GROUP B — ENGINE SERVICES

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Introduction

1. The information given in this group covers the electrical starting of the engine besides the associated circuits affecting its satisfactory functioning. The specialist Air Publication references for the components used are listed below.

Equipment	Air Publication
Starter motor, Type C.3804/1	4343D, Vol.1, Sect.1, Chap.14
Time switch, Type D.8403	4343C, Vol.1, Sect.3, at a later date
Slow engagement relay, Type U.9794	◀ 4343, Vol.1, Sect.13, at a later date ▶
Heavy duty relay, Type U	4343C, Vol.1, Sect.3 at a later date
Relay, Type Q1	4343C, Vol.1, Sect.3, Chap.5
High energy igniter unit, Type C.10TS/1	1374G, Vol.1, Sect.4, Chap.2
Booster coil, Type C.2TS	1374E, Vol.1, Sect.1, at a later date
Re-light push-switch, Type C.5162Y, Mk.2	4343C, Vol.1, Sect.1, at a later date
Fuel booster pump, Type BP1, Mk.4	4343D, Vol.1, Sect,7, Chap.15
Suppressor, Type P No.1	4343C, Vol.1, Sect.5, Chap.10
Pressure switch, Mk.1E*) Resistor)	1275A, Vol.1, Sect.24, Chap.17.
Lucas pump, GC.221/19N (single pump engine)) Lucas pump, GC.237/11J (dual pump engine))	4282A, Vol.1.

STARTER AND IGNITION

Description

2. An electric starter motor is used, the motor being geared by a dog-toothed starter jaw via the engine lower accessories gear box to the engine impeller shaft. A separate external supply socket is fitted to the starboard side of the engine bay beneath the starboard wing root to allow an external 24-volt d.c. supply to be utilized for turning the starter motor.

3. The motor is allowed to turn at three separate speeds, these speed variations being obtained by connecting resistors in series with the motor. Two such resistors are used, both being connected in circuit when the starting cycle is begun, as shown in fig. 2.

4. With the 10 amp. circuit breaker and the STARTER MASTER switch set to ON, pressure on the STARTER PUSH-SWITCH actuates a time switch and a slow engagement relay. The push-switch may now be released as the time switch automatically controls the starting cycle for its 30 seconds duration.

5. At this stage the starter motor will turn slowly being excited via the two resistors (one in the slow-engagement relay, the other a separate starting resistance), and a Type Q1 relay which supplies the booster coils or high energy igniters, as fitted, will be energised, and ignition commence.

6. As the time switch unwinds contacts 3 and 4 close, thereby operating one of the heavy duty relays to short circuit the resistor in the slow-engagement relay. The starter motor will therefore speed up.

7. As the time switch further unwinds contacts 4 and 5 close to operate the second heavy-duty relay, thus short-circuiting the starter resistor and supplying the starter motor direct from the external 24-volt d.c. supply. The motor will therefore increase speed to its maximum.

8. Thirty seconds after the push-switch has been originally depressed the time switch becomes fully unwound, opening all contacts and thereby de-energising the starter circuit. By this time combustion should have occurred and the engine be running.

Note . . .

It is important that the starting cycle is complete BEFORE removing the external supply plug from the starter supply socket of the aircraft.

9. The engine may be re-lit in flight by operating the engine re-light push-switch housed in the H.P. fuel cock lever of the port throttle quadrant. This completes the circuit to energise the Type Q1 relay feeding the ignition system without operating the engine starting timing sequence.

WARNING

The discharge of the capacitors of the high energy igniter units through the human body can be FATAL. Before servicing the high energy igniter system, the L.T. plugs to both units are to be DISCONNECTED FOR AT LEAST ONE MINUTE. This will allow the stored capacitor energy to dissipate, and obviate inadvertent discharge.

Servicing

10. The servicing instructions for the starting system components will be found in the specialist Air Publication listed in para. 1.

Removal

11. The starter motor is secured to the engine lower accessories gearbox by eight bolts, the electrical connections being secured by terminal nuts. Removal and refitting is straight forward, and should be carried out in collaboration with an engine tradesman.

