GROUP 3.A

AIR PRESSURE OPERATED INSTRUMENTS

LIST OF CONTENTS

DESCRIPTION

Introduction

1. This group contains a description of the aircraft's air pressure operated flying instruments, 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 1.A. The location and access to all the instruments and their associated equipment is given in Group 1.C. Detailed information on the standard components used will be found in the appropriate Air Publications listed in Table 1.

Equipment details

Pressure head installation

2. The pressure head installation *(fig.1)* operates the air speed indicator, machmeter, altimeter and rate of climb indicator, and 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 by a system of pipe lines to the instruments, via the pressure and static connectors, which are mounted on the port forward face of the centre instrument panel. 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 (Code P)

3. 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.

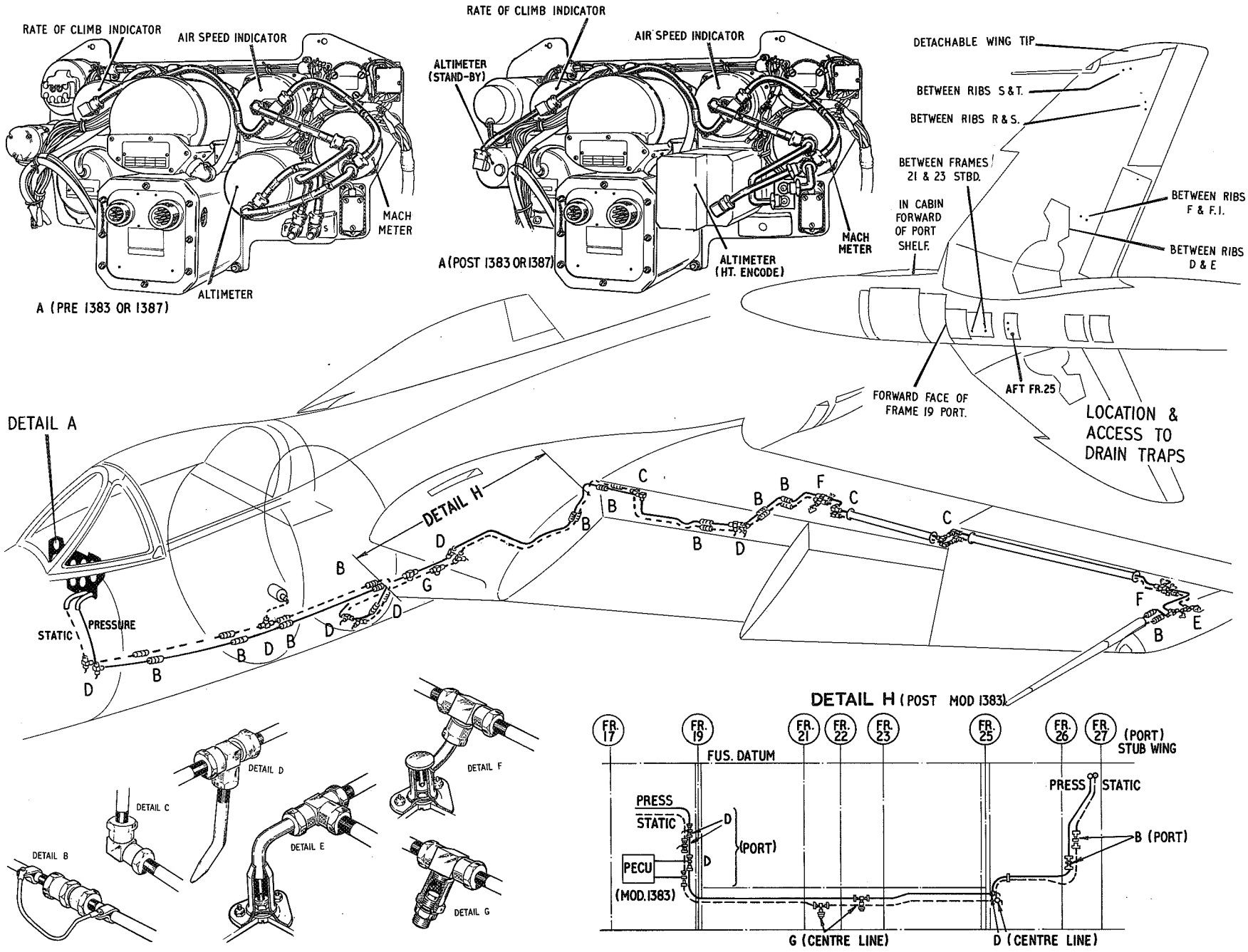


Fig.1 Pressure head installation

(To include Mods.1383/1387)

A routeing 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

4. 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 from the pressure head installation, which is described in para.2.

Machmeter

5. The machmeter is installed just below the artificial horizon on the centre instrument panel. 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.2.

Altimeter

6. The altimeter is located below the air speed indicator on the port side of the centre instrument panel. It is an atmospheric pressure operated instrument provided to give a continuous indication of the aircraft height. The instrument is connected to the static pressure pipe line of the pressure height installation described in para.2. The MK28 altimeter has an auto-transformer and induction motor driving a mechanical vibrator, all fitted internally. In the case of the MK19F altimeter, the auto-transformer, induction motor and vibrator are fitted externally. In each case the auto-transformer is supplied from the aircraft a.c. supply as shown in fig. 3.

Cabin altimeter

7. 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

8. 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.2.

V.G. recorder

9. 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.2)* 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

TABLE 1

Equipment type and Air Publication reference

Equipment	Air Publication
Pressure head, Mk.9J Air speed indicator, Mk.12A Machmeter, Mk.3A	A.P.1275A, Vol.1, Sect.21
Tumbler switch S.P./ON-OFF, Type XD779 No.4	A.P.4343C, Vol.1, Book 1, Sect.1
Altimeter, Mk.28 (MC.3) or Mk.19F (Mod.1347) Cabin altimeter Mk.18 Rate of climb indicator, Mk.3A(P) or Mk.3(P) or Mk.3P* or Mk.3Q	A.P.1275A, Vol.1, Sect.22
V.G. recorder Mk.2	A.P.1275A, Vol.1, Sect.12

