

B737 NG



Fire Protection

Introduction

There are fire detection and extinguishing systems for:

- engines
- lavatories
- APU
- cargo compartments.

The engines also have overheat detection systems.

The main gear wheel well has a fire detection system, but no fire extinguishing system.

Engine Fire Protection

Engine fire protection consists of these systems:

- engine overheat and fire detection powered by the battery bus
- engine fire extinguishing powered by the hot battery bus.

Engine Overheat and Fire Detection

Each engine contains two overheat/fire detector loops. Each loop provides both fire and overheat detection. 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. Normally, both detector loops must sense a fire or overheat condition to cause an engine overheat or fire alert. The ENG OVERHEAT light or engine fire warning switch remains illuminated until the temperature drops below the onset temperature.

An OVHT DET switch for each engine, labeled A, B, and NORMAL, permits selection of either loop A or B, or both A and B, as the active detecting loops.

The system contains a fault monitoring circuit. If one loop fails with the OVHT DET switch in NORMAL, that loop is automatically deselected and the remaining loop functions as a single loop detector. There is no flight deck indication of single loop failure. If both loops fail on an engine, the FAULT light illuminates and the system is inoperative.

If the OVHT DET switch is positioned to A or B, the system operates as a single loop system. The non-selected loop is not monitored. If the selected loop fails, the FAULT light illuminates and the system is inoperative.

The indications of an engine overheat are:

- both MASTER CAUTION lights illuminate
- the OVHT/DET system annunciator light illuminates
- the related ENG OVERHEAT light illuminates.

The indications of an engine fire are:

- the fire warning bell sounds
- both master FIRE WARN lights illuminate
- the related engine fire warning switch illuminates
- all related engine overheat alert indications illuminate.

Engine Fire Extinguishing

The engine fire extinguisher system consists of two engine fire extinguisher bottles, two engine fire warning switches, two BOTTLE DISCHARGE lights, and an EXT TEST switch. Either or both bottles can be discharged into either engine.

The engine fire warning switches are normally locked down to prevent inadvertent shutdown of an engine. Illumination of an engine fire warning switch or ENG OVERHEAT light unlocks the engine fire warning switch. The switches may also be unlocked manually.

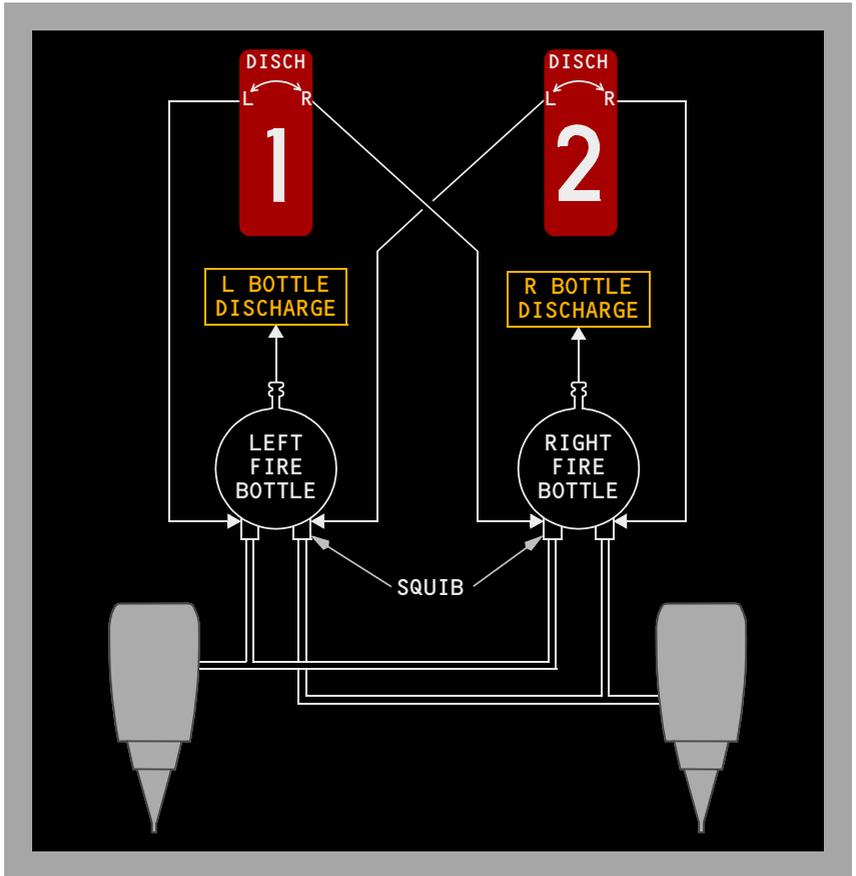
Pulling the engine fire warning switch up:

- closes both the engine fuel shutoff valve and the spar fuel shutoff valve
- closes the engine bleed air valve resulting in loss of wing anti-ice to the affected wing and closure of bleed air operated pack valve
- trips the generator control relay and breaker
- closes the hydraulic fluid shutoff valve. The engine driven hydraulic pump LOW PRESSURE light is deactivated
- disables thrust reverser for the related engine.
- allows the engine fire warning switch to be rotated for discharge
- arms one discharge squib on each engine fire extinguisher bottle.

Rotating the engine fire warning switch electrically “fires” a squib, discharging the extinguishing agent into the related engine. Rotating the switch the other way discharges the remaining bottle.

The L or R BOTTLE DISCHARGE light illuminates a few seconds after the engine fire warning switch is rotated, indicating the bottle has discharged.

Engine Fire Extinguisher Schematic



Left & Right Fire Bottles as per visible in wheel well bay

Check Both Engine Fire Extinguishers Pressure in RIGHT wheel well

OAT	Mini PSI	Maxi PSI
-20°C	515	665
0°C	605	755
+20°C	735	890
+40°C	935	1095

APU Fire Protection

APU fire protection consists of these systems:

- APU fire detection powered by the battery bus.
- APU fire extinguishing powered by the hot battery bus.

APU Fire Detection

A single fire detection loop is installed on the APU. As the temperature of the detector increases to a predetermined limit, the detector senses a fire condition. The APU fire warning switch remains illuminated until the temperature of the detector has decreased below the onset temperature.

The system contains a fault monitoring circuit. If the loop fails, the APU DET INOP light illuminates indicating the APU fire detection system is inoperative.

The indications of an APU fire are:

- the fire warning bell sounds
- both master FIRE WARN lights illuminate
- the APU fire warning switch illuminates
- the APU automatically shuts down
- the wheel well APU fire warning horn sounds, (on the ground only), and the wheel well APU fire warning light flashes.

APU Fire Extinguishing

The APU fire extinguisher system consists of one APU fire extinguisher bottle, an APU fire warning switch, an APU BOTTLE DISCHARGE light, and an EXT TEST switch. The APU ground control panel located in the right main wheel well also contains an APU fire warning light, an APU BOTTLE DISCHARGE switch, an APU fire control handle and APU HORN CUTOFF switch.

The APU fire warning switch is normally locked down to prevent inadvertent shutdown of the APU. Illumination of the APU fire warning switch unlocks the switch. The switch may also be unlocked manually.

Pulling the APU Fire Warning switch up:

- provides backup for the automatic shutdown feature
- deactivates the fuel solenoid and closes the APU fuel shutoff valve
- closes the APU bleed air valve
- closes the APU air inlet door
- trips the APU generator control relay and breaker
- allows the APU fire warning switch to be rotated for discharge
- arms the APU fire extinguisher bottle squib.

Rotating the APU fire warning switch in either direction electrically “fires” the squib discharging the extinguishing agent into the APU. The APU BOTTLE DISCHARGE light illuminates after a few seconds, indicating the bottle has discharged.

Main Wheel Well Fire Protection

Main wheel well fire protection consists of fire detection powered by the No. 2 AC transfer bus.

Note: The main wheel well has no fire extinguishing system. The nose wheel well does not have a fire detection system.

