Group 3

ALTERNATIVE BOMBING INSTALLATIONS

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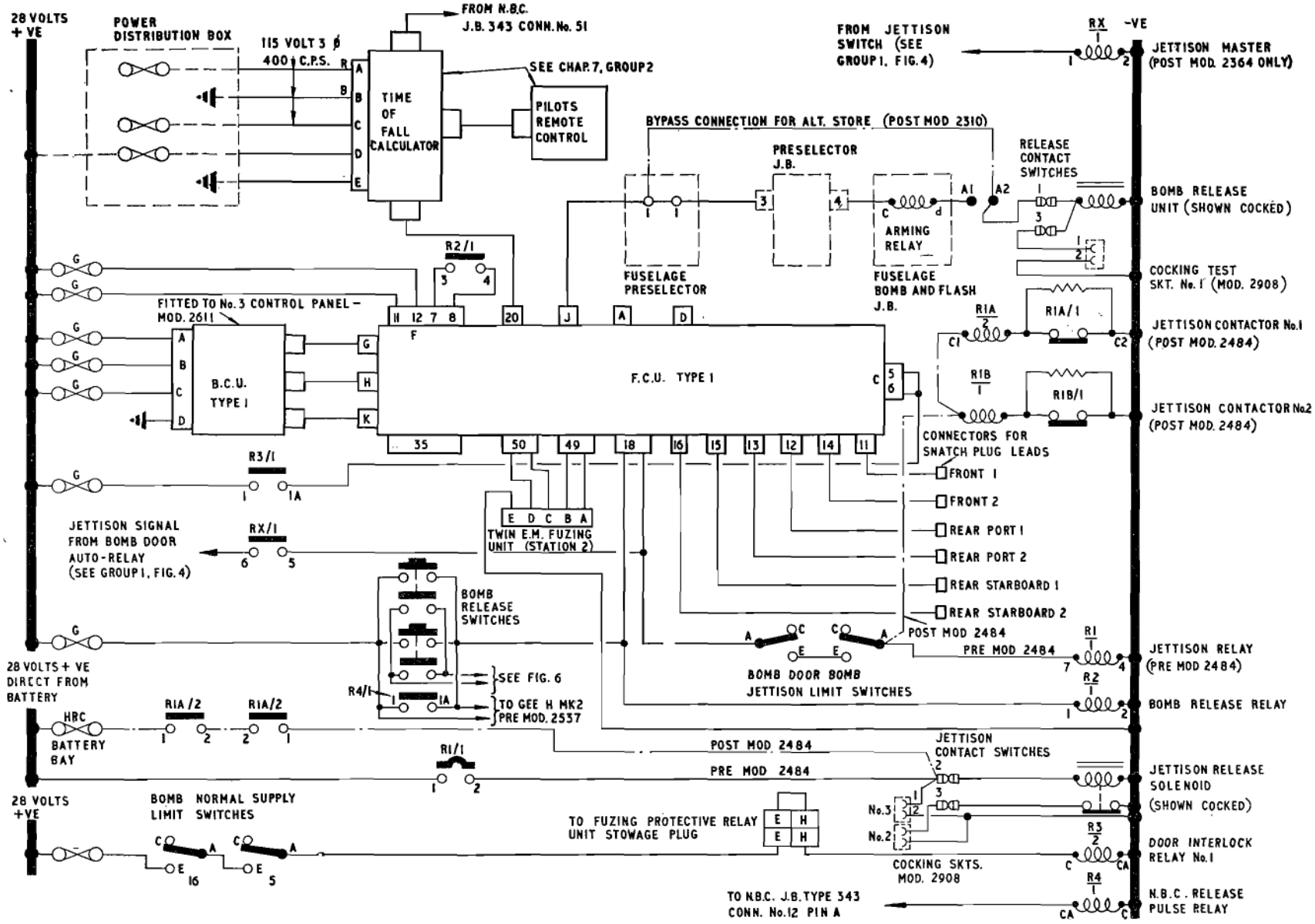


Fig. 1. 10,000 lb. M.C. Alternative bomb control (pre-Mod. 2612, 2645, 2646 or 2725)

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 be made with the electrical power switched on, the greatest care must be exercised.

DESCRIPTION

Introduction

1. Provision is made on all aircraft for carrying the 10,000 lb. M.C. alternative store. In addition, B. Mk. 1, B/PR Mk.1, B/K Mk. 1 and B/K/PR Mk. 1 aircraft incorporating Mod. 2646, 2645, 2612 or 2725 respectively may carry other alternative stores. Where these modifications are incorporated, a number of other modifications are considered essential and must be incorporated, these are:—1620, 1850, 1980, 2249, 2310 and 2364. Aircraft modified for carrying these extra alternative stores make provision for the fitment of the radio crate of various bomb control panels. The three currently available panels are as follows:—

No. 1 CONTROL PANEL	Mod. 2609
No. 2 CONTROL PANEL	Mod. 2610
No. 3 CONTROL PANEL	Normal stores (*Group* 1)—Mod. 2611 or 10,000 lb. M.C. store

Note . . .

Information is given in this group for the stores related to the No. 2 *and No.* 3 *Control Panels only. Information concerning other stores and control panels is not available and will be issued later.*

2. An integrated system of wiring is fitted to aircraft incorporating these modifications so that whichever control panel is fitted the same system of wiring can be used: in order to achieve this, all control equipment peculiar to any one store is mounted on the control panel concerned, the cables are stowed clear of the bomb bay in such a way that only the cables necessary for a given role need be removed from stowage and run to the equipment. For all three roles, a system of numbered plug and socket identification is employed, the numbers being on identification sleeves at both ends of each connector and prefixed by the words ARMAMENT WIRING; all mating connections whether on equipment or on stowage panels, are identified by the corresponding numbers.

ALTERNATIVE STORE, 10,000 lb. M.C. (No. 3 CONTROL PANEL)

Note . . .

Post-Mod. 2612, 2645, 2646 *or* 2725, *the B.C.U. is mounted on No.* 3 *CONTROL PANEL* (*Mod.* 2611) *after the normal bomb aimer's panel has been removed.*

3. This equipment will be described in two parts, release controls and Chimney service. The B.C.U., Type 1, (Ref. No. 5D/1782) and F.C.U. Type 1, (Ref. No. 5D/1780 or 1956) are replacement items for the normal aircraft bomb aimer's panel and 12/24 way control unit, and have to be connected up using the special plugs normally stowed in the stowage panel on the top of the radio crate, starboard side. Aircraft normal bomb control plugs and sockets are not required, and are to be stowed on the stowage panel. The time-of-fall calculator (Ref. No. 9/4537) is fitted in the table at the 1st navigator's position and pilot's remote control unit is fitted above the instrument panel at the 2nd pilot's position.

4. The Chimney service is no longer required, but pre-Mod. 2612, 2645, 2646 or 2725 provision is made for it and all wiring is installed. When these Mods. are incorporated, all the Chimney service wiring will be removed. The chimney unit was to be fitted in a tunnel near bomb station 3 extending from the bomb bay roof to the top of the fuselage. The chimney controls are at the 2nd navigator/bomb aimer's position on the radio crate. Servicing controls, circuit-breakers and relay are on the preselector panel at the forward end of the bomb bay.

5. Testing of the circuits before loading the store requires the use of a test rig. Normal wiring continuity and release function checks will be described for routine aircraft maintenance.

Release and Control

6. The time-of-fall calculator is fed with 115-volts, 3-phase, 400 c/s a.c. (white phase earth) and 28-volts d.c. from the power distribution box, and is connected to the pilot's remote control unit and to the N.B.S. system at the junction box, Type 343 (*Chap.* 7, *Group* 2).

7. Three 28 volts supplies from fuses 1, 2, 3 on panel G are fed to the B.C.U. Two 28-volt supplies from fuses 43 and 44 on panel G are fed to the F.C.U.

8. Supplies are fed from the B.C.U. to the store, through the snatch plugs, and to the twin E.M. fuzing unit at No. 2 hoist position. These supply lines pass through the F.C.U. as do others from the time-of-fall calculator; the calculator is, in turn, connected to the N.B.S. equipment (*Chap.* 7, *Group* 2). Release signals are obtained from the aircraft normal bomb release systems, both for normal and jettison conditions. Protection for release and fuzing is provided by the bomb door interlock relay (or door interlock relay No. 1, post-Mods. 2612, 2645, 2646 or 2725 in the same manner as for normal stores (*Group* 1).

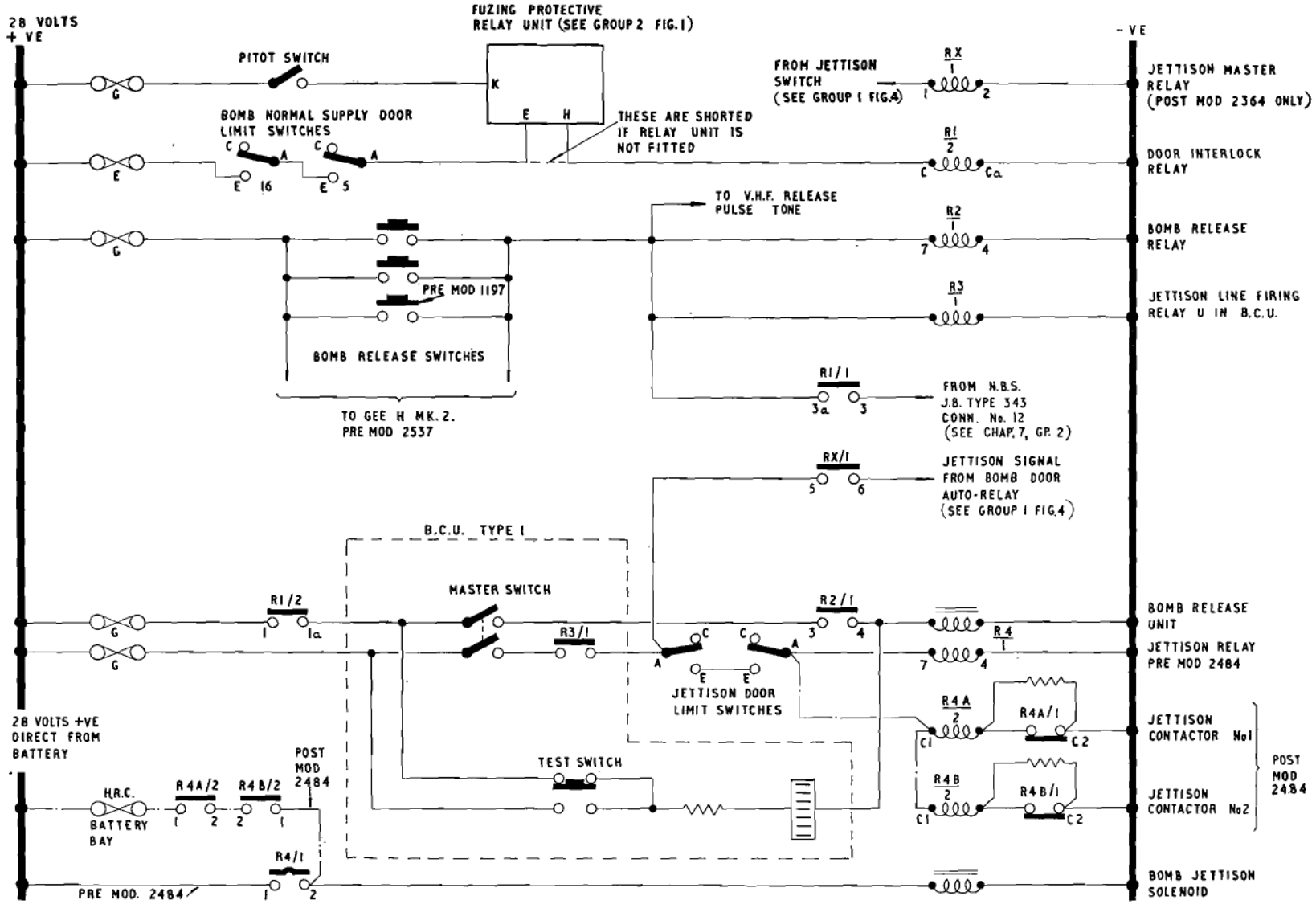


Fig. 2. 10,000 lb. M.C. Alternative bomb release circuits (pre-Mod. 2612, 2645, 2646 or 2725)

9. When a release switch is operated or the N.B.S. release pulse is made, both normal and jettison release circuits are energized simultaneously. As the store falls away, the snatch plug connections are 'broken' and the store fuzing pins, if selected, are pulled out by the E.M. fuzing unit lanyards. The snatch plugs are connected to the store before loading, the cables being retracted onto the cable drums as the store is being hoisted. When the store is loaded, the snatch plugs are secured to the bomb bay roof by inserting the latch pins through the snatch plug loops, thus the snatch plugs 'break' as soon as the store is released.

Note . . .

Mod. 2310 *introduces wiring to by-pass the heavy store release arming relay to minimize volt drop when operating with the alternative store. The new wiring picks up on the feed side of pre-selector A (terminal* 1) *and is connected to terminal* 2 *of the two-way terminal block* (3-*way, post Mod.* 2908) *on the starboard side of the No.* 3 *slip hoist position ; the normal release line is connected to terminal* 1 *of this connector. Before loading the store, the cable to the No.* 3 *slip housing connector for the release slip armature*) *has to be disconnected from terminal A*1 *and reconnected to terminal A*2. (*Refer to Group* 6, *fig.* 29 *for illustration of these connections*).

Chimney control (pre-Mod. 2612, 2645, 2646 or 2725 only)

10. The controls include a normal and an emergency UP/DOWN switch at the bomb aimer's position at the radio crate, an UP/INCH/DOWN and an inching UP/DOWN servicing switch on the preselector panel at forward end of the bomb bay. A position indicator, operating on the desynn principle, is fitted at the bomb aimer's position, together with an electromagnetic 'down' indicator. A test socket is provided on the preselector panel.

11. For ground servicing the servicing switches on the preselector panel are used to control the chimney. The supply to these switches comes from panel G, and is connected by the ground test relay R1 which is energized when the 28-volt external ground plug is inserted. The ground test relay also breaks the circuit to the normal emergency control systems.

ALTERNATIVE STORE (No. 2 CONTROL PANEL ROLE)

12. The store is carried on a special carrier (Ref. No. 11A/N.I.V.) at the No. 3 heavy store position in the bomb bay after the common removable (mechanical) equipment (Mod. 2613) has been fitted. The normal heavy store release circuits are not used, the release system being contained in the carrier. The release circuits are duplicated throughout, if one should fail, the store will be released by the other. There are two bus-bars on the control panel (No. 2—Mod. 2610), each being supplied from an H.R.C. fuse on panel Z. These bus-bars supply the release, control and fuzing circuits, each release circuit being fed from one bus-bar. There are two door interlock relays, each controlled by two series-connected bomb door limit switches (one port and one starboard) and two firing relays each controlled by one pole of the double-pole bomb release switches which replaced the normal single-pole switches when Mod. 2612, 2645, 2646 or 2725 was incorporated. A 'cocking test and release' indicator is provided for each release circuit and has the dual function of indicating that the release systems are satisfactorily cocked when the 'cocking test' push-switch is depressed, and of indicating that the release circuits have operated when a bomb release selection is made. The release mechanism in the carrier is not duplicated, and only one indicator lamp is provided; this incorporates a press-to-test facility for its filament. The store can be jettisoned at any time, the jettison circuits being similar to those for normal stores.

13. Bomb control and fuzing protection is duplicated, each system being supplied from one of the control panel bus-bars. Each system is controlled by a bomb door interlock relay, a bomb release relay and an undercarriage interlock, the latter ensuring that the system is completely safe whilst the aircraft is on the ground. A.C. control and fuzing supplies are obtained from the type 350 radar inverters at 115 volts, 400 c/s and 115 volts, 1600 c/s both single-phase. The output from the fuzing equipment is fed in duplicate to the carrier.

ALTERNATIVE STORE (No. 1 CONTROL PANEL ROLE)

13A. The store is carried at the No. 3 heavy store position in the bomb bay. The normal heavy store release circuits are not used, the release system being contained in the carrier. Release control circuits are supplied mainly from the bus-bar in the control panel (No. 1—Mod. 2609) which is in turn supplied from a Type B circuit-breaker, mounted above panel Z, controlled by a switch on the control panel. The bomb release unit on the carrier is provided with a heater which is controlled by a switch on the control panel. Indicators, with press-to-test contacts for their filaments, are provided for slip locking pressure, arming and bomb gone indication. The release circuits are interlocked with the bomb doors in the usual way and release is impossible if the system is not armed; only one pole of the double-pole release switches is used. The store may be jettisoned at any time, the jettison circuits being similar to those for normal stores.

13B. There is no protection for the bomb control and fuzing other than that provided within the control units themselves. Three control units are used, A, B and C all three being mounted on the control panel. D.C. supplies from the control panel bus-bar are fed to the control units, each supply being protected by a Type A circuit-breaker. The fuzing relay, mounted in the rear fuselage, is

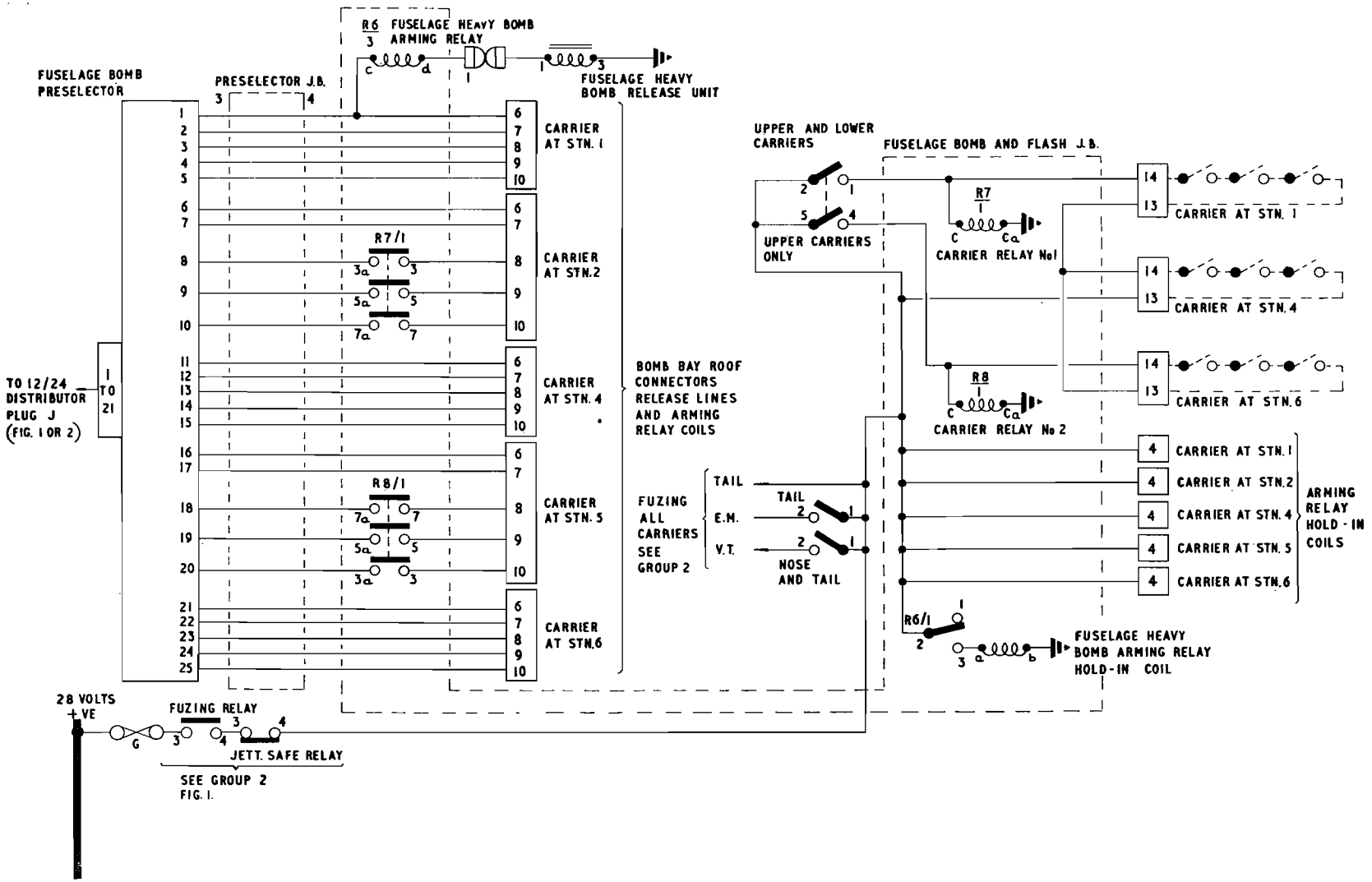


Fig. 3. 10,000 lb. M.C. Alternative bomb chimney service control (pre-Mod. 2612, 2645, 2646 or 2725 only)

controlled by the unit C and, when energized, connects two further d.c. supplies from the control panel bus-bar directly to the carrier. These supplies are protected by Type A circuit-breakers arranged so that one supply cannot be made 'live' until the other is 'live'.

13C. Duplicate a.c. supplies at 115 volts, 400 c.p.s. single-phase are obtained from the Type 350 radar inverters and fused in the control panel; the selection of which is to be used is made by a switch on the control panel. A 100/130-volt neon indicator connected to the output side of the selector switch indicates supply failure, in which case the alternative supply is to be selected. The 115- volt supply is reduced to 26 volts by a transformer in the control panel and is fed to the control unit B.

ALTERNATIVE STORE, 10,000 lb. M.C. (No. 3 CONTROL PANEL)

Normal release (*fig.* 1 *or* 4)

14. When the bomb doors are fully open, the bomb normal supply limit switches (Nos. 16 and 5 in series) will be made across their contacts A-E to connect a supply from panel E through pins E and H of the E.L. Fuzing Protective Relay Unit 12-way connector (these are linked by the stowage for the connector if the unit is not fitted) to the coil R1 of the door interlock relay (or door interlock relay No. 1, post Mod. 2612, 2645, 2646 or 2725 (*fig.* 4). At the same time the bomb jettison limit switches are made across their contacts A-E to complete the circuit between the contact R3/1 (normally open) of the jettison firing relay in the B.C.U. and the jettison relay R4 (or jettison contactors R4A and R4B in parallel (post Mod. 2484), at the forward end of the bomb bay.

