GROUP D11 AIR BRAKES CONTROL (CODE AB)

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ILLUSTRATION

Introduction

1. This group contains a brief description, including the method of operation, of the air brake control circuit installed in this aircraft, together with the necessary servicing information required to maintain the equipment in an efficient condition. A routing and theoretical diagram of the circuit is also included. For a description of the electrical system as a whole, including system wiring details, referencing of components and general servicing, together with the location and removal of the major items of equipment, reference should be made to Group A1, A2 and A3 of this chapter. Detailed information on the standard components used will be found in the appropriate volumes of A.P.4343 series.

DESCRIPTION

AIR BRAKES CONTROL

2. The electrical control circuit for the hydraulically-operated air brake is operated by a thumb switch incorporated in the Type T.1, Mk. 2 throttle twist grip. This switch controls Type C.5701Y, Mk. B, and Type C.5705, Mk. A electro-hydraulic solenoid valves, located together in the rear fuselage on the port side adjacent to frame 50, via a relay box and a Type T.P.5300, T.P.5300/1, T.P.5300/2 or T.P.1300 hydraulic pressure switch. The relay box, which contains three control relays and a spring-return test switch, is located in the cockpit just aft of the hood control switch box, while the hydraulic pressure switch is located adjacent to the electro-hydraulic solenoid valves in the rear fuselage. To indicate the position of the air brake, a Type C.1838Y, Mk. 4 or Type A2 magnetic indicator is installed on the port side instrument panel adjacent to the alighting gear warning lamp. This indicator gives a white indication when the air brake is extended and black when retracted, and is controlled by a micro switch situated on a bracket attached to frame 47. To prevent damage, due to the limited ground clearance, the air brake control circuit is interconnected with the up button of the alighting gear selector switch in such a manner that it is impossible to extend the air brake by the normal control while the undercarriage is lowered. If the alighting gear is lowered while the air brake is extended, the air brake will automatically retract due to this interconnection; this condition will also be obtained by the action of a micro switch

located below the cockpit port shelf, which is operated by the alighting gear emergency air valve when the alighting gear emergency lowering system is operated. The installation may, however, be tested on the ground, while the alighting gear is down, by operation of the spring-return test switch on the relay box. Operation of this switch in conjunction with a micro switch, located adjacent to the air brake port hinge, will permit partial extension and immediate retraction of the air brake to give indication in the cockpit by the magnetic indicator that the system is operating satisfactorily.

Operation

3. When the alighting gear is retracted, contacts 3 and 4 of the alighting gear control UP switch (*Group* D7) are made and supply the air brake control switch via the normally closed contacts A and C of the alighting gear emergency air valve micro switch. Operation of the air brake switch to the OUT position will now energize the solenoid of the main electro-hydraulic control valve and hold-on relay P1. A supply is also made to the hydraulic pressure switch, the contacts of which are open at this time. After the control switch is released, the circuit to the solenoid valve is maintained via the closed contacts 3, 4, 5 and 6 of relay P1, contacts 5 and 6 of the test switch, and contacts 3 and 4 of relay R1, which are made while this relay is de-energized. The air brake jack will now extend to put the air brake out by differential action at high speed until the rise in hydraulic pressure due to the air load on the air brake causes the hydraulic pressure switch to operate and close its contacts. The closing of these contacts completes the supply to the solenoid of the high-speed electro-hydraulic control valve, the circuit being maintained, once the pressure switch is operated, via contacts 3, 4, 5 and 6 of hold-on relay N1, which is also energized by the pressure switch. The jack now continues to extend to put the air brake out, but now at full power normal speed, until the full-out position is reached. When the air brake starts to extend the aft micro switch completes the earth return for the magnetic indicator, which is energized by a supply from the circuit fuse and shows white to indicate that the air brake is extended.

4. If the alighting gear is selected down while the air brake is extended, the UP switch of the alighting gear control will immediately break contacts 3 and 4 to disconnect the supply to the air brake control switch, de-energize the electro-hydraulic control valves and hold-on relays, thus automatically retracting the air brake. The same condition is also obtained on the use of the alighting gear emergency lowering system by the opening of contacts A and C of the micro switch operated by the emergency air valve. Air brake retraction must not normally be obtained by selecting alighting gear down.

5. On operation of the air brake control switch to the IN position, relay R1 is energized to break the circuit to the hold-on relays P1 and N1, thus de-energizing the solenoids of the electro-hydraulic control valves. With the control valves de-energized the air brake jack will retract and bring the air brake to the IN position. When the air brake is fully in, the aft micro switch contacts are broken, thus de-energizing the magnetic indicator, which will show black to indicate that the air brake is retracted.

