

# EMERGENCY PROCEDURES

## TABLE OF CONTENTS

	Page
<b>EMERGENCY PROCEDURES</b> .....	3-7
<b>ENGINE/APU</b>	
Engine Fire, Failure, Master Warning or Any Other Non-Normal Event During Takeoff .....	3-7
Engine Fire (ENG FIRE Light and ENGINE FIRE L-R CAS Message) .....	3-10
Engine Failure During Final Approach (Possible ENGINE FAILED L-R CAS Message) .....	3-11
Engine Vibration (ENGINE VIBRATION L-R CAS Message) .....	3-11
APU Fire (APU Fire Light and APU FIRE CAS Message) .....	3-12
Dual Engine Flameout - Cruise (Possible ENGINE FAILED L-R CAS Message) .....	3-13
Dual Engine Flameout - Low Altitude (Possible ENGINE FAILED L-R CAS message) .....	3-15
Maximum Glide/Emergency Landing .....	3-17
Thrust Reverser In-Flight Deployment (Red DPLY EICAS Indication, Thrust Reverser EMER STOW Switch Flashing) .....	3-20
Oil Pressure Low (OIL PRESSURE LOW L-R CAS Message) .....	3-22
<b>COCKPIT/CABIN/BAGGAGE FIRE</b>	
Smoke Removal .....	3-23
Environmental System Smoke or Odor .....	3-25
Electrical System Fire or Smoke .....	3-26
Baggage Fire (BAGGAGE FIRE CAS Messages) .....	3-30
<b>ELECTRICAL</b>	
Dual Generator Failure (DC GEN OFF L-R-APU Red CAS Message) .....	3-32
Battery Overtemperature L or R (BATTERY O'TEMP L-R CAS Message) .....	3-35
<b>PRESSURIZATION/ENVIRONMENTAL</b>	
Loss of Cabin Pressure (CABIN ALTITUDE CAS Message) .....	3-36
Emergency Descent .....	3-37
<b>FLIGHT CONTROLS/HYDRAULICS</b>	
Jammed Pitch or Roll Control System .....	3-38
Aileron Trim Runaway .....	3-40
Rudder Trim Runaway .....	3-41
Primary Pitch Trim Runaway .....	3-41
Secondary Pitch Trim Runaway .....	3-41
Uncommanded Roll .....	3-42
Nosewheel Steering Malfunction .....	3-44
Hydraulic Wheel Brake Failure During Ground Operations .....	3-44

(Continued Next Page)

**EMERGENCY PROCEDURES (Continued)**

**FLIGHT GUIDANCE**

* Loss of Indicated Airspeed, Altitude, and/or Vertical Speed (Red "X" on PFD Airspeed, Altitude, and/or Vertical Speed Indicators) .....	3-45
* Loss of CAS Message Display (Red "X" in EICAS Message Area) .....	3-45
* Loss of Pitch/Roll and/or Heading Data (ATT FAIL and/or HDG FAIL in PFD).....	3-45
* Loss of Navigation Data (Red "X" Over Glideslope and/or Lateral Deviation Scales) .....	3-46
*Autopilot Disengaged (Red Inverse Video "AP ENG" on PFDs).....	3-46
NO TAKEOFF CAS Message .....	3-47

**MISCELLANEOUS**

Emergency Evacuation.....	3-48
Ditching.....	3-49
Inadvertent Stall (Buffet/Roll-Off) .....	3-50
Electrical System Distribution .....	3-51

\* Denotes Primus EPIC Message.

**EMERGENCY PROCEDURES****■ ENGINE FIRE, FAILURE, MASTER WARNING OR ANY OTHER NON-NORMAL EVENT DURING TAKEOFF****● SPEED BELOW  $V_1$  - TAKEOFF REJECTED**

1. Takeoff - ABORT.
---------------------

**NOTE**

- Maintain directional control.
- Brakes - APPLY MAXIMUM EFFORT.
- Throttles - IDLE.
- Speed Brakes - EXTEND.
- Control Column - FORWARD PRESSURE.
- Thrust Reverser(s) (nosewheel on ground) - DEPLOY. Use as required (if no fire).
- To obtain maximum braking performance from the antiskid system, the pilot must apply continuous maximum effort (no modulation) to the brake pedals.
- The Takeoff Field Lengths assume that the pilot has applied maximum effort to the brakes at the scheduled  $V_1$  speed during the aborted takeoff.

