamp will not operate normally if contaminated (page 6-28).

CAUTION

Do not force push-pull control when removing from airplane (page 6-30).

CAUTION

Clamps are used for support of push-pull control only. Control housing must be free to move through clamps. Incorrect clamping may restrict slider travel (page 6-30).

CAUTION

Locking arm in receptacle control linkage is spring loaded (page 6-33).

SECTION I

MAIN FUEL SYSTEM

1-1. DESCRIPTION. The main fuel system stores and transfers the airplane fuel supply. System capabilities are ground fueling and defueling, inflight refueling, or dumping. The main fuel system containers are a wing integral tank, two forward fuselage tanks, two midfuselage tanks, an aft fuselage tank, and a main sump tank. Polyurethane foam baffles are installed in all internal fuel tanks to reduce the threat of fire and/or explosion if hit by a projectile. The sump tank and the lower portion of the aft tank are self-sealing. For system controls and indicators, see figure 1-1. For system arrangement, see figure 1-2. For fuel tank location and capacities, see figure 1-3.

1-1.1. System Components. The main fuel system consists of precheck and float valves (primary and secondary), fueling pressure shutoff valve, pressure fueling manifold adapter, and wing and fuselage defueling check valves; also fuel boost pump, flexible fuselage tanks, integral wing tank, and internal components of tanks. See figure FO-1 for fuel system schematic.

1-1.2. Fuel Pressure/Transfer. Main fuel system pressure is supplied by three fuel pumps: (1) the fuel boost pump; (2) the low-pressure fuel pump; and (3) the high-pressure fuel pump. The low- and high-pressure pumps are engine-mounted and -driven. The fuel boost pump is airframe-mounted and driven by a hydraulic motor. An automatic transfer system, requiring a minimum amount of attention from the pilot, is an integral part of the system. Ejector pumps with no movable parts are used in fuel transfer functions.

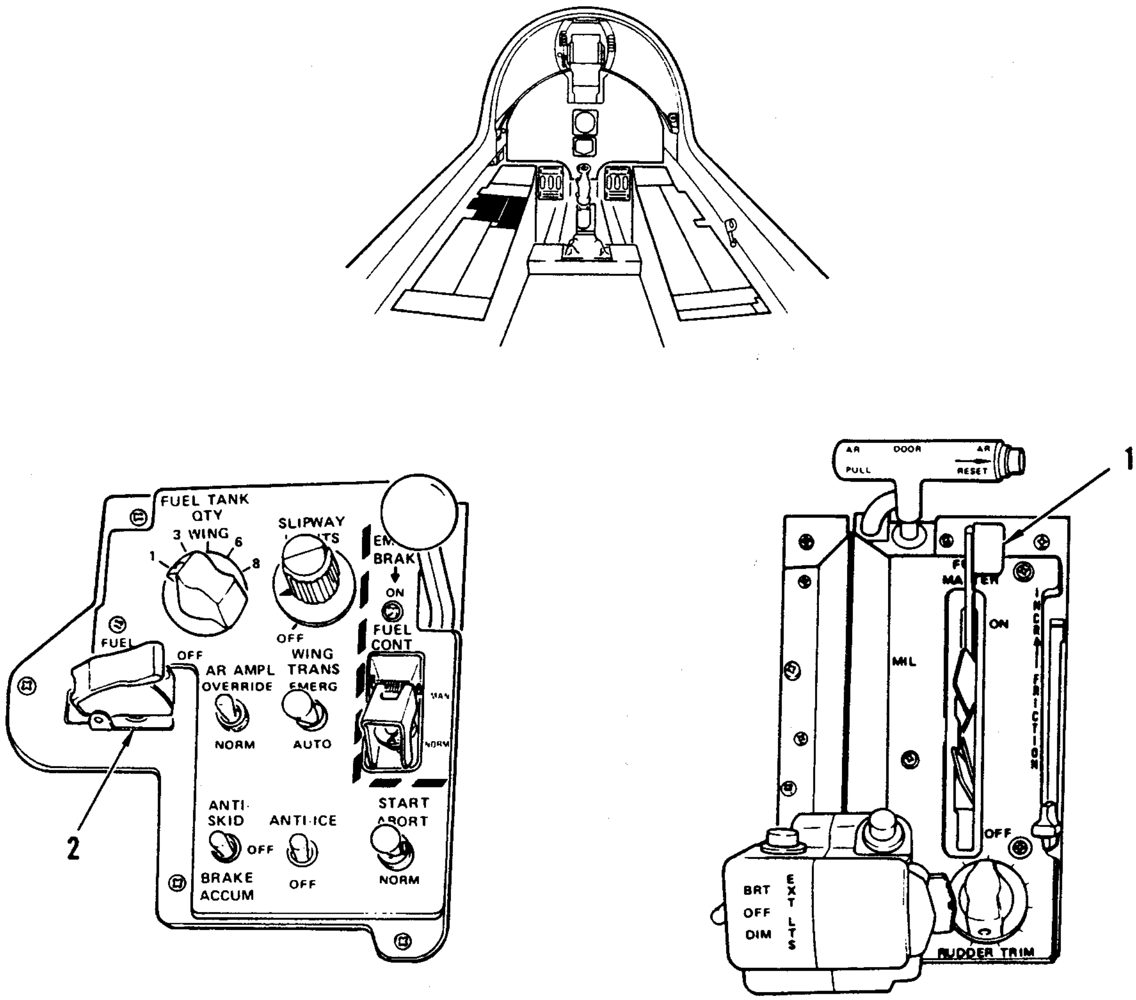
1-2. OPERATION. Operation of the main fuel system is limited to ground fueling, engine fuel feed, ground defueling, and fuel dumping in flight. The airplane is normally fueled on the ground through a single-point pressure fueling system; however, there are provisions for gravity fueling when pressure fueling facilities are not available.

1-2.1. Ground Fueling. (Figure FO-1.)

1-2.1.1. Normal Single-Point Servicing. Single-point fuel servicing is accomplished through the pressure fueling manifold in the left main gear well. After passing through a dual-seat fueling pressure shutoff valve, fuel flows simultaneously into the left and right forward fuselage tanks; then it flows to the left and right midfuselage tanks and into the aft fuselage tank. Fuel then flows by gravity directly into the fuselage sump tank from the forward fuselage and midfuselage tanks, and indirectly from the aft fuselage tanks. Thus, complete fueling is simultaneous. Fuel flows into the wing integral tank through lines from both forward and aft fuselage tanks. After the wing tank has filled to capacity, either the primary or secondary float valve in the wing tank will actuate and stop fuel flow by routing fuel sensing pressure to close the fueling pressure shutoff valve.

1-2.1.2. Partial Single-Point Servicing. Partial fuel servicing is accomplished in the same manner as normal single-point servicing, except that external electrical power must be connected in order to monitor the fuel quantity indicator in the cockpit. When the desired fuel level is reached, fuel flow may be stopped by actuating either of the precheck valves in the left main gear well and then shutting off flow from the fueling facility.

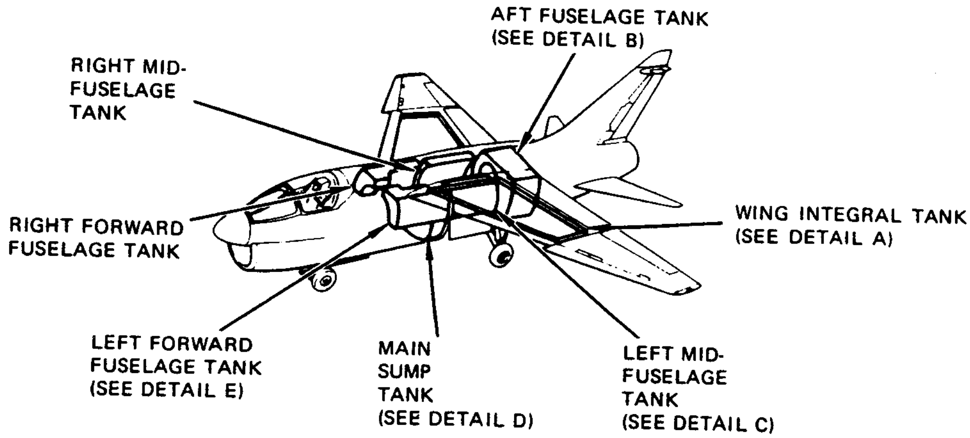
1-2.1.3. Gravity Servicing. (Figure 1-4.) The fuel system may be serviced through a fueling receptacle on top of the aft fuselage tank and a fueling receptacle on top of the wing center section. The fueling receptacles may be used simultaneously. The fuselage fueling receptacle cap has a lanyard attached. The opposite end of the lanyard is attached to a manual override check valve located on the forward bulkhead inside the aft tank. When the cap is removed from the receptacle, fuel may be serviced into the aft fuselage tank only. Pulling on the cap and keeping tension on the lanyard by

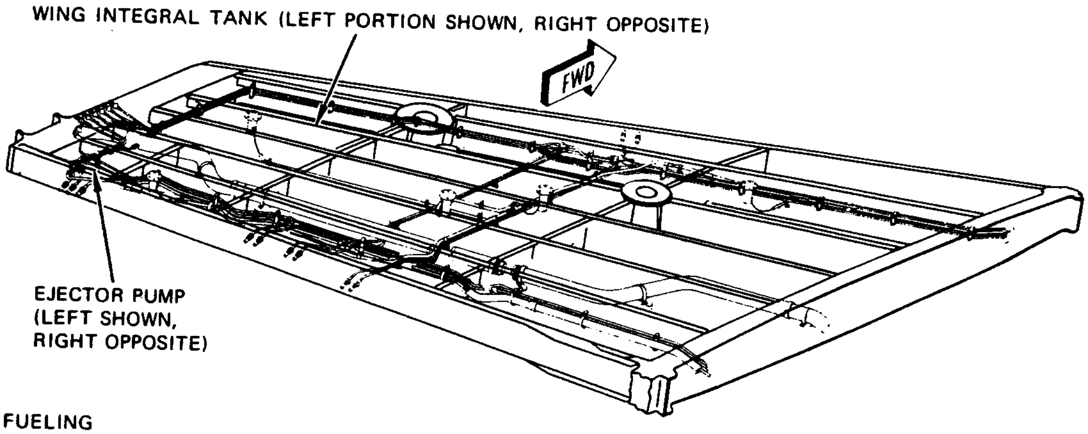


INDEX NO.	CONTROL/INDICATOR	FUNCTION
1.	Master fuel control lever (FUEL MASTER)	ON – opens manual fuel shutoff valve in engine and jet fuel starter fuel feed lines to allow normal fuel flow; closes switch in starting circuit to permit engine cranking. OFF – closes manual fuel shutoff valve to stop fuel flow through the engine fuel feed line; opens switch in starting circuit to stop or prevent cranking.
2.	Fuel dump switch (FUEL DUMP)	FUEL DUMP – opens dump valves and dumps wing tank fuel through ports located on each side of the wing trailing edge between the flap and aileron. OFF – closes dump valves to stop fuel dumping.

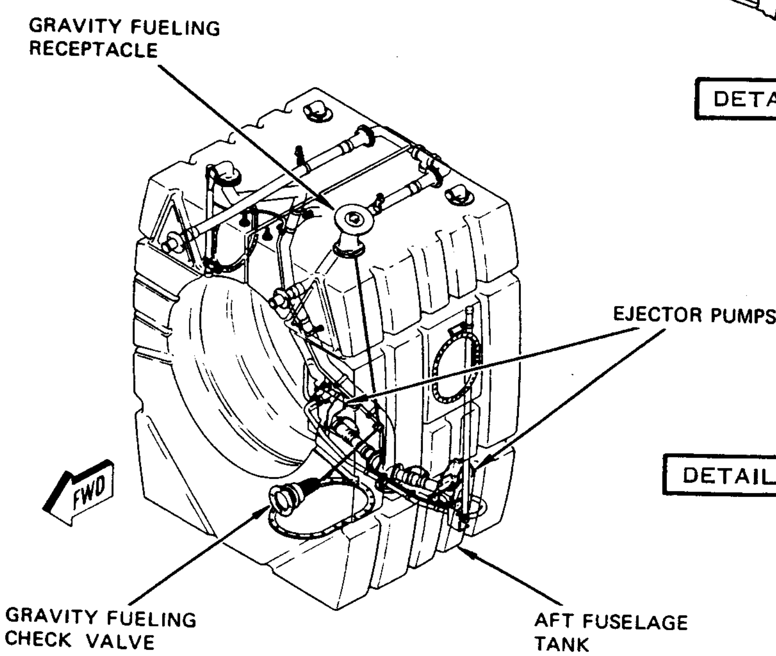
06D001–09–85

Figure 1-1. Controls and Indicators; Main Fuel System





DETAIL A



DETAIL B

06D002-01-09-85

Figure 1-2. System Arrangement; Main Fuel (Sheet 1 of 7)

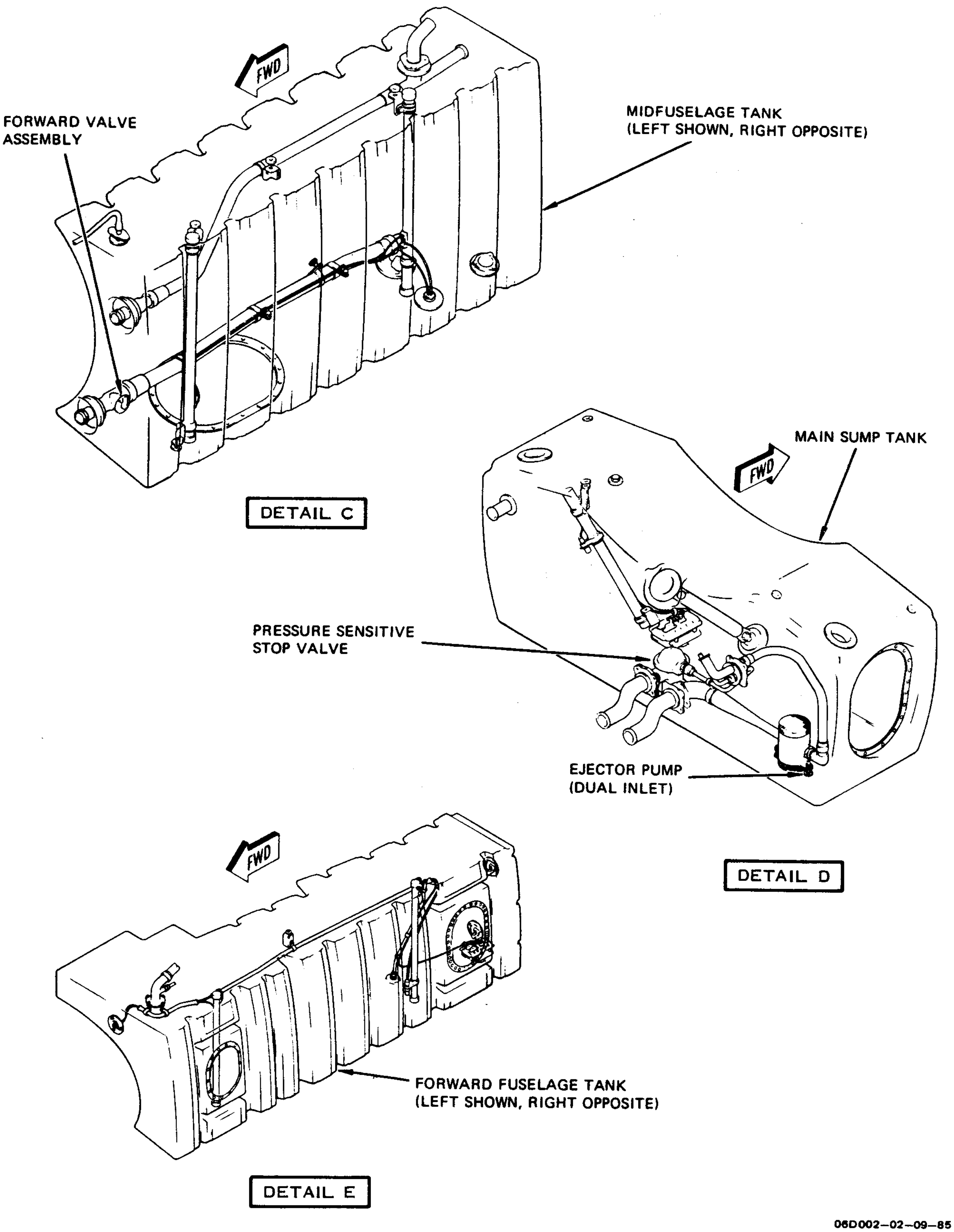
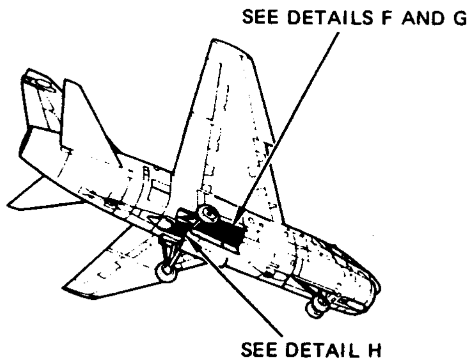
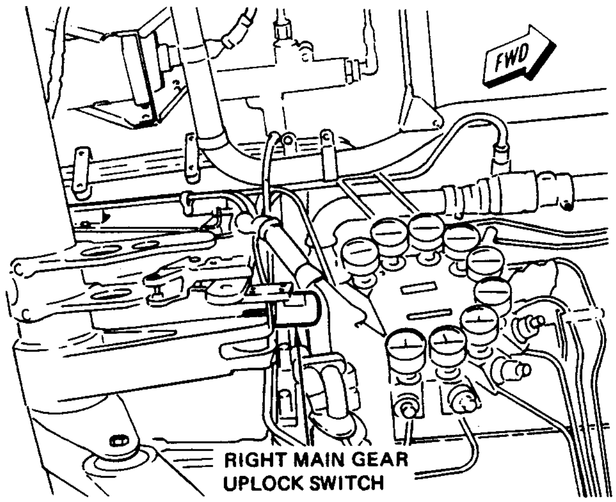


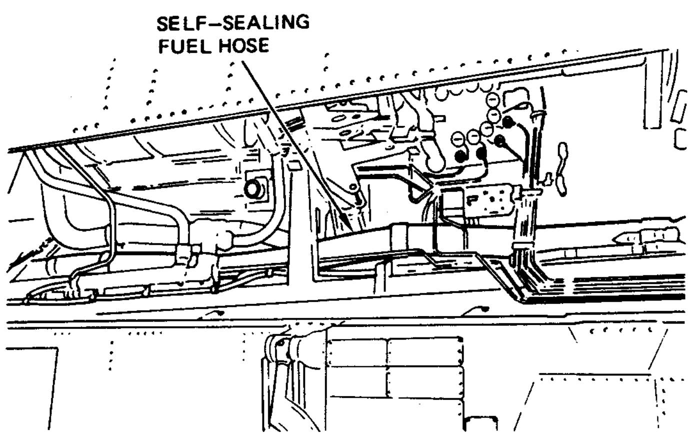
Figure 1-2. System Arrangement; Main Fuel (Sheet 2)





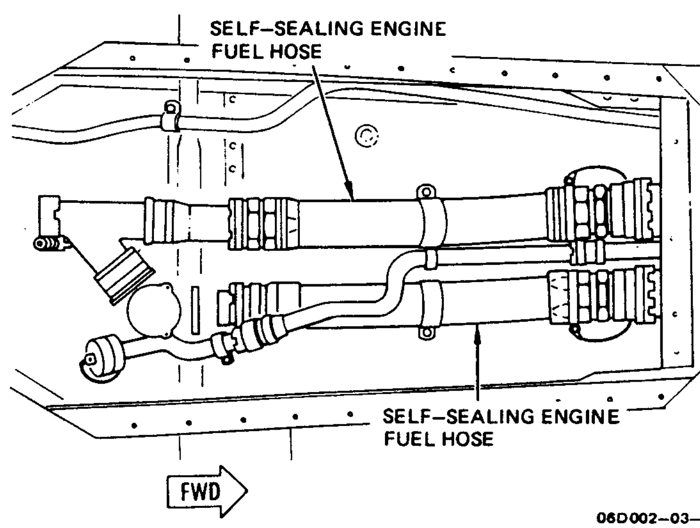
DETAIL F

(RIGHT MAIN GEAR WELL)



DETAIL G

(RIGHT MAIN GEAR WELL)

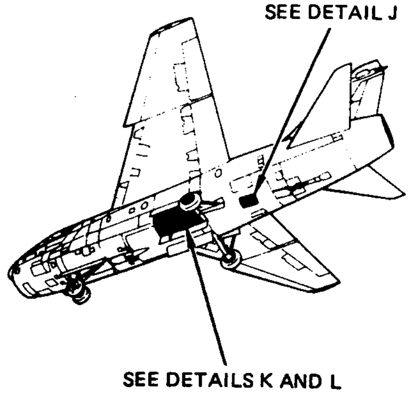


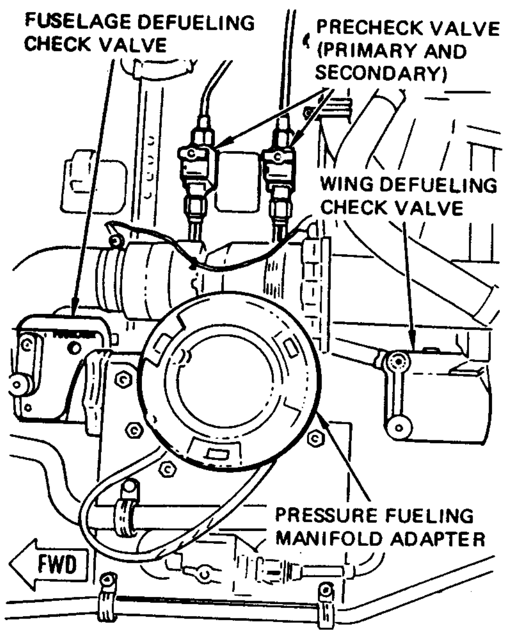
DETAIL H

(ACCESS 5213-3)

06D002-03-09-85

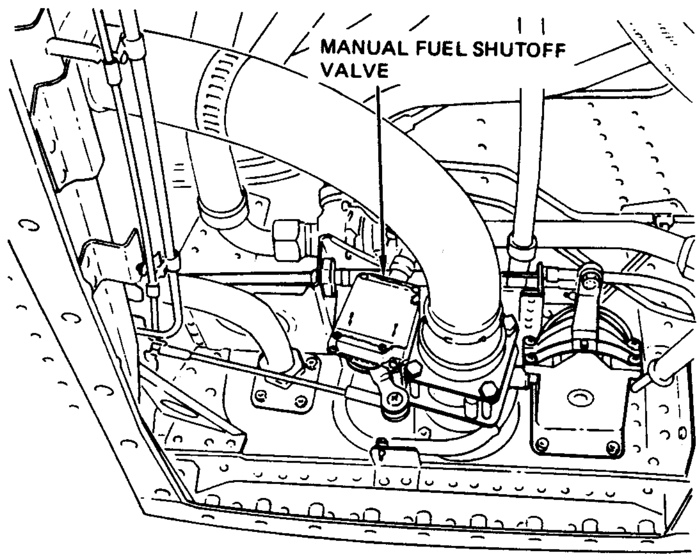
Figure 1-2. System Arrangement; Main Fuel (Sheet 3)





DETAIL K

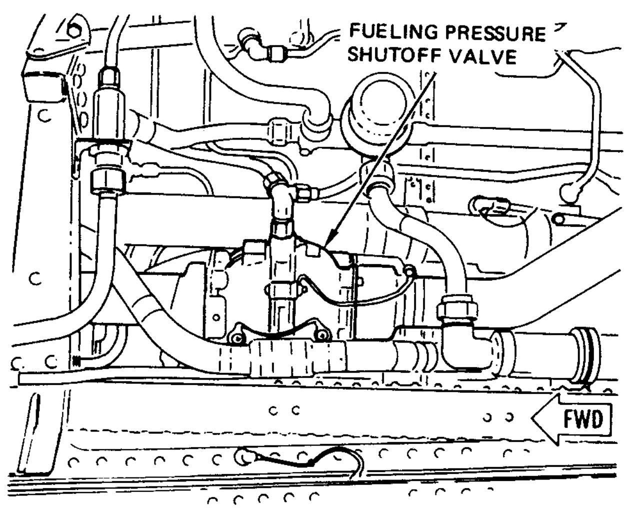
(LEFT MAIN GEAR WELL)



DETAIL J

(ACCESS 5223–1)

VIEW LOOKING UP AND FWD



DETAIL L

(LEFT MAIN GEAR WELL)

06D002–04–09–85

Figure 1-2. System Arrangement; Main Fuel (Sheet 4)

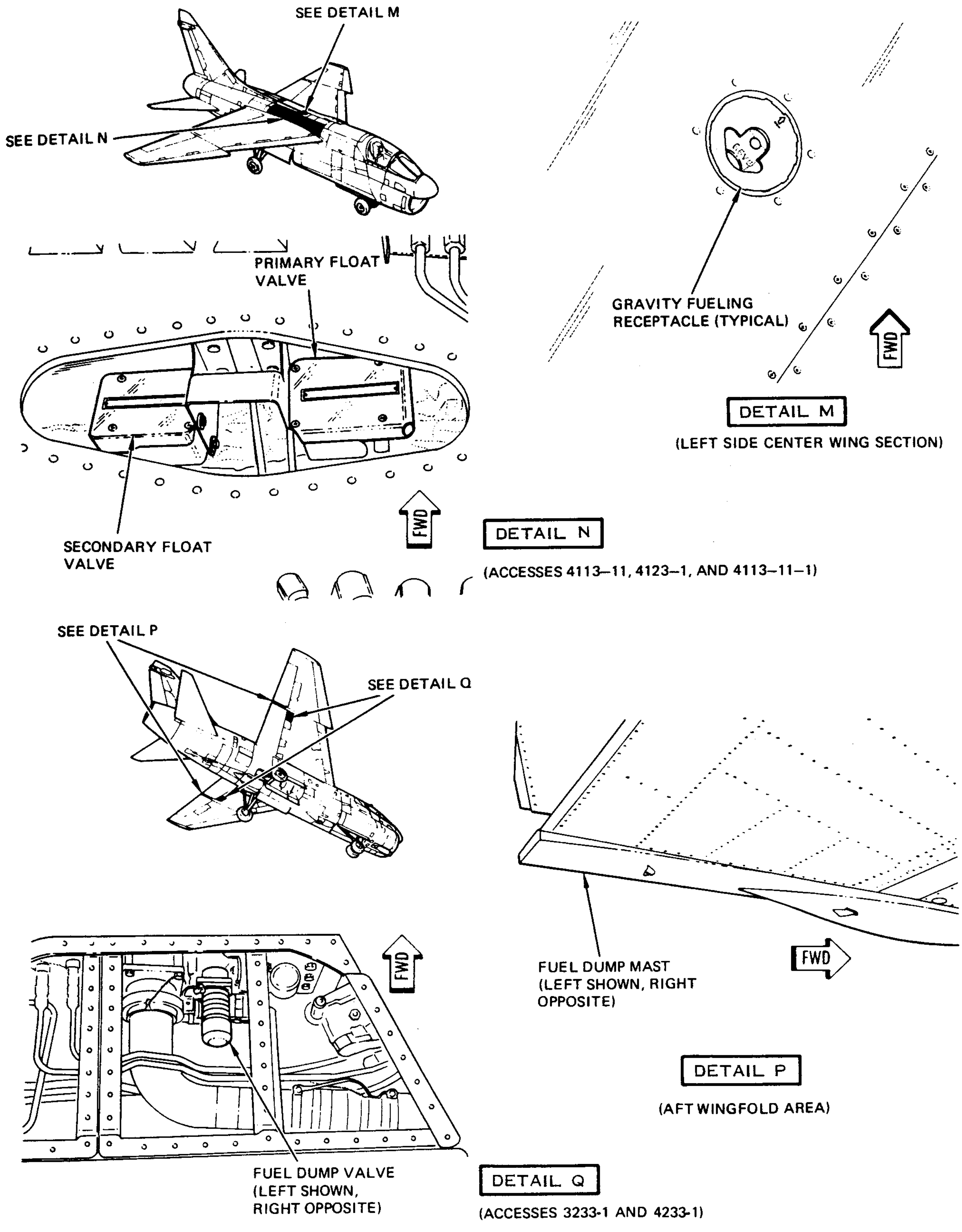
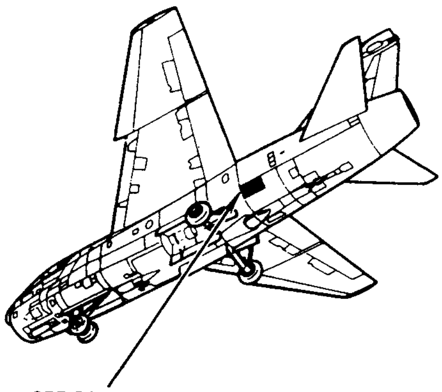
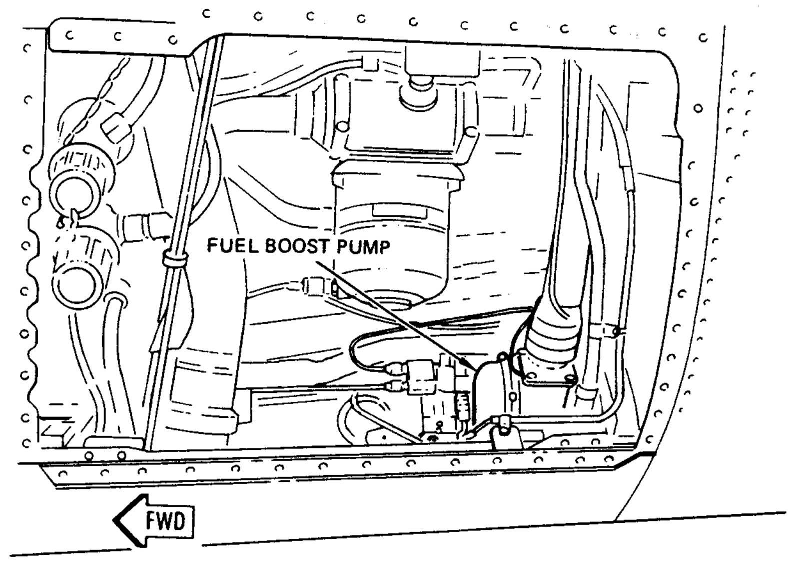
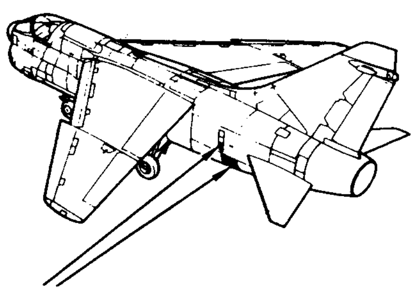


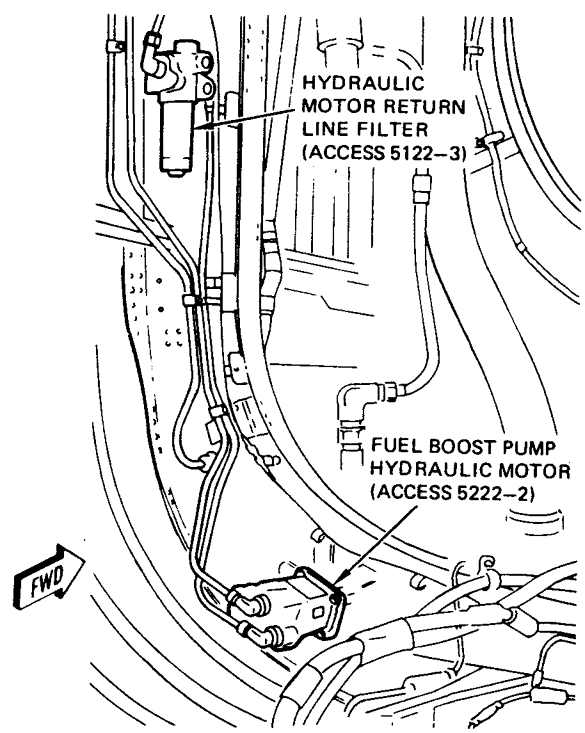
Figure 1-2. System Arrangement; Main Fuel (Sheet 5)





DETAIL R
(ACCESS 5222-1)





DETAIL S

06D002–06–09–85

Figure 1-2. System Arrangement; Main Fuel (Sheet 6)

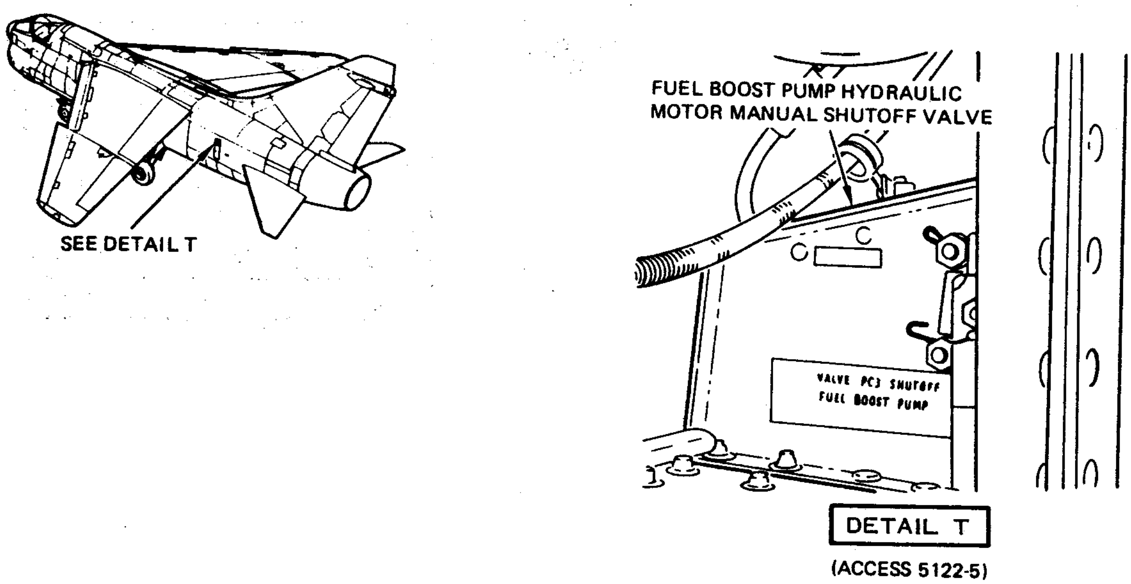
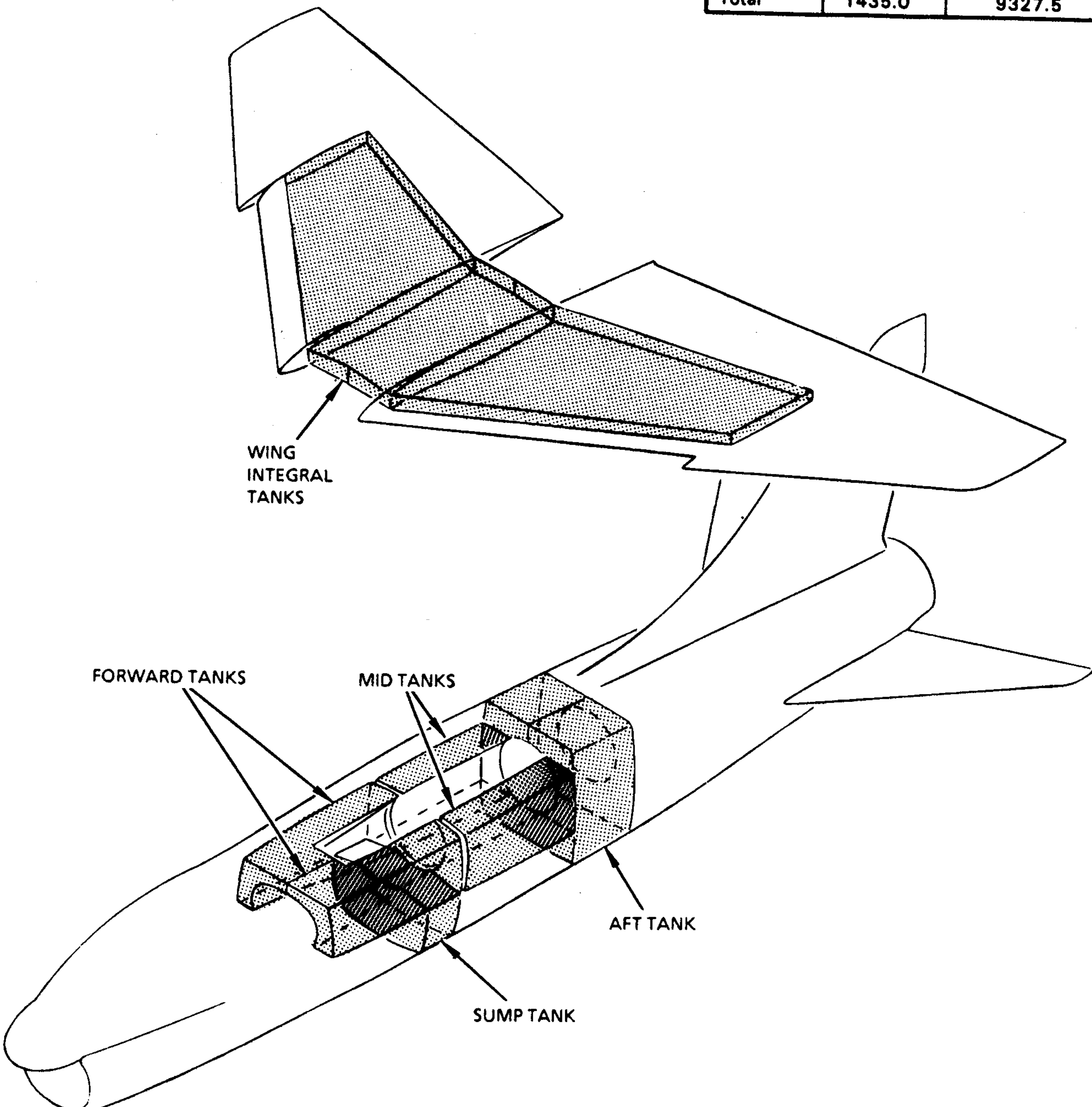


Figure 1-2. System Arrangement; Main Fuel (Sheet 7)

TANK CAPACITIES
USABLE FUEL – GROUND ATTITUDE (6° NOSE UP)

Tank	Gallons	Pounds (JP-4, 6.5 lbs/gal.)
Right fwd	87.0	565.5
Left fwd	87.0	565.5
Right mid	73.5	477.75
Left mid	73.5	477.75
Aft	313.5	2037.75
Sump	77.0	500.5
Wing	723.5	4702.75
Total	1435.0	9327.5



06D003-02-89

Figure 1-3. Locations and Capacities; Fuel Tank

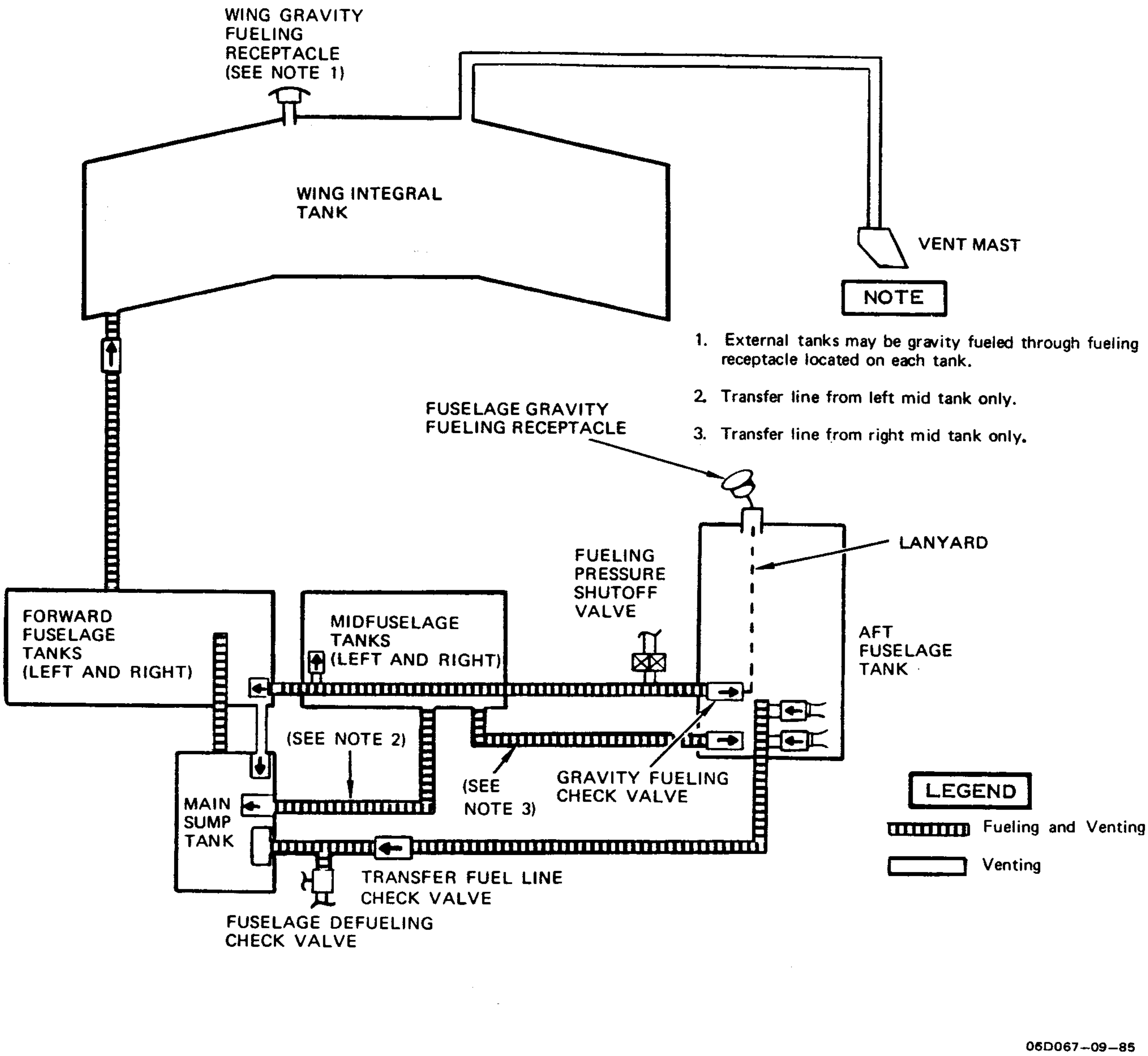


Figure 1-4. Schematic Diagram; Gravity Servicing

placing it in a keeper inside the filler neck while refueling will permit fuel to flow through the check valve to the right and left forward and midfuselage tanks, where it drains to the sump tank. During gravity servicing, care should be taken to avoid underfilling the fuselage tanks, because fuel enters the aft tank more rapidly than it drains from this tank into the other fuselage tanks. Wing tank fueling is accomplished through the wing fueling receptacle. Electrical power is not required for gravity servicing, except when necessary to monitor fuel quantity on the cockpit indicator during partial servicing. Care must be taken to avoid overfilling the wing tank. Air space for system venting must be provided.

1-2.2. **Engine Fuel Feed.** (Figure FO-1.) Cranking the engine for starting initiates operation of the engine fuel feed system by driving the boost, low-pressure, and high-pressure fuel pumps. A portion of the fuel from the low-pressure pump flows directly to the inlet of the ejector pump in the main sump tank. Another portion of the fuel flows through a fuel-cooled oil cooler to the three fuel transfer selector valves. This fuel provides motive flow for the other ejector pumps inside the wing and aft tanks. The ejector pumps have no moving parts and operate on the venturi principle. That is, within the pump the fuel flows rapidly from a jet nozzle across a screened opening that leads to the fuel tank, causing a pressure differential that draws fuel from the tank. This combined fuel flow is forced by the jet stream into a fuel line. The fuel routed to the selector valves is directed to ejector pumps in either the wing tank or aft fuselage tank, as a normal function of the fuel transfer system. The main sump tank ejector pump supplies fuel and maintains a positive inlet pressure to the engine fuel boost pump for use in the engine fuel system.

1-2.3. **Fuel Dumping.** (Figure 1-5.) When the airplane is in flight, all fuel in the wing integral tank may be dumped through the two wing dump masts by placing the fuel dump switch on the left console in FUEL DUMP. Also, all fuel in external tanks may be indirectly dumped by transfer to the wing tank. The switch supplies 28 volts dc from the primary dc bus through circuit breaker CB3148 to open two motor-operated dump valves, one on the aft outboard end of each wing main beam. This allows fuel to gravity flow through the two dump masts at the trailing edge of the wing. The fuel dump switch should be placed in OFF after the wing tank fuel has been dumped.

1-2.4. **Defueling Internal Fuel.** Internal fuel is removed by connecting a defueling nozzle adapter and suction pump to the pressure fueling manifold in the left main gear well. Suction applied to the manifold removes fuel through the wing or fuselage defueling check valves, which are manually opened and closed to select the wing or fuselage tanks. The wing tank is normally defueled before the fuselage tanks when complete defueling is required. If airplane is defueled using only a suction pump, approximately 60 gallons will be trapped in the aft tank. This fuel can be removed by connecting an adapter hose to the aft tank quick-disconnect and defueled with a suction pump. For faster defueling, motive flow pressure can be applied through an adapter hose connected into the transfer system. Using motive flow, all aft tank fuel is transferred to the sump tank where it can be removed by the defueling pump. Refer to T.O. 1A-7D-2-1 for complete defueling procedures.

WARNING

If fueling/defueling procedures are not accomplished in accordance with T.O. 1A-7D-2-1, a correct indication of usable fuel remaining may not be obtained when the fuel low light comes on.

1-3. COMPONENTS.

For a list of system components, their locations (accesses), and functions, refer to table 1-1.

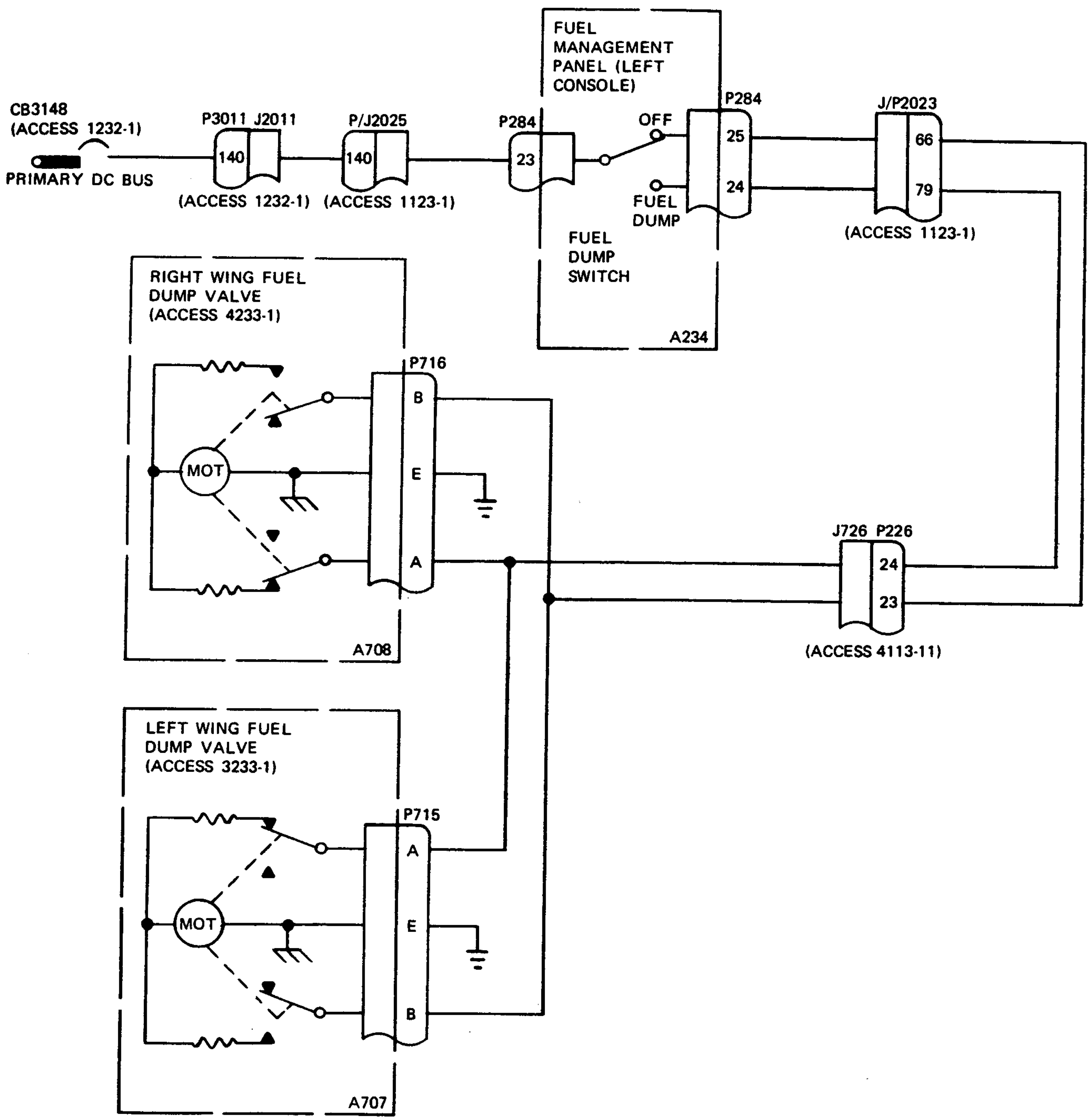


Figure 1-5. Schematic Diagram; Fuel Dump System Electrical

Table 1-1. Main Fuel System Components

Component	Access	Function
Adapter, pressure fueling manifold	Left main gear well	Provides quick connection for single-point fueling/defueling.
Baffles, tank	Wing and fuselage fuel tanks	Reduces threat of fire and/or explosion should fuel tank receive combat or crash damage.
Circuit breaker, CB3148	1232-1	Connects 28 volts dc to fuel dump switch.
Filter, fuel boost pump hydraulic motor return line	5122-3	Filters hydraulic fluid for fuel boost pump motor.
Fuel hose, self-sealing	5213-3	Routes fuel from aft tank to sump tank.
Fuel hose, self-sealing	Right main gear well	Routes fuel from sump tank to engine.
Fuel hose, self-sealing	5213-3	Routes fuel from sump tank to engine.
Lever, master fuel control	Throttle quadrant	Provides manual control for manual fuel shutoff valve.
Mast, fuel dump, left and right	Aft wingfold area	Routes dumped fuel overboard.
Motor, fuel boost pump hydraulic	5222-2	Drives fuel boost pump.
Pump, fuel boost	5222-1	With engine running, provides fuel pressure to the engine fuel pump.
Receptacle, fuselage gravity fueling	Fuselage midsection top-aft	Provides fuselage point for gravity fueling of fuselage tanks.
Receptacle, wing gravity fueling	Wing center section	Provides point for gravity fueling of wing tank.
Switch, fuel dump	Left console	When actuated, opens shutoff valves to dump wing fuel.
Switch, right main gear uplock	Right main gear well	Prevents pressurization of external tanks when the right main gear is not up and locked.
Tank, aft fuselage	5213-3	Stores fuel for airplane use. Lower portion (approximately 120 gallons) of tank is self-sealing. Contains fuel transfer control thermistor No. 2.

Table 1-1. Main Fuel System Components – CONT

Component	Access	Function
Tank, forward fuselage (left and right)	1133-1, -2 and 2133-1, -2	Stores fuel for airplane use. Left tank contains low fuel level thermistor No. 3. Right tank contains fuel transfer control thermistor No. 1.
Tank, midfuselage (left and right)	5211-1 and 6211-1	Stores fuel for airplane use.
Tank, sump	2232-2	Stores fuel for airplane use. Tank is self-sealing.
Tank, wing integral	Wing center section	Stores fuel for airplane use.
Valve, check, fuselage defueling	Left main gear well	Opened manually to permit defueling of fuselage tanks.
Valve, check, wing defueling	Left main gear well	Opened manually to permit defueling of wing and/or external tanks.
Valve, float (primary and secondary)	4113-11, 4123-1, and 4113-11-1	Shuts off fuel flow in sensing line to close fueling pressure shutoff valve when wing tank is full or during precheck.
Valve, fuel boost pump hydraulic motor manual shutoff	5122-5	Shuts off hydraulic pressure to hydraulic motor to allow application of external hydraulic power to PC No. 3 system without operating fuel boost pump.
Valve, fuel dump, left and right	3233-1 and 4233-1	Opens to permit dumping of wing tank fuel.
Valve, fueling pressure shut-off	Left main gear well	Provides automatic fuel shutoff in pressure fueling system lines to fuselage and wing during ground pressure fueling, air refueling, and external fuel transfer.
Valve, gravity fueling check	Aft fuselage tank	Opens (by lanyard connection) when gravity fueling cap is opened, permitting other fuselage tanks to fill.
Valve, manual fuel shutoff	5223-2	Closed manually (by control lever on throttle quadrant) to shut off fuel supply to engine.

Table 1-1. Main Fuel System Components - CONT

Component	Access	Function
Valve, precheck (primary and secondary)	Left main gear well	Permits operational check of wing tank float valves and fueling pressure shutoff valve during fueling.
Valve, stop, pressure sensitive	Sump tank	Protects sump tank from excessive fuel pressure surges that may be encountered during high g maneuvers. Gradually closes at 8 to 13 psi above atmospheric pressure.

1-4. OPERATIONAL CHECKOUT.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for defueling and fueling airplane		Defuel and fuel airplane during operational checkout
	Equipment required for connecting external electrical power		Supply power for checkout
	Power-driven rotary compressor	MC-2A	Provide external air for system pressure
	Ground air adapter set	215-00225-1	Connect external air pressure to vent mast cover
	Vent mast cover assembly	216-00203-1	Connect to fuel vent mast to check fuel dump operation

WARNING

Fire or explosion may occur causing injury to personnel and damage to equipment if improper ground is used. Ensure that airplane, fueling equipment, and fueling nozzle are properly grounded (T.O. 1A-7D-2-1).

Observe fuel servicing precautions listed in T.O. 1A-7D-2-1.

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in figure FO-2.

a. Defuel wing tank (T.O. 1A-7D-2-1).

b. Connect external electrical power (T.O. 1A-7D-2-1).

c. Remove four screws from vent mast, ensuring that hole pattern will mate with vent mast cover thumbscrews.

d. Install fuel vent mast cover on fuel vent mast.

e. Using ground air adapter, connect external air source to vent mast cover, and apply 4 psig to system.

f. Place fuel dump switch in FUEL DUMP, and hold hand at exit of fuel dump valves.

g. Check that air flows from dump valves and that air pressure indication drops on vent mast cover gage. {1}

h. Place fuel dump switch in OFF, and check that airflow at dump valves stops. {2}

i. Shut off air pressure, and disconnect external air source and ground air adapter.

j. Remove fuel vent mast cover, and install four screws in vent mast.

k. Place wing and fuselage defueling valves in NORMAL.

l. Remove fuselage gravity fueling cap; lift and place lanyard ball into groove to override check valve. Check that lanyard indicates an increased tension before being moved into position for inserting ball into groove. Release lanyard and install cap. {3, 4, and 5}

m. Connect fueling nozzle to fueling manifold, and start fuel flow to airplane. {6}

CAUTION

Complete fueling of airplane with a faulty float valve or pressure shutoff valve will result in large fuel spillage from vent mast and possible fuel tank bladder damage.

n. Place primary precheck valve in PRECHECK and hold. Check that fuel flow stops within 10 seconds after actuating valve. If fuel flow does not stop, discontinue servicing and isolate trouble. {7}

o. Repeat step n, using secondary precheck valve. If fuel flow does not stop, discontinue servicing and isolate trouble. {7}

p. After ensuring that fuselage tanks are full (monitor fuel quantity indicator), check that fuel does not drain from vent mast. {8}

q. Push press-to-test switch, and check cockpit fuel quantity indicator for proper operation. {9}

r. Shut down fuel flow at source, disconnect fueling nozzle, and install pressure fueling receptacle cap. {10}

s. Disconnect external electrical power (T.O. 1A-7D-2-1).

t. Move master fuel control lever from OFF to ON to OFF, and check for smooth operation. Check that detents fully engage lever in the on and off positions. {11}

u. Start engine (T.O. 1A-7D-2-1).

v. Check that fuel boost 1 caution light goes off. {12}

w. Shut down engine (T.O. 1A-7D-2-1).

1-5. TROUBLESHOOTING. See figure FO-2 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout. See figures 1-5 and FO-1 for troubleshooting schematics.

1-6. FUEL TANK PURGING.

WARNING

Observe all safety precautions given in T.O. 1-1-3.

Once a fuel tank is opened, a continuous air purge shall be maintained until all baffles are removed to ensure a firesafe and healthsafe condition. To prevent contamination and reduce fire hazard, removed baffles must be stored in clean polyethylene or canvas bags. Removed baffles from the repair area. For extended storage, the baffles should be dry of fuel. This prevents fuel vapors from forming an explosive hazard or a nauseating environment. Drying of the baffles may be achieved by static exposure to air in a dust- and dirt-free area or by blowing warm air through the baffles. To reduce possibility of static electricity building up, remove baffles slowly from fuel tank.

1-6.1. Methods. The three approved methods for purging fuel tanks are: oil, exhaust, and blow purge. Airplanes that require shelter for extensive maintenance shall be purged by any of the approved methods before moving airplane into shelter. Oil purge is the preferred purging method and shall be used unless liquid purge equipment is not available. The only approved fluids for the oil purge are MIL-F-38299 purging fluid or JP-5 fuel.

WARNING

Conductivity of MIL-F-38299 purge fluid or JP-5 shall be 100 to 700 conductivity units (CU), to prevent possible fuel tank fires from electrostatic buildup during purging.

1-6.2. Safety Precautions. The following applicable safety precautions shall be taken before and during purging operations.

a. Do not purge airplane when an electrical storm is in immediate vicinity.

b. Do not purge airplane containing ammunition or external stores.

c. Airplane shall be located a safe distance from all communications and electronic equipment capable of radiating radio frequency energy that might induce sparks and subsequent ignition of fuel vapors. Refer to T.O. 31Z-10-4 for establishing a safe distance between electronic systems and the purging area.

d. Personnel qualified by the Ground Safety Office or Chief of Maintenance shall certify fuel tank is safe before entry.

e. Do not perform maintenance on airplane other than purging operations until fuel tanks are purged and certified safe. After safety certification, maintenance may be accomplished provided electrical power is not required.

f. Portable breathing equipment shall be located close to airplane in the event of a respiratory failure.

NOTE

If the R-1 combustible gas indicator is being used, the healthsafe level shall be 5% of lower explosive limits (LEL), and the firesafe level shall be 20% of LEL.

g. Personnel entering a wetted fuel tank shall wear an air supply respirator full facepiece. Fuel tank entry with respirator shall not be made until a firesafe condition of 20% LEL or lower is indicated on type R-2 combustible gas indicator. Fuel tank entry without respirator shall not be made until a healthsafe level of 500 parts per million (PPM) or lower is indicated on the type R-2 indicator.

h. When entering a fuel tank, personnel shall work in pairs: one workman shall enter and the other shall remain outside as a safety guard. Both the safety guard and workman entering the tank shall wear air supply respirators. One additional respirator shall be in reach of the safety guard in case of emergency.

i. Master fuel control lever shall be OFF and AF Form 1492 placed on fuel control panel.

j. Use only air-driven drill motors and nonsparking handtools.

k. Use only explosion-proof electrical equipment (T.O. 1-1-3).

l. Place soiled rags in safety containers equipped with flash arresters and static grounds.

m. Personnel working in fuel tanks must wear lint-free cotton coveralls and hair covering.

n. Care must be taken to prevent contact with fuel or exposure to vapor. Fuel fumes are highly toxic and are dangerous skin irritants.

o. Personnel must statically discharge themselves by contacting an approved static discharge plate before entering the tank.

p. Objects capable of generating static electricity (including clothing made of synthetic fiber) shall not be worn or carried by personnel entering purging area.

q. Personnel must remove all matches or cigarette lighters from their persons when working in purging area.

NOTE

The combustible gas indicator check is not necessary if blower operation is continued during work stoppage.

r. If repair operation is discontinued for any length of time, the blower must be operated for 10 minutes and a combustible gas indicator check made before personnel reentry into fuel tank.

s. Measuring instruments containing mercury (e.g., mercury manometers and thermometers) will not be used in conjunction with fuel tank maintenance.

1-6.3. Preparation. (T.O. 1-1-3.)

a. Locate airplane at least 50 feet from any building or smoking area. Rope off area 50 feet in all directions from airplane.

b. Clearly mark area from all angles with signs: DANGER, OPEN FUEL TANKS, UNAUTHORIZED PERSONNEL KEEP OUT.

c. For exhaust purging, place blower in a downwind position approximately 50 feet from airplane. For blow purging, place blower in an upwind position.

d. Position two fully charged 50-pound CO_2 fire extinguishers in purging area.

e. Ground the airplane and oil purge equipment as indicated for fueling/defueling procedures (T.O. 1A-7D-2-1).

f. Ground the blower.

g. Check that reinforcement coil of blower duct is bonded to the outer ring. If not, modify duct to complete this bond.

h. Ground all maintenance stands to an approved ground and to the airplane.

WARNING

The external electrical power source and airplane battery shall remain disconnected while fuel tank is open.

CAUTION

To prevent possible damage to battery charger, open CB401 and CB402 before disconnecting battery. Always disconnect both battery cables.

i. Tag external electrical power receptacle with AF Form 1492. Disconnect airplane battery, and tag battery cables with AF Form 1492.

j. Notify fire department before performing defueling and purging procedures.

k. If exhaust or blow purge is to be accomplished during windy and dusty weather, place cheesecloth or commercial grade fiberglass filters over open fuel tank accesses to prevent drawing of dust or debris into the fuel tank.

1-6.4. Oil Purging.

a. Observe safety precautions given in paragraph 1-6.2.

b. Prepare airplane for purging (paragraph 1-6.3).

c. Check that airplane is defueled and that trapped fuel (approximately 60 gallons) has been removed from aft tank (T.O. 1A-7D-2-1).

NOTE

Before starting purge, ensure adequate purging fluid is available and the flash point of fluid is 120 °F or above.

d. Connect oil purging fluid supply source to airplane fueling manifold, and fill tanks in accordance with normal fueling procedures (T.O. 1A-7D-2-1).

CAUTION

Do not drain oil purging fluid into storage tank containing unused or refined fluid.

e. Allow fluid to remain in fuel tanks at least 10 minutes; then drain tanks (including trapped fluid in aft tank) in accordance with normal defueling procedures (T.O. 1A-7D-2-1).

f. Remove one fuel tank access. Remove sufficient baffle material to perform a combustible gas test.

g. Check oil-purged tank with a combustible gas indicator for a firesafe reading of 20% LEL or lower.

h. If combustible gas indication is excessive, install removed tank access, and repeat steps d through g until a desired reading is obtained.

i. Open applicable access(es), and remove tank baffles (paragraph 1-18).

j. Remove residual purging fluid from tank by siphoning and wiping dry with lint-free cheesecloth or cellulose sponge.

WARNING

To prevent possible fire or explosion, bond blower duct to airplane prior to starting blower.

k. For extensive repairs, exhaust purge or blow purge tank (paragraph 1-6.5 or 1-6.6) until a healthsafe reading of 500 PPM or lower is indicated on the R-2 combustible gas indicator. When this condition is accomplished, fuel tank may be entered without using an air respirator.

l. A continuous air purge shall be maintained during fuel tank repairs.

1-6.5. Exhaust Purging. (Figure 1-6.)

WARNING

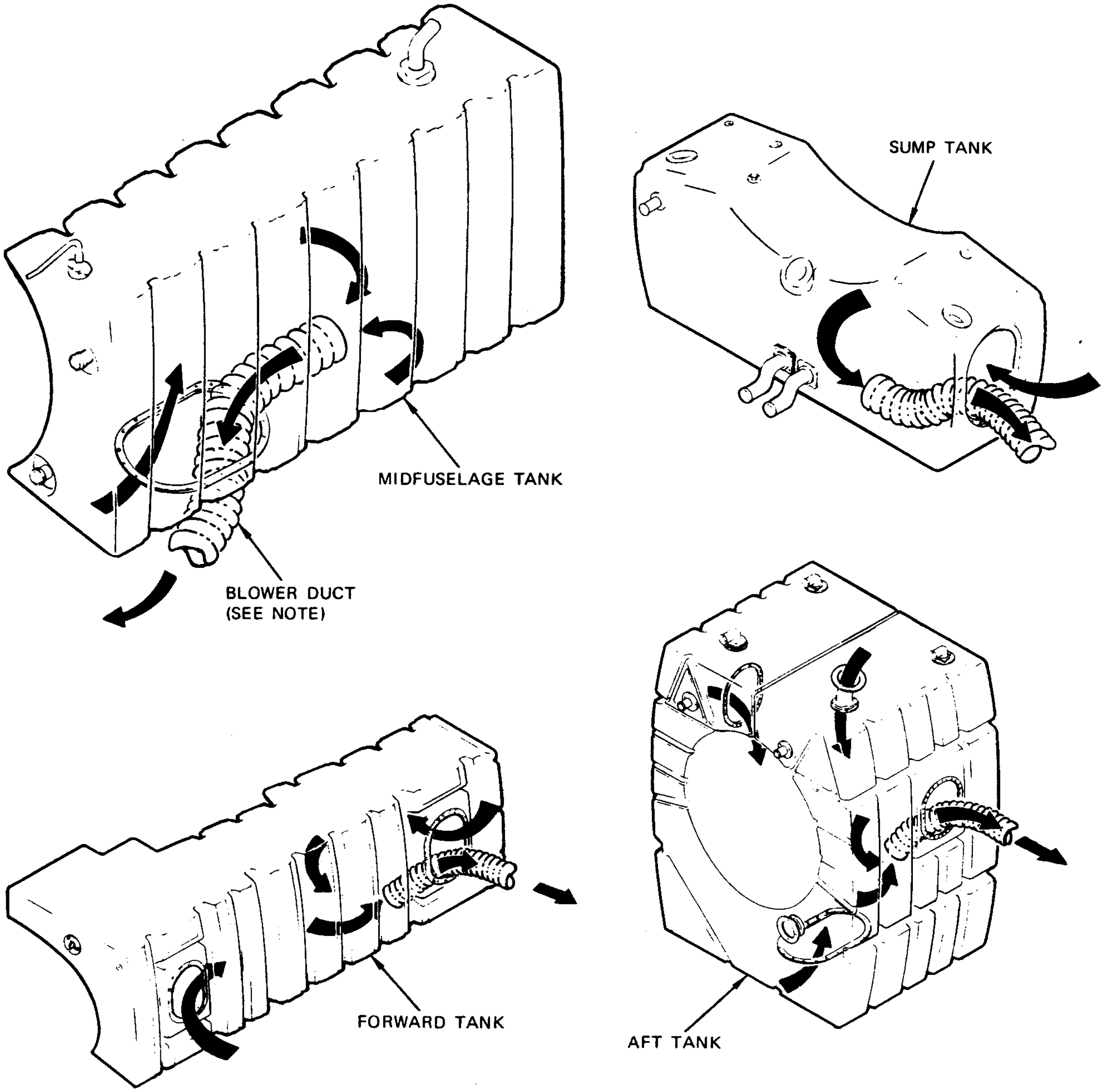
To prevent possible fire or explosion, use only equipment approved in T.O. 1-1-3 for purging.

a. Observe safety precautions given in paragraph 1-6.2.

b. Prepare airplane for purging (paragraph 1-6.3).

c. Check that airplane is defueled and that trapped fuel (approximately 60 gallons) has been removed from aft tank (T.O. 1A-7D-2-1).

d. Open tank and line drains (T.O. 1A-7D-2-1), and drain residual fuel.



NOTE

Ground blower duct
to airplane

06D005-09-85

Figure 1-6. Purging; Exhaust

e. Connect blower duct to the inlet side of blower, and extend duct to the airplane. Place duct in position so the end of duct is readily available when tank access(es) is removed.

WARNING

To prevent possible fire or explosion, bond blower duct to airplane prior to starting blower.

f. Attach static bond between airplane and blower duct.

g. Start blower.

h. Open access(es) of fuel tank undergoing repairs in accordance with applicable fuel tank access removal procedure(s), and remove adequate amount of tank baffles (paragraph 1-18) to aid in tank repair.

i. Place duct into opened tank access, and allow exhaust to run 10 minutes. On aft tank, relocate duct and continue purging for an additional 10 minutes.

j. Remove duct from fuel tank.

k. Stop blower.

l. Check purged tank with a combustible gas indicator for a firesafe reading of 20% LEL or lower.

m. If reading is excessive, repeat steps g through l.

n. Start blower; then place duct in tank.

o. With blower operating, remove residual fuel from tank by siphoning and wiping dry with lint-free cheesecloth or cellulose sponge.

p. For extensive repairs, continue purge until a healthsafe reading of 500 PPM or lower is indicated on the R-2 combustible gas indicator. When this condition is accomplished, fuel tank may be entered without using the air respirator.

q. A continuous air purge shall be maintained during fuel tank repairs.

1-6.6. Blow Purging. (Figure 1-7).

WARNING

To prevent possible fire or explosion, use only equipment approved in T.O. 1-1-3 for purging.

a. Observe safety precautions given in paragraph 1-6.2.

b. Prepare airplane for purging (paragraph 1-6.3).

c. Check that airplane is defueled and that trapped fuel (approximately 60 gallons) has been removed from aft tank (T.O. 1A-7D-2-1).

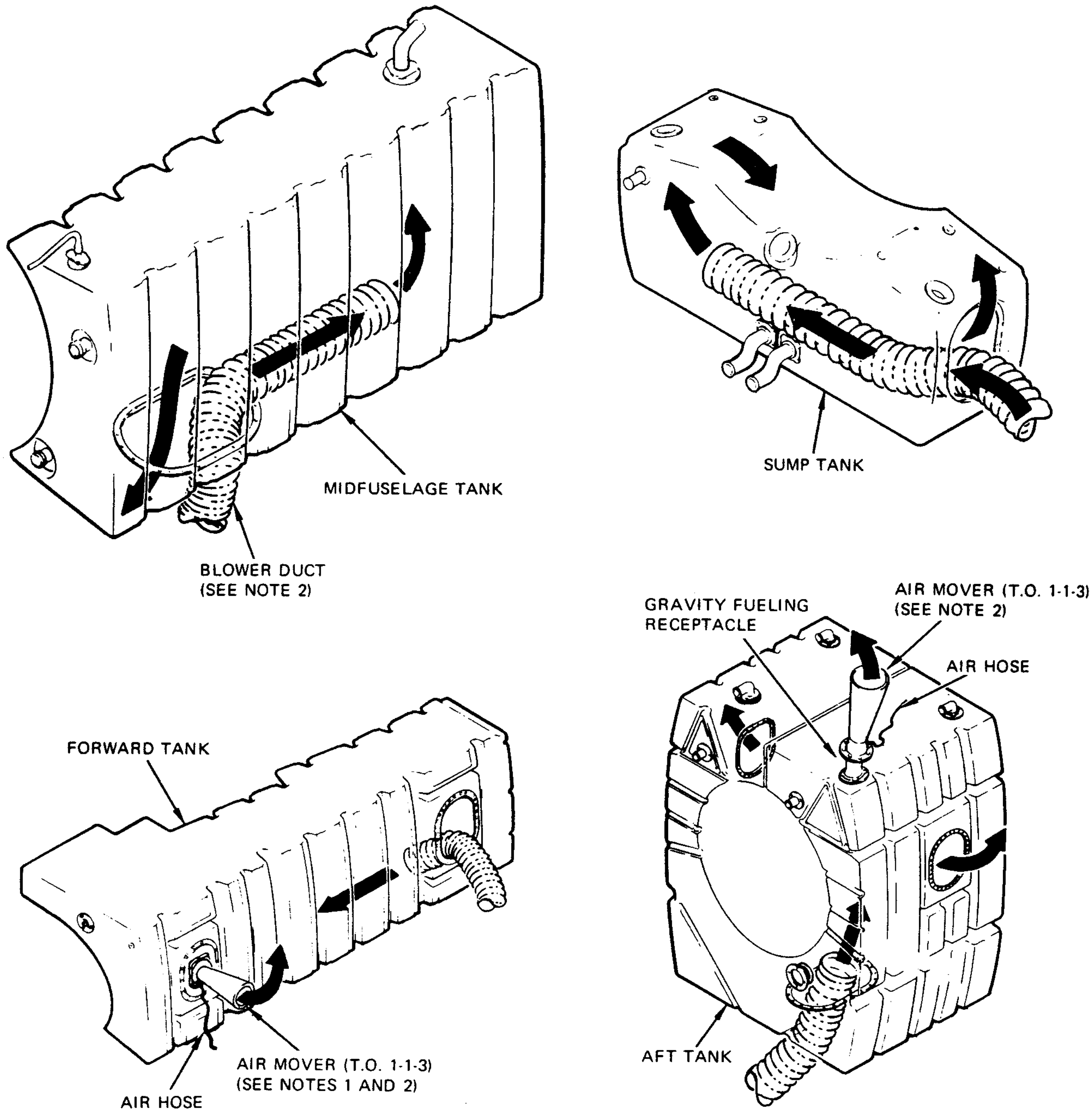
d. Open tank and line drains (T.O. 1A-7D-2-1), and drain residual fuel.

e. Connect the blower duct to the outlet side of the blower, and extend duct to the airplane. Place duct in position so the end of duct is readily available when tank access(es) is removed.

WARNING

To prevent possible fire or explosion, bond blower duct to airplane prior to starting blower.

f. Attach static bond between airplane and blower duct.



NOTE

1. Install air mover on forward or aft tank access depending on maintenance to be performed.
2. Ground air mover and blower duct to airplane.

06D006-09-85

Figure 1-7. Purging; Blow

g. Start blower.

h. Open access(es) of fuel tank undergoing repairs in accordance with applicable fuel tank access removal procedure(s), and remove adequate amount of tank baffles (paragraph 1-18) to aid in tank repair.

i. Place the venturi air mover over suitable tank opening, and secure air mover with tape and shotbags. Ground air mover to an approved ground.

j. Start the air mover, and place blower duct into the tank. Allow air mover and blower to operate for 30 minutes. On aft tank, relocate duct and continue purging for an additional 10 minutes.

k. Remove duct from fuel tank.

l. Stop blower and air mover.

m. Check purged tank with a combustible gas indicator for a firesafe reading of 20% LEL or lower.

n. If reading is excessive, repeat steps g through m.

o. Start blower and air mover; then place duct in fuel tank.

p. With blower and air mover operating, remove residual fuel from tank by siphoning and wiping dry with lint-free cheesecloth or cellulose sponge.

q. For extensive repairs, continue purge until a healthsafe reading of 500 PPM or lower is indicated on the R-2 combustible gas indicator. When this condition is accomplished, fuel tank may be entered without using the air respirator.

r. A continuous air purge shall be maintained during fuel tank repairs.

1-7. FORWARD FUSELAGE TANK ACCESS REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-7.1. Removal.

a. Defuel airplane (T.O. 1A-7D-2-1).

NOTE

If fuel tank cannot be oil purged (preferred method), steps c and d must be performed before fuel tank purging.

b. Purge fuel tank (paragraph 1-6 and T.O. 1-1-3).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

c. Remove bolts securing tank accesses 2133-1 and 2133-2 for right tank or 1133-1 and 1133-2 for left tank.

d. Remove access panels and gaskets.

e. During fuel tank entry, inspect and repair fuel tank as necessary (T.O. 1-1-3).

1-7.2. Installation.

a. Locally fabricate two guide studs by using NAS1304 bolts approximately 2.5 inches long. Remove boltheads, and round the nonthreaded end of shanks.

b. Screw guide studs into attaching holes in aft tank access flange (one stud at each end of flange).

c. Insert aft access 2133-2 or 1133-2 into cavity between fuselage structure and tank mounting flange. Properly orient access on guide studs.

d. Insert studs through holes in airplane structure.

e. Install four attaching screws (one in each corner of access), and tighten lightly.

f. Remove guide studs, and install balance of attaching panel screws. Torque each screw in increments of 5 inch-pounds in a crisscross manner until all screws are torqued to 60 (±5) inch-pounds.

g. Close forward access 2133-1 or 1133-1 using fabricated guide studs to orient access. Repeat steps d through f.

h. Fuel airplane (T.O. 1A-7D-2-1).

i. Check installation for evidence of leakage.

1-8. FORWARD FUSELAGE TANK REMOVAL, BUILDUP, AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Check out low fuel level caution circuit
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	413-900-020	Torque wrench, 100 to 750 inch-pounds	Torque nuts or bolts
	55-1	Explosion-proof vacuum cleaner	Clean tank cavity before inserting fuel tank

NOTE

The following procedure is applicable to both the left and right forward fuselage tanks.

1-8.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove forward fuselage tank accesses (paragraph 1-7).

b. Open accesses 2121-3, 2121-6, and 2123-3 for right tank or 1121-3, 1121-6, and 1123-3 for left tank.

c. Remove tank baffles (paragraph 1-18).

d. Remove forward fuselage tank in accordance with figure 1-8.

1-8.2. Buildup.

a. Bond new gaskets to external side of each tank opening, except access openings, with MMM-A-1617, Type III adhesive.

b. Install new O-rings on the following fittings protruding inside tank cavity: fuel and vent outlet, sump vent, sump transfer, and aft check valves.

c. Examine check valves for flapper security, proper operation, and general serviceability.

d. Inspect and repair fuel tank as necessary (T.O. 1-1-3).

e. Fold tank so that top and bottom are flat and sides are tucked in.

f. Fold or roll tank for installation into tank cavity.

1-8.3. Installation.

a. Clean and vacuum tank cavity before inserting fuel tank.

b. Inspect tank cavity for structural integrity and general condition.

c. Powder all interior surfaces of tank cavity with No. 1313 Canadian Talc (Whitaker, Clark, and Daniels) or Fibrene C-400 (Thompson Hayward Chemical Co.).

d. Lubricate all threads of fittings and bolts, except titanium, with SAE 10 or 10W oil.

e. Lubricate titanium bolts with MIL-M-7866 molybdenum disulfide lubricant.

f. Insert folded tank into tank cavity.

NOTE

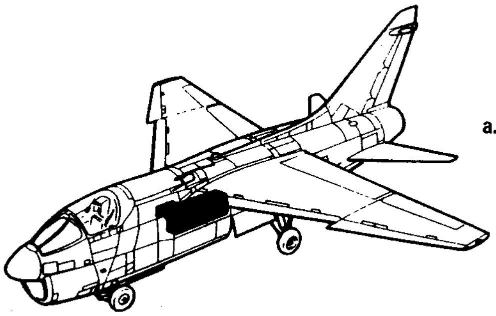
During tank installation, lubricate stat-o-seals with VV-P-236 petrolatum. Install stat-o-seals by screwing onto threads of fittings or bolts instead of pushing straight on. This will reduce the possibility of cutting the stat-o-seal which would result in a fuel leak.

g. Install forward fuselage tank in accordance with figure 1-9.

1-9. MIDFUSELAGE TANK ACCESS REMOVAL AND INSTALLATION.

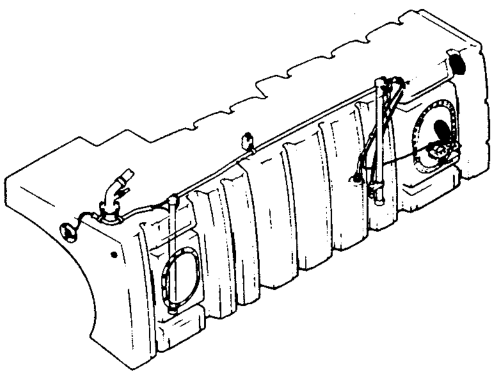
Tools Required

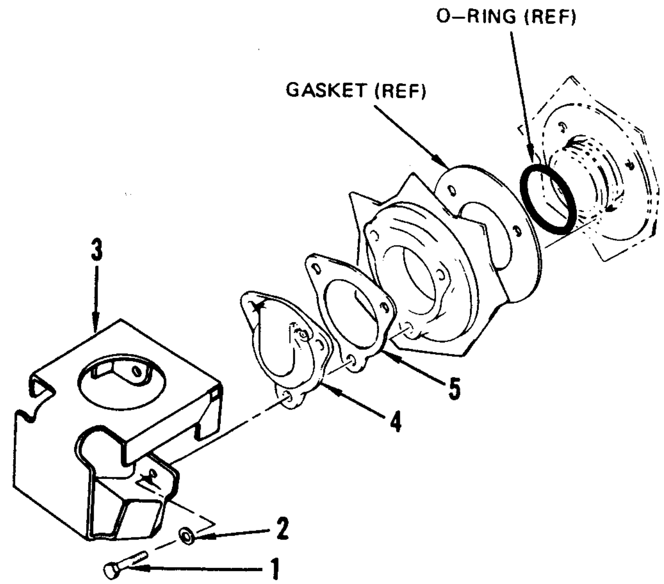
Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nut
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts



CHECK VALVES

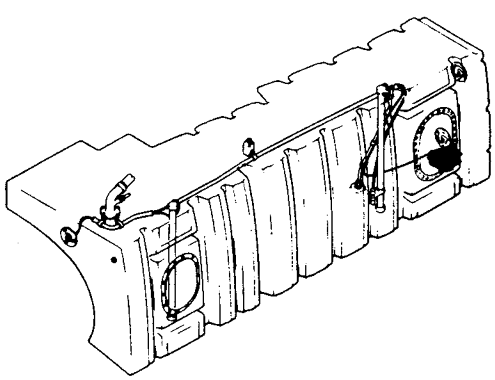
a. Remove bolts (1) and washers (2) securing check valves to tank. Remove valve cover (3). Remove check valves (4) and gaskets (5).

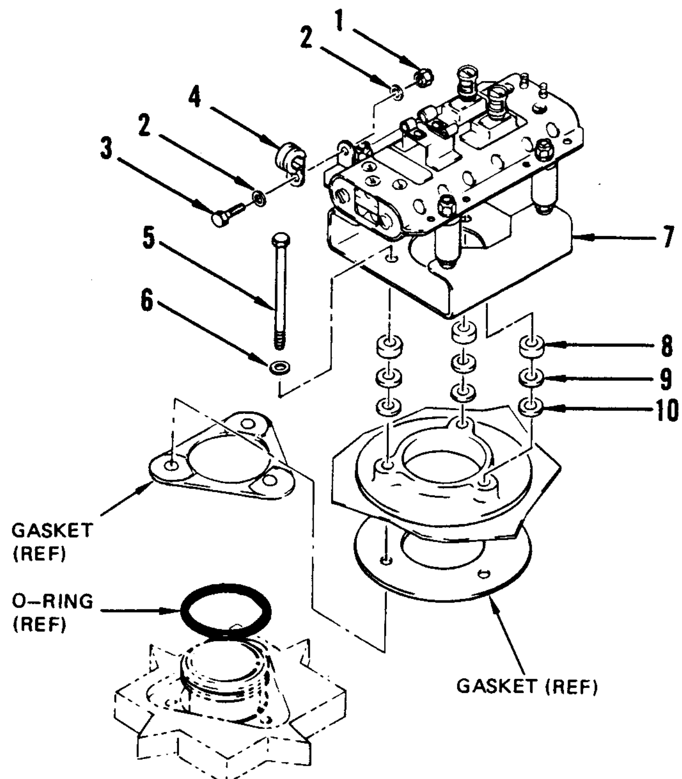




COMPENSATOR

a. Disconnect wiring harness from fuel quantity compensator terminals.
b. Remove nut (1), washers (2), and bolt (3) securing wiring harness clamp (4) to clamp bracket. Retain bolt, nut, and washers with clamp. Leave clamp bracket attached to compensator.
c. Remove bolts (5) and washers (6) securing compensator and mounting bracket (7) to sump transfer fitting.
d. Remove spacers (8), washers (9), and seals (10).



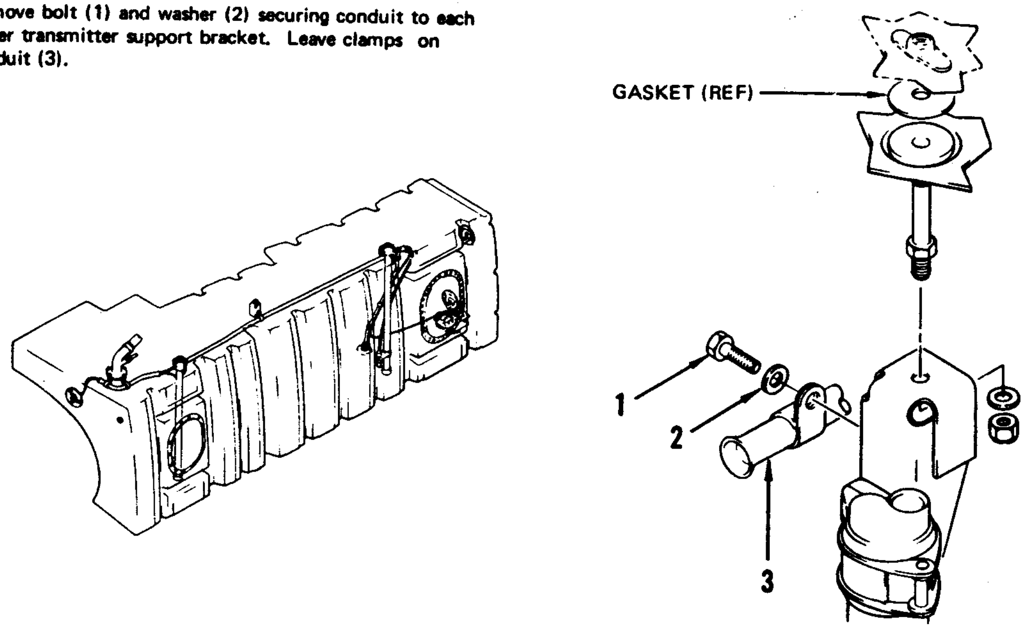


06D007–01–09–85

Figure 1-8. Removal; Forward Fuselage Tank (Sheet 1 of 7)

WIRING HARNESS

a. Remove bolt (1) and washer (2) securing conduit to each upper transmitter support bracket. Leave clamps on conduit (3).



b. Remove nut (4) and washer (5) securing conduit support bracket to fuel tank fitting stud at upper center of tank. Leave support bracket secured to conduit clamp.

c. Remove nuts (6), washers (7), and seals (8) securing elbow section of conduit (9) to studs of fuel tube fitting. Leave clamps secured to conduit.

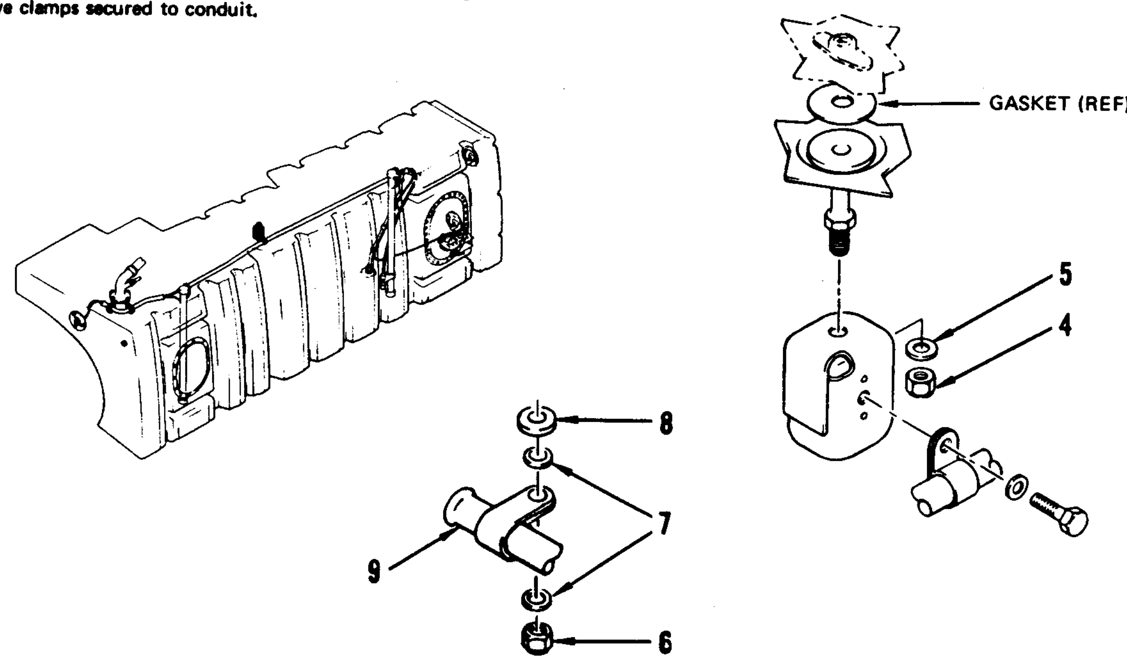
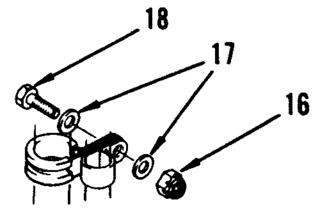


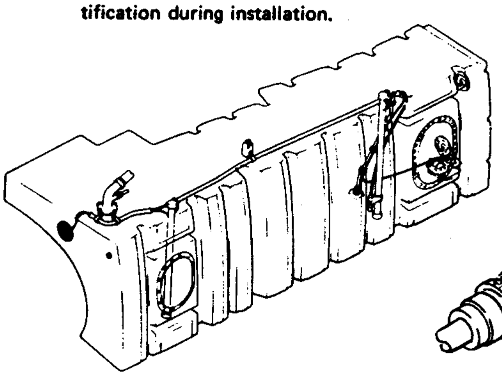
Figure 1-8. Removal; Forward Fuselage Tank (Sheet 2)

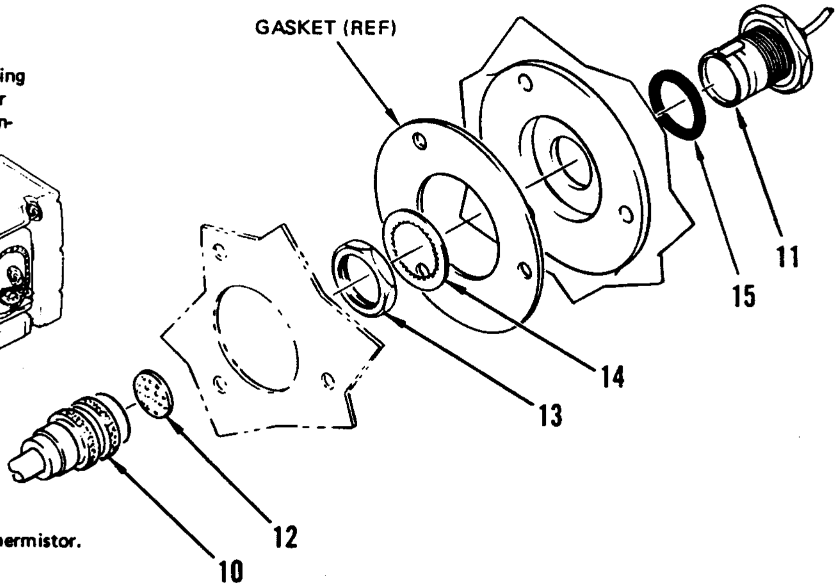
d. Disconnect external electrical connector (10) from feedthrough connector (11). Remove gasket (12). Inspect both connectors for contamination and/or moisture. Clean with Freon TF and dry with hot air gun or dry gaseous nitrogen.
e. Remove nut (13) and lockwasher (14) securing feedthrough connector to tank cavity. Discard O-ring (15). Retain nut and washer with feedthrough connector.
f. Remove nuts (16), washers (17), and bolts (18) securing wiring harness clamps to sump vent tube. Leave tube clamps on vent tube and harness clamps on harness.



NOTE

Before disconnecting terminals, tag wiring harness leads with thermistor lead color codes (blue, white, and brown) for identification during installation.

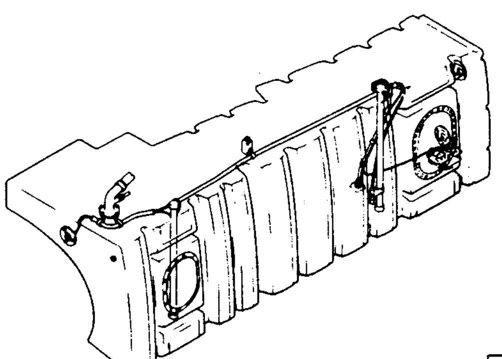


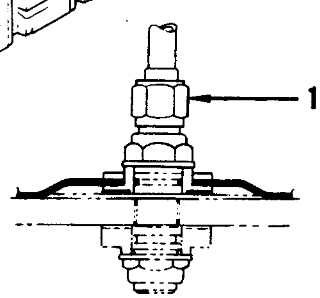


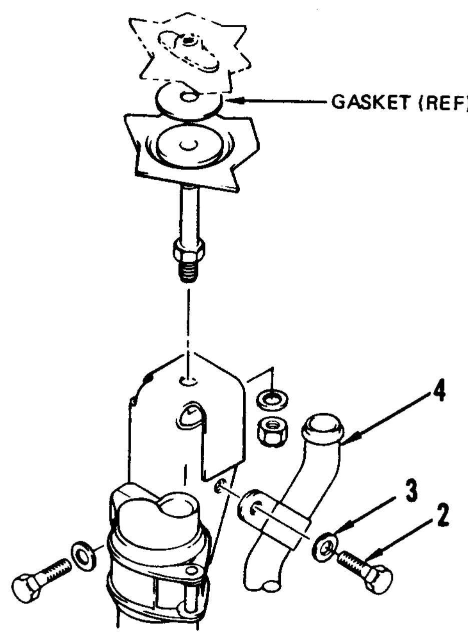
g. Disconnect harness from transmitters and thermistor.
h. Remove harness and conduits from tank.

SUMP VENT TUBE

a. Disconnect coupling (1) of sump vent tube from fitting at bottom of tank.
b. Remove bolt (2) and washer (3) securing tube clamp to transmitter upper support bracket. Remove sump vent tube (4) from tank.





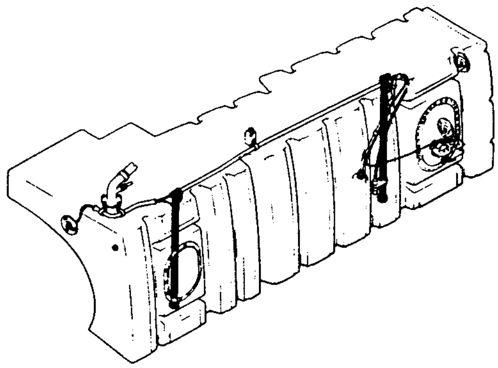


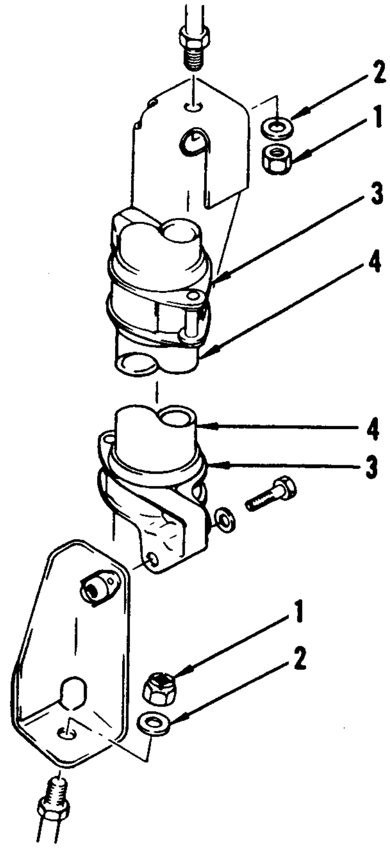
06D007–03–09–85

Figure 1-8. Removal; Forward Fuselage Tank (Sheet 3)

FUEL QUANTITY TRANSMITTERS

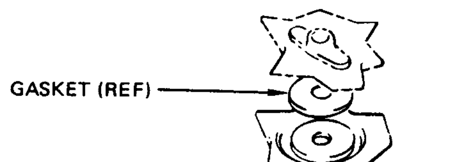
a. Remove nuts (1) and washers (2) securing transmitter support brackets to support studs at top and bottom of tank.
b. Loosen one transmitter clamp (3), if necessary, to allow movement of brackets on transmitters.
c. Remove transmitters (4) and attached components from tank.

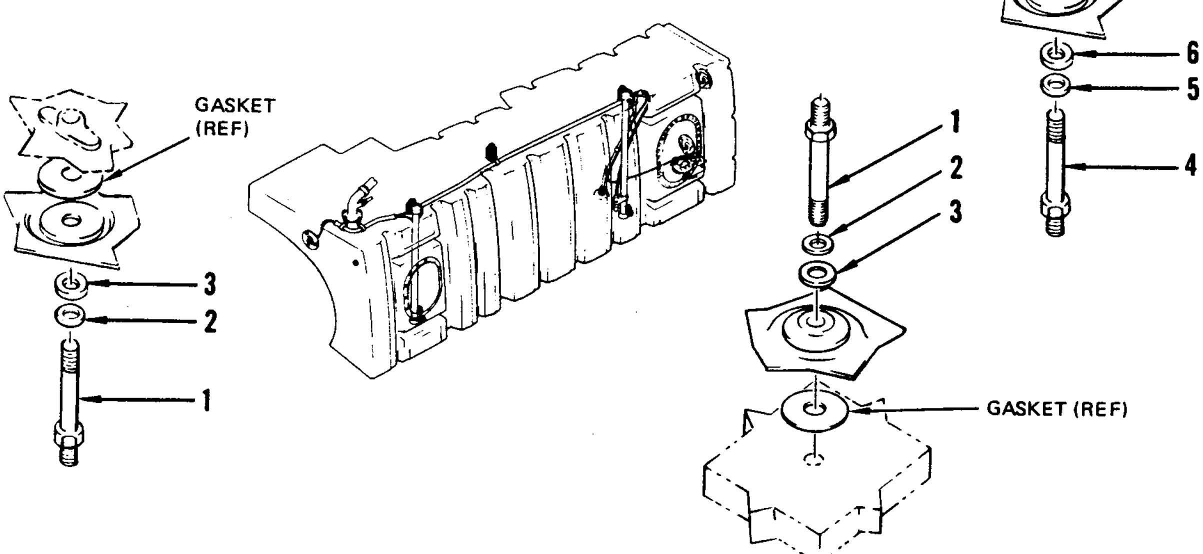




BRACKET SUPPORT STUDS

a. Remove bracket support studs (1), washers (2), and seals (3) securing transmitter bracket fittings to tank cavity.
b. Remove bracket support stud (4), washer (5), and seal (6) securing conduit bracket fitting to tank cavity.



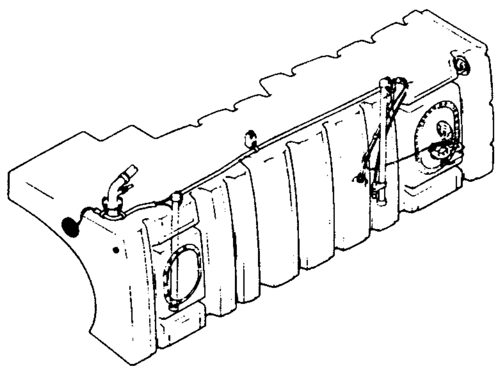


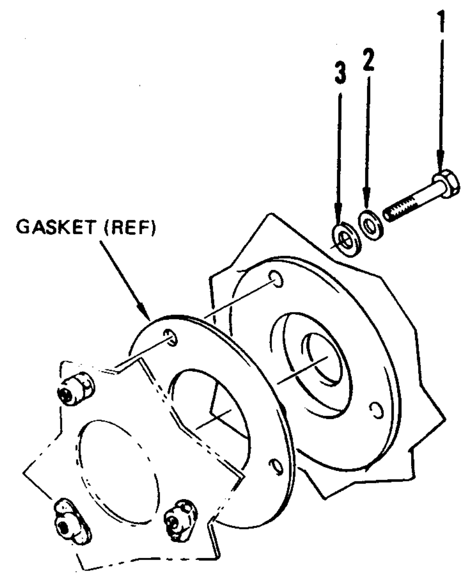
06D007–04–09–85

Figure 1-8. Removal; Forward Fuselage Tank (Sheet 4)

ELECTRICAL FEEDTHROUGH FITTING

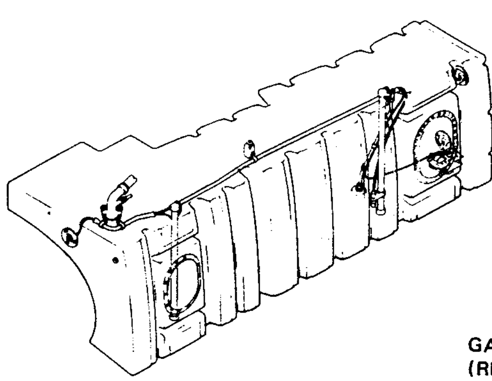
a. Remove bolts (1), washers (2), and seals (3) securing feedthrough fitting to tank cavity.

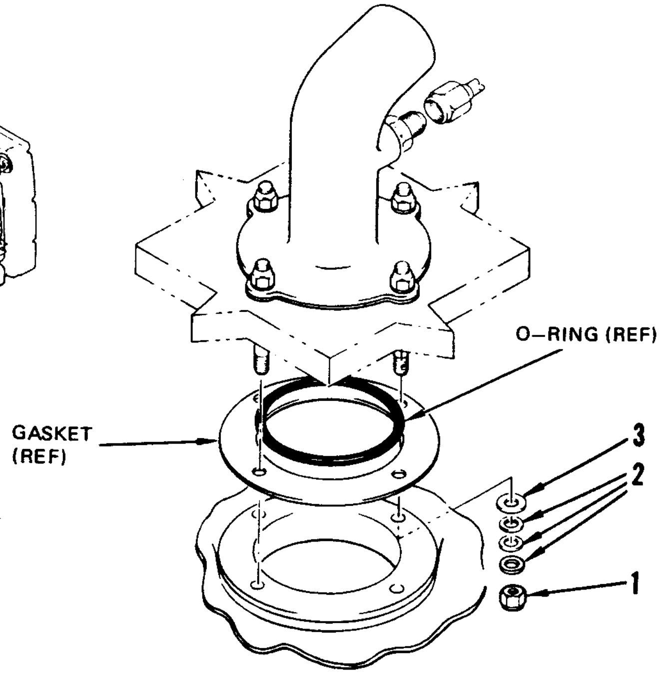




FUEL TUBE FITTING

a. Remove nuts (1), washers (2), and seals (3) securing fuel tube fitting to tank cavity.



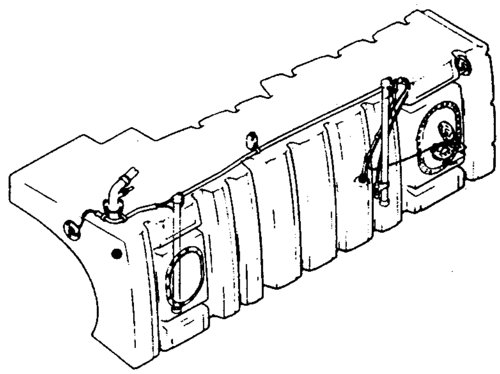


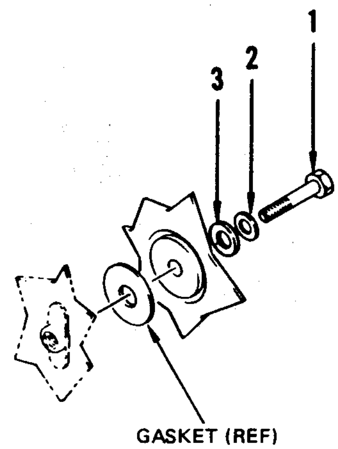
06D007–05–09–85

Figure 1-8. Removal; Forward Fuselage Tank (Sheet 5)

TANK SUPPORT FITTING

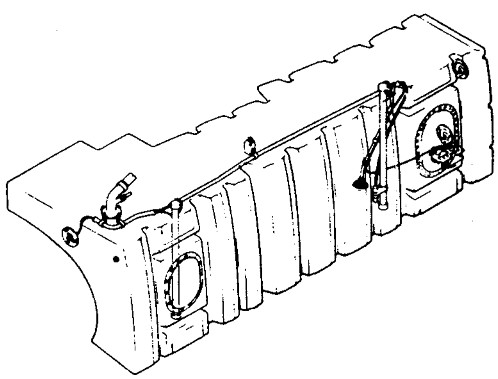
a. Remove bolt (1), washer (2), and seal (3) securing tank support fitting to forward end of tank cavity.

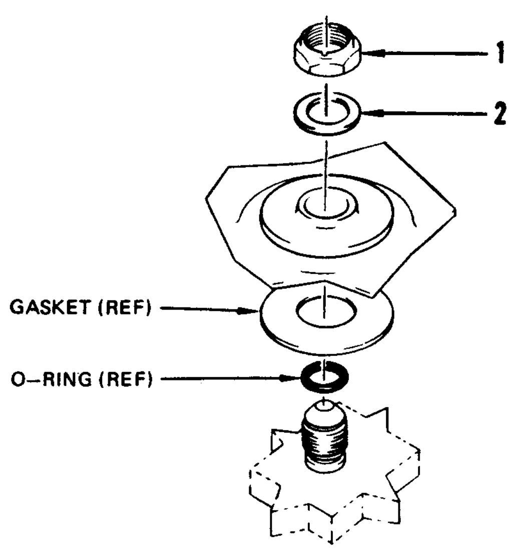




SUMP VENT TUBE FITTING

a. Remove nut (1) and washer (2) securing sump vent tube fitting.



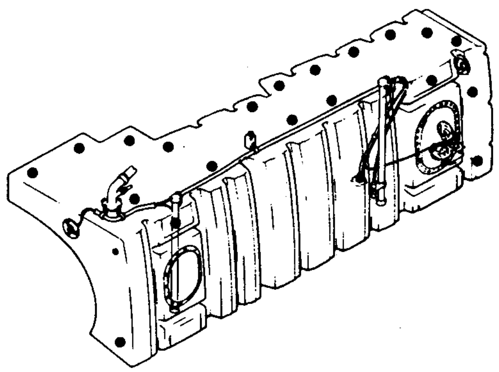


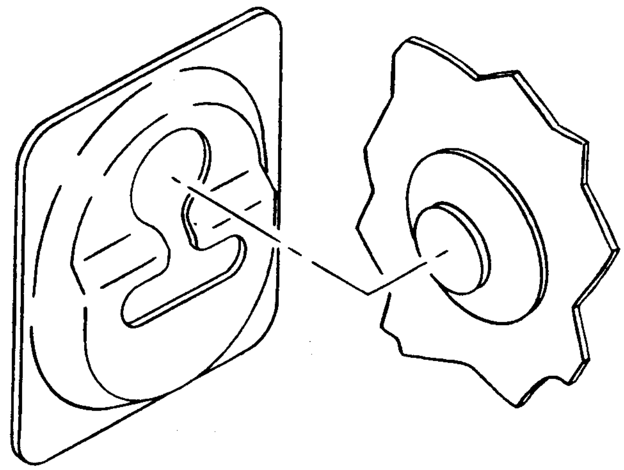
06D007-06-09-85

Figure 1-8. Removal; Forward Fuselage Tank (Sheet 6)

TANK HANGER BUTTONS

a. Remove all tools and other items from inside fuel tank.
b. Leaving upper corners until last, disengage twenty tank hanger buttons from tank cavity.



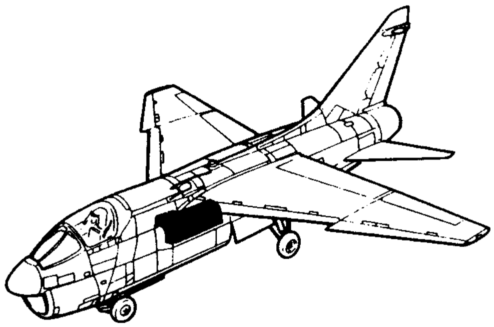


FUEL TANK

a. Fold fuel tank so that top and bottom are flat and sides are tucked in.
b. Cover edges of aft access with tape to protect fuel tank during removal from tank cavity.
c. Fold or roll fuel tank for convenience and remove from tank cavity.

06D007-07-09-85

Figure 1-8. Removal; Forward Fuselage Tank (Sheet 7)



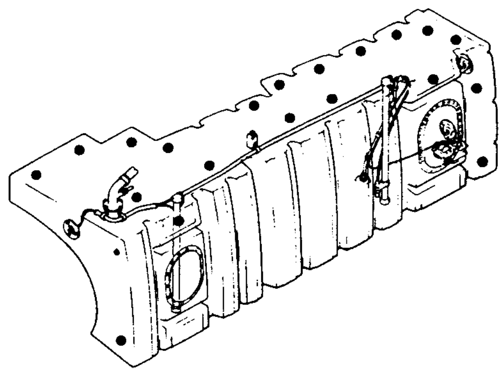
INSTALLATION

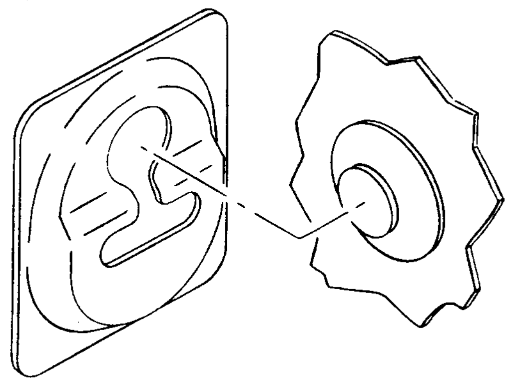
TANK HANGER BUTTONS

a. Unfold tank and engage upper corner hanger buttons with cavity fittings. This will approximately position remaining hangers.
b. Engage all other tank hangers.
c. Position tank flanges over all fittings that protrude inside tank cavity, being careful to seat O-rings properly.

CAUTION

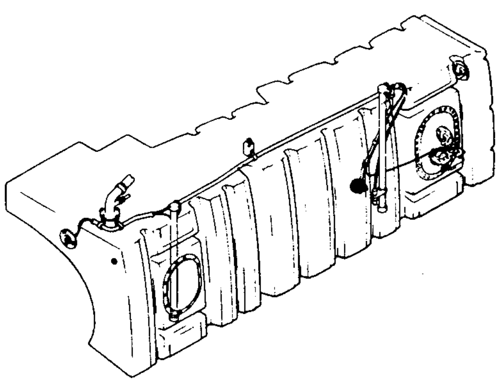
To prevent damage to tank, be careful when installing tank components.

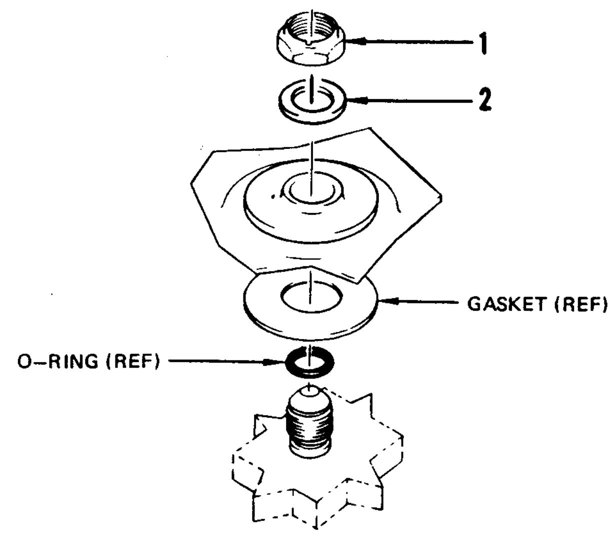




SUMP VENT TUBE FITTING

a. Install washer (2) and nut (1).
b. Torque nut to 600 (±40) inch-pounds above free running torque.



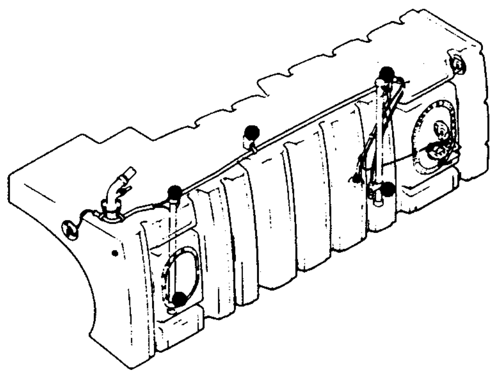


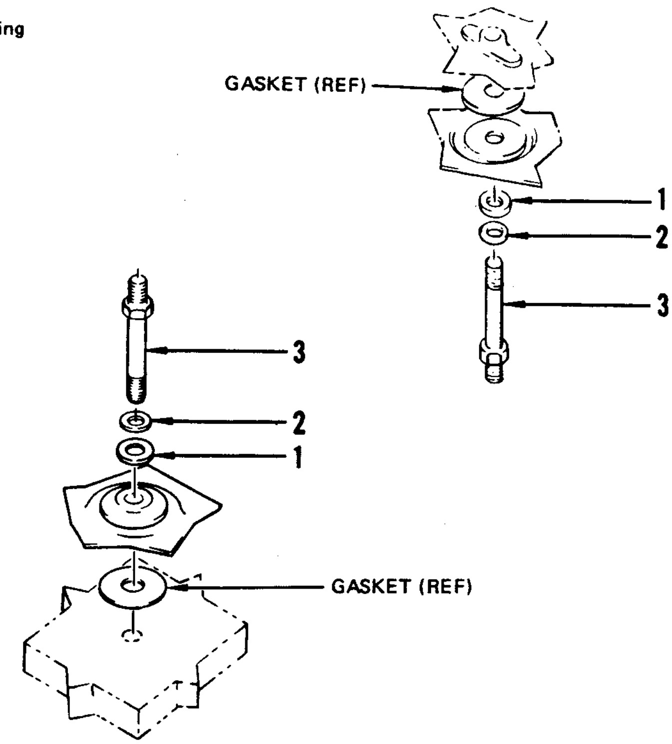
06D008–01–10–85

Figure 1-9. Installation; Forward Fuselage Tank (Sheet 1 of 7)

BRACKET SUPPORT STUDS

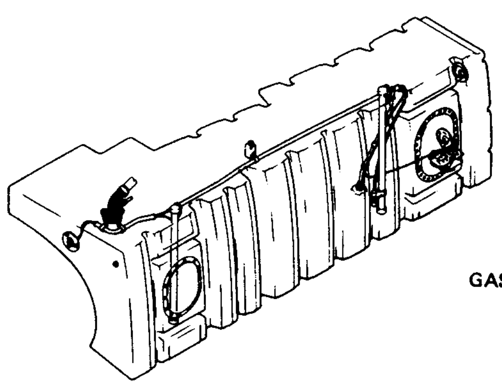
a. Install new seals (1), washers (2), and studs (3) securing bracket support fittings to tank cavity.
b. Torque studs to 60 (±5) inch-pounds.

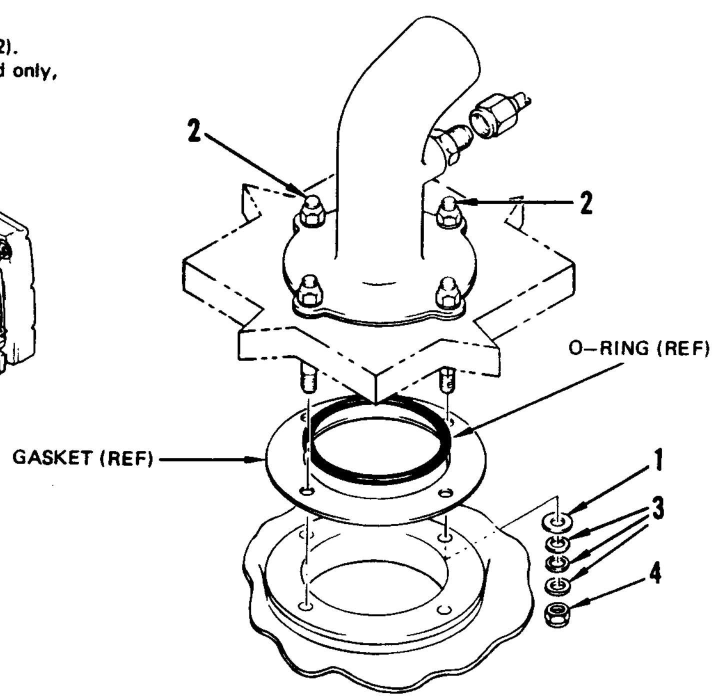




FUEL TUBE FITTING

a. Install new seals (1) on aft and inboard studs (2).
b. Install washers (3) and nuts (4), aft and inboard only, securing fuel tube fitting to tank cavity.



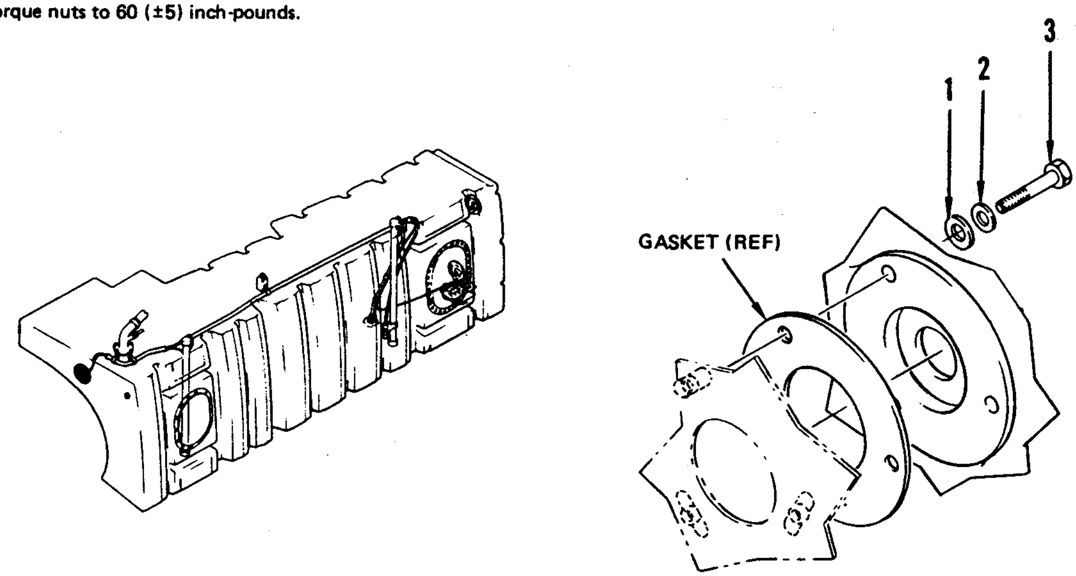


06D008–02–10–85

Figure 1-9. Installation; Forward Fuselage Tank (Sheet 2)

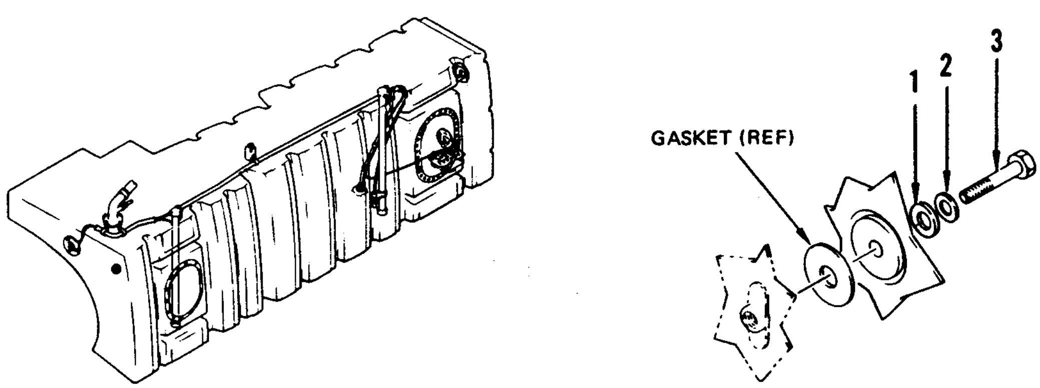
ELECTRICAL FEEDTHROUGH FITTING

a. Install new seals (1), washers (2), and bolts (3) securing feedthrough fitting to tank cavity.
b. Torque nuts to 60 (±5) inch-pounds.



TANK SUPPORT FITTING

a. Install new seal (1), washer (2), and bolt (3) securing tank support fitting to forward end of tank cavity.
b. Torque bolt to 60 (±5) inch-pounds.



06D008–03–10–85

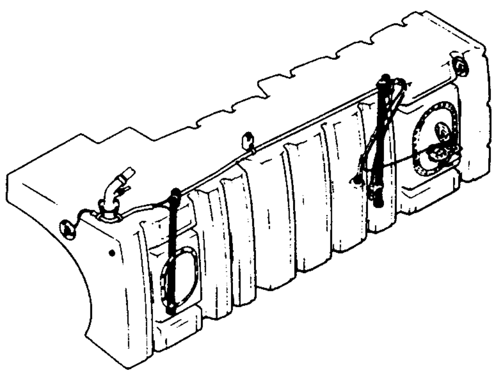
Figure 1-9. Installation; Forward Fuselage Tank (Sheet 3)

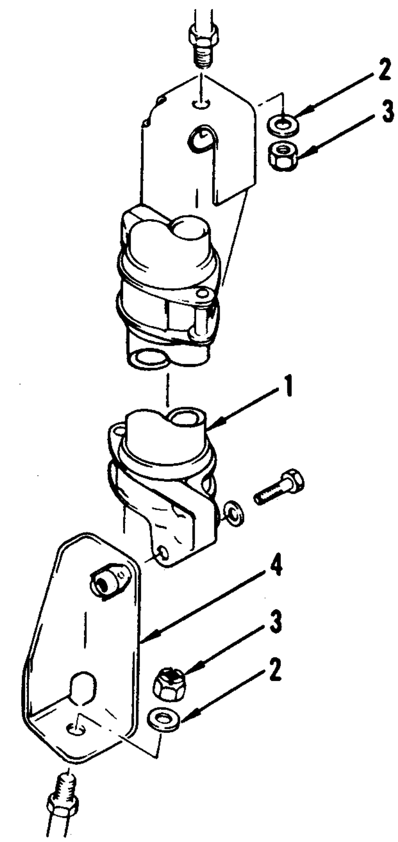
FUEL QUANTITY TRANSMITTERS

CAUTION

To prevent clamps from shorting to transmitter, check that insulators under transmitter clamps are properly aligned.

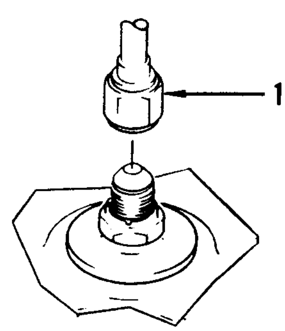
a. Position transmitters (1) and attached thermistors in tank. Install washers (2) and nuts (3) securing transmitter support brackets to support studs at top and bottom of tank.
b. Install washer and nut securing bracket to top of aft stud in accordance with MIL-B-5087 to prevent accumulation of static charge.
c. Torque nuts to 22 (+3, −2) inch-pounds.
d. Tighten bolts that secure brackets (4) to transmitters, if necessary.

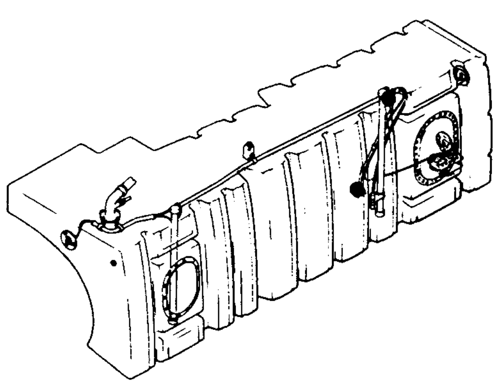


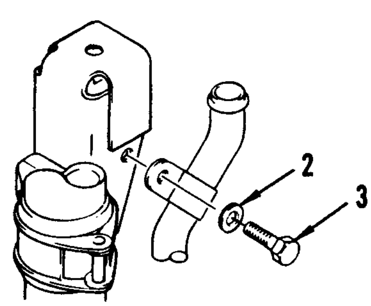


SUMP VENT TUBE

a. Connect coupling of sump vent tube (1) to fitting at bottom of tank.
b. Install washer (2) and bolt (3) securing sump vent tube clamp to transmitter upper support bracket.
c. Install washer and bolt securing vent tube clamp to transmitter support bracket in accordance with MIL-B-5087 to prevent accumulation of static charge.
d. Torque bolt to 22 (+3, −2) inch-pounds.







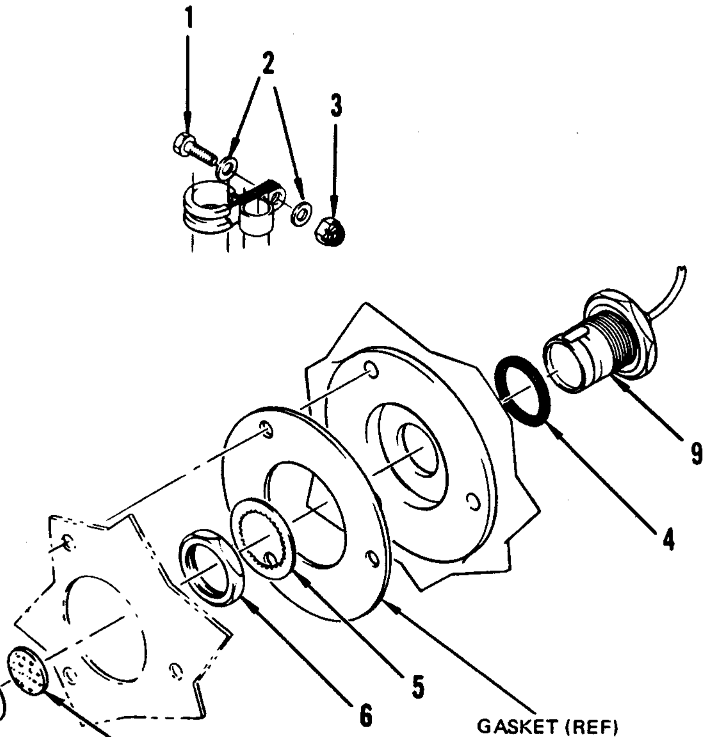
06D008-04-10-85

Figure 1-9. Installation; Forward Fuselage Tank (Sheet 4)

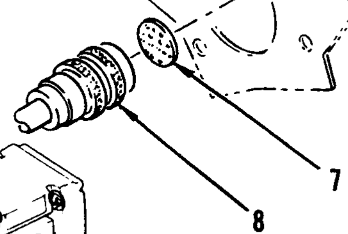
WIRING HARNESS

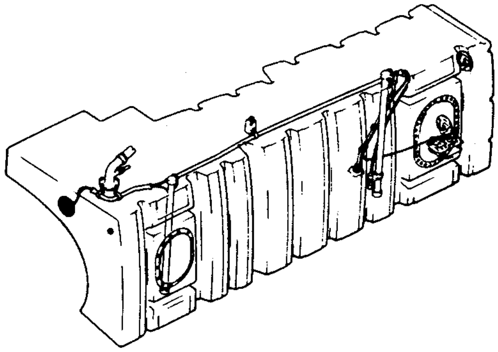
NOTE

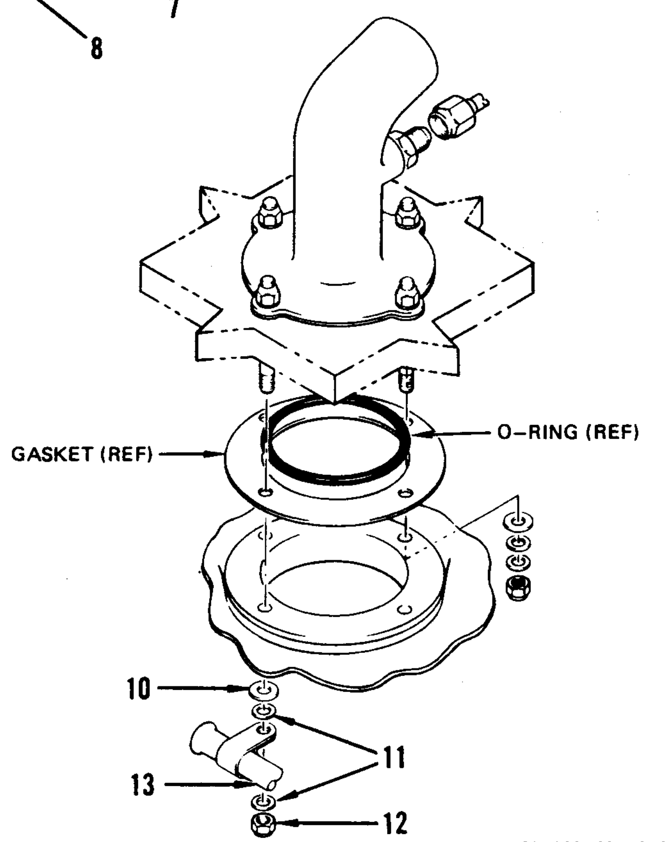
Connect wiring harness leads that were color tagged during removal to proper color-coded thermistor leads.



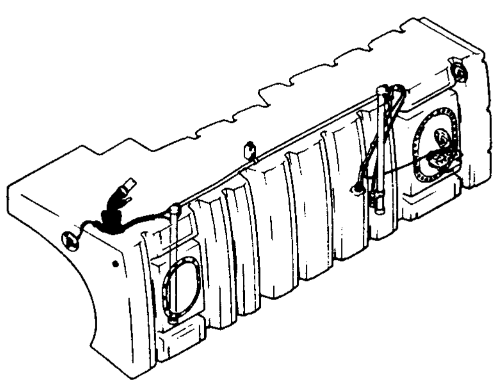
a. Place wiring harness and conduits in tank. Connect harness to transmitters and thermistors.
b. Space out matching clamps on wiring harness and sump vent tube. Install bolts (1), washers (2), and nuts (3) securing clamps to sump vent tube.
c. Torque nuts to 20 (+3, −2) inch-pounds.
d. Install new O-ring (4) on feedthrough connector.
e. Install lockwasher (5) and nut (6) securing feedthrough connector to tank cavity.
f. Torque nut to 110 (+3, −2) inch-pounds.
g. Install sealing gasket (7) into external electrical connector (8), with numbers on gasket facing out and aligned with pin numbers (pin 8 is adjacent to keyway). Connect electrical connector (8) to feedthrough connector (9).







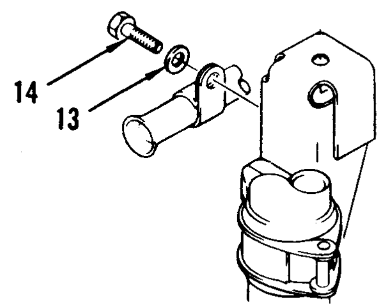
h. Install new seals (10), washers (11), and nuts (12) securing elbow section of conduit (13) to forward and outboard studs of fuel tube fitting.
i. Torque all 4 nuts to 60 (±5) inch-pounds.

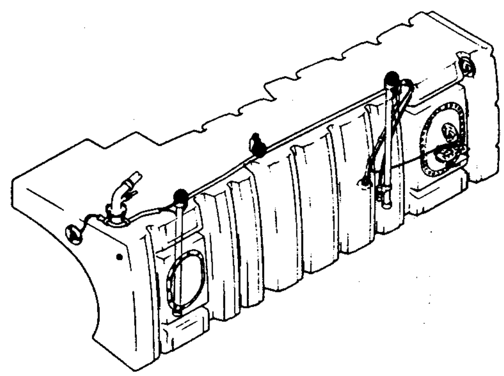


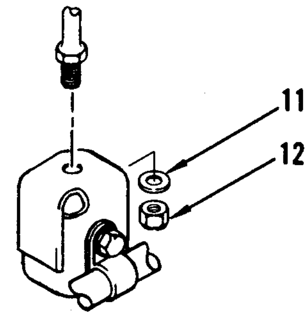
06D008–05–10–85

Figure 1-9. Installation; Forward Fuselage Tank (Sheet 5)

j. Install washer (11) and nut (12) securing conduit support bracket to fuel tank fitting stud at upper center of tank.
k. Torque nut to 20 (+3, −2) inch-pounds.
l. Install washer (13) and bolt (14) securing conduit clamps to each upper transmitter support bracket.
m. Install washer and bolt securing conduit clamp to aft bracket in accordance with MIL-B-5087 to prevent accumulation of static charge.
n. Torque bolt to 20 (+3, −2) inch-pounds.

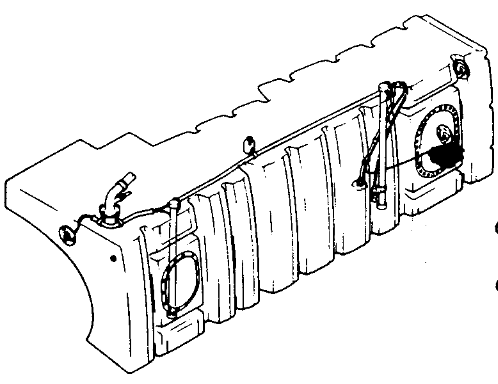


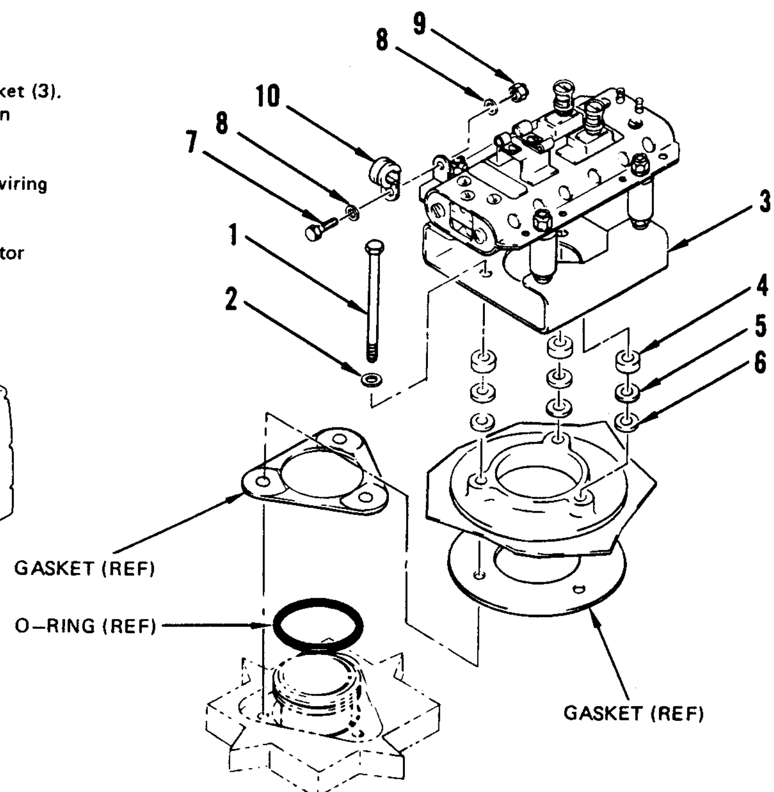




COMPENSATOR

a. Install bolts (1) and washers (2) in mounting bracket (3).
b. Install spacers (4), washers (5) and new seals (6) on bolt.
c. Torque bolts to 60 (±5) inch-pounds.
d. Install bolt (7), washers (8), and nut (9) securing wiring harness clamp (10) to compensator.
e. Torque nut to 20 (+3, −2) inch-pounds.
f. Connect wiring harness to fuel quantity compensator terminals (figure 5-15).





06D008–06–10–85

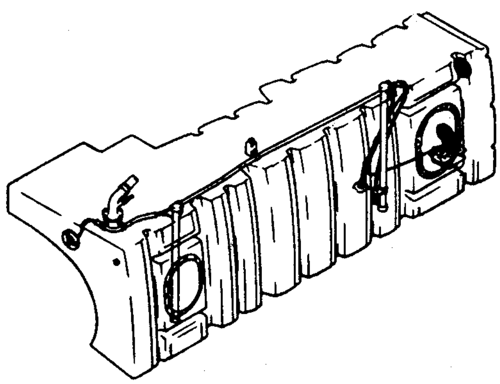
Figure 1-9. Installation; Forward Fuselage Tank (Sheet 6)

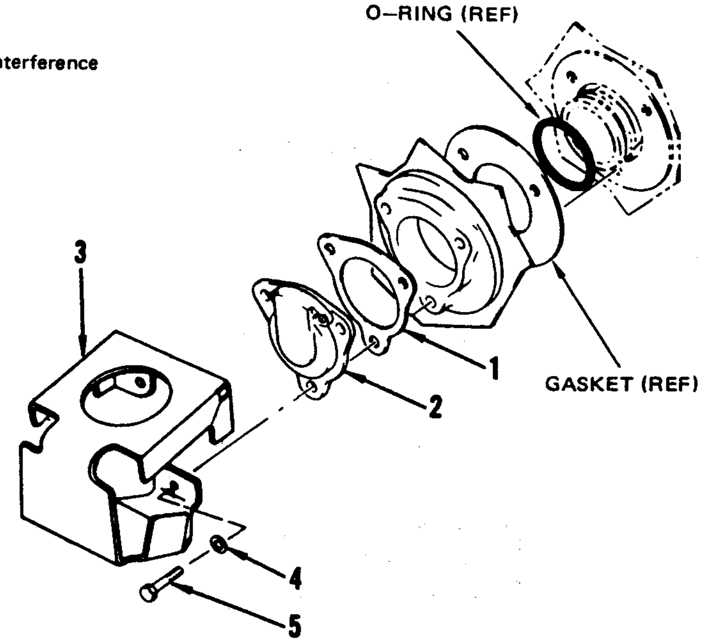
CHECK VALVES

a. Install new gaskets (1) and check valves (2). Install valve covers (3). Install washers (4) and bolts (5).

b. Manually open and close check valve to ensure that no interference exists between valve hinge and valve cover.

c. Torque bolts to 60 (±5) inch-pounds.





CHECKOUT AND ACCESS INSTALLATION

a. Check tank interior for security, mislaid tools, and other foreign objects.

b. Install tank baffles in accordance with paragraph 1–18.

c. Install accesses 2121–3, 2121–6, and 2123–3 for right tank or 1121–3, 1121–6, and 1123–3 for left tank.

d. Install tank accesses (paragraph 1–7) but do not fuel airplane.

e. Connect external electrical power (T.O. 1A-7D-2-1) and check that low level fuel warning light is on. Check that low sump level warning light is on.

f. Fuel airplane (T.O. 1A-7D-2-1) and check that low level fuel warning light goes off. Check that low sump level warning light goes off.

g. Check tank installation for evidence of leakage.

h. Disconnect external electrical power.

i. Perform a fuel contamination test (paragraph 1–20).

06D008–07–10–85

Figure 1-9. Installation; Forward Fuselage Tank (Sheet 7)

NOTE

The following procedure is applicable to both midfuselage tank accesses.

1-9.1. Removal. (Figure 1-10.)

a. Defuel airplane (T.O. 1A-7D-2-1).

NOTE

If fuel tank cannot be oil purged (preferred method), steps c through i must be performed before fuel tank purging.

b. Purge fuel tank (paragraph 1-6 and T.O. 1-1-3).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

c. To gain access to left midfuselage tank access, open access 5211-1. To gain access to right midfuselage tank access, open access 6211-1.

d. Remove bolts (1), washers (2), and washers (3) securing tank access (4) to fuel cavity floor.

CAUTION

To prevent tank damage, remove lower fuel vent tube before removing access panel from tank.

e. Slide access panel aft in tank.

f. Remove bolts (5), washers (6), and nuts (7) securing wiring clamps (8) to tube clamps (9).

g. Cut lockwire and disconnect couplings (10) at each end of lower fuel vent tube (11). Discard O-rings (12).

h. Remove nut (13) and washer (14) securing lower fuel vent tube to stud (15) and remove tube.

i. Remove access panel and gasket (16).

j. During fuel tank entry, inspect and repair fuel tank as necessary (T.O. 1-1-3).

1-9.2. Installation. (Figure 1-10.)

a. Check fuel tank internally, including mating surface of access panel, for cleanness and freedom from foreign objects.

b. Slide access panel (4) into forward part of tank.

c. Install new gasket (16) on inside of tank access flange.

d. Install new O-rings (12), and connect couplings (10) at both ends of lower fuel vent tube (11).

e. Torque couplings to 40 (±4) foot-pounds, and secure with MS20995C32 lockwire.

f. Secure vent tube to support stud (15) with washer (14) and nut (13) in accordance with MIL-B-5087 for static discharge.

g. Torque nut to 27 (+3, −2) inch-pounds.

h. Secure wiring clamps (8) to tube clamps (9) with nuts (7), washers (6), and bolts (5).

i. Torque nuts to 27 (+3, −2) inch-pounds.

j. Insert two bolts with washers (one on each side of access) through holes in cavity floor and through tank access flange.

k. Holding two bolts in place, slide panel in position so bolts will engage threaded holes. Tighten bolts finger-tight.

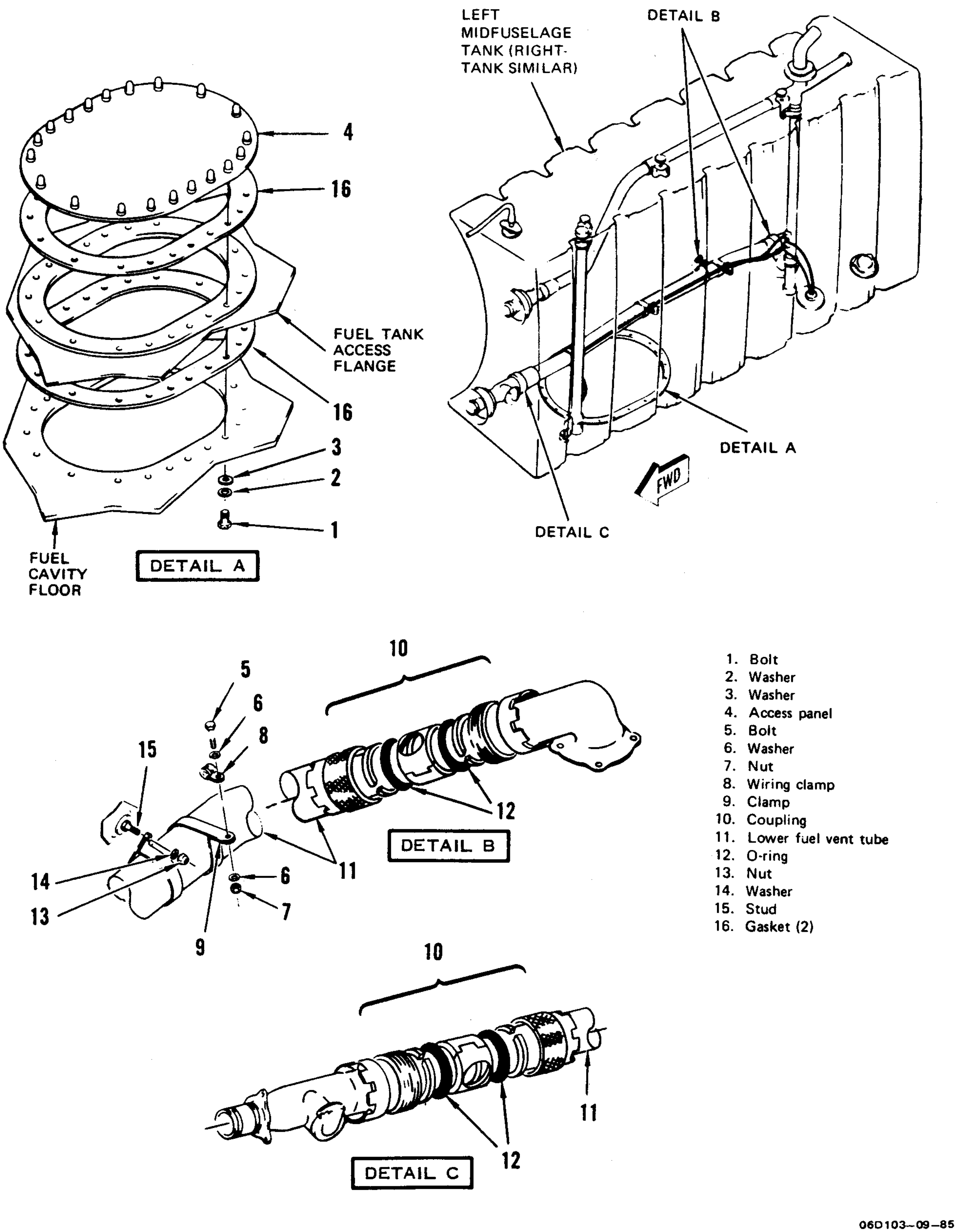


Figure 1-10. Removal and Installation; Midfuselage Tank Access

NOTE

Tolerance buildup may cause bolt (1) to bottom in dome nut. If this occurs, install additional washer (2) under each bolthead to prevent possible leakage of fuel.

l. Install remaining bolts (1), washers (2), and washers (3).

m. Torque each bolt in increments of 5 inch-pounds in a crisscross pattern until all bolts are torqued to 60 (±5) inch-pounds.

n. Fuel airplane (T.O. 1A-7D-2-1).

o. Check access installation for fuel leakage.

p. Close access 5211-1 or 6211-1.

1-10. MIDFUSELAGE TANK REMOVAL, BUILDUP, AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Check out low fuel level caution circuit
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	413-900-020	Torque wrench, 100 to 750 inch-pounds	Torque nuts, bolts, or couplings
	55-1	Explosion-proof vacuum cleaner	Clean structural cavity

NOTE

The following procedure is applicable to both midfuselage tanks.

1-10.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove tank access (paragraph 1-9).

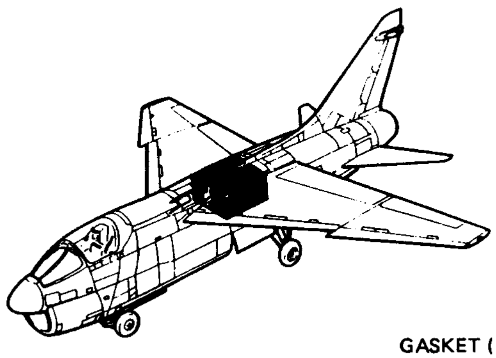
b. Open accesses 6112-1 and 6211-1 for access to right tank or accesses 5112-1 and 5211-1 for left tank access.

c. Install heavy tape around fuel tank access edges.

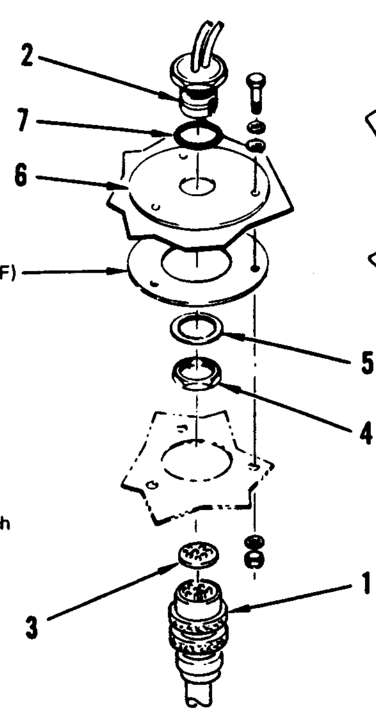
d. Remove tank baffles (paragraph 1-18).

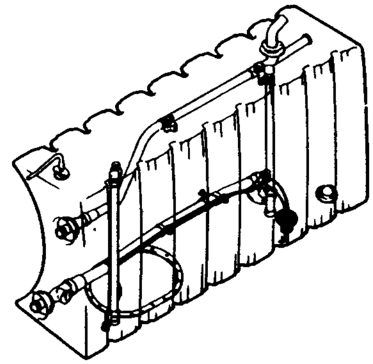
e. Remove midfuselage tank in accordance with figure 1-11.

f. Remove gasket on fuel cavity floor.



REMOVAL





ELECTRICAL FEEDTHROUGH

a. Disconnect external electrical connector (1) from feedthrough connector (2). Remove gasket (3), inspect both connectors for contamination and/ or moisture. Clean with Freon TF and dry with hot air gun or dry gaseous nitrogen.

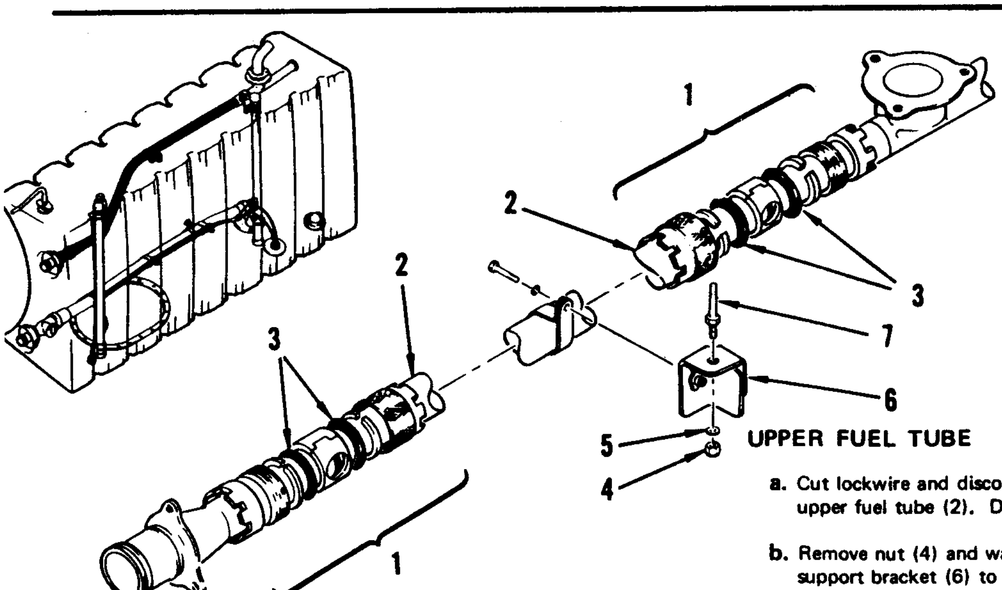
b. Remove nut (4) and washer (5) securing feedthrough to tank flange (6).

c. Discard O-ring (7).

FUEL QUANTITY TRANSMITTERS

a. Remove midfuselage tank fuel quantity transmitters (paragraph 5—11).

b. Remove wiring harness from tank.



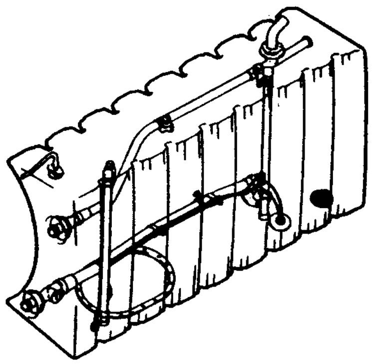
UPPER FUEL TUBE

a. Cut lockwire and disconnect couplings (1) at each end of upper fuel tube (2). Discard O-rings (3).

b. Remove nut (4) and washer (5) securing upper vent tube support bracket (6) to support stud (7). Remove tube and bracket assembly from tank.

