Group 2 FUEL SYSTEM

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WARNING . . .

Voltages in excess of 100 volts either a.c. or d.c. can be dangerous under certain circumstances. Personnel should therefore ensure that the electrical system is electrically safe before any servicing is attempted. Where it is essential that tests or adjustments be made with the electrical power switched on, the greatest care must be exercised.

Note . . .

Aircraft not fitted with Mod. 1471 (*other than B/K Mk.* 1 *or B/PR/K Mk.* 1) have wiring *for the underwing tank fuel control which is not to be used and which, although fitted, is not covered in this Chapter. Mod.* 1471 *introduces wiring which enables the B/K Mk.* 1 *or B/PR/K Mk.* 1 *underwing tank to be used on the B. Mk.* 1 *and B/PR Mk.* 1 *aircraft, but which is different from the wiring installed in the B/K Mk.* 1 *aircraft.*

DESCRIPTION AND OPERATION

Introduction

1. The General Information Group contained in this Book immediately after Section 5 marker card, describes the layout, and gives the interpretation of the schematic diagrams. Information on the general modifications applicable to all types of Valiant aircraft can be found in there. ◀Subsequent to March 1962 Modifications affecting this group will be covered by appendices which will be periodically incorporated into the Group.▶

General

2. Fuel is contained in twenty flexible cells, five in each outer plane and ten in the fuselage, and two rigid underwing tanks for long range flying. The cells in each outer plane are piped together in banks, the inboard two form No. 1 tank and the outboard three No. 2 tank, each tank containing a pump to deliver fuel to the respective port or starboard fuel distribution box in the fuselage. In case of failure of a pump in one wing tank, the fuel from that tank can be handled by the pump in its neighbouring tank after opening the wing tank transfer cock.

3. The cells in the fuselage are arranged five on each side of the aircraft centre line, those on each side (except for those aft of the rear spar (transfer tank) which are piped to the reserve and No. 1 cells) are individually piped to the associated pump housing. The forward cell on each side comprises the reserve tank, which is brought into use by opening the reserve shut-off cocks. The fuselage pumps feed fuel to their distributor boxes from which the fuel is fed to the engines. There is a flowmeter and an engine master cock in the fuel line to each engine. The two distributor boxes are connected by a crossfeed pipe with a cock at each end, these valves are opened in the event of failure of the pumps in either housing, thus allowing the pumps in the remaining housing to handle all the fuel.

4. On all aircraft except B Mk. 1 provision is made for carrying a metal fuel tank at the forward end of the bomb bay to provide an auxiliary fuel supply. The fuel is pumped from the tank to join the pipe line which leads the fuel from the transfer tank to the reserve and No. 1 tanks.

Fuel pumps

Main tanks (*fig.* 1 *and* 2)

5. There are seven main tank pumps on the aircraft. There is one in each wing tank, two in each of the fuselage pump housings. Each pump is driven by an electric motor controlled by switches on the port and starboard pilot's fuel panels. Each pump is independently controlled; when a switch is placed to ON, a supply is connected from fuse panel F, to the coil of its associated pump relay R1, mounted on power panel J. When this relay operates, it connects a 112-volt supply, from panel J, to the pump motor. The pump motor has built-in test suppressors across their contacts, so that an ammeter can be connected, to complete the 112-volt circuit, and to check the pump motor current without switching on by the main switches.

Cross references

Refuelling valve control (*B/K/PR Mk.* 1) *Chap.* 9, *Group* 2

Underwing tanks fuel pump and air valves control (*B/K/PR Mk.* 1) ... ... *Chap.* 9, *Group* 3

Auxiliary tanks (*pre-Mods.* 2443 *and* 2444) (*fig.* 1)

6. There are two auxiliary tank fuel pumps fitted to the aircraft. One in the starboard cell of the transfer tank and one in the bomb bay tank (when fitted). Each pump is controlled by its own double pole ON/OFF switch. The bomb bay tank pump switch being mounted on the port side, and the transfer tank pump switch on the starboard side of the pilots fuel panel. When either the transfer or bomb bay tank pump switch is selected to ON a supply, from panel E, is connected to the associated pump relay coil R2 or R3. Contacts R2/1 or R3/1 operate to connect a 112-volt supply, from power panel J, to the respective pump motor. The pump motors have built-in suppressors to minimize radio interference. The relays have built-in test sockets across their contacts, so that an ammeter can be connected to complete the 112-volt circuit and so check the pump motor current without switching on the pump motor switches.

Auxiliary tanks (*post Mods.* 2443 *and* 2444) (*fig.* 2)

Note . . .

(1) *Mod.* 2443 *introduces a stand-by fuel pump in the transfer tank and switch Ref. No.* 5*CW*/5828 (*double pole C/O centre OFF*) *in lieu of switch Ref. No.* 5*CW*/4198 (*double pole ON/OFF.*) *A relay, mounted above power panel J, is provided to control the* 112-*volt supply to the pump motor.*

(2) *Mod.* 2473 *introduces an extra fuel pump S.P.E.*1207 *Mk.* 1 *in the bomb bay tank on B/K Mk.* 1 *and B/K/PR Mk.* 1 *aircraft as a stand-by fuel pump.*

(3) *Mod.* 2444 *introduces switch Ref. No.* 5*CW*/5828 (*double pole C/O centre OFF*) *in lieu of switch Ref. No.* 5*CW*/4198 (*double*

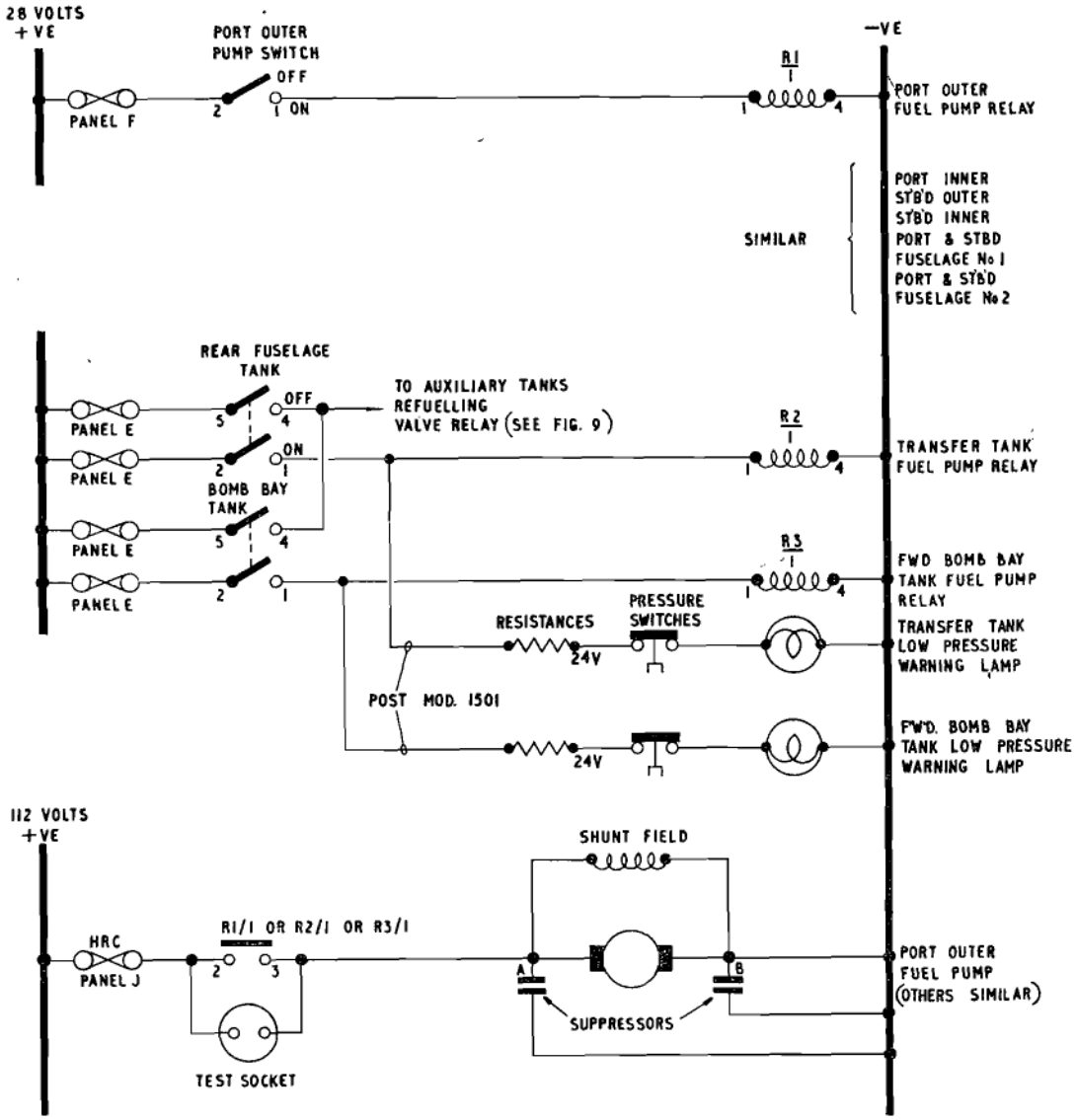

Fig 1. Fuel pumps control (pre-Mods. 2443 and 2444)

pole ON/OFF) to control the bomb bay tank fuel pumps. A relay, mounted above power panel J, provided to control the 112*-volt supply to the standby fuel pump.*

7. A single fuse, on panel E, supplies both the transfer tank, main and auxiliary fuel pump relays. Another fuse, on panel E, supplies both the bomb bay main and auxiliary fuel pump relays. When either the transfer or bomb bay pump control switch is selected to MAIN ON or AUX. ON a supply is connected, from panel E, to the respective pump relay coil R2, R3, R4 or R5. The associated relay contacts operate to connect a 112-volt supply to the associated pump motor. Built into each pump motor there is a radio interference suppressor. The relays have built-in test sockets across their contacts so that an ammeter can be connected to complete the 112-volt circuit, and so check the current consumption of the pump motor without switching on the pump control switch.

Engine master fuel cocks (*fig.* 3)

Note . . .

(1) *Mod.* 2146 *introduces fuel cocks fitted with Western ERJ.*60 *actuators in lieu of Plessey Panther actuators. These will be supplied as spares and will be fitted on replacement.*

(2) *Mod.* 2489 *introduces Western type ERJ.*60 *Mk.* 31 *actuator as an alternative to Plessey type CZ.*54709/5 *for the engine master fuel cocks.*

8. The engine master fuel cocks, one to each engine, are controlled independently by switches mounted on the pilots' instrument top panel. When a switch is placed to ON, it connects a supply, from fuse panel D, to the *open* field of the fuel cock rotary actuator through one of its limit switches. The actuator brake is released and the cock is opened. When the cock is fully open, the actuator *open* limit switch changes over to disconnect the supply to the actuator and connect it to an electro-magnetic indicator, mounted on the pilots' instrument top panel. The *close* limit switch closes as soon as the actuator leaves the closed position, to set the circuit for closing the cock. The indicator shows white when the cock is closed and black when it is open. To close the cock, the switch is placed to OFF to energize the actuator *close* field, so reversing the actuator motor.

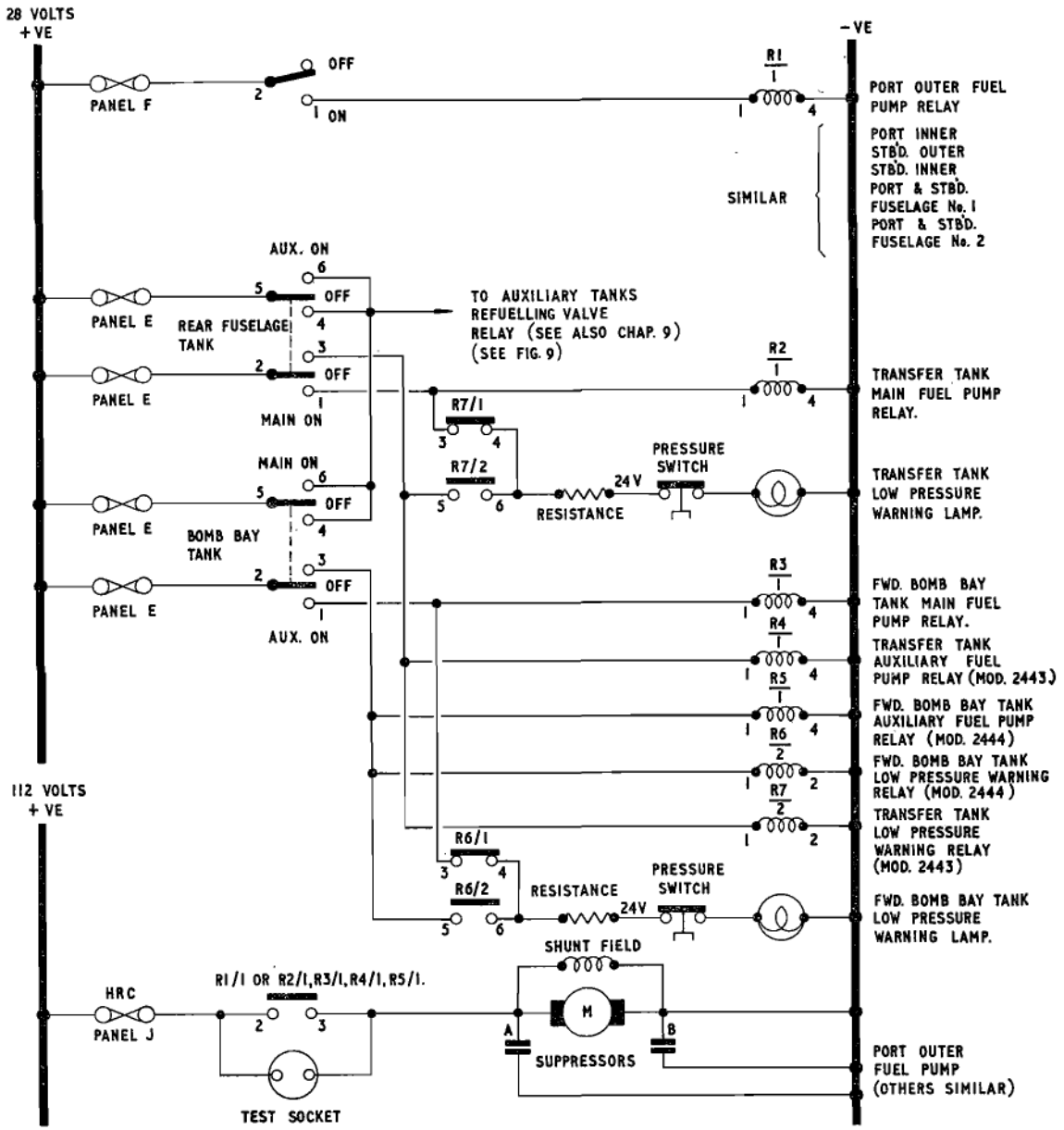

Fig. 2. Fuel pumps control (post Mods. 2443 and 2444)

Reserve fuel shut-off cocks (*fig.* 3)

Note . . .

Mod. 2146 *introduces fuel cocks fitted with Western ERJ.60 actuators in lieu of Plessey Panther actuators. These will be supplied as spares and will be fitted on replacement.*

9. The two reserve fuel shut-off cocks, which allow fuel to discharge from the two cells of the reserve tank to the two fuselage fuel pump housings, are independently controlled by switches on the pilots' fuel panel. When a switch is placed to ON, it connects a supply from panel E to the *open* field of the cock actuator, through one of its limit switches. The actuator brake is released and the cock is opened. When the cock is fully open, the actuator *open* limit switch will change over to disconnect the supply to the actuator and connect it to an electro magnetic indicator, mounted on the pilots' fuel panel. The *close* limit switch closes, as soon as the actuator leaves the closed position, to set the circuit to the actuator *close* field ready for closing the cock. The indicators show white when the cocks are open, and black when they are closed. To close the cock, the switch is placed to OFF to energize the actuator close field, so reversing the actuator motor.

Fuel pressure warning system (*fig.* 4)

10. Mounted on each of the port and starboard fuel distributor boxes and in the fuel feed lines from the transfer and bomb bay tanks, is a pressure switch; these pressure switches are operated by fuel pressure in the distributor boxes and feed lines respectively so that, should the pressure drop below 4 lbs./sq. in. the switch contacts will be made, thus connecting separate supplies, from fuses on the starboard fuse panel D, to red warning lamps mounted on the pilots' fuel panel, via resistances in the starboard console. The resistances are used to limit the current in the circuit to prevent excessive sparking when the switch contacts are broken. Since the distributor boxes feed the engines directly, a lamp showing red indicates that the engines on the respective side are being starved of fuel, and that the crossfeed cocks should be opened.

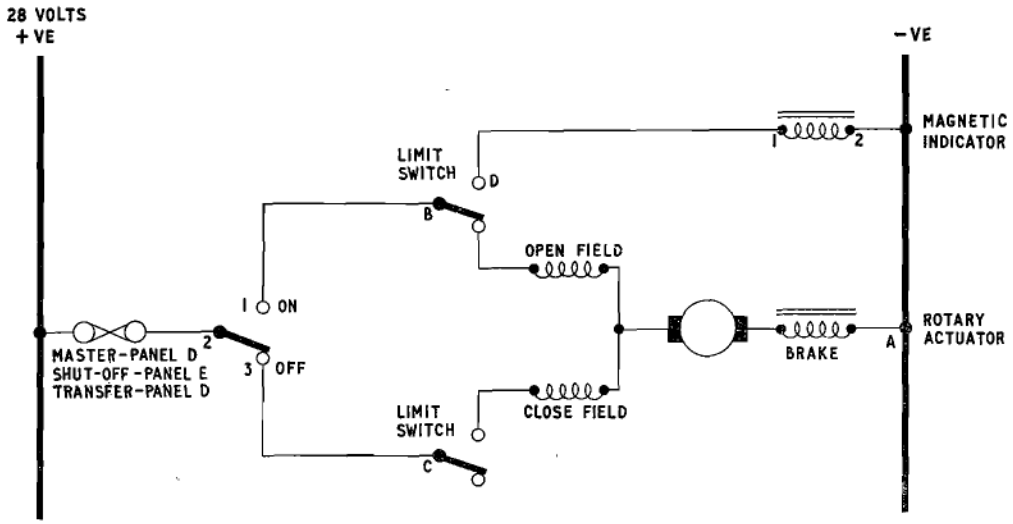

Fig. 3. Typical engine master fuel cock, reserve tank shut-off cock, and wing fuel transfer cock control

11. The lamps for the bomb bay and transfer tanks indicate when the respective tanks are empty. Pre-Mod. 1501, the warning lamps are fused individually (*fig.* 4) and stay on when the tanks are empty. Post Mod. 1501, the lamps are supplied via their respective tank control switches (*fig.* 1) so that once the tanks have been emptied, the lamps go out when the control switches are returned to the OFF position.

Rear transfer tank (*post Mod.* 2443) (*fig.* 2).

Note . . .

Mod. 2443 *introduces a relay, Type Q3, mounted in the starboard console, to control the supply from the pump motor control switch to the low pressure warning lamp.*

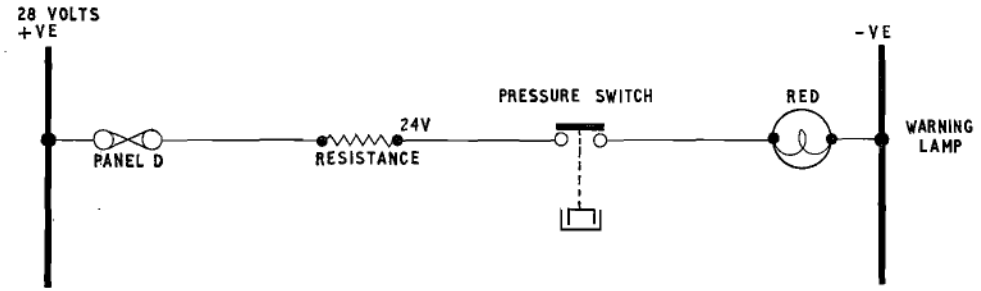

Fig. 4. Typical low fuel pressure warning

◀**12.** Selection of the REAR TRANSFER TANK fuel pump switch to MAIN ON connects (2–1) a supply, from a fuse at panel E, via contacts R7/1 (normally closed) and the associated resistance unit and pressure switch to the REAR TRANSFER TANK fuel pressure warning lamp. With the switch selected to AUX. ON a supply is connected (2–3) to the coil of relay R.7. Operation of the relay connects the supply via contacts R7/2 and the associated resistance unit and pressure switch, to the REAR TRANSFER TANK fuel pressure warning lamp. The pressure switch contacts open when the fuel pressure reaches 4 lbs./sq. in., to extinguish the warning lamp, although the supply will be maintained at the pressure switch until the pump switch is selected to OFF or MAIN ON.

Bomb bay tank (*post Mod.* 2444) (*fig.* 2)

Note . . .

Mod. 2444 *introduces a relay Type Q3, mounted in the port console, to control the supply from the pump motor control switch to the low pressure warning lamp.*

13. Selection of the FWD. BOMB BAY TANK fuel pump switch to MAIN ON connects a supply (2–3), from a fuse at panel E, to the coil of relay R.6. Operation of the relay connects (R6/2) the supply, via the associated resistance unit and pressure switch to the FWD. BOMB BAY TANK fuel pressure warning lamp. The pressure switch contacts open with a fuel pressure build-up to 4 lbs/sq. in. to extinguish the lamp, although the supply will be maintained at the pressure switch until the pump switch is selected to OFF or MAIN ON. Selection of the FWD. BOMB BAY TANK fuel pump switch to AUX. ON connects (2–1) a supply, from panel E, to the lamp via contacts R6/1 (normally closed).▶

Underwing tank (pre-Mod. 2732) (fig. 4)

Note . . .

Pre-Mod. 2732 the warning lamps will remain on after the fuel pump motor for the respective tank has been switched off. The warning lamp will go out only when the aircraft 28-volt bus-bar is de-energized or the pressure in the fuel transfer line is above 8 to 10 lbs./sq. in.

14. Mounted in each wing stalk, in the fuel transfer line, is a pressure switch controlling the supply to its associated low pressure warning lamp mounted on the pilots' fuel panel. When the aircraft 28-volt bus-bar is energized, supplies from separate fuses in panel F are connected to the warning lamps, via the associated low pressure switches. When the pressure in the fuel transfer line reaches 8 to 10 lb./sq. in. the pressure switch operates and opens its contacts to disconnect the supply to the low pressure warning lamp.

Underwing tank (post Mod. 2732) (figs. 8 and 9)

Note . . .

Post Mod. 2732 the supply for the low pressure warning lamp is taken via the pump motor control switch. Therefore the warning lamp will go out when the pump motor control switch is selected to OFF.

15. When the underwing tank pump control switch is selected to MOTOR ON a supply is connected, from a fuse in panel F, to the low pressure warning lamp, via the pressure switch. When the pressure in the fuel transfer line reaches 8 to 10 lb./sq. in. the pressure switch operates and opens its contacts to disconnect the supply to the low pressure warning lamp.

Crossfeed cocks (*fig. 5*)

Note . . .

(1) *Mod. 2146 introduces fuel cocks with Weston ERJ.60 actuators in lieu of Plessey Panther Actuators. These will be supplied as spares and will be fitted on replacement.*

(2) *Mod. 2331 provides for the repositioning of the crossfeed cocks control switch and associated magnetic indicator from the control pedestal to the pilots fuel panel.*

(3) *Mod. 2484 introduces Western type ERJ.60 Mk. 31 actuator as an alternative to*

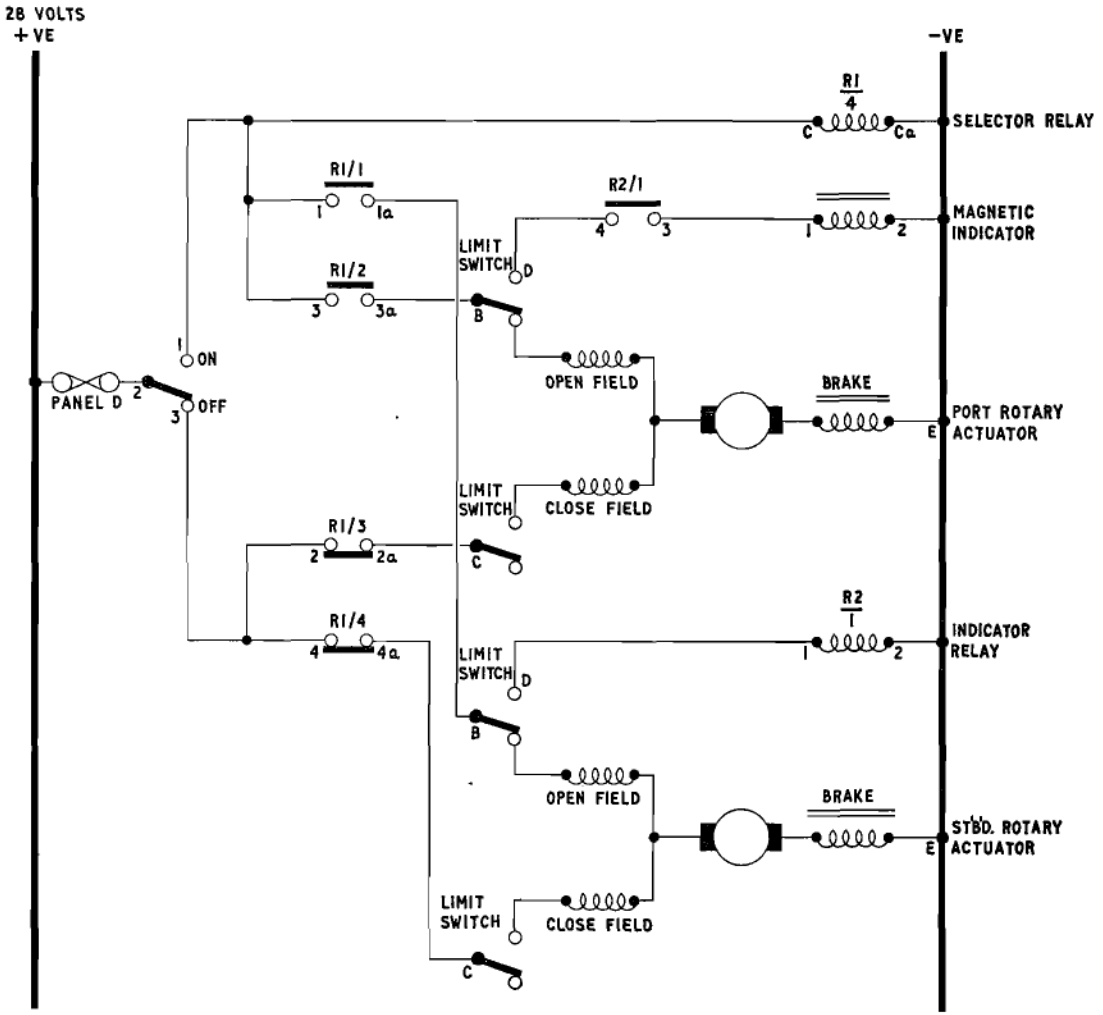

Fig. 5. Cross feed cock control

Plessey type CZ.54709/5 for the port and starboard crossfeed cocks.