15. The door interlock relay closes its contacts (1 and 3); contact R1/2 (1-1a) connects a supply from panel G through the F.C.U. (plain connector C, pins 5 and 6) to the MASTER switch on the B.C.U. Pre-Mod. 2612, 2645, 2646 or 2725 contact R1/1 (3-3a) closes the N.B.S. release pulse circuit from the N.B.S. junction box Type 343 to the firing circuits thus setting the system for N.B.S. controlled bomb releases if required (*fig.* 1). Post Mod. 2612, 2645, 2646 or 2725, the release pulse from the N.B.S. equipment is fed to an additional relay R5 (N.B.C. release pulse relay); contact R5/1 of this relay is in parallel with the bomb release switches (*fig.* 4).

16. With the MASTER switch on the Bomb Control Unit closed, any bomb release switch (when operated) will connect a supply from panel G to the coils of the bomb release relay R2 and the jettison line firing relay R3. (If N.B.S. controlled bombing is being used, these two relays are energized, pre-Mod. 2612, 2645, 2646 or 2725 by a supply from the N.B.S. junction box type 343 via contacts R1/1 of the door interlock relay or post these mods., by contact R5/1 of the N.B.C. release pulse relay which closes in parallel with the bomb release switches.

CIRCUIT OPERATION

17. The bomb release relay closes its contact R2/1 (3-4) to connect the supply from panel G via the contact R1/2 of the door interlock relay, the F.C.U. and the MASTER switch on the B.C.U. to the No. 3 slip release rotor via preselector A, the preselector junction box and the arming relay in the fuselage bomb and flash junction box pre-Mod. 2310 or direct, post Mod. 2310 (Note to para. 9).

18. The jettison line firing relay (u) in the B.C.U. closes its contact R3/1 to connect a supply from panel G via the MASTER switch on the B.C.U. through the bomb jettison limit switches (made across A-E when the bomb doors reach the fully open position) to the coil of the jettison relay R4 (or jettison contactors R4A and R4B in parallel, post Mod. 2484).

19. Pre-Mod. 2484, the jettison relay closes its contact R4/1 to connect a supply direct from the 24-volt battery to the bomb slip jettison solenoid. Post Mod. 2484, contacts R4A/2 and R4B/2, in series, close to connect a supply from the 24-volt battery via a 60-amp. H.R.C. fuse at the forward end of the bomb bay to the bomb slip jettison solenoid. Contacts R4A/1 and R4B/1 of the jettison contacts open to connect economy resistances into their respective coil circuits.

20. The bomb releases operate simultaneously. The bomb release relay contacts R2/1 short circuit the BOMB GONE indicator on the B.C.U. which, now ceasing to pass current, indicates that the store has been released.

Jettison release

21. The jettison release circuits, being independent of the B.C.U. and F.C.U. are as described for normal stores, (*Group* 1, *paras.* 34 *to* 41).

Chimney control (pre-Mod. 2612, 2645, 2646 or 2725) (*fig.* 3)

22. In flight, when the normal control switch is at UP, a supply from panel G, via normally closed contacts R1/1 of the ground test relay and contacts 5-2 of the emergency control switch, is connected to pin 2 of the chimney No. 1 connector. When the switch is selected DOWN, the same supply is connected to pin 8 of the chimney No. 1 connector.

23. The position of the chimney device is indicated continuously on the position indicator and when the device reaches the fully down position the magnetic 'down' indicator is energized.

24. In the event of failure of the normal system, the emergency system is brought into use. The emergency switch when selected UP, connects a supply from panel G to pin 2 of the chimney No. 2 connector. When selected DOWN, the switch connects the same supply to pin 8 of the chimney No. 2 connector.

25. Signals to the chimney are continuously fed from the Fuze Control Unit (plug 35); the test socket is tapped into these lines.

Chimney ground servicing control (pre-Mod. 2612, 2645, 2646 or 2725) (*fig.* 3)

26. The ground servicing switch connects its supply to the chimney No. 1 plug pin 2 for UP, and to pin 8 for DOWN. At the INCH position, the switch connects its supply to the inching switch. This has three positions UP, OFF and DOWN: the UP and DOWN positions being in parallel with the relevant positions of the servicing switch.

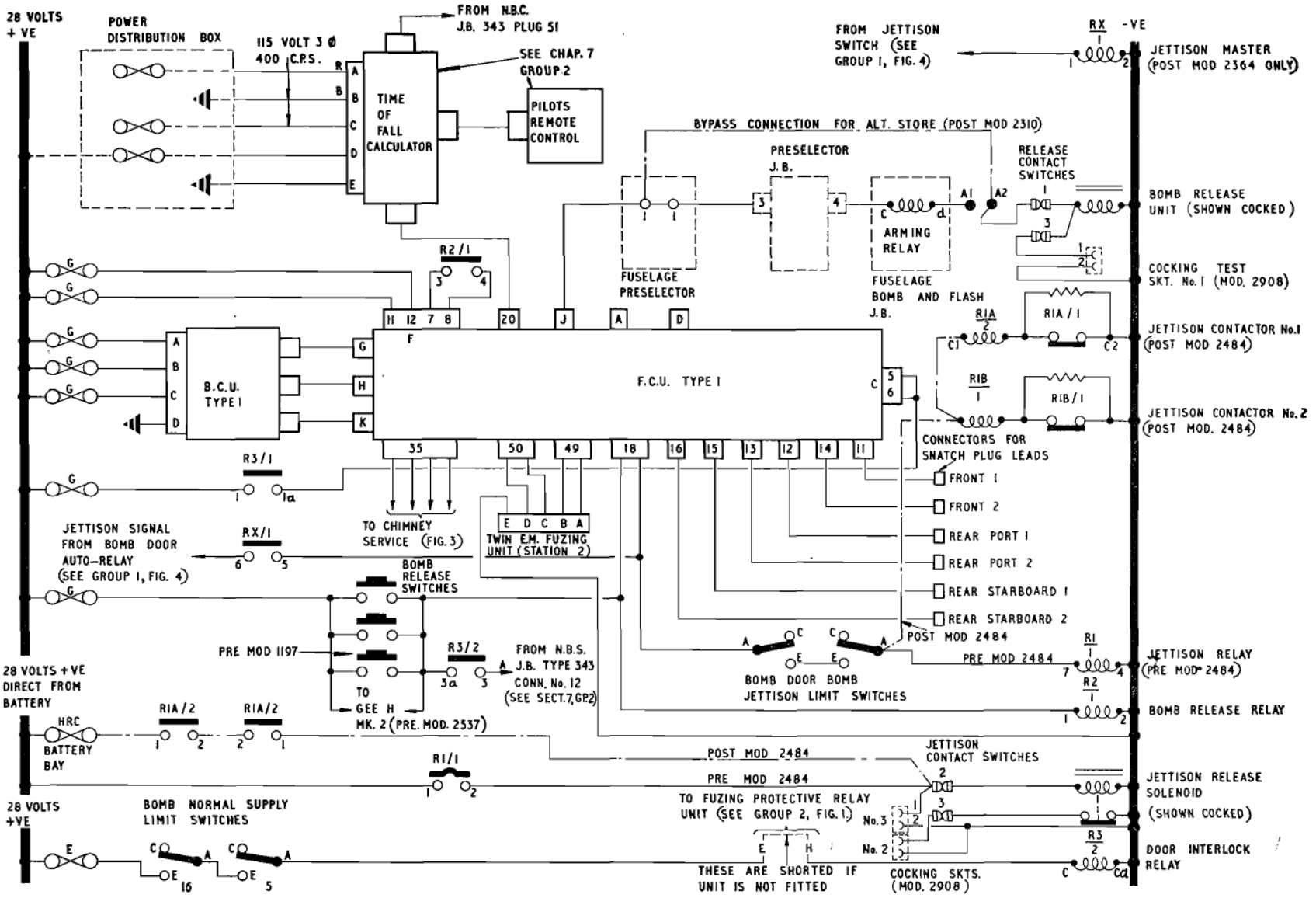


Fig. 4. 10,000 lb. M.C. Alternative bomb control (post Mod. 2612, 2645, 2646 or 2725)

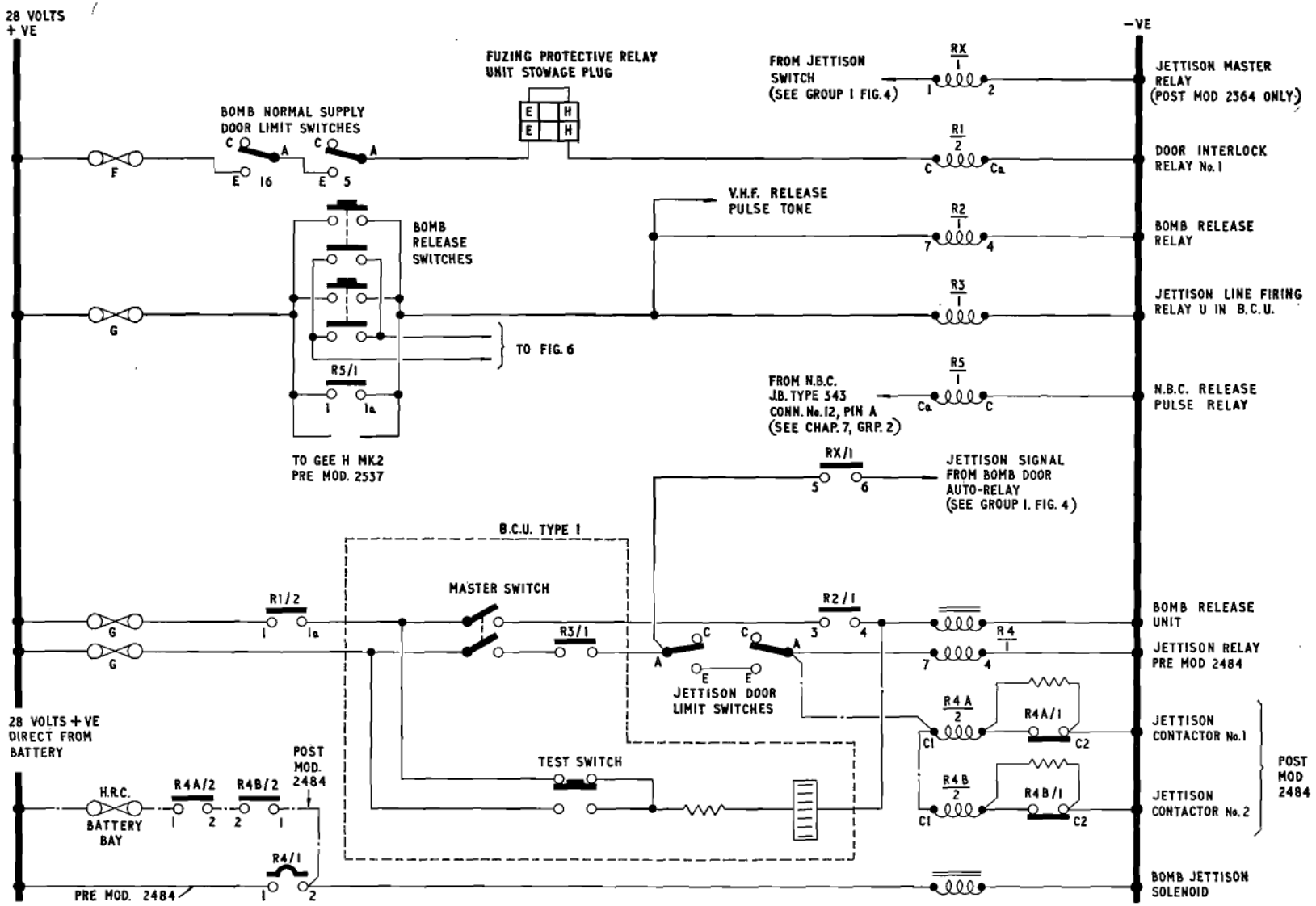


Fig. 5. 10,000 lb. M.C. Alternative release circuits (post Mod. 2612, 2645, 2646 or 2725)

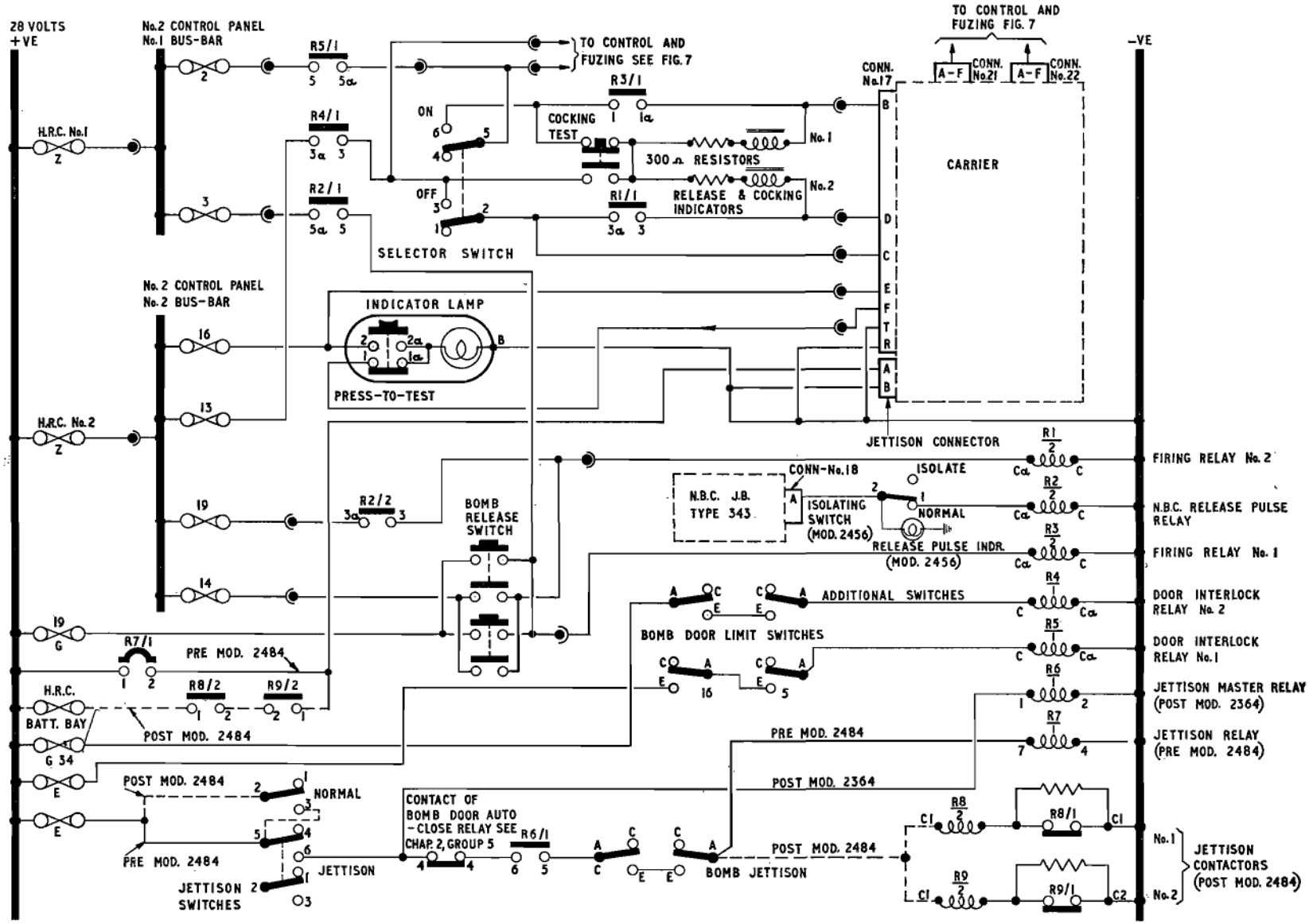


Fig. 6. No. 2 control panel role, bomb release (Mods. 2612, 2645, 2646 or 2725 and 2610)

The supply to these switches comes from panel G and is connected by contact R1/2 of the ground test relay R1 which is energized when the 28-volt external ground plug is inserted. Contact R1/1 of this relay breaks the circuit to the normal and emergency control systems.

ALTERNATIVE STORE (No. 2 CONTROL PANEL ROLE)

Manual release (*fig.* 6)

27. As soon as 28-volt power is on the aircraft, the control panel bus-bars are 'live', the supplies being obtained from H.R.C. fuses on panel Z. An unswitched supply from fuse 16 on bus-bar No. 2 is fed to the press-to-test contact of the indicator lamp, the filament of which can therefore be checked at any time and particularly before flight by depressing the face of the indicator. The supply from fuse 16 is also fed to the pressure switch in the carrier.

28. When the bomb doors are fully open, limit switches 16 and 5, in series, are made across their contacts A-E to connect a supply from panel E to the coil R5 of the door interlock relay No. 1 Type S4. Simultaneously, the two additional limit switches introduced by Mod. 2612, 2645, 2646 or 2725 are made across their contacts A-E to connect a supply from panel G to the coil R4 of the door interlock relay No. 2, Type S4. Contacts R5/1 (5-5a) and R4/1 (3a-3) of these relays close to prepare the release circuits Nos. 1 and 2 respectively (from fuses 2 and 13 on the control panel bus-bar).

29. When the SELECTOR switch is selected to ON, a supply from fuse 13 on the control panel bus-bar No. 2 via contact R4/1 (3a-3) of the door interlock relay No. 2 is connected by contact 2-3 of the switch to the release arming device in the carrier via pin C connector No. 17 and also to the COCKING TEST switch on the control panel (*para.* 35).

30. A duplicate supply from fuse 2 on the control panel bus-bar No. 1 via contact R5/1 (5-5a) of the door interlock relay No. 1 is connected by contact 5-6 of the switch to the COCKING TEST switch and thence through the 300 ohm resistances to the No. 1 and No. 2 'release and cocking' indicators; the negative return circuits from the indicators are via the carrier (connector No. 17, pins B, D and T—earth). Both indicators should change from black to black-and-white.

31. After selecting the SELECTOR switch to ON, the release arming device in the carrier is operated and feeds a signal via connector No. 17, pin F, to light up the indicator lamp (amber).

32. When a bomb release switch is depressed, a supply from Panel G is connected by one pole of the switch to the coil R3 of the firing relay No. 1, Type S2, simultaneously, a supply from fuse 14 on the control panel bus-bar No. 2 is connected by the other pole of the switch to the coil R1 of the firing relay No. 2, Type S2. Contact R3/1 (1-1a) of firing relay No. 1 closes to connect the supply from the SELECTOR switch (contact 5-6) to the No. 1 release system in the carrier via connector No. 17, pin B, Contact R1/1 (3a-3) of firing relay No. 2 closes to connect the supply from the SELECTOR switch (contact 2-3) to the No. 2 release system in the carrier via connector No. 17, pin D. The 'release and cocking' indicators are now short-circuited and ceasing to pass current, change from black-and-white to black.

Note. . . .

Contact R1/2 and R3/2 of the firing relay are used in the control and fuzing circuits (*para.* 47).

33. When the bomb release switch is released, the firing relays are de-energized, but the release indicators will stay black because the circuits are broken at the release unit.

N.B.S. Release (*fig.* 6)

34. When automatic bombing by N.B.S. is employed (*Chapter* 7) the circuits operate as for manual release, the only difference being that the firing relays are energized via contacts of the N.B.C. release relay instead of by the bomb release switches. The control circuits and cocking test circuits operate as for manual release, the SELECTOR switch must be at ON and the bomb doors must be open before the release system can operate (*paras.* 27-31).

Cocking test switch (*fig.* 6)

35. A COCKING TEST switch is provided on the control panel. With the SELECTOR at OFF, but with bomb doors open, and the store loaded, the release system can be checked for satisfactory cocking. Under these conditions, when the switch is depressed the supply from fuse 13 on the control panel bus-bar No. 2 via contact R4/1 (3a-3) of the bomb door interlock relay No. 2 (closed with the bomb doors open) is connected by the normally open contact of the switch (now closed) to the 'cocking test and release' indicators both of which should change from black to black-and-white. The negative return is completed via the release mechanism and connector No. 17, pin T. When the switch is released, the indicators will change back to black.

Indicator lamp (*fig.* 6)

36. The indicator lamp on the control panel should light up after the bomb doors have been opened, the SELECTOR switch has been selected ON and the release arming device has operated. The signal is fed from the carrier via connector No. 17, pin F, through the normally closed contact of the press-to-test switch to the indicator filament.