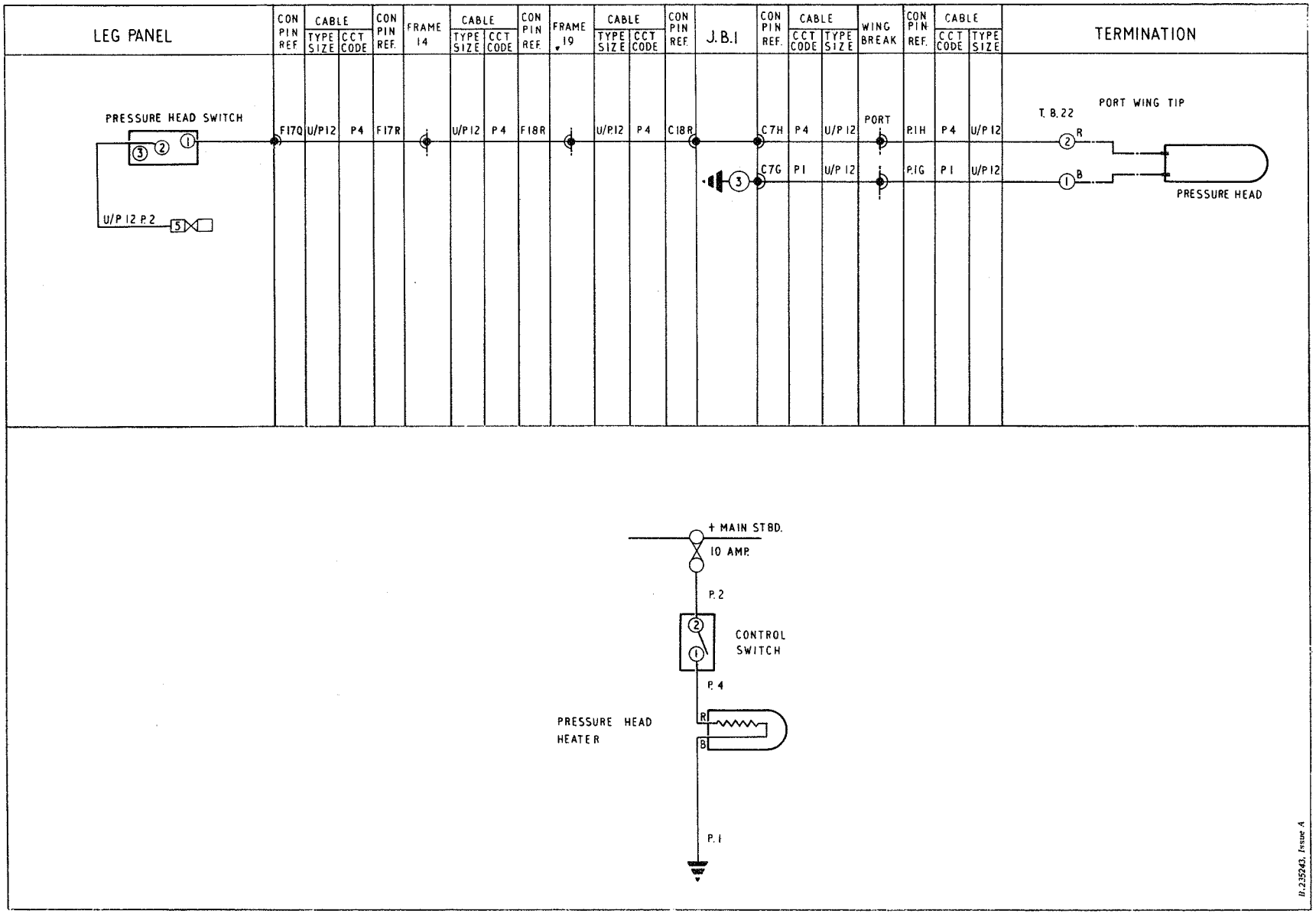


Fig.2 Pressure head heater (routeing and theoretical)

T.P.(E) 11436

given in Leaflet No.I.T.2031 *(Issue 2)*, titled, Routine Measurement of Flight Acceleration, and published by the Ministry of Aviation.

SERVICING

General

10. 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 Table 1,

Pressure head drain traps

11. 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.

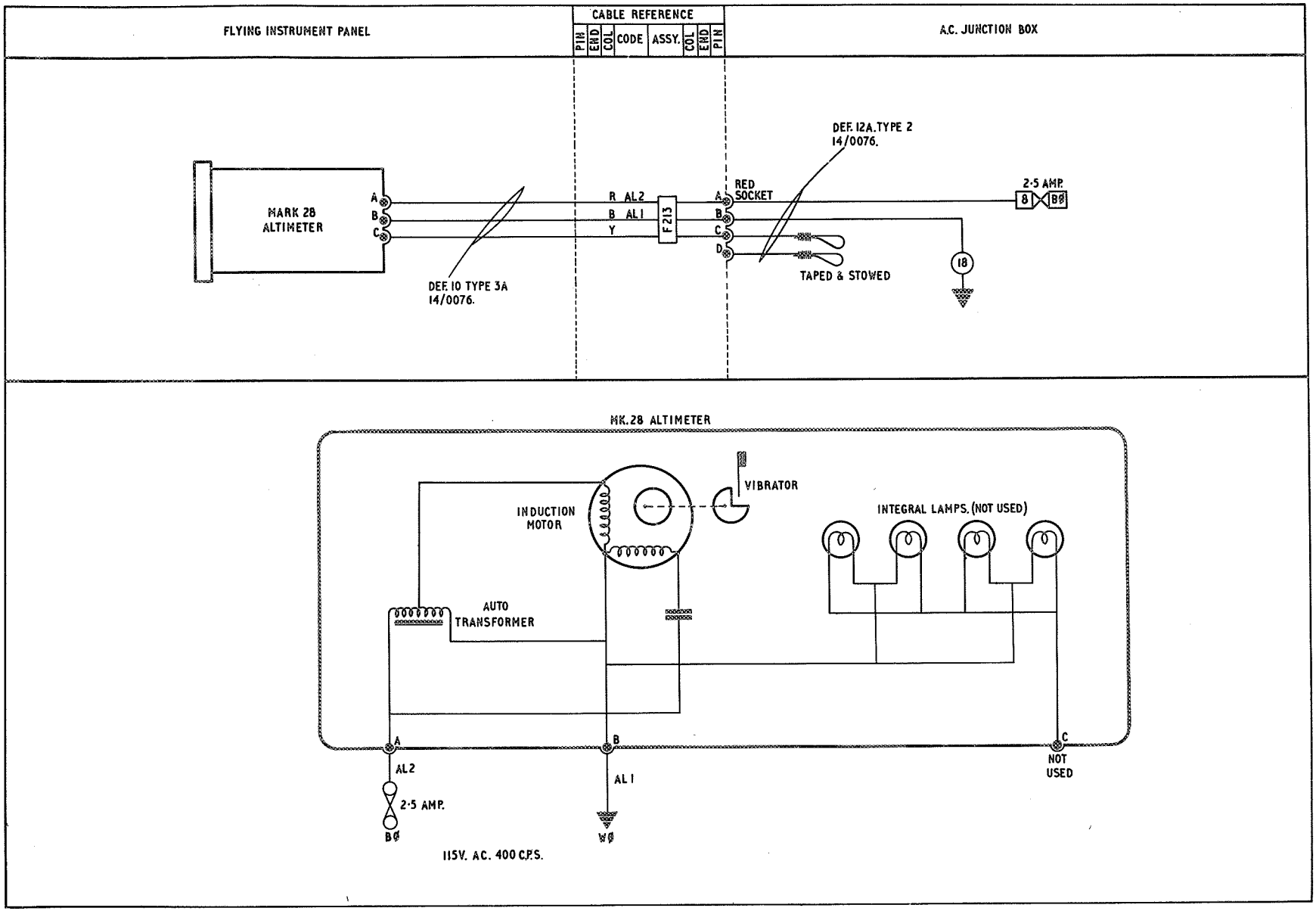
Pressure head leak tests

12. 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

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



T.P.(E) 10753

Fig. 3- Altimeter (routeing and theoretical)

APPENDIX 1 – MODS.1383 AND 1387
(HEIGHT ENCODING AND STAND-BY ALTIMETERS)

