Group 3—DAY ROLE

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Note . . .

If an aircraft has previously been prepared for night role operation (i.e. Mod. 2691 *has been incorporated) it cannot operate in the day role again unless Mod.* 2692 *is incorporated on the Day Role Control Panel to be fitted.*

CAMERA INSTALLATION

1. The day role camera crate has eight 36-in. lens, or four 48-in. lens cameras for the main fan and the centre camera of the tri-installation. The port and starboard oblique cameras of the tri-installation are fixed through the bomb bay wall at the rear end of the bomb bay. A survey camera is fitted to the rear fairing which is between the camera bay doors and the deflector.

Note . . .

Mod. 2722 *makes provision for* 48*-in. lens main cameras.*

2. The tri-installation of three F49 Mk. 3 (6-in. lens) cameras or centre F49 Mk. 3 (6-in. lens) and oblique F52 (20-in. lens) cameras makes a wide angle three picture scan across the flight path of the aircraft of the ground to be photographed in detail by the main cameras. Two types of adaptor are provided, with mating plugs at each end, one to be used with the F49 oblique cameras and the other for the F52 oblique cameras. The main F52 (36-in. lens or 48-in. lens, with motors Type B) make an eight or four film scan across the flight path of the aircraft according to which lens is fitted.

3. The tri-installation cameras can be set individually to make 1 exposure to 1 exposure of the main cameras, 1 to 4 of the main cameras or 1 to 8 of the main cameras; the ratio being set on the ratio selectors on the control panel and controlled by a uniselector. Reset switches are provided to enable the uniselector to be set up, a green indicator lamp on the control panel indicates when this is so. The lamp goes out when the reset switch is released.

4. Each camera has a green indicator lamp on the control panel, and at the bomb aimer's visual position. The lamps are pulsed for every exposure, the pulses being controlled by a contact cam in the cameras. The lamps at the bomb aimer's position, post Mod. 2573, are on a detachable panel. This panel is to be fitted when operating as a day role P.R. or as a bomber (*see Group* 1).

◄ **4A.** All the cameras are controlled from one of two Type 35, No. 16 controllers, one on the control panel and the other on the bomb aimer's P.R. panel. The controller supplies signals to the camera relays which in turn control the supplies to the cameras and their motors.

5. The F49 Mk. 3 (6-in. lens) survey camera is fitted to a mounting Type 125 (Type 80A, pre Mod. 2851) controlled by either one of two Type 80 mounting controllers, one on the control panel and the other on the visual bomb aimer's P.R. panel. This enables the camera to be adjusted for aircraft tilt and drift angles but not for bank. The camera is controlled in parallel with the tri-installation cameras and has, similarly, a ratio selector operating with the uniselector.

6. In order that the aircraft attitude can be corrected for bank when the survey camera is being operated, a green indicator lamp is fitted to the centre instrument panel (post Mod. 2099) to give the pilot a warning 3 seconds before the camera is pulsed. The lamp goes out as the camera is pulsed. ►

7. A P.R. camera sighting head, Mk. 2, may be fitted at the bomb aimer's visual position, a mounting for its control panel is provided on the bomb aimer's P.R. panel. The sight is gyro stabilized.

SEQUENCE OF OPERATION

8. Assuming that the camera sight is to be used, the sequence of operation is as follows:—

(1) Switch on the P.R. camera sight gyro.

(2) Using the sighting head and repeater compass to obtain correct track, open the camera window doors, using either switch, on approaching the target area. This will also close the camera master relay, and supply circuit-breaker.

(3) Select the camera master switches, as required, to ON. If 48-in. lens cameras are fitted, only cameras 3, 4, 5 and 6 are required.

(4) Set up the uniselector, by holding either reset push-switch depressed until the associated green indicator lamp comes on. The lamp will go out when the switch is released.

(5) Set the four ratio selector switches according to the arrangement of the cameras and lens being used.

(6) Set up the Type 35, No. 16 controller counters to zero and set up the time interval required.

(7) Adjust the survey camera mounting from either one of the two Type 80 mounting controllers to correct for aircraft drift angle and tilt. The tilt angle is obtained from the spirit level on the starboard side of the radio crate, or the level at the bomb aimer's visual position.

(8) Place the MASTER switch of the Type 35, No. 16 controller to be used, to ON.

(9) The cameras will now pulse steadily for as long as is required, the number of exposures being totalized on the counter in the controller. All the camera lamps should pulse together with the exception of the tri-installation cameras and the survey camera. These should pulse at the individual ratios of 1 : 1, 1 : 4 or 1 : 8 of the main cameras as selected.

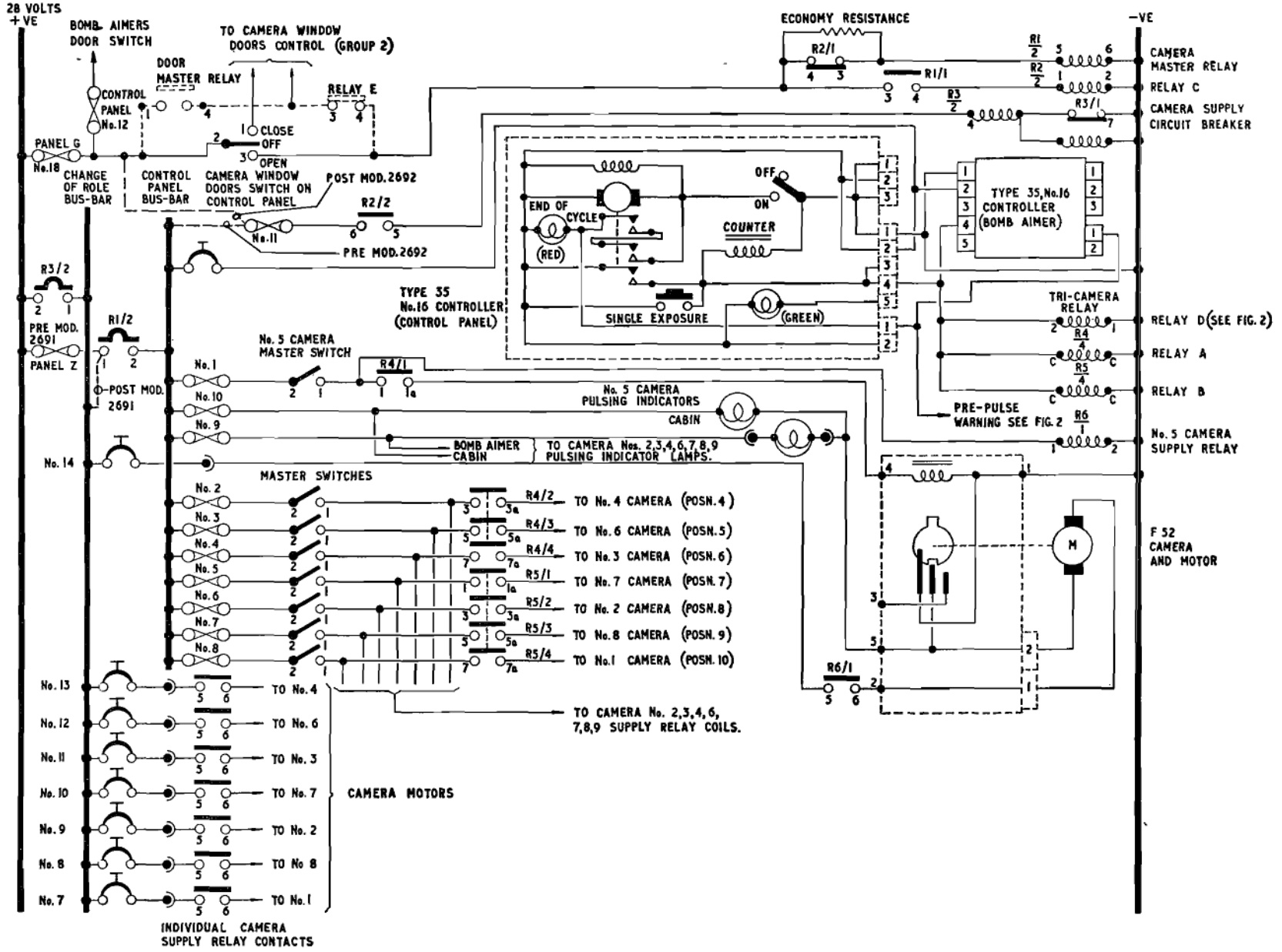

Fig. 1. Main cameras

(10) The aircraft has to be corrected for bank each time the 3-second indicator lamp on the instrument panel comes on.
(11) On completion of the photography, the controller switch is placed to OFF.
(12) In case of an individual camera runaway, its MASTER switch on the control panel should be selected OFF.
(13) It is important that the camera window doors are closed after the photographic operation; this ensures that all camera supplies are isolated.

OPERATION

MAIN CAMERAS (*fig.* 1)

9. None of the cameras can operate until the camera window doors have been opened. The cameras are controlled by either one of the two controllers, Type 35, No. 16, one on the control panel and the other on the bomb aimer's P.R. panel.

10. When either camera window doors control switch is selected OPEN, its supply from panel G is connected via contact R2/1 of relay C to energize the camera master relay (Ref. 5D/1397) in the radio crate. This closes its two contacts; R1/1 to connect the switch supply to the coil R2 of relay C behind the control panel and R1/2 to connect a supply from an H.R.C. fuse on panel Z to the control panel bus-bar.

11. Relay C opens its contact R2/1 to introduce an economy resistance into the coil circuit of the camera master relay R1, and closes its contact R2/2 to connect a supply from fuse No. 11 on the control panel to the coil R3 of the camera supply 150-amp circuit-breaker Type D in the battery bay.

Note . . .

Post Mod. 2691, *the supply from panel Z will be deleted and will be obtained from the main contacts of the camera supply contactor in the battery bay. Fuse No.* 11 *on the control panel will then be fed from fuse No.* 18 *on panel G (the fuse used for the window door switches) instead of from the control panel bus-bar (Mod.* 2692).

12. This circuit-breaker opens its contact R3/1 to introduce an economy coil in series with its pull-in coil, and closes its contact R3/2 to connect a supply from the 24-volt battery contactor to the change-of-role bus-bar in the battery bay.

Note . . .

