



**OPERATIONS MANUAL**  
**SECTION 6-15**  
**FIRE PROTECTION**

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## OPERATIONS MANUAL

### GENERAL DESCRIPTION

There are Fire Detection and Extinguishing Systems for:

- Engines;
- APU;
- Passenger Cabin (optional);
- Lavatory (optional);
- Baggage Compartment (optional).

The Engines and APU also have Overheat Detection Systems.

### ENGINE FIRE PROTECTION

Engine Fire Protection consists of these systems:

- Engine Overhead and Fire Detection System powered by the Emergency DC Buses;
- Engine Fire Extinguishing System powered by the Hot Battery Bus.

### ENGINE FIRE DETECTION

Each engine contains fire detector sensor tubes for the engine accessories, the tail pipe zone and the wheelwell.

The indications of an engine fire are:

- Both MASTER WARNING lights illuminate;
- The related FIRE ENG/WW light illuminates (if fire condition is on the engine wheelwell region);
- The related FIRE PIPE ZONE light illuminates (if fire condition is in the pipe zone region);
- FIRE light illuminates on the Multiple Alarm Panel (MAP);
- The warning bell sounds.

The FIRE ENG/WW light or the FIRE PIPE ZONE light remains illuminated until the temperature drops below the onset temperature.

The system contains a fault monitoring circuit. If the fire detector sensors located on the related engine or wheelwell region are inoperative, the DET INOP ENG/WW light illuminates. If the fire detector sensors located on the related pipe zone region are inoperative, the DET INOP PIPE ZONE light illuminates.



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### **ENGINE FIRE EXTINGUISHING**

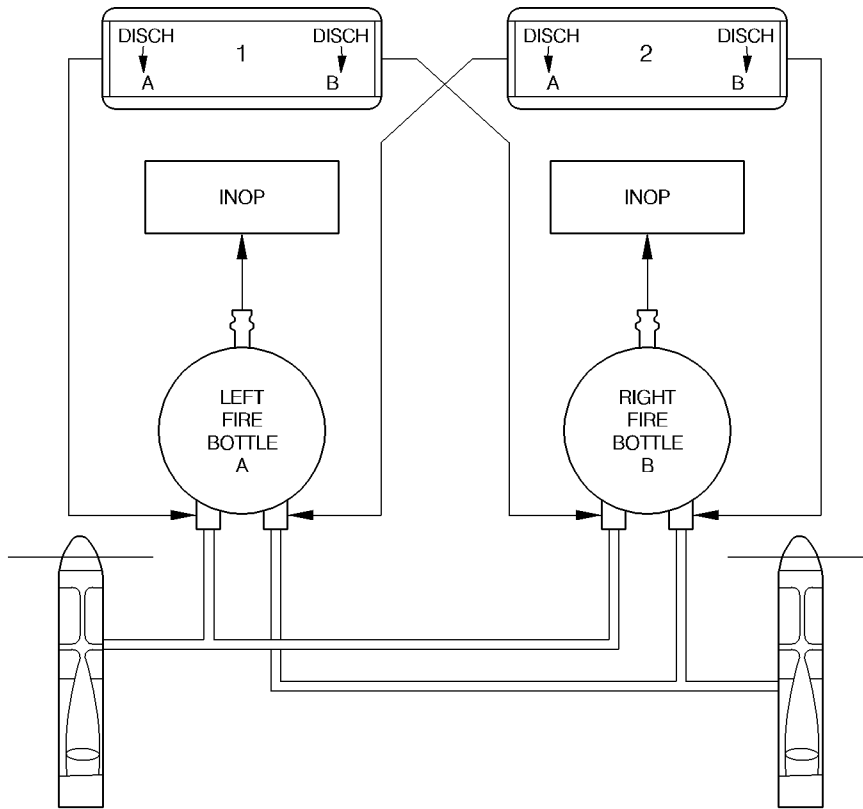
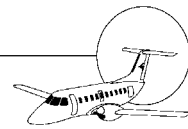
The Engine Fire Extinguishing System consists of two engine fire extinguisher bottles installed in each wing-fuselage fairing, two engine/wheelwell fire extinguishing handles, two ABLE bottle lights, two INOP bottle lights and a TEST button. Either or both bottles can be discharged into either engine.

