

Group 3—A.C. SYSTEM

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WARNING . . .

Voltages in excess of 100 volts either a.c. or d.c. can be dangerous under certain circumstances. Personnel should therefore ensure that the electrical system is electrically safe before any servicing is attempted. Where it is essential that tests or adjustments are to be made with the electrical power switched on, the greatest care must be exercised.

Introduction

1. This group contain descriptive and servicing notes of the a.c. system of the aircraft. Reference should be made to the relevant Air Publications for detailed information on the operation and servicing of the items of equipment used in the system.

2. Information on the lay-out and interpretation of schematic wiring diagrams can be obtained from the General Information group contained in this Book immediately after Section 5 marker card. ◀After September, 1961, modifications are covered by appendices which will be periodically incorporated into the Group.▶

DESCRIPTION AND OPERATION

Instruments supply (fig. 1 and 2)

Note . . .

Pre-Mod. 2648 the a.c. supply for the jet pipe temperature fuel control, on B/K Mk. 1 aircraft only, is taken from the Type 100A inverter. For all other types, of Valiant aircraft, No. 2 radar inverter, Type 350, pro-

vides the jet pipe temperature fuel control a.c. supply (See Table 1).

3. A Type 100A inverter, mounted on the crew floor behind the radio crate provides the a.c. supply for the instruments. Provision is made to supply the instruments from the radar and radio supply inverters if the Type 100A should fail.

4. When the INSTRUMENT MASTER switch is selected ON, the instrument bus-bar is connected to the 28-volt bus-bar on panel Z by the instrument contactor (Chapter 2, Group 3, fig. 1) and the red warning lamp, on panel G, is supplied at 28-volts from the starboard fuse panel D, through the d.c. selector relay R4. At the same time, the inverter main relay R1, Type P1, mounted on the inverter relay panel on the rear pressure bulkhead, is energized by a supply from panel D, through the discriminator relay (R2/2) (at rest), Type S1, mounted in the inverter torque switch box on the radio crate.

5. The main relay connects (R1/1) a 28-volt supply, from a fuse on panel Z, through a suppressor, Type B4, mounted on the inverter relay panel, to the inverter control panel. This supply is fed to the inverter d.c. armature, via the voltage regulator carbon pile, the series field and the shunt field, the inverter will now start to rotate.

6. The a.c. output is applied to the operating coil of the voltage regulator, via a full wave rectifier, ballast and trimmer resistances, to

maintain a stable output from the inverter. It is also connected to the coils of the torque switch, Type B, mounted in the inverter torque switch box.

7. As the a.c. voltage reaches its operating level the torque switch contacts (T1/1) close and connect a 28-volt d.c. supply from panel D, via a suppressor, Type B4, to the a.c. and d.c. selector relays, R3 and R4, mounted in the inverter torque switch box. Both these relays operate. The d.c. selector relay (R4/1), connects a further 28-volt supply, from panel D, to the inverter main relay R1, disconnects (R4/3) the warning lamp from its supply, and connects (R4/2) the 28-volt supply to the operating coil R2 of the discriminator relay. The a.c. selector relay disconnects (R3/3 and R3/4 pre-Mod. 2648:R3/1-4 post Mod. 2648) the a.c. supplies to the power distribution box for the instruments, from the radio and radar inverters and connects in their place (R3/1-2 pre-Mod. 2648, R3/1-4 post Mod. 2648) the red and blue phases of the Type 100A inverter. The white phase is earthed and therefore not switched.

8. The discriminator relay operates (R2/1) to connect an alternative supply to its operating coil as a hold-in and to disconnect (R2/2) the original supply to the main relay. This ensures that the inverter is shut down if the output fails and that it cannot be restarted until the discriminator relay is reset by moving the INSTRUMENT MASTER switch to OFF and then back to ON. The system is now operat-

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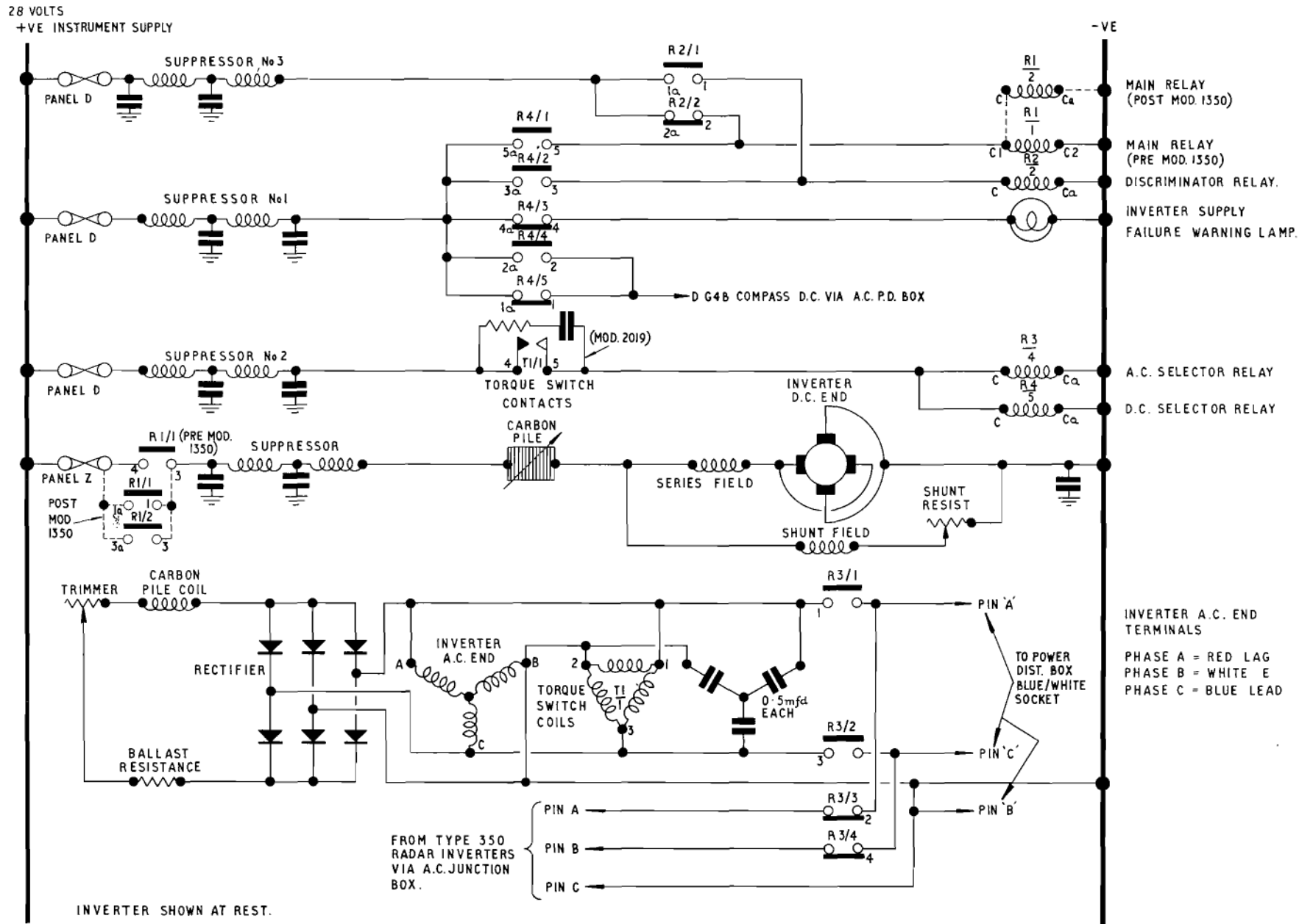


Fig. 1. Type 100A Instrument supply inverter (pre-Mod. 2648)

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ing normally. To shut down the inverter it is necessary to switch OFF the INSTRUMENT MASTER switch.

Inverter failure (fig. 1 and 2)

9. If the output voltage of the inverter falls excessively, due to failure of the machine, the torque switch contacts (T1/1) will open, thus disconnecting the a.c. and d.c. selector relay operating coils R3 and R4. The a.c. selector relay will disconnect (R3/1-2 pre-Mod. 2648, R3/1-4 post Mod. 2648) the supply from the Type 100A inverter and connect (R3/3-4 pre-Mod. 2648, R3/1-4 post Mod. 2648) the supply from the radio and radar inverters to the instruments. The d.c. selector relay will trip (R4/1) thus stopping the inverter and lighting the warning lamp (R4/3). At the time same the d.c. selector relay will disconnect (R4/2) the supply to the discriminator relay operating coil. The discriminator relay coil R2 will not be de-energized, however, as its contacts (R2/1) connected a separate hold-in supply when it was operated on starting up. This ensures that the main relay R1 cannot be re-energized via contacts R2/2 unless the INSTRUMENT MASTER switch has been selected to OFF and then back to ON.

10. On P.R. aircraft, a supply is required for the camera sight; an extra plug on the instrument inverter torque switch box is provided as a pick up point for this supply. Similarly, on tanker aircraft, an extra supply for the control panel hose drum unit control circuits is provided, via a further plug on the torque switch box. On the B/K/PR, Mk. 1 aircraft both these extra supply plugs are fitted.

◀ **Artificial horizon and G4B compass supply failure indicator (Mod. 2982) (fig. 3)** ▶

11. Failure of the supply to either of these instruments is indicated on the relative phase failure indicator on the a.c. manual change-over switch box, mounted above the voltage trimmer, at the A.E.O.'s position. If the artificial horizon indicator shows failure of

the supply it means that initially the supply from the instrument inverter (Type 100A) has failed and that the automatically switched alternative supply from the No. 2 radar inverter (Type 350) has either failed or is not getting through (e.g. dirty contacts on the a.c. selector relay or failure of the relay to operate satisfactorily).

12. Failure of the No. 2 radar inverter will be indicated by its warning lamp in which case, the No. 3 inverter should be switched in to take its place (*para. 20*). Failure of the a.c. selector relay to operate, or dirty contacts reducing the voltage output from the relay, can be overcome by selecting the ARTIFICIAL HORIZON SUPPLY CHANGE-OVER switch from NORMAL to EMERGENCY (*para. 14*).

13. If the G4B compass indicator shows failure of the supply, this means that the No. 2 radar inverter (Type 350) output has failed and that the No. 3 inverter should be switched in to take its place (*para. 20*).

◀ **Artificial horizon supply change-over switch (Mod. 2982) (fig. 3)** ▶

14. This switch is mounted in the a.c. manual change-over switch box at the A.E.O.'s position, above the voltage trimmer panel. The switch is connected in parallel with the contacts of the a.c. selector relay so that if the relay fails to operate or the output from the relay is reduced in voltage, due to dirty or otherwise bad contacts (*para. 12*), the switch can be selected to EMERGENCY to overcome the trouble and maintain the supply to the artificial horizons.

Radar supply (fig. 4)

15. To cater for the high frequency a.c. supplies required by some of the radar equipment, three inverters, Type 350, are installed. Each inverter has a voltage and frequency control panel Type 16 and a rectifier unit, Type C.P.16 and will supply 1kW, 3-phase, 400 c.p.s., 115-volts and 2kW, single-phase, 1600 c.p.s., 115-volts. The

control panel will regulate the voltage and frequency of the single-phase 1600 c.p.s. output to ± 1 per cent and of the 3-phase, 400 c.p.s. output to ± 2 per cent. Protection for each inverter is provided by connection to its contactor of over-voltage and over-frequency relays in the control panel, the contactor being tripped when either of the output voltages or frequencies rise in excess of 25 per cent above normal.

Control (fig. 4)

16. The 1600 c.p.s. output must be unloaded during starting, but may be loaded as soon as voltage and frequency control has been established (10 seconds). The 400 c/s output may be loaded during starting. When switching on and off the H²S load, the 2-position switch must be moved slowly to allow time for the regulators to settle down between switching from one position to the other.

17. The inverters are each controlled by an ON/OFF switch on the power distribution box, in the radio crate. When No. 1 inverter switch is placed to ON, it connects a 28-volt supply, from a fuse in the power distribution box, to the No. 1 contactor reset coil R1, via the contactor auxiliary protective contacts (R1/1 and R2/1) and normally closed contacts (R3/1) of relay No. 6. Inverter No. 2 contactor is fed via normally closed contacts, (R9/2) of relay No. 7, but inverter No. 3 contactor is fed direct.

18. The contactor R1 (Ref. No. 5CW/4394 pre-Mod. 1257 and Ref. No. 5CW/5047 post Mod. 1257) operates, closing its auxiliary contacts (R1/2) in the trip coil line, opening its auxiliary contacts (R1/1) in the reset coil line and closing its two main series connected contacts (R1/3 and R1/4) to connect a 112-volt supply, from panel J port bus-bar panel, through a suppressor to the starter unit and inverter d.c. armature and main field, the a.c. 1600 c/s main field and the control panel, and thence to the negative line. As the inverter runs-up, the starter relay R14 operates, closing its contacts (R14/1) to short circuit the

starting resistance and allowing the machine to operate at full voltage. The 1600 c/s and 400 c/s a.c. and the d.c. sections of the inverter are regulated by control fields supplied from the control panel, according to datum settings and feed-back signals from the a.c. outputs.

19. When inverter No. 1 is running, its output operates the torque switch connected across its 3-phase lines and mounted, together with inverter No. 2 and No. 3 torque switches, in a box adjacent to the power distribution box. The torque switch contacts (T1/1) close to connect a 28-volt supply from a fuse, inside the power distribution box, to the relative 400 c/s green warning lamp on the front of the power distribution box. The N.B.C. and H²S 400 c/s and 1600 c/s feeders have neon indicators which light up when these loads are switched on. In the event of excessive fall in voltage the lamps go out, to indicate failure. The neons in the 400 c/s lines are in the two live phases A and C only; phase B is earth.

Failure (fig. 4)

20. If either No. 1 or No. 2 inverter should fail, No. 3 inverter can be switched, by the emergency switch, to supply the faulty machine's load, its own load being switched off at the same time.

21. Assuming No. 1 inverter fails, the output will drop and its torque switch T1 will open its contacts (T1/1) to switch off the relative green warning lamps to indicate failure. The 2-pole EMERGENCY switch, on the power distribution box, must then be placed to No. 1 FAIL when one of its poles will connect a 28-volt supply, from a fuse in the power distribution box, to relay 5 (R6) and the other pole will connect the same supply to relays 2 (R5), 1 (R4) and 6 (R3). Relay 5 operates to disconnect, at R6/1-4, the 400 c.p.s. and 1600 c.p.s. loads from No.3 inverter; relay 1 operates (R4/2 and R4/3) to disconnect the 400 c.p.s. load from No. 1 inverter and to connect it (R4/1 and R4/4) to No. 3 inverter. Relay 6 operates (R3/1) to disconnect No. 1 inverter contactor reset coil R1 from its supply and (R3/2) to connect the emergency switch

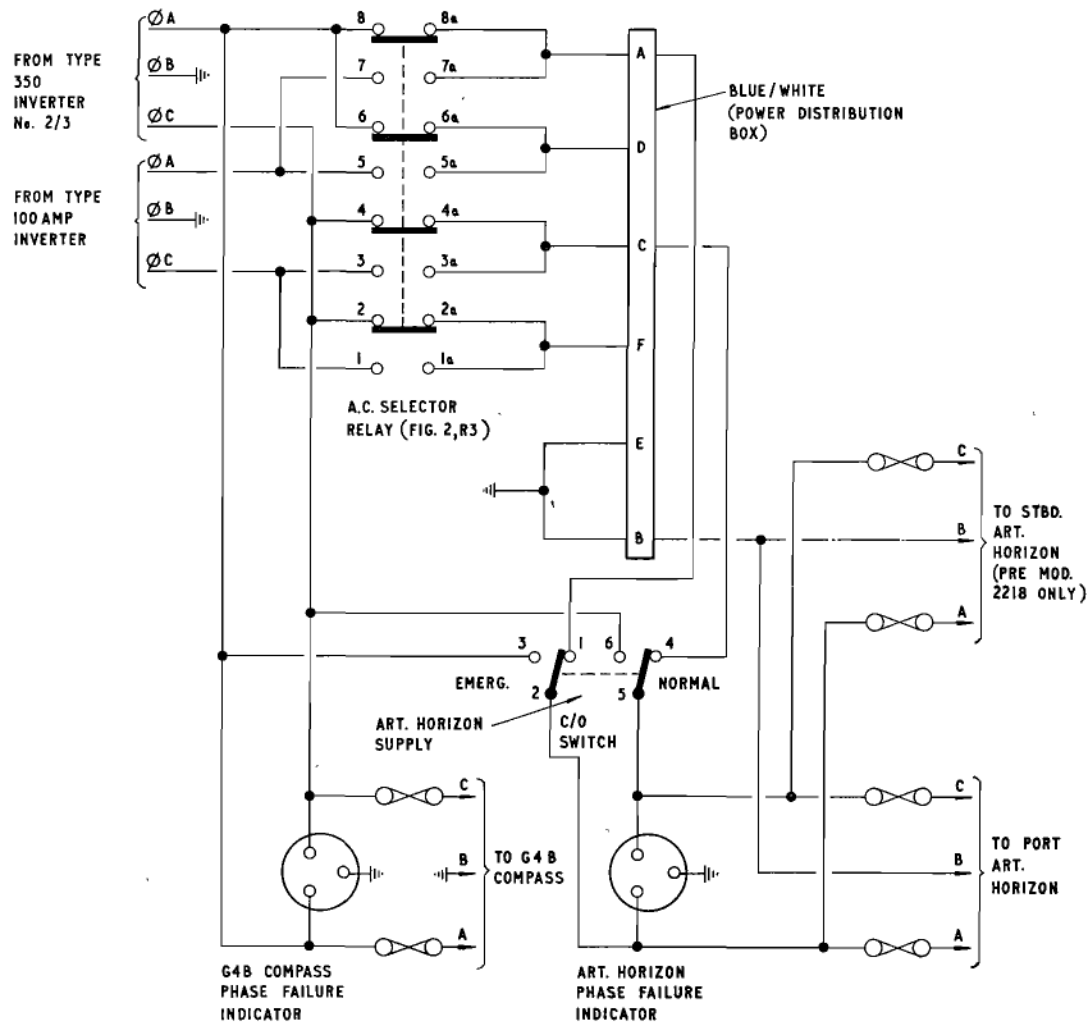


Fig. 3. A.C. Manual change-over switch (Mod. 2982)

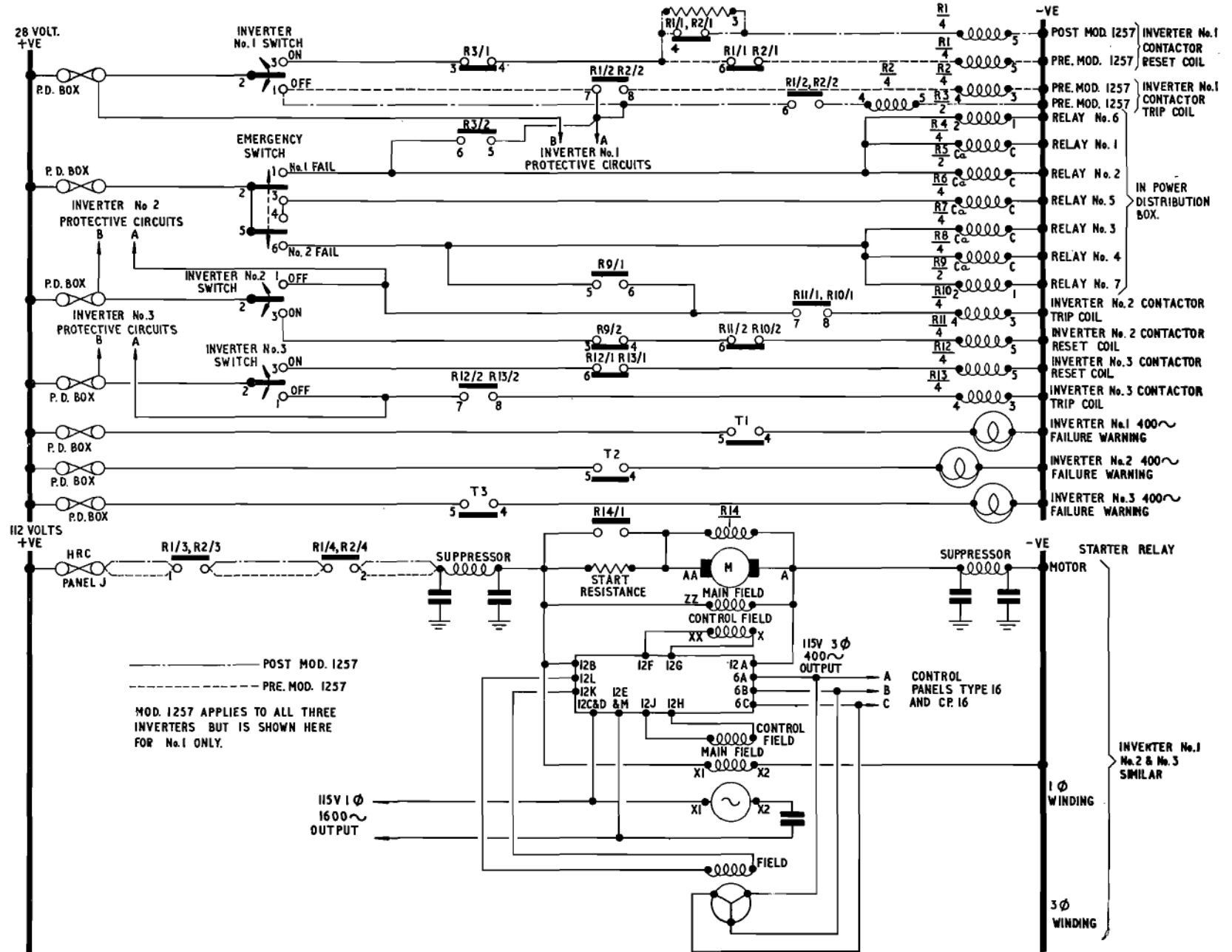


Fig. 4. Type 350 radar inverters control

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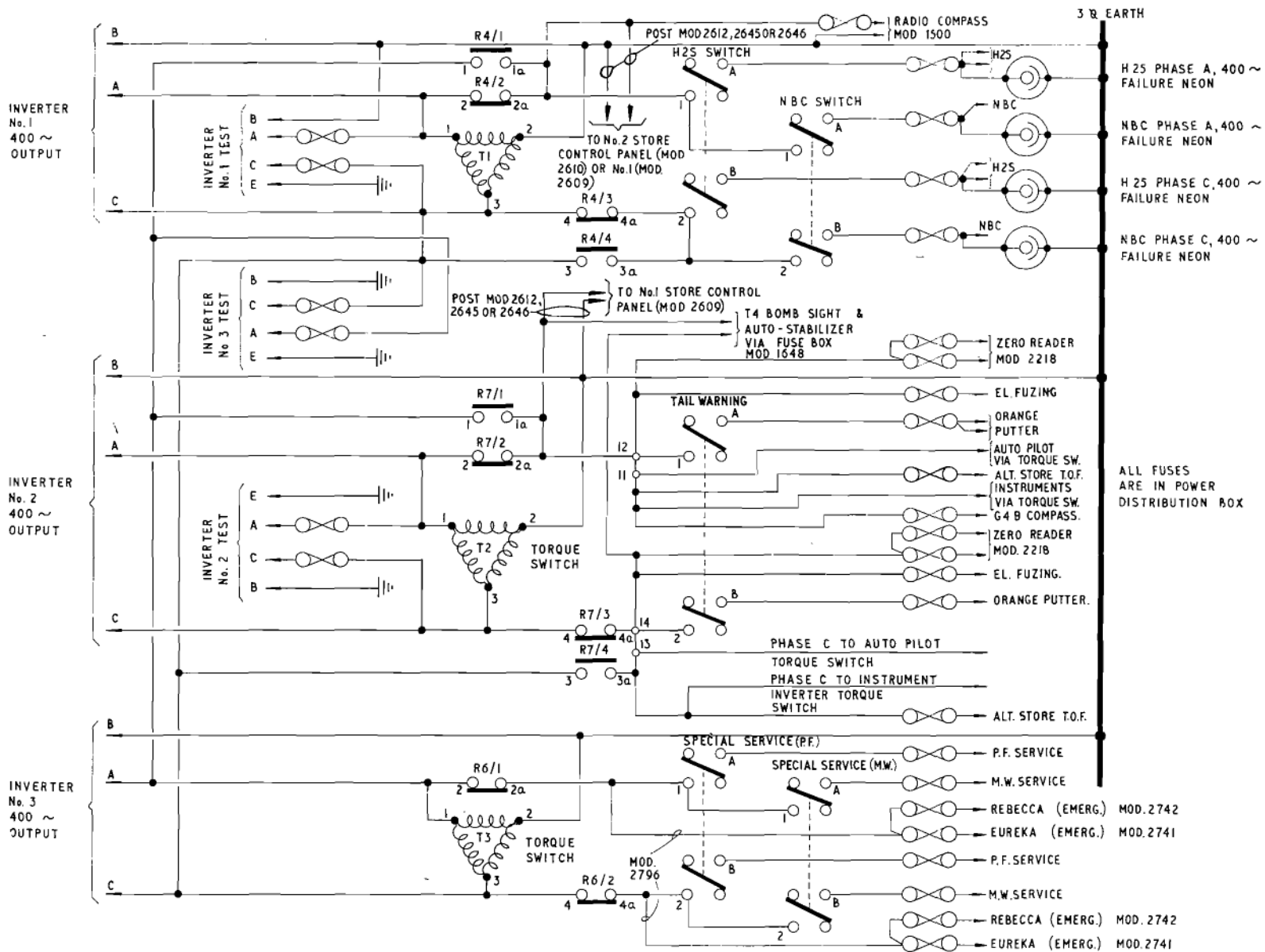


Fig. 5. 400 Cycle supplies (power distribution box-post Mod. 988)

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supply to No. 1 inverter contactor trip coil R2, via its auxiliary contacts, thus the contactor is tripped and the faulty machine shut down.