(1) *Although the camera window door switches are spring-returned to the OFF position, the above circuits are kept energized via contacts of the door master relay (closed when the doors are opened) and relay E. See Group* 2, *Camera window doors control—open.*

(2) *The circuit-breaker Type D provides thermal overload protection by its main contact.*

13. All the main supply circuits are now made, so that, when the camera master switches are selected ON, the individual camera relays R6 are energized to complete the circuits to their respective camera motors and the cameras can start operating when the controller switch is selected ON. When the controller ON/OFF switch is selected ON, the negative return circuit from the controller motor is completed and the motor starts running. The positive supply to the motor is from a circuit-breaker on the control panel; the supply to this circuit-breaker is connected when the camera master relay is energized.

14. The motor drives a cam system operating three sets of contacts (*see A.P.* 1355*C*, *Vol.* 1) of which one set supplies pulses to the camera control relays A (R4), B (R5) and D, mounted behind the control panel (relay D is for the rear cameras, see para. 20). The contacts of relays A and B close (R4/1-4, R5/1-4) to connect separate supplies from fuses on the control panel via the camera switches at ON to their respective camera shutter solenoids (terminal 4).

15. Supplies to the camera film wind motors are obtained from circuit-breakers on the change-of-role bus-bar, via normally open contacts R6/1 of the individual camera supply relays in the camera crate junction box. The contacts of these relays are closed when the camera MASTER switches are selected ON and the camera window doors are open. There is a cam switch in each F52 camera in the negative line from the motor so that the motor will only run whilst the cam switch is made (*see A.P.* 1355*C*, *Vol.* 1). In case of a camera motor runaway, the respective MASTER switch must be selected OFF. This will disconnect the supply to the camera supply relay which opens its contacts to break the motor supply.

16. The camera cam switches also control the camera pulsing indicator lamps on the control panel and at the bomb aimer's visual position. The lamps on the control panel are supplied from a single fuse, No. 10, on the control panel, and the lamps at the bomb aimer's position are fed from a single fuse, No. 9, on the control panel; the cam switch is in the negative return. Each lamp pulses once for each exposure of its associated camera.

17. The controllers have a single exposure push-switch, which, when depressed, energizes relays A, B and D so that all the cameras make one exposure. When the switch is released the relays drop out.

18. There is a solenoid-operated counter mechanism in each controller. The solenoid is pulsed simultaneously with the relays A,

B and D, and counts up one for each exposure. Whichever controller is used, both counters operate.

TRI-INSTALLATION AND SURVEY CAMERAS (*fig.* 2 *and* 3)

19. None of the cameras can operate until the camera window doors have been opened and selections have been made on the ratio selectors. The individual tri-camera RATIO SELECTOR switches each have an OFF position and the survey camera has a separate ISOLATE switch so that when any of these switches is selected OFF, a supply, from a circuit-breaker on the control panel, is connected to the coils (R4 on fig. 2, R8, R9 and R10 on fig. 3) of the associated camera supply relays, Type Q3. The relays for the side oblique and survey cameras are in the rear cameras junction box, and the relay for the centre tri-camera is in the camera crate junction box. When any relay is energized, its contacts are opened and the supply to the relative camera motor is broken. The cameras are controlled by either one of the two Type 35, No. 16 controllers; the circuits for connecting all the power supplies are described in para. 9 to 13.

20. When relay D (R5) is pulsed by the controller, it closes its two contacts. Contact R5/2 connects a supply, from a circuit-breaker on the control panel, through the two ratio selector reset switches (terminals 2-1) and the closed contact R13/5 of the uniselector, to the uniselector coil R13. Contact R5/1 connects the same supply to the four ratio selector switch 1 : 1 ratio terminals, and through bank B (R13/2) and bank A (R13/1) of the uniselector to the 1 : 4 and 1 : 8 ratio terminals of the four ratio selector switches.

21. According to the ratio selected, the supply will be connected every pulse, every fourth pulse or every eighth pulse to the tri-installation and survey camera shutter solenoids.

22. The uni-selector coil is energized by every pulse from the controller and at each pulse it pulls its banks A, B, D and E round one step. In order to prevent the uniselector notching round more than one step for each pulse from the controller, a hold-in economy resistance circuit is connected in series with its coil R13 as soon as the interrupter contacts R13/5 open. The coil is de-energized when contact R5/2 of relay D opens at the end of the pulse duration. Every fourth step of bank B is connected to the 1 : 4 terminals of the ratio switches; every eighth step of bank A is connected to the 1 : 8 terminals of the ratio switches.

23. As the uniselector has 30 steps on each bank and the selections are required in multiples of 4 (1 : 4 and 1 : 8) the uniselector is made to skip from step 10A to step 1 when the moving contacts reach step 10A. (The steps are numbered 1-15 then 1a-15a.) This is achieved by connecting together steps 10a-15a on bank E (R13/4). When the moving contact reaches step 10a on bank E the supply from the ratio selector circuit-breaker on the control panel is connected to the coil R6 of relay F. This closes its contact R6/2 to connect the same supply through the interrupter contact R13/5 of the uniselector to the uniselector coil R13. At the same time contact R6/1 of relay F breaks the hold-in economy resistance circuit to the uniselector coil so that when the interrupter contacts R13/5 open the uniselector will not lock home.

24. The uniselector will notch round steps 10A, 11A, 12A, 13A, 14A and 15A to step 1 when it will stop as there is no supply on step 1 to keep it going. The time taken to notch round from step 10A to step 1 is so short that step 10A can be considered to be the same as step 1 and by the time the contact has reached step 1 the pulse from the Type 35 controller onto banks A and B via contact R5/1 of relay D will have finished so that there will not be two pulses in quick sequence (one from step 10A and one from step 1).

25. Supplies to the camera film wind motors and control relays are obtained from circuit-breakers 2, 1, 6 and 3 on the change-of-role bus-bar, rear cameras group Nos. 2, 1 and 3 and main group No. 6 for the survey, starboard-tri, port-tri and centre-tri cameras respectively; the supplies being fed via the contacts of the individual camera supply relays provided that the ratio and ISOLATE switches are not at OFF (*see para.* 19).

26. There is a relay in the F49 camera with the delay switch in the negative return circuit for its coil, this delay switch is operated by the camera drive (*see A.P.*1355*C*, *Vol* 1). The relay contacts are in the negative return from the motor so that the motor operates only whilst the relay contacts are made.

Note . . .

If F52 cameras are used in the oblique positions the F52 adaptors will have to be used between the rear cameras junction box and the cameras instead of those for the F49 cameras. The control of the F52 camera is described briefly in para. 14.

27. A micro switch in the camera magazine in series with the contacts of the relay in the camera controls the camera pulsing indicator lamps on the control panel and at the bomb aimer's visual position. The lamps on the control panel are supplied from a single fuse, No. 10, on the control panel and the bomb aimer's lamps are fed from a single fuse, No. 9, on the control panel; the micro switch and camera relay contacts being in the negative return. Each lamp pulses once for each exposure of its associated camera.

28. The single exposure switch on the controller will pulse these cameras as well as the main cameras, provided that the uniselector is at an operating step but the counters record the number of main camera exposures only.

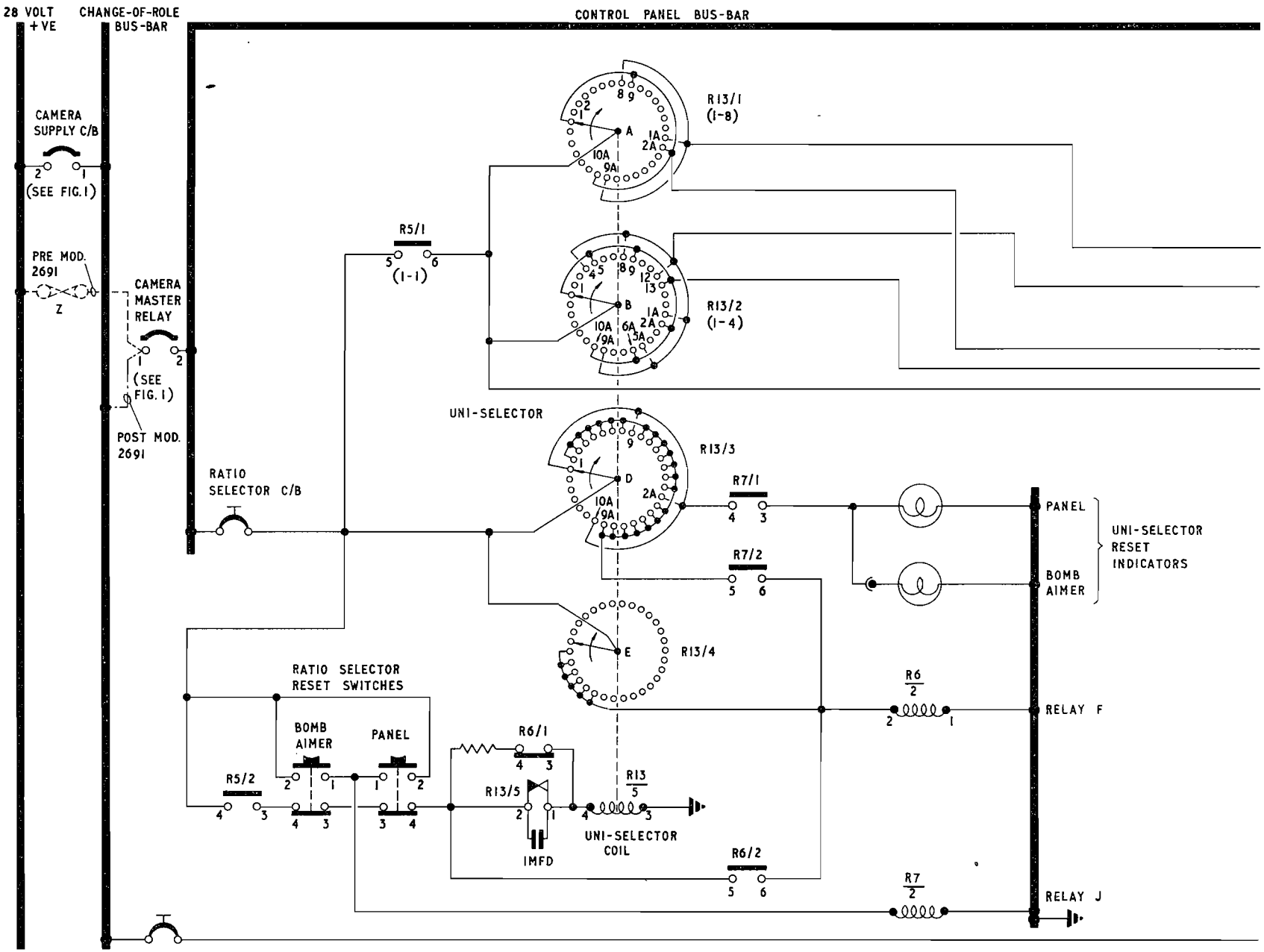

Fig. 2(1). Uniselector and survey camera (post Mod. 2099, 2122 and 2906)

