GROUP 3.B

ELECTRICALLY OPERATED FLIGHT INSTRUMENTS

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LIST OF ILLUSTRATIONS

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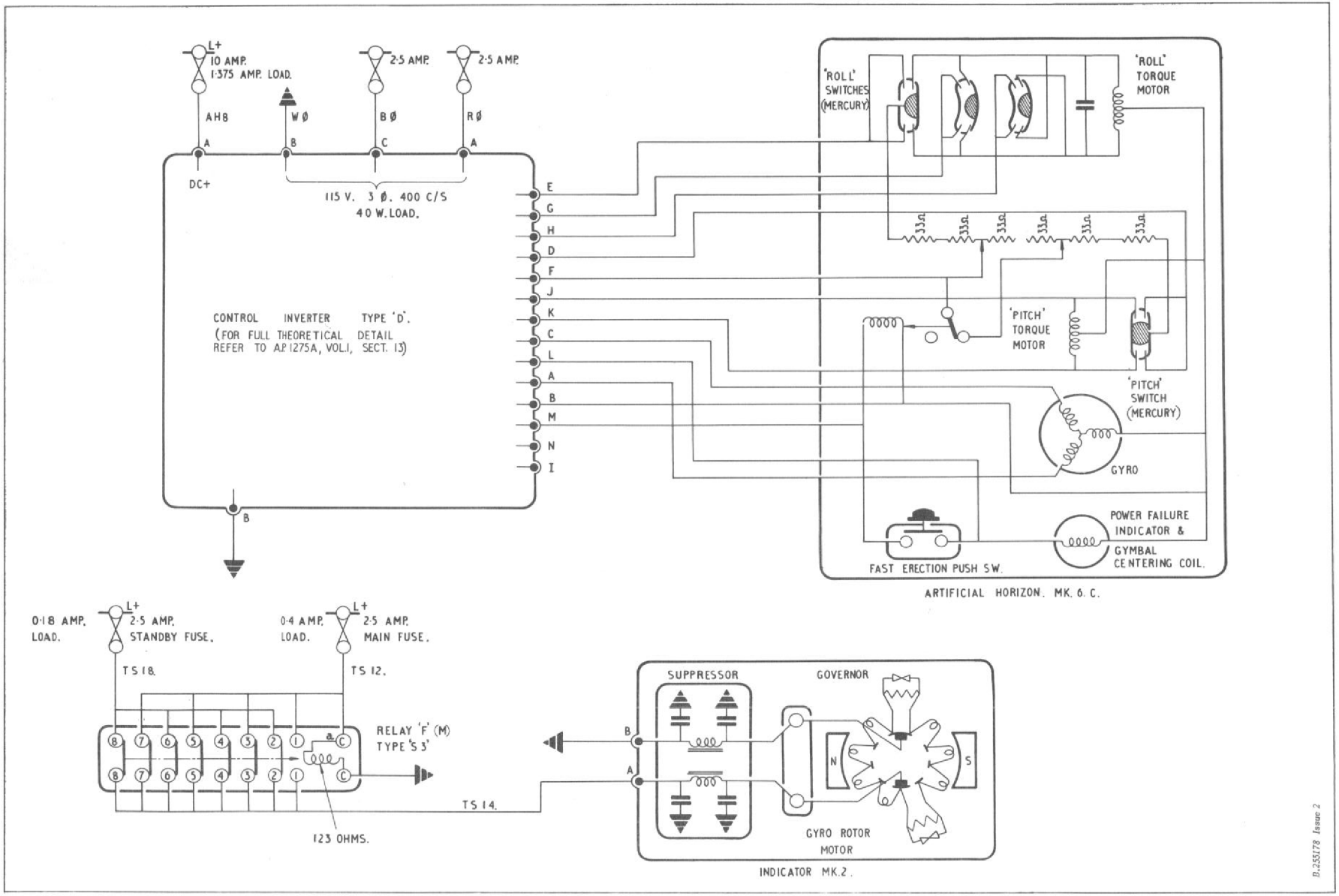

Fig.1. Artificial horizon and Turn and slip indicator (theoretical)

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Introduction

1. This Group contains a description of the aircraft's electrically operated flight instruments installed other than those mentioned in Group 3A, and includes the necessary routeing and theoretical diagrams of the installations. For a general description of the instrument installation, reference should be made to Group 1.A, but for the location and access to all the instruments and associated equipment reference should be made to Group 1.C. Detailed information on the standard components used will be found in the relevent Air Publications listed in Table 1.