12. The time switch, starter resistor and both heavy-duty relays are fitted to a mounting panel, the panel being secured to the aft, lower face of bulkhead 4 by five 2 BA bolts and aerotight nuts. Both heavy-duty relays are covered by a water-proofed Kalanoide sheath. The method of both panel and component removal will be obvious on examination.

FUEL BOOSTER PUMP

Description

13. A fuel booster pump is fitted in the base plate of the fuselage fuel tank. The pump motor is controlled by a single-pole toggle switch fitted to the instrument panel, the switch having a spring-loaded guard. A suppressor is connected in series with the pump motor to eliminate any radio interference set up by operation of the motor, the suppressor being bolted to the cannon bay roof. The circuit is shown in fig. 3.

Servicing

14. Instructions for servicing the fuel booster pump circuit components are to be found in the specialist Air Publications listed in para. 1.

Note . . .

Ensure that the pump is immersed in fuel BEFORE operating.

15. The efficiency of the pump may be checked by viewing the fuel pressure warning lamp. With the low pressure fuel cock ON and the high pressure fuel cock OFF (*Sect.* 4, *Chap.* 2), switch the pump motor ON and check that the warning lamp goes out almost immediately due to the pump delivering at the correct pressure.

16. The normal current consumption for this particular fuel pump is 7-amp. It is essential that the vent gauze at the base of the pump be kept clean to aid ventilation.

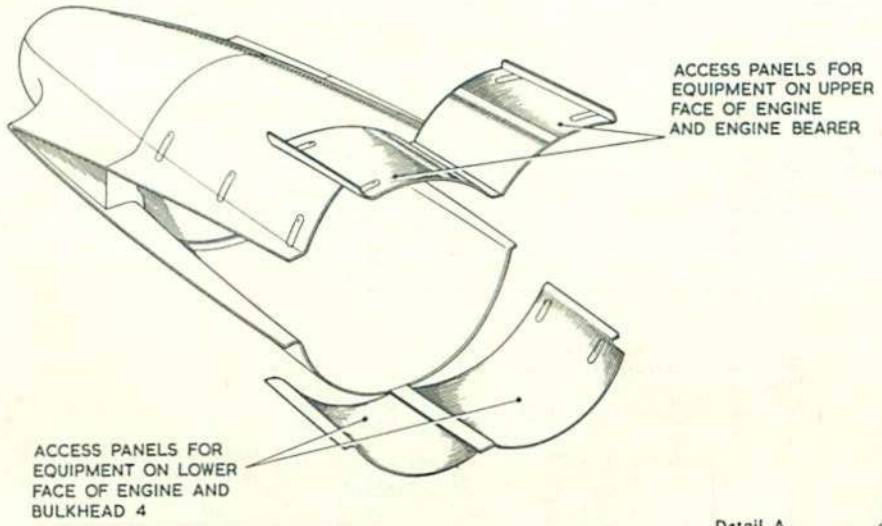
Removal

17. The fuel pump must be removed and refitted in collaboration with the engine tradesman as the pump is sealed to the fuel tank.