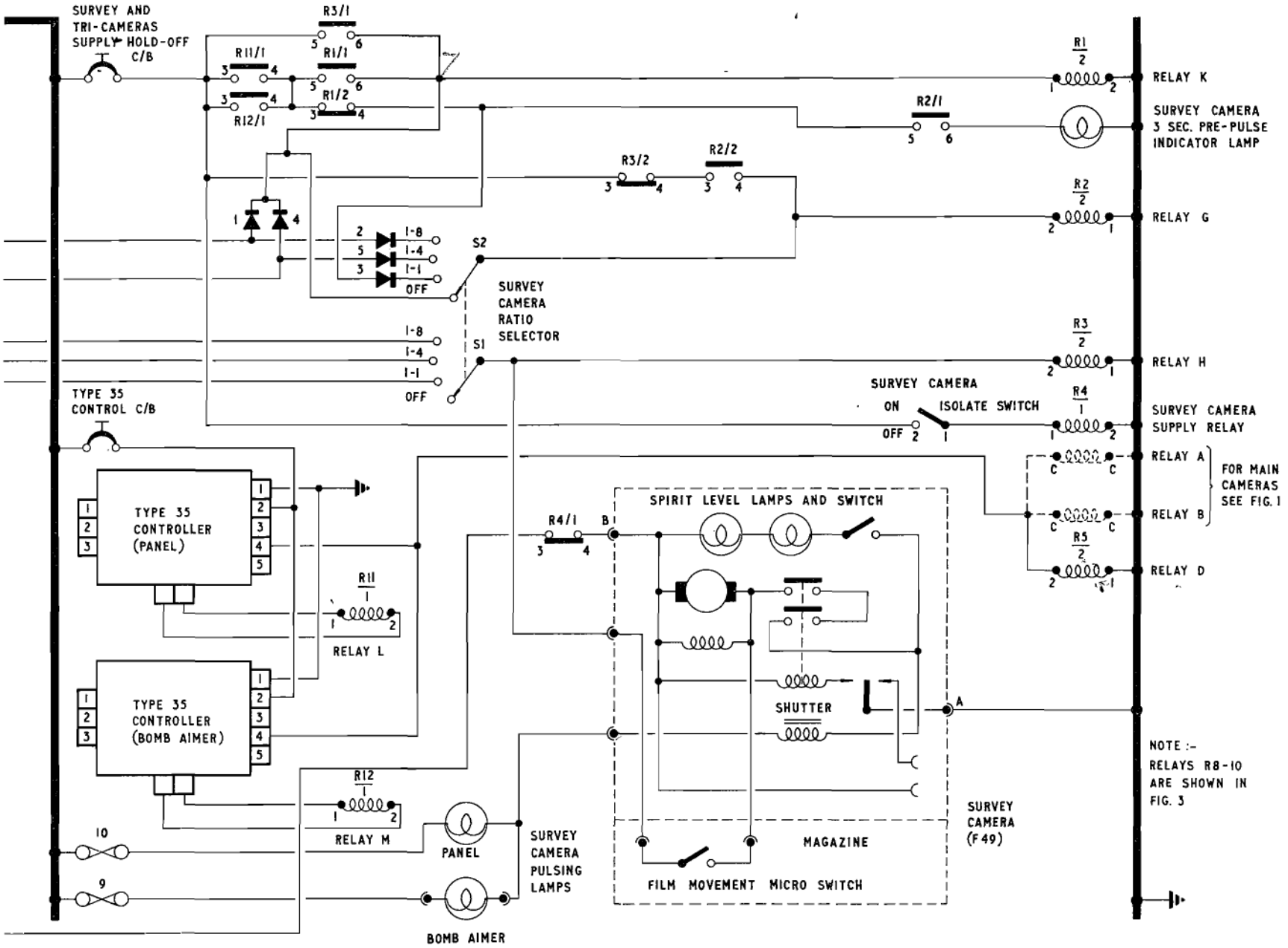

Fig. 2(2). Uniselector and survey camera (post Mod. 2099, 2122 and 2906)

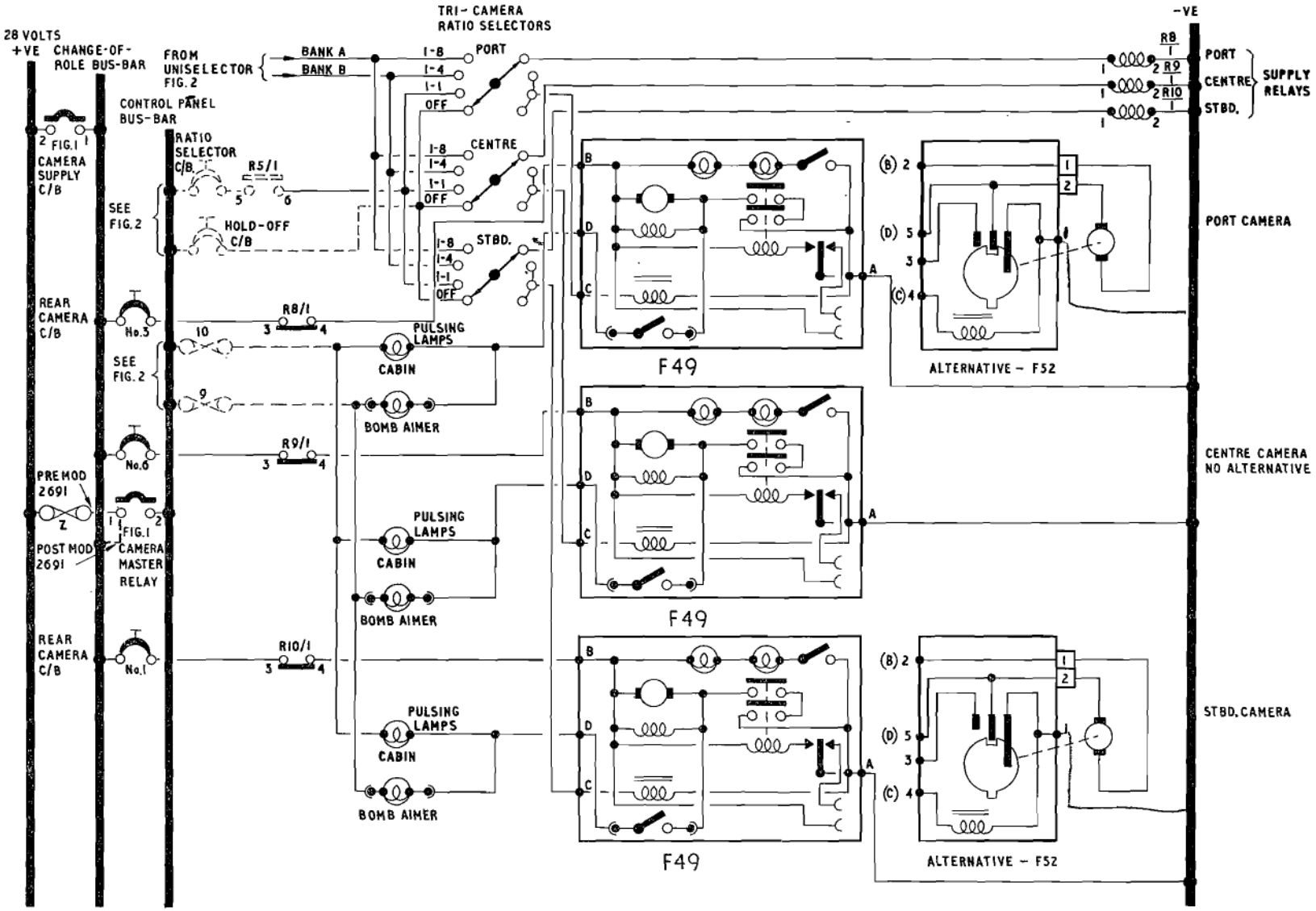

Fig. 3. Tri-cameras

SURVEY CAMERA PRE-PULSE -WARNING (*fig.* 2)

29. Mods. 2099 (fixed equipment), 2122 and 2906 (removable equipment) introduce a pre-pulse warning to the pilot for the survey camera. This brings on a green lamp on the centre instrument panel between 3 and 5 seconds before the survey camera is pulsed, the lamp remains on until the camera is pulsed. The circuit provides this pre-pulse signal whatever the controller timing is or whatever ratio selection is made, the only exception being when the controller is set to operate at intervals of 3-5 seconds or less, depending on the characteristics of the actual controller. Relays G, H, K, L and M, mounted behind the control panel, have been added, together with additional wiring on the uniselector and a two bank ratio selector switch for the survey camera.

Note . . .

(1) *The Type* 35, *No.* 16 *controllers have a* 3 *to* 5 *second tolerance on the pre-pulse contacts. It is therefore possible to have a controller on the panel providing a signal* 3 *seconds before the main pulse whilst the controller at the bomb aimer's station provides a signal* 5 *seconds before the main pulse. The controllers should not both be operating simultaneously.*

(2) *The pre-pulse contact cams are so shaped that the duration of the pulse is from* 3 *to* 5 *seconds before the main pulse and can last up to* 2 *seconds after the main pulse has finished. The aircraft circuitry is designed to overcome this and ensures that the pre-pulse indicator lamp always goes out when the main pulse is made.*

(3) *Because of the complexity of this circuit a number of crystal diode rectifiers have been connected in various parts of the circuitry to eliminate possible feedbacks which could otherwise occur under certain conditions.*

(4) *The function of this circuitry depends upon the timing between and during the various pulses from the controllers and uniselector. This must be borne in mind when interpreting the wiring diagrams.*

1 : 1 ratio (*fig.* 2)

30. The pre-pulse signal from the Type 35 controller, made 3 to 5 seconds prior to every camera pulse, operates relay L or M (R11 or R12) according to which controller is in use ; these relays close (R11/1 or R12/1) to connect a supply via contact R1/2 of relay K to energize relay G (R2) via a rectifier and the ratio selector switch S2 at position 1 : 1. Relay G operates:—

(1) To close R2/2 as a hold-in supply via contact R3/2 of relay H.

