Chapter 2 ARMAMENT AND PHOTOGRAPHIC INSTRUMENTS

(completely revised)

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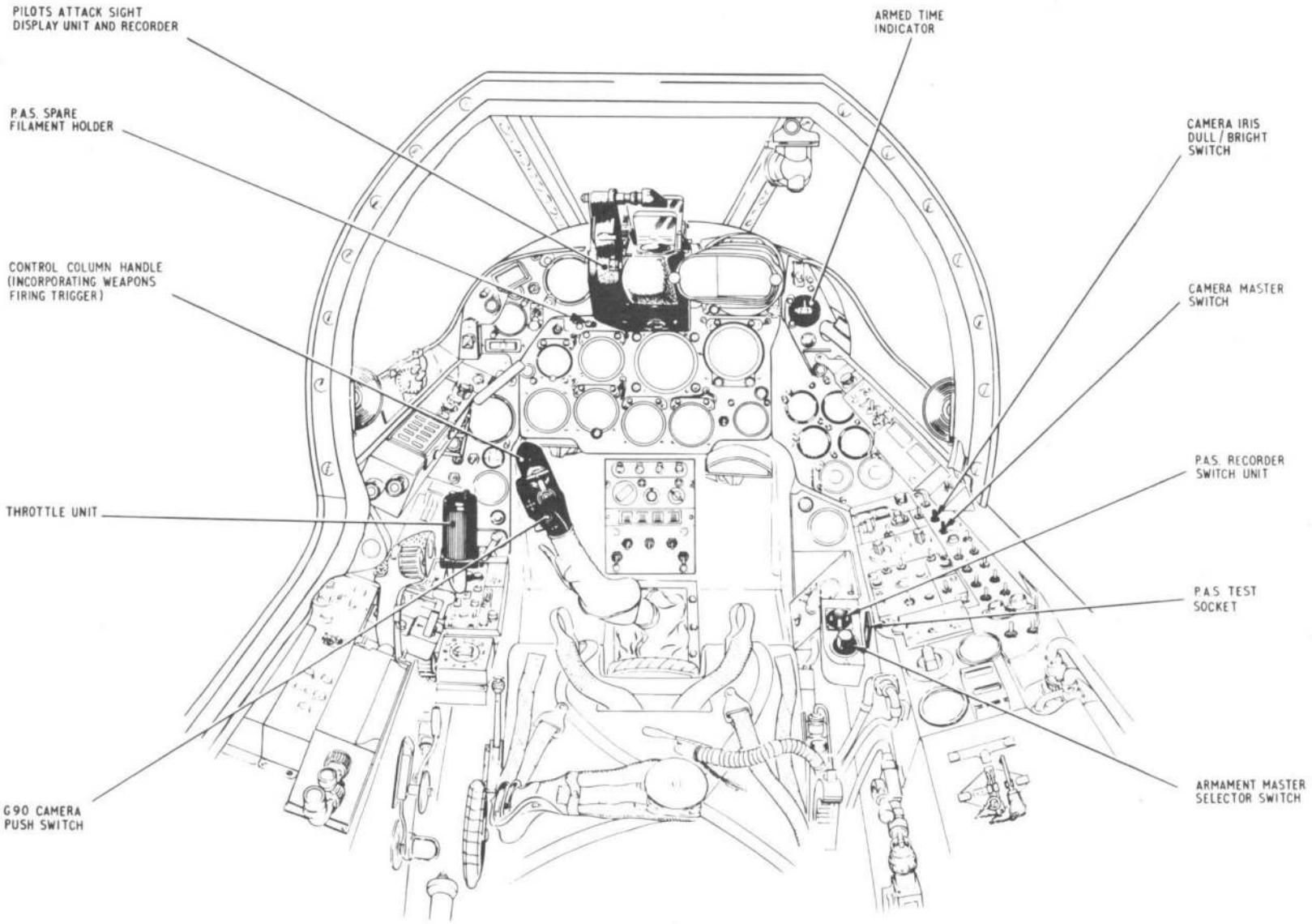


FIG. I. ARMAMENT AND PHOTOGRAPHIC UNITS - COCKPIT

◄ MINOR AMENDMENTS ►

DESCRIPTION

PILOT'S ATTACK SIGHT

General

1. The pilot's attack sight (P.A.S.) Mk.1 is basically a gyro sight for use with guns, rockets, or guided weapons. It normally functions in conjunction with AI 23 radar equipment but provision is made for the sight to be manually controlled. In the radar mode, the AI 23 radar locates and tracks the target and when locked on, controls the movement of a target indicator spot on the P.A.S. display unit target indicator reflector. The pilot makes the correct approach using an aiming graticule on the P.A.S. display to track the target indicator spot. Reference should be made to A.P.112E-0003-1, for a full description of the P.A.S. The AI 23 installation is described in Sect.9, Chap.4.

Display unit

2. The display unit Mk.1 is located above the main instrument panel and mounted on the centre line of the aircraft. Electrical connections to the unit are made via one 12-way and two 25-way plugs which are permanently connected by short leads to the rear of the unit. An air-drier tube connects the unit to a drying cell.

3. The necessary approach and attack information is presented as a bright pattern by means of two glass semi-reflectors mounted on the top of the unit. In addition, warning that an attack must be broken off is given by break-off lamps adjacent to the target indicator reflector. The lamps illuminating the display information are mounted in two housings, one at the top for the target indicator and break-off lamps, and the other at the base of the unit for the predicting gyro lamp. A lever at the starboard side of the unit lowers the lower housing for replacement of the lamp; the top housing is clip retained. The brilliance of the target indicator and predicting gyro lamps is controlled by dimmer resistances at the base of the unit; the illumination from the break-off lamp is adjusted by the setting of a semi-opaque shield. A small test push located forward of the span control is provided for checking the serviceability of the break-off lamp. A spring-clip type holder, for a spare filament, is fitted above the airspeed indicator.

Note...

Two levers are provided at the port side of the sight, for raising and lowering the sight reflectors. Damage may result to the reflectors if an attempt is made to raise or lower them by any other method.

Display unit controller

4. A display unit controller, either Mk.1 or Mk.2, is fitted adjacent to the ejector seat rails, at the port side of the aft pressure bulkhead. It contains a weapons computer, a firing bracket computer, power pack and voltage stabilizer, and various servo amplifiers, and it receives inputs from the AI 23 radar, the M.R.G., the altitude and air-speed unit, and the throttle unit. The inputs are used in the computing and amplifier circuits and provide control currents to the display unit. All electrical connections to the controller are made through a special 109-way plug and socket at the base of the unit.

Note...

1. A display unit controller Mk.1 pre Mod.517FE must only be used with an altitude and air-speed unit Mk.1. A display unit controller with Mod.517FE embodied or a display unit controller Mk.2 must only be used with an altitude and airspeed unit Mk.2.

2. Before fitting a new or replacement controller, the tapping connections of the power pack transformers must first be checked as detailed in para.27.