Main Wheel Well Fire Detection

A single fire detector loop is installed in the main wheel well. As the temperature of the detector increases to a predetermined limit, the detector senses a fire condition. The WHEEL WELL fire warning light remains illuminated until the temperature of the detector has decreased below the onset temperature.

The indications for a main wheel well fire are:

- the fire warning bell sounds
- both master FIRE WARN lights illuminate
- the WHEEL WELL fire warning light illuminates.

Cargo Compartment Fire Protection

Cargo fire protection consists of these systems:

- cargo compartment smoke detection powered by DC bus 1 and DC bus 2
- cargo compartment fire extinguishing powered by the hot battery bus.

Cargo Compartment Smoke Detection

The forward and aft cargo compartments each have smoke detectors in a dual loop configuration. Normally, both detection loops must sense smoke to cause an alert. These loops function in the same manner as the engine overheat/fire detection loops.

Cargo Compartment Fire Warning

The indications of a cargo compartment fire are:

- the fire warning bell sounds
- both master FIRE WARN lights illuminate
- the FWD/AFT cargo fire warning light(s) illuminates.

Cargo Compartment Fire Extinguishing

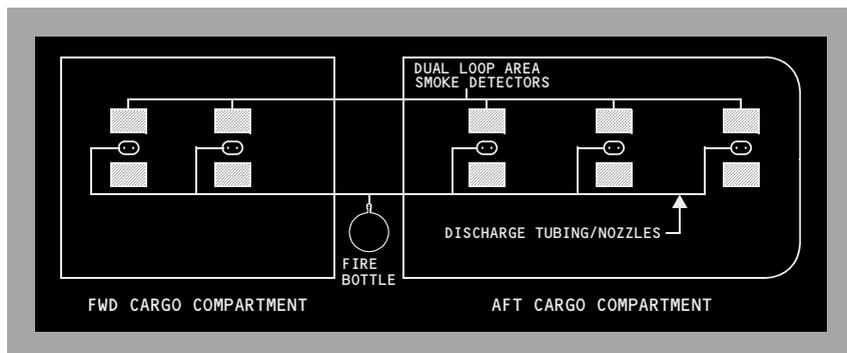
[Option - Single cargo fire extinguisher bottle]

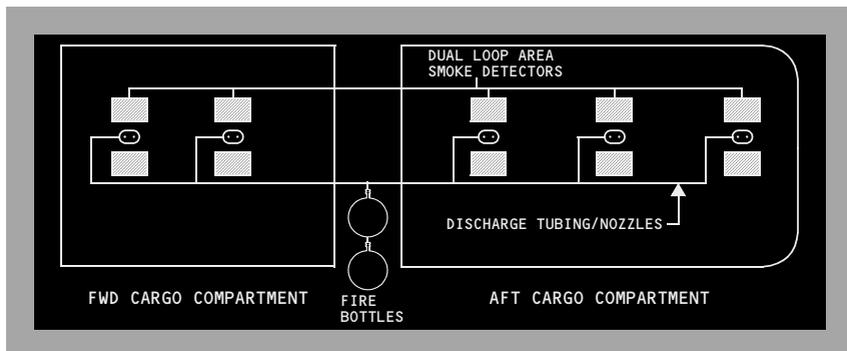
A single fire extinguisher bottle is installed in the air conditioning mix bay on the forward wing spar. Detection of a fire in either the forward or aft compartment will cause the FWD or AFT cargo fire warning light to illuminate. The extinguisher is armed by pushing the appropriate cargo fire ARMED switch. Once armed, the system is discharged by pushing the cargo fire DISCH switch. This results in the total discharge of the bottle contents into the selected compartment. The cargo fire DISCH light illuminates once the bottle is discharged. It may take up to 30 seconds for the light to illuminate.