(2) To close R2/1 to connect the supply, obtained via contact R1/2 of relay K, to the indicator lamp which now shows GREEN.

31. Three to 5 seconds later the main camera operating pulse is made, relay D (R5) is energized to operate as follows :—

(1) Contact R5/2 notches the uniselector round one step (*para.* 22).

(2) Contact R5/1 closes to feed a supply via the ratio switch S1 to energize relay H (R3). This operates in turn to open its contact R3/2, thus de-energizing relay G (R2) which switches off the indicator lamp (R2/1) and opens its coil circuit (R2/2), and to close its contact R3/1 to energize relay K. Relay K overrides the continued period of the pre-pulse signal when the main pulse has ended by opening its contact R1/2 in both relay G (R2) and the indicator lamp circuits.

32. At the end of the pre-pulse signal (up to 2 seconds after the camera pulse is made) the contacts R11/1 or R12/1 of relay L or M open and relay K (R1) is de-energized. The complete system is thereby restored to a state of rest ready for the commencement of the next cycle.

1 : 4 or 1 : 8 ratio (*fig.* 2)

33. Every contact immediately preceding a camera operating contact on uniselector bank A (1 : 8) or bank B (1 : 4) is connected via a rectifier to the 1 : 8 or 1 : 4 terminal respectively of the ratio selector switch pole S2. This connection is used to pre-set the pre-pulse indicator circuits so that the lamp will light 3 seconds prior to the camera being pulsed. The intermediate contacts of the uniselector banks A and B are not connected, thus ensuring that relay G (R2) remains un-energized and the lamp cannot be operated although the relays L or M (R11 or R12) are operated 3 to 5 seconds before every main camera operating pulse from the controller (these pulses also notch the uniselector round, *para.* 22).

33A. The following description assumes that a 1 : 4 ratio selection has been made (the operation of the 1 : 8 ratio is similar). When the uniselector bank B (R13/2) reaches a contact (4, 8, 12, 1A, 5A, 9A) immediately preceding a camera pulsing contact (5, 9, 13, 2A, 6A, 10A), the supply via contact R5/1 of relay D, energized by the controller pulse, is connected via bank S2 of the ratio selector switch at 1 : 4 to energized relay G (R2). Relay G operates:—

(1) To close R2/2 as a hold-in supply to its coil via contact R3/2 of relay H.

(2) To close R2/1 in the circuit to the indicator lamp. However, although the pre-pulse relay contacts R11/1 or R12/1 are closed, the lamp will not light since the circuit will be broken simultaneously by contact R1/2 of relay K (*para.* 33B).

33B. Simultaneously with relay G (R2) being energized, the supply from the uniselector is connected via a rectifier to energize relay K (R1) which operates as follows :—

(1) To close contact R1/1 to connect a hold-in supply to its coil for the duration of the pre-pulse signal (not required at this step of the uniselector), i.e. until relay contacts R11/1 or R12/1 open.

(2) To open contact R1/2 to isolate the indicator lamp, thus preventing premature indication on the third (1 : 4) or seventh (1 : 8) step of the uniselector in lieu of 3 seconds before the fourth or eighth step.

33C. At the end of this pre-pulse signal from the controller, relays R11 and R12 will be de-energized, consequently relay K (R1) will be de-energized. Relay G (R2), however, will remain energized via its hold-in contact R2/2 until the end of the camera operating pulse from the next step of the uniselector. Thus, the indicator circuits are pre-set ready for the pre-pulse signal associated with, and 3 seconds before, the camera operating pulse.

33D. Three to 5 seconds before the controller pulses the uniselector to the camera operating contact, the pre-pulse relay R11 or R12 will be energized. Contacts R11/1 or R12/1 will be closed to connect a supply via contact R1/2 of relay K and contact R2/1 of relay G (energized via the previous step of the uniselector (*para.* 33A)) to the indicator lamp which now shows GREEN. (Relay K will not be energized.)

33E. As the controller pulses the uniselector to the camera operating step, the supply via relay D (R5/1) is connected by uniselector bank B (R13/2) through the 1 : 4 terminal of the ratio selector switch pole S1 to energize relay H (R3) for the duration of the pulse. Relay H operates:—

(1) To open R3/2 to break the hold-in supply to relay G (R2) which is thus de-energized to switch off the indicator lamp.

(2) To close R3/1 to energize relay K (R1). This closes R1/1 to connect a hold-in supply to its coil for the remainder of the pre-pulse signal (i.e. until R11/1 or R12/1 are opened) and opens R1/2 to ensure that the indicator lamp remains isolated for this period.

33F. Two seconds approx. after the camera pulse, the pre-pulse relay R11 or R12 is de-energized, contacts R11/1 and R12/1 will be open and relay K (R1) thus de-energized. The complete system is thereby restored to a state of rest ready for commencement of the next cycle.

Off selection (*fig.* 2)

33G. If the survey camera ratio selector switch is selected OFF, under a condition whereby relay G (R2) is held-in, the hold-in supply via relay H (R3/2) is fed back through the OFF position of the switch (S2) to energize relay K (R1), thereby ensuring that the lamp circuit is isolated (R1/2). If this connection were not made, the lamp would pulse for every pre-pulse signal of the controller, since when selected OFF the camera pulsing signal cannot energize relay H (R3) to break (R3/2) the hold-in circuit to relay G as happens when the camera is required to be operated. ▶

UNISELECTOR RESET CIRCUIT

(*fig.* 2)

34. Uniselector reset switches are provided on the control panel and on the bomb aimer's P.R. panel in order to set up the uniselector so that the first pulse from the controller pulses main, tri- and survey cameras and subsequent pulses pulse the tri- and survey cameras at the required ratios to the main cameras. For this purpose uniselector bank D (R13/3) is used. ▶

35. Every step of R13/3, except 1, 9, 2a and 10a, is connected via the normally open contact R7/1 relay J to the coil R6 of relay F and also, when relay F is energized, via contact R6/2 of relay F, through the interrupter contact R13/5 to the coil R13 of the uniselector. Every eighth step (1, 9, 2a and 10a) of R13/3 is connected via the normally open contact R7/2 of relay J to the reset indicator lamps on the control panel and on the bomb aimer's P.R. panel.

36. Assume that the supply is connected to the control panel bus-bar (*para.* 9–13). When a reset push-switch is depressed, its contact 4-3 is broken and its contact 1-2 is made to connect a supply from the ratio selector circuit-breaker on the panel to energize relay J (R7). The supply from the ratio selector circuit-breaker on the panel via one of the steps other than 1, 9, 2a or 10a of R13/3 is then connected by contact R7/1 of relay J to the coil R6 of relay F. Contact R6/2 of relay F connects the supply from the uniselector bank R13/3 through the uniselector interrupter contact R13/5 to the uniselector coil R13. Contact R6/1 of relay F breaks the economy resistance hold-in circuit for the coil R13 so that when the interrupter contacts R13/5 open the uniselector will not lock home.

37. The uniselector coil operates and moves its banks round one step. At the same time it breaks and makes its interrupter contact R13/5 so that if bank D is not at step 1, 9, 2a or 10a its coil will be re-energized and its banks will be moved round another step. A 1 μF. capacitor suppressor is fitted across its interrupter contact R13/5 to minimize interference.

38. The uniselector notches round until it reaches step 1, 9, 2a or 10a, when the supply will be connected via contact R7/2 of relay J to the green reset indicator lamps, instead of to the uniselector coil via contact R7/1 of relay J. The uniselector is now reset and the reset switch can be released; the lamps will then go out. There is a lamp for each reset switch; both lamps will operate when either switch is used.

SURVEY CAMERA MOUNTING

(*fig.* 4)

39. The survey camera is mounted on a Type 125 (Type 80A pre Mod. 2851) mounting which is adjustable to correct for aircraft drift and tilt. Two controllers are provided, operating in parallel, one on the control panel and one on the bomb aimer's P.R. panel. Both controllers are supplied at 28 volts from a circuit-breaker on the control panel and the camera window doors must be open before the supply to the bus-bars is connected (*para.* 9–13).