16. The two crossfeed cocks are operated by rotary actuators controlled by an ON/OFF switch mounted on the pilots' fuel panel (control pedestal pre-Mod. 2331). When this swtich is placed to ON, a supply is connected from the starboard fuse panel E, to the operating coil of the selector relay, R1, Type S2, mounted on the pacitor relay panel. This relay operates (R1/1–4), to break the circuits to the actuator *close* fields and to connect the supply to the *open* fields of the actuators through the respective limit switches. The actuator brake solenoids are energized simultaneously with the actuator motors starting. The cocks will now be opened, and when fully open, the actuator *open* limit switch will be operated to disconnect the actuators from the supply, so applying the brakes and stopping the motors. The *close* limit switch closes as soon as the actuator leaves the closed position to prepare the circuit to the *close* fields, ready for closing the cocks. The limit switch on the starboard actuator connects the supply to the indicator relay R2, Type Q1, mounted on the pacitor relay panel, which operates (R2/1) to connect the supply from the limit switch on the port actuator, to the electro-magnetic indicator on the control pedestal. This indicator is white when the cocks are open and black when they are closed. The actuators operate in reverse to close the cocks by placing the switch to OFF, with the switch in this position the selector relay R1 is de-energized, connecting the supply to the actuator *close* fields.

Wing fuel tank transfer cocks (*fig.* 3)

Note . . .

(1) *Mod.* 2146 *introduces fuel cocks with Weston ERJ.60 actuators in lieu of Plessey Panther actuators. These will be supplied as spares and will be fitted on replacement.*

(2) *Mods.* 2330 *or* 2331 *provides for the repositioning of the port and starboard wing*

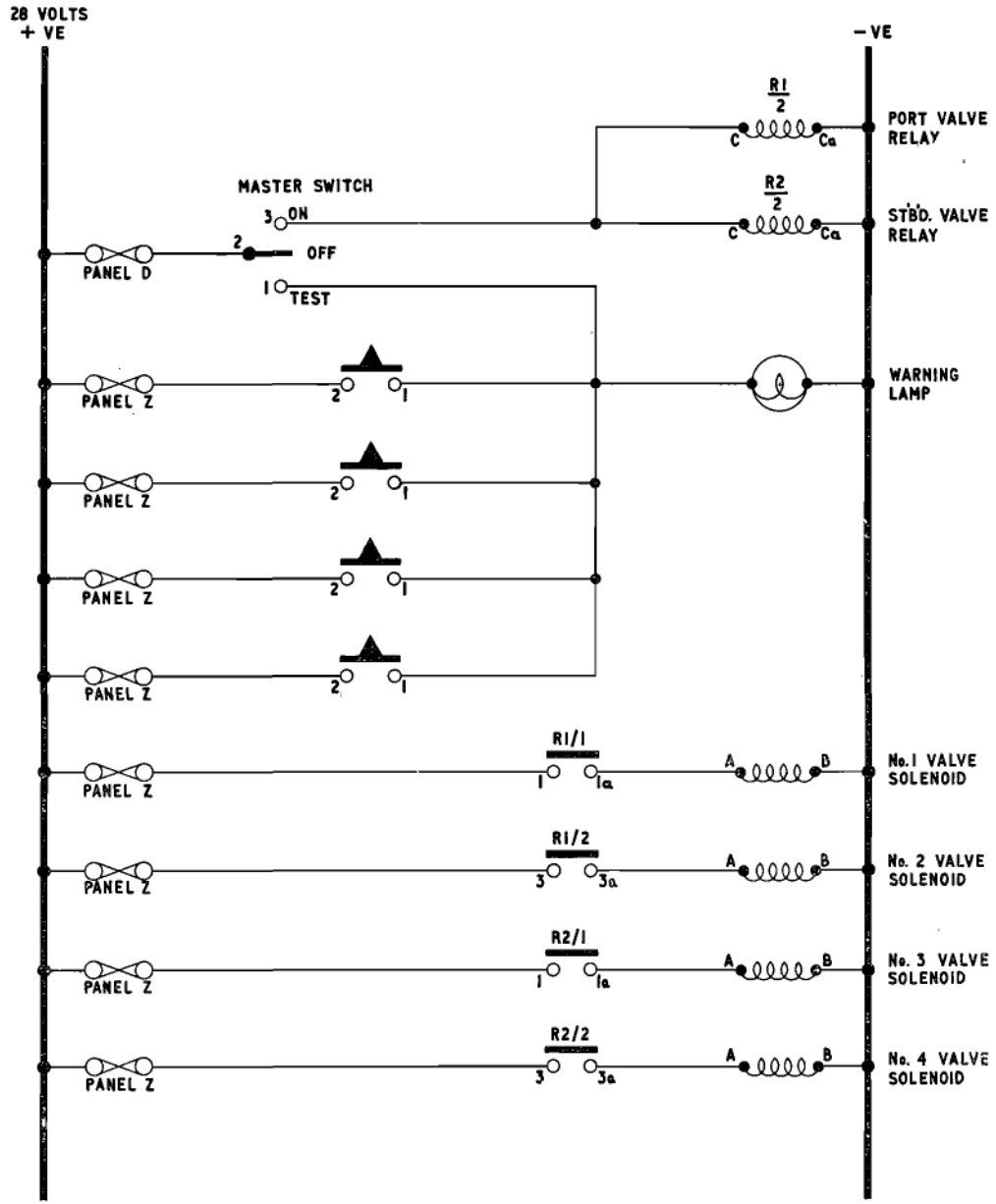

Fig. 6. Fuel filter de-icing

tank transfer cock control switches and associated magnetic indicators from the control pedestal to the pilot's fuel panel.

17. The port and starboard transfer cocks are controlled independently by ON/OFF switches on the pilots fuel panel control pedestal (pre-Mods. 2330 or 2331). When either switch is placed in the ON position, a supply from the starboard fuse panel D, is connected to the *open* field of the respective cock actuator via one of its limit switches. The field is in series with the armature and the brake solenoid, so that as soon as the supply is switched on, the brake is released and the motor will start. The motor continues to run until the actuator reaches the limit of its travel when the limit switches will be operated, thus stopping the motor and applying the brake. The operation of the limit switches prepares the circuit to the *close* field ready for closing the cock and also connects the supply from the control switch to an electro-magnetic indicator on the control pedestal. The indicators show white when the cock is open.

18. To close the cock, the control switch is put to the OFF position when the supply will be connected to the *close* field of the actuator motor. The motor is reversed and closes the cock. When the actuator reaches the closed limit, the limit switches are operated thus stopping the motor, disconnecting the indicator and resetting the circuit ready for opening the cock.

Fuel filter de-icing (*fig.* 6)

Note . . .

Until pressure differential switches are available, the ice warning lamp circuit will not be operable. However, the hot air valve solenoids will function and may be used.

19. Hot air is supplied from the engines via solenoid operated valves, mounted one above each fuel flowmeter, to a heat exchanging box round the fuel line to each engine. A pressure switch across each fuel filter closes when the filter tends to become blocked due to ice forming. This indicates on a warning lamp on the instrument top panel.

20. There is a differential pressure switch on each engine, the four switches, each fed separately from a fuse on panel Z, feed one warning lamp. When the pressure differential across any filter reaches the pre-determined pressure, the switch closes to connect its supply to the red warning lamp. The master switch is then placed to ON when it connects a supply, from a fuse on panel D, to the operating coils of the two valve relays R1 and R2, Types S2, mounted on the pacitor relay panel. These relays operate (R1/1–2, R2/1–2) to connect supplies, from fuses on panel Z, to the four valve solenoids. The valves are thus opened to allow hot air to heat the fuel line to each engine. The master switch has a TEST position which connects the supply to the warning lamp.

Air/Nitrogen reducing valve heaters (*fig.* 7)

21. Modification 2107 introduces thermostatically controlled heater muffs for the air/nitrogen reducing valves fitted in the 'cupboard' in each main undercarriage bay. The circuits are not controlled from the cockpit so that whenever power is on the aircraft, the heaters are energized.

22. Whenever 28-volt and 112-volt power is connected to the aircraft, a supply is fed from panel E to the coils R1 of the heater relays and thence through the heater thermostats to earth. With the muffs cold, the relays are energized to close their contacts R1/1 to connect separate 112-volt supplies from panel J to the heater muffs; each muff has three elements in series of 40/45 watts at the top, 80/85 watts, in the centre, and 20/25 watts at the bottom. When the valve muff ambient temperature reaches 28 deg. C. approx., the thermostat contacts break to de-energize the heater relays which in turn disconnect the heaters. When the valve muff ambient temperature falls to 26 deg. C. approx., the thermostats re-make to reconnect the heaters via the heater relays. It should be noted that the thermostats are buried in the valve lagging and do not operate at the actual valve internal or surrounding air temperatures although the correct operation of the thermostats is measured against the surrounding air temperatures.

Refuelling valve control (*fig.* 9)

Note . . .

1. *Mod.* 2652 *introduces, refuelling valve* 1112639 *in lieu of* 1112000/3 *in the bomb bay tank, and provides A.M.P. type tags for the connections to this valve.*

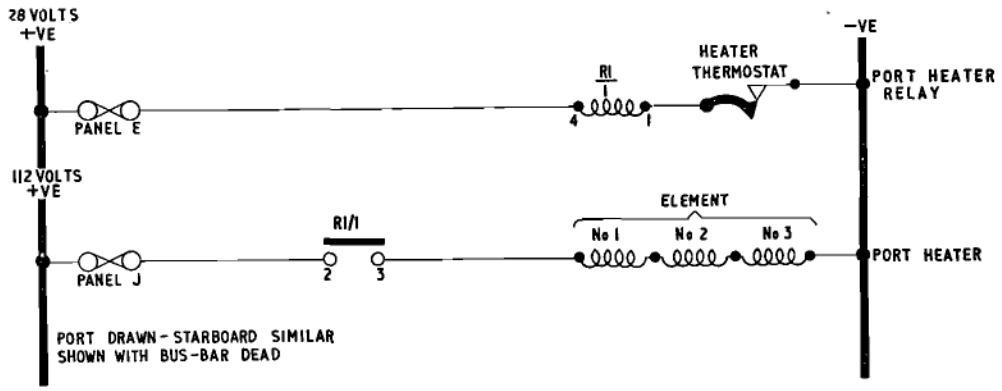

Fig. 7. Air/nitrogen reducing valve heaters

2. *Mod. 2653 introduces, refuelling valve 1112634 in lieu of 1112610 in the underwing stalk, and provides A.M.P. type tags for the connections to this valve.*

3. *When operating in the night role P.R., no fuel is to be carried in the transfer tank. Mod. 2297 introduces a 2-pin plug and socket in the refuelling circuit for this tank and this should be disconnected before fitting the photo flash crate.*

4. *Mod. 2066 introduces float switch 2103/FG/SB in lieu of 1601/FG/SB in the bomb bay tank.*

23. Each of the fuel tanks including the underwing tank has a refuelling cut-out valve and a float switch. They are located as follows:—

Bomb bay tank—both in the single tank.

Reserve tank—cut-out valve in port cell, float switch in starboard cell.

Transfer tank—cut-out valve in starboard cell, float switch in starboard cell.

No. 1 fuselage tank—cut-out valve in port cell, float switch in starboard cell.

No. 2 fuselage tank—cut-out valve in starboard cell, float switch in port cell.

No. 3 fuselage tank—cut-out valve in starboard cell, float switch in starboard cell.

No. 1 wing tanks—cut-out valve in inboard cell, float switch in inboard cell.

No. 2 wing tanks—cut-out valve in inboard cell, float switch in inboard cell.

Underwing tank—cut-out valve in wing stalk, float switch in tank.

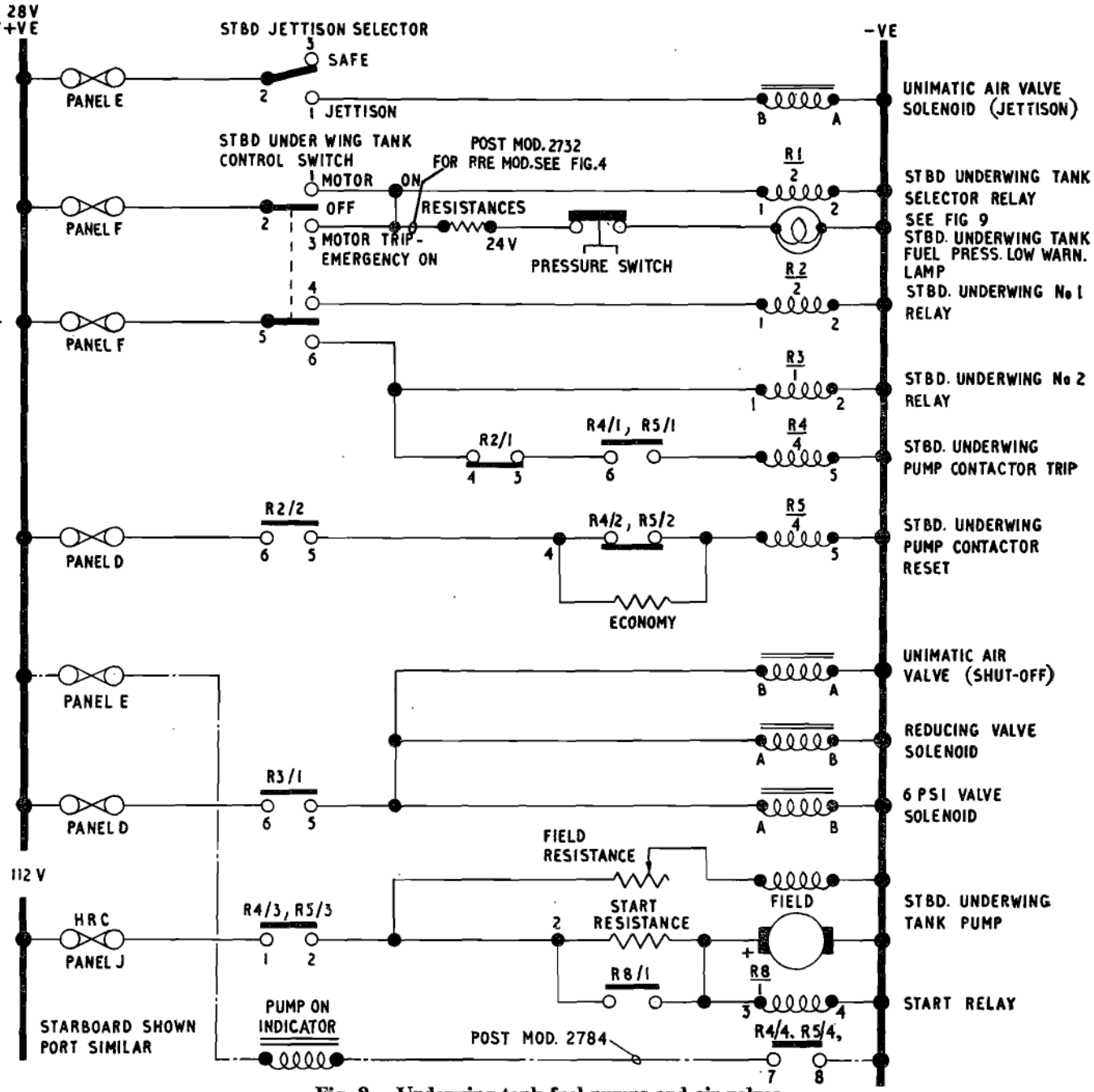

Fig. 8. Underwing tank fuel pumps and air valves

Each of the cut-out valves is connected in series with its associated float switch and an ON/OFF tank selector switch, mounted near the pressure refuelling connections, as follows:—

Reserve, auxiliary tanks (transfer and bomb bay) and No. 1 fuselage tank switches are adjacent to the port fuselage refuelling connection.

No. 2 and No. 3 fuselage tank switches are adjacent to the starboard fuselage refuelling connection.

Under wing tank and No. 1 and No. 2 wing tank switches are adjacent to the wing refuelling connections.

24. All the switches at the fuselage refuelling connections are supplied from a single fuse on panel E (Panel Z pre-Mod. 2554). All the switches at each wing refuelling connection are supplied from a fuse on panel E (panel Z pre-Mod. 2554). When a tank is to be refuelled, the appropriate selector switch is put into the ON position to energize the refuelling valve solenoid, thus opening the valve. When the tank is full the float switch is raised, thus breaking its contacts and disconnecting the supply to the refuelling valve which then closes. After refuelling, the tank selector switches should be placed to the OFF position, otherwise as soon as the fuel level began to fall the float switches would close and the valves would be opened.

Underwing tanks (*fig.* 8)

Note . . .

For operation of the underwing tanks in the tanker/receiver aircraft see Chapter 9.

25. The underwing tank installation is provided as follows:—

Mod. 1344—Underwing stalk

Mod. 1512—Underwing tanks

Mod. 1513—Suspension links

The tanks contain a fuel pump driven by a 5 H.P. motor which is used to transfer fuel into the wing tanks and a nitrogen pressurizing system which, controlled by solenoid operated air valves, can be used to transfer fuel in the event of pump failure. The nitrogen system used for normal tank pressurizing at 1 p.s.i. is supplied from a bottle in the tank and is controlled manually before flight by an ON/OFF cock in the nose cap of the tank. For emergency transference of fuel the nitrogen pressure is increased to 7 lb./sq. in. by the operation of the solenoid operated air and reducing valves, the air supply being obtained from a bottle in the tank. The systems to port and starboard are similar, the following is a description of one system only. When the tanks are fitted, the circuit is arranged so that as fuel is used from the wing tanks, it is automatically replaced by fuel from the underwing tanks (provided the tank switches have been selected) in order to meet the requirement that the underwing tanks must be emptied before the wing tanks.

Pumps (*fig.* 8)

26. There are two double pole switches, labelled MOTOR ON/OFF/MOTOR TRIP—EMERGENCY ON, mounted on the pilot's fuel panel, one for the port and one for the starboard tank. When a switch is placed to the MOTOR ON position, it connects two supplies from panel F; one to the relative selector relay coil R1 (Type Q1 mounted at station 240 in the wing) and the other to the relative underwing tank No. 1 relay R2 (Type Q3 mounted behind the pilots' hood coaming). The No. 1 relay operates to break R2/1, the circuit to the pump contactor trip coil R4 and to connect, R2/2, a supply from panel D to the reset coil R5 of the pump contactor (Type D.9411) mounted in the wing stalk.

27. The contactor operates to close, R5/1, the circuit from contacts R2/1 of the No. 1 relay (now open) to its trip coil, to insert, R5/2, an economy resistance in its circuit and to connect, R5/3, a 112-volt supply from panel J to the pump motor (Type EXP.5090) via the start unit (Type U2001, mounted in the wing stalk). As the pump runs up, its back e.m.f. rises and energizes the start unit relay R8 which closes its contact, R8/1, to short-circuit the starting resistance and allow the motor to run on full voltage. A variable resistance is connected in series with the motor shunt field.

◀ **Note . . .**

The variable resistance in the pump motor field circuit is pre-set to 10 *ohms, locked and the position marked with red paint. This setting should be satisfactory for the majority of pump motors to give the required pressure and rate of delivery. If a pump is seriously down on delivery it may be found necessary to adjust this resistance until the rate of delivery is within the correct limits* (*Book* 1, *Sect.* 4, *Chap.* 2).▶

28. To stop the pump, the switch is first placed to MOTOR TRIP—EMERGENCY ON, this disconnects the supply to the underwing tank No. 1 relay coil R2 which opens its contacts R2/2 in the line to the contactor reset coil R5 and completes, R2/1, the circuit to the contactor trip coil R4. The contactor is thus tripped, its contacts R4/3 breaking the circuit to the pump motor, contacts R4/2 resetting the line to its reset coil R5 and contacts R4/1 opening the line to its trip coil R4. At the same time the underwing tank No. 2 relay is energized to open the air valve and reducing valve (*see para.* 47). When the contactor has tripped the switch must be replaced to OFF thus closing the air and reducing valves

WARNING . . .

The switch must not be left at MOTOR TRIP—EMERGENCY ON since this will allow the air and nitrogen bottles to discharge.

◀ *Indicators* (*fig.* 8)

29. Mld. 2784 introduces magnetic indicators on the pilots fuse panel to indicate when the pump is running. These indicators do not operate from pressure switches in the fuel line as for the other fuel pumps in the aircraft. These indicators are operated by auxiliary contacts (7-8) of the pump contactors. When the pump contactor reset coil R5 is energized (*para.* 24), the contact R5/4 closes to complete the indicator circuit in the negative line; the indicators are supplied from fuses in panel E. When

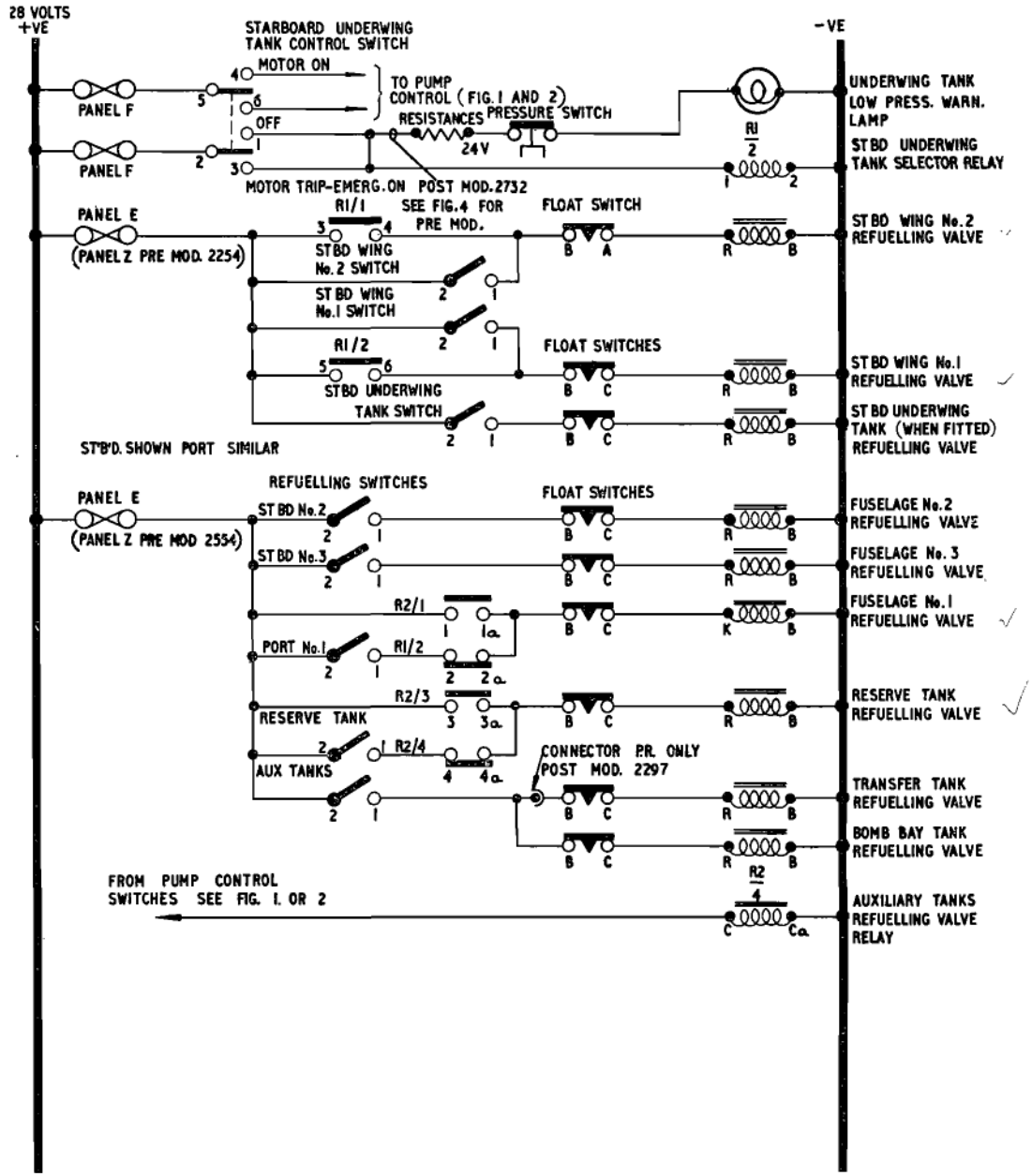

Fig. 9. Refuelling valve control

the pump is switched off, the contactor trip coil R4 is energized (*para.* 26) and its contact R4/4 opens to disconnect the indicator, the indications are as follows:—

Pump contactor reset—pump running—indicator WHITE.

