

Section - III SYSTEMS DESCRIPTION

Sub-section 4 FIRE PROTECTION

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GENERAL

Each engine is divided into two zones for fire detection purposes. Each zone is equipped with a fire or overheat detection element connected to a responder. When a fire or overheat is detected in a zone, an audible and visual warning is initiated. Two twin-shot fire extinguishers are provided in the rear equipment bay and are connected to each engine through tubing.

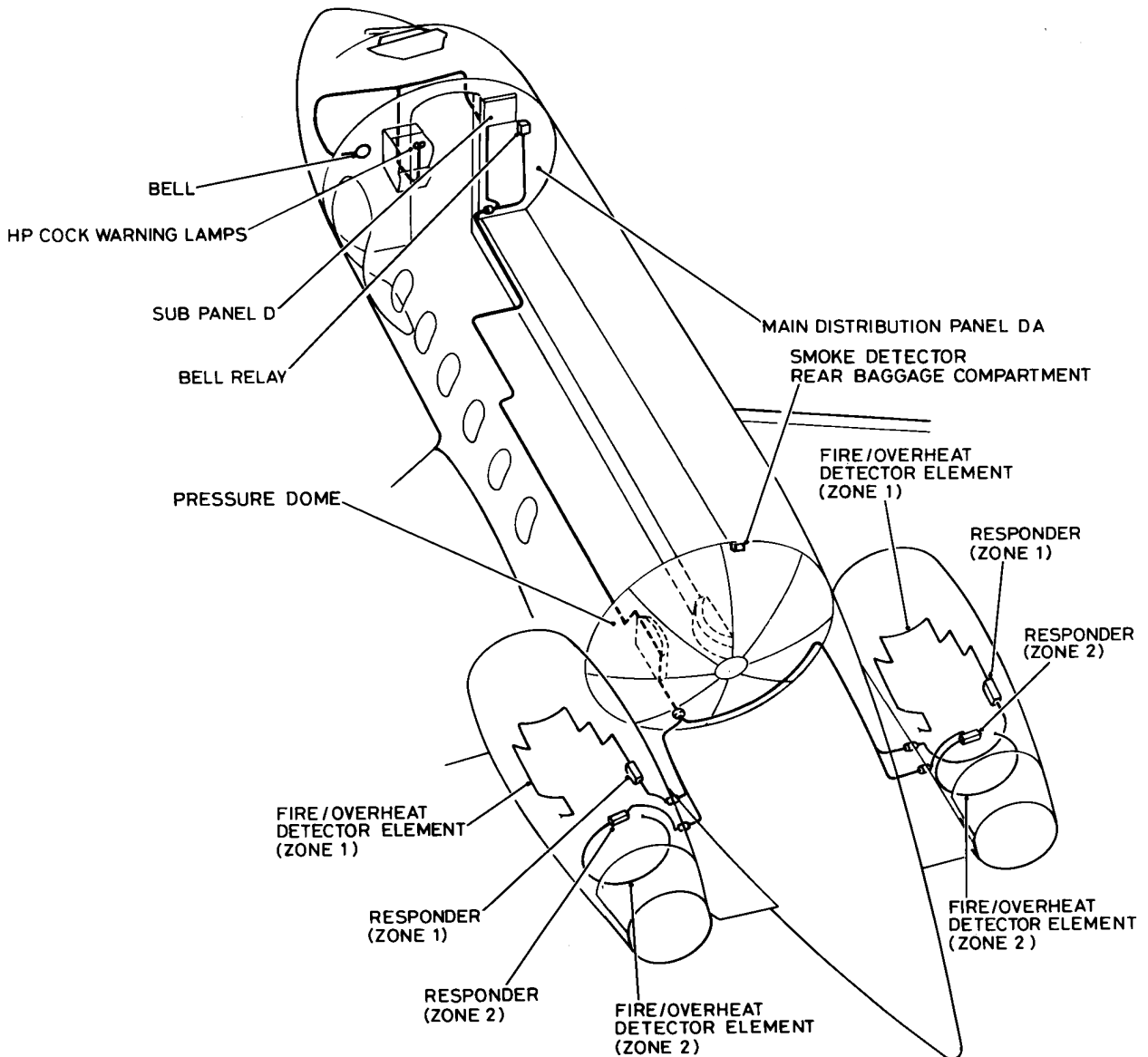
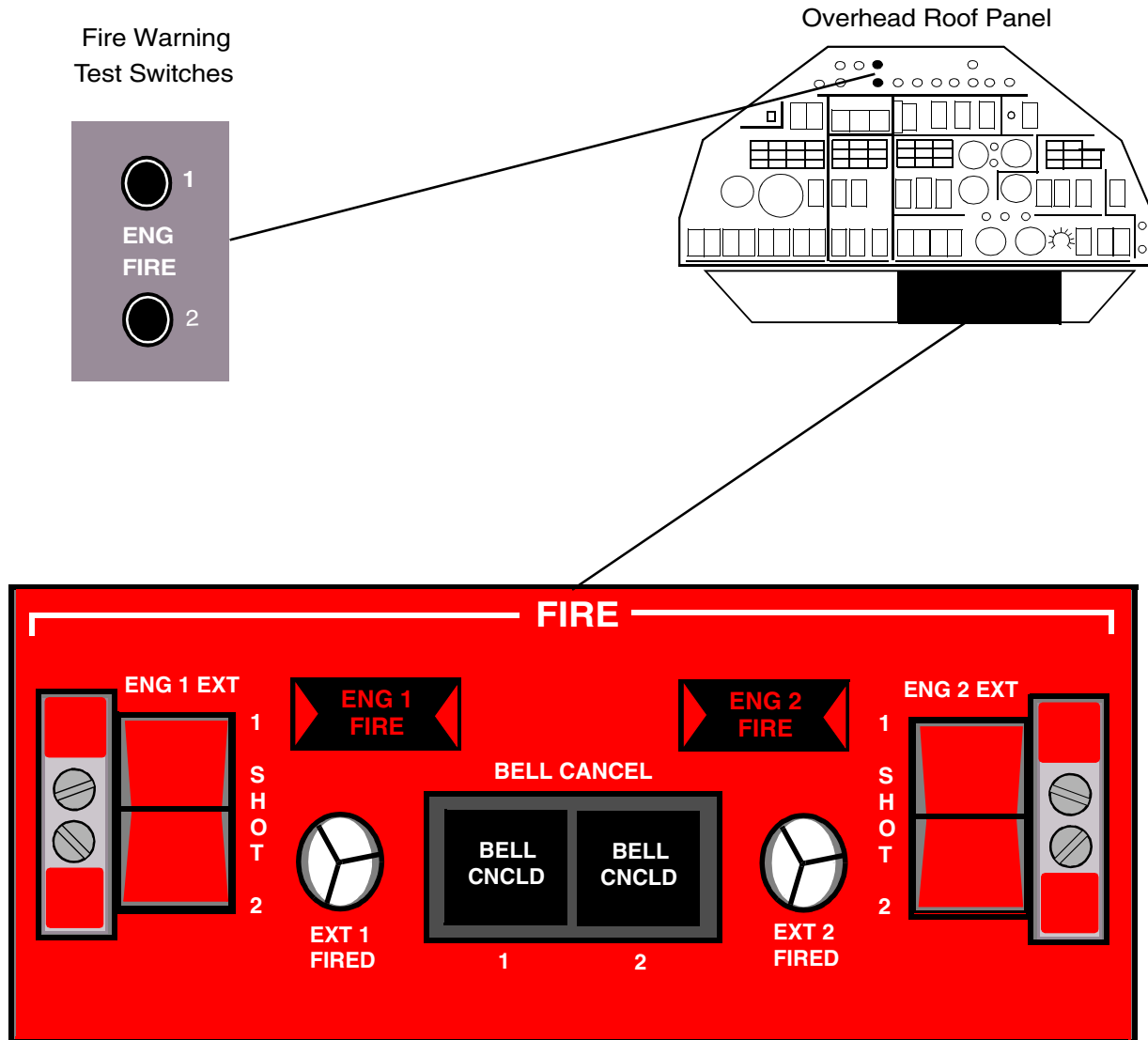