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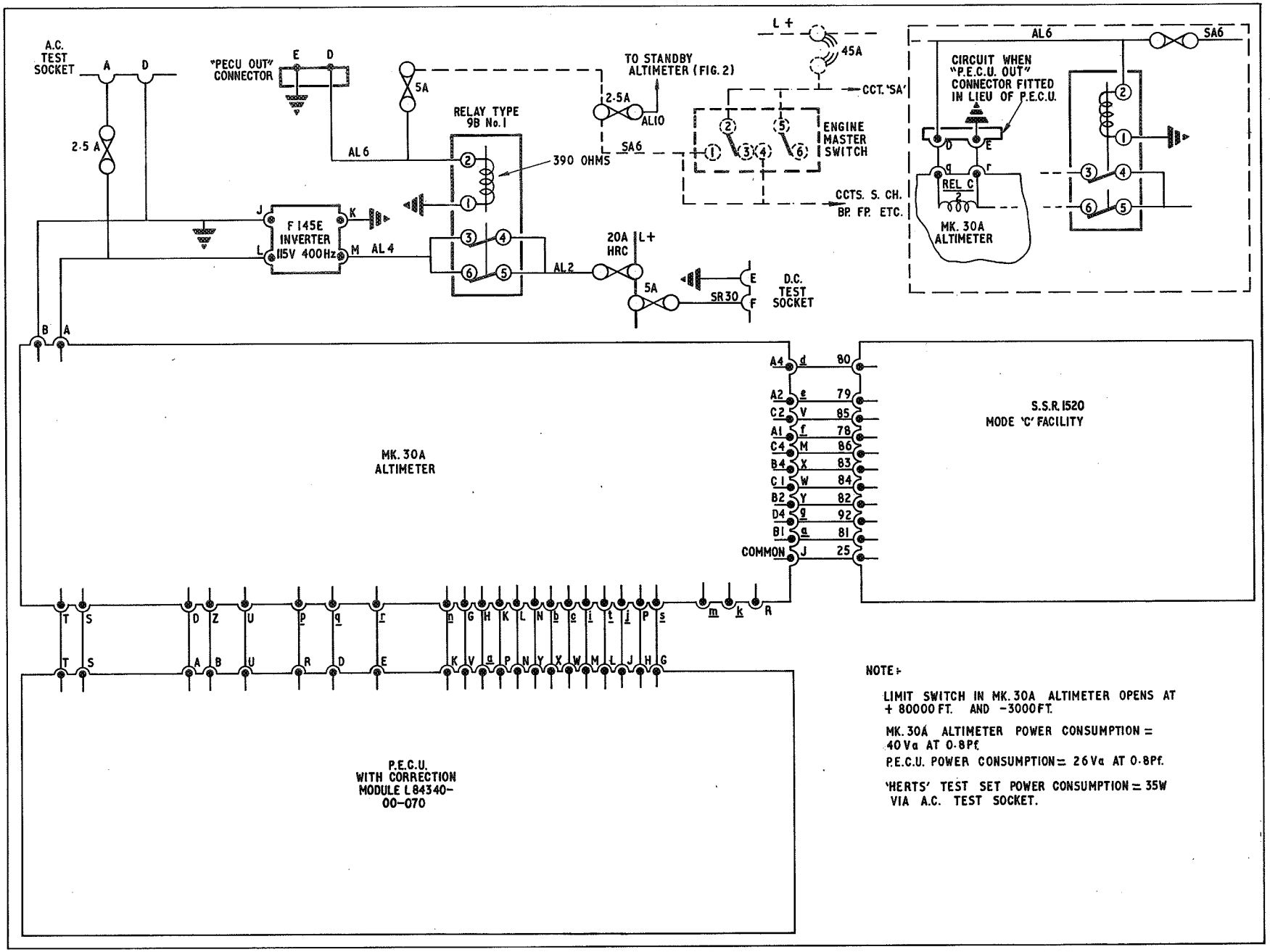


Fig.1 Height encoding altimeter system (theoretical — Mod.1383)

Introduction

1. This Appendix describes and illustrates the height encoding and standby altimeter systems which are embodied by Mod.1383 on the GA and PR Mk.11 aircraft of post Mod.228 state and by Mod.1387, on the GA Mk.11 aircraft of pre Mod.228 state only. Mod.1383 provides a Mk.30A height encoding altimeter with a Pressure Error Correction Unit *(PECU)* and Mod.1387 provides a Mk.30A height encoding altimeter without a PECU. An inverter, to provide 115V a.c., is installed by each modification. The inverter types are listed in Table 1. The Mk.30A altimeter replaces the previously fitted altimeter described in Group 3.A., and the standby altimeter, introduced by Mod.1383 and 1387, is an additional instrument. This Appendix includes servicing and in-situ testing information necessary to keep the altimeter systems in a serviceable and efficient condition. For more detailed information on the units installed by the above modifications, refer to the Air Publications listed in Table 1. For unit location and means of access, refer to Group 1.C.

Height encoding system (Mod.1383)

General

2. The height encoding altimeter system consists of a Mk.30A altimeter, a PECU and a single-phase 115V 400Hz inverter with its control and protection circuitry. Test sockets for in-situ testing of the system are also provided. Figures 1 to 3 illustrate the system.

Altimeter Mk.30A

3. The Mk.30A altimeter is mounted on the flying instrument panel in the aircraft cabin with the sealed case of the altimeter containing the operating pressure – sensitive capsule, connected to the static line of the aircraft pitot/static system *(Group 3.A.)*. Capsule movement is transmitted electrically to the altimeter indicating mechanism and to a brush encoder in the altimeter which transmits a coded output to the IFF/SSR installation *(Sect.6, Chap.2, App. 2)*, relative to the aircraft height. The altimeter has a millibar scale and an adjusting knob to vary the setting according to prevailing conditions. Two failure flags indicate the operating state of the instrument, a power failure striped flag which covers the height digits when operating power fails and a smaller flag identified P.E. which appears on the face of the instrument when the PECU fails.

Pressure Error Correction Unit

4. The Pressure Error Correction Unit *(PECU)* is mounted on the underside of the lower radio mountings in the radio bay and contains a pressure sensitive capsule in a sealed case with the interior of the capsule connected to the pitot pressure, and the exterior of the capsule connected to the static pressure of the aircraft pitot/static installation *(Group 3.A.)*. Movement of the capsule is converted to electrical signals which are passed, through the correction module in the PECU, as correction signals to the Mk.30A altimeter outputs and so gives a more accurate indicated height reading.

Inverter Type F145E and PECU OUT plug

5. The Type F145E inverter, which supplies an output of 115V, 400Hz, single phase a.c. for operation of the altimeter and PECU circuits, is mounted on the forward end of the radio bay upper mountings and receives its 28V d.c. input from the L+ bus-bar through a 20A fuse and the contacts of a control relay. The fuse is No.24 in the aircraft supply panel, and the control relay is mounted outboard, behind the inverter. The coil of the control relay is energised to close its contacts by a supply provided whenever the engine master switch *(Group C.1.)* is set to ON, through fuse 37 in the supply panel. A two-pin plug, mounted on the lower radio mountings and identified PECU OUT also obtains 28V supply through fuse 37. This system should be operated with the PECU inoperative, unless the outboard drop tanks are fitted to the aircraft. To achieve this, cable

TABLE 1

Equipment type and Air Publication reference

Equipment	Air Publication
Altimeter, servo encoding, Kollsman, Mk.30A	
Pressure error correction unit, with correction module L84340–00–070 (Mod.1383 only)	A.P.112G–1031–1
Inverter, Ferranti, Type 375 (Mod.1387 only)	A.P.113D–0300 Series
Inverter, Ferranti, Type F145E (Mod.1383 only)	A.P.113D–0300 Series
Altimeter, standby, Jaeger, Pt. No. 64142–200–1	A.P.112G–1000 Series
Magnetic relay, Type 9B, No.1A (Mod.1383 only)	A.P.113D–1328–1

