

Chapter 12 WARNING AND EMERGENCY SYSTEMS
(completely revised)

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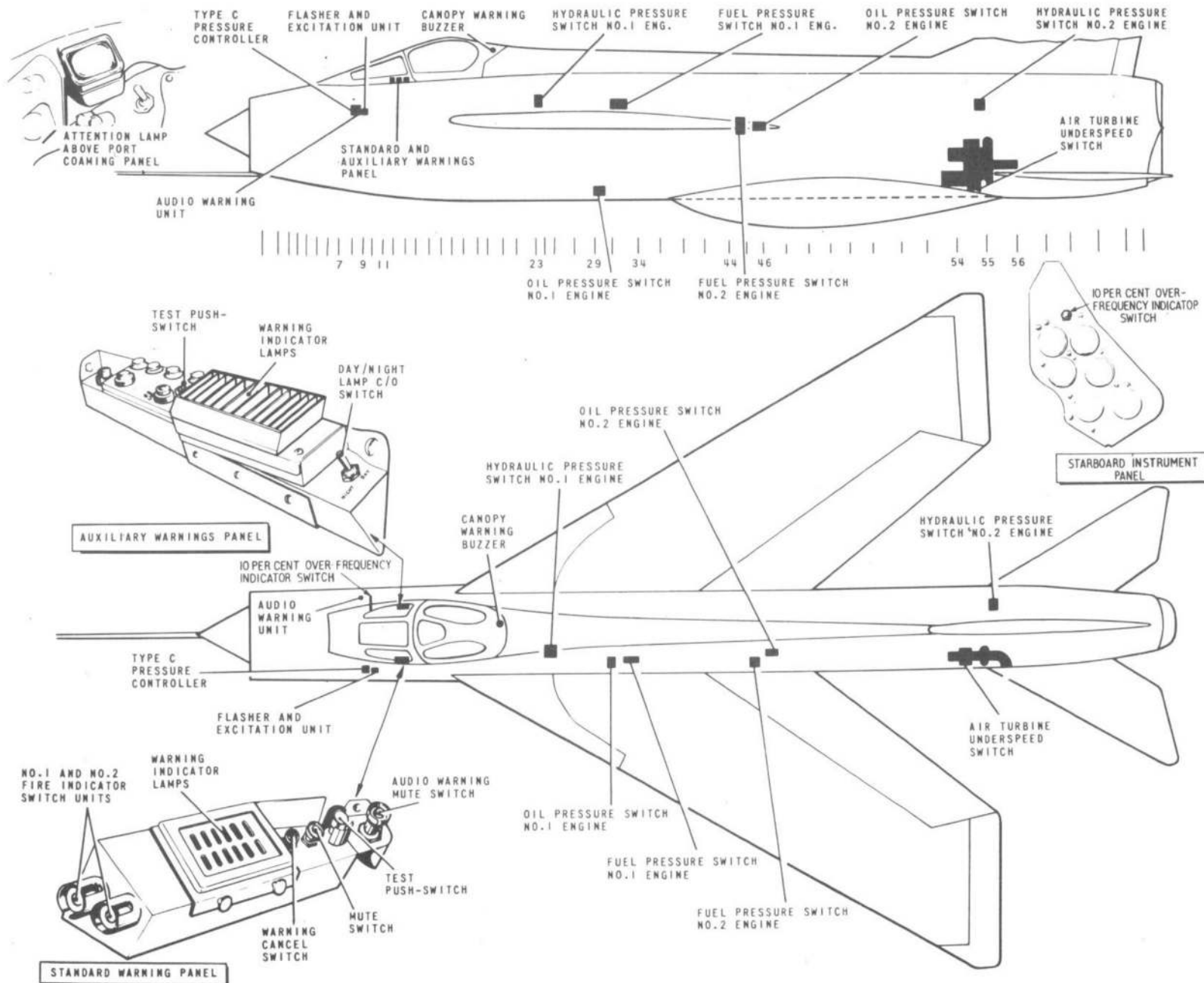


FIG.1. WARNING AND EMERGENCY SERVICE DETAILS

◀ MOD. 4551 EMBODIED ▶

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DESCRIPTION**General**

1. This chapter has been amended to include the following modifications:-

Mod.4049 To introduce Clare Type A24NR/1 relays in lieu of STC 4190HD or A24NR relays.

Mod.4551 To make provision for, and introduce, a ten per cent overfrequency warning system.

Provision is made to give, in the cockpit, indications of a failure in any of the important circuits. These warnings, except for those classified as additional warnings, are arranged in accordance with their functional importance, into two groups - the standard warning system and the auxiliary warnings system. The circuits included in the standard warning system indicate the more dangerous occurrences, whilst failures associated with the auxiliary warnings system are of less serious nature. In each case warning failure indications are given by a number of panel-mounted lamps. The emergency circuits are those associated with the fire extinguishers serving the engine compartments, and an inertia switch system which automatically initiates protective operation in the event of a crash landing.

STANDARD WARNING SYSTEM**General**

2. A description of the Mk.2 standard warning system is given in A.P.113F-1600-1.

Standard warning display panel

3. The warning panel (indicator unit C3850) is located in the cockpit, secured to the port windscreen member above the throttle box. The indicators

are covered by a transparent caption plate labelled according to the function of their associated warning circuit. At the forward end of the panel are mounted three switches, two of them, the CANCEL switch and the MUTE switch, have integral lamps which light when the switch is operated, the third is a TEST switch in the form of a push button. On the aft face of the panel are mounted two indicator switch units associated with the fire extinguisher circuits. A full description of the panel will be found in A.P.113F-1600-1. Interpretation of the indicator lamp labelling and filament rating is given in Table.1.

Warning circuits

4. All warning circuits except those associated with cockpit, hydraulic and oxygen pressure are described in the text covering the relevant service.

Cockpit pressure warning

5. Warning of a drop in cockpit pressure is controlled by a switch incorporated in the Type C pressure controller, located on the fuselage side, forward of the port console. The circuit is supplied from the d.c. system and protected by a fuse in the port fusebox. A description of the pressure controller will be found in A.P.107B-0227-1.

Hydraulic pressure warning

6. Two Type 298 pressure switches situated at frame 23 (port) and frame 55 (starboard) are associated with No.1 and No.2 controls hydraulic systems respectively. When the pressure in either system falls below 1750 lb/in² the relevant switch closes and lights the associated warning lamp on the auxiliary warnings panel. In the event of the failure of both hydraulic systems, a warning is also indicated on the standard warning panel. This is effected by a relay, Type A24NR/1. in the d.c. relay box

which receives an energizing supply from No.1 circuit and, in operating, connects a supply from No.2 circuit to the indicator lamps on the standard warning panel.

Oxygen pressure warning

7. The oxygen pressure warning circuit is inoperative pending the introduction of a suitable pressure switch.

Flasher and excitation unit

8. The flasher and excitation unit (Type No.C3870) is fitted in JB3, and the attention lamp and audio warning circuits. It is described in A.P.113F-1600-1.

Attention lamp

9. The attention lamp situated on the port coaming panel is supplied from the port fusebox, and controlled by the flasher and excitation unit. Should any of the warning lamps light, denoting failure of a particular circuit, the attention lamp will also light and commence to flash, calling the pilot's attention to the failure more quickly.

Audio warning unit

10. The Type A 1205, audio warning unit, is situated forward of the starboard console at frame 9. It operates in conjunction with the attention lamp and the standard warning system. The unit generates a sound similar to the clanging of a firebell, the sound being fed into the pilot's headphones via the audio section of the U.H.F. system (Sect.8, Chap.2). A full description of the audio warning device will be found in A.P.113F-0629-16. A muting switch, mounted forward of the indicator panel and labelled AUDIO WARNING PULL MUTE, attenuates the warning by switching an extra resistor into the volume control network.

