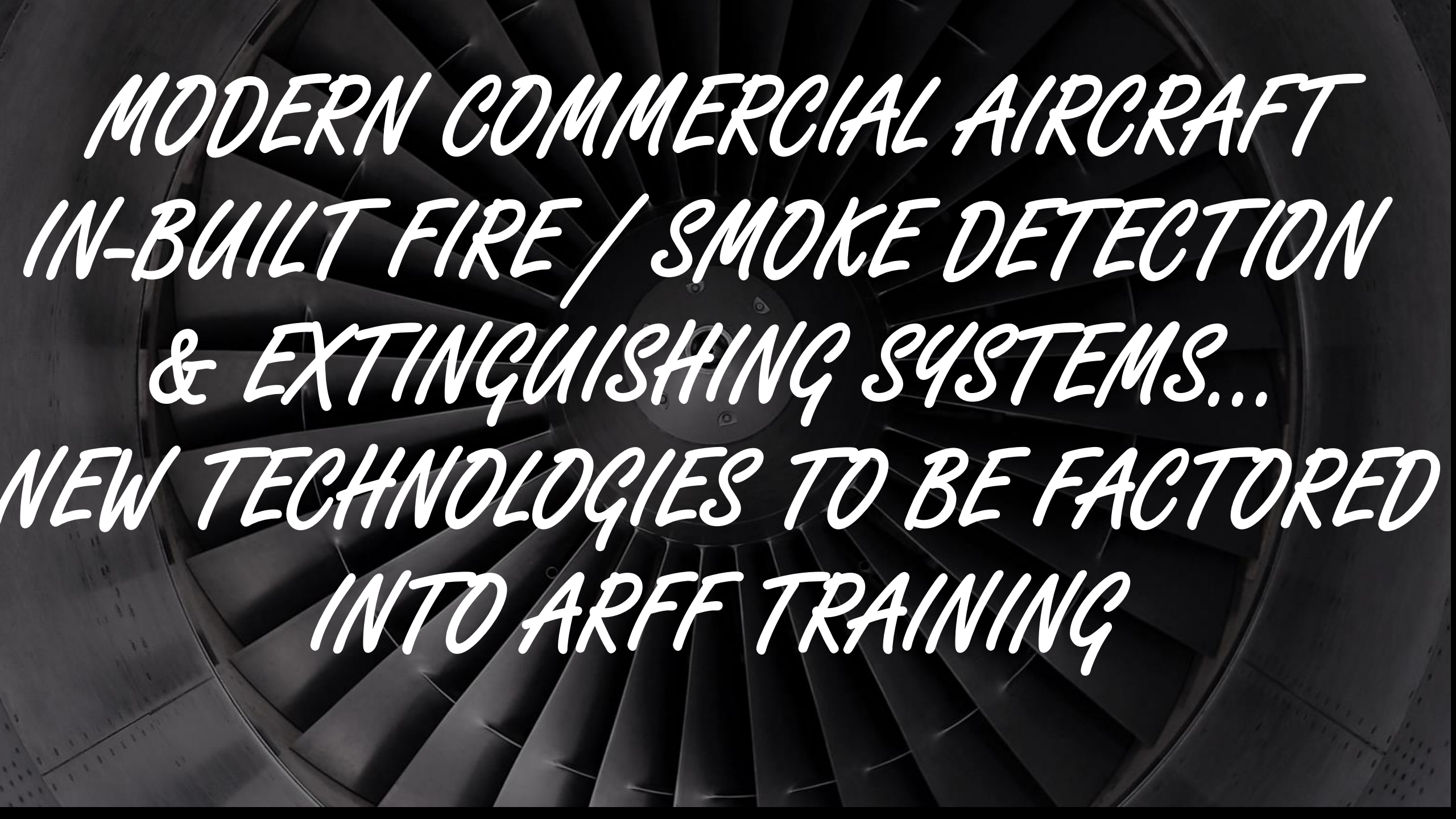
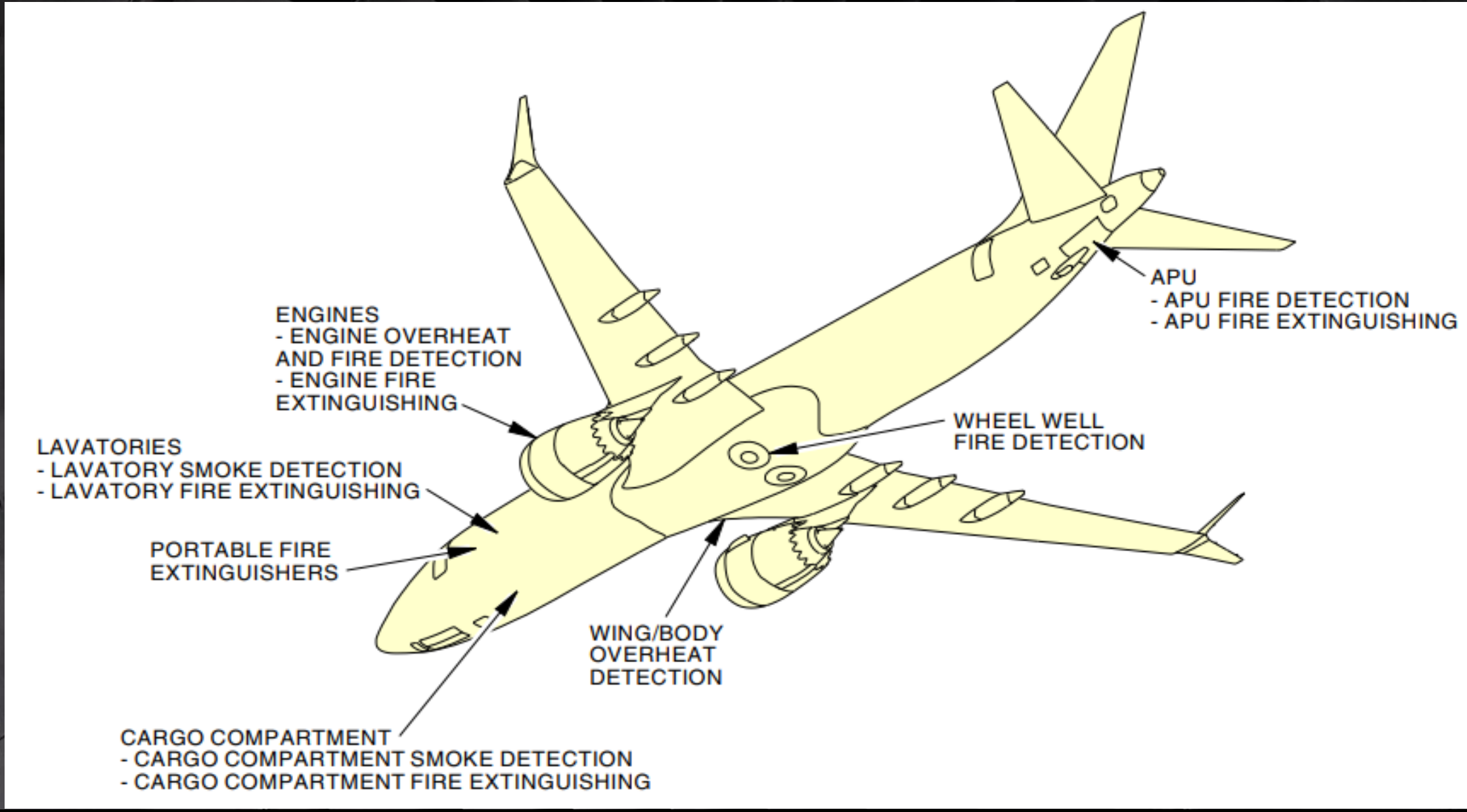
