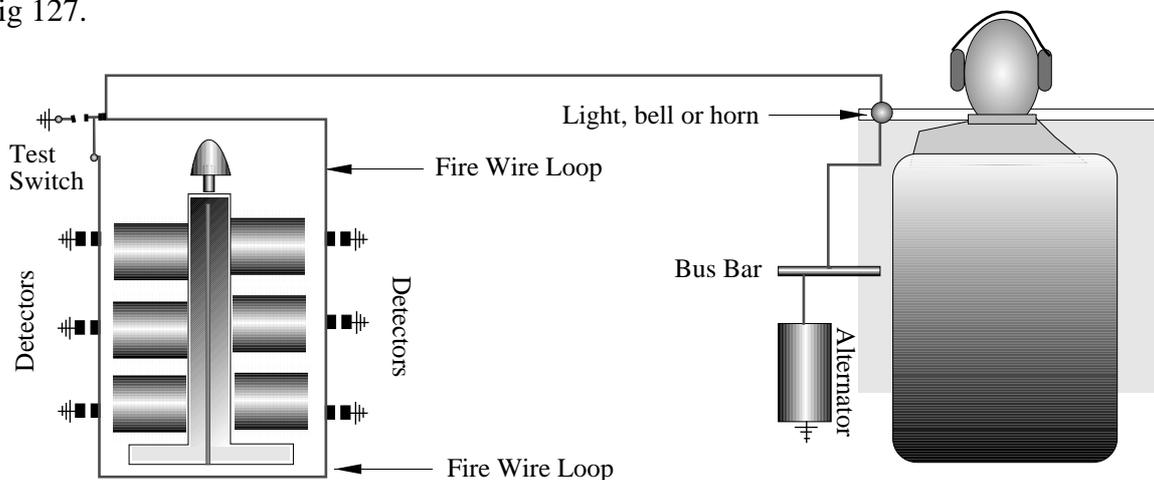


Fire protection systems are operated by the aircraft's electrical system. The three components of a fire protection system are fire detectors, fire warning devices and fire extinguishers. Although fire detection systems include cabin fire and smoke detectors, by far the most common application in general aviation are systems designed to detect and extinguish fires in the engine compartment. Here we examine a typical engine fire protection system in a general aviation aircraft.

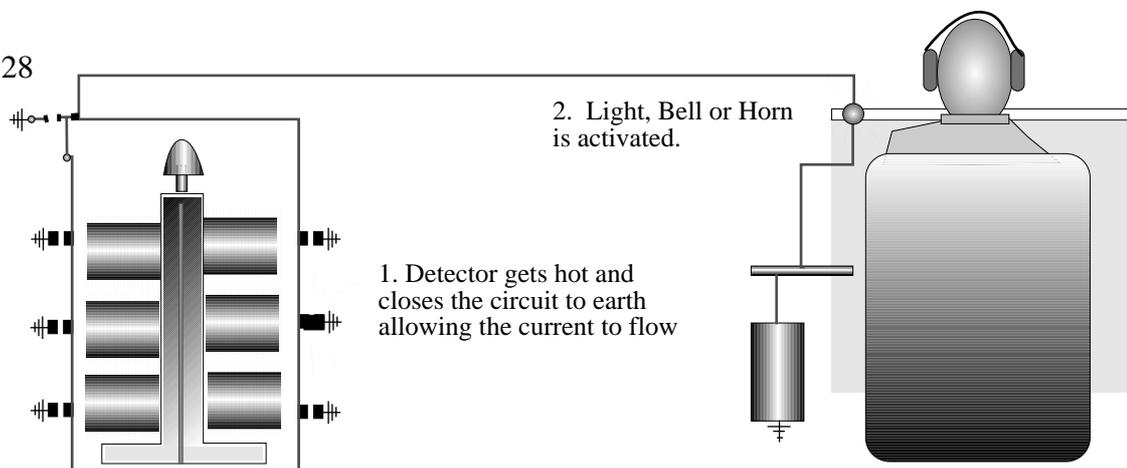
**Fire detectors.** The detectors can be thought of as switches which are normally in the 'off' position, but turn on whenever they reach a set temperature. They may be mechanical switches containing a bi-metallic strip which distorts when heated - much the same as the thermostatic switch in an electric iron, or they may be made of materials which resist the flow of electric current when they are cold but permit current to flow when they are hot. Infra-red detectors are also used - they react to the presence of hot spots. The detectors are positioned around the inside of the engine cowl and connected to a loop of wire [the fire wire loop]. The loop is connected to the aircraft's electrical system via a warning light, bell or horn in the cockpit [Fig 127].

