

GROUP D.1

RUDDER AND AILERON TRIM CONTROL AND INDICATORS

(CODE R, A, RD AND AD)

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Equipment employed

1. The major components employed in the rudder and aileron trim control and indicators circuits are quoted 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.

Rotary actuators Rotax Type C.5021/2 .....	A.P.4343D, Vol.1, Sect.16, Chap.18.
Trim switch Mk. 8/2 .....	A.P.4343B, Vol.1, Sect.20, Chap.19.
Desynn transmitters Type 470FL. (RUDDER TAB) Type 553FL & 568FL (AILERON TAB)	A.P.1275A, Vol.1, Sect. 1, Chap.12.
Desynn indicator Type 501FL. ....	A.P.1275A, Vol.1, Sect. 1, Chap.12.

## DESCRIPTION

### Rudder and aileron trim control and indicators

2. A trim tab in the trailing edge at the bottom of the rudder and another, in the inboard trailing edge of the port aileron, enable adjustments of trim to be made during flight. Each tab is operated by a rotary actuator, mounted in the rudder and aileron structures, respectively. These actuators are of the permanent magnet field type and are controlled by a combined rudder and aileron trim switch located on the forward portion of the cabin port shelf. The control box contains two double-pole micro switches used to select port wing up or down, and a rotary switch, used to select rudder trim to port or starboard. The switches are operated by a knob projecting from the top of the unit. The knob is moved from side to side for aileron trim and turned for rudder trim. To prevent inadvertent operation of the aileron tab when using the power controls, a pivoted lever, which prevents lateral movement of the trim control knob, can be swung into position. As the knob cannot be turned and moved sideways at the same time, it must be released and allowed to return to neutral after the desired trim has been obtained, before further operation is possible. When the knob is returned to neutral, the actuator is switched off, the tab position being then maintained by the load of the actuator gear train.

3. The setting of each tab is shown on a combined rudder and aileron tab position indicator which is located just forward of the trim switch and operated by Desynn transmitters. The Desynn transmitter for the rudder tab is bolted to nose rib F in the leading edge of the fin, while that for the aileron tab is located adjacent to the actuator in the aileron structure. Both transmitters are actuated by Bowden cables connected to levers on their respective actuators.

## Operation

4. When the trim switch knob is turned anti-clockwise, the two-pole rotary switch P is made and current from the fuse is conducted through one set of the switch contacts to pin K of the trim switch unit. From the trim switch, the current is conducted to the rudder trim tab actuator and the negative return from the actuator flows through the contacts of a limit switch in the actuator and back to pin L of the trim switch unit. At the trim switch, the negative return is conducted through the other set of contacts of the rotary switch and so to earth, via pin 1 of the unit. The actuator will rotate anti-clockwise when the current is passing in this direction and so move the tab to starboard, until it is switched off either by returning the trim switch knob to the neutral position or by the opening of the limit switch when the actuator completes its full travel.

5. When the trim switch knob is turned clockwise, the two-pole rotary switch S is made and current from the fuse is conducted through one set of the switch contacts to pin M of the trim switch unit. The current now passes to the rudder trim tab actuator in the opposite direction to that described in para. 4; the negative return passing back to the trim switch at pin 2, through the other contacts of the rotary switch and so to earth, via pin 1 of the trim switch as before. The actuator will now rotate in a clockwise direction and so move the tab to port, until switch off, either by returning the knob to the neutral position or by the limit switch being opened when the actuator has completed its full travel.

6. When the trim switch knob is moved from side to side, the double-pole micro switches D and U are made and control the aileron trim tab actuator in a similar manner as for the rudder tab actuator described above. For information on the Desynn transmitters and tab position indicators, together