Pump contactor tripped—pump stopped—indicator BLACK.

Air valves (*fig.* 8)

30. In case of failure of the pump, fuel can be transferred by using the air/nitrogen pressure system. The switch is placed to MOTOR OFF—EMERGENCY ON. This trips the pump contactor (*para.* 26), and connects one of its supplies to the selector relay R1 as before, and the other to the underwing tank No. 2 relay R3, R3 thus energized connects, R3/1, a supply from panel D to the air valve solenoid, the Unimatic shut-off valve solenoid and the pressure reducing valve solenoid. The air valves then allow the nitrogen to pressurize the tank and force the fuel out. The valves are shut by placing the switch to OFF when relay R3 drops out and disconnects the supply to the valve solenoids.

Fuel transfer (*fig.* 8 *and* 9)

Note . . .

The supply for the underwing tank fuel pressure low warning lamp as described in the following paragraphs is for the pre-Mod. 2732 *condition. Post Mod.* 2732 *the supply for the warning lamp is taken from the circuit side of the underwing tank control switch, therefore the pump must be selected to ON or MOTOR TRIP—EMERGENCY ON for the lamp to operate when the pressure switch closes.*

31. When the control switch is placed to MOTOR ON or MOTOR OFF—EMERGENCY ON, the pump is started or the air valves are opened (*para.* 25 *to* 27), at the same time a supply is connected to the coil R1 of the selector relay. The contacts R1/1 and R1/2 of this relay are connected

in parallel with their respective wing No. 1 and No. 2 wing tank refuelling selector switches, so that, when the relay operates, the refuelling valve supply from panel E (panel Z pre-Mod. 2554) is connected to the positive side of the wing tanks float switches. As the fuel is used from the wing tanks their float switches will close, thus energizing and opening the refuelling valves. Fuel will then be forced by the pump or by air pressure from the underwing tank until the wing tank is filled sufficiently for the float switches to break the circuit to and close the refuelling valves. As fuel is used from the wing tanks, the float switches will automatically continue to allow fuel transfer from the underwing tank.

32. When the underwing tank is empty the pressure switch in the wing stalk will close to connect a supply from panel D to the relative low pressure warning lamp on the fuel panel. The pump or air valves should then be switched off as in paras. 26 and 27. The low pressure warning lamp will also indicate a pump failure when using the pump; under this condition the EMERGENCY air system should be selected. When the lamp comes on again the switch should be returned to OFF.

Transfer tank fuel control (*fig.* 1 *and* 9 *or* 2 *and* 9)

33. The system works in a similar manner to the underwing tank system (*para.* 22). Fuel is transferred from the transfer tank to the reserve and No. 1 fuselage tanks, when the rear fuselage tank switch, on the pilot's fuel panel, is placed to ON (MAIN ON or AUX. ON post Mod. 2443). This starts the transfer tank pump and energizes the auxiliary tanks refuelling relay R2, the contacts R2/1 and R2/3 of which are in parallel with the refuelling switches for the fuselage No. 1 and reserve tanks. Contacts R2/2 and R2/4 of the relay are in series with the fuselage No. 1 and reserve tank refuelling switches. As the fuel is used from the fuselage No. 1 and reserve tanks, they are replenished continuously from the transfer tank, the flow being controlled by the float switches and refuelling valves in the fuselage No. 1 and reserve tanks.

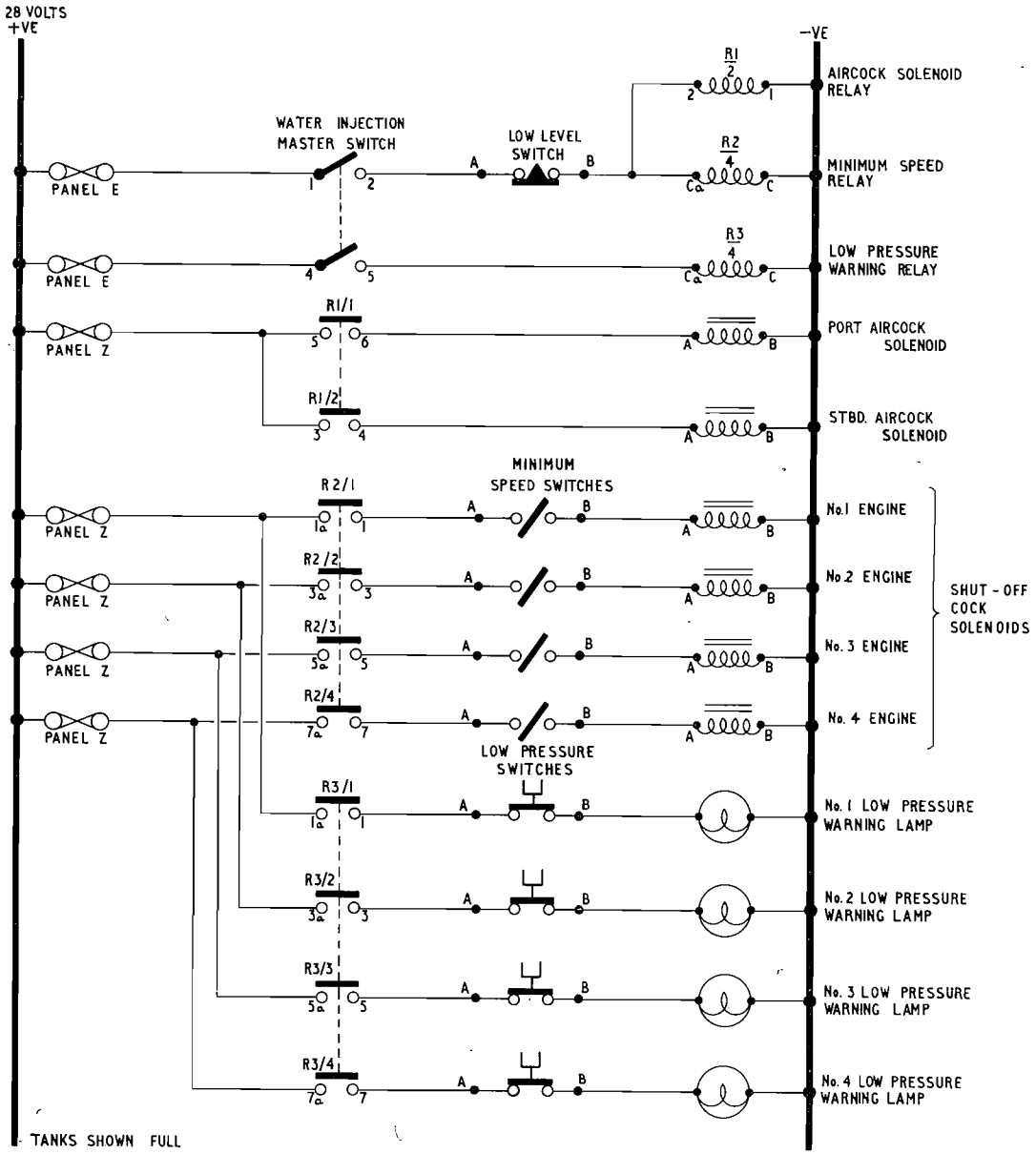

Fig. 10. Water-methanol control (pre-Mod. 2715)

Note . . .

Post Mod. 2443 there are two fuel pumps in the transfer tank and on selecting the pump control switch to either MAIN ON or AUX. ON the refuelling valves are operated as previously described.

Bomb bay tank fuel control (*fig.* 1 *and* 9 *or* 2 *and* 9)

34. This system works similarly to the transfer tank system (*para.* 25), fuel being transferred from the bomb bay tank to the fuselage No. 1 and reserve tanks. The bomb bay tank fuel pump and the auxiliary tanks refuelling relay R2 are energized when the bomb bay tank switch, on the pilot's fuel panel is placed to ON (MAIN ON or AUX. ON Post Mod. 2444). The relay operates as in para. 25 to energize the fuselage No. 1 and reserve tank float switch/refuelling valve circuits so that, as fuel is used from these tanks it is replaced automatically by fuel from the bomb bay tank.

Note . . .

Post Mod. 2444 there are two fuel pumps fitted into the bomb bay tank and on selecting the pump control switch to either MAIN ON or AUX. ON the refuelling valves will operate as previously described.

Underwing tank fuel jettison (*fig.* 8)

35. It may be found necessary to jettison the fuel in the underwing tank, due to failure of the underwing tank transfer system. This is achieved by placing to JETTISON the relevant tank fuel jettison switch on the port coaming panel. This connects a supply from panel E, to the Unimatic jettison air valve solenoid in the underwing tank concerned. This valve controls the air supply to the three jettison valves in the bottom of the tank this allowing the fuel to escape. The negative return from the valve is carried back through the wing stalk and is earthed at the outer wing panel.

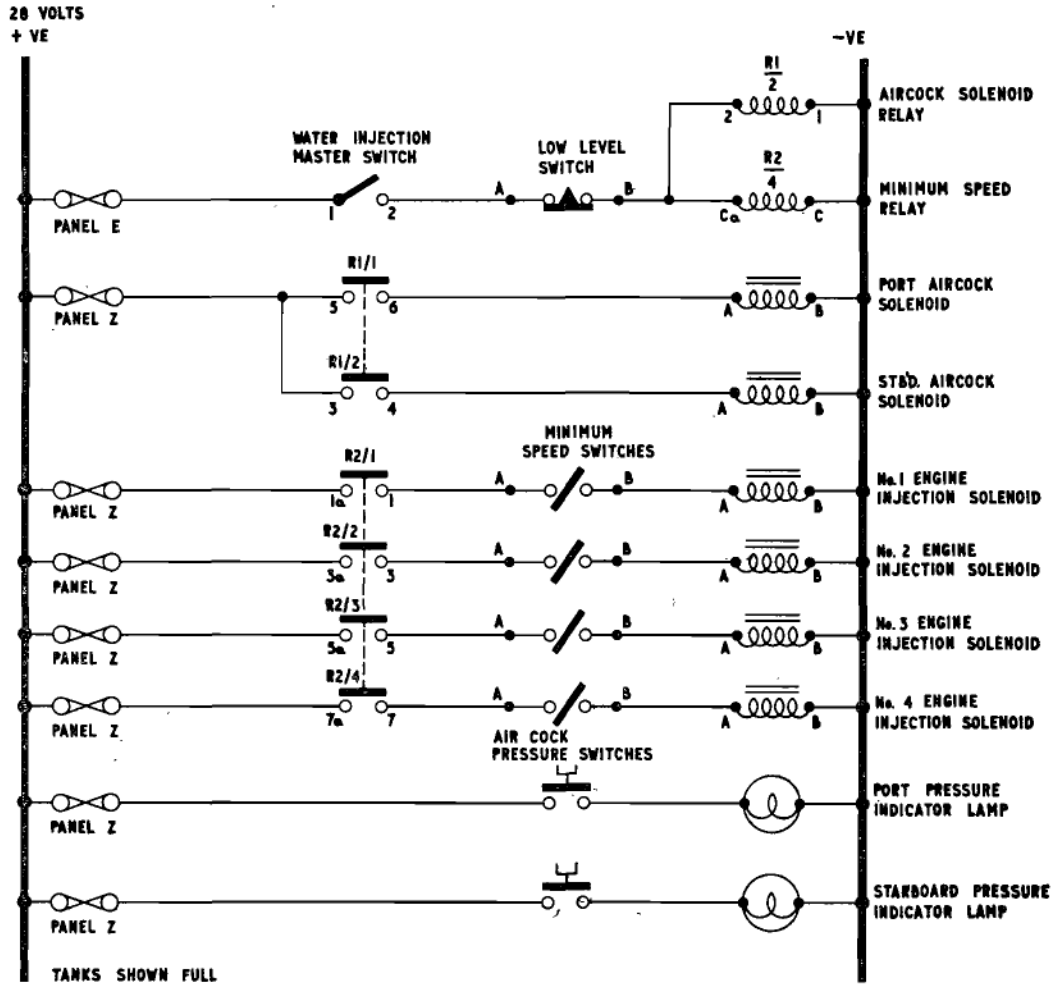

Fig. 10A Water-methanol control (post Mod. 2715)

Water-methanol control (post Mod. 1118) (*fig.* 10)

36. Water-methanol is contained in tanks fitted above the bomb bay between the rear spar and the transfer fuel tank. The water-methanol is pumped to each engine by an air driven pump. A solenoid operated shut-off valve, on each side of the fuselage, controls the air to the pumps, the air being taken from the tail de-icing hot air supply, at a branch on each side of the aircraft, forward of the tail de-icing shut-off valves. The water-methanol cannot be injected until engine compressor pressure reaches 60 lb./sq. in. When water-methanol is being injected, the engine governor overspeed setting comes into operation.

37. When the two-pole water-methanol master switch on the port coaming panel (forward of the starboard coaming panel,

post Mod. 2678 and 3004) is placed to ON, ▶ it connects two supplies from panel E, one, via a low level switch in the tank, to the aircock solenoid relay R1 (Type Q1), and the minimum speed switch relay R2 (Type S4) mounted on panel V. The other supply is connected to the low pressure warning relay R3 (Type S4) also on panel V.

◀ **Note . . .**
Post Mod. 3004 *the master switch is located on the bracket previously accommodating the R.A.T.O.G. indicators* (*Chap.*3, *Group* 5). ▶

38. Assuming that there is water-methanol in the tank and that the low level switch is closed, the aircock solenoid relay operates (R1/1–2) to connect a supply, from panel Z to energize the two aircock solenoids and allow the four pumps to start. The minimum speed relay operates to connect (R2/1–4) four separate supplies, from panel Z, to the minimum speed switches on each engine. These close when the engine compressor pressure reaches 60 lb./sq. in., to connect their respective supplies to the injection valve solenoids, one on each engine, to allow the water-methanol to enter the engine. The low pressure warning relay connects the injection valve solenoid supplies to the low pressure switches, one in the pipe to each engine, which closes when the pressure drops below $7{\cdot}5 \pm {\cdot}5$ lb./sq. in. to connect their supplies to the four warning lamps on the port coaming panel.

39. When the water-methanol tank is emptied (in approximately 50 seconds) the low level switch opens and disconnects the supply to the aircock solenoid relay R1 and the minimum speed relay R2. Contacts R1/1–2 operate and disconnect the supply to the aircock solenoids allowing the valves to close. Contacts R2/1–4 operate to disconnect the supplies to the engine injection solenoids and allow the valves to close. (The engine governor overspeed setting then returns to normal). The pressure in the pipe to each engine then decreases allowing the low pressure switch to operate and close its contacts to connect supplies, from panel Z, to the relevant warning lamps. When all these lamps are on, the master switch should be placed to OFF when the lamps will go out and the whole system becomes dead.

SERVICING

Introduction

40. A detailed description of all the general tests to be applied to all aircraft circuits can be obtained from the General Information Group contained in this Book immediately after Section 5 marker card.

Fuel pumps and low pressure warning system

41. Before testing check:—

(1) H.P. cocks CLOSED.
(2) Wing fuel transfer cocks OFF.
(3) Crossfeed cocks OFF.
(4) Engine master (L.P.) cocks OFF.
(5) All fuel pumps OFF.
(6) Low pressure warning lamps ON.
(7) Fuel in all tanks.

Then proceed as follows:—

(1) Check the circuit fuses and connect 112-volt and 28-volt d.c. supplies to the external connections.

(2) Switch ON the starboard outer wing pump and check that the starboard L.P. indicator lamp goes out.

(3) When the indicator lamp goes out switch the pump OFF.

(4) Switch ON the starboard inner wing, starboard fuselage Nos. 1 and 2 pumps in turn. Check that the pumps are running satisfactorily and that the associated L.P. indicator lamp stays out whilst the pumps are running.

(5) Switch all pumps OFF and check that the L.P. indicator lamps come on after 3 to 4 minutes. (The approximate time taken for the fuel pressure in the system to relieve.)

(6) Repeat the above operations for the port wing and fuselage pumps.

(7) Remove the refuelling valve circuit fuse (No. 64) from panel E for the rear transfer tank switch.

(8) Select the fuselage transfer tank pump switch to ON (MAIN ON and AUX. ON post Mod. 2443). Check that the pump runs satisfactorily and that the L.P. indicator lamp goes out.

(9) Switch OFF the pump and replace fuse No. 64 in panel E.

(10) Remove the refuelling valve circuit fuse (No. 66) from panel E.

(11) Select the bomb bay transfer switch to ON (MAIN ON and AUX. ON post Mod. 2444) and check that the pump runs satisfactorily and the L.P. indicator lamp goes out.

(12) Switch OFF the pump and replace fuse (No. 66) in panel E.

42. If the bomb bay tank is not fitted proceed as follows:—

(1) Select the bomb bay transfer switch to ON (MAIN ON and AUX. ON post Mod. 2444).

(2) Check that a 112-volt test lamp comes on when connected across the 2-pin connector (pin B—earth) mounted at the forward end of the bomb bay (starboard side).

(3) Switch the pump OFF and check that the lamp goes out.

Fuel pump current consumption check

43. Periodically, or if a pump appears faulty, a current consumption check should be made as follows:—

(1) Disconnect the pump wiring as near to the pump as possible.

(2) Connect a suitable ammeter in circuit.

(3) Connect a suitable voltmeter across the pump.

(4) Switch the relative pump switch to ON and check that the consumption with a pump flow of 1,200 galls. per hour is not more than 2·7 amps. at 100 volts, 3·3 amps. at 112-volts or 3·5 amps. at 116 volts.

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(5) Switch OFF, disconnect the meters, reconnect the pump wiring and function the circuit.

Note . . .

Test sockets are provided on the fuel pump motor relays on panel J. Suitable 112-volt ammeters may be plugged into these sockets when the pumps will start without operating the selector switches. Ideally these ammeters should have shorting switches which should be opened after they have been plugged-in to avoid any damage to the meters from the starting surge current taken by the pumps.

Engine master cocks

44. (1) Check the circuit fuses and connect a 28-volt d.c. supply to the external connection.

(2) Select each of the engine master cock switches to ON in turn and check that the actuators operate satisfactorily to open the cocks.

(3) Check that when the actuators reach the fully open position, the magnetic indicators show BLACK.

(4) Select the switches to OFF. Check that the magnetic indicators show WHITE as soon as the actuators leave the fully open position and that the actuators operate satisfactorily to close the cocks.

Note . . .

An arrow visible through a window in the actuator indicates whether the cock is shut or open.

Reserve fuel shut-off and wing transfer cocks

45. (1) Check the circuit fuses and connect a 28-volt d.c. supply to the external connection.

(2) Select the relevant four switches to ON in turn and check that the actuators operate satisfactorily.

(3) Check that when the actuators reach the fully open position the magnetic indicators show WHITE.

(4) Select the switches to OFF. Check that the actuators operate satisfactorily and that the magnetic indicators show BLACK as soon as the actuators have the fully open position.

Note . . .

An arrow visible through a window in the actuator indicates whether the cock is shut or open.

Crossfeed cocks

46. (1) Check the circuit fuses and connect a 28-volt d.c. supply to the external connection.

(2) Select the crossfeed switch to ON and check that both actuators operate satisfactorily to open the crossfeed cocks (If suspect, check the operation of the selector relay Type S2).

(3) Check that when the actuators reach the fully open position the two magnetic indicators show WHITE (If suspect check the operation of the indicator relay Type Q1).

Note . . .

An arrow visible through a window in the actuator indicates whether the cock is shut or open.

Fuel filter de-icing

47. (1) Check the circuit fuses and connect a 28-volt d.c. supply to the external connection.

(2) Select the fuel filter de-icing switch to TEST and check that the warning lamp comes on.

(3) Switch to OFF and check the lamp goes out.

(4) Select the switch ON and OFF several times and check that each solenoid valve can be heard operating.

Note . . .

It is not possible to check the operation of the pressure switches on the aircraft, but the wiring may be checked by disconnecting the plug at each pressure switch in turn, bridging pins 1 and 2 with a short length of wire and checking that the warning lamp comes on. Ensure that the bridging wire is removed and all pressure switches are connected up on completion of this test.

Air/nitrogen reducing valve heaters (Mod. 2107)

48. (1) Connect up both 112-volt and 28-volt external supplies.

(2) Select the 24-volt battery switch to ON.

(3) Feel the heater muffs and check that they are heating up.

(4) If suspect, disconnect the external supplies and check the operation of the relay for the suspect heater.

Note . . .

These heaters are on at all times when full power is connected to the aircraft.

Refuelling valves

49. Checks on these circuits depend upon whether access can be obtained to the inside of the fuel tanks or cells. If access to the inside of the fuel tanks is possible:—

(1) Open the access doors at the pressure refuelling points.

(2) Select each tank refuelling switch in turn to ON.

(3) Enter the associated tank and alternately raise and lower the float switch checking audibily that the associated refuelling valve operates positively.

(4) Return the switch to OFF.

(5) Ensure that all switches are at OFF before closing the access doors at the refuelling points.

If access to the inside of the tanks is not possible:—

(1) Select each refuelling switch to ON in turn, check that the associated refuelling valve can be heard to operate.

(2) Select the refuelling switch to OFF and check that the refuelling valve can be heard to close.

Note . . .

1. *If the fuel tanks are full then the above check will not be possible as the float switch contacts will be broken. Sufficient fuel will have to be drained off to allow the float switch contacts to make.*

2. *If the bomb bay and underwing tanks are not fitted, the circuits will have to be checked with the aid of* 24*-volt test lamps connected to pins A and B (earth) of the 6-pin plug in the forward end of the bomb bay for the bomb bay tank and to pins E and structure (earth) of the 6-pin yellow plug in each wing/stalk junction box for the underwing tanks.*

50. The refuelling valve circuits for the fuselage No. 1 and reserve tanks should also be checked by operating the BOMB BAY TRANSFER and FUSELAGE TRANSFER switches on the pilots' fuel panel as follows:—

(1) Remove fuses 63 and 65 from panel E (these are for the bomb bay and transfer tank pumps).

(2) Select the BOMB BAY TRANSFER switch to ON (MAIN ON and AUX. ON post Mod. 2444) and check that the fuselage No. 1 and reserve tank refuelling valves can be heard to open.

(3) Select the switch to OFF and check that both refuelling valves can be heard to close.

(4) Repeat items 2 and 3 using the FUSELAGE TRANSFER switch.

(5) If the refuelling valves do not operate satisfactorily, check the operation of the auxiliary tanks refuelling valve relay Type S2.

(6) Ensure that both switches are at OFF and replace fuses 63 and 65 in panel E.

51. The refuelling valve circuits for the port and starboard wing tanks should also be checked by operation of the port and starboard underwing tank selector switches on the pilots' fuel panel as follows:—

(1) Remove fuses 4 and 14 from panel F (these are for the underwing tank pumps).

(2) Operate the STARBOARD UNDERWING TANK selector switch to MOTOR ON and check that the refuelling valves in the two wing tanks can be heard to open.

(3) Operate the switch to OFF and check that the two refuelling valves can be heard to close.

(4) Repeat items 2 and 3 but select MOTOR TRIP—EMERGENCY ON.

(5) If the operation of the circuit is suspect, check the operation of the starboard underwing selector relay, Type Q.

(6) Repeat items 2 to 5 for the port system.

Underwing tanks fuel transfer system

53. If the tanks are fitted to the aircraft, the pump may be tested as follows:—

(1) Check H.P. cocks closed, wing fuel transfer cocks OFF, crossfeed cocks OFF, engine master cocks OFF, L.P. warning lamps on, fuel in tanks.

(2) Remove fuses 3 and 13 from panel F (these are for the wing tanks refuelling valves).

(3) Check the circuit fuses and connect 28-volt and 112-volt d.c. supplies to the external connection.

(4) Select the STARBOARD UNDERWING TANK selector switch to MOTOR ON, and check that the pump runs satisfactorily, check that the relative L.P. warning lamp goes out. Post Mod. 2784, check that the relative PUMP ON indicator shows WHITE.

(5) Select the switch to MOTOR TRIP. EMERGENCY ON and then to OFF and check that the pump stops. Check that the L.P. warning lamp comes on after a short delay. Post Mod. 2784 check that the relative PUMP ON indicator shows BLACK.

(6) Repeat items 3 and 4 for the port system.