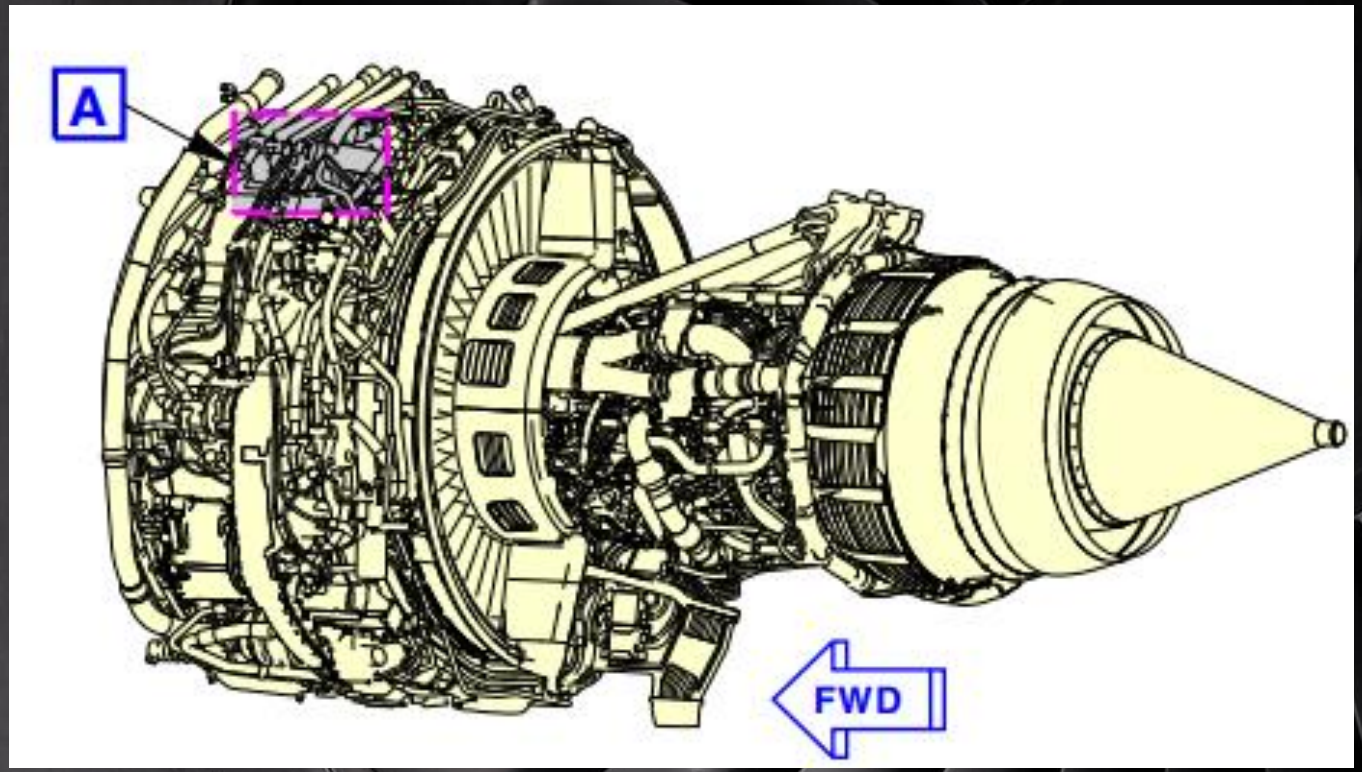