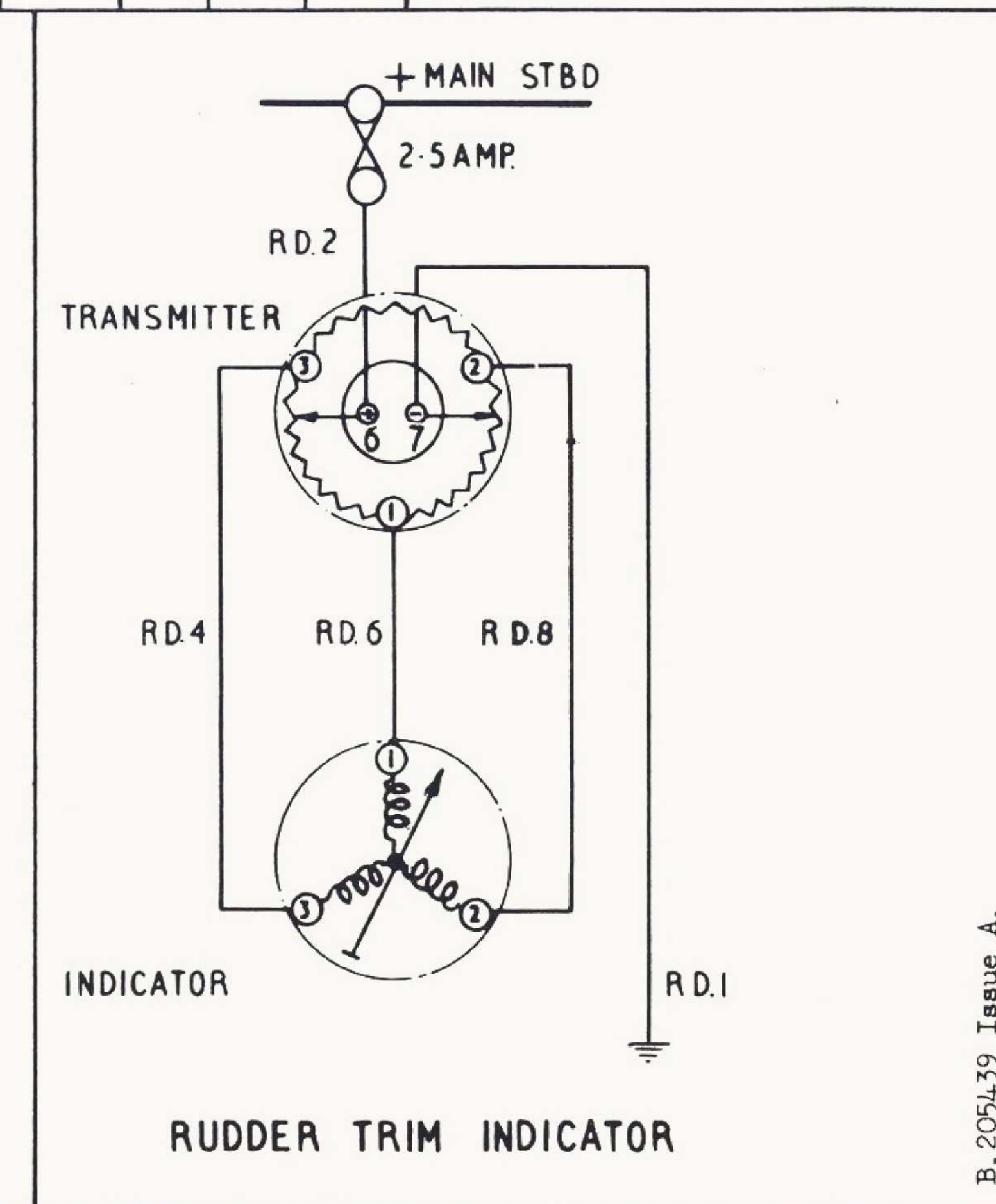