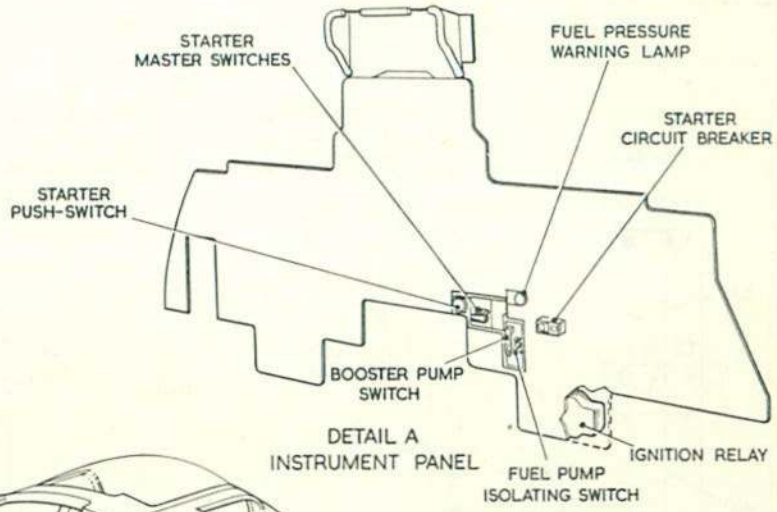
FUEL PRESSURE WARNING

Description

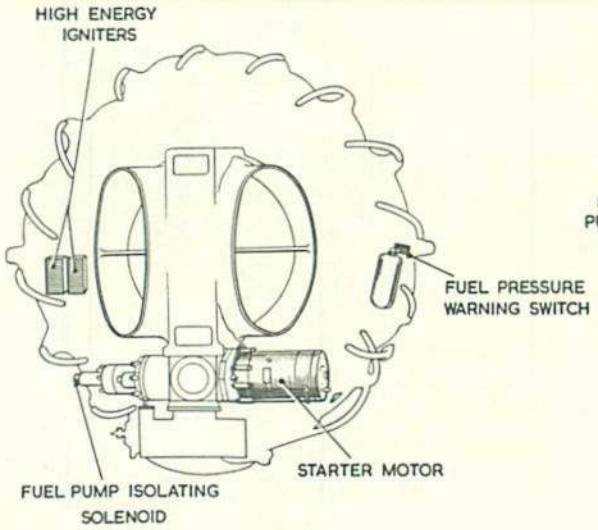
18. Should the pressure delivery from the immersed fuel booster pump fall below 1·5 p.s.i. a pressure switch, fitted to the outlet



