GROUP D.4

FLAP CONTROL (CODE F)

◄ (Including Mods. 1195 and 1353) ►

LIST OF CONTENTS

Introduction

1. This Group contains the description and operation of the flap control circuit together with the information required to maintain the equipment in an efficient condition. Routeing and theoretical circuit diagrams are also included. For a general description of the aircraft's electrical system, reference should be made to Groups A.1, A.2 and A.3. Detailed information on the standard items of equipment used in the circuit will be found in the Air Publications listed in Table 1.

DESCRIPTION

Flap control

Selector switches

2. The electrical control circuit for the hydraulically-operated flaps consists of two, lever operated, multi-position selector switches located one on the port instrument panel for the pupil's use, and the other on the starboard side instrument panel for the instructor's use. The latter switch has a mechanical safety stop incorporated. These switches control the two solenoids of an electro-hydraulic selector valve, which is mounted on the front spar in the port wheel bay, via a flap

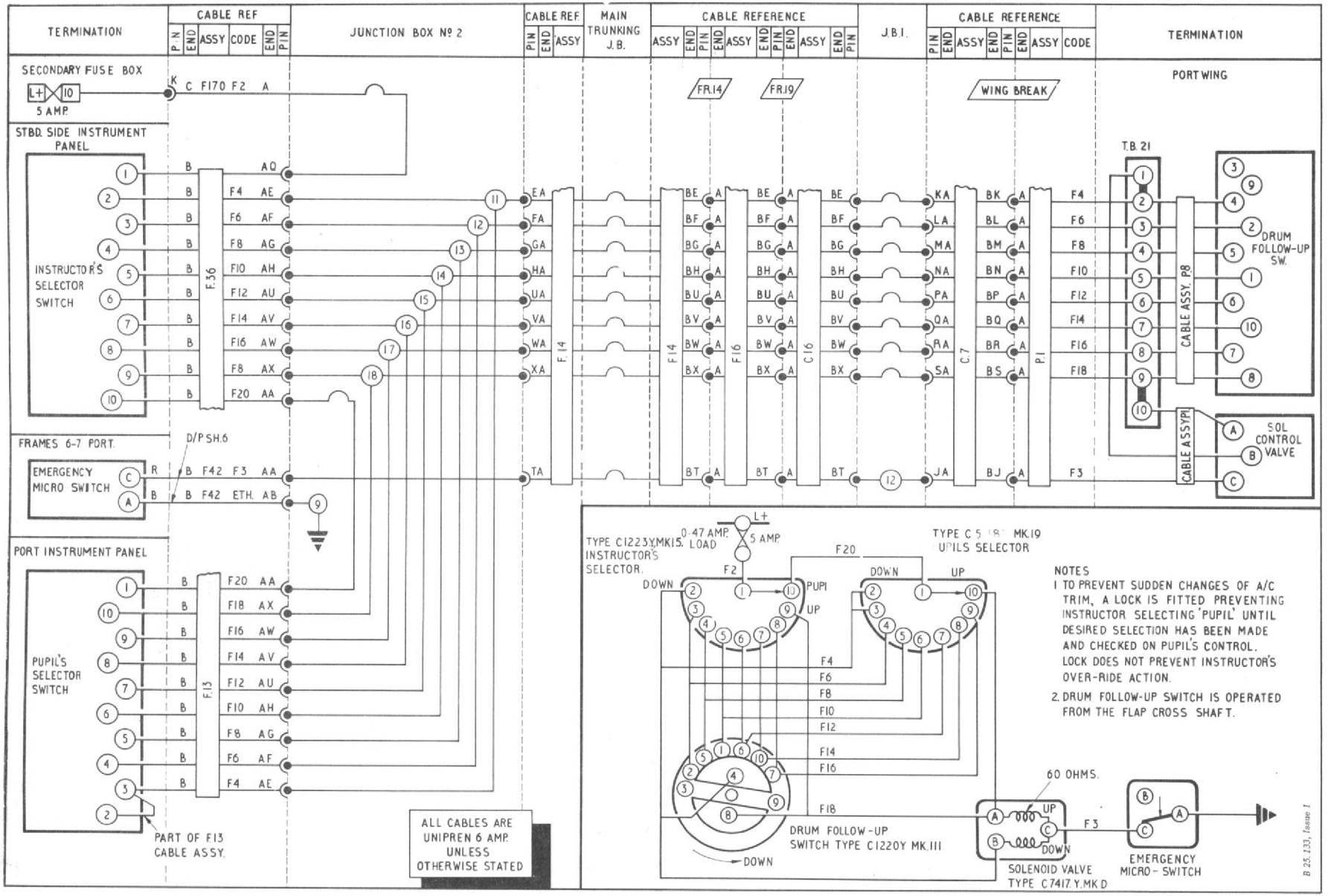

Fig. 1. Flap control (routeing and theoretical)

operated, multi-position follow-up drum switch located in the port wing root. The earth return for these solenoids is taken through the normally closed contacts of a microswitch which is operated to open circuit the earth return, when the flap emergency lowering control is used. This is to prevent the valve solenoids being energized, as the flaps lower, with the resultant loss of hydraulic oil via the jettison valve in the hydraulic emergency system.