DESCRIPTION

Artificial horizon

2. The artificial horizon for the instructor's use is located in the centre of the starboard instrument panel. The instrument, is an electrically-operated gyroscopic unit providing a continuous indication of the aircraft's attitude in roll and pitch in relation to the natural horizon. It is supplied with three phase a.c. from the a.c. supplies circuit, but in the event of this system failing, supplies would automatically be fed from the control inverter *(fig.1)*. Routeing and theoretical diagrams of the installations are given in figs.1 and 2.

Turn and slip indicator

3. This indicator is fitted on the instructor's instrument panel just below the rate of climb indicator to provide an indication of the aircraft's lateral attitude in relation to level flight and to indicate skid, side slip or correct bank during a turn. It is an electrically-operated instrument, which is supplied from the aircraft's 28 volt d.c. supply and is operative immediately the battery master switch is placed in the ON position. It is provided with duplicated fuses located in the main fuse box and the supply from the fuses to the instrument is controlled by relay M in the centre console.

Operation

4. The operation of the supply circuit is such that when the battery master switch is placed in the ON position, relay M is energized via the circuit fuse, and the contacts of this relay, which are made while it is energized, feed the supply from the normal fuse to operate the indicator. If the normal fuse fails, the relay will immediately de-energize, thus making the other set of contacts, which are fed from the standby fuse and also connected to the indicator. The indicator is now supplied from the standby fuse and remains in operation with no apparent indication of fuse failure. Routeing and theoretical diagrams of the installation are given in fig.1 and 2.

TABLE 1

Equipment used and Air Publication Reference

Equipment Type	Air Publication
Artificial horizons, Mk.6C Turn and slip indicator, Mk.3	A.P.1275A, Vol.1, Sect.13
Tail plane position indicator, Type 587 FL Tail plane and flap position transmitters, Type C Rudder and aileron trim indicators, Type 501 FL Rudder tab position transmitter, Type 470 FL Aileron tab position transmitter, Type 568 FL Flap position indicator, Type 7HSD (Pre.Mod.769) Flap position indicator, Type 19HSD (Post Mod.769)	A.P.1275A, Vol.1, Sect.16
Airstream direction detector indicator, Mk.12	A.P.1275A, Vol.1, Sect.27