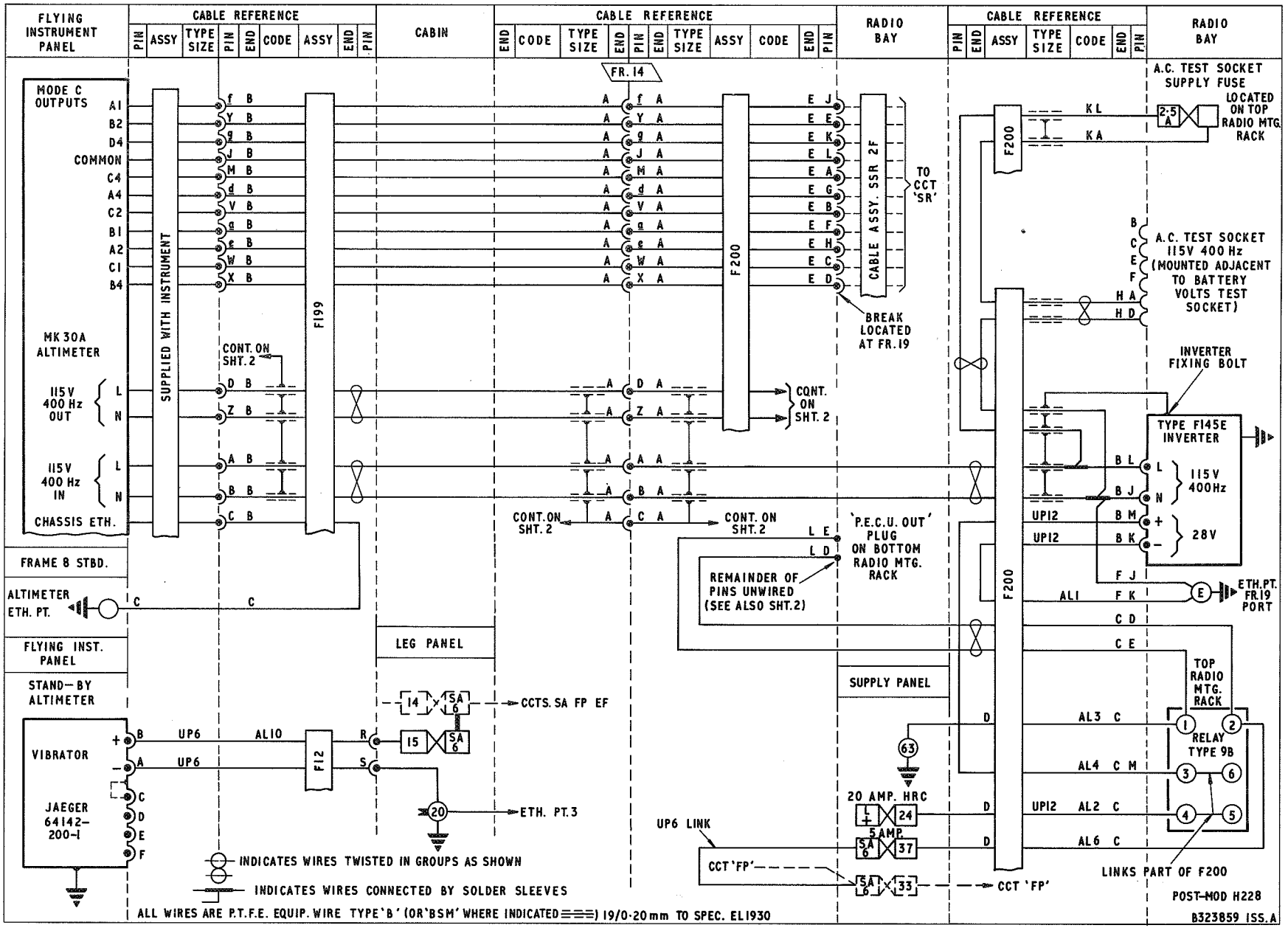


Fig.2 Height encoding and standby altimeter (routeing — Mod.1383, sheet 1)

assembly F200 end G *(ref. Figs.2 and 3)* is removed from PL3 on the PECU and connected to the PECU OUT plug and a protective cover is fitted to PL3.

Test sockets

6. Test sockets both a.c. and d.c., are provided on the aircraft battery mounting in the radio bay for in-situ testing of the height encoding system. The d.c. test socket circuit is protected by fuse 21 in the supply panel, and the a.c. test socket circuit by a fuse situated on the radio rack upper mounting in the radio bay. The d.c. circuit is from the aircraft L+ bus-bar and the a.c. circuit is from the Type F145E inverter output. All earth points for the height encoding system circuits are shown on the routeing diagrams.

Standby altimeter

7. The Jaeger altimeter is mounted on the pilots flying instrument panel and operates as an uncorrected air pressure operated instrument. The pressure sensitive capsule of the instrument is connected to the static line of the aircraft pitot/static installation *(Group 3.A.)*. The altimeter has a millibar scale and a setting knob projecting from the face and is provided with an integral vibrator which operates on 28V. d.c. from a circuit provided when the engine master switch *(Group C.1.)* is set to ON. This circuit is protected by fuse 15 in the leg panel *(ref. Fig.2)*.

Height encoding system (Mod.1387)

General

8. This height encoding system consists of a Mk.30A altimeter with a.c. power supplied from a Type 375 inverter and is provided with a.c. and d.c. test sockets for in-situ testing. The system circuit is illustrated in Figs. 4 and 5.

Altimeter Mk.30A

9. The location and description of this instrument is exactly the same as for Mod.1383, para.3. The only circuit difference is that supply to the PE failure flag is taken from the d.c. input to the Type 375 inverter instead of from the PECU.

Inverter Type 375

10. The Type 375 inverter which supplies single-phase 115V, 400Hz a.c. to operate the altimeter Mk.30A, receives a 28V d.c. input supply by a circuit which is completed when the engine master switch *(Group C.1.)* is set to ON. Fuse 37 in the supply panel protects this input circuit.

Test Sockets

11. The test socket location and circuit description is as in para.6. The only difference is that the a.c. circuit supply is taken from the IFF/SSR Type E182 inverter output *(Chap.1, Group H.1, App.3)*.

Standby altimeter

12. The location and description of the Jaeger altimeter is as in para.7.

Operation

Height encoding system (Mod.1383)

13. When the engine master switch *(Group C.1.)* is selected to ON, a circuit is completed through fuse 37 in the supply panel, to energize the coil and close the contacts of the control relay for the Type F145E inverter. A circuit is also made, through fuse 15 in the leg panel, to operate the standby altimeter vibrator. Closing the contacts of the control relay completes the d.c. input circuit to the inverter from L+, through fuse 24 in the supply panel, and the inverter will commence to operate and supply 115V, 400Hz a.c. to the Mk.30A, which, in turn, provides supply to the PECU. The striped failure flag will immediately disappear and the altimeter will read a height related to the millibar setting. The PE flag will disappear after approximately one minute. When the system is operated with the PECU inoperative *(F200 G connected to PECU OUT plug)*, only pins D and E of F200 G are in circuit to the altimeter Mk.30A *(ref. Figs.2 and 3)*. Pin D obtains 28V +ve from terminal 2 of the inverter control relay to energize the coil of an internal relay in the Mk.30A to ensure the encoded output of the altimeter is in circuit to the IFF/SSR transponder. Pin E and control relay terminal 1 complete the earth return for this circuit. The PE failure flag remains in view at all times when the PECU is inoperative.

Height encoding system (Mod.1387)

14. When the engine master switch *(Group C.1.)* is selected to ON, a 28V d.c. circuit is completed through fuse 37 in the supply panel to start the inverter Type 375 operating, and through fuse 15 in the leg panel, to the vibrator in the Jaeger standby altimeter. A circuit is also made to pin q of the Mk.30A, through fuse 37, to the coil of an internal relay in the altimeter, which completes a circuit between the encoded output of the inverter and Mode C of the IFF/SSR installation *(ref. Sect.6, Chap.2, App.2)*. Operation of the Type 375 inverter provides 115V, 400Hz to the Mk.30A altimeter and will cause the striped failure flag to disappear and the altimeter to register a height related to the millibar setting.

