



**PSA Airlines, Inc.**

**CRJ-900**

**Model CL 600-2D24**

**QUICK  
REFERENCE  
HANDBOOK**

**EVACUATION**

- 1. PARKING BRAKE.....ON**
- 2. ATC ..... State condition and advise evacuating**
- 3. GND LIFT  
DUMPING .....MAN DISARM**
- 4. Thrust Levers .....SHUTOFF**
- 5. EMER DEPRESS .....ON**
- 6. EMER LTS .....ON**
- 7. Evacuation .....Initiate using PA system**
- 8. Left and Right ENG FIRE PUSH,  
APU FIRE PUSH .....SELECT**
- 9. BATTERY MASTER.....OFF**

Evacuation Checklist as of  
03 MAR 20

UNCONTROLLED WHEN PRINTED

**IMMEDIATE  
ACTION ITEMS**

**MESSAGES**

**FMS  
MESSAGES**

**NON-  
MESSAGES**

**OPERATIONAL  
DATA**

**STATUS  
MESSAGES**

**UNCONTROLLED WHEN PRINTED**  
**CRJ-900 Quick Reference Card**

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**Evacuation**

1. PARKING BRAKE..... ON
  2. ATC ..... State condition and advise evacuating
  3. GND LIFT DUMPING..... MAN DISARM
  4. Thrust Levers ..... SHUT OFF
  5. EMER DEPRESS ..... ON
  6. EMER LTS ..... ON
  7. Evacuation ..... Initiate using PA system
  8. Left and Right ENG FIRE PUSH, APU FIRE PUSH ..... SELECT
  9. BATTERY MASTER..... OFF
- 

**2**

**CABIN ALT (Warning Message) or Emergency Descent**

1. Oxygen masks .....
2. Crew communication..... DON and 100%
3. Captain Assumes PF Duties
4. PASS SIGNS (both)..... ON
5. ATC ..... Declare Emergency and Advise of Descent
6. Autopilot..... Recommended
7. Altitude preselector ..... set to 10,000 feet or lowest safe altitude
8. SPEED Mode ..... SELECT
9. Thrust Levers ..... IDLE
10. Flight Spoilers ..... MAX DEPLOY

► Go to QRH page 5-1

**3**

**Smoke/Fire/Fumes**

1. Oxygen masks (if required) .....
2. Crew communication..... DON and 100%

► Go to QRH page 1-1

**4**

**Unreliable Airspeed**

1. Autopilot..... DISENGAGE
2. FDs ..... DESELECT
3. Use ISI for pitch reference.

**Initial takeoff climb or go-around is required:**

4. Pitch/N<sub>1</sub>..... 10°/TOGA from SL to 15,000 ft;  
5°/CLB above 15,000 ft
5. Aircraft Configuration ..... At clean up altitude Gear UP/FLAPS 0
6. Airplane altitude ..... Maintain lowest safe altitude or higher

**Caution**

**Respect Stall Warning/Stick Shaker.**

► Go to QRH page 12-13

**5 L or R ENG FIRE or Severe Damage (In Flight)****At a safe altitude, affected engine:**

1. Thrust lever ..... CONFIRM and IDLE
2. Thrust lever ..... CONFIRM and SHUT OFF
3. ENG FIRE PUSH ..... CONFIRM and SELECT
4. FUEL, BOOST PUMP ..... CONFIRM and SELECT OFF

**After 10 seconds L ENG FIRE or R ENG FIRE warning message persists:**

5. Affected engine BOTTLE ..... SELECT

**After another 30 seconds L ENG FIRE or R ENG FIRE warning message still persists:**

6. Other engine BOTTLE ..... SELECT

► Go to QRH page 2-7

**6 L or R ENG FIRE or Severe Damage (On Ground)****NOTE: Attempt to face the aircraft into the wind.**

1. PARKING BRAKE ..... ON

**Affected engine:**

2. Thrust Lever ..... SHUT OFF
3. ENGINE FIRE PUSH ..... SELECT
4. FUEL, L and R BOOST PUMP ..... SELECT OFF

**If after 10 seconds L ENG FIRE or R ENG FIRE warning message persists:**

5. Both Engine BOTTLES ..... SELECT

► If required, accomplish Evacuation Checklist QRC #1

**7 APU FIRE (In Flight)**

1. APU FIRE PUSH ..... CONFIRM and SELECT

**After 5 seconds APU FIRE warning message persists:**

2. APU BOTTLE ..... SELECT

► Go to QRH page 3-1

**8 Double Engine Failure**

1. CONT IGNITION ..... ON
2. Airspeed ..... Not less than 240 KIAS

► Go to QRH page 2-1

**9 L REV DEPLOYED or R REV DEPLOYED**

1. Affected thrust lever ..... CONFIRM and IDLE

► Go to QRH page 2-21

**10 Uncommanded Acceleration / ENGINE OVERSPD**

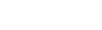
1. Affected thrust lever ..... CONFIRM and IDLE

► Go to QRH page 2-21

**11 BRAKE OVHT**

1. Airspeed ..... Not more than 220 KIAS
2. LDG GEAR lever ..... DN

► Go to QRH page 10-1

**12 MLG BAY OVHT**

1. Airspeed ..... Not more than 220 KIAS
2. LDG GEAR lever ..... DN

► Go to QRH page 10-3

**13 Ditching or Forced Landing Imminent****If time permits: Go to QRH page 14-2**

1. L and R PACK ..... OFF
2. EMER DEPRESS ..... CONFIRM AND ON

**Just before contact:**

3. EMER DEPRESS ..... SELECT OFF

**14 Loss of All AC Power**

1. ADG manual deploy handle ..... PULL

► Go to QRH page 4-17

**15 Aileron System Jammed**

1. Autopilot ..... DISENGAGE
2. Aileron controls (both) ..... RELEASE pressure
3. ROLL DISC ..... PULL and TURN 90° to lock
4. Airplane control ..... TRANSFER to pilot with Operative Aileron

► Go to QRH page 9-3

**16 Elevator System Jammed**

1. Autopilot ..... DISENGAGE
2. Elevator controls (both) ..... RELEASE differential pressure
3. PITCH DISC ..... PULL and TURN 90° to lock
4. Airplane control ..... TRANSFER to pilot with Operative Elevator

► Go to QRH page 9-4

**17 Rudder System Jammed**

1. YAW DAMPER, DISC ..... SELECT
2. Rudder pedals ..... OVERPOWER

► Go to QRH page 9-6

**18 Stabilizer Trim Runaway**

1. Control wheel ..... ASSUME manual control and OVERRIDE runaway
2. STAB TRIM DISC ..... Push, hold and release

► Go to QRH page 9-1

**19 Uncommanded Yaw Motion**

1. Controls ..... Assume manual control and counter aircraft motion using control wheel inputs
2. YAW DAMPER, DISC ..... SELECT to disconnect both yaw dampers

► Go to QRH page 9-7

**20 Rejected Takeoff**

1. Once at a complete stop
2. PARKING BRAKE ..... ON
3. Develop and Analyze a Plan

**NOTE:** Prior to the next takeoff, the minimum brake cooling time is 15 minutes and all BTMS indicators must be green and not increasing. If a BRAKE OVHT warning is displayed on EICAS, an inspection of the wheel fuse plugs is required before the next takeoff.

**21 L (R) STRT VLV OPEN (On Ground)**

1. Affected ENG STOP ..... STOP

**If L (R) STRT VLV OPEN caution message extinguishes:**

2. Normal Operations ..... Continue

**If L (R) STRT VLV OPEN caution message persists:**

2. BLEED SOURCE ..... Select non-affected engine source
3. ISOL ..... CLSD
4. BLEED VALVES ..... MANUAL

**If L (R) STRT VLV OPEN caution message still persists:**

5. Affected Thrust Lever ..... SHUT OFF

**If L (R) STRT VLV OPEN caution message extinguishes:**

5. Do not take off.

**22 L (R) START ABORT or Aborted Engine Start**

1. Affected Thrust Lever ..... SHUT OFF
2. Dry motor ..... Until ITT is reduced below 120° C respecting starter time limit of 90 seconds

**No Lightoff:** Dry motor for 90 seconds to drain fuel.

**NOTE:** If ITT is still above 120°C at 90 seconds, turn starter off for 10-second cooling period, then re-engage starter for up to 90 seconds to reduce ITT below 120°C.

3. Affected ENG STOP ..... STOP



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***Immediate Action Items*****Braking Loss / Asymmetry**

1. Wheel brakes ..... Release momentarily
2. PM will select ANTI-SKID to OFF
3. Wheel brakes ..... Re-apply as required

Extreme caution is required during braking to avoid tire damage or blow out.

4. Reverse Thrust ..... Apply maximum until stopping assured

5. Immediate Action Items complete.

**Configuration Warning**

1. Takeoff ..... DISCONTINUE Immediately
2. Immediate Action Items complete.

► Go to QRH page 14-1.

**Rejected Takeoff Before Achieving V<sub>1</sub>****Simultaneously:**

1. Thrust Levers ..... IDLE
2. Wheel Brakes ..... MAXIMUM until a safe stop
3. Thrust reverser(s)  
(operating engine[s]) ..... MAXIMUM consistent with directional control
4. Immediate Action Items complete.

► Go to QRH page IA-9.

**IA-2**

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**IMMEDIATE ACTION ITEMS****Stall Recovery**

1. Autopilot ..... DISENGAGE, if required
2. Pitch Attitude ..... Lower nose to reduce Angle of Attack
3. Thrust levers ..... Advance to MAX POWER
4. Roll Attitude ..... Wings level
5. FLIGHT SPOILER lever ..... RETRACT
6. Immediate Action Items complete and declare Low Speed Event with ATC.

**CABIN ALT Warning Msg****- OR -****Emergency Descent**

1. Oxygen masks ..... DON and 100%
2. Crew communications ..... ESTABLISH
3. Captain Assumes PF Duties
4. PASS SIGNS (both) ..... ON
5. ATC ..... Declare Emergency and Advise of Descent
6. Autopilot ..... Recommended
7. Altitude preselector ..... Set to 10,000 feet or lowest safe altitude
8. SPEED Mode ..... SELECT
9. Thrust Levers ..... IDLE
10. Flight Spoilers ..... MAX DEPLOY

► Go to QRH page 5-1.

**Smoke/Fire/Fumes**

- 1. Oxygen masks (if required)... DON and 100%**
- 2. Crew communications.....ESTABLISH**
3. Immediate Action Items complete.

► Go to QRH page 1-1.

**Unreliable Airspeed**

1. Autopilot..... DISENGAGE
2. FDs..... DESELECT
3. Use ISI for pitch reference.

**Initial takeoff climb or go-around is required:**

4. Pitch/ $N_1$  ..... 10°/TOGA from SL to 15,000 ft;  
5°/CLB above 15,000 ft.
5. Aircraft configuration ..... At clean up altitude  
Gear UP / FLAPS 0
6. Airplane altitude ..... Maintain lowest safe  
altitude or higher

**Caution**

Respect stall warning/stick shaker.

► Go to QRH page 12-13.

**IA-4**

REVISION 8

03 MAR 20

IMMEDIATE ACTION ITEMS

**L or R ENG FIRE****- OR -****Severe Damage (In Flight)****At a safe altitude, affected engine:**

1. Thrust lever ..... CONFIRM and IDLE
2. Thrust lever ..... CONFIRM and SHUTOFF
3. ENG FIRE PUSH ..... CONFIRM and SELECT
4. FUEL, BOOST PUMP..... CONFIRM and  
SELECT OFF

**After 10 seconds L ENG FIRE or R ENG FIRE warning message persists:**

5. Affected engine BOTTLE ..... SELECT

**After another 30 seconds L ENG FIRE or R ENG FIRE warning message persists:**

6. Other engine BOTTLE ..... SELECT

► Go to QRH page 2-7.

**L or R ENG FIRE****- OR -****Severe Damage (On Ground)****NOTE: Attempt to face airplane into the wind.**

1. PARKING BRAKE ..... ON

**Affected engine:**

2. Thrust lever ..... SHUTOFF
3. ENG FIRE PUSH ..... SELECT
4. FUEL, L and R BOOST PUMP ..... OFF

**After 10 seconds L ENG FIRE or R ENG FIRE warning message persists:**

5. Both engine BOTTLE ..... SELECT

► If required, accomplish EVACUATION Checklist on QRH cover.

**APU FIRE (In-Flight)**

1. APU FIRE PUSH ..... CONFIRM and SELECT

**After 5 seconds APU FIRE warning message persists**

2. APU BOTTLE ..... SELECT

► Go to QRH page 3-1.

**Double Engine Failure**

1. CONT IGNITION ..... ON
2. Airspeed ..... Not less than 240 KIAS

► Go to QRH page 2-1.

**IA-6**

REVISION 10

01 OCT 21

IMMEDIATE ACTION ITEMS

**L REV DEPLOYED  
- OR -  
R REV DEPLOYED**

1. Affected thrust lever ..... Confirm and IDLE

► Go to QRH page 2-21.

**Uncommanded Acceleration /  
ENGINE OVERSPD**

1. Affected thrust lever ..... Confirm and IDLE

► Go to QRH page 2-21.

**BRAKE OVHT**

1. Airspeed ..... not more than 220 KIAS

2. LDG GEAR lever ..... DN

► Go to QRH page 10-1.

**MLG BAY OVHT**

1. Airspeed ..... not more than 220 KIAS

2. LDG GEAR lever ..... DN

► Go to QRH page 10-3.

**Ditching  
- OR -  
Forced Landing Imminent**

**If time permits, go to QRH page 14-2.**

1. L and R PACK ..... OFF
2. EMER DEPRESS ..... Confirm and ON

**Just before contact:**

3. EMER DEPRESS ..... SELECT OFF



**Loss of all AC Power**

1. ADG manual deploy handle ..... PULL

► Go to QRH page 4-17.

**Aileron System Jammed**

1. Autopilot ..... Disengage
2. Aileron controls (both) ..... Release pressure
3. ROLL DISC handle .... PULL and TURN 90° to lock
4. Airplane control ..... TRANSFER to pilot with operative aileron

► Go to QRH page 9-3.

**IA-8**

REVISION 8

03 MAR 20

IMMEDIATE ACTION ITEMS

**Elevator System Jammed**

1. Autopilot ..... Disengage
2. Elevator controls (both) ..... Release differential pressure
3. PITCH DISC handle ... PULL and TURN 90° to lock
4. Airplane control ..... TRANSFER to pilot with operative elevator

► Go to QRH page 9-4.

**Rudder System Jammed**

1. YAW DAMPER, DISC ..... SELECT
2. Rudder pedals ..... OVERPOWER

► Go to QRH page 9-6.

**Stabilizer Trim Runaway**

1. Control wheel ..... **ASSUME manual control and OVERRIDE runaway**
2. STAB TRIM DISC ..... Push, hold and release

► Go to QRH page 9-1.

**Uncommanded Yaw Motion**

1. Controls ..... Assume manual control and counter aircraft motion using control wheel inputs
2. YAW DAMPER, DISC ..... SELECT to disconnect both yaw dampers

► Go to QRH page 9-7.

## Rejected Takeoff

1. Once at a complete stop:
2. PARKING BRAKE ..... ON
3. Develop and Analyze a Plan.

**NOTE: Prior to the next takeoff, the minimum brake cooling time is 15 minutes and all BTMS indicators must be green and not increasing. If a BRAKE OVHT warning is displayed on EICAS, an inspection of the wheel fuse plugs is required before the next takeoff.**



IA-10

REVISION 8

03 MAR 20

IMMEDIATE ACTION ITEMS

**L (R) STRT VLV OPEN****(On Ground)**

1. Affected Engine STOP ..... STOP

**If L (R) STRT VLV OPEN caution message extinguishes:**

2. Normal Operations..... Continue



**If L (R) STRT VLV OPEN caution message persists:**

2. BLEED SOURCE..... Select non-affected engine source

3. ISOL..... CLSD

4. BLEED VALVES..... MANUAL

**If L (R) STRT VLV OPEN caution message still persists:**

5. Affected Thrust Lever..... SHUT OFF



**If L (R) STRT VLV OPEN caution message extinguishes:**

5. Do not take off.



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**L (R) START ABORT****- OR -****Aborted Engine Start**

1. Affected Thrust lever ..... SHUT OFF
2. Dry Motor ..... Until ITT is reduced below 120° C  
respecting starter time limit  
of 90 seconds

**No Lightoff:** Dry motor for 90 seconds to drain fuel.

**NOTE: If ITT is still above 120°C at 90 seconds,  
turn starter off for 10-second cooling  
period, then re-engage starter for up to  
90 seconds to reduce ITT below 120°C.**

3. Affected ENG STOP..... STOP



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**IMMEDIATE ACTION ITEMS**

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SMOKE - FIRE	REVISION 8	1-1
	03 MAR 20	

## **Chapter 1: Smoke - Fire**

### **Smoke / Fire / Fumes**

- 1. Oxygen masks (if required) ..... Don and 100%**
- 2. Crew communication..... Establish**

3. Immediate Action Items complete, assign PF.

----- Continued from QRC ----- |

**WARNING**

Time is critical during smoke/fire/fumes emergencies. The flight crew should consider an immediate landing anytime the situation cannot be controlled.

**Caution**

**Do not activate PAX OXY.**

- If smoke/fire/fumes is the greatest threat and below 10,000 feet:

4. EMER DEPRESS ..... Confirm and ON
5. AFT CARGO ..... OFF
6. RECIRC FAN ..... OFF
7. PASS SIGNS ..... ON
8. Land immediately at the nearest suitable airport.

Dependent upon the severity of the situation, the or flight crew should expedite the landing. The crew should also consider an overweight landing, tailwind landing, ditching or a forced off-airport landing.

9. Smoke/Fire/Fumes Checklist complete, and  
☞ **If required**, accomplish EVACUATION Checklist on QRH cover.

- If smoke/fire/fumes is NOT the greatest threat, OR above 10,000 feet:

4. AFT CARGO ..... OFF
5. RECIRC FAN ..... OFF
6. PASS SIGNS ..... ON

**CONT'D**



<b>1-2</b>	<b>REVISION 8</b>	<b>SMOKE - FIRE</b>
	03 MAR 20	

7. Descent..... INITIATE to 10,000 feet or  
lowest safe altitude  
— whichever is higher
8. PRESS CONT ..... MAN
9. MAN ALT ..... UP
10. MAN RATE ..... INCR as required to  
depressurize the cabin
11. Land immediately at the nearest suitable airport.  
  
Dependent upon the severity of the situation, the flight crew should expedite the landing. The crew should also consider an overweight landing, tailwind landing, ditching or a forced off-airport landing.

**Caution**

**Upon landing, if required, accomplish  
EVACUATION Checklist on QRH cover.**

Accomplish as much of the remainder of this checklist as possible before calling for the Descent Checklist and the Before Landing Checklist.

12. Time and conditions permit and source of smoke/fire/fumes can be quickly identified and eliminated:

Determine source of smoke/fire/fumes

- |   |
|---|
| <ul style="list-style-type: none"> <li>• If <b>Air-Conditioning Smoke</b>, page 1-3<br/>Smoke coming from gaspers or vents</li> </ul>                               |
| <ul style="list-style-type: none"> <li>• If <b>Electrical Smoke or Fire</b>, page 1-4<br/>Electrical fire smell<br/>Potential loss of associated systems</li> </ul> |
| <ul style="list-style-type: none"> <li>• If <b>Galley Smoke or Fire</b>, page 1-8</li> </ul>  |
| <ul style="list-style-type: none"> <li>• If <b>Cabin Smoke or Fire</b>, page 1-9</li> </ul>   |
| <ul style="list-style-type: none"> <li>• If <b>SMOKE AFT CARGO Msg</b>, page 1-10</li> </ul>  |
| <ul style="list-style-type: none"> <li>• If <b>SMOKE FWD CARGO Msg</b>, page 1-11</li> </ul>  |
| <ul style="list-style-type: none"> <li>• If <b>SMOKE AFT LAV Msg</b>, page 1-12</li> </ul>  |
| <ul style="list-style-type: none"> <li>• If <b>SMOKE FWD LAV Msg</b>, page 1-12</li> </ul>  |

SMOKE - FIRE	REVISION 6	1-3
01 JUN 18		

**Air-Conditioning Smoke**

- 13. BLEED SOURCE ..... BOTH ENG
- 14. ISOL ..... CLSD
- 15. BLEED VALVES ..... MANUAL
- 16. L PACK ..... OFF

→ If smoke/fumes condition subsides:

or      17. Go to step 21 below

↳ If smoke/fumes conditions persist:

- 17. L PACK ..... On
- 18. R PACK ..... OFF

→ If smoke/fumes condition subsides:

or      19. Go to step 21 below

↳ If smoke/fumes conditions persist:

- 19. R PACK ..... On
- 20. Land immediately at the nearest suitable airport.

**21. Smoke/Fire/Fumes Checklist complete, and**

☛ **If required, accomplish EVACUATION Checklist on QRH cover.**

**NOTE: Airplane altitude not above 31,000 feet during single pack operations.**

**WARNING**

**EMER DEPRESS** switch should only be used as a last resort for smoke evacuation. Using the **EMER DEPRESS** switch will have potential impact/hazard on crew and passengers' health, if it is used at high altitudes.

**If faster removal rate required:**

- a. EMER DEPRESS  
(15,000 feet and below) ..... Confirm and ON

**1-4****REVISION 6****SMOKE - FIRE**

01 JUN 18

**Electrical Smoke or Fire**

13. AC and DC Electrical loads ..... Monitor

- If source of electrical smoke/fire/fumes is not positively identified:  
or
- 14. Go to step 15 (ADG manual deploy handle...) below.
- If source of electrical smoke/fire/fumes is positively identified:

**WARNING**

The steps that follow provide guidance on how to isolate each electrical bus. Select only the steps required to isolate the positively identified bus. The steps below are not to be used for trial and error in an attempt to identify the source bus.

**NOTE: If required, refer to Bus Inop – Affected Systems List, page 4-20 for a list of Busses and associated equipment.**

14. Affected electrical bus ..... Isolate

**AC BUS 1:**

- a. AC ESS XFER ..... ALTN
- b. Left AUTO XFER ..... OFF
- c. GEN 1 ..... OFF/RESET

**AC BUS 2:**

- a. Right AUTO XFER ..... OFF
- b. GEN 2 ..... OFF/RESET

**AC ESS BUS:**

- a. AVIONICS FAN ..... FLT ALTN
- b. AC ESS FEED cb (1S2) ..... Open

**AC SERV BUS:**

- a. AC SERV FEED cb (2E2) ..... Open

**DC BUS 1:**

- a. DC 1 FEED cb (1D6) ..... Open

**CONT'D**

<b>SMOKE - FIRE</b>	<b>REVISION 6</b>	<b>1-5</b>
	<b>01 JUN 18</b>	

**DC BUS 2:**

- a. DC BUS 2 cb (2L8) ..... Open

**DC ESS BUS:**

- a. DC ESS FEED cb (2R6) ..... Open

**DC SERV BUS:**

- a. SERV BUS FEED cb (2F5) ..... Open  
b. DC SERVICE ..... OFF

**DC BATT BUS:**

- a. Airplane altitude ..... Not above 13,000 feet  
b. PRESS CONT ..... AUTO  
c. LDG ELEV ..... SET to 14,000 feet  
d. BATT BUS FEED cb (2N2) ..... Open

**DC UTILITY BUS:**

- a. DC UTILITY FEED cb (2L7) ..... Open

→ **If electrical smoke/fire/fumes subsides:**

- or  
15. Affected airplane systems ..... Review  
inoperative systems  
16. Land immediately at the nearest suitable  
airport.

17. Smoke/Fire/Fumes Checklist complete.  
→ **If required**, accomplish EVACUATION  
Checklist on QRH cover.

→ **If electrical smoke/fire/fumes persists:**

15. ADG manual  
deploy handle ..... PULL and leave extended

**After ADG power is established:**

16. GEN 1 and GEN 2 (both) ..... Confirm OFF  
/RESET  
17. APU GEN ..... OFF/RESET  
18. STAB TRIM, CH 2 ..... Select  
19. R PACK ..... Check ON  
20. L PACK ..... OFF  
21. PRESS CONT ..... MAN  
• MAN ALT ..... As required  
• MAN RATE ..... As required  
22. Leave icing conditions

**CONT'D**

**1-6****REVISION 6****SMOKE - FIRE****01 JUN 18**

23. Land immediately at the nearest suitable airport.

► **If smoke/fire/fumes persists:**

24. GEN 1, GEN 2, APU GEN ..... AUTO

25. ADG manual deploy handle ..... STOW

26. ADG CONTROL,  
PWR TXFR OVERRIDE ..... Select

27. CAS messages ..... Review

28. Affected systems ..... Restore

**To evacuate smoke/fumes at a faster rate:**

**WARNING**

or

**EMER DEPRESS** switch should only be used as last resort for smoke evacuation. Using the **EMER DEPRESS** switch will have potential impact/hazard on crew and passengers' health, if it is used at high altitudes.

29. EMER DEPRESS ..... ON

30. Smoke/Fire/Fumes Checklist  
complete, and

► **If required, accomplish EVACUATION  
Checklist on QRH cover.**

► **If smoke/fire/fumes subsides:**

**The following significant systems are not available when on emergency power only:**

- Automatic pressurization
- Yaw damper 2 and autopilot
- Inboard ground spoilers and inboard multi-function spoilers
- Stabilizer trim channel 1, aileron trim and rudder trim
- Anti-skid system and nosewheel steering
- Hydraulic pumps 1B, 2B, and 3A
- PFD 2, MFD 2, VHF COM 2, RTU 2
- FD 2, VHF NAV 2, ADF 2, ATC 2
- Radio altimeter 2
- Copilot's instrument lights, NAV lights and taxi lights

**CONT'D**



<b>SMOKE - FIRE</b>	<b>REVISION 8</b>	<b>1-7</b>
	<b>03 MAR 20</b>	

- Right probe heaters and ice detector 2
- Windshield wipers
- Windshield heaters and right window heater
- Below 135 KIAS, AC ESS bus is shed causing the loss of the following:
  - Remaining TRU (ESS TRU 1 or ESS TRU 2)
  - Rudder Limiter (Avoid excessive rudder inputs)
  - XFLOW pump
  - Left probe heaters and ice detector 1
  - Left window heat

**Prior to reducing speed below 145 KIAS:**

- |                    |      |
|--------------------|------|
| 24. LDG GEAR ..... | DOWN |
| 25. FLAPS .....    | 45   |

**Prior to landing:**

- |                                  |          |
|----------------------------------|----------|
| 26. Actual landing distance..... | Increase |
|----------------------------------|----------|

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

<b>Runway Surface</b>		
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With Two Thrust Reversers</b>	1.80 (80%)	2.30 (130%)
<b>Without Thrust Reversers</b>	2.30 (130%)	2.30 (130%)

**NOTE: If on ADG power:**

- (1) The slats/flaps will operate at half speed
- (2) Momentary loss of ADG power may occur:
  - At 140 KIAS and below if slats/flaps are operating
  - At 108 KIAS and below if pitch trim is used.