06D009—01—09—85

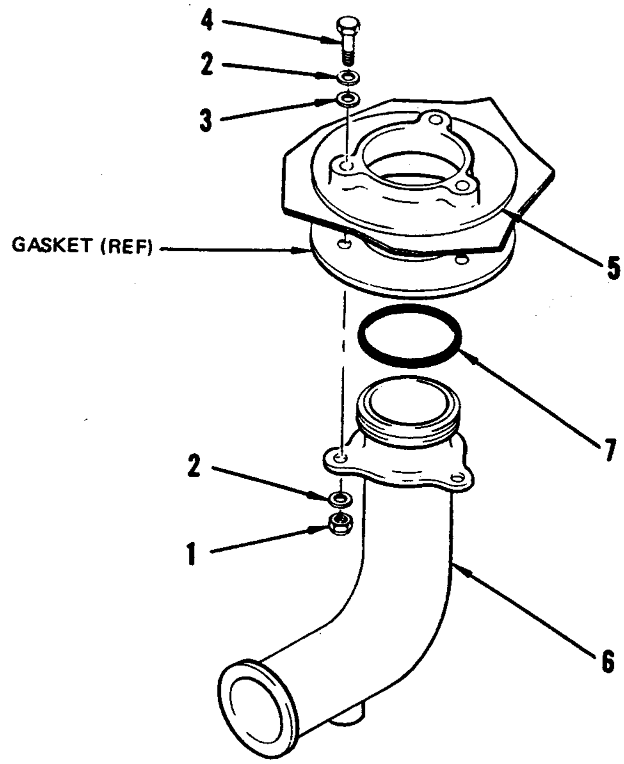
Figure 1-11. Removal; Midfuselage Tank (Sheet 1 of 6)

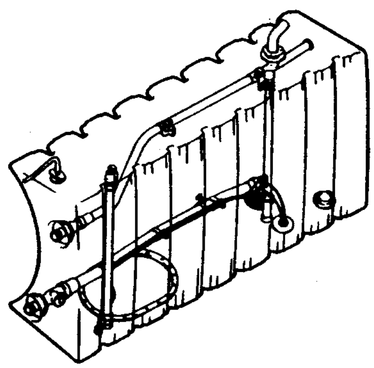


FUEL TRANSFER ELBOW

a. Remove nuts (1), washers (2), seals (3), and bolts (4) securing tank flange (5) to fuel transfer elbow (6).

b. Discard O-ring (7).

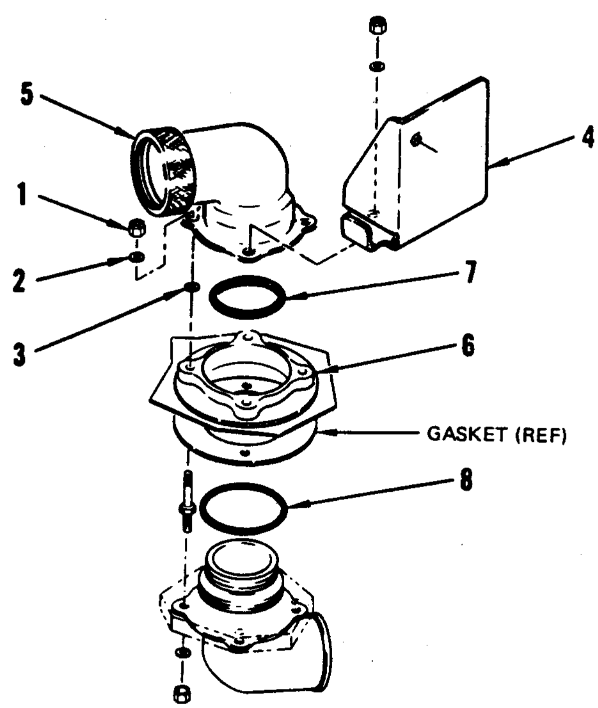




LOWER FUEL TUBE ELBOW

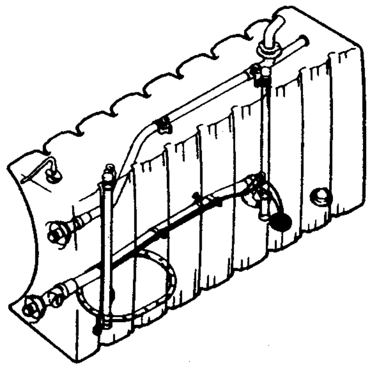
a. Remove nuts (1), washers (2), seals (3), and transmitter mounting bracket (4) securing lower fuel tube elbow (5) to tank flange (6).

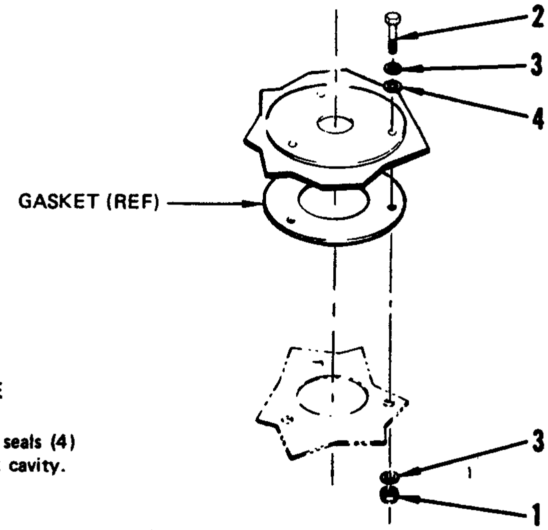
b. Remove elbow and discard O-rings (7 and 8).



06D009–02–09–85

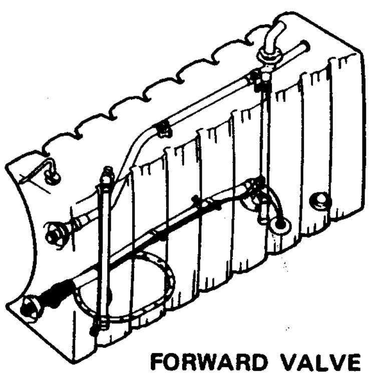
Figure 1-11. Removal; Midfuselage Tank (Sheet 2)

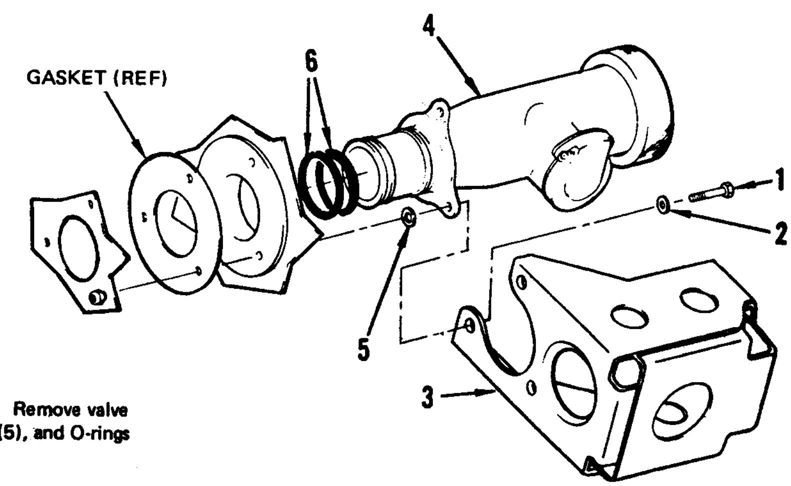




ELECTRICAL FEEDTHROUGH FLANGE

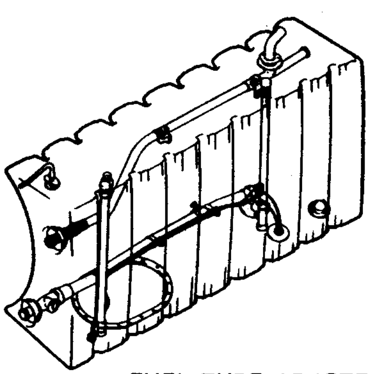
a. Remove nuts (1), bolts (2), washers (3), and seals (4) securing electrical feedthrough flange to tank cavity.

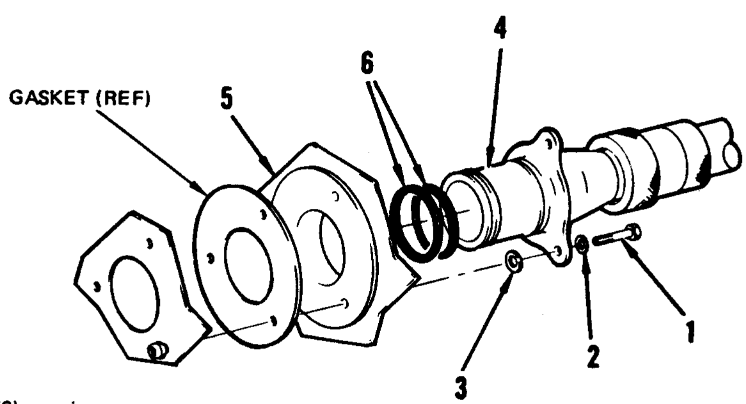




FORWARD VALVE ASSEMBLY

a. Remove bolts (1) and washers (2). Remove valve cover (3). Remove valve (4), seal (5), and O-rings (6).





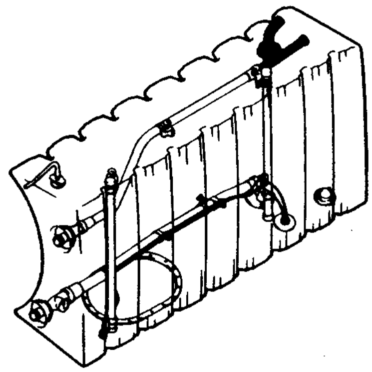
FUEL TUBE ADAPTER

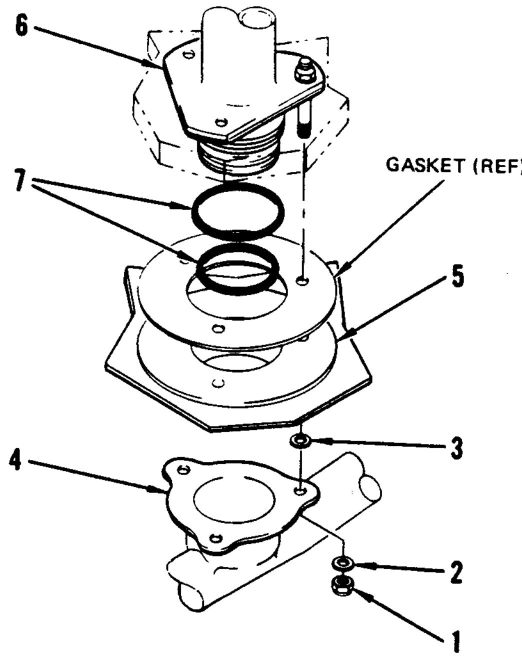
a. Remove bolts (1), washers (2), and seals (3) securing tube adapter (4) and tank flange (5) to upper forward end of tank cavity.

b. Discard seals and O-rings (6).

06D009–03–09–85

Figure 1-11. Removal; Midfuselage Tank (Sheet 3)



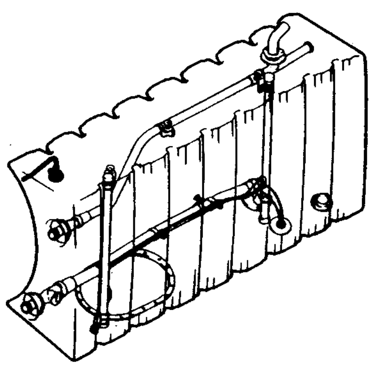


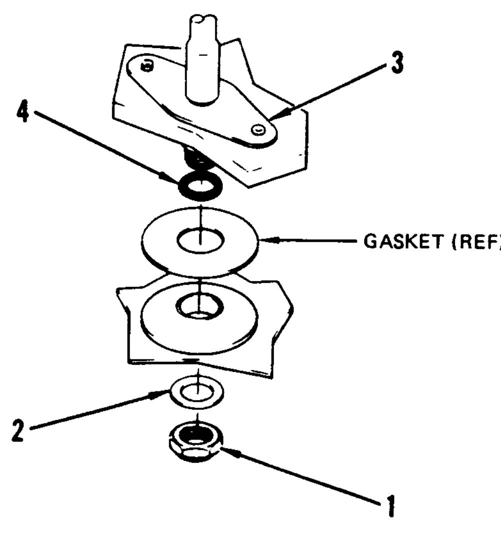
ADAPTER TUBE

a. Remove access 5112–2 or 6112–2 to gain access to left or right midfuselage tank check valve.

b. Remove nuts (1), washers (2), and seals (3) securing adapter tube (4) and tank flange (5) to check valve (6).

c. Remove adapter tube from tank and discard seals and O-rings (7).





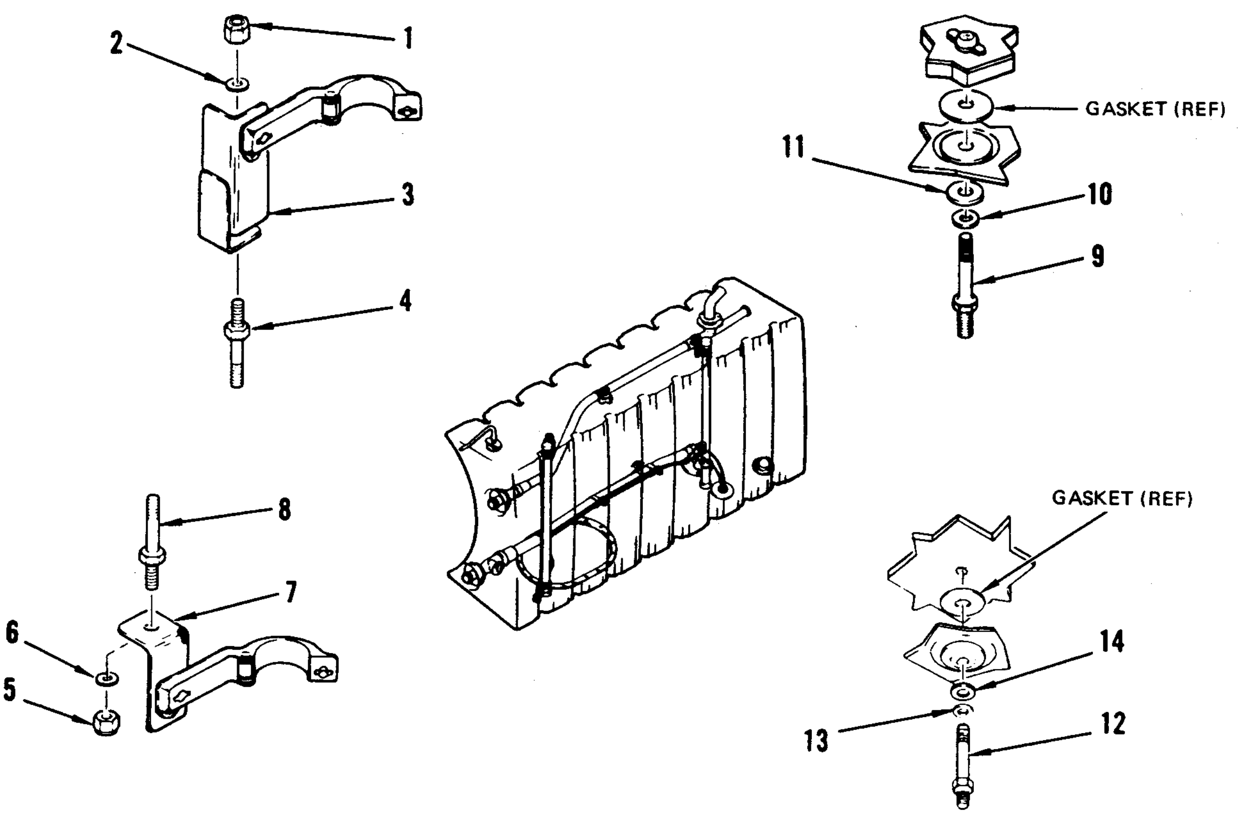
WING VENT LINE ADAPTER

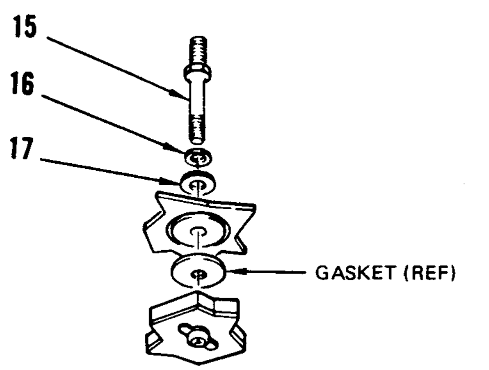
a. Remove nut (1) and washer (2) from wing vent line adapter (3) at forward top of tank.

b. Discard O-ring (4).

06D009–04–09–85

Figure 1-11. Removal; Midfuselage Tank (Sheet 4)





SUPPORT STUDS

a. Remove nut (1), washer (2), and transmitter mounting bracket (3) from lower support stud (4).

b. Remove nuts (5), washers (6), and transmitter mounting brackets (7) from upper support studs (8).

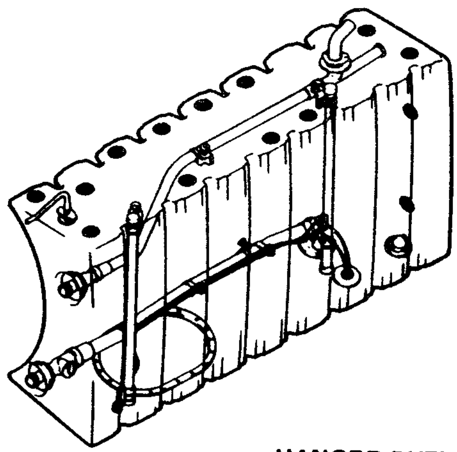
c. Remove three upper support studs (9), washers (10), and seals (11).

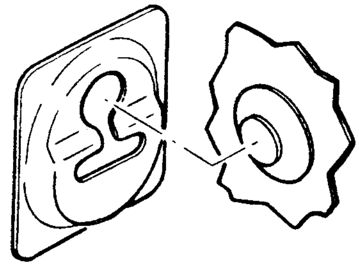
d. Remove inboard support stud (12), washer (13), and seal (14).

e. Remove forward support stud (15), washer (16), and seal (17).

06D009–05–09–85

Figure 1-11. Removal; Midfuselage Tank (Sheet 5)





HANGER BUTTONS

a. Check interior of tank cavity for cleanness and freedom from foreign objects.

b. Leaving upper corners until last, disengage 14 tank hanger buttons from cavity fittings.

FUEL TANK

a. Fold tank so that top and bottom are flat with sides tucked in. Roll tank from forward to aft and remove from airplane.

06D009—06—09—85

Figure 1-11. Removal; Midfuselage Tank (Sheet 6)

1-10.2. Buildup.

a. Place heavy paper or plastic on deck, and unfold replacement tank.

b. Bond new gaskets to external side of each tank flange, except tank access opening, with MMM-A-1617, Type III adhesive.

c. Install new O-rings on the following fittings protruding inside tank cavity.

(1) Fuel transfer elbow at aft outboard corner of cavity floor.

(2) Lower fuel tube elbow at aft inboard end of cavity floor (2 required).

(3) Wing vent line adapter at forward top of cavity.

(4) Check valve assembly at aft top of cavity (2 required).

d. Apply VV-P-236 petrolatum to all adapter ports of tank.

e. Inspect and repair fuel tank as necessary (T.O. 1-1-3).

f. Refold tank to original configuration.

1-10.3. Installation.

a. Clean and vacuum structural cavity.

b. Check structural cavity for condition and security.

c. Powder all interior surfaces of structural cavity using No. 1313 Canadian Talc (Whitaker, Clark, and Daniels) or Fibrene C-400 (Thompson Hayward Chemical Co.).

d. Lubricate all threads of fittings and bolts, except titanium, with SAE 10 or 10W oil.

e. Lubricate titanium bolts with MIL-M-7866 molybdenum disulfide lubricant.

f. Install new gasket on fuel cavity floor.

NOTE

During tank installation, lubricate stat-o-seals with VV-P-236 petrolatum. Install stat-o-seals by screwing onto threads of fittings or bolts instead of pushing straight on. This will reduce the possibility of cutting the stat-o-seal which would result in a fuel leak.

g. Install midfuselage tank in accordance with figure 1-12.

1-11. MAIN SUMP TANK ACCESS REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-11.1. Removal. (Figure 1-13.)

a. Defuel airplane (T.O. 1A-7D-2-1).

NOTE

If fuel tank cannot be oil purged (preferred method), steps c through e must be performed before fuel tank purging.

b. Purge fuel tank (paragraph 1-6 and T.O. 1-1-3).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

c. Open access 2232-2.

d. Remove bolts (1) and washers (2) securing support assembly (3), and remove support assembly.

CAUTION

To avoid damage to sump tank, do not allow access to drop to bottom of tank when final bolt is removed.

e. Remove bolts (4) and washers (5) securing access (6), and remove access and gasket (7).

f. During fuel tank entry, inspect and repair fuel tank as necesary (T.O. 1-1-3).

1-11.2. Installation. (Figure 1-13.)

NOTE

To simplify access installation, fabricate two guide studs from 1/4-inch bolts. Bolts must be 2 inches in length. Remove boltheads, and cut screwdriver slot in shank end of each bolt.

a. Check fuel tank internally, including mating surface of access, for cleanness and freedom from foreign objects.

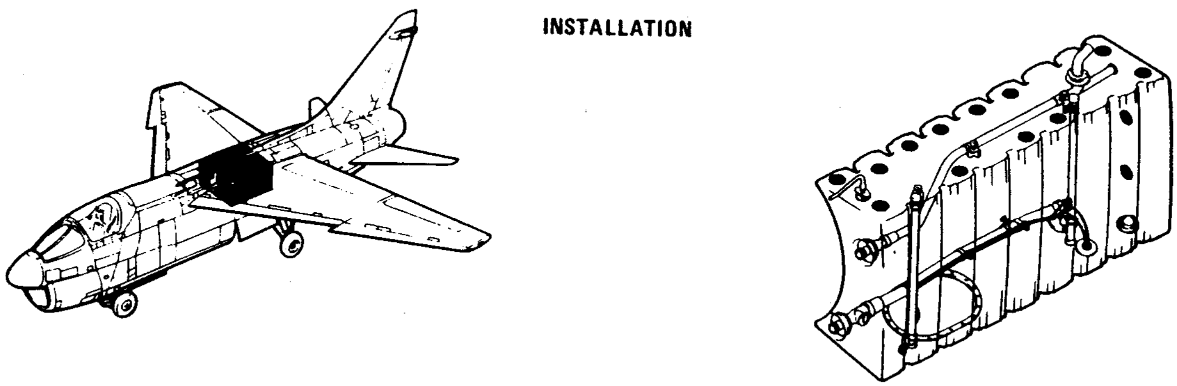
b. Install two guide studs diagonally in a top and bottom bolthold normally occupied by mounting bolts (1) in access.

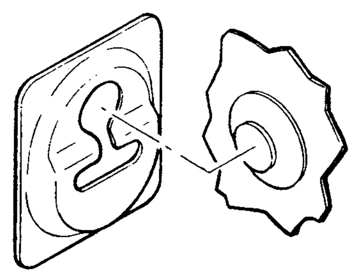
c. Install gasket (7) on studs.

d. Insert access (6) and gasket into main sump tank, and engage with internal flange of access opening, with studs protruding through flange boltholes.

e. Hold access in place by means of studs, and install access mounting washers (5) and bolts (4). Torque bolts in crisscross pattern in increments of 5 inch-pounds until 60 (±5) inch-pounds are obtained.

f. Remove guide studs, and install two remaining mounting bolts and washers as described in step g.





HANGER BUTTONS

a. Insert rolled tank into structural cavity, unfold tank, and engage four upper corner hanger buttons with cavity fittings.

b. Engage the other ten hangers.

c. Position tank flanges over fittings protruding into tank cavity, being careful to seat O-rings properly.

CAUTION

To prevent damage to tank, be careful when installing tank components.

SUPPORT STUDS

a. Using new seals (1), install washers (2) and three upper studs (3) securing tank flanges to cavity.

b. Torque studs to 60 (±5) inch-pounds.

c. Using new seal (4), install washer (5) and stud (6), securing tank flange to inboard air duct bulkhead.

d. Torque stud to 60 (±5) inch-pounds.

e. Using new seal (7), secure tank flange to floor at forward end of tank with washer (8) and stud (9).

f. Torque stud to 60 (±5) inch-pounds.

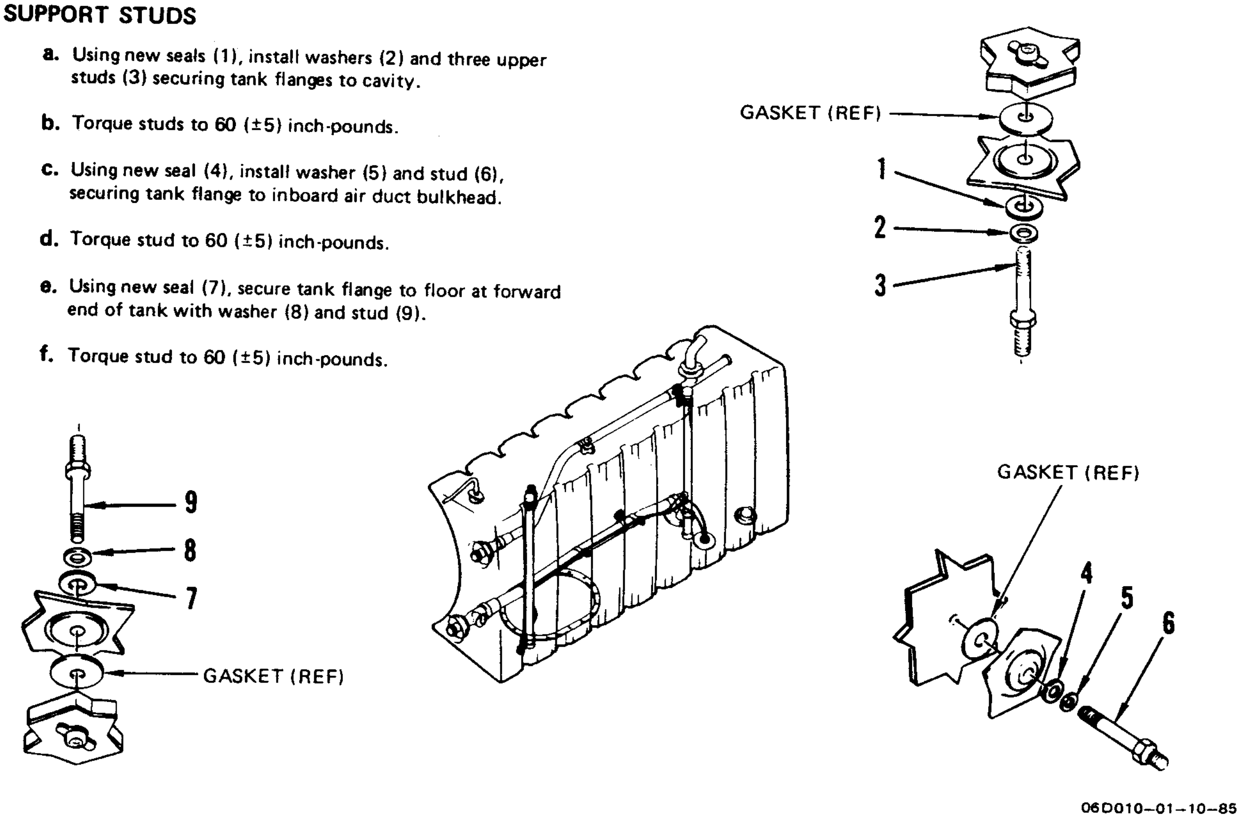


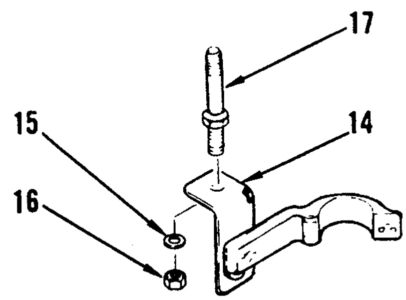
Figure 1-12. Installation; Midfuselage Tank (Sheet 1 of 7)

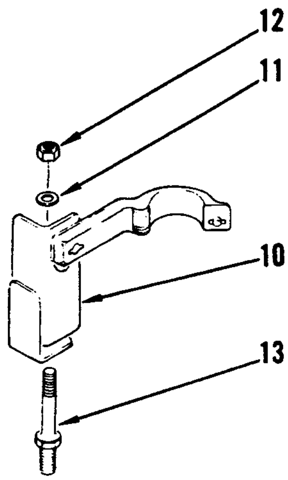
g. Install bracket (10), washer (11), and nut (12) on lower support stud (13).

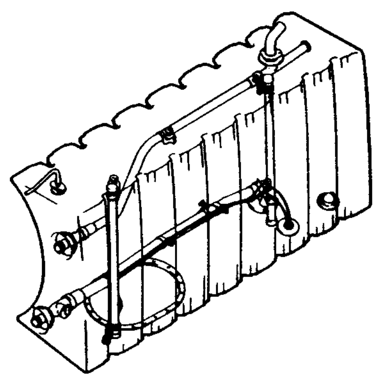
h. Torque nut to 27 (+3, −2) inch-pounds.

i. Install brackets (14), washers (15), and nuts (16) on upper support studs (17).

j. Torque nut to 27 (+3, −2) inch-pounds.



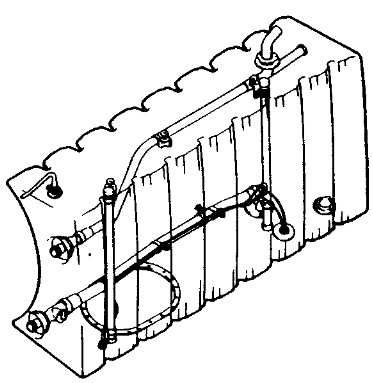


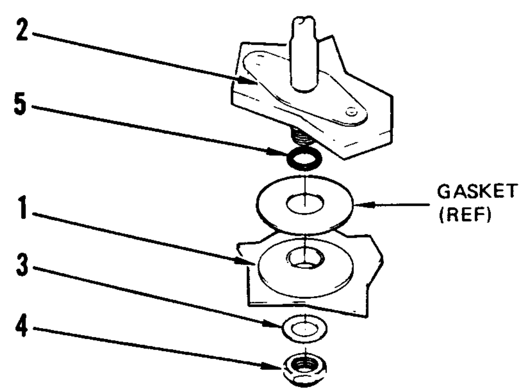


WING VENT LINE ADAPTER

a. Using new O-ring (5), position tank flange (1) over tube end of wing vent line adapter (2) and secure with washer (3) and nut (4).

b. Torque nut to 200 (±20) inch-pounds above free running torque.





06D010–02–10–85

Figure 1-12. Installation; Midfuselage Tank (Sheet 2)

ADAPTER TUBE

a. Gain access to left or right midfuselage tank check valve through access 5112-2 or 6112-2, respectively.

b. Ensure that shoulders of check valve studs (1) are properly seated in slots and that check valve flange is flush with partition skin.

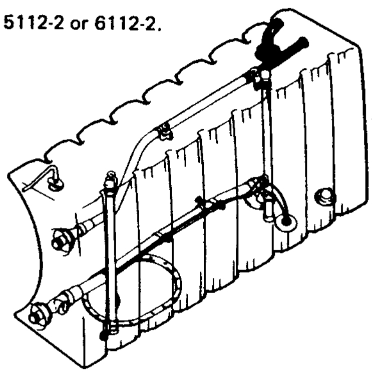
NOTE

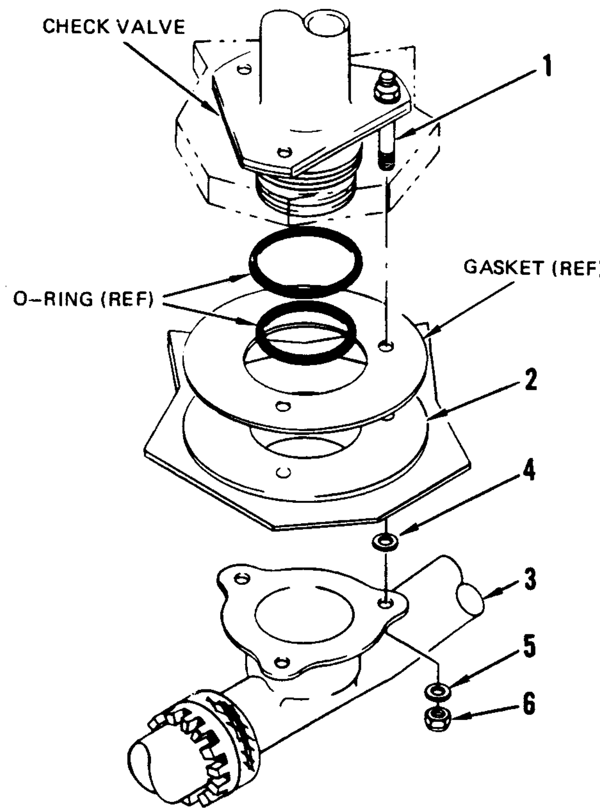
Install washers and nuts in accordance with MIL–B–5087 to prevent accumulation of static charge.

c. Press down on check valve and secure tank flange (2) and adapter tube (3) to check valve studs with new seals (4), washers (5), and nuts (6). Torque nuts to 60(±5) inch-pounds.

d. Check that check valve flange is flush with partition skin and is properly seated all the way around.

e. Close access 5112-2 or 6112-2.



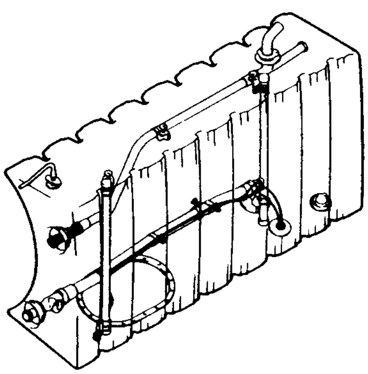


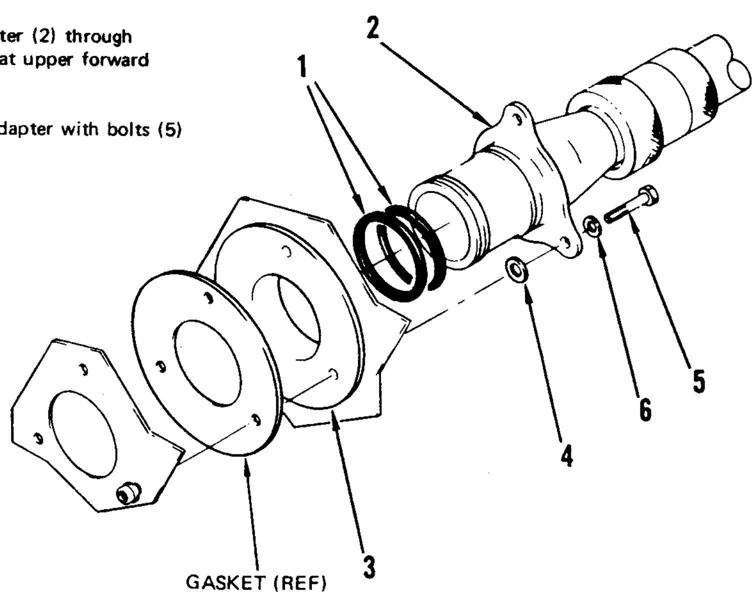
FUEL TUBE ADAPTER

a. Install new O-rings (1) and insert adapter (2) through tank flange (3) and into cavity fitting at upper forward end of tank.

b. Using new seals (4), secure fuel tube adapter with bolts (5) and washer (6).

c. Torque bolts to 60 (±5) inch-pounds.





06D010–03–10–85

Figure 1-12. Installation; Midfuselage Tank (Sheet 3)

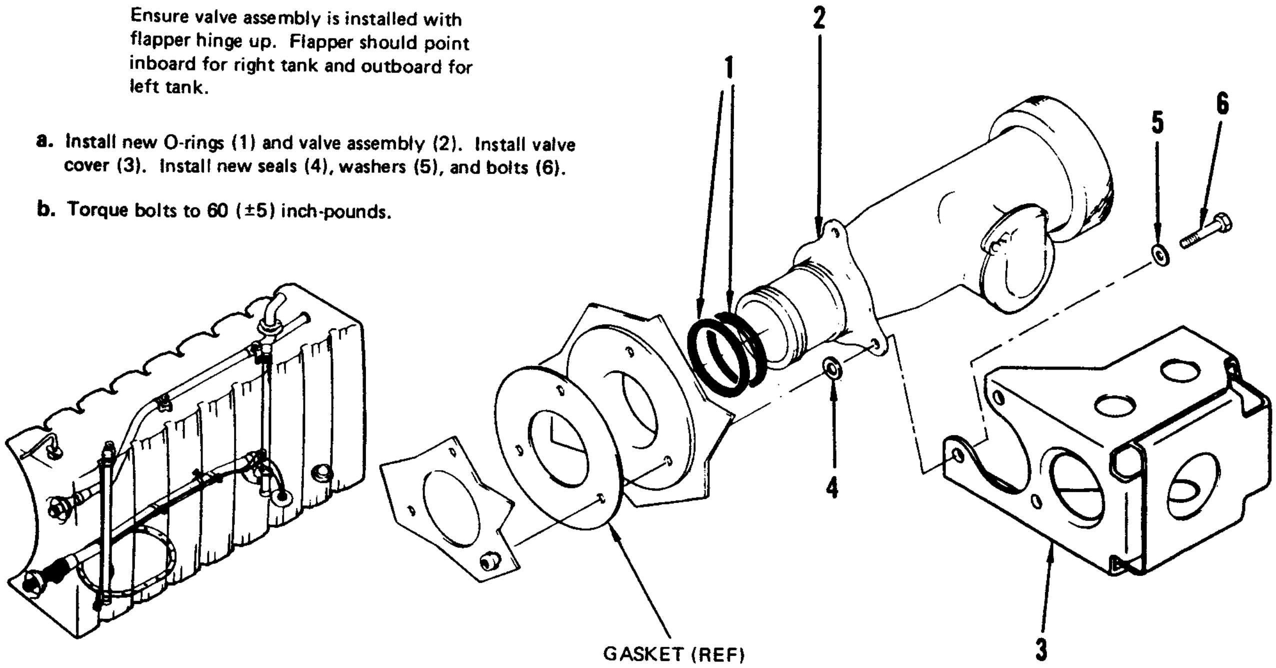
FORWARD VALVE ASSEMBLY

NOTE

Ensure valve assembly is installed with flapper hinge up. Flapper should point inboard for right tank and outboard for left tank.

a. Install new O-rings (1) and valve assembly (2). Install valve cover (3). Install new seals (4), washers (5), and bolts (6).

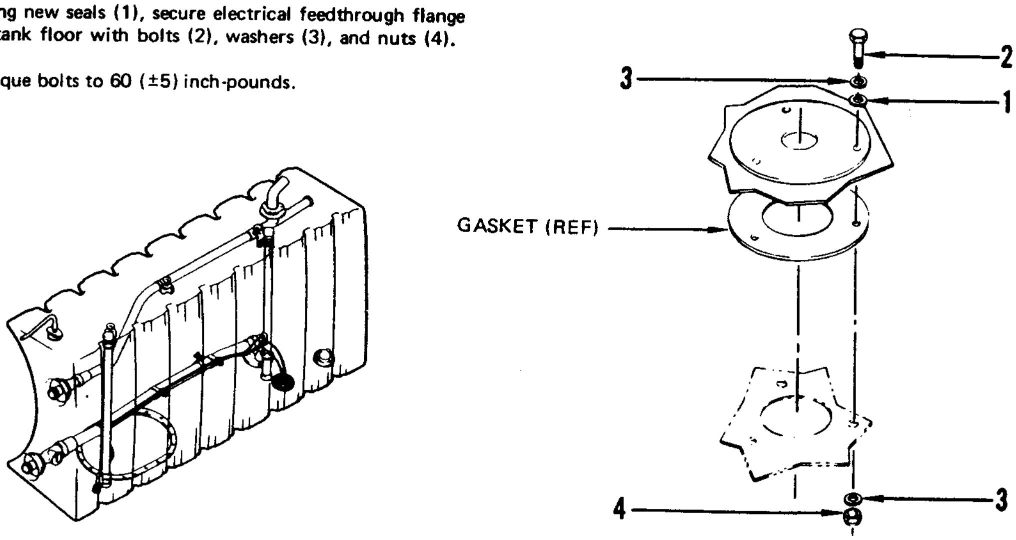
b. Torque bolts to 60 (±5) inch-pounds.



ELECTRICAL FEEDTHROUGH FLANGE

a. Using new seals (1), secure electrical feedthrough flange to tank floor with bolts (2), washers (3), and nuts (4).

b. Torque bolts to 60 (±5) inch-pounds.



06D010–04–10–85

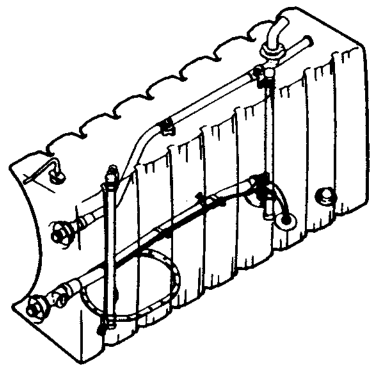
Figure 1-12. Installation; Midfuselage Tank (Sheet 4)

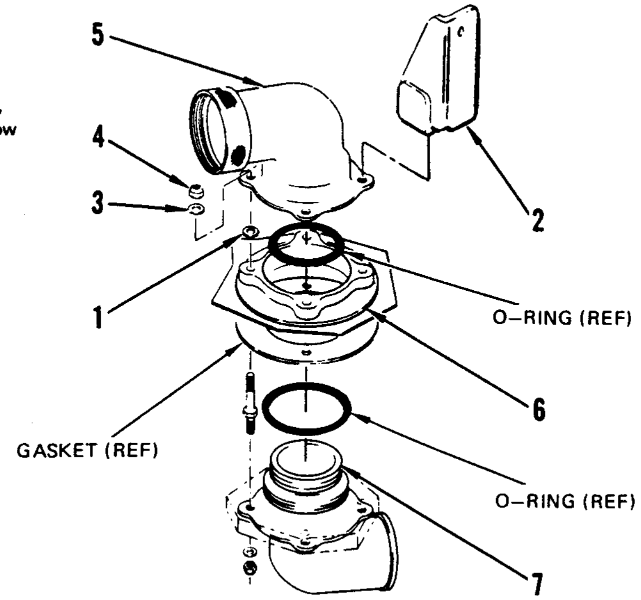
LOWER FUEL TUBE ELBOW

a. Install new seals (1), transmitter mounting bracket (2), washers (3), and nuts (4) securing lower fuel tube elbow (5) to tank flange (6) and transfer fitting (7).

b. Install washers and nuts to studs in accordance with MIL–B–5087 to prevent accumulation of static charge.

c. Torque nuts to 60 (±5) inch-pounds.

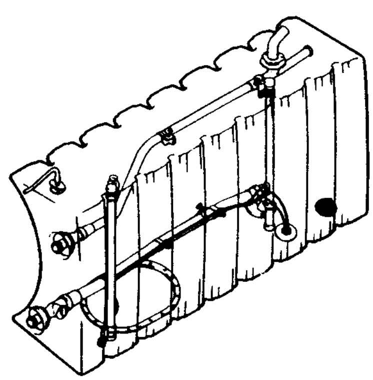




FUEL TRANSFER ELBOW

a. Using new seals (1), secure tank flange (2) to fuel transfer elbow (3) with bolts (4), washers (5), and nuts (6).

b. Torque nuts to 60 (±5) inch-pounds.



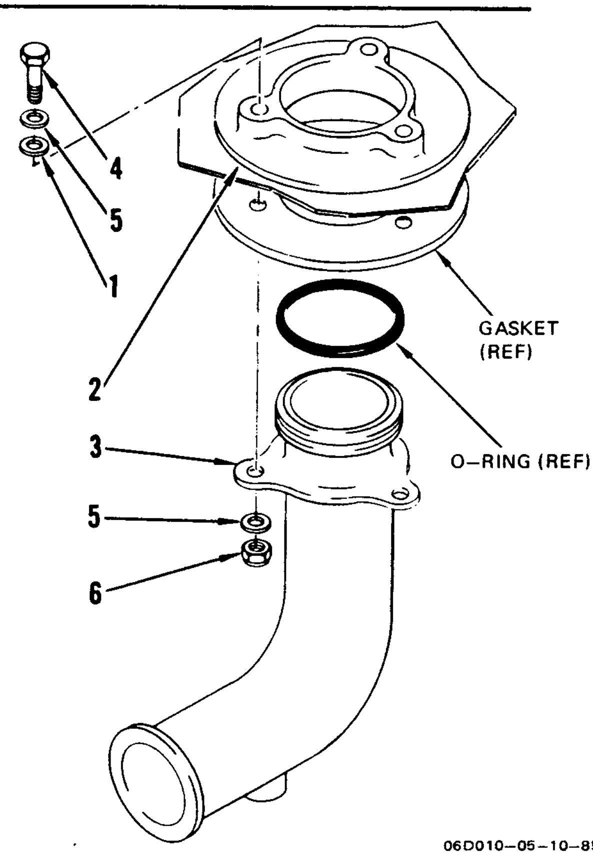


Figure 1-12. Installation; Midfuselage Tank (Sheet 5)

UPPER FUEL TUBE

a. Using new O-rings (1) in couplings (2) position upper fuel tube (3) in tank.

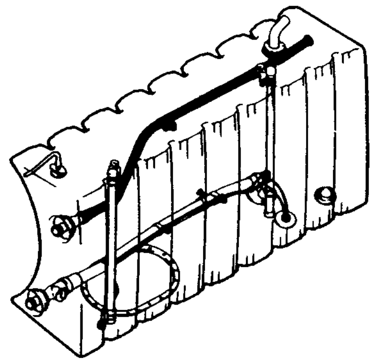
b. Connect couplings to adapter tube (4) and fuel tube adapter (5).

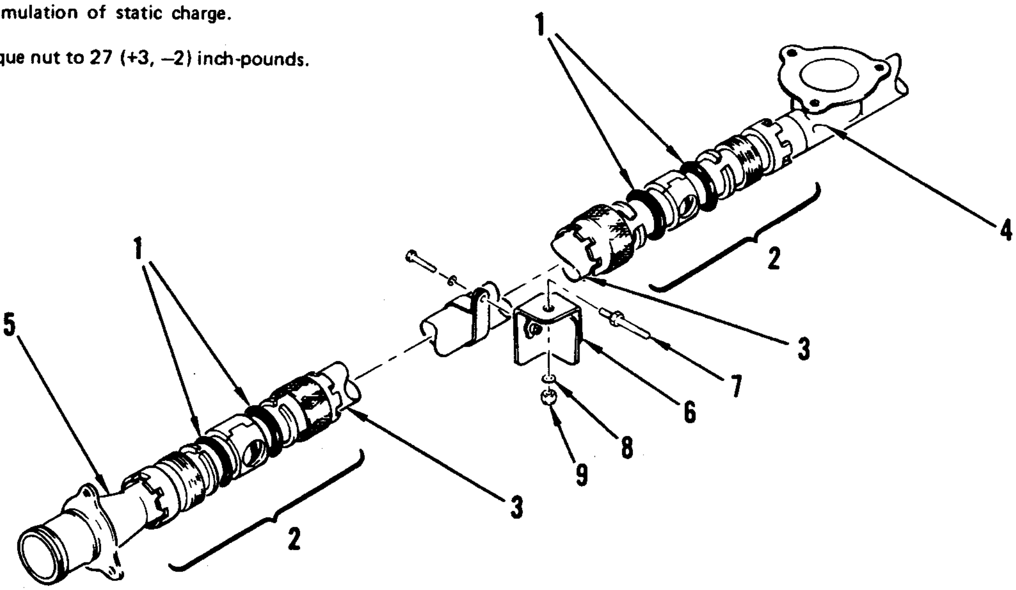
c. Torque couplings to 15 (±2) foot-pounds and secure with MS20995C32 lockwire.

d. Secure tube support bracket (6) to support stud (7) washer (8) and nut (9).

e. Install bracket, washer, and nut on support stud in accordance with MIL-B-5087 to prevent accumulation of static charge.

f. Torque nut to 27 (+3, −2) inch-pounds.





FUEL QUANTITY TRANSMITTERS

a. Place wiring harness in fuel tank.

b. Install midfuselage tank fuel quantity transmitters (paragraph 5—11).

06D010—06—10—85

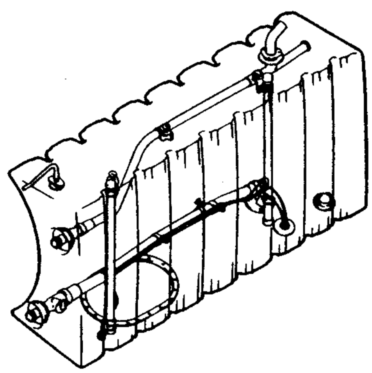
Figure 1-12. Installation; Midfuselage Tank (Sheet 6)

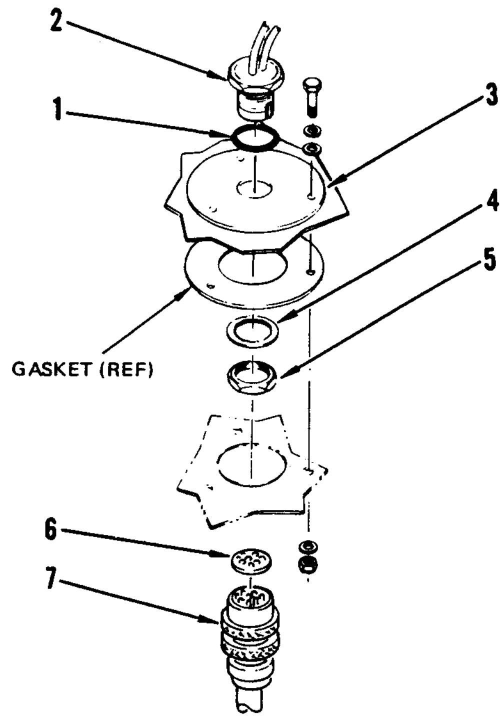
ELECTRICAL FEEDTHROUGH

a. Using new O-ring (1), secure wiring harness feedthrough (2) to tank flange (3) with washer (4) and nut (5).

b. Torque nut to 112 (+3, −2) inch-pounds.

c. Install sealing gasket (6) into external electrical connector (7), with numbers on gasket facing out and aligned with pin numbers (pin 8 is adjacent to keyway). Connect electrical connector (7) to feedthrough connector (2).





CHECKOUT AND ACCESS INSTALLATION

a. Check tank interior for security, mislaid tools, and other foreign objects.

b. Check compartments for cleanness and freedom from foreign objects.

c. Install tank baffles in accordance with paragraph 1–18.

d. Remove heavy tape covering access edges.

e. Install midfuselage tank access panel (paragraph 1–9), but do not fuel airplane.

f. Close accesses 6112-1 and 6211-1 for access to right tank or accesses 5112-1 and 5211-1 for access to left tank.

g. Connect external electrical power (T.O. 1A-7D-2-1) and check that low level fuel warning light is on. Check that low sump level warning light is on.

h. Fuel airplane (T.O. 1A-7D-2-1) and check that low level fuel warning light goes off. Check that low sump level warning light goes off.

i. Disconnect external electrical power.

j. Check installation for evidence of leakage.

k. Perform a fuel contamination test (paragraph 1–20).

06D010–07–10–85

Figure 1-12. Installation; Midfuselage Tank (Sheet 7)

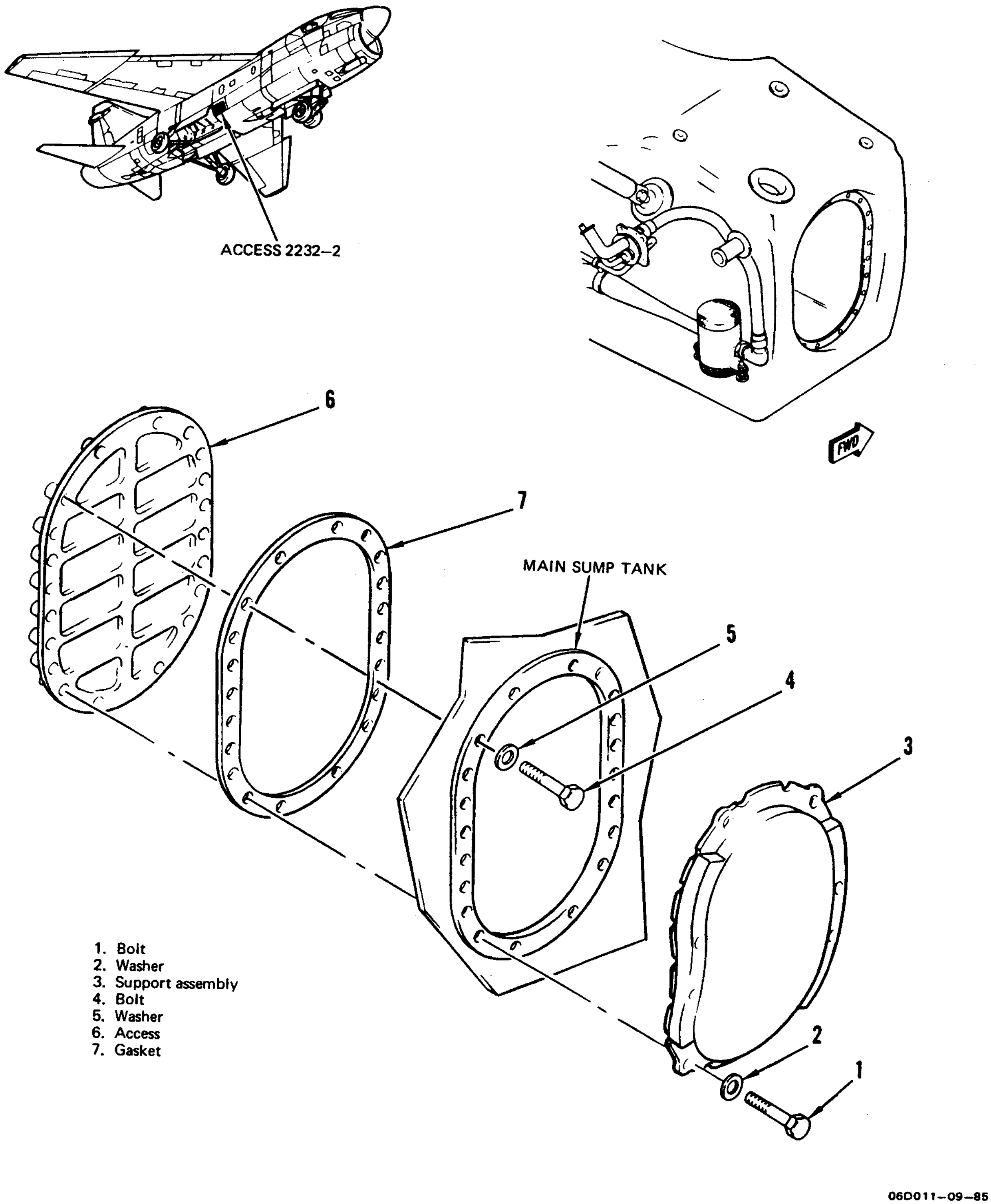


Figure 1-13. Removal and Installation; Main Sump Tank Access

g. Install support assembly (3), with arrow pointing forward, and secure with four washers (2) and bolts (1). Torque bolts in crisscross pattern in increments of 5 inch-pounds until 60 (±5) inch-pounds are obtained.

h. Close access 2232-2.

i. Fuel airplane (T.O. 1A-7D-2-1).

j. Check tank access installation for fuel leakage, paying particular attention to cavity drain.

1-12. MAIN SUMP TANK REMOVAL, BUILDUP, AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Supply power for check of fuel quantity indicator
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	218-01815-1	Sump tank truss bar installation tool	Install sump tank truss bar
	413-900-020	Torque wrench, 100 to 750 inch-pounds	Torque nuts, bolts, or couplings
	55-1	Explosion-proof vacuum cleaner	Clean tank mounting cavity
1-15	(Local fabrication)	Sump tank removal paddles	Remove sump tank
1-15	(Local fabrication)	Sump tank adapter supports	Install sump tank

1-12.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open main sump tank access (paragraph 1-11).

b. Extend speed brake (T.O. 1A-7D-2-8).

c. Remove bonding jumpers. Cut lockwire and disconnect fuel line couplings from main fuel sump tank fittings in left and right landing gear wells. Install plastic bags over couplings.

d. Remove sump tank baffles (paragraph 1-18).

e. Remove sump tank in accordance with figures 1-14 and 1-15.

1-12.2. Buildup.

a. Inspect main sump tank components, and repair or replace as necessary.

b. Bond new gaskets to external side of replacement tank flanges, except access opening, with MMM-A-1617, Type III adhesive.

c. Apply VV-P-236 petrolatum to all edges and adapter ports of tank.

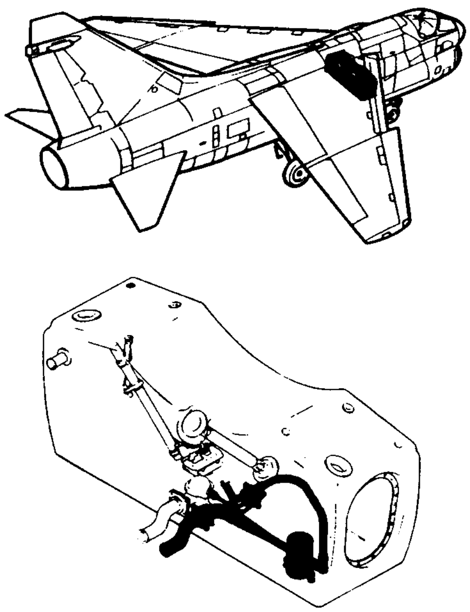
d. Inspect and repair fuel tank as necessary (T.O. 1-1-3).

e. Fold tank as follows (figure 1-16):

(1) Press down on top of tank at end opposite tank access (left end), and fold end of the tank inward.

(2) Apply pressure to each side of tank at the left end so that the sides fold inward.

REMOVAL



EJECTOR PUMP

a. Disconnect sensing tube (1) in right wheel well.

b. Remove nut (2), bolt (3) and washers (4) and disconnect bonding jumper (5) from fuel tube inside tank. Remove clamp (6) from tube and attach to bonding jumper with attaching hardware.

c. Cut lockwire and disconnect couplings (7) at both ends of fuel tube (8). Remove tube and discard O-rings (9).

d. Remove nut (10), bolt (11) and washer (12) securing sensing line clamp (13) to large clamp (14). Leave clamps on tubes and reinstall attaching hardware on large clamp.

e. Disconnect sensing tube (15) at both ends and remove.

f. Remove bolts (16), washers (17), nuts (18) and washers (19) securing ejector pump (20). Remove ejector pump assembly from tank by disengaging from tube fitting in aft tank wall and from mounting studs. Remove O-ring (21).

g. Remove washers (22) and screw ejector pump mounting studs (23) from tank bottom. Remove washers (24) and seals (25).

h. Remove bolts (26), and washers (27) securing adapter tube (28). Remove tube, seals (29) and O-ring (30).

i. Remove bolts (31) and washers (32) securing feed-through adapter (33). Remove adapter, seals (34), and O-ring (35).

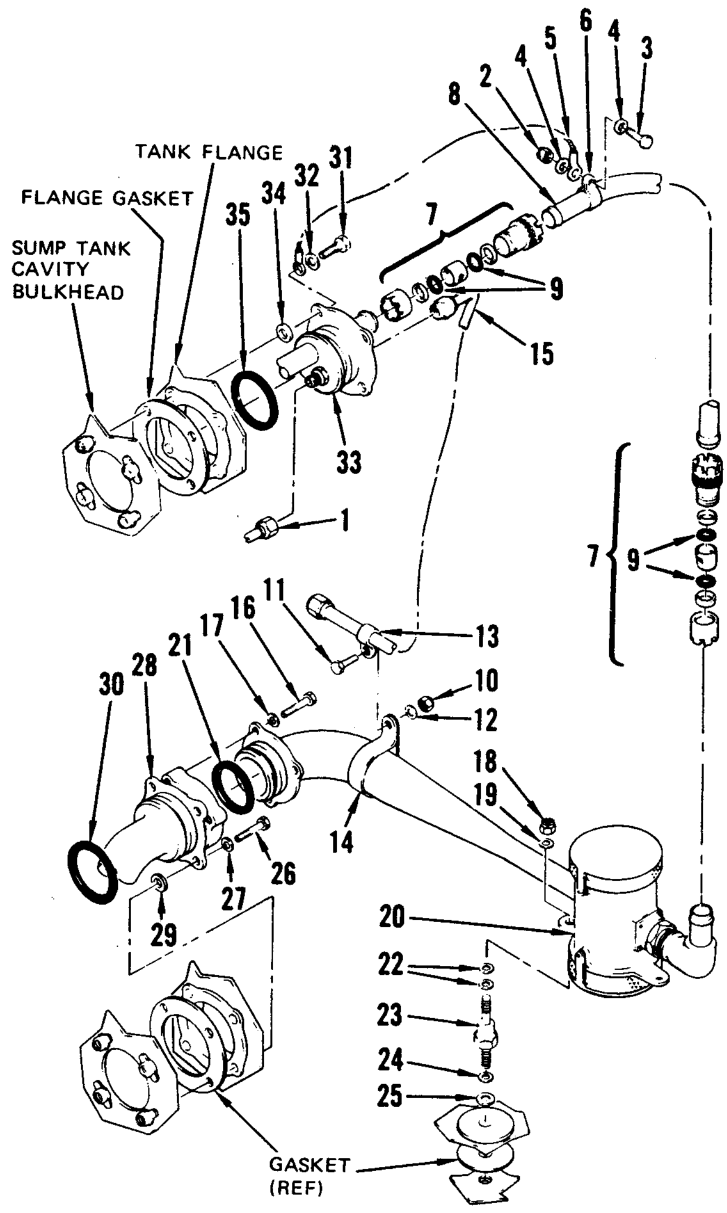
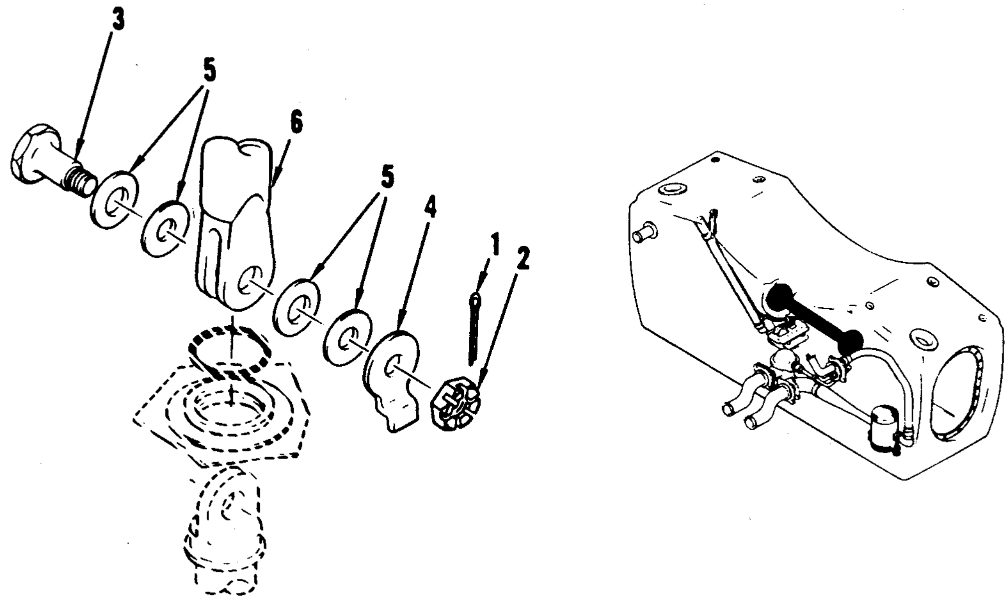


Figure 1-14. Removal; Main Sump Tank (Sheet 1 of 6)

TRUSS BAR

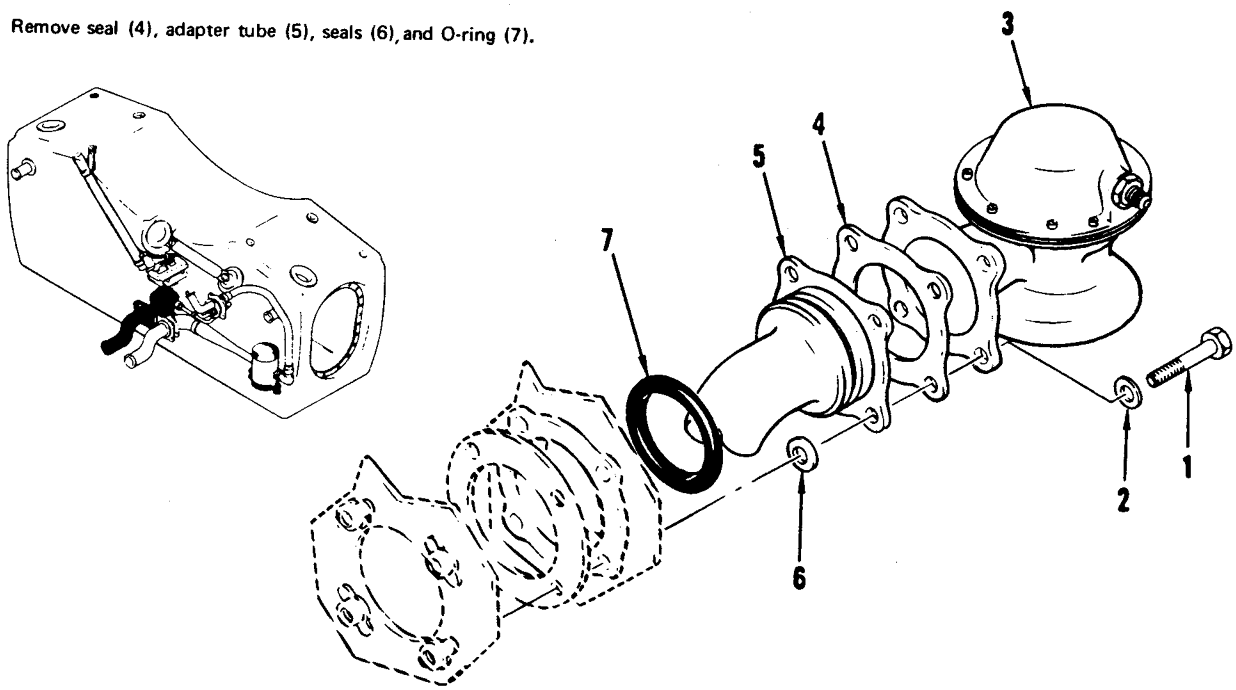
a. Remove cotter pin (1), nut (2), bolt (3), retainer washer (4), and washers (5) from both ends of truss bar (6), and remove truss bar from eye fittings.



PRESSURE SENSITIVE STOP VALVE

a. Remove bolts (1), washers (2), and pressure sensitive stop valve (3).

b. Remove seal (4), adapter tube (5), seals (6), and O-ring (7).

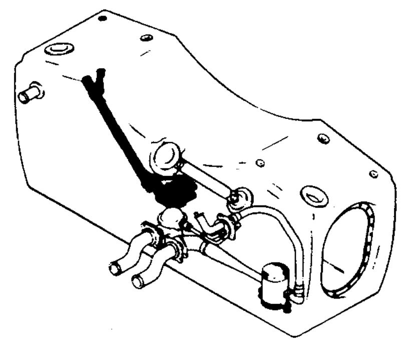


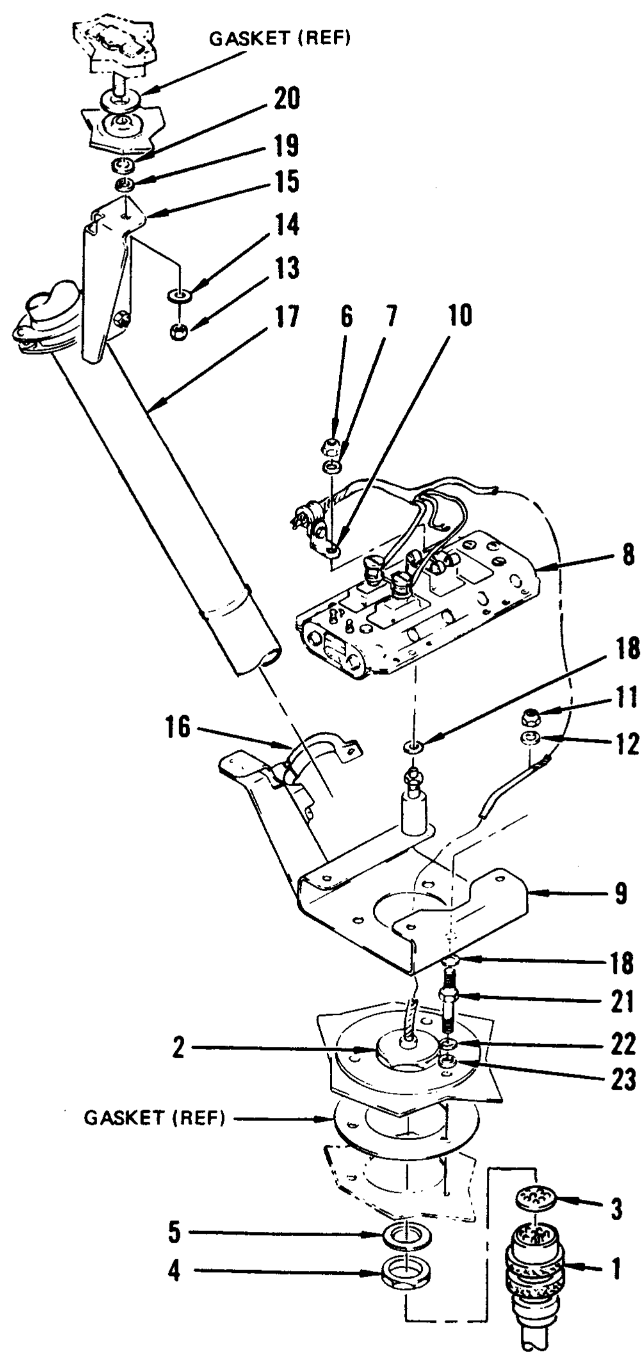
06D012-02-09-85

Figure 1-14. Removal; Main Sump Tank (Sheet 2)

FUEL QUANTITY TRANSMITTER AND COMPENSATOR

a. Disconnect external electrical connector (1) from feedthrough connector (2). Remove gasket (3). Inspect both connectors for contamination and/or moisture. Clean with Freon TF and dry with hot air gun or dry gaseous nitrogen. Remove locknut (4) and lockwasher (5) (external) securing feedthrough to tank and push feedthrough into tank.





b. Remove nuts (6) and washers (7) securing compensator (8) to compensator bracket (9). Disengage angle (10) from stud and allow to remain on wiring.

c. Remove nuts (11) and washers (12) securing compensator bracket to studs in bottom of tank.

d. Remove nut (13) and washer (14) securing fuel quantity transmitter bracket (15) to stud in top of tank.

e. Unlock quick-disconnect type clamp (16) and remove transmitter (17), wiring harness and compensator as an assembly.

f. Remove compensator bracket and washers (18).

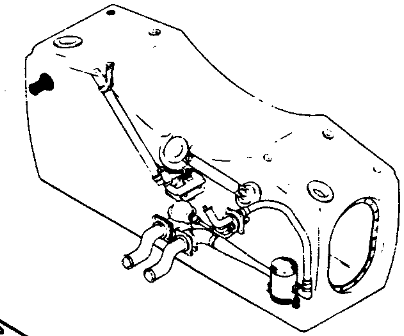
g. Remove washer (19) and seal (20) from upper stud.

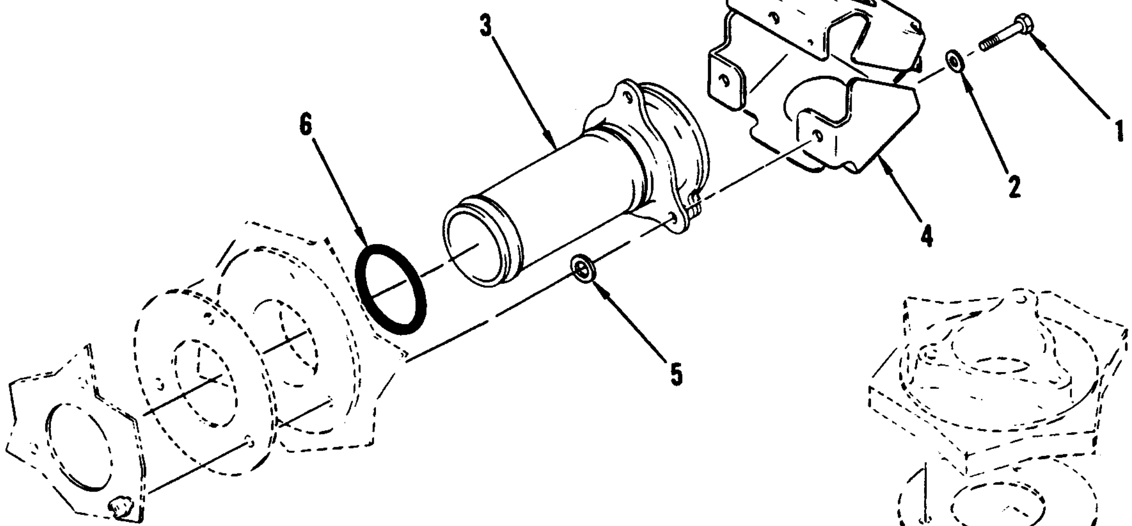
h. Remove studs (21), washers (22) and seals (23).

Figure 1-14. Removal; Main Sump Tank (Sheet 3)

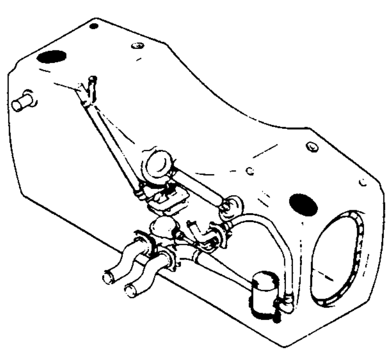
CHECK VALVES

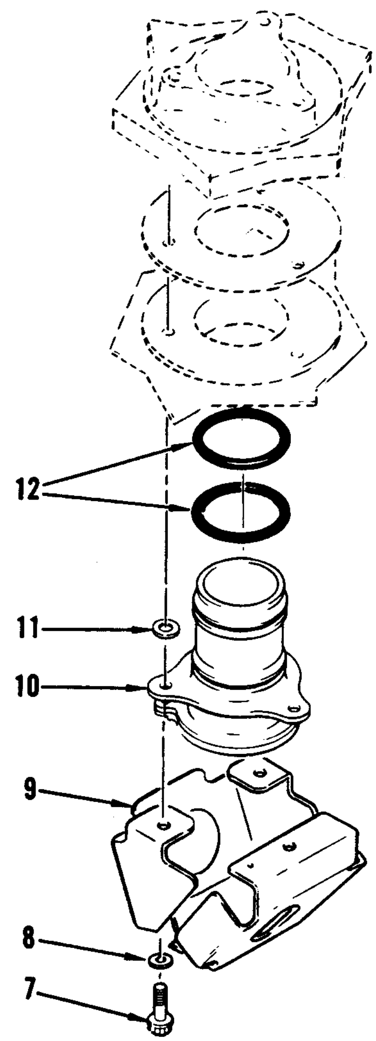
a. Remove bolts (1) and washers (2) securing valve cover and check valve to aft wall of tank. Remove cover (4), valve (3), seals (5), and O-ring (6).





b. Remove bolts (7) and washers (8). Remove valve covers (9). Remove valves (10), seals (11), and O-rings (12).



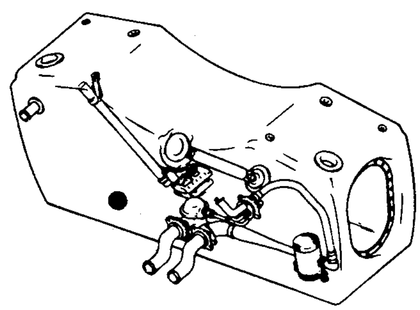


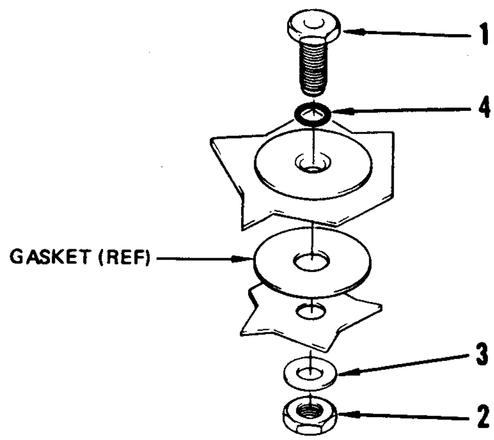
06D012—04—09—85

Figure 1-14. Removal; Main Sump Tank (Sheet 4)

TANK DRAIN ADAPTER

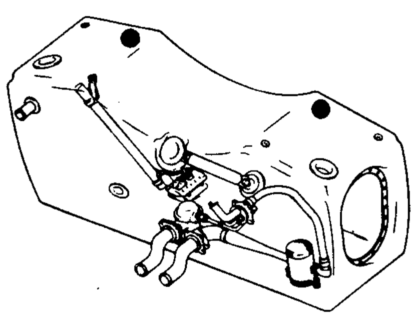
a. Disconnect tank drain line in speed brake well from tank drain adapter (1).
b. Cut lockwire and remove nut (2), washer (3), drain adapter and O-ring (4).

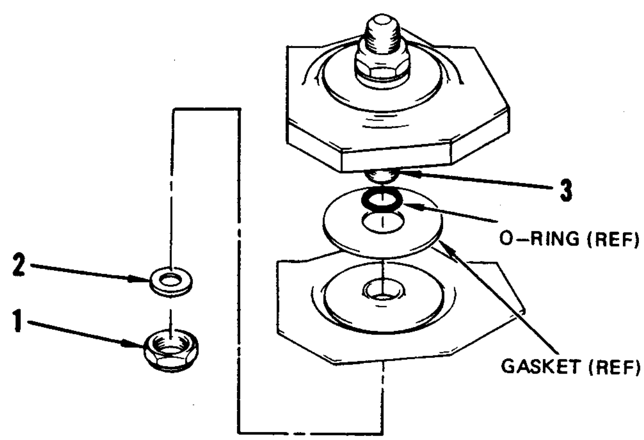




VENT TUBE FITTINGS

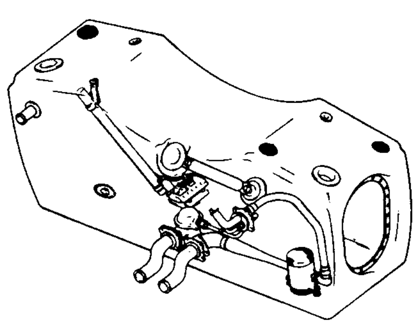
a. Remove nut (1) and washer (2) at two vent tube fittings (3).

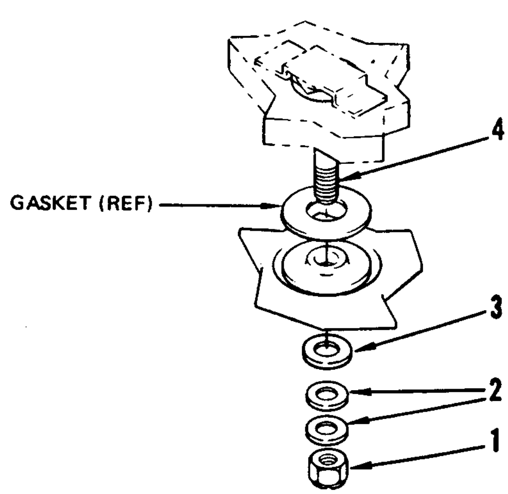




TANK HANGERS

a. Remove nut (1), washers (2), and seal (3) at three places to release tank from hangers (4).





06D012–05–09–85

Figure 1-14. Removal; Main Sump Tank (Sheet 5)

FUEL TANK

a. Tape edges of tank cavity access opening before removing tank.

b. Using two main sump tank removal paddles (figure 1–15), disengage tank adapters from truss bar fittings (1), tank hanger bolts (2), vent fittings (3), and forward fuselage tank check valve bolts (4) that protrude through forward fuselage tank floor.

CAUTION

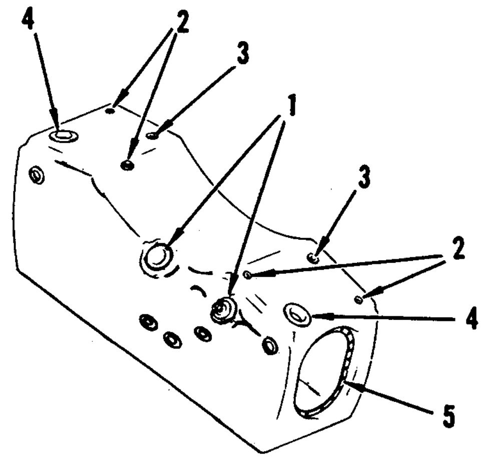
To prevent scoring of inner sealing surfaces of tank adapter, be careful not to bind adapters on bolts.

NOTE

Bolts at the far left end of the tank may be cleared of the tank adapters after the tank access end (right end) has been partially folded down.

c. Work each fitting and bolt free from the tank adapters individually by sliding the paddles between the main sump tank and tank cavity bulkhead or overhead.

d. To fold the tank, push in on bottom of tank access ring (5) while pulling down on upper edge of tank. Fold tank so that outer surface of access ring folds toward bottom of tank cavity.

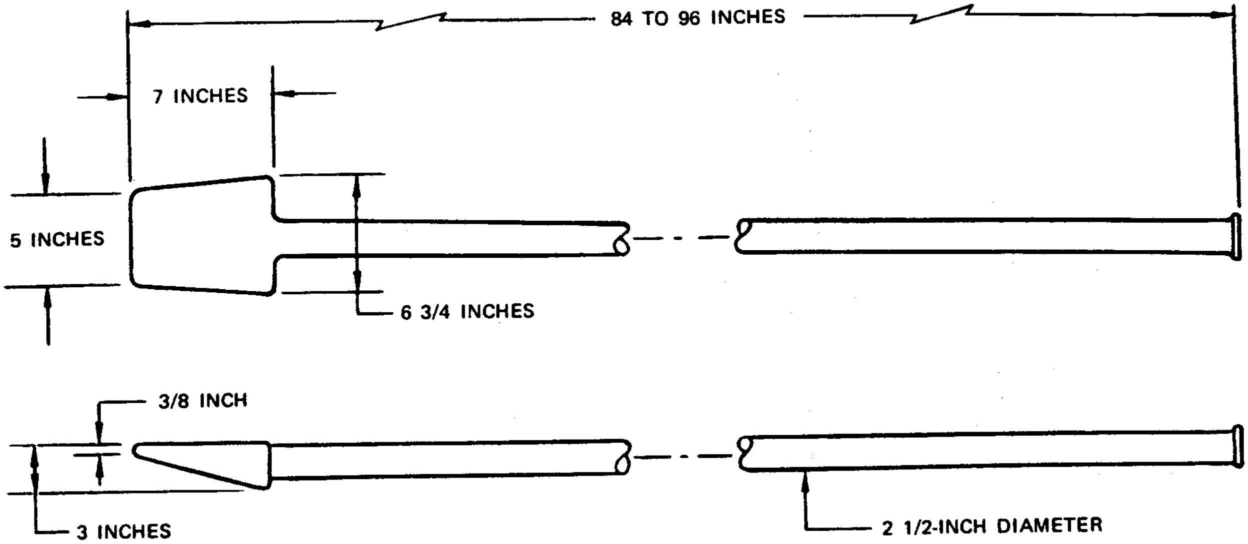


e. After the right top of tank is free of bolts and fittings, use the tank removal paddles to clear the remaining adapters.

f. When all tank adapters are clear of bolts and fittings, slowly pull tank from tank cavity using care to prevent snagging.

06D012–06–09–85

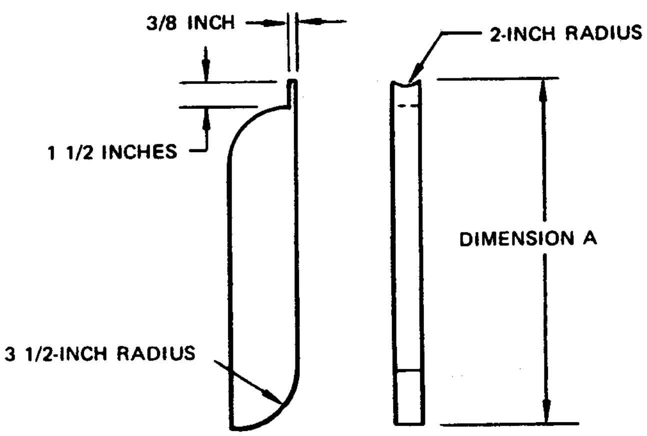
Figure 1-14. Removal; Main Sump Tank (Sheet 6)



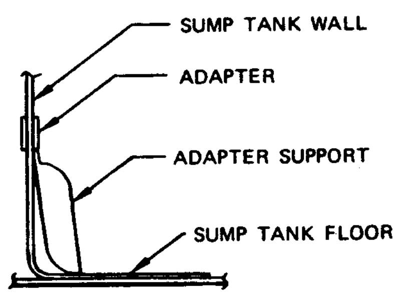
MAIN SUMP TANK REMOVAL PADDLE (2 Required)

NOTE

Make paddle from hardwood. Handle may be spliced and doweled if necessary. Round and smooth all sharp edges.



MAIN SUMP TANK ADAPTER SUPPORT



TYPICAL INSTALLATION OF ADAPTER SUPPORT

NOTE

Three wood adapter supports are required. Dimension A is as follows:

No. 1 – 11 inches
No. 2 – 17 3/4 inches
No. 3 – 17 3/4 inches

06D068–09–85

Figure 1-15. Removal Paddle and Adapter Supports; Main Sump Tank

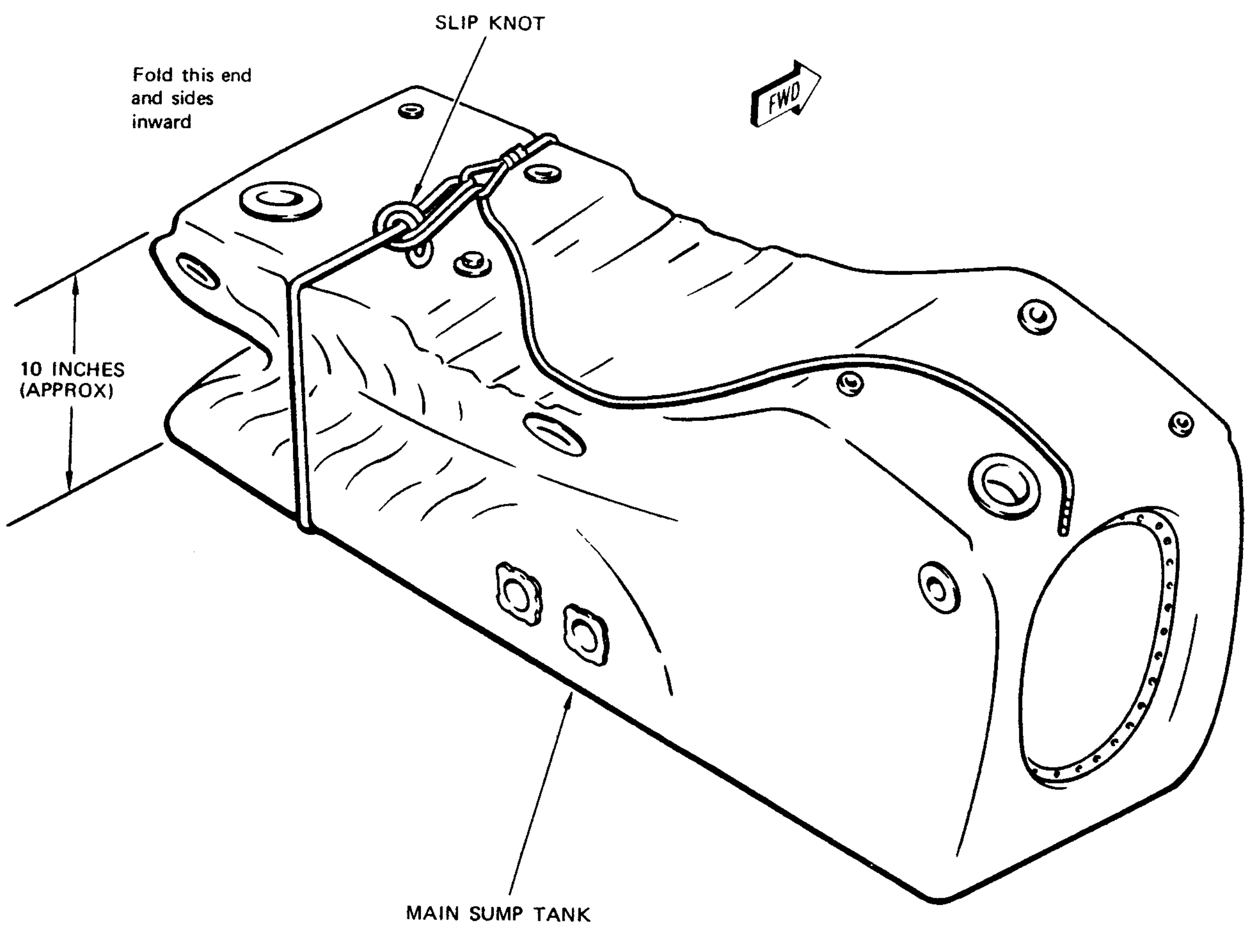


Figure 1-16. Folded for Installation; Main Sump Tank

(3) Continue to press down on top of tank until tank is approximately 10 inches in height in the area of the left end.

(4) Secure left end of tank with rope tied in a slip-knot so that rope may be removed by pulling on loose end.

(5) Check that edges and sides of folded tank do not protrude beyond the original dimensions of the tank.

1-12.3. Installation.

NOTE

Use a plastic-faced mallet to tap components into tank fittings.

a. Locally fabricate the following tools to simplify tank installation.

(1) Three 1/4-inch headless studs fabricated from bolts approximately 2 inches in length with screwdriver slot in shank end (for alignment of flange boltholes as necessary during adapter tube installation).

(2) A two by four, approximately 6 feet long, padded on one end and taped its entire length (to aid in positioning tank within the cavity and to install tank adapters over truss bar eye fittings).

b. Clean tank mounting cavity with vacuum cleaner.

c. Powder interior surfaces of cavity with No. 1313 Canadian Talc (Whitaker, Clark, and Daniels) or Fibrene C-400 (Thompson Hayward Chemical Co.).

d. Lubricate all threads of fittings and bolts, except titanium, with SAE 10 or 10W oil.

e. Lubricate titanium bolts with MIL-M-7866 molybdenum disulfide lubricant.

NOTE

During tank installation, lubricate stat-o-seals with VV-P-236 petrolatum. Install stat-o-seals by screwing onto threads of fittings or bolts instead of pushing straight on. This will reduce the possibility of cutting the stat-o-seal which would result in a fuel leak.

f. Install main sump tank in accordance with figure 1-17.

1-13. PRESSURE SENSITIVE STOP VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-13.1. Removal. (Figure 1-18.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove main sump tank access (paragraph 1-11).

b. Remove tank baffles (paragraph 1-18).

c. Disconnect sensing tube (1) from valve.

d. Remove bolts (2), washers (3), seals (8), valve (4), and gasket (5).

e. Remove reducer (6) and O-ring (7) from valve.

1-13.2. Installation. (Figure 1-18.)

a. Install reducer (6) with new O-ring (7) in valve.

b. Place new gasket (5) on valve mounting flange; position valve (4) and install mounting bolts (2), washers (3), and seals (8).

c. Connect sensing tube (1) to valve.

d. Wipe any contamination from interior surfaces of tank with cloth wet with an equal quantity mixture of water and O-G-491 glycerol.

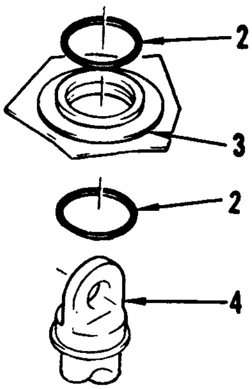
e. Install tank baffles (paragraph 1-18).

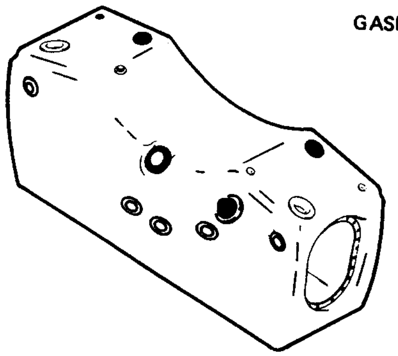
f. Install main sump tank access (paragraph 1-11).

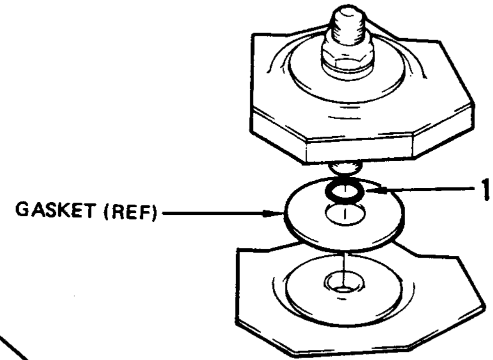
g. Perform fuel contamination test (paragraph 1-20).

FUEL TANK

a. Install new O-rings (1) on two vent fittings in top of tank.
b. Install new O-ring (2) on top and bottom tank fittings (3) through which truss bar fitting (4) extends.
c. Tape edges of tank cavity access opening to protect tank from sharp edges.







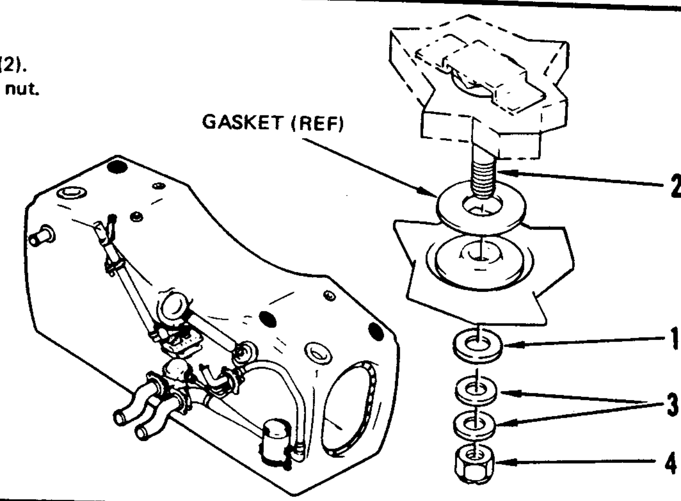
d. Orient folded main sump tank properly and insert into tank mounting cavity until approximately 12 inches protrudes from cavity access. Use care to avoid snagging tank on protruding fittings.
e. Remove rope from tank by pulling on loose end. Unfold tank and push into installed position.
f. Use padded and taped two-by-four board to approximately align tank openings and install tank adapters over truss bar eye fittings.

TANK HANGERS

a. Install new seals (1) on three tank hanger studs (2).
b. Install washers (3) and nuts (4). Do not tighten nut.

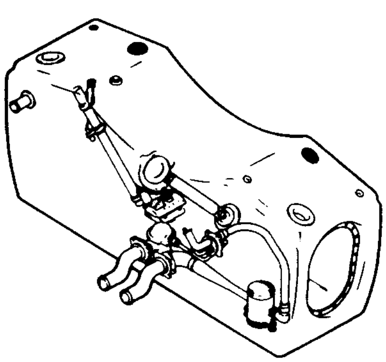
CAUTION

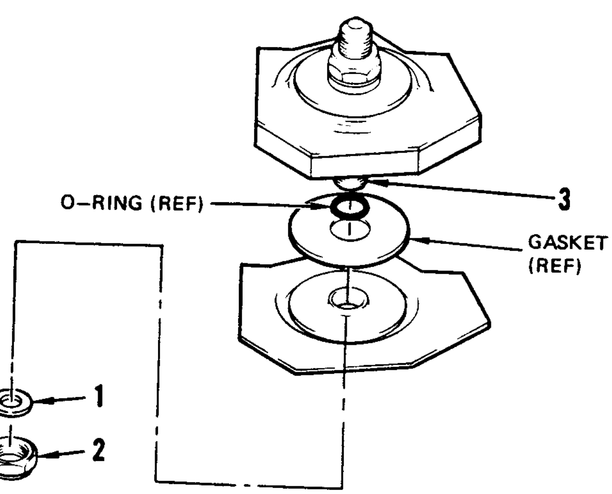
To prevent damage to tank, be careful when installing tank components.



VENT TUBE FITTINGS

a. Install washers (1) and nuts (2) on two vent tube fittings (3). Do not tighten nuts.





06D013-01-10-85

Figure 1-17. Installation; Main Sump Tank (Sheet 1 of 7)

CHECK VALVES

NOTE

To obtain equal fuel transfer from fuselage tanks, ensure that check valves used are from the same vendor.

a. Install new O-rings (1) on check valves (2).

b. Engage check valves with tank fittings so that flapper hinges are outboard and parallel to longitudinal center-line of airplane.

NOTE

Install washers and bolts in accordance with MIL-B-5087 to prevent accumulation of static charge.

c. Position covers (3) over check valves. Install and secure valves with new seals (4), washers (5), and bolts (6). Do not tighten bolts. If check valve flapper binds against cover (3) when in full open position, install (maximum of two) washer/s (7) as required.

d. Align tank adapter fittings with fuselage cavity openings using locally fabricated adapter supports (figure 1—15).

e. Install new O-rings (8) and insert check valves (9) through tank fittings. Remove adapter supports.

f. Position check valves with flapper hinges down and in horizontal position.

NOTE

Install washers and bolts in accordance with MIL—B—5087 to prevent accumulation of static charge.

g. Install valve cover (10). Install and secure check valve with new seals (11), washers (12) with countersink out, and bolts (13). Do not tighten bolts. If check valve flapper binds against cover (10) when in full open position, install (maximum of two) washer/s (14) as required.

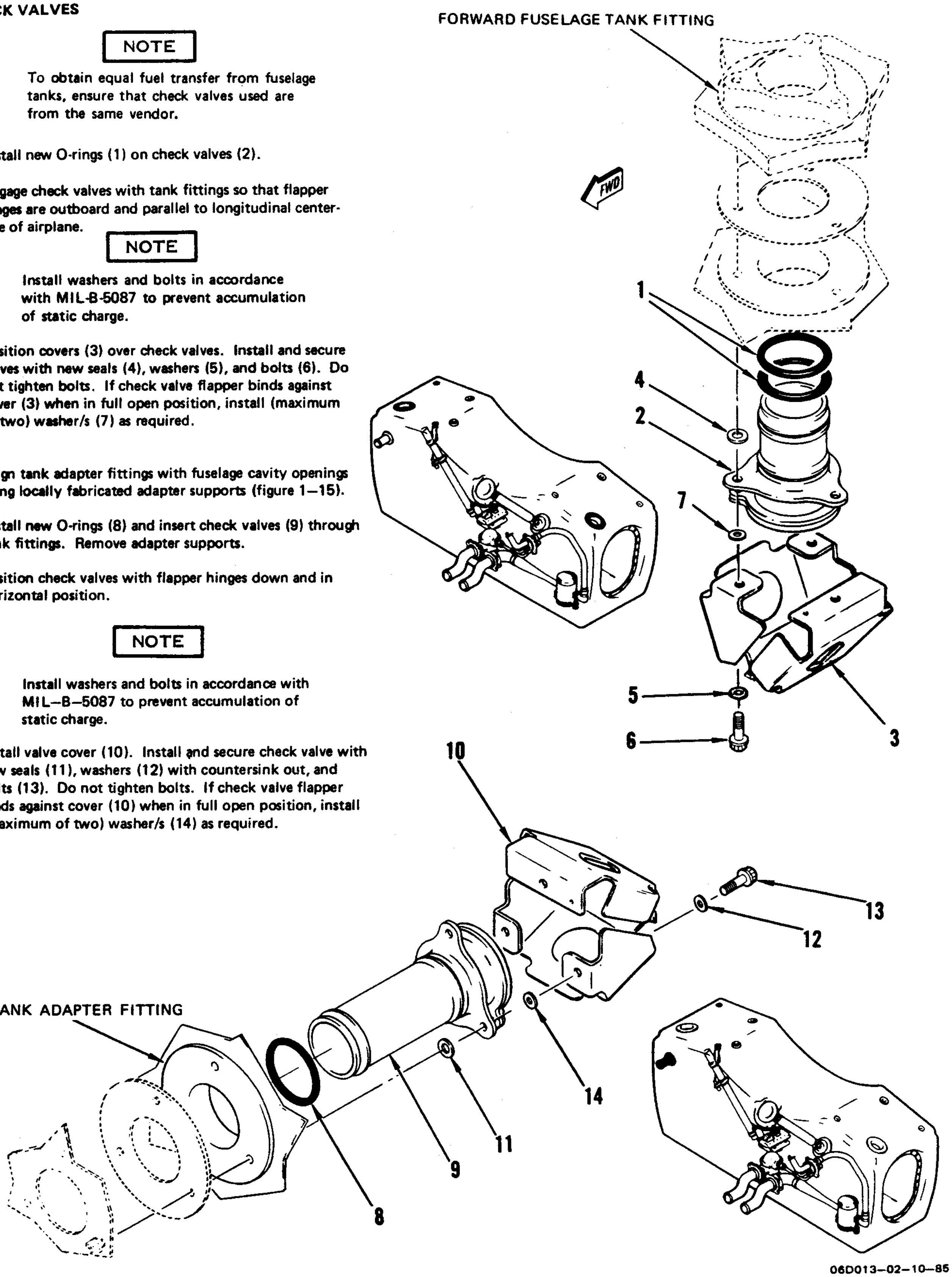
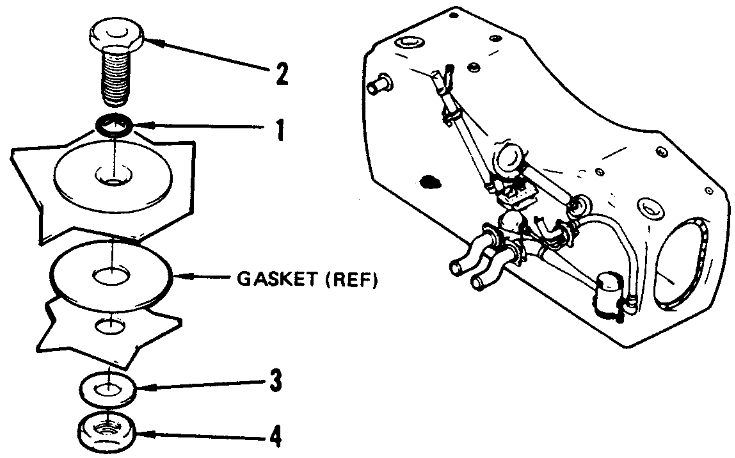


Figure 1-17. Installation; Main Sump Tank (Sheet 2)

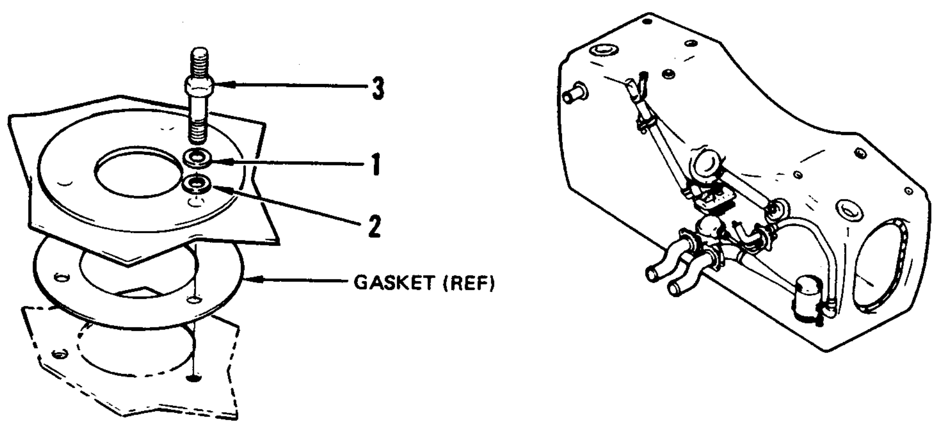
TANK DRAIN ADAPTER

a. Install new O-ring (1) on drain adapter (2) and insert fitting through drain opening in floor of tank.
b. Secure drain fitting with washer (3) and nut (4).
c. Torque nut to 140 (±10) inch-pounds and secure with MS20995C32 lockwire.
d. Connect tank drain line to drain adapter in speed brake well.



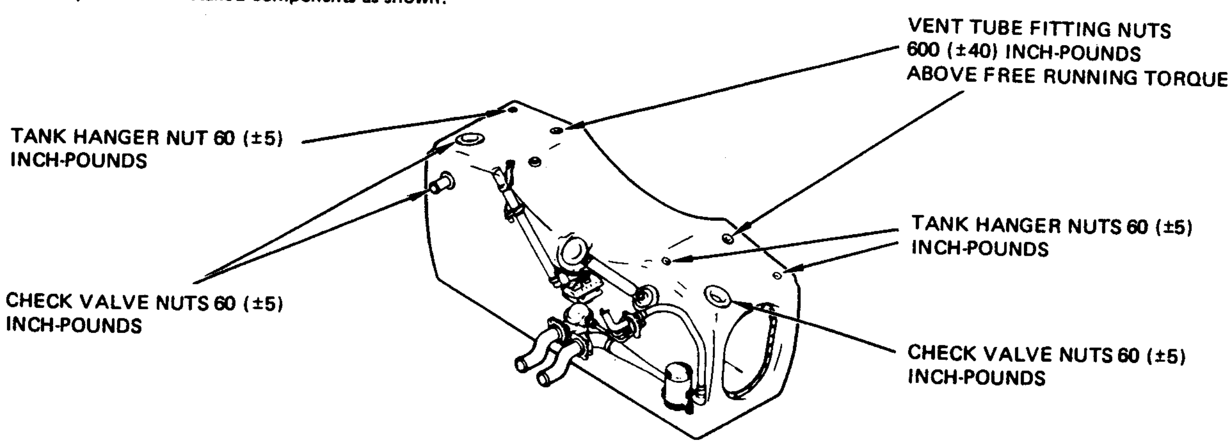
COMPENSATOR BRACKET STUDS

a. Install washers (1) and new seals (2) on compensator bracket mounting studs (3), and install studs, with short end up, in tank floor fittings.
b. Torque studs to 60 (±5) inch-pounds.



TORQUE VALUES

a. Torque nuts of installed components as shown.

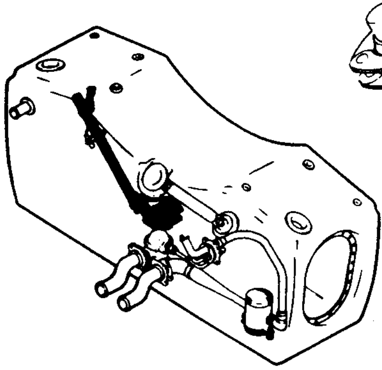


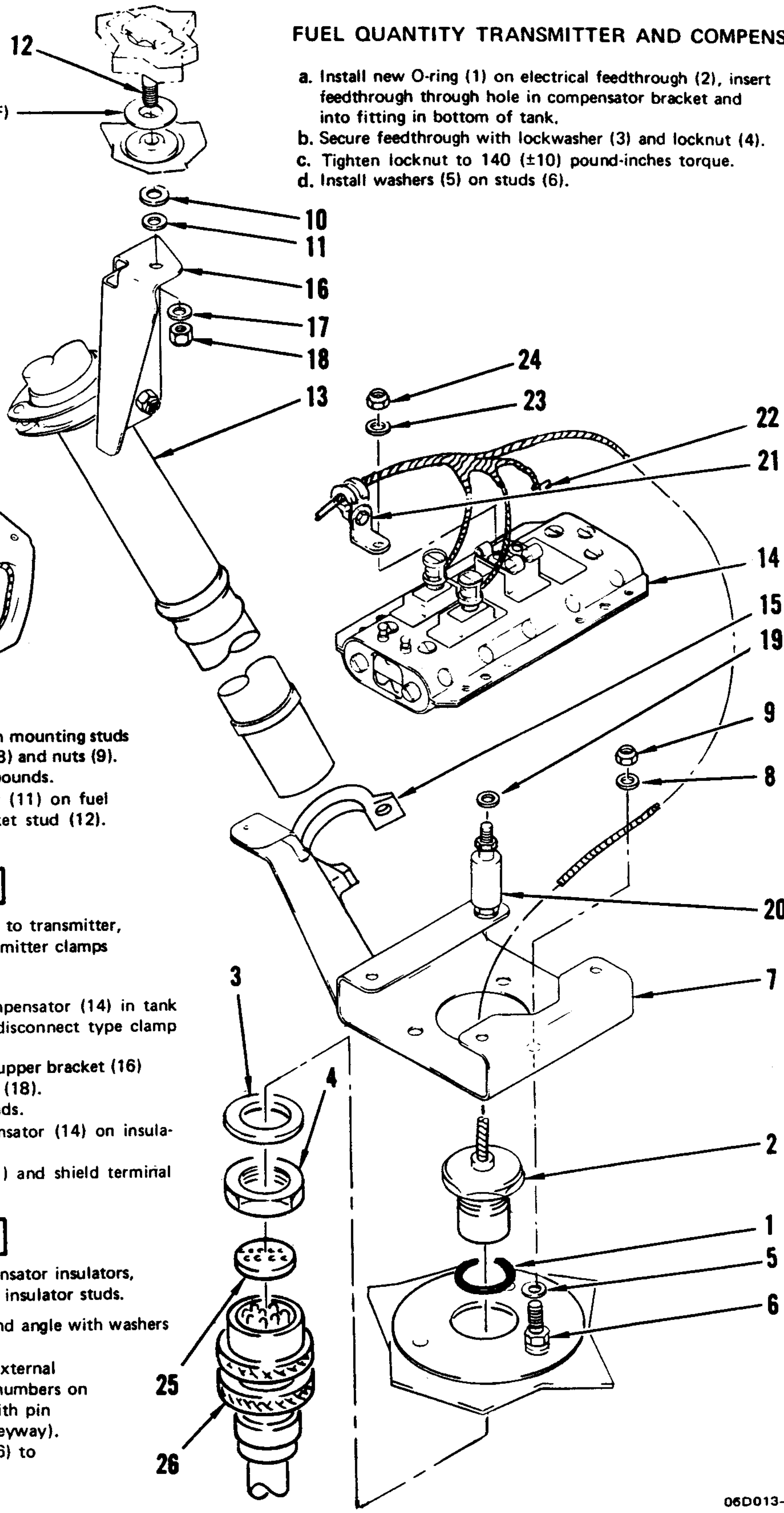
06D013–03–10–85

Figure 1-17. Installation; Main Sump Tank (Sheet 3)

FUEL QUANTITY TRANSMITTER AND COMPENSATOR

a. Install new O-ring (1) on electrical feedthrough (2), insert feedthrough through hole in compensator bracket and into fitting in bottom of tank.
b. Secure feedthrough with lockwasher (3) and locknut (4).
c. Tighten locknut to 140 (±10) pound-inches torque.
d. Install washers (5) on studs (6).





e. Install compensator bracket (7) on mounting studs and secure bracket with washers (8) and nuts (9). Torque nuts to 22 (+3, −2) inch-pounds.
f. Install new seal (10) and washer (11) on fuel quantity transmitter upper bracket stud (12).

CAUTION

To prevent clamps from shorting to transmitter, check that insulators under transmitter clamps are properly aligned.

g. Install transmitter (13) and compensator (14) in tank as an assembly and lock quick-disconnect type clamp (15) at bottom of transmitter.
h. Secure fuel quantity transmitter upper bracket (16) to stud with washer (17) and nut (18).
i. Torque nut to 60 (±5) inch-pounds.
j. Install washers (19) and compensator (14) on insulators (20).
k. Engage wiring harness angle (21) and shield terminal (22) on insulator stud.

CAUTION

To avoid damage to compensator insulators, do not overtighten nuts on insulator studs.

l. Secure compensator, terminal and angle with washers (23) and nuts (24).
m. Install sealing gasket (25) into external electrical connector (26), with numbers on gasket facing out and aligned with pin numbers (pin 8 is adjacent to keyway). Connect electrical connector (26) to feedthrough connector (2).

Figure 1-17. Installation; Main Sump Tank (Sheet 4)

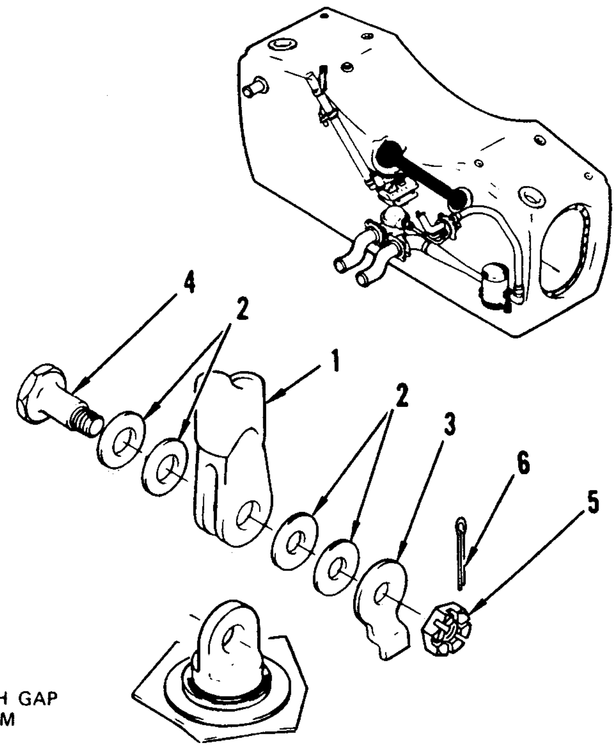
TRUSS BAR

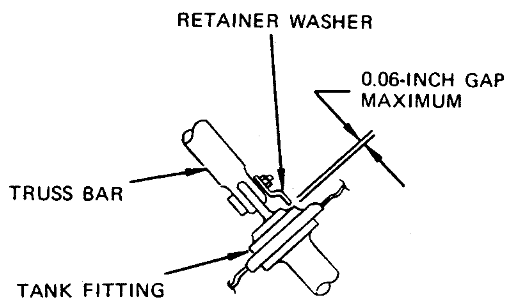
a. Place truss bar installation tool in sump tank and position end caps of tool over truss bar attach fittings.
b. Adjust tool length until tank fittings are firmly seated against shoulders of truss bar fittings. Remove tool from tank.

NOTE

Install retainer washers with offset outward from truss bar and straight edge parallel with adjacent tank surface. Gap between straight edge and tank surface shall not exceed 0.06 inch. Adjust washers under retainer washer, if necessary, to prevent lugs of truss bar from clamping attach fitting after nut is tightened.

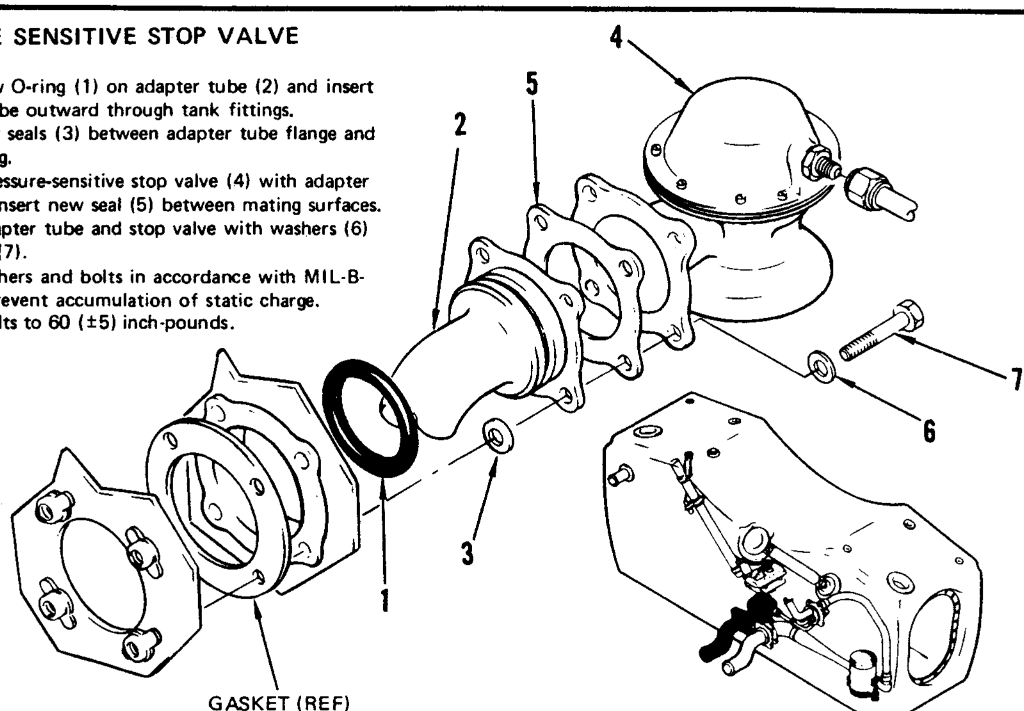
c. Engage truss bar (1) with fittings and secure at each end with washers (2), retainer washer (3), bolt (4), and nut (5).
d. Torque nut to 100 (+10, −5) inch-pounds and install new cotter pin (6). If cotter pin cannot be installed after proper torque is obtained, tighten nut to next cotter pin slot and install cotter pin.





PRESSURE SENSITIVE STOP VALVE

a. Install new O-ring (1) on adapter tube (2) and insert adapter tube outward through tank fittings.
b. Insert new seals (3) between adapter tube flange and tank fitting.
c. Engage pressure-sensitive stop valve (4) with adapter tube and insert new seal (5) between mating surfaces.
d. Secure adapter tube and stop valve with washers (6) and bolts (7).
e. Install washers and bolts in accordance with MIL-B-5087 to prevent accumulation of static charge.
f. Torque bolts to 60 (±5) inch-pounds.



06D013–05–10–85

Figure 1-17. Installation; Main Sump Tank (Sheet 5)

EJECTOR PUMP

a. Install washers (1) and new seals (2) on ejector pump mounting studs (3), and install studs in floor of tank.

b. Torque studs to 60 (±5) inch-pounds.

c. Install two washers (4) on each pump mounting stud.

d. Install new O-rihg (5) on adapter tube (6) and insert adapter tube through tank fitting with new seals (7) between adapter tube flange and tank fitting.

e. Secure adapter tube with washers (8) and bolts (9).

f. Torque bolts to 60 (±5) inch-pounds.

g. Install new O-ring (10) on ejector tube.

h. Install ejector pump assembly (11) by engaging tube with adapter tube and ejector pump with mounting studs.

i. Secure ejector tube with washers (12) and bolts (13).

j. Secure ejector pump with washers (14) and nuts (15).

k. Torque nuts and bolts to 60 (±5) inch-pounds. Install new O-ring (16) on feedthrough adapter (17) and insert adapter through tank fitting with new seals (18) between adapter flange and tank fitting.

l. Secure feedthrough adapter with washers (19) and bolts (20). Connect bonding jumper (21) at bolt in upper inboard corner of adapter with end fitting under washer.

m. Connect bonding jumper in accordance with MIL-B-5087 to prevent accumulation of static charge.

n. Torque bolts to 60 (±5) inch-pounds.

o. Connect sensing tube (22) between pressure-sensitive stop valve and adapter (17).

p. Install two new O-rings (23) in each fuel tube coupling (24).

q. Connect fuel tube (25) between ejector pump and adapter.

r. Torque couplings to 15 (±2) foot-pounds and secure with MS20995C32 lockwire.

s. Secure sensing tube clamp (26) to ejector tube clamp (27) with bolt (28), washer (29), and nut (30).

t. Install washers and bolts in accordance with MIL-B-5087 to prevent accumulation of static charge.

u. Torque nut to 22 (+3, −2) inch-pounds.

v. Secure bonding jumper (21) to clamp (31) with bolt (32), washers (33), and nut (34).

w. Install washers and bolts in accordance with MIL-B-5087 to prevent accumulation of static charge.

x. Torque nut to 22 (+3, −2) inch-pounds.

y. Connect sensing tube (35) in right wheel well.

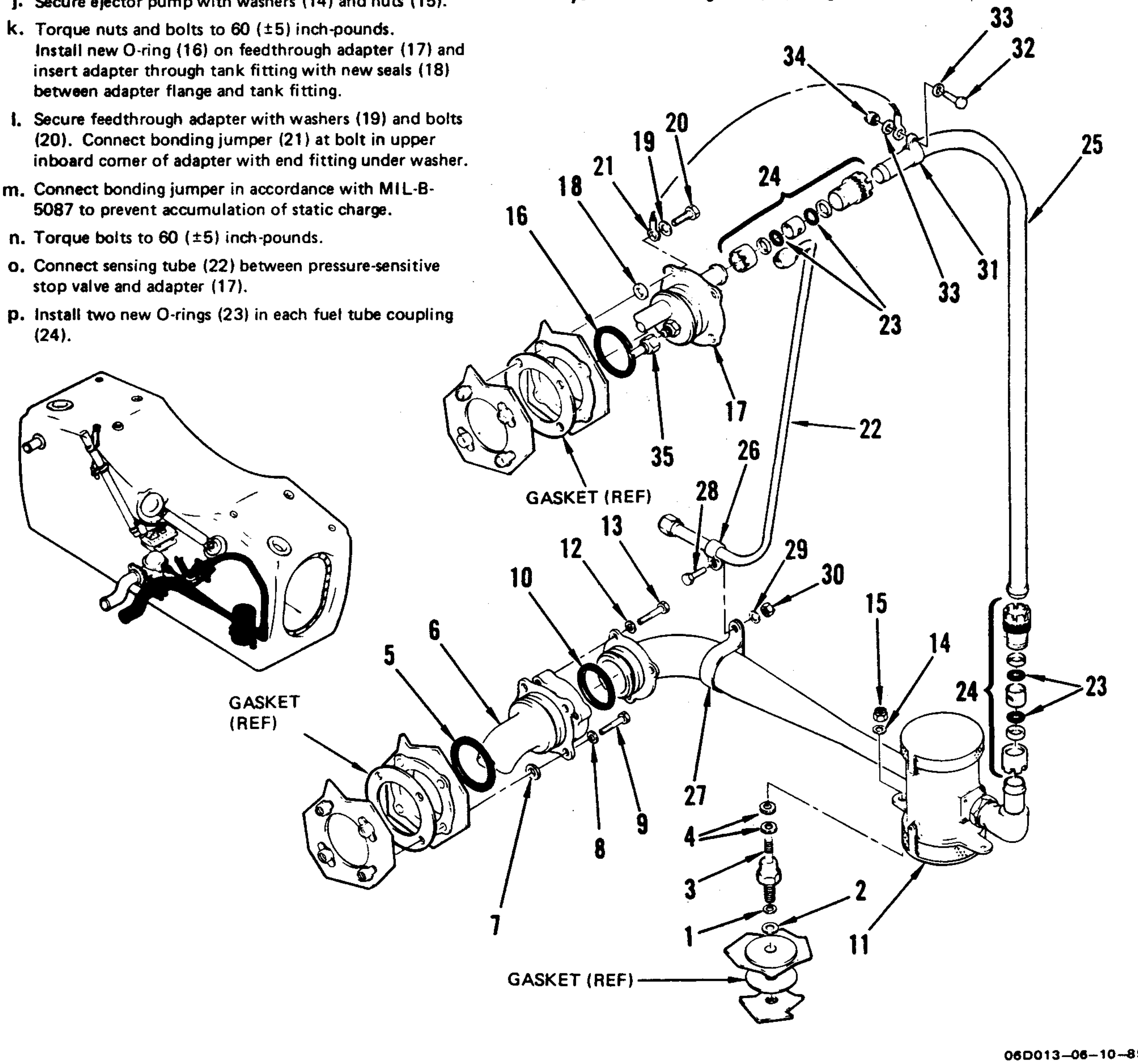
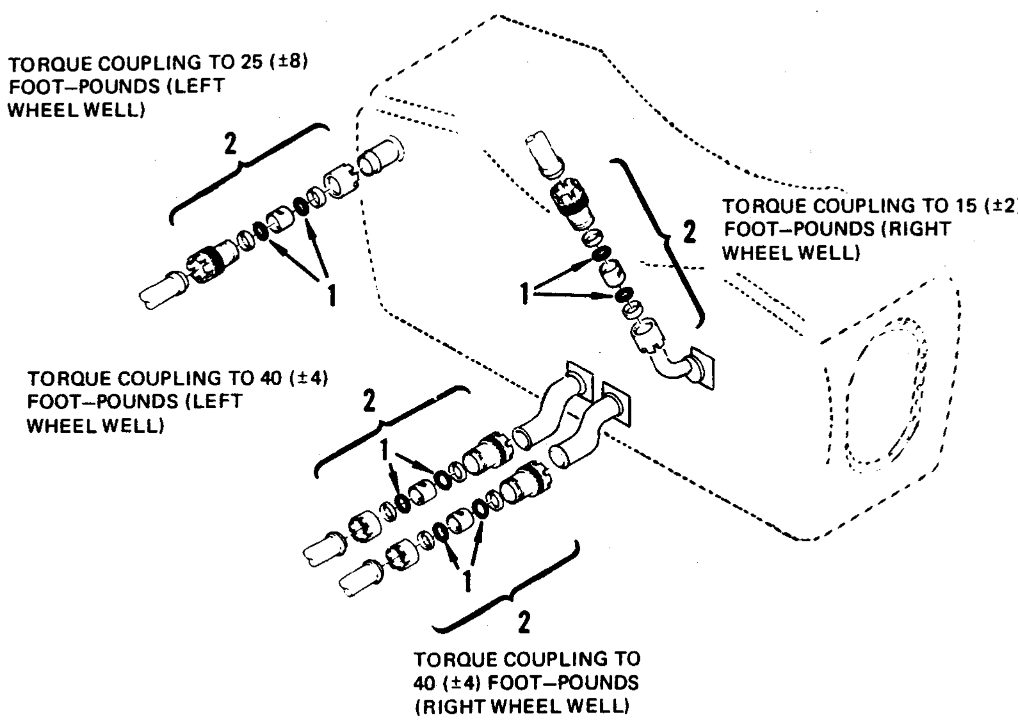


Figure 1-17. Installation; Main Sump Tank (Sheet 6)

MAIN SUMP TANK FUEL LINES

a. Remove plastic bags from main sump tank fuel lines in right and left wheel wells.
b. Install two new O-rings (1) in each fuel line coupling (2).
c. Connect coupling halves and tighten couplings as shown.
d. Secure couplings with MS20995C32 lockwire.
e. Install bonding jumpers in accordance with MIL-B-5087 to prevent accumulation of static charge.



CHECKOUT AND ACCESS INSTALLATION

a. Check tank interior for security, mislaid tools, and other foreign objects.

b. Install tank baffles (paragraph 1–18).

c. Install main sump tank access cover (paragraph 1–11), but do not fuel airplane.

d. Connect external electrical power (T.O. 1A-7D-2-1) and check that fuel quantity indicator in cockpit indicates 0 (± 100) pounds, and that low level fuel warning light is on. Check that low sump level warning light is on.

e. Close accesses 1132-2 and 2133-2 (if opened) and check for security.

f. Fuel airplane fuselage tanks (T.O. 1A-7D-2-1) and check that low level fuel warning light goes off. Check that low sump level warning light goes off. Check that fuel quantity indicator movement is smooth during fueling.

g. Check installation for leakage at sump tank cavity drain.

h. Retract speed brake by ground operation (T.O. 1A-7D-2-8).

i. Disconnect external electrical power.

j. Perform fuel contamination test (paragraph 1–20).

06D013–07–10–85

Figure 1-17. Installation; Main Sump Tank (Sheet 7)

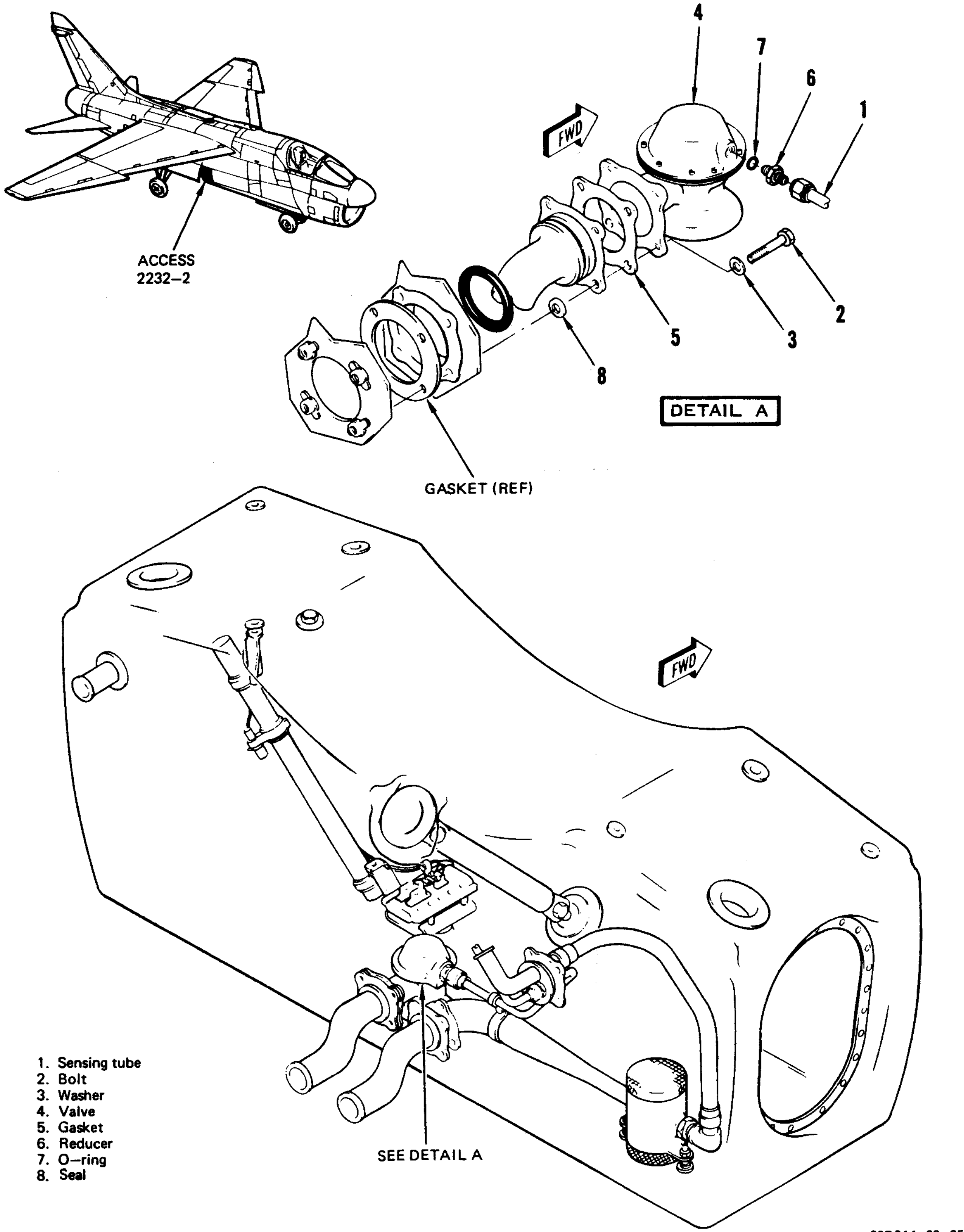


Figure 1-18. Removal and Installation; Pressure Sensitive Stop Valve

1-14. AFT FUSELAGE TANK ACCESS REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-14.1. Removal. (Figure 1-19.)

a. Defuel airplane (T.O. 1A-7D-2-1).

NOTE

If fuel tank cannot be oil purged (preferred method), steps c and d must be performed before fuel tank purging.

b. Purge fuel tank (paragraph 1-6 and T.O. 1-1-3).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

c. Gain access through bottom of aft fuel tank as follows:

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel.

(1) Open access 5213-1, disconnect antenna cable(s), and lower access.

(2) Cut lockwire and disconnect couplings on motive flow line. Remove line.

(3) Cut lockwire and disconnect couplings on sump transfer line and engine main fuel line at aft end of lines.

(4) Cut lockwire and disconnect coupling on sump transfer line in left wheel well, and remove clamp holding tube to bulkhead.

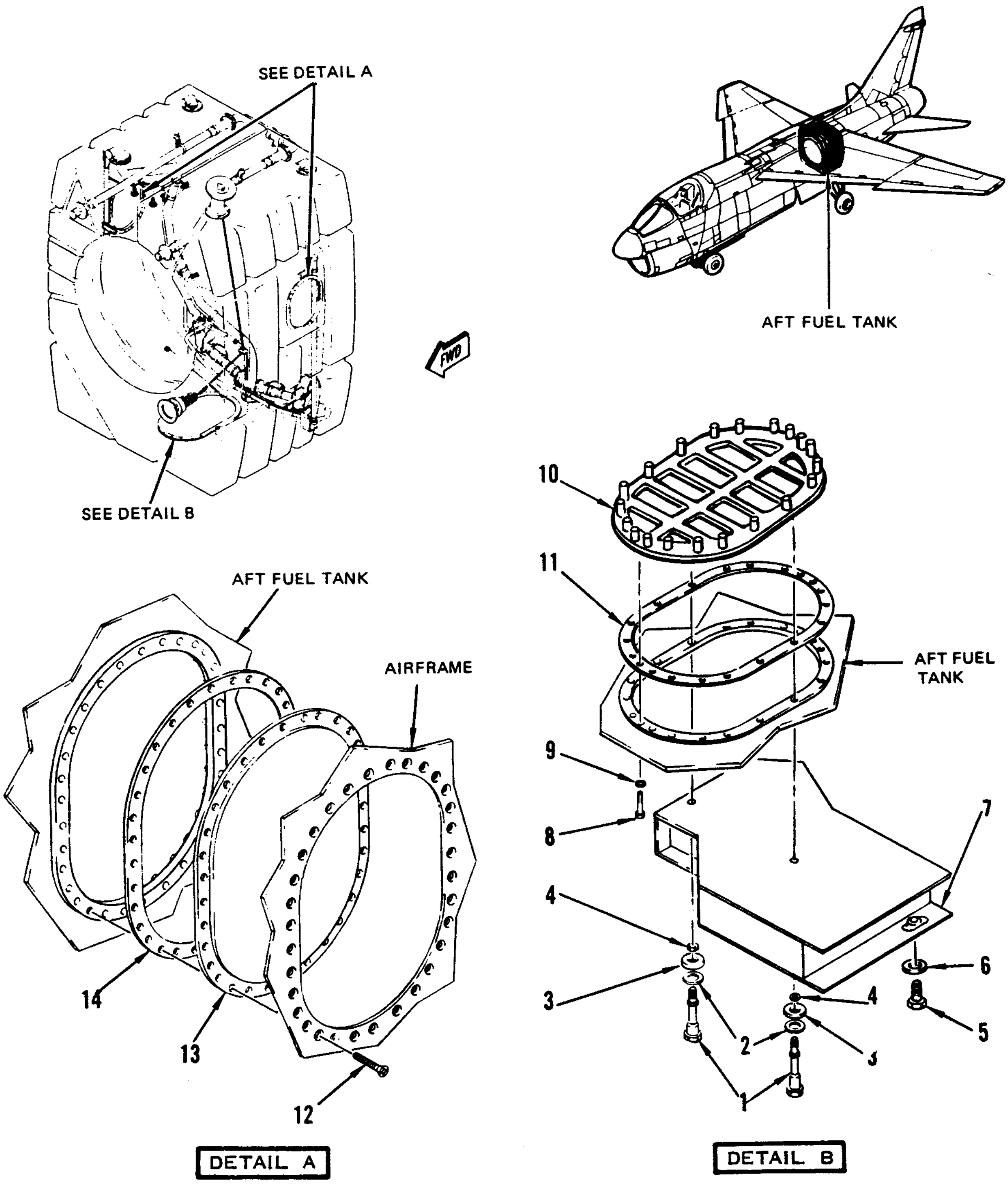
(5) Remove coupling half from line, and remove line through access 5213-1.

(6) Cut lockwire and disconnect coupling on engine main fuel line in right wheel well, and remove clamps holding tube to keel and to bulkhead.

(7) Remove coupling half from line, and remove line through access 5213-1.

(8) Remove two bolts (1), washers (2), rubber bushings (3), and washers (4) from access door.

(9) Remove bolts (5) and washers (6) securing access door. Rotate door (7) 90°, and remove from airplane.



1. Bolt
2. Washer
3. Rubber bushing
4. Washer
5. Bolt
6. Washer
7. Door
8. Bolt
9. Washer
10. Access
11. Gasket
12. Screw
13. Access
14. Gasket

06D083-09-85

Figure 1-19. Removal and Installation; Aft Fuselage Tank Access

(10) Remove bolts (8) and washers (9) securing access to tank. Rotate access (10) 90°, and remove access and gasket (11) through opening.

d. Open access 5113-2 and/or 6113-2 as follows:

(1) Remove screws (12) securing access to airplane.

(2) Rotate access (13) 90°, and remove access through opening. Remove gasket (14).

e. During fuel tank entry, inspect and repair fuel tank as necessary (T.O. 1-1-3).

1-14.2. Installation. (Figure 1-19.)

a. Inspect gaskets. If sealing capabilities are questionable, replace gasket. Check fuel tank internally for cleanness and freedom from foreign objects.

NOTE

It is advisable to install bottom tank access first. Side access will provide means of exerting pressure on bottom of tank to make securing of access retaining bolts easier.

b. Close aft tank bottom access as follows:

(1) Position access (10) and gasket (11) in tank. Install two mounting bolts (8) and washers (9) finger-tight.

(2) Check hole alignment, and install remaining bolts and washers finger-tight.

(3) Torque bolts in a crisscross pattern in increments of 5 inch-pounds until 60 (±5) inch-pounds are attained.

(4) Place tank access door (7) in airplane, and secure with bolts (5) and washers (6).

(5) Install two bolts (1), washers (2), rubber bushings (3), and washers (4). Torque bolts to 60 (±5) inch-pounds.

(6) Place engine main fuel line in airplane. Connect couplings using new packings, and secure with MS20995C32 lockwire. Replace clamps, securing line to bulkhead and keel.

(7) Place sump transfer line in airplane. Connect couplings using new packings, and secure with MS20995C32 lockwire. Replace clamp, securing line to bulkhead.

(8) Place motive flow line in airplane. Connect couplings using new packings, and secure with MS20995C32 lockwire.

c. Close access 5113-2 and/or 6113-2 as follows:

(1) Fabricate two guide studs using NAS1304 bolts approximately 2.5 inches long with boltheads removed.

(2) Screw guide stud into fuel tank flange, placing one stud at each end.

(3) Position gasket (14) and access (13) on guide studs.

(4) Place guide studs through mounting holes in airplane. Check that all holes in gasket align.

(5) Install four screws finger-tight, and remove guide studs.

(6) Secure access to airplane with screws (12). Torque screws to 60 (±5) inch-pounds in crisscross pattern in increments of 5 inch-pounds.

d. Fuel airplane (T.O. 1A-7D-2-1), and check for leaks.

e. Connect marker beacon antenna cable and ADF antenna cable. Close access 5213-1.

1-15. AFT FUSELAGE TANK REMOVAL, BUILDUP, AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Check out low fuel level caution circuit
		Equipment required for defueling and fueling airplane	Defuel tank before removal and fuel tank after installation
		Equipment required for purging fuel tank	Purge tank before removal
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	GGG-W-686	Torque wrench, 10 to 250 inch-pounds	Torque nuts or bolts
	55-1	Explosion-proof vacuum cleaner	Clean tank cavity

1-15.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove aft fuel tank access (paragraph 1-14).

b. Open accesses 5111-4, 6111-3, 6222-1, 5111-2, 6111-2, 5111-5, 5222-1, and 6111-4.

c. Install heavy tape around bottom access edges.

d. Remove aft tank baffles (paragraph 1-18).

e. Remove aft fuselage tank in accordance with figure 1-20.

1-15.2. Buildup.

a. Remove and replace packings on the following fuel fittings protruding inside tank cavity.

(1) Right and left seals on fueling and vent fittings.

(2) Seal on aft-to-wing tank transfer fitting.

(3) Seal on gravity fueling receptacle.

(4) Two seals on gravity fueling check valve.

(5) Left and right water drain seals.

b. Replace access door gaskets.

c. Inspect removed check valves for flapper condition and security.

d. Unfold replacement tank.

e. Bond gaskets to external side of tank flanges with MMM-A-1617, Type III adhesive.

f. Inspect and repair fuel tank as necessary (T.O. 1-1-3).

g. Refold tank to original configuration.

1-15.3. Installation.

a. Clean and vacuum aft tank fuselage cavity.

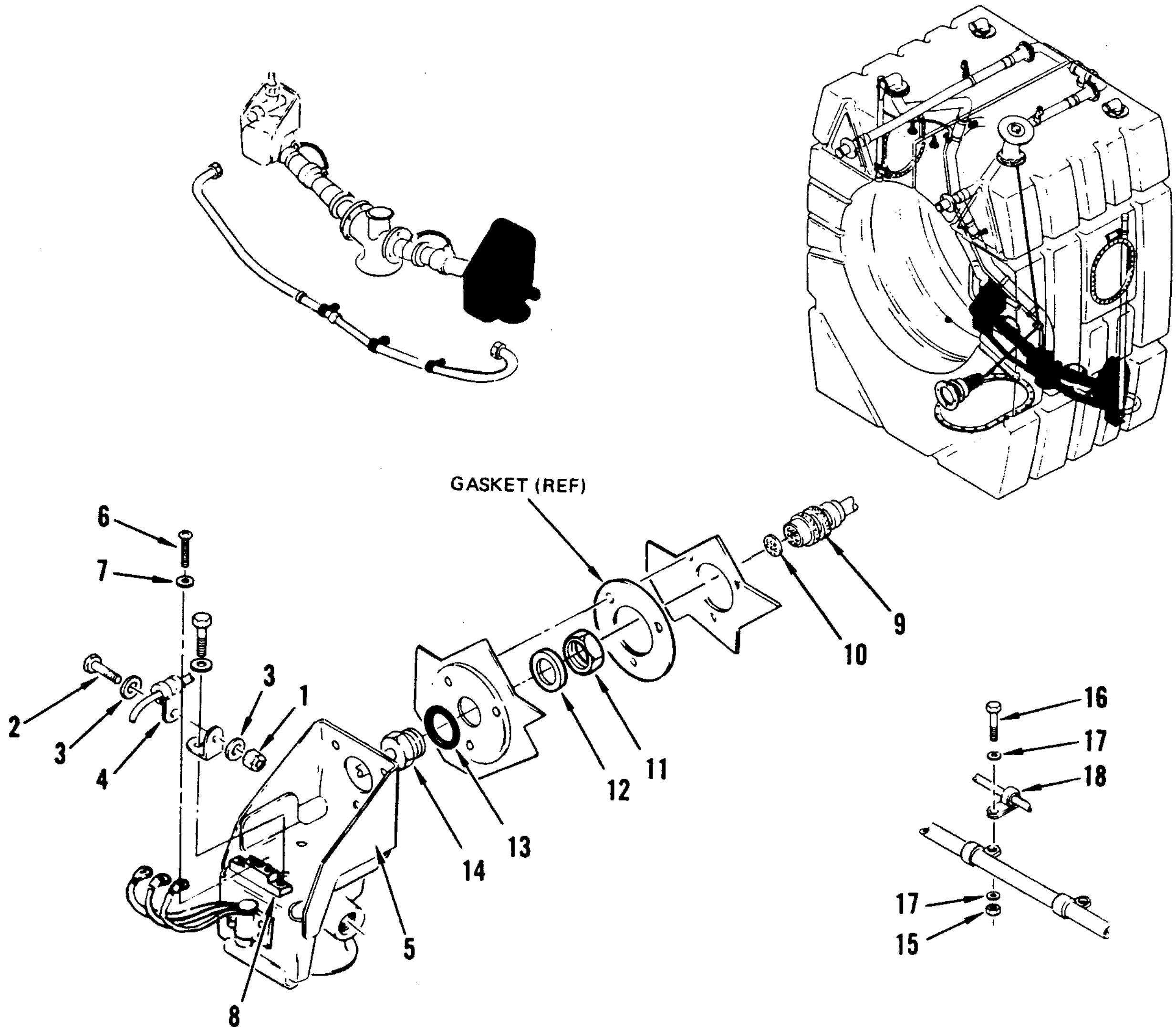
b. Inspect cavity for structural integrity and general condition.

c. Powder all interior surfaces of structural cavity with No. 1313 Canadian Talc (Whitaker, Clark, and Daniels) or Fibrene C-400 (Thompson Hayward Chemical Co.).

d. Lubricate all threads of fittings and bolts, except titanium, with SAE 10 or 10W oil.

e. Lubricate titanium bolts with MIL-M-7866 molybdenum disulfide lubricant.

LEADS AND TERMINALS



a. Remove nut (1), bolt (2), and washers (3) securing electrical feedthrough clamp (4) to left ejector pump bracket assembly (5).

NOTE

Before disconnecting terminals, tag wiring harness leads with thermistor lead color codes (blue, white, and brown) for identification during installation.

b. Remove screws (6) and washers (7) connecting wiring to thermistor terminal block (8).

c. Disconnect external electrical connector (9) from feedthrough connector. Remove gasket (10), inspect both connectors for contamination and/or moisture. Clean with Freon TF and dry with hot air gun or dry gaseous nitrogen. Remove nut (11), lockwasher (12), and O-ring (13) securing electrical feedthrough (14) to tank cavity.

d. Remove nuts (15), bolts (16), and washers (17) attaching wiring harness clamps (18) to motive flow crossover line. Leave clamps and attaching hardware installed on harness.

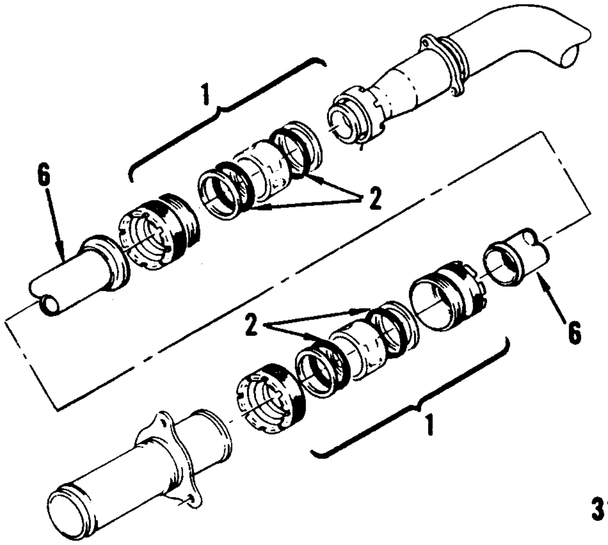
FUEL QUANTITY TRANSMITTERS

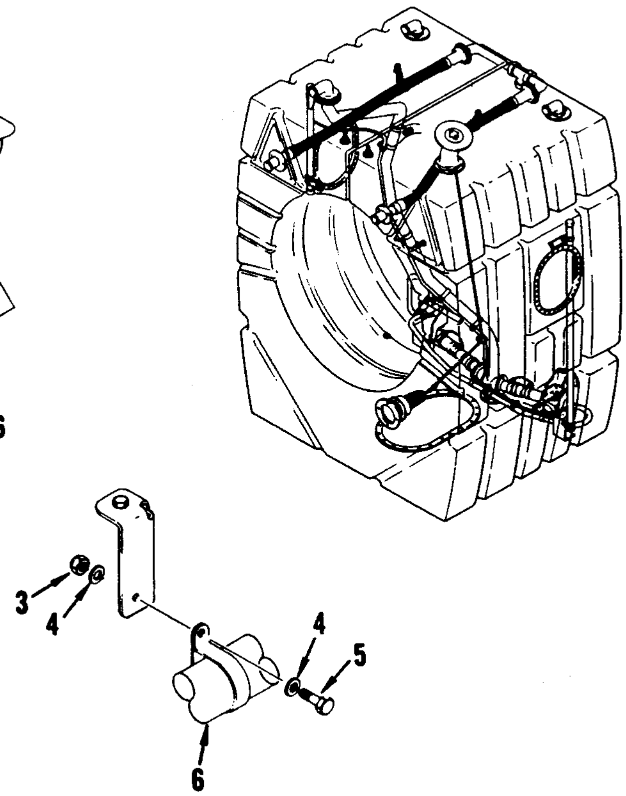
a. Remove aft fuselage tank transmitter (paragraph 5–12).

06D015–01–09–85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 1 of 11)

FUEL TRANSFER LINES

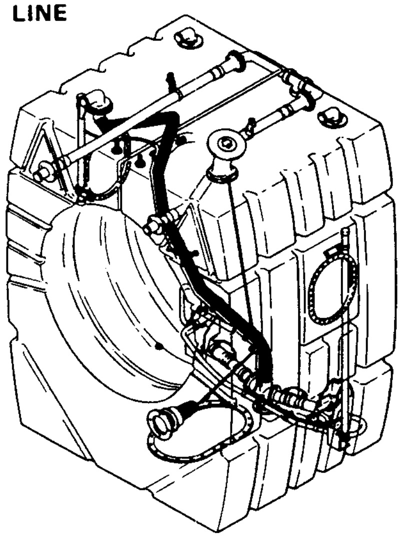


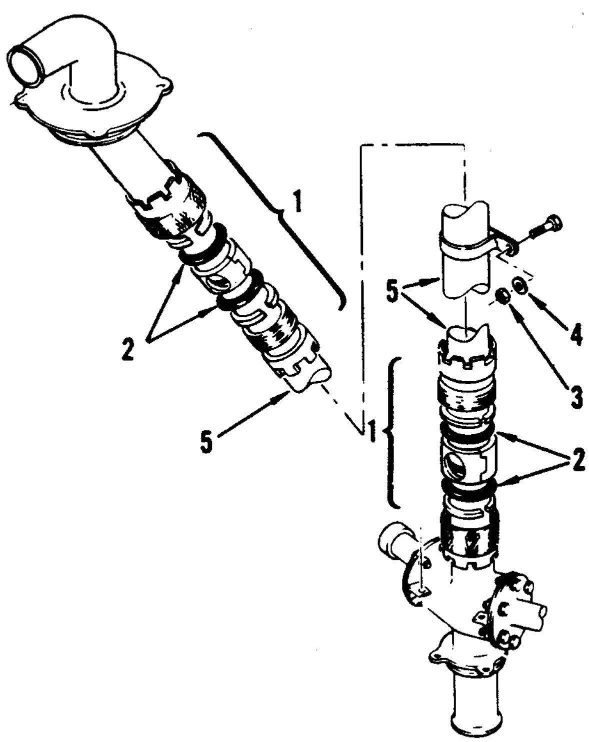


a. Cut lockwire and disconnect line couplings (1) from fuel and vent transfer fittings and adapters. Discard O-rings (2).

b. Remove nuts (3), washers (4), and bolts (5) securing clamps to mount brackets. Remove fuel transfer lines (6).

FUEL TRANSFER LINE





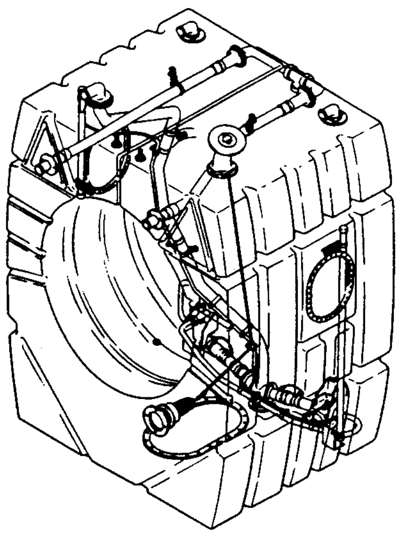
a. Cut lockwire and remove line couplings (1) from wing-to-aft transfer line. Discard O-rings (2).

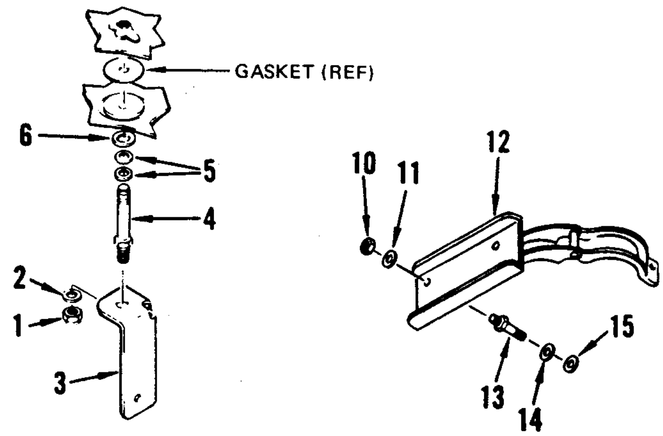
b. Remove nut (3) and washer (4) securing fuel transfer line clamps. Remove fuel transfer line (5), conduit, and wiring harness as an assembly.

