Chapter 7 PHOTOGRAPHIC INSTALLATION

LIST OF CONTENTS

LIST OF CONTENTS *(continued)*

LIST OF ILLUSTRATIONS

LIST OF APPENDIXES

A list of appendixes appears at the end of this chapter

Introduction

1. This chapter contains descriptive, operational and servicing information on the photographic installation which is fitted when the aircraft is converted for operation in the photographic reconnaissance role, together with associated fixed items of equipment and wiring on the aircraft. Information regarding the location of components together with a list of associated Air Publications is in Chapter 1 of this Section.

2. Conversion of the basic aircraft for operation in the photographic reconnaissance role is fully described in A.P. 101B-1201-1A, Cover 1, Sect. 2, Chap. 5B, and Cover 2, Sect. 3, Chap. 14 contains a full description of the equipment used.

Modification standard

3. This chapter includes the following modifications:- 67, 224, 502, 708, 827, 5006 and 5085.

GENERAL DESCRIPTION

4. The photographic installation provides for the carriage and control of up to six Type F95 cameras mounted vertically and obliquely, in various combinations, for daylight photography, and a single vertically-mounted Type F97 camera with pyrotechnic photoflash illumination for night photography.

5. The cameras and photoflash equipment are carried in two separate crates, the camera crate incorporating a self-contained heating system. In the photographic reconnaissance role the two crates are fitted in tandem on the inside of the bomb door and electrical connection with the fixed wiring in the remainder of the system is made via the role junction box in the accessories bay. The associated role control panel, containing the controls and indicators for the equipment, is fitted at the observer's station.

6. Prior to taking photographs the bomb door is opened and the cameras and photoflash dischargers are revealed ready for use. The armament selector in the pilot's position provides the master control switch for the photographic installation and only when CAMERA is selected can the system operate fully; all other selections are made on the role control panel at the observer's position. Provision is made for the pilot to operate the selected cameras by depressing the weapons release trigger switch on the control column. Protection circuits are included to prevent the functioning of all cameras and the photoflash equipment until the bomb door is locked in the open position.

Role control panel

7. A photographic role control panel C-P/C containing all the controls and indicators required for operating the complete system is installed on the observer's port console panel and connected by plugs and sockets to the remainder of the installation. In general the components on the panel are grouped to cover each mode of operation as follows:-

(1) F95 cameras
(2) F97 camera
(3) Photoflash
(4) Heating

The components in each group are described in the appropriate paragraphs in this chapter. The panel also contains the camera selector switch and camera control switch, both of which are common to the two camera installations.

Camera selector

8. The single-pole, changeover switch L, marked CAMERA SELECTOR, F95 – F97 provides for selection of either of the two camera installations as required. The selector connects the control switch (*para* 9) to the camera installation in use.

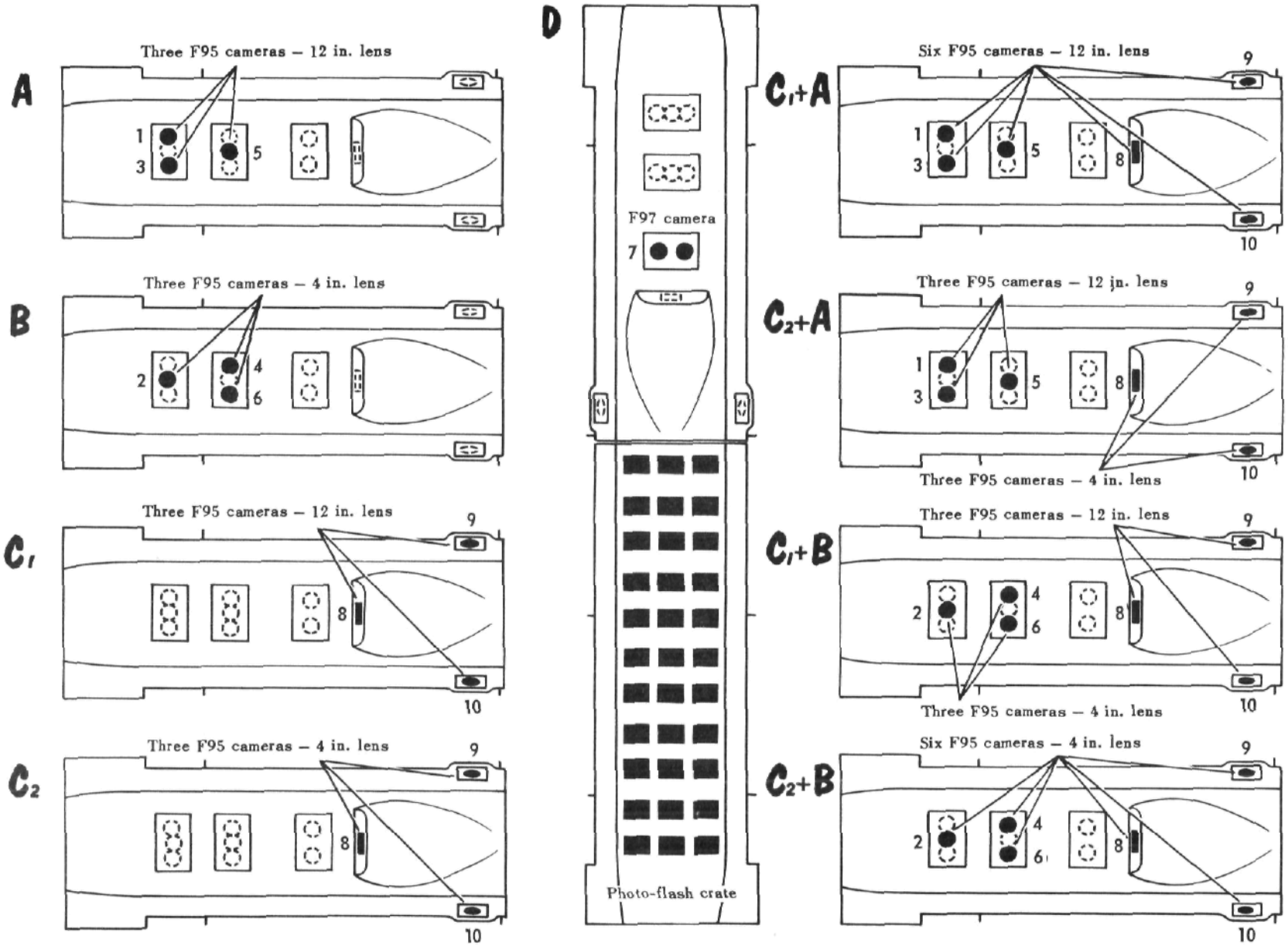
Control switch

9. The single-pole, changeover, centre off switch M, marked CONTROL SWITCH, CONT – OFF – INTERRUPT is spring-returned to OFF from the INTERRUPT position. The switch is provided to control the operation of either the F95 or F97 cameras, whichever installation is selected on the camera selector (*para* 8). When set to CONT any camera selected will run continuously until the switch is returned to OFF. Alternatively, for short periods of operation, the switch can be held to the INTERRUPT position as desired and it will spring-return to OFF when released.

Camera crate *(fig 1)*

Camera stations

10. Located in the camera crate B-C/B are ten stations, each of which has structural provision for camera mounting equipment. Station 7 is located centrally and is used for the carriage of the single vertically-mounted F97 camera. Two electrical connectors, one plug and one socket, are provided at this station together with stowage facilities for use when the F97 camera is not fitted. The other nine stations provide for the carriage of up to a maximum of six F95 cameras mounted as described in para 11 to 13.



INVERTED PLAN VIEW

Fig. 1. Camera arrangements

11. *Vertically-mounted F95 cameras.* Three stations are located in each of two compartments forward of station 7 for the carriage of vertically-mounted cameras. Three F95 cameras with 12 in. lenses can be accommodated, one each port and starboard in the forward compartment at stations 1 and 3 respectively, and one centrally in the second compartment at station 5.

12. Alternatively, three F95 cameras with 4 in. lenses can be accommodated, one centrally in the forward compartment at station 2, and one each port and starboard in the second compartment at stations 4 and 6 respectively. Two electrical socket connectors are provided at each of the four camera stations 1, 3, 5 and 6, the connectors at stations 1 and 5 also being employed when cameras are fitted at the alternative stations 2 and 4 respectively. Stowage facilities are provided for the connectors when not in use.

13. *Obliquely-mounted F95 cameras.* Three stations are located within two compartments aft of station 7 for the carriage of obliquely-mounted cameras. Two side-facing oblique F95 cameras with either 12 in. or 4 in. lenses can be accommodated, one each port and starboard in the aft compartment at stations 9 and 10 respectively, and a forward-facing oblique F95 camera with either a 12 in. or 4 in. lens can be accommodated centrally in the second compartment at station 8. Two electrical socket connectors are provided at each station together with stowage facilities for use when the oblique cameras are not fitted.

Heating and de-misting system

14. Two blower-heater units, D (port) and C (starboard), are fitted within a compartment forward of the bulkhead at station 263·8. The units are thermostatically controlled and deliver warm air, when required, to diffusers at six windows in the undersurface of the crate for de-misting purposes and for maintaining an optimum working temperature for the cameras.

Relay and junction panel

15. Located in the forward compartment of the crate and mounted on the bulkhead at station 263.8 is a relay and junction panel B-C/B/A. The panel contains relays and distribution sub-fuses used in the F95 camera circuits and camera crate heating circuits. Used as a junction panel for the camera crate wiring, the panel also contains terminal blocks and provides termination points for the cables which make up the camera crate loom. Fitted at the free end of the loom are four plugs marked A-C7, 8, 9 and 13 by which connection is made with the fixed wiring of the aircraft at corresponding sockets on the role junction box A-C.

16. A 10-pole socket marked B-C/B/2, fitted at the aft end of the camera crate, and a special cable loom are also provided for connecting the F97 camera with the photoflash crate wiring. A dust cap, for protecting the socket when the cable loom is disconnected, is secured to an adjacent stowage point.

Photoflash crate

Discharger unit stations

17. The photoflash crate B-C/C carries thirty-three discharger units each of which provides for the housing and discharging of six 1·75 in. photoflash cartridges. The dischargers are laid out in threes – port, centre and starboard – in eleven rows identified by the letters A to H and J to L inclusive, starting from the forward end of the crate, and the cartridges are numbered in their firing order A1 to L198 from port to starboard.

Connector mounting trays

18. Located on the port side of the crate are two connector mounting trays provided for connecting the outputs from two photoflash distributor units to the discharger units. The forward tray B-C/C/N contains eleven plugs and sockets, and connects No. 1 distributor directly to the discharger units A to E inclusive and therefore to photoflash cartridges A1 to E90. The aft tray B-C/C/Q, containing twelve plugs and sockets, provides further connections from No. 1 distributor to the first ten cartridges in row F, and also connects No. 2 distributor directly to the ninety-eight cartridges contained in the remaining discharger units.

19. Input connections to No. 1 distributor are taken from a 10-pole plug B-C/C/1 located at the forward end of the photoflash crate. The plug is provided for connecting the distributor to the F97 camera, and for maintaining earth continuity, via a special cable loom and a socket B-C/B/2 on the camera crate (*para* 16). A stowage point is provided on the photoflash crate, adjacent to plug B-C/C/1, for securing plug B-C/B/2 of the interconnecting loom when the crate is not installed on the aircraft.

Power supplies

20. The power supplies required for operating the photographic installation are 28V d.c. and 200V, 3-phase 400 Hz a.c.

The d.c. supplies are taken from the normal 28V d.c. busbars and, with the exception of fuse A10 on panel R-C which supplies the iris motors in the F95 cameras, the main distribution fuses are contained on panel C-Q. Sub-fuses, in the heater circuits of the F95 cameras and the motor circuits of the vertically-mounted F95 cameras are located on panel B-C/B/A in the camera crate. Three-phase a.c. supplies are taken from the normal 200V a.c. busbars in distribution box R-A, via fuses D9, E9 and F9, to sub-fuse blocks located on panel B-C/B/A for operating the two blower-heater units in the camera crate.

TYPE F95 CAMERA INSTALLATIONS

DESCRIPTION

General

21. For daylight operation the photographic role equipment essentially comprises two installations, one employing three vertically-mounted Type F95 cameras, the other employing three obliquely-mounted cameras. Fitted with either 12 in. or 4 in. lenses, the cameras are installed in the camera crate (*para* 10) in various combinations depending on operational requirements.

22. All three vertical cameras are selected by a single on-off switch and operate simultaneously, requiring only one film indicator – operated by one of the cameras – to show the quantity of unexposed film remaining in the magazines. Remote indication that film is passing through each of the remaining vertical cameras is given by the flashing of two green lamps. Separate selectors and film indicators are provided for the individual operation of each of the three oblique cameras. The lens apertures of all the cameras can be changed in flight by remote control and a choice of two shutter speeds is provided. Single-shot operation of the three vertical cameras is controlled by an intervalometer, and the facility is also available for operating the forward-facing oblique camera during practice runs. Individual camera heating is provided by thermostatically-controlled elements within each camera and is selected by a master switch.

Type F95, Mk. 4 camera

23. The Type F95, Mk. 4 aircraft camera is used for day reconnaissance, low-altitude, high-speed and low-speed oblique photography. A high shutter speed is used to minimize the effect of image movement, and alternative speeds of 1/1,000 sec at 4 pictures per second and 1/2,000 sec at 8 pictures per second are available. Two centrifugal switches are fitted so that the camera drive motor can be governed to either of the two speeds, whichever is selected on the intervalometer selector (*para* 32).

24. A single-shot microswitch, actuated by a slotted cam driven by the film transporting mechanism, and an associated relay (*para* 41) permit the camera to operate at a selection of reduced speeds in accordance with pulses received from an intervalometer (*para* 36), while maintaining the normal minimum shutter speed of 1/1,000 sec. In this way it is possible to increase the camera's economical ground cover. A second microswitch, actuated by a cam driven by the film feed core, provides impulse switching to operate a remote film indicator (*para* 29) or film indicator lamp (*para* 31). Two thermostatically controlled heater elements are housed in the gearbox primarily for maintaining the film in the magazine at a suitable working temperature.

◀ A 7-pole plug on the camera body provides ▶ electrical connection with the motor control, film indicator and heater circuits.

25. Interchangeable lens cones incorporating either a 12 in. f/4 telephoto lens or 4 in. f/2 lens can be fitted to the camera body, and a motor-driven iris mechanism enables the lens aperture to be changed by a remote iris selector (*para* 34) to any one of three settings, the values of which are preset before take-off to suit the anticipated flight conditions. A 6-pole plug on the unit provides electrical connection with the iris selector circuit.

Controls and indicators

26. The following controls and indicators (*para* 27 *to* 35) are located on the role control panel C-P/C (*para* 7), the camera selectors and film indicators being grouped within a defined area marked F95 CAMERAS.

Camera selectors

27. A single-pole, on-off switch R, marked VERTS, ON – OFF is used to select all three vertically-mounted cameras (*para* 11), whichever combination is installed. When selected to ON the switch connects 28V d.c. from fuse M8 (panel C-Q) to three sub-fuses H7, H8 and H9 on panel B-C/B/A in the camera crate. Three fused supplies, one for each camera, are then available for operating the vertical cameras simultaneously via the control relays (*para* 38).

28. Three single-pole, on-off switches P, N and Q, marked OBLIQUE, and PORT, FORD and STBD respectively, ON – OFF, provide independent selection of each of the three obliquely-mounted cameras (*para* 13). Three separately-fused supplies, one for each selector switch, are taken from fuses N10, N9 and N11 (panel C-Q) and when a switch is selected to ON, 28V d.c. is available for operating the associated oblique camera via the control relays (*para* 38).

Film indicators

29. Four film indicators are provided to show the quantities of unexposed film remaining in the magazines of the Type F95 cameras. Three indicators D, C and E, marked PORT, FORD and STBD respectively, are operated by the relevant oblique cameras. The other indicator F, marked VERTICALS STN 1 OR 2, covers all three vertically-mounted cameras and is operated by the camera fitted at either station 1 or 2, depending on which camera combination is installed (*para* 11).

30. The film indicator consists of an electromagnetically-operated pointer which rotates over a fixed disc marked F (full), ¾, ½, ¼ and 0 (empty). The pointer is moved one step clockwise by a solenoid-operated ratchet mechanism each time an electrical impulse is received from a microswitch within the camera (*para* 24). The indicator can be manually reset as required by rotating the pointer in a clockwise direction.

Film indicator lamps

31. Two green indicator lamps AD and AE, marked F95 VERTICALS, and STN 3 OR 6 and STN 4 OR 5 respectively, are operated by the relevant vertically-mounted cameras depending on which camera combination is installed (*para* 11). The indicators flash intermittently when an electrical impulse is received from a microswitch within each camera (*para* 24). Each lamp incorporates a press-to-test and rotate-to-dim facility, and the test supply – from fuse M6 (panel C-Q) – is available when the armament selector switch is set to CAMERA.

Intervalometer selector

32. The speed selector control for the Type F95 cameras is a 2-pole, 6-way rotary switch AA, marked INTERVALOMETER SELECTOR, and the first two positions of the switch, marked 8 FR (8 frames per second) and 4 FR, are used for selecting either of the two normal speeds available (*para* 23). The remaining positions of the switch, marked ½ SEC, ¾ SEC, 1 SEC and 2 SEC, apply to all but the two side oblique cameras and each selects one of four switching intervals produced by the intervalometer (*para* 36) for single-shot operation at a shutter speed of 1/1,000 sec.

Note...

Use of the single-shot facility when the side obliques are selected will result in the erratic operation of these two cameras and must be avoided.

33. Wafer 1 of the switch connects the operating relays (*para* 39) to the camera control switch either directly, if selected to 8 FR or 4 FR, or via the appropriate contacts of the intervalometer, if selected to any of the four remaining positions. Wafer 2 of the switch, when selected to 8 FR, connects the speed selector relays (*para* 42) to the camera control switch so that when the cameras are operated the relays are energized and the faster shutter speed is attained. With any other switch position selected the speed selector relays are out of circuit and the cameras will operate at the slower shutter speed.

Iris selector

34. Selector switch X is a single-pole, changeover, centre off type, marked IRIS SELECTOR, OPEN – 2 – 3 and is provided for setting the irises of all the Type F95 cameras simultaneously to any one of three preset apertures (*para* 25) as lighting conditions require. When the switch is selected to OPEN the irises are opened to the largest preset aperture, while the smallest preset aperture is obtained when position 3 is selected; position 2 selects an optimum setting. The selector controls the operation of six relays (*para* 43) to provide the necessary remote switching of the iris motor in each lens cone.

Heating selector

35. A double-pole, on-off switch W, marked CAMERA HEATER F95, ON – OFF is the master switch for the electrical heating elements housed in the gearbox of each camera (*para* 24). When selected to ON the switch connects 28V d.c. from fuses M10 and M9 (panel C-Q) to six sub-fuses, H1 to H6 inclusive, on panel B-C/B/A in the camera crate. Six fused supplies, one to each of the three oblique and three vertical cameras, are then available for operating the heaters which are individually controlled by thermostats.

Intervalometer

36. Located on the starboard side of the camera crate and mounted on the forward face of frame 277·8 is an intervalometer,

B-C/B/B, which is provided for controlling the single-shot operation of the Type F95 cameras (*para* 24). Four pairs of normally-open contacts within the unit are closed at ½, ¾, 1 and 2 second intervals respectively, by a series of cams driven by a suitably-geared motor.

