

6141A



**ENGINE OVERHEAT,
FIRE DETECTION
AND
FIRE EXTINGUISHING SYSTEM**

**443d TECHNICAL TRAINING SQUADRON
443d MILITARY AIRLIFT WING, TNG (MAC)
ALTUS AIR FORCE BASE, OKLAHOMA**

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1/96

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INTRODUCTION

From this program booklet you will become familiar with system terminology, location, and function of the components.

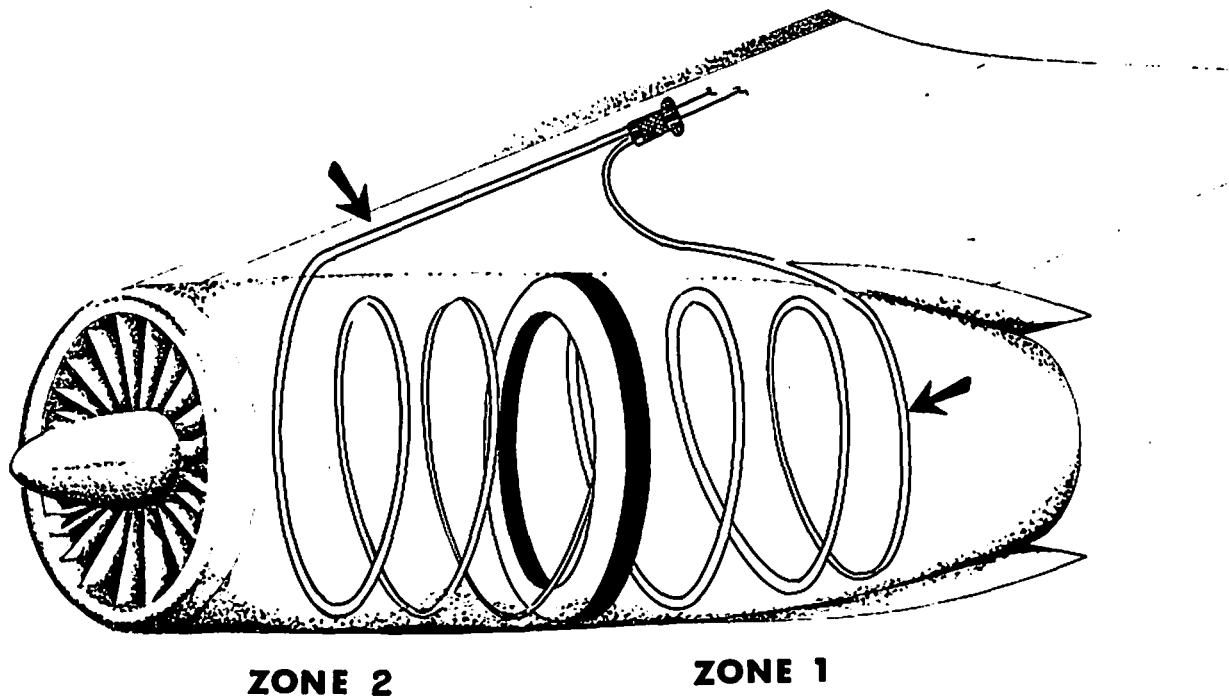
ENGINE OVERHEAT AND FIRE

DETECTION SYSTEM

Objectives: When you have completed this program, you will be able to:

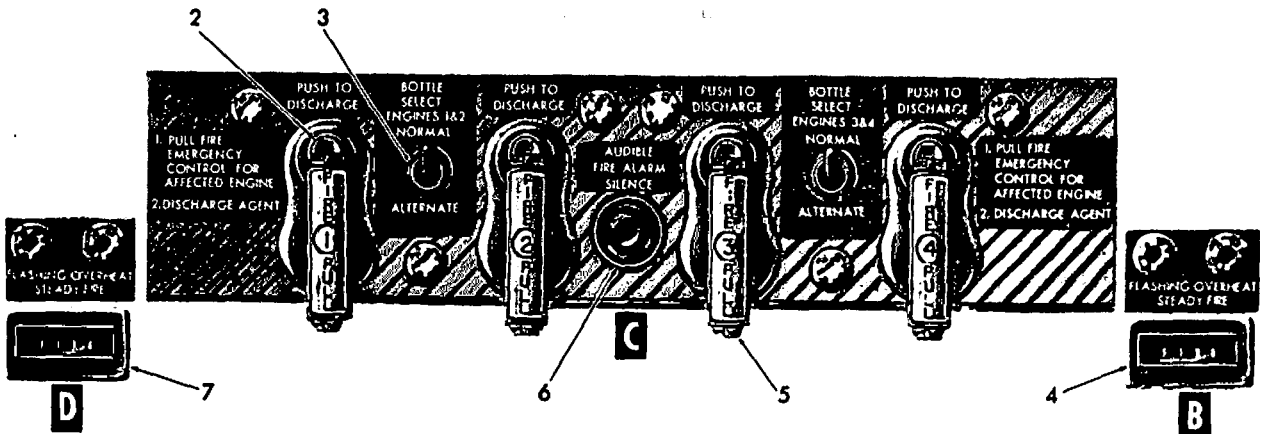
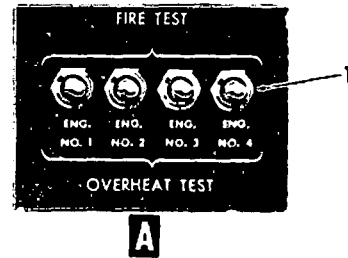
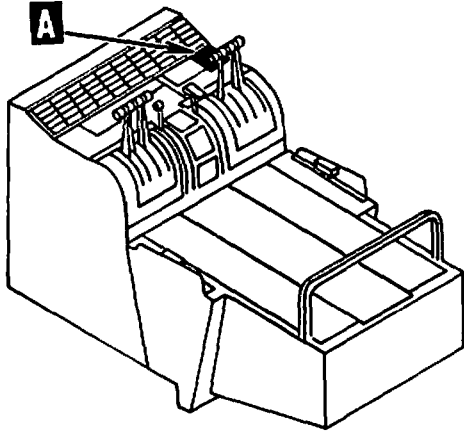
1. State the location of the engine overheat and fire detection system components.
2. Identify the warning signals of the master fire and overheat warning lights.
3. List the purpose of the fire warning test switches.
4. Identify normal and abnormal conditions during test.

The C-141 aircraft is equipped with an electrically operated fire and overheat detection system to alert the pilots in the event of an engine overheat or fire. Engine overheat and fire conditions are detected by an inconel loop mounted on the inside of the engine cowling and pylon.



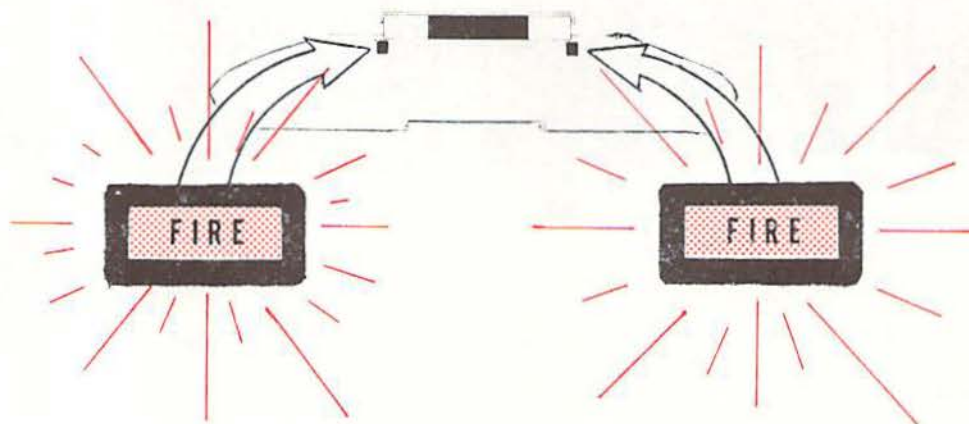
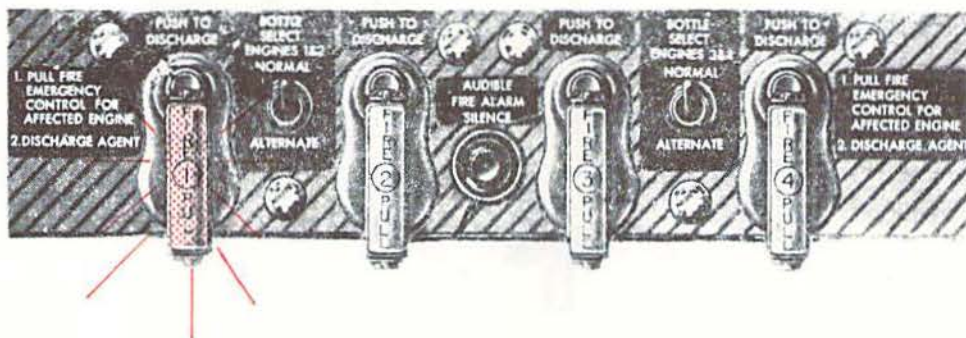
The inconel loop senses heat and when excessive heat is detected, a signal is sent to a central box, located in the right underdeck area. The control box then relays the respective signal to the flight station.

