

## GROUP 3.A

## AIR PRESSURE OPERATED INSTRUMENTS

(Completely revised)

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## Introduction

1. This group contains a description of the air pressure operated flying instruments installed in this aircraft, the majority of which are operated by the pressure head installation. For a general description of the instrument installation reference should be made to Group 1A. The location and access to all the instruments and their associated equipment is given in Group 1C. Detailed information on the standard components used will be found in the appropriate Air Publications quoted in para.2.

## Equipment employed

2. The air pressure operated flying

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instruments employed in this aircraft are listed below, together with the appropriate Air Publications to which reference should be made for a detailed description and the necessary servicing required to maintain them in an efficient condition.

Pressure head, Mk.9A	}	... ..	A.P.1275A, Vol.1, Sect.27
Air speed indicator, Mk.12A			
Machmeter, Mk.3A			
Altimeter, Mk.19A, 19B, 19C or 19F	}	... ..	A.P.1275A, Vol.1, Sect.22
Vibrator, Type KVC.0101			
Cabin altimeter Mk.18 or 21			
Rate of climb indicator, Mk.3A (P) or Mk.3 (P) or Mk.3P*, or 3(Q)			
V.G. recorder			
		... ..	Instruction Leaflet I.T.2031 Issue 2 (M.O.S. Publication)

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## DESCRIPTION

## Pressure head installation

3. This installation operates the air speed indicator, machmeter, altimeter and rate of climb indicator. The installation,