37. The intervalometer receives a 28V d.c. supply from the camera control switch via the camera selector, or firing relay contacts B2, and therefore functions whenever the Type F95 cameras are operated; the switching intervals are selected as and when required by the intervalometer selector (*para* 32).

Camera control relays

38. Fitted on panel B-C/B/A in the camera crate (*para* 15) are eight magnetic relays which are incorporated in the control circuits of the Type F95 cameras. The relays (*para* 39 *to* 42) – which are 4-pole, changeover type – are used for switching the d.c. supplies, as selected by the camera selectors (*para* 27 *and* 28), to control the associated camera drive motors.

39. *Operating relays.* Operation of the camera drive motors is controlled by two relays L and M, connected in parallel, which in turn are controlled by the camera control switch, either directly or via the intervalometer, as determined by the intervalometer selector (*para* 32).

40. The contacts of relay L are used in the circuits of the forward-facing oblique camera and the three vertical cameras and operate the motors via the associated single-shot relays (*para* 41). The contacts of relay M are used in the circuits of the two side oblique cameras and, as single-shot relays are not provided, the motors are operated directly.

41. *Single-shot relays.* Four relays, N, P, Q and R, together with a single-shot microswitch in each camera (*para* 24), are used in conjunction with relay L (*para* 40) to control the drive motors in the forward oblique camera and the three vertical cameras. The relays ensure that during single-shot operation the film is transported one complete frame for each impulse received from the intervalometer.

42. *Speed selector relays.* The shutter speed at which the six Type F95 cameras operate depends on which of the two centrifugal switches of the drive motor governor (*para* 23) is in circuit at the time. The necessary switching is achieved by two relays S and T, connected in parallel, which are selected as appropriate by the intervalometer selector (*para* 32).

Note...

For reasons of circuit reliability in the motor switching circuits, pairs of contacts connected in series are used on relays M, N, P, Q and R, and a 0·01 μF capacitor is connected across each pair for the purpose of spark quenching.

Iris control relays

43. Located on the port side of the camera crate at station 7 is a relay panel, B-C/B/G, containing six 4-pole, changeover, magnetic relays. Two groups of three relays, A, B and C, and D, E and F respectively, are used in conjunction with the iris selector (*para* 34) for the remote control of the lens apertures of all the Type F95 cameras.

44. Two pairs of contacts – one pair from each group of relays – are arranged to provide double-pole, three-way switching control of the iris motor in each lens cone (*para* 25) in response to the position of the iris selector, for the purpose of selecting any one of the three aperture settings available.

OPERATION *(fig 2-2a)*

Iris selector circuit

45. The operation of the motor-driven iris mechanism in the lens cones fitted to the Type F95 camera and the method of presetting each of the three selective aperture values before flight are fully described in A.P. 1355C, Vol. 1 (2nd Edition), Sect. 5, Chap. 3.

46. Setting the iris selector switch to OPEN causes relays A, Ba and Ca to be energized by +28V from fuse M7, and the appropriate contacts apply 28V d.c. from fuse A10 across pins D and A to two adjustable brushes contacting a slipring in each lens cone. The iris motor is connected to the slipring by a pair of fixed brushes and drives the iris mechanism and slipring until, on attaining the desired preset aperture, the supply is interrupted at the adjustable brushes by two insulated segments incorporated in the slipring.

47. A similar action takes place when the iris selector is set to position 3 except that relays D, E and F are energized and the supply is connected across pins F and C to a second pair of adjustable brushes, causing the motor to close the iris until the minimum preset aperture setting is attained. With the selector set at position 2 none of the iris control relays are energized and the appropriate normally-closed contacts connect the supply across E and B to the remaining pair of adjustable brushes so that the intermediate preset aperture setting is selected.

General

48. Before take-off the following selections are made on the role control panel:-

(1) Camera selector switch to F95.

(2) Blower motors and heaters switch to AUTO (*refer to para* 108).

(3) Camera heater F95 switch to ON.

49. When the aircraft is airborne the circuit protection relays are energized (*Cover* 1, *Sect.* 6, *Chap.* 7) and contacts C2 prepare the firing relay circuit for operation by the trigger switch on the control column (*para* 51).

50. Prior to operating the cameras the following selections are made:-

(1) Bomb door selector switch to OPEN (*Cover* 1, *Sect.* 6, *Chap.* 11A). With the bomb door locked in the open position a +28V supply from the indicator circuit energizes the interlock relay AB. Contacts AB4 prepare a circuit to the intervalometer and camera control relays for operation by the control switch or firing relay contacts B2 (*para* 51).

(2) Armament selector switch to CAMERA.

(3) Release selector switch to MANUAL.

(4) On descent to photographing altitude the blower motors and heaters switch is selected to MANUAL (*refer to para* 108).

(5) Iris selector switch to position 2 or as target conditions demand.

(6) Camera selector switches ON or OFF as required.

(7) Intervalometer selector switch as applicable.

51. The selected cameras are operated either by the observer using the camera control switch, or by the pilot using the weapons release trigger switch. Depressing the trigger switch feeds a +28V supply from fuse N2, via the release selector switch and contacts C2, and energizes firing relay B. Contacts B2 close and, as they are connected in parallel with the contacts of the camera control switch, provide an alternative switching circuit for operating the cameras.

Vertical cameras

52. With the vertical cameras selector switch set to ON, +28V from fuse M8 is fed to each of the three cameras via subfuses H7, H8 and H9 respectively and the field winding of each drive motor is energized.

53. As the three vertical cameras are operated simultaneously the operation of the camera installed at station 1 or 2 only is given.

54. Selecting the observer's camera control switch to CONT or INTERRUPT, as required, a +28V supply from fuse M6 and the armament selector switch is fed, via the camera selector switch and contacts AB4, to the intervalometer and associated selector switch.

55. With the intervalometer selector set at 8 FR the supplies at wafers 1 and 2 are taken to energize the operating relays L and M, and the speed selector relays S and T respectively. The +28V from sub-fuse H7 via contacts L1 energizes relay N, and contacts N4 and N1 (2-3), in series, feed the supply to the motor armature via contacts S1 (3-2) and the 8 PPS governor contacts, and the camera mechanism operates with a shutter speed of 1/2,000 sec at 8 pictures per second.

56. Returning the camera control switch to OFF causes relays L, M, S and T to be released, but a hold-circuit to relay N – provided by the single-shot microswitch and contacts N2 – maintains the supply to the motor armature. The camera continues to run until the exposure of a frame is completed when the microswitch, actuated by a cam, releases the relay hold-in circuit and stops the motor. A limited amount of overrun of the mechanism allows the single-shot microswitch to reset for further operation.

57. With the intervalometer selector set at 4 FR the camera operates as described in para 55 and 56 except that the speed selector relays are not energized. The supply to the motor armature is therefore fed via contacts S1 (3-1) and the 4 PPS governor contacts, and the camera mechanism operates with a shutter speed of 1/1,000 sec at 4 pictures per second.

Note...

The switching output of the intervalometer is not required at positions 8 FR *or* 4 FR *of the selector.*

58. For single-shot operation of the camera the intervalometer selector is set as required to ½ SEC, ¼ SEC, 1 SEC or 2 SEC. With the camera control switch selected to CONT or INTERRUPT (*para* 54) the supply from fuse M6 operates the motor of the intervalometer and an output pulse, fed via the appropriate contact on wafer 1 of the selector, energizes relays L and M. The +28V from sub-fuse H7 via contacts L1 energizes relay N, and contacts N4 and N1 (2-3), in series, feed the supply to the motor armature via contact S1 (3-1) and the 4 PPS governor contacts, and the camera mechanism operates with a shutter speed of 1/1,000 sec.

59. The cessation of the pulse from the intervalometer causes relays L and M to be released, but the hold-in circuit to relay N – provided by the single-shot microswitch and contacts N2 – maintains the supply to the motor armature. After the exposure of only a single frame the microswitch releases the relay hold-in circuit and stops the motor. The limited overrun of the mechanism resets the microswitch and the sequence is repeated – at a rate determined by the position chosen on the intervalometer selector – until the camera control switch is returned to OFF.

60. While the camera is running, a supply from sub-fuse H7 is fed via the indicator microswitch in the form of +28V pulses to operate the film indicator which serves all three vertical cameras.

Oblique cameras

Forward-facing camera

61. With the forward oblique camera selector switch set to ON, +28V from fuse N9 is fed to the camera and energizes the field winding of the drive motor.

62. Selecting the camera control switch to CONT or INTERRUPT, and with the intervalometer selector set at 8 FR, the operating relays L and M and speed selector relays S and T are energized as described in para 54 and 55.

63. The +28V from fuse N9 via contacts L4 energizes relay R, and contacts R4 and R1 (2-3), in series, feed the supply to the motor armature via contacts T1 (3-2) and the 8 PPS governor contacts, and the camera mechanism operates with a shutter speed of 1/2,000 sec at 8 pictures per second.

64. Returning the camera control switch to OFF releases relays L, M, S and T, and the hold-in circuit to relay R – via the single-shot microswitch and contacts R2 – controls the switching off of the motor in a similar way to that described in para 56.

65. With the intervalometer selector set at 4 FR the camera operates as described in para 62 and 63 except that the speed selector relays are not energized. The supply to the motor armature is therefore fed via contacts T1 (3-1) and the 4 PPS governor contacts, and the camera mechanism operates with a shutter speed of 1/1,000 sec at 4 pictures per second.

66. Single-shot operation of this camera – using the associated power supply and relays – is identical to that of the vertical camera described in para 58 and 59. While the camera is running, a supply from fuse N9 is fed via the indicator microswitch in the form of +28V pulses to operate the associated indicator.

Side facing cameras

67. Setting the port and starboard oblique camera selector switches to ON feeds +28V to the cameras from fuses N10 and N11 respectively and energizes the field winding of each drive motor.

68. With the intervalometer selector set at 8 FR or 4 FR, as required, the operation of each of the two cameras – using the associated power supplies, operating relay M and speed selector relay T as appropriate – is identical to that of the forward-facing camera, described in para 62 to 65. While the cameras are running, the film indicators are operated by supplies from fuses N10 and N11 via the appropriate indicator microswitches.

Note...

No provision is made for single-shot operation of the side-facing cameras.

Procedure before landing

69. After completion of photographic operations the following selections are made:-

(1) Camera selector switches to OFF.

(2) Armament selector switch to OFF.

(3) Release selector switch to AUTO.

(4) Blower motors and heaters switch to AUTO (*refer to para* 108).

(5) Bomb door selector switch to CLOSED.

TYPE F97 CAMERA AND PHOTOFLASH INSTALLATION

General

70. For night operation the photographic role equipment essentially comprises a single vertically-mounted Type F97 camera installed at station 7 in the camera crate (*para* 10), and associated photoflash equipment housed in a separate crate (*para* 17).

71. Selection of the installation is made by setting the camera selector to F97, and controls are provided for adjusting the speed of the camera to compensate for image movement appropriate to the ground speed of the aircraft and its height above the target. Remote indication that film is passing through the camera is given by the flashing of a green lamp. A suitable working temperature for the camera is maintained by the heating and de-misting system within the camera crate.

72. A release circuit, synchronized with the camera shutter and completed via a distributor, causes a single photoflash cartridge to be ejected from a discharger as each exposure is made; the number of unused cartridges remaining is indicated on a counter. A photoflash master switch is provided for rendering the distributors inoperative while the camera is being set-up or tested.

DESCRIPTION

Type F97, Mk. 3 camera

73. The Type F97, Mk. 3 aircraft camera is a moving film type, incorporating twin lenses, and is used for obtaining pictures of maximum definition during night photography. To reduce the effect of image movement particularly at low altitudes and at high speeds, the film is driven continuously – in the direction of flight – at an appropriate compensating speed.

74. The two lenses are mounted side-by-side and the main shutter alternately opens one aperture and closes the other at regular intervals while the film is moving. The illumination provided by each photoflash cartridge gives an effective exposure of approximately 1/50 second, and one half the width of the film is thus exposed while the other half clears the second aperture in readiness for the next exposure. In this way overlapping photographs of the same strip of ground are obtained.

75. Gear-coupled to the drive motor is an a.c. generator which forms part of the camera speed control circuit (*para* 81). Two microswitches are operated by cams driven by the film winding mechanism, one switch controls the two solenoids which operate the main shutter, and the other provides impulse switching to the photoflash distributors (*para* 84). The relative position of the two cams is adjustable so that the impulses from the microswitches can be displaced to suit particular height and ground speed conditions, and is preset before take-off. A further microswitch provides impulse switching to operate a remote film indicator. A capping shutter automatically closes both lens apertures when the camera is not in use.

76. A 12-pole plug on the camera provides electrical connection with the motor control and indicator circuits, and connection with the photoflash equipment is made via a 4-pole socket. The camera casing is also bonded to earth locally.

Controls and indicators

77. The following controls and indicators are located on the role control panel C-P/C (*para* 7) and are grouped within a defined area marked F97 CAMERA.

Film indicator lamp

78. A green indicator lamp G, marked F97 IND is connected to a microswitch in the film magazine, and lights intermittently when the film is being wound over. The lamp incorporates a press-to-test and a rotate-to-dim facility, and the test supply from fuse M6 is available when the armament selector switch is set to CAMERA.

Ground speed selector

79. The potentiometer K, marked GROUND SPEED KTS has two scales. One scale marked in white covers the range 300 – 600 knots, the other marked in black covers the range 150 – 300 knots and each is used in conjunction with a scale of the same colour on the altitude indicator (*para* 81). Selecting the potentiometer to the ground speed at which photography is to be carried out adjusts the resistance of the generator/indicator circuit to an appropriate value.

Altitude selector

80. Potentiometer S is marked ALTITUDE SETTING, HIGH (anti-clockwise) LOW (clockwise) and is used to adjust the voltage applied to the armature of the camera drive motor. The selector is set so that the speed of the motor, and hence the output of the generator, causes the pointer on the altitude indicator (*para* 81) to register the height of the aircraft over the target area. In this way the correct compensating speed at which the camera is driven is selected.

Altitude indicator

81. The a.c. voltmeter A is marked ALTITUDE FEET × 100 and has two scales. One scale marked in white covers the range 600 – 3 000 ft, the other marked in black covers the range 300 – 1500 ft; the particular scale in use depends on the colour of that selected on the ground speed indicator (*para* 79). The indicator measures a voltage, in terms of feet, relative to the speed of the motor driven generator (*para* 75) and the resistance set by the ground speed selector potentiometer.

Photoflash master switch

82. The single-pole, on-off switch V, marked PHOTOFLASH MASTER, ON – OFF is provided for isolating the main power supply from the pyrotechnic distributors (*para* 84) when not in use, and is normally locked in the OFF position. When selected to ON 28V d.c. from fuse M12 (panel C-Q), via the armament master safety break WS-BB, is available for operating the two distributor units as required.

Photoflash subtractive counter

83. A three-digit counter unit B, marked P F SUBTRACTIVE COUNTER is manually set to display the total number of photoflash cartridges loaded into the discharger units (*para* 17). As each cartridge is fired, an impulse from the distributor (*para* 85) causes the counter to subtract 1 and so indicate the number of cartridges remaining.

Distributor units

84. Two 100-way pyrotechnic distributors, connected in tandem and controlled by impulses from the Type F97 camera, are used to sequence the firing of the 198 photoflash cartridges (*para* 17). The main power supply to both units is controlled by a master switch (*para* 82). Located on the port side of the photoflash crate the forward No. 1 distributor, B-C/C/M, controls the firing of the first hundred cartridges and the aft No. 2 distributor, B-C/C/P, controls the firing of the remaining 98 cartridges; connections are made by the two connector mounting trays (*para* 18).

85. *The main components in each unit* include a miniature high-speed uniselector – comprising a sequence switch and five distributor switches – and a number of miniature relays. When the first distributor has completed its run the controlling impulses are automatically passed on to the second unit. A common line taken through both units provides impulse switching for operating the photoflash subtractive counter (*para* 83).

86. Manual resetting of each distributor is necessary to return the uniselector to its starting position, and in addition to the push-switch and indicator lamp fitted on each unit for this purpose, connections are made to duplicate components on a remote reset panel (*para* 87).

Distributor reset panel

87. Located in the forward compartment of the photoflash crate and mounted on the port side is a panel B-C/C/R, marked RESET DISTRIB. Used for the remote resetting of the two distributor units (*para* 86) the panel contains duplicate push-switches and indicator lamps, marked FWD and AFT respectively, and is readily accessible when the door of the crate is open.

Discharger units

88. Each of the thirty-three discharger units carried in the photoflash crate (*para* 17) consists of a barrel assembly accommodating six 1·75 in. photoflash cartridges, together with a head containing the associated firing contacts and a locking mechanism incorporating an electrical safety device.

89. The firing of individual cartridges is sequenced by the distributor units (para 84), connection being made via the connector mounting trays (*para* 18) and a 7-pole plug on the head of each discharger unit. Detailed information on the discharger units and cartridges is contained in A.P. 1641H, Vol. 1 and A.P. 1661E, Vol. 1 respectively.

OPERATION *(fig 2-2a and 6)*

General

90. Before take-off the following selections are made on the role control panel:-

(1) Photoflash master switch OFF.

(2) Camera selector to F97.

(3) Blower motors and heaters switch to AUTO (*refer to para* 108).

91. When the aircraft is airborne the circuit protection relays are energized (*Cover* 1, *Sect.* 6, *Chap.* 7) and contacts C2 prepare the firing relay circuit for operation by the trigger switch on the control column (*para* 51).

92. *Prior to operating the installation,* the following selections are made:-

(1) Bomb door selector switch to OPEN (*Cover* 1, *Sect.* 6, *Chap.* 11A). With the bomb door locked in the open position a +28V supply from the indicator circuit energizes the interlock relay AB. Contacts AB1 prepare the main *power supply circuit to the photoflash* distributors (*para* 96), and contacts AB3 prepare the camera circuit for operation by the control switch or firing relay contacts B2 (*para* 51).

(2) Armament selector switch to CAMERA.

(3) Release selector switch to MANUAL.

(4) Set ground speed selector to the speed at which photography is to be carried out.

(5) On descent to photographing altitude the blower motors and heaters switch is selected to MANUAL (*refer to para* 108).

(6) Ensure that the photoflash master switch is in the OFF position and operate the camera by setting the camera control switch to INTERRUPT. Ensure that the film indicator flashes intermittently and adjust the altitude setting control so that the height of the aircraft above the target is registered on the altitude indicator.

Note...
While the camera control switch is depressed, film is running through the camera. The altitude setting control should be adjusted as quickly as possible to conserve the film.

(7) Release the camera control switch to OFF.

93. With the photoflash master switch selected to ON, the installation is ready for operation either by the observer using the camera control switch, or by the pilot *using the weapons release trigger switch* (*para* 51).

F97 camera

94. Selecting the observer's camera control switch to CONT or INTERRUPT, as required, a +28V supply from fuse M6 and the armament selector switch is fed via the camera selector switch and contacts AB3, to start the camera drive motor and energize the solenoid which moves the capping shutter clear of both lens apertures.

95. The motor runs at a speed determined by the altitude setting potentiometer and drives the camera mechanism causing the *three microswitches to be actuated. One* microswitch alternately switches the +28V supply to each of the main shutter operating solenoids, causing the shutter blade to oscillate and uncover first one lens aperture and then the other. The other two microswitches pulse the +28V supply for operating the photoflash distributors (*para* 96) and the film indicator, causing the green lamp to flash intermittently.