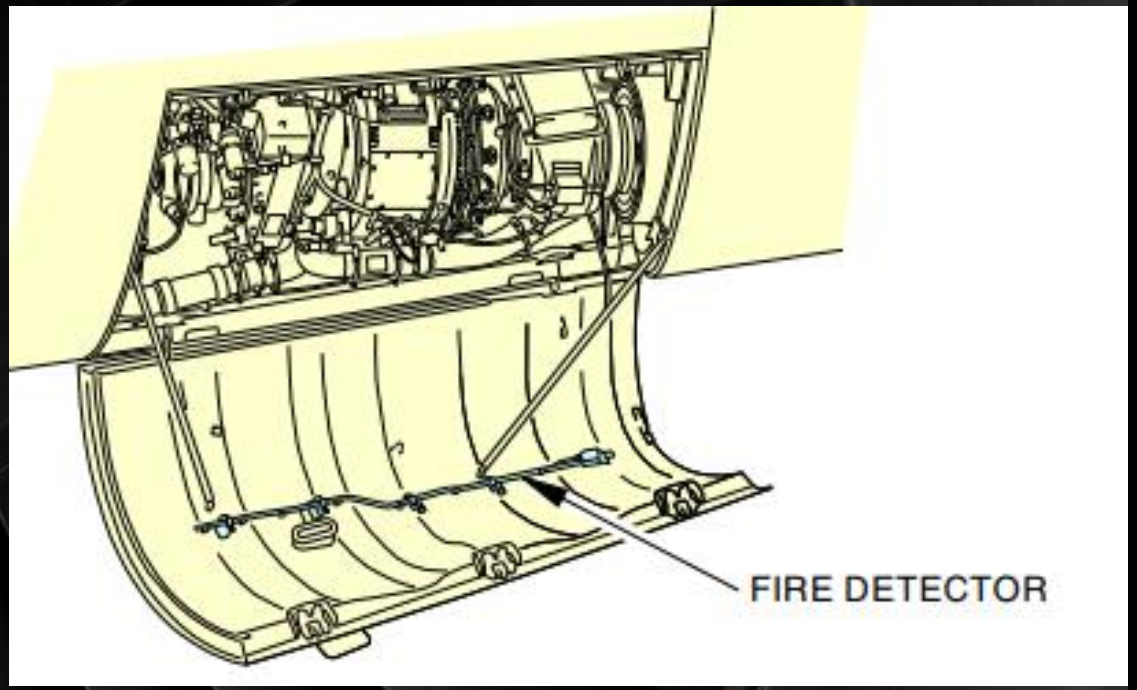
MODERN COMMERCIAL AIRCRAFT IN-BUILT FIRE / SMOKE DETECTION & EXTINGUISHING SYSTEMS... NEW TECHNOLOGIES TO BE FACTORED INTO ARFF TRAINING