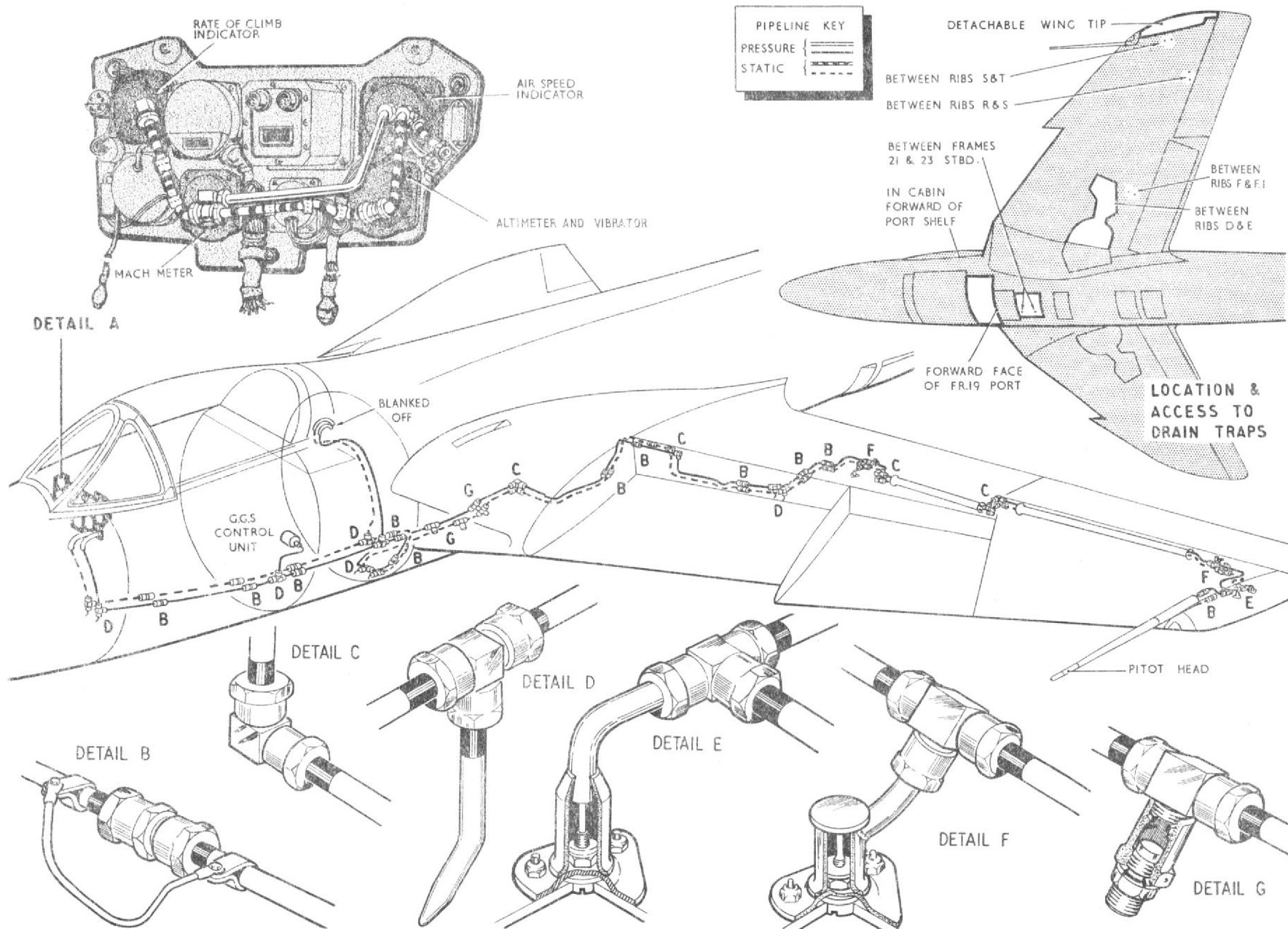


Fig.1. Pressure head installation

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which is illustrated in fig.1, consists of an electrically heated pressure head, projecting forward from the port wing tip. The pressure head contains the pressure and static pipes, together with an electric heater element. The pressure and static pipes in the head are connected to the instruments, via the pressure and static connectors, which are mounted on the port forward face of the centre instrument panel, by a system of pipe-lines. Moisture entering the pipe-lines is collected by a number of drain traps located in each pipe-line as shown in fig.1.

#### Pressure head heater

4. The electric heater element in the pressure head is controlled by a single-pole ON/OFF switch located on the leg panel adjacent to the camera master switch. A routing and theoretical diagram of the electrical heater circuit, the operation of which will be obvious, is given in fig.2.

#### NOTE...

*The pressure head heater must not be switched on before removal of the pressure head cover or damage to the cover will result. It is also important to ensure that the heater is not left switched on for any length of time, while the aircraft is on the ground, as the heater constitutes a danger to personnel should it be touched by accident.*

#### Air speed indicator

5. The air speed indicator is mounted on the port side of the centre instrument panel. It is a capsule type instrument operated by air pressure drawn from the

pressure head installation, which is described in para.3.

#### Machmeter

6. The machmeter is installed on the port side of the centre instrument panel adjacent to the air speed indicator. It is provided to give a continuous indication of the ratio of true air speed to the speed of sound. The instrument is operated by the differential air pressure between the pressure and static pipe-lines of the pressure head installation described in para.3.

#### Altimeter

7. The altimeter is located just below the air speed indicator on the centre instrument panel. It is an atmospheric pressure operated instrument provided to give a continuous indication of the aircraft's height. The instrument is connected to the static pressure pipe-line of the pressure head installation, described in para.3. A vibrator, is fitted to the rear end of the altimeter case in Post Mod.992 aircraft and is used to improve the performance of the instrument, especially at the upper altitude ranges, by imparting vibrations to the altimeter mechanism. It operates on a 115V. 400 c/s. single phase a.c. supply and vibrates at 3200 c/s. For detailed information of these instruments reference should be made to A.P.1275A, Vol.1, Sect.22.

#### Cabin altimeter

8. This is an aneroid instrument and is

located on the starboard instrument panel just above the oxygen gauge. It is not connected to the pressure head installation or to any other instrument, but is open to the air in the cabin, as it indicates the equivalent pressure cabin altitude and not the aircraft's height.

#### Rate of climb indicator

9. The rate of climb indicator is installed on the starboard side of the centre instrument panel adjacent to the artificial horizon. It is a sensitive differential pressure gauge giving the rate of change of the atmospheric pressure in terms of rate of climb or descent, whenever the aircraft departs from level flight. The instrument is connected to the static pressure pipe-line of the pressure head installation, described in para.3.

#### V.G. recorder

10. Provision has been made for the installation, under the battery platform, of a Service fitted V.G. recorder, which may be tapped into the pressure and static pipe-lines of the pressure head installation (para.3 of this group) after the removal of the two drain traps at frame 18. The recorder consists of a moving-weight accelerometer and an air speed capsule. The resultant movement of these mechanisms is transmitted to a stylus and automatically draws a graph of aircraft acceleration against air speed. A complete description of the recorder is given in Leaflet No. I.T.2031 (Issue 2), titled, Routine Measurement of Flight Acceleration, and published by the Ministry of Supply.