**□ IF ENGINE FIRE INDICATIONS ARE PRESENT (ENG FIRE LIGHT AND/OR CAS MESSAGE)**

2. Illuminated ENG FIRE Switch - LIFT COVER and PUSH.
3. Either Illuminated BOTTLE ARMED Light - PUSH (BOTTLE ARMED Light off).
4. Throttle (affected side) - CUTOFF.

**NOTE**

The throttles cannot be placed to CUTOFF unless the thrust reverser levers are stowed.

5. APU MASTER Switch - OFF.
6. If ENG FIRE Light on after 30 Seconds, Illuminated BOTTLE ARMED Light - PUSH.
7. PARK BRAKE Handle - SET.
8. Throttle(s) - CUTOFF.

**NOTE**

The throttles cannot be placed to CUTOFF unless the thrust reverser levers are stowed.

9. L and R BATT Switches - OFF.
10. Exit Aircraft.

(Continued Next Page)

**■ ENGINE FIRE, FAILURE, MASTER WARNING OR ANY OTHER  
NON-NORMAL EVENT DURING TAKEOFF (Continued)**

**○ IF THRU CABIN DOOR**

11. Cabin Door - OPEN.
12. Move away from the airplane.

Procedure completed

**○ IF THRU ESCAPE HATCH**

11. Escape Hatch - REMOVE and THROW HATCH OUT OF AIRPLANE.
12. Move away from the airplane.

Procedure completed

**□ IF NO ENGINE FIRE**

Procedure completed

**● SPEED ABOVE  $V_1$  - TAKEOFF CONTINUED**

- |                            |
|----------------------------|
| 1. Climb to safe altitude. |
|----------------------------|

**NOTE**

- Maintain directional control.
- Accelerate to  $V_R$  - ROTATE.
- LANDING GEAR Handle (after positive rate-of-climb) - UP.
- Airspeed -  $V_2$  MINIMUM (single-engine) or AS REQUIRED (multi-engine) until clear of obstacles at or above 1500 feet AGL.
- FLAP HANDLE -  $0^\circ$  AT  $V_2 + 10$  KNOTS Minimum.
- Accelerate to  $V_{ENR}$  (180 KIAS).

(Continued Next Page)

## ■ ENGINE FIRE, FAILURE, MASTER WARNING OR ANY OTHER NON-NORMAL EVENT DURING TAKEOFF (Continued)

### IF ENGINE FIRE INDICATIONS ARE PRESENT AND AT OR ABOVE 400 FEET AGL

2. Throttle (affected side) - IDLE.
3. Anti-Ice WING/STAB XFLOW Switch (if bleed air anti-ice systems are on) - XFLOW.

### IF ENG FIRE LIGHT REMAINS ON (15 SECONDS) - PROBABLE FIRE

4. Illuminated ENG FIRE Switch - LIFT COVER and PUSH.
5. Either Illuminated BOTTLE ARMED Light - PUSH (BOTTLE ARMED Light off).

#### NOTE

- The affected red ENGINE FAILED CAS message will be displayed when the engine is shut down using the ENGINE FIRE switch with the throttle at or forward of the idle detent. It will be replaced by the cyan ENG SHUTDOWN CAS message when the throttle is placed to cutoff.
- The STAB ANTI-ICE COLD L-R CAS message may be displayed under certain flight conditions that require a reduced throttle setting. Ice may accumulate on the leading edge of the horizontal stabilizer.
  6. BUS TIE Switch (lift cover-guard) - CLOSED.
  7. Throttle (affected side) - CUTOFF.
  8. If ENG FIRE Light on after 30 seconds, Illuminated BOTTLE ARM Light - PUSH.
  9. Land as soon as possible. Refer to Abnormal Procedures, SINGLE-ENGINE APPROACH AND LANDING or LANDING WITH ICE ON WING LEADING EDGE as required.

Procedure completed

### IF ENG FIRE LIGHT GOES OUT WITH THROTTLE AT IDLE AND NO OTHER ENGINE FIRE INDICATIONS ARE PRESENT (PROBABLE BLEED AIR LEAK)

4. ENG BLD AIR Knob (affected side) - OFF.
5. BAGGAGE HEAT Switch - OFF.
6. Throttle (affected side) - AS REQUIRED.

#### NOTE

- Consider reduced power on affected engine as required to keep the fire light out.
- The STAB ANTI-ICE COLD L-R CAS message may be displayed under certain flight conditions that require a reduced throttle setting. Ice may accumulate on the leading edge of the horizontal stabilizer.
  7. Altitude - FL410 MAXIMUM (eleven or less passengers) or FL390 MAXIMUM (twelve passengers).
  8. Land as soon as practical. Refer to Abnormal Procedures, CONTINUED FLIGHT IN ICING ENVIRONMENT AND SINGLE BLEED AIR SOURCE, if required.

