

SECTION 11

FUEL SYSTEM

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11-1. FUEL SYSTEM (EXCEPT T337-Series).

11-2. DESCRIPTION. (Thru 337F) The main fuel supply is contained in fuel tanks in the wings. Two interconnected metal tanks are located in each wing, just outboard of the booms. Fuel flows from the main tanks to sump tanks, one in each wing. Fuel from the main tanks will drain completely into the sump tanks. From the sump tanks, fuel flows through a bypass in electrical fuel pumps to both (front engine and rear engine) fuel selector valves in the wing roots. By using the selector valves, fuel can be selected from either the right or left main tank for either engine. This arrangement permits both engines to operate from either tank. Either electric pump will sustain both engines in the highly unlikely circumstance that the two engine-driven pumps and one electric pump should become inoperative. Fuel flows from each selector valve,

through a fuel strainer at each engine, into the engine-driven fuel pump of each engine. Each fuel strainer contains a remotely controlled drain valve. Each engine primer receives its fuel supply from the front strainer. The optional oil dilution fuel line connects at each fuel strainer. Fuel vapor return lines return vapor and unused fuel from the front engine-driven fuel pump to the left fuel tanks, and from the rear engine-driven fuel pump to the right fuel tanks, regardless of selector valve position. Auxiliary fuel tanks are available as optional equipment, and are installed, one in each wing, between the cabin and the boom. The left auxiliary fuel tank feeds directly into the front engine selector valve only, and the right auxiliary tank feeds directly into the rear engine selector valve only. On models prior to the 337C-Series, fuel level is indicated on electrically-operated fuel quantity gages. Each gage is operated by two interconnected fuel quantity transmitters, one in each main tank. Each auxiliary tank has

a fuel quantity transmitter which operates its individual gage. On Models 337C thru 337F, only two fuel quantity indicators are provided in the instrument cluster on the panel. The indicators are for left and right fuel tanks and indicate both main and auxiliary fuel tank levels.

11-3. FUEL SYSTEM (EXCEPT T337-SERIES).

11-4. DESCRIPTION. (Beginning with 337G) This fuel system is basically similar to the system described in paragraph 1-2, except that the fuel selector valves in the wing roots have been changed from a five-port valve to a three-port valve, and the fuel selector control device above the cabin console has been changed from a four-position gearbox configuration to a three-position cammed bellcrank design. The vapor and fuel return lines return unused fuel and vapor to the sump tanks.

11-5. FUEL SYSTEM (T337-SERIES).

11-6. DESCRIPTION. (Thru 337F). The main fuel supply is contained in fuel tanks in the wings. Two interconnected metal tanks are located in each wing, just outboard of the booms. Fuel flows from the main tanks to sump tanks, one in each wing. Fuel from the main tanks will drain completely into the sump tanks. From the sump tanks, fuel flows directly to both (front engine and rear engine) fuel selector valves in the wing roots. By using the selector valves, fuel can be selected from either the right or left main tank for either engine. This arrangement permits both engines to operate from either tank. Fuel flows from each selector valve into its fuel line manifold, through a fuel strainer at each engine, through a bypass in an electric fuel pump for each engine, into the engine-driven fuel pump of each engine. Each fuel strainer contains a remotely controlled drain valve. Each engine primer receives its fuel supply from the front strainer. The optional oil dilution fuel line connects at each fuel strainer. The front engine electric fuel pump will sustain the front engine if its engine-driven fuel pump should become inoperative, and the rear engine electric fuel pump will sustain the rear engine if its engine-driven fuel pump should become inoperative. Fuel vapor return lines return vapor and unused fuel from the front engine-driven fuel pump into the front fuel line manifold, where the fuel is recirculated and the vapor is returned to the left fuel tanks. Fuel vapor return lines return vapor and unused fuel from the rear engine-driven fuel pump into the rear fuel line manifold, where the fuel is recirculated and the vapor is returned to the right fuel tanks. This arrangement is always true, regardless of selector valve position.

11-7. FUEL SYSTEM (LONG-RANGE 337G).

11-8. DESCRIPTION. (Beginning with 337G). The fuel supply is contained in three metal fuel tanks located in each wing. Two interconnected tanks are located just outboard of the booms. An additional fuel tank is installed in each wing, between the cabin and the boom. This tank is interconnected with the outboard tanks. A fuel quantity sending unit is located in all three fuel tanks in each wing. The units

transmit fuel tank quantities to indicators located in a cluster on the instrument panel. Fuel flows from the main tanks to a sump tank, located in each boom, immediately beneath the wing. From the sump tanks, fuel flows directly to both (front engine and rear engine) fuel selector valves, located in each wing root area. These valves are mechanically connected to selector handles located in the pilot's overhead console in the cabin. By using the selector valves, fuel can be routed from either the right or left main tanks for either engine. This arrangement permits both engines to operate from either set of tanks. Fuel flows from each selector valve through each fuel strainer and a bypass in each auxiliary fuel pump, into an engine-driven fuel pump for each engine. Each fuel strainer contains a remotely controlled drain valve. Each engine primer receives its fuel supply from the front strainer. The optional oil dilution fuel line connects at each fuel strainer. The front engine electric fuel pump will sustain the front engine if its engine-driven fuel pump should become inoperative and the rear engine fuel pump will sustain the rear engine if its engine-driven fuel pump should become inoperative. Fuel vapor return lines return vapor and unused fuel from the front and rear engine-driven pumps into the respective fuel line tees located between the sump tank and inboard fuel tank in each wing. This arrangement is always true, regardless of selector valve position.

11-9. PRECAUTIONS.

NOTE

There are certain general precautions and rules concerning the fuel system which should be observed when performing the operations and procedures in this Section. These are as follows:

- a. During all fueling, defueling, tank purging, and tank repairing or disassembly, ground the airplane to a suitable ground stake.
- b. Residual fuel draining from lines and hoses constitutes a fire hazard. Use caution to prevent the accumulation of fuel when lines or hoses are disconnected.

NOTE

Throughout the aircraft fuel system, from the fuel tanks to the engine-driven fuel pump, use RAS-4 (Snap-On Tools Corp., Kenosha, Wisconsin), MIL-T-5544 (Thread Compound, Antiseize, Graphite-Petrolatum) or equivalent, as a thread lubricant or to seal a leaking connection. Apply sparingly to male threads only, omitting the first two threads. Always ensure that a compound, the residue from a previously used compound, or any other foreign material cannot enter the system. Throughout the fuel injection system, from the engine-driven fuel pump through the discharge nozzles, use only a fuel soluble lubricant, such as engine lubricating oil, on fitting threads. Do not use any other form of thread compound on the injection system.

11-10. TROUBLE SHOOTING.

NOTE

Use this trouble shooting chart in conjunction with the engine trouble shooting charts in Sections 10 or 10A.

TROUBLE	PROBABLE CAUSE	REMEDY
NO FUEL FLOW TO ENGINE-DRIVEN PUMP.	Selector valve not turned on.	Turn selector valve on.
	Fuel tanks empty.	Service with proper grade and amount of fuel.
	Fuel line disconnected or broken.	Connect or repair fuel lines.
	Defective selector valve.	Repair or replace selector valve.
	Selector valve not rigged properly.	Re-rig selector valve.
	Sump tank strainer or auxiliary strainer plugged.	Clean screens and flush out tanks.
	Plugged fuel strainer.	Clean strainer and screen.
	Defective bypass valve in electric fuel pump.	Repair pump. Replace bypass valve.
	Fuel line plugged.	Disconnect lines as necessary to locate obstructions, then clean.
FUEL STARVATION AFTER STARTING.	Partial fuel flow from the preceding causes.	Use the preceding remedies.
	Malfunction of engine-driven fuel pump or fuel injection system.	Refer to Sections 10 or 10A.
	Fuel vents plugged.	See paragraphs 11-26 and 11-66.
	Water in fuel.	Drain fuel tank sumps, fuel lines and fuel strainer.
NO FUEL FLOW WHEN ELECTRIC PUMPS OPERATED.	Defective auxiliary pump switch.	Replace defective switch.
	Open or defective circuit breaker.	Reset. Replace if defective.
	Loose connections or open circuit.	Tighten connections; repair or replace wiring.
	Defective electric fuel pump.	Replace defective pump.
	Defective engine-driven fuel pump bypass or defective fuel injection system.	Refer to Sections 10 or 10A.
NO FUEL QUANTITY INDICATION.	Fuel tanks empty.	Service with proper grade and amount of fuel.
	Defective indicator, transmitter, sending unit or electrical circuit.	Refer to Section 14.

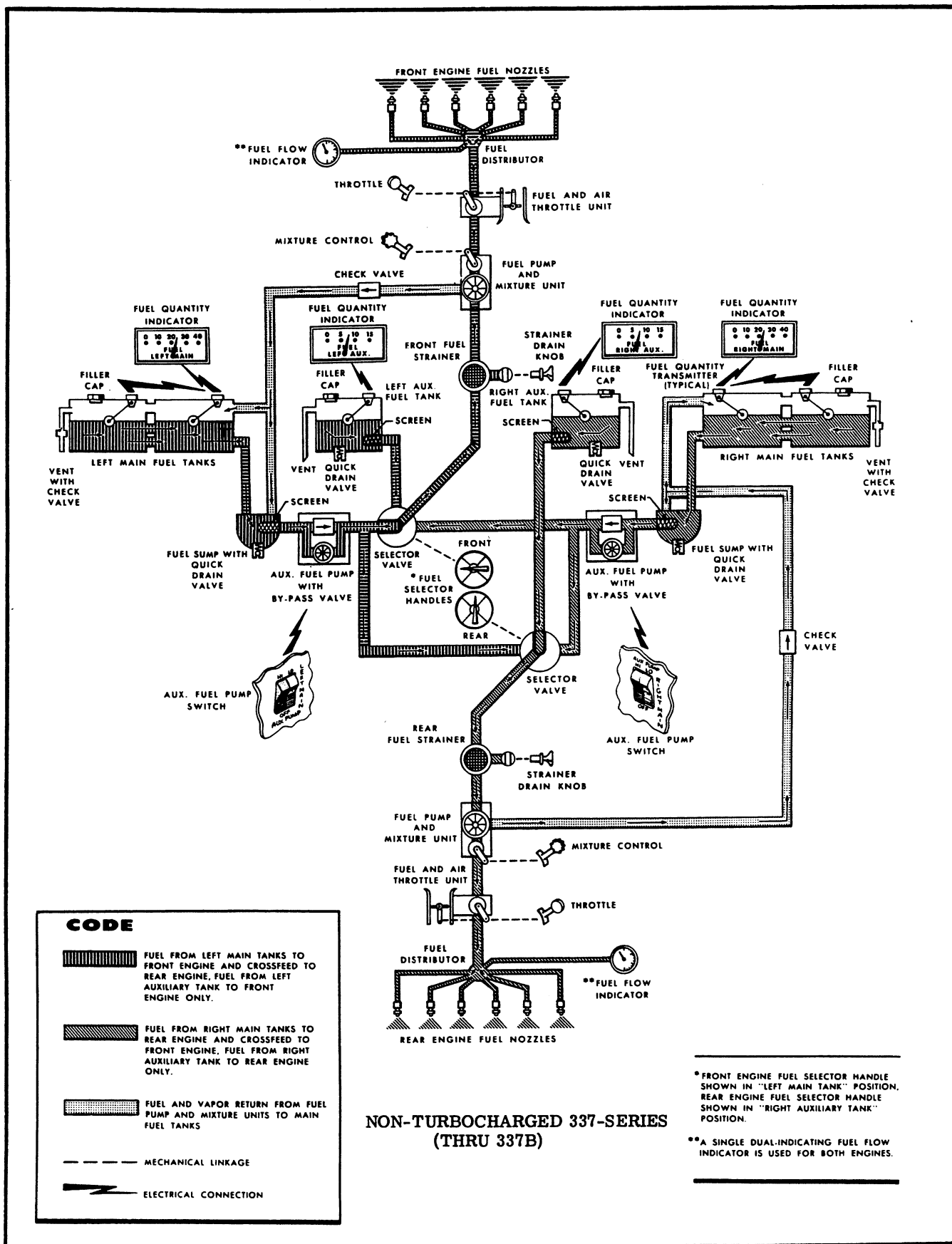
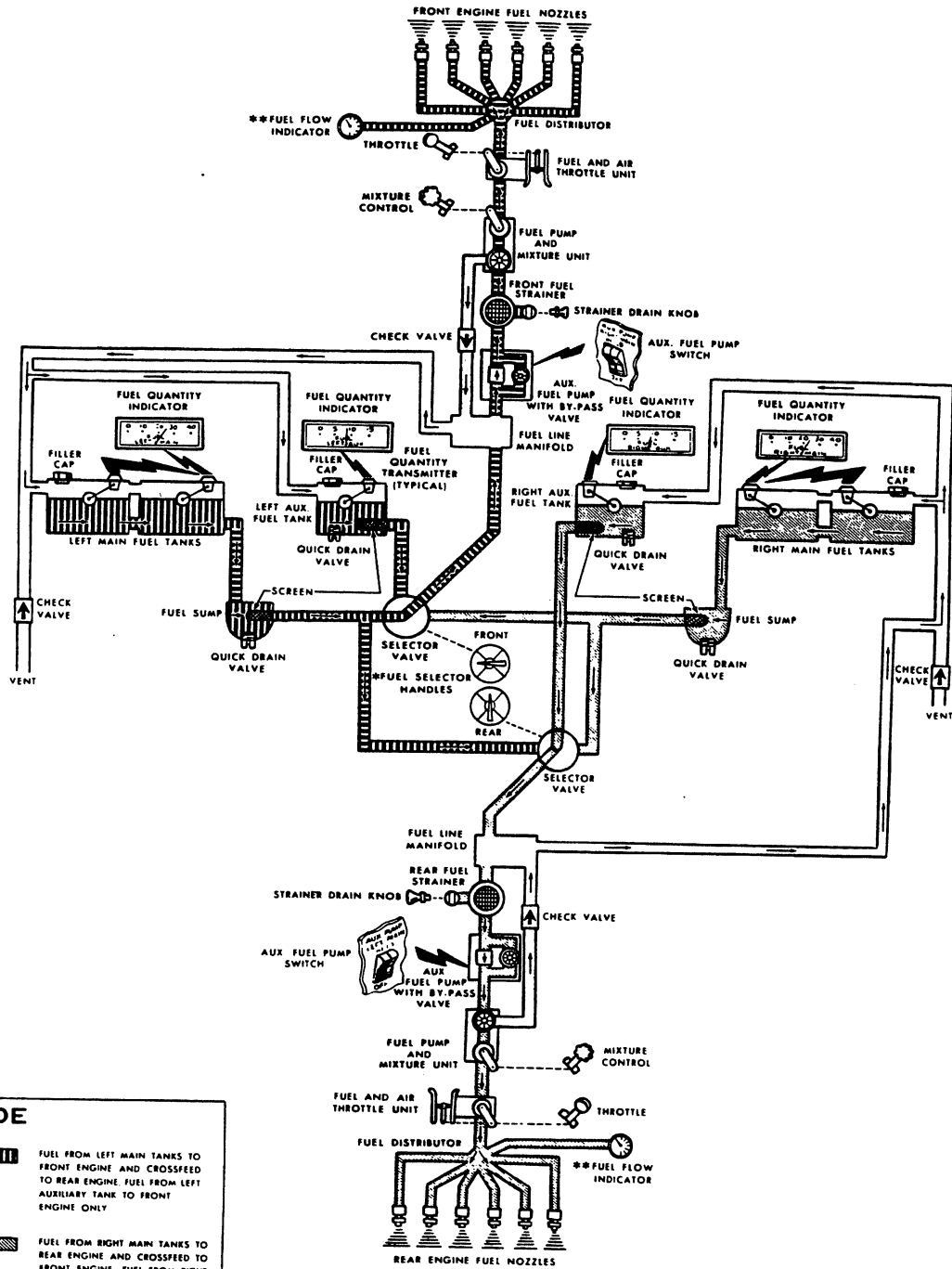


