NAVWEPS 01-40ALF-2

Handbook
Maintenance Instructions

NAVY MODELS

A-1H • A-1J
AIRCRAFT

SECTION IV
UTILITY SYSTEM

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SECTION IV

UTILITY SYSTEM

TABLE OF CONTENTS

TEXT

TABLES

4-1. UTILITY SYSTEMS.

4-2. DESCRIPTION. The airplane is equipped with controllable systems for heating and ventilating the cockpit, for defogging or defrosting the windshield, for supplying oxygen and anti-blackout pressure to the pilot, for ventilating pilots anti-exposure suit, and for degreasing the windshield.

4-3. Ducts are provided to supply cooling air to the generators, the voltage regulators, the magneto, and the hydraulic system reservoir. These cooling facilities are discussed in conjunction with the particular items for which they provide cooling.

4-3A. The Table of Contents on page 179 preceding this section should be consulted to determine where specific information can be found within the section. The Alphabetical Index at the end of the handbook should also be consulted for determining where specific information is contained within the handbook.

4-4. HEATING AND VENTILATING SYSTEMS.

4-5. DESCRIPTION. (See figure 4-1.) The heating and ventilating systems provide heat and ventilation for the cockpit, and heated air to defog or defrost the windshield. The heating and ventilating systems are controlled by two control handles mounted in the cockpit right-hand control panel. Airplanes reworked to A-1/ASC 719 incorporate a scarfed overboard duct to prevent a reverse flow of heat into the cockpit ventilation system.

4-6. TROUBLESHOOTING. Inadequate heating or ventilating may be caused either by breaks or by obstructions in the system ducts or heat exchangers, which should be carefully inspected and repaired if trouble occurs. If the supply of heated air is insufficient for heating the cockpit or defogging the windshield, the adjustment of the valves in the heating system riser duct should be checked. (See figure 4-2.) If cold air leaks into the cockpit, the adjustment of the ventilating system baffle should be checked. (See figure 4-2.)

4-7. HEATING SYSTEM.

4-8. DESCRIPTION. (See figure 4-1.) The heating system can be operated to heat the cockpit, to defog the windshield or to do both. The system includes the following principal components:

Control handle and linkage
Riser duct
Inlet wye-duct
Overboard duct
Heater muff assembly.

4-9. A take-off duct from the ventilating intake at the carburetor air scoop supplies air to the heater muff assembly, which is welded to, and is a component of, the exhaust manifold of engine cylinders No. 1 and No. 3. Heated air is conducted through flexible ducts aft to the inlet wye-duct bolted to the forward face of fuselage station 78 firewall. The riser duct, on the after face of fuselage station 78 firewall, contains air valves which are cable-controlled by the heating system control handle in the cockpit right-hand control panel to direct the heated air in the system to the overboard duct, to the cockpit and the windshield, or to the windshield only. The heating system units forward of fuselage station 78 firewall are accessible after removing the engine cowling and the engine accessory cowling; the heating system units aft of fuselage station 78 firewall are accessible through the forward equipment compartment and through the instrument access panels.

4-10. HEATING SYSTEM CONTROL HANDLE AND LINKAGE.

4-11. DESCRIPTION. (See figure 4-2.) The heating system control handle is mounted in the cockpit right-hand control panel, just outboard of the ventilating system control handle. The heating system control handle is connected by a control rod to a crank at fuselage station 110. Control cables extend forward, over pulleys, from the crank at fuselage station 110 to a crank mounted on the riser duct at fuselage station 78. The crank at fuselage station 78 is linked to the valve crank assembly, which is connected by control rods to the valves in the riser duct. The heating system control handle can be placed in any one of three positions to control the valves in the riser duct. The handle is adjustable for intermediate control positions by a friction adjustment. (See figure 4-2.) When the handle is placed in OFF, all of the heated air in the system is directed from the inlet wye-duct into the overboard duct and is vented to the atmosphere. When the handle is placed in WINDSHIELD AND CABIN, the heated air is directed both to the windshield and to the cockpit. When the handle is placed in ALL TO WINDSHIELD, all the heated air is directed through the windshield defrost manifold to the windshield.

4-12. REMOVAL. (See figure 4-2.)

a. In cockpit, disconnect heating system control cables from crank on riser duct at fuselage station 78.

b. Disconnect control cables from crank at fuselage station 110, and remove cables.

c. Disconnect outboard control rod from crank at fuselage station 110 and from control handle (HEAT) at after end of control rod.

d. Remove attaching bolt from crank at fuselage station 110, and remove outboard crank.

e. Remove two sets of pulleys at fuselage station 78 and single pulley at fuselage station 96.

f. Remove attaching bolt from heating system control handle (HEAT), and remove handle.

4-13. INSTALLATION. (See figure 4-2.)

a. In cockpit, position and install outboard crank on crank assembly at fuselage station 110.

b. Install two sets of pulleys at fuselage station 78 and single pulley at fuselage station 96.

c. Insert heating system control handle in cockpit right-hand control panel and install handle attaching bolt.

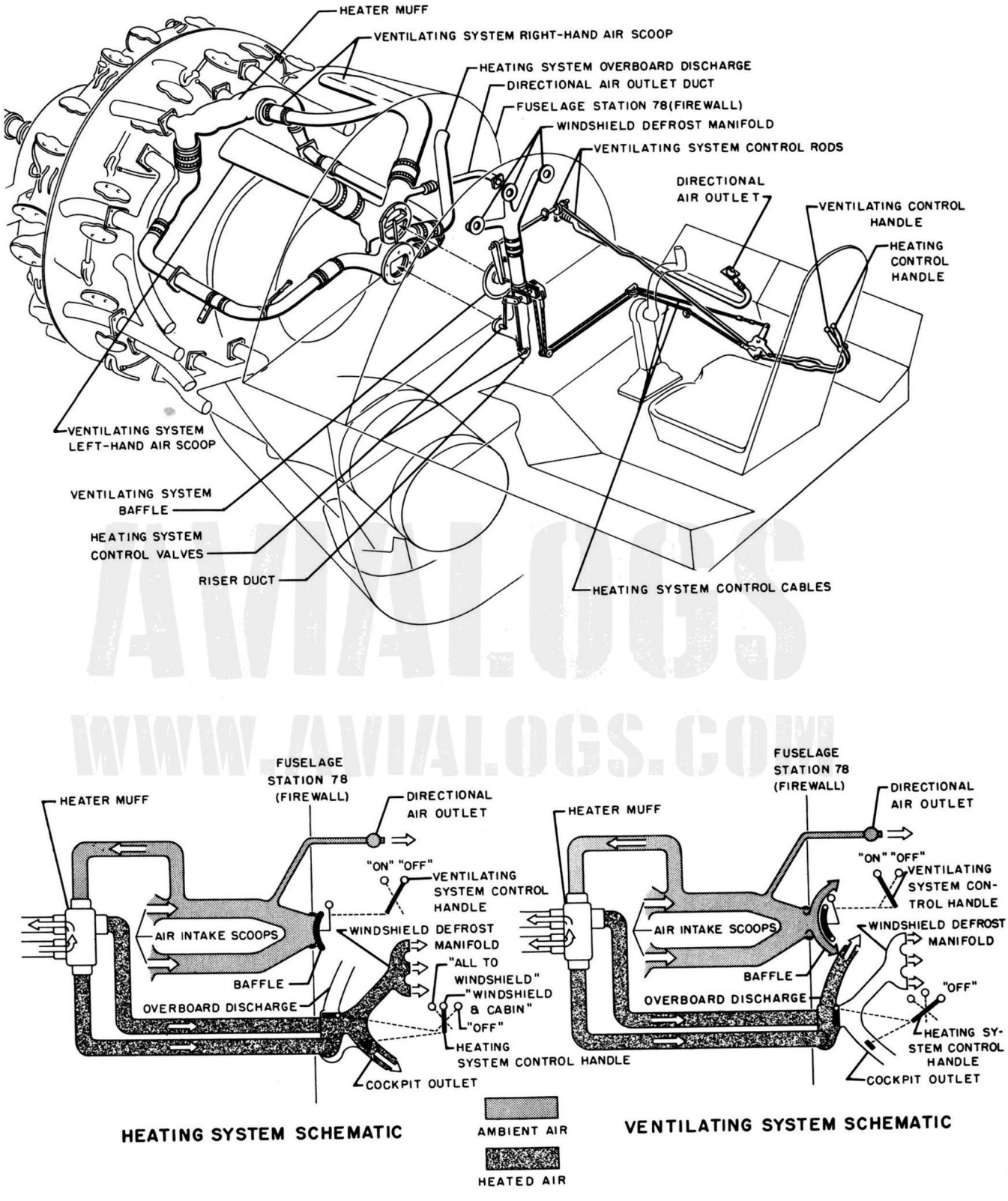


Figure 4–1. Heating and Ventilating Systems (Sheet 1)

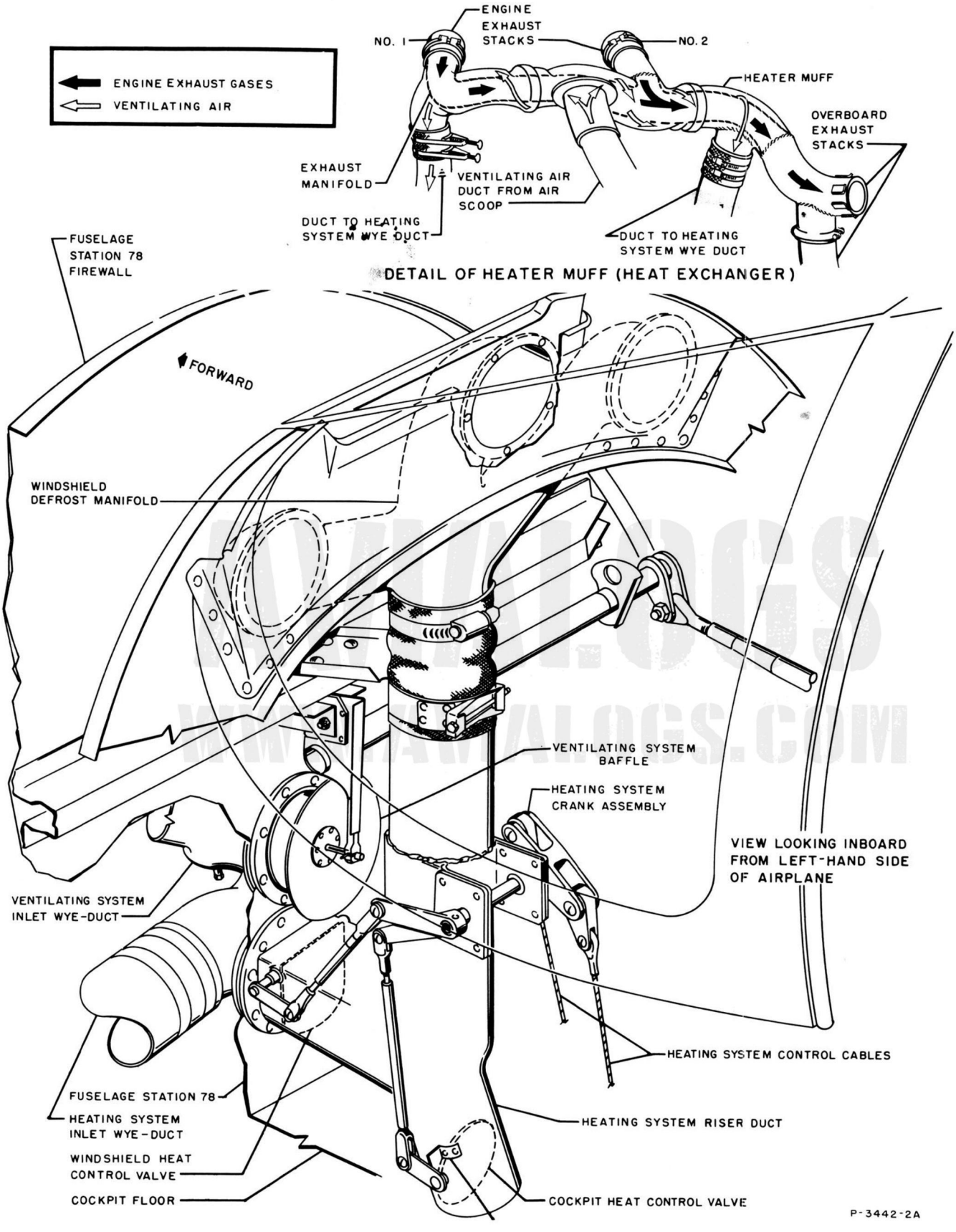


Figure 4–1. Heating and Ventilating Systems (Sheet 2)

d. Connect control cables to crank at fuselage station 110; guide cables over pulleys and connect cables to crank at fuselage station 78.

e. Place control handle in "OFF" and adjust control cables as shown on figure 4–2.

f. When control cables have been properly adjusted, connect control rod to control handle and to crank at fuselage station 110.

4–14. ADJUSTMENT. See figure 4–2.

4–15. HEATING SYSTEM RISER DUCT AND AIR CONTROL VALVES.

4–16. DESCRIPTION. (See figure 4–1.) The riser duct, mounted on the after face of fuselage station 78 firewall, contains two air control valves which are cable-operated from the heating system control handle on the cockpit right-hand control panel. The cockpit heat control valve is installed in the lower extension of the riser duct. The windshield heat control valve extends from the riser duct through fuselage station 78 firewall into the heating system inlet wye-duct. According to the position of the heating system control handle, the air control valves direct the heated air in the system to the overboard duct ("OFF"), to both the cockpit and the windshield ("WINDSHIELD AND CABIN"), or to the windshield only ("ALL TO WINDSHIELD"). The upper end of the riser duct is connected to the windshield defrost manifold.

4–17. REMOVAL. (See figure 4–1.)

a. Inside cockpit, disconnect heating system control cables from crank on riser duct at fuselage station 78.

b. Remove screws attaching riser duct to fuselage station 78 firewall.

c. Loosen clamps connecting riser duct to windshield defrost manifold, and remove riser duct.

4–18. INSTALLATION. (See figure 4–1.)

a. Position riser duct to fuselage station 78 firewall and clamp riser duct to windshield defrost manifold.

b. Install screws attaching riser duct to fuselage station 78 firewall.

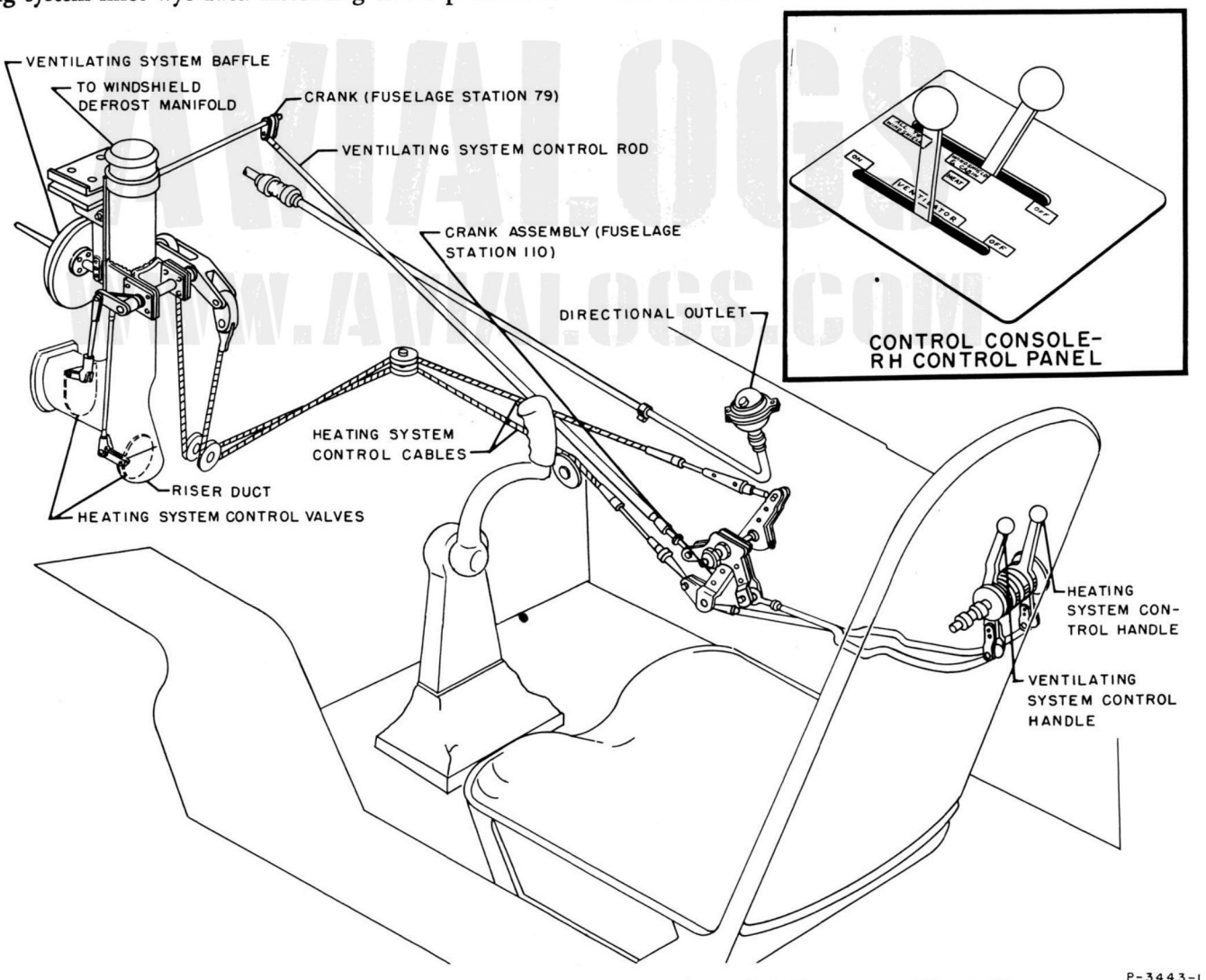
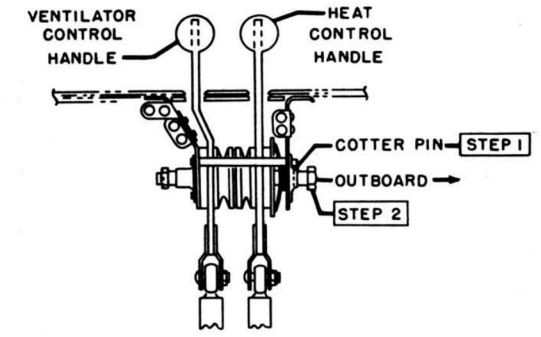
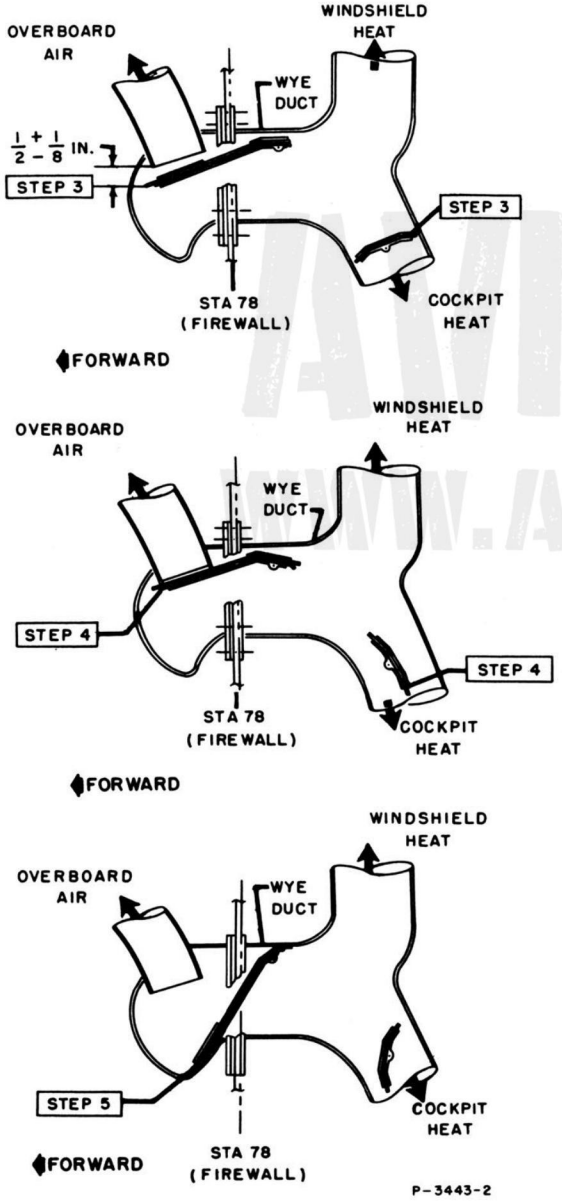


Figure 4–2. Heating and Ventilating Controls and Adjustments (Sheet 1)



VIEW LOOKING FORWARD



ADJUSTMENT

STEP 1

Remove cotter pin from outboard side of control handle pivot shaft.

STEP 2

Tighten or loosen pivot shaft until handle load is between 10 and 15 pounds. Check load by applying spring scale near top of control handle in fore-and-aft direction to just move either control. Re-install cotter pin.

STEP 3

Place heating system control handle in "ALL TO WINDSHIELD." Rig control cables so that valve forward of firewall in wye-duct is ½ ± ⅛ inch open to overboard air duct and valve in cockpit outlet duct is fully closed.

STEP 4

Place heating system control handle in "WINDSHIELD AND CABIN." Rig control cables so that valve forward of firewall in wye-duct is fully open to cockpit (fully closed to overboard air duct) and valve in cockpit outlet duct is fully open.

STEP 5

Place heating system control handle in "OFF." Rig control cables so that valve forward of firewall in wye-duct is fully closed. (Position of valve in cockpit outlet duct is optional.)

STEP 6

Rig control cables to correct tension. (Refer to section II of this manual.)

STEP 7

Rig ventilating system controls so that baffle is fully open (1¼ ± ⅛ inch aft of firewall) when ventilating system control handle is in "ON," and so that baffle is fully closed (against rubber seal) when control handle is in "OFF."

Figure 4–2. Heating and Ventilating Controls and Adjustments (Sheet 2)

c. Connect heating system control cables to crank on riser duct and adjust controls.

4–19. ADJUSTMENT. See figure 4–2.

4–20. HEATING SYSTEM INLET WYE-DUCT.

4–21. DESCRIPTION. (See figure 4–1.) The inlet wye-duct is bolted to the forward face of fuselage station 78 firewall. The duct has two air intakes and two air outlets. The intakes are connected to the flexible ducts from the heating system heater muff assembly. One outlet is connected to the heating system overboard duct, and the other outlet is connected, at the firewall, to the heating system riser duct. The windshield heat control valve, installed in the heating system riser duct, extends through the firewall into the inlet wye-duct. The valve is operated by the heating system control handle either to direct all heated air in the wye-duct to the overboard duct (when the control handle is in "OFF" and the valve is closed) or to direct heated air into the riser duct and to the cockpit and/or the windshield (when the control handle is in "WINDSHIELD AND CABIN" or in "ALL TO WINDSHIELD," and the valve is open).

4–22. REMOVAL. (See figure 4–1.)

a. Remove engine accessory cowling.

b. At two intakes on inlet wye-duct, disconnect flexible ducts from heater muff assembly.

c. Disconnect overboard duct from inlet wye-duct.

d. Remove screws attaching inlet wye-duct to firewall.

4–23. INSTALLATION. (See figure 4–1.)

a. Position inlet wye-duct to fuselage station 78 firewall and install attaching screws.

b. Connect overboard duct to inlet wye-duct.

c. Connect flexible ducts from heater muff assembly to intake ducts on inlet wye-duct.

d. Install engine accessory cowling.

4–24. HEATING SYSTEM HEATER MUFF ASSEMBLY.

4–25. DESCRIPTION. (See figure 4–1.) The heater muff assembly is welded to, and is a component of, the exhaust manifold of engine cylinders No. 1 and No. 3. The muff consists of an airtight manifold cover assembly with one air intake duct and two heated air outlet ducts. A flexible duct connected to the ventilating system right-hand air scoop directs ambient air into the heater muff assembly. The air is heated by the exhaust manifold and directed through two flexible ducts, connected to the muff heated-air outlet ducts, to the heating system inlet wye-duct at fuselage station 78 firewall.

Note

The heater muff should be inspected after 300 hours and replaced after 500 hours of operation.

4–26. REMOVAL. (See figure 4–1.)

a. Remove engine cowling.

b. Remove clamps at heater muff assembly outlet ducts and disconnect flexible ducts from heater muff assembly.

c. Remove clamp at heater muff assembly inlet duct and disconnect flexible duct from heater muff assembly.

d. Remove clamps which attach No. 1 and No. 3 cylinder exhaust manifold to cylinder exhaust extensions, and remove heater muff and exhaust manifold assembly.

4–27. INSTALLATION. (See figure 4–1.)

a. Place heater muff and exhaust manifold assembly in position and install clamps which attach exhaust manifold to No. 1 and No. 3 cylinder exhaust extensions.

b. Place flexible air intake duct in position on heater muff assembly inlet duct and install attaching clamp.

c. Place two flexible ducts in position on heater muff assembly outlet ducts and install attaching clamps.

4–28. VENTILATING SYSTEM.

4–29. DESCRIPTION. (See figure 4–1.) The ventilating system includes the following principal components:

Name	*Para Ref*
Control handle and linkage	4–31
Baffle	4–36
Inlet wye-duct	4–40
Air scoops	4–44
Directional air outlet	4–46

4–30. Air from the carburetor air induction scoop enters the ventilating system air scoops and is directed aft through the ventilating system inlet wye-duct, mounted directly above the heating system inlet wye-duct at fuselage station 78 firewall, and then enters the cockpit. The ventilating system is controlled from the ventilating system control handle, which controls the position of a baffle on the after side of fuselage station 78 firewall at the ventilating system inlet wye-duct, and from a ball-and-socket type directional air outlet. A drain from a collector chamber at the bottom of the ventilating system inlet wye-duct carries off moisture which accumulates in the ventilating system.

4–31. VENTILATING SYSTEM CONTROL HANDLE AND LINKAGE.

4–32. DESCRIPTION. The ventilating system is controlled by a handle mounted just inboard of the heating system control handle on the cockpit right-hand control panel. The ventilating system control handle is adjustable for any intermediate control position by a friction adjustment. (See figure 4–2.) The control handle is connected by a control rod to a crank at fuselage station 110. A push rod connects the crank at fuselage station 110 to a crank assembly at fuselage station 79. The crank at fuselage station 79 operates a baffle to open or close the cockpit outlet of the ventilating system inlet wye-duct. The control handle has two positions, "ON" and "OFF." When the control handle is in "OFF," the baf-

fle closes the cockpit outlet of the ventilating system inlet wye-duct so that no air from the ventilating system can enter the cockpit at the baffle. When the control handle is in "ON," the baffle is in its maximum open position to admit ventilating system air through the cockpit outlet of the ventilating system inlet wye-duct. Varying degrees of general ventilation of the cockpit can be obtained by placing the control handle in any position between "ON" and "OFF."

4–33. REMOVAL. (See figure 4–2.)

a. In cockpit, disconnect control rod from crank at fuselage station 110 and from crank at fuselage station 79.

b. Through instrument panel right-hand access, remove bolt attaching crank at fuselage station 79 to outboard supporting bracket.

c. In cockpit, remove screws attaching crank at fuselage station 79 to supporting bracket above baffle, and remove crank.

d. Disconnect inboard control rod from crank at fuselage station 110 and from ventilating system control handle (VENTILATOR).

e. Remove attaching bolt from crank assembly at fuselage station 110, and remove inboard crank.

f. Remove attaching bolt from ventilating system control handle and remove handle.

4–34. INSTALLATION. (See figure 4–2.)

a. Insert ventilating system control handle in cockpit right-hand control panel and install handle attaching bolt.

b. Position and install inboard crank on crank assembly at fuselage station 110.

c. Connect control rod to crank at fuselage station 110 and to ventilating system control handle.

d. Position crank at fuselage station 79 to supporting bracket above baffle and install crank attaching screws.

e. Through instrument panel right-hand access, install bolt attaching crank at fuselage station 79 to outboard supporting bracket.

f. In cockpit, connect push rod to crank at fuselage station 110 and to crank at fuselage station 79.

4–35. ADJUSTMENT. See figure 4–2.

4–36. VENTILATING SYSTEM BAFFLE.

4–37. DESCRIPTION. (See figure 4–1.) The ventilating system baffle, mounted just aft of fuselage station 78 firewall, is provided to regulate the amount of ventilating air supplied to the cockpit through the cockpit outlet of the ventilating system inlet wye-duct. The baffle is operated through a crank-and-control-rod system from the ventilating system control handle (VENTILATOR) in the cockpit right-hand control panel. When the control handle is in "OFF," the baffle is positioned against the rubber seal of the ventilating system wye-duct cockpit outlet, and no air can enter the cockpit at the cockpit outlet. When the control handle is in "ON," the baffle is positioned at its maximum distance ($1\frac{1}{4} \pm \frac{1}{8}$ inch aft of the firewall) from the wye-duct cockpit outlet. When the control handle is placed in any position between "ON" and "OFF," the baffle is positioned accordingly in relation to the wye-duct cockpit outlet, so that varying degrees of cockpit ventilation can be obtained.

4–38. REMOVAL. (See figure 4–1.) The baffle can be removed by removing the retaining pin in the baffle guide at fuselage station 79 in the cockpit.

4–39. INSTALLATION. (See figure 4–1.) The baffle can be installed by placing the baffle in position at fuselage station 79 in the cockpit and installing the retaining pin in the baffle guide.

4–40. VENTILATING SYSTEM INLET WYE-DUCT.

4–41. DESCRIPTION. (See figure 4–1.) The ventilating system inlet wye-duct is mounted on the forward face of fuselage station 78 firewall, directly above the heating system inlet wye-duct. The ventilating system wye-duct has two air intakes and two air outlets. The intakes are connected to the ventilating system air scoops. One of the two outlets extends through fuselage station 78 firewall and is the cockpit outlet of the wye-duct. The other outlet is connected to the directional air outlet duct.

4–42. REMOVAL. (See figure 4–1.)

a. Remove engine accessory cowling.

b. Disconnect ventilating air scoop ducts from inlet wye-duct.

c. Disconnect directional air outlet duct from wye-duct.

d. Remove screws attaching wye-duct to firewall, and remove wye-duct.

4–43. INSTALLATION. (See figure 4–1.)

a. Position inlet wye-duct to fuselage station 78 firewall and install attaching screws.

b. Connect ventilating air scoop ducts to wye-duct intakes.

c. Connect directional air outlet duct to wye-duct.

d. Install engine accessory cowling.

4–44. VENTILATING SYSTEM AIR SCOOPS.

4–45. DESCRIPTION. (See figure 4–1.) The air scoops are mounted one on each side of the carburetor air scoop ventilating air intake and are integral to the carburetor air induction scoop. Air entering the ventilating system air scoops is directed aft through flexible ducts to the ventilating system inlet wye-duct. An outlet in the ventilating system right-hand air scoop supplies air to the heater muff assembly of the heating system.

4–46. VENTILATING SYSTEM DIRECTIONAL AIR OUTLET.

4–47. DESCRIPTION. (See figure 4–2.) The directional air outlet, mounted on the cockpit right-hand control panel, consists of an adjustable ball-and-socket type outlet which is connected by air ducts to the ventilating system inlet wye-duct. The directional air outlet can be

closed to prevent the admission of ventilating air to the cockpit at the outlet, or can be adjusted to concentrate ventilating air on any selected area in the cockpit.

4-48. REMOVAL. (See figure 4-2.)

a. In engine accessory section, disconnect elbow extension of directional air outlet from ventilating system inlet wye-duct and from fuselage station 78 firewall.

b. In cockpit disconnect aft extension of directional air outlet duct from firewall and from directional air outlet on right-hand control panel.

c. Remove screws attaching upper and lower cups of directional air outlet to control panel.

4-49. INSTALLATION. (See figure 4-2.)

a. In cockpit, position upper and lower cups of directional air outlet on right-hand control panel, and install outlet attaching screws.

b. Connect aft extension of directional air outlet duct to directional air outlet and to fuselage station 78 firewall.

c. In engine accessory section, connect elbow extension of directional air outlet duct to firewall at fuselage station 78 and to ventilating system inlet wye-duct.

4-49A. ANTIEXPOSURE SUIT VENTILATION SYSTEM.

4-49B. DESCRIPTION. (See figure 4-2A.) The antiexposure suit ventilation system consists of a blower, connecting hose assembly, and a control switch for the purpose of circulating air thru the MARK V antiexposure suit.

4-49C. The blower assembly, located on the bulkhead station 134 behind the pilots seat, draws conditioned air from the cockpit and delivers the air thru the hose assembly to the antiexposure suit. A butterfly valve in the hose controls air flow. The hose assembly has a male quick disconnect for connection with the antiexposure suit. The blower is operated from the SUIT BLOWER switch panel on the right-hand control console adjacent to the C-1272/APA-89 control panel.

4-49D. TROUBLESHOOTING. Insufficient air delivery will likely be caused by an obstruction over the blower intake or within the hose. Check operation of the butterfly valve in the hose and repair or replace if defective. Check hose clamps for air leakage and tighten as required.

4-49E. REMOVAL.

a. Disconnect electrical cable at the blower motor.

b. Remove bolts attaching blower assembly to bracket.

4-49F. INSTALLATION.

a. Position blower on bracket and install attaching bolts. Secure the ground wire under the inboard mounting bolt.

b. Loosen clamp and rotate blower outlet to desired position. Tighten clamp.

c. Connect electrical cable to blower motor.

4-50. OXYGEN SYSTEM.

4-51. DESCRIPTION. (See figure 4-3.) The airplane is equipped with a diluter-demand type oxygen system. The principal components of the oxygen system include the following:

Supply cylinder
Filler-and-check valve
Manual shut-off valve
Regulator
Oxygen breathing and radio wiring tube assembly.

4-52. The oxygen system automatically mixes varying quantities of oxygen and air, the ratio depending upon the altitude, and delivers the mixture to the pilot's oxygen mask, the quantity delivered depending upon demand (inhalation).

NOTE

Only pressure-breathing type masks (A-13) can be used with the oxygen system.

4-53. The oxygen system supply cylinder supplies oxygen under pressure through the filler-and-check valve and the manual shut-off valve to the oxygen regulator. The regulator connects through piping to an adapter at the left-hand cockpit floor to the oxygen system breather tube which, in turn, connects to the oxygen mask.

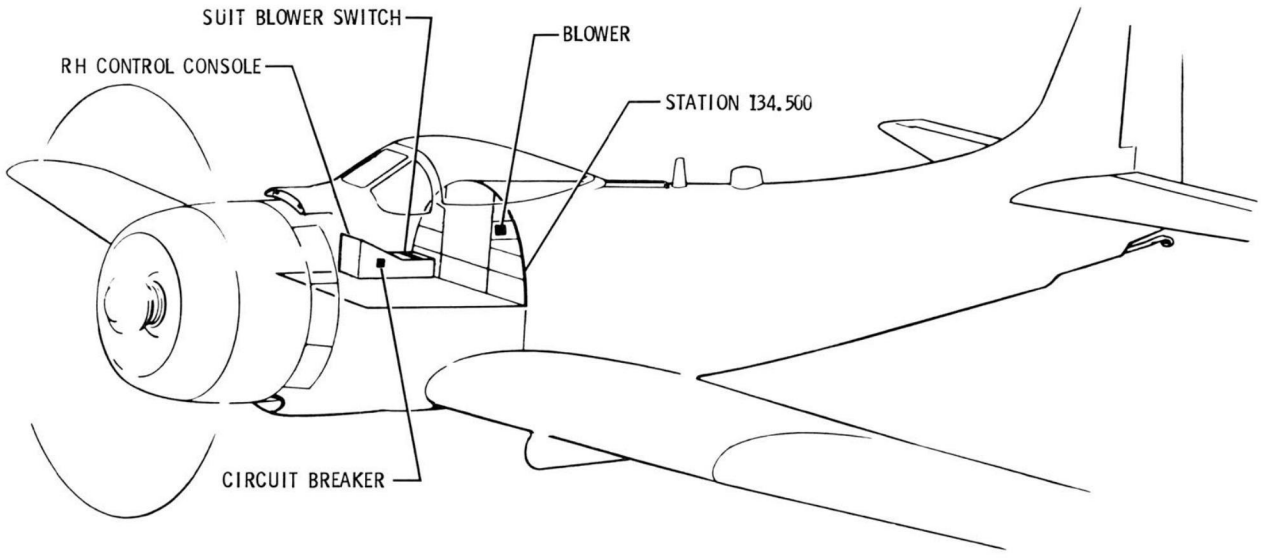
4-54. When the regulator control is placed in NORMAL, the regulator automatically mixes varying quantities of oxygen and air in ratios dependent upon altitude and delivers this mixture on demand. When the regulator control is placed in 100% OXYGEN, the regulator delivers 100 percent oxygen on demand. When the regulator SAFETY PRESSURE lever is ON, oxygen is delivered at the regulator outlet at 1-3/4 ± 1/4 inches water pressure. This increases pressure inside the mask which eliminates air leakage into the mask. At pressure altitudes above 30,000 feet, the regulator automatically delivers 100 percent oxygen with the regulator control in either NORMAL or 100% OXYGEN.

CAUTION

Oxygen system must be kept free of water to prevent corrosion, damage to valves and freezing at high altitudes.

4-55. CHARGING. Refer to section I

4-56. Deleted.



EFFECTIVITY-BUNO

FACTORY: NONE

SERV CHG: ALL AIRPLANES REWORKED TO A-1/ASC 713

ALF-2-4 P-41712-1

Figure 4-2A. Antiexposure Suite Ventilation System Provisions

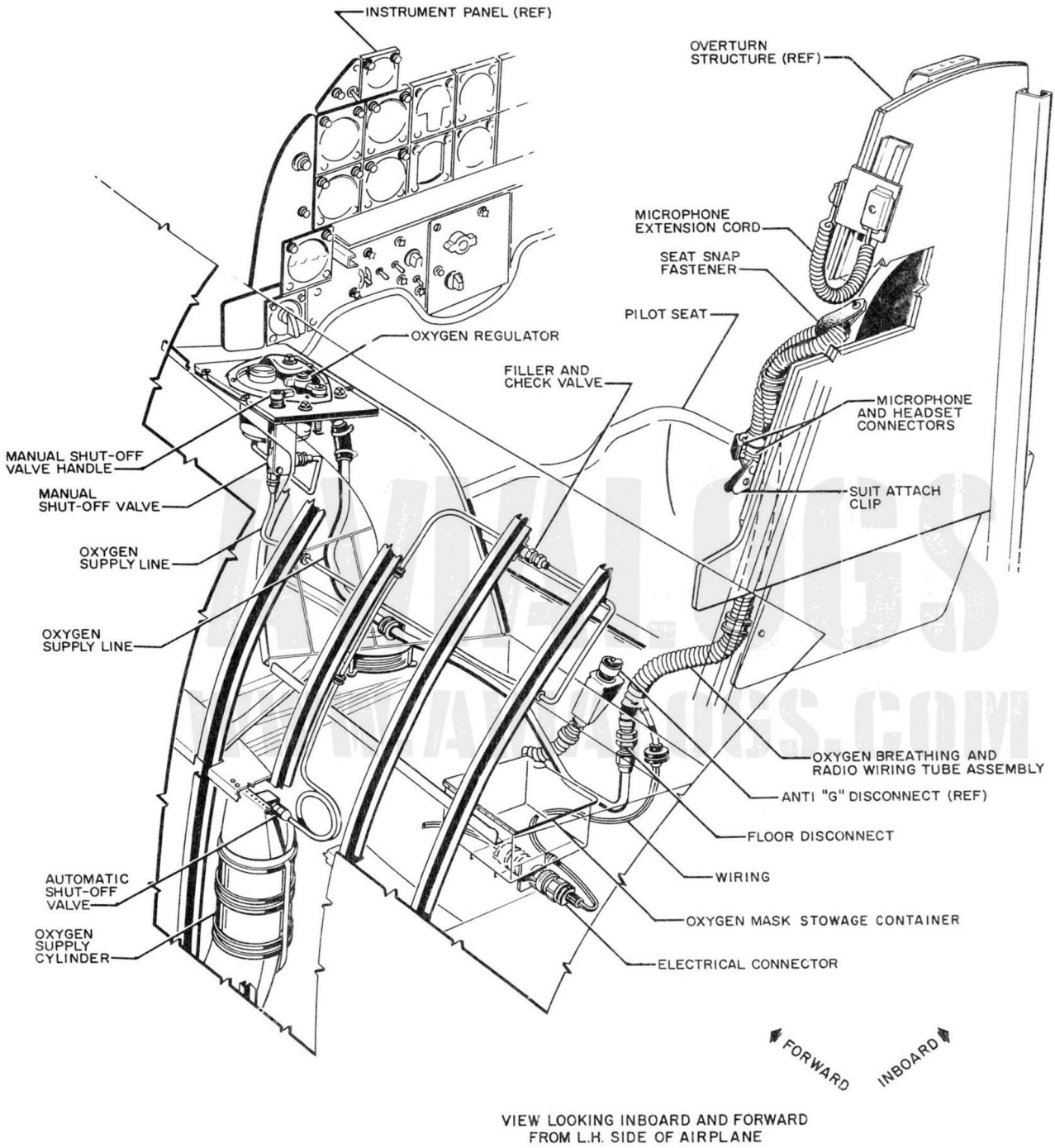
4-57. TROUBLESHOOTING. Refer to table 4-1.

4-58. LEAKAGE TEST. To determine excessive oxygen system leakage, the following procedure is recommended:

a. With oxygen supply of 1800 psi at 70 degrees Fahrenheit connected to system, record pressure gage reading.

b. Disconnect oxygen supply to system.

c. After 20 minutes, re-read pressure gage and note carefully drop in pressure. If pressure drop does not exceed 226 psi, system is sufficiently free of leaks.



VIEW LOOKING INBOARD AND FORWARD
FROM L.H. SIDE OF AIRPLANE

P-3446-1B

Figure 4–3. Oxygen System (Sheet 1)

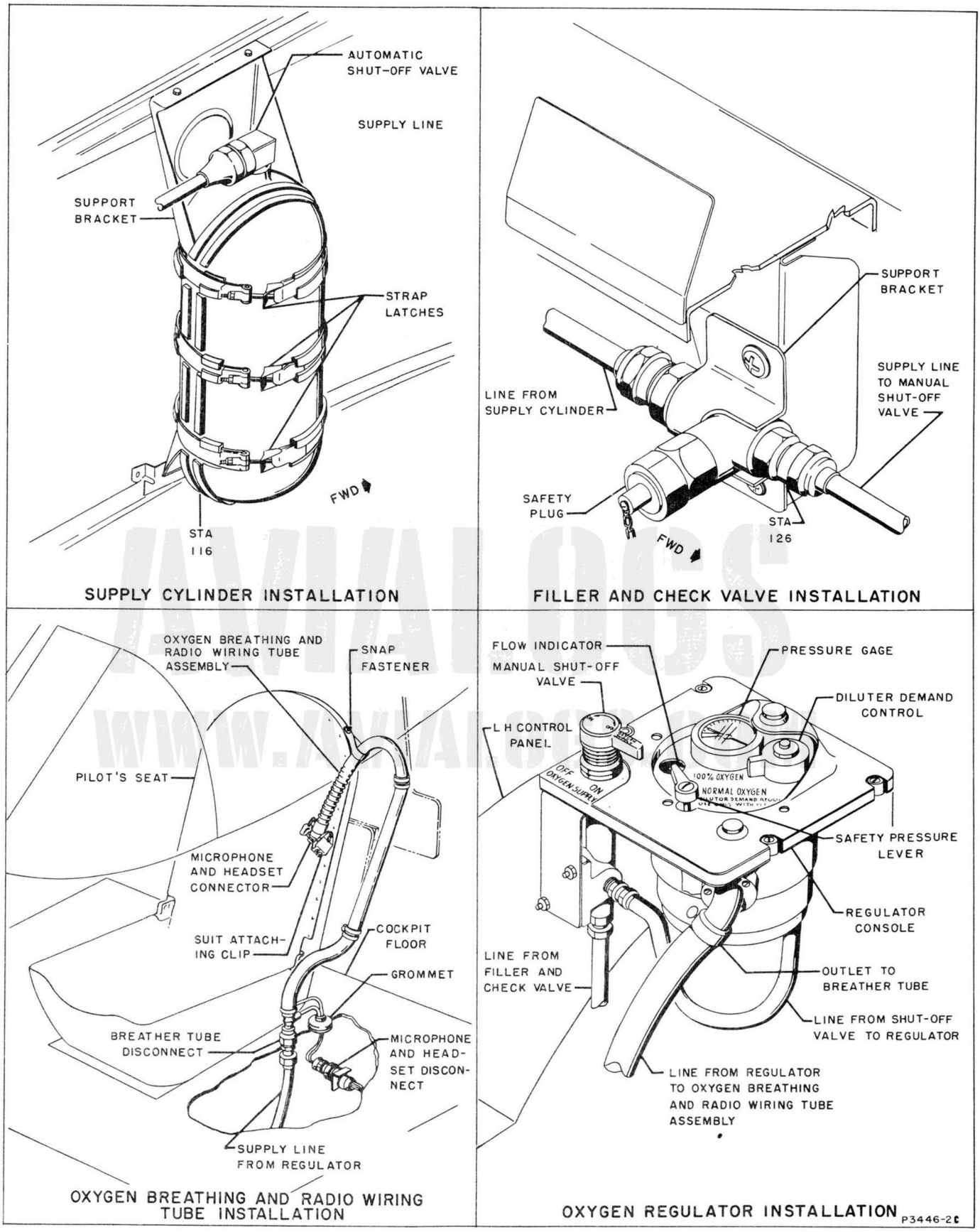


Figure 4–3. Oxygen System (Sheet 2)

d. If pressure drop exceeds 226 psi, excessive leakage or a defective regulator is indicated. Check regulator and replace if necessary.

e. To detect leaks, apply pure soap solution (prepared to consistency of castor oil) in a continuous film around all connections and joints.

f. After completion of leak test, thoroughly wipe solution from connections and joints.

Note

Do not permit soap solution to enter regulator or mask.

g. If tightening connections to torque values shown in paragraph 4–62 does not correct leakage, repair or replace defective lines or fittings.

h. Repeat procedure until pressure drop for twenty-minute test period is below 226 psi.

4–59. OPERATIONAL TEST. The oxygen system should be examined, prior to testing, to ascertain that all components of the system are properly installed and properly interconnected. The system must be free from oil, grease, or other foreign matter.

a. Inspect regulator gage to make certain that supply cylinder is fully charged.

b. With supply pressure on, place SAFETY PRESSURE control to "ON," and feel for oxygen flow at open end of oxygen breathing and radio wiring tube assembly. If no flow is evident, replace regulator.

c. Return SAFETY PRESSURE control to "OFF." Oxygen flow should cease immediately. Continued flow indicates defective demand valve, requiring that regulator be replaced.

d. Place regulator in "100% OXYGEN" and inhale deeply through oxygen breathing and radio wiring tube assembly. If excessive resistance to inhalation is noted, replace regulator.

e. If oxygen flow is obtained during steps b and d, but flow indicator does not "blink," replace regulator.

4–60. OXYGEN SYSTEM LINES.

4–61. DESCRIPTION. The oxygen system lines are fabricated of soft annealed copper ($\frac{3}{16}$-inch OD, 0.035-inch wall) and aluminum alloy ($\frac{3}{4}$-inch OD, 0.035-inch wall).

WARNING

To avoid danger of spontaneous combustion and explosion when connecting or disconnecting oxygen system fittings, make certain that system is free of grease and oil.

Note

Before connecting oxygen system lines, apply anti-seize compound (Specification MIL-C-5542) to all external threads.

4–62. TORQUE VALUES. Fittings on $\frac{3}{16}$-inch lines must not be tightened to more than 175 inch-pounds torque. Flared tubing connections on $\frac{3}{4}$-inch lines must not be tightened to more than 100 inch-pounds torque. If tightening of connections to these maximum torque values does not stop leakage, the line fitting is defective and must be replaced.

TABLE 4-1. OXYGEN SYSTEM TROUBLE SHOOTING

Trouble or Symptom	*Probable Cause*	*Correction*
1. Insufficient oxygen supplied to mask tube.	a. Manual shut-off valve turned "OFF."	Turn manual shut-off valve "ON."
	b. Less than 50 psi pressure in cylinder.	Replace supply cylinder with fully charged one.
	c. Damaged line or mask tube.	Repair or replace.
	d. Dirt or water in line.	Disconnect regulator supply line and allow pressure from cylinder to clear line. Recharge cylinder.
	e. Foreign matter in mask tube.	Inspect and clean tube.
	f. Regulator defective.	Replace regulator.
	g. Line connection loose.	Tighten connection. (Refer to paragraph 4–62.)
2. Oxygen supply consumed too rapidly.	a. Safety pressure valve lever "ON."	Turn lever to "OFF."
	b. Leakage: check all connections with soap solution.	Tighten line connections and recheck.
	c. Defective pressure gage in regulator.	Replace regulator.
3. Regulator delivers only pure oxygen or improper mixture.	Broken regulator aneroid assembly.	Replace regulator.
4. Howling sound or vibration noise emitted from regulator.	Failure of regulator to operate properly.	Replace regulator.

4–63. OXYGEN SYSTEM SUPPLY CYLINDER.

4–64. DESCRIPTION. (See figure 4–3.) The 514-cubic-inch capacity oxygen supply cylinder is located on the left-hand side of the forward equipment compartment at approximately fuselage station 116. The cylinder is retained in a support bracket by straps held together by latch assemblies. An automatic shut-off valve is installed at the cylinder port to automatically cut off the oxygen flow when the supply line is disconnected. When a charged cylinder has been installed and the supply line connected, the automatic shut-off valve opens, allowing oxygen flow through the lines.

CAUTION

Secure cylinder retaining straps whenever cylinder is not installed.

4–65. REMOVAL. (See figure 4–3.)

a. Disconnect and cap system supply line at cylinder. (Automatic shut-off valve on cylinder prevents escape of oxygen from cylinder when line is disconnected.)

b. Unlatch cylinder retaining straps, remove cylinder, and refasten straps.

4–66. INSTALLATION. (See figure 4–3.)

a. Position cylinder to support bracket and secure with cylinder retaining straps.

b. Uncap and connect system supply line at cylinder. Apply anti-seize compound (Specification MIL-C-5542) to external threads of connecting fitting.

CAUTION

When oxygen cylinder is replaced, inspect oxygen line (Douglas 7439788-301) for clearance between line and rudder left-hand control cable. In event oxygen line (Douglas 7439788-301) becomes distorted inboard while replacing oxygen cylinder, hand form line to clear left-hand control cable (Douglas 5262797-664).

4–67. OXYGEN SYSTEM FILLER-AND-CHECK VALVE.

4–68. DESCRIPTION. (See figure 4–3.) The oxygen filler-and-check valve is a high-pressure, three-ported valve, which incorporates disc-type checks in the filler port and in the port to the oxygen regulator. The check in the filler port prevents leakage from the filler port; the check in the port to the regulator prevents back-flow in the oxygen system. The filler-and-check valve is located below the cockpit left-hand rail at approximately fuselage station 126. When not in use, the filler port is covered by a cap chained to the valve support bracket.

4–69. REMOVAL. (See figure 4–3.)

a. In forward equipment compartment, disconnect and cap system supply line at supply cylinder. (Automatic shut-off valve on cylinder prevents escape of oxygen from cylinder when line is disconnected.)

b. In cockpit, remove safety cap from filler-and-check valve.

c. Disconnect and cap lines at filler valve.

d. Remove filler valve attaching screws, and remove filler valve.

4–70. INSTALLATION. (See figure 4–3.)

a. Position filler valve to bracket with arrow pointing toward line to regulator and install attaching screws.

b. Uncap and connect lines at filler valve.

c. Install safety plug on filler valve.

d. In forward equipment compartment, uncap and connect system supply line at oxygen supply cylinder.

4–71. OXYGEN SYSTEM MANUAL SHUT-OFF VALVE.

4–72. DESCRIPTION. (See figure 4–3.) The oxygen system manual shut-off valve, mounted on the cockpit left-hand control panel adjacent to the oxygen regulator, is installed in the oxygen system supply line between the oxygen supply cylinder and the oxygen regulator. The primary function of the manual shut-off valve is to discontinue the flow of oxygen to the regulator. With the manual shut-off valve "OFF," the regulator is relieved of system pressure.

Note

To fully remove oxygen from regulator, inhale at the breather tube to draw remaining air left in the line.

4–73. REMOVAL. (See figure 4–3.)

a. Remove oxygen regulator.

b. Remove valve from regulator console.

4–74. INSTALLATION. (See figure 4–3.)

a. Install shut-off valve on oxygen regulator console.

b. Install regulator console.

4–75. OXYGEN SYSTEM REGULATOR.

4–76. DESCRIPTION. (See figure 4–3.) The oxygen system diluter-demand type regulator is installed in the cockpit left-hand control panel. Included in the regulator are a pressure gage, a flow indicator, a SAFETY PRESSURE CONTROL, and diluter-demand controls. Under normal conditions of operation, suction created in the regulator by inhalation at the oxygen mask moves a diaphragm which operates mechanical linkage to a demand valve, causing the demand valve to pass a quantity of oxygen proportional to the demand. Flow of oxygen through the demand valve is indicated on the oxygen flow indicator. The pressure gage on the regulator indicates oxygen system pressure.

4–77. The diluter-demand control has two positions, "NORMAL" and "100% OXYGEN." When the regulator control is in "NORMAL," the regulator automatically mixes varying quantities of oxygen and air in ratios dependent upon airplane altitude. When the regulator control is in "100% OXYGEN," the regulator delivers pure oxygen to the oxygen breathing and radio wiring tube assembly. At pressure altitudes above 30,000 feet, the regulator automatically delivers 100 percent oxygen, regardless of regulator control position. When the SAFETY PRESSURE control is "ON," a spring-loaded lever depresses the diaphragm hub, which opens the demand valve. This permits the internal pressure of the regulator to increase slightly above the external pressure. When the internal pressure in the regulator reaches $1\frac{3}{4} \pm \frac{1}{4}$ inches of water, the diaphragm is lifted sufficiently to close the demand valve. As long as the internal positive pressure of the regulator is $1\frac{3}{4} \pm \frac{1}{4}$, the demand valve will remain closed even though the SAFETY PRESSURE control is "ON." This action results in oxygen delivered at a pressure high enough to prevent leakage around the mask.

4–78. REMOVAL. (See figure 4–3.)

a. In forward equipment compartment disconnect and cap system supply line at supply cylinder. (Automatic shut-off valve on cylinder prevents escape of oxygen from cylinder when line is disconnected.)

b. In cockpit remove side panel of left-hand control panel.

c. Disconnect and cap lines at regulator and at manual shut-off valve.

d. Disconnect electrical wiring at regulator console light assemblies.

e. Loosen dzus fasteners attaching regulator console to control panel, and remove regulator.

4–79. INSTALLATION. (See figure 4–3.)

a. Position regulator console in control panel and connect dzus fasteners.

b. Connect lines to regulator and to manual shut-off valve.

c. Connect electrical wiring to regulator console light assemblies.

d. Install side panel in control panel.

4–80. OXYGEN BREATHING AND RADIO WIRING TUBE ASSEMBLY.

4–81. DESCRIPTION. (See figure 4–3.) The oxygen breathing and radio wiring tube assembly is installed on the left-hand side of the pilot's seat, and is held to the seat, when not in use, by a strap with a snap fastener. In addition to an oxygen quick-disconnect for attaching the oxygen mask hose, the tube includes a clip for attaching the tube assembly to the pilot's flying suit. The upper end of the oxygen breathing and radio wiring tube assembly includes the electrical receptacle which connects to the pilot's headset plug. At the cockpit floor, the tube is connected to an adapter, the terminus of the piping from the oxygen regulator, while a plug at the lower end of the tube assembly mates with a connector beneath the cockpit floor.

4–82. REMOVAL. (See figure 4–3.)

a. Through left-hand forward equipment compartment access, disconnect headset wiring at connector.

b. In the cockpit, remove grommet at cockpit flooring and lift plug through hole into cockpit.

c. Disconnect oxygen breathing and radio wiring tube assembly from adapter at cockpit floor.

d. Remove clamps which secure tube assembly to deflector plate and remove tube assembly.

4–83. INSTALLATION. (See figure 4–3.)

a. Connect oxygen breathing and radio wiring tube assembly to adapter at cockpit floor.

b. Insert electrical plug through hole in cockpit floor and install grommet.

c. Through left-hand forward equipment compartment access, attach electrical plug to connector beneath cockpit floor.

d. Install clamps which secure tube assembly to deflector plate.

4–84. ANTI-G SYSTEM.

4–85. DESCRIPTION. (See figure 4–4.) The anti-G system is a pressure air system provided for use with a Z-2 or Z-3 type anti-blackout suit. The anti-G system includes the following principal components:

Name	*Para Ref*
Turn-and-bank indicator air filter	4–88
Air pump	4–90
Oil separators	4–94
Control valve	4–98
Disconnect receptacle	4–102

4–86. The engine-driven vacuum and pressure pump draws air from the turn-and-bank indicator, mounted on the pilot's instrument panel, and delivers the air, under pressure, through the oil separators to the anti-G system control valve. The air filter on the turn-and-bank indicator acts as the system air inductor and precludes the entrance of any dust into the system. The oil separators remove residual oil from the air and direct it to the engine oil sump. The anti-G control valve is normally closed, venting the pressurized air overboard. When a 1.8-G load factor is applied to the valve, the valve opens and pressurized air is forced into the anti-G suit; at 5 Gs, the suit is charged with a maximum of 6 psi air pressure in 2 to 3 seconds by action of the anti-G system.

4–87. TROUBLE SHOOTING. Refer to table 4–2.

4–88. TURN-AND-BANK INDICATOR AIR FILTER.

4–89. DESCRIPTION. (See figure 4–4.) The turn-and-bank indicator supplies and filters the air entering the

TABLE 4–2. ANTI-G SYSTEM TROUBLE SHOOTING

Trouble or Symptom	*Probable Cause*	*Correction*
1. Insufficient pressure in system.	a. Leaking connection. b. Obstruction in lines. c. Filter ineffective. d. Pump failure. e. Control valve stuck or damaged.	Tighten connection. Remove obstruction. Replace filter. Replace pump. Repair or replace control valve.
2. Too much pressure at low G load factors.	Refer to 1.e.	
3. Evidence of excessive oil at disconnect receptacle.	Separator failure.	Repair or replace separator. Check pump seal.

anti-G system. (For detailed information on the turn-and-bank indicator refer to section VI of this manual.)

4–90. VACUUM AND PRESSURE PUMP (ANTI-G SYSTEM PUMP).

4–91. DESCRIPTION. (See figure 4–4.) The vacuum and pressure pump (anti-G system pump) is mounted on the engine supercharger rear cover. The pump, lubricated by engine oil, is engine driven and provides air of 7 psi pressure to the anti-G system control valve whenever the engine is operating. The pump also maintains the vacuum necessary for operation of the vacuum driven turn-and-bank indicator system.

4–92. REMOVAL. (See figure 4–4.)

a. Loosen clamps on pump inlet and outlet ports, and disconnect and cap air lines.

b. Remove mounting bolts, and remove pump.

c. Cap oil supply port on supercharger rear cover.

4–93. INSTALLATION. (See figure 4–4.)

a. Uncap oil supply port on supercharger rear cover.

b. Position pump on pad and install mounting bolts.

c. Uncap and connect air lines to pump.

4–94. ANTI-G SYSTEM OIL SEPARATORS.

4–95. DESCRIPTION. (See figure 4–4.) Two oil-air separators are connected between the air pump and control valve of the anti-G system and are mounted on the left-hand side of the engine supercharger housing. The dual separators are provided to remove oil that may become mixed with pressurized air from the pump. Oil removed by the separators is drained into the engine oil sump.

4–96. REMOVAL. (See figure 4–4.)

a. Loosen clamps on inlet, outlet and drain ports of separators, and disconnect and cap lines.

b. Remove bolts attaching separators to bracket and support.

4–97. INSTALLATION. (See figure 4–4.)

a. Position separators to bracket and support and install attaching bolts.

b. Uncap and connect lines to inlet, outlet and drain ports of separators and tighten clamps.

4–98. ANTI-G SYSTEM CONTROL VALVE.

4–99. DESCRIPTION. (See figure 4–4.) The anti-G system control valve is mounted on a bracket in the left-hand side of the forward equipment compartment at fuselage station 119.250. The control valve is a plunger-type regulator which opens automatically to admit pressurized air to the pilot's anti-blackout suit when a 1.8 G load factor is applied on the airplane. At five Gs the valve is fully open and admits a maximum of 6 psi of air to the suit. When there is no G load applied to the airplane, the control valve vents the pressurized air overboard.

4–100. REMOVAL. (See figure 4–4.)

a. In forward equipment compartment, loosen clamps at inlet, outlet and vent ports of control valve, and disconnect and cap lines.

b. Remove bolts attaching valve to support bracket, and remove valve.

4–101. INSTALLATION. (See figure 4–4.)

a. Position control valve on support bracket and install valve attaching bolts.

b. Uncap and connect lines to inlet, outlet and vent ports of control valve and tighten clamps.

4–102. ANTI-G SYSTEM SUIT DISCONNECT RECEPTACLE.

4–103. DESCRIPTION. Pressurized air is connected with the G-suit at the receptacle mounted on the left-hand control panel. The receptacle permits free passage of air into the suit when the control valve is open.

4–104. WINDSHIELD DEGREASER SYSTEM.

4–105. DESCRIPTION. (See figure 4–5.) The windshield degreaser system is installed in the airplane to maintain visibility during flight by removing grease, dirt and other material which may accumulate on the wind-

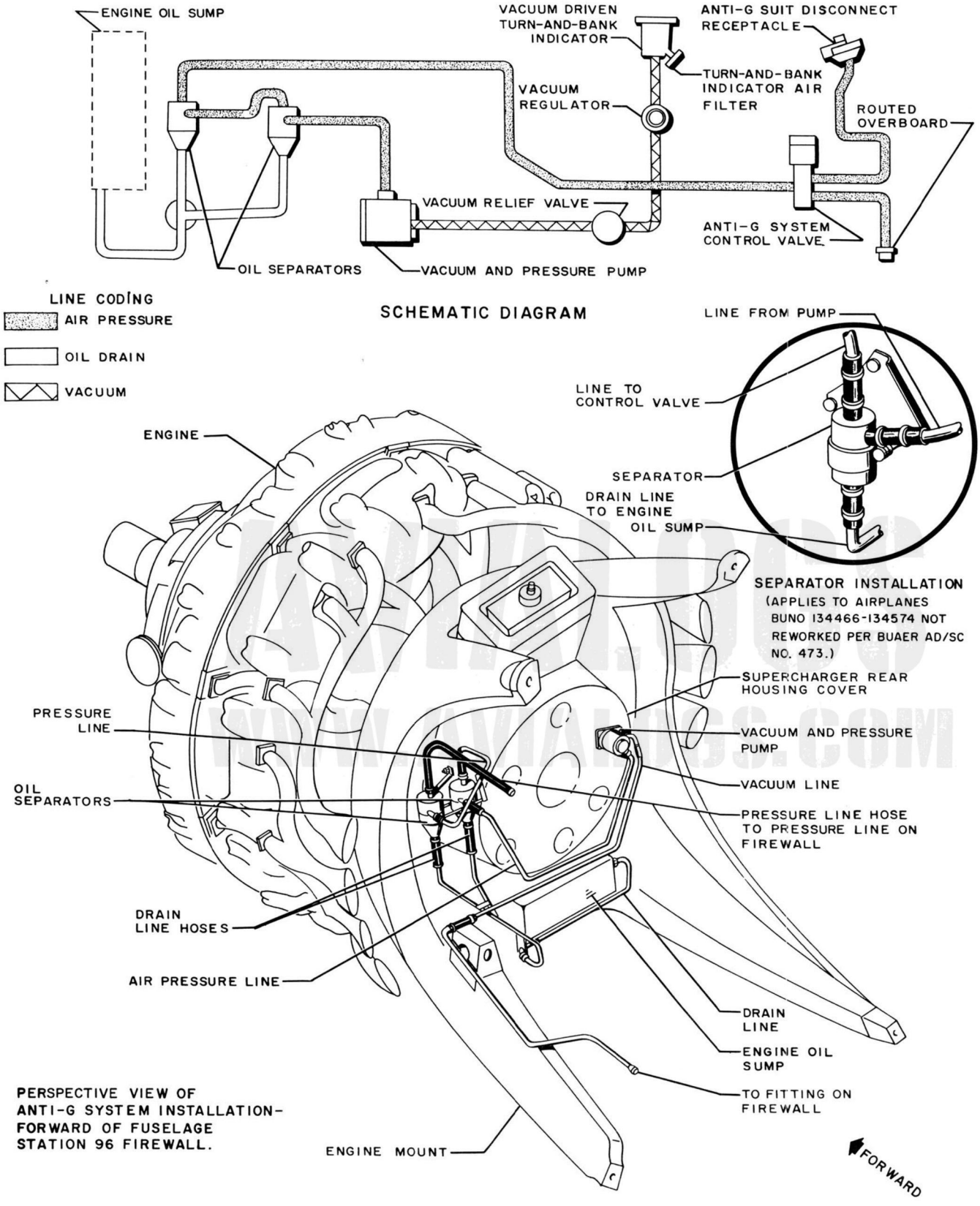


Figure 4–4. Anti-G System (Sheet 1)

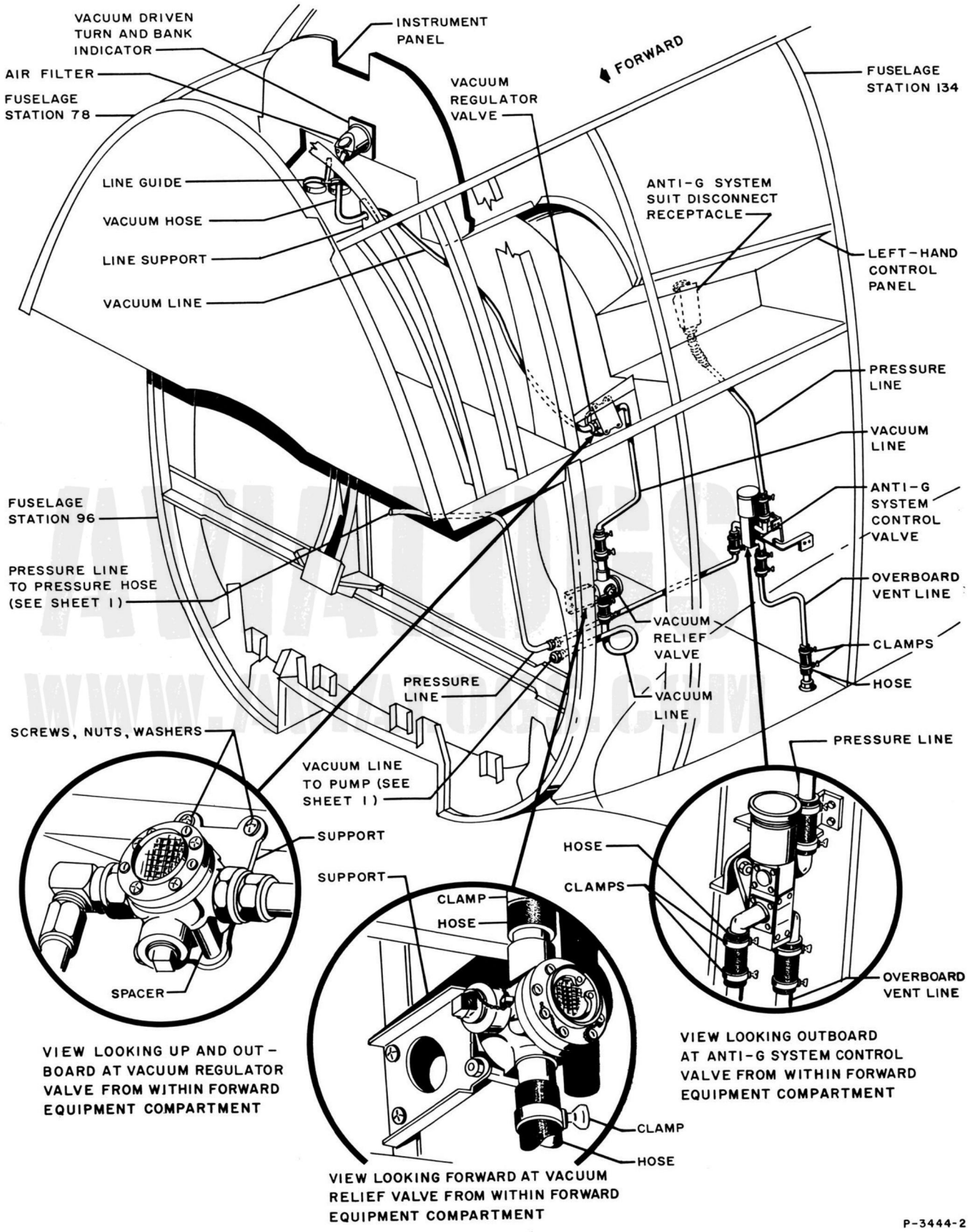


Figure 4–4. Anti-G System (Sheet 2)

shield. The windshield degreaser system includes the following principal components:

Reservoir
Filter
Pump
Control switch
Spray tube.