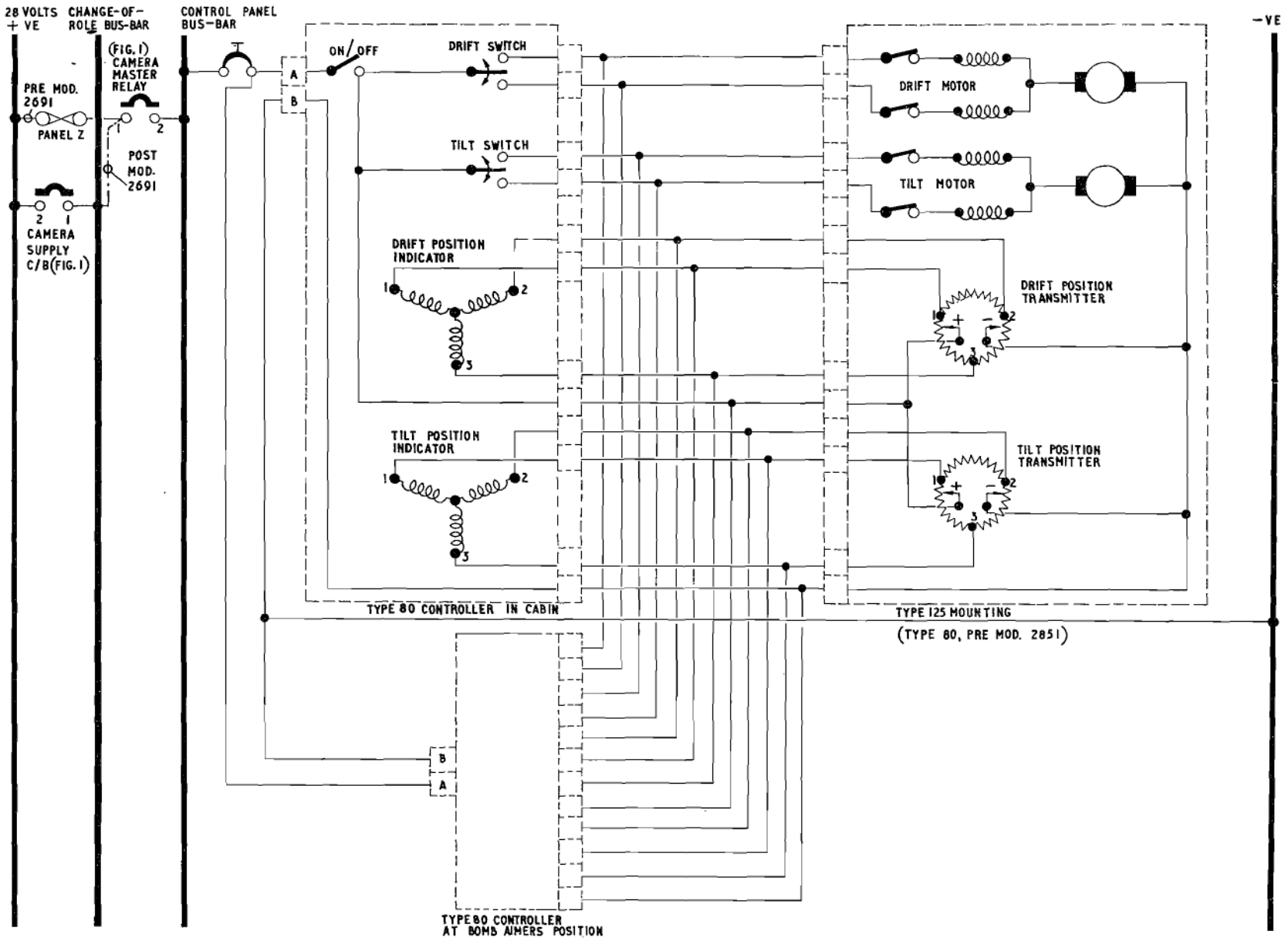

Fig. 4. Survey camera mounting control

40. Each controller has an ON/OFF switch which connects the supply to the drift and tilt switches. The tilt and drift switches each have two positions and when selected, in the required *sense*, connect their supplies to the corresponding *sense* fields of their respective actuators in the mounting.

41. There are desynn transmitters in the mounting for the correction angles, both tilt and drift, which record on respective indicators on the controllers. When the correction angle is equal and opposite to the aircraft deviation angle the control switches can be returned to OFF.

42. The negative return for the equipment in the mounting is carried back to the controllers where it is connected to earth locally. A stowage is provided for the supply plug when the bomb aimer's controller is not fitted.

◄ **Note . . .**
The mounting is not adjustable for bank or roll, therefore, the aircraft attitude has to be adjusted to level flight (athwartships) whilst the camera is pulsed. A green indicator lamp is provided for the pilots which comes on 3 to 5 seconds before the camera is pulsed to warn the pilots that an exposure is imminent and that a correction should be made if and as necessary. The lamp goes out as the camera is operated. ►

SERVICING

INTRODUCTION

43. Reference should be made to the General Information Group at the front of this Section (*see Book* 2) for the general principles of servicing and fault finding, for information on the care of equipment and for precautionary measures.

44. 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 . . .
Whenever the camera master relay (circuit-breaker Type B) has to be replaced, it is necessary to remove the link between terminals 3 *and* 5 *of the replacement item before fitting it to the aircraft or control panel.*

CAMERA CIRCUITS

45. A test rig will be provided to enable the camera system to be tested before loading the camera crate (complete with cameras) on to the aircraft. All cameras are then easily accessible for adjustments or fault location.

Note . . .
Mod. 2721 *introduces a* 100*-amp. terminal to the camera crate as an earthing point for the test rig.*

46. Once the camera crate and cameras are fitted to the aircraft, the complete system may be operated as follows:—

(1) Before closing the P.R. role bomb doors, check all camera connections to the plug-and-socket panel in the bomb bay roof. Check that all the camera motor flexible drives are connected up. Check that plug and socket connections on all main and oblique cameras are made and secure. Check that all the removable equipment in the cabin is fitted and connected up.

(2) Check that all the circuit-breakers on the P.R. panel at the front end of the bomb bay are reset.

(3) Connect up both 112-volt and 28-volt external supplies.

(4) With all personnel clear of the bomb bay, close and lock the bomb doors.

(5) Select either camera window doors switch to OPEN and release the switch when the DOORS SELECTED OPEN and POWER ON indicators show white.

(6) ►◄ Check all DOOR OPEN indicators show white.

(7) Set both Type 35 controller counters to zero.

(8) Set the time interval on both Type 35 controllers to any time not less than 5 seconds.

(9) Set up the ratio uniselector by depressing either ratio selector reset switch until the associated green lamp comes on, then release the switch.

(10) Select 1 : 1 on the four ratio selector switches. Select the survey camera isolate switch to ON.

(11) Switch the Type 35 controller at the bomb aimer's position to ON.

◄ (12) Check that all the selected camera pulsing ► indicators on the control panel and at the bomb aimer's position start pulsing together and continue to pulse steadily at the time interval set on the controller. The red lamp on the controller should light up between 3 and 5 seconds before each exposure is made and go out as each exposure is ◄ made, i.e. as the camera pulsing lamps ► light up. Check that the controller counter is counting correctly.

(13) Check that the pilot's pre-pulse green warning lamp on the instrument panel lights up between 3 and 5 seconds before the cameras are pulsed, and goes out as the cameras are pulsed. The lamp lights up and goes out simultaneously with the red lamp on the controller (provided that the survey camera ratio selector is set 1 : 1).

(14) Select each main camera master switch to OFF in turn and check that as each camera is switched off its pulsing indicator lamps stop pulsing.

(15) Select each tri-camera switch and survey camera ratio and isolate switch to OFF in turn and check that as each camera is switched off, its pulsing indicator lamps stop pulsing.

(16) Switch the Type 35 controller OFF.

(17) Re-select the main camera master switches to ON, set the ratio selector switches to 1 : 1 and the survey camera isolate switch to ON.

(18) Select the Type 35 controller on the control panel to ON.

(19) Check that both sets of camera pulsing indicators pulse steadily at the time interval set on the controller. Check the pulsing of the red lamp and the counter on the controller (*see item* 12). Check the pulsing of the pilot's pre-pulse warning lamp (*see item* 13).

(20) Select each ratio selector switch in turn to 1 : 4. Check that as each switch is selected, the associated camera pulsing indicator lamps pulse once at every fourth pulse of the main camera indicators. When the survey camera ratio switch is selected, check that the pilot's pre-pulse warning lamp lights up between 3 and 5 seconds before the survey camera is pulsed, i.e. the lamp lights up and goes out simultaneously with the red lamp on the controller for that pulse.

(21) Switch the Type 35 controller OFF at the first or second pulse after the tri and survey cameras have pulsed.

(22) Depress the ratio selector reset switch on the control panel, when the reset green indicator lamp lights up, release the switch, the green lamp should go out.

(23) Re-select the Type 35 controller to ON and check that all pulsing indicator lamps (for the main, tri and survey cameras) light up together at the first pulse and then continue pulsing in ratio.

(24) Repeat items 21 to 23, but use the ratio selector switch at the bomb aimer's position.

(25) Repeat item 20 but with the ratio selector switches selected in turn to 1 : 8; the cameras should then pulse once at every eighth pulse of the main cameras.

(26) Switch the Type 35 controller OFF.

(27) Return all control switches to OFF and remove the external supplies.

SURVEY CAMERA MOUNTING

47. With the P.R. role bomb bay doors closed and locked, select the door control switch to OPEN to raise the deflector only. Select either camera window doors switch to OPEN, release the switch when the DOORS SELECTED OPEN and POWER ON indicators show white. Check that the Type 80 mounting controller circuit-breaker on the control panel is reset, then proceed as follows:—

(1) Switch the controller on the control panel to ON.

(2) Operate the TILT switch in alternate directions and check that the ▶◀ mounting moves in the correct sense, i.e. if the switch is moved to correct for aircraft nose down trim, the forward edge of the mounting should lift and vice versa. Check that the position indicator moves in the correct sense. Check the angular displacement of the mounting against the indication given on the position indicator.

(3) Operate the DRIFT switch in alternate directions and check that the Type 80 mounting moves in the correct sense, i.e. if the switch is moved to correct for port drift (aircraft nose to starboard of the line of flight), the forward edge of the mounting should swing to port and vice versa. Check that the position indicator moves in the correct sense. Check the angular displacement of the mounting against the indication given on the position indicator.

(4) Switch the controller OFF.

(5) Repeat items 1–4 for the Type 80 controller at the bomb aimer's position.