Altitude and air-speed unit

5. An altitude and air-speed unit Mk.1 or Mk.2, is mounted in the forward equipment compartment and supplied with pitot and static pressures from the pitot and static system *(Sect.7, Chap.5)*. The unit provides correction currents to the display unit controller computing circuits to compensate for the effects of air speed and air density on projectile trajectory. The air speed term is derived from a pitot capsule whose movements are transmitted to a wiper contact which sweeps a variable resistor to give an output which modifies the gain of the trail amplifier in the display unit controller. The air density term is derived from an aneroid capsule which expands or contracts with variation in

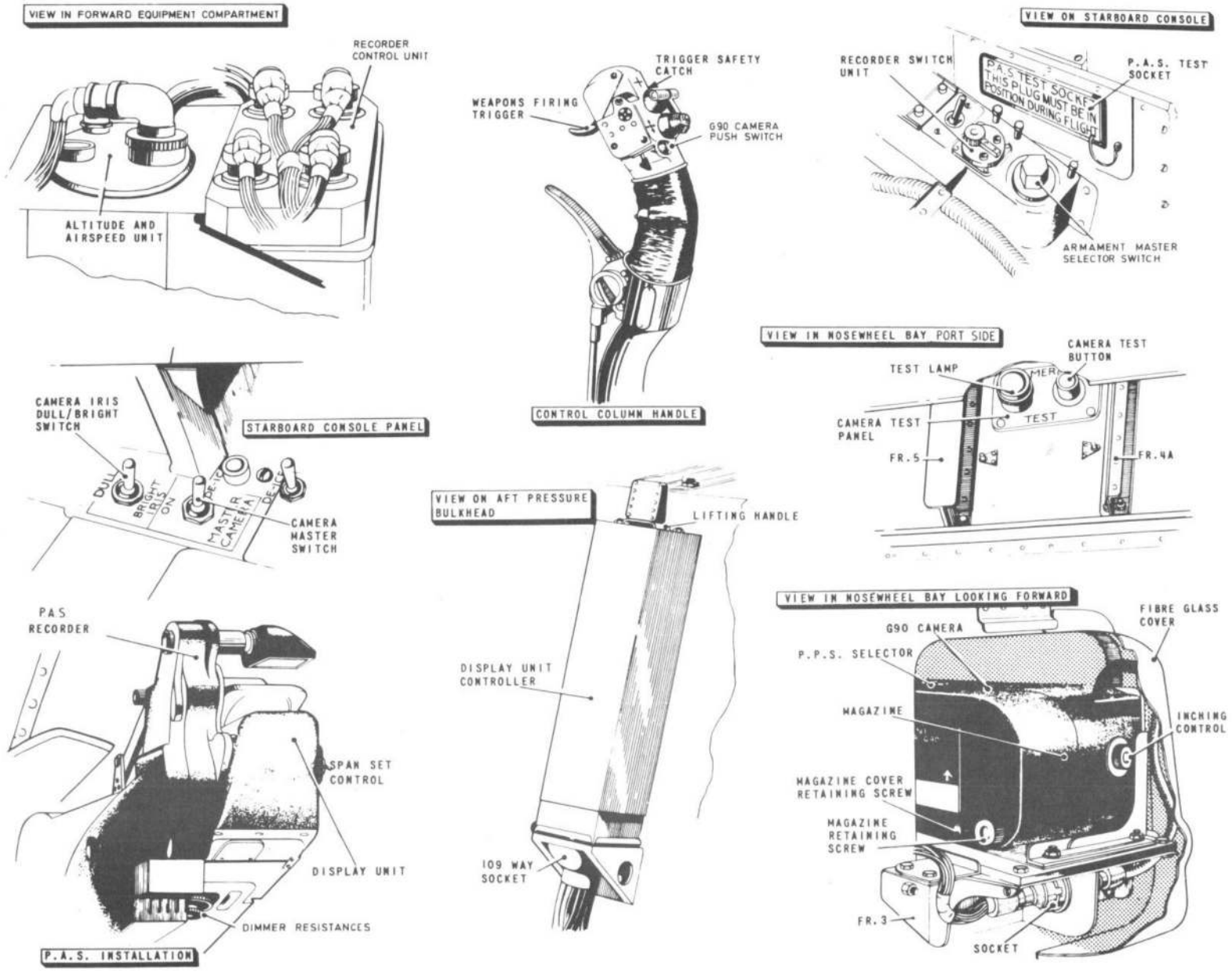


FIG. 2. ARMAMENT AND PHOTOGRAPHIC DETAILS

◀ MINOR AMENDMENTS ▶

air density. Movement of the capsule is transmitted to a potentiometer wiper contact; the potentiometer receives a 40-volt a.c. supply from the display unit controller, and the potentiometer pick-off supplies an input signal to the altitude servo amplifier. An air drying unit which consists of a replaceable cartridge filled with indicating silica gel crystals, is fitted to the unit.

Note...

An altitude and air-speed unit Mk.1 must only be used with a display unit controller Mk.1 pre Mod. 517FE. An altitude and air-speed unit Mk.2 must only be used with a display unit controller Mk.2 or a display unit controller Mk.1 with Mod.517FE embodied.

Throttle unit, Type 1, Mk.1

6. The throttle unit provides for use of the sight in radar or manual mode. Housed in the base of the unit is a radar/manual switch plate, the normal position of which is at radar selection. Manual selection is made by lifting the twist grip and turning it counter-clockwise, the actual circuit changes being completed by relays in the controller. The size of the ring of diamonds in the display is now controlled by further rotation of the twist grip and by the setting of the span set control on the display unit. Rotation of the twist grip positions the wiper arms of a variable resistance and a potentiometer housed in the unit. The output from the variable resistance is fed to the graticule servo in the display unit to control the size of the ring of diamonds seen in the display; the potentiometer feeds an input, a function of range, to the computer servo in the display unit controller. The air brakes switch *(Sect. 6, Chap.3)* and the press-to-transmit switch *(Sect.8, Chap.2)* are also incorporated in the throttle unit.

Drying cell

7. To prevent oxydisation of the aluminized mirrors and corrosion of the metal components in the display unit, air is only permitted to enter the unit after filtering through a drying cell which contains silica gel dessicant. This cell is fitted at the port side of the display unit and is connected to the display unit by a short length of flexible tube which acts as a dry air reservoir. An inspection window, fitted in the side of the cell, and a small mirror fitted adjacent to the window, allow the condition of the silica gel to be checked in situ.

Test socket

8. A 91-way test socket is positioned above the armament master selector switch on the inboard side of the starboard console. Those supplies which are of test importance are routed to the test socket and their circuits completed through a 91-way shorting plug which mates with the test socket and which has appropriate pins *(Table 2)* shorted together. This plug must be secured in position for flight.

Power supplies

9. The armament master selector switch, fitted at the inboard side of the starboard console, is the master switch for the P.A.S. installation. It has four selections – GUNS – GW-RB-OFF. When set to any weapon selection the P.A.S. supply relay, housed in the a.c. fuse and relay box, is energized and 28-volt d.c. and 200-volt, 400 Hz, 3-phase a.c. power supplies fed to the display unit controller for the correct aiming of that weapon. For details of the electrical armament circuits refer to Sect. 6, Chap. 2.

P.A.S. RECORDER INSTALLATION

General

10. The P.A.S. recorder is an electrically driven cine camera used in conjunction with the pilot's attack sight to produce a film record of the target and display information as viewed through the sight reflectors. The recorder installation comprises the camera and its mounting, a control unit, and a switch unit.