3. With the solenoids de-energized, a slide, within the valve housing adopts a neutral position thus blanking off both ports so that only the hydraulic oil in the lower ends of the jacks is jettisoned. This prevents the possibility of manual reversion of the powered flying controls occurring due to loss of hydraulic oil. The flap position indicator circuit is described in Sect.5, Chap.2.

Instructor's override

4. The pupil's selector switch is out of circuit at all times, except when the instructor's switch is moved past the UP position and after the release of the safety stop. By moving his switch from this position, the instructor will override any selections made by the pupil.

Operation

Full UP or DOWN

5. To understand the operation of the flap control circuit, it must be noted that the drum switch is not in circuit, to control the flap selector valve, when the selector switches are in either the fully UP or fully DOWN positions. In these positions the circuit is, from the fuse and through the selector switches, to the appropriate solenoid of the selector valve via common terminals on the drum switch. This arrangement ensures that the flaps are held in the up or down position by hydraulic pressure.

Intermediate positions

6. The function of the drum switch in all its intermediate positions is to complete a circuit, from the selector switches to either the UP or DOWN solenoids of the selector valve, according to the position of the drum switch centre spindle at the time of operation, and to break this circuit when the selected position is attained. The drum switch spindle is rotated by a mechanical linkage from the flaps, causing the drum contacts to open and close, in succession. The flaps are thus raised or lowered in a series of steps corresponding to the movement of the selector switches.

TABLE 1

Equipment type and Air Publication reference

Equipment Type	Air Publication
Selector switch	
Instructor:- Type C1223Y Mk.15N or C1223Y Mk.27 *(Mod.1353)*	A.P.113D-1137-1
Pupil:- Type C5148Y Mk.19NP *(Mod.1195)* or C5148Y Mk.55 *(Mod.1353)*	A.P.113D-1137-1
Drum switch, Type C.1220Y, Mk.111	A.P 113D–1209–1
Microswitch, Type 1.A	A.P.4343C, Vol.1, Book 1, Sect. 2
Control valve, Type C.7417Y, Mk.D or 08817Y.A05	A.P.1803D, Vol.1, Book 3

7. The circuit diagram *(fig.1)* is drawn for the condition when the flaps are fully up and the instructor's switch is set to the position which gives the pupil control of the flaps.

8. It will be seen that contacts 10 of the pupil's switch are supplying the up solenoid of the selector valve, and the common terminal of the drum switch, to maintain hydraulic pressure on the flap jacks. Because the flaps have now attained their selected position, the contact arcs

on the drum switch have rotated until contacts 3 and 9, which are not used, have been lifted clear of the cam.

9. If the pupil's selector switch is then moved down in its gate, to lower the flaps, contact 9 will close first and feed contact 7 of the drum switch, which is bearing on the contact arc feeding terminal 4 of the unit. The circuit will now be, from the fuse through the instructor's and pupil's selector switches and through the drum switch, to the down solenoid of the flap selector valve.

10. When this solenoid is energized, it allows the hydraulic pressure to move the slide within the valve housing in such a direction as to supply hydraulic pressure to the flap jacks and lower the flaps. As the flaps move down, the drum switch spindle and its contact arcs are rotated by the mechanical linkage, until contact 7 is lifted clear so opening the circuit and de-energizing the down solenoid.

11. When the solenoid is de-energized the valve will cut off the hydraulic pressure to the flap jacks, which will then stop at the selected position, and be held by the pressure locked in the jacks. A similar sequence of operations occurs at all intermediate positions of the selector switch until an extreme position is reached, where the drum switch is out of circuit and the relevant valve solenoid energized, as described in para.5.

Instructor's override

12. If the instructor wishes to override the pupil's selection, he must move his selector switch from the PUPIL position thereby cutting off the supply to the pupil's switch. The drum switch is now fed directly in a manner similar to that described in para.7 to 11, for the pupil's switch. For a full description of the flap hydraulic system, reference should be made to Book 1, Sect.3, Chap.6.

Note . . .

Before the instructor's selector switch is placed in the position to give the pupil control of the flaps, the instructor MUST ensure that the pupil's selector switch is in the fully UP position. If this is not done the flaps will move to the position selected by the pupil's switch.

SERVICING

General

13. For general servicing of the aircraft electrical system, reference should be made to Group A.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 electrical tests of the electro-hydraulic selector valve as described in the appropriate Air Publication listed in Table 1. The method of adjusting the linkage between the flaps and the drum switch is contained in Book 1, Sect.3, Chap.4.

REMOVAL AND ASSEMBLY

General

14. Once access has been obtained, the removal and assembly of the components forming the flap control circuit, should present no difficulties. The location and access to all the components is indicated in Group A.3.