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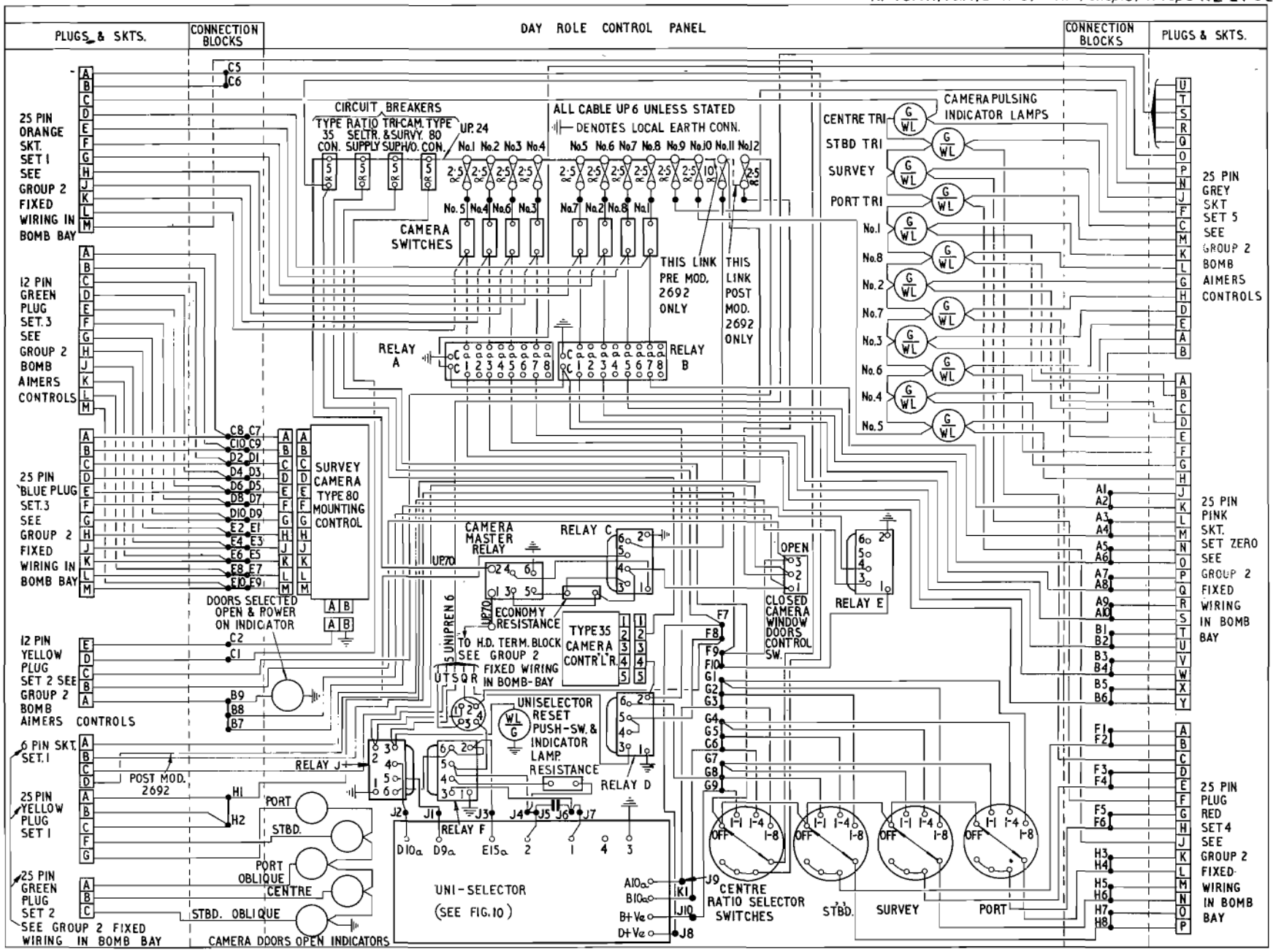

SWITCH MARKINGS REFER TO TOGGLE POSITIONS
ALL CABLE UP. 6 UNLESS STATED
LINK BETWEEN TERMINALS 3 AND 5 REMOVED FROM CAMERA MASTER RELAY

Fig. 5 Control panel (post Mod. 2098)

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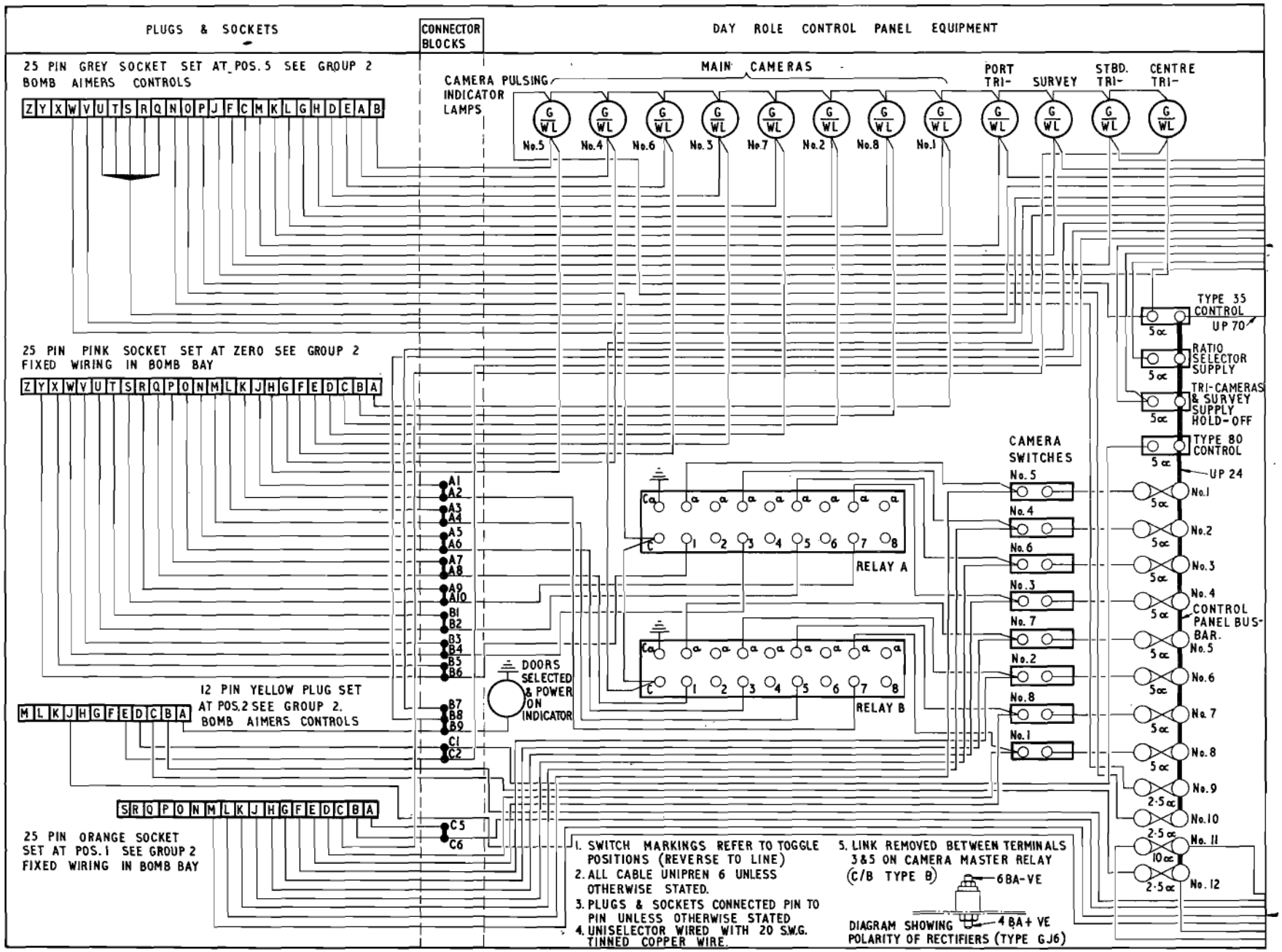

Fig. 6 (1) Control panel (post Mods. 2098, 2122, 2692 & 2906)

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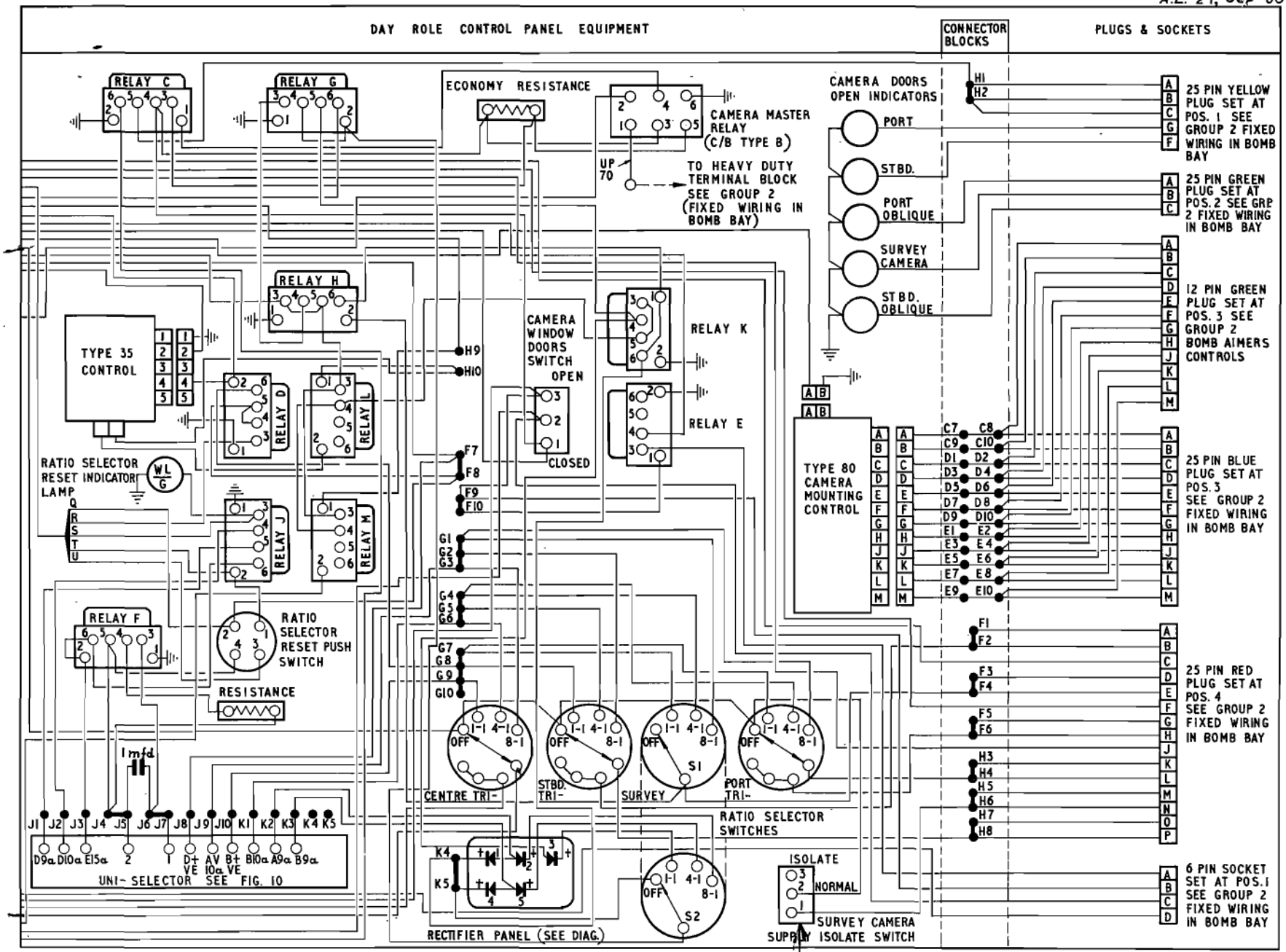