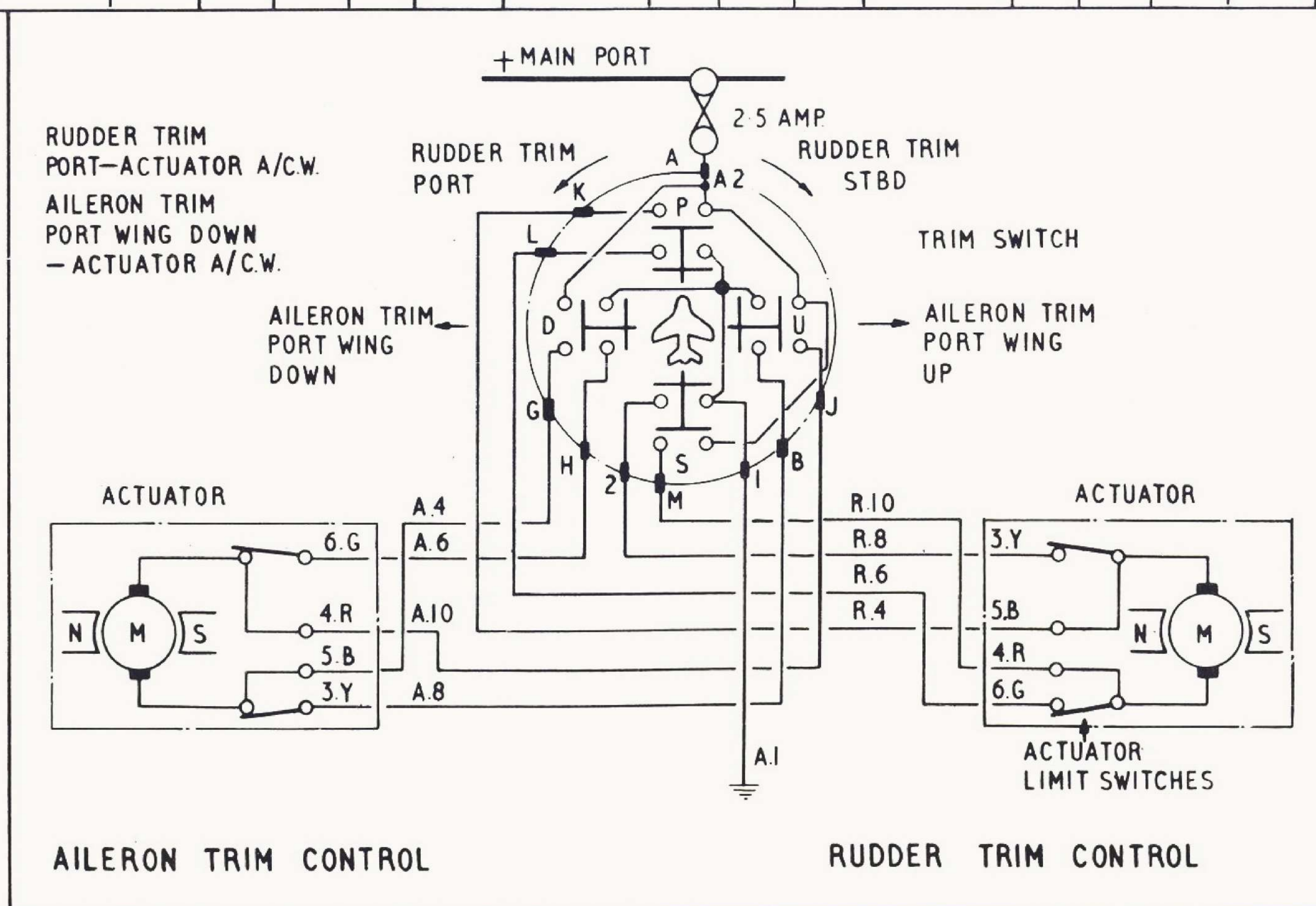
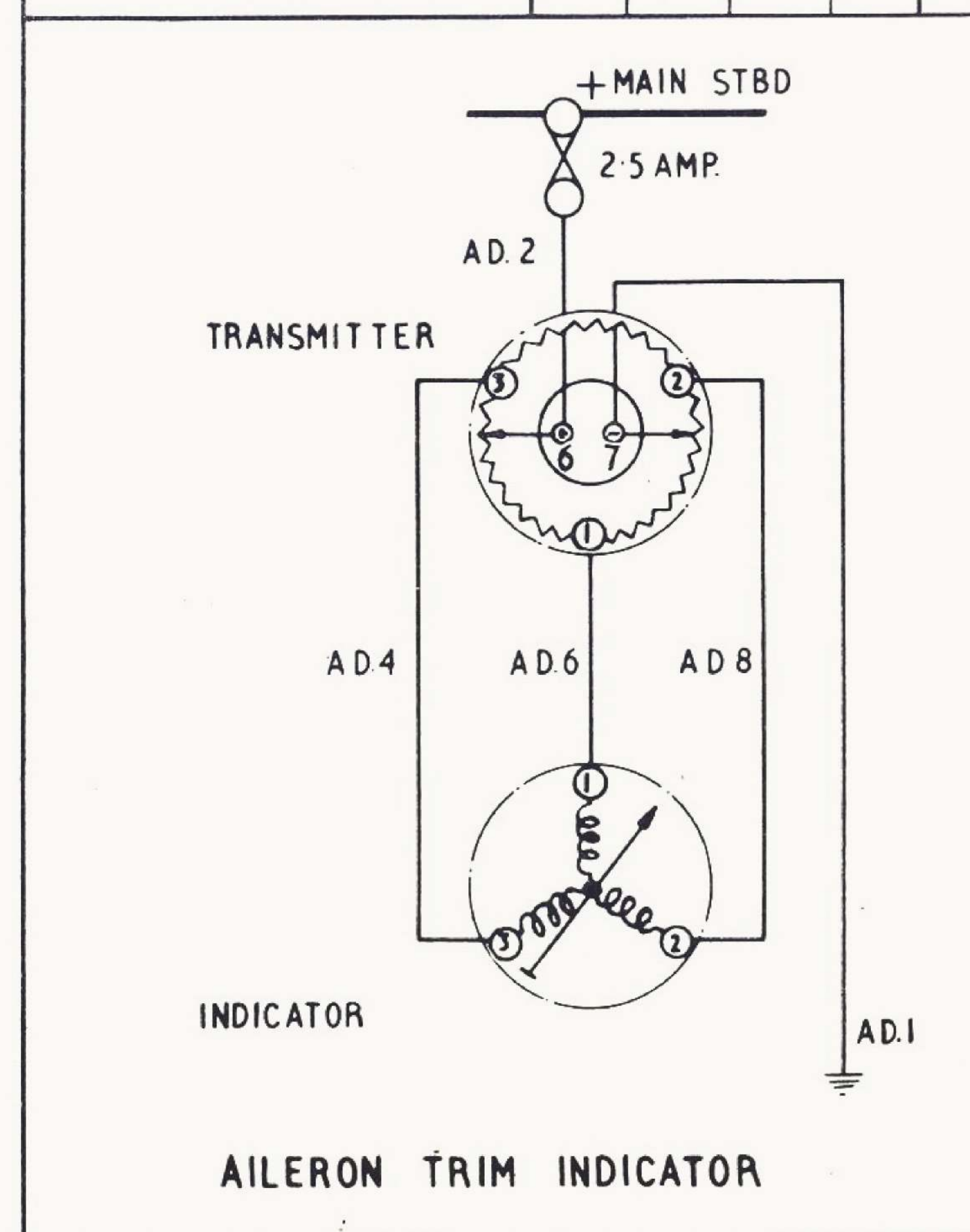