AREAS THAT ARE PROTECTED

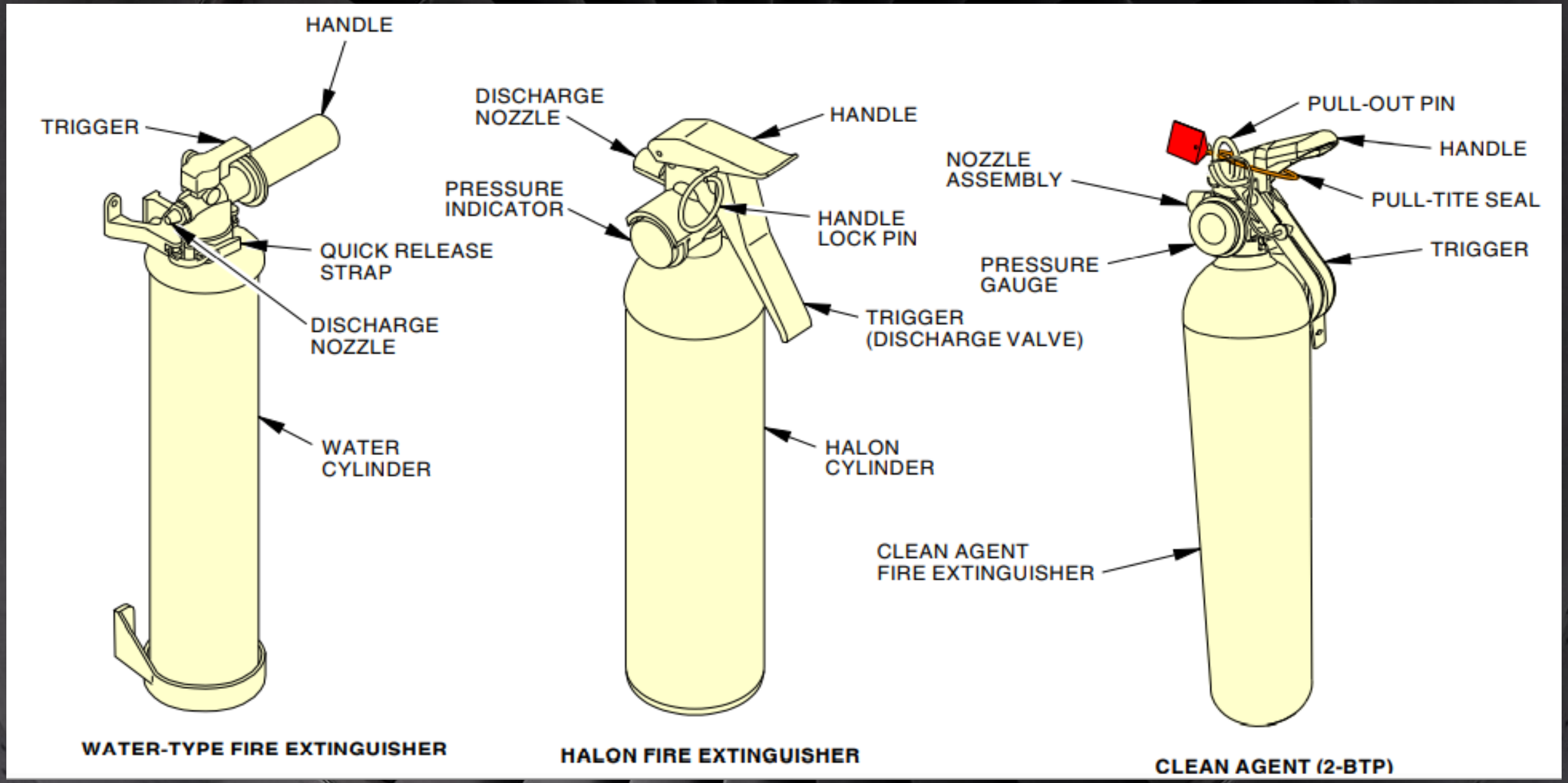


ENGINE & APU

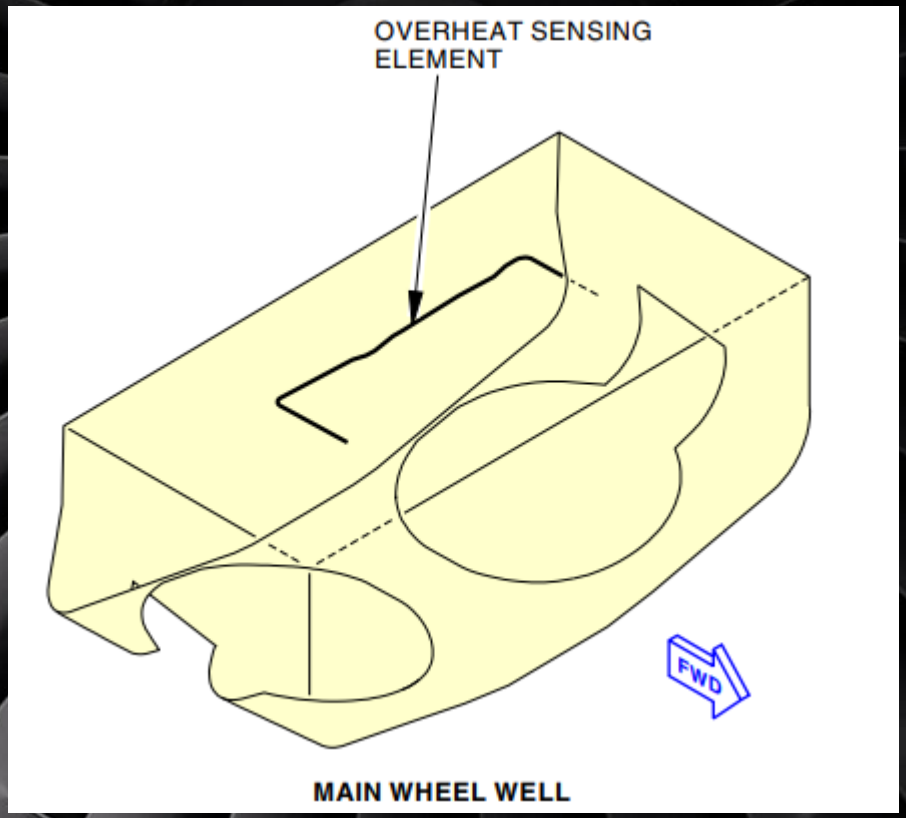




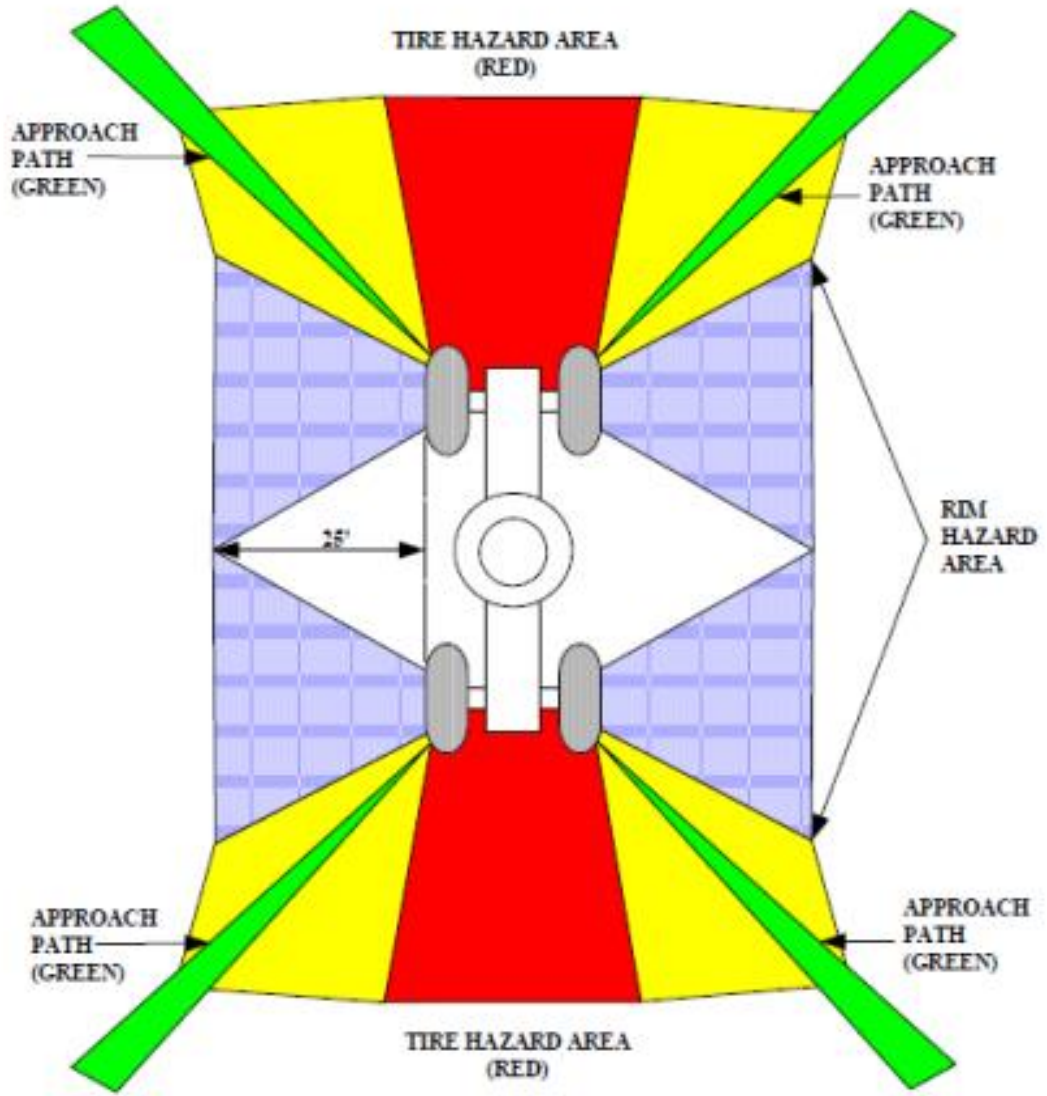
WHAT'S USED IN THE CABIN



WHEELWELL PROTECTION



Hot Brake and Damaged Tire Safety Areas



Approach Main Gear Along Arrows
Never Enter Shaded Areas When There Is A Suspect Hot Brake Or Tire.
Stay At Least 25 Feet (7.6 meters) Away From Tire Or Rim Until Temperature Returns To Ambient.