Pulling the engine/wheelwell fire extinguishing handle:

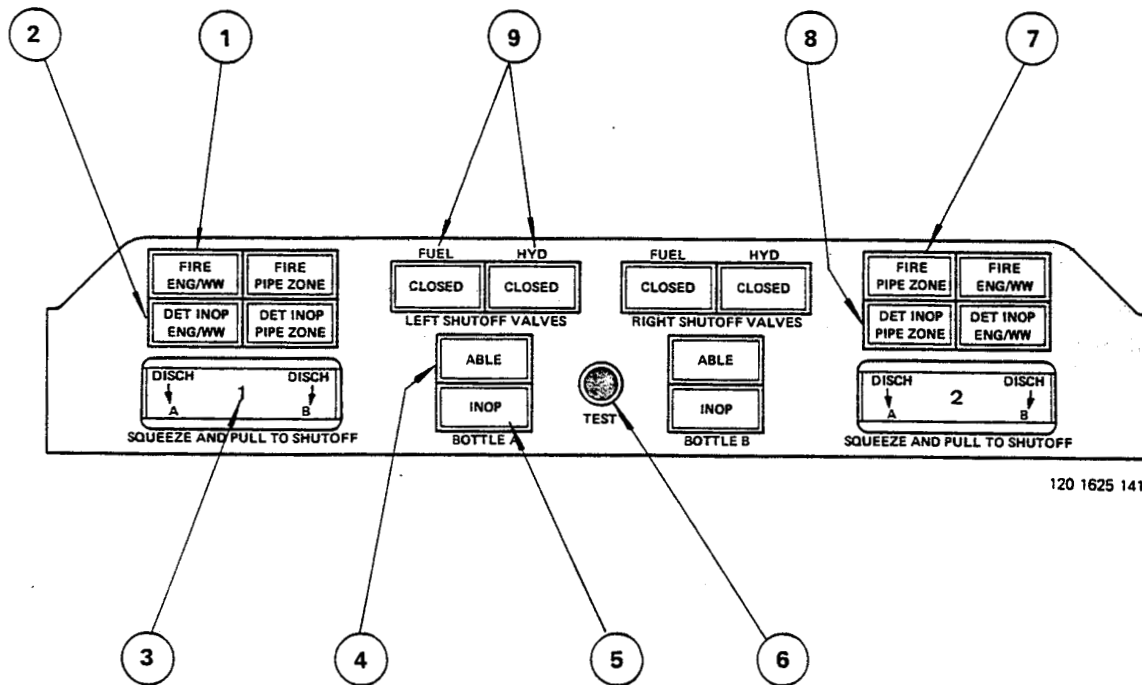
- Closes the related engine fuel shutoff valve;
- Closes the related hydraulic shutoff valve;
- Closes the bleed air shutoff valve;
- Actuates the auxiliary electric Auxiliary Propeller Oil Pump;
- Closes the air inlet de-icer ejector flow control valve.

Rotating the fire extinguishing handle counterclockwise discharges the extinguishing agent into the related engine. Rotating the handle clockwise discharges the remaining bottle.

The bottle A or Bottle B INOP light illuminates, after the fire extinguishing handle is rotated, indicating that the bottle has discharged.



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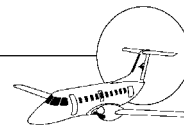
**ENGINE/WHEEWELL AND PIPE ZONE FIRE CONTROL PANEL  
(CENTER GLARESHIELD PANEL)**

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## **OPERATIONS MANUAL**

- 1. ENGINE/WHEELWELL No. 1 FIRE WARNING LIGHT (RED)**  
ILLUMINATED – When a fire/overheat condition is sensed by any detector. Remains illuminated until fire/overheat condition disappears.
- 2. ENGINE/WHEELWELL No. 1 FIRE DETECTOR INOPERATIVE LIGHT (AMBER)**  
ILLUMINATED – In case of failure of engine and/or gear wheelwell fire detector.
- 3. ENGINE/WHEELWELL No. 1 FIRE EXTINGUISHING HANDLE**  
Pulling action causes automatically and simultaneously:
  - Engine fuel, hydraulic and bleed air shutoff valves to be closed.
  - Propeller electrical auxiliary oil pump and feather solenoid to be actuated.
  - Air inlet de-icer ejector flow control valve to be actuated to the closed position.Rotating action causes fire extinguisher agent to be discharged. First shot (counterclockwise rotation) and second shot (clockwise rotation) are provided for the same region.
- 4. FIRE EXTINGUISHER BOTTLE ABLE LIGHT (GREEN)**  
ILLUMINATED – Indicates the extinguisher agent bottle in perfect condition for discharge.
- 5. FIRE EXTINGUISHER BOTTLE PRESSURE CONDITION LIGHT (AMBER)**  
ILLUMINATED – When bottle is in empty condition, or in any condition which renders the agent bottle inoperative as far as agent pressure and charge are concerned.
- 6. ENGINE-WHEELWELL - PIPE ZONE AND APU FIRE PANELS TEST BUTTON**  
PRESSED– Checks the fire detection and extinguishing circuits. If the button is pressed more than 10 seconds, the APU is shut down, if it is running.  
  