37. The indicator has a built-in press-to-test switch so that, provided there is power on the aircraft, the filament can be tested. When the face of the indicator is pressed, one contact closes to connect a supply from fuse 16 on the control panel bus-bar No. 2

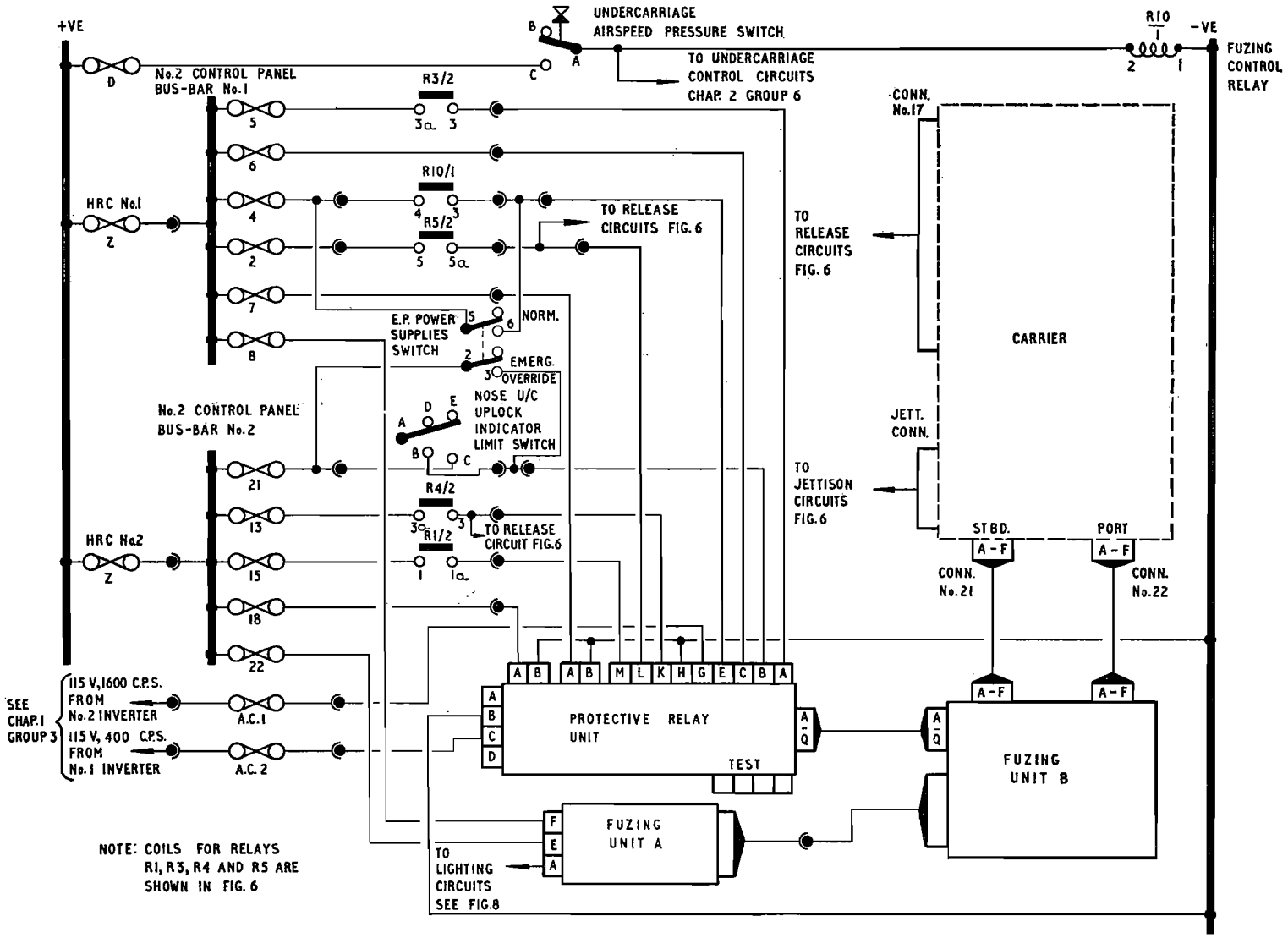


Fig. 7. No. 2 control panel role, bomb control and fuzing (Mods. 2612, 2645, 2646 or 2725 and 2610)

to the filament whilst the other contact breaks to prevent this supply from feeding back into the carrier via connector No. 17 pin F.

Jettison release (*fig.* 6)

38. The jettison circuits are the same for normal stores carried at No. 3 position except that the release unit is in the carrier. A separate jettison release line (fixed wiring) is connected to the jettison circuits at the jettison heavy-duty connector block at the forward end of the battery bay and is run to a 2-pin socket which is normally stowed in a stowage mounted on a bracket adjacent to bomb station 5 (port side). When the carrier is loaded, this socket is removed from its stowage and connected to the carrier.

39. When the BOMB JETTISON switch on the control pedestal is selected JETTISON, a supply from panel E is connected to the coil R6 of the jettison master-relay, Type Q, in the battery bay. The contact R6/1 of this relay closes to connect the supply from the BOMB JETTISON switch to the bomb door operated 'bomb jettison supply' limit switches via the normally closed contacts 4-4a of the bomb door auto-close relay (*Chapter* 2, *Group* 5). When the bomb doors reach the fully open position, these micro-switches are made across their contacts A-E to connect the supply to the coil R7 of the jettison relay (circuit-breaker Type D) in the battery bay.

40. Contact R7/1 of the jettison relay is closed to connect a supply from the 24-volt battery, unfused, via the bomb jettison heavy-duty connector block at the forward end of the bomb bay to the carrier via the 2-pin jettison connector (pin A); the negative return is carried back to a local earth on the aircraft via the connector pin B.

41. When the time switch signals the bomb doors to close (*Chapter* 2, *Group* 5) the supply to the jettison relay is broken by contacts 4-4a of the bomb door auto-close relay and the circuit is further isolated when the bomb jettison micro-switches break contact A-E as the bomb doors start to close.

Post Mod. 2484 (*fig.* 6)

42. Mod. 2484 introduces an extra (single-pole) jettison switch on the control pedestal mechanically linked externally to the original double-pole switch. In addition, the jettison relay (circuit-breaker Type D) has been replaced by two contactors (Ref. No. 5CW/4387) with their main contacts connected in series—these contactors are mounted on the battery bay so that the direction of operation of the contacts on No. 1 is opposite to that for No. 2 in order to prevent inadvertent operation due to 'g' forces; a 60 amp. H.R.C. fuse is fitted in the circuit.

43. The operation of the system is the same as for pre-Mod. 2484 except that the supply from panel E to the bomb door jettison limit switches is now switched by the two jettison selector switches in series. The two jettison contractor coils R8 and R9 are energized in parallel, their contacts R8/2 and R9/2 closing in series to connect a supply from the 24-volt battery via the 60 amp. H.R.C. fuse mounted in the battery bays to the 2-pin jettison connector. Contacts R8/1 and R9/1 of the jettison contactors operate to connect economy resistances into their respective coil circuits.

Control and fuzing (*fig.* 7)

44. Bomb control and fuzing comes under the control of a Protective relay unit and is determined by settings on unit A. These two units control unit B which feeds the signals in duplicate into the carrier via

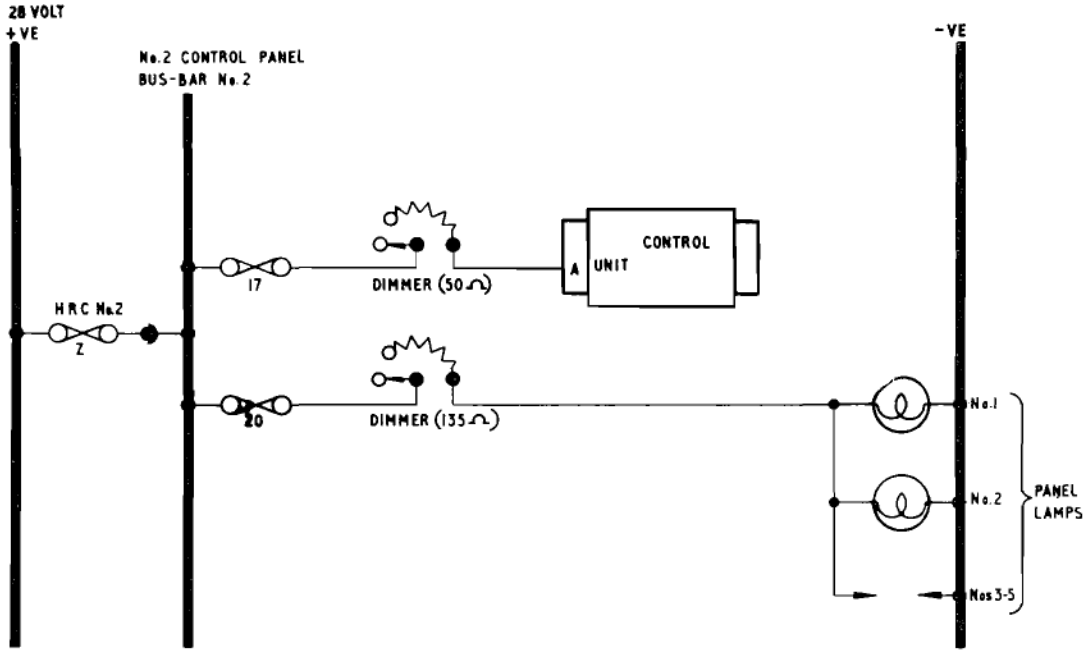


Fig. 8. No. 2 control panel lighting (Mod. 2610)

connectors 21 and 22. Unit B and the Protective relay unit are mounted in the rear fuselage immediately aft of the wing rear spar and replace the E.L. Fuzing generator and Protective relay units (Ref. No. 5D/N.I.V.); unit A is mounted on the control panel (No. 2).

45. Whenever 28-volt power is on the aircraft, the control panel bus-bars are 'live' and consequently supplies from fuses 6, 7 and 18 in the control panel bus-bars are connected to Protective relay unit and supplies from fuses 8 and 22 are connected to unit A. Safety precautions are taken by ensuring that the circuits in these units cannot function when the aircraft is on the ground; these are achieved by interlocking control circuits with the undercarriage. Further interlocking with the bomb doors is provided and finally there is interlocking with the bomb release circuits. All the interlocking is in duplicate, each set being supplied from separate bus-bars in the control panel.

46. When the aircraft attains an airspeed of 80-85 knots approximately, the undercarriage airspeed pressure switch operates, closing its contact A-C to connect a supply from panel D to the coil R10 of the fuzing control relay, Type 9B, No. 1. Contact R10/1 of this relay closes to connect a supply from fuse 4 on the control panel bus-bar No. 1 to the Protective relay unit. When the alighting gear is raised, the nose undercarriage uplock indicator micro switch makes its contact B-C (*see Chapter* 2, *Group* 6) to connect a supply from fuse 21 on the control panel bus-bar No. 2 to the Protective relay unit.

46A. To guard against the unlikely failure of the interlocking circuits, an override switch has been provided on the control panel. The switch is heavily guarded and is marked with black and yellow stripes. The 2-pole switch (labelled E.P. POWER SUPPLIES) is connected in parallel with the interlocks so that if they should fail, selection of EMERGENCY OVERRIDE will connect the supplies from fuses 4 and 21 on the control panel to the Protective Relay Unit.

47. When the bomb doors are opened, the two door interlock relays R4 and R5 are energized (*para.* 28). Contact R5/2 (5-5a) of relay No. 1 closes to connect a supply from fuse 2 on the control panel bus-bar No. 1 to the Protective relay unit and contact R4/2 (3a-3) of relay No. 2 operates similarly to connect a supply from fuse 13 on bus-bar No. 2.

48. When a bomb release selection is made, the two firing relays R1 and R3 are energized (*para.* 32). Contact R3/2 (3a-3) of relay No. 1 closes to connect a supply from fuse 5 on the control panel bus-bar No. 1 to the Protective relay unit and contact R1/2 (1-1a) of relay No. 2 operates similarly to connect a supply from fuse 15 on bus-bar No. 1.

A.C. supply (*fig.* 7)

49. Two a.c. supplies are required, one at 115 volts, 400 c/s and the other at 115 volts, 1600 c/s. Both are single-phase supplies and are fed to the Protective relay unit via fuses on the control panel. The 400 c/s supply is obtained from the No. 1 radar inverter, Type 350, via the a.c. power distribution box and the 1600 c/s supply is obtained from the No. 2 radar inverter, Type 350, via the a.c. power distribution box. Both supplies are 'live' whenever these inverters are running. Reference should be made to Chapter 1, Group 3, for the control of these inverters, but it should be noted that No. 3 radar inverter, Type 350, can be switched to supply the load of No. 1 or No. 2 inverter if either one should fail.

CONTROL PANEL LIGHTING (*fig.* 8)

50. The lighting of the control panels is on the edge lighting principle, whereby a Cobex' panel is placed over the controls (with the necessary cut-outs, etc.), and in which are buried a number of lamp units fitted with 'P' type filaments (Ref. No. 5L/9959118). The No. 2 control panel has five lamps controlled by a 135 ohm dimmer switch supplied from fuse 17 on the control panel bus-bar No. 2; in addition, a 50 ohm dimmer switch is provided on the panel, and supplied from fuse 17 on the control panel bus-bar No. 2, from the lamps in unit A. There is no built-in-lighting for the No. 3 control panel; this is illuminated by lamps secured to the radio crate, the circuits being described in Chap. 2, Group 1.

ALTERNATIVE STORE (No. 1 CONTROL PANEL ROLE) (*fig.* 9)

Manual release

51. The control panel bus-bar is not 'live' when 28-volt power is connected to the aircraft but only after the D.C. SUPPLIES switch has been selected ON. However, as soon as 28-volt power is connected to the aircraft, the locking indicator circuit is energized and the lamp will come on if a store is locked and the mechanism locked. When the D.C. SUPPLIES switch is selected ON, a supply from panel G is connected via contact R2/1 (4–4a) of the economy relay to the coil R1 of the main supply circuit-breaker, Type B, mounted above panel Z. Contact R1/1 (3–4) closes to connect the same supply to the coil R2 of the economy relay Type S2 which operates in turn to open its contact R2/1 to introduce an economy resistance into the coil circuit of the circuit-breaker. Contact R1/2 (1–2) of the circuit-breaker, which incorporates a thermal overload element, closes to connect a supply from the main 28-volt bus-bar on panel Z to the control panel bus-bar.

52. As soon as panel bus-bar is 'live' a supply from fuse 4 is fed to the carrier and lights up the pressure indicator lamp on the control panel. A supply from fuse 3, is fed to the press-to-test contacts of the 'pressure', 'armed' and 'bomb gone' indicators when the control panel bus-bar is made 'live' and the filaments of these indicators can then be tested. The BOMB SLIP HEATERS switch can now be operated to connect a supply from fuse 2 to the heaters in the carrier via pin J of connector No. 17.

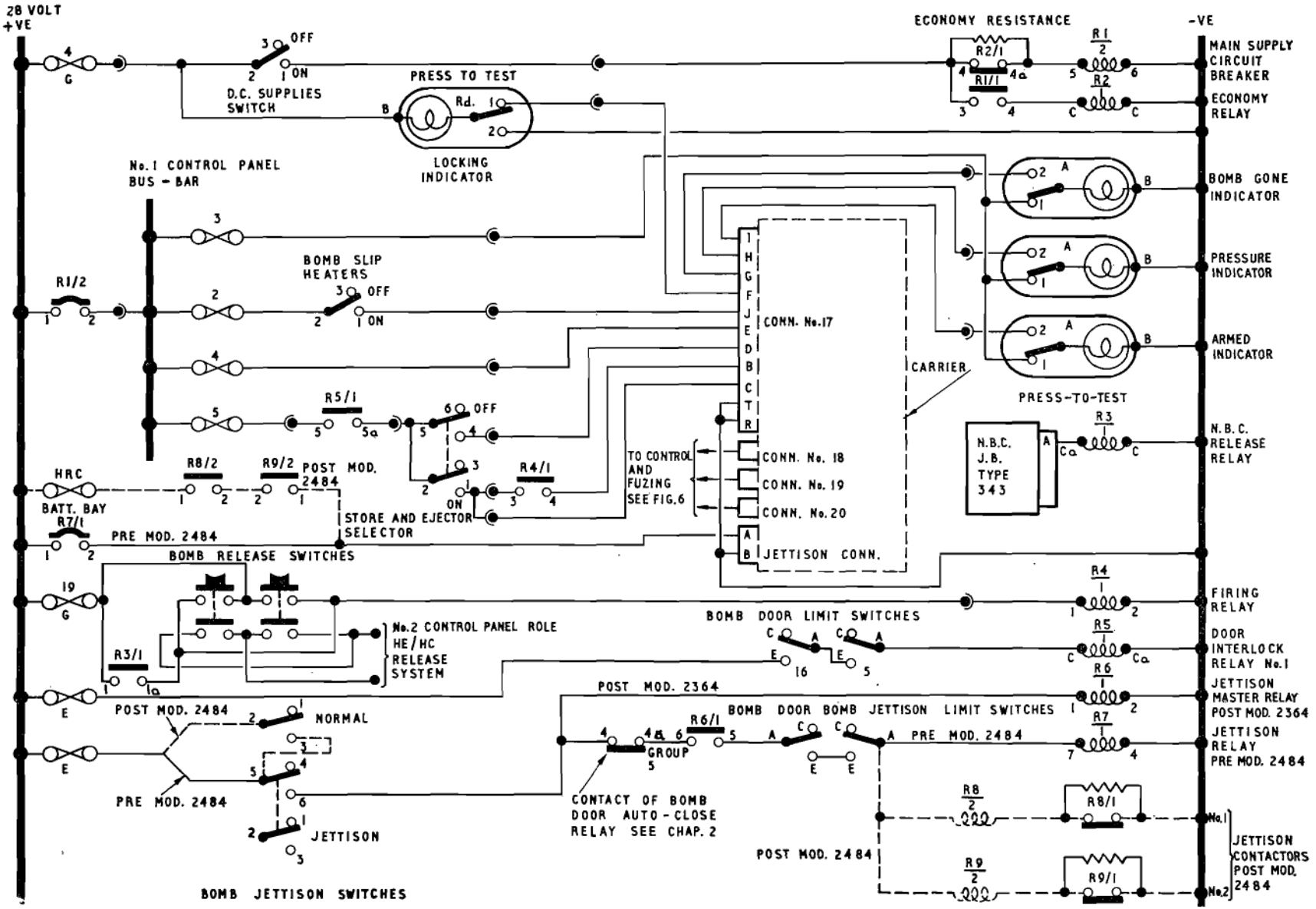


Fig. 9. No. 1 control panel role bomb control release (Mods. 2612, 2645, 2646 or 2725 and 2609)

53. When the bomb doors are fully open, limit switches 16 and 5 in series are made across their contacts A–E to connect a supply from panel E to the coil R5 of the door interlock relay No. 1. Contact R5/1 (5–5a) of this relay closes to connect a supply from fuse 5 on the control panel to the SELECTOR switch, thus preparing the ejector and release circuits. When the SELECTOR switch is selected ON, contact 5–4 of the switch connects this supply (fuse 5) to the ejector circuits in the carrier via pin D of connector No. 17 and contact 2–1 connects this supply (fuse 5) to the ejector circuits via pin C of connector No. 17 and to the contact R4/1 of the release relay. The release system in the carrier is thus armed and a signal from the arming device is fed via pin 1 of connector No. 17 to the 'armed' indicator on the control panel.

54. When a bomb release switch is operated, a supply from panel G is connected to the coil R4 of the firing relay, Type 9B, No. 1. Contact R4/1 (3–4) closes to connect the supply from the SELECTOR (contact 2–1) to the release system in the carrier via pin B of connector No. 17. As the store is released, a signal is fed via pin G of connector No. 17 to the 'bomb gone' indicator on the control panel. This indicator stays on until the D.C. SUPPLIES switch is selected OFF.

N.B.S. Release (*fig.* 9)

55. The circuits operate as for manual release, the only difference being that the firing relay is energized via a contact of the N.B.C. release relay instead of by the bomb release switches. When a release signal from the N.B.S. equipment is initiated (*see Book* 3, *Sect.* 5, *Chap.* 7), it is fed via the N.B.C. junction box, Type 343 (connector No. 12, pin A) to the coil R3 of the N.B.C. release relay, Type S4. Contact R3/1 (1–1a) of this relay closes in parallel with the bomb release switches to connect a supply from fuze 19 on panel G to the coil R4 of the firing relay. This relay operates as for manual release (*see para.* 54) to energize the release system.

Indicators (*fig.* 9)

56. Four indicators are provided as follows:

Locking pin
Pressure
Armed
Bomb gone

All these indicator lamps incorporate a press-to-test switch for testing the filament. Provided that there is 28-volt power on the aircraft and the D.C. SUPPLIES switch is ON any filament can be checked by depressing the face of its lamp. When the lamp face is depressed, one contact of the switch connects the supply from fuze 3 on the control panel bus-bar to the filament whilst the other contact breaks to prevent this supply feeding back into the indicator circuitry. The locking indicator can be checked whenever the aircraft 28–volt system is 'live' (the D.C. SUPPLIES switch need not be ON) and it is negatively switched so that the press-to-test contacts break the indicating circuit and connect the negative side of the filament direct to earth.

57. The locking indicator indicates when a store is loaded and the release system is locked. The indicator is negatively switched via pin F of connector No. 17 to the carrier; the positive supply to this indicator is 'live' whenever 28-volt power is connected to the aircraft and is not dependant upon the D.C. SUPPLIES switch being ON.

58. The 'pressure' indicator lights up after the D.C. SUPPLIES switch has been selected ON. The lamp is controlled in the positive line, the supply being fed via pin H of connector No. 17 to the carrier.

59. The 'armed' indicator lights up after the D.C. SUPPLIES switch has been selected ON, the bomb doors have been opened, the SELECTOR switch has been selected ON and the arming device has operated. The lamp is controlled on the positive line, the supply being fed via pin 1 of connector No. 17 to the carrier.

60. The 'bomb gone' indicator operates after the D.C. SUPPLIES switch has been selected ON, the bomb doors have been opened, the SELECTOR switch has been selected ON and the bomb release has operated. The lamp is switched in the positive line, the supply being fed via pin G on connector No. 17 to the carrier.

Jettison release (*fig.* 9)

61. The jettison circuits are the same as for normal stores carried at No. 3 position except that the release unit is in the carrier. A separate jettison release line (fixed wiring) is connected to the jettison circuits at the jettison heavy-duty connector block at the forward end of the bomb bay and is run to a 2-pin socket which is normally stowed in a stowage mounted on a bracket adjacent to bomb station 5 (port side). When the carrier is loaded, this socket is removed from its stowage and connected to the carrier.

62. When the BOMB JETTISON switch on the control pedestal is selected JETTISON, a supply from panel E is connected to the coil R6 of the jettison master relay, Type Q, in the battery bay. The contact R6/1 of this relay closes to connect the supply from the BOMB JETTISON switch to the bomb door operated 'bomb jettison supply' limit switches via the normally closed contact 4–4a of the bomb door auto-close relay (*see Sect.* 5, *Chap.* 2, *Group* 5). When the bomb doors reach the fully open position, these micro-switches are made across their contacts A–E, to connect the supply to the coil R7 of the jettison relay (circuit-breaker Type D) in the battery bay.