Note . . .

When a PECU is not fitted in the system, the PE failure flag will remain in view at all times.

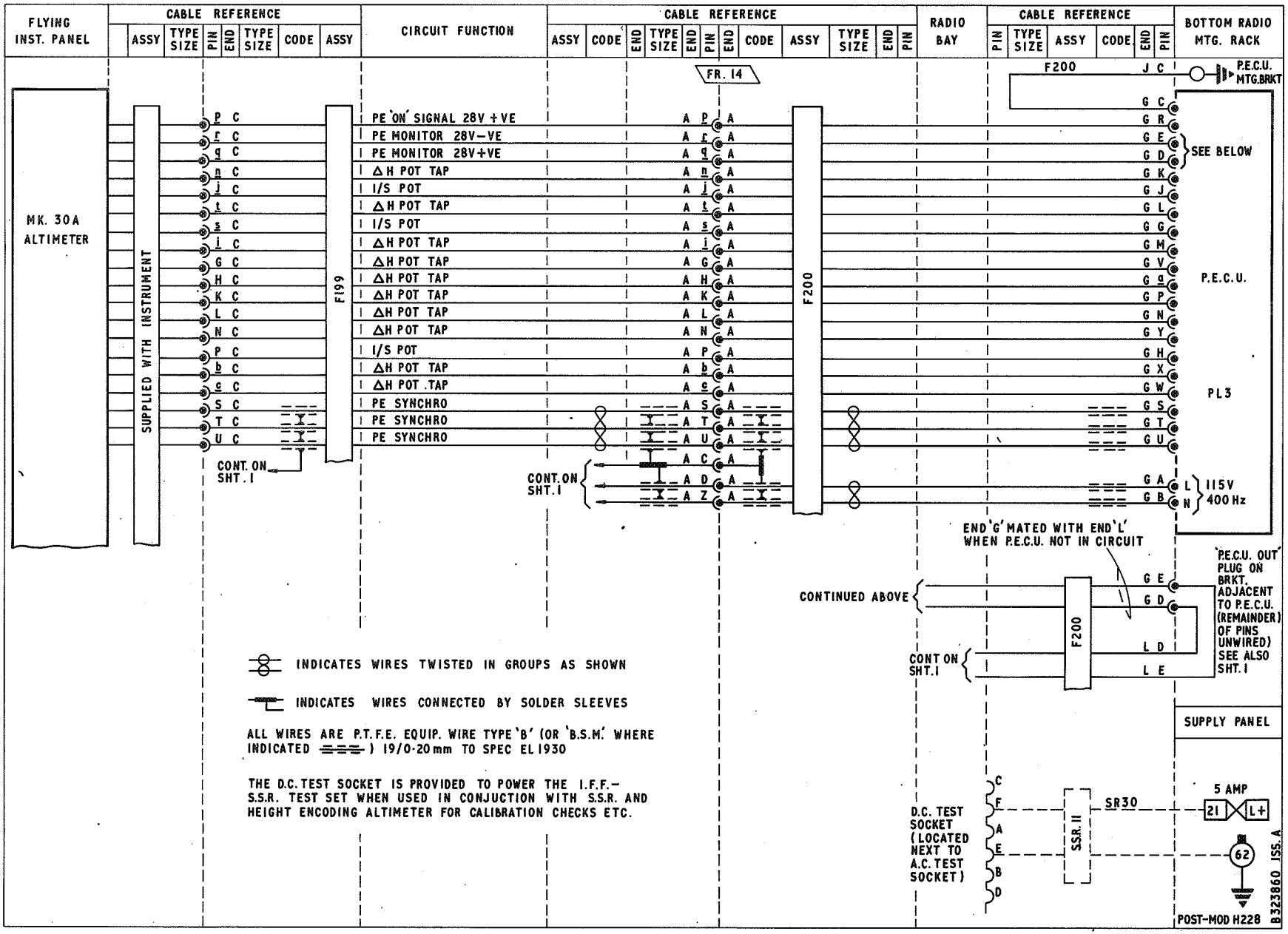


Fig.3 Height encoding and standby altimeter (routeing – Mod.1383, sheet 2)

SERVICING

General

15. Servicing of the height encoding system consists of keeping the components clean, checking they are securely mounted and all connectors properly secured. Detailed servicing and standard serviceability checks to be carried out on the components of the system will be found in the Air Publications listed in Table 1. The components should be checked in-situ and then, if found defective, removed from the aircraft for detailed servicing.

System tests

General

16. The following in-situ tests on the height encoding system are carried out to check the condition of suspect units.

Associated equipment

17. The associated equipment required is listed below.

(1) IFF/SSR Type 1520, ARI 23134/3 *(ref. Sect.6, Chap.2, App.2).*

(2) A.P.112G–1031–1 Altimeter Mk.30A publication.

(3) Routeing diagrams – Figs.1 to 5.

Test Equipment

18. Test equipment required is listed below.

(1) Aircraft pitot/static test set.

(2) Transponder test set Type CRM 544.

(3) Height Encoding Readout Test Set *(HERTS)*, Type 2600 or 2600-1 *(ref. A.P.112T–0618–1)*

(4) Insulation tester 500V.

(5) Voltmeter to read 115V, 400Hz a.c.

(6) Test lamp 28V.

Pitot/static system leak test

19. Carry out an aircraft pitot/static pressure leak test in accordance with the appropriate test schedule/publication.

Note . . .

Ensure connection of pitot/static test set will not damage other instruments during altimeter testing.

Electrical test (Mod.1383 and 1387 system)

20. Carry out the following electrical test.

(1) Ensure that the BATTERY and ENGINE MASTER switches are OFF and external 28V supply removed.

(2) *(Mod.1383)* Disconnect connecting cable plugs/sockets from Mk.30A flying lead, standby altimeter, PECU and inverter F145E. Disconnect cable assembly F200 end E from SSR2F at frame 19. Remove fuses 21, 24 and 37 from supply panel and fuse 15 from leg panel.
(Mod.1387) Disconnect cable plug/socket connectors from Mk.30A flying lead, standby altimeter and inverter. Disconnect cable F200 end E from cable SSR2 end E at frame 19. Remove fuses 21 and 37 from supply panel and fuse 15 from leg panel.

(3) Carry out continuity and insulation checks on altimeter cable assemblies.

CAUTION . . .

Do not use insulation tester on the instruments.

(4) Reconnect all plugs/sockets and fuses removed at (2) above, as applicable to Mod. state.

(5) Connect an external 28V d.c. supply to the aircraft, then check for 28V at altimeter d.c. test socket. *(Pin F is positive and pin E negative).*

(6) Insert CRM 544 test set power connector into d.c. test socket and functionally check IFF/SSR for correct operation.

(7) *(Mod.1383)* Select the ENGINE MASTER switch to ON and check that the a.c. supplies *(Group E.1)* standby inverter Type 100A starts to operate *(dolls-eye indicator shows stripes)* and the altimeter system Type 145E static inverter operates *(Mk.30A altimeter failure and PE failure flags clear).* Standby altimeter vibrator should be heard to operate.
(Mod.1387) The Type 375 static inverter will operate, altimeter failure flag will clear but PE failure flag remain in view.

(8) Check at the altimeter system test panel a.c. socket in radio bay for a.c. supply across pins A and D.

CAUTION . . .

Pin A is at 115V in respect to airframe.

Note . . .

With Mod.1387 systems, the test panel a.c. socket is not live unless the IFF/SSR inverter Type 182 is operating.