Float switch and refuelling valve locations

52. The float switches and refuelling valves are not necessarily in the same tank or cell and are disposed as follows:—

Tank	Float switch	Refuelling valve
Reserve	Starboard side	Port side
No. 1 fuselage	Starboard side	Port side
No. 2 fuselage	Port side	Starboard side
No. 3 fuselage	Starboard side	Starboard side
Transfer	Starboard side	Starboard side
Bomb bay	Both in the single tank	——
No. 1 wing	Inboard cell	Inboard cell
No. 2 wing	Inboard cell	Inboard cell
Underwing	In tank	In wing stalk

Note . . .

The pumps must be run no longer than absolutely necessary to ensure satisfactory operation (2 minutes, and must NOT be run again before 30 minutes have elapsed), unless blast cooling is applied. These pumps are very large (5 H.P.) and are liable to overheat without cooling.

54. If the tanks are not fitted, the circuit may be tested as follows:—

(1) Select the STARBOARD UNDERWING TANK switch to MOTOR ON.

(2) Check that a 28-volt test lamp lights up when connected to the red plug pin B, in the starboard wing/stalk junction box, using the structure as earth. Check that a 112-volt test lamp lights up when connected to the heavy duty terminals A and B at the starboard wing/stalk break, using the structure as earth.

(3) Select the switch to MOTOR TRIP —EMERGENCY ON.

(4) Check that a 28-volt test lamp lights up when connected to the red plug pin A, in the starboard wing/stalk junction box, using the structure as earth. Check that pin B is now ' dead.'

(5) Select the switch to OFF and check that both pins A and B of the red plug are not ' dead.'

(6) Repeat items 1 to 5 for the port side system.

(7) Ensure all switches are at OFF and that all dust covers are replaced on the junction boxes.

55. With the tanks fitted to the aircraft the operation of the air/nitrogen system solenoid valves may be tested as follows:—

(1) Ensure that the nitrogen system is turned off (the ON/OFF cock is in the nose portion of the tank).

(2) Select the STARBOARD UNDERWING TANK switch to MOTOR TRIP—EMERGENCY ON and check audibly that the valves operate. It is not possible to check the valves individually, but this check does prove continuity through the butt connector.

(3) Select the switch to OFF and check audibly that the valves close.

(4) Repeat for the port side system.

56. If the tanks are not fitted to the aircraft, the circuit may be tested as follows:—

(1) Select the STARBOARD UNDERWING TANK switch to MOTOR TRIP—EMERGENCY ON.

(2) Check that a 28-volt test lamp lights up when connected to the yellow plug pin F, in the starboard wing/stalk junction box, using the structure as earth.

(3) Select the switch OFF.

(4) Repeat for the port side system.

(5) Ensure that all switches are at OFF and that all dust covers are replaced on the junction boxes.

Underwing tanks fuel jettison

57. If this system is to be tested when the tanks are fitted to the aircraft it is necessary to empty the tanks first. Then proceed as follows:—

(1) Select the STARBOARD JETTISON switch on the port coaming panel to JETTISON, and check that the unimatic (jett) valve can be heard to operate. Check that the three jettison valves under the tank open.

(2) Select the switch to SAFE and check that the valves close.

(3) Repeat the above for the port tank system.

Water-methanol control

58. Check the system as follows:—

(1) Check the circuit fuses and connect a 28-volt d.c. supply to the external connection.

(2) Check the low pressure warning lamp filaments.

(3) Short-circuit the low level switch in the water-methanol tank with a suitable piece of wire.

(4) Select the WATER-METHANOL MASTER switch to ON and check that both aircock solenoids can be heard to operate. If suspect, check the operation of the aircock solenoid relay, Type S4.

◀(5) *Pre-Mod.* 2715—Check that all four low pressure warning lamps come on. This will only check that the wiring is correct, as without the system operating, it is not possible to open the pressure switch contacts. *Post Mod.* 2715.—The two pressure indicator lamps can only be checked by short-circuiting each pressure switch in turn.▶

(6) Disconnect the 9 pin socket from each engine minimum speed switch.

(7) With a suitable piece of wire bridge pins 3 and 4 on the 9 pin socket and check that the injection valve can be heard to operate every time the bridge is made and broken. This will check the operation of the minimum speed relay, Type S4, so that if a fault occurs on the system, it can be considered to be a fault on the minimum speed switch or its associated wiring from pins 3 and 4 on the 9 pin plug.

(8) Return the master switch to OFF.

(9) Remove the shorting link on the low level switch and reconnect the 9 pin socket.

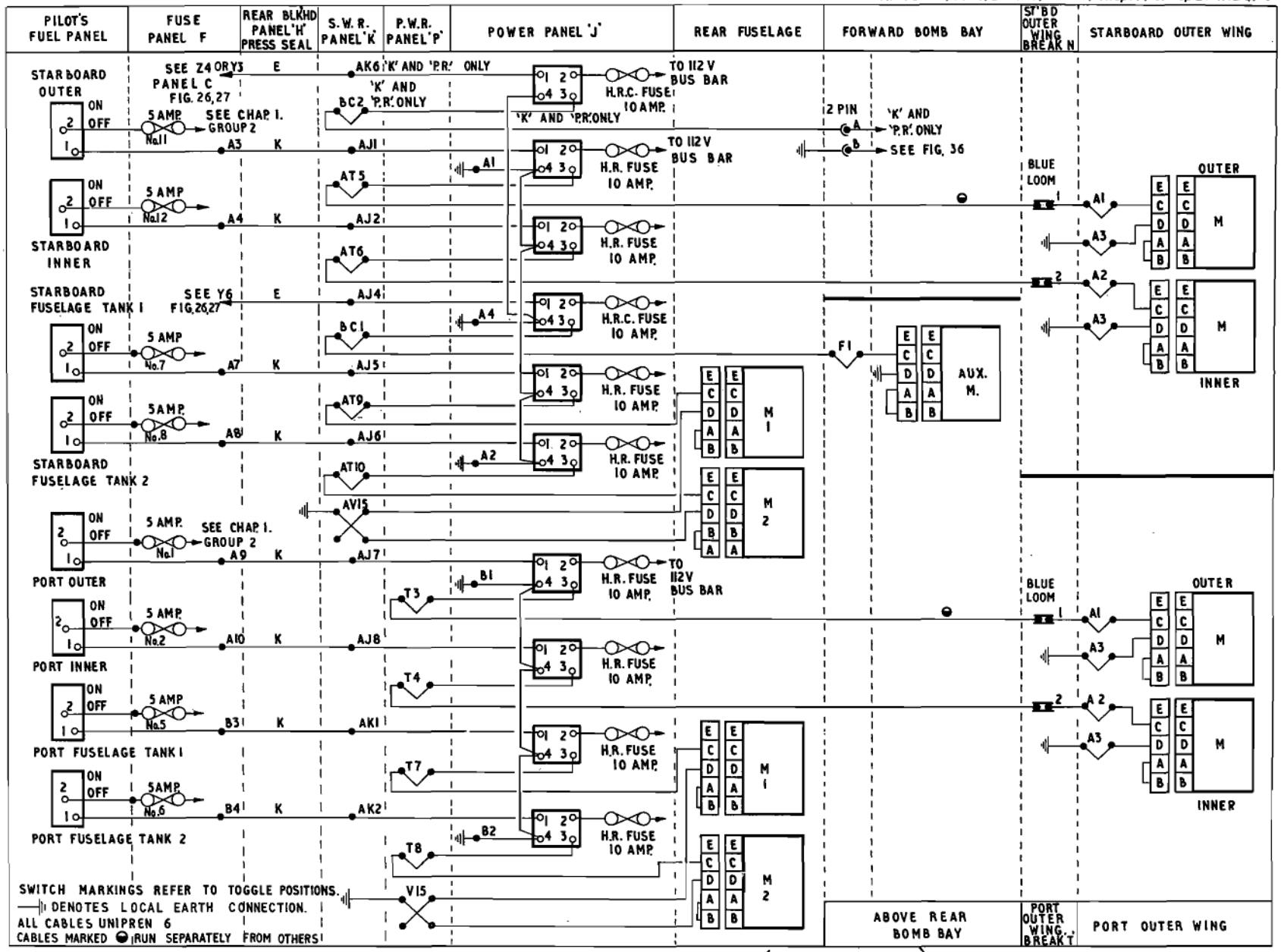

Fig. 11. Fuel pumps (post Mod 1835)

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P.R.-71036 SHT 135-D

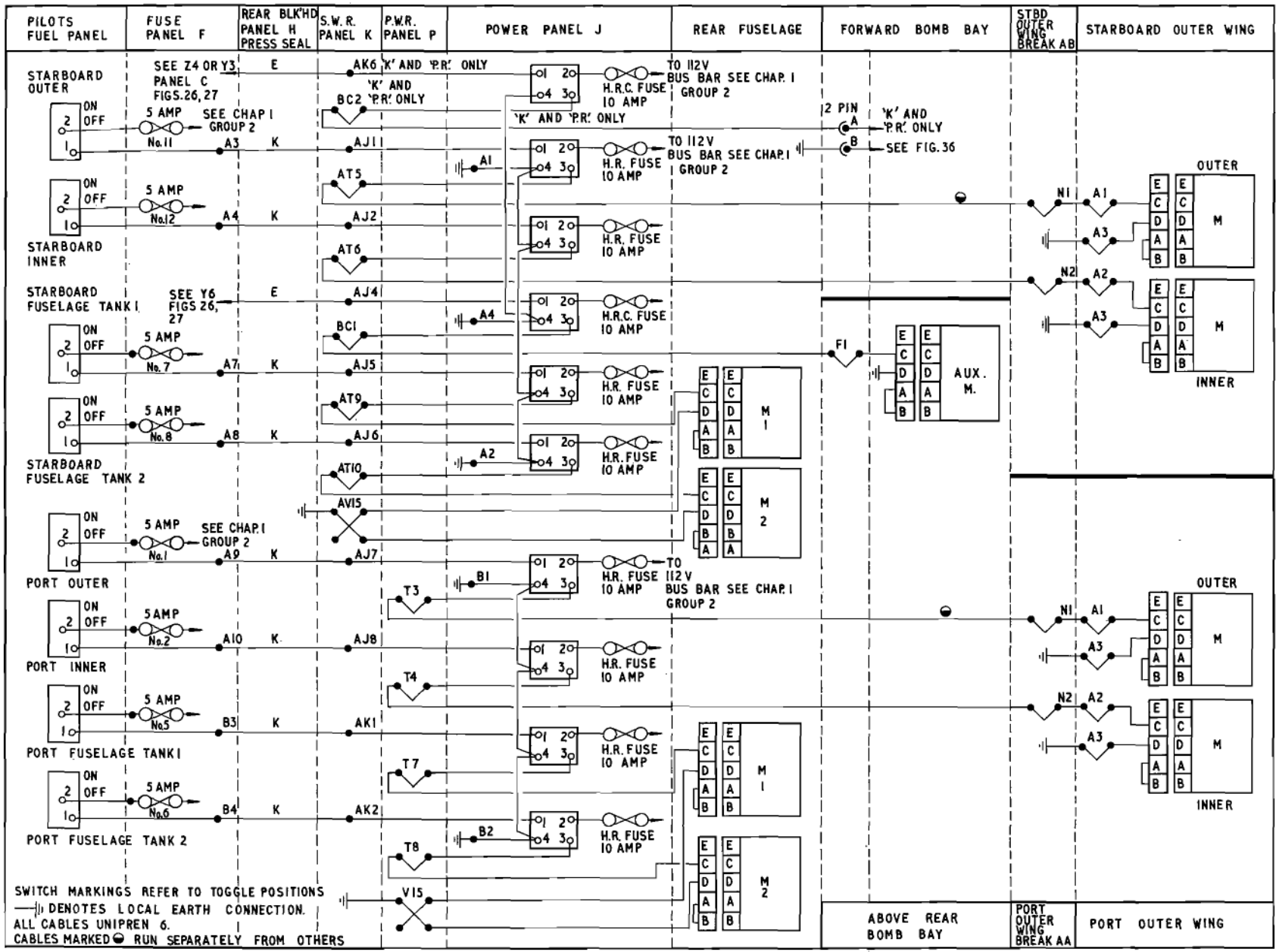

Fig. 12. Fuel pumps (post Mod. 1785, pre Mods. 2443 & 2444)

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K-75836 SHT 135-B P.R.-71036 SHT 135-E

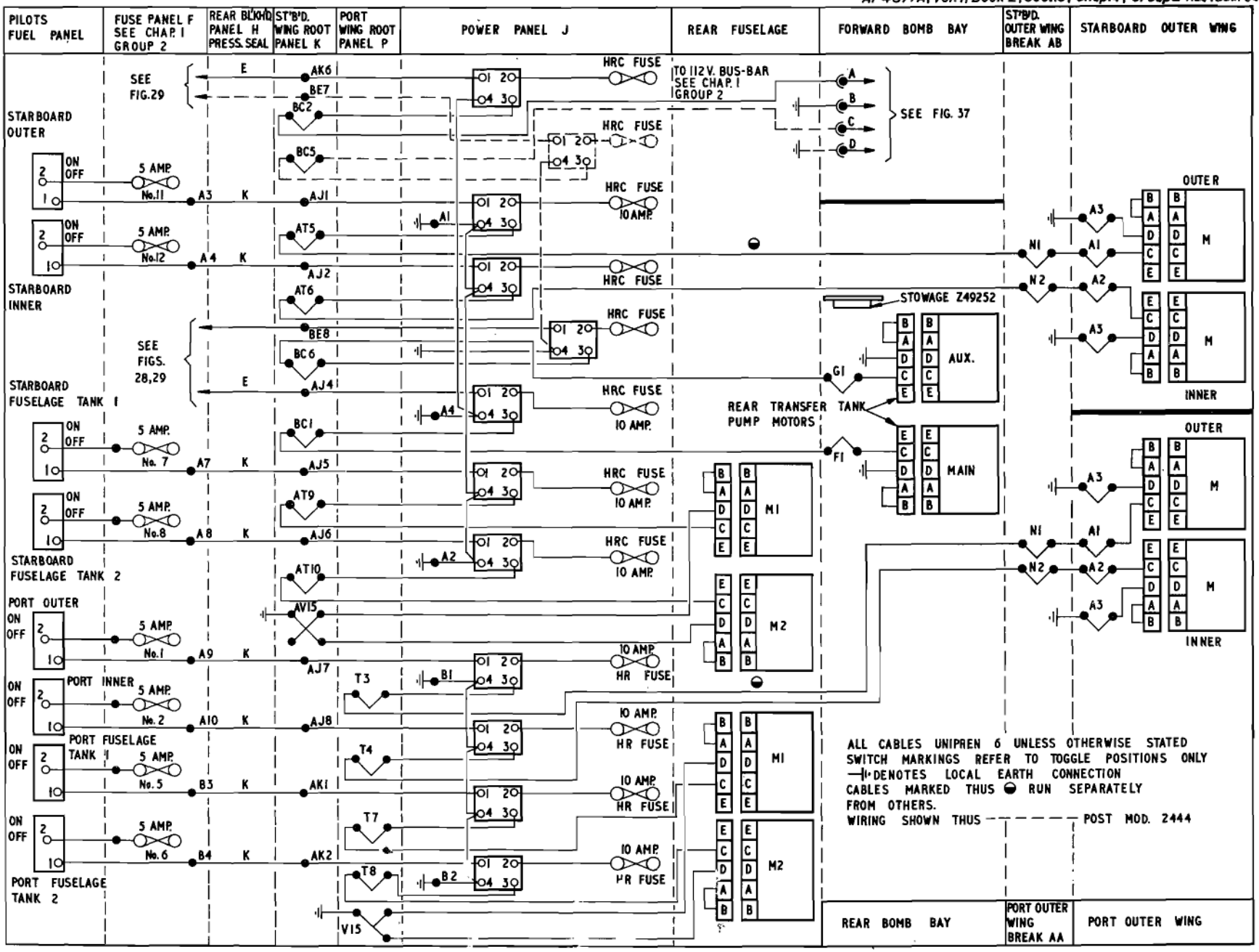

Fig. 13. Fuel pumps (post Mods. 2443 and 2444)

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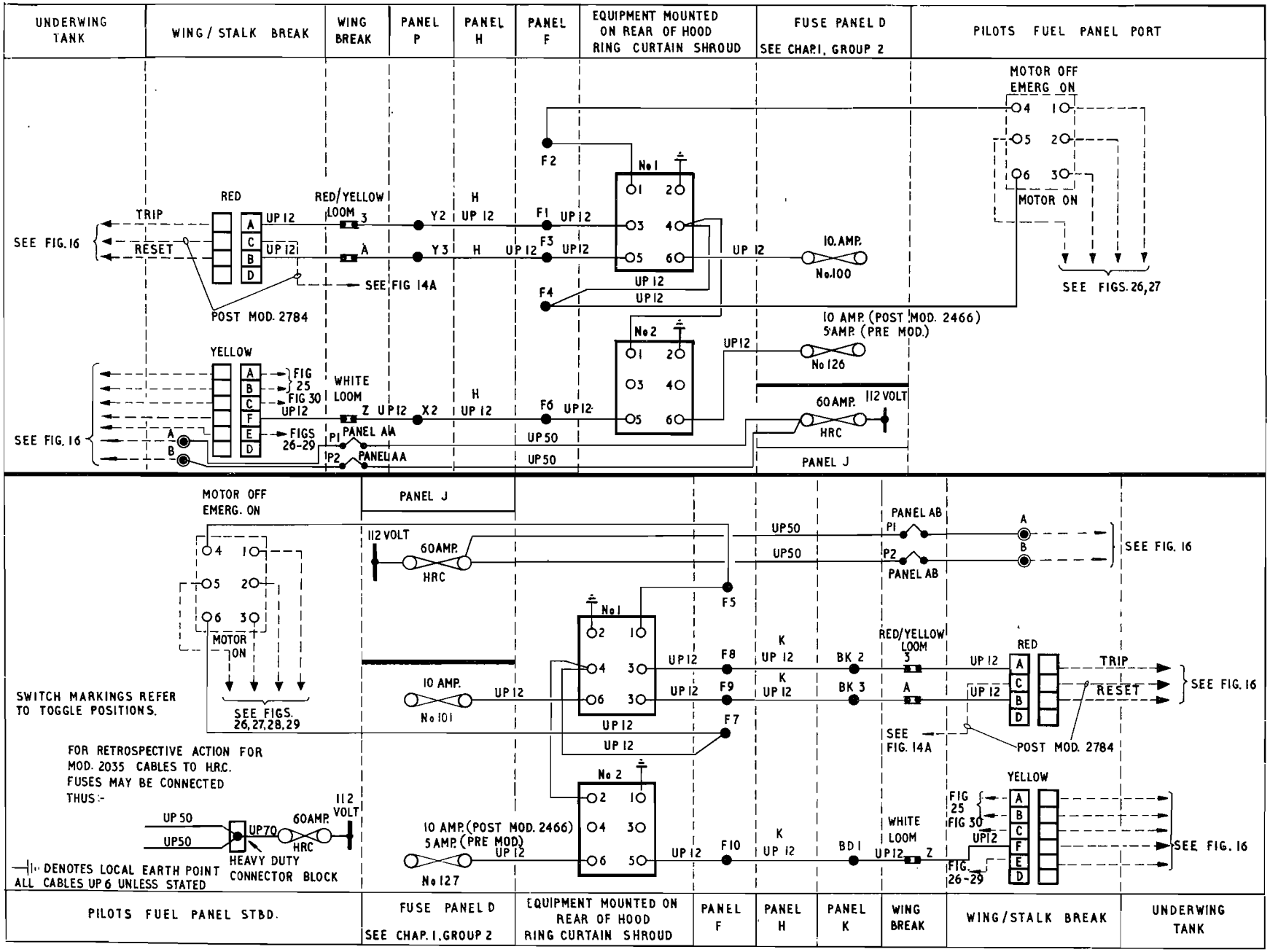

Fig. 14. Underwing tanks fuel control (post Mods 1471 & 1835)

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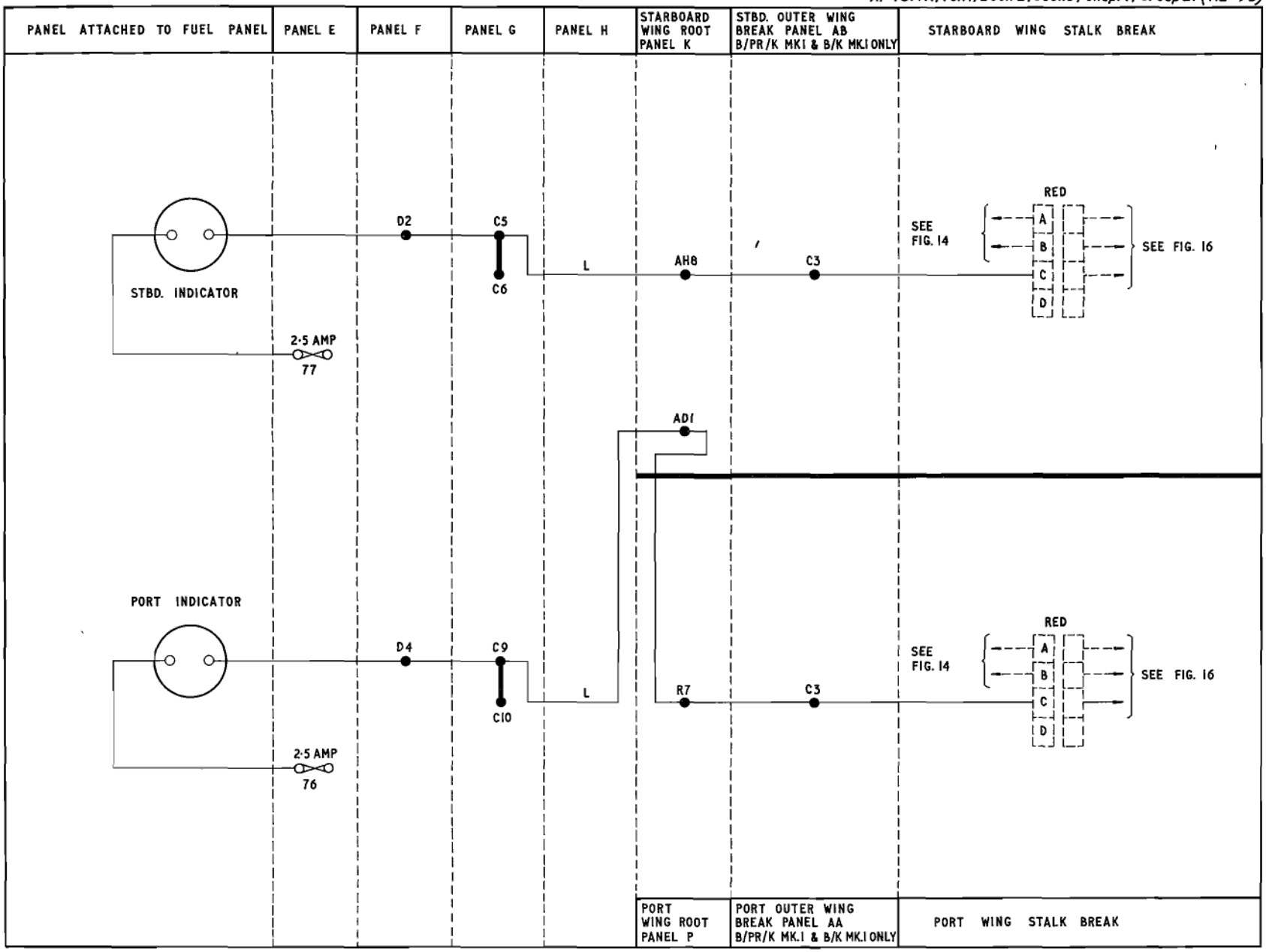

Fig. 14A. Underwing tank fuel pump indicators (Mod. 2784)

