Group D 5

HOOD CONTROL (CODE HC)

CONTENTS

ILLUSTRATIONS

TABLE

Introduction

1. This Group contains the description and operation of the hood control circuit, together with the information necessary 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

Hood control

General

2. These circuits control the hydraulic operations involved when opening and closing the hinged cabin hood. Also, by means of electrical interlocks, they effect automatic deflation and inflation of the hood seal, and depressurization of the cabin. The primary interlock is through the battery master switch, thus rendering it impossible to open the hood inadvertently during flight, or to leave the cabin after flight, without putting the battery master switch to the OFF position. This

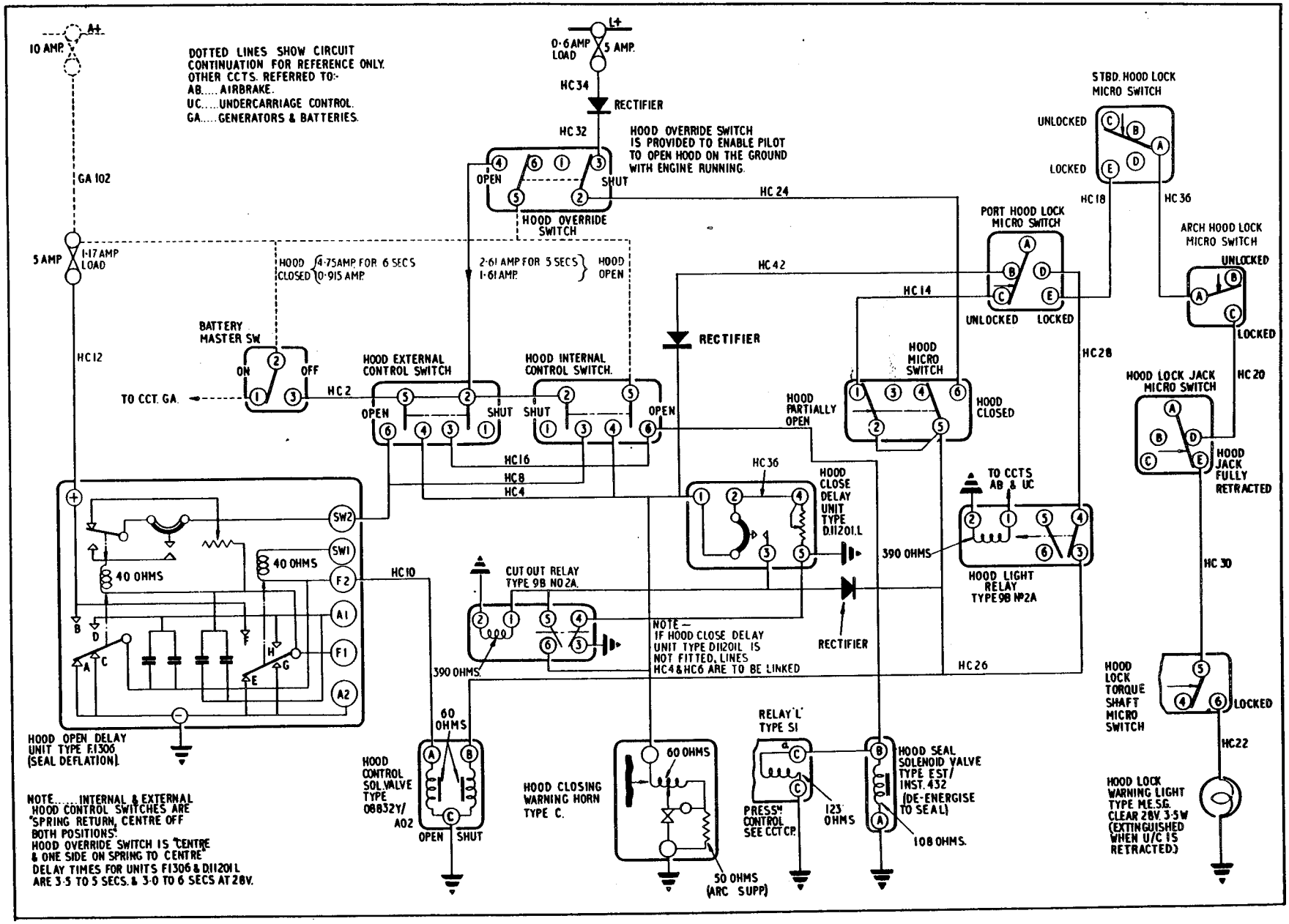

Fig.1 Hood control (theoretical)

▶ (lead HC14 corrected) ◀

TP(E) 25412

condition can, however, be modified by the use of an override switch, which enables the pilot to open the hood when the aircraft is on the ground with the engine running.