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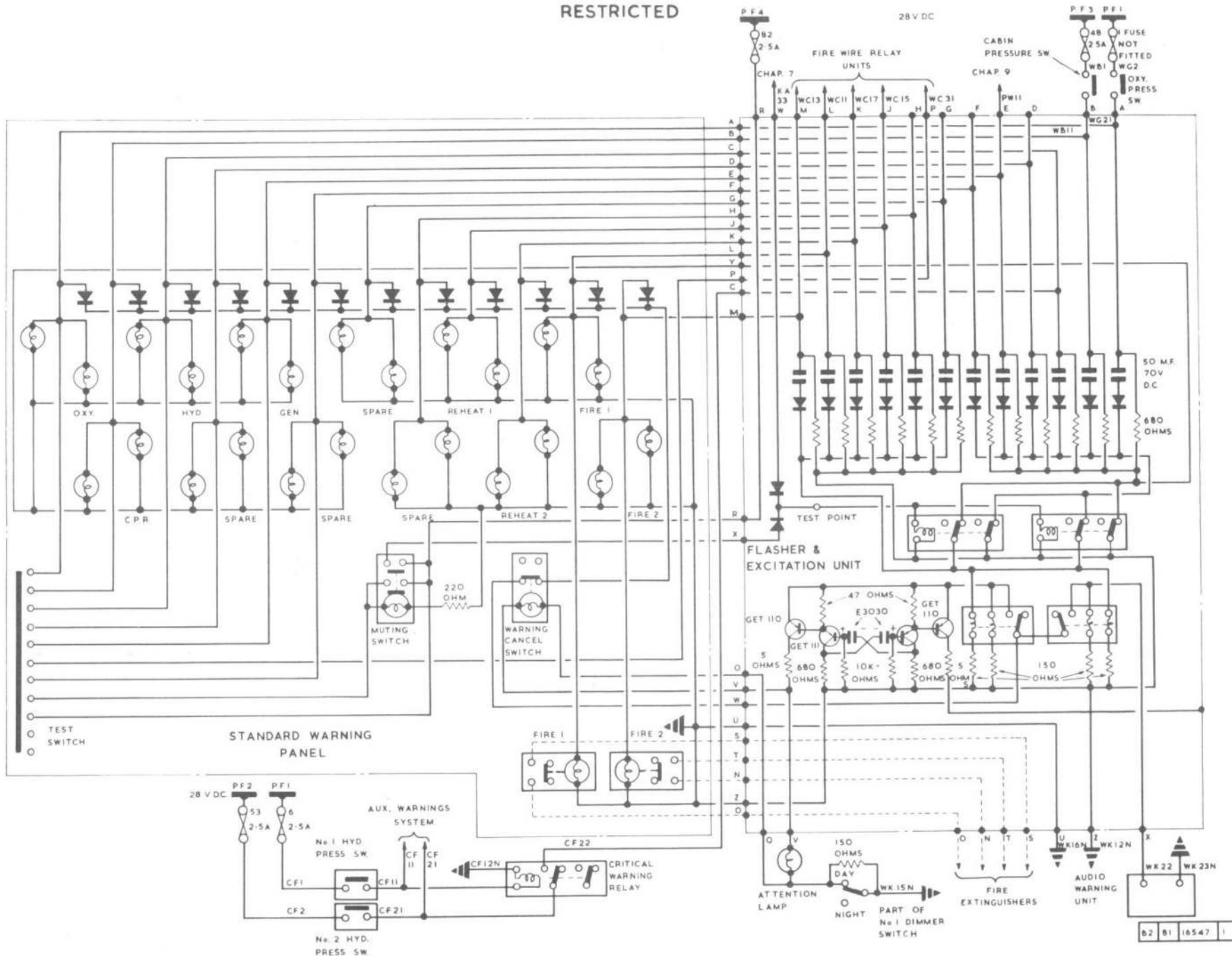


FIG.2. STANDARD WARNING SYSTEM

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AUXILIARY WARNINGS SYSTEM

General

11. Apart from the a.c. failure and turbine underspeed warnings, all other auxiliary warnings are associated with the engine fuel, oil, hydraulics and jet pipe temperature services. Warning signals are given by a group of centralized indicator lamps. The system also includes facilities for testing the continuity of the lamp filaments and associated wiring, and varying the brightness of the indicator display to suit day or night requirements.

Auxiliary warnings display panel

12. Several indicator lamps, a TEST

switch, and a DAY/NIGHT selector switch, are mounted on a panel which is secured to the starboard windscreen member above the console switch panel. The panel assembly also incorporates several rectifiers and resistors. Four indicator lamps are allotted to each circuit, the lamps being wired in paralleled pairs to maintain circuit continuity in the event of filament fracture. The two pairs of lamps associated with each circuit are for day and night use respectively. As all lamps in each group are connected via a common negative line, a blocking rectifier is wired in series with each pair to prevent interaction between circuits. The caption plate covering the lamps is so constructed that, by day the

engraved captions appear white and the warning lamps amber, whereas at night, when illuminated, only the captions appear amber. A louvred light shield covers the indicators to make the warnings uni-directional. The captions, interpretation and ratings of the day and night filament lamps are given in Table 2.

Warning circuits

13. All warning circuits are supplied from the d.c. system. When the switch or relay in any warning circuit closes, a supply is connected via the rectifiers to its associated lamps and, since the return circuit of the lamps is via the day/night switch, the relevant lamps light. As the fuel and oil pressure warning circuits contain 12-volt indicator lamps, a voltage dropping resistor is connected between the pressure switch and the supply fuse in each circuit. These resistors are fitted in the fuse-boxes from which the circuits are fed.

(1) Fuel pressure warning

The operating switches which control the fuel pressure warnings are installed in the fuel pipelines in their respective engine compartments. No.1 engine switch is located on the engine hatch longeron, aft of frame 29, port side, the one for No.2 engine being attached to the aft face of frame 46, port side. Should the fuel pressure fall below 3 lb/in², the switch will close and cause the associated warning lamps to light.

(2) Oil pressure warning

Each engine is equipped with a pressure-

TABLE 1

Standard warning panel - indicator lamps

Caption	Interpretation	Lamp Rating
FIRE 1	No.1 engine fire (zones 1 and 2)	
FIRE 2	No.2 engine fire (zones 1 and 2)	
RHT 1	No.1 jet pipe region (zone 3)	
RHT 2	No.2 jet pipe region (zone 3)	All lamps are
GEN	D.C. generator failure	rated at
CPR	Cockpit pressure failure	28-volt, 0.04-amp
HYD	Hydraulic failure (No.1 and 2 systems)	
OXY	Oxygen pressure failure	
SPARE	4 circuits	

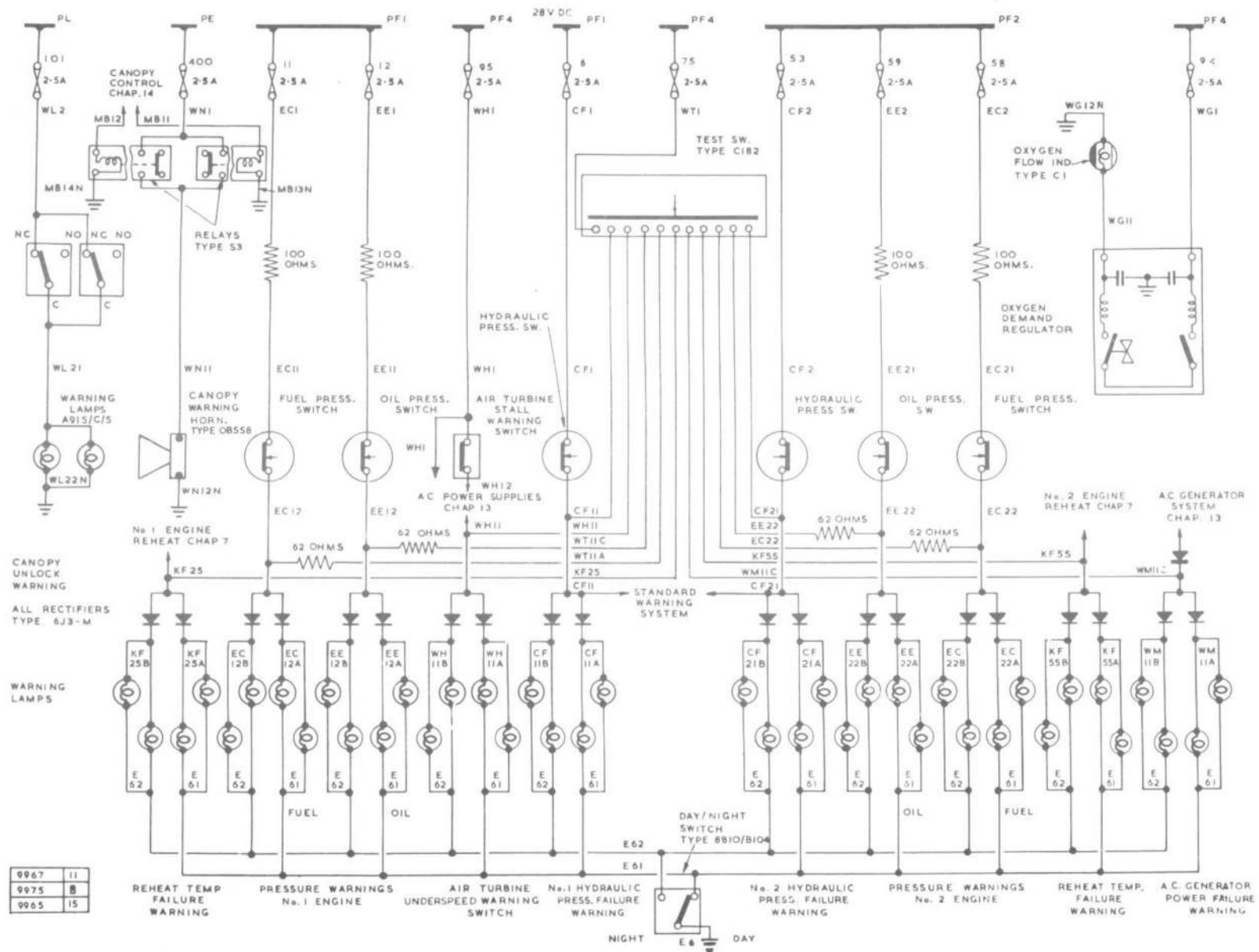


FIG. 3. AUXILIARY AND ADDITIONAL WARNINGS

◀ MINOR AMENDMENTS ▶

operated switch which controls the relevant oil pressure warning circuit. A drop in oil pressure below a predetermined figure results in the necessary warning being given on the display panel.

(3) *A.C. generator failure warning*

Operation of the a.c. generator failure warning circuit is given in Chap.13 of this section.

(4) *Air turbine underspeed warning*

This circuit is controlled by an underspeed switch actuated by the turbine governor mechanism. When the speed of

the turbine falls below its normal value, the switch closes, and the indicator lamps labelled TURB light. The circuit is supplied from the starboard fusebox.

(5) *Top temperature control warning*

Automatic cancellation of engine reheat is indicated by the lamps labelled TTC 1 and TTC 2 respectively. The associated circuits are described in Chap.7 of this section.

(6) *Hydraulic pressure warnings*

A description of these warnings is given in the standard warning system (para.6).