Figure 11-1. Fuel System Schematic (Sheet 1 of 6)



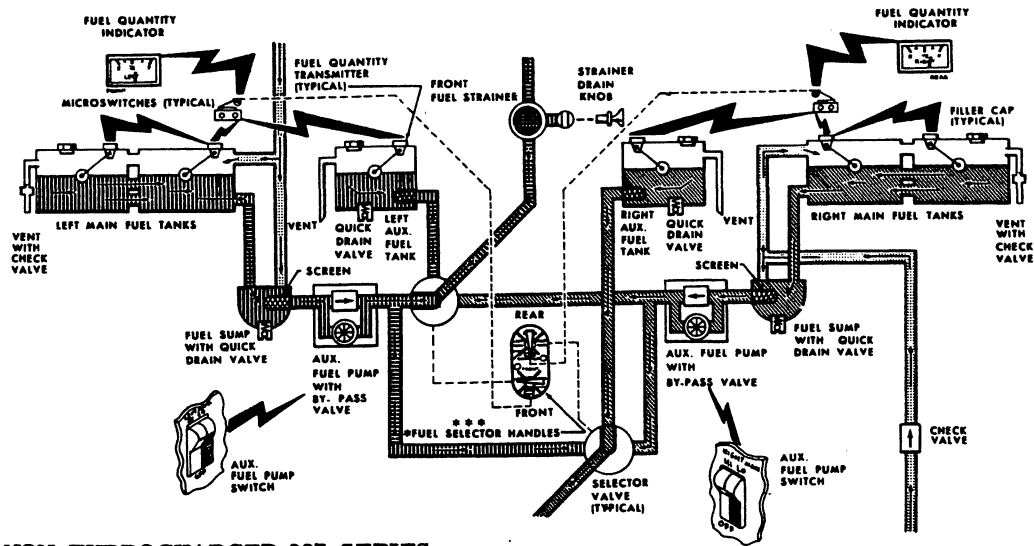
CODE	
	FUEL FROM LEFT MAIN TANKS TO FRONT ENGINE AND CROSSFEED TO REAR ENGINE. FUEL FROM LEFT AUXILIARY TANK TO FRONT ENGINE ONLY
	FUEL FROM RIGHT MAIN TANKS TO REAR ENGINE AND CROSSFEED TO FRONT ENGINE. FUEL FROM RIGHT AUXILIARY TANK TO REAR ENGINE ONLY
	FUEL AND VAPOR RETURN FROM FUEL PUMP AND MIXTURE UNITS TO FUEL LINE MANIFOLD
	VENT LINES
	MECHANICAL LINKAGE
	ELECTRICAL CONNECTION

**TURBOCHARGED 337-SERIES
(THRU 337B)**

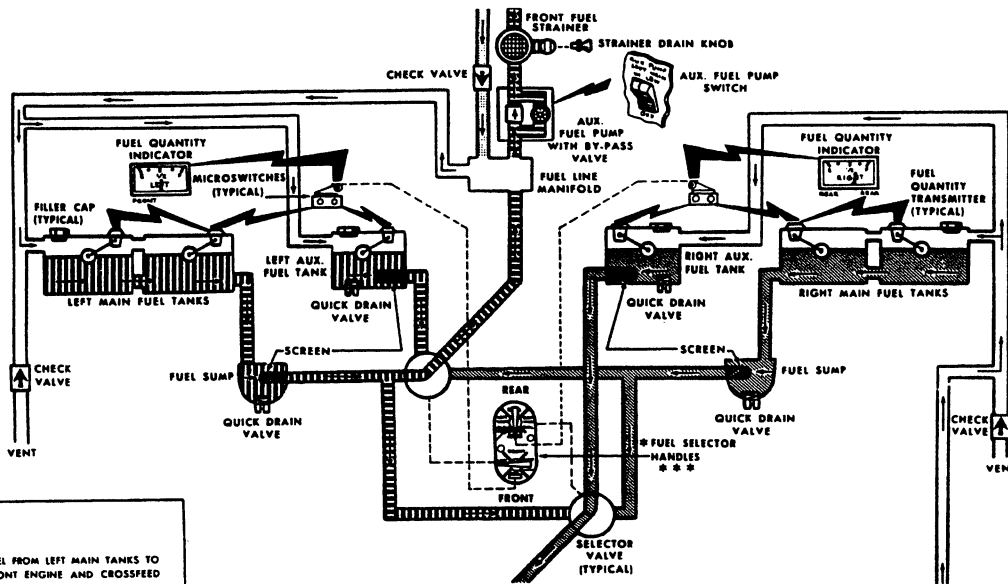
*FRONT ENGINE FUEL SELECTOR HANDLE SHOWN IN 'LEFT MAIN TANK POSITION'. REAR ENGINE FUEL SELECTOR HANDLE SHOWN IN 'RIGHT AUXILIARY TANK POSITION'

**A SINGLE DUAL INDICATING FUEL FLOW INDICATOR IS USED FOR BOTH ENGINES

Figure 11-1. Fuel System Schematic (Sheet 2 of 6)









**NON-TURBOCHARGED 337-SERIES
(MODEL 337C THRU 337D)**



**TURBOCHARGED 337-SERIES
(MODEL 337C THRU 337D)**

CODE

-  FUEL FROM LEFT MAIN TANKS TO FRONT ENGINE AND CROSSFEED TO REAR ENGINE. FUEL FROM LEFT AUXILIARY TANK TO FRONT ENGINE ONLY
-  FUEL FROM RIGHT MAIN TANKS TO REAR ENGINE AND CROSSFEED TO FRONT ENGINE. FUEL FROM RIGHT AUXILIARY TANK TO REAR ENGINE ONLY
-  FUEL AND VAPOR RETURN FROM FUEL PUMP AND MIXTURE UNITS TO FUEL LINE MANIFOLD
-  VENT LINES
-  MECHANICAL LINKAGE
-  ELECTRICAL CONNECTION

NOTE

Remainder of the fuel system schematic is the same as that shown on sheets 1 and 2.

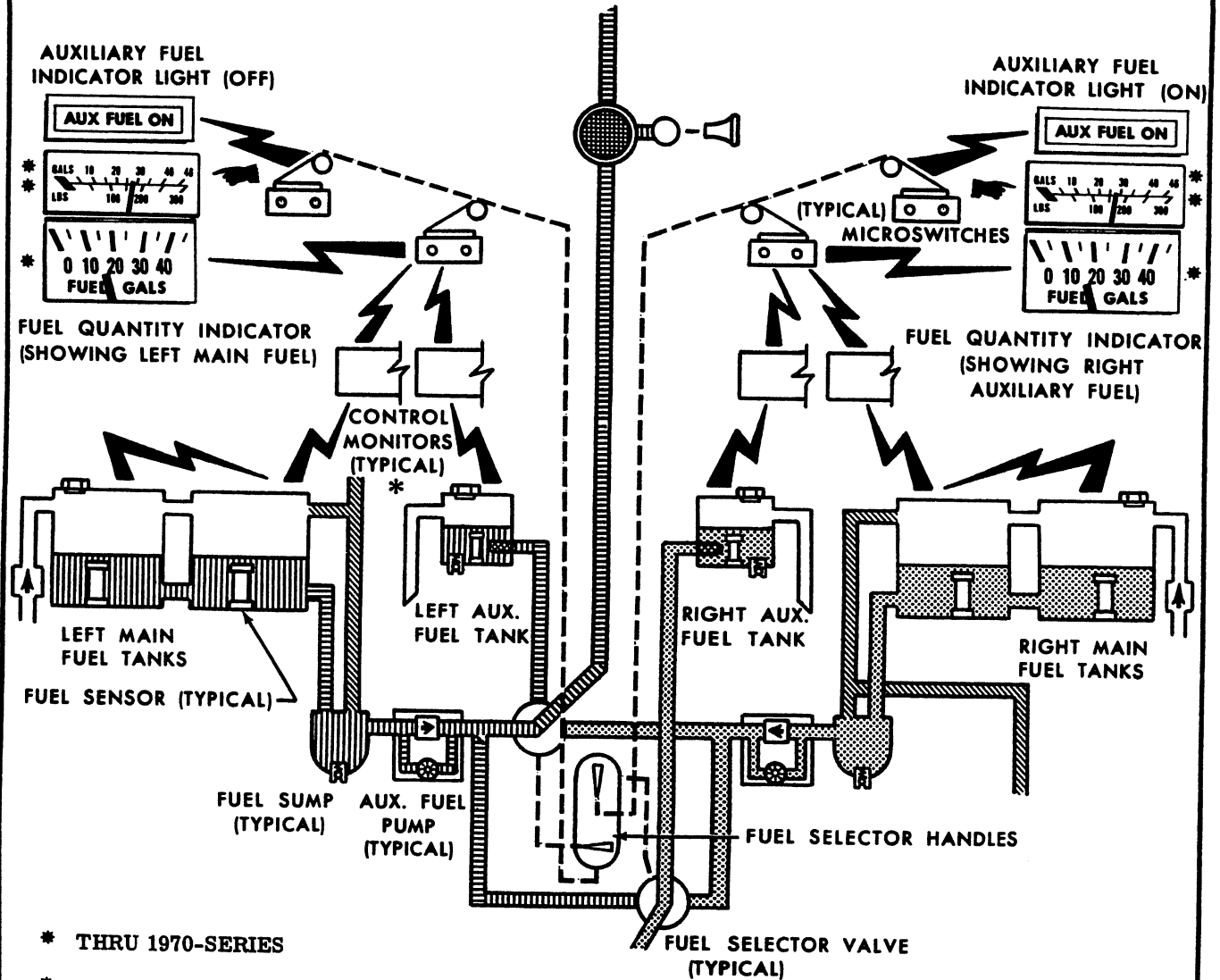
* FRONT ENGINE FUEL SELECTOR HANDLE SHOWN IN "LEFT MAIN TANK" POSITION. REAR ENGINE FUEL SELECTOR HANDLE SHOWN IN "RIGHT AUXILIARY TANK" POSITION

** A SINGLE DUAL-INDICATING FUEL FLOW INDICATOR IS USED FOR BOTH ENGINES

*** LOOKING UP AND FORWARD

Figure 11-1. Fuel System Schematic (Sheet 3 of 6)

MODEL 337E THRU 337F



* THRU 1970-SERIES

* BEGINNING WITH 1971-SERIES

NOTE

Remainder of the fuel system schematic is the same as that shown on sheets 1 and 2.

* A SINGLE CONTROL MONITOR ELECTRICALLY SERVES BOTH RIGHT AND LEFT MAIN TANKS. A SEPARATE MONITOR SERVES BOTH AUXILIARY TANKS.

Figure 11-1. Fuel System Schematic (Sheet 4 of 6)

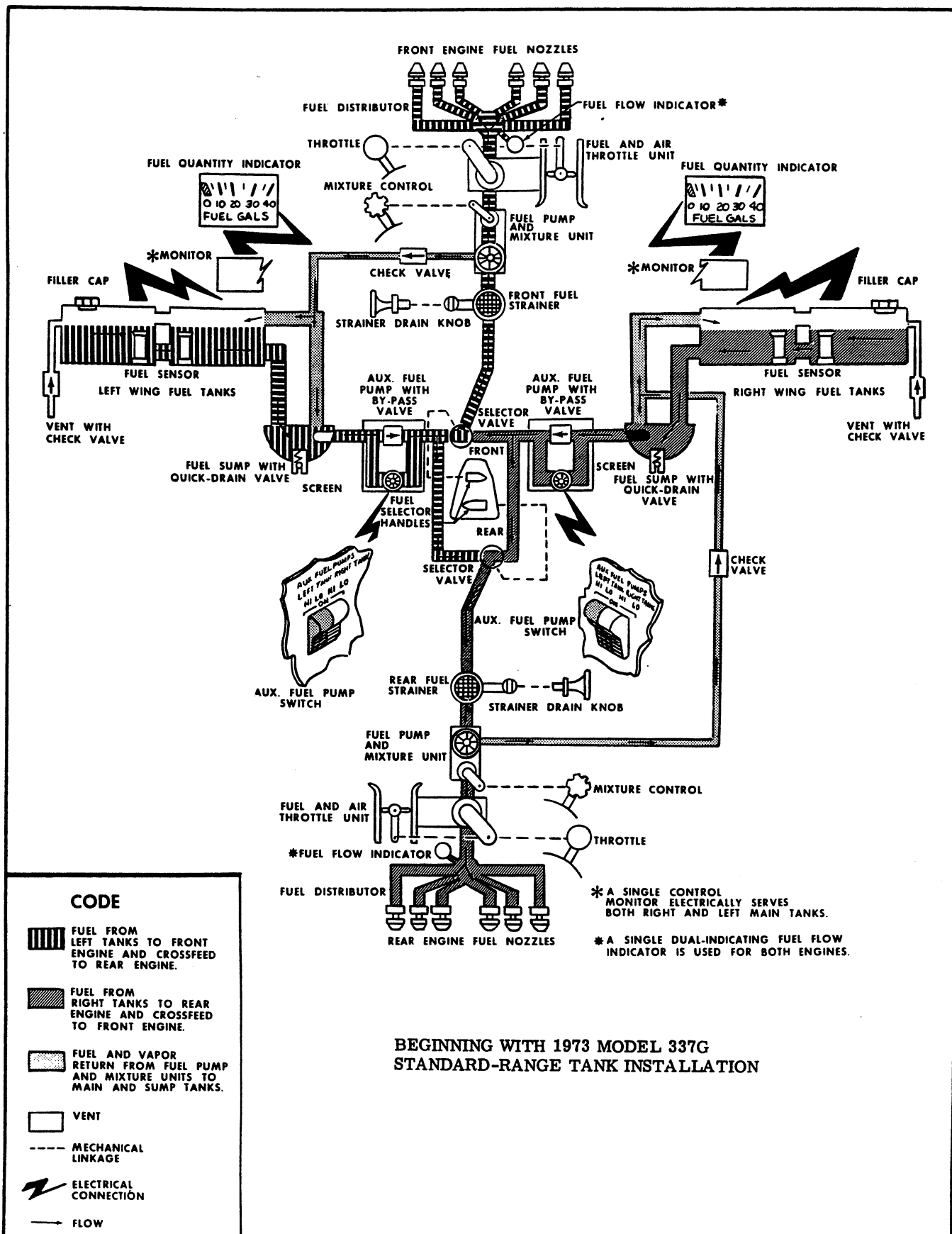


Figure 11-1. Fuel System Schematic (Sheet 5 of 6)

*A SINGLE CONTROL MONITOR ELECTRICALLY SERVES BOTH RIGHT AND LEFT MAIN TANKS.