63. Contact R7/1 of the jettison relay closes to connect a supply from the 24-volt battery, unfused, via the bomb jettison heavy-duty connector block at the forward end of the battery bay to the carrier via the 2-pin jettison connector (pin A); the negative return is carried back to a local earth on the aircraft via the connector pin B.

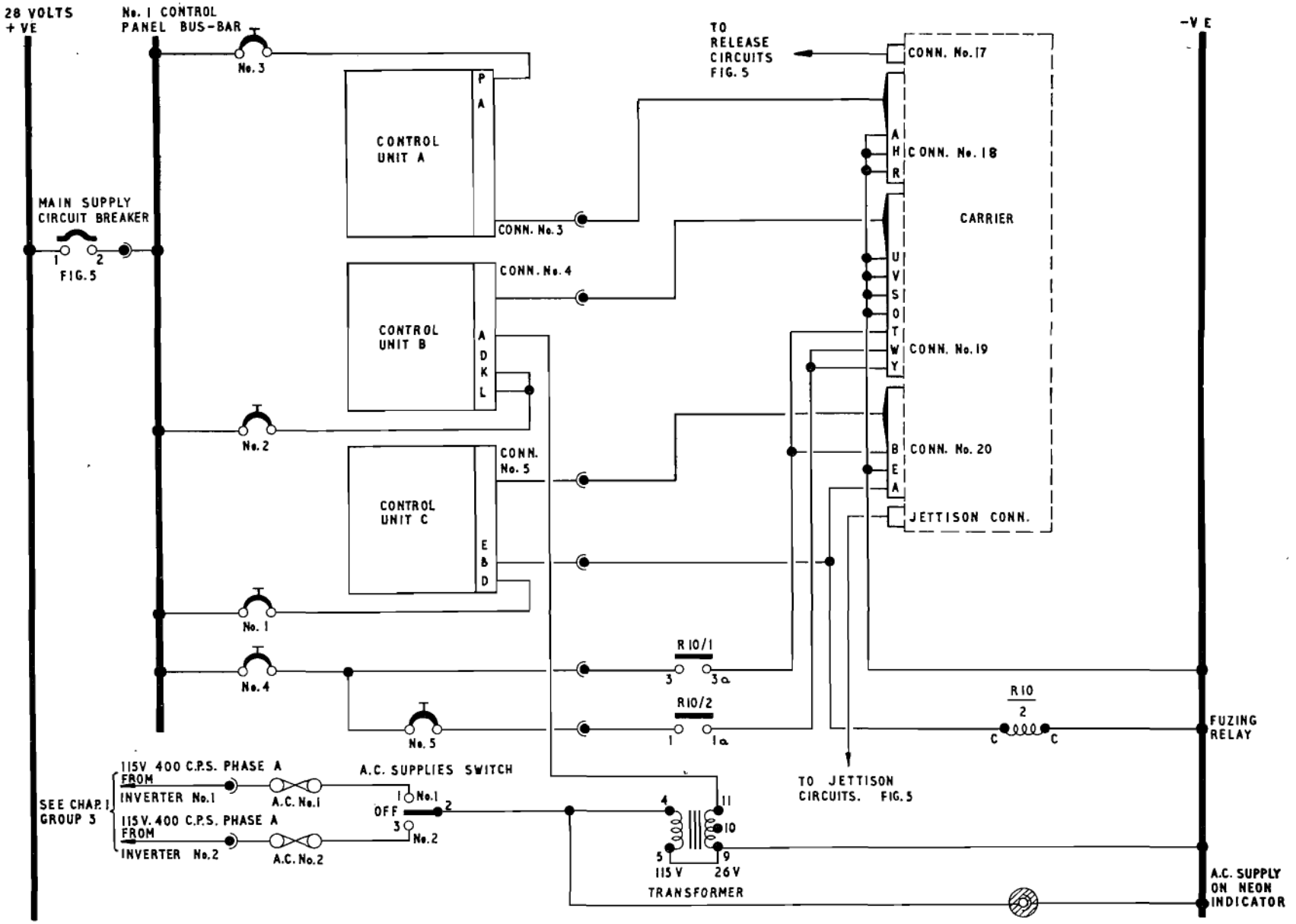


Fig. 10. No. 1 control panel role bomb control and fuzing (Mods. 2612, 2645, 2646 or 2725 and 2609)

64. When the time switch signals the bomb doors to close (*see Sect.* 5, *Chap.* 2, *Group* 5) the supply to the jettison relay is broken by contacts 4–4a of the bomb door auto-close relay and the circuit is further isolated when the bomb jettison micro-switches break contact A–E as the bomb doors start to close.

Post Mod. 2484 (*fig.* 9)

65. Mod. 2484 introduces an extra (single-pole) BOMB JETTISON switch on the control pedestal mechanically linked externally to the original double-pole switch. In addition, the jettison relay (circuit-breaker Type D), has been replaced by two contactors (Ref. No. 5CW/4387) with their main contacts connected in series. These contactors are mounted in the battery bay such that the direction of operation of the contacts on No. 1 is opposite to that for No. 2 in order to prevent inadvertant operation due to 'g' forces. A 60 amp. H.R.C. fuse is fitted in the circuit.

66. The operation of the circuit is similar to pre-Mod. 2484 except that the supply from panel E to the door jettison limit switches is now switched by the two BOMB JETTISON switches in series. The two jettison contactor coils R8 and R9 are energized in parallel, their contacts R8/2 and R9/2 closing in series to connect a supply from the 24-volt battery via the 60 amp. H.R.C. fuse mounted in the battery bay to the 2-pin jettison connector. Contacts R8/1 and R9/1 of the jettison contactors operate to connect economy resistances into their respective coil circuits.

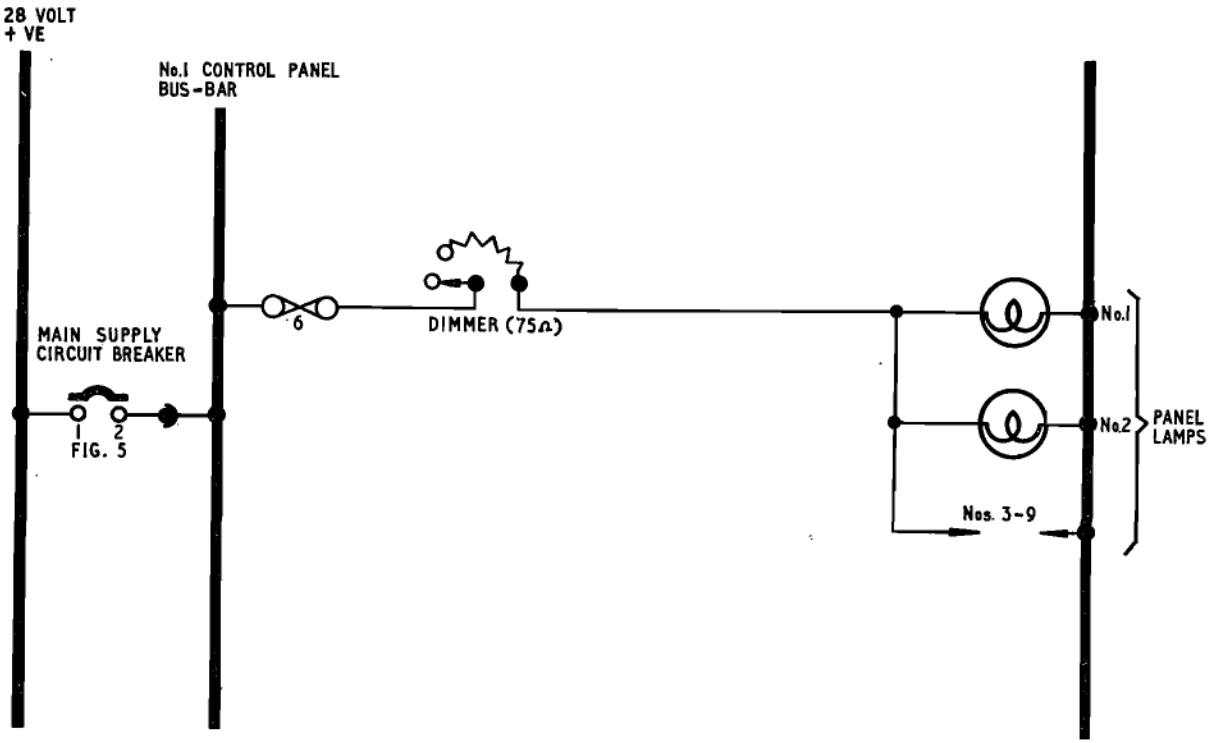


Fig. 11. No. 1 control panel lighting (Mod. 2609)

Control and Fuzing (*fig.* 10)

67. Bomb control and fuzing is determined by settings on the three control units A, B and C. There are no special safety precautions, but none of the control units can operate unless the D.C. SUPPLIES switch has been selected ON and the individual control unit circuit-breakers have been made.

68. When the D.C. SUPPLIES switch is selected ON, the main supply circuit-breaker connects the main 28-volt supply to the panel bus-bar. From here, individual supplies are fed to the three control units via circuit-breakers 1, 2 and 3 for units C, B and A respectively. Signals from all three control units are fed direct to the carrier via connectors 18, 19 and 20 for units A, B and C respectively. In addition, the control unit C controls the fuzing relay R10, Type S2. When this relay is energized, it closes its contacts R10/1 and R10/2 to connect supplies to the carrier. Contact R10/1 (3–3a) connects a supply from circuit-breaker No. 4 on the control panel to the carrier via connector No. 19, pin T and contact 20, pin B; contact R10/2 (1–1a) connects the supply from circuit-breaker No. 4 via circuit-breaker No. 5 to the carrier via connector No. 19, pins W and Y.

A.C. Supply (*fig.* 10)

69. Two a.c. supplies are provided, one as a standby for the other. Both are single-phase supplies at 115-volts, 400 c.p.s., No. 1 supply being obtained from No. 1 radar inverter, Type 350, and No. 2 supply being obtained from No, 2 radar inverter, Type 350, The supplies are fed via the a.c. power distribution box and are fused on the control panel; also on the control panel is the A.C. SUPPLIES switch which is used to select either supply. From the switch the 115-volt supply is connected to the 'a.c. supply on' neon indicator and to the primary winding of a single-phase transformer. The 26-volt

tapping on the secondary winding of the transformer is used and the supply at 26-volts is fed to the control unit B.

70. Reference should be made to Sect. 5, Chap. 1, Group 3 for the control of the radar inverters, Type 350, but it should be noted that No. 3 radar inverter can be switched to supply the load of No. 1 or No. 2 inverter if either one should fail.

Control Panel Lighting (*fig.* 11)

71. The edge-lighting principle is used for illuminating the No. 1 CONTROL PANEL, whereby a 'Cobex' panel (or light guide) is placed over the controls (with the necessary cut-outs etc.) and in which are buried a number of lamp units fitted with 'P' type filaments; the caps of these lamp units are used to secure the 'Cobex' panel to the main panel. Nine such lamps are used on this panel and they are controlled by a 75-ohm dimmer switch, the supply being fed from fuse No. 6 in the control panel when the D.C. SUPPLIES switch has been selected ON.

SERVICING

Introduction

72. Reference should be made to the General Information Group immediately following the Section 5 marker card, for the general principle of servicing and fault finding, for information on the care of equipment and for general precautionary measures.

73. The following notes are intended to assist in the servicing of equipment and are not intended to provide a complete fault finding analysis. If a circuit goes unserviceable, the routine fault finding procedures should be adopted to locate the fault.

Note . . .

The bomb release switches have soldered connections, frequent inspections should be made to ensure that the connections are sound otherwise leads or strands may break off and short together thereby providing an unintentional bomb release signal when the bomb doors are opened.

ALTERNATIVE STORE 10,000 lb. M.C. (No. 3 CONTROL PANEL)

74. For routine servicing, continuity checks only can be carried out for this installation. These should be done after the checks detailed in group 1.

Release circuits

75. Pin-to-pin continuity checks should be carried out as below. Each pin on a connector plug or socket must be checked for continuity with the pin of the plug or socket at the other end of the cable and also for non-continuity with each other pin at the other end of the cable.

(1) Remove and check fuses Nos. 1, 2 and 3 on panel G. Check for continuity and short circuits from panel G, connector block V, terminals 1, 2, 3 and 4 to the B.C.U. supply plug (stowed on stowage panel). Pin D to earth. Replace fuses.
(2) Remove the dark green and white connector from the back of the power distribution box and make a continuity and short-circuit check between this and the time-of-fall calculator supply plug. Pin E to earth. Replace dark green and white connector.
(3) Remove connector No. 51 from the N.B.C. junction box, Type 343 and make a continuity and short-circuit check between this and the time-of-fall calculator N.B.C. interconnection plug.
(4) Make a continuity and short-circuit check between the F.C.U. connector No. 20, plain (stowed on stowage panel) and the time-of-fall calculator bomb control interconnection plug.
(5) Make a continuity and short-circuit check between the plugs of the interconnector from the pilot's remote control unit to the time-of-fall calculator.
(6) Make a continuity and short-circuit check between the F.C.U. connector No. 11, plain (stowed on stowage panel) and the front No. 2, port, snatch plug connector in the bomb bay.
(7) Make a continuity and short-circuit check between the F.C.U. connector No. 12, red (stowed on stowage panel) and the rear No. 1, port, snatch plug connector in the bomb bay.
(8) Make a continuity and short-circuit check between the F.C.U. connector No. 13, yellow (stowed on the stowage panel) and the rear No. 2, port, snatch plug connector in the bomb bay.
(9) Make a continuity and short-circuit check between the F.C.U. connector No. 14, black (stowed on the stowage panel) and the front No. 2, starboard, snatch plug connector in the bomb bay.
(10) Make a continuity and short-circuit check between the F.C.U. connector No. 15, green (stowed on the stowage panel) and the rear No. 1, starboard, snatch plug connector in the bomb bay.
(11) Make a continuity and short-circuit check between the F.C.U. connector No. 16, blue (stowed on the stowage panel) and the rear No. 2, starboard, snatch plug connector in the bomb bay.
(12) Make a continuity and short-circuit check between the F.C.U. connector No. 18, plain (stowed on the stowage panel) and terminals W7 and W8 on panel G.
(13) Make a continuity and short circuit check between the F.C.U. connector No. 50, plain (stowed on the stowage panel) and pins C and D of the E.M.

fuzing unit connector aft of bomb station 2 in the bomb bay.

(14) Make a continuity and short-circuit check between the F.C.U. connector No. 49, plain (stowed on the stowage panel) and pins A and B (Pin E to earth) of the E.M. fuzing connector aft of bomb station 2 in the bomb bay.

Release function

Note . . .

The aircraft is assumed to be in the 10,000 *lb. M.C. alternative store role for these checks, further tests on the installation with the aid of special test gear are required before loading the store. Instructions on the use of this test gear are not included in this Air Publication.*

76. Check that the B.C.U., F.C.U. and Time-of-fall controls and all other removable equipment associated with this role are fitted. If Mod. 2612, 2645, 2646 or 2725 is incorporated on the aircraft, the No. 3 control panel (Mod. 2611) will have to be fitted and made secure and this panel should carry the Bomb Control Unit (Ref. No. 5D/1782) in lieu of the 12/24 bomb aimer's control panel.

77. Connect up both 112-volt and 28-volt external supplies, select the 24-volt battery switch to ON. Open the bomb doors and set the trip switch to TRIP—the green lamp should come on to indicate safe working conditions. Disconnect the deflector and the door jettison time switch and then proceed as follows:—

(1) Depress the TEST switch on the B.C.U. and check the flag indicator.

(2) Select the MASTER switch on the B.C.U. to ON.

(3) Both the bomb release switch at the bomb aimer's position on the radio crate and that at the visual bombing position should be used for the following checks. The LIVE JETTISON switch at the visual position will not be operative.

(4) With an 80-watt test lamp connected to the No. 3 position normal release 2-way (3-way, post Mod. 2908) terminal block (terminal A2, structure earth), operate a bomb release switch and check that the lamp pulses once and that the flag indicator on the B.C.U. operates. Repeat, using the other bomb release switch.

(5) With a test lamp connected to the No. 3 position jettison release 2-way (3-way, post Mod. 2908) terminal block (terminal A1, structure earth), operate a bomb release switch and check that the lamp pulses once. Repeat, using the other bomb release switch.

Jettison release

78. For operations (1), (2) and (3) the bomb door control time switch must be disconnected.

Note . . .

Before every flight, the jettison contactors introduced by Mod. 2472 *or* 2484 *MUST be checked to ensure that they are not interlocked. This will not be necessary post Mod.* 2781 *as the contactors fitted will not have interlocks.*

(1) With the bomb doors, etc., in the same condition as for the normal release checks (*para.* 56), switch the BOMB JETTISON switch on the control pedestal to JETTISON.

(2) Check with a test lamp for a continuous supply at the No. 3 position jettison release terminal block (terminal A1, structure earth).

(3) Return the BOMB JETTISON switch to NORMAL, close the guard and fit the safety pin.

(4) Reconnect the deflector, the door control time switch, close the bomb doors (if required) and remove external supplies. Select the 24-volt battery switch to OFF.

Chimney service (pre-Mod. 2612, 2645, 2646 or 2725 only)

79. Check that the two circuit-breakers on the pre-selector panel are reset. Then proceed as follows:—

(1) With the external ground supply disconnected, switch the 24-volt battery switch to ON.

(2) With the chimney control switch at UP, check with a test lamp for continuity at pin 2 of the chimney No. 1 connector using pin 4 as the negative return.

(3) With the control switch at DOWN, check with a test lamp for continuity at pin 8 of the chimney No. 1 connector using pin 4 as the negative return.

(4) With the emergency control switch at UP, check with a test lamp for continuity at pin 2 of the chimney No. 2 connector using pin 4 of No. 1 connector as the negative return. Check that there is no supply to pin 2 of No. 1 connector.

(5) With the emergency control switch at DOWN, check with a test lamp for continuity at pin 8 of the chimney No. 2 connector using pin 4 of No. 1 connector as the negative return. Check that there is no supply to pin 8 of No. 1 connector.

(6) Connect the 28-volt external supply, 24-volt battery switch ON.

(7) Check with the test lamp that there is no supply on terminal W2 on panel G.

(8) Check for continuity with a test lamp on pins 2 and 8 of the chimney No. 1 connector with the servicing switch at UP and DOWN respectively and that there is no supply with the switch at INCH.

(9) Place the servicing switch to INCH. Check for continuity with the test lamp on pins 2 and 8 of the chimney No. 1 connector with the inching switch at UP and DOWN respectively, and that there is no supply with the switch at its central position.

(10) Check for continuity of 28-volt supply on pin 1 of chimney No. 1 and No. 2 connectors after resetting the two circuit-breakers on the pre-selector panel in the battery bay.

(11) Disconnect the external 28-volt supply and switch 24-volt battery switch to OFF.

(12) With a 24-volt battery and test lamp carry out a continuity check between connector No. 35, plain, of the F.C.U. (this is stowed on stowage panel) and

the test socket on the pre-selector panel and the chimney No. 1 and No. 2 connectors as follows:—

Connector No. 35		*Test Socket*	*Chimney No. 1*	*Chimney No. 2*
Pin C	to	Pin D	—	Pin 3
Pin D	to	Pin E	—	Pin 7
Pin E	to	Pin B	Pin 7	—
Pin F	to	Pin A	Pin 3	—
		Pin C—earth	Pin 4—earth	

ALTERNATIVE STORE (No. 2 CONTROL PANEL ROLE)

80. The following checks assume the aircraft to be in this role, i.e. the No. 2 control panel (Mod. 2610), complete with removable equipment, has been fitted to the radio crate, made secure and connected up using the appropriate numbered connectors from the stowage panel on the top of the radio crate, the appropriate numbered connectors have been removed from the stowage panel aft of the rear spar and the cables fed through the 'gaiter' in the bomb bay roof and run to the carrier position (straps are provided on the bomb bay roof members to support these cables) and the 'gaiter' fastened up using its zip fastener and strap. Preloading checks and function testing of the bomb controls will be carried out with the aid of specialist test equipment which can be connected to the carrier. Description of the use of this test equipment is not given in this Air Publication.

Release circuits

81. Connect up both 112-volt and 28-volt external supplies, select the 24-volt battery switch and instrument master switches ON, then proceed as follows:—

(1) Close the bomb doors.

(2) Raise the deflector only by selecting the BOMB DOORS switch to AUTO. This gives access to the bomb bay but leaves the bomb doors closed.

(3) Select the SELECTOR switch to ON.

(4) Operate a bomb release switch and check with a 24-volt test lamp that there is no positive supply on pins B, C and D of connector No. 17 in the bomb bay, using pin T as earth.

(5) With the bomb release switch still depressed, connect together pins E and F of connector No. 17 in the bomb bay and check that the indicator lamp lights up. Provided that checks under item 4 are satisfactory, this may be taken as an indication to the operator in the cabin that the bomb release switch may now be released.

(6) Remove the shorting link from connector No. 17 (pins E and F) and return the SELECTOR switch to OFF.

(7) Ensure that all personnel are clear of the bomb bay, then select the BOMB DOORS switch to OPEN. Select the doors TRIP switch to TRIP and check that the green safe lamp is indicating.

(8) With a 24-volt test lamp connected across pins C and T (earth) of connector No. 17, check that the lamp lights up when the SELECTOR switch is selected ON. Leave the switch at ON.

(9) Connect together pins B and T of connector No. 17 and check that No. 1 'cocking test and release' indicator changes from black to black-and-white. Repeat for No. 2 indicator using pins D and T of the connector.

(10) Remove the shorting links.

(11) Press a bomb release switch and check that a 24-volt test lamp lights up when connected across connector No. 17 pins B and T and also D and T in turn. Pin T is negative. Repeat, using the alternative bomb release switch.