4-106. Operation of the windshield degreaser system pump, which is electrically controlled, draws fluid from the degreaser reservoir and expels the fluid, under pressure, from the spray tube onto the windshield. Although the system is installed mainly for the removal of grease, the system is equally effective for the removal of ice, dirt, or salt spray provided the proper fluid is utilized in the system. The type of fluid to be used is determined by a survey of probable flight conditions. If a grease film on the windshield is anticipated, a degreasing agent should be used; if icing conditions are probable, the use of de-icing fluid is indicated; for mud or dirt, a mixture of plain water and alcohol is most effective.

4-107. The windshield degreaser system is electrically operated and is controlled by the switch mounted on the pilot's instrument panel.

4-108. TROUBLESHOOTING. If the windshield degreaser system fails to operate satisfactorily, the most probable cause is insufficient fluid. Fluid level in the reservoir should be checked and fluid should be added, if necessary. Other probable causes of trouble in the system are leaking lines, clogged perforations in the spray tube, dirty filter element, or failure in the electrical circuit. If an inspection of these units fails to reveal the source of trouble, the windshield degreaser pump should be tested, and, if necessary, replaced.

4-109. WINDSHIELD DEGREASER SYSTEM RESERVOIR.

4-110. DESCRIPTION. (See figure 4-5.) The windshield degreaser system reservoir is mounted on a shelf in the left-hand side of the forward equipment compartment, approximately seven inches outboard of the center line of the airplane. The capacity of the reservoir is one pint plus 20 percent foaming and expansion space. A standpipe in the reservoir is connected, through the degreaser system filter, to the degreaser pump. A vent plug in the reservoir cover provides for the relief of pressure in the reservoir created by atmospheric and altitude changes and contains a shut-off ball to prevent loss of fluid from the reservoir during flight maneuvers. A level marker on the reservoir filling instruction decalcomania indicates the level to which the reservoir should be filled with fluid. The fluid used (depending upon anticipated flight conditions) must be one of the following:

For degreasing: Solvent (Fed. Spec. P-D-680 or TT-T-291).

For de-icing: Alcohol (Spec. MIL-A-6091 or Fed. Spec. TT-I-735).

For removal of dirt: Water and alcohol (Spec. MIL-A-6091).

4-111. FILLING. The reservoir tank can be removed for filling by loosening the two wing nuts on the reservoir cover and lowering the reservoir tank away from the cover.

NOTE

When filling and installing the reservoir, care should be taken to prevent the admission of foreign matter into the reservoir fluid.

4-112. REMOVAL. (See figure 4-5.)

a. Disconnect and cap vent line at reservoir.

b. Disconnect and cap fluid supply line at reservoir.

c. Remove screws attaching reservoir to shelf, and remove reservoir.

4-113. INSTALLATION. (See figure 4-5.)

a. Position reservoir to shelf and install attaching parts.

b. Uncap and connect fluid supply line at reservoir.

c. Uncap and connect vent line at reservoir.

4-114. WINDSHIELD DEGREASER SYSTEM FILTER.

4-115. DESCRIPTION. (See figure 4-5.) The windshield degreaser system filter is located just outboard of the windshield degreaser reservoir in the forward equipment compartment. The filter removes foreign matter from the fluid in the degreaser system to prevent damage to the degreaser pump and to prevent clogging of the system. The filter element should be inspected regularly and replaced when necessary.

4-116. WINDSHIELD DEGREASER SYSTEM PUMP.

4-117. DESCRIPTION. (See figure 4-5.) The windshield degreaser system pump is mounted just inboard of the windshield degreaser reservoir in the forward equipment compartment. The pump is provided to draw fluid from the degreaser reservoir and pressurize the fluid sufficiently so that the fluid is expelled through the perforations of the spray tube onto the windshield. The pump is electrically operated and is controlled from a momentary-contact push-button switch mounted on the pilot's instrument panel.

4-118. WINDSHIELD DEGREASER CONTROL CIRCUIT.

4-119. DESCRIPTION. The windshield degreaser pump circuit receives power from the monitor bus through a 5-ampere circuit breaker, designated WINDSHIELD DEGREASE. When the control switch is depressed the circuit is completed through the switch to the windshield degreaser pump motor to energize the motor and actuate the pump.

4–120. WINDSHIELD DEGREASER CONTROL SWITCH.

4–121. DESCRIPTION. The windshield degreaser control switch, mounted on the pilot's instrument panel, is a normally open, momentary contact, push-button type switch wired in series between the WINDSHIELD DEGREASE circuit breaker and the windshield degreaser pump. Closing the switch by depressing the switch button actuates the windshield degreaser pump.

4–122. WINDSHIELD DEGREASER SPRAY TUBE.

4–123. DESCRIPTION. (See figure 4–5.) The windshield degreaser system spray tube is located outside the fuselage along the base of the windshield. The spray tube consists of two sections of tubing welded together in the form of a "T." The stem of the "T" connects with the pressure supply line from the windshield degreaser pump. The crosspiece of the "T" is the perforated header portion of the spray tube.

4–124. REMOVAL. (See figure 4–5.)

a. Remove screws attaching spray tube retainer to support structure at base of windshield.

b. Carefully disengage spray tube stem from connecting fitting, and remove spray tube.

4–125. INSTALLATION. (See figure 4–5.)

a. Inspect O-ring in spray tube stem connecting fitting. Replace O-ring if necessary.

b. Place spray tube in position and press stem into place in connecting fitting.

c. Position spray tube retainer and install retainer attaching screws.

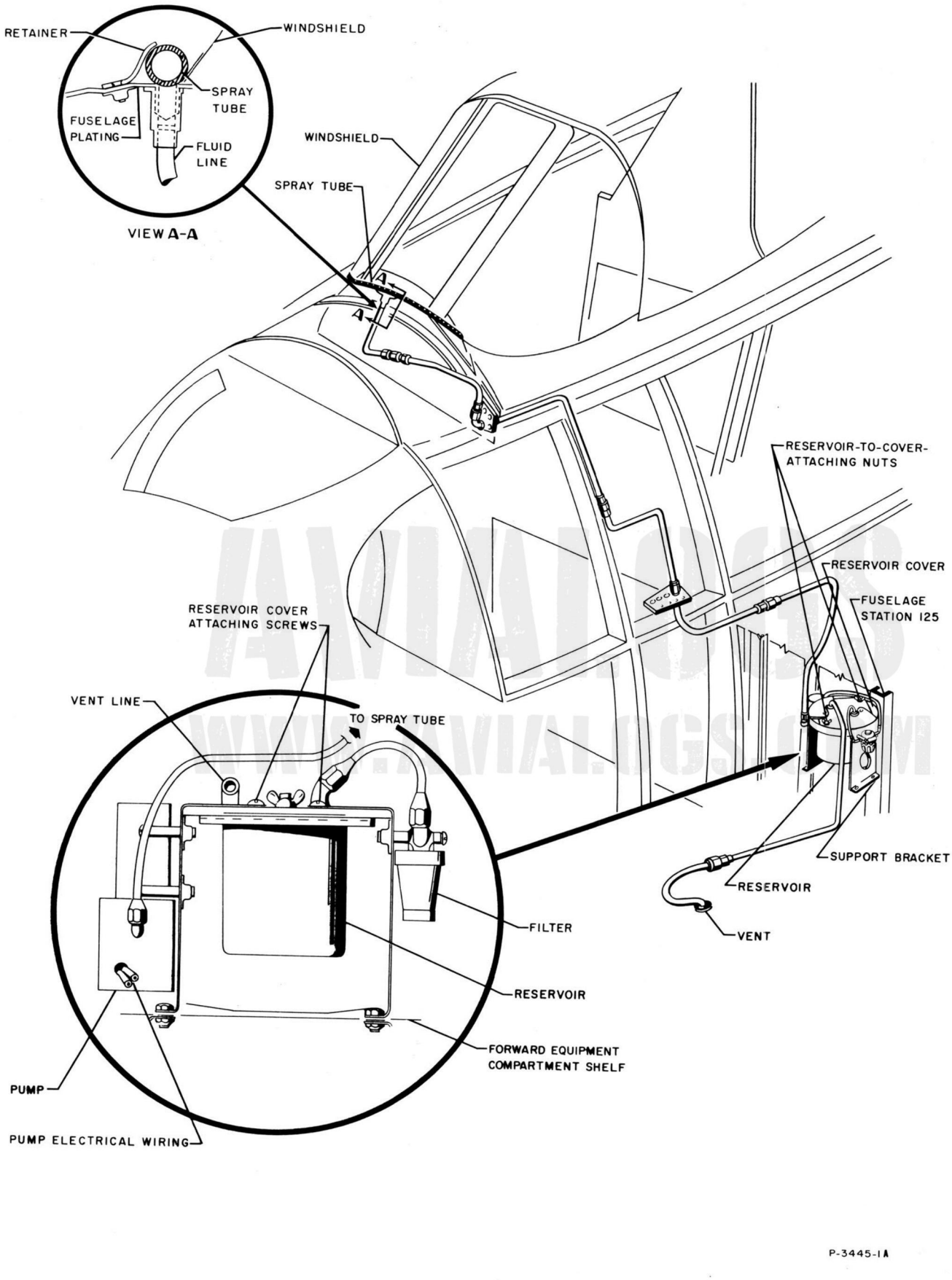
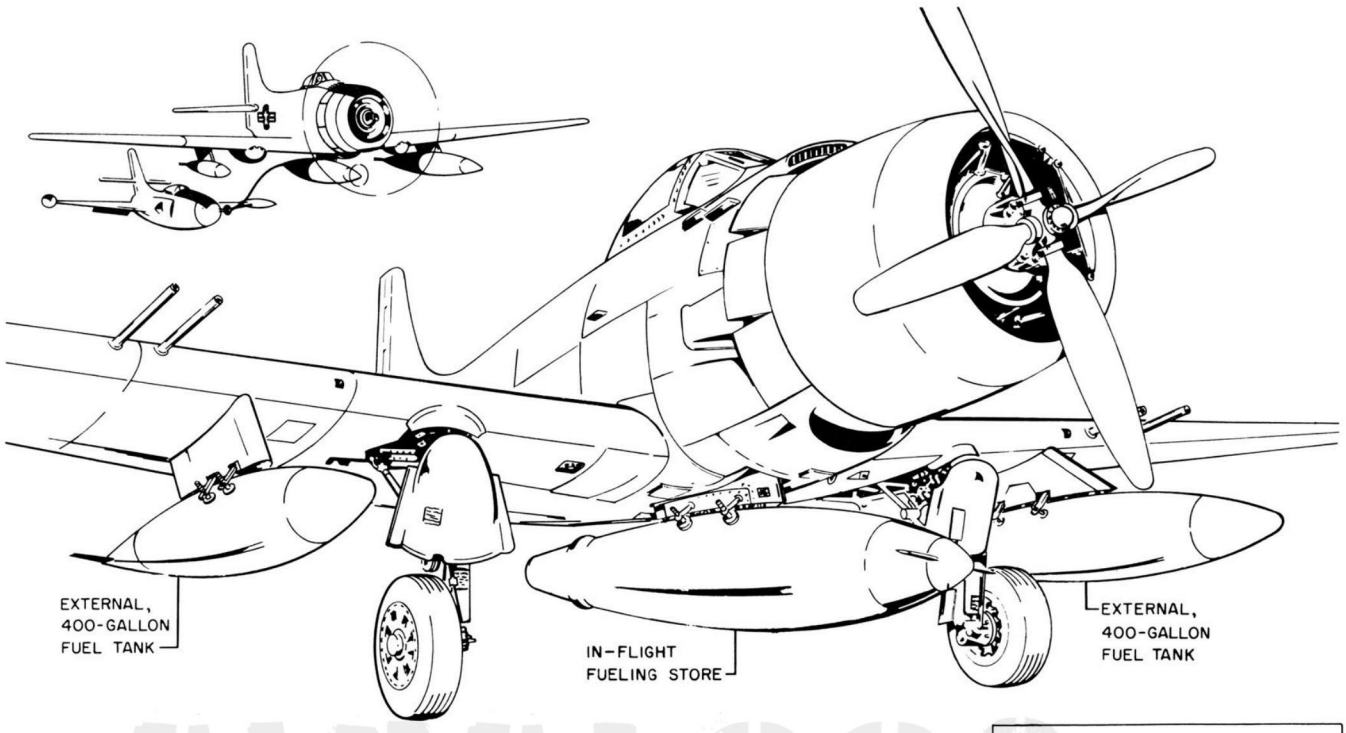


Figure 4–5. Windshield Degreaser System



AD-6/-7 TANKER CONFIGURATION

EFFECTIVITY-BUNO.
FACTORY: PROVISIONS-ALL AD-7 AIRPLANES, AND AD-6 AIRPLANES BUNO. 139641, 139774-139821
SERV CHG: PROVISIONS-AD-6 AIRPLANES PRIOR TO BUNO. 139774, EXCEPT 139641, REWORKED PER BUAER AD/SC NO. 606 AND AIRPLANES REWORKED PER BUAER AD/SC NO. 681

P-8837-1B

Figure 4-5A. AD-6 and AD-7 Tanker Configuration

4–126. IN-FLIGHT FUELING SYSTEM.

4–127. GENERAL. (See figure 4–5A and 4–6.) The in-flight fueling system enables an airborne model AD-6 or AD-7 airplane to transfer fuel to a receiver aircraft. The system provides two auxiliary fuel transfer configurations: a basic configuration, and an extended range configuration. In the basic configuration, fuel is transferred from two ATP-D1, 400-gallon external wing tanks to an in-flight fueling store suspended beneath the fuselage of the airplane. In the extended range configuration, the fuel from the 400-gallon wing tanks is divided between the in-flight fueling store and the engine of the tanker. This is accomplished by changing one end of one fuel hose in the forward equipment compartment (refer to paragraph 4–169). The in-flight fueling store provides power and a fuel hose for transferring the fuel between airplanes. The operation of the system is controlled from a panel on the right-hand console of the cockpit. This panel is part of the in-flight fueling store kit. Table 4–7 at the end of the section will provide a general procedure for converting the model AD-6 or AD-7 airplane into a tanker, and table 4–8 will provide a general procedure for converting the model AD-6 or AD-7 tanker back into the normal combat configuration.

4–128. The major components of the system are as follows:

Name	*Para Ref*
Tanker provisions	4–132
AD-6 & AD-7 tanker conversion kit	4–149
ATP-D1, 400-gallon auxiliary fuel tanks	4–172
In-flight fueling store	4–176

4–129. The in-flight fueling system is installed on all model AD-7 airplanes. Prior to model AD-6 airplanes may be reworked per BuAer AD/SC No. 606 with modifications per AD/SC No. 681 and AD/SC No. 694. The modification by BuAer AD/SC No. 681 provides for the removal of a hydraulically operated fuel pump and its accessories from the forward equipment compartment, and for the addition of an electrically operated fuel pump in each 400-gallon auxiliary fuel tank. Take 4–4A outlines various service change configurations for model AD-6 and AD-7 airplanes.

4–130. (Deleted)

4–131. (Deleted)

4–132. TANKER PROVISIONS.

4–133. DESCRIPTION. The tanker provisions are permanently installed in-flight fueling assemblies. The following tanker provisions are installed on model AD-7 airplanes BuNo. 142010 and 142081, and on prior model AD-6 and AD-7 airplanes reworked per BuAer AD/SC No. 606, AD/SC No. 681 and AD/SC No. 694 (see table 4–4A for service change tanker adaptations):

Name	*Para Ref*
Tanker fuel system	4–134
Tanker electrical provisions	4–142

4–134. TANKER FUEL SYSTEM.

4–135. DESCRIPTION. (See figures 4–7 and 4–8.) The tanker fuel system consist of line and hose assemblies that inter-connect the external fuel stores with the tanker-conversion kit check valve assembly. In order to simplify the removal and installation of the tanker fuel lines, they are divided into three sections: the right-hand external-fuel-tank fuel line, the center external-fuel-tank fuel line, and the left-hand external-fuel-tank fuel line. The right- and left-hand external-fuel-tank supply lines extend behind the front spar from the right- and left-hand wing external-stores racks to the forward equipment compartment. The right- and left-hand external-fuel-tank supply lines enter the forward equipment compartment through the front spar and are routed to the fuel selector valve. The center external-fuel-tank supply line extends from the fuselage external-stores ejector rack through the front spar to the fuel selector valve. Removing the center-line fuel-selector-valve fuel hose, reversing the hose and then connecting it to the center-line fuel-selector valve port (forming a thermal expansion area for the fuel selector valve, see figure 4–6) readies the forward equipment compartment for the installation of the conversion-kit check valve assembly (refer to paragraph 4–168). The conversion-kit check valve assembly inter-connects the right- and left-hand external-fuel-tank supply lines with the center external-fuel-tank supply line. When the conversion-kit check valve installation is accomplished, the tanker is in the basic tanker configuration; that is, both wing-tank fuel lines supply fuel to the in-flight fueling store attached to the fuselage external-stores ejector rack.

4–136. REMOVAL—RIGHT-HAND EXTERNAL-FUEL-TANK SUPPLY LINE.

a. Remove right-hand wing external stores rack at wing vertical station 119. (Refer to section IX.)

b. Remove screws securing right-hand outboard fuel fitting to right-hand wing vertical station 119.

c. Disconnect right-hand outboard fuel line from nipple of right-hand outboard fuel fitting, and remove fitting from wing.

d. Disconnect right-hand outboard fuel line from union of right-hand outboard-center fuel hose at wing vertical station 95.5.

e. Disconnect right-hand outboard-center fuel hose from union at wing vertical station 55.5.

f. Disconnect clamps that secure right-hand outboard center fuel hose to brackets at wing vertical stations 85.5 and 75.5.

g. Remove right-hand outboard-center fuel hose from wing.

h. Disconnect right-hand center-inboard fuel line from union at wing vertical station 55.5.

i. Disconnect right-hand center-inboard fuel line from union at wing vertical station 30.165, and remove line from wing.

j. Disconnect right-hand inboard fuel line from union at wing vertical station 30.165.

k. In forward equipment compartment, disconnect right-hand inboard fuel line from supported union at right-hand edge of front-spar shear shelf.

l. Break vapor seal and remove right-hand inboard fuel line from center wing.

m. Disconnect right-hand center inboard fuel hose from supported union at right-hand edge of front-spar shear shelf in forward equipment compartment.

n. Disconnect clamp which holds right-hand center inboard fuel hose to right-hand edge of front-spar shear shelf.

o. Disconnect right-hand fuel-selector-valve fuel line from supported bushing at left-hand edge of front-spar shear shelf.

p. Disconnect right-hand fuel-selector-valve fuel line from right-hand fuel-selector-valve fuel hose.

q. Remove clamps which hold right-hand fuel-selector-valve fuel line to left-hand fuel-selector-valve fuel hose.

r. Disconnect right-hand fuel-selector-valve fuel hose from elbow at right-hand fuel-selector-valve port.

4–137. INSTALLATION—RIGHT-HAND EXTERNAL-FUEL-TANK SUPPLY LINE.

a. Connect right-hand fuel-selector-valve fuel hose to elbow on right-hand fuel-selector valve port.

b. Connect right-hand fuel-selector-valve fuel hose to right-hand fuel-selector-valve fuel line.

c. Connect right-hand fuel-selector-valve fuel line to supported bushing at left-hand edge of front-spar shear shelf.

d. Clamp right-hand fuel-selector-valve fuel line to left-hand fuel-selector-valve fuel hose.

e. Connect right-hand center inboard fuel hose to supported union at left-hand edge of front-spar shear shelf.

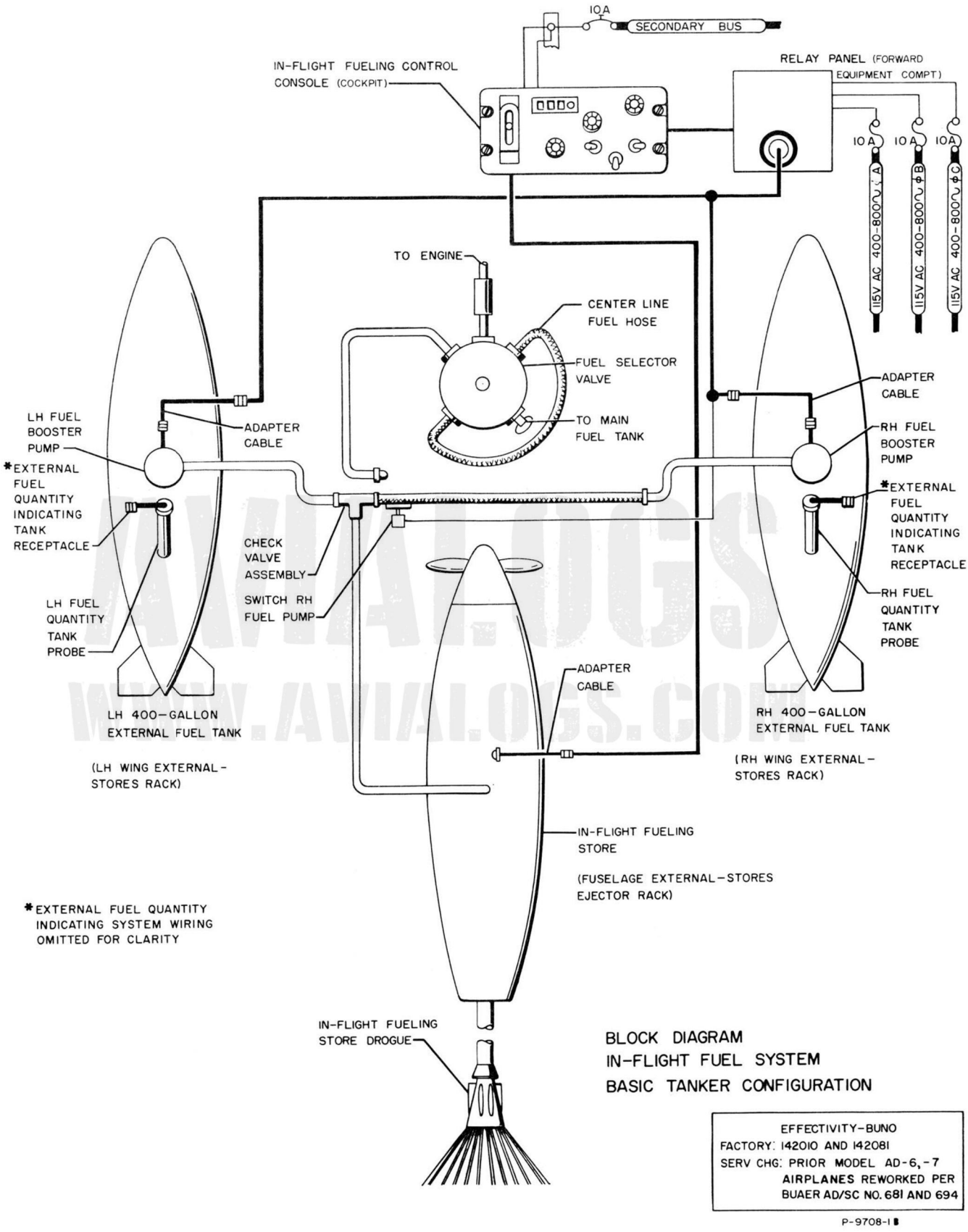


Figure 4-6. Block Diagram—In-Flight Fueling System (Sheet 1)

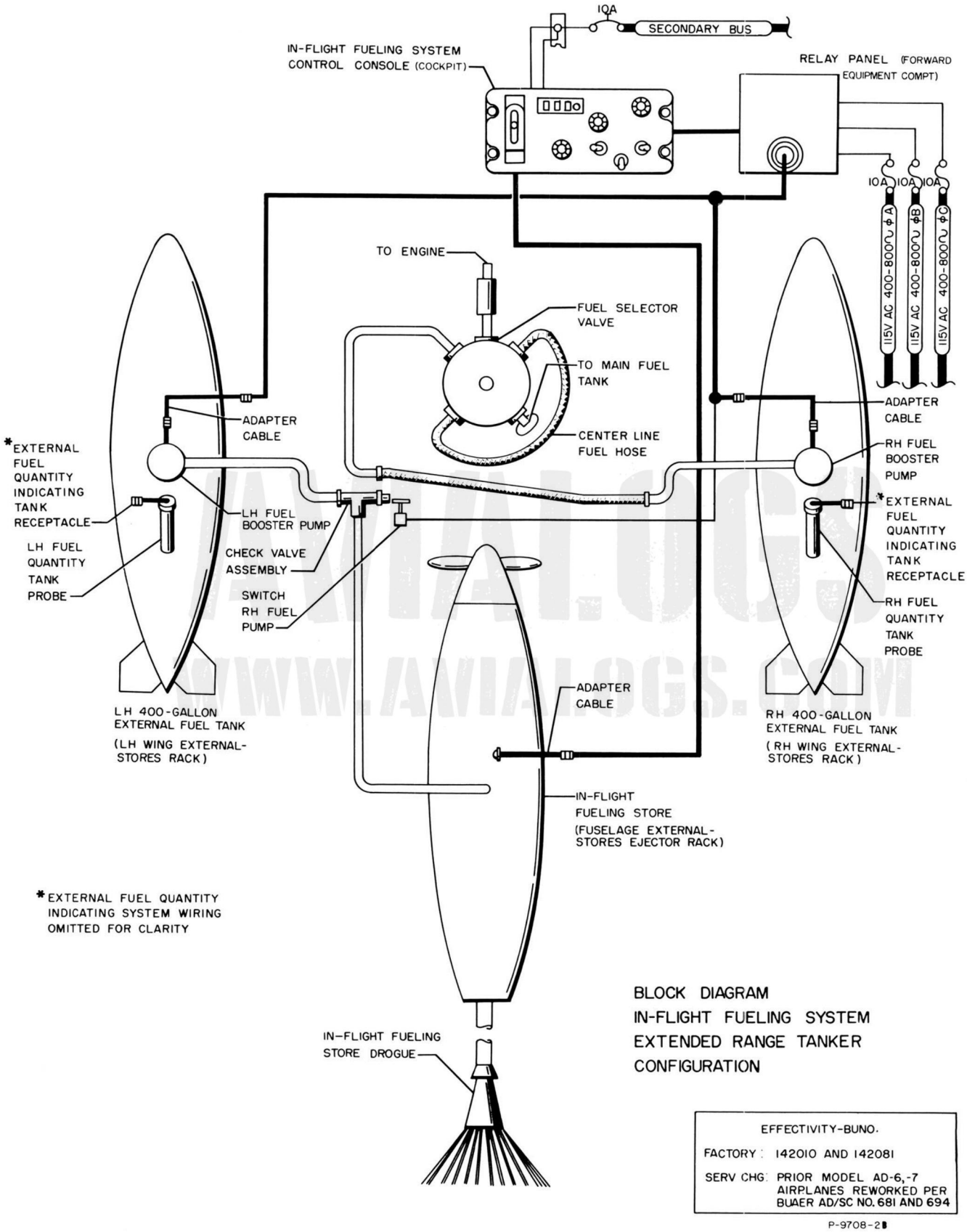


Figure 4-6. Block Diagram—In-Flight Fueling System (Sheet 2)

f. Connect right-hand center-inboard fuel hose to supported union on right-hand edge of front-spar shear shelf.

g. Clamp right-hand center-inboard fuel hose to edge of front-spar shear shelf.

h. Insert right-hand inboard fuel line through hole provided in right-hand side of front spar.

i. Loosely connect right-hand inboard fuel line to supported union at right-hand edge of front-spar shear shelf.

j. Connect right-hand inboard fuel line to union at right-hand wing vertical station 30.165.

k. Tighten right-hand inboard fuel line at supported union on right-hand edge of front-spar shear shelf.

CAUTION

There should be ⅛-inch minimum vapor seal gap between inboard fuel line and front-spar door assembly. This gap should be filled with a bead of EC Compound (Specification MIL-S-7124) to prevent inboard fuel line from chafing against front-spar door assembly.

l. Vapor seal right-hand inboard fuel line to front-spar door assembly through which it passes. (Refer to Handbook of Structural Repair Instructions, Navy Models AD-6 and AD-7 Aircraft.)

m. Connect right-hand center-inboard fuel line to union at right-hand wing vertical station 30.165.

n. Connect right-hand center-inboard fuel line to union at right-hand wing vertical station 55.5.

o. Connect right-hand outboard-center fuel hose to union at right-hand wing vertical station 55.5.

p. Connect right-hand outboard-center fuel hose to union at right-hand wing station 95.5.

q. Clamp right-hand outboard-center fuel hose to brackets at right-hand wing vertical stations 75.5 and 85.5.

r. Connect 2-inch side of right-hand outboard fuel line to right-hand outboard-center fuel hose.

s. Insert nipple end of right-hand outboard fuel fitting into wing vertical station 119 and connect fuel fitting to right-hand outboard fuel line.

t. Install right-hand outboard fuel fitting flange to right-hand wing vertical station 119.

4–138. REMOVAL—CENTER EXTERNAL FUEL TANK SUPPLY LINE.

a. Remove center-line ejector rack. (Refer to section IX.)

b. Remove screws that secure center-line fuel fitting to fuselage center line.

c. Disconnect center-line fuel fitting from clamp at fuselage station 141.

d. In forward equipment compartment, disconnect center-line fuel-selector-valve fuel line from center-line fuel fitting.

e. Break vapor seal and remove center-line fuel fitting.

f. Disconnect center-line fuel-selector-valve fuel hose from elbow at center-line fuel-selector valve port.

g. Remove clamp holding center-line fuel-selector-valve hose to main-fuel-cell fuel hose and remove combination center-line fuel hose and fuel line from airplane.

4–139. INSTALLATION—CENTER EXTERNAL FUEL TANK SUPPLY LINE.

a. Connect center-line fuel-selector-valve fuel hose to elbow at center-line fuel-selector valve port.

b. Connect center-line fuel-selector-valve fuel line to center-line fuel-selector-valve fuel hose.

Note

Center-line fuel-selector-valve fuel line should have a rubber bumper attached to prevent the left-hand forward-equipment-compartment access door from chafing the fuel line.

c. Clamp center-line fuel-selector-valve fuel line to main-fuel-cell fuel hose.

d. Insert nipple end of center-line fuel fitting through front spar into forward equipment compartment.

e. Connect center-line fuel-selector-valve fuel line to nipple of center-line fuel fitting.

CAUTION

There should be ⅛-inch minimum vapor seal gap between center-line fuel fitting and front-spar door assembly. This gap should be filled with a bead of EC Compound (Specification MIL-S-7124) to prevent center-line fuel fitting from chafing against front-spar door assembly.

f. Vapor seal center-line fuel fitting to front-spar door assembly through which it passes. (Refer to Handbook of Structural Repair Instructions, Navy Models AD-6 and AD-7 Aircraft.)

g. Clamp center-line fuel fitting to bracket at fuselage station 141.

h. Install screws that secure center-line fuel fitting flange to fuselage center line.

i. Install center-line external stores rack.

4–140. REMOVAL—LEFT-HAND EXTERNAL FUEL TANK SUPPLY LINE.

a. Remove left-hand wing external stores rack at left-hand wing vertical station 119.

b. Remove screws securing left-hand outboard fuel fitting flange to wing vertical station 119.

c. Disconnect left-hand outboard fuel line from left-hand outboard-fuel fitting nipple, and remove left-hand outboard fuel fitting from wing.

d. Disconnect left-hand outboard fuel line from union of left-hand outboard-center fuel hose at wing vertical station 95.5.

e. Disconnect left-hand outboard-center fuel hose from union at left-hand wing vertical station 55.5.

f. Disconnect clamps that secure left-hand outboard-center fuel hose to brackets at wing vertical stations 85.6 and 75.5.

g. Disconnect left-hand center-inboard fuel line from union at left-hand wing vertical station 55.5.

h. Disconnect left-hand center-inboard fuel line from union at left-hand wing vertical station 30.165, and remove left-hand inboard fuel line from wing.

i. Disconnect left-hand inboard fuel line from union at left-hand wing vertical station 30.165.

j. Remove clamp that secures left-hand inboard fuel line to main fuel cell fuel hose.

k. Remove clamp at left-hand wing vertical station 22.

l. Disconnect left-hand inboard fuel line from union on front spar at fuselage station 136.

m. In forward equipment compartment, disconnect left-hand fuel-selector-valve fuel hose from union on front spar at fuselage station 136.

n. Disconnect left-hand fuel-selector-valve fuel hose from elbow at left-hand fuel selector valve port.

4–141. INSTALLATION—LEFT-HAND EXTERNAL-FUEL-TANK SUPPLY LINE.

a. Connect left-hand fuel-selector-valve fuel hose to elbow at left-hand fuel-selector valve port.

b. Connect left-hand fuel-selector-valve fuel hose to union on front spar at fuselage station 136.

c. Clamp left-hand fuel-selector-valve fuel hose to right-hand fuel-selector-valve fuel line. (See figure 4–8.)

d. Connect left-hand inboard fuel line to union on aft side of front spar.

e. Connect left-hand inboard fuel line to union at left-hand wing vertical station 30.165.

f. Clamp left-hand inboard fuel line to bracket at left-hand wing vertical station 22.

g. Clamp left-hand inboard fuel line to main-fuel-cell fuel hose.

h. Connect left-hand center inboard fuel line to union at left-hand wing vertical station 30.165.

i. Connect left-hand center inboard fuel line to union at left-hand wing vertical station 55.5.

j. Connect left-hand center outboard fuel hose to union at left-hand wing vertical station 55.5.

k. Connect left-hand center outboard fuel hose to inboard side of union at left-hand wing vertical station 95.5.

l. Clamp left-hand center outboard fuel hose to brackets at left-hand wing vertical stations 75.5 and 85.6.

m. Connect 2-inch outside diameter side of left-hand outboard fuel line to union at left-hand wing vertical station 95.5.

n. Insert nipple end of left-hand outboard fuel fitting into bottom of left-hand wing at wing vertical station 119.

o. Connect 1-inch outside diameter side of left-hand, outboard fuel line to nipple end of left-hand outboard fuel fitting.

p. Secure left-hand outboard-fuel fitting flange to wing vertical station 119.

q. Install left-hand wing external stores rack on left-hand wing at vertical station 119.

4–142. TANKER ELECTRICAL PROVISIONS.

4–143. DESCRIPTION. (See figure 10–30A.) The tanker electrical provisions consists of the wire bundle, circuit breakers, right-hand fuel booster pump disconnect switch and a relay panel bracket assembly that interconnect the aircraft electrical system to the inflight fueling store.

4–144. TANKER WIRE BUNDLE. (See figure 10–30A.) The tanker provisions utilize the chemical tank wire bundles extending from the cockpit right-hand console to the front spar. The in-flight fueling adapter cable completes the circuit from the spray tank receptacle to the in-flight fueling store. Four additional wires are routed from terminal panel 20 to provide power control for the in-flight fueling control panel and the conversion-kit relay panel.

Note

To replace a defective wire in a wire bundle, disconnect defective wire at terminal panel. Splice new wire to defective wire, and then pull opposite end of defective wire until new wire replaces defective wire.

4–145. TANKER CIRCUIT BREAKERS. (See figure 7–2.) The tanker circuit breakers, labeled "INFLIGHT FUELING," are located on the cockpit circuit breaker

panel. The inflight fueling circuit breaker, on the secondary bus controls d-c power to the in-flight fueling control panel. When the circuit breaker is pulled out, no current flows to the in-flight fueling circuits.

4-146. BOOSTER PUMP DISCONNECT SWITCH. (See figure 4-9.) The right-hand fuel-booster-pump disconnect switch assembly is located in the forward equipment compartment on the edge of the front-spar shear shelf, approximately 9 inches to the left of the center line of the airplane. The disconnect switch assembly consists of a class D limit switch, an actuator, and an insulated panel assembly. The actuator is aligned with the limit switch so that when both are bolted into the panel assembly, the actuator depresses the limit switch plunger. The actuator is adjusted to depress the limit switch plunger when the right-hand external-fuel-tank center fuel hose is connected to the conversion-kit check valve assembly; then the installation bolts are tightened. Lateral adjustment for the actuator and switch is provided by the bottom installation bolt.

4-147. ADJUSTMENT.

a. Connect right-hand external-fuel-tank center fuel hose to tee assembly of conversion-kit check valve assembly.

b. Loosen screws that secure limit switch to panel.

c. Adjust limit switch so that actuator presses against right-hand external-fuel-tank center fuel hose with limit switch plunger depressed.

d. Tighten limit switch in position found in step c.

4-148. TANKER RELAY PANEL BRACKET. (See figure 4-12.) The tanker relay panel bracket is a sheet aluminum bracket which is riveted to the bottom of the pilot's seat support in the forward equipment compartment. The bracket is permanently installed to provide a means of locating and aligning the conversion-kit panel in the forward equipment compartment.

4-149. CONVERSION-KIT, A-1H OR A-1J TANKER.

4-150. GENERAL. The A-1H or A-1J tanker conversion kit includes the additional equipment to be installed in the airplane so that fuel can be transferred from the external 400-gallon wing tanks to an in-flight fueling store on the fuselage external-stores ejector rack. The principal components of the conversion kit are as follows:

Conversion-kit adapter cables
Conversion-kit fuel booster pumps
Conversion-kit relay panel
Conversion-kit check valve assembly
Conversion-kit control panel adapter.

4-151. CONVERSION-KIT ADAPTER CABLES. (See figure 4-10.) The conversion-kit wire adapter cables (Douglas 4553203-501) serve as connectors between the permanently installed aircraft wiring and the external 400-gallon wing tanks. The conversion-kit wire adapter cables (Douglas 4669008) serves as a connector between the permanent aircraft wiring and the in-flight fueling store.

4-152. INSTALLATION - ADAPTER CABLE (Douglas 4553203-501).

a. Remove store from right-and-left-hand wing external-stores rack.

b. Remove sway braces from right-and-left-hand wing external-stores rack.

c. Remove fairing from right-and-left-hand wing external-stores rack.

d. Plug applicable end of adapter cable (Douglas 4553203-501) in spray tank receptacle, located at right-and-left-hand wing external-stores rack.

e. Re-install fairing on right-and-left-hand wing external-stores rack.

f. Loosen adapter-cable support pin (pin head located on left-hand side of rack fairing).

g. Install adapter-cable support lanyard over adapter-cable support pin and then re-install support pin.

h. Re-install sway braces to right-and-left-hand wing external-stores rack.

4-153. REMOVAL - ADAPTER CABLES (Douglas 4553203-501).

a. Remove store from right-and-left-hand wing external-stores rack.

b. Loosen adapter-cable support pin (pin head located on left-hand side of fairing).

c. Remove adapter-cable support lanyard from adapter-cable support pin and then re-install adapter-cable support pin.

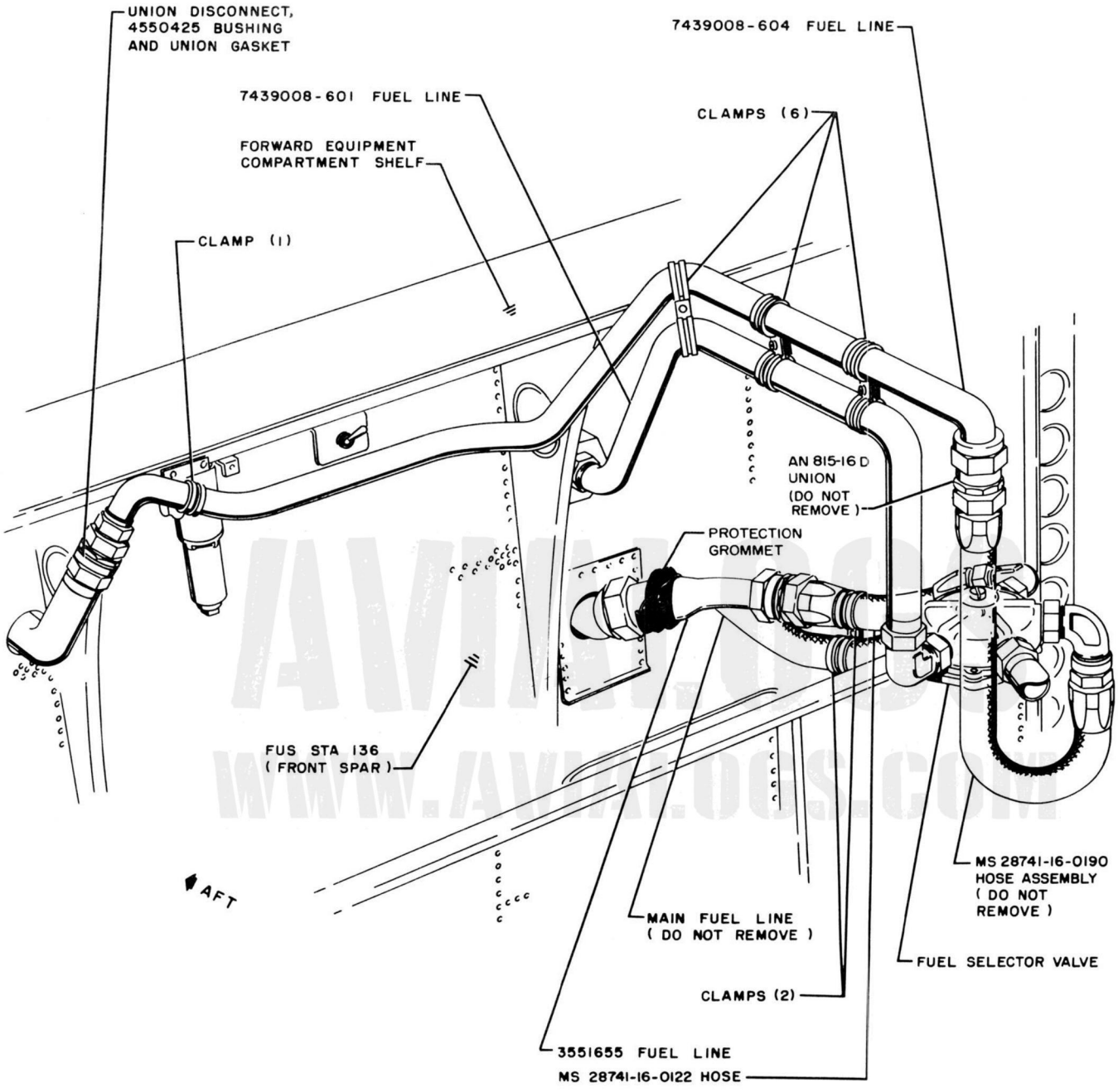
d. Remove sway braces from right-and-left-hand wing external-stores rack.

e. Remove fairing from right-and-left-hand wing external-stores rack.

f. Unplug adapter cable (Douglas 4553203-501) from spray tank receptacle.

g. Reinstall fairing to right-and-left-hand wing external-stores rack.

h. Re-install sway braces to right-and-left-hand external-stores rack.



VIEW LOOKING AFT FROM WITHIN FORWARD EQUIPMENT COMPARTMENT SHOWING FUEL LINES TO BE REMOVED PRIOR TO INSTALLATION OF TANKER PROVISIONS

EFFECTIVITY-BUNO.	
FACTORY:	PROVISIONS - 139641, 139774 - 139821, 142011 - 142060 NOT REWORKED PER BUAER AD/SC NO. 681
SERV CHG:	PROVISIONS - MODEL AD-6 AIRPLANES PRIOR TO BUNO 139774 EXCEPT 139641 REWORKED PER BUAER AD/SC NO. 606

P-8832-1B

Figure 4–7. Removal of Existing Fuel Lines—In-Flight Fueling System

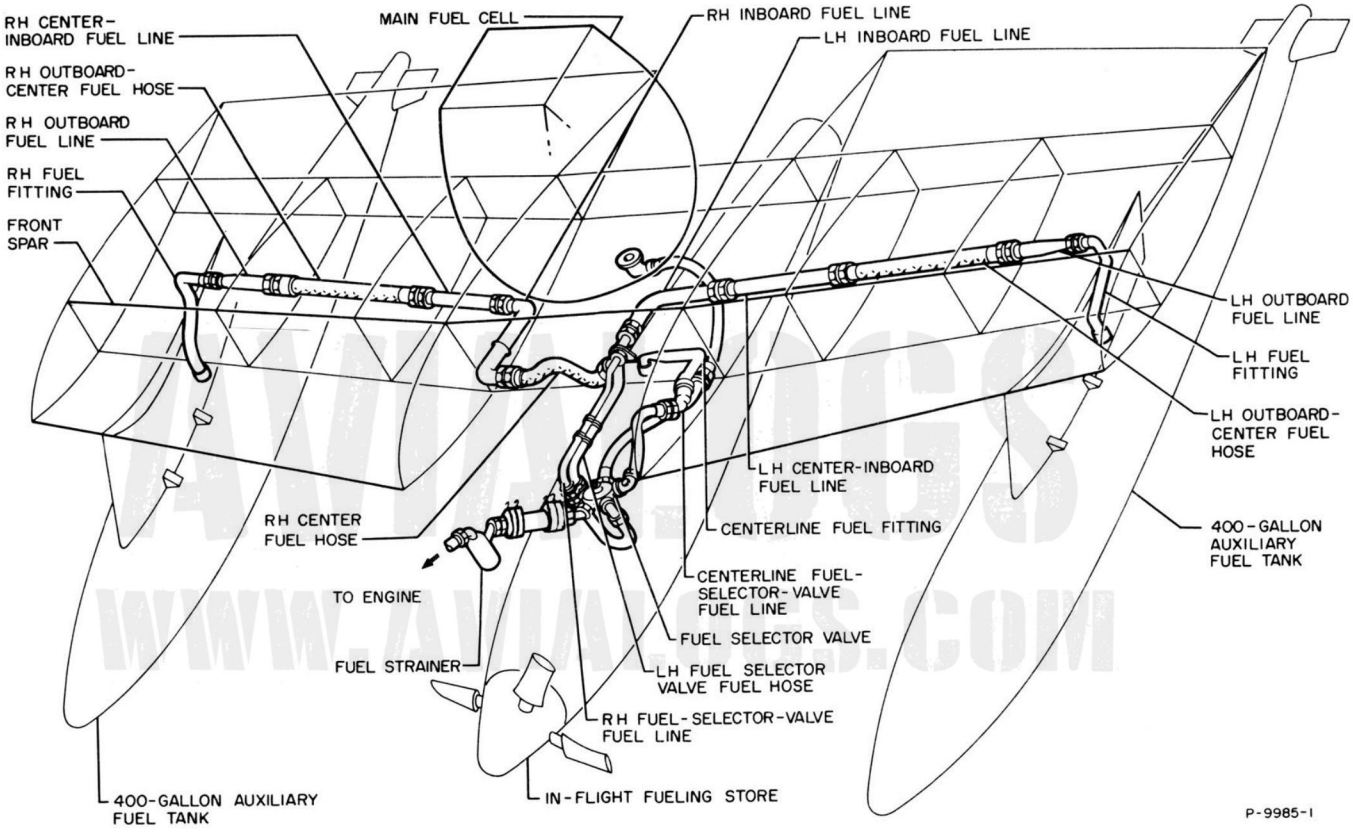


Figure 4–8. Tanker Fuel Lines—Provisions

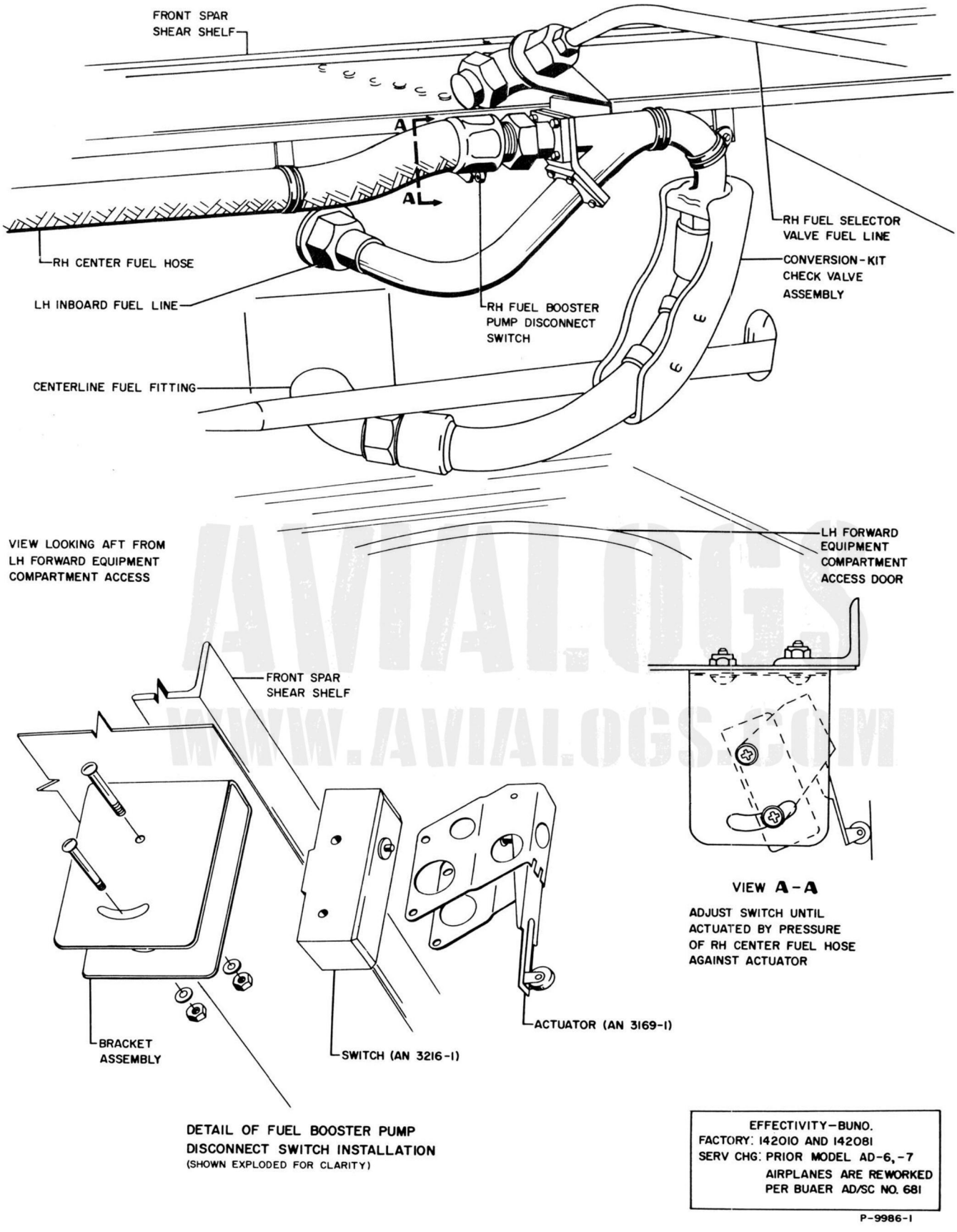


Figure 4–9. Tanker Right-Hand Fuel-Booster-Pump Disconnect Switch

4–154. INSTALLATION—ADAPTER CABLE (Douglas 4669008).

a. Remove fuel cell compartment drain access door, located aft of fuselage external-stores ejector rack fairing.

b. Remove bottom cover plate (Douglas 4551580) from fuselage external-stores ejector rack fairing, and store plate for re-installation.

c. Apply anti-seize compound (Specification JAN-A-669) to threads of adapter cable.

d. Route adapter cable through hole shown in figure 4–10, sheet 2 and/or 3, and plug to spray tank receptacle on aft side of front spar, station 136.

e. Remove cotter pins from aft support pin in fuselage external-stores ejector rack fairing and remove pin.

f. Re-install support pin through adapter-cable lanyard, and secure pin with cotter pins.

g. Install fuel cell compartment drain access door.

5–155. REMOVAL—ADAPTER CABLE (Douglas 4669008).

a. Remove fuel cell compartment drain access door, located aft of fuselage external-stores ejector rack fairing.

b. Remove cotter pins from aft support pin in fuselage external-stores ejector rack fairing; release adapter cable lanyard, and secure support pin with cotter pins.

c. Disconnect adapter cable plug from spray tank receptacle on aft side of front spar, station 136; remove adapter cable.

d. Re-install bottom cover plate on fairing.

e. Re-install fuel cell drain access door on fuselage.

4–156. CONVERSION-KIT FUEL BOOSTER PUMPS. (See figure 4–11.) The conversion-kit fuel booster pumps are installed in the bottom center of the external 400-gallon auxiliary fuel tanks. The fuel booster pumps are energized by the "SHIP TANK" switch and operate on 200 volt 3-phase 700/800 cps power. The conversion-kit fuel booster pumps provide the power for transferring fuel from the wing tanks to the centerline in-flight fueling store. When the right-hand 400-gallon auxiliary wing tank is connected to the tanker's fuel system in the tanker extended range configuration, the right-hand fuel-booster-pump disconnect switch prevents the right-hand booster pump from becoming energized and a bypass valve, which is incorporated in the pump, permits fuel to flow from the right-hand 400-gallon auxiliary wing tank to the engine of the tanker. Refer to table 4–4 for fuel booster pump characteristics.

4–157. INSTALLATION.

a. Remove door from bottom of external 400-gallon auxiliary wing tank (center of tank).

b. Remove bolts securing fuel strainer assembly to tank.

c. Lower fuel strainer assembly and disconnect fuel hose from outlet fitting.

d. Place gasket removed from fuel strainer assembly on flange of fuel booster pump.

e. Connect fuel hose to fuel-booster-pump fuel outlet.

f. Position fuel booster pump in external 400-gallon auxiliary wing tank and loosely re-install bolts which were removed with fuel strainer assembly.

g. Tighten bolts installed in step f.

h. Splice wires as shown in figure 4–11.

i. Install door to bottom of fuel tank.

4–158. REMOVAL.

a. Remove door from bottom of external 400-gallon auxiliary wing tank (center of tank).

b. Cut wires shown in figure 4–11.

c. Remove bolts securing fuel booster pump to tank.

d. Lower fuel booster pump and disconnect fuel hose from fuel outlet fitting.

e. Place gasket removed from fuel booster pump on flange of fuel strainer assembly.

f. Connect fuel hose to fuel strainer assembly fuel outlet.

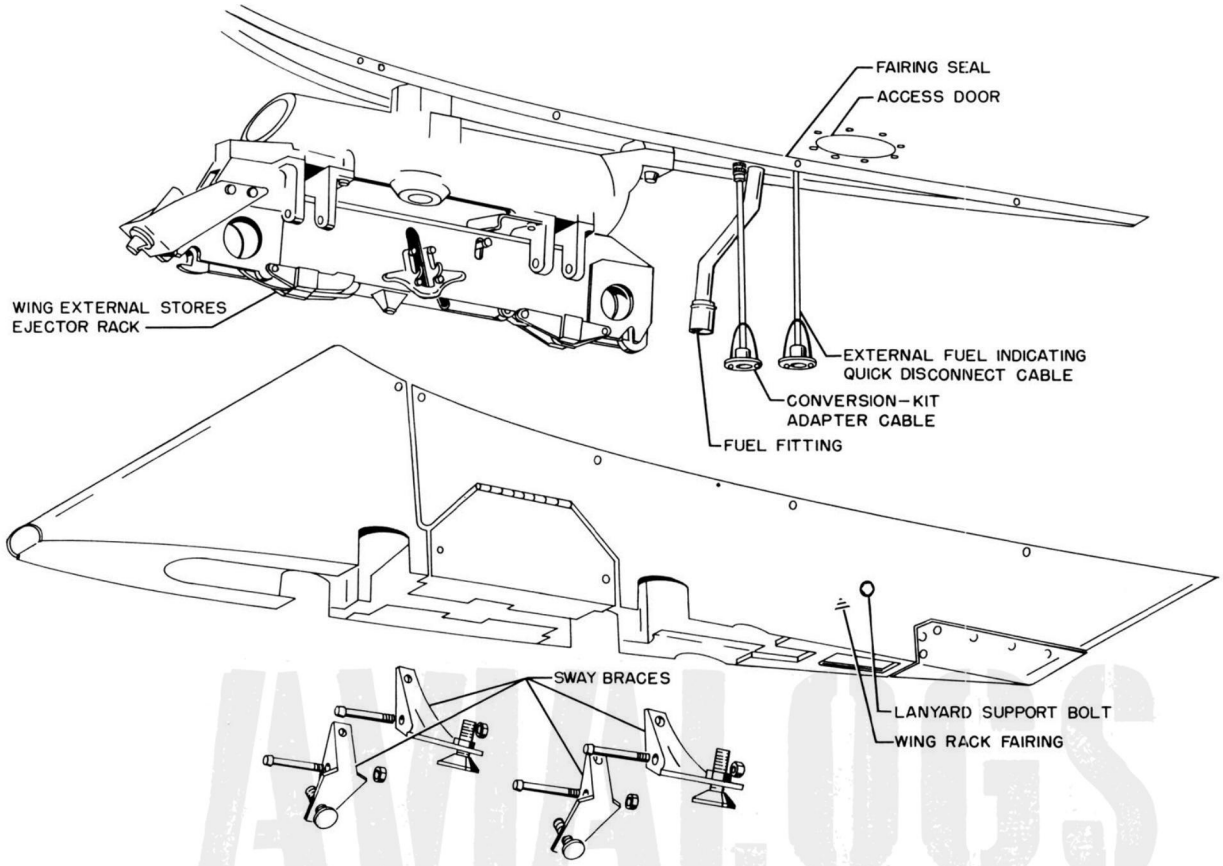
g. Position fuel strainer assembly in external 400-gallon auxiliary wing tank, and loosely re-install bolts which were removed with fuel booster pump.

h. Tighten bolts installed in step g.

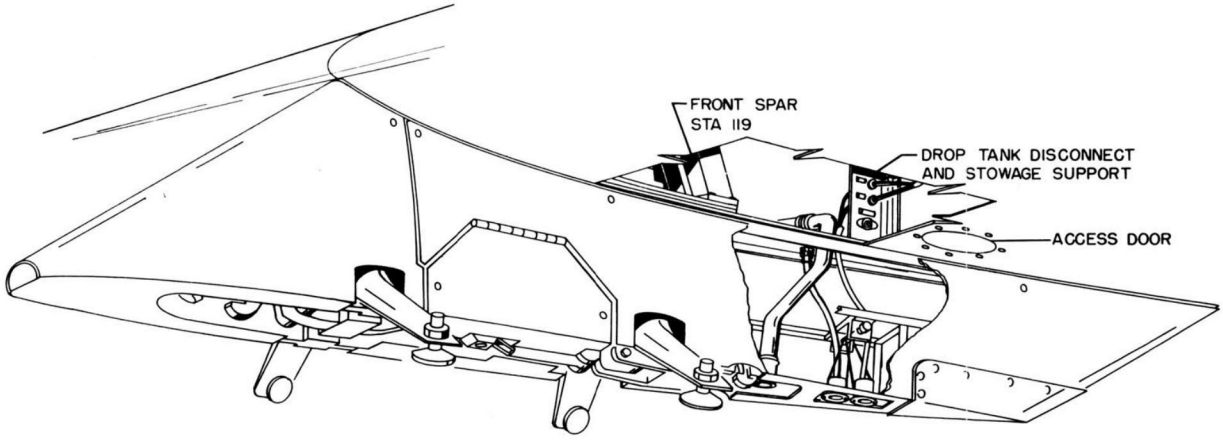
i. Install door on bottom of fuel tank.

4–159. CONVERSION-KIT RELAY PANEL. (See figure 4–12.) The conversion-kit relay panel contains the electrical equipment necessary to control the conversion-kit fuel booster pumps. It is a 12½-inch by 7-inch aluminum panel which is installed in the forward equipment compartment between the pilot seat support and the front-spar shear shelf. The relay panel acts as a support for a frequency sensor, two fuel-booster-pumps transfer relays, 6 circuit breakers, a receptacle, a ground stud, and the wires necessary to interconnect these units with the permanently installed aircraft wires.

4–160. The frequency sensor prevents high currents at low fuel-booster-pump speeds from damaging the fields of the fuel-booster-pump electric motors. The frequency sensor unit consists of a high-pass filter circuit which rejects low frequency currents. When the variable a-c line frequency of the tanker drops below 690 cps, the contacts of a sensor relay open and break the circuit to the fuel-booster-pump transfer relay coils. This action de-energizes the conversion-kit fuel booster pumps installed in the external 400-gallon auxiliary wing tanks. When



REMOVE SWAY BRACES AND FAIRING IN ORDER TO PROPERLY INSTALL CONVERSION-KIT ADAPTER CABLE AND EXTERNAL FUEL INDICATING QUICK DISCONNECT CABLE.



COMPLETED ASSEMBLY WITH CONVERSION-KIT ADAPTER CABLE AND EXTERNAL FUEL INDICATING QUICK DISCONNECT CABLE INSTALLED.

