

SECTION 12

FIRE PROTECTION1. Introduction

This section contains brief details on the following systems:-

- a. Engine and AAPP fire detectors.
- b. Engine fire extinguishers.
- c. AAPP fire extinguishers.
- d. Fuel tank and wing leading edge fire extinguishers.
- e. Bomb bay fire extinguishers.

2. Engine Fire Detection (Introduction)

Engine fire detection and warning is fully automatic and operates immediately an engine fire or rapid rise in temperature occurs.

The engine fire extinguishers can be brought into operation manually by depressing the push switches marked "ENGINE FIRE EXTINGUISHERS" on the coaming above 1P. The extinguishers are automatically discharged on crash landing by the action of two crash switches located on the lower forward face of the cabin rear pressure bulkhead.

A combined fire detection and warning circuit employing thermo-couple detectors is provided for each engine. Eleven detectors connected in series form an unbroken chain and are installed at possible fire danger points in each engine bay. Each detector chain is connected to the relevant relay in one of two control units fitted in the nose wheel bay. A brief description of the system components is given in the following paragraphs.

NOTE:- AAPP system similar to engine fire detection.

3. Detector Heads

Each detector head consists of two thermo-couples connected in series but of opposite polarity. One of the couples is shrouded from flame and heat changes whilst the other, being exposed, is more readily affected by changes in temperature.

NOTE:- All detector heads are mounted to face the 'flame expectant' area. When the combined temperature of the exposed couple exceeds that of the shrouded couple by 185°C, a voltage of 7.5mV will be developed in the chain and fed to a moving coil relay in the respective control unit.

CAUTION It should be noted that the exposed couples are 'live' when 28 volts DC is applied to the essential bus bars. Therefore it is advised that when work is in progress inside the engine bays that fuses 819 and 830 (both in 19P) are removed.

4. Control Unit Type TP.5902

Two control units are fitted in the nose wheel bay. The port unit controls the No. 2 and 3 engine fire detector circuit, the starboard unit controls the No. 1 and 4 engine circuit.

Each unit contains two sensitive moving coil relays, one for each engine circuit. The moving coil relay is operated from the 7.5mV output from the detector chain couples. Each moving coil relay control two P.O. type relays, one for the warning circuit and the other for warning cancellation.

Two further P.O. type relays are arranged to give a pulsing circuit. These relays interrupt the main supply voltage to the moving coil relay contacts at regular intervals.

A test circuit is installed integral with the unit to inject a voltage into the detector chain to simulate fire conditions. The circuit may be operated by the test switch fitted on 4P or operation of the individual test buttons fitted to the side of each unit.

5. AAPP fire extinguisher

On receipt of fire warning (7OP) the fire extinguisher may be discharged by the operation of the Fire Push. The extinguisher will also discharge by the operation of Nos. 1 and 6 inertia switches.

During both operations, relay 486 is energised to close the L.P. cock of the AAPP. Relay 486 in turn is held in via a supply from fuse 961 via contacts of relays 486 and 85.

NOTE:- This hold in circuit has to be broken before connecting a new fire extinguisher.

6. Fuel Tank, Leading Edge and Bomb Bay Fire Protection

Fire protection for the above areas is fully automatic and is controlled by the Graviner firewire system. This system consists of sensing elements routed around the tank bays and bomb bay to provide complete sensing coverage. Operation of the elements during fire conditions is rapid and operates to discharge the appropriate fire extinguishers into the affected area. A brief description of the system components is given in the following paragraphs.

7. Sensing Elements

The element consists of a stainless steel capillary tube, the centre of which carries an electrode. The electrode is separated from the tube by a material, the electrical resistance of which decreases with increase of temperature. The ends of the assembly are provided with a co-axial coupling plug. The elements are supplied in fixed lengths and cannot be altered to suit local requirements, the range is in the following sizes, 1½', 2', 5' and 10'.

Although the elements are described as "flexible" sharp bends are to be avoided and should an element become 'kinked' it is to be regarded as unserviceable. The minimum bending radius is 2".

8. Control Units (Type D.1760)

The control units are used in conjunction with the firewire sensing element and contain a transformer, full wave rectifier and a relay. (The built in test circuit is used in the bomb bay unit only).