22. If No. 2 inverter should fail, the torque switch T2 will operate to switch off the relative warning lamp and the emergency switch should be placed to No. 2 FAIL. This will operate relays 5 (R6), 3 (R7), 4 (R8) and 7 (R9) to disconnect the 400 c.p.s. and 1600 c.p.s. loads from No. 2 inverter and to connect them to No. 3 inverter, at the same time disconnecting No. 3 inverter loads and tripping No. 2 inverter contactor similarly to No. 1 inverter failure condition.

23. If both No. 1 and No. 2 inverters should fail, No. 3 inverter can be used to supply the loads of one inverter only. If No. 3 inverter should fail it must be switched off at its control switch and if it should fail before No. 1 or No. 2 fail, then both machine loads will remain disconnected.

24. Three test sockets are provided on the voltage trimmer panel in the cabin to enable the 400 c.p.s. and 1600 c.p.s. output of each inverter to be tested. A further test socket is provided on the panel to test the 24-volt systems at the distribution box.

A.R.I.5851 supply (pre-Mod. 2399) (fig. 8)

25. The 400 c.p.s. supplies to the A.R.I. 5851 equipment are obtained from a separate inverter, Type 153, with its own control panels, Type 19, C.P.19 and 25. The inverter is controlled by a switch on the power distribution box. When the switch is placed to ON, it connects a 28-volt supply, from a fuse in the power distribution box, to the coil of a magnetic relay, Type 9A, R1. This relay operates (R1/1) to put an economy resistance in its coil circuit and to close its two main series connected contacts (R1/2 and R1/3) to connect a 112-volt supply, from panel J port bus-bar panel, to the starter unit and thence via a suppressor to the inverter d.c. armature and shunt field and regulator.

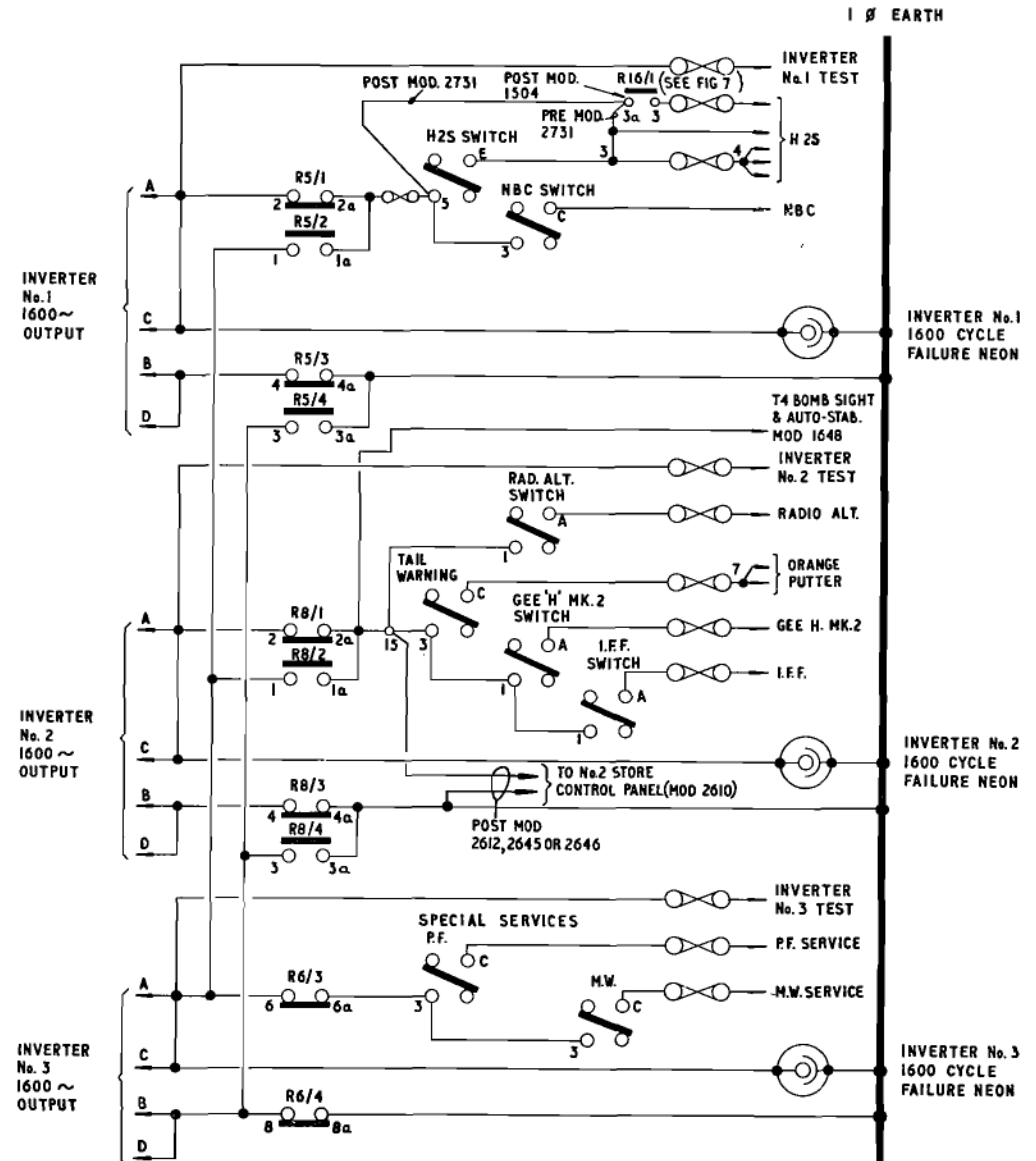


Fig. 6. 1600 Cycle supplies (power distribution box post Mod. 988)

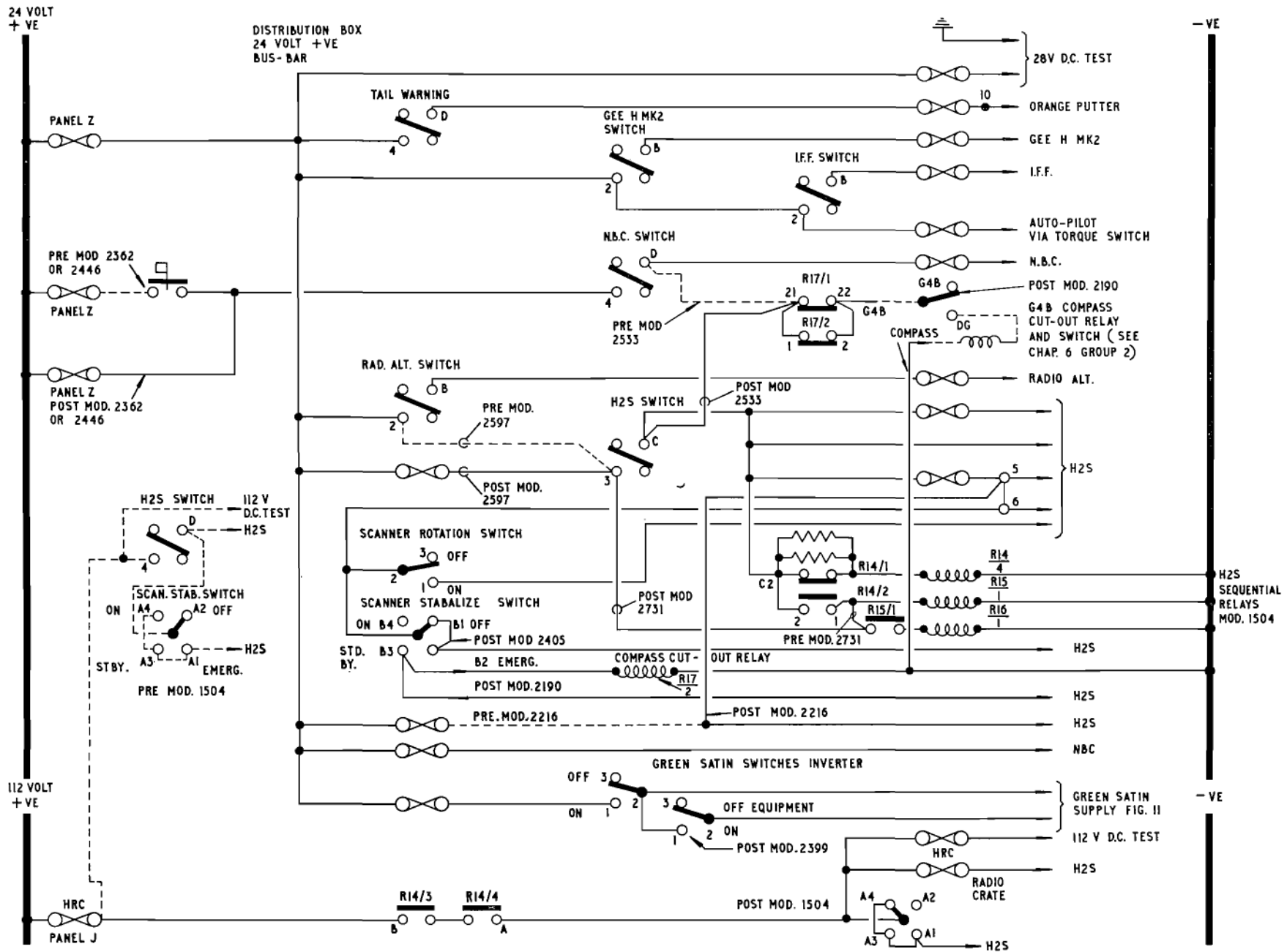


Fig. 7. D.C. Supplies (pre-Mod. 2728) (power distribution box post Mod. 988)

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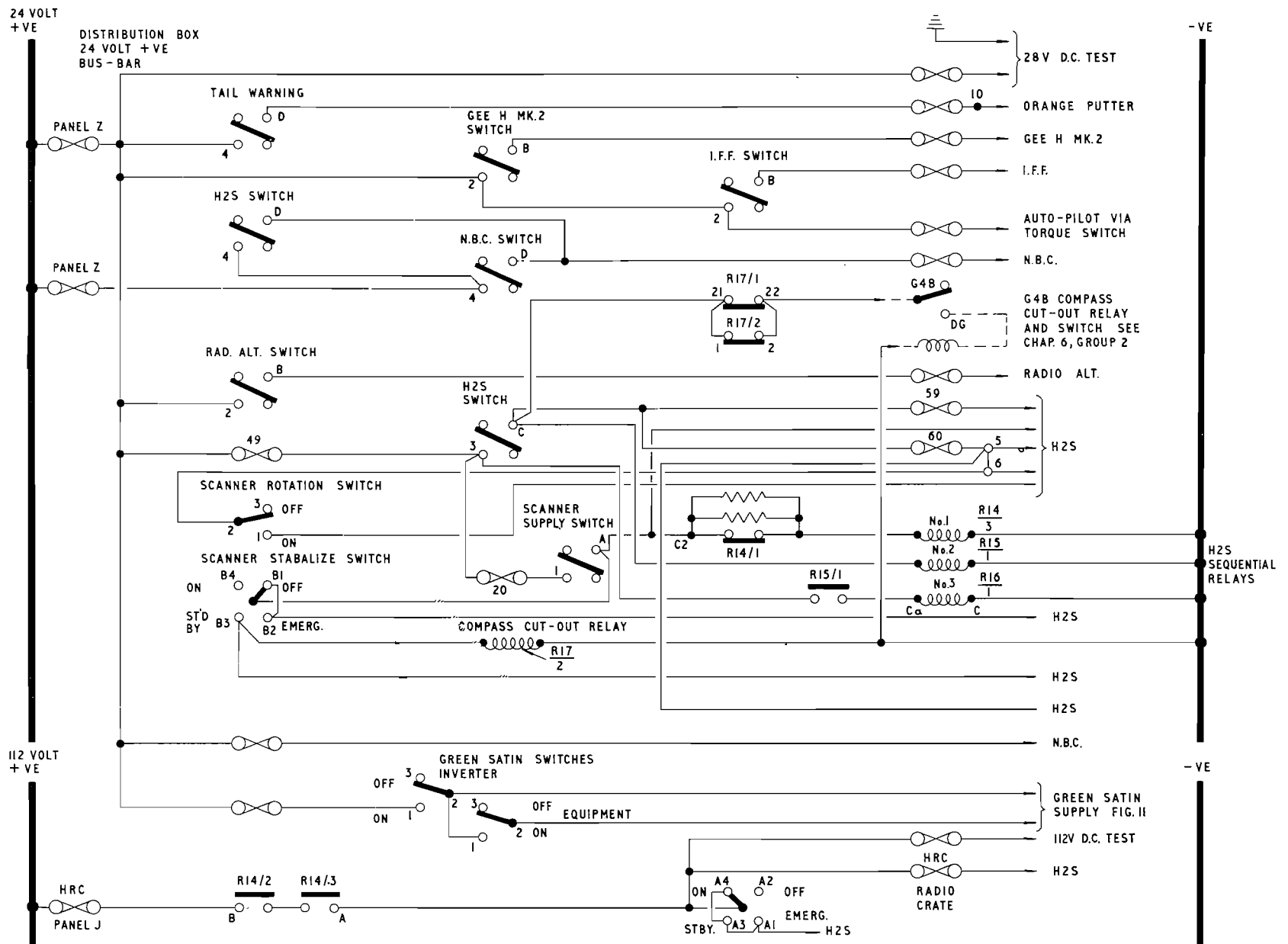


Fig. 7A. D.C. Supplies (up to and including Mod. 2728) (power distribution box post Mod. 988)

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26. As the inverter runs-up, the starter relay R2 closes its contacts (R2/1) to short-circuit the starting resistance and allows the machine to run on full voltage. The a.c. and d.c. sections of the machine are regulated by control fields supplied from the control panel, Type 19, according to datum settings and feed-back signals from the a.c. output. The outputs, normal and special, are obtained via the control panel, Type 25.

A.R.I.5851 supply (post Mod. 2399)
(fig. 9)

27. The 400 c.p.s. supplies to the A.R.I.5851 or A.R.I.5871 equipment are obtained from a separate inverter, Type 153, with its own control panels, Types 19, CP19 and 25. The inverter is controlled by a switch on the power distribution box and the equipment is switched on separately by a switch adjacent to the inverter switch.

28. When the INVERTER switch is selected ON, a 28-volt supply from a fuse in the power distribution box is connected to the equipment switch and to the coil R2 of the magnetic relay, Type 9A. This relay closes its contact R2/1 to connect an economy resistance into its coil circuit and closes its main series connected contacts R2/2 and R2/3 to connect a 112-volt supply from panel J (port bus-bar panel) to the start unit and thence via a suppressor to the inverter d.c. armature and to the shunt field and regulator.

Note . . .

Mod. 2821 introduces a Type 153A inverter in lieu of the Type 153 and this has its shunt field winding positive connection brought out to a separate terminal. The shunt field is therefore connected to the supply as soon as the magnetic relay, Type 9A, closes its contacts R2/2 and R2/3.

29. As the inverter runs up, the start unit relay R3 closes its contact R3/1 to short-circuit the starting resistance and allows the machine to run on

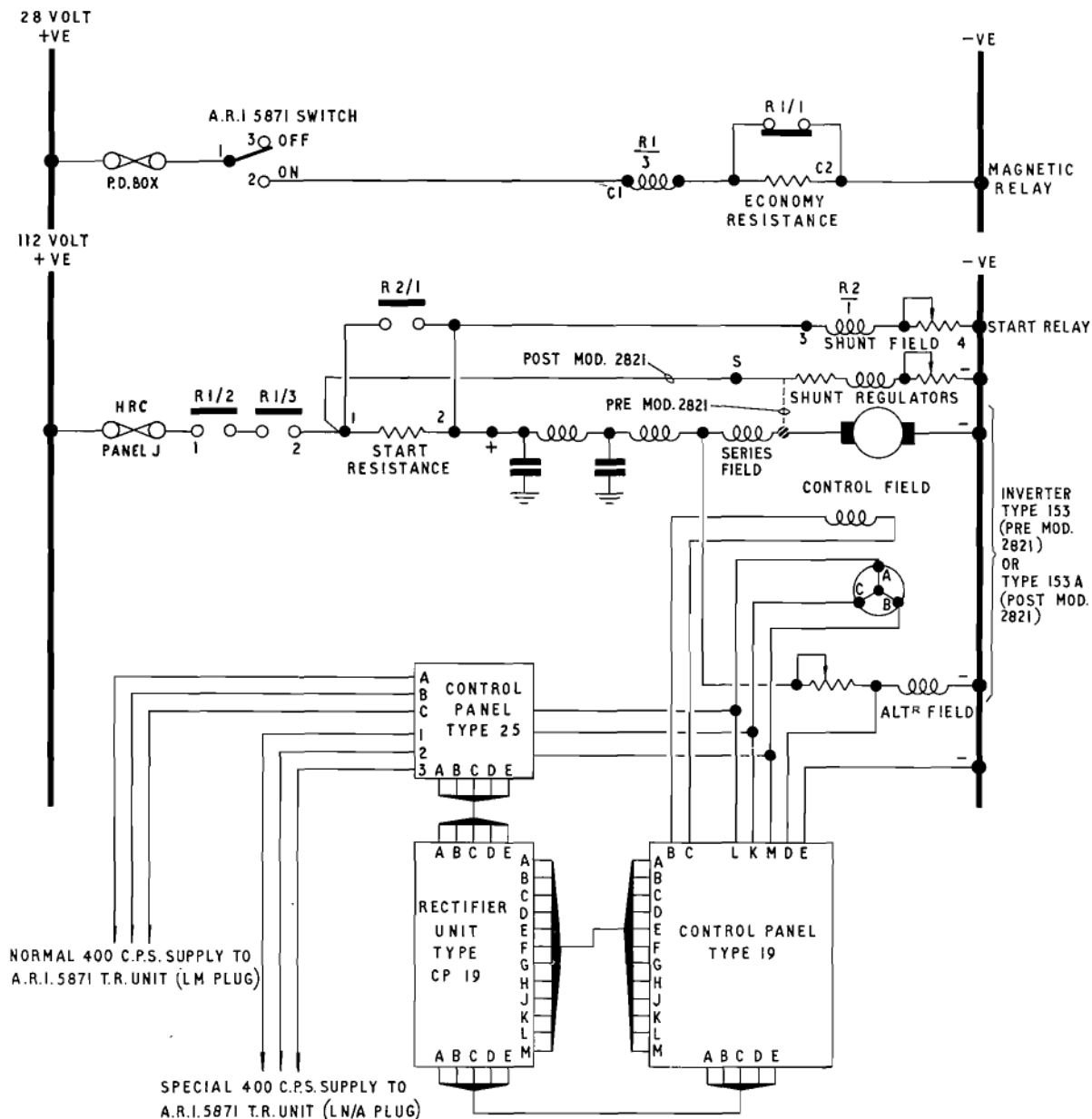


Fig. 8. A.R.I.5851 inverter Type 153 (pre-Mod. 2399)

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full voltage. The a.c. and d.c. sections of the machine are regulated by control fields supplied from the control panel, Type 19, according to datum settings and feedback signals from the a.c. output.

30. The a.c. output circuits cannot be connected to the equipment by selecting the equipment switch to ON unless the inverter has been selected ON, nor can the equipment be switched off by the equipment switch alone, the inverter switch must be switched off as well. When the equipment switch is selected ON and held, the 28-volt supply from the power distribution box via the inverter switch at ON is connected to the coil R1 of the equipment relay, Type S2.

31. This relay closes its contact R1/1 to connect a hold-in supply to its coil from the inverter switch, enabling the equipment switch to be released, and closes its contacts R1/2 and R1/3 in the red and blue phase a.c. lines from the inverter via fuses to the control panel Type 25. From the control panel, two supplies (normal and special) are fed to the A.R.I.5851 or A.R.I.5871 equipment T.R. unit. The white phase of the normal supply only is earthed.

A.R.I.5922 and A.R.I.5924 supplies (Mod. 2796) (fig. 9A)

32. The 115-volt, 3-phase, 400 c.p.s. supplies for the Eureka-Rebecca equipment introduced by Mods. 2741 and 2742 are obtained from a Type 153A inverter fitted in the rear servicing bay. The rectifier unit (CP19) and control panel, Type 19, which provide voltage and frequency control, are fitted adjacent to the inverter. Control is by a NORMAL ON/OFF/EMERG. ON switch fitted to the radio crate at the A.E.O.'s station.

33. When the control switch at the A.E.O.'s position is placed to the NORMAL ON position (up), a 28-volt supply from fuse No. 57 in panel G energises coil R1 of the magnetic switch, Type 9A, No. 4. Contacts R1/1 open and insert an economy resistance into the coil circuit, and series contacts

R1/2 and R1/3 close to connect a 112-volt d.c. supply from an H.R.C. fuse on panel J through the resistance in the start relay, Type 1A, No. 4, to the input +ve terminal of the inverter. At the same time, the inverter d.c. shunt field is fully energized by the 112-volt supply. As the inverter speed increases, coil R3 of the start relay magnetic switch is energized, causing contacts R3/1 to close and by-pass the resistance thus applying full voltage to the inverter.

34. The a.c. output and frequency are controlled by a control panel Type 19, and a rectifier unit, CP19. Output feed-back voltage is fed to a transducer circuit, rectified, and then used to regulate the inverter d.c. field strength, and consequently speed and frequency. Voltage is controlled by a balanced bridge network which varies a.c. voltage output by controlling the alternator field strength. A.C. output is fed to the Eureka-Rebecca fuse and relay box, situated near the Type 153A inverter.