Test switch

14. The continuity of the panel wiring and all lamp filaments may be checked by operating the TEST switch in conjunction with the DAY/NIGHT switch. The test switch when pressed, connects a supply to the rectifiers in each lamp circuit. In all circuits employing 12-volt lamps, connection is made via a 62-ohm resistor fitted in the panel assembly.

ADDITIONAL WARNING CIRCUITS

Oxygen flow warning

15. A diaphragm-operated switch, incorporated in the oxygen regulator, controls a magnetic indicator on the port coaming panel. The circuit is supplied from the d.c. system via the starboard fusebox. Details of the regulator and indicator are given in Sect.7, Chap.6.

Canopy lock warning

16. Two parallel-connected microswitches, Type V3, are operated by the canopy locking mechanism and control two warning lamps, also connected in parallel. These lamps are mounted on the E2B compass bracket. When the canopy is unlocked, the microswitches close to complete the lamp circuit which is supplied from the d.c. feeder fusebox. At the same time, operation of the canopy causes a warning buzzer to sound in the cockpit. The buzzer unit is secured to the side of the d.c. relay box. Details of the canopy control circuit are given in Chap.14.

TABLE 2
Auxiliary warnings panel - indicator lamps

Caption	Interpretation	Lamp rating	
		Day	Night
FUEL 1	Fuel pressure warning (No.1 engine)	12V 0.1A	12V 0.1A
FUEL 2	Fuel pressure warning (No.2 engine)	12V 0.1A	12V 0.1A
OIL 1	Oil pressure warning (No.1 engine)	12V 0.1A	12V 0.1A
OIL 2	Oil pressure warning (No.2 engine))	12V 0.1A	12V 0.1A
HYD 1	Hydraulic failure warning (No.1 system)	28V 0.08A	28V 0.04A
HYD 2	Hydraulic failure warning (No.2 system)	28V 0.08A	28V 0.04A
TTC 1	Top temperature control warning (No.1 engine)	28V 0.08A	28V 0.04A
TTC 2	Top temperature control warning (No.2 engine)	28V 0.08A	28V 0.04A
A.C.	A.C. generator supply failure warning	28V 0.08A	28V 0.04A
TURB	Air turbine underspeed warning	28V 0.08A	28V 0.04A

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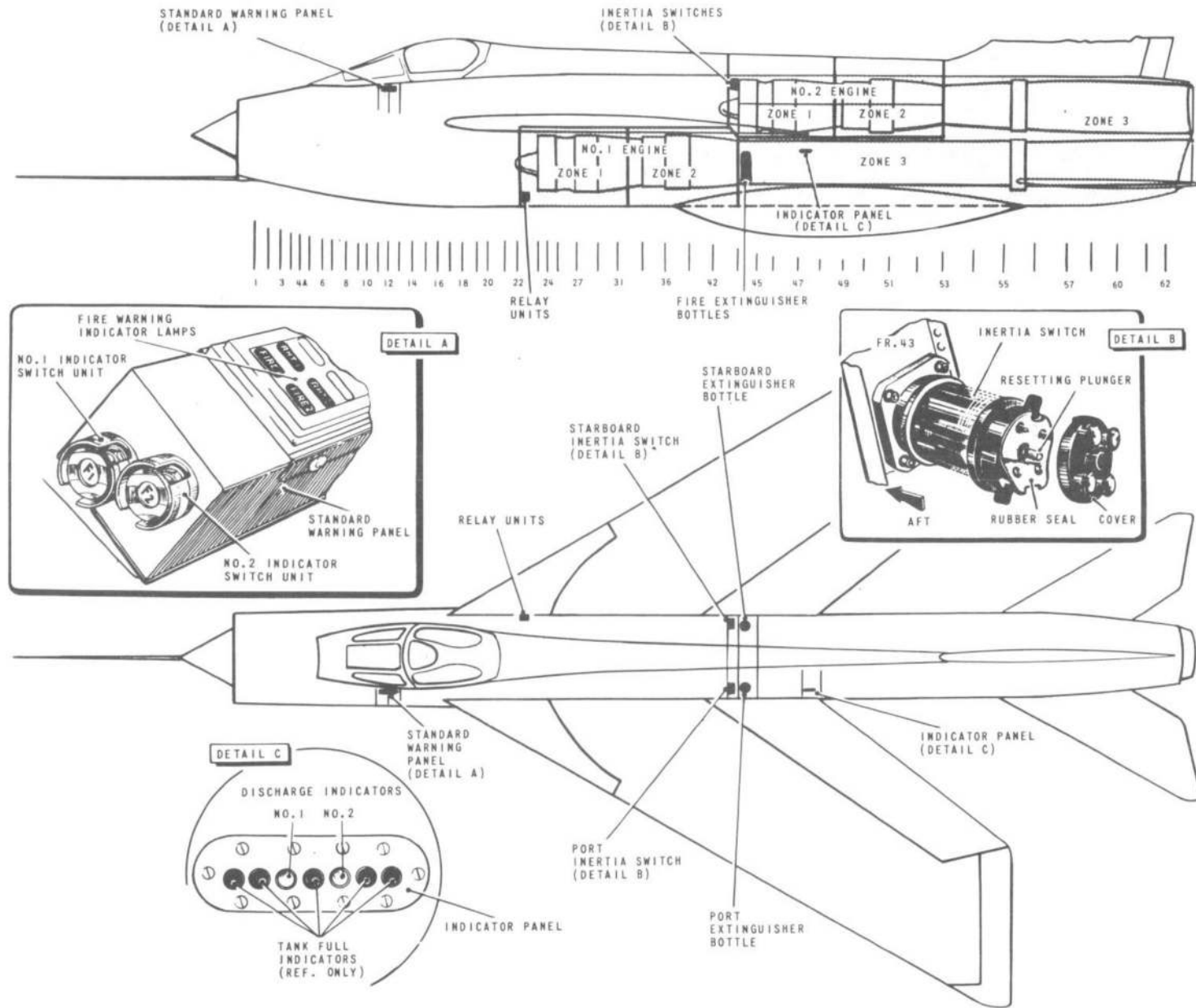


FIG. 4. FIRE PROTECTION SYSTEM DETAILS

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Ventral tank 'no flow' indicator

17. This indicator, mounted on the starboard instrument panel, operates in conjunction with a flow-sensing switch in the fuel line. Should flow to the tank cease, either because the tank is empty or because a fault has occurred, the switch energizes the indicator to denote 'no flow' conditions. Full details of the fuel system are given in Chap.10.

Stand-by inverter indicator

18. Should the normal instrument supplies fail, warning that automatic change-over to a stand-by supply (*Chap.13*) has taken place is shown by an indicator on the main instrument panel. When energized, the indicator changes from a black to a white display.

Armament warnings

19. A number of other warnings, mainly associated with the armament system, are not described in this chapter; their purpose and operation is included in the description of the armament and photographic system (*Chap.2*).

Overfrequency warning indicator switch (post Mod. 4551)

20. The overfrequency warning indicator switch is fitted on the starboard instrument panel and connected to the air-turbine governed switch on the turbo-generator. With the turbo-generator running at 10 per cent overspeed and above, a warning is given by means of a lamp lighting in the indicator switch.

FIRE PROTECTION SYSTEM**General**

21. Fire detection equipment provides for continuous monitoring of all three fire zones of the engines, and automatically warns the pilot if an outbreak should occur. Engine zones No.1 and No.2 are protected by fire extinguishing apparatus, whilst fire in No.3 zone is dealt with by cutting off engine reheat. Information relating to the fire detector and extinguisher systems is given in A.P.107E-0001-1, details of the Firewire elements appear in A.P.107E-0102-1. Further information regarding the fire protection system will be found in Book 1, Sect.4, Chap.5.

Fire detection

22. Fire detection is by means of continuous Firewire elements. There are two elements to each engine, one element serving zones No.1 and 2 of the engine compartment and the other serving the jet pipe region, zone No.3. Each element consists of several lengths of Firewire, joined together by special end fittings. Connection to the elements is made by means of bulkhead fittings, and each circuit is extended in heat-resisting cable to a relay unit which controls the associated warning circuit.

Relay units

23. Four relay units, Type 162D are located between frames 23 and 25 on the starboard side of the front fuselage. A description of these units is given in A.P.107E-0104-1.

Warning indication

24. Warning of engine compartment fires is given by the lamps labelled FIRE 1 and FIRE 2 on the standard warning indicator panel, and also by the integral lamps of the indicator switch units F1 and F2, fitted on the end face of the panel assembly. When abnormal conditions prevail in the jet pipe regions (zone 3) the lamps labelled RHT 1 and RHT 2 will light. The warning lamp circuits and their operation in conjunction with the attention lamp and audiowarning circuits are described in the standard warning system (*para.2-10*).

Extinguisher circuits

25. Two fire extinguisher bottles, Type 57A, are respectively installed in the port and starboard compartments and located between frames 44 and 45. The one on the port side serves the No.2 zones of the engine compartments, and that on the starboard side, the No.1 zones. The circuits to the fuzing units in the discharge heads of each bottle are such that, when either indicator switch unit is pressed, both extinguisher bottles discharge the whole of their contents into zones No.1 and 2 of the relevant engine. In the event of a crash landing, operation of the inertia switch system automatically energizes all fuzing units, causing the contents of the bottles to be discharged into the compartments of both engines. The fire extinguisher circuits are supplied from the battery busbar via the emergency services fusebox.