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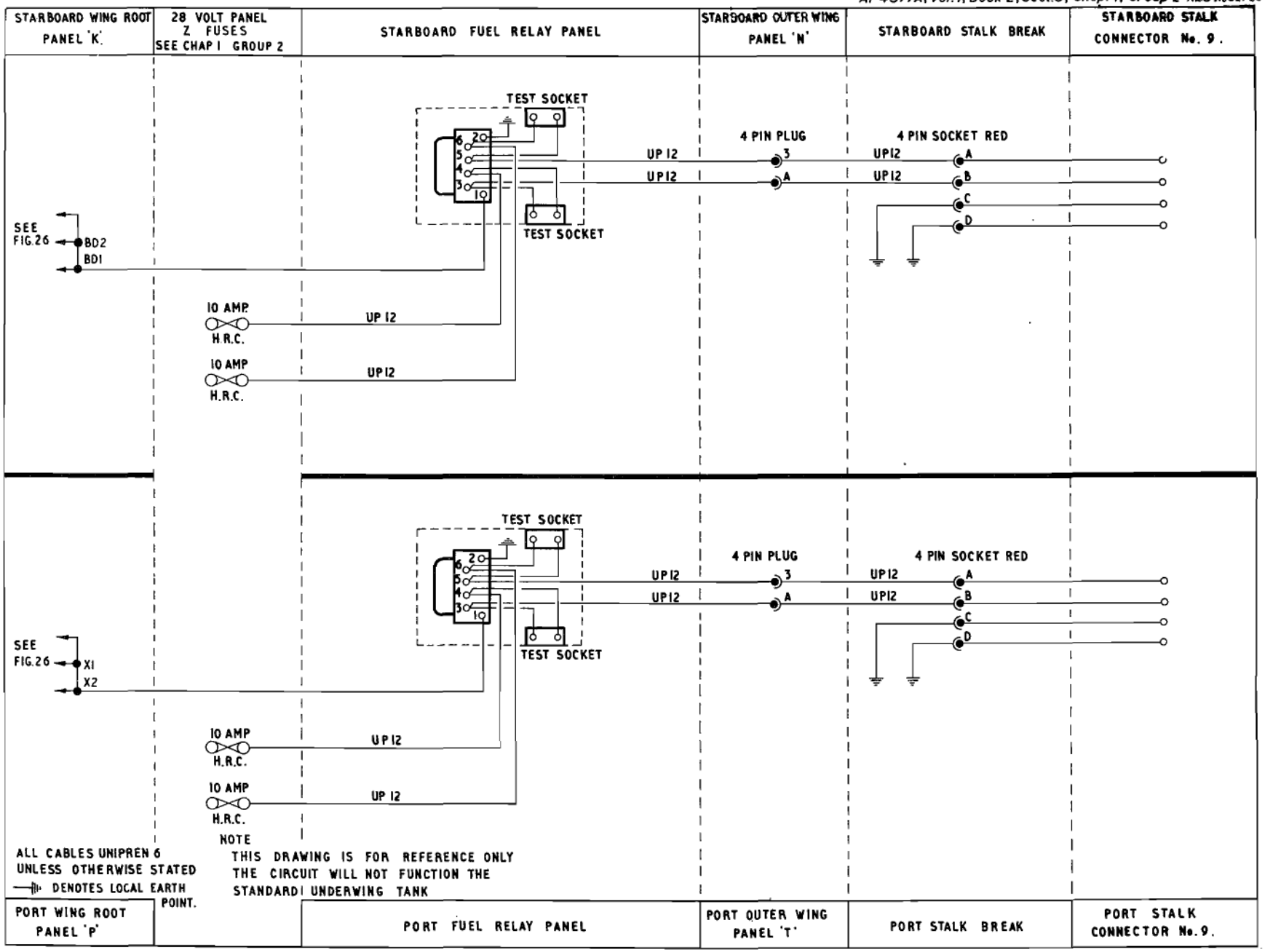

Fig. 15. Underwing tanks fuel pump control (pre mod 1471)

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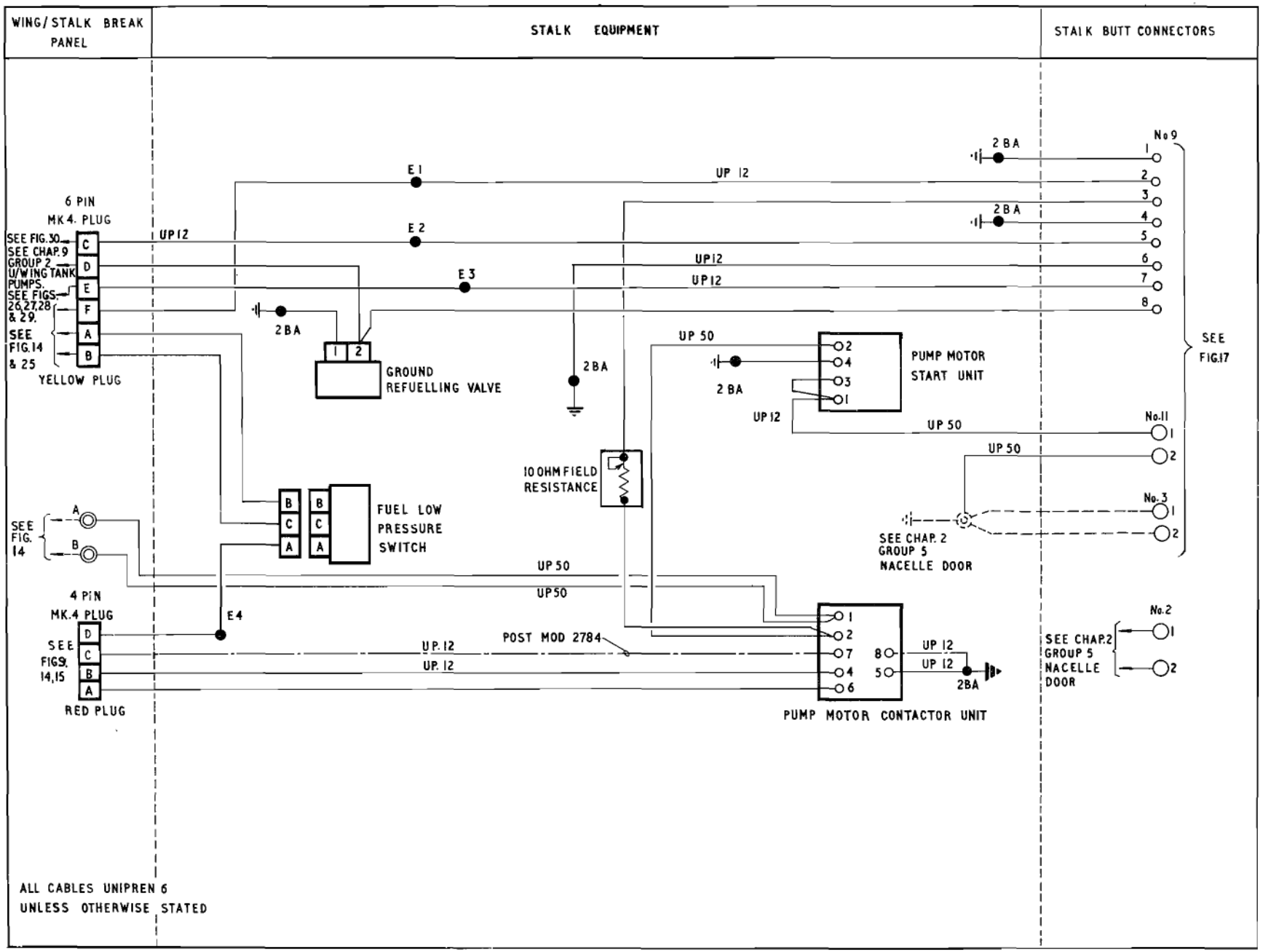

Fig. 16. Wiring in wing stalk underwing tank system

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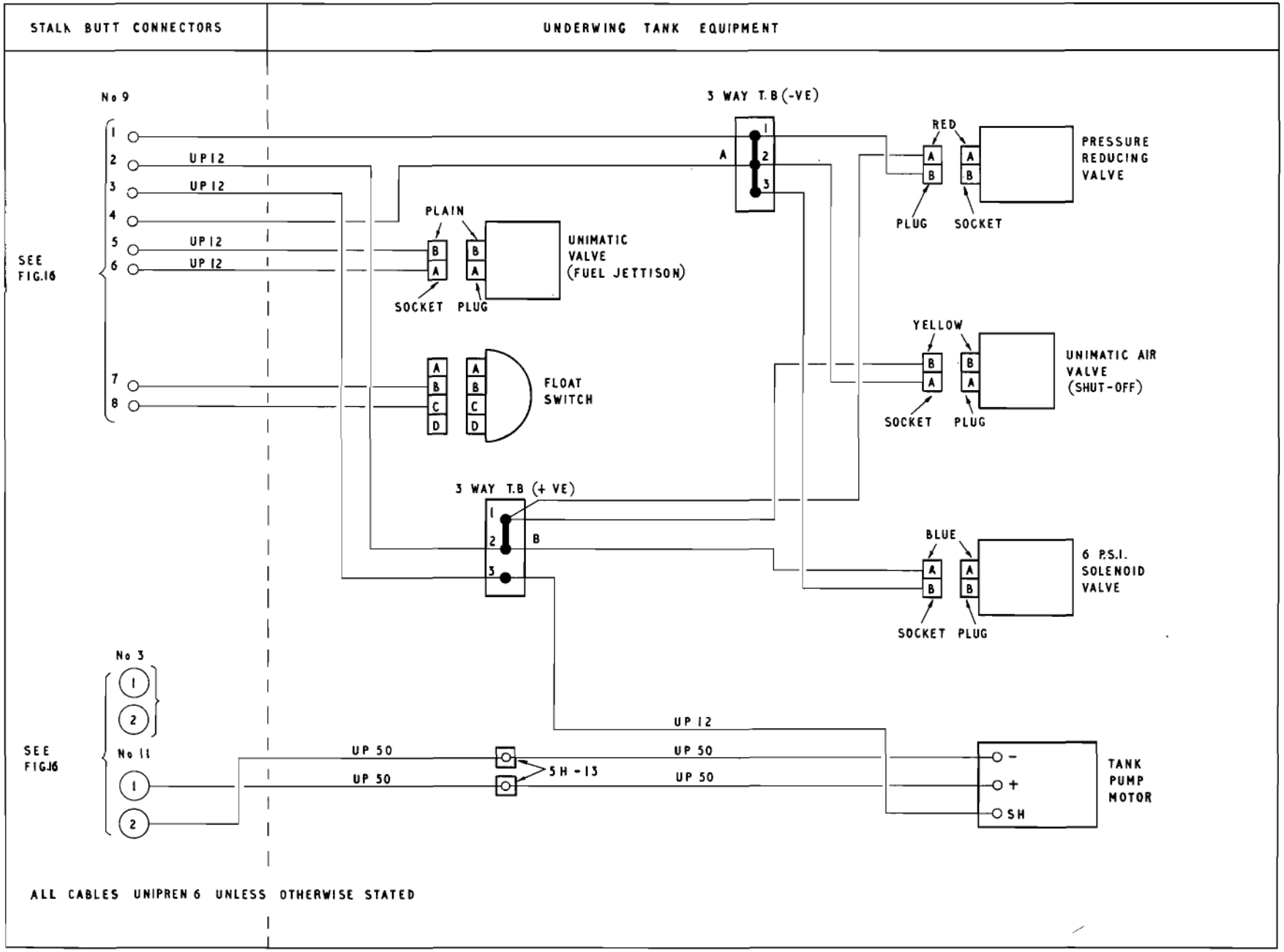

Fig. 17. Wiring in underwing tank

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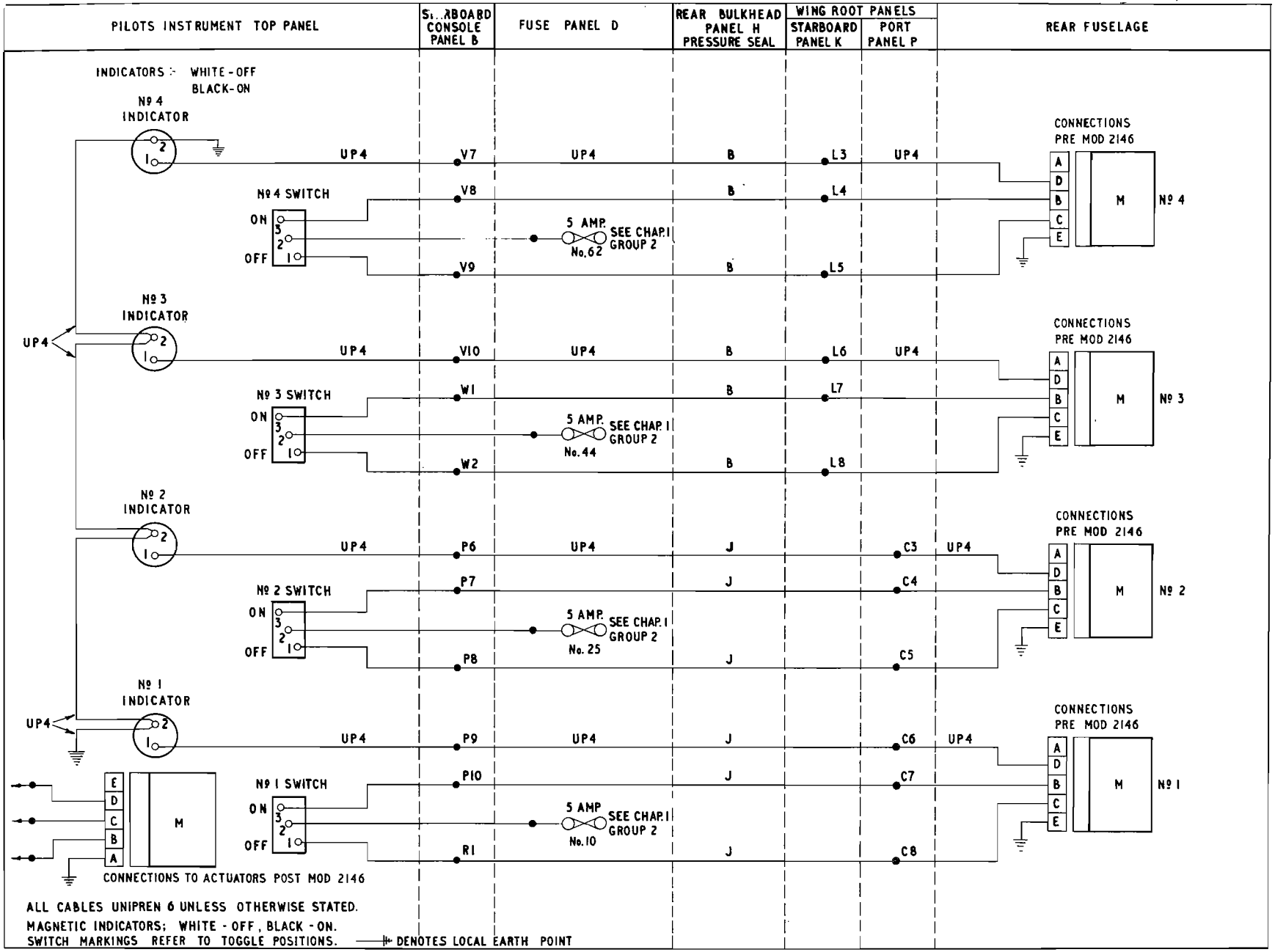

Fig. 18. Engine master fuel cocks

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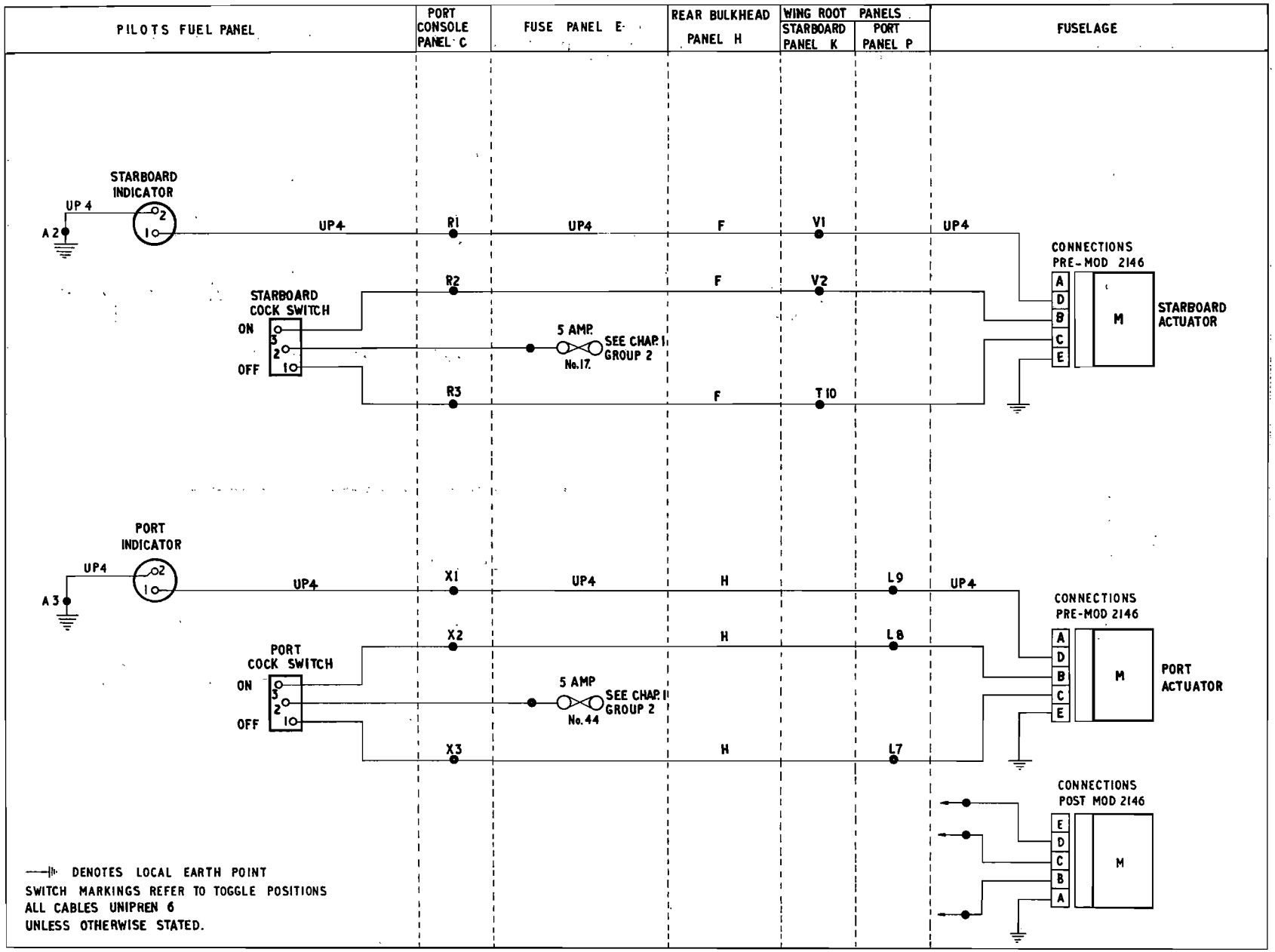

Fig. 19. Reserve fuel shut-off cocks

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(AL. 31 DEC. '58)

75836 SHT. 190-D, 67436 SHT. 190-K

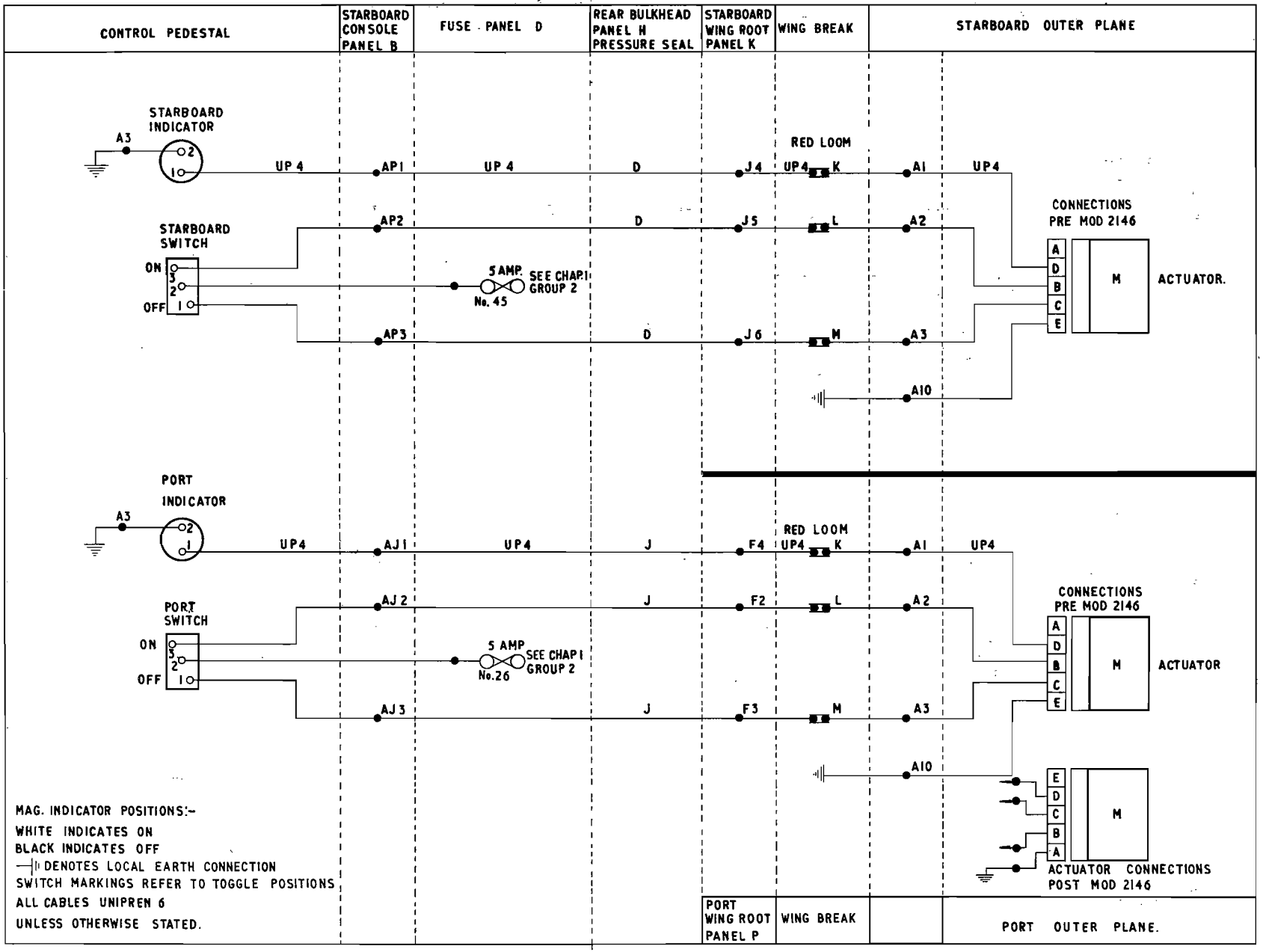

Fig. 20. Wing fuel transfer cocks (post Mod 1835)

RESTRICTED

75836 SHT 132-D, 67436SHT32-G

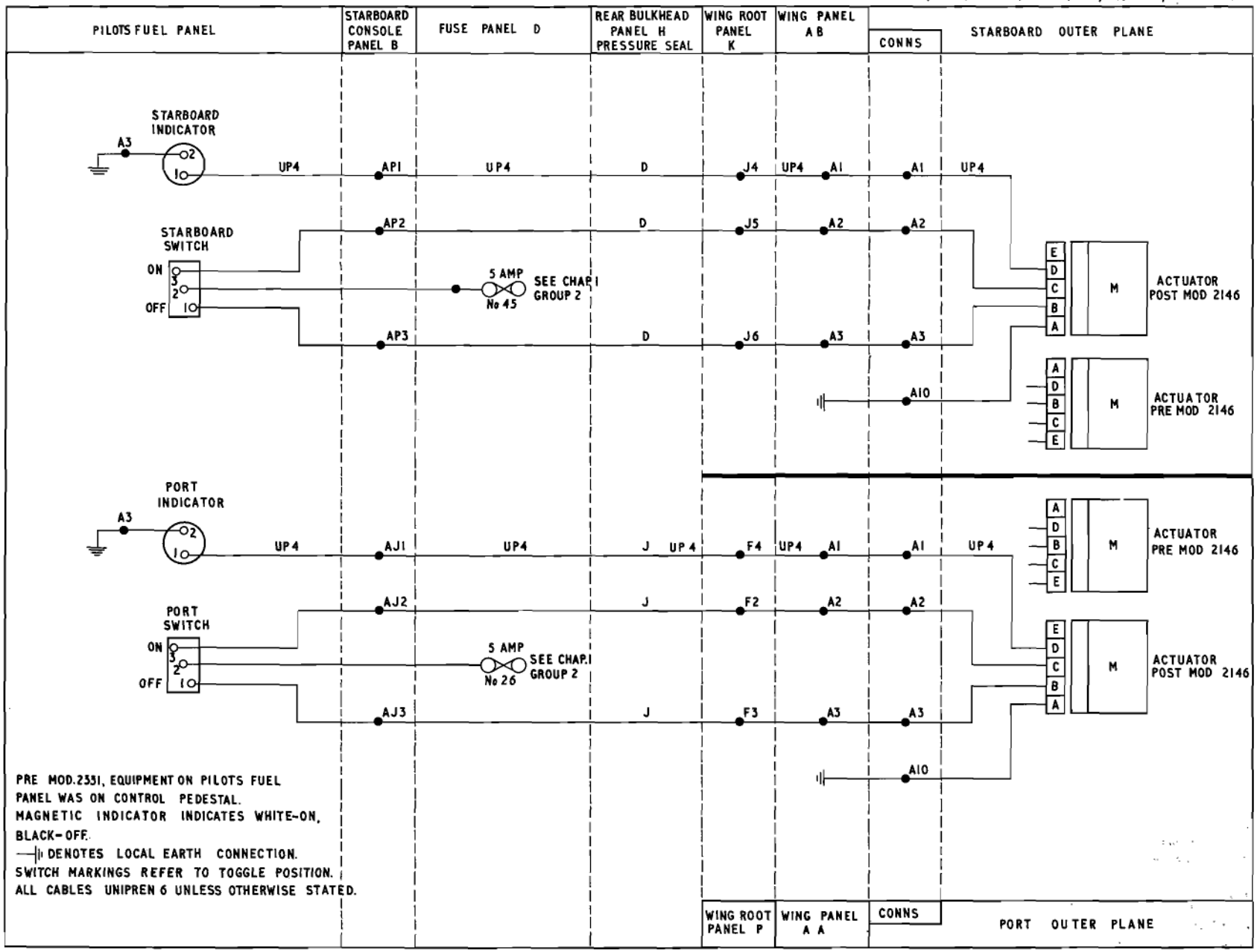

Fig. 21. Wing fuel transfer cocks (post Mod 1785)

8986 363214 4/59 631 C.B. & S. LTD. GP 924.