**CONT'D**



**1-8****REVISION 8****SMOKE - FIRE**

03 MAR 20

27. Perform Descent and Before Landing Checklists

**NOTE: Category II operations may be affected. Review the requirements.**

**28. Smoke/Fire/Fumes Checklist complete**

- If required, accomplish EVACUATION Checklist on QRH cover.

**Galley Smoke or Fire**

13. Flight Attendant ..... Contact

- Advise to isolate and extinguish source of smoke or fire and secure the area.
- Galley control panel circuit breakers (all) ..... Open

14. WATER SYSTEM cb (2D8) ..... Open

15. WASTE SYSTEM cb (2M9) ..... Open

16. WATER CONT cb (2M10) ..... Open

17. GALLEY HEATER CONT cb (2F11) ..... Open

18. GALLEY HEATER cb (2B11) ..... Open

19. GALLEY EXHAUST FAN cb (2B8) ..... Open

20. LIGHTS GALLEY AREA cb (2M6) ..... Open

21. LIGHTS CABIN UTIL cb (1P4) ..... Open

→ **If smoke/fire/fumes condition subsides:**

22. Land at the nearest suitable airport

or

**23. Smoke/Fire/Fumes Checklist complete, and**

- If required, accomplish EVACUATION Checklist on QRH cover.

→ **If smoke/fire/fumes condition persists:**

22. Land immediately at the nearest suitable airport.

**WARNING**

**EMER DEPRESS** switch should only be used as a last resort for smoke evacuation. Using the **EMER DEPRESS** switch will have potential impact/hazard on crew and passengers' health, if it is used at high altitudes.

**CONT'D**



<b>SMOKE - FIRE</b>	<b>REVISION 8</b>	<b>1-9</b>
	03 MAR 20	

23. EMER DEPRESS ..... Confirm and ON

**24. Smoke/Fire/Fumes Checklist complete, and**

- ☞ If required, accomplish **EVACUATION Checklist** on QRH cover.

**Cabin Smoke or Fire**

13. EMER LTS.....ON

14. Flight Attendants ..... Contact

- Advise to isolate and extinguish source of smoke or fire and secure the area
- Advise to turn off ALL lights at FWD and AFT flight attendant panels
- PSU READING LIGHTS ..... OFF
- CEILING LIGHT ..... OFF
- SIDEWALL LIGHT ..... OFF
- ENTRANCE LIGHT ..... OFF
- ACCENT LIGHT (if installed) ..... OFF
- FWD AFT READING LIGHTS ..... OFF

15. PASS SIGNS ..... OFF

16. PASS DOOR ACT cb (1E1) ..... Open

17. LIGHTS CAB UTIL cb (1P4)

18. LIGHTS BOARD cb (2M3) ..... Open

→ **If smoke/fire/fumes condition subsides:**

19. Land at the nearest suitable airport

or

**20. Smoke/Fire/Fumes Checklist complete, and**

- ☞ If required, accomplish **EVACUATION Checklist** on QRH cover.

→ **If smoke/fire/fumes condition persists:**

19. Land immediately at the nearest suitable airport.

**WARNING**

**EMER DEPRESS** switch should only be used as a last resort for smoke evacuation. Using the **EMER DEPRESS** switch will have potential impact/hazard on crew and passengers' health, if it is used at high altitudes.

CONT'D



**1-10****REVISION 8****SMOKE - FIRE****03 MAR 20**

20. EMER DEPRESS ..... Confirm and ON

**21. Smoke/Fire/Fumes Checklist complete, and**

- ☞ If required, accomplish **EVACUATION Checklist** on QRH cover.

**Red****SMOKE AFT CARGO Msg****Red**

1. Oxygen Masks (if required) ..... Don and 100%
2. Crew Communication ..... Establish
3. CARGO FIREX, AFT CARGO SMOKE ..... Confirm and SELECT
4. CARGO FIREX BOTTLE ..... SELECT
  - Push and hold for 5 seconds. Check Squib/Bottle discharge

→ **If on ground:**

or

5. **SMOKE AFT CARGO Checklist complete, and**
- ☞ If required, accomplish **EVACUATION Checklist** on QRH cover.

→ **If in flight:**

5. Land at the nearest suitable airport

**Caution**

**Depending on the severity of the situation, the crew should consider an overweight landing, tailwind landing, ditching, or a forced off-airport landing.**

6. PASS SIGNS ..... ON
7. Flight Attendant ..... Advise
8. LDG ELEV ..... Set to 8,000 feet
9. Descent ..... Initiate to 10,000 feet or lowest safe altitude

**At 10,000 feet or lowest safe altitude, whichever is higher:**

10. LDG ELEV ..... Set to landing field elevation

**11. SMOKE AFT CARGO Checklist complete, and**

- ☞ If required, accomplish **EVACUATION Checklist** on QRH cover.

SMOKE - FIRE	REVISION 8	1-11
03 MAR 20		

Red

**SMOKE FWD CARGO Msg**

Red

1. Oxygen Masks (if required) .....Don and 100%
2. Crew Communication .....Establish
3. CARGO FIREX, FWD CARGO SMOKE .....Confirm and  
SELECT
4. CARGO FIREX BOTTLE .....SELECT
  - Push and hold for 5 seconds. Check Squib/Bottle discharge

→ **If on ground:**

- or
5. **SMOKE FWD CARGO Checklist complete, and**
    - ☞ If required, accomplish **EVACUATION Checklist** on QRH cover.

→ **If in flight:**

5. Land at the nearest suitable airport

**Caution**

**Depending on the severity of the situation, the crew should consider an overweight landing, tailwind landing, ditching, or a forced off-airport landing.**

6. PASS SIGNS .....ON
7. Flight Attendant .....Advise
8. LDG ELEV .....Set to 8,000 feet
9. Descent .....Initiate to 10,000 feet or  
lowest safe altitude

**At 10,000 feet or lowest safe altitude, whichever is higher:**

10. LDG ELEV .....Set to landing field elevation

11. **SMOKE FWD CARGO Checklist complete, and**
  - ☞ If required, accomplish **EVACUATION Checklist** on QRH cover.

**1-12****REVISION 6**

01 JUN 18

**SMOKE - FIRE**

Red

**SMOKE AFT LAV Msg**

Red

**- OR -**

Red

**SMOKE FWD LAV Msg**

Red

1. Oxygen Masks (if required) .....Don and 100%
2. Crew Communication .....Establish
3. PASS SIGNS .....ON
4. Flight Attendant .....Contact
  - Advise to isolate and extinguish source of smoke or fire and secure the toilet area.
5. Toilet / Lav circuit breakers .....Open
  - LAV EXHAUST FAN cb (1B8)
  - WATER SYSTEM cb (2D8)
  - WASTE SYSTEM cb (2M9)
  - WATER CONT cb (2M10)
  - TOILET cb (2D5)
  - LIGHTS – TOILET cb (2M5)
6. Descent .....Initiate to 10,000 feet or lowest safe altitude
7. PRESS CONTROL .....MAN
8. MAN ALT .....UP
9. MAN RATE .....As required

► **If smoke/fire/fumes condition subsides:**

10. Land at the nearest suitable airport

or

**11. SMOKE AFT/FWD LAV Checklist complete, and**  
**☞ If required, accomplish EVACUATION**  
**Checklist on QRH cover.**

► **If smoke/fire/fumes condition persists:**

10. Land at the nearest suitable airport

**Caution**

**Depending on the severity of the situation, the crew should consider an overweight landing, tailwind landing, ditching or a forced off-airport landing.**

**CONT'D**

SMOKE - FIRE	REVISION 6	1-13
01 JUN 18		

**WARNING**

**EMER DEPRESS** switch should only be used as a last resort for smoke evacuation. Using the **EMER DEPRESS** switch will have potential impact/hazard on crew and passengers' health, if it is used at high altitudes.

11. EMER DEPRESS ..... Confirm and ON

**12. SMOKE AFT/FWD LAV Checklist complete, and**

☞ If required, accomplish **EVACUATION**  
**Checklist** on QRH cover.

**1-14****REVISION 6****SMOKE - FIRE**

01 JUN 18

Amber

**AFT CARGO DET Msg**

Amber

**-OR-**

Amber

**FWD CARGO DET Msg**

Amber

1. Land at the nearest suitable airport
2. AFT (FWD) CARGO DET Checklist complete

Amber

**AFT CARGO SQB 1(2) Msg**

Amber

1. AFT CARGO FAN ..... OFF
2. Land at the nearest suitable airport
3. AFT CARGO SQB 1(2) Checklist complete

Amber

**CARGO BTL LO Msg**

Amber

1. Cargo Bottle ..... Assumed Discharged
2. AFT CARGO FAN ..... OFF
3. Land at the nearest suitable airport

**Caution**

**Advise ground crew of the possible presence of Halon vapors and smoke in the cargo compartment.**

4. CARGO BTL LO Checklist complete

Amber

**FIRE SYS FAULT Msg**

Amber

☞ If aircraft is on the ground and off the gate, accomplish System Reset.

1. FIRE DETECTION/FIREX MONITOR TEST..... Select  
**NOTE: Carry out the appropriate procedure for any or all related messages which come on during the test.**
2. FIRE SYS FAULT Checklist complete

Amber

**FWD CARGO SQB 1(2) Msg**

Amber

1. Land at the nearest suitable airport
2. FWD CARGO SQB 1(2) Checklist complete

POWERPLANT	REVISION 8	2-1
	03 MAR 20	

## ***Chapter 2: Powerplant***

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### **Double Engine Failure**

1. CONT IGNITION.....ON
2. Airspeed .....Not less than 240 KIAS

----- **Continued from QRC** -----

3. Turn toward nearest suitable airport.

**NOTE: Glide ratio is approximately 15:1 (2.5 NM per 1,000 feet).**

4. Engines instruments ..... MONITOR for automatic relight

**NOTE: L ENG FLAMEOUT and R ENG FLAMEOUT caution messages are displayed.**

5. ADG manual deploy ..... PULL

**When ADG power is established:**

6. STAB TRIM, CH 2 ..... SELECT
7. Oxygen masks (if required) ..... DON
8. Crew communications ..... ESTABLISH
9. PASS SIGNS (both) ..... ON
10. APU (if available, at 37,000 feet and below) ..... START
11. APU GEN ..... CHECK AUTO

**If engines continue to run-down and L ENG FLAMEOUT and R ENG FLAMEOUT caution messages are not displayed:**

12. Thrust levers (both) ..... SHUT OFF

**NOTE: (1) Consider feasibility of relight procedure based on current altitude.  
(2) APU Bleed Air relight procedure may be attempted at 21,000 feet and below.  
(3) Windmilling relight procedure may be attempted at 25,000 feet and below.**

- If relight of either engine is not considered feasible, proceed to step 13.
- If windmilling relight is considered feasible, proceed to step 16.
- If APU bleed air relight is considered feasible, proceed to step 35.

**CONT'D**



**2-2****REVISION 8****POWERPLANT**

03 MAR 20

- 13. RELIGHT OF EITHER ENGINE IS NOT CONSIDERED FEASIBLE**  
 14. Target glide airspeed .....ESTABLISH

<b>Airplane Weight</b>	<b>Target Airspeed</b>
55,000 lbs	180 KIAS
82,500 lbs	220 KIAS
84,500 lbs	225 KIAS

15. Proceed to step 57, **ALL ENGINE OUT PROCEDURE.**

**16. WINDMILLING RELIGHT PROCEDURE**

17. Descent.....INITIATE to 25,000 feet or below  
 18. Airspeed.....Not less than 250 KIAS  
 19. FUEL, L and R BOOST PUMP .....CONFIRM ON  
 20. ANTI-ICE, WING and COWL.....ALL OFF  
 21. IGNITION, CONT.....CONFIRM ON

**When ITT is 90° or less and N<sub>2</sub> is at least 7.2%:**

22. Thrust levers (both).....IDLE

**NOTE: An ENG FLAMEOUT caution message may momentarily be displayed.**

23. Engine indications.....MONITOR

**NOTE: N<sub>2</sub> acceleration should be positive and uninterrupted. Stable idle speed should be reached within 3 to 4 minutes.**

- If at least one engine relights and stabilizes at flight idle, proceed to step 24.
- If neither engine relight within 25 seconds, proceed to step 32.

**At least one engine relights and stabilizes at flight idle:**

24. Thrust lever(s).....As required  
 25. WING A/I CROSS BLEED.....AS REQUIRED  
 26. ANTI-ICE, WING and COWL.....AS REQUIRED  
 27. IGNITION, CONT.....SELECT OFF

**Re-establish normal power:**

28. Affected GEN .....CHECK AUTO  
 29. ADG manual deploy .....STOW  
 30. ADG CONTROL, PWR TXFR OVERRIDE .....SELECT  
 31. Double Engine Failure Checklist complete, and accomplish appropriate action below.

**CONT'D**



<b>POWERPLANT</b>	<b>REVISION 10</b>	<b>2-3</b>
	<b>01 OCT 21</b>	

**If both engines started:**

Review CAS messages and restore affected systems as applicable.

**If one engine started:**

- ☛ Accomplish Inflight Start Checklist, page 2-15.

**Neither engine relights within 25 seconds:**

32. Thrust levers (both)..... SHUT OFF

**Another windmill relight attempt is still possible:**

33. Wait 30 seconds, then proceed to step 16 and repeat **WINDMILLING RELIGHT PROCEDURE**.

**Another windmill relight attempt is not possible:**

34. Proceed to step 35 or to step 57, **ALL ENGINE OUT PROCEDURE**.

**35. APU BLEED AIR RELIGHT PROCEDURE**

36. Target airspeed ..... ESTABLISH

<b>Airplane Weight</b>	<b>Target Airspeed</b>
55,000 lbs	180 KIAS
82,500 lbs	220 KIAS
84,500 lbs	225 KIAS

37. FUEL, L and R BOOST PUMP ..... CONFIRM ON  
 38. ANTI-ICE, WING and COWL..... ALL OFF  
 39. BLEED SOURCE..... APU  
 40. ISOL..... OPEN  
 41. BLEED VALVES..... MANUAL

**Attempt to start one engine at a time (21,000 feet and below):**

42. IGNITION, CONT ..... CONFIRM ON

**When ITT is 90°C or less:**

43. L or R ENG START ..... SELECT and HOLD until N<sub>2</sub> is increasing

**When N<sub>2</sub> is at least 20%:**

44. Applicable thrust lever..... IDLE  
 45. Engine indications..... MONITOR

- If engine relights and stabilizes at flight idle, proceed to step 46.
- If engine does not relight within 25 seconds, proceed to step 53.

**Engine relights and stabilizes at flight idle:**

46. Thrust lever ..... As required  
 47. IGNITION, CONT ..... SELECT OFF  
 48. BLEED VALVES..... AUTO

**CONT'D**



**2-4****REVISION 10**  
**01 OCT 21****POWERPLANT****Re-establish normal power:**

49. Affected GEN ..... CHECK AUTO  
 50. ADG manual deploy ..... STOW  
 51. ADG CONTROL, PWR TXFR OVERRIDE ..... SELECT  
 52. Double Engine Failure Checklist complete, and  
 |  Accomplish Inflight Start Checklist, page 2-15.

**Engine does not relight:**

53. Affected thrust lever ..... SHUT OFF  
 54. Affected ENG STOP ..... SELECT

**If another APU BLEED AIR RELIGHT attempt is possible:**

55. Attempt relight on other engine. Proceed to step 35 and repeat **APU BLEED AIR RELIGHT PROCEDURE**.

**If another APU BLEED AIR RELIGHT attempt is not possible:****Neither engine is restarted:**

56. Proceed to step 57.

**57. ALL ENGINE OUT PROCEDURE**

58. Determine if APU GEN is available.  
 • If APU GEN is available, proceed to step 59.  
 • If APU GEN is not available, proceed to step 62.

**APU GEN is available:**

59. ADG manual deploy handle ..... STOW  
 60. ADG CONTROL, PWR TXFR OVERRIDE ..... SELECT  
 61. Proceed to step 62.

**APU GEN is not available:**

62. Determine if a suitable landing site is within gliding range.

**NOTE:** (1) Target glide speed provides for a range of approximately 2.5 NM for every 1,000 feet of altitude lost (15:1 glide ratio in still air).  
 (2) Descent rate will be approximately 1,200 – 1,600 fpm.  
 (3) Recommended approach is a descending 360-degree turn started at 5,000 feet above the landing area.  
 (4) With both engines inoperative, the gliding distance and time from 10,000 feet above the landing area to the initiation of the recommended approach maneuver at 5,000 feet above the landing area, will be approximately:

Airplane Weight	Target Airspeed	Gliding Distance and Time
55,000 lbs	180 KIAS	12.5 NM – 4.5 minutes
82,500 lbs	220 KIAS	12.5 NM – 3.5 minutes

**CONT'D**

<b>POWERPLANT</b>	<b>REVISION 8</b>	<b>2-5</b>
	<b>03 MAR 20</b>	

63. If time allows, affected aircraft systems ..... Review

**NOTE: The following significant systems are not available when all engines are out and APU GEN is not available (on emergency power only):**

- Automatic pressurization
- Yaw damper 2 and autopilot
- Inboard and outboard ground spoilers, inboard and outboard multi-function spoilers
- Stabilizer trim channel 1, aileron and rudder trims
- Anti-skid system and nosewheel steering
- Hydraulic EDP 1A and EDP 2A, hydraulic pumps 1B, 2B and 3A
- PFD 2, MFD 2, VHF COM 2, RTU 2
- FD 2, VHF NAV 2, ATC 2
- ADF 2
- Radio altimeter 2
- Copilot's instrument lights, NAV lights and taxi lights
- Right probe heaters and ice detector 2
- Windshield wipers, both windshield heaters and right window heater
- Below 135 KIAS, AC ESS bus is shed causing the loss of the following:
  - The remaining TRU (ESS TRU 1 or ESS TRU 2)
  - Rudder limiter
  - XFLOW pump
  - Left probe heaters and ice detector 1
  - Left window heater

- If suitable landing site is in range, proceed to step 64.
- If no suitable landing site in range, proceed to step 76.

**Suitable landing site is in range:**

**At 10,000 feet MSL or lowest safe altitude:**

64. EMER DEPRESS ..... ON
65. RAM-AIR ..... OPEN
66. GRND PROX, FLAP ..... OVRD
67. Approach start point ..... ESTABLISH at 5,000 feet  
AGL over landing area
68. 20 to 30-degree angle of bank turn ..... START over landing area
69. Target airspeed ..... MAINTAIN
70. Downwind leg ..... ESTABLISH at 2,500 feet  
AGL abeam landing area and  
180 degrees from final  
approach heading

**CONT'D**



**2-6****REVISION 8****POWERPLANT****03 MAR 20**

71. Final approach.....ESTABLISH at 1,500 feet AGL  
72. LDG GEAR lever .....DN when runway is assured  
73. Landing FLAPS .....20  
74. Final approach speed..... $V_{REF}$  (FLAPS 20)  
75. Actual landing distance.....INCREASE

<b>Without Thrust Reversers</b>
2.80 (180%)

**No suitable site is in range:**

76. Double Engine Failure Checklist complete, and Accomplish appropriate Ditching or Forced Landing – Planned Checklist, page 14-2, or Ditching or Forced Landing – Imminent Checklist, page 14-2.

Red

**L or R ENG FIRE**  
**-OR-**  
**Severe Damage (In Flight)**

Red

**At a safe altitude, affected engine:**

1. Thrust Lever.....CONFIRM and IDLE
2. Thrust Lever.....CONFIRM and SHUTOFF
3. ENG FIRE PUSH .....CONFIRM and SELECT
4. FUEL BOOST PUMP .....CONFIRM and SELECT OFF
5. Wait 10 seconds

→ If the fire extinguishes:

or      6. Go to step 9 below

→ If the fire still persists:

6. Affected Engine BOTTLE .....SELECT |
- Push and hold until ENG BTL 1 (2) LO Msg displays.

→ If within 30 seconds, the fire extinguishes:

or      7. Go to step 9 below

→ If after 30 seconds, the fire still persists:

7. Other Engine BOTTLE .....SELECT |
- Push and hold until ENG BTL 1 (2) LO Msg displays.

----- Continued from QRC ----- |

→ If the fire extinguishes:

or      8. Go to step 9 below

→ If the fire still persists:

8. Land at the nearest suitable airport accomplishing as much of the remainder of this checklist as possible before calling for the SINGLE ENGINE LANDING Checklist, page 2-9.
9. WING A/I CROSS BLEED.....Select Non-Affected side
10. Affected Hydraulic B pump:
  - Left Engine shutdown .....HYDRAULIC 1 ON
  - Right Engine shutdown .....HYDRAULIC 2 ON
11. Affected COWL ANTI-ICE.....OFF
12. Affected Pack.....OFF
13. FUEL XFLOW .....Auto
14. Fuel quantity .....Check / Balanced

**CONT'D**

**2-8****REVISION 8****POWERPLANT**

03 MAR 20

**NOTE:** (1) Powered crossflow may not be able to correct fuel imbalance during single engine operations. If required, accomplish Gravity Crossfeed Procedure, page 7-12.

(2) Leave icing conditions to prevent ice accumulation on inoperative engine cowl.

15. Land at nearest suitable airport
16. If enroute terrain clearance is a consideration:
  - a. Operating engine thrust ..... Set to MCT
  - b. Airspeed.....Maintain  $V_T$
  - c. Allow the airplane to climb or descend to the single engine level-off altitude
17. APU (if available – 37,000 feet and below) ..... START
18. **If After Takeoff Checklist required:**
  - a. GEAR / FLAPS ..... Up
  - b. THRUST REVERSERs.....OFF
  - c. CAS ..... Checked
19. FLAPS ..... Land at 20°
20. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either dry, wet, or contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.30 (30%)
<b>Without Thrust Reversers</b>	1.30 (30%)	1.30 (30%)

21. Establish and communicate a plan
22. L (R) ENG FIRE Checklist complete, and
  - ☛ Accomplish SINGLE ENGINE DESCENT Checklist and SINGLE ENGINE LANDING Checklist, page 2-9.

**CONT'D**

POWERPLANT	REVISION 8 03 MAR 20	2-9
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**SINGLE ENGINE DESCENT**

1. Pressurization.....Set
2. Altimeters.....*Verify* ..... \_\_\_\_\_. Set
3. GRND PROX, FLAP..... Confirm and OVRD
4. Landing Data.....Set
5. Arrival Briefing.....Complete

**Caution**

If required, use remaining thrust reverser carefully upon landing.

**NOTE:** (1) Category II operations may be affected. Review the requirements.  
 (2) If a go-around/missed approach is executed, return to step 18 above.

6. Single Engine Descent Checklist complete

**SINGLE ENGINE LANDING**

1. Flight Attendants.....Advised
2. PASS SIGNS .....ON
3. THRUST REVERSERs (both) .....ARMED
4. CAS.....*Verify* ..... Checked
5. LDG GEAR .....*Verify* ..... Down, 3 Green
6. FLAPS.....*Verify* ..... 20°, Indicating
7. Single Engine Landing Checklist complete, and  
 If required, accomplish EVACUATION Checklist on QRH cover.

**2-10****REVISION 8****POWERPLANT**

03 MAR 20

**Engine Failure****- OR -****Intentional Shutdown**

1. (Left/Right) Thrust Lever.....Confirm and IDLE
2. (Left/Right) Thrust Lever.....Confirm and SHUTOFF

| → If severe engine damage is suspected:  
 |     3. LH (RH) ENG FIRE PUSH .....Confirm and SELECT  
 | or     4. Go to step 5

| → If severe engine damage is not suspected:  
 |     3. Go to step 5

5. (Left/Right) FUEL BOOST PUMP.....Confirm and SELECT OFF
6. WING A/I CROSS BLEED .....Select Non-Affected side
7. Affected Hydraulic B pump:
  - Left Engine shutdown .....1 ON
  - Right Engine shutdown .....2 ON
8. Affected COWL ANTI-ICE .....OFF
9. Affected pack .....OFF

**NOTE:** Airplane altitude maximum 31,000 feet during single pack operations.

10. FUEL XFLOW.....Auto
11. Fuel quantity .....Check / Balanced

**NOTE:** (1) Powered crossflow may not be able to correct fuel imbalance during single engine operations.  
 If required, accomplish Gravity Crossfeed Procedure, page 7-12.  
 (2) Leave icing conditions to prevent ice accumulation on inoperative engine cowl.

12. Land at nearest suitable airport
13. If enroute terrain clearance is a consideration:
  - a. Operating engine thrust.....Set to MCT
  - b. Airspeed .....Maintain V<sub>T</sub>
  - c. Allow the airplane to climb or descend to the single engine level-off altitude.
14. APU (if available – 37,000 feet and below) .....START
15. **If After Takeoff Checklist required:**
  - a. GEAR / FLAPS .....Up
  - b. THRUST REVERSERs .....OFF
  - c. CAS .....Checked

**CONT'D**

<b>POWERPLANT</b>	<b>REVISION 10</b>	<b>2-11</b>
	<b>01 OCT 21</b>	

- If no severe engine damage exists and engine relight is to be attempted:
16. Engine Failure or Intentional Shutdown Checklist complete, and  
or      ➡ Accomplish Inflight Start Checklist, page 2-15.

- If engine relight will not be attempted:
16. FLAPS ..... Land at 20°  
17. Actual landing distance ..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either dry, wet, or contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

	<b>Runway Surface</b>	
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With One Thrust Reverser</b>	1.25 (25%)	1.30 (30%)
<b>Without Thrust Reversers</b>	1.30 (30%)	1.30 (30%)

18. Establish and communicate a plan  
19. Engine Failure or Intentional Shutdown Checklist complete, and  
➡ Accomplish SINGLE ENGINE DESCENT and SINGLE ENGINE LANDING checklists below.

#### SINGLE ENGINE DESCENT

1. Pressurization..... Set
2. Altimeters..... Verify..... Set
3. GRND PROX, FLAP..... Confirm and OVRD
4. Landing Data..... Set
5. Arrival Briefing..... Complete

#### Caution

If required, use remaining thrust reverser carefully upon landing.