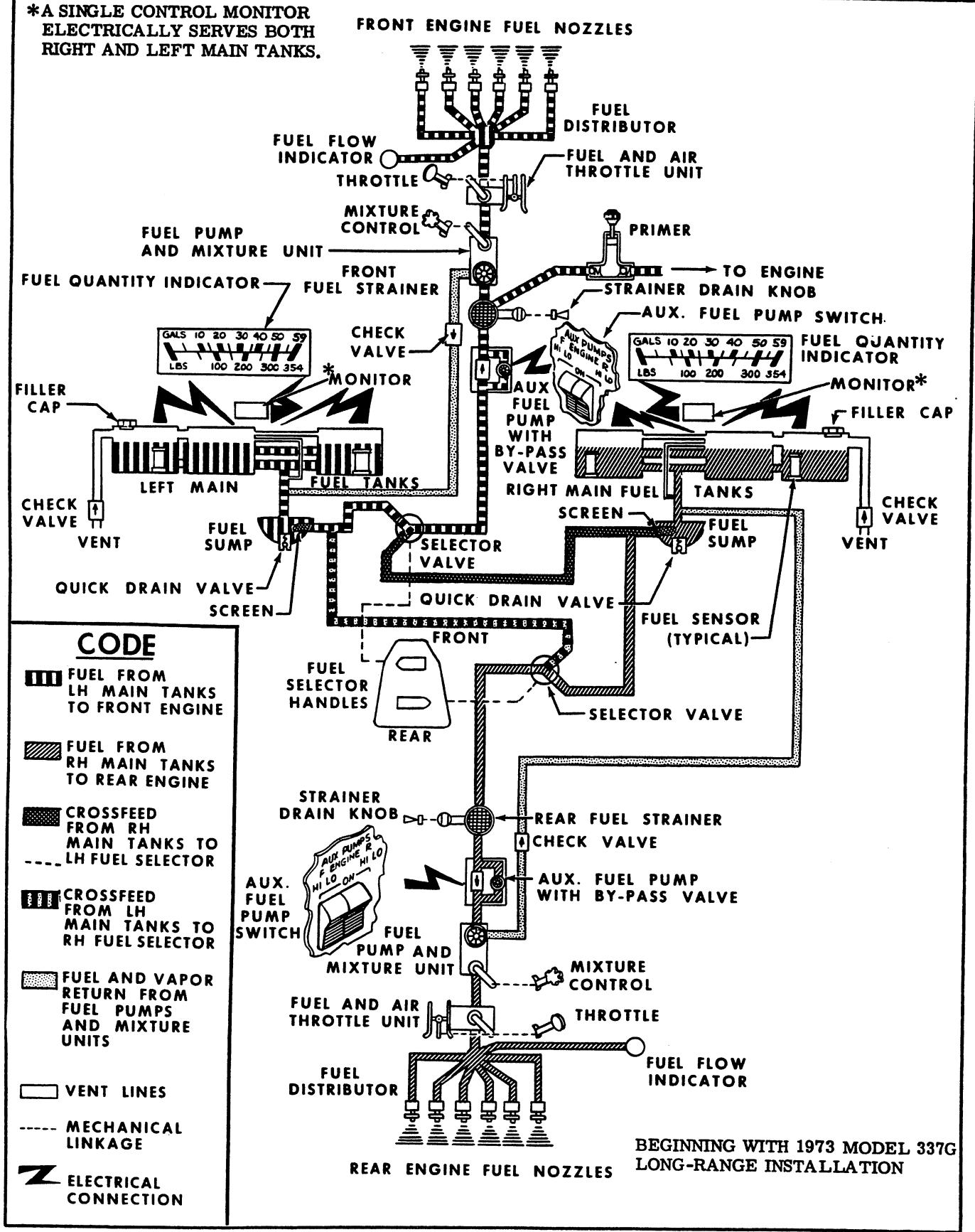


Figure 11-1. Fuel System Schematic (Sheet 6 of 6)

11-11. MAIN FUEL TANKS.

11-12. DESCRIPTION (Thru 337F). The main tank in each wing consists of two interconnected metal tanks. The tanks are connected by two hoses, one at the forward bottom edge and one at the aft bottom edge. The outboard tank in each wing has a vent line which extends outboard from the fuel tank to the wing tip and then aft to the wing trailing edge. A check valve is installed in each vent line at the wing tip. The inboard tank is vented to the outboard tank by an interconnecting hose at the top forward outboard corner. Both tanks are serviced through a single filler neck in the outboard tank. The inboard tank has two lines, one at the forward inboard corner and one at the aft inboard corner, through which fuel flows from both tanks to the fuel sump tank. Fuel flow from the tanks to the sump tank is complete, eliminating unusable fuel in the tanks and the need for drains in the tanks. All fuel draining is done through the quick-drain valve or strainer in the bottom of the sump tank. Through the Model 337D-Series, each fuel tank has a fuel transmitter mounted in the top of the tank. These transmitters are wired in parallel in each wing to give only one reading for each set of tanks. Beginning with the Model 337E-Series, each tank has a sending unit installed on a bracket inside the tank. These sending units are wired in parallel in each wing.

11-13. DESCRIPTION. (Beginning with 337G). The standard-range aircraft is the same as described in the preceding paragraph. The long-range aircraft is equipped with three interconnected metal tanks in each wing. The two outboard tanks are connected by three hoses, one at the aft bottom edge, and one each at the top and bottom forward edge. The inboard tank is connected to the center tank by a large and a small hose and a metal line. A sump tank, located in each boom between the center and inboard tanks, is fed fuel by two lines from the center and inboard tanks. The sump tanks are connected to the fuel selector valves located in each wing root. Fuel flow from the main tanks to the sump is complete, eliminating need for drains in the tanks. All fuel draining is accomplished through the quick-drain valve or strainer in the bottom of the sump tanks. The outboard tank in each wing has a vent line which extends outboard from the fuel tank to the wing tip. A check valve is installed in each vent line at the wing tip. Each main tank has a sending unit installed on a bracket inside the tank.

11-14. REMOVAL OF MAIN TANKS. (Thru 337F). Each tank is retained by two metal straps and may be removed as an individual unit.

- a. Place fuel selector valves in OFF position.
- b. Remove sump tank access cover and drain all fuel from tanks by removing quick-drain valve. Strainer can be removed to expedite fuel draining.

NOTE

Support outer wing panel and tail boom with cradle supports, before removing fuel tank covers, to prevent wing and boom deflection.

- c. Remove tank cover from top of wing by removing

screws around outer edge of cover and around filler opening. After screws are removed, the forward edge of the cover must be pulled aft from under the leading edge skin. Retain gaskets between filler neck and top wing cover.

- d. Remove bolts from retaining straps securing tank to be removed.

- e. Disconnect electric wire from fuel quantity transmitter or sending unit at each tank to be removed.

- f. Remove two access plates from bottom of wing between fuel tanks to gain access to two lower interconnect hoses. Remove hose clamps and lower hoses. Remove clamps and upper interconnect hose through top of wing.

- g. If outboard tank is being removed, disconnect vent line at tank, and lift tank from wing.

- h. If inboard tank is being removed, disconnect fuel lines from inboard side of tank and lift tank from wing.

11-15. INSTALLATION. (Thru 337F). Installation of the main fuel tanks may be accomplished by reversing the steps of paragraph 11-14. A cradle to support the outer wing panel should be provided to prevent wing deflection. Wing deflection can cause misalignment of holes in wing and fuel tank cover, making installation of the cover extremely difficult. When installing fuel tank cover, make sure that forward edge of cover is under wing leading edge skin. Be sure that gaskets are placed between scupper and fuel tank cover. A maximum of three gaskets may be used to maintain wing contour and prevent canning of the cover.

11-16. REMOVAL OF OUTBOARD TANKS. (Beginning with 337G). Each tank is retained by two metal straps and may be removed as an individual unit.

NOTE

Remove outboard tanks in accordance with procedures outlined in paragraph 11-14.

11-17. INSTALLATION (Beginning with 337G). Install outboard tanks in accordance with procedures outlined in paragraph 11-15.

11-18. REMOVAL OF INBOARD TANK (Beginning with 337G). Removal of either inboard fuel tank is accomplished through the top of the wing.

NOTE

Remove inboard tanks in accordance with procedures outlined in paragraph 11-62.

11-19. INSTALLATION (Beginning with 337G). Install inboard fuel tanks in accordance with procedures outlined in paragraph 11-63.

11-20. FUEL QUANTITY TRANSMITTERS. (Thru 337D). Fuel quantity transmitters are installed in the top of fuel tanks. A complete description, along with procedures for removal, installation and adjustment are contained in Section 15.

11-21. FUEL QUANTITY SENDING UNITS (Beginning with 337E). A fuel quantity sending unit is

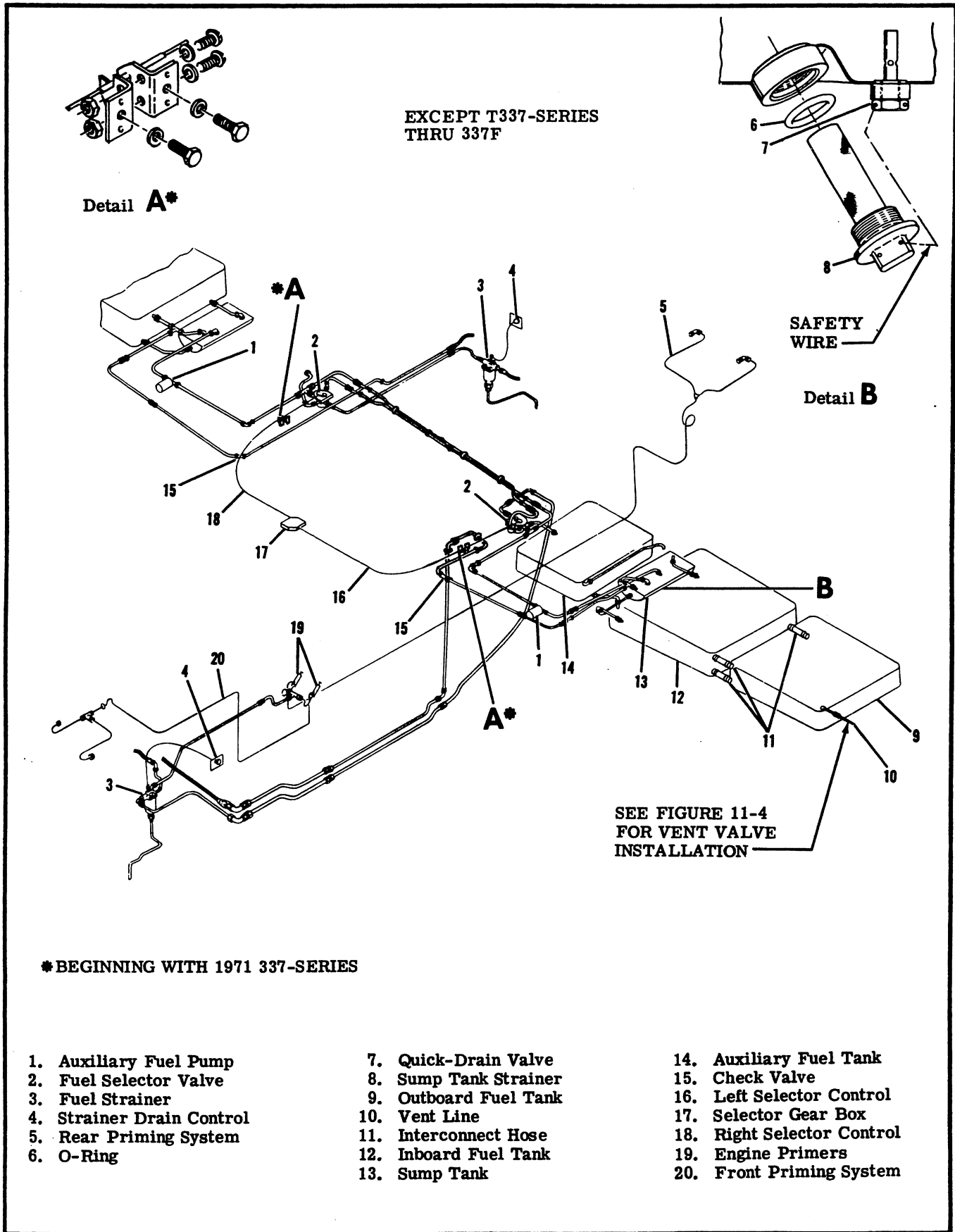
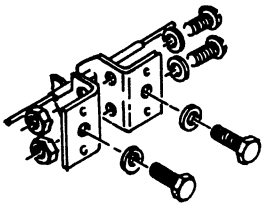
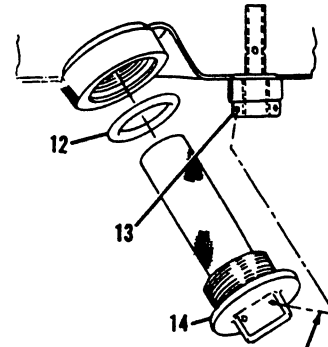


Figure 11-2. Fuel System (Sheet 1 of 4)