(12) To check the N.B.S. release, operate the N.B.C. controls to give a release pulse and check that a 24-volt test lamp connected across pins B and T of connector No. 17 lights up as the pulse is made. Repeat, using pins D and T of the connector.

Note . . .

If the N.B.S. equipment is not fitted, there is no need to check the N.B.S. release system.

(13) Close the bomb doors (if required) after selecting the TRIP switch to NORMAL, ensure that all switches are in the normal (safe) positions, remove all shorting links, etc., and disconnect the external supplies.

Jettison release

Note . . .

Before every flight, the jettison contactors introduced by Mod. 2472 *or* 2484 *MUST be checked to ensure that they are not interlocked. This will not be necessary post Mod.* 2781 *as the contactors then fitted will not have interlocks.*

82. (1) Connect both 112-volt and 28-volt external supplies. Select the 24-volt battery switch to ON.

(2) Open the bomb doors (if not already open). Select the TRIP switch to TRIP.

(3) Connect a 24-volt test lamp across pins A and B (earth) if the 2-pin jettison release connector in the bomb bay in such a way that the lamp will remain connected without being held.

(4) Return the bomb door TRIP switch to NORMAL and close the bomb doors.

(5) With an operator clear of the bomb doors, but in a position to see the test lamp, select the BOMB JETTISON switch on the control pedestal to JETTISON. Check that the lamp lights up when the bomb doors reach the fully open position.

WARNING . . .

On no account allow any personnel to enter the bomb bay as the doors will automatically close at the end of the time cycle.

(6) Select the BOMB JETTISON switch to NORMAL and the BOMB DOORS switch to open and then the TRIP switch to TRIP. Remove the test lamp.
(7) Close bomb doors (if required) after returning TRIP switch to NORMAL.
(8) Remove external supplies select 24-volt battery switch OFF.

Control and fuzing

83. Very little can be checked during normal servicing other than checking a few interlocks and continuity tests on connectors, etc. Functioning of the controls will be carried out with the aid of the specialist test equipment connected to the carrier with the carrier in position.

84. Circuit checks may be carried out as follows:—
(1) Connect up both 112-volt and 28-volt external supplies, switch 24-volt battery switch to ON.
(2) Check that the bomb doors are closed, close if open.
(3) With a 24-volt test lamp, check for positive supply on pin C of the 12-pin connector to the protective relay unit using pin H as negative.
(4) With a 24-volt test lamp, check for positive supply on pin A of each of the two 4-pin connectors to the protective relay unit using pin B as negative.
(5) Apply air pressure to the starboard pitot head equivalent to an air speed of 80-85 knots, then check with a 24-volt test lamp for a positive supply on pin E of the 12-pin connector to the protective relay unit using pin H as negative. Release air pressure.
(6) Depress the nose undercarriage uplock indicator micro switch to the undercarriage up position and check with a 24-volt test lamp for a positive supply on pin B of the 12-pin connector to the protective relay unit using pin H as negative. Release the micro switch.
(7) Operate the E.P. POWER SUPPLIES switch to EMERGENCY OVERRIDE and check for positive supplies on pins B and E of the 12-pin connector to the protective relay unit using pin H as negative. Return switch to normal.
(8) Check with a 24-volt test lamp for a positive supply on pins E and F of the 6-pin connector to the unit A on the control panel using the panel local earth as negative.
(9) Open the bomb doors.
(10) Check with a 24-volt test lamp for a positive supply on pins K and L of the 12-pin connector to the protective relay unit using pin H as negative.
(11) Depress a bomb release and check with the 24-volt test lamp for a positive supply on pins A and M of the 12-pin connector to the protective relay unit using pin H as negative.
(12) Switch on Nos. 1 and 2 radar inverters, Type 350, and check for 115-volts, 1600 c/s on pin G of the 12-pin connector to the protective relay unit using pin H as earth. Check for 115-volts, 400 c/s on pin C of the 6-pin connector to the protective relay unit using pin B as earth.
(13) Switch off the radar inverters.
(14) Check the cables for continuity from the fuzing Unit A to the fuzing Unit B and from the fuzing Unit B to the carrier connectors 21 and 22.
(15) Reconnect all connectors.
(16) Close the bomb doors (if required).
(17) Switch 24-volt battery switch to OFF, check all other switches to the normal (safe) condition and remove external supplies.

Panel lighting

85. Whichever control panel is fitted (except No. 3), switch on the 24-volt battery switch, switch off all other lamps in the cabin, close the door, draw the side window black-out screen and draw the pilot's curtain. Switch on the panel lighting dimmer switch and check all filaments and satisfactory operation of the dimmer. Switch off, withdraw the black-out screens and curtains and switch off the 24-volt battery.

ALTERNATIVE STORE (No. 1 CONTROL PANEL ROLE)

86. The following notes assume that the aircraft has been prepared for the No. 1 control panel role (*see para.* 4) and are intended to assist in the servicing of equipment and are not intended to provide a complete fault finding analysis. If a circuit goes unserviceable, the routine fault finding procedures should be adopted to locate the fault. Pre-loading checks and function testing of the bomb controls will be carried out with the aid of specialist test equipment (ref. No. 11A/4920) which can be connected to the cables normally connected to the carrier junction box.

Release circuits

87. Connect up both 112-volt and 28-volt external supplies and select the 24-volt battery switch to ON, then proceed as follows:
(1) Close the bomb doors, if open.
(2) Raise the deflector only by selecting the BOMB DOORS switch to AUTO. This gives access to the bomb bay but leaves the bomb doors closed.
(3) Link pin F to pin T or R (negative) of connector No. 17 in the bomb bay and check that the locking indicator lights up. Remove the link.
(4) Select the control panel D.C. SUPPLIES switch to ON.
(5) Test the filaments of the pressure, armed and 'bomb gone' indicators by pressing the face of the indicators.
(6) Link together pins E and H of connector No. 17 in the bomb bay; the pressure indicator should come on. Remove the link.
(7) Select the control panel BOMB SLIP HEATERS switch to ON and check with 24-volt test lamp for a positive supply on pin J of connector No. 17 in the bomb bay using pins T or R as negative. Select the switch OFF.
(8) Select the control panel SELECTOR switch to ON and check with a 24-volt test lamp that there is no supply on pins D, B and C of connector No. 17 in the bomb bay using pins T or R as negative. Leave the switch at ON.

(9) Ensure that all personnel are clear of the bomb bay, then select the BOMB DOORS switch to OPEN. Select the doors TRIP switch to TRIP and check that the green safe lamp is indicating.
(10) With a 24-volt test lamp, check that there is a positive supply on pins C and D of connector No. 17 in the bomb bay using pins T or R as negative.
(11) Link together pins D and I of connector No. 17 and check that the armed indicator lights up. Remove the link.
(12) Link together pins B and G of connector No. 17, then depress a bomb release switch and check that the 'bomb gone' indicator lights up. Release the switch but leave the link in position. Repeat using the alternative bomb release switch.
(13) If the N.B.S. equipment is fitted, link together pins B and G of connector No. 17 then operate the N.B.C. controls to produce a bomb release pulse and check that the 'bomb gone' indicator lights up as the pulse is made. Remove the link.

Note . . .

There is no need to check the N.B.S. release wiring if the N.B.S. equipment is not fitted.

(14) Check that all links are removed, return all switches to their normal (safe) position.
(15) Close the bomb doors (if required) after selecting the TRIP switch to NORMAL.
(16) Remove external supplies.

Jettison release

88. Connect up both 112-volt and 28-volt external supplies. Select the 24-volt battery switch to ON and then proceed as follows:
(1) Open the bomb doors and select the doors TRIP switch to TRIP. Check that the green safe lamp is indicating.
(2) Connect a 24-volt test lamp to the 2-pin jettison connector in the bomb bay in such a way that it will remain in position without being held.
(3) Return the doors TRIP switch to NORMAL and close the bomb doors.
(4) With an operator clear of the bomb bay but in a position to see the test lamp, select the BOMB JETTISON switch on the control pedestal to JETTISON. Check that the lamp lights up when the bomb doors reach the fully open position.

WARNING . . .

On no account allow any personnel to enter the bomb bay as the doors will automatically close at the end of the time cycle.

(5) Select the BOMB JETTISON switch to NORMAL and the BOMB DOORS switch OPEN. When the doors are open, select the doors TRIP switch to TRIP.
(6) Remove the test lamp and connect the connector to its stowage if the store is not to be loaded immediately.
(7) Close the bomb doors (if required) after returning the doors TRIP switch to NORMAL.
(8) Remove the external supplies and select the 24-volt battery switch to OFF.

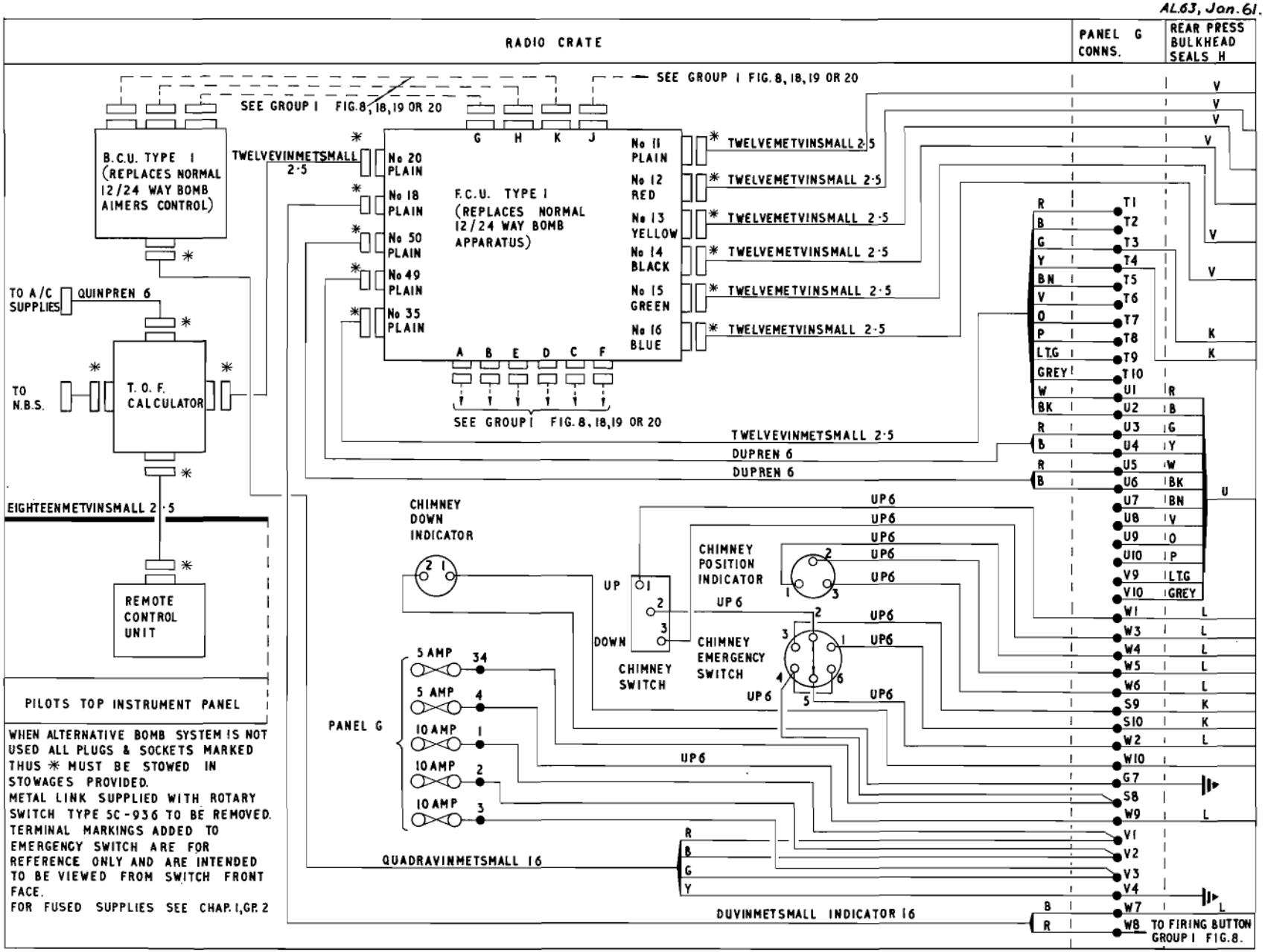
Control and fuzing

89. Very little can be checked during normal servicing other than continuity and supply checks. Functioning of the controls will be carried out with the aid of specialist test equipment connected to the carrier with the carrier in position.

90. Circuit checks may be carried out as follows:
(1) Connect up both 112-volt and 28-volt external supplies. Select the 24-volt battery switch to ON.
(2) Open the bomb doors and select the doors TRIP switch to TRIP. Check that the green safe lamp is indicating.
(3) Reset all the circuit-breakers on the control panel.
(4) Select the control power D.C. SUPPLIES switch to ON.
(5) With a 24-volt test lamp, check for a positive supply on pin P of connector No. 3, pins R and L of connector No. 4 and pin D of connector No. 5 using the panel structure as earth return.
(6) Connect a 28-volt supply to pin 3 of connector No. 5 and check with a 24-volt test lamp for a positive supply on pins T, W and Y of connector No. 19 and B of connector No. 20 in the bomb bay. Remove the 28-volt supply, and then check that there is no supply on these pins of connectors No. 19 and No. 20.
(7) Continuity and short-circuit test between connector Nos. 3, 4 and 5 and 18, 19 and 20 respectively.
(8) Switch on Nos. 1 and 2 radar inverters, Type 350.
(9) Select the control panel A.C. SUPPLIES switch to No. 1, check that the supply neon indicator comes on, then check for 26 volts, 400 c.p.s., a.c. on pin A of connector No. 4 using the panel structure as earth. Repeat with the switch selected to No. 2.
(10) Select the A.C. SUPPLIES switch to OFF (the neon indicator should go out), the D.C. SUPPLIES switch to OFF (the neon indicator should go out), the D.C. SUPPLIES switch to OFF and trip the circuit-breakers.
(11) Connect up all appropriate connectors.
(12) Close the bomb doors (if required) after returning the doors TRIP switch to NORMAL.
(13) Remove the external supplies and select the 24-volt battery switch to OFF.

Panel lighting

91. Select the 24-volt battery switch to ON, switch off all other lamps in the cabin, close the door, draw the side window black-out screen and draw the pilots curtain. Switch on the panel lighting dimmer switch and check all filaments and satisfactory operation of the dimmer. Switch off, withdraw the black-out screens and curtains and switch off the 24-volt battery.



WHEN ALTERNATIVE BOMB SYSTEM IS NOT USED ALL PLUGS & SOCKETS MARKED THUS ✳ MUST BE STOWED IN STOWAGES PROVIDED.
METAL LINK SUPPLIED WITH ROTARY SWITCH TYPE 5C-936 TO BE REMOVED.
TERMINAL MARKINGS ADDED TO EMERGENCY SWITCH ARE FOR REFERENCE ONLY AND ARE INTENDED TO BE VIEWED FROM SWITCH FRONT FACE.
FOR FUSED SUPPLIES SEE CHAP. 1, GP. 2

Fig. 12 (1) 10,000 lb M.C. Alternative bombing installation (pre Mod 2612, 2645, 2646 or 2725)

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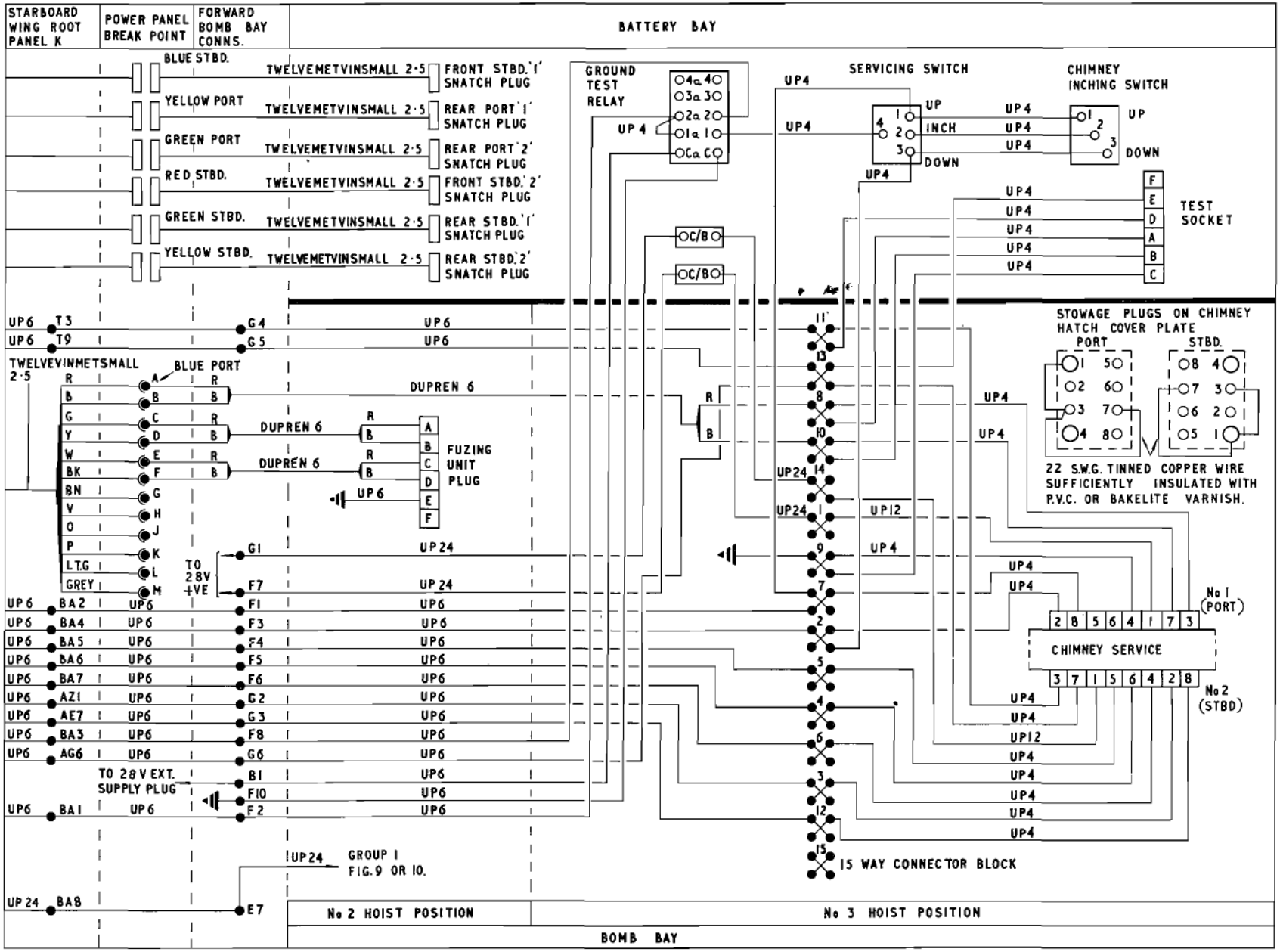

Fig. 12 (2) 10,000lb M.C. Alternative bombing installation (pre Mod 2612, 2645, 2646 or 2725)

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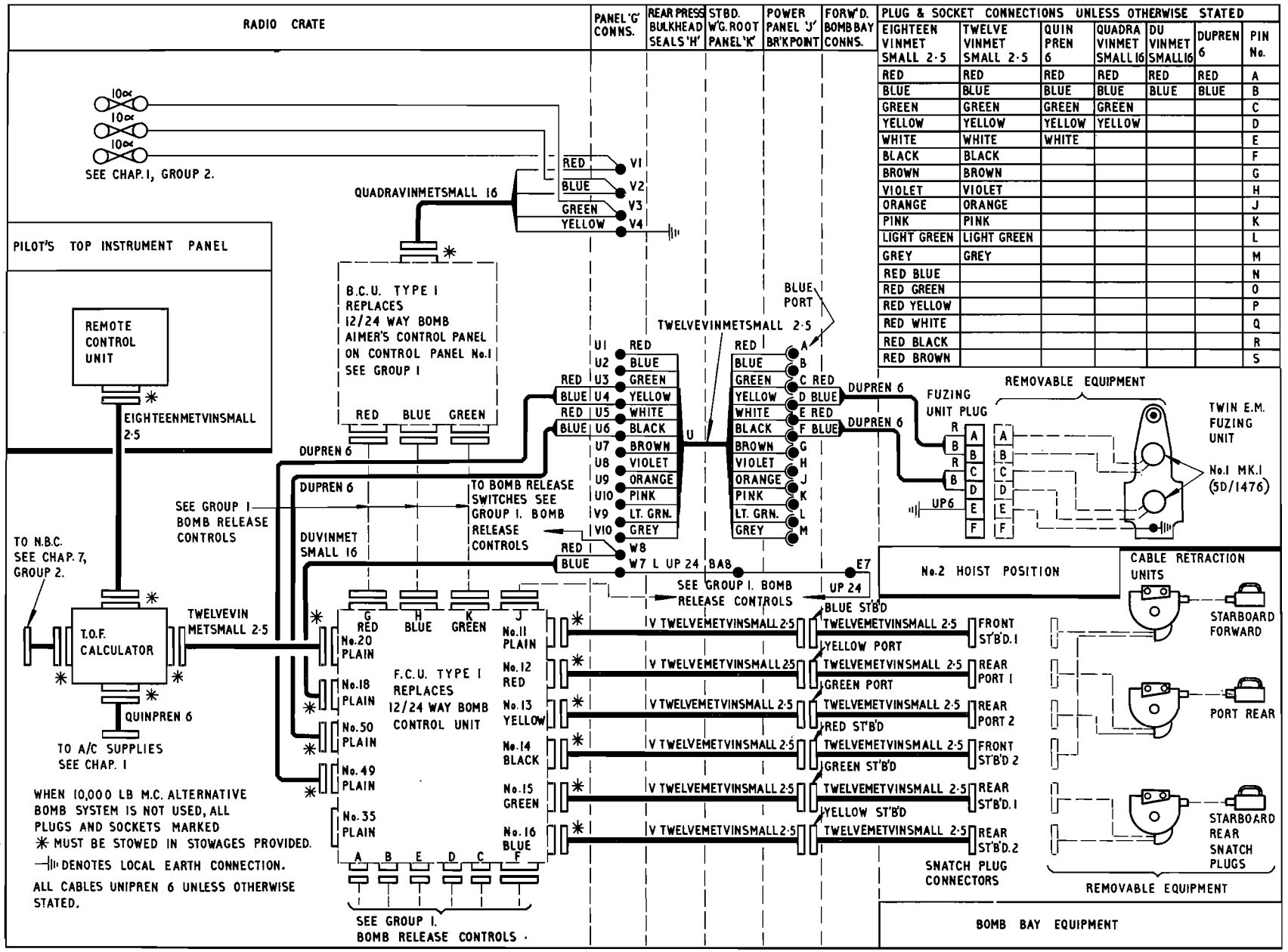