[Option - Dual cargo fire extinguisher bottles]

Two fire extinguisher bottles are installed in the air conditioning mix bay on the forward wing spar. Detection of a fire in either the forward or aft compartment will cause the FWD or AFT cargo fire warning light to illuminate. The extinguishers are armed by pushing the appropriate cargo fire ARMED switch. Once armed, the first bottle is discharged by pushing the cargo fire DISCH switch. This results in the total discharge of the first bottle contents into the selected compartment. The second bottle discharge is metered to discharge at a reduced flow into the selected compartment. Discharge of the second bottle may be disabled if the system is disarmed. The cargo fire DISCH light illuminates when a bottle is discharged. It may take up to 30 seconds for the light to illuminate. On landing, if the first bottle was discharged and the system remains armed, the second bottle discharge is inhibited.

Cargo Fire Extinguisher Schematic





Lavatory Fire Protection

Lavatory fire protection consists of these systems:

- lavatory smoke detection
- lavatory fire extinguishing (heat activated).

Lavatory Smoke Detection

The lavatory smoke detection system monitors for the presence of smoke. When smoke is detected:

- an aural warning sounds
- the red alarm indicator light on the lavatory smoke detector panel illuminates and the appropriate amber lavatory call light will flash
- the amber lavatory SMOKE light on the forward overhead panel illuminates.

When smoke is no longer present the system automatically resets.

Lavatory Fire Extinguisher System

A fire extinguisher system is located beneath the sink area in each lavatory. When a fire is detected:

- fire extinguisher operation is automatic
- flight deck has no indication of extinguisher discharge.

Fire and Overheat System Tests

The fire and overheat detection systems can be tested by pushing and holding the FAULT/INOP and OVHT/FIRE TEST switch. Extinguisher continuity can be tested by pushing and holding the EXT TEST switch. All test indications clear when switches are released.

FAULT/INOP Test Detection

The fault detection circuits for both the engines and the APU are tested by pushing and holding the FAULT/INOP and OVHT/FIRE TEST switch in the FAULT/INOP position.

The indications for the FAULT/INOP test are:

- both MASTER CAUTION lights illuminate
- the OVHT/DET system annunciator light illuminates
- the FAULT light illuminates
- the APU DET INOP light illuminates.

OVERHEAT/FIRE Test Detection

The overheat and fire detection loops on both engines, the APU, and the fire detector in the wheel well are tested by pushing and holding the FAULT/INOP and OVHT/FIRE TEST switch in the OVHT/FIRE position.

The indications for the OVHT/FIRE test are:

- the fire warning bell sounds
- both master FIRE WARN lights illuminate
- both MASTER CAUTION lights illuminate
- the OVHT/DET system annunciator light illuminates
- both engine fire warning switches illuminate
- the APU fire warning switch illuminates
- both ENG OVERHEAT lights illuminate
- the WHEEL WELL fire warning light illuminates if AC power is available
- on the ground, the wheel well APU fire warning horn sounds and the wheel well APU fire warning light flashes.

Extinguisher Test

When the EXT TEST switch is positioned to 1 or 2, the green EXT TEST lights illuminate, verifying circuit continuity from the squib to the engine fire warning switch.

Cargo Fire System Tests

The cargo fire detection and suppression system can be tested by pushing and holding the cargo fire TEST switch. This sends a test signal to the forward and aft cargo fire detector loops and verifies continuity of the extinguisher bottle squib circuits. All test indications clear when the TEST switch is released

Cargo Fire TEST

The indications for the Cargo Fire test are:

- the fire warning bell sounds
- both master FIRE WARN lights illuminate
- the extinguisher test lights illuminate
- the FWD and AFT cargo fire warning lights illuminate when all detectors in selected loops (s) respond to the fire test
- the cargo fire bottle DISCH light illuminates

Note: The fire warning BELL CUTOFF switch on the Overheat/Fire Protection panel can silence the fire warning bell and extinguish the master FIRE WARN lights

Note: During a Cargo Fire Test, the DETECTOR Fault light will illuminate if one or more detectors in the loop(s) has failed.