06D015-02-09-85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 2)

BRACKET SUPPORT STUDS





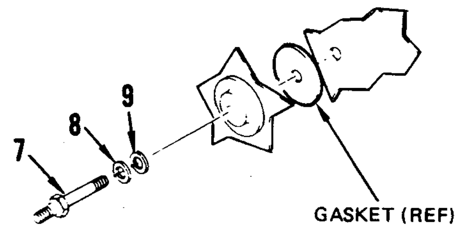
a. Remove nuts (1) and washers (2) attaching transfer line support brackets (3) to mounting studs (4).

b. Remove studs, washers (5), and seals (6).

c. Remove wing-to-aft transfer line mounting studs (7), washers (8), and seals (9).

d. Remove nuts (10) and washers (11) attaching transmitter mounting brackets (12) to support studs (13).

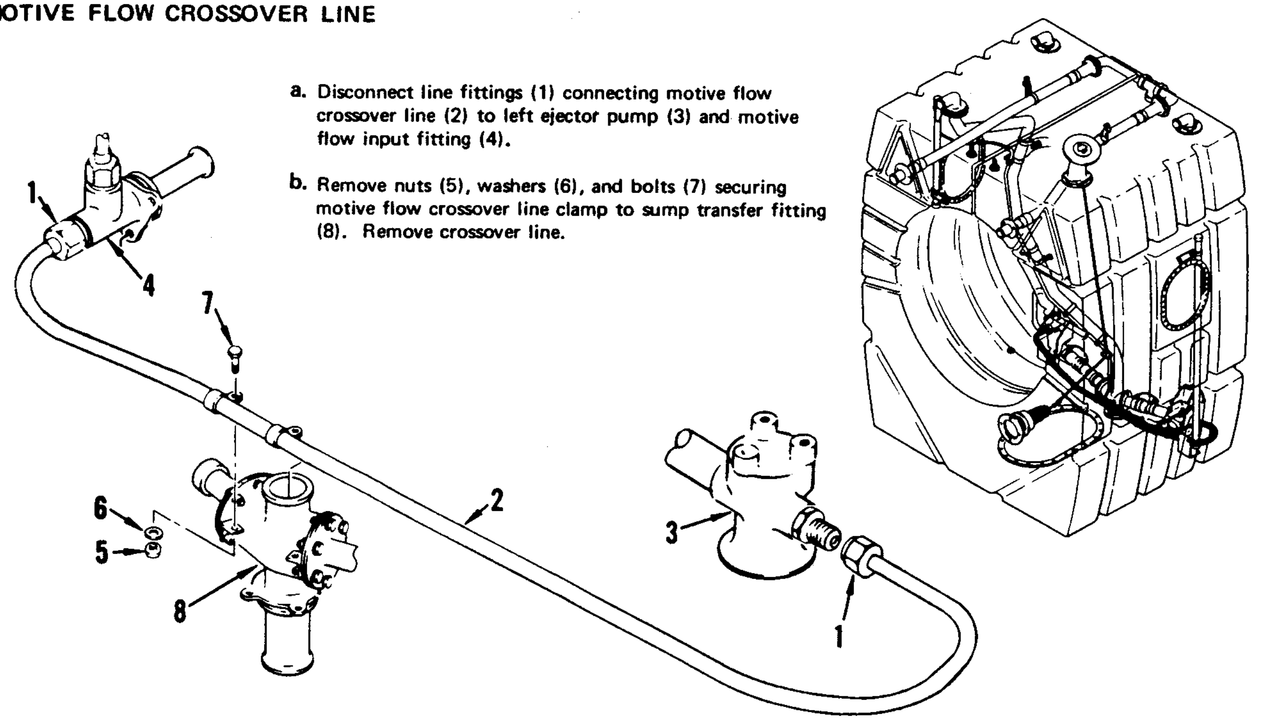
e. Remove support studs, washers (14), and seals (15).



MOTIVE FLOW CROSSOVER LINE

a. Disconnect line fittings (1) connecting motive flow crossover line (2) to left ejector pump (3) and motive flow input fitting (4).

b. Remove nuts (5), washers (6), and bolts (7) securing motive flow crossover line clamp to sump transfer fitting (8). Remove crossover line.



06D015–03–09–85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 3)

GRAVITY FUELING RECEPTACLE, CHECK VALVE, OVERRIDE LANYARD, AND LANYARD SHIELDS

a. Remove cotter pin (1) and pin (2).

b. Open gravity fueling receptacle cap and lift override lanyard (3) from tank cavity.

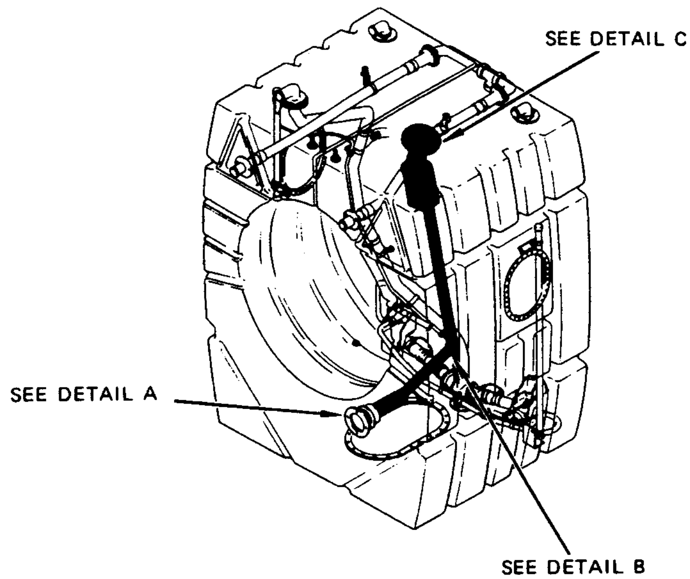
c. Remove bolts (4), washers (5), and seals (6).

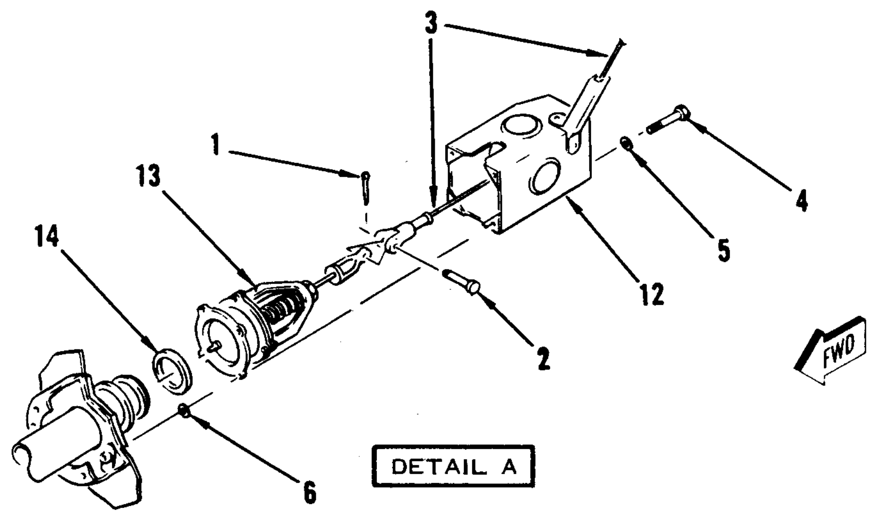
d. Remove nut (7), bolt (8), washers (9), spacers (10), bearing (11), and lanyard shield (12).

e. Remove check valve (13) and O-ring (14).

f. Remove bolt (15), washer (16), seal (17), and support (18).

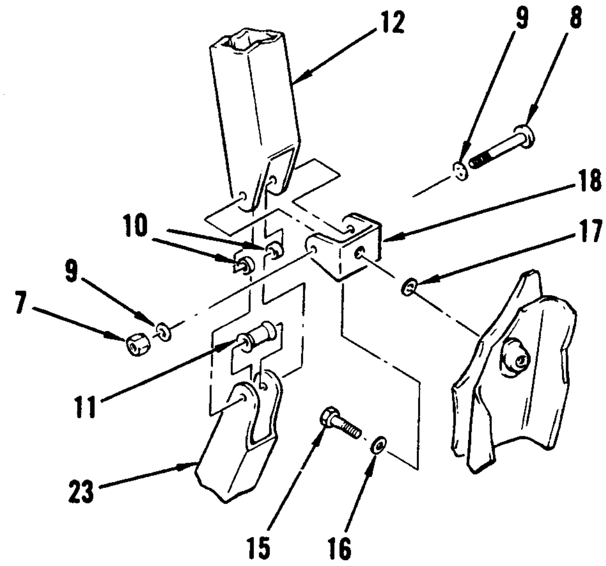
g. Remove nuts (19), washers (20), seals (21), bolts (22), and lanyard shield (23). Leave fueling receptacle (24) in place.



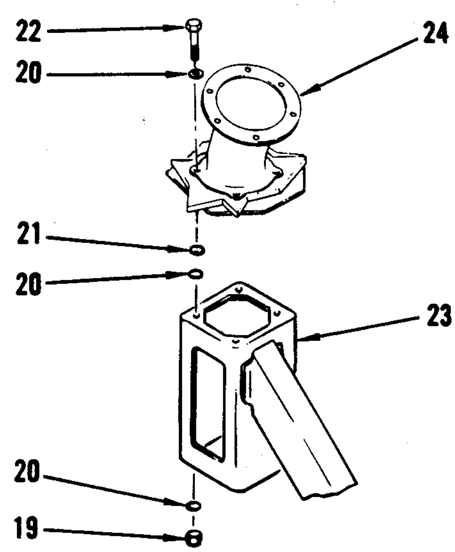


06D015–04–09–85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 4)

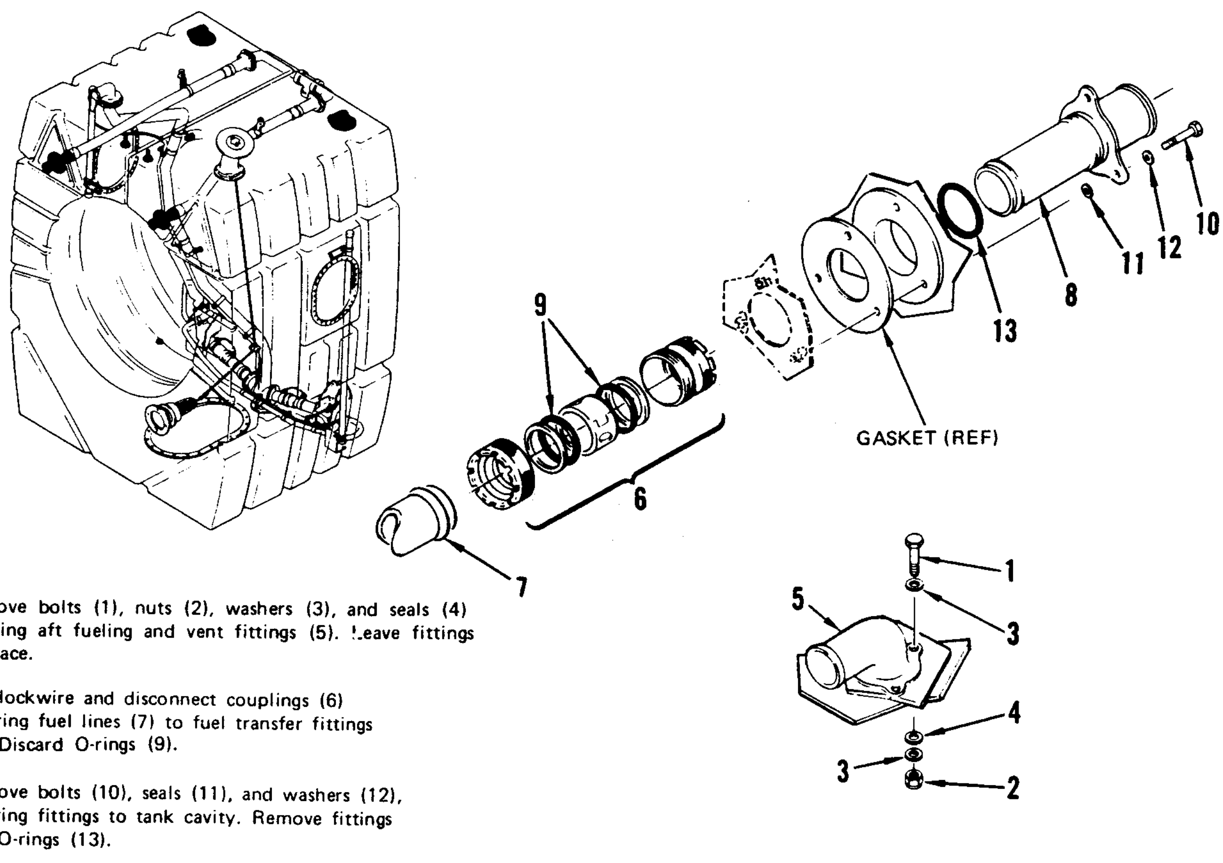


DETAIL B



DETAIL C

FUELING AND TRANSFER FITTINGS



a. Remove bolts (1), nuts (2), washers (3), and seals (4) securing aft fueling and vent fittings (5). Leave fittings in place.

b. Cut lockwire and disconnect couplings (6) securing fuel lines (7) to fuel transfer fittings (8). Discard O-rings (9).

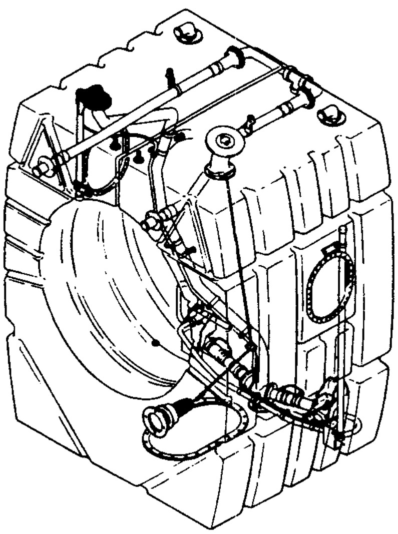
c. Remove bolts (10), seals (11), and washers (12), securing fittings to tank cavity. Remove fittings and O-rings (13).

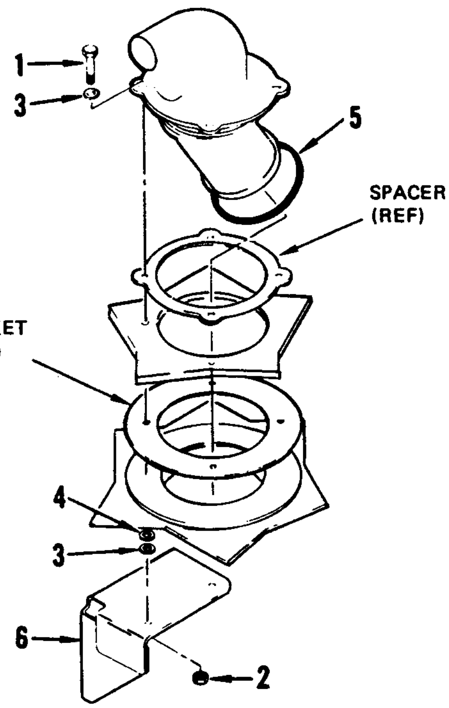
06D015-05-09-85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 5)

AFT-TO-WING FUEL TRANSFER FITTING

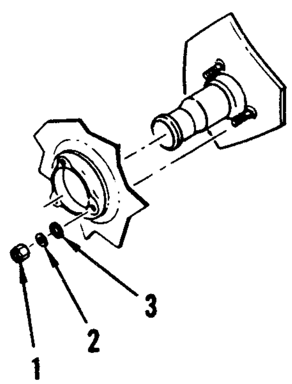
a. Remove bolts (1), nuts (2), washers (3), seals (4), O-ring (5), and transmitter mounting bracket (6) from aft-to-wing transfer fitting. Leave fitting in place.

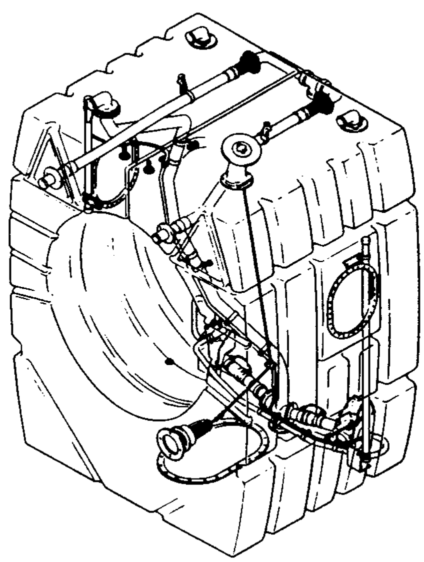




FUEL AND VENT LINE ADAPTERS

a. Remove nuts (1), washers (2), and seals (3) securing fuel tank to bulkhead. Leave adapters in place.





06D015-06-09-85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 6)

SUMP TRANSFER FITTING

a. Cut lockwire and remove nuts (1), washers (2), and bolts (3) securing bonding cables (4) to jumper clamps.

b. Disconnect line couplings (5) and remove fuel line (6). Discard O-rings (7).

c. Hold bolts in access area below tank cavity floor and remove nuts (8), washers (9), seals (10), and bolts (11) securing sump transfer fitting (12). Remove transfer fitting and discard O-rings (13 and 14).

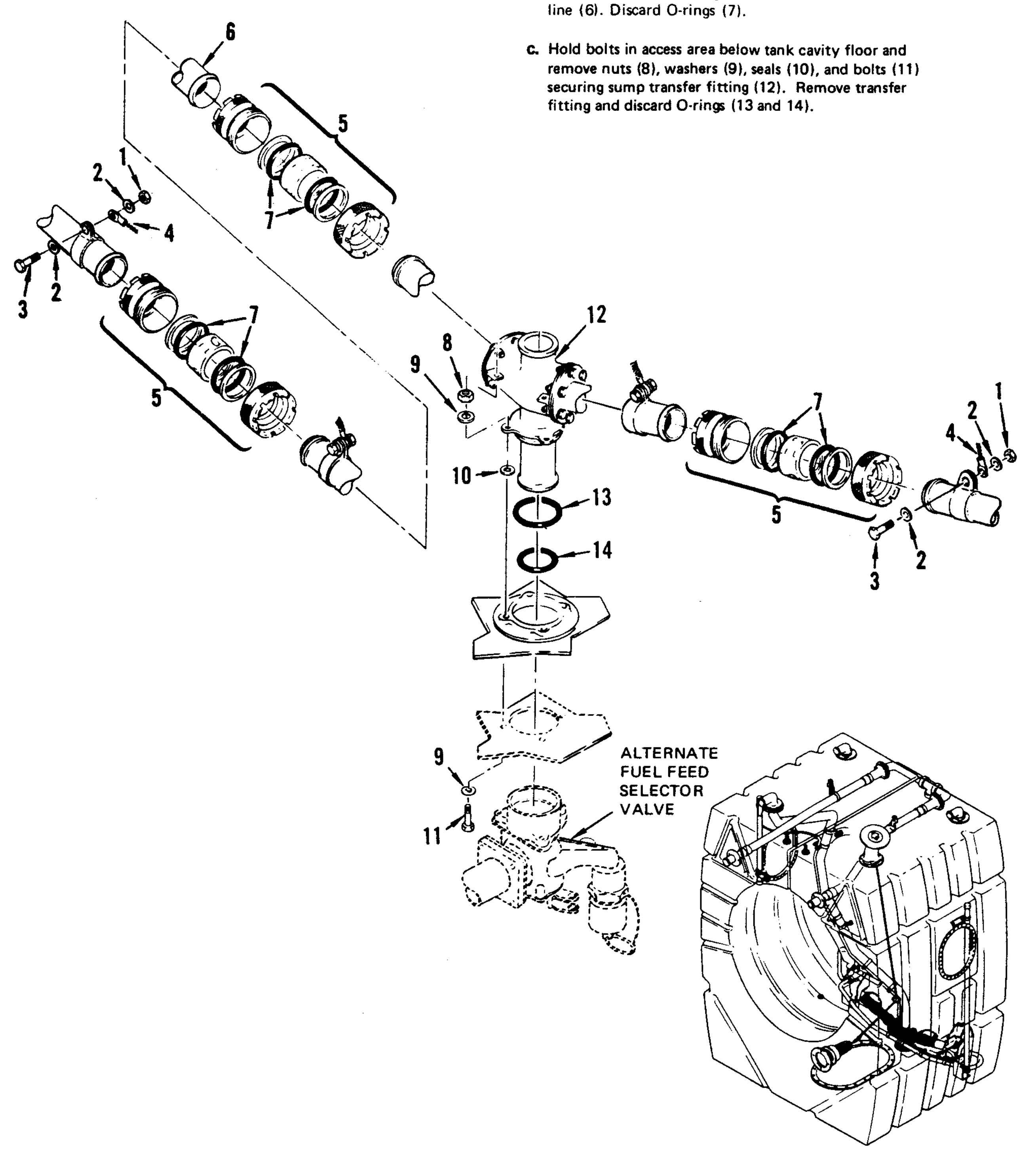
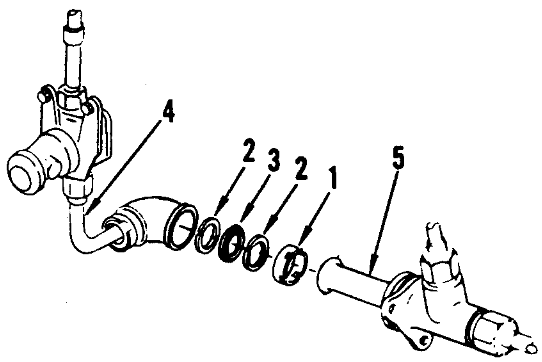


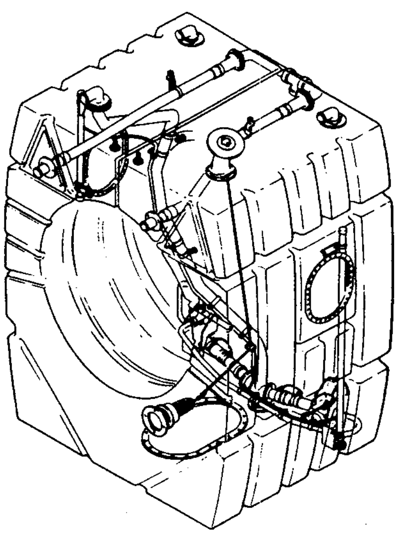
Figure 1-20. Removal; Aft Fuselage Tank (Sheet 7)

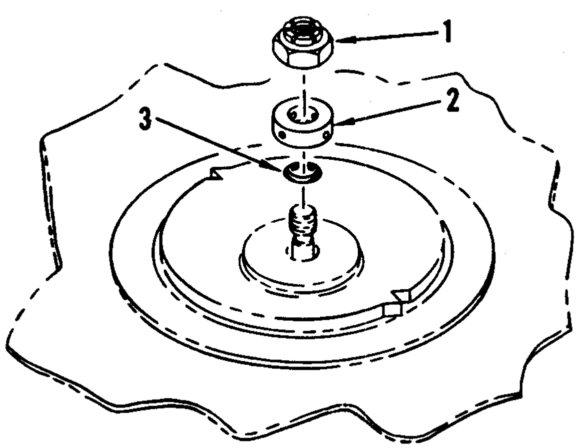
MOTIVE FLOW INPUT LINE

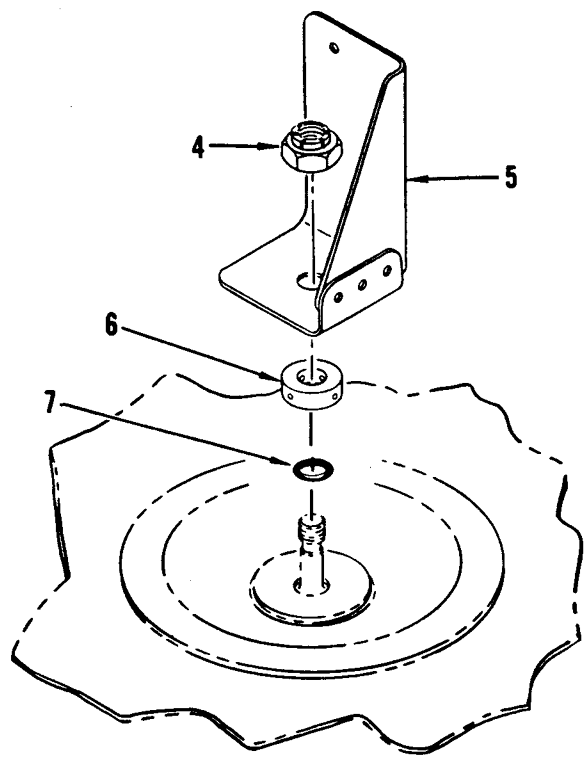


a. Through access 6222-1, cut lockwire and remove coupling (1), washers (2), and O-ring (3) connecting wing transfer selector valve output line (4) to aft fuel tank motive flow input fitting (5).

WATER DRAINS







a. Remove nut (1), drain washer (2), and seal (3) securing tank flange to right water drain outlet.

b. Remove nut (4), transmitter bracket (5), drain washer (6), and seal (7) securing tank flange to left water drain outlet.

06D015–08–09–85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 8)

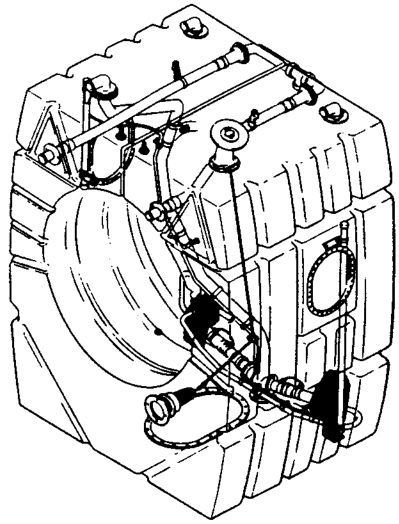
EJECTOR PUMPS

a. Remove nuts (1) and washers (2) securing left ejector pump and bracket assembly (3) to studs (4). Remove bracket assembly from tank.

b. Remove studs, washers (5), and seals (6) securing tank flange to bulkhead.

c. Remove bolts (7), washers (8), and seals (9) securing right bracket assembly (10) and ejector pump to aft wall of tank.

d. Remove right bracket assembly from tank. Discard O-ring (11).



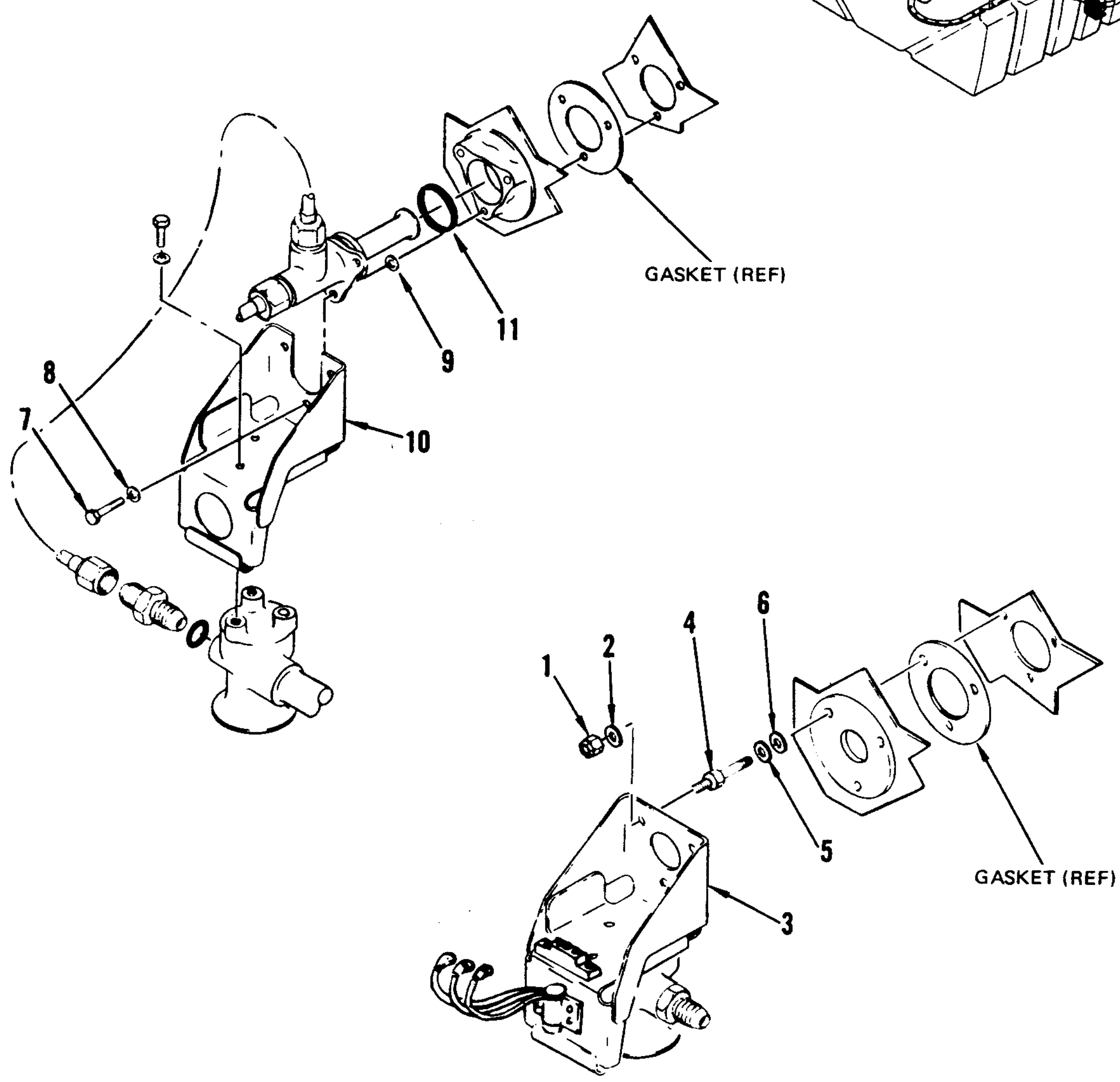
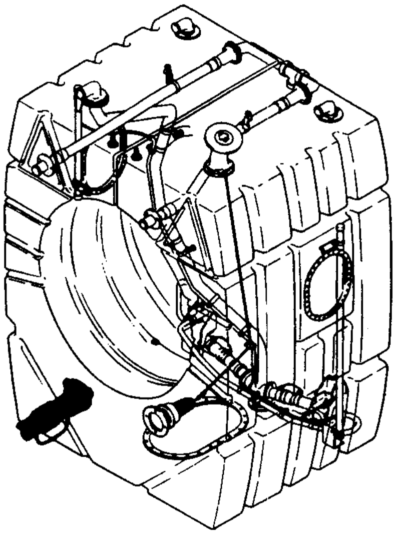


Figure 1-20. Removal; Aft Fuselage Tank (Sheet 9)



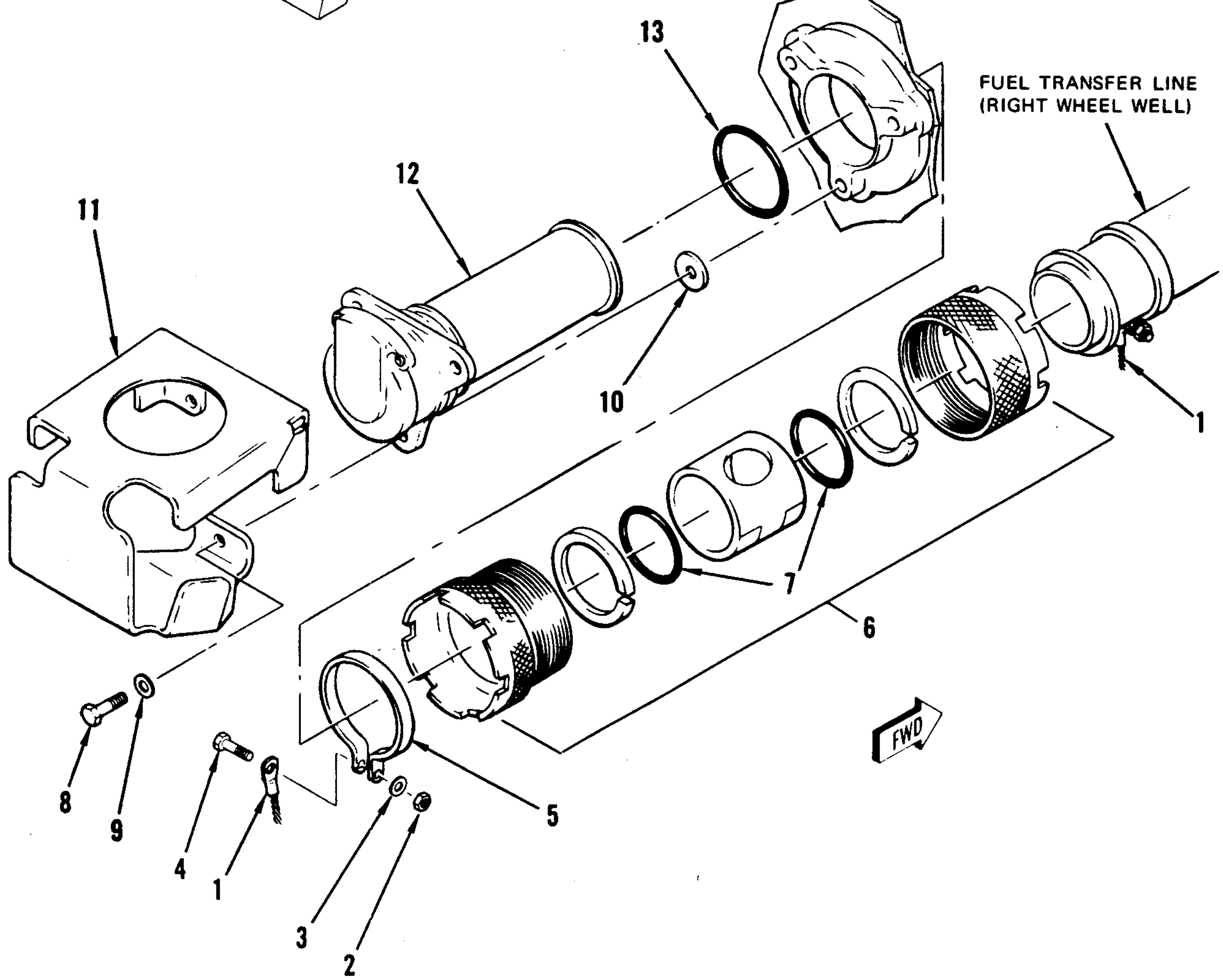
CHECK VALVE

a. Disconnect bonding jumper (1) by removing nut (2), washer (3), bolt (4) and clamp (5).

b. Disconnect coupling (6) and discard O-rings (7).

c. Remove bolts (8), washers (9), and seals (10).

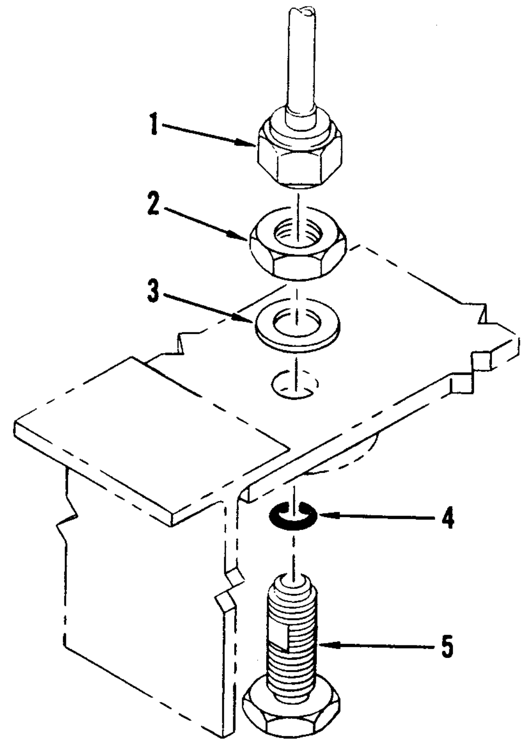
d. Remove valve cover (11) and check valve (12). Remove and discard O-ring (13).

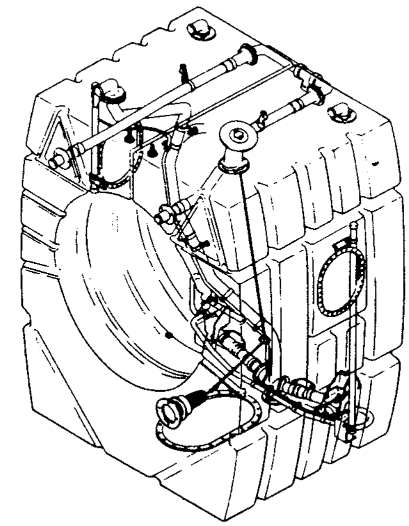


06D015–10–09–85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 10)

VENT LINE ADAPTERS

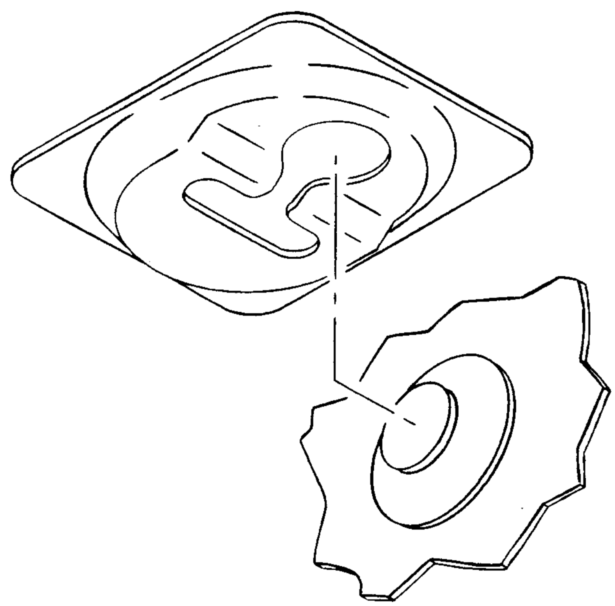


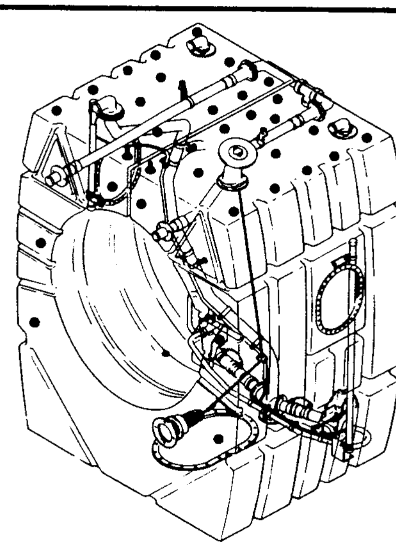


a. Disconnect vent line fitting (1) connecting vent lines to tank adapters.

b. Remove nuts (2), washers (3), and seals (4) securing adapters (5) to fuel tank.

TANK HANGER BUTTONS





a. Check that all hardware, tools, and foreign objects have been removed from inside of aft tank.

b. Leaving upper corners until last, remove tank from hanger fittings by sliding 34 hanger buttons to center of round cutout in fitting and pulling button through cutout.

FUEL TANK

a. Remove tank mount flanges from all ends of fittings protruding into inner tank cavity.

b. Fold tank so that top is flat against bottom and sides are tucked in. Roll tank from one side to the other and remove through access in bottom of tank cavity.

06D015–11–09–85

Figure 1-20. Removal; Aft Fuselage Tank (Sheet 11)

NOTE

During tank installation, lubricate stat-o-seals with VV-P-236 petrolatum. Install stat-o-seals by screwing onto threads of fittings or bolts instead of pushing straight on. This will reduce the possibility of cutting the stat-o-seal which would result in a fuel leak.

f. Install aft fuselage tank in accordance with figure 1-21.

1-16. FUSELAGE GRAVITY FUELING RECEPTACLE REPAIR.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel fuselage tanks before check for gravity fueling receptacle and fuel tanks after check
	MIL-H-4034B	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-16.1. Cap and Seal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Release lock tab, and remove fuselage gravity fueling cap from aft tank filler adapter.

NOTE

Do not disconnect lanyard until keeper ball is seated in notched receptacle; otherwise, lanyard may fall inside tank, forcing tank access removal to retrieve lanyard.

b. Lift cap and attached manual override lanyard, and seat ball on lanyard in notched receptacle in top of adapter neck. Disconnect lanyard from cap.

c. Check cap and seal for physical damage which would prevent cap from sealing fuel tank.

d. Replace cap and seal if cap is damaged. Replace seal if seal is faulty and cap is serviceable.

e. Connect lanyard to cap assembly, pull up on lanyard, and remove keeper ball from receptacle in top of adapter neck. Position cap on adapter, and secure in position with lock tab.

1-16.2. Adapter and Seal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove aft tank access (paragraph 1-14).

b. Release lock tab, and remove fuselage gravity fueling cap from aft filler adapter (paragraph 1-16.1).

c. Attach lead-in cord to exposed end of lanyard. Secure opposite end of cord, and release lanyard keeper ball from adapter receptacle.

d. Release fasteners securing access 5111-5 to adapter.

e. Release fasteners securing access 5111-5 to airframe, and remove from airplane.

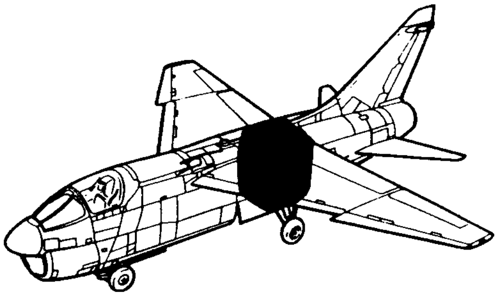
f. Remove tank baffles (paragraph 1-18).

g. With one workman holding bolts in area above tank cavity, remove nuts inside tank cavity securing tank flange to adapter. Remove adapter from tank cavity.

h. Disconnect lead-in cord, remove cord from inside adapter, and secure.

i. Check adapter for cracks, distortion, and other physical damage.

j. Replace adapter and seal if adapter is damaged, or replace seal on adapter if adapter is serviceable.

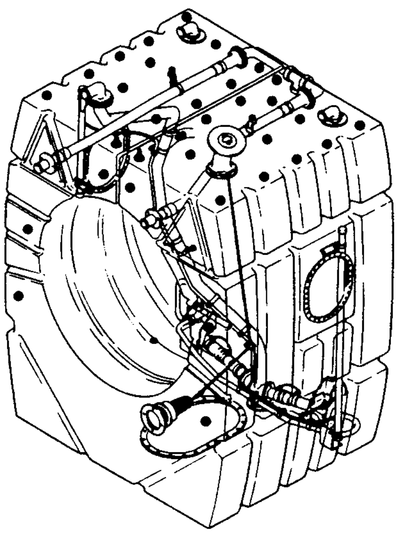


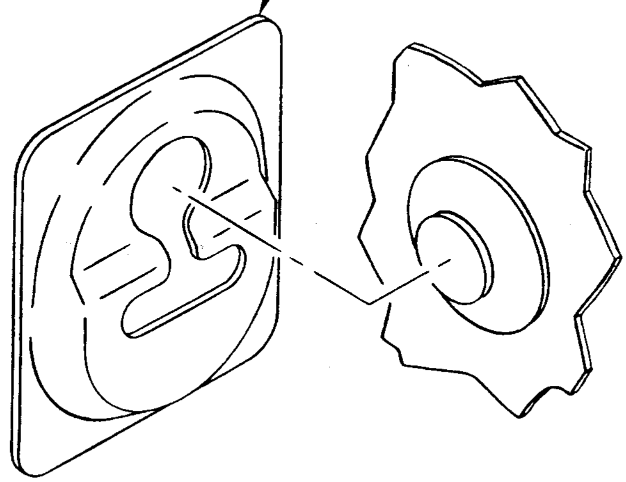
FUEL TANK

a. Insert folded tank through bottom tank access and unfold tank.

b. Position tank flanges over ends of fittings protruding into inner tank cavity being careful to properly seat O-rings.

TANK HANGER BUTTONS





a. Engage upper corner hanger buttons with cavity fittings. This will approximately position remaining hangers.

b. Install remaining hangers.

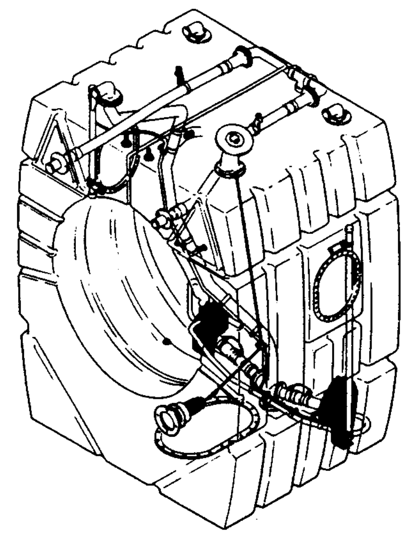
06D016-01-09-85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 1 of 13)

EJECTOR PUMPS

CAUTION

Be careful when installing components to prevent damage to tank.



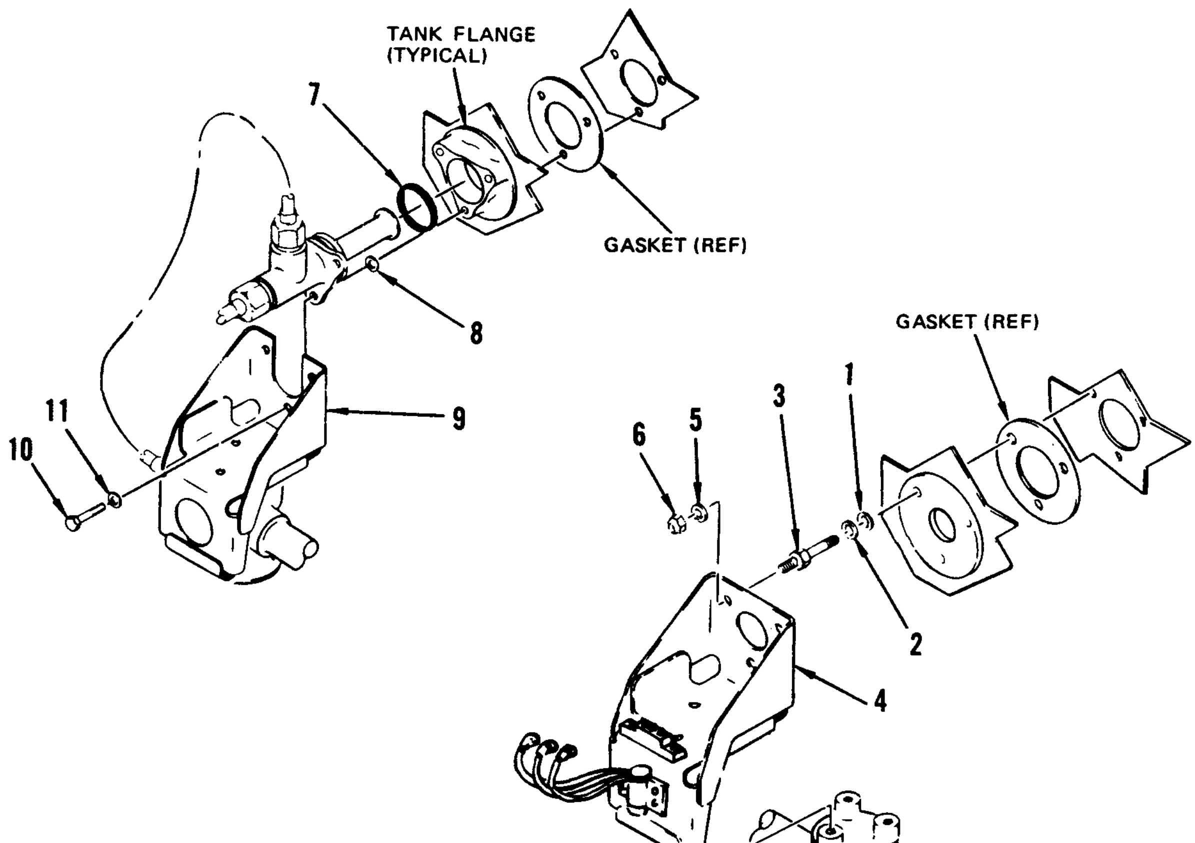
a. Using new seals (1), secure tank flange with washers (2), and studs (3).

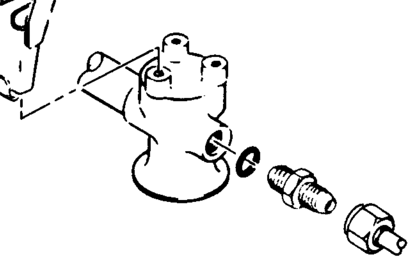
b. Torque studs to 60 (±5) inch-pounds.

c. Secure left ejector pump and bracket assembly (4) to studs with washers (5) and nuts (6).

d. Torque nuts to 22 (+3, −2) inch-pounds.

e. Install new O-ring (7) on right ejector pump assembly.





f. Using new seals (8), install right ejector pump and bracket assembly (9) to tank flange with bolts (10) and washers (11).

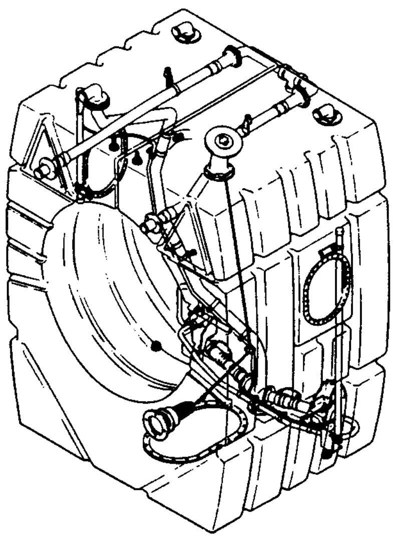
g. Install washers and bolts in accordance with MIL–B–5087 to prevent accumulation of static charge.

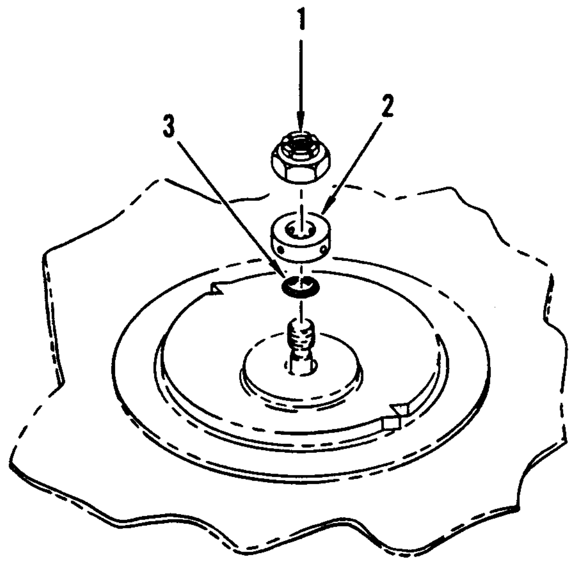
h. Torque bolts to 60 (±5) inch-pounds.

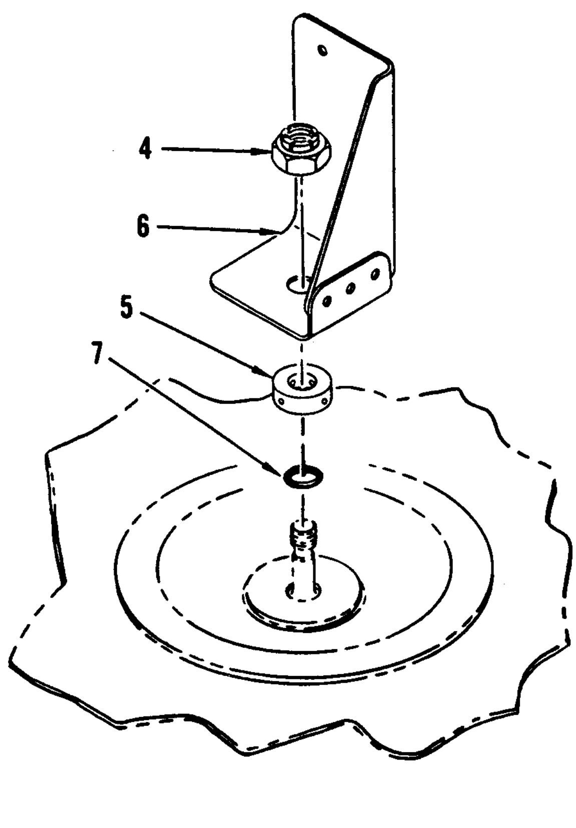
06D016–02–10–85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 2)

WATER DRAINS







a. Secure water drain to right side of fuel tank floor with nut (1), drain washer (2), and new seal (3).

b. Torque nut to 180 (±20) inch-pounds.

c. Secure water drain to left side of tank floor with nut (4), drain washer (5), transmitter mounting bracket (6), and new seal (7).

d. Torque nut to 180 (±20) inch-pounds.

06D016-03-10-85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 3)

SUMP TRANSFER FITTING

a. Install new O-rings (1 and 2) on sump transfer fitting (3) and position fitting over tank flange with bottom of fitting inserted in alternate fuel feed selector valve.

b. Secure sump transfer fitting with bolts (4), washers (5), new seals (6), and nuts (7). Torque nuts to 60 (±5) inch-pounds.

NOTE

Install bolts, washers, and nuts in accordance with MIL-B-5087 to prevent accumulation of static charge.

c. Connect left and right ejector pump outlet lines and fuel line (8) to sump transfer fitting with couplings (9) using new O-rings (10).

d. Torque couplings to 20 (±2) foot-pounds and sequre with MS20995C32 lockwire.

e. Install bonding cables (11) with bolts (12), washers (13), and nuts (14). Torque nuts to 22 (+3, −2) inch-pounds.

f. Torque coupling to 40 (±4) foot-pounds and secure with MS20995C32 lockwire.

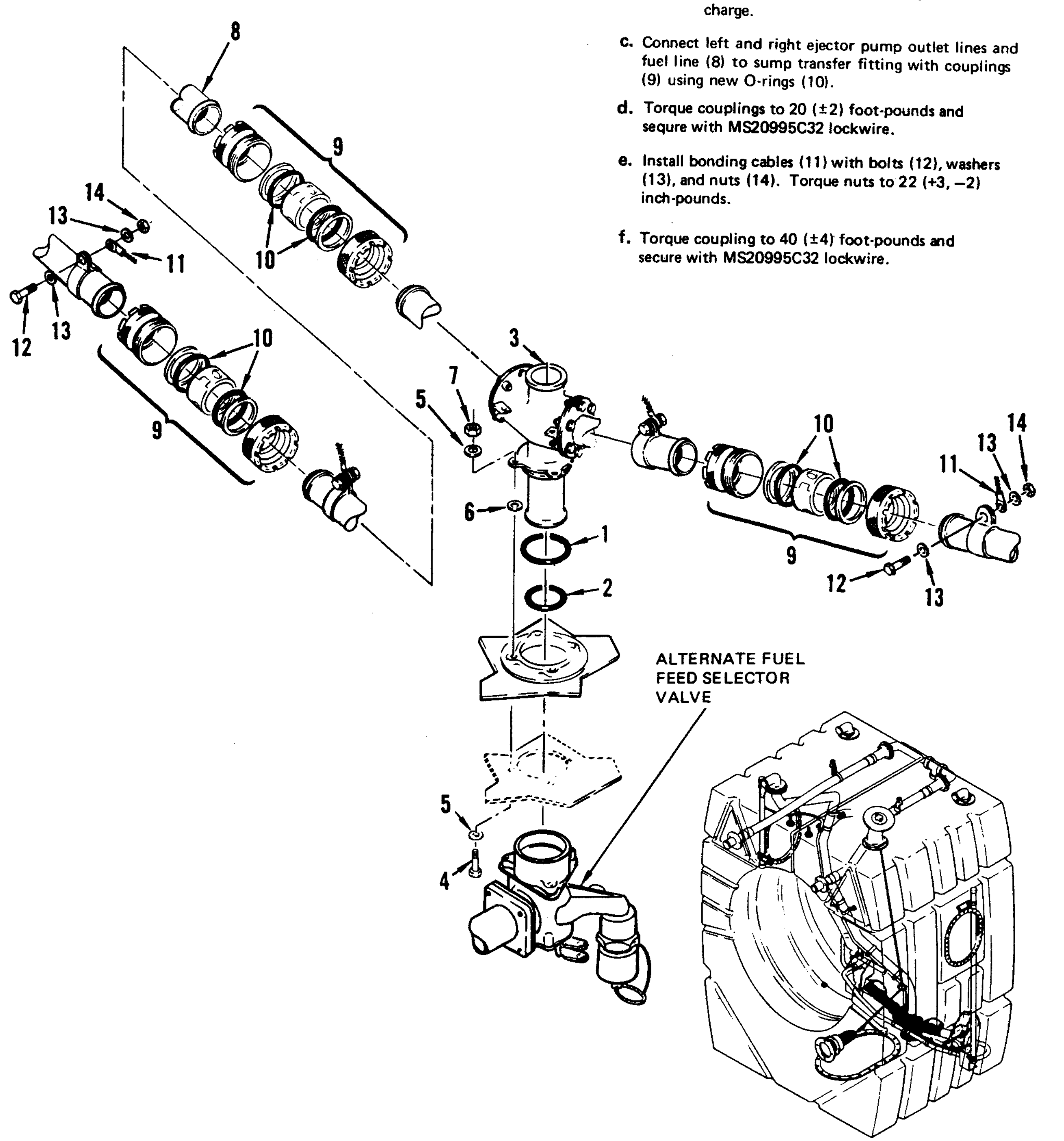
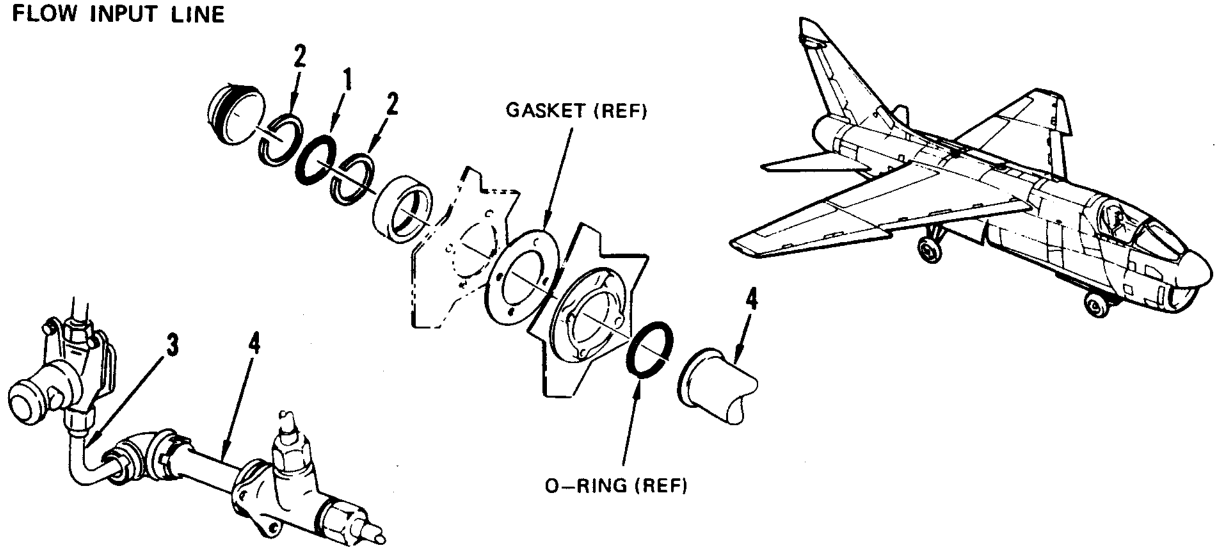


Figure 1-21. Installation; Aft Fuselage Tank (Sheet 4)

MOTIVE FLOW INPUT LINE

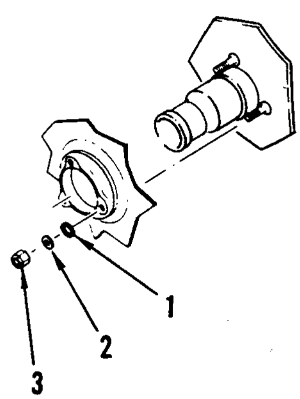


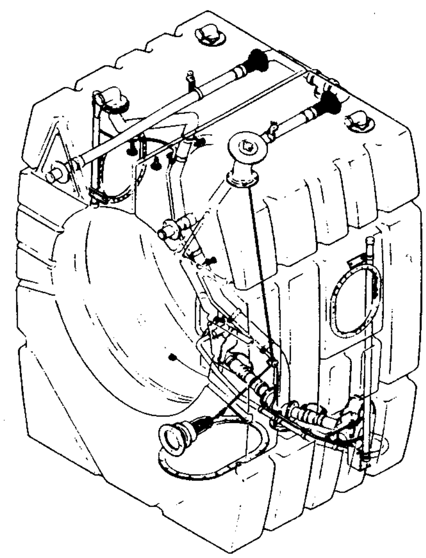
a. Using new O-ring (1), install washers (2) in coupling and connect wing transfer selector valve output line (3) to motive flow input fitting (4) in right forward engine bay.

b. Torque coupling to 6 (±1) foot-pounds and secure with MS20995C32 lockwire.

FUEL AND VENT LINE ADAPTERS

a. Position tank flanges around adapters and secure flanges to bulkhead with new seals (1), washers (2), and nuts (3).

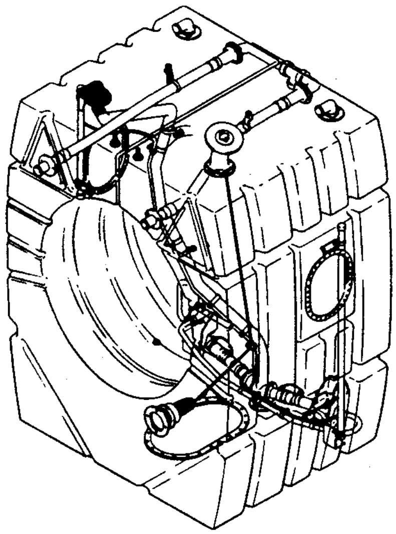


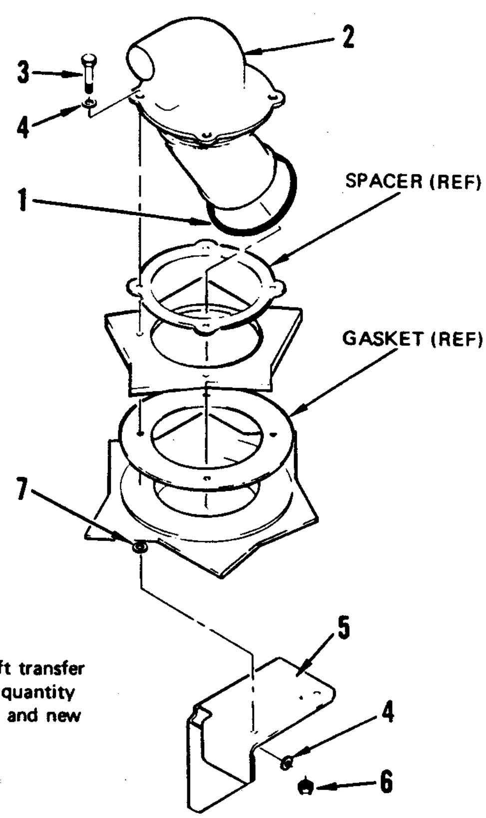


06D016–05–10–85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 5)

AFT-TO-WING FUEL TRANSFER FITTING

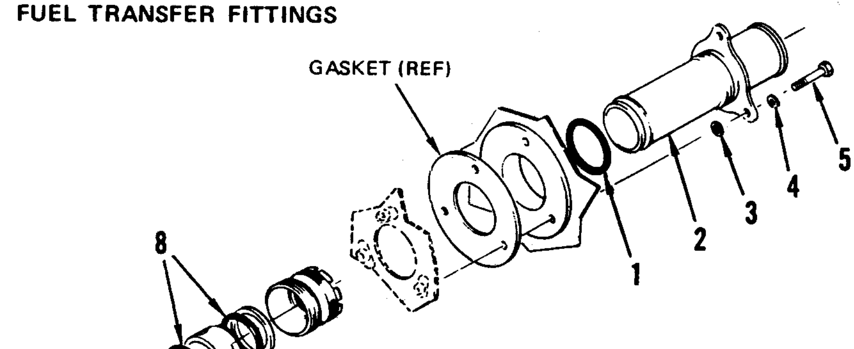




a. Install new O-ring (1) and secure wing-to-aft transfer fitting (2) with bolts (3), washers (4), fuel quantity transmitter mounting bracket (5), nuts (6), and new seals (7).

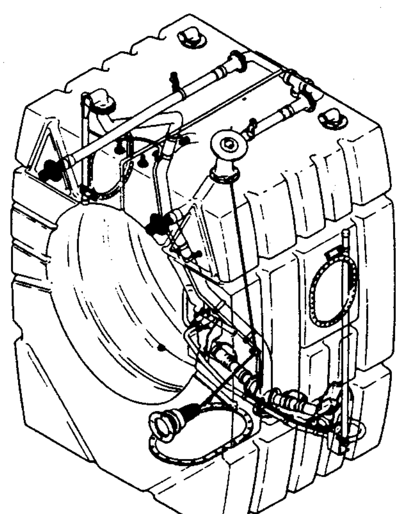
b. Torque nuts to 60 (±5) inch-pounds.

FUEL TRANSFER FITTINGS



NOTE

Install bolts and washers in accordance with MIL-B-5087 to prevent accumulation of static charge.



a. Install new O-rings (1) on fuel transfer fittings (2) and secure fittings to tank cavity with new seals (3), washers (4), and bolts (5). Tighten bolts to 60 (±5) pound-inches torque.

b. Connect fuel transfer fittings to fuel lines (6) with couplings (7) and new O-rings (8).

c. Torque couplings to 20 (±2) foot-pounds and secure with MS 20995C32 lockwire.

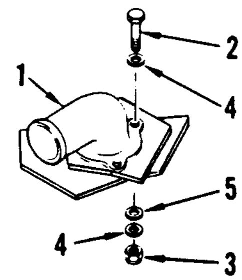
06D016–06–10–85

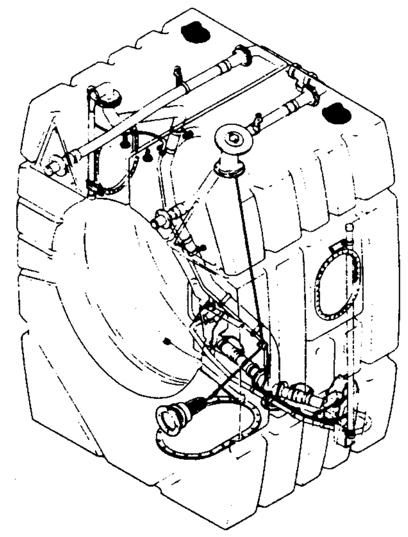
Figure 1-21. Installation; Aft Fuselage Tank (Sheet 6)

FUELING AND VENT FITTINGS

a. Secure fueling and vent fittings (1) with bolts (2), nuts (3), washers (4), and new seals (5).

b. Torque nuts to 60 (±5) inch-pounds.





GRAVITY FUELING RECEPTACLE, CHECK VALVE, OVERRIDE LANYARD, AND LANYARD SHIELDS

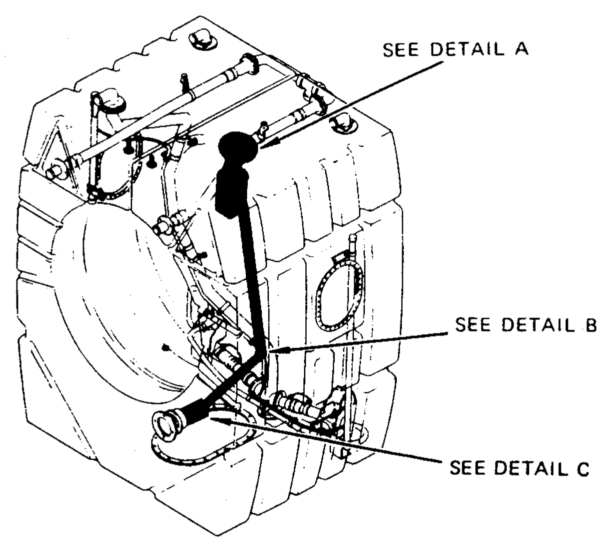
a. Install override lanyard shield (1) and gravity fueling receptacle (2) with new seals (3), washers (4), bolts (5), and nuts (6). Torque nuts to 60 (±5) inch-pounds.

b. Route override lanyard (7) down through lanyard shield and install gravity fueling receptacle cap.

c. Install support (8), new seal (9), washer (10), and bolt (11).

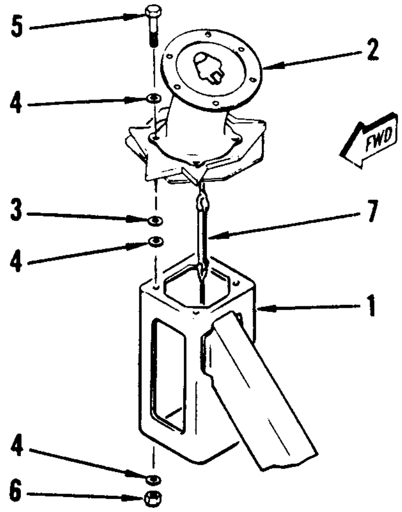
d. Coat new seal (12) with VV-P-236 petrolatum and install on fuel line.

e. Position check valve (13) on fuel line.

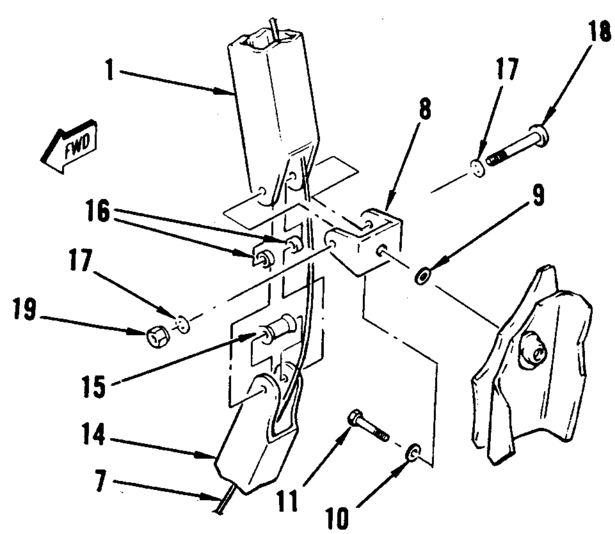


06D016-07-10-85

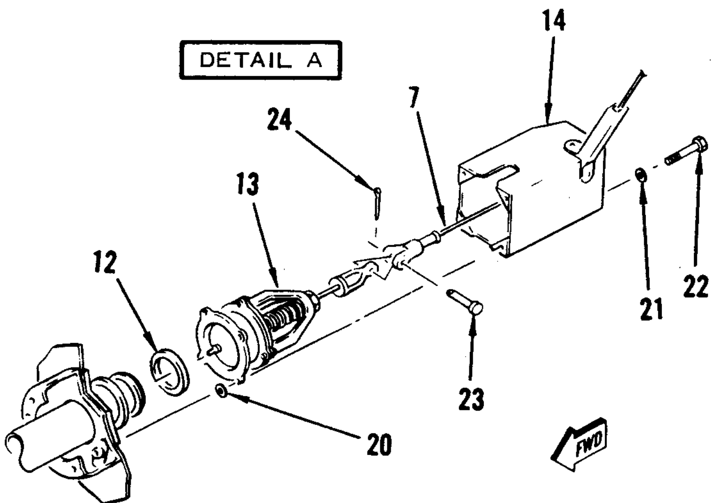
Figure 1-21. Installation; Aft Fuselage Tank (Sheet 7)



DETAIL A



DETAIL B



DETAIL C

f. Secure lanyard shields (1 and 14) to support with bearing (15), spacers (16), washers (17), bolt (18), and nut (19). Check that override lanyard is positioned between support and bearing.

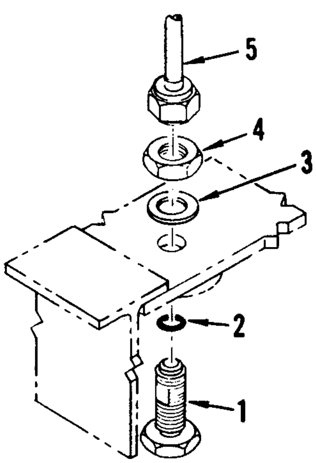
g. Secure lanyard shield (14) and check valve (13) to tank wall with new seals (20), washers (21), and bolts (22). Torque bolts to 60 (±5) inch-pounds.

h. Attach override lanyard to check valve with pin (23) and new cotter pin (24).

i. Remove gravity fueling cap and seat keeper ball of lanyard inside slot of filler neck. Check that valve opens a minimum of 0.75 inch.

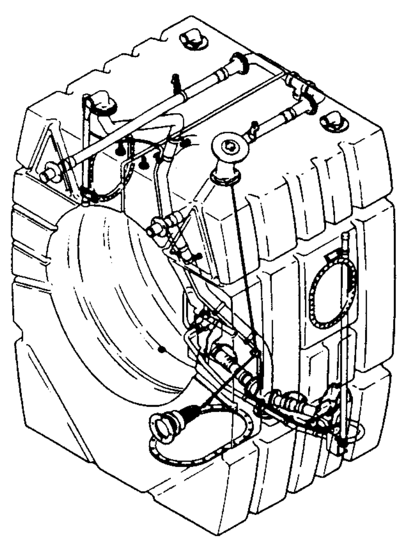
j. Release lanyard and check that valve closes.

VENT LINE ADAPTERS



a. Secure tank vent adapters (1) with new O-rings (2), washers (3), and nuts (4).

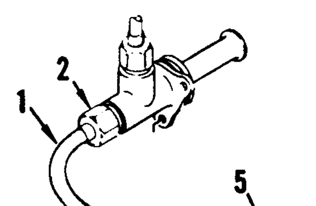
b. Connect vent line fittings (5) to tank adapters.



06D016-08-10-85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 8)

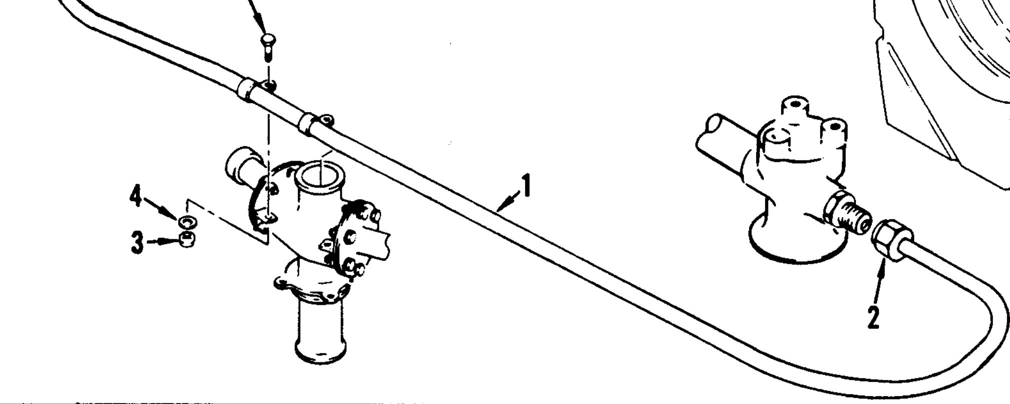
MOTIVE FLOW CROSSOVER LINE

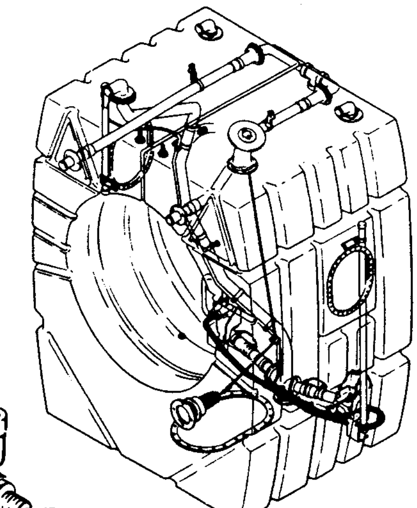


a. Connect motive flow crossover line (1) to left ejector pump and to motive flow input fitting with line fittings (2).

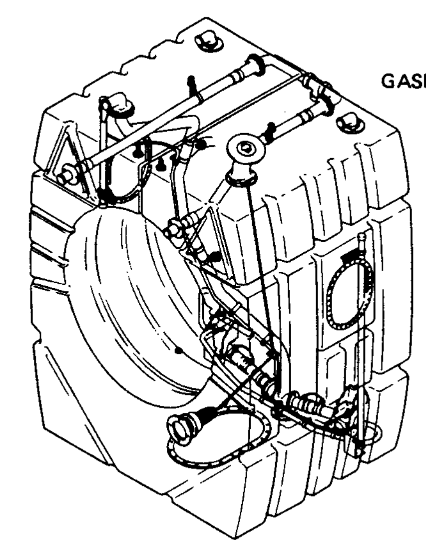
b. Install clamps to sump transfer fitting with nuts (3), washers (4), and bolts (5) in accordance with MIL-B-5087 to prevent accumulation of static charge.

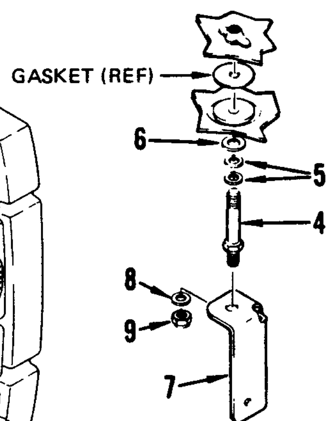
c. Torque nuts to 22 (+3, –2) inch-pounds.





BRACKET SUPPORT STUDS



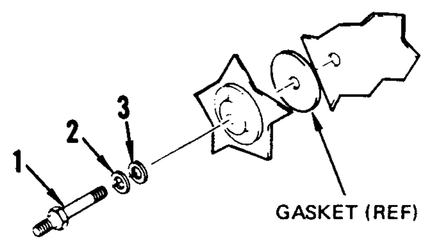


a. Install wing-to-aft transfer line support bracket studs (1) with washers (2) and new seals (3) in accordance with MIL-B-5087A(ASG) to prevent accumulation of static charge.

b. Torque studs to 60 (±5) inch-pounds.

c. Install fuel transfer line bracket support studs (4) with washers (5) and new seals (6) in accordance with MIL-B-5087 to prevent accumulation of static charge.

d. Torque studs to 60 (±5) inch-pounds.



e. Install brackets (7), washers (8), and nuts (9) to fuel transfer bracket support studs in accordance with MIL-B-5087 to prevent accumulation of static charge.

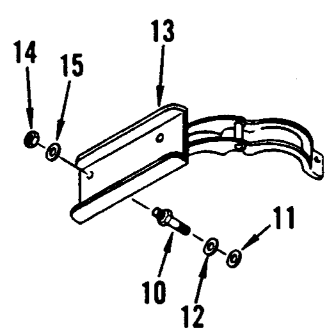
f. Torque nuts to 22 (+3, –2) inch-pounds.

g. Install fuel quantity transmitter support studs (10) with new seals (11) and washers (12).

h. Torque studs to 60 (±5) inch-pounds.

i. Secure transmitter brackets (13) and attached clamps to studs with nuts (14) and washers (15).

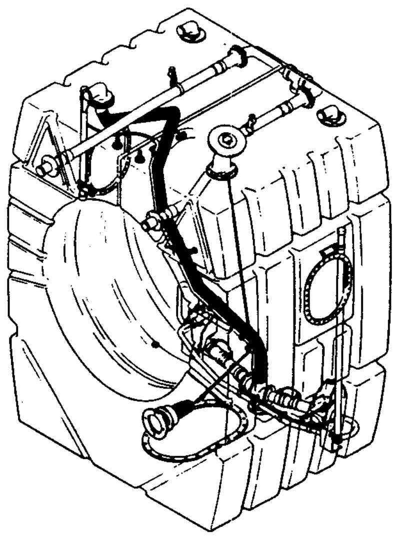
j. Torque nuts to 22 (+3, –2) inch-pounds.



06D016–09–10–85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 9)

FUEL TRANSFER LINE

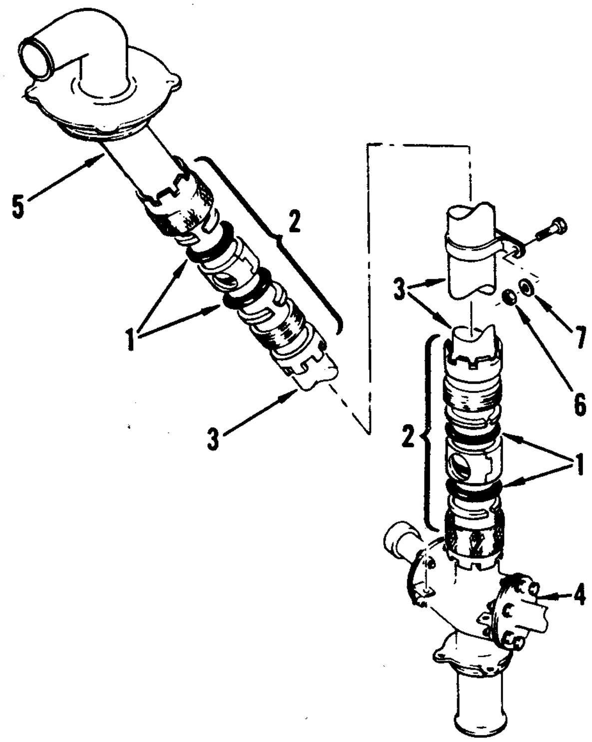


a. Install new O-rings (1) in couplings (2) and connect fuel transfer line (3) to sump transfer fitting (4) and transfer fitting (5).

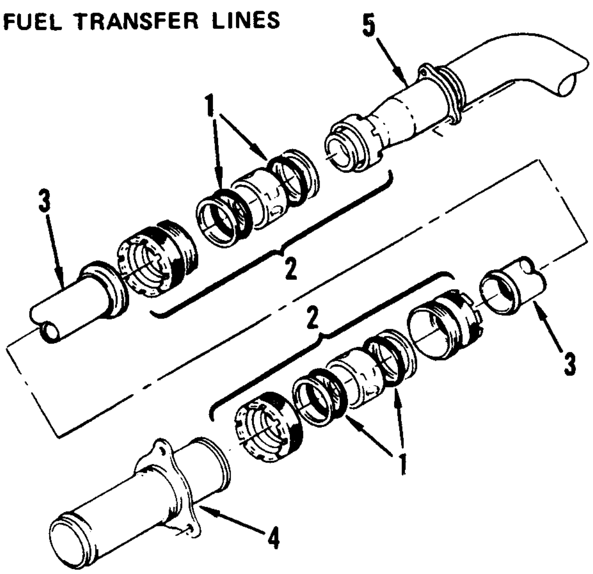
b. Torque couplings to 35 (±4) foot-pounds and secure with MS20995C32 lockwire.

c. Install line clamps with nuts (6) and washers (7) in accordance with MIL-B-5087 to prevent accumulation of static charge.

d. Torque nuts 20 to 25 inch-pounds.



FUEL TRANSFER LINES

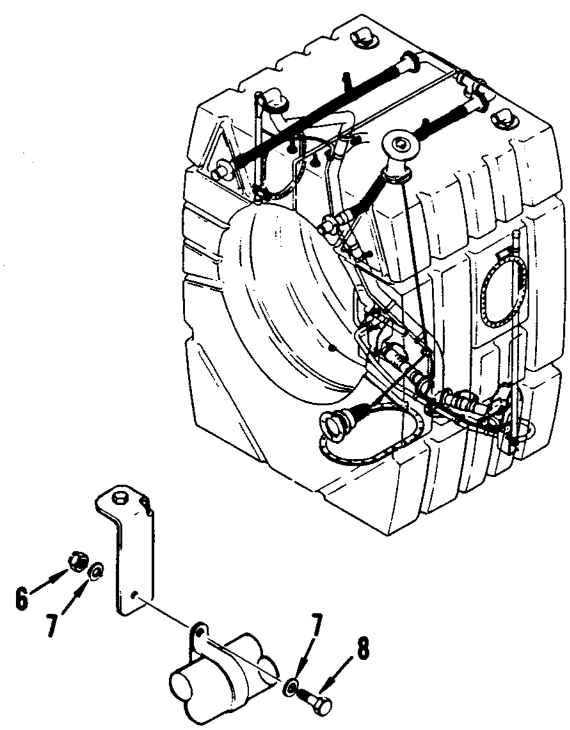


a. Install new O-rings (1) in couplings (2) and connect fuel transfer lines (3) to fuel transfer fittings (4) and adapters (5).

b. Torque couplings to 20 (±2) foot-pounds and secure with MS20995C32 lockwire.

c. Install clamps to mount brackets with nuts (6), washers (7), and bolts (8) in accordance with MIL-B-5087 to prevent accumulation of static charge.

d. Torque nuts to 22 (+3, −2) inch-pounds.



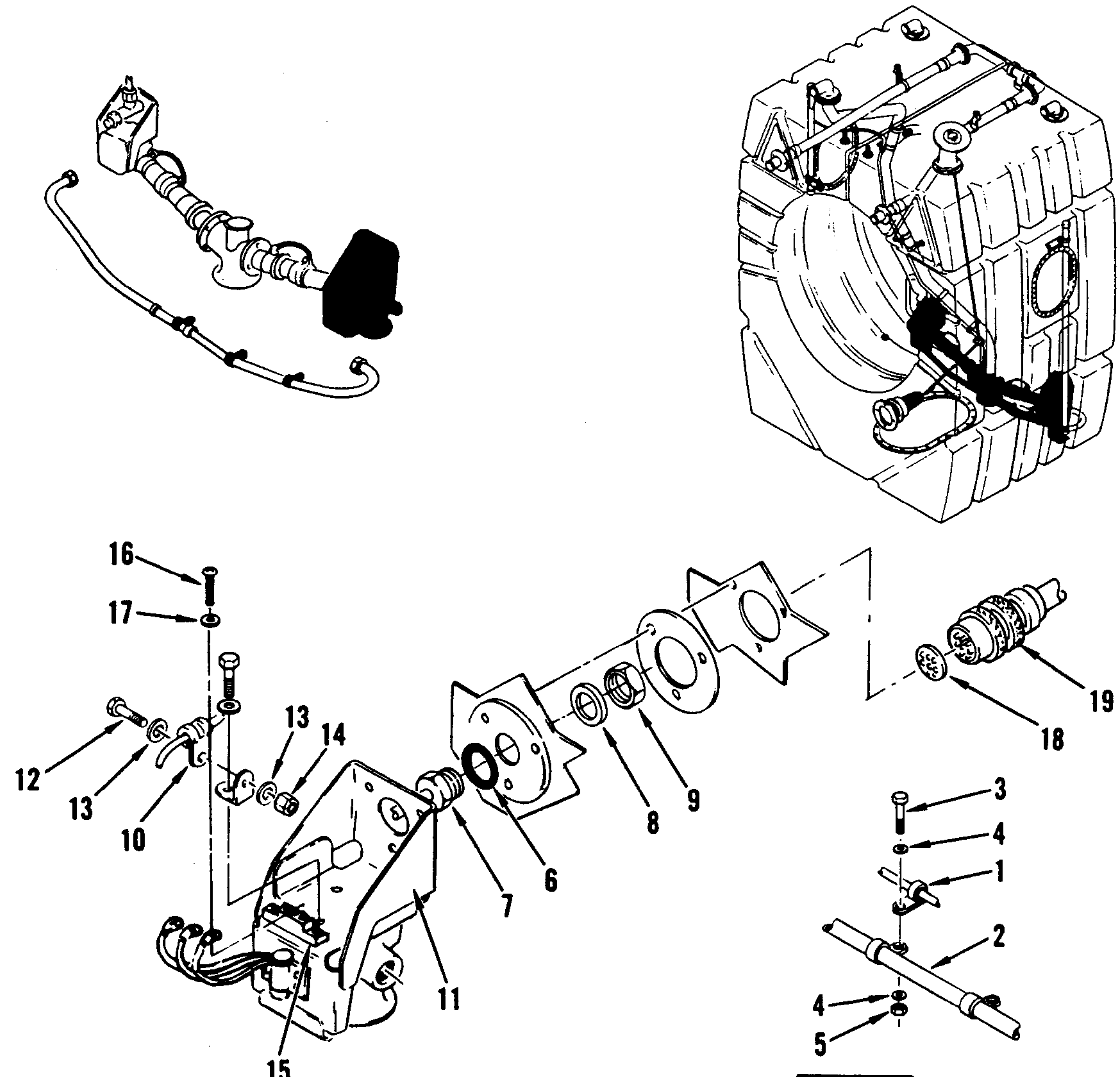
06D016-10-10-85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 10)

FUEL QUANTITY TRANSMITTERS

a. Install fuel quantity transmitters (paragraph 5–12).

LEADS AND TERMINALS



a. Install wiring harness clamps (1) to motive flow crossover line (2) with bolts (3), washers (4), and nuts (5).

b. Torque nuts to 22 (+3, –2) inch-pounds.

c. Install new O-ring (6) and secure electrical feedthrough (7) to tank cavity with lockwasher (8) and nut (9).

d. Torque feedthrough nut to 112 (+3, –2) inch-pounds.

e. Install feedthrough alignment clamp (10) to ejector pump bracket assembly (11) with bolt (12), washers (13), and nut (14).

f. Torque nuts to 22 (+3, –2) inch-pounds.

NOTE

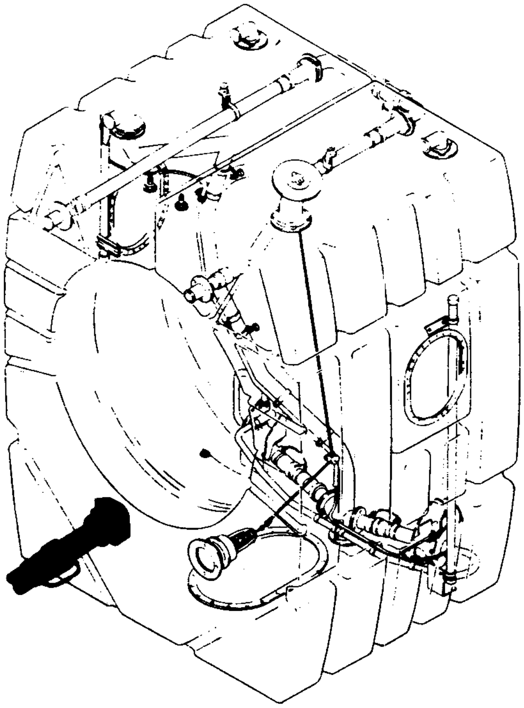
Connect wiring harness leads that were color tagged during removal to proper color-coded thermistor leads.

g. Secure wiring to terminal thermistor block (15) with screws (16) and washers (17).

h. Install the sealing gasket (18) into external electrical connector (19), with numbers on gasket facing out and aligned with pin numbers (pin 8 is adjacent to keyway). Connect electrical connector (19) to feedthrough connector (7).

06D016–11–10–85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 11)



CHECK VALVE

a. Install new O-ring (1).

b. Insert check valve (2) into fuel tank fitting with flapper hinge up and in horizontal position.

c. Position valve cover (3) on valve. Secure valve and cover with new seals (4), washers (5), and bolts (6). Torque bolts to 60 (±5) inch-pounds.

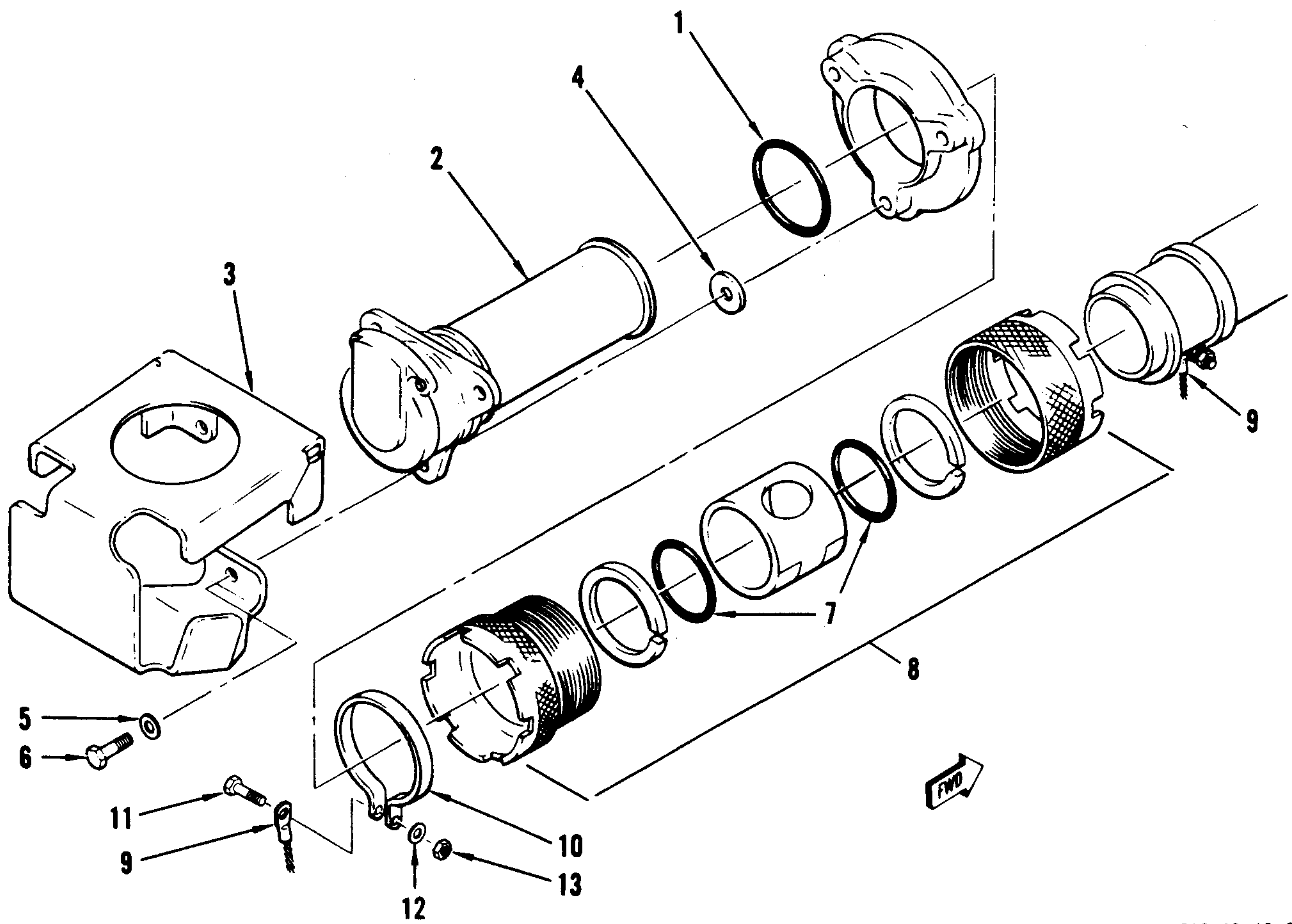
d. Install new O-rings (7) in coupling (8) as shown. Torque coupling to 25 (±8) foot-pounds.

e. Secure coupling with MS20995C32 lockwire.

NOTE

Clean bonding surfaces and install bonding jumper in accordance with MIL-B-5087.

f. Secure bonding jumper (9) to valve with clamp (10), bolt (11), washer (12), and nut (13).



06D016-12-10-85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 12)

CHECKOUT AND ACCESS INSTALLATION

a. Check tank for security, cleanness, and freedom from foreign objects.

b. Install baffles in accordance with paragraph 1–18.

c. Remove heavy tape covering access edges.

d. Install aft fuel tank access cover (paragraph 1–14), but do not fuel airplane.

e. Connect external electrical power (T.O. 1A-7D-2-1) and check that low level fuel warning light is on. Check that low sump level warning light is on.

f. Fuel airplane (T.O. 1A-7D-2-1) and check that low level fuel warning light goes off and that fuel quantity indicator movement is smooth during fueling. Check that low sump level warning light goes off.

g. Check tank installation for evidence of leakage.

h. Disconnect external electrical power.

i. Close accesses 5111–4, 6222–1, 6111–3, 6111–2, 5111–2, 6111–4, and 5111–5 and check for security.

j. Perform a fuel contamination test (paragraph 1–20).

06D016–13–09–85

Figure 1-21. Installation; Aft Fuselage Tank (Sheet 13)

k. Remove and discard gasket from adapter above tank cavity.

l. Bond new gasket with MMM-A-1617, Type III adhesive to base of adapter mating area.

m. Coat packing seal on lower end of adapter with VV-P-236 petrolatum.

n. Feed lead-in cord through adapter, and secure aft end of cord.

o. Position adapter in mating area above tank cavity, and with one workman holding bolts in upper area, install new Stat-O-Seals, washers, and nuts inside aft tank, securing tank flange to adapter. Torque nuts to 60 (±5) inch-pounds.

p. Install tank baffles (paragraph 1-18).

q. Install aft tank access (paragraph 1-14), but do not fuel airplane.

r. Pull up on lanyard, and insert keeper ball in receptacle in top of adapter neck. Disconnect lead-in cord from lanyard.

s. Install gravity fueling cap (paragraph 1-16.1).

t. Fuel airplane fuselage tanks (T.O. 1A-7D-2-1).

u. Check tank for leakage.

v. Position access 5111-5 in airplane, install fasteners, and secure access to airframe. Install fasteners, securing access to adapter.

w. Perform fuel contamination test (paragraph 1-20).

1-17. GRAVITY FUELING CHECK VALVE REMOVAL AND INSTALLATION.

Tools Required

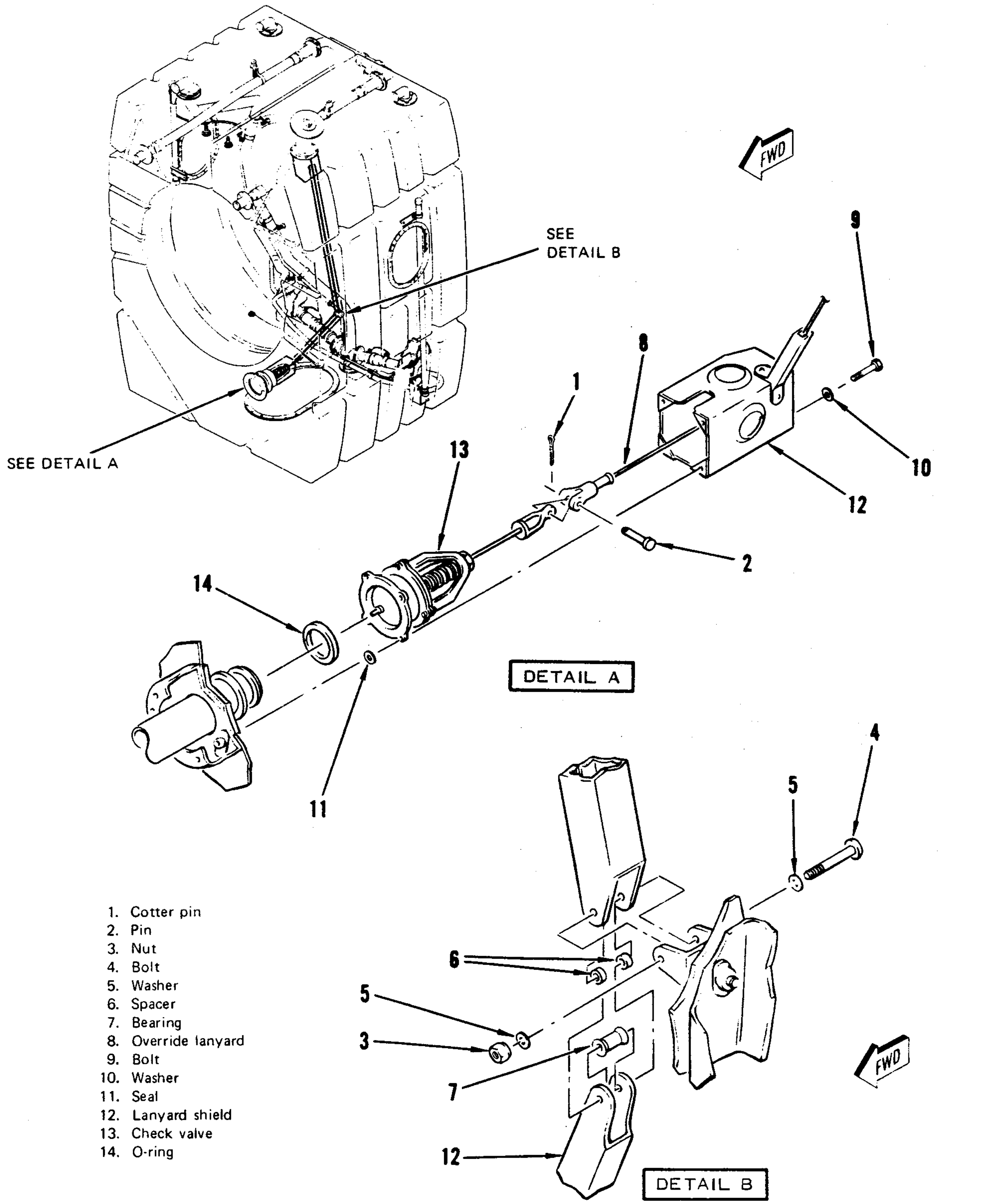
Figure & index No.	Part number	Nomenclature	Use and application
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	55-1	Explosion-proof vacuum cleaner	Clean aft fuel tank cavity

1-17.1. Removal. (Figure 1-22.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove aft fuel tank access (paragraph 1-14).



1. Cotter pin
2. Pin
3. Nut
4. Bolt
5. Washer
6. Spacer
7. Bearing
8. Override lanyard
9. Bolt
10. Washer
11. Seal
12. Lanyard shield
13. Check valve
14. O-ring

06D069–09–85

Figure 1-22. Removal and Installation; Gravity Fueling Check Valve

b. Install heavy tape around fuel tank access edges.

c. Remove aft tank baffles (paragraph 1-18).

d. Remove cotter pin (1) and pin (2).

e. Remove nut (3), bolt (4), washers (5), spacers (6), and bearing (7).

f. Open gravity fueling receptacle cap, and lift override lanyard (8) from tank cavity.

g. Remove bolts (9), washers (10), and seals (11) securing lanyard shield (12) and check valve (13) to tank wall.

h. Remove lanyard shield, check valve, and O-ring (14).

1-17.2. Installation. (Figure 1-22).

a. Check tank cavity for foreign objects, and vacuum tank cavity.

b. Coat new O-ring (14) with VV-P-236 petrolatum, and install on fuel line.

c. Install check valve (13) on fuel line. Secure check valve and lanyard shield (12) to tank wall with new seals (11), washers (10), and bolts (9). Torque bolts to 60 (±5) inch-pounds.

d. Route override lanyard (8) down through lanyard shields, and secure to check valve with pin (2) and cotter pin (1).

e. Install bearing (7), spacers (6), washers (5), bolt (4), and nut (3). Check that override lanyard is positioned between bearing and tank wall.

f. Remove gravity fueling cap and seat keeper ball of lanyard inside slot of filler neck.

g. Check that valve opens a minimum of 0.75 inch.

h. Release lanyard, and check that valve closes.

i. Install tank baffles (paragraph 1-18).

j. Remove tape from tank access edges.

k. Install fuel tank access in accordance with paragraph 1-14, except leave access 5213-1 open and do not fuel airplane.

l. Fuel aft tank through gravity fueling receptacle (T.O. 1A-7D-2-1). Pull override lanyard, and check valve for leakage and proper operation.

m. If valve operation is satisfactory, fuel airplane (T.O. 1A-7D-2-1).

n. Connect marker beacon antenna cable and ADF antenna cable. Close access 5213-1.

o. Perform fuel contamination test (paragraph 1-20).

1-18. FUSELAGE TANK BAFFLES REMOVAL, CLEANING, AND INSTALLATION.

WARNING

Observe all safety precautions given in T.O. 1-1-3.

Once a fuel tank is opened, a continuous air purge shall be maintained until all baffles are removed to ensure a firesafe and healthsafe condition. To prevent contamination and reduce fire hazard, removed baffles must be stored in clean polyethylene or canvas bags. Remove baffles from the repair area. For extended storage, the baffles should be dry of fuel. This prevents fuel vapors from forming an explosive hazard or a nauseating environment. Drying of the baffles may be achieved by static exposure to air in a dust- and dirt-free area or by blowing warm air through the baffles. To reduce possibility of static electricity building up, remove baffles slowly from fuel tank.

1-18.1. Removal. (Figures 1-23 through 1-26.)

CAUTION

Cotton gloves should not be worn when handling baffles. The lint produced by cotton material will contaminate the foam.

NOTE

Part numbers are marked on each baffle as well as arrows designating up, forward or aft, and inboard or outboard. To facilitate installation, each baffle should be checked for proper markings immediately after removal from the fuel tank. Markings that are obscure should be identified and re-marked before installation.

a. Using leather or rubber gloves, compress and carefully withdraw baffles through the fuel tank accesses. Note position of baffles to save time during installation.

b. Re-mark baffles as required using a Blaisdell Liquid Tip No. 1173-F felt tip marker, Blaisdell Pencil Co., or equivalent. See figures 1-23 through 1-26 for part numbers and baffle locations.

c. Visually inspect removed baffles for cleanness and deterioration. If the foam appears to be excessively contaminated and cannot be easily cleaned, replace baffle (paragraph 1-19).

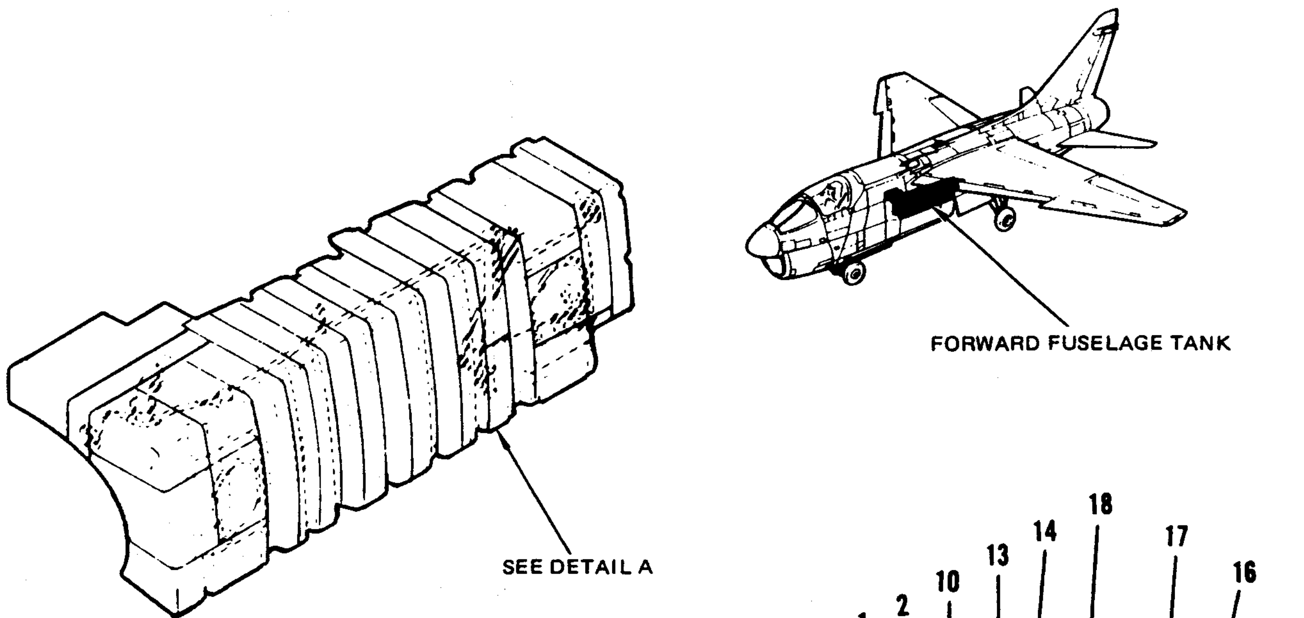
d. Using fingers, attempt to tear or pull a few strands of the foam material at various points on the surface of each baffle. Use a small piece of unused baffle material for comparison. If the foam tears easily, or visual inspection reveals evidence of loose particles of foam strands collected in the open network, replace baffles (paragraph 1-19).

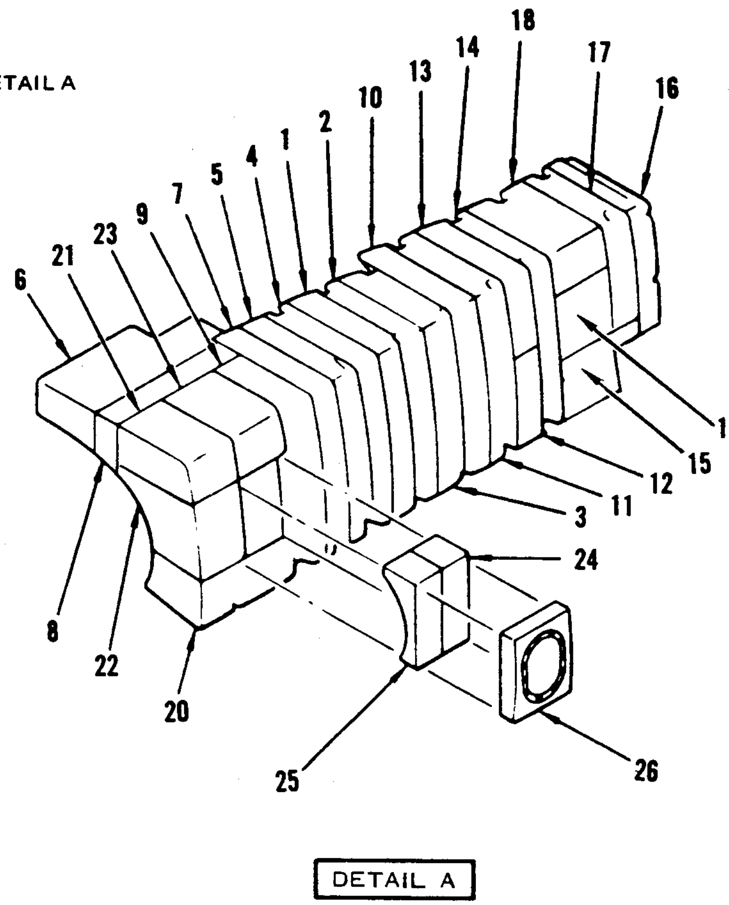
1-18.2. Cleaning.

a. Immerse and agitate baffles in JP-5 fuel to remove foreign residue.

b. Inspect baffles for contamination caused by sump tank self-sealing material. Replace baffles if self-sealing material is present (paragraph 1-19).

c. Allow baffles to dry after cleaning.



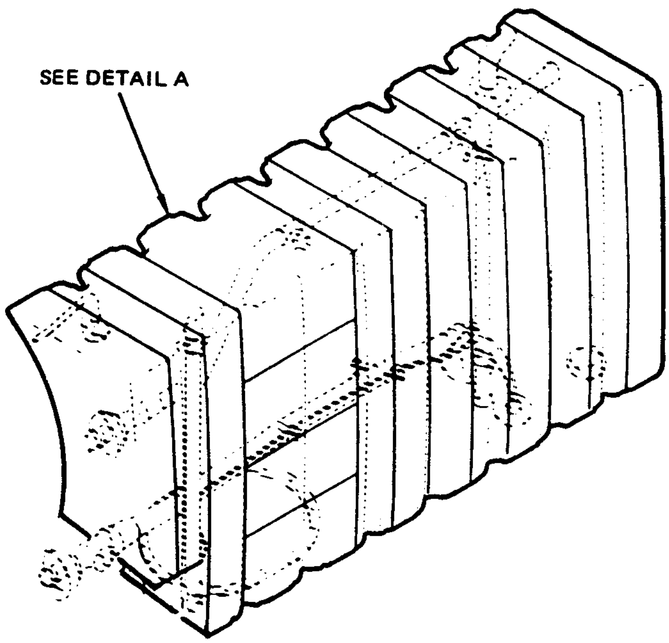


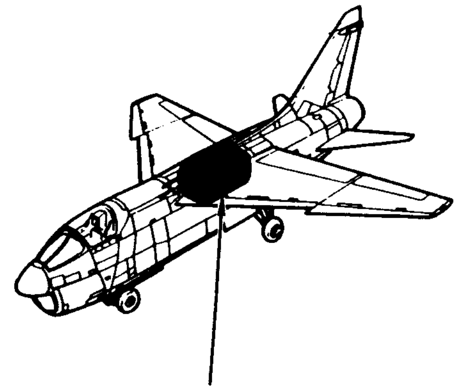
Blue Foam

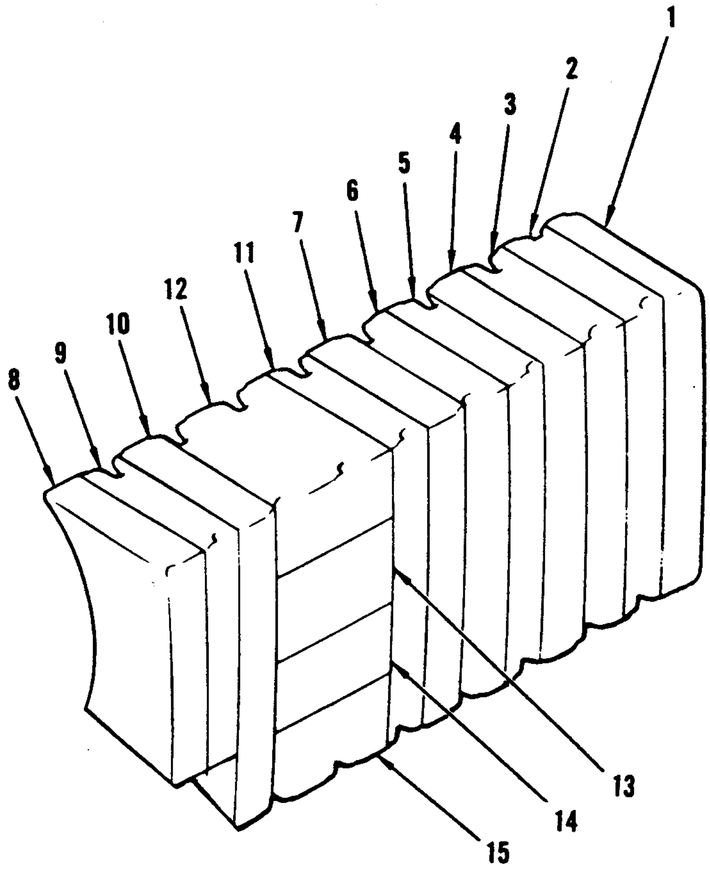
1. Baffle, L/R (7827236-47, -48)
2. Baffle, L/R (7827236-53, -54)
3. Baffle, L/R (7827236-21, -22)
4. Baffle, L/R (7827236-27, -28)
5. Baffle, L/R (7827236-57, -58)
6. Baffle, L/R (7827236-41, -42)
7. Baffle, L/R (7827236-05, -06)
8. Baffle, L/R (7827236-55, -56)
9. Baffle, L/R (7827236-13, -14)
10. Baffle, L/R (7827236-43, -44)
11. Baffle, L/R (7827236-31, -32)
12. Baffle, L/R (7827236-01, -02)
13. Baffle, L/R (7827236-03, -04)
14. Baffle, L/R (7827236-35, -36)
15. Baffle, L/R (7827236-07, -08)
16. Baffle, L/R (7827236-45, -46)
17. Baffle, L/R (7827236-23, -24)
18. Baffle, L/R (7827236-37, -38)
19. Baffle, L/R (7827236-51, -52)
20. Baffle, L/R (7827236-15, -16)
21. Baffle, L/R (7827236-61, -62)
22. Baffle, L/R (7827236-25, -26)
23. Baffle, L/R (7827236-63, -64)
24. Baffle, L/R (7827236-33, -34)
25. Baffle, L/R (7827236-11, -12)
26. Baffle, L/R (7827236-17, -18)

06D017–09–85

Figure 1-23. Removal and Installation; Forward Fuselage Tank Baffles





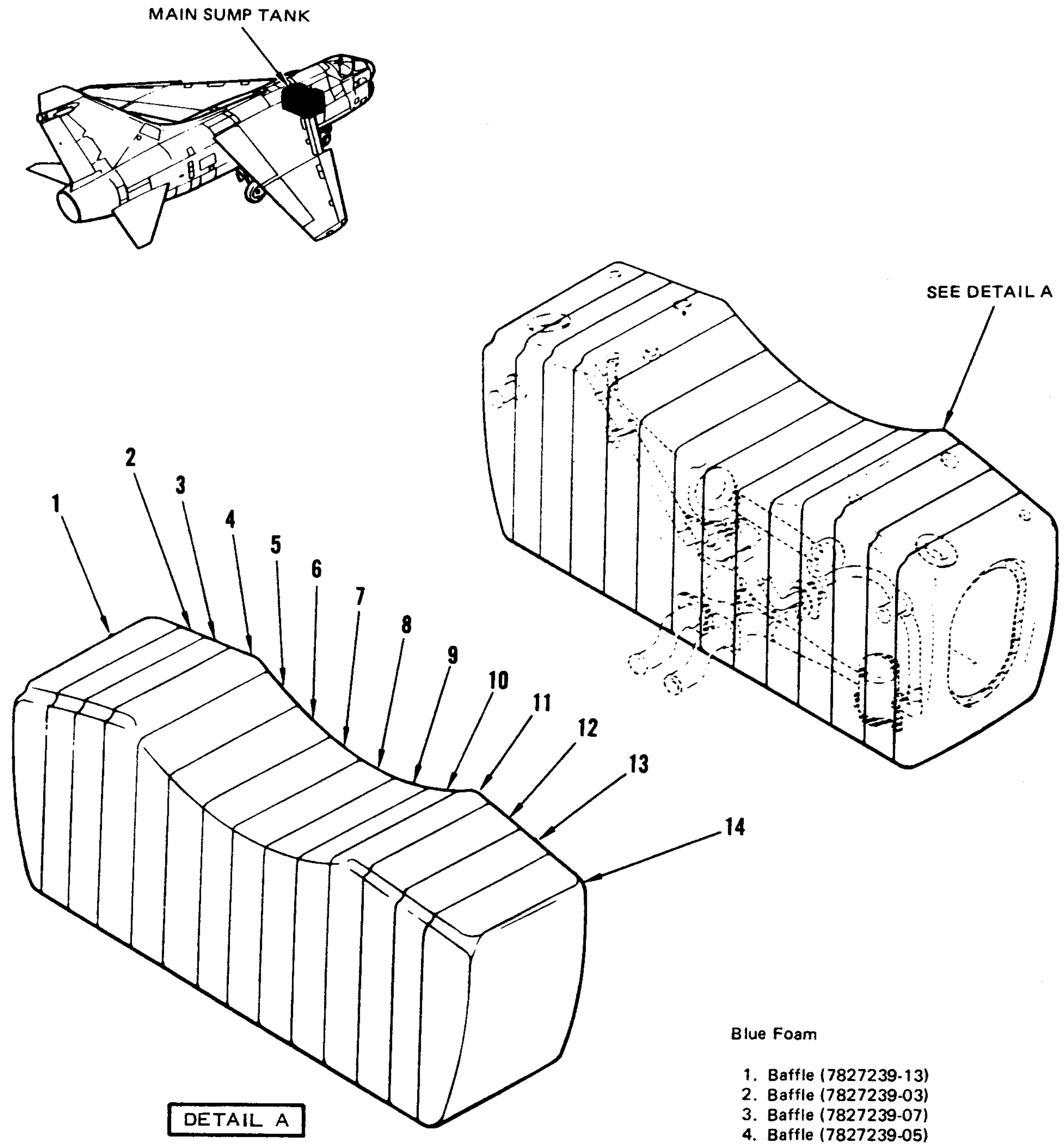


Blue Foam

1. Baffle, L/R (7827237-11, -12)
2. Baffle, L/R (7827237-23, -24)
3. Baffle, L/R (7827237-31, -32)
4. Baffle, L/R (7827237-25, -26)
5. Baffle, L/R (7827237-13, -14)
6. Baffle, L/R (7827237-35, -36)
7. Baffle, L/R (7827237-33, -34)
8. Baffle, L/R (7827237-07, -08)
9. Baffle, L/R (7827237-05, -06)
10. Baffle, L/R (7827237-27, -28)
11. Baffle, L/R (7827237-15, -16)
12. Baffle, L/R (7827237-21, -22)
13. Baffle, L/R (7827237-01, -02)
14. Baffle, L/R (7827237-17, -18)
15. Baffle, L/R (7827237-03, -04)

06D018–09–85

Figure 1-24. Removal and Installation; Midfuselage Tank Baffles

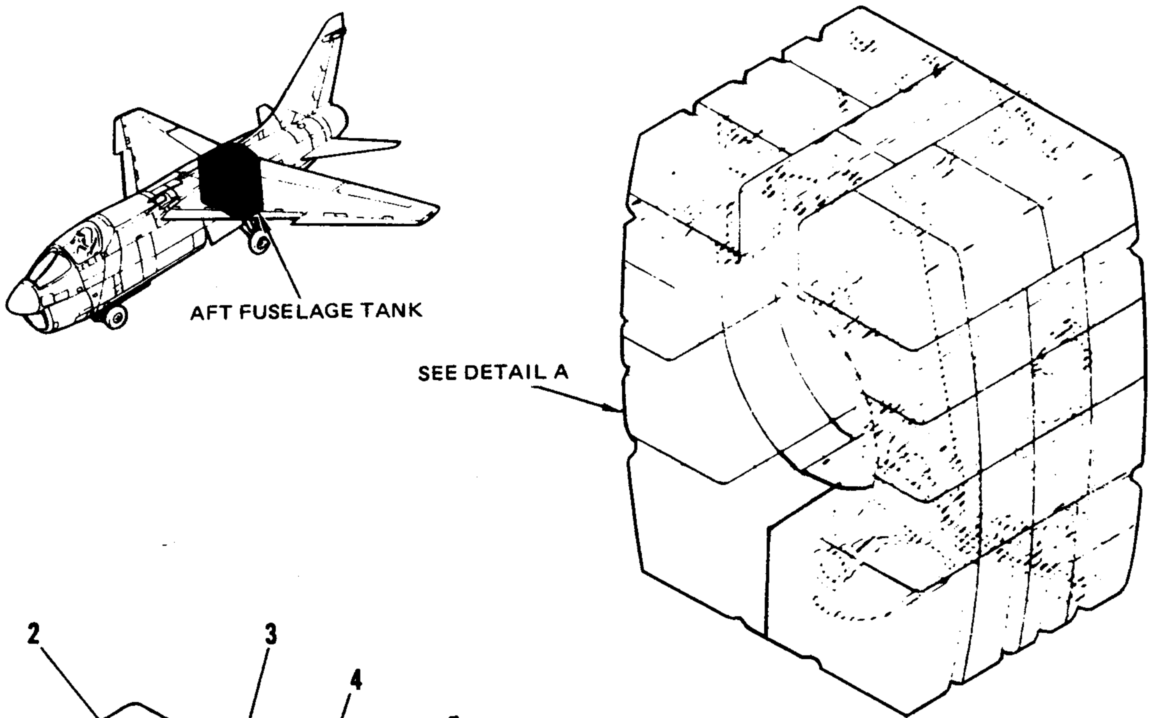


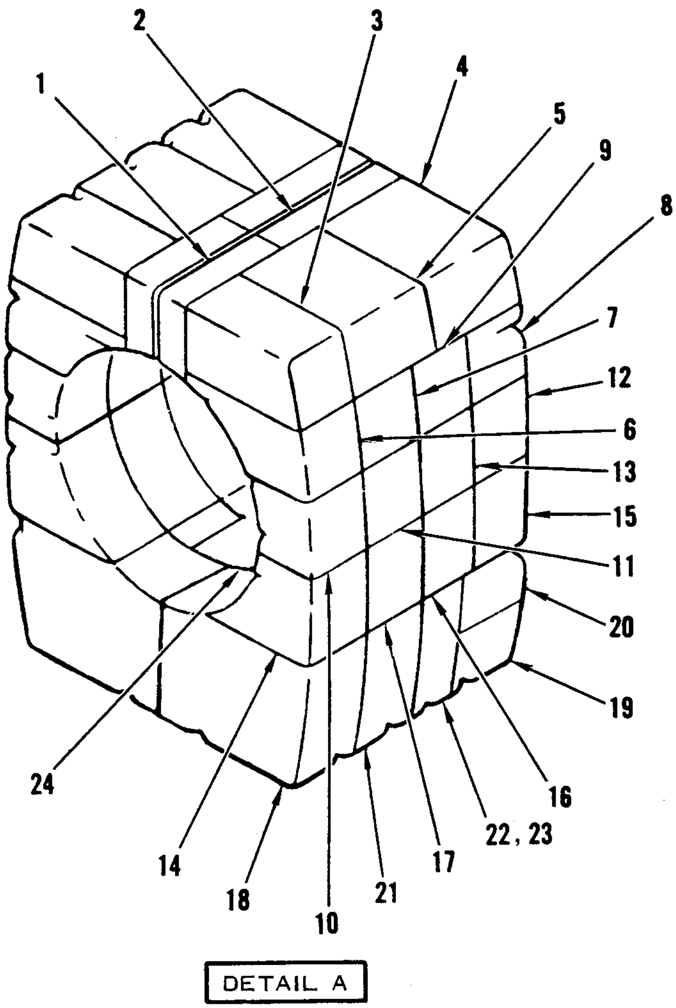
Blue Foam

1. Baffle (7827239-13)
2. Baffle (7827239-03)
3. Baffle (7827239-07)
4. Baffle (7827239-05)
5. Baffle (7827239-01)
6. Baffle (7827239-11)
7. Baffle (7827239-15)
8. Baffle (7827239-17)
9. Baffle (7827239-21)
10. Baffle (7827239-23)
11. Baffle (7827239-25)
12. Baffle (7827239-27)
13. Baffle (7827239-31)
14. Baffle (7827239-33)

06D019—09—85

Figure 1-25. Removal and Installation; Main Sump Tank Baffles





Blue Foam

1. Baffle, L/R (7827238-01, -02)
2. Baffle, L/R (7827238-03, -04)
3. Baffle, L/R (7827238-05, -07)
4. Baffle, L/R (7827238-11, -12)
5. Baffle, L/R (7827238-13, -15)
6. Baffle, L/R (7827238-17, -18)
7. Baffle, L/R (7827238-23, -24)
8. Baffle, L/R (7827238-27, -28)
9. Baffle, L/R (7827238-31, -32)
10. Baffle, L/R (7827238-53, -54)
11. Baffle, L/R (7827238-35, -36)
12. Baffle, L/R (7827238-67, -68)
13. Baffle, L/R (7827238-55, -56)
14. Baffle, L/R (7827238-43, -44)
15. Baffle, L/R (7827238-71, -72)
16. Baffle, L/R (7827238-73, -74)
17. Baffle, L/R (7827238-65, -66)
18. Baffle, L/R (7827238-45, -47)
19. Baffle, L/R (7827238-51, -37)
20. Baffle, L/R (7827238-63, -64)
21. Baffle, L/R (7827238-33,* -34)
22. Baffle, L/R (7827238-61, -62)
23. Baffle, L/R (7827238-57, -58)
24. Baffle, L/R (7827238-41

06D020—09—85

* May be cut in half for ease of installation.

Figure 1-26. Removal and Installation; Aft Fuselage Tank Baffles

1-18.3. Installation. Install baffles in sequence shown in figures 1-23 through 1-26, observing the following:

WARNING

To prevent vapors from creating an explosive hazard or a nauseating environment, the foam baffles must be dry of fuel before installation.

CAUTION

Correct positioning and total installation of baffles in fuel tanks is extremely important to maintain required clearances around fuel components and prevent static charge generation.

NOTE

When in position, all baffles are compressed approximately 2%. This compression load holds the foam material in position and maintains the essential clearances.

a. Use rubber or leather gloves when installing baffles.

b. When installed, ensure markings on baffles always face the fuel cell opening.

1-19. FUSELAGE TANK BAFFLE REPLACEMENT.

Using the damaged or contaminated baffle as a sample, fabricate replacement baffle as follows:

a. Cut MIL-B-83054 polyurethane foam blank to identical shape as damaged baffle. The foam material can easily be cut with a sharp electric knife.

b. Mark replacement baffle with same markings as replaced baffle using a Blaisdell Liquid Tip No. 1173-F felt tip marker, Blaisdell Pencil Co., or equivalent. See figures 1-23 through 1-26 for part numbers and baffle locations.

1-20. FUEL CONTAMINATION TEST.

a. Flush system with clean filtered fuel to remove contamination. A minimum of one fueling and defueling shall be conducted (T.O. 1A-7D-2-1).

b. Obtain sump samples, and perform a solid contamination analysis. Maximum acceptable increase in solid contamination is 2 milligrams per gallon over that serviced to the airplane during fueling.

1-21. PRIMARY AND SECONDARY FLOAT VALVES REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel airplane for removal and installation of float valve
		Equipment required for purging fuel tank	Purge tank to remove float valve
		Equipment required for engine operation	Operate engine for air-conditioning duct leak check
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	PD4104 (Semco Sales and Service, Inc.)	Fuel tank sealant gun	Seal access
	215-00331-1	Wing fuel tank sealing nozzle set	Seal access

1-21.1. Removal. (Figure 1-27.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Defuel wing tank (T.O. 1A-7D-2-1).

NOTE

If fuel tank cannot be oil purged (preferred method), steps c through k must be performed before fuel tank purging.

b. Purge fuel tank (paragraph 1-6 and T.O. 1-1-3).

c. Open accesses 4113-11 and 4123-1.

d. Remove forward fuselage tank vent line check valve (paragraph 3-7).

e. Cut and pull back insulation from camera compartment cooling duct couplings.

f. Disconnect bonding jumpers.

g. Disconnect attachments securing duct clamps.

h. Cut lockwire, disconnect couplings, and remove coupling retainer halves and O-rings.

i. Remove camera compartment cooling duct.

j. Remove wing section low-pressure and high-pressure bleed air ducts (T.O. 1A-7D-2-3).

k. Remove bolts (1), washers (2), and seals (3), and open access 4113-11-1. Rotate and remove inner access plate.

l. Disconnect sensing line from precheck valve in wheel well that indicated defective float valve.

m. Identify defective float valve by applying air pressure through disconnected sensing line and checking for airflow from float valve.

n. Disconnect lines (4) from float valves.

o. Remove bolts (5) and washers (6). Remove float valve.

p. Remove fittings (7) and O-rings (8) from float valve.

1-21.2. Installation. (Figure 1-27.)

NOTE

Do not install fuel sensing line elbow too deep in secondary float valve. Restricted flow may result and cause partial closing of fueling shutoff valve during airplane pressure fueling.

a. Install new O-rings (8) on fittings and install fittings (7) on float valve.

NOTE

Lubricate titanium bolts with MIL-M-7866 molybdenum disulphide lubricant before installation.

b. Position float valve to bracket, and secure with washers (6) and bolts (5).

c. Torque bolts to 13 (+2, -1) inch-pounds.

d. Connect lines (4) to fittings.

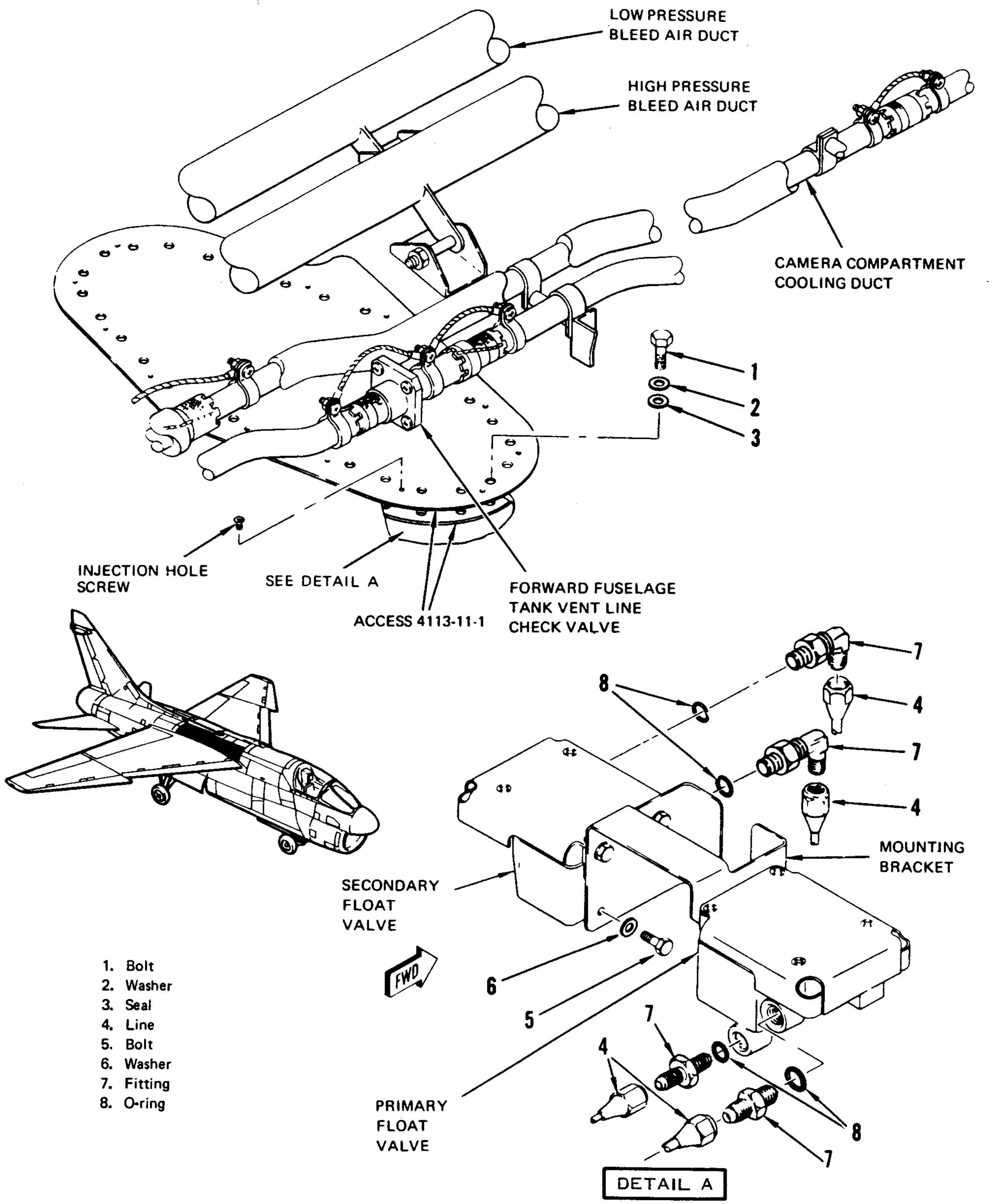
e. Clean access cover and around access opening. Do not allow residue to enter tank.

f. Install access 4113-11-1 as follows:

(1) Position inner access plate, and hold with wires.

(2) Position outer access plate, and install new seals (3), washers (2), and bolts (1) finger-tight on both ends of access.

(3) Remove wires from access, and install remaining new seals, washers, and bolts.



1. Bolt
2. Washer
3. Seal
4. Line
5. Bolt
6. Washer
7. Fitting
8. O-ring

06D021-09-85

Figure 1-27. Removal and Installation; Primary and Secondary Float Valves

(4) Torque bolts to 60 (±5) inch-pounds.

(5) Remove sealant injection hole screws.

(6) Fill sealant groove by injecting G651 (General Electric Cyanosilicone) sealant or Q4-2805 (Dow Corning) sealant in one hole until it extrudes from adjacent hole. Install injection screw in first hole, and repeat procedure for remaining holes.

g. Clean all extruded sealant.

h. Install wing section low-pressure and high-pressure bleed air ducts (T.O. 1A-7D-2-3).

i. Position camera compartment cooling duct.

j. Install new O-rings and retainer halves, and connect couplings.

k. Torque couplings to 15 (±2) foot-pounds, and secure with MS20995C32 lockwire.

l. Install bonding jumpers in accordance with MIL-B-5087.

m. Install attachments, and secure duct clamps.

n. Install forward fuselage tank vent line check valve (paragraph 3-7).

o. Perform operational checkout (paragraph 1-4).

p. Check access cover for leakage.

WARNING

To prevent hot airflow burns, wear asbestos gloves and use small cloth flags to check for bleed air leaks.

NOTE

The application of antiseize compound to duct flanges will cause brief smoking on first engine runup.

q. Start engine (T.O. 1A-7D-2-1), and check for leakage at high-pressure and low-pressure bleed air duct couplings.

r. Shut down engine (T.O. 1A-7D-2-1).

s. Secure bleed air ducts insulation with MS20995C32 lockwire. Lockwire must make two complete turns around each capstan.

NOTE

Exposed areas of camera compartment cooling duct and duct couplings must be entirely covered with foam plastic insulation.

t. Cover camera compartment cooling duct and duct couplings with insulation. Bond insulation as required with MMM-A-1617, Type III adhesive.

u. Close accesses 4113-11 and 4123-1.

1-22. WING EJECTOR PUMP NOZZLE REMOVAL AND INSTALLATION.

NOTE

Procedure is typical for removal and installation of either left or right nozzle.

1-22.1. Removal. (Figure 1-28.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Defuel wing (T.O. 1A-7D-2-1).

b. Purge fuel tank (paragraph 1-6 and T.O. 1-1-3).

c. Open accesses 3233-1 and 3233-2 to remove left nozzle. To remove right nozzle, open accesses 4233-1 and 4233-2.

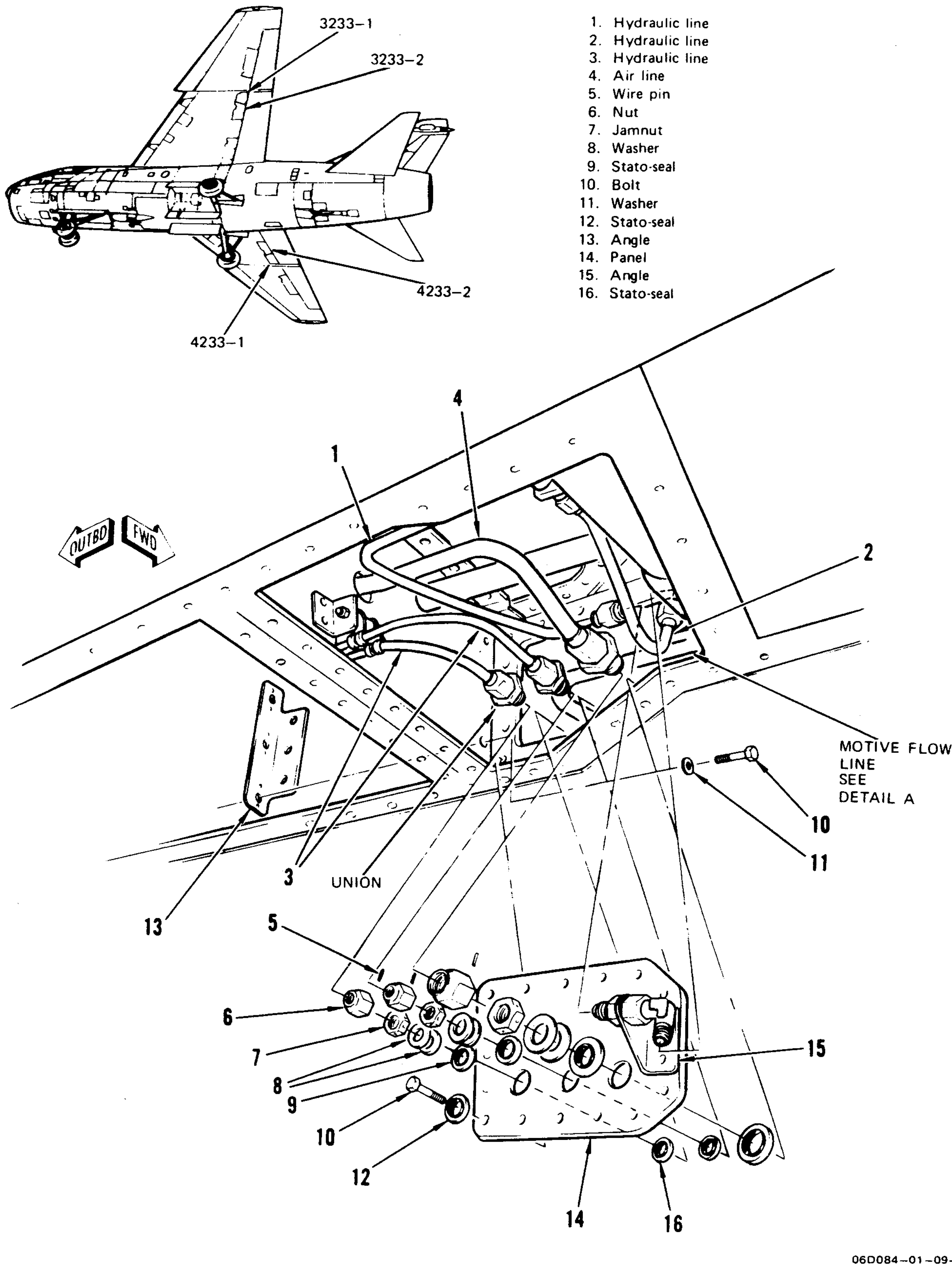


Figure 1-28. Removal and Installation; Wing Ejector Pump Nozzle (Sheet 1 of 2)

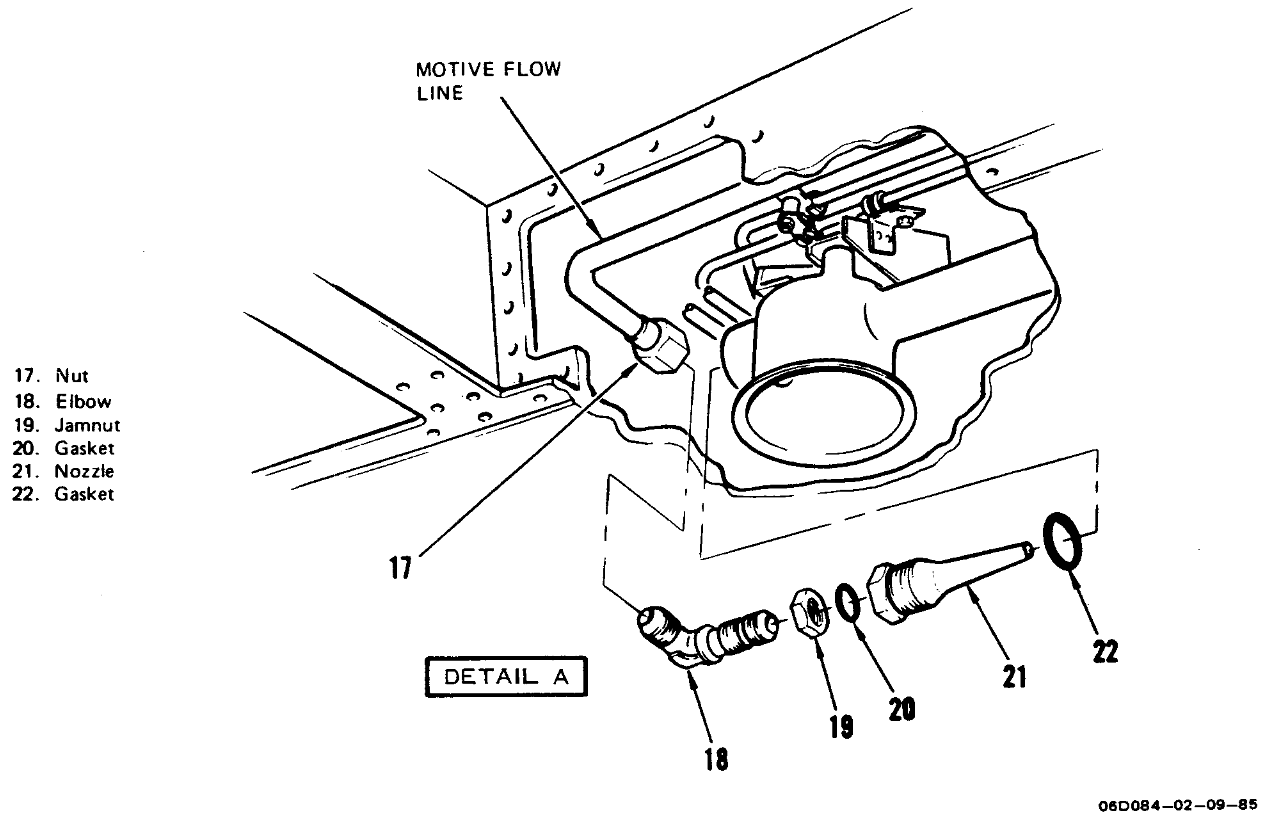


Figure 1-28. Removal and Installation; Wing Ejector Pump Nozzle (Sheet 2)

d. Remove flap hydraulic lines (1 and 2).

e. Disconnect hydraulic lines (3) and air line (4). Retain unions.

f. Remove wire pins (5) and swivel nuts (6).

g. Cut lockwire and remove jamnuts (7), washers (8), and Stat-O-Seals (9).

h. Remove bolts (10), washers (11), and Stat-O-Seals (12). Slide angle (13) outboard.

i. Remove access panel (14) by sliding straight aft over flareless fittings. Retain angle (5) and attached swivel.

j. Remove Stat-O-Seals (16) from end of flareless fittings.

k. Remove enough baffling to gain access to outboard side of ejector.

l. Disconnect tube nut (17), and pull tube aft.

m. Remove elbow (18), jamnut (19), and gasket (20).

n. Cut lockwire and remove nozzle (21) and gasket (22).

1-22.2. Installation. (Figure 1-28.)

a. Using new gasket (22), install nozzle (21) into ejector. Secure with MS20995C32 lockwire.

b. Install elbow (18), jamnut (19), and new gasket (20).

c. Move tube forward, and connect tube nut (17).

d. Install baffling into access.

e. Install new Stat-O-Seals (16), and slide panel (14) into position.

f. Place angles (13 and 15) into position, and secure panel with bolts (10), washers (11), and new Stat-O-Seals (12).

g. Install new Stat-O-Seals) (9), washers (8), and jamnuts (7). Secure jamnuts with MS20995C32 lockwire.

h. Install swivel nuts (6) and wire pins (5).

i. Using retained unions, connect hydraulic lines (3) and air line (4).

j. Connect flap hydraulic lines (1 and 2).

k. Fuel wing (T.O. 1A-7D-2-1), and check panel (14) for leaks.

l. Perform external fuel system checkout (paragraph 4-4), and check for air leaks in line (4).

m. Perform flap checkout (T.O. 1A-7D-2-8), and check for hydraulic leaks in lines (1 and 2).

n. Perform wingfold checkout (T.O. 1A-7D-2-1), and check for leaks in lines (3).

o. Close accesses 3233-1 and 3233-2 or 4233-1 and 4233-2 as applicable.

1-23. WING TANK GRAVITY FUELING RECEPTACLE REPAIR.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	PD4104 (Semco Sales and Service, Inc.)	Fuel tank sealant gun	Seal injection holes
	215-00331-1	Wing fuel tank sealing nozzle set	Adapt PD4104 for use on A-7D

1-23.1. Cap and Seal Replacement.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Replace cap by removing cap from adapter, disconnecting chain from cap, attaching chain to replacement cap, and installing cap.

b. Replace cap seal by removing cap from adapter, disconnecting chain, replacing seal, reconnecting chain, and installing cap.

1-23.2. Adapter Seal Replacement.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open access 4113-1.

b. Check each of eight adapter bolts for torque of 70 (±5) inch-pounds.

c. Remove four injection hole screws located between bolts.

d. Inject G651 (General Electric Cyanosilicone) sealant or Q4-2805 (Dow Corning) sealant until it is extruded from either of the adjacent holes to a length approximately two times the distance between holes.

e. Replace screw in first injection hole. Wipe sealant from bleeder hole, and inject sealant into bleeder hole until sealant is extruded from the adjacent hole. Replace screw in second bleeder hole, and repeat operation for the remaining holes.

f. Clean area of all extruded sealant.

g. Close access 4113-1.

1-24. PRESSURE FUELING MANIFOLD REPAIR.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for fueling airplane	Service airplane to check installation for leakage

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

NOTE

Ensure that wing check valve internal components are not broken by rotating handle approximately 3/4 inch past defuel wing position. If handle moves further, internal components may be broken and repair/replacement is required.

a. Place fuselage defueling check valve and wing defueling check valve handles in NORMAL.

b. Open manifold drain valve, and drain trapped fuel.

c. Disconnect cap from manifold adapter.

d. Remove screws securing adapter to manifold, and remove adapter, cap, and O-ring.

e. Lubricate new O-ring with VV-P-236 petrolatum, and install O-ring on adapter.

NOTE

Ensure adapter is properly positioned on manifold as indicated by the word TOP, embossed on the adapter body.

f. Secure adapter to manifold with screws.

g. Install adapter cap.

h. Fuel airplane (T.O. 1A-7D-2-1), and check installation for leaks.

1-25. PRESSURE FUELING MANIFOLD REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for fuel airplane	Service airplane to check for leakage

1-25.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

NOTE

Ensure that wing check valve internal components are not broken by rotating handle approximately 3/4 inch past defuel wing position. If handle moves further, internal components may be broken and repair/replacement is required.

a. Place fuselage defueling check valve and wing defueling check valve handles in NORMAL.

b. Open manifold drain valve, and drain residual fuel.

c. Remove bolts, nuts, and washers securing fuel tube to forward side of manifold housing.

d. Remove nuts, bolts, and washers securing fuel tube to aft side of manifold housing.

e. Disconnect overboard drainlines from the fitting on bottom of manifold housing.

f. Remove bolts and washers securing manifold to inboard mounting brackets.

g. Remove nuts, bolts, and washers securing manifold to support bracket, and remove manifold from airplane.

h. Loosen jamnut and remove tee fitting from manifold.

1-25.2. Installation.

NOTE

Install washers and nuts in accordance with MIL-B-5087 to prevent accumulation of static charge.

a. Install new packing on tee, and install tee in manifold housing. Do not tighten jamnut.

b. Position manifold in airplane, and install bolts, washers, and nuts in outboard and inboard mounting brackets. Do not tighten nuts.

c. Install new gaskets between manifold and forward and aft fuel tubes. Install but do not tighten bolts, nuts, and washers, securing manifold to tubes.

d. Connect drainlines to manifold tee fitting.

e. Tighten all bolts and nuts, and tighten jamnuts on drainline fitting.

f. Fuel airplane (T.O. 1A-7D-2-1), and check installation for leakage.

1-26. FUELING PRESSURE SHUTOFF VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel airplane prior to removal of pressure shutoff valve and fuel after installation for checks
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	MIL-H-4034B	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-26.1. Removal.

a. Defuel airplane (T.O. 1A-7D-2-1).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

b. Disconnect primary and secondary sensing lines from shutoff valve.

c. Remove nut, washers, and screw securing bonding cable to valve.

d. Cut lockwire and disconnect coupling from shutoff valve.

e. Remove bolts and washers securing shutoff valve to mounting flange, and remove valve from airplane.

f. Remove bolts and washers securing coupling adapter, and remove adapter from airplane.

1-26.2. Installation.

CAUTION

To ensure proper operation of system, flow arrow on valve shall point aft when valve is installed in airplane.

a. Install new packing, position coupling adapter to valve, and secure with bolts and washers. Torque bolts to 100 (±20) inch-pounds.

b. Install new seal between mounting flange and valve body, position valve on mounting bracket, and secure with bolts and washers. Torque bolts to 100 (±20) inch-pounds.

c. Install new packings; connect coupling to valve adapter. Torque coupling to 40 (±4) foot-pounds, and secure with MS20995C32 lockwire.

d. Connect primary and secondary sensing lines to shutoff valve.

e. Secure bonding cable to valve with screw, washers, and nut.

f. Fuel airplane (T.O. 1A-7D-2-1), and check operation of valve.

g. Check shutoff valve installation for leakage.