ENGINE COWLINGS



DETAIL A
INSTRUMENT PANEL



EQUIPMENT ON ENGINE

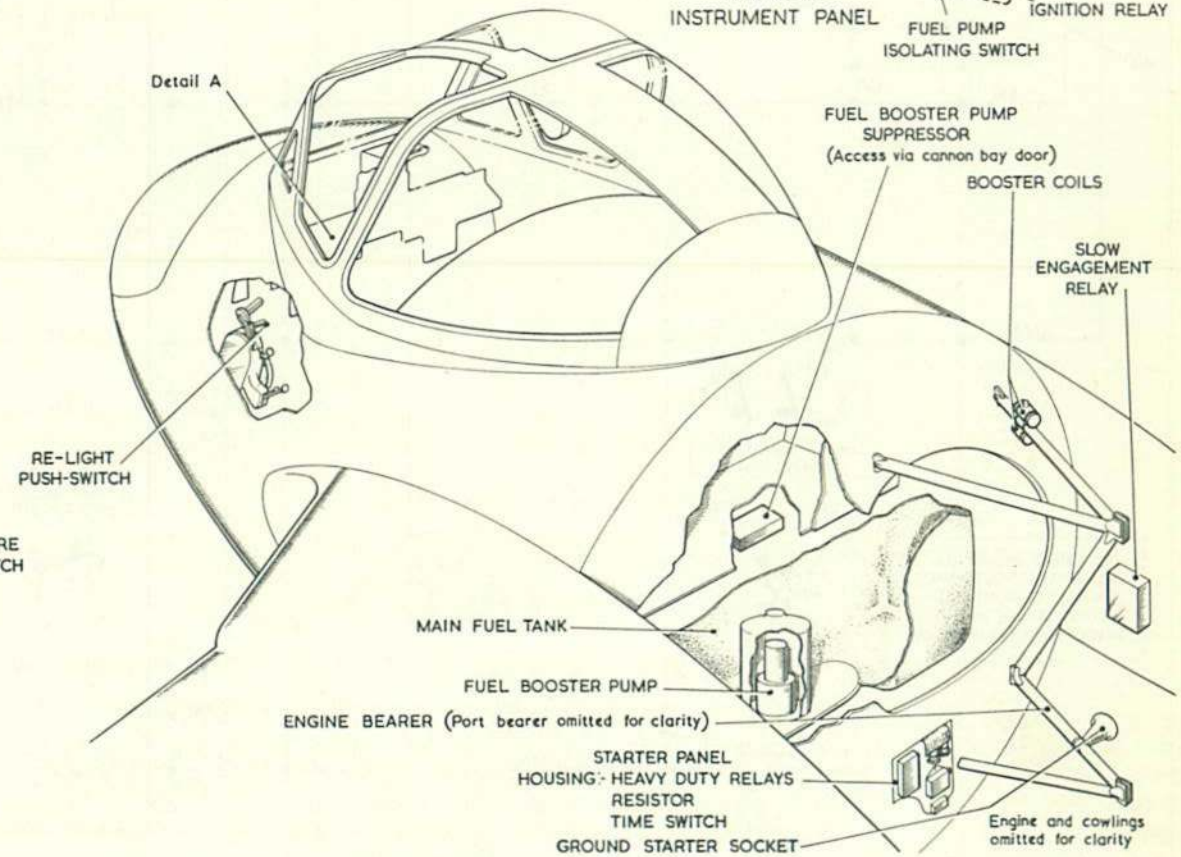


Fig.1. Location and access of components

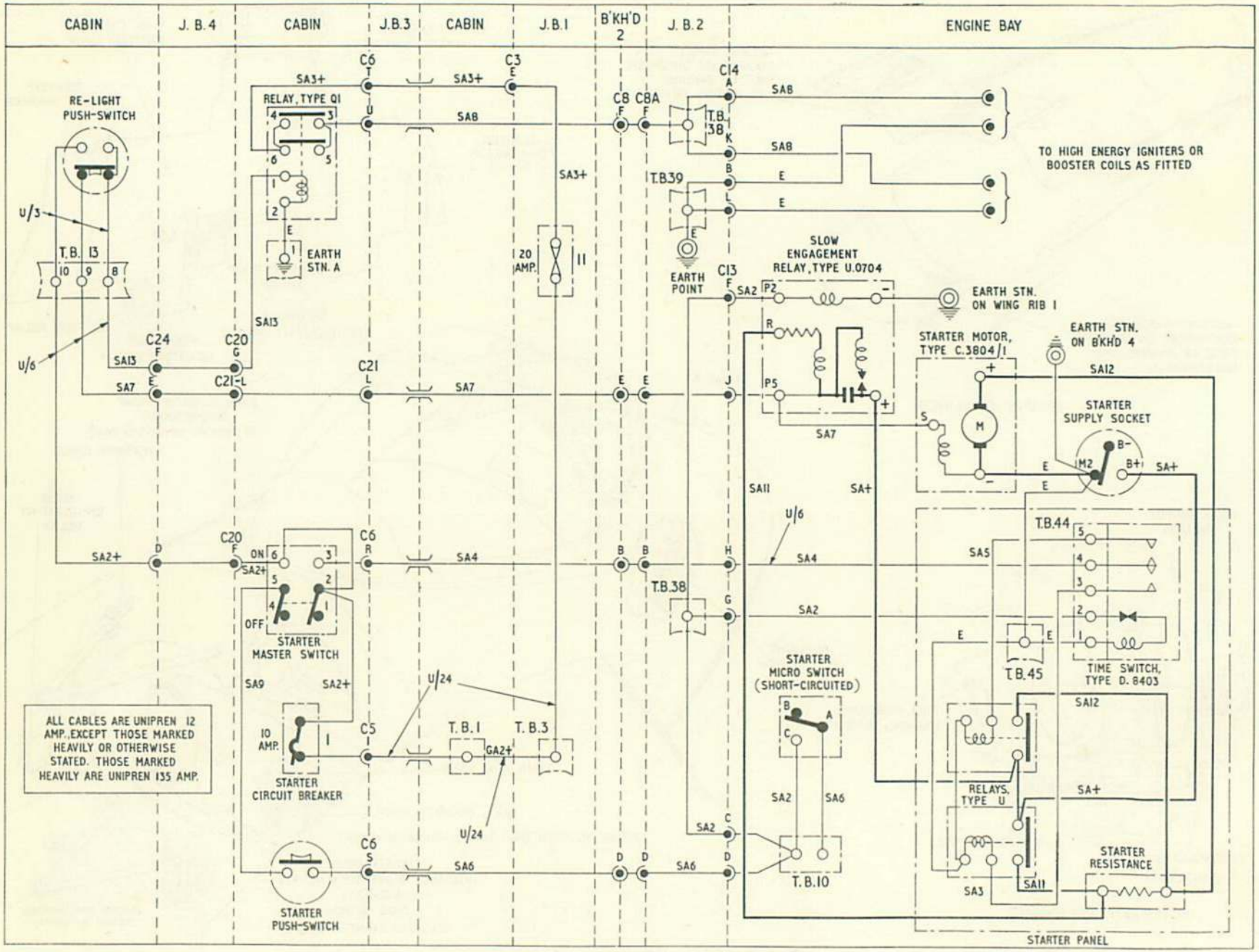