P.A.S. recorder

11. The P.A.S. recorder Mk.1 is carried by a mounting bracket fitted to the port side of the pilot's attack sight and is mounted with the camera lens unit aligned above the target indicator reflector. A release lever facilitates the removal of the recorder from its mounting. The camera has three shutter speeds, 1/50th, 1/100th, and 1/300th of a second, which are manually selected at a knurled spring-loaded push-in knob; the rate may be set to either 2 or 16 frames per second by adjustment of a F.P.S. control on the recorder. The recorder supply is connected through the pilot's attack sight and recorder

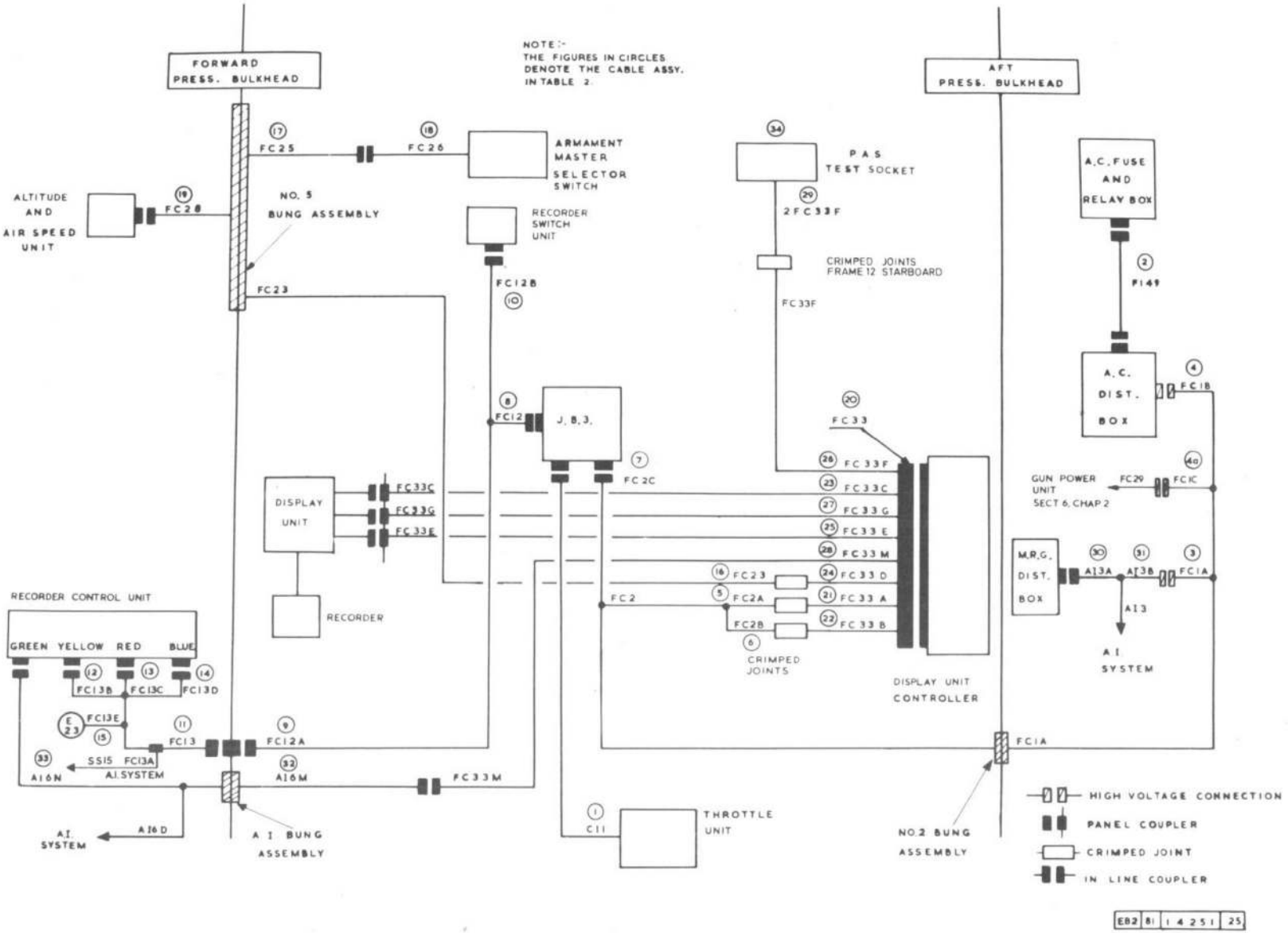


FIG.3. P.A.S. INSTALLATION

◀ MINOR AMENDMENTS ▶

mounting. A 5-pole plug on the camera mates with a socket on the mounting which is connected to terminal connections at the side of the sight. The camera motor runs whenever the master armament selector switch is set to a weapon position but the recorder mechanism will not drive until the mechanism solenoid in the camera has been energized from the recorder control unit. A marker solenoid, when energized, positions a marker flag in the optical path to identify the frames exposed during firing. For full details of the recorder refer to A.P.112P series.

Recorder control unit

12. The recorder control unit, P.O. Mk.1, fitted in the forward equipment compartment, controls the operation of the P.A.S. recorder by a series of interlocking hold-in relays and motor driven cam contacts. When the AI 23 radar is locked on, the control unit automatically starts the recorder on receipt of firing bracket signals from the display unit controller and provides a pre-run period before the firing trigger is operated. After release of the weapons firing trigger, the control unit allows the recorder to over-run for a short period (3 sec).

Recorder switch unit

13. The recorder switch unit Mk.1 mounted on the inboard side of the starboard console, is an additional control for the P.A.S. recorder. It incorporates two push-switches for recorder operation, and a green light which is illuminated whenever the camera is running without the weapons firing trigger operated. The switch can also be used to override or cancel the automatic operation of the recorder.

Operation

14. Whenever the pilot's attack sight is switched on, *(para.9)*, a 28-volt d.c. supply is connected through the P.A.S. supply relay to pin C of the recorder control unit yellow plug and the recorder camera motor idles, but film will not pass through the recorder or exposures be made until (a) the ON switch of the recorder switch unit is pressed, (b) the firing trigger or camera push is pressed, or (c) the AI 23 radar is locked on, and firing bracket signals received at the recorder control unit.

(1) When the ON switch of the recorder switch unit is pressed, relay E is energized and its retaining circuit completed via the OFF switch, contacts C3, cam contacts CC1 and contact E2. Contacts E1 close and connect a supply to energize the recorder mechanism solenoid; the recorder commences to run and continues to run until the OFF switch of the recorder switch unit is pressed. This breaks the retaining circuit of relay E; contacts E1 and E2 open and the recorder stops. The recorder switch unit light is illuminated via contacts E1 and D2 whilst the recorder shutter is operating.

(2) On pressing the weapons firing trigger or camera push switch, a positive supply is fed via the camera relays *(para.17)* to pin A of the control unit yellow plug. The marker solenoid in the recorder is energized, and positions the marker flag in the optical path. Relay D is energized, and is held closed by contacts D3 and cam contacts CC3 to ensure that the correct sequence of relay operation is followed should the firing trigger be pressed only momentarily. Relay E is energized through contacts D1, and its retaining circuit completed via contacts E2 as in (1). The recorder mechanism solenoid is energized via contacts E1, and the recorder commences to take pictures. Contacts D4 and cam contacts CC3 complete the circuit for the control unit cam motor and the motor runs until cam contacts CC3 are broken. When the weapons firing trigger or camera push-switch is released, the marker solenoid and relay D are de-energized and the cam motor runs via contacts D4 and cam contacts CC2. The recorder mechanism solenoid remains energized via contacts E1 and the recorder over-runs for a short period (3 sec) until cam contacts CC1 open, and break the retaining circuit for relay E. The cam motor continues to run until cam contacts CC2 are broken. The lamp in the recorder switch unit will illuminate only during the over-run period.

