GROUP E.1 A.C. SUPPLIES

(CODE CH)

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LIST OF ILLUSTRATIONS

Equipment employed

1. The major components employed in the A.C. supplies circuit 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:—

Inverter, Type 100A *(Rotax S2903)* Control panel, Type 12 *(For inverter)*	*(5UB/6507)*	*A.P.4343B, Vol. 1, Book 3, Sect. 16*
Torque switch, Type B.1, E.A.P. 2312		*A.P.4343B, Vol. 1, Book 2, Sect.*
Circuit breaker (15A), Type A.3		*A.P.4343B, Vol. 1, Book 2, Sect. 10*
Tumbler switch, S.P/ON-OFF, Type XD443/1 *(Test/Normal)*		*A.P. 4343C, Vol. 1, Book 1, Sect. 1*
Magnetic indicator, Type A.2		*A.P.4343E, Vol. 1, Sect. 18*
Suppressor, Type F. No. 2 *(For inverters)*		*A.P. 4343C, Vol. 1, Book 3, Sect 5*
Relay, Type S. No. 1 *(Relays B and F)* Relay, Type S. No. 3 *(Relays A, C, D and E)*	...	*A.P.4343C, Vol. 1, Book 2, Sect. 3*
Autotransformer, Type 213 M.V. *(For oil pressure circuit)*		*A.P.4343B, Vol. 1, Book 3, Sect. 19*
Capacitor *(0.25 microfarad), (For autotransformer)* ...		
Capacitor *(0.5 microfarad), (For torque switch)*		
Capacitor *(0.5 microfarad), (For suppressor Type B4) (Ref. C.215622)*		
Suppressor, Type B.4 *(For oil pressure circuit)*		*A.P.4343C, Vol. 1, Book 3, Sect. 5*

DESCRIPTION

A.C. supplies

2. This circuit controls the supply to the alternating current operated flight instruments *(described in Sect. 5, Chap. 2)* and to the radar ranging installation *(described in Sect. 6, Chap. 2)*. The supply is 115 volts, 3-phase, 400 cycles per second, which is obtained from two inverters mounted on the cabin floor on the starboard side behind the seat. The flight instruments are normally operated by No. 1 inverter, while No. 2 inverter supplies the radar ranging installation, but should No. 1 inverter fail, No. 2 inverter will automatically off-load the radar ranging installation and act as a stand-by supply to maintain operation of the flight instruments. Located on the top of the a.c. junction box are two circuit breakers *(one of which protects each inverter)*, a magnetic indicator to give indication of NORMAL supply failure and a stand-by test switch, marked TEST and NORMAL. The d.c. input to each inverter is controlled by relays and suppressors are provided between the d.c. and a.c. sections of the circuit to minimize interference with the radio equipment. The a.c. output of the inverters and the off-