1-27. PRIMARY AND SECONDARY PRECHECK VALVES REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for fueling airplane	Service airplane to check primary and secondary fuel shutoff

1-27.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Disconnect lines from valve. Cap lines.

b. Detach valve from bracket by removing jamnut.

1-27.2. Installation.

a. Install valve on bracket, remove caps, and connect lines to valve. Tighten jamnut.

b. Fuel airplane (T.O. 1A-7D-2-1) as necessary to check primary and secondary fuel shutoff.

c. Check for leakage at valve connections.

1-28. FUSELAGE DEFUEL CHECK VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel airplane for removal and installation of defuel check valve
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-28.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Defuel fuselage tanks (T.O. 1A-7D-2-1).

b. Cut lockwire and disconnect valve couplings from airplane fuel lines.

c. Disconnect valve by removing bolts, washers, nuts, and seal between valve flange and pressure fueling receptacle. Remove valve.

1-28.2. Installation.

a. Position valve on pressure fueling receptacle, using new seal between valve flange and pressure fueling receptacle.

b. Secure valve to airplane with bolts, washers, and nuts.

c. Torque nuts to 100 (±20) inch-pounds.

CAUTION

To prevent possible interference with landing gear tire, install forward coupling with female half of coupling forward.

d. Connect valve to airplane fuel lines with couplings. Use new packings in couplings.

e. Torque couplings to 40 (±4) foot-pounds. Secure couplings with MS20995C32 lockwire.

f. Service airplane with fuel (T.O. 1A-7D-2-1), and check valve installation for leaks.

1-29. WING DEFUEL CHECK VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling wing tanks	Defuel and fuel wing tanks for removal and installation of wing defuel check valve
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

1-29.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Defuel wing tank (T.O. 1A-7D-2-1).

b. Cut lockwire and disconnect valve coupling from airplane fuel line. Discard packings.

c. Disconnect valve by removing bolts, washers, nuts, and seal between valve flange and pressure fueling receptacle. Remove valve.

1-29.2. Installation.

a. Position valve to pressure fueling receptacle, using new seal between valve flange and pressure fueling receptacle.

b. Connect valve to pressure fueling manifold flange with bolts, washers, nuts, and new seal.

c. Torque nuts to 100 (±20) inch-pounds.

d. Connect valve to airplane fuel line with coupling. Use new packings in coupling.

e. Torque coupling to 40 (±4) foot-pounds. Secure coupling with MS20995C32 lockwire.

f. Fuel wing tank (T.O. 1A-7D-2-1), and check valve installation for leaks.

1-30. SELF-RETAINING BOLT REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nut on self-retainng bolt

1-30.1. Removal. (Figure 1-29.)

a. Remove cotter pin (1), nut (2), and counterbored washer (3).

b. Depress locking plunger in head of bolt, releasing locking balls (5) in shank. Remove self-retaining bolt (4) and washer (5).

1-30.2. Installation. (Figure 1-29.)

a. Depress locking plunger in head of bolt (4), and install washer (5). Insert bolt through linkage, and check for 0.010-inch clearance between washer and adjacent mating surface (step 1, figure 1-29).

b. Check maximum clearance (dimension X) of locking balls to ensure counterbored washer will not bear against locking balls (step 2, figure 1-29).

c. Install counterbored washer (3) and nut (2). Torque nut, and check exposed threads (step 3, figure 1-29).

d. Install new cotter pin (1).

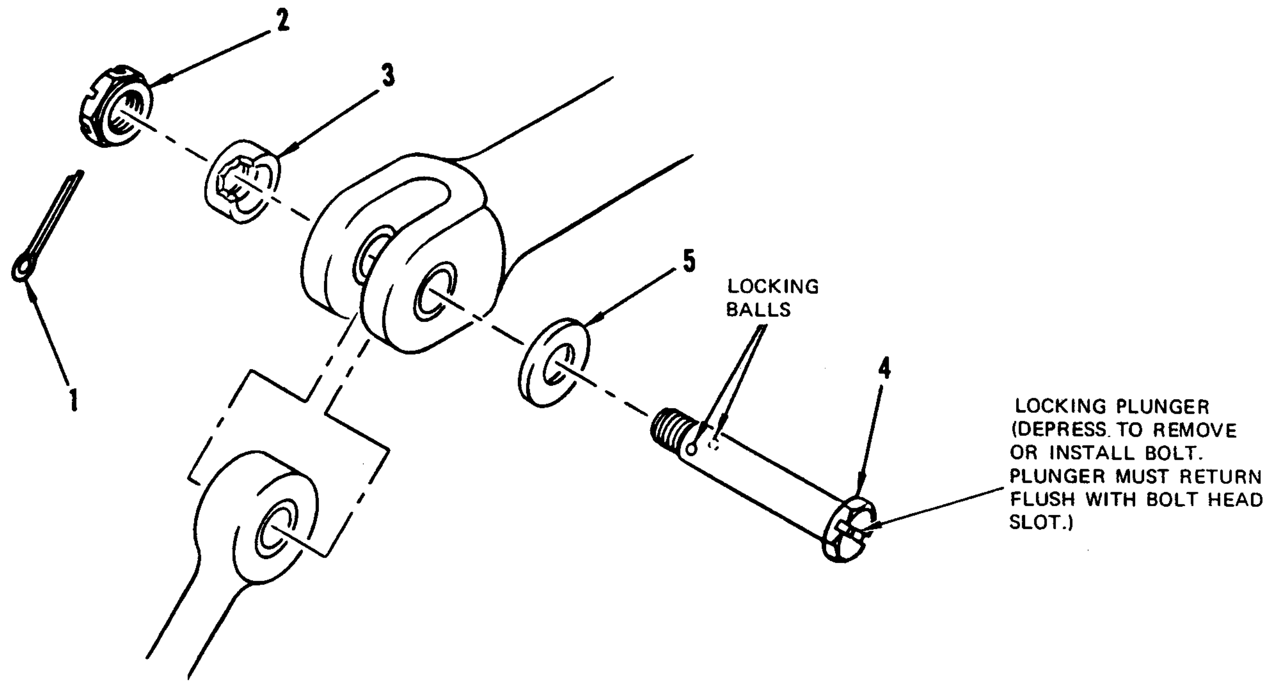
1-31. MANUAL FUEL SHUTOFF VALVE REMOVAL AND INSTALLATION.

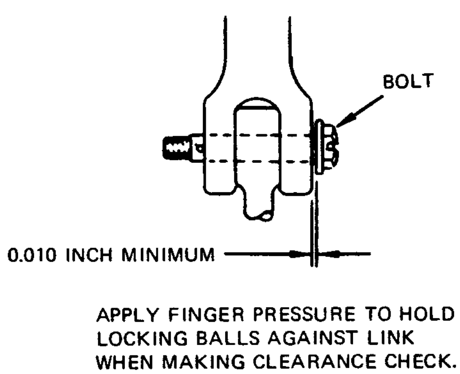
Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling fuselage tanks	Defuel and fuel fuselage tanks for removal and installation of manual fuel shutoff valve
	AN/PSM-6	AC-DC multimeter	Check continuity
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	0013	Spring scale, 0 to 50 pounds	Measure pounds of force required in check

1-31.1. Removal.

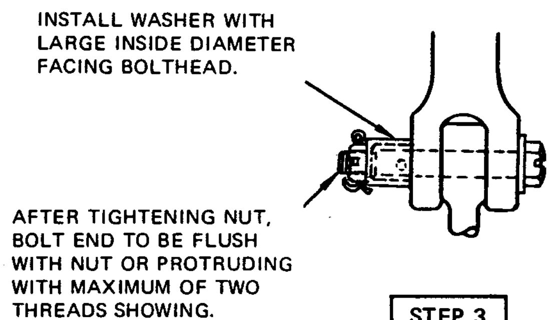
a. Defuel fuselage tanks (T.O. 1A-7D-2-1).





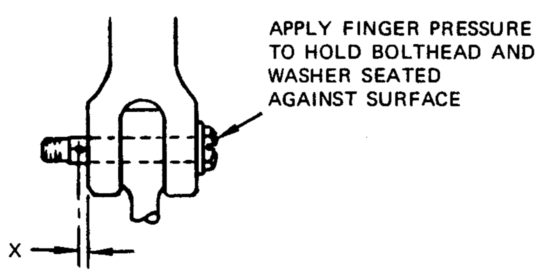
STEP 1

(SEE NOTE)



STEP 3

(SEE NOTE)



STEP 2

(SEE NOTE)

NOTE

SELECTION OF PROPER GRIP LENGTH AND USE OF WASHERS UNDER BOLTHEAD WILL BE USED TO CONTROL CLEARANCES. NO MORE THAN TWO WASHERS SHALL BE USED.

BOLT SIZE	DIMENSION X (MAXIMUM)	TORQUE (INCH-POUNDS)
10–32	0.094	12 to 15
1/4–28	0.125	30 to 40
5/16–24	0.156	60 to 80
3/8–24	0.171	95 to 110
7/16–20	0.202	270 to 300
1/2–20	0.234	290 to 410
9/16–10	0.265	480 to 600

1. Cotter pin
2. Nut
3. Counterbored washer
4. Self-retaining bolt
5. Washer

06D070–10–85

Figure 1-29. Removal and Installation; Self-Retaining Bolt

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

b. Open access 5223-1, and remove cotter pin, nut, washers, and self-retaining bolt (paragraph 1-30) securing push-pull control assembly rod end to shutoff valve.

c. Disconnect electrical connector from shutoff valve assembly, and remove nuts, washers, and bolts securing valve assembly to mating flanges.

d. Cut lockwire, loosen line couplings, deflect forward line assembly slightly to allow clearance, and slide valve assembly from between flanges.

1-31.2. Installation.

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames.

a. Clean mating surfaces of valve and flanges with TT-M-261 methyl ethyl ketone.

b. Install new packings in machined recesses, coat exposed surface of each packing with VV-P-236 petrolatum, and position valve to flanges taking care not to displace packings.

c. Secure valve with bolts, washers, and nuts. Torque nuts to 50 (±10) inch-pounds.

d. Connect line couplings, and torque to 40 (±4) foot-pounds. Secure couplings with MS20995C32 lockwire.

e. Place fuel master shutoff control in OFF and valve actuating arm against closed position stop.

f. Adjust rod end until holes in rod end and arm are aligned. Secure temporarily with bolt, washer, and nut.

g. Cycle fuel master shutoff control from OFF to ON and to OFF. Check that valve arm goes to full stop position and control lever detents engage fully at the end of each stroke. Adjust as required (paragraph 1-33).

h. Check that control operates smoothly and that additional force is not required to engage control in detents.

i. Using spring scale attached at the center point of the lever knob, determine force required to move control from ON to OFF. Force required shall not exceed 12 pounds.

j. Close valve and check for loss of continuity across pins 1 and 2 of electrical connector. Open valve and check for continuity between pins 1 and 2.

k. Remove temporary bolt, washer, and nut, and connect rod end to actuating arm with self-retaining bolt (paragraph 1-30). Install bolt with bolthead aft.

l. Connect electrical connector to valve.

m. Fuel fuselage tanks (T.O. 1A-7D-2-1), and check valve installation for leaks.

n. Perform engine fuel system bleed procedures (T.O. 1A-7D-2-5).

o. Close access 5223.1.

1-32. MANUAL FUEL SHUTOFF PUSH-PULL CONTROL REMOVAL AND INSTALLATION.

CAUTION

To prevent damage to controlex unit, observe controlex handling precautions (T.O. 1A-7D-2-1) during removal and installation of control.

1-32.1. Removal. (Figure 1-30.)

a. Open accesses 1221-1, 1123-1, 1121-3, 1123-4, 1132-1, 5112-1, 5112-2, 5222-1, and 3233-4.

b. Remove ammunition chute (T.O. 1A-7D-2-13).

c. Remove ejection seat (T.O. 1A-7D-2-2).

d. Remove access from inboard side of left console.

e. Disconnect left outboard rod end of spoiler/deflector load limiting link (T.O. 1A-7D-2-8). Move link aft to provide additional clearance for removal and installation of the cable.

f. Hold slider at wrench flats, and loosen checknut (1).

g. Disconnect rod end (2) from fuel master shutoff lever by removing cotter pin, nut, washers, and bolt.

h. Remove rod end (2) and checknut (1).

i. Hold slider and housing at wrench flats, and remove scraper ring seal (3).

j. Cut lockwire and remove pin (4).

k. Hold housing at wrench flats, and loosen checknut (5).

l. Remove checknut (5) and spacer (6).

m. Remove support clamps (7).

n. Remove sealant from around control housing at station 526.5 bulkhead.

o. Carefully pull control aft until clear of support bearing.

p. Cut lockwire and remove pin (8).

q. Remove spacer (9) and checknut (10).

r. Carefully pull control aft until clear of access 1221-1 aft bulkhead.

s. Hold slider at wrench flats, and loosen checknut (11).

t. Disconnect rod end (12) from manual fuel shutoff valve arm by removing self-retaining bolt (paragraph 1-30).

u. Remove rod end (12) and checknut (11).

v. Cut lockwire and remove pins (13).

w. Hold housing and slider at wrench flats, and loosen checknut (14).

x. Remove checknut (14) and spacer (15).

y. Carefully pull control outboard through support bearing.

z. Remove spacer (16) and checknut (17).

CAUTION

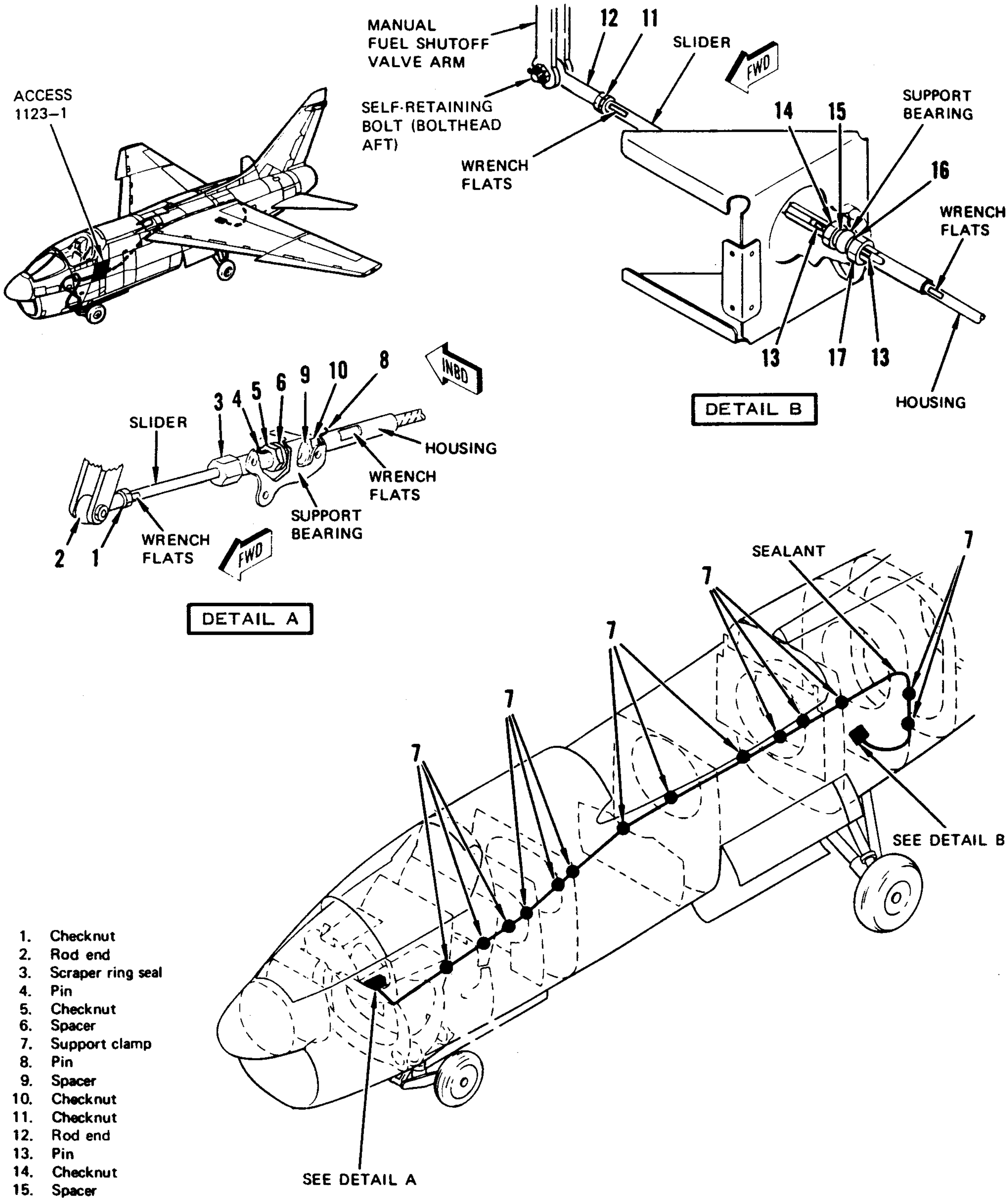
To prevent damage to control, do not use force when removing from airplane.

aa. Carefully remove control through access 1123-1.

1-32.2. Installation. (Figure 1-30.)

a. Carefully uncoil new fuel shutoff control and lay on clean, flat surface.

b. Move slider back and forth through control housing. Check that slider moves freely and does not bind.



1. Checknut
2. Rod end
3. Scraper ring seal
4. Pin
5. Checknut
6. Spacer
7. Support clamp
8. Pin
9. Spacer
10. Checknut
11. Checknut
12. Rod end
13. Pin
14. Checknut
15. Spacer
16. Spacer
17. Checknut

06D022–09–85

Figure 1-30. Removal and Installation; Manual Fuel Shutoff Push-Pull Control

c. Carefully coil control into a figure eight.

CAUTION

To prevent chafing of the control assembly on the aft wing attach casting, ensure that the assembly is routed through the fiberglass tubing at fuselage station 480.0.

d. Carefully thread control through access 1123-1 keeping loops in a vertical plane. Allow control to assume natural contours as it is uncoiled and guided into position.

e. Move slider back and forth through housing. Check that force required is approximately that required in step b and that slider does not bind.

f. Install checknut (17) on housing, and screw on to approximate limit of threads.

g. Install spacer (16) and slide into contact with checknut.

h. Carefully insert control through support bearing until spacer contacts bearing.

i. Install spacer (15) and checknut (14) on housing. Screw checknut on housing to fully engage threads.

j. Install checknut (11) and rod end (12) on slider. Do not tighten checknut.

k. Hold slider at wrench flats, and remove scraper ring seal (3).

l. Install checknut (10) and screw on to approximate limit of threads.

m. Install spacer (9) and slide into contact with checknut.

n. Carefully insert control through support bearing.

o. Install spacer (6) and checknut (5). Screw checknut on housing to fully engage threads.

p. Install scraper ring seal (3) on housing and torque to 4 (±1) inch-pounds.

q. Install checknut (1) and rod end (2). Do not tighten checknut.

r. Install support clamps (7). Check that each support clamp will allow control housing to move back and forth.

s. Check that radius of bends in control is not less than 6 inches.

t. Check that control is not twisted or binding.

u. Move slider back and forth in housing. Check that force required is approximately that required in step b and that slider does not bind.

NOTE

Pins (4, 8, and 13) will be installed and rod ends (2 and 12) will be connected in adjustment procedure.

v. Perform manual fuel shutoff valve control adjustment (paragraph 1-33).

w. Apply caulk seal around control at station 526.5 bulkhead (T.O. 1A-7D-23).

x. Install ammunition chute (T.O. 1A-7D-2-13).

y. Install access on inboard side of left console.

z. Install ejection seat (T.O. 1A-7D-2-2).

aa. Connect outboard rod end of spoiler/deflector load limiting link (T.O. 1A-7D-2-8).

ab. Close accesses 1221-1, 1123-1, 1121-3, 1123-4, 1132-1, 5112-1, 5112-2, 5222-1, and 3233-4.

1-33. MANUAL FUEL SHUTOFF VALVE CONTROL ADJUSTMENT.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	AN/PSM-6	Multimeter	Check continuity
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	0013	Spring scale, 0 to 50 pounds	Measure pounds of force required in check

1-33.1. Aft Fuselage Adjustment.

a. Open access 5223-1.

b. Disconnect fuel control assembly rod end from fuel shutoff valve arm by removing cotter pin, nut, washers, and self-retaining bolt (paragraph 1-30).

CAUTION

Do not allow control assembly to turn when adjusting rod end of tightening checknuts.

c. Adjust rod end so checknut is 0.10 (±0.03) inch from end of wrench flat.

d. Torque checknut to 35 (±5) inch-pounds.

e. Place fuel shutoff valve arm in CLOSED.

f. Place fuel master control lever in OFF.

g. Adjust aft support checknuts to align rod end bolthole with shutoff valve arm bolthole.

h. Torque checknuts to 35 (±5) inch-pounds, and secure with MS20995C32 lockwire.

i. Connect fuel control assembly rod end to fuel shutoff valve arm with self-retaining bolt, washers, nut, and cotter pin (paragraph 1-30). Install bolt with bolthead aft.

j. Cycle fuel master shutoff control from OFF to ON and then to OFF. Check that valve arm goes to full stop position and control lever detents engage fully at the end of each stroke.

k. Check that control operates smoothly and that additional force is not required to engage control in detents.

l. Attach spring scale to center point of master fuel control lever knob. Determine force required to move control from OFF to ON and then to OFF. Force required shall not exceed 15 pounds with fuel in system or 12 pounds with no fuel in system.

m. Close valve and check for loss of continuity across pins 1 and 2 of electrical connector. Open valve and check for continuity across pins 1 and 2.

n. Close access 5223-1.

1-33.2. Forward Fuselage Adjustment.

a. Remove ejection seat (T.O. 1A-7D-2-2).

b. Remove access from side of left console to gain access to the fuel control assembly.

c. Disconnect fuel control assembly rod end from master fuel control lever by removing cotter pin, nut, washers, and bolt.

CAUTION

Do not allow control assembly to turn when adjusting rod end to tightening checknuts.

d. Adjust rod end so checknut is 0.10 (±0.03) inch from end of wrench flat.

e. Torque checknut to 35 (±5) inch-pounds.

f. Place fuel master control lever in OFF.

g. Move control assembly fully forward.

h. Adjust control assembly forward support checknuts so hole in rod end is positioned 0.75 (±0.06) inch forward of hole in control lever.

i. Torque checknuts to 35 (±5) inch-pounds, and secure with MS20995C32 lockwire.

j. Move control assembly aft, and check for alignment with fork of control lever.

k. Connect fuel control assembly rod end to control lever with bolt, washers, nut, and cotter pin.

l. Cycle fuel master shutoff control from OFF to ON and then to OFF. Check that valve arm goes to full stop position and control lever detents engage fully at end of each stroke.

m. Check that control operates smoothly and that additional force is not required to engage control in detents.

n. Attach spring scale to center point of master fuel control lever knob. Determine force required to move lever from OFF to ON and then to OFF. Force required shall not exceed 15 pounds with fuel in system or 12 pounds with no fuel in system.

o. Close valve and check for loss of continuity across pins 1 and 2 of electrical connector. Open valve and check for continuity across pins 1 and 2.

p. Close access on side of left console.

q. Install ejection seat (T.O. 1A-7D-2-2).

1-34. SELF-SEALING FUEL HOSE (RIGHT WHEEL WELL) REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling fuselage tanks	Defuel and fuel tanks for removal and installation of self-sealing fuel hose
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts and bolts

1-34.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Defuel fuselage tanks (T.O. 1A-7D-2-1).

b. Disconnect bonding jumper from both ends of hose.

c. Disconnect couplings at both ends of hose.

d. Remove four clamps securing fuel hose to airframe.

e. Move fuel hose aft, and remove from airplane.

1-34.2. Installation.

a. Position self-sealing fuel hose in right main landing gear wheel well.

b. Using new packings, connect forward and aft fuel hose couplings to fuel hose.

c. Torque couplings to 40 (±4) foot-pounds, and secure with MS20995C32 lockwire.

NOTE

Position clamps to ensure a minimum of 0.10-inch clearance between hose and emergency accumulator shutoff valve handle when valve is in the OPEN position. Ensure teflon tape or teflon chafe pad (Part No. MIL-P-22241) is located on chafing prone area of hose. If chafe pad is used, cut to fit and secure with MS3367 tie down straps or nylon cord (MIL-T-713).

d. Install clamps securing fuel hose to airframe.

e. Connect bonding jumper to both ends of fuel hose.

f. Fuel fuselage tanks (T.O. 1A-7D-2-1), and check for leaks.

1-35. SELF-SEALING FUEL HOSE (ACCESS 5213-3) REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling fuselage tanks	Defuel and fuel tanks for removal and installation of self-sealing fuel hose
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts and bolts

1-35.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Defuel fuselage tanks (T.O. 1A-7D-2-1).

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel.

b. Open access 5213-1, disconnect antenna cable(s), and lower access.

c. Remove phenolic blocks, clamps, and attaching hardware that secures motive flow line to brackets.

d. Cut lockwire and disconnect forward and aft motive flow line couplings. Remove line from airplane.

e. Remove phenolic blocks, clamps, and attaching hardware securing self-sealing fuel hose to brackets.

f. Cut lockwire and disconnect forward and aft fuel hose couplings from fuel hose, and remove packing.

g. Remove fuel hose from airplane.

1-35.2. Installation.

a. Position self-sealing fuel hose under aft tank.

b. Using new packing, connect forward and aft fuel hose couplings to fuel hose.

c. Torque couplings to 40 (±4) foot-pounds, and secure with MS20995C32 lockwire.

d. Install phenolic blocks, clamps, and attaching hardware securing fuel hose to bracket.

e. Position motive flow line, and using new packing, connect forward and aft couplings.

f. Torque couplings to 15 (±2) foot-pounds, and secure with MS20995C32 lockwire.

g. Install phenolic blocks, clamps, and attaching hardware, securing motive flow line to brackets.

h. Fuel fuselage tanks (T.O. 1A-7D-2-1), and check for leaks.

i. Connect marker beacon antenna cable and ADF antenna cable. Close access 5213-1.

1-36. FUEL DUMP VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Operate dump valve for checks
		Equipment required for defueling and fueling wing tank	Defuel and fuel wing tank for removal and installation of fuel dump valve
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts and bolts
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts and bolts

1-36.1. Removal.

a. Defuel wing tank (T.O. 1A-7D-2-1).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

b. Open access 3233-1 or 4233-1.

c. Disconnect bonding jumper from dump line elbow.

d. Cut lockwire and disconnect couplings from dump line elbow. Remove elbow and packing.

e. Cut lockwire and disconnect electrical connector from fuel dump valve.

f. Remove four mounting bolts and washers securing valve to airplane. Remove valve, adapter, and packing.

1-36.2. Installation.

a. Secure electrical connector to fuel dump valve with MS20995C32 lockwire.

b. Install new packings and adapter on valve, and position valve on airplane. Secure valve with four mounting bolts and washers.

c. Torque bolts diagonally, in 5 inch-pound increments, to 55 (±5) inch-pounds.

d. Position elbow between valve and dump line, install new packing, and connect couplings.

e. Torque couplings to 40 (±4) foot-pounds, and secure with MS20995C32 lockwire.

f. Install bonding jumper on dump line elbow.

g. Perform the following electrical check.

(1) Connect electrical connector to fuel dump valve.

(2) Connect external electrical power (T.O. 1A-7D-2-1).

(3) Place fuel dump switch in FUEL DUMP. Check that valve indicator arm moves to OPEN.

(4) Place fuel dump switch in OFF. Check that valve indicator arm moves to CLOSED.

(5) Disconnect external electrical power (T.O. 1A-7D-2-1).

h. Fuel wing tank (T.O. 1A-7D-2-1).

i. Check valve installation for leaks.

j. Close access 3233-1 or 4233-1.

1-37. FUEL BOOST DIFFERENTIAL PRESSURE SWITCH REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for engine operation	Operate engine for fuel leak check

1-37.1. Removal. (Figure 1-31.)

a. Ensure that master fuel control lever is OFF.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

b. Open access 5222-1.

c. Disconnect electrical connector (1) from fuel boost differential pressure switch (2).

d. Disconnect pressure switch lines (3) from pressure switch.

e. Remove unions (4) and packings (5) from pressure switch ports. Discard packings.

f. Remove two bolts (6) and washers (7) securing pressure switch to fuel boost pump, and remove pressure switch.

1-37.2. Installation. (Figure 1-31.)

a. Install pressure switch (2) on fuel boost pump, and secure with bolts (6) and washers (7).

b. Using new packings (5), install unions (4) on pressure switch ports.

c. Connect pressure switch lines (3) to pressure switch.

d. Connect electrical connector (1) to pressure switch.

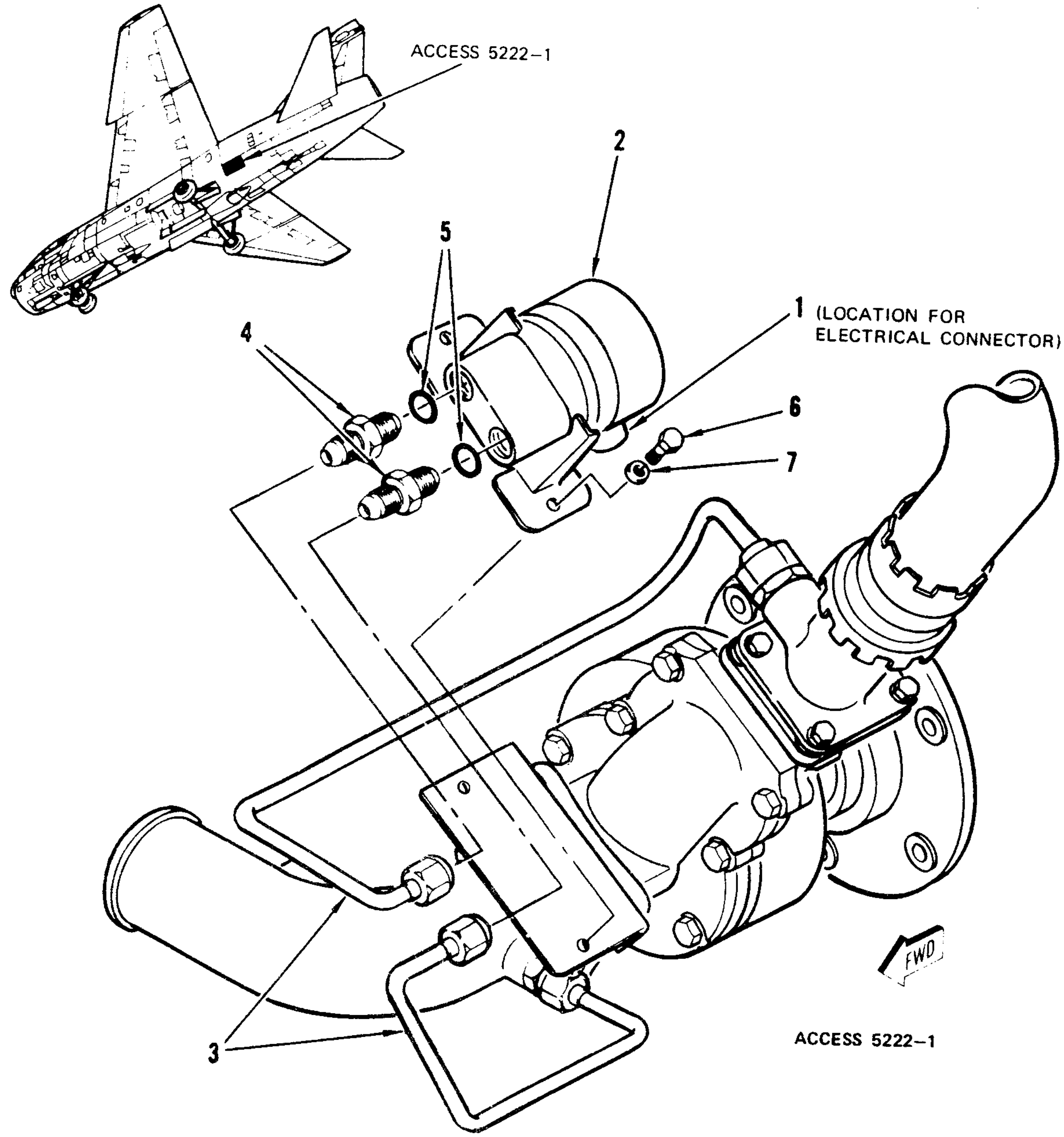
e. Start engine (T.O. 1A-7D-2-1).

f. Check that fuel boost 1 caution light goes off.

g. Check for fuel leaks.

h. Shut down engine (T.O. 1A-7D-2-1).

i. Close access 5222-1.



1. Connector
2. Fuel boost differential pressure switch
3. Pressure switch lines
4. Union
5. Packing
6. Bolt
7. Washer

06D085-09-85

Figure 1-31. Removal and Installation; Fuel Boost Differential Pressure Switch

1-38. FUEL BOOST PUMP REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for engine operation	Operate engine for fuel leak check
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque couplings

1-38.1. Removal. (Figure 1-32.)

a. Ensure that master fuel control lever is OFF.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

b. Open access 5222-1.

c. Remove nut (1) and bolt (2) securing bonding cable (3) to clamp (4). Remove clamps from fuel tube and PC 3 vent line.

d. Cut lockwire and disconnect coupling (5) securing fuel tube to adapter, and remove O-rings (6) (paragraph 1-45).

e. Cut lockwire and disconnect coupling (7) securing fuel tube to tube elbow, and remove O-rings (8) (paragraph 1-45).

f. Disconnect electrical connector (9) from pressure switch.

g. Disconnect starter fuel supply line (10) from tube elbow.

h. Remove bolts (11) and washers (12) securing pump to bulkhead, remove pump (13) from airplane, and remove gasket (14).

NOTE

To prevent damage to boost pump and/or hydraulic motor in the event of a stuck shaft, use ammended procedures steps (1) thru (5) (see figure 1-32).

(1) Install two 3/8-24 bolts with 1 1/4 inch of threads, Part No. NAS-1306-20, FSN 5306-00-826-5336, into the mount bolt holes on the "backside" of the mounting flange. The two bolts should be installed in opposition on each side of the hydraulic motor.

(2) Turn the pump approximately one inch away from alignment with mount bolt holes.

(3) Place a shim of 0.018 inch thick and 301 1/4 inch hard stainless steel (FSN 9515-00-184-8814) between the pump flange and the mounting flange on each side.

(4) Turn each bolt in until it is against the shim. Turn each bolt in, alternating equal turns to prevent binding, and press the pump out of the mounting flange and hydraulic motor.

NOTE

If shims cannot be installed due to no clearance, press the pump out just enough to install them, then press the pump the rest of the way out.

(5) Remove shims that were installed in step (3), and the bolts that were installed in step (1).

i. Disconnect pressure switch lines (15) from pressure switch, adapter, and tube elbow.

j. Remove bolts (16) and washers (17) securing tube elbow (18) and pressure switch (19) to pump, and remove seal (20).

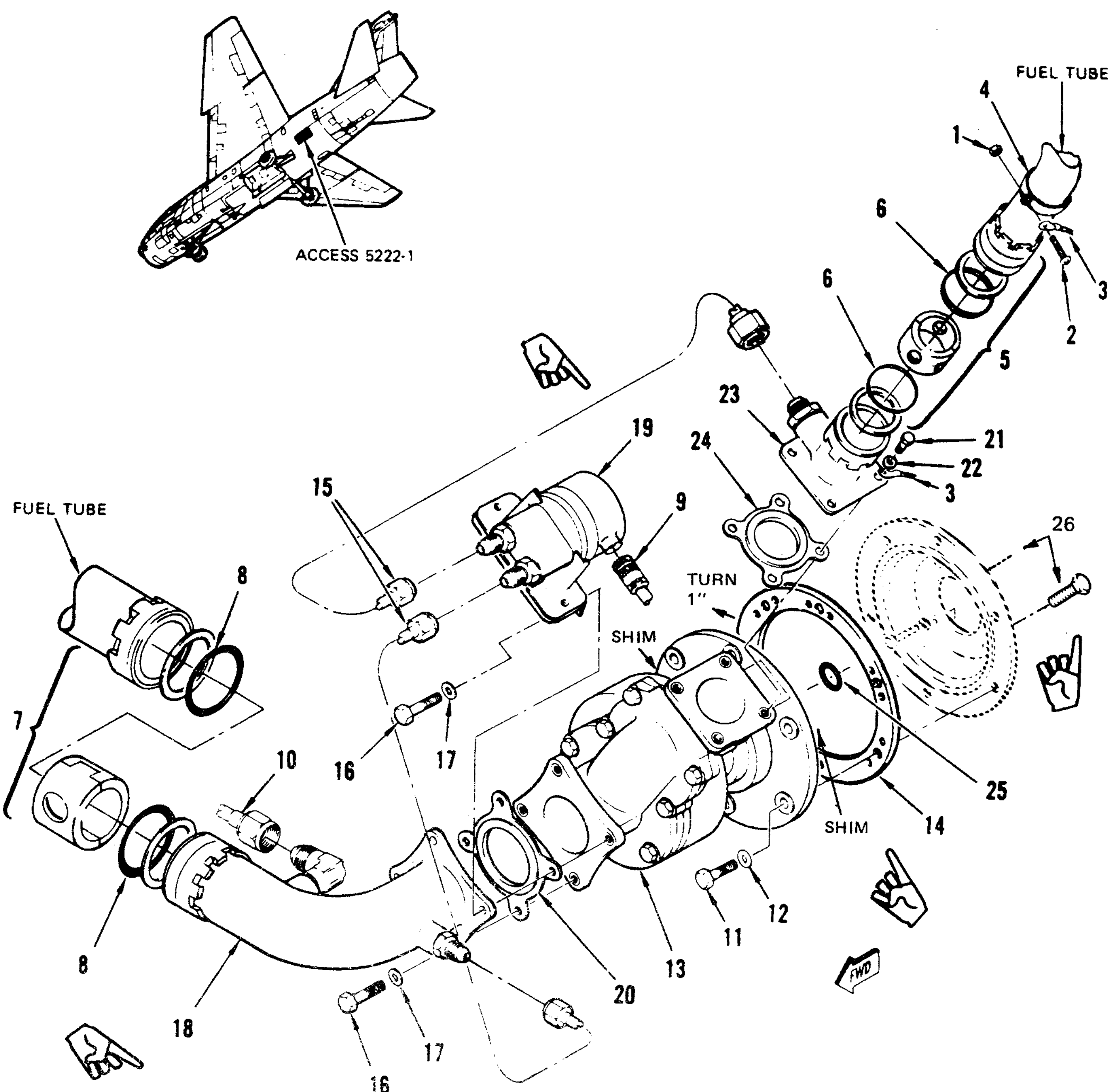
k. Remove bolts (21) and washers (22) securing adapter (23) to pump, and remove bonding cable (3) and seal (24).

l. Remove O-ring (25) from pump spline.

m. Inspect drive shaft (paragraph 1-40).

1-38.2. Installation. (Figure 1-32.)

a. Install adapter (23) on pump, using new seal (24), and secure with washers (22) and bolts (21), and install bonding cable (3).



*INSTALL TWO EACH BOLTS, PART NO. NAS-1306-20, FSN 5306-00-826-5336 FOR REMOVAL OF STUCK PUMPS/HYDRAULIC MOTORS ONLY. REMOVE BOLTS AFTER PUMP AND/OR MOTOR IS SEPARATED. REMOVE SHIM STOCK.

1. Nut
2. Screw
3. Bonding cable
4. Clamp
5. Coupling
6. O-ring
7. Coupling
8. O-ring
9. Connector
10. Starter fuel supply line
11. Bolt
12. Washer
13. Pump
14. Gasket
15. Pressure switch lines
16. Bolt
17. Washer
18. Tube elbow
19. Pressure switch
20. Seal
21. Bolt
22. Washer
23. Adapter
24. Seal
25. O-ring

*26. Bolt used for removal only

06D086-09-85

Figure 1-32. Removal and Installation; Fuel Boost Pump

b. Install tube elbow (18) and pressure switch (19) on pump, using new seal (20), and secure with washers (17) and bolts (16).

c. Connect pressure switch lines (5) to tube elbow, adapter, and pressure switch.

d. Install new O-ring (25) on pump spline, and lubricate with MIL-G-81322 grease.

e. Install pump (13) in airplane, using new gasket (14), and secure to bulkhead with washers (12) and bolts (11). Torque bolts to 175 (±15) inch-pounds.

f. Connect starter fuel supply line (10) to tube elbow.

g. Connect electrical connector (9) to pressure switch.

h. Using new O-rings (8), connect coupling (7) between tube elbow and fuel tube (paragraph 1-45).

i. Torque coupling (7) to 40 (±4) foot-pounds, and secure with MS20995C32 lockwire.

j. Using new O-rings (6), connect coupling (5) between adapter and fuel tube (paragraph 1-45).

k. Torque coupling (5) to 30 (±3) foot-pounds, and secure with MS20995C32 lockwire.

CAUTION

To prevent chafing of fuel tube against PC 3 vent line, ensure clamps are installed back to back in area where chafing would occur.

l. Secure bonding cable (3) to clamp (4) with bolt (2) and nut (1). Install clamps on fuel tube and PC 3 vent line.

m. Place master fuel control lever in ON, and check for fuel leaks.

NOTE

If air is suspected in jet fuel starter fuel line, perform bleeding procedures before engine start (T.O. 1A-7D-2-5).

n. Start engine (T.O. 1A-7D-2-1).

o. Check that fuel boost 1 caution light goes off.

p. Check for fuel leaks.

q. Shut down engine (T.O. 1A-7D-2-1).

r. Close access 5222-1.

1-39. FUEL BOOST PUMP HYDRAULIC MOTOR REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external hydraulic power	Connect hydraulic power
		Equipment required for engine operation	Operate engine for fuel leak check
	E10385 (Stewart Avionics Inc., Brooklyn, New York)	Hydraulic filler cart	Provide fluid flow to bleed motor

1-39.1. Removal. (Figure 1-33.)

a. Open accesses 5222-2 and 5122-5.

b. Close hydraulic motor manual shutoff valve through access 5122-5.

CAUTION

To prevent damage to brazed fitting or tubing, jamnut on fitting must be loosened before removal of fitting is attempted.

c. Remove fittings (1) and O-rings (2) from motor and cap fittings.

U. S. Government Printing Office : 86 666-000 P.O. 42743

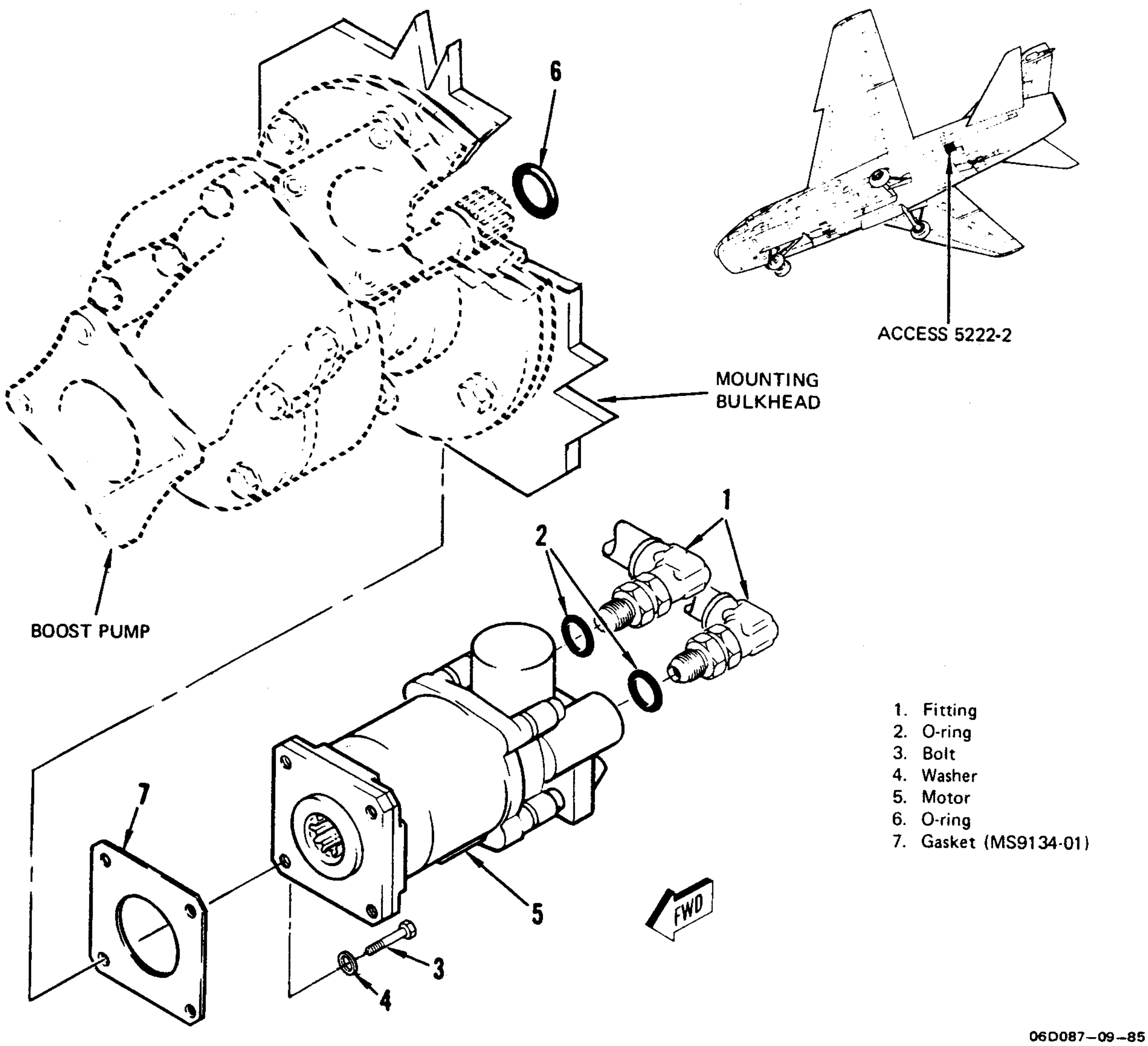


Figure 1-33. Removal and Installation; Fuel Boost Pump Hydraulic Motor

d. Remove bolts (3) and washers (4) securing motor (5) to bulkhead, and remove motor from airplane.

e. Remove O-ring (6) from fuel pump spline.

f. Remove and discard gasket (7).

g. Inspect internal spline of motor for wear, using 0.0720-inch diameter pins. Maximum dimension (inside diameter) across pins should be 0.3520 inch.

h. Inspect fuel boost pump drive shaft (paragraph 1-40).

1-39.2. Installation. (Figure 1-33.)

a. Install new O-ring (6) to fuel pump spline, and lubricate with MIL-G-81322 grease.

b. Position gasket (7) and motor (5) in airplane, and secure to bulkhead with washers (4) and bolts (3).

c. Using new O-rings (2), install fittings (1) in motor, leaving return fitting loose.

CAUTION

To ensure that the valve is in the full-open position, depress spring lock when placing the manual shutoff handle in the open position.

d. Open hydraulic motor manual shutoff valve.

e. Connect hydraulic filler cart to filler valve. Operate filler cart, and bleed motor slowly until fluid is free of air. Tighten return fitting. Close valve.

f. If replacing failed pump drive motor, remove filter assembly (paragraph 1-41). Check element for metal chips and indicator button for extension. If filter button is extended and metal chips are found, install new filter element and flush system (T.O. 1A-7D-2-4). If metal chips are present in filter element and indicator button is not extended, perform the following:

(1) Clean filter bowl, and install new element.

(2) Verify airplane is fueled.

(3) Connect external hydraulic power to PC 3 system (T.O. 1A-7D-2-1).

(4) Place master fuel control lever in ON.

(5) Check that engine throttle is in OFF.

(6) Open hydraulic motor manual shutoff valve. Allow pump motor to operate for 1 minute only, and close manual shutoff valve.

(7) Place master fuel control lever in OFF.

(8) Disconnect external hydraulic power (T.O. 1A-7D-2-1).

g. Start engine (T.O. 1A-7D-2-1).

h. Check that fuel boost 1 caution light goes off.

i. Check motor for leaks.

j. Shut down engine (T.O. 1A-7D-2-1).

k. Close accesses 5222-2 and 5122-5.

1-40. FUEL BOOST PUMP DRIVE SHAFT REMOVAL, INSPECTION, AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Micrometer	Measure wear limits of shaft splines
		Snap ring pliers	Remove snap ring securing drive shaft

1-40.1. Removal.

a. Gain access to drive shaft by removing hydraulic motor (paragraph 1-39) or fuel boost pump (paragraph 1-38).

b. Remove retaining ring, and slide drive shaft out of boost pump.

1-40.2. Spline Inspection.

a. For inspection of drive shaft large splines (part No. 209404, 214506, and 214620), use 0.096-inch diameter pins. Minimum allowable dimension (outside diameter) across pins should be 1.320 inches.

b. For inspection of drive shaft small splines (part No. 209404, 214506, 214507, 214620, and 214621), use 0.080-inch diameter pins. Minimum allowable dimension (outside diameter) across pins should be 0.552 inch.

c. If either spline exceeds wear limits, replace drive shaft.

1-40.3. Installation.

a. Lubricate drive shaft splines with 1 gram of MIL-G-81322 or MIL-G-21164 grease.

b. Insert drive shaft into boost pump.

CAUTION

Be careful not to damage retaining ring.

c. Secure shaft in pump with retaining ring.

1-41. FUEL BOOST PUMP HYDRAULIC MOTOR RETURN LINE FILTER ELEMENT RETURN AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	E10385 (Stewart Avionics Inc., Brooklyn, New York)	Hydraulic filler cart	Provide fluid flow to bleed filter
	GGG-W-686	Torque wrench, 100 to 750 inch-pounds	Torque filter bowl

1-41.1. Removal. (Figure 1-34.)

a. Remove access 5122-3.

WARNING

Fluid in filter will be hot if system has been in operation. Escaping fluid may injure personnel.

b. Cut lockwire and unscrew filter bowl (1) from filter head.

c. Remove filter element (2).

d. Clean filter bowl.

1-41.2. Installation. (Figure 1-34.)

a. Reset differential pressure indicator, if extended.

b. Immerse filter element in clean MIL-H-83282 hydraulic fluid for several minutes, and install filter element (2) in filter bowl. Fill bowl with clean MIL-H-83282 hydraulic fluid.

CAUTION

To prevent damage to brazed fitting or tubing, jamnut on fitting must be loosened before fitting is loosened.

NOTE

Ensure spring is in filter head before performing next step.

c. Loosen outlet fitting, and allow air to bleed off while installing filter bowl. Torque bowl (1) on filter head to 150 (±30) inch-pounds.

d. Connect hydraulic filler cart to filler valve. Operate filler cart, and bleed filter slowly until fluid is free of air. Tighten outlet fitting.

e. Secure bowl with MS20995C32 lockwire.

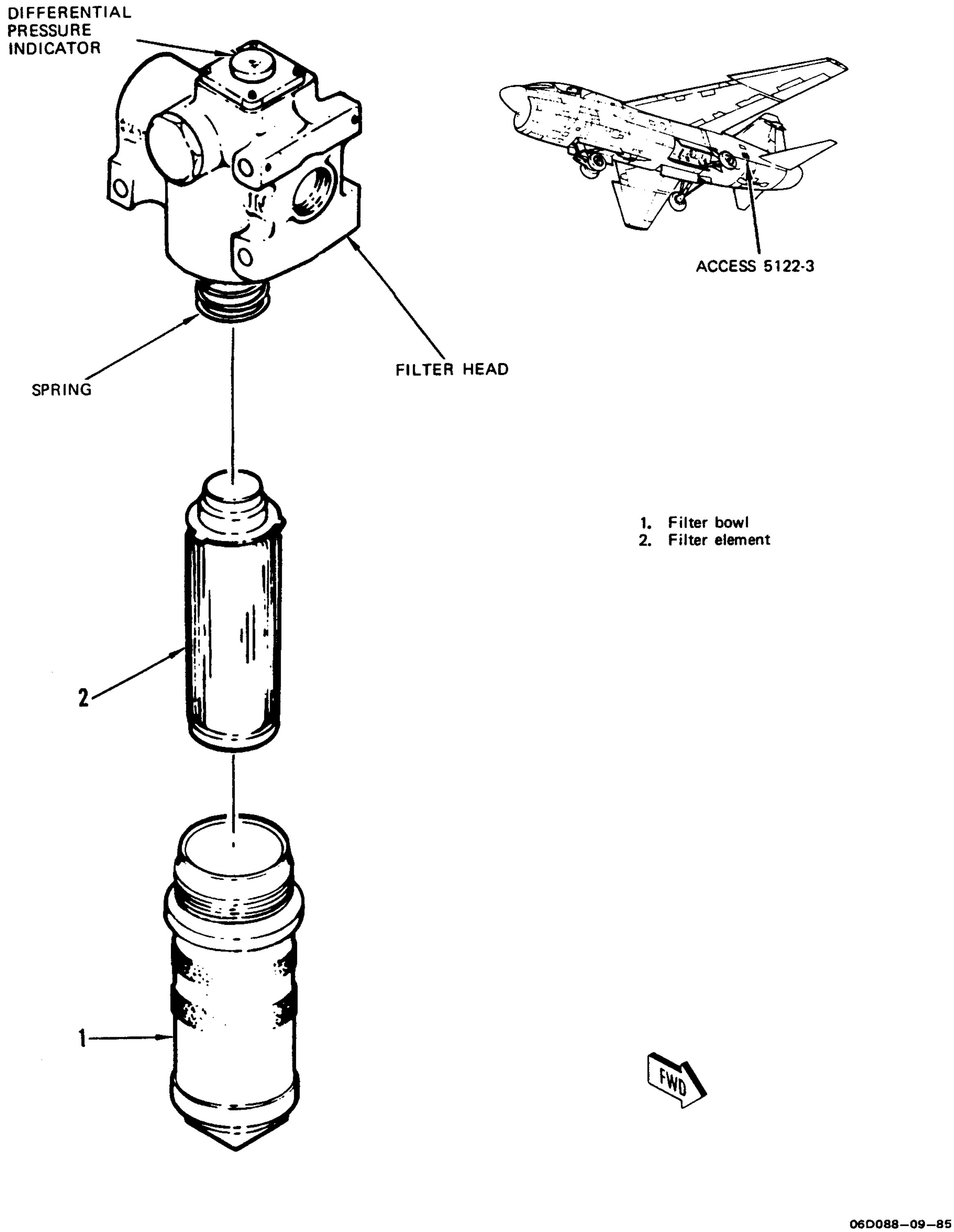
f. Perform hydraulic system air check (T.O. 1A-7D-2-1). Check filter for leaks and indicator button for extension.

g. Close access 5122-3.

1-42. FUEL BOOST PUMP HYDRAULIC MOTOR RETURN LINE FILTER REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	E10385 (Stewart avionics Inc., Brooklyn, New York)	Hydraulic filler cart	Provide fluid flow to bleed filter



1. Filter bowl
2. Filter element

Figure 1-34. Removal and Installation; Fuel Boost Pump Hydraulic Motor Return Line Filter Element

1-42.1. Removal. (Figure 1-35.)

a. Open access 5122-3.

WARNING

Fluid in filter will be hot if system has been in operation. Escaping fluid may injure personnel.

CAUTION

To prevent damage to brazed fitting or tubing, jamnut on fitting must be loosened before fitting is loosened.

b. Loosen jamnuts and remove fittings (1) and O-rings (2) from filter. Cap fittings.

c. Remove bolts (3) and washers (4) securing filter (5) to bracket, and remove filter from airplane.

1-42.2. Installation. (Figure 1-35.)

a. Drain preservative fluid, and position filter (5) in airplane, and secure to bracket with washers (4) and bolts (3).

b. Fill filter with hydraulic fluid.

c. Using new O-rings (2), install fittings (1) in valve, leaving outlet fitting loose.

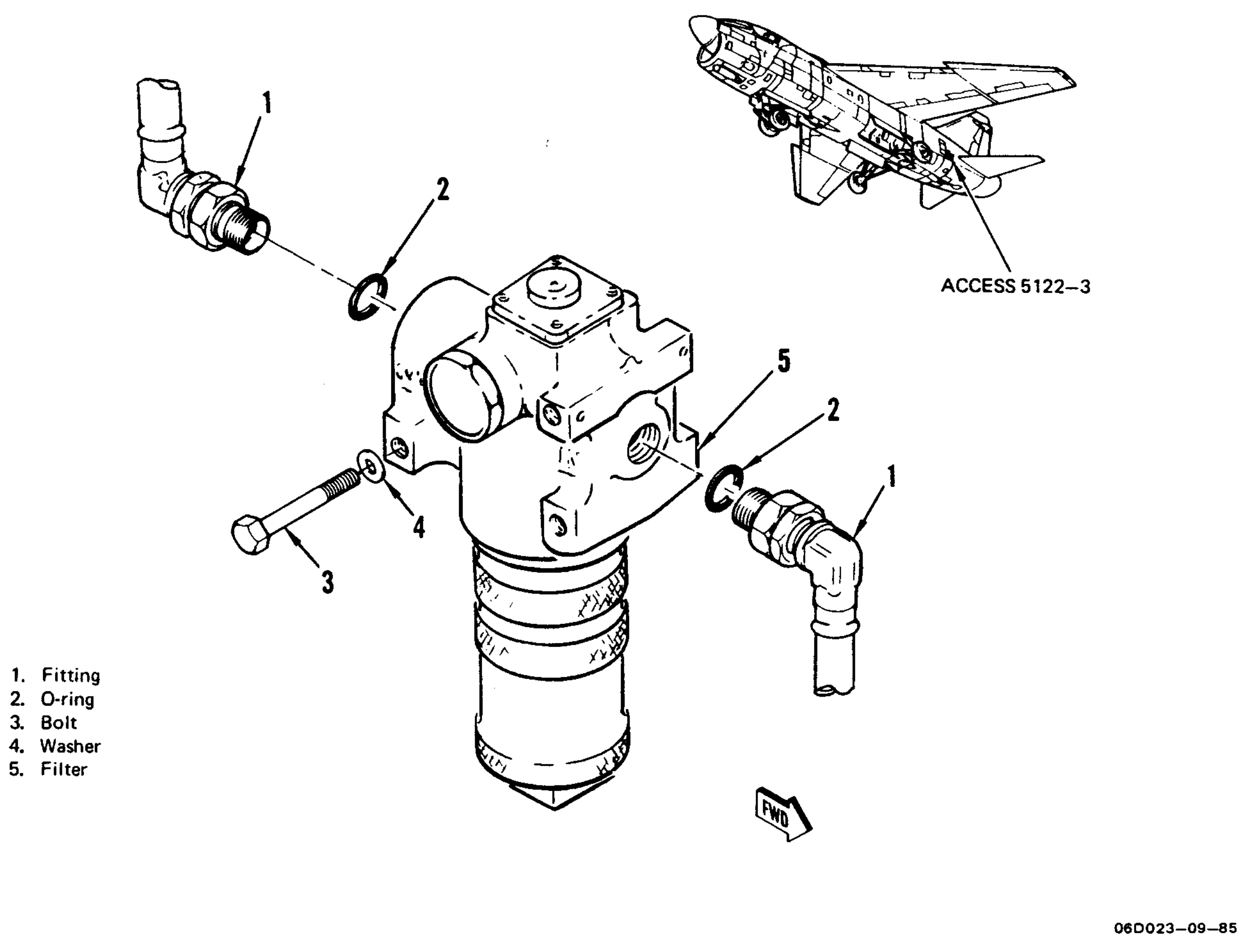


Figure 1-35. Removal and Installation; Fuel Boost Pump Hydraulic Motor Return Line Filter

d. Connect hydraulic filler cart to filler valve. Operate filler cart, and bleed filter slowly until fluid is free of air. Tighten outlet fitting. Tighten jamnuts on both fittings.

e. Perform hydraulic system air check (T.O. 1A-7D-2-1).

f. Check filter for leaks.

g. Close access 5122-3.

1-43. FUEL BOOST PUMP HYDRAULIC MOTOR MANUAL SHUTOFF VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	E10385 (Stewart Avionics Inc., Brooklyn, New York)	Hydraulic filler cart	Provide fluid flow to bleed shutoff valve

1-43.1. Removal. (Figure 1-36.)

a. Open access 5122-5.

b. Remove bolt (1) and washer (2) securing handle (3) to valve.

c. Disconnect hydraulic lines (4) from valve, and plug lines.

d. Remove bolts (5) and washers (6) securing valve (7) to bracket (8), and remove valve from airplane.

e. Remove reducers (9) and O-rings (10) from valve.

1-43.2. Installation. (Figure 1-36.)

a. Using new O-rings (10), install reducers (9) in valve.

b. Position valve in airplane, and secure valve (7) to bracket (8) with washers (6) and bolts (5).

c. Connect hydraulic lines (4) to valve leaving outlet line loose.

d. Secure handle (3) to valve with washer (2) and bolt (1), and place handle in OPEN.

e. Connect hydraulic filler cart to filler valve. Operate filler cart, and bleed valve slowly until fluid is free of air. Tighten outlet line and check valve for leaks.

f. Perform hydraulic system air check (T.O. 1A-7D-2-1).

g. Close access 5122-5.

1-44. FUEL MANAGEMENT PANEL REMOVAL AND INSTALLATION.

1-44.1. Removal.

a. Remove emergency brake control lever knob.

b. Push cockpit insulating blanket outboard, if necessary, to gain access to captive mounting screws on panel outboard edge.

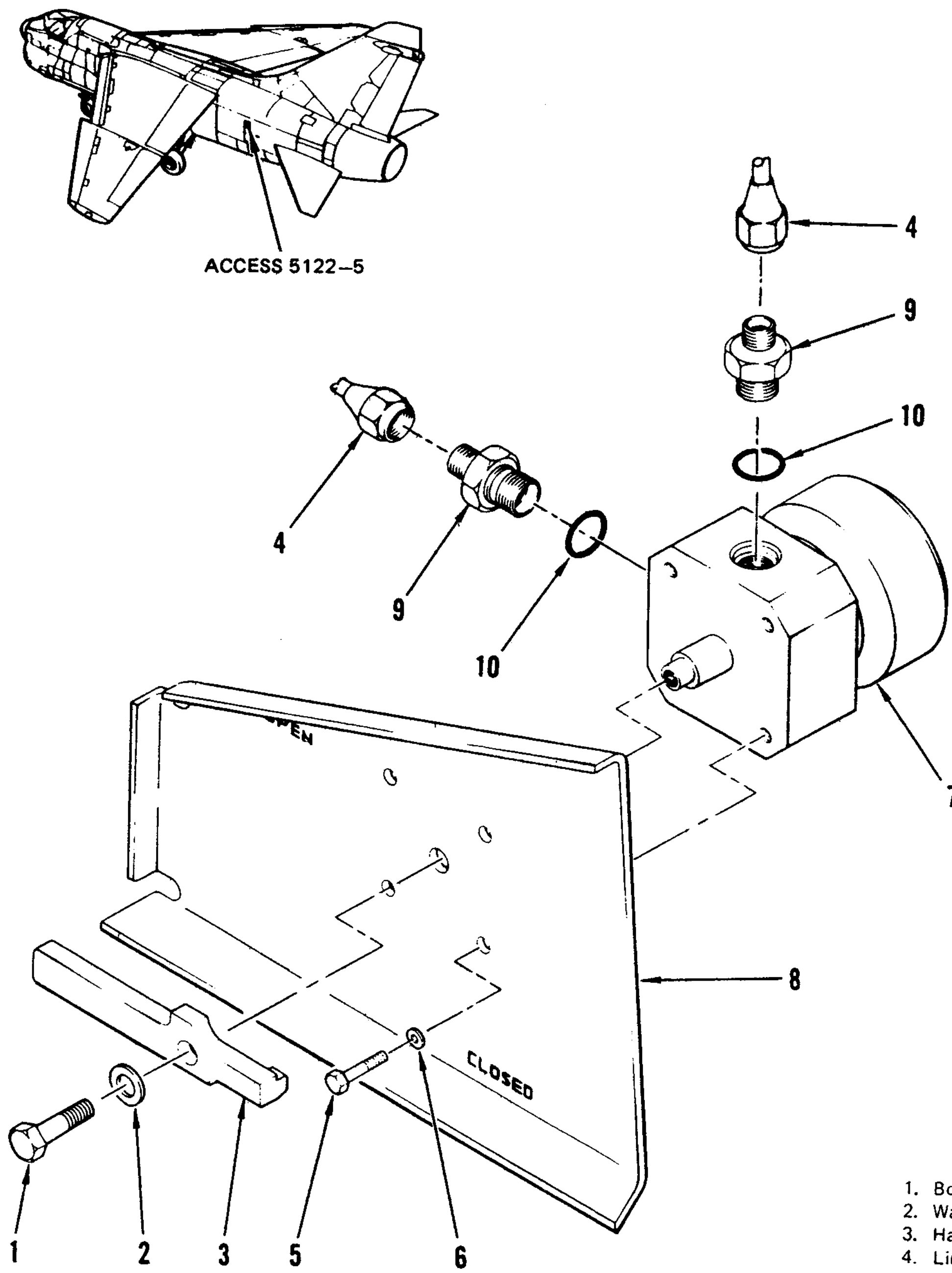
CAUTION

Fuel management panel mounting screws incorporate a captive feature. Loosen and engage all screws in sequence, no more than three turns at a time. More than three turns of screws will damage the captive feature or panel components.

c. Remove captive screws securing fuel management panel to left console.

d. Lift inboard side of control panel to clear emergency brake control lever, more panel slightly inboard, rotate clockwise, and lift from console.

e. Disconnect electrical connector(s).



1. Bolt
2. Washer
3. Handle
4. Line
5. Bolt
6. Washer
7. Valve
8. Bracket
9. Reducer
10. O-ring

06D024–09–85

Figure 1-36. Removal and Installation; Fuel Boost Pump Hydraulic Motor Manual Shutoff Valve

1-44.2. Installation.

a. Connect electrical connector to fuel tank monitor switch first to facilitate orienting pins correctly.

b. Connect electrical connector to panel.

c. Rotate panel counterclockwise around emergency brake control lever, and lower onto left console. Press outboard edge of control panel onto console, and slide panel outboard until it can be lowered into place.

d. Tighten captive screws securing fuel management panel to left console.

e. Pull cockpit insulating blanket back into place.

f. Install emergency brake control lever knob.

g. Perform the following operational checkouts, steps (1) through (5) when maintenance is performed on the panel or when a new panel is installed. If panel was removed to only facilitate other maintenance, perform steps (1), (3), (4), (6) and (7).

(1) Transfer fuel system (paragraph 2-4).

(2) Air refueling system (paragraph 6-4).

(3) Fuel quantity indicating system (paragraph 5-4.1.).

(4) Manual fuel control check (T.O. 1A-7D-2-5).

(5) Anti-skid brake system (T.O. 1A-7D-2-7).

(6) Anti-skid brake system as follows:

(a) Connect external power, check that Anti-skid caution light on the advisory panel comes on (T.O. 1A-7D-2-1).

(b) Place Anti-skid control switch to the Anti-skid position and check that Anti-skid caution light goes out.

(c) Place Anti-skid control switch to OFF position and ensure that Anti-skid caution light comes back on.

(d) Disconnect external electrical power (T.O. 1A-7D-2-1).

(7) Air refueling system as follows:

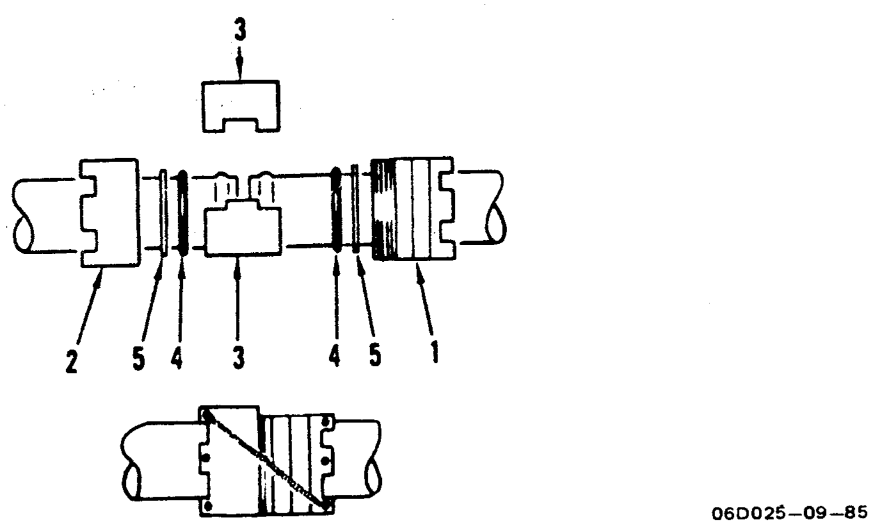
(a) Manually open receptacle door.

(b) Install release handle safety clamp.

(c) Check that amplifier switch is in NORMAL.

(d) Connect external electrical power (T.O. 1A-7D-2-1).

(e) Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).



1. Coupling
2. Coupling nut
3. Retainer half
4. Packing
5. Washer

Figure 1-37. Removal and Installation; Wiggins Coupling

(f) With receptacle door open, check that ready light is on.

(g) Rotate slipway light control fully clockwise and check that slipway lights are on. Rotate slipway lights control counterclockwise to OFF and check that lights dim and go off.

(h) Place test nozzle in receptacle slipway and install nozzle restraint (figure 7-5).

(i) Insert test nozzle in receptacle. Check that latched light comes on and ready light goes off. Pull on nozzle to check that nozzle is locked in receptacle.

(j) Actuate landing gear handle switch through access hole in console.

WARNING

Ensure test nozzle is restrained before pressing the disconnect switch.

(k) Press disconnect switch and check that disconnect light comes on, latched light goes off, and nozzle releases.

(l) Release landing gear handle switch.

(m) Press and release reset switch and check that ready light comes on and disconnect light goes off.

(n) Place amplifier switch in override and check that all three advisory lights are off.

(o) Insert nozzle in receptacle and check that nozzle is locked.

(p) Actuate landing gear handle switch through access hole in console.

(q) Press disconnect switch and check that nozzle releases.

(r) Release landing gear handle switch.

(s) Insert nozzle and check that it will not lock. Press reset switch and check that nozzle locks.

(t) Actuate induction coil switch and test nozzle and check that nozzle does not release.

(u) Press reset switch. Nozzle will release.

(v) Place amplifier switch in NORM, check that ready light comes on.

(w) Insert nozzle in receptacle. Actuate induction coil switch on test nozzle and check that nozzle releases.

(x) Remove restraint and test nozzle from airplane.

(y) Remove release handle safety clamp.

(z) Close receptacle door and check that disconnect light goes out after several seconds.

(aa) Disconnect electrical power and hydraulic power (T.O. 1A-7D-2-1).

1-45. WIGGINS COUPLING REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	GGG-W-686	Torque wrench, 10 to 50 inch-pounds	Torque couplings
	413-900-020	Torque wrench, 100 to 750 inch-pounds	Torque couplings
	57F890775-1	Adapter kit, torque	Torque couplings
		Spanner wrench or strap wrench	Tighten couplings

1-45.1. Removal. (Figure 1-37.)

a. Cut lockwire and disconnect coupling body (1) from coupling nut (2).

b. Remove retainer halves (3), O-rings (4), and washers (5).

1-45.2. Installation. (Figure 1-37.)

a. Inspect inner diameter of retainer half (3) for wear. If retainer shows wear, replace coupling.

b. Check ends of tubes for excessive wear around bead. Maximum allowable depth of wear around the tube bead is 15% of tubing wall thickness extending no more than 180 degrees around tubing circumference. If wear is excessive, replace tube.

c. Install coupling body (1) on one tube end and coupling nut (2) on other tube end.

d. Install washers (5) on tube ends between bead and coupling.

e. Install O-rings (4) on each tube end between bead and washer.

f. Ensure centerline alignment between tubes is within ±0.06 inches.

g. If tubes require alignment, remove nuts, screws and spacers on any clamps installed on tubes.

h. Ensure tubes are a maximum of 1/4 inch apart, and install retainer halves (3) to enclose both tube beads.

i. Slide coupling body into position, and engage threads. Torque to value given in installation procedure for specific coupling, or if torque is not given, use value specified in table 1-2. Use strap or spanner wrench to secure ends; this allows Wiggins coupling to be properly torqued.

j. Secure coupling with MS20995C32 lockwire as shown.

k. Align tube clamps, and install proper length NAS 43 spacer between clamps, if required to ensure no side load will be induced into tube installation when clamps are secured.

l. Secure clamps using length of spacer determined in step k. and length of screw as required.

Table 1-2. Wiggins Coupling Torque

Coupling number	O-ring MS29513-	Torque (inch-pounds) Minimum	Maximum
3608-8	-112	48	60
3608-10	-114	60	72
3605-12	-210	72	84
3605-16	-214	156	204
3605-20	-218	216	264
3605-24	-325	324	396
3605-28	-327	372	468
3605-32	-329	432	528
3605-40	-333	552	648
3605-48	-337	672	768

1-46. FUEL SYSTEM TUBING DAMAGE LIMITATIONS.

Inspect tubing for damage in accordance with T.O. 1-1A-8, Section XIII, except for chafing damage. Chafing up to 15% of the tubing wall thickness is permissible providing there are no rough edges. Rough edges may be burnished out provided the 15% limitation is not exceeded.

☆U.S. GOVERNMENT PRINTING OFFICE: 1988 - 568-000/82370

SECTION II

TRANSFER FUEL SYSTEM

2-1. DESCRIPTION. The transfer system transfers fuel from the external tanks, wing tank, and fuselage tanks to the main sump tank. Normally, all fuel to the engine flows through the sump tank. In the event of sump tank rupture, the alternate fuel feed system enables fuel to be transferred to the engine directly from the wing and/or aft tank. Fuel is transferred by air pressure from the external tanks and by motive flow and gravity flow from the internal fuel tanks. The transfer system consists of four external tanks, one integral wing tank, two forward fuselage tanks, two midfuselage tanks, one aft fuselage tank, and a main fuselage sump tank. For system controls and indicators, see figure 2-1. For system arrangement, see figure 2-2.

2-1.1. System Components. Transfer system components consist of three selector valves: an emergency wing transfer selector valve, a wing transfer selector valve, and a bypass transfer selector valve. The system also includes a quick-disconnect, pressure sensitive stop valve, water drain, fuel transfer manifold, a fuel transfer thermistor control unit, four thermistors, five ejector pumps, a manually operated alternate fuel feed selector valve, and a manually operated motive flow shutoff valve.

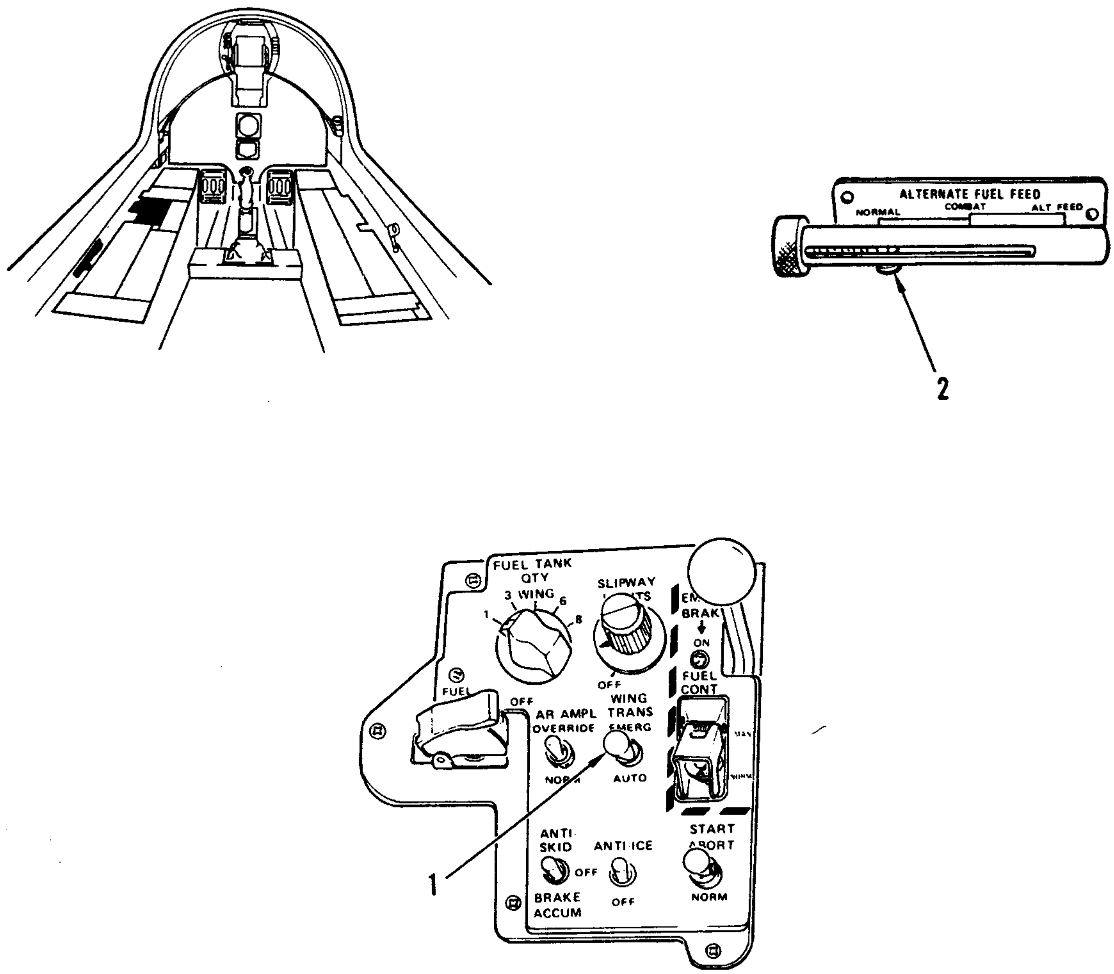
2-1.2. System Function. The primary function of the fuel transfer system is to provide a constant flow of fuel, keeping the center of gravity of the airplane as constant as possible. The wing tank has normal and emergency transfer capabilities.

2-2. OPERATION.

2-2.1. Normal Fuel Transfer. (Figures 2-3, 2-4, and FO-3 or FO-4.) Operation of the transfer fuel system requires engine operation to provide motive flow to the sump tank dual inlet ejector pump and wing and aft tank ejector pumps. The fuel boost pump provides fuel pressure to the low-pressure fuel pump when the engine is operating. The low-pressure fuel pump supplies fuel to the high-pressure engine fuel pump and also provides motive flow for the ejector pumps in the wing tank or aft fuselage tank, depending upon the position of the three transfer selector valves. The high-pressure engine fuel pump supplies fuel to the engine fuel control. Normal fuel consumption sequence begins by using the external tank fuel, the wing tank fuel, and then the fuselage tanks fuel. All fuel tanks feed into the main sump tank, which supplies fuel directly to the engine. Normal operation of the transfer fuel system is automatic, requiring no fuel management tasks other than placement of the wing transfer switch on the cockpit left console in AUTO. Fuel is transferred as described in the following paragraphs.

2-2.1.1. Transfer Valves. The wing transfer selector valve is supplied 28 volts dc from the primary dc bus, through CB358 and through fuel transfer relay K4. The bypass transfer selector valve receives 28 volts dc from the primary dc bus through CB3251 and through fuel transfer relay K5. The transfer valves are positioned to direct ejector pump motive flow either to the wing tank, or to the aft fuselage tank, or to bypass both of these tanks and direct motive flow to the sump tank. The engine low-pressure fuel pump provides motive flow fuel, which is routed through a fuel-cooled engine oil cooler before it is delivered to ejector pumps in the wing tank and the aft fuselage tank.

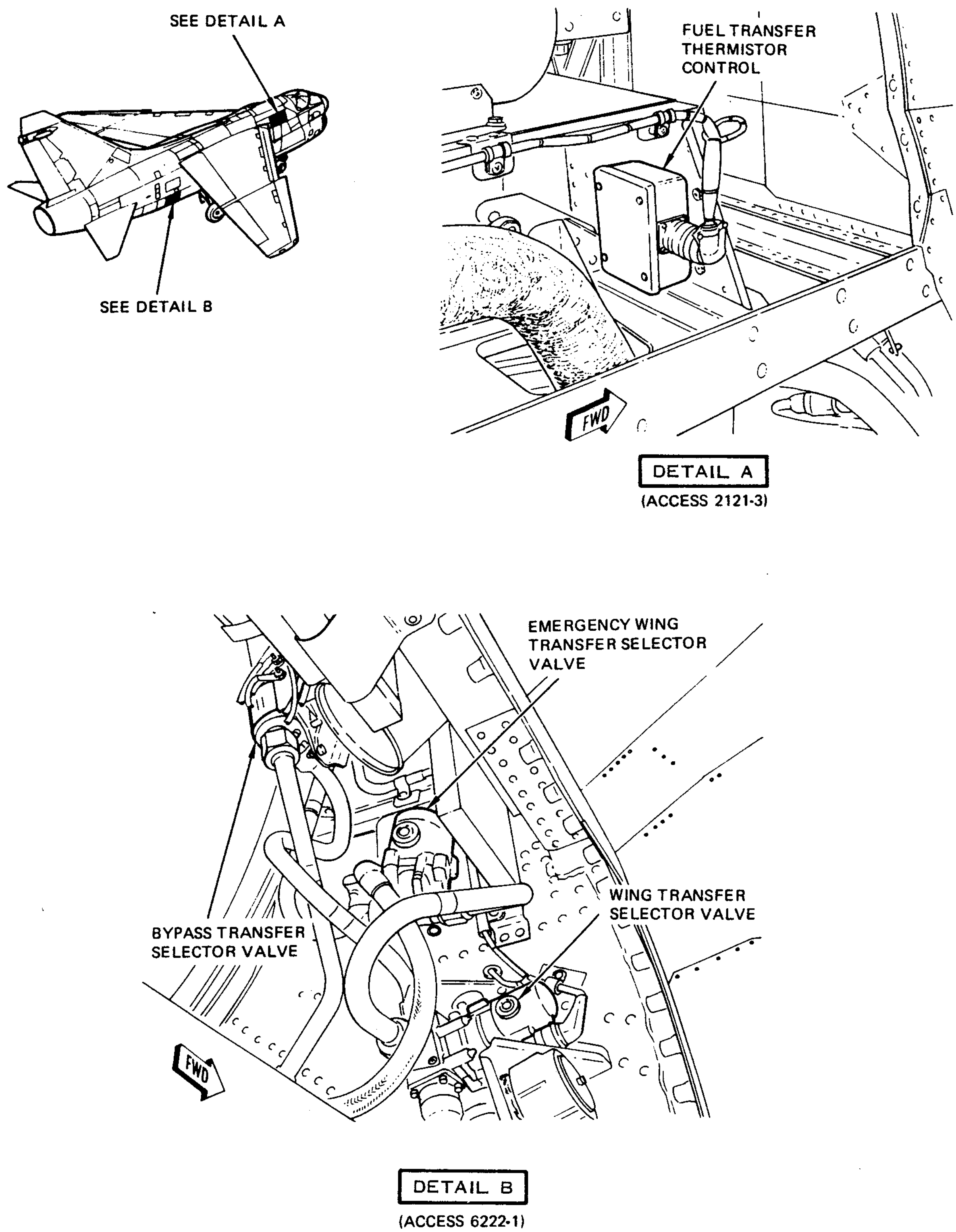
2-2.1.2. Thermistor Operation. Normal fuel transfer is accomplished primarily by operation of thermistors (figure 2-3) which control fuel transfer electrical circuits. As long as a thermistor is immersed in fuel, resistance is high and a relay control transistor in the fuel transfer thermistor control is biased above cutoff. The transistor in the thermistor control conducts, thereby providing a ground circuit, and the relay in the control is energized. However, when the thermistor is above fuel level, resistance decreases, providing a low resistance ground circuit for the transistor base voltage. The transistor becomes biased below cutoff, interrupting the ground circuit, and the relay is deenergized.



INDEX NO.	CONTROL/INDICATOR	FUNCTION
1.	Wing fuel transfer switch (WING TRANS)	AUTO – actuates fuel transfer selector valves to provide jet ejector pump motive flow for normal transfer of fuselage and wing fuel. With switch in this position, sequence of internal fuel transfer is automatically accomplished. EMERG – actuates emergency fuel transfer selector valve to provide motive flow to the wing tank jet ejector pumps.
2.	Fuel selector handle (ALTERNATE FUEL FEED)	NORMAL – allows normal fuel system operation. COMBAT – closes motive flow shutoff valve to shut off motive flow to the sump tank ejector pump. ALT FEED – actuates alternate fuel feed manual selector valve in the aft tank transfer line which directs the wing and/or aft tank fuel directly to the engine fuel boost pump. Shutoff valve remains closed as in COMBAT.

06D026–09–85

Figure 2-1. Controls and Indicators; Transfer Fuel System



06D027-01-09-85

Figure 2-2. System Arrangement; Transfer Fuel (Sheet 1 of 3)

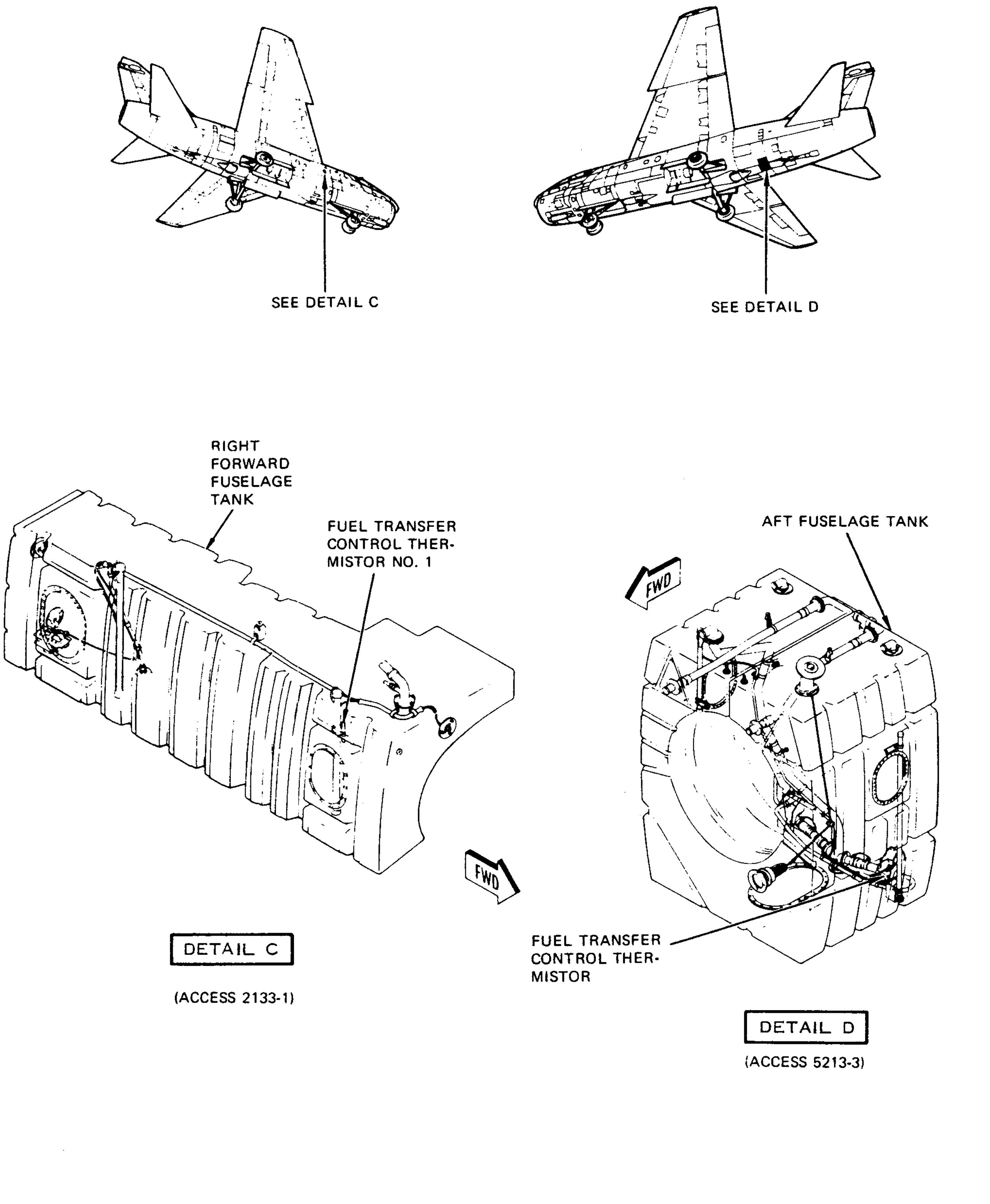
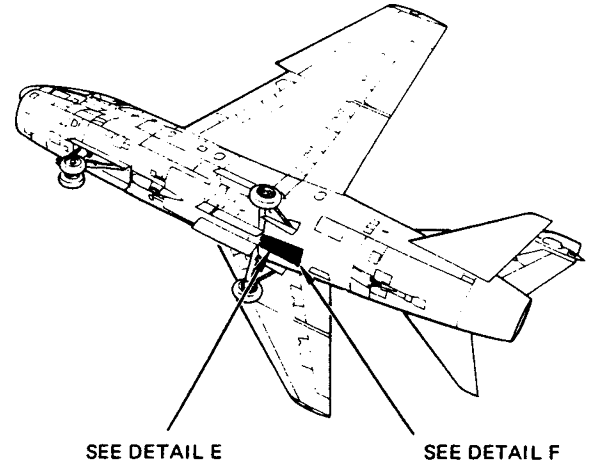
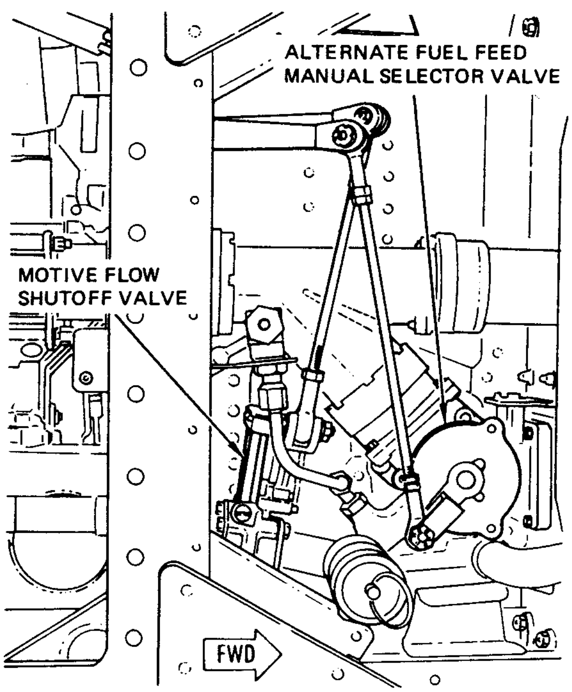


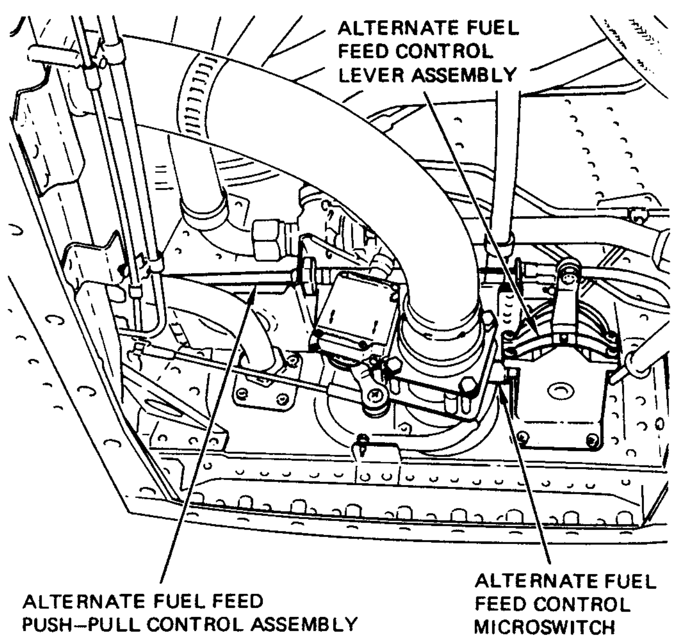
Figure 2-2. System Arrangement; Transfer Fuel (Sheet 2)





DETAIL E

(ACCESS 5213-3)



DETAIL F

(ACCESS 5223-1)
VIEW LOOKING UP AND FWD

06D027–03–09–85

Figure 2-2. System Arrangement; Transfer Fuel (Sheet 3)

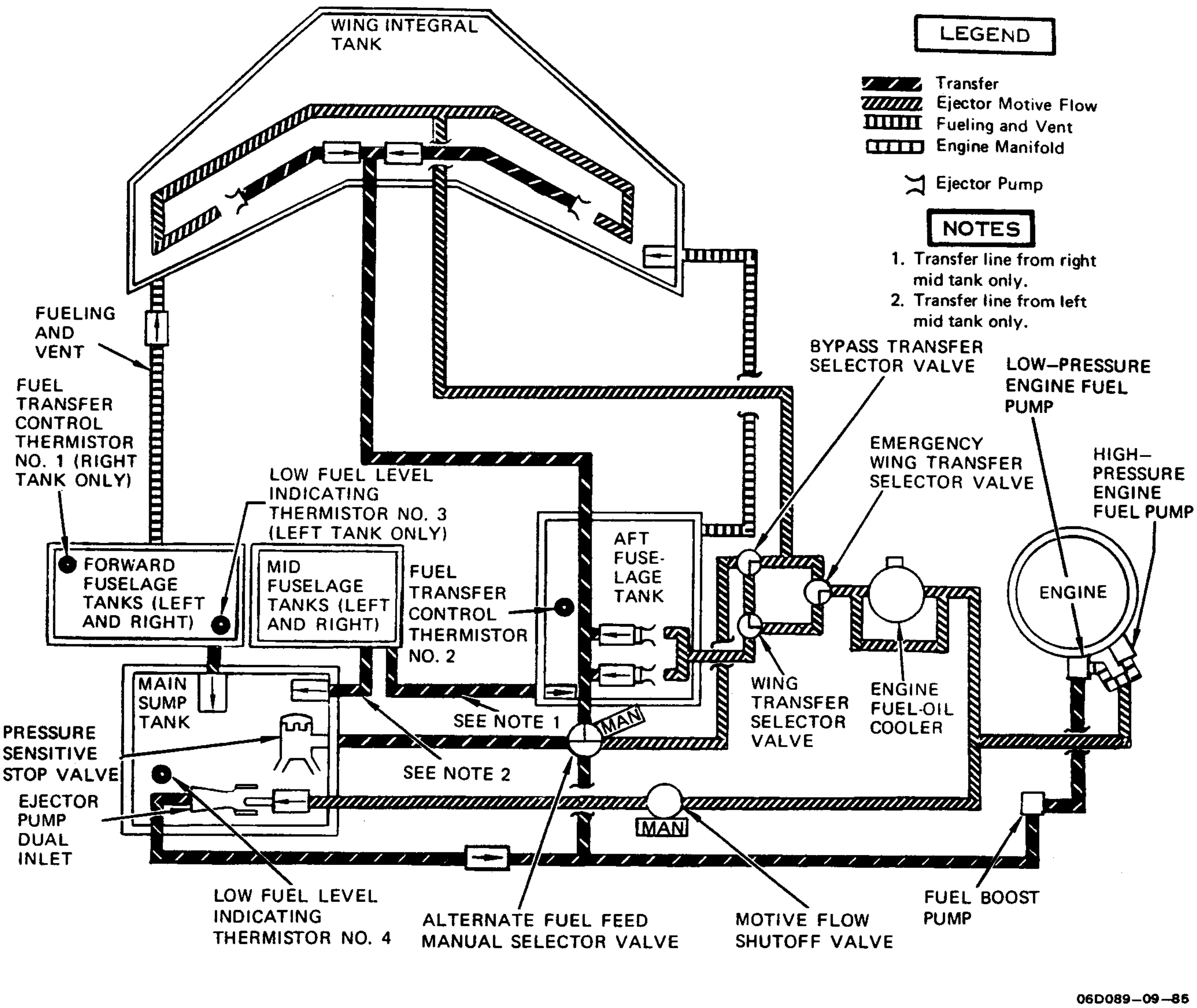
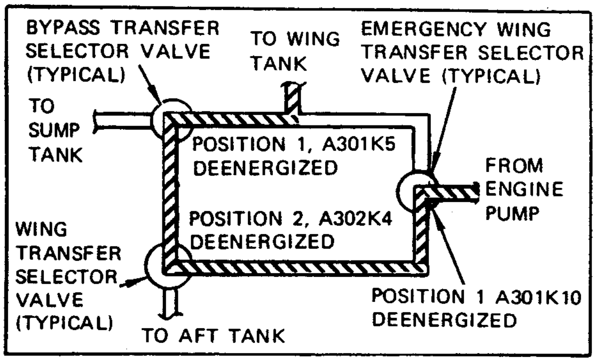


Figure 2-3. Schematic Diagram; Internal Fuel Transfer

FUEL TRANSFER SEQUENCE

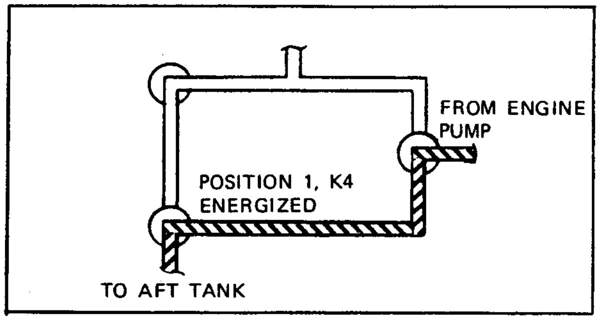
WING FUEL TRANSFER SWITCH IN AUTO



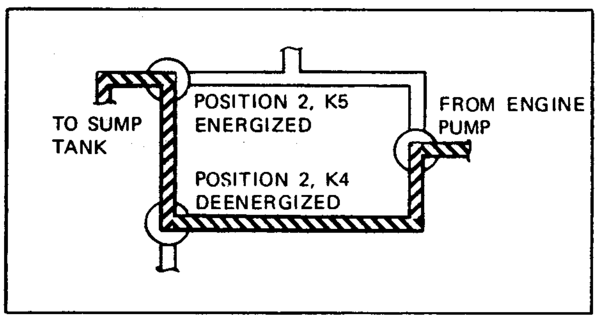
1. Fuselage tanks are full, all thermistors are wet. Motive flow directed to wing integral tank.

NOTE

Selector valves have position "1" and "2" engraved on valve body.

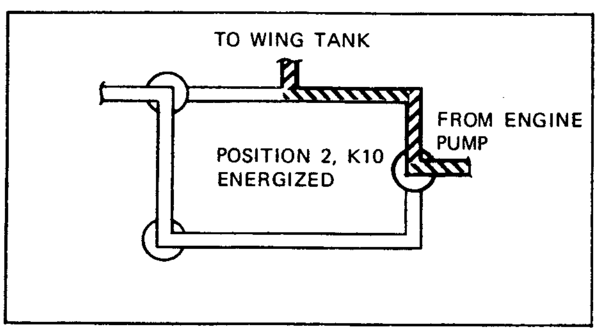


2. Wing tank empties and fuselage tanks gravity feed into sump tank until No. 1 thermistor in right forward tank is dry. Motive flow is directed to aft tank. Fuel flow from aft tank overfills sump tank and excess fuel refills forward tanks, covering No. 1 thermistor. All thermistors now wet motive flow returns to wing.



3. Motive flow cycles between wing tank and aft tank until No. 2 thermistor is dry (aft tank empty). No. 1 thermistor also dry. Motive flow is directed to sump tank.

WING FUEL TRANSFER SWITCH IN EMERG



Motive flow goes direct to wing tank, independent of thermistor condition.

06D071—09—85

Figure 2-4. Transfer Sequence; Fuel

2-2.1.3. Thermistor Location. Thermistors in the fuel transfer system are identified numerically in the following discussion, and figure 2-3 shows their location in the system. There are four thermistors in the fuel transfer system: one is in the right forward fuselage tank (fuel transfer control thermistor No. 1); one is in the left forward fuselage tank (low fuel level indicating thermistor No. 3); one is near the bottom of the aft fuselage tank (fuel transfer control thermistor No. 2); and a fourth thermistor is provided in the main sump tank (low fuel level indicating thermistor No. 4).

2-2.1.4. Transfer Sequence. If the wing tank is fueled and the wing transfer switch is in AUTO, the wing transfer selector valve and bypass transfer selector valve are positioned to direct motive flow to wing tank ejector pumps, initiating transfer of fuel from the wing tank directly to the main sump tank. When the wing tank is empty, the fuselage tanks begin to gravity-drain into the main sump tank until fuel transfer control thermistor No. 1, located near the top of the right forward fuselage tank, is uncovered. Uncovering thermistor No. 1 provides a signal to the fuel transfer thermistor control to energize fuel transfer relay K4. This action causes the wing transfer selector valve to actuate and to direct motive flow to the aft tank ejector pumps. Fuel in the aft tank is then transferred to the main sump tank (this provides further gravity feed from the forward and mid tanks at this time) until all fuel in the aft tank is depleted. When thermistor No. 2, located near the bottom of the aft tank, is uncovered, relay K5 is energized and K4 is deenergized. This action causes the wing transfer selector valve and bypass transfer selector valve to actuate, directing motive flow through the motive flow line to the sump tank and back to the fuel boost pump. This allows the forward fuselage tanks and left midfuselage tank to resume fuel transfer by gravity flow into the sump tank. Fuel flows from the right mid tank to the aft tank, rather than directly to the sump tank. This is a part of the alternate fuel system that permits the engine to use fuel from the aft tank rather than the sump tank. At 1,000 (±140) pounds (154 gallons), thermistor No. 3 in the left forward fuselage tank is uncovered, causing the low fuel level warning light to come on. Thermistor No. 4 in the main sump tank is uncovered at approximately 360 pounds (55 gallons) causing the low sump level warning light to come on. Refer to Section V for additional information on thermistors No. 3 and No. 4.

2-2.1.5. Pressure Sensitive Stop Valve. Fuel transferred from the wing intergral tank and the aft fuselage tank enters the main sump tank through the pressure sensitive stop valve. This valve protects the sump tank from excessive fuel pressure surges which may be encountered during high g maneuvers. The valve is set to close whenever fuel pressure reaches 8 to 13 psi above atmospheric pressure.

2-2.2. Emergency Fuel Transfer. (Figure FO-3 or FO-4). During normal operation, failure of the normal wing fuel transfer system will be indicated by a decrease in the main fuel quantity indicator reading, while the wing fuel quantity indication remains relatively constant. Emergency transfer of wing fuel is obtained by placing the wing transfer switch in EMERG. This supplies 28 volts dc from the primary dc bus through CB3147 to energize emergency fuel transfer relay K10 which actuates the motor-operated emergency wing transfer selector valve to direct motive flow to the wing ejector pumps, regardless of thermistor conditions or positions of the wing selector valve and the bypass transfer selector valve. When transfer of wing fuel is completed, the wing transfer switch shall be returned to AUTO to prevent possible trapping of a portion of aft tank fuel.

2-2.3. Alternate Fuel Feed System. The alternate fuel feed system allows fuel to be transferred to the engine directly from the wing and/or aft tank (figure 2-3) should the sump tank become ruptured. Detection of a ruptured sump tank is indicated by a low sump level warning light on the advisory and caution panel.

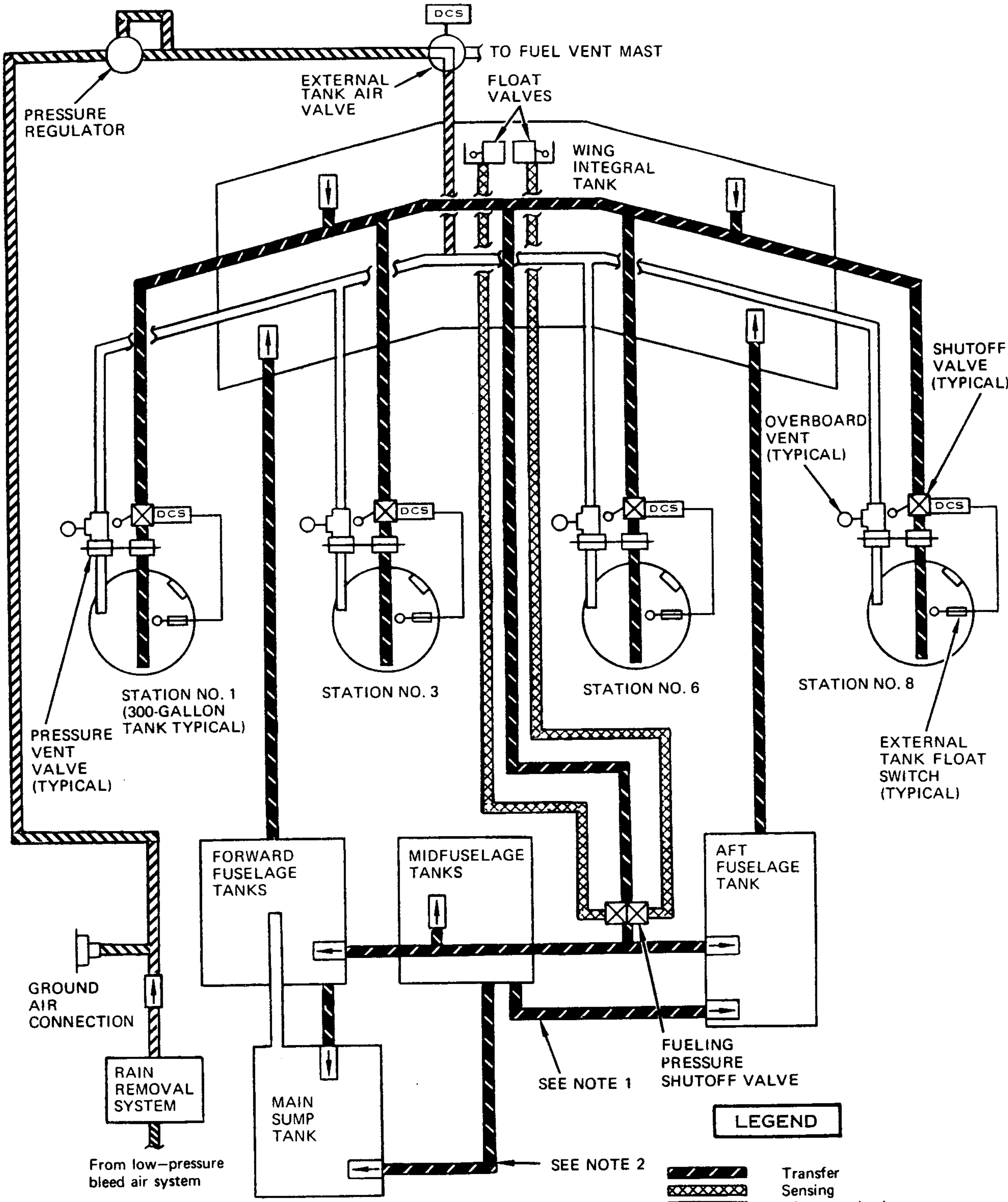
2-2.3.1. Normal/Combat. The alternate fuel feed system is manually operated. A three position alternate fuel feed selector handle is located in the cockpit under the left canopy rail longeron (figure 2-1). The NORMAL position of the handle allows normal fuel system operation. Placing the handle in COMBAT closes a shutoff valve in the sump tank motive flow line. This action depressurizes the motive flow line forward of the engine compartment and the self-sealing main engine feed line, increasing the capability of the self-sealing feature to prevent fuel leakage if the line is hit by a projectile.

2-2.3.2. Alternate Feed. If a sump tank rupture is detected by the pilot, the alternate fuel feed handle is placed in ALT FEED. This moves the manual selector valve in the aft tank transfer line to the alternate position and, at the same time, switches the wing motive flow selector valve to aft tank position (position 1), which diverts the aft tank fuel straight to the engine fuel boost pump and prevents this fuel from being lost through the damaged area in the sump tank. The bypass motive flow selector valve will also switch to bypass position when in alternate feed. This ensures gravity fuel flow from the aft tank to the engine if the wing motive flow selector valve failed in wing tank position. If there is fuel in the wing tank, this fuel can be transferred to the engine fuel boost pump by placing the wing transfer switch in EMERG. This switches the wing emergency motive flow valve to wing position. If no sump tank damage is detected, or the pilot chooses, the alternate fuel feed handle can be returned to NORMAL, which returns the fuel system to the normal condition.

2-2.4. External Tanks Transfer. (Figure 2-5.) The external tanks air valve solenoid is deenergized when the landing gear is up and locked, which routes 13 (±2) psi (regulated) air (from the rain removal system while the engine is operating, or from an external ground source) through pylons on wing stations 1, 3, 6, and 8 to pressurize the external tanks. Fuel flows under pressure from the external tanks, through their respective fueling shutoff valves in the pylons, and through a fueling pressure shutoff valve to the forward fuselage, midfuselage, and aft fuselage tanks. When the fuselage tanks are filled, fuel overflows through vent lines into the wing tank. The float valves in the wing tank will maintain the wing fuel level as long as adequate external tank fuel is available. As fuel in each external tank empties, a float-actuated air sensing section (integral with the tank fueling shutoff valve) senses that the external tank fuel supply is depleted and closes the fueling shutoff valve to prevent the flow of air from disrupting fuel transfer from other tanks.

2-3. COMPONENTS.

For a list of system components, their locations (accesses), and functions, refer to table 2-1.



NOTES

1. Transfer line from right mid tank only
2. Transfer line from left mid tank only

06D072–09–85

Figure 2-5. Schematic Diagram; External Fuel Transfer

Table 2-1. Transfer Fuel System Components

Component	Access	Function
Circuit breaker, CB358	2232-1	Connects 28 volts dc to the wing transfer selector valve.
Circuit breaker, CB3147	1232-1	Connects 28 volts dc to the emergency wing transfer selector valve.
Circuit breaker, CB3251	1232-1	Connects 28 volts dc to the bypass transfer selector valve.
Control, fuel transfer thermistor	2121-3	One portion of control, receiving input from thermistor No. 1, and the other portion of control, receiving input from thermistor No. 2, opens or closes electrical circuit to control position of wing transfer selector valve and bypass transfer selector valve.
Handle, alternate fuel feed selector	Left canopy rail	Provides selection of normal or alternate fuel transfer.
Pump, ejector (4)	5213-1 and wing center section	Increases fuel flow when supplied with motive pressure.
Pump, ejector (dual inlet)	2132-2	Increases fuel flow to engine fuel boost pump when supplied with motive pressure.
Relay, emergency fuel transfer K10	2232-1	Energizes emergency wing transfer selector valve to direct motive flow to the wing tank.
Relay, fuel transfer K4	2232-1	Energizes wing transfer selector valve to change direction of ejector motive flow.
Relay, fuel transfer K5	1232-1	Energizes bypass transfer selector valve to change direction of ejector motive flow.
Switch, wing fuel transfer	Left console	Provides selection of automatic or emergency wing fuel transfer.

Table 2-1. Transfer Fuel System Components – CONT

Component	Access	Function
Thermistor No. 1, fuel transfer control	Right forward fuselage tank	When dry, provides input to fuel transfer thermistor control to actuate wing transfer selector valve into position directing motive flow to aft tank ejector pumps.
Thermistor No. 2, fuel transfer control	Aft fuselage fuel tank	When dry, motive flow is directed to sump tank; when wet, motive flow is directed to aft tank or wing tank.
Valve, alternate fuel feed manual selector	5213-3	When alternate fuel feed selector handle is in ALT FEED, diverts wing and/or aft tank fuel directly to the engine.
Valve, bypass transfer selector	6222-1	Directs motive flow to wing ejector pumps or main sump tank during fuel transfer operation.
Valve, emergency wing transfer selector	6222-1	When wing fuel transfer switch is in EMERG, directs motive flow to the wing tank.
Valve, motive flow shutoff	5213-3	When alternate fuel feed selector handle is in COMBAT or ALT FEED, shuts off motive flow to the sump tank.
Valve, wing transfer selector	6222-1	Direct motive flow to the bypass transfer selector valve or aft fuselage ejector pumps during fuel transfer.

2-4. OPERATIONAL CHECKOUT.

2-4.1. Normal and Emergency Transfer System.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for system operation
	Multimeter	AN/PSM-6	Check continuity and voltage
	Fuel low level control system test set	215-00136-2 or 215-00136-3	Check fuel transfer system

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following tests is a reference to a corresponding number in figure FO-5.

a. Place wing fuel transfer switch on left console in AUTO.

b. Ensure that alternate fuel feed control selector handle is in NORMAL.

c. Open accesses 2121-3 and 6222-1.

d. Disconnect electrical connector P285 from fuel transfer thermistor control.

WARNING

To prevent possible injury to personnel or equipment damage, leave protective covers installed on test cable connectors not used in test setup.

NOTE

With exception of differences in test set decal nomenclatures, the following procedure is applicable for the 215-00136-2 or 215-00136-3 test set. When nomenclatures differ, the -3 test set nomenclature is followed by -2 test set nomenclature enclosed in parentheses.

e. Connect test set to thermistor control and electrical connector P285 using test cable W1 as shown in figure 2-6.

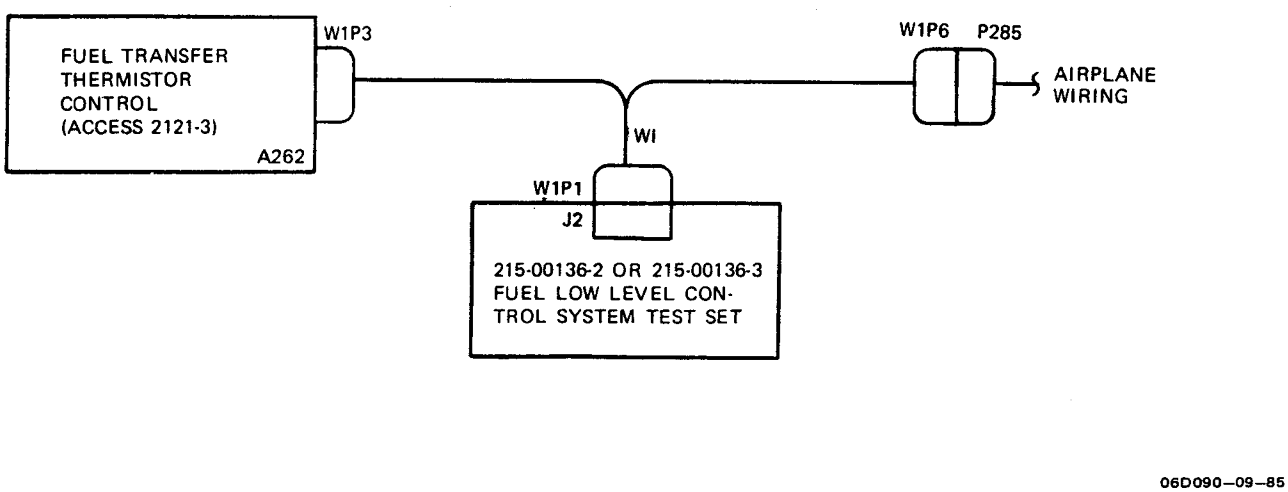


Figure 2-6. Test Setup; Internal Fuel Transfer System

NOTE

Test set DC4 indicator lamp must be removed to ensure correct cycling of bypass transfer selector valve.

f. Remove DC4 indicator lamp from test set.

g. Set test set controls as follows:

(1) PWR (INPUT PWR) switch in OFF.

(2) ALL FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) switches in OFF.

(3) Both SIMULATE SENSOR (SENSOR SIMULATE) controls rotated clockwise to 3.33 turns.

(4) CONT UNIT SELECT (CONTROL UNIT SELECT) switch in position 2.

h. Connect external electrical power (T.O. 1A-7D-2-1). Check that DC5 light comes on. {1}

i. Place test set PWR (INPUT PWR) switch in ON. Check that PWR, FUEL 1, and FUEL 2 lights come on. {2 and 3}

j. Place CONT UNIT SELECT (CONTROL UNIT SELECT) switch in 5, and check thermistor No. 1 as follows:

NOTE

Fuel saturated foam baffles in tank(s) may cause a wet thermistor indication during a dry thermistor check.

(1) Place THMS SELECT switch in B, and check between jacks J14 and J22 for 1.3 to 2.2 volts dc on a dry thermistor and 4.5 to 7.0 volts dc on a wet thermistor. {4}

(2) Place THMS SELECT switch in A, and check thermistor No. 1 for proper resistance as specified in figure 2-7. {4}

k. With CONT UNIT SELECT (CONTROL UNIT SELECT) switch in 5, check thermistor No. 2 as follows:

(1) Place THMS SELECT switch in A, and check between jacks J13 and J21 for 1.3 to 2.2 volts dc on a dry thermistor and 4.5 to 7.0 volts dc on a wet thermistor. {5}

(2) Place THMS SELECT switch in B, and check thermistor No. 2 for proper resistances as specified in figure 2-7. {6}

l. Place CONT UNIT SELECT (CONTROL UNIT SELECT) switch in 2.

m. Rotate both SIMULATE SENSOR 1 (SENSOR 1 SIMULATE) and SIMUATE SENSOR 2 (SENSOR 2 SIMULATE) controls counterclockwise to off and then clockwise to 1.33 turns. FUEL 1 and FUEL 2 indicator lights will go off, and AIR 1 and AIR 2 indicator lights shall come on. {6}

n. Rotate both SIMULATE SENSOR 1 (SENSOR 1 SIMULATE) and SIMULATE SENSOR 2 (SENSOR 2 SIMULATE) controls counterclockwise to off and then clockwise to 3.33 turns. FUEL 1 and FUEL 2 indicator lights shall come on, and AIR 1 and AIR 2 indicator lights shall go off. {7}

NOTE

The following steps check the transfer selector valves and associated controls and circuitry. Steps should be performed in sequence, leaving switches in position until directed to change position.

o. With all test set FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) switches in OFF, check that bypass transfer selector valve is in position 1 and wing transfer selector valve is in position 2. {8 and 9}

p. Place FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) 3 and 2 switches in AIR. Check that bypass transfer selector has moved to position 2. {10}

q. Place FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) 3 switch in FUEL. Check that wing fuel transfer selector valve has moved to position 1 and that bypass transfer selector valve returns to position 1. {11 and 12}

TEMPERATURE OF FUEL		RESISTANCE* (OHMS)	
°C	°F	C TO A	C TO B
−40	−40	455 TO 535	11,750 TO 35,250
−30	−22	453 TO 533	6,600 TO 19,800
−20	−4	450 TO 530	3,925 TO 11,775
−10	14	434 TO 514	2,350 TO 7,050
0	32	420 TO 500	1,450 TO 4,350
10	50	400 TO 480	925 TO 2,775
20	68	375 TO 455	610 TO 1,830
25	77	360 TO 440	500 TO 1,500
30	86	348 TO 428	413 TO 1,240
40	104	307 TO 387	283 TO 849
50	122	268 TO 348	200 TO 601
60	140	226 TO 306	143 TO 429
*THE RESISTANCE READINGS ARE NOT CRITICAL AND MERELY ENSURE THAT THE THERMISTOR BEADS ARE INTACT AND PROPERLY LOCATED.			

TEST SET JACKS (FIGURE FO–8)

CONNECT TO J22 AND J14	C TO A	THERMISTOR NO. 1
CONNECT TO J22 AND J6	C TO B	
CONNECT TO J21 AND J13	C TO A	THERMISTOR NO. 2
CONNECT TO J21 AND J5	C TO B	
CONNECT TO J19 AND J3	C TO A	THERMISTOR NO. 3
CONNECT TO J19 AND J11	C TO B	
CONNECT TO J20 AND J4	C TO A	THERMISTOR NO. 4
CONNECT TO J20 AND J12	C TO B	

06D028–09–85

Figure 2-7. Resistances; Thermistor

r. Place FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) 3 and 2 switches in OFF. Check that wing fuel transfer selector valve returns to position 2. {13}

s. With the wing fuel transfer switch on left console in AUTO, check that emergency wing fuel selector valve is in position 1. {14}

t. Place wing fuel transfer switch in EMERG. Check that emergency wing fuel selector valve has moved to position 2. {15}

u. Place wing fuel transfer switch in AUTO.

v. Place test set PWR (INPUT PWR) switch in OFF, and disconnect external electrical power.

w. Disconnect test set cable assembly from airplane wiring connector and thermistor control.

x. Connect electrical connector P285 to dual thermistor control.

y. Install test set DC4 lamp.

z. Close accesses 2121-3 and 6222-1.

2-4.2. Alternate Fuel Feed System Static Checkout.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for system operation
	Spring scale, 0 to 50 pounds	0013 (John Chatillon and Sons, Scale and Spring Division, New York, N.Y.)	Measure pounds of force required in check

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting figure FO-6.

a. Connect external electrical power (T.O. 1A-7D-2-1).

b. Ensure that main fuel system contains minimum of 3,000 pounds of fuel.

c. Open accesses 6222-1 and 5223-1.

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel.

d. Open access 5213-1, disconnect antenna cables, and lower access.

e. Cycle cockpit alternate fuel feed control selector handle. Check that operation is smooth and selector handle engages detents fully. {1}

f. Connect spring scale to cockpit selector handle.

NOTE

Apply forces to the selector handle parallel to the line of travel. Apply force in compression or tension.

g. Move selector handle from NORMAL to COMBAT and from COMBAT to ALT FEED. Check that force required to move selector handle does not exceed 22 pounds. {1}

h. Reverse position of spring scale, and move selector handle from ALT FEED to COMBAT and from COMBAT to NORMAL. Check that force required to move selector handle does not exceed 22 pounds. {1}

i. As selector handle is moved, make visual check for clearance of rods and arms. {1}

j. Place selector handle in COMBAT. Check that motive flow shutoff valve arm moves to CLOSED and engine fuel selector valve arm remains in NORMAL. {2}

k. Place selector handle in ALT FEED. Check that engine fuel supply selector valve arm moves to ALT FEED, motive flow shutoff valve arm remains in CLOSED, and wing transfer selector valve is in position 1. Check that bypass transfer selector valve is in position 2. {2, 3, and 4}

l. Place selector handle in COMBAT. Check that engine fuel supply selector valve arm moves to NORMAL and motive flow shutoff valve arm remains in CLOSED. {2}

m. Place selector handle in NORMAL. Check that motive flow shutoff valve arm moves to OPEN and engine fuel supply selector valve control arm remains in NORMAL. {2}

n. Disconnect external electrical power (T.O. 1A-7D-2-1).

o. Close accesses 6222-1 and 5223-1.

p. Connect marker beacon and ADF antenna cables. Close access 5213-1.

2-4.3. Alternate Fuel Feed System – Dynamic Checkout.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for engine operation		Operate engine for checkout

NOTE

This checkout is a requirement only after each engine change or removal while airplane is on runup pad.

a. Ensure that main fuel system contains minimum of 3,000 pounds of fuel.

b. Start engine (T.O. 1A-7D-2-1).

c. Advance throttle to MIL.

d. Place alternate fuel feed selector handle in COMBAT and then ALT FEED.

e. Check that engine continues running with no indication of surges or flameout.

f. Return alternate fuel feed selector handle to NORMAL.

g. Retard throttle to IDLE.

h. Shut down engine (T.O. 1A-7D-2-1).

i. If engine surges or flameout was indicated, perform static checkout (paragraph 2-4.2).

2-5. TROUBLESHOOTING.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Multimeter	AN/PSM-6	Check continuity

2-5.1. Normal and Emergency Transfer System. See figure FO-5 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout. See figure FO-3 or FO-4 for troubleshooting schematic.

2-5.2. Alternate Fuel Feed System. See figure FO-6 for troubleshooting information. Malfunctions are listed numerically and are related to a corresponding number following a step in the alternate fuel feed system operational checkout. See figure FO-3 or FO-4 for troubleshooting schematic.

2-5.3. Flight/Ground Operations. See figure FO-7 for troubleshooting information. Malfunctions listed are usually detected in flight or during dynamic ground operations, and do not correspond to any system operational checkout.

2-5.4. Thermistor Troubleshooting. See figure FO-8 for thermistor troubleshooting schematic diagrams.

2-6. TRANSFER SELECTOR VALVES REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel airplane for transfer selector valve removal and installation
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

NOTE

The following procedure is applicable to the wing transfer selector valve, bypass transfer selector valve, and the emergency wing transfer selector valve.

2-6.1. Removal. (Figure 2-8.)

a. Defuel airplane (T.O. 1A-7D-2-1).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

b. Open access 6222-1.

c. Disconnect fuel lines (1) from valve.

d. Cut lockwire and disconnect electrical connector (2).

e. Remove bolts (3) and washers (4) securing valve to bulkhead.

f. Remove transfer selector valve (5) from airplane.

2-6.2. Installation. (Figure 2-8.)

a. Position transfer selector valve (5), and secure with bolts (3) and washers (4).

b. Torque bolts (3) to 22 (+3, −2) inch-pounds.

c. Connect electrical connector (2) to valve, and secure with MS20995C32 lockwire.

d. Connect fuel lines (1) to valve.

e. Fuel airplane with fuel (T.O. 1A-7D-2-1), and visually check for leaks.

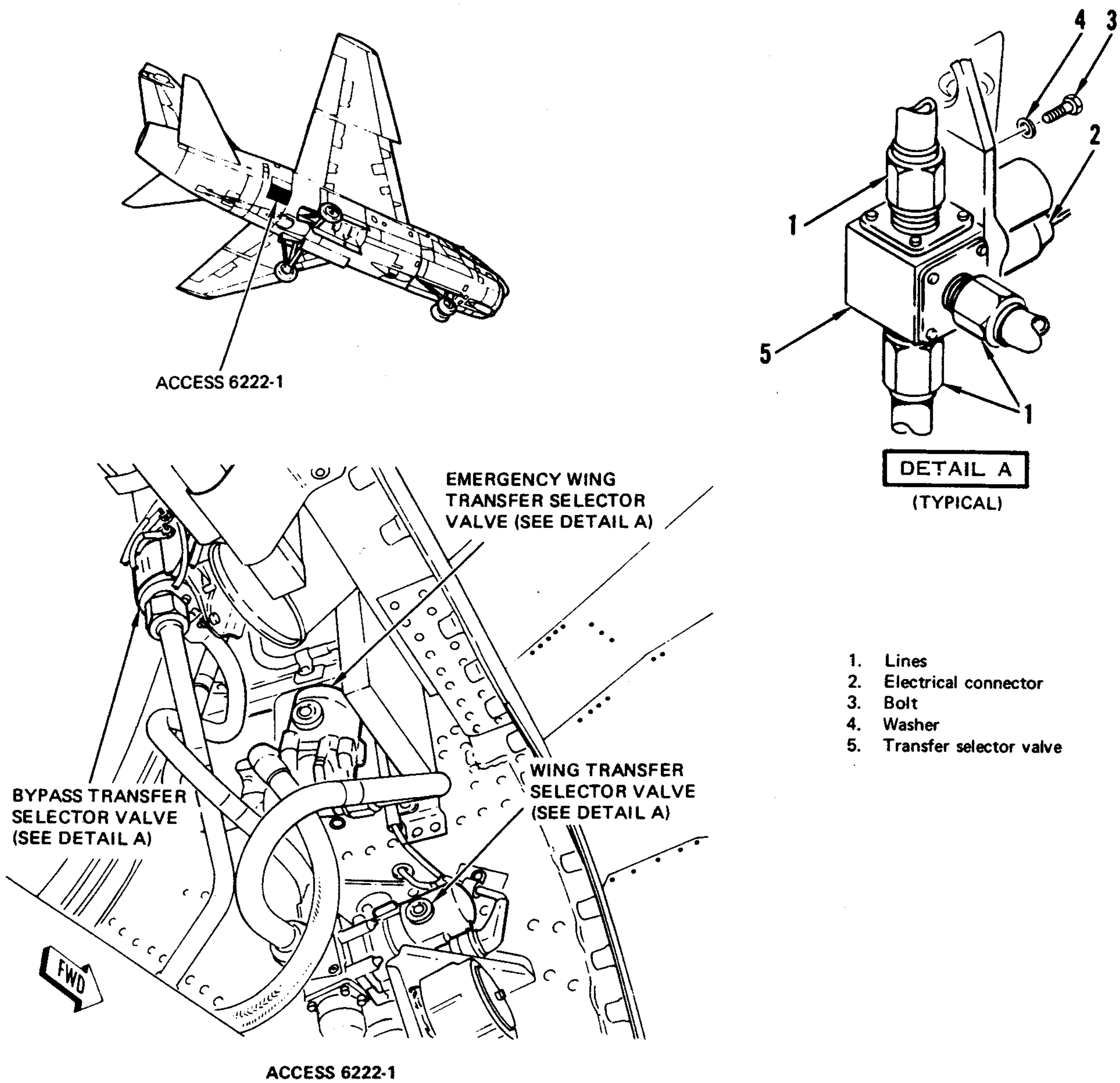
f. Connect external electrical power (T.O. 1A-7D-2-1).

g. Place wing fuel transfer switch in EMERG. Check that emergency wing transfer selector valve indicator lever is in position 2.

h. Place wing fuel transfer switch in AUTO. Check that emergency wing transfer selector valve lever is in position 1, bypass transfer selector valve lever is in position 1, and wing transfer selector valve lever is in position 2.

i. Disconnect external electrical power (T.O. 1A-7D-2-1).

j. Close access 6222-1.



1. Lines
2. Electrical connector
3. Bolt
4. Washer
5. Transfer selector valve

Figure 2-8. Removal and Installation; Transfer Selector Valves

2-7. AFT TANK EJECTOR PUMP REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel fuselage and wing tank for ejector pumps removal and installation
		Equipment required for purging fuel tank	Purge tank to remove pump
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts
	55-1	Explosion-proof vacuum cleaner	Clean fuel tank

2-7.1. Removal. (Figure 2-9.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

NOTE

Removal and installation procedures for both the left and right pumps are the same except as indicated.

a. Remove aft fuel tank access (paragraph 1-14).

b. Remove tank baffles (paragraph 1-18).

c. Disconnect nut (1), washers (2), bolt (3), and bonding jumper (4) from clamp on transfer line.

d. Disconnect coupling (5) securing ejector pump to transfer line, and remove packings (6) (paragraph 1-45).

e. Disconnect motive flow line (7) from ejector pump.

f. Remove bolts (8) and washers (9) securing ejector pump to bracket. Remove pump (10) from tank.

g. Remove fitting (11) from pump, and remove packing (12).

2-7.2. Installation. (Figure 2-9.)

a. Install fitting (11) and new packing (12) on ejector pump.

b. Place pump (10) in tank, and secure to bracket with bolts (8) and washers (9).

c. Torque bolts (8) to 60 ($\pm$5) inch-pounds.

d. Connect motive flow line (7) to ejector pump.

e. Using new packings (6), connect pump to transfer line with coupling (5) (paragraph 1-45). Torque coupling to 20 ($\pm$2) foot-pounds, and secure with MS20995C32 lockwire.

NOTE

Install bonding jumper clamp in accordance with MIL-B-5087 to prevent accumulation of static charge.

f. Secure bonding jumper (4) to clamp on transfer line with bolt (3), washer (2), and nut (1).

g. Vacuum fuel tank.

h. Install tank baffles (paragraph 1-18).

i. Install aft fuel tank access (paragraph 1-14).

j. Perform fuel contamination check (paragraph 1-20).

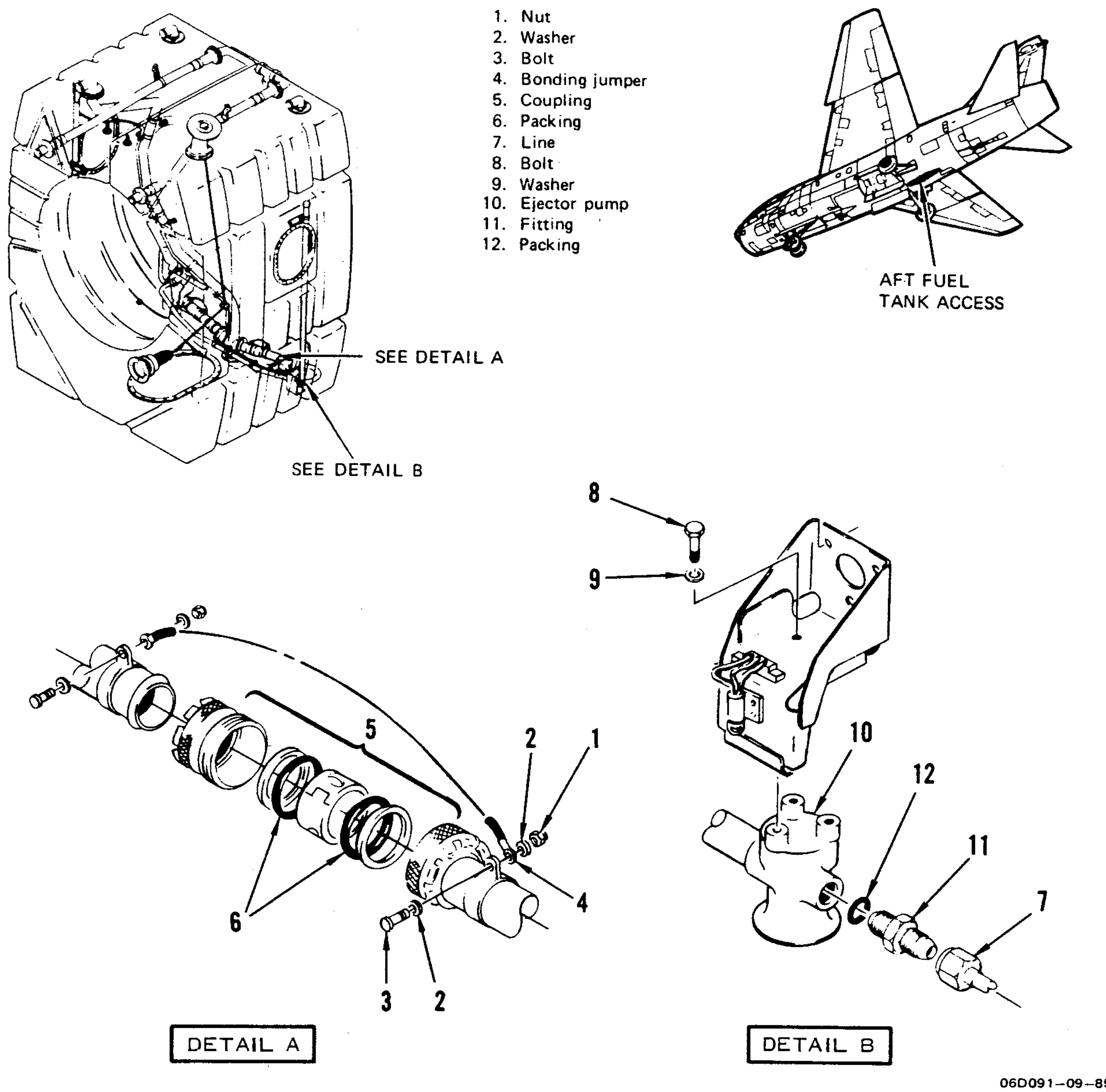


Figure 2-9. Removal and Installation; Aft Tank Ejector Pump

2-8. SUMP TANK EJECTOR PUMP REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling fuselage tanks	Defuel and fuel tanks for sump tank ejector pump removal and installation
		Equipment required for purging fuel tank	Purge fuel tank for ejector pump removal
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque nuts or bolts
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

2-8.1. Removal. (Figure 2-10.)

a. Remove main sump tank access (paragraph 1-11).

b. Remove tank baffles (paragraph 1-18).

c. Disconnect sensing tube clamp from ejector clamp by removing nut (1), washer (2), and bolt (3), and remove ejector clamp (4).

d. Remove lockwire and disconnect coupling (5) from ejector elbow. Remove and discard packings (6) (paragraph 1-45).

e. Remove bolts (7) and washers (8) securing ejector pump to tank fitting.

f. Remove nuts (9) and washers (10) securing ejector pump to tank floor, and remove ejector pump (11) and packing (12).

g. Loosen jamnut (13), and remove elbow (14) and packing (15) from ejector.

2-8.2. Installation. (Figure 2-10.)

a. Install new packing (15), with elbow (14), on ejector pump (11). Do not tighten jamnut (13).

b. Install new packing (12) on opposite end of ejector pump.

c. Position ejector pump (11) in tank, and secure with washers (10) and nuts (9).

d. Secure ejector pump to tank fitting with washers (8) and bolts (7).

e. Using new packings (6), connect coupling (5) to elbow (14), and torque to 15 (±2) foot-pound. Secure with MS20995C32 lockwire (paragraph 1-45).

f. Torque jamnut (13) to 120 (±20) foot-pounds.

g. Install ejector clamp (4), and secure to sensing tube clamp with bolt (3), washer (2), and nut (1).

h. Install tank baffles (paragraph 1-18).

i. Install main sump tank access (paragraph 1-11).

j. Perform fuel contamination test (paragraph 1-20).

k. Perform engine operation (T.O. 1A-7D-2-1) to check ejector pump operation.

2-9. FUEL TRANSFER THERMISTOR CONTROL REMOVAL AND INSTALLATION.

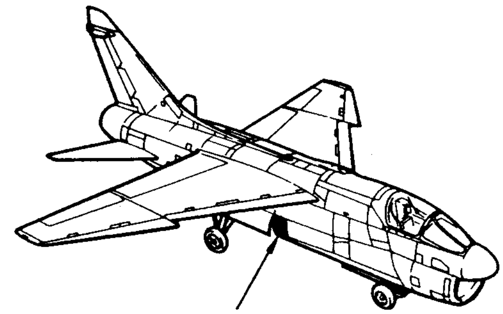
2-9.1. Removal.

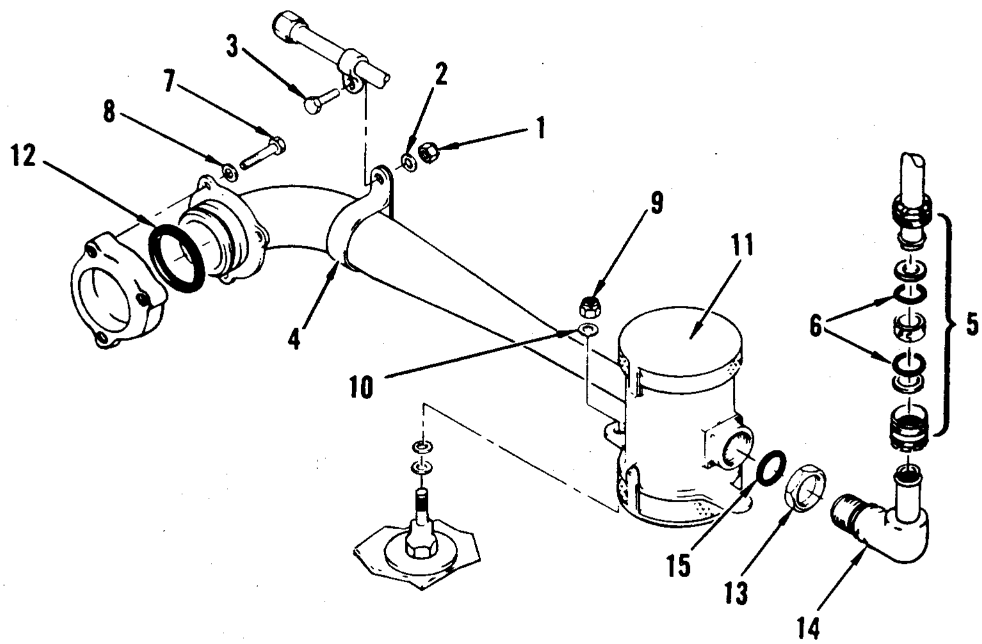
a. Open access 2121-3.

b. Disconnect electrical connector from control.

c. Remove four bolts, washers, and nuts securing control to airframe, and remove control.

1. Nut
2. Washer
3. Bolt
4. Clamp
5. Coupling
6. Packing
7. Bolt
8. Washer
9. Nut
10. Washer
11. Ejector pump
12. Packing
13. Jamnut
14. Elbow
15. Packing





06D030–09–85

Figure 2-10. Removal and Installation; Sump Tank Ejector Pump

2-9.2. Installation.

a. Position control in airplane, and secure with four bolts, washers, and nuts.

b. Connect electrical connector.

c. Perform internal transfer system operational checkout (paragraph 2-4).

d. Close access 2121-3.

2-10. FUEL TRANSFER CONTROL THERMISTOR NO. 1 REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel tanks for thermistor No. 1 removal and installation
		Equipment required for purging fuel tank	Purge tank for removal of thermistor No. 1
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

2-10.1. Removal. (Figure 2-11.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open accesses 2133-1 and 2133-2 (paragraph 1-7).

b. Remove tank baffles (paragraph 1-18).

c. Remove cable ties (1) securing thermistor electrical leads to transmitter.

NOTE

Before disconnecting terminals, tag wiring harness leads with thermistor lead color codes (blue, white, and brown) for identification during installation.

d. Disconnect thermistor terminals and wiring harness terminals from transmitter by unscrewing captive screws (2). Thermistor terminals, lockwashers (3), and captive screws should be retained together by captive washers (4).

e. Remove nut (5), washer (6), and bolt (7) securing thermistor shield clamp (8).

f. Remove thermistor shield (9) and thermistor shield clamp from thermistor.

g. Remove nuts (10) and screws (11) securing thermistor clamp (12) and thermistor (13) to transmitter, and remove thermistor and clamp.

2-10.2. Installation. (Figure 2-11.)

NOTE

When installing fuel transfer control thermistor No. 1, position thermistor (12) and thermistor clamp (11) so that sensor level is 7.97 ($\pm$0.06) inches from top of transmitter.

a. Position thermistor (13) and clamp (12) on transmitter, and secure with screws (11) and nuts (10).

b. Install thermistor shield (9) and thermistor shield clamp (8) on thermistor, and secure with bolt (7), washer (6), and nut (5).

c. Torque nut to 22 (+3, −2) inch-pounds.

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames.

d. Thoroughly clean terminals and transmitter area with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

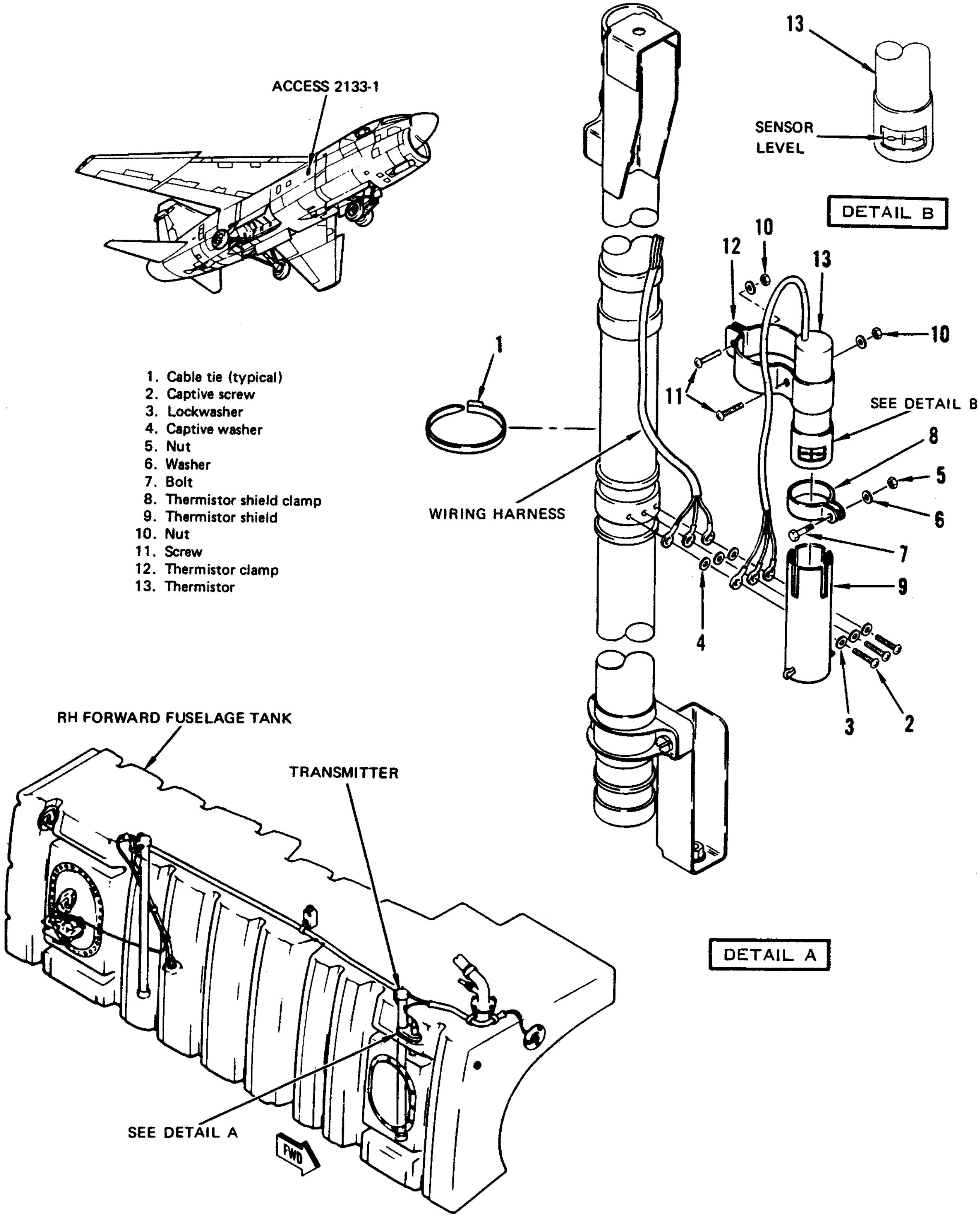


Figure 2-11. Removal and Installation; Fuel Transfer Control Thermistor No. 1

NOTE

Connect wiring harness leads that were color tagged during removal to proper color-coded thermistor leads.

e. Secure wiring harness terminals and thermistor terminals to transmitter with captive washers (4), lockwashers (3), and captive screws (2).

f. Apply MIL-S-8802, Class A-1/2 brush-on type sealant to the terminals, attaching screws, and washers. Cover all exposed metallic portions of the attaching hardware.

g. Secure thermistor leads and wiring harness to transmitter with new cable ties (1).

h. Install tank baffles (paragraph 1-18).

i. Close accesses 2133-1 and 2133-2 (paragraph 1-7).

j. Perform internal transfer system operational checkout (paragraph 2-4).

k. Fuel airplane (T.O. 1A-7D-2-1).

l. Perform fuel contamination test (paragraph 1-20).

2-11. FUEL TRANSFER CONTROL THERMISTOR NO. 2 REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel tanks for thermistor No. 2 removal and installation
		Equipment required for purging fuel tank	Purge fuel tank for removal of thermistor No. 2

2-11.1. Removal. (Figure 2-12.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove aft fuel tank access (paragraph 1-14).

b. Remove tank baffles (paragraph 1-18).

NOTE

Before disconnecting terminals, tag wiring harness leads with thermistor lead color codes (blue, white, and brown) for identification during installation.

c. Disconnect electrical terminals from terminal block (4) by unscrewing captive screws (1). Terminals, lockwires (2), and captive screws should be retained together by captive washers (3).

d. Remove bolts (5), washers (6), and nuts (7) securing thermistor (8) and spacers (9) to bracket, and remove thermistor and spacers.

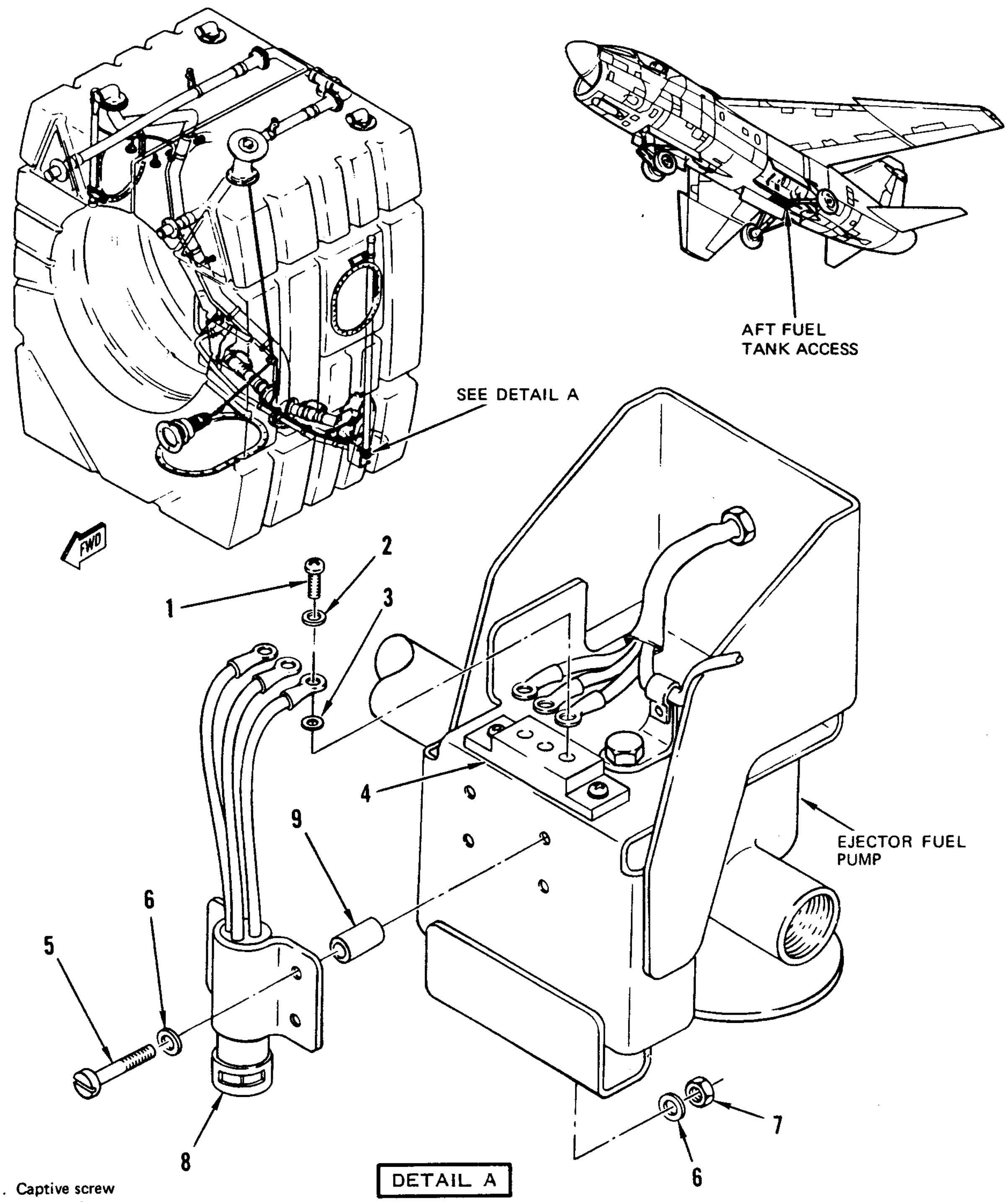
2-11.2. Installation. (Figure 2-12.)

a. Install thermistor (8) and spacers (9) on bracket with bolts (5), washers (6), and nuts (7).

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames.

b. Thoroughly clean terminals and transmitter area with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.



1. Captive screw
2. Lockwasher
3. Captive washer
4. Terminal block
5. Bolt
6. Washer
7. Nut
8. Thermistor
9. Spacer

06D032–09–85

Figure 2-12. Removal and Installation; Fuel Transfer Control Thermistor No. 2

NOTE

Connect wiring harness leads that were color tagged during removal to proper color-coded thermistor leads.

c. Connect electrical terminals to terminal block (4) with captive screws (1), lockwashers (2), and captive washers (3).

d. Apply MIL-S-8802, Class A-1/2 brush-on type sealant to terminals, attaching screws, and washers. Cover all exposed metallic portions of attaching hardware.

e. Install tank baffles (paragraph 1-18).

f. Install aft fuel tank access (paragraph 1-14).

g. Perform internal transfer system operational checkout (paragraph 2-4).

h. Fuel airplane (T.O. 1A-7D-2-1).

i. Perform fuel contamination test (paragraph 1-20).

