

STUDENT GUIDE

FOR

UH-60 FIRE DETECTION / EXTINGUISHING SYSTEMS



THIS PACKAGE HAS BEEN DEVELOPED FOR USE BY:

Blackhawk (UH-60) Helicopter Maintenance Test Pilot Training Program

PROPONENT FOR THIS TSP IS:

U.S. Army Maintenance Test Pilot School AVIATION TRAINING BRIGADE ATTN: ATZQ-ATB-CA Ft. Rucker, Alabama 36362-5000

FOREIGN DISCLOSURE RESTRICTIONS:

Unclassified: This product/publication has been reviewed by the product developers in coordination with the USAALS foreign disclosure authority. This product is releasable to students from foreign countries on a case-by-case basis.

FIRE DETECTION / EXTINGUISHING SYSTEMS TABLE OF CONTENTS

SECTION I. - INTRODUCTION	3
TERMINAL LEARNING OBJECTIVE:	3
SECTION II. - PRESENTATION	4
A. ENABLING LEARNING OBJECTIVE No. 1:.....	4
SECTION III. - SUMMARY.....	19
B. ENABLING LEARNING OBJECTIVE No. 2:.....	20
SECTION IV. - SUMMARY	44
APPENDIX A.....	A-1
APPENDIX B.....	B-1

SECTION I. - INTRODUCTION

TERMINAL LEARNING OBJECTIVE:

ACTION: Identify the characteristics of the fire detection/extinguishing system.

CONDITIONS: As a UH-60 Maintenance test pilot.

STANDARD: In Accordance with (IAW) UH-60 Technical Manual TM 1-1520-237-23-7.

SAFETY REQUIREMENTS: Will be addressed as NOTES, CAUTIONS, and WARNINGS throughout the lesson outline.

RISK ASSESSMENT LEVEL: Low

ENVIRONMENTAL CONSIDERATIONS: There are no environmental concerns for this lesson.

EVALUATION: Evaluation will be accomplished with performance exam at the end of this module of instruction.

SECTION II. - PRESENTATION

A. ENABLING LEARNING OBJECTIVE No. 1:

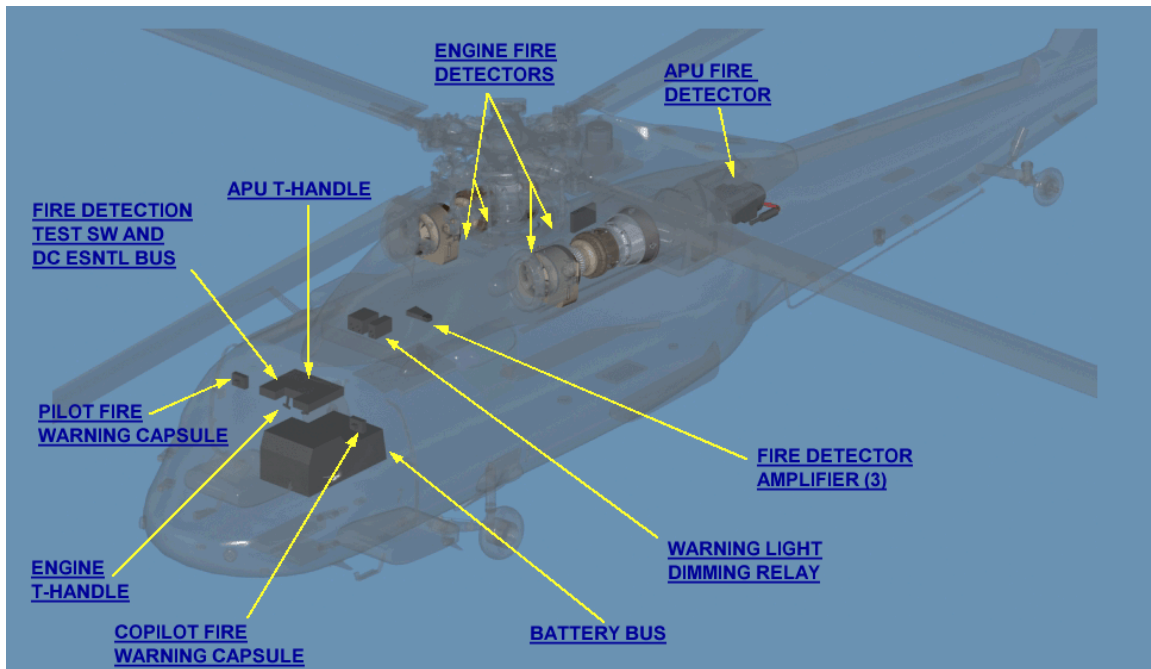
ACTION: Identify the characteristics of the Fire Detection System.

CONDITIONS: As a UH-60 Maintenance test pilot.

STANDARD: IAW TM 1-1520-237-23-7.

a. Fire Detection System

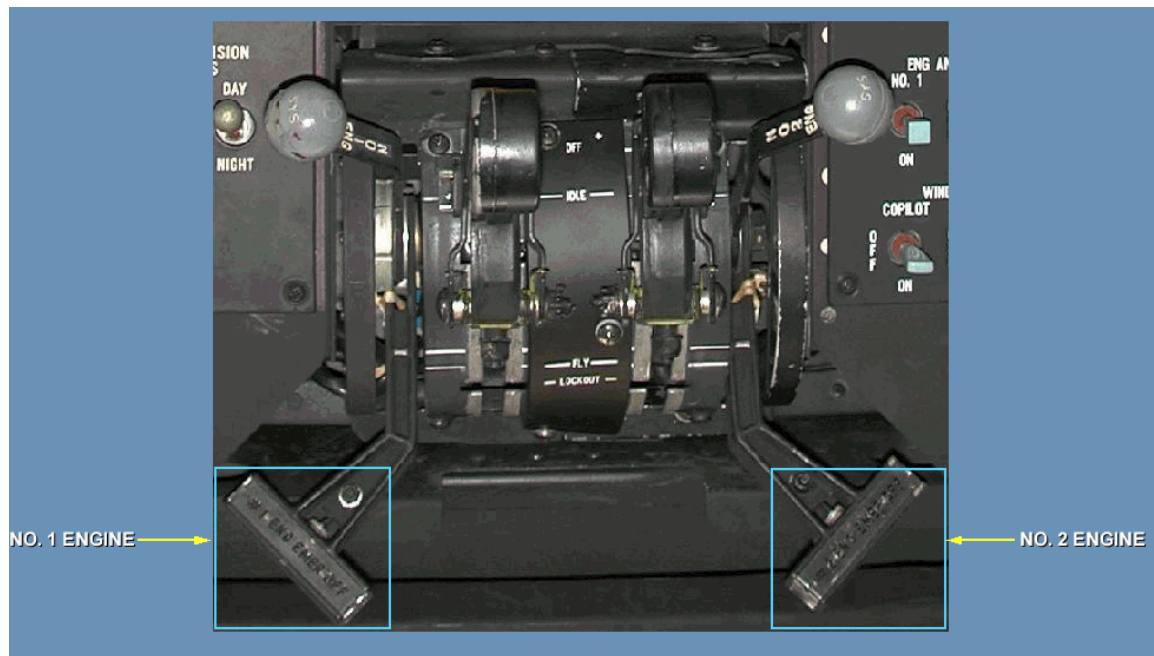
Frame #1000 (Fire Detection System Components Menu)



- (1) The detection system provides fire warning to the cockpit, in case of fire in either main engine compartment or in the Auxiliary Power Unit (APU) compartment.
- (2) The system consists of five radiation-sensing, solid-state photoconductive fire detectors, control amplifiers, and a test panel.
- (3) Two detectors are installed in each main engine compartment and one detector is in the APU compartment, providing continuous volume optical surveillance of the monitored areas.

(a) Engine Control Quadrant/T-Handles

Frame #1045 (Engine Control Quadrant/T-Handles)



- 1) The engine control quadrant contains two T-handles, one for the No. 1 engine and one for the No. 2 engine.
- 2) Each containing two lamps for illumination and labeled #1 ENG EMER OFF and #2 ENG EMER OFF.
- 3) When a handle is pulled, dc power actuates the fire extinguisher logic module to select the compartment to which the fire extinguisher agent is to be directed, and also energizes the circuit to the fire extinguisher switch.

(b) Fire Warning Capsule-Copilot Master Warning Panel

Frame #1025 (Fire Warning Capsule-Copilot Master Warning Panel)



- 1) The copilot Master Warning Panel is attached to the bottom side of the glare shield, directly in front of the copilot seat.
- 2) The master FIRE warning capsule will go on if a fire is detected.
- 3) The detector system automatically resets itself, with warning lights off, when the infrared radiation source ceases to emit.

(c) Battery Bus

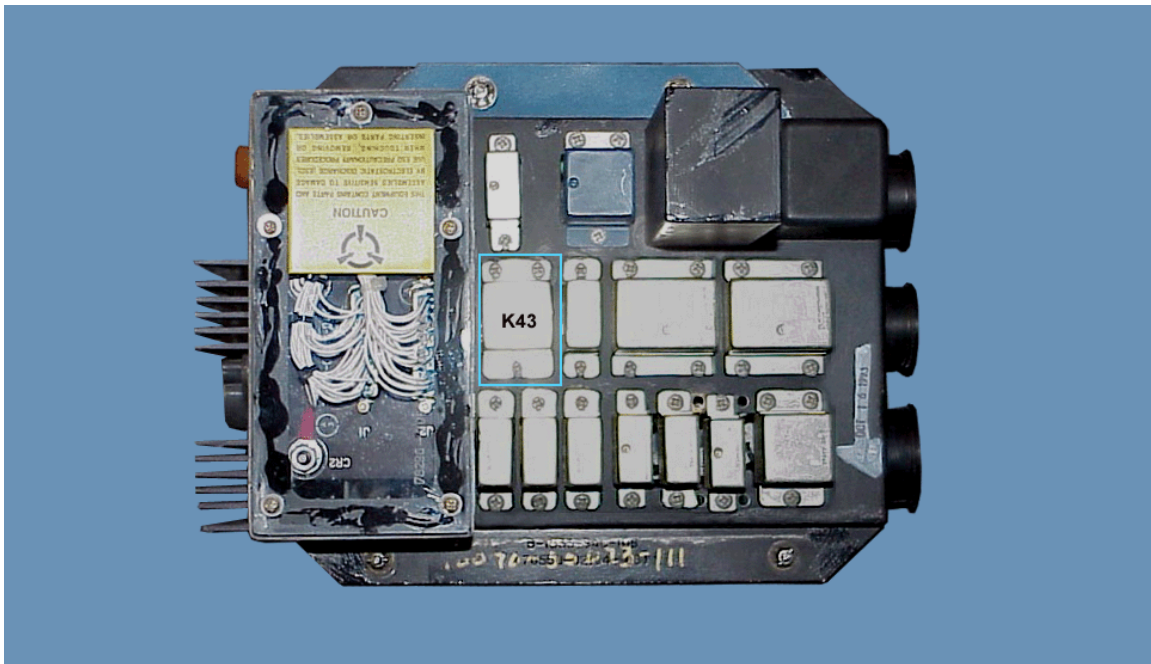
Frame #1030 (Battery Bus)



- 1) The battery and battery utility bus is located on the center lower console, left side and aft.
- 2) The BATT BUS provides power to the APU CONTR INST and APU FIRE DET circuit breakers, and the BATT UTIL BUS provide power to the FIRE EXTGH and APU CONTR INST circuit breakers.

(d) Warning Light Dimming Relay

Frame #1050 (Warning Light Dimming Relay)



- 1) The warning lights dimming relay K43, is controlled by the BRT/DIM Test switch on the caution/advisory panel.
- 2) It provides T-handle light dimming and is located on the left hand relay panel.