**NOTE: (1) Category II operations may be affected.  
Review the requirements.  
(2) If a go-around/missed approach is executed,  
return to step 15 above.**

6. Single Engine Descent Checklist complete

**CONT'D**



**2-12****REVISION 8****POWERPLANT****03 MAR 20****SINGLE ENGINE LANDING**

1. Flight Attendants.....Advised
2. PASS SIGNS .....ON
3. THRUST REVERSERs (both) .....ARMED
4. CAS.....*Verify* .....Checked
5. LDG GEAR .....*Verify* ..... Down, 3 Green
6. FLAPS.....*Verify* ..... 20°, Indicating
7. Single Engine Landing Checklist complete

POWERPLANT	REVISION 8	2-13
	03 MAR 20	

## Engine Failure During Approach

1. Autopilot (if engaged)..... Disengage
2. Operating engine ..... Increase thrust as required
3. Flight spoilers (if extended) ..... Retract
4. Approach and landing FLAPS ..... 20
5. Airspeed ..... Increase to  $V_{REF}$  (FLAPS 45) + 12 KIAS
6. Airplane ..... Retrim and continue approach, or go-around at pilot's discretion

**NOTE: The autopilot may be re-engaged, if above 400 feet AGL.**

**If continuing the approach:**

7. GRND PROX, FLAP ..... Confirm and OVRD
8. Final approach speed ..... Maintain  $V_{REF}$  (FLAPS 45) + 12 KIAS
9. Actual landing distance ..... Increase

Without Thrust Reversers	With One Thrust Reverser
1.30 (30%)	1.25 (25%)

**Caution**

**If required, use remaining thrust reverser carefully upon landing.**

**After landing:**

10. Affected thrust lever ..... SHUT OFF
11. Engine Failure During Approach Checklist complete.

**2-14****REVISION 9****POWERPLANT**

30 JUL 21

**Engine Failure in Climb During ALTS CAP**

1. Autopilot (if engaged)..... Disengage
2. Pitch attitude ..... Adjust to maintain the required single engine operating airspeed
3. Engine Failure in Climb During ALTS CAP Checklist complete.

**NOTE: Vertical FD commands may be used and Autopilot re-engaged after FCC mode changes to ALTS at desired altitude.**

**Engine Failure in Climb During (V) ALTS CAP or (V) ALTV CAP**

1. Autopilot (if engaged) ..... DISENGAGE
2. Pitch attitude ..... Adjust to maintain the required single engine operating airspeed.
3. Engine Failure in Climb During (V) ALTS CAP or (V) ALTV CAP Checklist Complete.

**NOTE: Vertical FD commands may be used and Autopilot re-engaged after FCC mode changes to (V) ALTS or (V) ALTV at desired altitude.**

POWERPLANT	REVISION 9	2-15
	30 JUL 21	

## Inflight Start

- NOTE:** (1) Ensure Engine Failure or Intentional Shutdown procedure (page 2-10), or Double Engine Failure procedure (page 2-1), as applicable, has been accomplished before attempting this checklist.
- (2) Relight engine using Cross-Bleed Relight below whenever possible. If not possible, relight engine using Windmilling Relight, page 2-18.

### Cross-Bleed Relight

1. Engine Conditions.....Check
  - Verify no severe engine damage or fire exists.
2. Altitude ..... Not above 21,000 feet
3. L and R FUEL BOOST PUMPS ..... Confirm and SELECT ON
4. BLEED SOURCE ..... Operative Engine
5. ISOL ..... OPEN
6. BLEED VALVES ..... MANUAL
7. ECS Duct pressure ..... Not less than 40 psi
  - Increase operating engine's N<sub>2</sub> as required. Do not reduce thrust until relight procedure is complete.

**When 21,000 feet or below and ready to start:**

8. CONT IGNITION ..... ON
9. Affected ENG START ..... START
  - Push and hold until N<sub>2</sub> is increasing.

**When ITT is 90°C or less and N<sub>2</sub> reaches at least 20%:**

10. Affected Thrust Lever.....IDLE

**NOTE: A BLEED MISCONFIG caution message will be displayed after engine start. The message will go out when the BLEED VALVES switch is set to AUTO.**

- If engine relights and stabilizes at IDLE:
11. Thrust Levers..... As required
  12. BLEED VALVES ..... AUTO
  13. Affected PACK ..... Select On
  14. WING A/I CROSS BLEED ..... NORMAL
  15. IGNITION, CONT ..... SELECT OFF
  16. WING and COWL ANTI-ICE..... As required
  17. Affected Hydraulic B pump ..... AUTO
  18. Inflight Start Checklist complete
- or
- If engine relight unsuccessful:
11. (Left/Right) Thrust Lever ..... Confirm and SHUTOFF
  12. Affected ENG STOP ..... STOP
  13. Wait 30 seconds

**CONT'D**



<b>2-16</b>	<b>REVISION 9</b>	<b>POWERPLANT</b>
	<b>30 JUL 21</b>	

- If another Cross-Bleed Relight is to be attempted:  
14. Go to step 8 above

or

→ If a Windmilling Relight is to be attempted:  
14. Go to **[Windmilling Relight]**, page 2-18

or

→ If another engine relight is not going to be attempted:

14. IGNITION, CONT ..... SELECT OFF

15. Affected FUEL BOOST PUMP ..... Confirm and  
SELECT OFF

16. Land at the nearest suitable airport

17. If After Takeoff Checklist required:

a. GEAR / FLAPS ..... Up

b. THRUST REVERSERS ..... OFF

c. CAS ..... Checked

18. FLAPS ..... Land at 20°

19. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either dry, wet, or contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.25 (25%)	1.30 (30%)
Without Thrust Reversers	1.30 (30%)	1.30 (30%)

20. Establish and communicate a plan
  21. Inflight Start Checklist complete, and  
→ Accomplish SINGLE ENGINE DESCENT Checklist and  
SINGLE ENGINE LANDING Checklist, below.

CONT'D



POWERPLANT	REVISION 9	2-17
	30 JUL 21	

**SINGLE ENGINE DESCENT**

1. Pressurization.....Set
2. Altimeters.....*Verify*..... Set
3. GRND PROX, FLAP..... Confirm and OVRD
4. Landing Data.....Set
5. Arrival Briefing.....Complete

**Caution**

If required, use remaining thrust reverser carefully upon landing.

**NOTE:** (1) Category II operations may be affected. Review the requirements.  
(2) If a go-around/missed approach is executed, return to step 17 above.

6. Single Engine Descent Checklist complete

**SINGLE ENGINE LANDING**

1. Flight Attendants.....Advised
2. PASS SIGNS ..... ON
3. THRUST REVERSERs (both) .....ARMED
4. CAS.....*Verify*..... Checked
5. LDG GEAR .....*Verify* ..... Down, 3 Green
6. FLAPS.....*Verify* ..... 20°, Indicating
7. Single Engine Landing Checklist complete

2-18

REVISION 9

POWERPLANT

30 JUL 21

**Windmilling Relight**

1. Engine Conditions.....Check
  - Verify no severe engine damage or fire exists.
2. Altitude .....21,000 feet or below

**NOTE: Windmill astart efficiency is enhanced by attaining the highest practical airspeed and N<sub>2</sub> within the relight envelope.**

3. L and R FUEL BOOST PUMPS .....Confirm and ON

**When ready to start:**

4. CONT IGNITION .....ON
5. Airspeed .....Establish
 

Not less than 290 KIAS from 21,000 feet to 10,000 ft.  
Not less than 250 KIAS from 10,000 feet to sea level.

**NOTE: Maintain airspeed throughout light-off until engine start is complete (stable idle). Monitor engine parameters carefully.**

**When N<sub>2</sub> is at least 7.2% and ITT is less than 90°C:**

6. Affected Thrust Lever.....Confirm and IDLE

**NOTE: (1) An ENGINE FLAMEOUT caution message may be displayed momentarily.  
(2) N<sub>2</sub> acceleration should be positive and uninterrupted. Stable Idle should be reached within three to four minutes.**

→ **If engine achieves stabilized IDLE:**

or

7. Thrust Levers.....As required
8. IGNITION, CONT .....SELECT OFF
9. WING and COWL ANTI-ICE.....As required
10. WING A/I CROSSBLEED.....NORMAL
11. Affected Hydraulic B pump .....AUTO
12. APU .....As required
13. Inflight Start Checklist complete

→ **If engine relight unsuccessful:**

7. Affected Thrust Lever .....Confirm and SHUTOFF

→ **If another Windmilling Relight is to be attempted:**

or

8. Wait 30 seconds
9. Go to step 3 above

→ **If another Windmilling Relight is not to be attempted:**

8. IGNITION, CONT .....SELECT OFF
9. Affected FUEL BOOST PUMP ....Confirm and SELECT OFF

**CONT'D**

POWERPLANT	REVISION 9	2-19
	30 JUL 21	

10. Land at the nearest suitable airport
11. If After Takeoff Checklist required:
  - a. GEAR / FLAPS.....Up
  - b. THRUST REVERSERs .....OFF
  - c. CAS.....Checked
12. FLAPS .....Land at 20°
13. Actual landing distance .....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either dry, wet, or contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.30 (30%)
<b>Without Thrust Reversers</b>	1.30 (30%)	1.30 (30%)

14. Establish and communicate a plan
15. Inflight Start Checklist complete, and
  - ☛ Accomplish SINGLE ENGINE DESCENT Checklist and SINGLE ENGINE LANDING Checklist, below.

### SINGLE ENGINE DESCENT

1. Pressurization.....Set
2. Altimeters..... Verify ..... Set
3. GRND PROX, FLAP ..... Confirm and OVRD
4. Landing Data.....Set
5. Arrival Briefing.....Complete

#### Caution

If required, use remaining thrust reverser carefully upon landing.

**NOTE:** Category II operations may be affected. Review the requirements.

6. Single Engine Descent Checklist complete

### SINGLE ENGINE LANDING

1. Flight Attendants.....Advised
2. PASS SIGNS ..... ON
3. THRUST REVERSERs (both) .....ARMED
4. CAS..... Verify ..... Checked
5. LDG GEAR ..... Verify ..... Down, 3 Green
6. FLAPS..... Verify ..... 20°, Indicating
7. Single Engine Landing Checklist complete

**2-20****REVISION 9****POWERPLANT**

30 JUL 21

Red

**L (R) ENG OIL PRESS Msg**

Red

**- OR -****Oil Pressure Low**

1. (Left/Right) Engine oil pressure/quantity ..... Check
2. (Left/Right) Thrust Lever..... Confirm and retard to idle
3. Verify the following (3) three indications:
  - L (R) ENG OIL PRESS Msg is on
  - Engine oil pressure is below 25 psi
  - Engine oil temperature is increasing or decreasing abnormally

→ If any (2) two of the preceding (3) three statements are true:

or

4. L (R) ENG OIL PRESS or Oil Pressure Low Checklist complete, and  
 ➡ Accomplish Intentional Shutdown Checklist, page 2-10.

→ If only (1) one of the preceding (3) three statements are true:

4. (Left/Right) Thrust Lever ..... Adjust as required
5. Engine indications ..... Monitor
6. L (R) ENG OIL PRESS or Oil Pressure Low Checklist complete

Amber

**L (R) ENG FLAMEOUT Msg**

Amber

1. (Left/Right) Thrust Lever..... Confirm and IDLE
2. Engine instruments..... Monitor Auto-Relight

**NOTE: (1) The affected engine's ITT may drop and its N<sub>2</sub> may drop below idle.  
 (2) The affected engine may shutdown.**

→ If engine relight is successful:

or

3. L (R) ENG FLAMEOUT Checklist complete

→ If ENG FLAMEOUT caution message persists OR N<sub>2</sub> drops below 40%:

3. L (R) ENG FLAMEOUT Checklist complete, and  
 ➡ Accomplish Engine Failure Checklist, page 2-10.

Red

**ENGINE OVERSPD Msg**

Red

**- OR -****Engine - Uncommanded Acceleration****→ If on ground:**

- or
1. (Left/Right) Thrust Lever ..... SHUTOFF
  2. LH (RH) ENG FIRE PUSH ..... PUSH
  3. ENGINE OVERSPD or Uncommanded Acceleration Checklist complete

**→ If in flight:**

1. (Left/Right) Thrust Lever ..... Confirm and IDLE
2. Engine instruments ..... Monitor

**→ If the engine responds:**

- or
3. (Left/Right) Thrust Lever ..... As required
  4. Engine instruments ..... Monitor
  5. ENGINE OVERSPD or Uncommanded Acceleration Checklist complete

**→ If the engine does not respond:****NOTE: Do not attempt to relight the engine.**

3. ENGINE OVERSPD or Uncommanded Acceleration Checklist complete, and

 Accomplish Intentional Shutdown Checklist, page 2-10.

Red

**L (R) REV DEPLOYED Msg**

Red

1. (Left/Right) Thrust Lever ..... Confirm and IDLE

**----- Continued from QRC -----**

2. Airspeed ..... Do not exceed 200 KIAS
3. Affected THRUST REVERSER ..... OFF / Do not arm
4. APU (if available – 37,000 feet and below) ..... START
5. L (R) REV DEPLOYED Checklist complete, and

 Accomplish Intentional Shutdown Checklist, page 2-10.

**2-22****REVISION 9****POWERPLANT**

30 JUL 21

Amber

**APR CMD SET Msg**

Amber

→ **If on the ground:**

1. Do not takeoff  
 or  
 2. APR CMD SET Checklist complete

→ **If in flight:**

1. ENGINES, SYNC .....OFF  
 2. Thrust Levers.....Adjust to within normal range

**NOTE: (1) Thrust levers may be split.**

- (2) Selecting TOGA detent may set APR thrust.  
 (3) Selecting CLIMB detent may set maximum continuous thrust.

3. Engine performance.....Monitor  
 4. APR CMD SET Checklist complete

Amber

**ENG BTL 1 (2) LO Msg**

Amber

1. Affected Engine BOTTLE .....Assume Discharged  
 2. Land at nearest suitable airport  
 3. ENG BTL 1 (2) LO Checklist complete

Amber

**L (R) ENG DEGRADED Msg**

Amber

1. Engine instruments.....Monitor

**NOTE: (1) Engine performance may be degraded.**

- (2) If both L and R ENG DEGRADED caution messages are displayed simultaneously after WING ANTI-ICE ON is selected, then monitor engine for higher than normal ITTs at CLB thrust setting and above. Thrust reduction will reduce ITTs to normal values. In this condition, flight with WING ANTI-ICE selected ON may continue.

2. L (R) ENG DEGRADED Checklist complete

Amber

**L (R) ENG SQB Msg**

Amber

1. Fire extinguishing on the affected side is not available  
 2. Land at nearest suitable airport  
 3. L(R) ENG SQB Checklist complete

POWERPLANT	REVISION 9	<b>2-23</b>
30 JUL 21		

Amber

**L (R) ENG SRG CLSD Msg**

Amber

→ **If on the ground:**

- or  
1. Do not takeoff  
2. L (R) ENG SRG CLSD Checklist complete

→ **If in flight:**

1. (Left/Right) Thrust Lever ..... Adjust as required  
• Avoid rapid acceleration or deceleration and high power settings.

→ **If compressor stall does not occur:**

- or  
2. Engine instruments ..... Monitor  
3. L (R) ENG SRG CLSD Checklist complete

→ **If compressor stall does occur:**

2. (Left/Right) Thrust Lever ..... Retard to IDLE, then  
slowly advance to desired thrust

→ **If compressor stall does not continue:**

3. Engine instruments ..... Monitor

or

**Caution**

If required, use remaining thrust reverser  
carefully upon landing.

4. L (R) ENG SRG CLSD Checklist complete

→ **If compressor stall continues or engine limits are exceeded:**

3. L (R) ENG SRG CLSD Checklist complete, and

☞ Accomplish Intentional Shutdown Checklist, page 2-10.

Amber

**L (R) ENG SRG OPEN Msg**

Amber

→ **If on the ground:**

- or  
1. Do not takeoff  
2. L (R) ENG SRG OPEN Checklist complete

→ **If in flight:**

1. (Left/Right) Thrust Lever ..... Adjust to maintain  
ITT within limits  
2. Affected THRUST REVERSER ..... OFF / Do not arm

**Caution**

If required, use remaining thrust reverser carefully upon  
landing.

3. L (R) ENG SRG OPEN Checklist complete

**2-24****REVISION 9****POWERPLANT**

30 JUL 21

Amber

**L (R) ENG TAT HEAT Msg**

Amber

**NOTE: Affected engine T<sub>2</sub> probe is not heated.**

1. Avoid icing conditions
2. L (R) ENG TAT HEAT Checklist complete

Amber

**L (R) FADEC Msg**

Amber

► **If on the ground:**

1. (Left/Right) Thrust Lever ..... Confirm and SHUTOFF  
 or 2. L(R) FADEC Checklist complete

► **If in flight:**

1. (Left/Right) Thrust Lever ..... Confirm and IDLE
2. Engine indications ..... Monitor
3. Land at nearest suitable airport

**Caution**

- (1) The engine may shutdown.
- (2) The engine may reduce to IDLE setting.
- (3) The engine may operate normally, but it will not have overspeed protection.

► **If engine indications are normal:**

4. GRND PROX, FLAP ..... Confirm and OVRD
5. (Left/Right) THRUST REVERSER ..... OFF / Do not arm
6. FLAPS ..... Land at 20°
7. Actual landing distance ..... Increase using the table below

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either dry, wet, or contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

or

	<b>Runway Surface</b>	
	Dry	Wet or Contaminated
<b>With One Thrust Reverser</b>	1.25 (25%)	1.30 (30%)
<b>Without Thrust Reverser</b>	1.30 (30%)	1.30 (30%)

**Caution**

**If required, use remaining thrust reverser carefully upon landing.**

8. L (R) FADEC Checklist complete

► **If engine shutdown occurs or is desired:**

4. L (R) FADEC Checklist complete
- ☛ Accomplish Intentional Shutdown Checklist, page 2-10.

POWERPLANT	REVISION 9	<b>2-25</b>
30 JUL 21		

Amber

**L (R) FADEC OVHT Msg**

Amber

**NOTE: This message may indicate erroneous information or loss of an engine.**

1. (Left/Right) Thrust Lever..... Retard until message extinguishes
2. Leave icing conditions

**When clear of icing conditions:**

3. (Left/Right) COWL ANTI-ICE .....OFF
4. (Left/Right) Thrust Lever..... As required

► **If L (R) FADEC OVHT Msg extinguishes:**

5. Engine instruments ..... Monitor  
or            6. L (R) FADEC OVHT Checklist complete

► **If L (R) FADEC OVHT Msg persists:**

**NOTE: A relight attempt may be carried out when the FADEC OVHT caution message extinguishes after engine shutdown.**

5. L (R) FADEC OVHT Checklist complete, and



Accomplish Intentional Shutdown Checklist, page 2-10.

Amber

**L (R) FIRE FAIL Msg**

Amber

1. Affected Engine instruments..... Monitor
2. L (R) FIRE FAIL Checklist complete

**2-26****REVISION 9****POWERPLANT**

30 JUL 21

Amber

**L (R) REV INOP Msg**

Amber

1. Affected THRUST REVERSER..... Confirm ARMED

→ If L (R) REV INOP Msg extinguishes:  
or  
2. L (R) REV INOP Checklist complete

→ If L (R) REV INOP Msg persists:  
2. L(R) THRUST REVERSER .....OFF

**Caution**

If required, use remaining thrust reverser carefully upon landing.

3. L (R) REV INOP Checklist complete

Amber

**L (R) REV UNLOCKED Msg**

Amber

1. (Left/Right) Thrust Lever.....Confirm and IDLE  
2. Airspeed.....Do not exceed 200 KIAS  
3. (Left/Right) THRUST REVERSER .....OFF

**Prior to landing:**

4. GRND PROX, FLAP..... Confirm and OVRD  
5. FLAPS..... Land at 20°  
6. Actual landing distance..... Increase using table below

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either dry, wet, or contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

Runway Surface		
	Dry	Wet or Contaminated
<b>With One Thrust Reverser</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reverser</b>	1.35 (35%)	1.35 (35%)

**Caution**

If required, use remaining thrust reverser carefully upon landing.

7. L (R) REV UNLOCKED Checklist complete

POWERPLANT	REVISION 9	2-27
	30 JUL 21	

Amber

**L (R) REV UNSAFE Msg**

Amber

1. Affected THRUST REVERSER.....OFF

**Caution**

If required, use remaining thrust reverser carefully upon landing.

2. L (R) REV UNSAFE Checklist complete

Amber

**L (R) START VALVE Msg**

Amber

**NOTE:** Air turbine start is not available.

- If on ground:
  - 1. Affected ENG STOP .....STOP
  - or 2. L (R) START VALVE Checklist complete
  
- If in flight:
  - 1. L (R) START VALVE Checklist complete, and
    - ☛ Accomplish Inflight Start, Windmilling Relight Checklist, page 2-15.

**2-28****REVISION 9****POWERPLANT**

30 JUL 21

Amber

**L (R) STRT VLV OPEN Msg**

Amber

► **If on the ground:**

1. Affected ENG STOP ..... STOP

↳ **If L (R) STRT VLV OPEN Msg extinguishes:**

or 2. L (R) STRT VLV OPEN Checklist complete

↳ **If L (R) STRT VLV OPEN Msg persists:**

2. BLEED SOURCE ..... Select non-affected engine source
3. ISOL ..... CLSD
4. BLEED VALVES ..... MANUAL

↳ **If L (R) STRT VLV OPEN Msg persists:**

- or 5. Affected thrust lever ..... SHUT OFF

↳ **If L (R) STRT VLV OPEN Msg extinguishes:**

5. Do not take off.
6. L (R) STRT VLV OPEN Checklist complete

► **If in flight:**

1. Affected ENG STOP ..... STOP

↳ **If L (R) STRT VLV OPEN caution message extinguishes:**

- or 2. L (R) STRT VLV OPEN Checklist complete

↳ **If L (R) STRT VLV OPEN caution message persists:**

2. BLEED SOURCE ..... Select non-affected engine source
3. ISOL ..... CLSD
4. BLEED VALVES ..... MANUAL

↳ **If L (R) STRT VLV OPEN caution message extinguishes:**

5. Affected PACK ..... OFF

**NOTE: Maximum altitude is 31,000 feet  
during single pack operations.**

- or 6. WING A/I CROSS BLEED ..... Select source engine side

7. ANTI-ICE, LH OR RH COWL ..... Affected side OFF

8. Leave icing conditions to prevent ice accumulation on inoperative cowl.

9. L (R) STRT VLV OPEN Checklist complete

↳ **If L (R) STRT VLV OPEN caution message persists:**

5. L (R) STRT VLV OPEN Checklist complete, and

👉 Accomplish Intentional Shutdown Checklist, page 2-10.

POWERPLANT	REVISION 9	2-29
	30 JUL 21	

Amber

**L (R) THROTTLE Msg**

Amber

- NOTE: (1) There will be no response to Thrust Lever movement.
- (2) FADEC will maintain the affected engine operating at a thrust level equal to the last valid thrust lever setting.
- (3) When either the LDG GEAR lever is selected DN or the flaps are selected to greater than FLAPS 20, the FADEC will set the affected engine thrust to approach IDLE until touchdown and then to normal ground IDLE. Thrust will remain at idle regardless of configuration changes.
- (4) The thrust reverser on the affected side is inoperative.
- (5) Selecting the Thrust Lever to SHUTOFF will cause the engine to shutdown.

1. Affected THRUST REVERSER..... OFF / Do not arm

- If engine thrust is above IDLE:
- 2. Airplane performance..... Evaluate for continued engine operation
- or
- If engine shutdown is desired:
- 3. L (R) THROTTLE Checklist complete, and
  - Accomplish Intentional Shutdown Checklist, page 2-10.
- If engine shutdown is not desired:
- When IDLE thrust is required:
- 3. LDG GEAR lever..... DN
  - 4. Go to step 2 below
- If engine thrust is at IDLE:
- Prior to landing:
- 2. GRND PROX, FLAP ..... Confirm and OVRD
  - 3. FLAPS ..... Land at 20°
4. Actual landing distance..... Increase using table below

NOTE: Apply the following factors to FLAP 45 actual landing distances for either dry, wet, or contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

CONT'D



**2-30****REVISION 9****POWERPLANT**

30 JUL 21

<b>Runway Surface</b>		
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With One Thrust Reverser</b>	1.25 (25%)	1.30 (30%)
<b>Without Thrust Reverser</b>	1.30 (30%)	1.30 (30%)

**Caution**

If required, use remaining thrust reverser carefully upon landing.

5. L (R) THROTTLE Checklist complete

**Engine Oscillations**

1. ENG SYNC.....OFF
- If the engine stabilizes:
- 2. ENG SYNC .....Select N<sub>2</sub>
- or
- 3. Engine Oscillations Checklist complete
- If the engine does not stabilize:
- 2. Engine instruments .....Monitor
  - 3. Engine Oscillations Checklist complete

**FAN VIB Indicator Inoperative**

1. Operational FAN VIB indicator .....Monitor
2. Avoid icing conditions
3. FAN VIB Indicator Inoperative Checklist complete

**Hot or Hung or Interrupted Start**

1. (Left/Right) Thrust Lever.....SHUTOFF
2. Affected Engine .....Dry motor until ITT is reduced below 120° C, respecting starter time limit of 90 seconds

**NOTE: If ITT is still above 120° C at 90 seconds, turn starter off for 10 second cooling period, then re-engage starter for up to 90 seconds to reduce ITT below 120° C.**

3. Affected ENG STOP.....STOP
4. Hot or Hung or Interrupted Start Checklist complete

POWERPLANT	REVISION 9	2-31
	30 JUL 21	

Amber	<b>L (R) START ABORT Msg</b>	Amber
-------	------------------------------	-------

1. (Left/Right) Thrust Lever..... SHUTOFF
2. Affected Engine ..... Dry motor until ITT is reduced below 120° C, respecting starter time limit of 90 seconds

**NOTE: If ITT is still above 120° C at 90 seconds, turn starter off for 10 second cooling period, then re-engage starter for up to 90 seconds to reduce ITT below 120° C.**

3. Affected ENG STOP..... STOP
4. L (R) START ABORT Checklist complete

**2-32**

REVISION 9

POWERPLANT

30 JUL 21

**N<sub>1</sub> Fan Vibration****Caution**

**It is not recommended that an engine be shut down unless there is another indication of a severe engine abnormality, i.e., high oil temperature, high oil pressure, abnormal increase in ITT, ITT exceedance or abnormal engine vibration is felt through the airframe.**

→ **If in icing conditions:**

1. (Left/Right) Thrust Lever ..... Adjust to achieve N<sub>2</sub> above 80% and N<sub>1</sub> above 70% (not to exceed CLB) and maintain settings until vibration is reduced

**NOTE: (1) Vibration may increase during the ice shedding process.**

- (2) Vibrations may momentarily indicate full scale.
- (3) Thrust settings up to and including CLB may be required to shed ice.
- (4) In colder conditions, several minutes may be required to shed ice.
- (5) Ice shedding may be accompanied by a sharp metallic noise as ice impacts the inside of the nacelle.
- (6) An airframe vibration and a change in engine noise may occur during the ice shedding process.

or

2. Engine indications ..... Monitor

└→ **If vibration ceases:**

or      3. N<sub>1</sub> Fan Vibration Checklist complete

└→ **If vibration persists:**

3. N<sub>1</sub> Fan Vibration Checklist complete, and

☞ Accomplish Intentional Shutdown Checklist, page 2-10.