Photoflash distributors

96. The main 28V d.c. supply for operating the distributors is fed from fuse M12 via the armament master safety break, the photoflash master switch and contacts AB1 to pins 6A and 6B of No. 1 distributor unit. The supply at pin 6A is also fed out through pin 5A to pin 6A of No. 2 distributor unit.

97. The first +28V impulse received from the F97 camera (*para* 95) is fed via pin 6D and the normally-closed contacts CO1 in No. 1 distributor and energizes the firing relay FR. Contacts FR2 close and the supply at pin 6B is fed via the normally-closed contacts RS2 to energize the solenoid of the uniselector switch DS; the solenoid is then held energized via resistor YA. Contacts FR3 and 4, connected in parallel, changeover and a d.c. supply, taken through the normally-closed contacts CO2 and the current limiting resistance YB, is fed to the first contact of sequence switch SS. The supply is then fed via the normally-closed contacts RS1 and the starting contact of DS1 to pin A of the first photoflash discharger unit, causing No. 1 cartridge to be fired. Contacts FR1 feed a +28V impulse via pin 6E to operate the photoflash subtractive counter.

98. The cessation of the impulse from *the camera releases relay* FR. *Contacts* FR2 open and the uniselector solenoid is de-energized causing the wipers of all five levels of the distributor switch to be moved forward to the next contact in readiness for the next impulse from the camera, when the sequence is repeated.

99. After No. 30 cartridge has been fired, a cam operated by the uniselector causes the second contact of SS to be selected so that the supply, fed via contacts FR3 and 4, is taken to the second level DS2 of the distributor switch. Similarly, after the firing of cartridges No. 60 and No. 90, the third and fourth levels, DS3 and DS4 respectively, are brought into use.

100. After the 100th impulse has been received from the camera, the wiper on DS4 passes to contact 101. A supply connected through resistor YC and contact 101 is fed back via the appropriate contact of

SS and the normally-closed contacts FR3 and 4 to energize the cut-off and pass-on relay CO. Contacts CO1 change over and the impulse line from pin 6D is transferred from relay FR so that subsequent impulses received are fed out on pin 5D to pin 6D and the firing relay FR in the second distributor unit. The operating supply at pin 6B is transferred via contacts CO2 and is fed out on pin 5B to pin 6B of the second unit. In this way the firing of the remaining photoflash cartridges is controlled by No. 2 distributor.

Procedure before landing

101. After completion of photographic operations the following selections must be performed before landing:-

(1) Photoflash master switch OFF.

(2) If it is necessary to run-off any unexposed film, operate the camera by setting the control switch to INTERRUPT until the film indicator ceases to flash then release the control switch to OFF.

(3) Armament selector switch to OFF.

(4) Release selector switch to AUTO.

(5) Blower motors and heaters switch to AUTO (*refer to para* 108).

(6) Bomb door selector switch to CLOSED.

Procedure after landing

102. On completion of a flight during which the photoflash equipment has been used the following procedure must be observed:-

(1) Ensure that the armament master safety breaks are disconnected and the photoflash master switch is locked in the OFF position.

(2) Remove any photoflash cartridges which have not been used or which the dischargers have failed to eject.

WARNING...

If the above precautions are not taken, any remaining cartridges will be fired if the camera is operated. These cartridges will explode almost immediately and serious injury to personnel or damage to aircraft and equipment will result.

Resetting the distributors

103. The uniselector in each distributor is returned to the starting position by depressing and holding the appropriate push-switch until the associated indicator is illuminated. The d.c. supply for operating the resetting circuit is taken off pin 6A of the distributor, and is provided when a circuit tester is connected to the photoflash crate as described in para 140.

104. With the push-switch depressed the reset relay RS is held energized. Contacts RS2 change over and a supply is fed via the normally-closed contacts HSP1 to the self-impulsing circuit of the uniselector switch DS. The selector switch pulses forward until No. 1 position on the distributor is reached, when contact 1 on DS5 causes the home starting point relay HSP to be energized by completing the earth return circuit via contacts RS1, SS1, FR3 and 4 and RS3.

105. Contacts HSP1 change over and disconnect the supply from the uniselector, stopping it at the home position, and feed a supply to illuminate the reset indicator. On releasing the reset push-switch, relays RS and HSP are de-energized and the indicator lamp is extinguished.

CAMERA CRATE HEATING

General

106. The heating and de-misting system in the camera crate comprises two thermostatically-controlled blower-heater units selected by a master switch. Overheat protection circuits are provided which give remote indication of their operation.

DESCRIPTION

Controls and indicators

107. The following components are grouped together on the role control panel C-P/C (*para* 7).

Blower motors and heaters selector

108. Master control of the blower-heater units is provided by a 4-pole changeover, centre off switch AC, marked BLOWER MOTORS AND HEATERS, AUTO – OFF – MANUAL. With the switch selected to MANUAL the port and starboard blower

motors run continuously and each of the two heater elements is automatically switched on or off by its associated thermostat (*para* 110). The operation is similar when AUTO is selected, except that both blower motors run only during the period when one or both heater elements are switched on thermostatically.

Blower heater indicators

109. The two magnetic indicators H and J, marked BLOWER HEATERS, PORT and STBD respectively, display black and white diagonal stripes when the blower motors and heaters selector (*para* 108) is in the OFF position, and change to black when the selector is set to either AUTO or MANUAL. In the event of the heater element in one of the blower-heater units being isolated by the operation of an overheat thermostat (*para* 111), the associated indicator display will revert to black and white diagonal stripes; the blower motor will continue to run as selected. Should the heater elements in both port and starboard blower-heater units be isolated, however, the blower motors will only continue to run providing the selector is set to MANUAL.

Control thermostats

110. Centrally located in the camera crate and mounted on the aft face at frame 291·8, a panel B-C/B/J contains two thermostats. Used in conjunction with the selector switch (*para* 108) the thermostats, marked A and B, provide automatic control of the port and starboard blower-heater units respectively so that the crate temperature is maintained at 15 ± 2.5 deg C. A 0.01 μF capacitor is connected across the contacts of each thermostat for the purpose of spark quenching. Information regarding the operating temperature setting of the control thermostats is in para 150.

Blower-heater units

111. Each of these units (*para* 14) is a two-stage, axial flow, blower-heater driven by a totally enclosed 200V, 3-phase, squirrel-cage type induction motor. The heater in each unit consists of three spiral elements, star-connected, of which only two are used; these are connected across two phases of the 200V, 3-phase supply and dissipate 500W nominal. Overheat protection is provided by two parallel-connected thermostats secured to each heater casing. The thermostats are set to operate at 70 deg C (nominal) and, in the event of an overheat condition in the blower-heater unit, cause the power supplies to be isolated from the heater element.

OPERATION (*fig 9*)

Normal

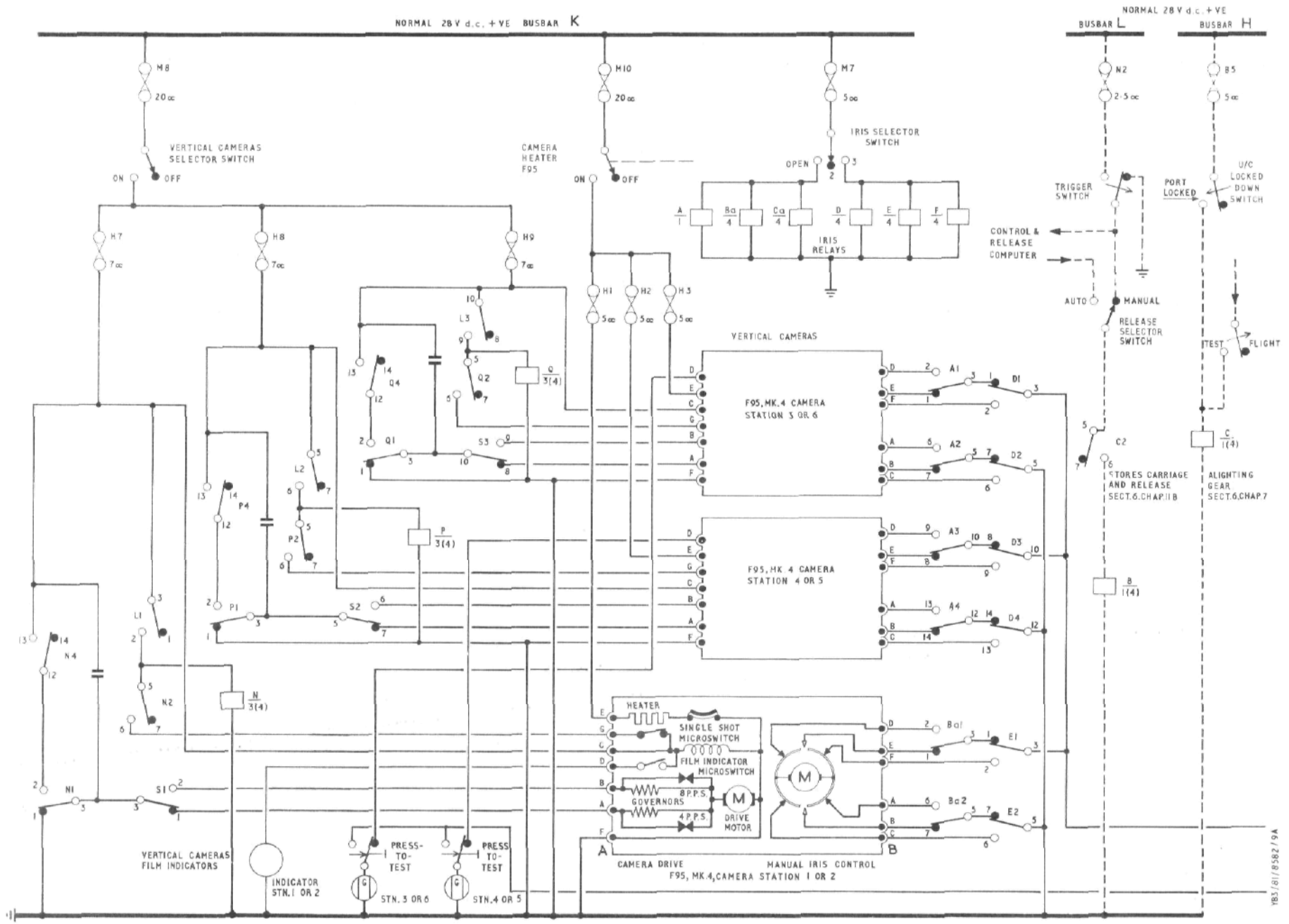
112. With the blower motors and heaters selector switch selected to MANUAL, +28V from fuse N12 energizes relay R-GE, the contacts of which feed 200V, 3-phase a.c. supplies – taken from fuses D9, E9 and F9 – via sub-fuses K1, K5 and K9, and K2, K6 and K10 to energize the port and starboard blower motors respectively.

113. Other contacts on the selector switch feed +28V from fuses M11 and N8 to energize the port and starboard blower-heater indicators respectively, which change to black; the two d.c. supplies are also taken to the port and starboard control thermostats which operate as required to control relays U and V respectively. With relay U energized, two phases of the 200V, 3-phase supply are fed via sub-fuses K3 and K7 and contacts U3 and U2 to energize the heater in the port blower-heater unit. Relay V controls the heater in the starboard unit in a similar way.

114. With the selector switch set to AUTO the two indicators and relays U and V are operated as described in para 113. In addition, contacts U4 and V4 – connected in parallel – switch the +28V from fuse N12 to relay R-GE (*para* 112) so that the blower motors run only while one or both relays U and V are energized.

Overheat

115. Should a restriction occur in the airflow to a blower-heater unit to cause the heater elements to overheat, the overheat thermostats contacts will close and earth the supply taken from the relevant fuse M11 or N8. The resulting heavy current will consume the fuse and release the associated indicator and relay U or V, causing the indicator display to revert to black and white diagonal stripes and the power supplies to be isolated from the heater.



BUCCANEER S MK. 1 AIRCRAFT AIR DIAGRAM 6333AF/MIN.	
ISSUE 3	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY MINISTRY OF DEFENCE