35. A change-over Type S4 relay R2 mounted in the fusebox is normally de-energized, allowing the inverter Type 153A a.c. output to be fed via the relay contacts R2/1-4 and internal fuses to the A.R.I.5922 and A.R.I.5924 loads.

36. Inverter operation is monitored by a torque switch T1, in the fuse and relay box, connected across the output. Whilst the voltage and frequency are inside the prescribed limits, the torque switch contacts T1/1 will be closed to connect a supply from panel G to the green indicator lamp. If the inverter should fail, the torque switch controls T1/1 will open and the lamp will go out thus indicating the failure.

37. When the inverter control switch at the A.E.O.'s station is selected to EMERG. ON the magnetic switch Type 9A (R1) is de-energized, and the inverter (Type 153A), if operating, will consequently stop. The change-over relay Type S4 (R2) in the Eureka-Rebecca fuse and relay box is energized by a supply from fuse No. 62 in panel G, via the double-

pole inverter control switch. The relay contacts R2/1-4 change over and connect an alternative a.c. supply from No. 3 radar inverter, Type 350, via relay No. 5 in the power distribution box to the Eureka-Rebecca equipments, via the fuses in the power distribution box.

Note . . .

Emergency supplies will be dependent on Type 350 inverter operation and will not be available if the No. 3 inverter has been switched to supply equipment consequent upon failure of either No. 1 or No. 2 inverter.

SERVICING

WARNING . . .

Voltagés in excess of 100 volts either a.c. or d.c. can be dangerous under certain circumstances. Personnel should therefore ensure that the electrical system is electrically safe before any servicing is attempted. Where it is essential that tests or adjustments are to be made with the electrical power switched on, the greatest care must be exercised.

Introduction

Note . . .

Whenever a 3-phase inverter is re-wired or an inverter is replaced, a check should be made to ascertain correct phase sequence. The sequence should be A.B.C. where A is red phase—lagging, B is white phase—earthed, and C is blue phase—leading.

38. Detailed descriptions of all the general tests to be applied to all aircraft electrical circuits can be found in the General Information group contained in this Book immediately after Section 5 marker card. Reference should be made to the relevant Air Publications for detailed information on the servicing of the items of equipment used in the system.

Instrument inverter

39. Remove the OUTPUT plug from the instrument inverter torque switch box, then select the instrument master switch ON and

Table 1. A.C. supplies

Inverter	Output	Supply	Stand-by supply
Instrument Type 100A	115-volts, 400 c.p.s., 3-phase	Artificial horizons (port only post Mod. 2218) G4B compass (pre-Mod. 2040) Jet pipe temperature fuel control (B/K Mk. 1 only) (pre-Mod. 2648) Oil pressure gauges (pre-Mod. 1350) Tanker panel H.D.U. control (K type aircraft) (pre-Mod. 2648 or 2649)	No. 2 or No. 3 radar inverter, Type 350
No. 1 radar Type 350	115-volts, 400 c.p.s., 3-phase and 115-volts, 1600 c.p.s., single-phase	Radio compass (post Mod. 1500) A.R.I.5810 G4B compass (post Mod. 2040) Alternative store control (T.O.F. calculator) E.L. fuzing Oil pressure gauges (post Mod. 1350) Automatic pilot (post Mod. 785) Jet pipe temperature fuel control (B Mk. 1; B/PR Mk. 1; B/K/PR Mk. 1) (B/K Mk. 1) (post Mod. 2648)	No. 3 radar inverter Type 350
No. 2 radar Type 350		Tanker panel H.D.U. control (K type aircraft) (post Mod. 2648) Camera sight (PR type aircraft) T4 bomb sight (post Mod. 1648) Auto-stabilizer (post Mod. 2252) Zero reader (post Mod. 2218) A.R.I.5380 (Radio altimeter) A.R.I.5829 (Gee H. Mk. 2) A.R.I.5800 (Orange putter) A.R.I.5848 (I.F.F.)	
No. 3 radar Type 350		Standby for Nos. 1 and 2 radar inverters Special services (M.W. and P.F. if fitted) A.R.I.5910 (B/K/PR Mk. 1 aircraft converted to P.R. role) Standby for Rebecca/Eureka inverter (post Mod. 2796)	
Special, Type 153 (pre-Mod. 2821) or 153A (post Mod. 2821)	115-volts, 400 c.p.s., 3-phase	A.R.I.5851 or A.R.I.5871	None
Rebecca/Eureka supplies inverter Type 153A (Mod. 2796)	115-volts, 400 c.p.s., 3-phase	A.R.I.5922 (Eureka Mk. 10) A.R.I.5924 (Rebecca Mk. 10)	No. 3 radar inverter Type 350

RESTRICTED

the No. 2 radar inverter switch to ON. Check that the instrument inverter supply failure warning lamp goes out. Check that output is 3-phase, 115-volts, 400 c.p.s. at the output socket on the torque switch box and trim if necessary.

40. Switch OFF the INSTRUMENT MASTER switch, remove fuse No. 119 from panel D (the control supply to the main relay) and re-select the instrument master switch ON. The failure warning lamp should stay on. Check the output is 3-phase, 115-volts, 400 c.p.s. at the OUTPUT socket on the torque switch box to prove that the torque switch circuits have operated and that the No. 2 radar inverter is switched on in lieu of the Type 100A.

41. Replace fuse No. 119 on panel D, the failure warning lamp should go out. Switch OFF No. 2 RADAR inverter and check that the output is correct at the output socket on the torque switch box; this proves that the Type 100A inverter will take over from the No. 2 radar inverter when the INSTRUMENT MASTER switch is selected ON.

42. Switch OFF the INSTRUMENT MASTER switch and reconnect the plug to the OUTPUT socket on the torque switch box.

Artificial horizon phase failure indicator and supply change-over switch (Mod. 2982)

43. (1) Switch on the instrument inverter (Type 100A) and Nos. 2 and 3 radar inverters (Type 350).
- (2) Check that the indicator indicates normal working conditions.
- (3) Switch off the instrument inverter, check that the indicator momentarily flickers and then shows normal working conditions.
- (4) Switch off No. 2 radar inverter, indicator should indicate supply failure.
- (5) Disconnect 100A or 350 INVERTER OUTPUT plug and socket on the instrument inverter torque switch box.

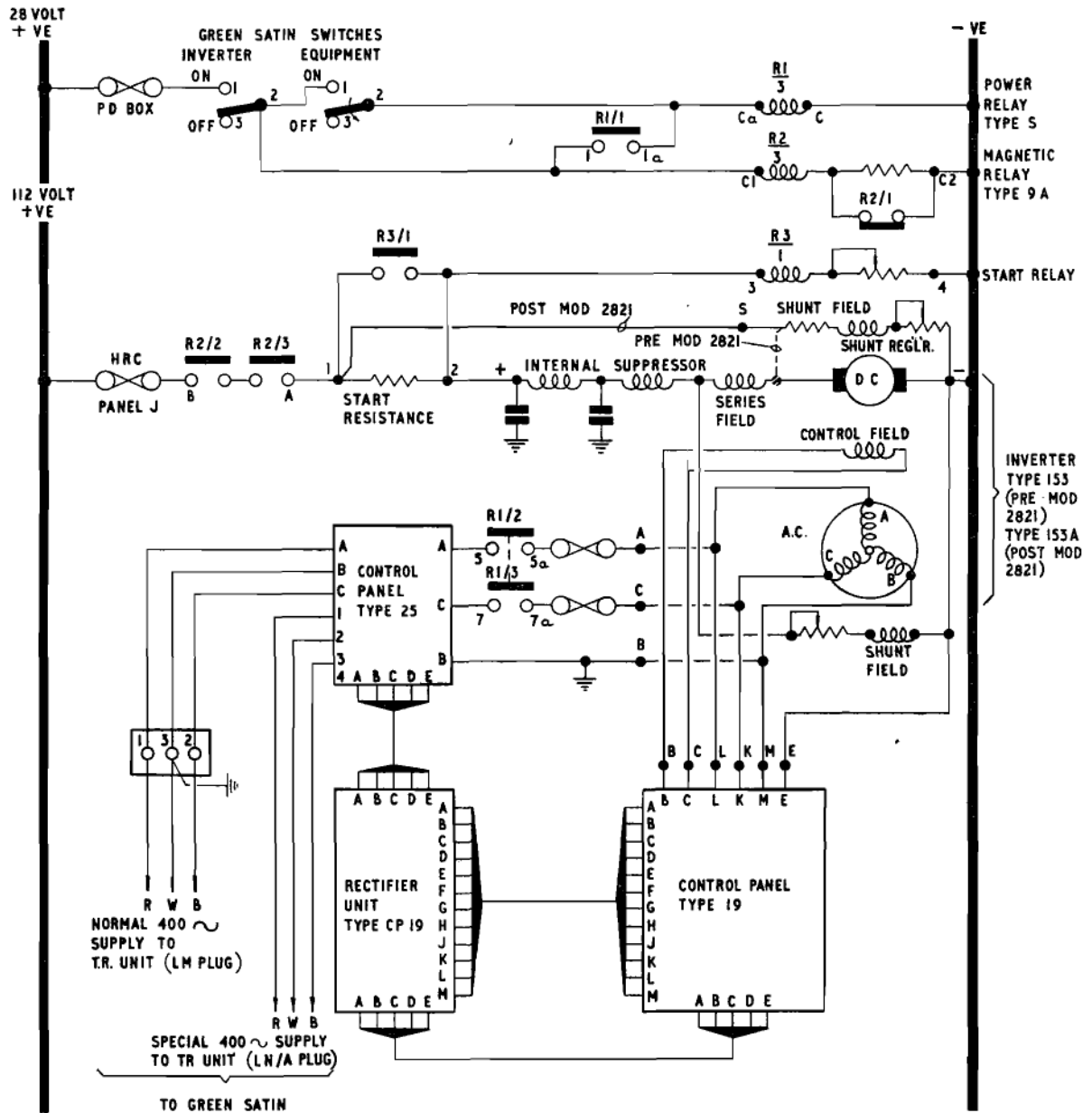


Fig. 9. A.R.I.5851 inverter Type 153 (post Mod. 2399)

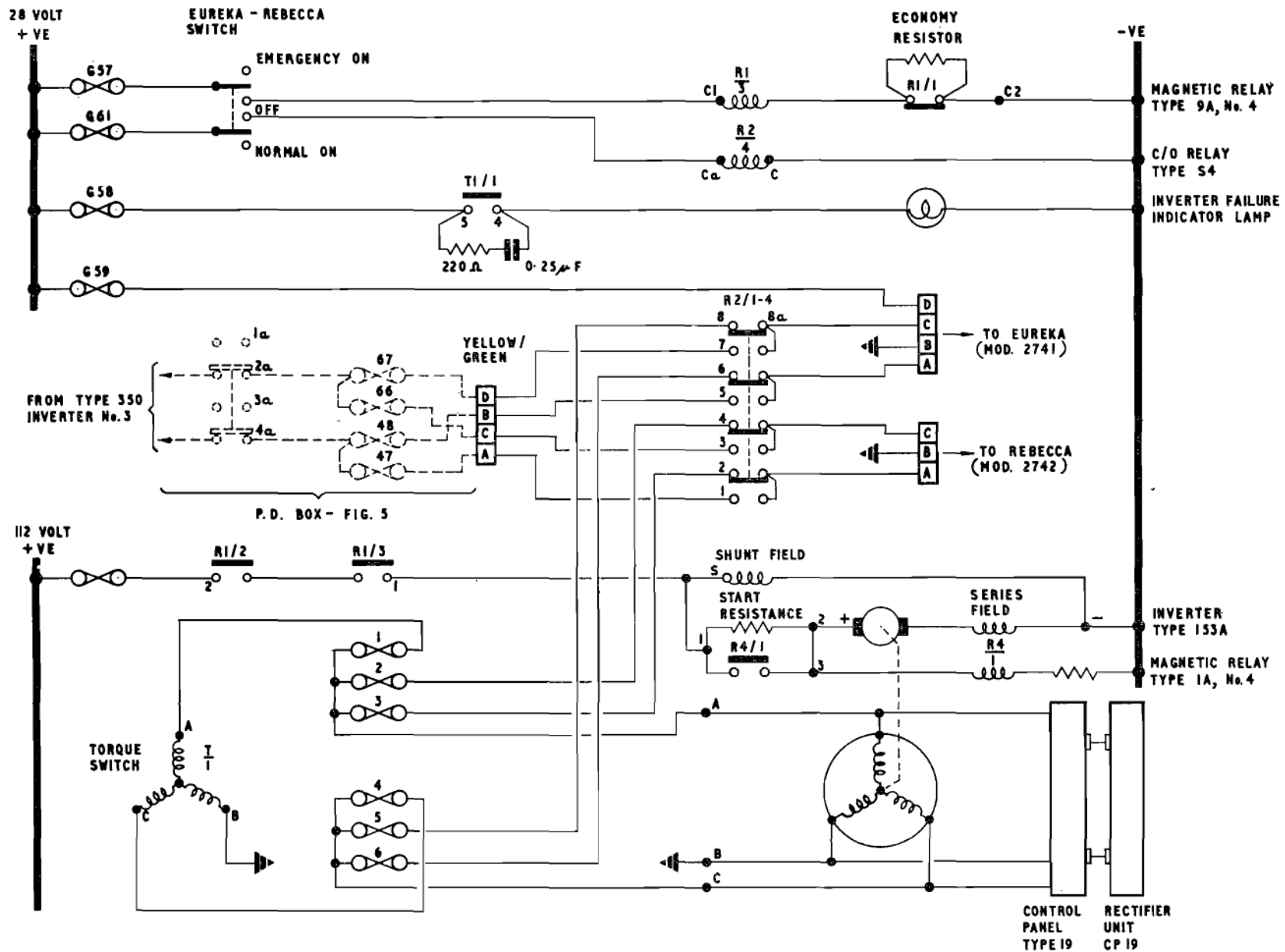


Fig. 9A. A.R.I.5922 and A.R.I.5924 inverter, Type 153A

RESTRICTED

(6) Switch radar inverter emergency switch to No. 2 fail, then select the ARTIFICIAL HORIZON SUPPLY CHANGE-OVER switch to EMERGENCY; the indicator should now indicate restoration of normal working conditions.

(7) Switch off No. 3 radar inverter and return the radar inverter emergency switch to its normal (central) position. Return the ARTIFICIAL HORIZON CHANGE-OVER switch to NORMAL.

(8) Reconnect the 100A or 350 INVERTER OUTPUT plug and socket on the instrument inverter torque switch box.

G4B Compass phase failure indicator (Mod. 2982)

44. (1) Switch on the No. 2 radar inverter, Type 350.

(2) Check that the indicator indicates normal working conditions.

Type 350 radar inverters

45. The setting of the output voltages at 115 volts (R.M.S.) and the frequency at 1600 c.p.s. should be checked when the control panel or inverter is newly installed. At regular intervals this should be carried out by the method described below.

46. Switch ON each inverter in turn, check that the associated green warning lamp comes on, and check the output and frequency at the test socket provided on the voltage trimmer panel.

47. The alternator voltages should be 115 volts (R.M.S.) at a frequency of 1600 c.p.s. (test socket pins D and E—earth). Correction, if necessary, should be made by adjustment of the control panel trimmers which are accessible from the front of the panel. Adjust the 1600 c.p.s. voltage trimmer first, then the frequency trimmer and then the 400 c.p.s. voltage trimmer.

48. The 1600 c.p.s. voltage should be measured on a thermal meter, Ref. No. 5Q/462, since the trimmer controls the R.M.S. value of the voltage. The frequency should be measured on a frequency meter, Type 5Q/181 and should be adjusted by the left-hand side adjusting spindle only of the variable reactor L2 on the front of the control panel, Type 16.

49. Adjustment of the 400 c.p.s. voltage is more readily made with the 400 c.p.s. on no-load, when the three line voltages will be normally balanced. If the 400 c.p.s. is loaded, it is necessary to measure all three line voltages and adjust the trimmer until the mean value of all three line voltages is correct (test socket pins A, B—earth C).

Emergency change-over switching

50. Select all three radar inverters ON, check that the respective green lamps come on. Select the emergency switch to No. 1 FAIL and check that No. 1 inverter warning lamp goes out. Select No. 1 inverter switch to OFF.

51. Select the EMERGENCY switch to No. 2 FAIL and check that No. 2 inverter warning lamp goes out. Select No. 2 and No. 3 inverter switches to OFF.

Power distribution box d.c. supplies

52. A test socket is provided on the voltage trimmer panel for the radio d.c. supplies. With both external power-supplies connected, check for 28-volts between pins A and B—earth. Switch the H2S switch ON and check for 112-volts between pins C and B—earth. Switch the H2S switch off.

A.R.I.5851 Inverter (pre-Mod. 2399)

53. Remove the five fuses from the fuse blocks on the inverter mounting structure, select the A.R.I.5851 switch to ON and check that the inverter is running satisfactorily. Check the voltage and frequency (115 volts, 3-phase, 400 c.p.s.) at the fuse blocks for

both the normal and special supplies, trim if necessary. Switch the inverter OFF and replace the fuses.

Note . . .

The white phase of the special supply MUST NOT be earthed.

A.R.I.5851 Inverter (post Mod. 2399)

54. Remove the 3-pin input connector to the control panel Type 25, select the INVERTER switch to ON and check that the inverter is running satisfactorily. Select the equipment switch to ON and check that the output, measured at the 3-pin plug is 115 volts, 3-phase, 400 c.p.s. (pin B—earth). Select the equipment switch to OFF and check that the supply is maintained. Select the inverter switch to OFF and re-connect the 3-pin plug.

A.R.I.5922 and A.R.I.5924 Inverter (Mod. 2796)

55. Remove all the fuses except Nos. 1 and 4 in the Eureka-Rebecca fuse and relay box, Select the inverter switch to NORMAL ON, and check that the inverter runs satisfactorily mechanically. Ensure that torque switch operation is correct (green indicator lamp comes on) and then check voltage and frequency (115-volts, 400 c.p.s.) at fuses No. 2 and 3 (phase A) and 5 and 6 (phase B) in the fuse and relay box.

Note . . .

Phase A and C are above earth potential and should not be earthed, phase B is earthed. If readings are incorrect, remove the swing panels, on the front of the control panel Type 19, and adjust as necessary.

56. Operate the inverter selector switch to EMERG. ON, and check that the 153A inverter stops. With No. 3 radar inverter, Type 350, operating, check that the correct supplies are available at plugs 2 and 3 on the Eureka-Rebecca fusebox. Return all switches to the OFF position, and replace all fuses and covers.

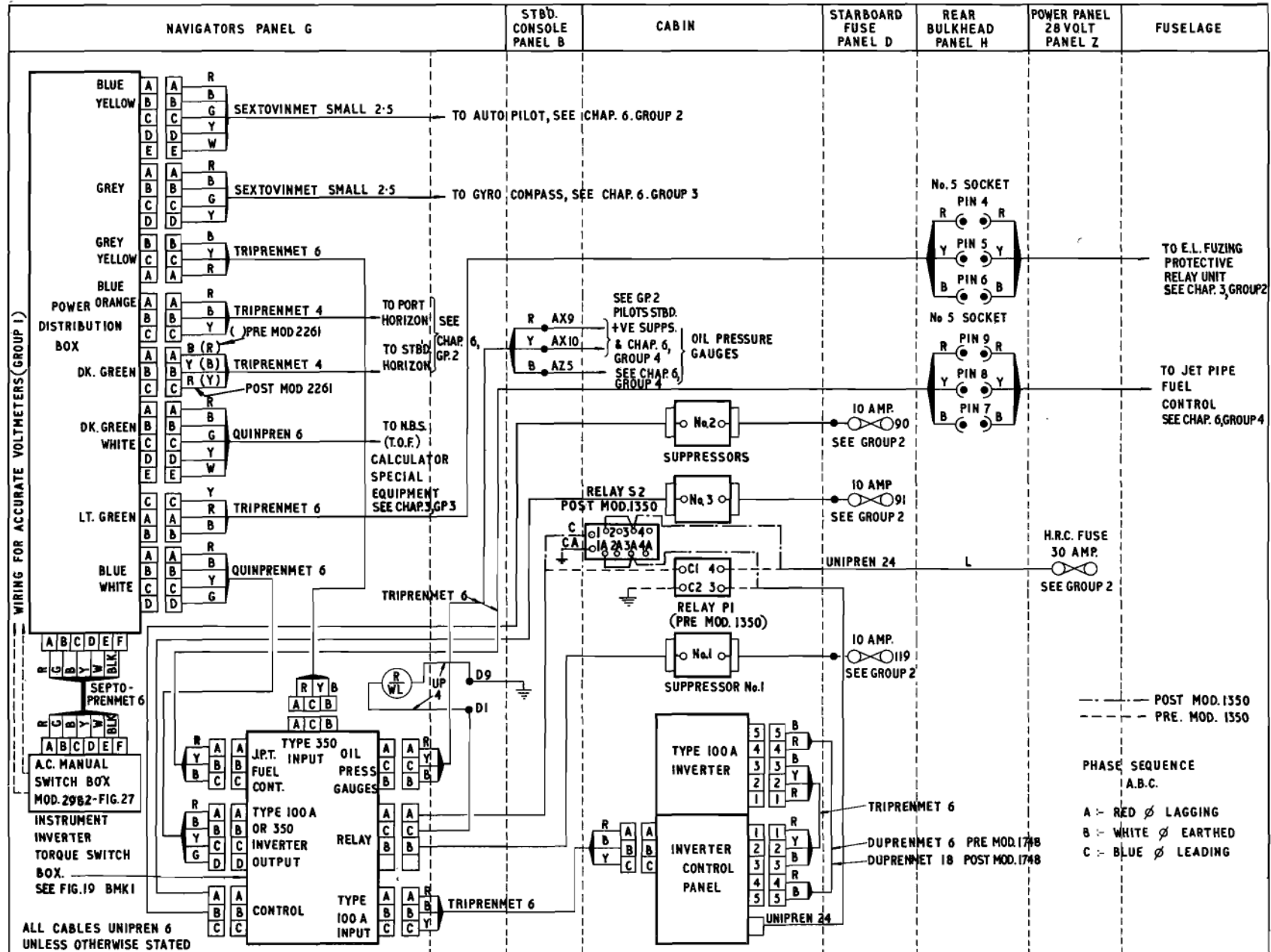


Fig. 10 A.C. Supplies to instruments (pre Mod 2648)