When any part of the sensing element is heated to a certain level, the resistance of the filling material in the element decreases and allows the small standby current flow through the control unit relay coil to increase, so closing a pair of contacts, which in turn feed a supply direct to the fire extinguishers. A lamp indicator fitted to the second pilot's panel 1P will light to indicate that the fire extinguishers have fired. The fire extinguishers are also discharged during crash conditions by the operation of Nos. 1 and 6 inertia switches.

9. Bomb Bay Fire Protection

On aircraft where Mod. 526 has been embodied a fire extinguisher system using the Graviner firewire method of detection is fitted in the bomb bay. This system is provided to afford protection for the bomb bay fuel tanks when these are fitted during special stores roles.

The sensing elements are routed around the sides of the bomb bay to give complete fire protection coverage. The control unit is a type D.1740 located on the starboard side of the nose-wheel bay. The principle of operation is similar to that of the tank and leading edge system.

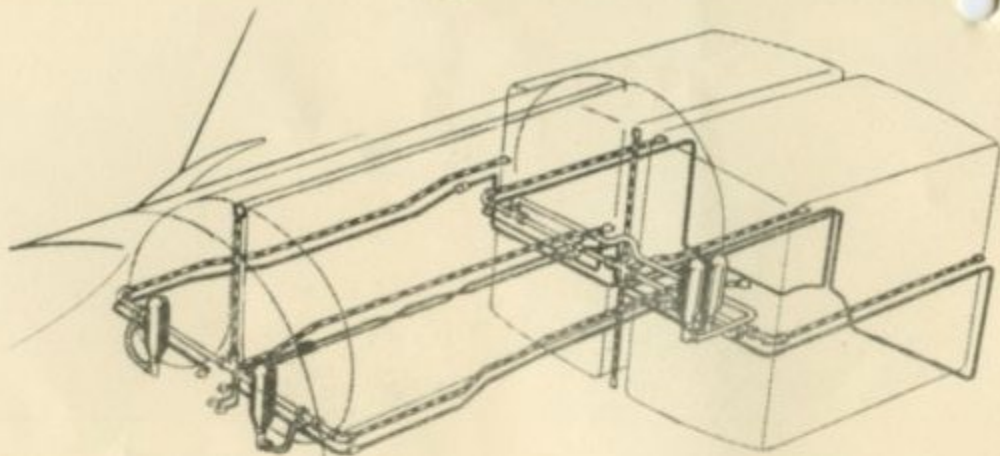
10. Location of Fire Bottles

System	No	Location
Wing Tank Starboard	6	Outboard of No.5 and 7 tanks
Wing Tank Port	6	Outboard of No.5 and 7 tanks
Leading edge Starboard	3	Forward of starboard mainwheel bay
Leading edge Port	3	Forward of port mainwheel bay
Fuselage Tank No.1	2	Beneath No.1 tank in nosewheel bay on rear of pressure bulkhead
Fuselage Tank No.2	2	Port side rear of nosewheel bay
Bomb Bay	8	Fitted in groups of four - one group port side, the other starboard side, forward bomb bay
1 and 2 engine	2	1 per engine - port bomb bay
3 and 4 engine	2	1 per engine - starboard bomb bay roof
AAPP	1	Fwd face AAPP

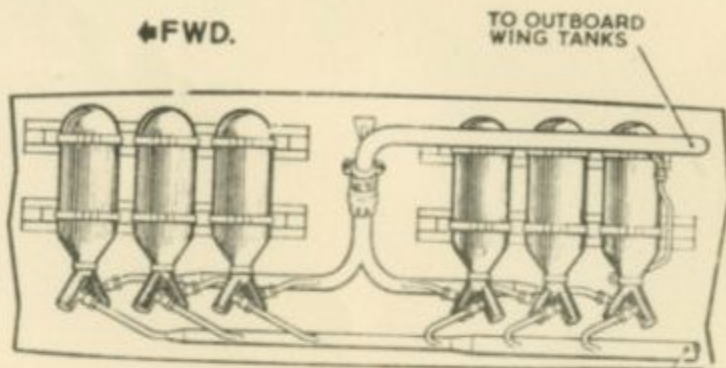
CAUTION - Methyl Bromide is an odourless non-irritant vapour, highly poisonous. The effects may not be apparent at once and may be fatal if a large amount is inhaled.