→ **If not in icing conditions:**

1. (Left/Right) Thrust Lever ..... Adjust to maintain vibration level within normal range

2. Engine indications ..... Monitor

└→ **If vibration ceases:**

or      3. N<sub>1</sub> Fan Vibration Checklist complete

└→ **If vibration persists:**

3. N<sub>1</sub> Fan Vibration Checklist complete, and

☞ Accomplish Intentional Shutdown Checklist, page 2-10.

POWERPLANT	REVISION 9	2-33
	30 JUL 21	

## **N<sub>2</sub> Core Vibration**

### **Caution**

**It is not recommended that an engine be shut down unless there is another indication of a severe engine abnormality, i.e., high oil temperature, high oil pressure, abnormal increase in ITT, ITT exceedance or abnormal engine vibration is felt through the airframe.**

1. (Left/Right) Thrust Lever..... Adjust to maintain vibration level within normal range
  2. Engine indications..... Monitor
- If vibration ceases:  
or      3. N<sub>2</sub> Core Vibration Checklist complete
- If vibration persists:  
3. N<sub>2</sub> Core Vibration Checklist complete, and  
    ➡ Accomplish Intentional Shutdown Checklist, page 2-10.

## **No Lightoff**

1. (Left/Right) Thrust Lever..... SHUTOFF
2. Affected Engine ..... Dry motor for 90 seconds to drain fuel
3. Affected ENG STOP..... STOP
4. No Lightoff Checklist complete

## **Oil Temperature High**

1. (Left/Right) Thrust Lever..... Adjust to maintain oil temperature within normal range
- If oil temperature can be reduced:  
or      2. Engine instruments ..... Monitor  
          3. Oil Temperature High Checklist complete
- If oil temperature can not be reduced:  
2. Oil Temperature High Checklist complete, and  
    ➡ Accomplish Intentional Shutdown Checklist, page 2-10.

UNCONTROLLED WHEN PRINTED

**2-34**

REVISION 9

POWERPLANT

30 JUL 21

**Intentionally Left Blank**

APU	REVISION 8 03 MAR 20	<b>3-1</b>
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## **Chapter 3: APU**

Red

### **APU FIRE Msg**

Red

► **If on ground:**

**NOTE: APU automatically shuts down and the APU fire bottle discharges.**

or

- ☞ If required, accomplish EVACUATION Checklist on QRH cover.

► **If in flight:**

**NOTE: APU automatically shuts down.**

1. APU FIRE PUSH ..... Confirm and SELECT |
2. Wait 5 seconds

► **If APU FIRE Msg extinguishes:**

3. APU START/STOP ..... SELECT OFF |
4. APU PWR FUEL ..... SELECT OFF |

**Caution**

or

**Do not restart APU.**

5. Land at the nearest suitable airport
6. APU FIRE Checklist complete, and

- ☞ If required, accomplish EVACUATION Checklist on QRH cover.

► **If APU FIRE Msg persists:**

3. APU BOTTLE ..... SELECT |
- Push and hold until APU BTL LO Msg is annunciated.

----- **Continued from QRC** -----

4. APU START/STOP ..... SELECT OFF |
5. APU PWR FUEL ..... SELECT OFF |

**Caution**

**Do not restart APU.**

6. Land immediately at the nearest suitable airport
7. APU FIRE Checklist complete, and

- ☞ If required, accomplish EVACUATION Checklist on QRH cover.

3-2

REVISION 8

APU

03 MAR 20

Red

## APU OVERSPEED Msg

Red

**NOTE: APU automatically shuts down.**

1. APU START/STOP.....SELECT OFF
2. APU PWR FUEL.....SELECT OFF

**Caution****Do not restart APU.**

3. APU OVERSPEED Checklist complete

Red

## APU OVERTEMP Msg

Red

## ► If on ground:

**NOTE: APU automatically shuts down.**

1. APU START/STOP .....SELECT OFF
2. APU PWR FUEL.....SELECT OFF

or

**Caution****Do not restart APU.**

3. APU OVERTEMP Checklist complete

## ► If in flight:

► If APU GEN is not essential:

1. APU START/STOP .....SELECT OFF
2. APU PWR FUEL .....SELECT OFF
3. APU OVERTEMP Checklist complete

► If APU GEN is essential:

1. APU indications .....Monitor
2. Land at the nearest suitable airport
3. BLEED SOURCE .....BOTH ENG
4. ISOL .....CLSD
5. BLEED VALVES .....MANUAL

**NOTE: Upon landing if the APU overtemp condition persists, the APU will shut down automatically after 60 seconds.**

**After landing:**

6. APU START/STOP .....SELECT OFF
7. APU PWR FUEL .....SELECT OFF
8. APU OVERTEMP Checklist complete

APU	REVISION 8 03 MAR 20	<b>3-3</b>
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Amber

**APU BLEED ON Msg**

Amber

**NOTE:** No action is required if the APU BLEED ON caution message occurs during a starter-assisted APU bleed relight.

1. BLEED SOURCE.....BOTH ENG

► If APU BLEED ON Msg extinguishes:  
or      2. APU BLEED ON Checklist complete

► If APU BLEED ON Msg persists:  
2. Descend to an altitude where the message extinguishes  
3. APU BLEED ON Checklist complete

Amber

**APU BTL LO Msg**

Amber

1. BLEED SOURCE.....Select alternate source, if required

► If APU generator is required:  
or      2. APU indications.....Monitor  
3. APU BTL LO Checklist complete

► If APU generator is not required:  
2. APU START/STOP .....SELECT OFF  
3. APU PWR FUEL.....SELECT OFF  
4. APU BTL LO Checklist complete

Amber

**APU FAULT Msg**

Amber

► If APU generator is required:  
or      1. APU indications.....Monitor  
2. APU FAULT Checklist complete

► If APU generator is not required:  
1. APU START/STOP .....SELECT OFF  
2. APU PWR FUEL.....SELECT OFF

**Caution**

**Do not restart APU.**

3. APU FAULT Checklist complete

**3-4****REVISION 8****APU****03 MAR 20**

Amber

**APU FIRE FAIL Msg**

Amber

## → If APU generator is required:

- or  
1. APU indications.....Monitor  
2. APU FIRE FAIL Checklist complete

→ If APU generator is not required:

1. APU START/STOP .....SELECT OFF  
2. APU PWR FUEL.....SELECT OFF

**Caution****Do not restart APU.**

3. APU FIRE FAIL Checklist complete

Amber

**APU LCV CLSD Msg**

Amber

**NOTE: (1) Do not select the APU as the bleed source if wing or cowl anti-ice is required.  
(2) APU bleed can only be used to a maximum of 25,000 feet for ECS.  
(3) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**

1. BLEED SOURCE.....BOTH ENG
2. ISOL.....CLSD
3. BLEED VALVES.....MANUAL
4. APU LCV CLSD Checklist complete

APU	REVISION 8 03 MAR 20	<b>3-5</b>
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Amber

**APU LCV OPEN Msg**

Amber

► If the APU generator is not required:

1. BLEED SOURCE ..... BOTH ENG
2. ISOL ..... CLSD
3. BLEED VALVES ..... MANUAL

**NOTE: No action is required for the BLEED MISCONFIG caution message.**

4. APU START/STOP ..... SELECT OFF |
5. APU RPM ..... Monitor

## ► If the APU RPM is 0:

or

or

**NOTE: The APU is available for restart.**

6. APU LCV OPEN Checklist complete

## ► If the APU RPM is greater than 0:

6. BLEED SOURCE ..... R ENG

**NOTE: When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**

7. L PACK ..... OFF
8. WING A/I CROSS BLEED ..... FROM RIGHT
9. LH COWL ANTI-ICE ..... OFF
10. Leave icing conditions to prevent ice accumulation on inoperative engine cowl
11. APU LCV OPEN Checklist complete

## ► If the APU generator is required:

**NOTE: When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**

1. BLEED SOURCE ..... R ENG
2. ISOL ..... CLSD
3. BLEED VALVES ..... MANUAL

**NOTE: No action is required for the APU BLEED ON caution message, if present.**

4. L PACK ..... OFF
5. WING A/I CROSS BLEED ..... FROM RIGHT
6. LH COWL ANTI-ICE ..... OFF
7. Leave icing conditions to prevent ice accumulation on inoperative engine cowl
8. APU LCV OPEN Checklist complete

3-6

REVISION 8

APU

03 MAR 20

Amber

## APU ECU FAIL Msg

Amber

► If the APU generator is not required:

- or
1. APU START/STOP ..... SELECT OFF
  2. APU PWR FUEL..... SELECT OFF
  3. APU ECU FAIL Checklist complete

## ► If the APU generator is required:

1. APU GEN frequency and voltage ..... Monitor using AC ELECTRICAL synoptic

## ► If APU generator maintains sufficient electrical power:

- or
2. APU ECU FAIL Checklist complete

► If APU generator does not maintain sufficient electrical power:

2. APU START/STOP..... SELECT OFF
3. APU PWR FUEL ..... SELECT OFF

**Caution****Do not restart APU**

4. APU ECU FAIL Checklist complete

Amber

## APU PUMP Msg

Amber

► If the APU generator is not required:

- or
1. APU START/STOP ..... SELECT OFF
  2. APU PWR FUEL..... SELECT OFF
  3. APU PUMP Checklist complete

## ► If the APU generator is required:

1. APU indications..... Monitor
2. Altitude ..... Maximum 20,000 feet
3. APU PUMP checklist complete

Amber

## APU DOOR OPEN Msg

Amber

**NOTE: If the APU shuts down, it may be restarted.**

## ► If APU is running:

- or
1. APU DOOR OPEN Checklist complete

## ► If APU is shutdown:

1. Airspeed..... Do not exceed 220 KIAS
2. APU DOOR OPEN Checklist complete

**NOTE: The APU may be restarted and operated throughout the remainder of the flight without any airspeed restriction.**

APU	REVISION 8 03 MAR 20	<b>3-7</b>
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Amber	<b>APU SOV FAIL Msg</b>	Amber
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1. APU START/STOP.....SELECT OFF
2. APU PWR FUEL.....SELECT OFF
3. APU SOV FAIL Checklist complete

Amber	<b>APU SOV OPEN Msg</b>	Amber
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1. APU START/STOP.....SELECT OFF
2. APU PWR FUEL.....SELECT OFF
3. APU SOV OPEN Checklist complete

Amber	<b>APU SQB Msg</b>	Amber
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- If the APU generator is required:
- or
- 1. APU operation .....Monitor
  - 2. APU SQB Checklist complete
- If the APU generator is not required:
1. APU START/STOP .....SELECT OFF
  2. APU PWR FUEL.....SELECT OFF
  3. APU SQB checklist complete

3-8

REVISION 8

APU

03 MAR 20

**APU Door Failure**

## → If DOOR INHIB/CLSD:

- or
1. APU START/STOP ..... SELECT OFF
  2. APU PWR FUEL.....SELECT OFF
  3. APU Door Failure Checklist complete

## → If DOOR INHIB/OPEN:

- or or
- If APU is operating:
    1. APU Door Failure Checklist complete
  - If APU is not operating:
    1. Airspeed .....Do not exceed 220 KIAS
    2. APU Door Failure Checklist complete

## → If DOOR INHIB ---, or Door ----:

→ If APU is not operating:

- or
1. Do not start APU
  2. Airspeed .....Do not exceed 220 KIAS
  3. APU Door Failure Checklist complete

## → If APU is operating:

1. APU START/STOP ..... SELECT OFF
2. APU PWR FUEL .....SELECT OFF
3. Airspeed .....Do not exceed 220 KIAS
4. APU Door Failure Checklist complete

***Chapter 4: Electrical***

Red

**EMER PWR ONLY Msg**

Red

1. ADG manual deploy handle.....Pull
2. STAB TRIM CH 2 .....ENGAGE
3. Engine instruments.....Verify engine operation

→ **If both engines confirmed failed:**

4. EMER PWR ONLY Checklist complete, and  
or      ↗ Accomplish Double Engine Failure Checklist, page 2-1.

→ **If both engines confirmed not failed:**

4. AC ELECTRICAL synoptic .....Check to verify proper  
ADG operation

→ **If ADG power is not established:**

5. EMER PWR ONLY Checklist complete, and  
or      ↗ Accomplish Electrical – Loss of All AC Power Checklist, page  
4-17.

→ **If ADG power is established:**

5. Cabin altitude.....Monitor
6. Descent .....As required
7. GEN 1 and GEN 2 .....Confirm and OFF/RESET,  
then AUTO
8. APU (if available – 37,000 feet and below) .....START

→ **If any generator comes on-line:****Re-establish normal power:**

9. ADG manual deploy handle.....Stow  
10. ADG PWR TXFR OVERRIDE .....SELECT |  
or      11. Normal power source .....Verify using AC  
ELECTRICAL SYNOPTIC  
12. CAS Messages .....Review  
13. Affected systems .....Restore  
14. EMER POWER ONLY Checklist complete

→ **If no generator comes on-line:****Continue flight on emergency power only:**

9. Descent .....Continue to 10,000 feet or  
lowest safe altitude
10. R PACK .....Check ON
11. L PACK .....OFF
12. PRESS CONTROL .....MAN
  - MAN ALT .....As required
  - MAN RATE .....As required
13. Leave icing conditions
14. Land at the nearest suitable airport
15. Avoid excessive rudder inputs

**CONT'D**

4-2

REVISION 8

ELECTRICAL

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**The following significant systems are not available when on emergency power only:**

- Automatic pressurization
- Yaw damper 2
- Autopilot
- Inboard ground spoilers and inboard multi-function spoilers
- Stabilizer trim channel 1, aileron and rudder trims
- Hydraulic pumps 1B, 2B and 3A
- Co-pilot's PFD, MFD, VHF COM 2, RTU 2, ACP 2
- FD 2, VHF NAV 2, ADF 2, ATC 2, Radio Altimeter 2
- Co-pilot's instrument lights, NAV lights, and taxi lights
- ADC 2 (probe heaters) and ice detector 2
- Windshield wipers
- Windshield heaters and right window heater
- Anti-skid system and nosewheel steering

**Below 135 KIAS, AC ESS bus is shed causing the loss of the following:**

- Remaining TRU (ESS TRU 1 or ESS TRU 2, as applicable)
- Rudder Limiter
- XFLOW PUMP
- ADC1 (probe heaters) and ice detector 1
- Left window heater

**Prior to landing and prior to reducing speed below 145 KIAS:**

16. LDG GEAR lever ..... DN
17. FLAPS..... Set for landing
18. Final approach speed.....  $V_{REF}$  (Flaps 45)
19. Actual landing distance..... Increase using table below

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.80 (80%)	2.30 (130%)
<b>Without Thrust Reversers</b>	2.30 (130%)	2.30 (130%)

**NOTE: (1) The slats/flaps will operate at half speed.**

- (2) Momentary loss of ADG power may occur at and below 140 KIAS if the slats/flaps are operated or at 108 KIAS and below if pitch trim is used.
- (3) Use thrust reverser as required during landing.

CONT'D



**Caution**

**After landing apply the brakes slowly and steadily. Do not cycle the brakes.**

## 20. EMER PWR ONLY Checklist complete

- NOTE:** (1) If the ADG is not operating properly and the airplane is on battery power only, then all electrical power may be lost after 30 minutes.  
 (2) Hydraulic pump 3B will be inoperative when on battery power only.

Amber

**AC 1 (2) AUTOXFER Msg**

Amber

- If affected AC Bus is powered:  
 or      1. AC 1(2) AUTOXFER Checklist complete
- If affected AC Bus is not powered (associated GEN 1 (2) OFF and AC BUS 1 (2) caution messages displayed):  
 1. Inoperative airplane systems ..... Review

AC BUS 1	AC BUS 2
<ul style="list-style-type: none"> <li>• Flaps Channel 1</li> <li>• Recirc Fan 1</li> <li>• Display Cooling Fan 2</li> <li>• Avionics Display Cooling Fan 2</li> <li>• Avionics Cooling Fan 2</li> <li>• Hydraulic System Fan</li> <li>• Left Windshield Heater</li> <li>• TAT Probe Heater</li> <li>• Right AOA Heater</li> <li>• Right Pitot Heater</li> <li>• ADG Heater</li> <li>• TRU 1</li> <li>• Lav Exhaust Fan</li> <li>• Main Battery Charger</li> <li>• Flight Recorder Power</li> <li>• Baggage Compartment Heater</li> <li>• Power Sensor</li> <li>• EGPWS</li> </ul>	<ul style="list-style-type: none"> <li>• Hydraulic pumps 1B and 3A</li> <li>• Pitch Trim Channel 2</li> <li>• Slats Channel 2</li> <li>• Flaps Channel 2</li> <li>• Recirc Fan 2</li> <li>• Right Windshield Heater</li> <li>• Ice Detector 2</li> <li>• TRU 2</li> <li>• ESS TRU 2</li> <li>• Galley Heater</li> <li>• Integral Lighting Copilot Panels</li> <li>• Right Window Heater</li> <li>• Galley Exhaust Fan</li> </ul>

2. AC 1 (2) AUTOXFER Checklist complete

**4-4****REVISION 8****ELECTRICAL****03 MAR 20****Amber****AC BUS 1 Msg****Amber**

1. GEN 1 ..... Confirm and OFF/RESET, then AUTO

→ If AC BUS 1 Msg extinguishes:

or      2. AC BUS 1 Checklist complete

→ If AC BUS 1 Msg persists:

2. GEN 1 ..... Confirm and OFF/RESET
3. APU (if available – 37,000 feet and below) ..... START

→ If AC BUS 1 Msg extinguishes:

or      4. AC BUS 1 Checklist complete

→ If AC BUS 1 Msg still persists:

4. Inoperative airplane systems ..... Review

**AC Bus 1**

- Hydraulic pumps 2B and 3B
- Pitch Trim Channel 1
- Slats Channel 1
- Flaps Channel 1
- Recirc Fan 1
- Display Cooling Fan 2
- Hydraulic System Fan
- Left Windshield Heater
- TAT Probe Heater
- Right AOA Heater
- Right Pitot Heater
- ADG Heater
- TRU 1
- Lav Exhaust Fan
- Ground Prox Warning
- Main Battery Charger
- Engine Vibration Monitor
- Flight Recorder Power
- Baggage Compartment Heater
- Power Sensor
- EGPWS

|

5. AC BUS 1 Checklist complete

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Amber

**AC BUS 2 Msg**

Amber

1. GEN 2 ..... Confirm and OFF/RESET, then AUTO

→ If AC BUS 2 Msg extinguishes:

- or 2. AC BUS 2 Checklist complete

→ If AC BUS 2 Msg persists:

2. GEN 2 ..... Confirm and OFF/RESET  
3. APU (if available – 37,000 feet and below) ..... START  
4. APU GEN ..... AUTO |

→ If AC BUS 2 Msg extinguishes:

- or 5. AC BUS 2 Checklist complete |

→ If AC BUS 2 Msg still persists:

5. HYDRAULIC 3B pump ..... ON  
6. Inoperative airplane systems ..... Review |

**AC Bus 2**

- Hydraulic pumps 1B and 3A
- Pitch Trim Channel 2
- Slats Channel 2
- Flaps Channel 2
- Recirc Fan 2
- Right Windshield Heater
- Ice Detector 2
- TRU 2
- ESS TRU 2
- Galley Heater
- Integral Lighting Copilot Panels
- Right Window Heater
- Galley Exhaust Fan

7. AC BUS 2 Checklist complete |

**4-6****REVISION 6****ELECTRICAL****01 JUN 18****Amber****AC ESS BUS Msg****Amber**

| 1. AC ESS XFER.....ALTN

- If AC ESS BUS Msg extinguishes:  
or      2. AC ESS BUS Checklist complete

- If AC ESS BUS Msg persists:  
2. Inoperative airplane systems .....Review

**AC Essential Bus**

- Crossflow Pump
- ESS TRU 1
- Left Pitot Heater
- Left AOA Heater
- Standby Pitot Heater
- Cabin Lighting Ceiling
- Ice Detector 1
- Display Cooling Fan 1
- Engine Ignition A
- Avionics Fan 1
- Integral Lighting CB Panels
- Integral Lighting Pilot Panels
- Integral Lighting Center Panels
- Integral Lighting Overhead Panels
- TCAS
- Left Window Heater

3. AC ESS BUS Checklist complete

**Amber****AC SERV BUS Msg****Amber**

1. Inoperative airplane systems.....Review

**AC Service Bus**

- Toilet
- Water System
- Cabin Lighting Ceiling
- APU Charger
- Cabin Lighting Sidewall
- Logo Lights

2. AC SERV BUS Checklist complete

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Amber

**APU BATT OFF Msg**

Amber

1. BATTERY MASTER ..... Check ON
  - If APU BATT OFF Msg extinguishes:  
or                  2. APU BATT OFF Checklist complete
  - If APU BATT OFF Msg persists:  
                2. APU battery voltage ..... Monitor
- NOTE:** (1) Assume loss of APU battery.  
(2) APU start is not possible.  
(3) The APU shutdown sequence may be altered.  
Wait 30 seconds before selecting the APU PWR/FUEL or the BATTERY MASTER to OFF. This allows the APU ECU to log all events. The APU door may not close.
3. Inoperative airplane systems ..... Review

**APU Battery Direct Bus**

- APU Battery Power Sensors
- APU Battery Control
- DCPC 1
- APU ECU Secondary
- External AC Power
- APU Door Actuator
- Engine Oil Indicator
- Refuel/Defuel Panel
- Emergency Refuel
- Engine Oil Replenishment
- SERV BUS Feed
- EMER BUS Feed

- If APU running:  
or                  4. APU BATT OFF Checklist complete
- If APU not running:  
                4. Airspeed ..... Do not exceed 220 KIAS  
5. APU BATT OFF Checklist complete

Amber

**APU GEN OFF Msg**

Amber

1. APU GEN ..... Confirm and OFF/RESET, then AUTO
2. AC loads ..... Monitor
- If APU GEN OFF Msg extinguishes:  
or                  3. APU GEN OFF Checklist complete
- If APU GEN OFF Msg persists:  
                3. APU GEN ..... Confirm and OFF/RESET  
4. APU GEN OFF Checklist complete

Amber

**APU GEN OVLD Msg**

Amber

1. GEN load(s) ..... Monitor
2. AC loads ..... Reduce as necessary
3. APU GEN OVLD Checklist complete



**4-8****REVISION 6****ELECTRICAL****01 JUN 18****Amber****BATTERY BUS Msg****Amber**

1. Airplane Altitude.....Not more than 13,000 feet
2. Land at the nearest suitable airport
3. Inoperative airplane systems.....Review

**DC Battery Bus**

- ACS Control 1 Channel A
- Flaps Control Channel 2
- Slats Control Channel 2
- Aileron/Rudder Trim Indication
- Hydraulic System Indications 3
- Emergency Bus Feed
- Left Engine Oil Pressure Indication
- Left and Right Engine Start
- Left Fuel Pump
- Left Fuel Pump Control
- Cargo Smoke Detection
- Passenger signs
- Fuel System Control
- Fire Detection
- APU Control
- Fuel Gravity Crossflow
- Left Transfer Fuel SOV
- APU Fuel Pump
- APU ECU Primary
- Wing Landing Lights
- Pilot / Copilot / Observer Map Lights
- Cabin Utility Lights
- Ram Air SOV
- Cabin Pressure Manual Control
- Left IAPS / AFCS
- MDC
- Left IAPS Fan
- Right Transfer Fuel SOV
- Passenger Oxygen Auto Deploy L and R
- Crew Oxygen Monitor
- Power Sensor
- RTU 1
- Right T2 Heater
- Overhead Panel Lights
- EICAS / RTU Dimming
- Pass Oxy Manual Deploy L and R
- IDG 1 and 2 Disconnect
- Stick Pusher
- Stall Protection Left Channel
- FADEC L and R backup power
- Ignition B
- VHF COM 1
- Emergency Tuning

**CONT'D**

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01 JUN 18		

- Pilot / Copilot / Observer Audio
- Generator Control Units 1, 2 and 3
- ACPC Control 3
- Cowl Anti-Ice Valves
- Wing Anti-Ice Isolation Valve
- ADG Deploy Auto and Manual
- MLG Bay Overheat Detection
- Integrated Standby Instrument
- Clock 1
- PSEU Channel A and B
- WOW Relay
- EICAS DCU 1 and 2
- Cabin Interphone
- Passenger Address
- Right Lamp Driver Unit
- EICAS Bright / Dim Power 1 and 2
- EICAS Primary Display
- EICAS Secondary Display
- EICAS Control Panel

**Prior to landing:**

4. L and R PACK (both).....OFF |  
 5. BATTERY BUS Checklist complete

Amber	<b>DC BUS 1 Msg</b>	Amber
1. Inoperative airplane systems.....	Review	
<b>DC Bus 1</b>		
<ul style="list-style-type: none"> <li>• Anti-Ice Control Channel A</li> <li>• Baggage Comp Control</li> <li>• Lav Smoke Detection</li> <li>• ACPC Control 1</li> <li>• Passenger Door Actuator</li> <li>• L Fwd / Aft Cabin Reading Lights</li> <li>• Flight Recorder Control</li> <li>• SSCU 1 Channel A</li> <li>• Pitch Feel 1 RTL 1</li> <li>• Taxi Lights</li> <li>• Fan Monitor</li> <li>• Cabin Pressure Control 1</li> <li>• Hydraulic AC Pump Control 3B</li> <li>• Hydraulic Fan Control</li> <li>• Hydraulic Indicator 2</li> <li>• Hydraulic AC Pump Control 2</li> <li>• PSEU Channel A</li> <li>• Left T2 Heater</li> </ul>		
<b>CONT'D</b>		
▼		

**4-10****REVISION 8****ELECTRICAL**

- Nose steering
- Cockpit Dome Light
- Boarding Music
- Anti-Skid
- Wiper, Pilot
- Nose Landing Lights
- Cockpit Floor Lights
- Rear Anti-Collision Lights
- Wing Inspection Lights
- Maintenance Lights
- GPS 1
- Left Windshield Heater Control
- ADS Heater Control 2
- Right Static Heater
- Left IAPS (or IAPS 1 FMS)
- EICAS Primary Display
- EICAS Secondary Display
- Left Lamp Driver Unit
- EICAS Dimming
- CDU 1
- DME 1
- AFT Cabin Temperature Sensor
- Radio Altimeter 1
- WX Radar
- ACS Control 2 Channel A
- Brake Pressure Application
- Cockpit Temperature Sensor

2. DC BUS 1 Checklist complete, and

 Accomplish A / SKID INBD - AND - A / SKID OUTBD Msg  
Checklist, page 10-6.

