



**STANDARD OPERATING  
PROCEDURES**

**AIRCRAFT RESCUE  
FIRE FIGHTING  
RESPONSES**

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**MEMPHIS INTERNATIONAL AIRPORT**

**I. ALERT I RESPONSE (Precautionary Emergency)**

1. A condition in which a deferred potential emergency or minor mechanical abnormality exist that may require immediate dispatch of emergency equipment at a later time.
2. The response is an apron standby of air rescue apparatus A-1, A-2, and A-3.
3. ARFF personnel will don their protective gear, board and start their equipment, pull out onto the apron, (weather permitting) and monitor radios in preparation of an upgraded alert.
4. No Emergency Unit will be dispatched at this time.

**II. ALERT II RESPONSE (Declared Emergency)**

1. A condition in which an aircraft is experiencing difficulty and a potential situation exists requiring immediate dispatch of ARFF equipment to appropriate standby positions.
2. The response is a runway standby of air rescue apparatus A-1, A-2, A-3, & Emergency Unit.
3. Unit 19 will stand by on the apron or Fed-Ex ramp. If Unit 19 is not available the closest unit will stand by at Fire Station 33.
4. ARFF vehicles will contact tower and assume their predetermined set up locations.
5. The Incident Commander (IC) will establish command utilizing "Memphis Command" for all Aircraft incidents. The term "Airport Command" will be utilized on all other airfield incidents.
6. **(Incident Commander)**
  - a) Respond safely to the incident, set up to best advantage of incident.
  - b) Identify Haz-Mat or Dangerous Goods on board.
  - c) Identify Fuel amount, Souls on Board, and Nature of Emergency.



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- d) Request permission to follow aircraft down runway.
  - e) Establish Discrete Emergency Frequency (DEF) 121.00 with Pilot as soon as the aircraft is on the ground.
  - f) Report all findings to the Pilot and determine a course of action.
7. If the decision is made to approach the aircraft, the Investigative team will wear full protective clothing and approach or enter aircraft at point closest to incident. Remaining ARFF personnel will assume RIT and tactical positions.
  8. Aircraft should be followed to the gate as a precaution, but remains at the discretion of the Pilot or Incident Commander.
  9. **Alert II ARFF Equipment Set ups:**

Runway	ARF F	Taxiway	Runway	ARFF	Taxiway
18L / 36R	A-1 A-2 A-3	Yankee & Papa Yankee & Hotel Yankee & Yankee-2	18R / 36L	A-1 A-2 A-3	Mike & Mike-5 Nov. & Mike-4 Mike & Mike-7
18C / 36C	A-1 A-2 A-3	Sierra & Papa Sierra & Echo Sierra & Sierra-5	9 / 27	A-1 A-2 A-3	Alpha & Yankee Alpha & Charlie Alpha & Alpha-2

**III. ALERT III RESPONSE (Aircraft Accident)**

1. A condition in which a crash has actually occurred; a crash is imminent; or there is a fire on board an aircraft.
2. For a full ARFF response, the incident must be in the immediate vicinity of the airport. The response is ARFF Equipment, EMS Level I, Second Alarm Commercial assignment and Staff Activation.
3. The primary responsibilities for ARFF is to provide a rescue path for self-evacuating passengers, extinguish fuselage fires, provide cover for rescuers, and maintain a foam blanket to prevent flash back.