11. Fire Protection Components

Component	No	Location
Engine 'Firetec' Control Unit TP.4202	2	Port and Starboard Nosewheel Bay
AAPP 'Firetec' Control Unit	1	Fwd Face AAPP Bay
Warning Test Switch	1	4P
Relay 340	1	Nosewheel Bay
Fire pushes	4	Coaming above 1P
Thermocouple Detectors	48	Disposed around engine bay 11per engine plus 4 in AAPP
Crash relays	4	
R.76		34P
R.77		34P
R.85		35P
R.86		35P
R.357		Nose wheel Bay
R.506		78P
Inertia Switches	2	Cabin rear press bulkhead
'Firewire' Control Unit D1740 Bomb Bay system	1	Nosewheel bay starboard side
'Firewire' Control Unit D1760, Wing tank and L/E system port and starboard	4	2 on port wing 2 on starboard wing
Control Unit D.1740 No.1 & 2 Fuel tank system	2	Nosewheel bay
'Firewire' test switch bomb bay system	1	Starboard side nosewheel bay
'Firewire' Extinguisher fired lamp	2	1P



FUSELAGE TANKS



DETAIL A

← FWD.

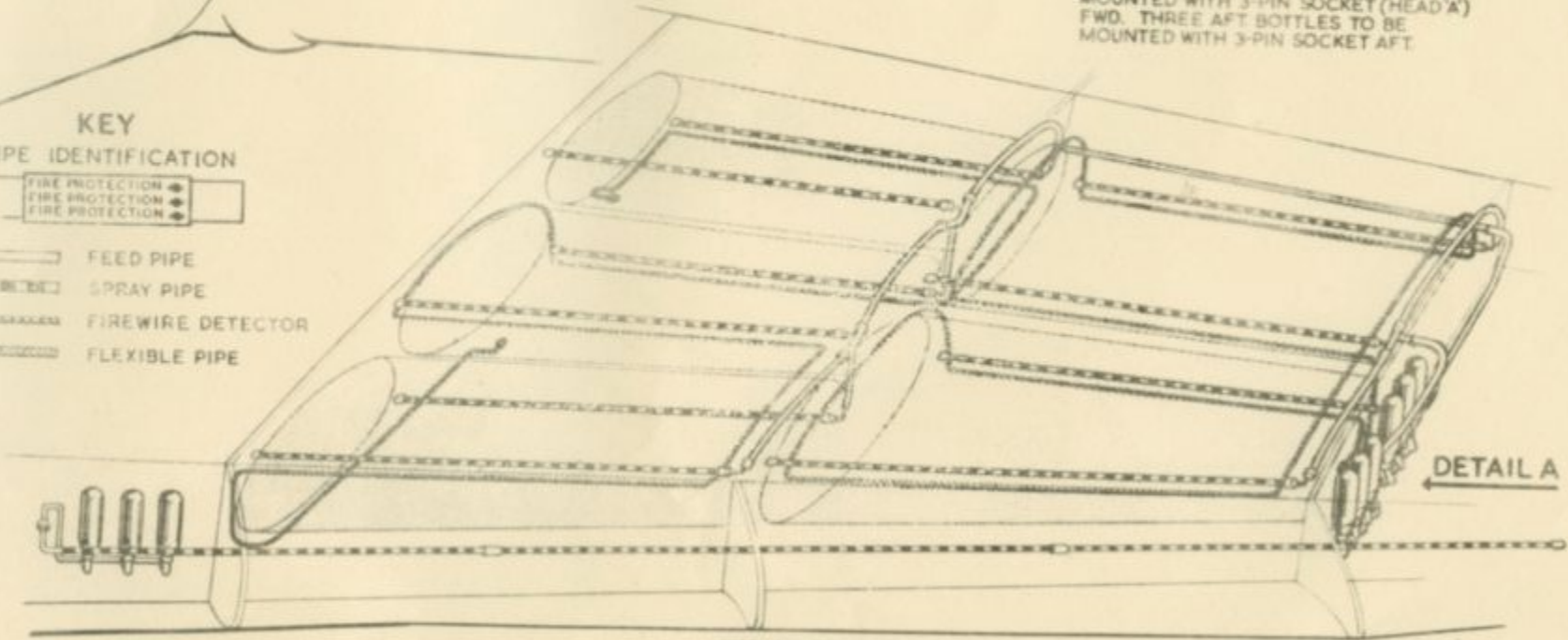
TO OUTBOARD WING TANKS

TO INBOARD WING TANKS

NOTE:
THE THREE FORWARD BOTTLES TO BE MOUNTED WITH 3-PIN SOCKET (HEAD 'A') FWD. THREE AFT BOTTLES TO BE MOUNTED WITH 3-PIN SOCKET AFT.