(9) Switch ENGINE MASTER switch to OFF.

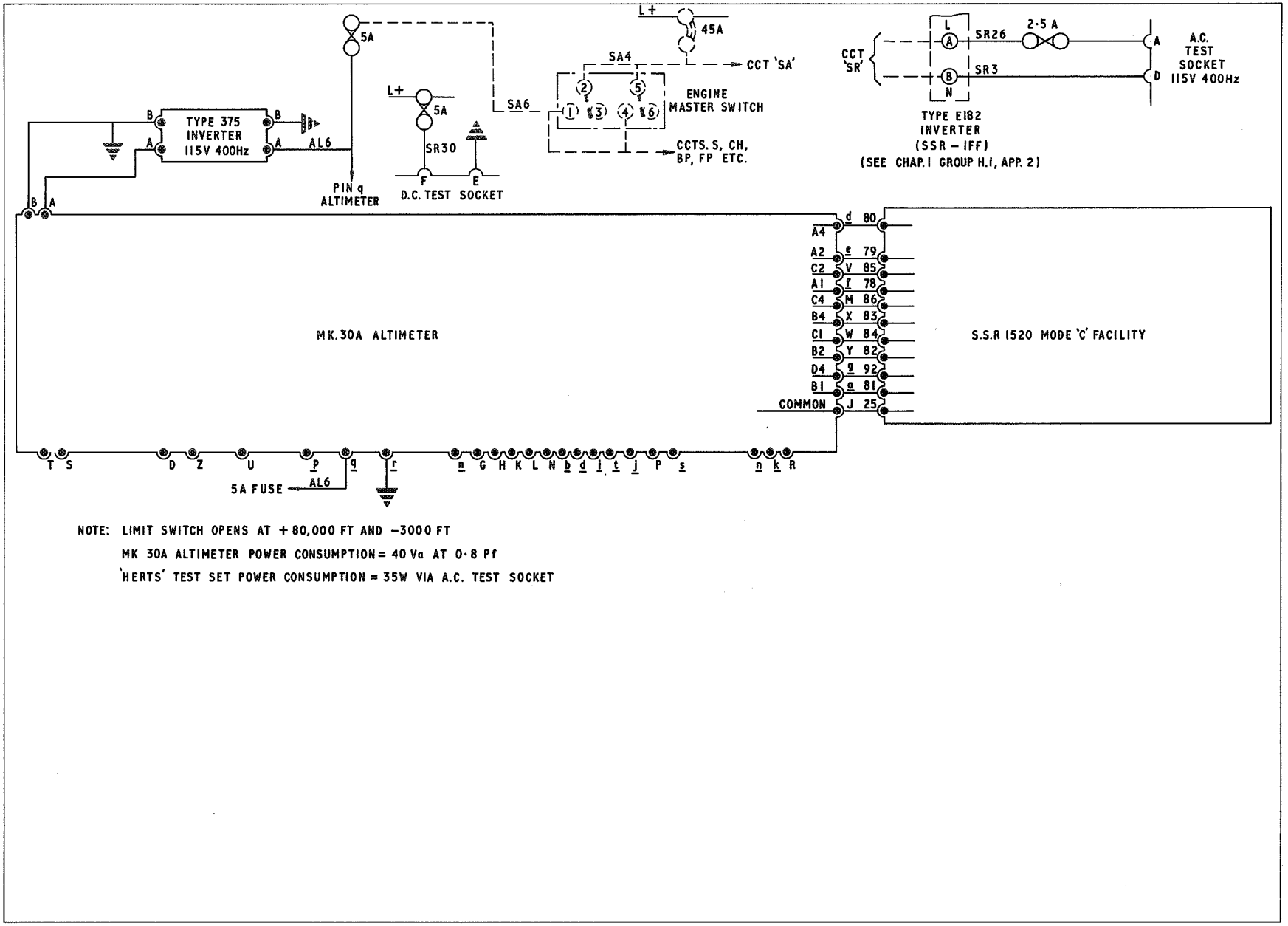
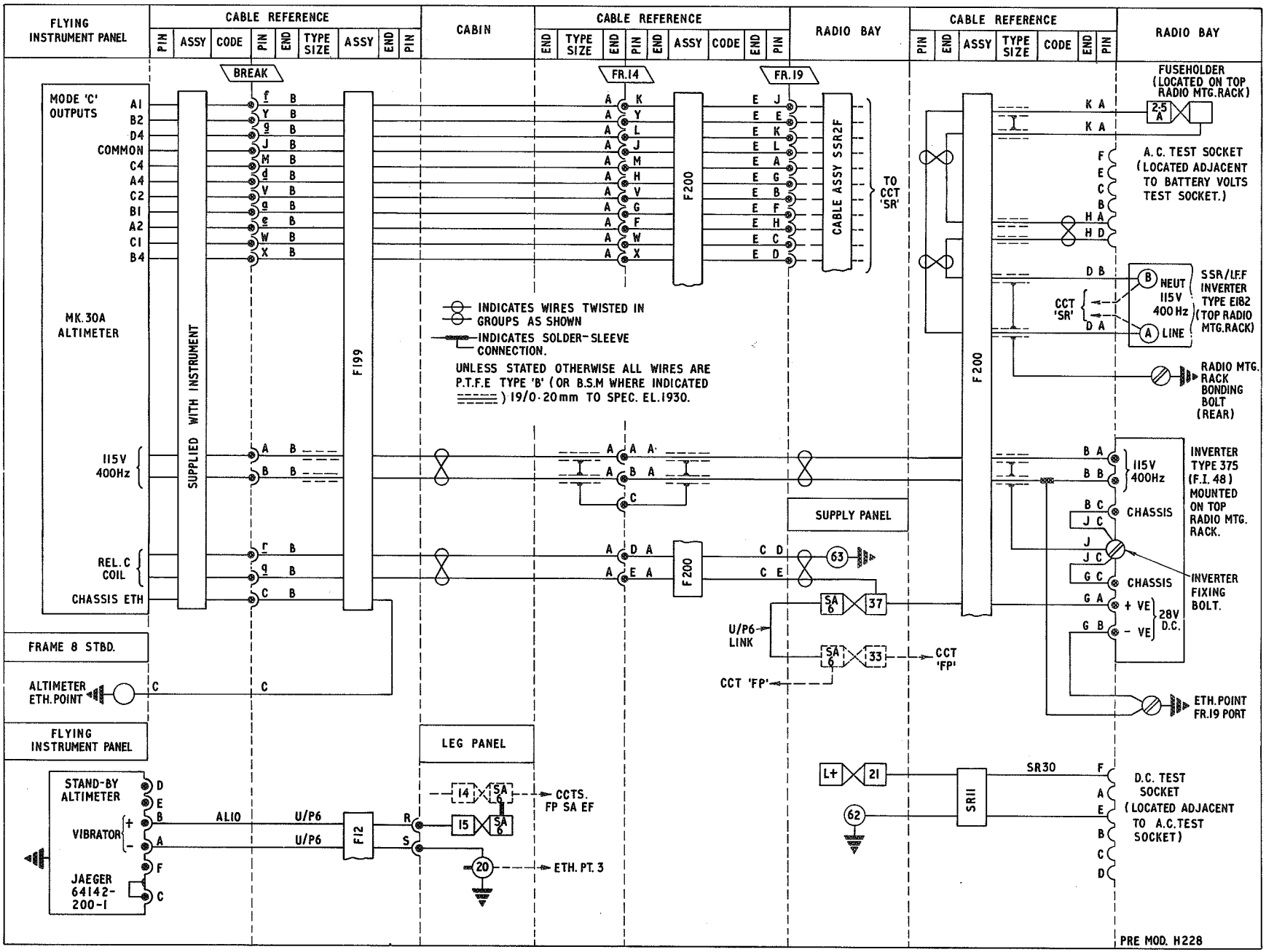