RESTRICTED

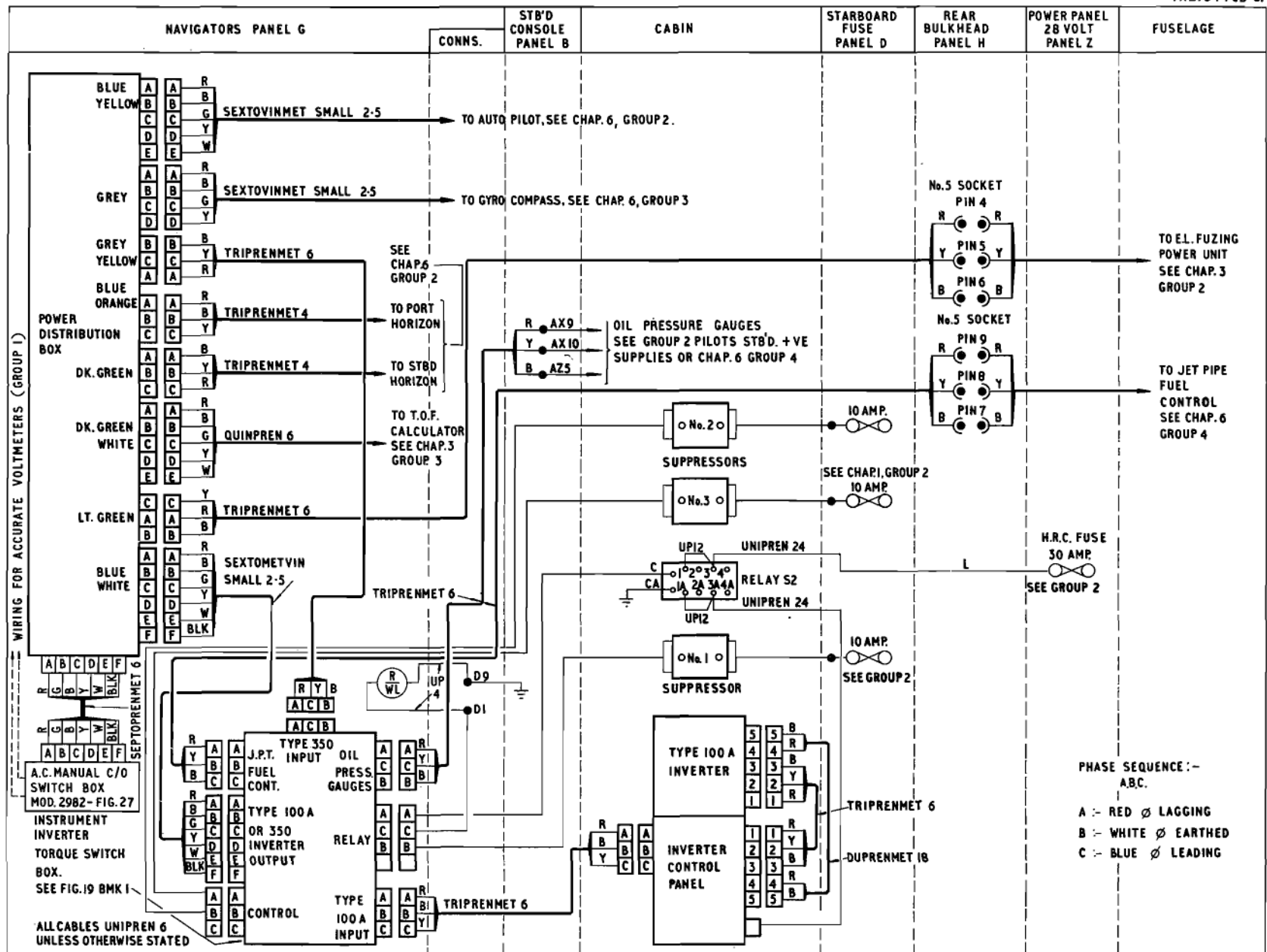


Fig. II A.C. supplies to instruments (post Mod. 2648)

RESTRICTED

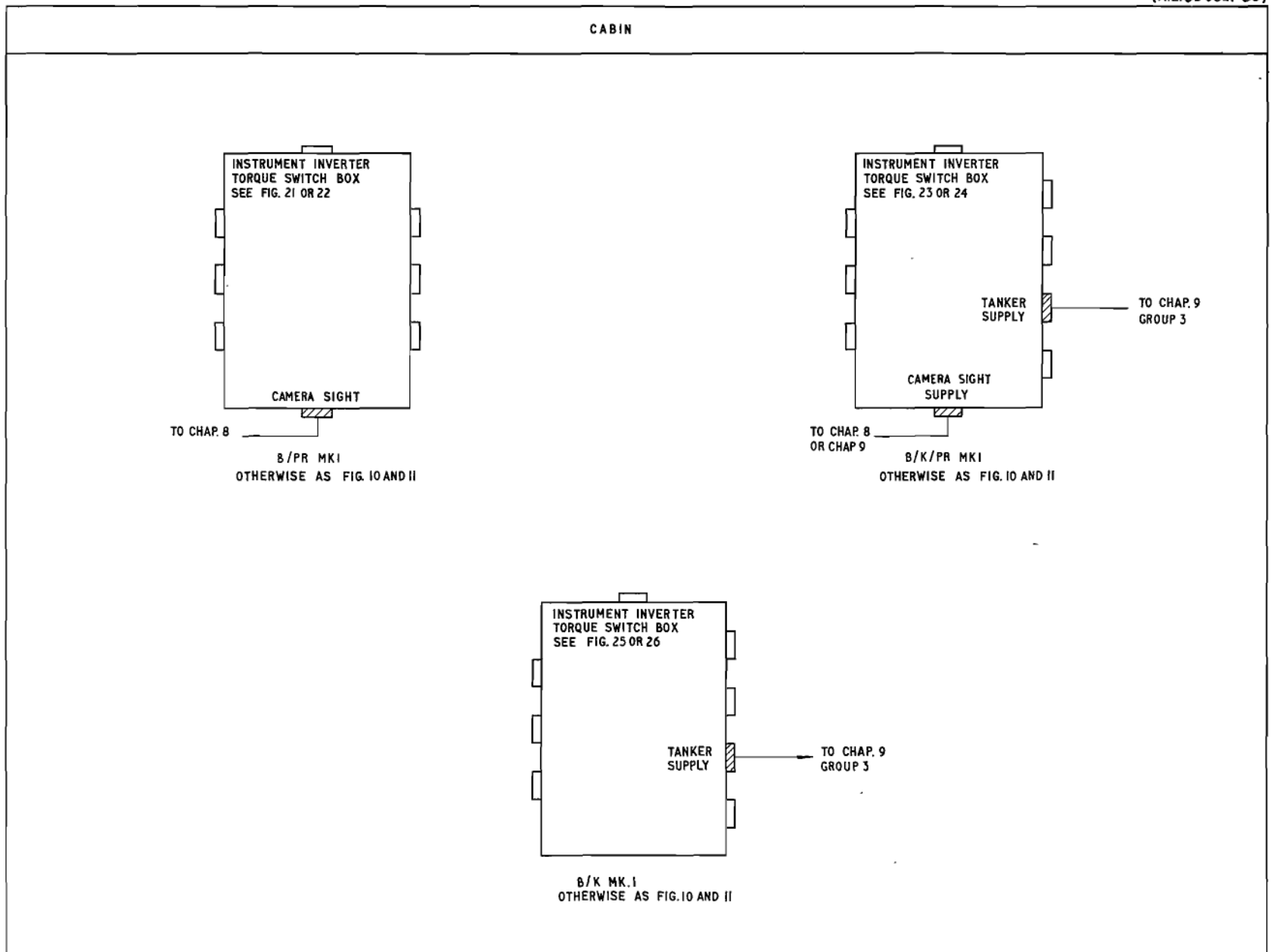


Fig. 13 P.R. and tanker a.c. supplies
RESTRICTED

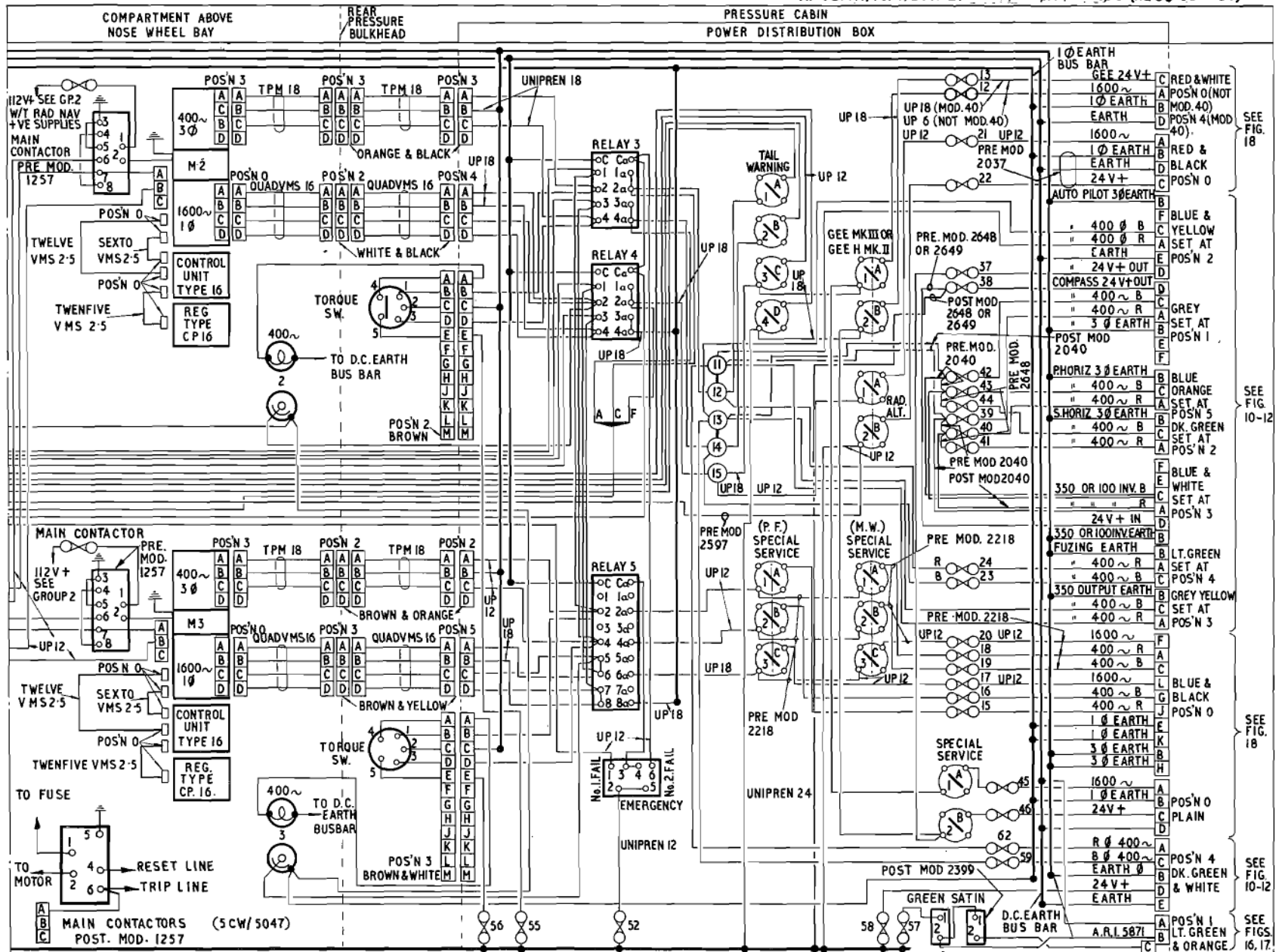


Fig 14 (2) Power distribution box and Type 350 Inverter supplies (pre Mod 988 & 2728)

RESTRICTED

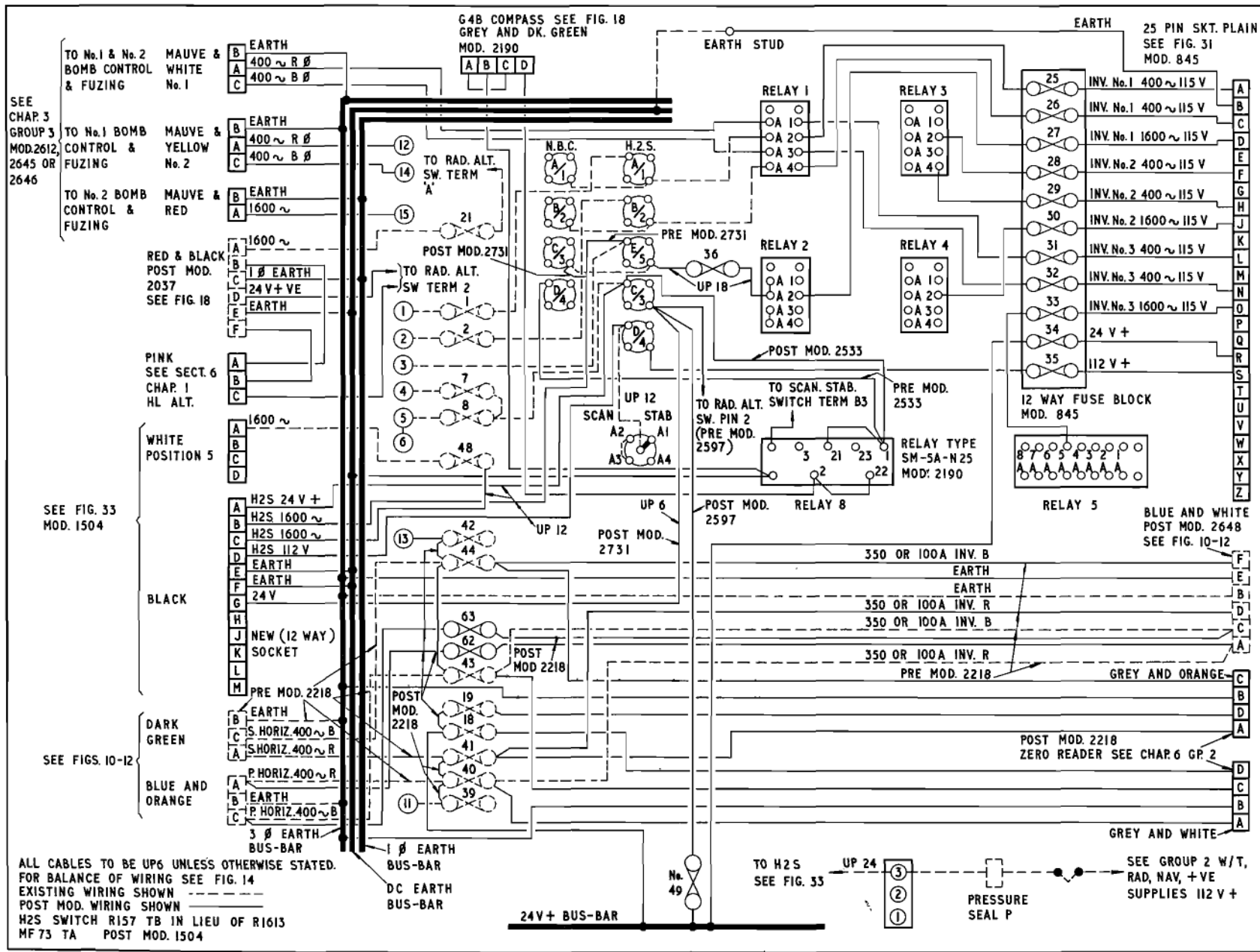


Fig. 15 Modifications to power distribution box (fig. 14)pre Mod 2728

RESTRICTED

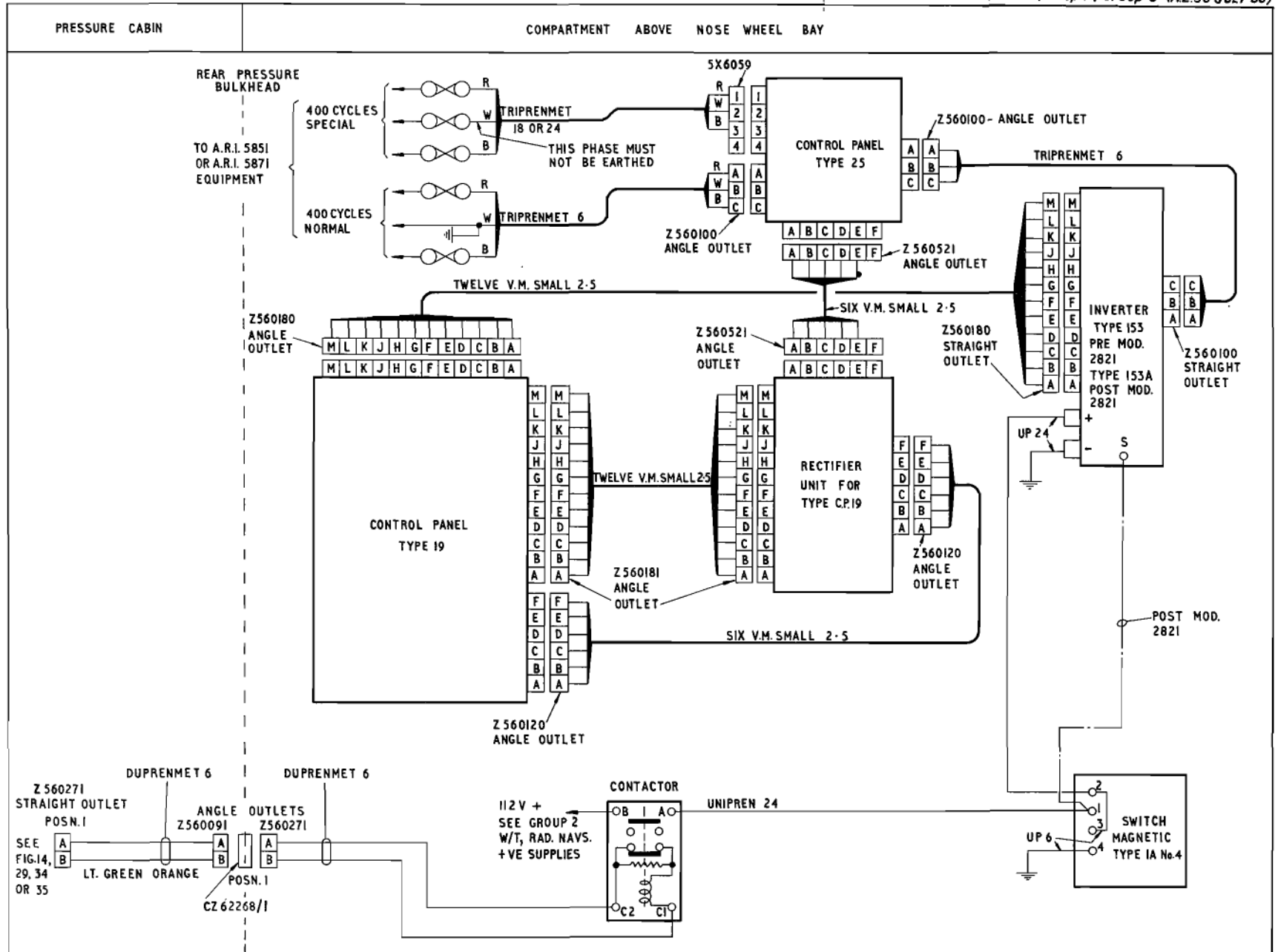


Fig. 16 Type 153 Inverter supplies to A.R.I. 5851 or A.R.I. 5871 (pre Mod 2399)

RESTRICTED

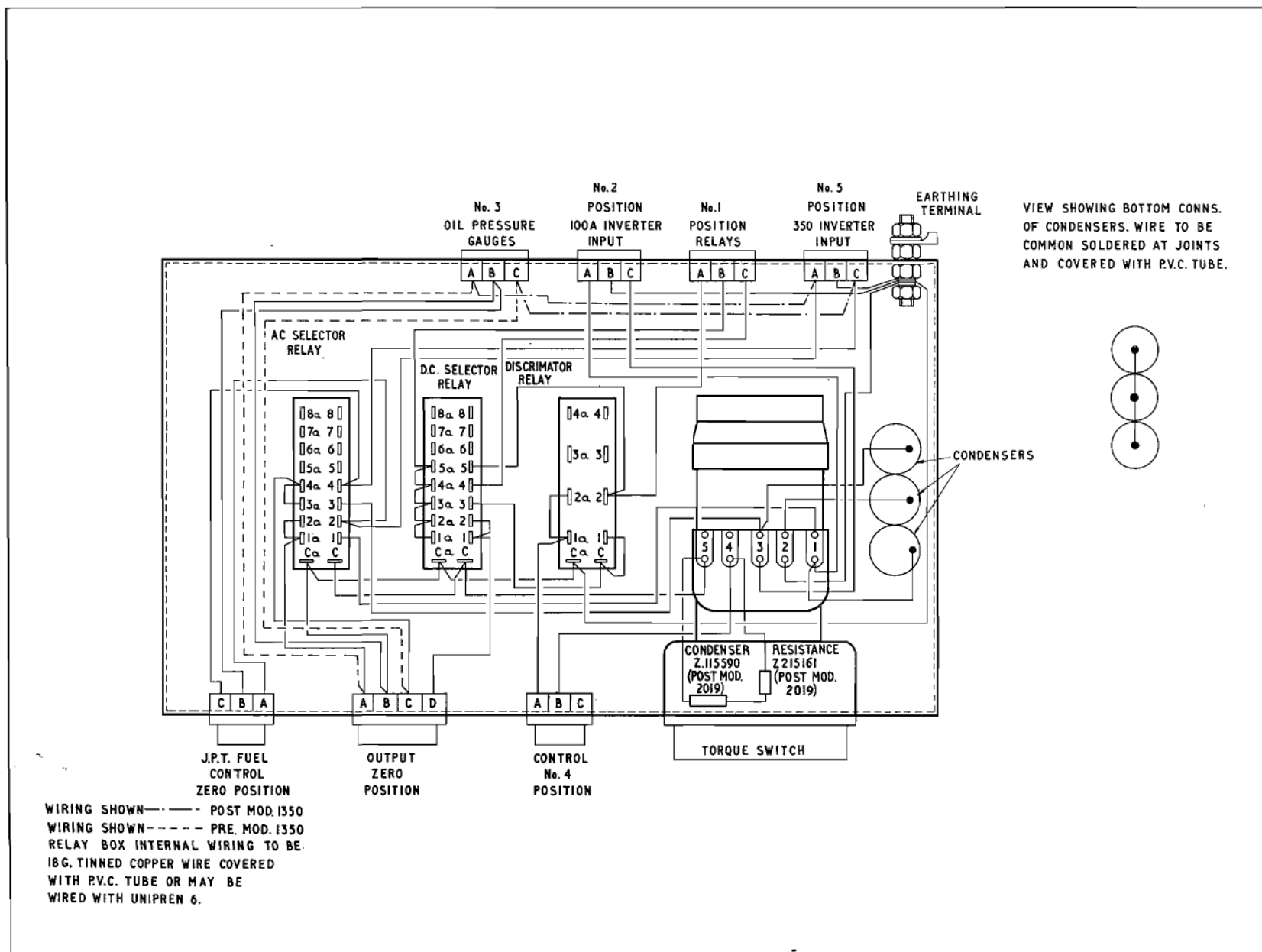


Fig. 19 Instrument inverter torque switch box (B MK I)(pre Mod.2648)

