Description and operation

Fire Detection / Extinguishing System Description

The Fire Detection systems on the FD1 Plus represents a typical Continuous Loop and Fenwal Spot Type detector system that would be found on the more sophisticated reciprocating and turbine aircraft. Extreme caution should be observed at all times when activating this trainer. Students should not operated this system without instruction and supervision. Please review Walter Kidde video tape that was provided for specific vendor information.

The 24 volt Fire detection system contains the essential components typical on a production aircraft and provides a single self contained detection / extinguishing system to provide a means for trainees to understand basic operation as well as troubleshoot faults that have been integrated into the trainer.

FAULT PANEL OPERATION:
Any circuit breaker can be functioned to place a fault in the system by pulling out on the breaker. Various faults have been wired into this trainer. The Instructor can activate the faults through the fault Panel utilizing the “FS” switches and the student will utilize proper troubleshooting procedures to locate and provide a possible narrative for corrective action.

This unit has an 120V AC power supply that replaces the aircraft’s 24 volt electrical system.

Description and operation

Fire Bottle with Explosive Cartridge

The Fire Bottle is made from corrosion resistant steel and has a service pressure of 700 psi. at a minimum capacity of 60 cu. in. The bottle is normally charged with Bromotrifluoromethane. The charge is maintained by a breakable seal. Upon activation of the fire extinguishing system, the explosive cartridge ejects a projectile that breaks the seal allowing the contents to be routed to the area of the fire. The bottle pressure is transmitted to a remote bottle pressure gauge on the flight deck by a pressure sensor mounted on the bottle. The extinguishing agent is routed to the fire by a stainless steel flexible hose, expelling the agent at the most likely location of a fire.

Fill valve

Blow out disc

Explosive cartridge

Pressure sensor

Extinguishing outlet

Description and operation

Fire Control Unit

The control unit contains a solid state circuit that monitors the resistance of the thermistor type sensing element. An alarm signal is given when the element is heated and its resistance drops to the alarm temperature point. The circuit operates from a single 28 Volt D.C. power source (+16 to +31 VDC) protection diodes for power line and sensor loop transients, and filters for EMI. The circuits are housed in a hermetically sealed case. In addition the control box is able to sense a false ground of the loop element and not trigger a fire. There is a timing comparator circuit in the control box that will time the resistance change in the loop and if a sudden change is sensed it will interpret that as a short to ground.

Description and operation

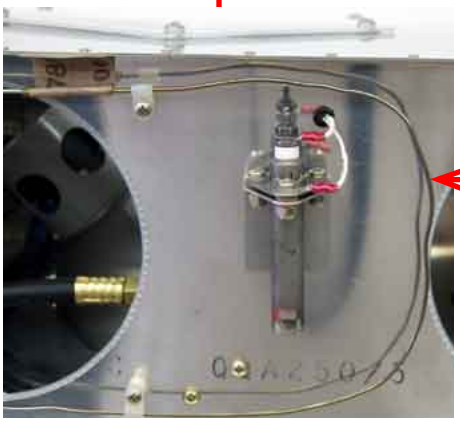
Spot type detector

One Spot detector is wired into the detection system and activated with external heat. The spot works on the principle of a bimetallic thermo switch that makes contact upon the outer housing reaching a set temperature thereby completing the warning systems circuit.

Description and operation

Continuous Loop Sensing Element

The sensing element loop is an Inconel housing containing two wires embedded in a special ceramic material. The sensing element loop connects at the input terminal to two voltage sensing comparators, which are set to trigger at different levels of element resistance. As the element resistance decreases at a finite rate in response to heating, the enable level circuit switches first. After a short time delay, the lower level circuit, set at the fire trip point, is triggered and the logic circuit outputs a fire signal.



Loop Sensor

Description and operation

Indicator Lights and switches

The Fire Detection / Extinguishing system indicator lights are comprised of the *Master light* indicating the system is on with 24 volts DC is on the buss. *Fire Light* (panel) illuminates with the sensing of a fire or heat in either the loop or spot detector. *Fire "T" pull handle light / pull switch*, illuminated when a fire is sensed and the fire extinguisher bottle is charged. *Fault light / switch*, indicating when the system has a fault, in addition this switch is used to reset the system. *Low Bottle* pressure light, indicating the fire extinguisher bottle is low on charge. *Bleed Air, Fuel Off*, indicating the fuel and bleed air shutoff valves have been activated. *Horn off lamp / switch* will illuminate when the horn off switch is pushed in. *Test light*, this switch is used to perform a function test on the system.

Fire pull "T" Handle

Description and operation

Fire bottle pressure gauge

Master switch

Fault switches

Fuses AC & DC systems

Horn alarm

Relay timer adjustment

24 VDC power supply

Pneumatic valve 24 VDC