Fig. 2. F95, Mk. 4 camera installations – theoretical

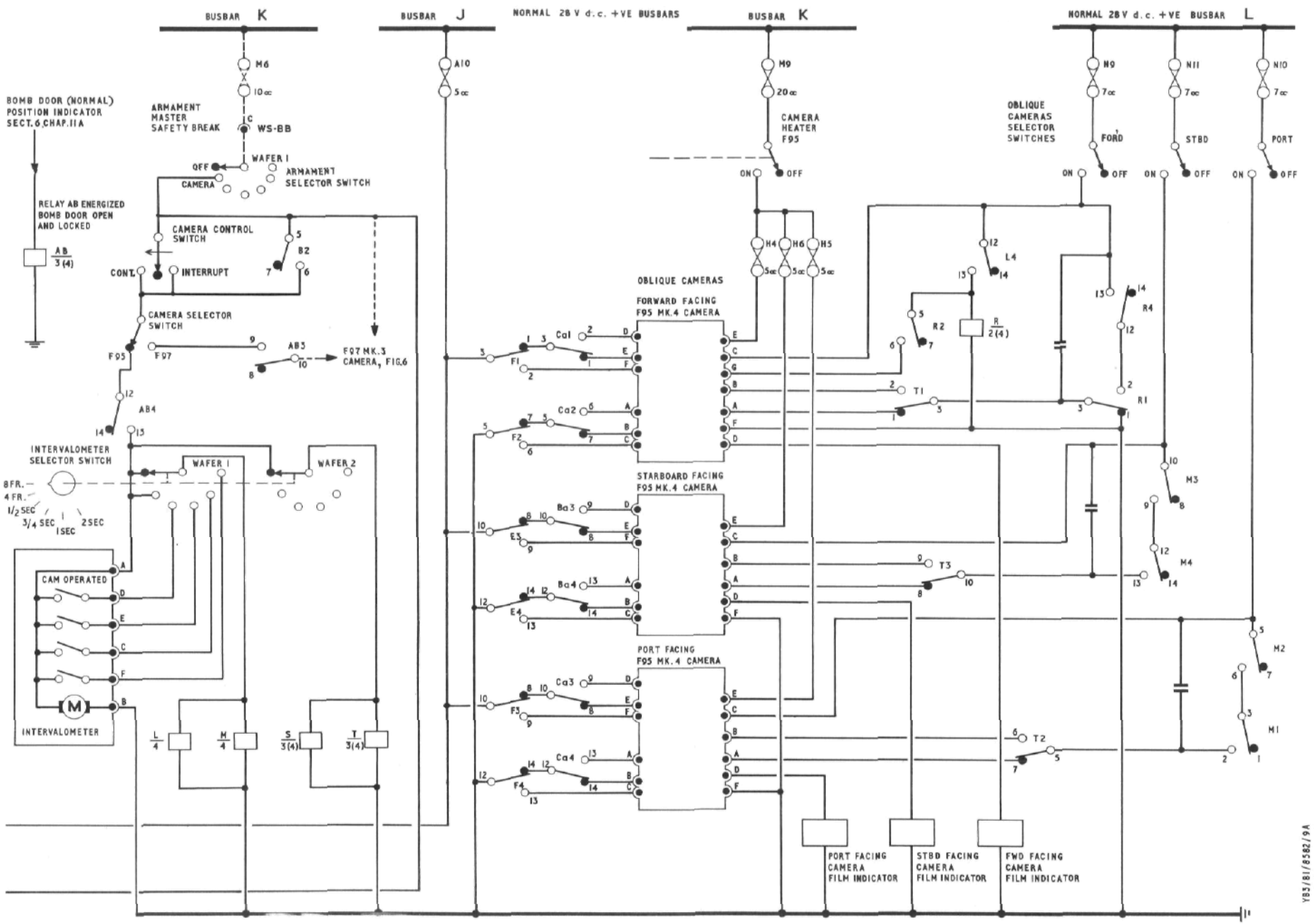


Fig. 2a. F95, Mk. 4 camera installations – theoretical

BUCCANEER S MK. 1 AIRCRAFT
AIR DIAGRAM 6333AG/MIN.
ISSUE 4
PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY

103/2/2/85 89970 375 + 625 12/66 HSAL 1423

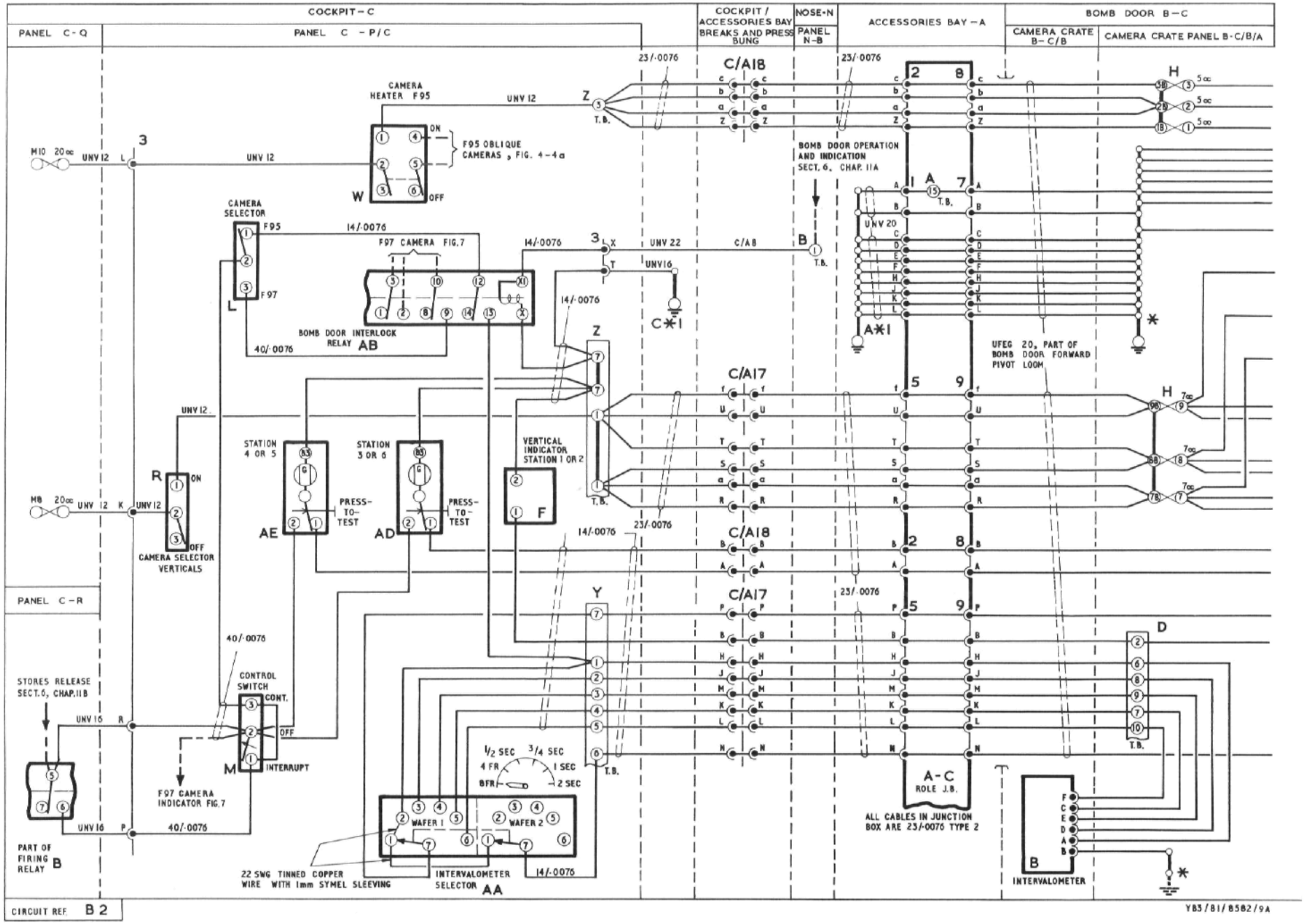


Fig. 3. F95, Mk. 4 vertical camera installation

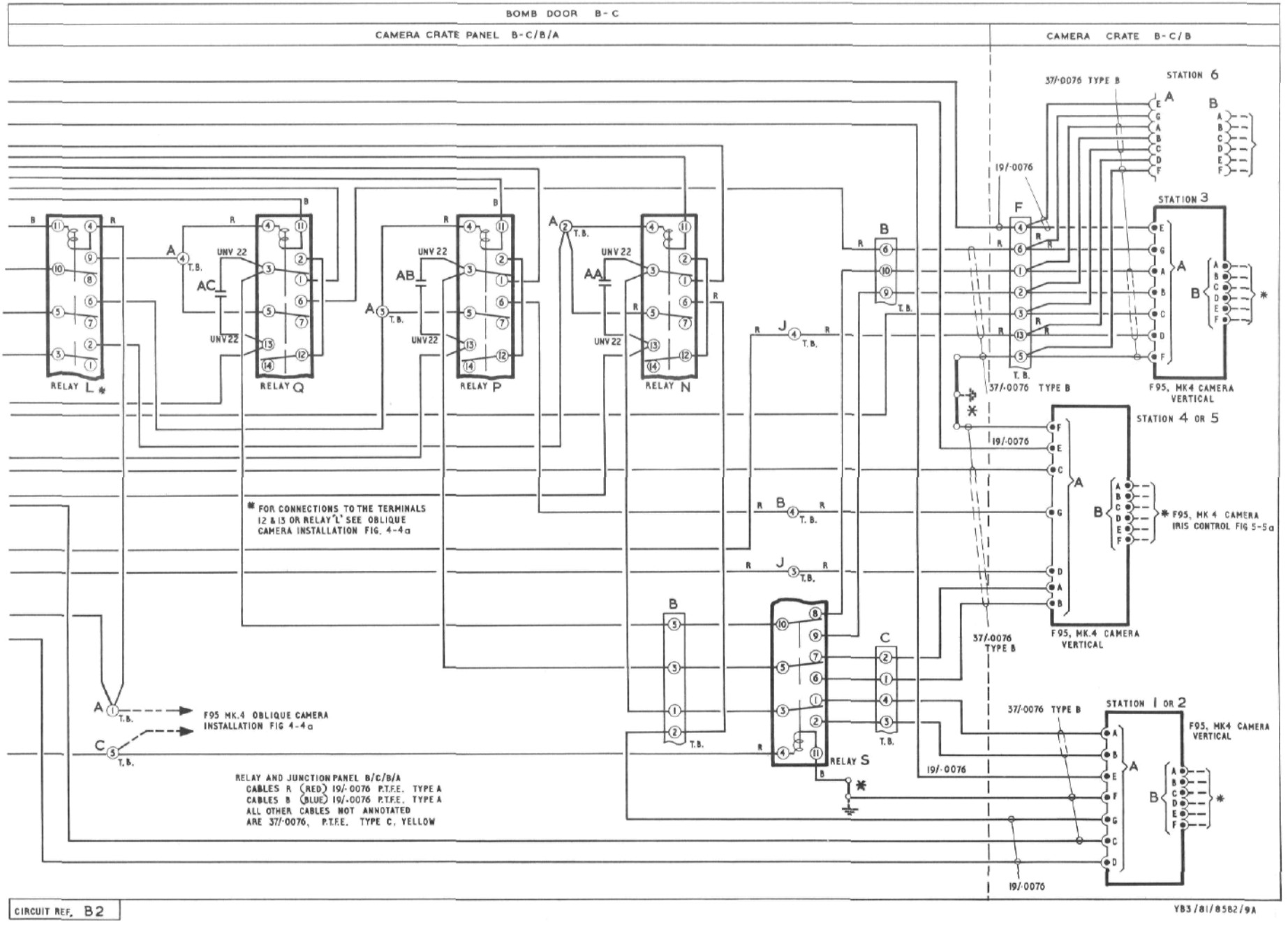


Fig. 3a. F95, Mk. 4 vertical camera installation

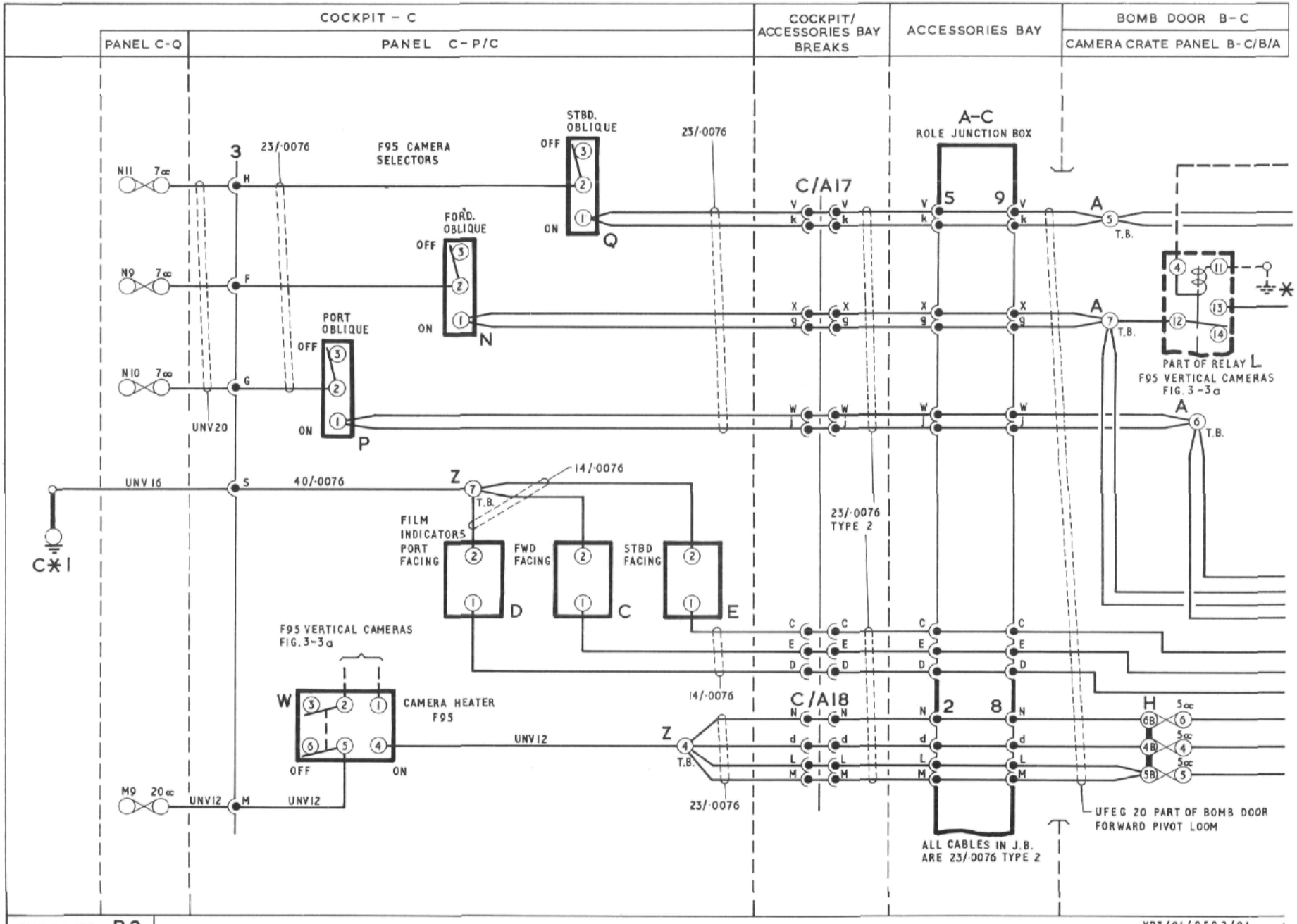


Fig. 4. F95, Mk. 4 oblique camera installation

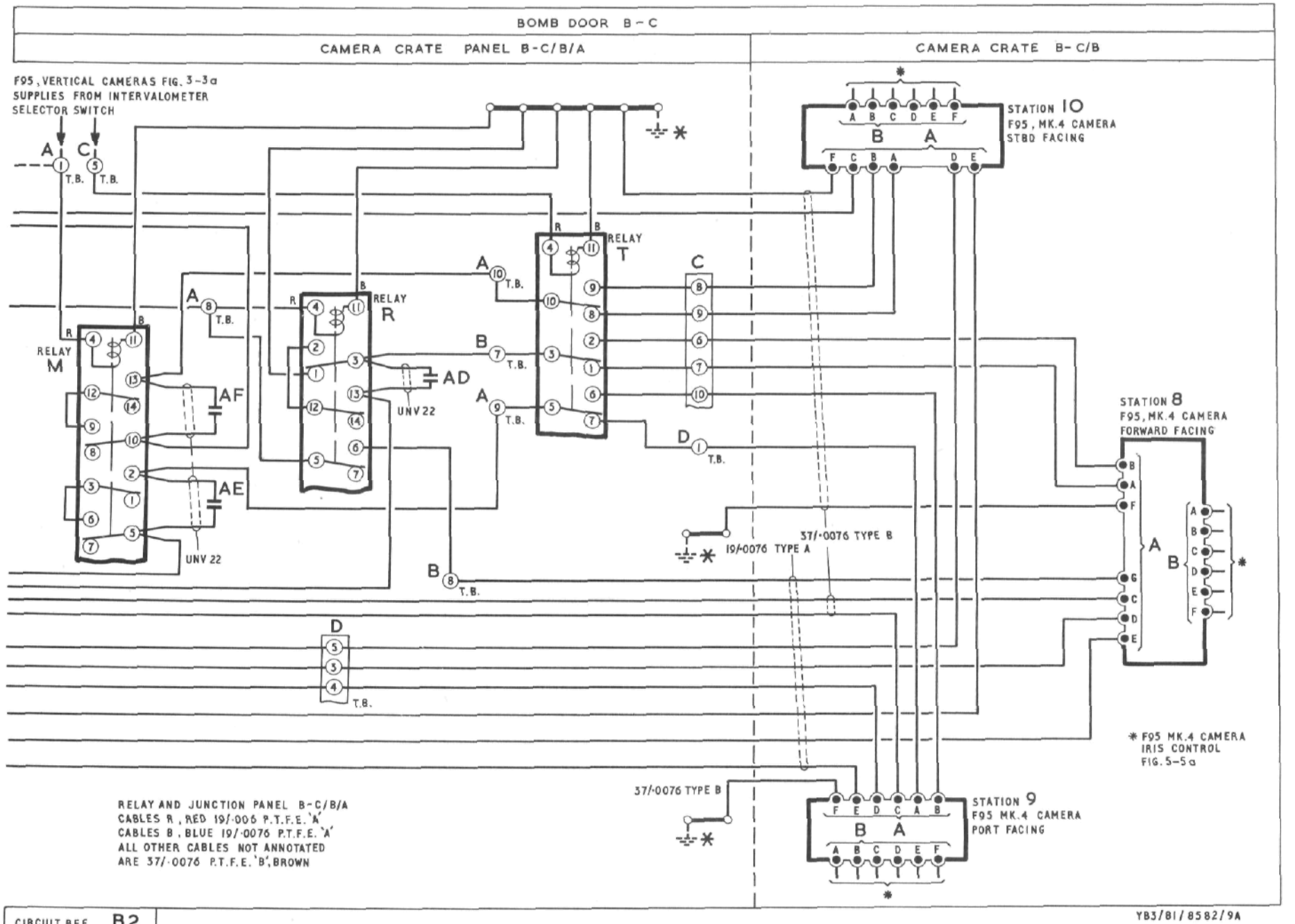
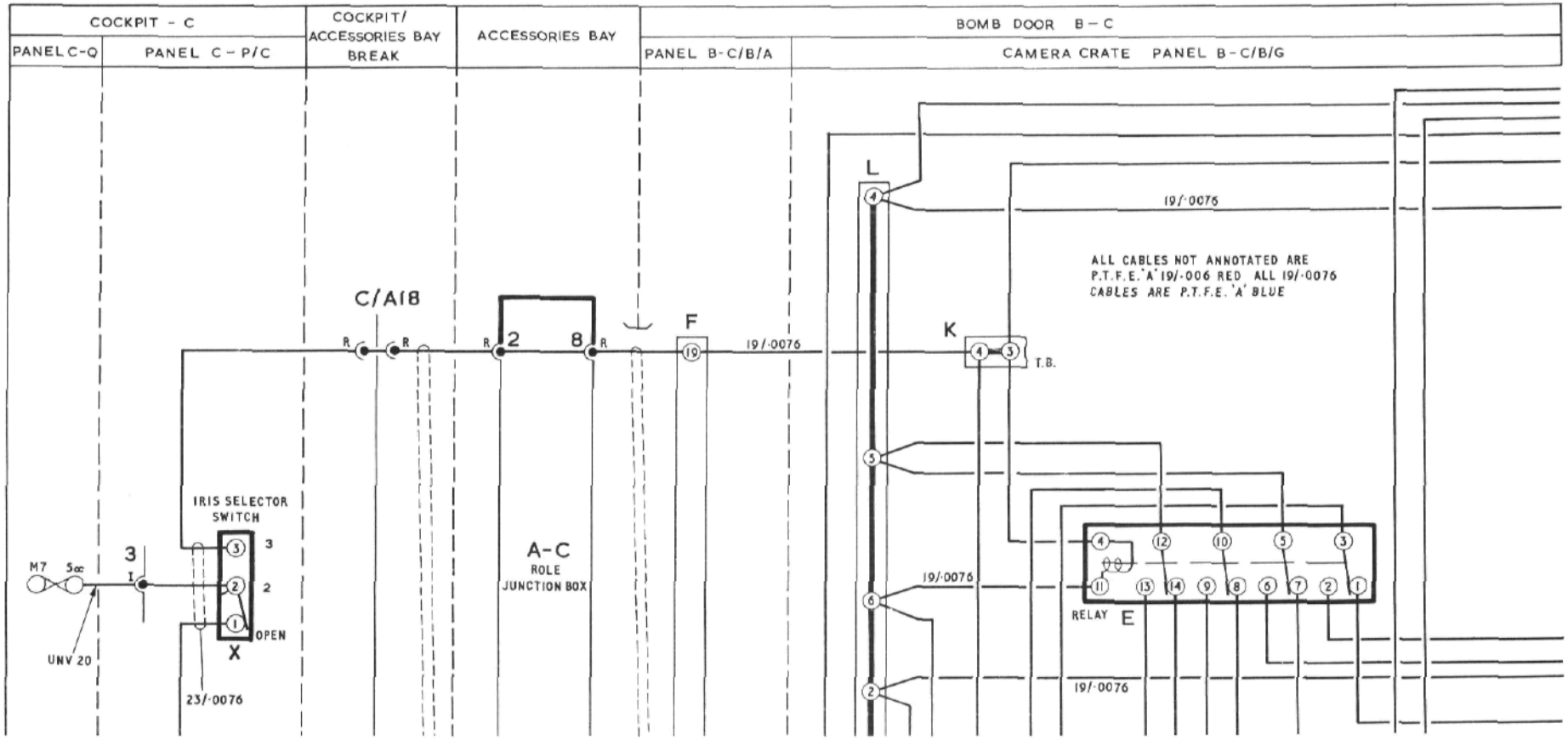
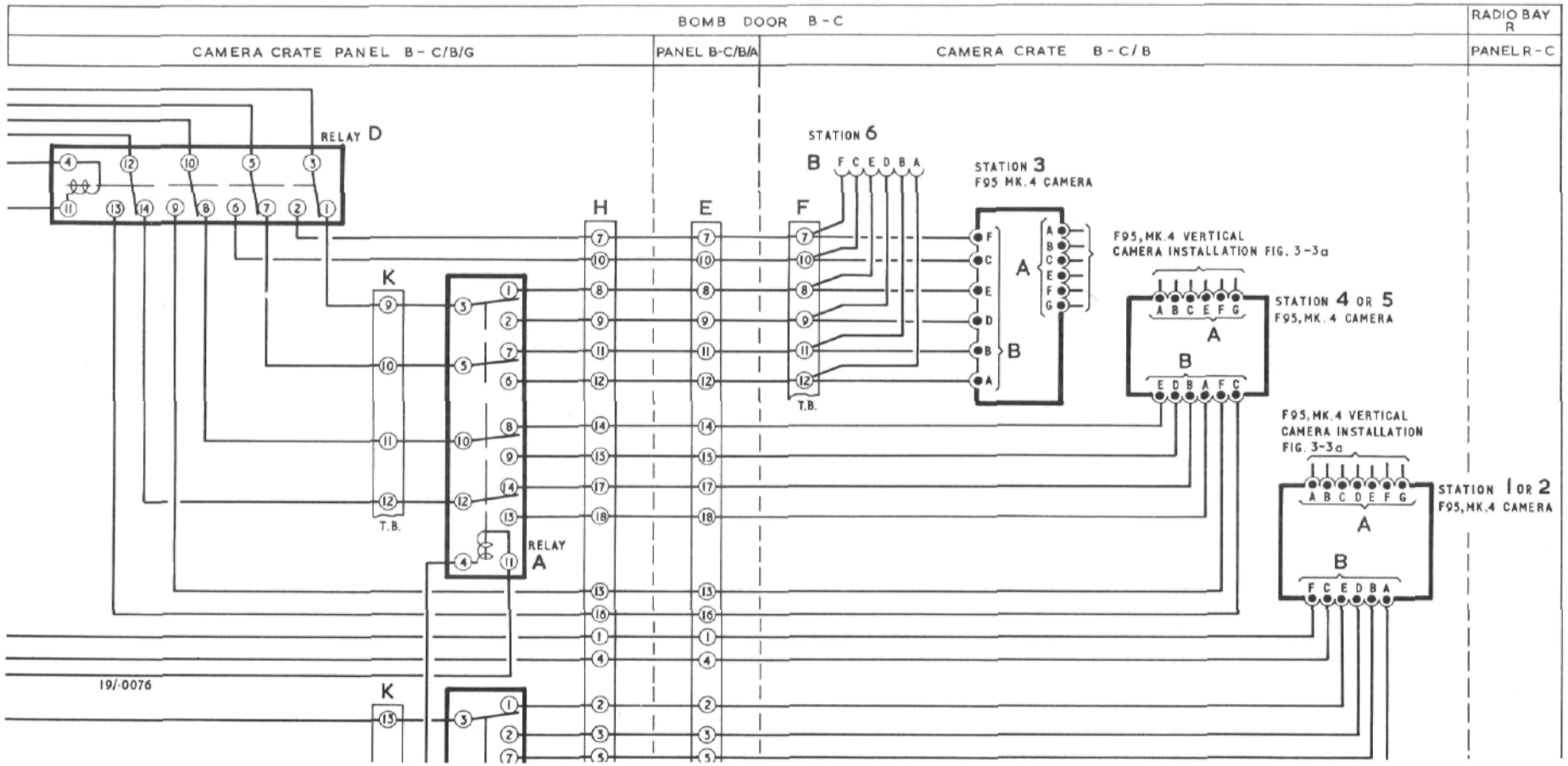
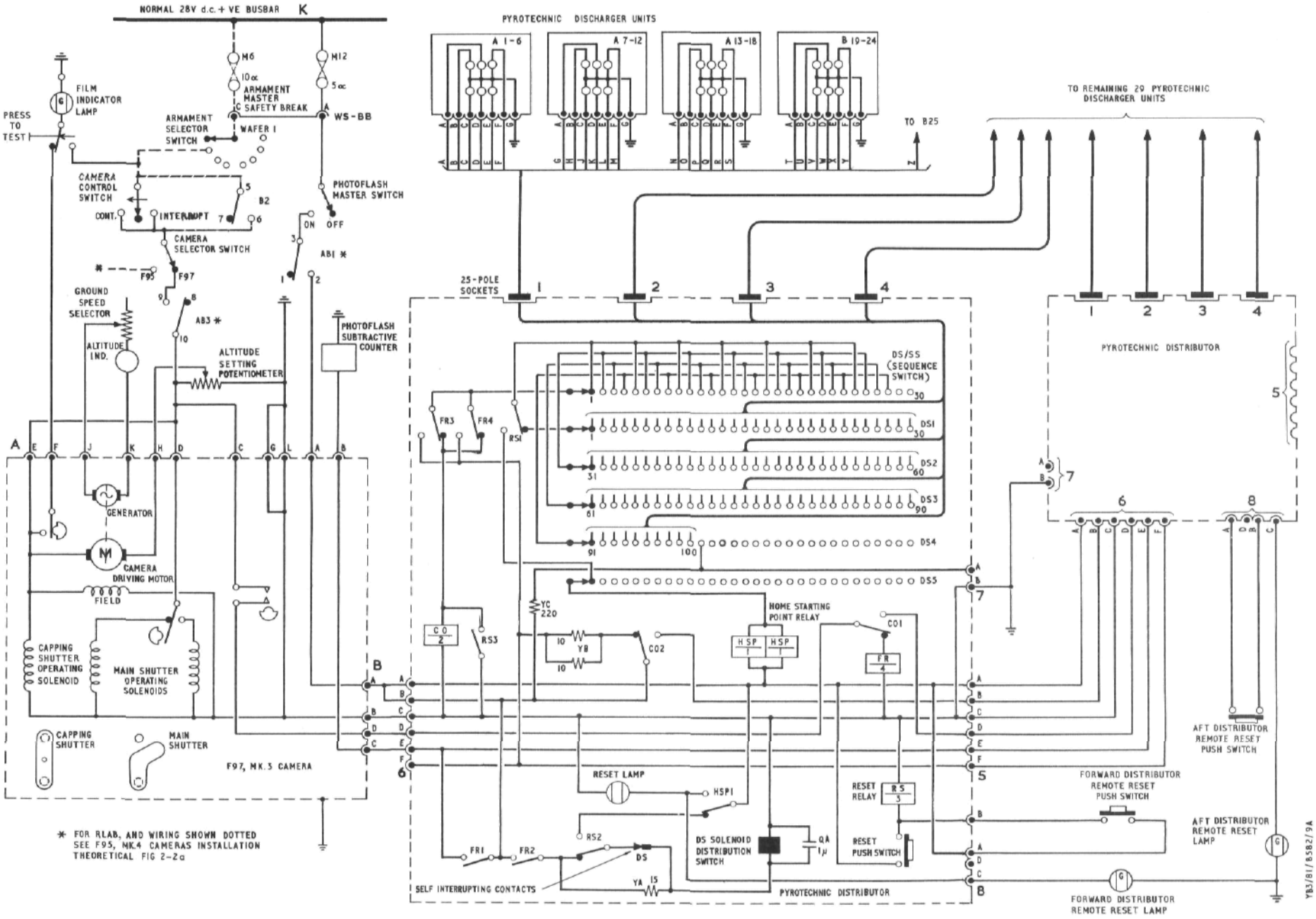