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Figure 4-10. Conversion-Kit Adapter Cable Installation (Sheet 1)

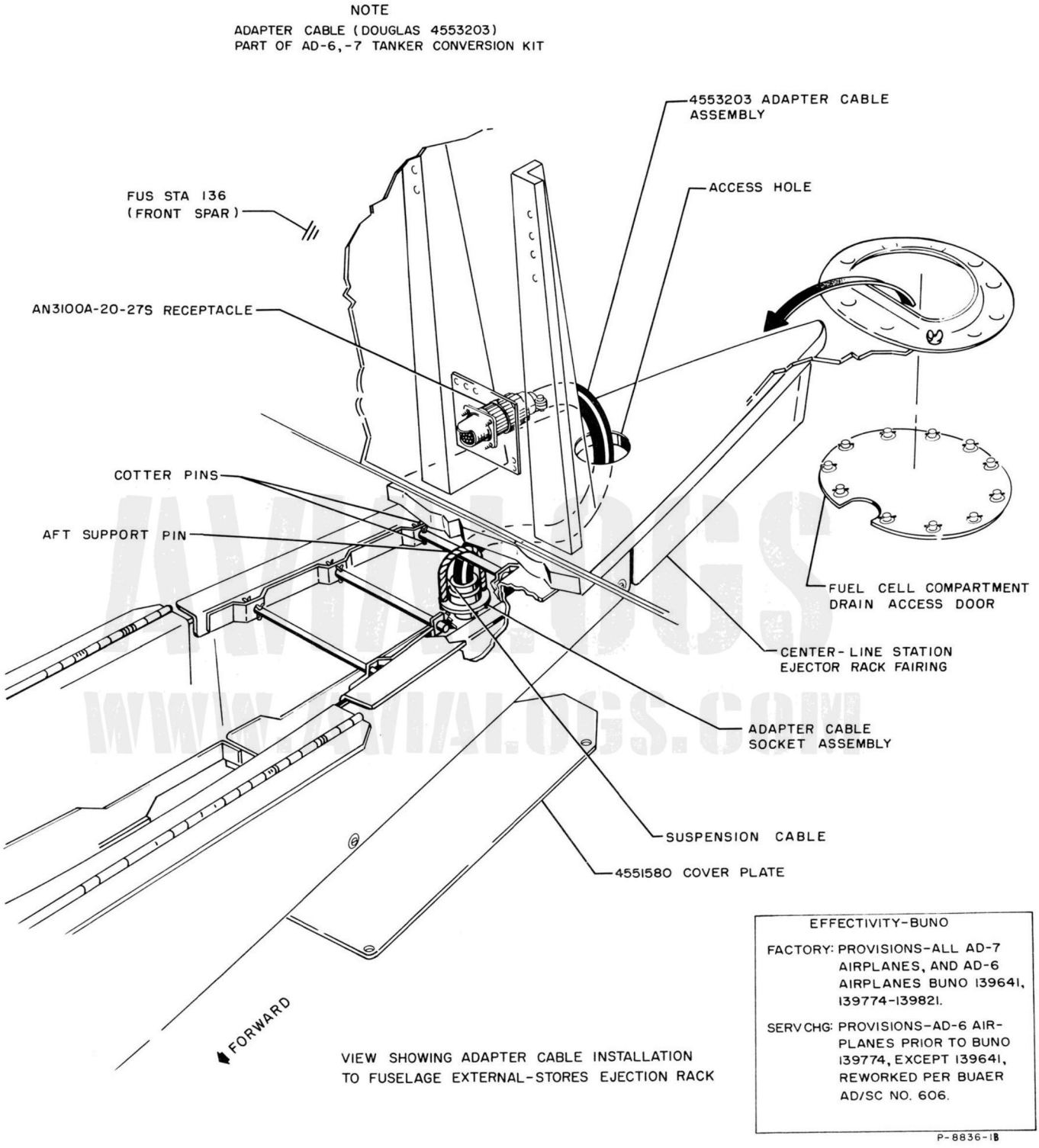
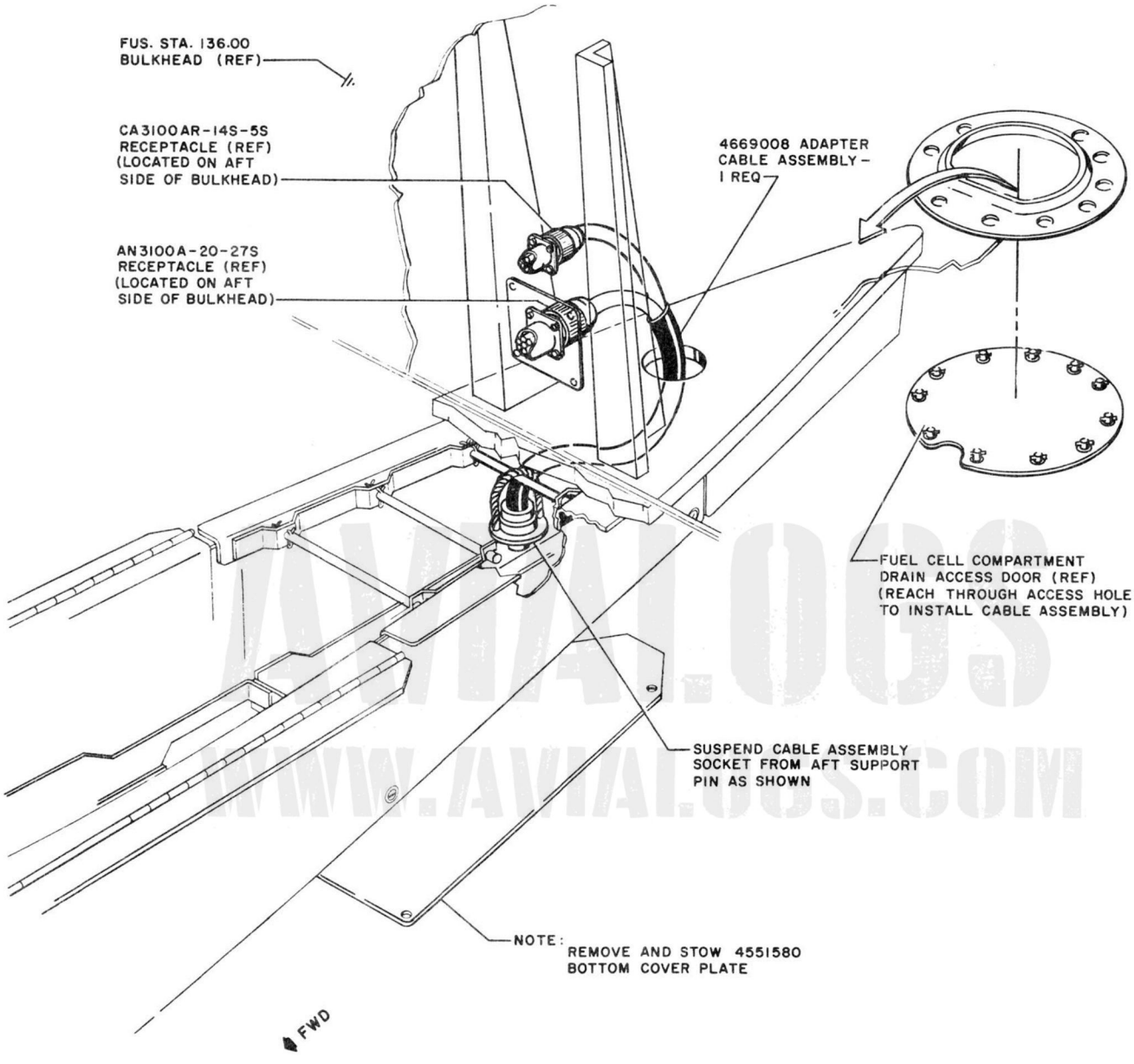


Figure 4-10. Conversion-Kit Adapter Cable Installation (Sheet 2)



CONVERSION KIT ADAPTER CABLE INSTALLATION

EFFECTIVITY-BUNO.
FACTORY: NONE
SERV CHG: MODEL AD-6 AND AD-7 AIRPLANES REWORKED PER BUAER AD/SC NO. 694

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Figure 4-10. Conversion-Kit Adapter Cable Installation (Sheet 3)

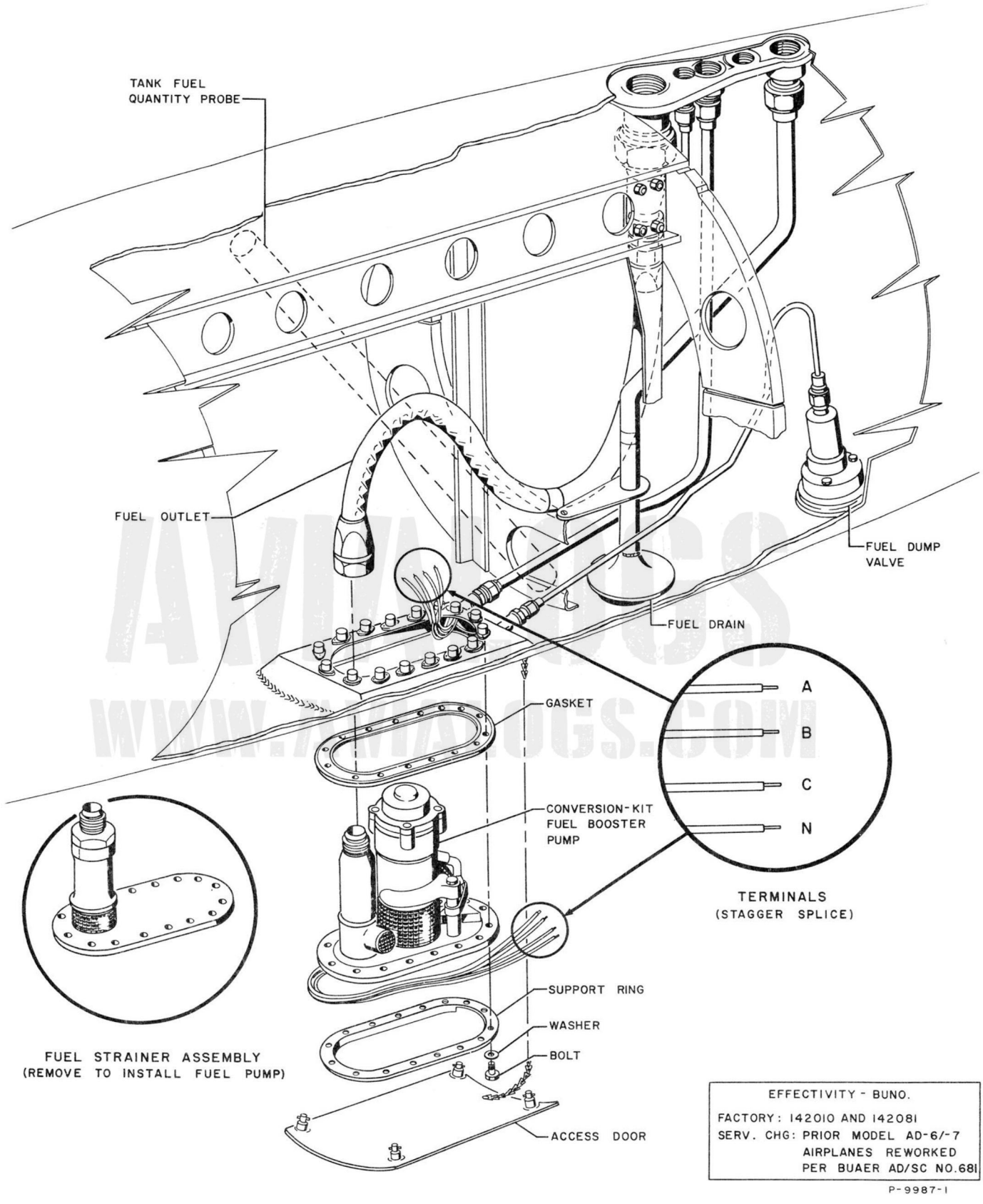


Figure 4-11. Conversion-Kit Fuel Booster Pump Installation

the variable a-c line frequency of the tanker rises above 698 cps, the LCR circuit of the sensor closes the sensor relay contacts. This action re-energizes the conversion-kit fuel booster pumps. The frequency sensor is hermetically sealed and is to be replaced when not functioning properly.

4–161. The two fuel-booster-pump transfer relays are mounted adjacent to the frequency sensor on the conversion kit relay panel. Both relays are wired so that when their coils are energized by the frequency sensor, the fuel-booster-pump electric motors are energized. The right-hand fuel-booster-pump transfer relay contains a disconnect switch between its coil and ground. The disconnect switch is installed on the front-spar shear shelf in the forward equipment compartment. The disconnect switch prevents the right-hand fuel-booster-pump transfer relay from becoming energized when the refueling airplane is placed in the tanker extended range configuration.

4–162. Six circuit breakers prevent a variable a-c current overload from entering the conversion-kit relay panel circuitry. The circuit breakers are installed below the fuel-booster-pump transfer relays. There is one for each phase of the a-c current entering the relay panel. The circuit breakers are removed and replaced from the rear of the relay panel.

4–163. The receptacle is installed beneath the frequency sensor on the conversion-kit relay panel. The receptacle supplies the means of connecting the relay panel wires to the permanently installed tanker wire bundle which is connected to a stowage repectacle behind the bottom of the relay panel. The receptacle is a nineteen pin plug of which thirteen pins are utilized. Refer to the applicable in-flight fueling wire diagram in section X for information concerning the conversion-kit relay panel wiring.

4–164. The ground stud is installed between the receptacle and the circuit breakers on the conversion-kit relay panel. It supplies the means of grounding the coil of the left-hand fuel-booster-pump transfer relay. The ground stud consists of a bolt, three washers, two lockwashers and two nuts.

4–165. There are 324 inches of 20 gage, unshielded copper wire interconnecting the electrical units on the conversion-kit relay panel. Refer to table 4–3 for lengths of wires used on the conversion-kit relay panel. Refer to the applicable wiring diagram in section X for replacement of wires on the conversion-kit relay panel.

4–166. INSTALLATION. (See figure 4–12.)

a. Temporarily install conversion-kit relay panel on pilot-seat-support relay panel bracket.

Note

Push bottom of relay panel against front-spar shear shelf, and align relay-panel installation holes with matching holes in edge of shear shelf.

b. Attach relay panel to front-spar shear shelf.

c. Tighten installation nuts.

d. Disconnect relay panel plug from stowage receptacle and connect plug to relay panel receptacle.

4–167. REMOVAL. (See figure 4–12.)

a. Disconnect relay panel plug from relay panel receptacle and connect plug to stowage receptacle.

b. Remove bolts attaching relay panel to front-spar shear shelf.

c. Remove bolts attaching relay panel to pilot-seat-support relay panel bracket.

4–168. CONVERSION-KIT CHECK VALVE ASSEMBLY. (See figure 4–13.) The check valve assembly is installed in the forward equipment compartment between the tanker fuel lines and the center-line external-fuel-tank disconnect fitting. It basically consists of a tee assembly and two flapper-type check valves through which fuel from the 400-gallon auxiliary wing tanks is channeled to the in-flight refueling store. Each valve is installed between the tee assembly and fuel line from the auxiliary wing tanks so that they open into the tee. Thus, if one auxiliary wing tank fuel booster pump fails, the associated check valve will close to prevent transfer of fuel from the other external tank.

WARNING

Install a shield (Douglas 3662672) on the check-valve hose assembly which leads from the check valve tee assembly to the center-line external-fuel-tank fuel fitting located on the front spar. The shield prevents fuel from splashing on the adjacent auxiliary-hydraulic-pressure system pump which is electrically driven.

4–169. INSTALLATION. (See figure 4–13.)

a. Defuel external fuel tanks which are installed on center wing racks.

b. In cockpit, turn fuel selector handle to "OFF" position.

c. In forward equipment compartment, disconnect centerline external-fuel-tank supply line between fuel selector valve and center-line external-fuel-tank fuel fitting on front spar.

Note

Left-hand external-fuel-tank fuel fitting is located directly above center-line external-fuel-tank fuel fitting on front spar.

d. Disconnect left-hand external-fuel-tank supply hose from left-hand external-fuel-tank fuel fitting on front spar.

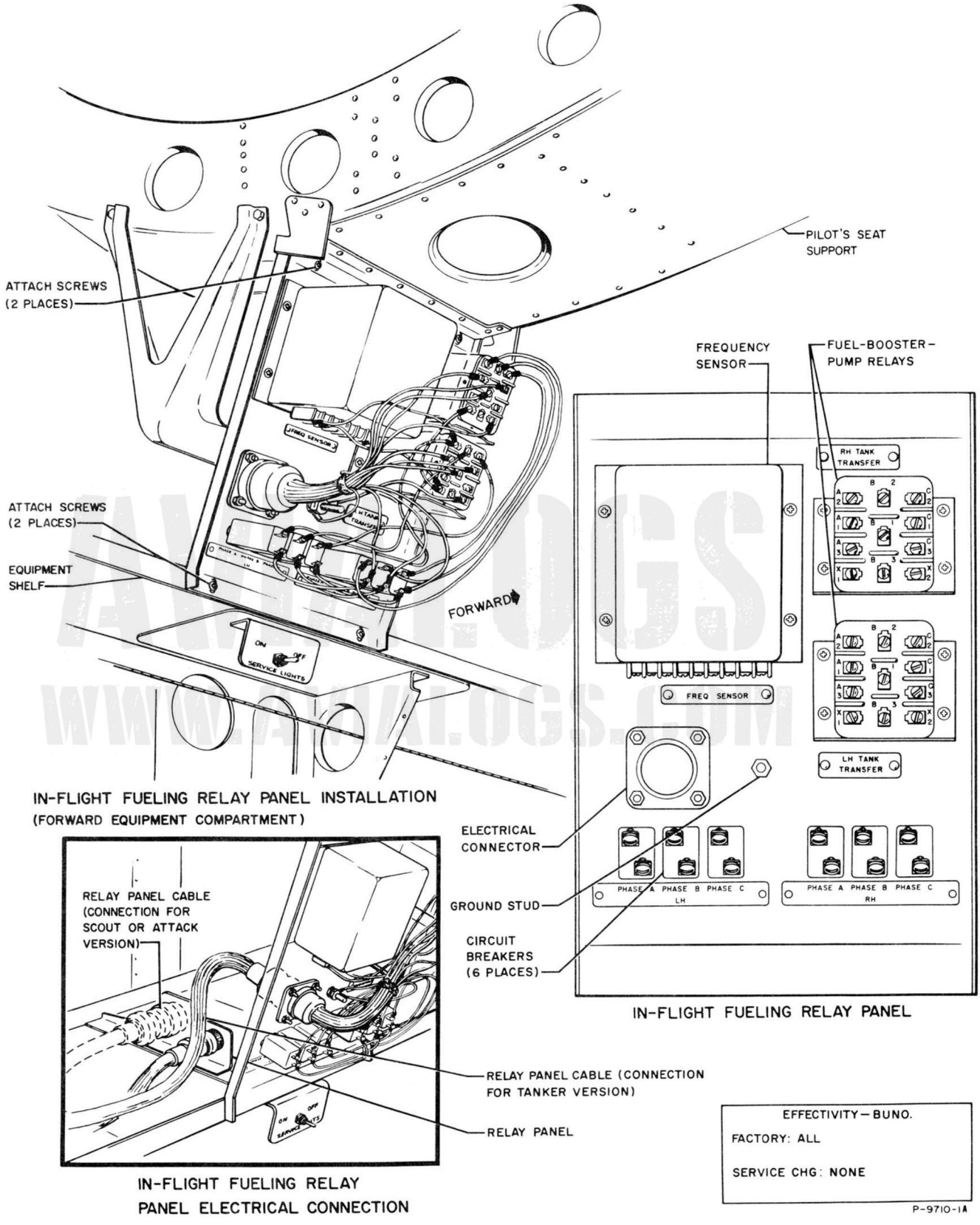


Figure 4-12. Conversion-Kit Relay Panel Installation

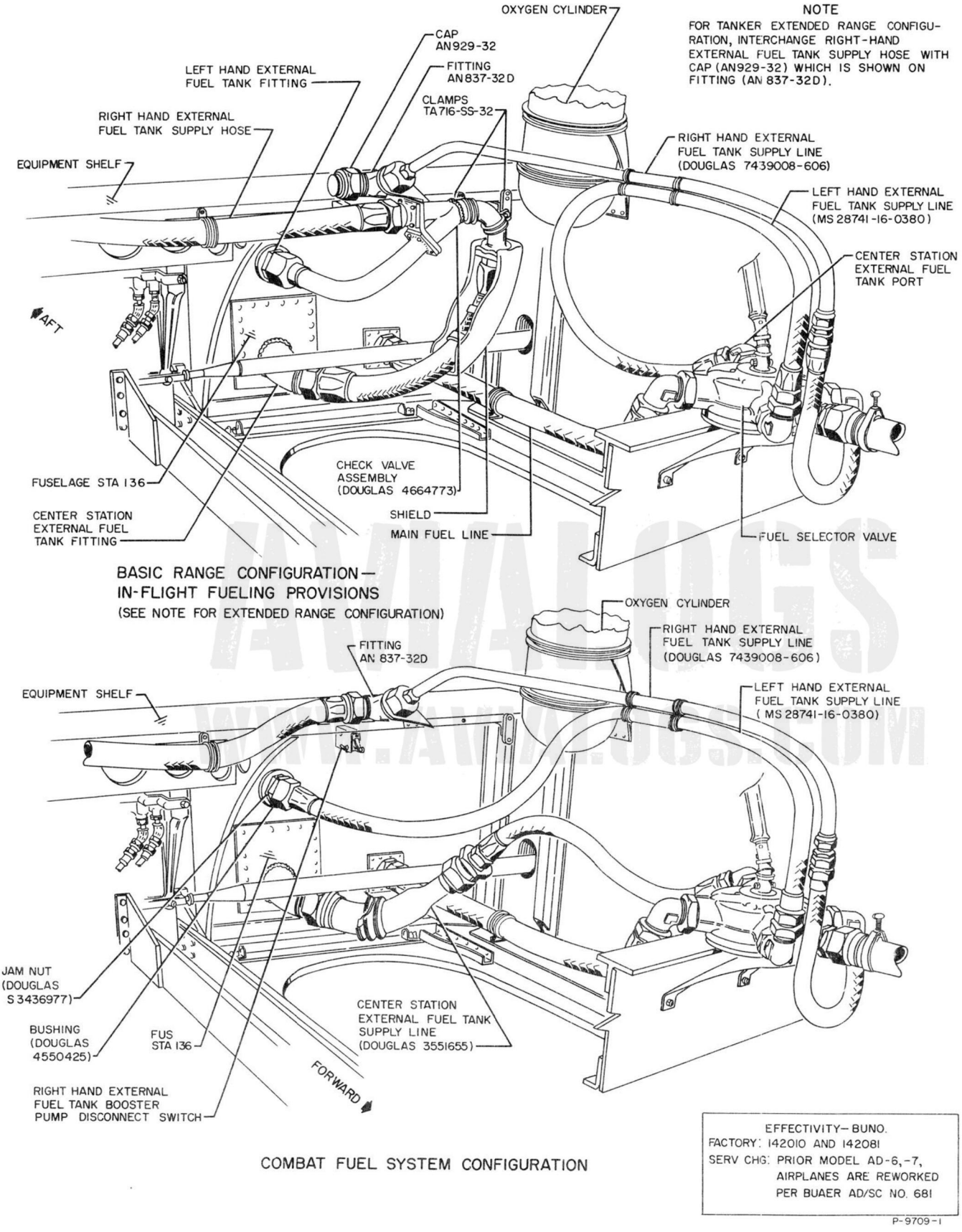


Figure 4-13. Conversion-Kit Check Valve Installation

e. Reverse direction of left-hand external-fuel-tank supply hose and connect it to center-line external-fuel-tank supply port on fuel selector valve.

f. Connect check valve tube assembly to left-hand external-fuel-tank fuel fitting on front spar.

g. Install check valve assembly on front-spar shear shelf.

h. Connect check valve hose assembly to center-line external-fuel-tank fuel fitting on front spar.

Note

Refueling airplane is now in tanker extended range configuration where only the left-hand external wing tank feeds the in-flight fueling store.

To change the refueling airplane into the basic tanker configuration perform the following steps:

i. Remove cap assembly from check valve tee assembly.

j. Disconnect right-hand external-fuel-tank center fuel hose from disconnect fitting build-up which is located above check valve assembly.

k. Connect right-hand external-fuel-tank center fuel hose to check valve tee assembly.

l. Install check valve cap assembly to disconnect fitting build-up.

Note

Right-hand external-fuel-tank disconnect switch should be closed by the installation of the right-hand external-fuel-tank center fuel hose to the check valve tee assembly. The refueling airplane is now in the basic tanker configuration where both external wing tanks feed the in-flight fueling store.

4–170. REMOVAL. (See figure 4–13.)

Note

If tanker is in extended range configuration, begin with step e. If tanker is in basic range configuration, begin with step a.

a. Remove check valve cap assembly from right-hand external-fuel-tank disconnect build-up fitting on edge of front-spar shear shelf.

b. Disconnect right-hand external-fuel-tank center fuel hose from check valve tee assembly.

c. Connect right-hand external-fuel-tank center fuel hose to disconnect fitting build-up.

d. Install cap assembly to check valve tee assembly.

e. Disconnect check valve hose assembly from center-line external-fuel-tank fuel fitting on front spar.

f. Remove check valve assembly from front-spar shear shelf.

g. Disconnect check valve tube assembly from left-hand external-fuel-tank fuel fitting on front spar.

h. Disconnect left-hand external-fuel-tank supply hose from center-line external-fuel-tank supply port of fuel selector valve.

i. Reverse direction of left-hand external-fuel-tank supply hose, and attach it to the left-hand external-fuel-tank fuel fitting on front spar.

j. Install center-line external-fuel-tank supply line between fuel selector valve, and front spar center-line external-fuel-tank fuel fitting.

4–171. CONVERSION-KIT CONTROL PANEL ADAPTER. (See figure 4–21.) The conversion-kit control panel adapter (Douglas 3552434) is a blank panel that fits next to the in-flight fueling control panel on the cockpit right-hand console. Besides completing the right-hand console installation, this panel provides the means of electrically integrating the in-flight fueling control panel with the system wiring. It includes a wire bundle which is connected to the control panel, and a receptacle to which system wiring is connected. Refer to paragraph 4–192 for installation of this panel.

4–172. ATP-D1 400-GALLON AUXILIARY FUEL TANKS.

4–173. DESCRIPTION. (See figure 4–14.) Two ATP-D1 400-gallon auxiliary fuel tanks are installed on the wing external-stores racks to provide additional fuel for the in-flight fueling system. They are adapted to the racks by using the forward fuel outlet, the electrical receptacles, and the 30-inch suspension with an extended forward lug. The remaining two outlets are capped. The tanks are adapted for use with the in-flight fueling system by removing the fuel strainer assembly, which is accessible through the bottom-center access door, and installing a conversion-kit fuel booster pump in its place. The pump provides the means for transferring fuel from the tanks to the in-flight fueling store. Maintenance of all internal parts, other than the pump, is accomplished by removing the nose of the tank. Nose bolts are made accessible by removing the pressure fueling shut-off valve located on the forward left-hand side of the tank.

Note

Filling the 400-gallon tanks is accomplished through either a conventional filler port located on the upper left-hand side of the tank, or through a pressure fueling port located on the forward left-hand side of the tank.

4–174. INSTALLATION.

a. Open wing stores rack fairing access door.

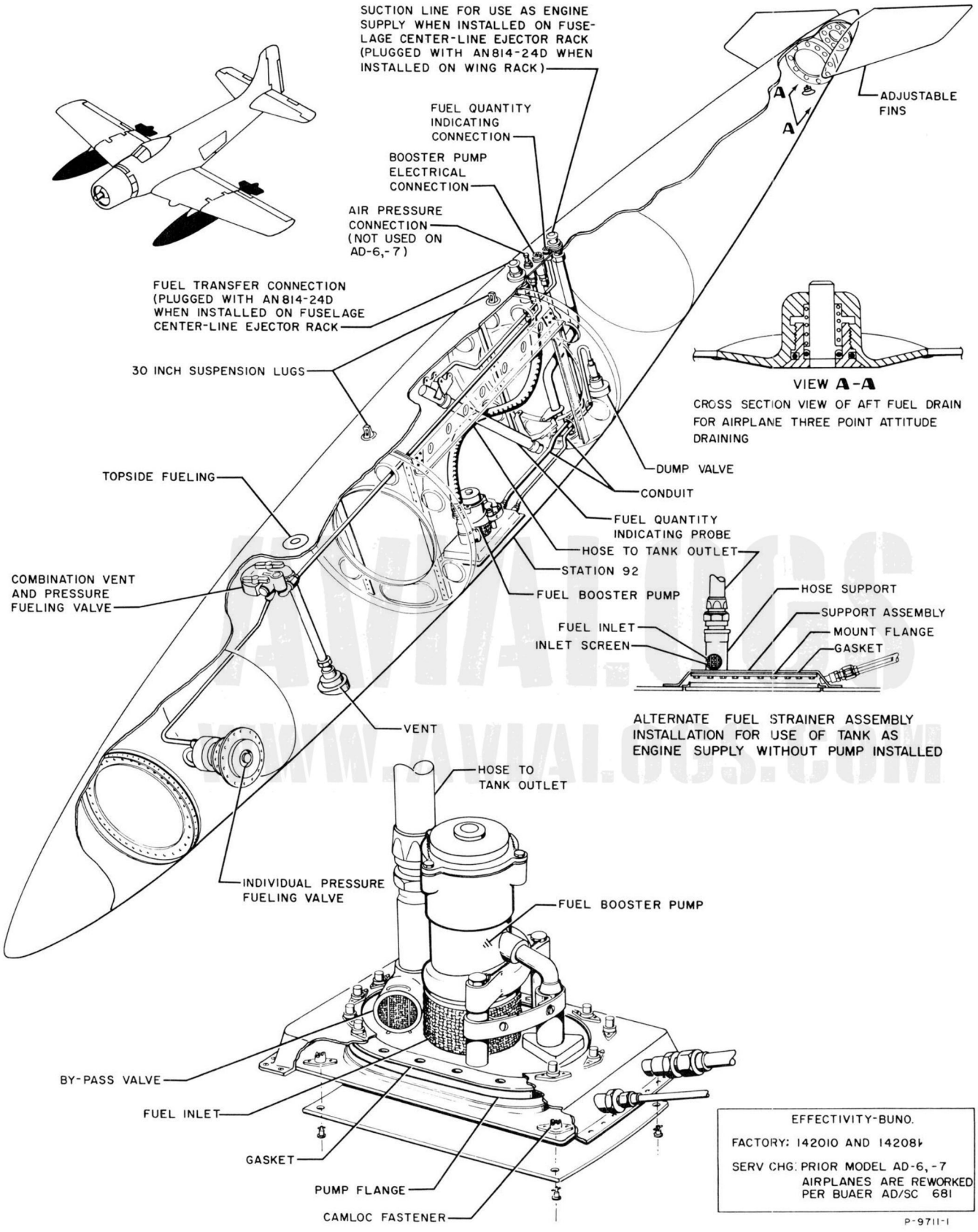


Figure 4-14. ATP-D1 400-Gallon Auxiliary Fuel Tank

WARNING

DO NOT operate manual release handle in cockpit.

b. Manually open hooks at rack.

c. Loosen adjustable sway braces.

Note

Install the following equipment on the ATP-D1 400-gallon auxiliary fuel tank.

d. Install MC29513-224 gasket and adapter (Douglas 4550619) in forward fuel outlet.

e. Install MS29513-11 gasket and AN814-6D plug in air pressure inlet.

f. Install MS29513-224 gasket and AN814-24D plug in aft fuel outlet.

g. Install lug (Douglas 4555001) in forward lug position.

h. Install lug (Douglas 4544419) in aft lug position.

i. Install hose (Douglas 5550344-9) on fuel fitting inside of wing rack.

j. Seal pylon hose with Gastite (American Metal Hose Co, Waterbury, Conn.) and one hose clamp at either end.

Note

Empty, ATP-D1 400-gallon auxiliary fuel tank weighs 253 pounds. With a man on each end of empty tank, raise tank while a third man guides adapter (Douglas 4550619) onto hose (Douglas 5550344-9), and electrical connectors to correct fittings. Rack hooks should automatically close on store lugs.

k. Check all connections for tightness.

l. Adjust braces to rest firmly against store.

m. With airplane in three (3) point attitude and fuel cell empty, adjust all four (4) sway brace cables for 30 ± 10 pounds tension.

n. Close wing stores rack fairing access doors.

o. Fill fuel cell and recheck sway brace cables for proper tension (30 ± 10 pounds).

4–175. REMOVAL.

a. Defuel store.

b. Open wing stores rack fairing access doors.

WARNING

DO NOT operate manual release handle in cockpit.

c. With a man at each end of tank, raise tank to remove weight from rack hooks.

d. Manually release hooks at rack.

e. Lower rack to suitable carrier.

f. Close wing stores rack fairing access doors.

4–176. INFLIGHT FUELING STORE.

4–177. DESCRIPTION. (See figure 4–15 and 4–15A.) The in-flight fueling store is a cylindrical tank which contains compartments for storing fuel and the hydraulic units necessary for control of a drogue and hose reel assembly. The store has a fuel capacity of 300 gallons and can transfer fuel to a receiving airplane at rates up to 200 gallons per minute at 25 to 50 psi pressure. When installed, the store is attached to the centerline rack hooks by two lugs spaced 30 inches apart. Fuel and electrical connections are made between fittings on top of the store and the respective airplane systems. The store weighs approximately 680 pounds unfueled and is equipped with pressure fueling shut-off features which prevent damage to the store during ground servicing. The inflight fueling store consists basically of the following major assemblies: Nose section, center section, aft section, aft bulkhead, hose reel and tailcone section. The hydraulic and fuel system installations are integrated with the major assemblies. For purposes of clarity, operating features are combined and discussed as follows:

System	*Para Ref*
Hydraulic System	4–194
Fuel System	4–196
Emergency System	4–198

4–177A. ACCESS PROVISIONS. (See figure 4–15B.)

4–178. NOSE SECTION. (See figure 4–16.) The nose section contains a ram air turbine, hydraulic pump, hydraulic reservoir and hydraulic fluid cooler. Provisions for ground servicing of the store are provided in the nose section for draining, filling or bleeding the hydraulic system.

4–179. CENTER SECTION. (See figure 4–17.) The center section contains the fuel cell, pressure fueling receptacle, gravity fuel filler and fuel pump. The fuel cell extends from the center section forward bulkhead to the center section aft bulkhead. Suspension lugs, fuel and electrical connections are provided on the top side of the center section for adapting the store to the aircraft. Two receptacles for fuel servicing of the store are provided on the forward top and lower left-hand side of the center section. The top receptacle is used for gravity servicing and the lower receptacle is used for pressure fuel servicing. Provisions for manually draining the fuel cell through a drain valve or emergency dumping of fuel through an electrically actuated dump valve are located on the bottom side of the center section.

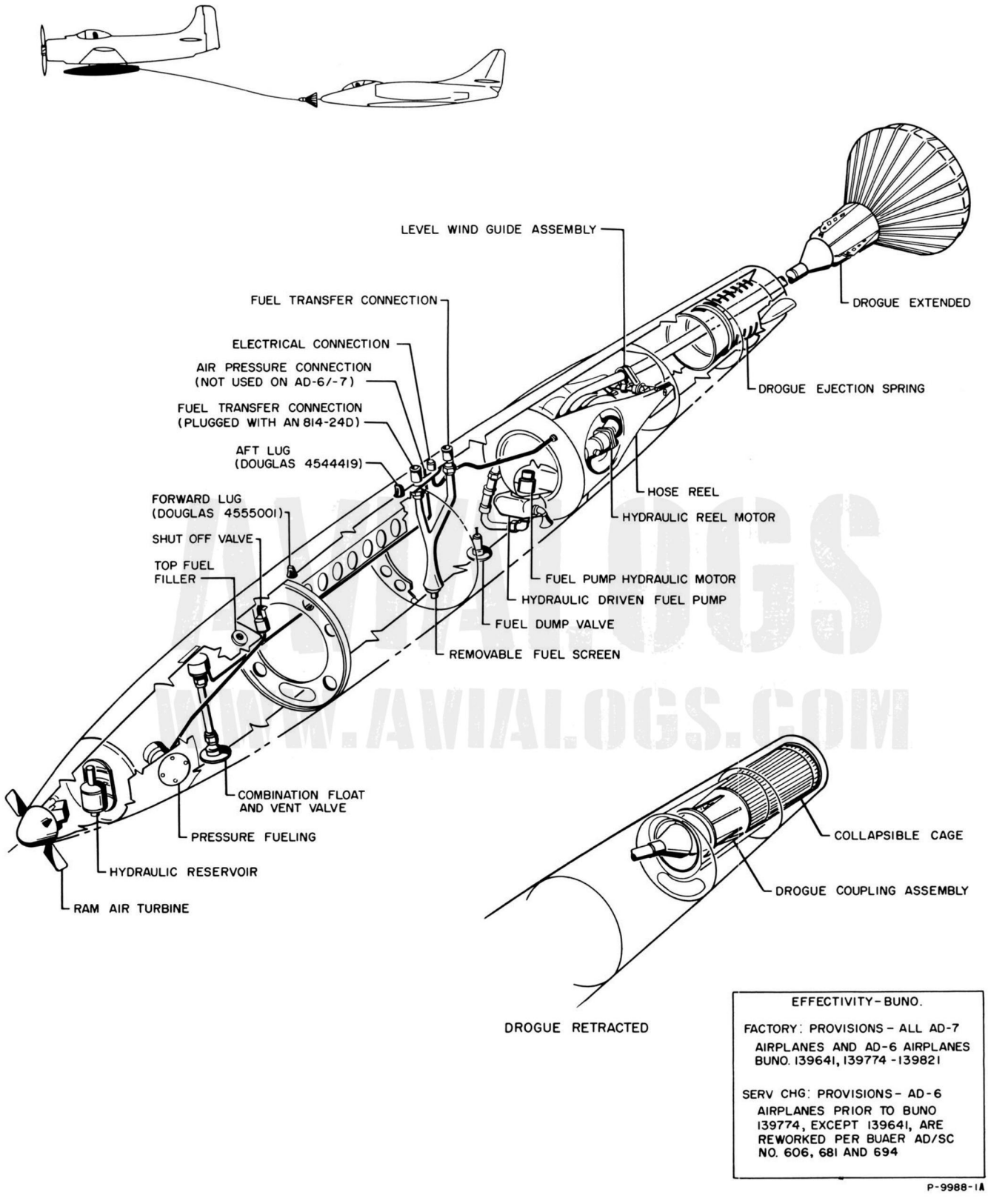
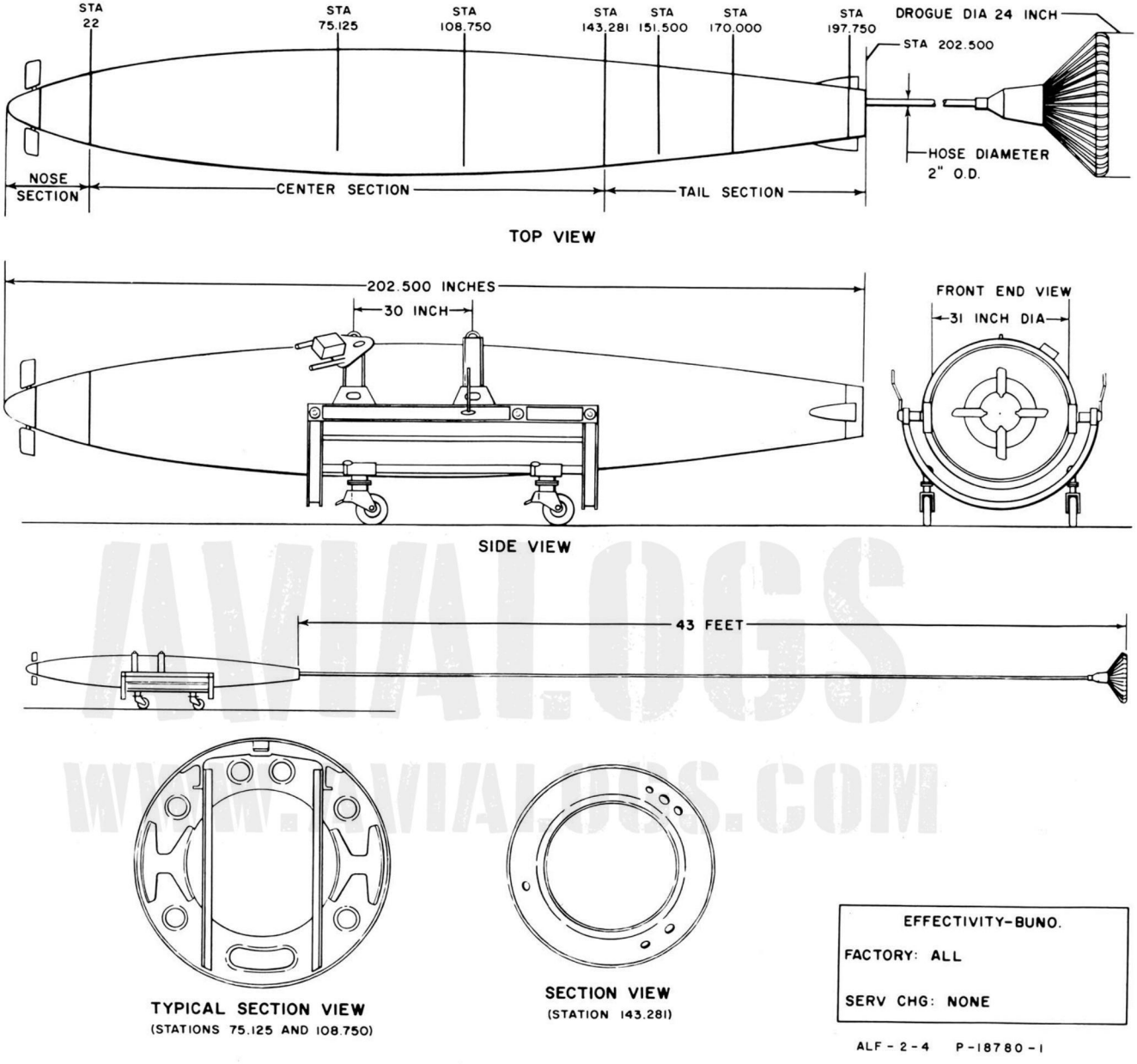


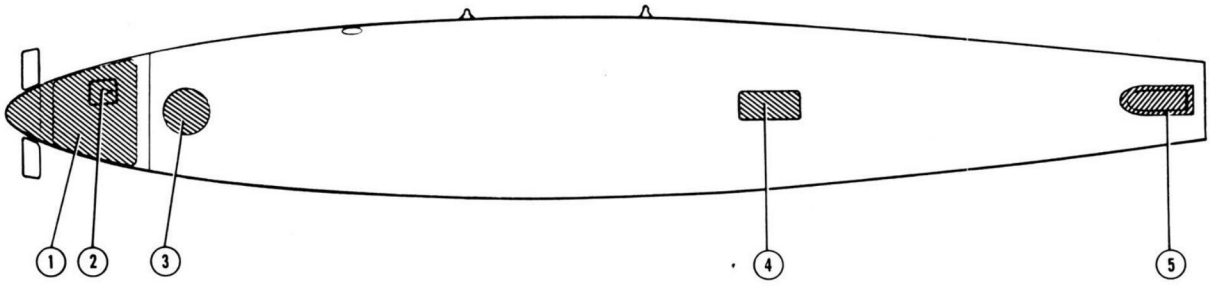
Figure 4-15. In-Flight Fueling Store

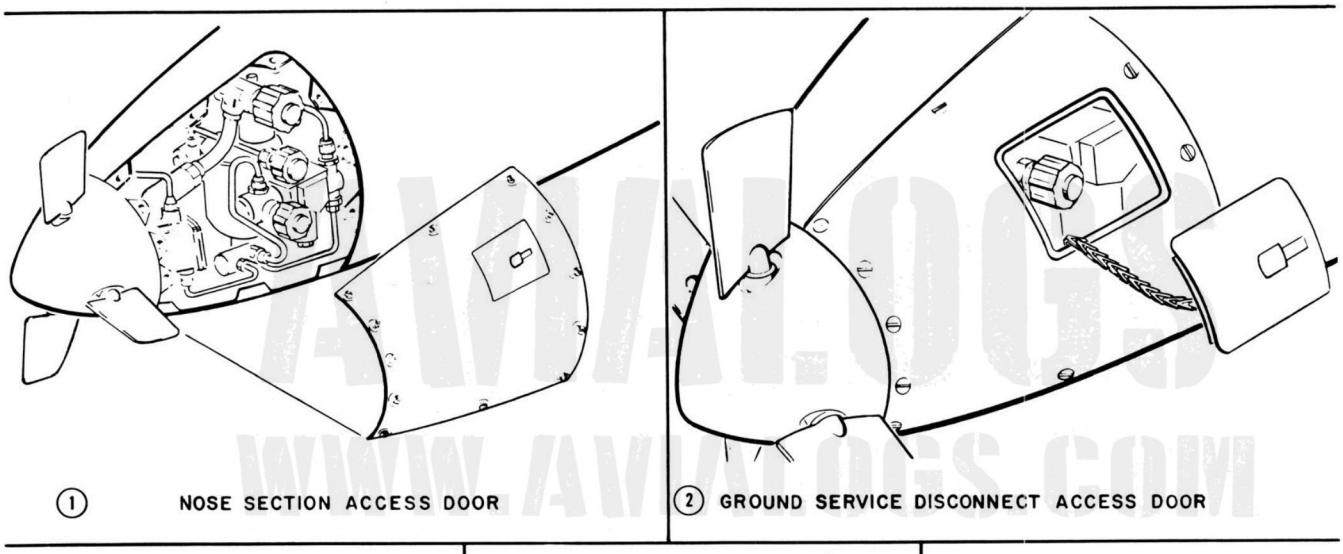


Maximum Diameter	31 inches	Lug Spacing	30 inches or 20 inches
Height (Store on Dolly)	45.3 inches	Hose Diameter	2 inches OD 1 ½ inches ID
Drogue Diameter	24 inches		
Propeller Diameter	22.5 inches	Hose Length (Total) (Extended)	50 feet 43 feet, 2 inches

Figure 4-15A. In-Flight Fueling Store Principle Dimensions

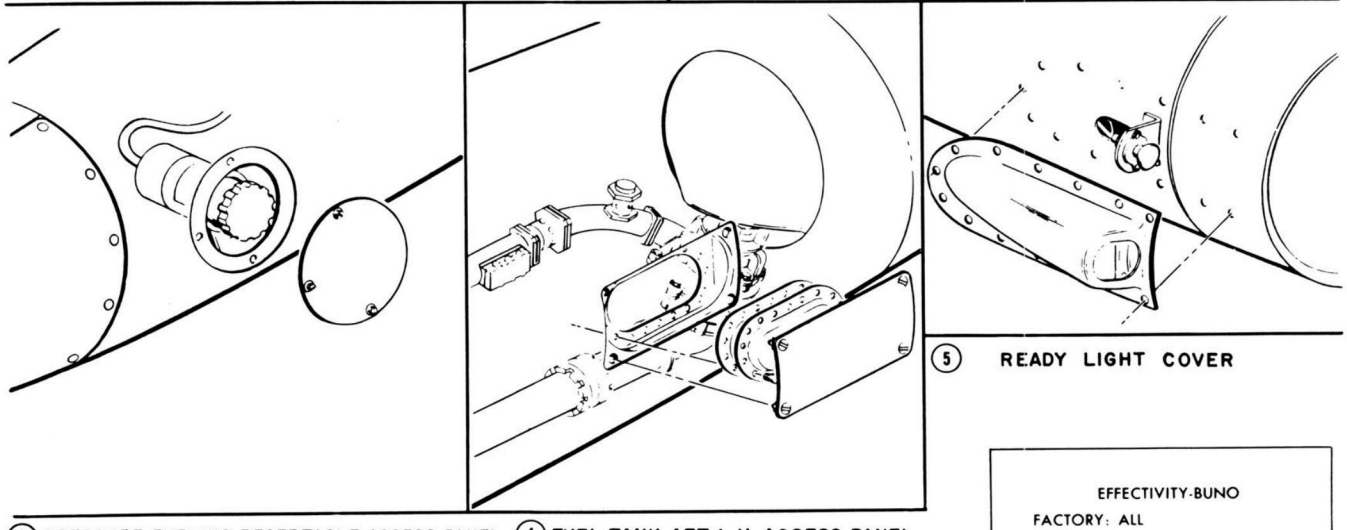
LEFT-HAND SIDE





1 NOSE SECTION ACCESS DOOR

2 GROUND SERVICE DISCONNECT ACCESS DOOR



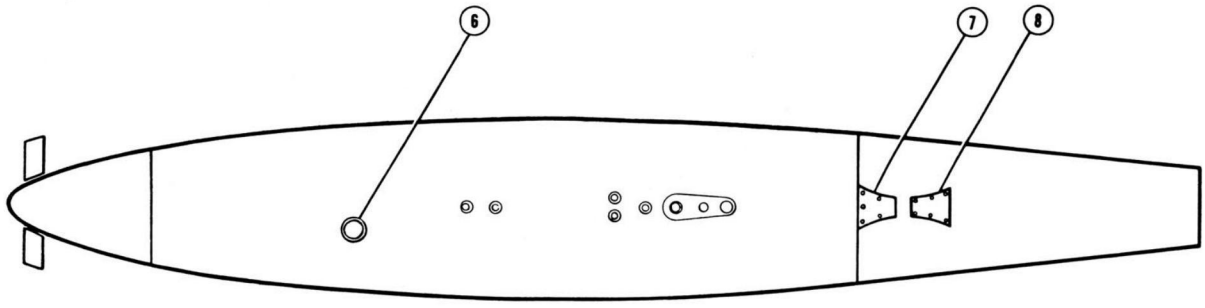
3 PRESSURE FUELING RECEPTACLE ACCESS PANEL 4 FUEL TANK AFT L.H. ACCESS PANEL

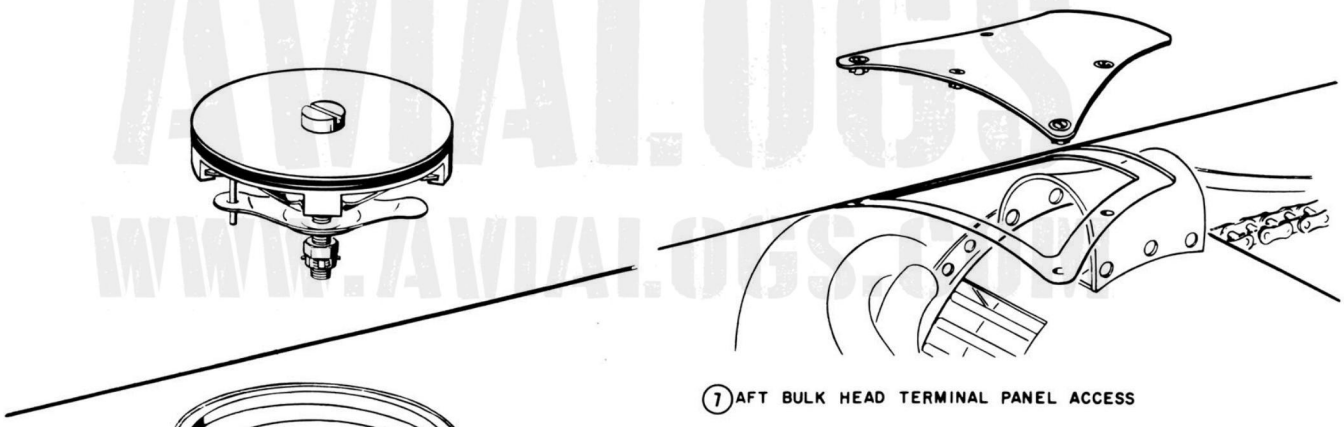
5 READY LIGHT COVER

EFFECTIVITY-BUNO
FACTORY: ALL
SERV CHG: NONE

ALF-2-4 P-18782-1

Figure 4-15B. In-Flight Fueling Store Access Provisions (Sheet 1)





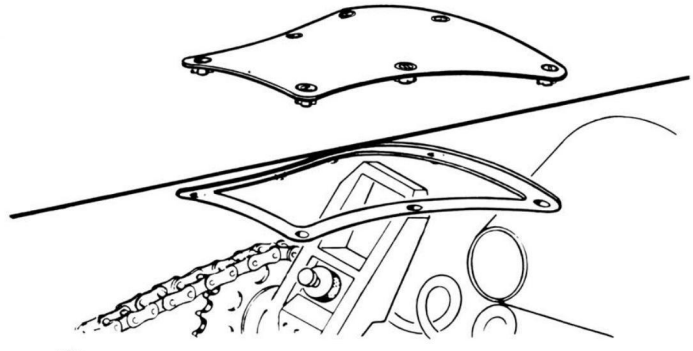
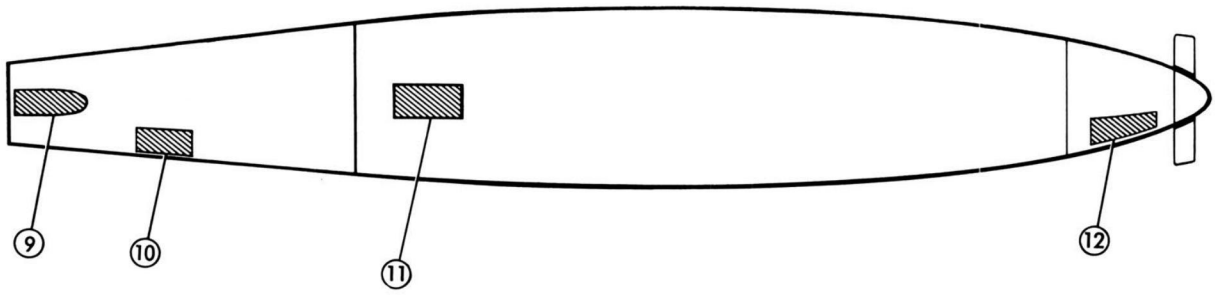
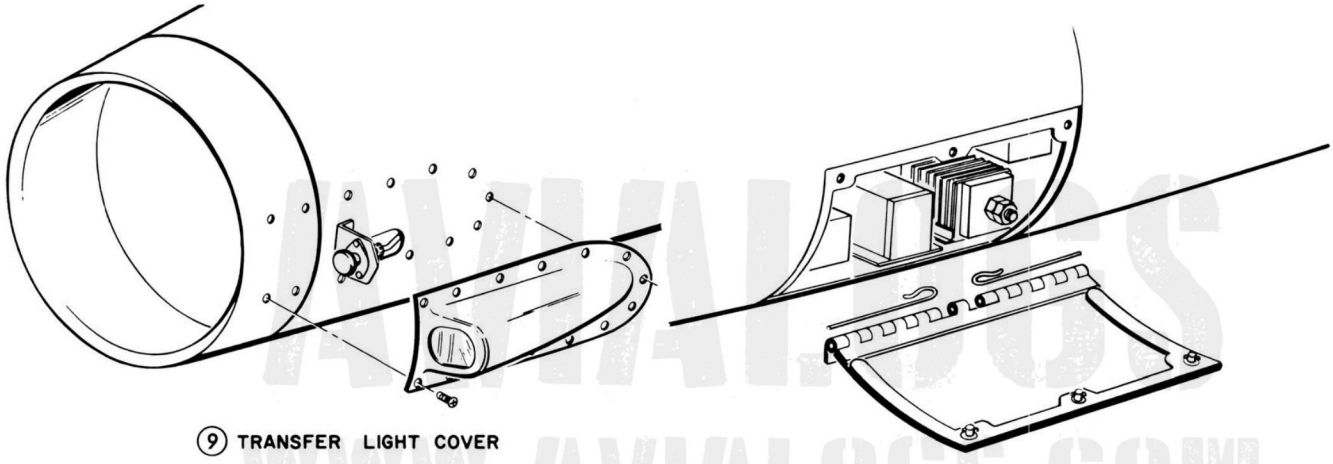


Figure 4-15B. In-Flight Fueling Store Access Provisions (Sheet 2)

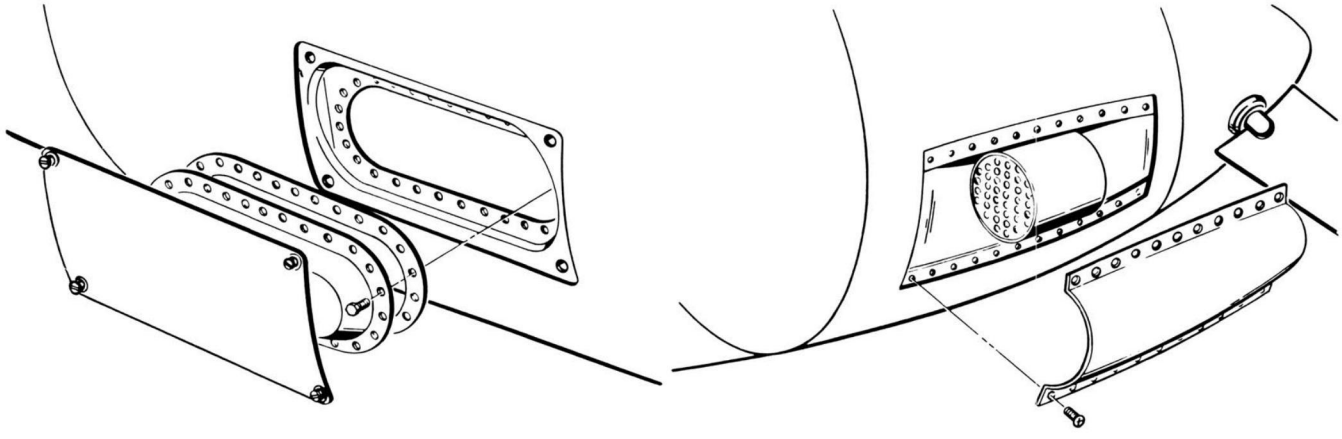
RIGHT-HAND SIDE





⑨ TRANSFER LIGHT COVER

⑩ TRANSFORMER-RECTIFIER ACCESS DOOR



⑪ FUEL TANK AFT RH ACCESS PANEL

⑫ FLUID COOLER AIR SCOOP

ALF-2-4 P-18782-3

Figure 4-15B. In-Flight Fueling Store Access Provisions (Sheet 3)

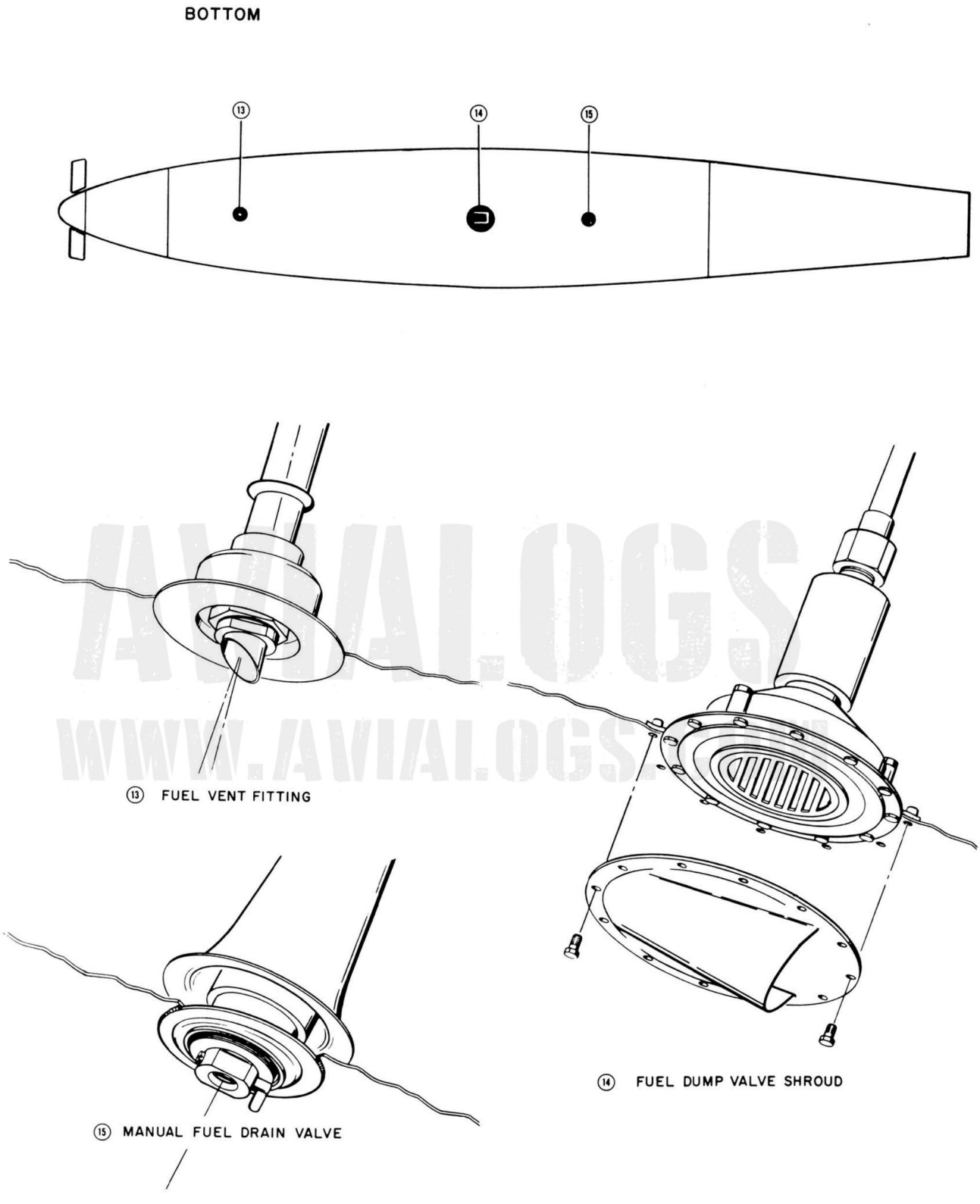


Figure 4-15B. In-Flight Fueling Store Access Provisions (Sheet 4)

4-180. AFT BULKHEAD. (See figure 4-17.) The aft bulkhead supports the fuel pump (installed on the forward side of the bulkhead within the fuel cell), fuel pump hydraulic motor (on aft side of the bulkhead), and components of the fuel, hydraulic and electrical systems.

4-181. HOSE REEL ASSEMBLY. (See figure 4-18.) The hose reel assembly, which is supported by the center section structure, consists of a hose reel, hose and drogue assembly, hose cutter and a level wind assembly.

4-181A. TAIL CONE SECTION.

4-181B. DESCRIPTION. (See figure 4-18.) The tail cone section forms a housing for the hose reel assembly, transformer rectifier, ready and transfer lights and the drogue assembly. Access to hose reel assembly is provided by two panels on top of the tail cone. Access to the transformer rectifier is obtained through door on the right-hand side of cone. The tail cone structure is a monocoque shell made of .050 aluminum sheet. At the forward attachment point a doubler is used as a strength member. At stations Y170 and Y190 support frames are spot welded to the skin and at station Y198 a doubler is used for attaching the sleeve of the tail cone guide assembly with sixteen screws. The ready and transfer light fairings (fiber glass) are attached to right- and left-hand sides of cones with thirteen screws each. The tail cone guide assembly, attached by a sleeve to tail cone section at station Y198, is a telescoping mechanism consisting of a sleeve, cylinder and a helical spring. The sleeve and cylinder are of .071 aluminum sheet and are connected to the helical cadmium plated steel spring by retainers. The spring, .406 inches in diameter with a total of 3-1/2 turns, exerts constant pressure against the drogue when it and the hose are in the fully retracted position. A pressure of approximately 190 ± 15 pounds is on the spring in the extended position, causing the drogue to eject when the hose reel is unlocked and retract power is removed from the hose reel hydraulic motor. Corrosion resistance steel guides are attached 30 degrees from the top centerline of tail cone between stations Y170 and Y190 on both right- and left-hand sides. The guides function as rub strips for the spring and cylinder during retraction and extension of the hose and drogue. When the drogue and hose are in an extended position, the cylinder telescopes into the sleeve and when the drogue and hose are in a retracted position the cylinder extends from the aft end of the sleeve.

4-181C. REMOVAL.

WARNING

Disarm hose cutter by removing explosive cartridge from cutter.

a. Install hose reel lock pin retractor (see figure 4-27) in hose reel through opening on right-hand side of tail cone.

WARNING

Stand clear of tail cone. Ejection spring assembly will eject drogue from 4 to 6 feet distance.

b. Install C-8 drogue handle (see figure 4-27) in end of drogue assembly.

c. Use handle to extend hose approximately 10 feet.

NOTE

Two men should be utilized to extend hose.

d. Remove MA-2 coupling from end of hose.

NOTE

It will not be necessary to remove coupling if hose reel assembly is not to be removed for maintenance. Slide tail cone aft along hose until clear of store.

e. Through hose jettison access panel (index 8, figure 4-15B), disconnect electrical connector from aft bulkhead.

f. Support tail cone and remove twenty-eight flush screws attaching the forward end to center section doubler.

NOTE

At least two men should support tail cone during removal of screws.

g. Carefully move tail cone aft until clear of store.

4-182. INSTALLATION.

a. If drogue assembly was removed, insert aft end of hose fitting through tail cone and then carefully slide tail cone down hose into position on center section doubler.

b. Install twenty-eight flush-head screws attaching tail cone to center section doubler.

c. Through hose jettison access panel, connect electrical connector to receptacle on aft bulkhead.

d. Install MA-2 coupling if removed from hose.

e. Perform operational test on store. (Refer to table 4-6.)

4-183. The inflight fueling hose is extended from the store during operation and retracted onto the hose reel when refueling is completed. The drogue assembly on the end of the fueling hose contains a fitting (coupling) into which the receiving airplane must engage its inflight fueling probe to effect fuel transfer. When not in use the inflight fueling store is supported on a dolly, and is stored in a shipping container pressurized to 5 psi (Douglas K-7552668). The store, on its dolly, is unloaded from the aft end of the shipping container. Applicable loose equipment items for the airplanes, supplied with the store, are installed along the top of the store. The store is hoisted from the dolly by two hoisting straps (slings) to the fuselage external stores ejector rack. All equipment necessary to remove the enclosing dolly structure and to hoist the store is contained in a tool box located on the aft right-hand side of the dolly.

CAUTION

Particular care must be exercised when using dolly aboard carrier. Maneuver dolly with tractor only. Lock one pair of dolly wheels in fore and aft direction and allow other pair to swivel freely.

4-184. STORE LEADING PARTICULARS. (See figure 4-15A.)

Weight (empty) (approximately)	680 pounds
Weight fueled (approximately)	1906.5 pounds
Length	202.5 inches
Maximum diameter	31 inches
Mounting lug spacing	30 inches or 20 inches
Fuel cell capacity	300 gallons
With 7 degree nose up (A-1H and A-1J Airplanes)	293.3 gallons
Residual – level attitude	3.86 gallons
Residual – 5.5 degrees nose down	6.78 gallons
Permissible fuels	MIL-G-5572 (All grades) MIL-J-5624 (JP-4 and JP-5)
Rated fuel flow from store	200 gpm
Rated fuel pressure at air refueling coupling	35 psi
Hose diameter	2 inches O.D. 1-1/2 inches I.D.
Hose length	50 feet
Hose retraction rate	14 ft/sec Max. 2 ft/sec Min.
Air refueling coupling target diameter	24 inches
Hydraulic system capacity (approx.)	1-3/4 gallons
Hydraulic reservoir capacity	1-1/4 quarts
Hydraulic fluid, petrolatum base	MIL-H-5606A (Red)
Hydraulic operating pressure	3000 ± 50 psi
Electrical requirements	28 volts d-c or 115 volts a-c, 400/800 cps
Hose cutter cartridge	One Mk 1 Mod 3 (bomb ejector cartridge)

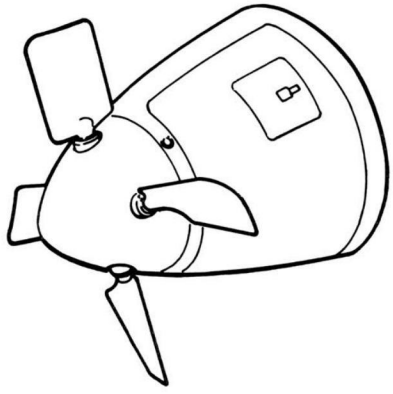
4-185. INSTALLATION. (See figure 4-19.) The installation procedures for installing the inflight fueling store on A-1H and A-1J airplanes is described in three separate procedures: aircraft preparation, inflight fueling store preparation and hoisting and installation.

4-186. AIRPLANE PREPARATION. Prepare the airplane for installation of the inflight fueling store as follows:

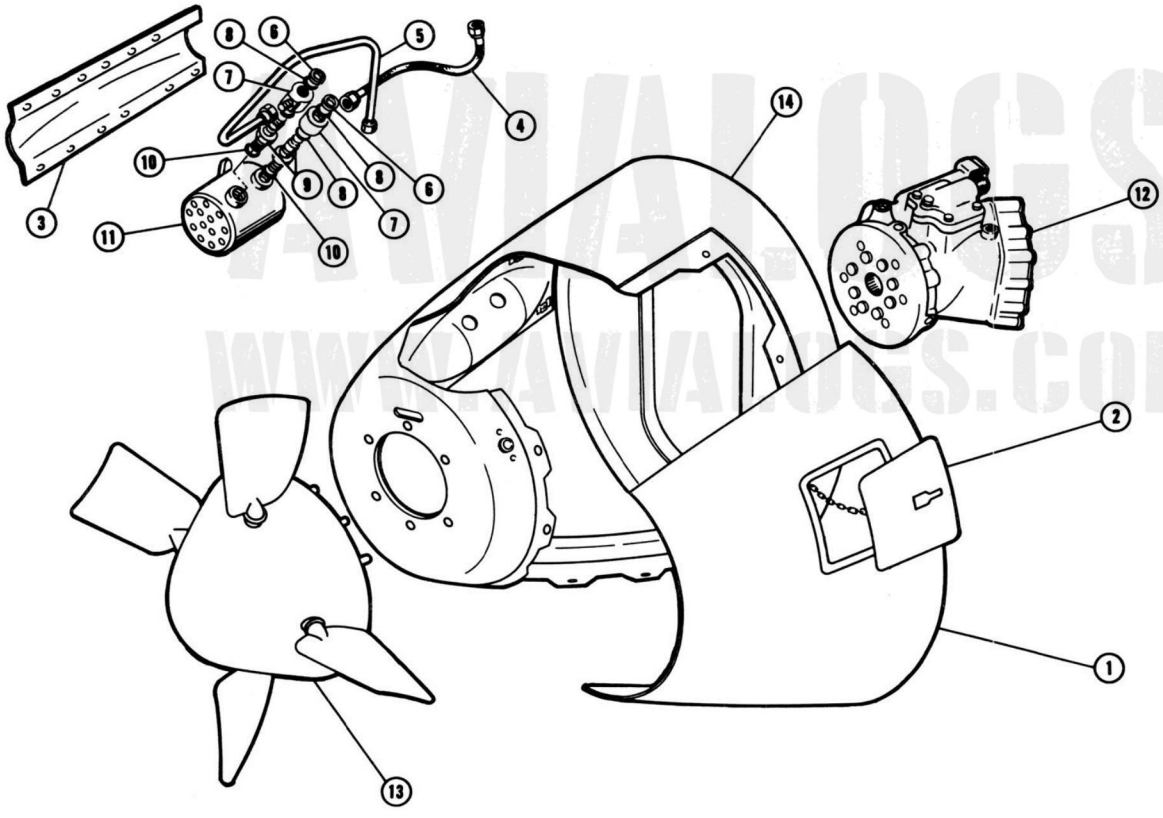
CAUTION

Before store is installed on airplane, manually adjust the airplane bottom dive brake lockout valve to the closed position to prevent inadvertent lowering of dive brake after store installation. If bottom dive brake has been removed, this adjustment may be disregarded.

a. Remove airplane center drop tank line plug (Douglas 4550427) from within centerline aft fairing section. Stow plug in small stowage tube at bottom of fuel cell compartment to left of drain access door.