(e) Caution/Advisory Panel

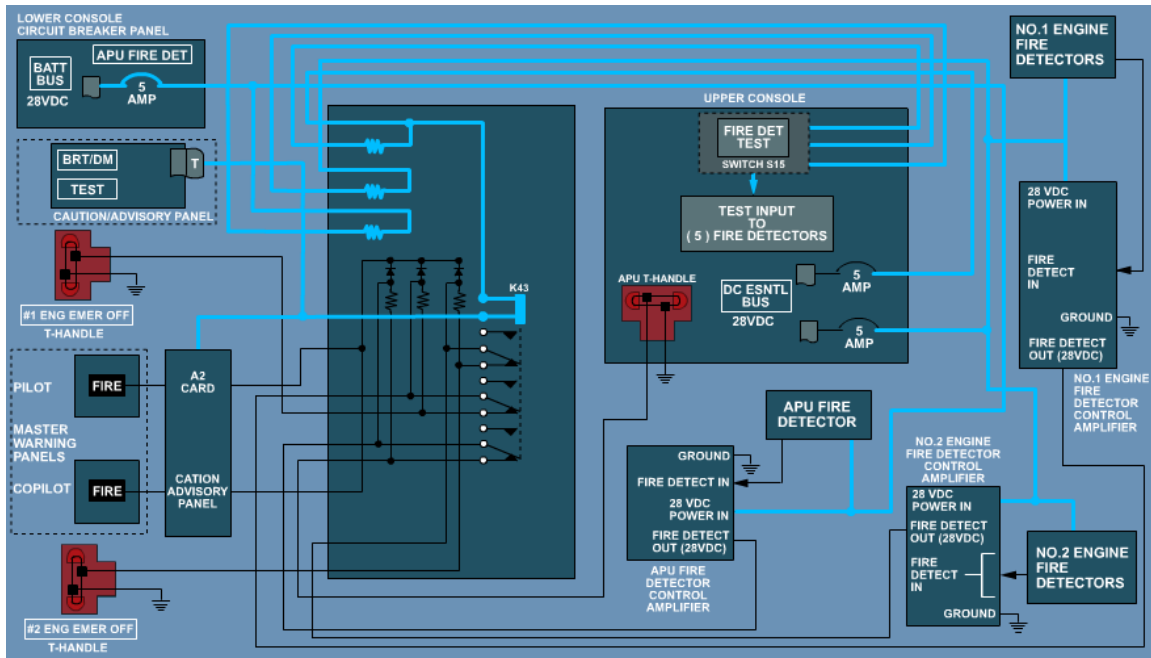
Frame #1051 (Caution/Advisory Panel)



- 1) Lighting intensity of the three T-Handles are controlled by the BRT/DIM TEST switch on the caution/advisory panel, controlling relay K43 on the left hand relay panel.

(f) Block Diagram of Dimming Circuit

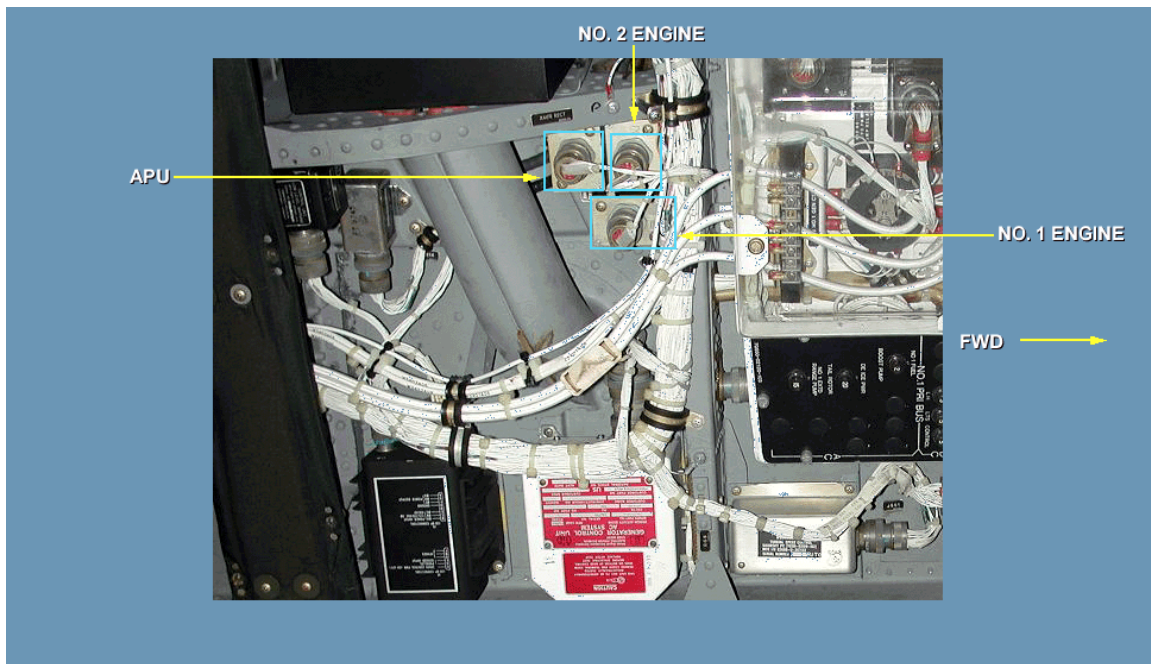
Frame #1052 (Dimming Circuit Block Diagram FLASH)



- 1) The fire detector test switch supplies 28 Vdc to the fire detectors.
- 2) The 28 Vdc is then routed to each detector's control amplifier, and then through K43 to the T-handles and the master warning capsules.
- 3) Placing the BRT/DIM test switch on the caution/advisory panel to the DIM position, applies a ground to relay K43.
- 4) This inserts resistors into the circuit, reducing the 28 Vdc to a lesser value and dimming the 3 T-handles.
- 5) The master warning capsules are dimmed by the A2 card within the caution/advisory panel after a ground is applied.

(g) Fire Detector Control Amplifiers

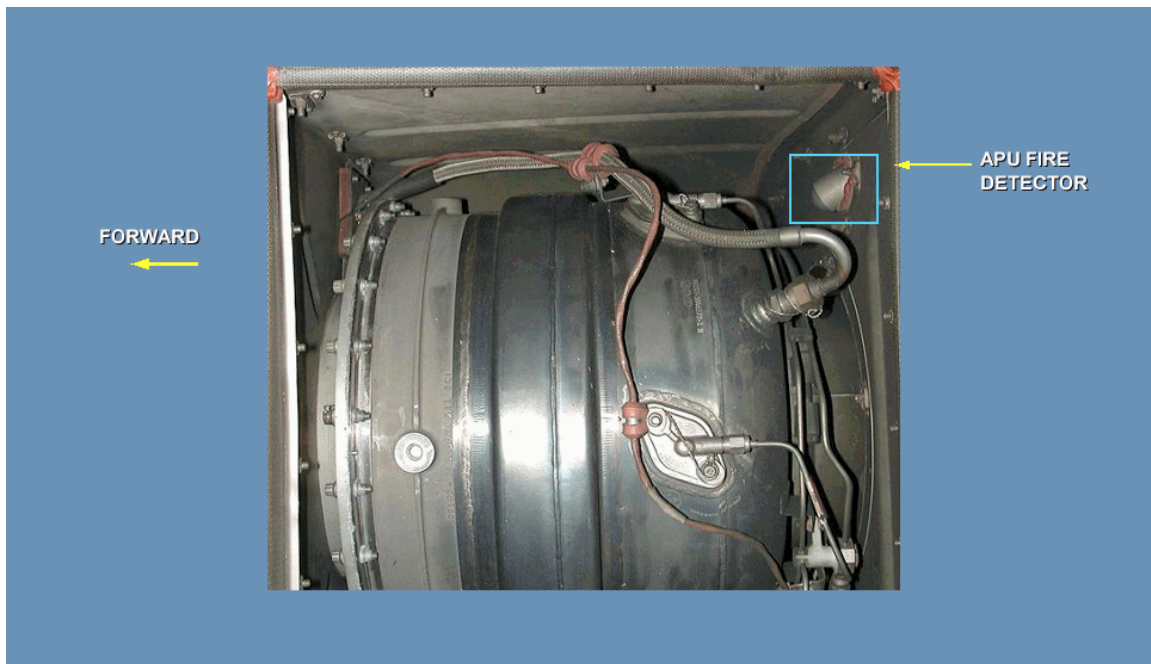
Frame #1015 (Fire Detector Control Amplifiers)



- 1) Three control amplifiers, one for each engine and one for the APU, are located in the forward cabin overhead.
- 2) The fire detector amplifiers control switching of 28 Vdc to the fire warning capsule and T-Handles.
- 3) A voltage of 9-11 Vdc from the detectors to the amplifiers, creates an output of 0 Vdc.
- 4) A voltage of 13-15 Vdc, from the detectors to the amplifiers, creates an output of 28 Vdc.

(h) APU Fire Detector

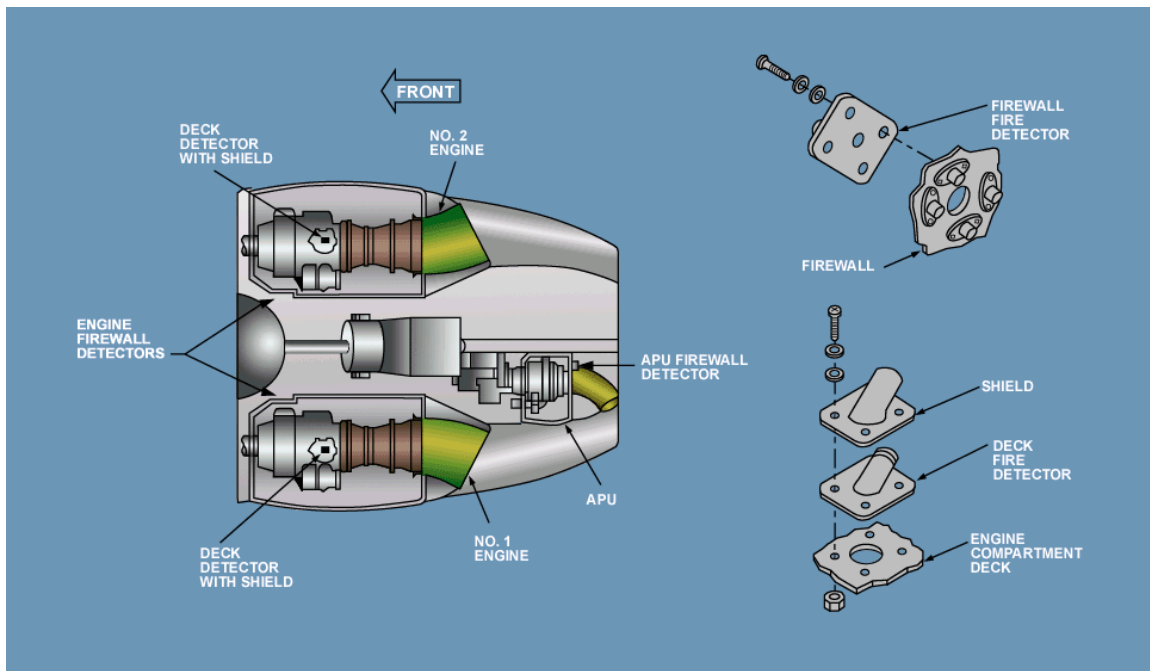
Frame #1005 (APU Fire Detector)



- 1) The APU compartment only has one detector, located on the rear firewall.
- 2) In case of fire, the detector reacts to the infrared radiation and sends a signal to the APU control amplifier.
- 3) The control amplifier then illuminates the APU T-handle and the fire warning capsule on both master warning panels.

(i) Fire Detectors

Frame #1010 (Engine Fire Detectors)



- 1) Each engine compartment has two detectors, one on the engine deck and one on the firewall.
- 2) Each detector is a dual-element photo resistive light detector, whose electrical resistance decreases with the intensity and color of the light energy reaching the detector elements.
- 3) One element is sensitive to red light, the other to blue light.
- 4) With the switch in OPER position, the detector circuit configuration produces an output of 9-11 Vdc when blue component of ambient light reaches the detector, and an output of 13-15 Vdc when the red component of fire's flame reaches the detector.

(j) APU T-Handle

Frame #1040 (APU T-Handle)



- 1) The APU T-handle is on the upper console, labeled APU.
- 2) When a handle is pulled, dc power is routed to the fire extinguisher logic module, which selects the compartment to which the fire extinguisher agent is to be directed, and also energizes the circuit to the fire extinguisher switch.
- 3) The handle also house two lamps, used as fire detector warning lights.