Amber

**DC BUS 2 Msg**

Amber

1. Inoperative airplane systems.....Review
2. Captain assumes pilot flying duties

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**DC Bus 2**

- Fwd Cabin Temperature Sensor
- Radar Altimeter 2
- EICAS DCU 2
- ACS Control 1 Channel B
- PFD 2
- MFD 2
- EFIS Control Panel 2
- Attitude Heading 2
- AHRS FAN 2
- Right ACS Manual
- RTU 2
- SSCU 1 Channel B
- Rudder Trim
- Aileron Trim
- Service Bus Feed
- Left ACS Pressure Sensor
- Cabin Pressure Control 2
- Galley Heater Control
- Hydraulic System 1 Indication
- Hydraulic AC Pump Control 1/3A
- PSEU Channel B
- ACPC Control 2
- Brake Pressure Indicator
- Anti-Skid
- Wiper, Copilot
- Chart Holder Lights
- Copilot Map Lights
- Wing Anti-Collision Lights
- Right Fuel Pump
- Right Fuel Pump Control
- Right Windshield Heater Control
- Right Window Heater Control
- Right IAPS
- Right AFCS
- Right IAPS Fan
- Clock 2
- ADC 2
- ADF 2
- Transponder 2
- VHF COM 2
- VHF NAV 2
- DME 2
- Observer's audio
- Nose Steering
- TCAS

3. DC BUS 2 Checklist complete, and

☛ Accomplish A / SKID INBD - AND - A / SKID OUTBD Msg Checklist, page 10-6.

**4-12**

ORIGINAL

ELECTRICAL

15 MAY 14

Amber

**DC EMER BUS Msg**

Amber

1. Land at the nearest suitable airport
2. Inoperative airplane systems.....Review

**DC Emergency Bus**

- FIREX A
- FIREX B
- Right Engine Hydraulic SOV
- Left Engine Hydraulic SOV
- Right Engine Fuel SOV
- Left Engine Fuel SOV
- APU Fuel SOV
- APU BATT DIR Feed

**NOTE:** (1) Engine and APU fire extinguishing systems are inoperative.  
 (2) APU fuel feed SOVs and ENG fuel SOV will not close.  
 (3) Engine hydraulic SOVs will not close.

3. DC EMER BUS Checklist complete

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Amber

**DC ESS BUS Msg**

Amber

1. Land at the nearest suitable airport
2. Inoperative airplane systems.....Review
3. First Officer assumes pilot flying duties

**DC Essential Bus**

- Flaps Control Channel 1
- Slats Control Channel 1
- SSCU 2 Channel A
- SSCU 2 Channel B
- Pitch Feel 2 RTL 2
- Crossflow Pump Control
- Door Indicators
- Left Static Heater
- ADS Heater Control 1
- ADS Heater Control Standby
- Left Window Heater Control
- Thrust Reversers
- Right Eng Oil Pressure Indication
- Left Bleed SOV
- Right Bleed SOV
- Anti-Ice Control Channel B
- ACS Control 2 Channel B
- Left ACS Manual
- Display Fan Control
- DC ESS Feed
- Right ACS Pressure Sensor
- Instrument Flood Lights
- Emergency Lights
- EFIS CRT Dimming
- Stall Protection Right Channel
- EFIS Control Panel 1
- EICAS DCU 1
- RTU 1
- Fuel System Control
- Captain Audio
- ADC 1
- ADF 1
- Transponder 1
- VHF NAV 1
- Cockpit Voice Recorder
- Attitude/Heading 1
- AHRS Fan
- PFD 1
- MFD 1

4. DC ESS BUS Checklist complete

**4-14****ORIGINAL****ELECTRICAL****15 MAY 14****Amber****DC SERV BUS Msg****Amber**

1. DC SERVICE ..... ON

→ If DC SERV BUS Msg extinguishes:  
 or            2. DC SERV BUS Checklist complete

→ If DC SERV BUS Msg persists:  
 2. DC SERVICE ..... OFF  
 3. Inoperative airplane systems ..... Review

**DC Service Bus**

- Forward Service Lights
- Aft Service Lights
- Boarding Lights
- Navigation Lights
- Toilet Lights
- Galley Area Lights
- Service Area Lights
- Beacon Lights
- Waste System
- Water Control

4. DC SERV BUS Checklist complete

**Amber****GEN 1 OFF Msg****Amber**

1. GEN 1 ..... Confirm and OFF/RESET, then AUTO

→ If GEN 1 OFF Msg extinguishes:  
 or            2. AC and DC loads ..... Monitor  
 3. GEN 1 OFF Checklist complete

→ If GEN 1 OFF Msg persists:  
 2. GEN 1 ..... Confirm and OFF/RESET  
 3. APU (if available – 37,000 feet and below) ..... START

**NOTE: Category II operations may be affected. Review the requirements.**

4. GEN 1 OFF Checklist complete

<b>ELECTRICAL</b>	<b>REVISION 6</b>	<b>4-15</b>
	<b>01 JUN 18</b>	

Amber	<b>GEN 2 OFF Msg</b>	Amber
-------	----------------------	-------

1. GEN 2 ..... Confirm and OFF/RESET, then AUTO
- If GEN 2 OFF Msg extinguishes:
2. AC and DC loads..... Monitor
- or
3. GEN 2 OFF Checklist complete
- If GEN 2 OFF Msg persists:
2. GEN 2 ..... Confirm and OFF/RESET
  3. APU (if available – 37,000 feet and below) ..... START
- NOTE: Category II operations may be affected. Review the requirements.**
4. GEN 2 OFF Checklist complete

Amber	<b>GEN 1 (2) OVLD Msg</b>	Amber
-------	---------------------------	-------

1. AC and DC loads ..... Monitor and reduce as necessary
- NOTE: Use the Bus Inop – Affected Systems List Checklist, page 4-20 thru 4-26, in conjunction with the AC and DC ELECTRICAL synoptic pages to help reduce loads.**
2. GEN 1 (2) OVLD Checklist complete

Amber	<b>IDG 1 (2) Msg</b>	Amber
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1. Affected GEN ..... Confirm and OFF/RESET
  2. IDG 1 (2) DISC Press  
for not more than 3 seconds ..... Confirm and DISC
- NOTE: (1) Category II operations may be affected. Review the requirements.  
(2) The IDG cannot be re-connected during flight.**
3. APU (if available – 37,000 feet and below) ..... START
  4. IDG 1 (2) Checklist complete

**4-16****REVISION 8****ELECTRICAL**

03 MAR 20

Amber

**MAIN BATT OFF Msg**

Amber

1. BATTERY MASTER..... Check ON

► If MAIN BATT OFF Msg extinguishes:  
or  
2. MAIN BATT OFF Checklist complete

► If MAIN BATT OFF Msg persists:  
2. Main battery voltage..... Monitor

**NOTE: Assume loss of main battery if less than 18 volts indicated.**

3. Inoperative airplane systems ..... Review

<b>Main Battery Direct Bus</b>
<ul style="list-style-type: none"> <li>• Main Battery Power Sensor</li> <li>• Main Battery Control</li> <li>• Cockpit Dome Lights</li> <li>• External AC Power</li> <li>• DCPC 2</li> <li>• Clock 1</li> <li>• Clock 2</li> <li>• Main Battery Charger Output</li> </ul>

- Main Battery Power Sensor
- Main Battery Control
- Cockpit Dome Lights
- External AC Power
- DCPC 2
- Clock 1
- Clock 2
- Main Battery Charger Output

**NOTE: If main battery voltage is less than 20 volts, both clocks must be reset.**

4. MAIN BATT OFF Checklist complete

<b>ADG Inadvertent Deployment</b>
-----------------------------------

**To re-establish normal operations:**

1. ADG manual release handle ..... Stow
2. ADG PWR TXFR OVERRIDE ..... SELECT
3. Normal power source ..... Verify using AC ELECTRICAL SYNOPTIC
4. HYDRAULIC pump 3B ..... As required
5. ADG Inadvertent Deployment Checklist complete

**Electrical – Loss of All AC Power**

1. ADG manual deploy handle.....Pull

**Continued from QRC**

- If AC power is established:
  - 2. Electrical – Loss of All AC Power Checklist complete, and
  - or
  - ☛ Accomplish EMER PWR ONLY Msg Checklist, page 4-1.
- If battery power only persists:
  - 2. Engine instruments ..... Verify engine operation
  - If both engines confirmed failed:
    - 3. Electrical – Loss of All AC Power Checklist complete, and
    - or
    - ☛ Accomplish Double Engine Failure Checklist, page 2-1.
  - If both engines confirmed not failed:
    - 3. Cabin Altitude ..... Monitor
    - 4. Descent ..... As required
    - 5. GEN 1 and GEN 2 ..... Confirm and OFF/RESET, then AUTO
    - 6. APU (if available – 37,000 feet and below).....START

**NOTE: Each APU start attempt consumes approximately 6 minutes of battery life.**
  - 7. APU GEN ..... AUTO
  - If any generator comes on-line:
    - Re-establish normal power:
      - 8. ADG manual deploy handle ..... Stow
      - 9. ADG PWR TXFR OVERRIDE ..... SELECT
      - or
      - 10. Normal power source ..... Verify using AC ELECTRICAL SYNOPTIC
    - 11. CAS Messages ..... Review
    - 12. Affected systems ..... Restore
    - 13. Electrical – Loss of All AC Power Checklist complete
  - If no generator comes on-line:
 

**Continue flight on battery power only:**

**NOTE: All electrical power may be lost after 30 minutes.**

    - 8. Descent ..... Continue to 10,000 feet or lowest safe altitude
    - 9. STALL PTCT PUSHER (Left or Right) ..... OFF
    - 10. R PACK ..... Confirm ON
    - 11. L PACK ..... OFF
    - 12. PRESS CONTROL ..... MAN
    - 13. Leave icing conditions
    - 14. Land at the nearest suitable airport

**CONT'D**



**4-18****REVISION 8****ELECTRICAL**

03 MAR 20

**The following significant systems are not available when on battery power only:**

- Automatic pressurization
- Yaw damper 2
- Autopilot
- Ground spoilers and multi-function spoilers
- Stabilizer, Aileron and rudder trims, rudder limiter
- Flaps and slats
- All TRU's
- XFLOW pump
- Mach trim
- Hydraulic pumps 1B, 2B, 3A, and 3B
- Co-pilot's PFD and MFD
- VHF Com 2, Nav 2, RTU 2, ADF 2
- FD 2, ATC 2, ACP 2, Radio Altimeter 2
- DME 1 and 2
- FMS
- Co-pilot's instrument lights
- Taxi lights and NAV lights
- ADC (probe heaters) and ice detectors
- Windshield wipers
- Both windshield heaters and window heaters
- Anti-skid system and nosewheel steering
- Normal landing gear extension

**Prior to landing:**

15. GRND PROX, FLAP ..... Confirm and OVRD
16. Final approach speed .....  $V_{REF}$  FLAPS 45 plus  
 $\Delta V_{REF}$  from table below plus additive
17. Actual landing distance ..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

Flaps Position	Slats Position	$\Delta V_{REF}$	Without Thrust Reversers or wet/contaminated runway	With Thrust Reversers and dry runway
0-7	0-19	40	4.00	2.75
0-7	20-25	24	3.10	2.40
8-19	0-19	30	3.50	2.50
8-19	20-25	18	2.95	2.25
20-29	0-19	30	3.50	2.50
20-29	20-25	12	2.80	2.05
30-44	0-24	24	3.10	2.40
30-44	25	8	2.65	2.00
45	0-24	10	2.70	2.00
45	25	0	2.35	1.80

**CONT'D**

ELECTRICAL	REVISION 8	4-19
	03 MAR 20	

**Caution**

The maximum tire speed (195 knots ground speed) may be exceeded at high OAT and/or high airfield elevation.

**After touchdown:**

**Do not cycle the brakes.**

18. Brake pedals ..... DEPRESS, apply slowly and steadily

**NOTE: A slight pitch-up tendency may occur upon selection of reverse thrust. This can be readily corrected by the application of nose-down elevator and/or brakes.**

19. Electrical – Loss of All AC Power Checklist complete, and  
☞ Accomplish Landing Gear Manual Extension Checklist, page 10-16.

**4-20****REVISION 6****ELECTRICAL**

01 JUN 18

**Bus Inop – Affected Systems List****AC Bus 1**

- Hydraulic pumps 2B and 3B
- Pitch Trim Channel 1
- Slats Channel 1
- Flaps Channel 1
- Recirc Fan 1
- Display Cooling Fan 2
- Hydraulic System Fan
- Left Windshield Heater
- TAT Probe Heater
- Right AOA Heater
- Right Pitot Heater
- ADG Heater
- TRU 1
- Lav Exhaust Fan
- Avionics Cooling Fan 2
- Main Battery Charger
- Engine Vibration Monitor
- Flight Recorder Power
- Baggage Compartment Heater
- EGPWS

**AC Bus 2**

- Hydraulic pumps 1B and 3A
- Pitch Trim Channel 2
- Slats Channel 2
- Flaps Channel 2
- Recirc Fan 2
- Right Windshield Heater
- Ice Detector 2
- TRU 2
- ESS TRU 2
- Galley Heater
- Integral Lighting Copilot Panels
- Right Window Heater
- QAR (Quick Access Recorder)
- Galley Exhaust Fan

ELECTRICAL	REVISION 3	<b>4-21</b>
26 JUN 15		

**AC Essential Bus**

- Crossflow Pump
- ESS TRU 1
- Left Pitot Heater
- Left AOA Heater
- Standby Pitot Heater
- Cabin Lighting Ceiling
- Ice Detector 1
- Display Cooling Fan 1
- Engine Ignition A
- Avionics Fan 1
- Integral Lighting CB Panels
- Integral Lighting Pilot Panels
- Integral Lighting Center Panels
- Integral Lighting Overhead Panels
- TCAS
- Left Window Heater

**AC Service Bus**

- Toilet
- Water System
- Cabin Lighting Ceiling
- AC SERVICE Feed
- APU Charger
- Cabin Lighting Sidewall
- Logo Lights

**APU Battery Direct Bus**

- APU Battery Power Sensors
- APU Battery Control
- DCPC 1
- APU ECU Secondary
- External AC Power 2
- APU Door Actuator
- Engine Oil Indicator
- Refuel/Defuel Panel
- Emergency Refuel
- Engine Oil Replenishment

**DC Battery Bus**

- ACS Control 1 Channel A
- Flaps Control Channel 2
- Slats Control Channel 2
- Aileron/Rudder Trim Indication
- Hydraulic System Indications 3
- Emergency Bus Feed
- Left Engine Oil Pressure Indication
- Left and Right Engine Start
- Left Fuel Pump
- Left Fuel Pump Control
- Cargo Smoke Detection
- Passenger signs
- Fuel System Control
- Fire Detection A and B
- APU Control
- Fuel Gravity Crossflow
- Left Transfer Fuel SOV
- APU Fuel Pump
- APU ECU Primary
- Wing Landing Lights
- Pilot / Copilot / Observer Map Lights
- Cabin Utility Lights
- Ram Air SOV
- Cabin Pressure Manual Control
- Left IAPS / AFCS
- MDC
- Left IAPS Fan
- Right Transfer Fuel SOV
- Passenger Oxygen Auto Deploy L and R
- Crew Oxygen Monitor
- Right T2 Heater
- Overhead Panel Lights
- EICAS / RTU Dimming
- Pass Oxy Manual Deploy L and R
- IDG 1 and 2 Disconnect
- Stick Pusher
- Stall Protection Left Channel
- FADEC L and R backup power
- Ignition B
- VHF COM 1
- Emergency Tuning
- Pilot / Copilot / Observer Audio
- Generator Control Units 1, 2 and 3
- ACPC Control 3
- Cowl Anti-Ice Valves
- Wing Anti-Ice Isolation Valve
- ADG Deploy Auto and Manual
- MLG Bay Overheat Detection

**CONT'D**

<b>ELECTRICAL</b>	<b>REVISION 6</b>	<b>4-23</b>
01 JUN 18		

- Integrated Standby Instrument
- Clock 1
- PSEU Channel A and B
- WOW Relay
- EICAS DCU 1 and 2
- Cabin Interphone
- Passenger Address
- Right Lamp Driver Unit
- EICAS Bright / Dim Power 1 and 2
- EICAS Primary Display
- EICAS Secondary Display
- EICAS Control Panel
- Power Sensor

### **DC Bus 1**

- Anti-Ice Control Channel A
- Baggage Comp Control
- Lav Smoke Detection
- ACPC Control 1
- Passenger Door Actuator
- L Fwd / Aft Cabin Reading Lights
- Flight Recorder Control
- SSCU 1 Channel A
- Pitch Feel 1
- Taxi Lights
- Fan Monitor
- Cabin Pressure Control 1
- Hydraulic AC Pump Control 3B
- Hydraulic Fan Control
- Hydraulic Indicator 2
- Hydraulic AC Pump Control 2
- PSEU Channel A
- Nose steering
- Cockpit Dome Light
- Boarding Music
- Anti-Skid
- Wiper, Pilot
- Nose Landing Lights
- Cockpit Floor Lights
- Rear Anti-Collision Lights
- Wing Inspection Lights
- Maintenance Lights
- GPS 1
- Left Windshield Heater Control
- ADS Heater Control 2
- Right Static Heater
- Left IAPS (or IAPS 1 FMS)
- EICAS Primary Display

**CONT'D**



**4-24****REVISION 3****ELECTRICAL****26 JUN 15**

- EICAS Secondary Display
- Left Lamp Driver Unit
- EICAS Dimming
- CDU 1
- Data Loader
- DME 1
- AFT Cabin Temperature Sensor
- Radio Altimeter 1
- WX Radar R/T and Control 1/2
- ACS Control 2 Channel A
- Brake Pressure Application
- Cockpit Temperature Sensor

### **DC Bus 2**

- Fwd Cabin Temperature Sensor
- Radar Altimeter 2
- EICAS DCU 2
- ACS Control 1 Channel B
- PFD 2
- MFD 2
- EFIS Control Panel 2
- Attitude Heading 2
- AHRS FAN 2
- Right ACS Manual
- RTU 2
- SSCU 1 Channel B
- Rudder Trim
- Aileron Trim
- Service Bus Feed
- Left ACS Pressure Sensor
- Cabin Pressure Control 2
- Galley Heater Control
- Hydraulic System 1 Indicator
- Hydraulic AC Pump Control 1/3A
- PSEU Channel B
- ACPC Control 2
- Brake Pressure Indicator
- Anti-Skid
- Wiper, Copilot
- Chart Holder Lights
- Copilot Map Lights
- Wing Anti-Collision Lights
- Right Fuel Pump
- Right Fuel Pump Control
- Right Windshield Heater Control
- Right Window Heater Control

**CONT'D**

ELECTRICAL	REVISION 3 26 JUN 15	<b>4-25</b>
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- Right IAPS
- Right AFCS
- Right IAPS Fan
- Clock 2
- ADC 2
- ADF 2
- Transponder 2
- VHF COM 2
- VHF NAV 2
- DME 2
- Observer's audio
- Nose Steering

### **DC Emergency Bus**

- FIREX A
- FIREX B
- Right Engine Hydraulic SOV
- Left Engine Hydraulic SOV
- Right Engine Fuel SOV
- Left Engine Fuel SOV
- APU Fuel SOV
- APU BATT DIR Feed

**NOTE:** (1) Engine and APU fire extinguishing systems are inoperative.  
 (2) APU fuel feed SOVs and ENG fuel SOV will not close.  
 (3) Engine hydraulic SOVs will not close.

**4-26****REVISION 6****ELECTRICAL****01 JUN 18**

## **DC Essential Bus**

- Flaps Control Channel 1
- Slats Control Channel 1
- SSCU 2 Channel A
- SSCU 2 Channel B
- Pitch Feel 2 RTL 2
- Crossflow Pump Control
- Door Indicators
- Left Static Heater
- ADS Heater Control 1
- ADS Heater Control Standby
- Left Window Heater Control
- Thrust Reverser 1/2
- Right Eng Oil Pressure Indication
- Left Bleed SOV
- Right Bleed SOV
- Anti-Ice Control Channel B
- ACS Control 2 Channel B
- Left ACS Manual
- Display Fan Control
- DC ESS Feed
- Right ACS Pressure Sensor
- Instrument Flood Lights
- Emergency Lights
- EFIS CRT Dimming
- Stall Protection Right Channel
- EFIS Control Panel 1
- EICAS DCU 1
- RTU 1
- Fuel System Control
- Audio Pilot
- ADC 1
- ADF 1
- Transponder 1
- VHF NAV 1
- Cockpit Voice Recorder
- Attitude/Heading 1
- AHRS Fan
- PFD 1
- MFD 1
- VHF COMM 3 (ACARS)

**DC Service Bus**

- Forward Service Lights
- Aft Service Lights
- Boarding Lights
- Navigation Lights
- Toilet Lights
- Galley Area Lights
- Service Area Lights
- Beacon Lights
- Waste System
- Water Control

**Main Battery Direct Bus**

- Main Battery Power Sensor
- Main Battery Control
- Cockpit Dome Lights
- External AC Power 1
- DCPC 2
- Clock 1
- Clock 2
- Main Battery Charger Output

UNCONTROLLED WHEN PRINTED

**4-28**

REVISION 3

26 JUN 15

ELECTRICAL

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***Chapter 5: Air Conditioning / Pressurization***

Red

**CABIN ALT Msg**

Red

**- OR -****Emergency Descent Procedure**

- 1. Oxygen masks ..... Don and 100%**
- 2. Crew communication ..... Establish**
- 3. Captain assumes PF duties**

4. PASS SIGNS ..... ON
5. ATC ..... Declare Emergency and Advise of Descent
6. Autopilot ..... Recommended
7. Altitude preselector ..... Set to 10,000 feet or lowest safe altitude
8. SPEED Mode ..... Select
9. Thrust Lever ..... IDLE
10. FLIGHT SPOILER lever ..... MAX Deploy
11. Immediate Action Items complete.

**----- Continued from QRC -----**

12. PASS OXY ..... ON

- If structural damage is suspected or door / hatch message is displayed:
13. Airspeed ..... Do not exceed speed at which damage occurred
  14. Do not attempt to repressurize airplane

**At safe altitude at or below 10,000 ft:**

15. Oxygen masks ..... As required
16. Flight Attendants ..... Advise
17. Land at nearest suitable airport

**Caution**

Closing the doors on the mask stowage compartment or  
or pressing RESET will stop the flow of oxygen to the masks.

- If door / hatch message is displayed/unsafe condition:
18. CABIN ALT or Emergency Descent complete, and
- or
- Accomplish Applicable door procedure at a safe cabin altitude.  
Refer to QRH 13-1 through 13-8.

- If door / hatch message is not displayed/unsafe condition:

18. CABIN ALT or Emergency Descent complete, and
- Accomplish Pressurization – Unpressurized Flight Procedure Checklist, page 5-18.

**NOTE: If supplemental crew oxygen is still required, setting  
masks to normal (N) will reduce consumption.**

- If structural damage is not suspected and door/hatch message is not displayed:

**CONT'D**

**5-2****REVISION 6****AIR CONDITIONING / PRESSURIZATION****01 JUN 18**

- 13. Airspeed..... Mmo / Vmo
- 14. PRESS CONTROL..... MAN
- 15. MAN ALT..... DN
- 16. MAN RATE..... Max INCR

**At safe altitude:**

- 17. Oxygen masks ..... As required
- 18. Flight Attendants ..... Advise
- 19. Land at nearest suitable airport

**Caution**

**Closing the doors on the mask stowage compartment or pressing RESET will stop the flow of oxygen to the masks.**

**NOTE: If supplemental crew oxygen is still required, setting masks to normal (N) will reduce consumption.**

→ **If control of cabin pressurization regained:**

- 20. Cabin altitude ..... Set to destination airport elevation
- 21. → **To increase cabin altitude:**
  - or      a. MAN ALT..... UP
  - or      b. MAN RATE..... As required
- **To decrease cabin altitude:**
  - or      a. MAN ALT..... DN
  - or      b. MAN RATE..... As required
- **To maintain cabin altitude:**
  - a. MAN ALT..... HOLD

or  
→ **After Landing:**

- 22. MAN ALT ..... UP
- 23. MAN RATE ..... Max INCR
- 24. CABIN ALT or Emergency Descent Procedure complete

→ **If control of cabin pressurization not regained:**

- 20. Altitude..... Maximum 10,000 feet or lowest safe altitude
- 21. EMER DEPRESS ..... Confirm and ON
- 22. CABIN ALT or Emergency Descent Procedure complete

Red

**L (R) BLEED DUCT Msg**

Red

- OR -

Amber

**L (R) BLEED DUCT Msg**

Amber

**Caution**

If L or R BLEED DUCT warning message persists for 30 seconds, all bleed air sources will be closed causing a loss of pressurization.

**NOTE:** The L or R BLEED DUCT warning message will be replaced by a L or R BLEED DUCT caution message following automatic bleed valve closure.

1. ECS Synoptic ..... Select to determine affected side

→ If both L and R engine Bleed valves are closed:

2. BLEED VALVES ..... CLSD
3. Altitude ..... Descend 10,000 feet or lowest safe altitude
4. WING ANTI-ICE ..... OFF
5. Affected COWL ANTI-ICE ..... OFF
6. Leave icing conditions
7. Land at the nearest suitable airport
8. Airspeed ..... Not less than 210 KIAS

**NOTE:** This is the minimum recommended to provide sufficient airflow to cabin

- or
9. L and R Packs ..... OFF
  10. RECIRC FAN ..... OFF
  11. AIR-CONDITIONING, AFT CARGO ..... OFF
  12. RAM-AIR ..... Confirm and OPEN

**NOTE:** If RAM AIR OPEN status message does not come on, the cockpit and/or cabin temperature can rise quickly. Expedite landing at nearest suitable airport.