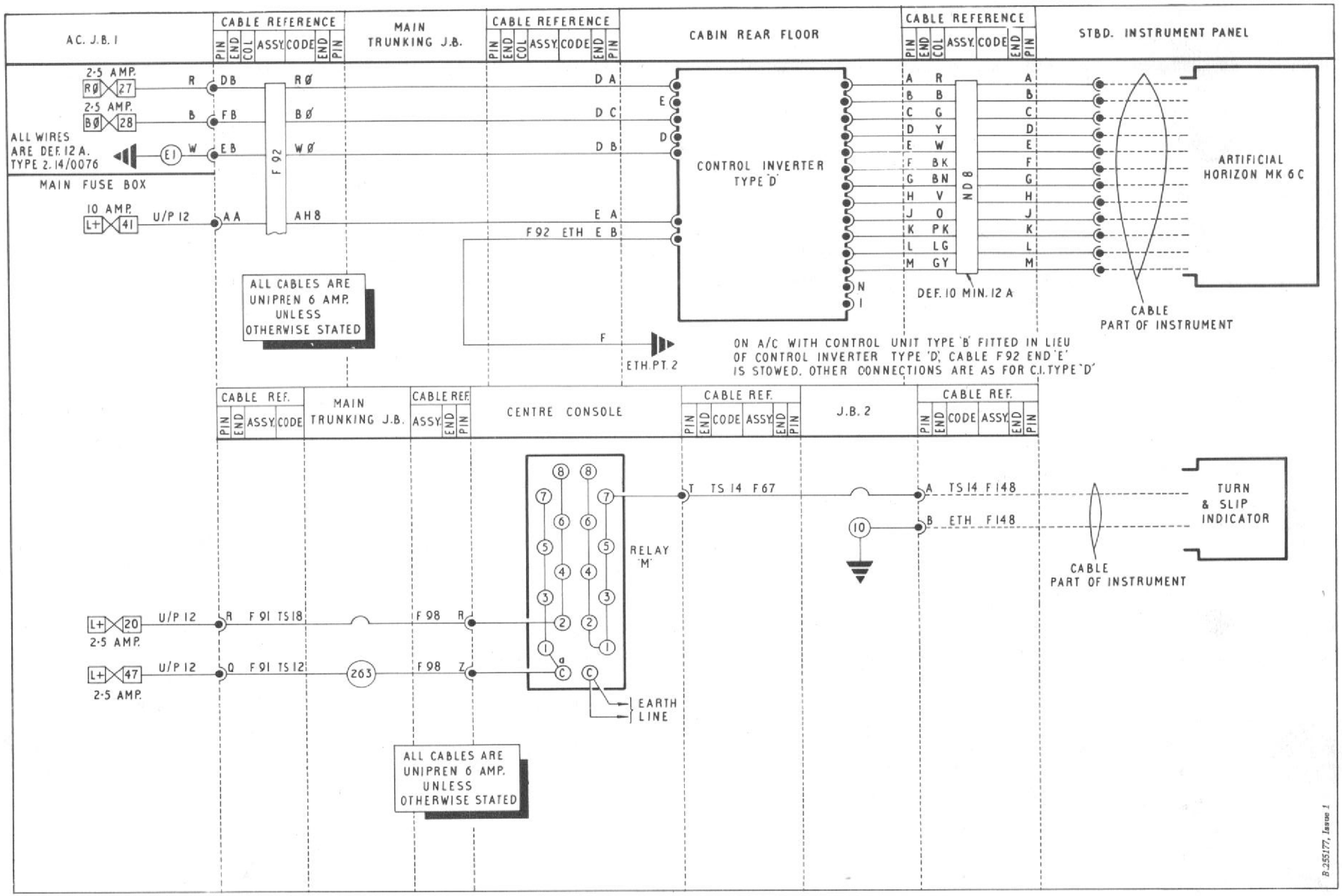

Fig.2 Artificial horizon and Turn and slip indicator (routeing)

Note . . .

Due to the fuse change-over facility of this circuit, it is important to check before each flight that the normal and standby circuit fuses are both serviceable.

Tail plane position indicator

5. The incidence of the tail plane is shown on an indicator situated on the port side of the pupil's flying instrument panel. The indicator is operated by a Desynn transmitter located in the dorsal fin just above the tail plane actuator and linked to the actuator by a short operating rod. A theoretical diagram of the circuit is given in fig.3 and a routeing diagram in fig.4. Details of the Desynn system will be found in the Air Publication listed in Table 1.

Rudder and aileron tab position indicators

6. The setting of the rudder and aileron trim tabs are shown on twin indicators located just forward of the trim switches on the cabin port and starboard shelves. The rudder portion of each indicator is operated by a Desynn transmitter, which is secured to nose rib F in the leading edge of the fin and the aileron portion of each indicator is actuated by a further Desynn transmitter located adjacent to the actuator in the aileron structure. Both transmitters are actuated by cables connected to levers on the tab actuators. Routeing and theoretical diagrams of the electrical circuits of these indicators are given in fig.5.