Control switches

3. Provision for operating the hood either from inside or outside the cabin is made by two control switches. The internal hood control switch is situated, together with the HOOD LOCKED warning lamp, on the centre instrument panel. The external control switch is in the nose wheel bay. The hood override switch is mounted on the miscellaneous switch panel on the port side of the cabin.

Safeguards

4. To safeguard operators, a delay unit in the hood opening circuit allows time for the seal to deflate and 3.5 to 5 seconds to elapse, after the operation of the switch, before the hood commences to open. There is also a delay unit and a warning horn in the closing circuit. The horn sounds when the control switch is held in the SHUT position, and the delay unit allows 3 to 6 seconds to elapse before the hood commences closing. The hood closing delay unit is protected from an overload by a cut-out relay, which is located on frame 14 behind the pilots' seats. Correct hood-locking is indicated visually by a HOOD LOCKED warning lamp, which is arranged to remain extinguished during flight. On pre-Mod 1442 aircraft, hood micro-switch failure could cause undemanded hood closure without horn warning. Mod 1442 ensures that the warning horn will sound in all cases of undemanded hood closure except where mechanical jamming of the hood microswitch contacts to CLOSE has occurred.

TABLE 1

Equipment type and Air Publication reference

Equipment Type	Air Publication
Control switches internal and external, Double pole change-over, centre off, spring return both positions, C.W.C., Type XD.787, No.4. Hood override switch, Double pole change-over spring return centre, single throw, C.W.C. Type XD.788, No.4	A.P.113D–1100 series
Microswitches, Type 1A, 4A and Dowty Type C.1831Y, Mk.102C	A.P.113D–1200 series
Relay unit, Rotax Type F.1303 or F.1306	A.P.113D–1300 series
Relay L, Type S No. 3	A.P.113D–1309–1
Thermal delay unit, Rotax Type D.11201.L	A.P.113D–1400 series
Hood light and cut-out relays, Type 9B No.2A	A.P.113D–1328–1
Warning lamp, Type A	A.P.113F–0200 series
Warning horn, Type C	A.P.113F–0600 series
Solenoid control valve, Dowty Type 08832Y/A02 Hood seal solenoid, Type EST/INST/432	A.P.113F–0100 series
Rectifiers, Type G.J.6M, Diode (A.E.I)	A.P.113D–1900 series

Microswitches and hood light relay

5. The supply to the HOOD LOCKED warning lamp is controlled by six microswitches associated with the closing and locking mechanism, and also by the hood light relay. This relay is energized by the airbrake and undercarriage control circuit *(Group D.7)* when the undercarriage is retracted; in this condition, the relay contacts 3-4 are broken, and the warning light circuit is isolated. Three of the microswitches are operated by the hood locks i.e. the port, starboard and windscreen arch locks; the others by the hood lock torque shaft, the hood lock jack, and the hood operating shaft.