(3) When the AI 23 radar is locked on to a target, a 28-volt d.c. supply is fed from pin 14 of the display unit controller to pin D of the recorder control unit green plug. On receipt of firing bracket signals from the controller, either or both of the two relays, F and G are energized and a circuit is completed from pin D, through contacts F1 or G1, and B2; to energize relay A. Contacts A1 close, relay E is

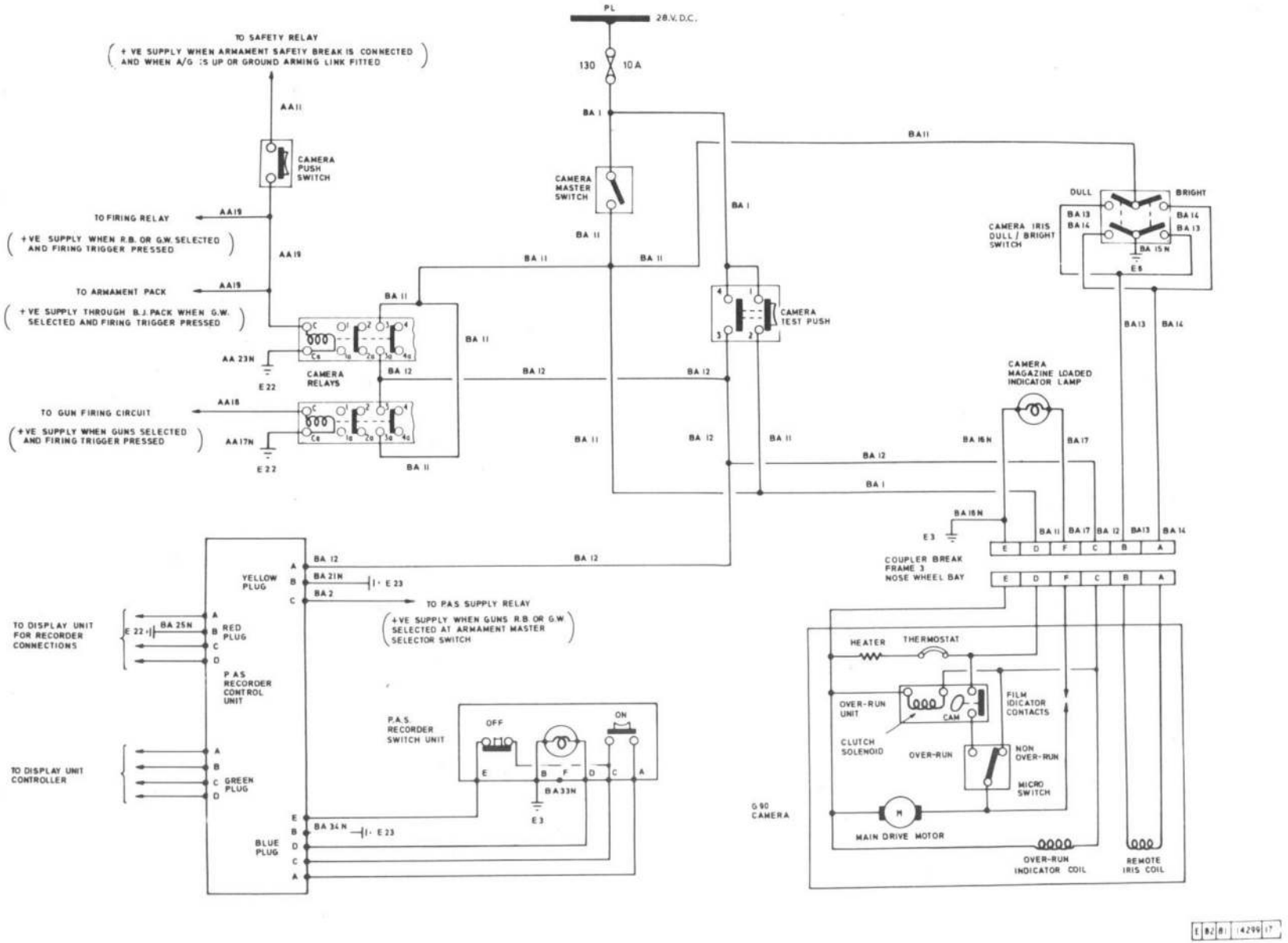


FIG. 4. CAMERA CONTROL

◄ MINOR AMENDMENTS ►

energized and its retaining circuit completed by contacts E2 as in (1). The recorder mechanism solenoid is now energized via contacts E1 and the recorder shutter automatically commences to operate; the recorder switch unit lamp lights via contacts E1 and D2. At the same time, relay C receives an energizing supply via contacts E1, D2 and A2. Contact C1 closes, C2 closes and energizes relay B, C3 opens and is replaced by B3. Contact B1 connects a supply to complete the retaining circuit for relay B; contact B2 opens, de-energizing relay A and contacts A1 and A2 open. On loss of the firing bracket signals or radar lock-on, relays B, E, and C are de-energized and the recorder stops.

G90 CAMERA INSTALLATION

G90 camera

15. The G90, Mk.1 cine camera is used during training or combat for 16 mm film records of air-to-air or air-to-ground attack. Camera speed and lens aperture settings are adjustable to suit the conditions of flight and the camera can be used with either a 1½-inch or a 3-inch lens. Speed selections are made at a P.P.S. selector located on the top of the camera body and can be set to give a camera shutter speed of 8, 16, or 32 frames per second; a built-in over-run unit gives 0-2 sec over-run at all speeds. If over-run is not required, a small selector on the top of the camera body should be moved from the OV to the NO OV position. An adjustable iris diaphragm, incorporated in the lens unit has two ranges of settings, one for bright conditions and the other for dull conditions. The diaphragm is manually adjusted within each range to give a required aperture setting for either condition, and either setting, dull or bright, can then be remotely selected from the camera iris DULL/BRIGHT switch on the starboard console. The camera is fully described in A.P.112P series.

Installation

16. The camera is installed in a compartment at the base of the radar bullet pylon and is accessible through the nose-wheel bay. It is carried on a camera mounting which is secured to the aircraft structure by a central spigot bolt fitted at the forward end of the mounting and by two ¼ in. B.S.F. bolts at the rear of the mounting. An optical flat fitted in the front of the pylon protects the camera lens. Electrical connections to the camera are made via a pig-tail lead and a 6-pole socket which mates with a coupler plug fitted to a bracket on the aft face of frame 3 in the nose-wheel bay. The rear of the camera compartment is closed by a glass-fibre cover secured by two Dzus fasteners.

Operation

17. Operation of the camera is closely associated with the armament firing circuits *(Sect.6, Chap.2)*, and the camera will run whenever the camera master switch is selected and guns, rockets, or guided weapons fired. The weapon firing circuits control two camera relays housed in the armament relay box, one being energized from the guns and the other from the R.B. or G.W. firing circuits. The selection of the camera master switch provides a 28-volt supply to camera pin D and the closing of either relay connects a further supply from the camera master switch to camera pin C to operate the camera. The camera may also be operated from a camera push switch on the control column, when the camera master switch is ON.

Test panel

18. A camera test panel located between frames 4A and 5 on the port nose-wheel beam, is provided to enable the camera operation to be checked from an adjacent position. The test panel indicator lamp will wink when a loaded magazine is correctly fitted to the camera and the test push-switch depressed.

MISCELLANEOUS ARMAMENT INSTRUMENTS

Armed time indicator

19. An armed time indicator Mk.2, fitted to the starboard support panel, is an electrically-controlled, spring-driven clock which operates in conjunction with the G.W. arming circuits *(Sect.6, Chap.2)* and indicates the time which has elapsed from the moment of setting the G.W. arming switch to ARMED. After 30 minutes of elapsed time, the indicator pointer comes to rest against an internal stop. A pair of normally open contacts, fitted within the instrument, close at 15 minutes of elapsed time and connect a supply to a relay box which causes the arming indicator to operate intermittently and give warning that the missile cooling air and ammonia supplies are exhausted. The pointer is