Procedure completed

(Continued Next Page)

■ **ENGINE FIRE, FAILURE, MASTER WARNING OR ANY OTHER NON-NORMAL EVENT DURING TAKEOFF** (Continued)

- IF ENGINE FAILURE AND NO ENGINE FIRE AND AT OR ABOVE 400 FEET AGL**

- |  |
|--|
| 2. Throttle (affected side) - IDLE.  |
| 3. Anti-Ice WING/STAB XFLOW Switch (if bleed air anti-ice systems are on) - XFLOW.   |
| 4. Accomplish Abnormal Procedures, ENGINE FAILURE/PRECAUTIONARY SHUTDOWN and/or INFLIGHT RESTART - ONE ENGINE as required. |

Procedure completed

- IF NO ENGINE FIRE OR FAILURE**

2. Refer to appropriate Emergency or Abnormal Procedure.

Procedure completed

■ **ENGINE FIRE (ENG FIRE LIGHT AND ENGINE FIRE L-R CAS MESSAGE)**

- |                                     |
|-------------------------------------|
| 1. Throttle (affected side) - IDLE. |
|-------------------------------------|

● **IF ENG FIRE LIGHT REMAINS ON (15 SECONDS) - PROBABLE FIRE**

- |   |
|---|
| 2. Illuminated ENG FIRE Switch - LIFT COVER and PUSH.                     |
| 3. Either Illuminated BOTTLE ARMED Light - PUSH (BOTTLE ARMED Light off). |

**NOTE**

The affected red ENGINE FAILED CAS message will be displayed when the engine is shut down using the ENGINE FIRE switch with the throttle at or forward of the idle detent. It will be replaced by the cyan ENG SHUTDOWN CAS message when the throttle is placed to cutoff.

4. BUS TIE Switch (lift cover-guard) - CLOSED.  
5. Throttle (affected side) - CUTOFF.

- IF ENG FIRE LIGHT ON AFTER 30 SECONDS**

6. Illuminated BOTTLE ARMED Light - PUSH.  
7. Land as soon as possible. Refer to Abnormal Procedures, ENGINE FAILURE/PRECAUTIONARY SHUTDOWN.

Procedure completed

- IF FIRE EXTINGUISHED**

6. Accomplish Abnormal Procedures, ENGINE FAILURE/PRECAUTIONARY SHUTDOWN.

Procedure completed

(Continued Next Page)

## ■ ENGINE FIRE (ENG FIRE LIGHT AND ENGINE FIRE L-R CAS MESSAGE) (Continued)

### ● IF ENG FIRE LIGHT GOES OUT WITH THROTTLE AT IDLE AND NO OTHER ENGINE FIRE INDICATIONS ARE PRESENT (PROBABLE BLEED AIR LEAK)

2. ENG BLD AIR Knob (affected side) - OFF.
3. BAGGAGE HEAT Switch - OFF.
4. Throttle (affected side) - AS REQUIRED.

### NOTE

Consider reduced power on the affected engine as required to keep the fire light out.

5. Altitude - FL410 MAXIMUM (eleven or less passengers) or FL390 MAXIMUM (twelve passengers).
6. Land as soon as practical. Refer to Abnormal Procedures, CONTINUED FLIGHT IN ICING ENVIRONMENT AND SINGLE BLEED AIR SOURCE, if required.

Procedure completed

## ■ ENGINE FAILURE DURING FINAL APPROACH (POSSIBLE ENGINE FAILED L-R CAS MESSAGE)

1. AP/TRIM/NWS DISC Button - PRESS.
2. FLAP Handle - 15°.
3. Airspeed -  $V_{APP}$ .

4. Airplane - TRIM AS REQUIRED.
5. YD or AP Switch - AS DESIRED/DISENGAGE prior to minimum use height.
6. SPEED BRAKE Lever - 0%.
7. TAWS Flap Override (time and conditions permitting) - SELECT.
8. Multiply **FLAPS 35°** Landing Distance by 1.20.

### CAUTION

AVOID LANDING WITH A TAILWIND OR DOWNHILL RUNWAY GRADIENT.