T337-SERIES
THRU 337F

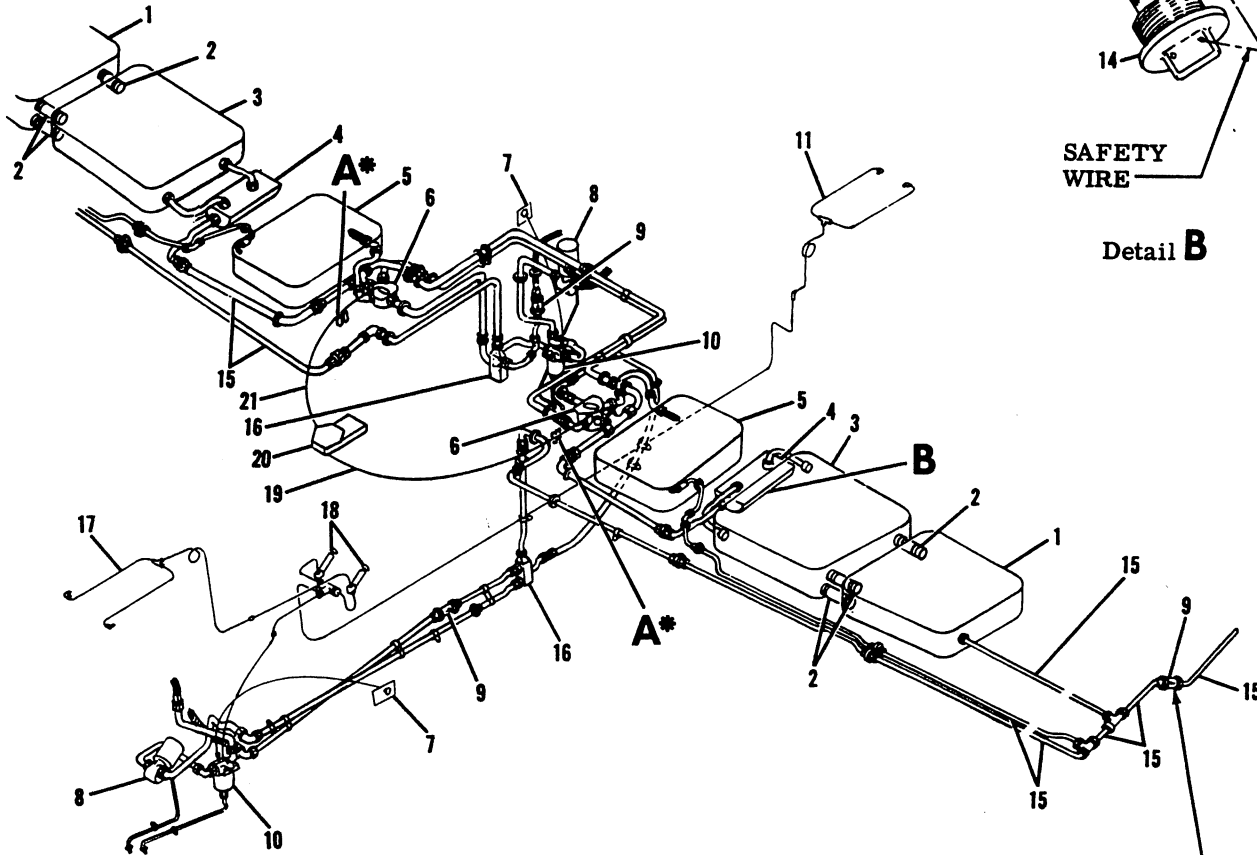


Detail A*



SAFETY
WIRE

Detail B

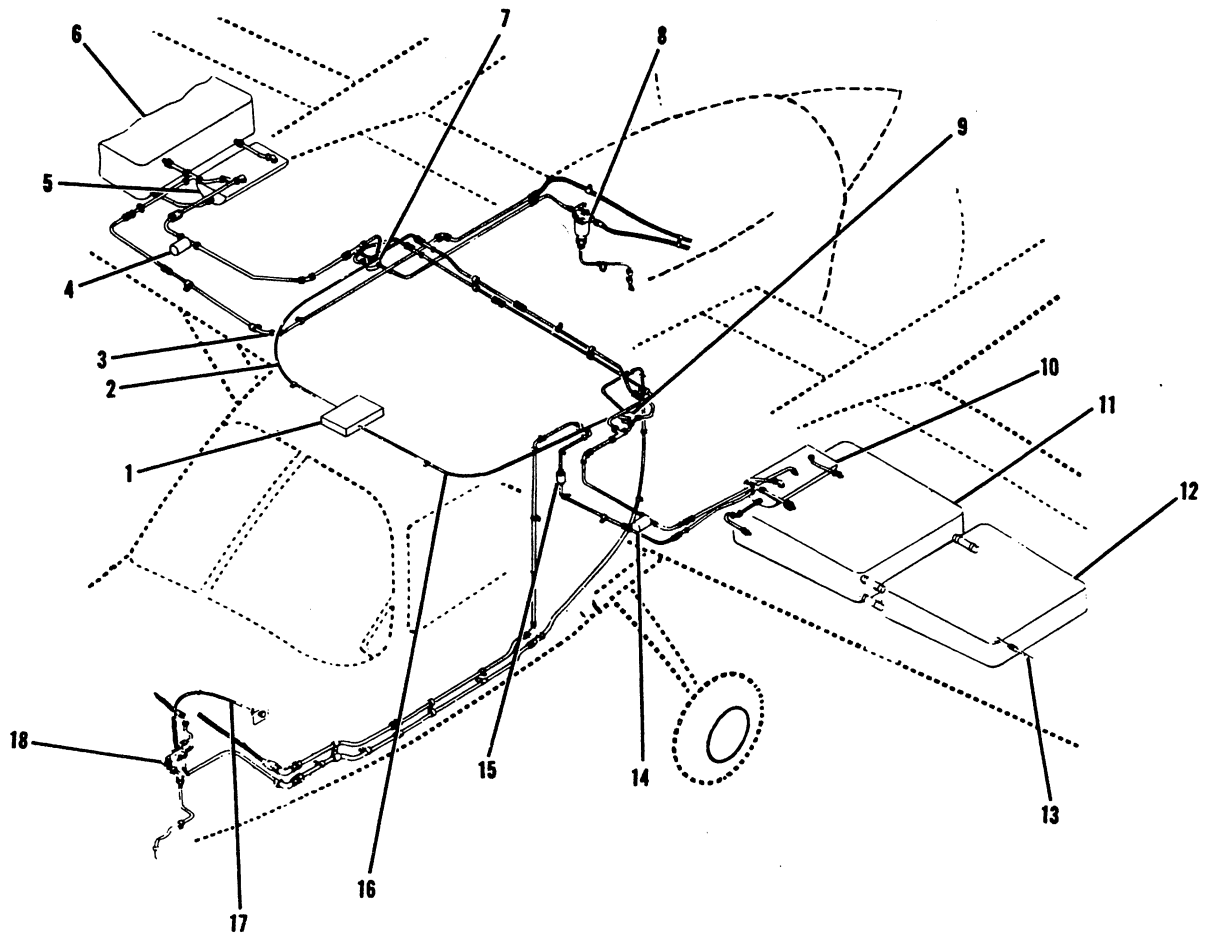


SEE FIGURE 11-4
FOR DETAIL OF
INSTALLATION

* BEGINNING WITH 1971 T337-SERIES

- | | | |
|---------------------------|-------------------------|----------------------------|
| 1. Outboard Fuel Tank | 8. Auxiliary Fuel Pump | 15. Vent Line |
| 2. Interconnect Hose | 9. Check Valve | 16. Fuel Line Manifold |
| 3. Inboard Fuel Tank | 10. Fuel Strainer | 17. Front Priming System |
| 4. Sump Tank | 11. Rear Priming System | 18. Engine Primers |
| 5. Auxiliary Fuel Tank | 12. O-Ring | 19. Left Selector Control |
| 6. Fuel Selector Valve | 13. Quick-Drain Valve | 20. Selector Gear Box |
| 7. Strainer Drain Control | 14. Sump Tank Strainer | 21. Right Selector Control |

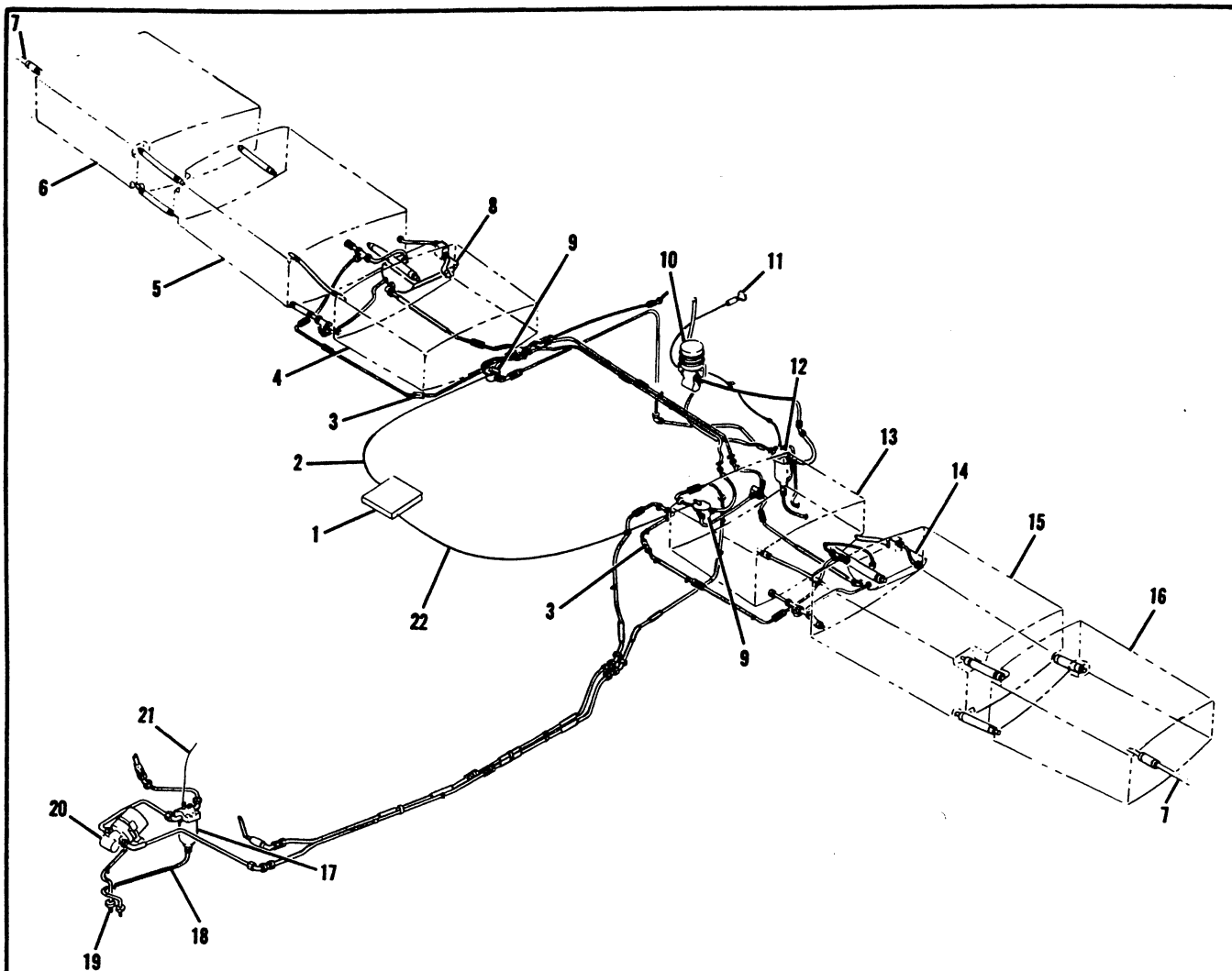
Figure 11-2. Fuel System (Sheet 2 of 4)



BEGINNING WITH 1973 MODEL 337G
 STANDARD FUEL TANK INSTALLATION

- | | | |
|---------------------------|---------------------------|----------------------------|
| 1. Selector Gearbox | 7. RH Fuel Selector Valve | 13. Vent Line |
| 2. Right Selector Control | 8. Fuel Strainer | 14. LH Auxiliary Fuel Pump |
| 3. Check Valve | 9. LH Fuel Selector Valve | 15. Check Valve |
| 4. RH Auxiliary Fuel Pump | 10. Left Fuel Sump Tank | 16. Left Selector Control |
| 5. Right Fuel Sump Tank | 11. LH Inboard Fuel Tank | 17. Strainer Drain Control |
| 6. RH Inboard Fuel Tank | 12. LH Outboard Fuel Tank | 18. Fuel Strainer |

Figure 11-2. Fuel System (Sheet 3 of 4)



**BEGINNING WITH 1973 MODEL 337G
LONG-RANGE FUEL TANK INSTALLATION**

- | | | |
|---------------------------|------------------------------|-------------------------------|
| 1. Selector Gearbox | 8. RH Sump Tank | 16. LH Outboard Tank |
| 2. Right Selector Control | 9. Selector Valve | 17. Front Fuel Strainer |
| 3. Check Valve | 10. Rear Auxiliary Fuel Pump | 18. Strainer Drain Line |
| 4. RH Inboard Tank | 11. Strainer Drain Control | 19. Pump Drain Line |
| 5. RH Center Tank | 12. Rear Fuel Strainer | 20. Front Auxiliary Fuel Pump |
| 6. RH Outboard Tank | 13. LH Inboard Tank | 21. Strainer Drain Control |
| 7. Vent Line | 14. LH Sump Tank | 22. Right Selector Control |
| | 15. LH Center Tank | |

Figure 11-2. Fuel System (Sheet 4 of 4)

located in each tank. A complete description, along with procedures for removal, installation and calibration are contained in Section 15.

11-22. FUEL SUMP TANKS.

11-23. DESCRIPTION. A fuel sump tank is installed in the forward part of the boom in each wing. Each sump tank has a quick-drain valve and strainer installed in the bottom of the tank. The quick-drain valve is used for draining water or sediment which may have collected in main tanks or sump tanks. The quick-drain valve may be removed to drain fuel from the main tanks. The strainer can be removed to expedite fuel draining.

11-24. REMOVAL.

- a. Place fuel selector valves in OFF position.
- b. Support outer wing panels and tail boom with cradle supports before removing tank covers, to prevent wing and boom deflection.
- c. Remove access cover beneath sump tank in boom and remove inboard fuel tank cover from top of wing between boom and cabin.
- d. Completely drain all fuel from main and sump tanks by removing quick-drain valve in sump tank. Strainer can be removed to expedite fuel draining.
- e. Remove inboard tank as outlined in paragraph 11-18. This is necessary for access to fuel line connections on top of sump tank.
- f. Disconnect all fuel lines at sump tank.
- g. Loosen bolts and remove two retaining straps; remove sump tank.

NOTE

Quick-drain valve or strainer in bottom of sump tank may be removed for replacement or cleaning.

11-25. INSTALLATION. Install sump tank by reversing procedures outlined in the preceding paragraph.

11-26. FUEL VENTS.

11-27. DESCRIPTION. (Except T-337-Series thru 337F). The main tank vent line extends outboard from the upper forward corner of the outboard fuel tank to the wing tip. This vent line contains a swing check valve to prevent fuel drainage through the vent line, but still allows the positive pressure from expanding fuel to escape from the tanks. The inboard tank is vented to the outboard tank through a hose which connects the two tanks at the forward top adjacent corners. The fuel vent line on each auxiliary tank runs from the forward outboard corner of the tank to the flap gap panel at the trailing edge of the wing. The vent line on some aircraft contains a restrictor, shown in figure 11-3. The main fuel tank vent outlet at the trailing edge of the wing and the auxiliary fuel tank vent outlet should be checked daily for evidence of foreign matter. Check all fittings and clamps for tightness and all tubes or lines for clearance to prevent chafing against inner wing structure.

11-28. REMOVAL. Figure 11-2 illustrates the various vent lines and components, and may be used as a

guide during removal. Drain fuel from tanks if line to be removed is below fuel level. Remove wing tips, access covers, fairings, upholstery and trim as required for access to fittings and clamps along the vent line routing. When necessary to remove main or auxiliary fuel tank covers for access, support outer wing panel and tail boom with cradle supports before removing the covers, to prevent wing and boom deflection.

11-29. CHECKING FUEL VENTS. Field experience has demonstrated that fuel vent lines can become plugged, with possible fuel starvation of the engine or collapse of fuel tanks. Also, the bleed hole in the vent valve assembly could possibly become plugged, allowing pressure from expanding fuel to pressurize the tank.

NOTE

Remember that a plugged vent line or bleed hole can cause either fuel starvation or collapse of fuel tanks, or pressurization of tanks by fuel expansion.

NON-TURBOCHARGED AIRCRAFT:

- a. Attach a rubber tube to the end of vent line at trailing edge of wing tip.
- b. Blow into tube to pressurize tank. If air can be blown into tank, vent line is open.
- c. After tank is slightly pressurized, insert end of tube into a container full of water and watch for continuous stream of bubbles which indicate bleed hole in valve assembly is open and relieving pressure.
- d. Any vents found plugged or restricted shall be corrected prior to returning airplane to service.
- e. Check auxiliary fuel tank by removing fuel filler cap and blowing through vent line with the rubber tube attached to vent line at flap gap panel. A restrictor is used in this line instead of a check valve with bleed hole.

TURBOCHARGED AIRCRAFT:

- a. Remove wing tip.
- b. Disconnect fuel line manifold vapor return line from tee and plug the tee.
- c. Disconnect auxiliary fuel tank vent line, if installed, at tee and plug the tee.
- d. Check the main vent in the same manner as non-turbocharged aircraft.
- e. To check the auxiliary fuel tank vent, disconnect and plug tees for main vent line and fuel line manifold vapor return line, then check in the same manner as the main vent.
- f. Any vents found plugged or restricted shall be corrected prior to returning airplane to service.
- g. Reconnect all lines and reinstall wing tip.

11-30. DESCRIPTION (Turbocharged aircraft and 337G). These fuel vent systems are the same as those described in paragraph 11-27, except that the optional auxiliary fuel tank vents and the fuel line manifold vapor return lines are also connected to the main fuel tank vent lines at the wing tips. The auxiliary tank vent lines do not contain restrictors. On the Model 337G, only one vent line extends from the outboard fuel tanks to the wing tips.