Fig.4 Height encoding altimeter system (theoretical — Mod.1387)


FLYING INSTRUMENT PANEL
CABLE REFERENCE
PIN
ASSY
CODE
PIN
END
TYPE SIZE
ASSY
END
PIN
CABIN
CABLE REFERENCE
END
TYPE SIZE
END
PIN
END
ASSY
CODE
END
PIN
RADIO BAY
CABLE REFERENCE
PIN
END
ASSY
TYPE SIZE
CODE
END
PIN
RADIO BAY
BREAK
FR.14
FR.19
MODE 'C' OUTPUTS
A1
B2
D4
COMMON
C4
A4
C2
B1
A2
C1
B4
MK.30A ALTIMETER
SUPPLIED WITH INSTRUMENT
F199
F200
CABLE ASSY SSR2F
TO CCT 'SR'
INDICATES WIRES TWISTED IN GROUPS AS SHOWN
INDICATES SOLDER-SLEEVE CONNECTION.
UNLESS STATED OTHERWISE ALL WIRES ARE P.T.F.E TYPE 'B' (OR B.S.M WHERE INDICATED) 19/0·20mm TO SPEC. EL.1930.
FUSEHOLDER (LOCATED ON TOP RADIO MTG.RACK)
2·5 A
A.C. TEST SOCKET (LOCATED ADJACENT TO BATTERY VOLTS TEST SOCKET.)
NEUT
115V 400Hz
LINE
SSR/LF.F INVERTER TYPE EI82 (TOP RADIO MTG.RACK)
CCT 'SR'
RADIO MTG. RACK BONDING BOLT (REAR)
115V 400Hz
REL.C COIL
CHASSIS ETH
SUPPLY PANEL
INVERTER TYPE 375 (F.I. 48) MOUNTED ON TOP RADIO MTG. RACK.
CHASSIS
INVERTER FIXING BOLT.
+ VE
- VE
28V D.C.
63
SA 6
37
U/P6 LINK
33
CCT 'FP'
ETH.POINT FR.19 PORT
FRAME 8 STBD.
ALTIMETER ETH.POINT
FLYING INSTRUMENT PANEL
LEG PANEL
STAND-BY ALTIMETER
VIBRATOR
JAEGER 64142-200-1
ALI0
U/P6
U/P6
F12
14
15
20
CCTS. FP SA EF
ETH. PT. 3
L+
21
62
SR11
SR30
D.C. TEST SOCKET (LOCATED ADJACENT TO A.C.TEST SOCKET)
PRE MOD. H228

Encoding altimeter test with PECU inoperative (Mod.1383)

21.

(1) On post Mod.1383 system *(PECU fitted)*, render PECU inoperative by transferring cable assembly F200, end G, from PL3 on PECU, to PECU OUT fixed connector, positioned adjacent to PECU.

Note . . .

The above action ensures that non-pressure error corrected encoding data is routed to the IFF/SSR transponder.

(2) Select ENGINE MASTER switch to ON and note that the Mk.30A altimeter power failure flag clears and PE flag remains in view.

(3) Adjust the millibar setting on the Mk.30A altimeter to read 1013.25mb. then adjust the static pressure in the aircraft pitot/static system by steps to obtain the altitude readings listed in Table 2. At each step check that the data transmitted by the IFF/SSR transponder, and displayed on the CRM 544 test set is as tabulated in Table 2.

Note . . .

Local ambient conditions may prelude checks at zero feet.

(4) Select ENGINE MASTER switch to OFF.

Encoding altimeter test with PECU operative (Mod.1383)

22.

(1) On post Mod.1383 systems, check that cable assembly F200 end G is connected to PL3 of the PECU.

Note . . .

The above action ensures that pressure error corrected encoding data is routed to the IFF/SSR transponder.

(2) Select ENGINE MASTER switch to ON and note that the Mk.30A altimeter failure flag disappears immediately and the PE flag disappears within 75 sec.

TABLE 2

Altitude/output code

Altitude (ft.)	Output Code D	A	B	C	CRM 544 Setting A	B	C	D
0	00	000	011	010	0	6	2	0
1,600	00	000	011	011	0	7	6	0
2,700	00	000	100	001	0	1	4	0
5,300	00	001	011	100	4	6	1	0
10,000	00	011	101	010	6	5	2	0
25,000	00	101	110	010	5	3	2	0
31,000	01	100	000	010	1	0	2	4

(3) Repeat para.21, (3), and operate TACAN *(ref. Sect.6, Chap.2, App.1)* during this step, to ensure that TACAN transponder transmissions do not influence the CRM 544 test set read-outs.

(4) Vent aircraft pitot/static installation static line to atmosphere.

(5) Set Mk.30A altimeter to read zero feet then apply pressure to the pitot line of the pitot/static installation by steps to obtain the airspeed values listed in Table 3.

Note . . .

The indicated altitude will vary during the above operation due to applied pressure error correction. This correction at each airspeed check shall be as specified in Table 3 and within the tolerance given in column 4.

(6) Set Mk.30A and test set altimeters to 1013.25mb. then reduce the static line pressure until the Mk.30A altimeter register 30,000ft, as required for Table 4 test, and note the reading on the test set altimeter.

(7) Seal off the static line and vent the pitot line in steps to obtain the airspeed/machmeter readings listed in columns 1 and 2 of Table 4. At each step, ensure the test set altimeter is still indicating the initial reading noted at step (6), adjusting the pressure as necessary to maintain this reading. Note the Mk.30A altimeter reading at each step, and establish the applied correction which must be as listed in Table 4 and within the listed tolerance.

Altimeter power failure test (Mod.1383)

23.

(1) Adjust millibar setting on Mk.30A and standby altimeters to 1013.25mb., then adjust static line pressure to obtain a reading of 10,000 ft. on the Mk.30A altimeter.

Note . . .

Ensure pitot pressure line is vented to atmosphere.

(2) Select ENGINE MASTER switch to OFF, and note that the Mk.30A altimeter power failure and PE flags appear on the instrument face, and in the standby altimeter vibrator ceases to operate.

(3) Reduce static line pressure to atmospheric, noting that, as the standby altimeter follows, there may be some hesitation due to lack of vibrator action.

(4) Select ENGINE MASTER switch to ON, and note that the Mk.30A altimeter power failure and PE flags clear, and the instrument aligns to the ambient pressure altitude, as indicated by the pitot/static test set master altimeter, i.e. The PECU is not influencing read-out.

TABLE 3

Mach/A.S.I. applied corrections at zero feet

Mach No.	Airspeed (knots)	Correction (ft.)	Tolerance (±ft.)
0.5	332	134	40
0.55	364	166	55
0.6	397	203	65
0.7	463	283	80
0.8	529	385	120
0.85	562	465	145

(5) Select ENGINE MASTER switch to OFF and disconnect external 28V supply.

(6) Fit protective caps to a.c. and d.c. socket on altimeter system test panel and transfer cable assembly F200 end G from PL3 on PECU to fixed PECU OUT plug, then fit a protective cap to PL3. Remove the pitot/static test set.

Encoding altimeter test (Mod.1387)

24.

(1) Operate TACAN *(ref. Sect.6, Chap.2, App.1)* during the following test and ensure the TACAN transponder transmissions do not influence the CRM 544 test set read-outs.

(2) Select ENGINE MASTER switch to ON, and ensure the Mk.30A altimeter failure flag disappears, and PE flag remains in view.