1. DOOR ASSY
2. DOOR ASSY
3. DUCT ASSY
4. HOSE ASSY
5. TUBE ASSY
6. NUT
7. UNION
8. PACKING
9. BOLT
10. GASKET
11. OIL COOLER
12. PUMP
13. POWER UNIT
14. BODY ASSY



EFFECTIVITY–BUNO.

FACTORY: NONE

SERV CHG: ALL AD-6 AND AD-7 AIRPLANES REWORKED PER BUAER AD/SC NO. 606

P-11975-1

Figure 4-16. In-Flight Fueling Store Nose Section (Sheet 1)

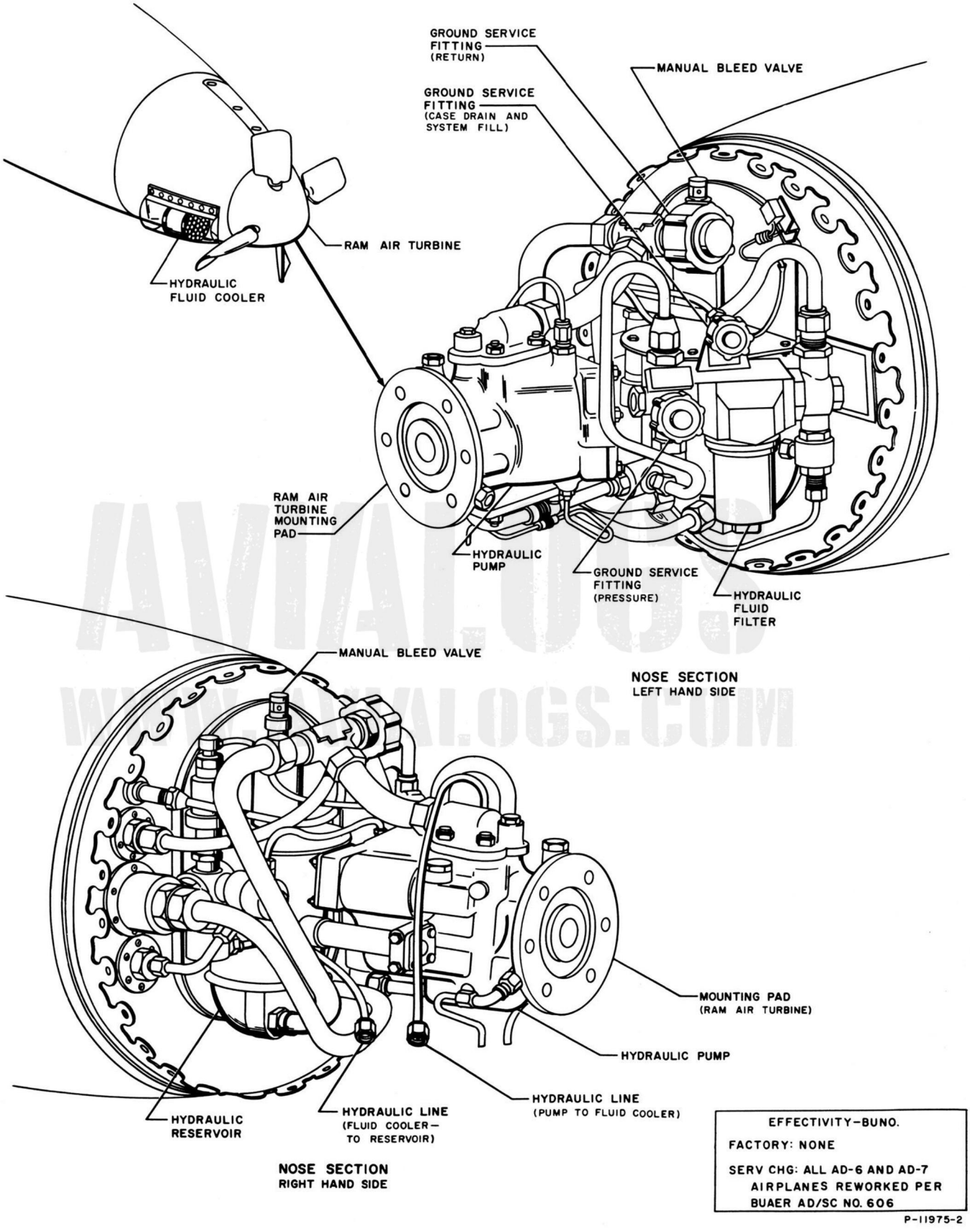
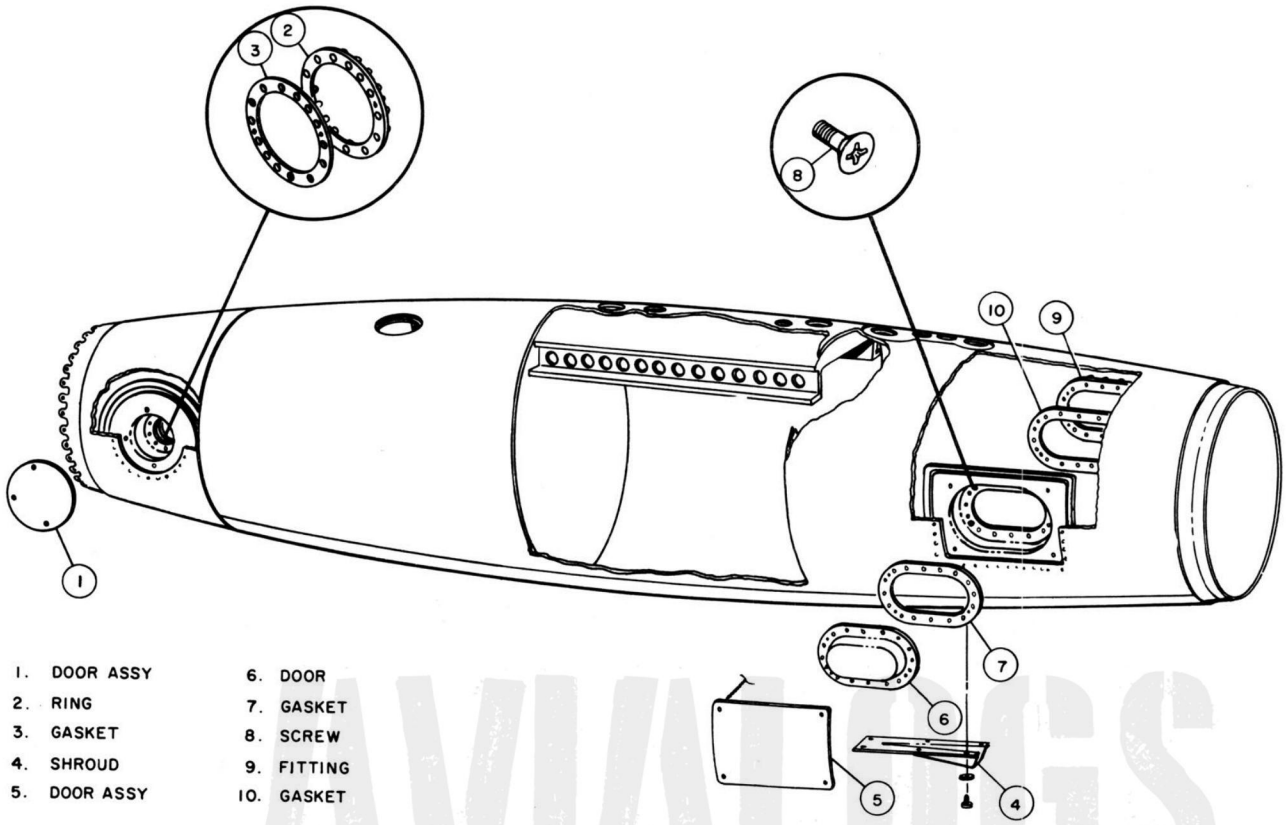
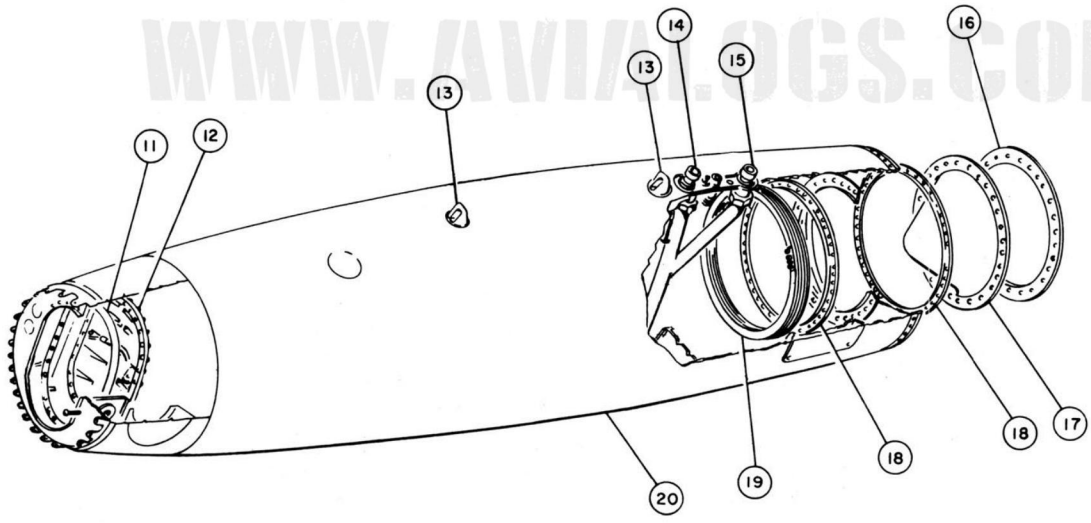


Figure 4-16. In-Flight Fueling Store Nose Section (Sheet 2)



1. DOOR ASSY
2. RING
3. GASKET
4. SHROUD
5. DOOR ASSY
6. DOOR
7. GASKET
8. SCREW
9. FITTING
10. GASKET



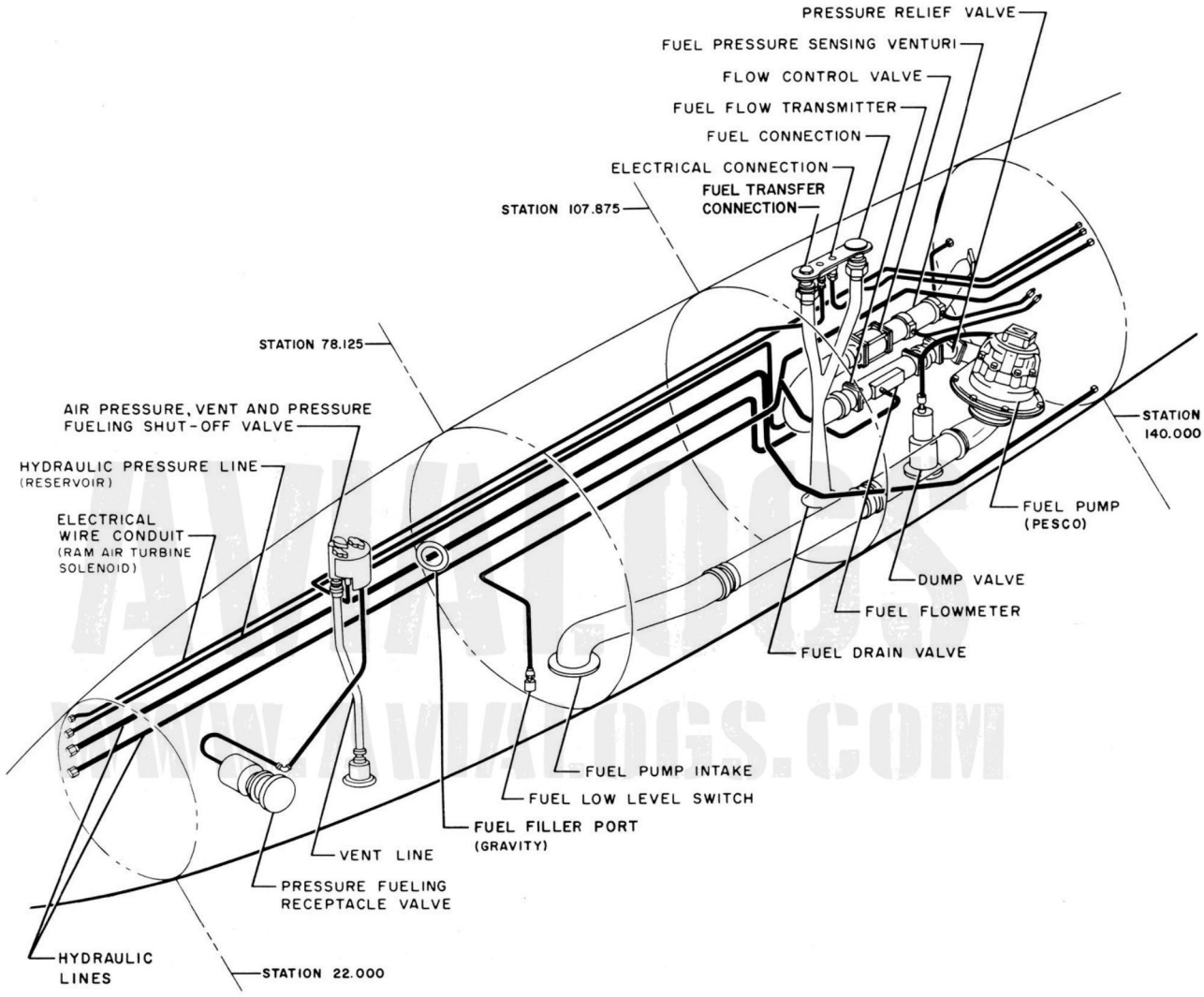
11. GASKET
12. DOOR
13. LUG
14. ADAPTER
15. CONNECTOR
16. RING
17. DOOR
18. GASKET
19. RING
20. STRUCTURE

EFFECTIVITY - BUNO.
FACTORY: NONE

SERV CHG: ALL AD-6 AND AD-7 AIRPLANES REWORKED PER BUAER AD/SC NO. 606

P-11976-1

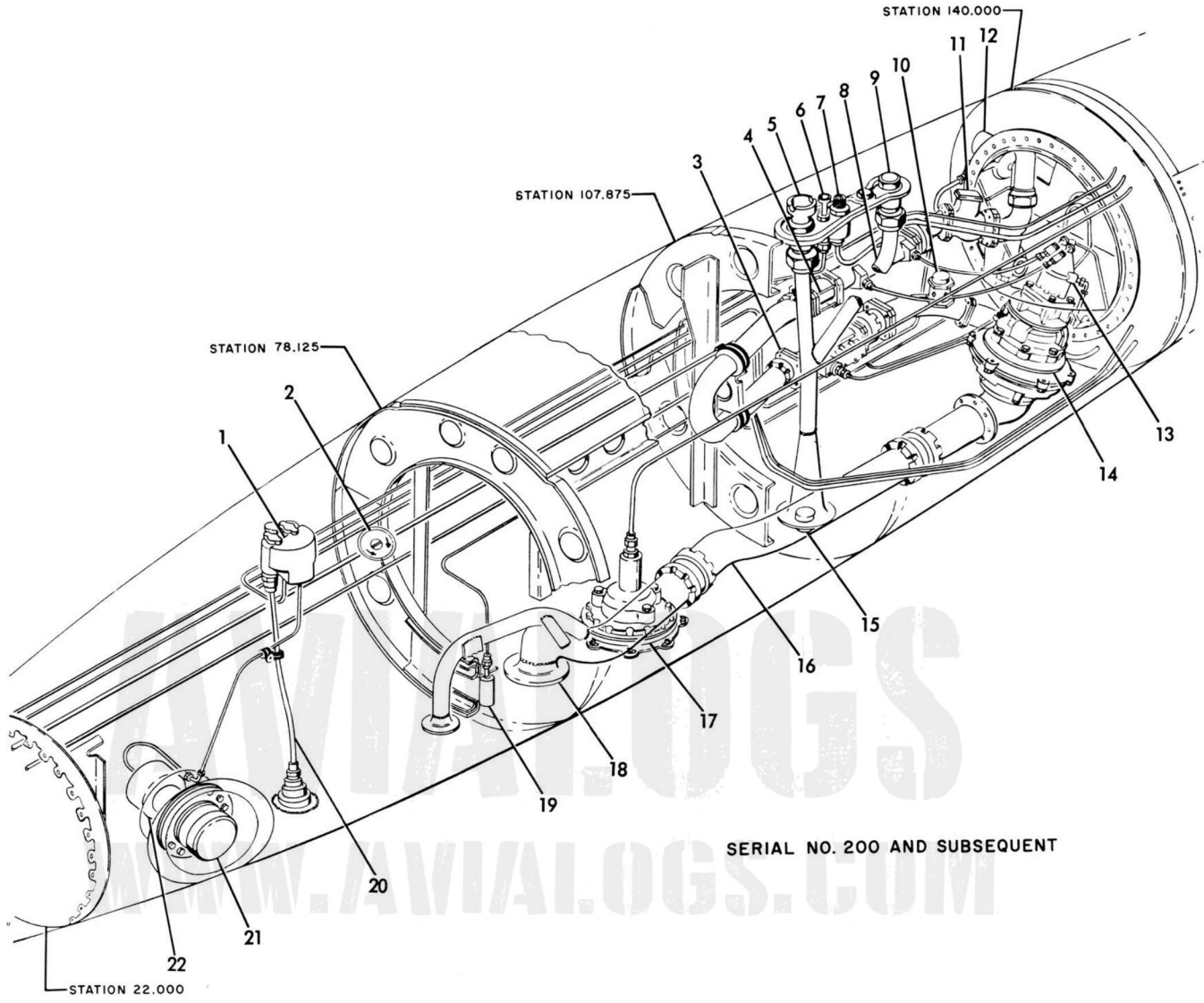
Figure 4-17. In-Flight Fueling Store Center Section (Sheet 1)



IN-FLIGHT FUELING SYSTEM STORES
P/N 5547000-517 AND-521
(SERIAL NO-1 THRU-199)

ALF-2-4 P-11976-2A

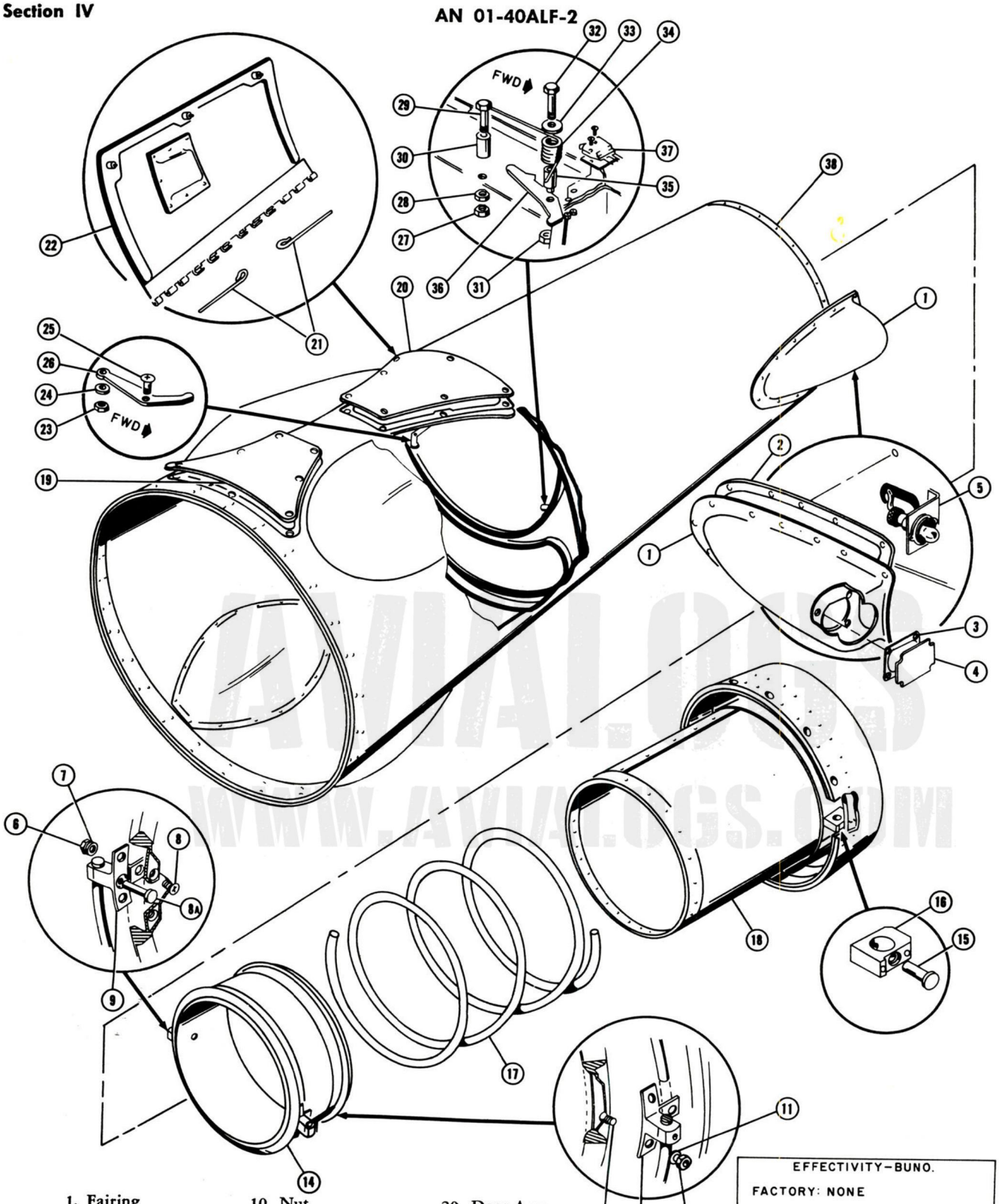
Figure 4-17. In-Flight Fueling Store Center Section (Sheet 2)



1 COMBINATION FLOAT SHUT—OFF AND VENT VALVE.
2 GRAVITY FUEL FILLER CAP
3 FUEL FLOW METER
4 FUEL CONTROL VALVE
5 FUEL TRANSFER CONNECTION
6 AIR PRESSURE CONNECTION
7 ELECTRICAL CONNECTION
8 PRESSURE VENTURI
9 FUEL TRANSFER CONNECTION
10 FUEL PRESSURE RELIEF VALVE
11 FUEL SHUTOUT VALVE
12 HOSE REEL LOCKPIN CYLINDER
13 FLOW CONTROL VALVE
14 NASH FUEL PUMP ASSEMBLY
15 MANUAL DRAIN VALVE
16 FUEL PUMP INTAKE LINE
17 FLOW CONTROL CHECK VALVE
18 BELLMOUTH ASSEMBLY
19 RESTRICTOR
20 VENT LINE
21 PRESSURE FUELING RECEPTACLE
22 FUEL FLOAT AND VENT VALVE

ALF-2-4 P-11976-3A

Figure 4-17. In-Flight Fueling Store Center Section (Sheet 3)



1. Fairing
2. Gasket
3. Gasket
4. Window
5. Clip
6. Nut
7. Washer
8. Screw
8A. Pin
9. Retainer
10. Nut
11. Washer
12. Screw
13. Block
14. Cylinder Assy.
15. Pin
16. Retainer
17. Spring
18. Guide Assy.
19. Door Assy.
20. Door Assy.
21. Pin
22. Door
23. Nut
24. Washer
25. Screw
26. Stop
27. Nut
28. Washer
29. Bolt
30. Spacer
31. Nut
32. Bolt
33. Washer
34. Spring
35. Spacer
36. Arm
37. Switch
38. Cone Assy.

Figure 4-18. In-Flight Fueling Store Tail Section (Sheet 1)

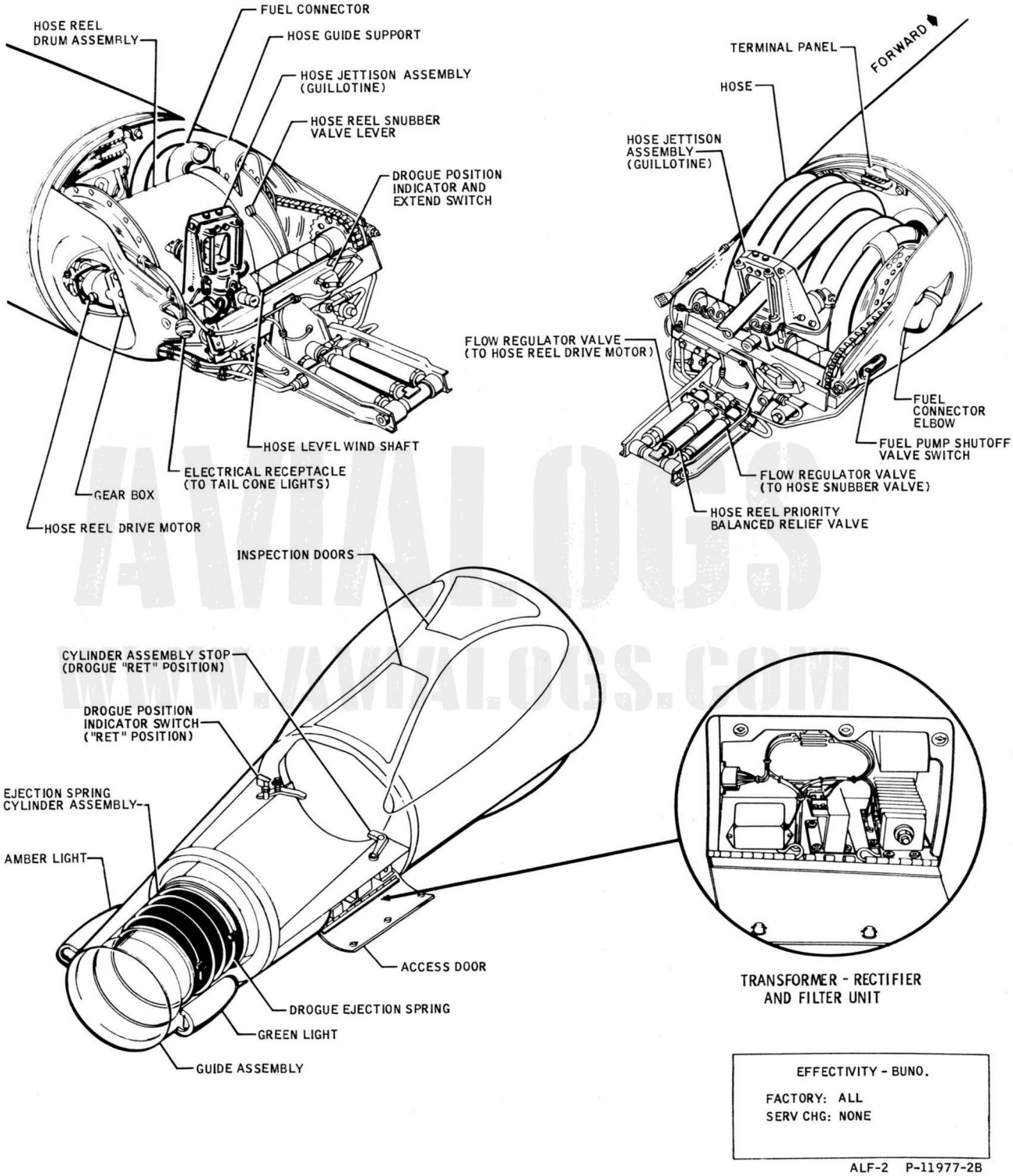


Figure 4-18. In-Flight Fueling Store Tail Section (Sheet 2)

b. Open airplane centerline ejector rack fairing access doors.

CAUTION

Refer to section IX for safety precautions to be observed when loading external stores on the centerline ejector rack. Before loading store, foot assembly must be retracted and sway brace screw assemblies must be backed off. This procedure insures carrying hooks will latch properly when store is raised into position.

c. Install hose (Douglas 5662572-9) on fuel fitting inside of ejector rack. Add AN737TW66 clamp to bottom of hose. (See figure 4–19.)

d. Remove forward equipment compartment doors.

e. Perform circuit continuity check on bomb ejector cartridge breech caps. (Refer to section IX.)

f. Manually open ejector rack hooks. Make sure all hooks are open.

g. Adjust sway braces to maximum up position.

h. Adjust ejector foot to maximum up position.

4–187. INFLIGHT FUELING STORE PREPARATION. Prepare the inflight fueling store for installation on AD-6 and AD-7 airplanes as follows:

a. Inspect dolly hoisting straps for snug fit against bottom half of store. If loose, use winch handles located on each side beneath dolly main rails, to tighten hoist until straps support weight of store.

b. Remove control panel from dolly upper supports and install in airplane cockpit. (Refer to paragraph 4–192 and figure 4–21.)

c. Using long flat tool from tool container on dolly, remove lugs securing store to dolly upper supports.

d. Remove bolts securing dolly upper supports to dolly support rail and carefully remove upper supports to prevent damage to store.

e. Install following equipment on inflight fueling store prior to installation on aircraft:

MS29513-224 "O" ring and adapter (Douglas 4550619) in aft fuel outlet.

MS29513-11 "O" ring and AN814-6D plug in air pressure inlet.

MS29513-224 "O" ring and AN814-24D plug in forward fuel outlet.

(Douglas 4555001) lug in forward lug position.

(Douglas 4544419-501) lug in aft lug position.

f. Position store and dolly beneath fuselage external stores ejector rack.

4–188. HOISTING AND INSTALLING STORE. (See figure 4–19.)

a. Hoist store by operating dolly hoists simultaneously while guiding lugs to ejector rack hooks. Guide electrical and fuel fittings to insure correct connection.

b. Hoist store until carrying lugs enter hook recesses sufficiently to close hooks. Verify by visual inspection that hooks are properly latched. Leave inner hooks unlatched.

c. Secure fuel hose (Douglas 5662572-9) to adapter with AN737TW66 clamp.

d. Secure electrical connection of adapter cable assembly to store. (See table 4–4B.)

e. Lower hoisting slings and remove dolly.

f. Adjust sway brace foot assemblies to rest firmly against store.

g. Tighten left-hand sway brace screw assemblies one-half turn, then turn right-hand sway brace screw assemblies one-half turn.

CAUTION

Less tightening is acceptable, but care must be taken not to exceed one-half turn value.

h. Adjust ejector foot gently against store.

i. Attach dump shroud (Douglas 5667895) at store dump valve with existing hardware.

j. Close and secure ejector rack fairing access doors.

CAUTION

Refer to section IX for safety precautions to be observed with Aero 3A ejector rack.

k. Install forward equipment compartment doors. (Refer to section I.)

CAUTION

Do not remove ram-air propeller guard (Douglas K-5552678) until just before take-off time.

4–189. REMOVAL.

CAUTION

Refer to section IX for instructions and precautions to be observed with Aero 3A ejector rack.

a. Install ram-air propeller guard (Douglas K-5552678).

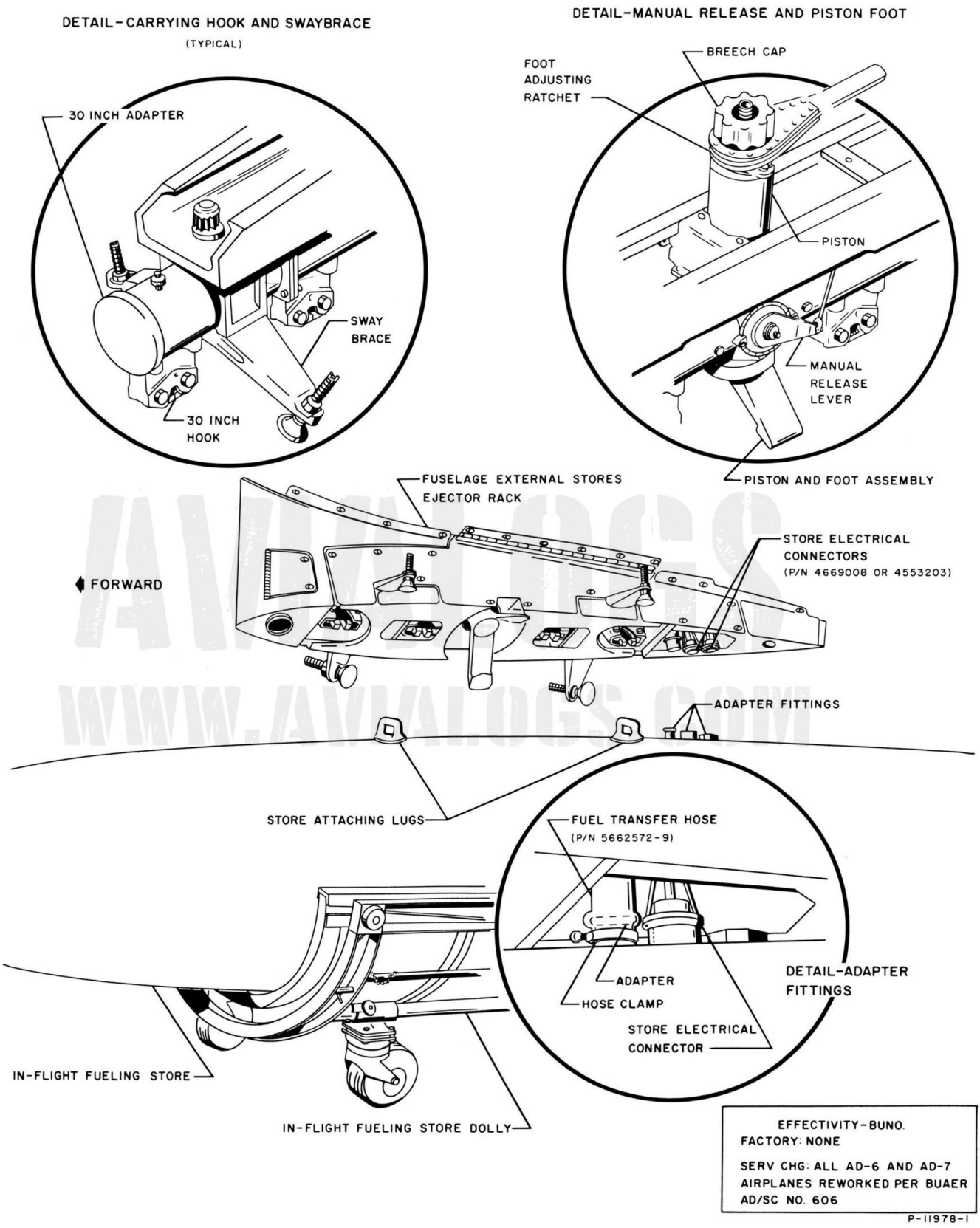


Figure 4-19. In-Flight Fueling Store Installation (Sheet 1)

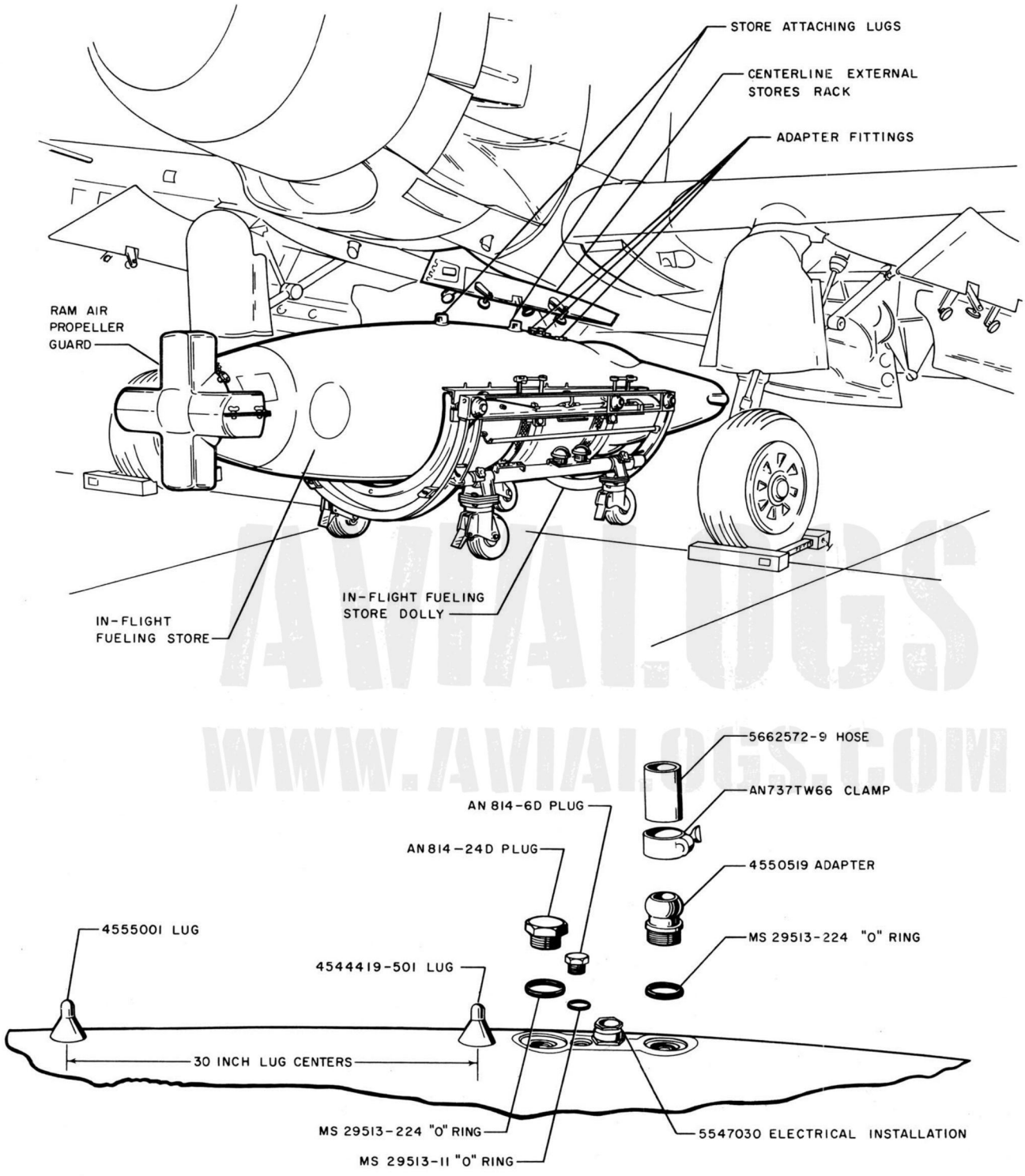
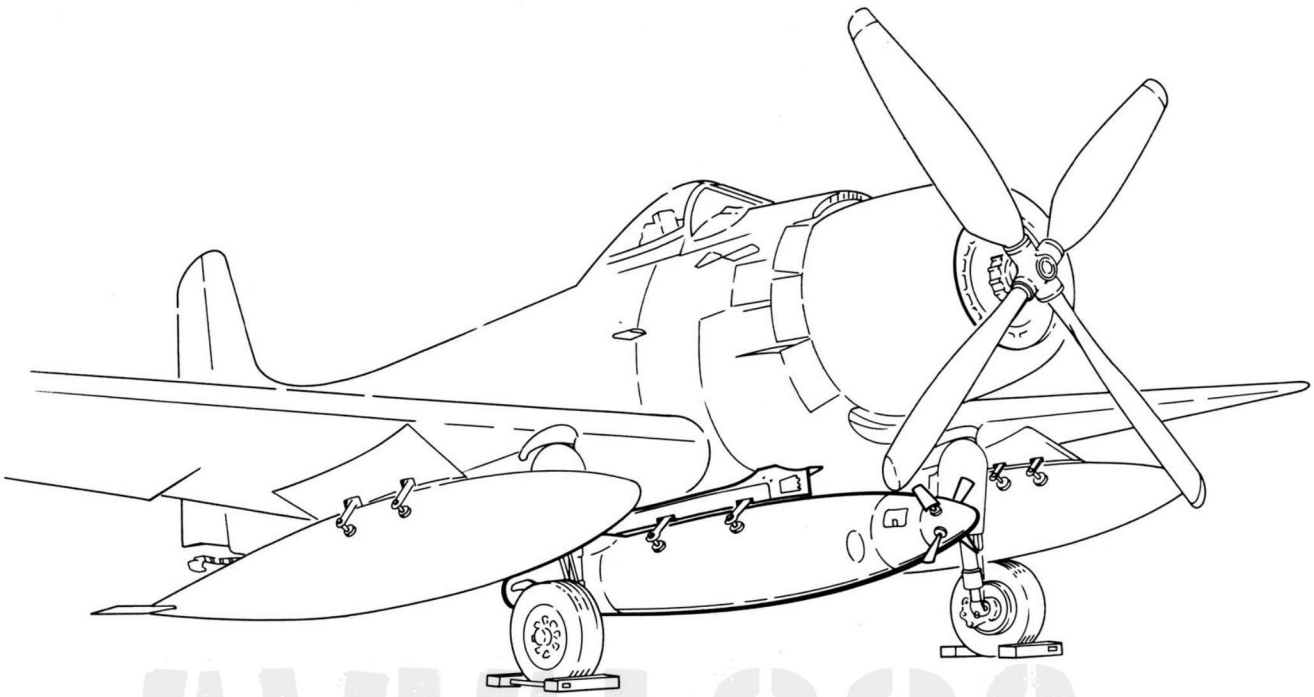
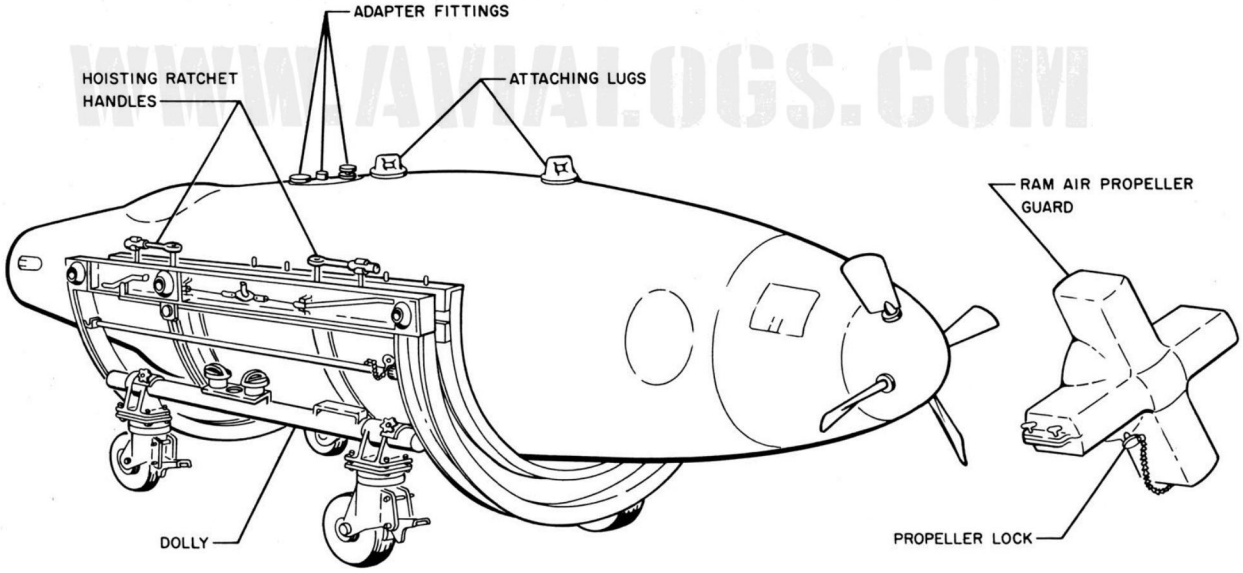


Figure 4-19. In-Flight Fueling Store Installation (Sheet 2)



IN-FLIGHT FUELING STORE INSTALLED
ON CENTERLINE RACK



IN-FLIGHT FUELING STORE

P-11978-3

Figure 4-19. In-Flight Fueling Store Installation (Sheet 3)

b. Remove forward equipment compartment doors. (Refer to section I.)

c. Open ejector rack fairing access doors.

d. Remove dump shroud (Douglas 5667895) from store, disconnect adapter cable assembly socket from store, and loosen AN737TW66 clamp at fuel adapter.

e. Position dolly under store with aft end of dolly toward store drogue. Raise dolly slings until full weight of store is supported by dolly.

WARNING

Do not use dolly with in-flight fueling store containing over 50 gallons of fuel. (This restriction does not apply to Douglas 7552668-503 dollies, serial numbers 4207-4419 inclusive, which are strengthened to handle fully fueled stores.

f. Manually actuate arm release mechanism at rack to release store.

WARNING

Do not release ejector rack hooks electrically or operate manual release handle in cockpit. Operation of release handle will open fuselage and wing racks simultaneously.

g. Operate dolly hoists simultaneously to lower store and carefully remove dolly from beneath airplane.

h. Remove loose equipment items from store. (Refer to paragraph 4-187e.)

i. Carefully install dolly upper supports to prevent store damage, and install bolts to secure dolly supports to support rail.

j. Hoist store by means of dolly slings until original dolly support lugs can be installed. Secure store to dolly upper supports with support lugs, then relieve tension on dolly slings by lowering dolly hoists.

k. Remove control panel from cockpit and install on dolly upper support.

l. Install plug (Douglas 4550427) in centerline fuel line and return fuel hose (Douglas 5550344-9) to loose equipment storage with store.

m. Close ejector rack fairing access doors.

n. Install forward equipment compartment doors. (Refer to section I.)

4-190. IN-FLIGHT FUELING CONTROL PANEL.

4-191. DESCRIPTION. (See figures 4-20 and 4-22.) The in-flight fueling control panel includes switches necessary to effect control of the in-flight fueling stores. It is shipped as a component part of the in-flight fueling store and is adapted to the cockpit right-hand console of the model A-1H or A-1J airplane by re-arranging existing blank panels. In-flight fueling stores are shipped with a control panel which contains the following units:

a. Lever lock switch with ON, OFF and DUMP positions. Normally in the OFF position, the toggle is moved forward to ON. To place the switch in the DUMP position, the lever must be raised before the toggle can be moved aft to DUMP.

b. A single-pole, single-throw, drogue operating switch with RET (retract) and EXT (extend) positions.

c. A single-pole, single-throw, refueling switch with TRANS (transfer) and OFF positions.

d. A single-pole, single-throw switch with BRT and DIM positions to control the intensity of the indicating lights on the in-flight fueling store.

e. A drogue position indicator which displays flags for RET (retracted), EXT (extended) and TRA (when fuel can be or is being transferred).

f. A SHIP TANK fuel transfer switch which controls direction of fuel flow between the in-flight fueling store and the tanker airplane fuel system with OFF TO STORE and FROM STORE positions.

g. An electric counter which gives an indication of GALS DEL during fueling operations.

h. A DUMP indicator light which indicates when fuel is exhausted from the store either thru the DUMP switch or when transferred to the aircraft fuel tanks via the SHIP TANK switch.

4-191A. The control panel contains a lever lock switch for operating the store guillotine (hose cutter). To actuate the guillotine in the store, the switch toggle must be raised before it can be moved aft to the HOSE JETTISON position.

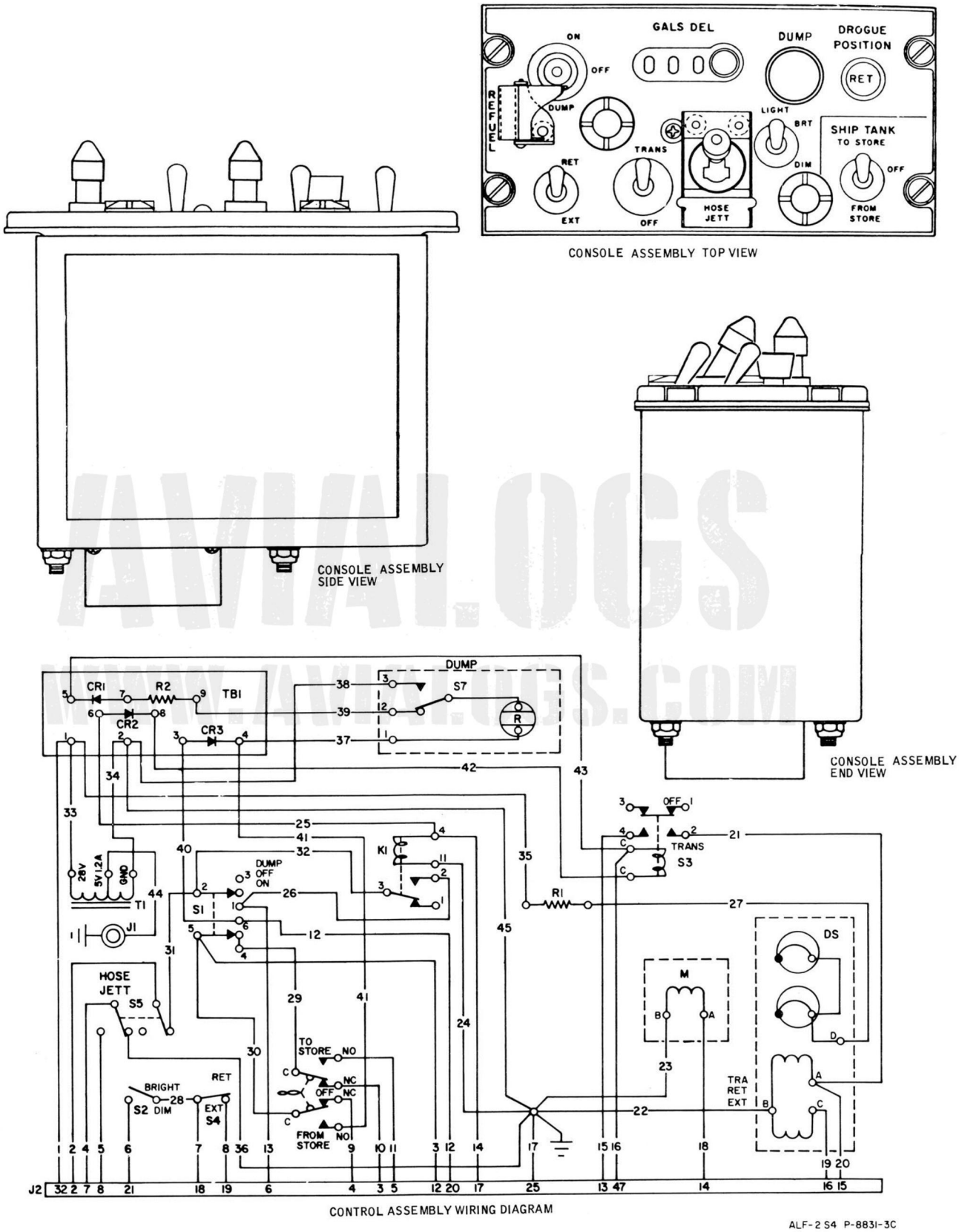


Figure 4-20. In-Flight Control Panel

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Figure 4-21 (Sheet 2) Deleted

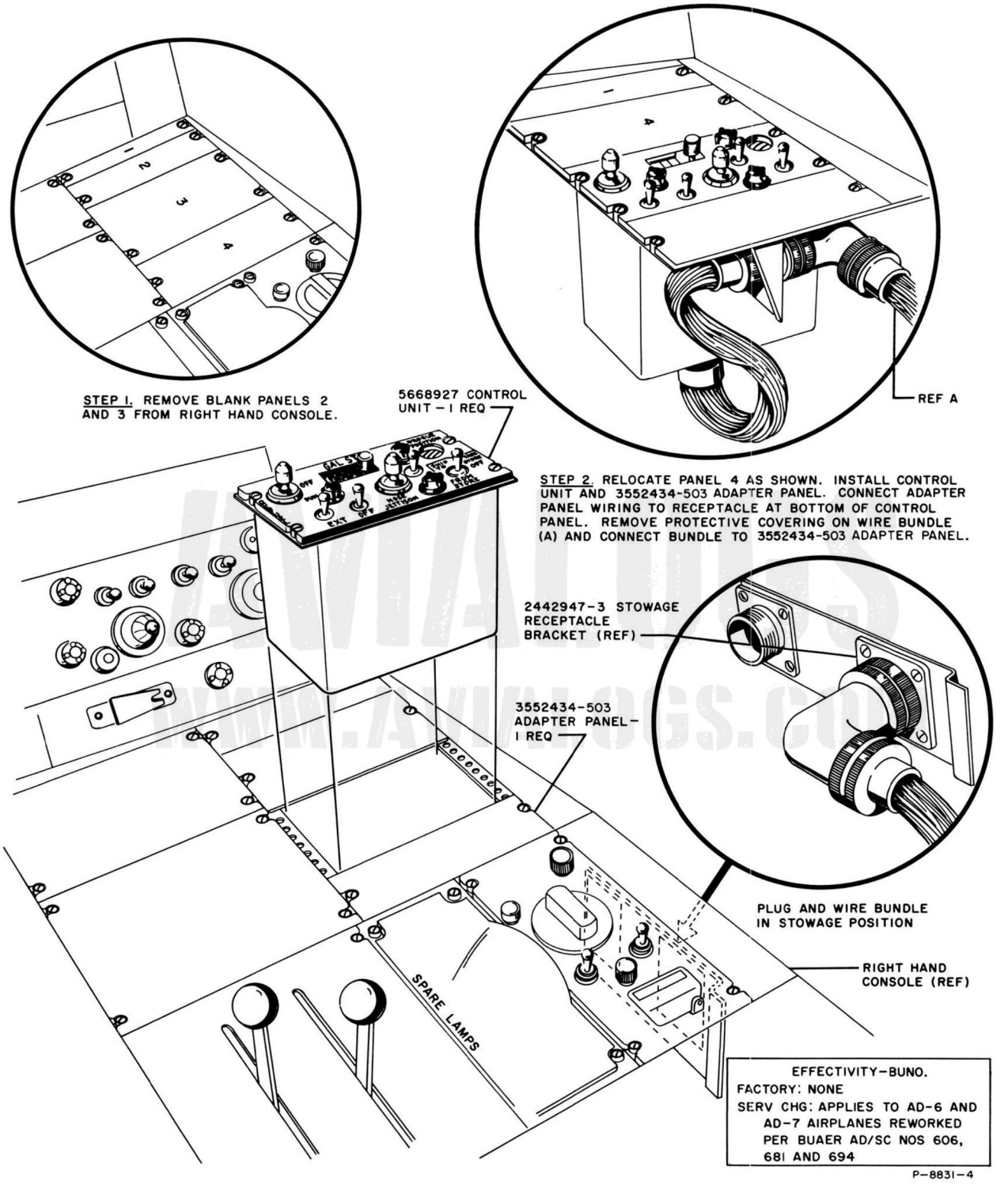

Figure 4-21. In-Flight Fueling Control Panel (Sheet 3)

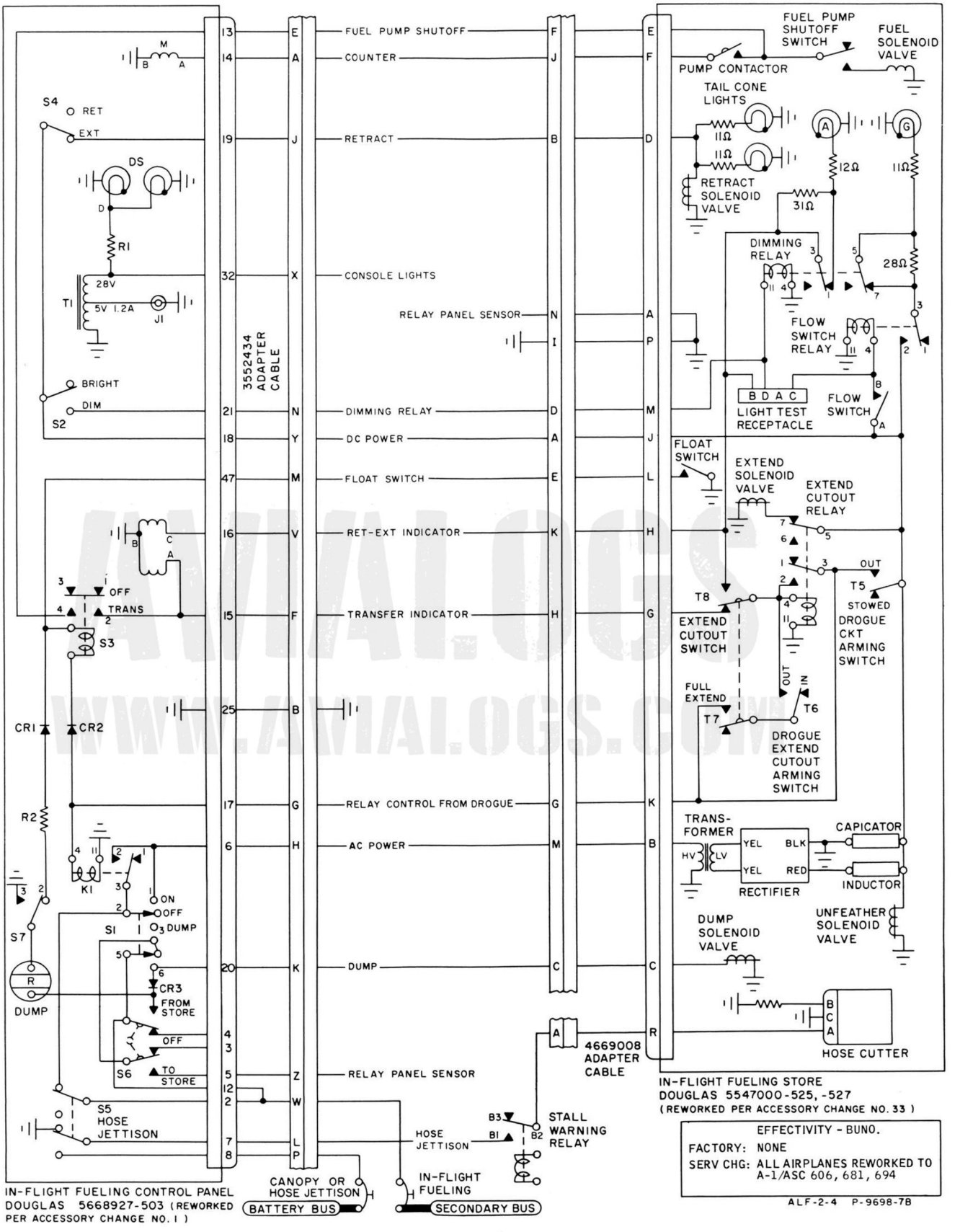

Figure 4-22. In-Flight Fueling Store and Console - Electrical Schematic Diagram

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Figure 4-22 (Sheet 3) Deleted.

4–192. INSTALLATION. (See figure 4–21.)

a. Remove blank panel numbers S4386543E, S4386543B, S4386543C41 and S4386543C22 from cockpit right-hand console.

Note

Remove spray tank control unit when it is installed in the area occupied by blank panels.

b. Remove chemical tank wire bundle from stowage receptacle beneath AN/APX-6 control panel, and connect to in-flight fueling control panel.

c. Beginning aft and working forward, install S4386543C17 blank panel, then in-flight fueling control panel. Complete installation by replacing blank panels S4386543C22 and S4386543B forward of in-flight fueling control panel.

4–193. REMOVAL.

a. Remove S4386543B, S4386543C22 and S4386543C17 blank panels from right-hand console.

b. Detach in-flight fueling control panel from right-hand console and disconnect chemical tank wire bundle from control panel.

c. Stow chemical tank wire bundle to stowage receptacle beneath AN/APX-6 control panel.

d. Starting at forward end of right-hand console slot install S4386543E blank panel, then S4386543B, S4386543C41 and S4386543C22 blank panels.

4–194. IN-FLIGHT FUELING STORE HYDRAULIC SYSTEM.

4–195. DESCRIPTION. (See figure 4–22A.) The in-flight fueling store hydraulic system provides power for extension or retraction of the drogue and operation of the fuel pump. It is self-contained and functions completely independent of the airplane hydraulic system. Principal components of the system are as follows:

Hydraulic Reservoir
Hydraulic Pump
Ram Air Turbine
Main Hydraulic Filter Unit
Hydraulic System Relief Valve
Hydraulic Priority Valve
Hydraulic Fluid Cooler
Hydraulic Ground Service Connectors
Fuel Pump Motor
Hose Reel Drive Assembly
Hose Reel Drive Motor
Level Wind Guide Assembly
Hose Reel Lockpin

4–195A. THEORY OF OPERATION. A ram air turbine operates the hydraulic pump to provide the necessary operating pressure. Placing the ON-OFF-DUMP switch on the in-flight fueling control panel in the "ON" position causes the ram air turbine propeller to unfeather and the extend solenoid selector valve to energize. Unfeathering of the ram air turbine propeller blades and rotation of the ram air turbine drives the store hydraulic pump, pressurizing the hydraulic system. Actuation of the RET-EXT switch to "EXT" position, energizes the solenoid operated retract valve, reducing hydraulic pressure to zero on the rewind end of the hose tension regulator valve. As diverted hydraulic pressure increases to 1700 psi, the hose reel lock cylinder disengages from the hose reel plate, allowing the drogue ejection spring to eject the drogue, developing a torque on the hose reel drive motor. The torque is applied in the opposite direction to the normal motor rotation causing the motor to act as a pump, building up pressure at the hose tension regulator valve and shifting it to the extend position. The drogue is then carried out by slipstream toward the fully extended position. A few feet prior to full extension, the hose level wind guide mechanically contacts the hose tension regulator valve arm, moving the valve slide to the reel-in position, blocking off hydraulic fluid and applying 3000 psi system pressure on the hose reel motor to stop reel rotation. Excess pressure (3000 psi) created by inertia of the reel mechanism is relieved through the hose reel relief valve. The hose reel motor then reels the drogue in slightly until the hose tension regulator valve is in equilibrium with the mechanical override force on the hose tension regulator valve arm. As the level wind guide contacts the hose tension regulator valve arm, the guide actuates the extend cut-out arming switch, de-energizing the solenoid operated extend valve and directing 3000 psi pressure to the small pin in the hose tension regulator valve, moving the slide toward the reel-in position until a fixed tension of 200 pounds is applied on the hose and drogue. Engagement of the receiver airplane probe into the drogue can now be effected for transfer of fuel.

4–195B. Upon conclusion of fuel transfer operations, placing the RET-EXT switch on the control panel in the "RET" position de-energizes the retract solenoid valve, diverting system pressure to the reel-in side of the hose tension regulator valve and hose reel drive motor. The hose then retracts onto the hose reel at the rate of 14 feet per second until just prior to entry of the drogue into the tail cone, the hose snubbing valve is actuated mechanically by the hose which reduces the reel-in rate to 2 feet per second. When the drogue reaches the fully retracted position, the drogue centering collar opens the circuit arming switch, removing power from the drogue position indicating circuit and causing the position indicator on the control panel to change to the "RET" position. Placing the ON-OFF-DUMP switch in the "OFF" position, feathers the ram air turbine propeller which reduces the system pressure to zero. As hydraulic pressure drops below 1700 psi, the hose reel lockpin cylinder engages the hose reel plate to hold the drogue in the retracted position.

4–195C. TROUBLE SHOOTING. The store fuel, hydraulic and electrical systems are closely interrelated; therefore, to facilitate correction of any erratic operation data regarding malfunctions for all systems are combined in table 4–5.

4–195D. BLEEDING STORE HYDRAULIC SYSTEM (STORE INSTALLED ON AIRCRAFT). (See figure 4–28.) The following procedures are applicable to the store when installed in the airplane. If bleeding is to be accomplished with the store on the dolly, disregard requirements specified in steps i and j; instead connect the in-flight fueling system tester to the store as outlined in table 4–6.

CAUTION

Disconnect hose jettison electrical connector from breech lock cap receptacle to prevent accidental firing of hose jettison cartridge.

a. Servicing store with minimum of 50 gallons fuel.

b. Remove nose section access door (index 1, figure 4–15B).

c. Service hydraulic reservoir. (Refer to paragraph 4–195G.)

Note

If store (Serial Number 1 through 199) is equipped with Pesco Hydraulic Pump (P/N 01327-010-01) perform steps d through g because pump will not rotate in reverse with external hydraulic power applied. Disregard steps d through g if store (Serial Numbers 200 and subsequent) contains Vickers Hydraulic Pump (P/N AA65674-L6).

d. Connect pressure line of external hydraulic power source (50 psi maximum) to store hydraulic RETURN ground service quick-disconnect.

CAUTION

Hydraulic test stand may be used for external hydraulic power source, but stand must be regulated to supply *maximum output of 50 psi.*

e. Connect return line of external hydraulic power source to store hydraulic PRESSURE ground service quick-disconnect.

f. Operate hydraulic stand to supply 3–6 gallons per minute flow to store for bleeding pump and lines.

g. Disconnect external hydraulic power source from store.

h. Connect hydraulic test stand lines to corresponding SUPPLY, PRESSURE and RETURN service ground service quick-disconnects on store.

Note

Hydraulic test stand must have a fluid cooler and variable displacement pump with minimum rating of 6 gpm flow rate and 3500 psig pressure output. Stand must also have reservoir of at least 3 gallons minimum capacity at 0–65 psig maximum pressure.

CAUTION

If test stand does not have cooler, limit bleeding operations to ten minutes, allowing half-hour fluid cooling period between operations. Fluid temperature must not exceed 93°C (200°F).

i. Provide electrical ground between hydraulic test stand and store.

j. Connect external electrical power source to airplane.

WARNING

Under no circumstances attempt to operate store without electrical power when hydraulic test stand is connected to store. Operation without electrical power will cause hose reel to retract hose (if extended or if drogue is not installed) with resultant damage to equipment and possible injury to personnel. Cork lining on ram air turbine brake will also overheat and char if propeller lock (figure 4–27) is not installed.

k. Install reel-in snubber valve retainer (figure 4–27).

l. Place in-flight fueling control panel ON-OFF-DUMP switch in "ON" position.

m. Operate hydraulic test stand until 3000 psig pressure is available; open test stand supply and return lines until minimum flow of 6 gpm is obtained and then partially close hydraulic test stand return valve to restrict flow from store, thus maintaining slight back pressure to insure proper bleeding.

n. On stores (serial numbers 200 and subsequent) equipped with Vickers Hydraulic Pump (P/N AA65674-L2A or L2B) rotate ram air propeller by hand to bleed pump).