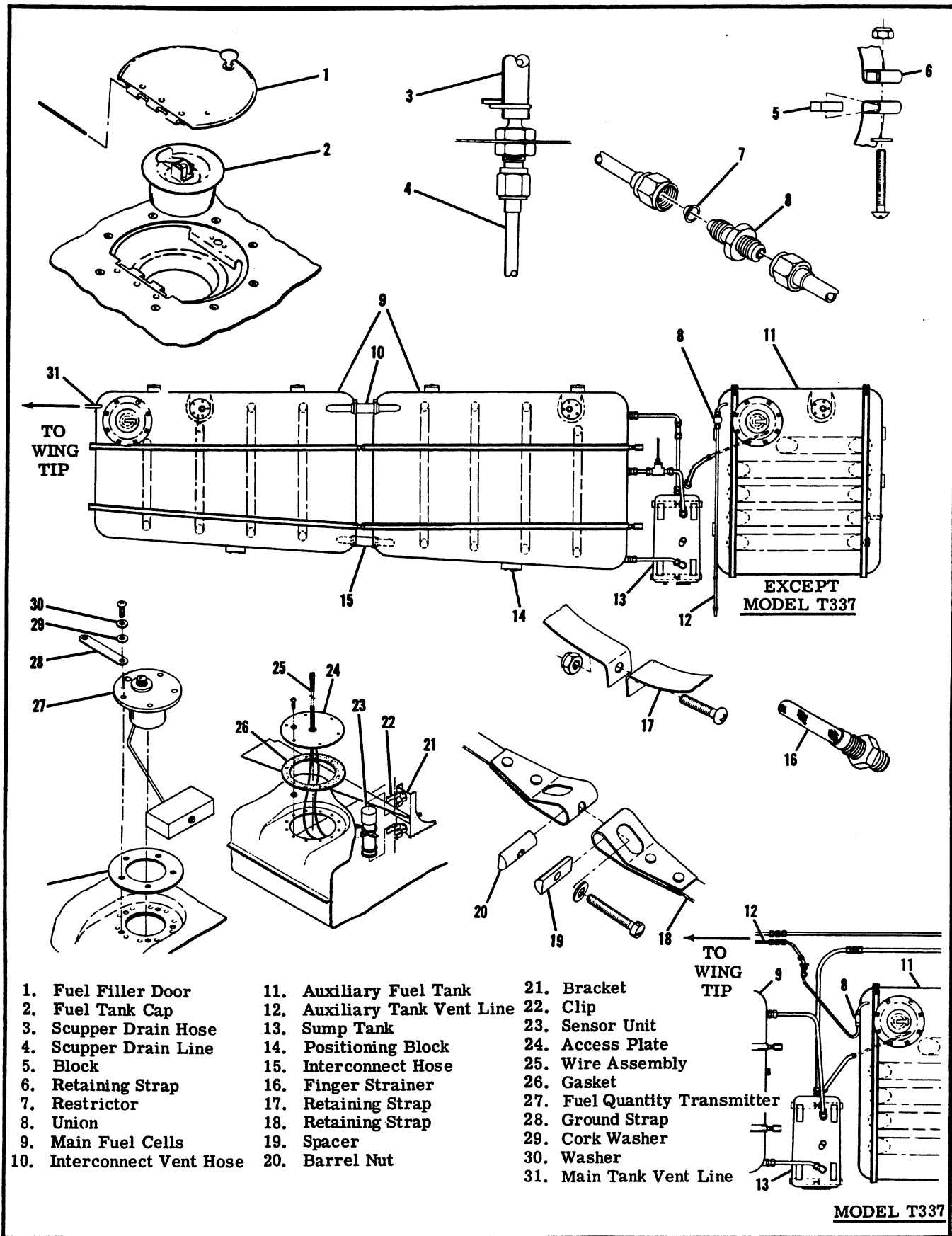


Figure 11-3. Fuel Tanks and Sump Tanks Installation (Sheet 1 of 2)

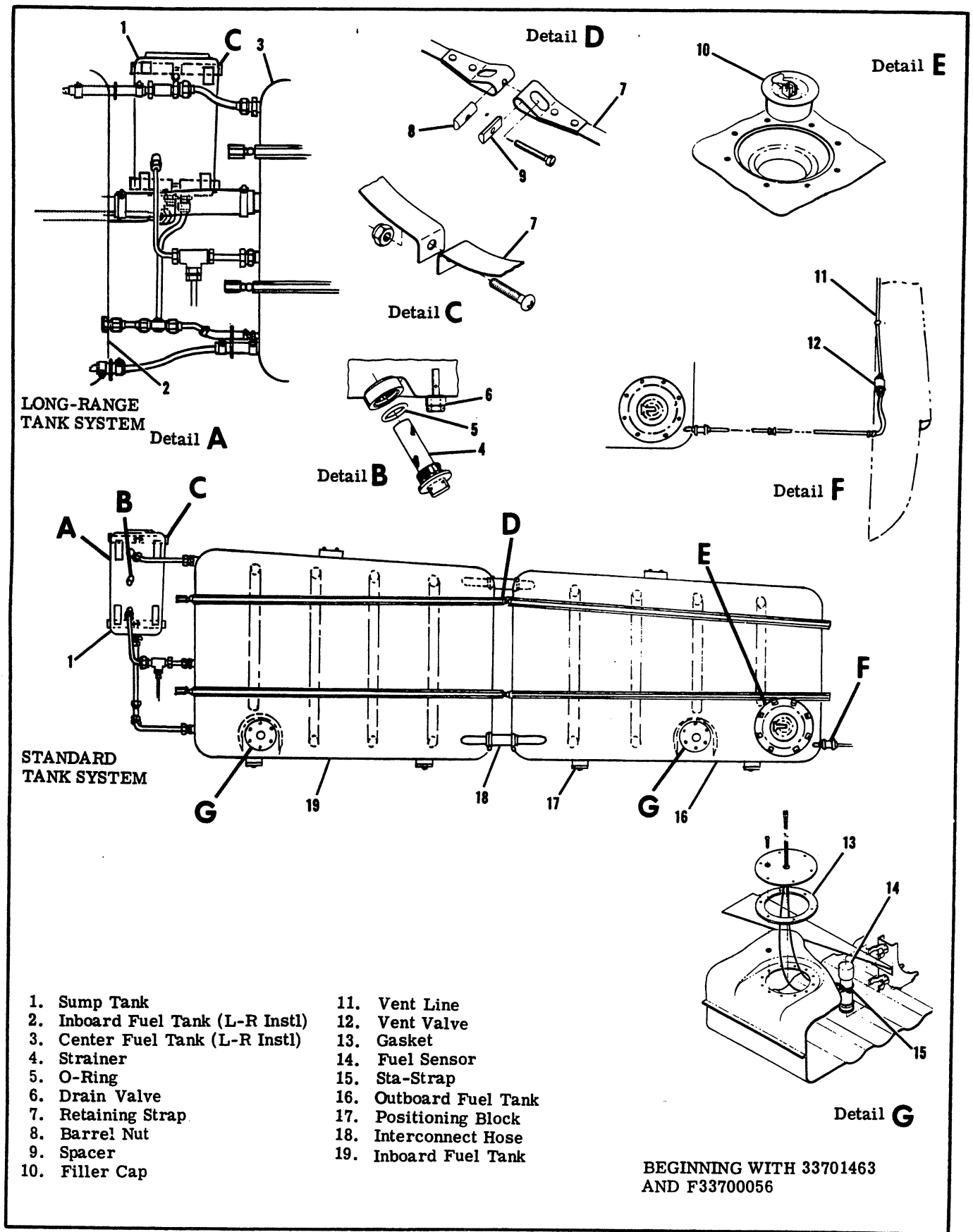


Figure 11-3. Fuel Tanks and Sump Tanks Installation (Sheet 2 of 2)

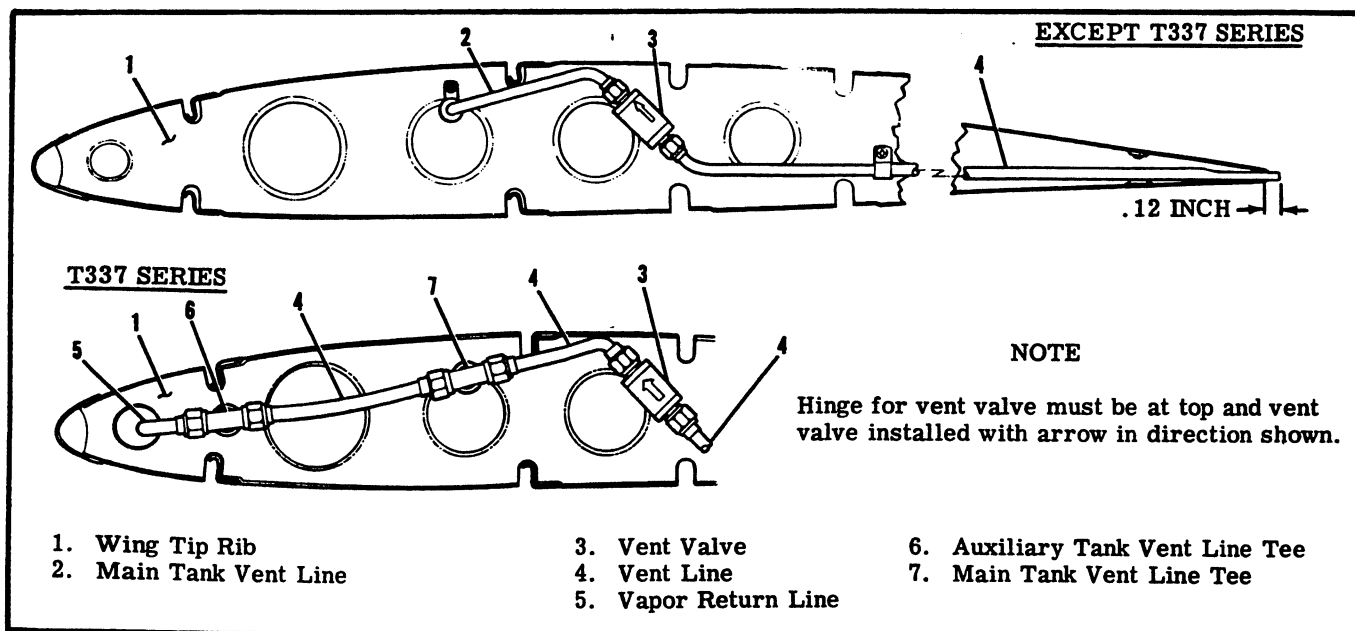


Figure 11-4. Fuel Tank Vent Valve

11-31. **REMOVAL.** Refer to figure 11-2 and paragraph 11-28 for routing of vent lines and information regarding vent line removal.

11-32. **CHECKING.**

NOTE

Check vents in accordance with procedures outlined in paragraph 11-29. Eliminate steps which do not pertain to a certain aircraft.

11-33. **FUEL LINE MANIFOLDS (Thru T337F).** The front fuel line manifold is located on the left side of the cabin, just below and aft of the pilot's window. The rear fuel line manifold is located on the right-hand side of the aft wheel well, just below the horizontal firewall.

11-34. **REMOVAL AND INSTALLATION (Refer to figure 11-2.)** Turn off fuel selector valves before disconnecting fuel lines. The rear manifold is accessible and may be removed by disconnecting all lines attached to it. The left side panel must be removed to gain access to the front manifold. Remove the manifold by disconnecting all lines attached to it. When installing manifolds, check connections for fuel leaks before reinstalling parts removed for access.

11-35. **REMOVAL AND INSTALLATION OF FUEL LINES.** The various fuel lines are shown in figure 11-2, which may be used as a guide during removal and installation. Turn off selector valves, drain fuel strainers, or drain fuel from tanks as required for lines being removed. Remove access covers, fairings, upholstery or other components as necessary for access to fittings and clamps along fuel line routing. When necessary to remove main or auxiliary fuel tank covers for access, support outer wing panel and tail boom with cradle supports before re-

moving the covers, to prevent wing and boom deflection. When installing fuel lines, check connections for fuel leaks before reinstalling parts removed for access.

11-36. **AUXILIARY FUEL PUMPS.**

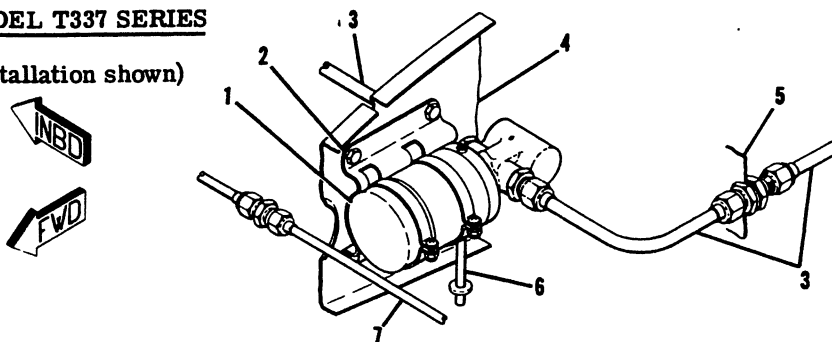
11-37. **DESCRIPTION.** On non-turbocharged aircraft, an electric auxiliary fuel pump is installed in the leading edge of each wing between the boom and the cabin. On turbocharged aircraft and aircraft with long-range installations beginning with 1973 Model 337G, the electric auxiliary fuel pump for the front engine is located in the nose wheel well and the electric auxiliary fuel pump for the rear engine is located on the upper right side of the rear cabin bulkhead. The pumps are operated by a split rocker switch arrangement, one for each pump, located on the switch panel. They are powered by the airplane electrical system. The switch positions are labeled HI, OFF, and LO. The pumps are used in starting and, in the event of an engine-driven fuel pump malfunction, supply pressure to operate the engine. An integral bypass and check valve permits fuel flow through the pump even when the pump is inoperative, but prevents reverse flow. A separate overboard pump drain line prevents entry of fuel into the electric motor, in the event of pump internal leakage.

11-38. **REMOVAL AND INSTALLATION.**

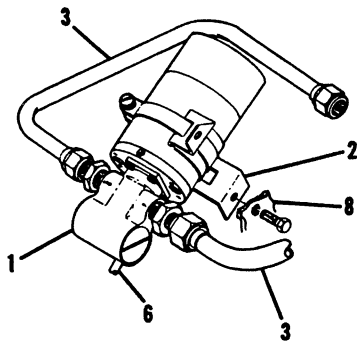
- a. Place selector valves in OFF position.
- b. On non-turbocharged airplanes, drain all fuel from main tanks on side from which pump is being removed, and remove auxiliary fuel pump access cover in bottom of leading edge skin.
- c. On turbocharged airplanes, open the landing gear doors for access to the front pump, and remove the right engine cowling for access to the rear pump after disconnecting the right cowl flap.
- d. Disconnect the two fuel lines and electrical leads.

EXCEPT MODEL T337 SERIES

(Left hand installation shown)



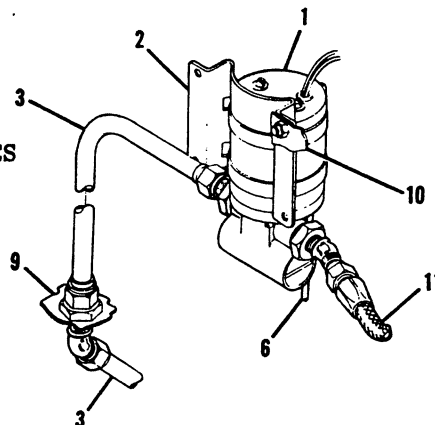
FRONT



**MODEL T337-SERIES
THRU 337F**



REAR



1. Auxiliary Fuel Pump
2. Pump Bracket
3. Fuel Line
4. Wing Rib
5. Front Wing Spar Web
6. Overboard Drain Line
7. Vapor Return Line
8. L.H. Wheel Well Tunnel Wall
9. Horizontal Firewall
10. Aft Cabin Bulkhead
11. Fuel Hose

NOTE

An adjustable resistor is included in each fuel pump electrical circuit. Refer to Section 15 for adjustment of the resistors.

Figure 11-5. Auxiliary Fuel Pump Installation (Sheet 1 of 3)

- e. Remove two bolts from pump retaining straps and remove pump.
- f. Remove pump drain line and fitting.
- g. Reverse the preceding steps to install the pump.