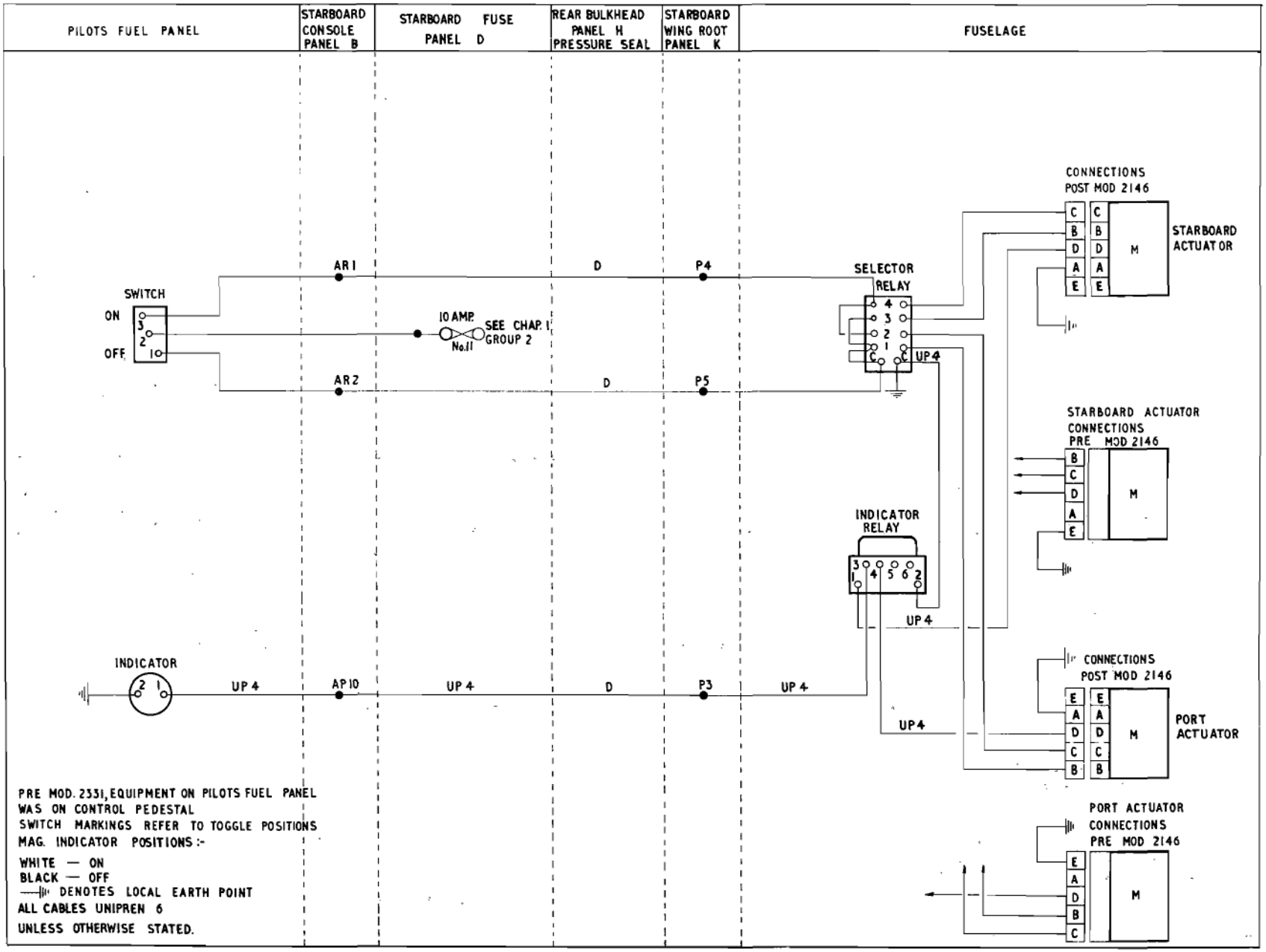

Fig. 22. Crossfeed cocks

RESTRICTED

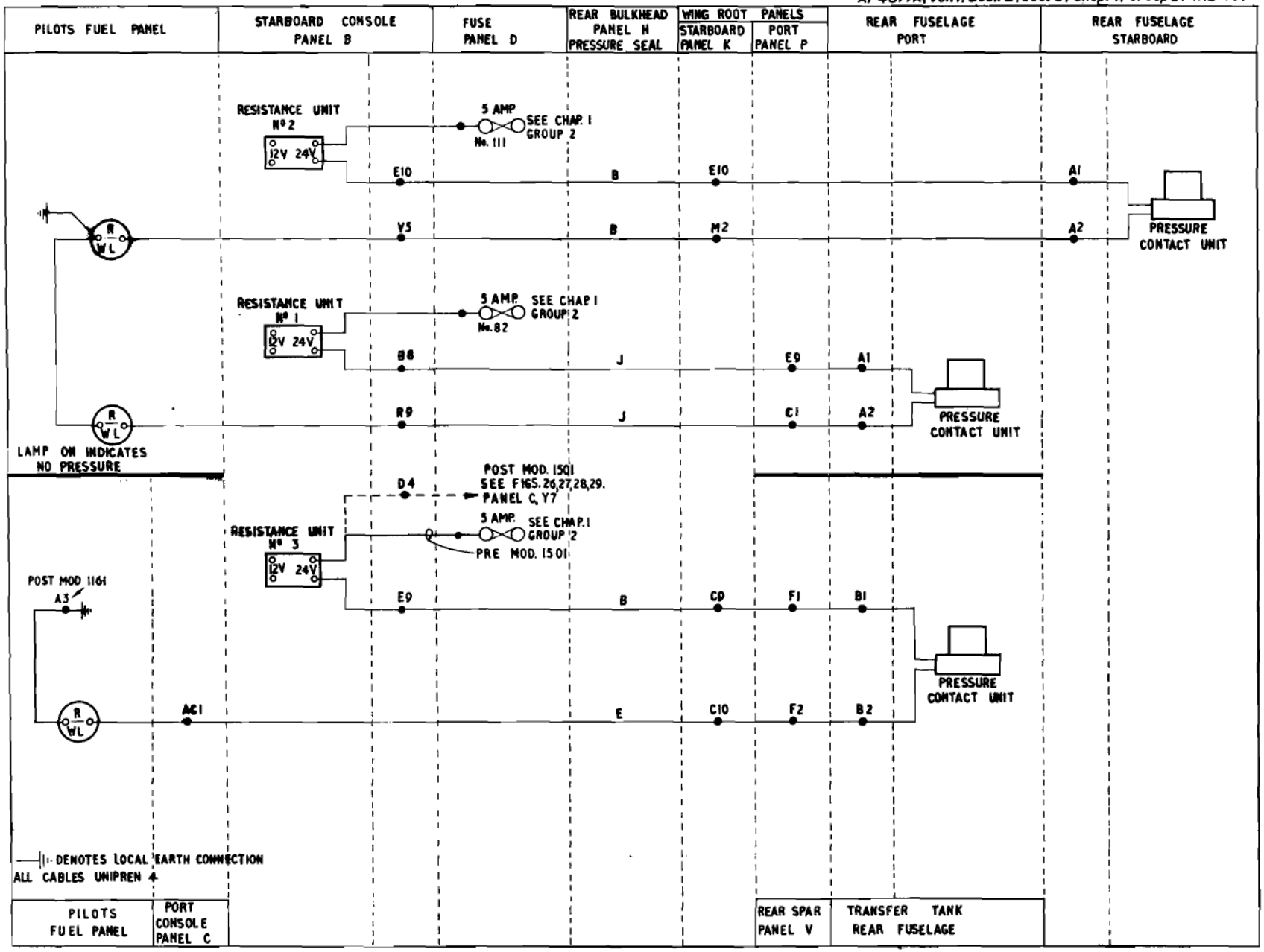

Fig. 23. Fuel pressure low warning.

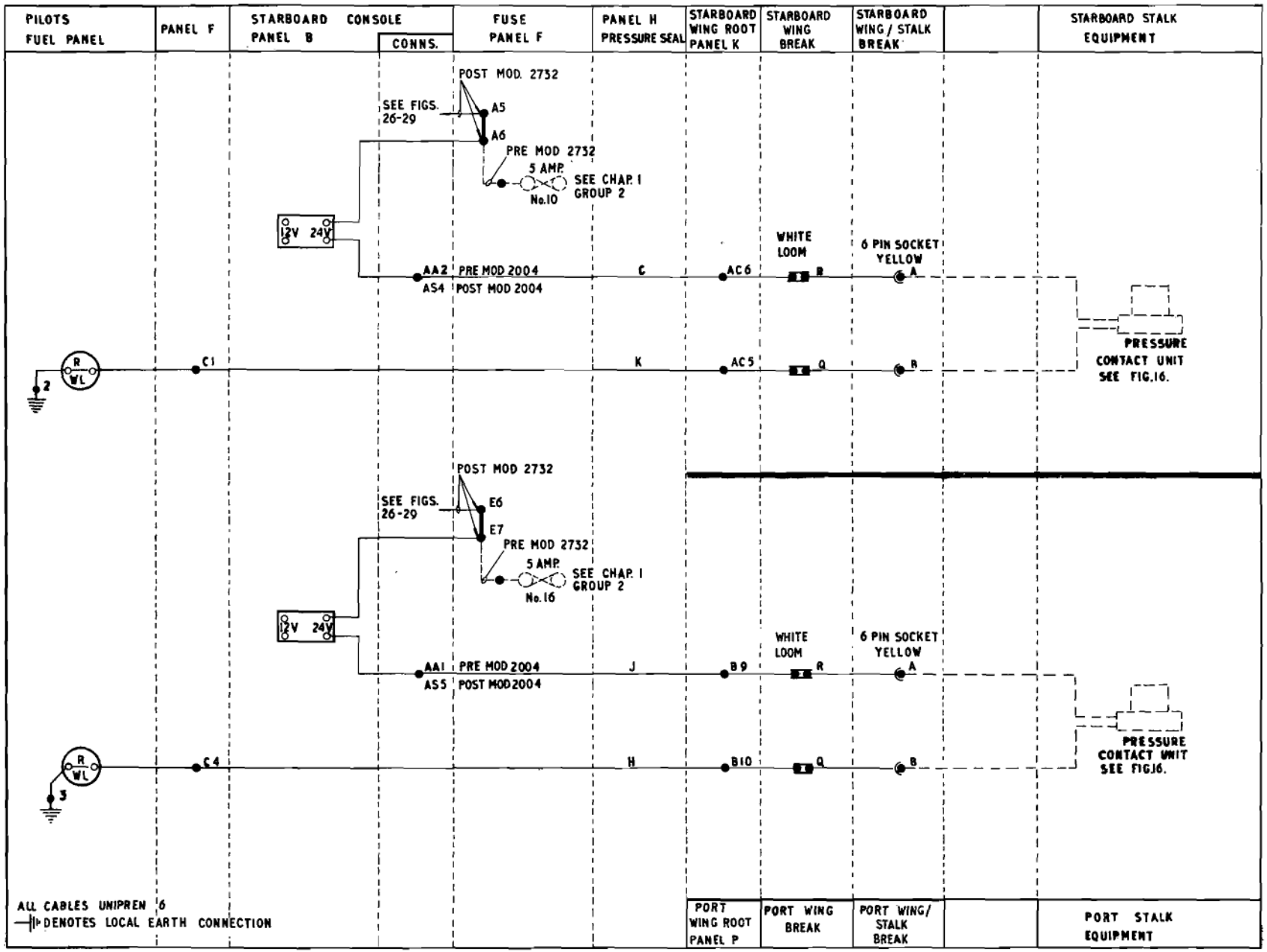

Fig. 24. Underwing tank fuel pressure low warning (post Mod 1835)

RESTRICTED

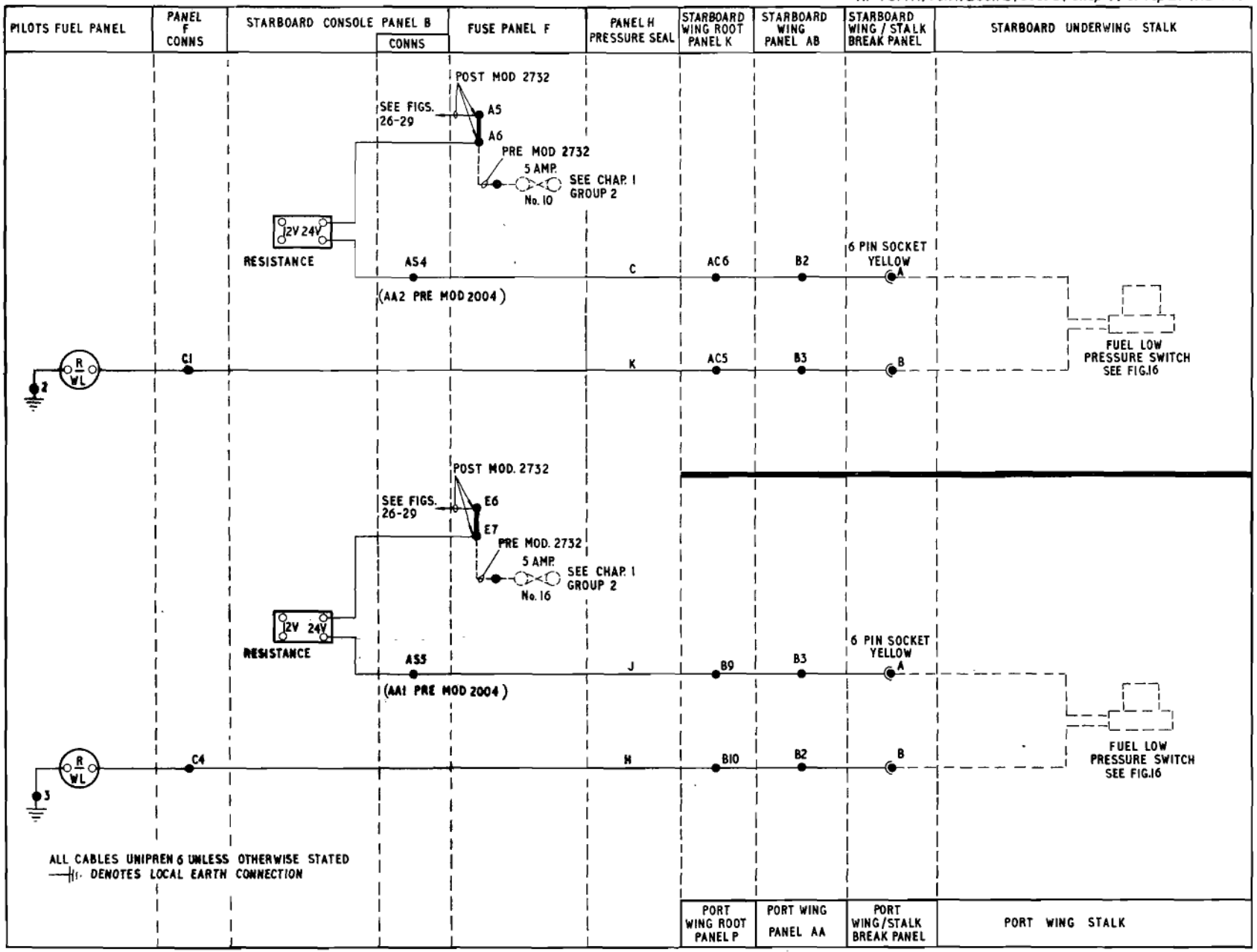

Fig. 25. Underwing tank fuel pressure low warning (post Mod 1785)

RESTRICTED

8040 455226 11/59 631 C.B.&S.L^td GP.924.

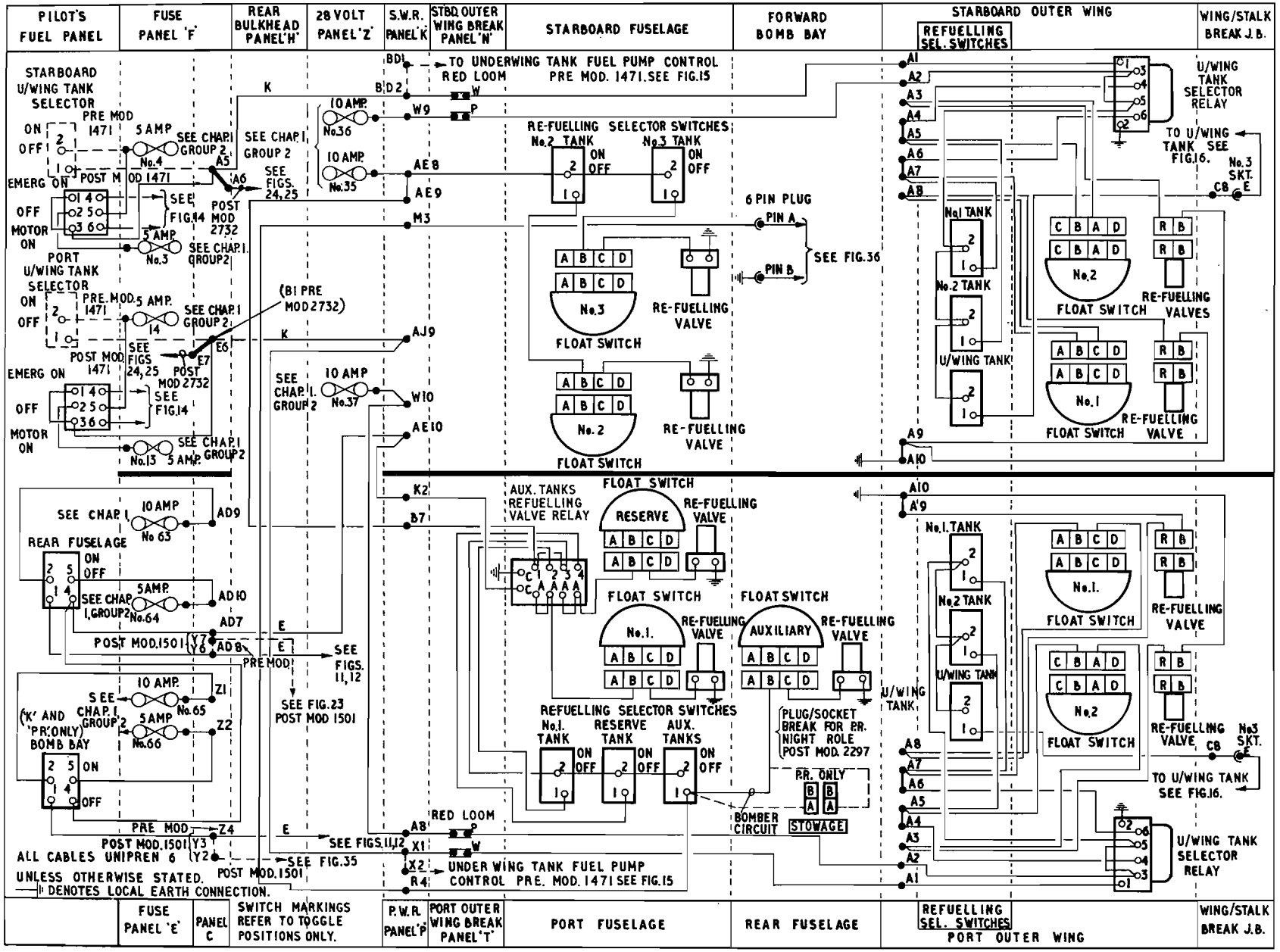

Fig. 26. Refuelling valve control (post Mod 1835)

RESTRICTED

67436 SHT 124-Y, 71036 SHT. 124-V.

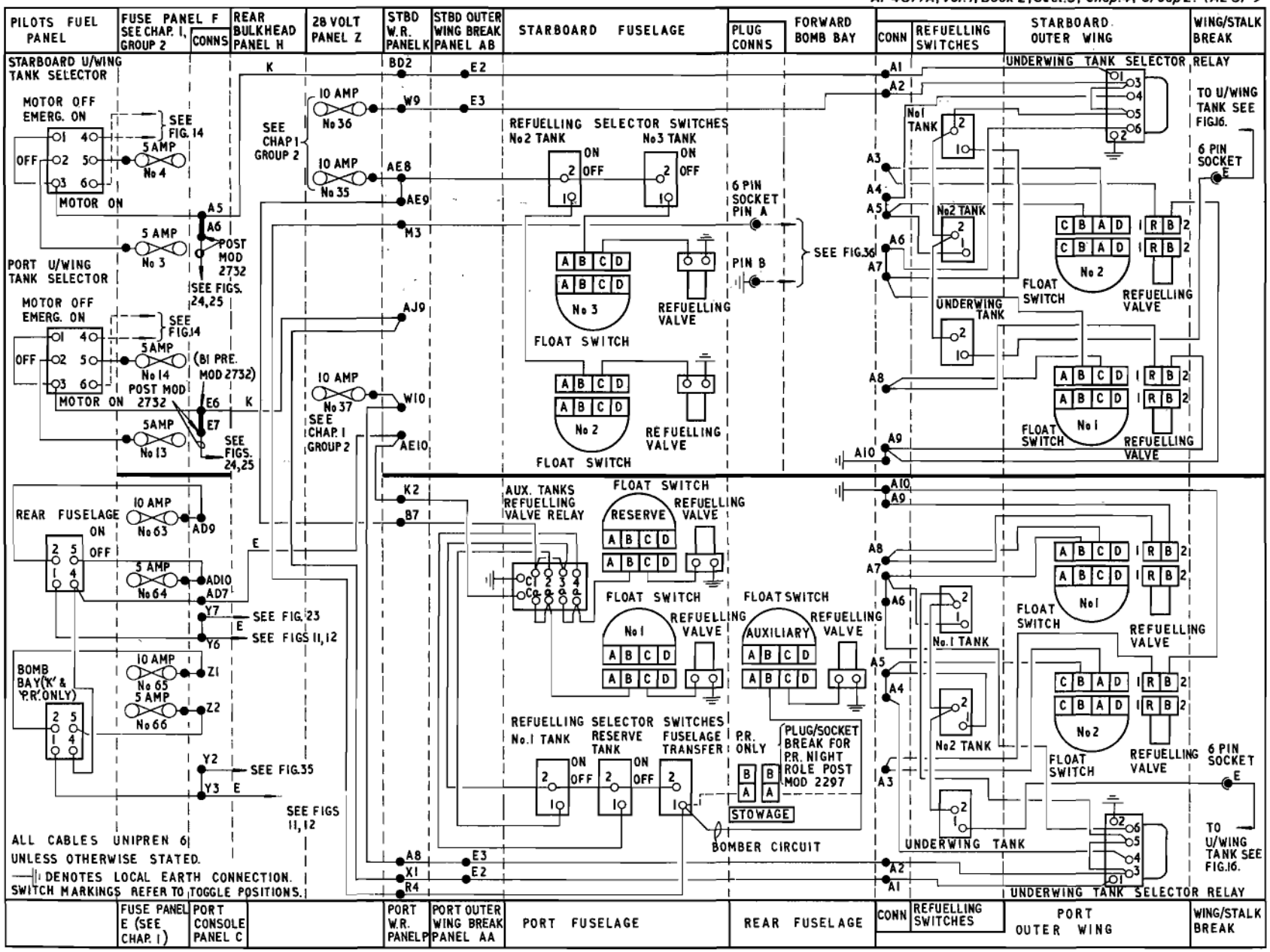

Fig. 27. Refuelling valve control (post Mod 1785, pre Mod. 2443)