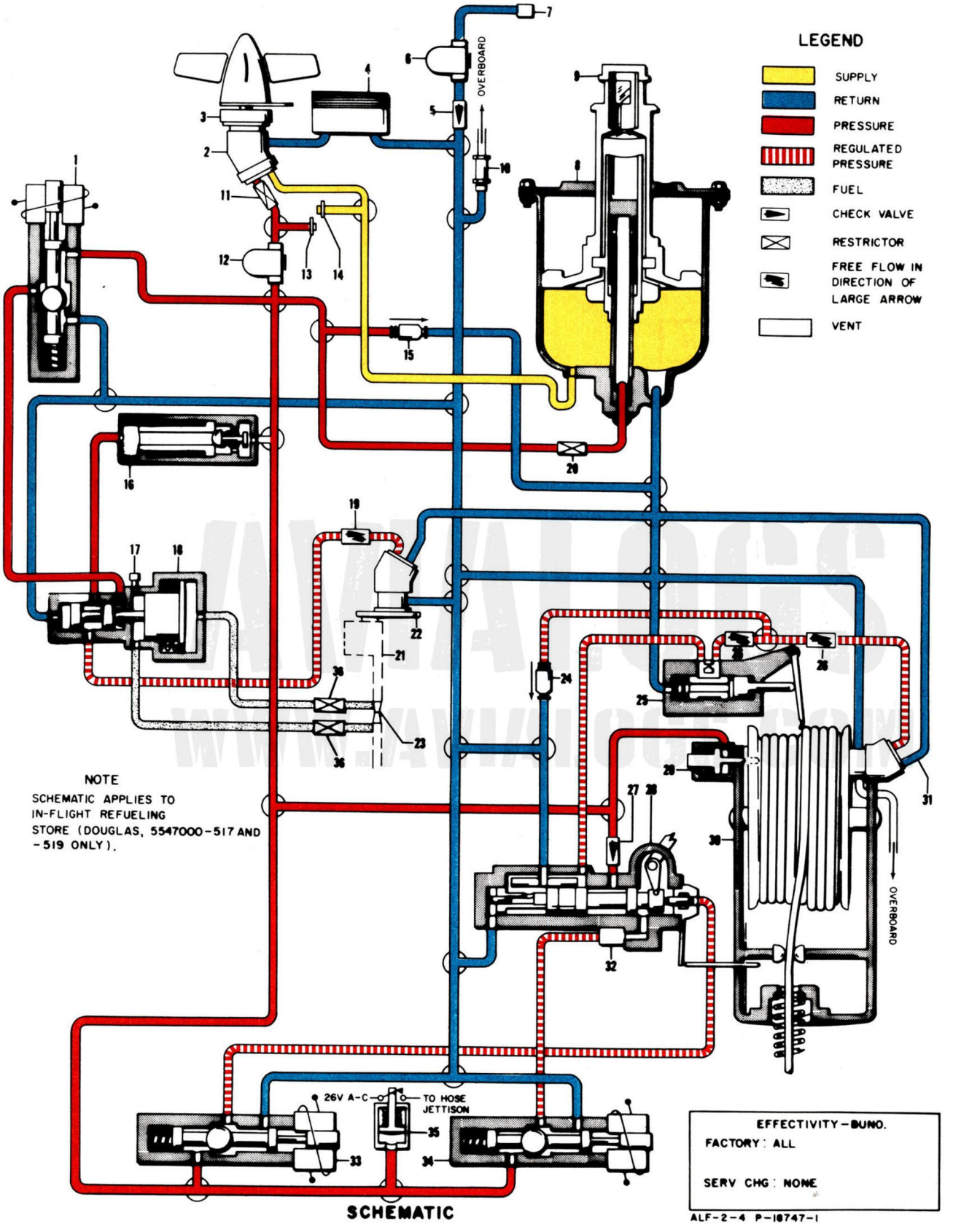


Figure 4-22A. In-Flight Fueling Store Hydraulic System (Sheet 1)

1. Fuel pump drive motor shut-off solenoid valve
2. Hydraulic pump
3. Ram air turbine
4. Hydraulic fluid cooler
5. Check valve
6. Hydraulic filling line filter
7. Pump case drain (return) disconnect
8. Hydraulic reservoir
9. Manual bleed valve
10. Case drain relief valve
11. Filtered restrictor (one-way)
12. Hydraulic main filter
13. Hydraulic pressure disconnect
14. Hydraulic suction (supply) disconnect
15. Hydraulic system relief valve
16. Hose reel priority valve
17. Vent
18. Fuel pressure regulator valve
19. Fuel pump drive motor flow regulator
20. Filtered restrictor
21. Fuel pump
22. Fuel pump drive motor
23. Fuel line venturi
24. Hose reel stop relief valve
25. Hose reel-in snubbing valve
26. Hose reel drive motor flow regulators
27. Check valve
28. Hose tension regulator valve
29. Hose reel lock cylinder
30. Hose reel assembly
31. Hose reel drive motor
32. Restrictor fitting
33. Un-reel solenoid selector valve
34. Re-reel solenoid selector valve
35. Hydraulic pressure switch

Figure 4-22A. In-Flight Fueling Store Hydraulic System (Sheet 2)

o. Place in-flight fueling control panel RET-EXT switch in "EXT" position.

p. Install drogue handle in drogue and utilize at least two men to freely extend hose from store.

q. Place in-flight fueling control panel RET-EXT switch in "RET" position and maintain tension on hose during retraction to prevent hose snarling on reel.

r. Repeat steps o through q at least three times to insure air is bled from all hydraulic components.

Note

During bleeding procedure release air frequently through manual bleed valve on top of store hydraulic reservoir.

s. Place in-flight fueling control panel RET-EXT switch in "EXT" position and extend hose from 15 to 20 feet.

t. Place in-flight fueling control panel TRANS-OFF switch in "TRANS" position then return switch to "OFF" position.

Note

Accomplishment of step t operates the fuel pump which will remove air in the hydraulic line to the fuel pump motor.

CAUTION

Do not operate fuel pump more than five seconds.

u. Place in-flight fueling control panel RET-EXT switch in "RET" position and maintain tension on hose during retraction.

v. De-energize hydraulic test stand and allow hydraulic pressure to dissipate.

w. Disconnect hydraulic test stand from store service fittings.

x. Disconnect external electrical power source or in-flight fueling system control panel.

y. Service store hydraulic reservoir. (Refer to paragraph 4–195J.)

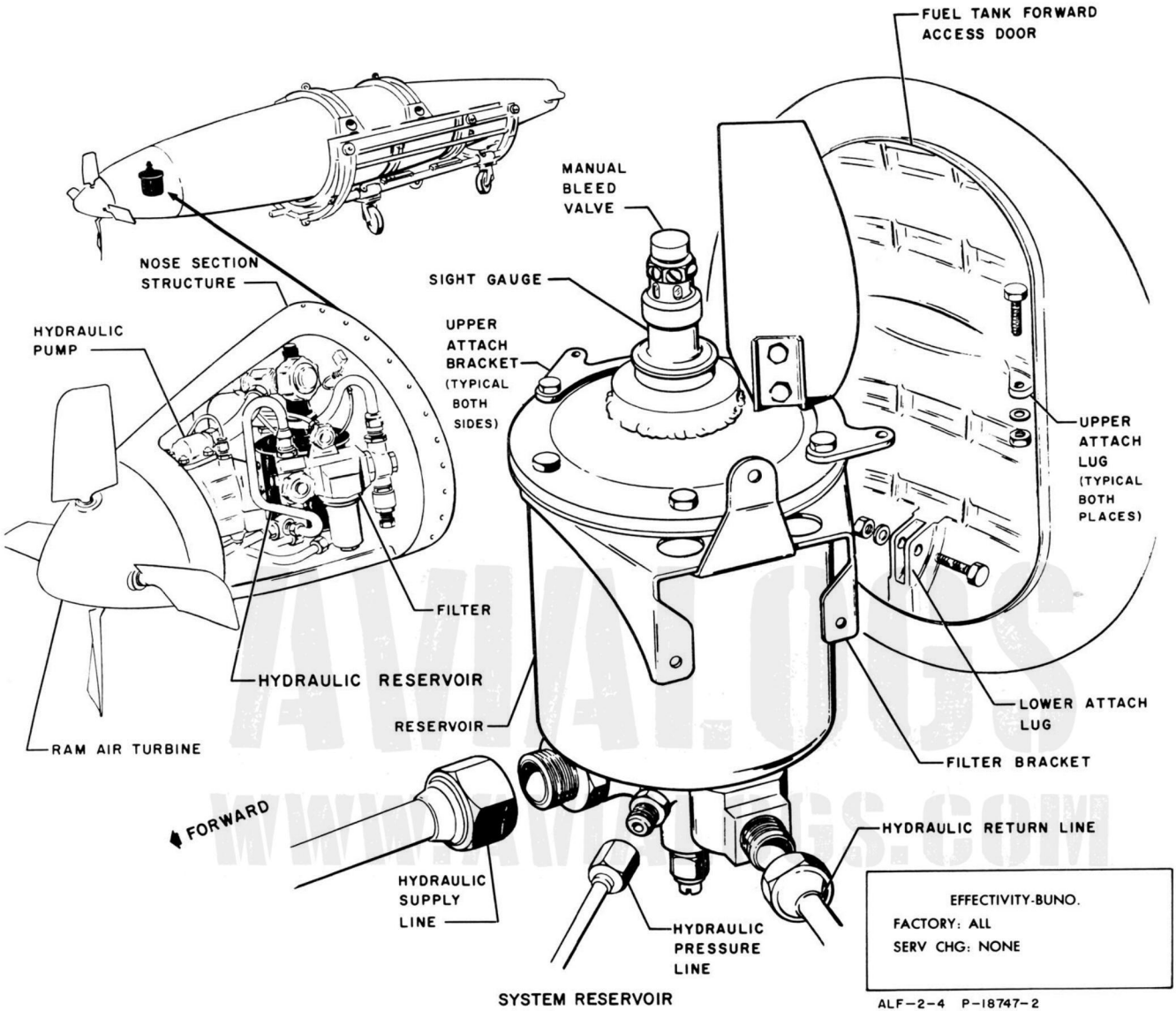


Figure 4-22A. In-Flight Fueling Store Hydraulic System (Sheet 3)

z. Manually rotate ram air turbine propeller three or four turns. If rotation of propeller causes hydraulic fluid level to lower more than ½ inch, bleeding procedure must be repeated.

aa. Remove reel-in snubber valve retainer (figure 4–27, sheet 3).

ab. Install nose section access door (index 1, figure 4–15B).

WARNING

In-flight fueling store must be functionally tested and inspected for hydraulic leaks whenever repairs or replacement of parts have been made in hydraulic system.

4–195E. HYDRAULIC LINES.

4–195F. DESCRIPTION. Corrosion resistant steel lines of ⅝-inch O.D. with .049-inch wall thickness and lines of ½-inch O.D. with .035-inch wall thickness are used for high-pressure lines. Aluminum alloy 61S-T6 line of ¼-inch O.D. with .035-inch wall thickness are utilized for low-pressure lines. Return lines of the system are

formed of aluminum alloy 61S-T6. The pump supply line from the hydraulic reservoir is of 6061 ST aluminum alloy of one-inch O.D. with .083-inch wall thickness. All hydraulic lines within the fuel tank (center section) are formed of corrosion-resistant steel. Pressure lines are fabricated from ⅝-inch O.D. with .049-inch wall thickness; return lines from one-inch O.D. with .049-inch wall thickness and drain lines from ½-inch O.D. with .035-inch wall thickness. All line fittings are of MS standard flareless type or AN standard flared type. AN standard packings are utilized as required on components throughout the hydraulic system.

4–195G. HYDRAULIC RESERVOIR.

4–195H. DESCRIPTION. (See figure 4–22A.) The hydraulic reservoir maintains a supply of fluid for the store hydraulic system. It is installed in the nose section on the left-hand side of the center section forward bulkhead. Access for visual inspection of the sight gage is provided by a door (index 2, figure 4–15B) on the right-hand side of the nose section. The reservoir is a cylindrical tank of 1¼-quart capacity. A stationary piston, extending vertically inside the tank from its base, is enclosed by a sliding cylinder which has the lower end flared to form a diaphragm. Pump output pressure is directed through an integral passage in the stationary piston forcing the diaphragm down against the fluid supply. Thus, during system operation the fluid supply is pressurized sufficiently to prevent pump cavitation. The upper end of the cylinder extends through the reservoir lid and contains a glass sight gage to reflect fluid level. Any air in the store hydraulic system is returned to the lower (fluid supply) chamber of the reservoir by fluid displaced from operating hydraulic components. The air bubbles are forced through pressure of the diaphragm to collect in the sight gage chamber. Air trapped in the chamber can be relieved through a manual bleed on top of the reservoir. The reservoir is serviced through a SUPPLY quick-disconnect on the left-hand side of the nose section. A filter element is installed between the quick-disconnect and reservoir to remove foreign matter from the hydraulic fluid used for servicing.

4–195J. SERVICING.

a. Remove nose section access door (index 1, figure 4–15B).

b. Remove dust cap from supply ground service quick-disconnect on supply line.

c. Attach source of hydraulic fluid with hand pump (469100 Bendix, or equiv.) to supply quick-disconnect.

d. Remove screw from receptacle in manual bleed valve, attach drain line to receptacle and place free end of drain line in suitable container of at least one-quart capacity.

e. Operate hand pump to add hydraulic fluid until sight glass is full of fluid. Approximately 65 psi hydraulic fluid pressure is required to fill reservoir.

f. Depress manual bleed valve and remove any air trapped in sight gage.

Note

Bleed store hydraulic system as outlined in paragraph 4–195D until difference between pressurized and unpressurized level is ¼-inch or less.

g. Continue filling until sight gage glass is free of air bubbles and gage is full when pressurized.

h. Remove drain line and reinstall screw in valve receptacle.

i. Remove supply line and install dust cap on SUPPLY quick-disconnect.

Note

To prevent deterioration of rubber or removal of paint, clean any spilled fluid immediately with cloth dampened in naphtha.

j. Install nose section access door.

4–195K. REMOVAL.

a. Remove nose section access door (index 1, figure 4–15B).

b. Place suitable drip pan under nose section.

c. Disconnect hydraulic fluid cooler and supply lines from hydraulic pump fittings.

Note

Have a suitable container ready to catch hydraulic fluid from disconnected lines.

d. Remove air scoop (index 12, figure 4–15B) from fluid cooler.

e. Disconnect inlet and outlet lines from fluid cooler fittings.

f. Disconnect hydraulic pressure line from restrictor on lower side of hydraulic pump.

g. Disconnect electrical lead from connector on ram air turbine.

Note

One man, preferably two, should be utilized to support the nose section during removal (approximate weight—75 pounds).

h. Remove 30 screws attaching nose section to center section.

i. Carefully place nose section on suitable work bench after removal.

j. Open manual bleed valve.

k. Place suitable container of at least ½-gallon capacity beneath reservoir; remove drain plug in bottom of reservoir and drain fluid into container.

l. Disconnect hydraulic return line from connector on bottom of reservoir.

m. Disconnect supply line bottom of reservoir; remove line and cap open ends.

n. Disconnect pressure line from fitting on top of pressure relief valve.

o. Disconnect line from fitting at back of DRAIN ground service quick-disconnect identification panel.

p. Disconnect pressure line from fitting on center section bulkhead.

q. Remove bolt attaching bottom of reservoir to center section fuel tank access door bracket.

r. Support reservoir and remove two bolts attaching top of reservoir to fuel tank access door brackets.

s. Carefully lower reservoir downward and outboard away from nose section.

Note

Inspect all fittings and lines for damaged threads, cracks, dents and/or distortions. Replace all lines with scratches or pits exceeding 10 percent of wall thickness.

t. Place reservoir with filter unit, brackets, relief valve and attaching lines on suitable work bench for disassembly.

4–195L. INSTALLATION.

Note

Install new O-ring on all fittings disconnected. Moisten O-rings with hydraulic fluid to facilitate installation and proper seating.

a. Install brackets, filter unit, pressure relief valve and attaching lines removed during disassembly.

b. Place reservoir in position on center section fuel tank access door brackets and install two bolts attaching top of reservoir to brackets.

c. Install bolt in lower bracket and then tighten three bolts securely.

d. Temporarily connect supply line to fitting on bottom of reservoir.

e. Temporarily connect return line to fitting on bottom of reservoir.

f. Connect line to fitting at back of DRAIN ground service quick-disconnect identification plate.

g. Connect return line to fitting at top of pressure relief valve.

h. Tighten line fittings securely.

Note

Two men should be utilized when installing nose section to preclude damage to equipment.

i. Carefully guide nose section over hydraulic components onto center section lugs.

j. Install 30 attaching screws.

k. Connect electrical lead to receptacle on ram air turbine.

l. Connect hydraulic pressure line to hydraulic pump restrictor.

m. Connect hydraulic fluid cooler lines.

n. Connect cooler and supply line to hydraulic pump.

o. Install fluid cooler air scoop.

p. Service and bleed store hydraulic system. (Refer to paragraphs 4–195D and 4–195J.)

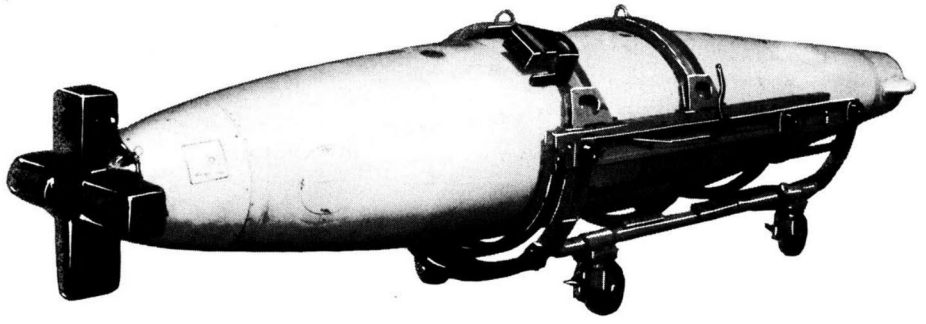
CAUTION

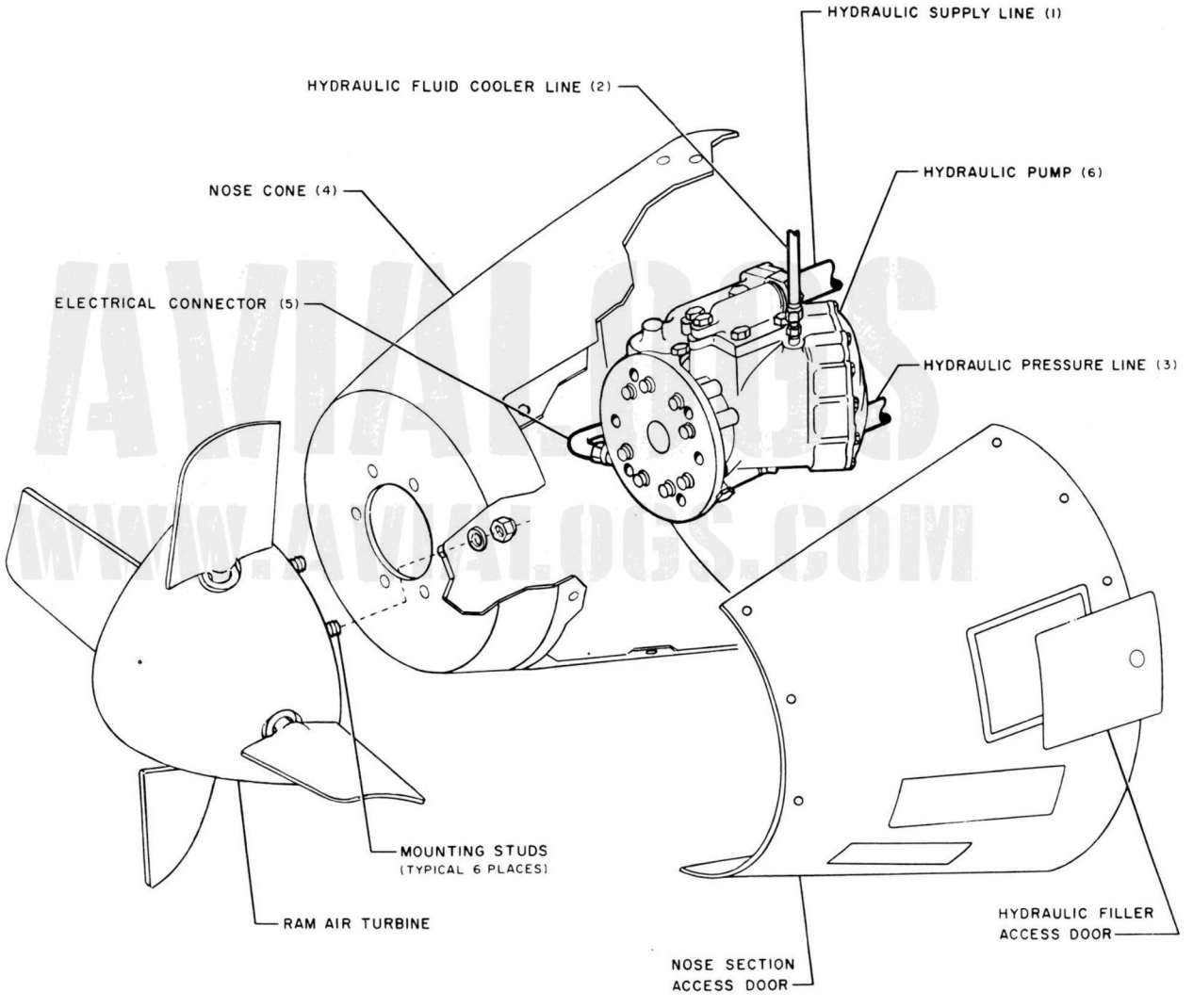
Do not attempt to operate ram air turbine with electrical power disconnected or burning and charring of brake will result.

q. Perform operational test procedures. (Refer to table 4–6.)

Note

Clean any spilled hydraulic fluid by wiping area with cloth dampened in naphtha.





HYDRAULIC PUMP

EFFECTIVITY – BUNO.
FACTORY: ALL
SERV CHG: NONE

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Figure 4-22A. In-Flight Fueling Store—Hydraulic System (Sheet 4)

4–195M. HYDRAULIC PUMP.

4–195N. DESCRIPTION. (See figure 4–22A.) The hydraulic pump, located in the nose section provides the necessary hydraulic pressure of 3000 ± 50 psi for operating the store. It is coupled to and driven by the ram air turbine. On stores serial numbers 200 and subsequent, the pump is an axial piston type containing nine pistons in a cylinder block. The pistons are attached by ball and socket arrangements to the end of the drive shaft near its outer periphery; the cylinder block by a universal link to the center of the shaft. Thus, the pistons and cylinder block rotate with the drive shaft. The forward end of the cylinder block is supported by a valve plate; the mating faces of the plate and block provide the valving action which, in conjunction with the piston stroking, pumps hydraulic fluid. The cylinder block and valve plate are contained in a yoke that swivels on pintels through an angle of 30 degrees below the drive shaft axis. When the pump is operating, downward deflection of the yoke acts to increase the length of the piston strokes thereby increasing fluid displacement. Conversely, a decrease in the angle of yoke deflection acts to shorten the piston strokes with a resultant decrease in fluid displacement. When the yoke aligns the pistons with the drive shaft axis, further stroking ceases and the pump continues to operate without displacing fluid. A full angle of thirty degrees is maintained from 0-2950 psi pressure to provide maximum fluid output upon start. At 2950 psi pressure an automatic compensating unit begins decreasing the angular deflection until an output pressure of 3050 ± 50 psi is obtained. The pump is self-cooled and lubricated by hydraulic fluid in the case. It is always full of fluid and, as the pump operates, more fluid escapes past the pistons and mating faces of the valve plate and cylinder block. An integral case pressure relief valves releases fluid to the inlet side of the pump when the case pressure exceeds the inlet pressure by a 35 ± 5 psi differential.

4–195P. The hydraulic pump pad is attached to six studs on the ram air turbine which extends through the nose section forward bulkhead. Power to operate the pump is transmitted through a splined drive shaft on the air turbine to a mating coupling in the center of the pad.

Note

The Pesco pump, installed on stores serial numbers 1 through 199, is a fixed stroke, variable displacement nine-cylinder pump with stationary piston barrels and a rotating swash plate. The pump also contains an adjustable compensator for maintaining operational pressures. Output and delivery pressure are the same as the pressures provided by the pumps on stores serial numbers 200 and subsequent.

4–195Q. REMOVAL.

a. Remove nose section access door (index 1, figure 4–15B.)

b. Place suitable drip pan under nose section.

c. Disconnect hydraulic fluid cooler and supply lines from hydraulic pump fittings.

Note

Have a suitable container ready to catch hydraulic fluid from disconnected lines. Cap ends of all open lines and equipment fittings when disconnected.

d. Remove fluid cooler air scoop (index 12, figure 4–15B).

e. Disconnect inlet and outlet lines from fluid cooler fitting.

f. Disconnect hydraulic pressure line from restrictor on lower side of hydraulic pump.

g. Disconnect electrical lead from connector on ram air turbine.

Note

One man, preferably two, should support the nose section during removal. (Approximate weight—75 pounds.)

h. Remove 30 screws attaching nose section to center section.

i. Place nose section on suitable work bench after removal.

j. Remove six self-locking nuts attaching pump pad to studs on ram air turbine through nose section forward bulkhead.

k. Support ram air turbine; work hydraulic pump pad clear of turbine studs and spline.

l. Disengage turbine studs from nose section forward bulkhead; place assembly on work bench.

Note

Inspect all fittings and lines for damaged threads, cracks, dents and/or distortions. Replace all lines with scratches or pits exceeding 10 percent of wall thickness.

4–195R. INSTALLATION.

a. Insert ram air turbine studs through corresponding opening in nose section forward bulkhead.

b. Carefully work hydraulic pump pad into position on air turbine studs, rotating turbine as necessary to engage splined shaft in pump coupling.

c. Install six washers and self-locking nuts on studs.

d. Carefully guide nose section over hydraulic components onto center section lugs.

Note

Two men should be utilized when installing nose section to preclude equipment damage.

e. Install thirty attaching screws.

f. Connect electrical lead to receptacle on ram air urbine.

g. Remove caps from hydraulic pressure line and fitting on pump restrictor; connect line to restrictor fitting.

h. Remove caps from hydraulic inlet and outlet lines and fittings on fluid cooler; connect lines to respective fittings on cooler.

i. Remove caps from hydraulic pump cooler and supply line fittings and then connect lines to respective fittings on pump.

j. Install fluid cooler air scoop.

k. Service and bleed store hydraulic system. (Refer to paragraphs 4–195D and 4–195J.)

CAUTION

Do not attempt to operate ram air turbine with external hydraulic power connected to store and with electrical power disconnected because burning and/or charring of ram air turbine will result.

l. Perform operational test on store. (Refer to table 4–6.)

Note

Clean any spilled hydraulic fluid by wiping area with cloth dampened in naphtha.

4–195S. RAM AIR TURBINE.

4–195T. DESCRIPTION. (See figure 4–22A.) The ram air turbine is a constant speed, propeller driven power plant with a rated output of 44 horse power at 4000 rpm. It drives the store hydraulic pump through a splined shaft to provide the necessary hydraulic pressure for in-flight fueling operations. The turbine has four propeller blades, with a maximum disc diameter of 22.5 inches, which are attached to a common shaft within a metal spinner. An automatic feathering mechanism with a solenoid operated brake is incorporated in the unit. Normally, the solenoid is de-energized and the propeller blades are fully feathered at an attitude (angle of attack) at which a minimum of blade area is subjected to the force of ram air. Constant speed of the turbine is maintained by governor weights which change the propeller blade angle mechanically in proportion to airspeed variations. When the brake solenoid on the forward end of the turbine drive shaft is de-energized, it disengages a clutch plate from a gear collar in the housing at the base of the propeller blades. Thus, the blades and drive shaft are free to turn. The blades are rotated to a feathered or unfeathered position by rakes which engage a yoke on the lower end of each blade shaft. In moving to the feathered position rake worm gears, riding around the stationary gear collar, turn to retract the rakes causing the yokes to turn the blades. The blades are locked in the feather position by the bottoming of the worm gears in the rakes. As the rakes retract, each compresses a coil spring which provides the force to fully extend the rakes when released by the energized brake solenoid. The extended rakes turn the blades through the yokes to a maximum angle of attack, whereupon ram air turns the turbine. Each governor weight meshes with a worm gear on its related blade shaft and is free to move up or down the shaft in response to centrifugal force generated by rotation of the turbine. Guides in the blade shaft housing prevent rotation of the weights; thus linear movement rotates the blade shaft, altering the angle of attack. Outward movement of the weights decreases the angle of attack with a resultant decrease in turbine speed; inward movement toward the drive shaft to increase the angle of attack is accomplished by a spring within each weight.

4–195U. The ON-OFF-DUMP switch on the in-flight fueling store control panel controls the unfeathering and feathering of the ram air turbine propeller blades. When the switch is placed in the "ON" position, the turbine solenoid is energized, releasing the brake and allowing the turbine propeller blades to snap into the unfeathered position. The turbine will accelerate from the feathered position to governed speed within 3 seconds after the solenoid is energized. When the switch is placed in the "OFF" position, the solenoid is de-energized, releasing the brake to stop rotation of turbine and return the propeller blades to a feathered position. The turbine bearings are sealed and do not require lubrication prior to installation nor during the service life of the unit.

CAUTION

Do not operate ram air turbine with external source of hydraulic power connected to store and with electrical power disconnected because brake burning and/or charring will result.

4–195V. REMOVAL AND INSTALLATION.

Removal and installation of the hydraulic pump requires removal and installation of the ram air turbine; therefore procedures are combined with hydraulic pump removal and installation instructions in paragraph 4–195Q and 4–195R.

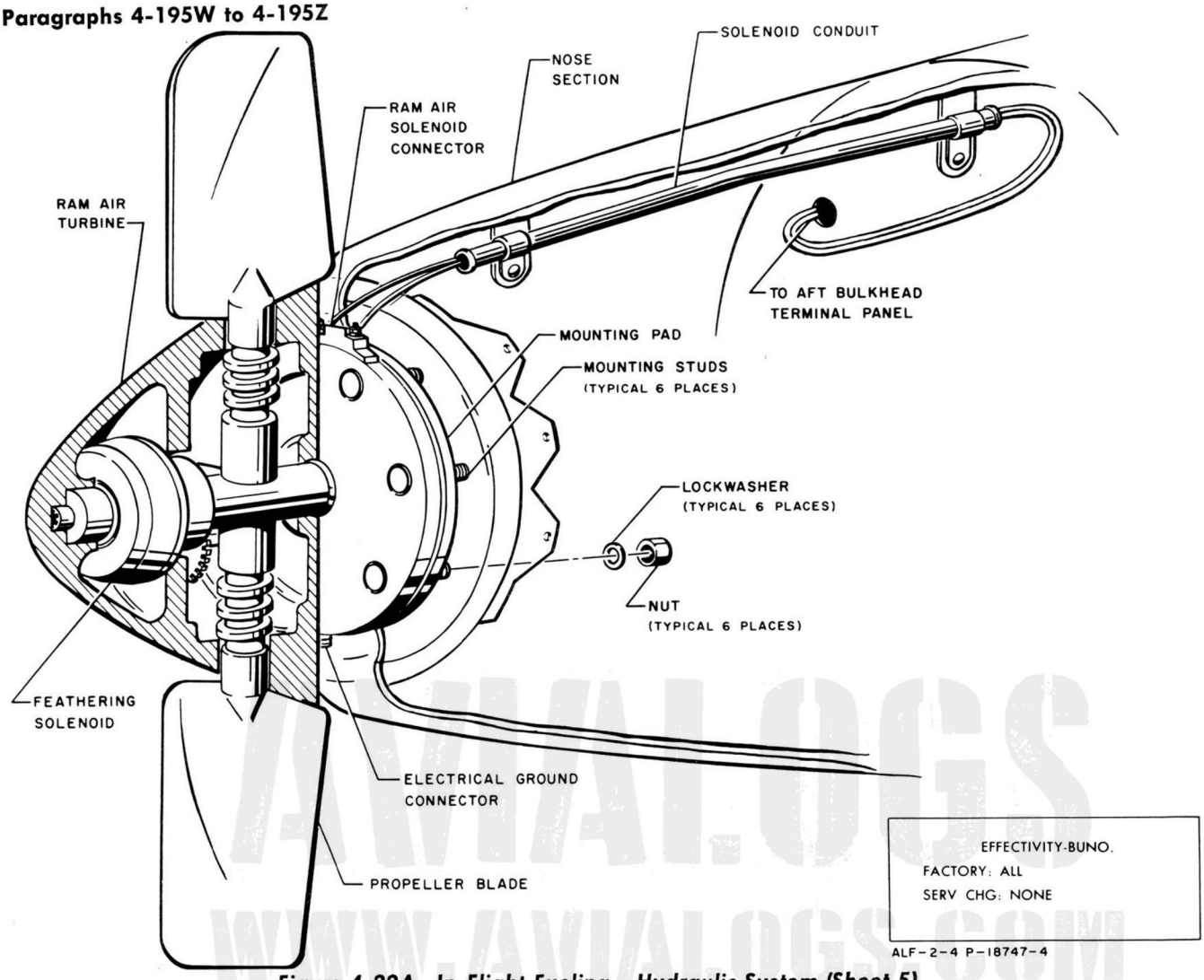


Figure 4-22A. In-Flight Fueling—Hydraulic System (Sheet 5)

4–195W. RAM AIR TURBINE PREFLIGHT OPERATION CHECK. Prior to flight, the ram air turbine should be checked as follows to verify it will operate properly;

a. Check axial freedom of each blade to make certain no looseness exists.

b. Check angular freedom of each blade for maximum freedom of 10 degrees.

c. Check feathering operation by momentarily energizing ram air turbine until blades unfeather. Rotate blades counterclockwise to feathered position and then continue rotation several turns to simulate normal brake slippage with maximum of 60 inch-pounds of torque.

4–195X. HYDRAULIC SYSTEM MAIN FILTER UNIT.

4–195Y. DESCRIPTION. (See figure 4–22A.) The hydraulic system main filter unit removes foreign matter from fluid displaced by the hydraulic pump. It is installed on the left-hand side of the nose section and interconnects the main pressure line downstream from the pump and PRESSURE ground service quick-disconnect. Access is gained through the nose section access door (index 1, figure 4–15B). The filter unit is an MS 28720-12 type which consists of an inline, two-port head and a cylindrical bowl. A replaceable micronic filter element is contained in the bowl. Fluid displaced from the pump enters the inside of the filter element through port "A" on the filter head, flows through the element into the bowl, and exits through port "B." An arrow is stamped on the filter head to preclude installation with improper direction of fluid flow. A wrench holding surface is provided on the lower end of the filter bowl to facilitate its removal from the filter head. A fitting in the base of the threaded filter bowl receptacle on the head prevents installation of the element in the reverse direction. The element is capable of filtering fluid at a rate of 12 g.p.m. and must be replaced after every 120 hours of operation.

4–195Z. REMOVAL AND INSTALLATION. See figure 4–22A.

4–195AA. HYDRAULIC SYSTEM RELIEF VALVE.

4–195AB. DESCRIPTION. (See figure 4–22A.) The hydraulic system relief valve protects the hydraulic system from excessive pressure or pressure surges by releasing hydraulic fluid from the pressure line into the return line. It interconnects the pressure line downstream of the main filter unit and the return line upstream of the reservoir. The valve is installed on the reservoir filter bracket behind the filter unit in the nose section. Access to the valve is gained through the nose section left-hand access door (index 1, figure 4–15B). The valve consists of a cylindrical housing containing a spring-loaded poppet. Adjustment of the valve opening pressure is accomplished by turning an Allen-head screw inside the return port. The valve is normally adjusted to allow a rated flow of 20 gpm at 3850 psi pressure; to just open at 3450 psi pressure; and to reseat at 3100 psi pressure.

4–195AC. REMOVAL AND INSTALLATION. See figure 4–22A.

4–195AD. TESTING. (See figure 4–22A.)

a. Connect hydraulic pressure source to port "A," with port "B" open.

b. Slowly increase pressure at port "A." When pressure reaches 3450 plus or minus 50 psi the valve should unseat, permitting flow out port "B."

Note

If pressure is too high or too low, change setting by turning adjustment screw inside port "B" counterclockwise to increase pressure; turn clockwise to reduce pressure.

c. Reduce pressure to 3100 psi; fluid flow after two minutes should not exceed 4 cubic centimeters per minute.

4–195AE. PRIORITY VALVE.

4–195AF. DESCRIPTION. (See figure 4–22A.) The priority valve diverts all hydraulic pressure to the hose reel motor for hose retraction in the event the store hydraulic system pressure decreases below 2000 psi. It is connected to the fuel pressure regulator valve which is installed on the frame in the tail cone at the bottom of the fuel tank aft bulkhead. Access is gained by removing the tail cone. During fuel transfer, hydraulic pressure from the main pressure line flows through the valve into the pressure regulator valve for operation of the fuel pump motor. Basically the valve consists of a cylindrical housing containing a poppet valve and piston assembly. Each end of the housing is fabricated with a wrench holding surface. Ports are identified as "PRESS" and "RET." An arrow on the housing indicates the direction of free flow. The poppet valve is located inside the "PRESS" port and is spring seated over an axial passage through the piston assembly which extends to the "RET" port. A chamber between the outer surface of the piston rod and the inner surface of the housing is vented to the atmosphere and is equipped with a coil spring that seats the piston against the face of the poppet, closing the axial passage. The vented chamber allows the coil spring to maintain a constant pressure against the piston regardless of the downstream pressure. When the pressure applied to the inlet (PRESS) port reaches 2000 ± 75 psi, it forces the piston to compress the coil spring and move clear of the poppet valve head. Thus, the pressure is released through the valve to the fuel pump pressure regulator valve. If the pressure upstream of the valve decreases below 1750 psi, the piston is reseated by the coil spring against the poppet valve preventing further pressure flow.

4–195AG. HYDRAULIC FLUID COOLER.

4–195AH. DESCRIPTION. (See figure 4–22A.) The hydraulic fluid cooler utilizes ram air to cool hydraulic fluid released from the hydraulic pump case. It is installed within an air scoop on the lower right-hand side of the nose section. Access is gained by removing the air duct. The cooler consists of a cylindrical housing containing a radiator type cooling unit. A coiled line which has an inlet and outlet port on top of the housing routes hydraulic fluid through the cooling unit. The cooler inlet port is connected to the hydraulic pump case outlet and the outlet port is connected to the system return line. Ram air flowing through the unit will cool hydraulic fluid released from the pump case to a minimum of 93.3°C (200°F).

4–195AJ. REMOVAL.

a. Remove nose section access door (index 1, figure 4–15B).

b. Through access disconnect line and hose from cooler inlet and outlet port cluster fitting; cap all open lines.

Note

Wipe any spilled hydraulic fluid from surrounding structure with cloth moistened in naphtha.

c. Remove cluster fitting body from fittings in cooler inlet and outlet ports by removing hex bolt in top of each body.

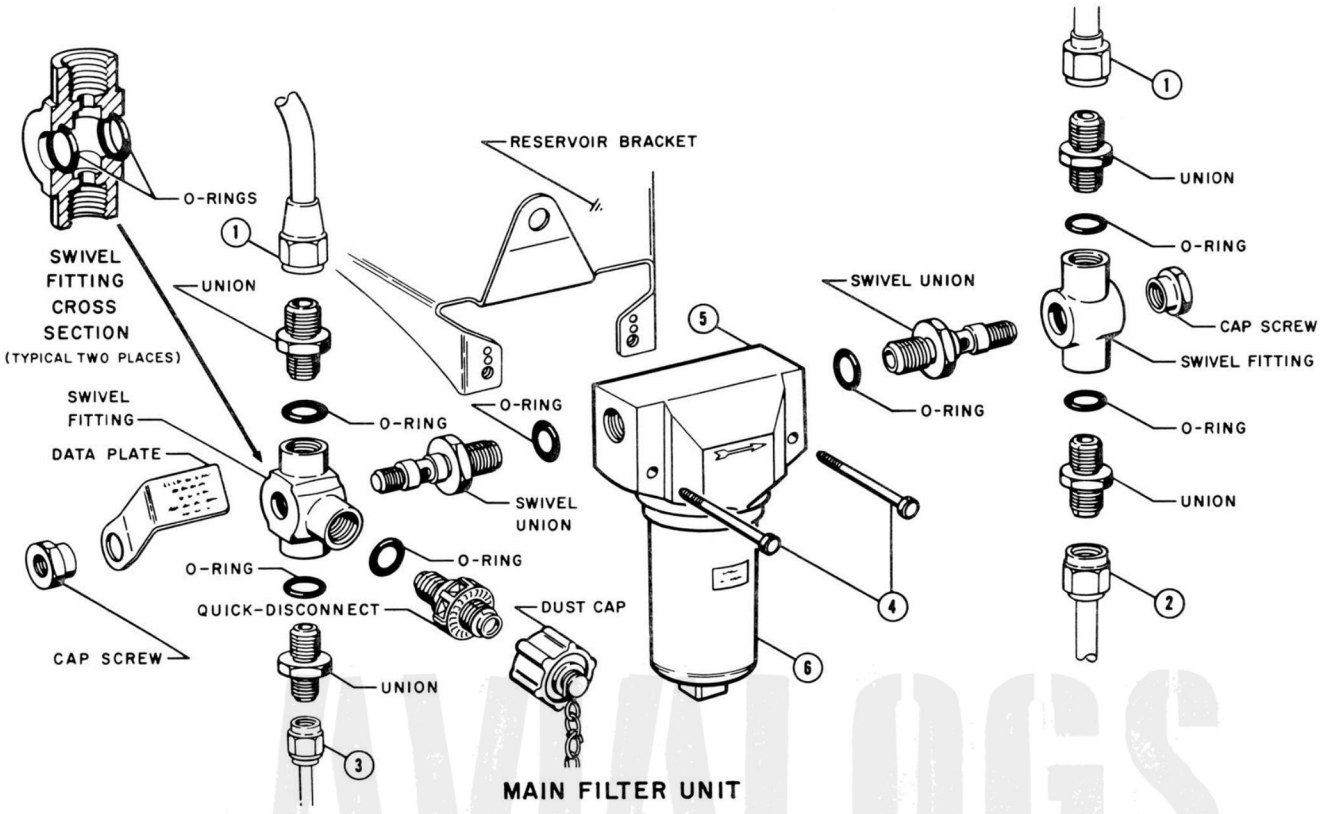
d. Remove 14 screws attaching air duct to lower right-hand side of nose section.

e. Carefully work cooler free of structure; remove fittings from cooler ports and then cap each.

4–195AK. INSTALLATION.

a. Remove caps from cooler ports and fittings.

b. Install new O-rings on each end of fittings and then install fittings in cooler ports.



REMOVAL.

a. Disconnect hydraulic pressure lines **(1)** from top of union on each side of filter unit.

b. Disconnect reservoir pressure line **(2)** at check valve.

c. Disconnect relief valve line **(3)**.

d. Remove two attaching bolts **(4)** from each side of filter unit.

e. Remove filter unit **(5)** with unions attached.

INSTALLATION.

Note

Install new O-rings and gasket seals on re-assembly of cluster unions.

a. Install cluster unions.

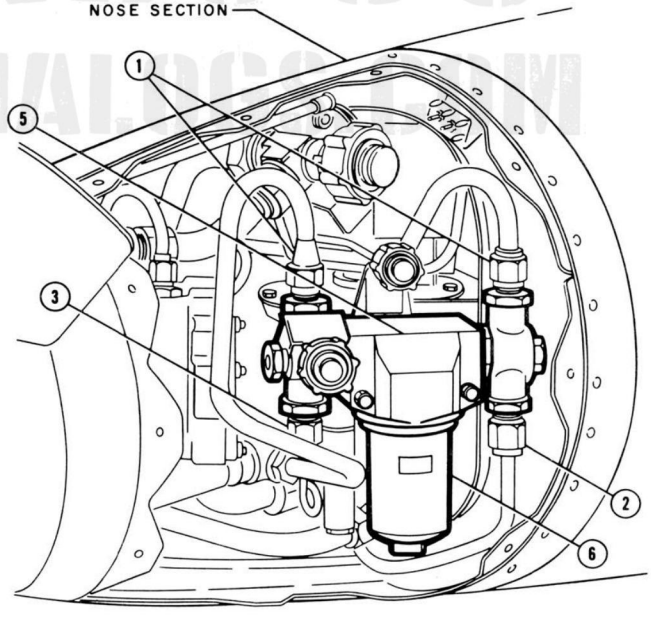
b. Install filter unit and attach with bolts **(4)**.

c. Attach relief valve line **(3)**.

d. Attach reservoir pressure line **(2)** to check valve.

e. Attach hydraulic pressure lines **(1)**.

f. Bleed hydraulic system. (Refer to paragraph 4-195D.)



EFFECTIVITY – BUNO.

FACTORY: ALL

SERV CHG: NONE

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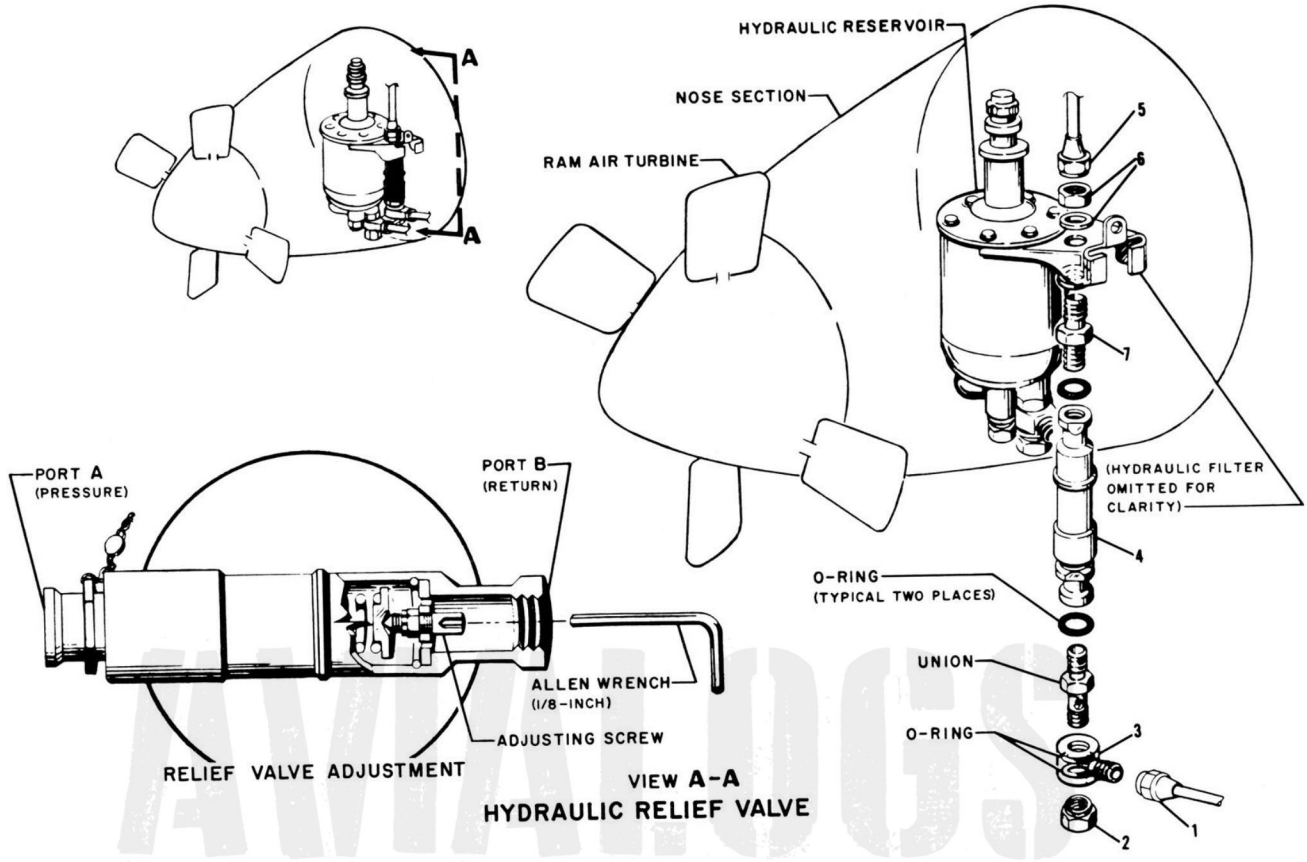
Figure 4-22A. In-Flight Fueling Store—Hydraulic System (Sheet 6)



REMOVAL.

a. Disconnect pressure line **(1)** from connector on bottom of relief valve **(4)**.

b. Remove cluster retaining nut **(2)** from swivel fitting **(3)**.

c. Disconnect hydraulic return line **(5)** from top of relief valve.

d. Remove nut and washer **(6)** from relief valve union **(7)**; slide relief valve from from reservoir bracket.

INSTALLATION.

a. Insert relief valve port "**B**" through bracket and secure with nut and washer **(6)**.

b. Connect hydraulic return line **(5)** to relief valve union **(7)**.

c. Install swivel fitting **(3)** and cluster retaining nut.

d. Attach pressure line **(1)** and then bleed hydraulic system. (Refer to paragraph 4–195D.)

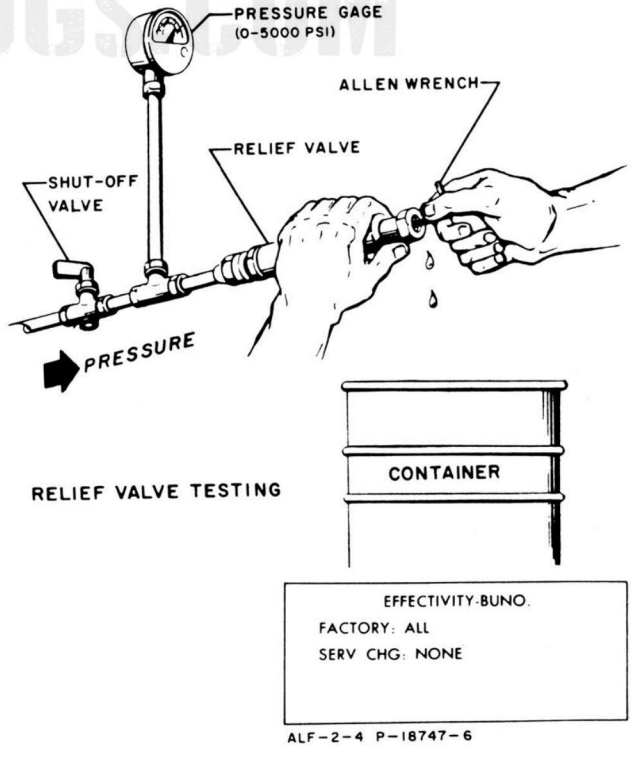


Figure 4-22A. In-Flight Fueling Store—Hydraulic System (Sheet 7)

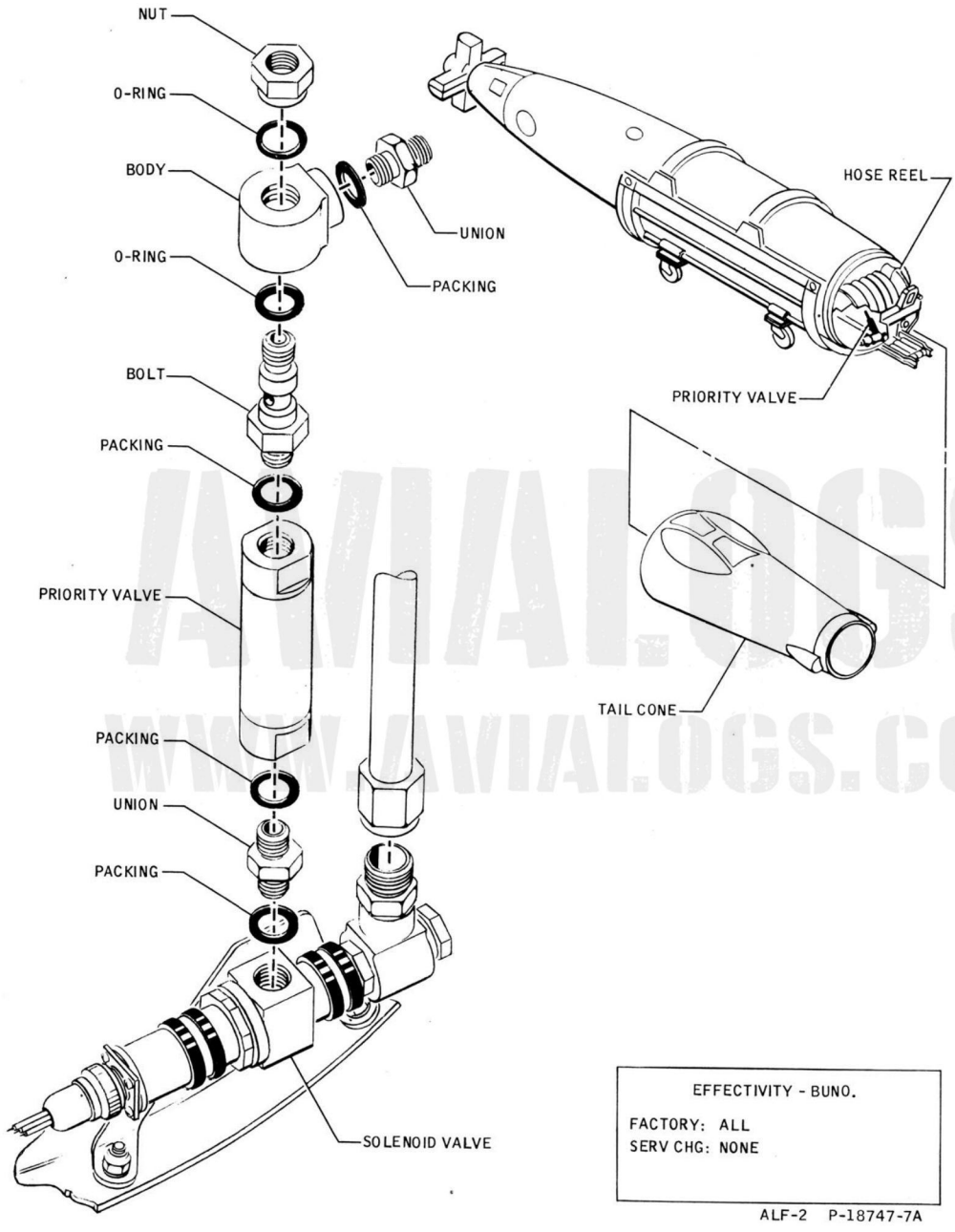


Figure 4-22A. In-Flight Fueling Store - Hydraulic System (Sheet 8)

REMOVAL.

a. Remove drogue and tail cone assemblies. (Refer to paragraph 4-181A.)

b. Disconnect hydraulic pressure lines from priority valve.

c. Remove hydraulic priority valve and union from fuel pressure regulator valve.

d. Remove unions from each end of valve.

TESTING AND ADJUSTMENT.

a. Connect hydraulic pressure source to pressure port.

b. Apply hydraulic pressure slowly; valve should unseat at 2000 ± 75 psi.

c. Slowly reduce pressure to 1750 psi; valve should reseat.

NOTE

For adjustment engage adjustment screw with Phillips screwdriver through return port. Turn clockwise to increase cracking pressure and counterclockwise to decrease.

d. Connect hydraulic pressure source to return port; free flow should occur through pressure port upon application of 2 to 8 psi pressure.

INSTALLATION.

NOTE

Reassemble hydraulic priority valve and unions with new O-ring seals. Apply small amount of hydraulic fluid (MIL-H-5606A) to seals to facilitate installation and proper seating of O-rings.

a. Install unions with O-ring seals on each end of priority valve.

b. Install priority valve with O-ring seal in proper port on fuel pressure regulator valve.

NOTE

Arrow on body of priority valve should point away from fuel pressure regulator valve.

c. Connect hydraulic pressure line to priority valve union.

d. Bleed hydraulic system. (Refer to paragraph 4-195D.)

e. Perform operational test on store. (Refer to table 4-6.)

f. Install tail cone and drogue assemblies.

Figure 4-22A. In-flight Fueling Store - Hydraulic System (Sheet 8A)

Note

Moisten O-rings in hydraulic fluid (MIL-H-5606A) to facilitate installation without twisting.

c. Work cooler into position on nose section structure and then attach air duct with 14 screws.

d. Through nose section access door, place cluster fitting body in position on inlet and outlet port fittings.

Note

The cluster body on valve inlet port fitting (forward port) must face forward; on the outlet port it must face inboard.

e. Use new O-ring on each cluster body and then install attaching washer and bolt.

f. Connect hydraulic line and hose to respective cluster body.

g. Bleed hydraulic system. (Refer to paragraph 4–195D).

h. Install nose section access door.

4–195AL. HYDRAULIC GROUND SERVICE CONNECTORS.

4–195AM. DESCRIPTION. The three hydraulic ground service connectors are utilized for connecting an external hydraulic power source to the store and for servicing the reservoir. All of the connectors are located in the nose section and are accessible when the nose section access door (index 1, figure 4–15B) is removed. Each disconnect is equipped with a chained dust cap and an identification placard specifying the type of hydraulic fluid for use in the store. The "HYD. PRESSURE" (pressure) disconnect is on the forward side of the main filter unit; the "HYD. DRAIN" (return) bracket on top of the main filter unit, and the "HYDRAULIC SUPPLY" (suction) is located directly above the filter unit. Union nuts on a hydraulic test stand or hand pump line can be connected to the applicable store disconnect by first pressing the two halves together then the line connector union nut forward and turning it clockwise to engage the threads on the store connector half. Positive locking is assured by a lock spring which engages teeth of a ratchet on the union nut when the connection is complete. Disconnection is accomplished by turning the union nut counterclockwise until the two halves are separated. Upon separation a poppet and sleeve arrangement seats, closing the connector to prevent loss of fluid or admission of air.

4–195AN. FUEL PUMP DRIVE MOTOR.

4–195AP. DESCRIPTION. (See figure 4–22A.) The fuel pump drive motor is a hydraulic pressure operated mechanism which provides the rotational power source for store fuel pump. It is attached to the fuel pump studs on the lower aft edge of the fuel tank aft bulkhead access door. Access is obtained by removing the tail cone. Direction of the motor shaft rotation is governed by the direction of fluid flow through the mechanism. High pressure fluid enters an inlet chamber in the motor and passes through individual cylinder ports to induce pressure against the pistons. Nine pistons are housed within the mechanism in a cylindrical yoke which is installed at a fixed angle relative to a disc on the end of the drive shaft. Connecting rods link the pistons to the perimeter of the drive shaft disc so that the piston stroking force is transferred eccentrically causing the shaft to rotate. The yoke rotates synchronously with the disc; thus, the angular attachment of the disc causes the pistons to reciprocate within the cylinders. Both the inlet and outlet chambers of the motor are circumferentially elongated to permit the equivalent of four pistons to alternate from inlet pressure to outlet pressure. An inlet pressure of 3000 psig will produce 454 inch-pounds of torque at a shaft speed of 3750 rpm. The speed of the motor is varied to maintain a constant fuel pump pressure output by action of the fuel pressure regulator valve. It senses fuel pressure output and increases or reduces hydraulic pressure flow to the motor accordingly. The end of the drive shaft contains a spline which engages a coupling in the fuel pump. A drain port in the base of the motor housing is connected to an overboard drain line to release fluid seepage from around the shaft.

4–195AQ. The fuel pump drive motor is identical to and interchangeable with the hose reel drive motor. (Refer to paragraph 4–195AY.)

4–195AR. REMOVAL.

a. Defuel store. (Refer to paragraphs 4–206 and 4–207.)

b. Remove tail cone. (Refer to paragraph 4–181A.)

c. Remove hose reel assembly. (Refer to paragraph 4–195AW.)

d. Disconnect return and pressure lines from fittings on top of motor housing.

Note

Wipe any spilled hydraulic fluid from structure and equipment with cloth dampened in naphtha.

e. Disconnect return line from fitting on left-hand side of motor housing.

Note

Additional working space can be obtained by loosening motor hydraulic line segments valve and cluster fittings; lines can then be moved clear of motor.

f. Disconnect drain line from base of motor housing.

g. Cap all open lines and motor fittings.

h. Remove four self-locking nuts attaching flange on base of motor to fuel pump studs.

i. Carefully work motor shaft and base free of fuel pump coupling and studs. Remove gasket at base of motor.

4–195AS. INSTALLATION.

a. Place new gasket on fuel pump studs and then carefully work motor into position.

b. Install four self-locking nuts on fuel pump studs.

c. Remove caps from hydraulic lines and fittings on motor.

d. Connect drain line to fitting in base of motor.

e. Connect return line to fitting on left-hand side of motor housing.

f. Connect pressure and return lines to respective fittings on top of motor housing.

g. Install hose reel assembly. (Refer to paragraph 4–195AX.)

h. Install tail cone. (Refer to paragraph 4–181D.)

i. Bleed hydraulic system. (Refer to paragraph 4–195D.)

j. Perform operational test on store. (Refer to table 4–6.)

4–195AT. HOSE REEL DRIVE ASSEMBLY.

4–195AU. DESCRIPTION. (See figure 4–22A.) The hose reel drive assembly operates hydraulically to extend or retract the drogue, and to regulate tension on the fuel hose when the drogue is extended. It is attached by screws to a doubler around the periphery of the center section aft bulkhead and is accessible when the tail cone is removed. Basically, the assembly consists of a fuel hose reel which is geared to a hydraulic drive motor, and a level wind assembly which guides the hose evenly onto the reel during retraction. Fuel transferred from the tank flows through the hollow axle on the right-hand side of the reel into an internal chamber; an external connector on the reel interconnects the chamber with the aft end of the fuel hose. A sprocket on the right-hand side of the reel is linked through a chain drive to a sprocket on the right-hand end of the level wind shaft. The shaft is grooved to provide a traverse gear for a hose guide carriage which moves from side to side as the shaft turns, causing the hose to wind evenly onto the reel without overlap. The U-shaped hose guide on the carriage contains an electrically operated hose jettison device for cutting the extended portion of the hose in the event an emergency arises. A spring-loaded lock pin on the right-hand side of the reel frame engages a plate on the reel when the store hydraulic system is not pressurized. The lockpin is fully disengaged from the reel when the pressure reaches 1150–1600 psi. A gear box interconnects the left-hand end of the reel axle with the hose reel drive motor. When the extend solenoid selector valve is energized, it closes the supply of hydraulic pressure to the hose tension regulator valve, which, in turn, causes the hose reel motor to operate as a pump (reverse direction) instead of a drive unit. The reverse operation of the pump recirculates hydraulic fluid, causing sufficient back pressure on the reel to prevent overspeeding during drogue extension. When the lockpin releases the reel, the ejection springs launch the drogue and the force of the airstream carries it aft to the fully extended position. As the drogue approaches the fully extended position, the level wind guide carriage mechanically actuates an arm which operates the hose tension regulator valve to direct hydraulic pressure to the drive port of the hose reel motor. The motor then operates to create a snubbing action as the drogue approaches a fully extended position. Simultaneously with actuation of the hose tension regulator valve, the level wind guide carriage operates a switch to de-energize the extend solenoid selector valve. Hydraulic pressure is then routed to one side of the hose tension regulator valve slide. The reel motor then causes the hose to retract slightly until the pressure on each side of the tension regulator valve is in balance. When the pressure is balanced, sufficient hydraulic pressure is metered to the motor to maintain 200 pounds tension on the drogue. When the retract solenoid extension valve is energized, hydraulic pressure is directed through the hose tension regulator valve to the hose reel drive motor and it then rotates the reel to retract the drogue. As the hose is reeled in, it actuates the reel-in snubbing valve which operates to reduce hose speed from 14 feet per second to 2 feet per second. When the drogue is fully seated and store hydraulic pressure is reduced to 575 psi, the lockpin engages the reel, locking it in place.

4–195AV. For detailed information regarding operation and maintenance of the hose jettison assembly, refer to paragraph 4–210.

4–195AW. REMOVAL.

a. Remove tail cone (Refer to paragraph 4–181A.)

b. Remove fuel hose from reel. (Refer to paragraph 4–181C.)

c. Remove nuts and bolts attaching fuel flow switch relay to aft bulkhead terminal panel bracket.

d. Remove two clamps securing wire bundle to center section aft bulkhead and then cut string ties around wire bundle.

e. Remove plastic covers from aft bulkhead terminal panel.

f. Disconnect hose reel assembly wiring from terminal panel studs and tag each wire with proper stud number for subsequent connection.

g. Disconnect hydraulic return line from fitting on fuel pump drive motor.

Note

Wipe any spilled hydraulic fluid from equipment and structure with cloth dampened in naphtha.

h. Disconnect hydraulic return manifold line from union on lower left-hand side of center section bulkhead.

i. Disconnect hydraulic return line from fuel flow selector valve.

j. Disconnect hose reel drive motor drain line from bulkhead fitting on left-hand side of fuel pressure regulator valve.

k. Remove clamp securing hose reel drive motor gear box drain line to aft bulkhead.

l. Disconnect hydraulic pressure line from union on right-hand side of hose reel assembly.

m. Disconnect hydraulic pressure line from flow control check valve union on right-hand side of hose reel frame.

n. Disconnect hose reel fuel line from elbow on center section aft bulkhead.

o. Attach sling to hose reel drive assembly and support with overhead hoist.

p. Remove screws attaching hose reel assembly frame to doubler on aft end of center section.

CAUTION

Make certain assembly is fully supported by hoist before removing upper screws.

q. Work assembly aft until clear of store.

r. Cap all open lines and fitting.

s. Place forward end of hose reel assembly on suitable support.

Note

Four equal lengths of pipe flattened on one end with holes drilled to fit hose reel frame mounting bolts may be fabricated locally to serve as support legs for a stand.

4–195AX. INSTALLATION.

a. Attach sling to hose reel drive assembly and use overhead hoist to support assembly in position at aft end of store.

CAUTION

Utilize two men to guide hose reel assembly into position on center section to prevent possible fitting or equipment damage.

b. Remove caps from disconnected lines and fittings.

c. Install screws attaching hose reel drive assembly frame to doubler on aft end of center section.

d. Disengage overhead hoist and remove sling.

e. Connect hose reel fuel line to elbow on center section aft bulkhead.

f. Connect hydraulic pressure line to flow control check valve union on right-hand side of hose reel frame.

g. Connect hydraulic pressure line to union on right-hand side of hose reel assembly.

h. Insert hose reel drive motor gear box drain line through opening at bottom of center section aft bulkhead and secure line to bulkhead with clamp.

i. Connect hose reel drive motor drain line to bulkhead fitting on left-hand side of fuel pressure regulator valve.

j. Connect hydraulic return line to fuel flow selector valve.

k. Connect hydraulic return manifold line to union on lower left-hand side of center section bulkhead.

l. Connect hydraulic return line to fuel pump drive motor.

m. Connect hose reel assembly wiring to proper studs on aft bulkhead terminal panel and then install plastic covers on terminal panel.

n. Secure wire bundle to center section aft bulkhead with two clamps.