RESTRICTED

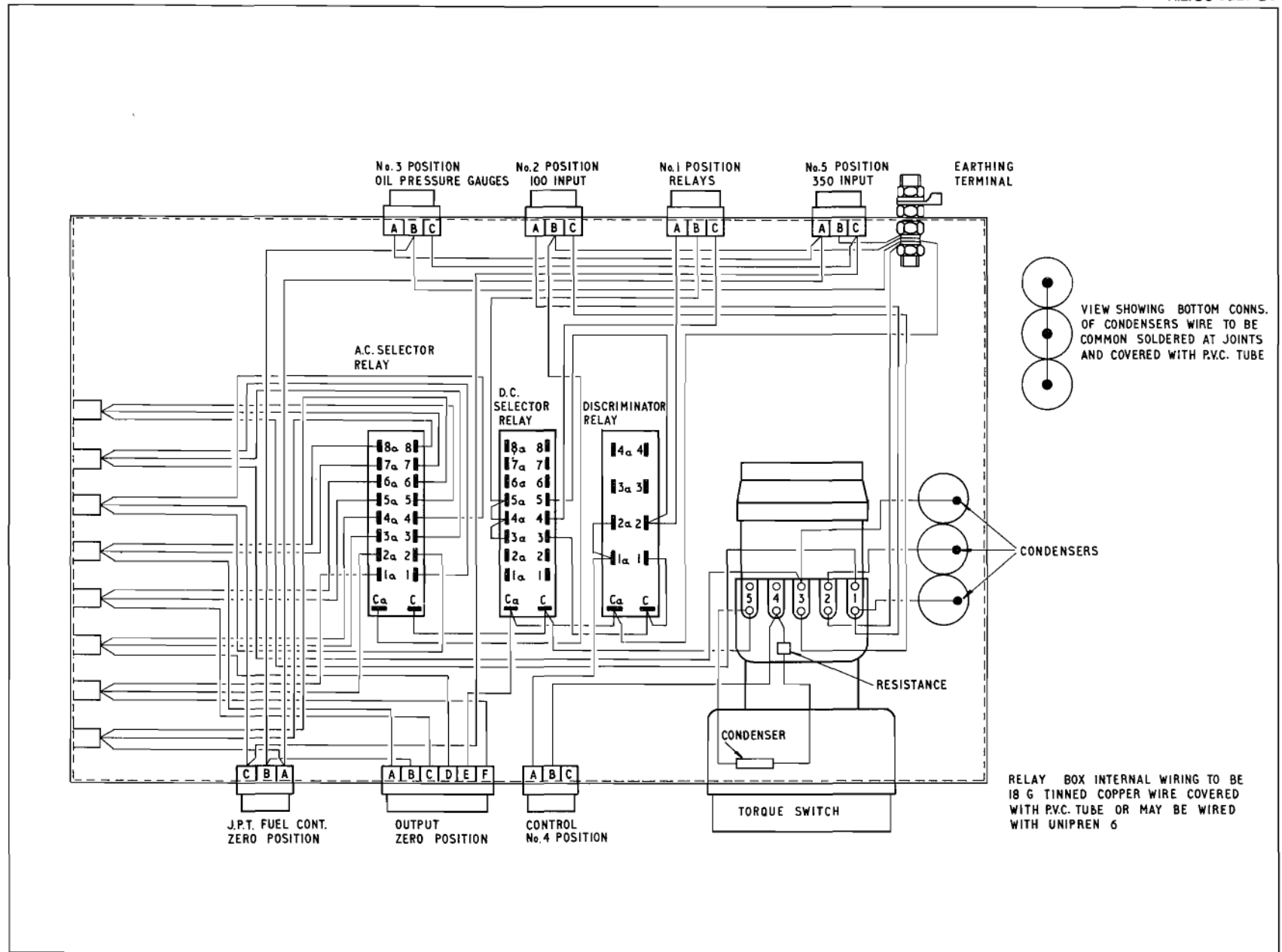


Fig. 20 Instrument inverter torque switch box (B. Mk.1) (post Mod. 2648)
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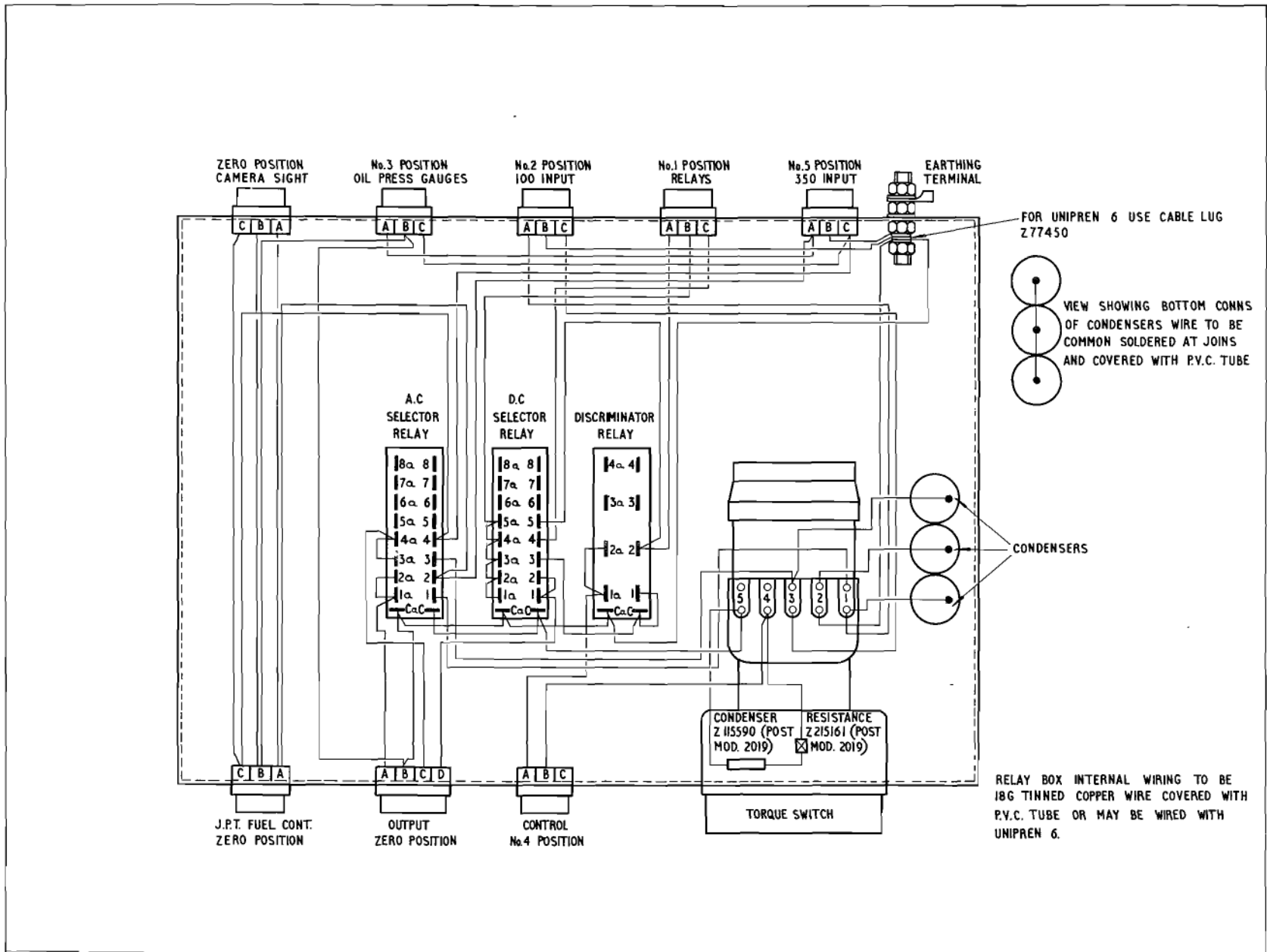


Fig. 21 Instrument inverter torque switch box (B/PR.MK.I)(pre Mod. 2648)
RESTRICTED

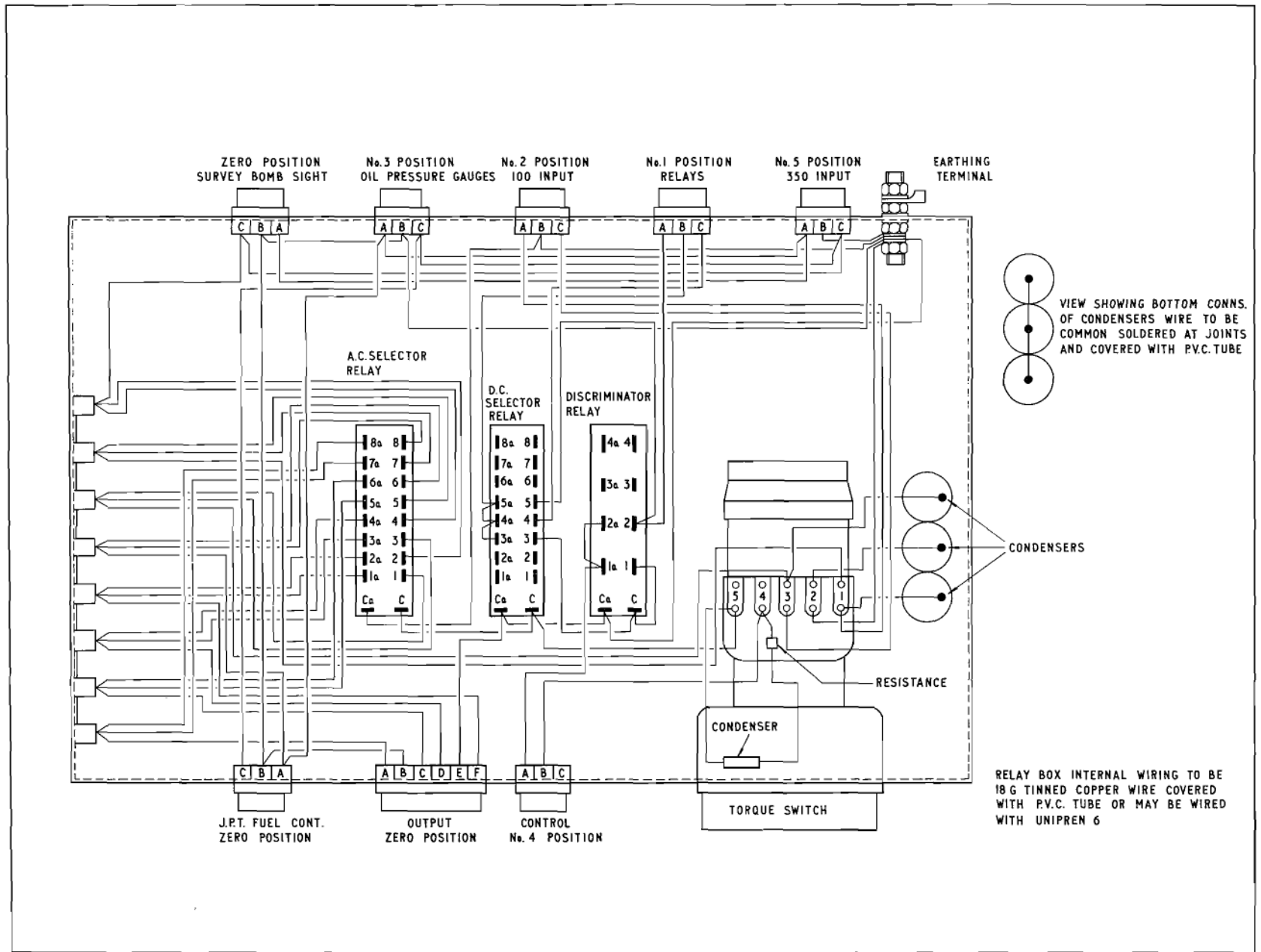


Fig. 22 Instrument inverter torque switch box (B/PR Mk.1) (post Mod. 2648)
RESTRICTED

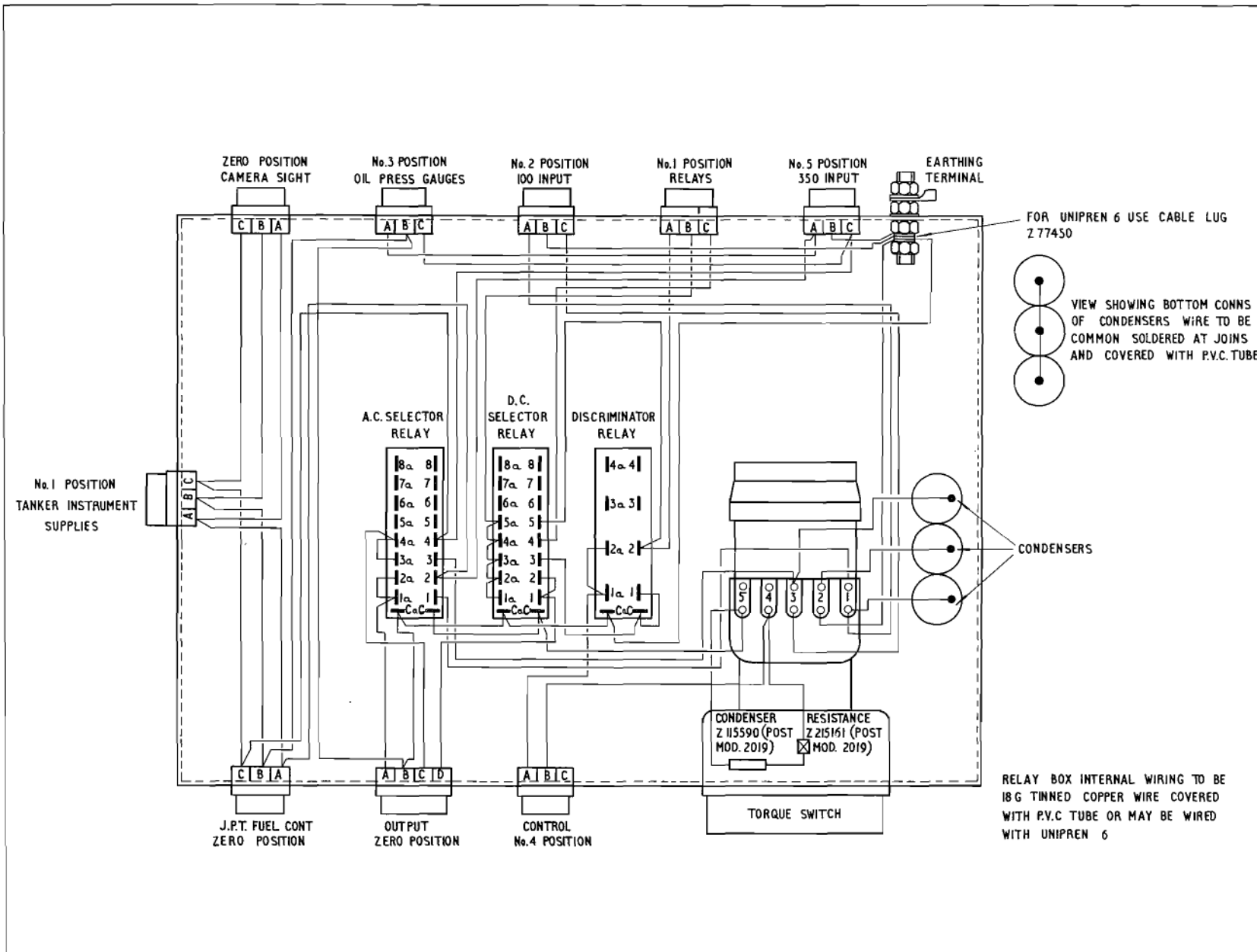


Fig. 23 Instrument inverter torque switch box (B/K/PR.MK.I)(pre Mod. 2648)
RESTRICTED

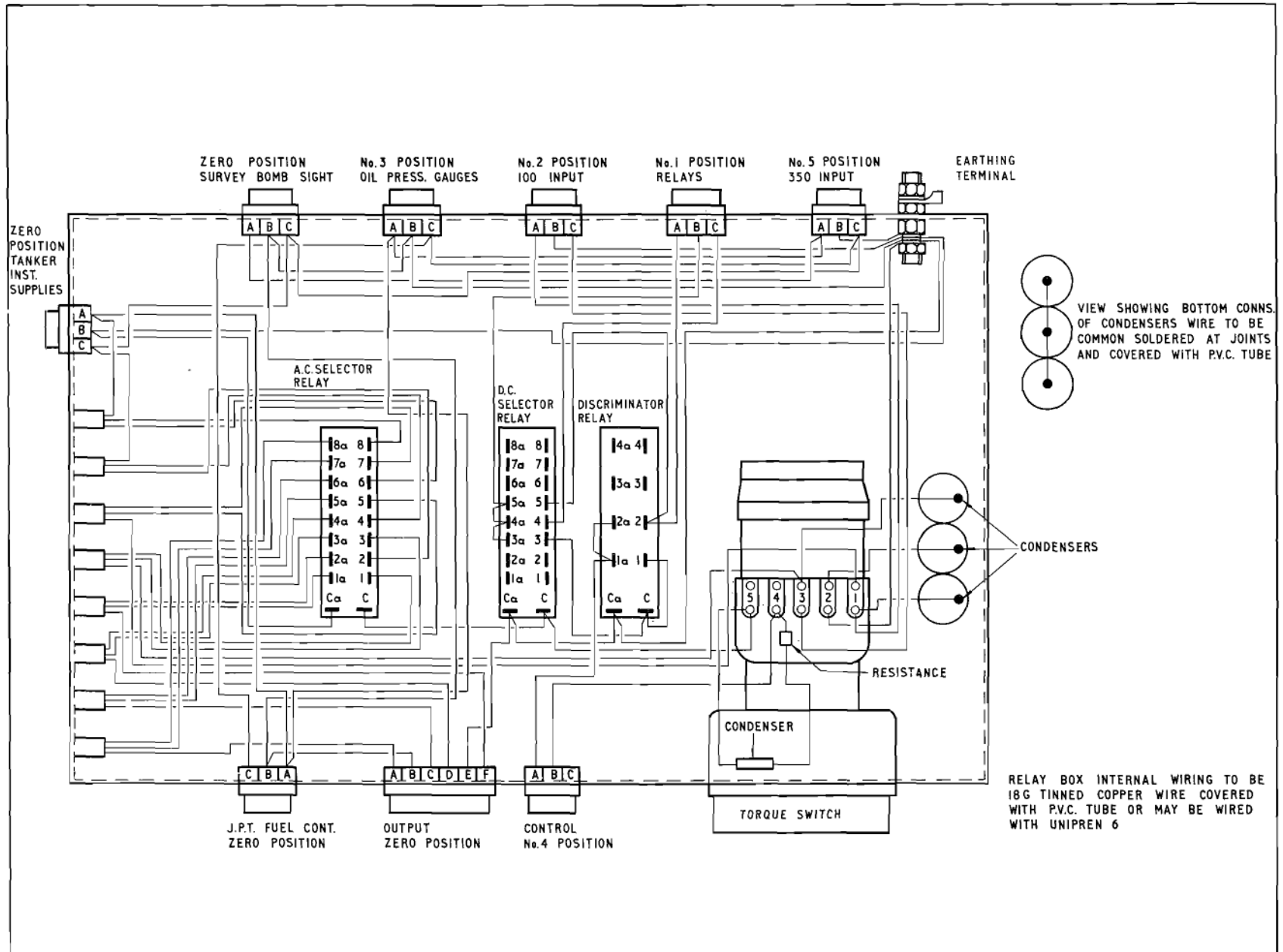


Fig. 24 Instrument inverter torque switch box (B/K/PR.Mk. 1) (post Mod. 2648)

RESTRICTED

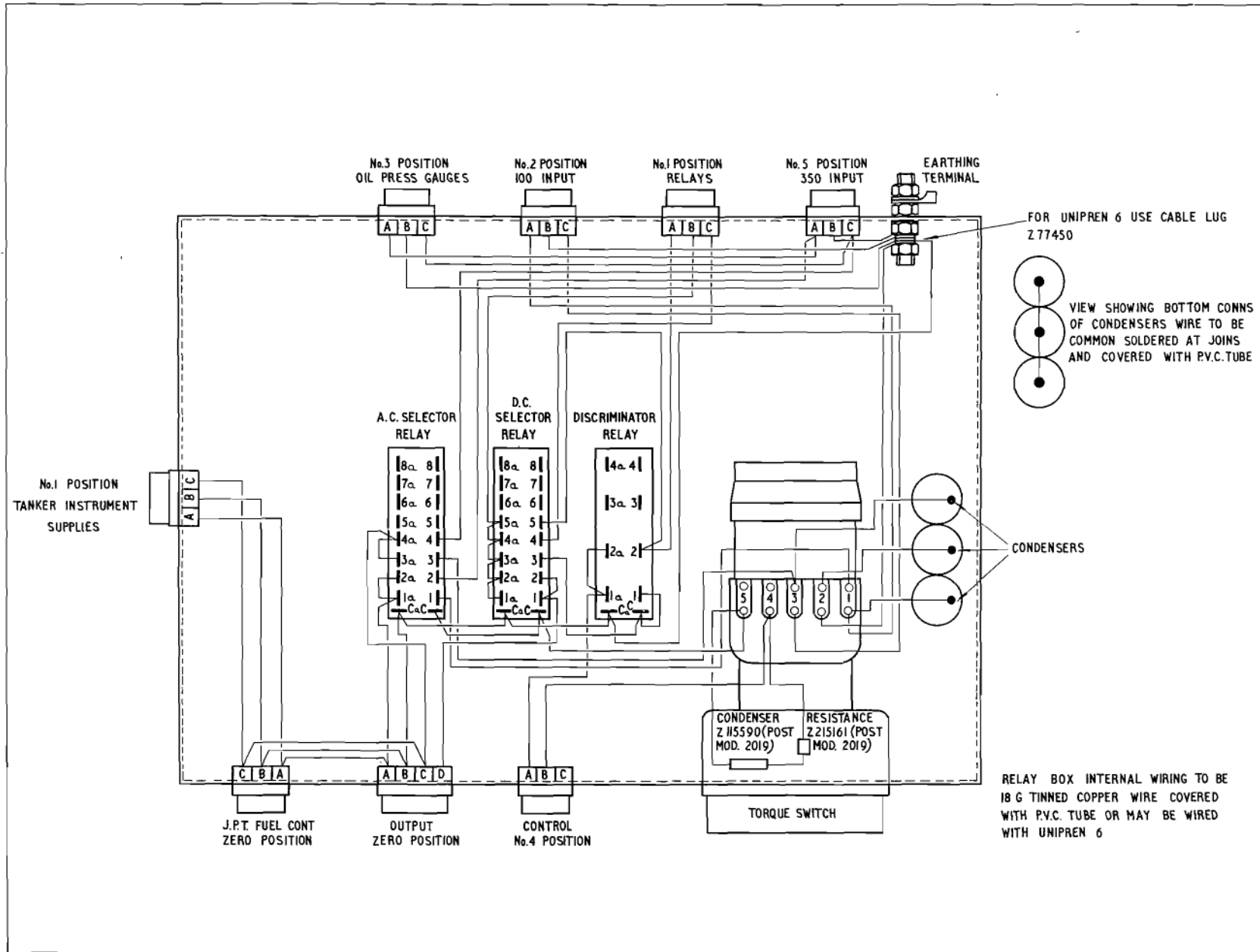


Fig. 25 Instrument inverter torque switch box (B/K MK.1) (pre Mod. 2648)
RESTRICTED.

