GROUP E1 A.C. SUPPLIES (CODE CH)

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ILLUSTRATION

Introduction

1. This group contains a brief description of the a.c. supplies circuit, together with the method of operation and 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 detailed information on the standard components used reference should be made to the appropriate volumes of A.P.4343 series, while a general description of the electrical system of the aircraft as a whole, including system wiring details, referencing of components and general servicing will be found in Group A1 of this chapter. The removal of the major electrical equipment is given in Group A2, and the location, including the means of access to all the components, will be found in Group A3 also of this chapter.

DESCRIPTION

A.C. SUPPLIES

2. This circuit controls the supply to the alternating current operated flight instruments described in Sect. 5, Chap. 2 of this volume, and to the radar ranging installation described in Sect. 6, Chap. 2, also of this volume. The supply is 3-phase, 400 cycles per sec., 115 volts, which is obtained from two Type 100A inverters mounted on the cockpit floor on the starboard side behind the seat. The flight instruments are normally operated by No. 1 inverter, while No. 2 inverter supplies the A.R.I.5820 installation, but should No. 1 inverter fail, No. 2 inverter will automatically off-load the A.R.I.5820 installation and act as a stand-by supply to maintain operation of the flight instruments. Located on the top of the a.c. junction are two circuit breakers, Type A3, one of which protects each inverter, a magnetic indicator Type C.1838Y, Mk. 1 or Type A2 which gives 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-loading of the A.R.I.5820 installation is controlled by two Type B, EAP.2312 torque switches and a relay, while the supply to the oil pressure gauge is taken through a Type 213MV auto-transformer and another suppressor. The torque switches, auto-trans-

former, control relays and suppressors are all located within the a.c. junction box situated on the starboard side of the cockpit. 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 10-amp. circuit fuse and suppressor. A supply is also made to the contacts of the top torque switch via a 5-amp. fuse in preparation for supplying the A.R.I.5820 junction box and Type 200 inverter when the top torque switch is energized (*para.* 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.* 5). 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 2·5-amp. 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.

4. 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 10-amp fuse in the gun-firing circuit. With this relay energized and the A.R.I.5820 installation switched on, a supply is conducted from the 10-amp. 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 A.R.I.5820 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 A.R.I.5820 junction box and Type 200 inverter (*para.* 3), and the A.R.I.5820 installation will commence operation.

5. 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 A.R.I.5820 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.

6. 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 as described in para. 5, thus the operation of the stand-by circuit is tested.

SERVICING

GENERAL

7. For 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 standard routine tests of security and serviceability as described in the appropriate volume of A.P.4343 series, the only other servicing is the testing of the stand-by circuit as described in para. 8 of this group.

TESTING STAND-BY CIRCUIT

8. During daily servicing the stand-by operation of No. 2 inverter and its control circuit should be tested for correct functioning by placing the stand-by test switch, located on the top of the a.c. junction box, to the TEST position. The normal supply failure indicator should then function and No. 2 inverter commence operation to supply the flight instrument. This may be checked by reference to the indicator and by observing the behaviour of the compass, artificial horizon and oil pressure gauge, which should all operate in the normal manner. After the test, return the stand-by test switch to the NORMAL position.

REMOVAL AND ASSEMBLY

9. Once access has been obtained, the removal and assembly of the components forming the flight instruments control circuit should present no unusual 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 A2 of this chapter. The location and access to all the components is indicated in Group A3, also of this chapter.

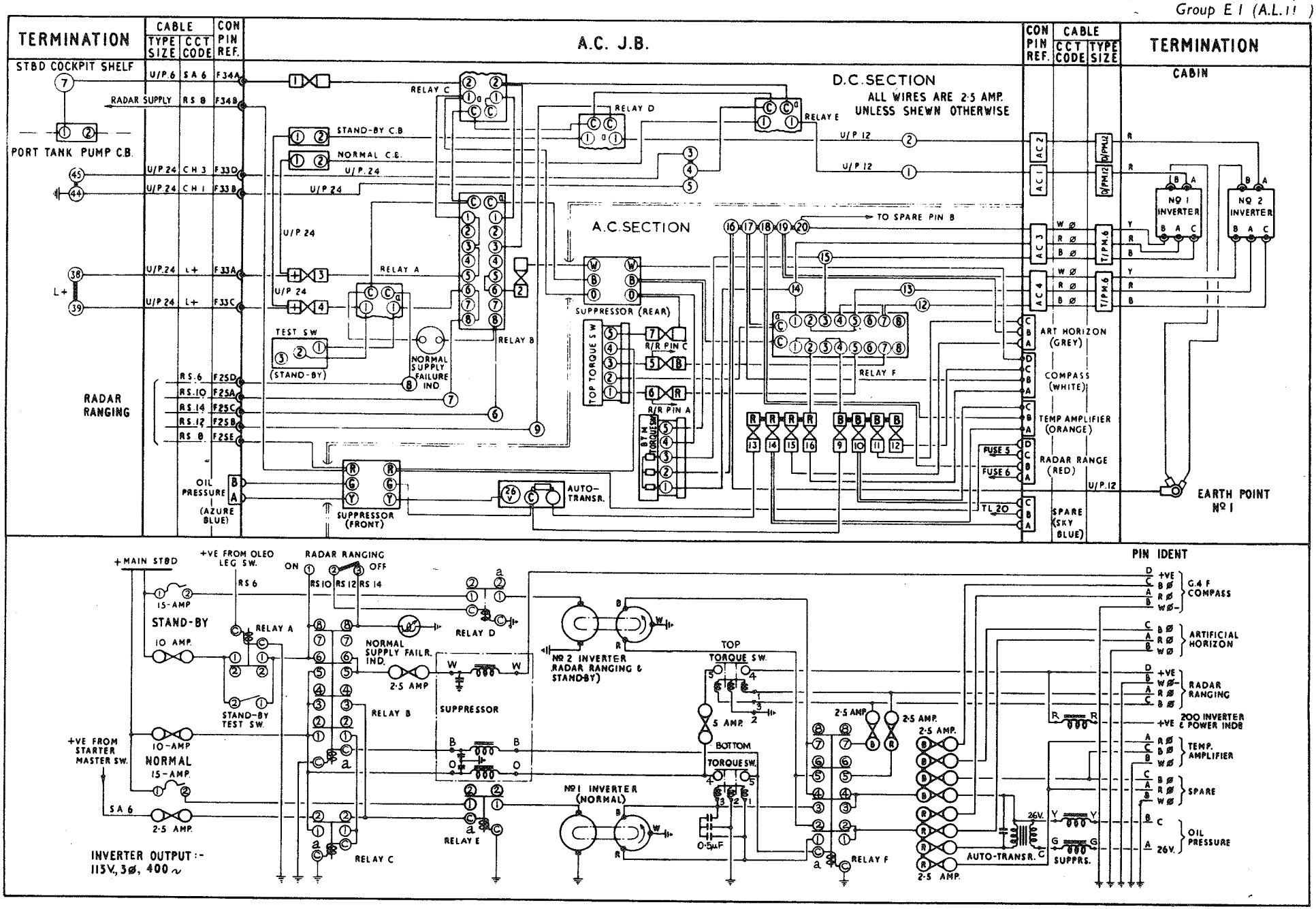

FIG. 1 A.C. SUPPLIES

RESTRICTED