Extinguisher discharge indicators

26. Indication that the extinguisher

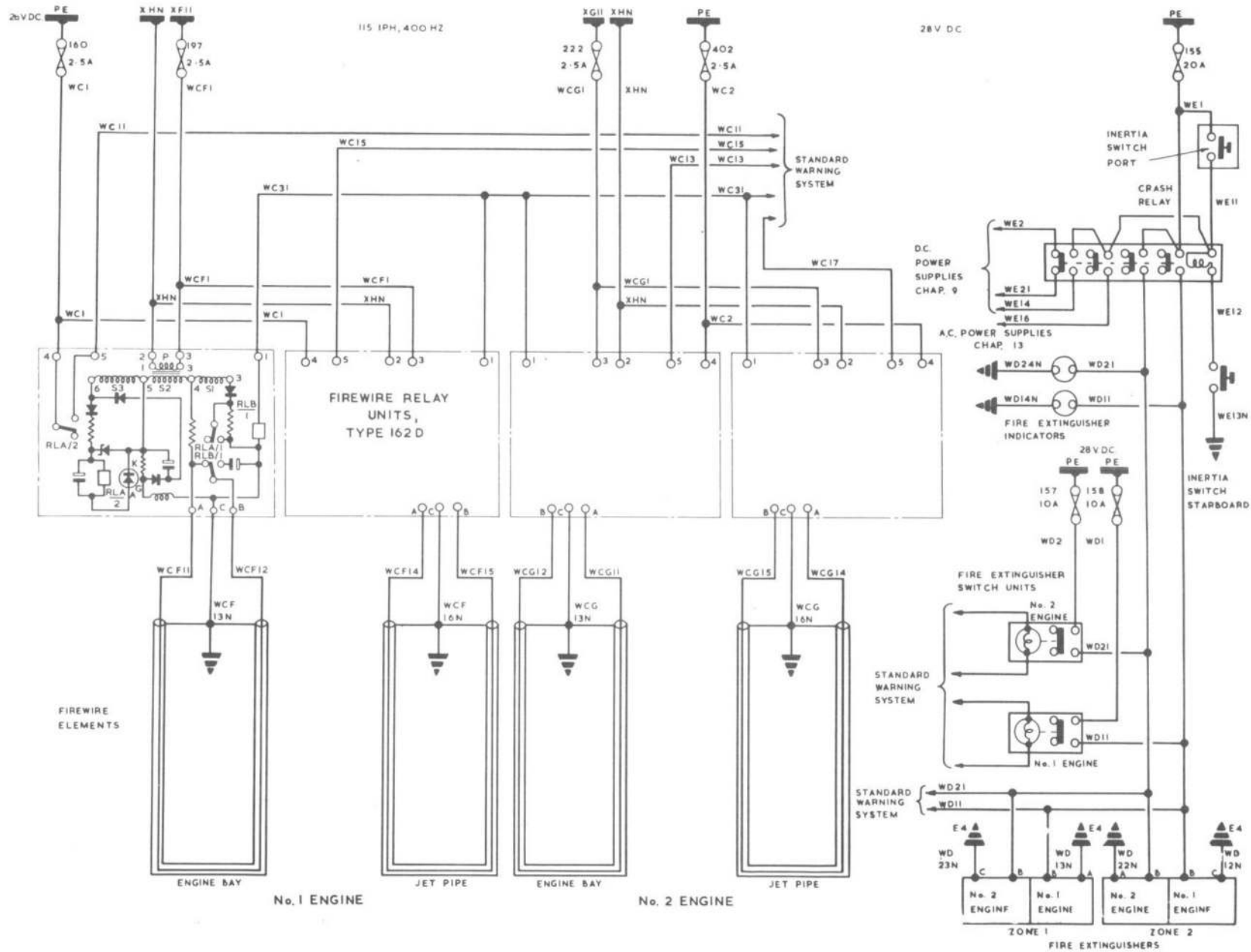


FIG. 5. FIRE PROTECTION SYSTEM

◀ MINOR AMENDMENTS ▶

TABLE 3

Details of Firewire units and fittings

Note... All sensing elements are Mk.2 medium temperature range

EQUIPMENT	TYPE	QUANTITY
No.1 engine bay		
Sensing element 10 ft	D2370/120	5
Sensing element 5 ft	D2370/60	3
Sensing element 2 ft 6 in.	D2370/30	3
Sensing element 1 ft 8 in.	D2370/20	1
Harness cable 1 ft 6 in.	D2605/18	1
Harness cable 1 ft 9 in.	D2605/21	1
Coupling unit	D2291 or D2475	7
Coupling unit	D828 or D3131	2
Coupling unit	D2477	2
Elbow coupling unit	D2243	2
No.2 engine bay		
Sensing element 10 ft	D2370/120	5
Sensing element 5 ft	D2370/60	2
Sensing element 2 ft 6 in.	D2370/30	1
Sensing element 1 ft 8 in.	D2370/20	3
Harness cable 1 ft 6 in.	D2605/18	2
Coupling unit	D2291 or D2475	6
Coupling unit	D828 or D3131	2
Coupling unit	D2477	2
Elbow coupling unit	D2243	2
No.1 jet pipe zone		
Sensing element 10 ft	D2370/120	7
Sensing element 5 ft	D2370/60	1
Sensing element 1 ft 8 in.	D2370/20	2
Sensing element supplied with jet pipe	D3010	1
Harness cable	D2207(3)	1
Coupling unit	D2291 or D2475	8
Coupling unit tee piece	D2460/12	1
No.2 jet pipe zone		
Sensing element 10 ft	D2370/120	4
Sensing element 5 ft	D2370/60	1
Sensing element 1 ft 8 in.	D2370/20	1
Sensing element supplied with jet pipe	D3010	1
Harness cable	D2206(3)	1
Coupling unit	D2291 or D2475	4
Coupling unit tee piece	D2460/12	1

bottles have been discharged is provided by two Type 984 extinguisher discharge indicator fuzes, which are mounted on the refuelling lamps panel (61P) between frames 47-48 port, and connected to their respective extinguisher circuits. If the extinguisher bottles are discharged, either manually or automatically at least one of the indicators will become energized and fuzing of its element will occur. This results in the formation of a reddish-brown deposit on the interior surface of the glass bulb of the indicator, thus providing visual indication that the extinguishers have been discharged.

INERTIA SWITCH SYSTEM

General

27. Two Mk.2 inertia switches, mounted one on each side of the aircraft, on the forward face of frame 49, are connected in series with the solenoid of a 'crash' relay, installed in relay box D2. This Type S3 relay is associated with several protective circuits. If, due to a crash landing, both inertia switches are tripped, the relay becomes energized by a supply from the service battery via the emergency services fusebox. Closing of the relay initiates the following automatic operations.

(1) Isolation of the service battery from the d.c. distribution system.

(2) Interruption of the respective field circuits of the main d.c., generator (Chap.9) and the a.c. generator (Chap.13).

(3) Detonation of the fuzing units of both fire extinguishers (para.25).

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.

General

28. All equipment units and connecting cables associated with the warning and emergency circuits should be inspected periodically for signs of deterioration, damage, or insecurity. At the appropriate servicing period all control units, switches and relays should be removed for bay servicing. Faulty or life expired units should be renewed.

Standard warning system

29. In addition to the normal operational and continuity checks, the following tests should be made at the intervals laid down in Vol.5 of this publication or whenever any major component of the system is renewed.

Procedure

Note...

The fire warning indicators F1 and F2, located on the end face of the standard warning panel, must NOT BE PRESSED at any time, as this will result in the fire extinguishers discharging.

(1) Remove fuses No.48, 62 and 107. Short-circuit the cores of cable C2C at the terminal block on the cabin pressure controller. Remove plug C6 from JB3 and apply a shorting link to pins R and S on the junction box. Ensure that the

mute switch is in the unmuted position. Plug in the headset (refer to note). Switch on the a.c. and d.c. external supplies. Switch on No.1 U.H.F. set.

Note...

The mic/tel plug on the headset will not mate with the personal equipment connector on the pilot's seat. The personal equipment connector (man portion) Ref.No.6D/2073 should therefore be used, together with an adapter, to enable a plug (large mic/tel Type 119, Ref.No.10H/10991) to connect to the socket (small mic/tel Ref.No.10H/18574).

(2) The HYD warning lamp should light, the attention lamp and warning cancel lamp should start to flash. The audio warning should be heard in the headset. Check that both hydraulic warning lamps on the auxiliary warnings panel are lit.

(3) Press the warning CANCEL switch, both attention and warning cancel switch lamps should go out and the audio warning stop. All hydraulic warnings should remain on.

(4) Remove fuse No.6 in the port fuse-box. The HYD lamp on the standard warning panel and HYD 1 on the auxiliary warnings panel should go out.

(5) Replace fuse No.6, the warnings should appear as in (2). Press the CANCEL switch. Attention and warning cancel switch lamps should go out and the audio warning cease.

(6) Remove fuse 53. The HYD lamp on the

standard warning panel and HYD 2 on the auxiliary warnings panel should go out.

(7) Replace fuse No.53. The warnings should appear as in (2). Press the warning CANCEL switch. Attention and warning cancel switch lamps should go out and the audio warning cease. Remove fuses No.6 and 53. All hydraulic warnings should go out.

(8) Replace fuse 107, the GEN failure lamp should light, the attention lamp and warning cancel switch lamp should flash and the audio warning should be heard.

(9) Press the CANCEL switch. The attention lamps and cancel switch lamp should go out and audio warning cease. The GEN lamp should remain lit.

(10) Remove fuse 107. The GEN failure warning should go out.

(11) Repeat tests (8) to (10) inclusive, using a 2.5-amp fuse in place of dummy fuse No.1, and substituting OXY failure warning for GEN failure warning. During the above tests, operate the audio warning MUTE switch, the volume should be reduced.

(12) Repeat tests (8) to (10) inclusive substituting fuse No.48 for 107 and CPR warning lamp for GEN warning lamp.