Fig 6 (2) Control panel (post Mods. 2098, 2122, 2692 & 2906)

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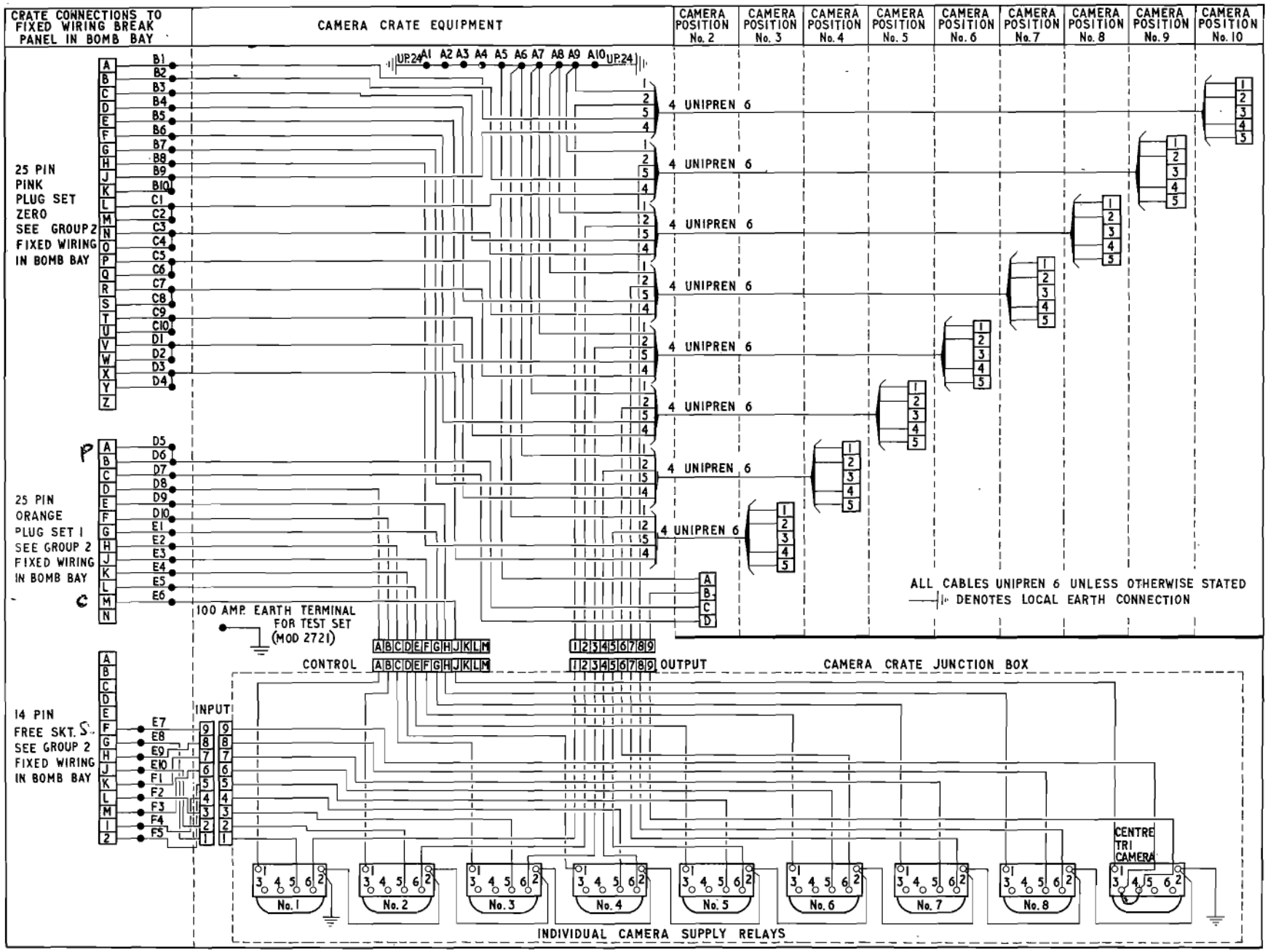

Fig. 7 Camera crate wiring

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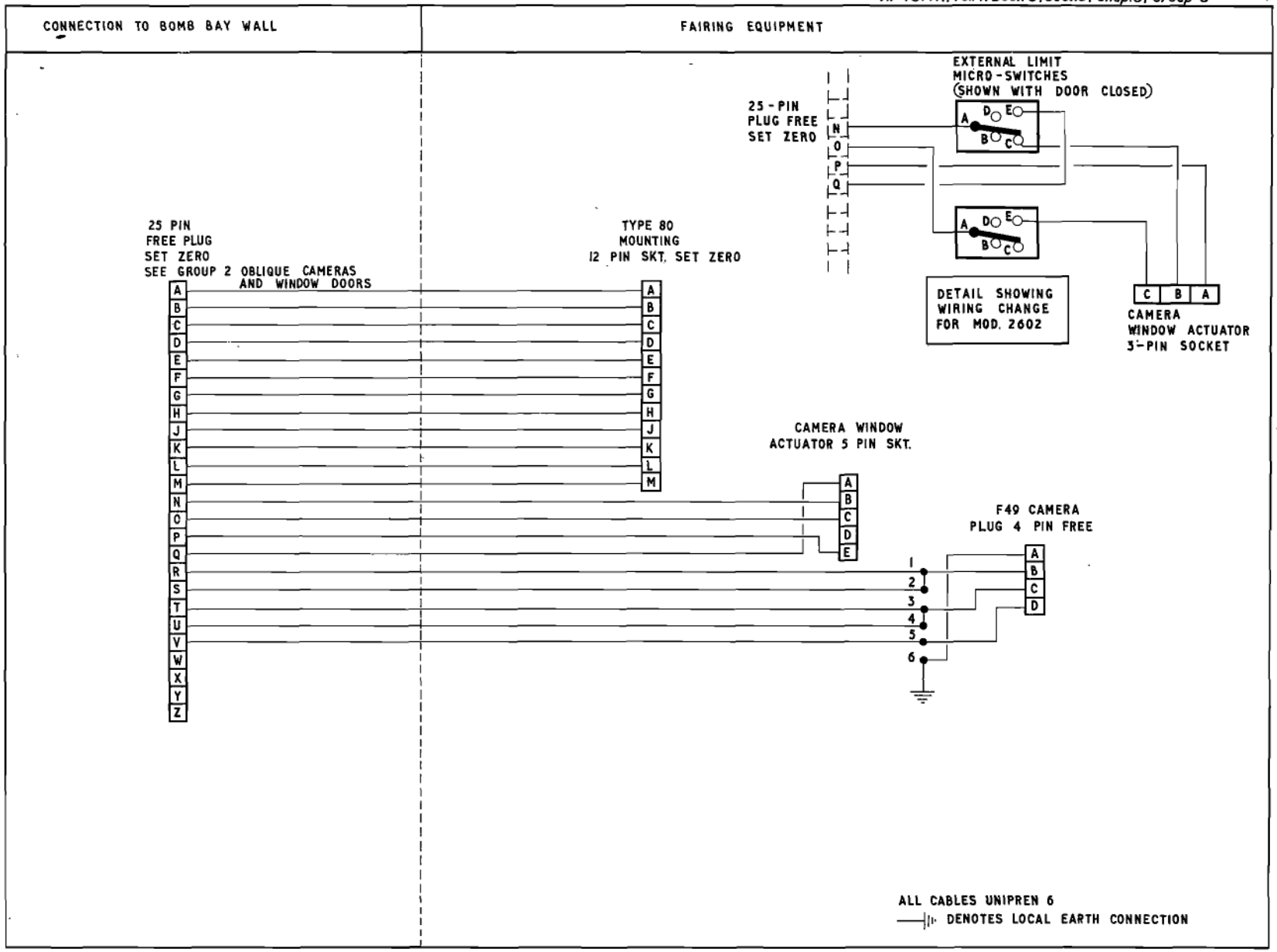