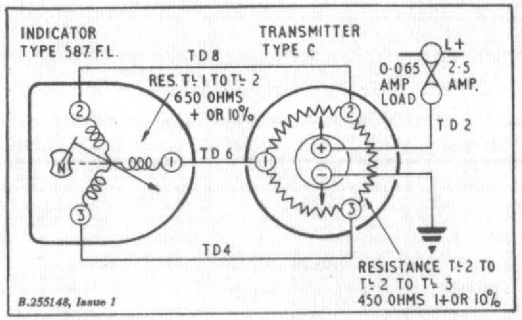

Fig.3 Tail plane position indicator (theoretcial)

Flap position indicator

7. This indicator is located on the port side of the pupil's flying instrument panel

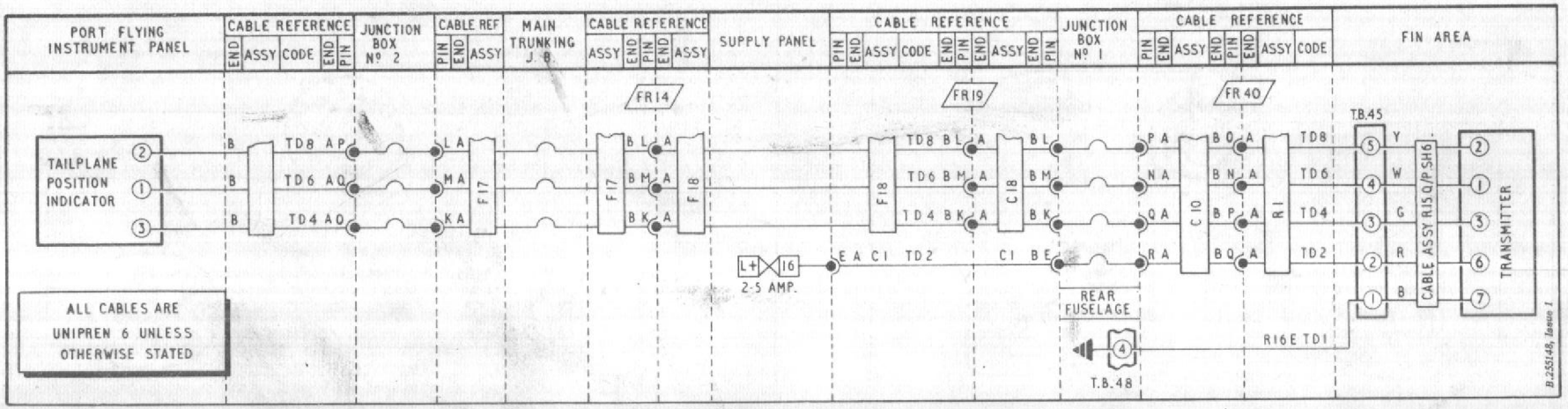

Fig.4 Tail plane position indicator (routeing)