TRANS

RESOURCES FOR ARFF PROFESSIONALS

- BOEING ARFF TRAINING MATERIAL B737 MAX


NEW TECHNOLOGIES

AIRCRAFT SEATBELT AIRBAGS

AIRCRAFT SEATBELT AIRBAGS

AIRCRAFT SEATBELT AIRBAGS

BOEING

Airplane Seatbelt Airbags

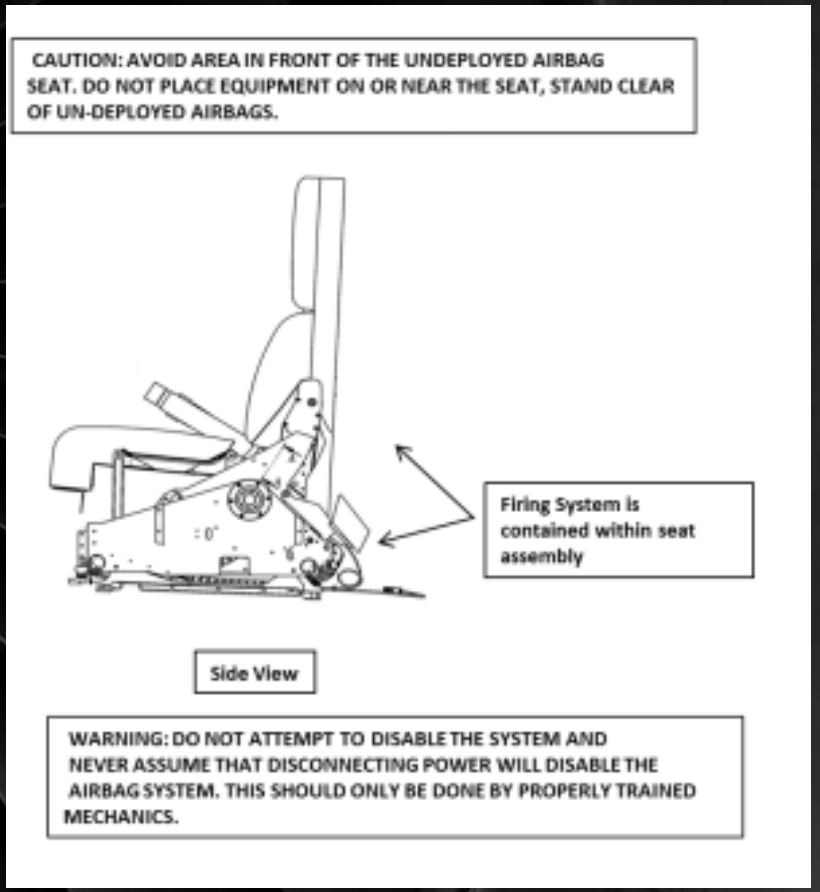
A Guide for Fire Fighters

The Response Hazard

Some aircraft models are equipped with optional seatbelt airbags. These seatbelts are noticeably thicker than normal seatbelts due to the airbag mechanism. These seatbelt airbags, as shown in the following graphic, may be located anywhere in the passenger seating areas.

The seatbelt airbag firing system is fully contained under the passenger seat and contains a high pressure (up to 7,400 psi) compressed gas cylinder and an electronics module (with battery) that is independent from the aircraft power. The electronics module has an accelerometer that fires the squib to the inflator (a compressed gas cylinder inside the seat pan) and deploys the airbag in the event of a sudden deceleration event.

Un-deployed Aircraft Seatbelt Airbags can pose a hazard to firefighters working around them, particularly if the seat is damaged or partially separated from the airframe. In extreme cases, the inflator might become a projectile if the airbag system was damaged and subsequently activated.



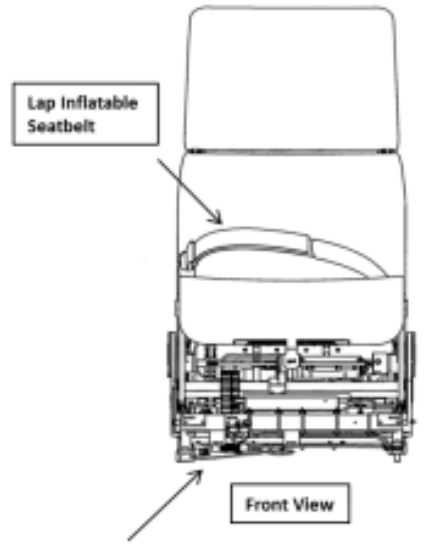
AIRCRAFT SEATBELT AIRBAGS

Recommended Response Tactics:

1. Avoid area in front of the un-deployed seatbelt airbag
2. Do not place equipment on or near the seat
3. Firefighters should never attempt to disable the seatbelt airbag system
4. Never assume that disconnecting power will disable the airbag system
5. Recommend cutting through the thin section of the seatbelt if needed
6. The seatbelt airbag will not deploy if you cut through the thick section of the seatbelt

WARNING - Disengagement or any work on the airplane seatbelt airbag system should only be done by a properly trained airplane mechanic.

NOTE: Some models have optional seatbelt airbags. These seatbelts are noticeably thicker due to the airbag mechanism.



Note: Firing system is contained in seat assembly and consists of a high pressure (up to 7,400 psi) compressed gas cylinder (inflator) that is actuated by an independent battery.

COMPOSITE AIRCRAFT

Firefighting Practices for New Generation Commercial Composite Structures

Boeing has received a number of inquiries from the airport fire community and airport operators related to the fire behavior associated with the increased usage of composite materials in the main structure of the 787 aircraft.

In reference to the composite structure, Boeing is not recommending any major changes to the standard way of fighting an aircraft fire. Extensive testing has been conducted in regards to combustibility and toxicity related to the composite structure. The tests have proven very successful and warrant the basis of our position. The structure is monocoque in its design with multiple layers of uni-dimensional woven fabric. This design not only adds to the strength of the product, but also makes it a good barrier to fire and heat. The structure does not aid in the spread of fire and acts as a barrier creating greater difficulty for an exterior fire to penetrate an intact fuselage. From a toxicity perspective, the composite structure during fire testing poses no greater hazard than an aluminum fuselage aircraft. Also, note that the burn through time on the composite structure is significantly longer than with the aluminum fuselage which may inherently provide greater safety to both the rescue fire responders and passengers in some scenarios.

Upon approach of a fire involving a 787 aircraft, the rescue fire services should deploy their standard tactics as if they were addressing an aircraft with an aluminum fuselage. This may be through the use of turrets or handlines, depending on the situation. Initial fire engagement should include foam to knock down the flames and suppress any fuel vapor that may be on the ground around the accident scene.

Gaining access to the 787 for rescue purposes should be in accordance with the local rescue fire service procedures. Our testing concludes that cutting the composite structure is much easier than cutting the aluminum fuselage. Testing has been conducted with the typical rescue tools: circular saw, air chisel, and chainsaw. The most effective method to cut through the composite structure is to utilize a circular saw with either a carbide tip blade or diamond tip blade.