Procedure completed

## ■ ENGINE VIBRATION (ENGINE VIBRATION L-R RED CAS MESSAGE)

1. Vibration - CONFIRM (sound and feel indications).

### ● IF VIBRATION EXISTS

2. Throttle (affected side) - RETARD to reduce vibration.

### IF VIBRATION CONTINUES OR OTHER EVIDENCE OF ENGINE MALFUNCTION EXISTS

3. Consider shutting down the engine to prevent greater damage and subsequent engine failure. Refer to Abnormal Procedures, ENGINE FAILURE/PRECAUTIONARY SHUTDOWN.

(Continued Next Page)

■ **ENGINE VIBRATION (ENGINE VIBRATION L-R RED CAS MESSAGE)** (Continued)

**CAUTION**

IF THE VIBRATION CONTINUES IN A RUNNING ENGINE, THE ENGINE WILL LIKELY FAIL.

4. Land as soon as possible.

Procedure completed

□ **IF VIBRATION DISCONTINUES AND NO OTHER EVIDENCE OF ENGINE MALFUNCTION EXISTS**

3. Continue flight at a reduced thrust setting on the affected side. Consideration should be given to accomplishing single-engine approach and landing procedures if the affected throttle is reduced below 60% N<sub>1</sub>. Refer to Abnormal Procedures, SINGLE-ENGINE APPROACH AND LANDING, if appropriate.

**CAUTION**

EVEN IF THE AFFECTED THROTTLE REMAINS ABOVE 60% N<sub>1</sub>, TOTAL ENGINE FAILURE MAY OCCUR IF A GO-AROUND IS ATTEMPTED USING BOTH ENGINES. CONSIDERATION SHOULD BE GIVEN TO USING ABNORMAL PROCEDURES, SINGLE-ENGINE GO-AROUND.

4. Land as soon as practical.

Procedure completed

● **IF VIBRATION DOES NOT EXIST**

2. Monitor engine parameters.  
3. Land as soon as practical.

Procedure completed

■ **APU FIRE (APU FIRE LIGHT AND APU FIRE CAS MESSAGE)**

1. AP FIRE Switch - LIFT COVER and PUSH.

**WARNING**

**THE AIRCRAFT BATTERIES MUST BE INSTALLED AND THE BATTERY SWITCHES ON OR THE AIRCRAFT GENERATOR(S) MUST BE OPERATING AND ON PRIOR TO AND DURING ALL APU OPERATIONS TO ASSURE FIRE PROTECTION SYSTEM POWER.**

**NOTE**

This step will discharge the APU fire extinguisher. APU shutdown will occur immediately after the APU FIRE light illuminates. The extinguisher bottle will be automatically discharged in 8 seconds if the crew does not push the APU FIRE Switch.

2. APU System MASTER Switch - OFF.  
3. Land as soon as possible.

Procedure completed

## ■ DUAL ENGINE FLAMEOUT - CRUISE (POSSIBLE ENGINE FAILED L-R CAS MESSAGE) (Refer to Figure 3-1 for Engine Airstart Envelope)

1. Crew Oxygen Masks (if required) - DON.
2. L and R MIC SEL Switches (if required) - MASK.
3. AP/TRIM/NWS DISC Button - PRESS.
4. PASS OXY Knob (if required) - ON.
5. Transponder - EMERGENCY CODE.
6. ATC - ADVISE.
7. Altitude - DESCEND AT OR BELOW FL300 (as required).
8. Fuel (Tanks/Quantity) - CHECK.
9. L and R ELEC Switches (select left side and then right side) - EMER (if required to conserve batteries).
10. Secondary Trim Switch (if ELEC switches are EMER; lift cover-guard) - ON.

## ● AT OR BELOW FL300, ATTEMPT ENGINE START (REFER TO ENGINE AIRSTART ENVELOPE)

11. L and R ELEC Switches - NORM.
12. APU System GENERATOR Switch (if APU is running) - ON.
13. BUS TIE Switch (lift cover-guard) - CLOSED.
14. INTERIOR Switch - OFF.
15. Hydraulic Pump L and R ENG Switches - UNLOAD.
16. Fuel BOOST L and R Switches - ON.
17. Throttles - CUTOFF.

### NOTE

Throttles must be placed to CUTOFF to reset FADEC start logic.

## □ WITH STARTER ASSIST (SINGLE)

18. Cyan FUEL FW SHUTOFF CAS Message (affected side) - NOT DISPLAYED.
19. Either Engine START Switch - PRESS momentarily.
20. Throttle - IDLE.
21. Engine Instruments - MONITOR.
22. Engine START Switch - LIGHT EXTINGUISHED.
23. Opposite Engine (if first engine start successful or APU generator is online) - START (repeat steps 18 thru 22, if required).
24. Refer to IF NEITHER ENGINE STARTS, IF ONLY ONE ENGINE STARTS, or IF BOTH ENGINES START this procedure, as appropriate.

