GROUP E 1

A.C. SUPPLIES (CODE CH)

CONTENTS

ILLUSTRATIONS

TABLE

Introduction

1. This Group contains the description of the a.c. supplies circuit, with information on the servicing required to maintain the equipment in an efficient condition. The control circuit is connected to the engine master switch *(Group G 1)* and also to the generators and batteries circuit *(Group B 1)*. Detailed descriptive and servicing information on the equipment used in the a.c. supplies circuit will be found in the Air Publications listed in Table 1.

DESCRIPTION

Equipment details

2. The a.c. supply is 115 volts, 3-phase 400 c/s obtained from two inverters *(No.1 and No.2)* mounted on the starboard side of the cabin floor behind the seat. No.1 inverter normally supplies the a.c. loads, No.2, as standby, is automatically switched on, by means of relays and other equipment in the A.C. junction box *(para 3)*, to supply the loads if No.1 inverter fails On the ground, before take-off; No.2 inverter commences operation to supply the a.c. loads when the engine master switch is put to ON. When the engine is started and the d.c. generators are running, No.1 inverter operates to supply the loads, and No.2 is switched off. Two relays on the generator control panel, A.2, and B.2, initiate the operation of No.1 inverter. Two switches on the generator control panel, marked NORMAL and TEST, are used for ground testing the inverters and the control circuit *(para 11)*. An indicator mounted on the flying instrument panel