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4. ARFF equipment may be given specific directions to the scene of the incident by the control tower.
5. **(QRV / Incident Commander)**
  - a) Respond safely to the incident, set up at SERP 3 o'clock position.
  - b) Depending on the initial report, the IC may elect to downgrade the alarm to an Alert II response or upgrade alarm to EMS Level II, MCI, H II, or additional Task Forces/Strike Teams.
  - c) Request via Airport Operations: Airfield Closures, Air Stairs, Emergency Medical Trailer, DART Trailer, Command Trailer, ATV's, Buses, Escorts, or any other MSCAA equipment needed.
  - d) Request EMS support through FCB.
  - e) Assign Command Post, Base, Staging, Medical, Triage, Rehab, Helipad, and Morgue etc. areas according to SERP as needed.
  - f) Establish par cards for personnel accountability system.
  - g) Request a passenger or cargo manifest from the airline involved.
  - h) Develop Tactical Worksheet, ICS forms, and equipment list.
  - i) Determine Exclusionary Zone and distribute Incident Command Vests.
6. **(Primary ARFF Major Vehicle)**
  - a) Respond safely to the aircraft being cautious of the debris field.
  - b) Position upwind of the fuselage on the side affected by fire or damage.
  - c) Position vehicle to protect egressing passengers. (best advantage)
  - d) Blanket area under aircraft and engine with AFFF if fuel, fire, or smoke is evident with the exterior turrets, ensuring you conserve extinguishing agents. (High Flow by orders of IC)
  - e) If no fuel, fire, or smoke are present, standby with hand lines and ensure passenger egress lanes are available.
  - f) If Rescue is required, gain access to the aircraft and remove all surviving occupants from fuselage/IDLH area exercising extreme caution.
7. **(Secondary ARFF Major Vehicle)**
  - a) Respond safely to the aircraft, position on opposite side of the aircraft.
  - b) Position 45 degrees off the nose or tail to protect egressing passengers.
  - c) Blanket area under aircraft and engine with AFFF if fire, or smoke are evident
  - d) Gain access to the aircraft and ensure power source de-energized.



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- e) Provide cover to protect Primary ARFF vehicle and standby as RIT team if personnel must enter aircraft or exclusionary zone.

**8. (1<sup>st</sup> Engine Structural Apparatus)**

- a) Respond safely to scene, position upwind outside the primary ARFF vehicle.
- b) Position vehicle to anticipate re-supply of primary ARFF vehicle.
- c) Don full protective clothing and give initial report to the Incident Commander.
- d) Ensure adequate fire fighting forces and hand lines are in place.
- e) Proceed as a team to the aircraft and gain access to the involved area.
- f) If no fire present, assist passengers if they are evacuating the aircraft.
- g) If passengers are in IDLH area, assist in evacuating to a safe area.
- h) Identify victims that are witnesses to the incident.

**9. (1<sup>st</sup> Truck Structural Apparatus)**

- a) Position upwind outside the primary ARFF vehicle or to best advantage.
- b) Don full protective clothing and report to the IC for orders.
- c) Establish grid search and remove passengers to a Causality Collection Point.
- d) Proceed as a team to the aircraft and gain access, but not from passenger egress openings. Over the wing exits may require ladder or elevated platform.
- e) Obtain the appropriate sized ladders for gaining access to the aircraft.
- f) Set up PPV fans and prepare to ventilate aircraft.
- g) Protect Cockpit Voice (CVR) & Flight Data Recorder (FDR) if located.

**10. (1<sup>st</sup> SORT Rescue and Engine)**

- a) Establish Haz-Mat Branch if dangerous goods are present.
- b) Establish decontamination and forcible entry needs.
- c) Assist Truck Company with rescue if casualties are in IDLH Area and establish RIT team if rescuer entry is required.

**11. (1<sup>st</sup> Emergency Unit)**

- a) Paramedic reports to the CP and establish Medical Branch Director.
- b) Initiate passenger count and maintain patient accountability.
- c) Determine EMS response by the size of the aircraft and manifest.



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- d) Request additional units through the Incident Commander.
- e) Divide incident into geographical areas and assign triage duties accordingly.
- f) Organize task force for patient removal incident area.
- g) Distribute Triage Belts of Triage Tags.
- h) EMT should position @ 6 o'clock and initiate START triage.
- i) Designate Causality Collection Point (CCP) to begin organizing victims for Triage, Treatment, and Transport as well as determine hospital availability.