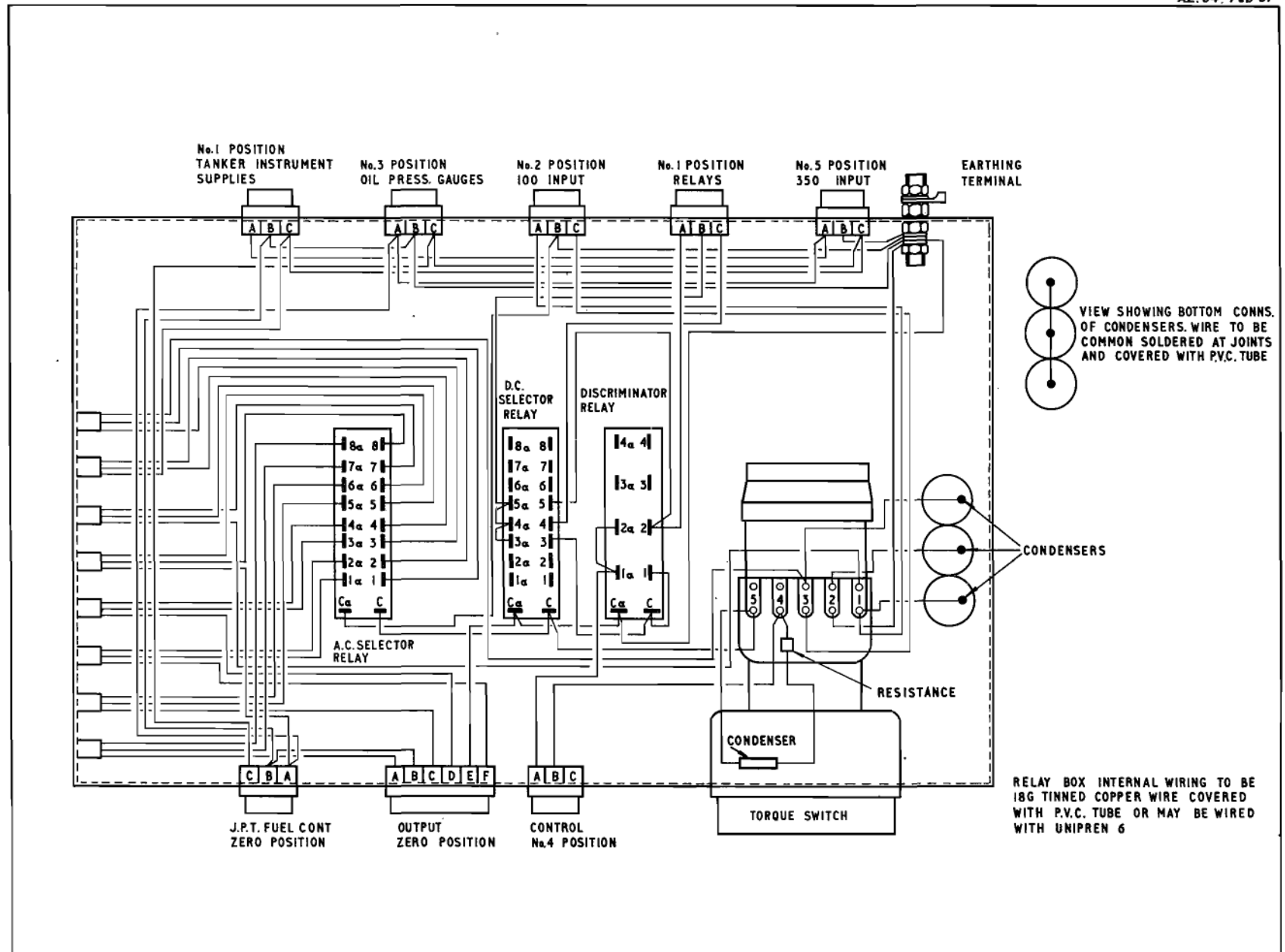


Fig.26 Instrument inverter torque switch box (B/K Mk.I) (post Mod. 2648)
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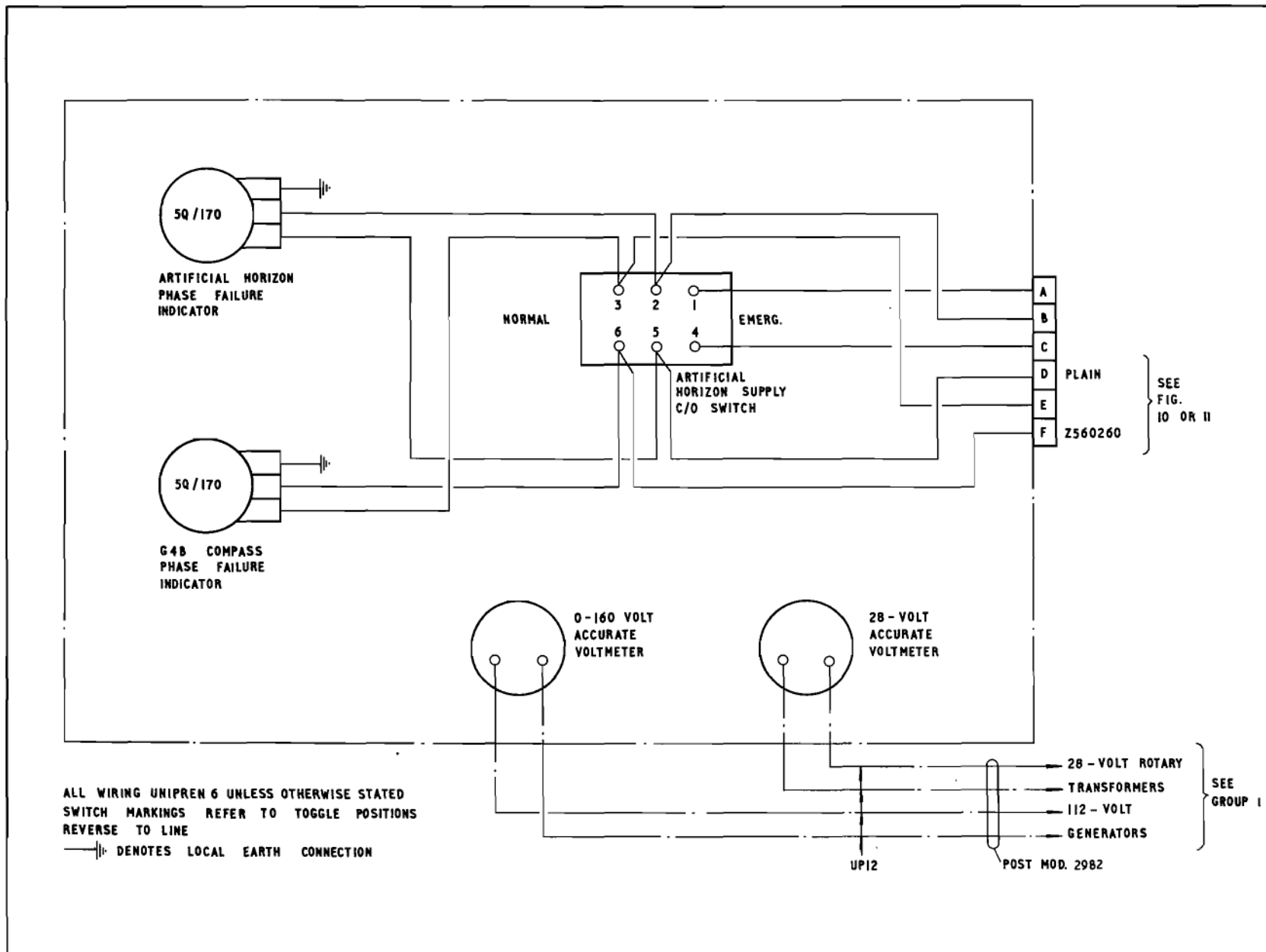


Fig. 27 A.C. Manual change-over switch box (Mod 2982)

RESTRICTED

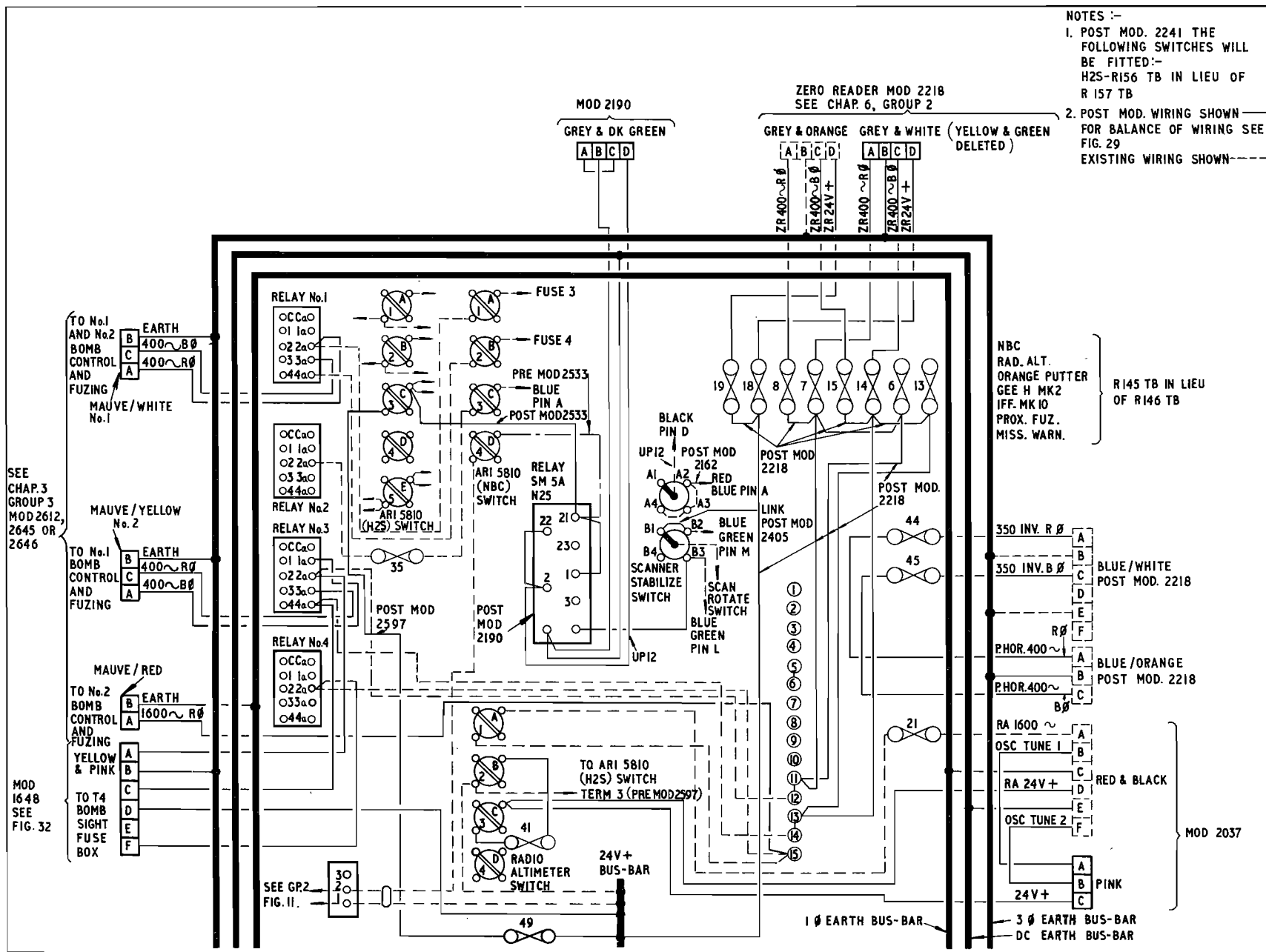


Fig. 30 Modifications to power distribution box (fig. 29) pre Mod. 2728

RESTRICTED

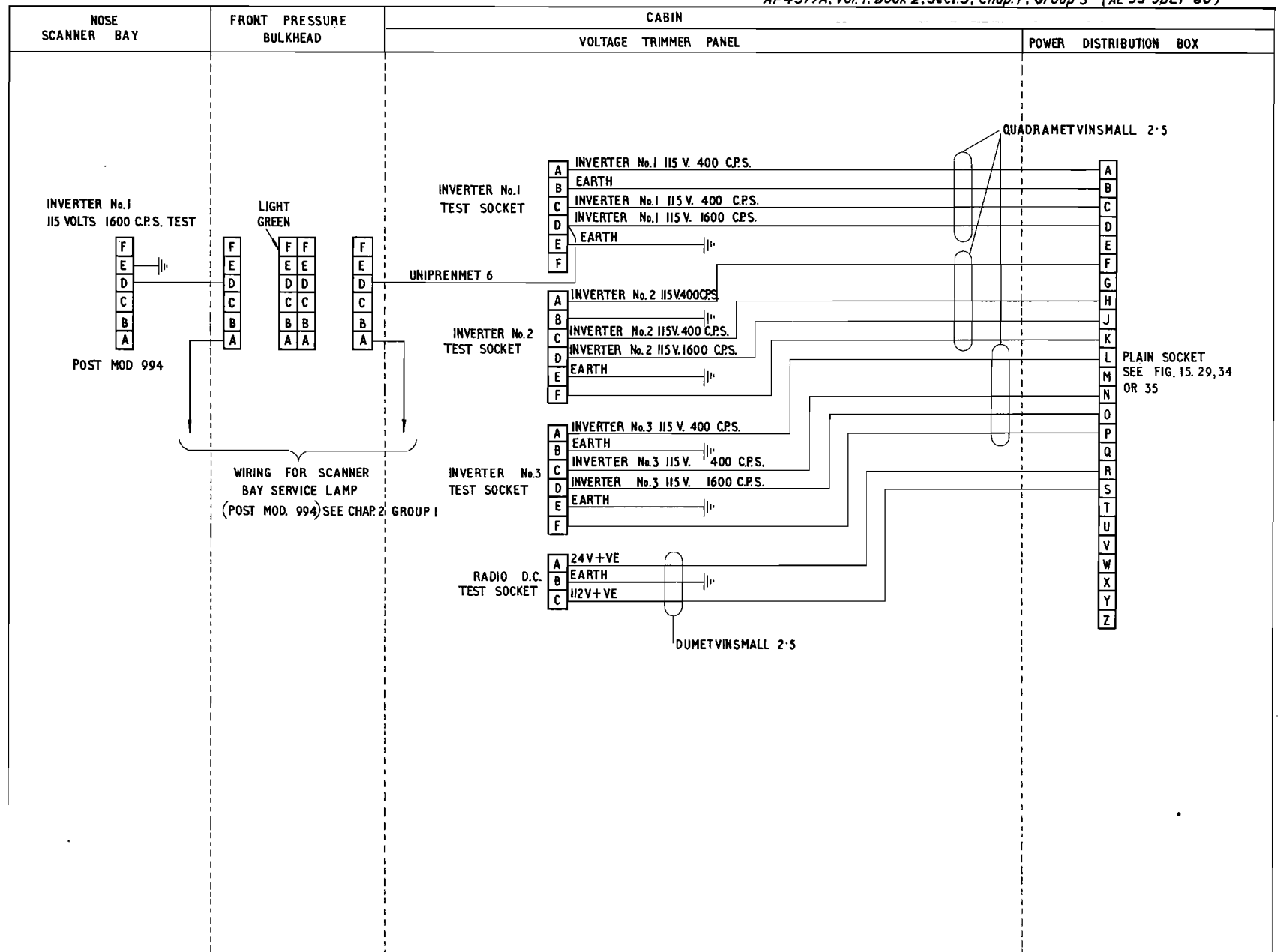
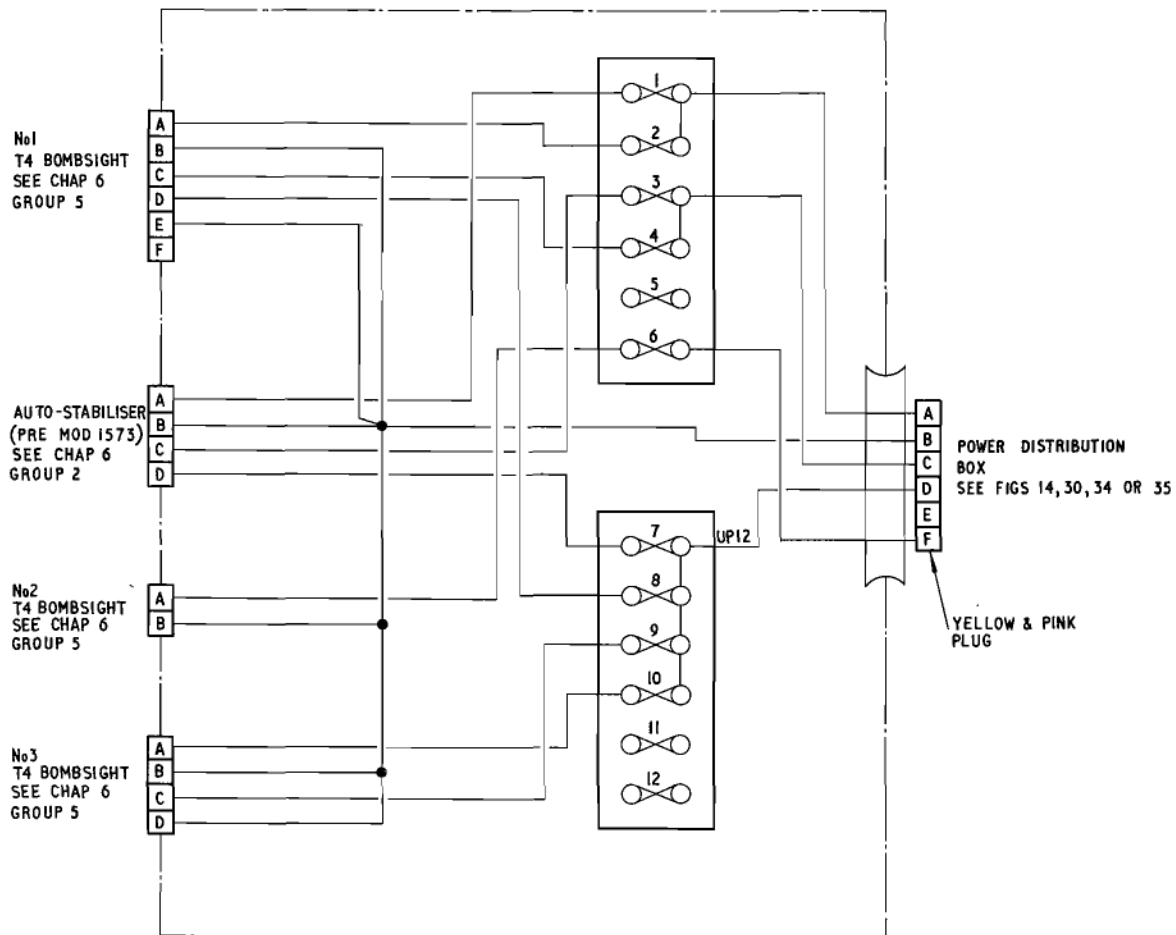


Fig. 31 Inverter test sockets (post Mod 988)

RESTRICTED



WIRING TO BE UNIPREN 6 UNLESS OTHERWISE STATED.
 EARTHS TO BE COMMONED UP TO STUD INSIDE FUSE BOX.
 TO BE WIRED IN CONJUNCTION WITH AC&DC TRANSFERS IN BOX.

Fig. 32 T4 Bomb sight fuse box (Mod 1648)
 RESTRICTED

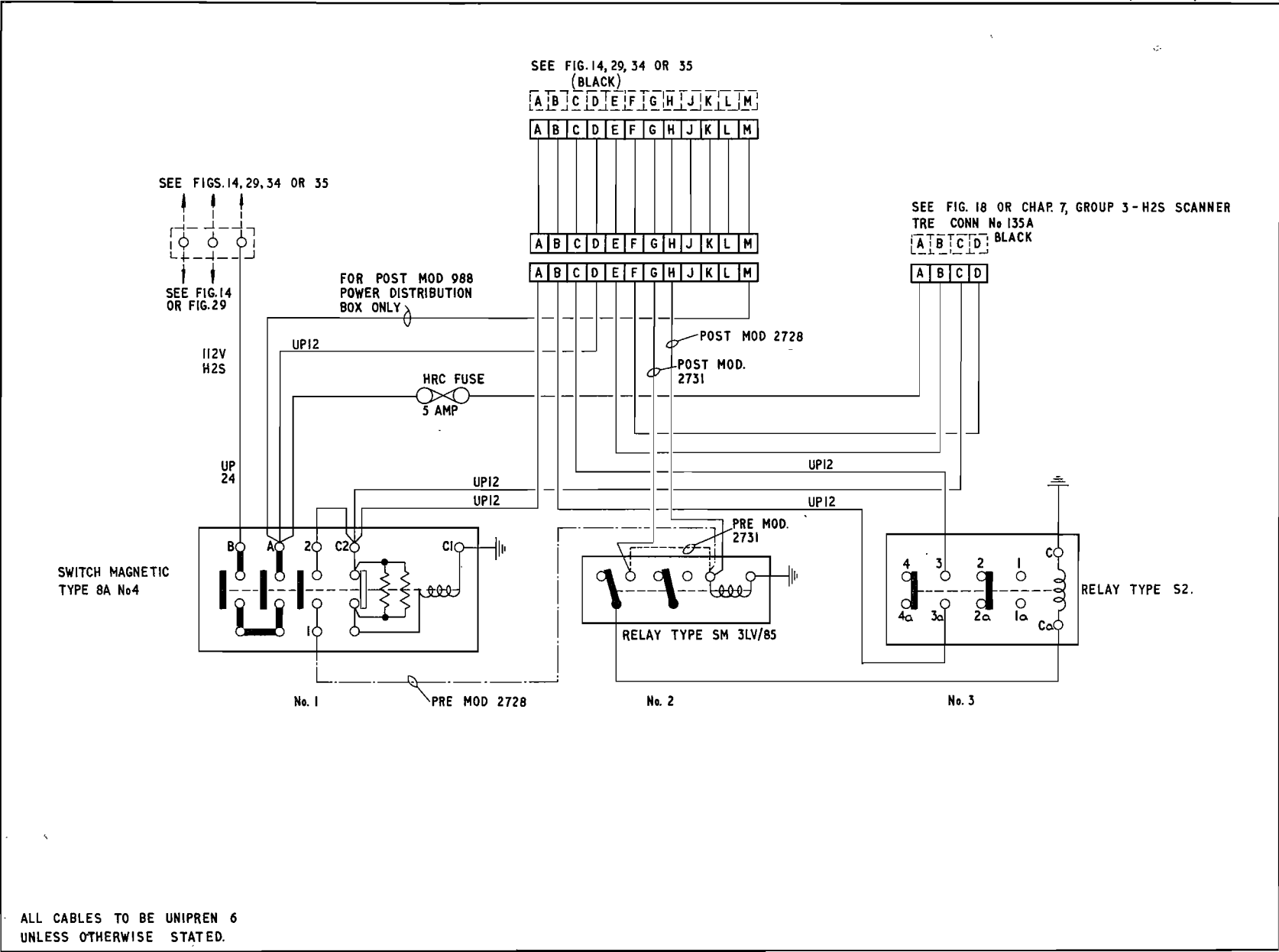
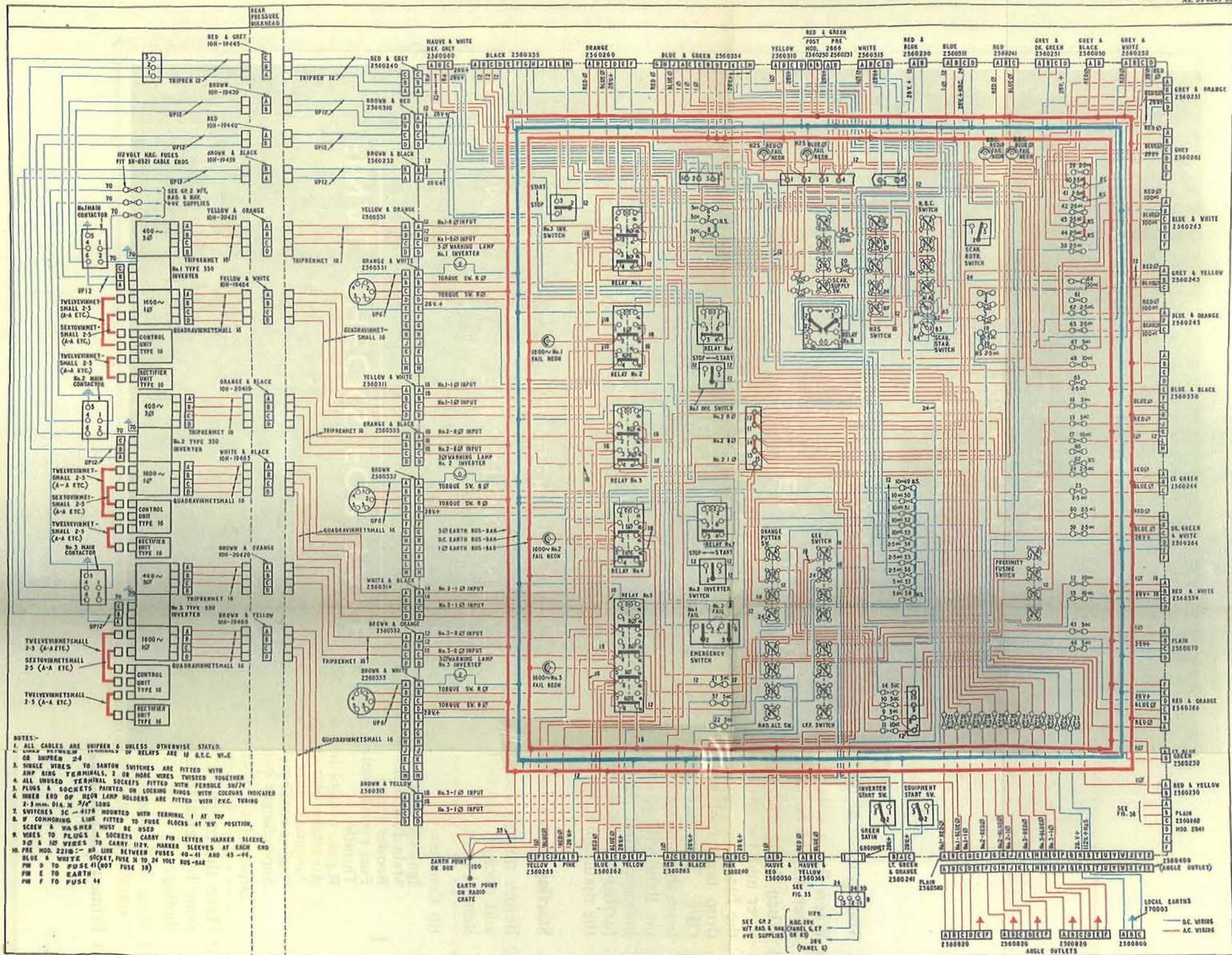