(k) Fire Detection Test Switch and DC Essential Bus

Frame #1035 (Fire Detection Test Switch and DC Essential Bus)

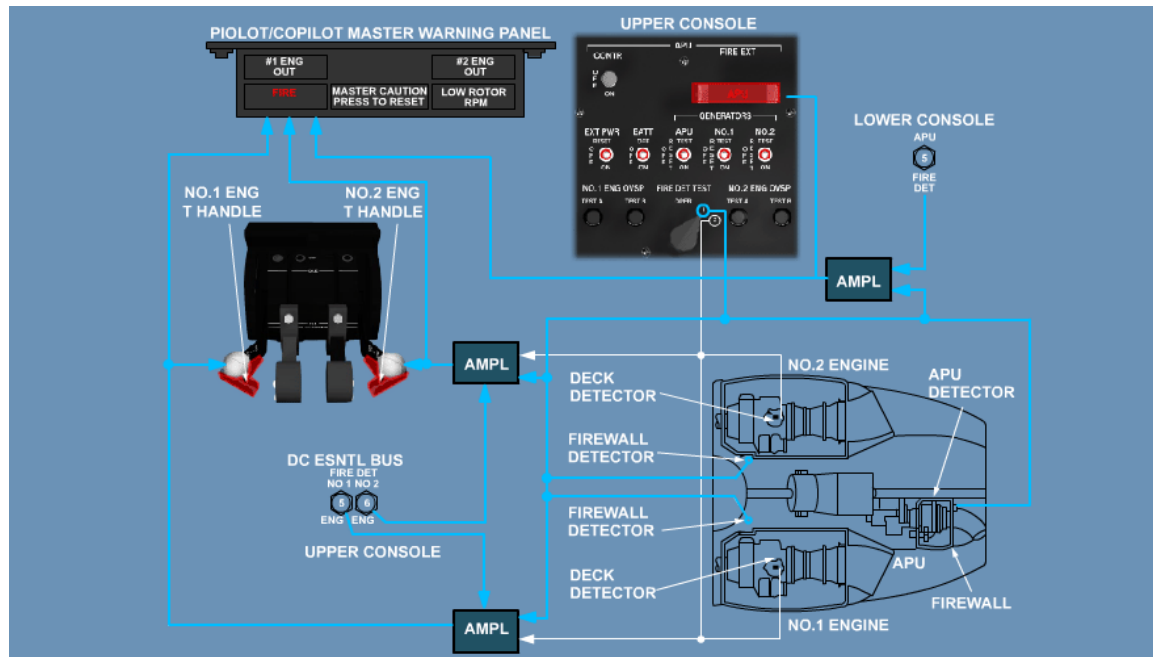


NOTE: The photosensitive material in the fire detectors is sensitive to red light. Sunlight filtered through smoke or haze, or at sunrise or sunset, may contain greater amounts of red light. This could trigger the fire detectors and cause a false fire indication.

With engine cowling open, sunlight may actuate fire warning system and/or may disable the test mode. A false fire light can also be caused by a short in a wire.

- 1) The FIRE DETR TEST switch is a three-position system test switch, located in the upper console, and is used to simulate a fire condition.
- 2) Three circuit breakers supplying power to the FIRE DET test switch. Two circuit breakers are located on the DC ESNTL BUS labeled FIRE DET NO 1 ENG and FIRE DET NO 2 ENG and one circuit breaker is located on the BATT BUS labeled APU FIRE DET.

Frame #1037 (Fire Detection Block Diagram FLASH)



- 3) In position 1, a simulated fire detected signal is applied to the APU fire detector, No. 1 and No. 2 firewall mounted detectors.
- 4) This lights both FIRE light capsules on the master warning panels, as well as the No. 1 ENG, No. 2 ENG, and APU T-Handles.
- 5) The detection system receives 28 Vdc power through the FIRE DET No. 1 ENG and No. 2 ENG circuit breakers on the upper console, and the APU FIRE DET circuit breaker on the lower console.
- 6) In position 2, a simulated fire detected signal is applied to the No. 1 and No. 2 engine deck mounted detectors.
- 7) This causes both FIRE lights to illuminate on the master warning panels, as well as No. 1 and No. 2 T-Handles.
- 8) Power from the No. 2 fire detector circuit breaker goes to the No. 2 engine firewall and deck mounted sensors, along with the No. 2 fire detector amplifier and left hand relay panel.
- 9) The BATT BUS supplies 28 Vdc, which is routed through the APU fire detector circuit breaker on the lower console, to the APU fire detector sensor, APU fire detector amplifier, and the left hand relay panel.

(I) PILOT MASTER WARNING PANEL

Frame #1055 (PILOT MASTER WARNING PANEL)



- 1) The pilot Master Warning Panel is attached to the bottom side of the glare shield, directly in front of the pilot seat.
- 2) The master FIRE warning capsule will go on if a fire is detected.
- 3) The detector system automatically resets itself, with warning lights off, when the infrared radiation source ceases to emit.

CHECK ON LEARNING

1. The Fire Detection System provides fire warning in the cockpit in case of _____.
2. The fire detectors are _____.
3. What action must be taken to reset the detector system, when the infrared radiation source ceases to emit?
4. What two colors are the fire detectors sensitive to?
5. Other than a fire, what can cause a fire warning light?

SECTION III. - SUMMARY

1. REVIEW/SUMMARIZE:

You have completed the characteristics of the Fire Detection System.

The key points to remember are:

- The detection system provides fire warning to the cockpit in case of fire in either main engine compartment or in the APU compartment.
- The system consists of five radiation-sensing, solid-state photoconductive flame detectors, control amplifiers, and a test panel.
- Two detectors are installed in each main engine compartment and one detector is in the APU compartment, providing continuous volume optical surveillance of the monitored areas.
- Each sensor is a photo resistive light sensor, whose electrical resistance decreases with the intensity and color of the light energy reaching the detector elements. One element is sensitive to red light, the other to blue light.
- With the switch in OPER position, the detector circuit configuration produces an output of 9-11 V dc when blue component of ambient light reaches the detector, and an output of 13-15 V dc when the red component of fire's flame reaches the detector.
- The master FIRE warning lights will illuminate if a fire is detected. The detector system automatically resets itself, with warning lights off, when the infrared radiation source ceases to emit.
- A three position system test switch labeled FIRE DETR TEST OPER, is located in the upper console, with the switch positions labeled as OPER / 1 / 2.
- A false fire light can be caused by a short in a wire, and sunlight filtered through smoke or haze. Also, with engine cowling open, sunlight may actuate fire warning system and/or may disable the test mode.

B. ENABLING LEARNING OBJECTIVE No. 2:

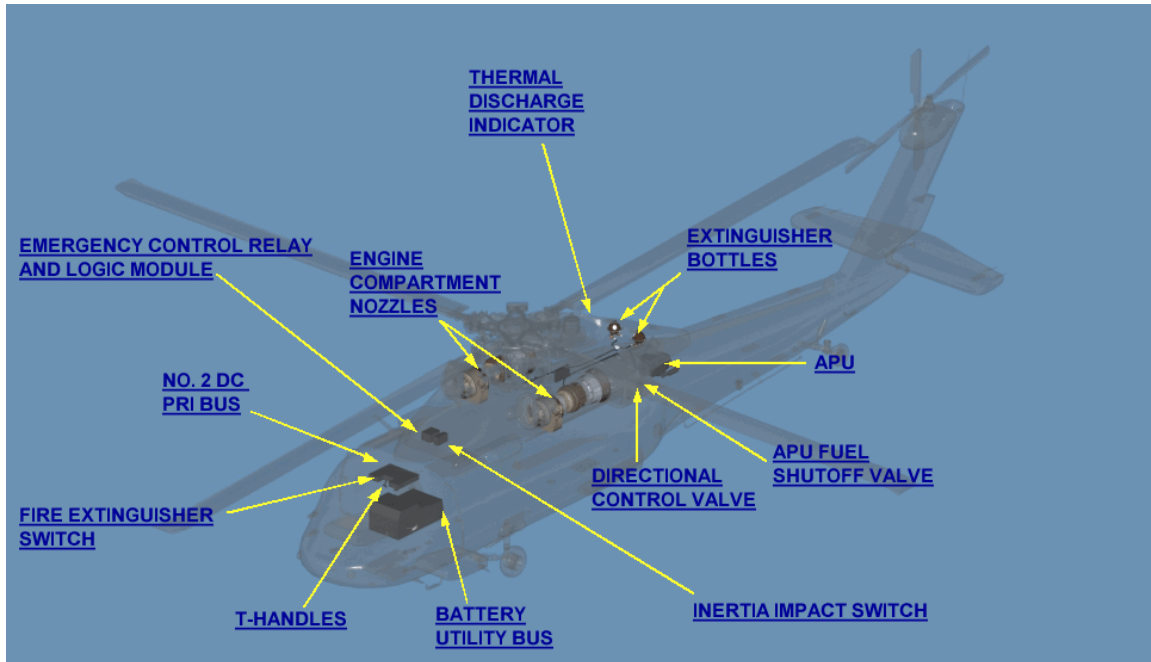
ACTION: Identify the characteristics of the Fire Extinguishing System.

CONDITION: Using TM 1-1520-237-23-7.

STANDARD: IAW TM 1-1520-237-23-7.

a. Fire Extinguishing System

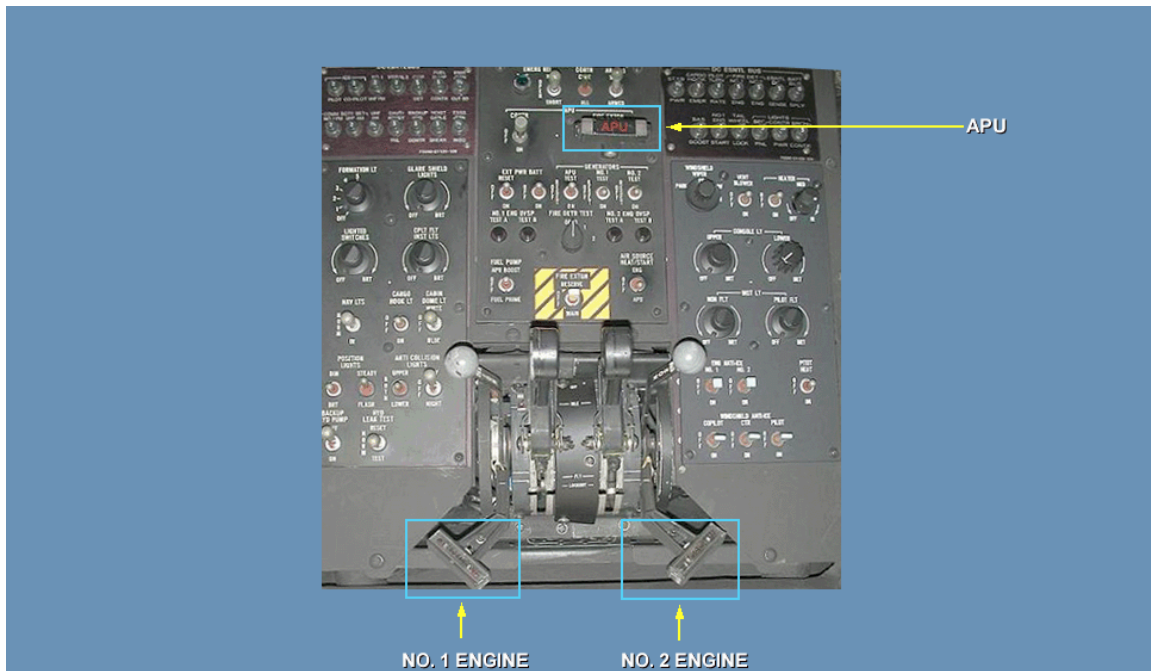
Frame #2000 (Fire Extinguishing System Menu)



- (1) The fire extinguishing system is an explosive cartridge (squib) activated high-rate discharge extinguishing system, providing monobromotrifluoromethane in a two shot, main and reserve capability, to either engine compartment or APU compartment.