11-39. AUXILIARY FUEL PUMP CIRCUIT ADJUSTMENT. Each auxiliary fuel pump is adjusted in the low output position. This adjustment is made by sliding a tap on a variable resistor in each circuit. The resistors are mounted on the left side structure of the control console as viewed from the pilots seat. The adjustment may be made by the following procedure.

- a. Engines off, aircraft outdoors.
- b. Throttle and mixture control full on.
- c. Pump switch. in LO position.
- d. Adjust resistor for 5 GHP reading on instrument panel fuel flow indicator.
- e. Repeat this procedure to adjust other pump.

WARNING

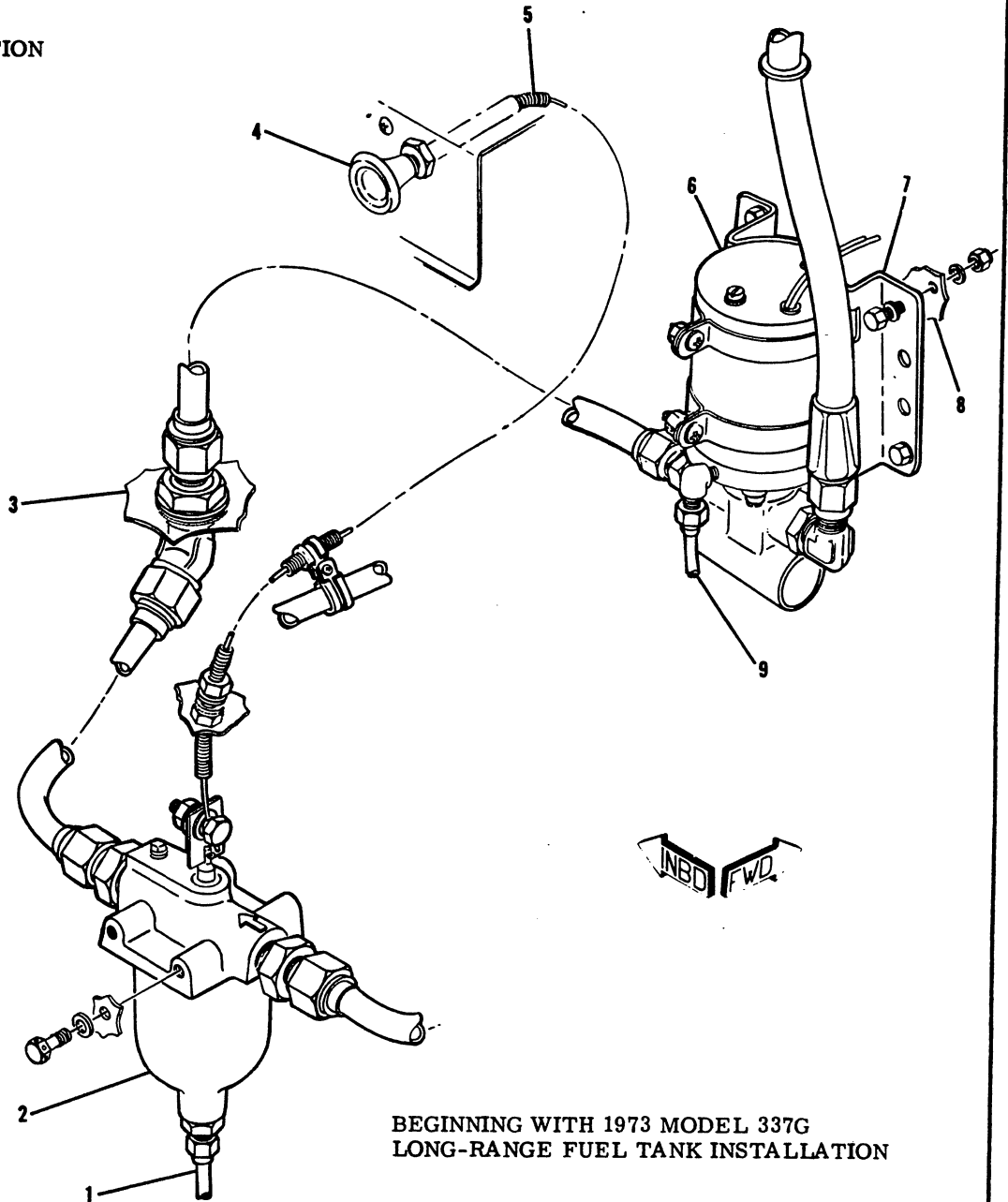
Operation of the fuel pumps with the mixture and throttle controls full on will allow fuel to overflow and spill on the ground from each engine, thus causing a dangerous fire hazard. Starting the engines should not be attempted for at least five minutes in order to allow drainage of excess fuel from the engines.

11-40. FUEL SELECTOR VALVES.

11-41. DESCRIPTION (thru 337F-Series).

Fuel selector valves are divided into two basic parts: the selector valve, located in the wing at the wing root, and the selector gearbox and handle, located on the centerline of the cabin top. Through the 1970 337-Series, and F337-Series, the selector gearbox handle is connected to the selector valve by a control wire, routed through a steel casing. Beginning with the 1971 Models, connection is made with a control cable with adjustable clevis terminals at each end. Figure 11-6 illustrates installation of the controls. Each selector valve has four positions: LEFT MAIN, RIGHT

REAR INSTALLATION



BEGINNING WITH 1973 MODEL 337G
LONG-RANGE FUEL TANK INSTALLATION

- | | | |
|------------------------|---------------------------------|--------------------|
| 1. Strainer Drain Tube | 4. Strainer Drain Control Knob | 7. Pump Bracket |
| 2. Fuel Strainer | 5. Drain Control | 8. Aft Firewall |
| 3. Horizontal Bulkhead | 6. Auxiliary Electric Fuel Pump | 9. Pump Drain Line |

Figure 11-5. Auxiliary Fuel Pump Installation (Sheet 3 of 3)

- g. Remove two bolts securing selector valve to wing rib, unbend end of control wire, and pull control forward out of clamps.
- h. Control may be removed after disconnecting inboard end of control as outlined in paragraph 11-46.
- i. Install fuel selector valve by reversing preceding steps, rigging controls in accordance with paragraph 11-50.

11-44. REMOVAL AND INSTALLATION OF FUEL SELECTOR VALVE. (33701317 and F33700025 thru 33701462 and F33700055). (Refer to figure 11-6.) Remove either fuel selector valve as follows:

- a. Remove sump tank access covers and drain all fuel from tanks by removing quick-drain valve in bottom of sump tank. Strainer can be removed to expedite fuel draining.
- b. If auxiliary tanks are installed, completely drain fuel from tanks by removing quick-drain valve in bottom of tank.
- c. Drain all fuel lines by draining each fuel strainer with the fuel selector valves placed in the various positions, then place selector valves in the OFF position.
- d. Remove forward wing-to-fuselage fairing and fuel selector valve access cover from bottom of wing at wing root.
- e. Disconnect all fuel lines at selector valve.
- f. Remove cotter pin and clevis pin from arm of selector valve and remove clevis.
- g. Remove two bolts securing selector valve to wing rib, and remove selector valve.
- h. Control may be removed after disconnecting inboard end of control.
- i. Install fuel selector valve by reversing preceding steps, rigging controls in accordance with paragraph 5-51.

11-45. REMOVAL AND INSTALLATION OF FUEL SELECTOR VALVE. (Beginning with 3370146 and F33700056). (Refer to figure 11-6.) Remove either fuel selector valve as follows:

- a. Remove sump tank access covers and drain all fuel from tanks by removing quick-drain valve in bottom of sump tank. Strainer can be removed to expedite draining.
- b. Drain all fuel lines by draining each fuel strainer with the fuel selector valves placed in the various positions, then place selector valves in the OFF position.
- c. Remove forward wing-to-fuselage fairings and fuel selector valve access cover from bottom of wing at wing root.
- d. Disconnect all fuel lines at selector valve.
- e. Remove cotter pin and clevis pin from arm of selector valve and remove clevis.
- f. Remove bolts securing selector valve bracket to wing rib, and remove selector valve and bracket.
- g. Reverse the preceding steps to install the fuel selector valve. Rig controls as outlined in figure 11-8.

11-46. REMOVAL AND INSTALLATION OF FUEL SELECTOR GEAR BOX. (Thru 33701316 and F33700024; Refer to figure 11-6.) Remove fuel selector gear box as follows:

- a. Remove fuel selector handles from overhead console.
- b. Remove the four screws attaching console to ceiling.
- c. If oxygen system is installed, remove oxygen selector handle knob.
- d. Partially pull console down until oxygen cylinder pressure gage can be held securely while unscrewing bezel attaching gage to console.

CAUTION

Use care in removing oxygen cylinder pressure gage to avoid damaging pressure line.

- e. Disconnect console light wires at quick-disconnects and remove the console.
- f. Loosen set screws holding control wires in swivels of selector gear box, loosen clamps holding casings on gear box, unbend end of control wires, and pull controls outward out of clamps.
- g. Remove the two screws attaching gear box to bracket on ceiling, and remove gear box.
- h. Install the fuel selector gear box by reversing the preceding steps, rigging the controls in accordance with paragraph 11-50.

11-47. REMOVAL AND INSTALLATION OF FUEL SELECTOR GEARBOX. (33701317 and F33700025 thru 33701462 and F33700055). (Refer to figure 11-6.) Remove fuel selector gearbox as follows:

- a. Remove fuel selector handles from overhead console.
- b. Remove screws attaching console to ceiling.
- c. If oxygen system is installed, remove oxygen selector handle knob.
- d. Partially pull console down until oxygen cylinder pressure gage can be held securely while unscrewing bezel attaching gage to console.

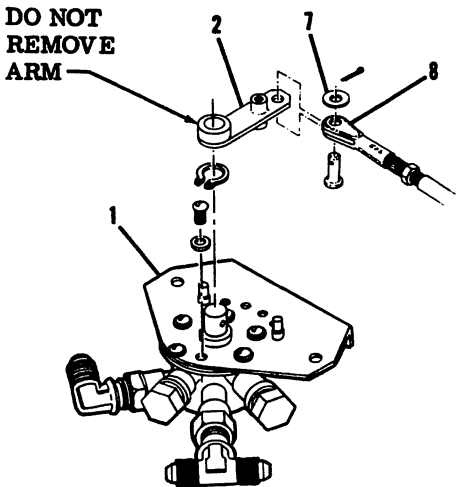
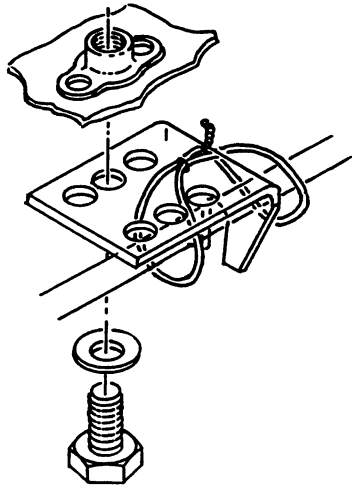
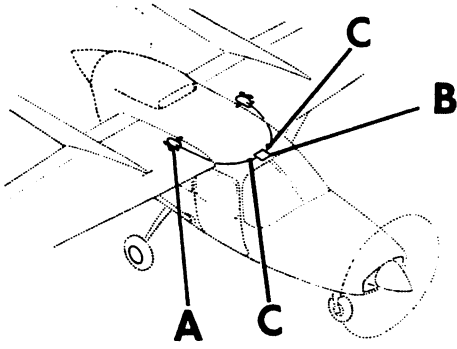
CAUTION

Use care in removing oxygen cylinder pressure gage to avoid damaging pressure line.

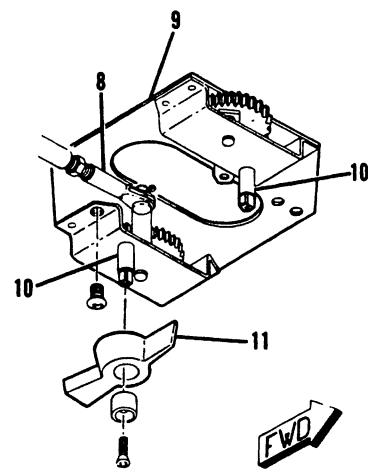
- e. Disconnect console light wires at quick-disconnects and remove console.
- f. Remove cotter pin and clevis pin from shaft in gear box, and remove clevis.
- g. Remove screws attaching gear box to bracket on ceiling, and remove gear box.
- h. Install fuel selector gear box by reversing preceding steps, rigging controls in accordance with paragraph 5-51.

11-48. REMOVAL AND INSTALLATION OF FUEL SELECTOR GEARBOX. (Beginning with 33701463 and F33700056). (Refer to figure 11-6.)

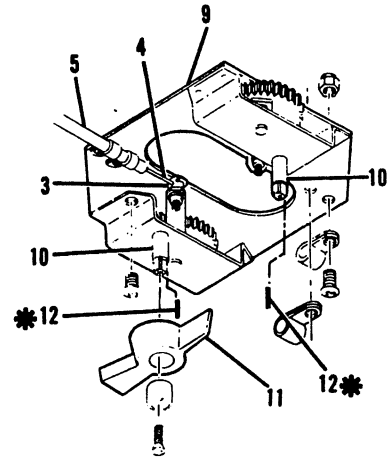
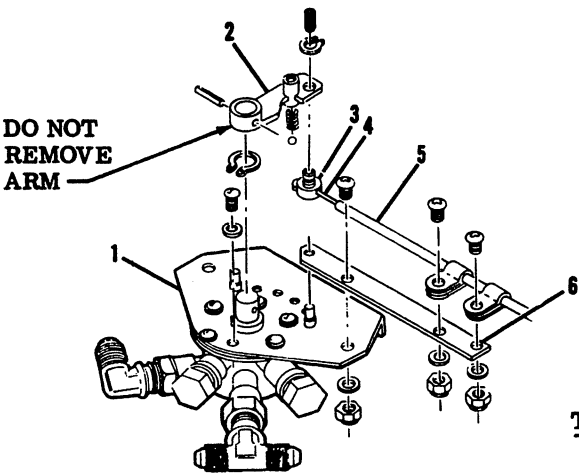
- a. Remove overhead console in accordance with applicable procedures outlined in Section 3.
- b. Remove cotter pins and clevis pins from shafts in gearbox, and remove clevises.
- c. Remove screws attaching gearbox to bracket on ceiling and remove gearbox.
- d. Reverse preceding steps to install fuel selector gearbox. Rig controls in accordance with applicable paragraph in this Section.