Fig 127.



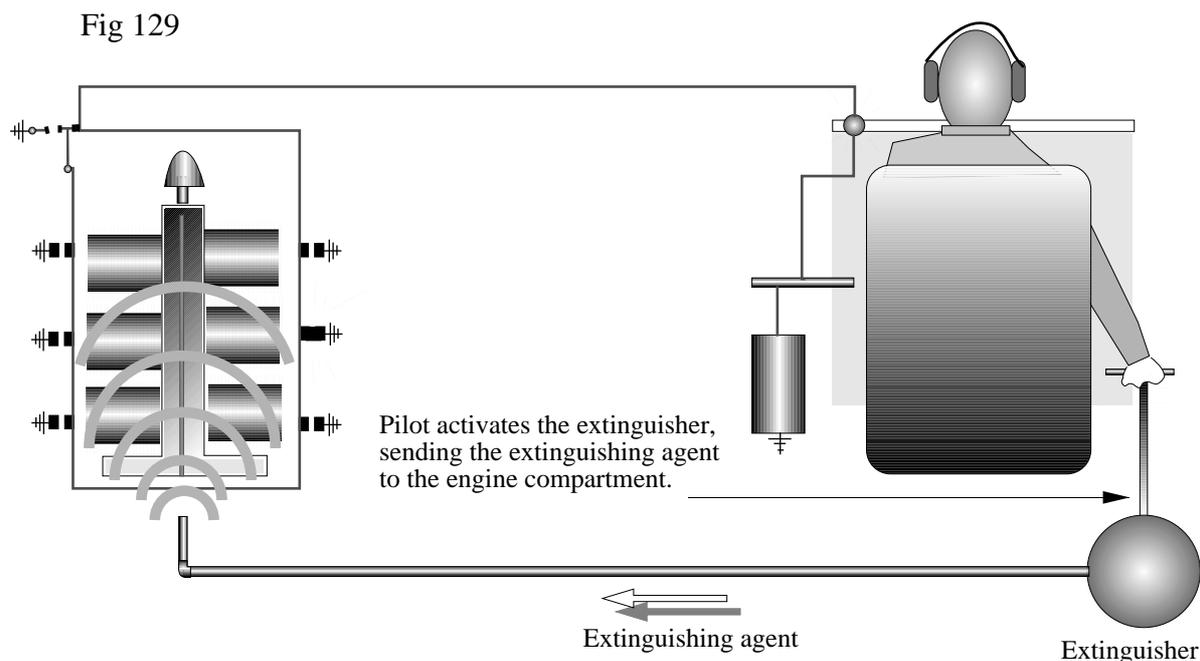
The current from the bus bar seeks a way to earth via the detectors. However while ever the detectors remain at normal temperatures, no path to earth is available so no current flows through the cockpit warning device. However if any one of the detectors becomes hot enough, it closes the circuit to earth and the current flows from the alternator through the bus bar and to earth through the hot detector. This current flow activates the light, bell or horn in the cockpit to warn the pilot of excessive temperature within the engine compartment [Fig 128].

Fig 128



The pilot must now decide what the problem is, and if he/she is convinced that a fire exists, activate the fire extinguisher. *[Note that the exact actions to take in the event of an engine fire will be outlined in the aircraft Operating Handbook or in the standard operating procedures in the company's Operations Manual.]*

The action of operating the fire extinguisher [usually located in the aircraft's fuselage], discharges the extinguishing agent into the engine compartment. This is usually an inert gas which smothers the fire by robbing it of oxygen. It also cools the ambient temperature within the compartment to below that required to sustain combustion.



Even during normal operation the environment within the engine cowl is rather hostile. The fire wire loop may have to survive this environment for years before it is called upon to perform its function. For this reason the system is always provided with a test switch which the pilot can activate from the cockpit during a normal preflight inspection. The current flows through the entire loop and then to earth through the test switch whenever the test switch is activated [Fig 130]. The test switch verifies the integrity of the entire loop circuit. Individual detectors are not tested by this method.

