GROUP D.1 RUDDER AND AILERON TRIM CONTROL AND INDICATORS

(CODE R, A, RD AND AD)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Equipment employed

1. The major components employed in the rudder and aileron trim control circuits are listed below, together with the relevant Air Publications to which reference should be made for a detailed description and the necessary servicing required to maintain them in an efficient condition.

Rudder trim actuator, Type C.5021/2 Aileron trim actuator, Type C.5021/2	... *A.P.4343D, Vol. 1, Book 3, Sect. 16*
Trim switch, Type LS1611, Mk. 8/2	*A.P.4343C, Vol. 1, Book 1, Sect. 1*
Rudder and aileron indicator, Type 501 FL Desynn transmitter (*rudder*), Type 470 FL Desynn transmitter (*aileron*), Type 553 FL	... ... *A.P.1275, Vol. 1, Sect. 16*

DESCRIPTION

Rudder and aileron trim control

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, which are used to select port wing up or down, and a rotary switch used to select the rudder trim to port or starboard. The switches are operated by a knob, projecting from the top of the unit, which is moved from side to side in the required direction for aileron trim and turned in the required direction 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. To facilitate simultaneous trimming in two planes, the knob can be

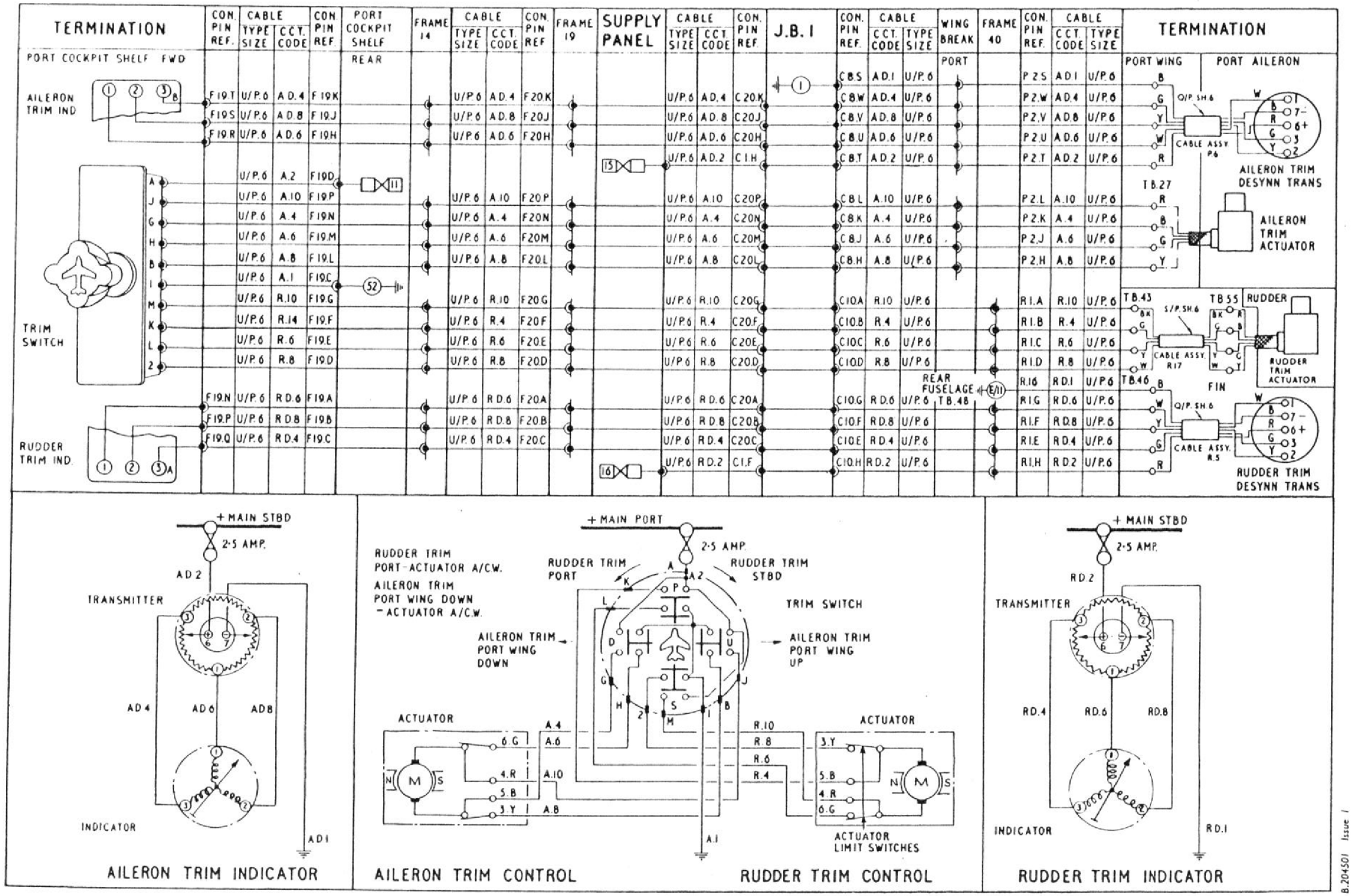

Fig. 1. Rudder and aileron trim control and indicators (routing and theoretical)

turned and rocked sideways at the same time. After the desired trim has been obtained, the knob must be released and allowed to return to its neutral position. 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.

Indicators

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. When the current is passing in this direction the actuator motor will rotate anti-clockwise 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 switched 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 microswitches 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 with the principle of operation, reference should be made to the relevant Air Publications *(listed in para. 1)*.

SERVICING

General

7. General servicing of the electrical system, as a whole, is fully described in Group A.1, while the standard serviceability tests which should be applied will be found in the relevant Air Publications *(listed in para. 1)*. 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 *(described in para. 8)*.

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 it is preferable to use a pure d.c. supply when testing, since, with a rectified a.c. supply, it is possible for the field of the actuator to become demagnetized. If a d.c. supply is not available, however, it is permissible to use an a.c. supply which has been rectified by a transportable rectifier, Type 37 *(Ref. 5P/2908)*. Spare rudder structures 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. SE.483JD for rudders and Pt. No. SE.484JD for ailerons)*. It is most important that these rigs are used when testing, as incorrect connection or the use of a supply other than that specified will cause serious damage.

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 *(described in Sect. 3, Chap. 3)*, 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.

10. After removal of the aileron *(described in Sect. 3, Chap. 2)*, 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.

11. 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 A2, while the location and access to all the components is given in Group A3.