2-12. ALTERNATE FUEL FEED MANUAL SELECTOR VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel airplane for selector valve removal and installation

2-12.1. Removal. (Figure 2-13.)

a. Defuel airplane (T.O. 1A-7D-2-1).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel.

b. Open access 5213-1, disconnect antenna cables, and lower access.

c. Remove cotter pin (1), nut (2), washers (3), and bolt (4) securing rod end (5) to valve.

d. Remove drain cap (6) and packing (7).

e. Disconnect fuel line (8) from valve.

f. Cut lockwire and remove bolts (9) and washers (10).

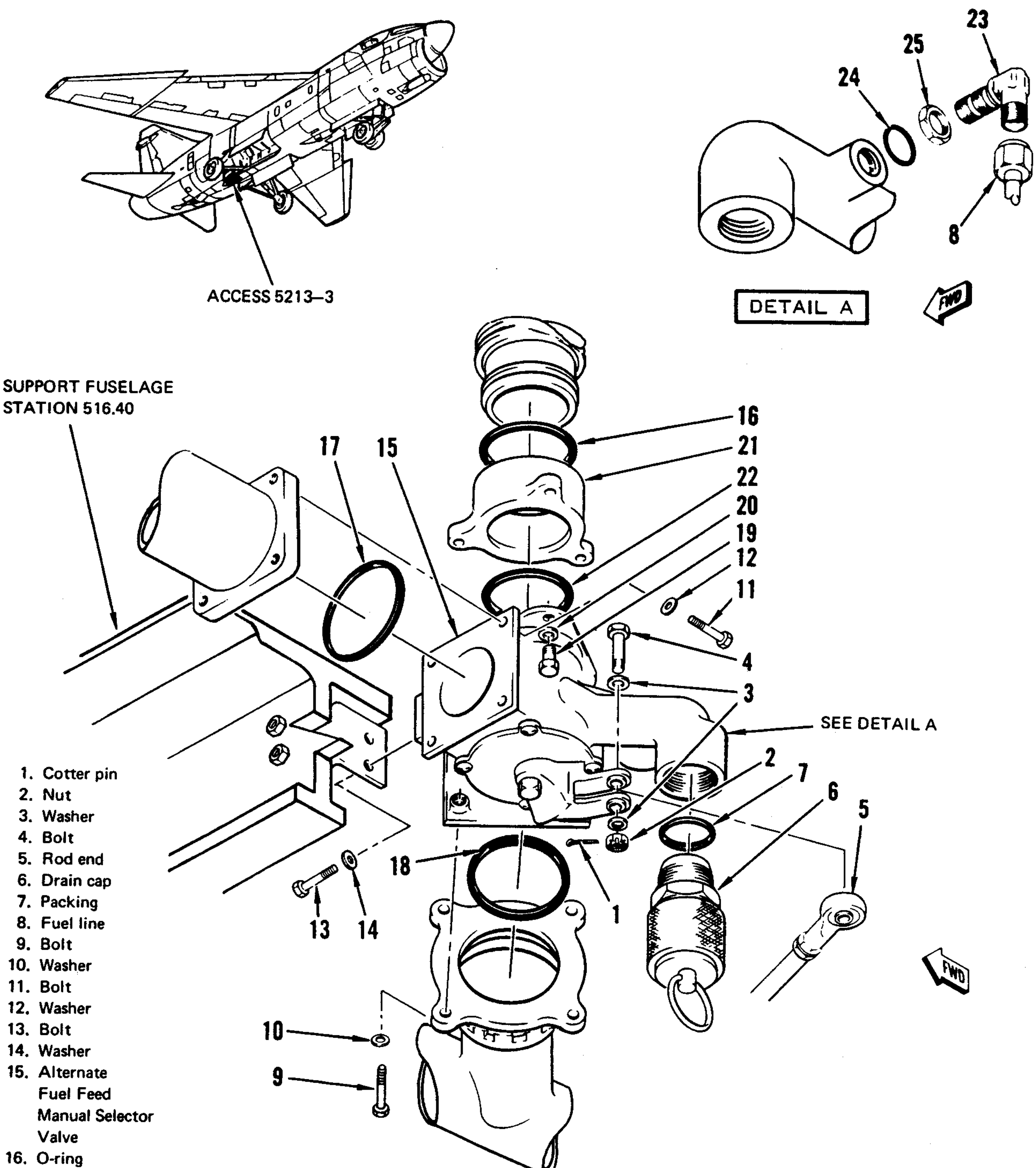
g. Remove bolts (11) and washers (12).

h. Remove bolts (13) and washers (14) securing valve to airframe. Remove selector valve (15) from airplane.

i. Remove O-rings (16, 17, and 18).

j. Remove bolts (19) and washers (20) securing adapter (21) to valve. Remove adapter and O-ring (22).

k. Remove elbow (23), O-ring (24), and nut (25).



1. Cotter pin
2. Nut
3. Washer
4. Bolt
5. Rod end
6. Drain cap
7. Packing
8. Fuel line
9. Bolt
10. Washer
11. Bolt
12. Washer
13. Bolt
14. Washer
15. Alternate Fuel Feed Manual Selector Valve
16. O-ring
17. O-ring
18. O-ring
19. Bolt
20. Washer
21. Adapter
22. O-ring
23. Elbow
24. O-ring
25. Nut

06D033–09–85

Figure 2-13. Removal and Installation; Alternate Fuel Feed Manual Selector Valve

2-12.2. Installation. (Figure 2-13.)

a. Install nut (25), new O-ring (24), and elbow (23).

b. Install new O-ring (22), adapter (21), washers (20), and bolts (19).

c. Install new O-rings (18, 17, and 16).

d. Position selector valve (15) in airplane, and secure to airframe with washers (14) and bolts (13).

e. Install washers (12) and bolts (11).

f. Install washers (10) and bolts (9). Secure one bolt to coupling with MS20995C32 lockwire.

g. Connect fuel line (8).

h. Install new packing (7) and drain cap (6).

i. Secure drain cap retaining cable to nearest armor plate mounting bracket with MS20995C32 lockwire to prevent cable from interfering with selector valve control mechanism.

j. Secure rod end (5) to valve with bolt (4), washers (3), nut (2), and new cotter pin (1).

k. Perform operational checkout (paragraph 2-4.2).

l. Check installation for leaks.

m. Connect marker beacon and ADF antenna cables. Close access 5213-1.

2-13. MOTIVE FLOW SHUTOFF VALVE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel airplane for shutoff valve removal and installation

2-13.1. Removal. (Figure 2-14.)

a. Defuel airplane (T.O. 1A-7D-2-1).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel.

b. Open access 5213-1, disconnect antenna cables, and lower access.

c. Remove cotter pin (1), nut (2), washers (3), and bolt (4) securing rod end (5) to valve.

d. Remove bolts (6) and washers (7).

e. Remove bolts (8) and washers (9). Remove shutoff valve (10) from airplane.

f. Remove O-rings (11).

2-13.2. Installation. (Figure 2-14.)

a. Install new O-rings (11).

b. Position shutoff valve (10) in airplane, and install washers (9) and bolts (8).

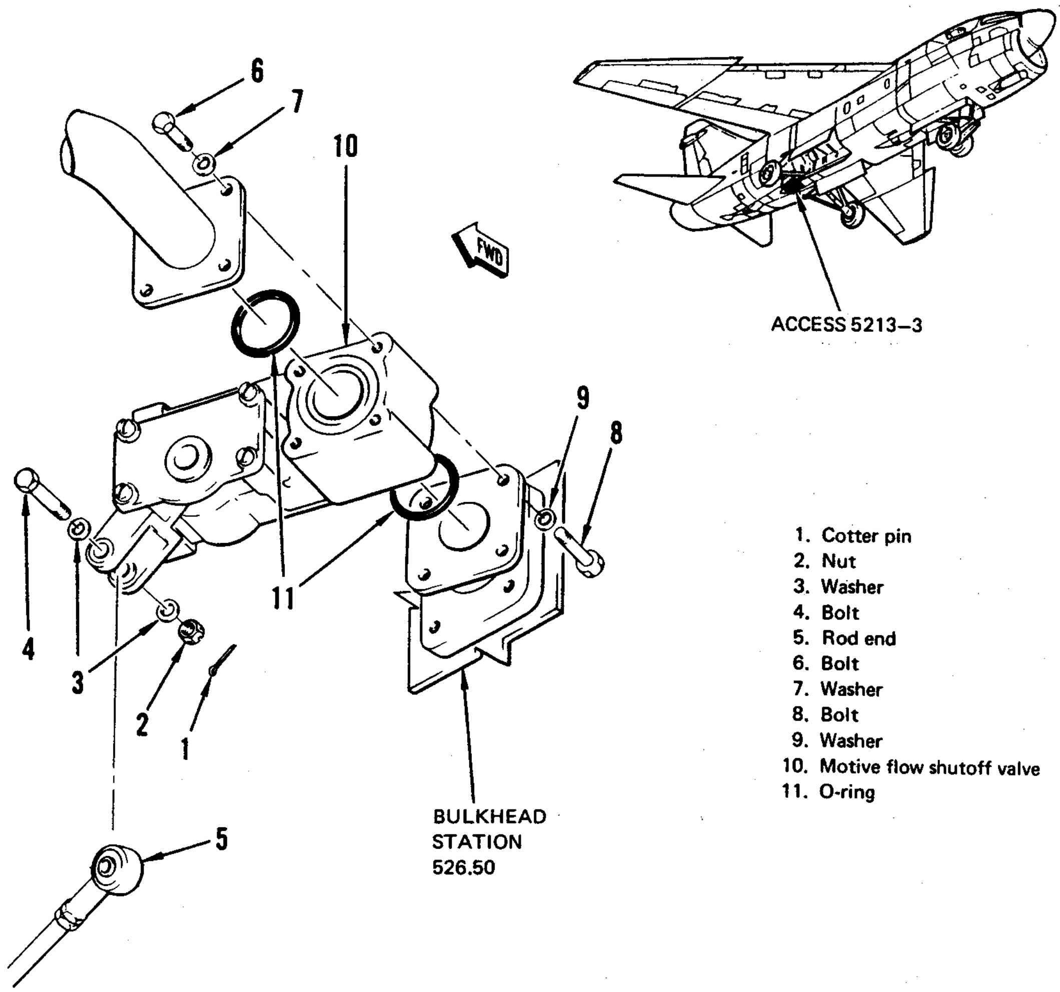
c. Install washers (7) and bolts (6).

d. Secure rod end (5) to valve with bolt (4), washers (3), nut (2), and new cotter pin (1).

e. Perform operational checkout (paragraph 2-4.2).

f. Check installation for leaks.

g. Connect marker beacon and ADF antenna cables. Close access 5213-1.



1. Cotter pin
2. Nut
3. Washer
4. Bolt
5. Rod end
6. Bolt
7. Washer
8. Bolt
9. Washer
10. Motive flow shutoff valve
11. O-ring

Figure 2-14. Removal and Installation; Motive Flow Shutoff Valve

2-14. ALTERNATE FUEL FEED PUSH-PULL CONTROL ASSEMBLY REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts

CAUTION

To prevent damage to controlex unit, observe controlex handling precautions (T.O. 1A-7D-2-1) during removal and installation of the control assembly.

2-14.1. Removal. (Figure 2-15.)

a. Open accesses 1121-3, 1121-8, 1123-1, 1123-3, 1123-4, 1132-1, 5111-2, 5111-4, 5112-1, 5112-2, 5222-1, 5223-3, and 3223-4. Disconnect spoiler/deflector load limiting link rod end (T.O. 1A-7D-2-8). Remove fairlead from access 1121-3.

b. Remove seals around control assembly at pilot seat bulkhead, station 308.80 bulkhead, and station 526.50 bulkhead (T.O. 1A-7D-23).

c. Remove support clamps securing control assembly to airframe.

d. Remove cotter pin (1), nut (2), washers (3), and bolt (4) securing control assembly rod end (5) to lever assembly.

e. Back off jamnut (6), and remove rod end. Remove jamnut.

f. Cut safety wire, and remove locking keys (7).

g. Remove nut (8) and spacer (9).

h. Carefully draw control assembly from support bearing.

i. Remove spacer (10) and nut (11).

j. Place selector control handle in ALT FEED.

k. Remove tubing, cut safety wire, and remove locking key (12).

NOTE

Use wrench flats as backup when disengaging turnbuckle to prevent rotation of control assembly.

l. Back off turnbuckle (13) until mating ends of shoulder bolt (14) and control assembly rod end (15) are exposed. Disengage shoulder bolt and rod end as shown.

m. Remove bolts (16).

n. Disconnect electrical wire (17) from indicating panel electrical receptacle.

o. Remove selector assembly from airplane.

p. Remove control assembly from airplane through cockpit area.

2-14.2. Installation. (Figure 2-15.)

CAUTION

To prevent chafing of the control assembly on the aft wing attach casting, ensure that the assembly is routed through the fiberglass tubing at fuselage station 480.0.

NOTE

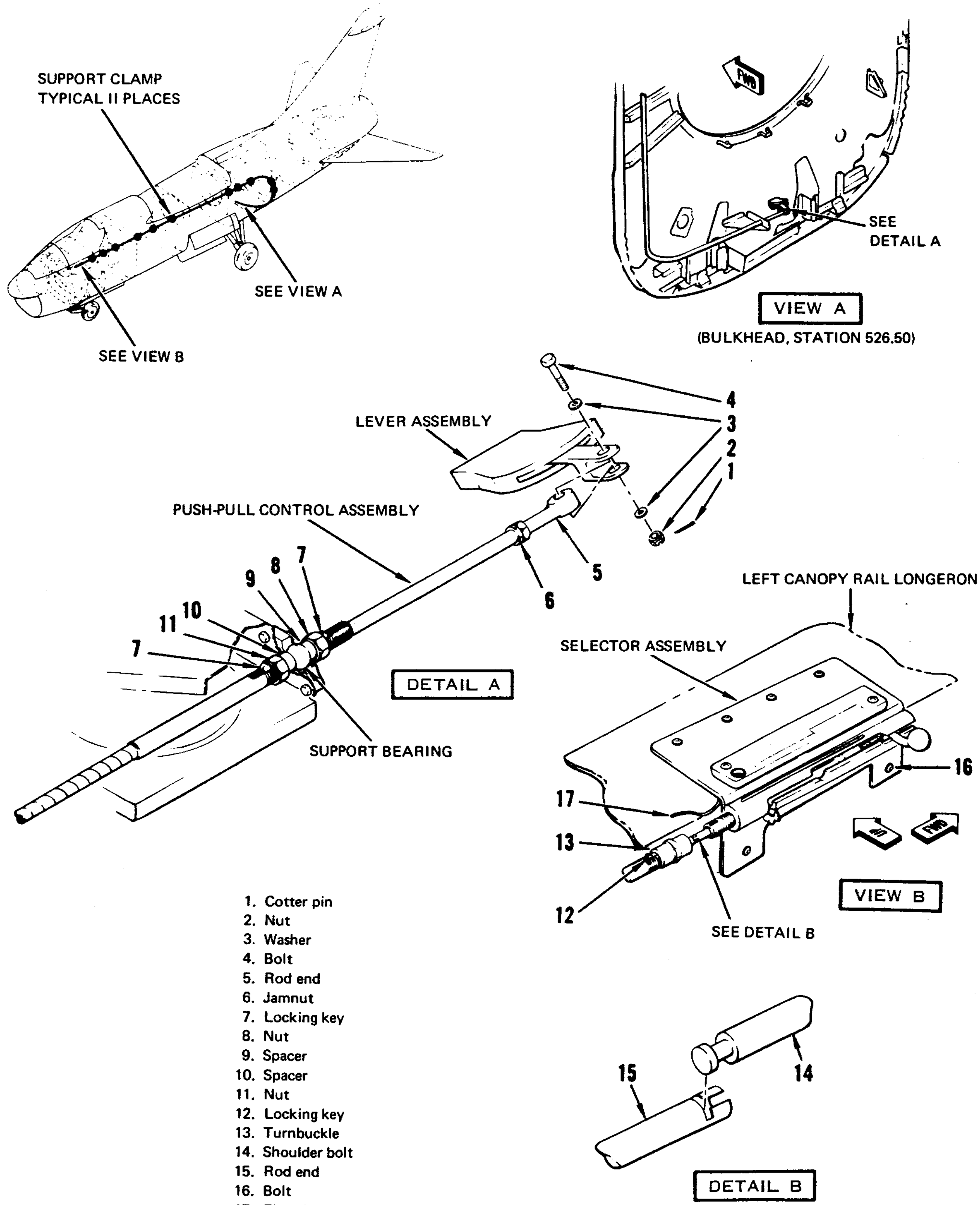
The control assembly must be free in support clamps and completely rigged in accordance with paragraph 2-15 before any application of sealant.

a. Install control assembly through cockpit area and route through cutouts provided in airframe.

NOTE

On airplanes AF72-202 and subsequent, front support clamp is not required.

b. Install support clamps located approximately as shown.



1. Cotter pin
2. Nut
3. Washer
4. Bolt
5. Rod end
6. Jamnut
7. Locking key
8. Nut
9. Spacer
10. Spacer
11. Nut
12. Locking key
13. Turnbuckle
14. Shoulder bolt
15. Rod end
16. Bolt
17. Electrical wire

06D092—09—85

Figure 2-15. Removal and Installation; Alternate Fuel Feed Push-Pull Control Assembly

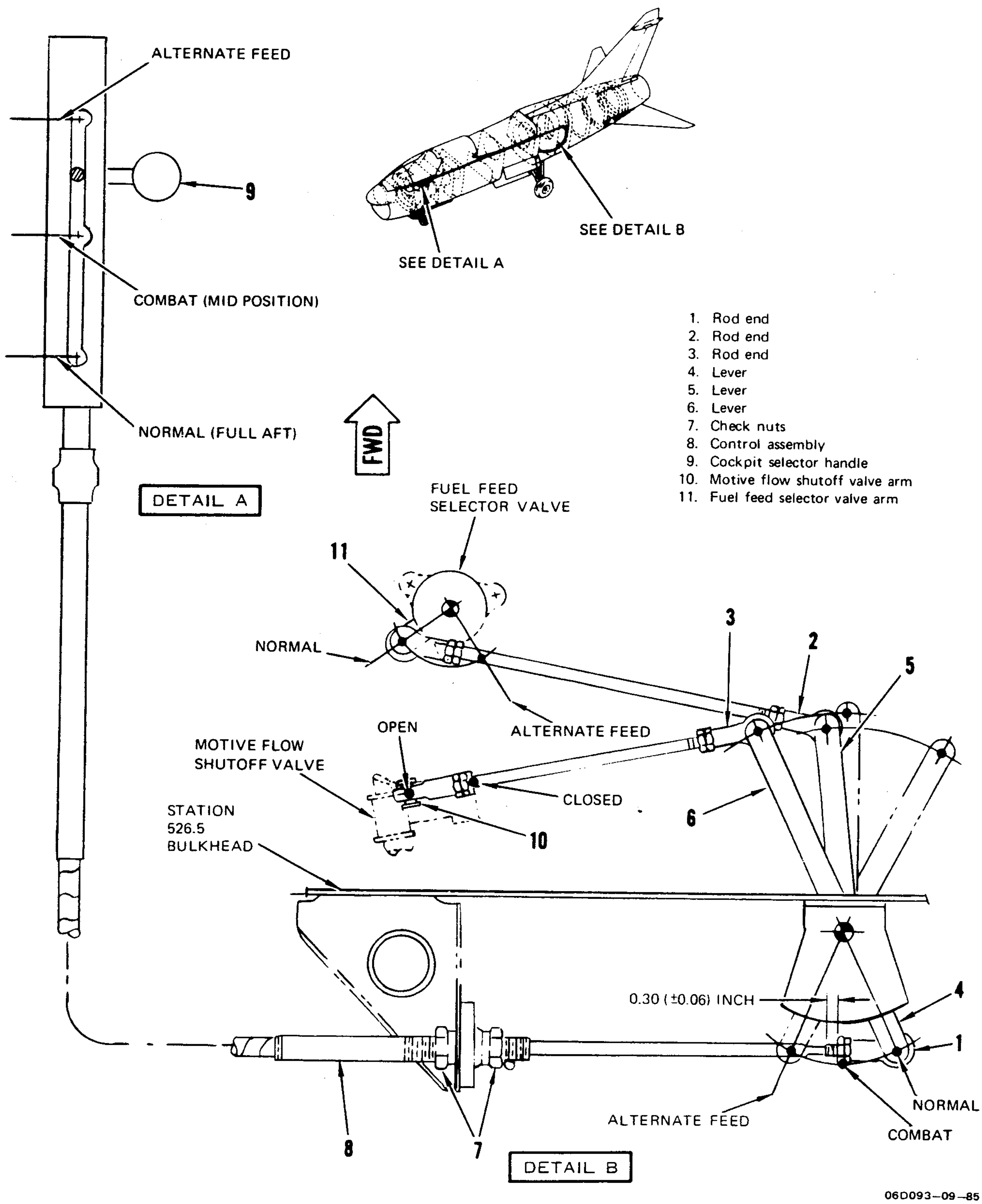


Figure 2-16. Rigging; Alternate Fuel Feed Push-Pull Control Assembly

f. Move cockpit selector handle (9) through several cycles. Motion shall be free and smooth.

NOTE

If operation of selector handle is not completely free and smooth, check entire length of control assembly for improper installation or damage to control housing. If improper installation exists, correct in accordance with push-pull control assembly handling procedures given in T.O. 1A-7D-2-1, or replace control assembly (paragraph 2-14).

g. Place selector handle (9) in COMBAT.

h. Place lever (4) in COMBAT.

CAUTION

To prevent rotation of control assembly, use wrench flats for backup when adjusting rod end and tightening checknuts.

i. Adjust rod end (1) so that checknut is 0.30 (±0.06) inch from end of wrench flat. Tighten checknut.

j. Adjust checknuts (7) so that hole in rod end (1) and hole in lever (4) are aligned. Torque checknuts to 35 (±5) inch-pounds, install locking keys, and secure with MS20995C32 safety wire.

k. Connect rod end (1) to lever (4) with bolt, two washers, nut, and new cotter pin.

l. Place selector handle (9) in NORMAL.

m. Place motive flow shutoff valve arm (10) against OPEN position stop.

n. Adjust rod end (3) so that hole in rod end and hole in lever (6) are aligned.

o. Connect rod end (3) to lever (6) with bolt, washer, nut, and new cotter pin.

p. Place fuel supply selector valve arm (11) against NORMAL position stop.

q. Adjust rod end (2) so that hole in rod end and hole in lever (5) are aligned.

r. Connect rod end (2) to lever (5) with bolt, washer, nut, and new cotter pin.

s. Secure control assembly support clamps previously loosened.

t. Install gusset seal around control assembly at pilot seat bulkhead (T.O. 1A-7D-3).

u. Install caulk seal around control assembly at stations 308.8 and 526.5 bulkheads (T.O. 1A-7D-23).

v. Perform operational checkout (paragraph 2-4.2).

w. Close accesses 5222-1 and 5223-1.

x. Connect marker beacon and ADF antenna cables. Close access 5213-1.

2-16. ALTERNATE FUEL FEED CONTROL SWITCH REMOVAL AND INSTALLATION.

2-16.1. Removal. (Figure 2-17).

a. Open accesses 5222-1 and 5223-1.

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel.

b. Open access 5213-1, disconnect antenna cables, and lower access.

c. Position alternate fuel feed cockpit selector handle in COMBAT.

d. Remove safety wire from switch jamnuts.

e. Remove jamnut (1) and switch platen (2).

f. Remove switch (3), and identify and disconnect electrical leads.

g. Remove washers (4 and 5) and jamnut (6) from switch.

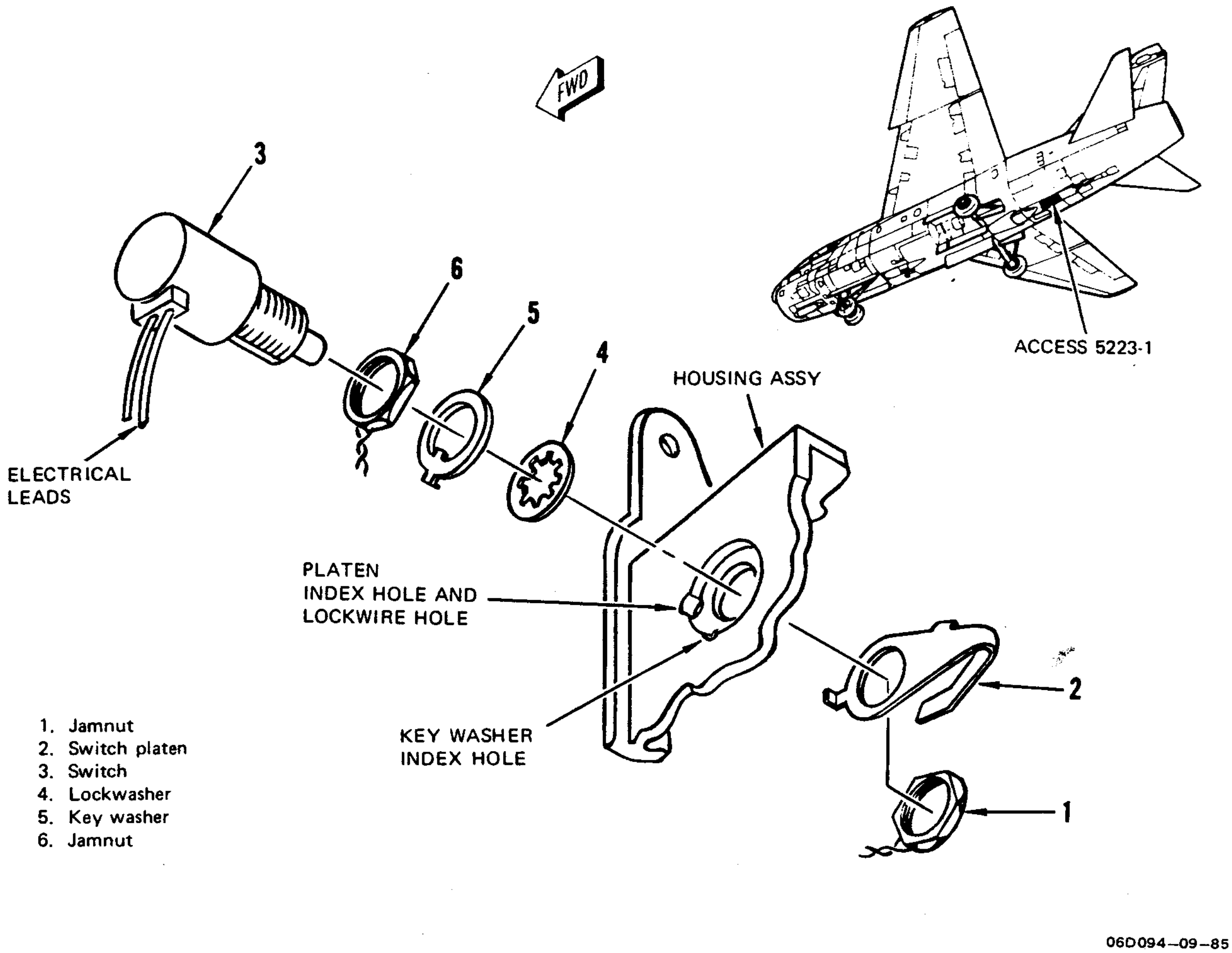


Figure 2-17. Removal and Installation; Alternate Fuel Feed Control Switch

2-16.2. Installation. (Figure 2-17.)

a. Install jamnut (6) and washers (5 and 4) on new switch.

NOTE

Switch platen indexing tab must mate with large locating hole in lever housing assembly.

b. Position switch platen (2) and jamnut (1) on inside of housing, and install switch (3).

c. Adjust switch (paragraph 2-17).

d. Reconnect switch electrical leads.

e. Perform operational checkout (paragraph 2-4.2)

f. Close accesses 5222-1 and 5223-1.

g. Connect marker beacon and ADF antenna cables. Close access 5213-1.

2-17. ALTERNATE FUEL FEED CONTROL SWITCH ADJUSTMENT.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Multimeter	AN/PSM-6	Checks continuity

a. Position alternate fuel feed cockpit selector handle in ALTERNATE.

b. Open accesses 5222-1 and 5223-1.

CAUTION

Disconnect marker beacon and ADF antenna cables before lowering access panel.

c. Open access 5213-1, disconnect antenna cables, and lower access.

d. Cut lockwire and loosen jamnuts (1 and 6, figure 2-17) on alternate fuel feed control switch.

e. Locate switch electrical leads 1-20 and 3-20, disconnect 1-20 from ground terminal, and check across leads for continuity.

f. Back off jamnut inside housing until no continuity is indicated.

g. Adjust jamnuts in until switch just closes (continuity indicated). Ensure that tab on switch platen (2) remains engaged with index hole in housing assembly.

h. Adjust switch jamnuts two full turns in.

i. Tighten jamnuts.

j. Position alternate fuel feed cockpit selector handle in COMBAT.

k. Check to ensure that continuity does not exist between 1-20 and 3-20. Connect 1-20 to ground terminal.

CAUTION

Lockwire must be flat against the inside of the lever housing to prevent interference with lever movements.

l. Secure switch jamnuts with MS20995C32 lockwire.

m. Cycle linkage and check for clearance.

n. Close accesses 5222-1 and 5223-1.

o. Connect marker beacon and ADF antenna cables. Close access 5213-1.

SECTION III

FUEL VENT AND PRESSURIZATION SYSTEM

3-1. DESCRIPTION. The fuel vent and pressurization system performs several essential functions. The system prevents buildup of excessive tank and cavity pressure differential (which might cause tank rupture) during climb/dive maneuvers, fueling, defueling, and fuel transfer operations. During flight, the system maintains a slight positive air pressure on the fuel to provide flow to the engine even during maneuvers. The system also provides regulated air pressure for external tank fuel transfer. For system arrangement, see figure 3-1.

3-1.1. System Components. The fuel vent and pressurization system consists of an air pressure vent valve, pressure regulator, and vent mast on the lower aft fuselage.

3-1.2. System Pressure. The fuel vent and pressurization system receives air pressure from the engine low-pressure bleed air system through the rain removal system or may be pressurized (when the engine is not operating) through an external air valve.

3-2. OPERATION. (Figure 3-2.)

3-2.1. Ground Vent Operation. During ground operation, the fuselage fuel tanks are vented through an open vent system of interconnecting lines and fittings to the wing tank. The wing tank is vented overboard through the vent mast on the lower left side of the aft fuselage. When the tanks are filled, the interconnecting lines serve as fuel transfer lines. Check valves in the lines prevent reverse flow into the tanks.

3-2.2. Flight Vent Operation. During flight, vent air pressure is provided by intake of air through the bottom of the vent mast, with pressure increasing proportionally to increasing airspeed. This keeps a small but positive pressure (relative to tank cavity pressure) in each fuel tank, even during a maximum performance dive at maximum fuel consumption. The vent mast and interconnecting lines have check valves so that fuel spillage is avoided during normal flight conditions. However, a small amount of fuel may vent overboard following a negative g condition.

3-2.3. Vent During Climb. During climb to altitude, expanding air in the fuselage tanks is vented to the wing tanks and vented overboard through the wing vent masts. Vent lines are connected to both the forward and aft ends of the tanks to permit them to function during either climb or dive.

3-2.4. Pressure Supply. Pressurization is provided for external tank fuel transfer or dumping. The pressurization system uses low-pressure engine bleed air through the rain removal system to the air pressure regulator. The regulator then supplies regulated air pressure for the selected operations. Air may also be supplied through the external air valve when the engine is not in operation.

3-2.5. External Tanks Pressurization. When the airplane is on the ground, and electrical power is applied to the airplane, 28 volts dc is applied from the secondary bus through circuit breaker CB353 to the external tank air valve (figure 3-3). This closes the external tanks air valve, preventing pressurization of the external tanks. When the airplane is in flight and the landing gear is up and locked, no voltage can be applied to actuate the external tank air valve, and the external tanks are pressurized.

3-2.6. Air Refueling. When the airplane is in flight with landing gear up and locked and the air refueling door release handle is pulled up, 28 volts dc is applied from the primary bus through circuit breaker CB343 to energize relay A302K5. When relay K5 is energized, the external air valve is actuated closed, shutting off pressurized air to the external tanks. The line to the air pressure vent valve in the pylon is vented. As pressure on the inlet side of the pressure vent valve is reduced to approximately 2 psig, a shuttle, inside the valve, is repositioned so that tank pressure is vented through the valve and into the open pylon (overboard). This allows the tanks to breathe and compensate for air

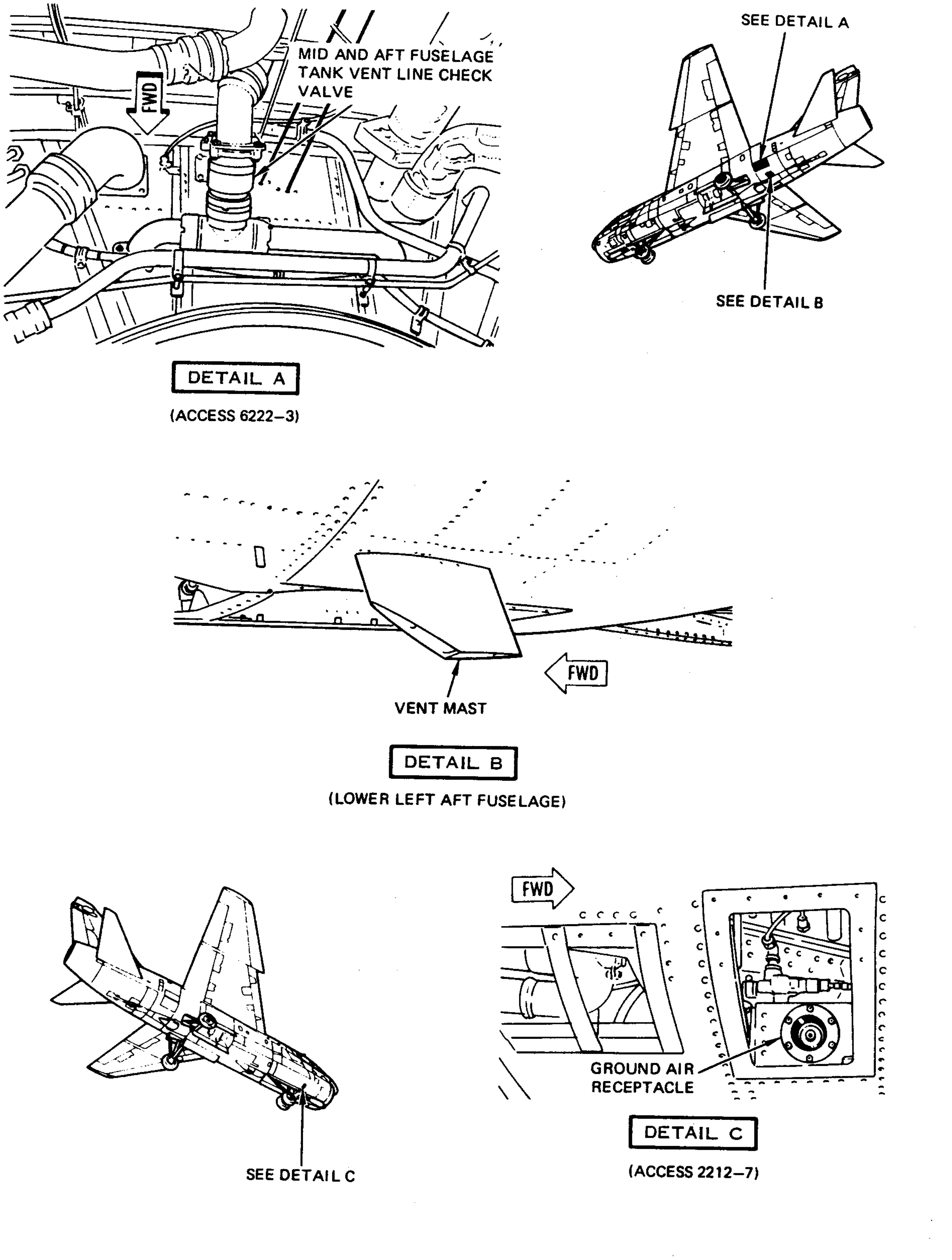
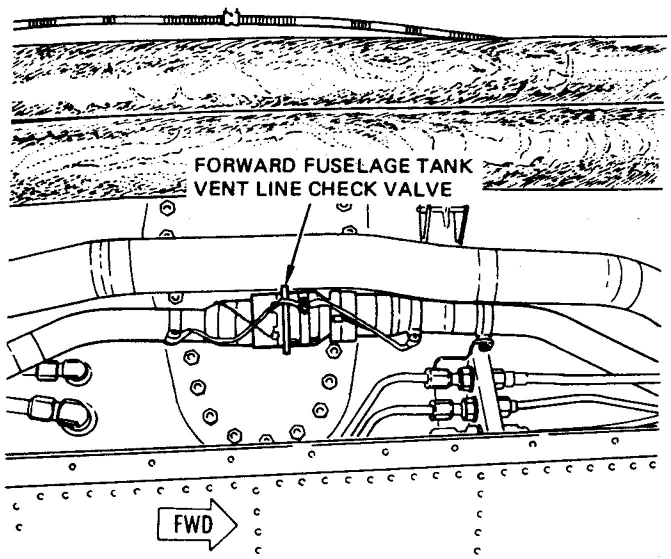
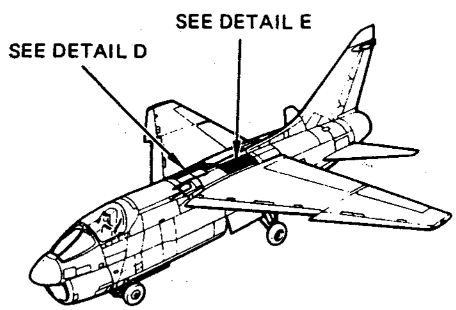
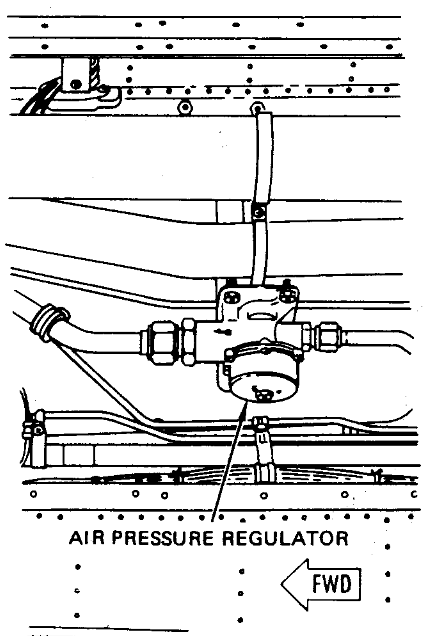


Figure 3-1. System Arrangement; Fuel Vent and Pressurization (Sheet 1 of 2)







06D035–02–09–85

Figure 3-1. System Arrangement; Fuel Vent and Pressurization (Sheet 2)

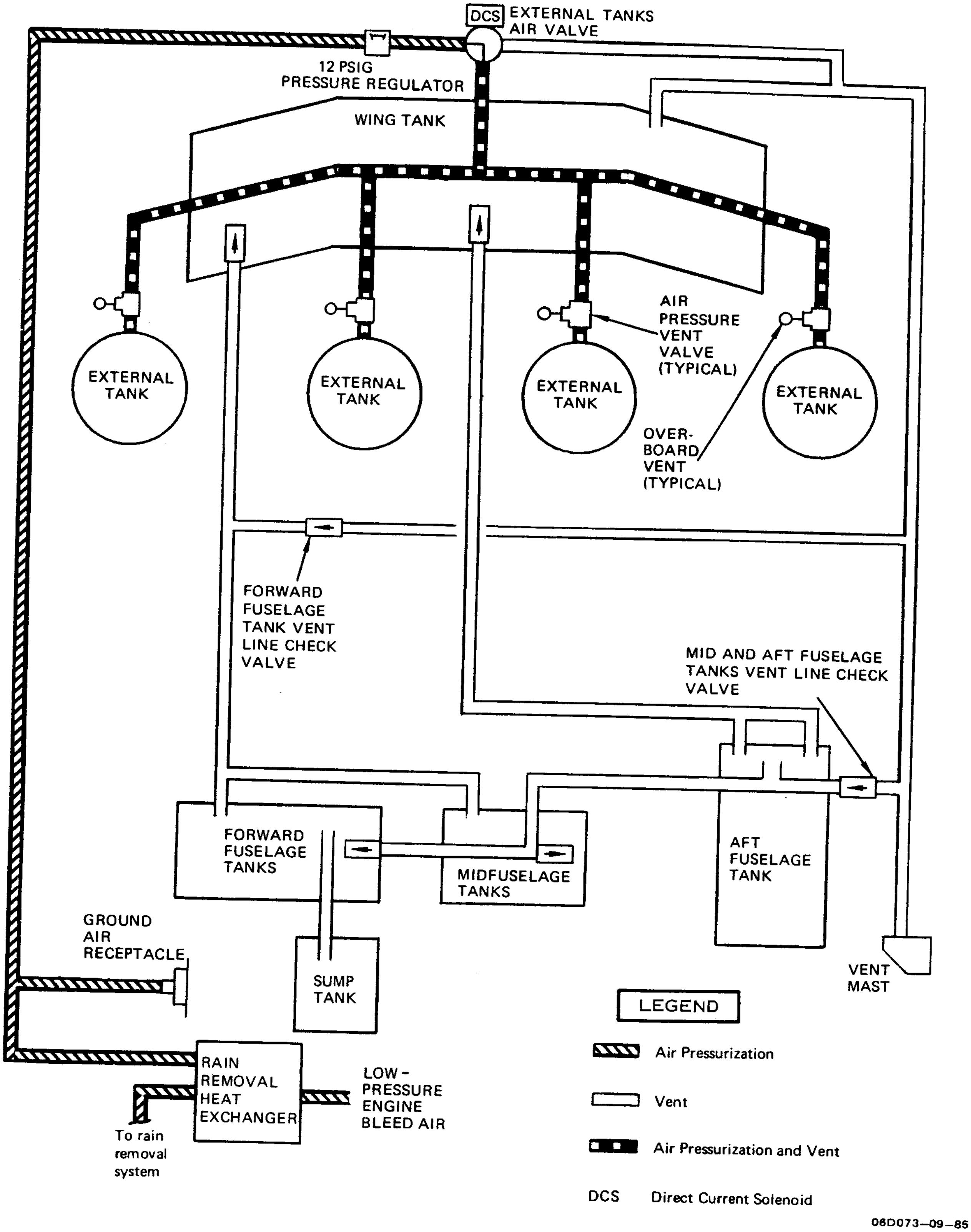


Figure 3-2. Schematic Diagram; Fuel Vent and Pressurization System

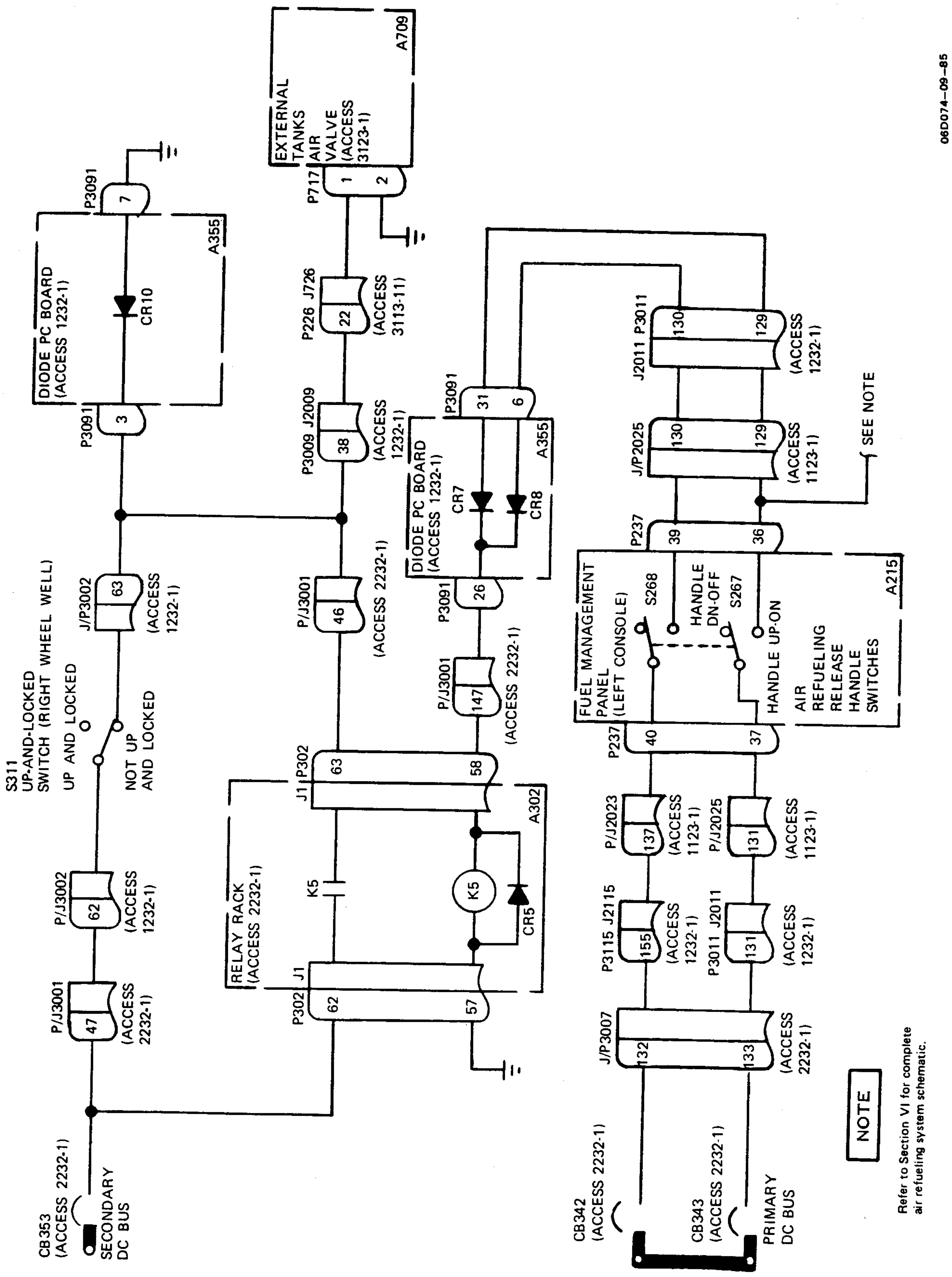


Figure 3-3. Schematic Diagram; Air Pressurization Electrical

pressure changes during climb and dive or during fueling and defueling. When the air refueling process is ended and the air refueling door release handle is pushed down, the external air valve opens and air pressurization to the external tanks is resumed.

3-3. COMPONENTS.

For a list of system components, their locations (accesses), and functions, refer to table 3-1.

3-4. OPERATIONAL CHECKOUT.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Power-driven rotary compressor	MC2A	Supply air pressure
	Fuel system ground air connection adapter set	215-00225-1	Regulate required air pressure
	Vent mast cover assembly	216-00203-1	Connect fuel venting system for leak check

3-4.1. System Checkout. The fuel vent and pressurization system is checked in conjunction with the external fuel system. Refer to paragraph 4-4 for operational checkout.

3-4.2. System Leak Check. If system components have been repaired or replaced, perform leak check as follows:

a. Ensure that fuel master lever is in OFF.

b. Remove four screws from vent mast, and install fuel vent mast cover.

c. Using ground air adapter, connect external air source to vent mast cover. Apply and maintain 4 psig regulated air pressure.

d. Check for leakage at repaired or replaced component by applying leak detector liquid. Clean off residue.

e. Turn off air pressure, and disconnect external air source and ground air adapter from vent mast cover.

f. Disconnect fuel vent mast cover, and install four screws in vent mast.

3-4.3. Fuselage Leak Check.

CAUTION

Failure to comply with fuselage leak check procedures could result in catastrophic damage to the aircraft.

a. Using locally manufactured fittings (T.O. 1A-7D-3, figure 3-1, detail B), cap off 215-33296-1 elbow assembly (2 each), 216-33611-4 tube assembly, 215-33101-112 tube assembly, and 215-33461-2 elbow. Using AN806 end plugs, plug off tube assemblies 216-23130-16, 216-33101-60, 216-33101-61, 216-33101-63, and 215-33299-13.

b. Ensure that fuel master handle is in OFF.

c. Remove four screws from vent mast, and install vent mast cover.

d. Using ground air adapter, connect external air source to vent mast cover. Apply and maintain 4 psig regulated air pressure.

e. Check for leakage in fuel system components in areas to be covered by the wing by applying leak detector liquid. Clean off residue.

f. Turn off air pressure, disconnect external air source, and ground air adapter from vent mast cover.

g. Disconnect fuel vent mast cover, and install four screws in vent mast.

h. Remove all locally manufactured fittings and AN806 plugs. Reconnect all tube assemblies and elbows (step a).

3-5. TROUBLESHOOTING. The fuel vent and pressurization system is checked in conjunction with the external fuel system. Refer to paragraph 4-5 for troubleshooting information.

3-6. FUEL DUMP SWITCH REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane wing tank	Defuel and fuel wing tank for checking operation of fuel dump switch
		Equipment required for connecting external electrical power	Check operation of fuel dump switch

CAUTION

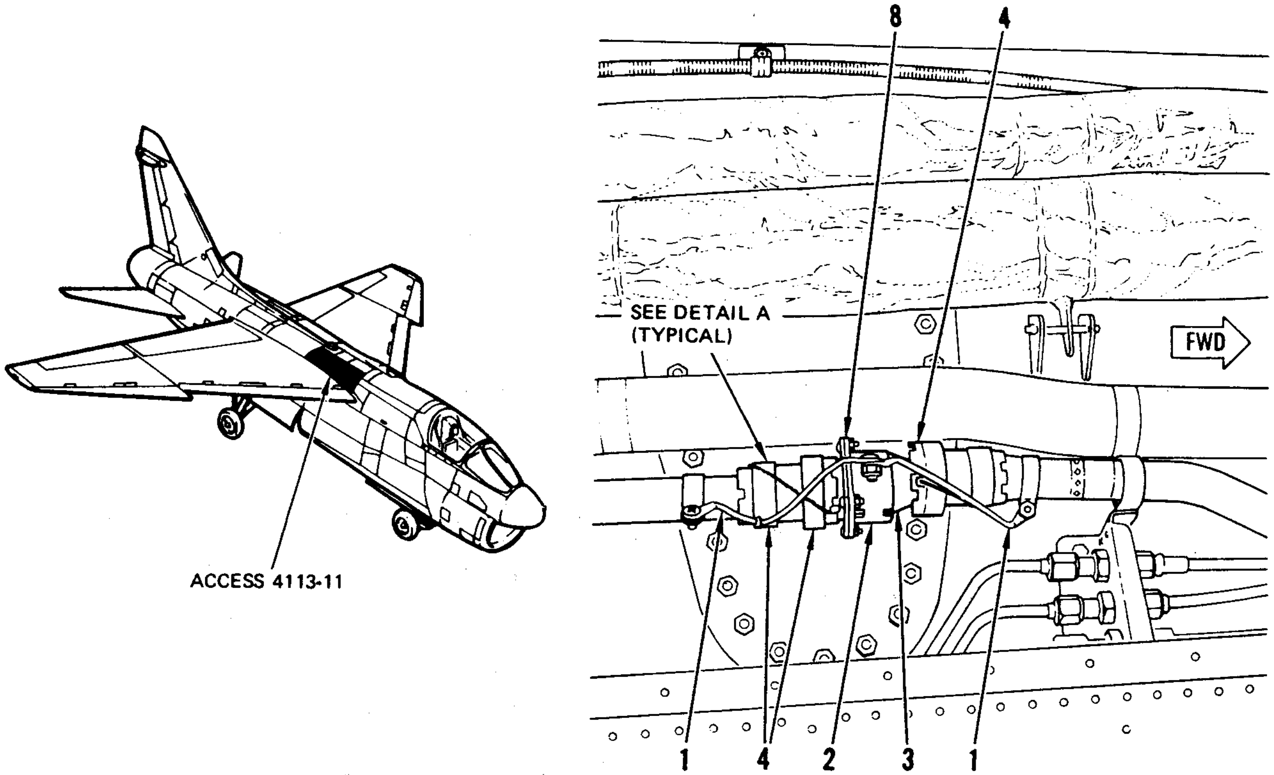
Fuel management panel mounting screws incorporate a captive feature. Loosen and engage all screws in sequence, no more than three turns at a time. More than three turns of screw will result in damage to captive feature or panel components.

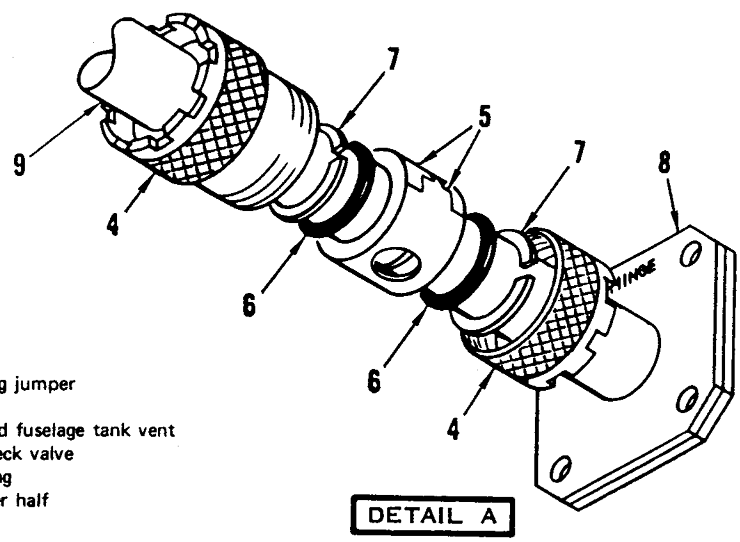
3-6.1. Removal.

a. Remove six screws attaching fuel control panel to left console.

b. Raise panel, and disconnect electrical connector.

c. Raise fuel dump switch guard, and remove nut attaching guard to fuel control panel.





1. Bonding jumper
2. Clamp
3. Forward fuselage tank vent line check valve
4. Coupling
5. Retainer half
6. O-ring
7. Washer
8. Flange
9. Vent tube

06D036-09-85

Figure 3-4. Removal and Installation; Forward Fuselage Tank Vent Line Check Valve

3-8.2. Installation.

a. Using new O-ring and two washers, install coupling on valve.

CAUTION

To ensure proper operation, check valve must be correctly positioned during installation.

b. Using new seal between valve and vent line flange, position valve so word TOP on valve flange is up.

c. Secure valve to vent line flange with four bolts, eight washers, and four nuts. Torque nuts to 22 ($\pm$2) inch-pounds.

d. Connect coupling to vent line tee and torque coupling to 30 ($\pm$3) foot-pounds. Secure coupling with MS20995C32 lockwire.

e. Perform fuel vent and pressurization system operational checkout (paragraph 3-4).

f. Install battery (T.O. 1A-7D-2-11).

SECTION IV

EXTERNAL FUEL SYSTEM

4-1. DESCRIPTION. The external fuel system stores fuel in pylon-mounted tanks. Fuel is transferred from the external tanks to the main fuel system. The 300-gallon fuel tanks may be mounted on pylons at wing stations 1, 3, 6, and 8. For system controls and indicators, see figure 4-1. For system arrangement, see figure 4-2. For external tank locations and capacities, see figure 4-3.

4-1.1. System Components. The external fuel system consists of four external fuel tanks, an external tanks air valve, an external tank ground refueling switch, a fueling shutoff valve in each applicable wing pylon, and pylon electrical, air, and fuel connections.

4-1.2. System Pressure. External tank air pressure (figure 4-4) is provided by the low-pressure bleed air system through the rain removal system and is supplied after landing gear retraction.

4-1.3. External Tanks Mounting. The 300-gallon external fuel tanks may be mounted on pylon stations 1, 3, 6, and 8 (figure 4-5). The mounting lugs of the external fuel tanks are attached to the pylons by hooks of the MAU-12 ejector rack. The ejector rack sway braces prevent movement of the tanks during flight.

4-2. OPERATION.

NOTE

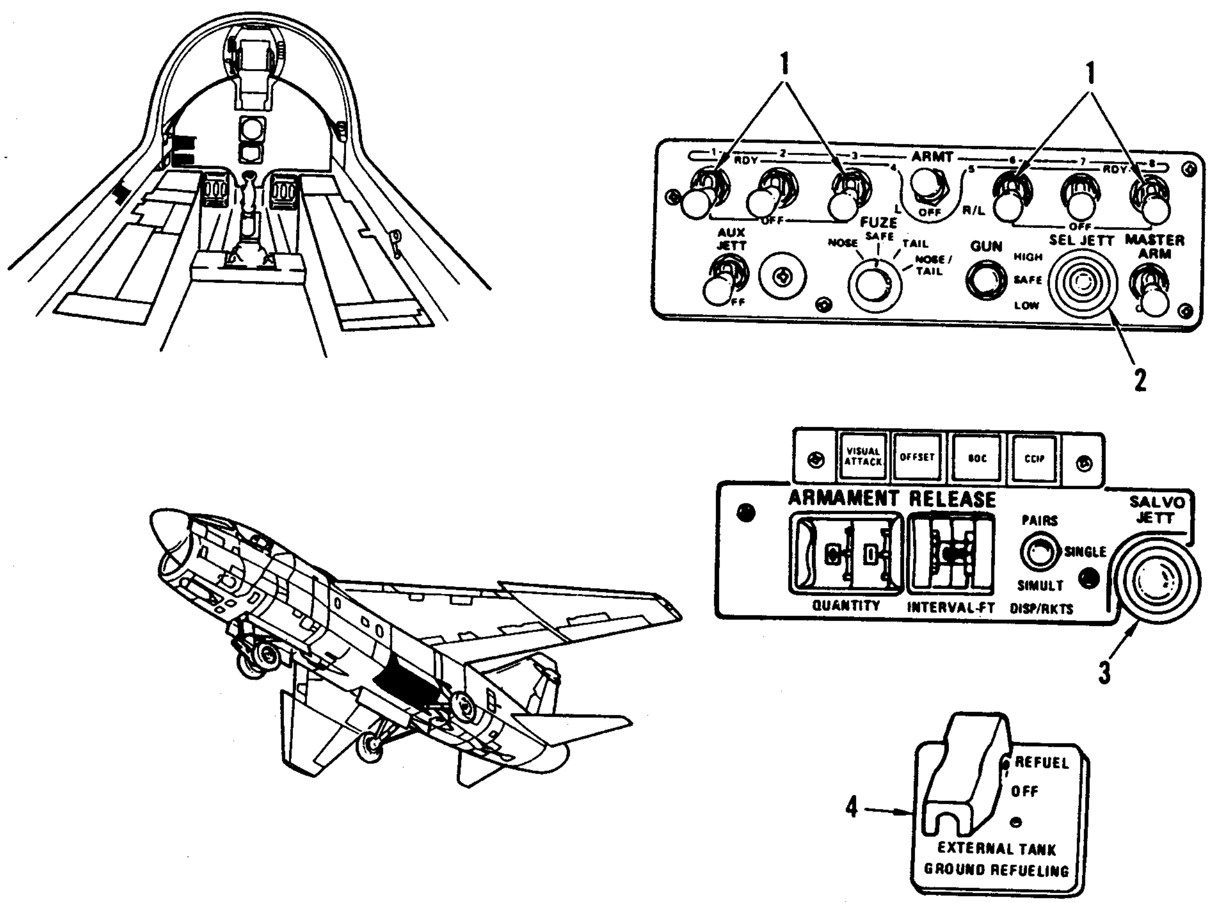
Refer to T.O. 1A-7D-2-1 for detailed fueling procedures.

4-2.1. External Tanks Fueling. The 300-gallon external tanks may be fueled through the airplane pressure fueling adapter or gravity fueled through a receptacle on the forward top side of each tank. Single-point servicing the 300-gallon external tanks requires application of electrical power provided by the battery bus (figure FO-9) to open the solenoid-actuated fueling shutoff valves in the wing pylons. With weight-on-gear switch actuated, placing and holding the external tank ground refueling switch, located near the pressure fueling manifold adapter in the left main wheel well, in REFUEL energizes the solenoids on the valves to open the valves and initiate fueling of the tanks. Fuel flow to the individual tanks through fueling shutoff valves is controlled by a float switch inside each tank. When a tank is filled, the float switch deenergizes the solenoid on the fueling shutoff valve, closing it and stopping fuel flow to that tank. The external tanks may also be refueled in flight.

4-2.2. External Tanks Defueling. The external fuel tanks may be defueled by connecting a hose and suction pump to the pressure fueling manifold adapter, opening the wing defueling check valve, and connecting external air pressure to the ground air receptacle. As fuel in each external tank empties, a float-actuated air sensing section (integral with the tank fueling shutoff valve) senses that the external tank fuel supply is depleted and closes the fueling valve to prevent the flow of air from disrupting fuel flow from the other tanks.

4-2.3. External Tanks Transfer. (Figures 4-4 and FO-9.) External tanks fuel transfer is performed with the wing transfer switch, on the left console, in AUTO or EMERG. The external tanks are pressurized by air taken from the rain removal system with the engine operating and the landing gear retracted. When wing tank fuel level begins to drop, fuel from the external tanks is forced into the forward fuselage, midfuselage, and aft fuselage fuel tanks. Fuel from the fuselage tanks overflows into the wing tank until the wing tank is refilled, at which point the float valves cause the shutoff valve to stop fuel flow. This cycle continues until the external tanks are empty. Thus, external tanks are always emptied first. If the landing gear is extended or air refueling system is actuated, the external tanks will be depressurized and fuel flow will cease.

4-2.3.1. Ground Transfer. External tank transfer can be accomplished during ground operation with the engine operating by manually actuating the main gear up-and-locked switch in the right gear well to simulate a gear up-and-locked condition. External tank transfer without the engine operating may be performed by applying external



INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Station select switches	RDY – selects station or stations for jettisoning.
2	Select jettison switch (SEL JETT)	PRESSED – jettisons stores from stations selected with station select switches. Stations 3 and 6 will not jettison unless the gear is up and locked.
3	Salvo jettison switch (SALVO JETT)	PRESSED – jettisons all stores and external tanks (those attached to the MAU-12 ejector racks) from wing pylons. Stations 3 and 6 will not jettison unless the landing gear is up and locked.
4	External tank ground refueling switch (EXTERNAL TANK GROUND REFUELING)	REFUEL – open fueling shutoff valves in wing pylons for ground refueling. OFF – allows fueling shutoff valves to close.

06D037–09–85

Figure 4-1. Controls and Indicators; External Fuel System

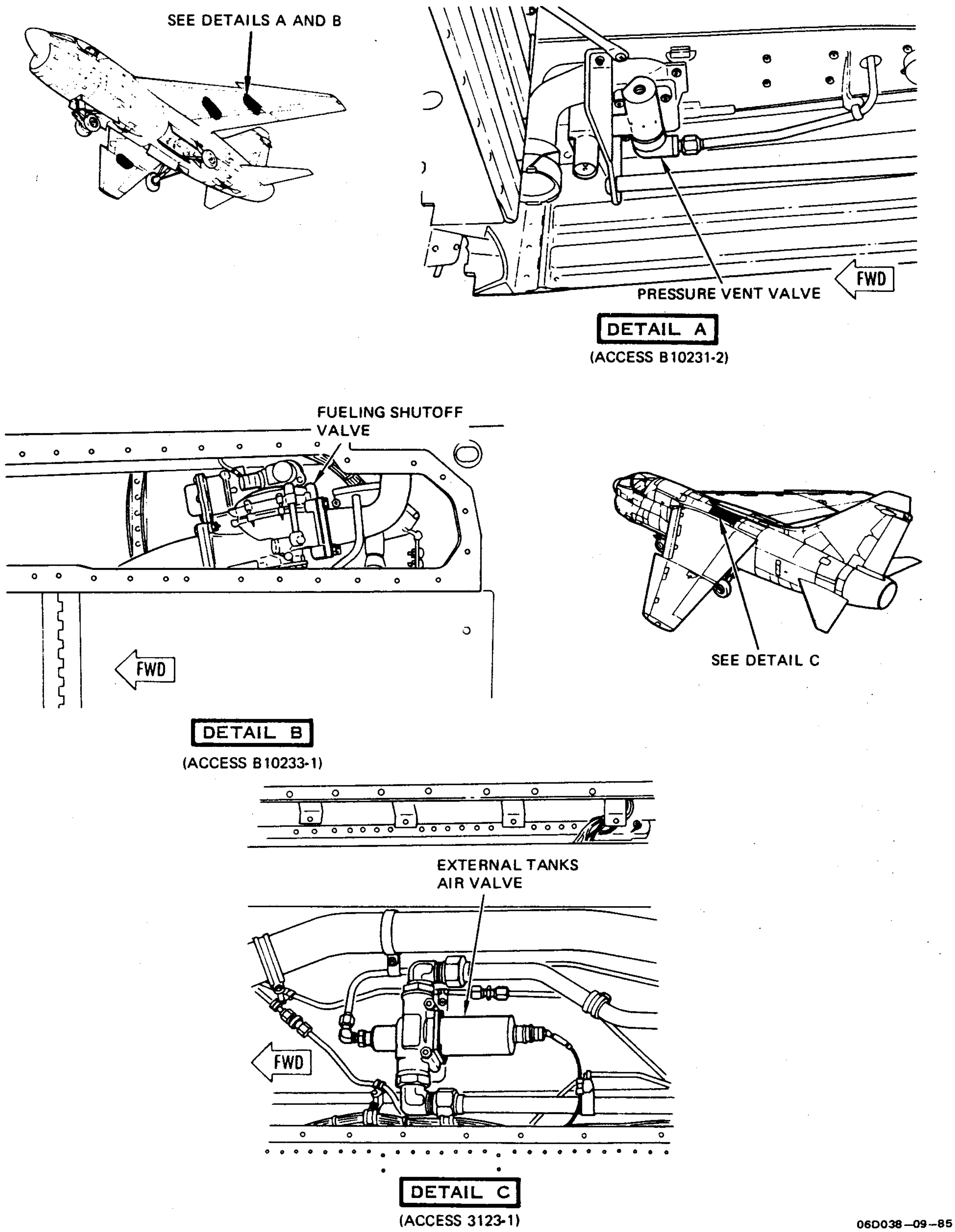
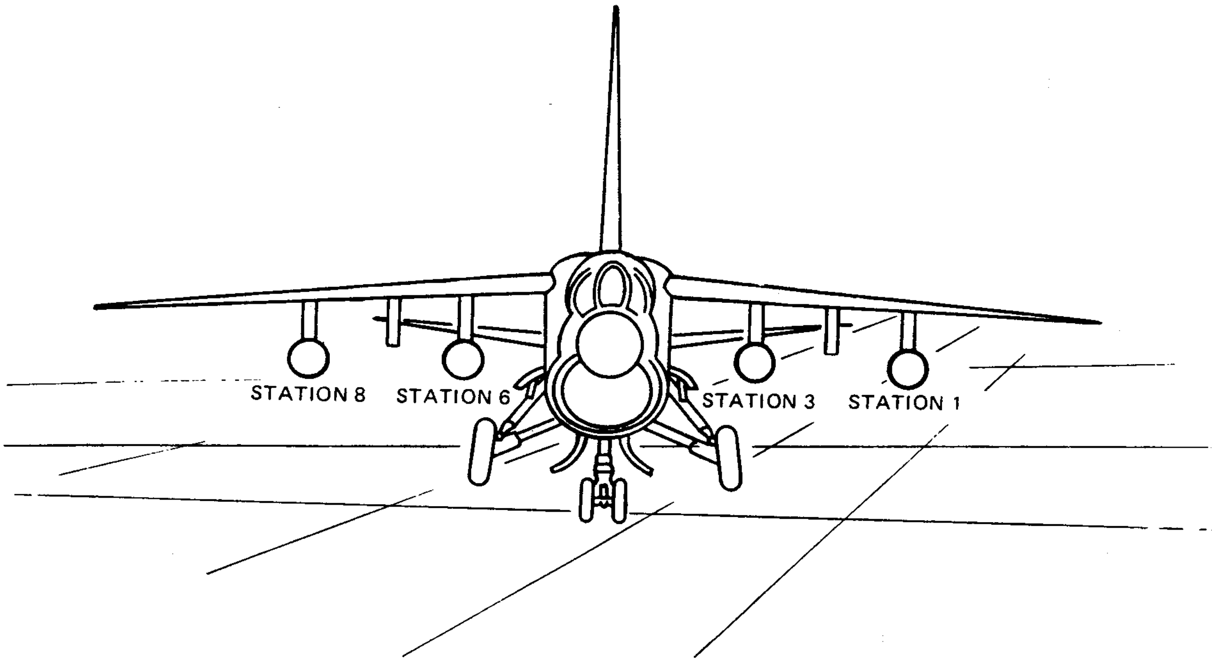


Figure 4-2. System Arrangement; External Fuel



USABLE FUEL – GROUND ATTITUDE		
TANK	GALLONS	JP-4 POUNDS FUEL (6.5 LB/GAL.)
300 GALLON STATION 1	300	1,950
300 GALLON STATION 3	300	1,950
300 GALLON STATION 6	300	1,950
300 GALLON STATION 8	300	1,950
TOTAL	1,200	7,800

NOTE

Fuel gage readings may vary ±3.5% from quantities shown.

06D039–09–85

Figure 4-3. Locations and Capacities; External Fuel Tank

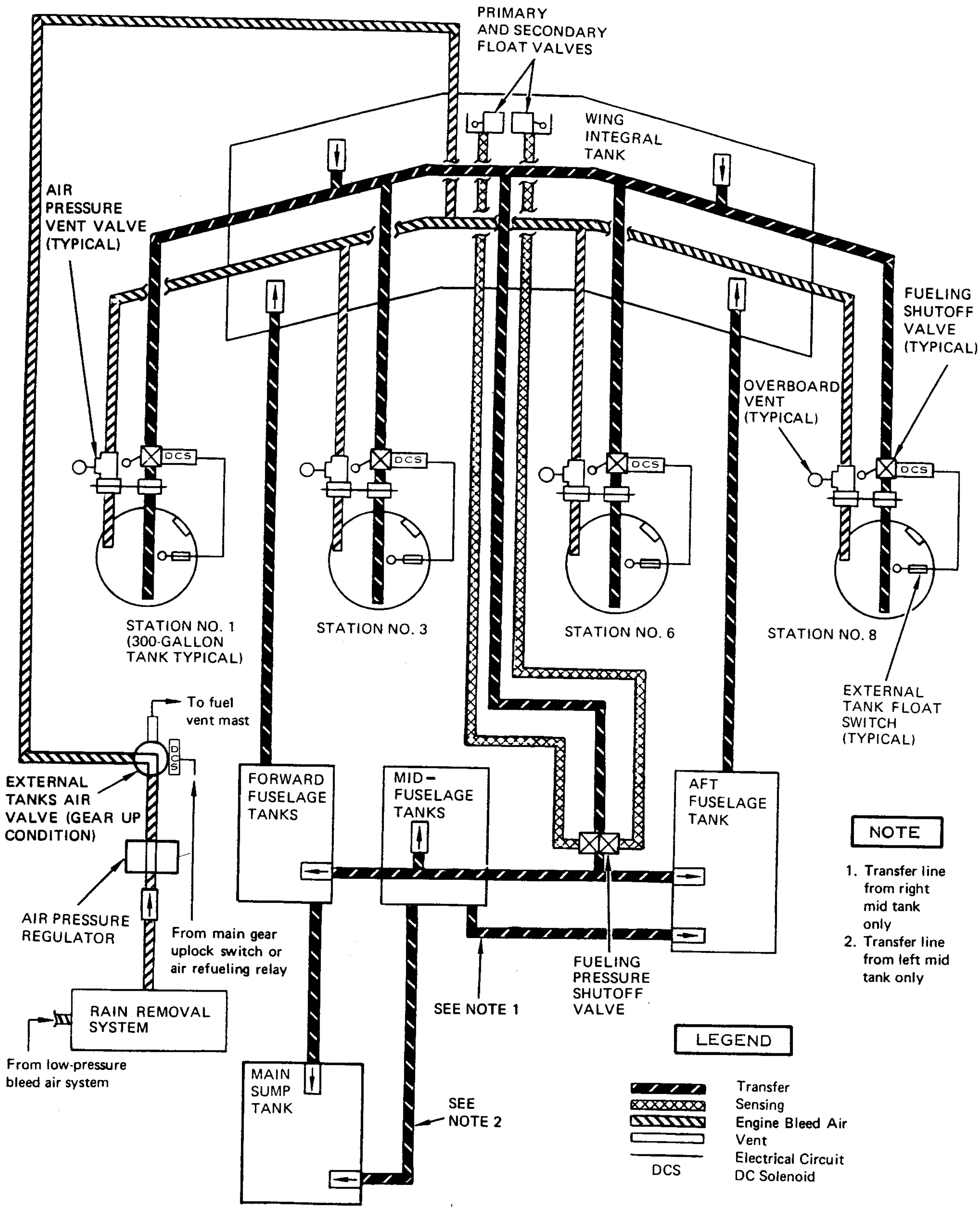
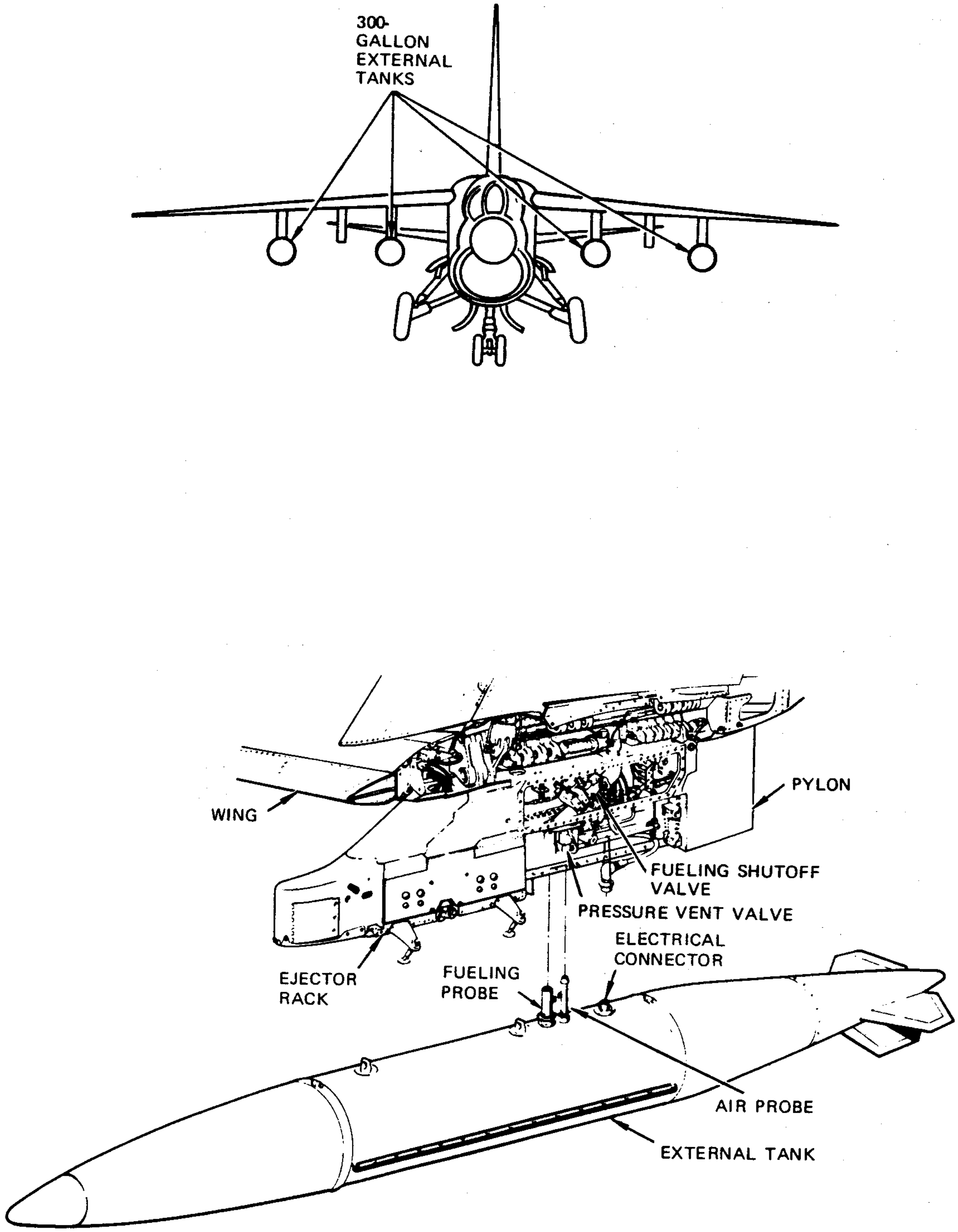


Figure 4-4. Schematic Diagram; External Fuel Tank and Air Pressurization



06D095-09-85

Figure 4-5. Tank Mounting; External Fuel air pressure to the ground air connection, located in the right fuselage nose section, and manually actuating the main gear up-and-locked switch to simulate gear up-and-locked condition.

4-2.3.2. Shutoff. As fuel in each external tank empties, a float-actuated air sensing section (integral with the tank fueling shutoff valve) senses the external tank fuel supply is depleted and closes the fueling shutoff valve to prevent the flow of air from disrupting fuel transfer from other tanks.

4-2.4. External Tanks Fuel Dump. External fuel can be dumped indirectly through the wing dump mast. Dumping external fuel through the wing dump masts is accomplished by placing the fuel dump switch in FUEL DUMP. Fuel begins transferring from the external tanks to the fuselage tanks, and the wing tanks begin dumping. Fuel flows in the normal sequence from the fuselage tanks to replace fuel dumped from the wing tanks. When all fuel has been transferred from the external tanks, the fuel dump switch is placed in OFF, and normal operation continues.

4-2.5. External Tanks Jettisoning. The external tanks may be jettisoned from the ejector rack by a jettison signal voltage to the ejector rack. The jettison signal is initiated by actuation of the salvo jettison switch or the select jettison switch. When initiated, jettison voltage is applied to the MAU-12 ejector rack, which fires two impulse cartridges in the breech assembly. Gas pressure from the cartridges extends a slave piston and two ejector pistons. The slave piston forces a bellcrank to rotate, mechanically actuating the release linkage. This opens the suspension hooks holding the tank. The suspension hooks are held open by a spring attached to the bellcrank. Gas pressure from the impulse cartridges is also routed to the ejector pistons which force the external tank from the airplane. A safety pin is inserted in the ejector rack linkage when the airplane is on the ground to prevent accidental release of the tank.

4-3. COMPONENTS.

For a list of system components, their locations (accesses), and functions, refer to table 4-1.

4-4. OPERATIONAL CHECKOUT.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Provide power required to check the external fuel system
	Power-driven rotary compressor	MC2A	Supply air pressure
	Ground air adapter set	215-00225-1	Apply external air

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in figure FO-10.

a. Service each external tank with approximately 50 gallons of fuel, with attention placed on the pressure vent valves for venting during servicing (T.O. 1A-7D-2-1). {1}

b. Check each external tank for leakage.

NOTE

The fuel quantity indicator transfer pointer may vary between tanks. This is due to difference in fuel flow rate to each tank during single-point fueling and is not a cause for rejection.

c. Install locally fabricated cap and gage assembly (figure 4-6) on each tank.

Table 4-1. External Fuel System Components

Component	Access	Function
Circuit breaker, CB368	2232-1	Connects 28 volts dc to the external tank ground refueling switch.
Panel, control	Left console	Provides mounting for fuel probe switch, fuel transfer switch, and fuel dump switch.
Receptacle, gravity fueling	Tank	Access for external gravity fueling.
Regulator, air pressure	3123-1	Regulates air pressure to external tanks.
Switch, float	Tank	Opens circuit at tank full level to shut off fuel flow into tank.
Tank, external 300-gallon	Wing stations 1, 3, 6, and 8 pylons	Provides airplane with additional fuel storage capacity for extended missions.
Transmitter (fuel quantity probe)	Tank	Basic sensing element of fuel quantity indicating system.
Valve, external tanks air	3123-1	Allows regulated air pressure to pressurize external tanks for fuel transfer or dumping.
Valve, fueling shutoff	Wing stations 1, 3, 6, and 8 pylons	Controls fuel flow to the external tanks.
Valve, pressure vent	Wing stations 1, 3, 6, and 8	Prevents overpressurization of external tanks by venting pressure overboard.
Valve, relief, float override	Tank	Provides pressure relief for tank if float switch is inoperative.

NOTE

Fuel is transferred from all external tanks simultaneously; check that fuselage tanks and wing tank can accommodate fuel contained in external tanks.

d. Start and operate engine (T.O. 1A-7D-2-1) or perform the following:

(1) Open access 2212-7.

(2) Connect external, regulated air source to ground air receptacle, and apply 30 to 100 psig.

(3) Connect external electrical power (T.O. 1A-7D-2-1).

(4) Connect external hydraulic power (T.O. 1A-7D-2-1).

e. Ensure that air refueling door release handle is down and air refueling door is closed. Air refueling indicator lights must be off. {2}

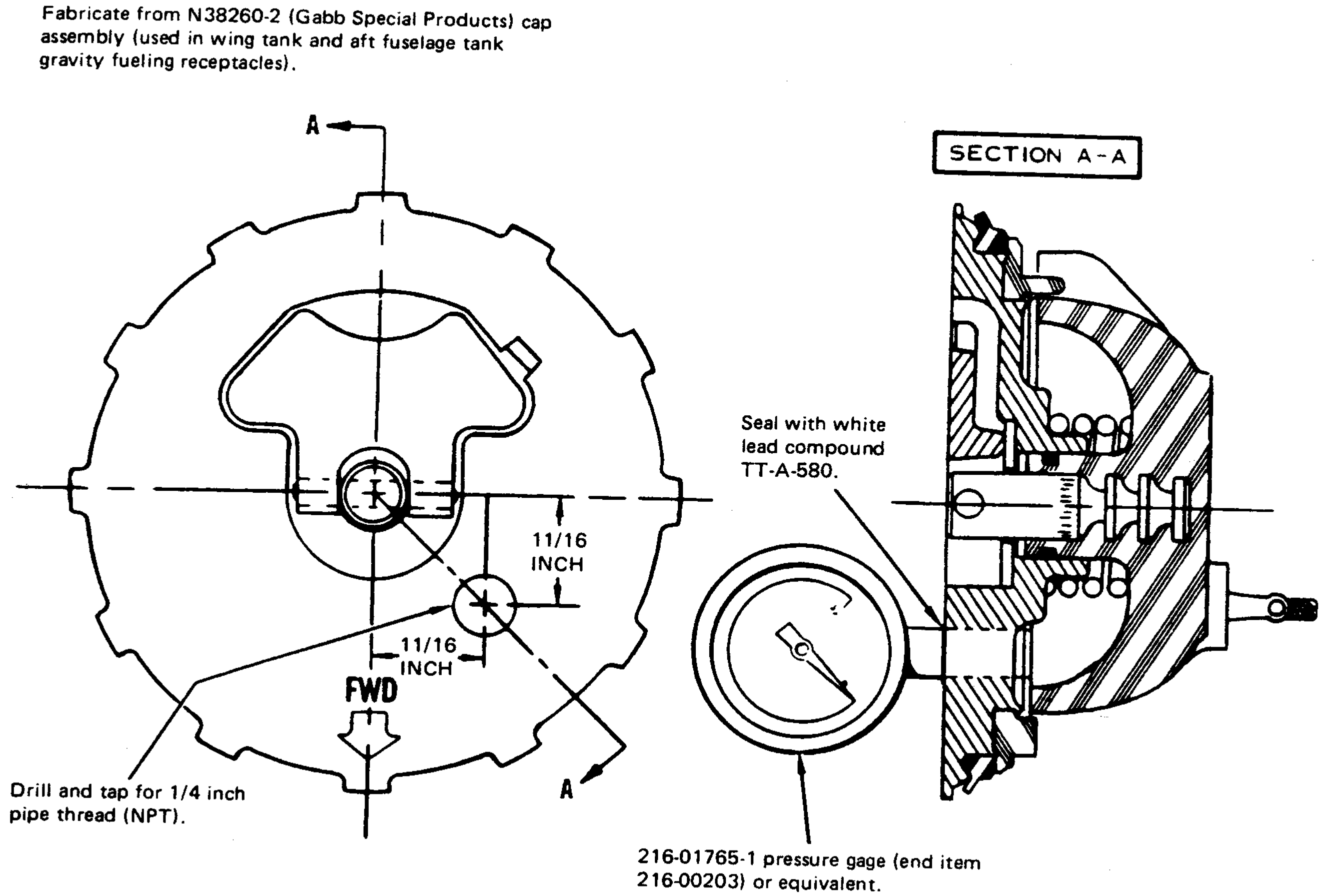


Figure 4-6. Cap and Gage Assembly; Gravity Fueling

CAUTION

Do not use C-clamp to actuate gear up-and-locked switch. Excessive pressure will damage switch. An MS21919 clamp or equivalent, hand formed to provide sufficient pressure, can be used to actuate switch.

f. Depress and hold gear up-and-locked switch in right wheel well in up-and-locked position, and check that each external tank is pressurrized. {3}

g. Check that fuel quantity indicator indicates approximately equal fuel transfer from each external tank. {4}

NOTE

Open pylon accesses so that venting of air from pylon vent valves can be felt.

h. Check that pressure vent valve is not venting and that there is no leakage around fuel tank air and fuel probes. {5 and 6}

i. Release gear up-and-locked switch, and check that each external tank vents through the pylon vent valve until no pressure exists in the tanks. {7}

j. Depress and hold gear switch in up-and-locked position.

WARNING

To prevent injury to personnel and/or equipment damage, ensure area around air refueling receptacle door is clear before operation.

k. Pull air refueling door release handle up.

l. Check that each external tank vents until no pressure exists in tanks. {8}

m. Push air refueling door release handle down. Check that pressure in each tank returns.

n. When fuel quantity indicator indicates all fuel has been transferred from each external tank, check for 13 (±2) psig tank pressure on each gage. {9 and 10}

o. Release gear switch, and check that each tank vents until no pressure exists in tanks.

p. Shut down engine or perform the following:

(1) Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

(2) Disconnect ground air supply.

(3) Close access 2212-7.

q. Remove cap and gage assembly from each tank and check that tanks are empty.

r. Install standard filler caps on each tank.

4-5. TROUBLESHOOTING.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	AC-DC multimeter	AN/PSM-6	Check continuity of circuits

4-5.1. Procedures. See figure FO-10 for troubleshooting information. Malfunctions in the figure are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout.

4-5.2. Schematic. For system troubleshooting schematic, see figure FO-9.

4-6. FUELING SHUTOFF VALVE REMOVAL AND INSTALLATION.

4-6.1. Removal.

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open pylon access B10233-1 for stations 1 and 8 or B10231-1 for stations 3 and 6.

b. Defuel wing tank (T.O. 1A-7D-2-1).

c. Disconnect electrical connector.

d. Disconnect fuel lines from each end of valve.

e. Remove attaching hardware securing valve to supporting structure, and remove valve.

4-6.2. Installation.

NOTE

Ensure that separate flange (plate) is installed at valve aft port.

a. Secure valve to support structure using attaching hardware.

b. Connect fuel lines to each end of valve using new packings.

c. Connect electrical connector.

d. Perform external fuel system operational checkout (paragraph 4-4).

e. Close pylon access B10233-1 for stations 1 and 8 or B10231-1 for stations 3 and 6.

4-7. FUELING SHUTOFF VALVE REPAIR.

a. Open pylon access B10233-1 for stations 1 and 8 or B10231-1 for stations 3 and 6.

b. Disconnect electrical connector from solenoid.

c. Remove two screws and washers securing solenoid to valve, and remove solenoid from valve.

d. Install replacement solenoid on valve, and secure with two screws and washers.

e. Connect electrical connector to solenoid.

f. Perform external fuel system operational checkout (paragraph 4-4).

g. Close pylon access B10233-1 for stations 1 and 8 or B10231-1 for stations 3 and 6.

4-8. EXTERNAL FUEL TANK INSTALLATION AND REMOVAL. (T.O. 1A-7D-35.)

4-9. EXTERNAL TANK AIR VALVE REMOVAL AND INSTALLATION.

4-9.1. Removal.

a. Open access 3113-11.

b. Disconnect electrical connector from valve.

c. Disconnect lines from valve.

d. Remove bolts and washers that secure valve to bracket, and remove valve.

e. Remove fittings and connectors from valve.

4-9.2. Installation.

a. Install fittings, connectors, and new seals on valve.

NOTE

Install air valve with data plate up as shown in figure 4-2.

b. Install valve on bracket with bolts and washers.

c. Connect lines to valve using new seals.

d. Connect electrical connector to valve, and secure with MS20995C32 lockwire.

e. Perform external fuel system operational checkout (paragraph 4-4).

f. Close access 3113-11.

4-10. AIR PRESSURE REGULATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Provide power to perform checkout of regulator

4-10.1. Removal.

a. Open accesses 3113-11 and 3123-1.

b. Disconnect lines from air pressure regulator.

c. Remove attaching hardware securing regulator to mounting bracket, and remove regulator.

d. Install protective covering over open lines and ports.

4-10.2. Installation.

a. Remove protective coverings from lines and ports.

b. Secure regulator to mounting bracket with attaching hardware.

c. Connect lines to ends of regulator.

d. Perform external fuel system operational checkout (paragraph 4-4).

e. Close accesses 3113-11 and 3123-1.

4-11. PRESSURE VENT VALVE REMOVAL AND INSTALLATION.

4-11.1. Removal.

a. Open pylon access B10233-2 (stations 1 and 3) or B10231-2 (stations 6 and 8).

b. If external fuel tank is installed, remove external tank (paragraph 4-8).

c. Remove three nuts and bolts and six washers securing valve to bracket, and remove valve.

4-11.2. Installation.

a. Install valve on bracket using three bolts, six washers, and three nuts.

b. Install external fuel tank (paragraph 4-8).

c. Close access B10233-2 (stations 1 and 3) or B10231-2 (stations 6 and 8).

4-12. TANK PRESSURIZATION SYSTEM PURGING.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Provide power required to check the external fuel system
	Power-driven rotary compressor	MC2A	Supply air pressure
	Ground air adapter set	215-00225-1	Apply external air

a. Open access 2212-7.

b. Ensure that fuel master lever is in OFF.

c. Connect external electrical power (T.O. 1A-7D-2-1).

d. Check that air refueling release handle is down.

CAUTION

Do not use C-clamp to actuate gear up-and-locked switch. Excessive pressure will damage switch. An MS21919 clamp, or equivalent, hand formed to provide sufficient pressure, can be used to actuate switch.

e. Secure right main gear up-and-locked switch in up-and-locked position.

f. Using ground air adapter and regulated air pressure, apply 30 to 100 psi through external air receptacle.

g. Using a tank air probe (Sargent-Fletcher part No. 27-300-01026), open check valve at quick-disconnect port of pylon vent and relief valve. Hold valve open for approximately 30 seconds to purge accumulated moisture from pressurization system.

h. Release right main gear up-and-locked switch.

i. Repeat steps g and h at each pylon station which is equipped for external fuel service but does not have an external fuel tank mounted.

j. Disconnect external electrical power (T.O. 1A-7D-2-1).

k. Disconnect ground air supply and ground air adapter.

l. Close access 2212-7.

SECTION V

FUEL QUANTITY INDICATING SYSTEM

5-1. DESCRIPTION. The fuel quantity indicating system measures the quantity of fuel in the airplane fuel tanks for visual indication on a cockpit gage and on the caution and advisory panel. The system is a single-point grounded system which provides fuel quantity indications with optimum reliability. The system consists of capacitance-type transmitters (fuel quantity probes) in each fuel tank to measure fuel quantity, compensators (density monitors) to compensate for fuel density changes, a fuel tank monitor switch, which contains repeater transformers, and a fuel quantity indicator. For system controls and indicators, see figure 5-1. For system arrangement, see figure 5-2.

5-1.1. Fuel Quantity Indicator. The fuel quantity indicator has two pointers and a digital readout. Pointer M indicates fuselage tanks fuel quantities; pointer T indicates wing and external tanks fuel quantitites. The M and T pointers revolve around the indicator dial face, which is calibrated in pounds. Total fuel quantity is indicated by a digital counter on the fuel quantity indicator. The counter and both pointers are driven by individual amplifier bridges within the indicator. Only the power supply is common.

5-1.2. Fuel Tank Monitor Switch. The fuel tank monitor switch permits monitoring of the fuel in the wing tank or any individual external tanks which may be carried on wing store stations 1, 3, 6, and 8. This information is displayed by the fuel quantity indicator transfer (T) pointer. An indicator press-to-test switch is mounted on the indicator for testing the indicator circuitry. Low fuel level warning is provided by a thermistor-controlled warning light. Low sump level warning is provided by a thermistor-controlled warning light.

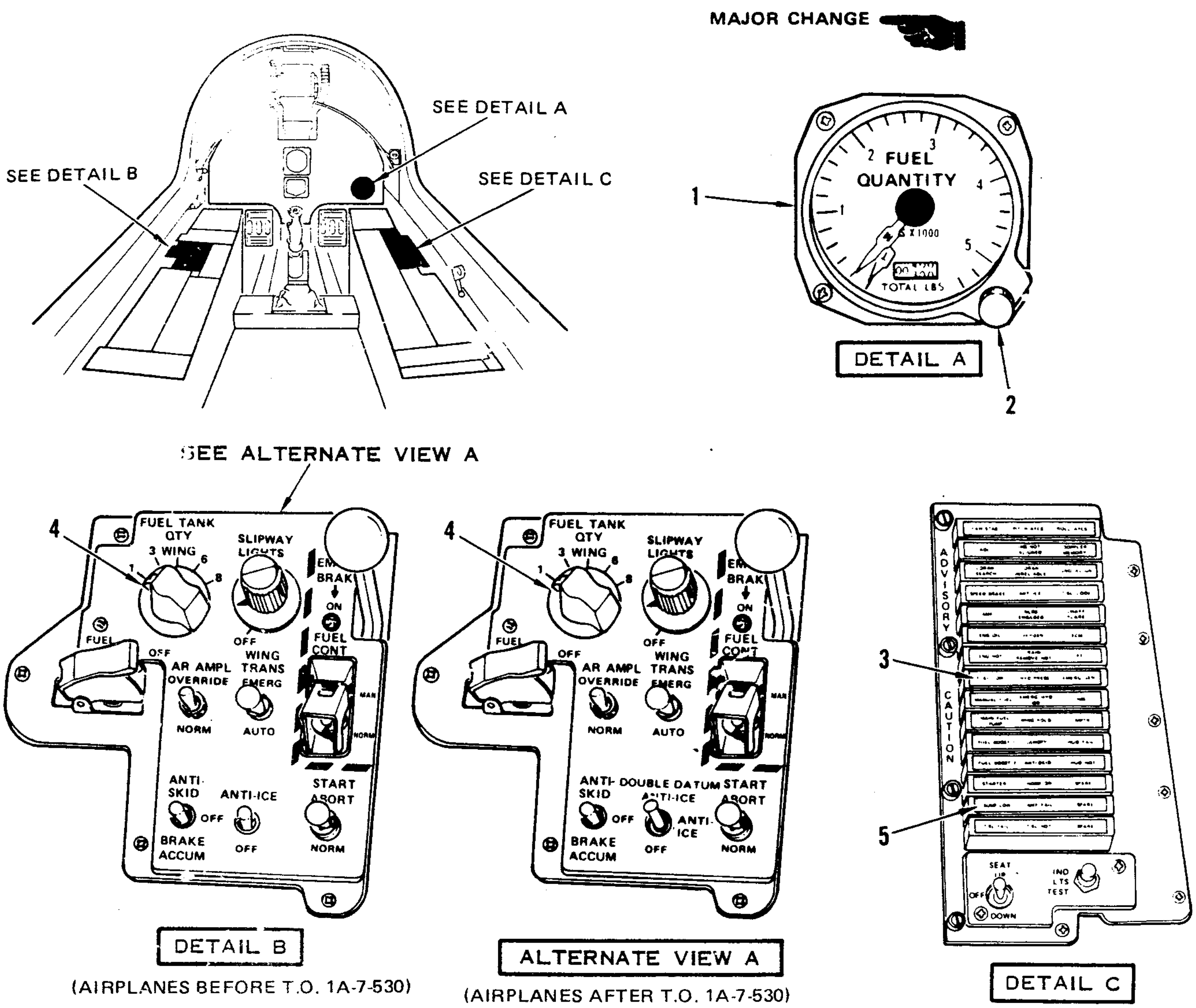
5-2. OPERATION.

5-2.1. Main Fuel Quantity Indicating System. (Figure FO-11.) The fuel quantity indicator operates on 115-volt, 400-hertz ac power from the primary ac bus. The indicator, in turn, supplies 400-hertz power to the transmitters and compensators.

5-2.1.1. Transmitters. The system has transmitters in all tanks that provide continuous readings to the cockpit fuel quantity indicator. Each transmitter is an electrical capacitor whose two probes (electrodes) are immersed in fuel, fuel vapor, or a mixture of the two that is an insulating medium between the probes. When the level of the fuel in the tank changes, the electrical resistance between the probes changes. The probes transmit a continuous signal to the cockpit fuel quantity indicator bridge circuit. When the tanks are full, the capacitance of the transmitters is approximately two times the empty capacitance, and any change of fuel level between full and empty produces a corresponding change in transmitters capacitance.

5-2.1.2. Indicator Circuit. The indicator circuit is a continuously rebalanced bridge circuit in which the total capacitance of the transmitters and the main fuel density compensator is adjusted according to changes in fuel level and density. The density compensator is part of the circuit, connecting the fixed leg of the bridge circuit. Thus, the system is self-correcting for changes in fuel density caused by changes in temperature or the type of fuel used. The signal that is sent to the indicator from the transmitters in the fuselage fuel tanks is adjusted by a signal from the density compensator in the main sump tank; the resulting proportional signal is amplified sufficiently to operate a motor-driven potentiometer. The movement of the potentiometer rebalances the bridge to null the circuit. Pointer M is attached to the potentiometer shaft to follow its movement, thereby indicating fuel quantity (by weight) in the fuselage fuel tanks.

5-2.2. Transfer Fuel Quantity Indicating System. The transfer fuel quantity indicating system operates on 400-hertz power supplied from the indicator. The measuring, density compensating, and indicator circuits operation is the same as for the main fuel quantity indicating system except that the density compensator for the transfer system is located in the right forward fuselage tank.



INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Fuel quantity indicator (FUEL QUANTITY)	M pointer – provides an indication of fuel quantity in main system (fuselage tanks). T pointer – provides an indication of fuel quantity in transfer system tank selected with fuel quantity monitoring switch (wing or selected external tank). Digital counter – displays total quantity, including external tank fuel.
2	Indicator press-to-test switch	DEPRESSED – causes indicator pointers and counter to move to zero position. When released, pointers and counters return to position representing actual fuel quantities.

06D040–01–06–86

Figure 5-1. Controls and Indicators; Fuel Quantity Indicating System (Sheet 1 of 2)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
3	Low level fuel warning light (FUEL LOW)	On – indicates that usable fuel remaining in the fuselage tanks is 1,000 ±140 pounds when the light first comes on. The master caution light comes on at the same time, but may be turned off by depressing the lens cover. The FUEL LOW light remains on as long as the fuel low condition exists. With quantity of approximately 1,000 pounds, attitude changes may cause temporary covering of the light control thermistor and resultant on-off cycling of the caution and master lights.
4	Fuel tank monitor switch (FUEL TANK QTY)	1, 3, 6, or 8 – selects desired external fuel tank for fuel quantity indicator reading (wing stations 1, 3, 6, or 8). During switching from one external tank to another, total quantity reading may change due to variance in tank capacitance values. WING – selects integral wing tank for fuel quantity indicator reading.
5	Low sump level warning light (SUMP LOW)	On – indicates that fuel remaining in the main sump tank is approximately 365 pounds when the light first comes on. The master caution light comes on at the same time, but may be turned off by depressing the lens cover. The SUMP LOW light remains on as long as the low sump level condition exists.

06D040–02–09–85

Figure 5-1. Controls and Indicators; Fuel Quantity Indicating System (Sheet 2)

5-2.2.1. Tank Selection. When the wing tank or one of the external fuel tanks is selected by the fuel tank monitor switch for monitoring, the switch applies the signal received from the fuel tank transmitter, or transmitters, to the transfer indicator balancing and amplifier circuits. This signal is corrected by the transfer fuel density compensator in the right forward fuselage tank. The resulting signal determines the fuel quantity indication on the transfer (T) pointer. The fuel tank monitor switch should normally be positioned to WING; therefore, the transfer (T) pointer normally displays wing tank fuel quantity.

5-2.2.2. External Tanks. When external fuel tanks are installed on wing pylon stations 1, 3, 6, and 8, the transmitters in these tanks provide fuel quantity signals to the cockpit indicator. The signal flows from the external fuel tank transmitter to the fuel tank monitor switch and through the external tank capacitance simulator to the fuel quantity indicator. When external tanks are not installed, an external tank capacitance simulator provides an empty condition signal to the fuel quantity indicator.

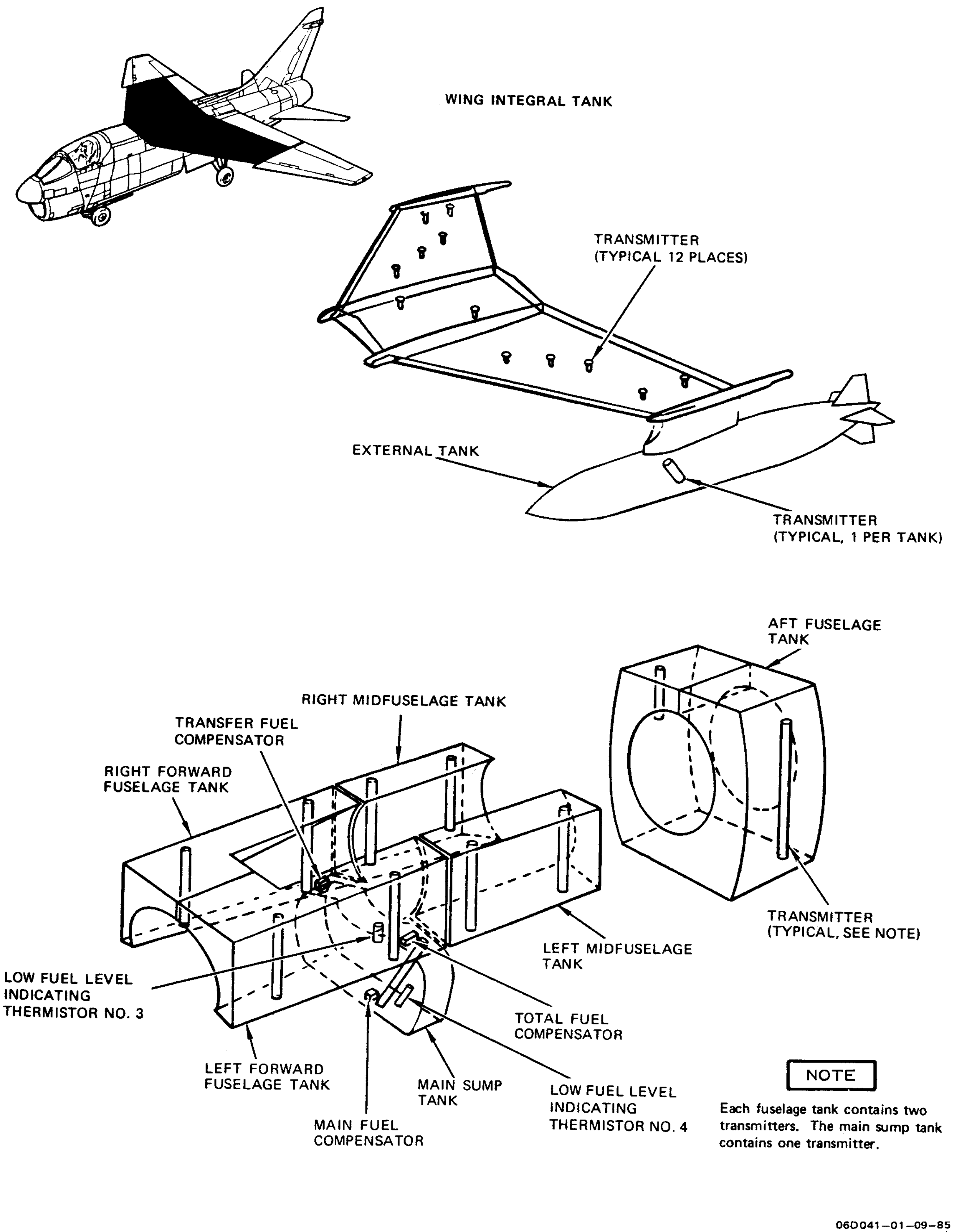


Figure 5-2. System Arrangement; Fuel Quantity Indicating (Sheet 1 of 2)

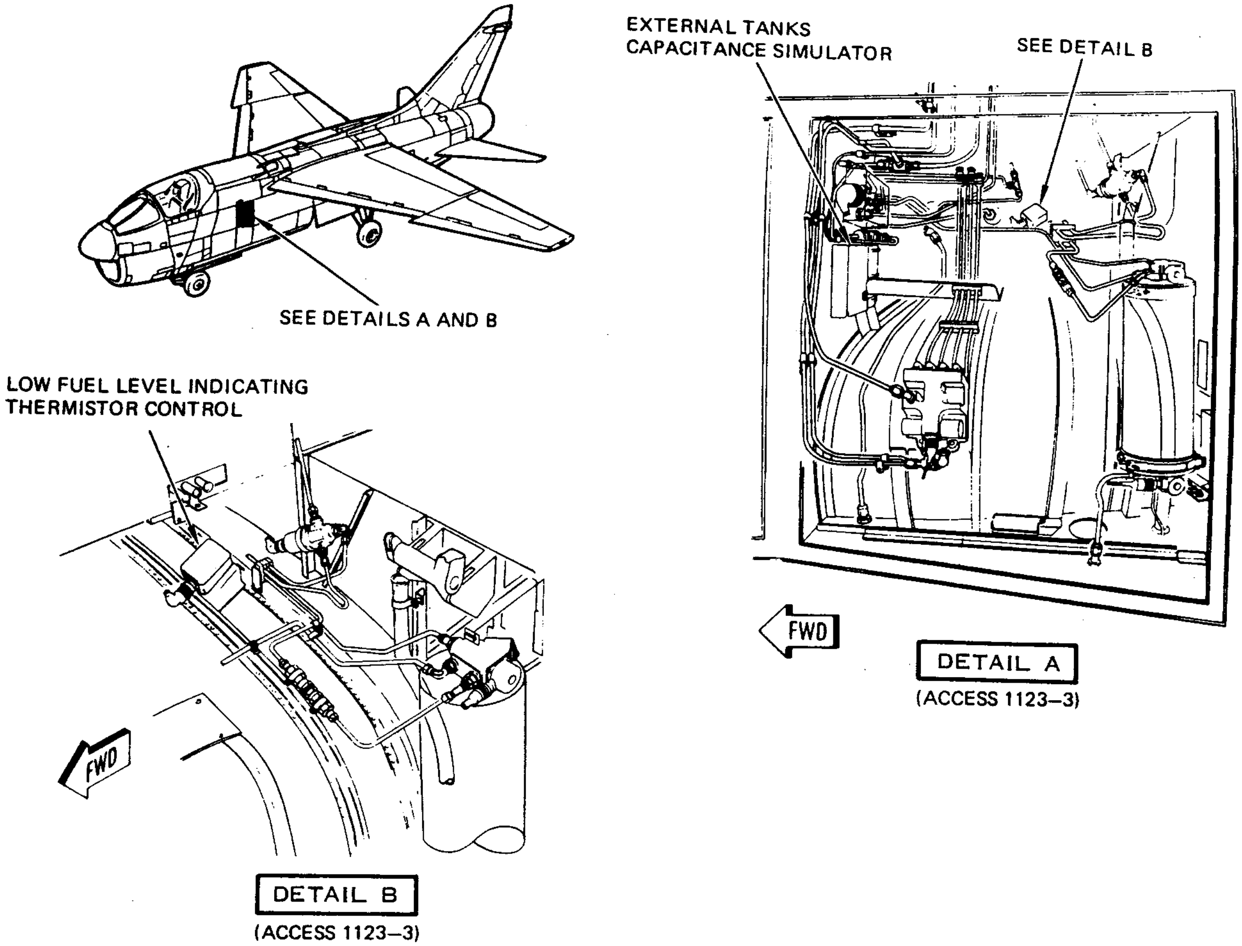


Figure 5-2. System Arrangement; Fuel Quantity Indicating (Sheet 2)

5-2.3. Total Fuel Quantity Indicating System. (Figure FO-11.) The operation of the total fuel quantity indicating system is controlled by signals received by the indicator from the primary winding of a summing transformer located in the fuel tank monitor switch and the total fuel density compensator in the left forward tank. The indicator and density compensator operation is the same as for the main fuel quantity indicating system (paragraph 5-2.1). The secondary windings of the transformer receive signals from the main and transfer fuel system transmitters. The signal from the primary winding is changed by the signal from the total fuel density compensator with the resulting signal applied to the total fuel indicator counterbalancing and amplifier bridge circuits for display on the indicator counter.

5-2.4. Low Level Fuel Warning System. The low level fuel warning circuit energizes the low level fuel warning light when the fuel level for all fuselage tanks drops to 1,000 (±140) pounds. An additional low level warning circuit is provided for the sump tank. The low sump level fuel warning circuit energizes the low sump level warning light when the sump tank fuel drops to approximately 360 pounds.

5-2.4.1. Low Fuel. A dual bead low fuel indicating thermistor (thermistor No. 3) is provided in the left forward fuselage tank to sense low fuel level in the fuselage tanks. The low fuel level indicating thermistor control passes electric current through the thermistor. As long as the thermistor is submerged in fuel, the heat developed by the current is dissipated by the fuel. When the fuel level becomes low and the thermistor is uncovered, undissipated heat results in a thermistor temperature increase and a decrease in thermistor resistance. This resistance decrease lowers the base voltage, turning off a transistor which deenergizes a relay in the thermistor control. The deenergized relay contacts connect power to the low level fuel warning light and the light comes on. At the same time, power is supplied to the master caution light, causing it to come on.

5-2.4.2. Low Sump. A low fuel level indicating thermistor (thermistor No. 4) is provided in the main sump tank to sense low fuel level in the sump tank. Operation of this circuit is the same as the low level warning circuit for the fuselage tanks.

5-3. COMPONENTS.

For a list of system components, their locations (accesses), and functions, refer to table 5-1.

5-4. OPERATIONAL CHECKOUT.

5-4.1. Fuel Quantity Indicating System.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Provide power for checkout
	Equipment required for fueling airplane		Fuel to check quantity indications

Table 5-1. Fuel Quantity Indicating System Components

Component	Access	Function
Compensator (density) (3)	Sump tank, left and right forward fuselage tanks	Provides correction to compensate for differences in fuel density.
Control, low fuel level indicating thermistor	1123-3	Connects power to the low level fuel warning light and low sump level warning light when deenergized by thermistor signal.
Indicator, fuel quantity	Instrument panel	Provides pointer indication of fuel quantity in main (M pointer) and transfer (T pointer) system tanks (and in external tanks as selected). Provides counter display of total fuel quantity, including fuel in external tanks.
Light, low level fuel warning	Caution panel, right console	On (FUEL LOW) – indicates that available fuel remaining in fuselage tanks is approximately 1,000 ($\pm$140) pounds (154 gallons) when light first comes on.

Table 5-1. Fuel Quantity Indicating System Components – CONT

Component	Access	Function
Light, low sump level warning	Caution and advisory panel, right console	On (SUMP LOW) – indicates that available fuel remaining in main sump tank is approximately 360 pounds (55 gallons) when light first comes on.
Simulator, external tanks capacitance	1123-3	Provides substitute capacitance equal to the dry capacitance of the external tank when external tanks are not installed.
Switch, fuel tank monitor	Left console	Selects desired external fuel tank for fuel quantity indicator reading (wing store station 1, 3, 6, or 8). WING – selects wing integral tank for fuel quantity indicator indication.
Thermistor No. 3, low fuel level indicating	Left forward fuselage tank	Transmits signal to deenergize the low fuel level indicating thermistor control when not immersed in fuel (low fuel level).
Thermistor No. 4, low fuel level indicating	Main sump tank	Transmits signal to deenergize the low fuel level indicating thermistor control when not immersed in fuel (low sump level).
Transmitter (fuel quantity probe), external tank (1 per tank)	External tanks	Indicates fuel quantity by providing directly proportionate changes in electrical capacitance with respect to fuel volume.
Transmitters (fuel quantity probes) Aft tank (2) Left forward tank (2) Right forward tank (2) Left midtank (2) Right midtank (2) Sump tank (1) Wing tank (12)	Fuel tanks	Indicate fuel quantity by acting as electrostatic capacitor. The fuel acts as an insulating medium, or dielectric, between two electrodes. Changes in fuel level cause directly proportionate changes in electrical conductivity between the electrodes.

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames.

NOTE

Any electrical connector disconnected during system checkout, troubleshooting, and/or maintenance shall be checked for interface damage and contamination and cleaned with methyl ethyl ketone (TT-M-261) and a stiff bristle brush before mating. Ensure that the sealing gasket is installed in fuel tank connectors.

a. Fuel airplane completely (T.O. 1A-7D-2-1).

b. If external tanks are installed, disconnect pylon harness from each tank.

c. Place fuel tank monitor switch in WING.

d. Connect external electrical power (T.O. 1A-7D-2-1).

e. Check fuel quantity indications on M needle, T needle, and TOTAL counter. Record indications and any abnormal fluctuations, needle position, etc.

f. Depress press-to-test switch on fuel quantity indicator and hold. From any indication on the scale, both the T and the M needles shall move counterclockwise at a steady rate through zero to a position below zero. The TOTAL counter shall, from any reading above zero, count down to zero and will show an arbitrary number at the upper end of the scale after passing through zero. Record results.

g. Release press-to-test switch. Needles and counter should return to within ±25 pounds of original indications. Record results.

h. Connect each external tank harness. Select appropriate station(s) with fuel tank monitor switch, and record indication (T needle).

i. Check that recorded fuel quantity indications agree with values shown in table 5-2.

Table 5-2. Indicated Fuel Quantities

Fuel tanks	Usable JP4 fuel indication ground attitude (pounds)
Main system tanks (M)	4,624 (±300)
Transfer system tanks (T)	
External tank station 1	1,950 (±100)
External tank station 3	1,950 (±100)
Wing integral tank	4,702 (±300)
External tank station 6	1,950 (±100)
External tank station 8	1,950 (±100)
All tanks (total lb)	
Without external tanks	9,326 (±750)
With external tanks	17,128 (±1,100)

j. Disconnect external electrical power (T.O. 1A-7D-2-1).

WARNING

Trichlorotrifluoroethane is toxic to respiratory tract. Use only in a well ventilated area. Avoid prolonged breathing of vapors. Breathing vapors can be fatal. Eye protection (goggles/faceshield) is required. Avoid skin contact. Keep away from open flame or hot surfaces.

NOTE

Any electrical connector disconnected during system checkout, troubleshooting, and or maintenance shall be visually inspected for corrosion, contamination and interface damage. If corroded or contaminated clean electrical connector with MIL-C-81302B (Trichlorotrifluoroethane). Use MIL-C-83360 procedures for cleaning electrical contacts. Ensure that sealing gasket is installed in fuel tank connectors.

5-4.2. Low Level Fuel Warning System.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for system checkout
	Multimeter	AN/PSM-6	Check resistance and voltage
	Fuel low level control system test set	215-00136-2 or 215-00136-3	Perform tests
	Test jumper	(Local fabrication)	Connect airplane power to test set

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following test is a reference to a corresponding number in figure FO-16.

a. Open access 1123-3.

b. Disconnect electrical connector P256 from thermistor control.

WARNING

To prevent possible injury to personnel or equipment damage, leave protective covers installed on test cable connectors not used in test setup.

NOTE

With exception of differences in test set decal nomenclatures, the following procedure is applicable for the 215-00136-2 or 215-00136-3 test set. When nomenclatures differ, the -3 test set nomenclature is followed by -2 test set nomenclature enclosed in parentheses.

c. Connect test set to electrical connector P256 and to thermistor control using test cable W1 as shown in figure 5-3.

d. Set test set controls as follows:

(1) PWR (INPUT PWR) switch in OFF.

(2) All FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) switches in OFF.

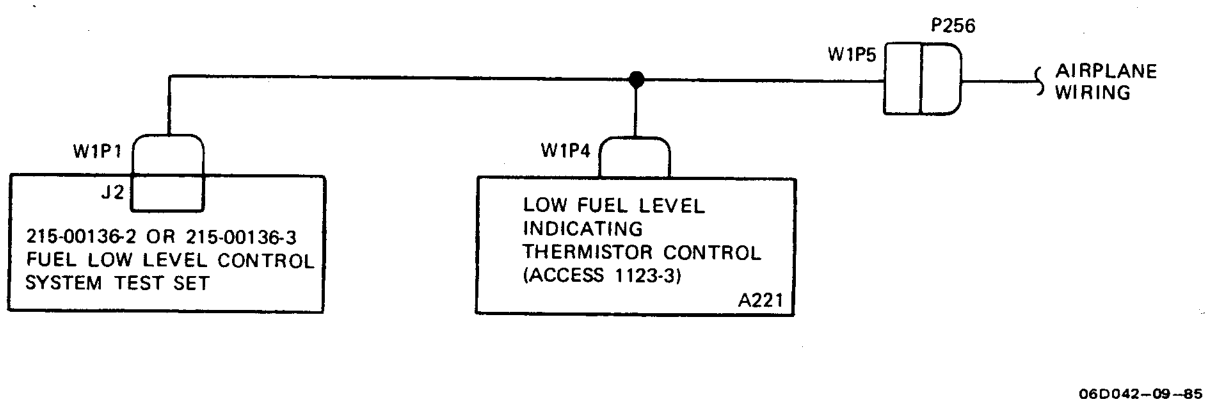


Figure 5-3. Test Setup; Low Level Fuel Warning System

(3) Both SIMULATE SENSOR 1 (SENSOR 1 SIMULATE) and SIMULATE SENSOR 2 (SENSOR 2 SIMULATE) controls rotated clockwise to 3.33 turns.

(4) CONT UNIT SELECT (CONTROL UNIT SELECT) switch in position 1.

e. Connect locally fabricated jumper (figure 5-4) between test jack J18 and J8 on test set.

f. If locally fabricated test jumper is not available, or if preferred, the following alternate procedure may be used to obtain power to test set.

(1) Open accesses 1132-1 and 2121-3.

(2) Disconnect electrical connector P285 from fuel transfer thermistor control.

(3) Connect test cable connector W1P6 to electrical connector P285.

(4) Check that CB358 is closed.

NOTE

If jumper is used, test light DC2 will come on when external electrical power is connected to airplane. If alternate procedure is used, test set lights DC3 and DC5 will come on. These lights do not have any significance in this checkout.

g. Connect external electrical power (T.O. 1A-7D-2-1). Check that test set lights DC6 through DC9 come on. {1 and 2}

h. Place test set PWR (INPUT PWR) switch in ON. Check that PWR, FUEL 1, and FUEL 2 lights come on. {3 and 4}

i. Place CONT UNIT SELECT (CONTROL UNIT SELECT) switch in 4, and check low fuel level indicating thermistor No. 3 as follows:

(1) Place THMS SELECT switch in B, and check between jacks J3 and J19 for 1.3 to 2.2 volts dc on a dry thermistor and 4.5 to 7.0 volts dc on a wet thermistor. {5}

(2) Place THMS SELECT switch in A, and check thermistor 3 for proper resistances as specified in figure 2-7. {5}

j. With CONT UNIT SELECT (CONTROL UNIT SELECT) switch in 4, check low fuel level indicating thermistor No. 4 as follows:

(1) Place THMS SELECT switch in A, and check between jacks J4 and J20 for 1.3 to 2.2 volts dc on a dry thermistor and 4.5 to 7.0 volts dc on a wet thermistor. {6}

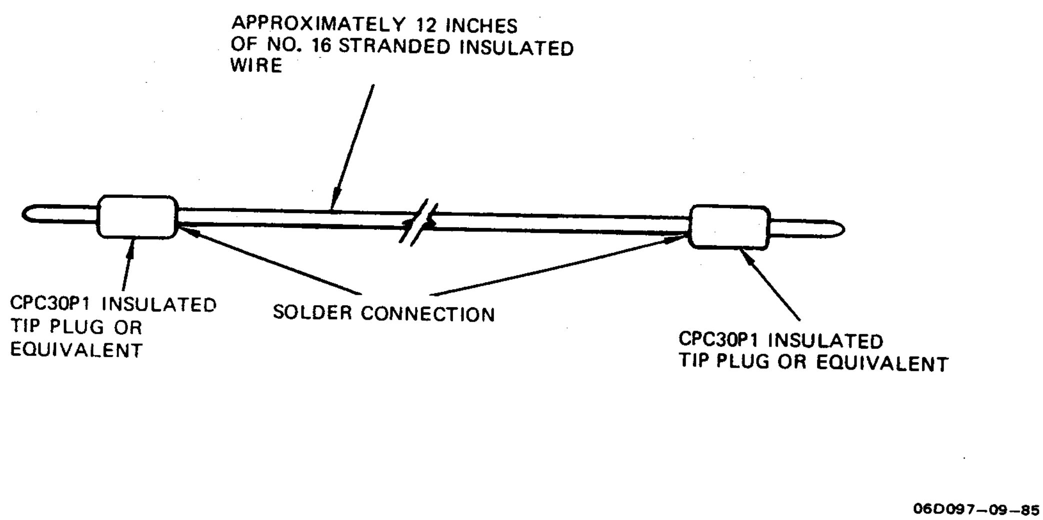


Figure 5-4. Test Jumper; Low Level Fuel

(2) Place THMS SELECT switch in B, and check thermistor 4 for proper resistances as specified in figure 2-7. {6}

k. Place CONT UNIT SELECT (CONTROL UNIT SELECT) switch in 1.

l. Rotate both SIMULATE SENSOR 1 (SENSOR 1 SIMULATE) and SIMULATE SENSOR 2 (SENSOR 2 SIMULATE) controls counterclockwise to off and then clockwise to 1.33 turns. FUEL 1 and FUEL 2 indicator lights will go off, and AIR 1 and AIR 2 indicator lights will come on. {7}

m. Place FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) 4 and FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) 5 switches in AIR. Check that SUMP LOW and FUEL LOW advisory lights in cockpit on right console come on. {8 and 9}

n. Place FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) 4 and FUEL LEVEL SIMULATE (CONTROL UNIT SIMULATE) 5 switches in OFF.

o. Place test set PWR (INPUT PWR) switch in OFF, and disconnect external electrical power.

p. Disconnect test set cable assembly from airplane wiring connector and thermistor control.

q. Connect electrical connector P256 to thermistor control.

r. Close access 1123-3.

s. If alternate procedure was used to obtain power to test set, perform the following:

(1) Connect electrical connector P285 to thermistor control.

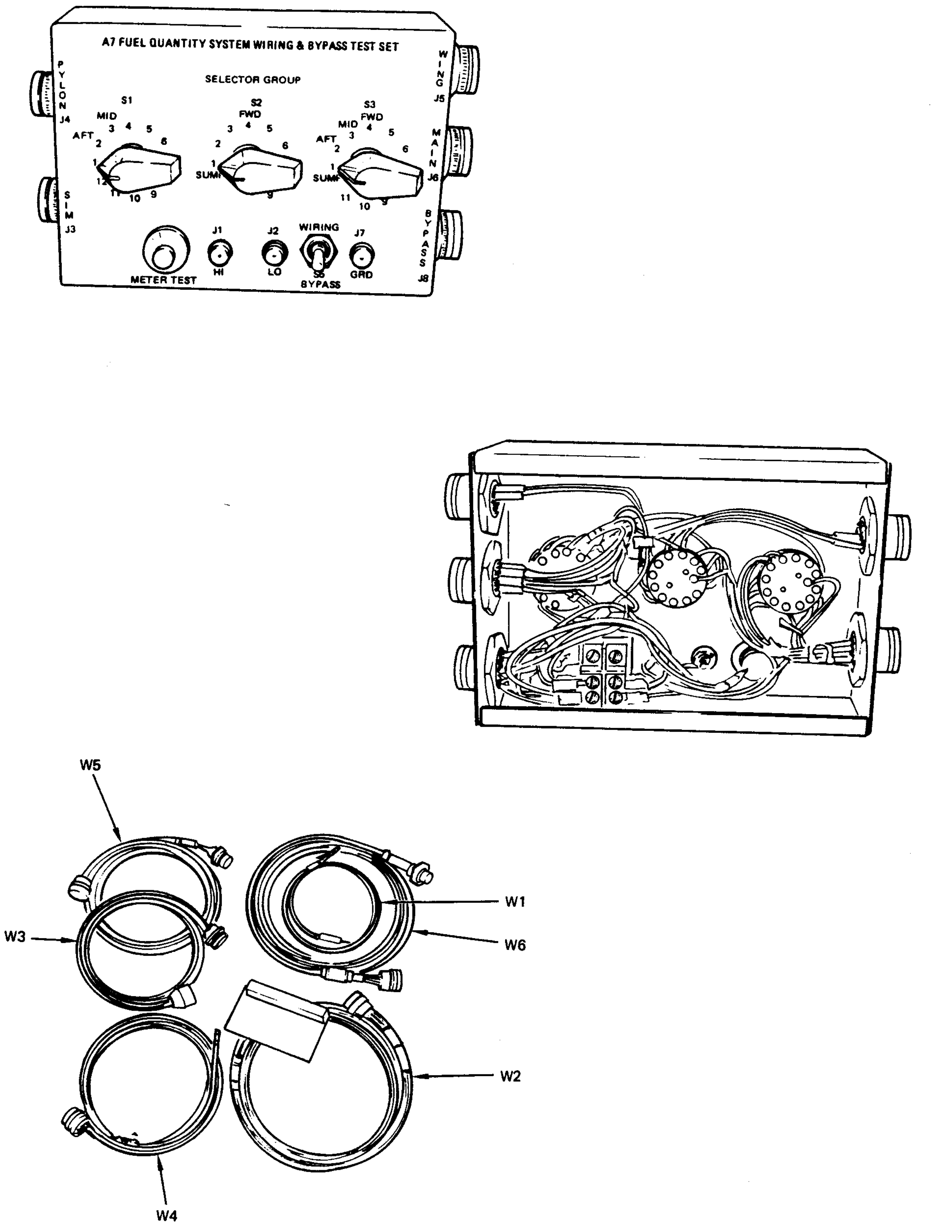
(2) Close accesses 1132-1 and 2121-3.

5-5. TROUBLESHOOTING. (Figures 5-5 and 5-6.)

Test Equipment Required

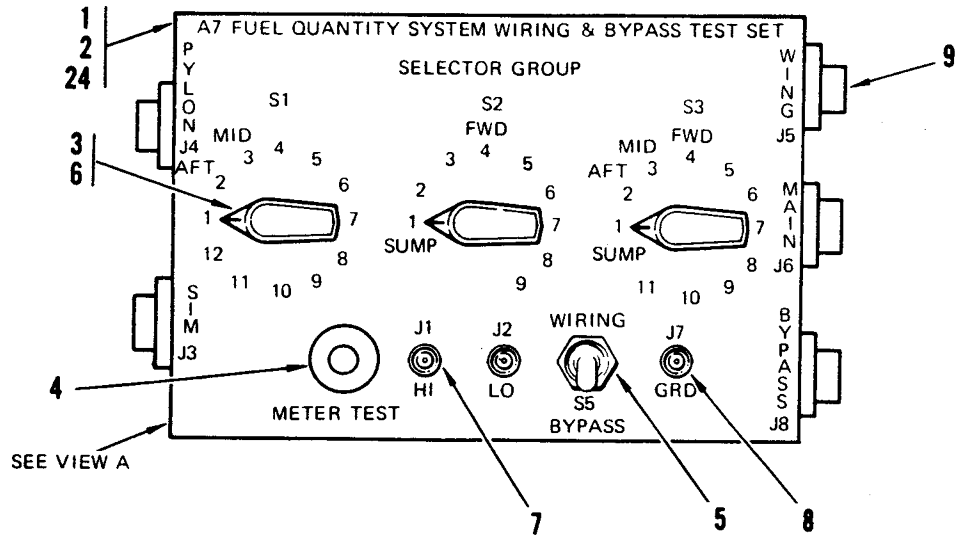
Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for checkout
	Equipment required for fueling and defueling airplane		Fuel and defuel airplane
	Multimeter	AN/PSM-6	Check continuity and voltage
5-5	Test set No. 1 – wiring and main tank bypass	Local fabrication	Perform wiring tests and simulate main tank capacitances
5-6	Test set No. 2 – external tank simulator	Local fabrication	Simulate external tank dry capacitance

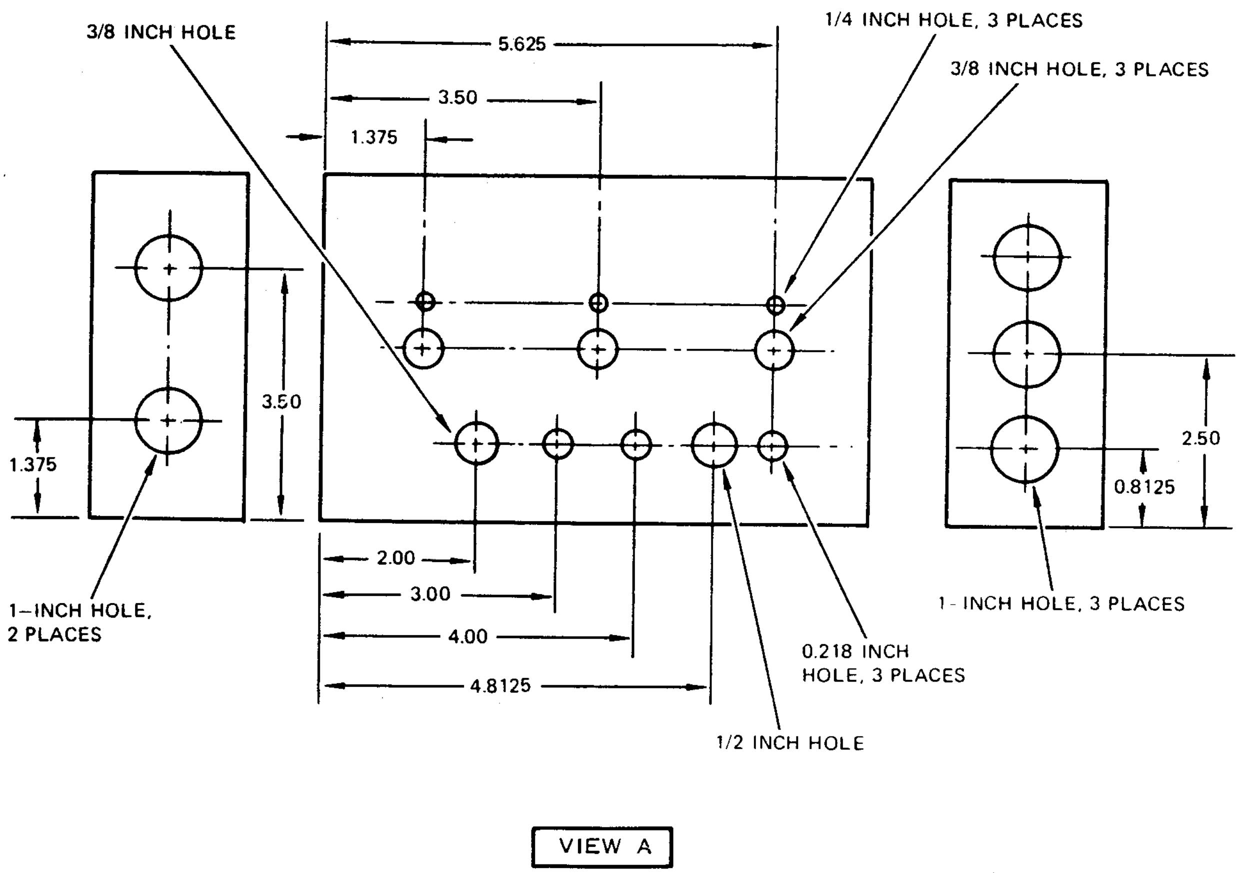
5-5.1. <u>Primary Fuel Quantity System Troubleshooting.</u> (Figures FO-12 and FO-13.) Primary troubleshooting procedures are provided in the following paragraphs (5-5.1.1 through 5-5.1.6). These procedures should quickly isolate a malfunction to a single circuit (i.e., main coax, wing shield, etc.). Reference to the schematic (figure FO-13) must then be made to further isolate the malfunction. If required, step-by-step troubleshooting is provided by the alternate procedures (paragraph 5-5.2). The sequence/method for using the primary procedures is left up to the maintenance personnel; therefore, the following paragraphs should be thoroughly understood before starting troubleshooting.



06D043-01-09-85

Figure 5-5. Test Set No. 1; Wiring and Main Tank Bypass (Sheet 1 of 6)





06D043-02-09-85

Figure 5-5. Test Set No. 1; Wiring and Main Tank Bypass (Sheet 2)

LIST OF MATERIALS				
ITEM NO.	NOMENCLATURE	PART NUMBER	QTY	FSN
1	Chassis, Aluminum, 5 X 7 X 2 Inch	270–246 (Radio Shack)	1	
2	Cover, Chassis	7 X 4 15/16 X 1/16 Inch, Aluminum	1	
3	Switch, Rotary, 12 Position (S1, S2, and S3)	32112J	3	5930–00–548–6350
4	Switch, Pushbutton (S4)	MS25089–1CR	1	5930–00–462–1802
5	Switch, DPST Toggle (S5)	MS24524–23	1	
6	Knob, Switch (1/4 Inch Shaft)	MS90120–2B01	3	5355–00–160–5910
7	Jack, Tip, Red (J1)	MS16108–7A	1	5935–00–681–5690
8	Jack, Tip, Black (J2 and J7)	MS16108–8A	2	5935–00–681–5689
9	Connector (J3, J4, J5, J6, and J8)	CVC6059C–19P	5	5935–878–1385
10	Capacitor, 51 pF (C1)	M23269/05–2072	1	
11	Capacitor, 56 pF (C2 and C3)	M23269/05–2075	1	
12	Capacitor, 68 pF (C4)	M23269/05–2081	2	
13	Capacitor, 240 pF (C5)	M23269/05–2120	1	
14	Wire, No. 20 AWG Insulated	1382	265 ft	6145–00–578–7519
15	Wire, Coax	MIL–W–71398	25 ft	6145–959–0081
16	Tip, Metal (W1P1)	576R5191104	1	6625–051–2901
17	Clip, Alligator	304 Black	1	6625–00–841–8187
18	Connector (W2P1, W3P1, W4P1, W5P1, and W6P1)	CVC6062AE–195	5	5935–878–1370
19	Board	3 X 5 X 1/16 Inch Phenolic Sheet	1	
20	Connector (W2P2)	10–285393–1P (Bendix)	1	
21	Connector (W3P2)	MS27473E20R–41R	1	
22	Connector, Coax (W4P2)	1221–304 (TRW Cinch Connector)	1	
23	Connector (W5P2 and W6P2)	CVC6059C–19P	2	
24	Screw, Machine	6–32 X 3/8 Inch	4	
25	Screw	6–32 X 5/8 Inch	1	
26	Nut	6–32	1	
27	Clamp	AN742D6	1	

06D043–03–09–85

Figure 5-5. Test Set No. 1; Wiring and Main Tank Bypass (Sheet 3)

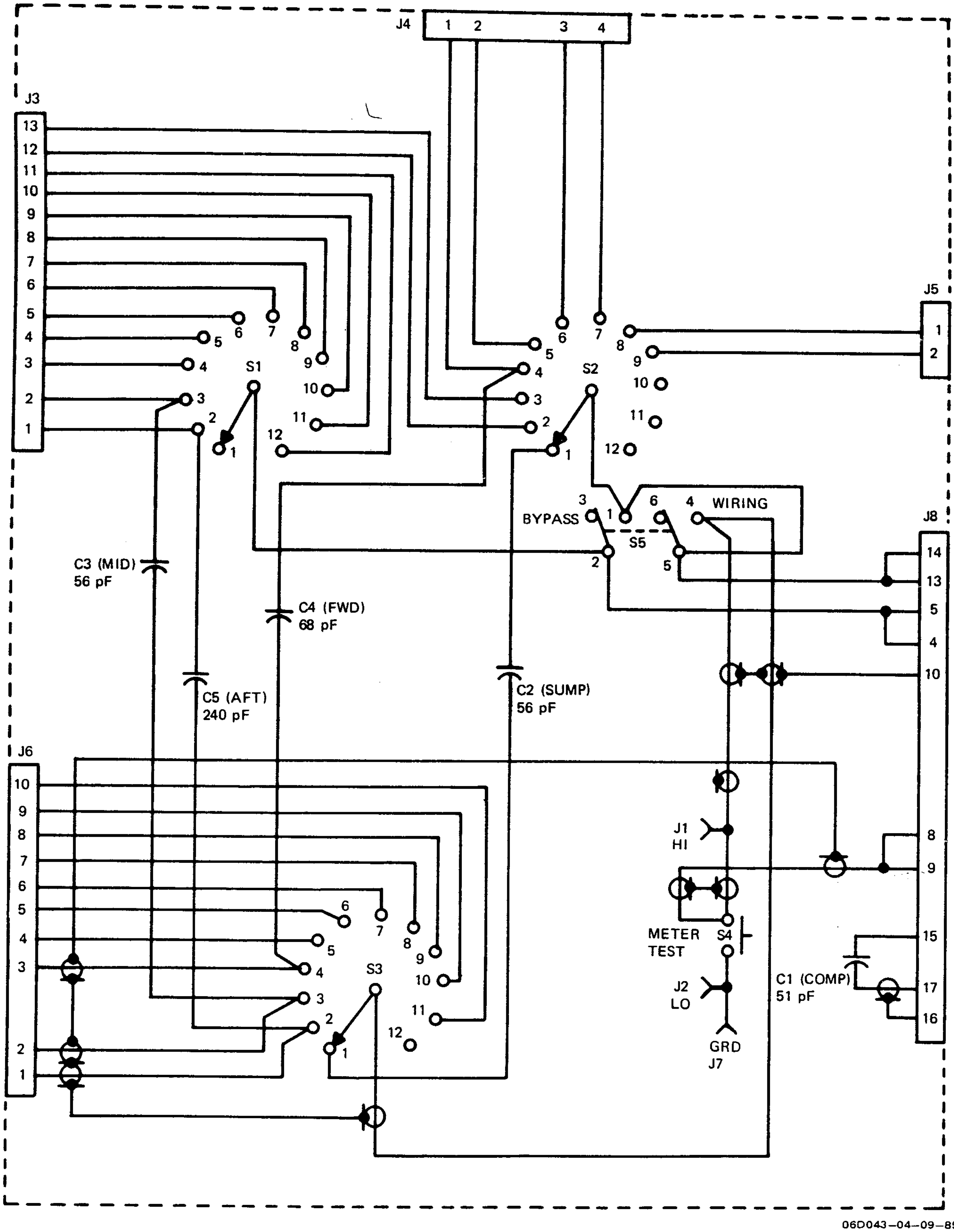
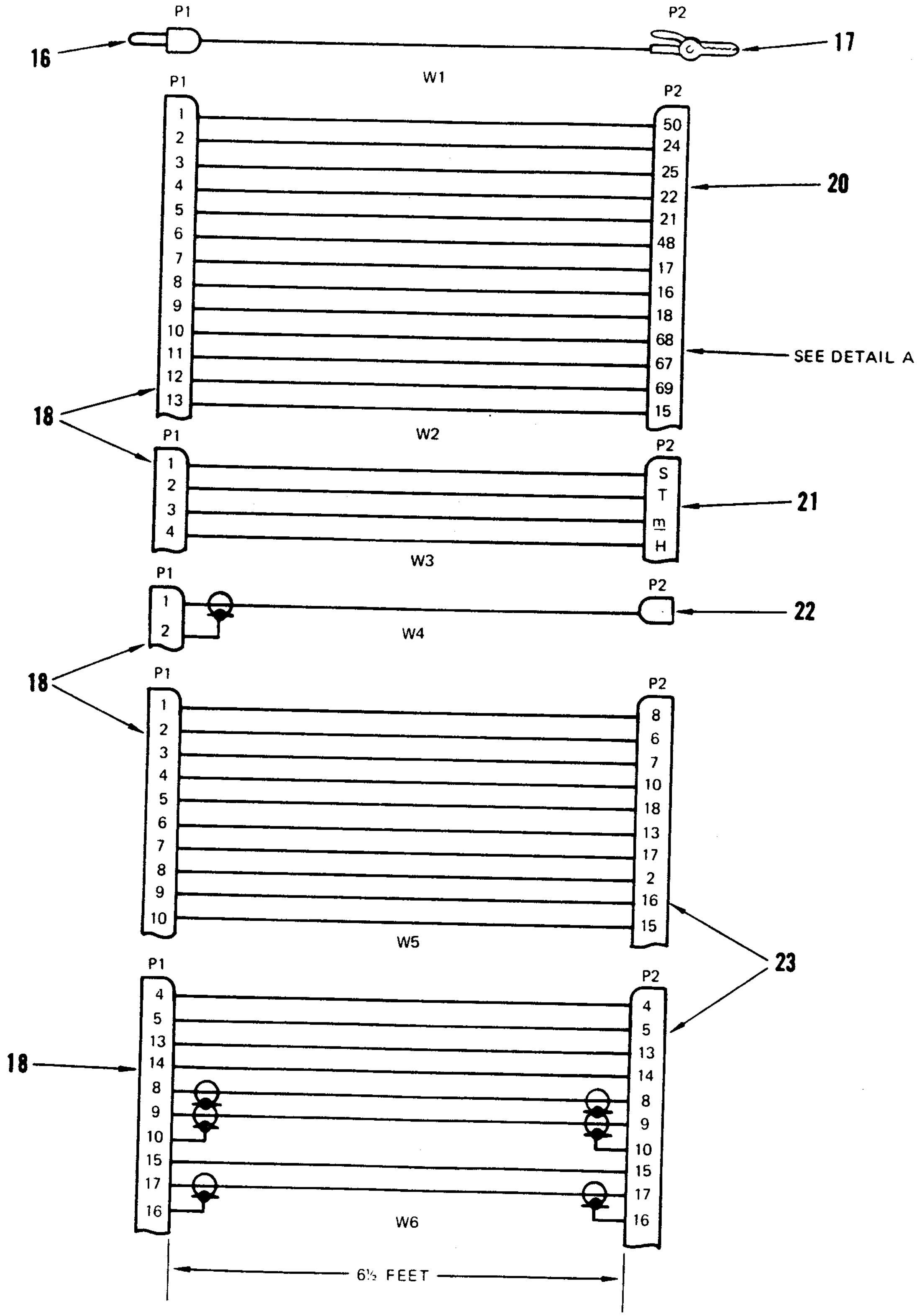
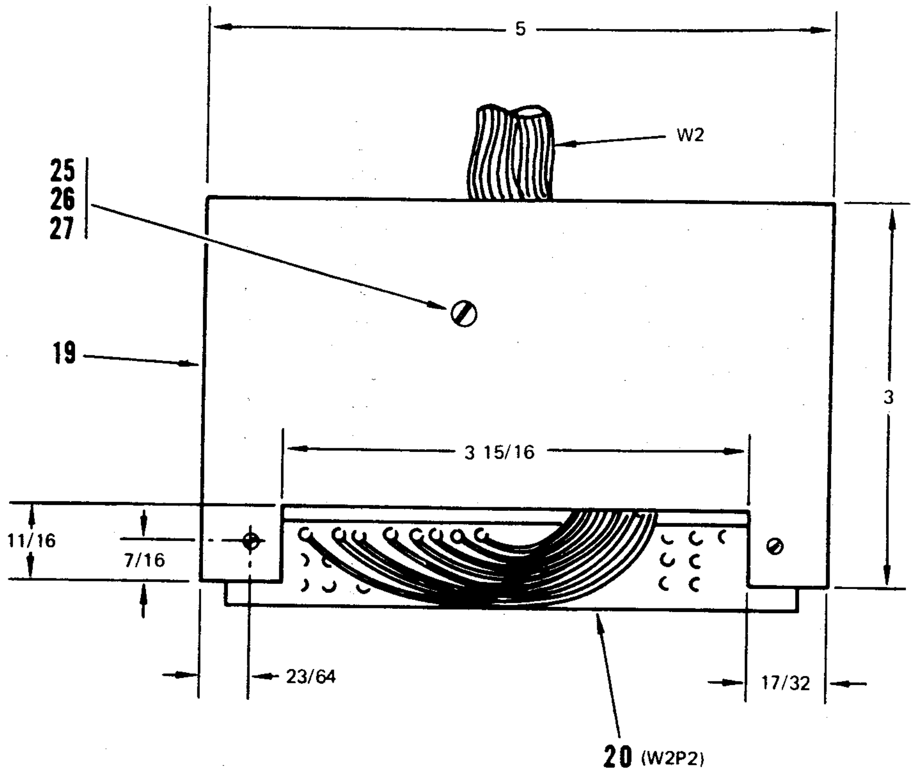


Figure 5-5. Test Set No. 1; Wiring and Main Tank Bypass (Sheet 4)



06D043-05-09-85

Figure 5-5. Test Set No. 1; Wiring and Main Tank Bypass (Sheet 5)



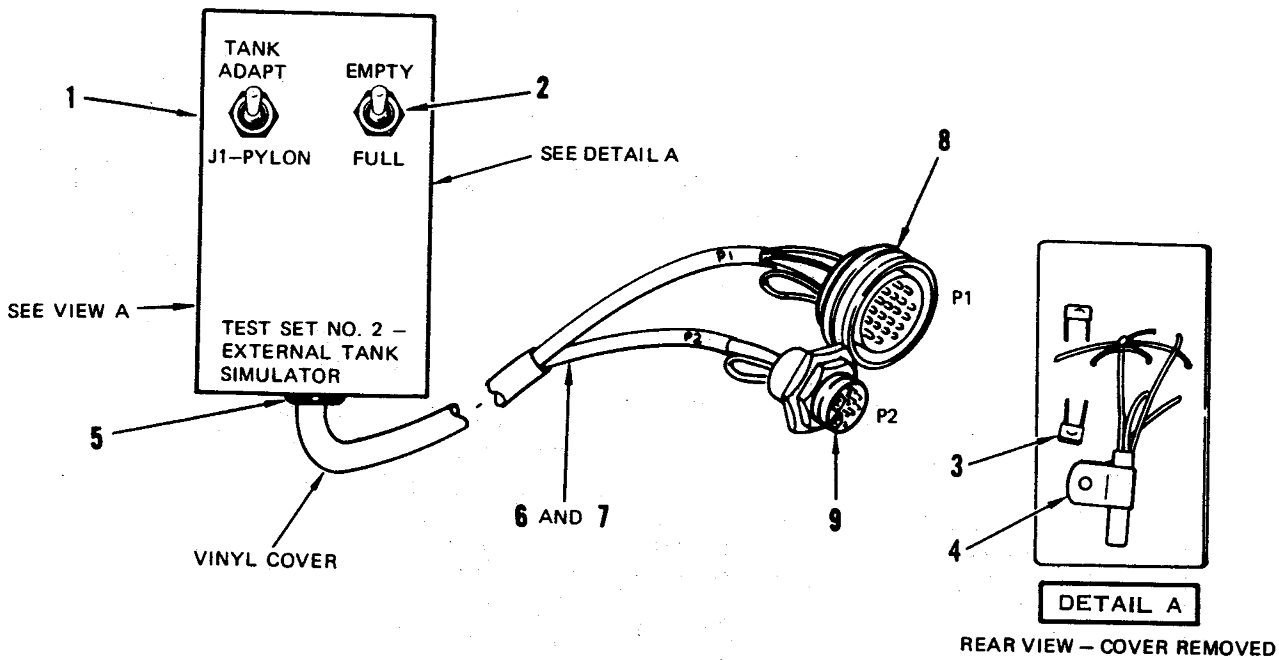
DETAIL A

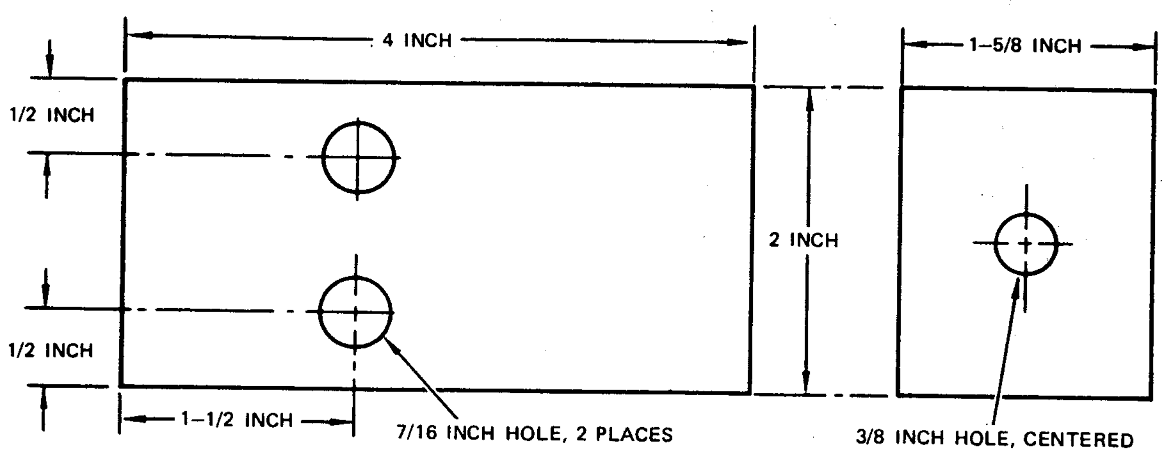
NOTE

1. Secure cover plate (2) to chassis (1) with screws (24). Drill four 0.144 inch holes in cover plate to match chassis rail. Tap holes in chassis rail with 6–32 tap.
2. All cable lengths are 6 feet, 6 inches.
3. Encapsulate connectors W2P2, W5P2, and W6P2.
4. Lead length of capacitors should be as short as possible with a maximum length of 1.2 inches.
5. All dimensions are in inches.