(13) Operate the TEST switch. All standard warning lamps and the fire push-button lamps should light, the attention lamps and cancel switch lamp should flash and the audio warning be heard.

(14) Release TEST switch. All standard warning lamps and fire push-button lamps should go out. The attention lamp and the cancel switch lamp should continue to flash, and the audio warning be heard.

(15) Press the CANCEL switch. Attention lamp and warning cancel switch lamp should go out and the audio warning cease.

(16) Refit fuses 1,6,48,53 and 107, GEN, HYD, OXY, and CPR failure warning lamps should light, the attention lamp and warning cancel switch lamp should flash. The audio warning should be heard and HYD 1 and HYD 2 lamps on the auxiliary panel will come on and remain on through-out tests (17) to (25) inclusive.

(17) Press warning CANCEL switch. Attention lamp and warning cancel lamp should go out and audio warning cease. GEN, HYD, OXY, and CPR failure lights should stay on.

(18) Replace fuse 62. With the ENGINE MASTER in the OFF position, check that GEN, HYD, OXY, and CPR lamps go out. Operate TEST switch. All fire warnings and two spares should light. Attention lamp and warning cancel lamps should flash and the audio warning be heard.

(19) Press warning CANCEL switch. Attention and warning cancel lamps should go out and the audio warning cease. Release the TEST button, all warning lamps should go out.

(20) Switch the ENGINE MASTER switch on. GEN, HYD, OXY, and CPR warning lamps should come on. The attention lamp and

warning cancel lamp should flash and the audio warning be heard.

(21) Press warning CANCEL switch. Attention lamp and warning cancel switch lamp should stop flashing and the audio warning cease. All warning lamps should remain on.

(22) Operate the ground MUTE switch. GEN, HYD, OXY, and CPR lamps should go out. The ground mute switch lamp should light.

(23) Return the ground MUTE switch to its normal position. The lamp in the mute switch should go out. GEN, HYD, OXY, and CPR failure lamps should light. Attention and warning cancel lamps should flash. Audio warning should be heard. Operate the audio warning MUTE switch and note that the volume is reduced.

(24) Press the warning CANCEL switch, the attention and warning cancel lamps should go out and the audio warning cease. GEN, HYD, OXY, and CPR should go out. The lamp in the mute switch should come on. Press the TEST switch, all fire warning lights and two spares should come on. Attention lamp and warning cancel switch lamp should flash and the audio warning be heard. Release the TEST switch. Check the action of the dimmer switch on the attention lamp and cancel lamp. Press warning CANCEL switch. All lamps except the mute switch should go out. Return MUTE switch to normal position.

(25) Disconnect both a.c. and d.c. ground supplies. Return the ENGINE MASTER

switch to the OFF position. Remove the short circuits from C2C and C6 (sub-para.(1)). Remove fuse No.1 and replace the dummy fuse.

Auxiliary warnings system

30. The following functioning tests should be undertaken during servicing or whenever the associated circuits have been interrupted for the purpose of fault location.

Procedure

(1) Check the continuity of the display panel wiring and the associated lamp filaments, by pressing the TEST switch at the forward end of the test panel and operating the DAY/NIGHT switch to each position. All lamps should light.

Note...

When renewing faulty lamps, ensure that the new lamps are of the correct rating. The necessary information will be found in Table 2.

(2) All circuits associated with the engine services, air turbine, and the a.c. generator, can be checked for operation on engine run up. The warning lamps used in the top temperature trip control should be checked for correct operation during the testing of the reheat system (Chap.7).

Additional warnings

31. All warning lamps or indicators used in the oxygen, canopy, ventral tank, stand-by inverter overfrequency and armament systems should be observed for correct operation during the servicing and operational checks detailed

in the respective chapters for each system.

Fire protection system

32. Testing of the fire protection system should take place at the intervals laid down in A.P.101B-1001-5 or whenever any major component of the system has been repaired or renewed.

Test equipment required

33. The following equipment will be required:-

A decade resistance box having a range of 0-3000 ohms

Condenser 1 mF

Six 28-volt test lamps

Safety ohmmeter, Ref.No.5G/2643

Headset, Type 9 with personal equipment connector Ref.No.6D/2073 and a mic/tel adapter

Suitable 28-volt d.c. and 200-volt a.c. ground supplies truck.

A testmeter, Type D

Preparation

34.

(1) Disconnect the fire extinguishers (cables R3A, R3B, 2R3C, 2R3D) and connect a test lamp to each cable end.

(2) Remove the indicator fuzes from the refuelling panel (61P) and connect a test lamp to each fuze outlet.

(3) Connect the headset to the pilot's personal equipment connector and switch on the U.H.F.

(4) Connect the ground supplies truck and set the BATTERY ISOLATION switch to ON.

Checking the system

No.1 engine bay circuit

35.

(1) Disconnect the Firewire sensing element from terminal B of No.1 engine zone relay unit and connect the decade resistance and condenser in series, across terminals B and C. Set the decade resistance to 3000 ohms.

(2) Switch ON the INSTRUMENT MASTER switch. There should be no fire warning indications at this stage.

(3) Reduce the setting of the decade resistance, somewhere between the range 1160-900 ohms the following indications should come on, FIRE 1, F1, the attention and cancel indications flash, and the audio warning be heard in the headset phones.

(4) Operate the F1 push-switch. The test lamps fitted to cables R3A and 2R3C (No.1 engine zone) and to No.1 indicator fuze, should light.

(5) Increase the setting of the decade resistance. Somewhere between 1600-2700 ohms FIRE 1 and F1 indications should go out, the attention and cancel indications go out and the audio warning cease.

(6) Disconnect the condenser and then reconnect the decade box across A and B of the relay unit. Set the resistance to 470 ohms and operate the test switch

on the standard warning panel. Indications FIRE 1, FIRE 2, F1, F2, RHT 1, and RHT 2 should come on, the attention and cancel lights flash and the audio warning be heard. No test lamps should light.

(7) Switch OFF the INSTRUMENT MASTER switch.

(8) Disconnect the decade resistance. With the testmeter, measure the resistance of No.1 engine Firewire sensing element. This should be between 149 and 242 ohms.

(9) Remake all connections to leave the circuit in a serviceable condition.

No.2 engine bay circuit

36. Repeat the above tests (1) to (9) but changing the references from No.1 to No.2, the test lamps to R3B and 2R3D, and the indications to FIRE 2 and F2. In test (8) the sensing element resistance should be between 135-220 ohms.

No.1 jet pipe area

37.

(1) Disconnect the Firewire sensing element from terminal B of No.1 jet pipe zone relay unit and connect the decade resistance and condenser across terminals B and C. Set the decade box to 3000 ohms.

(2) Switch ON the INSTRUMENT MASTER switch. There should be no fire warning indications at this stage.

(3) Reduce the setting of the decade resistance, somewhere between 1160-900 ohms the RHT 1 indication should come

on. Flashing of the attention and cancel lights should occur and the audio warning be heard in the headset phones.

(4) Increase the setting of the decade box resistance. Somewhere between 1600-2700 ohms RHT 1 will go out, the attention and cancel lights stop flashing and the audio warning cease.

(5) Disconnect the condenser and connect the decade resistance across A and B of the relay unit. Set the resistance to 470 ohms and operate the TEST switch on the standard warning panel. Indications RHT 1, RHT 2, FIRE 1, FIRE 2, F1, and F2 should come on, the attention and cancel lights flash, and the audio warning be heard.

(6) Switch OFF the INSTRUMENT MASTER switch.

(7) Disconnect the decade resistance and, with the testmeter, measure the resistance of the No.1 reheat zone Firewire sensing element. This should be between 164 and 271 ohms.

(8) Remake all connections to leave the circuit in a serviceable condition.

No.2 jet pipe area

38. Repeat the tests for No.1 jet pipe (1) to (8) but changing the references from No.1 jet pipe to No.2 jet pipe, RHT 1 to RHT 2. In test (7) the sensing element resistance should be between 110-179 ohms.

General check

39.

(1) Operate the INSTRUMENT MASTER

switch to ON and press and hold the TEST switch on the standard warning panel. All fire warning indications should come on, the attention and cancel lights flash and the audio warning be heard.

(2) Operate the CANCEL switch. The fire warning indications should remain ON. The attention and cancel lights go out, and the audio warning cease.

(3) Release the TEST switch. All warning indications should go off.

(4) Short out the terminals at each Firewire termination unit in turn. Operate the TEST switch each time. Check that the warning indication associated with the shorted-out unit remains OFF and the other warning indications come on together with the attention lights, cancel light and the audio warning.

(5) Release the TEST switch. All warning indications, should go off, attention and cancel lights go out, and the audio warning cease.

(6) Check that all test lamps are out. Switch on a d.c. load (e.g. cockpit lighting). Without disconnecting port inertia switch, remove (4 bolts) and trip; there should be no circuit effect. Reset port inertia switch and repeat on starboard inertia switch.

(7) Trip both inertia switches. All test lamps should light. The a.c. generator main and bias fields should be open-circuited by the field crash relay.

The generator should be open-circuited by its field crash relay. The d.c. load selected in (6) should go off indicating that the battery isolation relay is de-energized.

(8) Reset and refit both inertia switches. All test lamps should go out. The generator field crash relay should be reset and the battery isolation relay should be energized and the a.c. generator field crash relay should remain energized.

(9) Operate the d.c. generator RESET switch to reset the a.c. generator field circuit.

(10) Disconnect and remove all test lamps. Check that no supply exists at cable ends R3A, R3B, 2R3C and 2R3D then reconnect the fire extinguisher bottles.