6. The operation of the spring-return test switch, used to test the installation on the ground while alighting gear is down, is such that when it is placed in the ON position, current is conducted from the circuit fuse, through contacts 4 and 5 of the test switch and contacts 3 and 4 of relay R1, to energize the solenoid of the main electro-hydraulic control valve. The air brake jack will now extend to put the air brake out until, at a position of approximately 15 deg. out, the forward micro switch is operated by the air brake hinge arm. When operated, this micro switch completes the supply via contacts A and B to the coil of relay K1, via contacts 1 and 2 in the test switch. When energized, this relay breaks the supply to the electro-hydraulic control valve and the air brake immediately retracts. Relay R1 is maintained in the energized state by a hold-on circuit through its own contacts and the test switch until the test switch is released and returns to the OFF position. As the air brake extends, the magnetic indicator is energized by the operation of the aft micro switch in a similar manner to that described in para. 3 to provide indication that the installation is operating satisfactorily.

SERVICING

7. For general servicing of the electrical system as a whole, reference should be made to Group A1 of this chapter. 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 adjustment of the micro switches to ensure the correct functioning of the installation and magnetic indicator as described in Sect. 3, Chap. 4, followed by the functioning checks of the installation as described in Sect. 3, Chap. 6. The electrical tests of the electro-hydraulic control valves is described in A.P.1803D, Vol. 1.

REMOVAL AND ASSEMBLY

8. Once access has been obtained, the removal and assembly of the components forming the air brake control circuit should present no unusual difficulties. The location and access to all the components is indicated in Group A3 of this chapter.

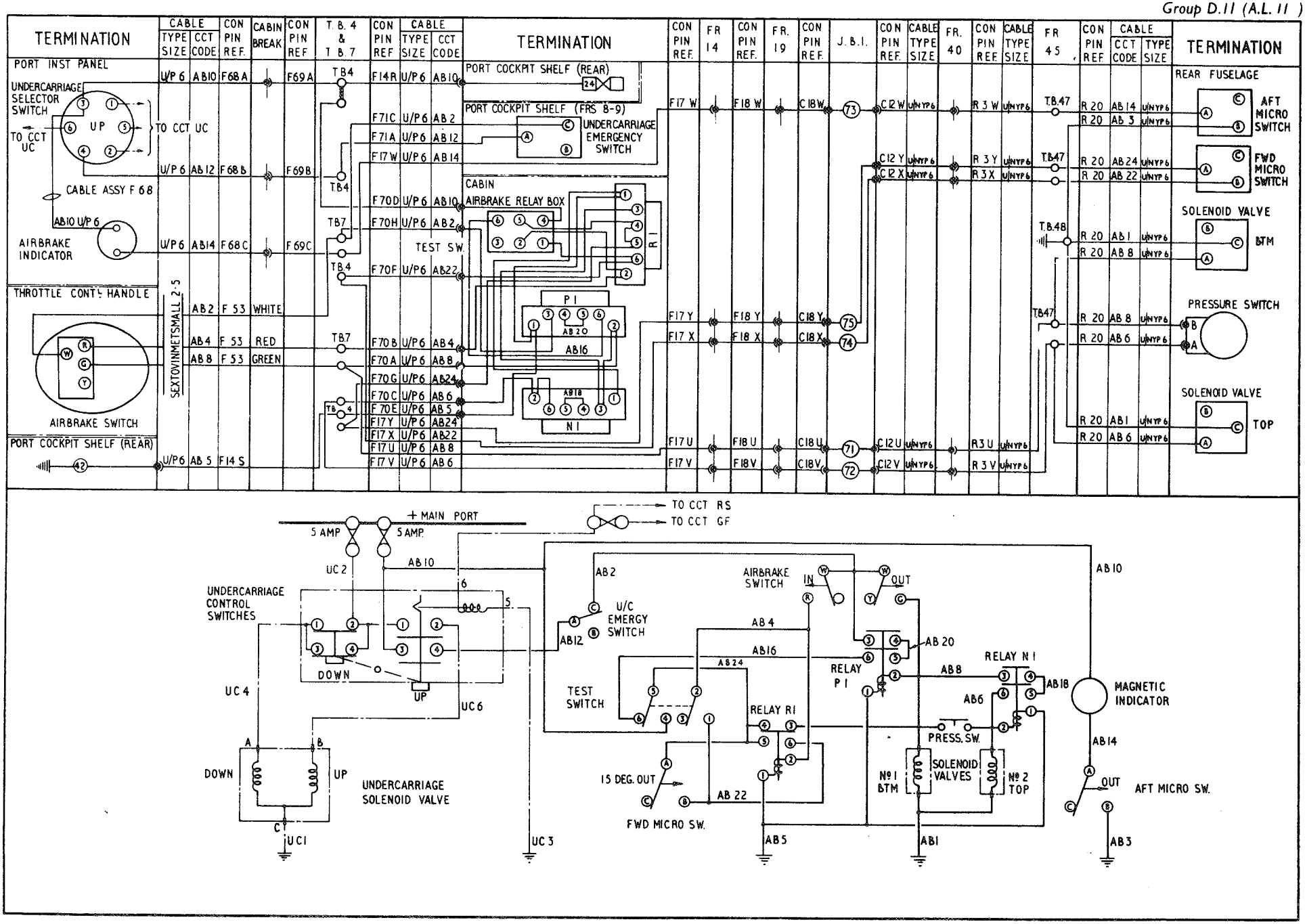

FIG. 1 AIR BRAKES

(A.L.11, Nov., 54)

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