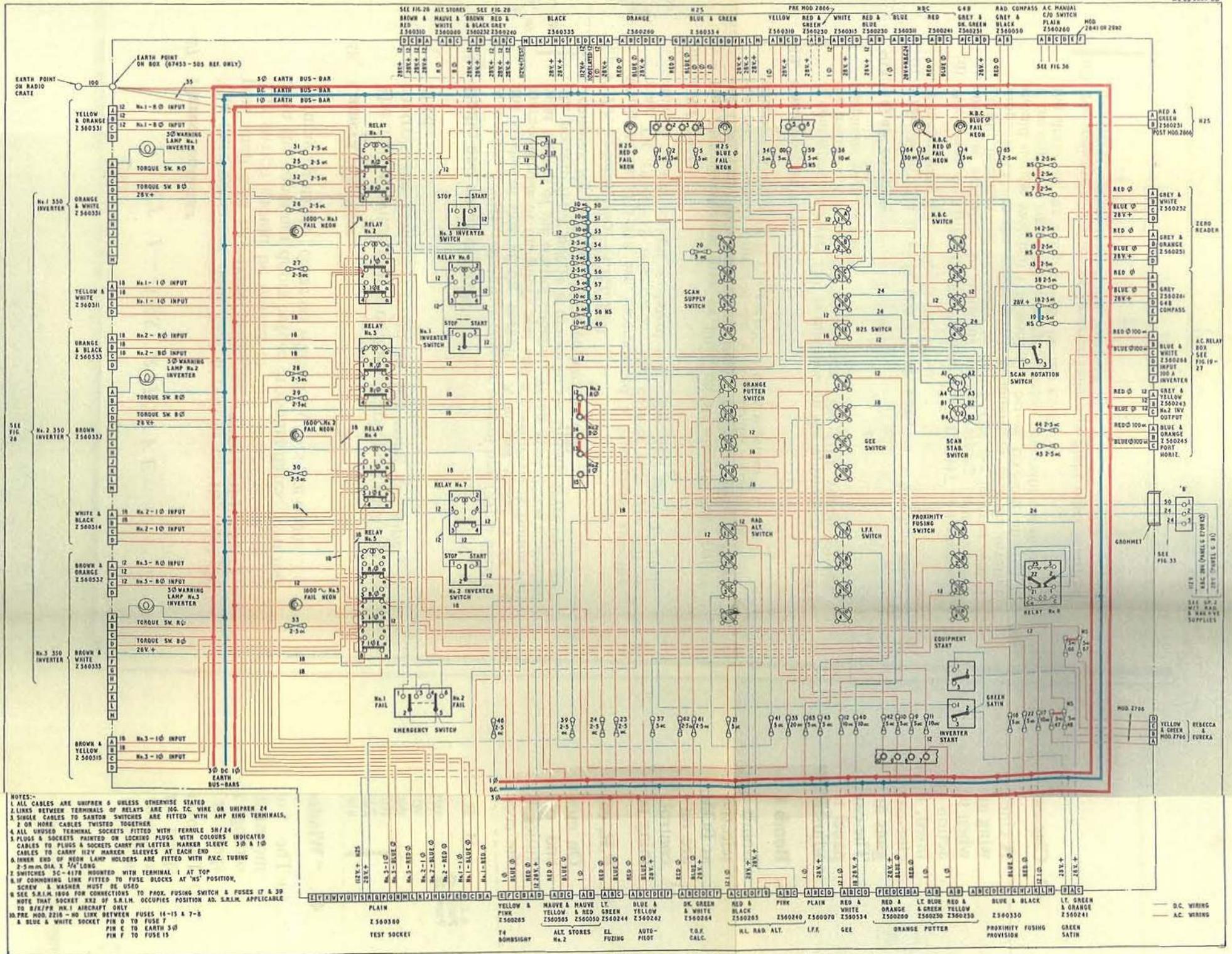
Fig. 33 H2S Sequential switching (Mod 1504)
RESTRICTED



- NOTES:-
1. ALL CABLES ARE TRIPREN 6 UNLESS OTHERWISE STATED.
 2. LINKS BETWEEN TERMINALS OF RELAYS ARE 18 G.C. WIRE OR TRIPREN 24.
 3. SINGLE WIRES TO SWITCHES ARE FITTED WITH ANP RING TERMINALS, 2 OR MORE WIRES TWISTED TOGETHER.
 4. ALL UNUSED TERMINAL SOCKETS FITTED WITH FLEXIBLE SHUTTER PLUGS & SOCKETS PAINTED ON LOCKING RINGS WITH COLOURS INDICATED.
 5. HORN LED ON HORN LAMP HOLDERS ARE FITTED WITH P.V.C. TUBING 2.5mm. DIA. X 3/4" LONG.
 6. SWITCHES SC-4178 MOUNTED WITH TERMINAL 1 AT TOP.
 7. IF CORNERING LINK FITTED TO FUSE ROCKS AT 'BV' POSITION, SCREW & WASHER MUST BE USED.
 8. WIRES TO PLUGS & SOCKETS CARRY PH LETTER MARKER SLEEVE, 3/8" & 1/2" WIRES TO CARRY 112V. MARKER SLEEVE MOD. 2218 - 50 LINK BETWEEN FUSES 40-41 AND 43-44.
 9. BLUE & WHITE SOCKET, FUSE 11 TO 24 VOLT BUS-BAR PH D TO FUSE 11 (NOT FUSE 13).
 10. PH E TO EARTH.
 11. PH F TO FUSE 44.

Fig. 34 Power distribution box (pre Mod. 988) - post Mod. 2728

RESTRICTED



- NOTES:-
1. ALL CABLES ARE UNIPREN & UNLESS OTHERWISE STATED
 2. LINKS BETWEEN TERMINALS OF RELAYS ARE 10G. T.C. WIRE OR UNIPREN 24
 3. SINGLE CABLES TO SAFTON SWITCHES ARE FITTED WITH AMP RING TERMINALS, 2 OR MORE CABLES TWISTED TOGETHER
 4. ALL UNUSED TERMINAL SOCKETS FITTED WITH FERRULE 5H/24
 5. PLUGS & SOCKETS PAINTED OR LOCKING PLUGS WITH COLOURS INDICATED
 6. CABLES TO PLUGS & SOCKETS CARRY PIN LETTER MARKER SLEEVE 30 & 10 CABLES TO CARRY 12V MARKER SLEEVES AT EACH END
 7. INNER END OF HOSE LAMP HOLDERS ARE FITTED WITH PVC TUBING
 8. 2.5mm DIA. X 1/4" LONG
 9. SWITCHES 3C-4178 MOUNTED WITH TERMINAL 1 AT TOP
 10. IF COMMUNING LINE FITTED TO FUSE BLOCKS AT 'MS' POSITION, SCREW & WASHER MUST BE USED
 11. SEE S.R.L.M. 1894 FOR CONNECTIONS TO PROX. FUSING SWITCH & FUSES 17 & 39
 12. NOTE THAT SOCKET XX2 OF S.R.L.M. OCCUPIES POSITION AD. S.R.L.M. APPLICABLE TO 8X/7P, N.I. AIRCRAFT ONLY
 13. THE MOD. 2218 - NO. LINK BETWEEN FUSES 16-15 & 7-8 & BLUE & WHITE SOCKET PIN D TO FUSE 7 & PH C TO EARTH 3/0 & PIN F TO FUSE 15

Fig. 35 Power distribution box (post Mod 988) - post Mod. 2728
 RESTRICTED

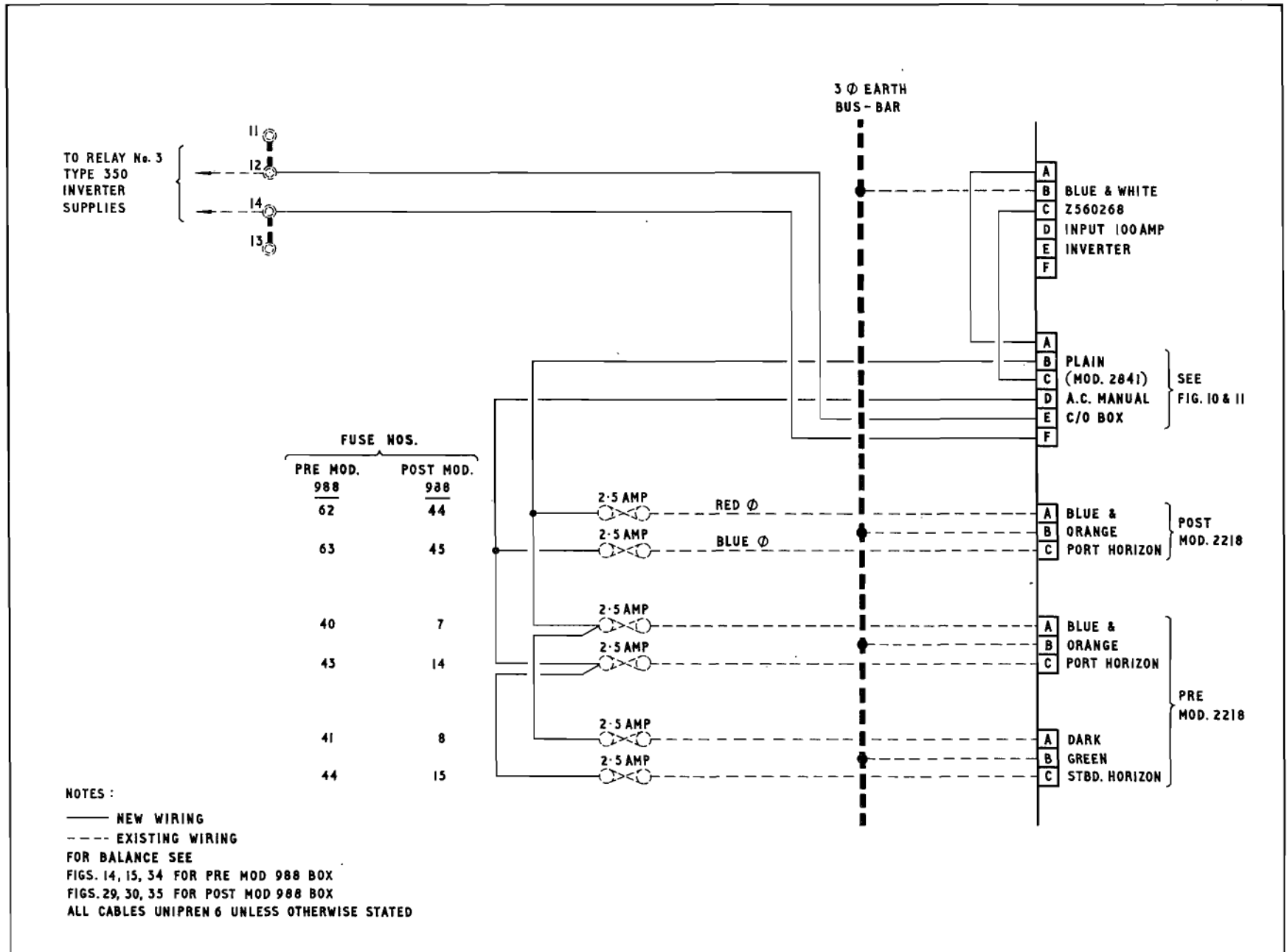


Fig. 36 Mod. 2982 to power distribution box
RESTRICTED

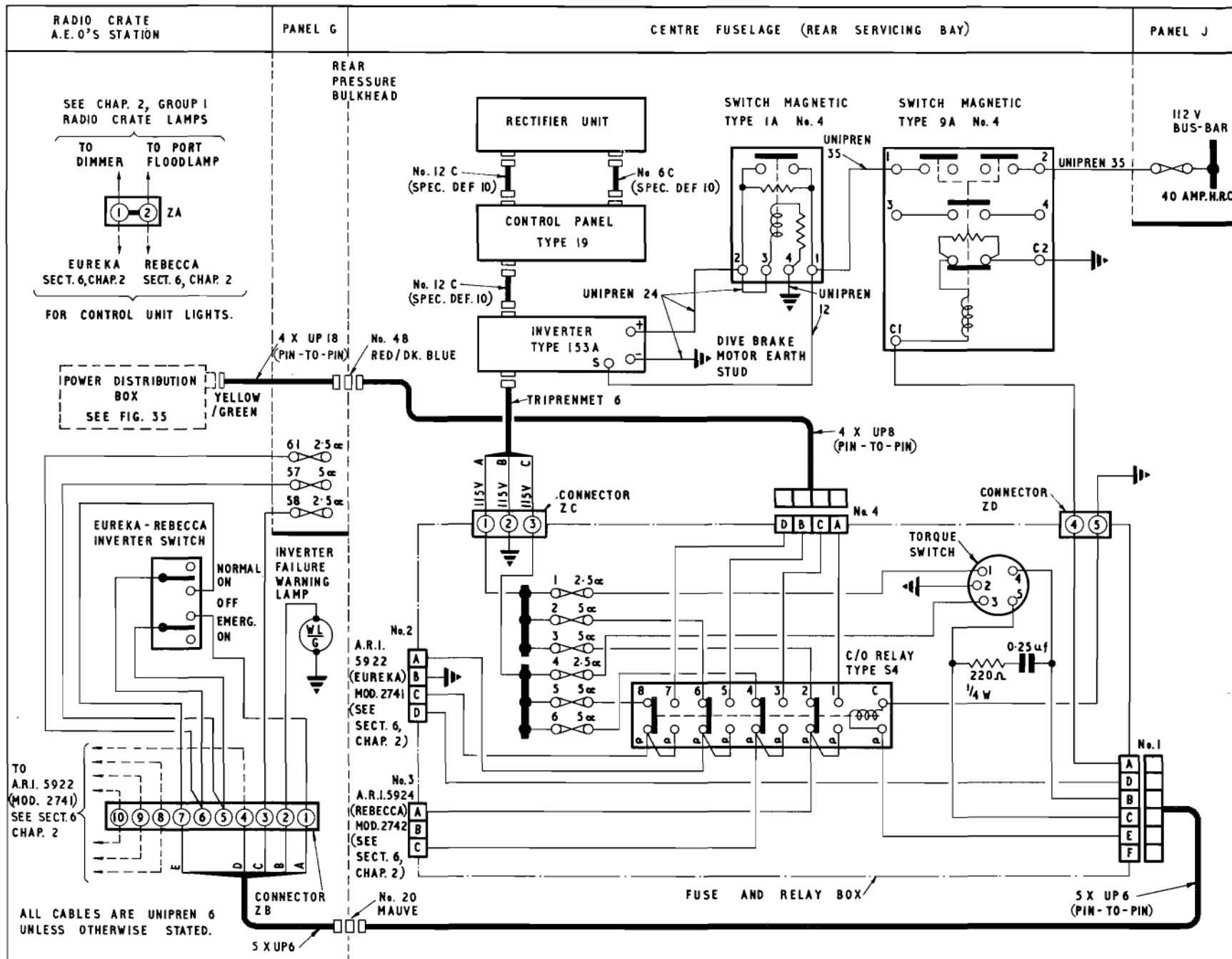


Fig. 37 Type 153A inverter supplies to A.R.I. 5922 and A.R.I. 5924 (Mod 2796)
RESTRICTED

LIST OF APPENDICES

	<i>App.</i>
<i>A.C. system (post Mod. 2939)</i>	1
<i>Instrument supply (post Mod. 1669 or 3019)</i>	2
◀ <i>A.R.I. 18107/4 and /13 T.A.C.A.N. and Collins D.F. system supplies (Mod. 3168 Part A and B)</i>	3
<i>A.R.I. 5910 (Mod. 2884)</i>	4▶

Appendix 1

A.C. SYSTEM (POST MOD. 2939)

LIST OF CONTENTS

	Para.		Para.
<i>Introduction</i>	1	<i>Alterations to the Power Distribution Box</i>	2

LIST OF ILLUSTRATIONS

	Fig.		Fig.
<i>Alteration to fig. 5 (post Mod. 2939) in Main Group</i>	1	<i>Alteration to fig. 35 (post Mod. 2939) in Main Group</i>	2

Introduction

1. Modification 2939 introduces spraymat heaters, which are thermostatically controlled, as additional engine de-icing (*Chap. 5, Group 1, App. 1*). A supply of 115 volts, 400 c/s single phase is fed from the Power Distribution Box to the spraymat thermal controller.

Alterations to the Power Distribution Box (*fig. 1*)

2. A supply is taken from terminal 12 to pin A of an additional 2 pin socket via fuse 22. This supply is normally from No. 2 inverter red phase but in emergency from No. 3 inverter, red phase, changed over by RL7. Pin B of the socket is connected to

the 3 ϕ earth bus-bar. For identification the new socket and the associated plug are painted dark green.

Note . . .

For B/K/PR Mk. 1 aircraft fuse 47 is used instead of fuse 22.

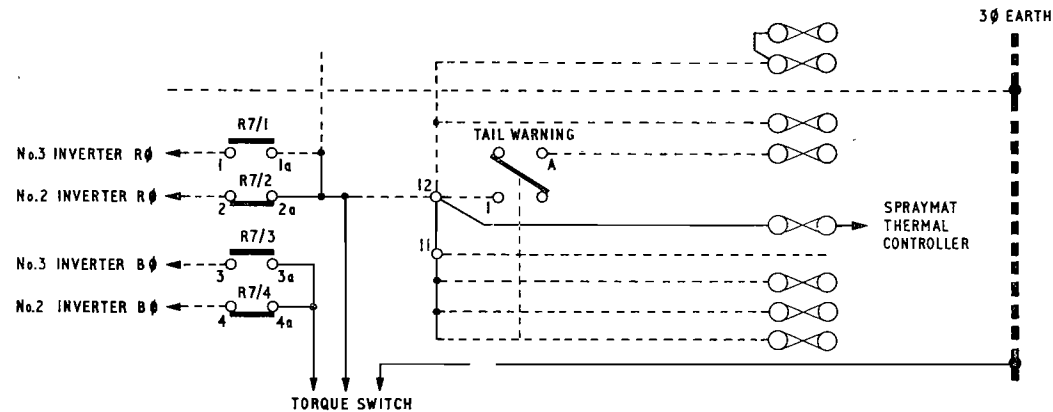
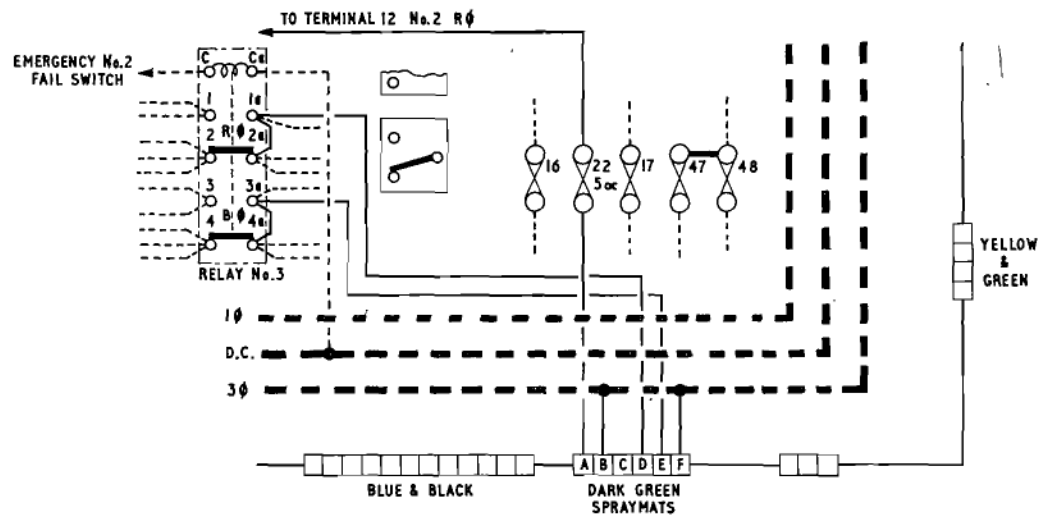


Fig. 1. Alteration to fig. 5 (post Mod. 2939) in Main Group

RESTRICTED



67453 SHT.99-BL

Fig. 2 Alteration to fig. 35 (post Mod. 2939) in Main Group

RESTRICTED

Appendix 2**INSTRUMENT SUPPLY (post Mod. 1669 or 3019)****LIST OF ILLUSTRATIONS**

	<i>Fig.</i>
<i>Alterations to Fig. 11 in Group 3</i> ...	1
<i>Alterations to Fig. 20, 22, 24 and 26 in Group 3</i>	2
◀ <i>Alterations to Fig. 19 (post Mod. 1669)</i> ▶	3

General

1. Post Mod. 1669 or 3019, the type 100A inverter is additionally used to supply the fuselage fire extinguisher systems (*Chap. 4, Group 3, App. 1*). Wiring alterations at the a.c. relay box are shown in fig. 1 and 2.