KEY
PIPE IDENTIFICATION

-  FIRE PROTECTION
-  FIRE PROTECTION
-  FIRE PROTECTION
-  FEED PIPE
-  SPRAY PIPE
-  FIREWIRE DETECTOR
-  FLEXIBLE PIPE



WING TANKS

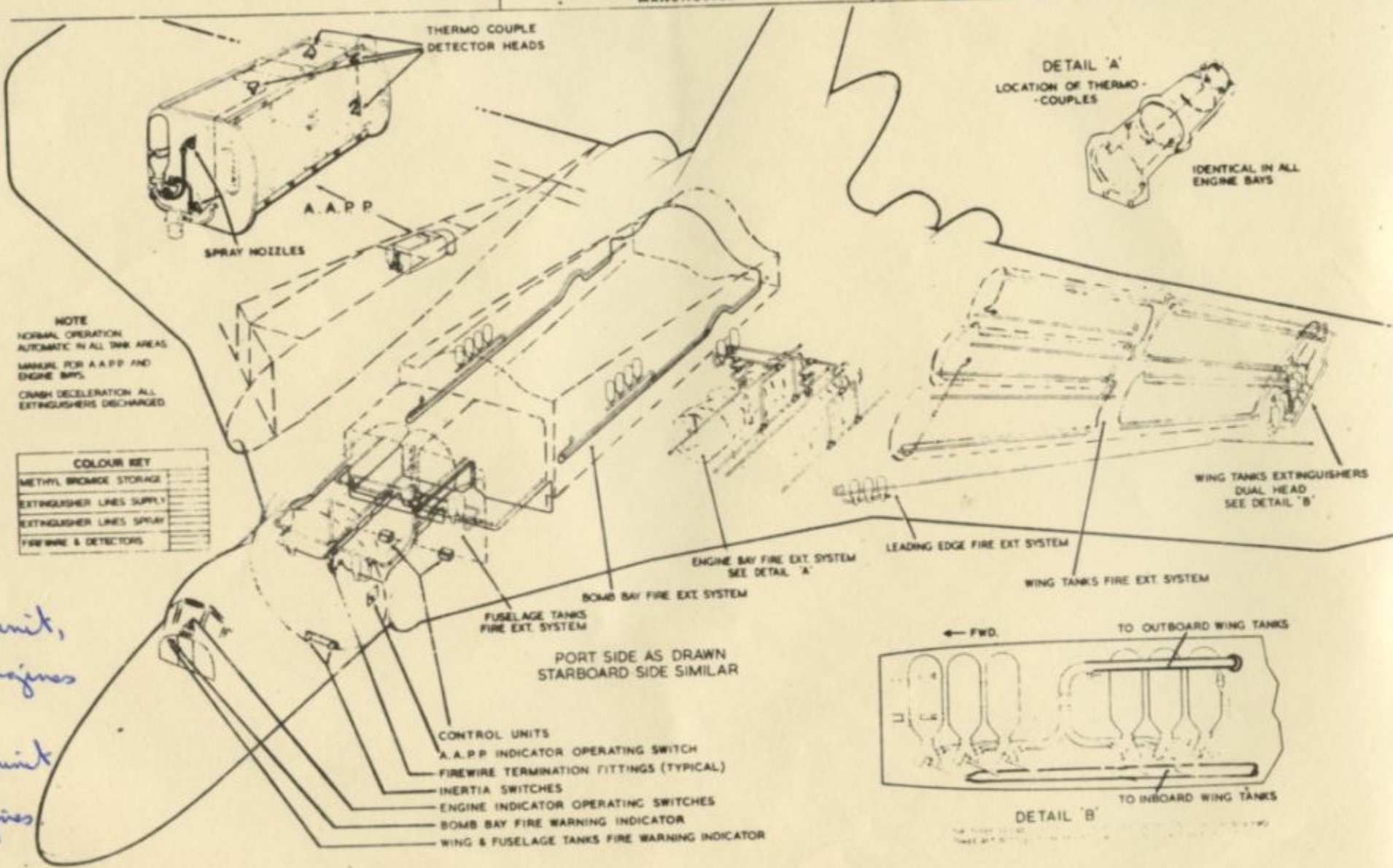
DETAIL A

VULCAN B. MK. 2



FIRE EXTINGUISHING GENERAL ARRANGEMENT

MOD. NO.
ISSUE NO.