Figure 1
Engine Fire Detection and Warning System Component Locations

CONTROLS and INDICATIONS



ENGINE FIRE DETECTION SYSTEM

Fire or overheat in each engine zone is detected by a continuous pneumatic sensing capillary type detector element connected to a fire/overheat responder. The detector element is a sealed capillary tube filled with helium gas and a hydrogen-charged core material.

The sensor has two sensing functions:

- **Overheat** sensing of average temperature increase.
- **Fire** sensing of discrete temperatures caused by impinging flame or hot gases.

OVERHEAT

The sensor acts as a fixed volume device filled with helium gas. When the average temperature in the engine detection zone increases, the helium gas pressure rises in proportion. An alarm switch in the responder is triggered when a pre-set average temperature is reached.

FIRE

The hydrogen-filled core in the sensor releases large quantities of gas whenever a small section of the tube is heated to a pre-set temperature, by flame or a local hot spot. The hydrogen gas triggers the alarm switch in the responder.

Both the overheat and fire detection functions are reversible. When the detected temperature reduces to normal level, the warnings cease.

WARNINGS

The flight compartment engine fire, visual and audible, warnings are activated by the responder. The sensor does not trigger false alarms if mechanical damage occurs to the sensor. Each pair of responders is connected to:

- An associated ENG 1 or ENG 2 FIRE annunciator (overhead roof panel).
- The MWS master warning lamps (glare shield).
- An associated ENG 1 or ENG 2 FIRE repeater annunciator (MWS panel).
- FIRE legend in the lower center of the applicable N₁/ITT scale.
- An associated HP cock red fire warning lamp (directly above the HP cocks).
- A fire warning bell.

The operation of the fire warning bell may be cancelled by pushing the relevant BELL CANCEL 1 or 2 switch/annunciator on the forward extension of the overhead roof panel. The white BELL CNCLD annunciator, integral with the switch, illuminates.

TESTING

Each engine fire/overheat detector system is provided with an ENG FIRE warning TEST switch. These switches are located on the TEST section of the overhead roof panel.

When either switch is pushed:

- The associated ENG 1 or ENG 2 FIRE annunciator illuminates.
- The MWS master warning lamps flash until acknowledged.
- The associated ENG 1 or ENG 2 FIRE repeater annunciator illuminates.
- FIRE legend will flash for 5 seconds and then remain steady in the lower center of the applicable N₁/ITT scale.
- The associated HP cock red warning lamp illuminates.
- The fire warning bell sounds.

ENGINE FIRE EXTINGUISHING SYSTEM

Engine fire extinguishant is supplied from two dual-head, single-shot extinguisher bottles located in the rear equipment bay. The extinguishant is distributed from the bottles by tubing connected to twin high-rate discharge nozzles mounted one on each engine pylon wall and located to discharge into the associated engine bay.

Each extinguisher, via the dual extinguisher head, is piped to both engines which allows either one shot of extinguishant per engine or two shots of extinguishant to a single engine, as necessary.

OPERATION

Discharge of each bottle is achieved by the firing of electrically operated cartridge units mounted in the dual head of the bottles. Firing of the cartridges is controlled by two ENG EXT baulked selector switches, one for each engine.

When either switch is selected to SHOT 1 or SHOT 2 the relevant cartridge fires and one bottle is completely discharged into the appropriate engine. At the same time, adjacent to the selector switch, an associated EXT FIRED transparent indicator fuse turns red.

NOTE: Figure 2 shows a fire occurred in No. 1 engine and extinguisher bottle 1 has been used (shot 1).

The second bottle is still available for use, either in No. 1 engine (shot 2) or in No. 2 engine (shot 1) should the need arise.