**IV. AIRCRAFT ENGINE FIRE / APU FIRE / 3D FUEL LEAK**

1. Aircraft Engine fires, Auxiliary Power Units, and Third Dimensional (flowing fuel) type fires must be managed in a timely manner. The Flight crew may make first attempt to extinguish fires.
2. Directing a water or AFFF stream into the air inlet will not always extinguish engine fires. The safest method of fire control is the shutdown systems in the cockpit or external panel.
3. Firefighters may have to open engine cowlings or APU access panel doors. Hot or burning liquids and parts may be trapped inside. Consider using piercing tools to apply agents prior to opening. Some aircraft may have fire extinguishing access ports or knock in panels. Flowing liquid fires require Water, AFFF, and Dry Chemical to extinguish (HydroChem).
4. Response guidelines:
  - a) Respond safely to the incident, set up to best advantage of incident.
  - b) Position vehicle to protect fuselage, passenger egress, and expect probable evacuation assistance.
  - c) Don full personal protective clothing including SCBA.
  - d) Identify Fuel amount and advance fire fighting hose line.
  - e) Gain access to the engine and after fire knock down to assure all fire danger is addressed.



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- f) De-energize power source from flight deck or external panel.
  - g) Report all findings to the Pilot and determine a course of action.
  - h) Direct flame impingement critical areas including fuselage, fuel cells, and wings must be protected.
5. There are primarily three types of engine fires; Disintegration, Accessory Compartment, and Tail Cone

**a) Disintegration:**

Disintegration fires typically occur with high RPM conditions like take off. 3D fires with spraying or running fuel are possible. On board suppression systems are not designed to handle this type of fire. ARFF rigs will need a dual agent attack; Water, Dry Chemical, and Foam. Fragments may penetrate the fuselage passenger/cargo area requiring possible interior attack. Responders may need hand lines inside to protect fuselage, injured passengers, or extinguish hidden fires. Use the wind advantage to aid agent application.

**b) Accessory Compartment Fire:**

Engine Compartment Fires occur inside engine nacelle. Determine type of engine i.e., high by pass. Onboard suppression systems are designed for this type fire.

Onboard systems usually shut down fuel, hydraulics, pneumatics, and electrical to engine. Fire location accessed through push panel with hand line but penetrating nozzle should be considered for safety. May necessitate opening cowling to reach spot fires and hand line to extinguish hidden fires. Use extreme caution opening cowling due to pooled fuel and hot metal. Use ARFF rig to protect passenger egress, exposures, and be prepared for evacuation.

**c) Tail Cone Fire:**

Usually caused by too much fuel during startup and are easily extinguished by experienced pilot. Tail Cone Fires are also known as a "hot start". Turn fuel off and spool engine up to burn off excess fuel. Tail



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Cone Fires carry minimal ARFF concern. Firefighters should investigate and check for extension, but no evacuation anticipated.

**V. AIRCRAFT CABIN FIRE / SMOKE**

1. Responding crews will safely respond, position vehicles, assist in evacuation, advance an adequately sized fire fighting hose line, gain access to the engine, and de-energize the power source, while wearing full personal protective clothing. Evacuate the aircraft if you suspect hidden fire or fuel involvement.

**2. Passenger Cabin Smoke:**

Electrical wires, fuses, and ballast are the most common Interior Odors. E & E bay should be check thoroughly for electrical shorts. Flight deck, food galley, unknown cargo, and smoking in bathrooms should all be considered. Most aircraft have local alarms but some newer aircraft also notify the flight deck.

**3. Interior Odors:**

Attempt to get information from pilots if possible using the Discreet Emergency Frequency (DEF) 121.00. Visual inspection should be followed by hand held Thermal Imaging. The pilot is in charge of aircraft but Fire fighters should also check Circuit breakers in flight deck. An aircraft mechanic should inspect the aircraft before being allowed to return to service. This final decision is the responsibility of the aircraft operator. Follow to gate, inspect after deplaning, and get documentation someone else assumes responsibility.

**4. Interior Fires:**

Interior passenger aircraft fires require aggressive interior attacks. Over wing entry's cuts aircraft in half. Ventilation can be hydraulic, Positive Pressure, horizontal, or topside. Air stairs are an ideal working platform for attack, ventilation, or evacuation assistance. Safety lines for interior attack teams. ARFF rigs should cover egress paths, exposures, and safety for hand lines. Type and location of interior fire is dependent on origin and duration. Cockpit Fire, Baggage Fire, Lavatory Fire, and Food Galley Fire are among the most common.



