DEPARTMENT OF AEROSPACE ENGINEERING

19ASB303 AIRCRAFT MAINTENANCE ENGINEERING

UNIT-1 AIRCRAFT GROUND HANDLING AND SUPPORT EQUIPMENT

Engine Fire Extinguishing

Introduction

Engine fires are among the most critical emergencies that can occur during aircraft operations. This document outlines the procedures for detecting and extinguishing engine fires, the types of fire suppression systems used, and the necessary precautions to ensure safety during ground handling and support operations.

1. Understanding Engine Fires

Engine fires can arise from various causes, including fuel leaks, electrical failures, or mechanical malfunctions. Recognizing the signs of an engine fire and understanding the appropriate response is crucial for maintaining safety.

1.1 Types of Engine Fires

- In-Flight Engine Fires: These occur during flight and require immediate action from the flight crew.
- Ground Engine Fires: These can happen during start-up, taxiing, or maintenance operations.

2. Fire Detection Systems

Effective fire detection is essential for timely intervention. Modern aircraft employ various systems to detect engine fires:

2.1 Thermal Switch Systems

- Utilize heat-sensitive switches that complete an electrical circuit at a predetermined temperature.

2.2 Continuous Loop Systems

- Employ inconel tubing containing heat-sensitive elements that complete a circuit when exposed to high temperatures. These systems are commonly used in commercial airliners.

2.3 Pneumatic Detection Systems

- Use a helium-filled tube that closes a switch as temperature increases, indicating a fire.

3. Fire Extinguishing Systems

Once a fire is detected, it is crucial to extinguish it promptly using appropriate systems:

3.1 Fire Extinguishing Agents

- Halon 1301: Traditionally used in aircraft fire suppression systems but banned for new production due to environmental concerns.
- Hydrofluorocarbons (HFCs): Newer agents replacing Halon in modern aircraft systems.

3.2 Extinguishing System Configuration

- Engine compartments are typically divided into zones (Zone 1 and Zone 2) for targeted extinguishing.
- Each engine is equipped with two electrically operated extinguishers that can be activated manually by the flight crew.

4. Engine Fire Extinguishing Procedures

The following steps outline the standard procedures for extinguishing an engine fire:

4.1 In-Flight Engine Fire Procedure

1. Throttle Control: Reduce thrust on the affected engine by closing the thrust lever.
2. Fuel Cutoff: Move the affected engine's start lever to cutoff to stop fuel flow.
3. Activate Fire Extinguishers: Pull the fire handle and rotate it to discharge the extinguishing agent into the engine compartment.
4. Monitor Instruments: Continuously check engine parameters for indications of fire suppression success.

4.2 Ground Engine Fire Procedure

1. Shut Down Engine: Immediately shut down the engine by pulling the mixture control to idle-cutoff.
2. Evacuate Personnel: Ensure all personnel are evacuated from the vicinity of the aircraft.
3. Use Fire Extinguisher: If necessary, utilize a portable fire extinguisher to suppress any visible flames after shutting down the engine.

5. Post-Fire Procedures

After extinguishing an engine fire, several follow-up actions are necessary:

- Conduct a thorough inspection of the affected engine and surrounding areas.
- Document the incident and report it according to maintenance protocols.
- Perform any necessary repairs before returning the aircraft to service.

Conclusion

Understanding engine fire extinguishing procedures is vital for ensuring safety during aircraft operations. By adhering to established protocols and utilizing effective detection and suppression systems, maintenance personnel can significantly reduce risks associated with engine fires.