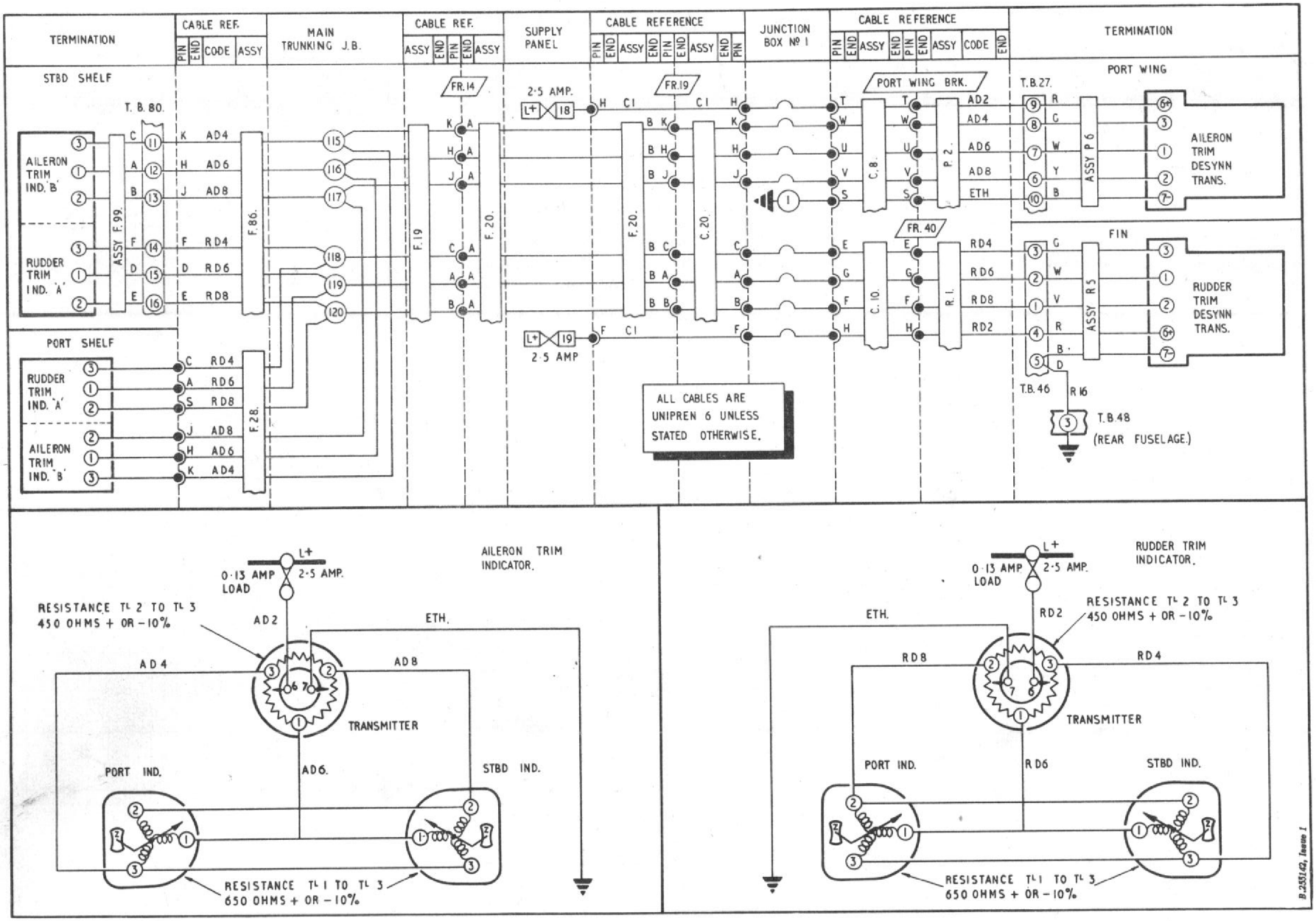

Fig.5 Rudder and aileron tab position indicators (routeing and theoretical)

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and is operated by a Desynn transmitter located in the port wheel bay and linked to the flap drum switch and interconnecting levers by a Bowden cable. A theoretical diagram of the circuit is given in fig.6 and details of the routeing of the electrical cables will be found in fig.7.

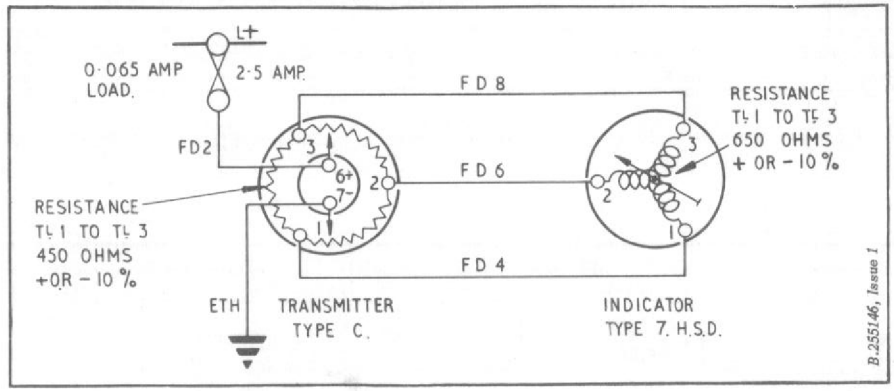


Fig.6. Flap position indicator (theoretical)

Airstream direction detector indicator

8. The airstream direction detector indicator enables the pilot to fly on the optimum approach angle whilst concentrating his attention outside the cabin. The equipment used in this installation consists of a probe unit which transmits angle of attack information to the indicator, audio generator and indicator lights. The indicator and indicator lights provide a visual warning to the pilot, whilst the audio generator gives an audio warning through the pilots' telephones via the radio circuit and an audio control unit.