(11) Return all switches to their normal position and disconnect the a.c./d.c. ground supply truck.

(12) Using the safety ohmmeter, take readings at the indicator fuze holder terminals No.1 and No.2 in turn. The readings should be between 2.5 and 4 ohms. Replace the indicator fuzes in the refuelling panel.

Fire protection units

40. Servicing information covering the sensing elements, relays, coupling units, bulkhead fittings, inertia switches, discharge indicators, and the testing of the extinguisher bottle cartridge heads is contained in the various chapters of A.P.107E-0001-1 and A.P.107E-0102-1.

Disconnection of Firewire components on removal of jet pipes

41. To prevent damaging the Firewire installation during the removal of the jet pipes it is essential to take special precautions when disconnecting the plugs and sockets in the system.

42. Interconnection between the reheat Firewire element and the jet pipe tunnel

element is made by a flexible connector harness terminating at each end in identical plugs, Part No.D.2009, Ref. No.5CZ/5645.

43. These plugs are secured to their mating sockets by a free-running coupling ring, and the practice normally adopted for removing standard plugs by slackening the rear locking nut first is not to be

used. Under no circumstances is the rear locking nut to be disturbed or disorientation of the pins and damage to the socket insert will result.

44. Correct orientation of the pins may be verified by viewing the plugs from the front with the location key uppermost, when the pins should lie on the horizontal diameter of the assembly.

FIG. 6. STANDARD WARNING SYSTEM

(illustration overleaf)