Following lights must illuminate:
  - All lights in eng/gear wheelwell – pipe zone and APU fire control panels.
  - CLOSED fuel shutoff valve light on the APU panel.Following lights must flash:
  - WARNING and CAUTION lights.
  - FIRE APU and APU lights on the multiple alarm panel.Aural warning must sound continuously. During test, ALARM LT switch should be selected to BRT, to check the integrity of both lamps on each annunciator module.
- 7. PIPE ZONE No. 2 FIRE WARNING LIGHT (RED)**  
ILLUMINATED – When a fire/overheat condition is sensed by pipe zone detectors. Remains illuminated until fire/overheat condition disappears.
- 8. PIPE ZONE No. 2 FIRE DETECTOR INOPERATIVE LIGHT (AMBER)**  
ILLUMINATED – In case of failure of pipe zone fire detectors.
- 9. ENGINE No. 1 FUEL AND HYDRAULIC SHUTOFF VALVES POSITION INDICATION LIGHTS (WHITE)**  
ILLUMINATED – When the valve (actuated through the fire ext. handle pulling) reaches the fully closed position.



## OPERATIONS MANUAL

### APU FIRE PROTECTION

APU Fire Protection consist of these systems:

- APU Fire Detection;
- APU Fire Extinguishing.

#### APU FIRE DETECTION

The APU region contains overheat/fire detector sensor tubes. As the temperature of a detector increases to a predetermined limit, the detector senses an overheat condition. At higher temperatures, the detector senses a fire condition.

The indications of an APU fire are:

- The APU FIRE Detection Light illuminates;
- Both Master Warning Lights illuminates;
- The Fire Warning Bell sounds;
- The FIRE APU Light illuminates.

The system contains a fault monitoring circuit. If the overheat/fire detector sensors located on the APU are inoperative, the Fire Detection INOP Light illuminates.

#### APU FIRE EXTINGUISHING

The APU Fire Extinguishing System consists of the one APU fire extinguisher bottle, an APU SHUTOFF/EXTINGUISHER switch, an ABLE bottle light, an INOP bottle light, and a TEST button.



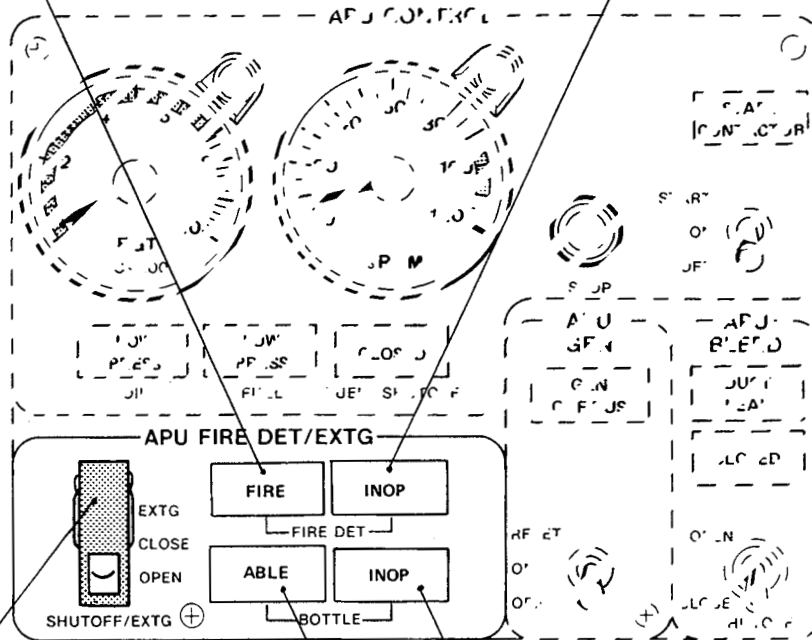
**OPERATIONS MANUAL**

**APU FIRE WARNING LIGHT (RED)**

**ILLUMINATED** - When a fire/overheat condition is sensed by the detector. It remains lit until the fire/overheat condition disappears. Illuminates in conjunction with FIRE APU red light on multiple alarm panel.