COMPOSITE AIRCRAFT

Tactics

The cut-in area should be forward or aft of the wing.

Avoid cutting directly over the wing due to significant structural reinforcement

COMPOSITE AIRCRAFT

Tactics (cont.)

The recommend cut-in area is 12 inches (31 centimeters) above and 12 inches (31 centimeters) below windows.

COMPOSITE AIRCRAFT

Tactics (cont.)

The recommend cut-in area is 12 inches (31 centimeters) above and 12 inches (31 centimeters) below windows.

COMPOSITE AIRCRAFT

Tool recommendation

A rotary rescue saw with a minimum 14-inch diamond-tipped blade is recommended.

Note: Although other types of blades (i.e. abrasive disc, carbide tip) can perform these cuts, we have found the diamond-tipped blade to be the most serviceable.

COMPOSITE AIRCRAFT

Recommended cutting technique

- First cut — Top
- Second cut — Far side
- Third cut — Bottom
- Final cut — Near side

While performing cuts flow water from the crown of the aircraft over the cut area to limit particulates becoming airborne and to control sparking

This sequence of cuts demonstrated no pinching while conducting the third (Bottom) cut.

COMPOSITE AIRCRAFT

Decon

- Every aircraft incident that involves fires or other operations that can leave a residue or debris should require that all personnel and equipment be fully decontaminated at the scene per your department procedures.

COMPOSITE AIRCRAFT

- COMPOSITE FUSELAGE CUTTING

COMPOSITE AIRCRAFT

LITHIUM ION BATTERIES

787 Battery locations

Lithium-ion Batteries

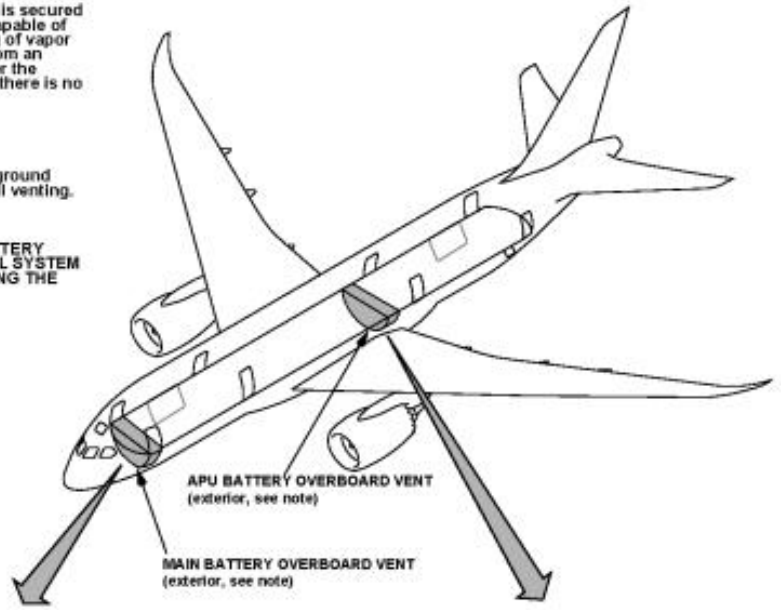
For additional information on recommended fire fighting procedures related to the lithium-ion batteries on the 787, please see data posted in the "Fire & Rescue" section at the following website: www.boeing.com/airports.

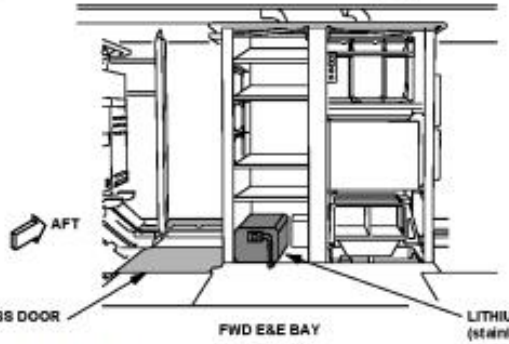
NOTE: The box containing the lithium-ion battery cells is secured inside a reinforced stainless steel enclosure capable of containing a lithium-ion battery event. Venting of vapor during a battery failure event may be visible from an exterior vent on the bottom of the aircraft under the forward or aft E&E bay. During active venting, there is no reason to make access to the E&E bay.

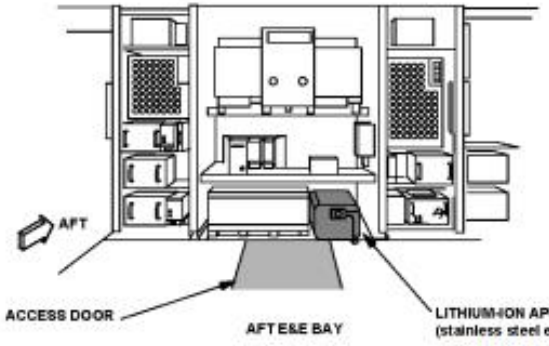
NOTE: If vapor is visible or odors are noticed, advise ground personnel to stay clear of vapor if battery is still venting.