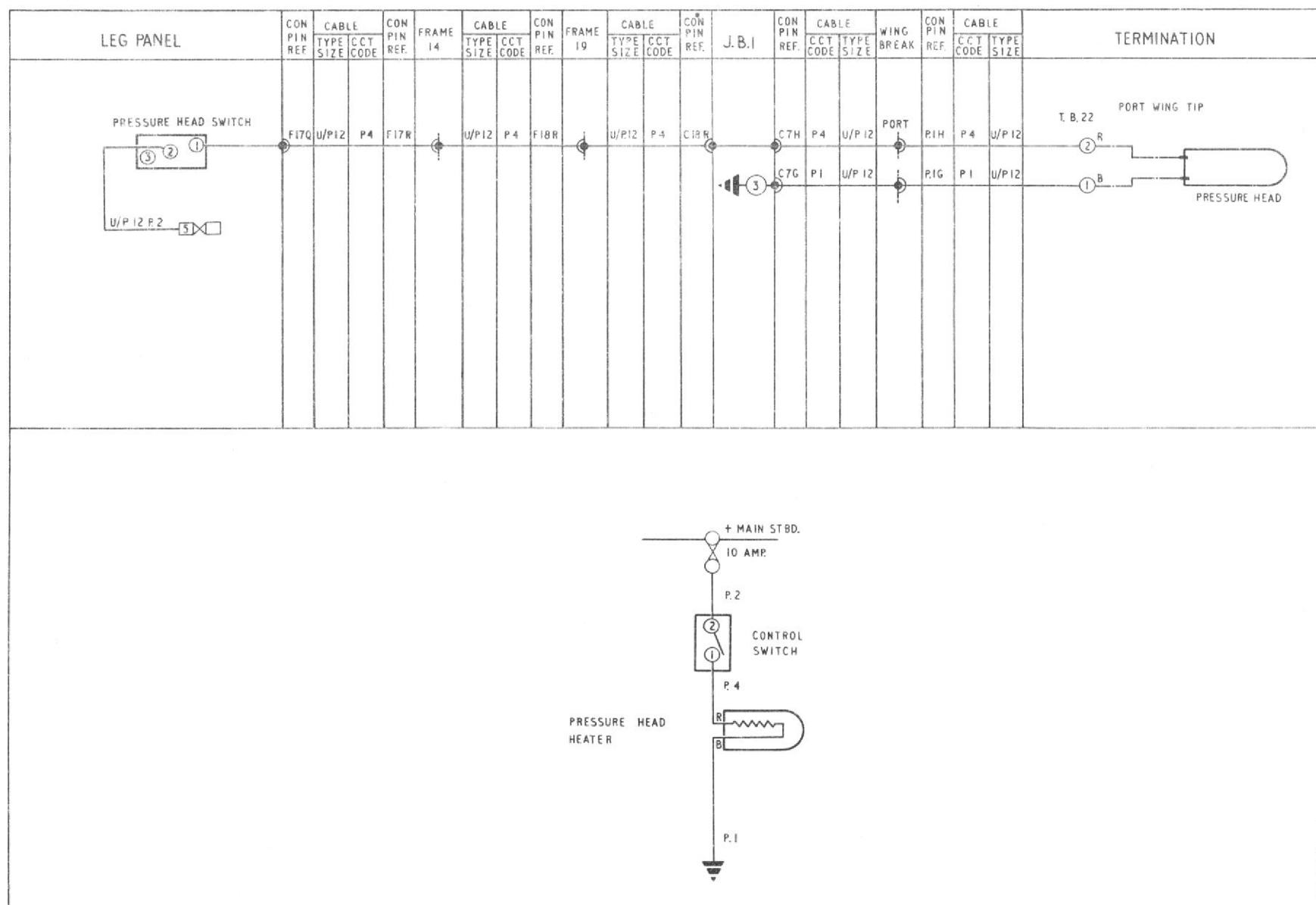


Fig.2. Pressure head heater (routing and theoretical)

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## SERVICING

### General

11. The necessary servicing to maintain the instruments in an efficient condition and the standard serviceability tests, which should be applied, together with the equipment to be used and the method of conducting the tests is contained in the appropriate Air Publications quoted in para.2.

### Pressure head drain traps

12. Drain traps are provided in the pressure head installation to collect any moisture which may enter this installation. The drain traps, which are of three different types, are connected into the installation by tee-pieces and are located in pairs as illustrated in fig.1. Each type of drain trap is illustrated in the details given on the illustration and the means of access to the traps is also indicated. All the moisture etc., in the drains, should be removed periodically as follows :-

- (1) The drain traps illustrated in detail D of fig.1 should be disconnected from the system and any moisture removed. When refitting the drains new rubber sealing rings should be inserted in the union nuts and after the nuts are tightened, an examination should be made to ensure that the unpainted ends of the drain traps do not show below the heads of the union nuts.
- (2) The drain traps illustrated in detail E and F of fig.1 should be opened by unscrewing the slotted plugs in the wing skin until any moisture in the traps drains away.
- (3) The drain traps illustrated in detail G of fig.1 should be opened by inserting a suitable length and diameter of hose into each drain in turn after removing the small access doors, Insertion of the hose pushes open the valve and allows any moisture to escape down the hose.

### Pressure head leak tests

13. The pressure and static systems are as leak-tight as possible and every care must be taken to maintain the system in this condition since even a moderate leak may develop into a more serious leak and cause instrument failure. To ensure that the leakage rate is within the required tolerances, the system must be tested in accordance with the instructions given in A.P.1275B, Vol.2, Part 1, Leaflet A.8 whenever the system is suspect or its pipeline joints and connections to instruments are disturbed.

## REMOVAL AND ASSEMBLY

### General

14. The removal of the instrument panels carrying the flying instruments is fully described in Group 1.B of this chapter. The removal of the pressure head is covered in Section 3, Chapter 2 of this volume and once access has been obtained, the removal of the remaining items of equipment should present no unusual difficulties.

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