RESTRICTED

8988 363214 4/59 631 C.B. & S.L^TD. GP924

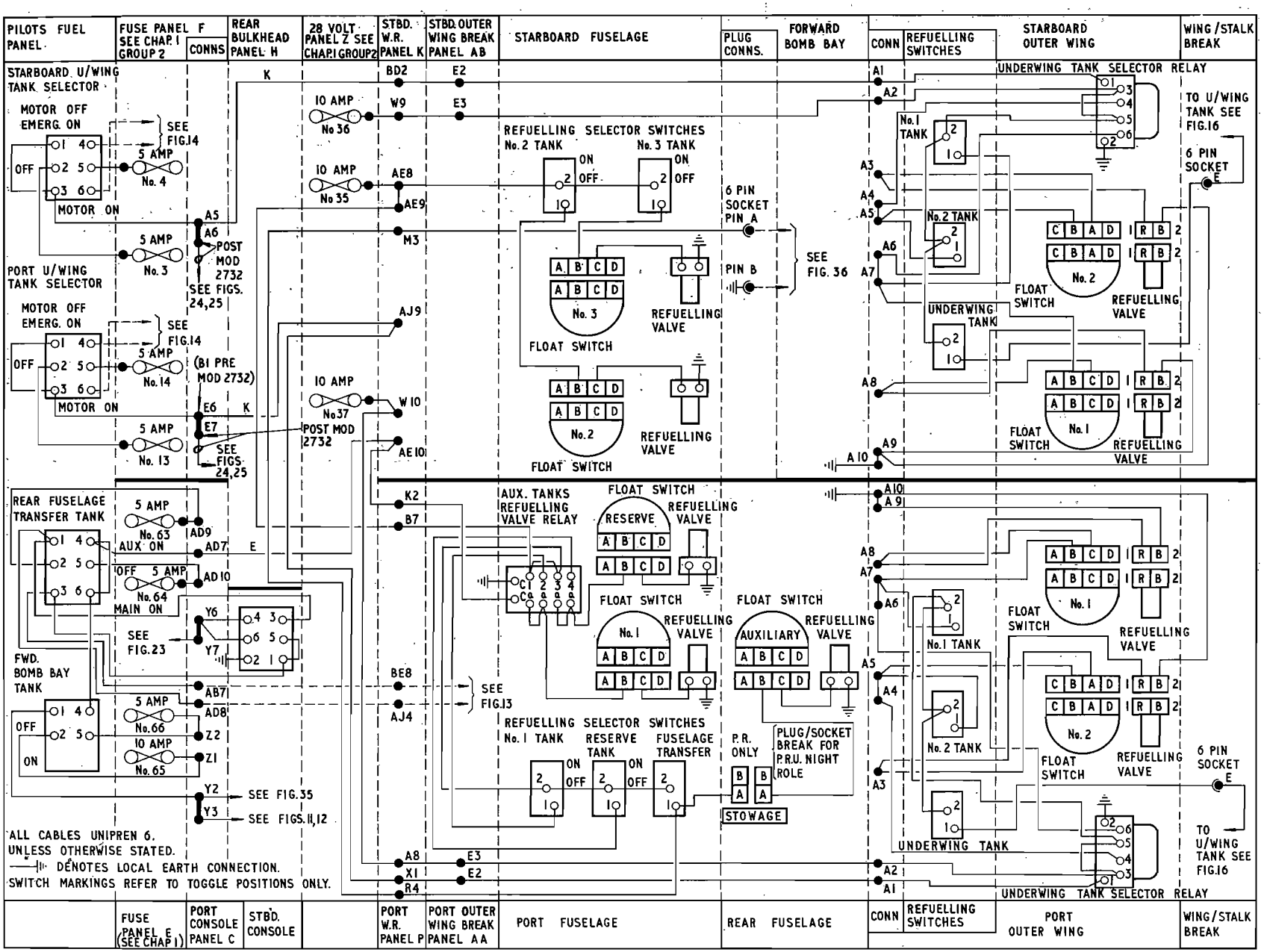

Fig 28. Refuelling valve control (post Mod. 2443 pre Mod. 2444)

RESTRICTED

71036 SHT. 124 – AA

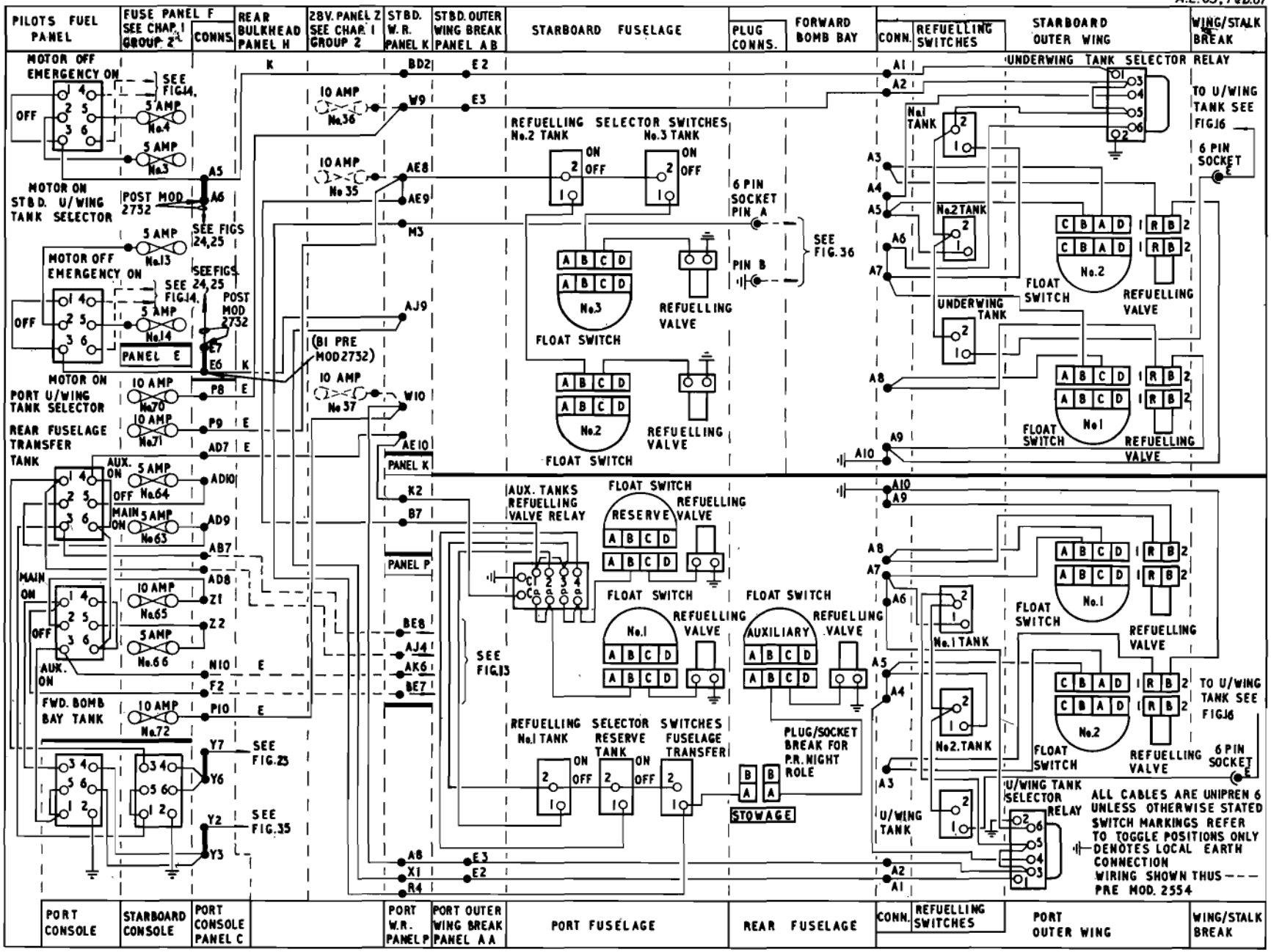

Fig. 29. Refuelling valve control (post Mod 2444 & 2554)

RESTRICTED

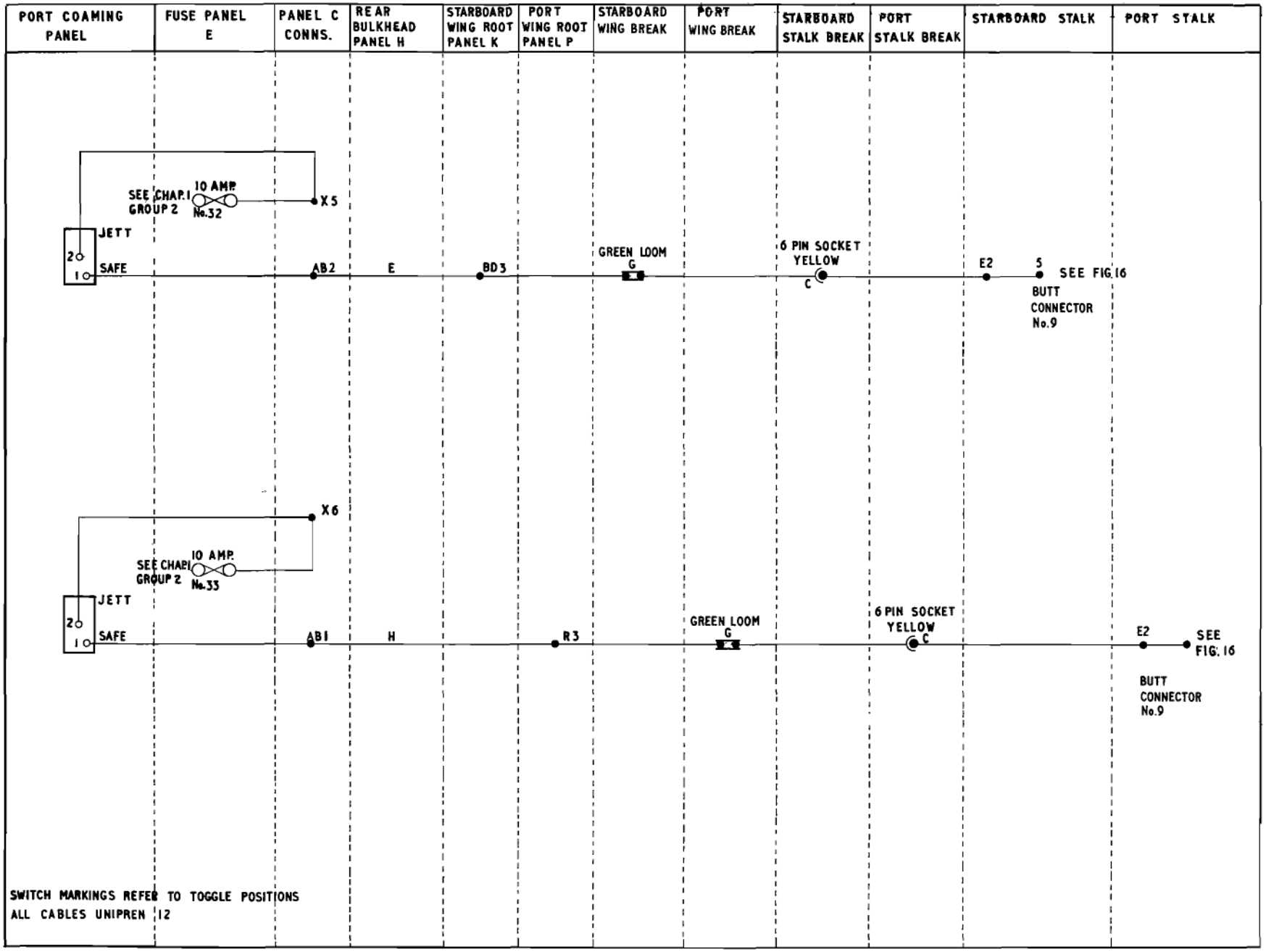

Fig. 30. Underwing tank fuel jettison (post Mod 1835)

RESTRICTED

67436 SHT 411-G

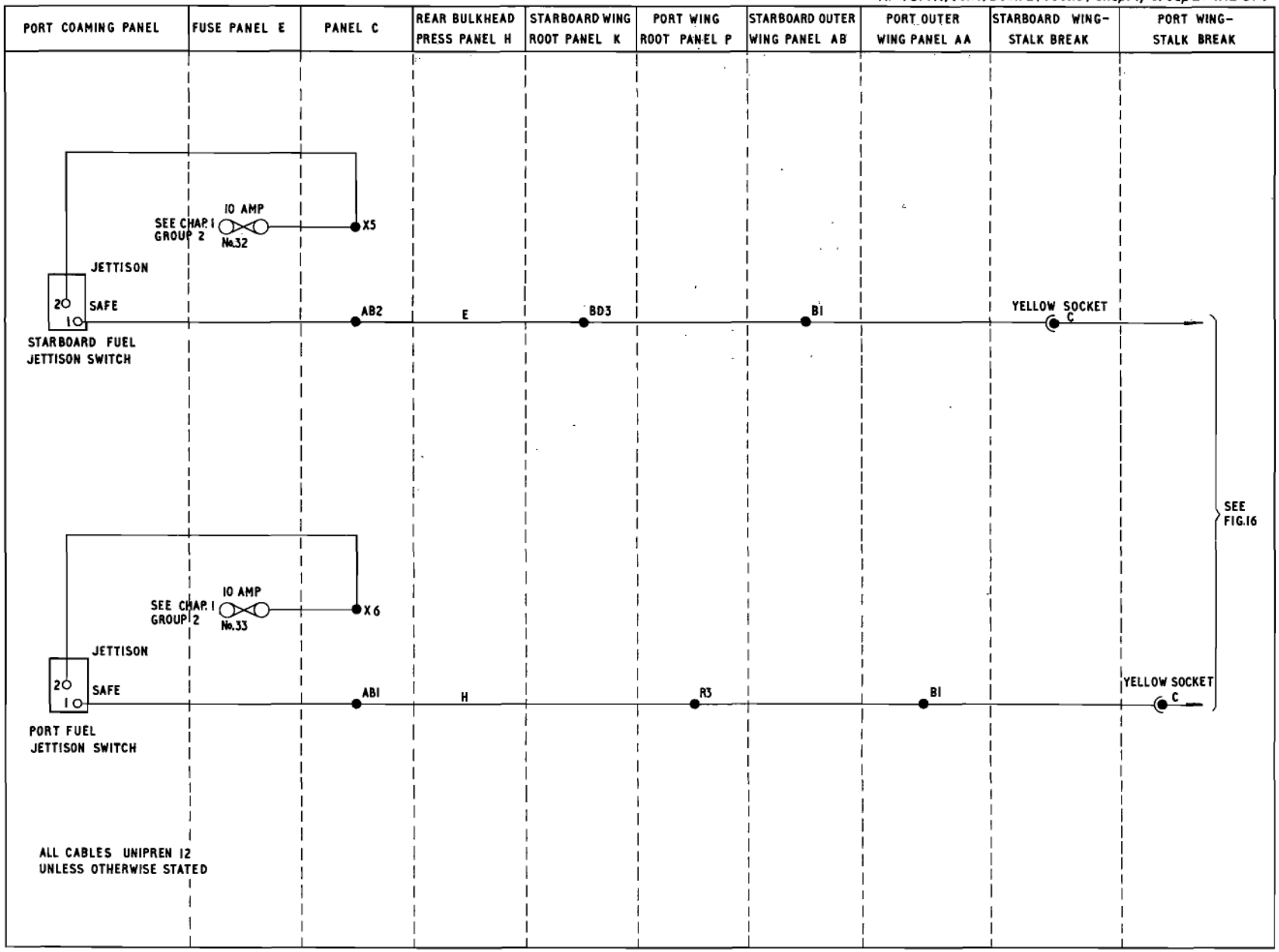

Fig. 31. Underwing tank fuel jettison (post Mod 1785)

RESTRICTED

6988 363214 4/59 631 C.B. & S.L™. GP924

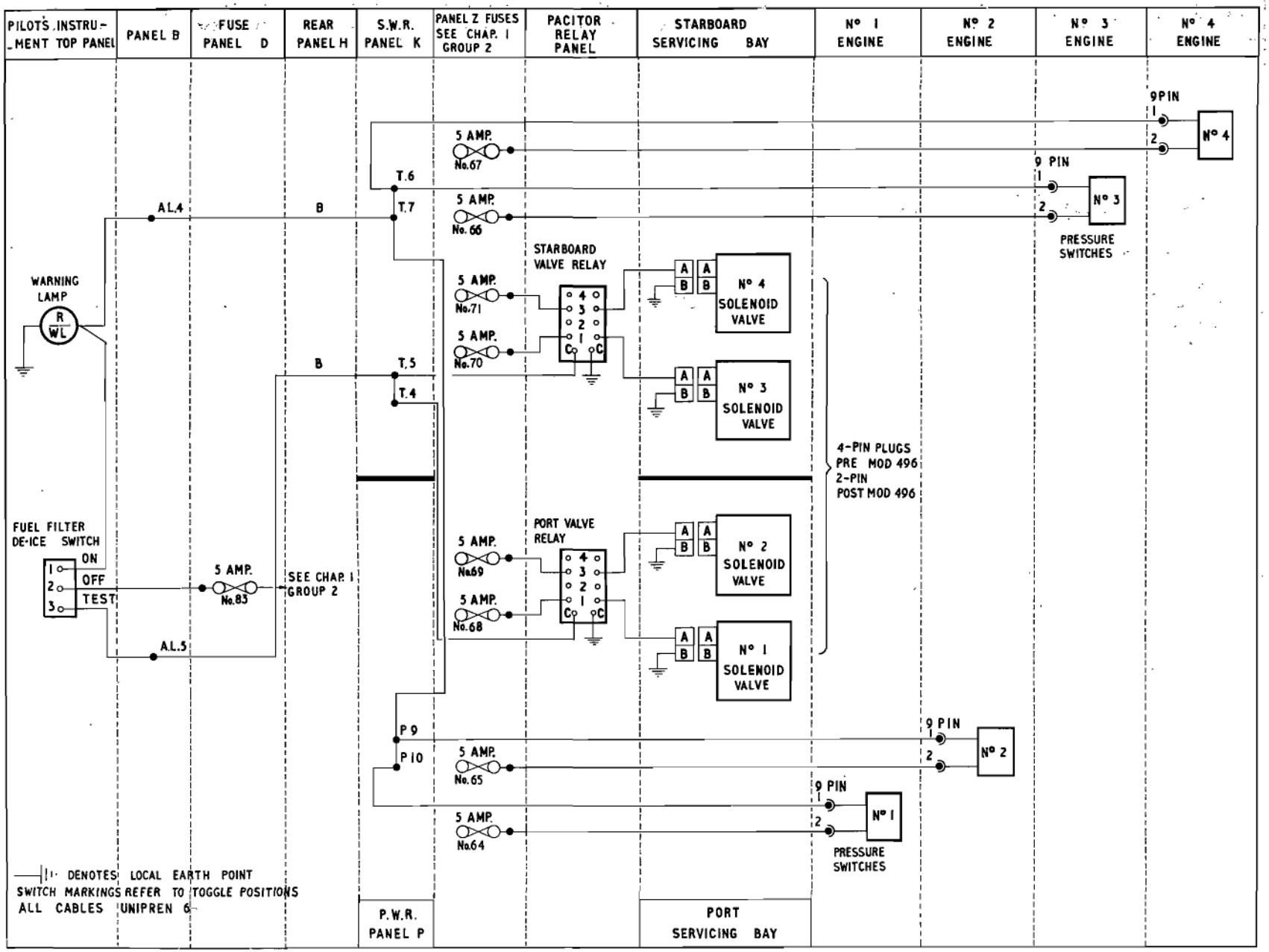

Fig. 32. Fuel filter de-icing

RESTRICTED

75836 SHT 407-B 70636 SHT. 407-E

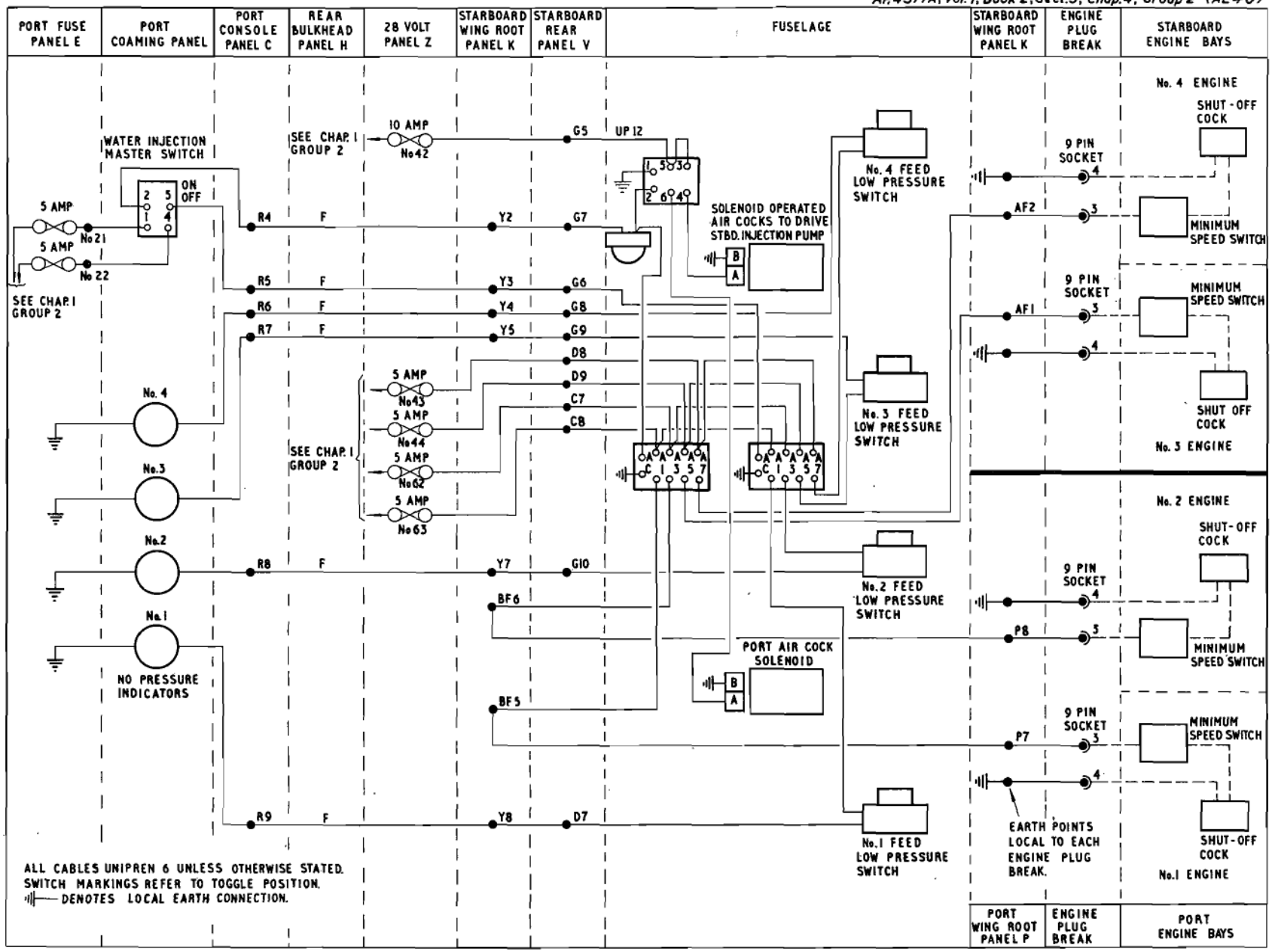

Fig. 33 Water methanol control (pre Mod. 1118)

RESTRICTED

8040 455226 11/59 631 C.B. & S. Ltd GP. 924.