**APU FIRE DETECTOR INOPERATIVE LIGHT (AMBER)**

**ILLUMINATED** - In case of failure of any fire detector.



**APU SHUTOFF/EXTINGUISHER SWITCH**

**OPEN** - APU general system in normal operation.

**CLOSE** - Causes automatically and simultaneously:

- APU fuel and bleed valves closed.
- APU bleed CLOSED light and fuel shutoff CLOSED light illuminated.
- APU generator disconnected from bus bar.
- APU GEN OFF BUS light illuminated.

**EXTG** - Causes fire extinguisher agent to be discharged.

**APU FIRE EXT BOTTLE PRESSURE CONDITION LIGHT (AMBER)**

**ILLUMINATED** - Indicates the bottle empty condition or when any condition which renders the extinguisher agent bottle inoperative as far as agent pressure and charge are concerned.

**APU FIRE EXT BOTTLE ABLE LIGHT (GREEN)**

**ILLUMINATED** - Indicates the extinguisher agent bottle in perfect condition for discharge.

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**APU FIRE CONTROL PANEL (OPTIONAL)**  
**(OVERHEAD PANEL)**



## OPERATIONS MANUAL

### SMOKE DETECTION SYSTEM (OPTIONAL)

**NOTE:** Only for airplane Combi, Quick Change, and Full Cargo Version. The system is designed to detect smoke inside the Passenger Cabin when cargo is transported in the Passenger Cabin.

The Smoke Detection System is activated by a rotary switch on the overhead panel, which also checks the detectors individually for correct operation.

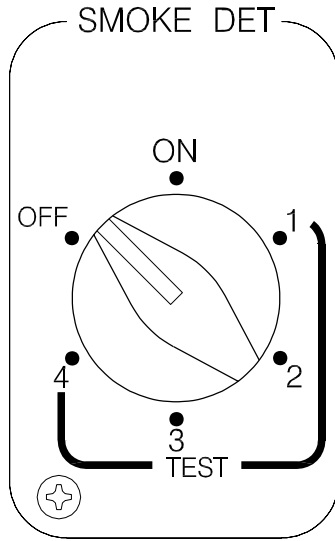
Three smoke detectors are installed on the ceiling, and another one is installed near the pressurization control valves.

In the presence of smoke, the system activates the aural alarm and the red SMOKE light illuminates, on the multiple alarm panel. As the smoke density drops to a level associated with a safe condition, the system is automatically reset.