Fig. 2. Starter and ignition—SA

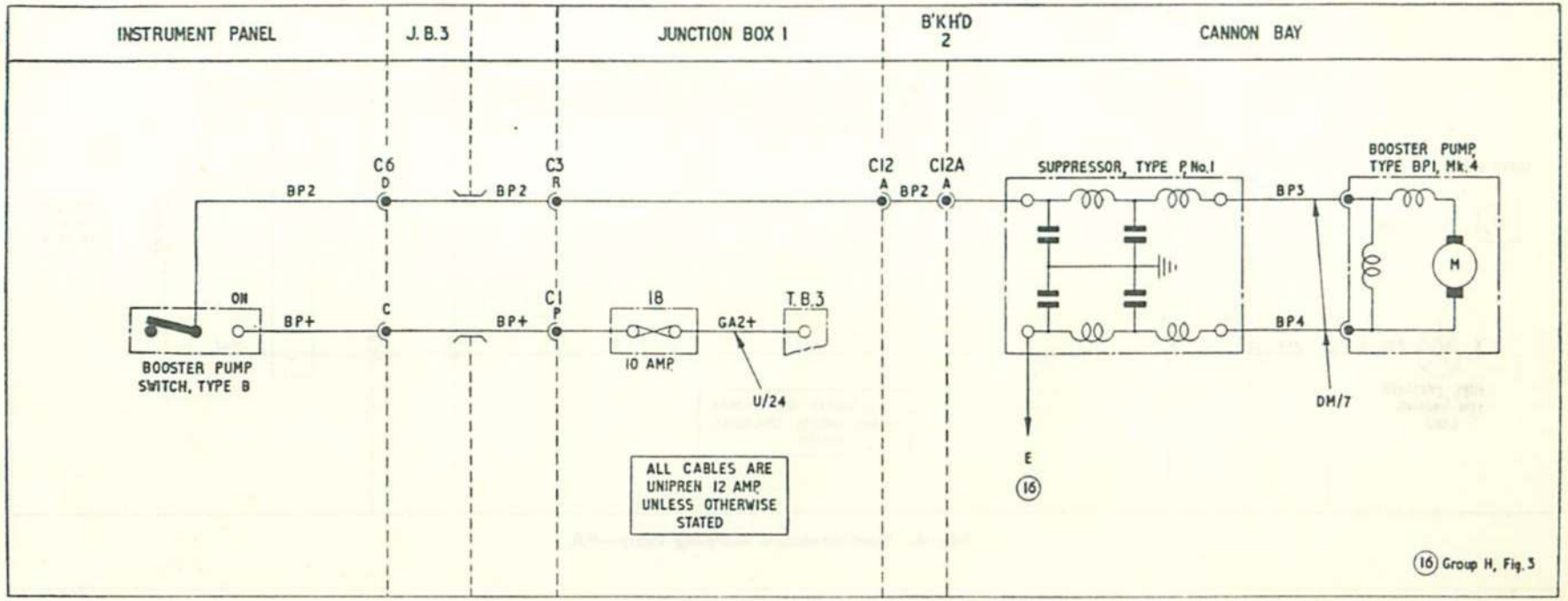


Fig. 3. Fuel booster pump—BP

of the fuel low pressure filter in the engine bay, will close and cause a lamp mounted on the instrument panel to light.