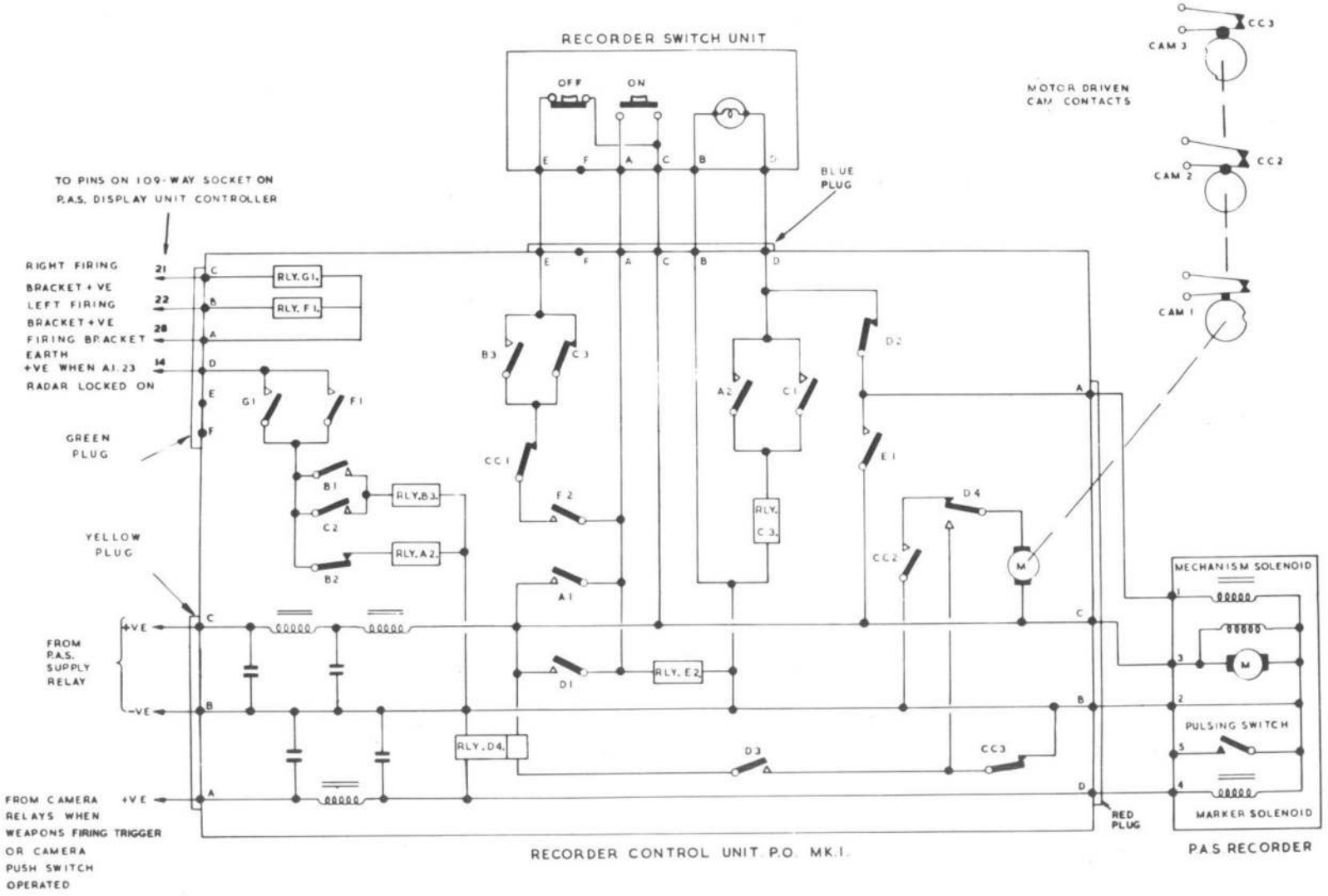


FIG.5. P.A.S. RECORDER CONTROL

◀ MINOR AMENDMENTS ▶

manually reset to zero by turning back the resetting knob on the face of the indicator.

Miniature pressure gauge

20. The pressure in the air cylinder of the two-missile pack cold-air system is shown by a miniature pressure gauge, Type AI 440E, which is fitted in a socket housing, with its face flush with the skin of the pack. The gauge has a pressure range of 0-4000 lb/in^2. For full details of the gauge refer to A.P.112G-0400-1.

SERVICING

WARNING

The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cockpit or performing any operations upon the aircraft.

P.A.S. functioning checks

21. The following functioning checks should only be carried out after the checks detailed for the M.R.G. system *(Sect.7, Chap.5)* have been done, and always before the checks required for the A.I. 23 system *(Sect.9, Chap.4)*. The necessary test equipment is listed below:-

Type 1A test set, Ref.No.8B/4001, in stowage case

Coupling harness, Ref.No.8B/4030

Test collimator, Ref.No.8B/4033.

Preparation

22. Before commencing the functioning checks it is necessary to make the following preliminary checks:-

(1) Remove the display unit controller from its mounting on the aft pressure bulkhead *(para.26)* and ensure that the voltage tappings are correct *(para.27)*.

(2) Check that the 200V, 3-phase supply is connected to the correct pins on the 109-way controller socket as follows:-

A phase - pin 65

B phase - pin 66

C phase - pin 67

(3) Ensure that the armament safety break is connected.

Running up procedure

23. Connect a ground supply trolley (200V, 400 Hz, 3-ph. a.c. and 28V d.c..) to the aircraft and carry out the following functional checks in sequence:-

(1) Switch on the M.R.G. at the instrument master switch, and the pilot's attack sight by setting the armament master selector switch to the GUNS position.

(2) Note that the reflectors on the P.A.S. display unit are fully erected.

(3) Check that the dimmers smoothly control the P.A.S. graticule brightness.

(4) Operate the span setting control on the P.A.S. display unit and check that the circle of diamonds expands and contracts.

(5) Check the 'break off' lamps by pressing the test plunger on the P.A.S. display unit.

(6) Operate the throttle unit over its full range and check that the circle of diamonds expands and contracts; note that the gravity drop shown by the aiming circle increases with range.

(7) Select the R.B. position on the armament master selector switch. A larger gravity drop than for the GUNS mode gravity drop should be shown by the aiming circle.

(8) Again operate the throttle unit over its full range and note that the circle of diamonds expands and contracts and that the gravity drop increases with range.

(9) Select G.W. on the armament master selector switch and check that only two diamonds are visible on the graticule - at 12 o'clock and 6 o'clock. Check that there is no gravity drop shown by the aiming circle.

(10) Operate the throttle unit over its full range and check that the space between the two diamonds expands and contracts, but that the aiming circle is not deflected.

(11) Select GUNS on the armament master selector switch. Reset the throttle unit to 'Radar' mode. Switch OFF the P.A.S. and M.R.G. Remove the 91-way shorting plug from the P.A.S. test socket on the side of the starboard console. Plug the coupling harness into the test socket and the Type 1A test set. Attach

the test collimator to the P.A.S. display unit.

(12) Switch on the P.A.S. by setting the armament master selector switch to the relevant position and carry out the functional checks detailed in A.P.112E-0003-1.

(13) After completing the checks, switch off the P.A.S., disconnect the coupling harness from the aircraft test socket and REPLACE THE SHORTING PLUG. Remove all test equipment. Lower the P.A.S. reflectors to their fully retracted position.

P.A.S. recorder

24. With normal use the only servicing required is cleaning, adjusting, and lubricating. For details of these operations refer to A.P.112P series.

G90 camera

25. The procedure for harmonization of the camera is given in A.P.101B-1001-1A, Sect.5, Chap.3. For other servicing details refer to A.P.112P series.

REMOVAL AND ASSEMBLY

Display unit controller removal

Note...

Before the display unit controller can be removed, the seat must be tilted forward. This operation must be carried out by a qualified tradesman only.

26. To remove the controller proceed as follows:-

(1) Remove the two ¼ in. B.S.F. bolts securing the controller mounting brackets to the aft pressure bulkhead. These are located at the top and to the rear of the controller.

(2) Ease the controller forward and upward and remove complete with mounting brackets.

Display unit controller assembly

27. Before fitting a new or replacement controller, the tapping connections of the power pack transformers must first be checked. These should be linked in the 200-volt position and can be checked as follows:-

(1) Unscrew the four 2 B.A. screws securing the top place of the controller and remove the top plate.