Detail C



1971 THRU 1972-SERIES



THRU 1970-SERIES

Detail A

Detail B

- | | | |
|------------------------|----------------------|----------------------|
| 1. Fuel Selector Valve | 5. Control Casing | 9. Selector Gear Box |
| 2. Arm | 6. Bracket | 10. Shaft |
| 3. Swivel | 7. Washer | 11. Handle |
| 4. Control Wire | 8. Adjustable Clevis | 12. Roll Pin * |
- * Roll pins used on serials prior to 337-0044

Figure 11-6. Fuel Selector Valve and Fuel Selector Gearbox Installation (Sheet 1 of 2)

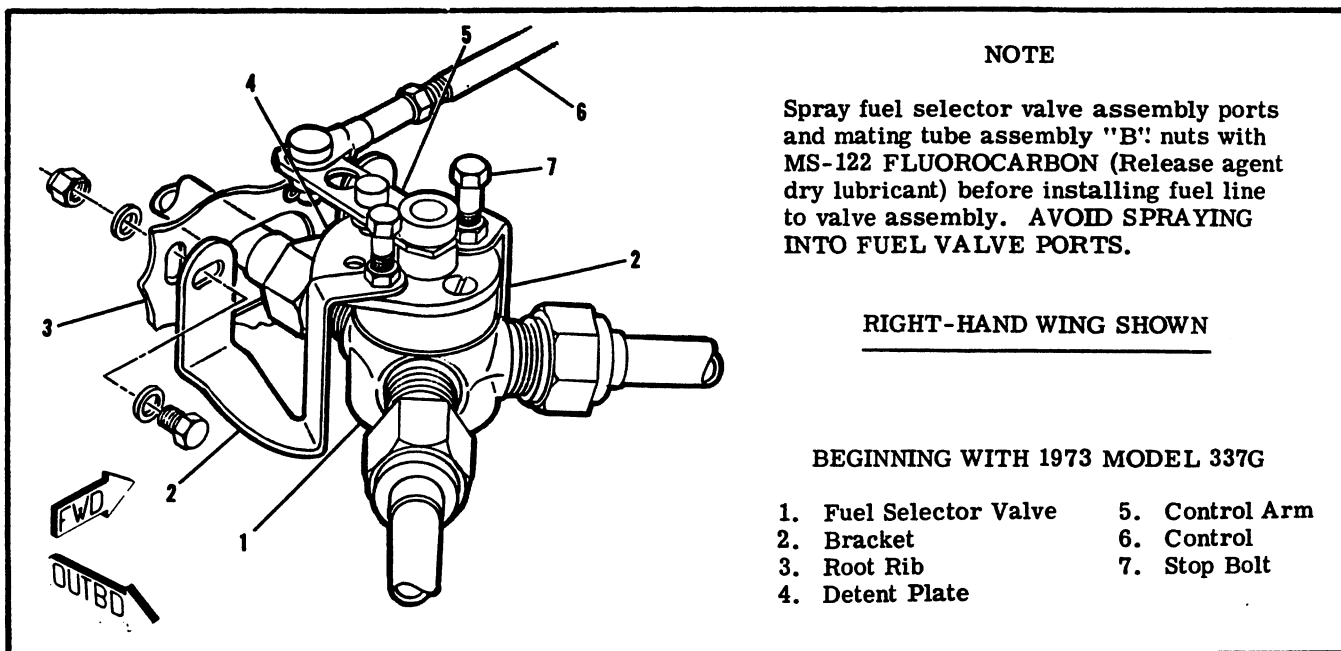


Figure 11-6. Fuel Selector Valve and Fuel Selector Gearbox Installation (Sheet 2 of 2)

11-49. INSTALLING NEW FUEL SELECTOR VALVE HANDLE. On serial number 337-0044 and on, the handles and selector valve shafts are fabricated so they can only be assembled in the correctly indexed position. Prior to serial number 337-0044, the handles and shafts were indexed by drilling a hole part way through them and installing a roll pin. The roll pins were not installed in any particular position. Since a replacement handle for these serial numbers is not drilled to accommodate the roll pin, it is necessary to modify the handle to match the position of the roll pin on a particular shaft. Proceed as follows:

- a. (FRONT gearbox shaft.) Rotate front shaft clockwise (looking up at the gearbox) as far as it will go. With the roll pin removed, place new handle on the shaft with the handle pointing to the RIGHT side of the airplane. Drill or file new handle to match existing roll pin hole, then install handle and roll pin.
- b. (REAR gearbox shaft.) Rotate rear shaft clockwise (looking up at the gearbox) as far as it will go. With the roll pin removed, place new handle on the shaft with the handle pointing FORWARD. Drill or file new handle to match existing roll pin hole, then install handle and roll pin.

11-50. RIGGING FUEL SELECTOR VALVES. (Thru 33701316 and F33700024: Refer to figure 11-8.) If fuel selector valves and fuel selector gear box are already installed, the following rigging procedure may be accomplished without draining the fuel system. Remove overhead console and wing access plates as necessary for access.

- a. If controls are being installed, position controls in clamps on brackets attached to selector valves, allowing enough control wire to protrude through holes in selector valve swivels to bend around swivels. Tighten set screws and bend the wire around the swivels.
- b. Position control arms of selector valves in wings in AFT detents, and maintain this position of

selector valve arms.

- c. Using one of the selector valve handles to turn the gearbox shaft, rotate shaft of front gearbox clockwise (looking up at the gearbox) until FRONT gearbox lever is moved to the LEFT as far as it will go, then turn back very slightly so the handle points straight toward the right side of the airplane.

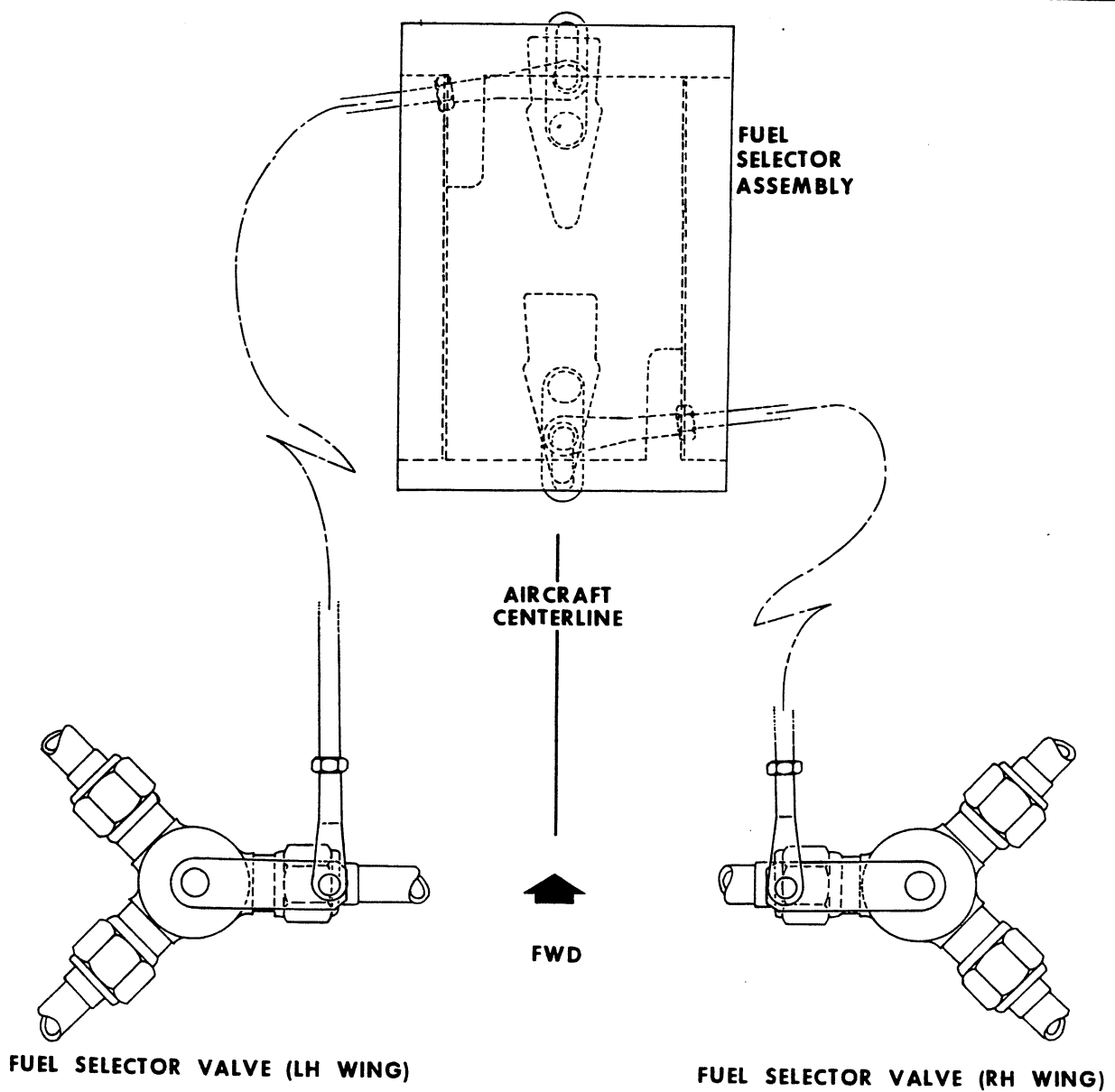
- d. Rotate shaft of rear gearbox clockwise (looking up at the gearbox) until REAR gearbox lever is moved to the RIGHT as far as it will go, then turn back very slightly so the handle points straight forward.

- e. With gearbox levers in these positions and arms of selector valves in wings in AFT detents, secure controls in clamps on gearboxes, insert wires through holes in swivels, tighten set screws, and bend remaining wire around swivels.

- f. Reinstall parts removed for access, then install fuel selector handles. The handles and shafts are indexed so the handles cannot be installed incorrectly. Prior to serial number 337-0044, a roll pin indexes the handles, and on all other serials the parts are fabricated so they can only be assembled in the correct position.

11-51. RIGGING FUEL SELECTOR VALVES. (33701317 and F33700025 thru 33701462 and F337-00055.) (Refer to figure 11-6.) If fuel selector valves and fuel selector gear box are already installed, the following rigging procedure may be accomplished without draining the fuel system. Remove overhead console and wing access plates as necessary for access.

- a. If controls are being installed, position controls in brackets and clamps along routing.
- b. Position control arms of selector valves in wing roots in AFT detents, and maintain this position of selector valve arms.
- c. Using one of the selector valve handles to turn the gear box shaft, rotate shaft of front gear box clockwise (looking up at the gear box) until FRONT gear box lever is moved to the LEFT as far as it



FUEL SELECTOR RIGGING INSTRUCTION SCHEMATIC
(CONTROL ARMS IN SELECTOR ASSEMBLY AND CONTROL ARM FOR LEFT-HAND AND RIGHT-HAND WING VALVES SHOWN IN OFF POSITION)

FUEL SELECTOR RIGGING INSTRUCTIONS

1. Position fuel selector control arms parallel to centerline of aircraft as shown.
2. Position left-hand and right-hand fuel valve control arms in the center detent with the control arm extended inboard as shown.
3. Attach control cables with the control arms in the OFF position as shown.

Figure 11-7. Fuel Selector Valve Rigging (1973 Model 337G)

will go, then turn back very slightly so the handle points straight toward the right side of the aircraft.

d. Rotate shaft of rear gear box clockwise (looking up at the gear box) until REAR gear box lever is moved to the RIGHT as far as it will go, then turn back very slightly so the handle points straight forward.

e. With gear box levers in these positions, and arms of selector valves in wings in AFT detents, attach control terminal clevises to gear box levers.

NOTE

Terminals may be rotated to align with gear box levers. Loosen lock nut to rotate terminal. Tighten locknut after terminal is secured to gear box lever.

f. Attach terminal clevises to arms of fuel selector valves in wings.

g. Install clevis pins, cotter pins, and safety wire controls in brackets as shown in figure 11-8.

h. Reinstall parts removed for access, then install fuel selector handles. The handles and shafts are indexed so the handle cannot be installed incorrectly.

11-52. RIGGING FUEL SELECTOR VALVES. (Beginning with 33701463 and F33700056.) Refer to figure 11-7 for procedures to be followed during selector valve rigging.

11-53. FUEL STRAINERS. (Refer to figure 11-8.)

11-54. DESCRIPTION. The fuel strainer for the front engine on either turbocharged or non-turbocharged aircraft is located in the nose wheel well. The fuel strainer for the rear engine on non-turbocharged aircraft is located on the upper right-hand side of the rear cabin bulkhead, and on the firewall in the aft wheel well on turbocharged aircraft. Each fuel strainer is equipped with a drain valve control which affords control of the strainers through access doors in the upper cowling of both engines. Strainer screens, gaskets and bowls may be removed and cleaned with the strainer installed in the aircraft.

11-55. REMOVAL AND INSTALLATION.

- a. Turn off fuel selector valves and drain each strainer.
- b. Open landing gear doors to gain access to fuel strainers mounted in wheel wells.
- c. Remove rear engine right cowling after disconnecting cowl flap for access to rear strainer on non-turbocharged airplanes.
- d. Disconnect all lines and controls attached to strainers.
- e. Remove strainer mounting bolts.
- f. Reverse the preceding steps to install fuel strainers. Check for fuel leaks.

11-56. DISASSEMBLY. (Refer to figure 11-8.)

- a. Turn off applicable fuel selector valve and drain strainer.
- b. Remove safety wire, nut, and washer at bottom of filter bowl and remove bowl.
- c. Carefully unscrew standpipe and remove.
- d. Remove filter screen and gasket. Wash filter

screen and bowl with solvent (Federal Specification P-S-661, or equivalent) and dry with compressed air.

e. Using a new gasket between filter screen and top assembly, install screen and standpipe. Tighten standpipe only finger tight.

f. Using all new O-rings, install bowl. Note that step-washer at bottom of bowl is installed so that step seats against O-ring.

g. Turn on fuel selector valve, close strainer drain, and check for leaks. Check for proper operation.

h. Safety wire bottom nut to top assembly. Wire must have right hand wrap, at least 45 degrees.

11-57. PRIMER SYSTEM.

11-58. DESCRIPTION. The primer system is a manually operated type. Fuel is supplied by a line from the front fuel strainer to plunger-type primers. Two primer handles, one for each engine, are located on the control quadrant. Operating the primers force fuel to the engines. Fuel is delivered to the propeller end of each intake manifold. This primes the entire length of the intake manifold for each bank of cylinders. Primer lines should be replaced when crushed or broken, and should be properly clamped to prevent vibration and chafing.

11-59. REMOVAL AND INSTALLATION.

- a. Remove console cover.
- b. Disconnect primer lines at primer bodies.
- c. Remove screws from brackets and remove each primer body and bracket as a unit.
- d. Reverse the preceding steps to install the primers, checking for correct pumping action and positive fuel shut-off in the locked position.

11-60. AUXILIARY FUEL SYSTEM.

11-61. DESCRIPTION. The system is described in paragraph 11-2.

11-62. REMOVAL OF AUXILIARY FUEL TANK. Removal of either auxiliary fuel tank is accomplished through the top of the wing.

- a. Place fuel selector valve in the OFF position.
- b. Completely drain the auxiliary fuel tank to be removed by removing the quick-drain valve in the bottom of the tank.

NOTE

Support outer wing panel and tail boom with cradle supports, before removing fuel tank covers, to prevent wing and boom deflection.