13. EMER DEPRESS ..... Confirm and ON
14. L (R) BLEED DUCT Checklist complete

→ If Either L or R engine bleed valve is open:

2. BLEED SOURCE ..... Select non-affected side

**NOTE:** When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

3. ISOL ..... CLSD

CONT'D



<b>5-4</b>	<b>REVISION 8</b>	<b>AIR CONDITIONING / PRESSURIZATION</b>
	<b>03 MAR 20</b>	

4. BLEED VALVES ..... MANUAL
5. Inoperative PACK ..... OFF

**NOTE: Airplane altitude maximum 31,000 feet during single pack operations.**

6. WING A/I CROSS BLEED.....Select non-affected side
7. Affected COWL ANTI-ICE .....OFF
8. Leave icing conditions to prevent ice accumulation on inoperative cowl
9. L (R) BLEED DUCT Checklist complete

Red

## DIFF PRESS Msg

Red

**Caution**

**DIFF PRESS** warning message can be posted even if the pressure values on the ECS synoptic page are green.

► If  $\Delta P$  is 8.6:

**NOTE:** For altitudes above 30,000 feet, if climbing at a rate greater than 1,500 FPM, a DIFF PRESS warning message may come on.

or

1. Reduce rate of climb
2.  $\Delta P$ .....Monitor
3. DIFF PRESS Checklist complete

► If  $\Delta P$  is greater than 8.6 or message persists:

1. PRESS CONTROL.....MAN
2. MAN ALT.....UP
3. MAN RATE.....As required to increase cabin altitude and reduce differential pressure

## ► If control of cabin pressurization regained:

4. DIFF PRESS Checklist complete, and

or

☛ Accomplish Pressurization – Manual Control Procedure Checklist, page 5-17.

► If control of cabin pressurization is not regained:

4. Descent.....Initiate to 10,000 feet or lowest safe altitude
5. L OR R PACK.....OFF

**NOTE: Maximum altitude 31,000 feet during single pack operations.**

## ► If DIFF PRESS Msg extinguishes:

6. Pressurization.....Monitor
7. DIFF PRESS Checklist complete, and

or

☛ Accomplish Pressurization – Manual Control Procedure Checklist, page 5-17.

## ► If DIFF PRESS Msg persists:

6. Descent.....Initiate to lowest possible altitude
7. Cruise airspeed.....Not less than 210 KIAS

**NOTE: This is the minimum recommended to provide sufficient airflow to cabin.**

8. L and R PACKs.....OFF
9. RECIRC FAN .....OFF
10. AIR-CONDITIONING, AFT CARGO.....OFF

**CONT'D**

**5-6****REVISION 8****AIR CONDITIONING / PRESSURIZATION****03 MAR 20**

11. RAM-AIR ..... Confirm and OPEN

**NOTE: If RAM AIR OPEN status message does not come on, the cockpit and/or cabin temperature can rise quickly. Expedite landing at nearest suitable airport.**

12. EMER DEPRESS ..... Confirm and ON

13. DIFF PRESS Checklist complete

**Amber****AFT CARGO OVHT Msg****Amber**

1. AFT CARGO FAN ..... AIR

- If AFT CARGO OVHT Msg extinguishes:  
or      2. AFT CARGO OVHT Checklist complete
- If AFT CARGO OVHT Msg persists:  
2. AIR-CONDITIONING, AFT CARGO ..... OFF
- If no live cargo:  
or      3. AFT CARGO OVHT Checklist complete
- If live cargo:  
3. Land at the nearest suitable airport  
4. AFT CARGO OVHT Checklist complete

**Amber****ALT LIMITER Msg****Amber**

1. Altitude ..... Not more than 25,000 feet  
2. ALT LIMITER Checklist complete

**Amber****AUTO PRESS Msg****Amber**

**NOTE: Do not attempt to reselect auto mode.**

1. MAN ALT ..... HOLD
2. PRESS CONT ..... MAN
3. AUTO PRESS Checklist complete, and
  - ☛ Accomplish Pressurization – Manual Control Procedure Checklist, page 5-17.

**Amber****AVIONICS FAN Msg****Amber**

- If on the ground:  
or      1. Do not takeoff  
2. AVIONICS FAN Checklist complete
- If in flight:  
1. AVIONICS FAN ..... FLT ALTN  
2. AVIONICS FAN Checklist complete

Amber

**L (R) BLEED LOOP Msg**

Amber

**NOTE:** When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

1. BLEED SOURCE.....Select non-affected source
2. ISOL.....CLSD
3. BLEED VALVES.....MANUAL
4. Affected PACK .....OFF

**NOTE:** Airplane altitude maximum 31,000 feet during single pack operation.

5. WING A/I CROSS BLEED .....Select non-affected side
6. Affected COWL ANTI-ICE .....OFF
7. Leave icing conditions to prevent ice accumulation on inoperative cowl
8. L (R) BLEED LOOP Checklist complete

Amber

**BLEED MISCONFIG Msg**

Amber

- If BLEED VALVES, AUTO position is operative:
  - 1. BLEED VALVES .....AUTO
  - 2. BLEED MISCONFIG Checklist complete
- or
- If BLEED VALVES, AUTO position is not operative:
  - 1. BLEED VALVES .....MANUAL
  - 2. BLEED VALVES .....CLSD
  - 3. BLEED MISCONFIG Checklist complete, and
    - ☛ Accomplish Bleed Source – Manual Selection Procedure Checklist, page 5-15.

Amber

**CABIN ALT Msg**

Amber

1. BLEED VALVES .....AUTO
2. L and R PACKs .....Check On
3. EMER DEPRESS .....Check OFF
4. MAN ALT .....HOLD
5. PRESS CONTROL .....MAN, then Auto

- If CABIN ALT caution Msg extinguishes:
  - or 6. CABIN ALT Checklist complete
- If CABIN ALT caution Msg persists:
  - 6. CABIN ALT Checklist complete, and
    - ☛ Accomplish Pressurization – Manual Control Procedure Checklist, page 5-17.

<b>5-8</b>	<b>ORIGINAL</b>	<b>AIR CONDITIONING / PRESSURIZATION</b>
	<b>15 MAY 14</b>	

Amber	<b>DISPLAY COOL Msg</b>	Amber
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- If on the ground:
    - 1. DSPLY FAN ..... GND ALTN
  - or
    - If within 60 seconds, DISPLAY COOL Msg extinguishes:
      - or
        - 2. DISPLAY COOL Checklist complete
    - If after 60 seconds, DISPLAY COOL Msg persists:
      - 2. DSPLY FAN..... STDBY
      - 3. DISPLAY COOL Checklist complete
  - If in flight:
    - 1. DSPLY FAN ..... FLT ALTN
  - or
    - If within 60 seconds, DISPLAY COOL Msg extinguishes:
      - or
        - 2. DISPLAY COOL Checklist complete
    - If after 60 seconds, DISPLAY COOL Msg persists:
      - 2. DSPLY FAN..... STDBY
      - 3. Cockpit temperature .... Reduce to as low as you can stand
  - or
    - If within another 60 seconds, DISPLAY COOL Msg extinguishes:
      - or
        - 4. DISPLAY COOL Checklist complete
    - If after another 60 seconds, DISPLAY COOL Msg persists:
      - 4. Land at the nearest suitable airport
      - 5. DISPLAY COOL Checklist complete
- NOTE: All displays will keep functioning for at least 30 minutes after fan failure.**

Amber	<b>EMER DEPRESS Msg</b>	Amber
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- If emergency depressurization is required:
  - 1. EMER DEPRESS Checklist complete
- or
  - If emergency depressurization is not required:
    - 1. EMER DEPRESS..... Select Off
    - 2. EMER DEPRESS Checklist complete

Amber

**L (R) ENG BLEED Msg**

Amber

1. BLEED SOURCE.....Select non-affected source

**NOTE:** (1) Do not select the APU as the bleed source if wing or cowl anti-ice is required.

(2) APU bleed can only be used to a maximum of 25,000 feet for ECS.

(3) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

2. ISOL.....CLSD

3. BLEED VALVES.....MANUAL

4. Affected PACK .....OFF

**NOTE:** Airplane altitude maximum 31,000 feet during single pack operations.

5. WING A/I CROSS BLEED.....Select non-affected side

6. Affected COWL ANTI-ICE .....OFF

7. Leave icing conditions to prevent ice accumulation on inoperative cowl

8. L (R) ENG BLEED Checklist complete

Amber

**ISOL FAIL Msg**

Amber

→ If accompanied by ISOL CLSD status message:

1. BLEED SOURCE .....BOTH ENG

2. ISOL .....CLSD

or 3. BLEED VALVES .....MANUAL

4. ISOL FAIL Checklist complete

→ If accompanied by ISOL OPEN status message:

1. BLEED SOURCE .....L ENG or R ENG

**NOTE:** When operating above 30,000 ft, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

2. ISOL .....OPEN

3. BLEED VALVES .....MANUAL

4. L or R PACK .....OFF

**NOTE:** Airplane altitude maximum 31,000 feet during single pack operations.

5. WING A/I CROSS BLEED.....Select non-affected side

6. Affected COWL ANTI-ICE .....OFF

7. Leave icing conditions to prevent ice accumulation on inoperative cowl

8. ISOL FAIL Checklist complete

**5-10****REVISION 6****AIR CONDITIONING / PRESSURIZATION**

01 JUN 18

Amber

**OVBD COOL Msg**

Amber

**NOTE:** The airplane will not pressurize to normal levels  
when the overboard cooling SOV is failed open.

1. Do not takeoff
2. OVBD COOL Checklist complete

Amber

**OXY LO PRESS Msg**

Amber

- If oxygen is in use or a leak is suspected:  
 or  
 1. Descent ..... Initiate to a safe altitude  
 2. OXY LO PRESS Checklist complete
- If oxygen is not in use and a leak is not suspected:  
 1. Oxygen pressure ..... Monitor  
 2. OXY LO PRESS Checklist complete

Amber

**L (R) PACK AUTOFAIL Msg**

Amber

1. Affected AIR-CONDITIONING, MAN ..... MAN
2. Affected HOT/COLD ..... Adjust temperature as desired
3. L (R) PACK AUTOFAIL Checklist complete

Amber

**L (R) PACK Msg**

Amber

1. Affected PACK .....OFF

**NOTE:** (1) Airplane altitude maximum 31,000 feet during single pack operations.

(2) If a L or R COWL A/ICE caution message is displayed after cowl anti-ice is selected on, reduce or increase thrust on the affected engine as required, until the PRSOV opens (as verified from the ANTI-ICE synoptic page). Thereafter, set thrust as required.

- If L (R) PACK Msg extinguishes:  
 or  
 2. Pressurization .....Monitor  
 3. L (R) PACK Checklist complete

- If L (R) PACK Msg persists:  
 2. BLEED SOURCE .....Select alternate source to isolate affected PACK

**NOTE:** (1) Do not select the APU as the bleed source if wing or cowl anti-ice is required.

(2) APU bleed can only be used to a maximum of 25,000 feet for ECS.

(3) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

3. ISOL .....CLSD  
 4. BLEED VALVES .....MANUAL  
 5. WING A/I CROSS BLEED.....Select non-affected side  
 6. Affected COWL ANTI-ICE .....OFF  
 7. Leave icing conditions to prevent ice accumulation on inoperative cowl  
 8. L (R) PACK Checklist complete

**5-12****REVISION 6****AIR CONDITIONING / PRESSURIZATION**

01 JUN 18

Amber

**L (R) PACK TEMP Msg**

Amber

**NOTE:** If a L or R COWL A/ICE caution message is displayed after cowl anti-ice is selected on, reduce or increase thrust on the affected engine as required, until the PRSOV opens (as verified from the ANTI-ICE synoptic page). Thereafter, set thrust as required.

→ **If PACK is operating in Auto Mode:**

1. Affected PACK ..... OFF

**NOTE:** Airplane altitude maximum 31,000 feet during single pack operations.

2. Pressurization ..... Monitor

→ **If L (R) PACK TEMP Msg extinguishes:**

or      3. L (R) PACK TEMP Checklist complete

→ **If L (R) PACK TEMP Msg persists:**

3. BLEED SOURCE ..... Select alternate source to isolate affected PACK

**NOTE:** (1) **Do not select the APU as the bleed source if wing or cowl anti-ice is required.**

or

(2) **APU bleed can only be used up to a maximum of 25,000 feet for ECS.**

(3) **When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**

4. ISOL ..... CLSD
5. BLEED VALVES ..... MANUAL
6. WING A/I CROSS BLEED ..... Select non-affected side
7. Affected COWL ANTI-ICE ..... OFF
8. Leave icing conditions to prevent ice accumulation on inoperative cowl
9. L (R) PACK TEMP Checklist complete

→ **If PACK is operating in MAN Mode:**

**NOTE: PACK discharge temperature is less than 5°C or greater than 85°C.**

1. Affected Manual mode temperature control knob ..... Adjust to maintain PACK discharge temperature between 5°C and 85°C
2. Affected PACK discharge temperature ..... Monitor

**CONT'D**

- If L (R) PACK TEMP Msg extinguishes:  
or            3. L (R) PACK TEMP Checklist complete
- If L (R) PACK TEMP Msg persists:  
3. Affected PACK .....OFF
- NOTE: Airplane altitude maximum 31,000 feet during single pack operations.**
4. Pressurization .....Monitor  
5. BLEED SOURCE .....Select alternate source to isolate affected PACK
- NOTE: (1) Do not select the APU as the bleed source if wing or cowl anti-ice is required.**
- (2) APU bleed can only be used up to a maximum of 25,000 feet for ECS.**
- (3) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**
6. ISOL .....CLSD  
7. BLEED VALVES .....MANUAL  
8. WING A/I CROSS BLEED .....Select non-affected side  
9. Affected COWL ANTI-ICE .....OFF  
10. Leave icing conditions to prevent ice accumulation on inoperative cowl  
11. L (R) PACK TEMP Checklist complete

Amber

**PASS OXY ON Msg**

Amber

1. Passenger Oxygen .....Check Status
2. PASS OXY ON Checklist complete

**5-14****REVISION 8****AIR CONDITIONING / PRESSURIZATION**

03 MAR 20

White

**OVBD COOL FAIL  
Status Msg**

White

**→ If on the ground:**

1. Passenger door and Service door..... Ensure correctly CLOSED and fully LOCKED  
 or  
 2. OVBD COOL FAIL Checklist complete

**→ If in flight:**
**→ If no door messages are displayed:**

- or  
 1. OVBD COOL FAIL Checklist complete

**→ If a door message is also displayed:**

1. OVBD COOL FAIL Checklist complete, and  
 ↗ Accomplish the appropriate door checklist

- PASSENGER DOOR Msg, page 13-1
- PAX DR LATCH Msg, page 13-5
- PAX DR OUT HNDL Msg, page 13-6
- FWD SERVICE DOOR Msg, page 13-7

**Bleed Source – Manual Selection Procedure****To select both engines as the bleed source:**

1. BLEED SOURCE.....BOTH ENG
2. ISOL.....CLSD
3. BLEED VALVES.....MANUAL
4. Bleed Source – Manual Selection Procedure complete

**To select the APU as the bleed source:**

**NOTE:** (1) Do not select the APU as the bleed source if wing or cowl anti-ice is required.  
 (2) APU bleed can only be used to a maximum of 25,000 feet for ECS.

1. APU (if available – 37,000 feet and below) .....START
2. WING ANTI-ICE.....OFF
3. LH and RH COWL ANTI-ICE .....OFF
4. BLEED SOURCE.....APU
5. ISOL.....OPEN
6. BLEED VALVES.....MANUAL
7. Bleed Source – Manual Selection Procedure complete

**To select only one engine as the bleed source:**

1. BLEED SOURCE.....L ENG or R ENG
2. ISOL.....CLSD

**NOTE:** (1) Only one PACK may be operated with only one engine as the bleed source. If it is necessary to operate a pack from the opposite engine bleed, select ISOL OPEN.  
 (2) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

3. BLEED VALVES.....MANUAL
4. Inoperative PACK .....OFF

**NOTE:** Airplane altitude maximum 31,000 feet during single pack operations.

5. WING A/I CROSS BLEED .....Select non-affected side
6. Affected COWL ANTI-ICE .....OFF
7. Leave icing conditions to prevent ice accumulation on inoperative cowl
8. Bleed Source – Manual Selection Procedure complete

**CONT'D**

**5-16**

REVISION 3

AIR CONDITIONING / PRESSURIZATION

26 JUN 15

**To close both engine bleeds and the APU LCV:**

1. BLEED VALVES.....CLSD

**NOTE:** (1) The isolation valve will open.  
 (2) Pressurization will be inoperative.  
 (3) Wing and cowl anti-ice will be inoperative.

2. Bleed Source – Manual Selection Procedure complete

**Oxygen – PASS OXY Auto Deploy Failure**

Cabin altitude is above 14,250 ( $\pm 750$ ) feet and oxygen masks have not deployed automatically:

1. PASS OXY.....Confirm and ON
  - If masks deploy:  
or      2. Oxygen – PASS OXY Auto Deploy Failure Checklist complete
  - If masks do not deploy:  
2. Flight Attendant.....Advise to manually open oxygen mask compartments  
3. Oxygen – PASS OXY Auto Deploy Failure Checklist complete

**Oxygen Pressure Readout Invalid**

- If situation requires the use of the crew oxygen masks
  - 1. Descent ..... Initiate to a safe altitude  
or      2. Oxygen Pressure Readout Invalid Checklist complete
- If situation does not require the use of the crew oxygen masks
  - 1. No action required  
2. Oxygen Pressure Readout Invalid Checklist complete

## Pressurization – Manual Control Procedure

1. MAN ALT ..... HOLD
2. PRESS CONTROL ..... MAN |
3. **→ If descending for landing:**  
or      a. Set cabin altitude to destination airport elevation  
**→ If maintaining cruise flight:**  
a. For cruise flight below FL180, set destination airport elevation,  
OR  
For cruise flight at FL180 or above, use the following table:

CRUISE FL	180	200	220	240	260	280	290
TGT CABIN ALT	1100	1500	2000	2400	2900	3500	3800

CRUISE FL	310	330	350	370	390	410
TGT CABIN ALT	4500	5300	6000	6700	7400	8000

4. **→ To increase cabin altitude:**  
or      a. MAN ALT ..... UP  
b. MAN RATE ..... As required
- To decrease cabin altitude:**  
or      a. MAN ALT ..... DN  
b. MAN RATE ..... As required
- To maintain cabin altitude:**  
a. MAN ALT ..... HOLD  
when reaching target cabin altitude  
(see table above)

**Before landing:**

5. Cabin altitude ..... Decrease to destination airport elevation

**After landing:**

6. MAN ALT ..... UP
7. MAN RATE ..... Max INCR
8. Pressurization – Manual Control Procedure complete

**5-18****REVISION 8****AIR CONDITIONING / PRESSURIZATION**

03 MAR 20

## Pressurization – Unpressurized Flight Procedure

1. Altitude ..... Maximum 10,000 feet  
or lowest safe altitude

► **If at least one PACK is On:**

- or
2. EMER DEPRESS ..... Confirm and ON
  3. Pressurization – Unpressurized Flight Procedure Checklist complete

► **If both PACKs are OFF:**

2. Cruise airspeed ..... Not less than 210 KIAS

**NOTE: This is the minimum recommended to provide sufficient airflow to cabin.**

3. L and R PACKs ..... OFF
4. RECIRC FAN ..... OFF
5. AIR-CONDITIONING, AFT CARGO ..... OFF
6. RAM-AIR ..... Confirm and OPEN

**NOTE: If RAM AIR OPEN status message does not come on, the cockpit and/or cabin temperature can rise quickly. Expedite landing at nearest suitable airport.**

7. EMER DEPRESS ..... Confirm and ON
8. Pressurization – Unpressurized Flight Procedure Checklist complete

***Chapter 6: Ice Protection***

Red

**ANTI-ICE DUCT Msg**

Red

**- OR -**

Amber

**ANTI-ICE DUCT Msg**

Amber

1. WING ANTI-ICE.....OFF
2. Leave icing conditions

**WARNING**

Even small accumulations of ice on the wing leading edge can change the stall speed, stall characteristics, or warning margins provided by the stall protection system.

- If ice accumulation on wing leading edge is not observed:
  - or 3. ANTI-ICE DUCT Checklist complete
- If ice accumulation on wing leading edge is observed:
  - 3. Airspeed.....Increase to  $V_{MO} / M_{MO}$  if possible, to disperse ice
  - If ice is dispersed:
    - or 4. ANTI-ICE DUCT Checklist complete
  - If ice accumulation on wing leading edge persists:
    - 4. WING ANTI-ICE.....ON

**When ANTI-ICE DUCT Msg comes on:**

5. WING ANTI-ICE.....OFF
  - Repeat step 4 and step 5 as required (maximum 5 times).

- If ice is dispersed:
  - or 6. ANTI-ICE DUCT Checklist complete
- If ice accumulation on wing leading edge persists:
  - 6. Maneuvering speed .....Not less than 200 KIAS
  - 7. Land at the nearest suitable airport
  - 8. GRND PROX, FLAP ..... Confirm and OVRD
  - 9. FLAPS ..... Land at 20°
  - 10. Final approach speed ..... Not less than  $V_{REF}$  ( $FLAPS\ 45$ ) + 25 KIAS
  - 11. Actual landing distance  
(with ice accumulation and FLAPS 20°) .....Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

**CONT'D**

6-2

REVISION 8

ICE PROTECTION

03 MAR 20

	Runway Surface	
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.40 (40%)	1.50 (50%)
<b>Without Thrust Reversers</b>	1.50 (50%)	1.50 (50%)

**NOTE:** A slight pitch-up tendency may occur upon selection of reverse thrust. This can be readily corrected by the application of nose-down elevator and/or brakes.

12. ANTI-ICE DUCT Checklist complete

Red

**L (R) COWL A/I DUCT Msg**

Red

1. L (R) COWL ANTI-ICE .....OFF  
 2. Leave icing conditions to prevent ice accumulation on inoperative cowl

- If COWL A/I DUCT Msg extinguishes:  
or           3. L (R) COWL A/I DUCT Checklist complete
- If COWL A/I DUCT Msg persists:  
3. BLEED SOURCE .....Select non-affected source

**NOTE:** When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

4. ISOL .....CLSD  
 5. BLEED VALVES .....MANUAL  
 6. Affected PACK .....OFF

**NOTE:** Airplane altitude maximum 31,000 feet during single pack operations.

7. WING A/I CROSS BLEED.....Select non-affected side
- If COWL A/I DUCT Msg extinguishes:  
or           8. L (R) COWL A/I DUCT Checklist complete
  - If COWL A/I DUCT Msg still persists:  
8. L (R) COWL A/I DUCT Checklist complete, and  
    ☛ Accomplish Intentional Shutdown Checklist, page 2-10.

ICE PROTECTION	REVISION 6	6-3
	01 JUN 18	

Red

**WING OVHT Msg**

Red

1. Affected side ..... Determine
2. WING A/I CROSS BLEED ..... Select non-affected side

**NOTE:** When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

**Wait 40 seconds.**

- If WING OVHT Msg extinguishes:
  - 3. WING OVHT Checklist complete
- or
- If WING OVHT Msg persists:
  - 3. WING ANTI-ICE ..... OFF
  - 4. Leave icing conditions
  - 5. WING OVHT Checklist complete

Amber

**ANTI-ICE LOOP Msg**

Amber

1. Do not takeoff
2. ANTI-ICE LOOP Checklist complete

Amber

**L (R) AOA HEAT Msg**

Amber

- If both the L and R AOA HEAT Msgs are displayed, accomplish the L AOA HEAT Msg -AND- R AOA HEAT Msg Checklist, page 6-4.
- If aircraft is on the ground and off the gate, accomplish System Reset.

1. ANTI-ICE, LH (RH) PROBES ..... OFF then ON
2. L (R) AOA HEAT Checklist complete

**6-4****REVISION 10****ICE PROTECTION****01 OCT 21**

Amber

**L AOA HEAT Msg  
- AND -  
R AOA HEAT Msg**

Amber

1. ANTI-ICE, LH and RH PROBES.....OFF then ON
- If both L and R AOA HEAT Msgs extinguish:  
or      2. L AOA HEAT -AND- R AOA HEAT Checklist complete
- If either L or R AOA HEAT Msg persists:  
or      2. L AOA HEAT -AND- R AOA HEAT Checklist complete, and  
      → Accomplish L (R) AOA HEAT Msg Checklist, page 6-3.
- If both L and R AOA HEAT Msgs persist:  
2. STALL PTCT PUSHER (left or right) .....OFF  
3. Avoid icing conditions  
4. L AOA HEAT -AND- R AOA HEAT Checklist complete, and  
      → Accomplish STALL FAIL Msg Checklist, page 9-27.

Amber

**L (R) COWL A/I Msg**

Amber

**NOTE:** With a COWL A/I Msg displayed, APU starter-assisted starts are not available.

- If COWL ANTI-ICE is selected ON:  
1. BLEED VALVES .....AUTO
- NOTE:** COWL ANTI-ICE is not available when the APU is the bleed source.
- or  
2. Affected COWL ANTI-ICE ..... OFF, then ON
- If L (R) COWL A/I Msg extinguishes:  
or      3. L (R) COWL A/I Checklist complete
- If L (R) COWL A/I Msg persists:  
3. Leave icing conditions  
4. L (R) COWL A/I Checklist complete
- If COWL ANTI-ICE is selected OFF:  
1. Affected COWL ANTI-ICE .....ON, then OFF  
2. Engine instruments .....Monitor ITT  
3. L (R) COWL A/I Checklist complete

ICE PROTECTION	REVISION 6	6-5
	01 JUN 18	

Amber

**L (R) COWL A/I OPEN Msg**

Amber

**NOTE:** With a COWL A/I OPEN caution message displayed, APU starter-assisted starts are not available.

1. Affected COWL ANTI-ICE.....ON, then OFF
2. Engine instruments.....Monitor
3. L (R) COWL A/I OPEN Checklist complete

Amber

**L (R) COWL LOOP Msg**

Amber

1. Do not takeoff
2. L (R) COWL LOOP Checklist complete

Amber

**ICE Msg**

Amber

**NOTE:** (1) When the BLEED VALVES are set to MANUAL, ensure that the BLEED SOURCE is selected to L ENG, R ENG, or BOTH ENG prior to activating the wing or cowl anti-ice systems.