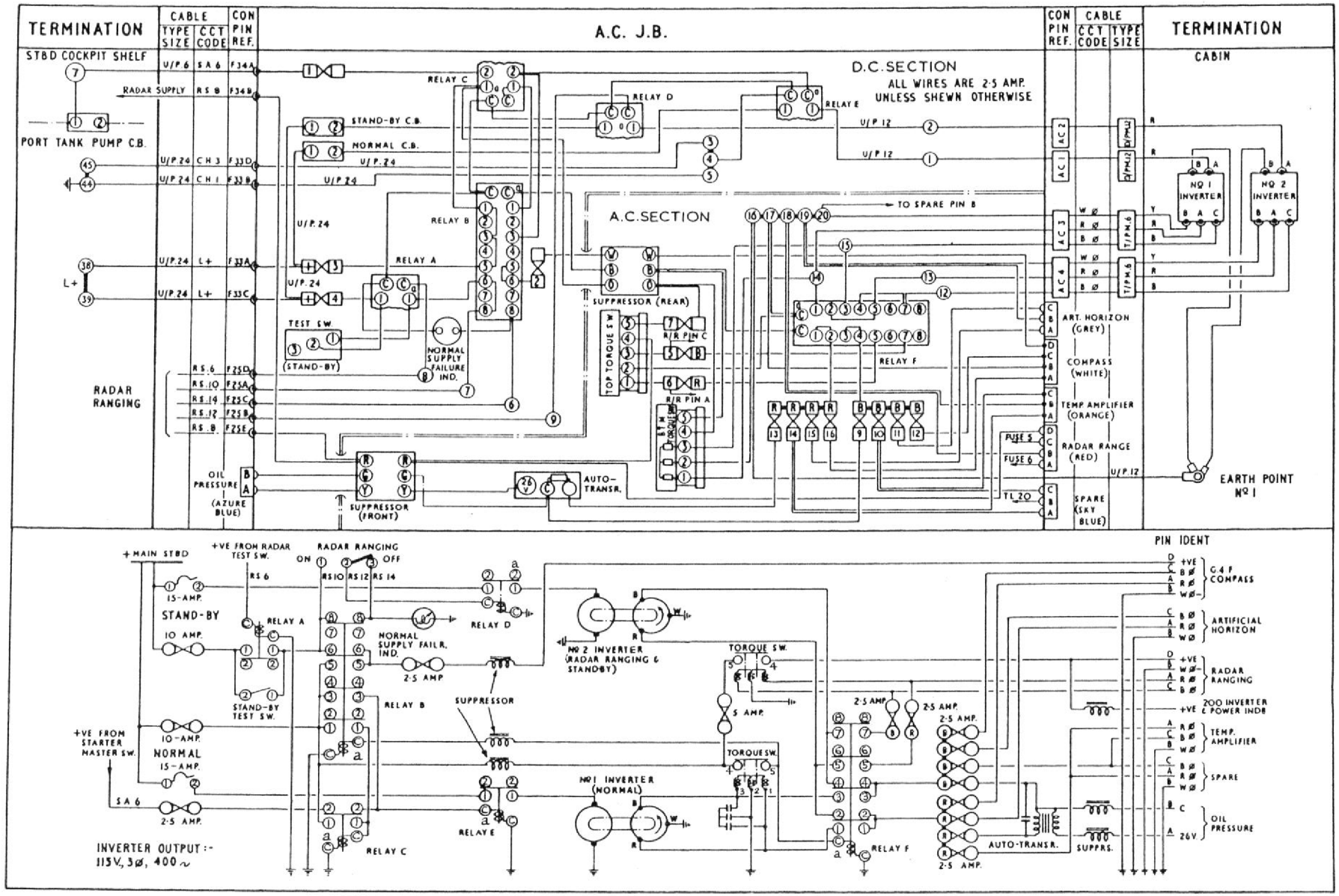

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Fig. 1. A.C. supplies (routing and theoretical)

loading of the radar ranging installation is controlled by two torque switches and a relay, while the supply to the oil pressure gauge is taken through an auto-transformer and another suppressor. The torque switches, auto-transformer, control relays and suppressors are all located within the a.c. junction box situated on the starboard side of the cabin. The circuit is coupled to the engine starter master switch *(Group C1)* and is energized immediately this switch is closed.

Operation

3. When the engine master switch is placed in the ON position, a positive supply from the engine starter circuit breaker energizes relay E, via the contacts of relay C, which are closed while this relay is de-energized. With relay E energized, a supply is made to No. 1 inverter, via its circuit breaker, and the inverter commences operation to energize the bottom torque switch. When the output reaches 100 volts, the torque switch makes contact and feeds the coils of relays B and F via the circuit fuse and suppressor. A supply is also made to the contacts of the top torque switch via a fuse in preparation for supplying the radar ranging junction box and inverter when the top torque switch is energized *(para. 5)*.

4. When relay B is energized, it energizes relay C, which, with relay B, forms an interlock circuit to isolate the engine starter circuit from relay E. Once energized, relay C is maintained in this state by a hold-in circuit through its own contacts, thus preventing relay E from being re-energized by the supply from the engine starter master switch when relay B is de-energized during failure of No. 1 inverter *(para. 6)*. Relay E will not, however, be de-energized by the opening of relay C as it is maintained in the energized state via the closed contacts of energized relay B. The d.c. bias supply for compass correction is also taken from the contacts of relay B via a circuit fuse. Relay F controls the output of the inverters, and, when energized, allows No. 1 inverter to supply the phase bus-bars. The compass, artificial horizon and magnetic amplifier *(cabin pressurization circuit)*, together with the oil pressure gauge, thus commence operation. The supply to the oil pressure gauge is, however, taken through an auto-transformer, which reduces the voltage to the value required by this instrument.

5. When the aircraft is airborne, the weight is taken from the alighting gear and the compression micro switches make contact to feed the coil of relay A from a fuse in the gun-firing circuit. With this relay energized and the radar ranging installation switched on, a supply is conducted from the circuit fuse through the radar ranging control switch to the coil of relay D, which is thus energized to complete the circuit from No. 2 circuit breaker to No. 2 inverter. No. 2 inverter will, therefore, commence operation and feed the top torque switch and the phase bus-bars in the radar ranging junction box via the contacts of relay F, which are made while this relay is energized. When the output of No. 2 inverter reaches 100 volts the top torque switch will make contact to supply d.c. to the radar ranging junction box and inverter *(para. 3)*, and the radar ranging installation will commence operation.

6. If No. 1 inverter fails, the bottom torque switch will be de-energized, thus breaking contact and de-energizing relays B and F. The de-energizing of relay B completes a supply to the normal supply failure indicator, and also maintains the supply for compass correction. The de-energizing of relay F causes the top torque switch to de-energize and break the supply to the radar ranging installation, thus off-loading this equipment and rendering that installation inoperative. At the same time No. 1 inverter is isolated from the phase bus-bars and the output of No. 2 inverter is connected to the bus-bars, thus maintaining the flight instruments in operation. This whole operation takes place automatically, and the normal supply failure indicator provides warning for the ground crew that failure has occurred. A similar process takes place if the supply fails due to a fuse failure or an open-circuit.

7. The operation of the stand-by test switch is such that, when closed while the aircraft is on the ground, it overrides relay A and energizes the normal supply failure indicator, together with relay D, irrespective of the position of the alighting gear compression micro switches and radar ranging control switch. Relay D feeds No. 2 inverter, which operates and feeds the phase bus-bars *(described in para. 6)*, thus the operation of the stand-by circuit is tested.

SERVICING

General

8. For general servicing of the electrical system as a whole, reference should be made to Group A.1. Apart from keeping all the components clean and carrying out the standard routine tests of security and serviceability as described in the relevant Air Publications *(listed in para. 1)*, the only other servicing is the testing of the stand-by circuit *(described in para. 9)*.

Ground testing stand-by circuit

9. During the daily servicing and before each flight, the operation of No. 2 inverter and its control circuit should be tested for correct functioning. The method to be adopted is as follows:—

(i) Switch the Stand-by test switch *(located on top of A.C. junction box)* to the TEST position.

(ii) Check that the NORMAL supply failure indicator then functions and No. 2 inverter commences running.

(iii) Check that compass, artificial horizon and oil pressure gauge are operating in the normal manner.

(iv) After test, return the Stand-by test switch to the NORMAL position.

REMOVAL AND ASSEMBLY

General

10. Once access has been obtained, the removal and assembly of the components forming the flight instruments control circuit should present no difficulties. The removal of the A.C. junction box, which contains the majority of the flight instruments control circuit components is fully described in Group A.2. The location and access to all the components is indicated in Group A.3.