06D043–06–09–85

Figure 5-5. Test Set No. 1; Wiring and Main Tank Bypass (Sheet 6)





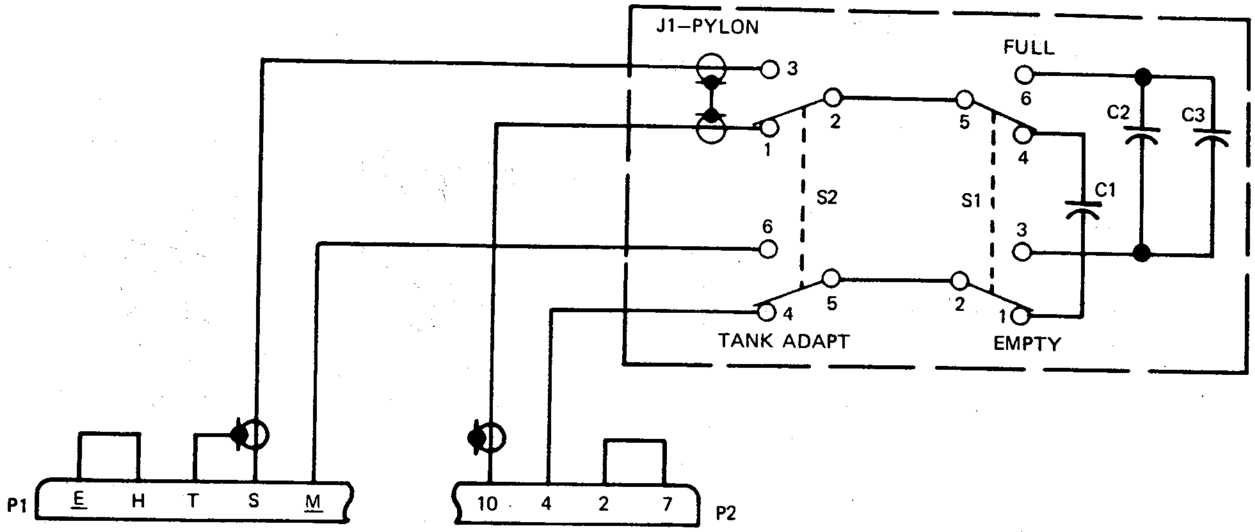
VIEW A

LIST OF MATERIALS

ITEM NO.	NOMENCLATURE	PART NUMBER	QTY	FSN
1	Mini Box, 4 X 2 X 1 5/8 Inch	270–231 (Radio Shack)	1	
2	Switch, DPDT Toggle (S1, S2)	275–666 (Radio Shack)	2	
3	Capacitor, 100 pF, ±5% (C1, C2, C3)	272–123 (Radio Shack)	3	
4	Clamp	MS21919–H6	1	
5	Grommet	3/8 Inch ID	1	
6	Wire, Coax	MIL–W–71398	4 ft	6145–959–0081
7	Wire, 22 AWG	M81044/9–22–9	16 ft	
8	Connector (P1)	JT06RE–20–41P (Bendix)	1	
9	Connector (P2)	DM5605–19–2P–691 (Deutsch)	1	

06D044–01–09–85

Figure 5-6. Test Set No. 2; External Tank Simulator (Sheet 1 of 2)



WIRING DIAGRAM

NOTE

1. Wire length from grommet to connectors should be approx. 2 ft.
2. Terminate vinyl covering approx. 6 inches from connectors.
3. Drill 1/8 inch hole in bottom of box approx. 7/8 inch from grommet and secure wiring with MS21919–H6 clamp.
4. Encapsulate connector P2.
5. Underscoring indicates lower case lettering.

06D044–02–09–85

Figure 5-6. Test Set No. 2; External Tank Simulator (Sheet 2)

NOTE

T.O. 1A-7D-2-20 provides procedures for performing time domain reflectometer (TDR) testing and troubleshooting of fuel quantity indicating system coaxial cables. When symptoms point to a possible malfunction involving coaxial cable components of the indicating system, TDR testing may be used to identify and isolate the cause of the problem.

If troubleshooting indicates that problem exists inside a fuel tank, paragraphs 5-7 and 5-9 or 5-8 and 5-10 provide procedures for checking tank capacitances and wiring.

5-5.1.1. Main Tanks Circuit Test (From P386). This test provides complete check of all main tank and compensator wiring including fuel monitor switch circuit.

a. Extend speed brake (T.O. 1A-7D-2-8).

b. Disconnect connector P386 from sump tank (left speed brake well).

c. Connect P2 of test cable W1 to a suitable airplane ground. Connect P1 to J7 on test set No. 1

d. Ensure test set SELECTOR switches S1, S2, and S3 are in position 1.

e. Place test set switch S5 in WIRING position.

f. Connect P1 of test cable W5 to J6 on test set and P2 to airplane connector P386.

g. Connect multimeter red (hi) lead to J1 and black (lo) lead to J2 on test set.

h. Place multimeter function switch in OHMS and range switch to RX1 scale. Press METER TEST switch on test set, and adjust multimeter for zero indication. Release switch.

i. Position test set SELECTOR switches S1, S2, and S3 as listed in table 5-3 to check main system circuits.

j. After testing is complete, disconnect test equipment, and reconnect P386 to sump tank.

k. Retract speed brake (T.O. 1A-7D-2-8).

Table 5-3. Main Circuit Testing From P386

Circuit tested	From P386 pin	Test set switch position S1	S2	S3	Multimeter indication (ohms)
Main coax	8	1	1	2	125 (±25)
Main shield	6	1	1	3	Less than 1
Main shield	7	1	1	4	Less than 1
Main shield	10	1	1	5	Less than 1
Main shield	18	1	1	6	Less than 1
Main lo Z	13	1	1	7	110 (±22)
Main comp coax	17	1	1	8	40 (±8)
Main comp shield	2	1	1	9	Less than 1
Main comp shield	16	1	1	10	Less than 1
Main comp lo Z	15	1	1	11	Varies with main pointer indication

5-5.1.2. Wing Tank Circuit Test (From P270). This test provides complete check of wing coax from P270 to indicator including fuel monitor switch circuit.

a. Open access 1121-3.

b. Disconnect coax connector P270 from CP208.

c. Connect P2 of test cable W1 to a suitable airplane ground. Connect P1 to J7 on fuel quantity test set No. 1.

d. Ensure test set SELECTOR switches S1, S2, and S3 are in position 1.

e. Place test set switch S5 in WIRING position.

f. Connect P1 of test cable W4 to J5 on test set and P2 to airplane connector P270.

g. Connect multimeter red (hi) lead to J1 and black (lo) lead to J2 on test set.

h. Place multimeter function switch in OHMS and range switch in RX1 scale. Press METER TEST switch on test set, and adjust multimeter for zero indication. Release switch.

i. Position test set SELECTOR switches S1, S2, and S3 as listed in table 5-4 to check wing coax circuit.

j. After testing is complete, disconnect test equipment, and reconnect P270 to CP208.

k. Close access 1121-3.

5-5.1.3. External Tank Circuit Test From Pylon. This test provides complete check of external tank wiring from pylon J1 including fuel monitor switch circuits.

NOTE

Following test is typical for all four pylons.

a. If required, disconnect adapter harness from pylon connector J1.

b. Connect P2 of test cable W1 to a suitable airplane ground. Connect P1 to J7 on fuel quantity test set No. 1.

c. Ensure test set SELECTOR switches S1, S2, and S3 are in position 1.

d. Place test set switch S5 in WIRING position.

e. Connect multimeter red (hi) lead to J1 and black (lo) to J2 on test set.

f. Place multimeter function switch in OHMS and range switch to RX1 scale. Press METER TEST switch on test set, and adjust multimeter for zero indication. Release switch.

g. Connect P1 of test cable W3 to J4 on test set. Connect P2 to pylon connector J1.

h. Position test set SELECTOR switches S1, S2, and S3 as listed in table 5-5 to check external circuits from pylon connector J1.

i. After testing is complete, disconnect test equipment.

j. If required, reconnect adapter harness to pylon connector J1.

Table 5-4. Wing Circuit Testing From P270

Circuit tested	From P270 pin	Fuel tank monitor switch position	Test set switch position S1	S2	S3	Multimeter indication (ohms)
Wing coax	Center pin	In wing	1	8	1	150 (±30)
Wing coax	Center pin	Out of wing	1	8	1	50 (±10)
Wing shield	Shell	None	1	9	1	Less than 1

Table 5-5. External Circuit Testing From Pylon

Circuit tested	From J1 pin	Fuel tank monitor switch position	Test set switch position S1	S2	S3	Multimeter indication (ohms)
Sta 1 coax	S	In 1	1	4	1	141 (±28)
Sta 1 coax	S	Out of 1	1	4	1	46 (±9)
Sta 1 shield	T	None	1	5	1	Less than 1
Sta 1 lo Z	m	None	1	6	1	190 (±38)
Sta 1 relay	H	None	1	7	1	690 (±138)
Sta 3 coax	S	In 3	1	4	1	141 (±28)
Sta 3 coax	S	Out of 3	1	4	1	48 (±10)
Sta 3 shield	T	None	1	5	1	Less than 1
Sta 3 lo Z	m	None	1	6	1	190 (±38)
Sta 3 relay	H	None	1	7	1	690 (±138)
Sta 6 coax	S	In 6	1	4	1	151 (±30)
Sta 6 coax	S	Out of 6	1	4	1	54 (±11)
Sta 6 shield	T	None	1	5	1	Less than 1
Sta 6 lo Z	m	None	1	6	1	190 (±38)
Sta 6 relay	H	None	1	7	1	690 (±138)
Sta 8 coax	S	In 8	1	4	1	156 (±31)
Sta 8 coax	S	Out of 8	1	4	1	56 (±11)
Sta 8 shield	T	None	1	5	1	Less than 1
Sta 8 lo Z	m	None	1	6	1	190 (±38)
Sta 8 relay	H	None	1	7	1	690 (±138)

5-5.1.4. External Tank Circuit Test From P267. This test provides complete check of external tank wiring from P267 including fuel tank monitor switch circuits.

a. Open access 1123-3.

b. Remove fuel quantity simulator circuit card (paragraph 5-16).

c. Connect P2 of test cable W1 to a suitable airplane ground. Connect P1 to J7 on fuel quantity test set No. 1.

d. Ensure test set SELECTOR switches S1, S2, and S3 are in position 1.

e. Place test set switch S5 in WIRING position.

f. Connect multimeter red (hi) lead to J1 and black (lo) lead to J2 on test set.

g. Place multimeter function switch in OHMS and range switch to RX1 scale. Press METER TEST switch on test set, and adjust multimeter for zero indication. Release switch.

h. Connect P1 of test cable W2 to J3 on test set. Connect P2 to airplane connector P267. Ensure P2 is completely seated with P267.

i. Position test set SELECTOR switches S1, S2, and S3 as listed in table 5-6 to check external system circuits from P267.

j. After testing is complete, disconnect test equipment.

k. Install fuel quantity simulator circuit card (paragraph 5-16).

l. Close access 1123-3.

5-5.1.5. Main Tank Transmitter/Wiring Bypass Test. This test verifies integrity of main tank transmitters and wiring by selectively inserting the simulated dry capacitance of a tank into the system and bypassing that individual tank. Wet compensator values are automatically provided to ensure proper system operation when bypassing the left forward (total), right forward (transfer), or sump tank (main).

a. Ensure airplane is completely fueled (T.O. 1A-7D-2-1).

b. Connect external electrical power (T.O. 1A-7D-2-1).

Table 5-6. External Circuit Testing From P267

Circuit tested	From P267 pin	Fuel tank monitor switch position	Test set switch position S1	S2	S3	Multimeter indication (ohms)
Sta 1 coax	50	In 1	2	1	1	140 (±28)
Sta 1 coax	50	Out of 1	2	1	1	45 (±9)
Sta 1 shield	24	None	3	1	1	Less than 1
Sta 1 shield	25	None	4	1	1	Less than 1
Sta 3 coax	22	In 3	5	1	1	140 (±28)
Sta 3 coax	22	Out of 3	5	1	1	47 (±9)
Sta 3 shield	21	None	6	1	1	Less than 1
Sta 3 shield	48	None	7	1	1	Less than 1
Sta 6 coax	17	In 6	8	1	1	150 (±30)
Sta 6 coax	17	Out of 6	8	1	1	58 (±11)
Sta 6 shield	16	None	9	1	1	Less than 1
Sta 6 shield	18	None	10	1	1	Less than 1
Sta 8 coax	68	In 8	11	1	1	155 (±31)
Sta 8 coax	68	Out of 8	11	1	1	55 (±11)
Sta 8 shield	67	None	12	1	1	Less than 1
Sta 8 shield	67	None	1	2	1	Less than 1
Simulator lo Z	15	None	1	3	1	190 (±38)

c. Note and record main (M) pointer indication.

d. Shut down electrical power to airplane.

e. Connect P1 of test cable W6 to J8 on fuel quantity test set No. 1.

f. Place test set switch S5 in BYPASS position.

g. Verify left forward tank as follows:

(1) Remove access 1123-3.

(2) Disconnect P263 from tank.

(3) Connect P2 of test cable W6 to P263.

(4) Place test set SELECTOR switches S2 and S3 in FWD.

(5) Apply electrical power to airplane.

(6) Main (M) pointer should decrease 560 (±120) pounds from value recorded in step c.

(7) Shut down electrical power.

(8) Disconnect test cable W6 from P263, and connect P263 to tank.

(9) Apply electrical power, and check that indicator returns to original indication. Shut down electrical power.

h. Verify right forward tank as follows:

(1) Remove access 2123-3.

(2) Disconnect P264 from tank.

(3) Connect P2 of test cable W6 to P264.

(4) Place test set SELECTOR switches S2 and S3 in FWD.

(5) Apply electrical power to airplane.

(6) Main (M) pointer should decrease 560 (±120) pounds from value recorded in step c.

(7) Shut down electrical power.

(8) Disconnect test cable W6 from P264, and connect P264 to tank.

(9) Apply electrical power, and check that indicator returns to original indication. Shut down electrical power.

i. Verify left mid tank as follows:

(1) Disconnect P3051 from tank (left wheel well).

(2) Connect P2 of test cable W6 to P3051.

(3) Place test set SELECTOR switches S1 and S3 in MID.

(4) Apply electrical power to airplane.

(5) Main (M) pointer should decrease 475 (±100) pounds from value recorded in step c.

(6) Shut down electrical power.

(7) Disconnect test cable W6 from P3051, and connect P3051 to tank.

(8) Apply electrical power, and check that indicator returns to original indication. Shut down electrical power.

j. Verify right mid tank as follows:

(1) Disconnect P3052 from tank (right wheel well).

(2) Connect P2 of test cable W6 to P3052.

(3) Place test set SELECTOR switches S1 and S3 in MID.

(4) Apply electrical power to airplane.

(5) Main (M) pointer should decrease 475 (±100) pounds from value recorded in step c.

(6) Shut down electrical power.

(7) Disconnect test cable W6 from P3052, and connect P3052 to tank.

(8) Apply electrical power, and check that indicator returns to original indication. Shut down electrical power.

k. Verify aft tank as follows:

(1) Remove access 5222-1.

(2) Disconnect P3053 from tank.

(3) Connect P2 of test cable W6 to P3053.

(4) Place test set SELECTOR switches S1 and S3 in AFT.

(5) Apply electrical power to airplane.

(6) Main (M) pointer should decrease 2,000 (±350) pounds from value recorded in step c.

(7) Shut down electrical power.

(8) Disconnect test cable W6 from P3053, and connect P3053 to tank.

(9) Apply electrical power, and check that indicator returns to original indication. Shut down electrical power.

l. Verify sump tank as follows:

(1) Lower speed brake (T.O. 1A-7D-2-8).

(2) Disconnect P386 from tank.

(3) Connect P2 of test cable W6 to P386.

(4) Place test set SELECTOR switches S2 and S3 in SUMP.

(5) Apply electrical power to airplane.

(6) Main (M) pointer should decrease 500 (±100) pounds from value recorded in step c.

(7) Shut down electrical power.

(8) Disconnect test cable W6 from P386, and connect P386 to tank.

(9) Apply electrical power, and check that indicator returns to original indication. Shut down electrical power.

m. Disconnect electrical power from airplane (T.O. 1A-7D-2-1).

n. Close accesses 1123-3, 2123-3, and/or 5222-1 as required.

o. Retract speed brake (T.O. 1A-7D-2-8) if required.

5-5.1.6. <u>External Tank Simulation Test.</u> This test quickly isolates an external system malfunction to either airplane wiring or the external tank by inserting the simulated dry capacitance of the tank into the system of the pylon. This test will also isolate a defective pylon adapter harness and/or adapter connector.

a. Disconnect connector P919 from each external tank.

b. Connect external electrical power (T.O. 1A-7D-2-1).

c. Note and record indication on total counter of fuel quantity indicator.

d. Shut down electrical power to airplane.

e. Connect P2 of fuel quantity test set No. 2 to airplane connector P919 (disconnected in step a).

f. Place test set switches in TANK ADAPT and EMPTY.

g. Place fuel tank monitor switch in station being tested.

h. Apply external electrical power.

i. Observe fuel quantity indicator. Transfer (T) pointer should indicate 0 (+300, -100) pounds. Total counter should indicate within 300 pounds of value recorded in step c.

j. Place test set EMPTY/FULL switch in FULL. Transfer (T) pointer should indicate 2,500 (±200) pounds. Total counter should indicate 2,500 (±200) pounds more than value recorded in step c.

k. Shut down electrical power to airplane.

l. If indications in steps i and j were correct, external tank is defective. If indications were not correct, perform the following:

(1) Disconnect connector P905 from pylon connector J1.

(2) Connect P1 of test set No. 2 to pylon connector J1.

(3) Place test set switches in J1-PYLON and EMPTY.

(4) Apply external electrical power.

(5) Observe fuel quantity indicator. Transfer (T) pointer should indicate 0 (+300, −100) pounds. Total counter should indicate within 300 pounds of value recorded in step c.

(6) Place test set EMPTY/FULL switch in FULL. Transfer (T) pointer should indicate 2,500 (±200) pounds. Total counter should indicate 2,500 (±200) pounds more than value recorded in step c.

(7) Shut down electrical power to airplane.

(8) If indications in substeps (5) and (6) were correct, adapter harness W919 or adapter connector W905 is defective. Isolate defective component using multimeter. (See figure FO-13 for schematic.)

(9) If indications in substeps (5) and (6) were not correct, problem exists in airplane wiring. Refer to paragraphs 5-5.1.3 and 5-5.1.4 for additional test procedures.

m. Repeat steps e through l for other pylons if required.

n. Disconnect external electrical power (T.O. 1A-7D-2-1).

o. Disconnect test equipment from pylon.

p. Reconnect adapter harness connector P905 to pylon connector J1 as required.

q. Reconnect P919 to each external tank.

5-5.2. Alternate Fuel Quantity System Troubleshooting. (Figures FO-12 and FO-13.) Alternate troubleshooting procedures are provided in figure FO-14. FO-14 provides step-by-step procedures for isolating system malfunctions to a specific component or section of wiring. The procedures are based on performing the operational checkout (paragraph 5-4.1) to establish trouble symptoms as indicated by the fuel quantity indicator. If trouble symptoms are known (with tanks full), troubleshooting may be accomplished without reference to the operational checkout. An index, on first sheet of figure FO-14, provides maintenance personnel with a list of malfunctions and the proper isolation procedure(s) for each malfunction. Probable cause of each malfunction is also provided.

NOTE

T.O. 1A-7D-2-20 provides procedures for performing time domain reflectometer (TDR) testing and troubleshooting of fuel quantity indicating system coaxial cables. When symptoms point to a possible malfunction involving coaxial cable components of the indicating system, TDR testing may be used to identify and isolate the cause of the problem.

5-5.3. Low Level Fuel Warning System. (Figure FO-15.) See figure FO-16 for troubleshooting information. Malfunctions in the figure are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout.

5-6. MAIN SYSTEM INDIVIDUAL TRANSMITTER CHECK. (Figure 5-7.)

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
5-7	Multimeter	AN/PSM-36 (or equivalent)	Check resistance

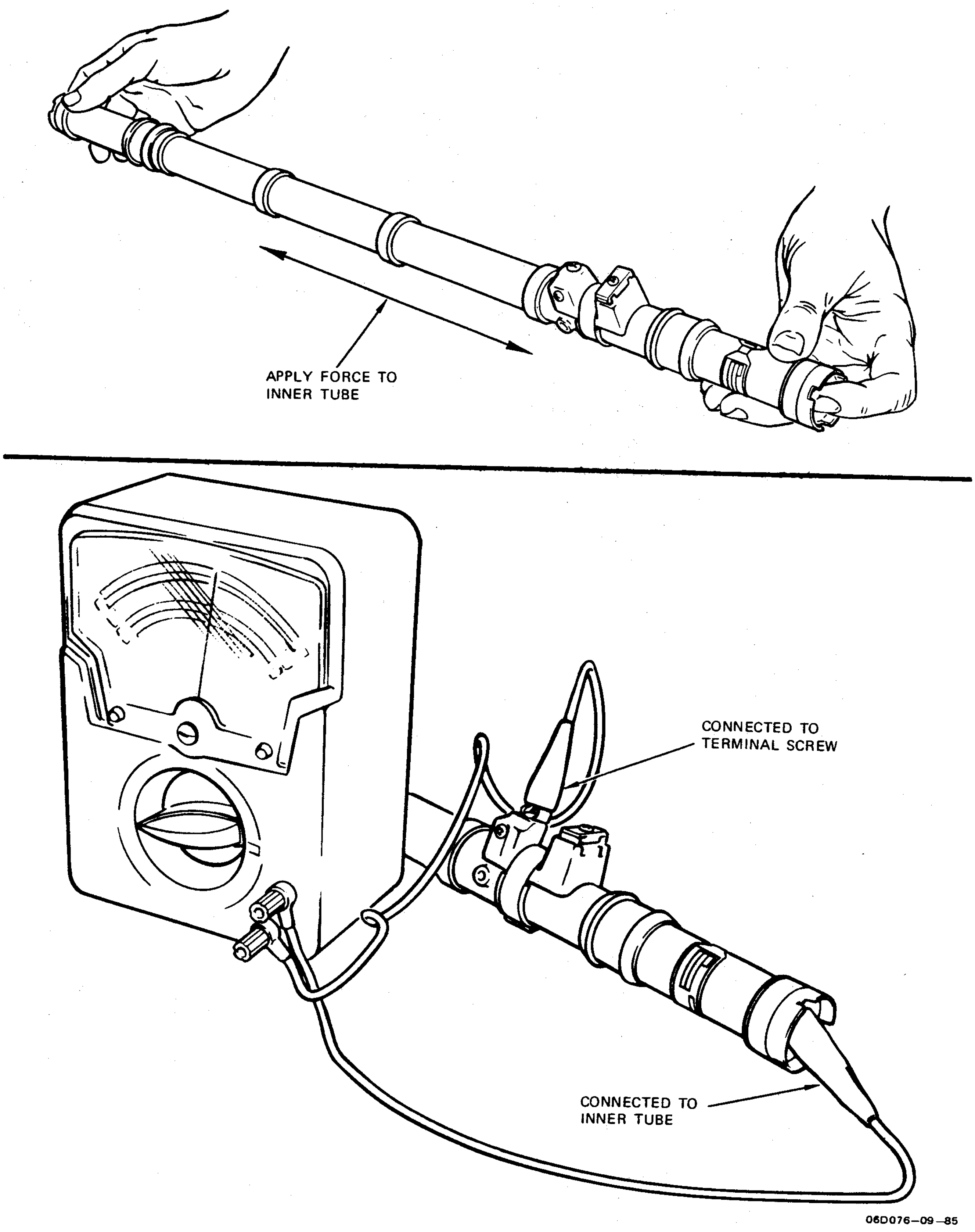


Figure 5-7. Transmitter Check; Main System

NOTE

The following checks are performed with transmitter removed from airplane to determine if transmitter is defective.

a. While holding transmitter in hands, alternately apply axial force to ends of inner tube with fingers. Any movement in relation to outer tube is cause for rejection.

b. Connect multimeter to measure resistance between terminal screw and inner tube as shown. Ensure terminal screw is tight. Continuity must be present.

c. Lightly tap on outer tube, especially in area of terminal block, while checking multimeter for variation in resistance. Variation greater than 0.5 ohm is cause for rejection.

5-7. MAIN TANK TRANSMITTER/WIRING CHECKS (USING GTF-6 TEST SET).

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for checks
	Capacitance-type fuel quantity gage test set	GTF-6	Perform checks
	Flight line fuel quantity gaging test set	215-01031-1	Perform checks

WARNING

Do not use a standard megger to perform insulation resistance checks on tank probes or associated circuitry. To do so may result in insulation and/or dielectric breakdown. The voltage output of the megger is sufficient to produce heat or an arc which could result in fire or an explosion. The megohmmeter section of the GTF-6 test set should be used to perform insulation resistance checks.

To prevent spilled fuel and reduce fire hazard when troubleshooting a fueled airplane, defuel airplane (T.O. 1A-7D-2-1) before performing repairs inside any fuel tank.

Failure to ground the GTF-6 fuel quantity gage test set to both aircraft and earth ground could result in damaged airplane and personnel injury.

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames.

NOTE

Individual fuel tank transmitter capacitances are given in table 5-7.

If transmitter and wiring check good, a low megohm value may indicate a buildup of dark residue around transmitter electrical terminals. Remove transmitter, and clean terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

If care is taken not to disturb the seal generated by MIL-S-8802 coating, the probe may be installed immediately in an empty fuel tank; however, a minimum of 6 hours curing time is required before immersion of probe in fuel.

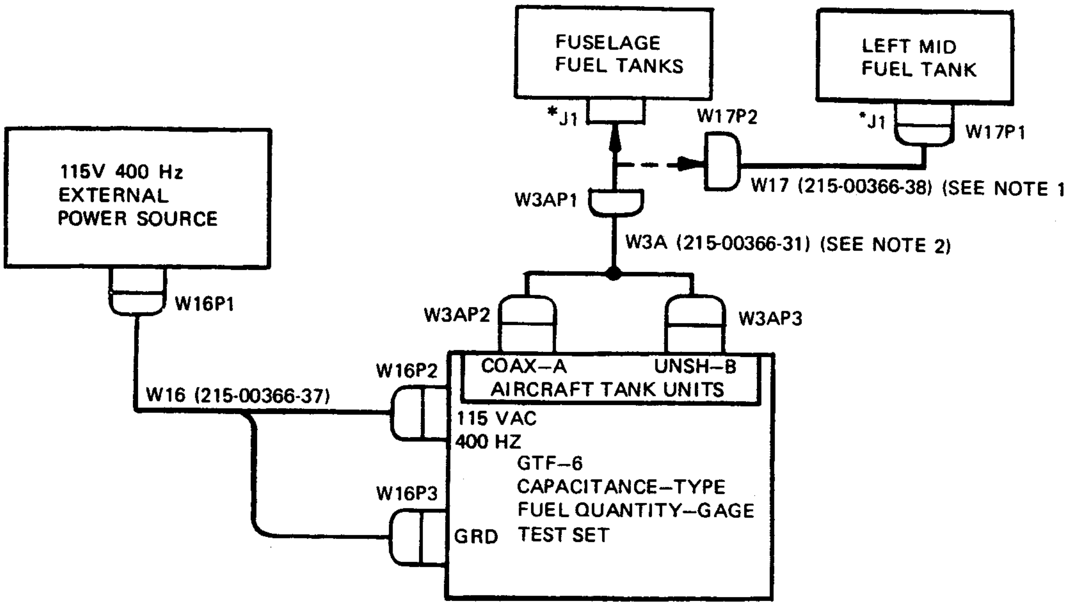
5-7.1. Preparation.

a. Fuel or defuel airplane completely (T.O. 1A-7D-2-1).

b. Connect test equipment as shown in figure 5-8, except do not connect test cable to fuel tank connector J1.

Table 5-7. Fuselage Transmitter and Compensator Capacitance Values

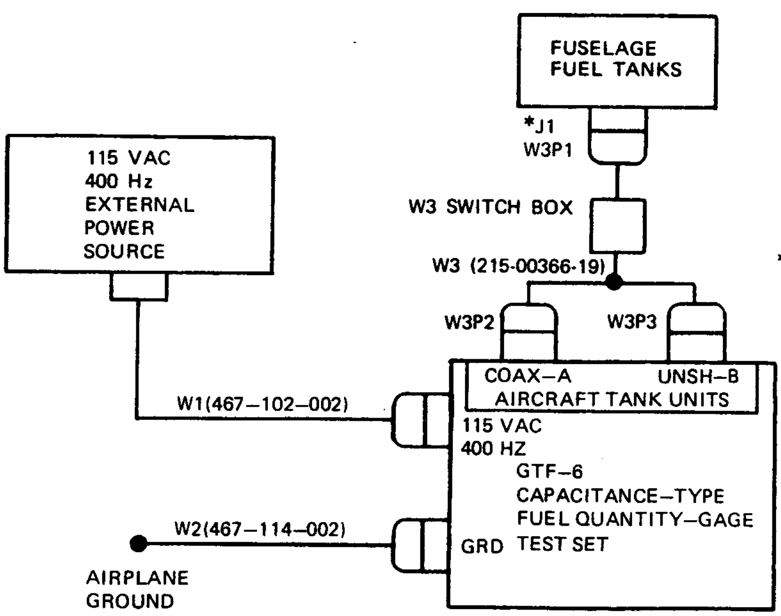
Fuel tank and component	Location in tank	Capacitance (pf) (airplane defueled)	Capacitance (pf) (airplane fueled)
Left forward tank			
Transmitter	Forward	31.52 to 33.52	59.31 to 80.25
Transmitter	Aft	30.73 to 32.73	57.43 to 77.71
Total compensator	Aft	25 to 30	45 to 59
Right forward tank			
Transmitter	Forward	31.52 to 33.52	59.31 to 80.25
Transmitter	Aft	30.73 to 32.73	57.43 to 77.71
Transfer compensator	Aft	25 to 30	45 to 59
Left mid tank			
Transmitter	Forward	25.20 to 27.20	47.77 to 64.63
Transmitter	Aft	26.62 to 28.62	50.36 to 68.14
Right mid tank			
Transmitter	Forward	25.20 to 27.20	47.77 to 64.63
Transmitter	Aft	26.62 to 28.62	50.36 to 68.14
Sump tank			
Transmitter		53.06 to 55.06	98.99 to 133.93
Main compensator		25 to 30	45 to 59
Aft tank			
Transmitter	Upper right forward	80.78 to 82.38	149.41 to 202.15
Transmitter	Lower left aft	145.99 to 148.99	269.91 to 365.17



TEST SETUP (See Alternate Setup)

NOTE

1. Cable 215-00366-38 is used to aid making connection to the left mid fuselage tank connector.
2. Cable 215-00366-19 is acceptable alternate for 215-00366-31.



ALTERNATE TEST SETUP

* J1 (mates with P263) left forward fuselage tank, access 1123-5 (switch position 3, if using cable W3)

J1 (mates with P264) right forward fuselage tank, access 2123-5 (switch position 1, if using cable W3)

J1 (mates with P3051) left midfuselage tank, left wheel well, (switch position 4, if using cable W3)

J1 (mates with P3052) right midfuselage tank, right wheel well, (switch position 2, if using cable W3)

J1 (mates with P3053) aft fuselage tank, access 5222-4 (switch position 5, if using cable W3)

J1 (mates with P386) main sump tank, speed brake well (switch position 6, if using cable W3)

06D104–09–85

Figure 5-8. Test Setup (Using GTF-6 Test Set); Main Tank Transmitter/Wiring

c. Perform GTF-6 calibration in accordance with CALIBRATION OF TEST SET on instruction placard.

d. Place GTF-6 DISPLAY SELECT switch in CAP (pf) and CAPACITANCE-FUNCTION switch in A/C TEST-UNSH.

e. Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

5-7.2. Left Forward Tank.

a. Perform preparation procedures (paragraph 5-7.1).

b. Disconnect P263 from left forward tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 13 and 14 of connector W3P1.

NOTE

Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

d. Hold shell of test connector to shell of fuel tank connector J1. Place W3 switch in position 3 if using cable W3. Record capacitance indication.

e. Remove jumper wires, and connect test cable to fuel tank connector J1. Check that left forward fuselage tank transmitter capacitance, minus capacitance recorded in step d, is 62.25 to 66.25 pf (defueled) or 116.75 to 157.95 pf (fueled).

f. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-C, A-GND, B-GND, and C-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms between 8 and 14 (A-B position), 8 and ground (A-GND position), and 14 and ground (B-GND position) of tank connector J1.

g. Disconnect test cable from left forward tank, and reconnect connector P263.

5-7.3. Right Forward Tank.

a. Perform preparation procedures (paragraph 5-7.1).

b. Disconnect connector P264 from right forward tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 13 and 14 of connector W3P1.

NOTE

Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

d. Hold shell of test connector to shell of right forward tank connector J1. Place W3 switch in position 1 if using cable W3. Place DISPLAY SELECT switch in CAP (pf). Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1 on tank. Check that capacitance of transmitters, minus capacitance recorded in step d, is 62.25 to 66.25 pf (defueled) or 116.75 to 157.95 pf (fueled).

f. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-C, A-GND, B-GND, and C-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms between pins 9 and 14 (A-B position), 9 and ground (A-GND position), and 14 and ground (B-GND position) of tank connector J1.

g. Disconnect test cable from right forward tank, and reconnect connector P264.

5-7.4. Right Midfuselage Tank.

a. Perform preparation procedures (paragraph 5-7.1).

b. Disconnect P3052 from right midfuselage tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 4 and 5 of connector W3P1.

NOTE

Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

d. Hold shell of test connector to shell of right midfuselage tank connector J1. Place W3 switch in position 2 if using cable W3. Place DISPLAY SELECT switch in CAP (pf). Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1. Check that right midfuselage tank transmitter capacitance, minus capacitance recorded in step d, is 51.82 to 55.82 pf (defueled) or 98.13 to 132.77 pf (fueled).

f. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-C, A-GND, B-GND, and C-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms between pins 8 and 5 (A-B position), 8 and ground (A-GND position), and 5 and ground (B-GND position) of tank connector J1.

g. Disconnect test cable from right midfuselage tank, and reconnect P3052.

5-7.5. Left Midfuselage Tank.

a. Perform preparation procedures (paragraph 5-7.1).

b. Disconnect P3051 from left midfuselage tank.

c. Connect adapter cable W17 to cable W3A or W3.

d. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 4 and 5 of connector W3P1 or W17P1.

NOTE

Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

e. Hold shell of test connector to shell of left midfuselage tank connector J1. Place W3 switch in position 4 if using cable W3. Place DISPLAY SELECT switch in CAP (pf). Record capacitance indication.

f. Remove jumper wires, and connect test cable to J1 on tank. Check that capacitance of transmitters, minus capacitance recorded in step e, is 51.82 to 55.82 pf (defueled) or 98.13 to 132.77 pf (fueled).

g. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-GND, B-GND, and C-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms between pins 5 and 8 (A-B position), 5 and ground (B-GND position), and 8 and ground (A-GND position) of tank connector J1.

h. Disconnect test cable from left midfuselage tank, and reconnect P3051.

5-7.6. Aft Tank.

a. Perform preparation procedures (paragraph 5-7.1).

b. Disconnect P3053 from aft tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 4 and 5 of connector W3P1.

NOTE

Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

d. Hold shell of test connector to shell of aft fuel tank connector J1. Place W3 switch in position 5 if using cable W3. Place DISPLAY SELECT switch in CAP (pf). Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1. Check that aft fuel tank transmitter capacitance, minus capacitance recorded in step d, is 226.77 to 231.37 pf (defueled) or 419.72 to 567.12 pf (fueled).

f. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-C, A-GND, B-GND, and C-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms between pins 8 and 4 (A-B position), 8 and ground (A-GND position), and 4 and ground (B-GND position) of tank connector J1.

g. Disconnect test cable from aft tank, and reconnect P3053.

5-7.7. Sump Tank.

a. Perform preparation procedures (paragraph 5-7.1).

b. Disconnect P386 from main sump tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 13 and 14 of connector W3P1.

NOTE

Set CAPACITANCE-RANGE (pF) switch to lowest range that will give non-blinking reading.

d. Hold shell of test connector to shell of connector J1. Place W3 switch in position 6 if using cable W3. Place DISPLAY SELECT switch in CAP (pf). Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1 on tank. Check that transmitter capacitance, minus the capacitance recorded above, is 53.06 to 55.06 pf (defueled) or 98.99 to 133.93 pf (fueled).

f. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-C, A-GND, B-GND, and C-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms between pins 8 and 13 (A-B position), 8 and ground (A-GND position), and 13 and ground (B-GND position) of tank connector J1.

g. Disconnect test cable from sump tank, and reconnect P386.

5-8. MAIN TANK TRANSMITTER/WIRING CHECKS (USING TF-20-1 TEST SET).

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for checks
	Capacitance-type liquid quantity system test set	TF-20-1	Perform checks
	Flight line fuel quantity gaging test set	215-01031-1	Perform checks

WARNING

Do not use a standard megger to perform insulation resistance checks on tank probes or associated circuitry. To do so may result in insulation and/or dielectric breakdown. The voltage output of the megger is sufficient to produce heat or an arc which could result in fire or an explosion. The megohmmeter section of the TF-20-1 test set should be used to perform insulation resistance checks.

To prevent spilled fuel and reduce fire hazard when troubleshooting a fueled airplane, defuel airplane (T.O. 1A-7D-2-1) before performing repairs inside any fuel tank.

Failure to ground the TF-20-1 fuel quantity gaging test set to both aircraft and earth ground could result in damaged aircraft and personnel injury.

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames.

NOTE

Individual fuel tank transmitter capacitances are given in table 5-7.

If transmitter and wiring check good, a low megohm value may indicate a buildup of dark residue around transmitter electrical terminals. Remove transmitter, clean terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush, and reinstall.

If care is taken not to disturb the seal generated by MIL-S-8802 coating, the probe may be installed immediately in an empty fuel tank; however, a minimum of 6 hours curing time must elapse prior to immersion of probe in fuel.

5-8.1. Preparation.

a. Fuel or defuel airplane completely (T.O. 1A-7D-2-1).

b. Connect test equipment as shown in figure 5-9, except do not connect test cable to fuel tank connector J1.

c. Place TF-20-1 test set power switch in ON. Allow a 10-minute warmup period.

d. Perform TF-20-1 calibration in accordance with CALIBRATION OF TESTER FOR USE on instruction placard.

e. Place TF-20-1 FUNCTION SELECTOR switch in TANK UNIT TEST UNSH position and CAP-RES CHECK switch in CAP.

5-8.2. Left Forward Tank.

a. Perform preparation procedures (paragraph 5-8-1).

b. Disconnect P263 from left forward tank.

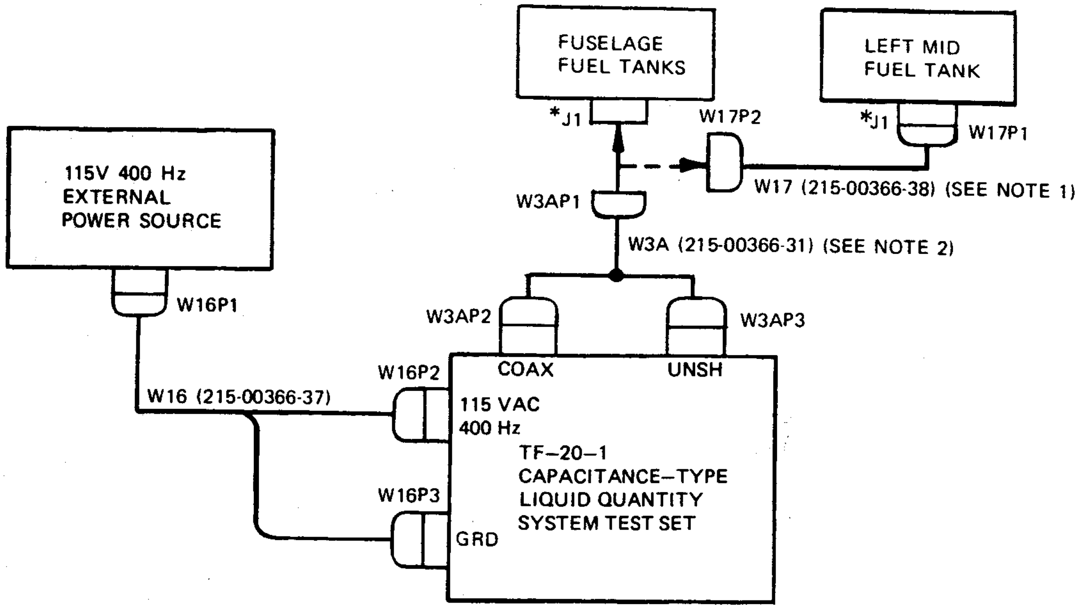
c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 13 and 14 of connector W3P1.

d. Hold shell of test connector to shell of fuel tank connector J1. Place W3 switch in position 3 if using cable W3. Record capacitance indication.

e. Remove jumper wires, and connect test cable to fuel tank connector J1. Check that left forward fuelage tank transmitter capacitance, minus capacitance recorded in step d, is 62.25 to 66.25 pf (defueled) or 116.75 to 157.95 pf (fueled).

f. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD. Check for minimum resistance of 20 megohms between 8 and 14 (A-B position), 8 to ground (A-GRD position), and 14 to ground (B-GRD position) of J1 on tank.

g. Disconnect test cable from left forward tank, and reconnect connector P263.

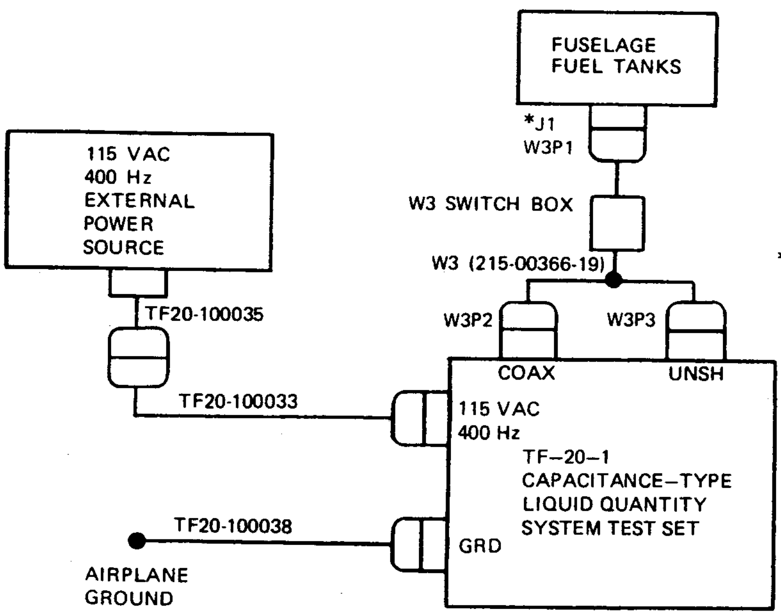


TEST SETUP (See Alternate Setup)

NOTE

1. Cable 215-00366-38 is used to aid making connection to the left mid fuselage tank connector.

2. Cable 215-00366-19 is acceptable alternate for 215-00366-31.



ALTERNATE TEST SETUP

* J1 (mates with P263) left forward fuselage tank, access 1123-5 (switch position 3, if using cable W3)

J1 (mates with P264) right forward fuselage tank, access 2123-5 (switch position 1, if using cable W3)

J1 (mates with P3051) left midfuselage tank, left wheel well, (switch position 4, if using cable W3)

J1 (mates with P3052) right midfuselage tank, right wheel well, (switch position 2, if using cable W3)

J1 (mates with P3053) aft fuselage tank, access 5222-4 (switch position 5, if using cable W3)

J1 (mates with P386) main sump tank, speed brake well (switch position 6, if using cable W3)

06D105–10–85

Figure 5-9. Test Setup (Using TF-20-1 Test Set); Main Tank Transmitter/Wiring

5-8.3. Right Forward Tank.

a. Perform preparation procedures (paragraph 5-8.1).

b. Disconnect connector P264 from right forward tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 13 and 14 of connector W3P1.

d. Hold shell of test connector to shell of right forward tank connector J1. Place W3 switch in position 1 if using cable W3. Place CAP-RES CHECK switch in CAP. Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1 on tank. Check that capacitance of transmitters, minus capacitance recorded in step d, is 62.25 to 66.25 pf (defueled) or 116.75 to 157.95 pf (fueled).

f. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms between pins 9 and 14 (A-B position), 9 and ground (A-GRD position), and 14 and ground (B-GRD position) of J1 on tank.

g. Disconnect test cable from right forward tank, and reconnect connector P264.

5-8.4. Right Midfuselage Tank.

a. Perform preparation procedures (paragraph 5-8.1).

b. Disconnect P3052 from right midfuselage tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 4 and 5 of connection W3P1.

d. Hold shell of test connector to shell of right midfuselage tank connector J1. Place W3 switch in position 2 if using cable W3. Place CAP-RES CHECK switch in CAP. Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1. Check that right midfuselage tank transmitter capacitance, minus capacitance recorded in step d, is 51.82 to 55.82 pf (defueled) or 98.13 to 132.77 pf (fueled).

f. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD. Check for minimum resistance of 20 megohms between pins 8 and 5 (A-B position), 8 and ground (A-GRD position), and 5 and ground (B-GRD position) of J1.

g. Disconnect test cable from right forward fuselage tank, and reconnect P3052.

5-8.5. Left Midfuselage Tank.

a. Perform preparation procedures (paragraph 5-8.1).

b. Disconnect P3051 from left midfuselage tank.

c. Connect adapter cable W17 to cable W3A or W3.

d. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 4 and 5 of connector W3P1 or W17P1.

e. Hold shell of test connector to shell of left midfuselage tank connector J1. Place W3 switch in position 4 if using cable W3. Place CAP-RES CHECK switch in CAP. Record capacitance indication.

f. Remove jumper wires, and connect test cable to J1 on tank. Check that capacitance of transmitters, minus capacitance recorded in step e, is 51.82 to 55.82 pf (defueled) or 98.13 to 132.77 pf (fueled).

g. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms between pins 5 and 8 (A-B position), 5 and ground (B-GRD position), and 8 and ground (A-GRD position) of J1 on tank.

h. Disconnect test cable from left midfuselage tank, and reconnect P3051.

5-8.6. Aft Tank.

a. Perform preparation procedures (paragraph 5-8.1).

b. Disconnect P3053 from aft tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 4 and 5 of connector W3P1.

d. Hold shell of test connector to shell of aft fuel tank connector J1. Place W3 switch in position 5 if using cable W3. Place CAP-RES CHECK switch in CAP. Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1. Check that aft fuel tank transmitter capacitance, minus capacitance recorded in step d, is 226.77 to 231.37 pf (defueled) or 419.72 to 567.12 pf (fueled).

f. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD. Check for minimum resistance of 20 megohms between pins 8 and 4 (A-B position), 8 and ground (A-GRD position), and 4 and ground (B-GRD position) of J1.

g. Disconnect test cable from aft tank, and reconnect P3053.

5-8.7. Sump Tank.

a. Perform preparation procedures (paragraph 5-8.1).

b. Disconnect P386 from main sump tank.

c. If using cable W3, place jumper wires, as short as possible, between pins 8 and 9 and between pins 13 and 14 of connector W3P1.

d. Hold shell of test connector to shell of connector J1. Place W3 switch in position 6 if using cable W3. Place CAP-RES CHECK switch in CAP. Record capacitance indication.

e. Remove jumper wires, and connect test cable to J1 on tank. Check that transmitter capacitance, minus the capacitance recorded in step d, is 53.06 to 55.06 pf (defueled) or 98.99 to 133.93 pf (fueled).

f. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms between pins 8 and 13 (A-B position), 8 and ground (A-GRD position), and 13 and ground (B-GRD position) of connector J1.

g. Disconnect test cable from sump tank, and reconnect P386.

5-9. WING TANK TRANSMITTER/WIRING CHECKS (USING GTF-6 TEST SET).

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for checks
	Capacitance-type fuel quantity gage test set	GTF-6	Perform checks
	Flight line fuel quantity gaging test set	215-01031-1	Perform checks

WARNING

Do not use a standard megger to perform insulation resistance checks on tank probes or associated circuitry. To do so may result in insulation and/or dielectric breakdown. The voltage output of the megger is sufficient to produce heat or an arc which could result in fire or an explosion. The megohmmeter section of the GTF-6 test set should be used to perform insulation resistance checks.

To prevent spilled fuel and reduce fire hazard when troubleshooting a fueled airplane, defuel airplane (T.O. 1A-7D-2-1) before performing repairs inside any fuel tank.

Failure to ground the GTF-6 fuel quantity gage test set to both airplane and earth ground could result in damaged airplane and personnel injury.

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

NOTE

If transmitter and wiring check good, a low megohm value may indicate a buildup of dark residue around transmitter electrical terminals. Remove transmitter and clean terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush. Inspect for loose, broken, or cracked inner tube spacer pins and cracked terminal insulator. Any defect found is cause for rejection. Reinstall transmitter in accordance with paragraph 5-14.

If care is taken not to disturb the seal generated by MIL-S-8802 coating, the probe may be installed immediately in an empty fuel tank; however, a minimum of 6 hours curing time is required before immersion of probe in fuel.

5-9.1. Preparation.

a. Fuel or defuel airplane completely (T.O. 1A-7D-2-1).

b. Connect test equipment as shown in figure 5-10.

c. Perform GTF-6 calibration in accordance with CALIBRATION OF TEST SET on instruction placard.

d. Place GTF-6 DISPLAY SELECT switch in CAP (pf) and CAPACITANCE-FUNCTION switch in A/C TEST-UNSH.

e. Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

5-9.2. Right Wing.

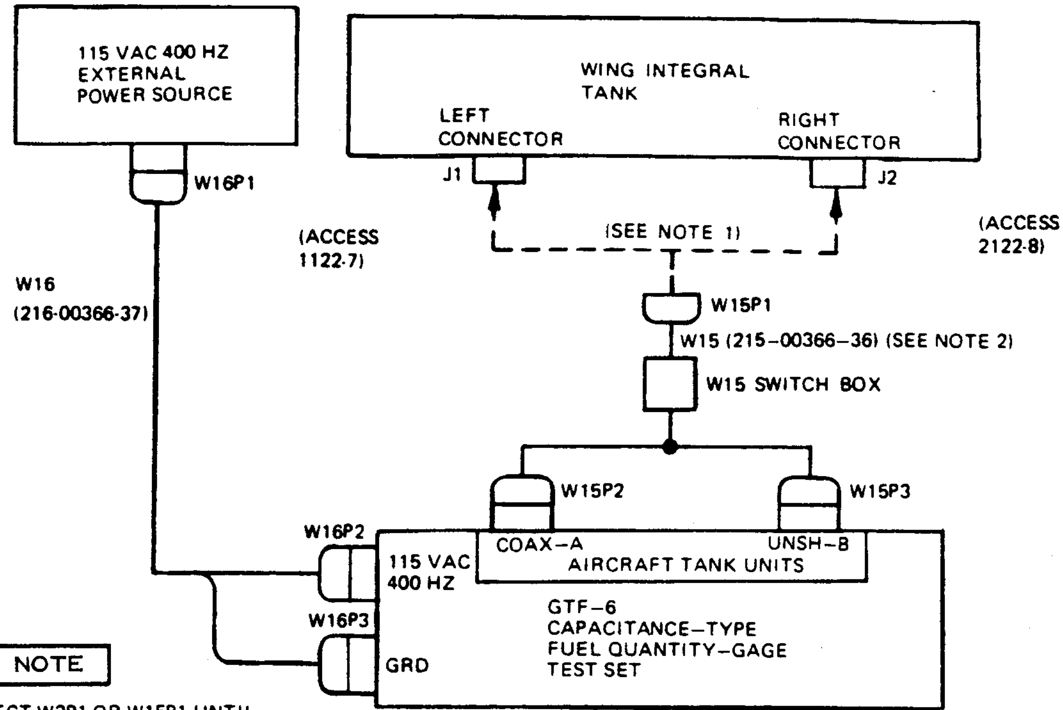
NOTE

Reference designator appearing in parentheses (W2) is for 215-00366-18 cable. Reference designator W15 is applicable to 215-00366-26/-36 cables.

a. Perform preparation procedures (paragraph 5-9.1).

b. Hold shell of connector W15P1 (W2P1) to shell of wing tank connector J2, and record capacitance value in each W15 (W2) switch position.

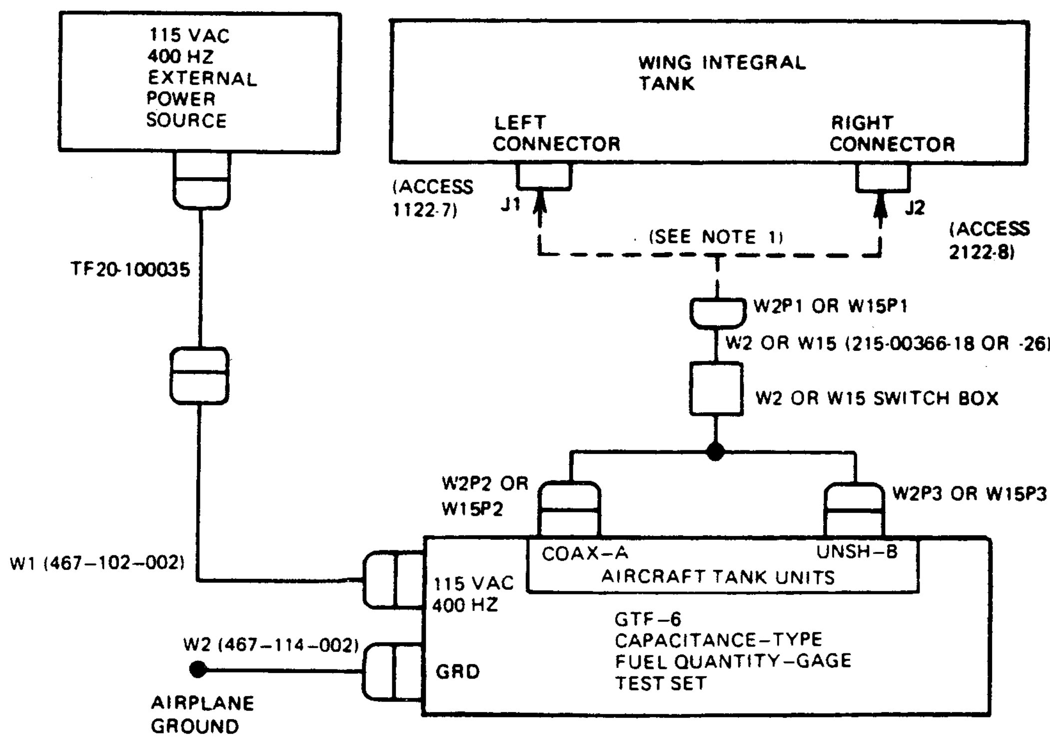
c. Connect W15P1 (W2P1) to connector J2, and using W15 (W2) switch box, check that right wing integral tank transmitter capacitances, minus capacitances recorded in step b for the corresponding switch positions, are in accordance with values shown in figure 5-11. Ensure CAPACITANCE-RANGE (pF) switch is set to lowest range that will give nonblinking reading after corresponding switch positions.



TEST SETUP
(SEE ALTERNATE SETUP)

NOTE

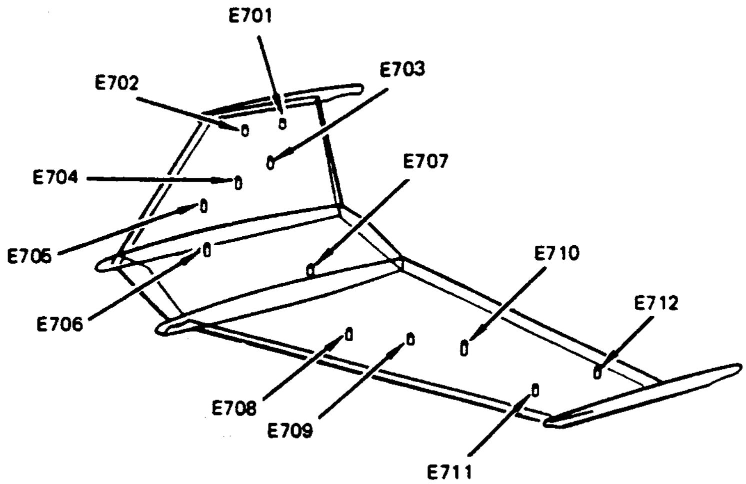
1. DO NOT CONNECT W2P1 OR W15P1 UNTIL SPECIFIED IN INDIVIDUAL TEST STEPS.
2. CABLE 215–00366–18 or –26 IS ACCEPTABLE ALTERNATE FOR 215–00366–36. REFERENCE DESIGNATOR FOR –18 CABLE IS W2 AND W15 FOR CABLES –26 AND –36.



ALTERNATE TEST SETUP

06D106–09–85

Figure 5-10. Test Setup (Using GTF-6 Test Set); Wing Tank Transmitter/Wiring



NOTE

W2 cable is acceptable alternate for W15 cable.

W2 OR W15 SWITCH POSITION (SEE NOTE)	TRANSMITTER REFERENCE DESIGNATOR	CAPACITANCE (PF) AIRPLANE DEFUELED	CAPACITANCE (PF) AIRPLANE FUELED
1	E701	5.58 TO 7.58	11.25 TO 15.32
2	E702	10.30 TO 12.30	19.87 TO 26.99
3	E703	15.72 TO 17.72	29.94 TO 40.28
4	E704	17.08 TO 19.08	32.33 TO 43.75
5	E705	16.63 TO 18.63	31.41 TO 42.49
6	E706	29.78 TO 31.78	55.71 TO 75.11
1	E712	5.58 TO 7.58	11.25 TO 15.32
2	E711	10.30 TO 12.30	19.87 TO 26.99
3	E710	15.72 TO 17.72	29.94 TO 40.28
4	E709	17.08 TO 19.08	32.33 TO 43.75
5	E708	16.63 TO 18.63	31.41 TO 42.49
6	E707	21.84 TO 23.84	40.99 TO 55.45
OFF			

06D098—09—85

Figure 5-11. Capacitance Checkout; Wing Integral Tank Transmitter

NOTE

When switching through positions in steps d through f, stop at each position and set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading.

d. Place DISPLAY SELECT switch in RES (MEG) and RESISTANCE-FUNCTION switch in A-B, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 2, 15 and 3, 16 and 9, 17 and 10, 18 and 11, and 19 and 12 of J2.

e. Place RESISTANCE-FUNCTION switch in A-GND, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 4, 15 and 5, 16 and 6, 17 and 7, 18 and 8, and 19 and 13 of J2.

NOTE

When using W2 cable for B-GND check, any shorted Lo Z leg on an individual tank unit will appear as a short in all W2 switch positions. For further isolation, the external resistance section of the GTF-6 test set must be used to check each Lo Z leg.

f. Place RESISTANCE-FUNCTION switch in B-GND, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 4 and 2, 5 and 3, 6 and 9, 7 and 10, 8 and 11, and 13 and 12 of J2.

g. Disconnect test cable from wing tank J2, and reconnect airplane connector.

5-9.3. Left Wing.

NOTE

Reference designator appearing in parentheses (W2) is for 215-00366-18 cable. Reference designator W15 is applicable to 215-00366-26/-36 cables.

a. Perform preparation procedures (paragraph 5-9.1).

b. Hold shell of connector W15P1 (W2P1) to shell of wing tank connector J1, and record capacitance value for each W15 (W2) switch position.

c. Connect W15P1 (W2P1) to connector J1, and using W15 (W2) switch box, check that left wing integral tank transmitter capacitances, minus capacitances recorded in step b for the corresponding switch positions, are in accordance with values shown in figure 5-11. Ensure CAPACITANCE-RANGE (pF) switch is set to lowest range that will give nonblinking reading after corresponding switch positions.

NOTE

When switching through positions in steps d through f, stop at each position and set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading.

d. Place DISPLAY SELECT switch in RES (MEG) and RESISTANCE-FUNCTION switch in A-B, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 2, 15 and 3, 16 and 9, 17 and 10, 18 and 11, and 19 and 12 of J1.

e. Place RESISTANCE-FUNCTION switch in A-GND, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 4, 15 and 5, 16 and 6, 17 and 7, 18 and 8, and 19 and 13 of J1.

NOTE

When using W2 cable for B-GND check, any shorted Lo Z leg on an individual tank unit will appear as a short in all W2 switch positions. For further isolation, the external resistance section of the GTF-6 test set must be used to check each Lo Z leg.

f. Place RESISTANCE-FUNCTION switch in B-GND, and in sequence, place W15 (W2) switch in positions 2, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 4 and 2, 5 and 3, 6 and 9, 7 and 10, 8 and 11, and 13 and 12 of J1.

g. Disconnect test cable from wing tank J1, and reconnect airplane connector.

5-10. WING TANK TRANSMITTER/WIRING CHECK (USING TF-20-1 TEST SET).

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power for checks
	Capacitance-type liquid quantity system test set	TF-20-1	Perform checks
	Flight line fuel quantity gaging test set	215-01031-1	Perform checks

WARNING

Do not use a standard megger to perform insulation resistance checks on tank probes or associated circuitry. To do so may result in insulation and/or dielectric breakdown. The voltage output of the megger is sufficient to produce heat or an arc which could result in fire or an explosion. The megohmmeter section of the TF-20-1 test set should be used to perform insulation resistance checks.

To prevent spilled fuel and reduce fire hazard when troubleshooting a fueled airplane, defuel airplane (T.O. 1A-7D-2-1) before performing repairs inside any fuel tank.

Failure to ground the TF-20-1 fuel quantity gaging test set to both aircraft and earth ground could result in damaged aircraft and personnel injury.

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

NOTE

If transmitter and wiring check good, a low megohm value may indicate a buildup of dark residue around transmitter electrical terminals. Remove transmitter, and clean terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush. Inspect for loose, broken, or cracked inner tube spacer pins and cracked terminal insulator. Any defect found is cause for rejection. Reinstall transmitter in accordance with paragraph 5-14.

If care is taken not to disturb the seal generated by MIL-S-8802 coating, the probe may be installed immediately in an empty fuel tank; however, a minimum of 6 hours curing time must elapse prior to immersion of probe in fuel.

5-10.1. Preparation.

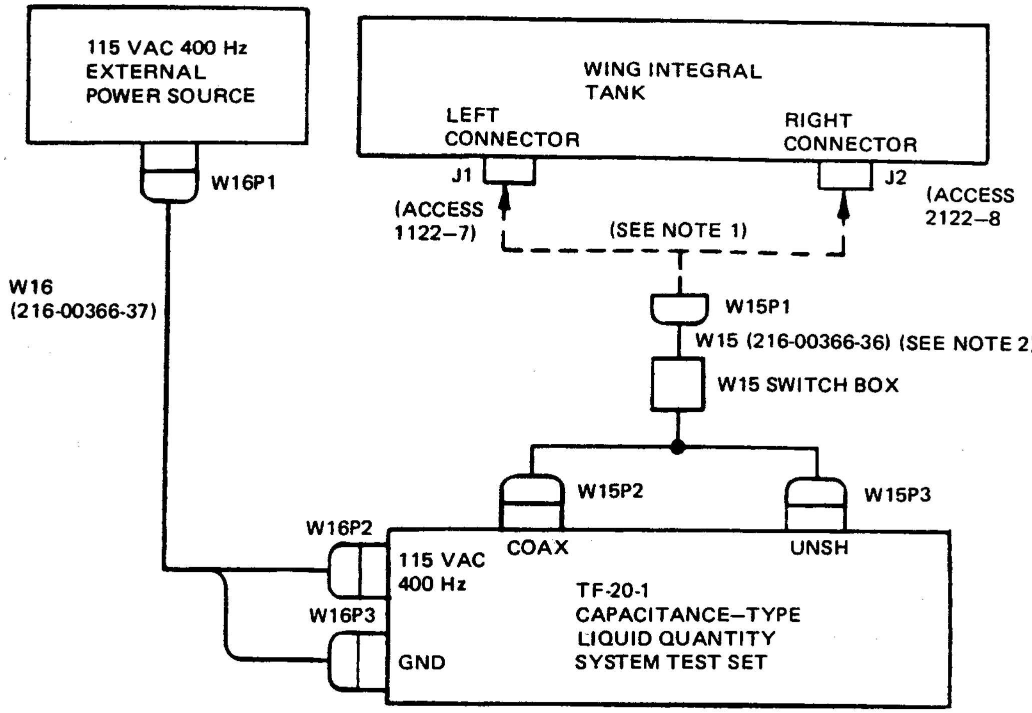
a. Fuel or defuel airplane completely (T.O. 1A-7D-2-1).

b. Connect test equipment as shown in figure 5-12.

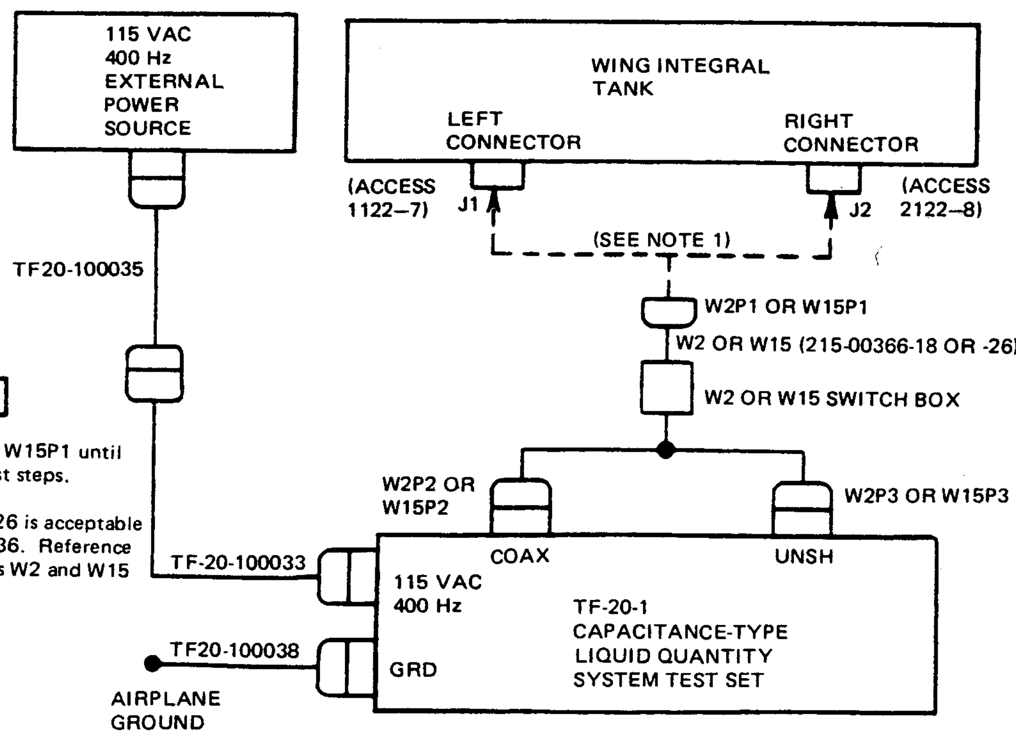
c. Place TF-20-1 test set power switch in ON. Allow a 10-minute warmup period.

d. Perform TF-20-1 calibration in accordance with CALIBRATION OF TESTER FOR USE on instruction placard.

e. Place TF-20-1 FUNCTION SELECTOR switch in TANK UNIT TEST UNSH position and CAP-RES CHECK switch in CAP.



TEST SETUP (See Alternate Setup)



NOTE

1. Do not connect W2P1 or W15P1 until specified in individual test steps.
2. Cable 215-00366-18 or -26 is acceptable alternate for 215-00366-36. Reference designator for -18 cable is W2 and W15 for cables -26 and -36.

ALTERNATE TEST SETUP

06D107–09–85

Figure 5-12. Test Setup (Using TF-20-1 Test Set); Wing Tank Transmitter/Wiring

5-10.2. Right Wing.

NOTE

Reference designator appearing in parentheses (W2) is for 215-00366-18 cable. Reference designator W15 is applicable to 215-00366-26/-36 cables.

a. Perform preparation procedures (paragraph 5-10.1).

b. Hold shell of connector W15P1 (W2P1) to shell of wing tank connector J2, and record capacitance value in each W15 (W2) switch position.

c. Connect W15P1 (W2P1) to connector J2, and using W15 (W2) switch box, check that right wing integral tank transmitter capacitances, minus capacitances recorded in step b for the corresponding switch positions, are in accordance with values shown in figure 5-11.

d. Place CAP-RES switch in A-B, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 2, 15 and 3, 16 and 9, 17 and 10, 18 and 11, and 19 and 12 of J2.

e. Place CAP-RES CHECK switch in A-GRD, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 4, 15 and 5, 16 and 6, 17 and 7, 18 and 8, and 19 and 13 of J2.

NOTE

When using W2 cable for B-GRD check, any shorted Lo Z leg on an individual tank unit will appear as a short in all W2 switch positions. For further isolation, the external resistance section of the TF-20-1 test set must be used to check each Lo Z leg.

f. Place CAP-RES CHECK switch in B-GRD, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 4 and 2, 5 and 3, 6 and 9, 7 and 10, 8 and 11, and 13 and 12 of J2.

g. Disconnect test cable from wing tank J2, and reconnect airplane connector.

5-10.3. Left Wing.

NOTE

Reference designator appearing in parentheses (W2) is for 215-00366-18 cable. Reference designator W15 is applicable to 215-00366-26/-36 cables.

a. Perform preparation procedures (paragraph 5-10.1).

b. Place CAP-RES CHECK switch in CAP. Hold shell of connector W15P1 (W2P1) to shell of wing tank connector J1, and record capacitance value for each W15 (W2) switch position.

c. Connect W15P1 (W2P1) to connector J1, and using W15 (W2) switch box, check that left wing integral tank transmitter capacitances, minus capacitances recorded in step b for the corresponding switch positions, are in accordance with values shown in figure 5-11.

d. Place CAP-RES CHECK switch in A-B, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 2, 15 and 3, 16 and 9, 17 and 10, 18 and 11, and 19 and 12 of J1.

e. Place CAP-RES CHECK switch in A-GRD, and in sequence place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 14 and 4, 15 and 5, 16 and 6, 17 and 7, 18 and 8, and 19 and 13 of J1.

NOTE

When using W2 cable for B-GRD check, any shorted Lo Z leg on an individual tank unit will appear as a short in all W2 switch positions. For further isolation, the external resistance section of the TF-20-1 test set must be used to check each Lo Z leg.

f. Place CAP-RES CHECK switch in B-GRD, and in sequence, place W15 (W2) switch in positions 1, 2, 3, 4, 5, and 6. Check for minimum resistance of 20 megohms at each position. In sequence, this checks resistance between pins 4 and 2, 5 and 3, 6 and 9, 7 and 10, 8 and 11, and 13 and 12 of J1.

g. Disconnect test cable from wing tank J1, and reconnect airplane connector.

5-11. FUSELAGE FUEL TANK TRANSMITTER REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel for removal and installation of transmitter
		Equipment required for purging fuel tanks	Purge tank to remove transmitter
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

NOTE

The removal and installation procedures in paragraph 5-11 cover only the forward, mid, and sump tank transmitters. For removal and installation of the aft tank transmitter, refer to paragraph 5-12.

5-11.1. Removal. (Figure 5-13.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open accesses as follows:

(1) Forward fuselage fuel tanks (paragraph 1-7).

(2) Midfuselage fuel tank (paragraph 1-9).

(3) Main sump tank (paragraph 1-11).

b. Remove tank baffles (paragraph 1-18).

c. Remove cable ties (1) securing wiring harness leads to transmitter.

d. Remove screw (2), washer (3), and anchor clip (4) securing electrical leads to terminal block (5), and remove leads from slots in terminal block.

NOTE

Before disconnecting terminals, tag wire leads with thermistor color codes (blue, white, and brown) for identification during installation.

e. Disconnect flag terminals (6, 7, and 8) by unscrewing captive screws (9, 10, and 11). Flag terminals, lockwashers (12, 13, and 14), and captive screws should be retained together by captive washers (15, 16, and 17).

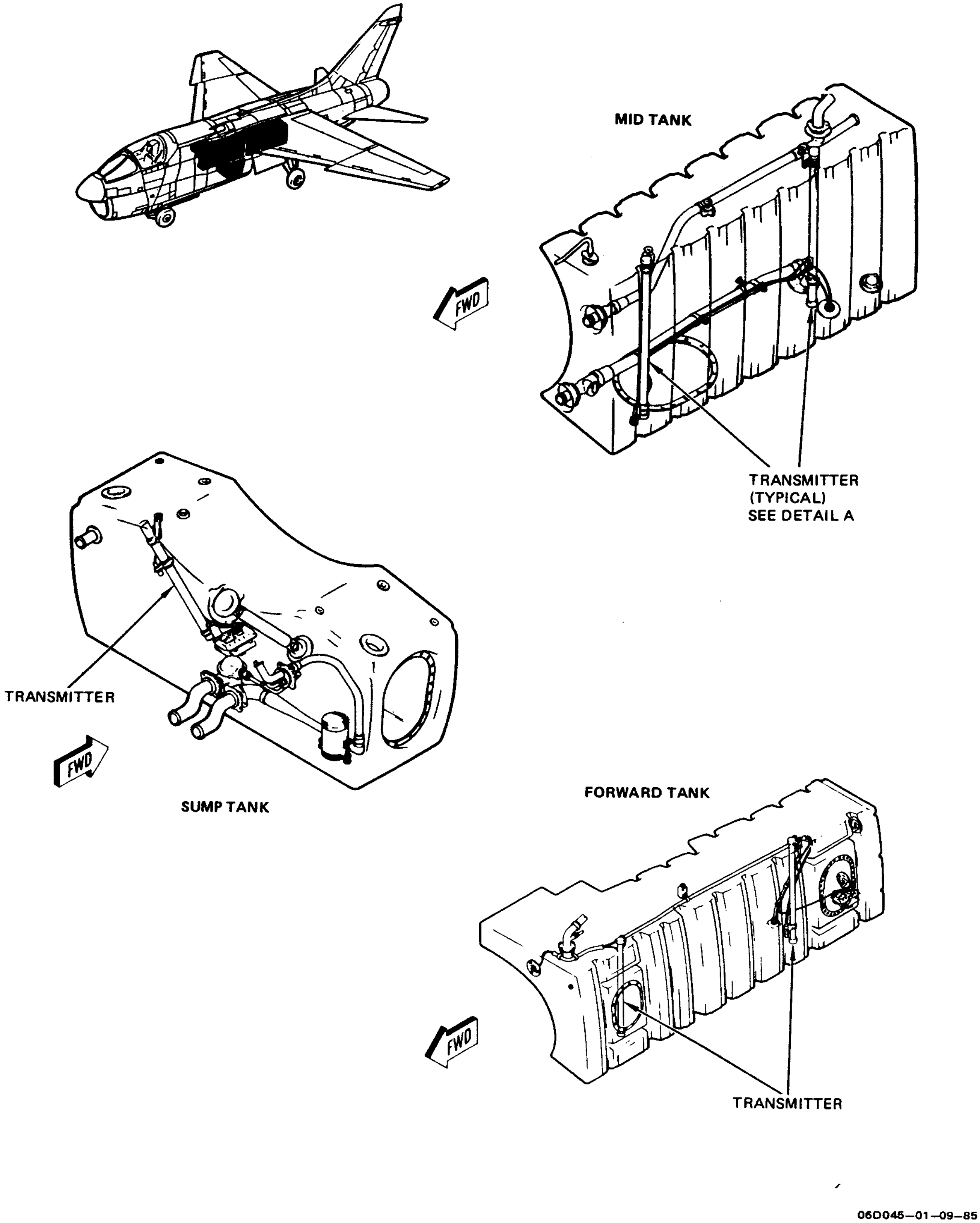
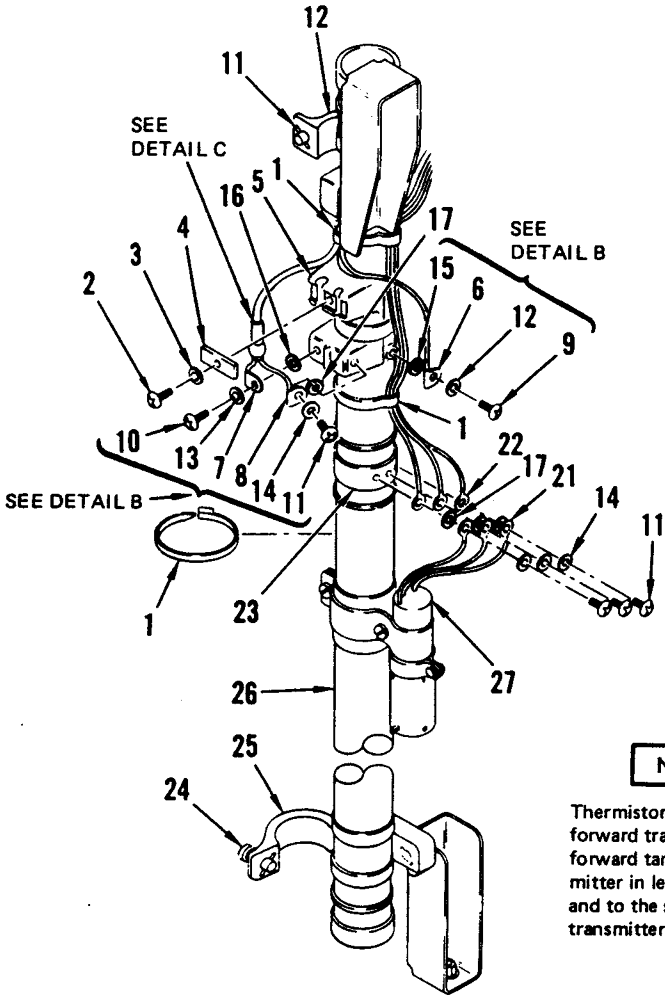


Figure 5-13. Removal and Installation; Fuselage Fuel Tank Transmitter (Sheet 1 of 3)



NOTE

Thermistors are attached to forward transmitter in right forward tank, to aft transmitter in left forward tank, and to the sump tank transmitter.

DETAIL A

1. Cable tie (typical)
2. Screw
3. Washer
4. Anchor clip
5. Terminal block
6. Flag terminal, No. 10 (AB53, Mfd by 59730)
7. Flag terminal, No. 8 (AB52, Mfd by 59730)
8. Flag terminal, No. 6 (AB51, Mfd by 59730)
9. Captive screw, No. 10 (398421–10, Mfd by 89305)
10. Captive screw, No. 8 (398421–8, Mfd by 89305)
11. Captive screw, No. 6 (398421–6, Mfd by 89305)
12. Lockwasher No. 10 (1710–00, Mfd by 78189)
13. Lockwasher, No. 8 (1708–00, Mfd by 79189)
14. Lockwasher, No. 6 (1706–00, Mfd by 79189)
15. Captive washer, No. 10 (396974, Mfd by 89305)
16. Captive washer, No. 8 (396648, Mfd by 89305)
17. Captive washer, No. 6 (396973, Mfd by 89305)
18. Thermofit tubing, Kynar, 3/16 inch I.D. (Mfd by 06090)
19. Inner sleeve (GSB 101, Mfd by 59730)
20. Outer sleeve (GSC 194, Mfd by 59730)
21. Wiring harness terminal
22. Thermistor lug (36151, Mfd by 00779)
23. Terminal block
24. Fastener
25. Clamp
26. Transmitter
27. Thermistor

NOTE

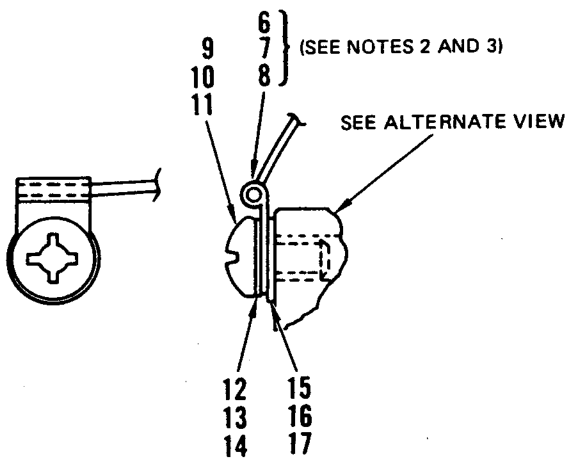
1. Crimp in place using Thomas & Betts tool WT406 (NSN 5120–00–941–0677).

2. Crimp wire to flag terminal (6, 7, and 8) before assembling with captive screw, lockwasher, and captive washer. Flatten captive washer to retain screw.

3. Crimp terminals using Thomas & Betts tool WT100M (NSN 5120–00–114–0794).

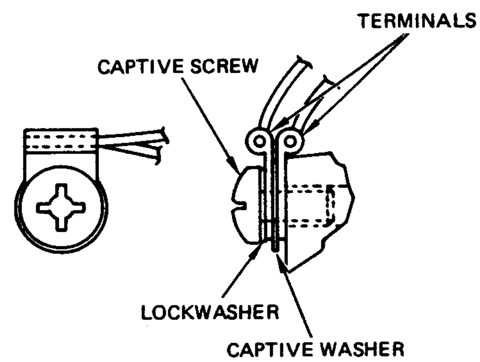
06D045–02–09–85

Figure 5-13. Removal and Installation; Fuselage Fuel Tank Transmitter (Sheet 2)



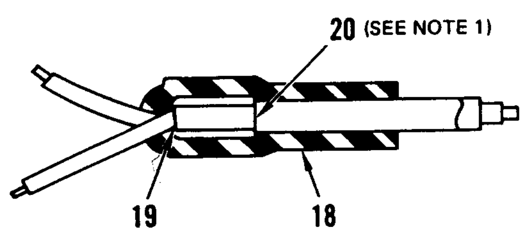
DETAIL B

(TYPICAL 3 PLACES)



ALTERNATE VIEW

MULTIPLE FLAG TERMINAL INSTALLATION



DETAIL C

06D045-03-09-85

Figure 5-13. Removal and Installation; Fuselage Fuel Tank Transmitter (Sheet 3)

NOTE

Terminal block (23), thermistor (27), and wiring harness connected to terminal block (23) are used on forward transmitter installation in right forward fuselage tank, on aft transmitter installation in left forward fuselage tank and on sump tank transmitter installation.

f. If required, disconnect thermistor terminal lugs (22) and wiring harness terminals (21) from terminal block (23) by unscrewing captive screws (11). Terminal lugs (22), lockwashers (14), and captive screws (11) should be retained together by captive washers (17).

g. Release fasteners (24), open clamps (25), and remove transmitter (26).

5-11.2. Installation. (Figure 5-13.)

CAUTION

To prevent clamps from shorting to transmitters, check that insulators under transmitter clamps are properly aligned.

a. Secure transmitter (26) in tank with clamps (25) and fasteners (24).

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

b. Thoroughly clean wiring and transmitter terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

c. If required, splice terminal wires to coax cable using sleeves (20 and 19) and tubing (18) as shown in detail C.

d. If required, crimp wire to flag terminal and install lockwasher, captive screw, and captive washer as shown in detail B.

e. Connect flag terminals (8, 7, and 6) to terminal block (5) with captive screws (11, 10, and 9), lockwashers (14, 13, and 12), and captive washers (17, 16, and 15).

f. If required, connect thermistor terminal lugs (22) and wiring harness terminals (21) to terminal block (23) with captive screws (11), lockwashers (14), and captive washers (17).

g. Pull wiring harness electrical leads into terminal block (5) slots.

h. Secure leads in terminal block slots with anchor clip (4), screw (2), and washer (3).

NOTE

Allow at least 6 hours curing time before fueling airplane.

i. Coat terminals and attaching washers and screws, installed in steps e, f, and h, with MIL-S-8802, Class A-1/2 brush-on type sealant.

j. Secure electrical leads to transmitter with new cable ties (1).

k. Install tank baffles (paragraph 1-18).

l. Close accesses as follows:

(1) Forward fuselage tanks (paragraph 1-7).

(2) Midfuselage tank (paragraph 1-9).

(3) Main sump tank (paragraph 1-11).

m. Perform fuel quantity indicating system adjustment (paragraph 5-24 or 5-25).

n. If removed transmitter is from left forward fuselage tank or main sump tank, perform low level fuel warning system operational checkout (paragraph 5-4.2).

o. If removed transmitter is from right forward fuselage tank, perform internal transfer system operational checkout (paragraph 2-4).

p. Perform fuel contamination test (paragraph 1-20).

5-12. AFT FUSELAGE FUEL TANK TRANSMITTER REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel for removal and installation of transmitter
		Equipment required for purging fuel tanks	Purge tank to remove transmitter
	GGG-W-686	Torque wrench, 10 to 150	Torque nuts or bolts

5-12.1. Removal. (Figure 5-14.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open aft fuselage tank accesses (paragraph 1-14).

b. Remove tank baffles (paragraph 1-18).

c. Remove cable ties (1) securing electrical leads to transmitter.

d. Remove screw (2), washer (3), and anchor clip (4) securing electrical leads to terminal block (5). Remove leads from slots in terminal block.

e. Disconnect flag terminals (6, 7, and 8) by unscrewing captive screws (9, 10, and 11). Flag terminals, lockwashers (12, 13, and 14), and captive screws should be retained together by captive washers (15, 16, and 17).

f. Disconnect quick-disconnect retainer clamps (21), and remove transmitter (22) from tank.

5-12.2. Installation. (Figure 5-14.)

CAUTION

To prevent clamps from shorting to transmitters, check that insulators under transmitter clamps are properly aligned.

a. Secure transmitter (22) to tank brackets with quick-disconnect retainer clamps (21).

WARNING

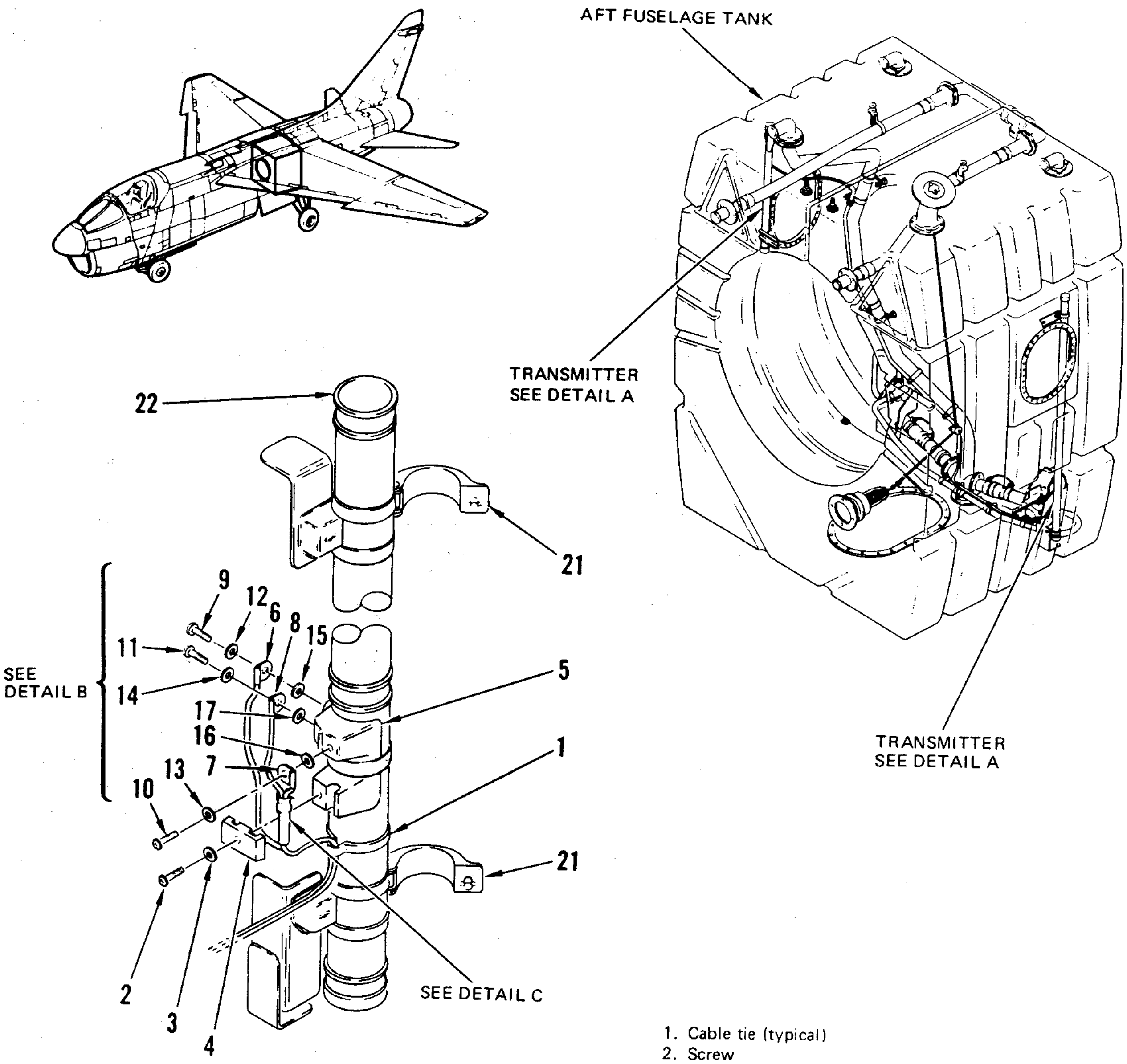
Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

b. Thoroughly clean wiring and transmitter terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

c. If required, splice terminal wires to coax cable using sleeves (20 and 19) and tubing (18) as shown in detail C.

d. If required, crimp wire to flag terminal and install lockwasher, captive screw, and captive washer as shown in detail B.

e. Connect flag terminals (8, 7, and 6) with captive screws (11, 10, and 9), lockwashers (14, 13, and 12), and captive washers (17, 16, and 15).



DETAIL A

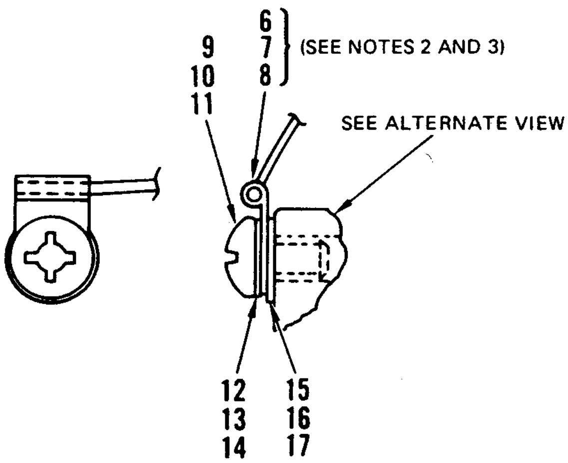
1. Cable tie (typical)
2. Screw
3. Washer
4. Anchor clip
5. Terminal block
6. Flag terminal, No. 10 (AB53, Mfd by 59730)
7. Flag terminal, No. 8 (AB52, Mfd by 59730)
8. Flag terminal, No. 6 (AB51, Mfd by 59730)
9. Captive screw, No. 10 (398421–10, Mfd by 89305)
10. Captive screw, No. 8 (398421–8, Mfd by 89305)
11. Captive screw, No. 6 (398421–6, Mfd by 89305)
12. Lockwasher, No. 10 (1710–00, Mfd by 78189)
13. Lockwasher, No. 8 (1708–00, Mfd by 79189)
14. Lockwasher, No. 6 (1706–00, Mfd by 79189)
15. Captive washer, No. 10 (396974, Mfd by 89305)
16. Captive washer, No. 8 (396648, Mfd by 89305)
17. Captive washer, No. 6 (396973, Mfd by 89305)
18. Thermofit tubing, Kynar, 3/16 inch I.D. (Mfd by 06090)
19. Inner sleeve (GSB 101, Mfd by 59730)
20. Outer sleeve (GSC 194, Mfd by 59730)
21. Retainer clamp
22. Transmitter

NOTE

1. Crimp in place using Thomas & Betts tool WT406 (NSN 5120–00–941–0677).
2. Crimp wire to flag terminal (6, 7, and 8) before assembling with captive screw, lockwasher, and captive washer. Flatten captive washer to retain screw.
3. Crimp terminals using Thomas & Betts tool WT100M (NSN 5120–00–114–0794).

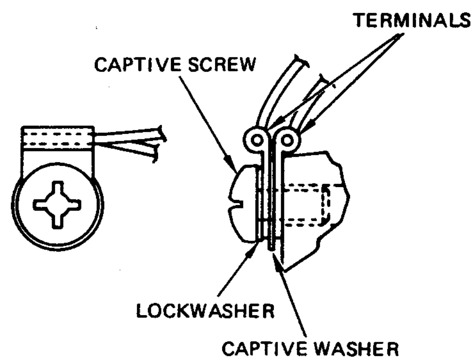
06D046–01–09–85

Figure 5-14. Removal and Installation; Aft Fuselage Fuel Tank Transmitter (Sheet 1 of 2)



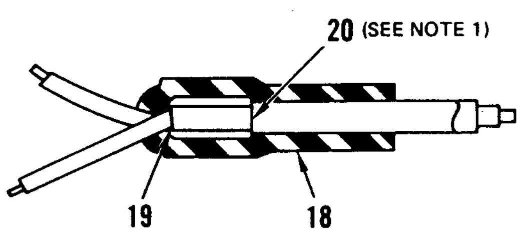
DETAIL B

(TYPICAL 3 PLACES)



ALTERNATE VIEW

MULTIPLE FLAG TERMINAL INSTALLATION



DETAIL C

06D046—02—09—85

Figure 5-14. Removal and Installation; Aft Fuselage Fuel Tank Transmitter (Sheet 2)

f. Install electrical leads in slots in terminal block (5), and secure with anchor clip (4), screw (2), and washer (3).

NOTE

Allow at least 6 hours curing time before fueling airplane.

g. Coat terminals and attaching washers and screws, installed in steps e and f, with MIL-S-8802, Class A-1/2 brush-on type sealant.

h. Secure electrical leads to transmitter with new cable ties (1).

i. Install tank baffles (paragraph 1-18).

j. Install aft tank accesses (paragraph 1-14).

k. Perform fuel quantity indicating system adjustment (paragraph 5-24 or 5-25).

l. Perform internal transfer system operational checkout (paragraph 2-4).

m. Perform fuel contamination test (paragraph 1-20).

5-13. SUMP AND FORWARD FUEL TANK COMPENSATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling aircraft	Defuel and fuel for removal and installation of compensator
		Equipment required for purging fuel tanks	Purge tank to remove compensator
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

5-13.1. Removal. (Figure 5-15.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Remove tank accesses as follows:

(1) Main sump tank acess panel (paragraph 1-11).

(2) Forward fuselage tank access (paragraph 1-7).

b. Remove tank baffles (paragraph 1-18).

c. Loosen screws (1), and disconnect terminals (2) from top of compensator.

d. Loosen nut, and disconnect shield terminal (3) from compensator case.

e. Remove bolt (4), washers (5), and nut (6), and remove wire support clamp (7) from clamp bracket.

f. Remove four nuts (8) and washers (9), and remove compensator (10) and clamp bracket (11) from mounting studs.

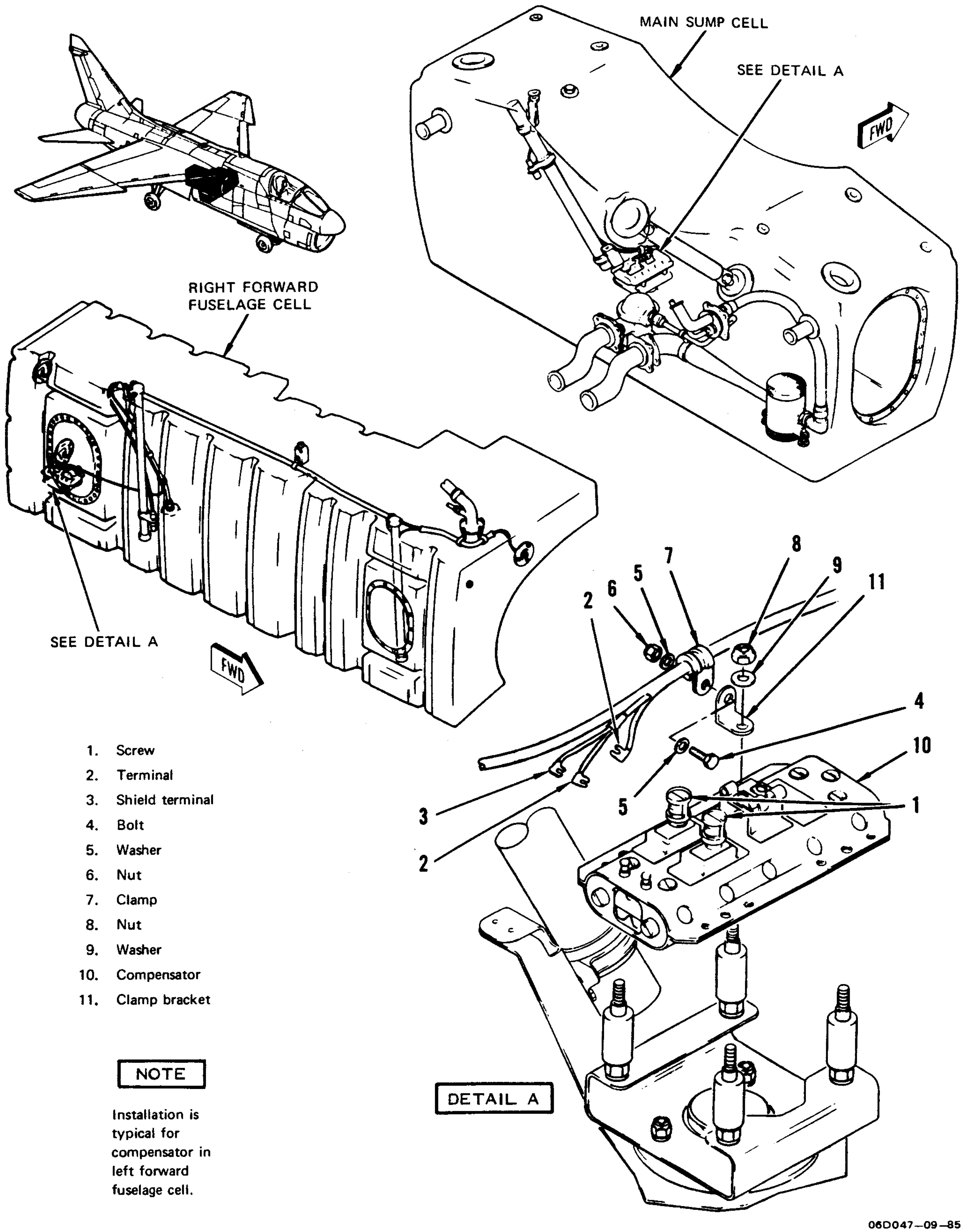
5-13.2. Installation. (Figure 5-15.)

CAUTION

To avoid damage to compensator insulators, do not overtighen nuts on mounting studs.

a. Install compensator (10) and clamp bracket (11) on mounting studs with four nuts (8) and washers (9).

b. Install shield terminal (3) under one nut before tightening nuts.



1. Screw
2. Terminal
3. Shield terminal
4. Bolt
5. Washer
6. Nut
7. Clamp
8. Nut
9. Washer
10. Compensator
11. Clamp bracket

NOTE

Installation is typical for compensator in left forward fuselage cell.

Figure 5-15. Removal and Installation; Sump and Forward Fuel Tank Compensator

c. Secure wire support clamp (7) to clamp bracket with nut (6), washers (5), and bolt (4).

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

d. Thoroughly clean wiring and compensator terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

e. Connect terminals (2) to compensator, and secure with screws (1).

NOTE

Allow at least 6 hours curing time before fueling airplane.

f. Coat terminals and attaching washers and screws with MIL-S-8802, Class A1/2 brush-on type sealant.

g. Torque all attachments to 60 (±5) inch-pounds.

h. Install tank baffles (paragraph 1-18).

i. Install main sump tank access (paragraph 1-11).

j. Install forward fuel tank access (paragraph 1-7).

k. Perform fuel quantity indicating system adjustment (paragraph 5-24 or 5-25).

l. Perform internal fuel transfer operational checkout (paragraph 1-4), and check for leakage.

m. Perform fuel contamination test (paragraph 1-20).

5-14. WING INTEGRAL FUEL TANK TRANSMITTER REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel tank for removal and installation of transmitter
		Equipment required for purging wing fuel tank	Purge tank to remove transmitter
	GGG-W-686	Torque wrench, 0 to 15 inch-pounds	Torque terminal screws

5-14.1. Removal. (Figure 5-16.)

a. Defuel airplane (T.O. 1A-7D-2-1).

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

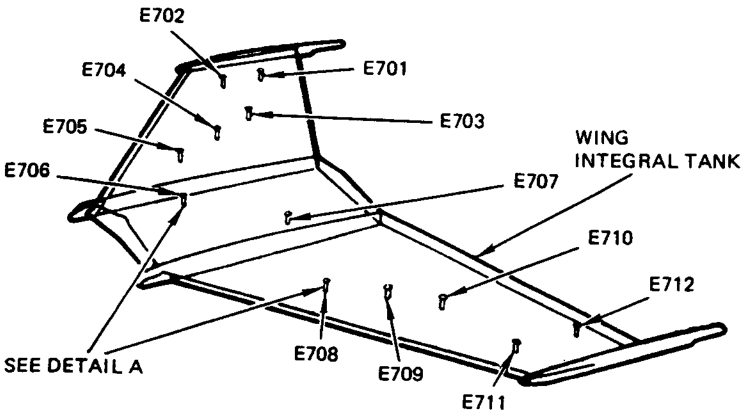
b. Open access 4113-11 or 3123-1 if either forward or aft transmitter in dorsal area is to be removed.

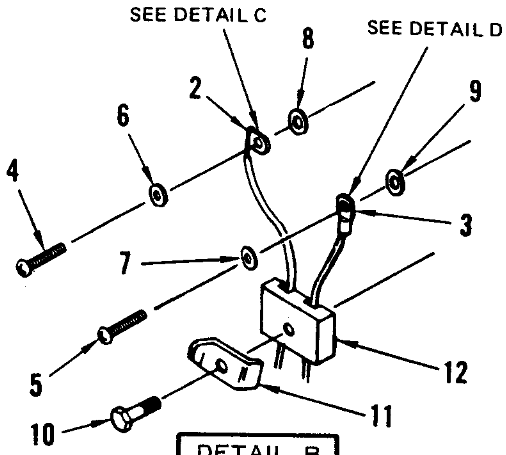
c. Purge tank (paragraph 1-6 and T.O. 1-1-3).

d. Remove screws (1) attaching transmitter to wing upper skin.

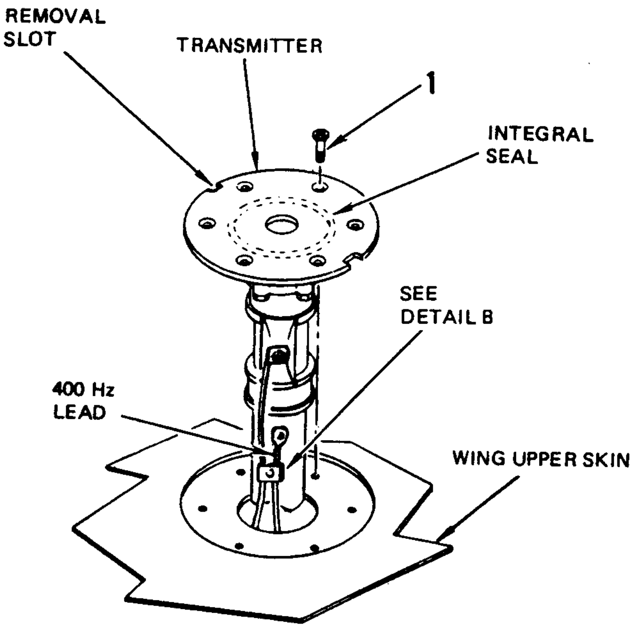
e. Carefully lift transmitter from mounting cavity.

f. Disconnect wiring harness terminals (2 and 3) from transmitter by unscrewing captive screws (4 and 5). Terminals, lockwashers (6 and 7), and captive screws should be retained together by captive washers (8 and 9).





DETAIL B



DETAIL A

(TYPICAL 12 PLACES)

1. Screw
2. Flag terminal (AB51, Mfd by 59730)
3. Ring terminal (A86, Mfd by 59730)
4. Captive screw, No. 6 (398421–6, Mfd by 89305)
5. Captive screw, No. 8 (398421–8, Mfd by 89305)
6. Lockwasher, No. 6 (1706–00, Mfd by 78189)
7. Lockwasher, No. 8 (1708–00, Mfd by 78189)
8. Captive washer, No. 6 (396973, Mfd by 89305)
9. Captive washer, No. 8 (396648, Mfd by 89305)
10. Screw
11. Lockplate
12. Clamp
13. Tubing (202–29403–5T)
14. Outer sleeve (GSC–156, Mfd by 59730)
15. Inner sleeve (GSC–101, Mfd by 59730)
16. Tubing (202–29403–3T)
17. Sleeve (398639, Mfd by 89305)

NOTE

1. Crimp in place using Thomas & Betts tool WT402 (NSN 5120–00–473–0972).

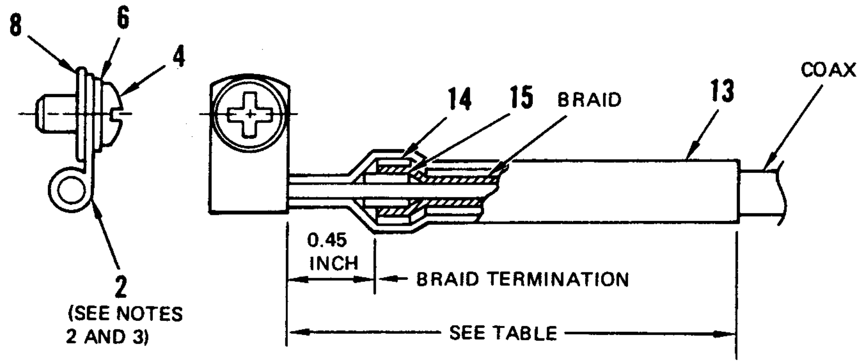
2. Crimp wire to terminal (2, 3) before assembling with captive screw, lockwasher, and captive washer. Flatten captive washer to retain screw.

3. Crimp terminals using Thomas & Betts tool WT100M (NSN 5120–00–114–0794).

WING FUEL TRANSMITTER REFERENCE DESIGNATOR	ACCESS	WIRE NO. (400 Hz POWER)	(COAX)	HEAT SHRINK TUBING (292–29403–3T, 5T) LENGTH IN INCHES (400 Hz POWER)	(COAX)	TUBING I. D. BEFORE SHRINK (400 hz POWER)	(COAX)
E701	UPPER SKIN	38–20	32	11	13	3/32–INCH	3/16–INCH
E702	UPPER SKIN	30–20	33	9	11	3/32–INCH	3/16–INCH
E703	UPPER SKIN	39–20	34	11	13	3/32–INCH	3/16–INCH
E704	UPPER SKIN	40–20	35	12	14	3/32–INCH	3/16–INCH
E705	UPPER SKIN	41–20	36	15	17	3/32–INCH	3/16–INCH
E706	4113–11	31–20	37	15	17	3/32–INCH	3/16–INCH
E707	3123–1	1–20	7	16 1/2	18 1/2	3/32–INCH	3/16–INCH
E708	UPPER SKIN	11–20	6	14	16	3/32–INCH	3/16–INCH
E709	UPPER SKIN	10–20	5	11 1/2	13 1/2	3/32–INCH	3/16–INCH
E710	UPPER SKIN	9–20	4	11	13	3/32–INCH	3/16–INCH
E711	UPPER SKIN	20–20	3	13	15	3/32–INCH	3/16–INCH
E712	UPPER SKIN	8–20	2	9	11	3/32–INCH	3/16–INCH

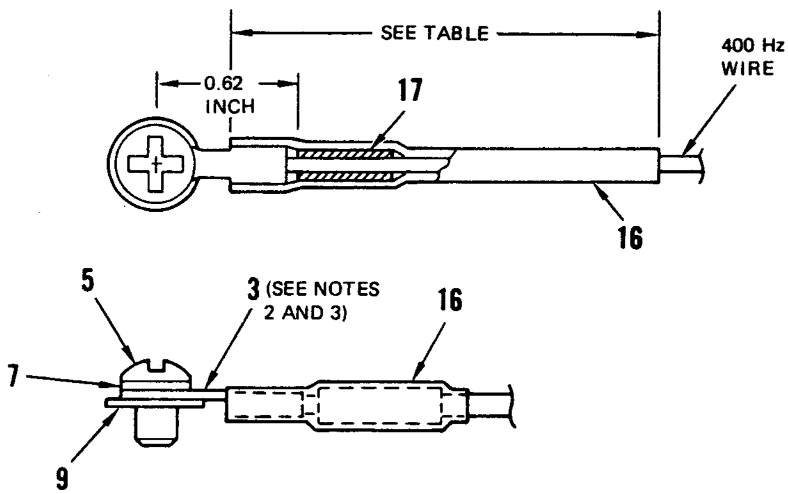
06D048–01–09–85

Figure 5-16. Removal and Installation; Wing Integral Fuel Tank Transmitter (Sheet 1 of 2)



DETAIL C

COAX LEAD TERMINATION



DETAIL D

400 Hz LEAD TERMINATION

06D048-02-09-85

Figure 5-16. Removal and Installation; Wing Integral Fuel Tank Transmitter (Sheet 2)

g. Bend down lockplate tab, and remove screw (10), lockplate (11), and clasp (12) securing leads to transmitter.

CAUTION

To prevent the inadvertent entrance of foreign objects into the fuel tanks, all fuel tank accesses should be securely covered immediately after probe is removed.

h. Cover mounting cavity.

i. Check transmitter for loose, broken, or cracked inner tube spacer pins and cracked terminal insulator. Any defect found is cause for rejection.

5-14.2. Installation. (Figure 5-16.)

a. Install new O-ring on transmitter.

b. Remove mounting cavity cover.

c. If heat shrink tubing is not installed in accordance with figure 5-16, remove terminal from both electrical leads. Install 202-29403 heat shrink tubing (diameter and length according to figure 5-16) over leads so tubing extends 2 inches into metal conduit. Shrink tubing after installing new terminal on leads.

d. If required, crimp wire to terminal, and install lockwasher, captive screw, and captive washer as shown in detail B or C.

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

e. Thoroughly clean wiring and transmitter terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

f. Connect wiring harness terminals (2 and 3) to transmitter with captive screws (4 and 5), lockwashers (6 and 7), and captive washers (8 and 9). Torque screws to 15 inch-pounds.

g. Clamp leads to transmitter with clamp (12), lockplate (11), and screw (10). Torque screws (10) to 8 inch-pounds. Bend up tab of lockplate.

NOTE

Allow at least 6 hours curing time before fueling airplane.

h. Coat terminals with MIL-S-8802, Class A-1/2 brush-on type sealant.

i. Apply continuous bead of G651 (General Electric Cyanosilicone) or Q4-2805 (Dow Corning) sealant around edge of skin opening to provide seal between O-ring on transmitter and edge of mounting hole.

j. Carefully insert and position transmitter in mounting cavity, and install with mounting screws (1).

k. Fuel airplane (T.O. 1A-7D-2-1).

l. Check transmitter installation for damage which could result in leakage.

m. Fillet-seal around transmitter flange with heat-resistant sealant (T.O. 1A-7D-3).

n. Apply recessed screwhead fairing sealant around transmitter mounting screws (T.O. 1A-7D-23).

5-15. WING INTEGRAL FUEL TANK TRANSMITTER REPAIR.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	GTF-6 or TF-20-1	Capacitance-type fuel quantity gage system test set	Perform test of transmitter

a. Remove transmitter (paragraph 5-14).

WARNING

P-D-680, Type II solvent is readily combustible and toxic to skin, eyes, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flames.

NOTE

Cleaning is not required if transmitter has been properly protected since removal from fuel tank.

b. Clean transmitter by flushing thoroughly with P-D-680, Type II drycleaning solvent, and allow to drip dry.

c. Check transmitter for nicks and scratches. Burnish out small nicks and scratches with fine hone, and polish with crocus cloth. Cover burnished areas with brush alodine in accordance with MIL-C-5541.

d. Connect GTF-6 or TF-20-1 test set to transmitter, and check that dry capacitance is within limits (figure 5-11). Replace transmitter if capacitance is incorrect.

e. Install transmitter (paragraph 5-14).

5-16. FUEL QUANTITY SIMULATOR CIRCUIT CARD REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Furnish external power to check fuel quantity simulator circuit card installation

5-16.1. Removal. Open access 1123-3, and remove cover from fuel quantity simulator. Remove card from simulator.

5-16.2. Installation. Install card, and perform the following:

a. Disconnect electrical connector to external tanks (stations 1, 3, 6, and 8).

b. Connect external electrical power (T.O. 1A-7D-2-1).

c. In sequence, place fuel tank monitor switch in 1, 3, 6, and 8. Check that fuel quantity indicator indicates 0 ($\pm$100) on all stations.

d. Disconnect external electrical power.

e. Check connectors and interfaces for damage and contamination. Clean with Freon TF.

f. Reconnect connectors.

g. Close access 1123.3.

5-17. FUEL TANK MONITOR SWITCH REMOVAL AND INSTALLATION.

CAUTION

Fuel management panel mounting screws incorporate a captive feature. Loosen and engage all screws in sequence, no more than three turns at a time. More than three turns of screw will result in damage to captive feature or panel components.

5-17.1. Removal.

a. Remove fuel management panel (paragraph 1-44).

b. Remove knob from switch.

c. Remove three screws securing switch to panel, and remove switch.

5-17.2. Installation.

a. Position switch on fuel management panel, and secure to panel with three screws.

b. Install knob on switch.

c. Check connector and interface for damage and contamination. Clean with Freon TF, and connect electrical connector.

d. Install fuel management panel (paragraph 1-44).

e. Perform fuel quantity indicating system operational checkout (paragraph 5-4.1).

5-18. FUEL QUANTITY INDICATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Power to check operation of fuel quantity indicator

5-18.1. Removal.

a. Remove screws securing indicator to instrument panel, and slide indicator out from panel.

b. Disconnect electrical connector.

5-18.2. Installation.

a. Perform fuel quantity indicating system adjustment (paragraph 5-24 or 5-25).

b. Check connector and interface for damage and contamination. Clean with Freon TF, and connect electrical connector.

c. Install indicator in instrument panel, and secure with screws.

5-19. LOW LEVEL FUEL WARNING SYSTEM THERMISTOR NO. 3 REMOVAL AND INSTALLATION.

Tools Required

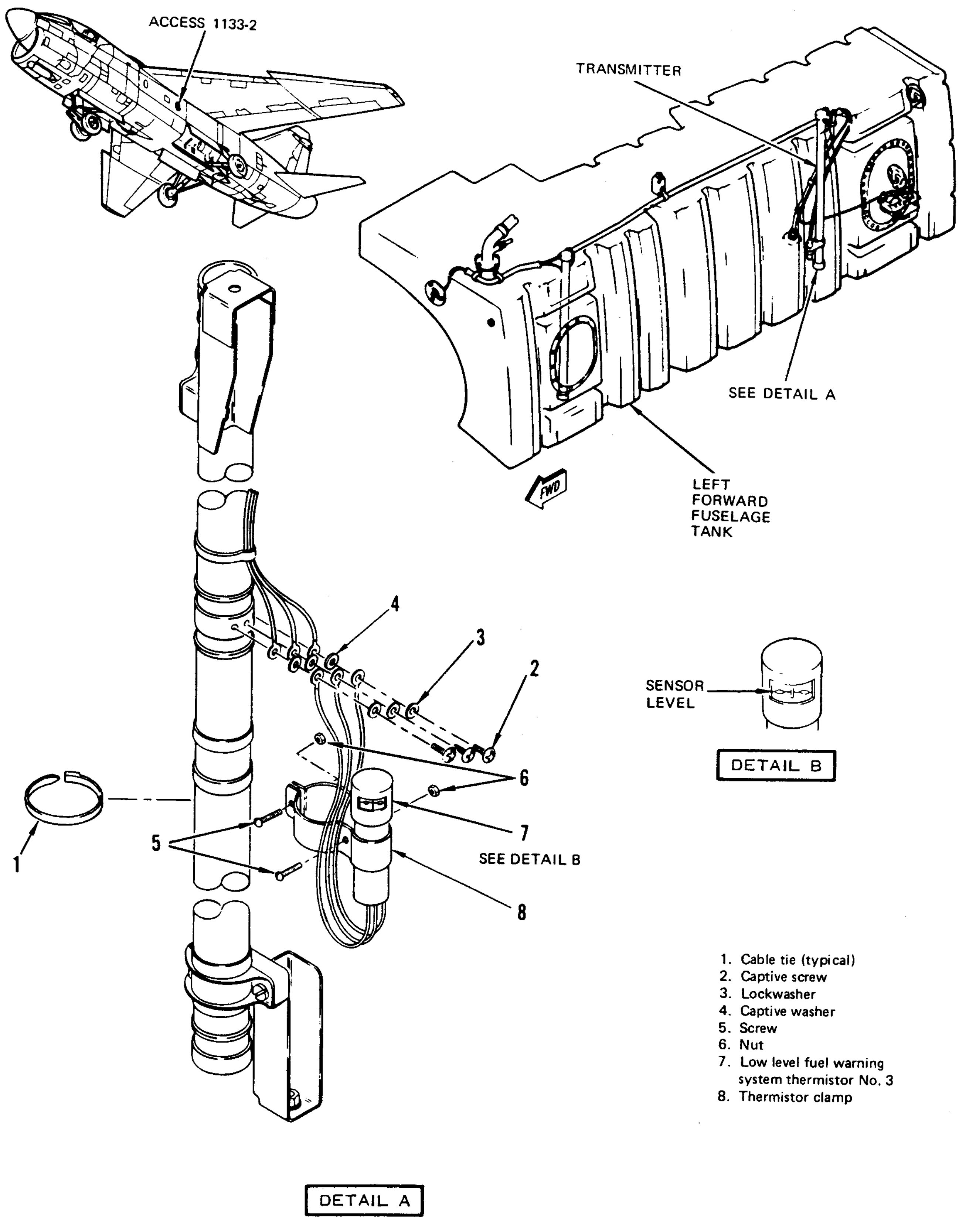
Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel for removal and installation of thermistor No.3
		Equipment required for purging fuel tank	Purge tank to remove thermistor No. 3

5-19.1. Removal. (Figure 5-17.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open forward fuselage tank access (paragraph 1-7).



1. Cable tie (typical)
2. Captive screw
3. Lockwasher
4. Captive washer
5. Screw
6. Nut
7. Low level fuel warning system thermistor No. 3
8. Thermistor clamp

Figure 5-17. Removal and Installation; Low Level Fuel Warning System Thermistor No. 3

b. Remove tank baffles (paragraph 1-18).

c. Remove cable ties (1) securing thermistor electrical leads to transmitter.

NOTE

Before disconnecting terminals, tag wiring harness leads with thermistor lead color codes (blue, white, and brown) for identification during installation.

d. Disconnect thermistor terminals and wiring harness terminals from transmitter by unscrewing captive screws (2). Thermistor terminals, lockwashers (3), and captive screws should be retained together by captive washers (4).

e. Remove screws (5) and nuts (6) securing low fuel level indicating thermistor No. 3 (7) and thermistor clamp (8) to transmitter, and remove thermistor and clamp.

5-19.2. Installation. (Figure 5-17.)

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

a. Thoroughly clean wiring and thermistor terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

b. Position thermistor (7) and thermistor clamp (8) on transmitter with sensor level positioned 18.64 ($\pm$0.06) inches from top of transmitter.

c. Secure thermistor and thermistor clamp to transmitter with screws (5) and nuts (6).

NOTE

Connect wiring harness leads that were color tagged during removal to proper color-coded thermistor leads.

d. Connect thermistor terminals and wiring harness terminals to transmitter with captive screws (2), lockwashers (3), and captive washers (4).

NOTE

Allow at least 6 hours curing time before fueling airplane.

e. Coat terminals and attaching washers and screws with MIL-S-8802, Class A-1/2 brush-on type sealant.

f. Secure thermistor electrical leads to transmitter with new cable ties (1).

g. Install tank baffles (paragraph 1-18).

h. Close forward fuselage tank access (paragraph 1-7).

i. Perform low level fuel warning system operational checkout (paragraph 5-4.2).

j. Fuel airplane (T.O. 1A-7D-2-1).

k. Perform fuel contamination test (paragraph 1-20).

5-20. LOW LEVEL FUEL WARNING SYSTEM THERMISTOR NO. 4 REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for defueling and fueling airplane	Defuel and fuel tanks for removal and installation of thermistor No. 4
		Equipment required for purging fuel tank	Purge fuel tank for removal of thermistor No. 4

5-20.1. Removal. (Figure 5-18.)

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

a. Open main sump tank access (paragraph 1-11).

b. Remove tank baffles (paragraph 1-18).

c. Remove cable ties (1) securing thermistor electrical leads to transmitter.

NOTE

Before disconnecting terminals, tag wiring harness leads with thermistor lead color codes (blue, white, and brown) for identification during installation.

d. Disconnect thermistor terminals and wiring harness terminals from transmitter by unscrewing captive screws (2). Thermistor terminals, lockwashers (3), and captive screws should be retained together by captive washers (4).

e. Remove screws (5) and nuts (6) securing low fuel level indicating thermistor No. 4 (7) and thermistor clamp (8) to transmitter. Remove thermistor and clamp.

5-20.2. Installation. (Figure 5-18.)

WARNING

Methyl ethyl ketone is flammable and toxic to eyes, skin, and respiratory tract. Use in a well-ventilated area. Avoid prolonged breathing of vapors. Eye protection (goggles/faceshield) is required. Avoid repeated skin contact. Keep away from sparks and flame.

a. Thoroughly clean wiring and thermistor terminals with methyl ethyl ketone (TT-M-261) and a stiff bristle brush.

b. Position thermistor (7) and thermistor clamp (8) on transmitter with sensor level 8.80 (±0.06) inches from top of transmitter.

c. Secure thermistor and thermistor clamp to transmitter with screws (5) and nuts (6).

NOTE

Connect wiring harness leads that were color tagged during removal to proper color-coded thermistor leads.

d. Connect thermistor terminals and wiring harness terminals to transmitter with captive screws (2), lockwashers (3), and captive washers (4).

NOTE

Allow at least 6 hours curing time before fueling airplane.

e. Coat terminals and attaching washers and screws with MIL-S-8802, Class A-1/2 brush-on type sealant.

f. Secure thermistor electrical leads to transmitter with new cable ties (1).

g. Install tank baffles (paragraph 1-18).

h. Close main sump tank access (paragraph 1-11).

i. Perform low level fuel warning system operational checkout (paragraph 5-4.2).

j. Fuel airplane (T.O. 1A-7D-2-1).

k. Perform fuel contamination test (paragraph 1-20).

5-21. LOW FUEL LEVEL INDICATING THERMISTOR CONTROL REMOVAL AND INSTALLATION.

5-21.1. Removal.

a. Open access 1123-3.

b. Disconnect electrical connector from sensor control.

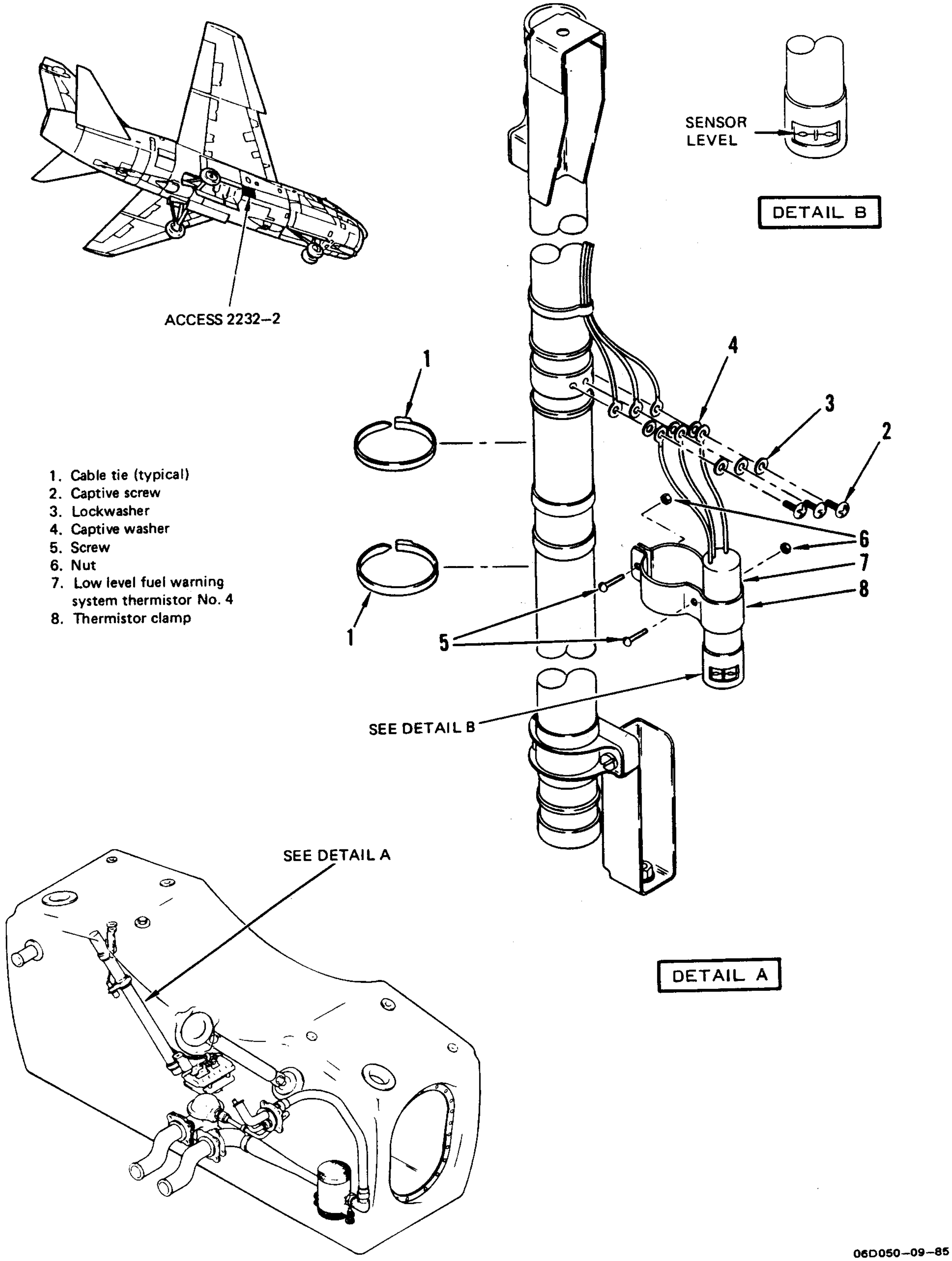


Figure 5-18. Removal and Installation; Low Level Fuel Warning System Thermistor No. 4

c. Remove four screws and washers securing control to bracket.

d. Remove sensor control.

5-21.2. Installation.

a. Install control on bracket, and secure with four washers and screws.

b. Perform low level fuel warning system operational checkout (paragraph 5-4.2).

c. Close access 1123-3.

5-22. FUEL QUANTITY INDICATOR TEST (USING GTF-6 TEST SET).

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Power to operate test sets and perform check
	Capacitance-type fuel quantity gage test set	GTF-6	Check system
	Flight line fuel quantity gaging system test set	215-01031-1	Check system
	Adapter cable	220-09074-101	Check system

5-22.1. Preparation.

a. Remove fuel management panel (paragraph 1-44).

b. Remove fuel quantity indicator from cockpit as follows:

(1) Remove screws securing indicator to instrument panel.

(2) Slide indicator from panel.

(3) Disconnect electrical connector from rear of indicator, and remove indicator from airplane.

c. Connect test equipment (figure 5-19).

d. Place fuel tank monitor switch in WING.

e. Check that power switch in GTF-6 test set is in OFF.

f. Check that POWER switch on 215-00366-24 power control box is in OFF.

g. Connect external electrical power (T.O. 1A-7D-2-1).

h. Place GTF-6 test set power switch in ON, and check that power indicator light comes on.

i. Perform GTF-6 test set calibration in accordance with instruction placard contained in GTF-6 test set cover. Perform only the procedure under CALIBRATION OF TEST SET FOR USE, paragraph 3.

5-22.2. Fuel Quantity Indicator Zero Test.

a. Connect test set cables and jumpers, and adjust (and lock) capacitance controls C1 through C11 as specified in table 5-8, steps 1 through 11. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading.

b. On fuel quantity gaging test set, disconnect connector W5P2 from connector W13P1 and connector W8P2 from connector W14P1.

c. Connect connector W5P2 to fuel tank monitor switch.

d. Connect connector W8P2 to connector W1P3, and connect connectors W1P1 and W1P2 to forward and aft fuel quantity indicators, respectively.

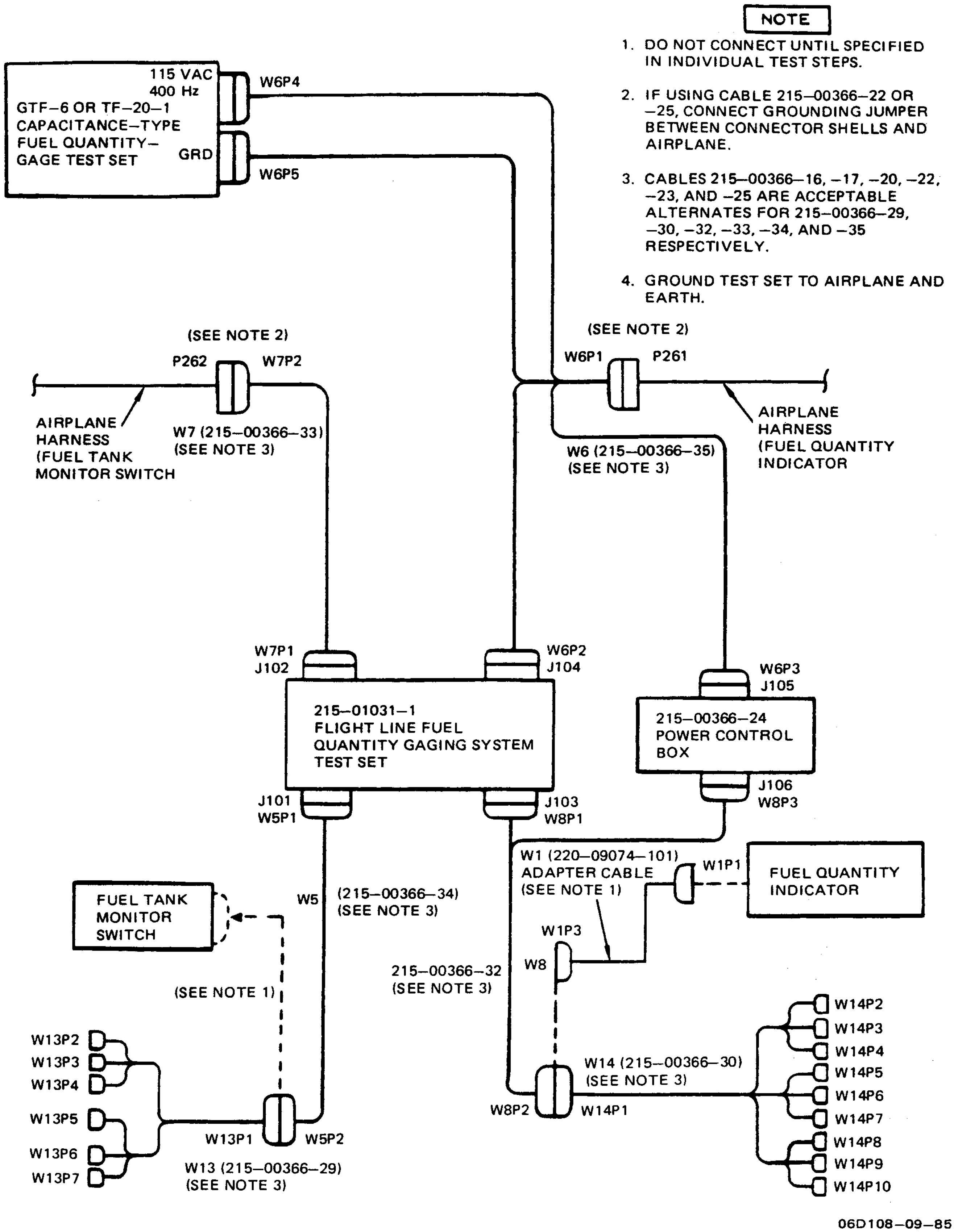


Figure 5-19. Test Setup; Fuel Quantity Indicating System Adjustment

Table 5-8. Fuel Quantity Indicator Test Setup (Using GTF-6 Test Set)

GTF-6 test set connections Aircraft tank units COAX-A to	UNSH-B to	Fuel quantity gaging test set cable W9 jumper connection	Condition simulated	215-01031-1 test set capacitance control	Capacitance (pf) (±0.1 pf) (set to lowest range that gives nonblinking reading)
1. W14P4	W14P5	None	MAIN MONITOR	C1	52.1
2. W14P3	W14P6	None	TRANS MONITOR	C2	52.1
3. W14P2	W14P7	None	TOTAL MONITOR	C3	52.1
4. W13P2	W14P8	J1 to J3	WING FULL	C4	400.0
5. W13P2	W14P8	J1 to J2	WING EMPTY	C5	194.0
6. W13P7	W14P10	J4 to J6	MAIN FULL	C6	1,167.5
7. W13P7	W14P10	J4 to J5	MAIN EMPTY	C7	519.0
8. W13P5	W14P9	None	TRANS STA 1	C8	95.5
9. W13P6	W14P9	None	TRANS STA 3	C9	95.5
10. W13P3	W14P9	None	TRANS STA 6	C10	95.5
11. W13P4	W14P9	None	TRANS STA 8	C11	95.5

e. Connect jumper cables W9 between J1 and J2 and between J4 and J5.

f. Place power control box POWER switch in ON. The 115-volt lamp on power control box must come on, and fuel quantity indicator lamp must come on.

g. Press indicator press-to-test switch on indicator. Cockpit indicator pointers (M and T) shall move counterclockwise at a steady rate through zero to a position below zero. The TOTAL counter on the indicator shall count down through zero and will show an arbitrary number at upper end of scale after passing through zero. Release press-to-test switch.

NOTE

If zero adjustment cannot be obtained in steps h and i, adjust to lowest value that can be obtained.

h. Rotate MAIN E adjustment screw on indicator until M (main) pointer indicates zero.

i. Rotate TRANSFER E adjustment screw on indicator until T (transfer) pointer indicates zero.

j. Rotate TOTAL E (empty) adjustment screw on indicator until counter indicates 0 pounds.

5-22.3. Fuel Quantity Indicator Full Test.

a. Move fuel quantity gaging test set jumper cables W9 to a new connection between J1 and J3 and between J4 and J6.

b. Rotate MAIN F adjustment screw on indicator until M (main) pointer indicates 5,400 pounds.

c. Rotate TRANSFER F adjustment screw on indicator until T pointer indicates 5,400 pounds.

d. Rotate TOTAL F adjustment screw on indicator until counter indicates 10,800 pounds.

e. Check fuel quantity indicator zero test (paragraph 5-22.2). If indicator does not indicate properly, repeat zero test procedure.

f. Place GTF-6 test set power switch in OFF.

g. Place power control box power switch in OFF.

h. In cockpit, place generator control switch in OFF.

i. Disconnect connector W5P2 from fuel tank monitor switch.

j. Disconnect connector W8P2 from connector W1P3, and disconnect connector W1P1 from fuel quantity indicator.

k. Install fuel management panel (paragraph 1-44).

l. Perform fuel quantity indicating system adjustment (paragraph 5-24) before installing indicator in airplane.

5-23. FUEL QUANTITY INDICATOR TEST (USING TF-20-1 TEST SET).

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Power to operate test sets and perform check
	Capacitance-type fuel quantity gage test set	TF-20-1	Check system
	Flight line fuel quantity gaging system test set	215-01031-1	Check system
	Adapter cable	220-09074-101	Check system

5-23.1. Preparation.

a. Place fuel tank monitor switch in WING.

b. Remove fuel quantity indicator (paragraph 5-18).

c. Remove fuel tank monitor switch (paragraph 5-17).

d. Connect test equipment (figure 5-19).

e. Check that power switch on TF-20-1 test set is in OFF.

f. Check that POWER switch on 215-00366-24 power control box is in OFF.

U.S. GOVERNMENT PRINTING OFFICE: 1987 - 748-000/62665

g. Connect external electrical power (T.O. 1A-7D-2-1).

h. Place TF-20-1 test set power switch in ON, and check that power indicator light comes on.

NOTE

Allow 10-minute minimum warmup period before calibrating TF-20-1 test set.

i. Perform TF-20-1 test set calibration in accordance with instruction placard contained in TF-20-1 test set storage box. Perform only the procedure under CALIBRATION OF TESTER FOR USE, paragraph 3, capacitance calibration.

5-23.2. **Fuel Quantity Indicator Zero Test.**

a. Connect test set cables and jumpers, and adjust (and lock) capacitance controls C1 through C11 as specified in table 5-9. Place TF-20-1 test set FUNCTION SELECTOR switch in TANK UNIT TEST UNSH position.

b. On fuel quantity gaging test set, disconnect connector W5P2 from connector W13P1 and connector W8P2 from connector W14P1.

c. Connect connector W5P2 to fuel tank monitor switch.

d. Connect connector W8P2 to fuel quantity indicator.

Table 5-9. Fuel Quantity Indicator Test Setup (Using TF-20-1 Test Set)

TF-20-1 test set connections COAX to	UNSH to	Fuel quantity gaging test set cable W9 jumper connection	Condition simulated	215-01031-1 test set capacitance control	Capacitance (pf) (±0.1 pf)
W14P4	W14P5	None	MAIN MONITOR	C1	52.1
W14P3	W14P6	None	TRANS MONITOR	C2	52.1
W14P2	W14P7	None	TOTAL MONITOR	C3	52.1
W13P2	W14P8	J1 to J3	WING FULL	C4	400.0
W13P2	W14P8	J1 to J2	WING EMPTY	C5	194.0
W13P7	W14P10	J4 to J6	MAIN FULL	C6	1167.5
W13P7	W14P10	J4 to J5	MAIN EMPTY	C7	519.0
W13P5	W14P9	None	TRANS STA 1	C8	95.5
W13P6	W14P9	None	TRANS STA 3	C9	95.5
W13P3	W14P9	None	TRANS STA 6	C10	95.5
W13P4	W14P9	None	TRANS STA 8	C11	95.5

NOTE

Check that jumper cables W9 are connected between J1 and J2 and between J4 and J5, since empty tank capacitance values are being simulated.

e. Place power control box POWER switch in ON. The 115-volt lamp on power control box must come on, and fuel quantity indicator lamp must come on.

f. Press indicator press-to-test switch. Both indicator pointers and the total counter must move counterclockwise toward zero end of indicator and shall indicate less than 0 pounds. Release switch.

NOTE

If zero adjustment cannot be obtained in steps g and h, adjust to lowest value that can be obtained.

g. Rotate MAIN E adjustment screw on indicator until M (main) pointer indicates zero.

h. Rotate TRANSFER E adjustment screw on indicator until T (transfer) pointer indicates zero.

i. Rotate TOTAL E (empty) adjustment screw on indicator until counter indicates 0 pounds.

5-23.3. Fuel Quantity Indicator Full Test.

a. Move fuel quantity gaging test set jumper cables W9 to new connection between J1 and J3 and between J4 and J6.

b. Rotate MAIN F adjustment screw on indicator until M (main) pointer indicates 5,400 pounds.

c. Rotate TRANSFER F adjustment screw on indicator until T pointer indicates 5,400 pounds.

d. Rotate TOTAL F adjustment screw on indicator until counter indicates 10,800 pounds.

e. Check fuel quantity indicator zero test (paragraph 5-23.2). If indicator does not indicate properly, repeat zero adjustment procedure.

f. Place power control box power switch in OFF.

g. Disconnect connector W5P2 from fuel tank monitor switch.

h. Disconnect connector W8P2 from fuel quantity indicator.

i. Place TF-20-1 test set power switch in OFF.

j. Perform fuel quantity indicating system adjustment (paragraph 5-25) before installing indicator in airplane.

5-24. FUEL QUANTITY INDICATING SYSTEM ADJUSTMENT (USING GTF-6 TEST SET).

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Furnish electrical power to operate test sets and perform checks
		Equipment required for fueling and defueling airplane	Fuel and defuel airplane
	GTF-6	Capacitance-type fuel quantity gage test set	Check fuel quantity system
	215-01031-1	Flight line fuel quantity gaging system test set	Check fuel quantity system
	220-09074-101	Adapter cable	Check fuel quantity system

WARNING

Failure to ground the GTF-6 fuel quantity gage test set to both airplane and earth ground could result in damage to airplane and injury to personnel.

NOTE

Any electrical connector disconnected during system adjustments shall be checked for interface damage and contamination and cleaned with Freon TF before mating.

5-24.1. Preparation.

a. Defuel or fuel airplane completely (T.O. 1A-7D-2-1).

b. Place fuel tank monitor switch in WING.

c. Remove fuel quantity indicator from instrument panel (paragraph 5-18).

d. Remove fuel tank monitor switch (paragraph 5-17).

e. Connect test equipment as shown in figure 5-20.

NOTE

Check that external electrical power is disconnected from airplane.

f. Place GTF-6 test set power switch in ON, and check that power indicator light comes on.

g. Perform GTF-6 test set calibration in accordance with instruction placard contained in GTF-6 test set cover.

h. If external fuel tanks are installed, disconnect pylon harness plugs at tank electrical connectors.

5-24.2. System Component Check.

NOTE

T.O. 1A-7D-2-20 provides procedures for performing time domain reflectometer (TDR) testing and troubleshooting of fuel quantity indicating system coaxial cables. When symptoms point to a possible malfunction involving coaxial cable components of the indicating system, TDR testing may be used to identify and isolate the cause of the problem.

a. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (pf) switch to lowest range that will give nonblinking reading. Connect W10P1 to connector J12 and W11P1 to connector J17 (figure 5-20). Check that main fuel quantity indicating system capacitance is 510 to 520 pf (empty) or 948 to 1,283 pf (full). If capacitance is incorrect, refer to system troubleshooting (paragraph 5-5).

b. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-GND, and B-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors. If wiring and connections check good, refer to paragraph 5-7.

c. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading. Connect W10P1 to connector J14 and W11P1 to connector J19. Check that main compensator capacitance is 25 to 30 .pf (empty) or 45 to 59 pf (full). If capacitance is incorrect, replace main compensator.

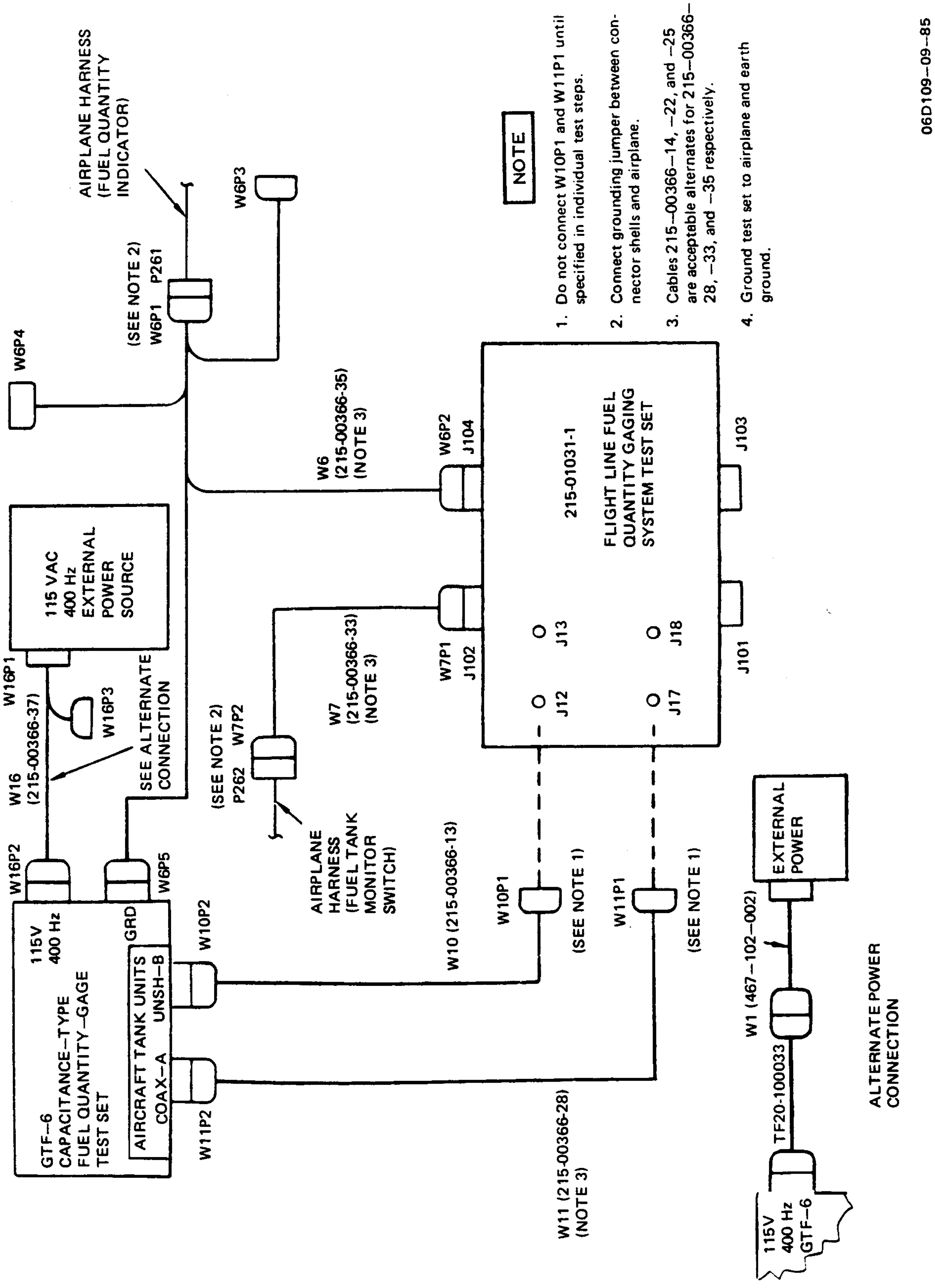


Figure 5-20. Test Setup (Using GTF-6 Test Set); Fuel Quantity Indicating System Transmitter/Wiring

d. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-GND, and B-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors.

e. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading. Connect W10P1 to connector J13 and W11P1 to connector J18. Check that transfer system capacitance is 190 to 204 pf (empty) or 346 to 468 (full). If capacitance is incorrect, refer to system troubleshooting (paragraph 5-5).

f. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-GND, and B-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors. If wiring and connections check good, refer to paragraph 5-9.

g. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (pF) switch to lowest range that will give on blinking reading. Connect W10P1 to connector J15 and W11P1 to connector J20. Check that transfer compensator capacitance is 25 to 30 pf (empty) or 45 to 59 pf (full). If capacitance is incorrect, replace transfer compensator.

h. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-GND, and B-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors.

i. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading. Connect W10P1 to connector J16 and W11P1 to connector J21. Check that total compensator capacitance is 25 to 30 pf (empty) or 45 to 59 pf (full). If capacitance is incorrect, replace total compensator.

j. Place DISPLAY SELECT switch in RES (MEG). Rotate RESISTANCE-FUNCTION switch through A-B, A-GND, and B-GND. Stop at each position to set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors.

k. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Connect W10P1 to connector J7, and one at a time, connect W11P1 to connectors J8, J9, J10, and J11. Record capacitance indication. Check that external tank simulator capacitance is 90 to 110 pf for each station. If capacitance is incorrect, replace fuel quantity simulator circuit card.

NOTE

The recorded values will be used in fuel quantity indicator empty or full adjustments (paragraph 5-24.3 or 5-24.4).

l. Place DISPLAY SELECT switch in RES (MEG). Place RESISTANCE-FUNCTION switch to A-B, and one at a time, connect W11P1 to J8, J9, and J11. Set RESISTANCE-RANGE (MEG) switch to lowest range that will give nonblinking reading. Check for minimum resistance of 20 megohms. Repeat procedure for RESISTANCE FUNCTION switch A-GND and B-GND positions. If resistance is low, repair or replace wiring or connectors in external tanks gaging circuit.

m. Place GTF-6 test set power switch in OFF.

n. Disconnect test cable connector W7P2 from electrical connector P262 and W6P1 from P261.

o. If performing system adjustment with tanks empty, proceed to paragraph 5-24.3. If performing adjustment with tanks full, proceed to paragraph 5-24.4.

5-24.3. Preferred Indicator Adjustment (Airplane Defueled).

a. Perform paragraphs 5-24.1 and 5-24.2.

NOTE

Because a greater degree of system accuracy is achieved, the following procedure is considered to be the preferred method for adjusting the fuel quantity indicator.

b. Connector P261 to fuel quantity indicator. Slide indicator out of panel to expose calibration adjustment screws.

c. Connect electrical connector P262 to fuel tank monitor switch. Check that switch is in WING.

d. Connect external electrical power to airplane (T.O. 1A-7D-2-1).

NOTE

If indicator cannot be adjusted as specified in the following steps, perform fuel quantity indicator test (paragraph 5-22).

e. Rotate MAIN E adjustment screw on indicator until M (main) pointer indicates zero.

f. Rotate TRANSFER E adjustment screw on indicator until T (transfer) pointer indicates zero.

g. Rotate TOTAL E (empty) adjustment screw on indicator until counter indicates 0 pounds.

h. Disconnect connector P261 from indicator and connector P262 from fuel tank monitor switch.

i. Connect test equipment as shown in figure 5-19.

j. Connect external electrical power to airplane (T.O. 1A-7D-2-1).

k. Place GTF-6 test set power switch in ON.

l. Connect test cables, and adjust (and lock) capacitance controls as specified in table 5-10, steps 1 through 9.

m. Connect test set jumper cables W9 between jacks J1 and J3 and between J4 and J6.

n. Disconnect connector W5P2 from connector W13P1 and connector W8P2 from connector W14P1.

o. Connect connector W5P2 to fuel tank monitor switch.

p. Connect connector W8P2 to connector W1P3, and connect connector W1P1 to fuel quantity indicator.

q. Place power control box POWER switch in ON. The 115-volt lamp on power control box must come on, and the fuel quantity indicator lamp must come on.

NOTE

If indicator cannot be adjusted as specified in the following steps, perform fuel quantity indicator test (paragraph 5-22).

r. Rotate MAIN F adjustment screw on indicator until M (main) pointer indicates 5,400 pounds.

s. Rotate TRANSFER F adjustment screw on indicator until T pointer indicates 5,400 pounds.

t. Rotate TOTAL F adjustment screw on indicator until counter indicates 10,800 pounds.

Table 5-10. Fuel Quantity Indicator Full Adjustment Test Setup (Using GTF-6 Test Set)

GTF-6 test set connections Aircraft tank units COAX-A to	UNSH-B to	Fuel quantity gaging test set cable jumper W9 connection	Condition simulated	215-01031-1 test set capacitance control	Capacitance (pf) (±0.1 pf)
1. W14P4	W14P5	None	MAIN MONITOR	C1	52.1
2. W14P3	W14P6	None	TRANS MONITOR	C2	52.1
3. W14P2	W14P7	None	TOTAL MONITOR	C3	52.1
4. W13P2	W14P8	J1 to J3	WING FULL	C4	400.0
5. W13P7	W14P10	J4 to J6	MAIN FULL	C6	1167.5
6. W13P5	W14P9	None	TRANS STA 1	C8	*
7. W13P6	W14P9	None	TRANS STA 3	C9	*
8. W13P3	W14P9	None	TRANS STA 6	C10	*
9. W13P4	W14P9	None	TRANS STA 8	C11	*

*Adjust C8, C9, C10, and C11 to capacitance values recorded in paragraph 5-24.2, step k. These values simulate the capacitance of the substitute capacitors for an empty tank and the capacitance of the airplane cabling to the tank.

u. Place power control box POWER switch in OFF and GTF-6 power switch in OFF.

v. Disconnect connector W5P2 from fuel tank monitor switch.

w. Disconnect connector W8P2 from connector W1P3, and disconnect connector W1P1 from fuel quantity indicator.

x. Connect electrical connector P261 to fuel quantity indicator and connector P262 to fuel tank monitor switch.

y. Verify that M (main) pointer indicates 0 (±100) pounds. If readjustment is necessary, perform steps l through r.

z. With fuel tank monitor switch in WING, verify that T (transfer) pointer indicates 0 (±100) pounds. If readjustment is necessary, perform steps l through s.

aa. If external fuel tanks are installed, connect pylon electrical connectors and verify that T (transfer) pointer indicates 0 (±100) pounds when fuel tank monitor switch is placed in station 1, 3, 6, or 8.

ab. Verify that total counter indicates 0 (±200) pounds. If readjustment is necessary, perform steps l through v.

ac. Disconnect connector P261 from fuel quantity indicator and connector P262 from fuel tank monitor switch.

ad. Paint fuel quantity indicator adjustment screws with MIL-V-173B varnish after final adjustment.

ae. Install fuel quantity indicator (paragraph 5-18).

af. Install fuel tank monitor switch (paragraph 5-17).

ag. Disconnect and remove test equipment.

ah. Disconnect external electrical power (T.O. 1A-7D-2-1).