Fig. 4a. F95, Mk. 4 oblique camera installation


COCKPIT - C
PANEL C-Q
PANEL C - P/C
COCKPIT/ ACCESSORIES BAY BREAK
ACCESSORIES BAY
BOMB DOOR B - C
PANEL B-C/B/A
CAMERA CRATE PANEL B-C/B/G
C/A18
R
R
R
2
8
R
F
19
19/-0076
L
4
19/-0076
ALL CABLES NOT ANNOTATED ARE P.T.F.E. 'A' 19/-006 RED ALL 19/-0076 CABLES ARE P.T.F.E. 'A' BLUE
K
4
3
T.B.
5
6
2
19/-0076
19/-0076
IRIS SELECTOR SWITCH
M7
5ac
3
I
3
2
1
OPEN
X
UNV 20
23/-0076
A-C
ROLE
JUNCTION BOX
4
12
10
5
3
11
13
14
9
8
6
7
2
1
RELAY E


BOMB DOOR B-C
RADIO BAY R
CAMERA CRATE PANEL B-C/B/G
PANEL B-C/B/A
CAMERA CRATE B-C/B
PANEL R-C
RELAY D
STATION 6
B
F C E D B A
STATION 3
F95 MK.4 CAMERA
F95, MK.4 VERTICAL
CAMERA INSTALLATION FIG. 3-3a
STATION 4 OR 5
F95, MK.4 CAMERA
A B C E F G
E D B A F C
F95, MK.4 VERTICAL
CAMERA INSTALLATION
FIG. 3-3a
STATION 1 OR 2
F95, MK.4 CAMERA
A B C D E F G
F C E D B A
K
T.B.
RELAY A
H
E
F
19/-0076



BUCCANEER S MK. 1 AIRCRAFT AIR DIAGRAM 6333AH/MIN.	
ISSUE 3	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY MINISTRY OF DEFENCE

Fig. 6. F97, Mk. 3 camera and photoflash installation – theoretical

RESTRICTED

103/2/2/85 89970 375 + 625 12/66 HSAL 1423

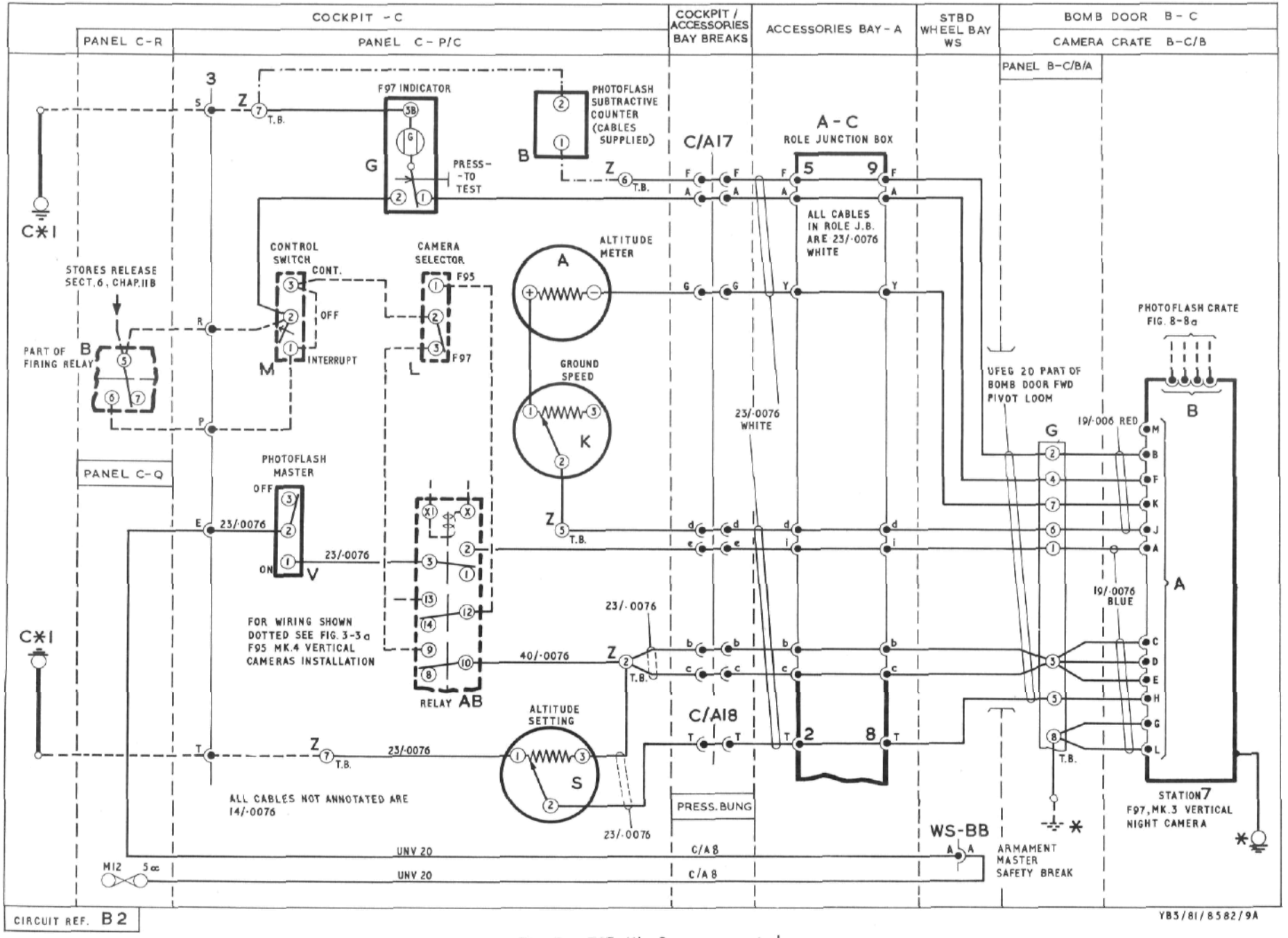
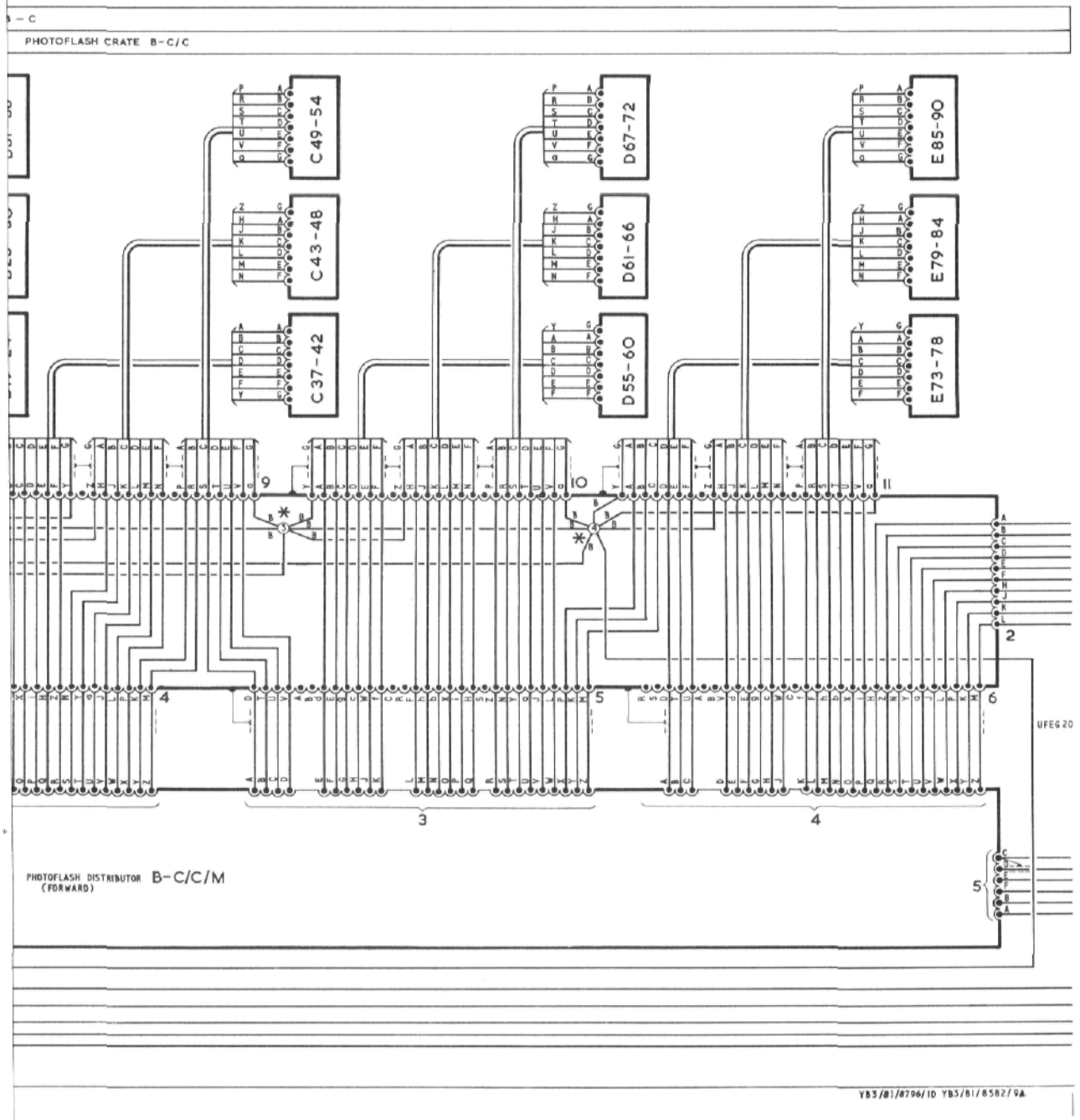
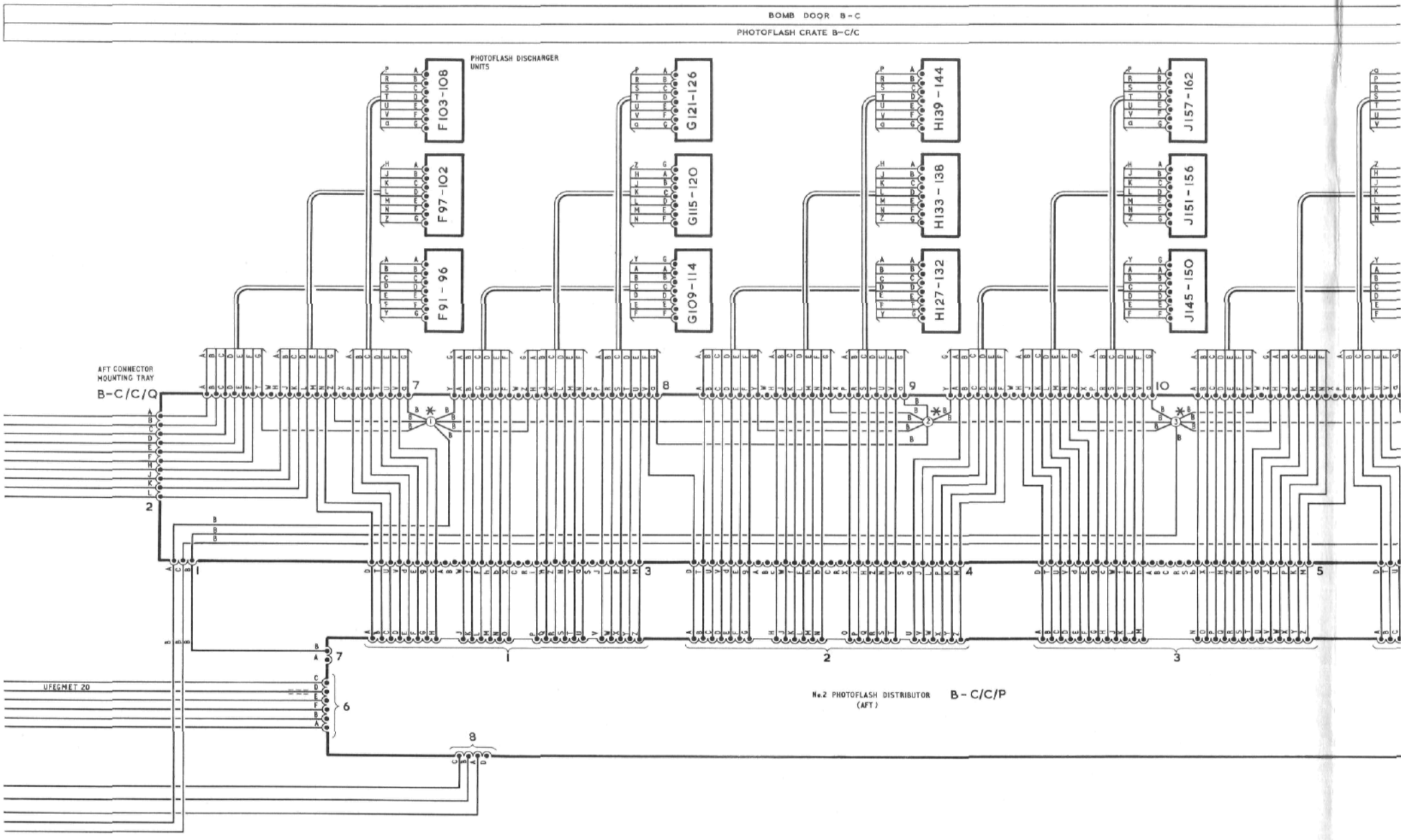