(2) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

1. WING ANTI-ICE.....ON
2. LH and RH COWL ANTI-ICE .....ON
3. ICE Checklist complete

6-6

REVISION 8

ICE PROTECTION

03 MAR 20

Amber

## ICE DET FAIL Msg

Amber

- NOTE:** (1) When the BLEED VALVES are set to MANUAL, ensure that the BLEED SOURCE is selected to L ENG, R ENG, or BOTH ENG prior to activating the wing or cowl anti-ice systems.
- (2) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

**During icing conditions or when icing conditions are anticipated:**

1. WING ANTI-ICE.....ON
2. LH and RH COWL ANTI-ICE .....ON
3. ICE DET FAIL Checklist complete

Amber

## L (R) PITOT HEAT Msg

Amber

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

- If L(R) STATIC HEAT and L(R) AOA HEAT caution messages are also displayed:  
or      1. L (R) PITOT HEAT Checklist complete
- If L(R) STATIC HEAT, and L(R) AOA HEAT caution messages are not displayed:  
1. ANTI-ICE, LH (RH) PROBES .....OFF then ON
- If L (R) PITOT HEAT Msg extinguishes:  
or      2. L (R) PITOT HEAT Checklist complete
- If L (R) PITOT HEAT Msg persists:  
2. Source select panel, AIR DATA .....Select to operative side

**NOTE: For L PITOT HEAT message, select 2.  
For R PITOT HEAT message, select 1.**

3. L (R) PITOT HEAT Checklist complete
- ☞ Accomplish ADC Failure Checklist, page 12-6.

Amber

**L (R) STATIC HEAT Msg**

Amber

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

- If L(R) PITOT HEAT and L(R) AOA HEAT caution messages are also displayed:

or 1. L (R) STATIC HEAT Checklist complete

- If L(R) PITOT HEAT and L(R) AOA HEAT caution messages are not displayed:

1. ANTI-ICE, LH (RH) PROBES ..... OFF then ON

- If L (R) STATIC HEAT Msg extinguishes:

or 2. L (R) STATIC HEAT Checklist complete

- If L (R) STATIC HEAT Msg persists:

2. Do not rely on the standby altitude and airspeed indications

3. L (R) STATIC HEAT Checklist complete

Amber

**STBY PITOT HEAT Msg**

Amber

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

1. ANTI-ICE, LH PROBES ..... OFF then ON

- If STBY PITOT HEAT Msg extinguishes:

or 2. STBY PITOT HEAT Checklist complete

- If STBY PITOT HEAT Msg persists:

2. Do not rely on ISI airspeed information

3. STBY PITOT HEAT Checklist complete

Amber

**TAT PROBE HEAT Msg**

Amber

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

1. ANTI-ICE, LH PROBES ..... OFF then ON

- If TAT PROBE HEAT Msg extinguishes:

or 2. TAT PROBE HEAT Checklist complete

- If TAT PROBE HEAT Msg persists:

2. Do not rely on the air temperature indications

3. TAT PROBE HEAT Checklist complete

**6-8****REVISION 6****ICE PROTECTION****01 JUN 18****Amber****L (R) WINDOW HEAT Msg****Amber**

- | 1. ANTI-ICE, LH (RH) WSHLD..... OFF/RESET, then LOW or HI as required

- If L (R) WINDOW HEAT Msg extinguishes:  
 or            2. L (R) WINDOW HEAT Checklist complete
- If L (R) WINDOW HEAT Msg persists:  
 2. Leave icing conditions  
 3. L (R) WINDOW HEAT Checklist complete

**Amber****L (R) WSHLD HEAT Msg****Amber**

- | 1. ANTI-ICE, LH (RH) WSHLD..... OFF/RESET, then LOW or HI as required

- If L (R) WSHLD HEAT Msg extinguishes:  
 or            2. L (R) WSHLD HEAT Checklist complete
- If L (R) WSHLD HEAT Msg persists:  
 2. Leave icing conditions  
 3. Airspeed..... Increase to  $V_{MO}/M_{MO}$ , if possible to disperse ice  
 4. L (R) WSHLD HEAT Checklist complete

<b>ICE PROTECTION</b>	<b>REVISION 6</b>	<b>6-9</b>
	<b>01 JUN 18</b>	

Amber	<b>L (R) WING A/I Msg</b>	Amber
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**NOTE:** This message indicates either a low temperature condition or a system failure.

1. L (R) Engine Thrust ..... Increase to 75% N<sub>2</sub> minimum
2. BLEED VALVES..... AUTO
3. Wait 30 seconds

- If L (R) WING A/I Msg extinguishes:  
or      4. L (R) WING A/I Checklist complete
- If L (R) WING A/I Msg persists:  
4. WING A/I CROSS BLEED.....Select non-affected side

**NOTE: (1) During wing anti-ice cross bleed operations, both wings and flow lines can be displayed amber with L WING A/I or R WING A/I caution messages on.**

**(2) When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**

5. Leave icing conditions
- If ice accumulation on wing leading edge is dispersed:  
or      6. L (R) WING A/I Checklist complete
- If ice accumulation on wing leading edge persists:  
6. L (R) WING A/I Checklist complete, and
- ☛ Accomplish Ice Dispersal Procedure Checklist, page 6-12.

**6-10****REVISION 3****ICE PROTECTION****26 JUN 15**

Amber

**L WING A/I Msg****- AND -****R WING A/I Msg**

Amber

**NOTE: This message indicates either a low temperature condition or a system failure.**

1. L and R Engine Thrust ..... Increase to 75% N<sub>2</sub> minimum
2. BLEED VALVES ..... AUTO
3. Wait 30 seconds

→ If both L and R WING A/I Msgs extinguish:

or      4. L WING A/I -AND- R WING A/I Checklist complete

→ If either L or R WING A/I Msg persists:

or      4. L WING A/I -AND- R WING A/I Checklist complete, and  
→ Accomplish L (R) WING A/I Msg Checklist, page 6-9.

→ If L and R WING A/I Msgs persist:

4. Leave icing conditions

→ If ice accumulation on wing leading edge is dispersed:

or      5. L WING A/I -AND- R WING A/I Checklist complete

→ If ice accumulation on wing leading edge persists:

5. L WING A/I -AND- R WING A/I Checklist complete, and  
→ Accomplish Ice Dispersal Procedure Checklist, page 6-12.

Amber

**WING A/I SNSR Msg**

Amber

1. WING ANTI-ICE.....OFF
2. Leave icing conditions

→ If ice accumulation on wing leading edge is dispersed:

or      3. WING A/I SNSR Checklist complete

→ If ice accumulation on wing leading edge persists:

3. WING A/I SNSR Checklist complete, and

→ Accomplish Ice Dispersal Procedure Checklist, page 6-12.

ICE PROTECTION	REVISION 6	6-11
01 JUN 18		

Amber

**WING XBLEED Msg**

Amber

- If WING A/I CROSS BLEED is selected to NORMAL:
1. WING A/I CROSS BLEED..... Select FROM LEFT or FROM RIGHT
- |
- or
- NOTE: When operating above 30,000 feet, wing anti-ice operating from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**
2. WING XBLEED Checklist complete
- If WING A/I CROSS BLEED is selected to FROM LEFT or FROM RIGHT:
1. WING ANTI-ICE .....OFF
  2. Leave icing conditions
- |
- or
- If ice accumulation on wing leading edge is dispersed:
3. WING XBLEED Checklist complete
- |
- If ice accumulation on wing leading edge persists:
3. WING XBLEED Checklist complete, and
- ➡ Accomplish Ice Dispersal Procedure Checklist, page 6-12.

White

**ICE DET 1(2) FAIL Status Msg**

White

**During icing conditions or when icing conditions are anticipated:**

1. WING ANTI-ICE..... ON
2. LH and RH COWL ANTI-ICE ..... ON
3. ICE DET 1(2) FAIL Checklist complete

|

**NOTE: When operating above 30,000 feet, wing anti-ice operation from a single source will have reduced ITT margins. Adjust thrust to maintain ITT within limits.**

**6-12****REVISION 8****ICE PROTECTION**

03 MAR 20

## Ice Dispersal Procedure

**NOTE:** This procedure is to be utilized after leaving icing conditions and ice accumulation is observed on the heated portion of the wing leading edge.

1. Airspeed ..... Increase to  $V_{MO} / M_{MO}$   
if possible, to disperse ice

→ **If ice is dispersed:**

- or      2. Ice Dispersal Procedure Checklist complete

→ **If ice accumulation on wing leading edge still present:**

2. Land at nearest suitable airport
3. Maneuvering speed ..... Not less than 200 KIAS

### **WARNING**

Even small accumulations of ice on the wing leading edge can change the stall speed, stall characteristics, or warning margins provided by the stall protection system.

**Prior to landing:**

4. GRND PROX, FLAP ..... Confirm and OVRD
5. FLAPS ..... Land at 20°
6. Final approach speed .....  $V_{REF}$  (FLAPS 45) + 25 KIAS
7. Actual landing distance  
(with ice accumulation and FLAPS 20°) ..... Increase using table below

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.40 (40%)	1.50 (50%)
Without Thrust Reversers	1.50 (50%)	1.50 (50%)

**Just prior to touchdown:**

8. Thrust Levers ..... IDLE  
and do not prolong the landing flare

**NOTE:** A slight pitch-up tendency may occur upon selection of reverse thrust. This can be readily corrected by the application of nose-down elevator and/or brakes.

9. Ice Dispersal Procedure Checklist complete

**Windshield or Window Cracking, Shattering, Arcing or Delamination**

1. ANTI-ICE, LH or RH WSHLD .....Affected Side OFF

- If above 28,000 feet:
- or
- 2. Descent .....INITIATE to 28,000 feet or lower altitude.
  - 3. Below 28,000' .....Proceed to step 4

- If at 28,000 feet or lower:
- 4. Crew and passenger oxygen .....ON, if required
  - 5. PRESS CONT .....MAN
  - 6. MAN RATE .....Maximum INCR
  - 7. MAN ALT .....ADJUST to achieve target cabin altitude per table that follows using step 8 below

**NOTE: CABIN ALT caution or warning message will be posted when cabin altitude exceeds 8,500 feet or 10,000 feet respectively.**

Cruise Flight Level	280	260	240	220	200	180
Target Cabin Altitude	7900	6800	5700	4600	3500	2200

8. To increase cabin altitude:

- a. MAN ALT .....UP
- b. MAN RATE .....As required

To decrease cabin altitude:

- a. MAN ALT .....DN
- b. MAN RATE .....As Required

To maintain cabin altitude:

- a. MAN ALT .....HOLD

9. When Below 8000 feet MSL:

- If windshield core ply or inboard ply shattered:
- or
- 10. Slow to 205 kts or less
  - 11. Proceed to Step 12
- If windshield core ply or inboard ply not shattered:
- 10. Proceed to Step 12
  - 12. Cabin Altitude .....SET to destination airport elevation

**CONT'D**



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**Before Landing:**

13. Cabin altitude ..... CHECK and SET to landing field elevation.

**NOTE: Do not set cabin altitude below destination field elevation.**

**After Landing:**

→ **If differential pressure is not zero upon landing**

14. MAN ALT ..... UP  
or 15. MAN RATE ..... Maximum INCR  
16. Windshield or Window Cracking, Shattering, Arching or Delamination  
Checklist complete.

→ **If differential pressure is zero upon landing.**

14. No Further action required.  
15. Windshield or Window Cracking, Shattering, Arching or Delamination  
Checklist complete.

FUEL	REVISION 8 03 MAR 20	7-1
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## Chapter 7: Fuel

Amber

### BULK FUEL TEMP Msg

Amber

→ If on the ground:

1. APU / Engines ..... Do not start  
 or  
**NOTE: Aircraft operation is prohibited.**  
 2. BULK FUEL TEMP Checklist complete

→ If in flight:

1. Airplane ..... Descend or deviate to warmer air mass, and / or  
 2. Airspeed ..... Increase as required  
 3. Engine instruments ..... Monitor  
 4. BULK FUEL TEMP Checklist complete

Amber

### L (R) ENG SOV CLSD Msg

Amber

1. Affected Engine ..... Confirm engine operation

→ If engine did not fail:

- or  
 2. Affected Engine ..... Monitor  
 3. L (R) ENG SOV CLSD Checklist complete

→ If engine failure is confirmed:

2. L (R) ENG SOV CLSD Checklist complete, and  
 ➔ Accomplish Engine Failure Checklist, page 2-10.

Amber

### L (R) ENG SOV FAIL Msg

Amber

1. Normal Engine operations ..... Confirm  
 2. Affected Engine instruments ..... Monitor

→ If engine parameters can be maintained within normal limits:

- or  
 3. L (R) ENG SOV FAIL Checklist complete

→ If engine parameters can not be maintained within normal limits:

3. L (R) ENG SOV FAIL Checklist complete, and  
 ➔ Accomplish Intentional Shutdown Checklist, page 2-10.

7-2

REVISION 8

FUEL

03 MAR 20

Amber

**L (R) ENG SOV OPEN Msg**

Amber

**NOTE:** The affected ENG SOV failed to close during execution of engine fire procedure.

1. Affected FUEL SOV cb .....Check Closed
  - L ENG – 1R8
  - R ENG – 1R7
2. L (R) ENG SOV OPEN Checklist complete

Amber

**FUEL CH 1/2 FAIL Msg**

Amber

 If aircraft is on the ground and off the gate, accomplish System Reset.

1. Engine thrust .....Monitor
  - Adjust as required to maintain equal fuel flow to the engines
2. Fuel balance .....Maintain
  - Monitor the FUEL USED indication on FMS PERF MENU - FUEL MGMT page 2/3
  - Accomplish Gravity Crossfeed Procedure, page 7-12, as required
3. Land at the nearest suitable airport
4. FUEL CH 1/2 FAIL Checklist complete

Amber

**L (R) FUEL FILTER Msg**

Amber

1. Affected Engine .....Monitor

**NOTE: Fuel Filter may be in bypass mode.**

2. L (R) FUEL FILTER Checklist complete

FUEL	REVISION 8	7-3
03 MAR 20		

Amber

**FUEL IMBALANCE Msg**

Amber

**NOTE:** (1) Fuel indications are inaccurate during maneuvers or uncoordinated flight. Accuracy will return only after 30 seconds of level and coordinated flight.

(2) Powered crossflow may not be able to correct fuel imbalance during single engine operations.

1. Automatic crossflow ..... Confirm operating
2. Fuel distribution ..... Monitor

→ If the center tank is increasing abnormally or fuel is suspected to be leaking into the center tank:

3. FUEL IMBALANCE Checklist complete, and
- ☛ Accomplish Fuel – Center Tank Quantity Abnormal Increase Checklist, page 7-8.

or

**Caution**

If center tank quantity increases by more than 500 lbs, land at nearest suitable airport.

→ If the center tank is not increasing abnormally and no fuel is suspected to be leaking into the center tank:

3. Continue with this Checklist

→ If automatic crossflow is operating and FUEL IMBALANCE persists:

- or
4. FUEL IMBALANCE Checklist complete, and
  - ☛ Accomplish Fuel Leak Procedure Checklist, page 7-10.

→ If automatic crossflow is operating and is sufficient to maintain balance:

- or
4. Tank quantities ..... Monitor
  5. FUEL IMBALANCE Checklist complete

→ If automatic crossflow is not operating:

4. XFLOW, AUTO OVERRIDE ..... MAN

Affected (low) tank:

5. XFLOW L (R) ..... ON
6. Tank quantities ..... Monitor  
for decreasing imbalance

→ If FUEL IMBALANCE Msg extinguishes:

- or
7. XFLOW L (R) ..... Off
  8. AUTO OVERRIDE ..... Auto
  9. Tank quantities ..... Monitor
  10. FUEL IMBALANCE Checklist complete

→ If FUEL IMBALANCE Msg persists:

7. FUEL IMBALANCE Checklist complete, and
- ☛ Accomplish Fuel Leak Procedure Checklist, page 7-10.

7-4

REVISION 8

FUEL

03 MAR 20

Amber

**L (R) FUEL LO PRESS Msg**

Amber

- If not accompanied by MAIN EJECTOR caution message and/or SCAV EJECTOR caution message:
    - or 1. Affected Engine ..... Monitor
    - 2. L (R) FUEL LO PRESS Checklist complete
  
  - If accompanied by same side MAIN EJECTOR caution message and/or SCAV EJECTOR caution message:
    - 1. Affected Engine fuel flow indications ..... Check
    - 2. Affected wing tank fuel quantity ..... Check
    - If affected fuel tank quantity is depleting at a normal rate:
      - or 3. Affected Engine ..... Monitor
      - 4. L (R) FUEL LO PRESS Checklist complete
    - If affected fuel tank quantity is depleting abnormally:
      - 3. Affected FUEL BOOST PUMP ..... Confirm and SELECT OFF
- NOTE: Leak from engine is suspected.**
4. L (R) FUEL LO PRESS Checklist complete, and
  - ☛ Accomplish Fuel Leak Procedure Checklist, page 7-10.

Amber

**L (R) FUEL LO TEMP Msg**

Amber

- If on the ground:
    - or 1. Do not takeoff
    - 2. L (R) FUEL LO TEMP Checklist complete
  
  - If in flight:
    - 1. Affected Engine ..... Monitor
- NOTE: (1) The engine fuel will not be heated.  
(2) FUEL FILTER caution message may come on, indicating an impending bypass.**
2. L (R) FUEL LO TEMP Checklist complete

Amber

**L (R) FUEL PUMP Msg**

Amber

1. Affected FUEL BOOST PUMP ..... Confirm and SELECT OFF then ON
- If L (R) FUEL PUMP Msg extinguishes:
    - or 2. L (R) FUEL PUMP Checklist complete
  
  - If L (R) FUEL PUMP Msg persists:
    - 2. Affected Engine ..... Monitor
    - 3. L (R) FUEL PUMP Checklist complete

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Amber	<b>L (R) MAIN EJECTOR Msg</b>	Amber
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☞ If L (R) SCAV EJECTOR caution message is also displayed, refer to L (R) MAIN EJECTOR Msg - AND - L (R) SCAV EJECTOR Msg Checklist, page 7-5.

1. L and R FUEL BOOST PUMPs ..... Confirm Operating
  2. Affected Engine ..... Monitor
- If center tank quantity is increasing:
3. L (R) MAIN EJECTOR Msg Checklist complete, and
- or
- ☞ Accomplish Fuel – Center Tank Quantity Abnormal Increase Checklist, page 7-8.
- If center tank quantity is not increasing:
3. L (R) MAIN EJECTOR Checklist complete

Amber	<b>L (R) MAIN EJECTOR Msg</b> - AND - <b>L (R) SCAV EJECTOR Msg</b>	Amber
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1. L and R FUEL BOOST PUMPs ..... Confirm operating
  2. Fuel tank quantities ..... Monitor
- If total fuel quantity is depleting normally:
3. L (R) MAIN EJECTOR -AND- L (R) SCAV EJECTOR Checklist complete
- or
- If total fuel quantity is depleting abnormally:
3. Affected FUEL BOOST PUMP ..... Confirm and Off
- NOTE: Leak from engine is suspected.**
4. L (R) MAIN EJECTOR -AND- L (R) SCAV EJECTOR Checklist complete, and
- ☞ Accomplish Fuel Leak Procedure Checklist, page 7-10.

7-6

REVISION 3

FUEL

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Amber

**L (R) SCAV EJECTOR Msg**

Amber

→ If L (R) MAIN EJECTOR caution message is also displayed, refer to MAIN -AND- SCAV EJECTOR combined checklist, page 7-5.

1. Fuel quantity and balance ..... Monitor

**Caution**

With a SCAV EJECTOR inoperative, the collector tank quantity may decrease at high thrust settings. This will be indicated by the fuel quantity indications being displayed amber. If this occurs, reduce pitch attitude and/or thrust on the affected engine to avoid engine flameout.

2. L (R) SCAV EJECTOR Checklist complete

Amber

**L (R) XFER SOV Msg**

Amber

1. Left, right, and center fuel tank quantities ..... Compare
  2. Left and right fuel tank quantities ..... Balance if required
  3. Center tank quantity ..... Monitor
- If center tank quantity decreases with fuel burn:
- or
    - 4. Fuel balance ..... Monitor
    - 5. L (R) XFER SOV Checklist complete, and
- If center tank quantity does not decrease with fuel burn:
- 4. Land immediately at the nearest suitable airport
    - 5. L (R) XFER SOV Checklist complete

Amber

**LO FUEL Msg**

Amber

**NOTE:** Quantity in either main tank is less than 600 lb, total fuel is less than 1200 lb, or both fuel collector tanks are low.

If this occurs, reduce pitch attitude and/or thrust on the affected engine to avoid engine flame out.

1. Do not Climb
2. Airplane attitude ..... Do not exceed 10° nose up
3. Fuel balance ..... Check
4. Land at the nearest suitable airport

**NOTE:** Do not attempt go-around. The minimum fuel quantity for go-around is 600 lb per wing (with the airplane level), and assuming a maximum airplane climb attitude of 10° nose up.

5. LO FUEL Checklist complete

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**NOTE: A FUEL CHAN 1 FAIL or FUEL CHAN 2 FAIL status message may also be displayed.**

☛ If aircraft is on the ground and off the gate, accomplish System Reset.

1. L and R XFLOW ..... Confirm Off

☛ If on the ground:

- or  
2. XFLOW PUMP Checklist complete, and  
☛ Contact Maintenance Control.

☛ If in flight:

2. Fuel quantities ..... Monitor

☛ If no fuel imbalance occurs:

- or  
3. XFLOW PUMP Checklist complete

☛ If fuel imbalance condition exists:

3. XFLOW PUMP Checklist complete

☛ Accomplish Gravity Crossfeed Procedure Checklist, page 7-12.

7-8

REVISION 8

FUEL

03 MAR 20

**Fuel – Center Tank Quantity Abnormal Increase**

**NOTE:** It is acceptable to have a temporary, limited fuel variance of up to 300 lb observed in the center tank during airplane pitch, roll and acceleration maneuvers.

1. Center tank quantity ..... Monitor
2. Lowest quantity main tank ..... Determine

**Affected (low) side:**

3. (Left/Right) Thrust Lever ..... Confirm and IDLE
4. Land immediately at the nearest suitable airport
5. GRAVITY XFLOW ..... OPEN

**NOTE:** (1) When performing fuel balance using GRAVITY XFLOW system, the transfer is not immediate and the rate of transfer can vary. GRAVITY XFLOW can be enhanced by using a steady heading side-slip maneuver. A steady heading side-slip maneuver is recommended to provide a positive fuel flow to the low fuel tank.

(2) Fuel indications are inaccurate during maneuvers or uncoordinated flight. Accuracy will return only after 30 seconds of level and coordinated flight.

6. Fuel tank quantities ..... Monitor

→ If the lowest quantity main tank depletes to less than 2,000 lbs and the center tank quantity is increasing or is abnormally full:

7. (Left/Right) Thrust Lever ..... Confirm and IDLE
8. (Left/Right) Thrust Lever ..... Confirm and SHUT OFF
9. LH (RH) ENG FIRE PUSH ..... Confirm and SELECT
10. Fuel – Center Tank Quantity Abnormal Increase Checklist complete, and

☛ Accomplish Intentional Shutdown Checklist, page 2-10.

→ If center tank quantity increases by more than 1,000 lbs or is abnormally full:

7. Affected BOOST PUMP ..... Confirm and SELECT OFF

**NOTE: Disregard L or R MAIN EJECTOR caution messages, if displayed.**

8. Fuel – Center Tank Quantity Abnormal Increase Checklist complete

→ If fuel tank quantities stabilize:

7. GRAVITY XFLOW ..... Closed
8. Fuel – Center Tank Quantity Abnormal Increase Checklist complete

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## Fuel Boost Pump Cycling

1. Center tank quantity ..... Monitor

**NOTE:** Boost pump cycling not accompanied by a center tank quantity increase of more than 500 lbs is acceptable.

- If the center tank quantity does not increase by more than 500 lbs:
  - 2. Fuel Boost Pump Cycling Checklist complete
- or
- If the center tank quantity increases by more than 500 lbs:
  - 2. GRAVITY XFLOW ..... OPEN
  - 3. Land at the nearest suitable airport
- or
- If the center tank quantity does not increase by more than 1,000 lbs:
  - 4. Fuel Boost Pump Cycling Checklist complete
- or
- If the center tank quantity increases by more than 1,000 lbs:
  - 4. Both BOOST PUMPS ..... Confirm and  
SELECT OFF |

**NOTE:** Disregard L or R MAIN EJECTOR caution messages, if displayed.

5. Fuel Boost Pump Cycling Checklist complete

7-10

REVISION 8

FUEL

03 MAR 20

## Fuel Leak Procedure

1. Land immediately at the nearest suitable airport

**NOTE:** (1) Do not delay landing while attempting to determine location of the leak. Expedite landing if LO FUEL message displayed.  
 (2) The minimum fuel quantity for go-around is 600 lbs per wing (with the airplane level), and assuming a maximum airplane climb attitude of 10° nose up.  
 (3) Disregard FUEL IMBALANCE, MAIN EJECTOR, SCAV EJECTOR, or FUEL LO PRESS messages.

2. Autopilot ..... Monitor

**NOTE:** Anticipate an out-of-trim situation when disconnecting the autopilot.

► If leak into center tank is suspected:

3. Fuel Leak Procedure Checklist complete, and

or

☛ Accomplish Fuel – Center Tank Quantity Abnormal Increase Checklist, page 7-8

► If leak from left wing tank is suspected:

3. XFLOW, AUTO OVERRIDE ..... MAN
4. GRAVITY XFLOW ..... Off
5. R XFLOW ..... ON

**When imbalance reaches 800 lbs:**

6. R XFLOW ..... Off

**Prior to landing**

7. Select the runway available with minimum turbulence and cross-wind
8. GRND PROX, FLAP ..... Confirm and OVRD
9. FLAPS ..... Land at 20°
10. Final approach speed ..... V<sub>REF</sub> (Flaps 20)
11. Actual landing distance ..... Increase

or

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

CONT'D



12. Fuel Leak Procedure Checklist complete

→ If leak from right wing tank is suspected:

- |                               |     |
|-------------------------------|-----|
| 3. XFLOW, AUTO OVERRIDE ..... | MAN |
| 4. GRAVITY XFLOW.....         | Off |
| 5. L XFLOW.....               | ON  |

**When imbalance reaches 800 lbs:**

- |                 |     |
|-----------------|-----|
| 6. L XFLOW..... | Off |
|-----------------|-----|

**Prior to landing:**

- |   |                             |
|---|-----------------------------|
| 7. Select the runway available with minimum turbulence and cross-wind |                             |
| 8. GRND PROX, FLAP .....  | Confirm and OVRD            |
| 9. FLAPS .....  | Land at 20°                 |
| 10. Final approach speed .....  | V <sub>REF</sub> (Flaps 20) |
| 11. Actual landing distance .....                                     | Increase                    |

or

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces.**  
**If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

12. Fuel Leak Procedure Checklist complete

→ If leak from engine is suspected:

**On the low quantity side:**

- |  |                     |
|--|---------------------|
| 3. (Left/Right) Thrust Lever .....             | Confirm and IDLE    |
| 4. (Left/Right) Thrust Lever .....             | Confirm and SHUTOFF |
| 5. (Left/Right) ENG FIRE PUSH.....             | Confirm and SELECT  |
| 6. Fuel Leak Procedure Checklist complete, and |                     |

☛ Accomplish Intentional Shutdown Checklist, page 2-10.