Two pressure relief discharge indicators, located on the fuselage below the left engine pylon, are connected one to each bottle and are visible for walk around inspections. The indicators normally display a green disc.

In the event of excessive pressure in the bottle, a safety disc ruptures to release the contents. The released extinguishant flows to the discharge indicator and blows out the green disc to reveal a bright red interior and the discharged bottle must be replaced before the next flight.

REAR EQUIPMENT BAY OVERHEAT

An overheat condition in the rear equipment bay is detected by six thermally-operated switches and indicated by a single REAR BAY OVHT annunciator on the MWS panel.

Operation of one or more of the switches connects a supply to the annunciator and activates the MWS master warning lamps which flash until acknowledged.

NOTE: The fire warning bell does not sound.

BAGGAGE BAY and TOILET SMOKE (if installed)

The airplane normally has three smoke detectors installed. The smoke detectors are located in the forward baggage compartment, the aft baggage compartment and the toilet vanity.

If smoke is detected, a red REAR BAGG SMOKE annunciator on the MWS panel illuminates and the MWS master warning lights flash until acknowledged.

NOTE: The fire warning bell does not sound.

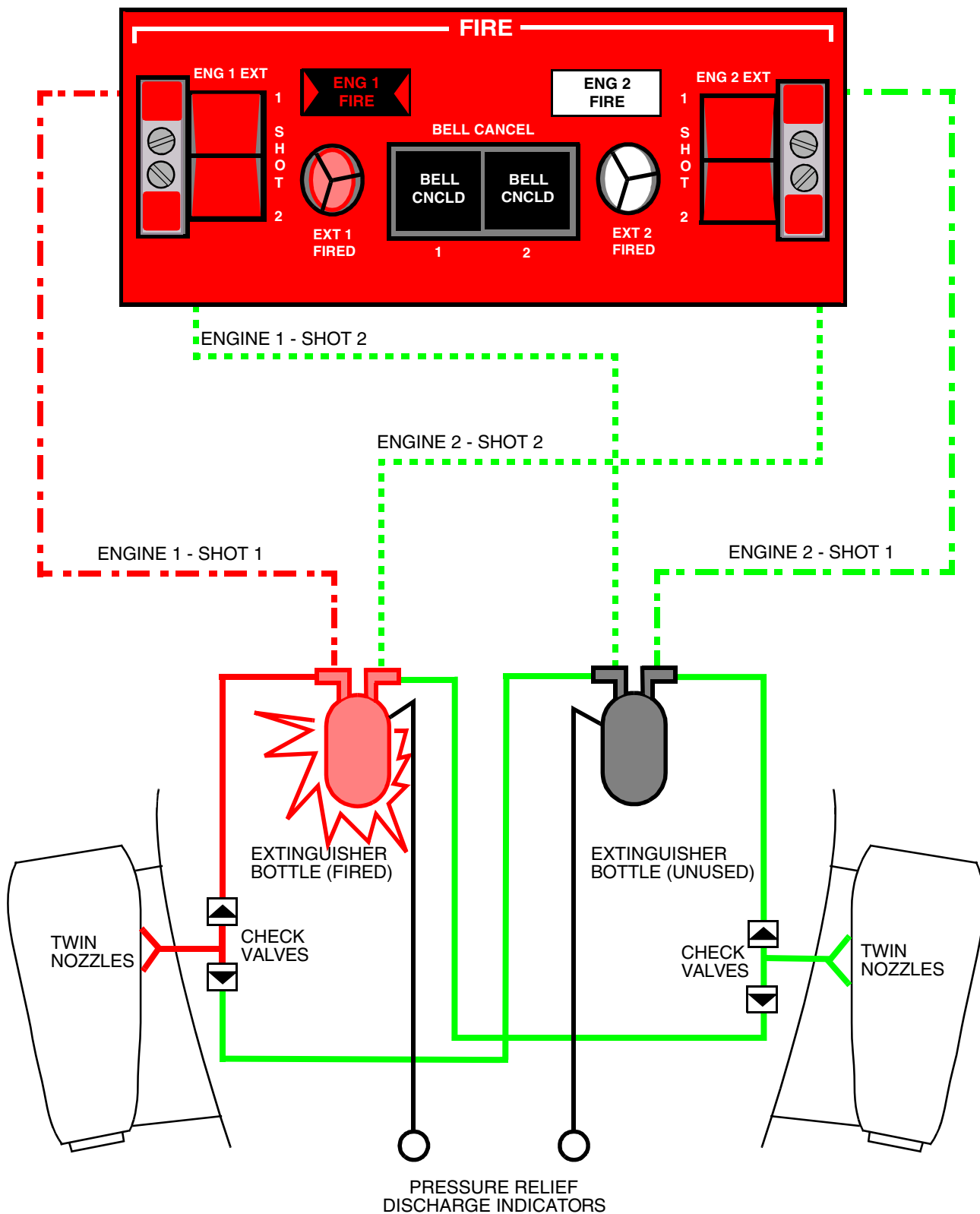