Fig. 8 Survey camera wiring fixed to rear fairing

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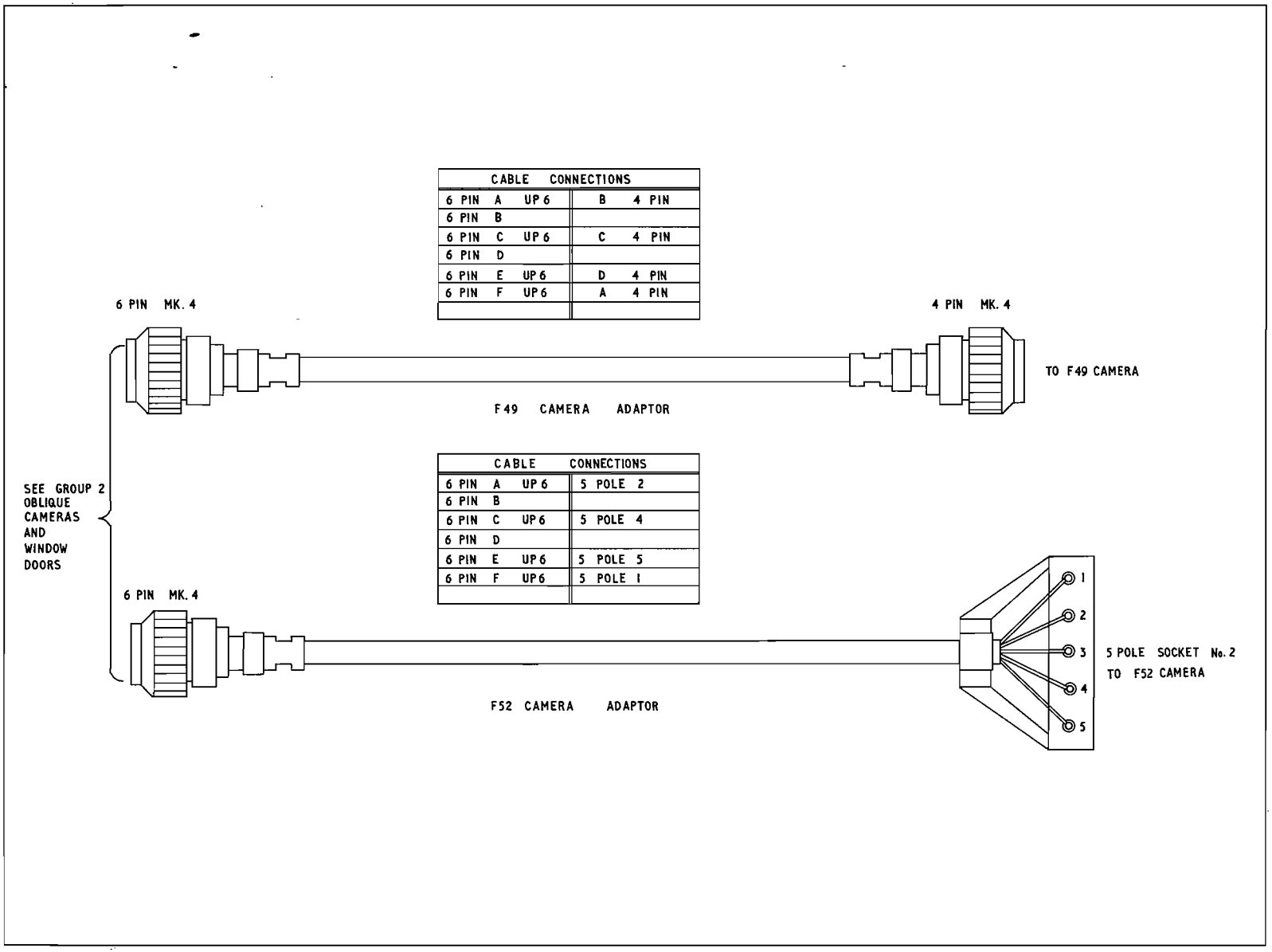

Fig. 9 Oblique cameras F49 and F52 adaptors

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71079 SHT. 463-C

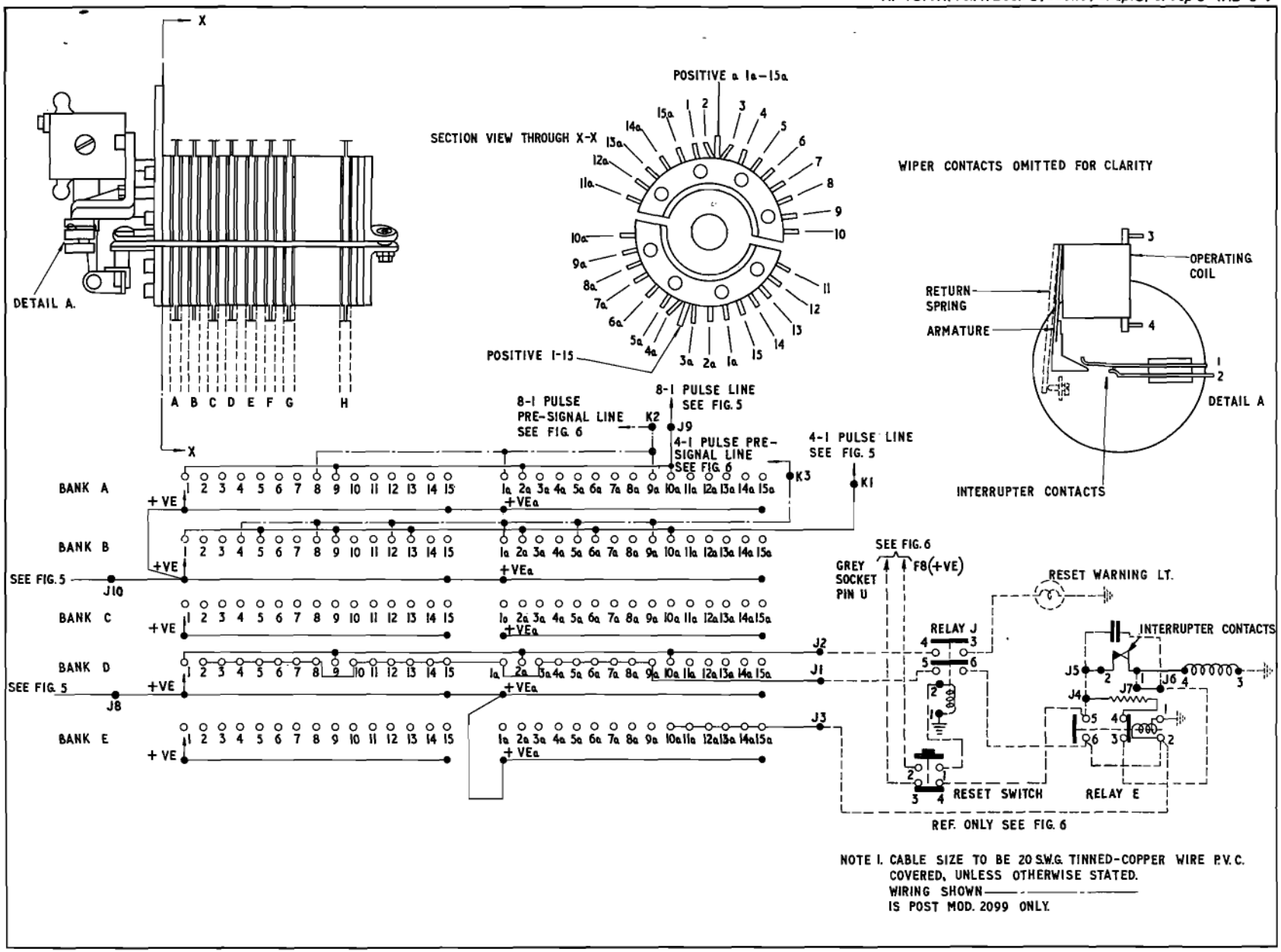

Fig. 10 Uni-selector wiring

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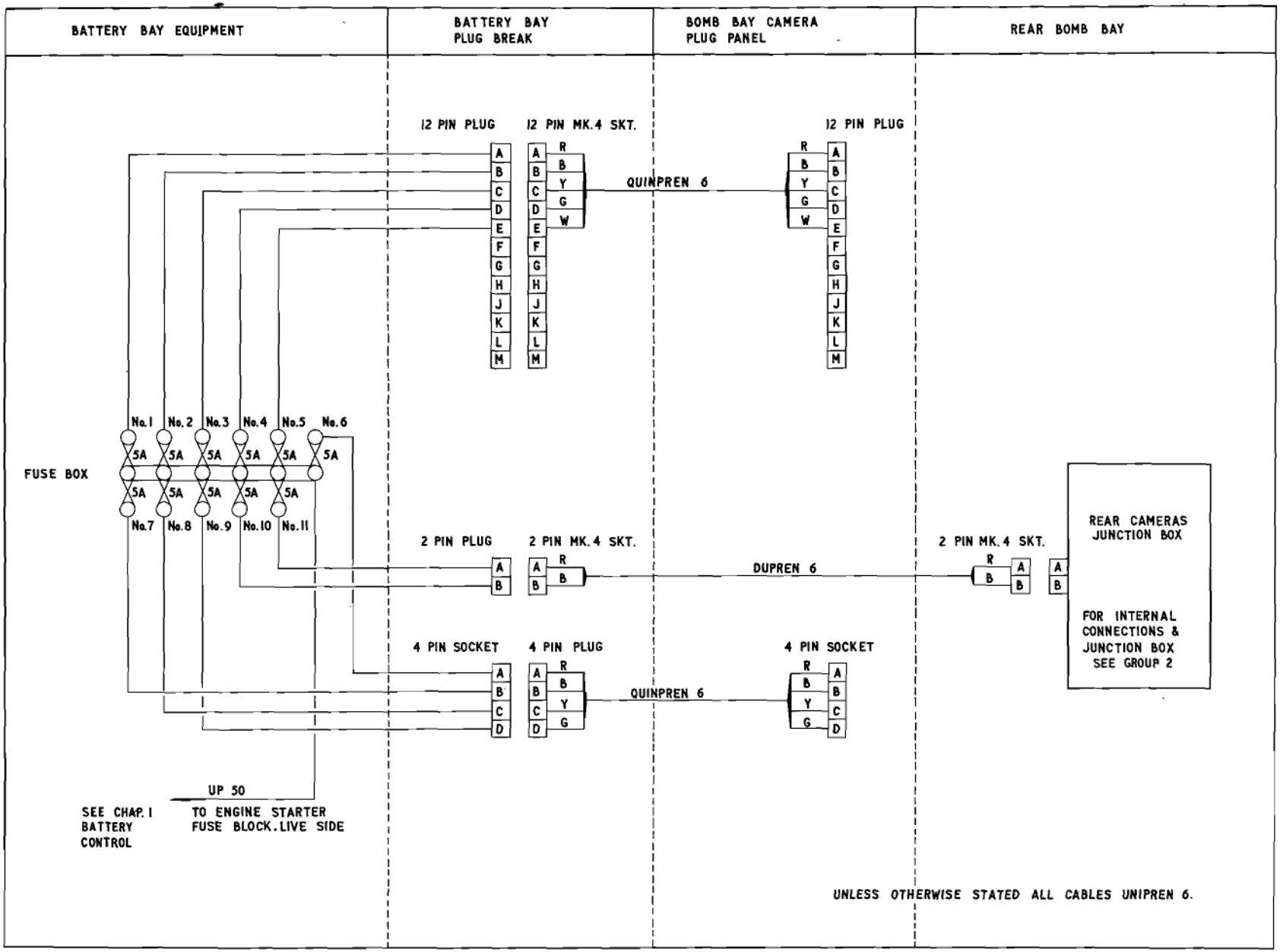

Fig. 11 Final day role positive supplies (ref. only)

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