Fig. 7. F97, Mk. 3 camera controls

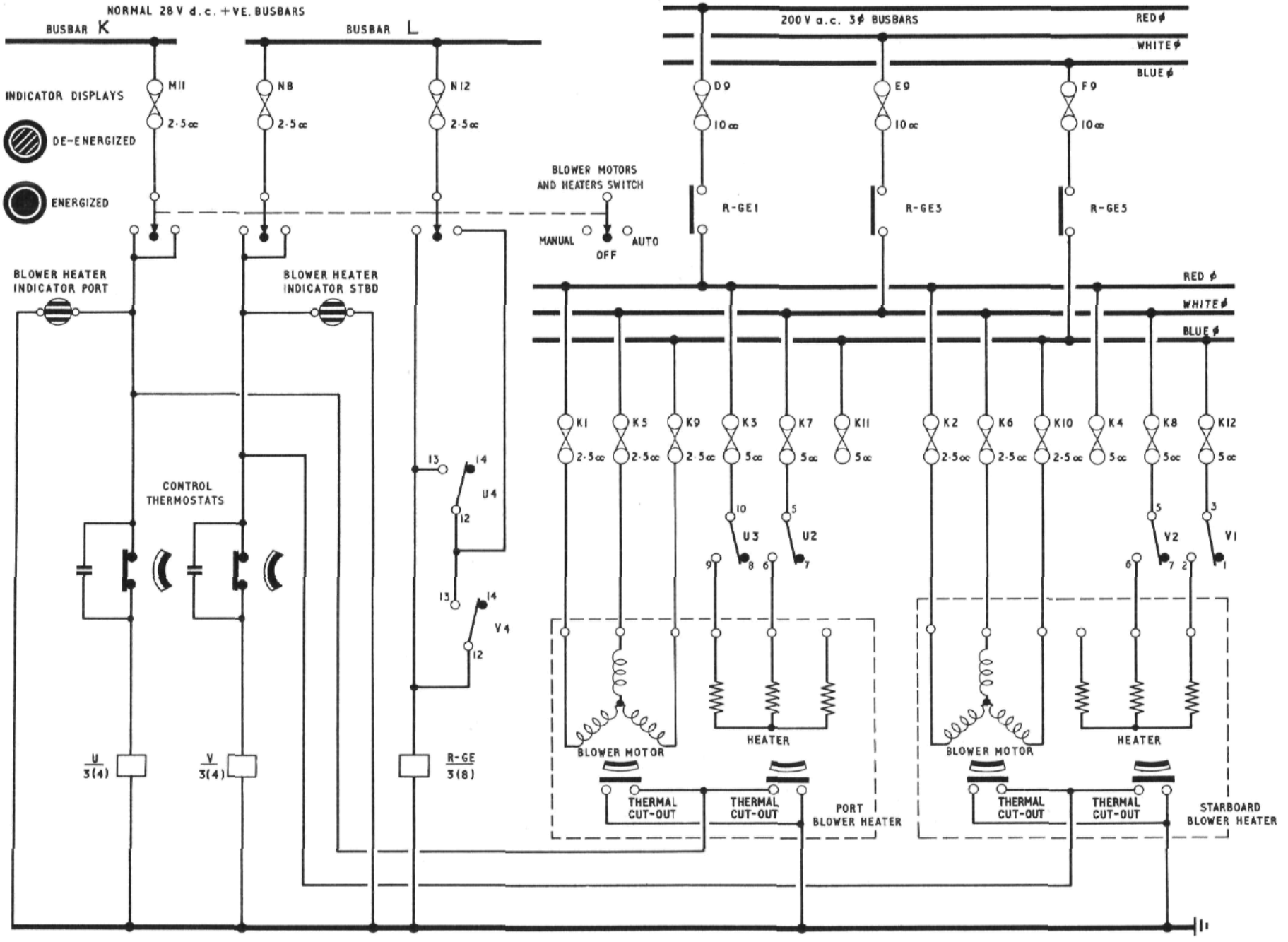


lash installation



CIRCUIT REF. B 2

Fig. 8a. F97, Mk. 3 camera and photoflash installation



BUCCANEER S MK. 1 AIRCRAFT AIR DIAGRAM 6333AJ/MIN.	
ISSUE 2	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY

Fig. 9. Camera crate heating installation – theoretical

103/2/2/85 89970 375 + 625 12/66 HSAL 1423

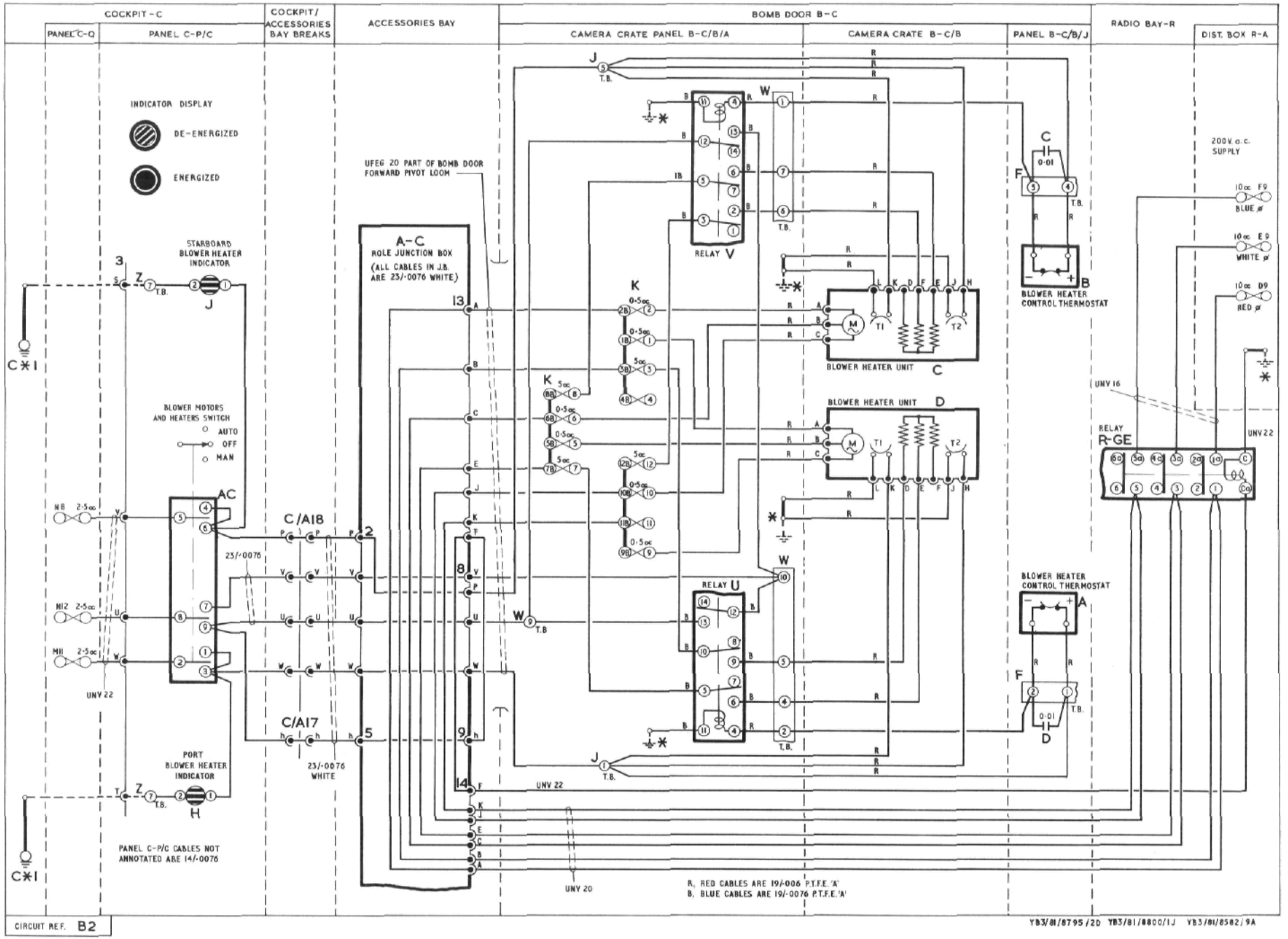


Fig. 10. Camera crate heating installation

Cameras

116. Servicing instructions for the Type F95 and Type F97 cameras are contained in A.P. 1355C, Vol. 1 (2nd Edition), Sect. 5 and 7 respectively.

Role control panel and camera crate

◀ **117.** Instructions for testing the camera role control panel and role junction box during first line servicing, using the indicator, fault locating, NATO C/N 4935-99-949-8075, are in succeeding paragraphs of this Chapter. Instructions on the use of this equipment for testing the role control panel and camera crate during second line servicing are in A.P. 1355C, Vol. 1 (2nd Edition), Sect. 5. ▶

Caution...

(1) During certain tests which follow, it is necessary to simulate flight conditions with the aircraft on the ground. While these conditions exist the attention of all personnel must be drawn to the fact that the safety provisions normally provided by the circuit protection relays are not effective.

(2) Before connecting the armament master safety breaks, the safety precautions relating to ERUs in A.P. 101B-1201-4H must be observed.

ROLE CONTROL PANEL AND ROLE JUNCTION BOX

Function test

118. The following equipment is required:-

(1) Indicator, fault locating, NATO C/N 4935-99-949-8075, described in A.P. 4343V, Vol. 1, Book 2.

◀ (2) 200V, 3-phase, 400 Hz a.c. ground ▶ supply.

(3) 28V d.c. ground supplies.

(4) General services hydraulic servicing trolley.

Preparation for test

119. (1) With the camera role control panel installed on the observer's port ◀ console (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 5B), set the controls as ▶ follows:-

(a) Photoflash master switch locked in the OFF position.

(b) Camera selector to F95.

(c) Intervalometer selector to 8 FR.

(d) Iris selector to position 2.

(e) All film indicators to F.

(f) Ground speed selector fully clockwise.

(g) Altitude selector fully clockwise.

(h) PF subtractive counter to any setting other than 000.

(j) All other switches to OFF.

(2) Disconnect from role junction box A-C, Cannon plugs No. 7, 8, 9 and 13, if fitted, and connect the indicator, fault locating to the vacated receptacles on the junction box, using the aircraft servicing adapter, YEU-14-39 (*fig* 11), provided.

(3) At the test set, select the closed circuit selector, tens to 0, rotate the altitude control fully clockwise, and select all remaining switches to OFF.

Connect 28V d.c. supply to the appropriate plug on the test set.

Note...

Continuity must exist between the 28V d.c. −ve line to the test set, and the ground supply earth line to the aircraft, for certain tests to be effective.

(4) With the armament selector switch (panel C-G/1) selected to OFF and the armament master safety breaks ◀ disconnected (*A.P.* 101B-1201-1A, ▶ *Cover* 3, *Sect.* 5, *Chap.* 4), connect a.c. and d.c. supplies to the appropriate ground supply plugs (*Cover* 1, *Sect.* 6, *Chap.* 1).

(5) Connect armament master safety breaks WS-BA and WS-BB.

(6) Set the armament selector switch to CAMERA.

(7) Set the release selector switch (panel C-E) to MANUAL.

(8) Simulate aircraft weight-off-ground conditions by operating the armament ◀ ground test switch (*A.P.* 101B-1201-1A, *Cover* 3, *Sect.* 5, *Chap.* 4). ▶

Test set checks

120. (1) Select the test set d.c. supply switch to ON, and the closed circuit selector, tens to 0, and units to TEST, observing that the DC indicator and CLOSED CIRCUIT INDICATOR are then illuminated.

(2) Depress the test set magnetic indicators push-switch, then release,

observing that the CLOSED CIRCUIT INDICATOR is extinguished only while the switch is depressed.

(3) Select the d.c. power supply switch to OFF, and observe that the DC indicator and CLOSED CIRCUIT INDICATOR are extinguished.

Test procedure

121. Two operators are required, one at the observer's station and the other at the indicator, fault locating.

122. *Aircraft earth continuity check.*

(1) Set the test set d.c. supply switch to ON, and the closed circuit selector, tens to 5, and observe that the DC indicator and CLOSED CIRCUIT INDICATOR are illuminated.

(2) Set the closed circuit selector, units to 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0 in turn, observing at each selection that the CLOSED CIRCUIT INDICATOR is illuminated, and remains illuminated when the magnetic indicators push-switch is depressed.

Note...
Operation of the subtractive counter and indicators on the role control panel should be ignored during this test.

123. *Intervalometer selector and safety circuit.*

(1) With the bomb door closed, set the test set d.c. supply switch to OFF, the closed circuit selector, tens to 0, and units to 1. Observe that the DC indicator and CLOSED CIRCUIT INDICATOR are extinguished.

(2) Select the camera control switch on the role control panel to CONT and INTERRUPT in turn, then release to OFF. Depress the weapons release trigger switch on the pilot's control column, then release. Observe at each selection that the CLOSED CIRCUIT INDICATOR is not illuminated.

(3) Set the closed circuit selector, units to 2, observing that the CLOSED CIRCUIT INDICATOR is not illuminated, and repeat operation (2).

(4) Set the closed circuit selector, units to 3, observing that the CLOSED CIRCUIT INDICATOR is not illuminated, and repeat operation (2).

◀ (5) Set the camera selector on the role control panel to F97 and the closed circuit selector, units to 4. Observe that the CLOSED CIRCUIT INDICATOR is not illuminated, then repeat operation (2).

(6) Set the closed circuit selector, units to 5, observing that the CLOSED CIRCUIT INDICATOR is not illuminated, and repeat operation (2).

(7) Set the photoflash master switch on the role control panel to ON and the closed circuit selector, tens to 2, and units to 3, observing that the CLOSED CIRCUIT INDICATOR is not illuminated.

(8) Return the photoflash master switch to OFF and the camera selector to F95.

(9) Open and secure the bomb door in either intermediate position, using the ground lock, as described in A.P. 101B-1201-1A, Cover 1, Sect. 2, Chap. 1.

(10) Set the closed circuit selector, tens to 0, and units to 1, observing that the CLOSED CIRCUIT INDICATOR is not illuminated, and repeat operations (2) to (8).

(11) Remove the bomb door ground lock (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 1) and fully open the bomb door. Stop the hydraulic servicing trolley and insert the bomb door safety pin.

(12) Set the closed circuit selector, tens to 0, and units to 1, observing that the CLOSED CIRCUIT INDICATOR is not illuminated. ▶

(13) Select the camera control switch to CONT and INTERRUPT in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated at each selection. Release the control to OFF and observe that the indicator is then extinguished.

(14) Depress the weapons release trigger switch, then release, observing that the CLOSED CIRCUIT INDICATOR is illuminated only while the switch is depressed.

(15) Set the closed circuit selector, units to 2, observing that the CLOSED CIRCUIT INDICATOR is not illuminated, and repeat operations (13) and (14). ▶

(16) Set the closed circuit selector, units to 3, observing that the CLOSED CIRCUIT INDICATOR is not illuminated, and repeat operations (13) and (14). ▶

◀(17) Set the camera selector to F97 and the closed circuit selector, units ▶

◀ to 4. Observe that the CLOSED CIRCUIT INDICATOR is not illuminated, then repeat operations (13) and (14).

(18) Set the closed circuit selector, units to 5, observing that the CLOSED CIRCUIT INDICATOR is not illuminated and repeat operations (13) and (14).

(19) Set the photoflash master switch to ON and the closed circuit selector, tens to 2, and units to 3, observing that the CLOSED CIRCUIT INDICATOR is illuminated.

(20) Return the photoflash master switch to OFF and the camera selector to F95. Set the closed circuit selector, tens to 0, and units to 3, observing that the CLOSED CIRCUIT INDICATOR is not illuminated. ▶

(21) Select the camera control switch to CONT. Set the intervalometer selector to 8FR, 4FR, ½ SEC, ¾ SEC, 1 SEC and 2 SEC in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated only at selections 8FR and 4FR.

(22) Select the test set d.c. supply switch to ON and observe that the DC indicator is illuminated. Set the intervalometer selector to each of its six positions in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated at each selection.

(23) Select the test set d.c. supply switch to OFF, observing that the DC indicator is extinguished, and set the closed circuit selector, units to 2. Set the intervalometer selector to each of its six positions in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated only at selection 8FR.

(24) Select the test set d.c. supply switch to ON, and observe that the DC indicator is illuminated. Set the intervalometer selector to each of its six positions in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated only at selection 8FR.

(25) Select the test set d.c. supply switch to OFF, observing that the DC indicator is extinguished, and set the closed circuit selector, units to 1. Set the intervalometer selector to each of its six positions in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated at each selection.

(26) Return the intervalometer selector to 8FR, and select the camera control OFF, observing that the CLOSED CIRCUIT INDICATOR is then extinguished.

124. *Blower-heater controls*

(1) With the test set d.c. supply switch selected to OFF, set the closed circuit selector, tens to 1, and units to 8, and observe that the DC indicator and CLOSED CIRCUIT INDICATOR are extinguished.

(2) Set the blower motors and heaters selector on the role control panel to MANUAL. With the closed circuit selector, units set to 8 and 9 in turn, observe at each selection that the CLOSED CIRCUIT INDICATOR, and BLOWER MOTOR PORT and BLOWER MOTOR STBD indicators on the test set are illuminated, and the BLOWER HEATERS, PORT and STBD magnetic indicators on the role control panel change to a black display. Set the closed circuit selector, units to 0, and the blower motors and heaters selector to AUTO, observing that the BLOWER MOTOR PORT and BLOWER MOTOR STBD indicators are extinguished.

(3) Set the closed circuit selector, tens to 2, and the blower motors and heaters selector to MANUAL. With the closed circuit selector, units set to 1 and 2 in turn, observe at each selection that the CLOSED CIRCUIT INDICATOR, and BLOWER MOTOR PORT and BLOWER MOTOR STBD indicators on the test set are illuminated, and the BLOWER HEATERS, PORT and STBD magnetic indicators on the role control panel give a black display.

(4) Set the blower motors and heaters selector to OFF, observing that all test set indicators are extinguished, and the BLOWER HEATERS, PORT and STBD magnetic indicators on the role control panel, display black and white diagonal stripes.

◀ **125.** *F95 camera selectors.* ▶

(1) With the test set d.c. supply switch selected to OFF, set the closed circuit selector, tens to 0, and units to 6, and observe that the DC indicator and CLOSED CIRCUIT INDICATOR are extinguished.

(2) Set the F95 vertical cameras selector on the role control panel to ON. With the closed circuit selector, units set to 6, 7, 8, 9 and 0 in turn, observe that the CLOSED CIRCUIT INDICATOR is illuminated at each

selection. Set the closed circuit selector, tens to 1, and units to 1, and observe that the CLOSED CIRCUIT INDICATOR is illuminated.

(3) Return the vertical cameras selector to OFF, and set the F95 starboard oblique camera selector to ON. Set the closed circuit selector, units to 2 and 3 in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated at each selection.

(4) Return the starboard oblique camera selector to OFF, and set the F95 port oblique camera selector to ON. Set the closed circuit selector, units to 4 and 5 in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated at each selection.

(5) Return the port oblique camera selector to OFF, and set the F95 forward oblique camera selector to ON. Set the closed circuit selector, units to 6 and 7 in turn, observing that the CLOSED CIRCUIT INDICATOR is illuminated at each selection. Return the forward oblique camera selector to OFF, and observe that the CLOSED CIRCUIT INDICATOR is extinguished. ▶◀

126. *Iris controls and F97 camera speed controls.*

(1) With the test set d.c. supply switch selected to OFF, set the closed circuit selector, tens to 2, and units to 4, and observe that the DC indicator is extinguished.

(2) On the role control panel, set the camera selector to F97, the camera control switch to CONT, and rotate the altitude setting control anti-clockwise to HIGH, then clockwise to LOW, observing that the brilliance of the CLOSED CIRCUIT INDICATOR is increased then diminished.

(3) Set the closed circuit selector, units to 5, and set the iris selector on the role control panel to OPEN, observing that the CLOSED CIRCUIT INDICATOR is illuminated.

(4) Set the closed circuit selector, units to 6, and the iris selector to 3, observing that the CLOSED CIRCUIT INDICATOR is illuminated. Set the iris selector to 2, and observe that the CLOSED CIRCUIT INDICATOR is extinguished.

(5) Set the test set d.c. supply switch to ON, and observe that the DC indicator is illuminated. Set the closed circuit selector, tens to 3, and units to 5, and rotate the altitude control on the test set anti-clockwise, observing that the altitude meter on the role control panel indicates an increase in altitude.

(6) At the test set, rotate the altitude control clockwise until the altitude meter pointer is at mid-scale position.

(7) On the role control panel, rotate the ground speed selector anti-clockwise, observing that the pointer of the altitude meter indicates a reduction in altitude. Rotate the ground speed control fully clockwise, observing that the pointer of the altitude meter indicates a slight increase in altitude.

(8) At the test set, rotate the altitude control fully clockwise, observing that the pointer of the altitude meter indicates maximum altitude.

127. *F95 camera heater selector.*

(1) With the test set d.c. supply switch selected to OFF, set the closed circuit selector, tens to 2, and units to 7, and observe that the DC indicator and CLOSED CIRCUIT INDICATOR are extinguished.

(2) Set the F95 camera heater selector on the role control panel to ON. With the closed circuit selector, units set to 7, 8, 9 and 0 in turn, observe that the CLOSED CIRCUIT INDICATOR is illuminated at each selection.