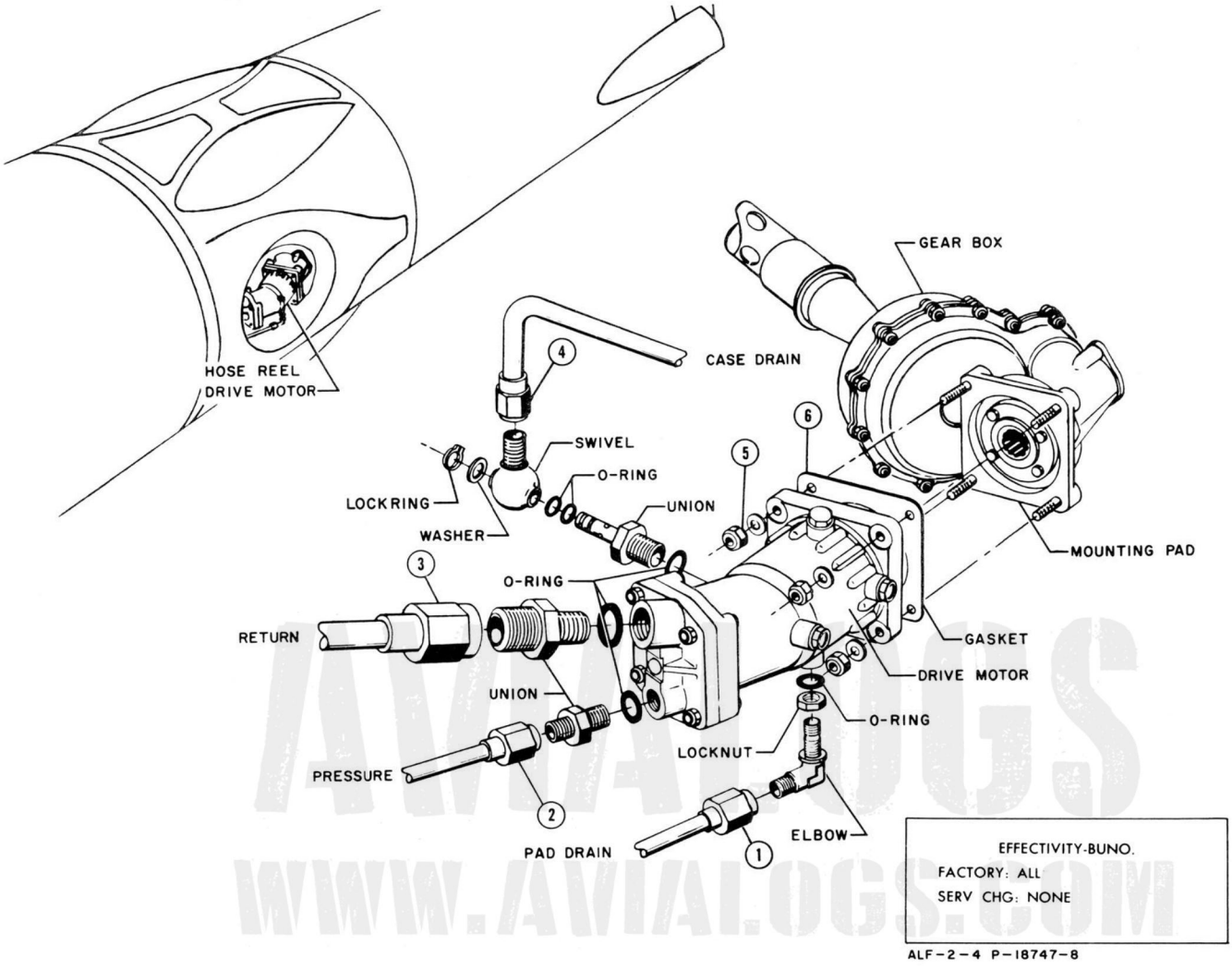
o. Install fuel flow switch relay on aft bulkhead terminal panel bracket.

p. Bleed store hydraulic system. (Refer to paragraph 4–195D.)

Note

Inspect lines and fittings for leakage during bleeding procedures.

q. Install tail cone. (Refer to paragraph 4–181D.)



REMOVAL.

a. Remove tail cone. (Refer to paragraph 4–195BA.)

b. Disconnect drain line **(1)** from elbow on bottom of motor housing.

Note

Wipe any spilled hydraulic fluid from structure and equipment with cloth dampened in naphtha.

c. Disconnect pressure line **(2)** and return line **(3)** from fittings on motor housing.

d. Disconnect return line **(4)** from swivel fitting on inboard side of motor housing.

e. Cap all open lines and motor fittings.

f. Remove four self-locking nuts **(5)** attaching flange on base of motor to hose reel gear box; remove washer from each stud.

g. Carefully work motor shaft free of gear box. Remove gasket **(6)** at base of motor.

INSTALLATION.

a. Place new gasket **(6)** on hose reel gear box studs and then carefully work motor into position.

b. Place washer on each stud and then install four self-locking nuts **(5)**.

c. Remove caps from hydraulic lines and fittings on motor.

d. Connect return line **(4)** to swivel fitting on inboard side of motor housing.

e. Connect return line **(3)** and pressure line **(2)** to respective fittings on motor housing.

f. Connect drain line **(1)** to elbow fitting.

g. Install tail cone. (Refer to paragraph 4–181D.)

h. Bleed hydraulic system. (Refer to paragraph 4–195D.)

i. Perform operational test on store. (Refer to table 4–6.)

Figure 4-22A. In-Flight Fueling Store—Hydraulic System (Sheet 9)

r. Perform operational test on store. (Refer to table 4–6.)

4–195AY. HOSE REEL DRIVE MOTOR.

4–195AZ. DESCRIPTION. The hose reel drive motor is a hydraulic pressure operated mechanism which drives the hose reel to extend or retract the drogue assembly. It is installed on the left-hand side of the hose reel drive assembly in the tail cone. Access is gained by removing the tail cone. The motor is attached to four studs on a gear box which drives the hose reel. Reverse flow of hydraulic fluid through the motor during hose extension causes it to operate as a pump while the reel turns. Hydraulic fluid is then pumped through the reel-in snubbing valve and hose tension regulator to the return line. At full extension the motor, governed by the hose tension regulator valve, maintains constant hose tension in opposition to pull of the slipstream on the drogue. Flow regulator valves prevent overspeeding of the hose reel during extension and retraction of the hose and drogue.

4–195BA. REMOVAL AND INSTALLATION. See figure 4–22A.

4–195BB. The hose reel drive motor is identical to the fuel pump drive motor; therefore, for operating principles, refer to paragraph 4–195AP.

4–195BC. HOSE REEL DRIVE MOTOR GEAR BOX.

4–195BD. DESCRIPTION. (See figure 4–22A.) The 25.6-pound hose reel drive gear box assembly is a motor-driven, reversible planetary gear reduction unit with a 23.5:1 ratio. With a maximum input speed of 4800 rpm at rated load (425 lb in.), the gear train assembly has a reduced rated output speed of 204 rpm at a rated load of 10,000 lb in. The gear box assembly is used to transmit the actuating drive motor output through a reduction gear train to the hose reel for winding and unwinding the drogue assembly. The unit is installed and secured to the hose reel drive motor and is accessible by removing the tail cone.

4–195BE. LEVEL WIND GUIDE ASSEMBLY.

4–195BF. DESCRIPTION. (See figure 4–25.) The level wind guide assembly insures the fuel hose winds evenly onto the reel without overlap. It is installed on the aft end of the hose reel frame and is accessible when the tail cone is removed. Basically, the assembly consists of a shaft which is grooved to form a traverse gear, and a carriage containing a hose guide and hose jettison assembly. A sprocket on the right-hand end of the shaft is linked by a drive chain to a sprocket on the hose reel; the fuel hose is inserted through the U-shaped guide on the shaft carriage. Thus, as the hose reel and level wind shaft turn, the guide moves back and forth across the shaft causing the hose to wind evenly on the reel. The hose jettison knife assembly is installed on the lower aft edge of the hose guide and the cartridge breech is on the forward side. When the cartridge is detonated electrically, the knife is forced upward across the guide opening to cut the hose. The knife remains seated against the top of the guide to crimp the hose preventing fuel loss. The electrical wiring to the jettison cartridge breech is clipped to the left-hand side of the hose reel frame and is spiraled to allow travel with the guide carriage.

4–195BG. ADJUSTMENT. See paragraph 4–213.

4–195BH. HOSE REEL TENSION REGULATOR VALVE.

4–195BJ. DESCRIPTION. The hose reel tension regulator valve is located in the tail cone and is accessible by the removal of the tail cone. The regulator valve is a pressure and mechanically operated unit and provides the hydraulic control for extension, tensioning and retraction of the hose assembly. When the extend and retract solenoid selector valves are energized, hydraulic pressure at the "crack end" of the regulator valve is decreased causing an unbalance of force against the slide within the valve. The hydraulic pressure unbalance causes the slide to move to the extend position, allowing the hose reel drive motor to reverse, permitting extension of the hose and drogue. When the hose and drogue approach the full extension, the level wind actuates a slide positioning lever that mechanically repositions the slide in the hose tension regulator control valve. Hydraulic pressure is then diverted to the rewind port of the hose reel drive motor, causing a snubbing action as the hose and drogue approach full extension.

4–195BK. FLOW CONTROL REGULATOR VALVE.

4–195BL. DESCRIPTION. The normally closed, hydraulically pressure-operated flow control valve provides fuel flow controlled by differential pressure. The valve also shuts off the fuel flow from the fuel pump when the pressure in the fuel pump outlet decreases to 15 psi, maximum. The flow control regulator valve is located on the right-hand center section of the store forward of bulkhead station 140.000.

4–195BM. HOSE REEL-IN SNUBBING VALVE.

4–195BN. DESCRIPTION. The hose reel-in snubbing valve is a mechanically actuated, piston-operated flow control valve and is located on the hose jettison assem-

bly. Access to the valve is gained by removing the tail cone. The snubbing valve is mechanically operated by the hose when the hose lacks several feet of being reeled in. Hydraulically, the valve brakes the hose reel-in speed from 14 feet per second to 2 feet per second.

4-196. IN-FLIGHT FUELING STORE FUEL SYSTEM.

4-197. DESCRIPTION. (See figures 4-22, 4-23 and 4-24.) The in-flight fueling store fuel system is hydraulically operated. Upon extension of the in-flight fueling hose, hydraulic pressure causes the hose reel priority valve to open (at 2000 ± 75 psi), directing hydraulic pressure to the fuel pump pressure regulator and the fuel pump drive motor solenoid shut-off valve. Placing the refueling switch on the in-flight fueling control panel in the TRANS position actuates the motor shut-off valve solenoid, allowing hydraulic pressure to operate the fuel pump drive motor. Fuel is then pumped at the rate of 200 gpm at a pressure of 25 to 50 psi. The shut-off valve, located in the hose reel fuel supply line, shuts off when the fuel pump output decreases to 15 psi pressure.

NOTE

If the fuel pump is operating and the receiver airplane pushes the hose in approximately half-way, the fuel pump will be shut off by action of the fuel pump shut-off switch attached to a traveling nut on the level wind shaft. The switch is connected in series with the motor shut-off solenoid valve.

4-197A. The in-flight fueling store fuel system includes the following principal components:

a. Fuel Tank. The in-flight fueling store fuel tank has a capacity of 300 gallons. It extends from the store center section forward bulkhead to the center section aft bulkhead and may be fueled through a topside gravity filler or through a pressure fueling receptacle valve on the forward left-hand side of the store center section. During pressure fueling, over filling is prevented by a float type pressure fueling shutoff valve located within the top forward area of the tank. (See figure 4-23.) When the tank is full to capacity the shutoff valve works with the valve in the pressure fueling receptacle to shut off the fuel flow. Sufficient air space is left above the fuel in the tank to provide for thermal expansion. A defueling float switch in the forward portion of the tank actuates the fuel pump motor shut-off solenoid valve to shut off fuel flow to the fuel pump when the tank is empty.

b. Pressure Fueling Receptacle Valve. The pressure fueling receptacle valve is located on the forward left-hand side of the store. It is connected by a bleed line to the air pressure, vent and pressure fueling shut-off valve which acts to close the receptacle valve when the store is pressure fueled to full capacity.

c. Fuel Pump. The fuel pump is installed in the bottom of the store fuel tank. It is a hydraulically driven, centrifugal pump having a pumping rate of 200 gpm.

d. Defueling Float Switch. The defueling float switch de-energizes the fuel pump motor shut-off valve when the store fuel tank is empty.

e. Fuel Shut-Off Valve. The fuel shut-off valve, installed in the fuel pump outlet line, shuts off the low of fuel when fuel pressure decreases below 15 psi.

f. Fuel Line Venturi. The venturi meters fuel outlet flow from the fuel pump and also provides a sensing of fuel pressure differential to the fuel pump pressure regulator valve for stabilizing the pressure output of the fuel pump.

g. Fuel Flow Indicator Switch. The fuel flow indicator switch, installed in the fuel pump outlet line, provides magnetic actuation for a relay to light the green light on the store tailcone when fuel is flowing through the pump outlet line.

h. Drain Valve. The fuel drain valve, installed in the bottom centerline of the store, is manually operated to remove fuel, impurities and water condensation from the store fuel tank.

i. Paradrogue. The paradrogue serves as a target and guide to the fuel reception coupling assembly for the in-flight fueling probe of the receiving airplane. The funnel-shaped paradrogue assembly consists of a collapsible strut cage, 108 short-length, ferruled cable assemblies and a cloth canopy. All struts are attached to the drogue coupling ring at their forward ends and are laced transversely by the cable assemblies which limit the drogue opening to a target diameter of 24 inches. The target end of the drogue is encircled by a 3-inch wide cloth canopy which folds between the strut ends when the drogue is retracted into the store. When the paradrogue is ejected, the canopy opens the paradrogue, pulls the fueling hose astern and maintains the paradrogue in a stable position for engagement by the receiver airplane. The paradrogue is equipped with four lights to illuminate the paradrogue and coupling during night in-flight refueling operations. A wind driven generator mounted on the adapter furnishes the current for the lights.

j. MA-2 Coupling (Douglas 5553887-501). The reception coupling (Type MA-2) is attached to the ring end of the paradrogue. It provides a female coupling for the fueling probe of the receiver airplane. A cam on the coupling secures the receiver aircraft probe during fueling operation. For lockwire procedure see figure 4-24.

2-198. IN-FLIGHT FUELING STORE EMERGENCY SYSTEM.

4-199. DESCRIPTION. The emergency system on the in-flight fueling store includes provisions for dumping of fuel and severing of the hose and drogue assembly. In the event of a hydraulic failure precluding hose retraction, operation of the hose jettison assembly is directed by the HOSE JETTISON switch on the in-flight fueling control panel. The switch must be lifted into the firing position, causing all electrical power, except power to the fuel dump valve, to be removed from the store. A pressure switch in the hose jettison

circuit, controlled by hydraulic pressure, delays hose cutter firing until hydraulic pressure diminishes to approximately 325 psi minimum. This delay permits engagement of the hydraulic cylinder lock pin in the hose reel. The cartridge is then fired driving the cutter knife through the hose and crimping the remaining portion of the hose against the hose cutter wall preventing fuel spillage. Upon jettisoning of the hose and paradrogue assembly the remaining fuel in the store may be dumped by actuating the dump valve. The fuel dump valve is actuated by lifting the ON-OFF-DUMP switch lever on the control panel to the DUMP position, energizing the dump valve solenoid and opening the valve allowing fuel to escape.

4-200. HOSE JETTISON ASSEMBLY. (See figure 4-25.) The hose jettison assembly (guillotine) serves as a hose cutter and hose guide. Attached to the level wind guide assembly, it guides the hose onto the reel during hose and paradrogue retraction, preventing hose overlap. On airplanes reworked to A-1/ASC 694, provisions are incorporated in the airplane to fire the cartridge-actuated hose cutter knife to effect jettisoning of the hose and paradrogue.

NOTE

The hose jettison assembly utilizes a Mark I Mod 3 bomb ejector cartridge. All cartridge handling requirements and safety precautions set forth in Bureau of Ordnance Pamphlets (OP) No. 4, 5, and 2173 must be adhered to where applicable.

4-201. FUEL DUMP VALVE. The fuel dump valve, installed in the bottom centerline of the fuel cell, is opened by solenoid action to provide emergency release of fuel while in flight. Placing the ON-OFF-DUMP switch on the cockpit control panel in the DUMP position, completes a circuit from the d-c bus to the dump valve solenoid which opens the fuel dump valve. Opening of the fuel dump valve allows fuel in the store to flow out through a rubber shroud located on the bottom centerline of the tank and into the airplane's slip-stream.

4-202. IN-FLIGHT FUELING STORE SERVICING AND ADJUSTMENT.

4-203. DESCRIPTION. The in-flight fueling store servicing and adjustment procedures consist of trouble shooting, lubrication, purging, preservation, cleaning, adjustment, system bleeding and testing. Nonconformance of any system with the requirements outlined, shall be cause for rejection of that system or component.

4-204. TROUBLESHOOTING. Refer to table 4-5.

4-204A. TAIL CONE DRAIN PROVISIONS. See figure 4-24A.

4-205. LUBRICATION. Remove tail cone assembly and lubricate the following components with grease (Spec MIL-G-23827) after each 10 hours of turbine operation.

a. Hose tension regulator valve (one fitting).

b. Reel-in snubbing valve (four fittings).

c. Level-wind guide assembly (one fitting).

d. Level-wind shaft drive chain. Apply grease (MIL-G-23827) sparingly to chain.

CAUTION

All excess grease must be removed and fittings wiped clean.

4-206. IN-FLIGHT FUELING STORE DECONTAMINATION.

NOTE

Auxiliary tanks and fuel lines carrying JP-grade fuel must be decontaminated before using aviation grade gasoline. Use the following procedures:

a. Drain residual JP-grade fuel from external tanks.

b. Fill 400-gallon tanks with 10 to 12 gallons of aviation grade gasoline.

CAUTION

Airplane tanker must be in the basic tanker configuration. (See figure 4-6, sheet 1, and table 4-4A.)

c. Connect external power supply to airplane.

d. Energize 400-gallon fuel booster pumps, and flush aviation grade gasoline to in-flight fueling store

e. Drain flushing gasoline from in-flight fueling store.

f. Reinstall in-flight-fueling-store drain plug.

4-207. PURGING. Prior to performing repairs within the fuel cell, purge store fuel cell as follows: (store installed on dolly).

a. Ground store electrostatically.

b. Remove gravity fill fuel cap.

c. Remove plugs (or adapters) from fuel transfer lines.

d. Open manual drain valve and drain fuel in a suitable container. Rock store to assure complete drainage.

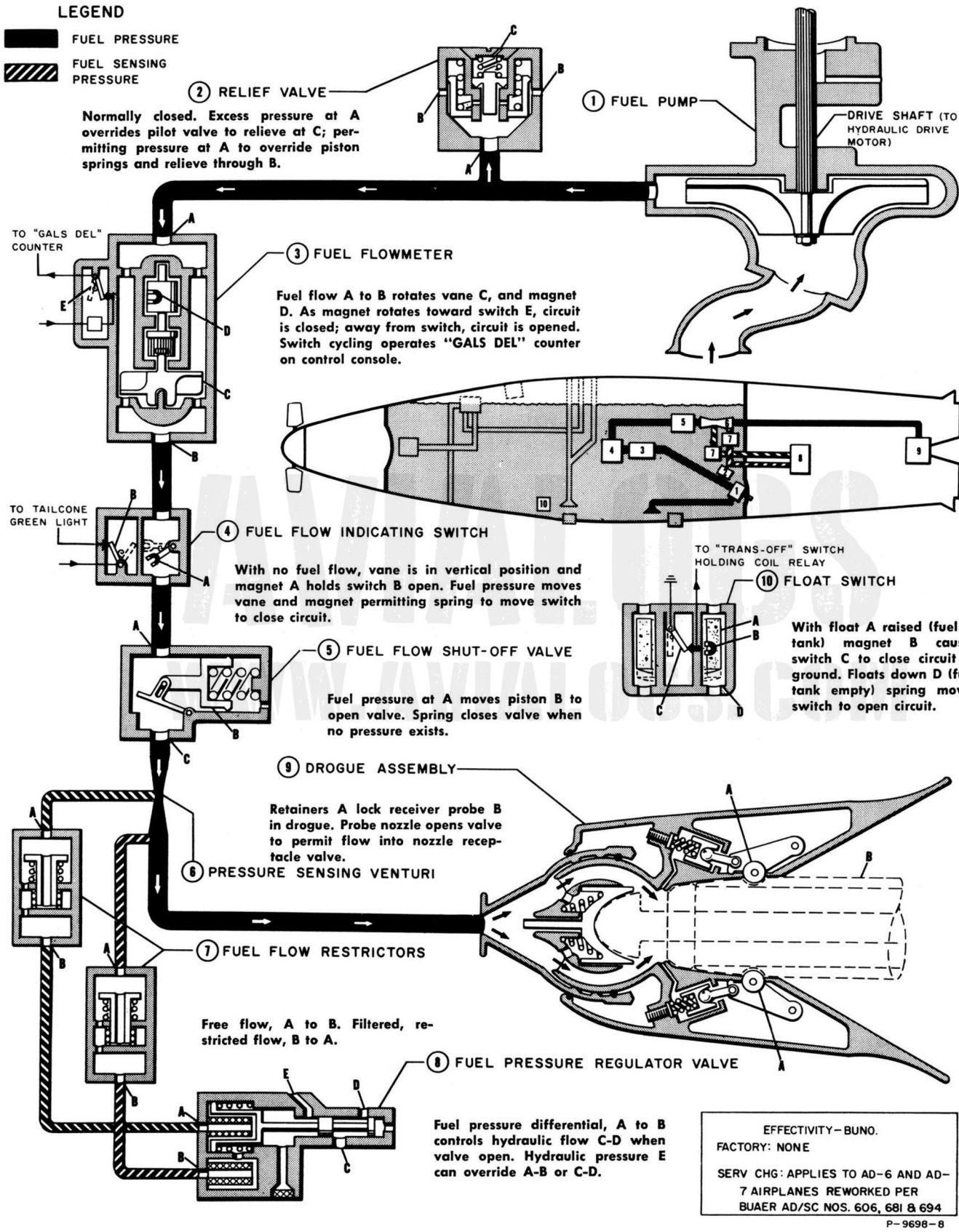


Figure 4-23. In-Flight Fueling Store and Control—Schematic (Sheet 1)

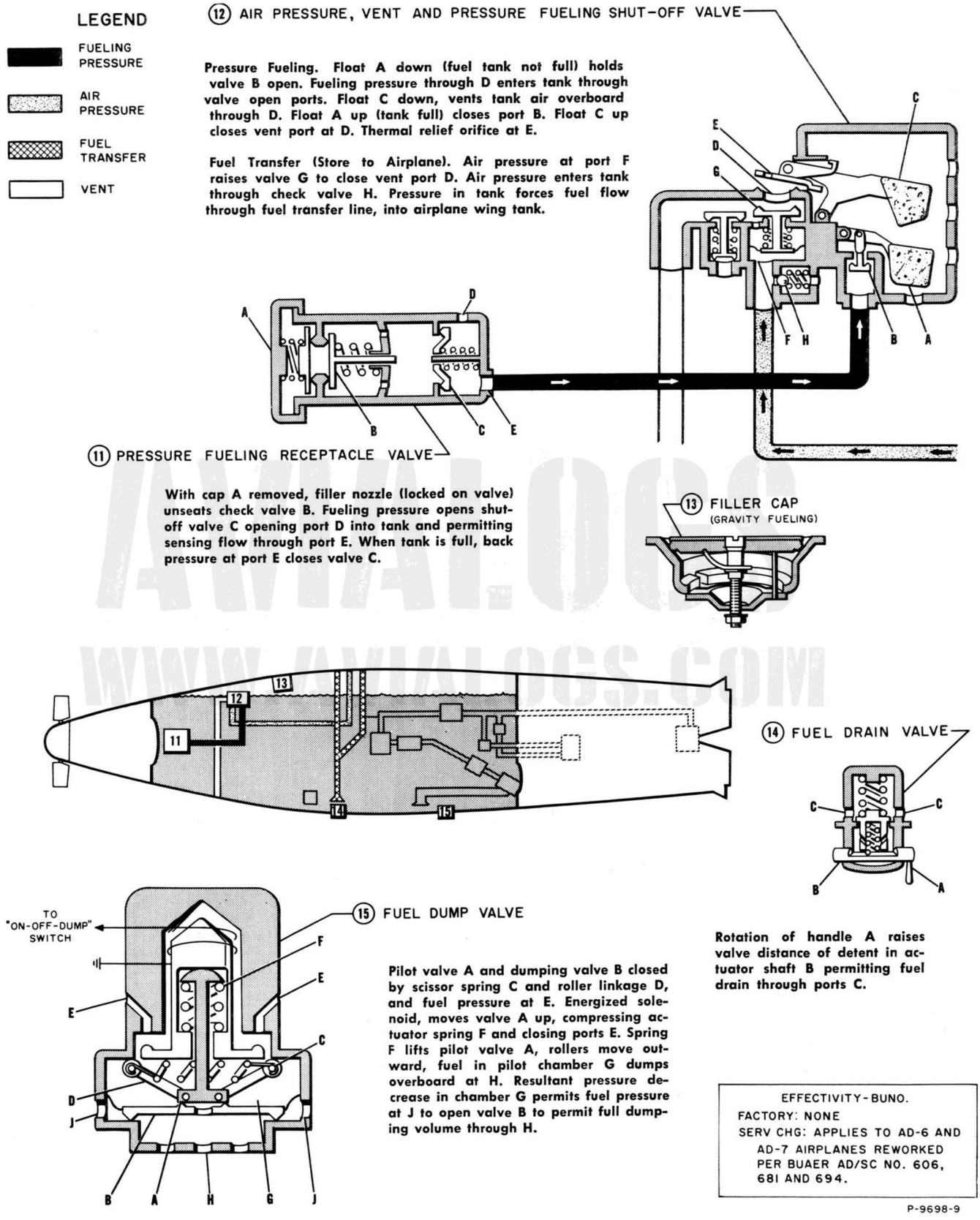


Figure 4-23. In-Flight Fueling Store and Control—Schematic (Sheet 2)

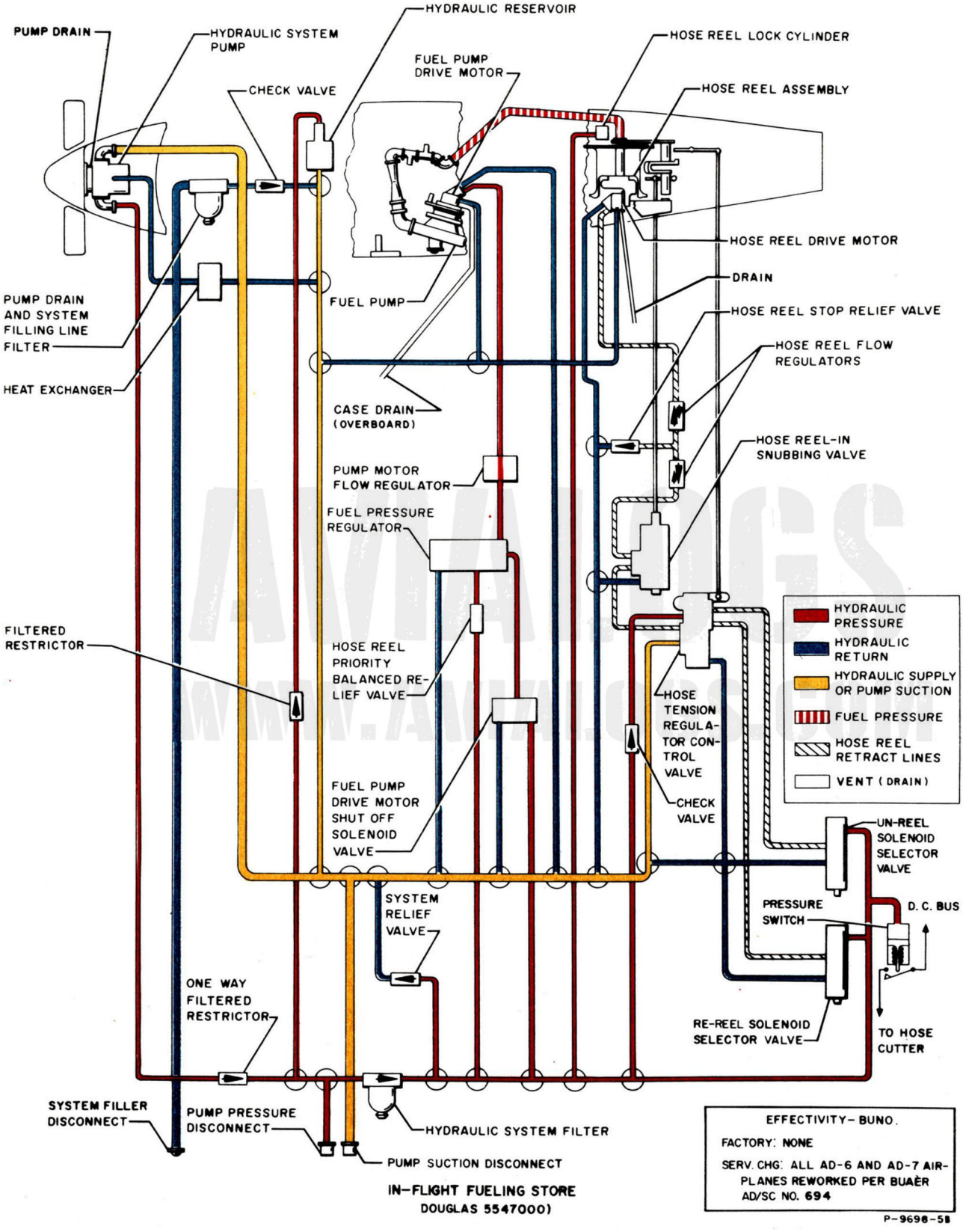
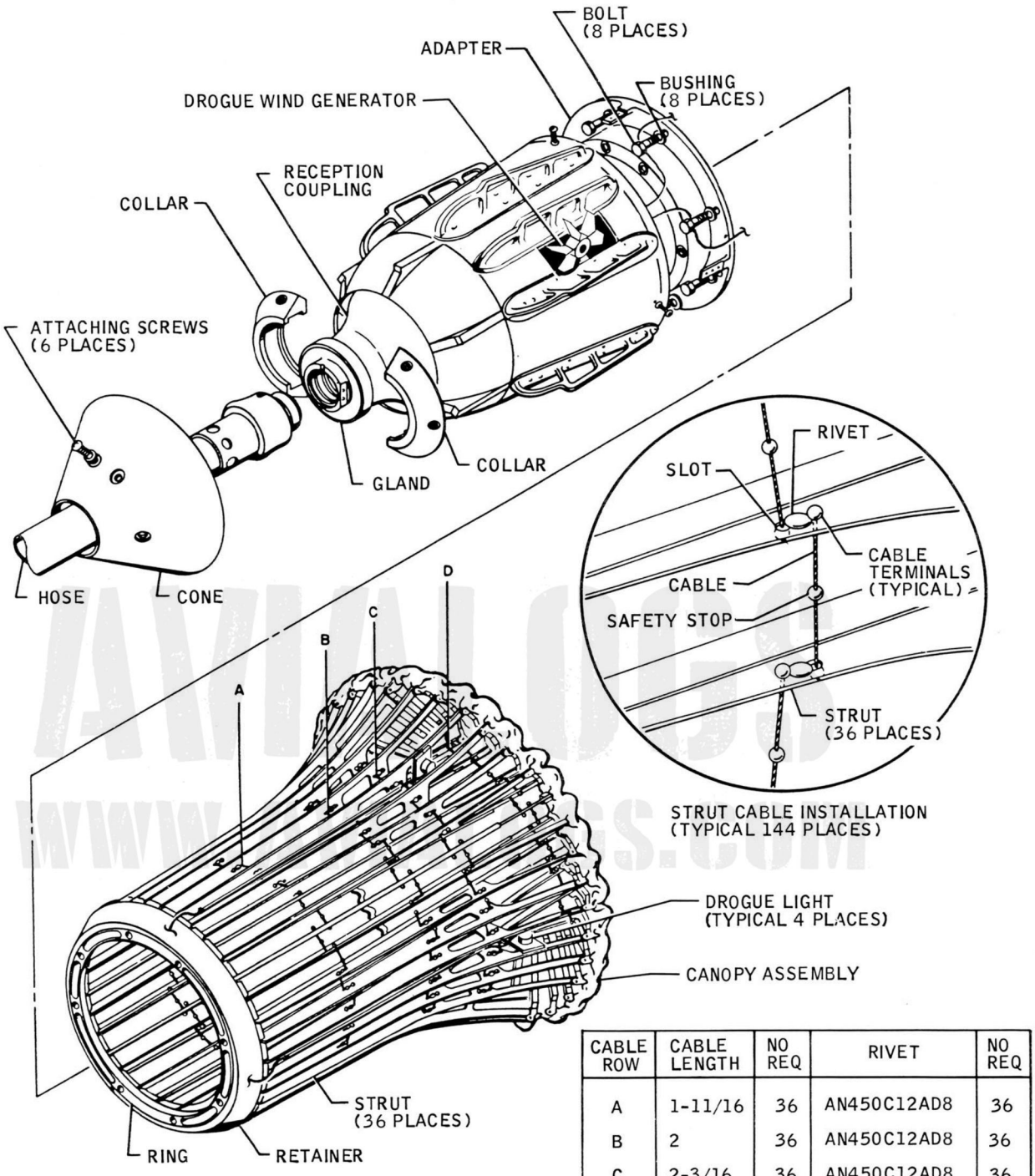


Figure 4-23. In-Flight Fueling Store and Control—Schematic (Sheet 3)



CABLE ROW	CABLE LENGTH	NO REQ	RIVET	NO REQ
A	1-11/16	36	AN450C12AD8	36
B	2	36	AN450C12AD8	36
C	2-3/16	36	AN450C12AD8	36
D	2-7/16	36	AN450C12AD12	36

EFFECTIVITY - BUNO.

FACTORY: NONE

SERV CHG: ALL AIRPLANES REWORKED TO A-1/ASC 606, 681 AND 694

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Figure 4-24. Drogue and Coupling (Sheet 1)

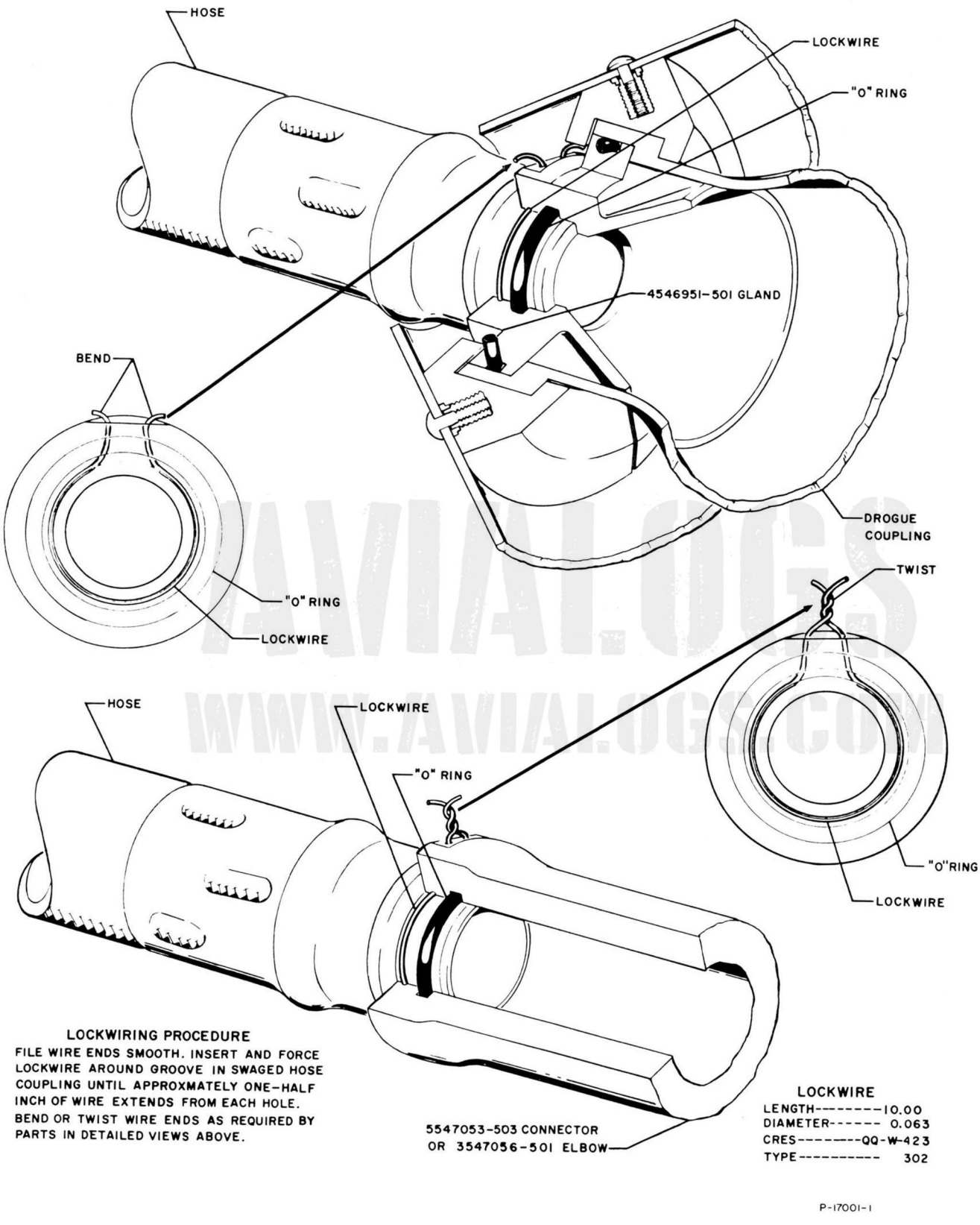
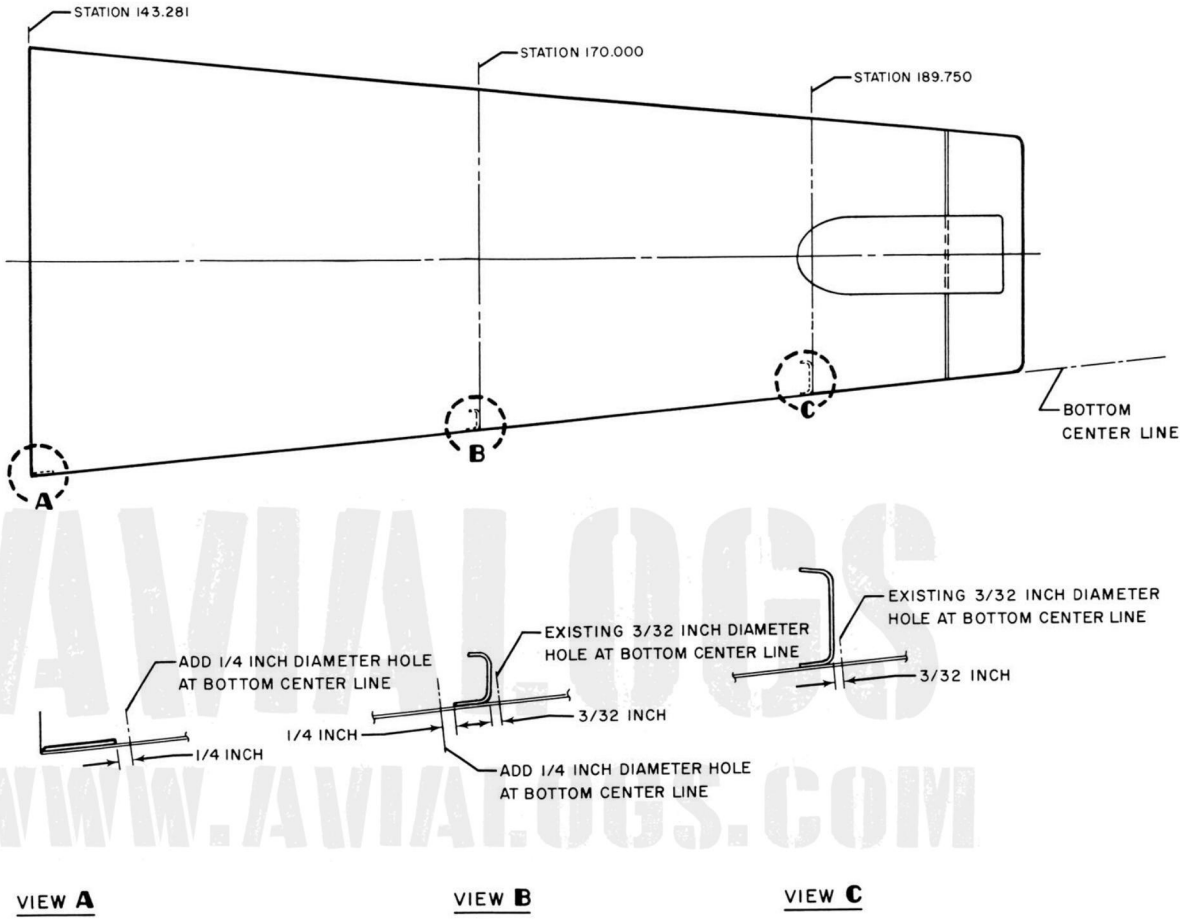


Figure 4-24. Drogue and Coupling (Sheet 2)



NOTE

ADD HOLES AS INDICATED TO PREVENT POSSIBLE TRAPPING OF FUEL IN THE TAIL CONE.

P-18823-1

Figure 4-24A. Tail Cone Drain Provisions

e. Remove fuel tank right- and left-hand access doors.

f. Purge tank with air through fuel tank access door. Direct nozzle toward forward end of fuel cell.

g. Purge tank until safe reading is obtained on eplosimeter. After safe reading is obtained, wait 20 minutes and take another reading to ascertain that all evidence of fuel has been expelled.

h. Upon completion of repairs, reinstall access doors and safety doors with lockwire.

i. Reinstall gravity filler cap.

j. Close manual drain valve.

4-208. PRESERVATION. If store is to be placed in storage for a period of less than two weeks, place under cover, such as shipping container, inside a building or under a tarp. Storage longer than two weeks perform the following preservation procedures:

WARNING

Disarm hose jettison by removing explosive cartridge from cutter.

a. Position empty store on dolly or stand so that store may be rocked to slosh preservative compound on upper interior surface of fuel cell.

b. Fill store fuel cell with preservative compound per Spec. MIL-C-6529, Type 2.

c. Rock store so that preservative compound sloshes against upper interior surface of fuel cell.

d. Remove paradrogue and paradrogue coupling if installed on hose. (See figure 4-24.)

e. Perform hydraulic system bleeding procedure outlined in paragraph 4-195D.

f. Extend hose fully, then retract to fuel transfer position. Place outboard end of hose in waste fuel container of 20 gallons minimum capacity.

g. Operate store fuel pump (control panel TRANS-OFF switch in TRANS position) for 3 seconds minimum, 5 seconds maximum.

h. Drain preservative compound from store fuel cell. Extend hose to fully extended position (RET-EXT switch in EXT position) and drain preservative compound from hose.

i. Place small amount of preservative compound in paradrogue coupling and rotate coupling until surface is covered with the compound. Drain off excess.

j. Reinstall paradrogue and paradrogue coupling on hose. Retract paradrogue and hose to fully retracted position. (RET-EXT switch in RET position.)

NOTE

While retracting hose, maintain tension (two men, or tug or tractor-maximum allowable tension 500 pounds) on hose to prevent hose snarling on hose reel.

k. Secure gravity filler cap, manual drain valve, air pressure line and fuel transfer line plugs. Use AN814-6D plug for air pressure line, AN814-24D plugs for fuel transfer lines.

l. De-energize hydraulic power. After hydraulic pressure has bled down, de-energize dc power. Remove hydraulic and electrical connections from store.

m. Attach red warning tag to camloc fastener on store pressure fueling receptacle cover and top-side gravity fueling filler cap (see figure 4-15B) bearing the following inscription:

WARNING

Fuel system contains preservative compound. To depreserve, run 15 to 20 gallons JP-4 or JP-5 through fuel pump and hose.

n. Load store in shipping container as outlined in paragraph 4-221.

4-209. HOSE JETTISON UNLOADING AND DISASSEMBLY. (See figure 4-25.)

WARNING

Ensure all electrical power to the store is off.

a. Disconnect electrical connector from breech lock cap receptacle.

b. Cut lock wire and remove breech lock cap.

c. Use channel lock pliers to remove cartridge.

d. Remove two bolts attaching jettison control unit to level wind shaft assembly.

e. Remove two clamps securing electrical wire to hose jettison assembly.

f. Remove hose jettison assembly from in-flight refueling store hose level-wind shaft.

g. If hose jettison cartridge has been actuated, insert wire through holes in each side plate to depress spring-loaded pins, permitting knife to drop into unfired position.

NOTE

If cartridge has been actuated knife is held in raised position by pins engaged in slots of side plate.

h. Remove plug on bottom aft side of assembly.

i. Remove nut beneath piston.

j. Remove piston and two rings.

k. Remove inner cylinder.

l. Remove two bolts attaching left-hand side plate to assembly.

NOTE

Remove plate carefully to prevent loss of spring-loaded pin in knife assembly.

m. If hose jettison cartridge has not been actuated, cut lock wire (two places).

n. Remove knife by withdrawing from left-hand side of assembly.

NOTE

Remove knife assembly carefully to prevent loss of spring-loaded pin.

4-210. HOSE JETTISON CLEANING AND REASSEMBLY. (See figure 4-25.)

a. Inspect cartridge chamber and combustion channels for cleanliness, freedom from obstruction.

NOTE

Clean interior of cartridge chamber with mixture of two parts water and one part solvent, Fed. Spec. P-D-680. Verify that cartridge chamber and combustion channels are thoroughly clean. Dry with compressed air.

b. Inspect firing pin plug and breech lock cap for cleanliness, freedom from damage and proper operation of firing pin.

c. Place knife in housing, hose crimper edge toward cartridge chamber.

d. Install left-hand side plate.

NOTE

Use care to prevent loss of spring-loaded pin from knife assembly.

e. Install inner cylinder.

f. Install piston and two rings.

g. Install piston support nut.

h. Install plug and tighten to 75 foot-pounds.

i. Install firing pin plug in breech lock cap.

j. Position jettison assembly on level-wind assembly and install attaching bolts.

k. Install lock wire (.063) two places.

l. Install Mk 1 Mod 3 cartridge in chamber.

m. Install breech lock cap on hose jettison assembly and safety with lock wire.

n. Perform continuity check of jettison switch.

o. Install electrical connector on breech lock receptacle.

4-211. HOSE REEL LOCK PIN.

4-212. DESCRIPTION. (See figure 4-29.) The hose reel lock pin operates mechanically to prevent rotation of the hose reel when the store hydraulic system pressure is below 575 psi. It is installed on the right-hand side of the hose reel support frame; access for maintenance is obtained by removing the tail cone. Basically, the mechanism consists of a hydraulic cylinder containing a pin assembly which is spring-loaded in the extended position. The extended pin engages a perforated plate on the right-hand side of the hose reel. Hydraulic pressure is supplied to the cylinder for pin retraction through a port near the base. As the hydraulic pressure reaches 1125 psi MAX, it acts against a piston, overriding the spring load and retracting the pin. Retraction of the pin for maintenance purposes is accomplished by threading a hose reel lock pin retractor (see figure 4-27) into the outboard end of the pin and then tightening the retractor handle until the pin is disengaged from the reel plate. An access opening for installing the pin is provided on the tail cone.

4-213. HOSE REEL LOCK PIN ADJUSTMENT. (See figure 4-29.)

a. Position hose reel drum assembly with sixth hole in plate, counterclockwise from fuel connector attaching screw, aligned with hose reel lock cylinder pin.

b. Insert lock pin cylinder adjust wrench (or 1/4-inch allen wrench) tool into back of lock pin cylinder. Adjust pin assembly for 0.250 to 0.281 inch engagement into drum assembly plate. Measure tolerance from plate outboard surface to end of pin. Tighten retaining nut.

c. Connect hydraulic fluid (MIL-H-5606) hand pump to lock cylinder hydraulic port and increase pressure slowly. Lock pin will retract at 1125 psi maximum pressure. Pin will bottom at 2350 psi maximum pressure permitting free rotation of hose reel.

d. Bleed pressure slowly. Pin will fully extend at 590 psi minimum pressure.

4-214. HOSE LEVEL-WIND SHAFT ADJUSTMENT. (See figure 4-25.)

a. Adjust hose reel lock pin cylinder as instructed in paragraph 4-213. Pin is to be extended.

b. Remove chain.

c. Rotate level wind shaft to position shoe as indicated in figure 4-25.

d. Position template on guide track and level wind shaft with the arrow at a groove intersection. Rotate level wind shaft as necessary to align the arrow.

e. Install chain while maintaining hose reel, shoe, and level wind shaft in relationship of steps a, c, and d.

f. Loosen level wind shaft bracket mounting bolts and adjust the level wind shaft adjusting nut to 9 to 12 inch-pounds torque.

g. Align level wind shaft with guide track and tighten bracket mounting bolts. Install lock nut against adjusting nut.

h. Check fuel pump shutoff switch adjustment. Readjust as required.

4-214A. FUEL PUMP SHUTOFF SWITCH.

4-214B. DESCRIPTION. (See figure 4-24B.) The fuel pump shutoff switch shuts off the fuel pump when the receiver aircraft pushes the in-flight fueling hose in approximately halfway. The switch is connected in series with the motor shut-off solenoid valve. The switch is actuated by an arm attached to a traveling nut on the level wind shaft end. The switch actuates within one full turn of the level wind shaft in either direction when the guide assembly is at the opposite end of the shaft.

4-214C. FUEL PUMP SHUTOFF SWITCH ADJUSTMENT.

a. With guide assembly at opposite end of shaft, adjust arm assembly so that nut is approximately in middle of threaded section of rod.

b. Shim as required between switch and hose reel side bracket so that switch actuates within one full turn of shaft in either direction.

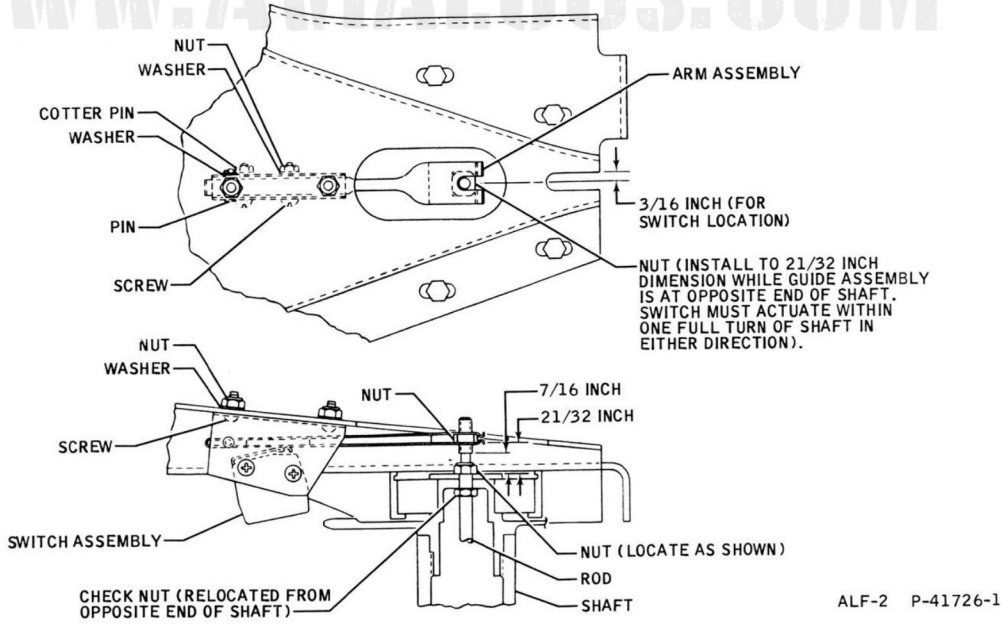


Figure 4-24B. Fuel Pump Shutoff Switch Adjustment

4–215. IN-FLIGHT FUELING STORE SHIPPING CONTAINER.

4–216. DESCRIPTION. (See figure 4–26.) The in-flight fueling store shipping container consists of a cylindrical fiberglas center section and two end bells which combine to form a pressurized housing for the store and its dolly. Both end bells are attached to the center with Marman clamps and rubber gaskets used between the mating edges to form a pressure seal. Normally the container is pressurized with dry air at 5 psig pressure to protect the store against corrosion. Each end bell is equipped with four handles, two on each side, to aid in handling during store removal or installation. A recessed area in the end of the aft end bell contains a humidity indicator, a pressure relief valve, and an air filling and release valve. The pressure relief valve is set to open at 10 ± 1 psig and to close at 5 ± 1 psig pressure. A channel along each side of the center section inner surface forms a track which engages the rollers on the outboard support channels of the dolly. The track supports the dolly during shipment or stowage and facilitates its removal or installation. Three sets of stops are provided on each center section track. A removable position stop on each end of the tracks secure the dolly in position; a carriage stop near the aft end of each track automatically engages the rollers on the dolly support channel to stop them at the correct position for extending or retracting the dolly wheels during removal or installation. The carriage stops can be released by pushing forward on the safety levers which extend through the lower surface of the tracks. A perforated rectangular container is installed on the center section inner surface near the forward upper end, for bagged desiccants. Four circular, metal frames are attached parallel to each other around the outer periphery of the center section for additional reinforcement. An I-beam containing a forklift channel is installed across the frames along each side of the center section to form a support for the container. Wooden skids are bolted to the lower surface of the beams and a tiedown ring is provided on the upper surface near each end. The wooden skids allow the container to be dragged for short distances on a level surface. Four brackets are provided on the center section upper surface to allow stacking of the container for stowage purposes. The right-hand aft bracket is equipped with a cylindrical record holder and a stowage receptacle for the container speed wrench. Two hoisting lugs are provided on the inboard side of each bracket to permit a four-point hoisting sling attachment for hoisting a loaded or empty container. Center-of-gravity points for both loaded and empty conditions are placarded on each side of the center section. All tools required to remove or install the dolly are installed in the container and the dolly support channel. (See figure 4–26.)

Note

In-flight fueling stores may be stored either in the Douglas 7552668-501 or 7552668-503 shipping container. Although the container parts are not interchangeable, both operate in the same manner. Principal difference involves the aft end bell on the -503 container. It has a larger inside diameter to accommodate stowage of the additional lower arch on the Douglas 7552668-503 Dolly and rearrangement of the valves on the end.

4–217. OPENING SHIPPING CONTAINER. A speed wrench for releasing air pressure from the container and removing the two Marman clamps attaching the end bells is stowed inboard of the record holder on the right-hand aft stacking bracket. For detailed opening proce dures, see figure 4–26.

CAUTION

Make certain air pressure has been released from container before loosening Marman clamp bolt.

4–218. MINOR REPAIR. (Refer to Handbook of Structural Repair and Instructions NAVWEPS 01-40ALF-3.)

4–219. REMOVAL OF STORE FROM SHIPPING CONTAINER. The dolly with the store can be removed from either the forward or aft end of the container; however, removal from the aft is preferable because the two wrenches used to remove the positive stops from the center section track are contained in a receptacle near the aft end of the dolly left-hand support rail. In addition, the carriage stops will not check the dolly rollers when it is removed from the forward end of the container. For detailed removal procedures, refer to figure 4–26.

4–220. SHIPPING CONTAINER GROUND HANDLING. (See figure 4–26.) The stowage space required for the container without a store can be reduced by disassembling the dolly and stowing it in the center section; the end bells can then be reversed and inserted into each end of the center section. A tapered pin on the upper surface of each stacking bracket is positioned to mate with corresponding tapered holes in the wooden skids. Thus, the container can be stacked a maximum of three high and secured against slippage. The tiedown rings on the skid beams and the hoisting lugs on the stacking brackets can be used in conjunction with chain assemblies to secure the containers for transporting or when stacked.

4–221. INSTALLATION OF STORE IN SHIPPING CONTAINER.

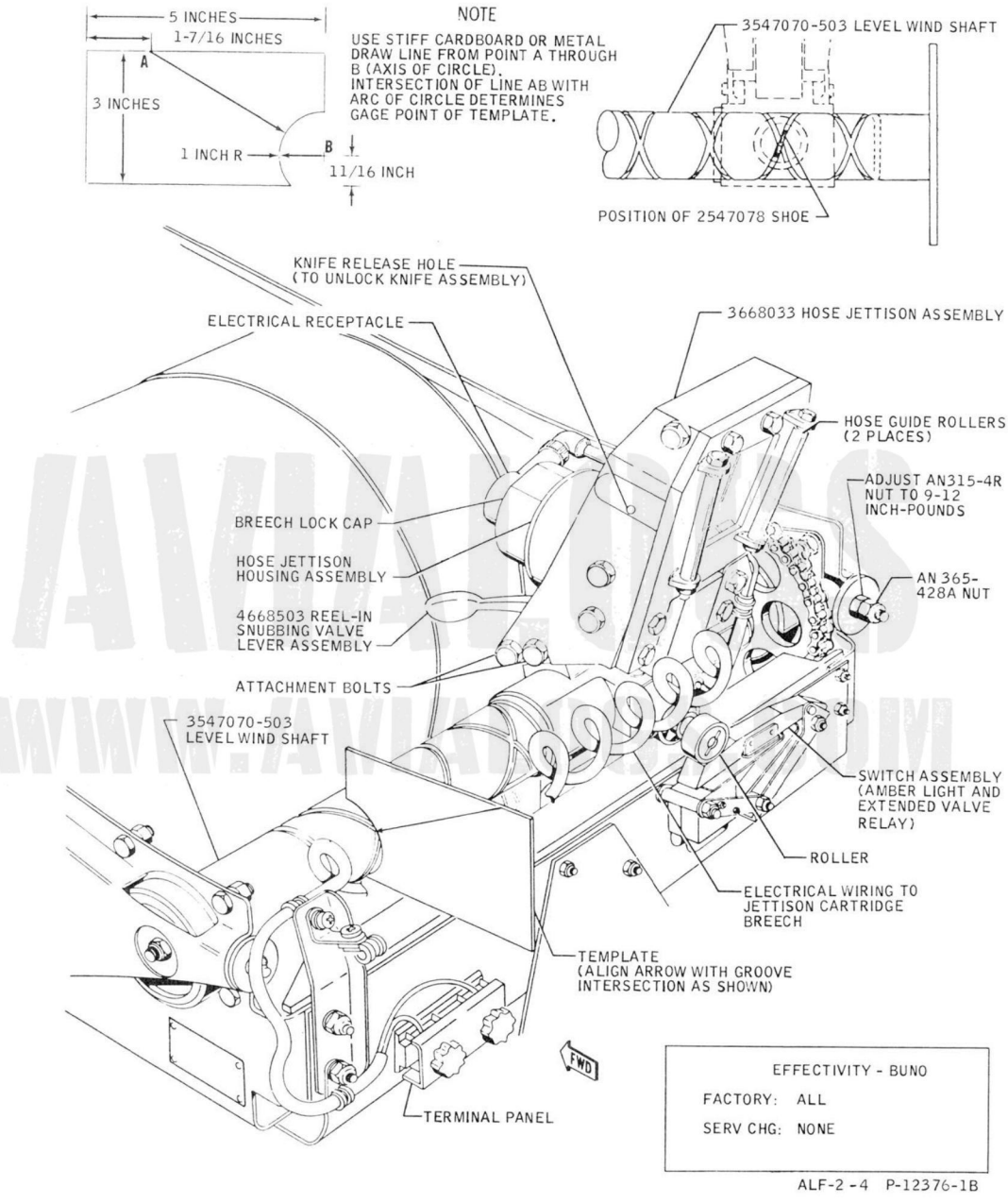


Figure 4-25. In-Flight Fueling Store Hose Cutter Assembly (Guillotine) (Sheet 1)

198AU

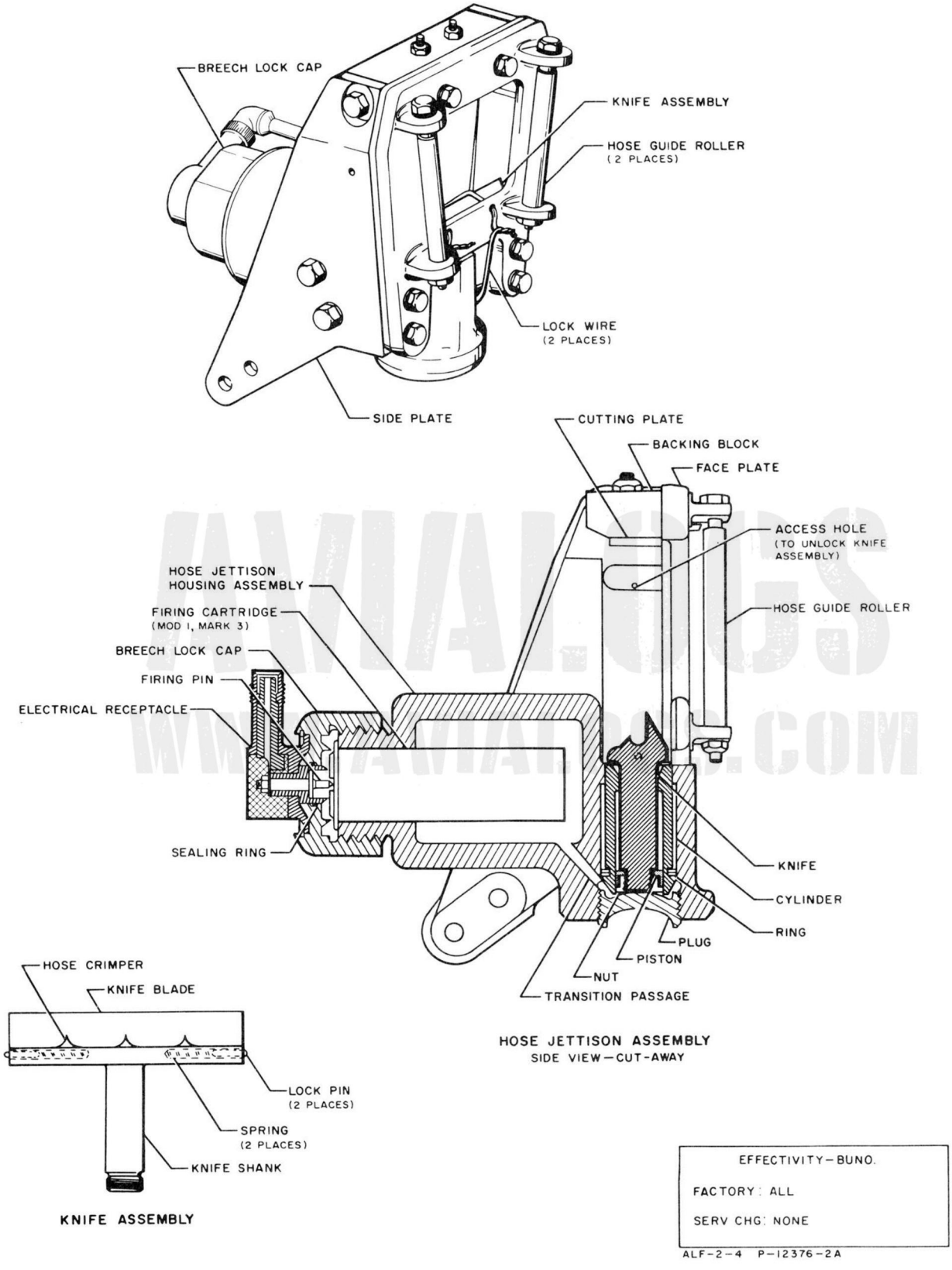


Figure 4-25. In-Flight Fueling Store Hose Cutter Assembly (Guillotine) (Sheet 2)

WARNING

Before loading store in shipping container, disarm hose jettison by removing cartridge from cutter.

a. Fill desiccant container in forward end of center section with bagged desiccant.

b. Install positive stops on forward end of center section tracks and then tighten check nuts on bolts.

c. Engage center section index pins with corresponding lugs on forward end bell; seat end bell against center section; support in position and stretch rubber gasket over mating flanges.

d. Place Marman clamp segments in position on mating flanges; seat segments and then engage clamp bolts.

e. Tighten Marman clamp bolts to 25–30 foot-pounds torque.

f. Install propeller guard (figure 4–27) on store ram air turbine.

g. Remove rack lugs from store and carefully place upper support arches in position over store.

h. Install bolts attaching upper support arches to dolly support rail.

i. Raise store with dolly hoist until support lugs can engage receptacles through opening in top of upper support arches.

Note

Support lugs are fastened to stowage bracket on left-hand side of dolly.

j. Use straight iron tool from stowage receptacle on dolly to tighten support lugs securely.

k. Loosen hoists to relieve tension on hoisting straps.

CAUTION

If store contained fuel from last mission, store must be defueled and purged as outlined in paragraph 4–207 until safe reading is obtained on explosimeter. If store is to be held in storage for longer than two weeks, perform preservation procedures contained in paragraph 4–208.

l. Remove positive stops from aft end of center section tracks.

m. Engage forward rollers on dolly support rails center section track and push dolly into container approximately two feet.

n. Lock dolly forward wheel swivels; raise wheels and then secure in retracted position.

o. Push dolly into container until dolly aft wheels are even with center section rim.

p. Lock dolly aft wheel swivels; raise wheels; secure in retracted position and then push dolly remaining distance into container.

q. Install aft end stops, tighten bolts until dolly is secure and then tighten check nuts on bolts.

r. Stow wrench in receptacle on dolly left-hand support rail.

s. Engage center section index pins with corresponding lugs on aft end bell; seat end bell against center section; support in position and stretch rubber gasket over mating flanges.

t. Place Marman clamp segments in position on mating flanges; seat segments and then engage clamp bolts.

u. Tighten Marman clamp bolts to 25–30 foot-pounds torque; install cotter pin.

v. Pressurize container to 5 psig pressure with dry compressed air.

w. Place records in cylindrical holder, and speed wrench in receptacle on stacking bracket.

4–221A. IN-FLIGHT FUELING STORE DOLLY.

4–221B. DESCRIPTION. (See figure 4–26.) The in-flight fueling store dolly provides an expedient means for ground handling of the store. The dolly consists of a portable cradle with hoisting, towing and braking features. The basic structure is a framework of two parallel upper struts (channels) supported at each end by a semi-circular end channel. Three rollers on the outboard side of each upper strut engage the track in the shipping container center section to retain the dolly during shipment and to facilitate its removal or installation. Wheel caster fittings are attached to tubular lower struts and interconnect the semi-circular end channels below the upper struts. Stowage receptacles for the store support lugs and upper arch attach bolts are provided on the left-hand lower strut. A support channel containing two hoist winches is bolted through three shock mounts to the inboard side of each upper strut. Four synthetic rubber pads are installed on the inboard surface of each support channel to prevent damage to the surface of the store. Two grab hooks stowed on the inboard side of each upper strut, are inserted between the upper struts and corresponding support channels to prevent the channel from warping when a fueled store is hoisted.