9. The probe unit, which contains a heater, projects into the airstream on the port side between frame 5 and 6. The audio generator is mounted on a plate between frame 5 and 6 on the starboard side. The master switch together with the audio control unit, which incorporates a power ON/OFF switch and volume control, are situated on the aft face of frame 9 on the port longeron in the cabin. The indicator and indicator lights are mounted on the glare shield above the armament panel.

10. Power is supplied to the master switch via a 10 amp fuse. When the master switch is in the on position a supply is fed, via a 5 amp circuit breaker, to the heater in the probe unit and via 2.5 amp fuses to the

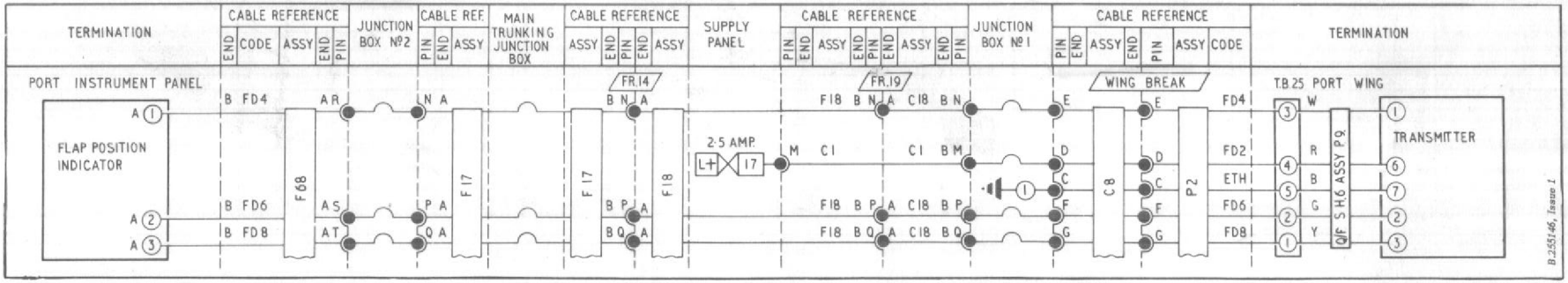
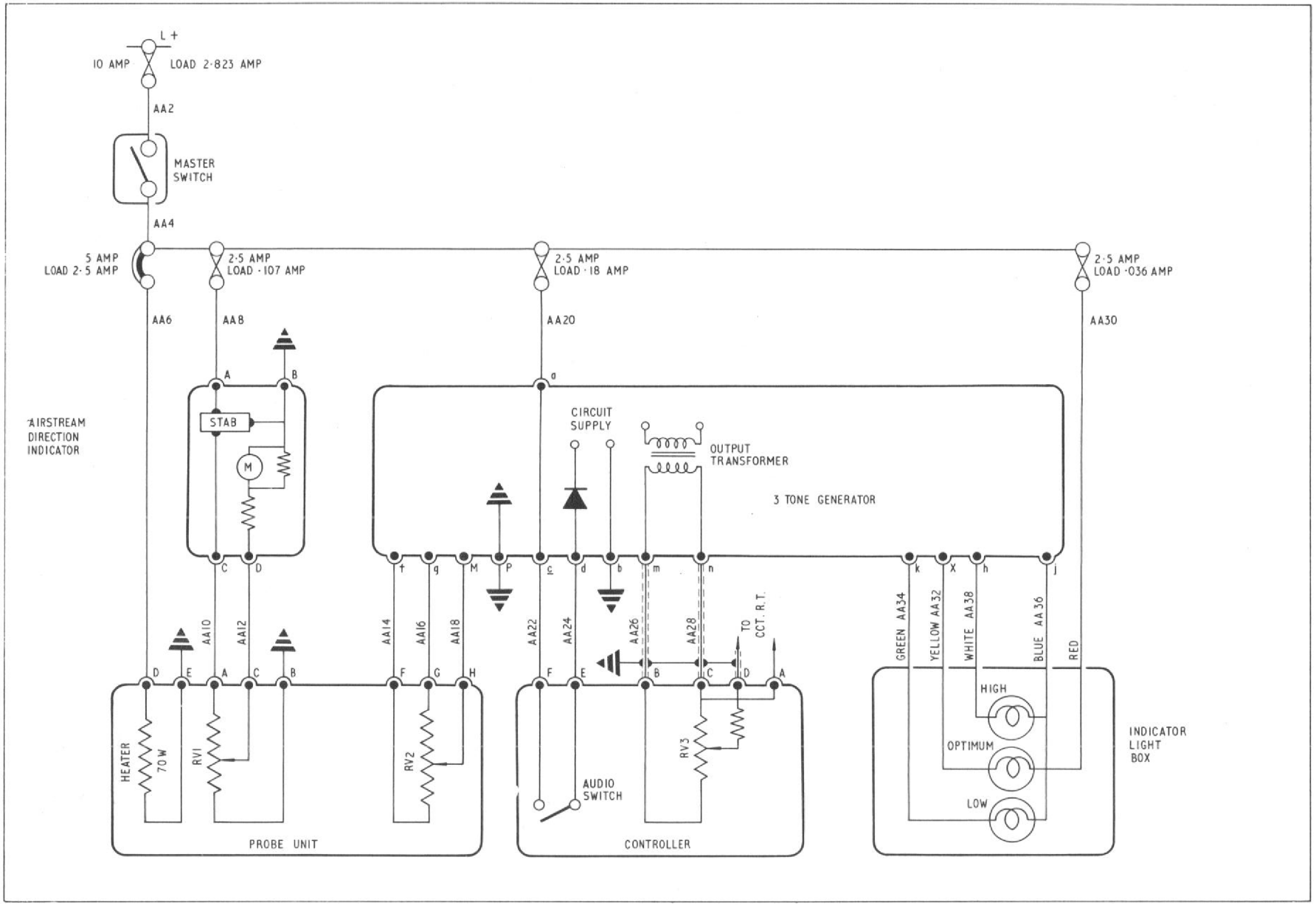
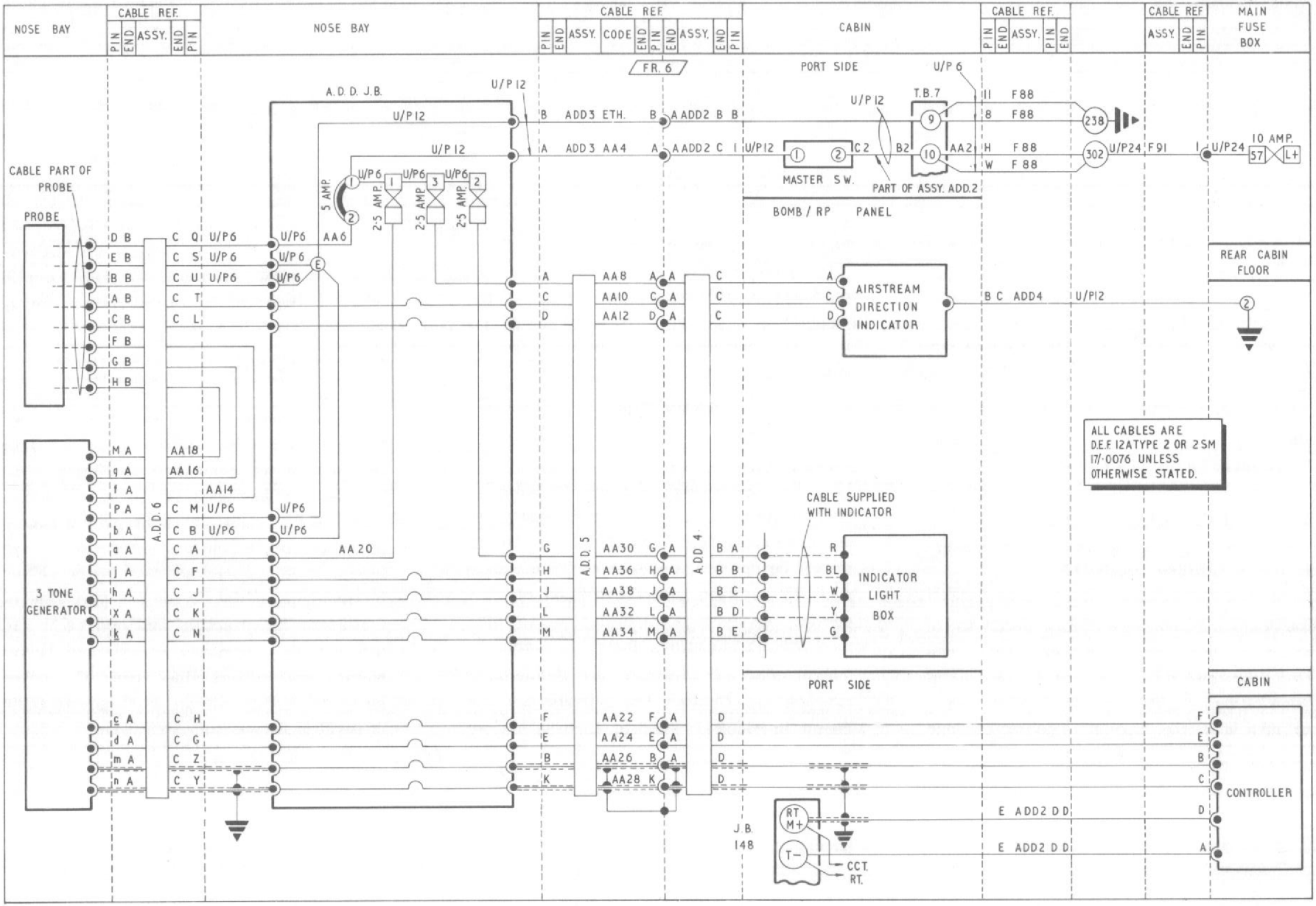