(a) T-Handles

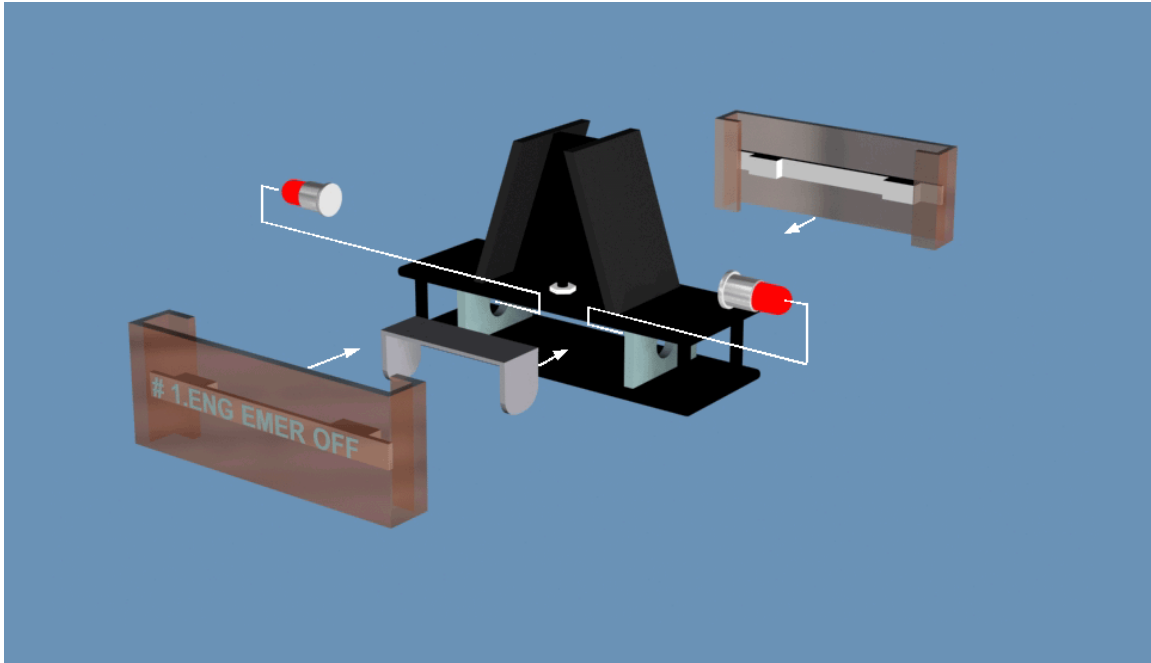
Frame #2015 (T-Handles)



1) Engine T-Handles

- a) T-handles on the engine throttle quadrant and APU control panel, are marked #1 ENG EMER OFF and #2 ENG EMER OFF and APU.
- b) When a handle is pulled, 28 Vdc power is routed to the fire extinguisher logic module to select the compartment to which the fire extinguisher agent is to be directed, and also energizes the circuit to the fire extinguisher switch.
- c) The handles house fire detector warning lights.

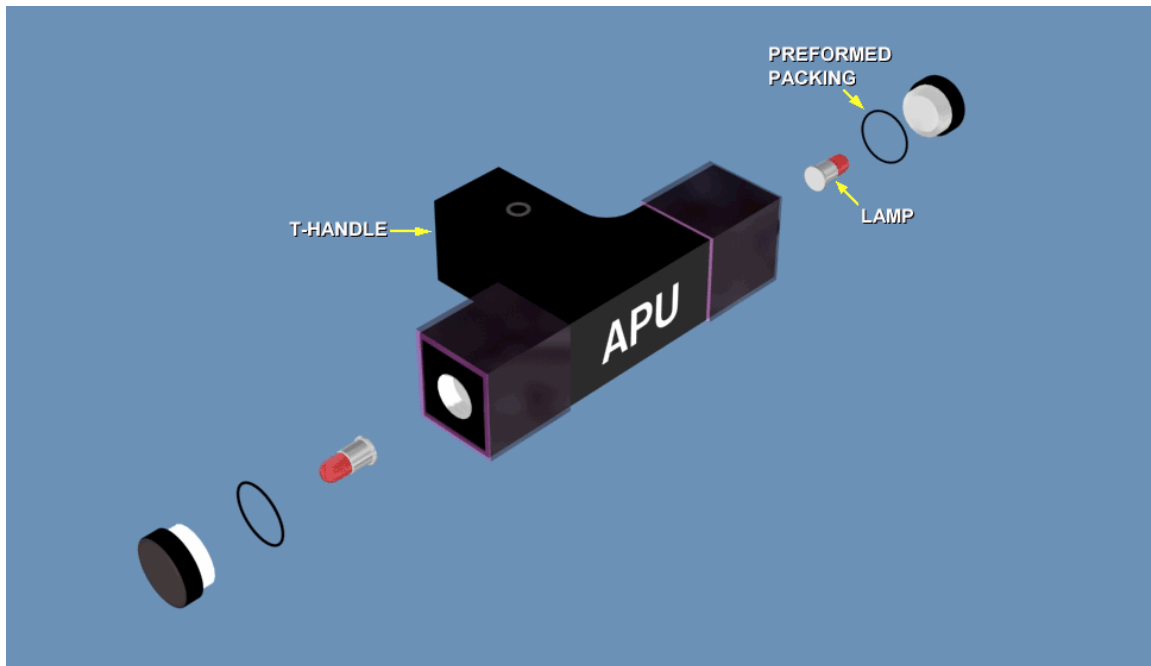
Frame #2016 (Engine T-Handle Lamps)



- d) Each T-Handle contains two lamps.
- e) To replace the engine T-Handle Lamps, turn off all electrical power.
- f) The following procedures apply to both No. 1 and No. 2 engine T-handles:
 - 1 Pull #1 ENG EMER OFF or #2 ENG EMER OFF lens from T-handle, and remove lamp from T-handle.
 - 2 Insert replacement lamp in T-handle.
 - 3 Install #1 ENG EMER OFF or #2 ENG EMER OFF lens on T-handle.
 - 4 Perform an operational check of engine fire detection system.

2) APU T-Handle Lamps

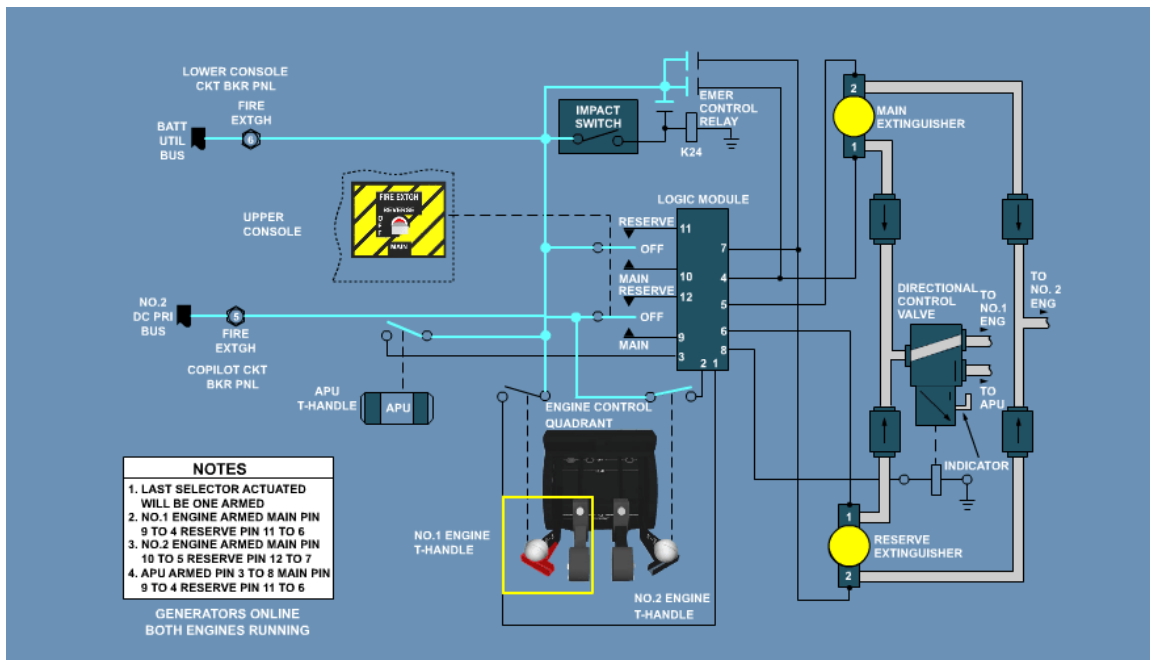
Frame #2017 (APU T-Handle Lamps)



- a) To replace APU T-Handle Lamps, turn off all electrical power.
- 1 Unscrew and remove end cap and preformed packing.
 - 2 Remove lamp from cap.
 - 3 Insert replacement lamp into cap.
 - 4 Install preformed packing and screw cap into T-handle.
 - 5 Perform an operational check of fire detection system.

3) Fire Extinguisher Block Diagram

Frame #2018 (Fire Extinguisher Block Diagram FLASH)



- If an engine compartment fire occurred, the appropriate T-handle would illuminate.
- Pulling the T-handle tells the logic module which path to use for routing the voltage to the appropriate bottle.
- Select MAIN on the FIRE EXTGH switch to activate main fire bottles.
- If the fire is not extinguished, putting the switch into the RESERVE position fires the remaining bottle.

(b) Battery Utility Bus

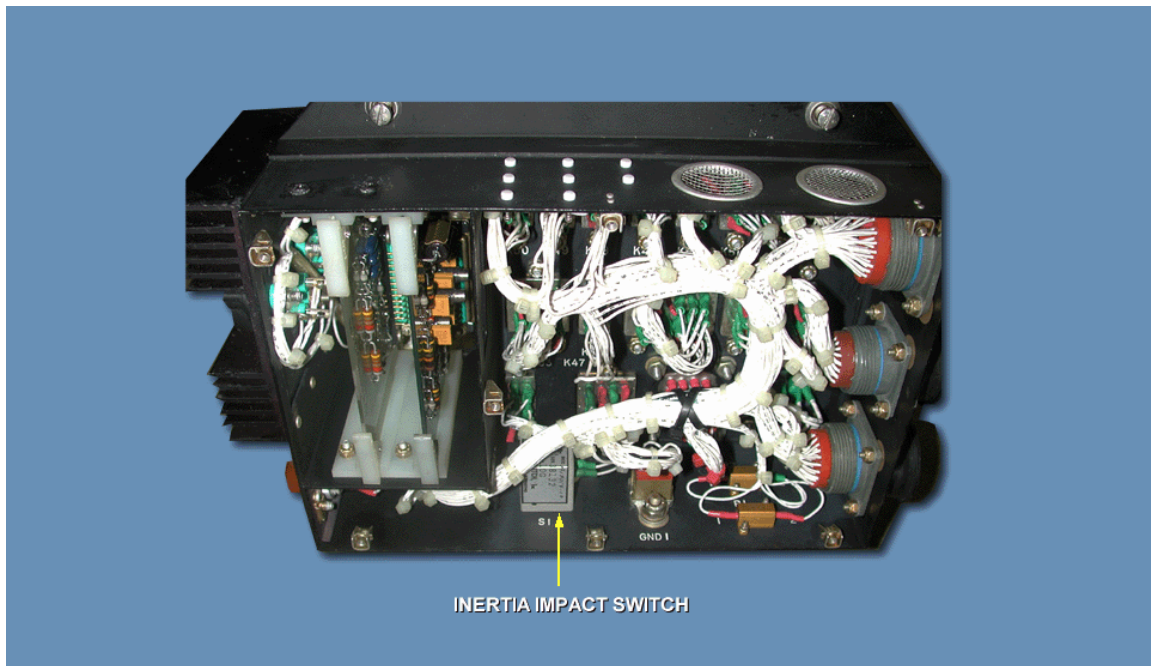
Frame #2065 (Battery Utility Bus)



- 1) The battery and battery utility bus are located on the center lower console, left side and aft.
- 2) The BATT BUS provides power to the APU CONTR INST and APU FIRE DET circuit breakers, and the BATT UTIL BUS provide power to the FIRE EXTGH and APU CONTR INST circuit breakers.