(2) Slide off the controller case.

(3) Examine, for correct setting, the connecting links of the power pack transformer tappings. These are found at the 109-way plug end of the controller.

(4) If incorrectly set, change over the tappings to the 200-volt position.

On replacement of the controller ensure that the key on the controller engages with the slot on the 109-way socket. This slot should face forward.

Drying cell removal

28. To remove the drying cell proceed as follows:-

(1) Remove the banjo adapter hollow bolt (accessible above the main instrument panel), taking care not to lose the two bonded seals fitted one each side of the banjo adapter.

(2) Slide the cell forward and remove complete with bracket, leaving the air pipelines and block assembly undisturbed in the aircraft.

Drying cell installation

29. To install the drying cell:-

(1) Place the cell in position on the gunsight beam, ensuring that the peg on the cell bracket mates with the rubber grommet on the gunsight beam structure.

(2) Examine the bonded seals and fit one each side of the banjo adapter.

(3) Fit the banjo hollow bolt through the banjo adapter and bonded seals, and tighten into the block assembly.

(4) Wire-lock the banjo hollow bolt to the locking tab on the drying cell.

Removal of the P.A.S. display unit

30. During removal of the display unit for servicing operations, it is possible for the union connecting the rubber hose to the display unit to become unscrewed with the hose. To prevent this occurrence the following points should be observed.

(1) The display unit should be removed complete with rubber hose, by disconnecting the banjo connection at the drying cell unit.

(2) The rubber hose can then be disconnected from the display unit using two spanners of the correct type.

(3) During reassembly the above procedure should be reversed.

Throttle unit removal

31. To remove the throttle unit proceed as follows:-

(1) Fold back, on to the conduit, the rubber sleeve securing the cables at the forward end of the conduit.

(2) Release the locking tabs and remove the four 8 UNC nuts securing the throttle unit to the throttle lever; remove the two tandem tabwashers.

(3) Mark the main body, distance piece and base plate with alignment marks to assist reassembly.

(4) Lift the throttle unit away from the throttle lever, turning it inboard to clear the standard warning panel.

(5) Pull the cable loom out of the throttle conduit until approximately six inches of cable is exposed.

(6) Remove the six 8 B.A. screws securing the base plate and distance piece to the main body.

(7) Slide the base plate, distance piece, aluminium alloy ring and rubber sealing ring along the cable loom, clear of the throttle unit.

(8) Open out the cables at the terminal assembly and remove the 10 B.A. securing screw. Care must be taken not to damage the cables and insulation.

(9) The throttle unit will now pull free from the terminal assembly.

Throttle unit assembly

32. The procedure for assembly is the reverse of that for removal but the following points should be noted:-

(1) Ensure that the terminal assembly registration lug is fitted into its correct position in the throttle unit main body.

(2) Care must be taken not to over-tighten the 10 B.A. securing screw.

(3) Ensure that the alignment marks are aligned before securing the base plate and distance piece to the main body.

(4) New tandem tabwashers must be fitted to the four 8 UNC nuts.

(5) All screws and nuts not otherwise locked are to be secured with silicone varnish.

On completion of the assembly, all throttle unit cables must be checked for continuity and their circuits checked for correct functioning.

P.A.S. recorder mounting

33. When fitting the recorder mounting to the pilot's attack sight ensure that the shortest of the three securing screws is fitted to the forward upper position. The electrical connections between the mounting 5-pole socket and the sight terminals should be made as follows:-

Socket insert	Colour code	Sight terminal
1	RED	1
2	BLUE	2
3	YELLOW	3
4	GREEN	4

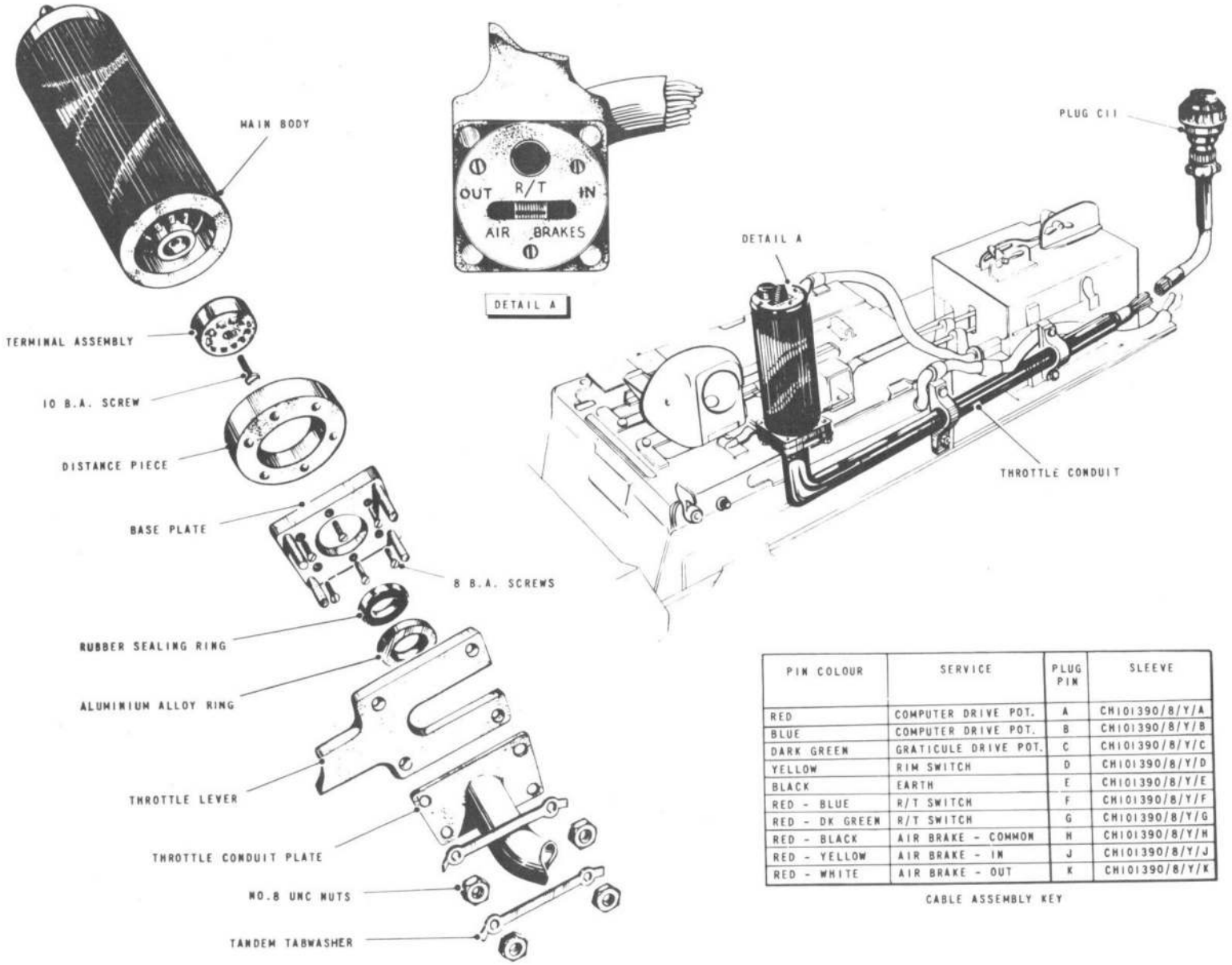
Miniature pressure gauge

34. To fit the gauge to the pack:-

(1) Insert the gauge into its housing through the aperture in the pack skin and ensure that the flange at the rear of the gauge passes through the cut-away at the rear of the housing.

(2) Rotate the gauge through 90 deg so that the flange is held behind the housing.

(3) In this position wire-lock the flange to the pack.