- c. Remove auxiliary fuel tank cover from top of wing by removing screws around outer edge of cover and around fuel filler opening.
- d. After screws are removed, the forward edge of the cover must be pulled aft from under the wing leading edge skin. Retain gaskets between filler neck and top wing cover.
- e. Remove bolts from retaining straps securing tank to wing structure.
- f. Disconnect wire from fuel quantity transmitter

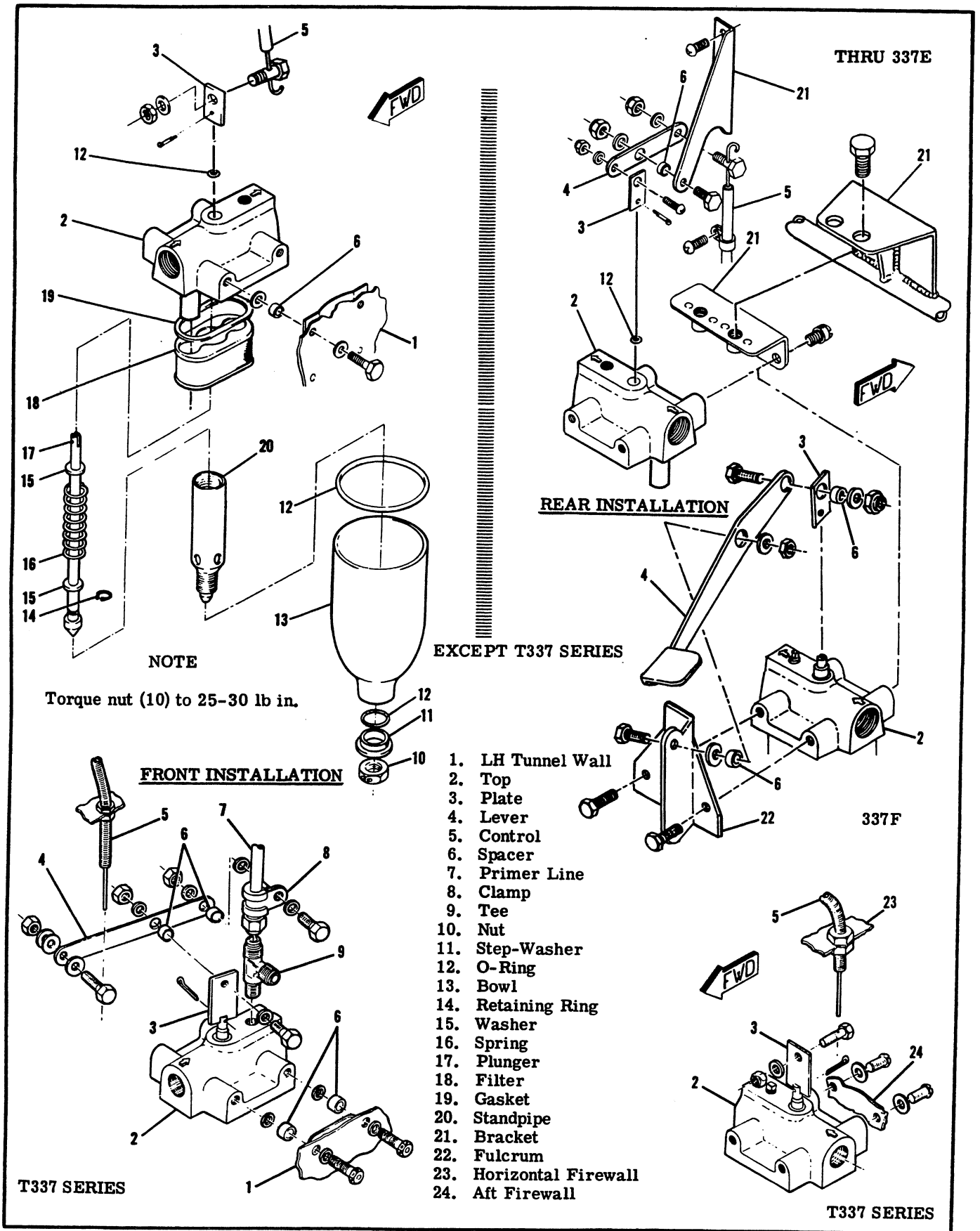


Figure 11-8. Fuel Strainers Installation

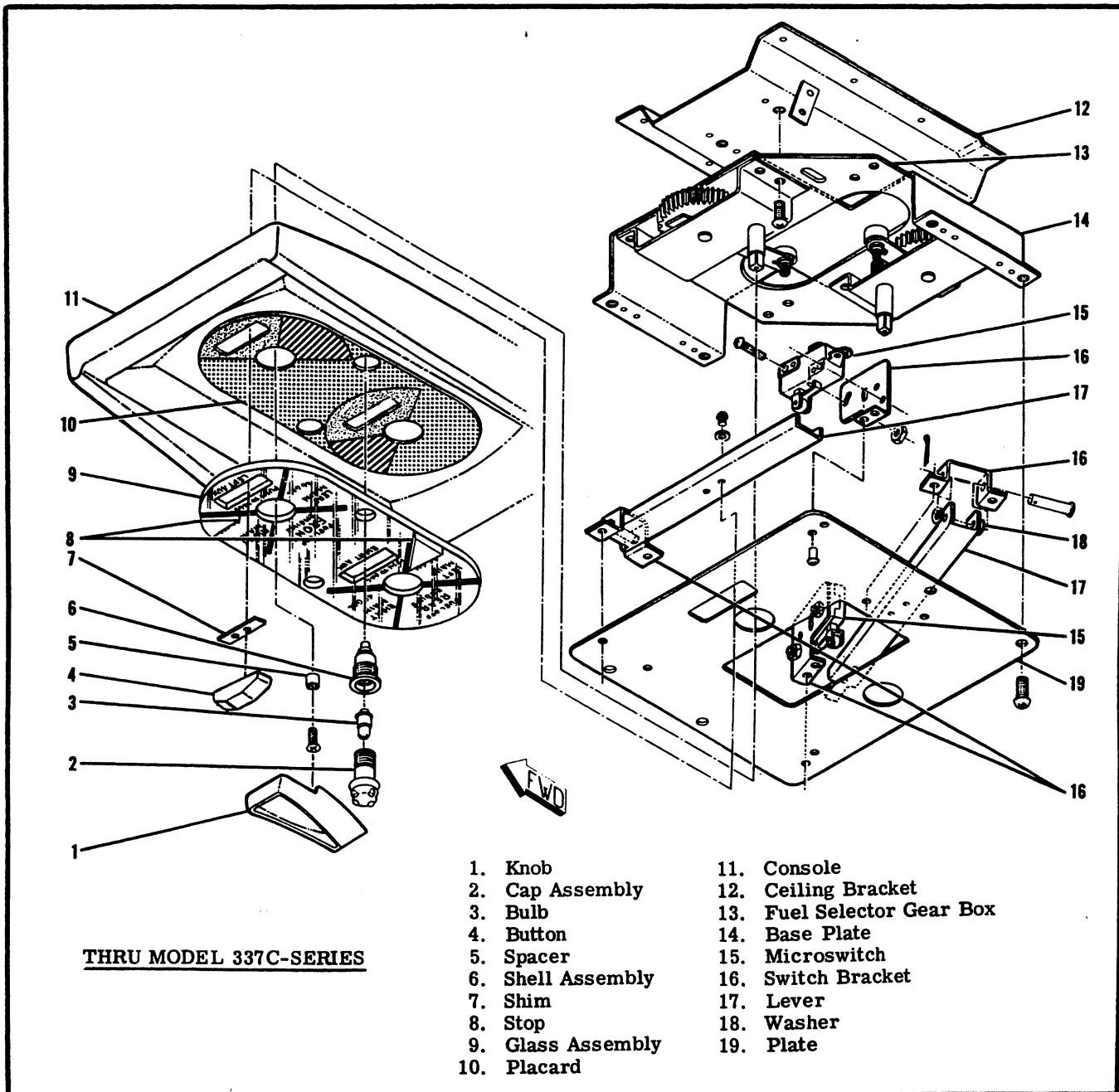


Figure 11-9. Fuel Quantity Indication (Sheet 1 of 3)

or sending unit.

g. Disconnect fuel outlet line at tank.

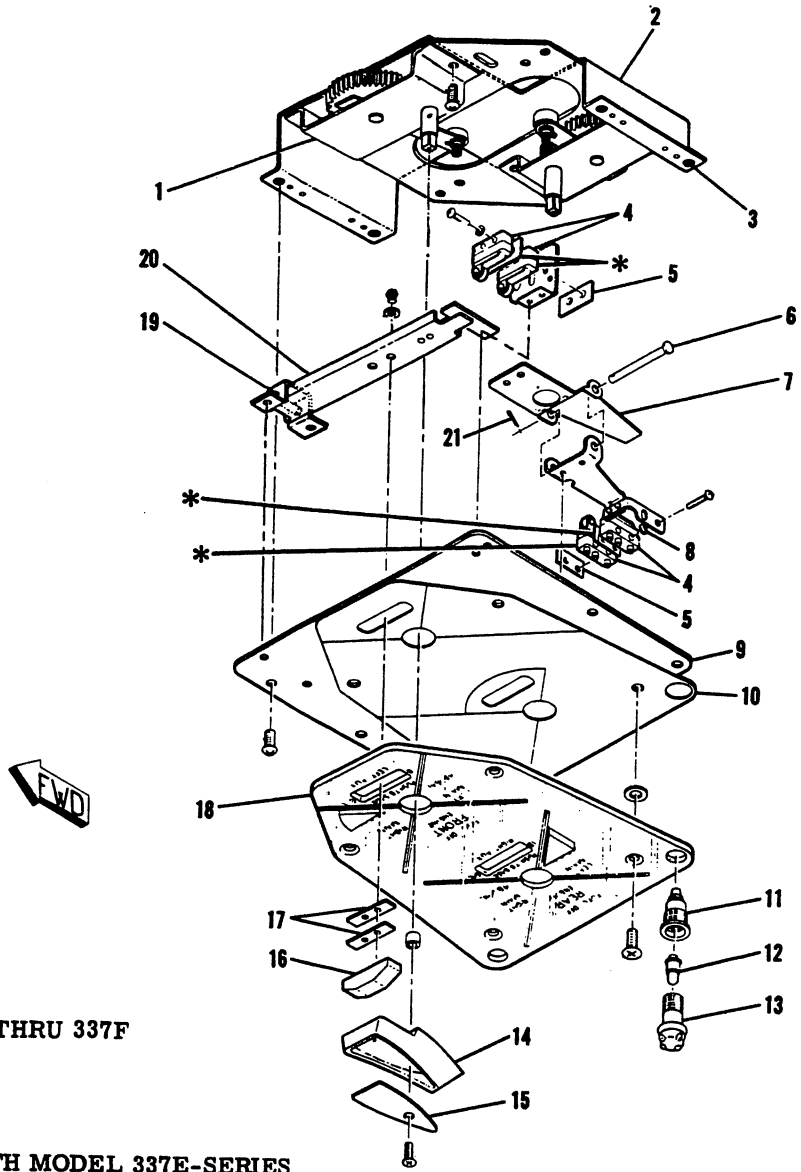
h. Disconnect fuel vent line at tank and remove line by pulling up and forward to remove line from grommets in wing structure on non-turbocharged airplanes. On turbocharged airplanes, disconnect the vent line at the hose connection near the tank, and remove the short section of line outboard of the hose connection.

i. Disconnect scupper drain line by loosening clamp on hose just outboard of tank and pull hose free from tank and lift tank from wing.

11-63. INSTALLATION OF AUXILIARY FUEL TANKS. Installation of either auxiliary fuel tank

may be accomplished by reversing the steps of paragraph 11-62. Cradles to support the outer wing panel and tail boom should be provided to prevent wing and boom deflection. Wing and boom deflection can cause misalignment of holes in wing and fuel tank cover, making installation of the cover difficult. When installing fuel tank cover, make sure that forward edge of cover is under wing leading edge skin. Be sure that gaskets are placed between scupper and fuel tank cover. A maximum of three gaskets may be used to maintain wing contour and prevent canning of the cover.

11-64. FUEL QUANTITY TRANSMITTER OR SENDING UNIT. Prior to the Model 337E-Series, a trans-

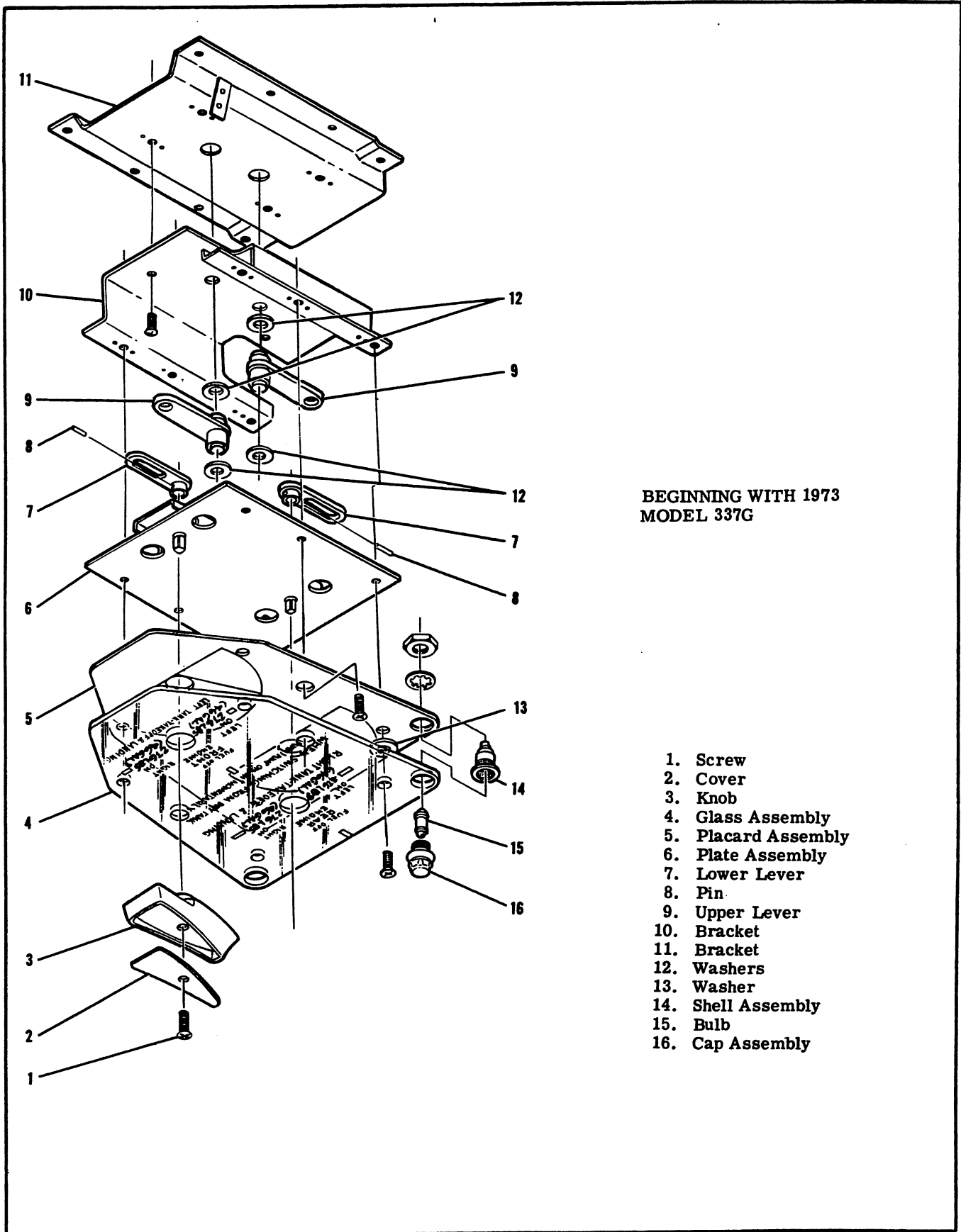


MODEL 337D THRU 337F

*BEGINNING WITH MODEL 337E-SERIES

- | | | |
|---------------------------|--------------------|--------------------|
| 1. Fuel Selector Gear Box | 8. Washer | 15. Cover |
| 2. Base Plate | 9. Plate Assembly | 16. Button |
| 3. Nutplate | 10. Placard | 17. Shim |
| 4. Microswitch | 11. Shell Assembly | 18. Glass Assembly |
| 5. Plate Assembly | 12. Bulb | 19. Pin |
| 6. Straight Pin | 13. Cap Assembly | 20. Lever |
| 7. Lever | 14. Knob | 21. Cotter Pin |

Figure 11-9. Fuel Quantity Indication (Sheet 2 of 3)



BEGINNING WITH 1973
MODEL 337G

1. Screw
2. Cover
3. Knob
4. Glass Assembly
5. Placard Assembly
6. Plate Assembly
7. Lower Lever
8. Pin
9. Upper Lever
10. Bracket
11. Bracket
12. Washers
13. Washer
14. Shell Assembly
15. Bulb
16. Cap Assembly

Figure 11-9. Fuel Quantity Indication (Sheet 3 of 3)