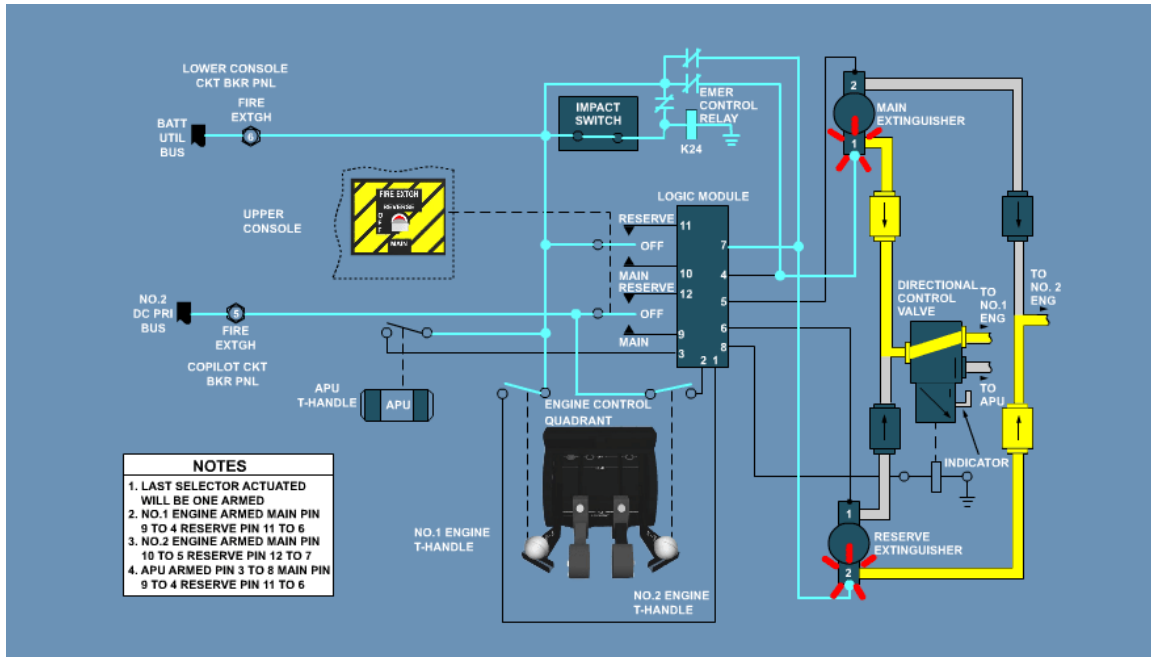
(c) Inertia Impact Switch

Frame #2010 (Inertia Impact Switch)



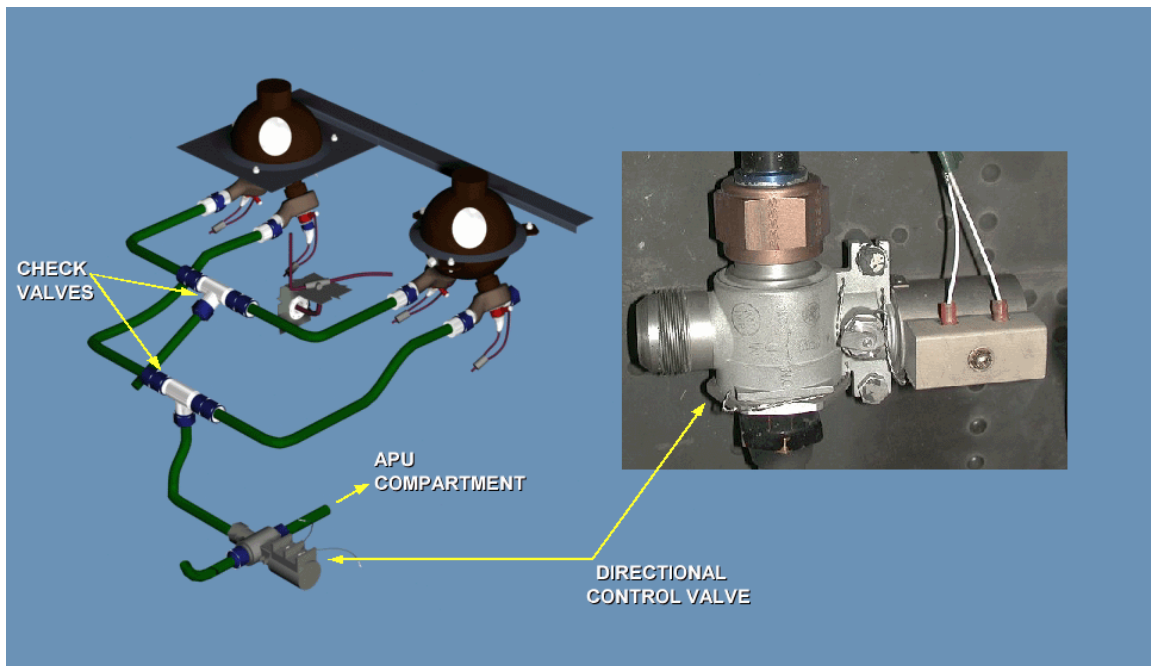
- 1) Upon impact or a crash of 10 Gs or more, an omni directional inertia switch (S1), mounted in the left hand relay panel, automatically fires both explosive cartridges (squibs) attached to the containers, releasing fire extinguishing agent into both main engine compartments.

Frame #2012 (Inertia Impact Switch Block Diagram FLASH)



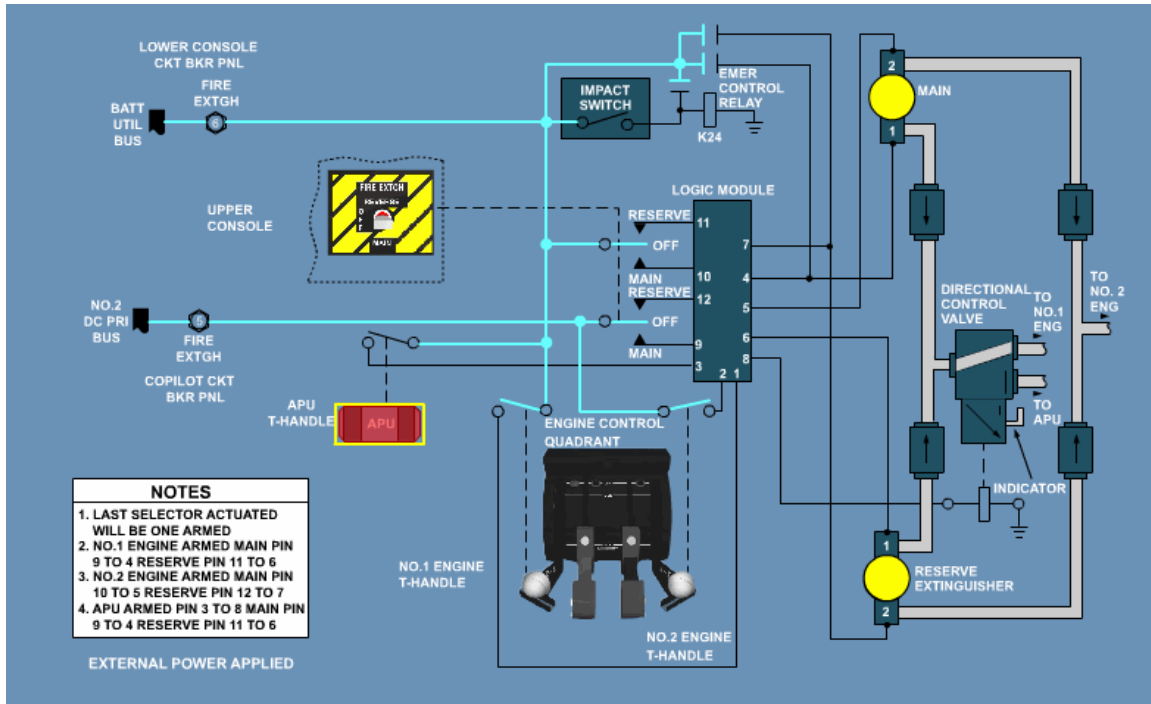
(d) Directional Control Valve

Frame #2040 (Directional Control Valve)



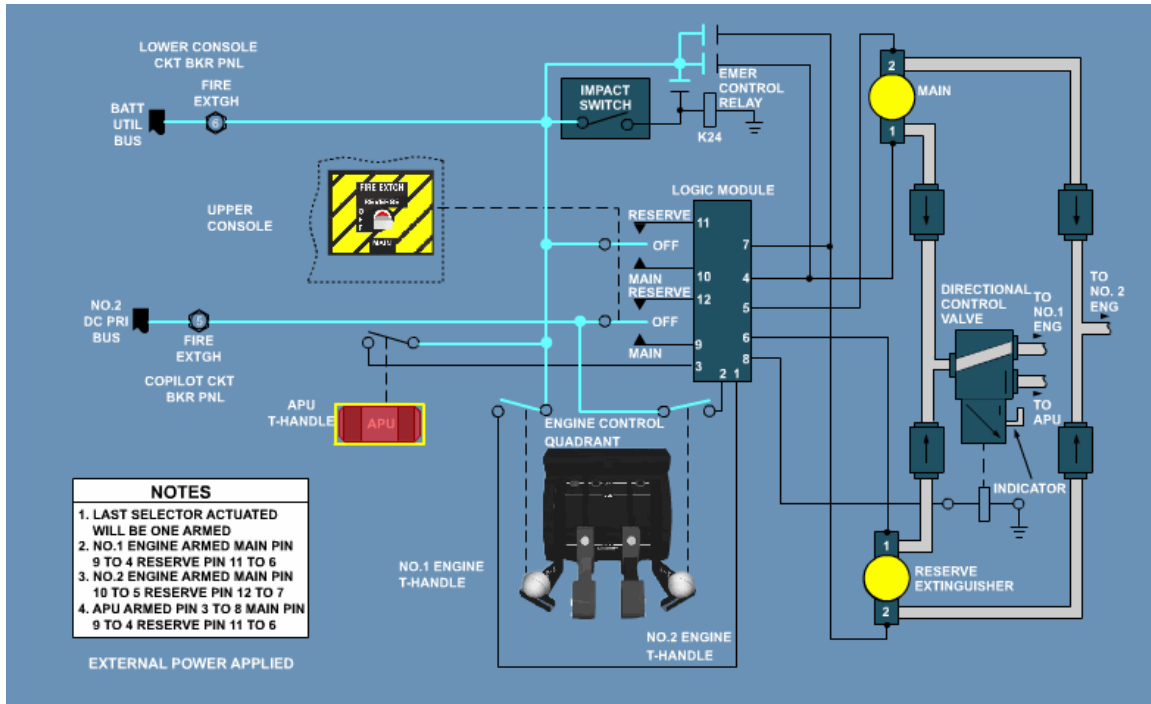
- 1) The directional control valve is activated by the APU T-handle and directs the agent to the APU compartment.
- 2) The valve is spring loaded to the No. 1 engine compartment position.
- 3) "T" style check valves are used to prevent the extinguishing agent from flowing into the other bottle once the agent is fired.

Frame #2042 (Directional Valve Block Diagram FLASH)



- If an APU compartment fire occurred, the APU T-handle would illuminate as simulated in the above diagram.
- Pulling the T-handle tells the logic module which path to use for routing the voltage to the bottle.
- Select MAIN on the FIRE EXTGH switch to activate main fire bottles.
- If the fire is not extinguished, putting the switch into the RESERVE position fires the remaining bottle.

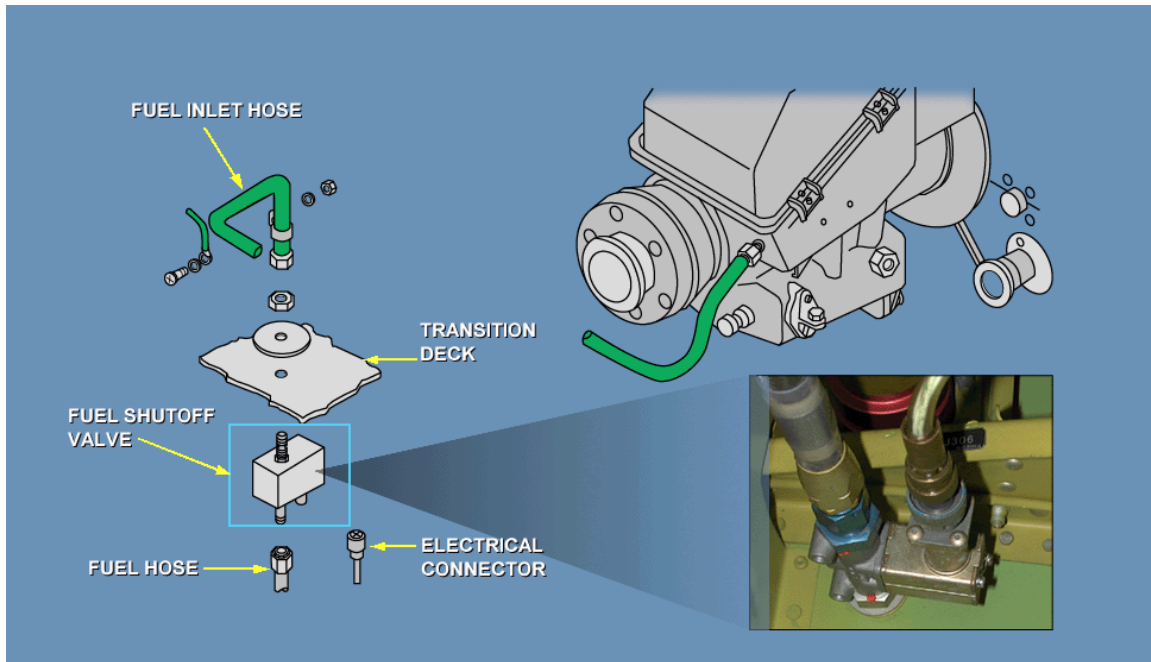
Frame #2043 (First Start APU Fire)



- e) If an APU compartment fire occurs when starting the APU using the aircraft battery power only, the APU T-handle would illuminate.
- f) Pulling the T-handle tells the logic module which path to use for routing the voltage to the bottle and actuates the directional control valve to the APU position.
- g) Select Reserve on the FIRE EXTGH switch to activate the reserve fire bottle.
- h) Due to the unavailability of the NO. 2 DC PRI BUS, there is NO possibility of using the Main extinguisher bottle as a back up.