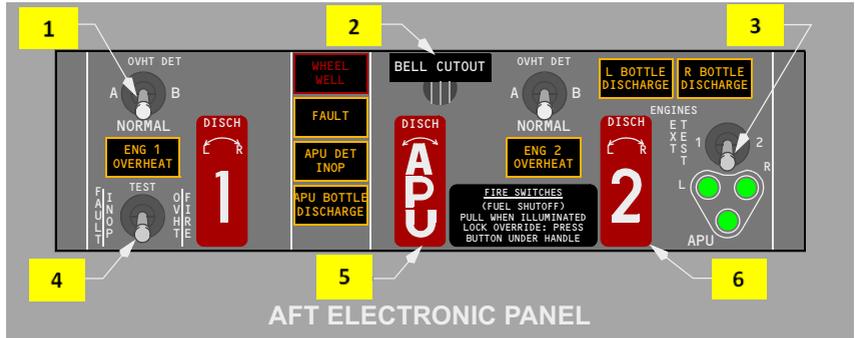
Note: Individual detector faults can only be detected by a manually initiated test. The MASTER CAUTION light does not illuminate.

Note: At the end of cargo fire testing, up to a four second delay may occur to allow all applicable indications to extinguish at the same time.

Cargo Fire Extinguisher Test

When the Cargo Fire TEST button is pushed, the green EXT lights illuminate, verifying the fire bottle discharge squib circuit continuity is normal.

Overheat/Fire Protection Panel Switches



1 Overheat Detector (OVHT DET) Switch

NORMAL – detection loop A and loop B are active.

A – detection loop A is active.

B – detection loop B is active.

2 Fire Warning BELL CUTOUT Switch

Push –

- extinguishes both master FIRE WARN lights
- silences the fire warning bell
- silences the remote APU fire warning horn (on the ground only)
- resets the system for additional warnings.

3 Extinguisher (EXT) TEST Switch

(spring-loaded to center)

1 or 2 – tests bottle discharge circuits for all three extinguisher bottles.

4 Fault/Inoperative (FAULT/INOP) and Overheat/Fire (OVHT/FIRE) TEST Switch

(spring-loaded to center)

FAULT/INOP – tests fault detection circuits for both engines and the APU.

OVHT/FIRE – tests overheat and fire detection loops on both engines and APU, and wheel well fire detector

5 APU Fire Warning Switch

Illuminated (red) –

- indicates fire in APU
- unlocks APU fire warning switch.

Note: Master FIRE WARN lights illuminate, fire warning bell sounds, and in the main wheel well the APU fire warning horn sounds (on ground only), and APU fire warning light flashes.

In – normal position, mechanically locked if no fire signal.

Up –

- arms APU extinguisher circuit
- closes fuel shutoff valve, APU bleed air valve, and APU inlet door
- trips generator control relay and breaker
- allows APU fire warning switch to rotate.

Rotate (left or right) –

- discharges APU fire bottle.

6 Engine Fire Warning Switch

Illuminated (red) –

- indicates fire in related engine
- unlocks related engine fire warning switch.

Note: Master FIRE WARN lights illuminate and fire warning bell sounds.

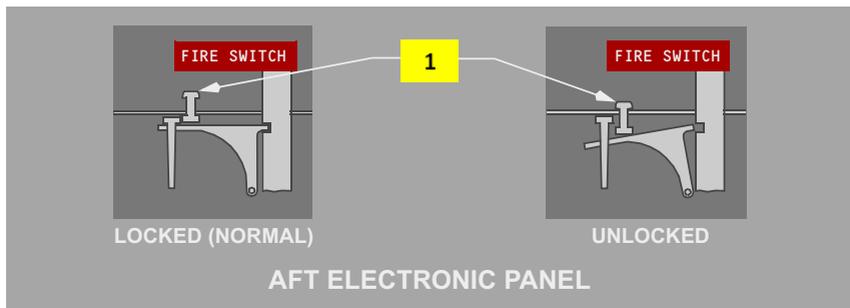
In – normal position, mechanically locked if no fire signal.

Up –

- arms one discharge squib on each engine fire extinguisher
- closes fuel, hydraulic shutoff and engine bleed air valves
- disables thrust reverser
- trips generator control relay and breaker
- deactivates engine driven hydraulic pump LOW PRESSURE light
- allows engine fire warning switch to rotate.