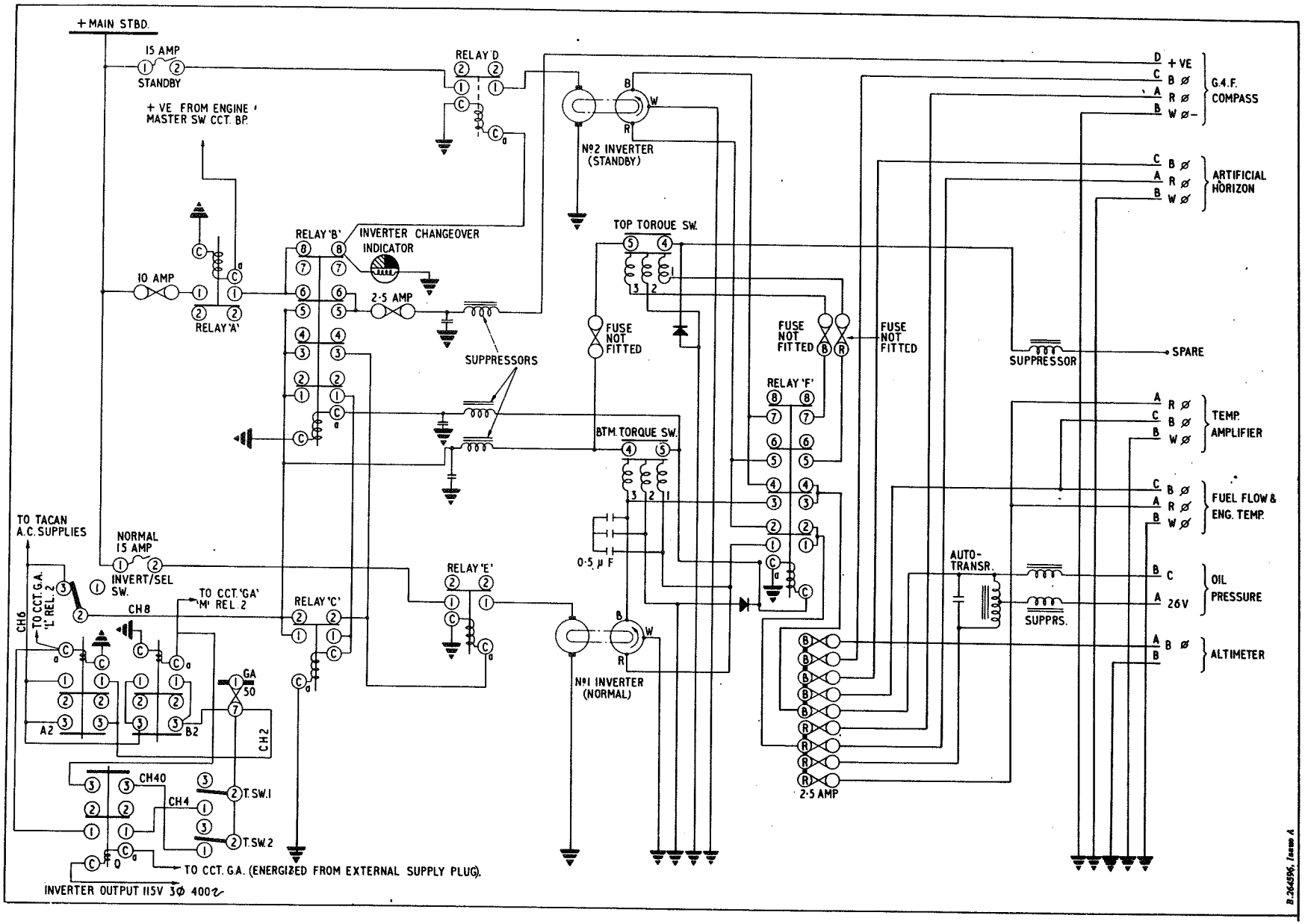


Fig.1 A.C. supplies (theoretical)

shows BLACK when No.1 inverter is operating, and changes over to show WHITE STRIPES when No.2 is operating. To enable No.1 and No.2 inverter to be selected manually, a switch marked NORMAL and STANDBY is provided; this is mounted on the rear portion of the cabin port shelf.

A.C. junction box

3. The a.c. junction box *(fig.2)*, which is mounted on the starboard side of the cabin, contains the torque switches and relays of the control circuit and also the rectifiers, radio-interference suppressors, fuses, and busbars. Since only one torque switch is used, the other is rendered ineffective by the fitting of dummy fuses. The junction box also contains an auto-transformer which reduces the supply to the oil pressure circuit to 26 volts. The two circuit breakers which protect the inverters are mounted on top of the junction box, and are marked NORMAL and STANDBY respectively.

Operation

4. When the engine master switch is put to ON, a supply from the engine starting circuit *(Group C3)*, energizes relay A, which causes a supply from the circuit fuse to pass via contacts 8-8a of relay B to energize the inverter change-over indicator and relay D; the same supply, passing via contacts 6-6a of relay B, the 2.5 amp fuse and suppressor, provides d.c. to the G4F compass circuit.

5. When relay D energizes, it connects a supply derived via the STANDBY circuit breaker to No.2 inverter, which starts to operate and its output passes via contacts 4a-4 and 2a-2 of relay F to supply the loads on the a.c. busbars, i.e. the G4F compass, the artificial horizon, the altimeter, the fuel flow and engine temperature amplifier, and, via the auto-transformer, the oil pressure circuit.

6. When the engine is started and the d.c. generators are on the line *(Group B1)* the relays A2 and B2 are energized, and through their contacts 1a-1 and 3a-3 route the supply to the Tacan supplies circuit *(Group H1, App 1)*, and also through the inverter selector switch and contacts 2a-2 of relay C, energize relay E; the supply is also available at contacts 1, 3 and 5 on relay B, and at contact 4 on the bottom torque switch. When the relay E contacts close, a supply via the NORMAL circuit breaker is connected to No.1 inverter, which runs, feeding the bottom torque switch and contacts 1a and 3a of the relay F.

7. When the torque switch closes, it connects the d.c. supply to energize the coils of relays B and F, causing their contacts to change over. The opening of the relay B contacts 8-8a disconnects the supply from the inverter change-over indicator and from the coil of relay D, causing relay D to de-energize, and disconnect the supply from No.2 inverter; the indicator, de-energized, shows BLACK. At the same time, the relay B contacts 5-5a maintain the d.c. supply to the compass circuit, while 3-3a and 1-1a connect supplies to the coils of relays E and C respectively. The supply to relay E keeps this relay energized, locking No.1 inverter to the NORMAL circuit breaker supply, while relay C latches on to the supply passed via the inverter selector switch. On relay F, contacts 3a-3 and 1a-1 connect No.1 inverter's output to the loads on the a.c. busbars *(para. 5)*.