Control valve circuits

6. The hydraulic power for operating

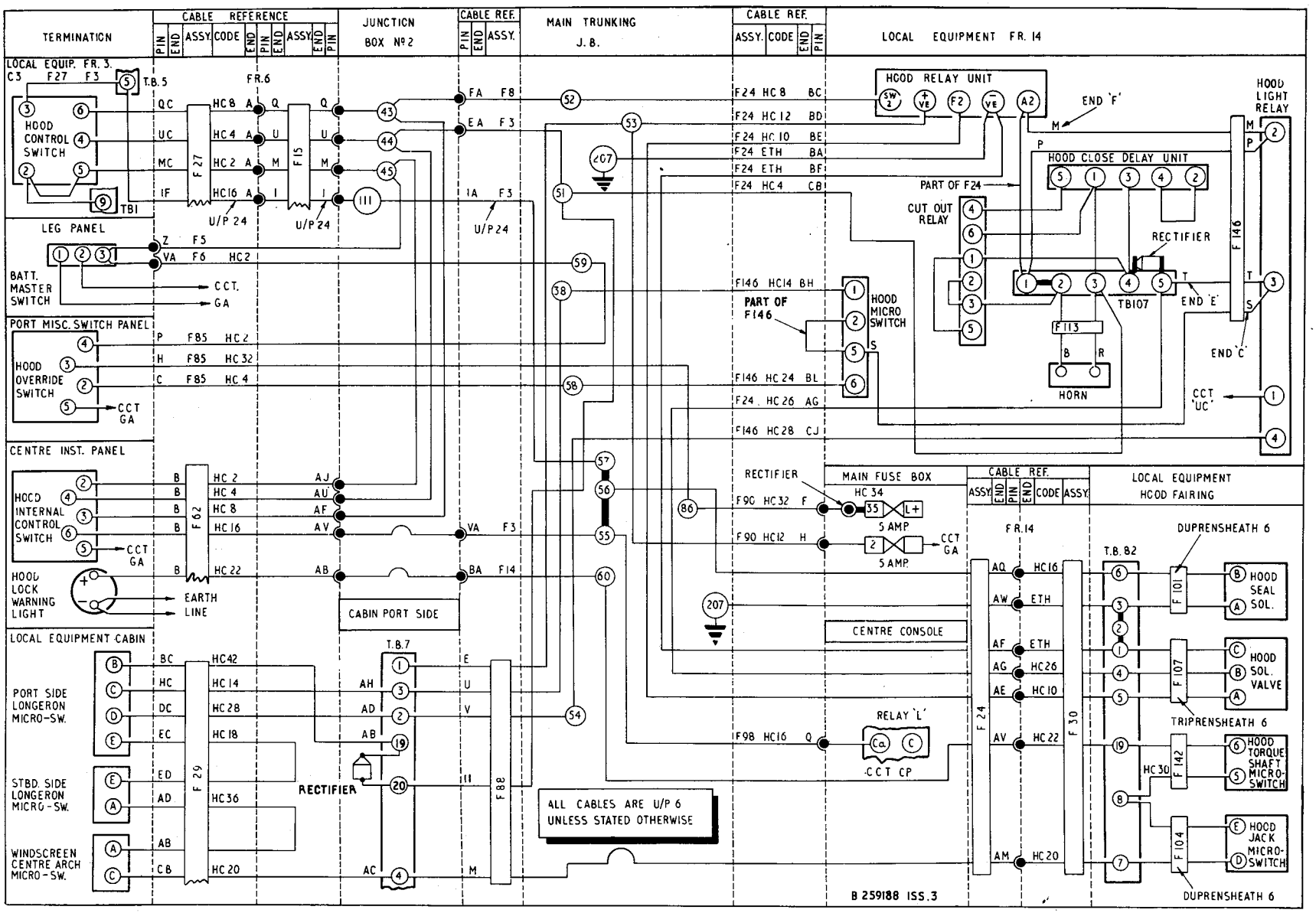

Fig. 2 Hood control (routeing)

◀ (Mod 1442 added) ▶

the hood is controlled by a solenoid-operated valve mounted in the hood fairing. This valve incorporates two solenoids, arranged to initiate either the opening or shutting operation. The circuit to each solenoid includes a thermal delay unit *(para. 4)*. These units are both situated on frame 14, that for the OPEN solenoid being incorporated in the hood relay unit.

7. The hood operating, shaft microswitch, besides controlling the supply to the HOOD LOCKED warning lamp *(para. 5)* also controls the supply to the solenoid of the hood seal valve and relay L, and – when the hood is closed and the generators are on-line – its contacts 6-5 maintain a holding supply to the SHUT solenoid of the control valve, keeping it energized during flight. Relay L, situated in the centre console, is linked with the cabin pressurization circuit *(Group D.6)* and, together with the hood solenoid, is de-energized when the hood is closed and energized when it is open; the function of relay L being to effect the opening or closing of the air supply valve as necessary, and that of the hood seal valve to inflate or deflate the hood seal.