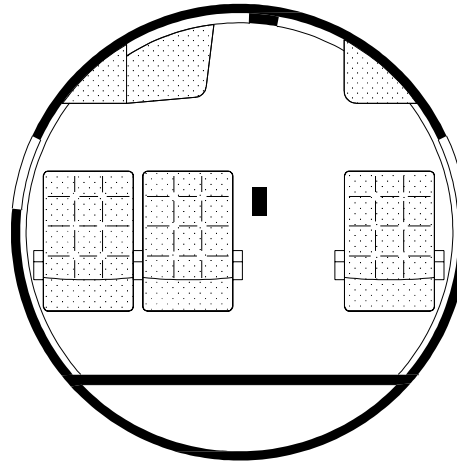
# OPERATIONS MANUAL



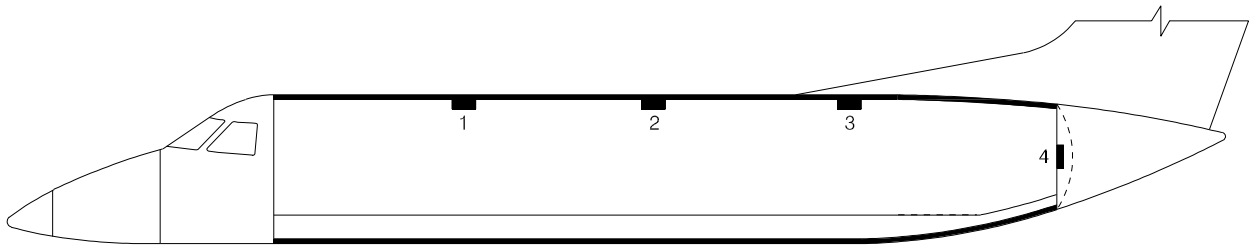
**(OVERHEAD PANEL)**

### SMOKE DETECTION SYSTEM CONTROL SWITCH

OFF - System deactivated (for passenger configuration).  
ON - System armed (when operating in the Combi or Full Cargo Version).  
1/2/3/4 - Operationally checks the respective detector: the aural/visual alarm is activated, indicating correct operation of the system.



**SMOKE DETECTOR LOCATIONS**



**SMOKE DETECTOR LOCATIONS**

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## OPERATIONS MANUAL

### LAVATORY FIRE PROTECTION (OPTIONAL)

The Lavatory Fire Protection consists of these systems:

- Lavatory Smoke Detection powered by DC BUS 2;
- Lavatory Fire Extinguishing powered by DC BUS 2.

#### LAVATORY SMOKE DETECTION

The Lavatory Smoke Detection System consists of a smoke sensor and a SMOKE DETECTOR panel.

The smoke sensor is installed close to the waste disposal, which is considered the place where a fire is most prone to start.

The SMOKE DETECTOR PANEL is installed in the upper portion of the right closet.

The indications when smoke is detected in the toilet are:

- Both Master Warnings illuminate;
- The Red SMOKE Light illuminates on the Multiple Alarm Panel;
- The Red Alarm Light illuminates on the Smoke Detector Panel;
- The SMOKE Aural Warning sounds;
- An Alarm Warning of the Smoke Detector Panel sounds in the toilet.

When smoke is no longer present, the system automatically resets.

#### TOILET FIRE EXTINGUISHING

The Toilet Fire Extinguishing System consists of a fire extinguisher bottle intended to extinguish a fire in the toilet waste disposal. The bottle is self-actuated and fully discharged when the waste disposal temperature reaches 79°C (174°F).

The flight deck has no indication of extinguisher discharge.



# OPERATIONS MANUAL

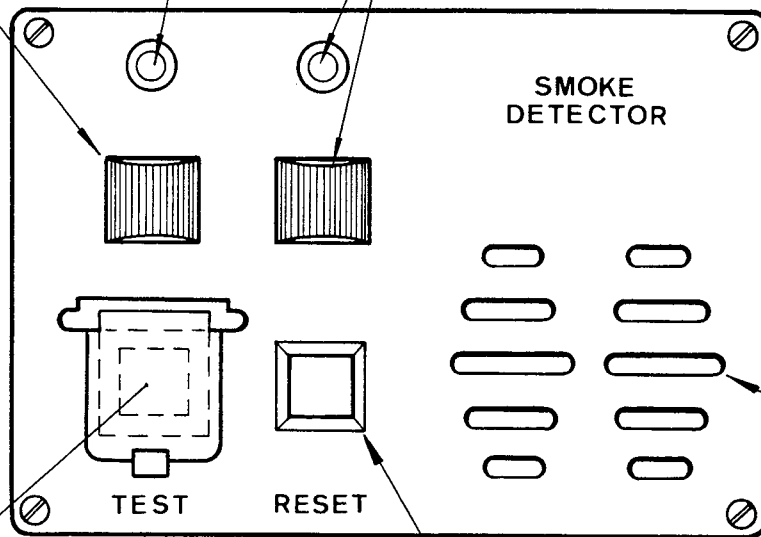
**ALARM LIGHT (RED)**

ILLUMINATED – In case of smoke or testing, flashes simultaneously with the smoke red light on the multiple alarm panel.

**OPERATION LIGHT (GREEN)**

ILLUMINATED – Indicates that the system is ready to operate.

DEACTIVATED



**TEST SWITCH**

PRESSED – Checks the normal operation of the system by simulating a smoke condition. Causes the alarm and smoke red lights to illuminate, and the aural warning and the audible tone to be activated.

**HORN RESET SWITCH**

PRESSED – Cuts off the horn audible sound, in case of smoke or testing.