FIRE WARNING & EXTINGUISHING SYSTEM CONTROLS & INDICATORS



- | | |
|---|---|
| 1. Fire Test & Overheat Test Switch | 5. Engine Fire Emergency Control Handle |
| 2. Push to Discharge Button | 6. Audible Fire Alarm Silence Button |
| 3. Normal & Alternate Button Select Switch | 7. Pilot's Overheat & Fire Warning Light (Located above his instrument panel) |
| 4. Copilot's Overheat & Fire Warning Light (Located above his instrument panel) | |

Should an overheat be sensed, the indication will be two flashing master overheat and fire warning lights located on the pilot's and copilot's instrument panels and a flashing light in the respective translucent emergency fire control handle.



Should a fire be sensed, the indication in the flight station would be two steady master overheat and fire warning lights located on the pilot's and copilot's instrument panels, a steady light in the respective translucent emergency fire control handle, plus an audible tone through the flight station loud speaker, pilot's and copilot's, observer and engineer's head set.



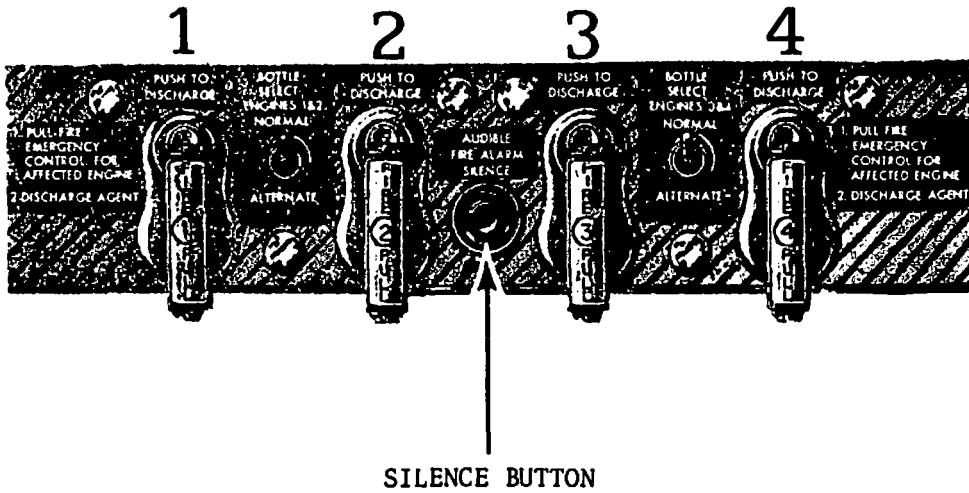
An AUDIBLE TONE on the FLIGHT STATION loud speaker.



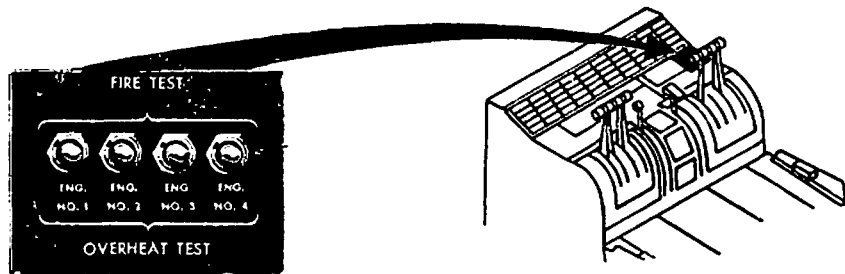
An AUDIBLE TONE on the pilot's, copilot's, observer's and engineer's headsets.

The audible tone can be silenced by an audible fire alarm silence button located on the engine fire control panel between emergency fire control handle #2 and #3.

FIRE CONTROL HANDLES



The engine fire and overheat WARNING TEST SWITCHES located on the CONTROL PEDESTAL just forward of the copilots' throttles allow TESTING of the overheat and fire warning system.



Procedures for testing the fire and overheat warning system are as follows:

1. Place the engine fire and overheat warning test switches in the FIRE TEST position one at a time. The light in each corresponding fire emergency control handle and the master fire warning lights should ILLUMINATE and the audible alarm should SOUND.