Operation

Hood open

8. With the hood fully open, the internal and external control switches will be in their central OFF position. The hood override switch will also be in its central position, making contacts 3-2, and 5-6. The port and starboard side lock microswitches will be making contacts A, B, and C; the windscreen arch lock microswitch, contacts A and B. The hood lock torque microswitch will be making contacts 5-4, and the hood operating shaft microswitch contacts 1-2, and 4-5. The hood light relay *(Group D.7)* will be de-energized, hence contacts 3-4 will be made. With the battery master switch to the OFF position, both poles of the control switches will be supplied by the battery circuit.

Hood shutting

9. When the internal control switch is held in the SHUT position, current passes via terminals 5-4 to operate the warning horn, and also, via terminals 1-2-4-5 of the hood closing delay unit and contacts 3-4 of the cut-out relay to earth. After a delay of 3 to 6 seconds, the thermal contacts of the delay unit make, enabling the supply to pass to terminal 3. From terminal 3, the supply passes to the coil of the cut-out relay and, via a rectifier to the SHUT solenoid of the control valve. When the cut-out relay is energized, its contacts 3-4 open to break the earth return of the hood closing delay unit, thus preventing any possible overheating. With the SHUT solenoid energized, hydraulic pressure is allowed to move the valve slide in the required direction to admit pressure to the retracting side of the hood operating jack, which then retracts to close the hood. As the jack commences operation, the hood operating shaft microswitch contacts change over, and terminals 6-5 complete a duplicate supply from the line *(via terminals 3-2 of the override switch)* to the SHUT solenoid, and also through terminals 3-4 of the hood light relay to terminal D of the port lock microswitch.

10. When the hood is fully shut, the hood lock jack retracts and closes the locks; whereupon their microswitches, and that of the hood torque shaft, change to the locked position, thereby completing the supply to the HOOD LOCKED warning lamp. When the control switch is allowed to return to the OFF position, the battery feed to the horn and the SHUT solenoid is broken, but the latter remains energized by the duplicate supply derived from the line *(para.9)* via the override switch and the hood operating shaft microswitch, and is maintained thus throughout flight. The hood light relay operates when the undercarriage is retracted, its contacts 3-4 then break the supply to the HOOD LOCKED warning light, which then remains extinguished during flight.

Hood opening (engine stopped)

11. With the aircraft on the ground and the battery master switch to OFF, a battery supply is available at both poles of the control switches. When the internal control switch is held to OPEN, the supply is routed via terminals 5-6 to the hood seal solenoid valve and relay L, thereby effecting deflation of the seal and depressurization of the cabin. The other terminals of the control switch, i.e. 2-3, supply the hood opening relay at terminal SW2. This feed passes through the thermal delay to earth until, after 3.5 to 5 seconds, the thermal switch completes a supply to the operative coil of the unit. When this coil is energized, its contacts change over, and, via contacts B-D, a supply from the positive terminal of the unit passes to terminal F2, which feeds the OPEN solenoid of the control valve.

12. Energization of the OPEN solenoid allows the valve slide to move in the requisite direction to admit hydraulic pressure to the locking jack, which then releases the locks. The hood operating jack then opens the hood. When the control switch is allowed to return to its central position, the supply to the hood seal solenoid and relay L is broken.

Hood opening (engine running)

13. Although the hood cannot be operated by the control switches alone while the battery master switch is in the ON position; a facility enabling the pilot to open the hood when the aircraft is on the ground with the engine running, is provided by the override switch. With this switch held to OPEN, the line supply energizing the SHUT solenoid will be broken at the override switch contacts 2-3. At the same time, contacts 5-4 will complete a battery supply to the control switches; both poles of which will be supplied. If the internal control switch is now also held to OPEN, the hood will open as described in para.11.

External control

14. By reference to fig.1, it will be seen that the external control switch controls the operation of the hood in a manner similar to that of the internal switch, but in this instance the battery master switch must be in the OFF position.

SERVICING

General

15. 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 as described in the appropriate Air Publication listed in Table 1 no further servicing should be necessary.

REMOVAL AND ASSEMBLY

General

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