(3) Adjust the millibar setting on the Mk.30A altimeter to read 1013.25mb., then adjust the static pressure in the aircraft pitot/static system, by steps, to obtain the altitude readings listed in Table 2. At each step check that the data transmitted by the IFF/SSR transponder, and displayed on the CRM 544 test set is as tabulated in Table 2.

TABLE 4

Mach/A.S.I. applied corrections at 30,000 feet

Mach No.	Airspeed (knots)	Correction (ft.)	Tolerance (±ft.)
0.5	184	59	35
0.55	203	74	45
0.6	223	90	55
0.7	263	126	70
0.8	304	172	85
0.85	325	207	100

Note . . .

Local ambient conditions may prelude check at zero feet.

(4) Select ENGINE MASTER switch to OFF.

Altimeter Power failure test (Mod.1387)

25.

(1) Adjust millibar setting of both altimeters to read 1013.25mb., then adjust the static line pressure to obtain a reading of 10,000 ft. on the Mk.30A altimeter.

(2) Select the ENGINE MASTER switch to OFF and check that the Mk.30A altimeter failure flag appears, and the standby altimeter vibrator ceases to operate.

Note . . .

The PE failure flag is always in view on this modification state.

(3) Reduce the static line pressure to atmospheric, noting that the standby altimeter may hesitate when following, due to lack of vibrator action.

(4) Select ENGINE MASTER switch to ON, and check that the Mk.30A altimeter power failure flag clears, and PE failure flag remains in view. The instrument should align to ambient pressure altitude as indicated by the pitot/static test set master altimeter.

(5) Select ENGINE MASTER switch to OFF, and disconnect external 28V supply, IFF/SSR test set connector and pitot/static test set. Fit protective caps to a.c. and d.c. test panel sockets.

Encoding altimeter read-out test using HERTS (Mod.1383 and 1387)

26. To calibrate the Mk.30A altimeter in-situ or diagnose a fault in the automatic height encoding read-out at first line servicing the following test is to be applied to the altimeter system.

(1) At frame 19 disconnect cable assembly SSR2F from F200E and connect the read-out cable of the HERTS between F200E and SKT 8 of the HERTS. Connect an external 28V supply to the aircraft, and the pitot/static installation.

(2) *(Mod.1383)* Ensure cable assembly F200G is removed from PL3 on the PECU and connected to PECU OUT connector, i.e. PECU out of circuit.

(3) Ensure that the HERTS POWER ON/OFF switch is set to OFF and connect the power supply cable between PL9 on the HERTS and the a.c. test socket, located on the underside of the battery mounting in the radio bay.

Note . . .

On Mod.1387 systems, the IFF/SSR Type 182 inverter must be operating to provide 115V a.c. at the test panel a.c. socket.

(4) Set the POWER ON/OFF switch on the HERTS to ON.

(5) Adjust the barometric pressure setting knob to 1,013.25mb.

(6) Set the ENGINE MASTER switch to ON.

Note . . .

The test set checks three functions of the encoder. These are logic 1 (turn on) and logic 0 (turn off) functions, and the corresponding error between indicated and encoded altitude.

(7) Set the HERTS functional switch to TURN ON.

(8) Set the HERTS 1,000 ft. TONE switch to ON.

(9) Adjust the static pressure in the aircraft system until the altimeter indicates – 1,000 feet. Check that the HERTS read-out display is – 001.0 and that the input code sequence is:–
0 0 0 0 0 0 0 0 0 1 0 (lamp C2 lit).

(10) Adjust the static pressure in the aircraft system to obtain the altitude readings listed in Table 5. At each altitude step, check that the read-out on the HERTS corresponds to the Table 5 read-out code.

Notes . . .

1. The audible tone can be used as a secondary check as it sounds at each 1,000 feet change of altitude.

2. The input code lamp indicate if a fault is present in a particular line of the encoder. For example, the code for 10,000 feet altitude is 00 011 101 010. If lamps A2, A4, B1, B4 and C2 are lit, the encoder is functioning correctly. If, for example, B1 was extinguished, this would indicate a fault in input line B1.

(11) Set the HERTS functional switch to TURN OFF. With the static pressure adjusted to give the maximum altitude listed in Table 5, check that the HERTS read-out corresponds to the figures in the read-out column.

(12) Repeat sub-para (10) to check the read-out against each altitude setting listed, checking in descending order. If there is a fault in the encoder logic, this will be indicated by an additional lamp being lit.

(13) Set the 1,000 feet TONE switch to OFF, the POWER ON/OFF switch to OFF, the ENGINE MASTER switch to OFF and disconnect the HERTS from the altimeter. Reconnect cable F200E to cable SSR2F at frame 19. Disconnect 28V supply and pitot/static test set.

TABLE 5

Altitude/encoding read-out

Altitude (ft.)	Read-out code			
0	00	000	011	010
1,600	00	000	111	011
2,700	00	000	100	001
5,300	00	001	011	100
10,000	00	011	101	010
25,000	00	101	110	010
40,000	01	111	011	010

REMOVAL AND ASSEMBLY

General

27. Location of all components of the height encoding altimeter system is indicated in Group 1.C., Fig.1 and 2, and means of access is indi-

cated in Group 1.C. Fig.5. Assembly is normally a reversal of the removal procedure, but any special assembly feature is covered by a note in the appropriate paragraph. Before the removal procedure for any component is undertaken, the aircraft must be rendered electrically safe as detailed in Chap.1, Group A.1, Para.39.

Altimeters

28. Removal of the centre instrument panel, containing both the Mk.30A and Jaeger standby altimeter, is detailed in Group 1.C. With this panel removed, removal of these two instruments is self evident.

Pressure error correction unit (Mod.1383 only)

29. With access gained, to remove this unit, proceed as follows:–

(1) Remove and blank off the pitot and static connections at the inboard end of the PECU.

(2) Remove cable F200G from PECU PL3.

(3) Remove the three bolts and washers securing PECU in its mounting bracket, and remove PECU from aircraft.

Note . . .

When any unit is assembled which has necessitated disturbing a connection in the pitot/static installation, a pitot/static leak test must be carried out in accordance with current servicing procedures.

Inverter Type F145E

30. With access gained, remove inverter as follows:–

(1) Remove cable assembly F200B connector from inboard end of inverter and fit approved blanking caps.

(2) Remove the two bolts on the forward side of the inverter which secure it to the mounting plate, noting that the inboard bolt also carries the cable screening earth lead.

Note . . .

On assembly, ensure the earth lead is replaced and makes good contact with the aircraft structure.

(3) Remove inverter from aircraft.

Inverter Type 375

31. With access gained, proceed as follows:–

(1) Remove cable assembly F200 end B and G connectors from inboard end of inverter and fit approved blanking caps.

(2) Remove the four bolts, two inboard and two outboard, sucuring the inverter to its mounting plate. Note that the rear inboard securing bolt also carries the cable bonding lead.

Note . . .

At assembly, ensure the bonding lead is replaced under the same bolt and makes good electrical contact with the structure.

Control relay

32. To gain space for removal of this relay will require the removal of inverter Type F145E. Refer to para.30. With inverter removed, proceed as follows:–

(1) Remove the relay terminal cover and remove all external connected wires then replace cover.

(2) Remove the two securing screws holding the relay in position and remove relay from aircraft.

(3) Assemble inverter Type F145E to mounting.

PECU OUT plug, fuseholder and test panel sockets.

33. Removal of these components from their respective mountings in the radio bay is self evident.

Note . . .

After assembly, carry out a standard insulation check between each component body and the aircraft structure.