PIN COLOUR	SERVICE	PLUG PIN	SLEEVE
RED	COMPUTER DRIVE POT.	A	CH101390/8/Y/A
BLUE	COMPUTER DRIVE POT.	B	CH101390/8/Y/B
DARK GREEN	GRATICULE DRIVE POT.	C	CH101390/8/Y/C
YELLOW	RIM SWITCH	D	CH101390/8/Y/D
BLACK	EARTH	E	CH101390/8/Y/E
RED - BLUE	R/T SWITCH	F	CH101390/8/Y/F
RED - DK GREEN	R/T SWITCH	G	CH101390/8/Y/G
RED - BLACK	AIR BRAKE - COMMON	H	CH101390/8/Y/H
RED - YELLOW	AIR BRAKE - IN	J	CH101390/8/Y/J
RED - WHITE	AIR BRAKE - OUT	K	CH101390/8/Y/K

CABLE ASSEMBLY KEY

FIG. 6. THROTTLE UNIT ASSEMBLY

◀ MINOR AMENDMENTS ▶

TABLE 1

Armament and photographic equipment

Ref. No.	Equipment		Qty.	Relevant A.P. Vol.1.
	Pilot's attack sight			112E series
8B/3765	Display unit, Mk.1		1	
8B/3768	Display unit controller, Mk.1	alternatives	1	
8B/4238	Display unit controller, Mk.2			
8B/3767	Altitude and airspeed unit, Mk.1	alternatives	1	
8B/4183	Altitude and airspeed unit, Mk.2			
8B/3766	Throttle unit, Type 1, Mk.1		1	
8B/4239	Drying cell, Mk.2		1	
5L/9951282	Predicting gyro lamp, 22V 12W		1	
5L/9951282	Target indicator lamp, 22V 12W		1	
5L/9959118	Break-off lamp, 28V 0.04A		1	
5L/9951282	Spare lamp, 22V 12W		1	
	P.A.S. recorder installation			112P series
14A/5485	P.A.S. recorder, Mk.1		1	
14A/5486	Mounting bracket, P.A.S. recorder, Mk.1		1	
14A/5487	Recorder control unit, P.O. Mk.1		1	
14A/5488	Recorder switch unit, Mk.1		1	
	G90 camera installation			112P series
14A/4929	Camera, Type G90, Mk 1, 1½ in. lens	alternatives	1	
14A/4981	Camera, Type G90, Mk.1, 3 in. lens			
14A/4936	Camera mounting		1	
	Miscellaneous armament instruments			
	Armed time indicator, Mk.2		1	
6A/6115	Miniature pressure gauge, Type AI 440E		1	112G-0400-1

TABLE 2

Cable assembly connection details

Note...
The number prefixing the cable assembly refers to the appropriate cable shown on the circuit diagram (fig.3).

(1)

C11

Pin	Wired to
A	Red
B	Blue
C	Dk.Green
D	Yellow
E	Black

(2)

F149

Pin	Wired to
T	T
U	U
V	V

(3)

FC1A

Pin	Wired to
A	FC2B-28
B	FC2B-29
C	FC2B-30
D	FC2B-23
E	FC2A-7
F	FC2A-11

(4)

FC1B

Pin	Wired to
A	FC2A-13
B	FC2A-14
C	FC2A-15
D	FC2A-16

(4a)

FC1C

Pin	Wired to
A	FC1B-F
B	FC1B-E
C	F180-E5

(5)

FC2A

Pin	Wired to
7	FC1A-E
8	FC2C-B

FC2A-*cont.*

Pin	Wired to
9	FC2C-C
10	FC2C-D
11	FC1A-F
12	FC2C-A
13	FC1B-A
14	FC1B-B
15	FC1B-C
16	FC1B-D
17	—
18	—

(6)

FC2B

Pin	Wired to
19	FC2C-E
20	FC2C-F
21	FC2C-G
22	FC2C-H
23	FC1A-D
24	FC2C-J
25	FC2C-K
26	FC2C-L
27	FC2C-M
28	FC1A-A
29	FC1A-B
30	FC1A-C

(7)

FC2C

Pin	Wired to
A	FC2A-12
B	FC2A-8
C	FC2A-9
D	FC2A-10
E	FC2B-19
F	FC2B-20
G	FC2B-21
H	FC2B-22
J	FC2B-24
K	FC2B-25
L	FC2B-26
M	FC2B-27

(8)

FC12

Pin	Wired to
A	FC12A-E
B	FC12A-F
C	FC12B-B
D	FC12A-H
E	FC12A-J
F	FC12A-K

(9)

FC12A

Pin	Wired to
A	FC12B-A
B	FC12B-E
C	FC12B-C
D	FC12B-D
E	FC12-A
F	FC12-B
G	FC12-H
H	FC12-D
J	FC12-E
K	FC12-F

(10)

FC12B

Pin	Wired to
A	FC12A-A
B	FC12-C
C	FC12A-C
D	FC12A-D
E	FC12A-B

(11)

FC13

Pin	Wired to
A	FC13D-A
B	FC13D-E
C	FC13D-C
D	FC13D-D
E	FC13B-A

FC13-*cont.*

Pin	Wired to
F	FC13B-C
G	—
H	FC13C-C
J	FC13C-D
K	FC13C-A / FC13A
L	—
M	—

(12)

FC13B

Pin	Wired to
A	FC13-E
B	FC13E-E23
C	FC13-F

(13)

FC13C

Pin	Wired to
A	FC13-K / FC13-A
B	FC13E-E23
C	FC13-H
D	FC13-J

(14)

FC13D

Pin	Wired to
A	FC13-A
B	FC13E-E23
C	FC13-C
D	FC13-D
E	FC13-B

(15)

FC13E

Pin	Wired to
E23	FC13D-B
E23	FC13C-B
E23	FC13B-B

(16)

FC23

Pin	Wired to
1	FC28-A
2	FC28-B
4	FC28-D
5	FC28-E
6	FC28-F

(17)

FC25

Pin	Wired to
A	FC4C-A
B	C16-B
C	C16-D
D	FC4C-D
E	FC4C-E
F	FC4C-F
G	FC4C-L
H	FC4C-M
J	FC4C-A
K	FC8-F
L	FC8-G
M	C303-U

(18)

FC26

Pin	Wired to
A	AA1
B	AA11
C	—
D	AA26
E	AA20
F	AA24
G	AE1
H	AE11
J	AE13
M	—

(19)

FC28

Pin	Wired to
A	FC23-1
B	FC23-2
C	—
D	FC23-4
E	FC23-5
F	FC23-6

(20)

FC33

Pin	Wired to
1	FC33F-1
2	FC33F-2
3	FC33F-5
4	FC33F-6
5	FC33C-E
6	FC33F-9
7	FC33F-10
8	FC33C-H
9	FC33F-11
10	FC33E-A
11	FC33E-B
12	FC33E-C
13	FC33F-14
14	FC33E-E / FC33M-Y
15	FC33E-F
16	FC33C-U
17	FC33F-16
18	FC33F-18
19	FC33E-J
20	FC33F-20
21	FC33E-M / FC33M-V
22	FC33E-K / FC33M-W
23	FC33G-H
24	FC33G-J
25	FC33G-K
26	FC33F-22
27	FC33F-24
28	FC33E-L / FC33M-X

continued...