(3) Set the closed circuit selector, tens to 3; set units to 1, 2, 3 and 4 in turn, observing at each selection that the CLOSED CIRCUIT INDICATOR is illuminated.

(4) Set the F95 camera heater selector to OFF, and observe that the CLOSED CIRCUIT INDICATOR is extinguished.

128. *Indicator and subtractive counter tests.*

(1) Set the test set d.c. supply switch to ON, observing that the DC indicator is illuminated, and set the closed circuit selector, tens to 4, and units to 1.

(2) Depress the test set magnetic indicators push-switch a number of times.

(3) Observe that the F97 IND film indicator lamp on the role control panel is illuminated at each depression of the switch.

(4) Set the closed circuit selector, units to 2, and repeat operation (2), observing that the pointer of the F95 cameras VERTICALS STN 1 OR 2 film indicator is moved one step clockwise at each depression of the switch.

(5) Set the closed circuit selector, units to 3, and repeat operation (2), observing that the pointer of the F95 cameras STBD film indicator is moved one step clockwise at each depression of the switch.

(6) Set the closed circuit selector, units to 4, and repeat operation (2), observing that the pointer of the F95 cameras PORT film indicator is moved one step clockwise at each depression of the switch.

(7) Set the closed circuit selector, units to 5, and repeat operation (2), observing that the pointer of the F95 cameras FORD film indicator is moved one step clockwise at each depression of the switch.

(8) Set the closed circuit selector, units to 6, and repeat operation (2), observing that the P F SUBTRACTIVE COUNTER subtracts one unit at each depression of the switch.

(9) Set the closed circuit selector, units to 7, and repeat operation (2), observing that the F95 VERTICALS, STN 3 OR 6 film indicator lamp is illuminated at each depression of the switch.

(10) Set the closed circuit selector, units to 8, and repeat operation (2), observing that the F95 VERTICALS, STN 4 OR 5 film indicator lamp is illuminated at each depression of the switch.

129. On completion of the function tests perform the following operations:-

(1) Restore the aircraft weight-on-ground conditions by releasing the armament ground test switch.

(2) Ensure that the photoflash master switch is locked in the OFF position.

(3) Set all the camera selectors to OFF.

(4) Set the armament selector switch to OFF.

(5) Set the release selector switch to AUTO.

(6) Disconnect both armament master safety breaks.

(7) Disconnect and remove the indicator, fault locating, and reconnect Cannon plugs No. 7, 8, 9 and 13 at junction box A-C as required.

(8) Remove the bomb door safety pin, start the servicing trolley and close the bomb door.

(9) Disconnect the ground electrical supplies and the hydraulic servicing trolley.

TYPE F95 CAMERA INSTALLATIONS

Function test

130. The following equipment is required:-

(1) Simulator, Type F95 camera (NATO C/N 4935-99-949-8076).

(2) 28V d.c. ground supply.

(3) General services hydraulic servicing trolley.

Preparation for test

131. (1) With the photographic reconnaissance role equipment installed on the aircraft (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 5B), set the camera role control panel as follows:-

(a) Photoflash master switch locked in the OFF position.

(b) Camera selector to F95.

(c) Intervalometer selector to 8 FR.

(d) Iris selector to position 2.

(e) All film indicators to F.

(f) All other switches to OFF.

(2) With the armament selector switch (panel C-G/1) selected to OFF and the armament master safety breaks disconnected (*A.P.* 101B-1201-1A, *Cover* 3, *Sect.* 5, *Chap.* 4), connect the d.c. supply to the ground supply plug (*Cover* 1, *Sect.* 6, *Chap.* 1).

(3) Connect the hydraulic servicing trolley to the aircraft (*A.P.* 101B-1201-1A, *Cover* 2, *Sect.* 3, *Chap.* 6), start the trolley and open the bomb door.

(4) Stop the servicing trolley and insert the bomb door safety pin (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 1).

(5) Lower the camera crate to the servicing position and gain access to the cameras (*A.P.* 101B-1201-1A, *Cover* 2, *Sect.* 3, *Chap.* 14); ensure that plug B-C/B/2 of the camera crate output loom is securely stowed on the photoflash crate.

(6) Connect armament master safety break WS-BB.

(7) Set the armament selector switch to CAMERA.

(8) Set the release selector switch (panel C-E) to MANUAL.

Test procedure

132. Two operators are required, one at the observer's station and the other at the camera crate. For general function testing of the F95 camera installations disconnect the cables from all associated cameras installed in the camera crate. Using cable assemblies YEU-18-5 and YEU-18-6, supplied, connect the camera simulator to each camera station in turn as applicable and perform the function tests described in A.P. 4343V, Vol. 1, Book 2 using the appropriate camera controls and indicators.

Note...

Camera stations 2 and 4 utilize the same cables as those used at stations 1 and 5 respectively.

133. If it is required to test only part of a camera installation, each of the remaining cameras installed in the crate must be isolated by setting the appropriate selector switches to OFF. If the circuit under test is that of a vertical camera the remaining vertical cameras must be isolated by disconnecting the associated cables.

134. On completion of the function tests perform the following operations:-

(1) Set all the camera selectors to OFF.

(2) Set the armament selector switch to OFF.

(3) Set the release selector switch to AUTO.

(4) Disconnect armament master safety break WS-BB.

(5) Disconnect and remove the camera simulator and reconnect or stow the camera cables as necessary.

(6) Return the camera crate to its closed position.

(7) Remove the bomb door safety pin, start the servicing trolley and close the bomb door.

(8) Disconnect the d.c. ground supply and the hydraulic servicing trolley.

TYPE F97 CAMERA AND PHOTOFLASH INSTALLATION

Type F97 camera controls function test

135. The following equipment is required:-

(1) Simulator, Type F97 camera (NATO C/N 4935-99-949-8077).

(2) 28V d.c. ground supply.

(3) General services hydraulic servicing trolley.

Preparation for test

136. (1) With the photographic reconnaissance role equipment installed on the aircraft (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 5B), set the camera role control panel as follows:-

(a) Photoflash master switch locked in the OFF position.

(b) Camera selector to F97.

(c) Intervalometer selector to 8 FR.

(d) Iris selector to position 2.

(e) *Ground speed selector fully clockwise.*

(f) Altitude selector fully anti-clockwise.

(g) PF subtractive counter to any setting other than 000.

(h) All other switches to OFF.

(2) With the armament selector switch (panel C-G/1) selected to OFF and the armament master safety breaks disconnected (*A.P.* 101B-1201-1A, *Cover* 3, *Sect.* 5, *Chap.* 4), connect the d.c. supply to the ground supply plug (*Cover* 1, *Sect.* 6, *Chap.* 1).

(3) Connect the hydraulic servicing trolley to the aircraft (*A.P.* 101B-1201-1A, *Cover* 2, *Sect.* 3, *Chap.* 6), start the trolley and open the bomb door.

(4) Stop the servicing trolley and insert the bomb door safety pin (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 1).

(5) Lower the camera crate to the servicing position and gain access to the cameras (*A.P.* 101B-1201-1A, *Cover* 2, *Sect.* 3, *Chap.* 14).

(6) Disconnect the two cables from the F97 camera, if fitted, and reconnect

these to the camera simulator using the appropriate cable harnesses provided. Disconnect the camera crate output loom at plug B-C/C/1 on the photoflash crate and reconnect the loom to the camera simulator using the cable harness provided; ensure that plug B-C/B/2 of the loom is connected to the camera crate output socket.

(7) Connect armament master safety breaks WS-BA and WS-BB.

(8) Set the armament selector switch to CAMERA.

(9) Set the release selector switch (panel C-E) to MANUAL.

Test procedure

137. Two operators are required, one at the observer's station and the other at the camera crate. Perform the function tests described in A.P. 4343V, Vol. 1, Book 2.

138. On completion of the function tests perform the following operations:-

(1) Ensure that the photoflash master switch is locked in the OFF position.

(2) Set the armament selector switch to OFF.

(3) Set the release selector switch to AUTO.

(4) Disconnect both armament master safety breaks.

(5) Disconnect and remove the camera simulator, and reconnect or stow the camera cables and camera crate output loom as necessary.

(6) Return the camera crate to its closed position.

(7) Remove the bomb door safety pin, start the servicing trolley and close the bomb door.

(8) Disconnect the d.c. ground supply and the hydraulic servicing trolley.

Distributors and photoflash discharger units function test, and no-volts test

WARNING...

It requires an extremely small electric current to fire the 1·75 in. photoflash cartridge. The explosion of a prematurely-fired cartridge is extremely dangerous and probably lethal, particularly since the delay before the explosion is very short. To guard against leakage currents which may fire a cartridge prematurely, the function test described in para 139 to 142 must be made immediately before loading any of the discharger units, and the no-volts test in para 144 and 145 must be performed at socket B-C/C/1 of the camera crate output loom immediately before connecting it to the loaded photoflash crate.

139. The following equipment is required:-

(1) Circuit tester for 1·75 in. photoflash discharger, Ref No. 5G/3226.

(2) Voltage detector, Mk. 3, Ref No. 5G/3297.

(3) Contact plate, Ref No. 5G/3227 (33 off).

(4) Contact plate tester, Ref No. 5G/3228.

(5) Connector lead, Ref No. 5G/3438.

(6) Cable assembly set, electrical, NATO C/N 4935-99-101-9212 (*fig* 12).

(7) 28V d.c. ground supply.

(8) 24 – 28V d.c. supply.

(9) General services hydraulic servicing trolley.

Preparation for function test

WARNING...

The circuit tester must not be connected to the photoflash crate or to a single discharger unit until it is ascertained that all the discharger units are free from cartridges.

140. (1) With the armament selector switch (panel C-G/1) selected to OFF and the armament master safety breaks ◀ disconnected (*A.P.* 101B-1201-1A, ▶ *Cover* 3, *Sect.* 5, *Chap.* 4), connect the d.c. ground supply to the ground supply plug (*Cover* 1, *Sect.* 6, *Chap.* 1).

(2) Connect the hydraulic servicing trolley ◀ to the aircraft (*A.P.* 101B-1201-1A, ▶ *Cover* 2, *Sect.* 3, *Chap.* 6), start the trolley and open the bomb door.

(3) Stop the servicing trolley and insert ◀ the bomb door safety pin (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 1). ▶

(4) Connect 24–28V d.c. supply to the circuit tester using the connector lead, Ref No. 5G/3438, and perform the preparatory tests laid down in A.P. 4343X, Vol. 1, Book 2, Sect. 1.

(5) With the photographic reconnaissance role equipment installed on the aircraft ◀ (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 5B), lower the photoflash crate to the servicing position (*A.P.* 101B-1201-1A, *Cover* 2, *Sect.* 3, *Chap.* 14), ▶ fit a contact plate into each of the 33 discharger units and clamp down the discharger heads. At plug B-C/C/1 disconnect the camera crate output loom.

(6) Connect the circuit tester to the photoflash crate, via the socket marked CRATE and plug B-C/C/1 respectively, using cable assembly special purpose,

electrical, NATO C/N 4935-99-949-8072 (*fig* 12).

(7) On the circuit tester panel, set the selector switch to CRATE and the supply switch to ON.

(8) At the photoflash crate reset each distributor unit in turn by depressing the associated remote push-switch until the reset indicator is illuminated. Set the counter on the circuit tester panel to zero.

Function test procedure

141. (1) Select the impulse switch on the circuit tester to ON; this causes the 198 firing circuits in the photoflash crate to be tested in sequence automatically.

(2) The circuit tester will cease to operate if a faulty circuit is detected and the appropriate LIMIT lamp, indicating either high or low resistance, will be illuminated. The number of the faulty circuit indicated on the counter should be noted.

(3) Restart the circuit tester by depressing the push-switch, and continue testing the remaining firing circuits.

◀ (4) Repeat operations (2) and (3) as necessary until all the firing circuits have been tested. ▶

(5) If one or more faults are detected, select the supply and impulse switches on the circuit tester to OFF and disconnect the unit from the photoflash crate.

(6) Remove from the photoflash crate any faulty dischargers and test each one individually as described in para 143.

(7) Fit serviceable dischargers into the crate and repeat the tests as necessary.

142. On completion of the function tests perform the following operations:-

(1) At the photoflash crate reset each distributor in turn by depressing the associated remote push-switch until the reset indicator is illuminated.

(2) Disconnect the circuit tester from the photoflash crate and remove all contact plates from the dischargers.

Single discharger test

143. (1) Connect the discharger, fitted with a contact plate, to the SINGLES socket of the circuit tester using cable assembly special purpose, electrical, NATO C/N 4935-99-949-8074 (*fig* 12).

(2) On the circuit tester panel, set the selector switch to SINGLES 1 and the supply switch to ON.

(3) With the selector switch set to each of the SINGLES positions in turn, depress the push-switch and test the six firing circuits of the discharger.

(4) Faulty circuits will cause the appropriate LIMIT lamp, indicating either high or low resistance, to be illuminated. The faulty circuit is identified by the number indicated on the selector switch.

No-volts test

144. (1) Determine the serviceability of the voltage detector, Mk 3, by performing the preparatory tests described in A.P. 4343J, Vol. 1, Sect. 4, Chap. 5. Perform continuity and insulation tests on the cable assembly special purpose, electrical, NATO C/N 4935-99-949 8073 (*fig* 12).

(2) Ensure that the Type F97 camera is installed in the camera crate.

(3) With the cable assembly 4935-99-949-8073 connected to plug PL1 on the voltage detector panel, connect one of the two branch plugs of the cable assembly to socket B-C/C/1 of the camera crate output loom; ensure that plug B-C/B/2 of the loom is connected to the camera crate output socket.

(4) Ensure that the photoflash master switch on the role control panel is locked in the OFF position.

(5) Set the release selector switch (panel C-E) to MANUAL.

(6) Simulate aircraft weight-off-ground conditions by operating the armament ◀ ground test switch (*A.P.* 101B-1201-1A, *Cover* 3, *Sect.* 5, *Chap.* 4). ▶

(7) Connect armament master safety breaks WS-BA and WS-BB.

(8) Set the armament selector switch to CAMERA.

(9) Observe the no-volts test procedure described in A.P. 4343J, Vol. 1, Sect. 4, Chap. 5.

(10) Transfer socket B-C/C/1 of the camera crate output loom to the alternative branch plug of the cable assembly 4935-99-949-8073 and repeat ◀ operation (9). ▶

(11) Set the armament selector switch to OFF.

(12) Disconnect both armament master safety breaks.

(13) Restore the aircraft weight-on-ground conditions by releasing the armament ground test switch.

◀ (14) Repeat operations (9) and (10). ▶

145. On completion of the no-volts test perform the following operations:-

(1) Disconnect the voltage detector and cable assembly from the camera crate output loom, and reconnect socket B-C/C/1 of the loom to the photoflash crate, and return the crate to its closed position.

(2) Remove the bomb door safety pin, start the servicing trolley and close the bomb door.

(3) Disconnect the d.c. ground supply and the hydraulic servicing trolley.

CAMERA CRATE HEATING INSTALLATION

Function test

146. The following equipment is required:-

(1) Hot air blower.

◀ (2) 200V, 3-phase, 400 Hz a.c. ground ▶ supply.

(3) 28V d.c. ground supply.

(4) General services hydraulic servicing trolley.

Preparation for test

147. (1) With the photographic reconnaissance role equipment installed on ◀ the aircraft (*A.P.* 101B-1201-1A, *Cover* ▶ 1, *Sect.* 2, *Chap.* 5B), set the blower motors and heaters selector switch on the role control panel to OFF.

(2) Connect a.c. and d.c. supplies to the appropriate ground supply plugs (*Cover* 1, *Sect.* 6, *Chap.* 1).

(3) Connect the hydraulic servicing trolley ◀ to the aircraft (*A.P.* 101B-1201-1A, ▶ *Cover* 2, *Sect.* 3, *Chap.* 6) start the trolley and open the bomb door.

(4) Stop the servicing troiley and insert ◀ the bomb door safety pin (*A.P.* 101B-1201-1A, *Cover* 1, *Sect.* 2, *Chap.* 1). ▶

(5) Lower the camera crate to the servic- ◀ ing position (*A.P.* 101B-1201-1A, ▶ *Cover* 2, *Sect.* 3, *Chap.* 14) and ensure that no cameras are fitted.

(6) Ensure that the port and starboard heater control thermostats (panel B-C/B/J) are closed; if found to be open connect shorting links across terminals F1 and F2 and across terminals F4 and F5 respectively.

(7) Ensure that neither blower-heater unit is operating and that both blower-heater indicators display black and white diagonal stripes.

Test procedure

148. During the following tests, when the selector switch is set to either AUTO or MANUAL, ensure that both blower-heater indicators change to a black display.

(1) Set the blower motors and heaters selector switch to MANUAL and ensure that both blower heater units are delivering hot air.

(2) Set the selector switch to OFF and remove the shorting links, if applicable, or direct a supply of hot air on to both control thermostats until they ◀ open (approximately 15 deg C). ▶

(3) Maintaining the thermostats open, set the selector switch to MANUAL and ensure that both blower-heater units are delivering cold air.

(4) Maintaining the thermostats open, set the selector switch to AUTO and ensure that neither blower-heater is operating.

(5) Set the selector switch to OFF and remove the hot air supply from the thermostats or replace the shorting links as applicable.

(6) Set the selector switch to AUTO and ensure that both blower-heater units are delivering hot air.

(7) Set the selector switch to OFF and ensure that neither blower-heater unit is operating.

149. On completion of the function test perform the following operations:-

(1) Remove the shorting links from the thermostats, if applicable.

(2) Return the camera crate to its closed position.

(3) Remove the bomb door safety pin, start the servicing trolley and close the bomb door.

(4) Disconnect the ground electrical supplies and the hydraulic servicing trolley.

◀ **Setting the control thermostats**

150. The correct operating temperature setting of the thermostats, Type TCS 3150 (Ref No. 5CW/8339), fitted on panel B-C/B/J, is 15 ± 2.5 deg C, adjustment of which is fully described in A.P. 4343C, Vol. 1, Book 2, Sect. 3, Chap. 104. Replacement thermostats are supplied to no specific setting and must be adjusted to the correct setting as described above, and colour coded black-brown-green, before installation.

Note...