2. While holding each switch in the FIRE TEST position, press the audible fire alarm silence BUTTON. The audible alarm should stop.

3. Place the engine fire and overheat test switches in the OVERHEAT TEST position one at a time. The light in each corresponding fire emergency control handle and the master fire warning lights should FLASH ON and OFF.

NOTE: The absence of lights and audible tone during testing indicates a malfunction in the system and must be corrected before flight.

REVIEW

Fill in the missing words and check your answers on Page 15.

1. A single averaging continuous _____ is mounted on each engine _____ and pylon.
2. An OVERHEAT CONDITION causes a _____ red light in the fire and overheat warning lights and a _____ red light in the associated fire emergency control handle.
3. An ENGINE FIRE causes:
 - a _____ red light in the associated fire control handle.
 - a _____ red light in the fire and overheat warning lights.
 - an audible _____ on the flight station _____.
 - an audible _____ in the _____ head sets.
4. An audible fire alarm silence button located between the center _____ is normally actuated by the _____.
5. The fire and overheat warning test switches located on the _____, _____ allows testing of the fire and overheat warning systems.

Key

1. inconel loop, cowling
2. flashing, flashing
3. steady,
steady,
tone, loud speaker
tone, pilot, copilot, observer and engineer
4. emergency fire control handles, copilot
5. control pedestal

FIRE EXTINGUISHING SYSTEM

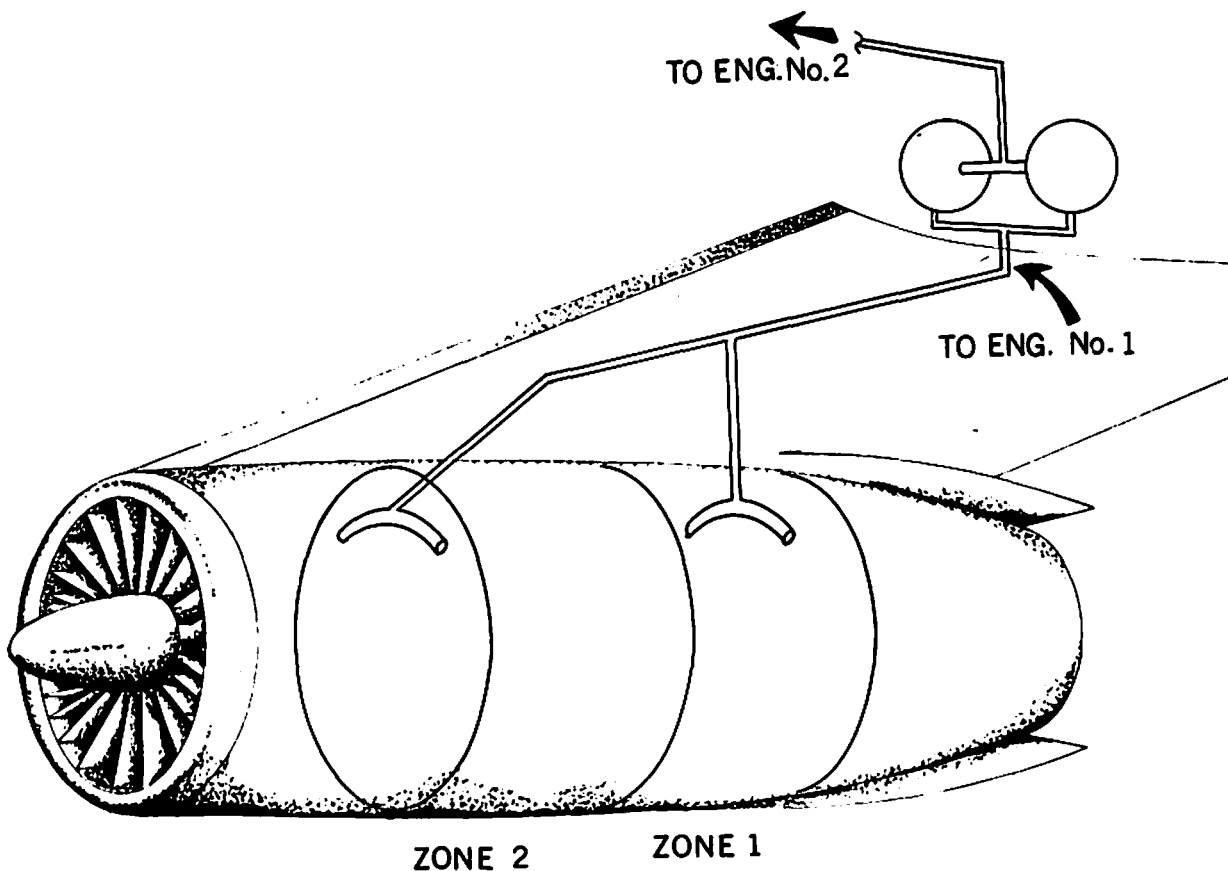
OBJECTIVES: When you complete this program, you will be able to:

1. State the type of fire extinguishing system used on the C-141 aircraft.
2. Locate the fire bottles and components.
3. List the purpose of the fire emergency control handles.
4. State two ways to expose the discharge buttons.
5. Identify the indication of the low pressure warning lights.
6. Identify the purpose of the "NORMAL" - "ALTERNATE" fire extinguisher bottle select switches.

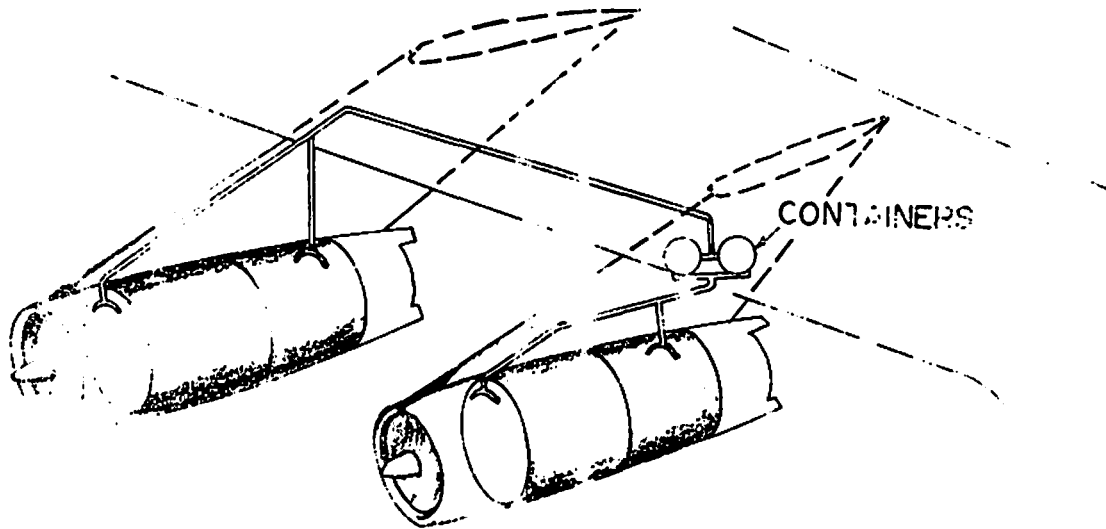
The aircraft engine fire protection system is made up of two identical fire extinguishing systems; a system for each wing, and each system is independent of the other.

Each system has two spherical type fire bottles clustered together and is located in the upper portion of the outboard pylons. (No. 1 and No. 4).

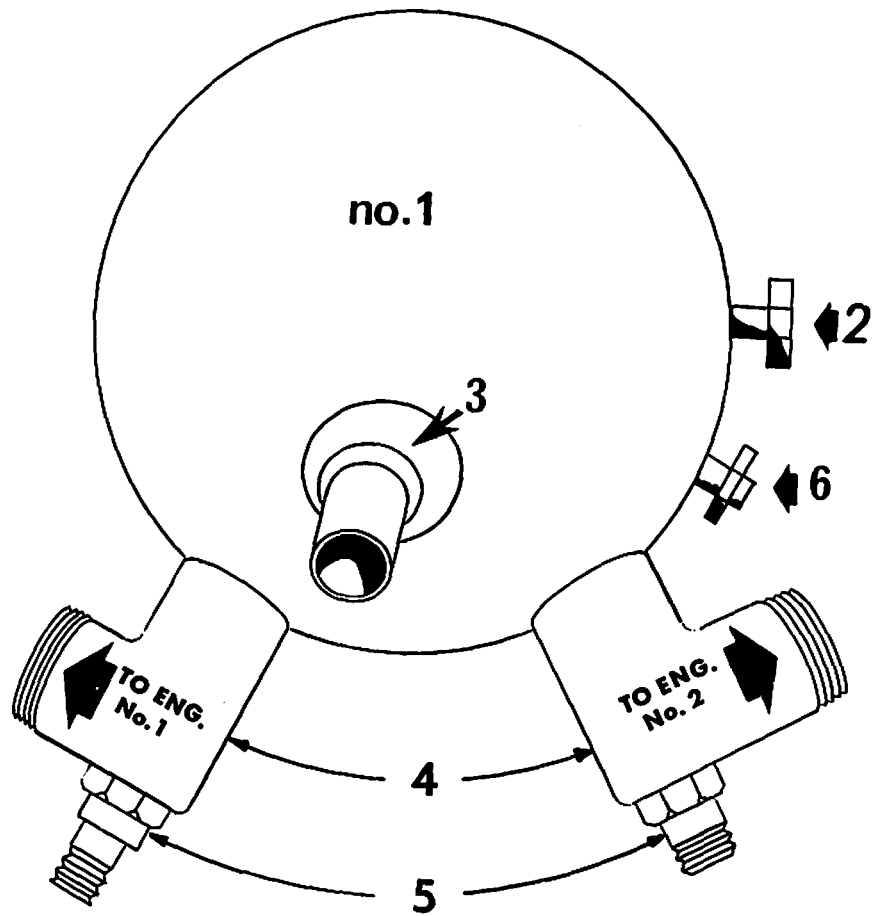
Bottle No. 1 and Bottle No. 2 are in the # 1 pylon and Bottle No. 3 and Bottle No. 4 are located in the No. 4 pylon. The bottles are charged with dibromodifluoromethane (DB) agent at about 600 PSI standard day temperature. A High Rate Discharge System.