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**SMOKE DETECTOR PANEL**  
**(RH CLOSET – TYPICAL)**



## OPERATIONS MANUAL

### CLASS-C BAGGAGE COMPARTMENT SMOKE DETECTION AND FIRE EXTINGUISHING SYSTEM (OPTIONAL)

The airplanes Post-Mod. SB 120-26-0025 or S/N 120.350 and on are equipped with a Class-C baggage compartment that contains a smoke detection and fire extinguishing system.

The system comprises: two smoke detectors; a high-rate discharge bottle, intended to fill the baggage compartment instantaneously; a metering discharge bottle intended to provide the concentration-fire-level extinguishing agent for at least 60 minutes; a dedicated smoke detection and fire extinguishing control panel located on the glareshield panel.

In case smoke is detected inside the baggage compartment, a red WARN light illuminates the baggage fire extinguishing button located on the control panel, the red SMOKE light illuminates on the multiple alarm panel, and the SMOKE aural warning sounds.

When the baggage fire extinguishing button is pressed, both bottles are discharged and an amber INOP light illuminates on the control panel to indicate that the bottles are empty.

The control panel has also a switch to allow the flight crew to test the system.

The bottles are installed in a non-pressurized compartment at the tail cone and are filled with Halon 1301 gas.

The electric power for the smoke detection/extinguishing system is supplied by 28 V DC EMERG DC Bus 1.



# OPERATIONS MANUAL

## TEST SWITCH

The smoke detection and fire extinguishing system is tested by means of a three-position switch. The switch has the TEST 1, TEST 2, and center positions. The TEST 1 and TEST 2 positions are spring-loaded to the center OFF position.

When the switch is positioned in TEST 1:

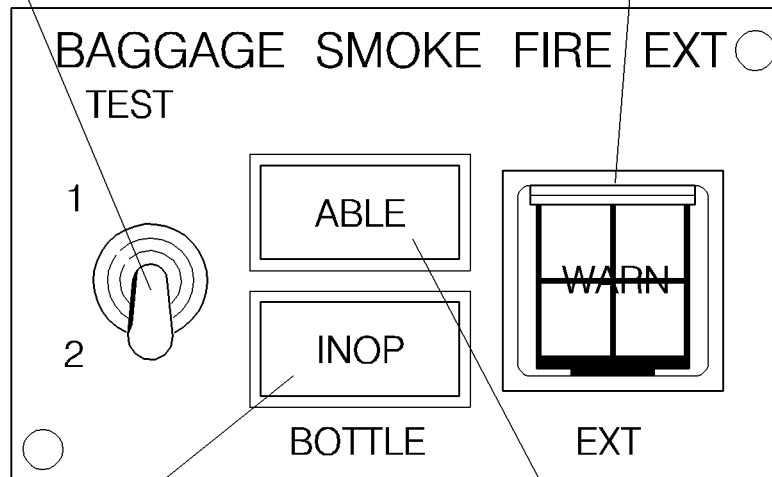
- Both fire extinguisher bottles and one smoke detector are tested.
- ABLE, INOP, and WARN lights illuminated on the BAGGAGE SMOKE/FIRE EXT panel.
- SMOKE light illuminated on the multiple alarm panel.
- SMOKE aural warning sounds.
- LEVEL 3 chimes is generated.

When the switch is positioned in TEST 2:

- The remaining smoke detector is tested.
- WARN light illuminates on the BAGGAGE SMOKE/FIRE EXT panel.
- SMOKE light illuminates on the multiple alarm panel.
- SMOKE aural warning sounds.
- LEVEL 3 chimes is generated.

## BAGGAGE FIRE EXTINGUISHING PUSH BUTTON (RED - GUARDED)

- When pressed, discharges both baggage fire extinguisher bottles.
- Illuminates when smoke is detected in the baggage compartment.
- Remains lit as long as there is smoke inside the baggage compartment.



## INOP LIGHT (AMBER)

The INOP light illuminates when:

- TEST 1 is performed.
- The fire extinguisher bottles are empty or present a low pressure state.

## ABLE LIGHT (GREEN)

- Illuminates when TEST 1 is performed and it indicates normal operation of the fire extinguisher bottles.

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## BAGGAGE DETECTION/EXTINGUISHING PANEL