### NOTE

An unsuccessful engine battery start may deplete the batteries to a point where a second engine battery start may not be possible.

(Continued Next Page)

■ **DUAL ENGINE FLAMEOUT - CRUISE (POSSIBLE ENGINE FAILED L-R CAS MESSAGE)** (Continued)

□ **WINDMILL (DUAL)**

18. Airspeed - 200 to 250 KIAS.
19. Cyan FUEL FW SHUTOFF CAS Messages - NOT DISPLAYED.
20. Throttles (at 9% N<sub>2</sub> minimum) - IDLE.
21. Engine Instruments - MONITOR.
22. Refer to IF NEITHER ENGINE STARTS, IF ONLY ONE ENGINE STARTS, or IF BOTH ENGINES START this procedure, as appropriate.

**IF NEITHER ENGINE STARTS**

1. L and R ELEC Switches (if APU generator not available; select left side and then right side) - EMER.
2. Refer to Emergency Procedures, MAXIMUM GLIDE/EMERGENCY LANDING.

Procedure completed

**IF ONLY ONE ENGINE STARTS**

1. BUS TIE Switch - VERIFY CLOSED or OPEN (if right engine and APU generators are on line; lift cover-guard).

**NOTE**

If only the right engine is successfully started, consideration should be given to starting the APU when conditions permit and having the APU generator supply power to the left electrical bus. Refer to Normal Procedures, APU GROUND OR IN-FLIGHT START (At Or Below FL200).

2. Secondary Trim Switch (if selected ON; lift cover-guard) - OFF.
3. INTERIOR Switch - NORM.
4. Fuel BOOST Switch (affected side) - NORM.
5. Hydraulic Pump L and R ENG Switches - ON.
6. Land as soon as possible. Refer to Abnormal Procedures, SINGLE-ENGINE APPROACH AND LANDING.

Procedure completed

**IF BOTH ENGINES START**

1. BUS TIE Switch (if both generators on line; lift cover-guard) - OPEN.
2. Secondary Trim Switch (if selected ON; lift cover-guard) - OFF.
3. INTERIOR Switch - NORM.
4. Fuel BOOST L and R Switches - NORM.
5. Hydraulic Pump L and R ENG Switches - ON.
6. Land as soon as possible.

Procedure completed

## ■ DUAL ENGINE FLAMEOUT - LOW ALTITUDE (POSSIBLE ENGINE FAILED L-R CAS MESSAGE)

1. Fuel - CHECK (Tanks/Quantity).
2. Fuel BOOST L and R Switches - ON.
3. Throttles - CUTOFF.

### NOTE

- Throttles must be placed to CUTOFF to reset FADEC start logic.
  - It is unlikely that an engine start using the battery or APU can be accomplished from below 1000 feet AGL, or using a windmill start from below 3000 feet AGL, following a low altitude dual engine flameout.
4. AP/TRIM/NWS DISC Button - PRESS.
  5. APU System GENERATOR Switch (if APU is running) - ON.
  6. BUS TIE Switch (lift cover-guard) - CLOSED.
  7. Either Engine START Switch - PRESS.
  8. Throttle - IDLE.
  9. Engine Instruments - MONITOR.
  10. Engine START Switch - LIGHT EXTINGUISHED.
  11. Opposite Engine (if first engine start successful) - START (repeat steps 7 thru 10, if required)

### ● IF NEITHER ENGINE STARTS

12. Landing Gear - AS REQUIRED, USE BLOWDOWN.
  - a. LANDING GEAR Handle - DOWN.
  - b. LANDING GEAR BLOWDOWN Handle (below 210 KIAS) - PULL.
  - c. Landing Gear - CHECK DOWN and LOCKED (3 green lights).
13. Flaps - 35°.

### NOTE

The flaps may not extend fully if the left battery has been depleted during start attempts and the BUS TIE Switch is not CLOSED. If unable to verify flap position, assume flaps 0° for landing.

14. Landing Data - CONFIRM.
  - a. Airspeed -  $V_{REF}$  MINIMUM.

### NOTE

The airspeeds in the following table are the minimum recommended until landing flare to ensure sufficient energy to arrest descent rate.

(Continued Next Page)