CAUTION: MAKE NO ATTEMPT TO DISCONNECT BATTERY PACK FROM THE AIRCRAFT'S ELECTRICAL SYSTEM USING QUICK DISCONNECT OR BY CUTTING THE BATTERY CABLES.

Updated Chart







LITHIUM ION BATTERIES

787 Main Battery Vent Port

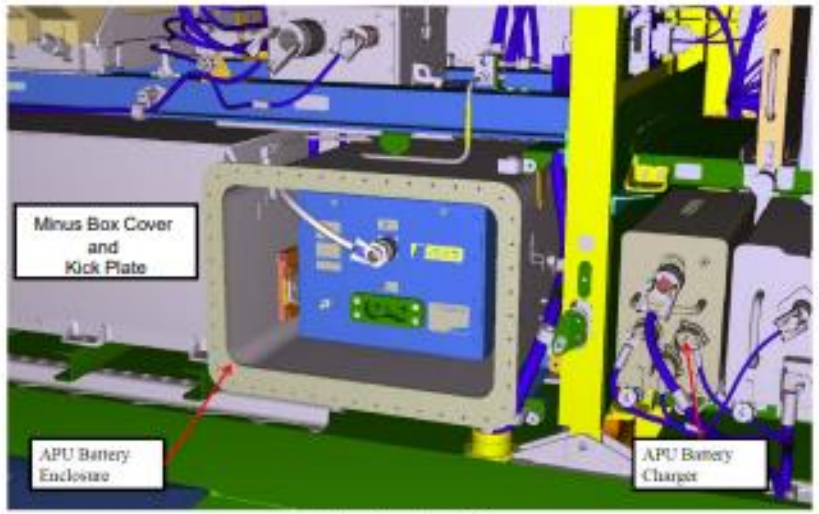
787 APU Battery Vent Port

LITHIUM ION BATTERIES

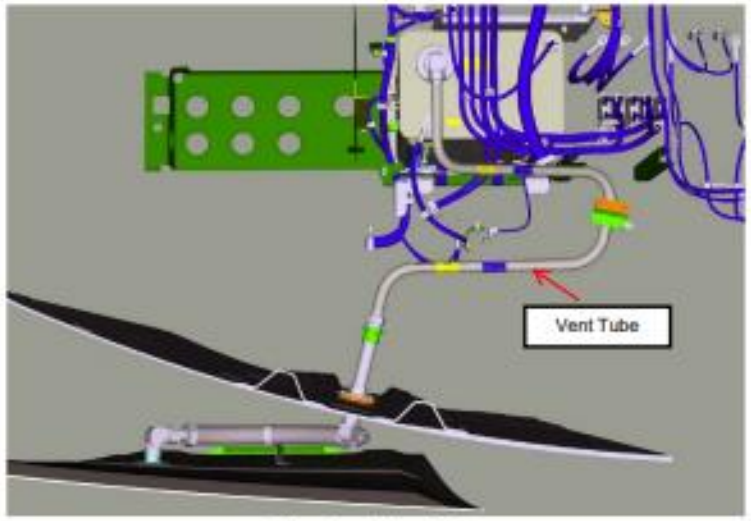
The Response Hazard

The box containing the lithium-ion battery cells is secured inside a reinforced stainless steel enclosure capable of containing a lithium-ion battery event. Venting of vapor during a battery failure event may be visible from an exterior vent on the bottom of the airplane under the forward or aft Electrical and Electronic (E&E) bay.

During active venting, there is no reason to make access to the E&E bay.



View Looking Aft



View Looking Fwd

LITHIUM ION BATTERIES

Recommended Procedures:

Fire Fighting Tactics for E&E bay events containing Lithium-Ion Battery Packs

1. A battery failure reaction should be fully contained within the stainless steel enclosure with any gasses vented overboard.
2. Passengers and crew are safe inside the airplane. Passenger evacuation is not expected for a battery failure.
3. Evacuate area around exterior of the airplane upwind to at least 18m/ 60 ft. from airplane.
4. While venting, make no attempt to access E&E bay.
5. Confirm airplane power is shut down by communicating with the flight deck prior to making access.
6. Don all fire fighting Personal Protective Equipment including Self Contained Breathing Apparatus (SCBA) when entering the Hot Zone (9m/30 ft).

LITHIUM ION BATTERIES

Recommended Procedures (cont.)

7. If battery is not venting or venting is complete, access the E&E bay to ensure there is no other visible fire source.
   a) **In the event of visible flame** Halon (or Halon replacement) is the recommended agent to suppress a fire. If Halon, or Halon replacement is unavailable, then CO2 would be the recommended agent. Do not use dry chemical or powder of any kind..
   b) Flood the E&E bay with appropriate agent for approximately 20 to 30 seconds and then close the bay hatch for at least 60 seconds.
   c) Open E&E hatch to confirm fire is out. If flame is present repeat step #7b.
8. Make no attempt to disconnect the battery pack from the airplane's electrical system using the quick disconnect or by cutting the battery cables.
9. Use heat detecting equipment to monitor temperature of reinforced box. Temperatures may reach as high as 338 degrees Celsius/640 degrees Fahrenheit.
10. Once the external temperature of the reinforced box is below 49 degrees Celsius/120 degrees Fahrenheit and atmosphere is clear of hazardous vapors, then the airplane can be turned over to maintenance.

AREAS THAT ARE PROTECTED