Failure of No.1 inverter

8. If No.1 inverter fails, the bottom torque switch opens, disconnecting the energizing supplies from relays B and F. When relay F contacts change over they connect No.2 inverter's output lines to the busbars in place of those of No.1 inverter. When relay B contacts change over, contacts 8-8a connect supplies to the inverter indicator and the coil of relay D. Relay D energizes, and connects No.2 inverter to the STANDBY circuit breaker supply. No.2 inverter operates and supplies the a.c. loads, and the indicator shows WHITE STRIPES. By the opening of the relay B contacts 3-3a, relay E is de-energized and its contacts disconnect No.1 inverter from the NORMAL circuit breaker supply. The opening of the relay B contacts 1-1a has no effect on relay C since this is latched on.

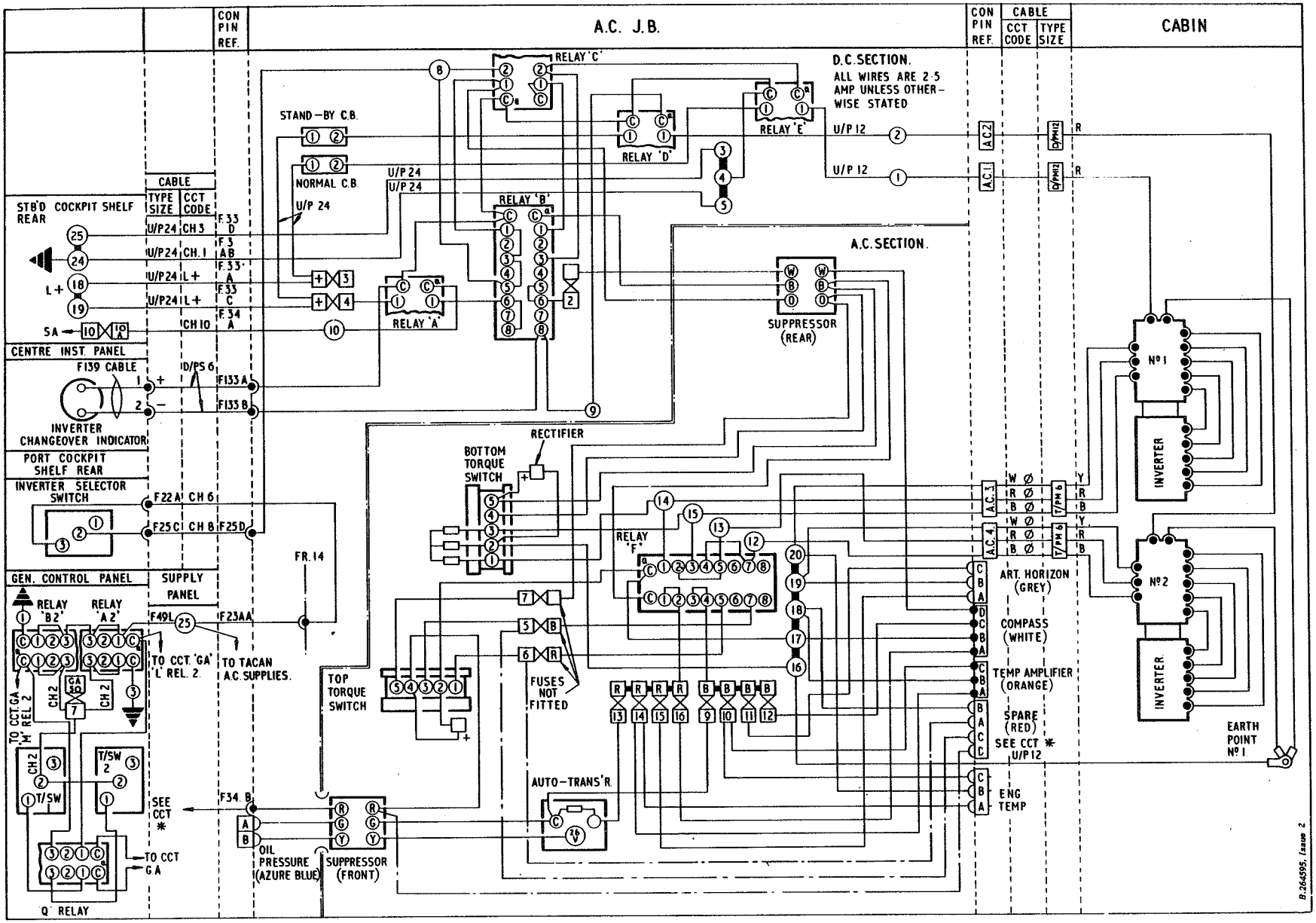
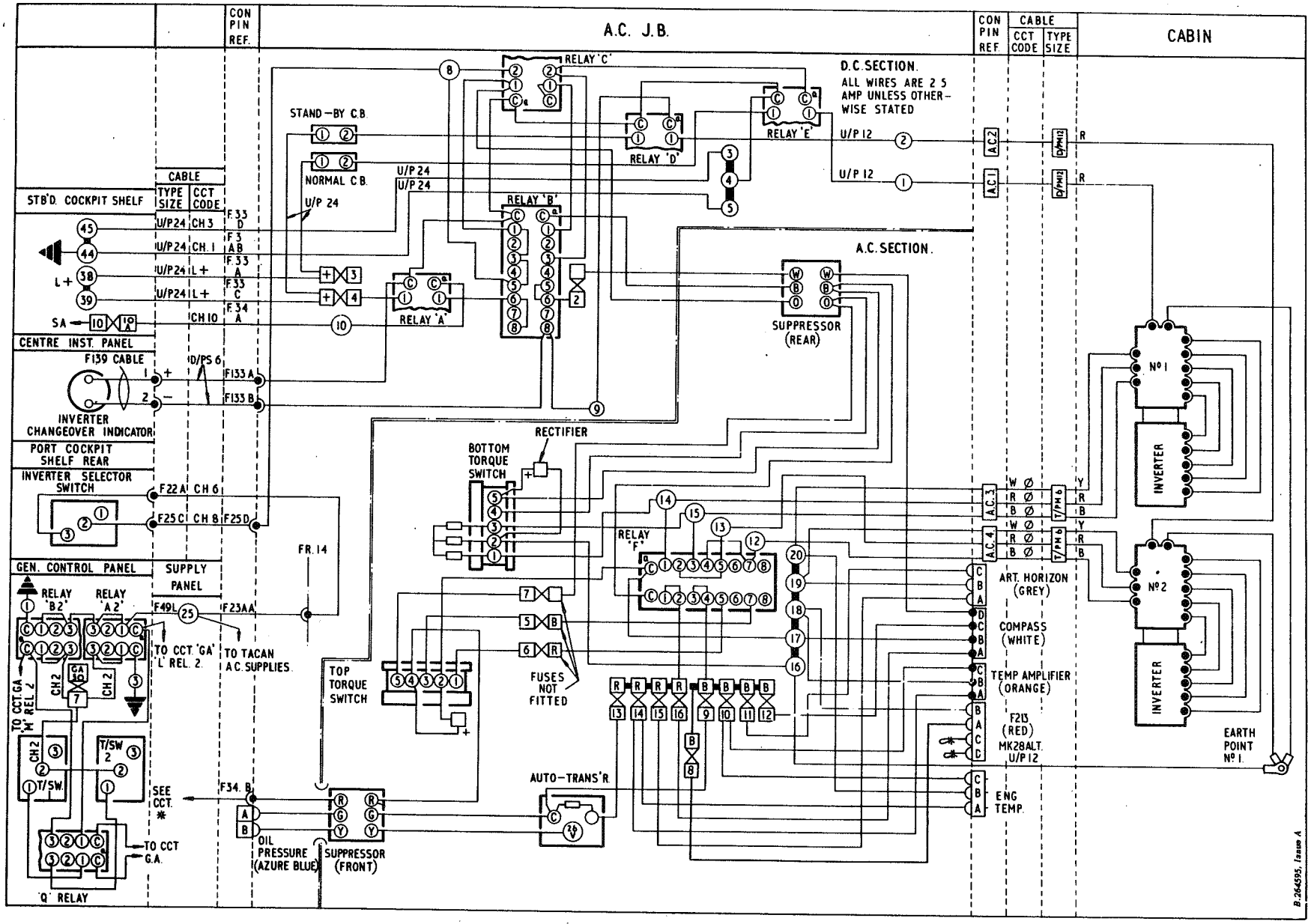