4–221C. Hoisting of the store is accomplished by a pair of nylon straps which are raised or lowered by independent operation of the four hoist winches. The winches consist of a rectangular plate containing a ratchet handle which drives a strap reel through a worm gear. Each plate is attached to a corresponding cutout in the support channel with four bolts. The hoists can be operated to

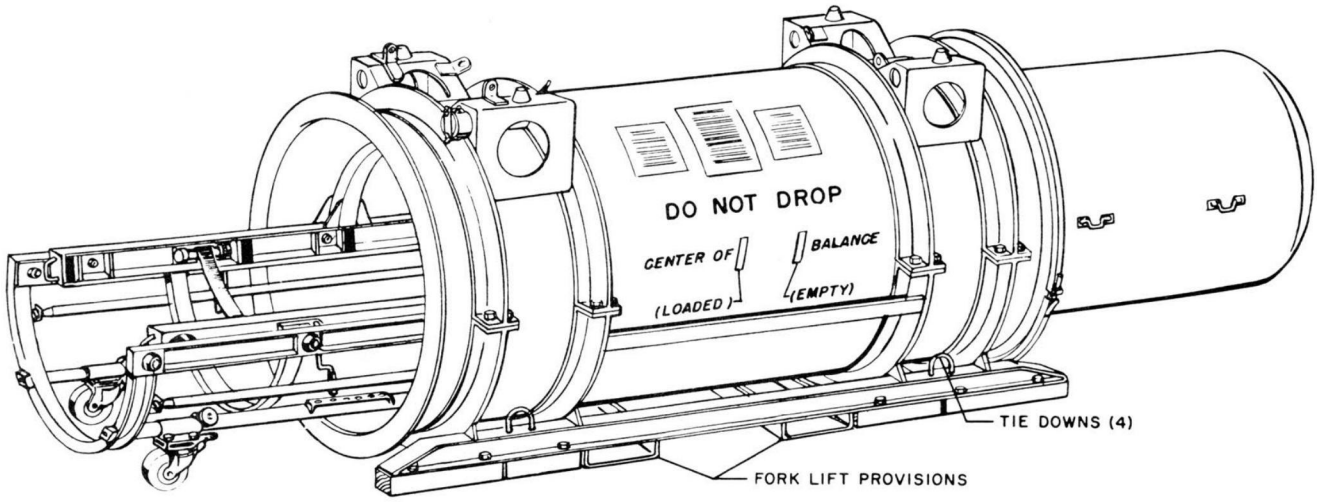
raise or lower the store ends as desired, or to rotate the store about its longitudinal axis as much as 15 degrees. Removable lower arches with synthetic rubber padding on the inner surfaces are installed across the dolly between the support channels to provide additional structural strength and to support the store when the lugs are removed from the upper arches. Two lower arches are used on the Douglas 7552668-501 Dolly; three on the Douglas 7552668-503 Dolly. The end of each lower arch contains a bolt which engages a slotted fitting on the lower surface of the channel; a wing nut secures the bolt in the fitting. The store is maintained horizontally in the dolly by two support lugs which engage receptacles in the store through two removable upper arches. Both upper arches are installed across the top of the support channels and are held in position by two cap screws through fittings on each end. Stowage receptacles for the in-flight fueling store control panel and the tow bar spreader are provided on the forward upper arch. A tow bar is stowed between the upper and lower struts on each side of the dolly. Both bars attach to sleeves on the tow bar spreader to form an assembly by which the dolly can be towed from either end.

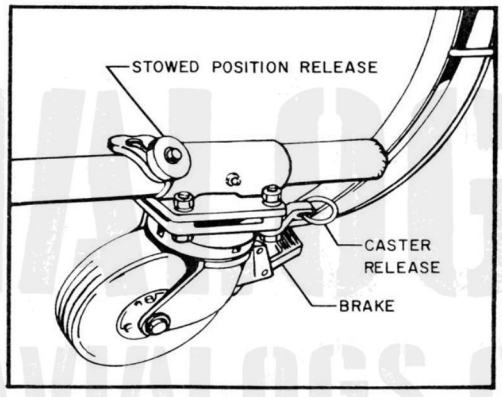
4–221D. The four wheels can be locked or unlocked to swivel freely throughout 360 degrees by operating a lock ring on the aft end of each wheel fork. Each wheel assembly is equipped with a serrated brake which rides against the solid rubber tire upon application. Individual braking of the wheels can be accomplished by depressing the foot pedal on the forward side of the wheel forks; however, emergency provisions are included to permit braking the two wheels on the left- and right-hand side of the dolly. The brakes on each side of the dolly are connected by cables to a crank on the outboard side of the upper struts. An EMERGENCY BRAKE lever, stowed near the aft outboard side of each upper strut, is installed in a receptacle on the crank to provide leverage for application of the brakes. The wheels must be swung inboard on the tubular lower struts to a retracted position for stowage in the shipping container. Each wheel is retracted by first loosening the lock wheel on the forward end of the lower strut wheel fitting; sliding the entire assembly forward until the fitting is disengaged from the strut guide; rotating the entire assembly inboard and then sliding it aft to engage the strut guide while retracted. Each lock wheel must be tightened to secure the wheels in the retracted position. A wrench to remove the nuts and cap screws from the dolly support structure, and a straight iron bar for removing or installing the support lugs are stowed in brackets near the aft end of the upper struts. All main structural members of the dolly contain alphabetical designations which are stenciled on each for identification. Index marks are painted across the top of the support channels which correspond with similar marks on the store to indicate proper loading positions. However, care must be exercised not to confuse the center of gravity index marks on the store with loading marks. The single line marks on the dolly are used when the store contains no fuel; double line marks for stores containing 50 to 300 gallons of fuel.

WARNING

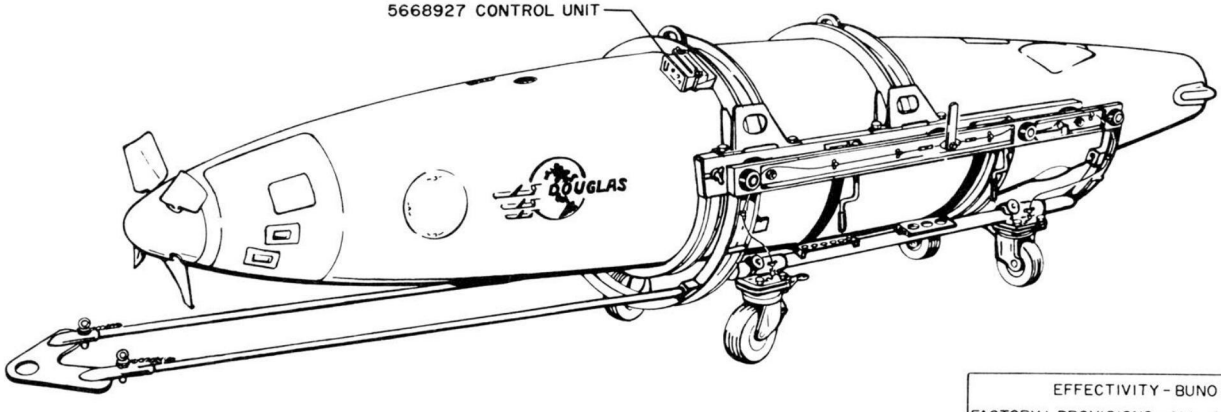
Do not transport store containing over 50 gallons of fuel on Douglas 7552668-501 Dolly. Completely fueled stores may be transported and loaded or unloaded from airplane on Douglas 7552668-503 Dolly; however, grab hooks must be installed between support channels and upper struts at all times. Fueled store must be positioned carefully on dolly with index marks properly aligned to preclude structural damage.

4–221E. DISASSEMBLY FOR STOWAGE. Normally the dolly does not have to be disassembled for stowage in the shipping container. However, if the end bells of the container are to be reversed and inserted into the container for space conservation, it must be partially disassembled to allow space in the center section for the end bells. (See figure 4–26.)





DETAIL OF WHEEL LOCK ENGAGEMENT



EFFECTIVITY - BUNO -

FACTORY: PROVISIONS - ALL AD-7 AIRPLANES, AND AD-6 AIRPLANES BUNO. 139641, 139774-139821

SERV CHG: PROVISIONS AD-6 AIRPLANES PRIOR TO 139774, EXCEPT 139641, ARE REWORKED PER BUAER AD/SC NO. 606

P-9834-1A

Figure 4-26. In-Flight Fueling Store Container and Dolly (Sheet 1)

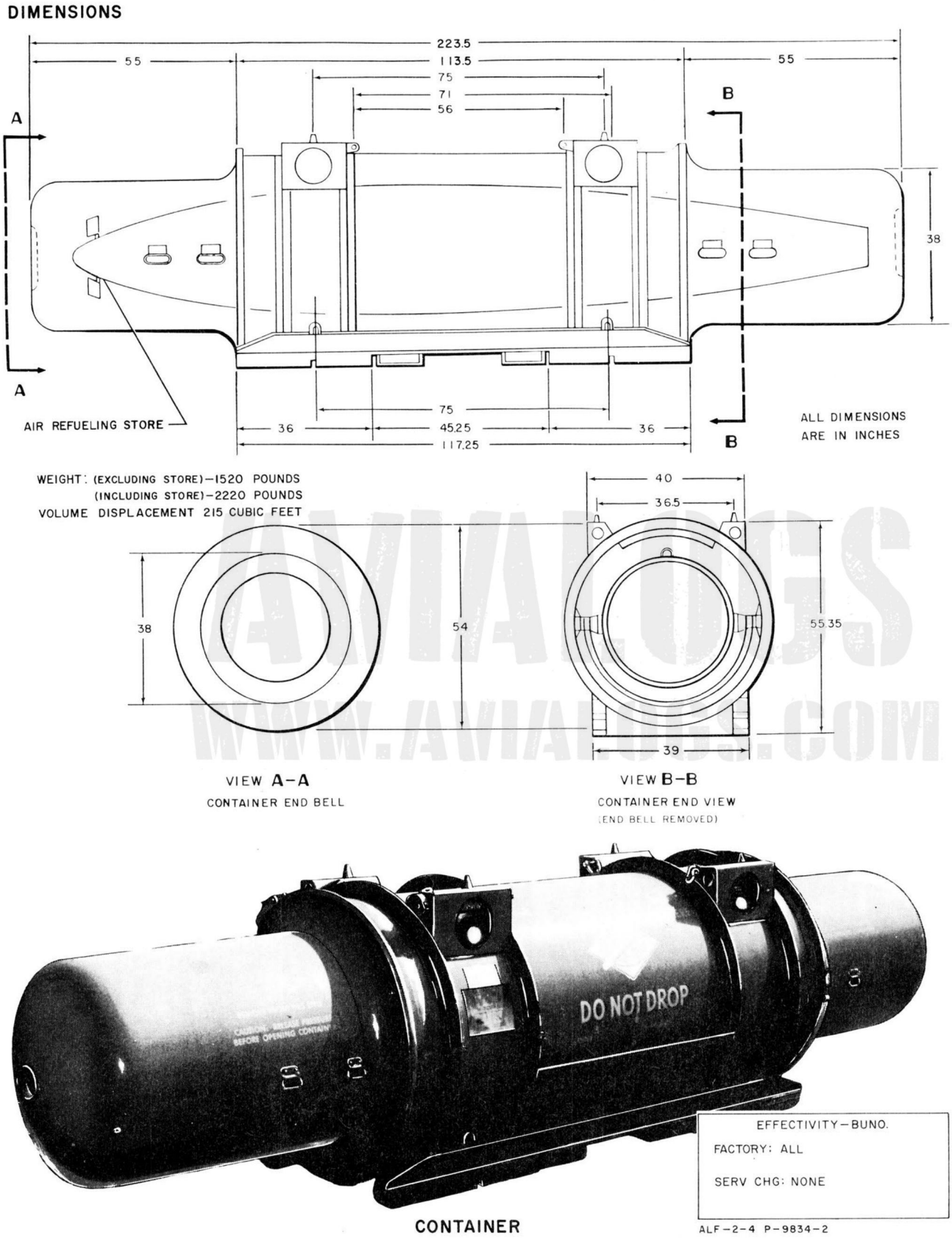
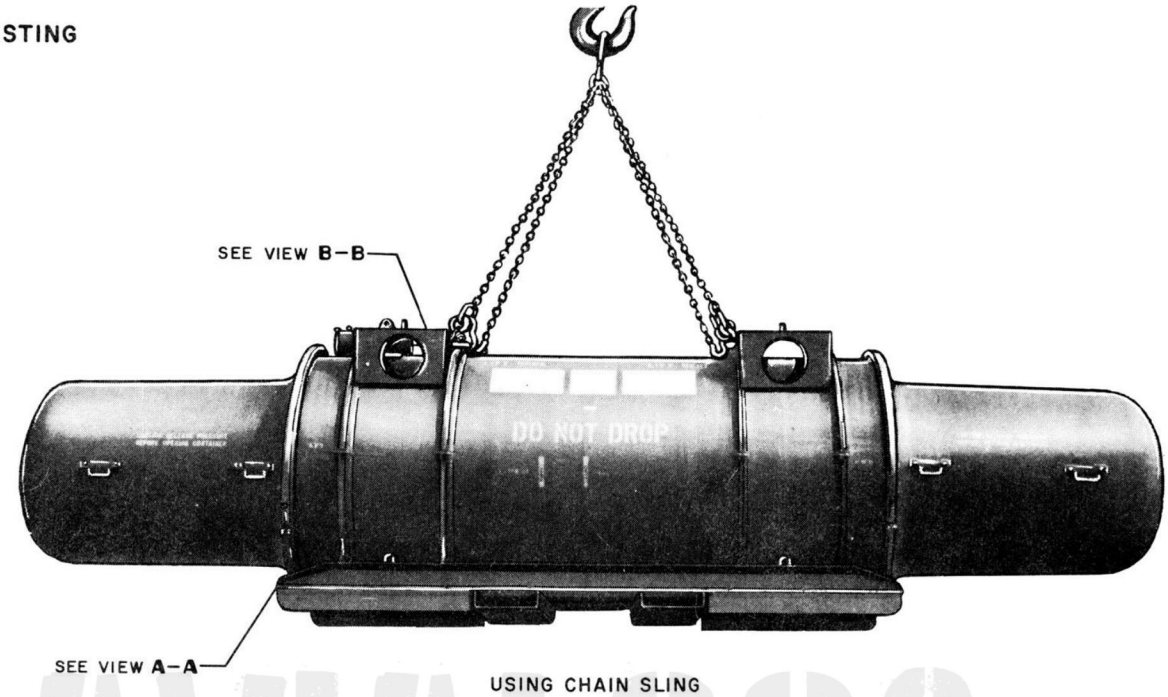
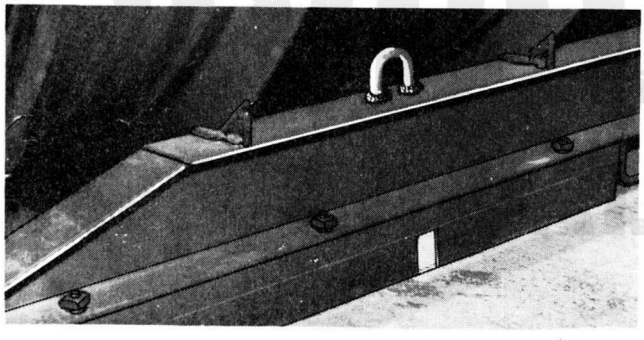


Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 2)

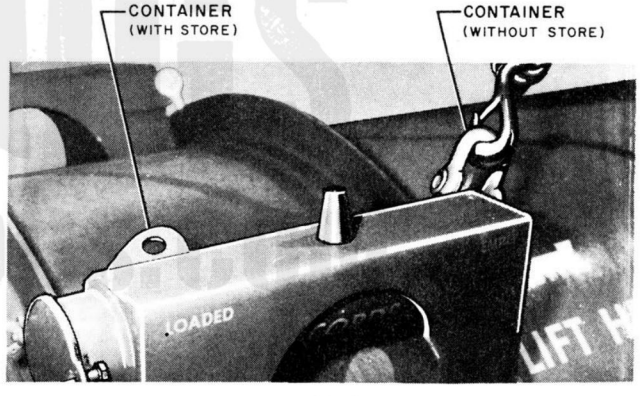
HOISTING



USING CHAIN SLING



VIEW **A-A**
CONTAINER TIEDOWN RING



VIEW **B-B**
CONTAINER CLEVIS LUGS
(AFT STACKING BRACKET)

ALF-2-4 P-9834-3

GROUND HANDLING

WEIGHT DATA

Container	1520 pounds
Container including dolly	2220 pounds
Container including store and dolly (store empty)	2920 pounds

HOISTING

Note

A four-point hoisting sling capable of a 3500 pound load should be used for hoisting the container with a store installed.

a. Install clevis in each lug on stacking brackets.

Note

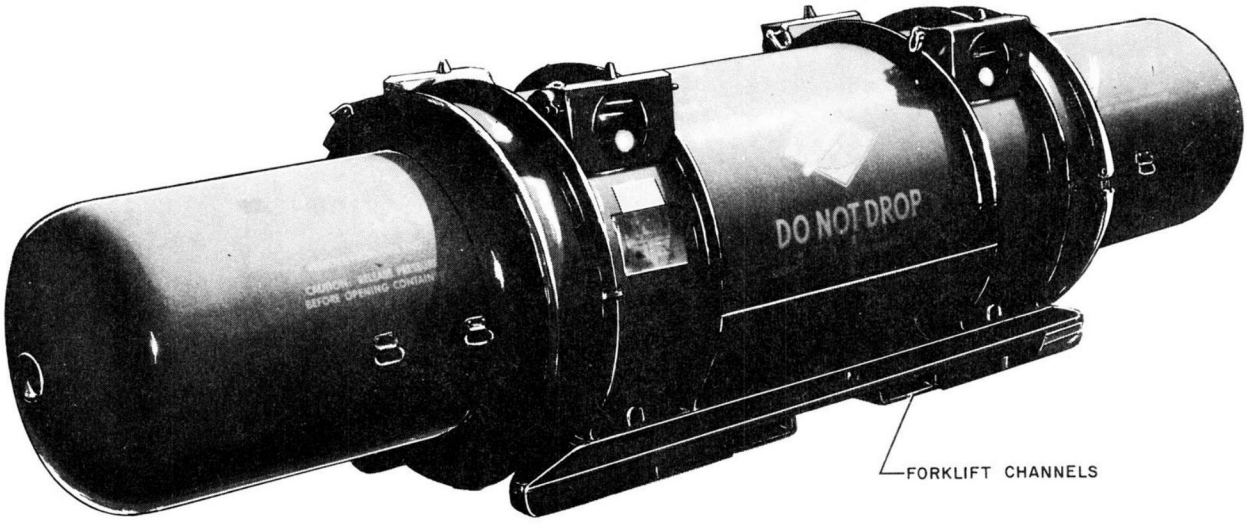
Six lugs are provided for hoisting container under various load conditions. Two lugs, identified as **LOADED** and **EMPTY**, are provided on each stacking bracket.

b. Attach suitable guide lines to tiedown rings to prevent container from swinging during hoisting. (See view A-A.)

c. Place sling shackle in hoist hook; raise sling above shipping container and then attach sling hooks to each lug clevis. (See view B-B.)

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 3)

HANDLING WITH FORKLIFT



NOTE

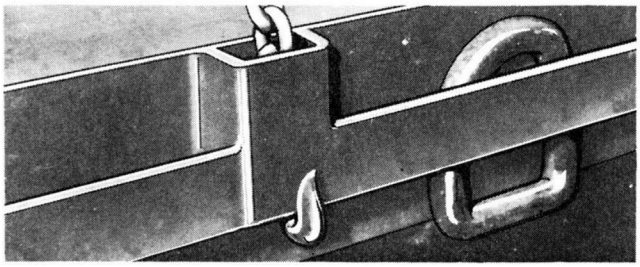
CENTER OF BALANCE INDEX MARKS ARE STENCILED ON BOTH SIDES OF CONTAINER TO INDICATE CENTER OF GRAVITY FOR HOISTING OR HANDLING WITH FORKLIFT. THE TWO CONDITIONS NOTED ARE LOADED AND EMPTY.

GROUND HANDLING

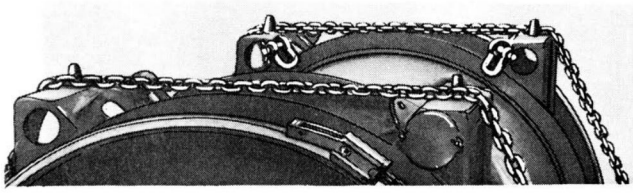
ALF-2-4 P-9834-4

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 4)

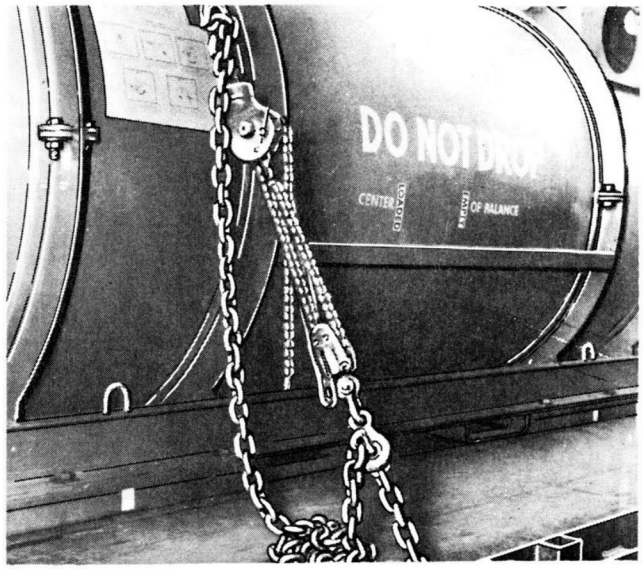
TRANSPORTING



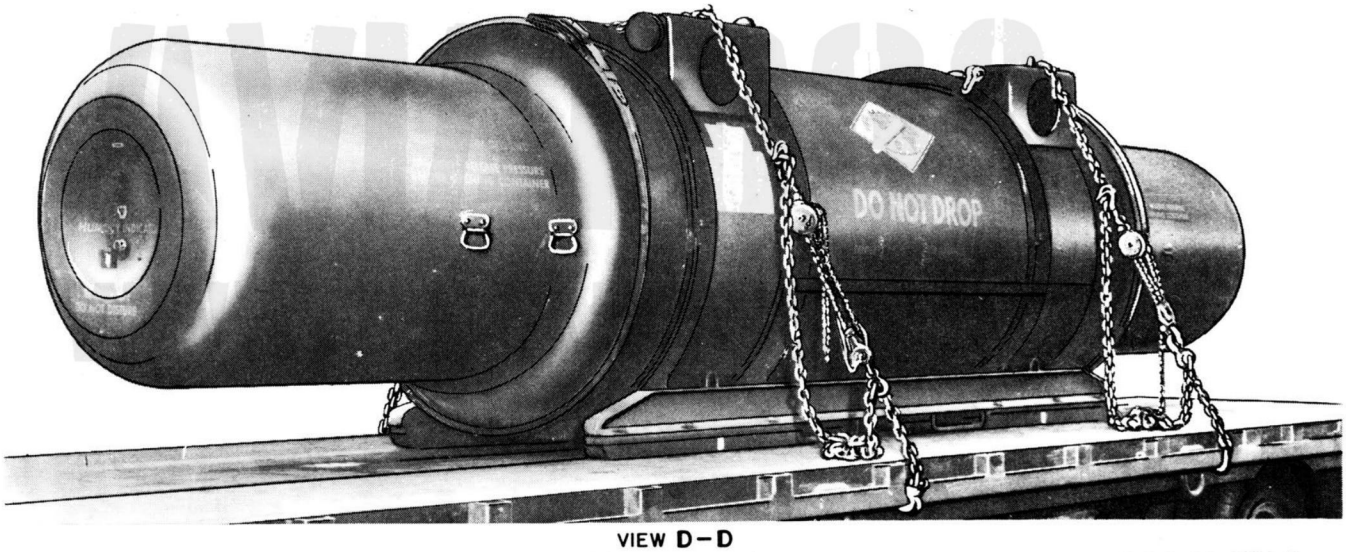
VIEW **A–A**



VIEW **B–B**



VIEW **C–C**



VIEW **D–D**
GROUND HANDLING

ALF-2-4 P-9834-5

TRANSPORTING

Note

Shipping containers may be stacked two high on low bed trailers. One-half inch diameter link chain should be used to secure containers.

a. Pass chain hook through stake hole and over top of stacking brackets. (See view A-A.)

Note

Chain should be outboard of stacking pins. (See view B-B.)

b. Pass other end of chain through stake hole on opposite side or into stake hole.

Note

Utilize anchor plates if installed on underside of truck bed.

c. Attach ratchet load binder between lower end of chain and farthest link that can be reached. (See view C-C.)

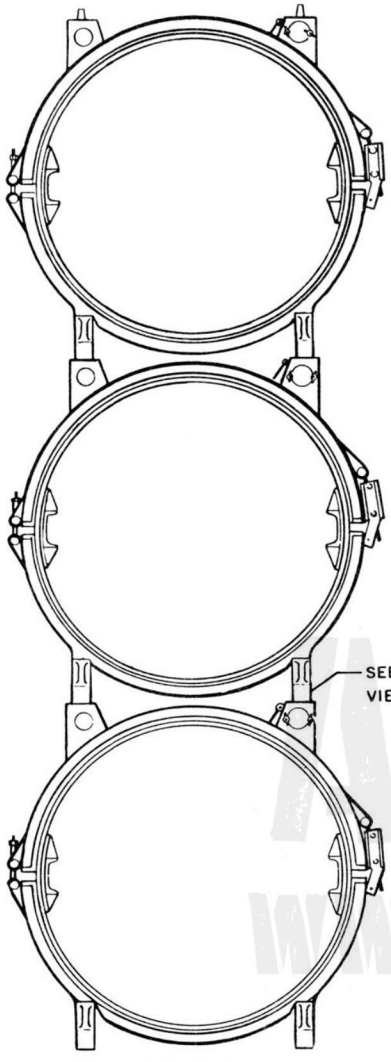
d. Operate ratchet lever and take up all slack until chain is tight.

Note

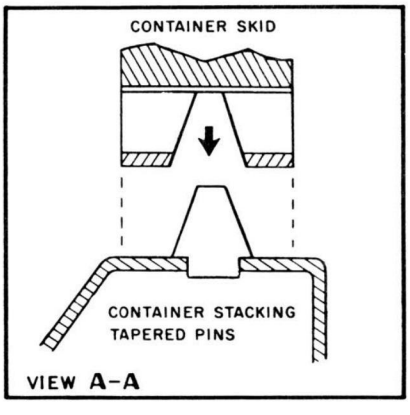
Fore and aft tiedown is the same and chains should be kept perpendicular to the container. (See view D-D.)

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 5)

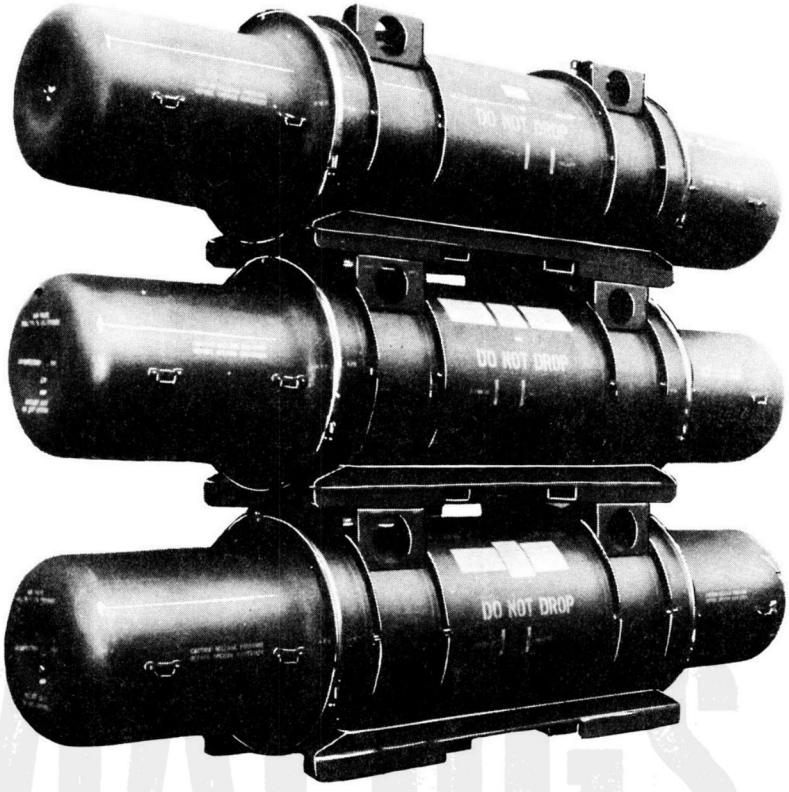
GROUND HANDLING



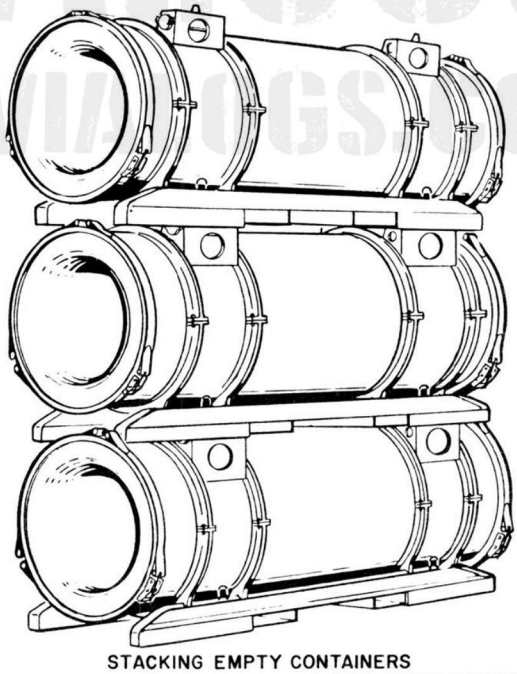
END VIEW
STORAGE STACKING CONTAINERS



STACKING BRACKET DETAIL



STACKING OF CONTAINERS WITH STORE
(MAXIMUM LIMIT OF 3)



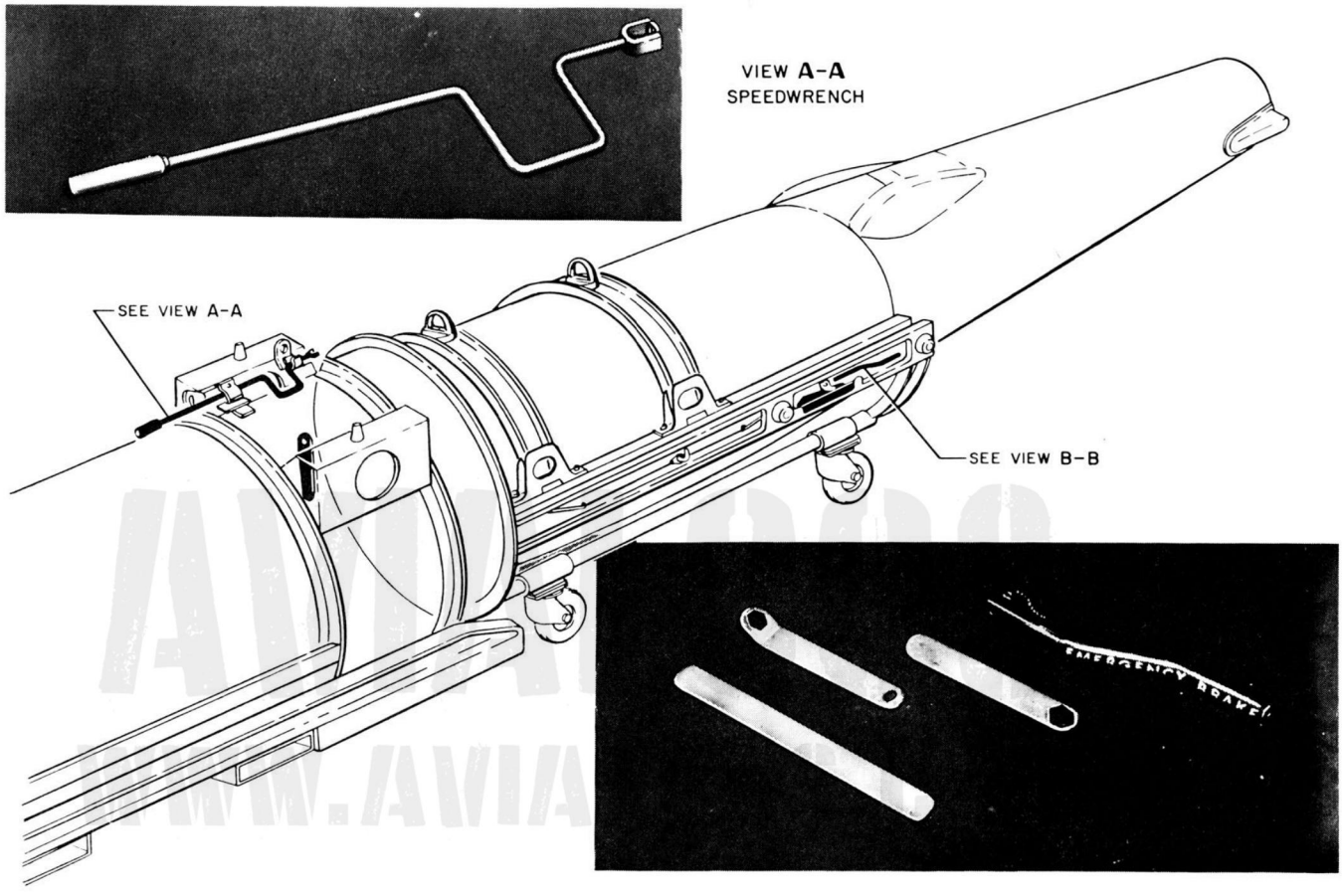
STACKING EMPTY CONTAINERS

EFFECTIVITY BUNO.
FACTORY: ALL
SERV CHG: NONE

P-9834-6

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 6)

STORE TOOL KIT



Note

Tools should be replaced in proper receptacles upon completion of work and prior to shipment of container.

CONTAINER TOOLS. (See view A-A.)

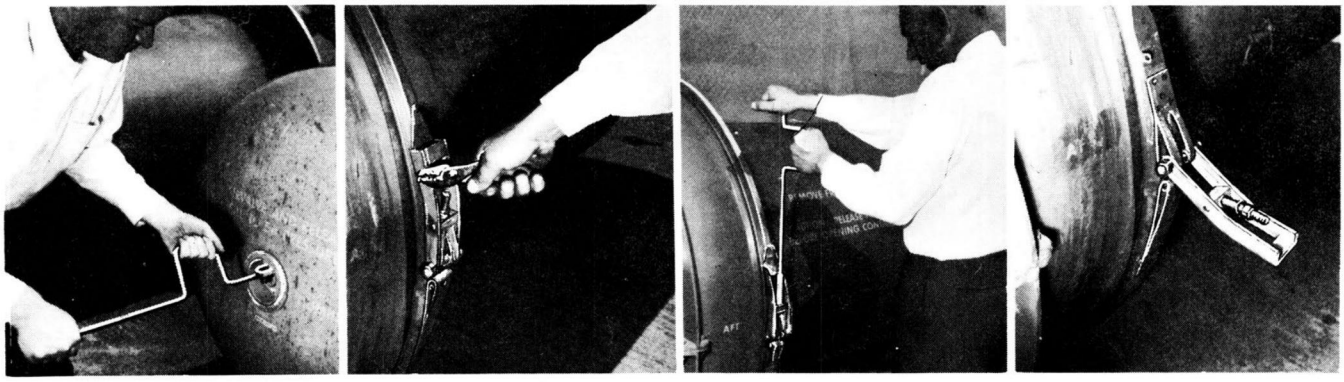
1. SPEEDWRENCH—For releasing air pressure and removing Marman clamp. Wrench is stowed next to records container on inboard side.

DOLLY TOOLS. (See view B-B.)

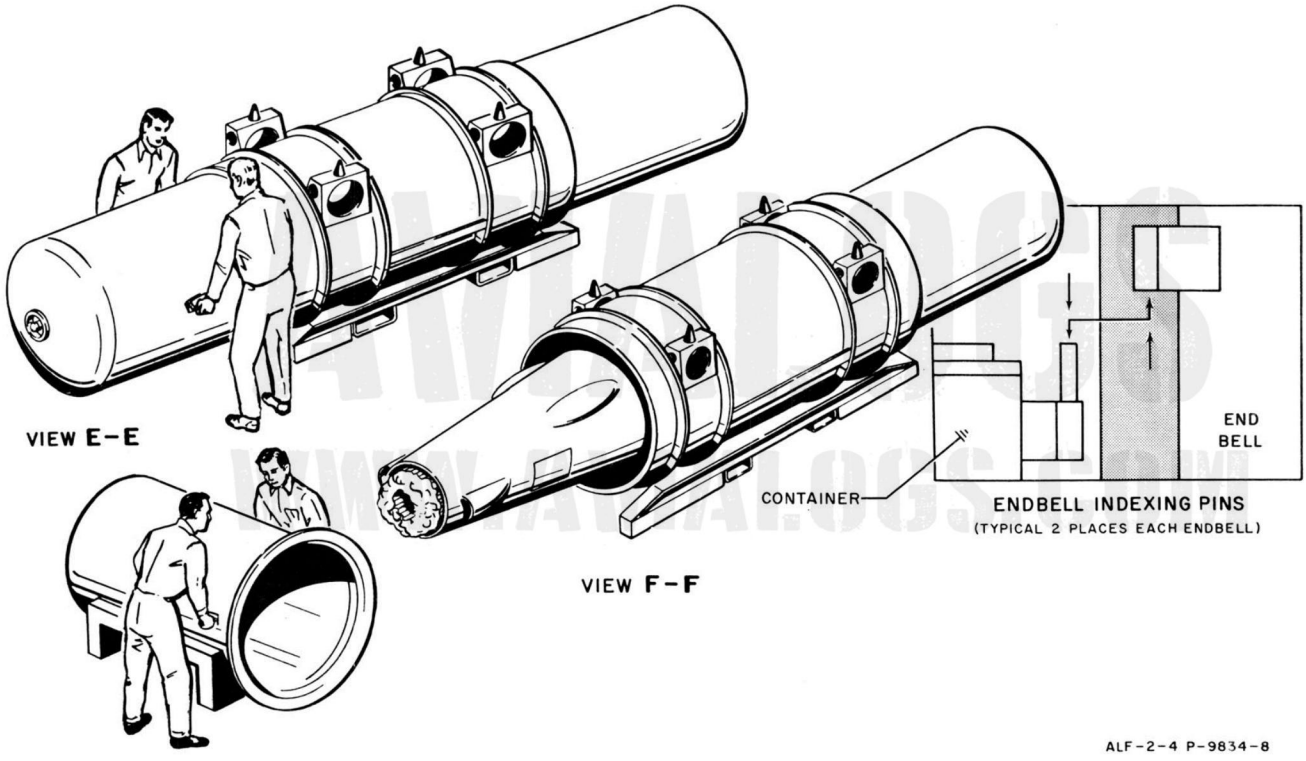
1. STRAIGHT IRON BAR—Removal and installation of lugs on dolly upper support arches.
2. DOLLY UPPER SUPPORT ARCH WRENCH—Removal and installation of cap screws and shock mounts.
3. POSITIVE STOP WRENCH—Removal and installation of positive stops on center track.
4. EMERGENCY BRAKE HANDLE—Two required, one for each brake actuator on upper struts.

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 7)

OPENING PROCEDURES



VIEW A-A VIEW B-B VIEW C-C VIEW D-D



a. Remove speedwrench from receptacle on container.

b. Use speedwrench to release air pressure through air filling valve on forward end of container. (See view A-A.)

c. Remove cotter pin from Marman clamp. (See view B-B.)

CAUTION

Make certain air pressure is released before loosening Marman clamp bolt.

d. Loosen Marman clamp tension bolt with speedwrench. (See view C-C.)

e. Raise clamp latch up and then down to release tension. (See view D-D.)

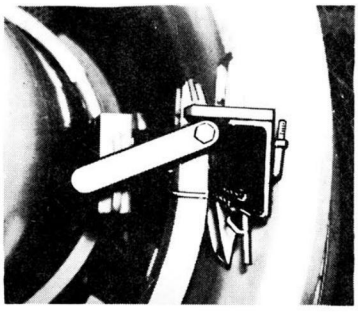
f. Support endbell (one man on each side). Remove clamp and rubber gasket. (See view E-E.)

g. Lift endbell off index pins and place on suitable support to prevent damage. (See view F-F.)

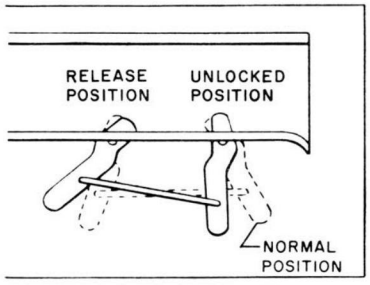
Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 8)

REMOVAL FROM CONTAINER

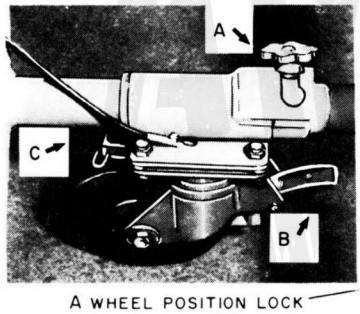
a. Remove positive stop wrench from receptacle on dolly left-hand support rail; use wrench to remove positive stops from aft end of center section track.



POSITIVE STOP NUT RELEASE



CARRIAGE STOP SAFETY LEVER



A WHEEL POSITION LOCK
B WHEEL BRAKE
C WHEEL SWIVEL LOCK

ALF-2-4 P-9834-9

b. Slide dolly from container until carriage stops; engage rollers on dolly upper strut.

c. Lower dolly aft wheels and lock each in place.

d. Slide dolly back into container approximately one to two inches.

e. Actuate safety lever on carriage stops to release dolly roller and then slide dolly forward approximately two feet to clear stops.

Note

Safety levers must be held up until dolly rollers clear stops.

f. Release safety levers and then continue to slide dolly from container until carriage stops; engage rollers on forward end of dolly support.

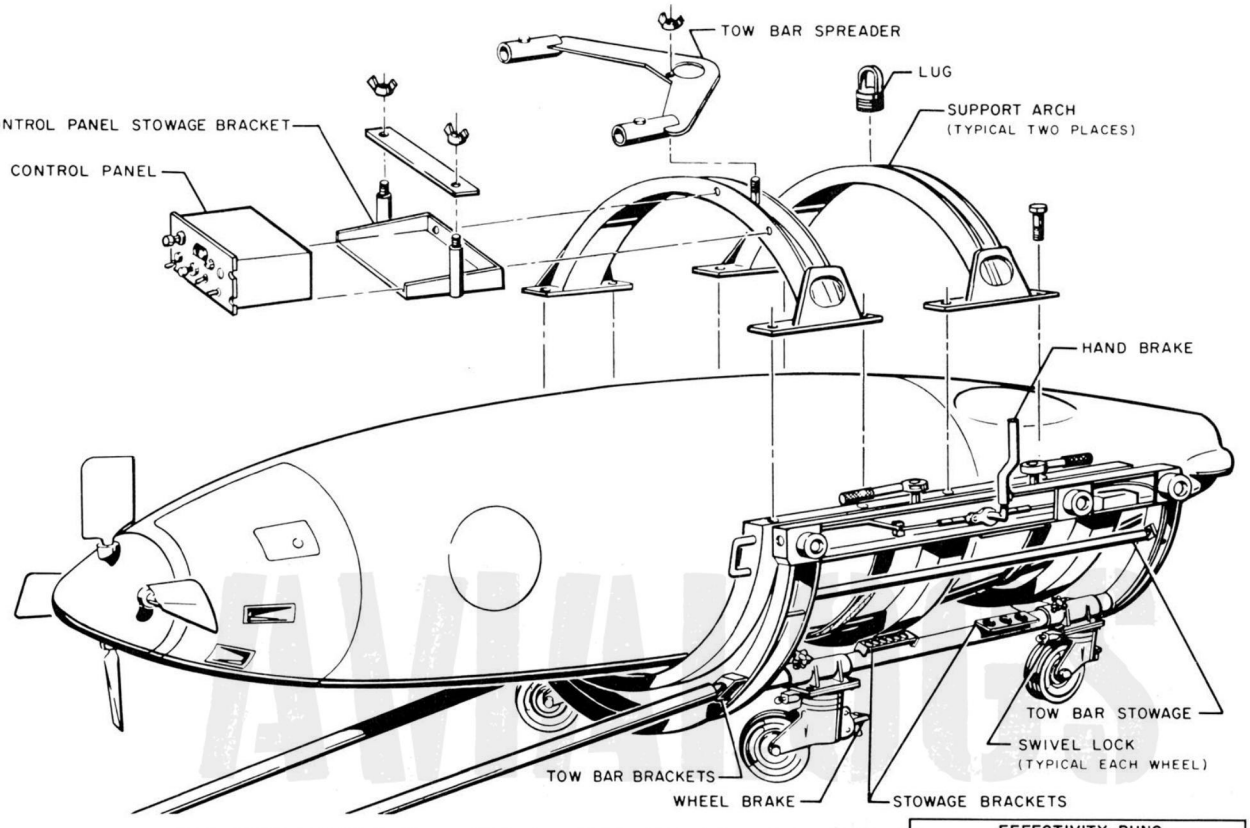
g. Lower dolly forward wheels and lock each in place.

h. Slide dolly back into container approximately two inches; hold carriage stop levers up and then slide dolly from container.

i. Install **EMERGENCY BRAKE** handles in receptacles on dolly and then move dolly clear of container.

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 9)

REMOVING STORE FROM DOLLY



a. Remove tow bar spreader from forward upper arch.

b. Remove two tow bar tubes; assemble tow bar and attach to dolly. (See figure 4–26.)

c. Tow dolly to work area to prepare store for installation on airplane.

CAUTION

Do not transport store on dolly without upper arches installed and attached to store with support lugs.

d. Set wheel brakes. (See figure 4–26.)

e. Remove control panel from stowage bracket on forward upper arch.

f. Remove straight iron bar from stowage receptacle.

g. Use straight iron bar to remove support lugs attaching upper arches to store. Stow lugs in bracket on left-hand side of dolly.

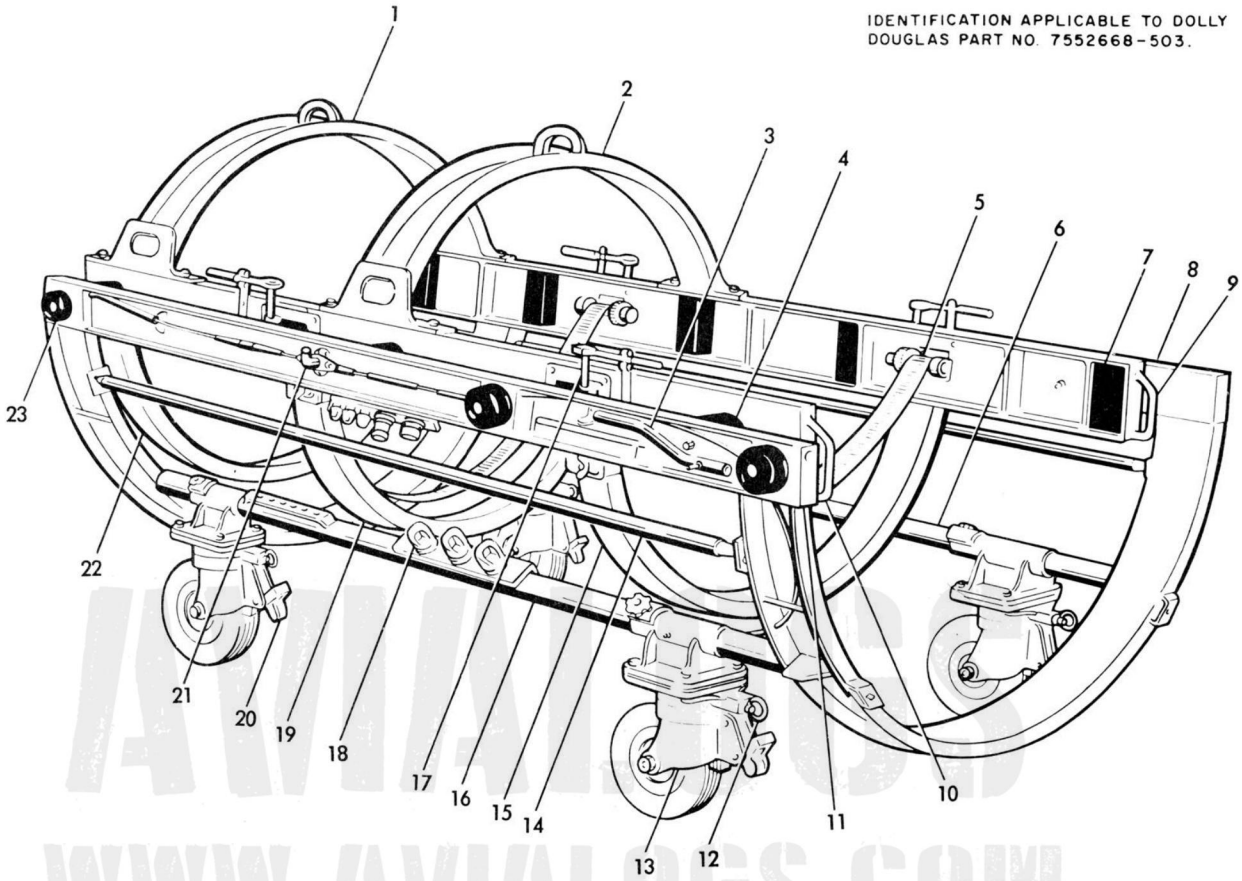
h. Remove eight 5/8-inch cap screws which secure upper arches to support channels; stow screws in receptacle on dolly left-hand lower strut and stow arches on support fittings in container forward end bell.

WARNING

Do not transport store containing over 50 gallons of fuel on Douglas 7552668-501 dolly. Completely fueled stores may be transported on Douglas 7552668-503 dolly; however, grab hooks must be installed between support channels and upper struts at all times.

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 10)

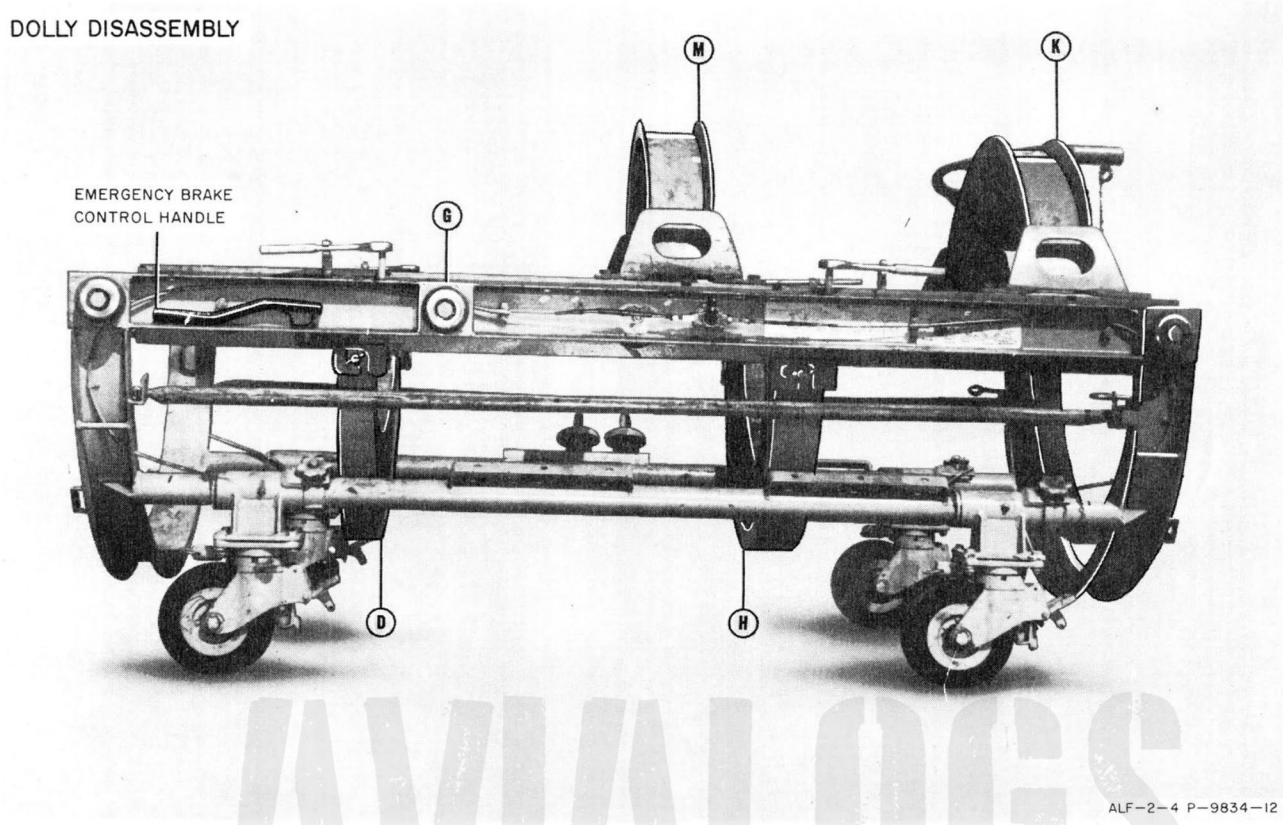
COMPONENT IDENTIFICATION



DOLLY

1. Upper support arch
2. Upper support arch
3. **Emergency brake** handle
4. Shock mount
5. Winch strap
6. Lower strut
7. Bumper pad
8. Upper strut
9. Support channel
10. Support channel
11. Upper strut
12. Swivel lock
13. Castor assembly
14. Tow bar
15. Lower arch
16. Lower strut
17. Winch
18. Lug
19. Lower arch
20. Foot brake actuator
21. Emergency brake actuator
22. Lower arch
23. Roller

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 11)



DOLLY ASSEMBLY—END-BELL STORAGE.

a. Remove **EMERGENCY BRAKE** handles from crank receptacles and stow in brackets on aft outboard sides of upper struts **(F)** and **(G)**. (See view A-A.)

b. Disassemble tow bar then stow bars in receptacles above lower struts **(N)** and **(I)**. Stow spreader on forward upper arch. (See view A-A.)

c. Remove eight 5/8-inch cap screws which secure upper arches **(K)** and **(M)** to support channels **(A)** and **(B)**; stow arches on support fittings in forward end bell.

d. Install six cap screws in stowage receptacle on left-hand lower strut **(N)**. (See view B-B.)

Note

Remaining two screws are used to secure support channels **(A)** and **(B)** on struts **(F)** and **(G)** as specified in step k.

e. Loosen wing nuts which secure lower arches **(C)**, **(D)** and **(H)** to support channels **(A)** and **(B)**; lift keepers and slide lower arches free of support channels.

Note

Douglas 7552668-501 dolly has two lower arches and Douglas 7552668-503 dolly has three lower arches.

f. Stow lower arches in aft end bell.

g. Release tension of winch straps then disconnect hoist straps from winch reels on one side of dolly; operate opposite winches until straps are wound on reels.

h. Remove grab hooks between support channels and upper struts.

i. On outboard side of each upper strut **(F)** and **(G)**, remove three nuts which secure support channel shock mount bolts.

Note

Shock mounts and winches are still attached to support channels.

j. Place support channels **(A)** and **(B)** on top of corresponding struts **(F)** and **(G)**; top edges of both together with bumper pads facing outboard. (See view D-D.)

k. Secure each support channel to upper struts with one 5/8-inch cap screw removal in step c; tighten cap screw securely. (See view D-D.)

l. Remove four nuts and bolts which secure two hoist winch plates to each support channel **(A)** and **(B)**.

m. Stow winches **E1** and **E2** in **E1** and **E2** mounting positions on inboard side of upper strut **(F)** with control handles down. (See view E-E.)

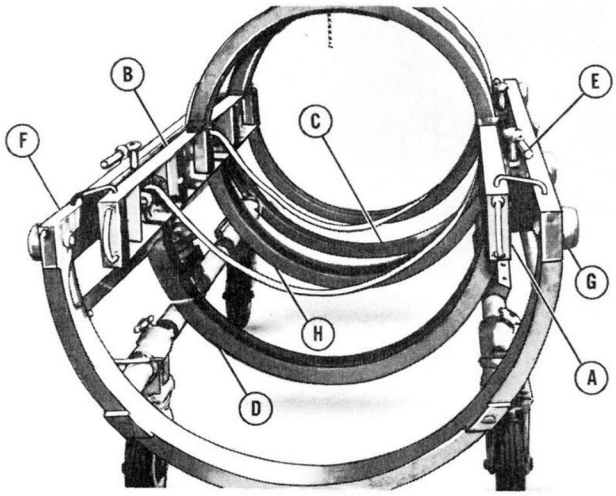
n. Stow winches **E3** and **E4** in **E3** and **E4** mounting positions on inboard side of upper strut **(G)** with control handles down. (See view F-F.)

Note

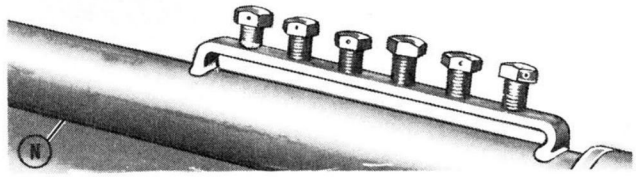
Remove winch handle retaining clips from support channels **(A)** and **(B)** and attach to winch mounting face.

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 12)

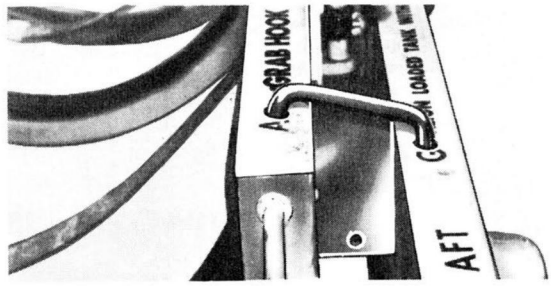
DOLLY DISASSEMBLY (CONT)



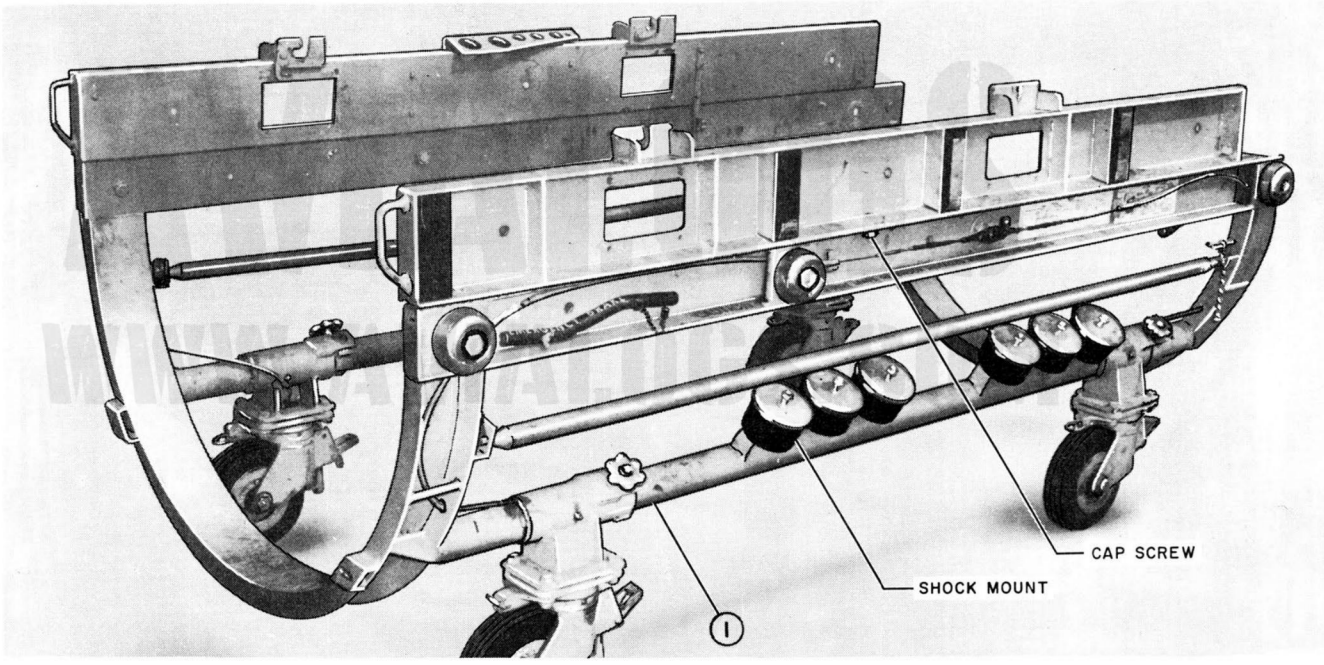
VIEW C–C



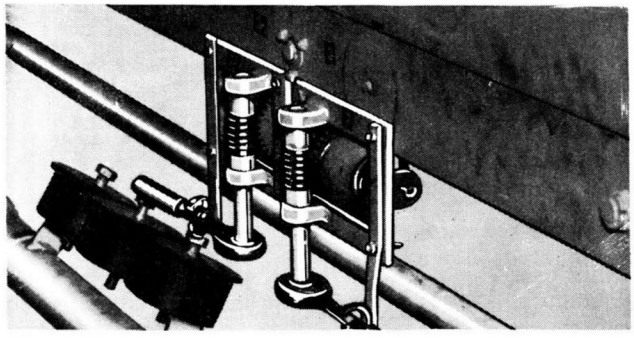
VIEW B–B



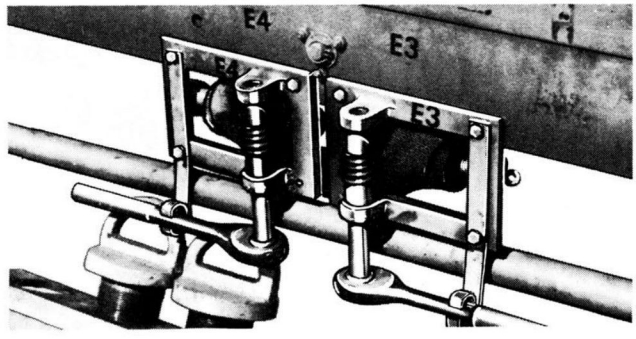
GRAB HOOK INSTALLATION DETAIL



VIEW D–D



VIEW E–E

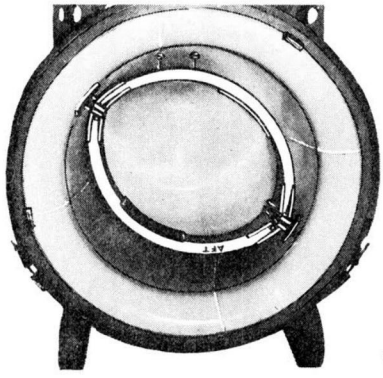


VIEW F–F

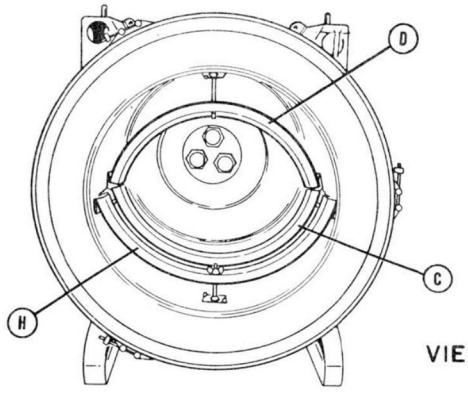
P-9834-13

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 13)

DOLLY DISASSEMBLY CONT.

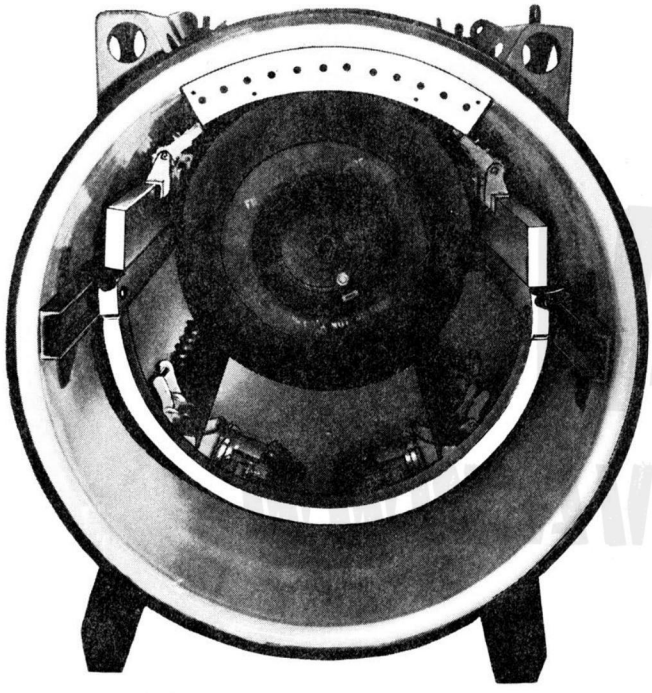


VIEW G-G



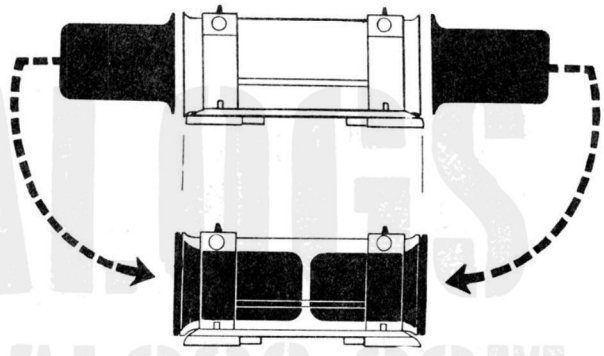
VIEW H-H

END BELL STOWAGE



DOUGLAS PART NO. 7552668-501 STOWAGE

VIEW I-I



VIEW J-J

ALF-2-4 P-9834-14

o. Remove shock mounts from support channels **(A)** and **(B)** and stow on brackets on lower strut **(I)**. (See view D-D.)

p. Stow gaskets in center section.

q. Secure grab hooks to struts on inboard side of each upper strut with wing nut.

r. Stow support lugs in receptacles on left-hand lower strut.

s. Stow upper support arches **(K)** and **(M)** on brackets in forward end-bell. (See view G-G.)

t. Stow lower arches **(C)** and **(H)** on side brackets and lower arch **(D)** on top side bracket in aft end bell. (See view H-H.)

u. Insert dolly in container and attach positive stops. (See view I-I.)

Note

Secure center of arches to brackets at top and bottom of end bell.