(LEFT WING)

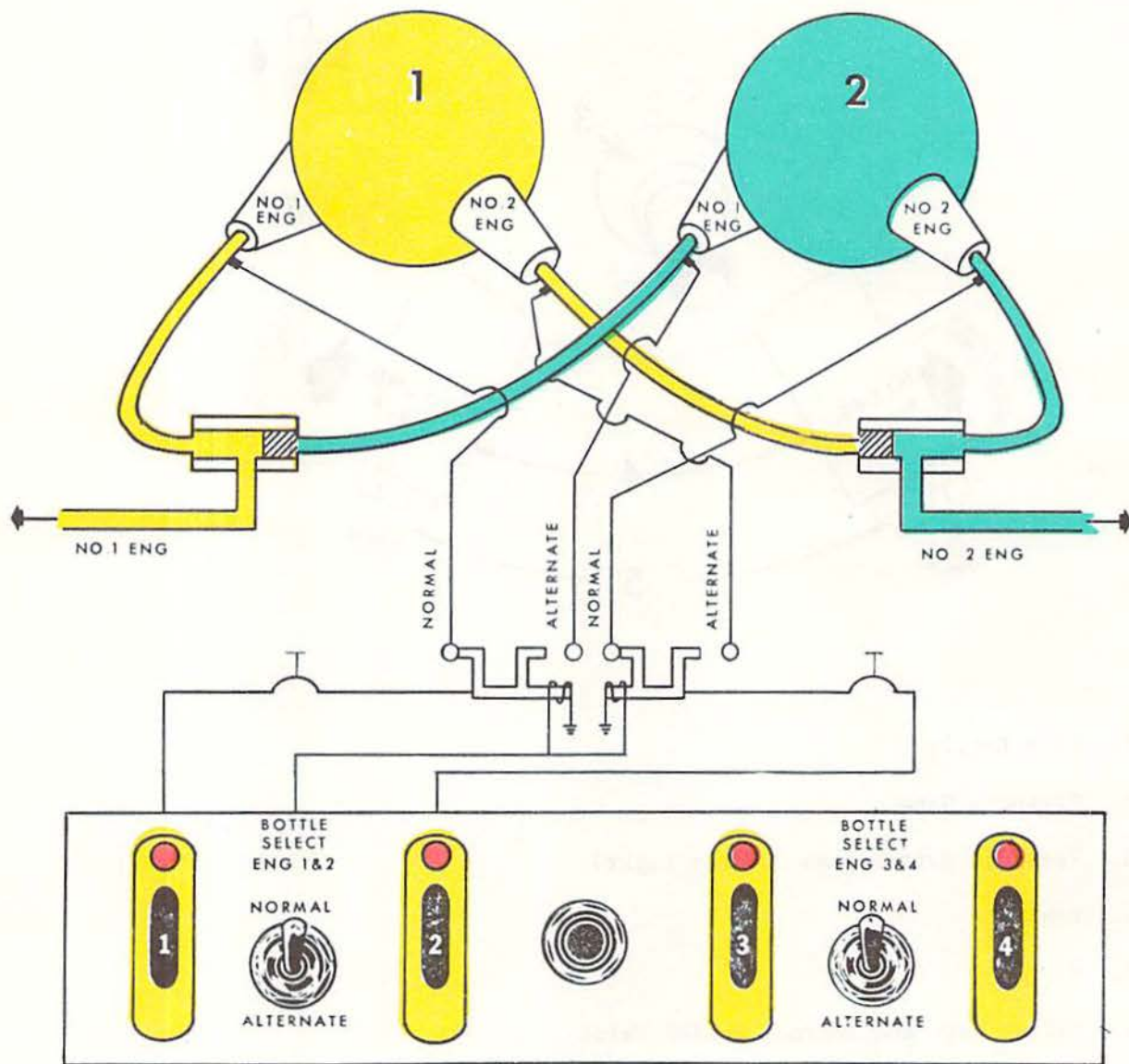


Right wing is identical. One red disc for both bottles (Thermal Expansion and Service Port) is located on right side of each outboard pylon, adjacent to pressure gage inspection panel. A Thermal Expansion will discharge all agents immediately.

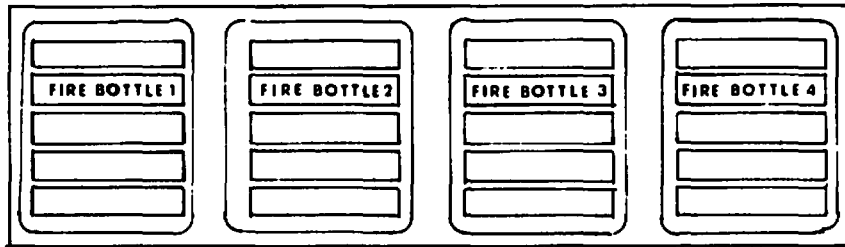


1. Fire Bottle
2. Pressure Gage
3. Pressure Switch (Annunciator Light)
4. Bonnett
5. Squib
6. Filler Port and Thermal Relief Valve

The bottles are clustered together in a manner that if needed both bottles can be discharged into the same engine. (See illustration).