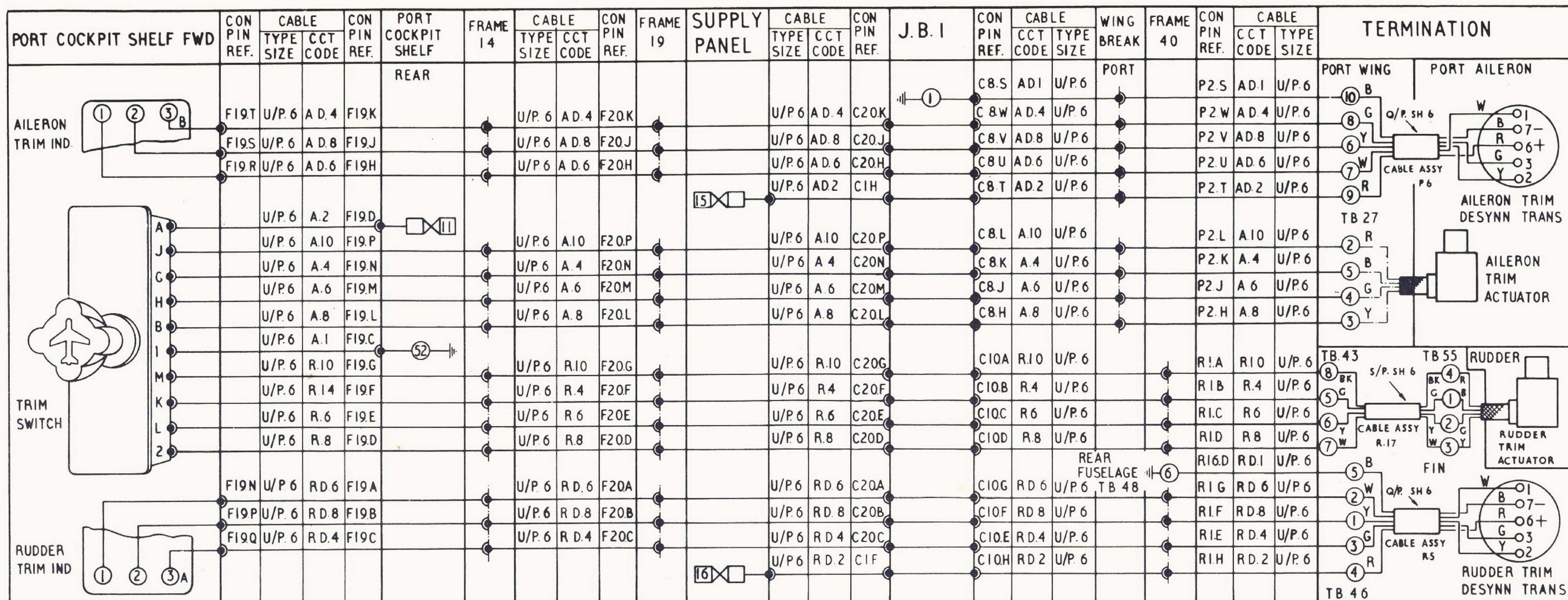