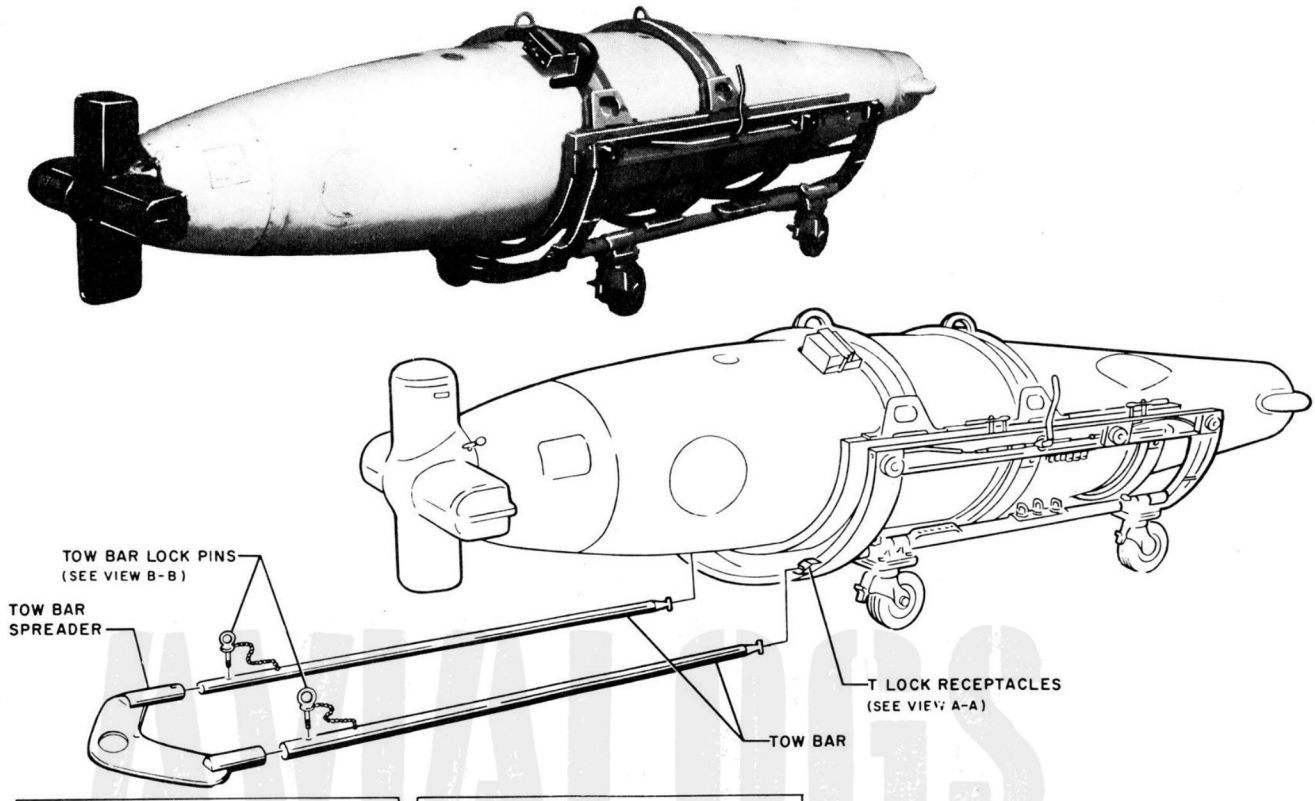
v. Reverse end bells and insert in container center section. (See view J-J.)

w. Install V-band couplings on flanges and tighten with speed wrench.

x. Stow tools on inboard side of records container.

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 14)

TOWING



VIEW **A-A**
TOW BAR INSTALLATION

VIEW **B-B**
TOW BAR SPREADER INSTALLATION

TOWING.

a. Remove tow bars from each side of dolly support frames. (See view A-A.)

b. Insert T-locks in receptacles on sides of the dolly support frame.

Note

The dolly may be towed from either end.

c. Rotate tow bars 90 degrees clockwise to lock in place.

d. Remove tow bar spreader from storage bracket on upper forward support arch. (See view B-B.)

e. Insert tow bars into tow bar spreader sockets and secure with tow bar lock pins.

Note

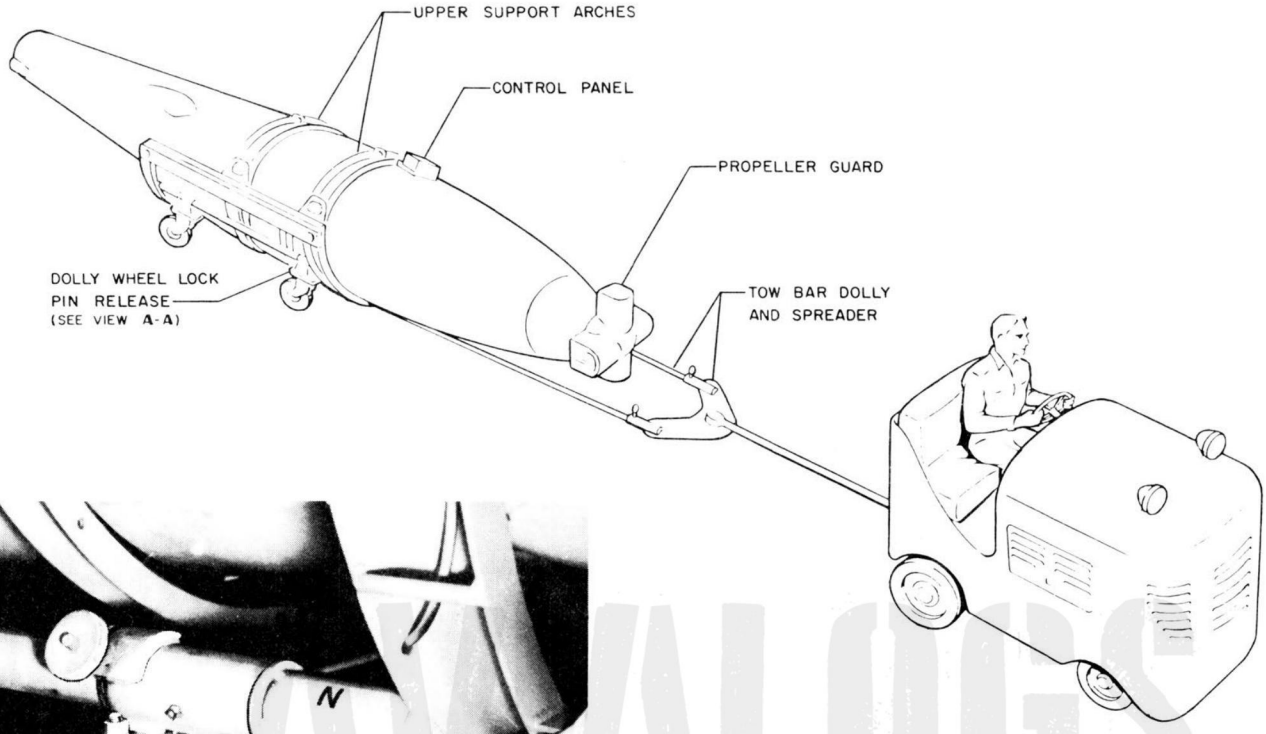
Make certain threaded portion of spreader sockets are on bottom side for proper pin attachment.

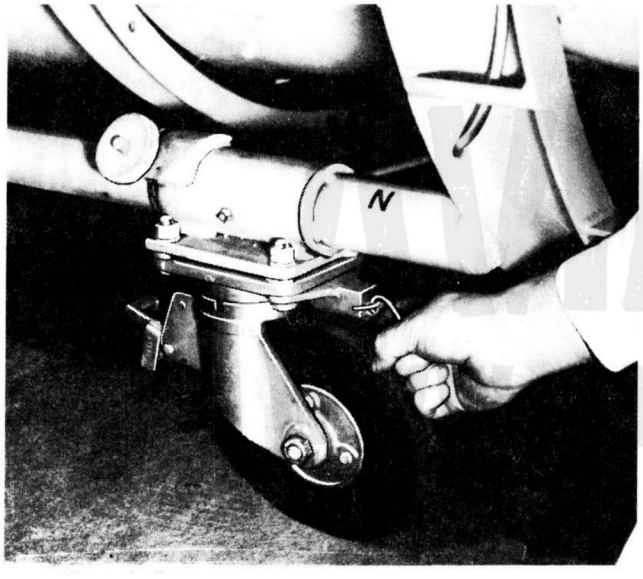
CAUTION

Do not stand on tow bars when attached to dolly.

Figure 4-26. In-Flight Fueling Store—Container and Store (Sheet 15)

TOWING CONT.





DOLLY WHEEL LOCK PIN RELEASE
(TYPICAL FOUR PLACES)

ALF-2-4 P-9834-16

TOWING.

CAUTION

- Do not transport store on dolly without upper arches installed and attached to store with support lugs. Do not transport fueled store on 7552668-501 dolly.
- Do not transport fueled store on 7552668-503 dolly without grab hooks installed.
- Do not roll dolly over cable or cables 1-inch in diameter above rolling surface.
- Do not move loaded dolly without men attending wheel brake hand levers.
- Do not transport store without propeller guard (figure 4–27) installed on ram air turbine.

f. Release brakes on end with tow bar attached.

g. Pull swivel lockpin rings and push dolly sidewards to allow wheel to turn and prevent lockpin from re-entering locking detent.

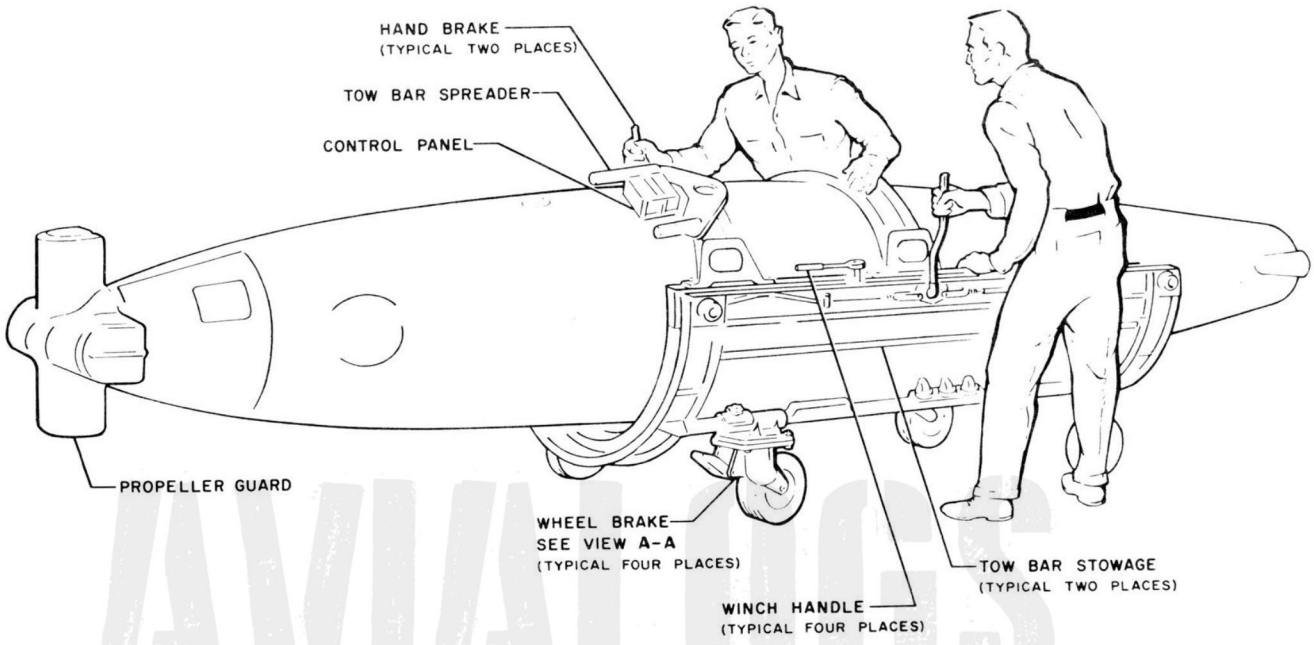
Note

This will allow the forward wheels to swivel freely during towing.

h. Attach tractor to dolly tow bar and release brakes on rear wheels when ready to move.

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 16)

BRAKING



BRAKING

Note

During all manual movement of in-flight fueling store and dolly, position a man on either side of dolly for operation of wheel brake hand levers.

a. Pull hand lever aft to apply braking action.

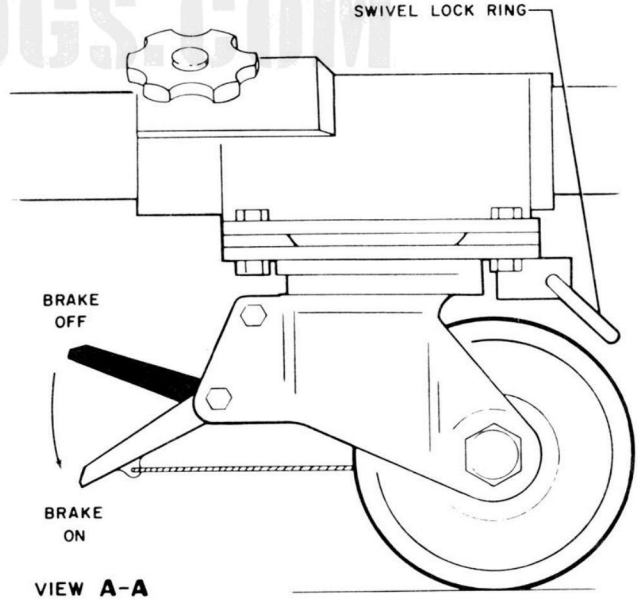
b. Move hand lever aft to vertical position and raise each individual foot brake pedal to release brakes.

CAUTION

Keep feet clear of wheels during movement of store.

c. Depress foot brake pedal on individual wheel to apply braking action. (See view A-A.)

d. Raise foot pedal to release brake.

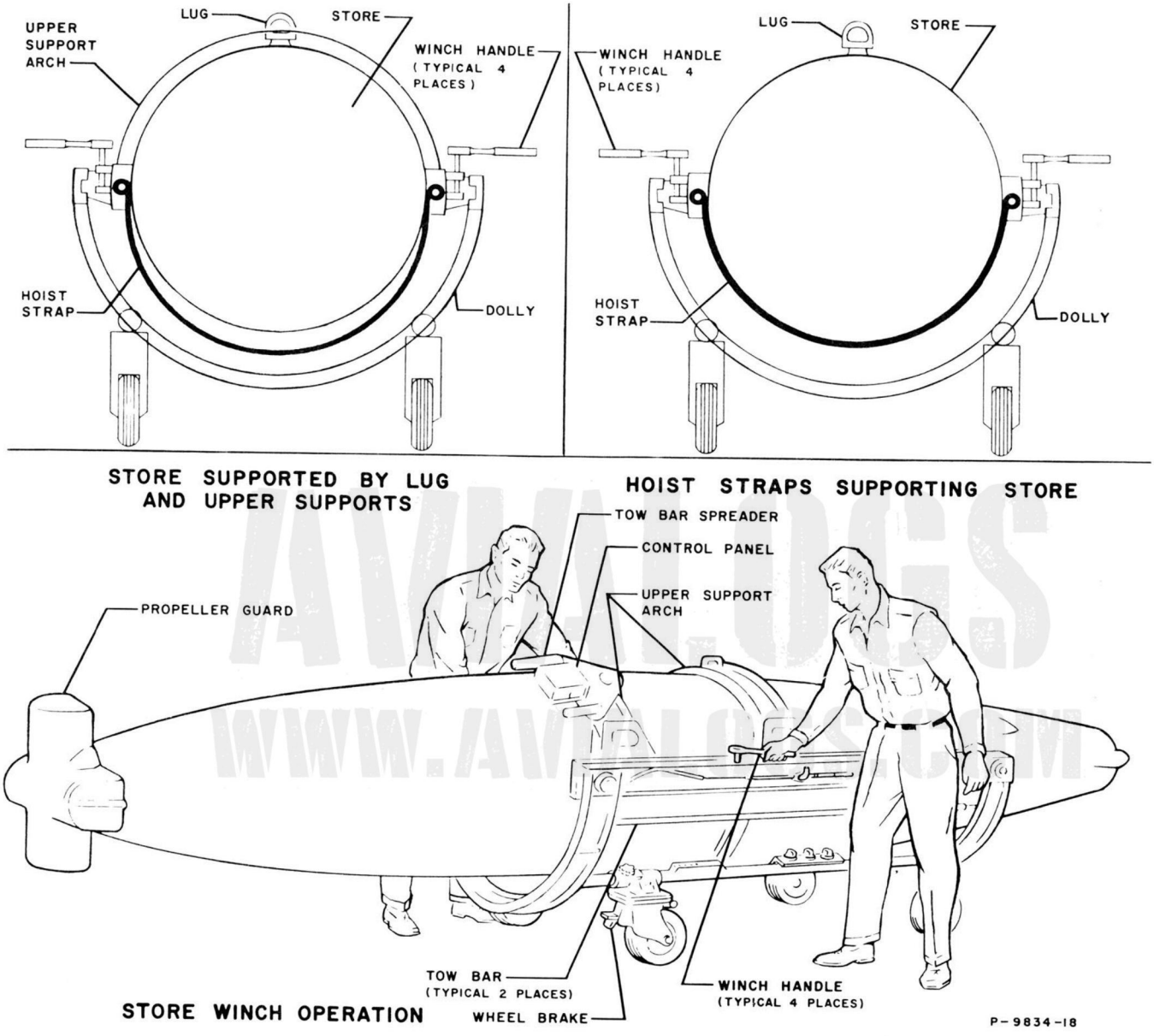


WHEEL BRAKE PEDAL OPERATION

ALF-2-4 P-9834-17

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 17)

HOISTING



HOISTING

Note

The store is raised or lowered by two straps, which are operated by four ratchet winches. The winches are turned by handles; direction is controlled by a dog on the winch.

Figure 4-26. In-Flight Fueling Store—Container and Dolly (Sheet 18)

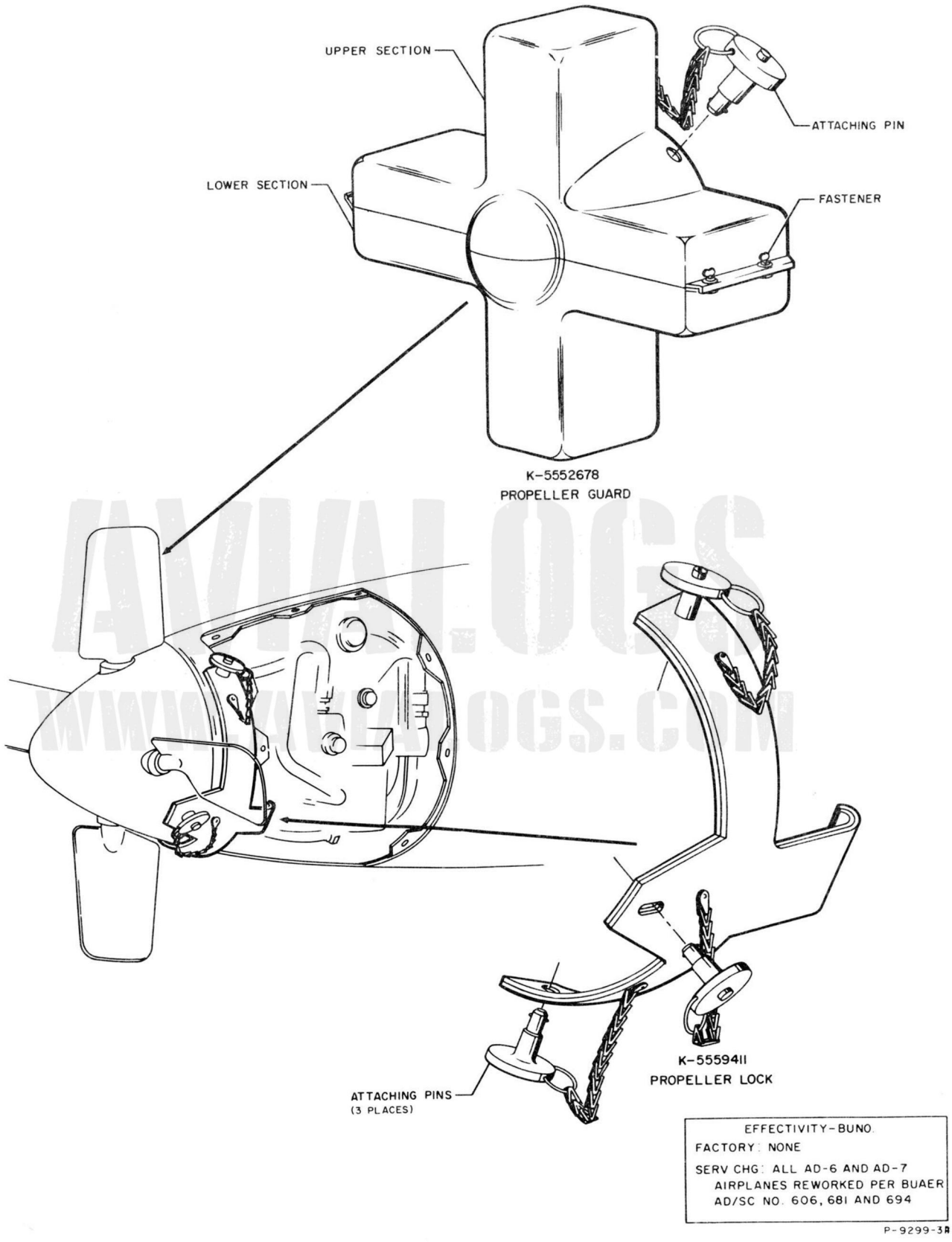


Figure 4-27. In-Flight Fueling Store Ground Handling Equipment (Sheet 1)

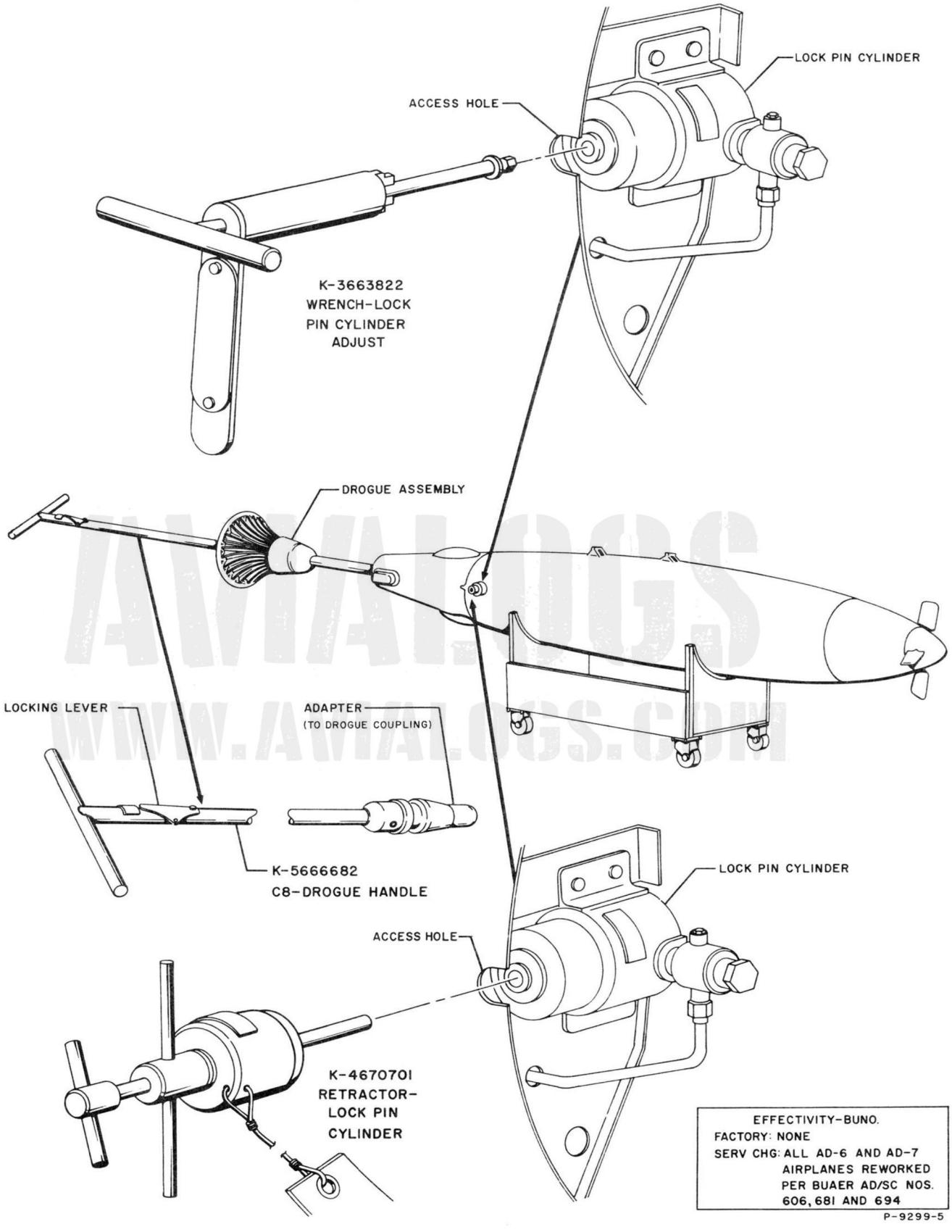


Figure 4-27. In-Flight Fueling Store Ground Handling Equipment (Sheet 2)

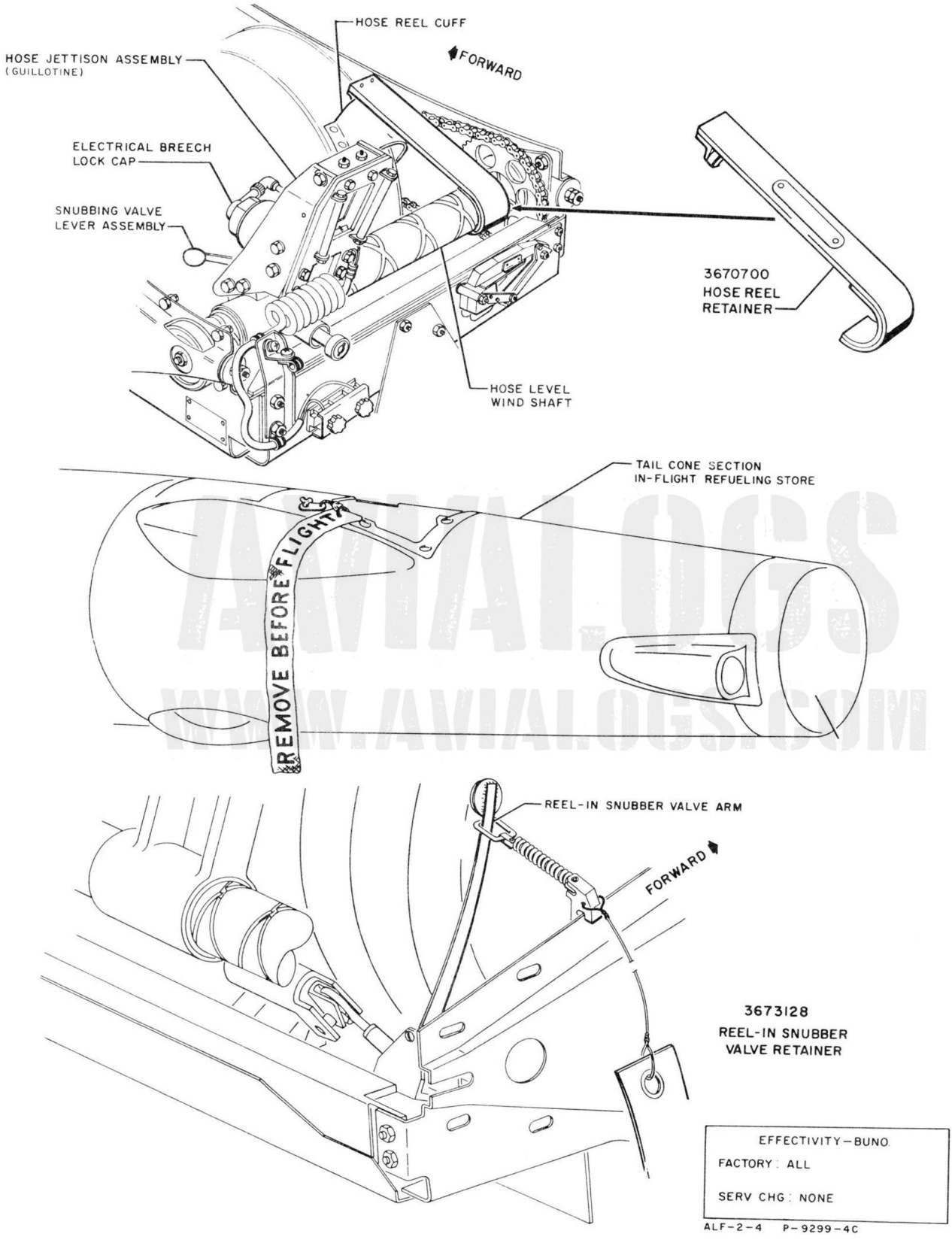


Figure 4-27. In-Flight Fueling Store Ground Handling Equipment (Sheet 3)

TABLE 4-3. CONVERSION-KIT RELAY PANEL WIRES

Wire Number	Length in Inches	Wire Number	Length in Inches
A242D20	17	Q21A20	15
A252G20	17	Q21B20	14
A252H20	14	Q22A20	15
A253F20	17	Q22B20	14
A253G20	14	Q22C20	13
A254D20	14	Q23A20	14
A300E20	12	Q23B20	13
A304E20	12	Q24RA20N	16
A310A20	14	X18F20A	11
Q20A20	15	X19F20B	13
Q20B20	14	X20F20C	15
A311B20N	14		

TABLE 4-4. CONVERSION-KIT FUEL BOOSTER PUMP CHARACTERISTICS

Characteristic	Value
Electric Motor	
Maximum power input	1.7 Kilowatts
Electric power	115/200 volts a-c
Cycles per second	700-750
Phase	3 phase
Fuel Pump	
Blocked outlet discharge pressure with MIL-J-5624 JP-4 grade fuel.	35 psig maximum
Rated capacity at sea level with MIL-J-5624 JP-4 grade fuel.	20,000 lbs. per hr. at 12.3 psig

TABLE 4-4A. A-1H AND A-1J SERVICE CHANGE CONFIGURATION (TANKER)

Service Charge	Combat	Extend Range (RH Wing Tank to Engine)	Sustaining Tanker
A-1/ASC 606	Not required but acceptable if accomplished	Must be accomplished	Must be accomplished
A-1/ASC 681	Not required by acceptable if accomplished	Must be accomplished (not required when both wing tanks used for tanker engine)	Must be accomplished
A-1/ASC 694	Not required	Acceptable if accomplished	Acceptable if accomplished
Conversion Kit P/N 5662572	Must not be installed	Must be accomplished (complete kit not required when both wing tanks are used for tanker engine)	Must be completely installed

SUMMARY:

1. A-1/ASC 606: Installation of provisions for refueling tanker (installs permanent refueling tanker system).
2. A-1/ASC 681: Revision of permanent tanker provisions (deletes hydraulic fuel pump provisions and provides for electrical pump in tanks).
3. A-1/ASC 694: Airplane provisions for in-flight refueling store hose jettisoning (guillotine).

TABLE 4-4B. A-1H AND A-1J CONVERSION KIT CONFIGURATIONS (STORE AND CONSOLE)

Conversion Kit	Store	Store Adapter Cable	Console	Console Adapter
5662572-507, -511	5547000-525, -527	4669008	5668927-503	3552434-503
5662472-507, -511	5547000-517	4669008	5668927	3552434-503
5662572-507, -511	5547000-519	4669008	5668927	3552434-503
5662572-507, -511	5547000-503 (Spare)	4669008	(None)	3552434-503

TABLE 4-5. IN-FLIGHT FUELING SYSTEM — TROUBLESHOOTING

NOTE

To facilitate troubleshooting, the in-flight fueling system is divided into Tanker Provisions and In-Flight Fueling Store in this table.

Trouble of Symptom	Probable Cause	Isolation Procedure	Remedy
Tanker Provisions (See figure 4-12.)			
1. Tanker conversion kit installation will not operate.	a. No electrical input.	Measure dc voltage between dc test jacks. Nominal voltage should be 27.5 ± 5 V dc.	Check dc external power and dc input connection.
		Measure ac voltage between phases of ac test jacks. Nominal voltage should be 200 ± 10.5 V ac between each phase.	Check ac external power and ac input connection.

TABLE 4–5. IN-FLIGHT FUELING SYSTEM—TROUBLE SHOOTING (Continued)

Trouble or Symptom	*Probable Cause*	*Isolation Procedure*	*Correction*
Tanker Provisions *(Continued)*			
1. Tanker conversion kit installation will not operate. (Continued)	b. Defective a-c power relay.	All systems that operate on variable a-c power do NOT function.	Repair or replace a-c power relay.
	c. Defective secondary bus relay.	All systems that operate off of secondary bus do NOT function.	Repair or replace secondary bus relay.
	d. In-flight fueling circuit breaker NOT engaged.	Check cockpit circuit breaker panel.	Engage in-flight fueling circuit breaker. If circuit breaker will NOT remain engaged, there is a short circuit in d-c in-flight fueling circuit.
	e. In-flight fueling circuit breakers NOT pushed in.	Check conversion-kit relay circuit breaker.	Reset circuit breaker.
	Note Perform step C of in-flight fueling test (table 4–6) before continuing with trouble shooting. During time test listen to pumps operate.		
2. Conversion kit fuel booster pumps operate, but do not pump fuel within specified three minutes maximum.	Fuel-booster pump bearings galled.	Noise of pumps should indicate whether or not pumps are galled.	Repair or replace galled pump.
3. Left-hand wing tank does not transfer fuel. (Indicated by lack of pump noise from left-hand wing tank.)	Defective left-hand fuel-booster pump motor.	A-c voltage between terminals 37, 86, and 87 of terminal panel 20 indicates left-hand fuel booster pump motor is faulty. No voltage indicates open circuit breakers and/or defective left-hand transfer relay.	Repair fuel-booster pump motor or replace fuel booster pump.
4. Right-hand wing tank does not transfer fuel. (Indicated by lack of pump noise from right-hand wing tank.)	a. Improper adjustment of right-hand fuel-booster-pump disconnect switch.	In forward equipment compartment, check right-hand fuel-booster-pump disconnect switch. Switch actuator should be in closed position.	Adjust switch installation bolts so that actuator depresses switch plunger.
	b. Defective right-hand fuel-booster pump motor.	A-c voltage between terminals 34, 35, and 36 of terminal panel 20 and closed right-hand fuel-booster-pump disconnect switch, indicate right-hand fuel-booster pump motor is faulty. No voltage indicates open circuit breakers and/or defective right-hand transfer relay.	Repair fuel-booster pump motor or replace fuel booster pump.

(Continued on page 198BF)

TABLE 4–5. IN-FLIGHT FUELING SYSTEM—TROUBLE SHOOTING (Continued)

Trouble or Symptom	*Probable Cause*	*Isolation Procedure*	*Correction*
Tanker Provisions *(Continued)*			
5. Both left- and right-hand fuel booster pumps do not transfer fuel. (Indicated by lack of pump noise from both wing tanks.)	a. Defective left-and right-hand fuel-booster pump motors.	A-c voltage, between terminals 37, 86, and 87, and between terminals 34, 35, and 36, indicate both fuel booster pump motors are faulty. No voltage at both of the three combinations of terminals indicates either open circuit breakers, defective frequency sensor or defective right- and left-hand transfer relay.	Repair fuel-booster pump motors or replace fuel booster pumps.
	b. Defective conversion-kit relay-panel frequency sensor.	D-c voltage between terminal-panel 20, terminal 82 and aircraft ground, and no voltage between frequency-sensor terminal D and aircraft ground, indicate frequency sensor defective.	Replace frequency sensor.
	c. Defective conversion-kit relay-panel left-hand transfer relay.	Frequency sensor controls left-hand transfer relay; therefore if frequency sensor is operating: a-c voltage is present between left-hand transfer relay terminals A2, B2 and C2; and there is no voltage between left-hand transfer-relay terminal A1, B1 and C1.	Repair or replace left-hand relay-panel transfer relay.
	d. Defective conversion-kit relay-panel right-hand transfer relay.	Frequency sensor controls right-hand transfer relay through right-hand fuel-booster pump disconnect switch; therefore, if right-hand fuel-booster-pump disconnect switch is closed, frequency sensor is operating; a-c voltage is present between right-hand transfer relay terminals A2, B2, and C2; and there is no voltage between right-hand transfer relay terminals A1, B1 and C1.	Repair or replace right-hand transfer relay.

Trouble or Symptom	*Probable Cause*	*Correction*
In-Flight Fueling Store *(See figure 4–22.)*		
1. Drogue will not extend.	a. Extend solenoid cut-out relay.	Jumper relay pins in such a way as to eliminate relay from circuit; if drogue extends, replace relay.
	b. Hose-reel extend solenoid.	Energize solenoid direct; if solenoid does not operate, replace it.
	c. Hose-reel lock cylinder will not unlock.	If hydraulic system has been bled, remove hose-reel lock cylinder. If drogue ejects, replace hose-reel lock cylinder. Bleed hydraulic system. (Refer to step A of in-flight fueling store test.)
	d. Drogue becomes fouled within tailcone of store.	Release hydraulic pressure and by working through aft access holes, remove hardware holding drogue sub-assemblies together. Remove drogue parts separately from end of tailcone.
		WARNING
		Do NOT stand behind drogue at any time during disassembly and removal of drogue parts.

TABLE 4–5. IN-FLIGHT FUELING SYSTEM—TROUBLE SHOOTING (Continued)

Trouble or Symptom	*Probable Cause*	*Correction*
In-Flight Fueling Store *(Continued)*		
1. Drogue will not extend. (Continued)	e. If cause of malfunction is not a, b, c, or d, trouble is hydraulic system.	Check hydraulic reservoir for fluid. If there is little or no fluid in reservoir, fill with hydraulic fluid, bleed system, pressurize system, and check for leaks. Eliminate hydraulic leaks.
2. Drogue fluctuates between eject and retract positions.	Power bypass sequencing switch is jammed closed.	Cut power and replace power bypass sequencing switch.
3. Drogue will not retract.	a. Hose-reel retract solenoid.	Energize solenoid direct; if solenoid does not operate, replace it.
	b. Electrical failure.	Check for electrical continuity.
	c. Mechanical failure of hose-reel or hydraulic motor.	If hydraulic motor operates and hose-reel does not operate, disengage units and replace geared shaft between motor and reel. If hose-reel retract solenoid operates and neither hose-reel nor hydraulic motor operate, disengage motor from reel to determine which one is galled.
	d. Hose-reel hydraulic motor.	If hydraulic motor will not operate when disengaged from hose-reel, and hose-reel retract solenoid operates, release hydraulic pressure and replace hydraulic motor.
4. Fuel will not dump.	Fuel dump valve.	Replace fuel dump valve.
5. Hose-reel will not snub to 2 fps in last retracting turn of hose-reel.	Hydraulic flow reducing valve.	Check flow-reducer actuating arm; if it contacts hose properly, replace hydraulic flow reducing valve.
6. Fuel will not transfer during flight check out.	a. Float switch.	Jumper switch; if transfer valve opens, replace switch.
	b. Fuel shut-off solenoid valve.	Energize fuel shut-off solenoid valve direct; if it fails to operate, replace.
	c. Fuel transfer pump.	If fuel shut-off solenoid valve operates, and fuel pump does not operate, remove hydraulic motor. If hydraulic motor runs, replace fuel pump.
	d. Hydraulic motor.	If hydraulic motor does not run when disengaged from fuel transfer pump, and fuel pump shut-off valve operates, release hydraulic pressure and replace hydraulic motor.
7. Indicating green lamp will not light when fuel flow 20 gpm or more.	Sequencing switch or light bulb.	Jumper sequencing switch. If green lamp lights, replace switch. If green lamp does not light, replace bulb.
8. Indicating lamps will not dim.	Dimming relay and/or 90 ohms, 15 watt resistors.	Jumper relay. If lamps dim, replace relay. If lights do not dim, replace resistors.
9. Ram air propeller will not unfeather.	Unfeathering solenoid valve and/or ram air turbine.	Energize unfeathering solenoid direct. If it does not open, replace. If it does open replace ram air turbine.

TABLE 4–6. IN-FLIGHT FUELING SYSTEM—TESTING

Equipment Required (See Figure 4–28)

In-flight fueling system tester
External a-c power supply (115V, 400-800 cps)
Multimeter
Reel-in snubber valve retainer
Drogue handle
Hydraulic test stand
Propeller lock

Note

Hydraulic test stand must have fluid cooler and variable displacement pump with minimum rating of 6 gpm and 3500 psig. Stand must also have reservoir of 3 galls minimum capacity, at 0 to 65 psig maximum pressure.

TABLE 4–6. IN-FLIGHT FUELING SYSTEM—TESTING (Continued)

CAUTION

If test stand does not have cooler, limit operation to 10 minutes, allowing half hour fluid cooling period between operations. Fluid temperature must not exceed 93°C (200°F).

1. Remove store access panels.

WARNING

To prevent accidental firing of hose jettison assembly remove electrical connector from cartridge breech cap.

2. Fuel store to minimum of 50 gallons.
3. Remove in-flight fueling control panel from cockpit.
4. Connect connector P5 (on tester internal cable W8) to control panel and install panel on tester.
5. Connect P1 connector on fueling control panel cable (W1) to tester receptacle J1.
6. Connect P15 connector on adapter cable (W3) to receptacle J6 on control panel cable (W1).
7. Install adapter cable (W3) connector P7 to receptacle on in-flight fueling store.
8. Connect external a-c power supply to receptacle J3 on tester using adapter power cable (W4).
9. Place test set and control panel switches in following positions:

Tester		*Control Panel*	
Switch	*Position*	*Switch*	*Position*
S-1 POWER	"OFF"	ON-OFF-DUMP	"OFF"
PUMP COUNTER S-4	"OFF"	RET-EXT	"RET"
DROGUE S-5	"STOWED"	TRANS-OFF	"OFF"
FLOAT S-6	"OFF"	LIGHT	"BRT"
FULL EXTEND—NORMAL S-7	"NORMAL"	SHIP TANK	"OFF"
		HOSE JETTISON	Locked off (forward)

10. Check ram air turbine for freedom of movement as follows and replace if required prior to testing of store:
    a. Axial blade freedom: No looseness permitted.
    b. Angular blade freedom: Maximum of 10 degrees permitted.
    c. Feathering: Place ON-OFF-DUMP switch momentarily in "ON" position until propeller blades unfeather. Rotate ram air turbine blades counterclockwise to a feathered position; continue rotation through several turns to simulate normal brake slippage with a maximum of 60 inch-pounds of torque.
    d. Unfeathering: Hold ram air turbine spinner stationary and place ON-OFF-DUMP switch in "ON" position. Propeller blades should snap to unfeathered position through approximately 45 degrees rotation.
    e. Blade Mechanism Freedom: Place ON-OFF-DUMP switch in "ON" position and grasp any two opposite blades. Twist in counterclockwise direction (feathering). The blades must drive the internal mechanism without evidence of binding.
11. Connect hydraulic test stand to store ground service quick disconnect fittings.

TABLE 4–6. IN-FLIGHT FUELING SYSTEM—TESTING (Continued)

Note

Removal of tail cone is not required for test. If tail cone has been removed, connect wiring harness (W6) between Cannon plugs in tail cone and store.

WARNING

To manually extend and retract hose at least two men are required to maintain constant tension during hose retraction.

WARNING

Do not disconnect or de-energize external electrical power source to store with hydraulic pressure applied to hydraulic system.

- Disconnecting or de-energizing electrical power source to store with hydraulic pressure applied to hydraulic system will cause hose and drogue to retract immediately.
- Disconnecting or de-energizing electrical power source to store with hydraulic pressure applied to hydraulic system causes actuation of ram air turbine brake which will burn up in 4 to 5 seconds.

12. Install reel-in snubber valve retainer.

Note

Using the reel-in snubber valve retainer will maintain a reel-in rate of 2 feet per minute.

13. Install propeller lock.
14. Energize external electrical power source.

Note

Ground store electrostatically for all operations.

15. Place tester power switch S-1 to "EXT" position.
16. Place control panel ON-OFF-DUMP switch in "ON" position.
17. Apply hydraulic test stand pressure of 3000 psi to store.

Test Procedure	*Desired Results*	*Remarks*
1. Control panel ON-OFF-DUMP switch in "ON" position.	Ram air propeller blades unfeather.	
2. Place control panel RET-EXT switch in "EXT" position.	a. Retract solenoid valve is energized.	Loss of electrical power to retract solenoid causes hose reel drive motor to retract drogue immediately.
	b. Drogue and hose eject approximately one foot.	Ejection causes mechanical action which closes drogue circuit arming switch. Circuit is completed through contacts of solenoid cut-out relay to extend solenoid valve. **Note** If drogue does not eject one of the following troubles must exist: *retract solenoid malfunction.* *ejection mechanism jammed.* *hydraulic system malfunction.*
	c. Holding coil relay on control panel is energized. (Current by-passes ON-OFF-DUMP switch.)	
	d. TRANS-OFF switch holding coil relay is energized.	Store float switch must be closed (store fueled).

TABLE 4–6. IN-FLIGHT FUELING SYSTEM—TESTING (Continued)

Test Procedure	*Desired Results*	*Remarks*
3. After drogue is ejected from tail cone install drogue handle in drogue coupling and pull drogue to fully extended position.		Extend cut-out arming switch, normally actuated when drogue is extended two feet out of store, is not operative when snubber valve retainer is installed. Drogue position indicator switch and extend cut-out switch are actuated by the last three feet of hose extension.
4. With drogue held in fully extended position, manually depress extend cut-out arming switch (located aft of hose reel beneath snubber valve lever on right-hand side of store.)	a. Drogue position indicator on control console reads "EXT." b. Tail cone amber light goes on. c. Extend solenoid cutout relay is energized and latched. d. Extend solenoid cutout relay deenergizes extend solenoid. Extend solenoid valve closes.	
5. Place control panel LIGHT switch in "DIM" position.	Tail cone amber light dims.	
6. Place LIGHT switch in "BRT" position.	Tail cone amber light brightens.	
7. Place control panel ON-OFF-DUMP switch in "OFF" position.	Drogue position indicator remains "EXT."	
8. Release tension on drogue hose to retract approximately 6 feet.	a. Drogue position indicator reads "TRA." b. Tail cone amber light goes out.	Procedure simulates engagement of receiver airplane in-flight fueling probe with drogue.
9. Place control panel TRANS-OFF switch in "TRANS" position.	a. Fuel pump drive motor operates fuel pump. b. Tail cone green light goes on. c. Control panel DROGUE position indicator reads "TRA."	**CAUTION** Do not operate switch to "TRANS" for more than 5 seconds.
10. Place control panel TRANS-OFF switch in "OFF" position.		It will be necessary to override holding coil action to return switch to "OFF" position.
11. Place control panel RET-EXT switch in "RET" position.	a. Drogue retracts at rate of two feet per second. b. Drogue circuit arming switch is actuated mechanically as drogue retracts into store tail cone. c. Drogue position indicator reads "RET."	Attach suitable rope to drogue to permit hands to be clear during final two feet of retraction. Extend and retract hose three full cycles. This will eliminate air in hydraulic system.

TABLE 4–6. IN-FLIGHT FUELING SYSTEM—TESTING (Continued)

Test Procedure	*Desired Results*	*Remarks*
12. De-energize hydraulic test stand and permit pressure to reduce to zero psig.		
13. Place control panel HOSE JETTISON switch in aft (jettison) position. Lift toggle upward to unlock.		
14. Use multimeter to measure voltage across contacts to hose jettison assembly breech cap connector return hose jettison switch locked off (forward).	Multimeter reading must be 22 volts d-c or more.	If no voltage is obtained reverse electrical leads because polarity may be reversed. If no voltage is obtained check voltage on opposite end of hose jettison wiring. Presence of voltage indicates faulty wiring. Check continuity of wiring from pin "R" of store receptacle to breech cap and repair open circuits as required.
15. Place empty container under store dump valve and momentarily place control panel ON-OFF-DUMP switch in "DUMP" position. Return switch immediately to "OFF" position.	Dump valve will open momentarily.	If dump valve does not open, check continuity of dump valve circuit in store. If store is complete replace valve.
16. Disconnect hydraulic test stand lines from store service fittings.		
17. Return test set control panel switches to positions indicated in preliminary conditions.		
18. Remove reel-in snubber valve retainer.		
19. Remove fueling control panel cable.		
20. Remove control panel from test set and install in left-hand control console.		
21. Install breech cap on hose jettison assembly.		
22. Remove propeller lock.		
23. Fill hydraulic reservoir (refer to paragraph 12–63). Rotate blades several turns clockwise by hand and rock counterclockwise.		
24. Remove screw from manual bleed valve and attach drain line; open bleed valve by depressing and then slowly rotate propeller counterclockwise.	To release all trapped air from hydraulic system.	**Note** Repeat until hydraulic reservoir plunger drop is less than 3/8-inch. System is then considered adequately bled.
25. Install access panels on store.		

TABLE 4–7. NORMAL TO TANKER CONVERSION

Note

The general procedure for installing the AD-6 and AD-7 tanker components is noted in this table.

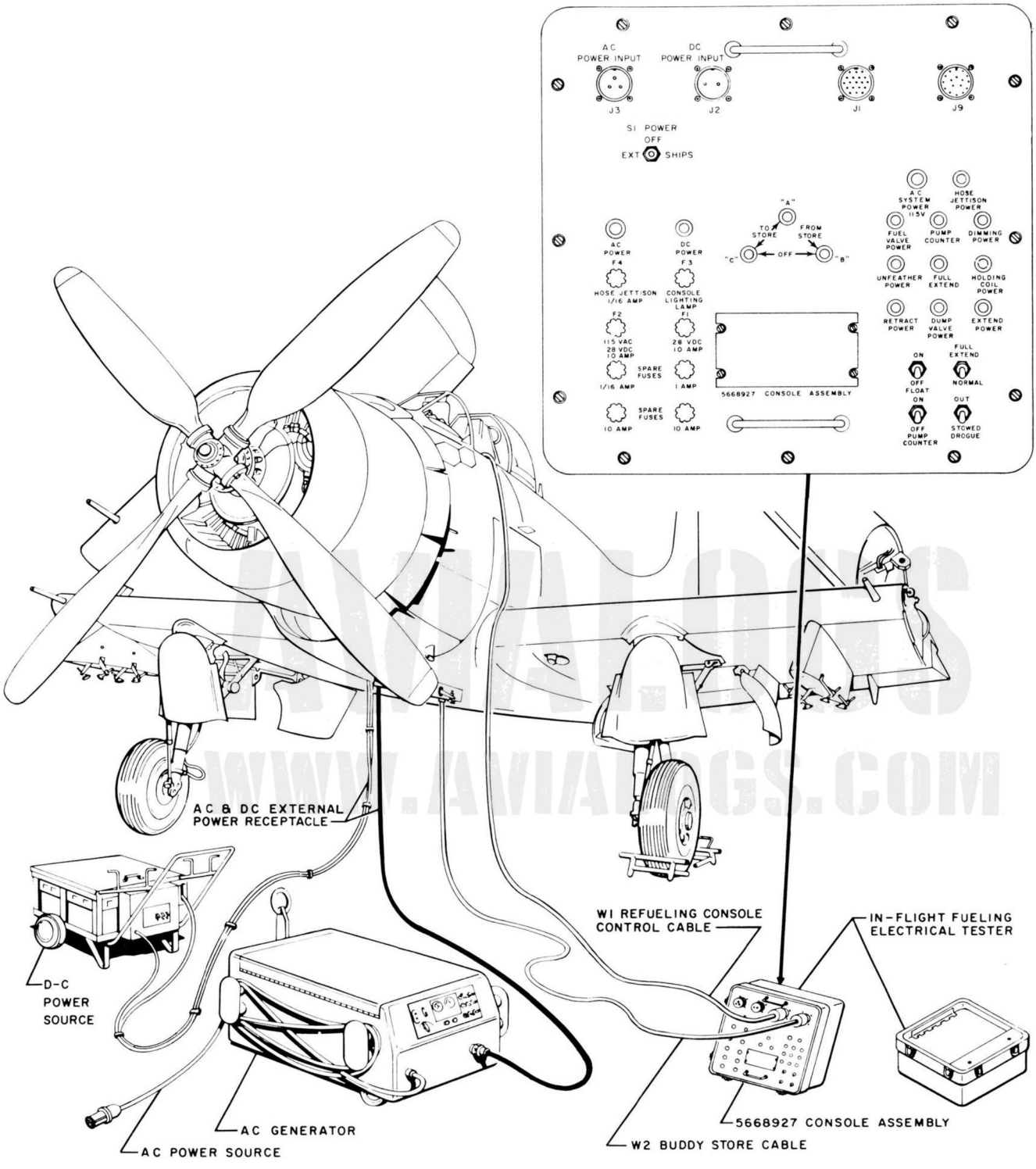
Step	*Para Ref*
1. Install in-flight fueling control panel into RH console of cockpit.	4–184
2. Remove centerline external-fuel-tank supply line from between fuel selector valve and front spar.	4–175
3. Disconnect left-hand external-fuel-tank supply hose from front spar.	4–175
4. Reverse left-hand external-fuel-tank supply hose, and attach it to centerline, external-fuel-tank supply port of fuel selector valve. (Creating an expansion area for fuel selector valve.)	4–175
5. Install conversion-kit check valve assembly.	4–175
6. Install conversion-kit relay panel.	4–171
7. Install conversion-kit adapter cables (Douglas 4553203-501) to wing racks.	4–155
8. Adapt ATP-D1 400-gallon auxiliary fuel tank for AD-6 or AD-7 airplane, and install tank on wing stores rack.	4–181
9. Remove fuel strainer assemblies from external ATP-D1 400-gallon fuel tanks.	4–161
10. Install conversion-kit fuel booster pumps to external ATP-D1 400-gallon fuel tanks.	4–161
11. Install conversion-kit adapter cable (Douglas 4553203 or 4669008) to fuselage external-stores ejector rack.	4–154
12. Adapt in-flight fueling store for AD-6 or AD-7 airplane, and install store to fuselage external-stores ejector rack.	4–187

TABLE 4–8. TANKER TO NORMAL CONVERSION

Note

The general procedure for removing the AD-6 or AD-7 tanker components is noted in this table.

Step	*Para Ref*
1. Remove in-flight fueling store from fuselage external-stores ejector rack.	4–188
2. Remove conversion-kit adapter cable (Douglas 4553203 or 4669008) from fuselage external-stores ejector rack.	4–155
3. Remove conversion-kit fuel booster pumps from external ATP-D1 400-gallon fuel tanks.	4–162
4. Install fuel strainer assembly into external ATP-D1 400-gallon fuel tanks.	4–162
5. Remove external ATP-D1 400-gallon fuel tanks from wing stores racks.	4–182
6. Remove conversion-kit adapter cables (Douglas 4553203-501) from wing stores racks.	4–156
7. Remove conversion-kit relay panel from forward equipment compartment.	4–172
8. Remove conversion-kit check valve assembly from forward equipment compartment.	4–176
9. Disconnect left-hand external-fuel-tank supply hose from centerline external-fuel-tank supply port of fuel selector valve.	4–176
10. Connect left-hand external-fuel-tank supply hose to left-hand external-fuel-tank fuel fitting on front spar.	4–176
11. Install centerline external-fuel-tank supply line between centerline external-fuel-tank supply port on fuel selector valve, and centerline external-fuel-tank fuel fitting on front spar.	4–176
12. Remove in-flight fueling control panel from right-hand console of cockpit.	4–184A



TESTING IN-FLIGHT FUELING CIRCUIT

EFFECTIVITY-BUNO.
FACTORY: ALL
SERV CHG: NONE

ALF-2-4 P-9299-2C

Figure 4-28. In-Flight Fueling Store—Testing (Sheet 1)

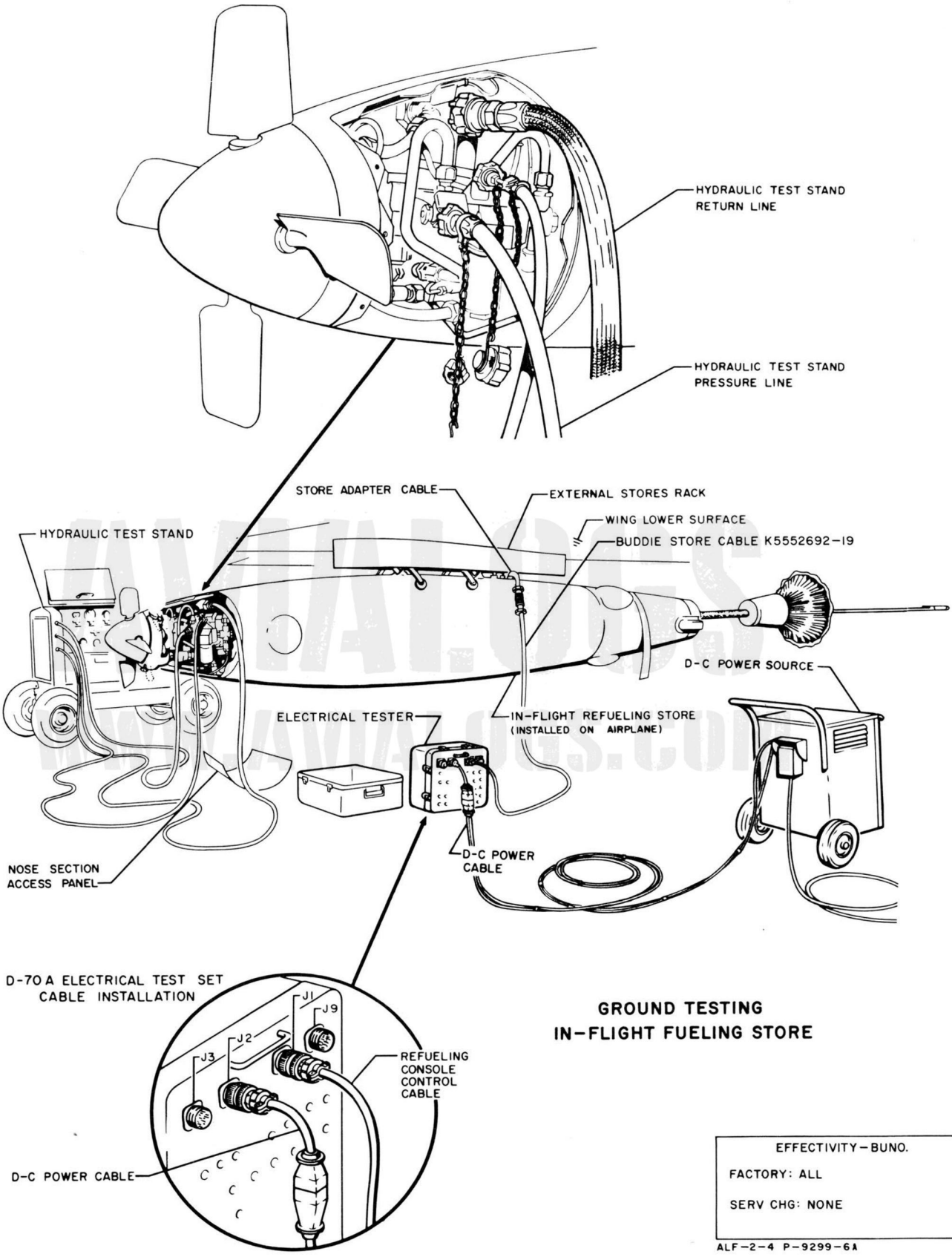


Figure 4-28. In-Flight Fueling Store—Testing (Sheet 2)

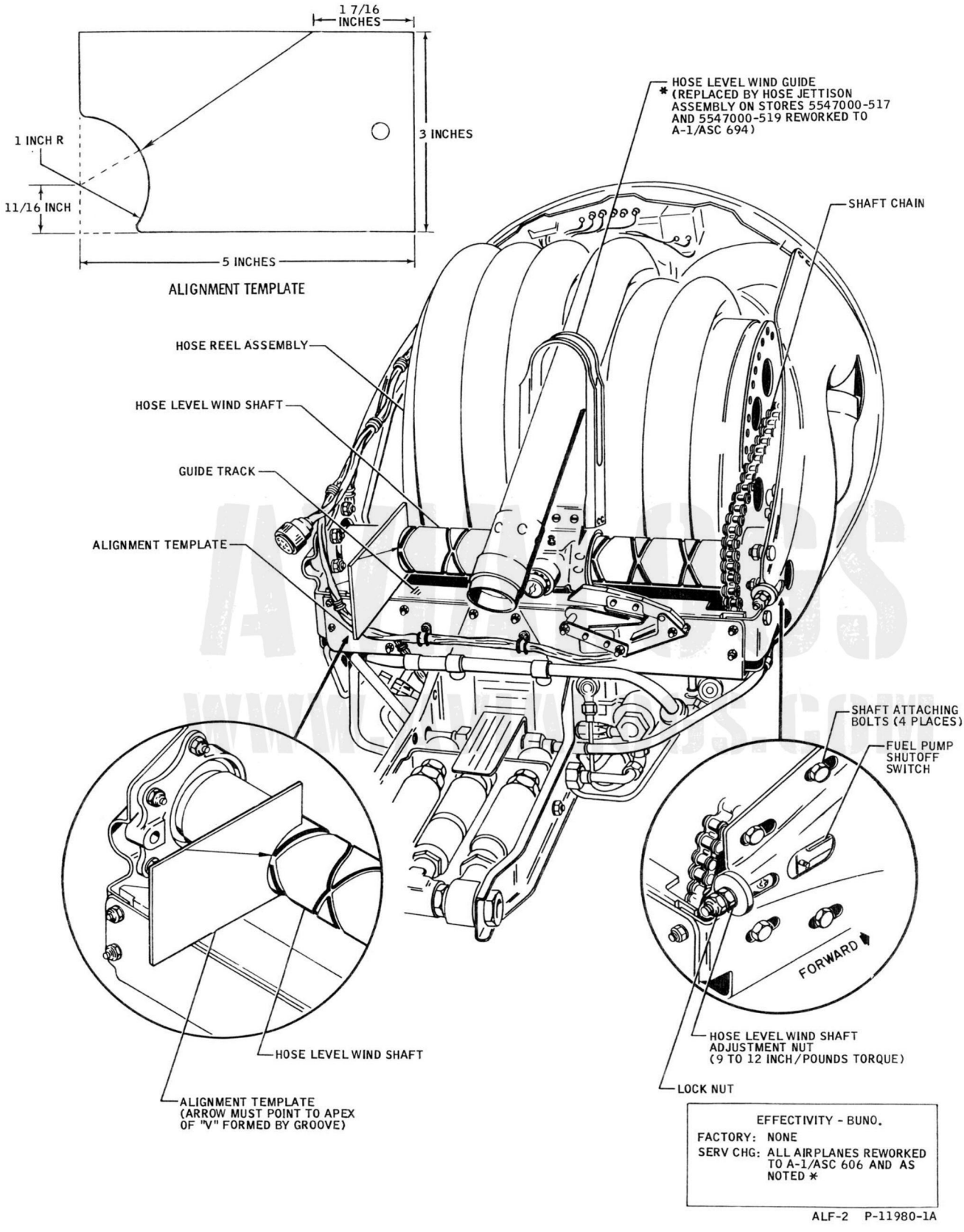


Figure 4-29. In-Flight Fueling Store - Adjustment (Sheet 1)

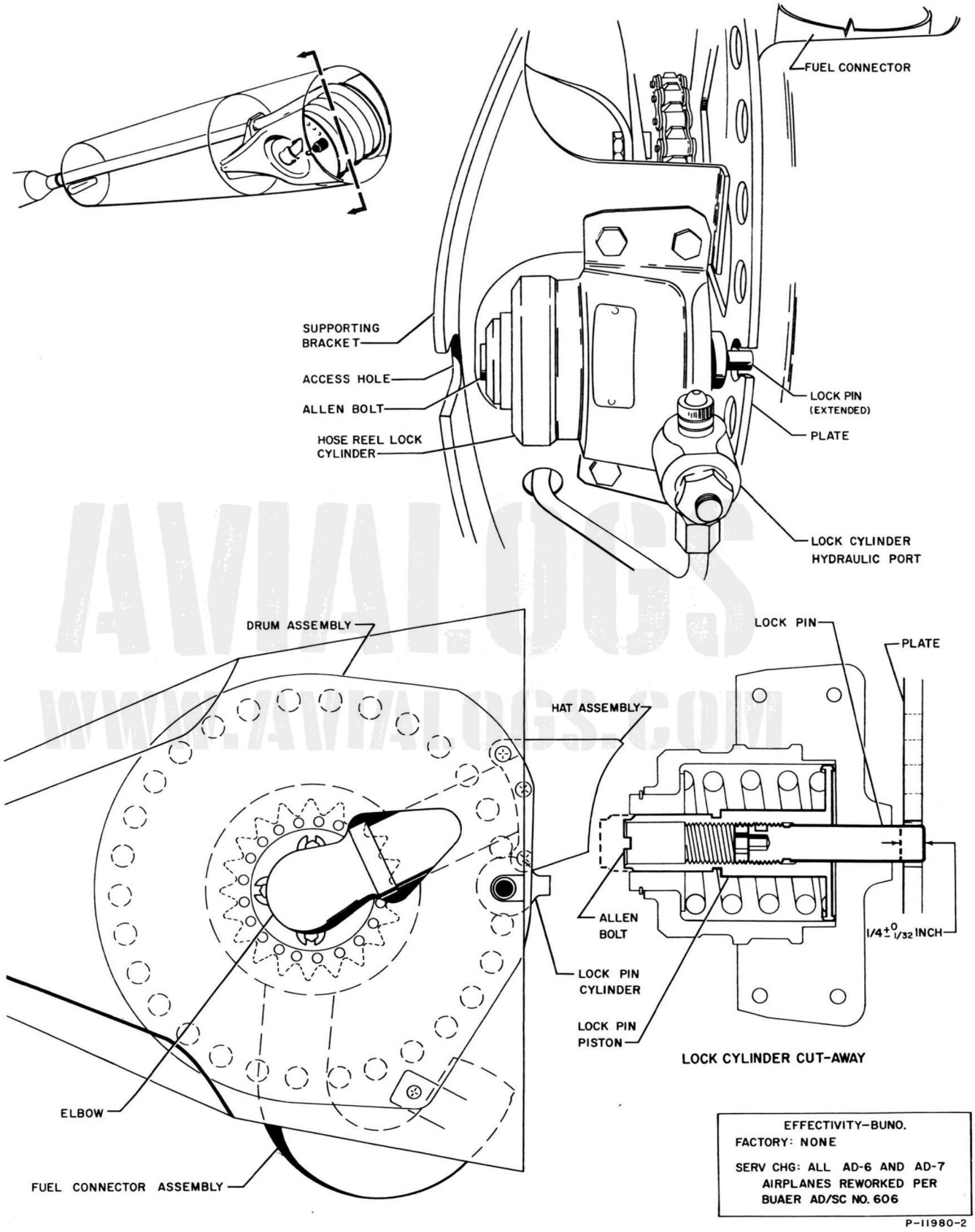


Figure 4-29. In-Flight Fueling Store—Adjustment (Sheet 2)