Figure 2
Engine Fire Extinguisher System
(depicts engine 1 warning and extinguisher 1, shot 1 fired)

BCF PORTABLE FIRE EXTINGUISHER

A single portable hand-operated extinguisher, stowed on the flight compartment left bulkhead, provides BCF extinguishant for fighting fires in the interior of the fuselage.

A second BCF extinguisher is located in the passenger cabin in a location determined by the cabin layout.

Either extinguisher is suitable for the following types of fires:

- Vaporized liquids such as kerosene, hydraulic fluid and similar.
- Electrical fires.
- The early stages of fires involving freely burning materials such as wood, paper and cloth.

The extinguishant is a charge of 1.5 kg of BCF (Halon 1211) propelled by a pressurized charge of dry nitrogen. Operation of the extinguisher is controlled by a manual trigger. A safety catch is on the mounting bracket to prevent operation of the trigger when the extinguisher is stowed. The extinguisher is retained in the mounting bracket by a strap and fastener.

Releasing the trigger interrupts the flow and seals the nozzle to prevent any leakage of extinguishant.

NOTE: A re-charged extinguisher must be installed in the airplane once an extinguisher has been completely or partially used.

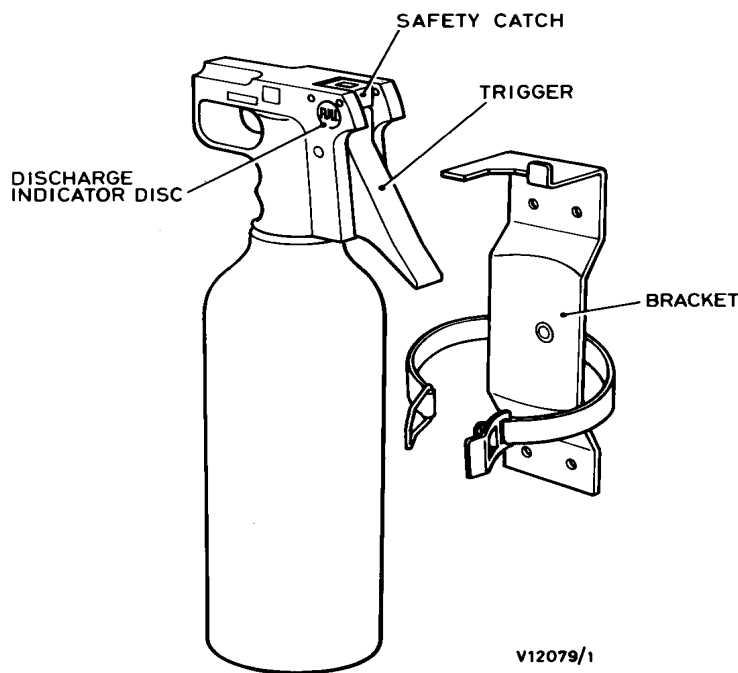


Figure 3
BCF Portable Fire Extinguisher