Rotate (left or right) – discharges related fire bottle.

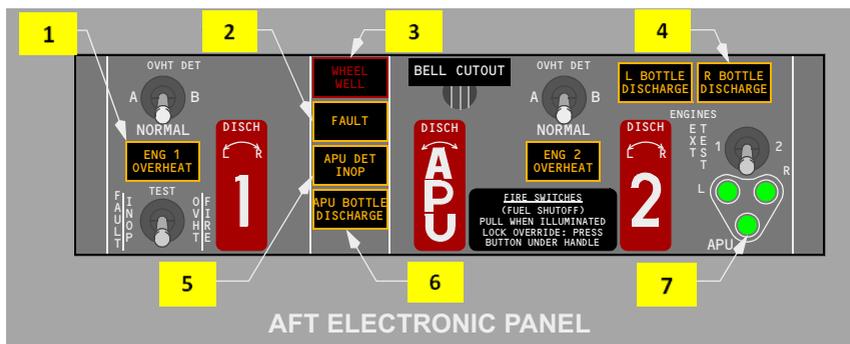
Fire Warning Switch Override



1 Fire Warning Switch Override

Push – unlocks fire warning switch.

Overheat/Fire Protection Panel Lights



1 Engine (ENG) OVERHEAT Light

Illuminated (amber) – indicates overheat in related engine.

Note: MASTER CAUTION and OVHT/DET system annunciator lights illuminate.

2 FAULT Light

Illuminated (amber) – with the overheat detector switch in NORMAL - indicates both detector loops for an engine have failed.

Illuminated (amber) – with the overheat detector switch in A or B – indicates the selected loop for an engine has failed.

Note: MASTER CAUTION and OVHT/DET system annunciator lights do not illuminate.

3 WHEEL WELL Fire Warning Light

Illuminated (red) – indicates fire in main gear wheel well

Note: Master FIRE WARN lights illuminate and fire warning bell sounds.

4 Engine BOTTLE DISCHARGE Light

Illuminated (amber) – indicates related fire extinguisher bottle has discharged.

5 APU Detector Inoperative (DET INOP) Light

Illuminated (amber) – indicates APU detector loop has failed.

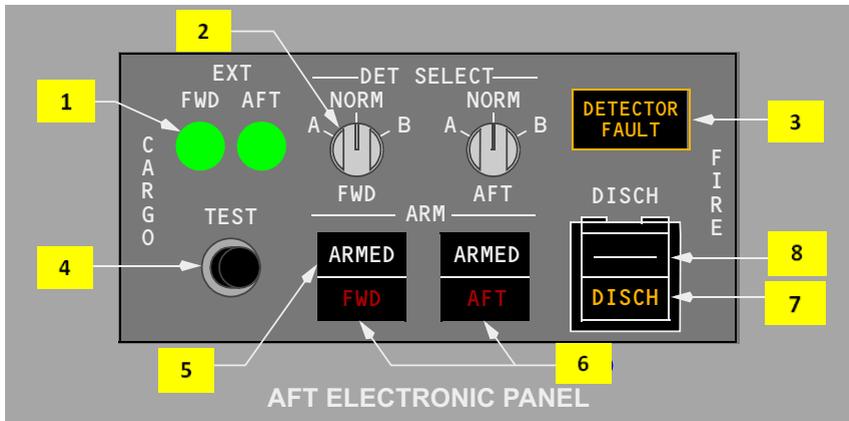
Note: MASTER CAUTION and OVHT/DET system annunciator lights illuminate.

6 APU BOTTLE DISCHARGE Light

Illuminated (amber) – indicates APU extinguisher bottle has discharged.

7 Extinguisher Test (EXT TEST) Lights

Illuminated (green) – EXT TEST switch is positioned to 1 or 2 and circuit continuity is normal.

Cargo Fire Panel**1 Extinguisher (EXT) Test Lights**

Illuminated (green) - Cargo Fire TEST switch is pushed and fire bottle discharge squib circuit continuity is normal.

2 Detector Select (DET SELECT) Switches

NORM - detection loop A and B are active.