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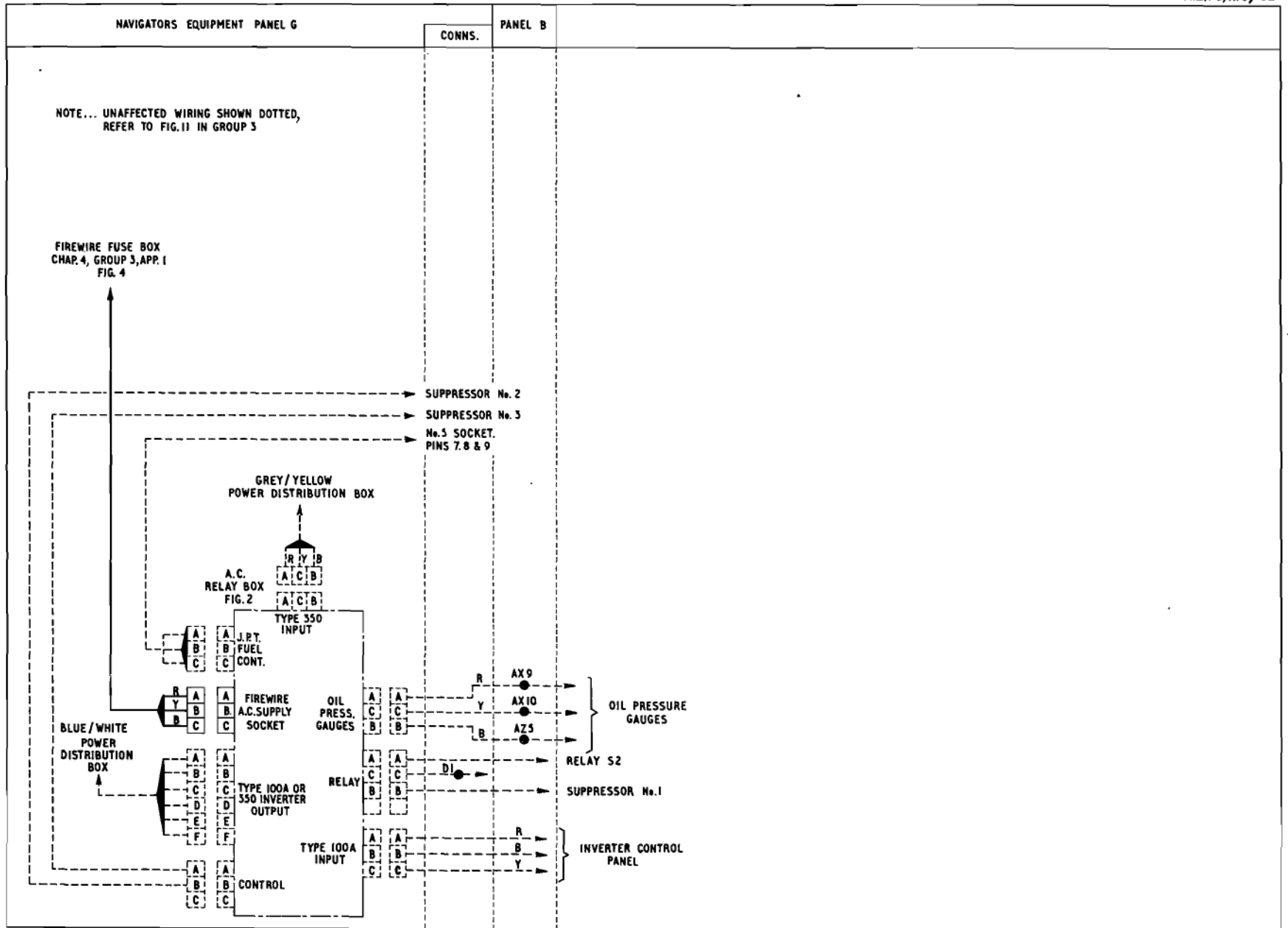


Fig.1. Alteration to Fig.11 in Group 3 (post Mod.1669 or 3019)

67436 SHT.148 - AK
79336 SHT.148 - X
71036 SHT.148 - V

NOTE:- UNAFFECTED WIRING SHOWN
DOTTED. REFER TO GROUP 3.

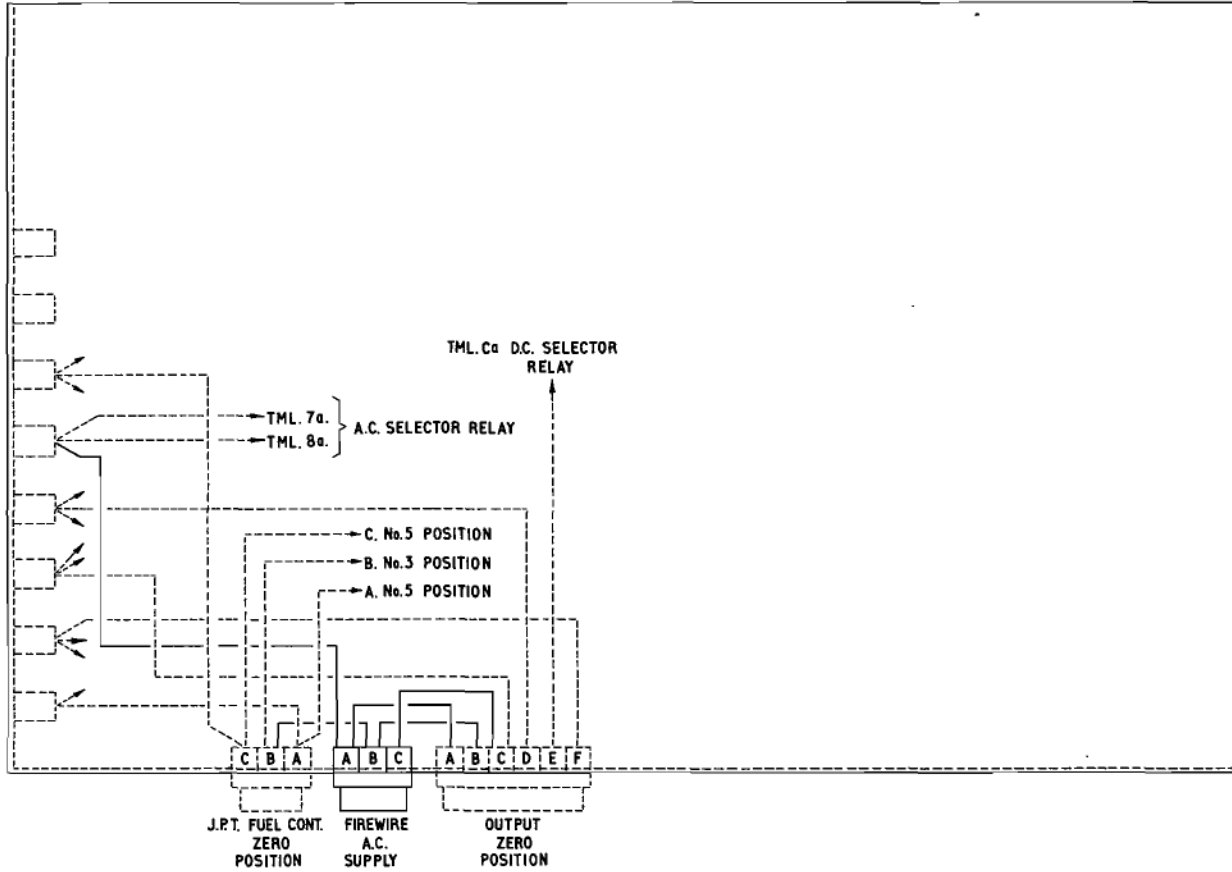
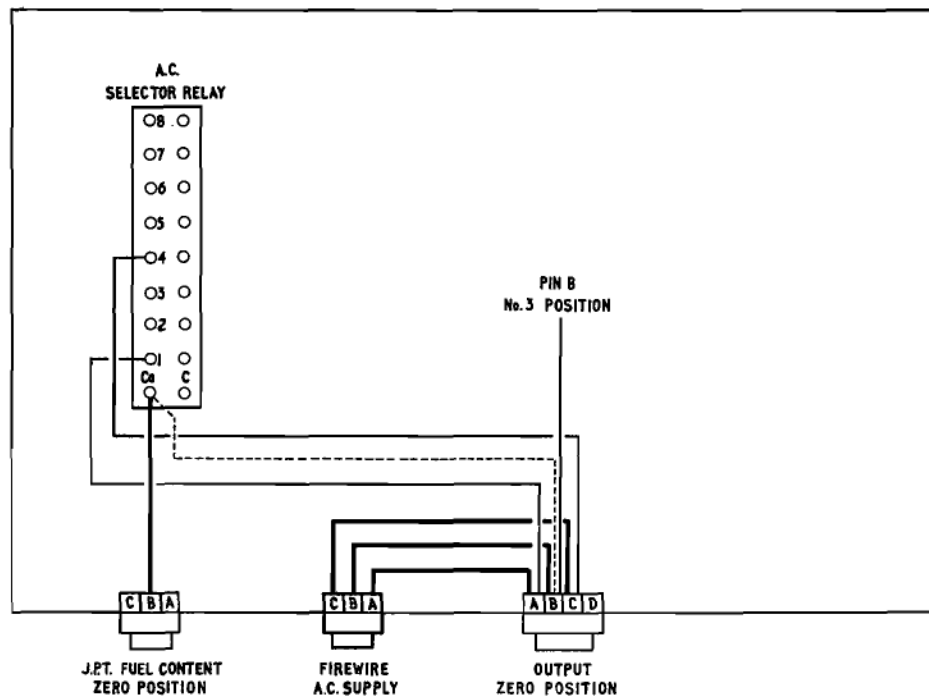


Fig.2. Alterations to Figs. 20, 22, 24 & 26 in Group 3 (post Mod. 1669 or 3019)

73336 SHT. 61 - C
75836 SHT. 543 - C
71036 SHT. 359 - C
67436 SHT. 733 - C

RESTRICTED



NEW ———
EXISTING - - -
DELETED . . .

Fig.3 Alteration to Fig.19 (post Mod.1669)

RESTRICTED

Appendix 3

A.R.I. 18107/4 and /13 T.A.C.A.N. AND COLLINS D.F. SYSTEM SUPPLIES (Mod. 3168 Part A and B)

LIST OF CONTENTS

	<i>Para.</i>
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Servicing	5

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LIST OF ILLUSTRATIONS

	<i>Fig.</i>		<i>Fig.</i>
Schematic diagrams		Routeing diagrams	
<i>Type 153A inverter supplies to A.R.I.</i>		<i>Type 153A inverter supplies to A.R.I.</i>	
<i>18107/4 and /13 T.A.C.A.N. and Collins</i>		<i>18107/4 and /13 T.A.C.A.N. and Collins</i>	
<i>D.F. system (Mod. 3168 part A and B)</i>	1	<i>D.F. system (Mod. 3168 part A and B)</i>	2
		<i>Alterations to Fig. 35 (post Mod. 3168</i>	
		<i>part A and B)</i>	3

Introduction

1. This appendix describes power supplies introduced by Mod. 3168 part A and B for T.A.C.A.N. and Collins D.F. equipments, described in Sect. 6, Chap 2, Group 1, App. 3. Part A is embodied in aircraft incorporating Mod. 2796, (Eureka/Rebecca power supplies, Group 3, para. 31A) and part B on pre Mod. 2796 aircraft.

2. The power supplies introduced by part B of the Mod. are similar to those introduced under Mod. 2796, i.e. a Type 153A inverter, a control panel, Type 19, and a rectifier unit, all located in the rear servicing bay, are introduced. Fig. 2 shows the wiring for the

power supplies. The disposition of equipment for both part A and B is given in the location diagrams in Group 4.

DESCRIPTION AND OPERATION

3. 115-volt, single-phase, 400 c/s supplies are obtained from the type 153A inverter. The rectifier unit Type CP19 and a control panel Type 19, which provide voltage and frequency control, are fitted adjacent to the inverter. Control is by a NORMAL/OFF/EMERGENCY switch fitted on the T.A.C.A.N. control panel at the 1st navigator position, on the radio crate. A phase corrector unit is included in the T.A.C.A.N. installation, to

correct any tendency of the phases becoming unbalanced due to the equipment using a single-phase of the three-phase inverter output.

4. Circuit operation is similar to that described in paras. 31B to 31F in the main group, and as shown in Fig. 1 of this appendix.

SERVICING

5. Servicing is similar to that described in para. 49 of the main group.

6. The Eureka/Rebecca supplies listed in the main group Table 1 are replaced by those listed in Table 1 to this appendix.

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TABLE 1
A.C. Supplies

Inverter	Output	Supply	Standby supply
No. 3 radar Type 350	115-volts 400c/s 3-phase	Standby for T.A.C.A.N. (and Collins D.F. system Mod. 3166) post Mod. 3168	None
T.A.C.A.N. (and Collins D.F. system, Mod. 3166) supplies inverter Type 153A (Mod. 3168)	115-volts 400 c/s 3-phase	A.R.I. 18107/13 T.A.C.A.N. (and Collins D.F. system Mod. 3166)	No. 3 radar inverter Type 350

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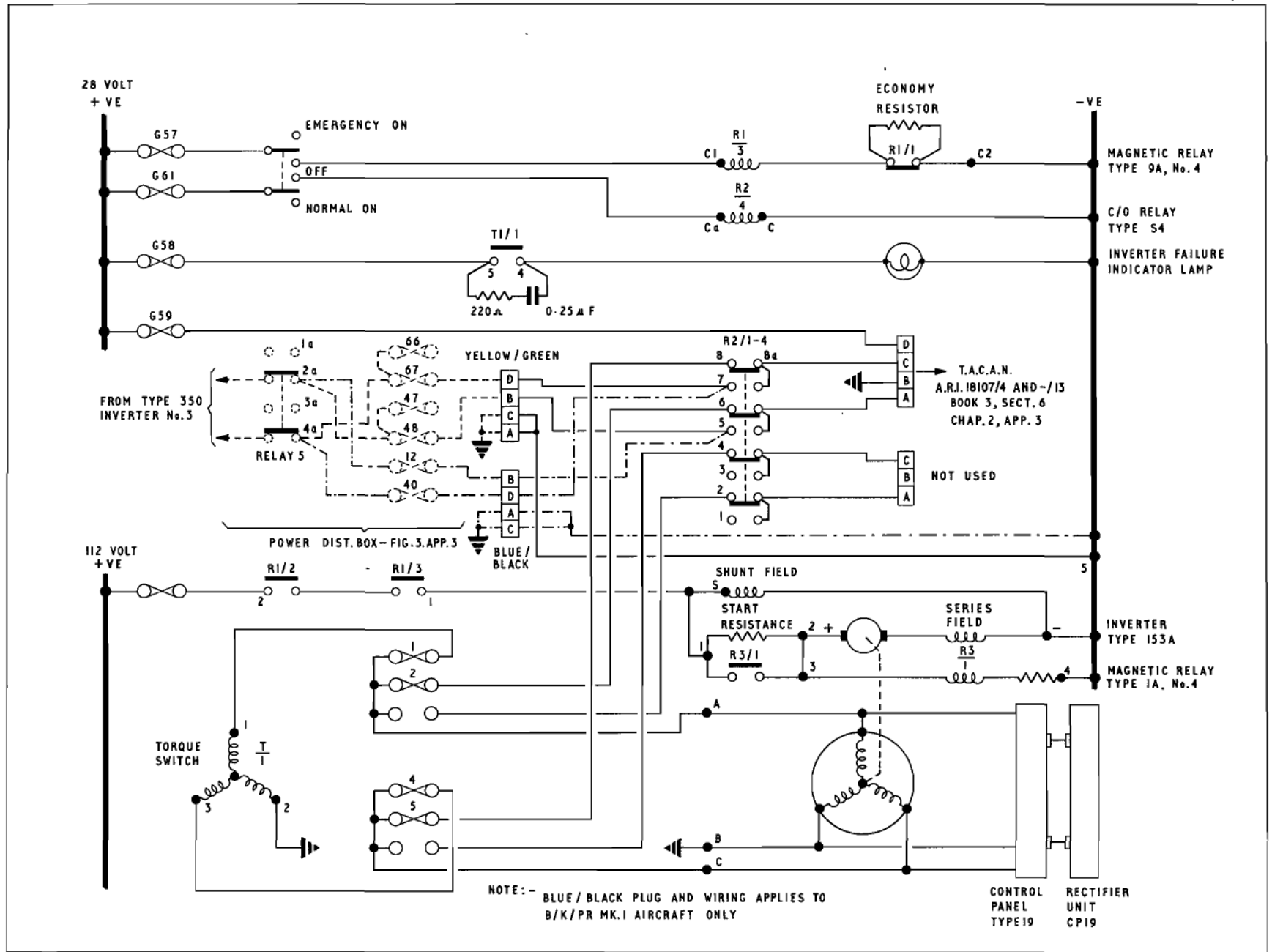
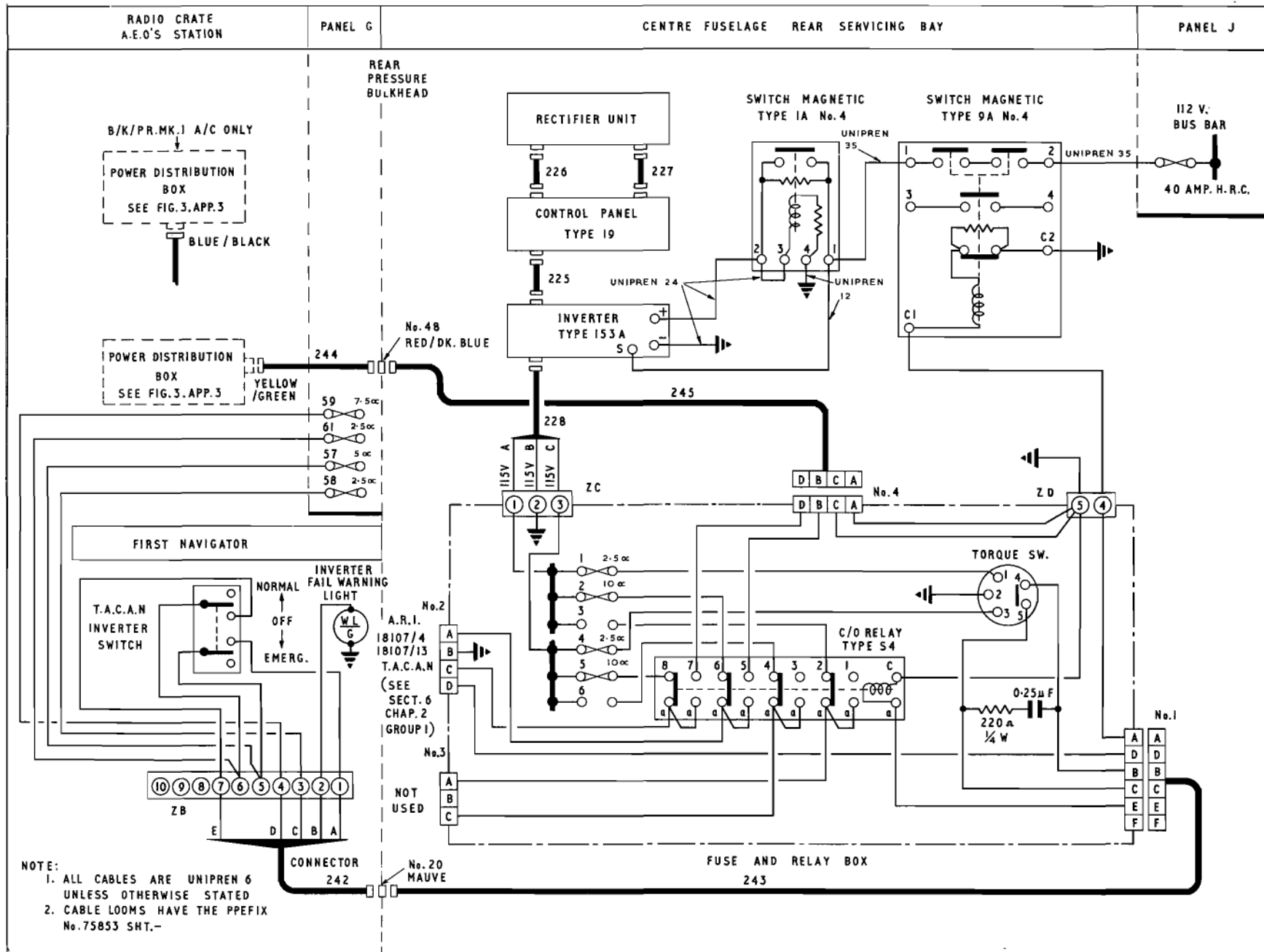


Fig. 1 Type 153A Inverter supplies to A.R.I.18107/4 and -/13 T.A.C.A.N. and Collins D.F. system (Mod.3168 part A and B)

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Fig.2 Type 153A Inverter supplies to A.R.I. 18107/4 and -/13 T.A.C.A.N. and Collins D. F. system (Mod. 3168 part A and B)

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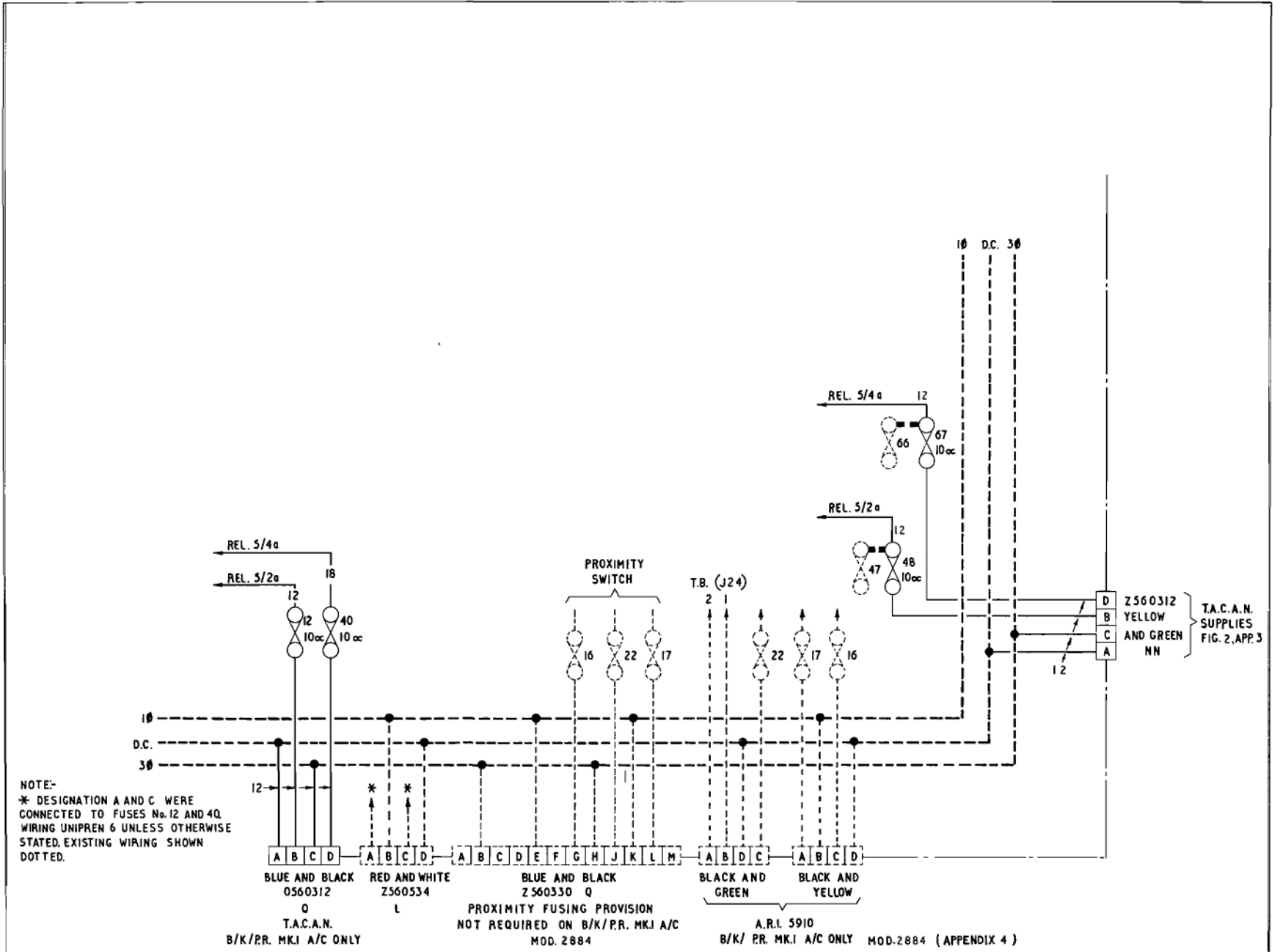


Fig. 3 Alterations to Fig. 35 (Post Mod. 3168, part A and B)

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Appendix 4

A.R.I. 5910 (Mod. 2884)

General

1. The A.R.I. 5910 supplies shown in Fig. 3, Appendix 3 are part of Mod. 2884. This modification is essential before Mod. 3168 can be incorporated in B/K/PR aircraft. Full details of Mod. 2884 will be incorporated in this Air Publication at a later date.

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