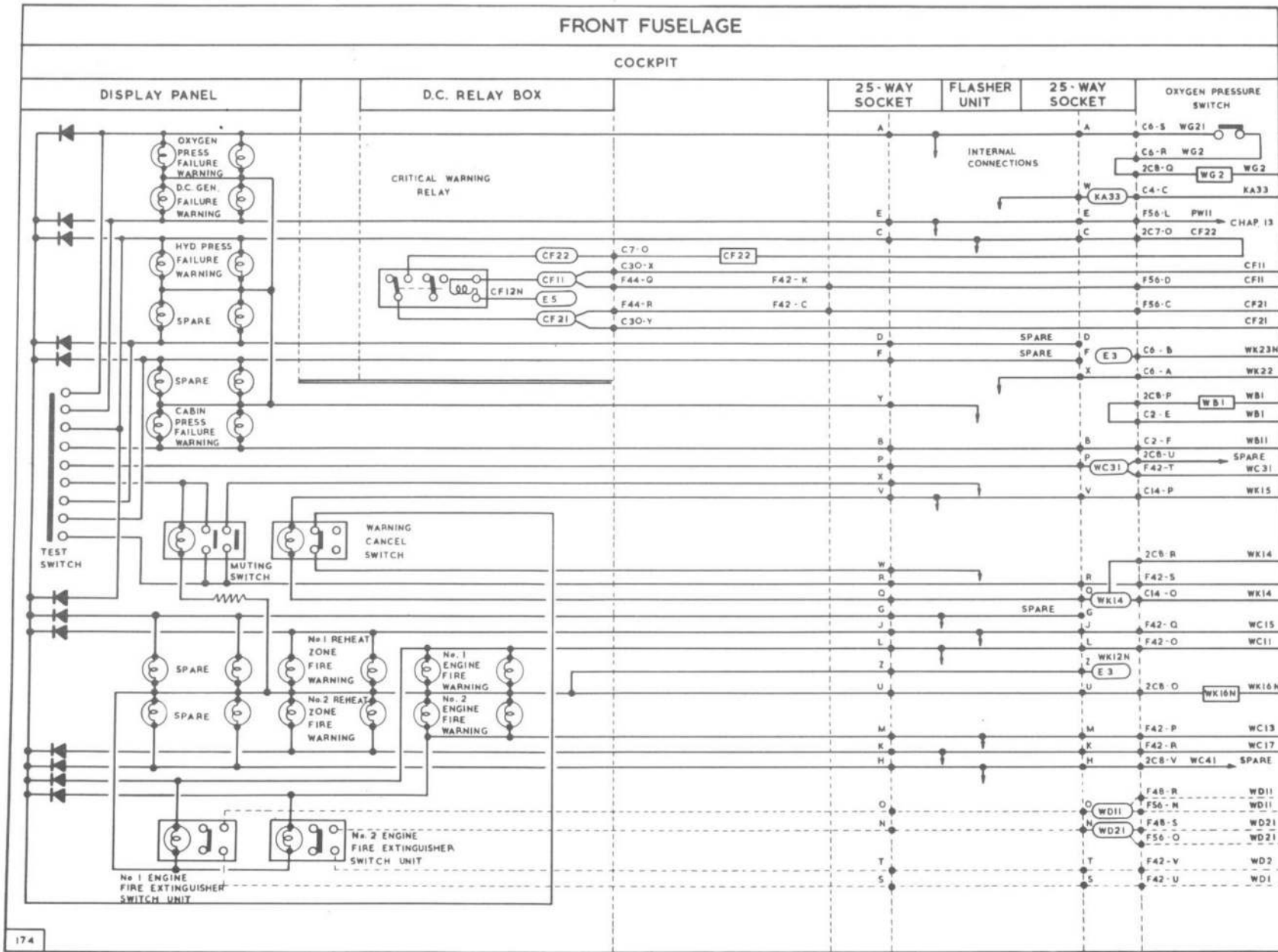


FIG. 6. STANDARD WARNING SYSTEM

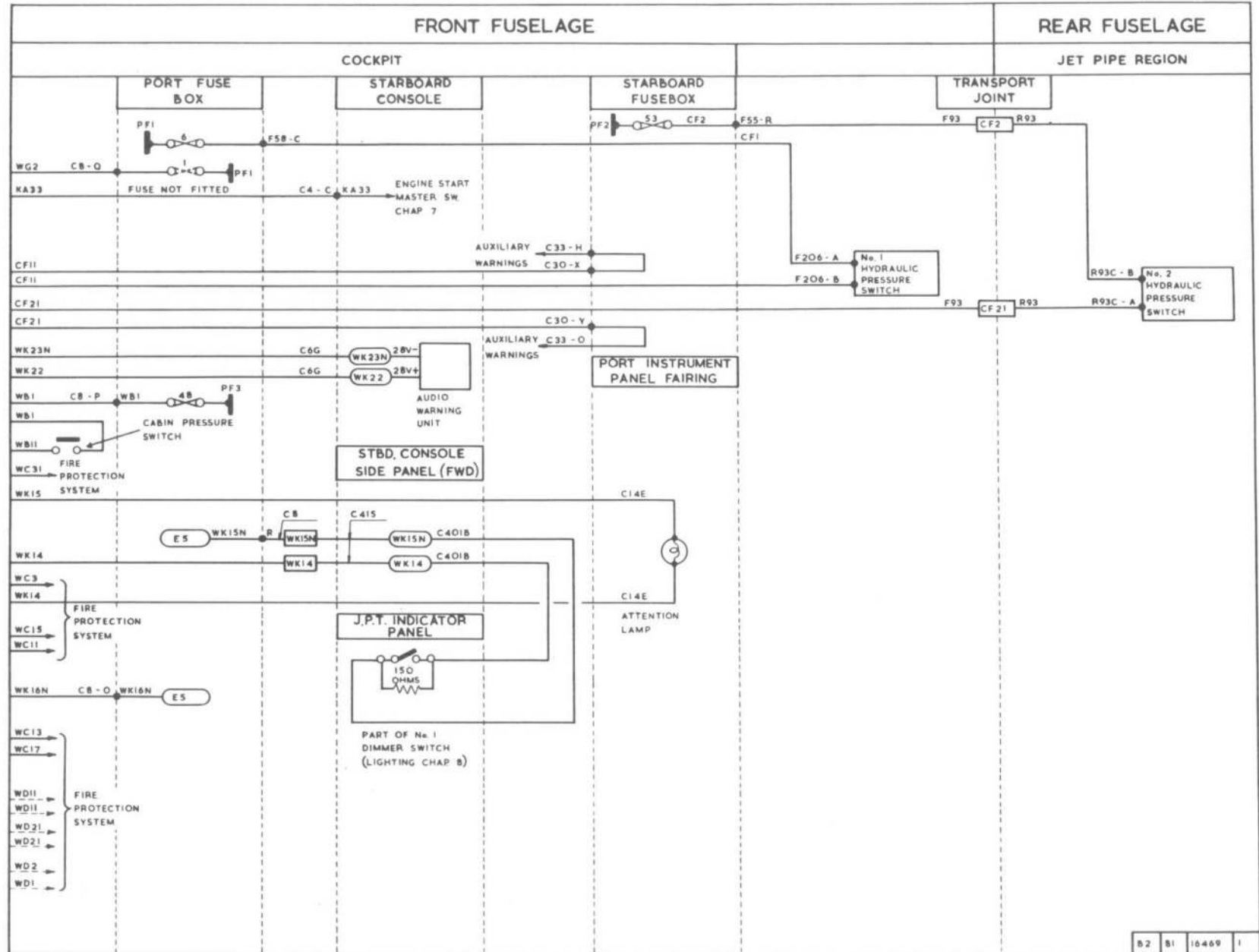


FIG. 6A. STANDARD WARNING SYSTEM

◀ MOD 2156 ADDED ▶

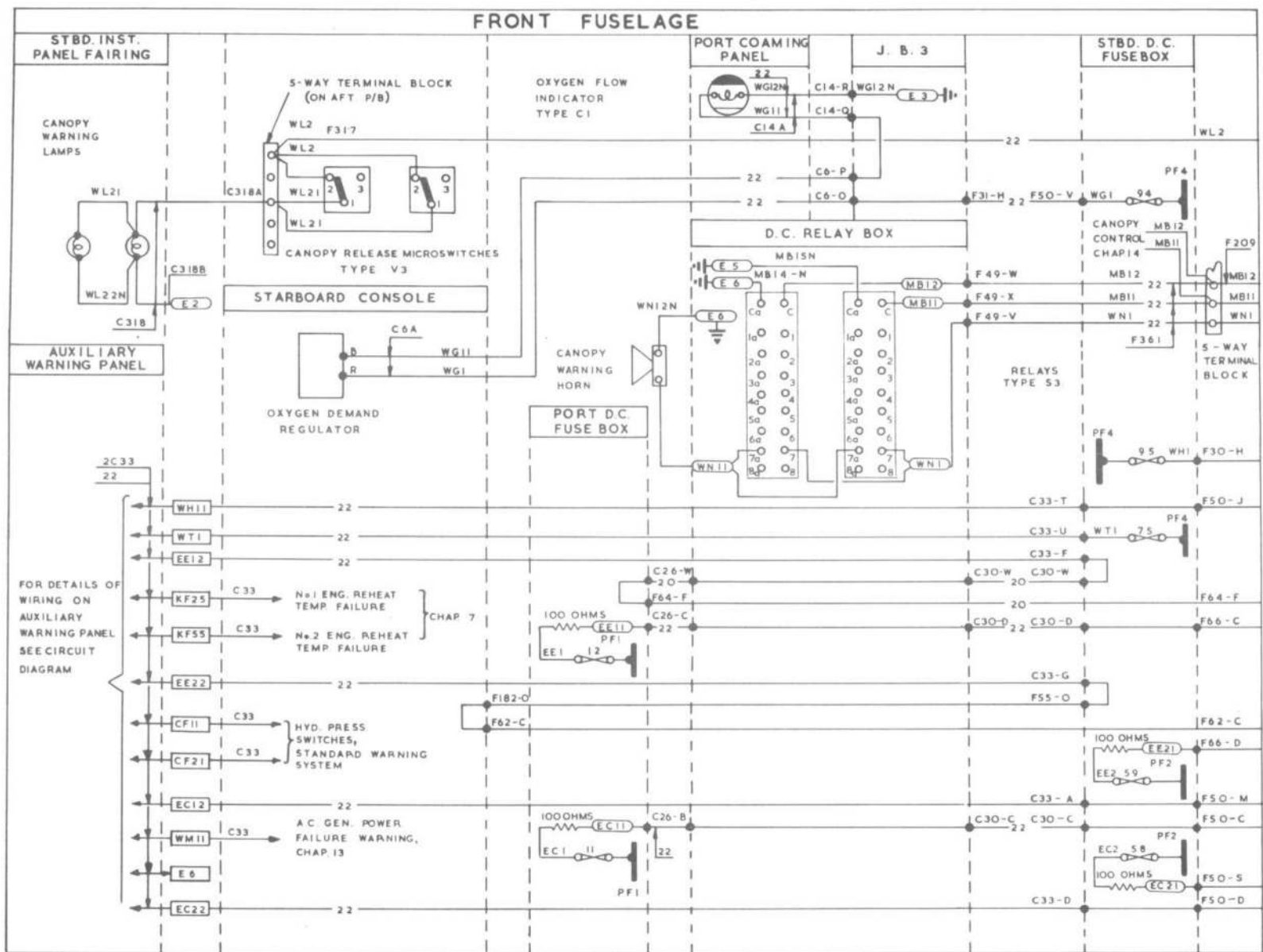


FIG.7. AUXILIARY AND ADDITIONAL WARNINGS

◀ MINOR AMENDMENTS ▶

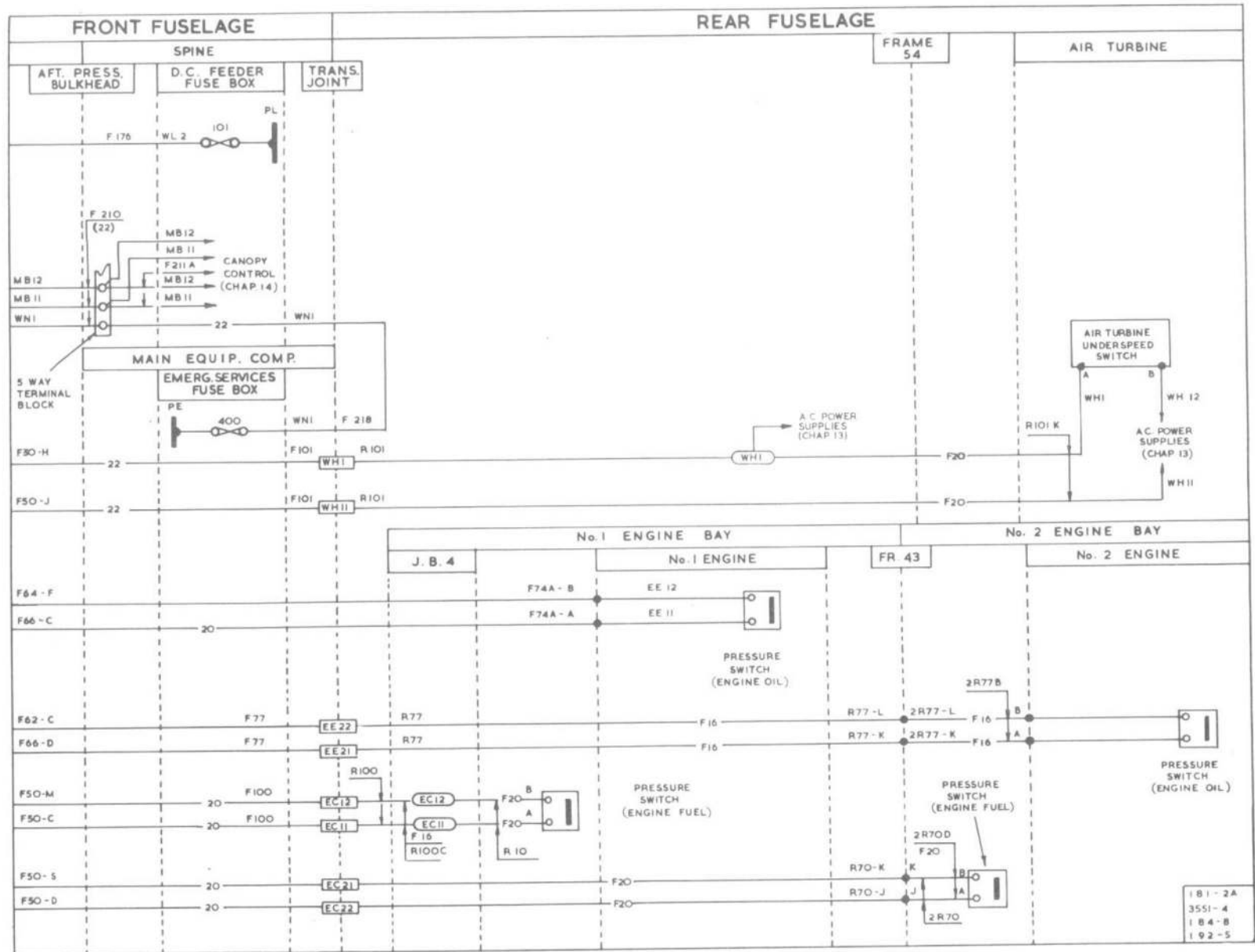


FIG.7A. AUXILIARY AND ADDITIONAL WARNINGS