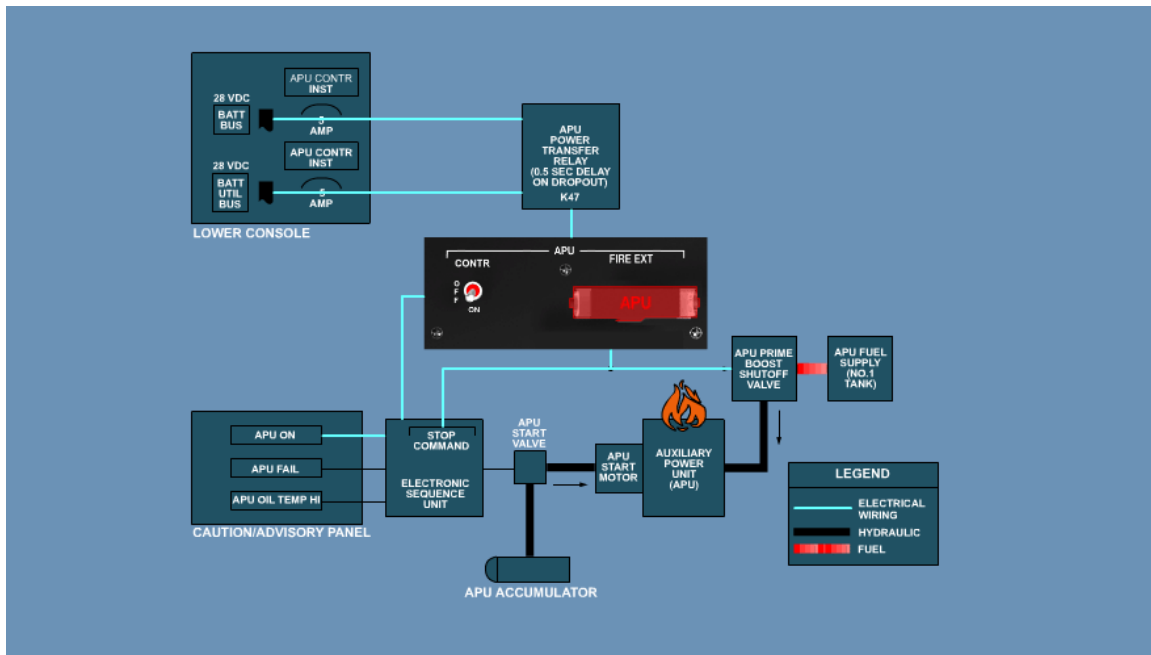
(e) APU Fuel Shutoff Valve

Frame #2075 (APU Fuel Shutoff)



- 1) The APU fuel shutoff valve controls the flow of fuel to the APU and is located in the transition deck above No. 1 fuel cell.

Frame #2077 (APU Fuel/Ignition Shutoff)

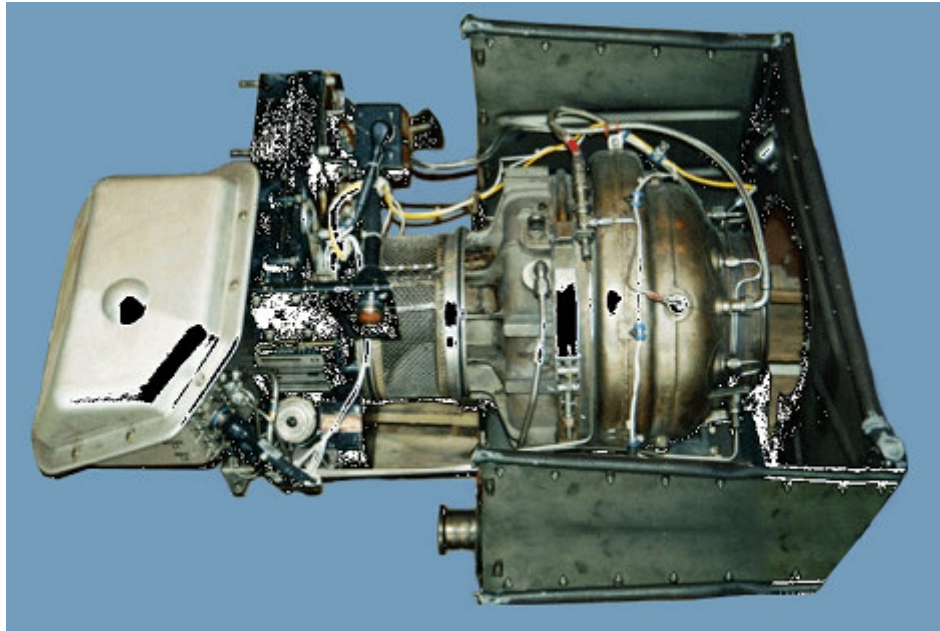


- 2) If an APU compartment fire occurred, the APU T-handle would illuminate.

- 3) Pulling the T-handle closes the APU prime boost shutoff valve, cutting off the fuel supply and also sending a stop command to the APU electronic sequence unit, which turns off the ignition to the APU.
- 4) The APU POWER TRANSFER RELAY (K47) has a .5 second time delay before dropout, to prevent inadvertent dropout of the APU due to loss of a start signal, during the switch over from battery power to either external power, or the helicopters main engine generators, or the APU generator when the battery bus is momentarily deenergized.
- 5) Closing the APU prime boost shutoff valve and applying a stop command to the ESU, ensures fuel and ignition sources are removed from the APU.

(f) APU

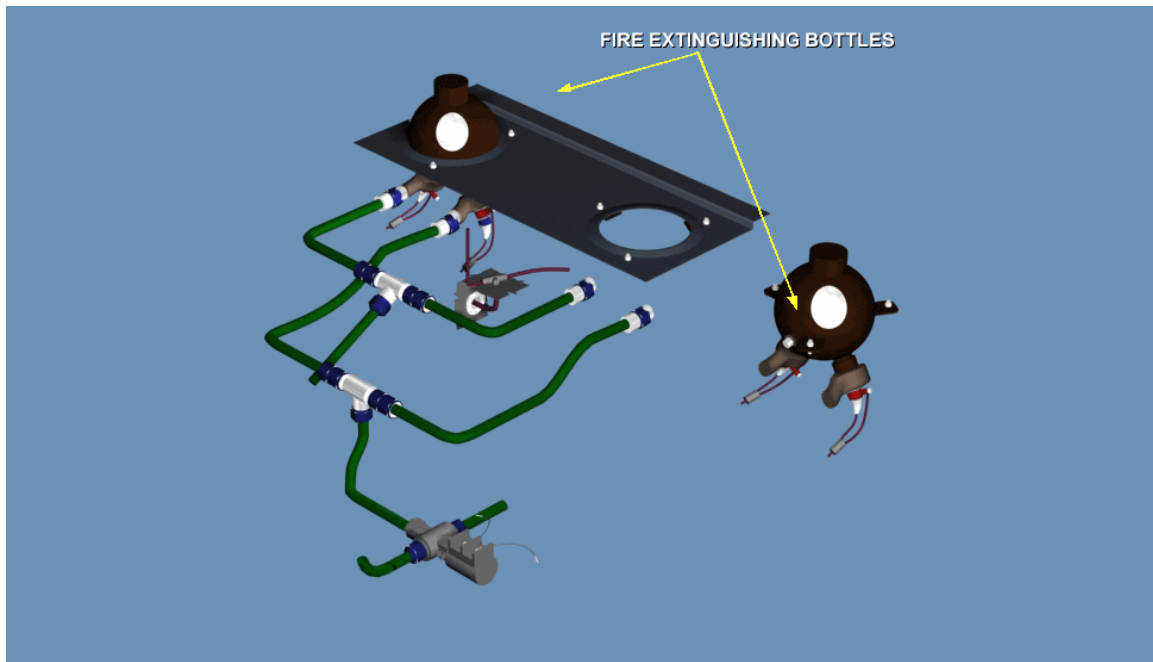
Frame #2035 (APU)



- 1) The APU compartment, unlike the engine compartments, has only a one shot extinguishing agent capability and from only one extinguishing container, while on battery power only.
- 2) With 115Vac power on the aircraft, selection of main or reserve is available.

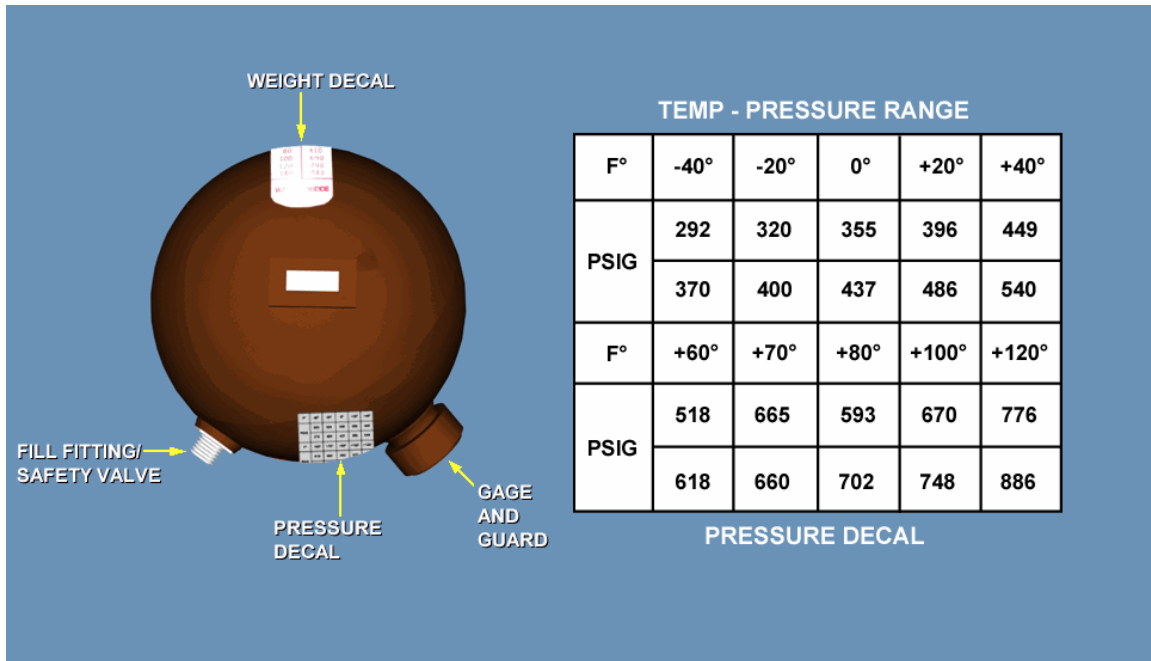
(g) Fire Extinguisher Bottles

Frame #2030 (Fire Extinguisher Bottles)

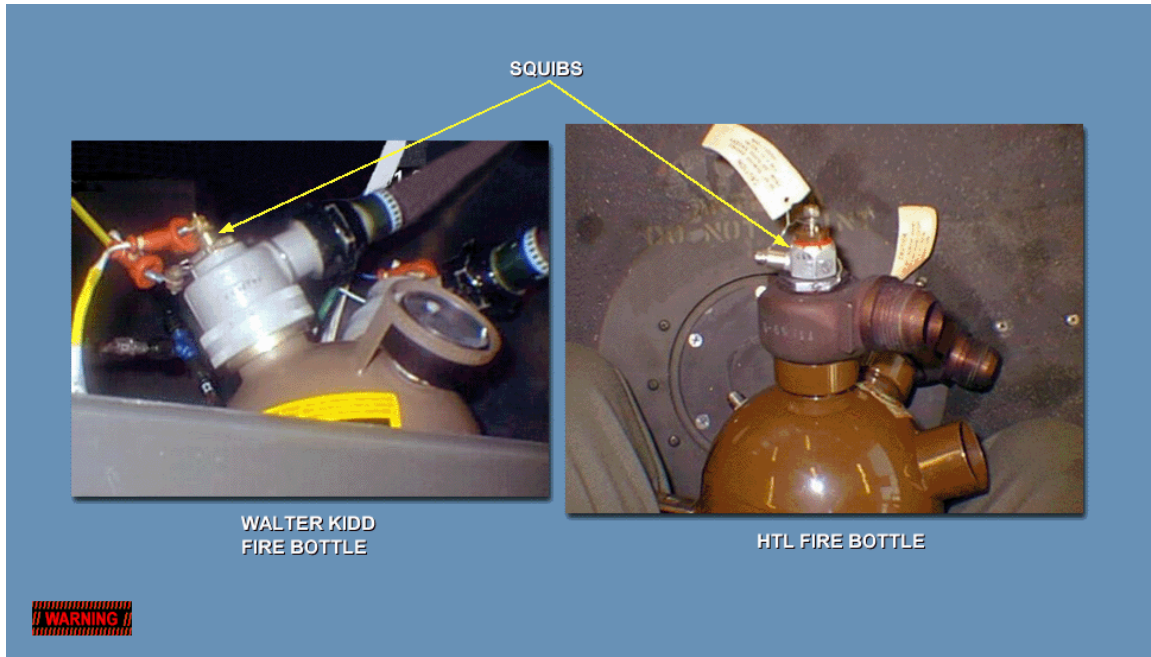


- 1) Each bottle is filled with 2.5 pounds of monobromotrifluoromethane, pressurized with gaseous nitrogen, and has a pressure gage for verification of charge.
- 2) Both bottles have dual outlets, each outlet with its own firing mechanism and one thermal discharge valve per bottle.
- 3) Each bottle serves as a backup for the other, thereby providing a two shot capability to extinguish fires in either main engine compartment or APU compartment.