19. The circuit is shown on Fig. 4, the lamp being supplied with d.c. via a resistor, inside J.B.1, and the pressure switch. The resistor is included to limit the current flow across the pressure switch contacts. A 6-volt filament lamp is used in the circuit.

Servicing

20. Servicing instructions for the pressure switch, and a description of both switch and resistor, are contained in the specialist Air Publication listed in para. 1.

Removal

21. Removal of the pressure switch from the fuel low pressure filter is the responsibility of the engine tradesman. Removal of the lamp and resistor will be self-evident when viewed.

FUEL PUMP ISOLATING SOLENOID

Description

22. The engine may have either one or two engine-driven fuel pumps. In both instances a solenoid operated valve is fitted to obviate the danger of a fuel cut to the engine due to the failure of the barometric pressure control unit. Operation of the valve isolates the fuel pump from the barometric pressure control of the fuel system. The circuit is shown in Fig. 5.

23. The solenoid is controlled by a single pole toggle switch fitted on the instrument panel. In the dual pump installation the solenoid is an integral part of the engine driven fuel pump fitted to the lower starboard side of the engine wheelcase, but in the single pump installation the solenoid is an integral part of the engine-driven fuel pump which is fitted to the lower port side of the wheelcase.

Servicing

24. The solenoid, being an integral part of the pump, is described in the specialist Air Publication dealing with the pump as listed in para. 1.

Removal

25. The solenoid cannot be removed from the pump; therefore, if the solenoid develops a fault, the pump must be changed, this being the responsibility of the engine tradesman.

FUEL CONTENTS SYSTEM

General

26. The power unit of the fuel contents system is supplied with d.c., the system itself being described in Chapter 2, Group D of this Section.