NOTE
NORMAL OPERATION
AUTOMATIC IN ALL TANK AREAS
MANUAL FOR A.A.P.P. AND
ENGINE BAYS
CRASH DECELERATION ALL
EXTINGUISHERS DISCHARGED

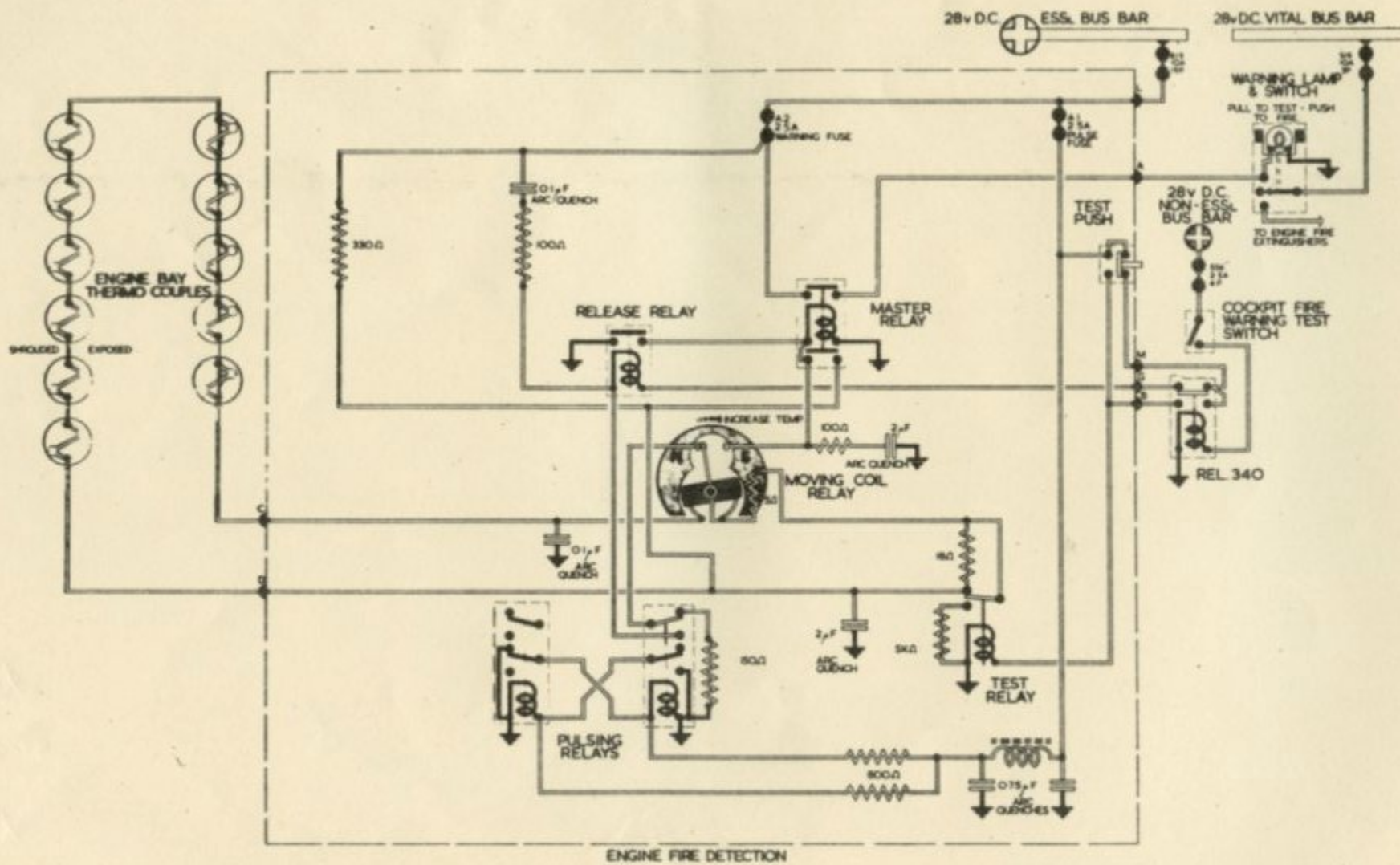
COLOUR KEY	
	METHYL BROMIDE STORAGE
	EXTINGUISHER LINES SUPPLY
	EXTINGUISHER LINES SPRAY
	FIREWIRE & DETECTORS