Fig.13 10,000 lb M.C. Alternative bomb installation (post Mod. 2612, 2645, 2646 or 2725)

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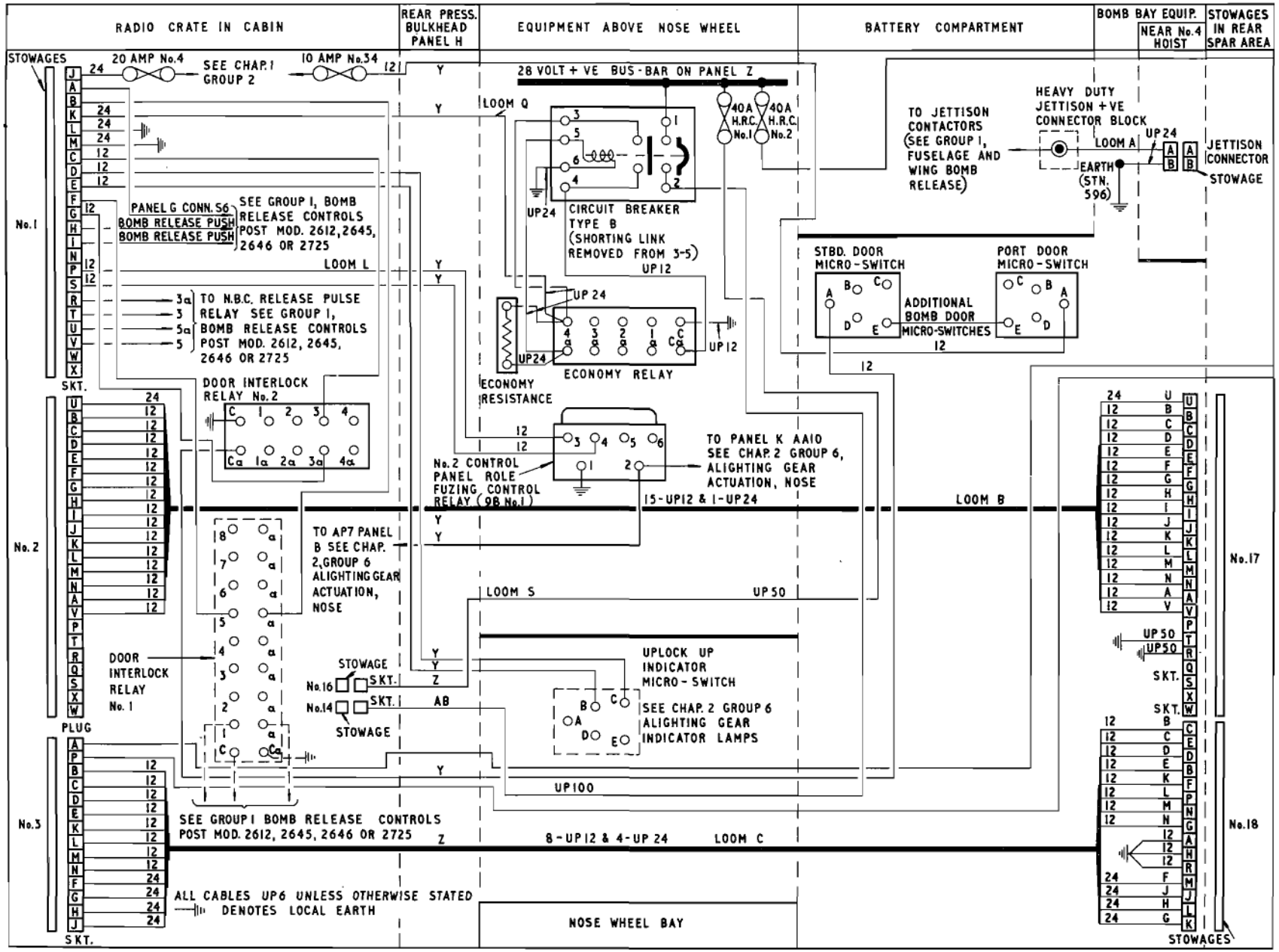

Fig.14 (1) Alternative bomb installation, integrated, fixed wiring (Mod. 2612, 2645, 2646 or 2725 includes Mods 2758 and 2759)

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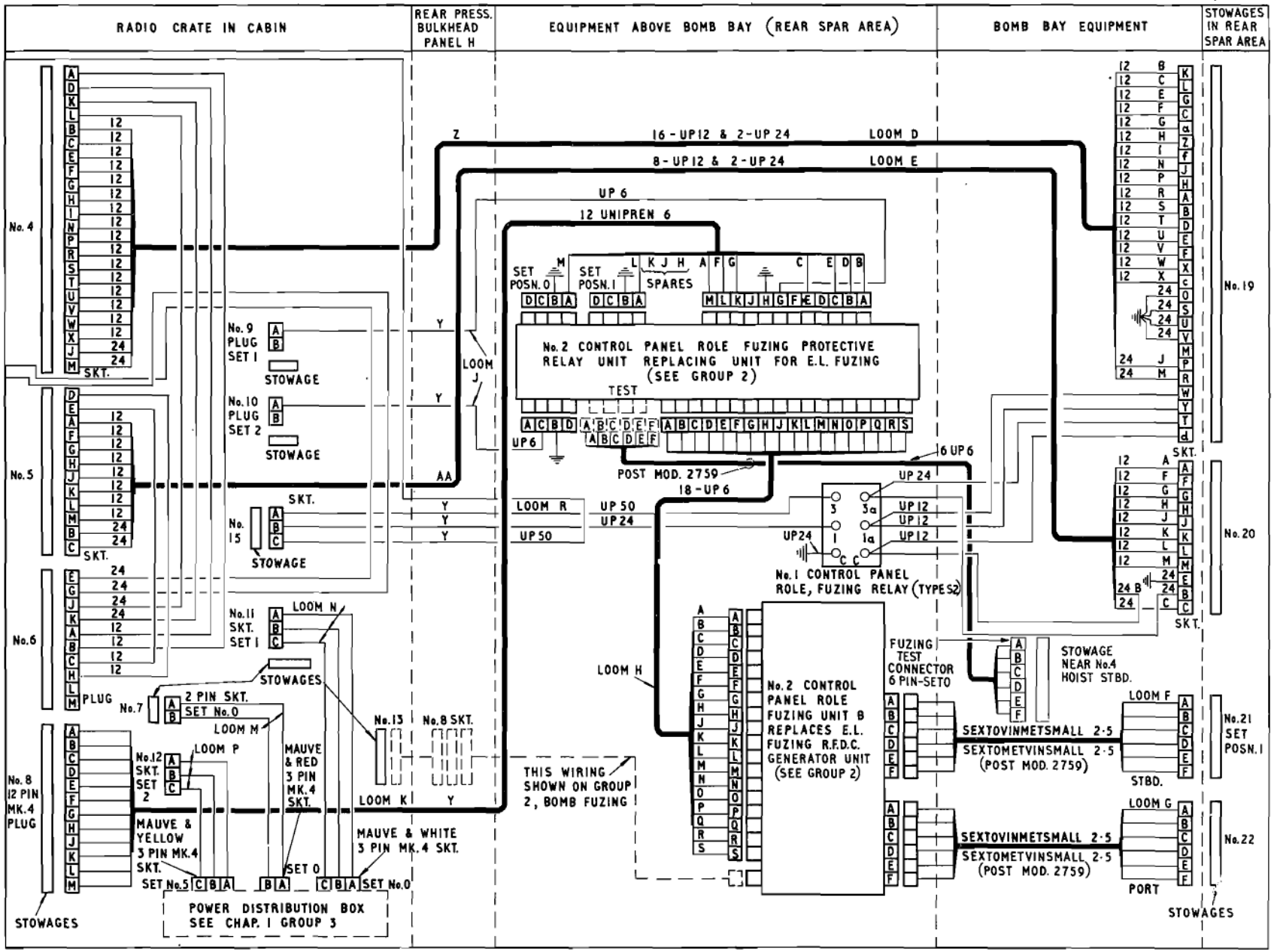

Fig. 14 (2) Alternative bomb installation, integrated, fixed wiring (Mod. 2612, 2645, 2646 or 2725) includes Mods. 2758 and 2759

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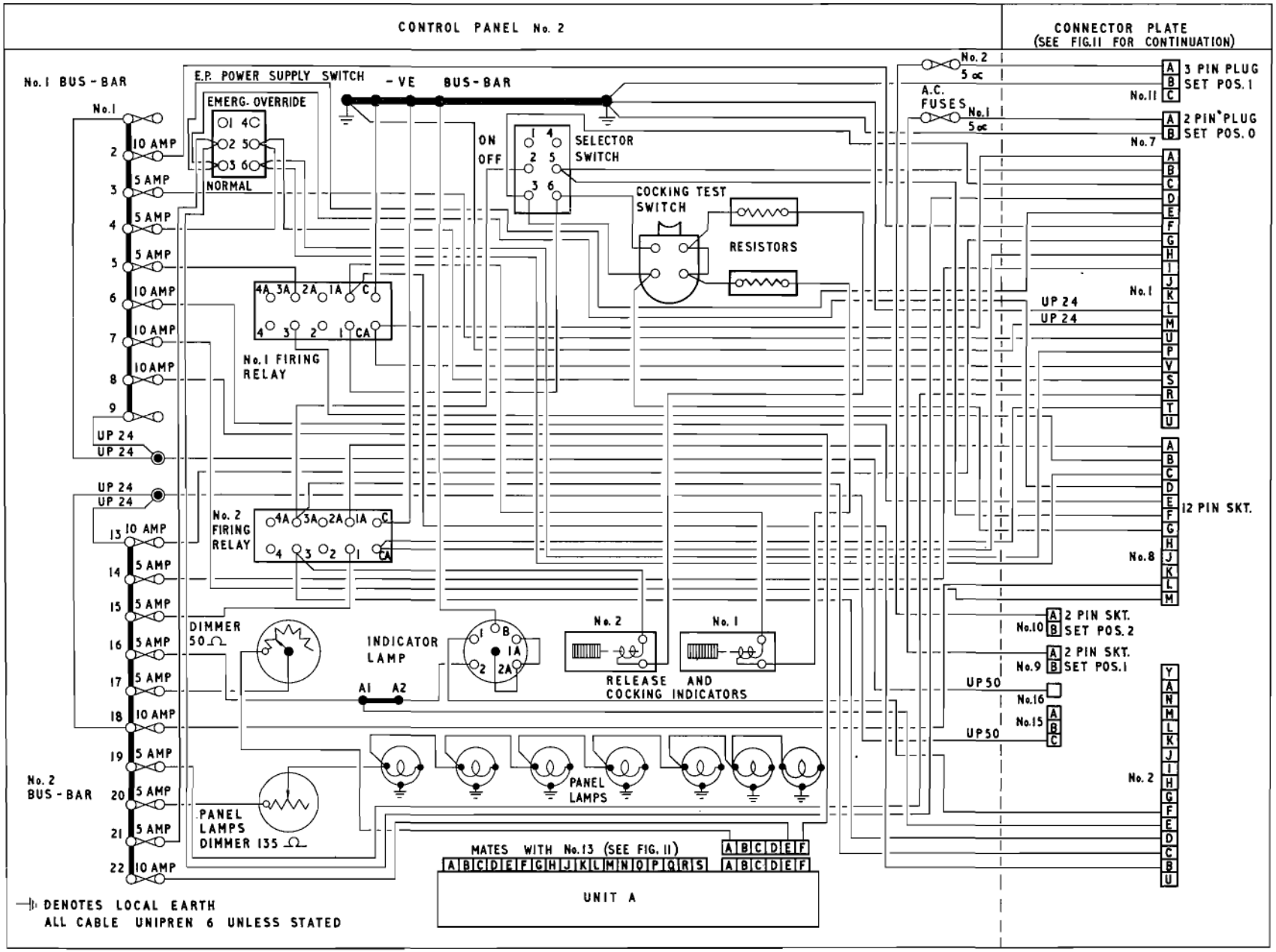

Fig. 15 No. 2 control panel (Mod. 2610)

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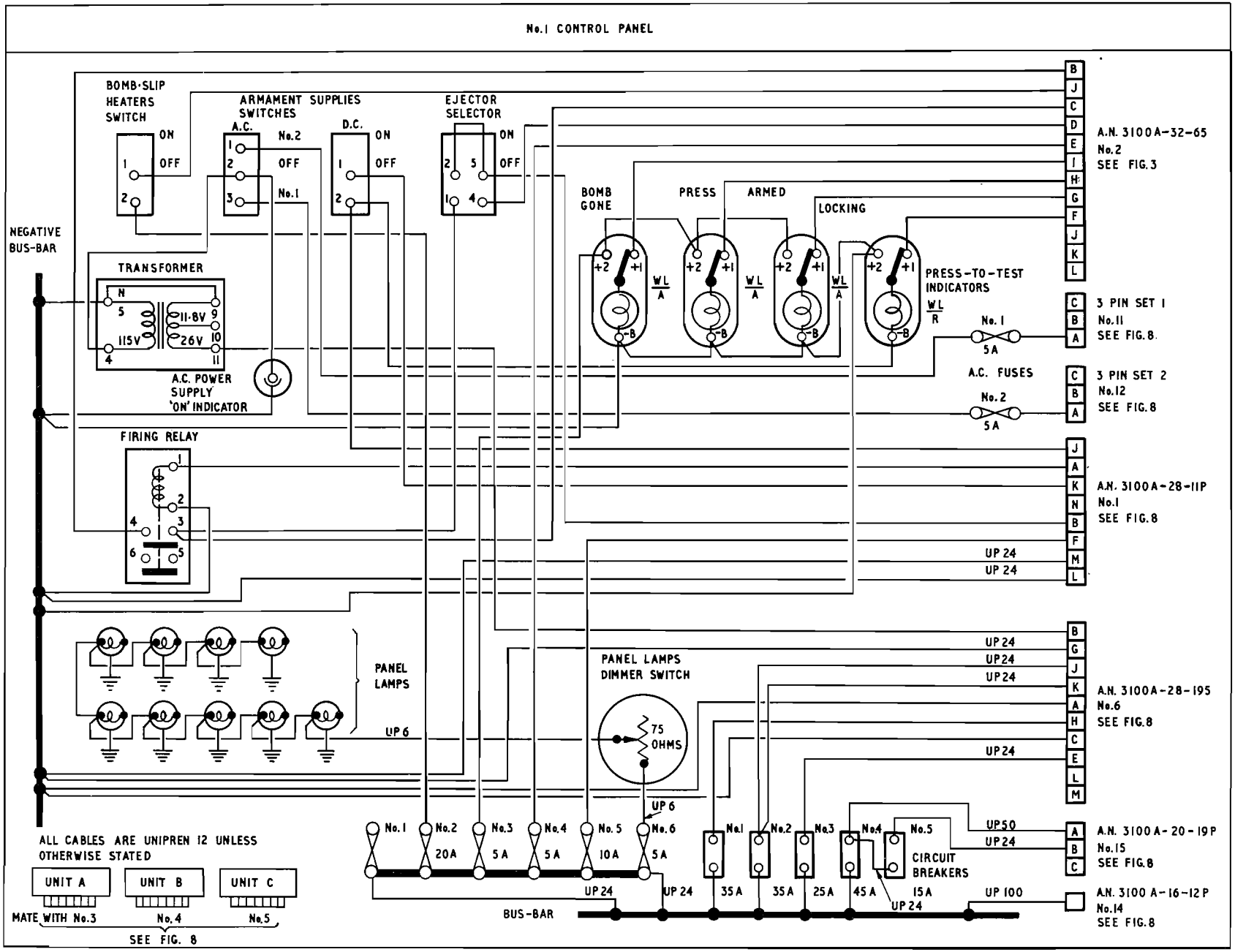

Fig. 16 No.1 control panel (Mod. 2609)

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924/8/4700/55813/630/2/61 J. T. & S.

LIST OF APPENDICES

Appendix 1 ALTERNATIVE STORE (No. 2A CONTROL PANEL ROLE) (Mod. 3039 and 3043)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. This appendix describes the No. 2A control panel role introduced by Mod. 3039 (to replace the No. 2 control panel role) and altered by Mod 3043 (Instrumentation deletions). Schematic and routing diagrams of this alternative store role are included in this appendix and the disposition of equipment is shown in Group 6.

Note . . .

The pilots' emergency jettison facility for this role is deleted by Mod. 3096 *as described in Appendix* 2.

DESCRIPTION AND OPERATION

General

2. The No. 2A control panel role utilizes a 2,000 lb. No. 2 Mk. 2 carrier fitted at the No. 3 heavy store position by Mod. 2613 (removable mechanical equipment). Two independent release circuits, No. 1 and No. 2, are so arranged that should one fail the store will be released by the other. No. 1 circuit controls a Bomb Slip No. 3 Mk. 1, and No. 2 a Jettison Unit No. 1 Mk. 3 on the carrier. The circuits are supplied with 28-volts from No. 1 and No. 2 bus-bars in the control panel, the bus-bars being fed via H.R.C. fuses at panel Z.

3. Two bomb door interlock relays on panel G are each controlled by two series-connected bomb door microswitches (one port and one starboard), and two firing relays in the control panel are controlled by one pole of either bomb release push switch. A magnetic test indicator is provided for each release system and has the dual function of indicating that the systems are

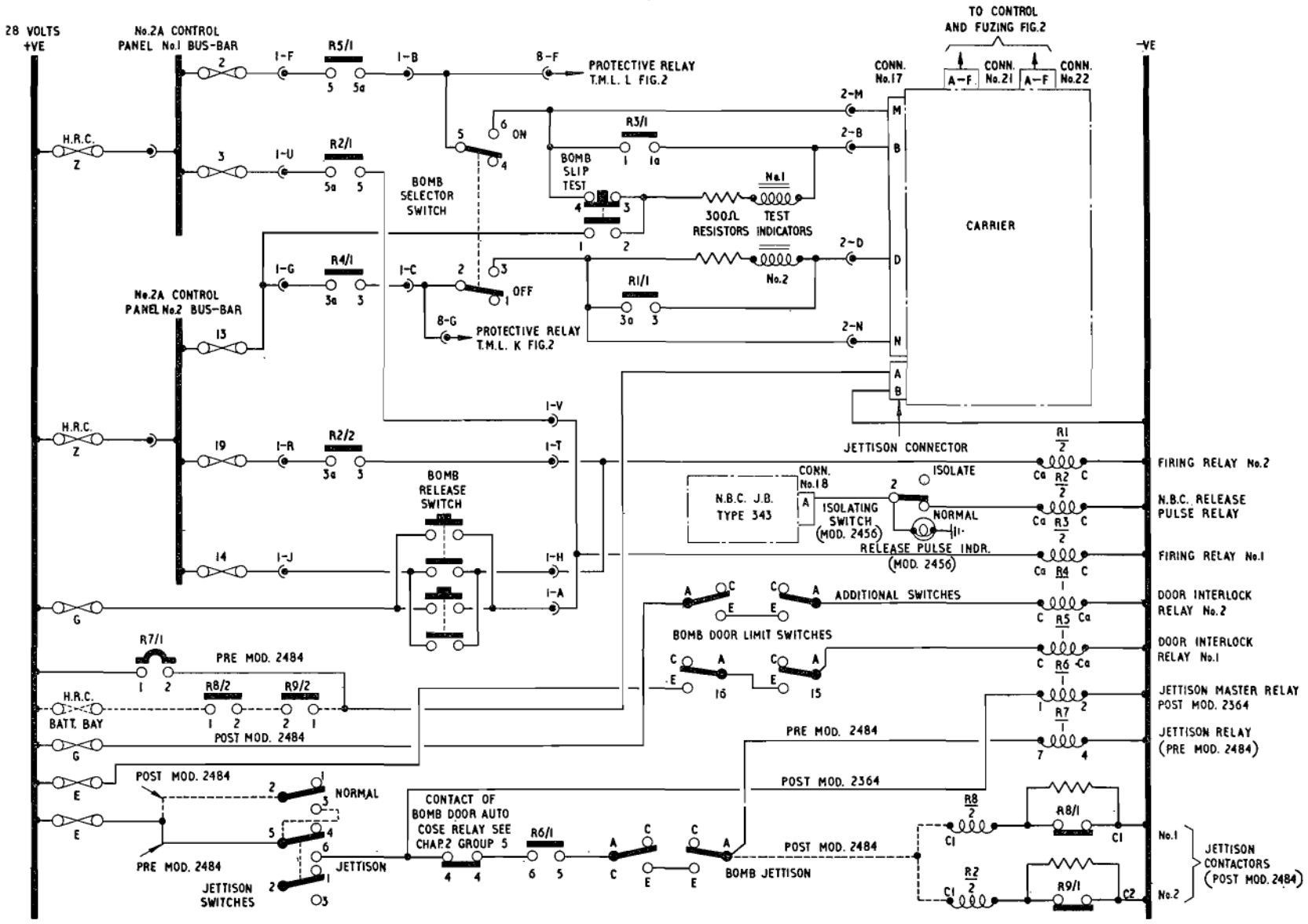

Fig. 1. No. 2A control panel role bomb release (post Mod. 3039 and 3043)

satisfactorily cocked and that when a bomb release switch is depressed the release units have operated.