◀ MINOR AMENDMENTS ▶

RESTRICTED

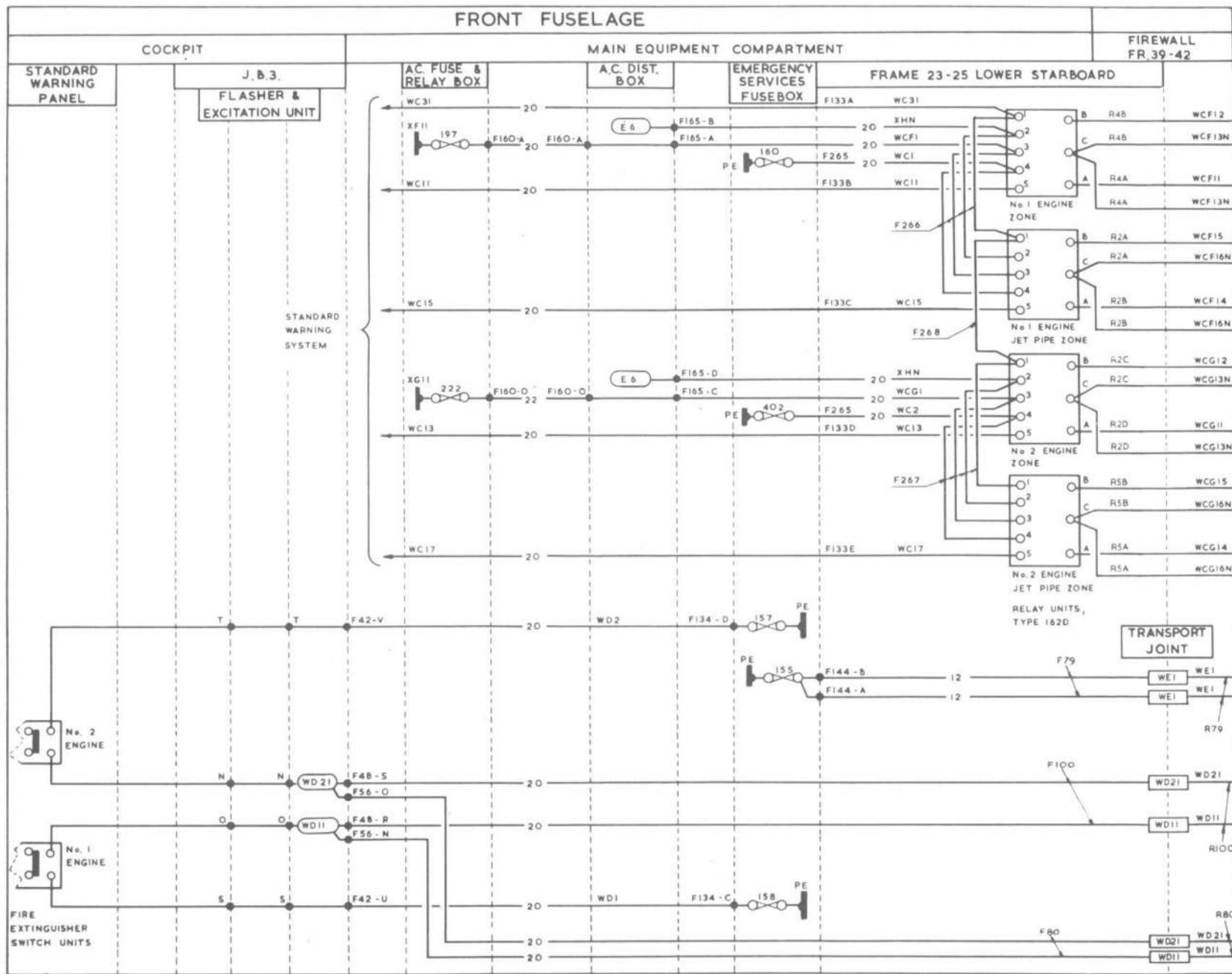


FIG. 8. FIRE PROTECTION SYSTEM

◀ MINOR AMENDMENTS ▶

RESTRICTED

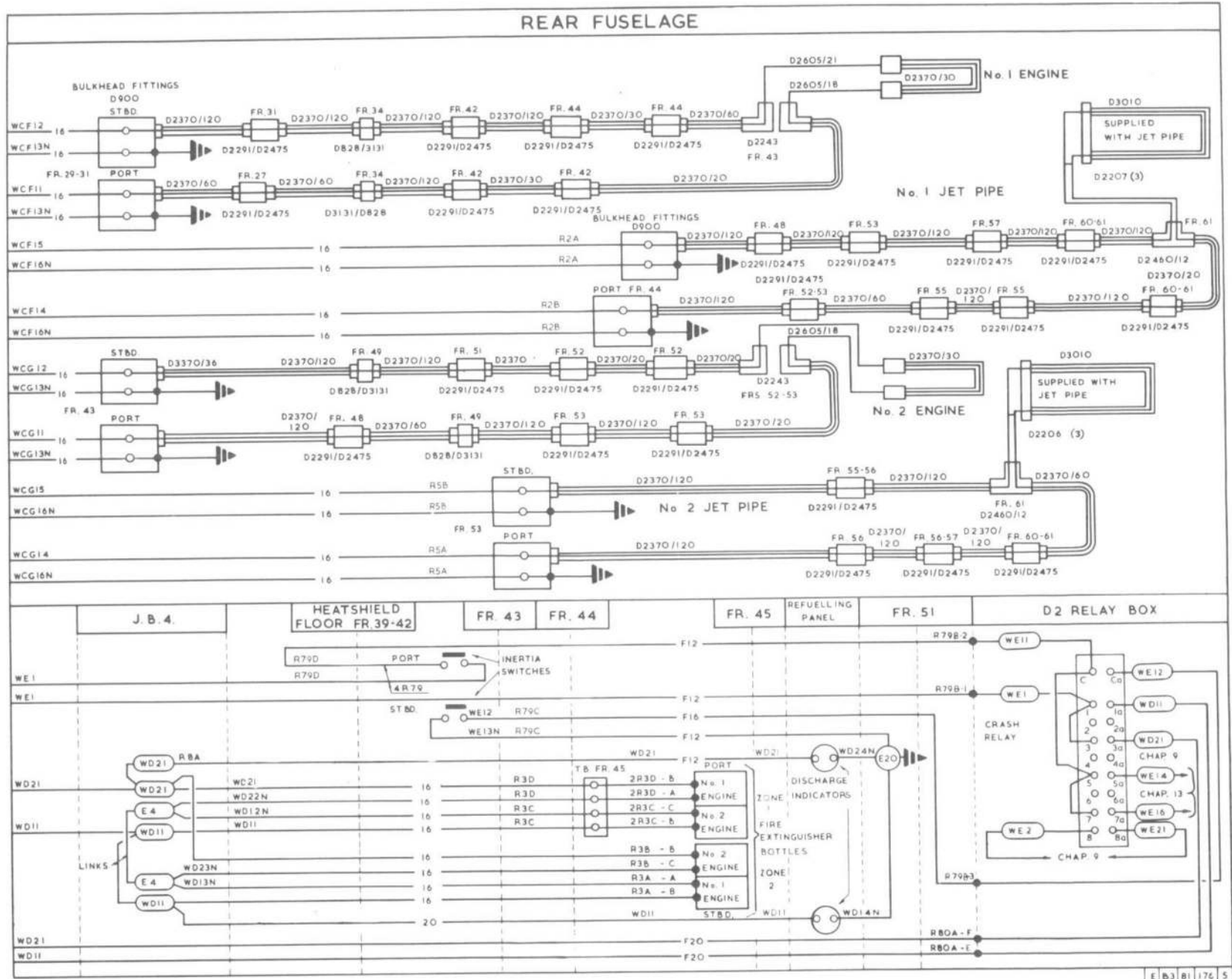
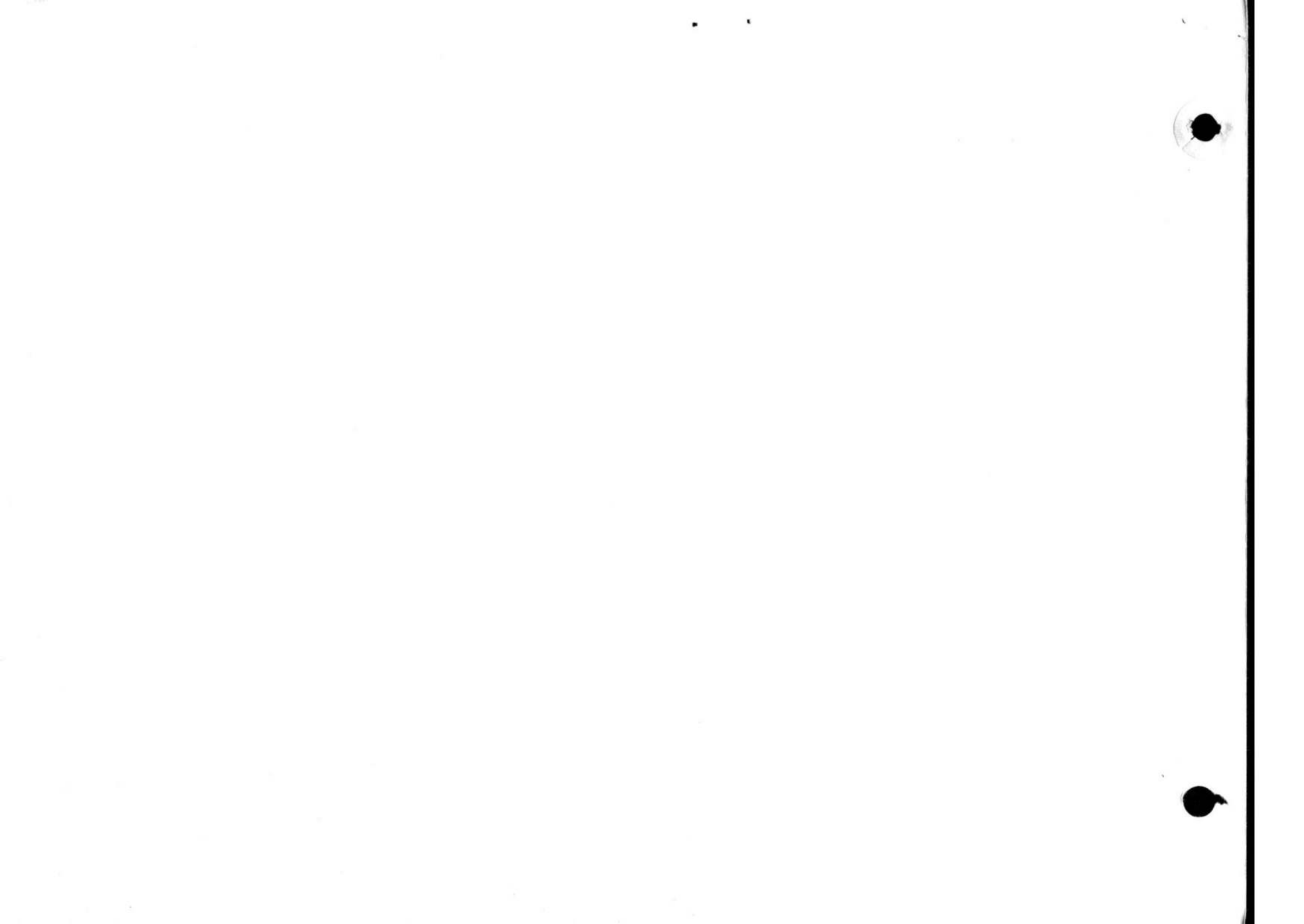


FIG.8A. FIRE PROTECTION SYSTEM

◀ MINOR AMENDMENTS ▶



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