The thermostats are provided with special securing screws and washers, and no others must be used. ▶

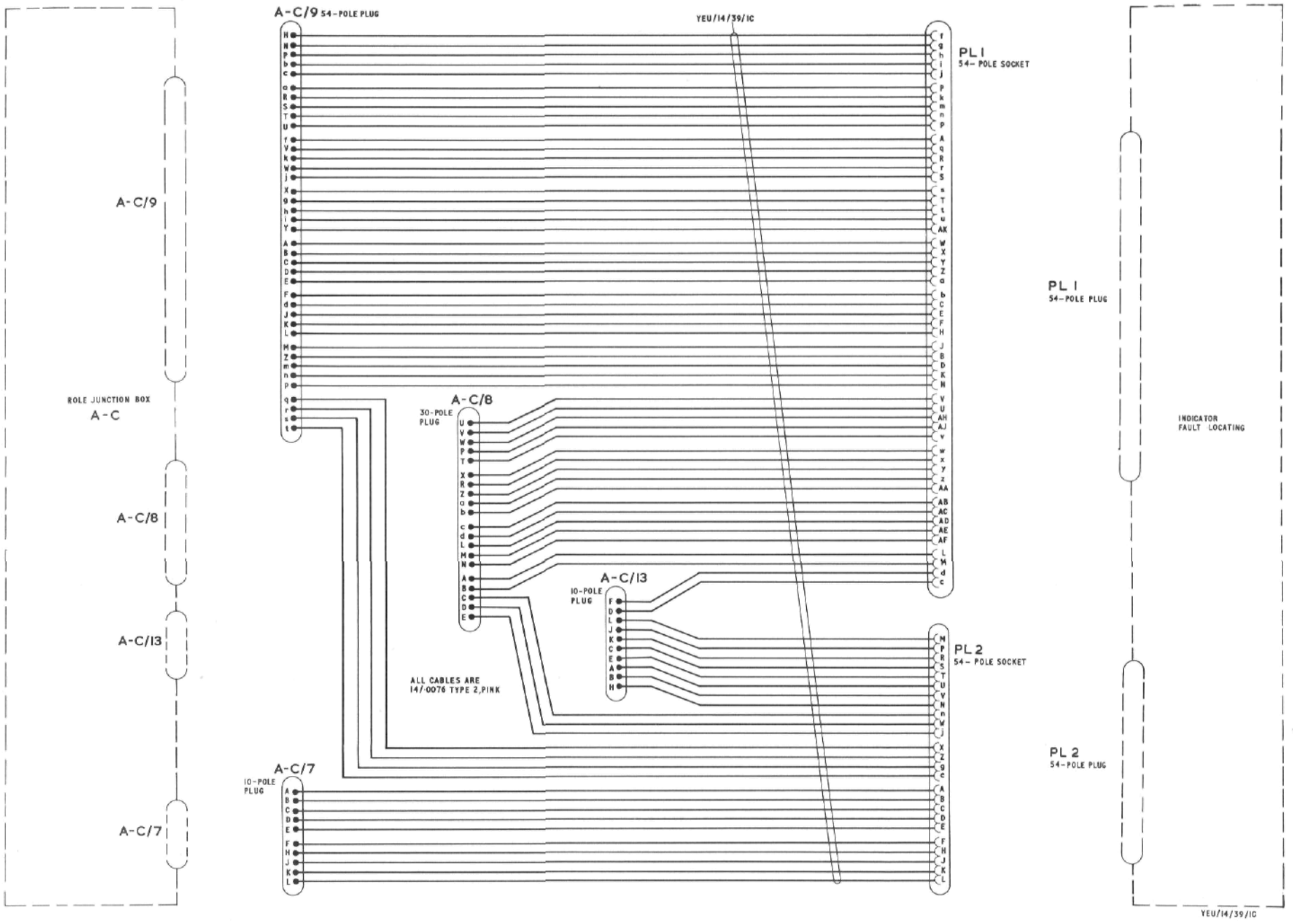


Fig. 11. Details of aircraft servicing adapter

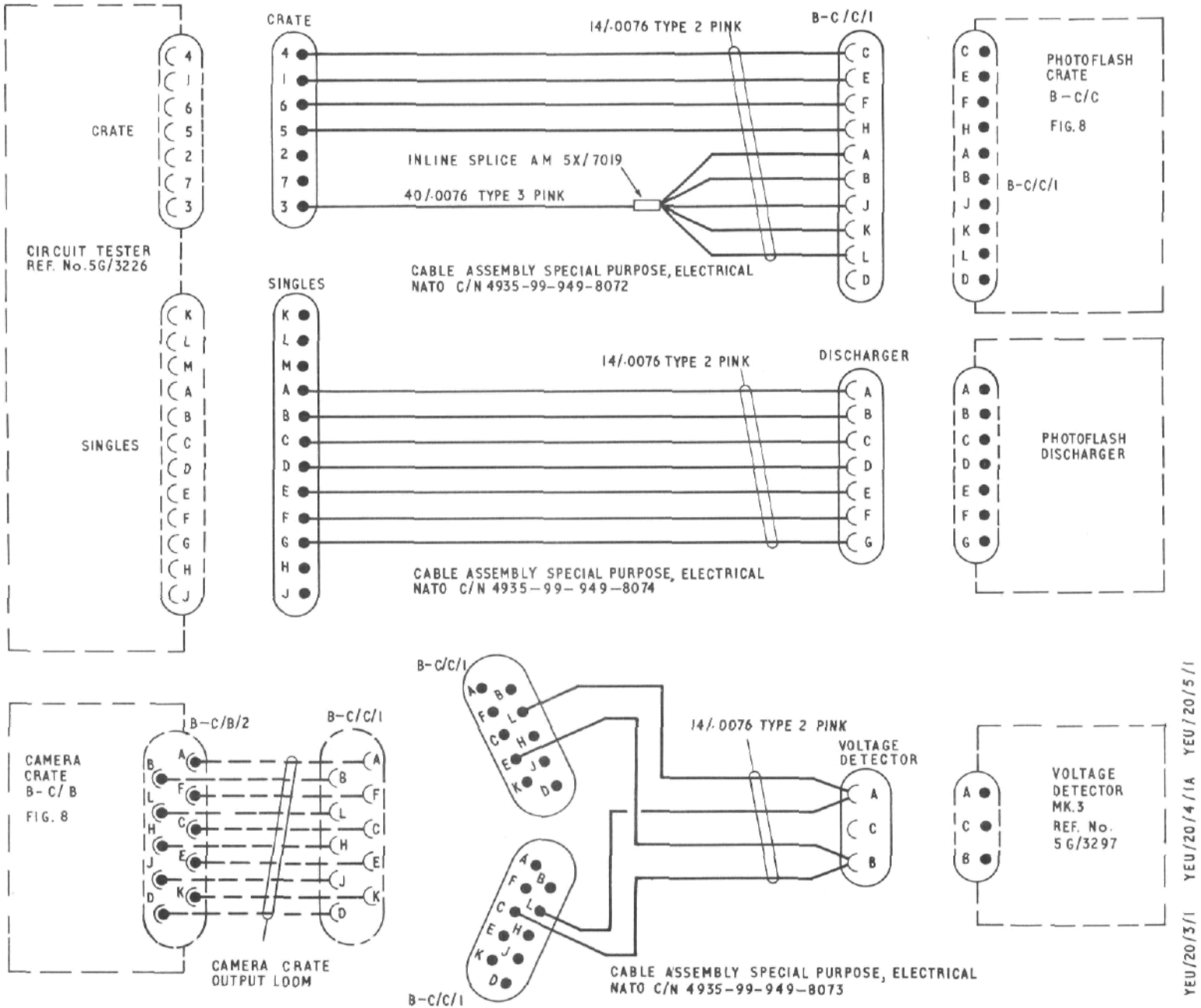


Fig. 12. Details of cable assembly set, electrical

LIST OF APPENDIXES

Appendix 1 ARMAMENT MASTER SAFETY BREAKS (Mod 829)

LIST OF ILLUSTRATIONS

◀ **1.** The introduction of Mod 829 involves ▶ wiring changes at the armament master safety breaks WS-BA and WS-BB. Associated circuits are terminated at the fixed socket of each safety break, and continuity is normally maintained by mated shorting plugs. To render the circuits safe, the shorting plugs are removed and a special blanking plate is then attached to the sockets.

2. The wiring changes affecting the photographic installation include re-routeing of the photoflash distributors main power supply from fuse M12, via safety break WS-BA in lieu of WS-BB, as shown in the accompanying diagrams. Further inform- on the armament master safety breaks is in A.P. 101B-1201-1A, Cover 3, Sect. 5, ▶ Chap. 4.

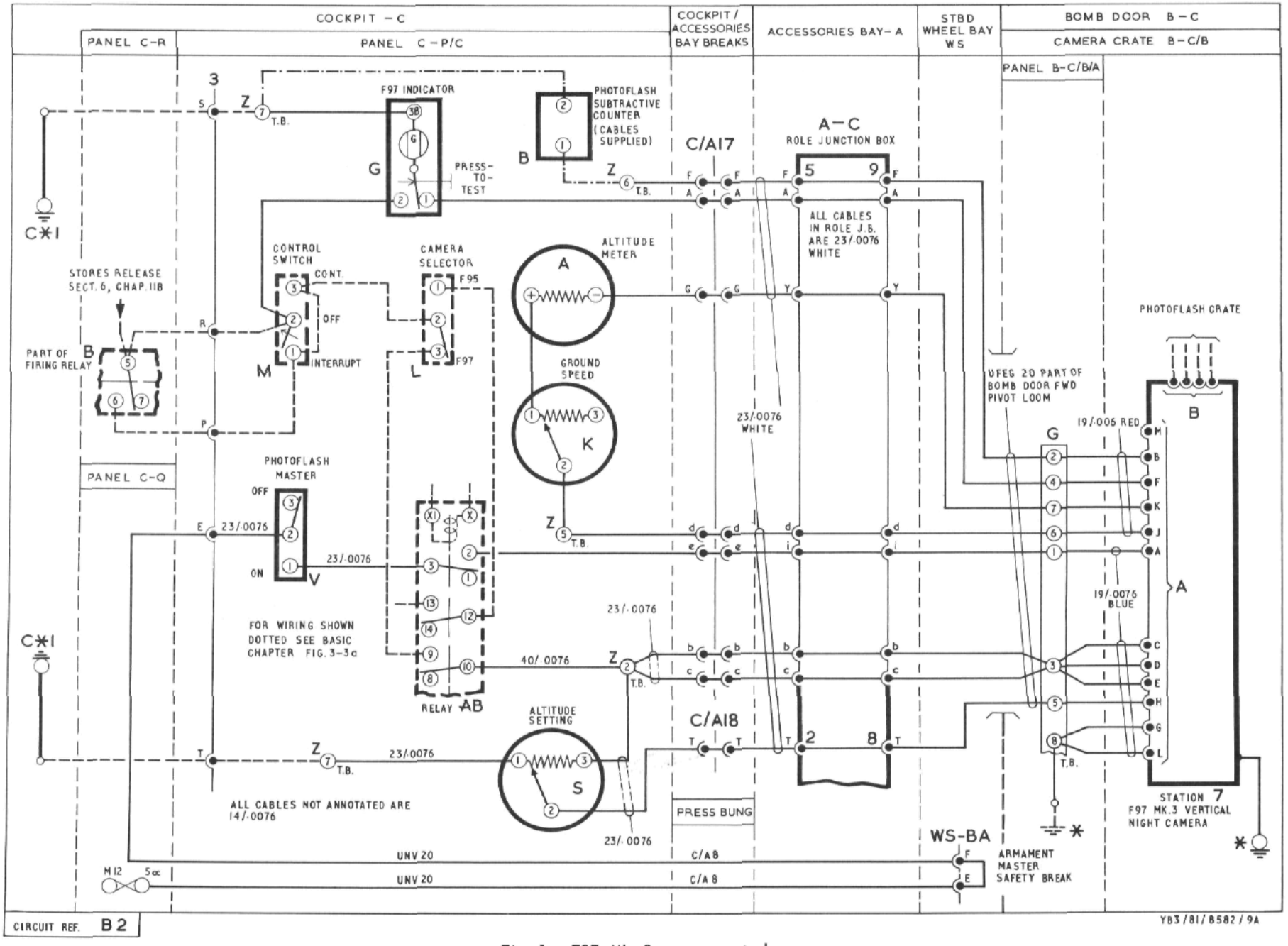
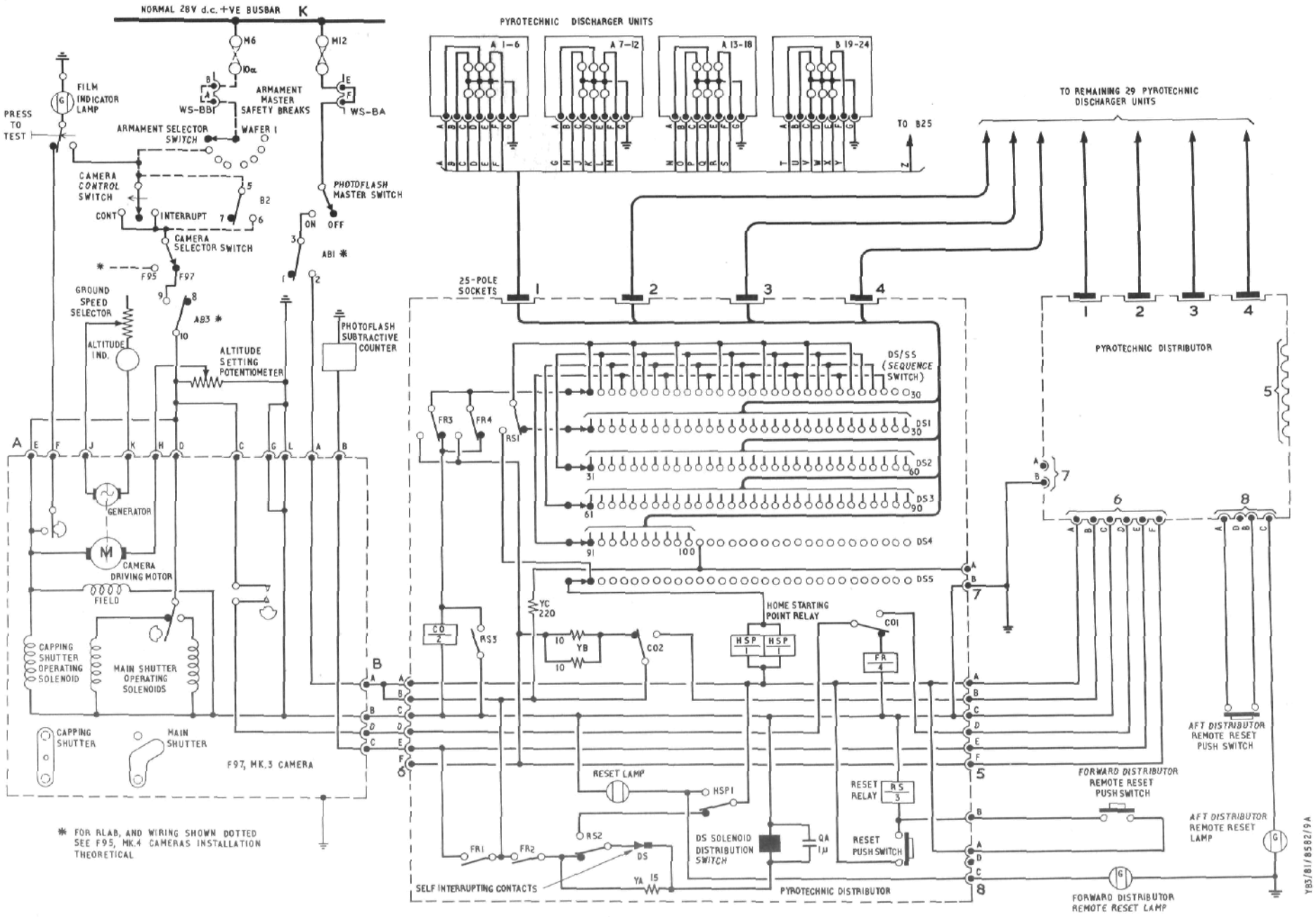
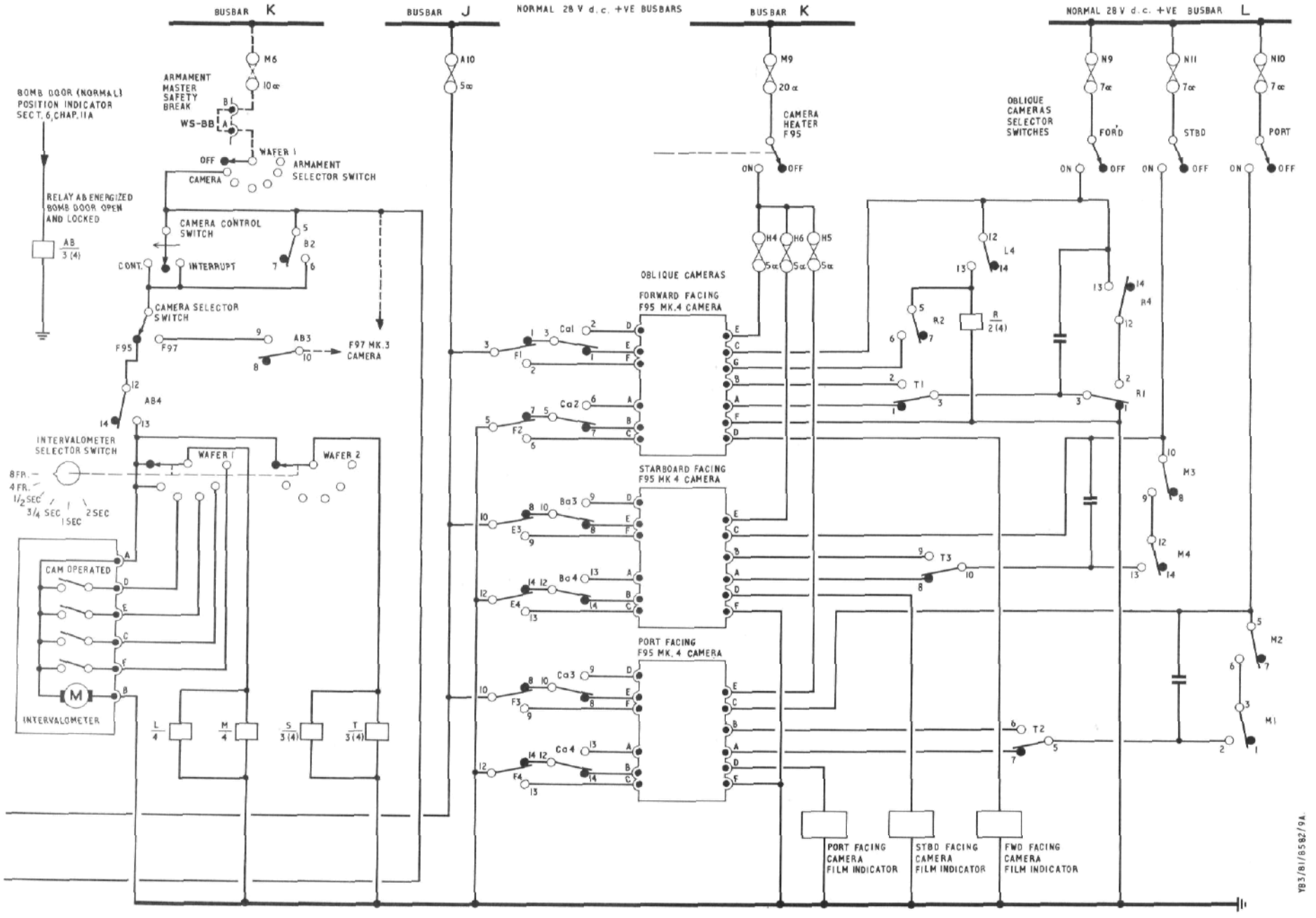


Fig. 1. F97, Mk. 3 camera controls



BUCCANEER S MK. 1 AIRCRAFT AIR DIAGRAM 6333DT/MIN.	
ISSUE 1	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY MINISTRY OF DEFENCE

Fig. 2. F97, Mk. 3 camera and photoflash installation (post-Mod 829) – theoretical



BUCCANEER S MK. 1 AIRCRAFT AIR DIAGRAM 6333DU/MIN.	
ISSUE 1	PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY MINISTRY OF DEFENCE

Fig. 3. F95, Mk. 4 camera installations (post-Mod 829) – theoretical

RESTRICTED

103/2/2/85 89970 375 + 625 12/66 HSAL 1423