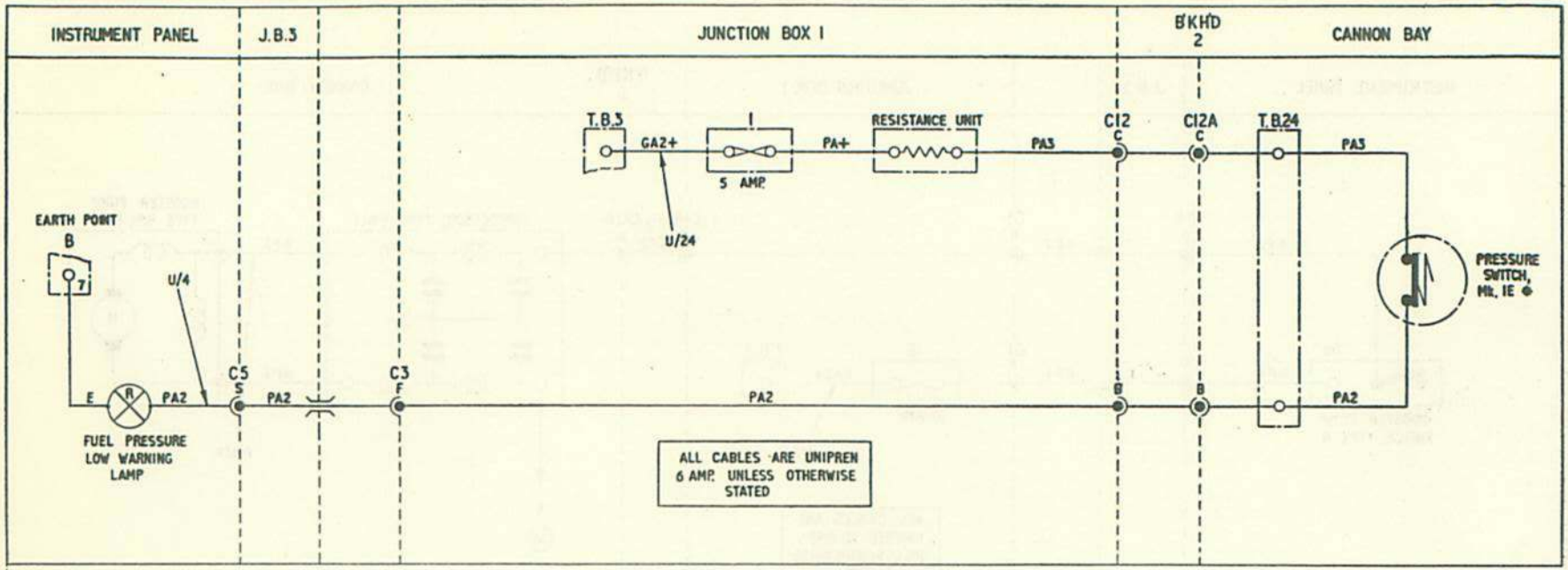


Fig. 4. Fuel pressure warning lamp—PA

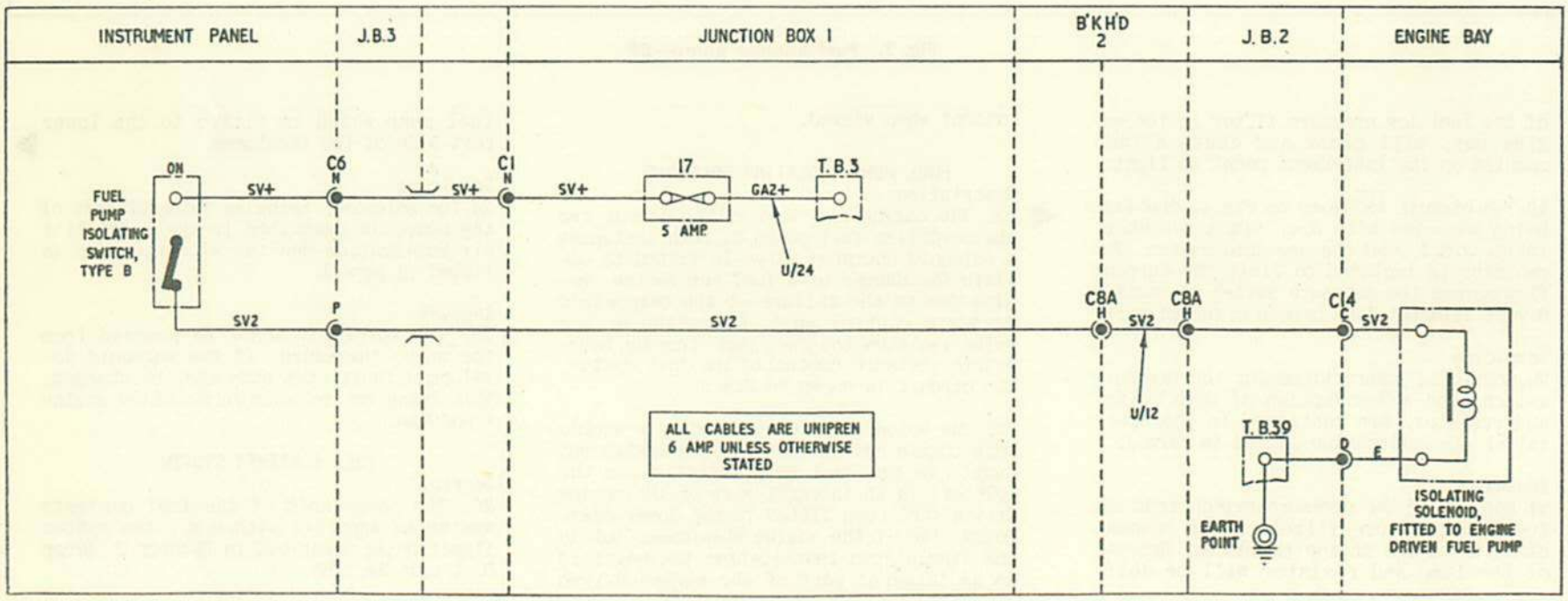


Fig. 5. Fuel pump isolation solenoid—SV