Frame #2031 (Pressure Conversion Decal)



- 4) A pressure conversion decal is attached to containers for verifying proper pressure reading on gages, versus temperature as a quick reference only. (For inspection criteria refer to proper TM).

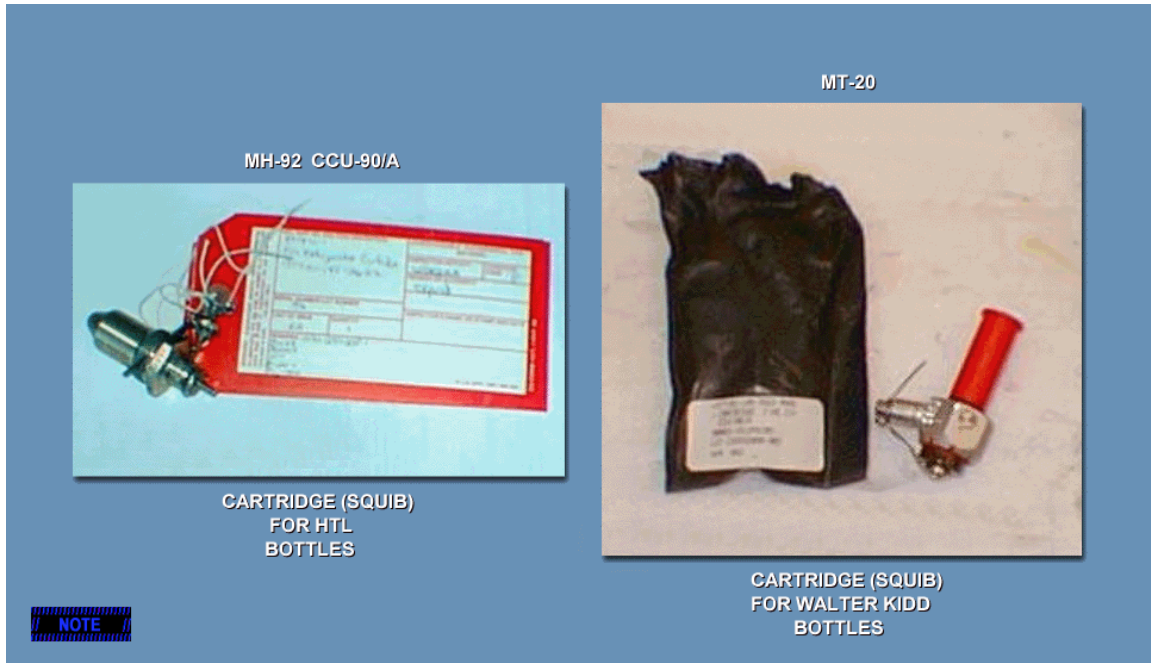


WARNING: Injury to personnel and damage to equipment will result if cartridge does not have a shorting jumper installed before being removed. Cartridge could detonate. Make sure shorting jumper is installed before removing cartridge.

Injury to personnel and or damage to equipment will result if cartridge housing assembly and or swivel discharge outlet are allowed to turn and loosen on the container while container is pressurized. Do not remove safety wire from the cartridge housing assembly to the container. Cartridge may be removed with pressure on the container as long as the cartridge housing assembly and swivel discharge outlet are held in place by a wrench.

- 5) There are two manufactures of fire bottles, HTL and Walter Kidd, that are interchangeable.
- 6) The squibs are not interchangeable between the two types.
- 7) Fire bottle maintenance inspections are done during PMS 1 and PMS 2 inspections.
- 8) The maintenance inspection criteria is listed in TM 1-1520-237-23-7.
- 9) After discharge into engine or APU compartments, corrosion preventative steps must be performed on engine or APU.

Frame #2033 (Types of Fire Bottle Cartridges (Squibs))

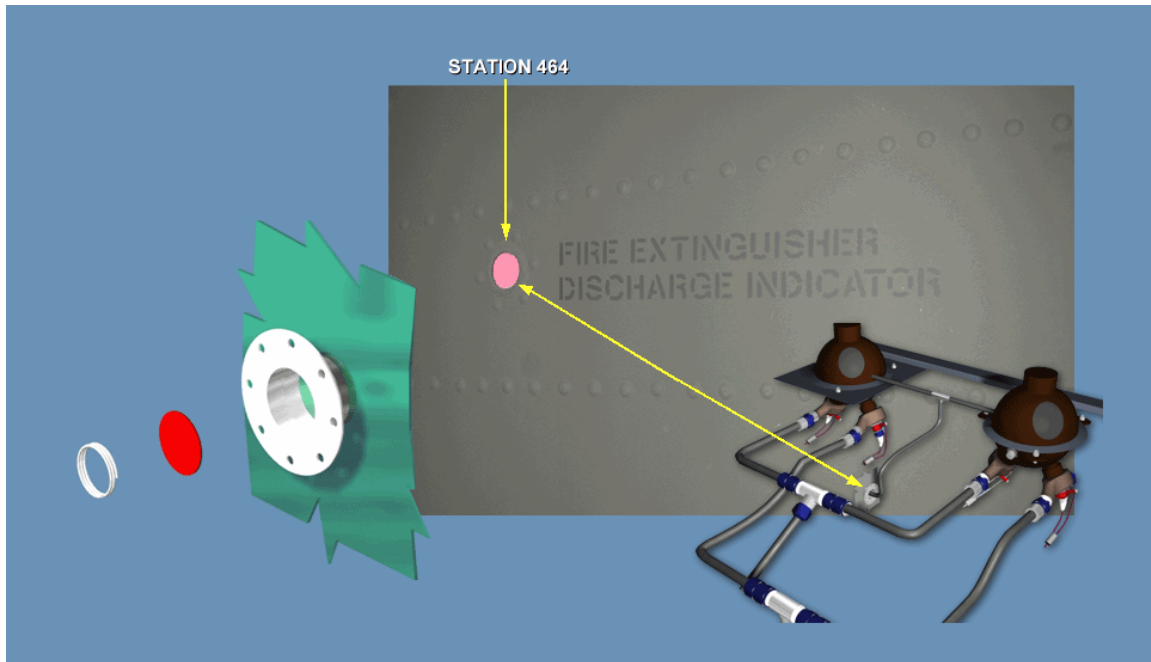


NOTE: Injury to personnel or damage to equipment will result if protective cover is removed from cartridge before installation in housing assembly. Make sure protective cover is not removed before cartridge is installed.

- 10) The MH-92 CCU-90/A, HTL cartridge and the MT-20, Walter Kidd Cartridge are physically different and will not interchange between the types of bottles.
- 11) Shelf life is 14 years from the date of manufacture.
- 12) Installed life is 72 months from when the package is opened for the MH-92 HTL cartridge, and is 66 months for the Walter Kidd, from the day the package is opened.

(h) Fire Extinguisher Discharge Indicator

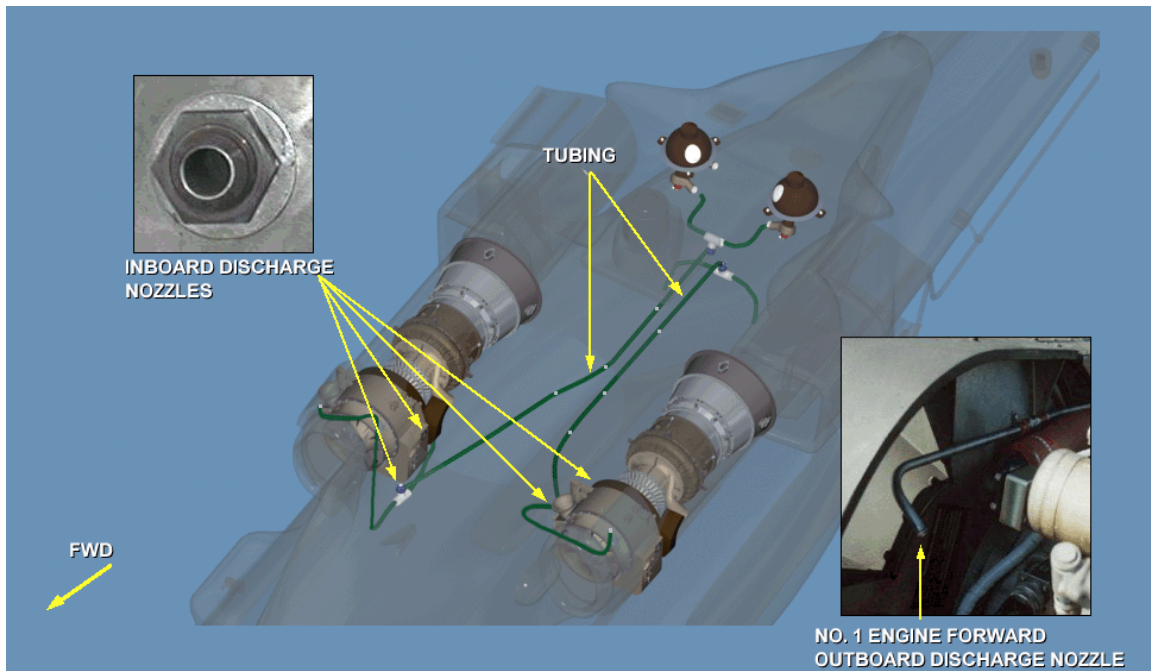
Frame #2020 (Fire Extinguisher Discharge Indicator)



- 1) A single, overboard discharge line is connected to both pressurized fire extinguisher agent containers.
- 2) A red indicator disc is at the end of the line, on the right side of the helicopter fuselage, at station 464.
- 3) A broken out or missing red disc indicates that one or both container's thermal relief valve has discharged and the containers must be removed and weighed to determine which container discharged and needs replaced.