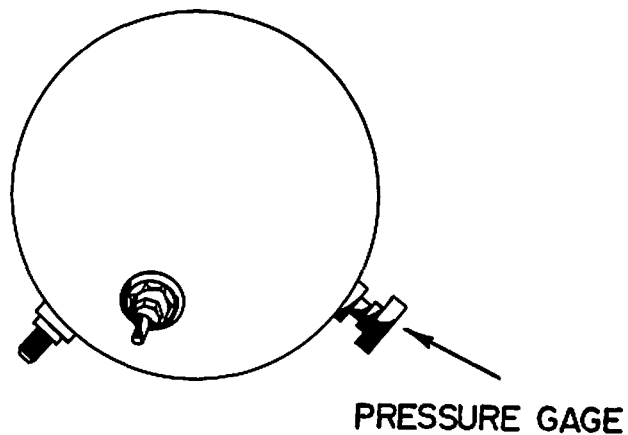


Four low pressure warning lights marked fire bottle 1, 2, 3 and 4 are located on the pilots annunciator panel.



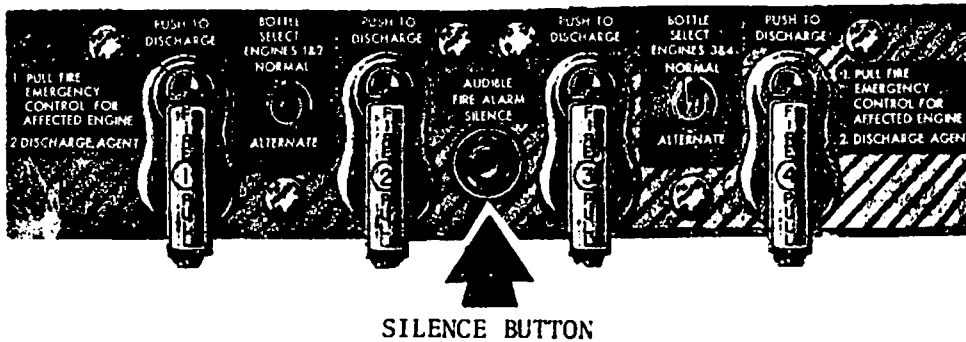
These lights illuminate when the pressure drops to 225 PSI warning the pilot of low container pressure.

A pressure gage located on the SIDE of each CONTAINER and accessible through an inspection door on the right side of each outboard pylon, is the only means to ascertain the exact pressure in the container.



Normal press is 600 PSI plus or minus ambient temperature variation.