TABLE 2 - Cable assembly connection details - *continued*

FC33-*cont.*

Pin	Wired to
29	FC33F-26
30	FC33F-27
31	FC33F-30
32	FC33F-32
	FC33G-N
33	FC33F-33
	FC33G-0
34	FC33F-34
35	FC33F-35
36	FC33F-36
37	
38	
39	—
41	FC33F-38
42	FC33F-39
43	FC33F-40
44	FC33F-41
45	FC33F-42
46	FC33F-43
47	FC33F-44
48	
49	
50	FC33M-T
51	FC33M-U
52	—
53	—
54	—
55	—
56	FC33F-45
57	FC33F-46
58	FC33F-47
59	FC33C-P
60	FC33B-21
61	FC33B-19
62	FC33A-8
63	FC33A-9
64	FC33A-10
65	FC33F-48
	FC33A-14
66	FC33F-49
	FC33A-15
67	FC33F-50
	FC33A-16
68	FC33F-51
	FC33A-13
69	—
70	FC33G-G
71	FC33B-20
72	—
73	—
74	—

FC33-*cont.*

Pin	Wired to
75	—
76	FC33C-F
77	FC33G-F
78	FC33M-F
79	FC33D-6
80	FC33F-52
	FC33A-12
81	—
82	FC33C-Q
83	FC33B-22
84	
85	
86	
87	
88	FC33F-53
89	FC33G-L
90	FC33G-V
91	FC33G-W
92	
93	
94	
95	—
96	—
97	—
98	FC33F-54
99	FC33F-55
100	FC33F-56
101	FC33M-M
102	
103	
104	
105	
106	
40	FC33F-37
107	—
108	—
109	FC33A-7

(21)

FC33A

Pin	Wired to
7	FC33-109
8	FC33-62
9	FC33-63
10	FC33-64
11	—
12	FC33-80
13	FC33-68
14	FC33-65

FC33A-*cont.*

Pin	Wired to
15	FC33-66
16	FC33-67
17	—
18	—

(22)

FC33B

Pin	Wired to
19	FC33-61
20	FC33-71
21	FC33-60
22	FC33-83
23	—
24	FC33C-N
25	FC33C-M
26	FC33C-L
27	FC33C-0
28	FC33F-78
29	FC33F-79
30	FC33F-80

(23)

FC33C

Pin	Wired to
A	FC33F-3
B	FC33F-4
C	FC33F-7
D	FC33F-8
E	FC33-5
F	FC33-76
G	FC33F-12
H	FC33-8
J	FC33F-17
K	FC33F-19
L	FC33B-26
M	FC33B-25
N	FC33B-24
O	FC33B-27
P	FC33-59
Q	FC33-82
R	FC33F-28
S	FC33F-29
T	—
U	FC33-16
V	—
W	—
X	—
Y	—
Z	—

(24)

FC33D

Pin	Wired to
1	FC33F-74
2	FC33F-75
3	—
4	FC33F-63
5	FC33F-76
6	FC33-79

(25)

FC33E

Pin	Wired to
A	FC33-10
B	FC33-11
C	FC33-12
D	FC33F-15
E	FC33-14
F	FC33-15
G	FC33F-21
H	FC33F-13
J	FC33-19
K	FC33-22
L	FC33-28
M	FC33-21

(26)

FC33F

Pin	Wired to
1	FC33-1
2	FC33-2
3	FC33C-A
4	FC33C-B
5	FC33-3
6	FC33-4
7	FC33C-C
8	FC33C-D
9	FC33-6
10	FC33-7
11	FC33-9
12	FC33C-G
13	FC33E-H
14	FC33-13
15	FC33E-D
16	FC33-17
17	FC33C-J
18	FC33-18
19	FC33C-K

FC33F-*cont.*

Pin	Wired to
20	FC33-20
21	FC33E-G
22	FC33-26
23	FC33G-P
24	FC33-27
25	FC33G-Q
26	FC33-29
27	FC33-30
28	FC33C-R
29	FC33C-S
30	FC33-31
31	FC33G-U
32	FC33-32
33	FC33-33
34	FC33-34
35	FC33-35
36	FC33-36
37	FC33-40
38	FC33-41
39	FC33-42
40	FC33-43
41	FC33-44
42	FC33-45
43	FC33-46
44	FC33-47
45	FC33-56
46	FC33-57
47	FC33-58
48	FC33-65
49	FC33-66
50	FC33-67
51	FC33-68
52	FC33-80
53	FC33-88
54	FC33-98
55	FC33-99
56	FC33-100
57	FC33G-A
58	FC33G-B
59	FC33G-C
60	FC33G-D
61	FC33G-E
62	FC33M-K
63	FC33D-4
64	FC33M-H
65	FC33M-Z
66	FC33M-J
67	FC33M-G
68	FC33M-N
69	FC33M-P
70	FC33M-Q

FC33F-*cont.*

Pin	Wired to
71	FC33M-R
72	FC33M-S
73	FC33M-0
74	FC33D-1
75	FC33D-2
76	FC33D-5
77	FC33M-L
78	FC33B-28
79	FC33B-29
80	FC33B-30
81	FC33M-A
82	FC33M-B
83	FC33M-C
84	FC33M-D
85	FC33M-F
86	FC33G-X
87	—
88	—
89	—
90	—
91	—

(27)

FC33G

Pin	Wired to
A	FC33F-57
B	FC33F-58
C	FC33F-59
D	FC33F-60
E	FC33F-61
F	FC33-77
G	FC33-70
H	FC33-23
J	FC33-24
K	FC33-25
L	FC33-89
M	—
N	FC33-32
O	FC33-33
P	FC33F-23
Q	FC33F-25
R	—
S	—
T	—
U	FC33F-31
V	FC33-90
W	FC33-91
X	FC33F-86
Y	—
Z	—

continued...

TABLE 2 - Cable assembly connection details - *continued*

(28)

FC33M	
Pin	Wired to
A	FC33F-81
B	FC33F-82
C	FC33F-83
D	FC33F-84
E	FC33F-85
F	FC33-78
G	FC33F-67
H	FC33F-64
J	FC33F-66
K	FC33F-62
L	FC33F-77
M	FC33-101
N	FC33F-68
O	FC33F-73
P	FC33F-69
Q	FC33F-70
R	FC33F-71
S	FC33F-72
T	FC33F-50
U	FC33-51
V	FC33-21
W	FC33-22

FC33M-*cont.*	
Pin	Wired to
X	FC33-28
Y	FC33-14
Z	FC33F-65

(29)

2FC33F	
Pin	Wired to
1	1
to	to
86	86

(30)

A13A	
Pin	Wired to
U	A13B-B
V	A13B-D
W	A13B-E
X	A13B-A
Y	A13B-F
Z	A13B-C

(31)

A13B	
Pin	Wired to
A	A13A-X
B	A13A-U
C	A13A-Z
D	A13A-V
E	A13A-W
F	A13A-Y

(32)

A16M	
Pin	Wired to
A	A16D-A
B	A16D-B
C	A16D-C
D	A16D-D
E	A16D-E
F	A16D-F
G	A16D-G
H	A16D-H
J	A16D-J
K	A16D-K

A16M-*cont.*	
Pin	Wired to
L	A16D-L
M	A16D-M
N	A16D-N
O	A16D-O
P	A16D-P
Q	A16D-Q
R	A16D-R
S	A16D-S
T	A16D-T
U	A16D-U
V	A16N-C
W	A16N-B
X	A16N-A
Y	A16N-D
Z	A16D-F

(33)

A16N	
Pin	Wired to
A	A16M-X
B	A16M-W
C	A16M-V

A16N-*cont.*	
Pin	Wired to
D	A16M-Y
E	——
F	——

(34)

PAS Shorting Plug	
Pin	Wired to
1	3
2	4
5	7
6	8
9	62
10	12
11	13
14	15
16	17
18	19
20	21
22	23
24	25
26	28

PAS-*cont.*	
Pin	Wired to
27	29
30	31
34	63
35	64
36	65
37	66
38	67
39	68
40	69
41	70
42	71
43	72
44	73
45	74
46	75
47	76
51	86
53	77
54	78
55	79
56	80
57	81
58	82
59	83
60	84
61	85

1018-1001-1C/52/940035/148/3-74/BAC/1405