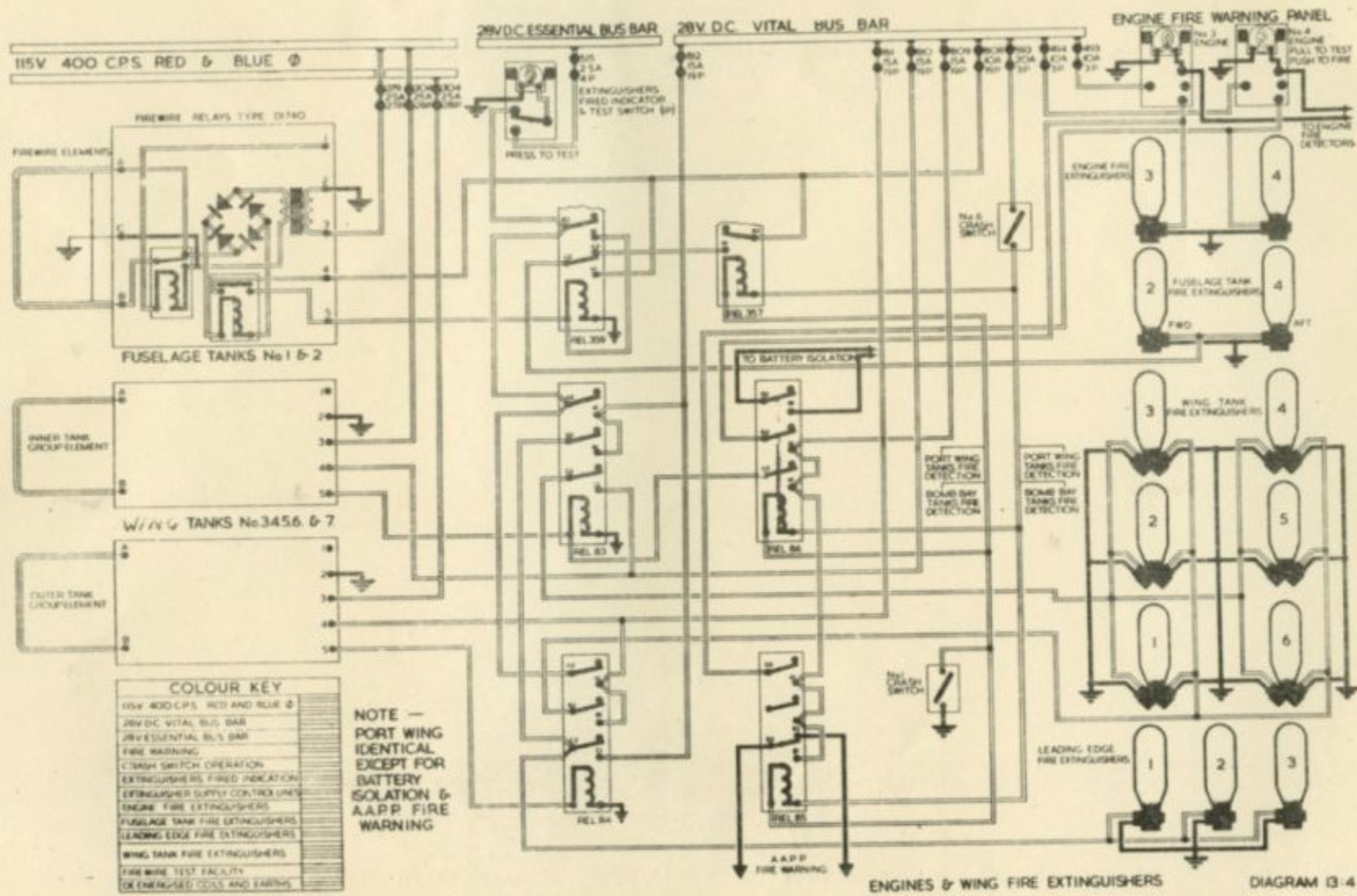
*Port control unit,
Inner engines*

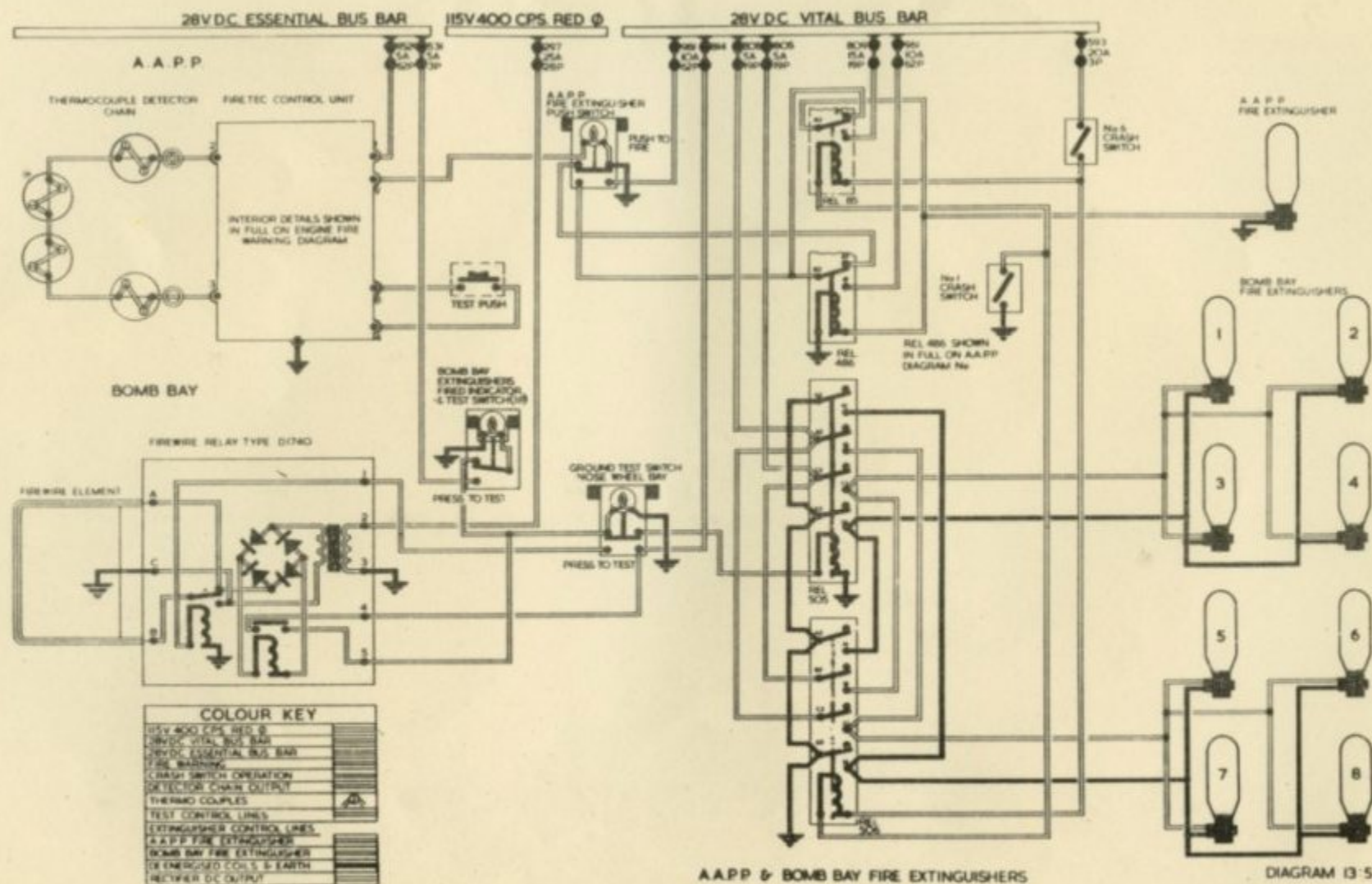
*Starboard control unit
outer engines*

PORT SIDE AS DRAWN
STARBOARD SIDE SIMILAR

DETAIL 'B'









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