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**VI. Landing Gear / Wheel Fire / Hot Brakes**

1. ARFF crews should approach landing gear emergencies with extreme caution. Approach should be from front, rear, or 45<sup>o</sup> depending on incident. Never allow crews to approach from 90<sup>o</sup>. Fusible plugs are designed to at deflate at approximately 300<sup>o</sup> preventing violent disintegration.

2. **Hot Brakes:**

If there is no fire visible allow brakes to cool naturally if possible. Brake pads will continue to heat up for 20 minutes. Cooling can be accelerated with PPV fans or prop wash. Aircraft should be followed to gate as precaution.

3. **Wheel Fire:**

Actual fire, extinguish with AFFF, short bursts 5 to 10 second duration every 30 seconds. Protect exposures especially wheel wells. Approach with hand lines when checking for extension or hidden fires. Visual examination by personnel on the ground is a must. Fusible plug melt at 300<sup>o</sup> so approach at 45<sup>o</sup> angle.

Some aircraft tire treads are recaps with air pressures of 300 psi. Fire presenting in long thin wisps from bottom is probably grease fire.

4. **Wheel Brake and/or Strut Fire:**

Most large aircraft wheels are not magnesium, they are aluminum. Landing gear assembly and engines contain magnesium creating Combustible Metal Fires. Best extinguishing agent is dry powder (met-l-ex) for combustible metal fires. Theoretically extinguishments can be achieved with copious amounts of water.

Agent management concerns when delivering copious amounts of water. The IC must establish water re-supply for front line equipment. The FAA states in large aircraft brake tests resulting in fire; the recommended extinguishing agent was plain water or foam.





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**VII. Fueling Operations**

1. Responding crews will safely respond, position vehicles, assist in evacuation, and de-energize the power source if necessary.
2. **Fuel Spill:**
  - a) Depending on the initial report and size up, the IC may elect to downgrade alarm or call for additional resources.
  - b) Request via Airport Operations: Fuel clean up crew, consider Air Stairs or buses for evacuated passengers.
  - c) Must report large spills of 55 gallons or more to FCB and EMA.
  - d) Do not allow airline to transfer aircraft fuel with passengers on board.
  - e) Do not allow aircraft to start engines sitting in pool of spilled fuel.
  - f) You may allow tugs to push aircraft away from gates depending on spill.
  - g) Make sure 95% of spilled fuel cleaned up prior to returning to service.
3. **Hot Fuel Refill:**

No Aircraft will be allowed to transfer fuel while occupied without notifying MFD and having an ARFF vehicle stand by until completed. Some Medical Flights are not possible to remove occupants and must be serviced occupied.

**VIII. MILITARY AIRCRAFT**

1. Civilian Fire departments do not have authority over Military aircraft. Our main objectives will be to knock down the fire and rescue the occupants. Establish command and other NIMS positions needed to mitigate the incident. Law enforcement will be responsible for securing the aircraft from the public. Once the incident is stabilized, the military will establish separate command post and assume authority over incident.
2. General guidelines:
  - a) Minimize injury or loss of life.
  - b) Reduce property loss through damage or fire.
  - c) Prevent loss of clues as to the cause of the accident.



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**3. Military Aviation Hazards:**

- \* Armaments
- \* Hydrazine
- \* Radiation
- \* Radar radio waves
- \* Ejection devices
- \* Composite materials

**IX. CARGO AIRCRAFT**

**1. Cargo Area Fire:**

Cargo Interior aircraft fires differ from passenger aircraft. Once the crew is accounted for, focus on exposures. Water, Foam, or Halatron may all be considered depending on the cargo itself. Overloading the airframe with water may cause the aircraft to tip or the tail to break off. Once the fire is extinguished, Firefighters may have to unload the aircraft to get to the origin of the fire.