Fig.2 A.C. supplies (routeing)

▶ (Mod 1429 added) ◀



▶ Fig.2A A.C. supplies (routeing) – pre-Mod 1429 ◀

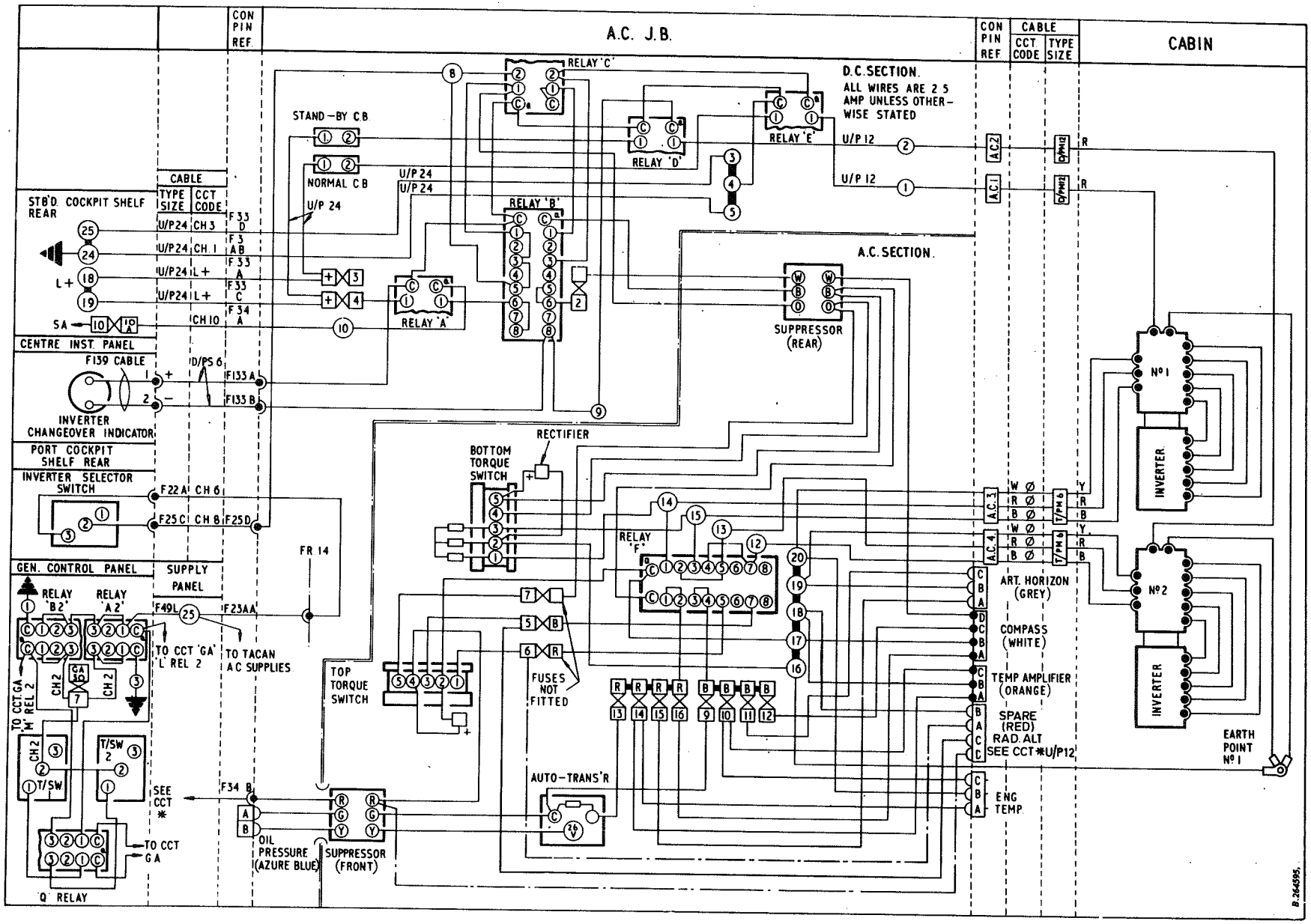


Fig. 2B A.C. supplies (routeing)
(Mod 1468 added)

Suspected failure of No.1 inverter

9. If it is suspected during flight that No.1 inverter is not functioning correctly, the inverter selector switch should be put to the STANDBY position. No.2 inverter will then run up and take over the a.c. loads as described.

SERVICING

General

10. General servicing of the aircraft's electrical system is described in Group A.1 Servicing of the a.c. supplies circuit consists in keeping the components clean, and carrying out the standard tests for security and serviceability described in the relevant Air Publications listed in Table 1, and also carrying out the tests described in paragraph 11.

Ground testing

11. Ground testing the a.c. supplies and control circuit is carried out with the engine stopped, the battery master switch OFF, and a ground supply connected *(Group B.1)*. The tests should be made during daily servicing and before each flight, using the following procedure:-

(1) Ensure that the battery master switch is OFF, and that an external supply is connected to the ground supply plug. Check that the inverter selector switch is to NORMAL.

(2) Put the engine master switch to ON. Check that No.2 inverter runs and supplies the a.c. loads, and that the indicator shows white stripes.