FIG. 1. RUDDER AND AILERON TRIM CONTROLS AND INDICATORS

with the principle of operation, reference should be made to the appropriate Air Publication quoted in Para.1, of this group.

### SERVICING

#### General

7. General servicing of the electrical system, as a whole, is fully described in Group A of this chapter, while the standard serviceability tests which should be applied to the Desynn transmitters and tab position indicators will be found in the appropriate Air Publication quoted in Para.1, of this group. Apart from keeping all the components clean and carrying out the normal routine tests of security and serviceability, the only other servicing necessary is the tab actuator tests as described in the following paragraph.

#### Tab actuator testing

8. These actuators should be tested periodically for correct functioning over their full travel and their range checked on the indicators, by operation of the trim switch on the cabin port shelf. The actuators have permanent magnet field motors and the manufacturers recommended that only a pure D.C. supply is used, when testing. Rectified A.C. supply must not be used unless this has been checked as suitable, or the field of the actuators will be demagnetized. Spare rudders and port ailerons are supplied without actuators and these must have actuators assembled to them before they are fitted to aircraft. Before fitting a new rudder or port aileron, it is recommended that the actuators are tested to ensure that they function correctly by use of the test rig Pt. No. ~~RT.329886~~ for rudders and Pt. No. ~~RT.329887~~ for ailerons. It is most important

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that these rigs are used when testing, as incorrect connection or the use of a supply other than that specified will cause serious damage.

#### NOTE...

The Type 37 rectifier (Stores Ref. 5P/2908) is suitable for testing actuators with permanent magnet pole pieces.

### REMOVAL AND ASSEMBLY

#### General

9. Once access has been obtained, the removal of the actuators and transmitters should present no unusual difficulties. After removal of the rudder, as described in Section 3, Chapter 3 of this volume, access to the rudder tab actuator may be obtained by removing an access door in the rudder nosing. Access to the rudder tab Desynn transmitter may be gained by removing a door on the port side of the upper fin structure. After removal of the aileron, as described in Section 3, Chapter 2 of this volume, access to the aileron tab actuator and its Desynn transmitter may be obtained by removing an access door from the upper surface of the aileron nosing. It must be noted that the operating rods from the actuators to the tabs are removed with the actuators and thus these rods must be disconnected from the tab operating levers before attempting to withdraw an actuator from the structure. The removal of the forward portion of the cabin port shelf, which carries the trim switch and the tab position indicators, is fully described in Group A of this chapter, together with the location and access to all the components.

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