5-24.4. Alternate Indicator Adjustment (Airplane Full).

NOTE

This procedure is considered to be the alternate method for adjustment of the fuel quantity indicator and should be used only if operational commitments preclude defueling of the airplane. Instructions for performing the preferred method of adjustment are provided in paragraph 5-24.3. If the alternate method of adjustment is used, the sytem must be checked at the earliest opportunity using the preferred method to ensure the greater degree of system accuracy.

a. Perform paragraphs 5-24.1 and 5-24.2.

b. Connect test equipment as shown in figure 5-19.

c. Connect external electrical power to airplane (T.O. 1A-7D-2-1).

d. Place GTF-6 test set power switch in ON.

e. Place GTF-6 CAPACITANCE-FUNCTION switch in A/C TEST-UNSH and DISPLAY SELECT switch in CAP (pf). Set CAPACITANCE-RANGE (pF) switch to lowest range that will give nonblinking reading. Connect test set cables and jumpers; adjust (and lock) capacitance controls C1 through C7 as specified in table 5-8. Adjust C8, C9, C10, and C11 to capacitance values recorded in paragraph 5-24.2, step k.

f. Disconnect connector W5P2 from W13P1 and connector W8P2 from W14P1.

g. Connect connector W5P2 to fuel tank monitor switch.

h. Connect connector W8P2 to connector W1P3, and connect connector W1P1 to fuel quantity indicator.

i. Connect jumper cable W9 between J1 and J2 of fuel quantity gaging test set. Connect second jumper cable W9 between J4 and J5.

j. Place power control box POWER switch in ON. The 115-volt lamp on power control box must come on, and fuel quantity indicator lamp must come on.

k. Press indicator press-to-test switch. Indicator pointer and total counter must move counterclockwise toward zero end of indicator and shall stop at an indication of less than 0 pounds. Release indicator press-to-test switch.

l. Rotate MAIN E adjustment screw on indicator until M (main) pointer indicates zero.

m. Rotate TRANSFER E adjustment screw on indicator until T (transfer) pointer indicates zero.

n. Rotate TOTAL E adjustment screw on indicator until counter indicates 0 pounds.

o. Move fuel quantity gaging test set jumper cables W9 to new connections J1 to J3 and J4 to J6.

p. Rotate MAIN F adjustment screw on indicator until M (main) pointer indicates 5,400 pounds.

q. Rotate TRANSFER F adjustment screw on indicator until T (transfer) pointer indicates 5,400 pounds.

r. Rotate TOTAL F adjustment screw on indicator until counter indicates 10,800 pounds.

s. Recheck zero settings in accordance with steps i through n. Repeat zero adjustment if required.

t. Place power control box POWER switch in OFF and GTF-6 test set power switch in OFF.

u. Disconnect W5P2 from fuel tank monitor switch. Disconnect connector W8P2 from connector W1P3, and disconnect connector W1P1 from fuel quantity indicator. Disconnect W6P1 from electrical connector P261 and W7P2 from electrical connector P262.

v. Connect electrical connector P261 to fuel quantity indicator and connector P262 to fuel tank monitor switch.

w. Verify that M (main) pointer indicates as shown in table 5-2. If readjustment is necessary, repeat adjustment procedure, starting with step d, except adjust MAIN E and MAIN F screws only.

x. With fuel tank monitor switch in WING, verify that T (transfer) pointer indicates as shown in table 5-2. If readjustment is necessary, repeat adjustment procedure, starting with step d, except adjust TRANSFER E and TRANSFER F screws only.

y. If external fuel tanks are installed, connect pylon electrical connectors, and verify that T (transfer) pointer indicates as shown in table 5-2 when fuel tank monitor switch is placed in station 1, 3, 6, or 8.

z. Verify that total counter indicates as shown in table 5-2. If readjustment is necessary, repeat adjustment procedure, starting with step d, except adjust TOTAL E and TOTAL F screws only.

aa. Disconnect connector P261 from indicator and connector P262 from fuel tank monitor switch.

ab. Disconnect external electrical power.

ac. Paint fuel quantity indicator adjustment screws with MIL-V-173B varnish.

ad. Install fuel quantity indicator (paragraph 5-18).

ae. Install fuel tank monitor switch (paragraph 5-17).

5-25. FUEL QUANTITY INDICATING SYSTEM ADJUSTMENT (USING TF-20-1 TEST SET).

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Furnish electrical power to operate test sets and perform checks
		Equipment required for fueling and defueling airplane	Fuel and defuel airplane
	TF-20-1	Liquid quantity gaging test set	Check fuel quantity system
	215-01031-1	Flight line fuel quantity gaging system test set	Check fuel quantity system

WARNING

Failure to ground the TF-20-1 fuel quantity gaging test set to both aircraft and earth ground could result in damage to aircraft and injury to personnel.

NOTE

Any electrical connector disconnected during system adjustments shall be checked for interface damage and contamination and cleaned with Freon TF before mating.

5-25-1. Preparation.

a. Defuel or fuel airplane completely (T.O. 1A-7D-2-1).

b. Place fuel tank monitor switch in WING.

c. Remove fuel quantity indicator from instrument panel (paragraph 5-18).

d. Remove fuel tank monitor switch (paragraph 5-17).

e. Connect TF-20-1 test set to external power supply and to airplane as shown in figure 5-21.

NOTE

Check that external electrical power is disconnected from airplane.

f. Place TF-20-1 test set power switch in ON, and check that power indicator light comes on.

NOTE

Allow 10-minute minimum warmup period before calibrating TF-20-1 test set.

g. Perform TF-20-1 test set calibration in accordance with instruction placard contained in TF-20-1 test set storage box.

h. If external fuel tanks are installed, disconnect pylon harness plugs at tank electrical connectors.

5-25.2. System Component Check.

NOTE

T.O. 1A-7D-2-20 provides procedures for performing time domain reflectometer (TDR) testing and troubleshooting of fuel quantity indicating system coaxial cables. When symptoms point to a possible malfunction involving coaxial cable components of the indicating system, TDR testing may be used to identify and isolate the cause of the problem.

a. Place TF-20-1 FUNCTION SELECTOR switch in TANK UNIT TEST UNSH position and CAP-RES CHECK switch in CAP. Connect W10P1 to connector J12 and W11P1 to J17 (figure 5-21). Check that main fuel quantity indicating system capacitance is 510 to 530 pf (empty) or 948 to 1,283 pf (full). If capacitance is incorrect, refer to system troubleshooting (paragraph 5-5).

b. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors. If wiring and connections check good, refer to paragraph 5-8.

c. Place CAP-RES CHECK switch in CAP. Connect W10P1 to J14 and W11P1 to J19. Check that main compensator capacitance is 25 to 30 pf (empty) or 45 to 59 pf (full). If capacitance is incorrect, replace main compensator.

d. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors.

e. Place CAP-RES CHECK switch in CAP. Connect W10P1 to connector J13 and W11P1 to J18. Check that transfer system capacitance is 190 to 204 pf (empty) or 346 to 468 pf (full). If capacitance is incorrect, refer to system troubleshooting (paragraph 5-5).

f. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors. If wiring and connections check good, refer to paragraph 5-10.

g. Place CAP-RES CHECK switch in CAP. Connect W10P1 to connector J15 and W11P1 to J20. Check that transfer compensator capacitance is 25 to 30 pf (empty) or 45 to 59 pf (full). If capacitance is incorrect, replace transfer compensator.

h. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors.

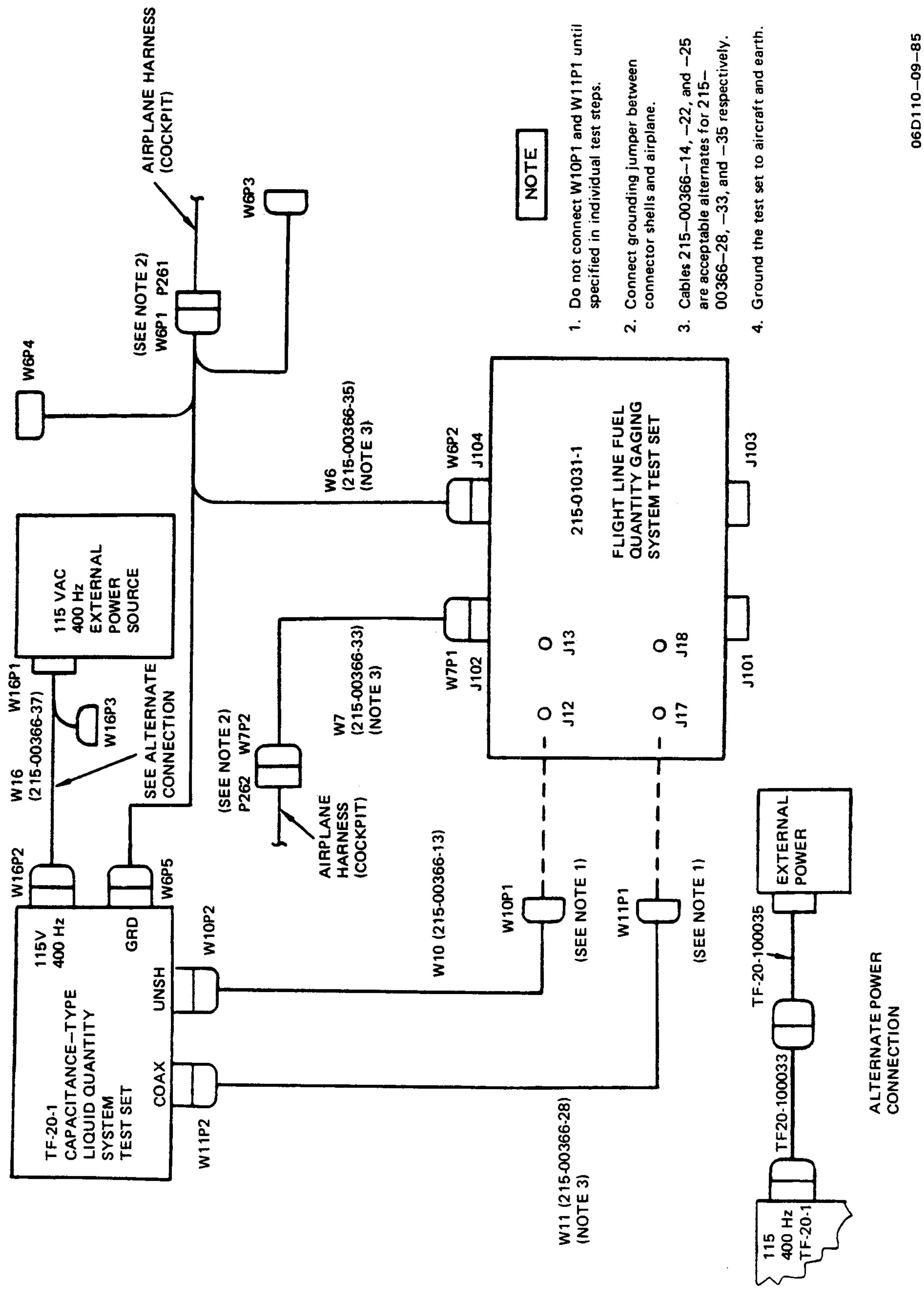


Figure 5-21. Test Setup (Using TF-20-1 Test Set); Fuel Quantity Indicating System Transmitter/Wiring

i. Place CAP-RES CHECK switch in CAP. Connect W10P1 to connector J16 and W11P1 to J21. Check that total compensator capacitance is 25 to 30 pf (empty) or 45-59 pf (full). If capacitance is incorrect, replace total compensator.

j. In sequence, place CAP-RES CHECK switch in A-B, A-GRD, and B-GRD positions. Check for minimum resistance of 20 megohms in each position. If resistance is low, repair or replace defective wiring or connectors.

k. Place CAP-RES CHECK switch in CAP. Connect W10P1 to connector J7, and one at a time, connect W11P1 to J8, J9, J10, and J11. Record capacitance indication. Check that external tank simulator capacitance is 90 to 110 pf for each station. If capacitance is incorrect, replace fuel quantity simulator circuit card.

NOTE

The recorded values will be used in fuel quantity indicator empty or full adjustments (paragraph 5-25.3 or 5-25.4).

l. Place CAP-RES CHECK switch in A-B, and one at a time, connect W11P1 to J8, J9, J10, and J11. Check for minimum resistance of 20 megohms. Repeat procedure for CAP-RES CHECK switch A-GRD and B-GRD positions. If resistance is low, repair or replace wiring or connectors in external tanks gaging circuit.

m. Place TF-20-1 test set power switch in OFF.

n. Disconnect test cable connector W7P2 from electrical connector P262 and W6P1 from P261.

o. If performing system adjustment with tanks empty, proceed to paragraph 5-25.3. If performing adjustment with tank full, proceed to paragraph 5-25.4.

5-25.3. Preferred Indicator Adjustment (Airplane Defueled).

a. Perform paragraphs 5-25.1 and 5-25.2.

NOTE

Because a greater degree of system accuracy is achieved, the following procedure is considered to be the preferred method for adjusting the fuel quantity indicator.

b. Connect electrical connector P261 to fuel quantity indicator, but do not install indicator in instrument panel.

c. Connect electrical connector P262 to fuel tank monitor switch. Check that switch is in WING.

d. Connect external electrical power to airplane (T.O. 1A-7D-2-1).

NOTE

If indicator cannot be adjusted as specified in the following steps, perform fuel quantity indicator test (paragraph 5-23).

e. Rotate MAIN E adjustment screw on indicator until M (main) pointer indicates zero.

f. Rotate TRANSFER E adjustment screw on indicator until T (transfer) pointer indicates zero.

g. Rotate TOTAL E (empty) adjustment screw on indicator until counter indicates 0 pounds.

h. Disconnect electrical connector P261 from indicator and connector P262 from fuel tank monitor switch.

i. Connect test equipment as shown in figure 5-19.

j. Connect external electrical power to airplane (T.O. 1A-7D-2-1).

k. Place TF-20-1 test set power switch in ON, and allow 10-minute warmup period.

l. Connect test cables, and adjust (and lock) capacitance controls as specified in table 5-11.

m. Connect test set jumper cables W9 between jacks J1 and J3 and between J4 and J6.

n. Disconnect connector W5P2 from connector W13P1 and connector W8P2 from connector W14P1.

o. Connect connector W5P2 to fuel tank monitor switch.

p. Connect connector W8P2 to W1P3, and connect connector W1P1 to fuel quantity indicator.

q. Place power control box POWER switch in ON. The 115-volt lamp on power control box must come on, and the fuel quantity indicator lamp must come on.

NOTE

If indicator cannot be adjusted as specified in the following steps, perform fuel quantity indicator test (paragraph 5-23).

r. Rotate MAIN F adjustment screw on indicator until M (main) pointer indicates 5,400 pounds.

s. Rotate TRANSFER F adjustment screw on indicator until T pointer indicates 5,400 pounds.

t. Rotate TOTAL F adjustment screw on indicator until counter indicates 10,800 pounds.

u. Place power control box POWER switch in OFF and TF-20-1 power switch in OFF.

Table 5-11. Fuel Quantity Indicator Full Adjustment Test Setup (Using TF-20-1 Test Set)

TF-20-1 test set connections COAX to	UNSH to	Fuel quantity gaging test set cable jumper W9 connection	Condition simulated	215-01031-1 test set capacitance control	Capacitance (pf) (±0.1 pf)
W14P4	W14P5	None	MAIN MONITOR	C1	52.1
W14P3	W14P6	None	TRANS MONITOR	C2	52.1
W14P2	W14P7	None	TOTAL MONITOR	C3	52.1
W13P2	W14P8	J1 to J3	WING FULL	C4	400.0
W13P7	W14P10	J4 to J6	MAIN FULL	C6	1167.5
W13P5	W14P9	None	TRANS STA 1	C8	*
W13P6	W14P9	None	TRANS STA 3	C9	*
W13P3	W14P9	None	TRANS STA 6	C10	*
W13P4	W14P9	None	TRANS STA 8	C11	*

*Adjust C8, C9, C10, and C11 to capacitance values recorded in paragraph 5-25.2, step k. These values simulate the capacitance of the substitute capacitors for an empty tank and the capacitance of the airplane cabling to the tank.

v. Disconnect connector W5P2 from fuel tank monitor switch.

w. Disconnect connector W8P2 from W1P3, and disconnect connector W1P1 from fuel quantity indicator.

x. Connect electrical connector P261 to fuel quantity indicator and connector P262 to fuel tank monitor switch.

y. Verify that M (main) pointer indicates 0 (±100) pounds. If readjustment is necessary, perform steps l through r.

z. With fuel tank monitor switch in WING, verify that T (transfer) pointer indicates 0 (±100) pounds. If readjustment is necessary, perform steps l through s.

aa. If external fuel tanks are installed, connect pylon electrical connectors and verify that T (transfer) pointer indicates 0 (±100) pounds when fuel tank monitor switch is placed in station 1, 3, 6, or 8.

ab. Verfiy that total counter indicates 0 (±200) pounds. If readjustment is necessary, perform steps j through q.

ac. Disconnect connector P261 from fuel quantity indicator and connector P262 from fuel tank monitor switch.

ad. Paint fuel quantity indicator adjustment screws with MIL-V-173B varnish after final adjustment.

ae. Install fuel quantity indicator (paragraph 5-18).

af. Install fuel tank monitor switch (paragraph 5-17).

ag. Disconnect and remove test equipment.

ah. Disconnect external electrical power (T.O. 1A-7D-2-1).

5-25.4. Alternate Indicator Adjustment (Airplane Full).

NOTE

This procedure is considered to be the alternate method for adjustment of the fuel quantity indicator and should be used only if operational commitments preclude defueling of the airplane. Instructions for performing the preferred method of adjustment are provided in paragraph 5-25.3. If the alternate method of adjustment is used, the system must be checked at the earliest opportunity using the preferred method to ensure the greater degree of system accuracy.

a. Perform paragraphs 5-25.1 and 5-25.2.

b. Connect test equipment as shown in figure 5-19.

c. Connect external electrical power to airplane (T.O. 1A-7D-2-1).

d. Place TF-20-1 test set power switch in ON, and allow a 10-minute warmup period.

e. Place TF-20-1 FUNCTION SELECTOR switch in TANK UNIT TEST UNSH and CAP-RES CHECK switch in CAP. Connect test set cables and jumpers; adjust (and lock) capacitance controls C1 through C7 as specified in table 5-9. Adjust C8, C9, C10, and C11 to capacitance values recorded in paragraph 5-25.2, step k.

f. Disconnect connector W5P2 from W13P1 and connector W8P2 from W14P1.

g. Connect connector W5P2 to fuel tank monitor switch.

h. Connect connector W8P2 to W1P3, and connect connector W1P2 to fuel quantity indicator.

i. Connect jumper cable W9 between J1 and J2 of fuel quantity gaging test set. Connect second jumper cable W9 between J4 and J5.

j. Place power control box POWER switch in ON. The 115-volt lamp on power control box must come on, and fuel quantity indicator lamp must come on.

k. Press indicator press-to-test switch. Both indicator pointer and total counter must move counterclockwise toward zero end of indicator and shall stop at an indication of less than 0 pounds. Release indicator press-to-test switch.

l. Rotate MAIN E adjustment screw on indicator until M (main) pointer indicates zero.

m. Rotate TRANSFER E adjustment screw on indicator until T (transfer) pointer indicates zero.

n. Rotate TOTAL E adjustment screw on indicator until counter indicates 0 pounds.

o. Move fuel quantity gaging test set jumper cables W9 to new connections J1 to J3 and J4 to J6.

p. Rotate MAIN F adjustment screw on indicator until M (main) pointer indicates 5,400 pounds.

q. Rotate TRANSFER F adjustment screw on indicator until T (transfer) pointer indicates 5,400 pounds.

r. Rotate TOTAL F adjustment screw on indicator until counter indicates 10,800 pounds.

s. Recheck zero settings in accordance with steps i through n. Repeat zero adjustment if required.

t. Place power control box POWER switch in OFF and TF-20-1 test set power switch in OFF.

u. Disconnect connector W5P2 from fuel tank monitor switch. Disconnect connector W8P2 from connector W1P3, and disconnect connector W1P1 from indicator. Disconnect W6P1 from electrical connector P261 and W7P2 from electrical connector P262.

v. Connect electrical connector P261 to fuel quantity indicator and connector P262 to fuel tank monitor switch.

w. Verify that M (main) pointer indicates as shown in table 5-2. If readjustment is necessary, repeat adjustment procedure, starting with step d, except adjust MAIN E and MAIN F screws only.

x. With fuel tank monitor switch in WING, verify that T (transfer) pointer indicates as shown in table 5-2. If readjustment is necessary, repeat adjustment procedure, starting with step d, except adjust Transfer E and Transfer F screws only.

y. If external fuel tanks are installed, connect pylon electrical connectors, and verify that T (transfer) pointer indicates as shown in table 5-2 when fuel tank monitor switch is placed in station 1, 3, 6, or 8.

z. Verify that total counter indicates as shown in table 5-2. If readjustment is necessary, repeat adjustment procedure, starting with step d, except adjust TOTAL E and TOTAL F screws only.

aa. Disconnect and remove test equipment. Disconnect connector P261 from fuel quantity indicator and connector P262 from fuel tank monitor switch.

ab. Disconnect external electrical power.

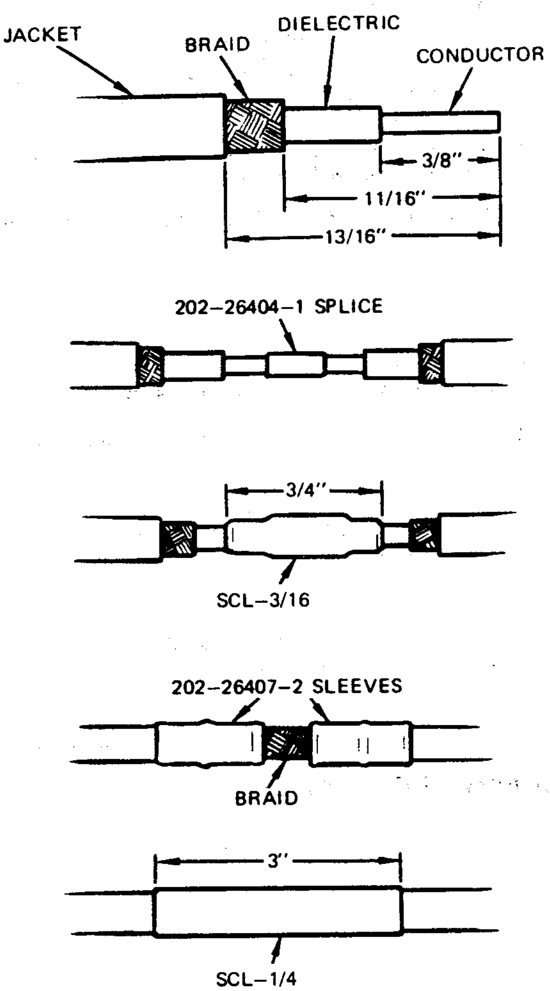
ac. Paint fuel quantity indicator adjustment screws with MIL-V-173B varnish.

ad. Install fuel quantity indicator (paragraph 5-18).

ae. Install fuel tank monitor switch (paragraph 5-17).

5-26. FUEL QUANTITY COAX CABLE REPAIR. Procedures for splicing the 210-37528-1 cable are contained in figure 5-22. For contact and connector installation, see figure 5-23.

METHOD 1



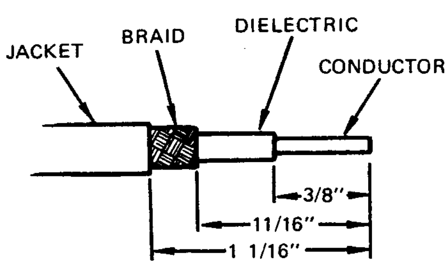
1. Cut existing cable minimum of 6 inches from connector.
2. Select section of cable to be spliced minimum of 12 inches in length.
3. Prepare ends to be spliced as shown.

NOTE

Slip shrink tubing over cable before crimping splice.

4. Center stripped conductors inside 202-26404-1 splice and crimp using T&B WT-130 hand tool.
5. Center splice inside SCL-3/16 (06090) gray tubing and shrink in place.
6. Cut 3 inch length of loose shield braid from 1/4 inch O.D. coaxial cable and center between cable braid. (RG-54A/U outer shield may be used). Trim to fit.
7. Position 202-26407-2 solder sleeves as shown and heat.
8. Center spliced area in SCL-1/4 (06090) white tubing as shown, and shrink in place.

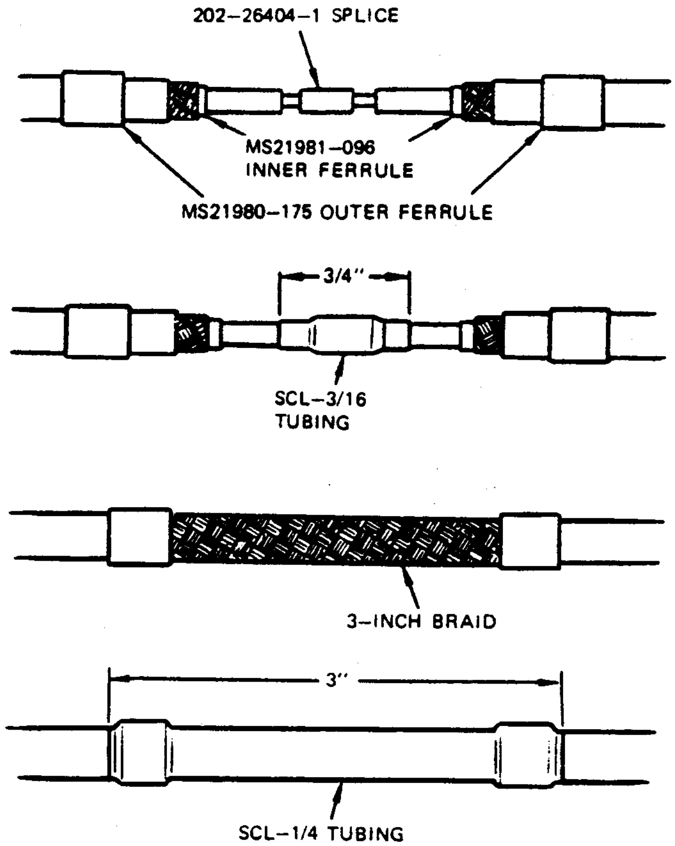
METHOD 2



1. Cut existing cable minimum of 6 inches from connector.
2. Select section of cable to be spliced minimum of 12 inches in length.
3. Prepare ends to be spliced as shown.

06D077-01-09-85

Figure 5-22. Splicing; 210-37528-1 Coax Cable (Sheet 1 of 2)



4. Slide MS21980–175 outer ferrules over cable.

5. Position MS21981–096 inner ferrules under cable braid against outer jacket.

NOTE

Slip shrink tubing over cable before crimping splice.

6. Center stripped conductors inside 202–26404–1 splice and crimp using T&B WT–130 hand tool.

7. Center splice inside SCL–3/16 (06090) gray tubing and shrink in place.

8. Cut 3 inches of loose shield braid from ¼ inch O.D. coaxial cable (RG–54A/U outer shield may be used).

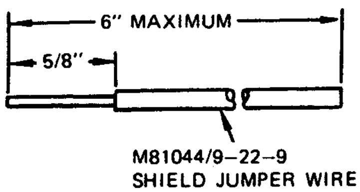
9. Position 3–inch length of loose braid over cable braid and inner ferrules. Trim to fit.

10. Position outer ferrules over braid and inner ferrules and crimp with T&B WT–203 hand tool or WT–440 with 4403 crimping die.

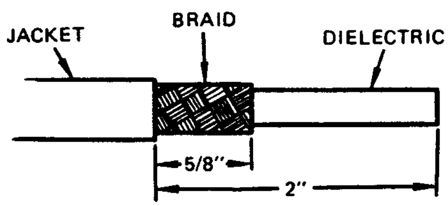
11. Center splice area in SCL–1/4 (06090) white tubing as shown and shrink in place.

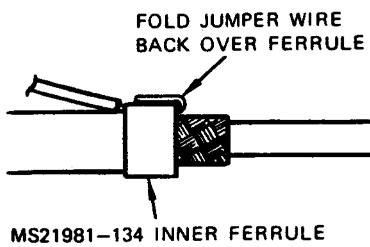
06D077–02–09–85

Figure 5-22. Splicing; 210-37528-1 Coax Cable (Sheet 2)



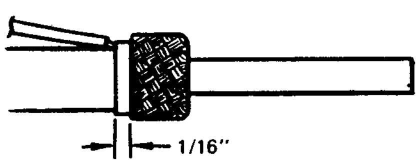
1. Prepare cable and jumper wire as shown.



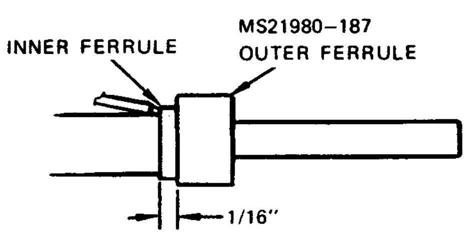


2. Place a MS21981–134 inner ferrule over jumper wire and braid and slide in place against jacket.

3. Install jumper wire as shown.

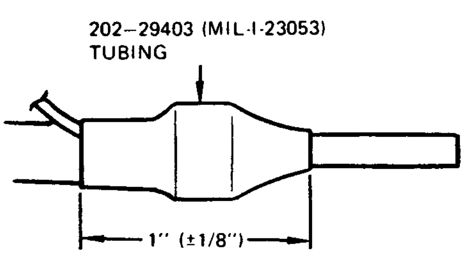


4. Flare braid and fold back over inner ferrule. Trim braid 1/16 inch from end of ferrule.



5. Place a MS21980–187 outer ferrule in place as shown and crimp with T&B Shure Stake hand tool WT–206 or WT–440 with a 4410 crimping die.

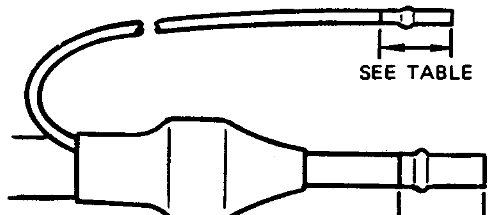
6. Check that jumper wire will withstand a pull of 5 pounds maximum.



7. Cut 202–29403 tubing and center over ferrule assembly. Shrink tubing in place.

06D078–01–09–85

Figure 5-23. Contact Installation; 210-37528-1 Coax Cable (Sheet 1 of 2)



8. Shield shall terminate 1/2 inch maximum from connector shell, cable clamp type backshell, contact, gland seal, or potting whichever is closer to shield termination.

9. Install contacts as shown.

10. Install contacts in connector (T.O. 1A–7D–2–11).

TABLE

CONNECTOR	STRIP DIMENSION	CRIMP TOOL	LOCATOR	TOOL INSERTION	TOOL REMOVAL
BENDIX JT & LJT	12/64	MS3191–4	W186	BENDIX 10–196940–20	BENDIX 11–8685–20
DEUTSCH CVC6062	14/64	MS3191–4	W84	DEUTSCH M15513–20	DEUTSCH M15515–20
HUGHES CVC6092/6093	12/64–14/64	MS3191–4	W186	HUGHES TMOITPOI (PIN) TMOITSOI (SKI)	HUGHES TMO16RT006

06D078–02–09–85

Figure 5-23. Contact Installation; 210-37528-1 Coax Cable (Sheet 2)

SECTION VI

AIR REFUELING RECEPTACLE SYSTEM

6-1. DESCRIPTION. The air refueling receptacle system permits complete refueling of the airplane fuel system (including external tanks), while the airplane is in flight, from a flying boom type tanker. The system consists of the receptacle, receptacle door, door hydraulic actuator, manual selector valve, nozzle latch, latch solenoid selector valve, latch hydraulic actuator, and air refueling door release handle; slipway lights and control, reset switch, signal amplifier, amplifier switch, disconnect switch, and advisory lights. See figure 6-1 for controls and indicators. See figure 6-2 for system arrangement.

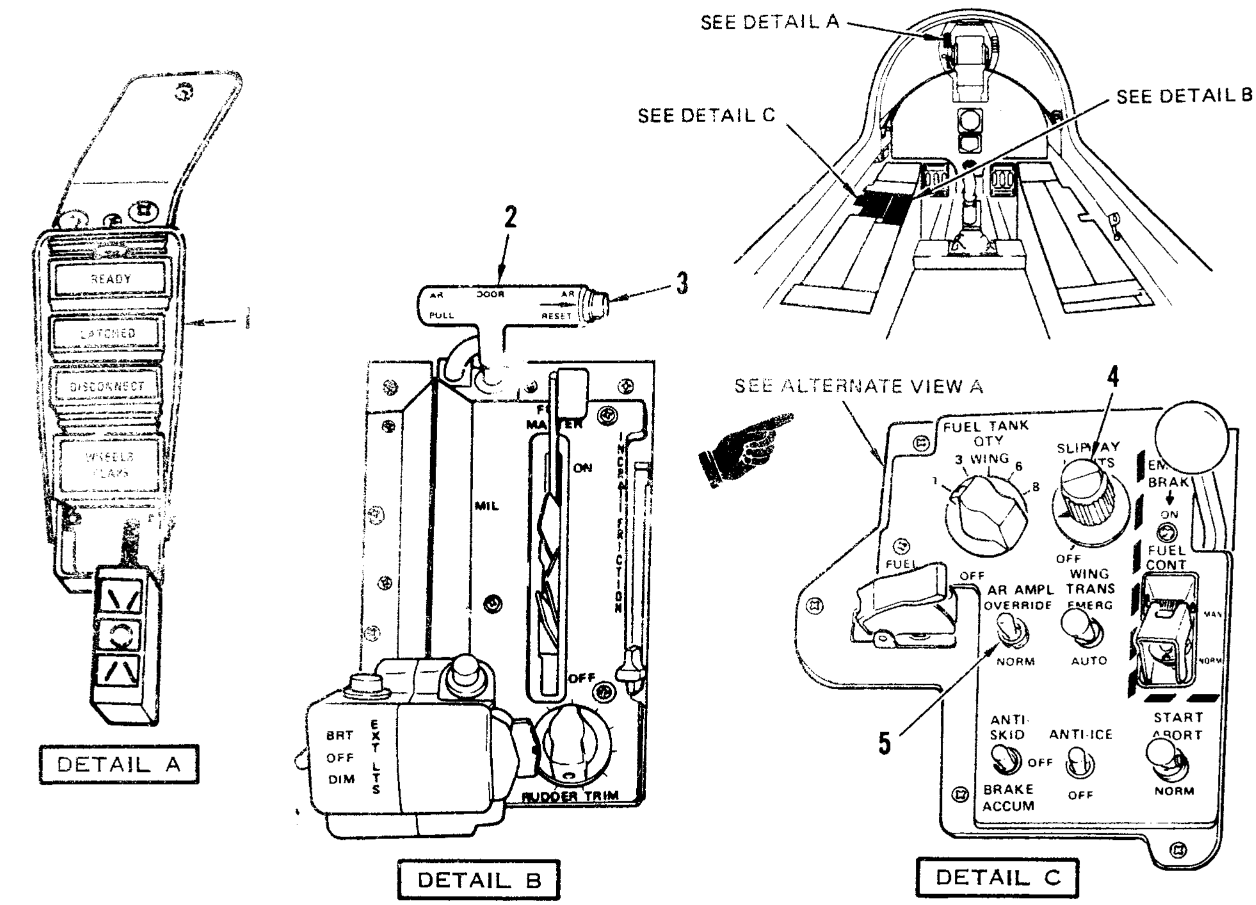
6-2. OPERATION. (Figures FO-17 and 6-3.)

6-2.1. Door Open. With engine operating or external electrical and hydraulic power connected, pulling the release handle up releases a mechanical lock, closes two handle switches, and operates the manual selector valve. This causes the door hydraulic actuator to retract and open the receptacle door. The receptacle door opens down and forms a part of the slipway. When the door is down and ready, indication is provided by a blue ready light. The receptacle door operating time is regulated by two restrictors in the actuator pressure and return line. If hydraulic power fails, the emergency backup system, consisting of two springs, will mechanically open the door. The door cannot be mechanically closed. Closing the handle switches by pulling the release handle up connects 28 volts dc from the primary bus to the air refueling system signal amplifier and relays A301K4 and A302K5. When the receptacle door opens, the door down switch closes and connects 28 volts dc to relay K205 completing the circuit from the amplifier to the air refueling indicator panel, causing the ready light to come on. When relay A302K5 is energized, it connects 115 volts ac from the primary bus to the slipway lights dimming control through contacts of deenergized relay K204. A slipway lights control on the fuel management panel controls the brightness of the slipway lights and is used to turn the lights off.

6-2.2. Tanker Nozzle Connection. Entrance of the tanker boom nozzle into the receptacle closes the nozzle contact switch, connecting 28 volts dc to open the latch solenoid selector valve. This directs hydraulic pressure to the nozzle latch actuator, which is attached to locking arms that lock the nozzle in the receptacle. The nozzle latched switch closes, completing a circuit that sends a signal to change the amplifier to the latched position. The blue ready light goes off, and a green latched light comes on. Fuel flow into the receiver aircraft can then begin.

6-2.3. Refueling Completion. When the fuel tanks are filled, the fuel pressure switch closes and completes a circuit which sends a signal to change the amplifier to the disconnect position. The latch solenoid selector valve is deenergized, causing the receptacle to release the nozzle and the amber disconnect light to come on. The amplifier may be recycled and returned to ready by momentarily pressing the reset switch.

6-2.4. Door Close. The system, including indicator lights, is turned off and the receptacle door closed by pushing the air refueling door release handle down. A door closed indicating circuit is provided through handle switch S267 and relay K204 to the disconnect light. When the release handle is pushed down, switch S267 completes a circuit through the contacts of K204. This keeps the disconnect light on until the door has fully closed. When the door closes, door up switch S708 will energize relay K204 turning off the disconnect light.

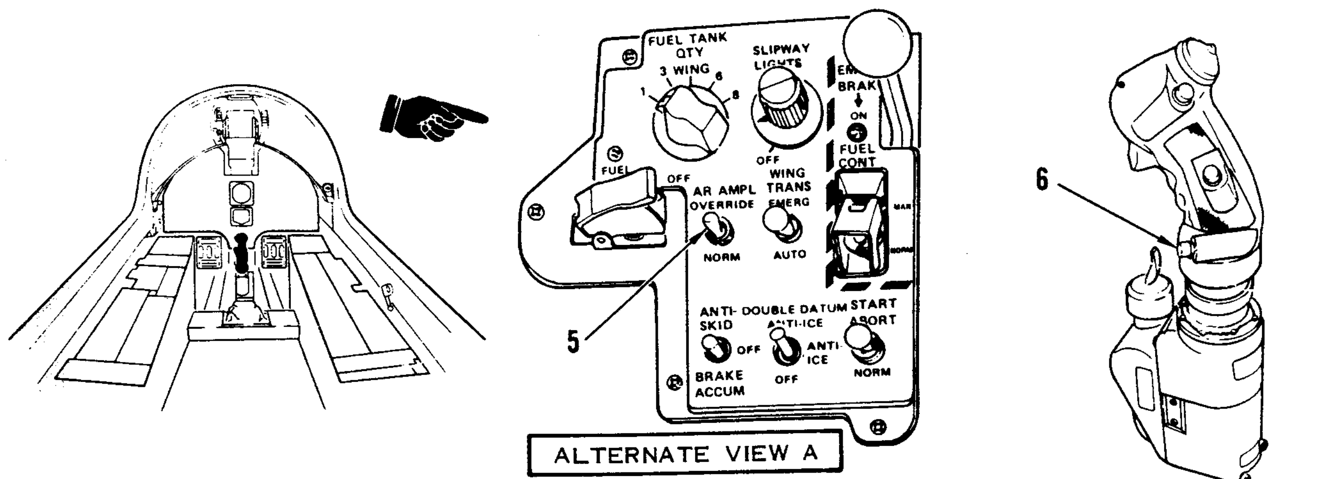


(AIRPLANES BEFORE T.O. 1A-7-530)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Advisory lights	On (READY) -- indicates receptacle door is open.
		On (LATCHED) -- indicates refueling nozzle is latched in receptacle.
		On (DISCONNECT) – indicates refueling nozzle is disconnected from receptacle. Also, after release handle is pushed down, indicates door is not closed.
2	Release handle, (AR DOOR)	Pulled up – opens receptacle door and connects electrical power to system. Depressurizes external fuel tanks and deactivates nose gear steering. Also deactivates manual AMF retract function of automatic maneuvering flap system by AMF Retract Switch.
		Pushed down -- closes receptacle door and disconnects electrical power from system.
3	Reset switch (AR RESET)	Pressed and released – resets signal amplifier to ready state.
4	Slipway lights control (SLIPWAY LIGHTS)	OFF -- turns slipway lights off.
		Turned clockwise – turns slipway lights on and increases brightness.

06D051-01-06-86

Figure 5-[illegible]. Controls and Indicators; Air Refueling Receptacle System (Sheet 1 of 2)



(AIRPLANES AFTER T.O. 1A-7-530)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
5	Signal amplifier switch (AR AMPL)	NORM – provides power to signal amplifier for normal system operation.
		OVERRIDE – provides power for latching and disconnecting if signal amplifier fails.
6	Disconnect switch	Pressed – unlatches receptacle latches to release refueling nozzle from receptacle. Landing gear must be retracted before disconnect switch can be used to release refueling nozzle.

06D051–02–06–86

Figure 6-1. Controls and Indicators; Air Refueling Receptacle System (Sheet 2)

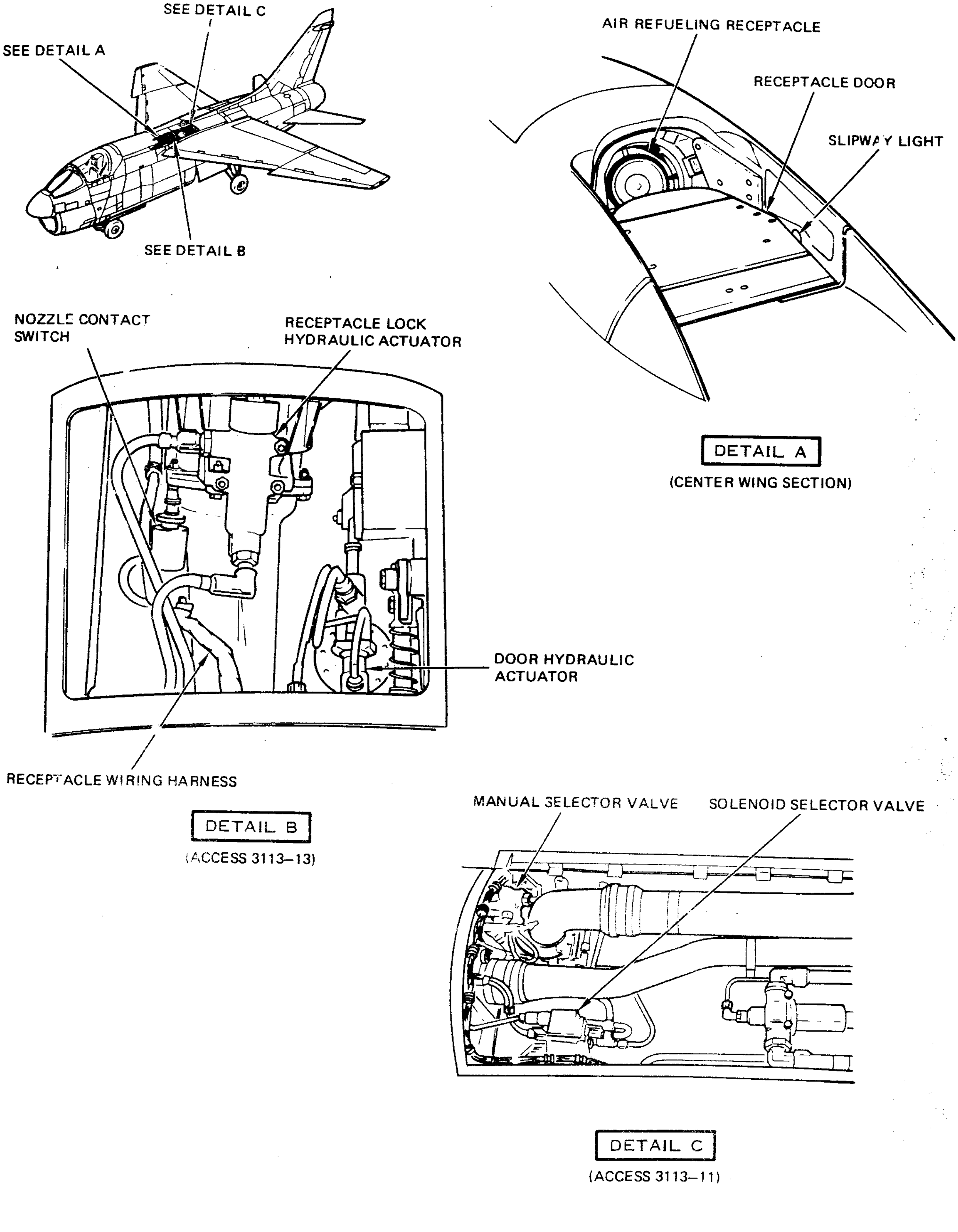


Figure 6-2. System Arrangement; Air Refueling Receptacle (Sheet 1 of 2)

U.S. Government Printing Office : 87 768-000 P.O. .4999

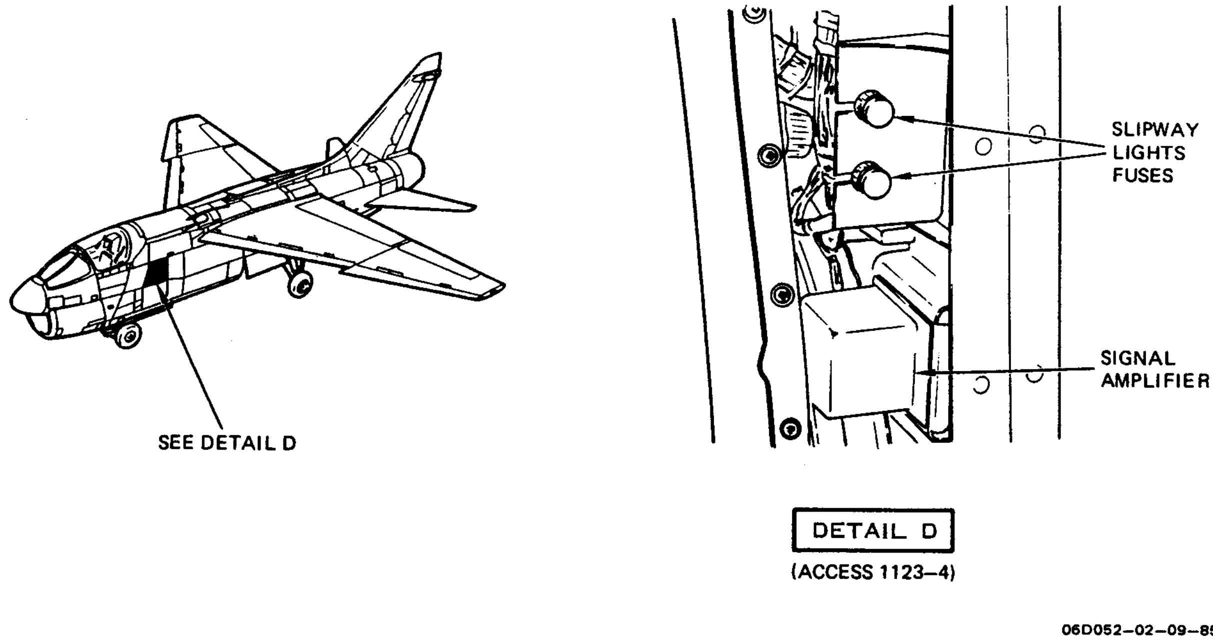


Figure 6-2. System Arrangement; Air Refueling Receptacle (Sheet 2)

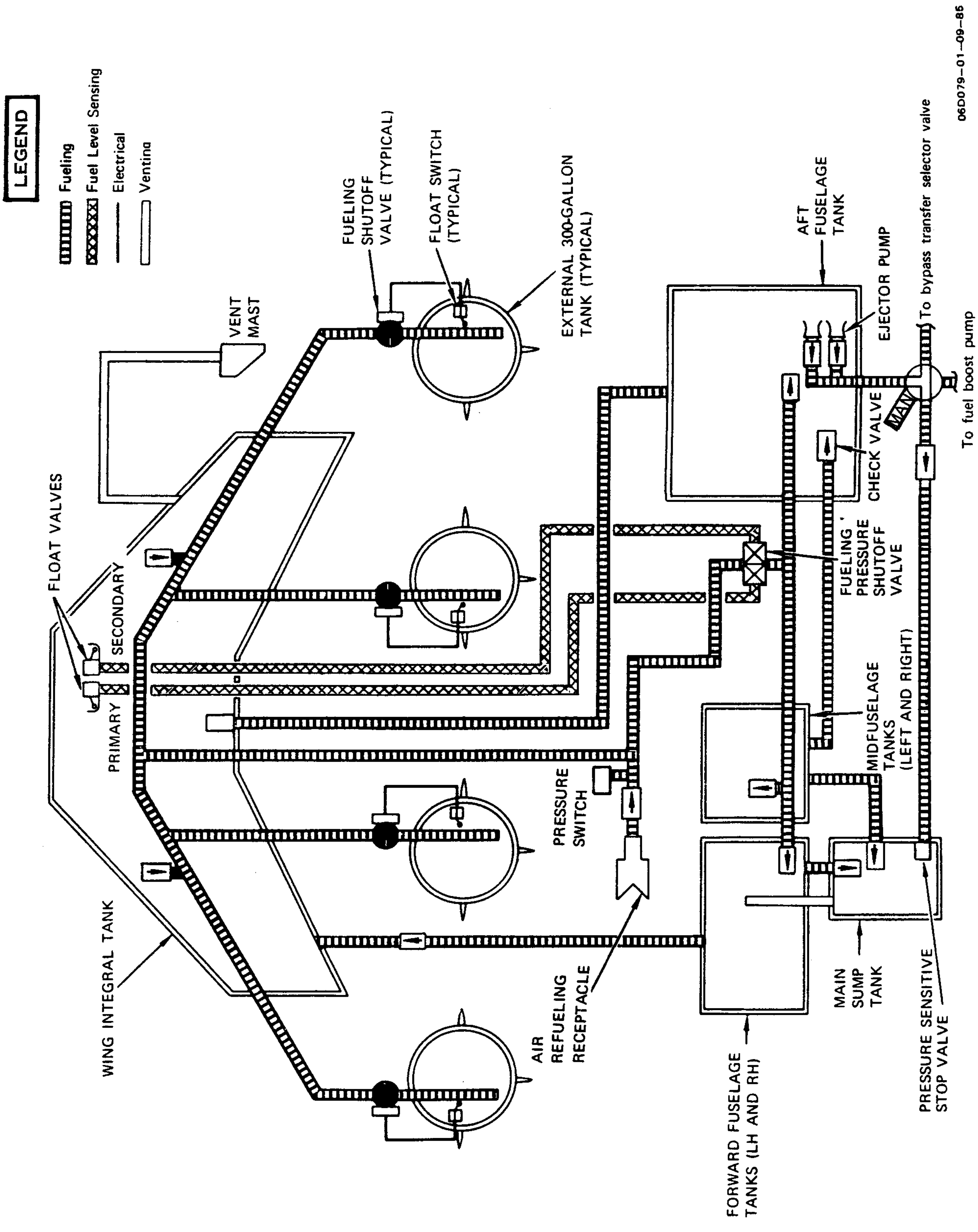


Figure 6-3. Schematic Diagram; Air Refueling Receptacle System (Sheet 1 of 2)

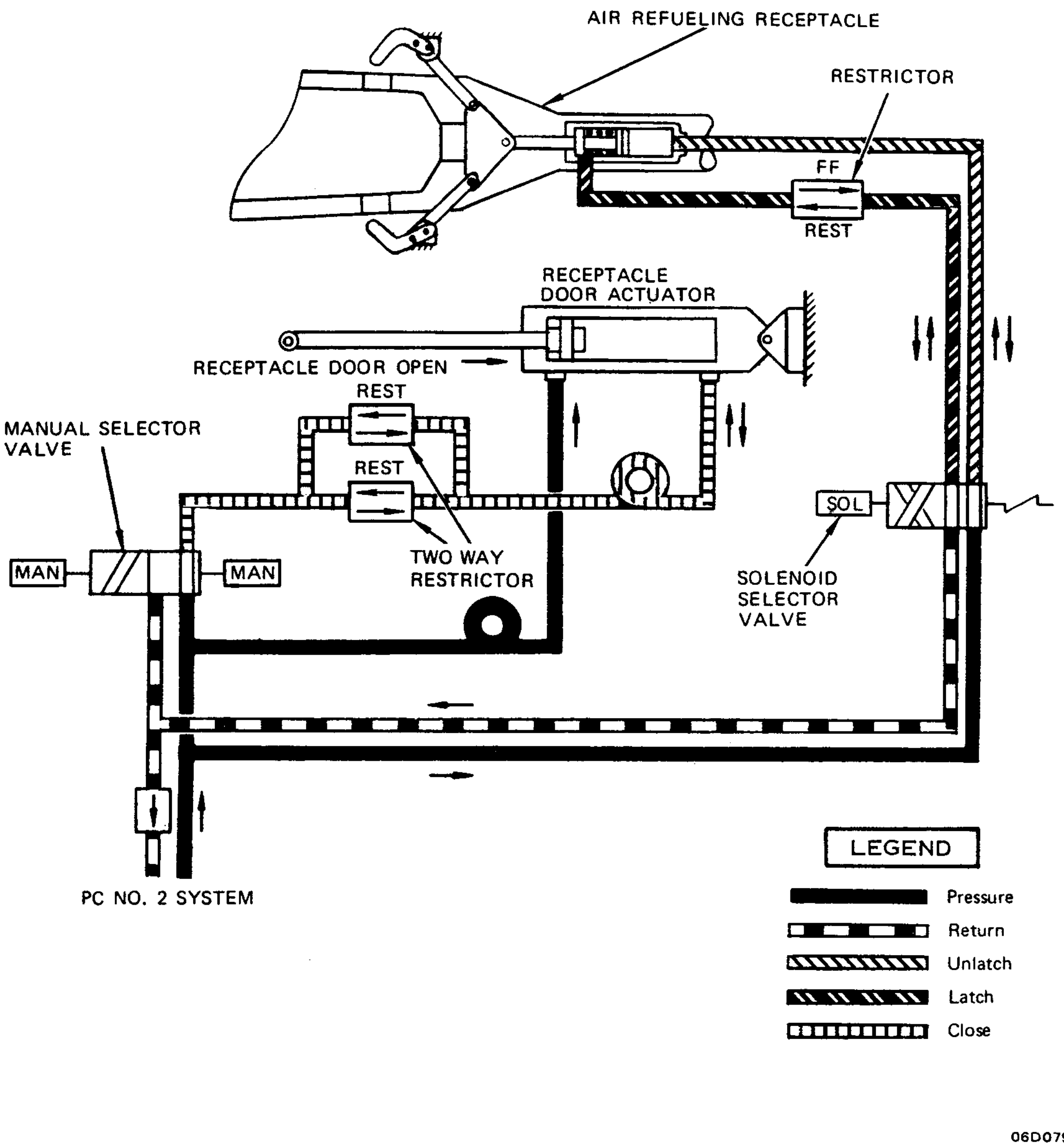


Figure 6-3. Schematic Diagram; Air Refueling Receptacle System (Sheet 2)

6-2.5. Pilot Disconnect. The nozzle may also be disconnected from the receptacle by pressing the disconnect switch on the stick grip. A disconnect can be initiated at any fuel load. This completes a circuit through A301K4 to change the amplifier to the disconnect position. When landing gear is down, the disconnect switch will control nose gear steering and cannot be used to disconnect the nozzle. Reset switch may be actuated to disconnect the nozzle. The disconnect switch also provides the pilot a means of retracting the flaps when using the automatic maneuvering flap (AMF) system. When the nozzle release handle is pushed down and weight is off the landing gear, relay A301K4 is deenergized and relay A347K8 is energized to connect the switch to the AMF system (T.O. 1A-7D-2-9).

6-2.6. Tanker Disconnect. During fueling, the tanker can initiate disconnect by providing a signal to the induction coil in the receptacle. When a signal is received by the induction coil, the amplifier changes to the disconnect position and nozzle disconnect occurs. The induction coil will also transmit a signal during disconnect initiated by the receiving airplane to provide the tanker with an indication that disconnect has occurred.

6-2.7. Amplifier Override. If the signal amplifier fails, the amplifier switch can be placed in override to provide capability for latching and disconnecting the nozzle. The air refueling advisory lights will not operate with the amplifier switch in override. In override, relay A301K7 is energized. When the nozzle enters the boom receptacle and the nozzle contact switch closes, 28 volts dc is supplied through A301K7 and A354K1 to energize the nozzle latch solenoid selector valve. Disconnect relay A354K1 is energized through closed contacts of A301K7 when fuel pressure switch is closed or when disconnect switch is pressed. Energizing A354K1 opens the circuit to the latch solenoid and releases the nozzle. Relay A354K1 remains energized until reset switch is pressed and released.

6-3. COMPONENTS.

For a list of system components, their locations (accesses), and functions, refer to table 6-1.

Table 6-1. Air Refueling Receptacle System Components

Component	Access	Function
Actuator, door hydraulic	3113-13	Opens and closes the air refueling receptacle door.
Actuator, receptacle latch hydraulic	Refueling receptacle	Locks refueling tanker boom nozzle in receptacle
Amplifier, signal	1123-4	Controls power distribution for air refueling
Assembly, push-pull control	1221-1	Provides mechanical linkage between the release handle in the cockpit and the receptacle door linkage.
Circuit breaker, CB342	2232-1	Connects 28 volts dc to the release handle switch S268 and to the door up and door down switches.
Circuit breaker, CB343	2232-1	Connects 28 volts dc to the release handle switch S267.
Circuit breaker, CB3034	2232-1	Connects 115 volts ac to lights dimming control through relays A302K5 and K204.
Coil, induction	Refueling receptacle	Transmits signal to refueling tanker when boom nozzle locks in receptacle and when a nozzle disconnect occurs. Receives signal from tanker during refueling to initiate a nozzle disconnect.

Table 6-1. Air Refueling Receptacle System Components – CONT

Component	Access	Function
Control, slipway lights	Fuel management panel (left console)	Controls intensity of slipway lights.
Door, receptacle	Center wing section	Provides access to air refueling receptacle.
Handle, release	Throttle quadrant (left console)	Opens and closes the manual selector valve to operate the air refueling receptacle door and turns on air refueling electrical system. Operates door mechanical lock.
Lights, receptacle slipway	Refueling receptacle slipway	Illuminates air refueling receptacle during refueling.
Panel, air refueling indicator	Cockpit windshield (left side)	Provides visual indication of ready, latched, or disconnect state of refueling.
Receptacle, air refueling	Center wing section	Provides an automatically locked pressure-tight connection between receiver airplane and the refueling tanker nozzle.
Relay, holding (K701)	3113-11	Provides holding circuit to maintain actuation of receptacle latch solenoid and prevent inadvertent disconnect due to opening of nozzle contact switch.
Restrictor, one-way	3113-13	Prevents chatter in lock line of receptacle latch actuator.
Restrictor (2), two-way	3123-1	Regulates operating time (open/close) of receptacle door by restricting hydraulic flow to and from door actuator.
Switch, disconnect	Stick grip (cockpit)	Changes amplifier to disconnect, which removes power from latch solenoid and permits removal of nozzle from receptacle.
Switch, door down	Receptacle housing (right side)	Closes when receptacle door opens to connect 28 volts dc to door down relay which completes circuit to ready advisory light.

Table 6-1. Air Refueling Receptacle System Components – CONT

Component	Access	Function
Switch, door up	Receptacle housing (right side)	Closes when receptacle door closes to connect 28 volts dc to door up relay which breaks circuit to disconnect advisory light and slipway lights.
Switch, fuel pressure	3123-1	Closes when tanks are full and completes circuit to change amplifier to disconnect position.
Switch, nozzle contact	Refueling receptacle	Completes circuit when nozzle is in receptacle to energize receptacle latch solenoid.
Switch, nozzle latched	Refueling receptacle	Completes circuit, when nozzle latches in receptacle, to change amplifier to latched position. Completes circuit, when forced disconnect occurs, to change amplifier to disconnect position.
Switch, release handle	Throttle quadrant (left console)	Connects 28 volts dc to air refueling system when release handle is pulled up.
Switch, reset	Release handle	Changes the signal amplifier to ready position when pressed and released.
Switch, signal amplifier	Fuel management panel (left console)	When placed in override position, permits operation of relay circuit for connecting and disconnecting nozzle if signal amplifier fails.
Valve, manual selector	3113-11	Directs hydraulic pressure to operate the door hydraulic actuator.
Valve, solenoid selector	3113-11	Directs hydraulic pressure to nozzle latches.

6-4. OPERATIONAL CHECKOUT.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply electrical power for air refueling system checkout
	Equipment required for connecting external hydraulic power		Supply hydraulic power for air refueling system checkout
	Equipment required for engine operation (optional)		Operate engine for checkout.
	Test nozzle, air refueling receptacle	E500050-3 (Viking Tool and Machine Corp., 20 Main, Belleville, N.J. 07109)	Test receptacle
	Safety clamp, air refueling receptacle door release handle	216-00326-1	Prevent inadvertent closing of receptacle door
	Spring scale, 0 to 80 pounds	80D (John Chatillon and Sons, Scale and Spring Division, New York, N.Y.)	Measure pounds of force
6-4	Restraint, air refueling test nozzle	(Local fabrication)	Restrain test nozzle during checkout

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in figure FO-18.

To perform abbreviated operational checkout, bypass steps n through x. Engine may be operated to perform steps a through l.

a. Attach spring scale to center point of air refueling door release handle, and determine force required to move handle from down to up, manually opening receptacle door. Force required must not exceed 40 pounds, and operation must be free and smooth. Check that receptacle door is open. {1 and 2}

b. Install release handle safety clamp.

c. Check that amplifier switch is in NORM.

d. Start and operate engine (T.O. 1A-7D-2-1) or perform the following:

   1. Connect external electrical power (T.O. 1A-7D-2-1).

   2. Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).

e. With receptacle door open, check that ready light is on. {3}

f. Rotate slipway lights control fully clockwise, and check that slipway lights are on. Rotate slipway lights control counterclockwise to OFF, and check that lights dim and go off. {4 and 5}

g. Place test nozzle in receptacle slipway, and install nozzle restraint (figure 6-4).

h. Insert test nozzle in receptacle. Check that latched light comes on and ready light goes off. Pull on nozzle to check that nozzle is locked in receptacle. {6 and 7}

i. Actuate landing gear handle switch through access hole in console.

WARNING

Ensure test nozzle is restrained before pressing disconnect switch and before fueling airplane.

j. Press disconnect switch, and check that disconnect light comes on, latched light goes off, and nozzle releases. {8, 9, and 10}

k. Release landing gear handle switch.

l. Press and release reset switch, and check that ready light comes on and disconnect light goes off. {11}

m. If abbreviated checkout was performed, steps a through l, shut down engine (T.O. 1A-7D-2-1).

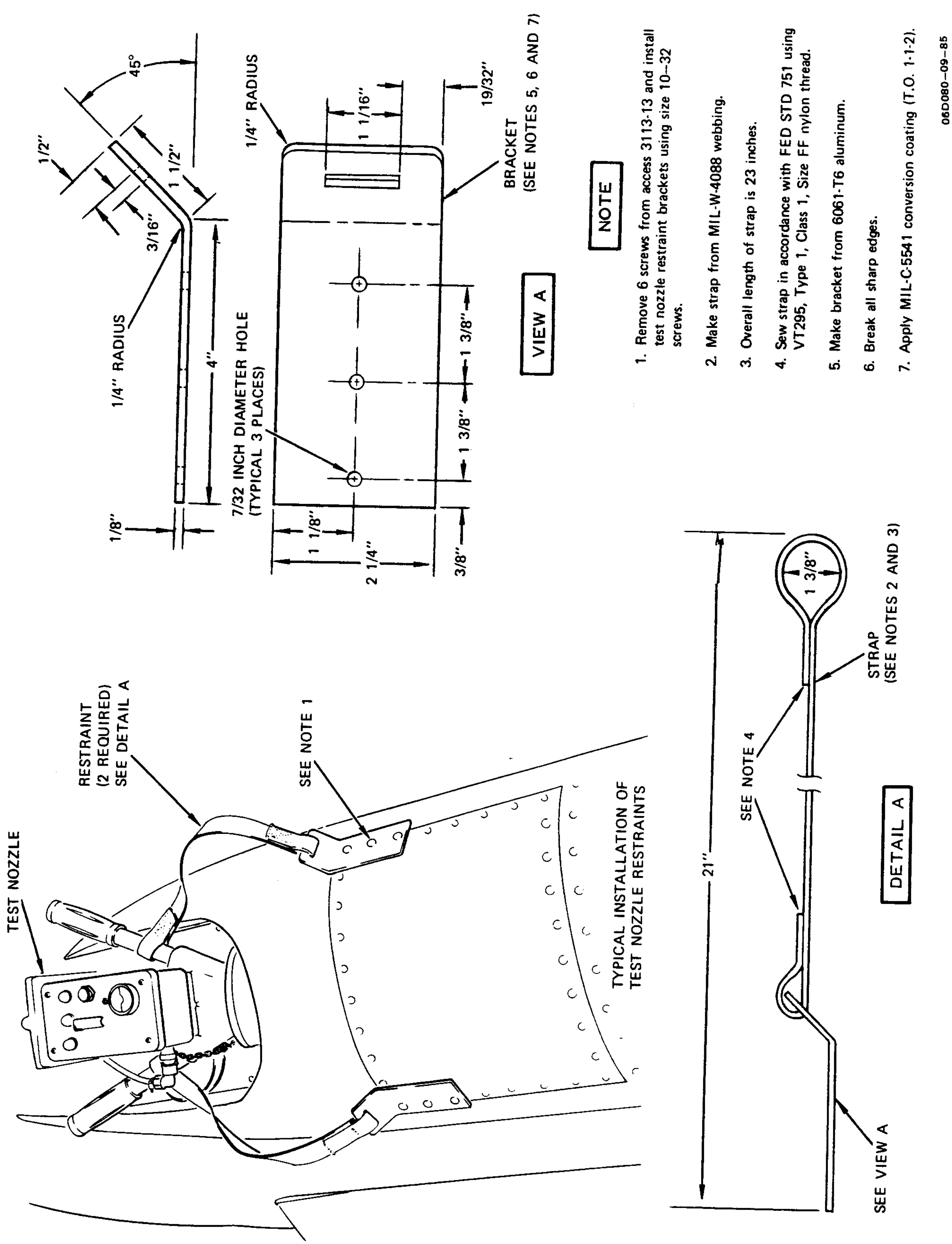


Figure 6-4. Test Nozzle Restraint; Air Refueling Receptacle

n. Insert test nozzle in receptacle, and ensure that nozzle is restrained. Check that latched light comes on and ready light goes off. {6}

WARNING

Fire or explosion may occur causing injury to personnel and damage to equipment if improper ground is used. Ensure that airplane, fueling equipment, and fueling nozzle are properly grounded (T.O. 1A-7D-2-1).

Observe fuel servicing precautions listed in T.O. 1A-7D-2-1.

o. Ground fueling nozzle to airplane, and connect fueling nozzle to test nozzle.

NOTE

Ensure that wing check valve internal components are not broken by rotating handle approximately 3/4 inch past defuel wing position. If handle moves further, internal components may be broken and repair/replacement is required.

p. Place the wing defueling check valve in DEFUEL - WING.

q. Start fuel flowing at 55 psi maximum pressure.

r. Rotate primary precheck valve handle to PRECHECK and hold. If fuel does not cease to flow within 10 seconds, stop fueling operations immediately and correct malfunction.

s. If fuel flow stops during primary precheck operation, rotate primary precheck valve handle to NORMAL.

t. Repeat steps r and s using secondary precheck valve.

u. Place the wing defueling check valve in NORMAL.

v. Fuel airplane until system shuts off. Check that air is venting from fuselage vent mast during fueling. Check receptacle for fuel leaks.

w. Check that disconnect light comes on when system is filled and nozzle releases. {12}

x. Turn fuel pressure off, and remove fueling nozzle from test nozzle.

y. Place amplifier switch in OVERRIDE, and check that all three advisory lights are off. {13}

z. Insert nozzle in receptacle, and check that nozzle is locked. {14}

aa. Actuate landing gear handle switch through access hole in console.

ab. Press disconnect switch, and check that nozzle releases. {15}

ac. Release landing gear handle switch.

ad. Insert nozzle, and check that it will not lock. Press reset switch, and check that nozzle locks. {16}

ae. Actuate induction coil switch on test nozzle, and check that nozzle does not release. {17}

af. Press reset switch. Nozzle will release.

ag. Place amplifier switch in NORM, and check that ready light comes on. {3}

ah. Insert nozzle in receptacle. Actuate induction coil switch on test nozzle, and check that nozzle releases. {18}

ai. Remove restraint and test nozzle from airplane.

aj. Remove release handle safety clamp, attach spring scale to center point of release handle, and determine force required to move handle from up (door open) to down (door closed) and then up. Force required shall not exceed 18 pounds. {19}

ak. Push release handle down, and check that receptacle door closes and disconnect light goes out after several seconds. {20} al. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

6-5. TROUBLESHOOTING.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Multimeter	AN/PSM-6	Check continuity and voltage

6-5.1. Procedures. See figure FO-18 for troubleshooting information. Troubles in the figure are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout.

6-5.2. Schematic. For system troubleshooting schematic, see figure FO-17.

6-6. RECEPTACLE WIRING HARNESS CHECKOUT.

Test Equipment Required

Figure & index No.	Name	AN type designation	Use and application
	Equipment required for connecting external electrical power		Supply power to operate receptacle electrical system
	Equipment required for connecting external hydraulic power		Supply power to operate receptacle hydraulic system
	Multimeter	AN/PSM-6	Measure resistance of receptacle induction coil
	Test nozzle, air refueling receptacle	E500050-3 (Viking Tool and Machine Corp., 20 Main, Belleville, N.J. 07109)	Test receptacle harness
	Safety clamp, air refueling receptacle door release handle	216-00326-1	Prevent inadertent closing of receptacle door
	Test set, in flight refueling harness	216-01802-1	Test receptacle harness
6-4	Restraint, air refueling test nozzle	(Local fabrication)	Restrain test nozzle during checkout

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in figure FO-19.

a. Remove access 3113-11.

b. Disconnect electrical connector P719 from receptacle wiring harness.

c. Place test set POWER switch in OFF.

d. Connect test set to receptacle wiring harness A710 and airplane electrical connector P719 using test cable W1 as shown in figure 6-5.

e. Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).

f. Connect external electrical power (T.O. 1A-7D-2-1).

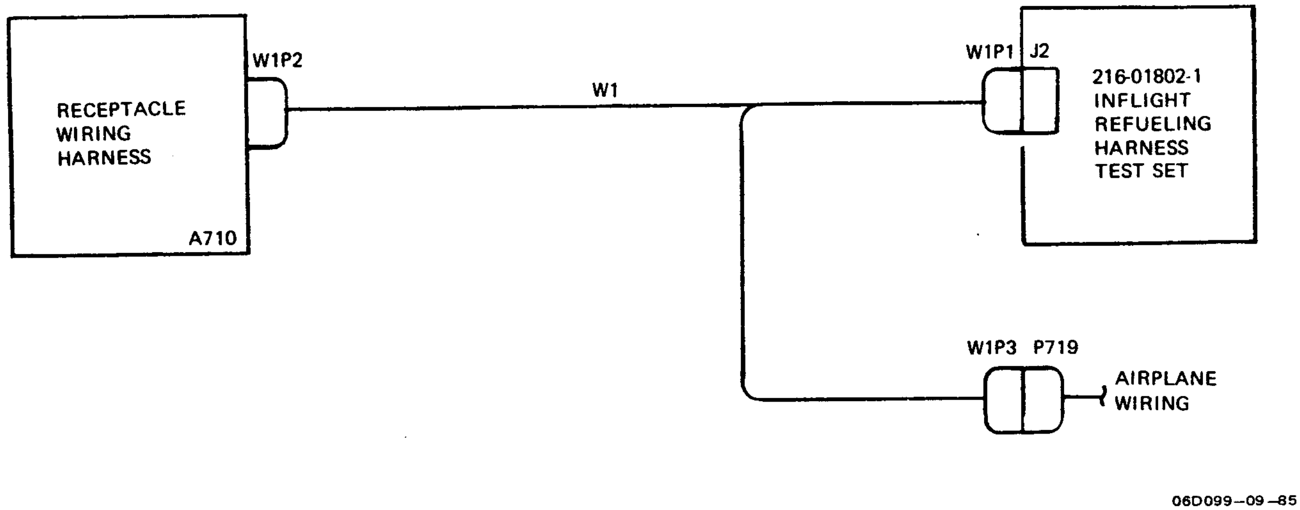


Figure 6-5. Test Setup; Receptacle Wiring Harness

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

g. Check that amplifier switch is in NORM.

h. Pull air refueling door release handle up to open receptacle door.

i. Check that ready light in cockpit comes on. If light does not come on, troubleshoot air refueling receptacle system (figure FO-18).

j. Install release handle safety clamp.

k. Place test set POWER switch in ON. Check that POWER light and four READY (yellow) lights come on. {1 and 2}

l. Place test nozzle in receptacle slipway, and install nozzle restraint (figure 6-4).

m. Insert and hold test nozzle in receptacle. Check that four INSERTED (two yellow and two green) lights come on. {3}

n. Press and hold LATCH LOCK switch. Check that four LATCHED (green) lights come on and test nozzle is locked in receptacle. {4}

o. Release LATCH LOCK switch, and check that READY lights come on.

p. Check that resistance (induction coil) between connectors J2 and J3 is 383 ($\pm$50) ohms. {5}

q. Check between connector J2 and ground for infinite resistance. {6}

r. Remove restraint and test nozzle from airplane.

s. Remove safety clamp, and push receptacle door release handle down.

t. Place test set POWER switch in OFF.

u. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

v. Disconnect test set cable from airplane wiring connector and receptacle wiring harness.

w. Connect electrical connector P719 to receptacle wiring harness.

x. Close access 3113-11.

6-7. BLEEDING.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external hydraulic power	Supply power to operate receptacle hydraulic system
		Equipment required for connecting external electrical power	Supply power to operate receptacle electrical system
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door

a. Open access 3113-13.

b. Connect external hydraulic power to PC 2 hydraulic system, and apply 400 (±100) psi hydraulic pressure (T.O. 1A-7D-2-1).

c. Loosen both hydraulic fittings on receptacle door hydraulic actuator, and observe loosened fittings for air-free flow of fluid. Tighten fittings.

d. Connect external electrical power (T.O. 1A-7D-2-1).

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

e. Pull air refueling door release handle up to open receptacle door. Check that READY light on indicator panel comes on.

f. Install release handle safety clamp.

g. Loosen hydraulic fitting on extend side of receptacle lock hydraulic actuator.

h. Push in and hold nozzle contact switch, and observe loosened fitting for air-free flow of fluid. Tighten fitting.

i. Press reset switch on release handle.

j. Remove safety clamp, and push release handle down to close receptacle door.

k. Cycle receptacle door five times to ensure that air has been bled from system and door is operating smoothly.

l. Perform hydraulic system air check (T.O. 1A-7D-2-1).

m. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

n. Close access 3113-13.

6-8. RECEPTACLE REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	GGG-W-686	Torque wrench, 0 to 250 foot-pounds	Torque coupling
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts or bolts

6-8.1. Removal. (Figure 6-6.)

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

a. Remove cover assembly (paragraph 6-18).

1. Coupling
2. Fuel tube
3. Retainer half
4. O-ring
5. Washer
6. Connector
7. Locknut
8. Lockwasher
9. Connector
10. O-ring
11. Hydraulic line
12. Nut
13. Washer
14. Seal
15. Bolt
16. Bolt
17. Washer
18. Bolt
19. Washer
20. Receptacle
21. Union
22. O-ring
23. Elbow
24. O-ring
25. Backup ring
26. Nut
27. Shim
28. Cotter pin
29. Drain tube

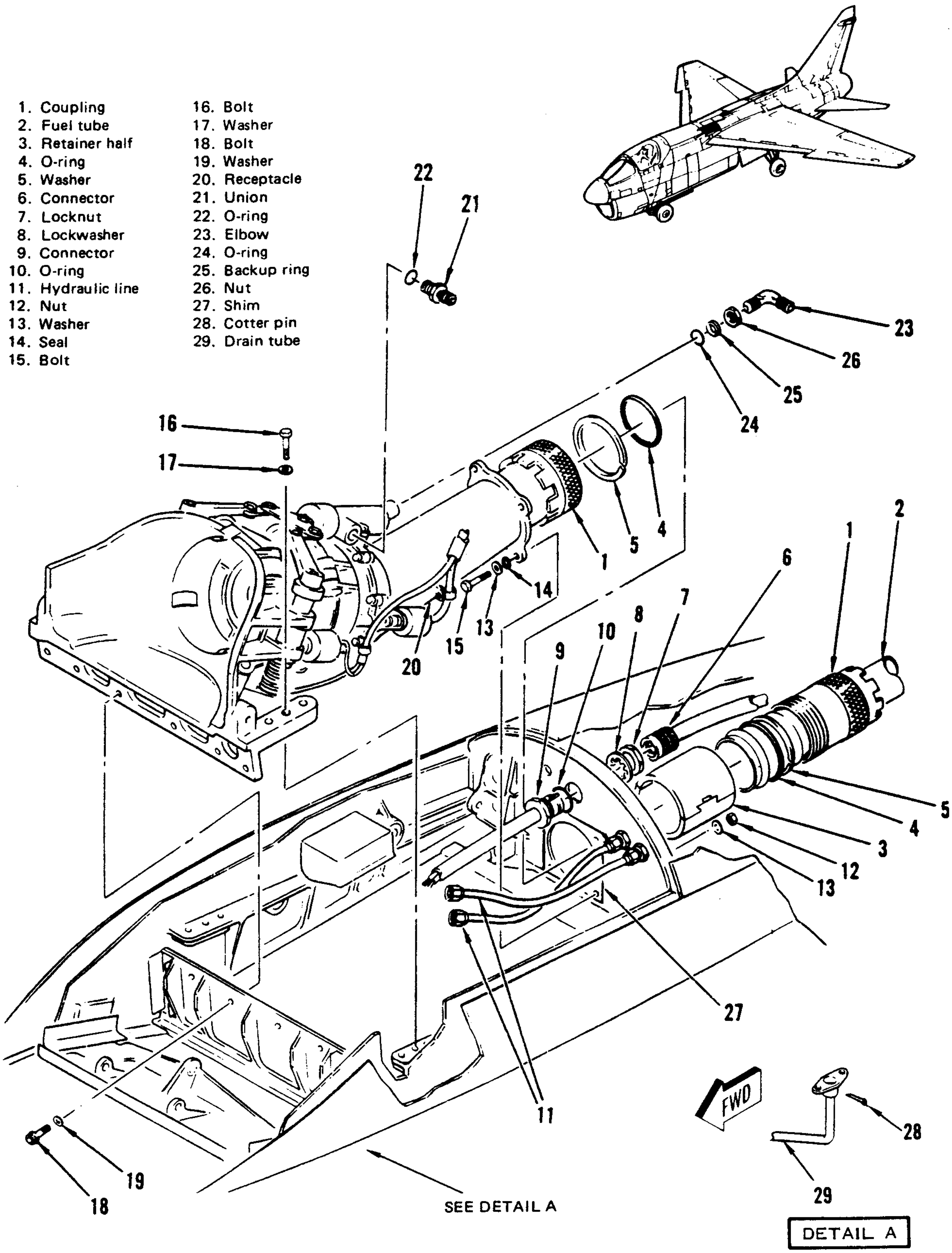


Figure 6-6. Removal and Installation; Receptacle

WARNING

To prevent ignition of fuel or fuel vapors, ensure that electrical power is disconnected from airplane and that static ground cable is installed before fuel system maintenance.

b. Cut lockwire and disconnect coupling (1) between end of receptacle and fuel tube (2).

c. Remove retainer halves (3) and O-rings (4). Remove washer (5) and coupling nut from receptacle, leaving washer (5) and coupling body on fuel tube.

d. Disconnect electrical connector (6), and remove locknut (7) and lockwasher (8). Remove electrical connector (9) from support panel, and remove O-ring (10) from connector.

e. Disconnect hydraulic lines (11) from receptacle lock actuator.

f. Remove nuts (12), washers (13), seals (14), and bolts (15) securing aft end of receptacle to support.

g. Remove bolts (16) and washers (17) securing sides of receptacle to support.

h. Remove bolts (18) and washers (19) securing forward end of receptacle to support. Remove receptacle (20) from airplane.

i. Remove union (21) and O-ring (22) from receptacle lock actuator.

j. Remove elbow (23), O-ring (24), backup ring (25), and nut (26) from receptacle lock actuator.

k. Remove old sealant from faying surfaces of receptacle flange and shim (27) (T.O. 1A-7D-23).

l. Inspect shim for damage. If damage exists, remove and discard shim and old sealant from bulkhead (T.O. 1A-7D-23).

6-8.2. Installation. (Figure 6-6.)

a. Check for loose or disconnected drainline (29) at cavity drain boss. If drainline is loose or disconnected, perform the following:

(1) Remove old sealant from drainline and boss, and clean joint for sealant application (T.O. 1A-7D-23).

(2) Insert drainline into boss a minimum of 0.50 inch.

(3) Drill hole through center of boss and drainline, and install cotter pin (28).

(4) Apply band of MIL-S-8802 sealant around joint and cotter pin 0.12 inch thick by 1 inch wide.

b. Install elbow (23), nut (26), new backup ring (25), and new O-ring (24) on receptacle lock actuator.

c. Install union (21) and new O-ring (22) on receptacle lock actuator.

d. If new shim (27) is used, bond shim to bulkhead with MIL-S-8802 sealing compound (T.O. 1A-7D-23).

e. If new shim is used, adjust shim thickness, if necessary, by peeling 0.003-inch layers from laminated shim. Maximum shim thickness shall be 0.068 inch.

f. Coat one faying surface between shim and receptacle flange with MIL-S-8802 sealing compound (T.O. 1A-7D-23).

g. Position receptacle (20) on support, and install coupling nut on receptacle.

h. Secure forward end of receptacle with washers (19) and bolts (18). Torque bolts (18) to 65 (±5) inch-pounds.

i. Secure sides of receptacle with washers (17) and bolts (16). Torque bolts (16) in crisscross pattern in increments of 5 inch-pounds until 65 (±5) inch-pounds are obtained.

j. Secure aft end of receptacle to support with bolts (15), seals (14), washers (13), and nuts (12).

k. Torque nuts (12) in crisscross pattern in increments of 5 inch-pounds.

l. Connect hydraulic lines (11) to receptacle lock actuator.

m. Install new O-ring (10) on electrical connector, install connector (9) through support panel, and secure with lockwasher (8) and locknut (7).

n. Connect electrical connector (6) to connector (9).

o. Install washer (5), new O-rings (4), and retainer halves (3) on fuel tube (2) and end of receptacle. Torque coupling (1) to 50 (±4) foot-pounds, and secure with MS20995C32 lockwire.

p. Install cover assembly (paragraph 6-18).

q. Bleed air refueling receptacle (paragraph 6-7).

6-9. RECEPTACLE REPAIR.

6-9-1. **Receptacle Main Seal Replacement.** (Figure 6-7.)

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	GGG-W-686	Torque wrench, 0 to 300 inch-pounds	Torque poppet
	1-1267-1001	Spring compression tool, refueling receptacle	Remove receptacle main seal
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

a. Open receptacle door by pulling air refueling receptacle door release handle up.

b. Install release handle safety clamp.

WARNING

The receptacle main seal is seated against the poppet under spring tension. To prevent personnel injury and damage to the seating surface of the seal, the replacement procedure should be carefully observed.

c. Insert spring compression tool outer sleeve (1) into receptacle cavity, and engage locking toggles with receptacle housing latch cavities.

d. Insert spring compression tool inner sleeve (2) into the outer sleeve, and index to the receptacle main sleeve assembly slots.

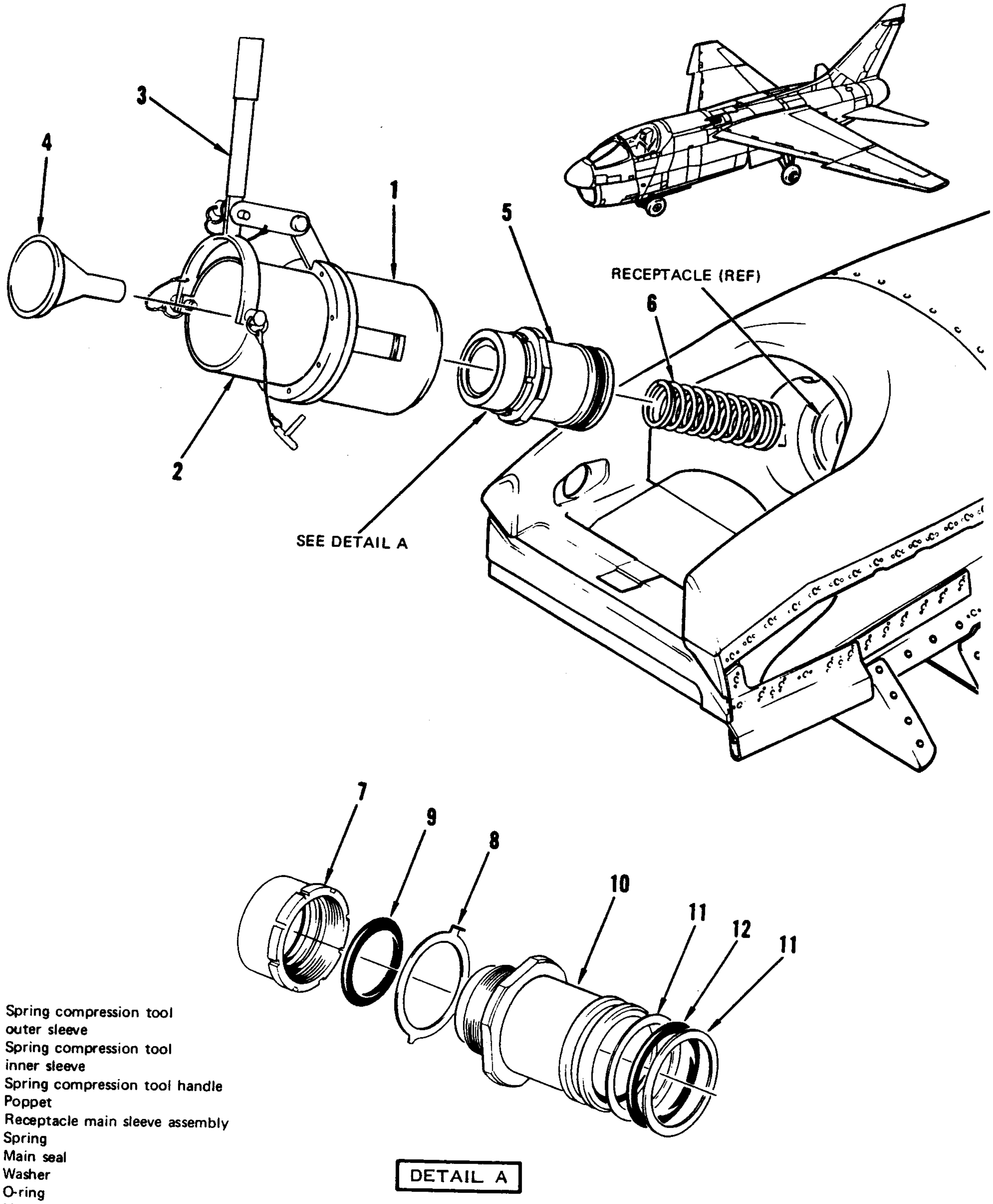
e. Attach spring compression tool handle (3) to the inner sleeve and outer sleeve pivot arm with pins.

f. Pull down on handle until the inner sleeve clears the hole in the inner surface of the outer sleeve, and insert locking pin in hole to lock inner sleeve in down position.

g. Align index marks on the inner and outer sleeves by moving handle to the left or right. This will align flats on the receptacle main sleeve assembly with the receptacle guide rollers.

h. Using a 3/8-inch drive extension, remove poppet (4) from receptacle by unscrewing in a counterclockwise direction.

i. Pull down on handle to relieve pressure on the locking pin, and remove pin. Slowly release pressure on handle until spring is fully extended.



1. Spring compression tool outer sleeve
2. Spring compression tool inner sleeve
3. Spring compression tool handle
4. Poppet
5. Receptacle main sleeve assembly
6. Spring
7. Main seal
8. Washer
9. O-ring
10. Main sleeve
11. Retainer
12. O-ring

06D100-09-85

Figure 6-7. Replacement; Receptacle Main Seal

j. Disconnect handle.

k. Remove inner sleeve, receptacle main sleeve assembly (5), and spring (6).

l. Disengage outer sleeve toggles, and remove outer sleeve from receptacle.

m. Bend tab of receptacle main sleeve assembly washer up until tab is free of slot in main seal.

n. Remove main seal (7), washer (8), and O-ring (9) from main sleeve (10).

o. Remove retainers (11) and O-ring (12).

p. Install new O-ring (12) and new retainers (11) on main sleeve (10).

q. Install new O-ring (9) and new washer (8).

r. Thread new main seal (7) to bottomed out position, and back off to align tab to nearest slot. Bend tab into slot.

s. Insert spring compression tool outer sleeve (1) into receptacle cavity, and engage locking toggles with receptacle housing latch cavities.

t. Insert spring (6) and main sleeve assembly (5) into receptacle cavity.

u. Insert spring compression tool inner sleeve (2) into outer sleeve, and index to the receptacle main sleeve assembly slots.

v. Attach spring compression tool handle (3) to the inner sleeve and outer sleeve pivot arm.

w. Align index marks on the inner and outer sleeves by moving the handle to the left or right. This will align the flats on the receptacle main sleeve assembly with the receptacle guide rollers.

x. Pull down on handle until the inner sleeve clears the hole in the inner surface of the outer sleeve, and insert locking pin in hole.

y. Install poppet (4) in receptacle. Using a 3/8-inch drive extension, torque poppet 150 inch-pounds.

z. Pull down on handle to relieve pressure on the locking pin, and remove pin. Slowly release pressure on handle.

aa. Remove inner sleeve from receptacle.

ab. Disengage outer sleeve toggles, and remove outer sleeve.

ac. Perform operational checkout (paragraph 6-4).

6-9.2. Receptacle Lock Hydraulic Actuator Replacement.

a. Remove access 3113-13.

b. Disconnect hydraulic lines from actuator, and cap lines.

c. Remove nut and bolt securing actuator rod end to receptacle latch mechanism.

d. Cut lockwire, remove three bolts securing actuator to receptacle, and remove actuator from airplane.

e. Loosen jamnut, and remove elbow from actuator. Remove O-ring backup ring and jamnut from elbow.

f. Remove union from actuator, and remove O-ring from union.

g. Install new O-ring on union, and install union in replacement actuator.

h. Install jamnut, new backup ring, and new O-ring on elbow, and install elbow in actuator. Do not tighten jamnut.

i. Position actuator on receptacle, and secure with three bolts. Secure bolts with MS20995C32 lockwire.

j. Secure actuator rod end to receptacle latch mechanism with bolt and nut.

k. Uncap hydraulic lines, and connect lines to actuator. Tighten elbow jamnut.

l. Bleed actuator (paragraph 6-7). Leave external hydraulic and electrical power connected.

m. Perform operational checkout (paragraph 6-4).

n. Close access 3113-13.

6-9.3. Induction Coil Replacement. (Figure 6-8.)

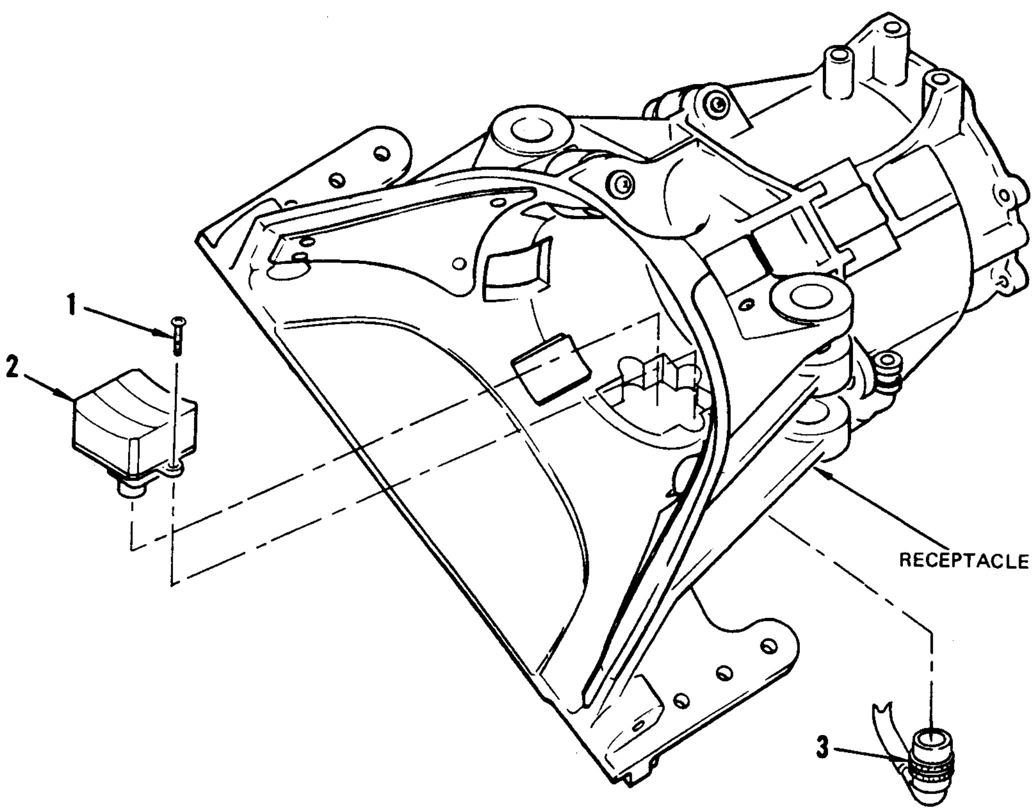
a. Remove three screws (1).

b. Lift induction coil (2) from receptacle, and disconnect electrical connector (3).

c. Connect electrical connector (3) to replacement coil, and position coil in receptacle.

d. Secure coil to receptacle with three screws (1).

e. Perform operational checkout (paragraph 6-4), except do not fuel airplane.



1. Screw
2. Induction coil
3. Electrical connector

06D081-09-85

Figure 6-8. Replacement; Induction Coil

6-9.4. Receptacle Wiring Harness Replacement. Replace wiring harness observing the following:

a. Remove cover assembly (paragraph 6-18).

b. After installation of replacement harness, adjust nozzle contact switch and nozzle latched switch (paragraph 6-10).

6-10. RECEPTACLE NOZZLE CONTACT SWITCH AND NOZZLE LATCHED SWITCH ADJUSTMENT.

6-10.1. Nozzle Contact Switch Adjustment. (Figure 6-9.)

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	E500050-3 (Viking Tool and Machine Corp., 20 Main, Belleville, N.J. 07109)	Test nozzle, air refueling receptacle	Actuate nozzle contact switch
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door
6-4	(Local fabrication)	Restraint, air refueling test nozzle	Restrain test nozzle in air refueling receptacle

a. Remove access 3113-13.

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

b. Pull air refueling door release handle up to open receptacle door.

c. Install release handle safety clamp.

d. Install test nozzle in receptacle, and restrain nozzle (figure 6-4).

e. Cut lockwire and back off checknuts.

f. Adjust checknuts to obtain 0.045 ($\pm$0.015) inch dimension between end of switch plunger and switch housing.

g. Remove restraint and test nozzle from airplane.

h. Tighten checknuts, and check that gap exists between nozzle contact switch plunger and actuating rod.

i. Secure checknuts with MS20995C20 lockwire.

j. Perform receptacle wiring harness checkout (paragraph 6-6).

6-10.2. Nozzle Latched Switch Adjustment. (Figure 6-9.)

a. Remove cover assembly (paragraph 6-18).

NOTE

The following steps should ensure overtravel of nozzle latched switch plunger in both directions.

b. Cut lockwire and back off checknuts.

c. Adjust checknuts until switch plunger is touching spring and spring just touches receptacle lock.

d. Tighten checknuts.

e. Secure checknuts with MS20995C20 lockwire.

f. Install cover assembly (paragraph 6-18), but leave access 3113-11 open.

g. Perform receptacle wiring harness checkout (paragraph 6-6).

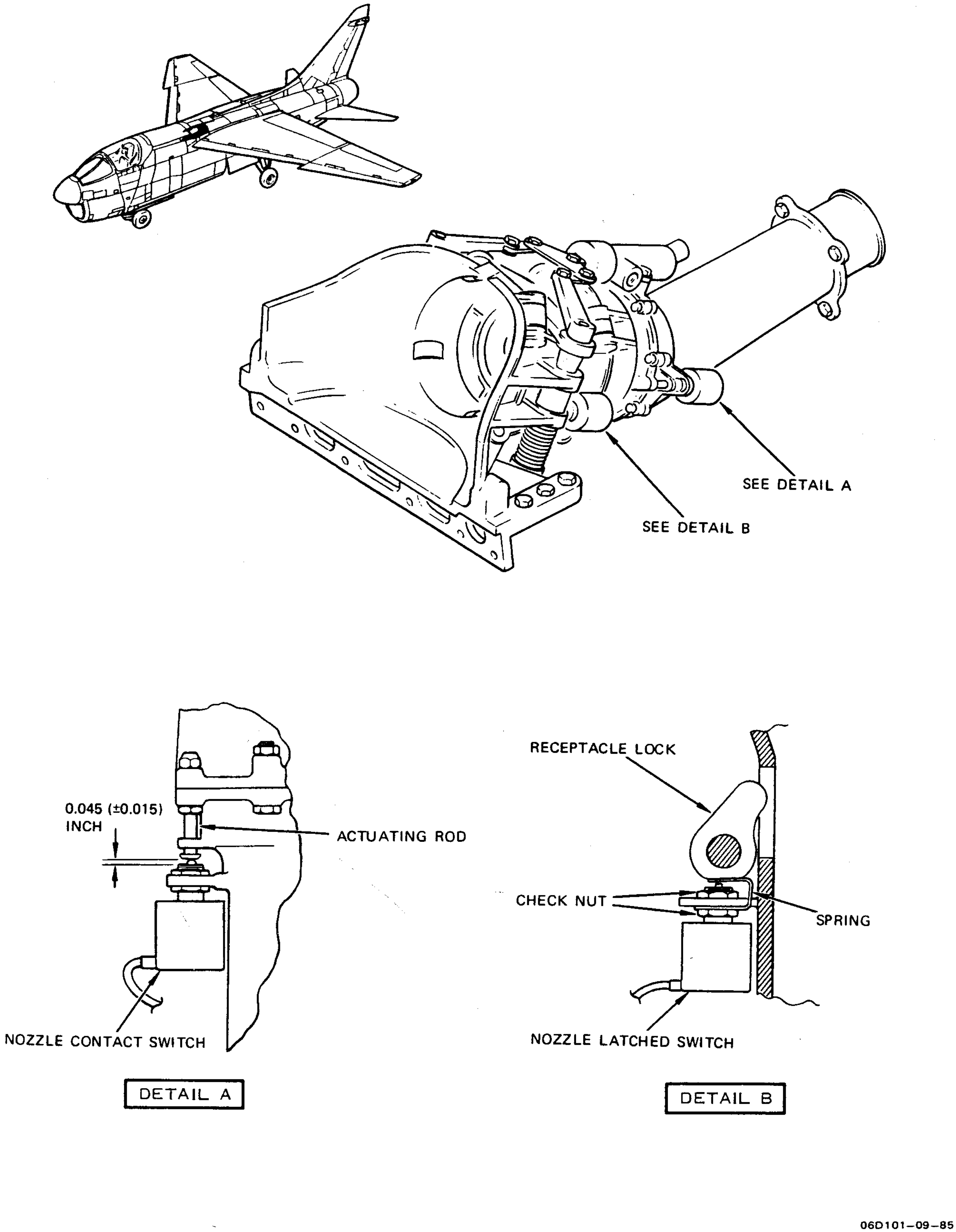


Figure 6-9. Adjustment; Receptacle Nozzle Contact Switch and Nozzle Latched Switch

6-11. DOOR HYDRAULIC ACTUATOR REMOVAL AND INSTALLATION.

6-11.1. Removal.

a. Open access 3113-13.

b. Disconnect hydraulic lines from actuator.

c. Remove cotter pins, nuts, washers, and bolts securing rod end of actuator to bellcrank and aft end of actuator to airframe. Remove actuator from airplane.

d. Remove union and O-ring from each actuator port.

6-11.2. Installation.

a. Install new O-ring on unions, and install union in each actuator port.

b. Position actuator in airplane. Secure aft end to airframe and rod end to bellcrank with bolts, washers, nuts, and cotter pins.

c. Connect hydraulic lines to actuator.

d. Bleed actuator (paragraph 6-7). Leave external hydraulic and electrical power connected.

e. Perform operational checkout (paragraph 6-4).

f. Close access 3113-13.

6-12. SOLENOID SELECTOR VALVE REMOVAL AND INSTALLATION.

6-12.1. Removal.

a. Open access 3113-11.

b. Disconnect electrical connector from solenoid selector valve.

c. Disconnect hydraulic lines from valve, and cap lines.

d. Remove three bolts and three spacers securing valve to bracket, and remove valve from airplane.

e. Remove unions from valve, and remove O-rings from unions.

f. Loosen jamnuts, and remove tee from valve. Remove O-ring and jamnut from tee.

6-12.2. Installation.

a. Install jamnut and new O-ring on tee, and install tee in solenoid selector valve. Do not tighten jamnut.

b. Install new O-rings on unions, and install unions in valve.

c. Position valve on bracket and secure valve with three spacers and three bolts.

d. Uncap hydraulic lines, and connect lines to valve. Tighten jamnut on tee.

e. Connect electrical connector to valve.

f. Bleed system at lock actuator (paragraph 6-7). Leave external hydraulic and electrical power connected.

g. Perform operational checkout (paragraph 6-4).

h. Close access 3113-11.

6-13. MANUAL SELECTOR VALVE REMOVAL AND INSTALLATION.

6-13.1. Removal.

a. Open access 3113-11.

b. Disconnect hydraulic lines from valve.

c. Remove cotter pin, nut, and washer securing lever to valve.

d. Remove nuts, washers, and screws securing valve to airframe, and remove valve.

e. Remove union and O-ring from valve.

f. Loosen jamnuts, and remove elbows, backup rings, and O-rings from valve.

6-13.2. Installation.

a. Using new O-rings, install backup rings, jamnuts, elbows, and union on replacement valve.

b. Position valve in airplane, and secure to bulkhead using screws, washers, and nuts.

c. Secure lever to valve using washer, nut, and cotter pin.

d. Connect hydraulic lines to valve.

e. Bleed system at door actuator (paragraph 6-7). Leave external hydraulic and electrical power connected.

f. Perform air refueling system operational checkout (paragraph 6-4).

g. Close access 3113-11.

6-14. RECEPTACLE SLIPWAY LIGHTS REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external electrical power	Power to operate slipway lights
		Equipment required for connecting external hydraulic power	Supply hydraulic power to operate receptacle door
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door

6-14.1. Removal.

a. Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).

WARNING

To prevent injury to personnel or damage to equipment, ensure area around receptacle door is clear before operation.

b. Pull air refueling receptacle door release handle up to open receptacle door.

c. Install release handle safety clamp.

d. Remove left or right fairing to gain access to slipway light electrical terminals.

e. Disconnect electrical wires from terminals.

f. Remove attaching screws, lens, and slipway light assembly from receptacle housing.

6-14.2. Installation.

a. Check gasket on lens retainer for damage and deterioration. Remove gasket, if defective, and install new gasket with Pro-Seal 590 cement.

b. Install slipway light assembly, lens, and screws.

c. Connect electrical wires to slipway light electrical terminals, and moisture proof with MIL-I-46058 insulating compound, or equivalent. Allow time for compound to cure.

d. Using MIL-S-8802 sealant, form a caulk seal around end of aerial refueling slipway light assemblies and to adjacent structure.

e. Connect external electrical power (T.O. 1A-7D-2-1).

f. Rotate slipway lights control clockwise, and check that slipway lights come on.

g. Rotate slipway lights control counter-clockwise to OFF, and check that slipway lights go off.

h. Remove safety clamp, and push release handle down to close receptacle door.

i. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

j. Install removed fairing.

6-15. RECEPTACLE SLIPWAY LIGHTS REPAIR.

6-15.1. Receptacle Slipway Lights Lens Replacement.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external hydraulic power	Supply power to operate receptacle door
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door

a. Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).

WARNING

To prevent injury to personnel or damage to equipment, ensure area around receptacle door is clear before operation.

b. Pull air refueling receptacle door release handle up to open receptacle door.

c. Install release handle safety clamp.

d. Remove attaching screws and defective lens from receptacle housing.

e. Install replacement lens and removed screws.

f. Remove safety clamp, and push release handle down to close receptacle door.

g. Disconnect external hydraulic power (T.O. 1A-7D-2-1).

6-15.2. Receptacle Slipway Lights Lamp Replacement.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external hydraulic power	Supply power to operate receptacle door
		Equipment required for connecting external electrical power	Supply power for slipway lights
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door

a. Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).

WARNING

To prevent injury to personnel or damage to equipment, ensure area around receptacle door is clear before operation.

b. Pull air refueling receptacle door release handle up to open receptacle door.

c. Install release handle safety clamp.

d. Remove attaching screws and lens.

e. Loosen socket stop nut approximately 1/4 turn counterclockwise, and remove lamp using a plastic or cardboard tube with a 3/8-inch inside diameter.

f. Check socket halves for cleanliness, corrosion, and signs of arcing. If socket halves are corroded or show signs of arcing, replace entire light assembly (paragraph 6-14).

CAUTION

Do not handle lamp with bare fingers after cleaning. Lamp will not operate normally if contaminated.

g. Clean replacement lamp thoroughly in acetone or alcohol until all traces of grease, oil film, and fingerprints are removed. Dry with a clean, lint-free cloth.

h. Using a plastic or cardboard tube with a 3/8-inch inside diameter, insert replacement lamp into socket halves until approximately 1/8 inch of metal lamp base is above socket halves. Tighten lamp socket stop nut approximately 1/4 to 1/2 turn clockwise.

i. Push down on lamp until it bottoms in socket, and remove tube from lamp.

j. Check gasket on lens retainer for damage and deterioration. Remove gasket, if defective, and install new gasket with Pro-Seal 590 cement.

k. Clean and dry lens, and install lens and screws.

l. Connect external electrical power (T.O. 1A-7D-2-1).

m. Rotate slipway lights control clockwise, and check that slipway lights come on.

n. Rotate slipway lights control counterclockwise to OFF, and check that slipway lights go off.

o. Remove safety clamp, and push release handle down to close receptacle door.

p. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

6-16. PUSH-PULL CONTROL REMOVAL AND INSTALLATION.

CAUTION

To prevent damage to controlex unit, observe controlex handling precautions (T.O. 1A-7D-2-1) during removal and installation of control.

6-16.1. Removal. (Figure 6-10.)

a. Open accesses 1123-1, 1123-4, 1121-3, 1121-6, 1121-7, 1121-8, 1123-3, and 10113-1.

b. Remove equipment as follows for access to push-pull control.

(1) Remove ejection seat (T.O. 1A-7D-2-2).

(2) Remove radar set control panel from left console (T.O. 1A-7D-2-14).

(3) Remove UHF control panel, ADF/auxiliary UHF control panel, and intercommunication set control panel (T.O. 1A-7D-2-12).

(4) Remove mounting screws, and remove two left console filler panels.

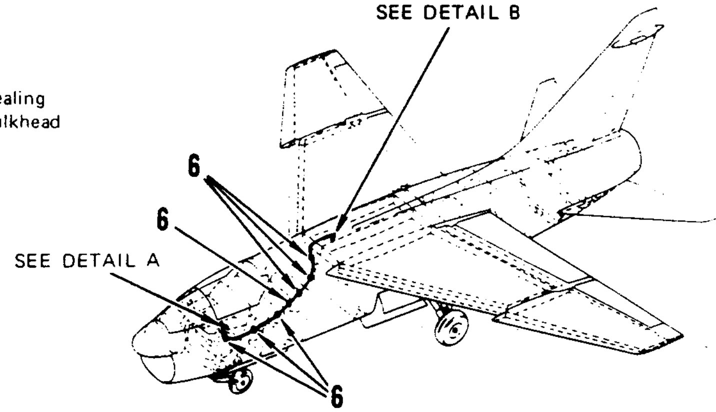
(5) Remove ammunition chutes (T.O. 1A-7D-2-13).

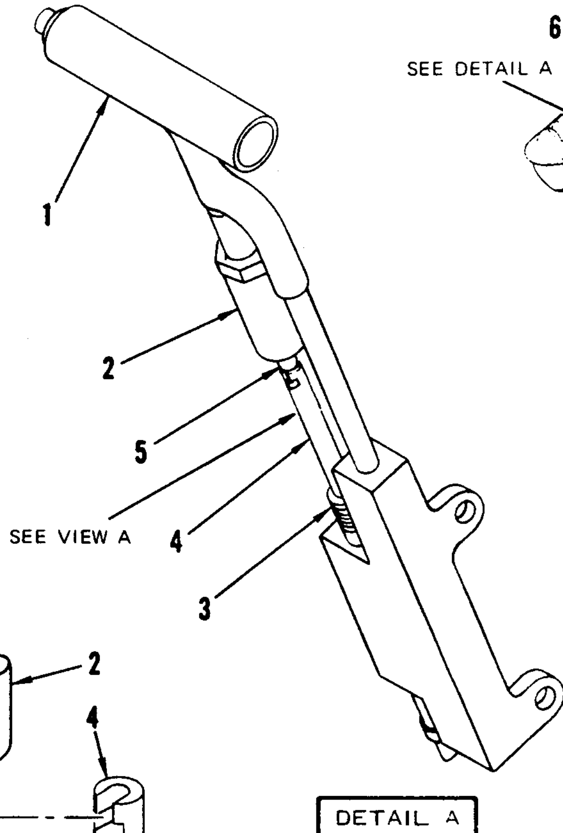
c. Remove pilot's generator control panel mounting screws (T.O. 1A-7D-2-11).

d. Lift up pilot's generator control panel, and remove throttle quadrant mounting screws (T.O. 1A-7D-2-5). Lift throttle quadrant approximately 2 inches as necessary for access to receptacle door push-pull control.

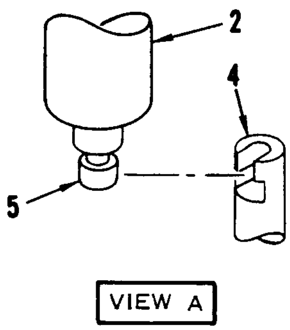
NOTE

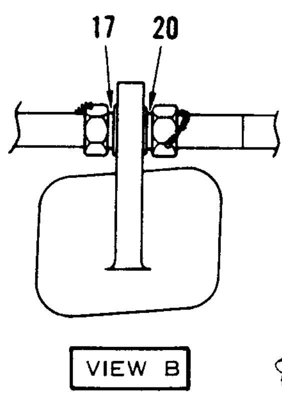
After system rigging, apply MIL–S–8802 heat resistant sealing compound around controlex housing at top left side of bulkhead at FS526.5.

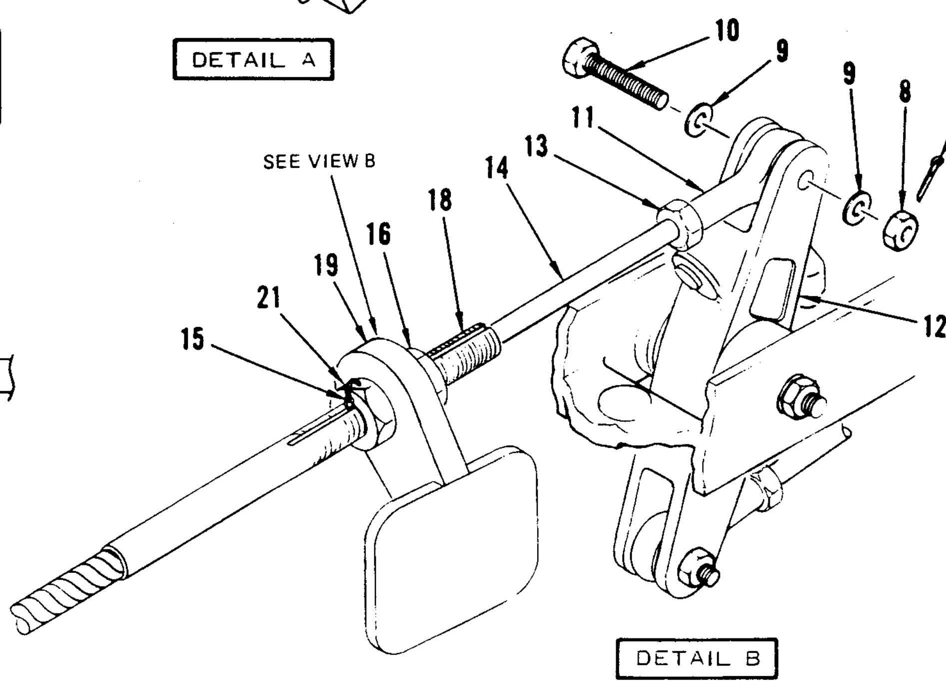




1. Release handle
2. Adapter
3. Housing
4. Control assembly
5. Handle shaft
6. Clamps
7. Cotter pin
8. Nut
9. Washers
10. Bolt
11. Rod end bearing
12. Lever
13. Checknut
14. Rod end
15. Key
16. Checknut
17. Spacer
18. Housing
19. Bearing support
20. Spacer
21. Checknut







06D054–09–85

Figure 6-10. Removal and Installation; Push-Pull Control

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

e. Pull air refueling receptacle door release handle (1) up. Cut lockwire securing adapter (2) to panel, and remove adapter (2) from control housing (3).

f. Push adapter (2) up, and remove control (4) from handle shaft (5).

g. Remove clamps (6) securing control to airplane.

h. Remove cotter pin (7), nut (8), washers (9), and bolt (10) securing rod end bearing (11) to lever (12).

i. Holding control at wrench flat, loosen checknut (13), and remove rod end bearing (11) and checknut (13) from rod end (14).

j. Cut lockwire and remove keys (15), checknut (16), and spacer (17) securing control housing (18) to bearing support (19).

k. Remove control from bearing support (19), and remove spacer (20) and checknut (21) from control housing (18).

CAUTION

Do not force control when removing from airplane.

l. Remove control through access 1123-1.

6-16.2. Installation. (Figure 6-10.)

a. Carefully uncoil new control and lay out on clean, flat surface.

b. Move slider back and forth through control housing. Check that slider moves freely and does not bind.

c. Carefully coil control into a figure eight.

d. Carefully thread control through access 1123-1 keeping loops in a vertical plane. Allow control to assume natural contours as it is uncoiled and guided into position.

e. Move slider back and forth through housing. Check that force required is approximately same as force required in step b and that slider moves freely without binding.

NOTE

Checknuts (16 and 21) will be tightened, and keys (15) installed in rigging procedure (paragraph 6-17).

f. Install checknut (21) and spacer (20) on control housing (18), and slide control through bearing support (19).

g. Install spacer (17) and checknut (16) on control housing (18).

NOTE

Rod end bearing (11) will be secured to lever (12) in rigging procedure (paragraph 6-17).

h. Install checknut (13) and rod end bearing (11) on rod end (14). Tighten checknut (13) so that checknut is 0.30 (±0.06) inch from end of wrench flat.

CAUTION

Clamps are used for support of control only. Control housing must be free to move through clamps. Incorrect clamping may restrict slider travel.

i. Install clamps (6) to secure control to airplane. Check that control moves freely through each clamp.

j. With release handle up, connect handle shaft (5) to control (4). Install adapter (2) on control housing (3), and secure with MS20995C32 lockwire.

k. Check that radius of bends in housing is not less than 6 inches.

l. Check that control is not twisted or binding.

m. Perform push-pull control rigging (paragraph 6-17).

n. Apply MIL-S-8802 heat-resistant sealing compound around controlex housing at top left side of bulkhead at FS526.5.

o. Install equipment as follows:

(1) Install UHF control panel, ADF/auxiliary UHF control panel, and intercommunication set control panel (T.O. 1A-7D-2-12).

(2) Install radar set control panel on left console (T.O. 1A-7D-2-14).

(3) Install two left console filler panels.

(4) Install ejection seat (T.O. 1A-7D-2-2).

(5) Install ammunition chutes (T.O. 1A-7D-2-13).

p. Install throttle quadrant and generator control panel mounting screws.

q. Close accesses 1123-1, 1123-4, 1121-3, 1121-6, 1121-7, 1121-8, 1123-3, and 10113-1.

6-17. PUSH-PULL CONTROL RIGGING.

(Figure 6-11.)

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external hydraulic power	Supply hydraulic power to operate receptacle door
	GGG-W-686	Torque wrench, 10 to 150 inch-pounds	Torque nuts
	80D (John Chatillon and Sons, Scale and Spring Division, New York, N.Y.)	Spring scale, 0 to 80 pounds	Measure pounds of force required in check

a. Open accesses 3113-11 and 10113-1.

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

b. Open receptacle door by pulling air refueling receptacle door release handle up.

c. Remove cotter pin, nut, washers, and bolt securing rod end (1) to lever (2).

d. Cut lockwire, remove keys, and back off checknuts (3) approximately 1 inch from support bearing.

NOTE

Control assembly (4) shall be free to oscillate in excess of that required by the rise and fall of lever (2). Clamps may be loosened as required.

e. Move control assembly back and forth several times, and check that it moves freely, does not bind, and has a minimum stroke of 2 inches.

f. If operation is not free of binds, check entire length of control assembly for improper installation and damage to housing.

g. Remove eight screws securing door access panel (2, figure 6-12) to door, and remove panel.

h. Remove springs (5, figure 6-11) from door linkage.

i. Remove cotter pin, nut, washers, and bolt securing link (6) and actuator (7) to bellcrank (8).

j. Close receptacle door against a 0.12 (±0.01) inch diameter rod inserted between door and cover assembly. Insert rod at top of door and ±0.50 inch of door centerline. Engage pin (9) on bellcrank (8) in notch of locking arm (10).

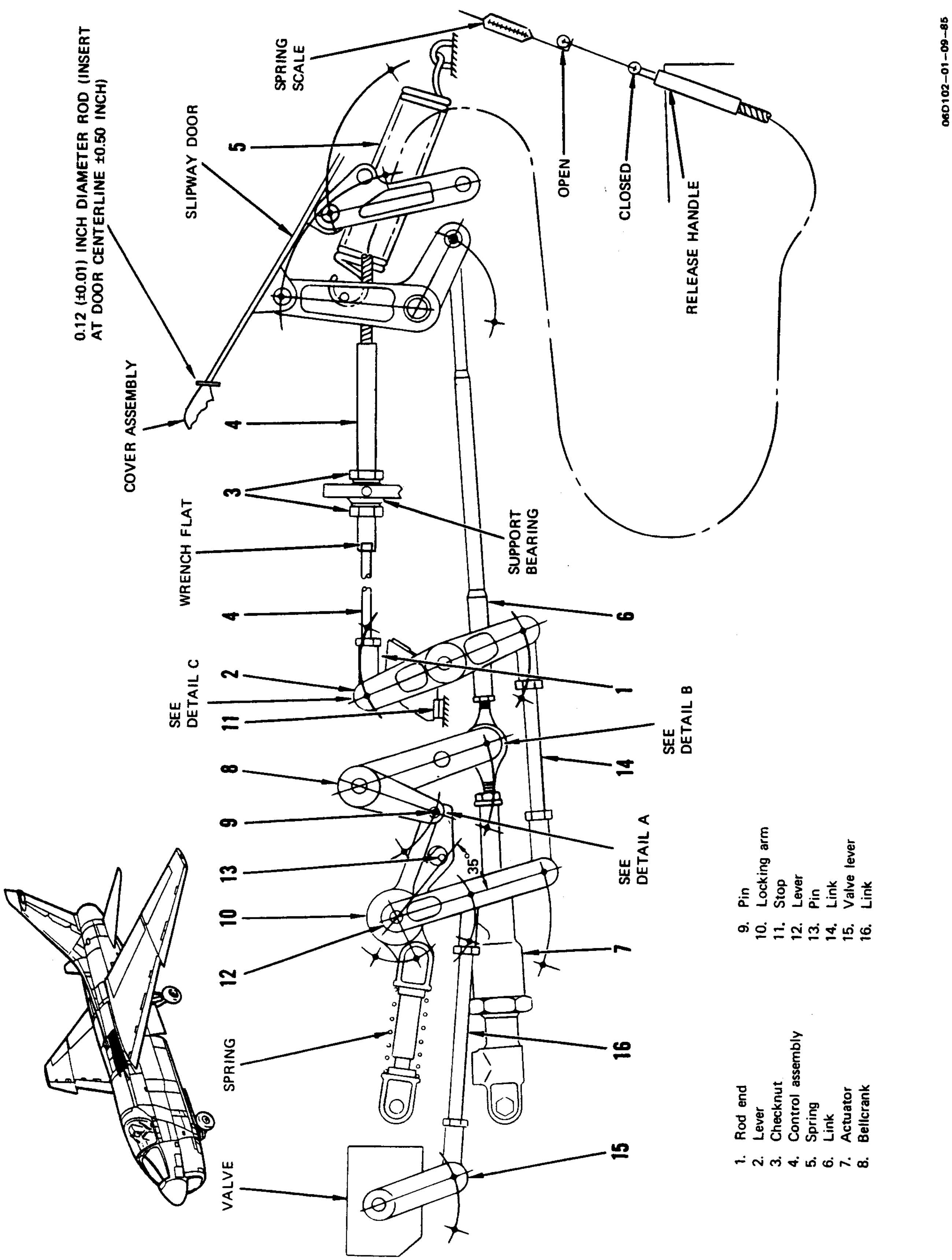


Figure 6-11. Rigging; Push-Pull Control (Sheet 1 of 2)

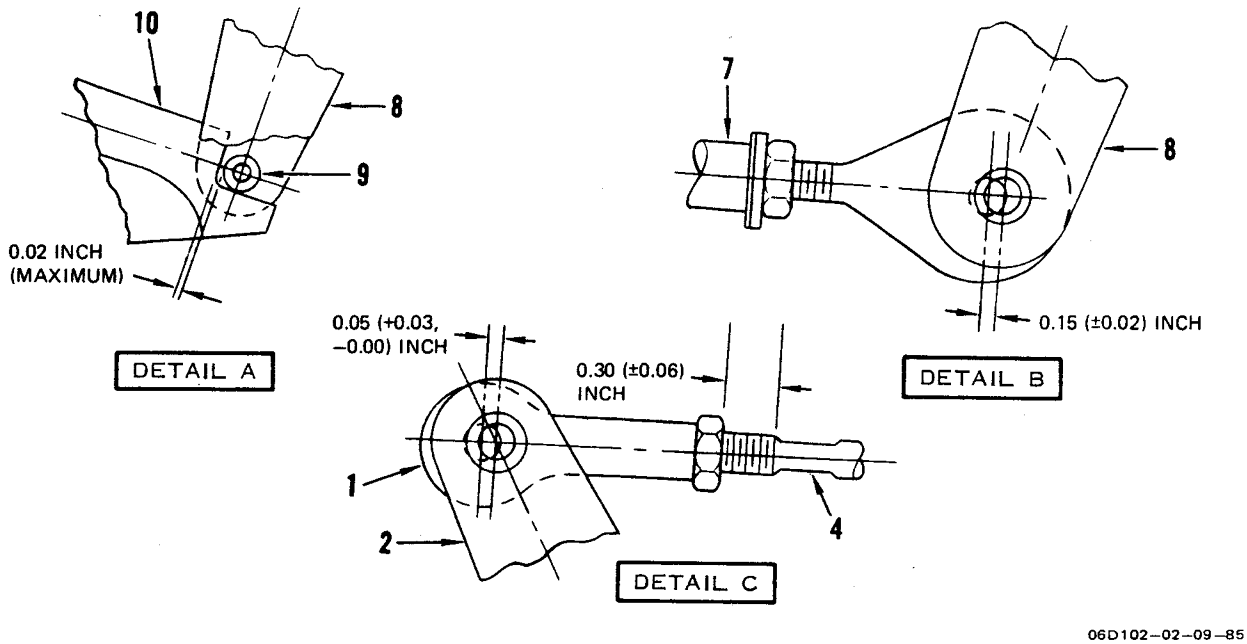


Figure 6-11. Rigging; Push-Pull Control (Sheet 2)

k. Adjust link (6) so link end bolthole lines up with bellcrank bolthole and bolt slides in freely. Do not install nut. A gap of 0.02 inch maximum is allowable between pin (9) and notch in locking arm (10).

CAUTION

Locking arm (10) is spring loaded.

l. Remove rod from between receptacle door and cover assembly. Rotate locking arm (10) down until pin (9) is out of notch. Open receptacle door against stops.

m. Connect springs (5) to door linkage.

n. Install door access panel, and secure with eight screws.

o. Rotate locking arm (10) up to locked position so that locking pin (9) locks. Close slipway door, engaging pin (9) in locking arm (10).

p. Check that clearance between receptacle door and cover assembly at top of door is 0.12 (±0.01) inch. Adjust link (6) if required.

q. Unlock receptacle door allowing springs (5) to open door.

r. With actuator (7) in retract position, adjust piston rod end so that bolthole is 0.15 (±0.02) inch short of bolthole in bellcrank (8). Approximately 0.15 inch of actuator rod end thread should be showing.

s. Secure link (6) and actuator (7) to bellcrank (8) with bolt, washers, nut, and cotter pin. Align boltholes by extending actuator rod end.

t. Close and lock receptacle door. Rotate lever (2) to contact stop (11).

u. Remove cotter pin, nut, washers, and bolt securing link (14) to lever (12).

v. Remove cotter pin, nut, washers, and bolt securing link (16) to lever (12).

w. Rotate lever (12) so pin (13) is at bottom of hole in locking arm (10). Adjust link (14) as required, and secure link (14) to lever (12) with bolt, washers, nut, and cotter pin.

x. Check that distance between holes in rod ends of link (16) is 7.90 (±0.03) inches and inspection holes in both rod ends are covered.

y. With lever (2) contacting stop (11), secure link (16) to lever (12) with bolt, washers, nut, and cotter pin.

z. Adjust control assembly rod end (1) so checknut is 0.30 (±0.06) inch from end of wrench flat, and tighten checknut.

aa. Push air refueling receptacle door release handle full down.

NOTE

In next step, shorten rod end of actuator (7) to increase gap, and lengthen rod end to decrease gap. One-half turn of rod end will move door approximately 0.04 inch.

ab. Check gap between receptacle door and cover assembly at top of door and ±0.50 inch of door centerline. Gap should be 0.07 inch minimum to 0.13 inch maximum. Adjust piston rod end of actuator (7) in half-turn increments up to a maximum of two full turns.

ac. With lever (2) against stop (11), position control assembly (4) in support so that bolthole in rod end (1) is 0.05 (+0.03, -0.00) inch beyond bolthold in lever (2).

ad. Hold housing at wrench flats, and torque support checknuts (3) to 35 (±5) inch-pounds. Install keys and secure checknuts (3) to keys with MS20995C32 lockwire.

ae. Attach spring scale to center of release handle, and support free end of push-pull control in the same position as if it were installed. Determine force required to move handle from down to up and then down. Force required shall not exceed 4 pounds.

af. Secure rod end (1) to lever (2) with bolt, washers, nut, and cotter pin.

WARNING

Door will close when hydraulic power is applied. To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

ag. Connect external hydraulic power to PC 2 system (T.O. 1A-7D-2-1).

ah. Pull release handle up, and check that locking arm (10) disengages pin (9) before actuator (7) begins to retract and that operation is smooth and does not bind.

ai. Push release handle down to close receptacle door.

aj. Attach spring scale to center point of release handle, and determine force required to move handle from down (receptacle door closed) to up (receptacle door open) and then down. Force required shall not exceed 18 pounds.

ak. Shut down external hydraulic power.

al. Attach spring scale to center point of release handle, and determine force required to move handle from down to up, manually opening receptacle door. Force required shall not exceed 40 pounds.

am. Apply external hydraulic power.

an. Push release handle down, and check that receptacle door closes.

ao. Disconnect external hydraulic power (T.O. 1A-7D-2-1).

ap. Close accesses 3113-11 and 10113-1.

6-18. COVER ASSEMBLY REMOVAL AND INSTALLATION.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door

6-18.1. Removal. (Figure 6-12.)

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

a. Open receptacle door by pulling air refueling receptacle door release handle up.

b. Install release handle safety clamp.

c. Remove accesses 3113-11, 3113-12, 3113-13, and 10113-1.

d. Remove screws (1) securing door access panel (2) to door, and remove door access panel.

e. Disconnect electrical wires from slipway lights.

f. Remove cotter pin (3), nut (4), washers (5), and bolt (6) securing door link to actuating arm.

g. Remove bolt (7) and washer (8) securing bonding jumper (9) to support.

NOTE

Bolts removed in steps h through k should be identified by location due to different bolt sizes.

h. Remove 11 bolts (10) and washers (11) securing aft end of cover to support.

i. Remove 16 bolts (12) and washers (13) securing sides of cover to support.

j. Remove 14 bolts (14) and washers (15) securing sides of cover to support.

k. Remove 10 bolts (16) and washers (17) securing forward end of cover to support. Remove cover (18) from airplane.

NOTE

The following steps are required only if cover is to be replaced.

l. Remove forward end of extension springs (19) from cover.

m. Remove screws (20), washers (21), nuts (22), and shims (23) securing door (24) to pads (25).

n. Remove screws (26), washers (27), and nuts (28) securing door (24) to pad (29). Remove door.

o. Remove cotter pins (30), nuts (31), washers (32), and bolts (33) securing pads (25) to actuating arm.

p. Remove cotter pin (34), nut (35), washers (36), and bolt (37) securing pad (29) to link.

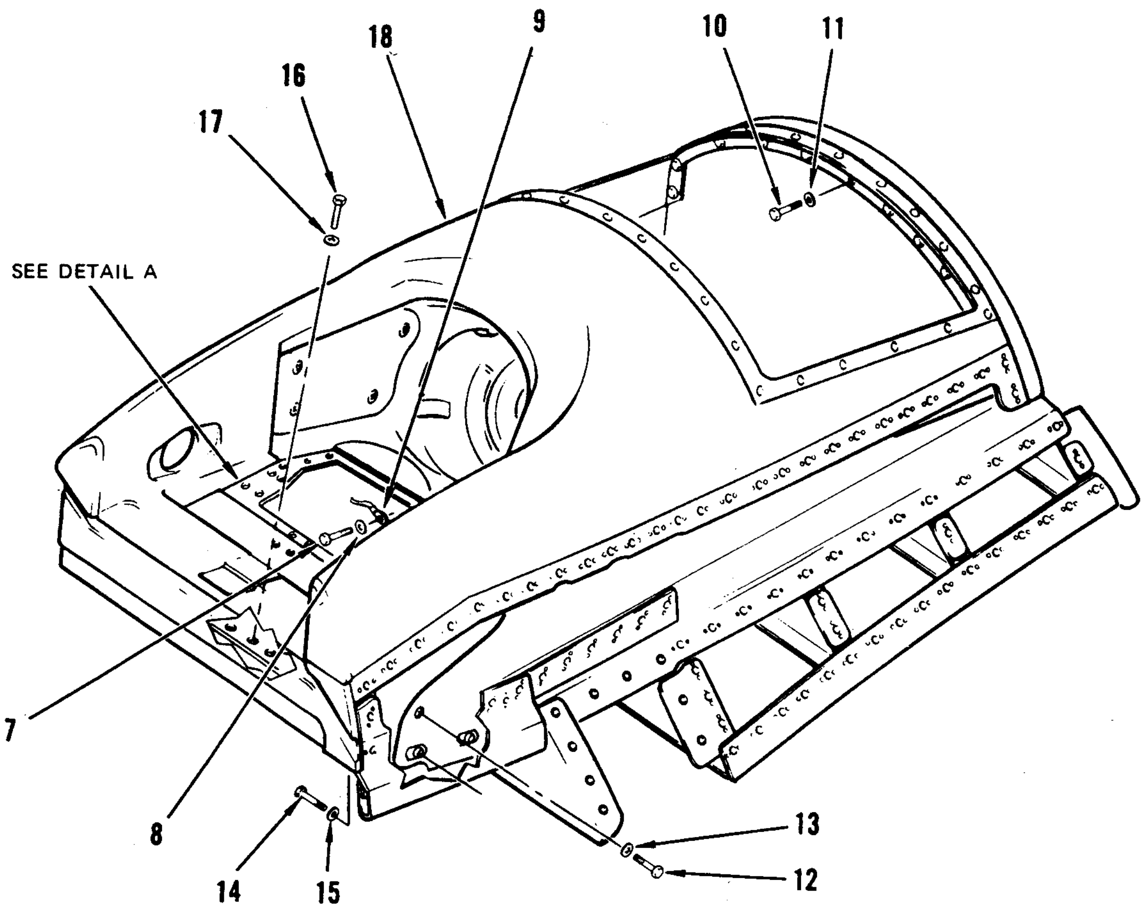
q. Remove cotter pin (38), nut (39), washer (40), and screw (41) securing shaft in actuating arm, and remove shaft (42) and washers (43). Remove actuating arm (44) from cover.

r. Remove cotter pin (45), nut (46), washers (47), and bolt (48) securing link (49) to pad recess door.

s. Remove cotter pin (50), nut (51), washers (52), and bolt (53) securing link (54) to cover. Remove link.

6-18.2. Installation. (Figure 6-12.)

a. Secure link (54) to cover with bolt (53), washers (52), nut (51), and cotter pin (50).



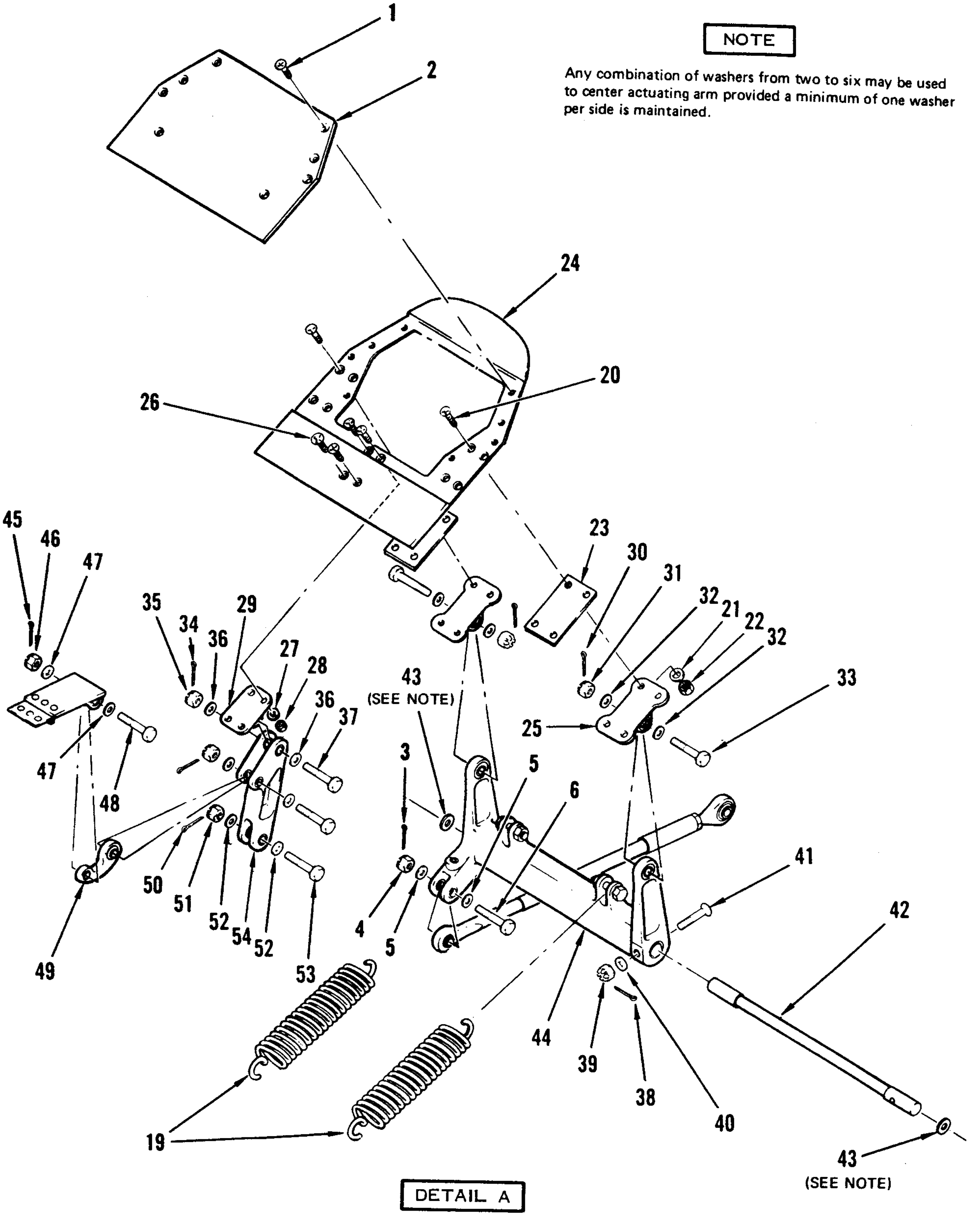
1. Screw
2. Door access panel
3. Cotter pin
4. Nut
5. Washer
6. Bolt
7. Bolt
8. Washer
9. Bonding jumper
10. Bolt
11. Washer
12. Bolt
13. Washer
14. Bolt
15. Washer
16. Bolt
17. Washer
18. Cover
19. Extension spring
20. Screw
21. Washer
22. Nut
23. Shim
24. Door
25. Pad
26. Screw
27. Washer
28. Nut
29. Pad
30. Cotter pin
31. Nut
32. Washer
33. Bolt
34. Cotter pin
35. Nut
36. Washer
37. Bolt
38. Cotter pin
39. Nut
40. Washer
41. Screw
42. Shaft
43. Washer
44. Actuating arm
45. Cotter pin
46. Nut
47. Washer
48. Bolt
49. Link
50. Cotter pin
51. Nut
52. Washer
53. Bolt
54. Link

06D118-01-09-86

Figure 6-12. Removal and Installation; Receptacle Cover Assembly (Sheet 1 of 2)

NOTE

Any combination of washers from two to six may be used to center actuating arm provided a minimum of one washer per side is maintained.



06D118-02-09-85

Figure 6-12. Removal and Installation; Receptacle Cover Assembly (Sheet 2)

b. Secure link (49) to pad recess door with bolt (48), washers (47), and nut (46). Tighten nut (46) finger-tight, and install cotter pin (45).

NOTE

Any combination of washers from two to six may be used to center actuating arm provided a minimum of one washer per side is maintained.

c. Position actuating arm (44) and washer (43) in cover assembly. Adjust washers until arm is approximately centered between receptacle housing.

d. Install shaft (42) in actuator arm, and secure with screw (41), washer (40), and nut (39). Do not install cotter pin at this time.

e. Secure pad (29) to door link with bolt (37), washers (36), nut (35), and cotter pin (34).

f. Secure pads (25) to actuating arm (44) with bolts (33), washers (32), nuts (31), and cotter pins (30).

g. Temporarily secure door (24) to pads (29 and 25) with screws (26 and 20).

h. Check that gap between left and right sides of door and receptacle housing is 0.10 (±0.02) inch. If gap is within limits, proceed to step j.

i. If door gap is not within limits, remove shaft, readjust washers, and reinstall shaft. Repeat steps g and h.

j. Secure door (24) to pad (29) with screws (26), washers (27), and nuts (28).

k. Secure door (24) to pads (25) with screws (20), washers (21), nuts (22), and shims (23).

l. Secure extension springs (19) to cover.

m. Perform faying surface seal procedure (T.O. 1A-7D-23) to install cover (18) on airplane. Secure forward end of cover to support with 10 washers (17) and bolts (16).

n. Secure sides of cover to support with 14 washers (15) and bolts (14).

o. Secure sides of cover to support with 16 washers (13) and bolts (12).

p. Secure aft end of cover to support with 11 washers (11) and bolts (10).

q. Secure bonding jumper (9) to support with washer (8) and bolt (7).

r. Connect electrical wires to slipway lights.

s. Secure door link to actuating arm with bolt (6), washers (5), nut (4), and cotter pin (3).

t. Perform push-pull control rigging (paragraph 6-17).

u. Perform operational checkout (paragraph 6-4).

v. Secure door access panel (2) to door with screws (1).

w. Install accesses 3113-11, 3113-12, 3113-13, and 10113-1.

6-19. RECEPTACLE DOOR UP SWITCH AND DOOR DOWN SWITCH ADJUSTMENT.

Tools Required

Figure & index No.	Part number	Nomenclature	Use and application
		Equipment required for connecting external hydraulic power	Supply power to operate receptacle hydraulic system
		Equipment required for connecting external electrical power	Supply power to operate receptacle electrical system
	216-00326-1	Safety clamp, air refueling receptacle door release handle	Prevent inadvertent closing of receptacle door

☆U.S. GOVERNMENT PRINTING OFFICE: 1987 - 568-000-63410

a. Remove receptacle door access panel to gain access to switches.

b. Connect external hydraulic power to PC 2 hydraulic system (T.O. 1A-7D-2-1).

WARNING

To prevent injury to personnel or equipment damage, ensure area around receptacle door is clear before operation.

c. Open receptacle door by pulling air refueling receptacle door release handle up.

d. Install release handle safety clamp.

e. Loosen setscrew, and adjust magnet until gap between magnet and door down switch is 0.04 (±0.02) inch. Tighten setscrew.

f. Remove safety clamp, and push release handle down to close receptacle door.

g. Check that gap between magnet and door up switch is 0.04 (±0.02) inch. If gap is within limits, proceed to step j.

h. If gap between magnet and door up switch is not within limits, readjust magnet until desired gap is obtained, and then recheck gap between magnet and door down switch.

i. If adjustment dimension cannot be obtained, check that switch surfaces are parallel to the plane of travel created by the magnet. If necessary, adjust shim thickness under switches as required, and repeat steps d through g.

j. Connect external electrical power (T.O. 1A-7D-2-1).

k. Pull release handle up to open receptacle door.

l. Check that receptacle slipway lights are on.

m. Check that READY light on indicator panel is on.

n. Push release handle down to close receptacle door.

o. Check that READY light and slipway lights go off.

p. Disconnect external electrical and hydraulic power (T.O. 1A-7D-2-1).

q. Install receptacle door access panel.

6-20. RECEPTACLE DOOR UP AND DOWN SWITCHES REMOVAL AND INSTALLATION.

6-20.1. Removal.

a. Disassemble receptacle door as required to gain access to switches (paragraph 6-18).

b. Remove access panels 4113-11-1, 10113-1, and 2121-9 to gain access to splice area and electrical connector P226.

c. Remove screws securing door up switch S708.

d. Remove screws securing switch mounting bracket. Move bracket to gain access to screws on door down switch S709. Remove screws from door down switch.

e. Locate switch wires at splice area. Cut and mark wires for installation.

f. Remove switches S708 and S709 as required.

6-20.2. Installation.

a. Install receptacle door down switch on mounting bracket.

b. Install mounting bracket in receptacle.

c. Install receptacle door up switch on mounting bracket.

d. Route switch wires to splice areas. Connect wires (T.O. 1A-7D-2-17 and T.O. 1-1A-14).

e. Reassemble receptacle door (paragraph 6-18).

f. Adjust receptacle door switches (paragraph 6-19).

g. Install access panels 4113-11-1, 10113-1, and 2121-9.

h. Perform operational check on IFR system.

GLOSSARY

C

CAPACITANCE — The property of an electrical nonconductor (capacitor) that permits the storage of electrical energy when the opposite surfaces of the nonconductor are maintained at a difference of potential.

CAPACITOR — A device that provides capacitance in an electrical circuit. The device usually consists of conducting surfaces (electrodes) separated by a dielectric (fuel/fuel vapor). Electrical energy is stored when the opposite surfaces (electrodes) are charged by a voltage source.

COAX CABLE — A cable that consists of a tube of electrically conducting material surrounding a central conductor and separated by insulators.

COMPENSATOR (DENSITY MONITOR) — Transmitter that provides a capacitance signal to compensate for changes in fuel density. Signal from the fuel tank transmitters is adjusted by the compensator signal.

CONTROLEX — A precision ball bearing device used to transmit push-pull control forces. The device consists of a movable blade, a fixed race, and ball separators contained in a flexible housing.

E

EJECTOR PUMP — Pump with no moving parts that operates on the venturi principle. That is, within the pump, the fuel flows rapidly from a jet nozzle across a screened opening that leads to a fuel tank causing a pressure differential that draws fuel from the tank.

ELECTRODE — A conductor used to establish electrical contact with a nonmetallic part of a circuit.

I

INDUCTION COIL — An apparatus for obtaining an intermittent high-voltage signal. It consists of a primary coil through which a primary signal flows and a secondary coil in which the high-voltage signal is induced.

J

JETTISON — To release from an airplane during flight.

M

MOTIVE FLOW — High-pressure, Low-volume fuel flow supplied to the ejector pumps from the engine high-pressure fuel pump. Action of motive flow through the ejector pump creates a low-pressure, high-volume fuel flow for engine operation.

P

POTENTIOMETER — A resistor with one or more adjustable sliding contacts that functions as an adjustable voltage divider.

S

SELF-SEALING HOSE — Hose capable of sealing itself if punctured.

SUMP — Lowest point in airplane fuel system.

T

THERMISTOR — An electrical resistor made of material whose resistance varies sharply with temperature. When submerged in fuel, the heat developed by the current is dissipated by the fuel and thermistor resistance is high. Uncovered, the undissipated heat results in a temperature increase and a decrease in thermistor resistance.

TIME DOMAIN REFLECTOMETRY (TDR) — Method that uses radar principles to locate and identify transmission line faults. An incident pulse is transmitted into a line by a TDR test set. A fault will be reflected back to the test set and recorded.

TRANSMITTER (FUEL QUANTITY PROBE) — An electrical capacitor whose two probes (electrodes) are immersed in fuel, fuel vapor, or a mixture of the two that is the insulating medium between the probes. As fuel level changes, the electrical resistance between the probes changes, which produces a corresponding change in transmitter capacitance.

V

VENTURI — A short tube that is inserted in a pipeline that has flaring ends connected by a constricted middle. Operation depends upon the fact that, as the velocity of flow of a fluid increases in the constricted part, the pressure decreases.