4. Automatic control of the circuits by the N.B.S. is possible when the firing relays are controlled via the N.B.C. pulse relay (*Chap.* 7, *Group* 2).

5. A BOMB SLIP test switch on the control panel allows the No. 1 bomb slip to be checked for correct cocking with the bomb doors closed and the BOMB SELECTOR switch at OFF.

6. A Fuzing Unit, Type A, is fitted in the control panel and used in addition to the protective relay unit and the Fuzing Unit, Type B, (introduced by Mod. 2612) to provide bomb control and fuzing protection for the role. Duplicated control circuits are supplied with 28-volts d.c. from the No. 1 and No. 2 control panel bus-bars. The circuits are controlled individually by the bomb door interlock relays and jointly by a fuzing control relay. The relay is located on the starboard side of the forward servicing bay and operated by the undercarriage airspeed pressure switch (*Chap.* 2, *Group* 6). Additional circuit control is affected by the nose undercarriage uplock indicator microswitch (*Chap.* 2, *Group* 6). An E.P. POWER SUPPLIES switch is provided on the control panel for extreme emergency use in the event of these interlocking circuits failing.

7. Single phase a.c. control and fuzing supplies at 115 volts, 400 c/s and 1600 c/s (*Chap.* 1, *Group* 3) are obtained from the type 350 radar inverters. The output from the fuzing equipment is fed in duplicate to the carrier.

8. The emergency jettison facility for this role is similar to that of the No. 2 control panel role described in Group 3.

9. A full description of the bomb carrier will be found in A.P.1664A, Vol. 1, and the fuzing unit in A.P.4343X.

Manual release (*fig.* 1)

10. An unswitched 28-volt supply is connected to the control panel bus-bars from H.R.C. fuses at panel Z. With the bomb doors in the fully open position, microswitches No. 15 and No. 16 (connected in series) are made (A-E) to connect a 28-volt supply from panel E to the coil of relay R5. Operation of the relay connects (R5/1) a supply from fuse No. 2 to the bomb selector switch terminal 5, for the No. 1 release circuit. Simultaneously, the two additional microswitches are made (A-E) to connect a supply from panel G to the coil of relay R4. Relay R4 operates to connect (R4/1) a supply from fuse 13 to the BOMB SELECTOR switch terminal 2, for the No. 2 release circuit.

11. With the BOMB SELECTOR switch set at ON, the fuse No. 2 supply is connected (5-6) to the release arming device in the carrier via pin M of connector No. 17 and, via the normally made contacts of the BOMB SLIP test switch, via the No. 1 test indicator to pin B of connector No. 17. The fuse 13 supply is connected (2-3) to the release arming device in the carrier via pin N of connector No. 17, and via the No. 2 test indicator to pin D of connector No. 17. The No. 1 and No. 2 test indicator circuits are completed to earth by the carrier and, provided that the release units are cocked, will change from black to black/white.

12. Operation of either bomb release switch connects a supply from a panel G fuse to the coil of relay R3. Contacts R3/1 close to connect the supply from the BOMB SELECTOR switch (5-6) to the No. 1 release unit in the carrier via connector No. 17, pin B. Simultaneously, a supply from fuse 14 is connected by the release switch to the coil of relay R1. Contacts R1/1 close to connect the supply from the BOMB SELECTOR switch (2-3) to the No. 2 release unit in the carrier via pin D of connector No. 17. The test indicators are short circuited by operation of the relays and change from black/white to black.

N.B.S. release (*fig.* 1)

13. When bombing automatically with the N.B.S., the firing relays are energized by the N.B.C. release relay (*Chap.* 7, *Group* 2) instead of by the bomb release switches. Provided that the BOMB SELECTOR switch is at ON and the bomb doors fully open, the control circuits operate in a manner similar to that for manual release.

Bomb slip test (*fig.* 1)

14. The No. 1 bomb release slip may be checked for satisfactory cocking with the bomb selector switch at OFF and the bomb doors closed. With the press-to-test switch depressed, a supply from No. 13 fuse is connected (1-2) via the No. 1 test indicator to pin B of connector No. 17 at the carrier, and thence to earth via the bomb slip solenoid.

Control and fuzing (*fig.* 2)

15. An unswitched 28-volts supply is fed to the control panel bus-bars from H.R.C. fuses at panel Z. Subsequently, the supply is connected from fuses No. 6, 7 and 18 to the protective relay unit, and from fuses No. 8 and No. 22 to Fuzing Unit A. It is ensured, by interlocking the control circuits with the undercarriage that the circuits in these units cannot function when the aircraft is on the ground.

16. When the aircraft attains a speed of approx. 80-85 knots, the U/C airspeed pressure switch connects (A-C) a supply from panel D to the coil of relay R10. Contacts R10/1 close to connect a supply from fuse No. 4 to the protective relay unit. When the undercarriage is raised, the nose U/C uplock indicator microswitch (*Chap.* 2, *Group* 6) connects (B-C) a supply from fuse No. 21 to the protective relay unit. Two single-phase a.c. supplies are connected to the protective relay unit via fuses, labelled AC1 and AC2, in the control panel. With the bomb doors in the fully open position, relays R4 and R5 operate (*fig.* 1) to connect (R4/1 and R5/1) supplies from fuses No. 2 and No. 13 to the protective relay unit.

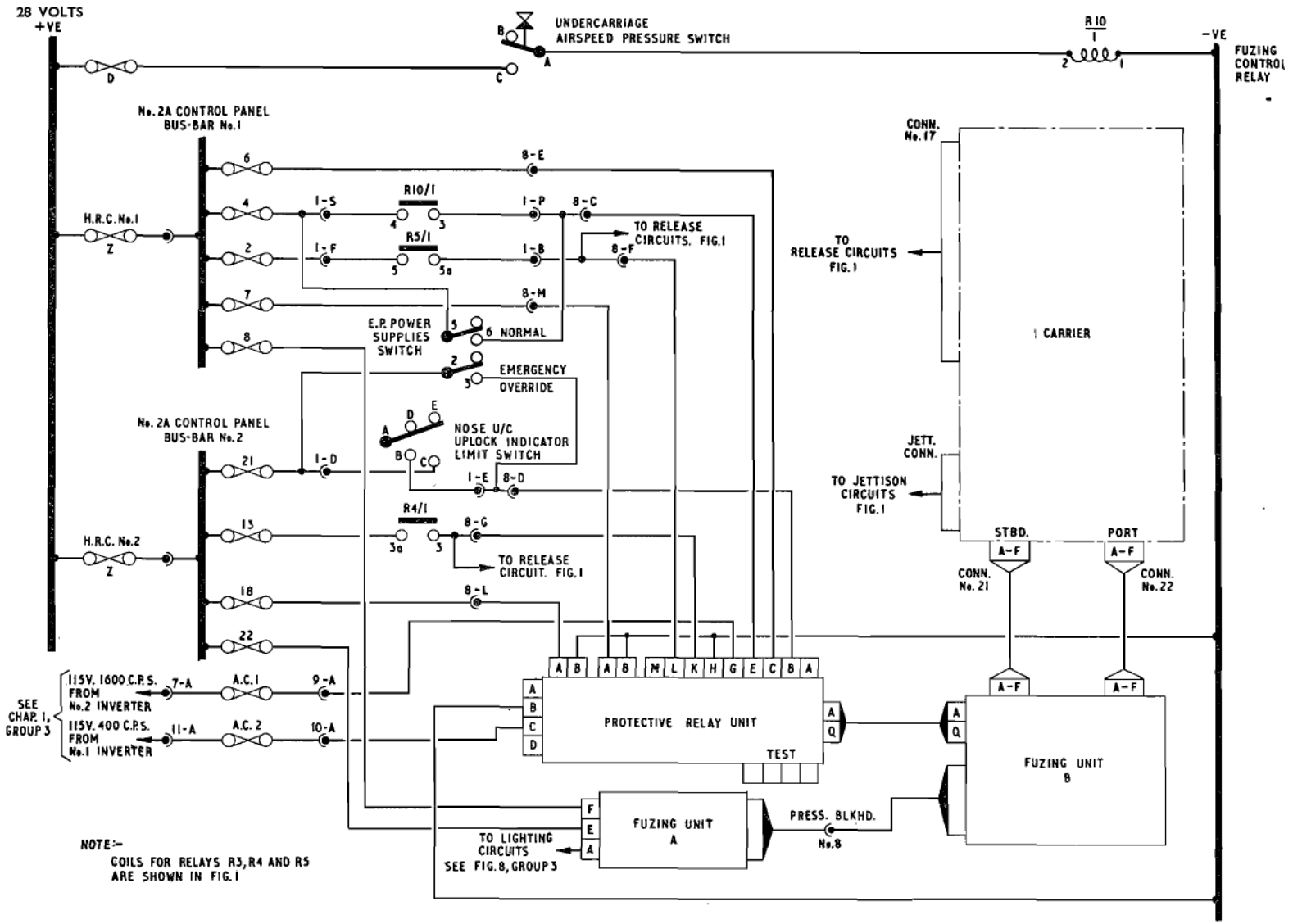

Fig. 2. No. 2A control panel role control and fuzing (post Mod. 3039 and 3043)

E.P. power supplies override

17. The E. P. POWER SUPPLIES switch is used to override the control and fuzing interlock circuits in the event of their unserviceability. Since the switch is intended for extreme emergency use only it is guarded, and locked in the NORMAL position. The switch is connected in parallel with the interlock circuits so that should they fail, selection to OVERRIDE will connect supplies from fuses No. 4 and No. 21 to the P.R.U.

Control panel lighting

18. The panel lighting is similar to that fully described in Group 3.

SERVICING

Introduction

19. A detailed description of the general tests to be applied to all the aircraft electrical circuits can be obtained from the General Information Group. Reference should be made to the relevant Air Publications for information on equipment servicing, pre-loading checks and function testing of the bomb controls, which are carried out with specialist test equipment.

Note . . .

The bomb release switches have soldered connections; frequent inspections should be made to ensure that the connections are sound, otherwise leads or strands may break off and short together thereby providing an unintentional bomb release signal when the bomb doors are opened.

Release circuits

20. (1) Connect 112-volt and 28-volt supplies at the external power supply plug.

(2) Select the 28-VOLT BATTERY MASTER switch and the INSTRUMENT MASTER switch to ON.

(3) Select ON at the BOMB SELECTOR switch.

(4) Close the bomb doors.

(5) Raise the bomb bay air deflector by selecting the BOMB DOOR switch to AUTO. (Lock the switch in this position).

(6) Depress each bomb release switch in turn and, using a 28-volt test lamp, check that there is no supply at pins B, D, M and N of connector No. 17.

(7) Open the bomb doors.

(8) Using a 28-volt test lamp, check for a supply at pins M and N of connector No. 17.

(9) Using a suitable length of insulated cable, link pins B and D of connector No. 17 to earth.

(10) Depress each bomb release switch in turn and check that the test indicators change from black to black/white.

(11) Depress the BOMB SLIP test switch and check that the No. 1 test indicator changes from black to black/white. Remove the earth links.

(12) To check the N.B.S. release, operate the N.B.C. controls to give a release pulse and, using a 28-volt test lamp, check for a supply at pin B of connector No. 17. Repeat for pin D of the connector.

(13) Return all switches to the "safe" position and remove the external supplies.

Control and fusing

21. With the exception of sub-para. (11) these circuits may be checked as detailed in Group 3, para. 84.

Panel lighting

22. These circuits may be checked as described in Group 3, para. 85.

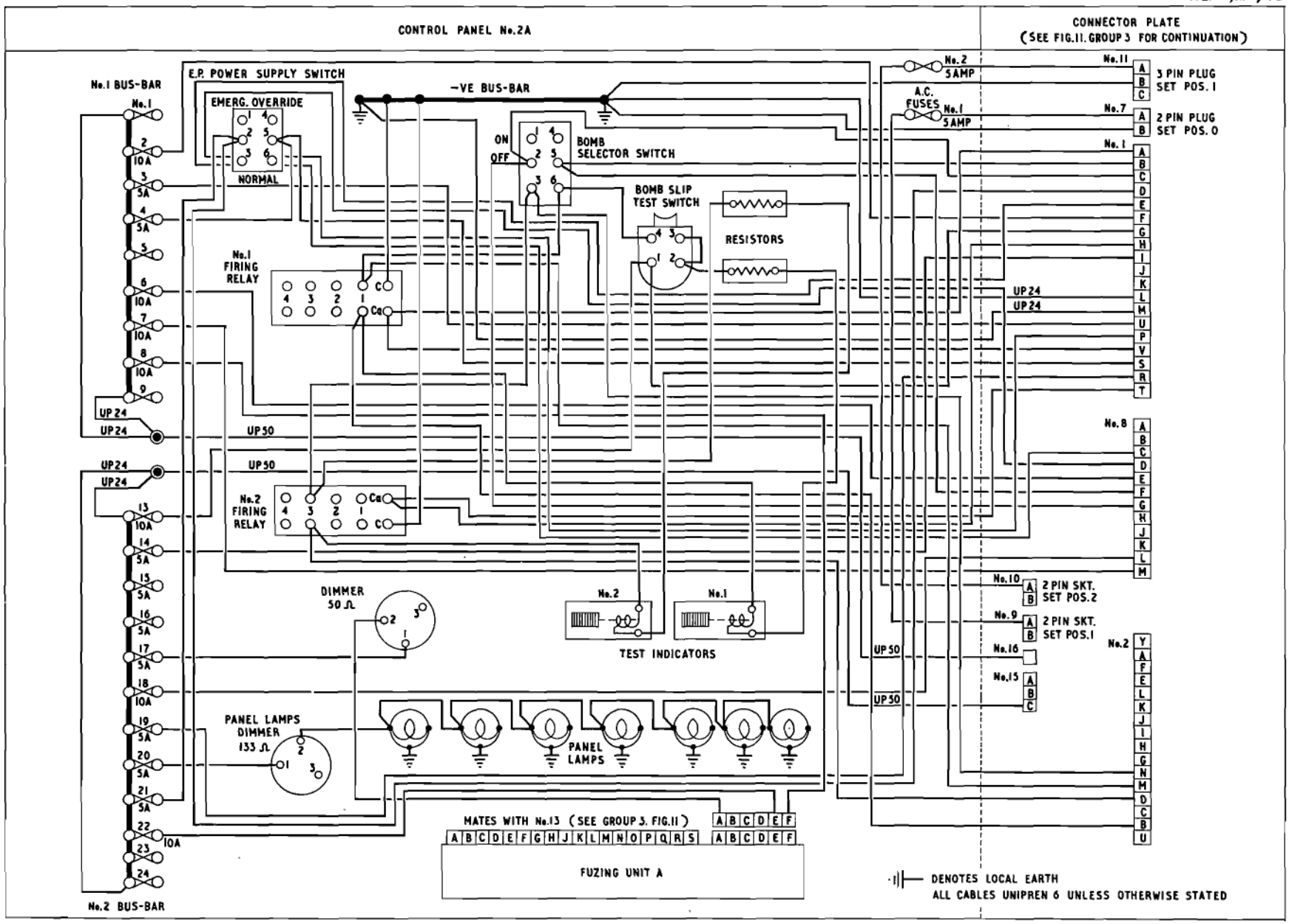

Fig.3. No.2A control panel (Mod. 3039 & 3043)

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Appendix 2 ALTERNATIVE BOMBING INSTALLATIONS (Post Mod. 3096)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. This appendix describes the alterations introduced by Mod. 3096, to the No. 1 and No. 2A control panel roles.

General

2. The modification deletes the jettison release facility from No. 1 and No. 2A control panel roles. The routing diagram in this Appendix shows the alterations to fixed wiring, and the Group 6 location diagrams the disposition of equipment affected.

3. A pre-Mod. description, together with schematic diagrams, of the circuits deleted is given in Group 3 for the No. 1 panel role and Appendix 1 for No. 2A panel role.

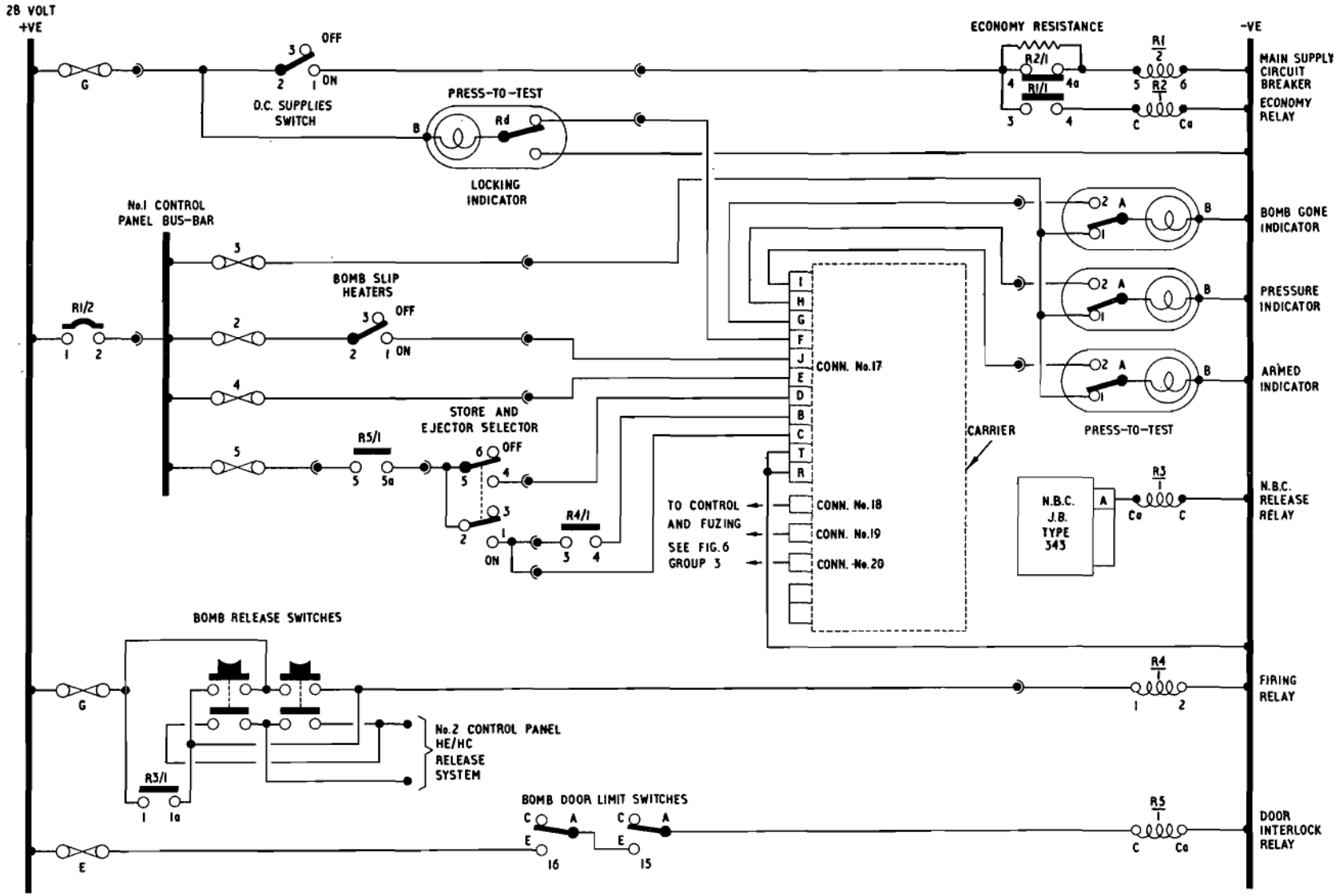

Fig. 1. No. 1 control panel role bomb release (post Mod. 3096)

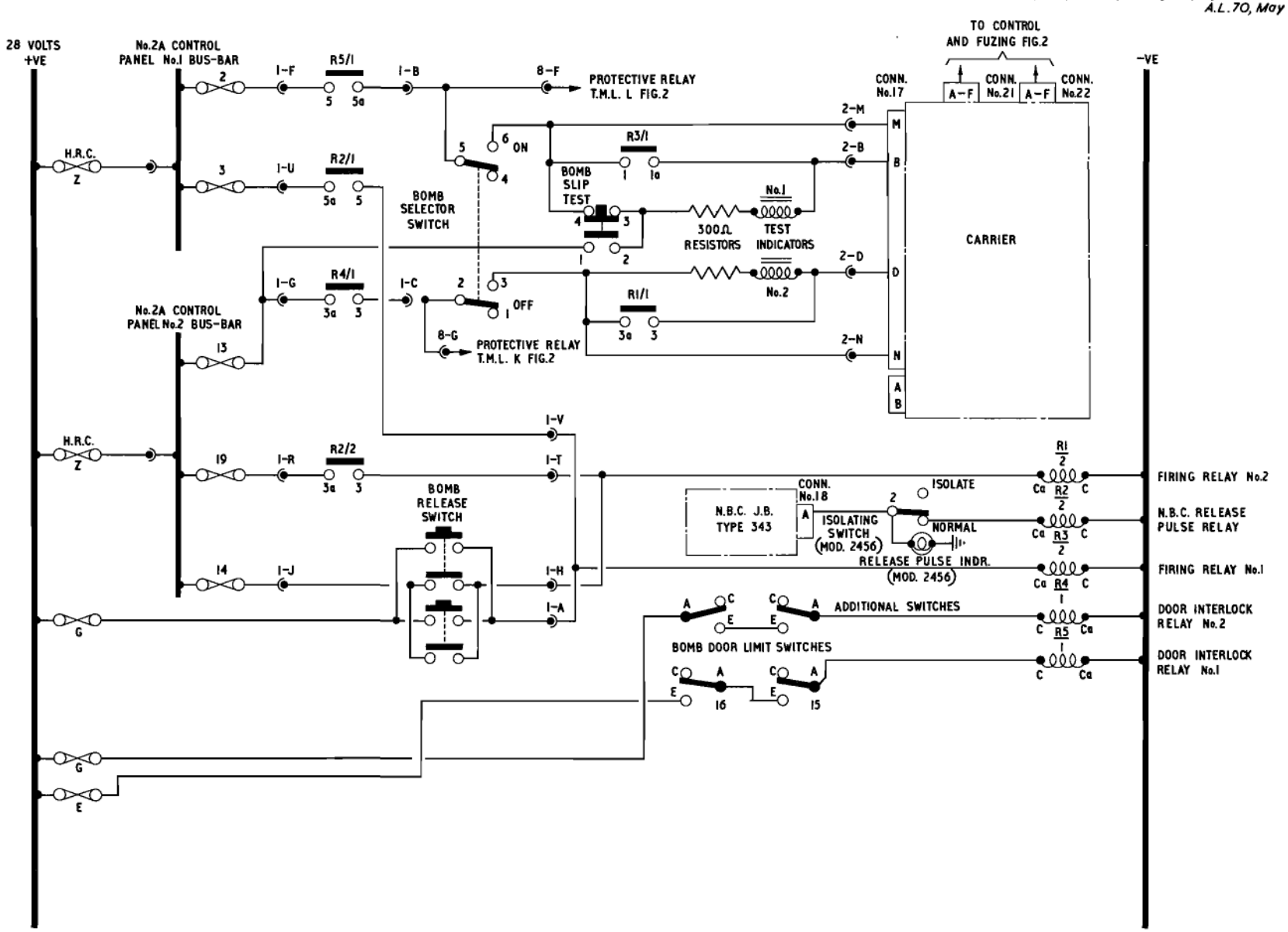

Fig.2. No.2A. control panel role bomb release (post Mod. 3096)