(3) Hold No.1 test switch on the generator control panel to the TEST position. Check that No.1 inverter operates, supplying the a.c. loads and that No.2 inverter is switched OFF. Check that the indicator shows BLACK.

(4) Release No.1 test switch *(simulating failure of No.1 inverter)* and check that No.2 inverter operates and supplies the a.c. loads.

(5) Repeat tests (3) and (4) using No.2 test switch.

(6) Disconnect the ground supply.

TABLE 1

Equipment type and Air Publications reference

Equipment	Air Publication
Inverter, Type 100A (Rotax S2903) Control panel, Type 12	A.P.4343B, Vol.1, Book 3, Sect.16
Torque switch, Type B.1, E.A.P.2340	A.P.4343C, Vol.1, Book 4, Sect.4
Circuit breaker, Type A.3, 15 amp.	A.P.4343B, Vol.1, Book 2, Sect.10
Magnetic indicator, Dowty Type C.5165Y, Mk.53	A.P.4343E, Vol.1, Sect.18
Suppressor, Type F. No.2 Suppressor, Type B.4	A.P.4343C, Vol.1, Book 3, Sect. 5
Relay B and F, Type S, No.1 Relay A, C, D & E, Type S, No.3	A.P.4343C, Vol.1, Book 2, Sect. 3
Auto-transformer, Type 213 M.V.	A.P.4343B, Vol.1, Book 3, Sect.19
Inverter selector switch, S.P. change-over Type C.W.C. No.4 Test switches, S.P. change-over, spring return to centre on, single throw, No.3	A.P.4343C, Vol.1, Book 1, Sect. 1

REMOVAL AND ASSEMBLY

General

12. The recommended procedures for the removal of the inverters and the A.C. junction box are described in Group A.2. For removing the remainder of the components no special instructions are necessary. The locations of and means of access to the components are given in Group A.3.