A - detection loop A is active.

B - detection loop B is active.

3 DETECTOR FAULT Light

Illuminated (amber) -

- Both loops in one or both cargo compartments have failed

4 Cargo Fire TEST Switch

PUSH - tests circuits for both forward and aft cargo fire detector loops and suppression system.

Note: See Cargo Fire System Tests in Section 20.

5 Cargo Fire ARM Switches

[Option - Single Cargo Fire Extinguisher bottle]

PUSH -

- FWD ARMED - extinguisher armed for the forward cargo compartment
- AFT ARMED - extinguisher armed for the aft cargo compartment.

5 Cargo Fire ARM Switches

[Option - Dual Cargo Fire Extinguisher bottles]

PUSH -

- FWD ARMED - extinguisher armed for the forward cargo compartment
- AFT ARMED - extinguisher armed for the aft cargo compartment.

Note: If the first bottle has discharged and the system remains armed, the second bottle discharge is inhibited upon landing. The second bottle discharge timer is disabled when the system is disarmed.

6 Cargo Fire (FWD/AFT) Warning Lights

Illuminated (red) -

- at least one detector in each loop detects smoke
- with power failed in one loop, at least one detector on the remaining loop detects smoke.

Note: Master FIRE WARN lights illuminate and fire warning bell sounds.

7 Cargo Fire Bottle Discharge (DISCH) Light

[Option - Single Cargo Fire Extinguisher bottle]

Illuminated (amber) - indicates the extinguisher bottle has discharged

7 Cargo Fire Bottle Discharge (DISCH) Light

[Option - Dual Cargo Fire Extinguisher bottles]

Illuminated (amber) - indicates that either extinguisher bottle has discharged

8 Cargo Fire Discharge (DISCH) Switch

[Option - Single Cargo Fire Extinguisher bottle]

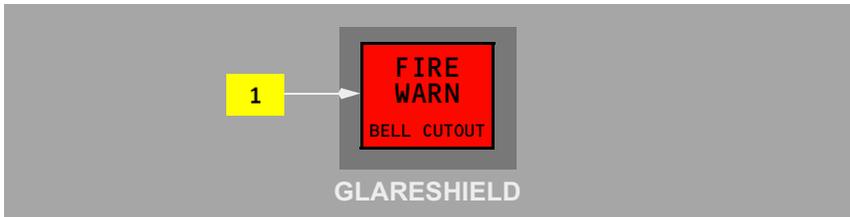
PUSH - if system is armed, discharges the extinguisher bottle.

8 Cargo Fire Discharge (DISCH) Switch

[Option - Dual Cargo Fire Extinguisher bottles]

PUSH - if system is armed, discharges the first extinguisher bottle. The timer is set for 60 minutes to discharge the second extinguisher bottle.

Master Fire Warning Light



1 Master Fire Warning (FIRE WARN) Lights

Illuminated (red) – indicates a fire warning (or system test) in engine, APU, main gear wheel well or cargo compartment

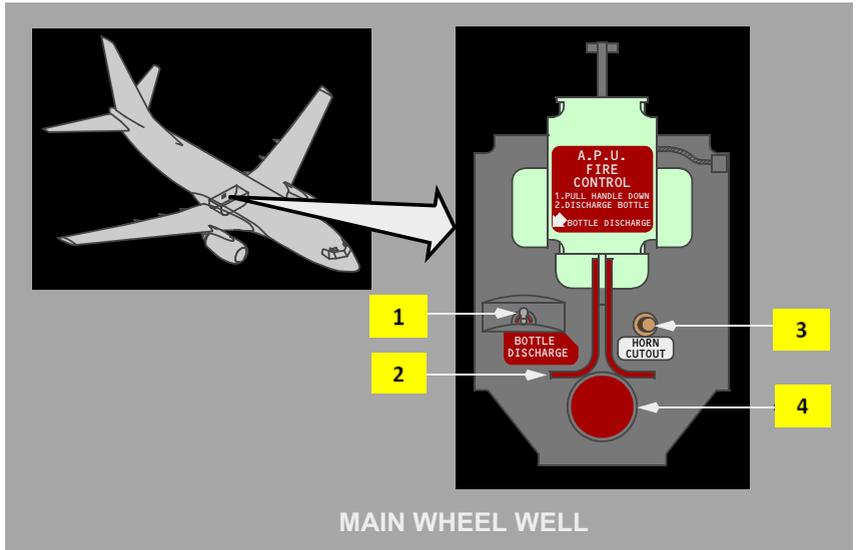
- fire warning bell sounds
- if on ground, remote APU fire warning horn sounds.