Fig.7 Flap position indicator (routeing)



T.P. (E) 9882

Fig. 8 Airstream direction detector (theoretical)



T.P. (E) 9883

Fig. 9 Airstream direction detector (routeing)

indicator, audio generator and indicator lights.

11. The probe unit transmits any change in the angle of airflow to the indicator and audio generator by means of potentiometers.

12. The indicator provides the pilot with angle of attack information by registering any change in the angle of airflow.

13. The audio generator provides an audio warning and also a lights sequence presentation in the indicator light box.

14. The indicator light box consists of three coloured lights, red *(too slow)*, green *(too fast)* and amber *(optimum)*. The sequence of these lights depends upon the angle of attack of the aircraft. Theoretical and routeing diagrams of the airstream direction detector installation are given in fig.8 and 9. For a full description of the equipment employed reference should be made to the relevant Air Publications listed in Table 1.

SERVICING

General

15. 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 relevant Air Publications listed in Table 1. The method of adjusting the linkages to the various Desynn transmitters will be found in Book 1, Sect.3, Chap.4. Before servicing or removing any of the electrically-operated instruments, the aircraft must be rendered electrically safe, *(Sect. 5, Chap.1, Group A.1)*.

REMOVAL AND ASSEMBLY

General

16. The removal of the instrument panels carrying the electrically-operated flight instruments is described in Group 1.B. Once access has been obtained, the removal of the instruments from the panels should present no difficulties. Access to the rudder tab Desynn transmitter may be gained by removing a door from the port side of the upper fin structure and access to the aileron tab transmitter is obtained by removing an access door from the upper surface of the aileron nosing, after the removal of the aileron.