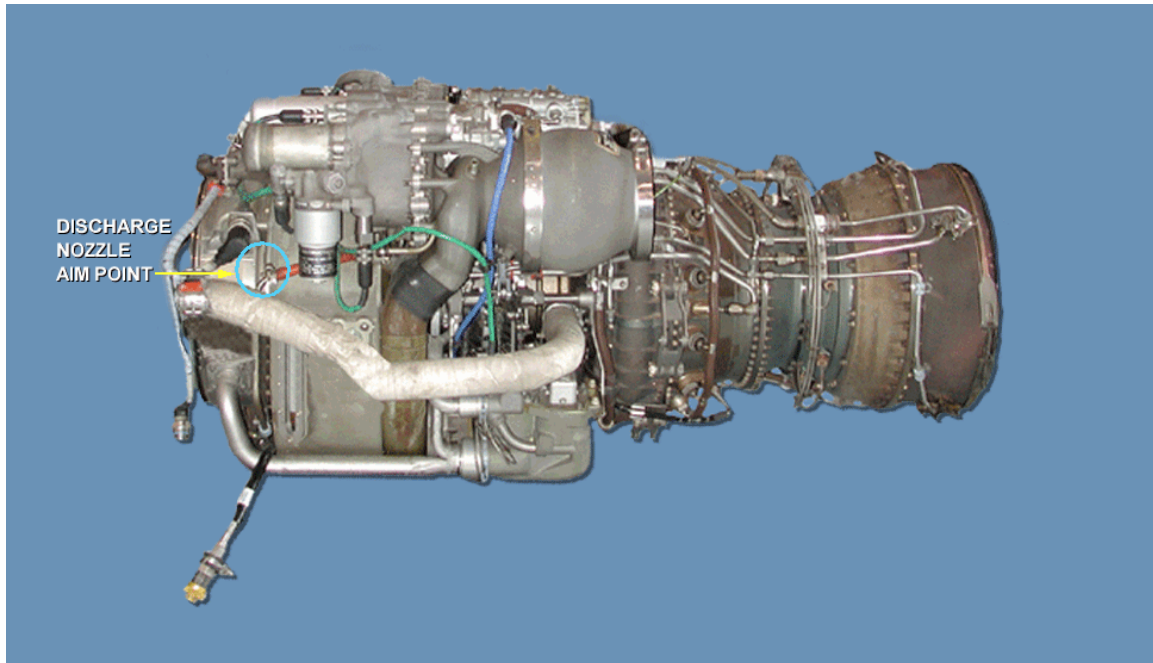
(i) Discharge Nozzles

Frame #2045 (Tubing/Discharge Nozzles)



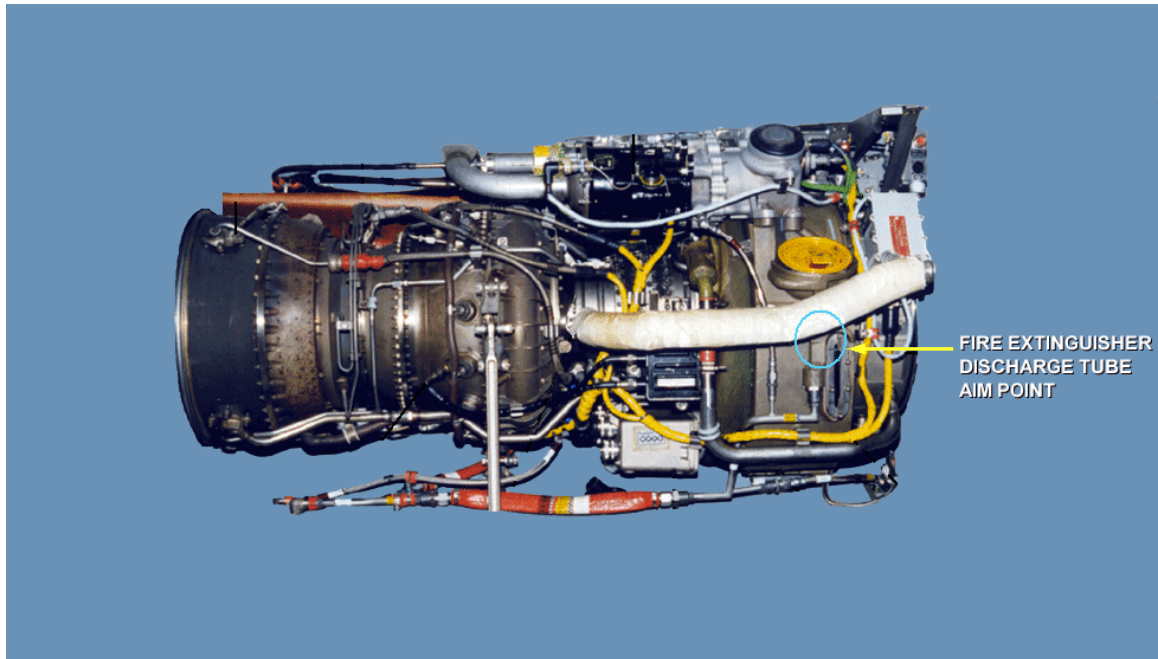
- 1) Inspection criteria for the tubing used in the extinguishing system is, no dent may be greater than 0.080 inch in depth or be within 4 inches of each other.
- 2) The inboard discharge nozzles are fixed and nonadjustable, while the forward outboard discharge nozzles have the capability of minor directional adjustments.

Frame #2055 (No. 1 Engine Discharge Nozzle Aim Point)



- 3) The No. 1 engine target point, at which the discharge nozzle should aim, is 1-1/2 inch up from the engine-mounted fuel filter base and 3/8-inch inboard of fuel filter centerline.
- 4) The target zone is a 2 inch diameter circle around the target point.

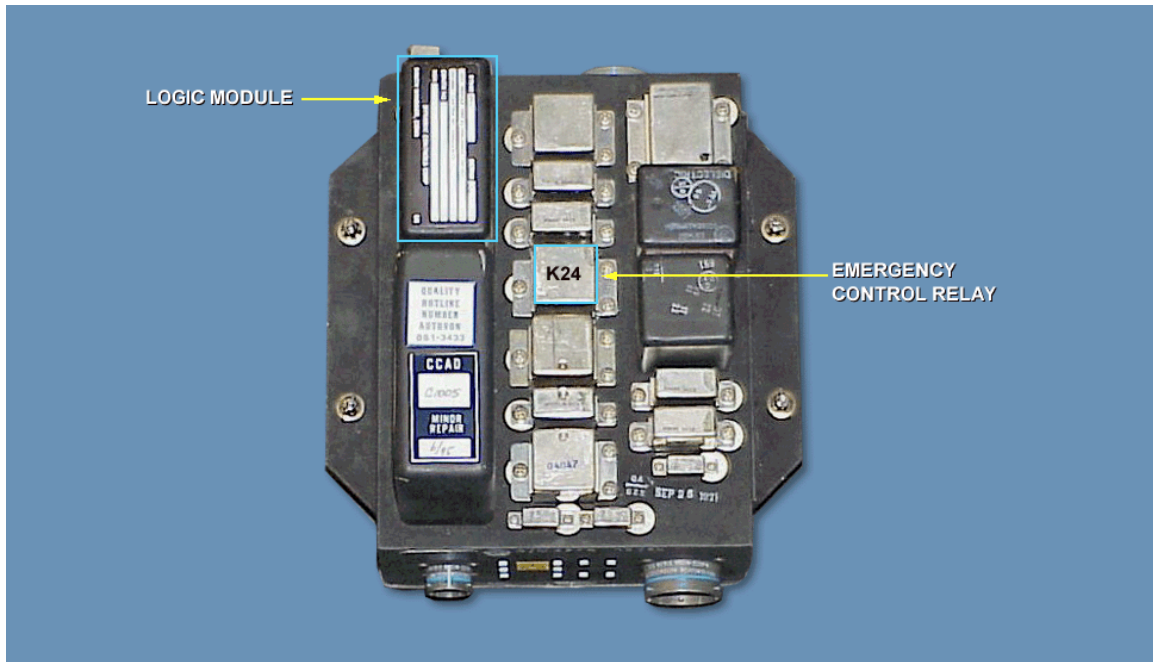
Frame #2060 (No. 2 Engine Discharge Tube Aim Point)



- 5) The No. 2 engine target point, at which the discharge tube should aim, is 5 1/2 inches aft of the air inlet firewall, measured along the engine inlet duct bleed air line, and 3/8-inch inboard of the bleed air line centerline.
- 6) The Target zone is a 2 inch diameter circle around the target point.

(j) Emergency Control Relay and Logic Module

Frame #2025 (Right Hand Relay Panel)



- 1) The logic module determines which path to use for routing the voltage to the appropriate bottle, and is located on the right hand relay panel in the cabin overhead.
- 2) The impact switch controls the emergency control relay K24, which fires both explosive cartridges (squibs) attached to the containers, releasing fire extinguishing agent into both main engine compartments.

Frame #2070 (No. 2 Primary Bus)



- 1) The NO. 2 DC PRIMARY BUS powers the FIRE EXTG circuit breaker and is located above the pilot seat.

(I) Fire Extinguisher Switch

Frame #2005 (Fire Extinguisher Switch)



WARNING: In case of fire, when ac electrical power is not applied to the helicopter, the reserve fire extinguisher must be discharged. Fire extinguisher agent cannot be discharged into No. 2 engine compartment if ac electrical power is not applied to helicopter.

- 1) The FIRE EXTGH switch, on the upper console, has marked positions of RESERVE/OFF/MAIN.
- 2) The switch is operative only after one of the two ENG EMER OFF or the APU T-handle has been pulled.
- 3) When the switch is placed to MAIN, after a T-handle has been pulled, the contents of the main fire extinguisher bottle are discharged into the corresponding compartment.
- 4) When the FIRE EXTGH switch is placed to RESERVE, after a T-handle has been pulled, the contents of the reserve fire extinguisher bottle are discharged into the selected compartment.
- 5) The contents of the fire extinguisher bottle discharge into the compartment of the last lever pulled.

CHECK ON LEARNING

1. Upon impact or a crash of 10 Gs or more, an omni directional inertia impact switch automatically fires both explosive cartridges attached to the containers, releasing fire extinguishing agent into _____?
2. What does a broken or missing red disk on the fire extinguisher discharge indicator indicate?
3. What is the purpose of the "T" style check valves used in the fire extinguishing system?
4. Dents of .080 in the extinguisher tubing can be no closer than _____?
5. When does the installed life tracking date, of either type squib begin?

SECTION IV. - SUMMARY

1. REVIEW/SUMMARIZE:

You have completed the characteristics of the Fire Extinguishing System.

The key points to remember are:

- The FIRE EXTGH switch, on the upper console, is operative only after one of the ENG EMER OFF or APU T-handle has been pulled.
- The contents of the first extinguisher bottle discharge into the compartment of the last T-handle pulled.
- Upon impact or a crash of 10 Gs or more, an omni directional inertia impact switch, mounted in the left hand relay panel, automatically fires both explosive cartridges (squibs) attached to the containers, releasing fire-extinguishing agent into both main engine compartments.
- A discharge port and overboard discharge line is connected to both pressurized containers. A broken out or missing red disc indicates that one or both containers thermal relief valve has discharged and the containers must be removed and weighed.
- A pressure conversion decal is attached to containers for verifying proper pressure readings on gages versus using temperature as a quick reference only. (For inspection criteria refer to proper TM).
- There are two manufactures of fire bottles that are interchangeable HTL and Walter Kidd, however the squibs are not interchangeable between the two.
- All three T-handles independently illuminate when a fire is detected. Pulling out on a lighted T-handle selects the compartment to which the extinguishing agent will be discharged. Placing the FIRE EXTGH switch to either MAIN or RESERVE selects the container from which the extinguishing agent will be discharged.

APPENDIX A

ILLUSTRATION LISTING

Frame #	Illustration Name
1000	Detection System Menu
1005	APU Fire Detector
1010	Fire Detectors
1015	Fire Detectors Control Amplifiers
1025	Fire Warning Capsule-Copilot Master Warning Panel
1030	Battery Bus
1035	Fire Detection Test Switch and DC Essential Bus
1037	Fire Detection Block Diagram FLASH
1040	APU T-Handle
1045	Engine Control Quadrant T-Handles
1050	Warning Light Dimming Relay
1051	Caution/Advisory Panel
1052	Dimming Circuit Block Diagram FLASH
1055	Fire Extinguisher Switch
1055	Pilot Master Warning Panel
2000	Fire Extinguishing System Menu
2010	Inertia Impact Switch
2012	Impact Switch Block diagram FLASH
2015	T-Handles
2017	APU T-Handle Lamps
2017	Engine T-Handle Lamps
2018	Fire Extinguisher Block Diagram FLASH
2020	Fire Extinguisher Discharge Indicator
2025	Right Hand Relay Panel
2030	Fire Extinguisher Bottles
2031	Pressure Conversion Decal
2032	Types of Fire Bottles
2033	Types of Fire Bottles Cartridges (Squibs)
2035	APU
2040	Directional Control Valve
2042	Directional Control Valve Block Diagram FLASH
2043	First Start APU Fire
2045	Tubing/Discharge Nozzles
2055	NO. 1 Engine Discharge Nozzle Aim Point
2060	NO. 2 Engine Discharge Tube Aim Point
2065	Battery Utility BUS
2070	NO. 2 DC Primary BUS
2075	APU Fuel Shutoff Valve
2077	APU Fuel/Ignition Shut-off

APPENDIX B

TEST AND TEST SOLUTIONS

1. This appendix is only used when the test and solutions are internal to the POI file.
2. When the test and solutions are internal to the POI file, then the POI file becomes a FOR OFFICIAL USE ONLY document.