Push –

- extinguishes both master FIRE WARN lights
- silences fire warning bell
- silences remote APU fire warning horn
- resets system for additional warnings.

Note: Pushing fire warning bell cutout switch on overheat/fire protection panel results in same actions.

APU Ground Control Panel



1 APU BOTTLE DISCHARGE Switch

(spring-loaded to the right and safety wired.)

Left – discharges APU extinguisher.

Note: Armed only if APU fire control handle is pulled at this panel.

2 APU Fire Control Handle

Up – normal position.

Down –

- arms APU BOTTLE DISCHARGE switch (on this panel only)
- closes APU fuel shutoff, bleed air valve and APU inlet door
- trips generator control relay and breaker.

3 APU Fire Warning HORN CUTOUT Switch

Push –

- silences fire alarm bell
- silences APU fire warning horn
- causes APU fire warning light to stop flashing but remain illuminated.

4 APU Fire Warning Light

Illuminated (red flashing) – indicates fire in APU.

Note: Also, flight deck fire warning bell sounds and APU fire warning horn in main wheel well sounds.

Illuminated (red steady) – indicates APU fire warning HORN CUTOUT switch has been pushed following an APU fire indication.

Lavatory Fire

Lavatory Smoke Detection

[Option - Lavatory Smoke Light]



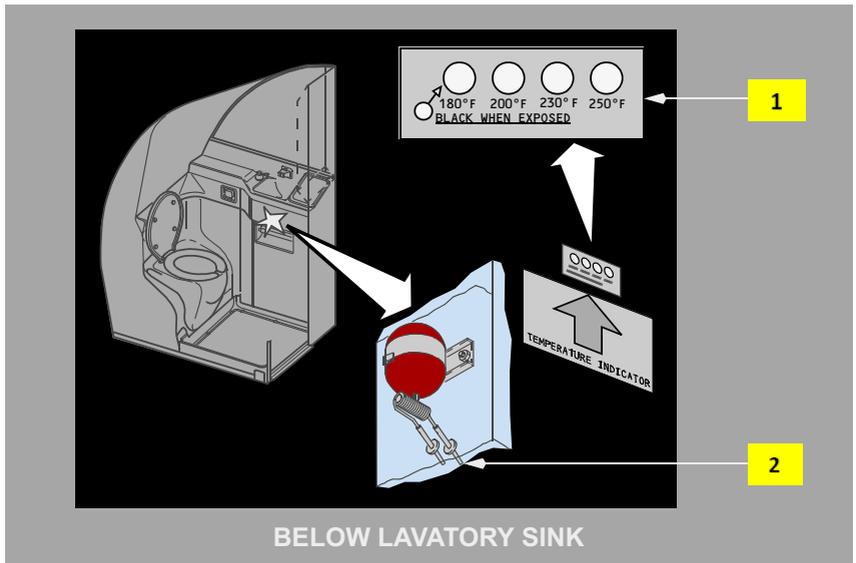
1 LAVATORY SMOKE Light

Illuminated (amber) –

- smoke has been detected in a lavatory
- a test is being conducted.

Note: MASTER CAUTION and OVERHEAD system annunciator lights illuminate.

Lavatory Fire Extinguisher



1 TEMPERATURE INDICATOR Placard

White – normal condition.

Black – exposed to high temperatures.

2 Heat Activated Nozzles

Flat black – normal condition.

Aluminum – indicates extinguisher has discharged.

Both nozzles discharge toward the towel disposal container.