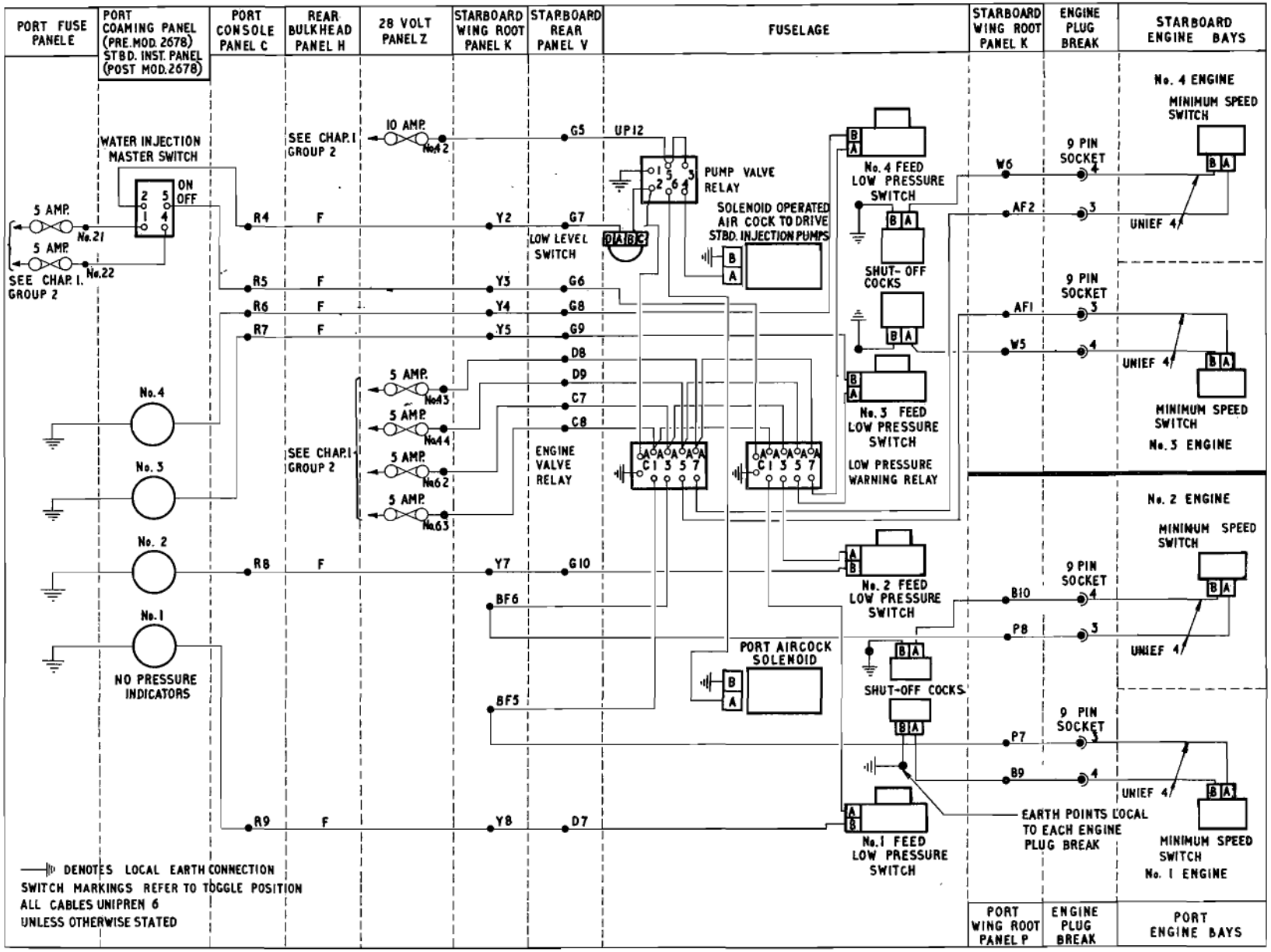

Fig. 34 Water methanol control (post Mod. 1118, pre Mod. 2715)

RESTRICTED

(75836 SHT. 176-D) 70636 SHT. 176-E
75892 SHT. 36/17-A

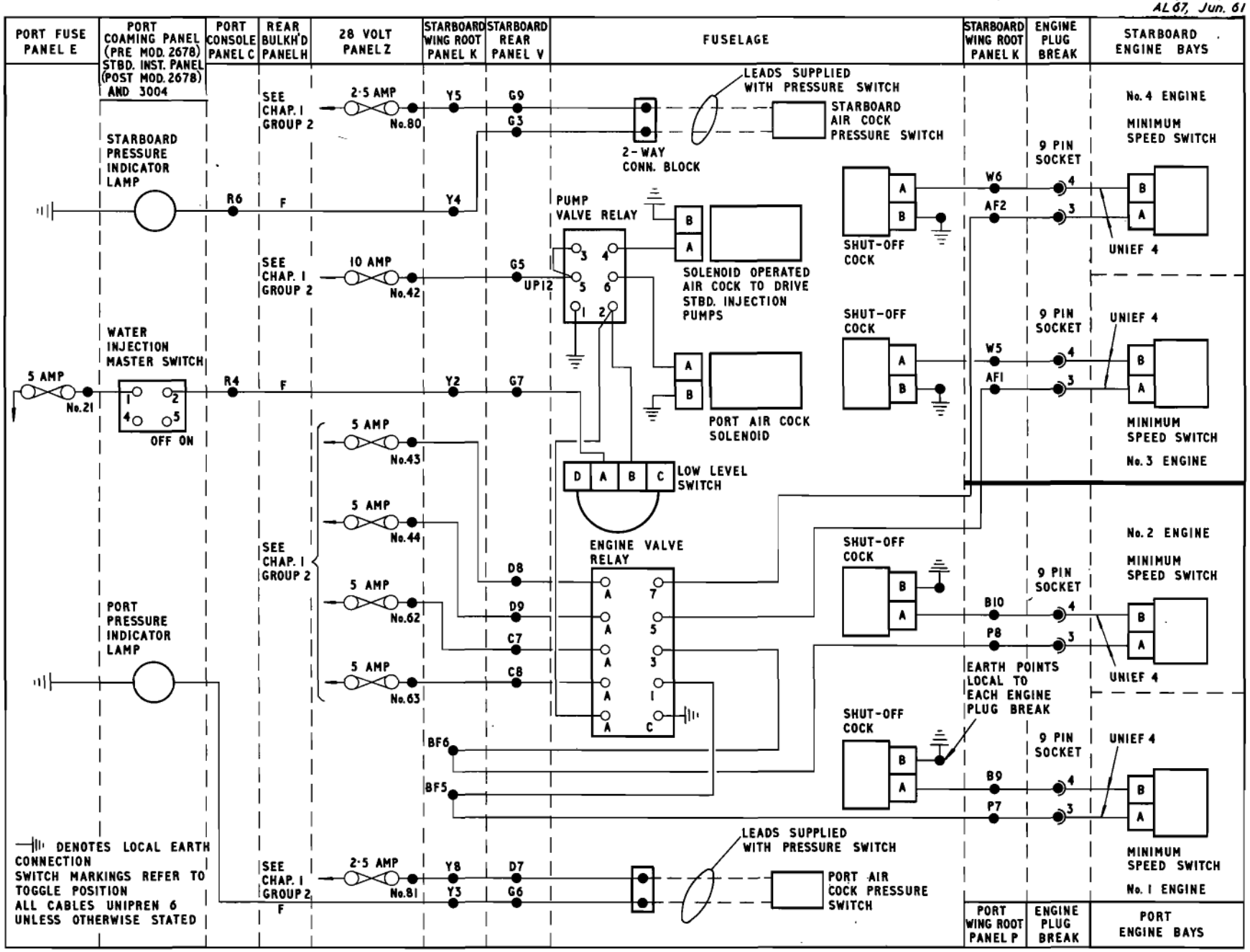

Fig. 34 A Water methanol control (post Mods. 1118 and 2715)

RESTRICTED

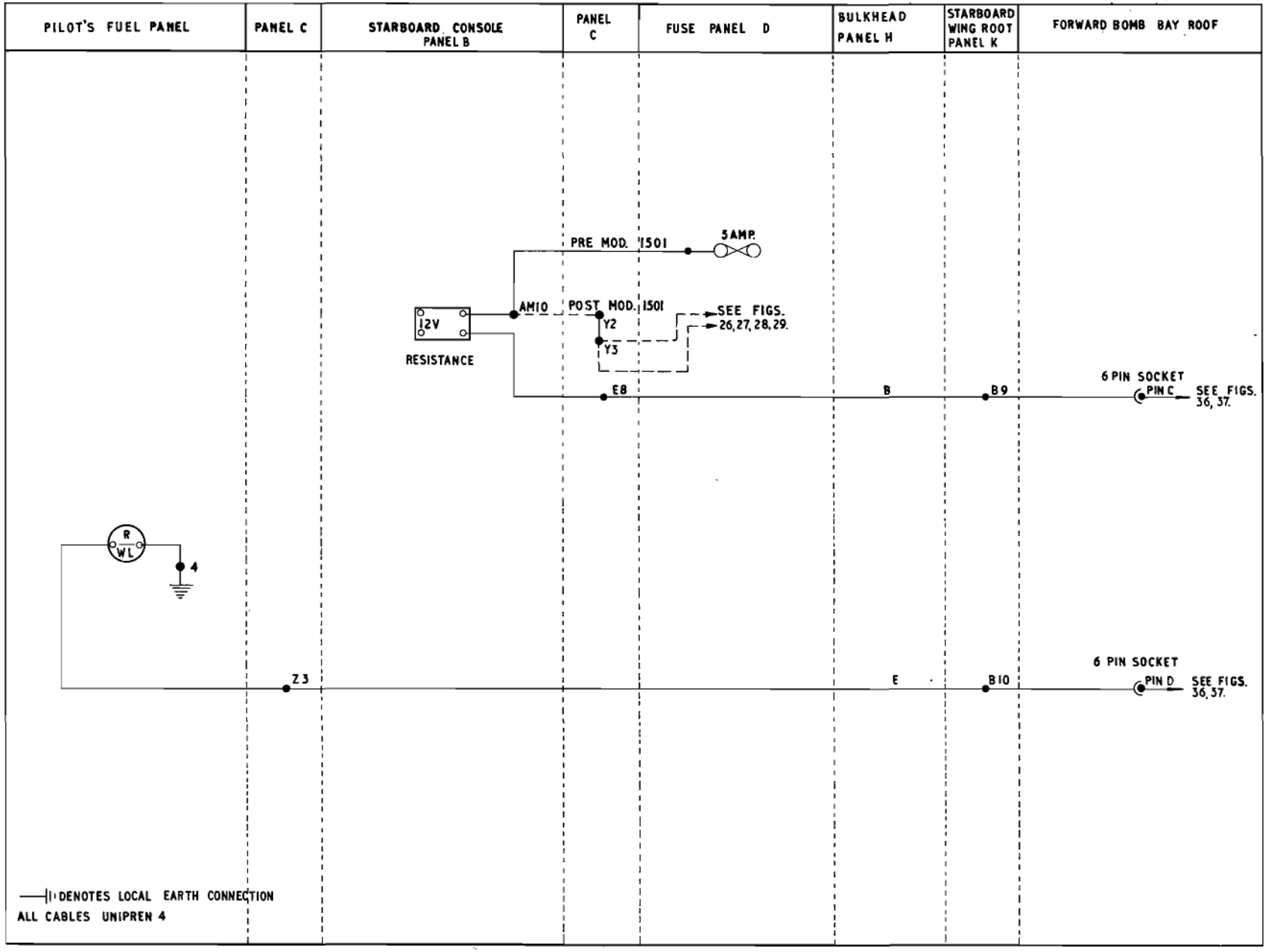

Fig. 35 Bomb bay tank pressure low warning

8986 363214 4/59 631 C.B. & S.L.™. GP924

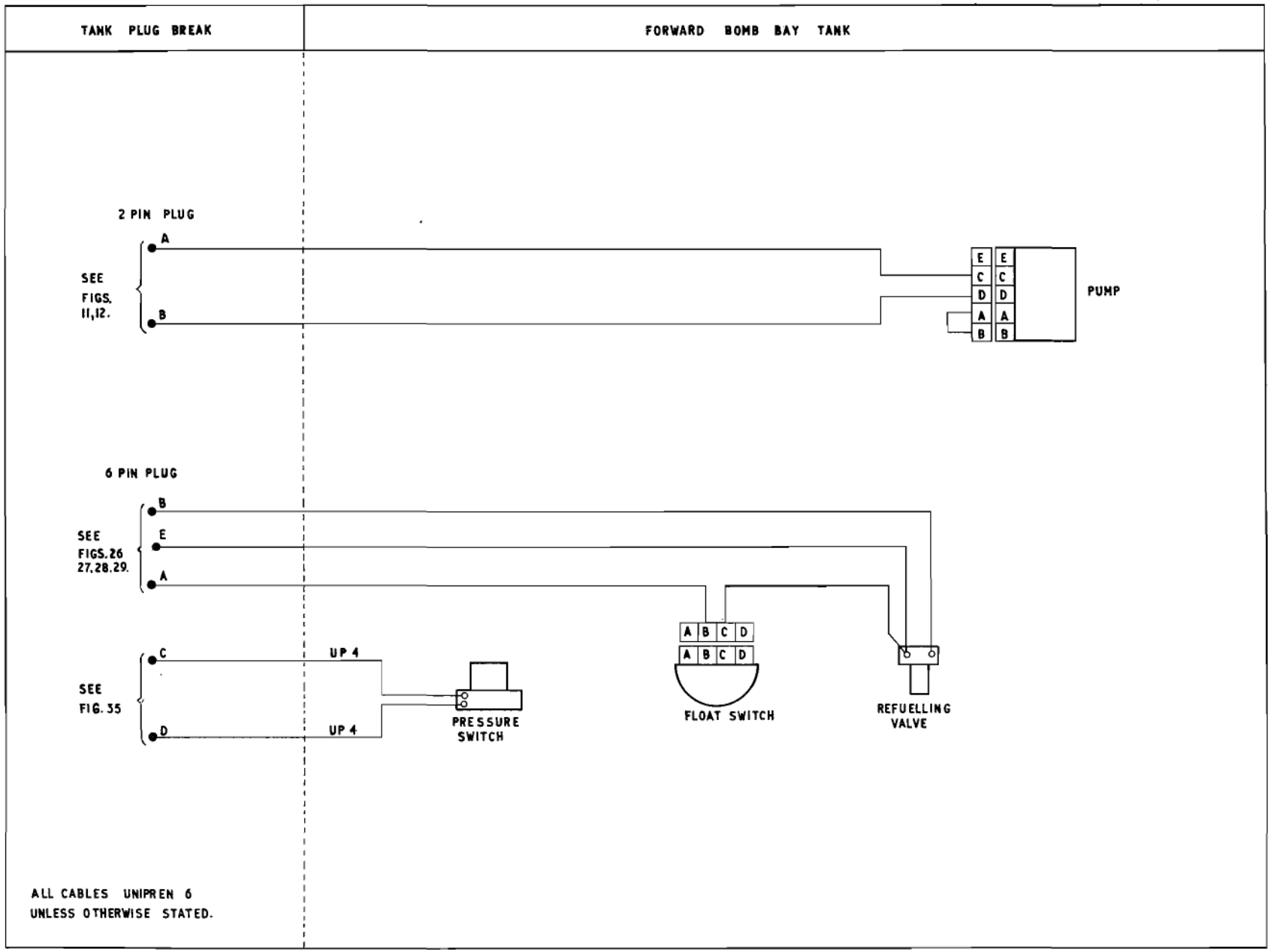

Fig. 36 Bomb bay tank wiring (pre Mod. 2473)

RESTRICTED

71079 SHT. 223-G

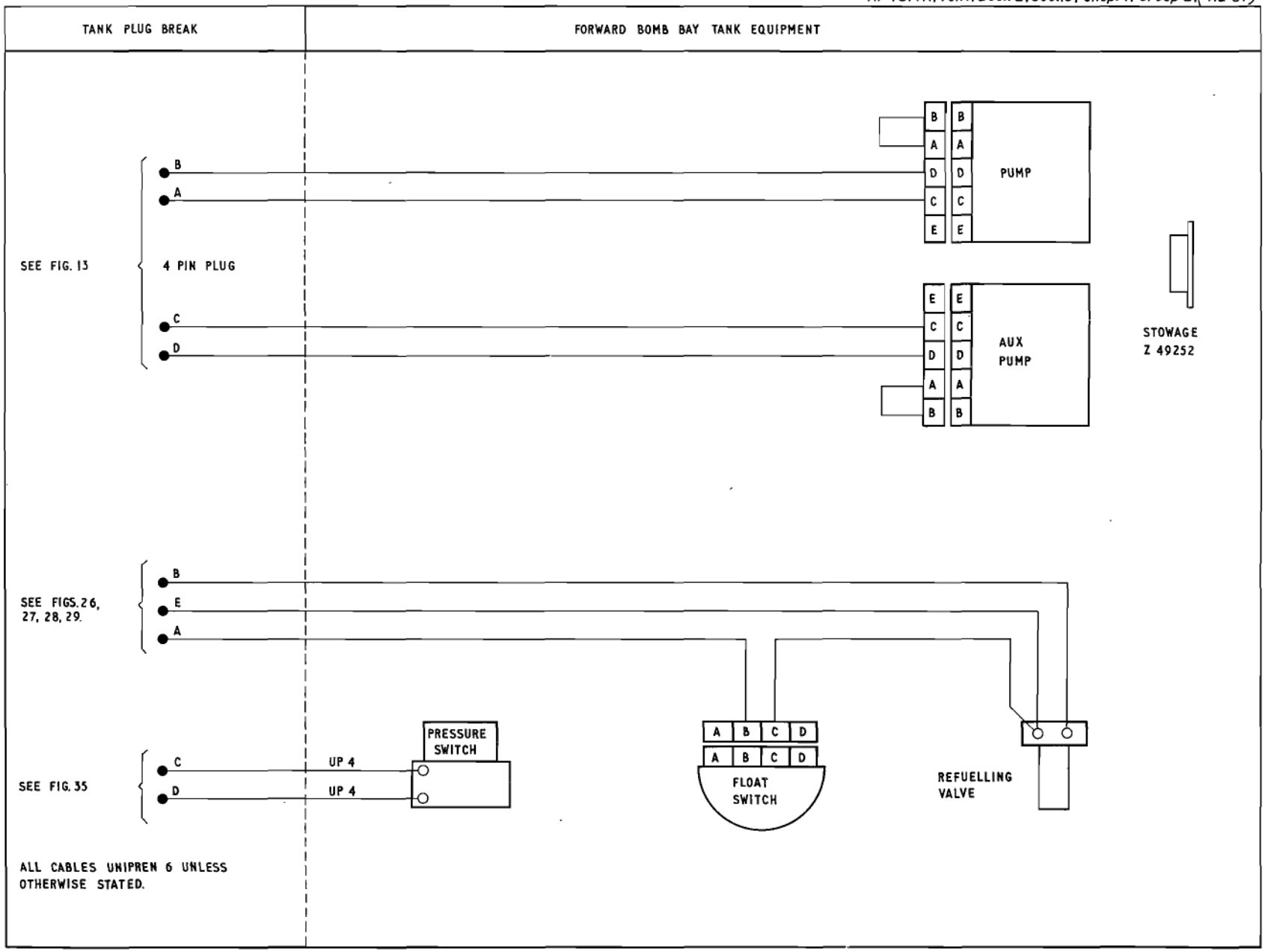

Fig. 37 Bomb bay tank wiring (post Mod 2473)

RESTRICTED

8986 363214 4/59 631 C.B. & S.L^TD. GP924.

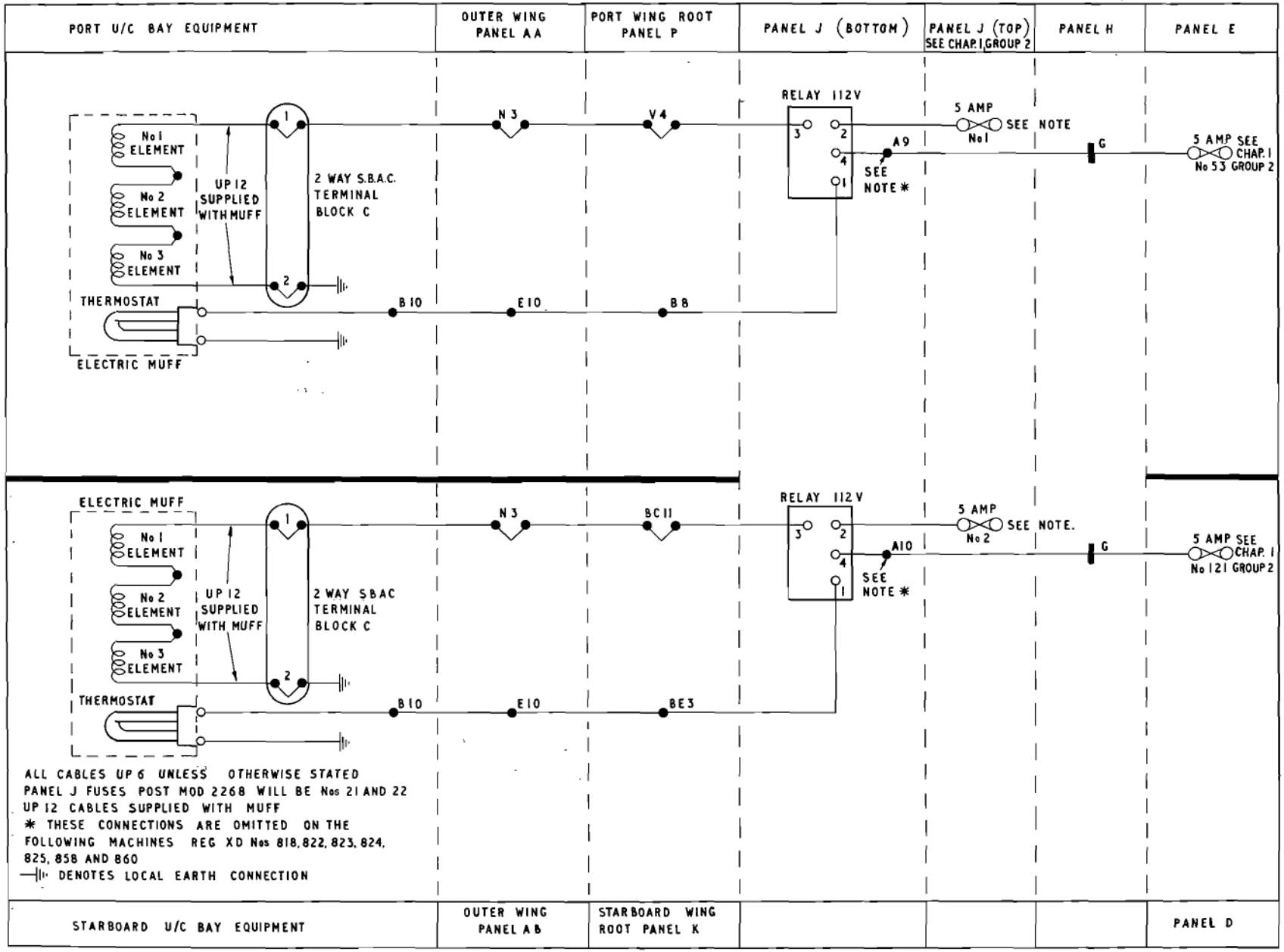

Fig 38 Air/nitrogen reducing valve heaters (Mod 2107)

RESTRICTED

75836 SHT 455-E

LIST OF APPENDICES

Appendix 1

UNDERWING TANKS — PUMPS (Post Mod. 3049 and 3050)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

DESCRIPTION AND OPERATION

Introduction

1. This appendix describes the alteration to underwing tank fuel pumps effected by Modification 3050 and should be read in conjunction with Group 2. The location diagrams in group 4 and the schematic diagrams in Group 2 are unaffected by this alteration, but a separate routeing diagram is included in this appendix to show circuit changes.

2. The underwing fuel pump motor 10 ohm variable resistance (Group 2, para. 25), is set to suit individual pump motors. Mod. 3049 (Rotax Mod. 6059) introduces a resistance setting label at the pump motor.

Pump motor variable resistance

3. The 10 ohm variable resistance is fitted in the wing stalk and connected in series with the motor shunt field. The resistance is set at the value indicated on the pump motor resistance setting label (+0% — 5%) and locked in position.

SERVICING

General

4. Servicing instructions contained in this Appendix should be read in conjunction with those detailed in Group 2.

Underwing tanks fuel transfer system

5. The fuel pump motor 10 ohms resistance in the wing stalk should not be adjusted during fuel flow checks (Group 2, para. 50).

Fuel pump replacement

6. Before fitting an underwing tank fuel pump motor, the 10 ohm variable resistance in the wing stalk must be set at the value indicated on the resistance setting label at the motor.

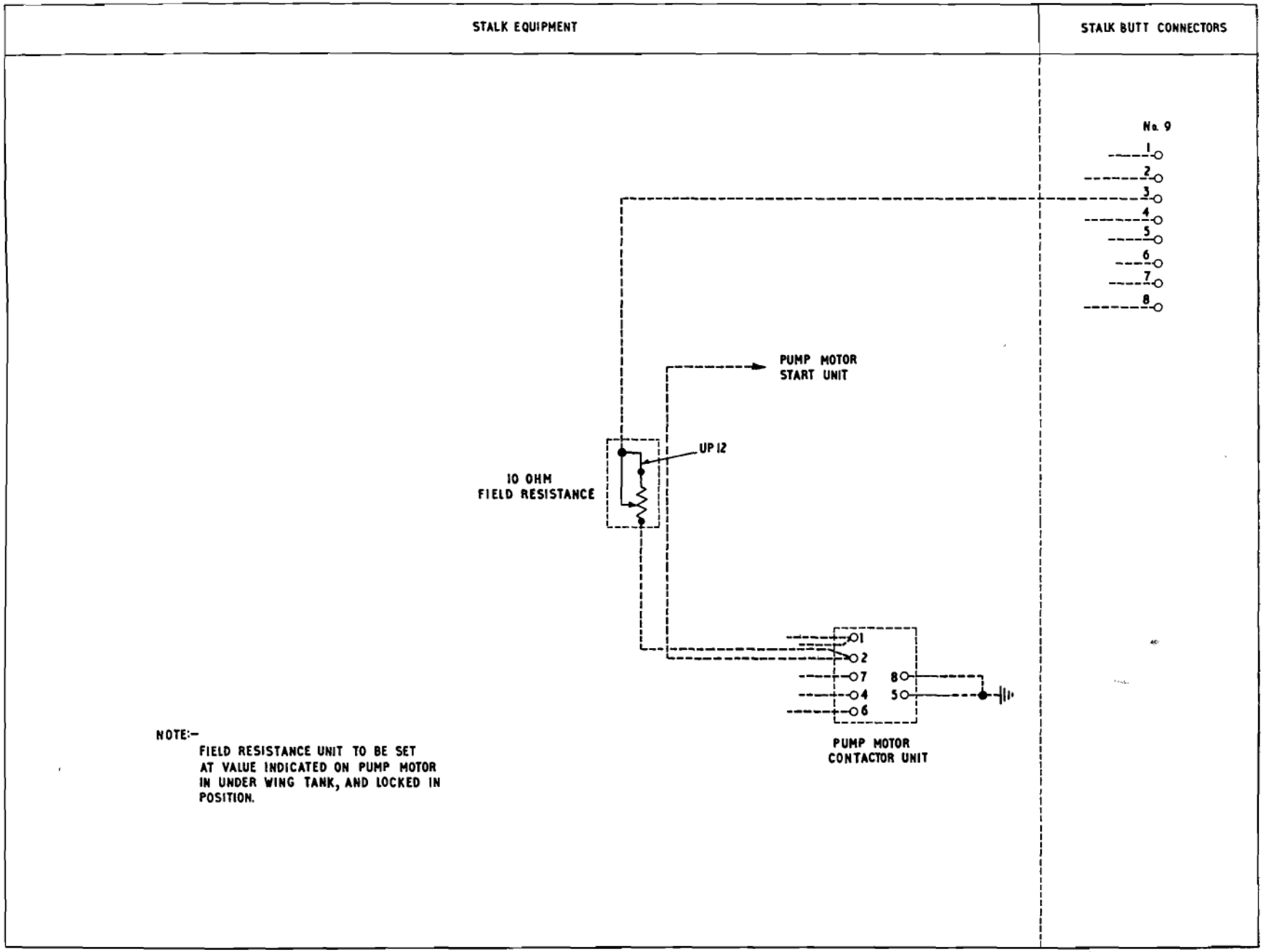

Fig. 1. Alteration to Fig. 16 in Group 2 (post Mod. 3050)

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