- a) Expect hazardous cargo quantities may be much larger.
- b) The flight crew is usually able to exit cargo aircraft
- c) Evacuation of passengers is not an issue.
- d) Penetrating nozzles should be used to suppress the fire.
- e) Extinguishing agent dependent upon cargo.
- f) Do not risk life to protect Cargo only.
- g) Before entry, determine the type and locations of cargo.

**2. Dangerous Goods:**

Information on dangerous cargo (Haz-Mat) can be found on the waybill located in the cockpit area, on the entrance door, from the Flight Crew or directly from the aircraft operator. Declare H-II if you are not sure what you are dealing with.

**3. Interior Fires Unoccupied Aircraft:**

There are typically no life hazards with unoccupied aircraft. Use handheld Thermal imagers or Forward Looking Infrared Radar (FLIR) to pinpoint location of fire. Reduce potential flashover or back draft with penetrating nozzle. Use topside ventilation if unable to properly horizontal ventilation. Do not risk life unnecessarily to save property only.



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**X. AIRPORT FED-X and TANG RESCUE EQUIPMENT**

**1. PURPOSE:**

To incorporate Federal Express and Tennessee Air National Guard air rescue equipment into response in an efficient, prudent manner.

**Alert 1** Fed-X and TANG apparatus should stand-by in house with engine running and radio on.

**Alert 2** Fed-X apparatus locate at "S" (Sierra) and "V" (Victor) and TANG apparatus locate at "Y" (Yankee) and "Mil" (Military) Taxiways. Equipment will monitor radio frequencies and respond if requested.

**Alert 3** Fed-X and TANG apparatus respond to site of actual emergency site and report to Memphis Command (A-1) for orders.

**2. Federal Express Property (Airport) Response:**

Federal Express apparatus, having all monitoring and computer printouts, should be first on the scene. Federal Express apparatus will determine the nature of the incident, take appropriate action as obligated by their company, and report their situation by Fire Department radio talk group "MFD-1" to A-1. A-1 having governmental jurisdiction, will decide the appropriate response and procedures thereafter.

**3. Tennessee Air Guard Property (Airport) Response:**

TANG apparatus, having all monitoring and computer printouts, should be first on the scene. TANG apparatus will determine the nature of the incident, take appropriate action as obligated by their company, and report their situation by Fire Department radio talkgroup "MFD-1" to A-1. TANG having governmental jurisdiction, will decide the appropriate response and procedures thereafter and A-1 will assist.

**4. Air Rescue Incident, Off Property:**

A-1 and one Major ARFF vehicle shall respond to all aviation incidents within one mile of airport property. A-1 may be requested to respond beyond that point for technical expertise. Federal Express apparatus should never leave airport property such as A-1. Federal Express apparatus with the remaining



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Memphis Fire Service apparatus and TANG shall establish a temporary air group to maintain Memphis International Airport's operating index.

**5. Fire Communications:**

Communications will not accept a disregard of Memphis Fire services companies from the Fed-X or TANG apparatus; A-30, A-35 and so on. All information received from the Federal Express or TANG equipment is to be passed on to A-1.

**XI. AIRPORT ABBREVIATIONS**

3 D	Third Dimensional Flowing Liquid Fires
AFFF	Aqueous Film Forming Foam
APU	Auxiliary Power Unit
ARFF	Aircraft Rescue Fire Fighting
ATCT	Air Traffic Control Tower
DART	Disabled Aircraft Recovery Trailer
DEF	Discrete Emergency Frequency
FAA	Federal Aviation Administration
FLIR	Forward Looking Infrared Radar
GPU	Ground Power Unit
IDLH	Immediately Dangerous to Life & Health
MCV	Major Crash Vehicle
MSCAA	Memphis Shelby County Airport Authority
NTSB	National Transportation Safety Board
QRV	Quick Response Vehicle
SCBA	Self Contained Breathing Apparatus
SERP	Standard Emergency Response Pattern
SMGCS	Surface Movement Guidance Control System
START	Simple Triage and Rapid Transport
TANG	Tennessee Air National Guard