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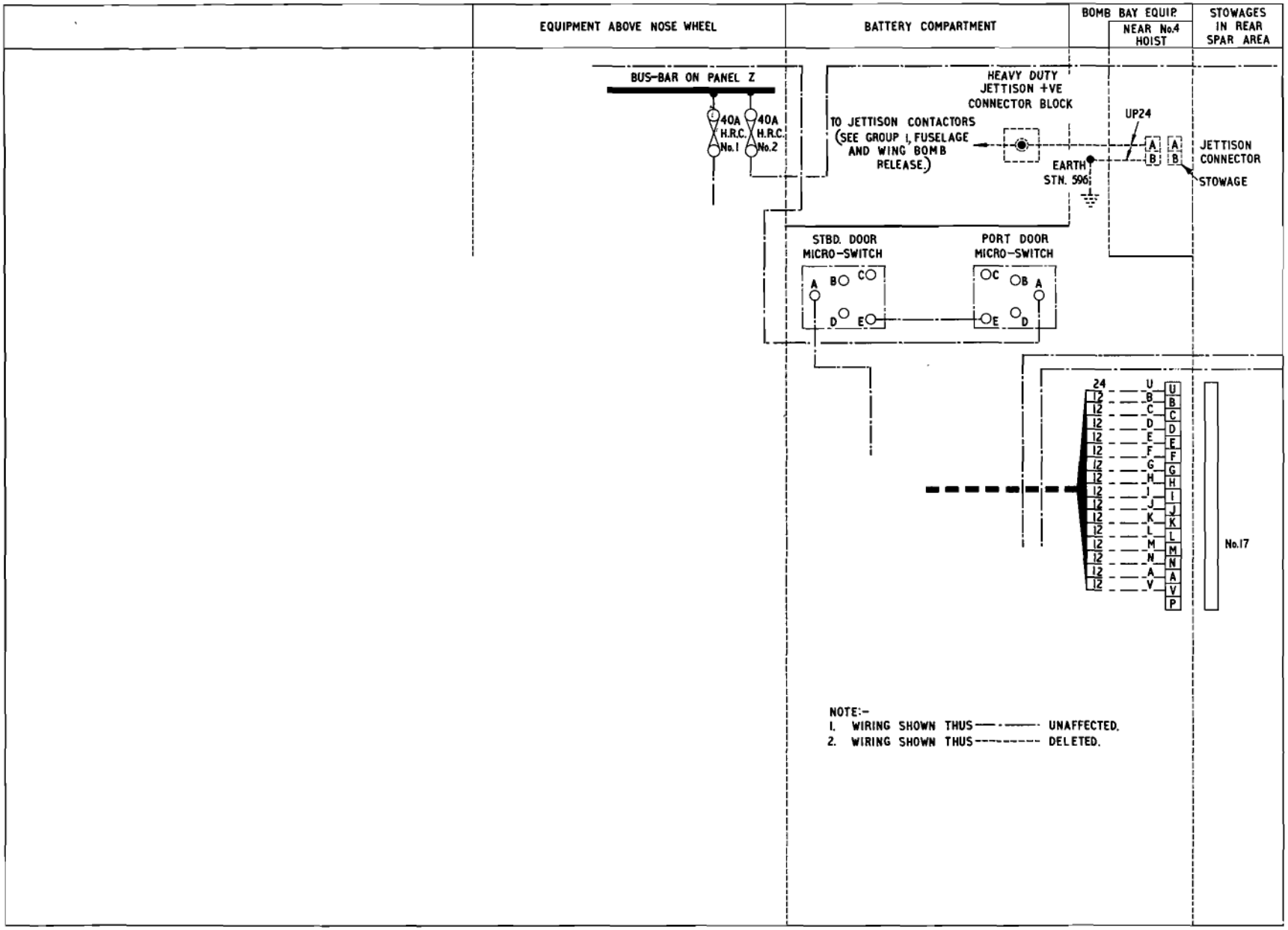

Fig.3. Alterations to Fig. 14 (1) in Group 3 (post Mod. 3096)

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Appendix 3

ALTERNATIVE STORE 10,000 M.C. (No. 3A Control panel) Mod. 3174

Introduction

1. Under Mod. 3174 the No. 3 control panel (group 3, para. 3) is replaced by a No. 3A control panel.

Circuit operation

2. The main difference between the two panels is that the 3A panel has a link between pins N and W of plug 1, this is to ensure that the release circuits cannot be energised until the control panel is fitted and connected.

Normal Release

3. The normal release circuit operation described in group 3, para. 14 is unaffected by this panel change.

Appendix 4

ALTERNATIVE BOMB CONTROL (post Mod. 3171)

LIST OF ILLUSTRATIONS

General

1. Positive supplies to the bomb release pushes were, pre the mod., fed directly from fuse 19 on panel G. Post Mod. 3171 the positive supplies are first routed through the bomb control panel as indicated in figs. 1 and 2 of this appendix, this is to ensure that bomb release circuits cannot be energised until the control panel is fitted and connected. The remainder of the bomb control circuit remains unaffected.

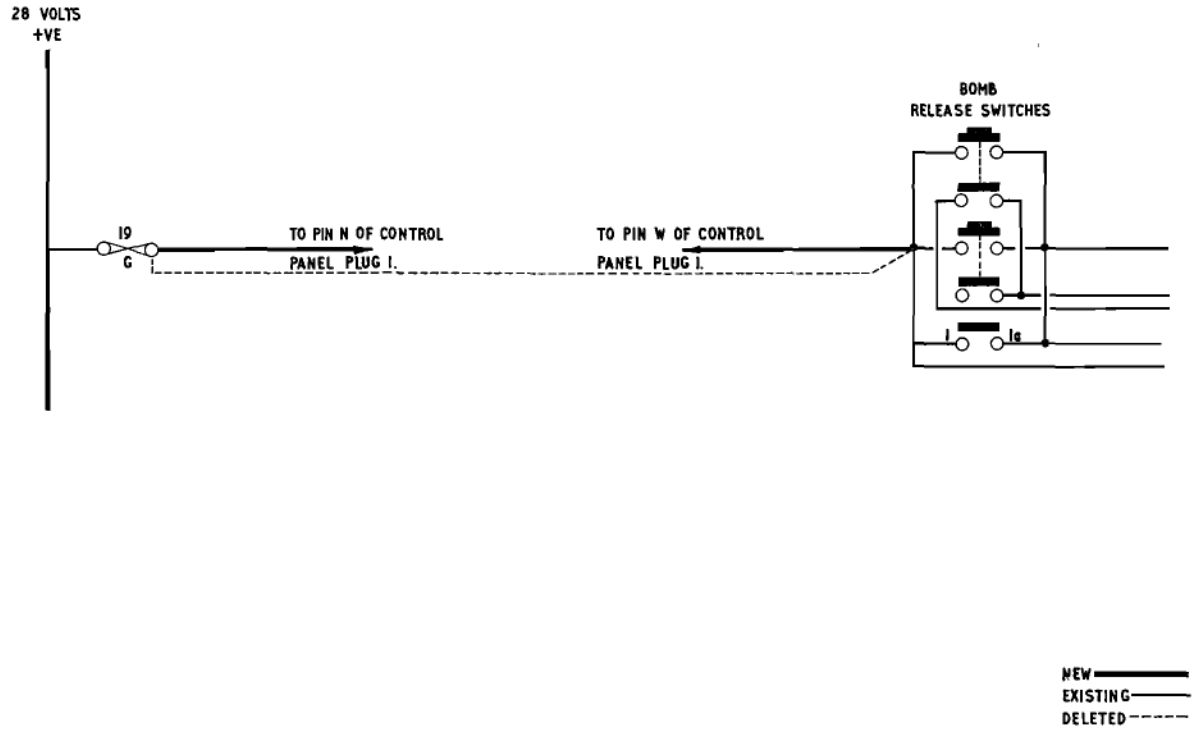

Fig.1 Alterations to Figs.4, 5, 6 and 9 (post Mod.3171)

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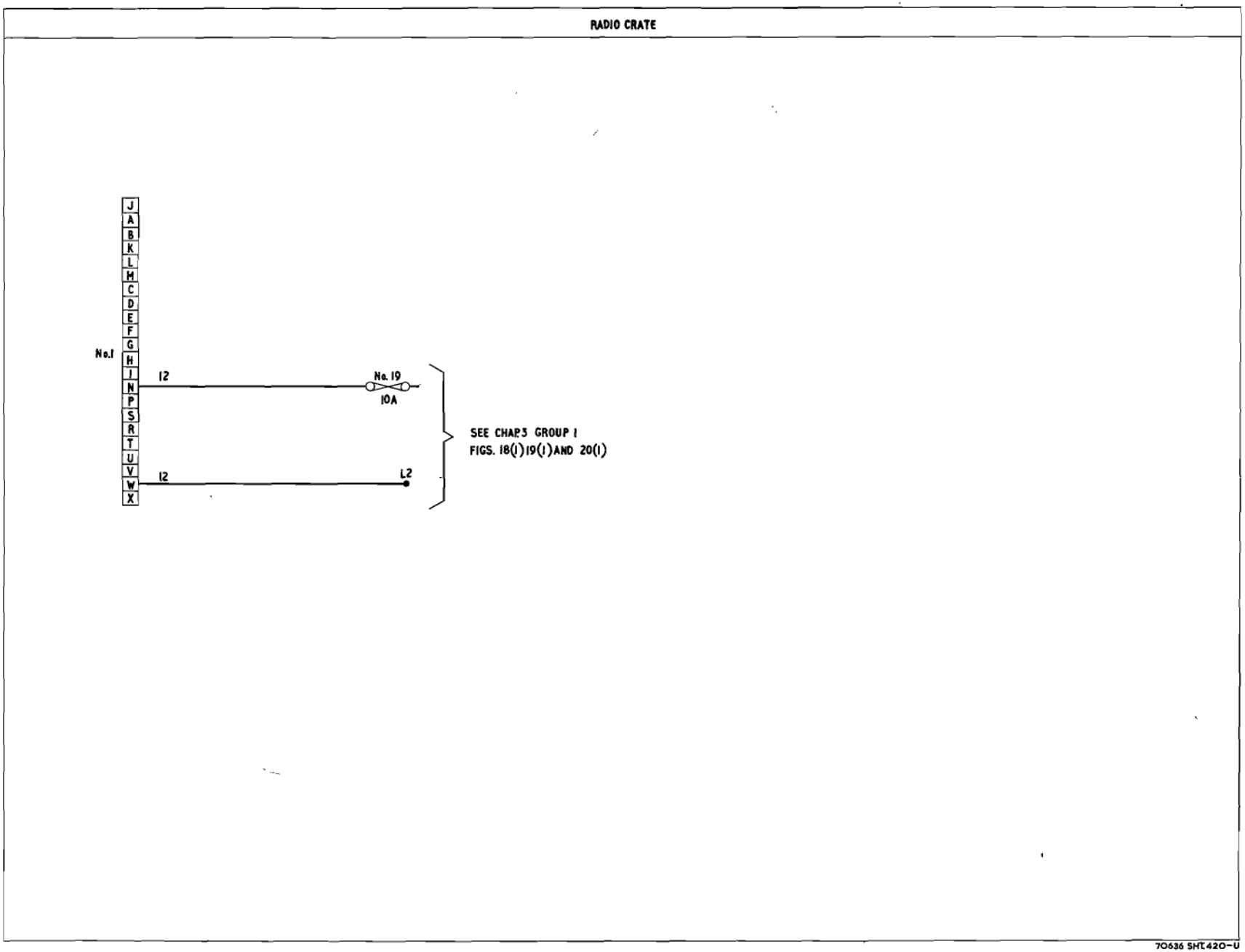

Fig. 2 Alteration to Fig. 14 (1) (post Mod. 3171)

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Appendix 5

ALTERNATIVE BOMBING INSTALLATIONS (post Mod. 3173)

LIST OF ILLUSTRATIONS

Introduction

1. Mod. 3173 introduces the No. 2B control panel. This differs from the 2A control panel in that fuse No. 5 is added to No. 1 bus-bar, this fuse supplies one pole of the bomb release switch. Previously Fuse 19, panel G, supplied the switch directly. The control panel must now be fitted and connected before the release switches can be energised; figs. 1 and 2 of this appendix show the alterations. The panel is illustrated in group 6 of this chapter.

Circuit operation

2. The release system functions as detailed in group 3, para. 32 but is amended as follows:—

When a bomb release switch is depressed, a supply from fuse 5 on the control panel bus-bar 1 is connected by one pole of the switch to the coil R3 of the firing relay No. 1, type S2.

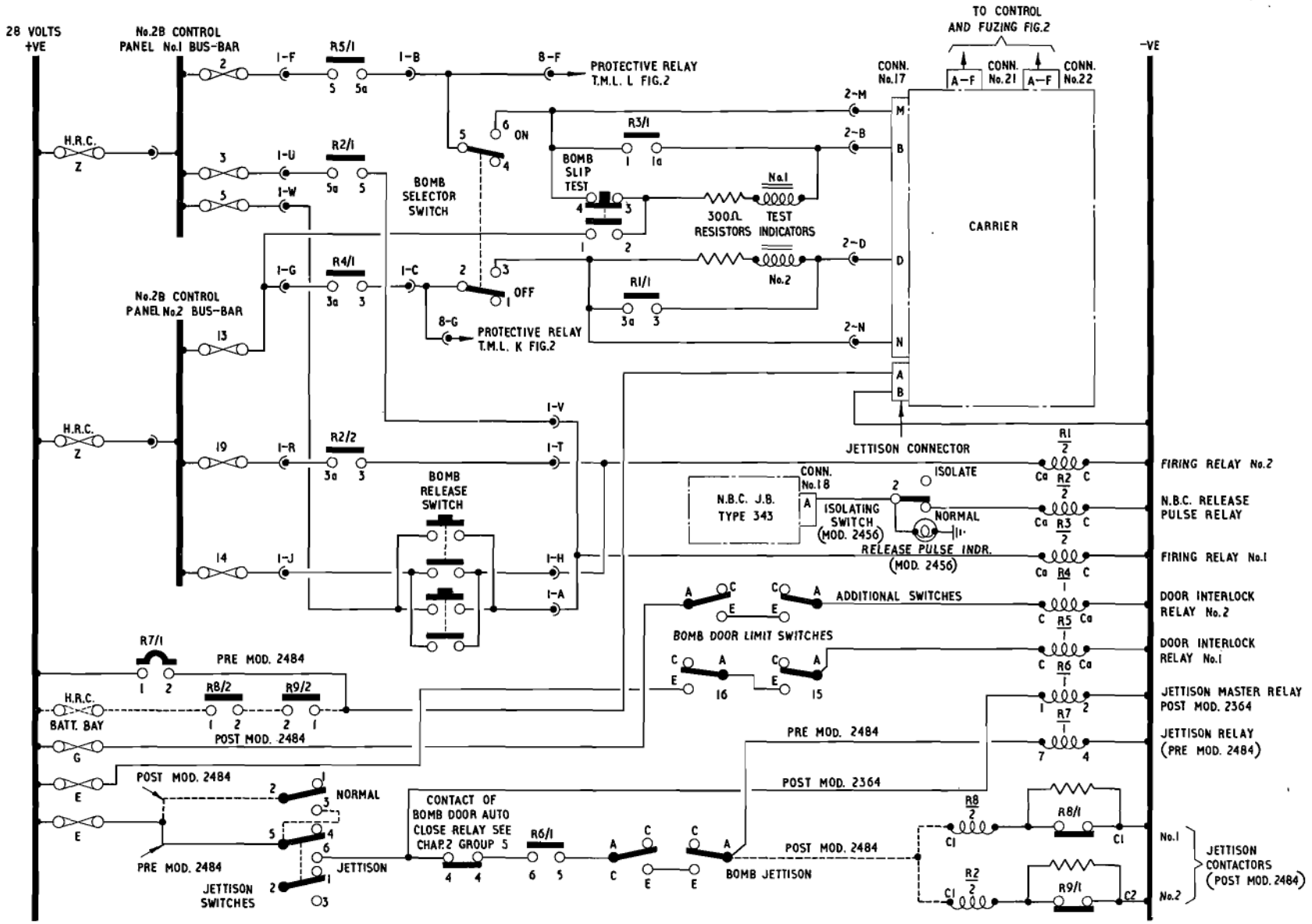

Fig.1. No.2B control panel role bomb release (post Mod. 3173)

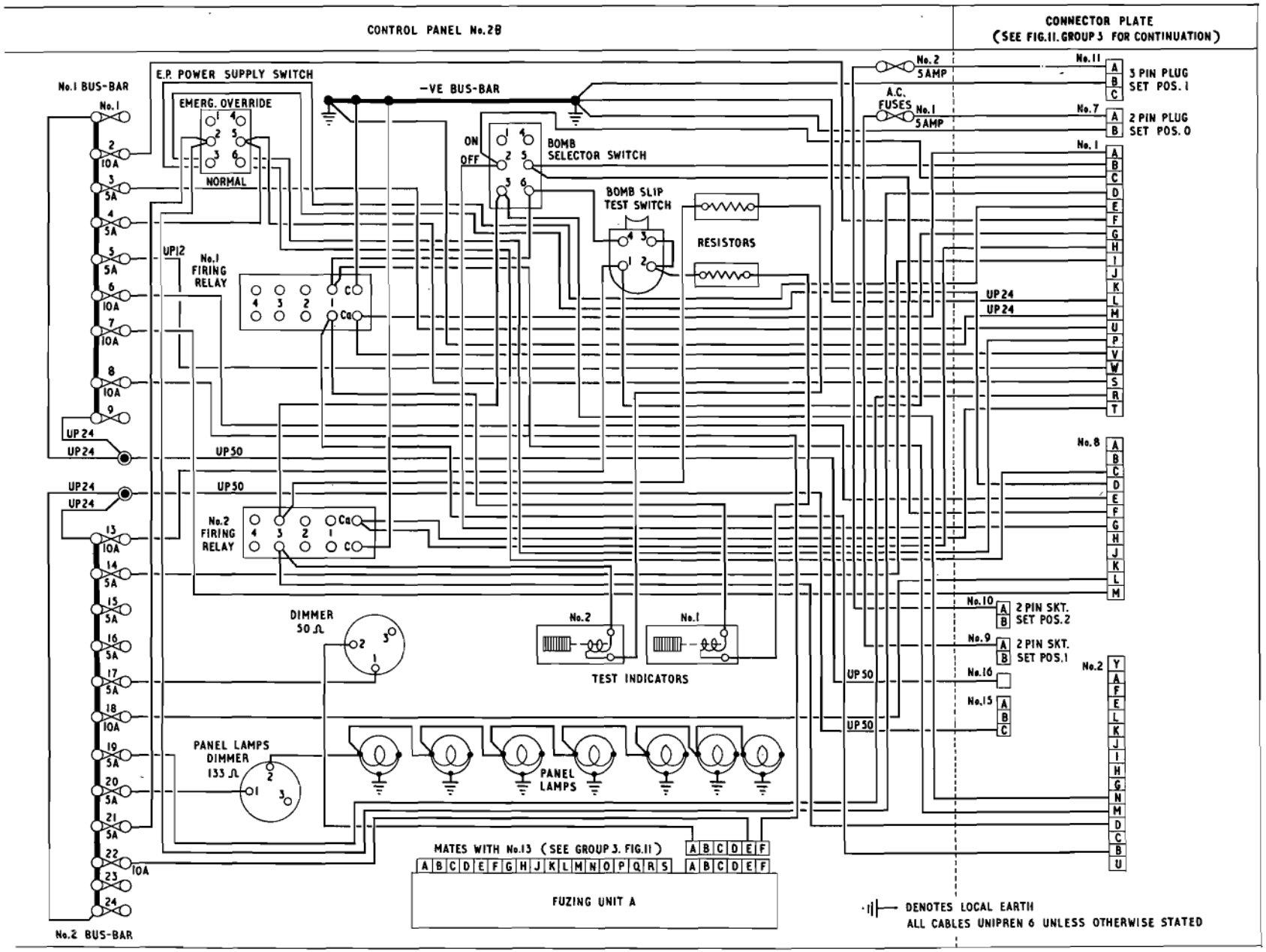

Fig.2. No.2B control panel (Mod. 3173)

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