INDEX

Subject | *Paragraph, figure or table number*

C

Subject | *Paragraph, figure or table number*

D

E

F

Subject	Paragraph, figure or table number

Subject | *Paragraph, figure or table number*

Subject	*Paragraph, figure or table number*

Subject	*Paragraph, figure or table number*

Subject *Paragraph, figure or table number*

V

W

☆U.S. GOVERNMENT PRINTING OFFICE:1986—659-002/40279

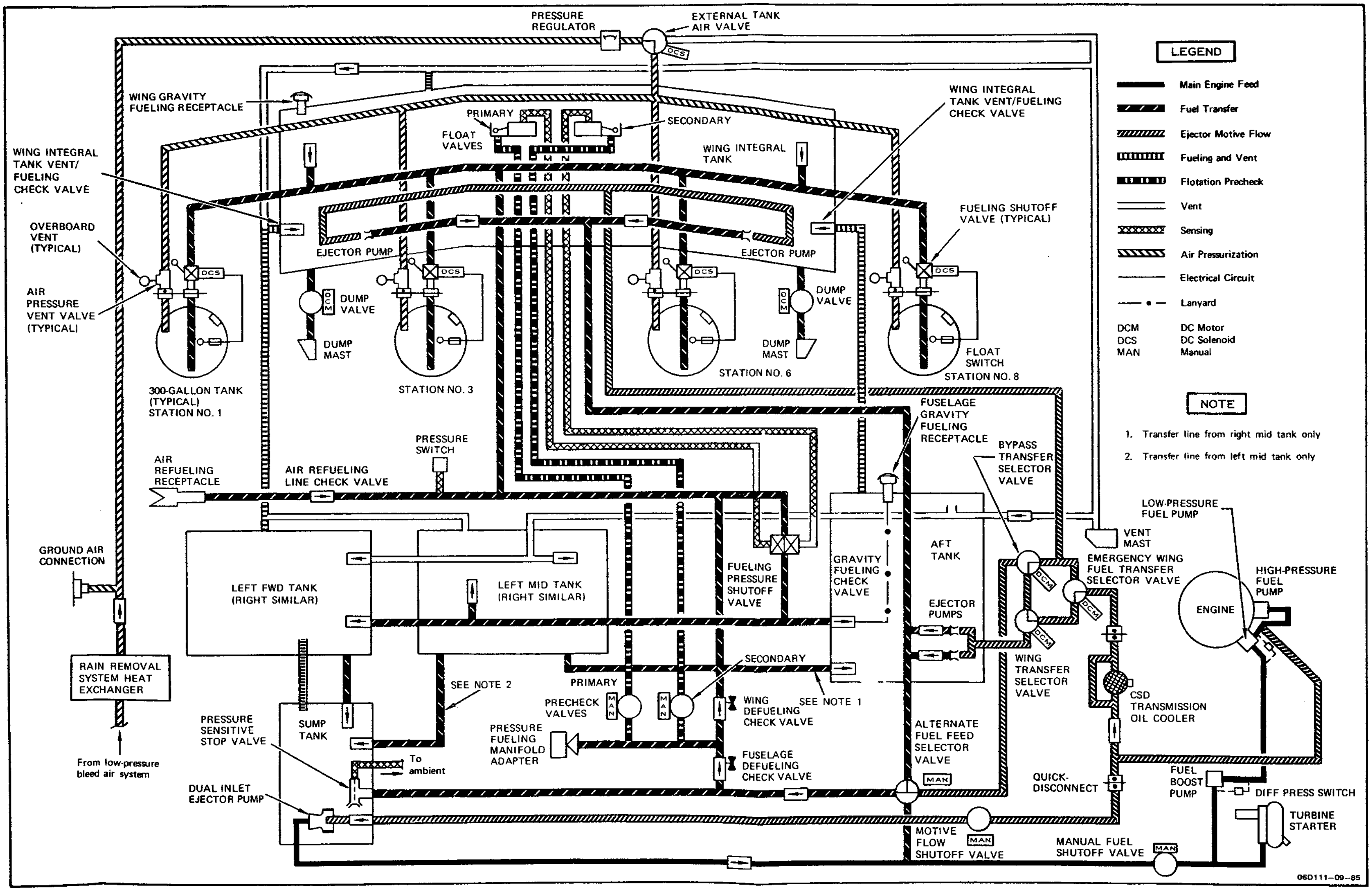


Figure FO-1. Schematic Diagram; Fuel System

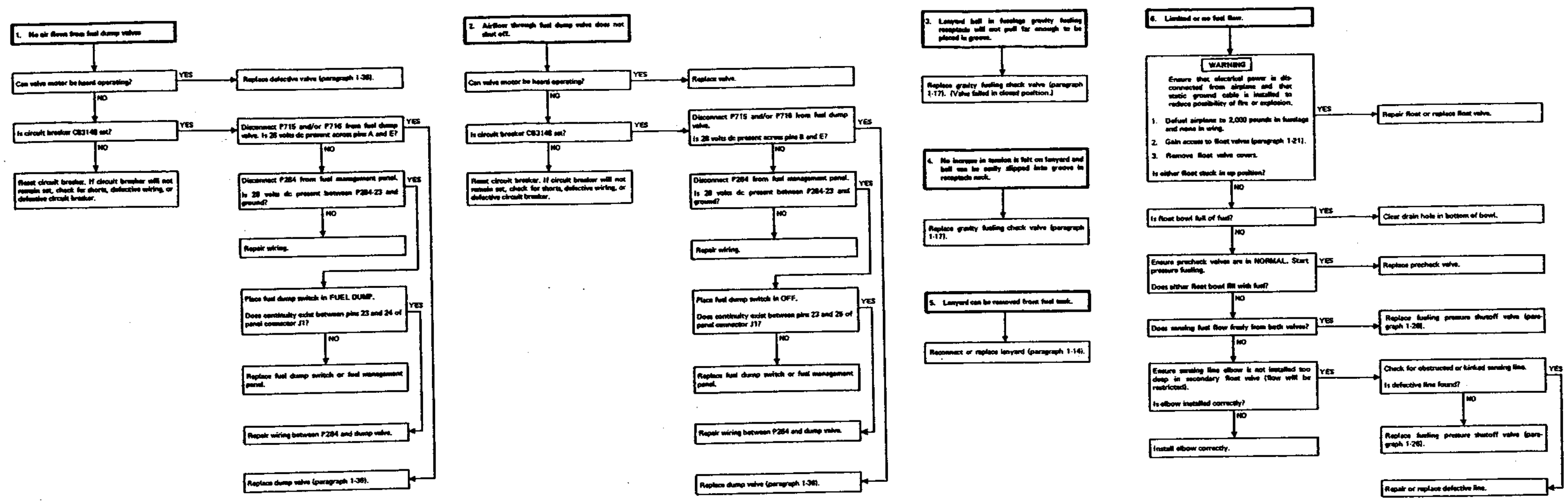
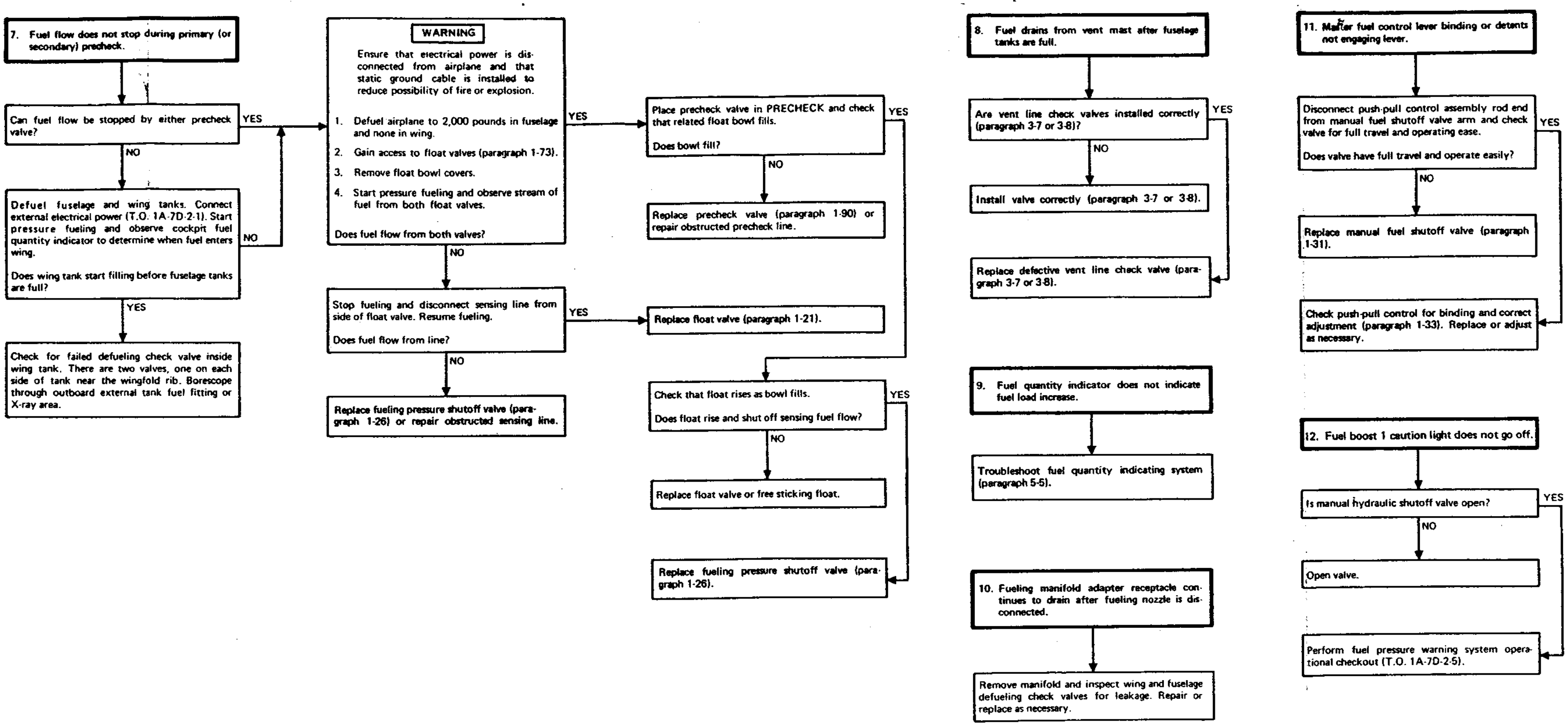


Figure FO-2. Troubleshooting; Main Fuel System (Sheet 1 of 2)

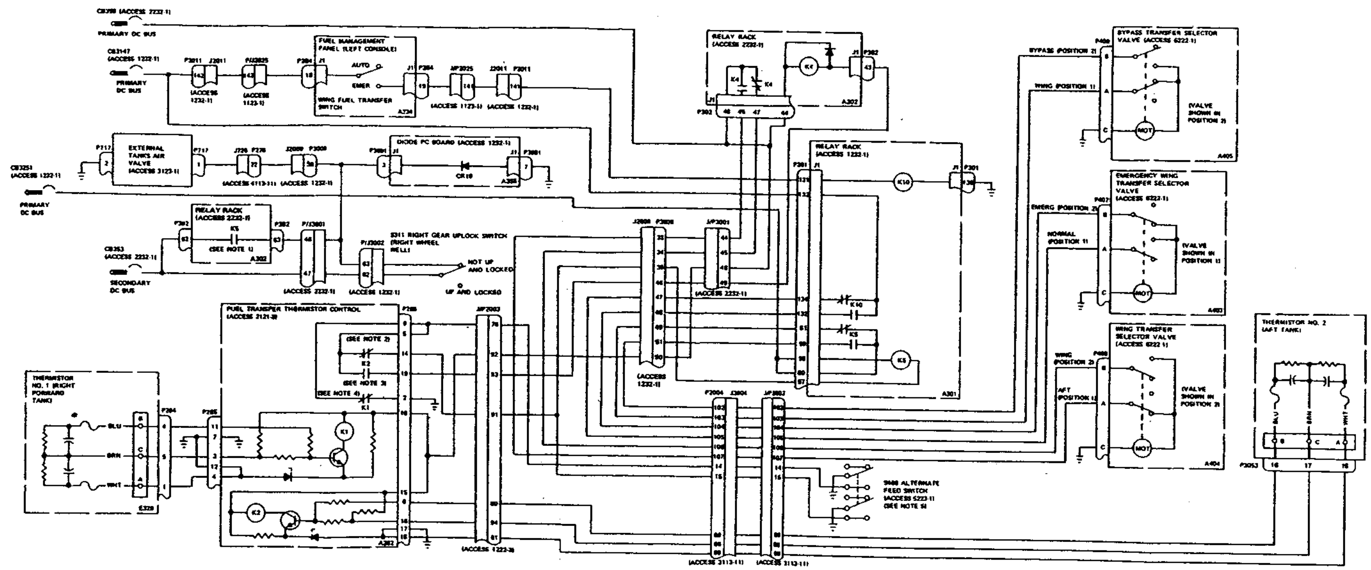


06D055-02-09-85

Figure FO-2. Troubleshooting; Main Fuel System (Sheet 2)

NOTE

1. Relay A302K5 is energized when the air refueling release handle is pulled up.
2. Open when fuel transfer thermistor No. 2 is wet.
3. Closed when fuel transfer thermistor No. 2 is wet.
4. Open when fuel transfer thermistor No. 1 is wet.
5. Alternate fuel feed switch S486 is closed when alternate fuel feed selector handle is placed in ALT FEED.

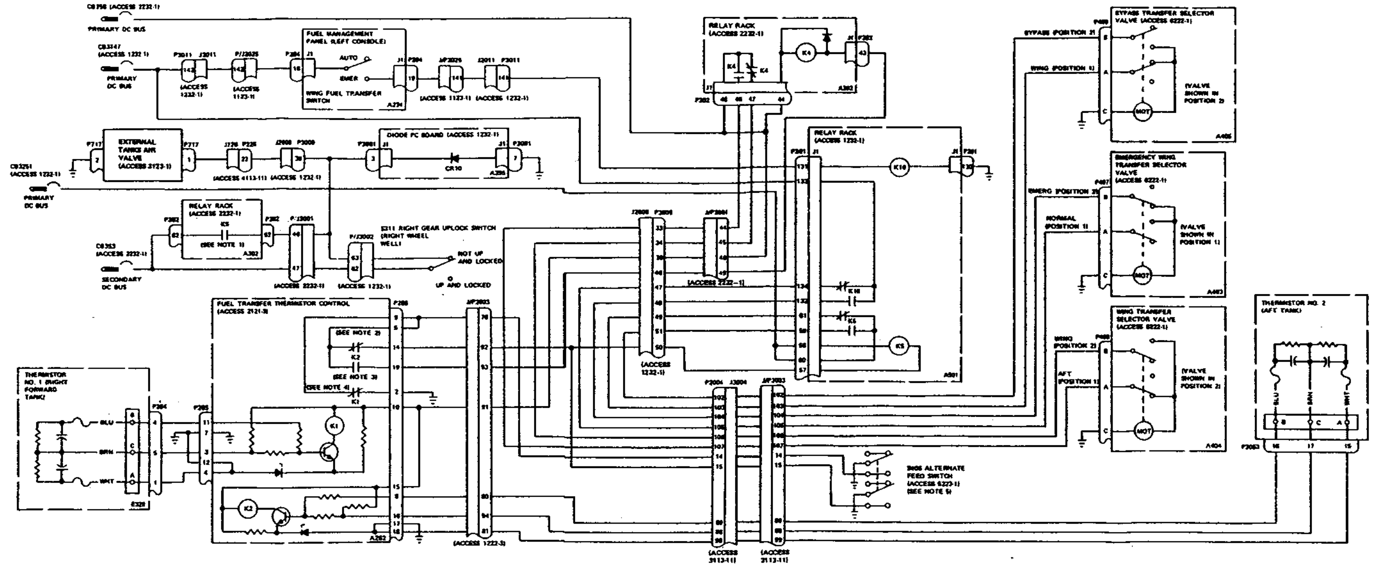


080112-08-05

Figure FO-3. Schematic Diagram (Airplanes AF69-6197 Through AF71-0370); Fuel Transfer Electrical

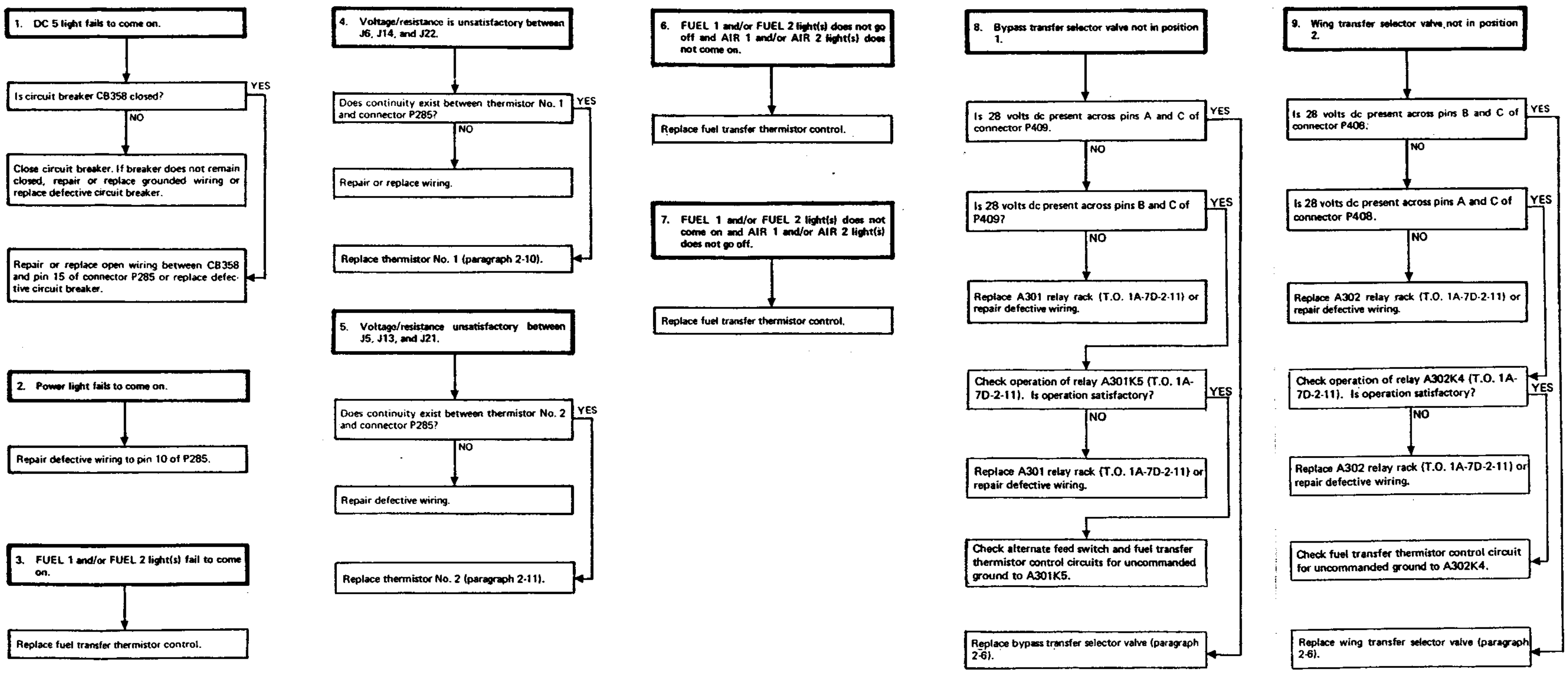
NOTE

1. Relay A302K5 is energized when the air refueling release handle is pulled up.
2. Open when fuel transfer thermistor No. 2 is wet.
3. Closed when fuel transfer thermistor No. 2 is wet.
4. Open when fuel transfer thermistor No. 1 is wet.
5. Alternate fuel feed switch S405 is closed when alternate fuel feed selector handle is placed in ALT FEED.



80D113-00-85

Figure FO-4. Schematic Diagram (Airplanes AF71-0371 and Subsequent); Fuel Transfer Electrical



06D056-01-09-85

Figure FO-5. Troubleshooting; Normal and Emergency Transfer Fuel System (Sheet 1 of 2)

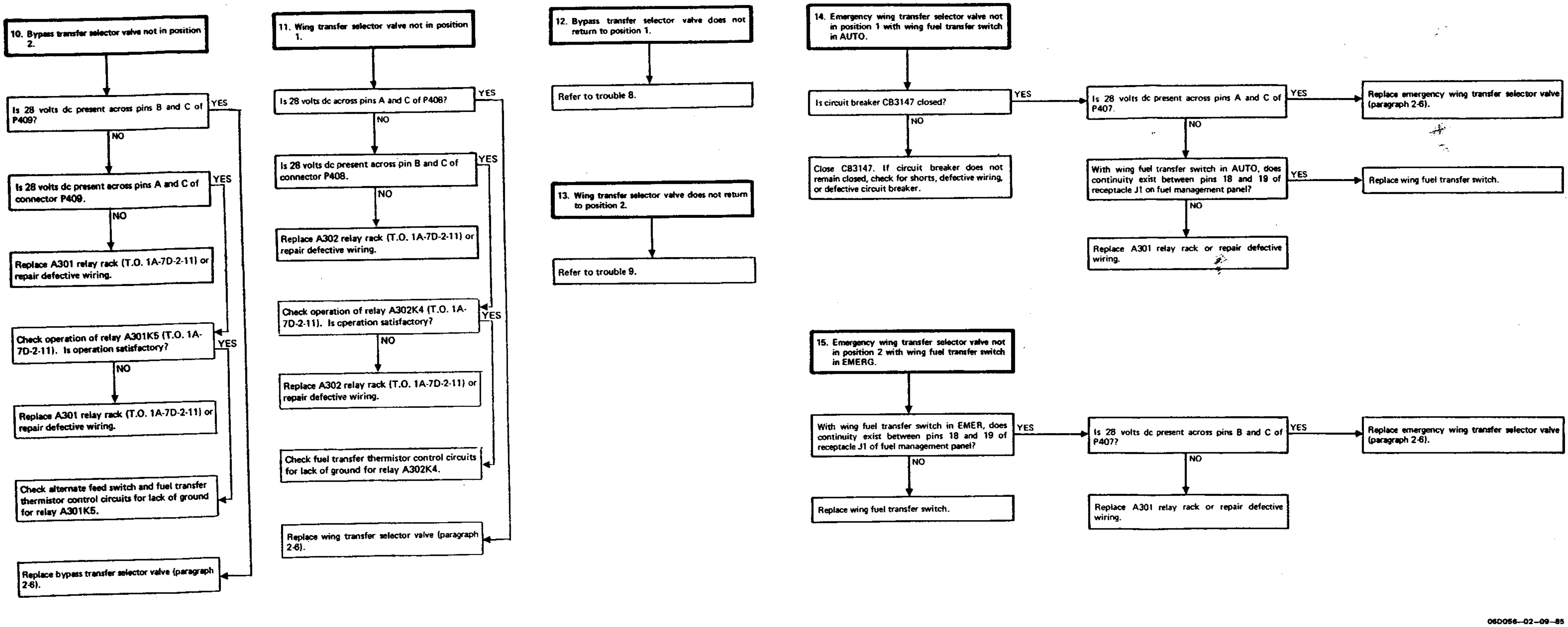


Figure FO-5. Troubleshooting; Normal and Emergency Transfer Fuel System (Sheet 2)

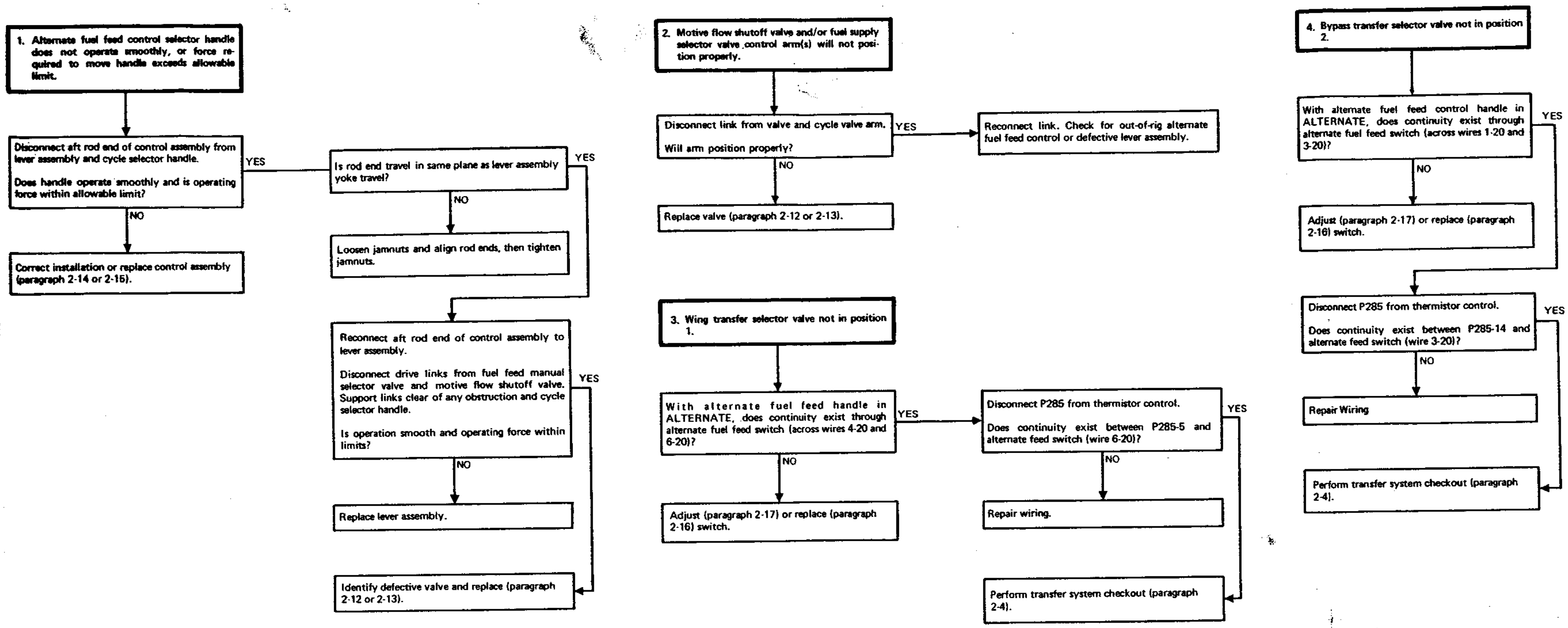
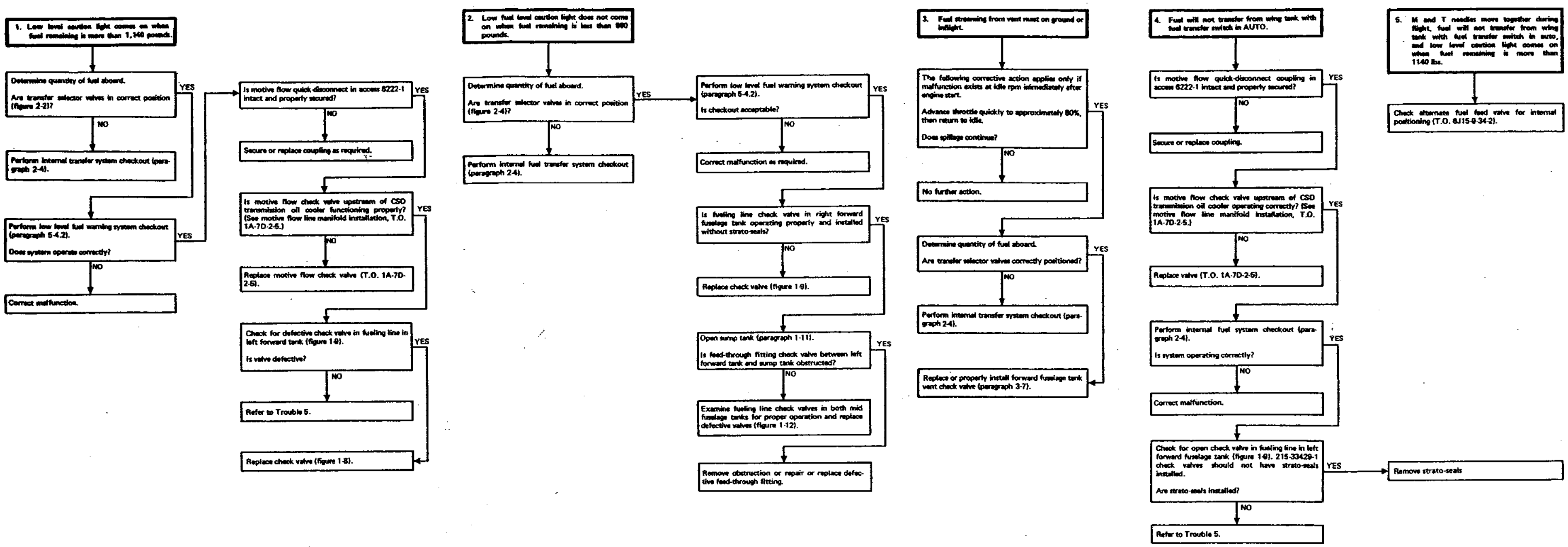
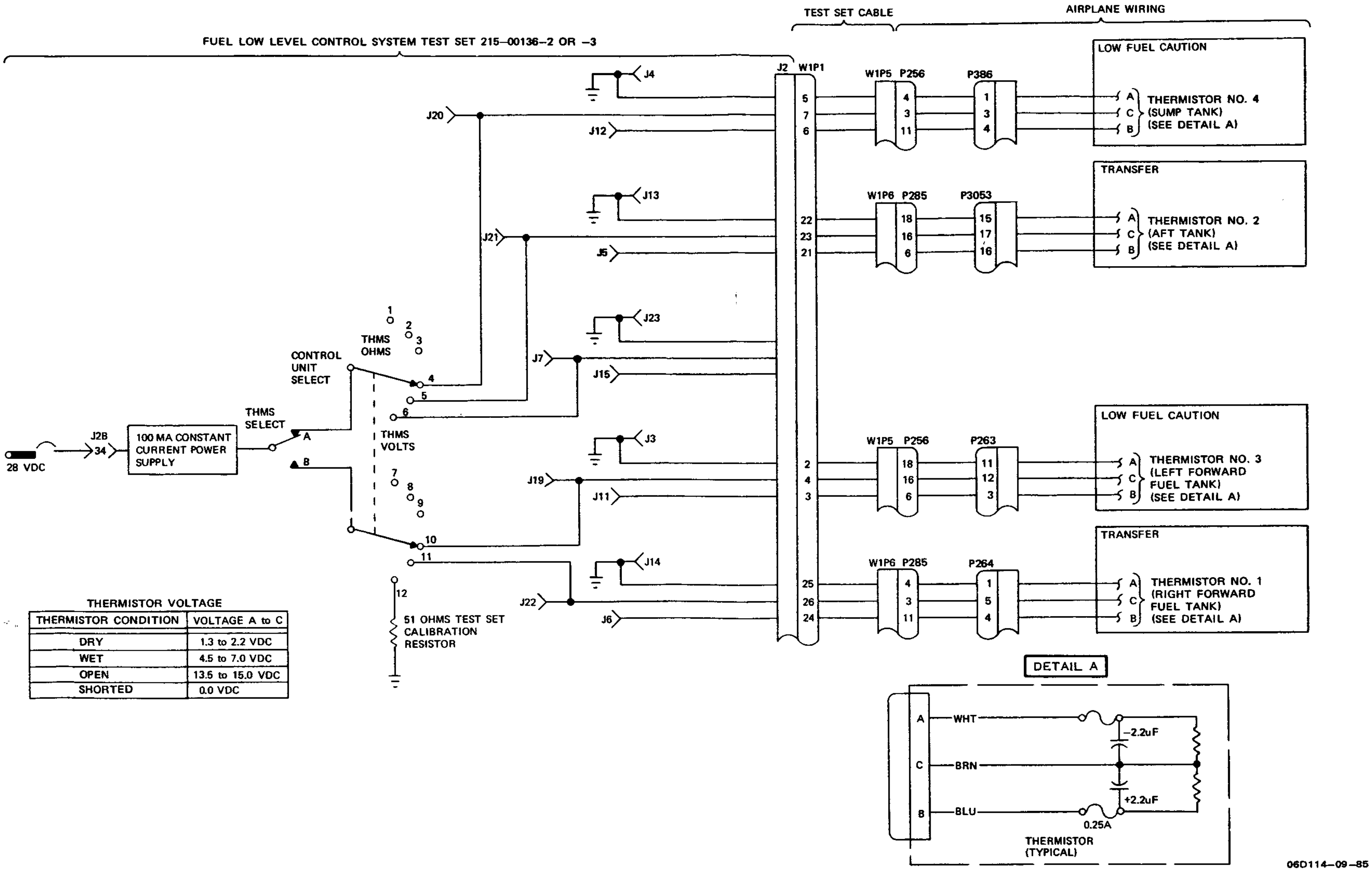


Figure FO-6. Troubleshooting; Alternate Fuel Feed System



06D058-09-85

Figure FO-7. Troubleshooting; Fuel System Flight/Ground Operations



THERMISTOR VOLTAGE

THERMISTOR CONDITION	VOLTAGE A to C
DRY	1.3 to 2.2 VDC
WET	4.5 to 7.0 VDC
OPEN	13.5 to 15.0 VDC
SHORTED	0.0 VDC

Figure FO-8. Schematic Diagram; Thermistor Troubleshooting

NOTE

1. Relay A302K5 is energized when the air refueling release handle is pulled up.
2. Same as station 8.
3. Underlining indicates lower case letters.

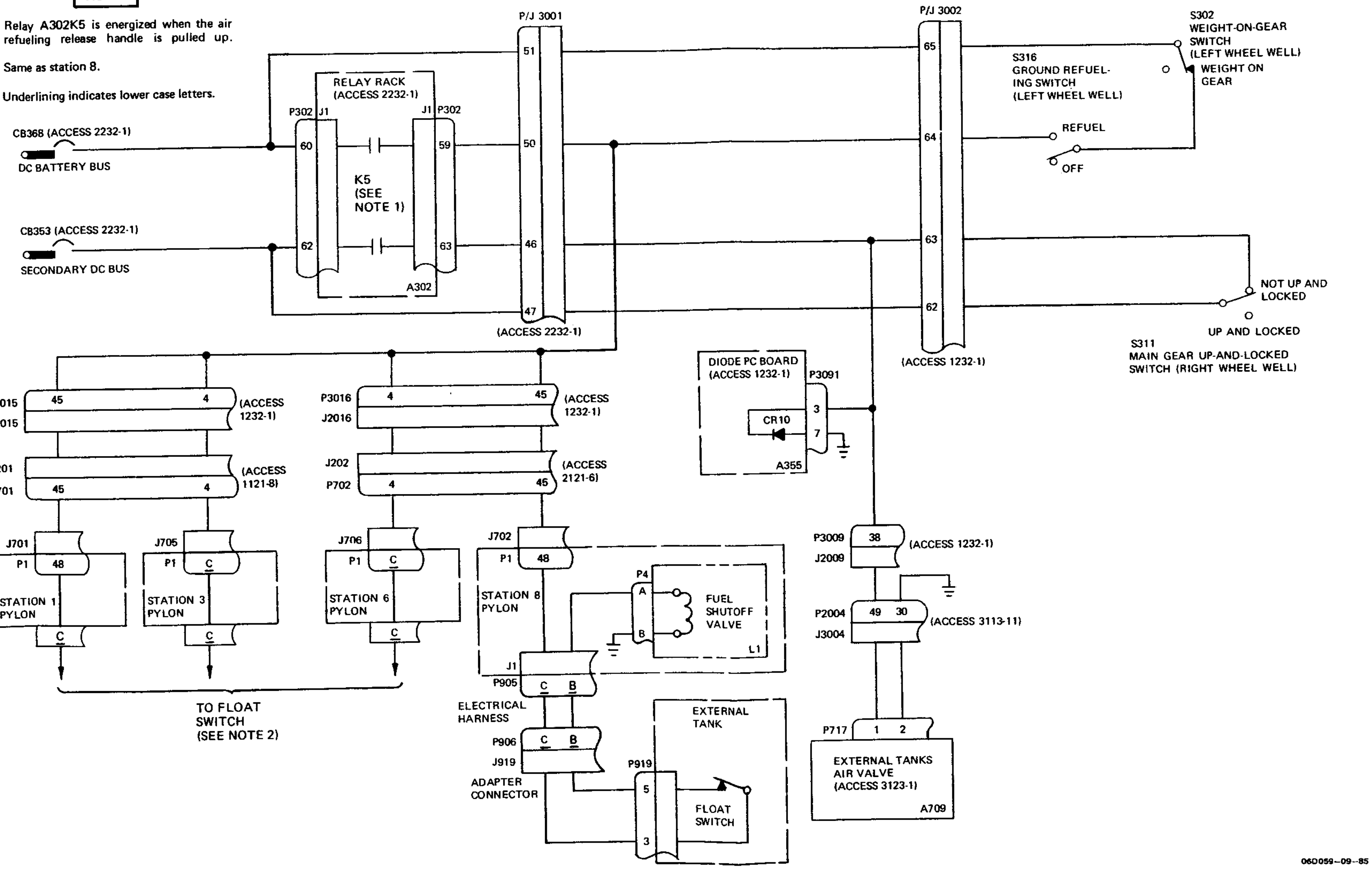


Figure FO-9. Schematic Diagram; External Fuel System Electrical

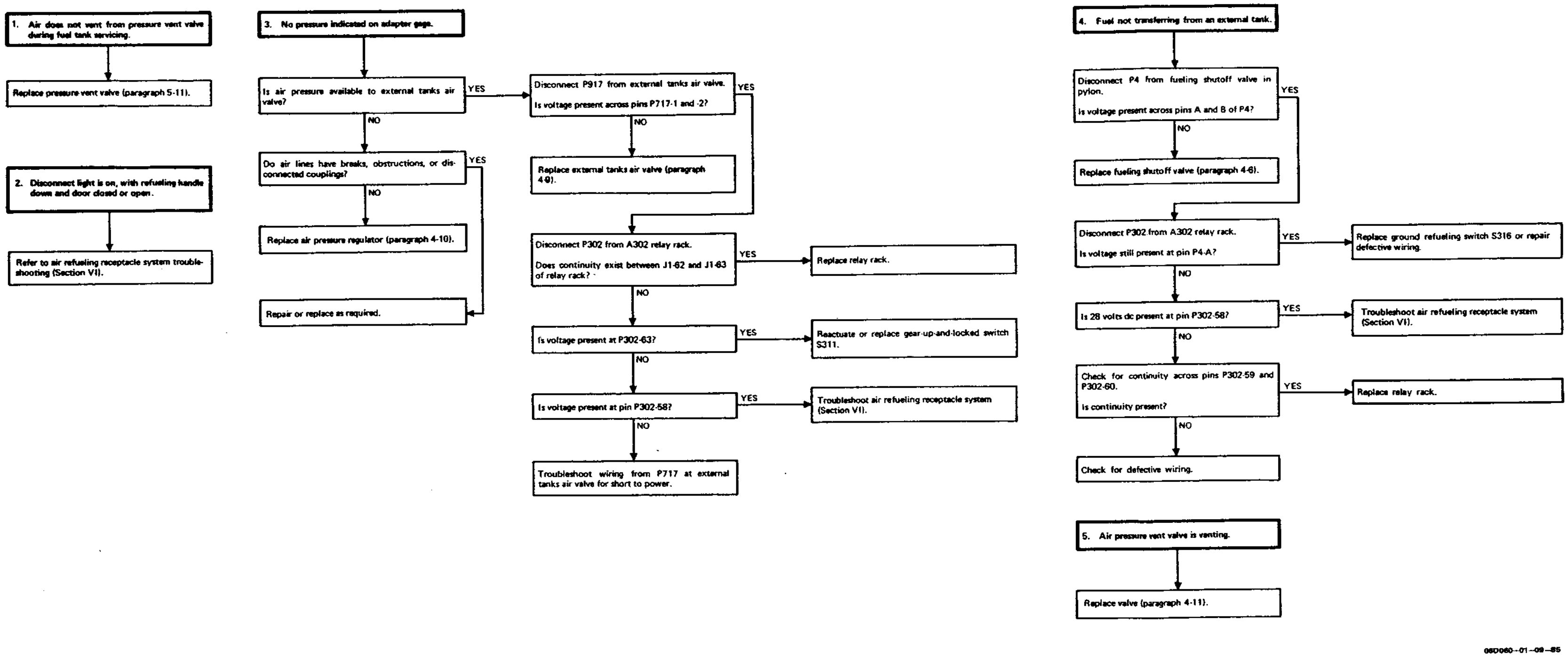
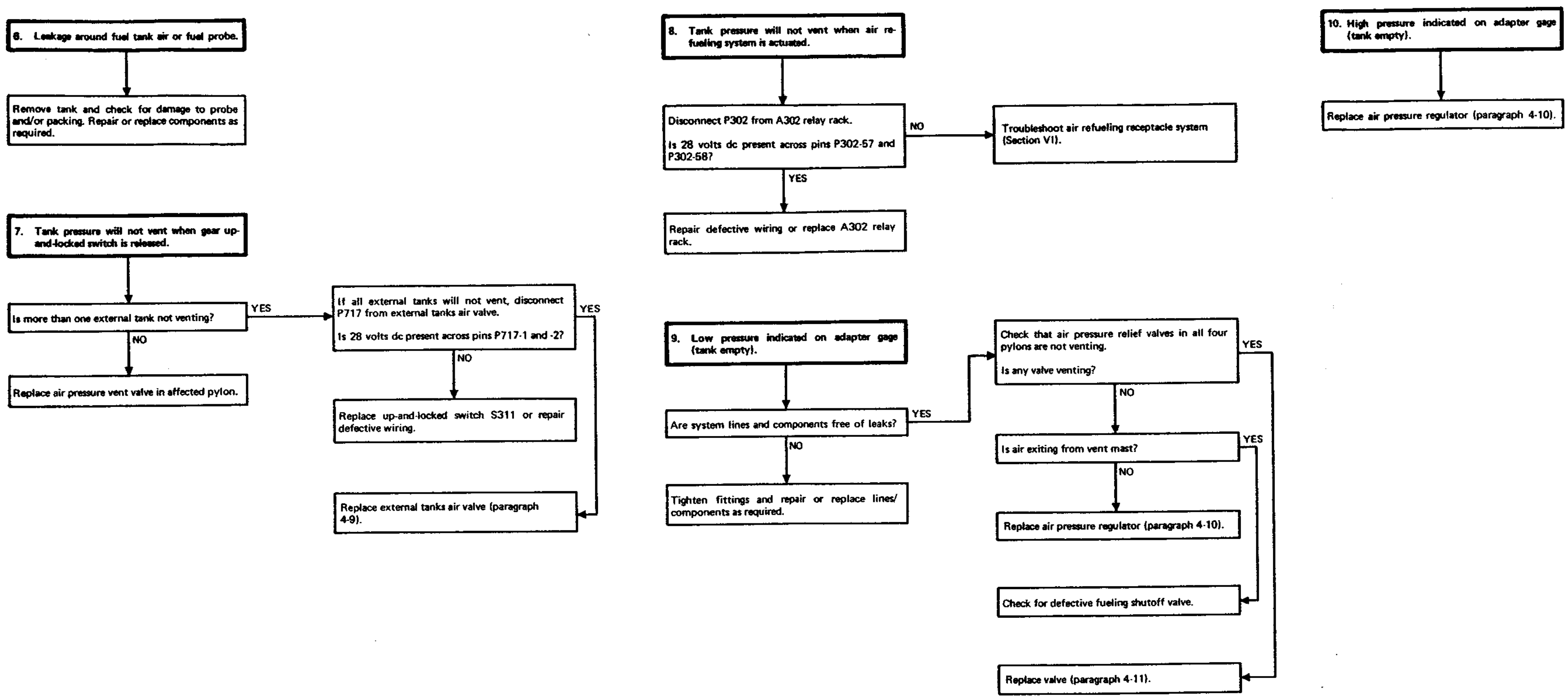


Figure FO-10. Troubleshooting; External Fuel System (Sheet 1 of 2)



08D060-02-09-85

Figure FO-10. Troubleshooting; External Fuel System (Sheet 2)

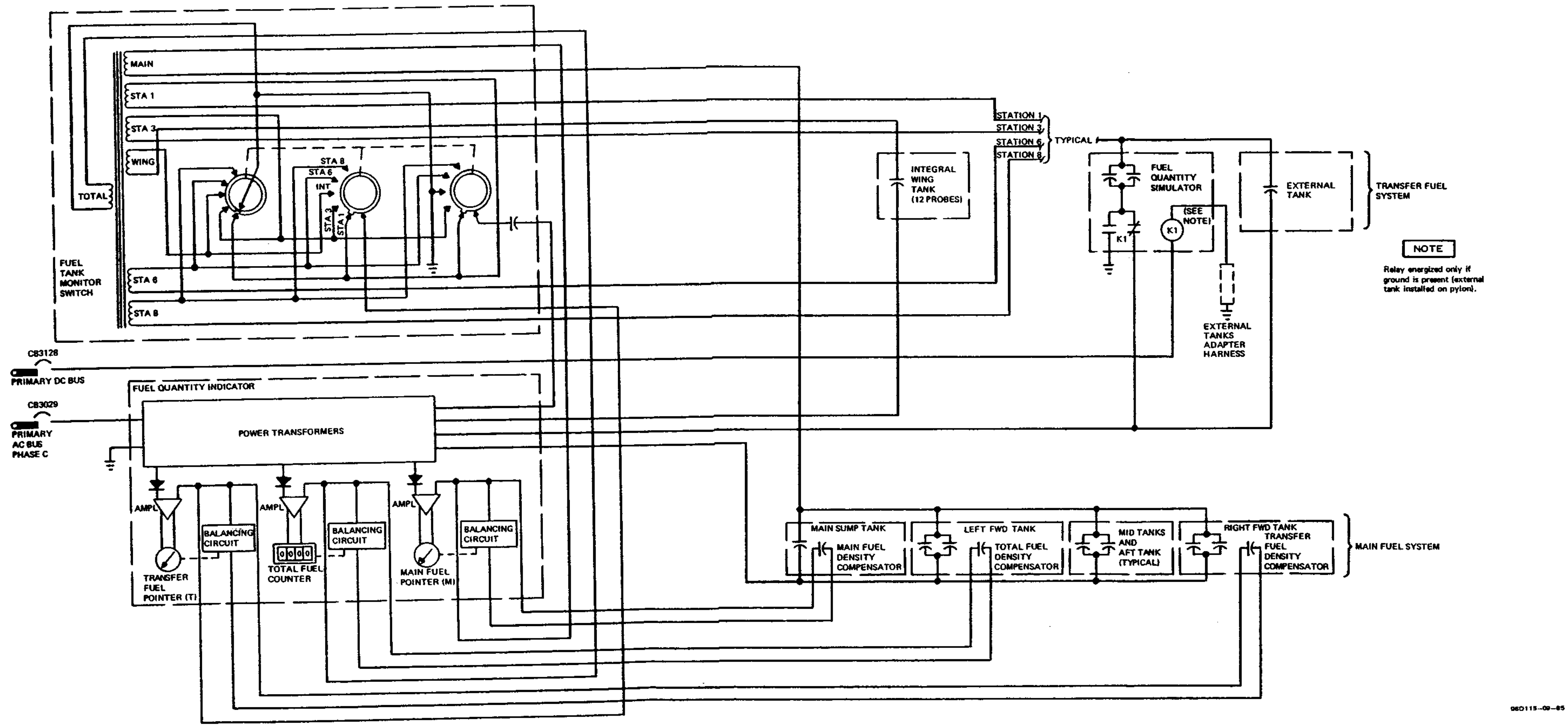
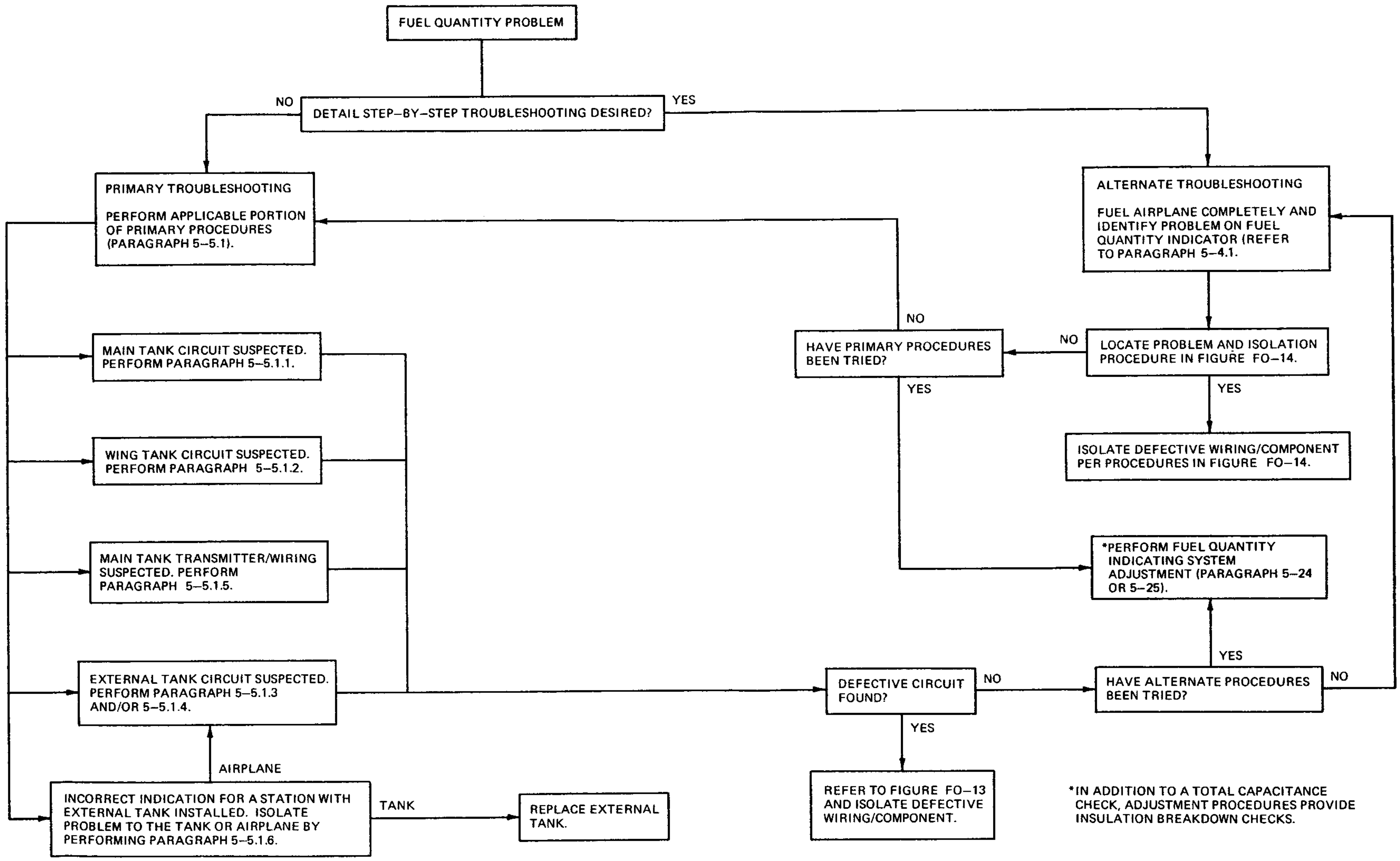


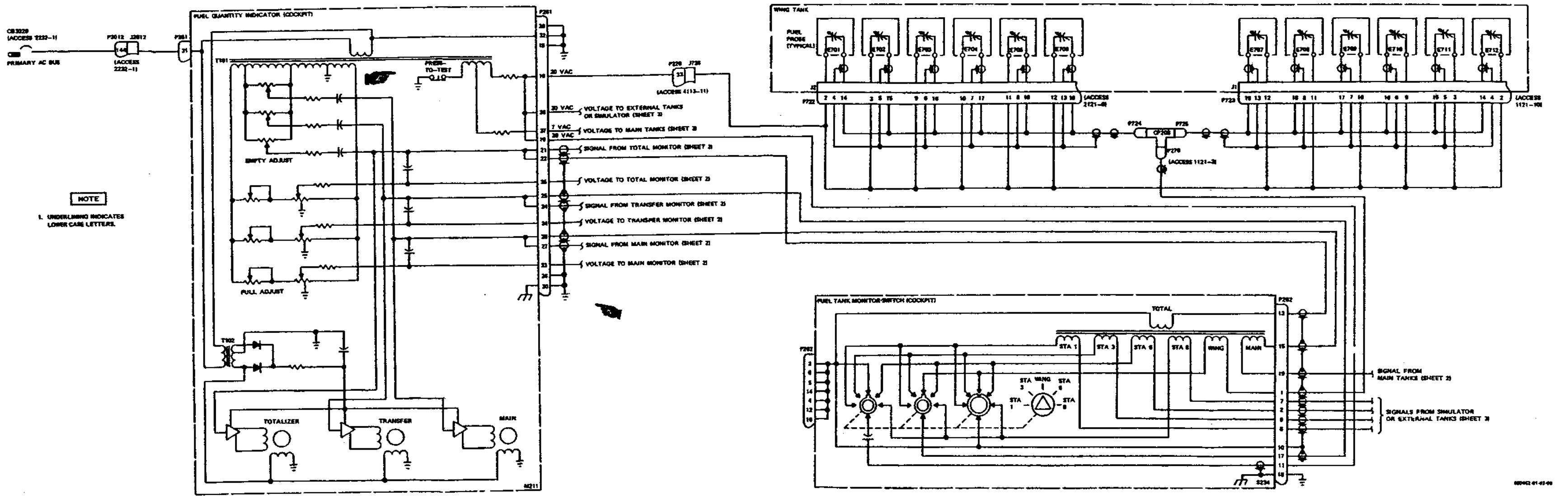
Figure FO-11. Schematic Diagram; Fuel Quantity Indicating System Electrical



*IN ADDITION TO A TOTAL CAPACITANCE CHECK, ADJUSTMENT PROCEDURES PROVIDE INSULATION BREAKDOWN CHECKS.

06D061–09–85

Figure FO-12. Flow Chart; Fuel Quantity System Troubleshooting



NOTE

1. UNDERLINING INDICATES LOWER CASE LETTERS.

Figure FO-13. Schematic Diagram; Fuel Quantity Indicating System Troubleshooting (Sheet 1 of 3)

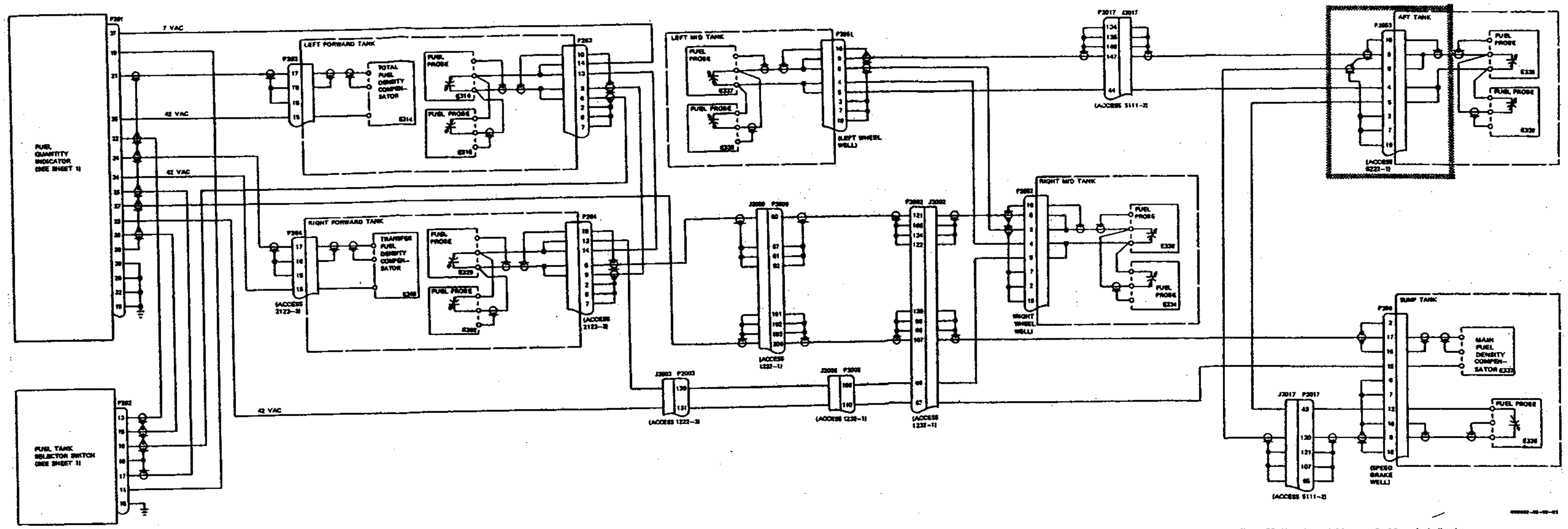


Figure FO-13. Schematic Diagram; Fuel Quantity Indicating System Troubleshooting (Sheet 2)

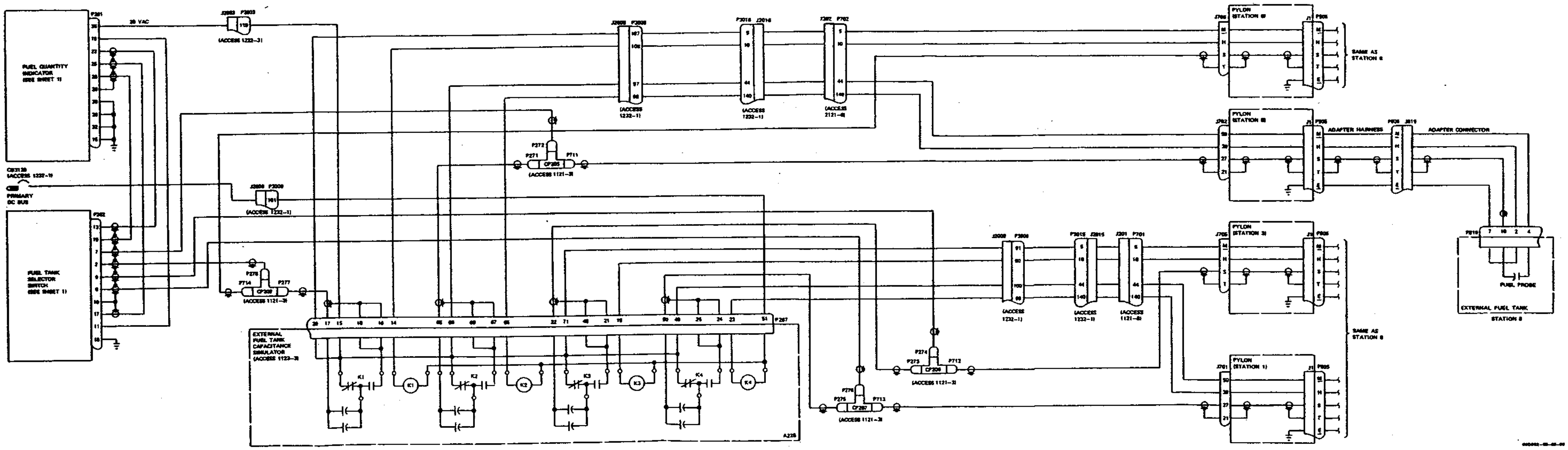


Figure FO-13. Schematic Diagram; Fuel Quantity Indicating System Troubleshooting (Sheet 3)

TROUBLESHOOTING INDEX

MALFUNCTION INDICATION (AIRPLANE FULL AND PRESS-TO-TEST PUSHED AND RELEASED)			PERFORM ISOLATION PROCEDURE	PROBABLE CAUSE
MAIN POINTER	TRANSFER POINTER	TOTAL COUNTER		
Normal	Normal	Reads high	11	Open Hi Z or Lo Z circuit in the total compensator circuit.
Normal	Normal	Dead	9	Hi Z shorted to ground in total compensator circuit.
Normal	Normal	Reads low	30	Open in Hi Z or Lo Z circuit on one or all stations, or Hi Z shorted to ground.
Normal	Pegged full	Normal	4	Open Hi Z or Lo Z circuit in the transfer compensator circuit.
Normal	Dead	Normal	5	Hi Z shorted to shield or ground in transfer compensator circuit.
Normal	Dead	Reads high	6	Hi Z shorted to Lo Z in transfer compensator circuit.
Normal	Reads low	Normal	32	Open shield in transfer compensator circuit.
Normal	Reads low	Reads low	23	Open Hi Z or Lo Z in transfer circuit inside wing tank.
Normal	Pegged empty	Reads low	24	Open Hi Z or Lo Z in transfer circuit outside of wing tank.
			25	Hi Z shorted to ground in transfer circuit.
Pegged empty	Normal	Reads low	17	Hi Z shorted to shield or ground in main system circuit, or main system Hi Z shorted to main compensator Lo Z.
			18	Hi Z or Lo Z open in main system circuit.
Pegged empty	Normal	Pegged empty	19	Main system Lo Z shorted to main compensator Hi Z.
Pegged empty	Pegged empty	Pegged empty	29	External system Lo Z shorted to main compensator Hi Z.
Pegged empty	Pegged empty	Reads low	27	Hi Z shorted to Lo Z in external system.
Pegged empty	Reads low	Reads low	16	Lo Z shorted to ground in main system circuit.
Pegged empty	Reads low	Pegged empty	14	Hi Z shorted to Lo Z in main system circuit.

EXAMPLE:

Indicator reads:

Main – Pegged empty
Transfer – Pegged empty
Total – Reads low
Probable cause – No. 27

Perform troubleshooting isolation procedure No. 27.

TROUBLESHOOTING INDEX

MALFUNCTION INDICATION (AIRPLANE FULL AND PRESS–TO–TEST PUSHED AND RELEASED)			PERFORM ISOLATION PROCEDURE	PROBABLE CAUSE
MAIN POINTER	TRANSFER POINTER	TOTAL COUNTER		
Pegged empty	Pegged full	Pegged empty	21	Main system Lo Z shorted to transfer system compensator Hi Z.
Reads low	Normal	Normal	31	Open shield in main compensator circuit.
Reads low	Pegged empty	Pegged empty	26	Lo Z shorted to ground in transfer or external tank circuit
Reads low	Dead	Dead	22	Hi Z shorted to Lo Z and/or to ground in transfer circuit.
Reads low	Pegged full	Pegged empty	28	External system Lo Z shorted to transfer compensator Hi Z.
Reads high	Reads high	Pegged full	8	Lo Z shorted to ground in total compensator circuit.
Reads high	Reads high	Dead	10	Lo Z shorted to Hi Z in total compensator circuit.
Reads high	Pegged full	Reads high	7	Lo Z shorted to shield or ground in transfer compensator circuit.
Pegged full	Normal	Normal	1	Open Hi Z or Lo Z circuit in the main compensator circuit.
Pegged full	Reads low	Reads high	15	Hi Z shorted to Lo Z and shield ground (failed connector) in main system circuit.
Pegged full	Reads high	Reads high	3	Lo Z shorted to shield or ground in main compensator circuit.
Pegged full	Pegged full	Reads low	12	Loss of single point shield ground at monitor switch.
Pegged full	Pegged full	Reads high	13	Loss of single point ground at the indicator.
Dead	Pegged full	Dead	20	Main system Hi Z shorted to transfer system compensator Lo Z.
Dead	Normal	Normal	2	Hi Z shorted to shield, Lo Z, or ground in main compensator circuit.

NOTE

1. Malfunctions are with internal fuel tanks full and external tanks removed unless otherwise noted.
2. Hi Z – signal (shield coax)
   Lo Z – excitation (non-shielded)
3. T.O. 1A–7D–2–20 provides procedures for performing Time Domain Reflectometer (TDR) testing and troubleshooting of fuel quantity system coaxial cables. When symptoms point to a possible malfunction involving coaxial cable components of the indicating system, TDR testing may be used to identify and isolate the cause of the problem.

06D063–01–09–85

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 1 of 25)

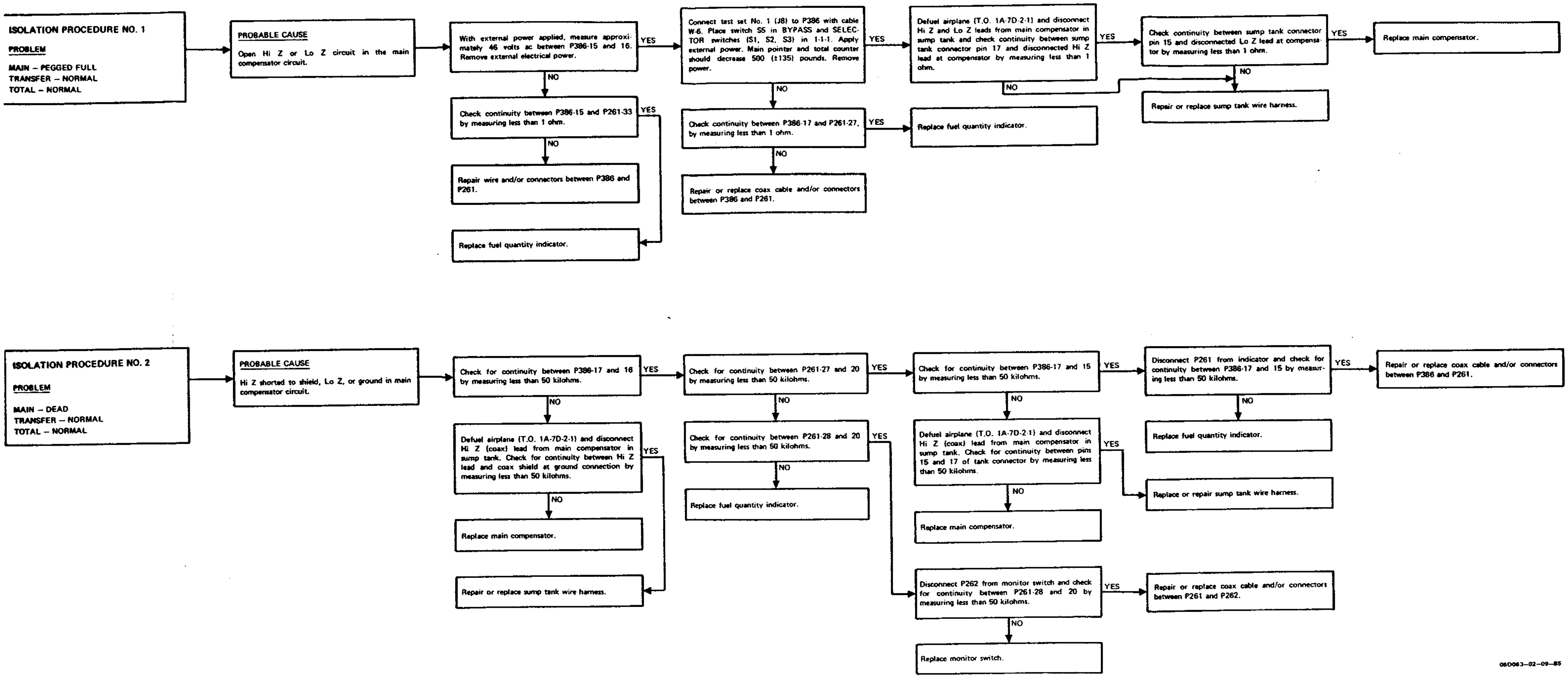


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 2)

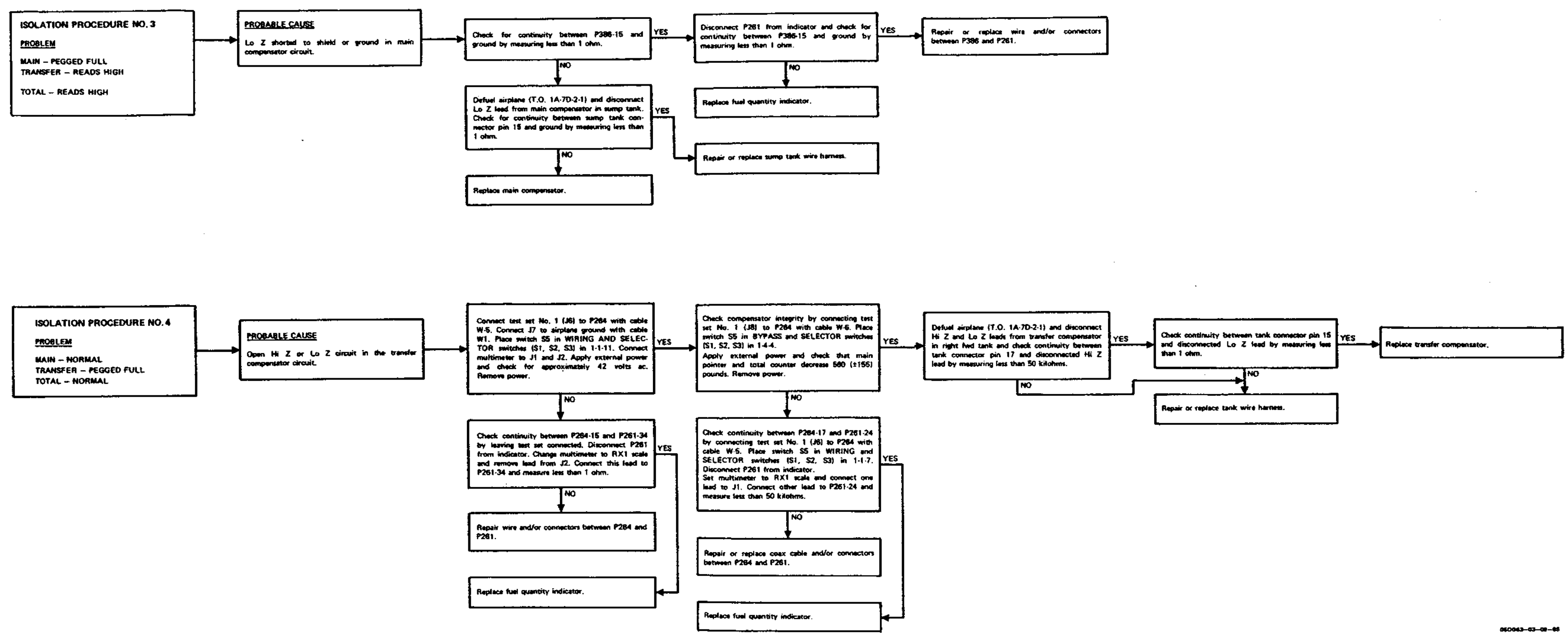


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 3)

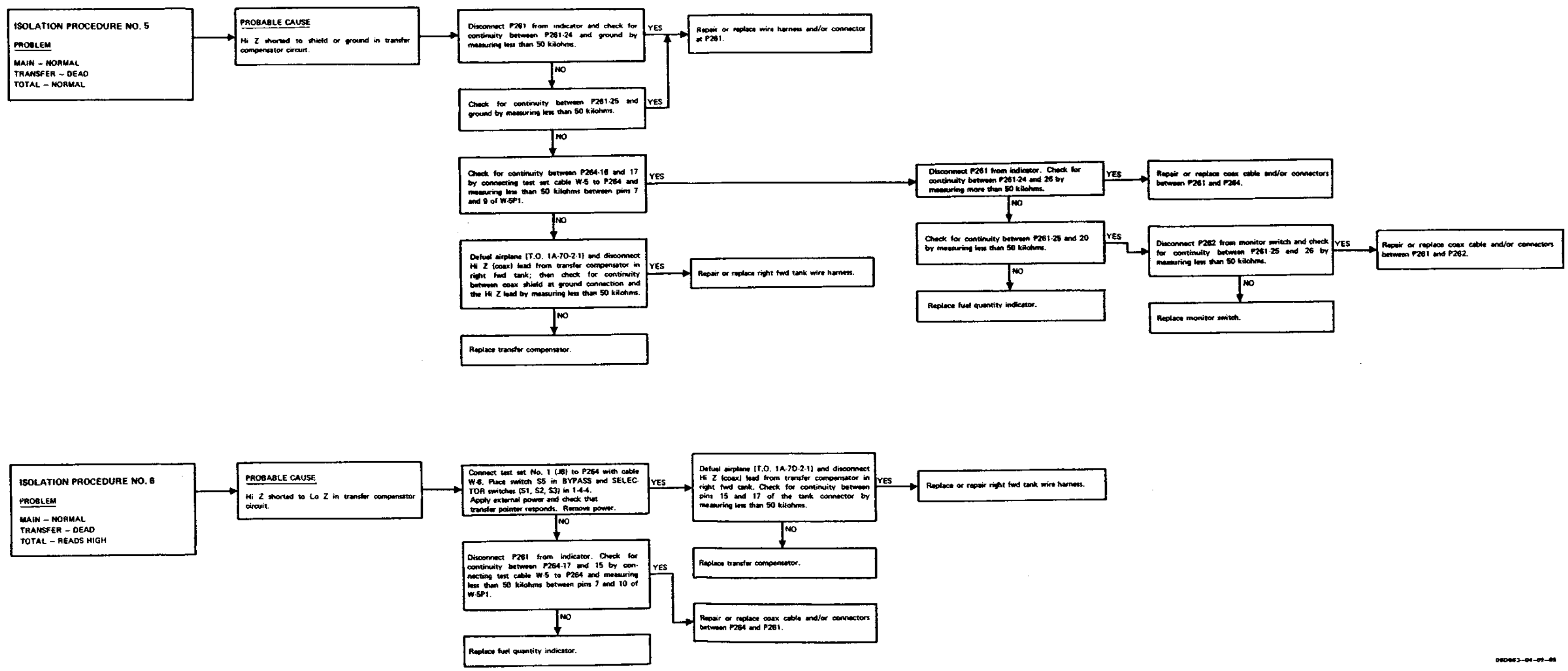


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 4)

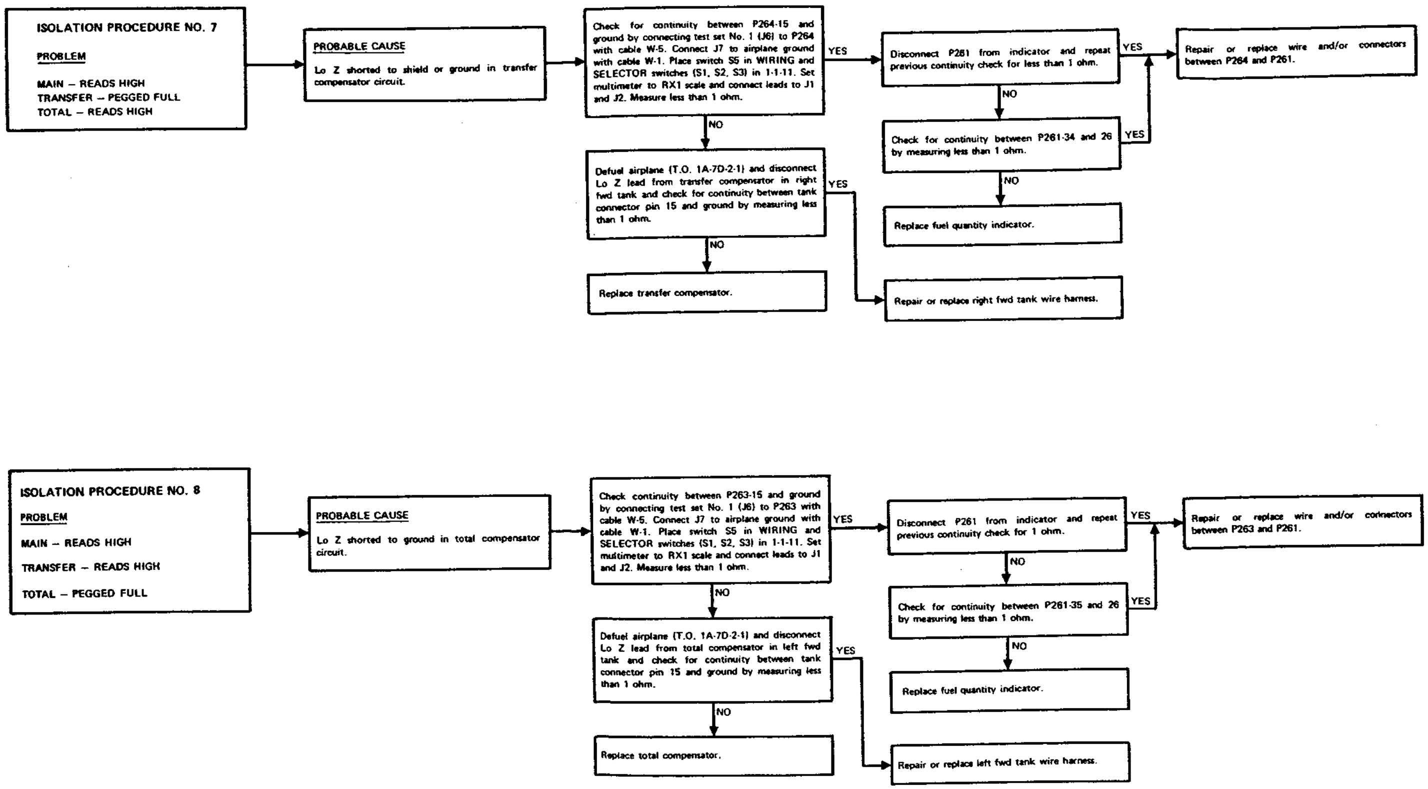


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 5)

ISOLATION PROCEDURE NO. 9

PROBLEM

MAIN – NORMAL
TRANSFER – NORMAL
TOTAL – DEAD

PROBABLE CAUSE

Hi Z shorted to ground in total compensator circuit.

Connect test set No. 1 (J8) to P264 with cable W-6. Set switch S5 to BYPASS and SELECTOR switches (S1, S2, S3) to 1-3-3. Apply external power and check that total counter responds. Remove power.

- YES → Defuel airplane (T.O. 1A-7D-2-1) and disconnect Hi Z (coax) lead from total compensator in left fwd tank. Check for continuity between tank connector pin 17 and ground, by measuring less than 50 kilohms.
  - YES → Repair or replace left fwd tank wire harness.
  - NO → Replace total compensator.
- NO → Disconnect P261 from indicator. Check for continuity between P261-21 and 20 by measuring less than 50 kilohms.
  - YES → Repair or replace coax cable and/or connectors between P261 and P263.
  - NO → Check for continuity between P261-21 and 26 by measuring less than 50 kilohms.
    - YES → Repair or replace connector P261.
    - NO → Replace fuel quantity indicator.

ISOLATION PROCEDURE NO. 10

PROBLEM

MAIN READS HIGH
TRANSFER – READS HIGH
TOTAL – DEAD

PROBABLE CAUSE

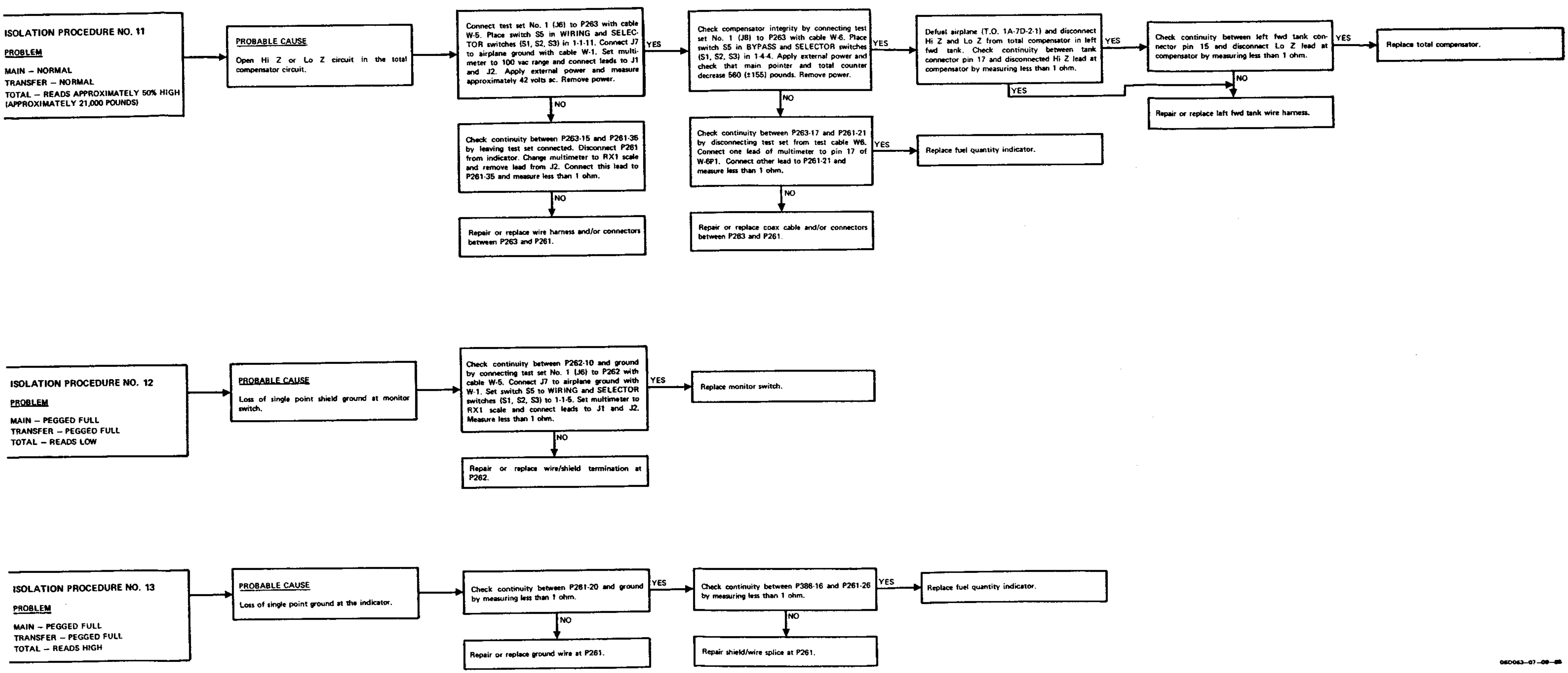
Lo Z shorted to Hi Z in total compensator circuit.

Connect test set No. 1 (J8) to P264 with cable W-6. Place switch S5 in BYPASS and SELECTOR switches (S1, S2, S3) in 1-3-3. Apply external power and check that total counter responds. Remove power.

- YES → Defuel airplane (T.O. 1A-7D-2-1) and disconnect Hi Z (coax) lead from total compensator in left fwd tank. Check for continuity between pins 15 and 17 of tank connector by measuring less than 50 kilohms.
  - YES → Replace or repair left fwd tank wire harness.
  - NO → Replace total compensator.
- NO → Disconnect P261 from indicator and check for continuity between P261-21 and 35 by measuring less than 50 kilohms.
  - YES → Repair or replace coax cable and/or connectors between P263 and P261.
  - NO → Replace fuel quantity indicator.

06D063—06—08—85

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 6)



06D063–07–09–85

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 7)

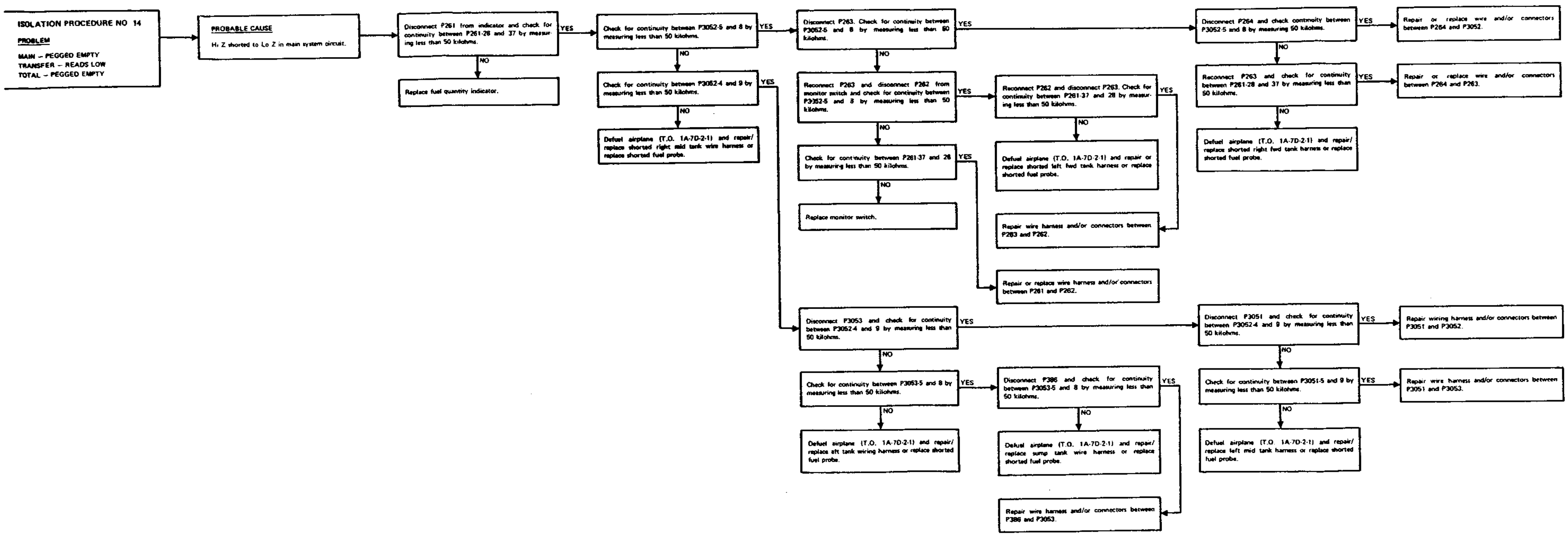


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 8)

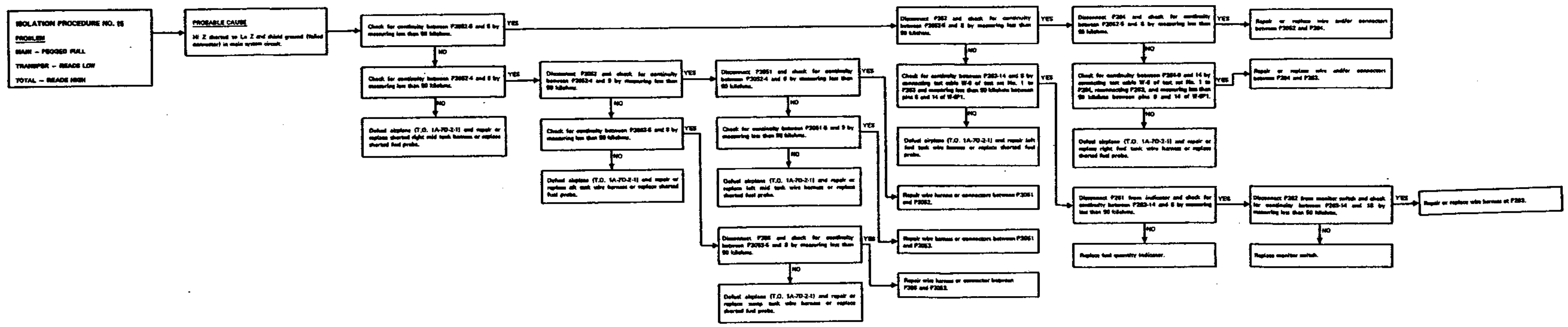


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 9)

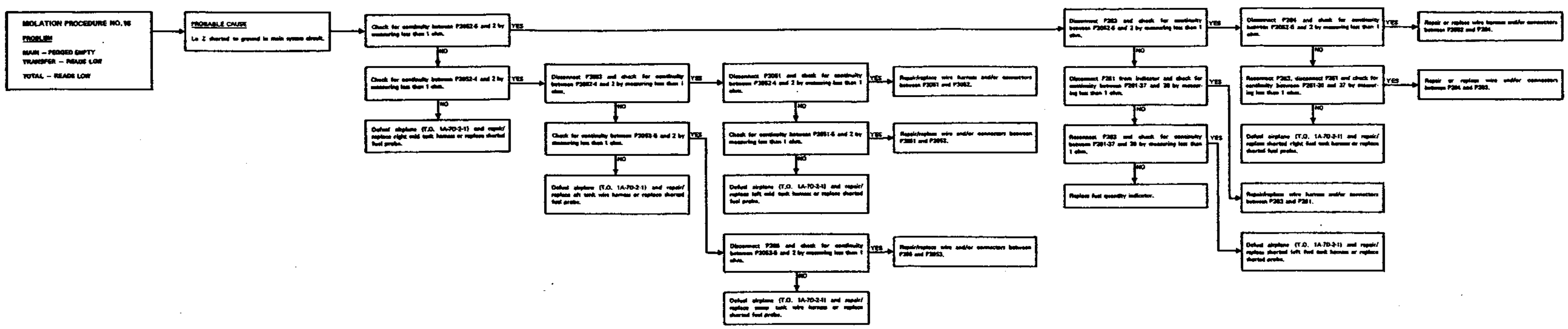


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 10)

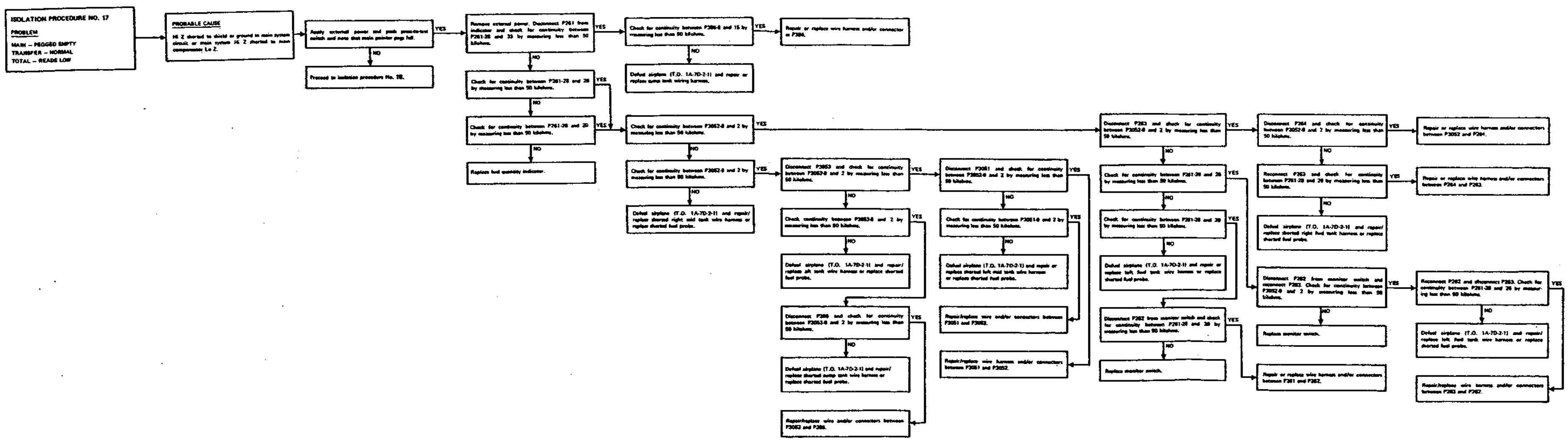


Figure FO-14. Troubleshooting: Fuel Quantity Indicating System (Sheet 11)

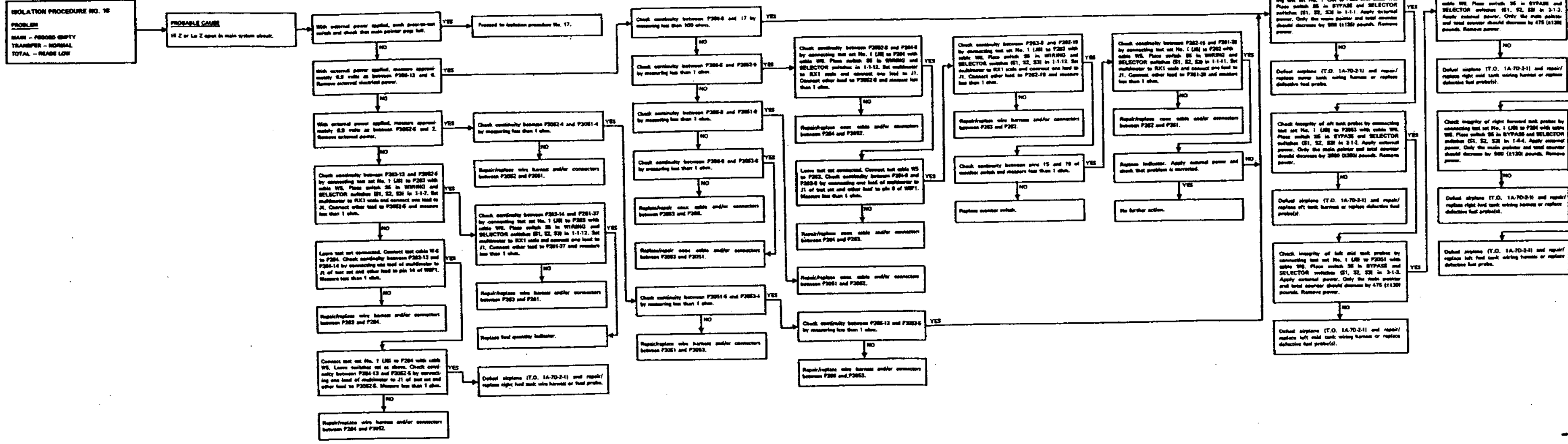
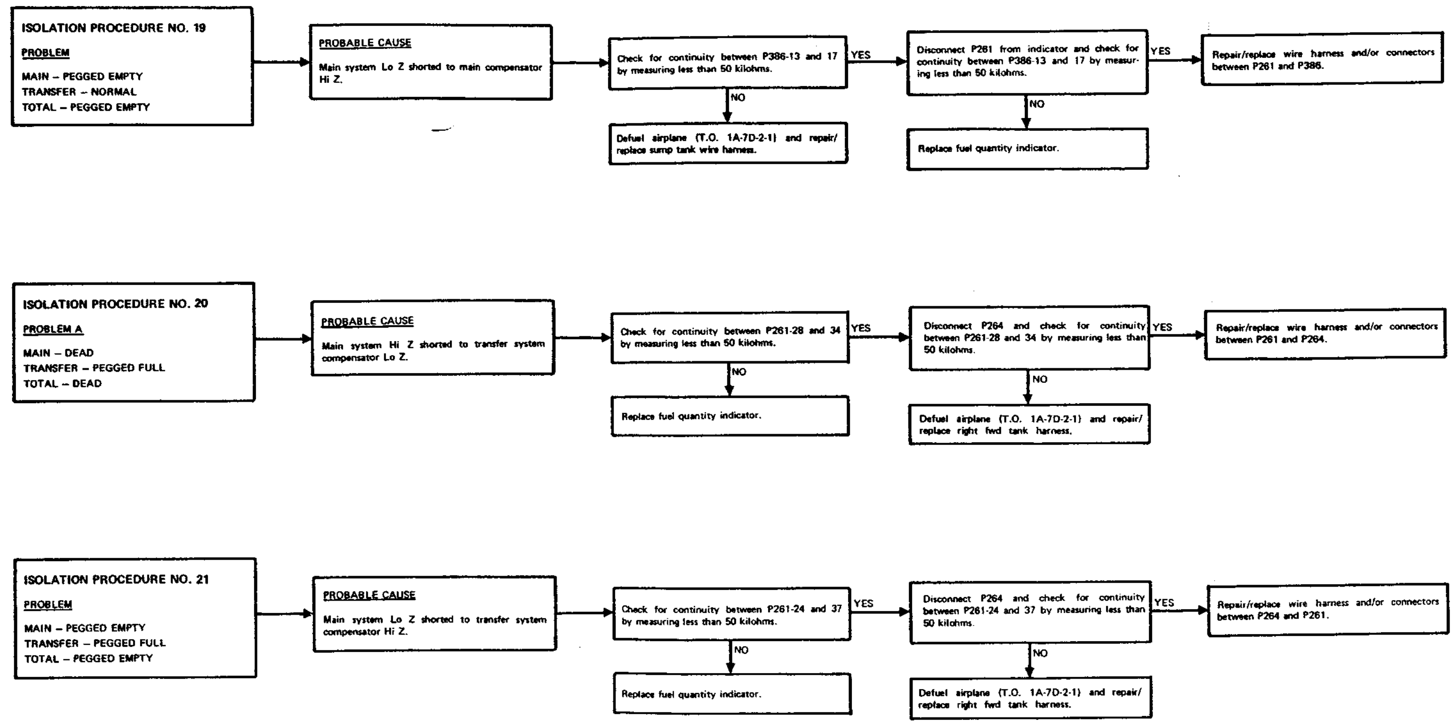


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 12)



06D063-13-09-85

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 13)

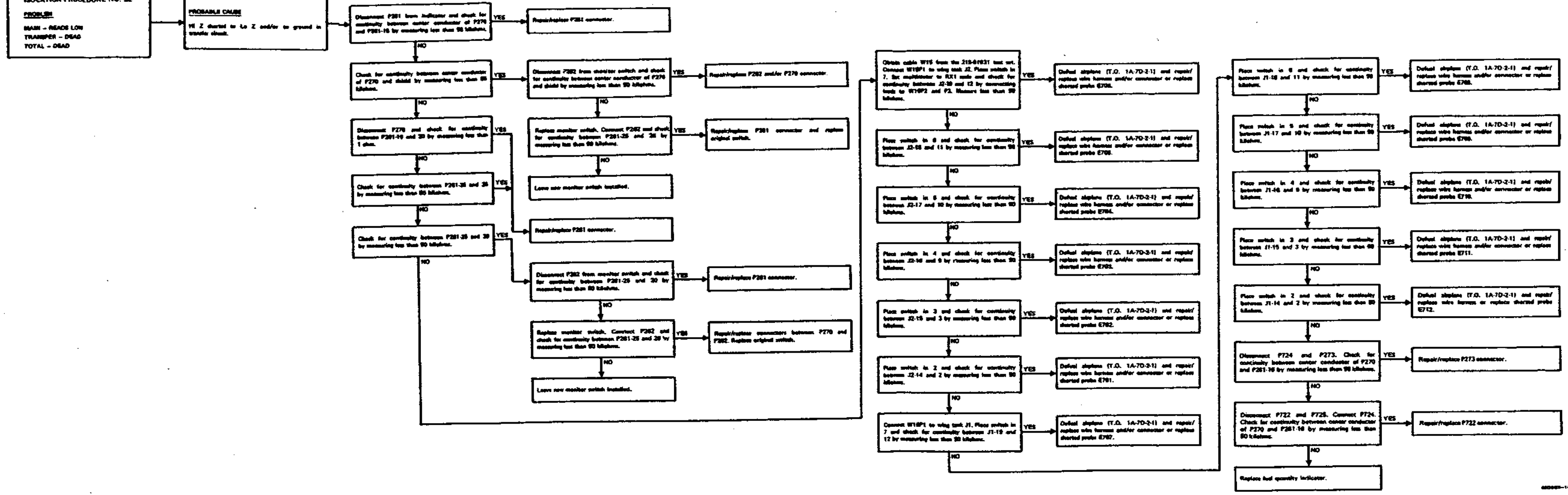


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 14)

FP-63/FP-64 bl.

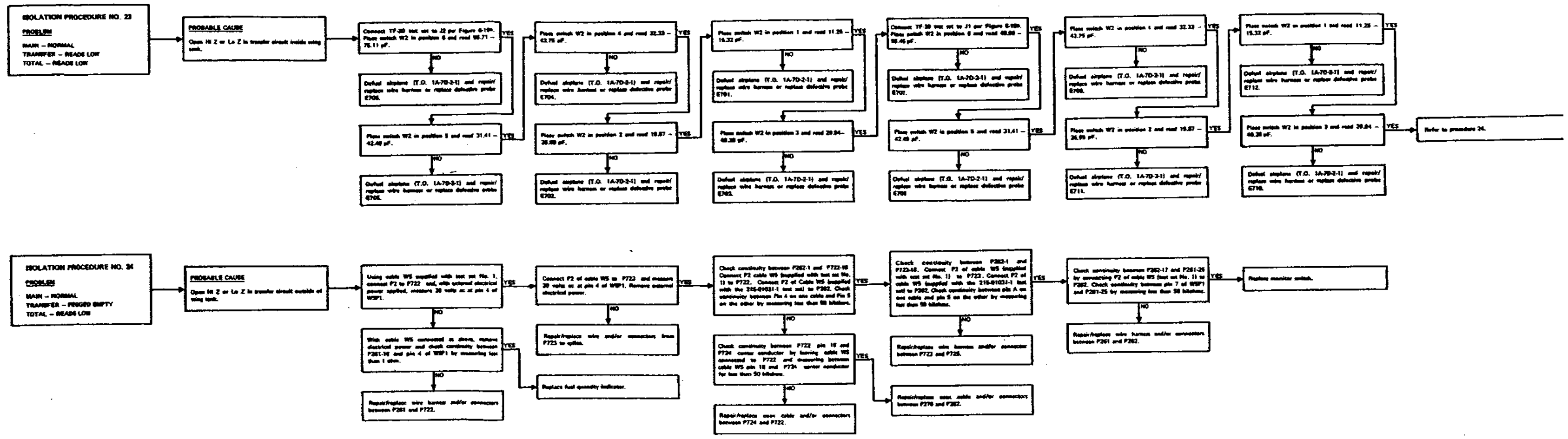


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 15)

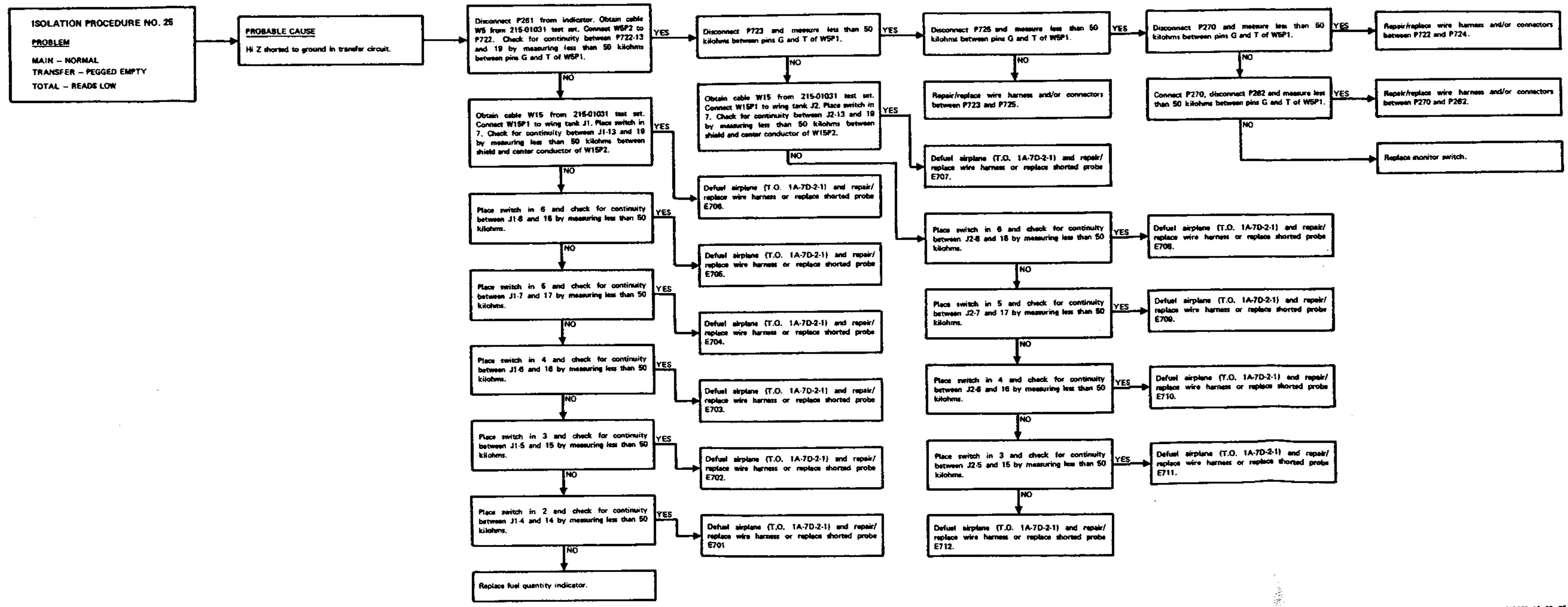


Figure FO-14. Troubleshooting, Fuel Quantity Indicating System (Sheet 16)

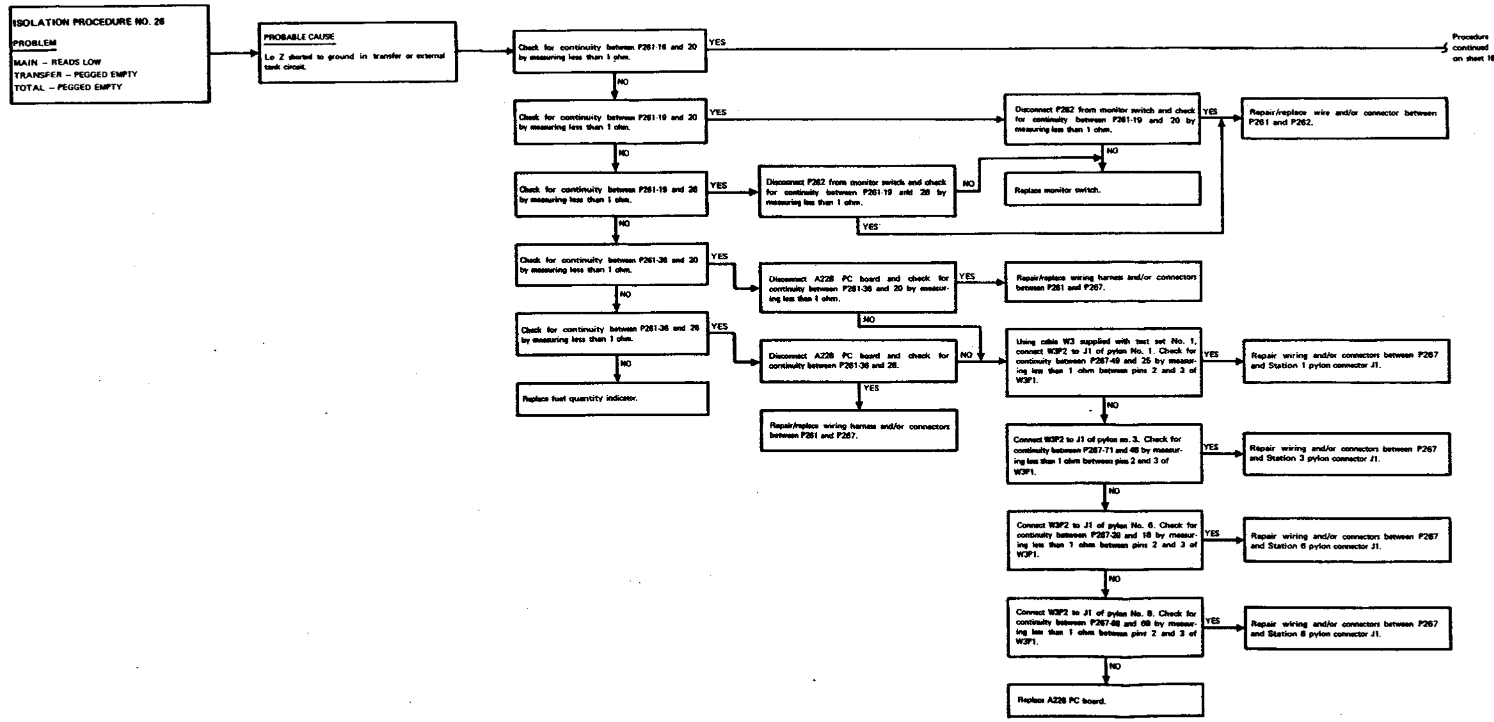


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 17)

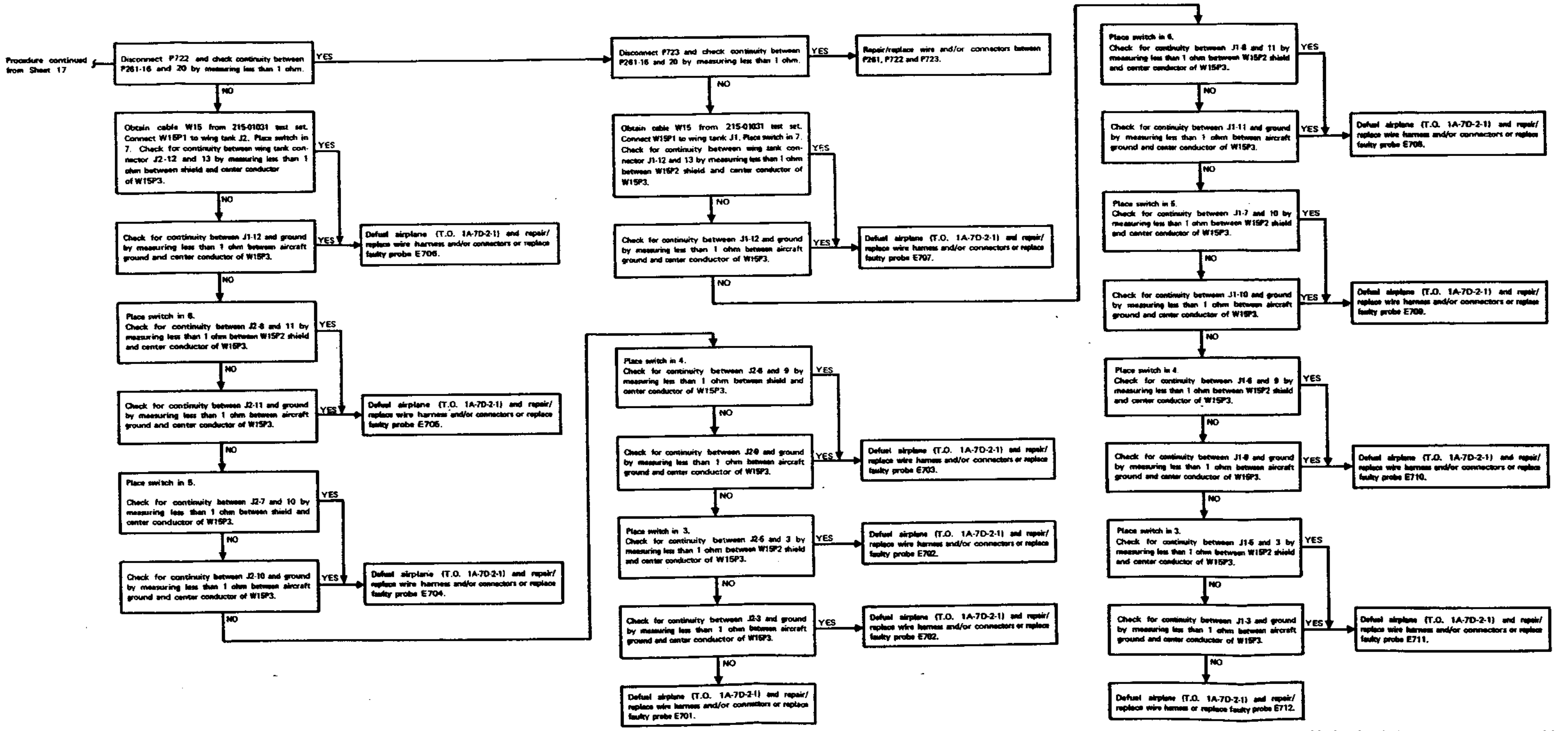


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 18)

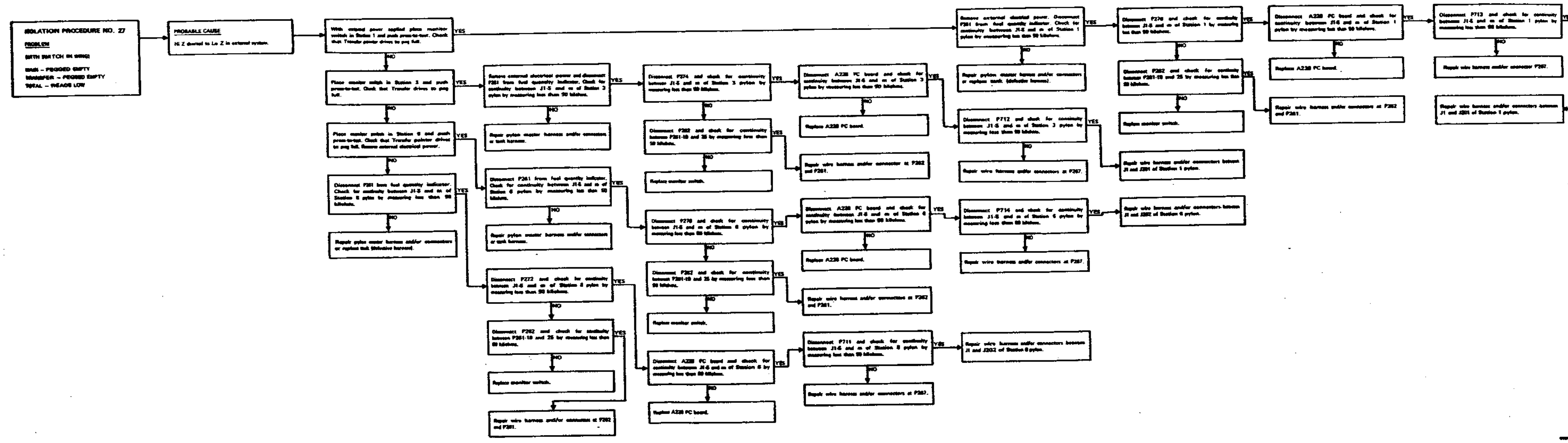
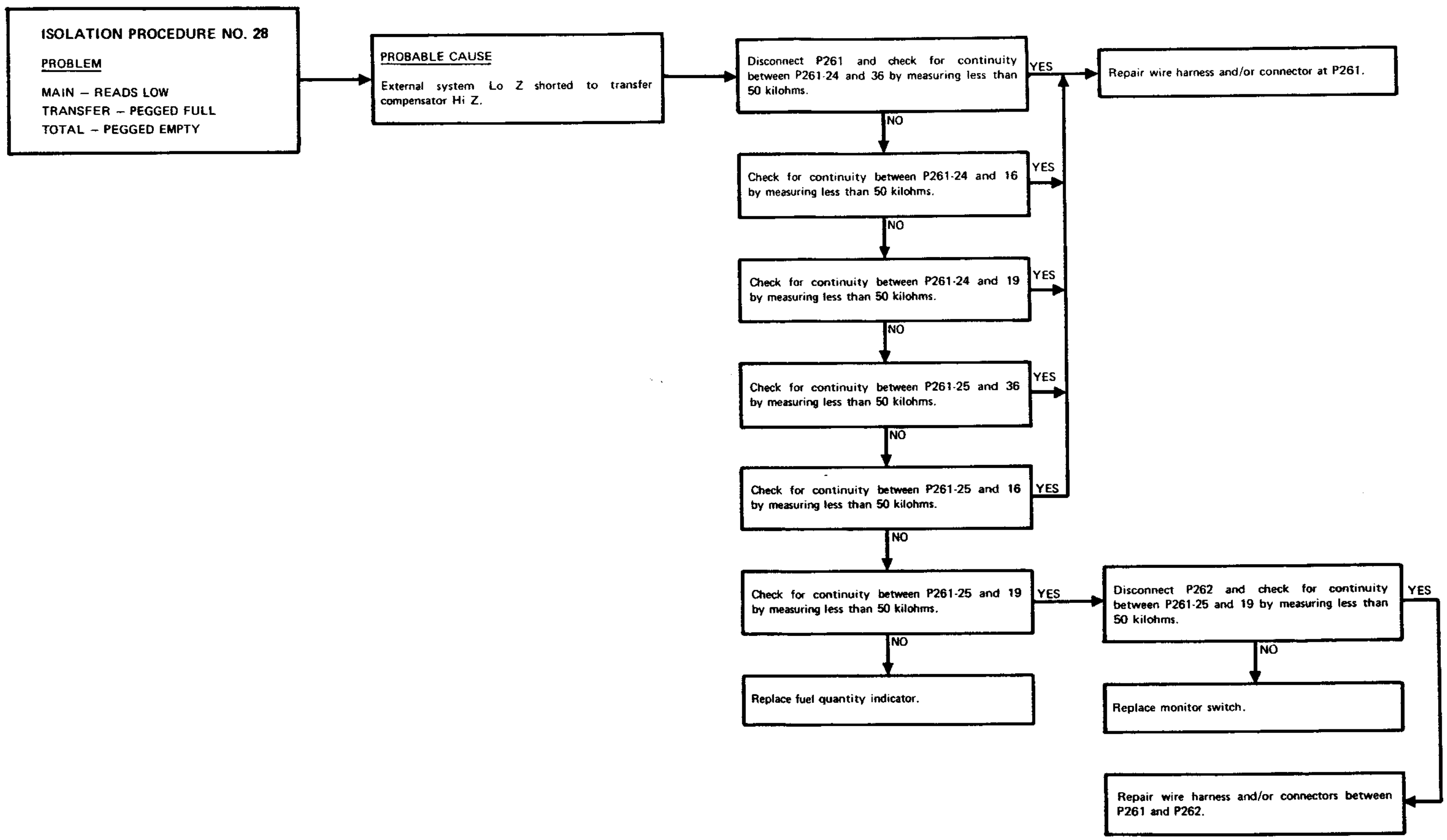
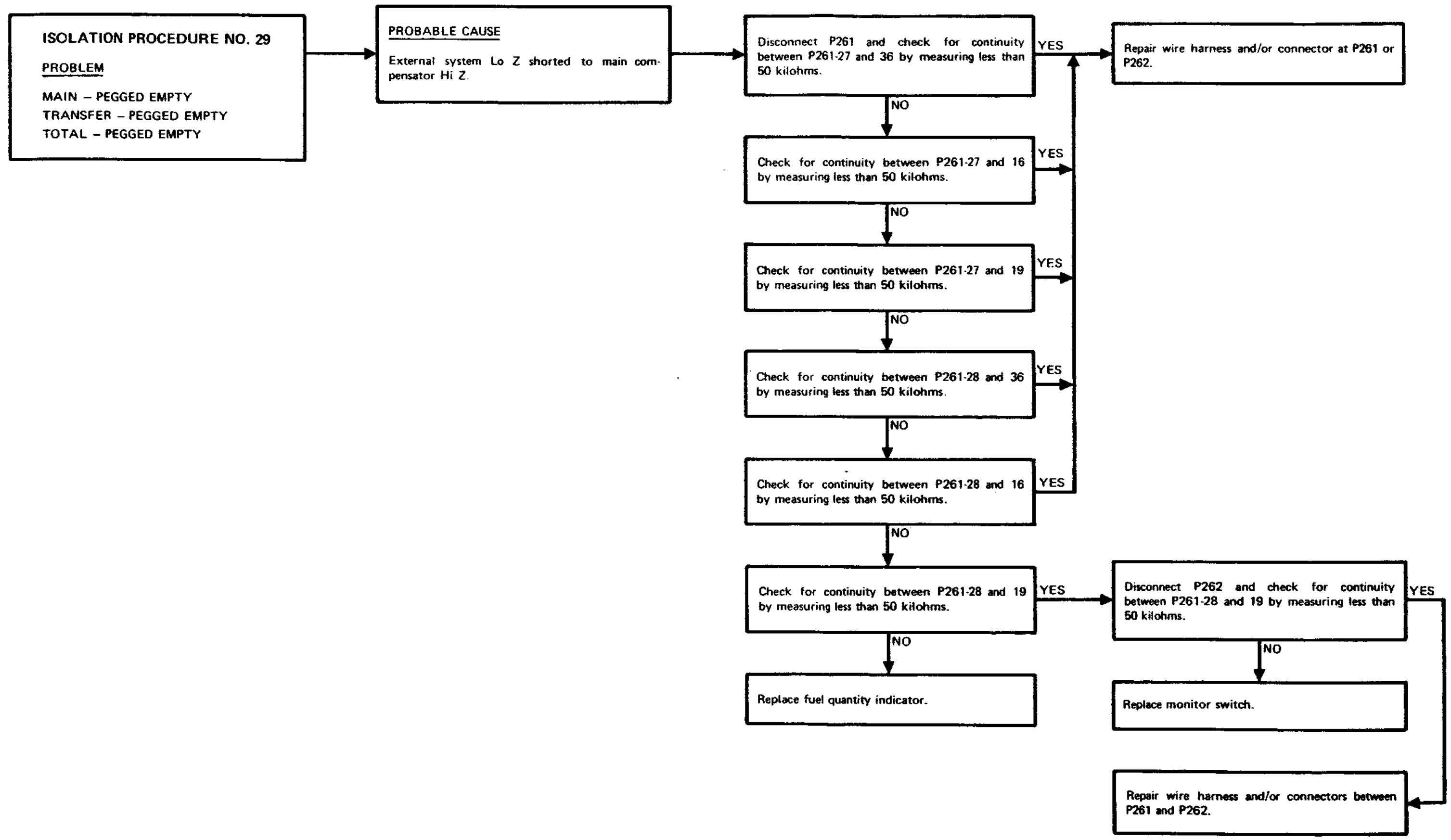


Figure FO-14. Troubleshooting: Fuel Quantity Indicating System (Sheet 19)



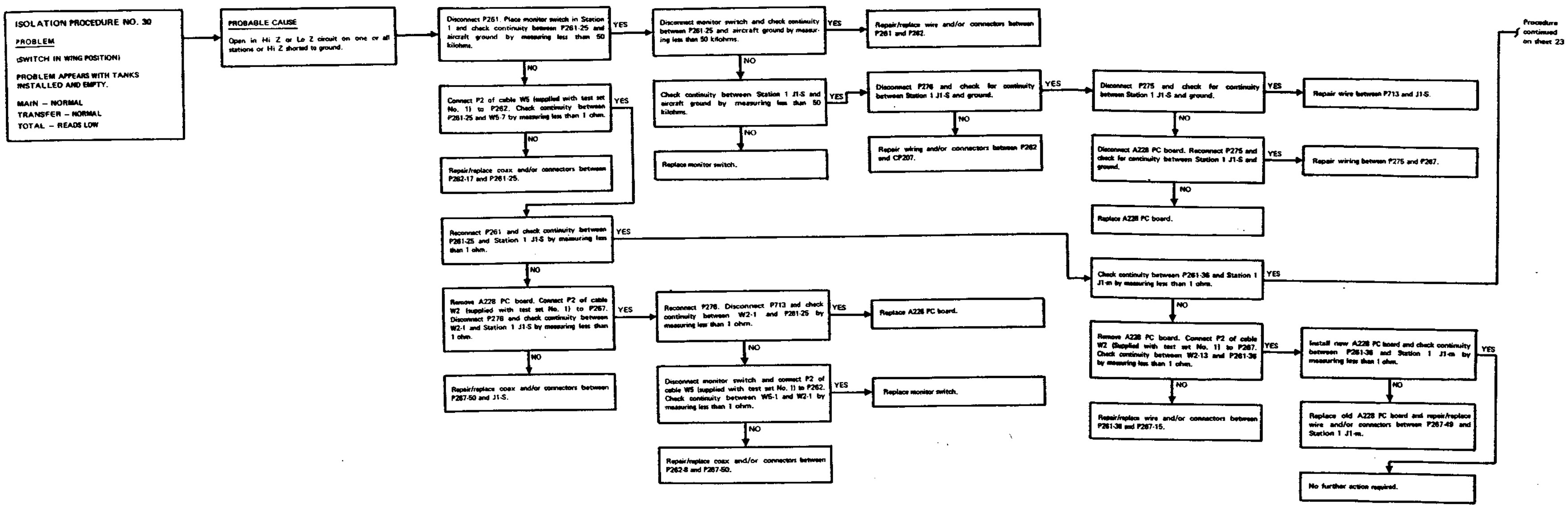
06D063–20–09–85

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 20)



06D063–21–09–85

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 21)



GP00063–72–09–88

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 22)

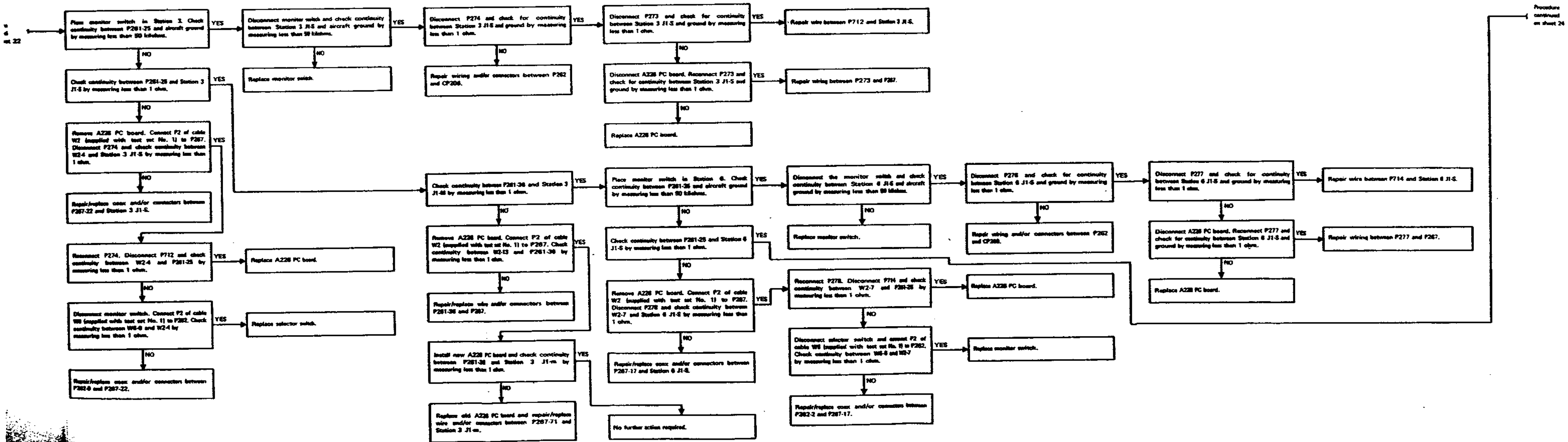


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 23)

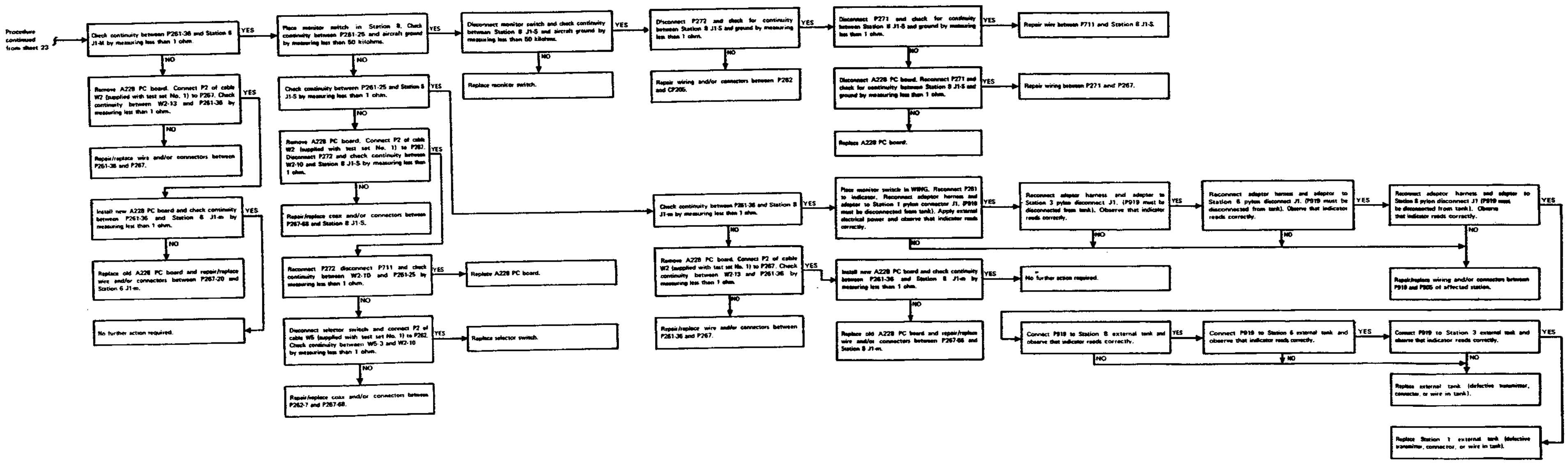
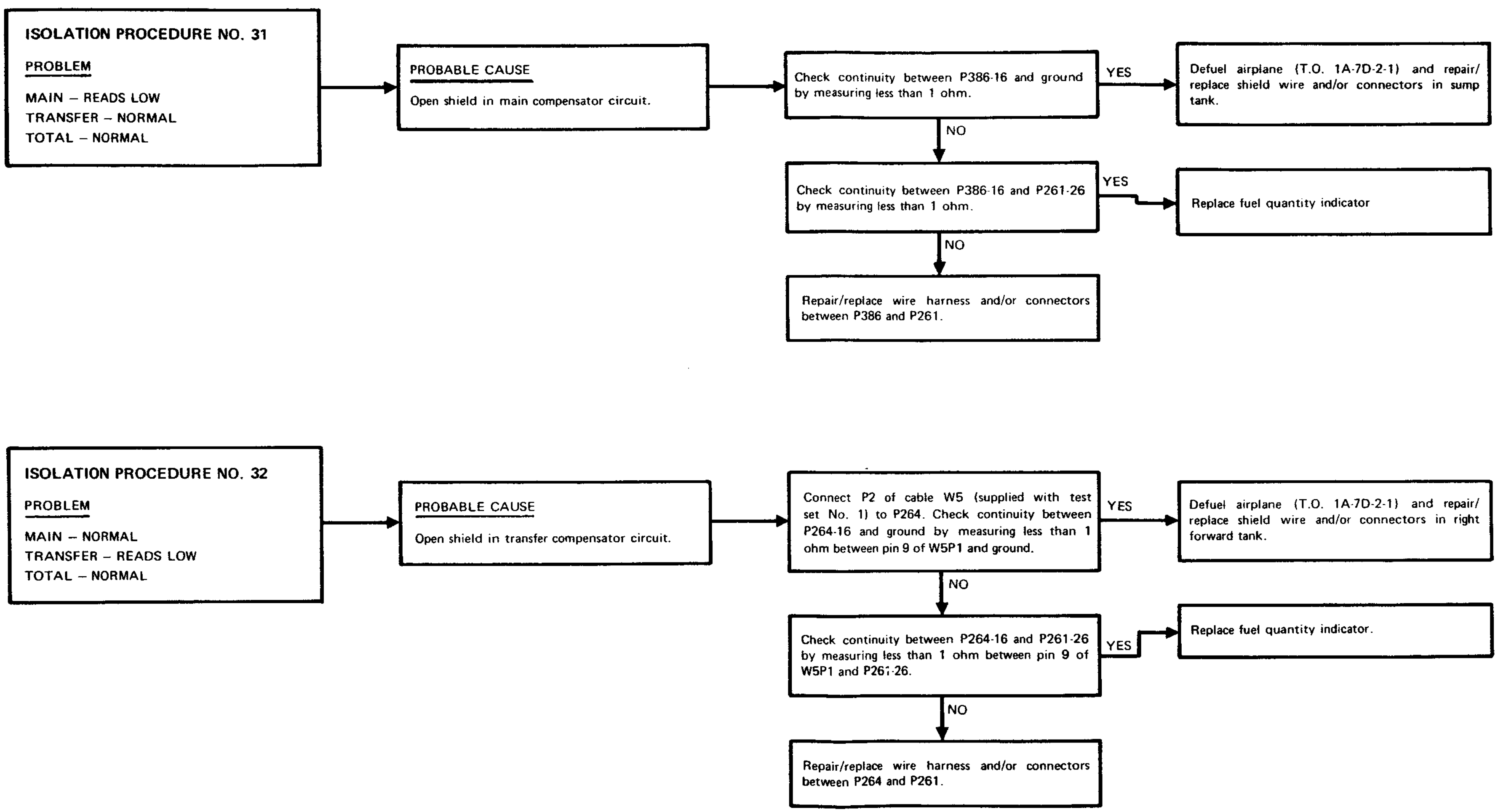
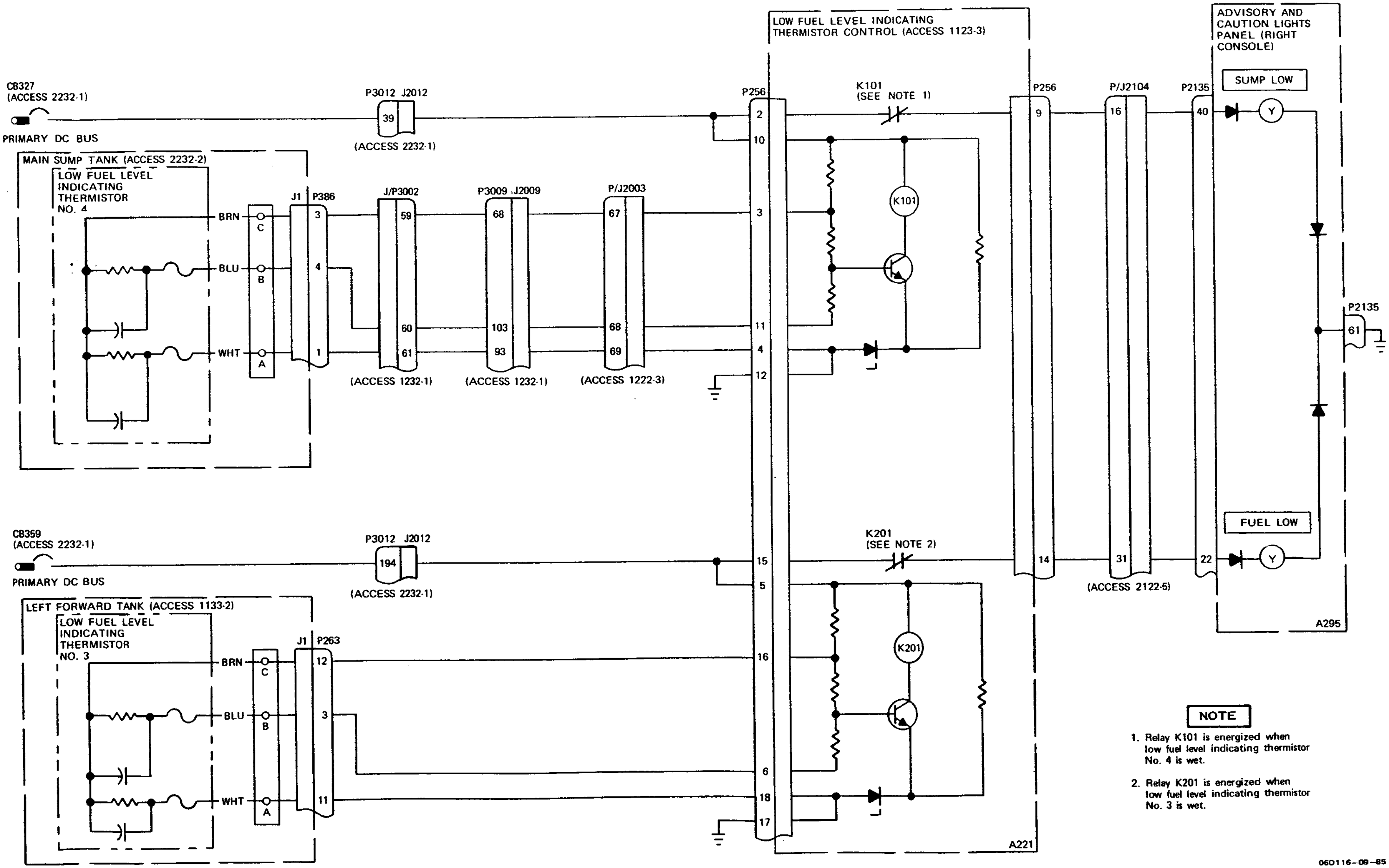


Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 24)



06D063–25–09–85

Figure FO-14. Troubleshooting; Fuel Quantity Indicating System (Sheet 25)



NOTE

1. Relay K101 is energized when low fuel level indicating thermistor No. 4 is wet.
2. Relay K201 is energized when low fuel level indicating thermistor No. 3 is wet.

Figure FO-15. Schematic Diagram; Low Level Fuel Warning System Electrical

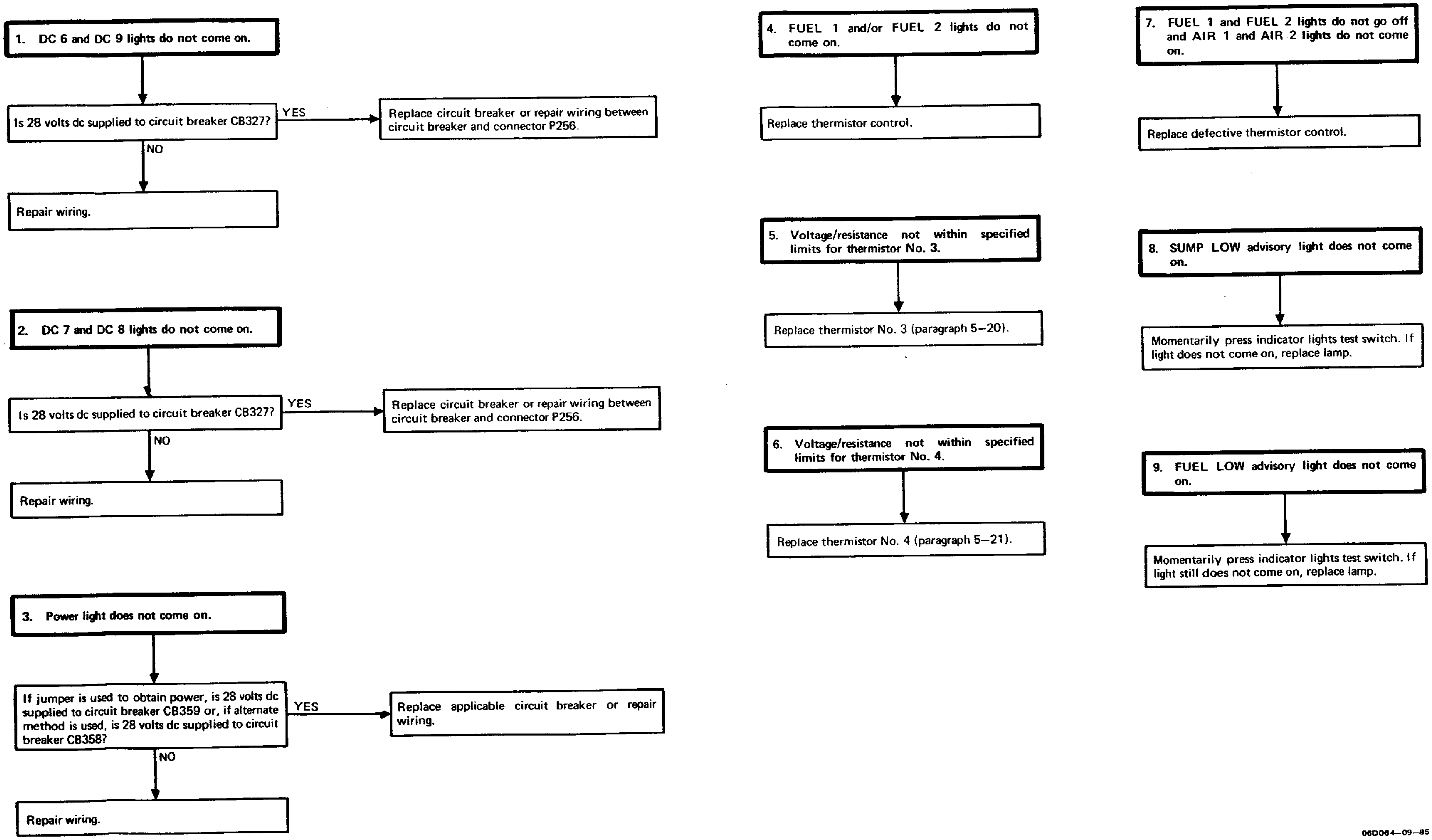
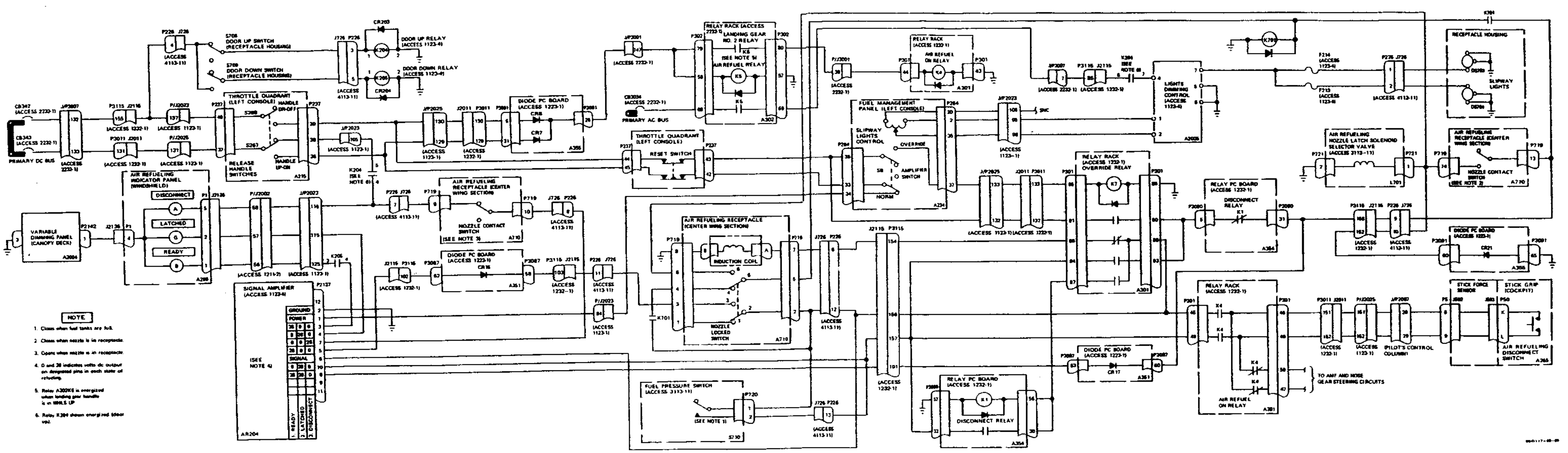


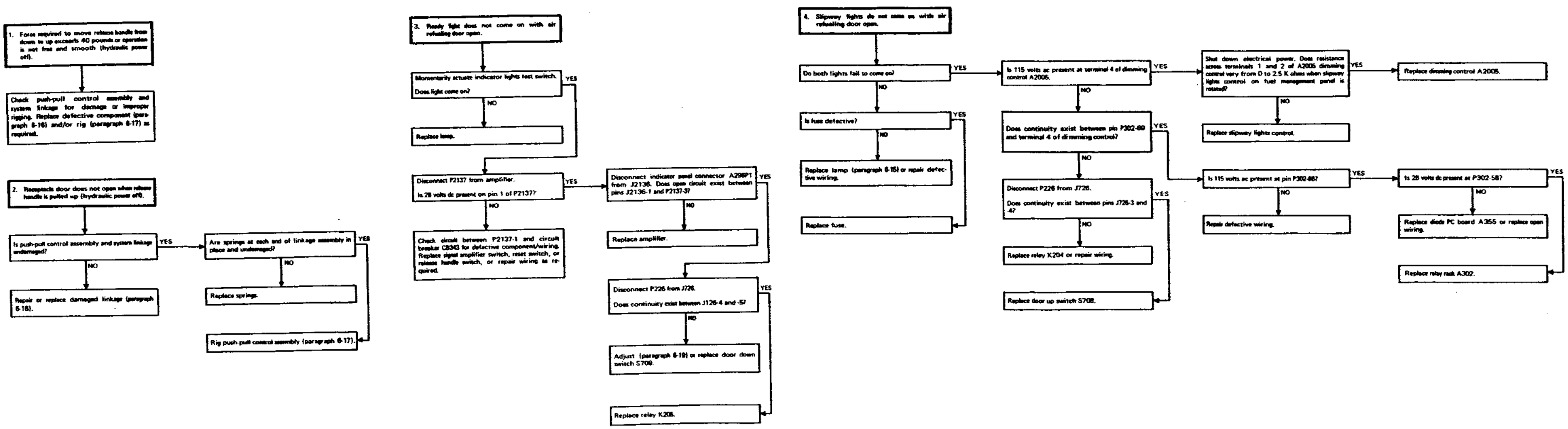
Figure FO-16. Troubleshooting; Low Level Fuel Warning System



NOTE

1. Closes when fuel tanks are full.
2. Closes when nozzle is in receptacle.
3. Opens when nozzle is in receptacle.
4. 0 and 28 indicates volts dc output on designated pins in each state of refueling.
5. Relay A302K6 is energized when landing gear handle is in WHLS UP
6. Relay K204 shown energized (door up).

Figure FO-17. Schematic Diagram; Air Refueling Receptacle System Electrical



06C065—01—10—86

Figure FO-18. Troubleshooting, Air Refueling Receptacle System (Sheet 1 of 4)

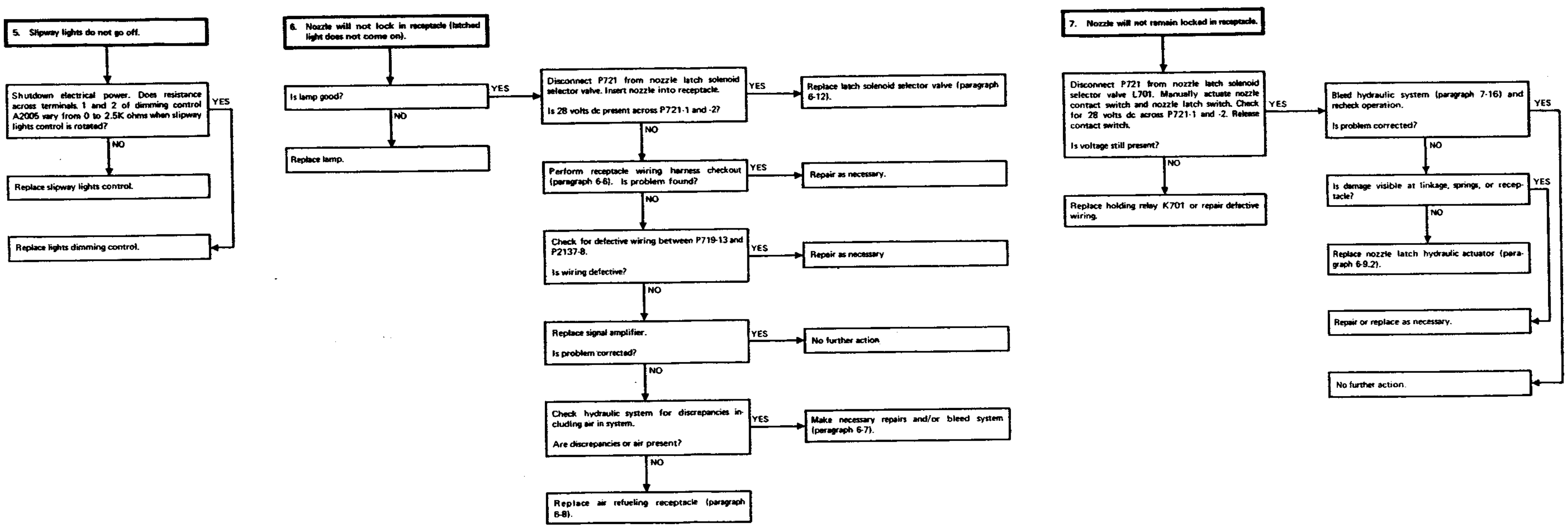


Figure FO-18. Troubleshooting; Air Refueling Receptacle System (Sheet 2)

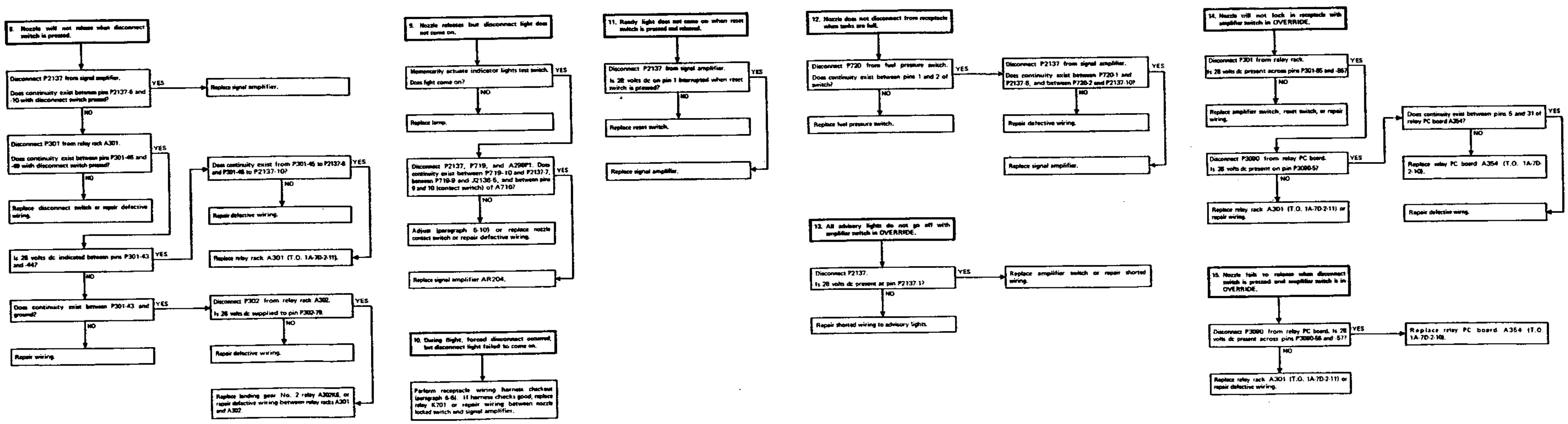
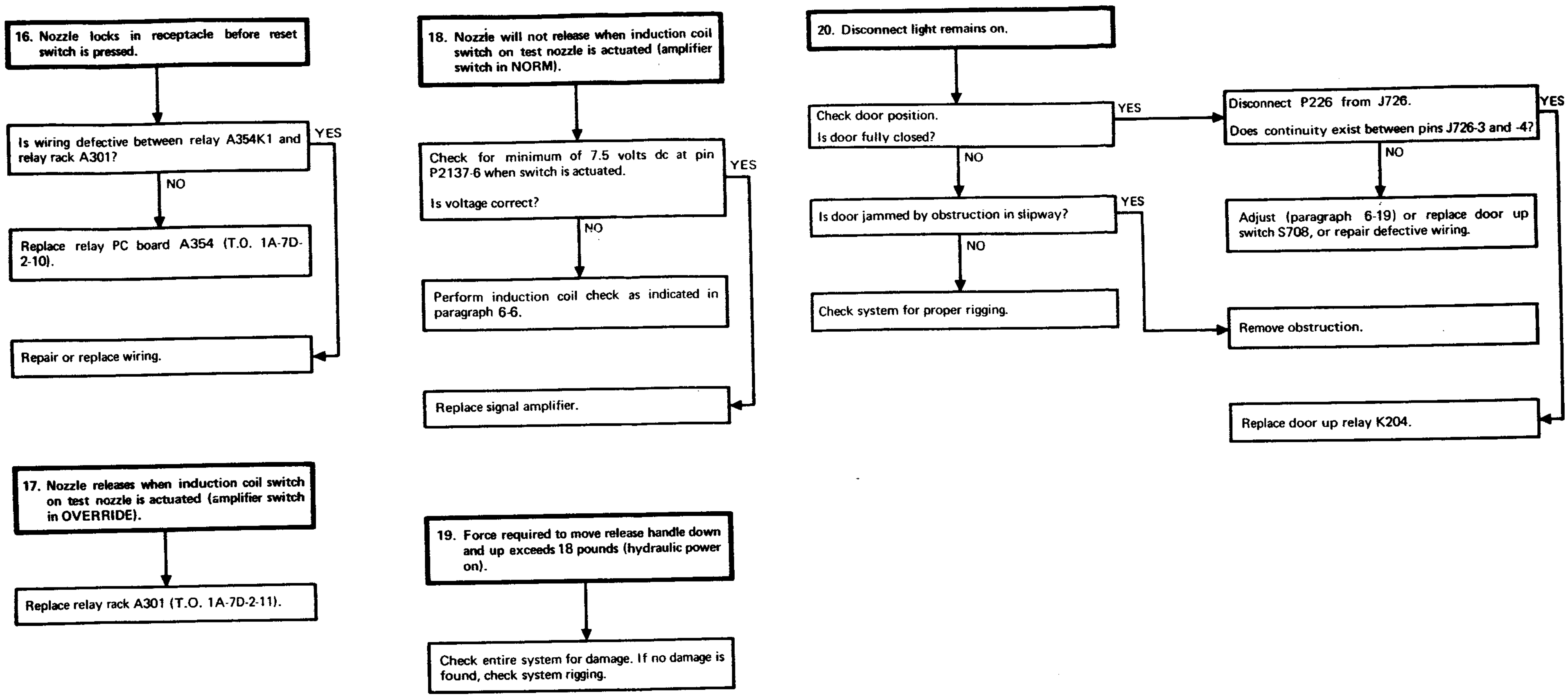


Figure FO-18. Troubleshooting; Air Refueling Receptacle System (Sheet 3)



06D065-04-09-85

Figure FO-18. Troubleshooting; Air Refueling Receptacle System (Sheet 4)

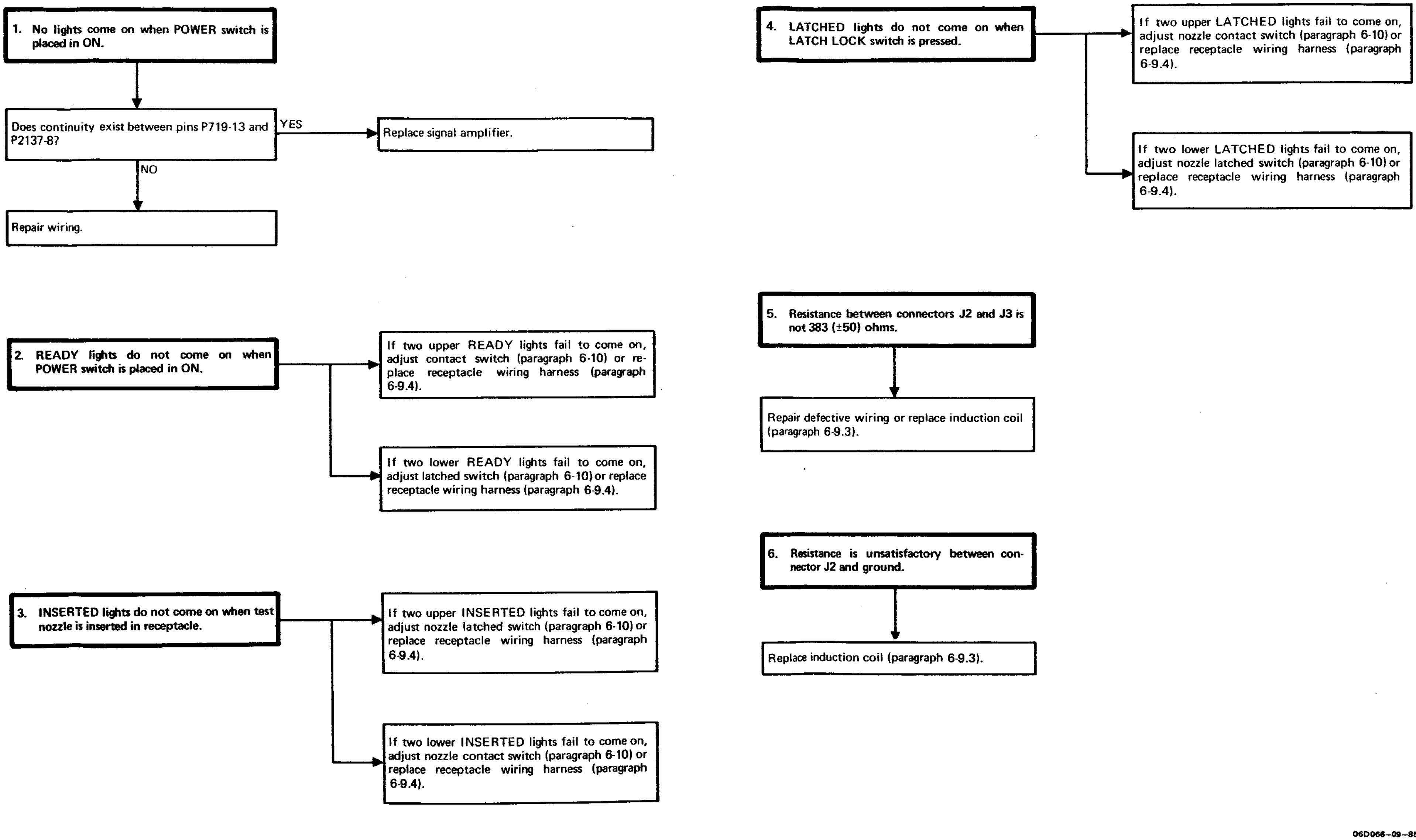


Figure FO-19. Troubleshooting; Receptacle Wiring Harness