There are FOUR engine fire emergency shutoff handles located between the engine instrument panel and the windshield on the fire emergency shutoff panel.



Pulling the engine fire emergency shutoff handle accomplishes the following:

MECHANICALLY

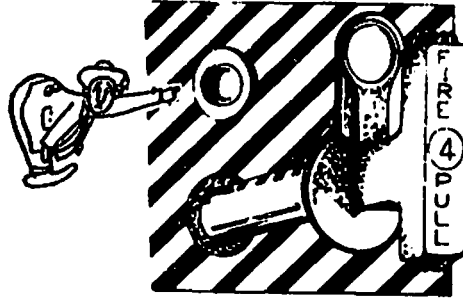
- (1) Closes the manual fuel shutoff valve.
- (2) Exposes the fire extinguisher discharge button.

ELECTRICALLY

- (1) Closes the engine fuel control valve.
- (2) Opens the generator line contactors, and de-energizes the generators.
- (3) Shuts off the hydraulic supply and pressure.
- (4) Closes the bleed air shutoff valve.
- (5) Closes the nacelle cooling air doors. (Zone Two cooling)
- (6) De-energizes ignition systems. (20 joule) and (4 joule)

NOTE: Engine oil is not shut off.

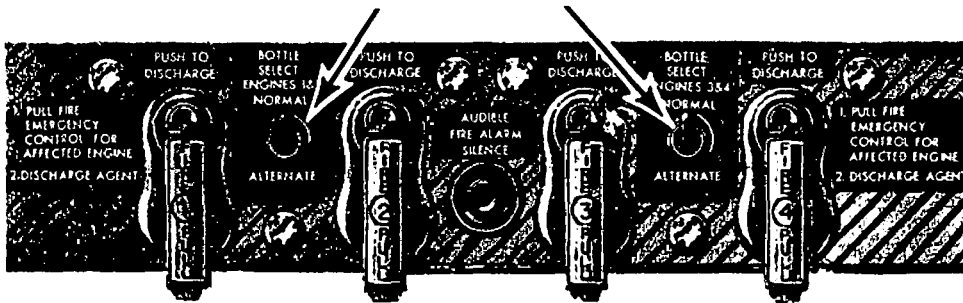
A discharge button is located immediately behind a shield on each engine Fire Emergency shutoff handle. The button is normally exposed when pulling the engine Fire Emergency shutoff handle, but a plastic pushout plug may be punched out and the agent discharged should the Fire Control handle become jammed.



Power to discharge a fire bottle is supplied through the Main DC No. 2 and the Isolated DC Bus. However, should normal electrical power be interrupted a fire bottle can be discharged with only battery power from the Isolated DC bus.

Two, two-position selector switches are located on the Fire Emergency Control panel, (see diagram) to provide a means of discharging the agent from the second bottle into the same engine if the first bottle fails to extinguish the fire. This provides maximum reliability in extinguishing an engine fire.

BOTTLE SELECT SWITCHES



For instance, there is an engine fire on #1 engine. The fire control handle is pulled and the agent is discharged. If the light still persists, then the bottle select switch located between fire control handles 1 and 2 is switched from normal to alternate. Now the second fire bottle can be discharged to #1 engine by pushing the same agent discharge button.

NOTE: However, if #2 bottle is not used after alternate has been selected then the selector switch must be moved back to "NORMAL" position.

REVIEW

As a short review of the fire extinguisher system fill in the blank spaces. Then check your answers by checking the key on page 21 and make corrections as necessary.

1. The fire extinguishing system is a HIGH RATE discharge system with two identical _____.
2. There are two spherical type containers located in each _____ pylon.
3. The engine fire emergency shutoff handles when pulled will MECHANICALLY and _____ isolate the affected engine from all systems except the _____ system.
4. The low pressure warning lights are located on the _____ panel and will illuminate when the pressure drops to _____ PSI and below.
5. The four discharge buttons are exposed by pulling the engine _____
_____ handle or punching out the protector
_____ in the engine fire emergency shutoff handle.
6. The Engine Fire Control Handle does not need to be pulled to discharge the agent.
 - a. True
 - b. False
7. The two fire extinguisher bottle select switches provide the capability of releasing _____ or _____ containers to a single _____.
8. The select switch must be moved to the ALTERNATE position to discharge the second bottle to the same engine.
 - a. True
 - b. False

Key

1. Systems.
2. Outboard.
3. Electrically, Engine oil.
4. Annunciator panel, 225 PSI.
5. Fire emergency shutoff, Plug.
6. True
7. One, both, nacelle
8. True