**7-12****REVISION 8****FUEL**

03 MAR 20

## Gravity Crossfeed Procedure

1. XFLOW L and R.....SELECT Off
2. AUTO OVERRIDE .....SELECT Off
3. GRAVITY XFLOW .....OPEN

**Verify the following:**

- GRAV XFLOW OPEN advisory message on
- GRAVITY XFLOW OPEN light on

**NOTE:** (1) When performing fuel balance using GRAVITY XFLOW system, the transfer is not immediate and the rate of transfer can vary. Using a steady heading sideslip maneuver may enhance GRAVITY XFLOW and is recommended to provide a positive fuel flow to the low fuel tank.  
 (2) During the maneuver, fuel will transfer at a rate of up to 100 lbs per minute. Fuel tank quantity gauging accuracy will be degraded. Accurate fuel indications will occur after 30 seconds of stabilized and coordinated flight.

**Caution**

Steady heading sideslip maneuvers should not exceed one half brick of uncoordinated flight, and should not be attempted when flaps are extended, when in icing conditions, or above FL 250 (procedural limitation).

4. Steady heading sideslip maneuver .....ACCOMPLISH
  - Establish a bank angle of 10 degrees down on the low quantity side. Use rudder pedal/trim to maintain a constant heading/course.
5. Fuel tank quantities .....Monitor

**CONT'D**



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► If main tank quantities are balanced:

- 6. Coordinated flight..... Establish

**Wait 30 seconds:**

or

- 7. Fuel Quantity / Balance ..... Re-check
- Repeat steps 4 through 7 as necessary to balance fuel
- 8. GRAVITY XFLOW ..... CLOSED
- 9. Gravity Crossfeed Procedure Checklist complete

► If Fuel Imbalance persists and cannot be controlled within limits:

**Caution**

The decision to shutdown an engine due to a fuel imbalance situation should be carefully considered. Lateral controllability problems may occur, but at fuel imbalance levels greater than the 800 lbs fuel balance limitation. Pilots must weigh all factors when deciding to continue to the closest available airport with a fuel imbalance or with an engine shutdown. Idle thrust on the low tank side should be sufficient to correct a fuel imbalance in the event all other methods of fuel crossflow fail.

**On the low quantity side:**

- 6. Affected thrust lever..... Confirm and IDLE
- 7. Affected thrust lever..... Confirm and SHUT OFF
- 8. LH (RH) ENG FIRE PUSH ..... Confirm and SELECT |
- 9. Gravity Crossfeed Procedure Checklist complete, and

☛ Accomplish Intentional Shutdown Checklist, page 2-10.

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***Chapter 8: Hydraulics***

Amber

**HYD 1 HI TEMP Msg**

Amber

**NOTE:** If the hydraulic temperature increases to between 138°C and 183°C, a hydraulic fuse will open and drain the contents of the hydraulic system.

1. L HYD SOV..... Confirm and CLOSED
2. HYDRAULIC synoptic ..... Select to confirm L HYD SOV CLOSED

**NOTE:** No action is required for the HYD 1 LO PRESS caution message. Continue the HYD 1 HI TEMP procedure until landing.

3. HYDRAULIC pump 1 ..... ON
4. System 1 temperature..... Monitor

- If System 1 temperature is increasing or L HYD SOV remains open or HYD 1 LO PRESS caution message is ON:  
or
  - 5. Go to **Hydraulic SOV Open**, below
- If L HYD SOV closes OR temperature decreases:  
  - 4. Go to **Hydraulic SOV Closes**, below

**Hydraulic SOV Closes**

6. HYDRAULIC pump 1 ..... Auto
7. System 1 temperature ..... Monitor
8. HYD 1 HI TEMP Checklist complete

**Hydraulic SOV Open**

6. HYDRAULIC pump 1 ..... OFF

**NOTE:** (1) No action is required if OB GND SPLRS and OB SPOILERONS caution messages illuminate.

(2) Category II operations may be affected. Review the requirements.

7. Inoperative Systems..... Review
  - L and R outboard spoilerons inoperative
  - L and R outboard flight spoilers inoperative
  - L and R outboard ground spoilers inoperative
  - L thrust reverser inoperative
8. Land at the nearest suitable airport

CONT'D



8-2

REVISION 8

HYDRAULICS

03 MAR 20

- If OB FLT SPLRS caution message is illuminated:
9. FLIGHT SPOILER lever ..... RETRACT  
 or  
 10. Altitude.....Max 26,000 feet  
 11. Continue with **Prior to Landing, below**
- If OB FLT SPLRS caution message is not illuminated:
9. Continue with **Prior to Landing, below**

**Prior to Landing**

12. GRND PROX, FLAP ..... Confirm and OVRD  
 13. LH THRUST REVERSER ..... OFF  
 14. FLAPS ..... Land at 20°

**NOTE:** The landing distance factors that follow are based upon the loss of the outboard multi-function spoilers, outboard ground spoilers, and left thrust reverser inoperative.

15. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
With One Thrust Reverser	1.40 (40%)	1.45 (45%)
Without Thrust Reversers	1.45 (45%)	1.45 (45%)

**Caution**

An asymmetric thrust condition will exist, using the thrust reverser system with the left thrust reverser not operating. Rudder control assistance (on ground) at high speed will be required to maintain directional control.

**NOTE:** If the hydraulic temperature increases to 138°C and above, a hydraulic fuse will eventually open and drain the contents of hydraulic system.

16. HYD 1 HI TEMP Checklist complete

Amber

**HYD 2 HI TEMP Msg**

Amber

**NOTE:** If the hydraulic temperature increases to between 138°C and 183°C a hydraulic fuse will open and drain the contents of the hydraulic system.

1. R HYD SOV ..... Confirm and CLOSED
2. HYDRAULIC synoptic ..... Select to confirm R HYD SOV CLOSED

**NOTE: No action is required for the HYD 2 LO PRESS caution message. Continue the HYD 2 HI TEMP procedure until landing.**

3. HYDRAULIC pump 2 ..... ON
4. System 2 temperature ..... Monitor

- If System 2 temperature is increasing or R HYD SOV remains open or HYD 2 LO PRESS caution message is ON:  
or      5. Go to **Hydraulic SOV Open**, below
- If R HYD SOV closes OR temperature decreases:  
5. Go to **Hydraulic SOV Closes**, below

**Hydraulic SOV Closes**

6. HYDRAULIC pump 2 ..... AUTO
7. System 2 temperature ..... Monitor
8. HYD 2 HI TEMP Checklist complete

**Hydraulic SOV Open**

6. HYDRAULIC pump 2 ..... OFF

**NOTE: (1) No action is required if OB BRAKE PRESS and/or IB SPOILERONS caution messages illuminate.**

**(2) Category II operations may be affected. Review the requirements.**

7. Inoperative Systems ..... Review
  - L and R inboard spoilerons inoperative
  - L and R inboard flight spoilers inoperative
  - R thrust reverser inoperative
  - Landing gear alternate extension is affected
  - Outboard brakes inoperative after accumulator is depleted
8. Land at the nearest suitable airport

CONT'D



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- ▶ If IB FLT SPLRS caution message is illuminated:
  - 9. FLIGHT SPOILER lever ..... RETRACT
  - 10. Altitude.....Max 26,000 feet
  - 11. Continue with **Prior to landing, below**
  
- ▶ If IB FLT SPLRS caution message is not illuminated:
  - 9. Continue with **Prior to landing, below**

**Prior to landing**

12. GRND PROX, FLAP ..... Confirm and OVRD
13. RH THRUST REVERSER ..... OFF
14. FLAPS..... Land at 20°

**NOTE:** The landing distance factors that follow are based upon the loss of the inboard multi-function spoilers, outboard brakes, and right thrust reverser inoperative.

15. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With One Thrust Reverser</b>	1.85 (85%)	1.95 (95%)
<b>Without Thrust Reversers</b>	1.95 (95%)	1.95 (95%)

**Caution**

- (1) An asymmetric thrust condition will exist, using the thrust reverser system with the right thrust reverser not operating. Rudder control assistance (on ground) at high speed will be required to maintain directional control.
- (2) Anticipate the loss of outboard brakes during landing when the system 2 brake accumulator depressurizes.

16. Use a steady brake application upon landing. Do not cycle the brakes.

CONT'D



**NOTE:** If the hydraulic temperature increases to 138°C and above, a hydraulic fuse will eventually open and drain the contents of the hydraulic system.

17. Brake pressure.....Check

    → If brake pressure is greater than 1,800 psi for the outboard brakes:

or      18. HYD 2 HI TEMP Checklist complete

    → If brake pressure is 1,800 psi or less for the outboard brakes:

        18. Maximum landing weight..... Determine and correct for wind and slope

OAT		Airport Pressure Altitude (Feet)					
		0	2000	4000	6000	8000	10000
°C	°F	Landing Weight (lb) Due to Maximum Brake Energy					
-40	-40	84371	81053	77876	74852	71894	68964
-20	-4	80638	77553	74562	71649	68803	66013
0	32	77300	74414	71564	68767	66037	63359
20	68	74350	71576	68861	66187	63558	60981
40	104	71693	69015	66400	63841	61290	58786

#### Wind Corrections:

Increase max landing weight by 220 lbs per 1 knot of headwind  
Decrease max landing weight by 970 lbs per 1 knot of tailwind

#### Runway Slope Corrections:

Increase max landing weight by 1325 lbs per 1% uphill slope  
Decrease max landing weight by 1765 lbs per 1% downhill slope

**NOTE: The actual landing weight must not exceed the corrected maximum landing weight due to brake energy.**

19. HYD 2 HI TEMP Checklist complete

8-6

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Amber

**HYD 3 HI TEMP Msg**

Amber

**NOTE:** If 3A and 3B pumps were running at the time the message appeared, attempt to isolate the high temperature by switching each pump to OFF, in turn.

1. HYDRAULIC pump 3B ..... ON
2. HYDRAULIC pump 3A ..... OFF
3. System 3 temperature ..... Monitor

→ If temperature stabilizes or decreases and HYD 3 LO PRESS message is off:

- or
4. Affected HYDRAULIC pump ..... Leave OFF
  5. System 3 temperature ..... Monitor
  6. HYD 3 HI TEMP Checklist complete

→ If temperature increases or HYD 3 LO PRESS message is on:

4. HYDRAULIC pump 3A ..... ON
5. HYDRAULIC pump 3B ..... OFF
6. System 3 temperature ..... Monitor

→ If temperature stabilizes or decreases and HYD 3 LO PRESS message is off:

- or
7. Affected HYDRAULIC pump ..... Leave OFF
  8. System 3 temperature ..... Monitor
  9. HYD 3 HI TEMP Checklist complete

→ If temperature increases or HYD 3 LO PRESS message is on:

7. HYDRAULIC pumps 3A and 3B ..... Both OFF
8. System 3 temperature ..... Monitor

→ If temperature less than 96°C:

Prior to landing:

9. HYDRAULIC pumps 3A and 3B ..... AUTO/ON

or  
NOTE: Category II operations may be affected. Review the requirements.

10. HYD 3 HI TEMP Checklist complete

→ If temperature 96°C or greater:

9. Land at the nearest suitable airport
10. HYD 3 HI TEMP Checklist complete

→ Accomplish HYD 3 LO PRESS Msg procedure, from step 2, page 8-12. **Leave HYDRAULIC PUMP 3B OFF.**

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Amber

**HYD 1 LO PRESS Msg**

Amber

- ☞ If during this procedure, a second hydraulic system loses pressure, proceed to the applicable double system low pressure procedure.

1. HYDRAULIC pump 1 ..... ON
2. Hydraulic quantity and pressure ..... Monitor

- If system 1 pressure is greater than or equal to 1800 psi:
3. HYDRAULIC pump 1 ..... Leave ON
  4. Hydraulic quantity and pressure ..... Monitor
  5. HYD 1 LO PRESS Checklist complete

- or
- If system 1 pressure is less than 1800 psi or is decreasing rapidly:
3. HYDRAULIC pump 1 ..... OFF
  4. L HYD SOV ..... Confirm and CLOSED

5. Inoperative systems ..... Review
  - Left and right outboard spoilerons inoperative
  - Left and right outboard flight spoilers inoperative
  - Left and right outboard ground spoilers inoperative
  - Left thrust reverser inoperative

**NOTE: No action is required if OB GND SPLRS and OB SPOILERONS caution messages display.**

6. Land at the nearest suitable airport

- If OB FLT SPLR caution message illuminates:
7. FLIGHT SPOILER lever ..... RETRACT
  8. Altitude ..... Max 26,000 Feet
  9. Proceed to Prior to landing, step 10 below

- or
- If OB FLT SPLR caution message is not illuminated:
7. Proceed to Prior to landing, step 10 below

**CONT'D**

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**Prior to landing**

10. GRND PROX, FLAP ..... Confirm and OVRD
11. LH THRUST REVERSER ..... OFF
12. FLAPS..... Land at 20°

**NOTE:** The landing distance factors that follow are based upon the loss of the outboard multi-function spoilers, outboard ground spoilers, and left thrust reverser inoperative.

13. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With One Thrust Reverser</b>	1.40 (40%)	1.45 (45%)
<b>Without Thrust Reversers</b>	1.45 (45%)	1.45 (45%)

**Caution**

An asymmetric thrust condition will exist, using the thrust reverser system with the left thrust reverser not operating. Rudder control assistance (on ground) at high speed will be required to maintain directional control.

**NOTE:** Category II operations may be affected. Review the requirements.

14. HYD 1 LO PRESS Checklist complete.

HYDRAULICS	REVISION 8	8-9
03 MAR 20		

Amber

**HYD 2 LO PRESS Msg**

Amber

- ☞ If during this procedure, a second hydraulic system loses pressure, proceed to the applicable double system low pressure procedure.

1. HYDRAULIC pump 2 ..... ON
2. Hydraulic quantity and pressure ..... Monitor

- If system 2 pressure is greater than or equal to 1,800 psi:
3. HYDRAULIC pump 2 ..... Leave ON
  4. Hydraulic quantity and pressure ..... Monitor
  5. HYD 2 LO PRESS Checklist complete
- or

- If system 2 pressure is less than 1,800 psi or quantity is decreasing rapidly:

3. HYDRAULIC pump 2 ..... OFF
4. R HYD SOV ..... Confirm and CLOSED

5. Inoperative systems ..... Review
  - Left and right inboard spoilerons inoperative
  - Left and right inboard flight spoilers inoperative
  - Landing gear emergency / alternate extension inoperative (downlock assist not available)
  - R thrust reverser inoperative
  - Outboard brakes inoperative (once system 2 accumulator pressure is depleted)

6. Land at the nearest suitable airport

**NOTE: No action is required if IB SPOILERONS and OB BRAKE PRESS caution messages illuminate.**

- If IB FLT SPLRS caution message illuminates:
- or
7. FLIGHT SPOILER lever ..... RETRACT
  8. Altitude ..... Max 26,000 feet
  9. Proceed to Prior to landing, step 10 below

- If IB FLT SPLRS caution message is not illuminated:
7. Proceed to Prior to landing, step 10 below

**Prior to landing:**

10. GRND PROX, FLAP ..... Confirm and OVRD
11. RH THRUST REVERSER ..... OFF
12. FLAPS ..... Land at 20°

**NOTE: The landing distance factors that follow are based upon the loss of the inboard multi-function spoilers, outboard brakes and right thrust reverser inoperative.**

**CONT'D**



8-10

REVISION 8

HYDRAULICS

03 MAR 20

13. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With One Thrust Reverser</b>	1.75 (75%)	1.90 (90%)
<b>Without Thrust Reversers</b>	1.90 (90%)	1.90 (90%)

**Caution**

- (1) An asymmetric thrust condition will exist using the thrust reverse system with the right thrust reverser not operating. Rudder control assistance (on ground) at high speed will be required to maintain directional control.
- (2) Anticipate the loss of outboard brakes during landing when system 2 brake accumulator depressurizes.

14. Use a steady brake application upon landing. Do not cycle the brakes.

**NOTE:** Category II operations may be affected. Review the requirements.

15. Brake pressure ..... Check

    → If brake pressure is greater than 1,800 psi for the outboard brakes:

    | or

- | 16. HYD 2 LO PRESS Checklist complete

    → If brake pressure is 1,800 psi or less for the outboard brakes:

- | 16. Maximum landing weight ..... Determine and correct for wind and slope

CONT'D



OAT		Airport Pressure Altitude (Feet)					
		0	2000	4000	6000	8000	10000
°C	°F	Landing Weight (lb) Due to Maximum Brake Energy					
-40	-40	84371	81053	77876	74852	71894	68964
-20	-4	80638	77553	74562	71649	68803	66013
0	32	77300	74414	71564	68767	66037	63359
20	68	74350	71576	68861	66187	63558	60981
40	104	71693	69015	66400	63841	61290	58786
Wind Corrections:							
Increase max landing weight by 220 lbs per 1 knot of headwind							
Decrease max landing weight by 970 lbs per 1 knot of tailwind							
Runway Slope Corrections:							
Increase max landing weight by 1325 lbs per 1% uphill slope							
Decrease max landing weight by 1765 lbs per 1% downhill slope							

**NOTE: The actual landing weight must not exceed the corrected maximum landing weight due to brake energy.**

17. HYD 2 LO PRESS Checklist complete

8-12

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Amber

**HYD 3 LO PRESS Msg**

Amber

- ☞ If during this procedure, a second hydraulic system loses pressure, proceed to the applicable double system low pressure procedure.

1. HYDRAULIC pump 3B ..... ON
2. Hydraulic quantity and pressure ..... Monitor

- If system 3 pressure is greater than or equal to 1800 psi:
  - 3. HYDRAULIC pump 3B ..... Leave ON
  - 4. Hydraulic quantity and pressure ..... Monitor
  - 5. HYD 3 LO PRESS Checklist complete
- If system 3 pressure is less than 1800 psi or quantity is decreasing rapidly:
  3. HYDRAULIC pumps 3A and 3B ..... OFF
  4. Inoperative systems ..... Review
    - L and R inboard ground spoilers inoperative
    - Inboard brakes inoperative (once system 3 accumulator pressure is depleted)
    - Normal landing gear extension and retraction inoperative
    - Nosewheel steering inoperative (may result in nosewheel shimmy)
    - Parking brake inoperative (when system 3 accumulator pressure is depleted)
  5. Land at the nearest suitable airport

**NOTE: No action is required if IB GND SPLRS and IB BRAKE PRESS caution messages illuminate.**

**Prior to landing:**

**NOTE: (1) Select the longest runway available with minimum cross-wind and turbulence.**

**(2) Category II operations may be affected. Review the requirements.**

6. GRND PROX, FLAP ..... Confirm and OVRD
7. N/W STRG ..... OFF
8. FLAPS ..... Land at 20°
9. LDG GEAR lever ..... DN
10. LANDING GEAR MANUAL RELEASE ..... PULL to full extension

**CONT'D**

- If gear not down-and-locked:
  - 11. HYD 3 LO PRESS Checklist complete, and
  - or      Accomplish Landing Gear – Unsafe Landing Procedure Checklist, page 10-17.
- If gear down-and-locked:
  - 11. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
With One or Both Thrust Reverser(s)	1.70 (70%)	2.00 (100%)
Without Thrust Reversers	2.00 (100%)	2.00 (100%)

### Caution

Anticipate the loss of inboard brakes during landing when system 3 brake accumulator depressurizes. Apply the brakes carefully.

**NOTE:** (1) Use differential braking, rudder and engine thrust as required to assist in directional control.  
 (2) Maximize the use of reverse thrust.  
 (3) The landing distance factors are based upon the loss of the inboard ground spoilers and inboard brakes.

- 12. Brake pressure.....Check
- If brake pressure is greater than 1800 psi for the inboard brakes:
  - or
    - 13. Use a steady brake application upon landing. Do not cycle the brakes.
    - 14. HYD 3 LO PRESS Checklist complete
- If brake pressure is 1800 psi or less for the inboard brakes:
  - 13. Maximum landing weight..... Determine and correct for wind and slope

CONT'D



**8-14****REVISION 8****HYDRAULICS****03 MAR 20**

OAT		Airport Pressure Altitude (Feet)					
		0	2000	4000	6000	8000	10000
°C	°F	Landing Weight (lb) Due to Maximum Brake Energy					
-40	-40	84371	81053	77876	74852	71894	68964
-20	-4	80638	77553	74562	71649	68803	66013
0	32	77300	74414	71564	68767	66037	63359
20	68	74350	71576	68861	66187	63558	60981
40	104	71693	69015	66400	63841	61290	58786

Wind Corrections:  
Increase max landing weight by 220 lbs per 1 knot of headwind  
Decrease max landing weight by 970 lbs per 1 knot of tailwind

Runway Slope Corrections:  
Increase max landing weight by 1325 lbs per 1% uphill slope  
Decrease max landing weight by 1765 lbs per 1% downhill slope

**NOTE: The actual landing weight must not exceed the corrected maximum landing weight due to brake energy.**

14. HYD 3 LO PRESS Checklist complete

HYDRAULICS	REVISION 8	8-15
03 MAR 20		

Amber	<b>HYD 1 LO PRESS Msg - AND - HYD 2 LO PRESS Msg</b>	Amber
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1. HYDRAULIC pumps (all).....ON
2. Hydraulic quantity and pressure .....Check

→ If systems 1 and 2 quantity and pressure **normal**:  
 or      3. Hydraulic quantity and pressure .....Monitor  
         4. HYD 1 LO PRESS -AND- HYD 2 LO PRESS Checklist complete

→ If systems 1 and 2 quantity and pressure **not normal**:  
 3. HYDRAULIC pumps 1 and 2 .....OFF  
 4. L and R HYD SOV .....Confirm and CLOSED

5. Inoperative systems .....Review
  - L and R spoilerons (inboard and outboard)
  - L and R flight spoilers (inboard and outboard) inoperative
  - L and R ground spoilers (outboard) inoperative
  - Landing gear emergency / alternate extension inoperative (downlock assist actuator)
  - Outboard brakes inoperative once system 2 accumulator pressure is depleted
  - L and R thrust reversers

6. Land at the nearest suitable airport

**NOTE: No action is required if OB GND SPLRS, IB SPOILERONS, OB SPOILERONS, and OB BRAKE PRESS caution messages illuminate.**

→ If IB FLT SPLRS and OB FLT SPLRS caution messages illuminates:  
 or      7. FLIGHT SPOILER lever .....RETRACT  
         8. Altitude .....Max 26,000 feet  
         9. Proceed to Prior to landing, step 10 below

→ If IB FLT SPLRS and OB FLT SPLRS caution message is **not illuminated**:  
 7. Proceed to Prior to landing, step 10 below

**Prior to landing:**

10. GRND PROX, FLAP .....Confirm and OVRD
11. LH and RH THRUST REVERSERS .....OFF
12. FLAPS .....Land at 20°
13. Actual landing distance .....Increase

**CONT'D**



**8-16****REVISION 8****HYDRAULICS**

03 MAR 20

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

		Runway Surface	
		Dry	Wet or Contaminated
Without Thrust Reversers	2.15 (115%)	2.15 (115%)	

**Caution**

Anticipate the loss of outboard brakes during landing when system 2 brake accumulator depressurizes. Apply brakes carefully. Do not cycle the brakes.

- NOTE:** (1) Category II operations may be affected. Review requirements.  
 (2) The landing distance factor is based upon the loss of the outboard multi-function spoilers, inboard/outboard ground spoilers, inboard brakes, and left thrust reverser.

14. Maximum landing weight ..... Determine and correct for wind and slope

OAT		Airport Pressure Altitude (Feet)					
		0	2000	4000	6000	8000	10000
°C	°F	Landing Weight (lb) Due to Maximum Brake Energy					
-40	-40	83318	80055	76924	73946	71027	68130
-20	-4	79617	76600	73650	70773	67963	65206
0	32	76320	73473	70677	67914	65219	62574
20	68	73393	70657	67979	65357	62760	60216
40	104	70758	68117	65538	63014	60510	58039

Wind Corrections:  
 Increase max landing weight by 220 lbs per 1 knot of headwind  
 Decrease max landing weight by 970 lbs per 1 knot of tailwind

Runway Slope Corrections:  
 Increase max landing weight by 1540 lbs per 1% uphill slope  
 Decrease max landing weight by 2200 lbs per 1% downhill slope

**NOTE:** The actual landing weight must not exceed the corrected maximum landing weight due to brake energy.

15. HYD 1 LO PRESS -AND- HYD 2 LO PRESS Checklist complete

HYDRAULICS	REVISION 8	8-17
03 MAR 20		

Amber	<b>HYD 1 LO PRESS Msg</b> - AND - <b>HYD 3 LO PRESS Msg</b>	Amber
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1. HYDRAULIC pumps (all).....ON
2. HYDRAULIC quantity and pressure.....Check

**NOTE: Normal system 3 quantity may be greater than 85% in flight.**

- If systems 1 and 3 quantity and pressure normal:
  - 3. Hydraulic quantity and pressure .....Monitor
  - or 4. HYD 1 LO PRESS -AND- HYD 3 LO PRESS Checklist complete
  
- If systems 1 and 3 quantity and pressure not normal:
  - 3. HYDRAULIC pumps 1, 3A and 3B .....OFF
  - 4. L HYD SOV .....Confirm and CLOSED

### Caution

**Flight path control is limited with hydraulic systems 1 and 3 failed. Select longest runway available with minimum crosswind and turbulence. Rudder control is adequate for normal flight and should be used in coordination with aileron, if necessary, during turns.**

5. Inoperative systems .....Review
  - L aileron inoperative and will upfloat. Use aileron trim to compensate.
  - L and R outboard spoilerons inoperative
  - L and R outboard flight spoilers inoperative
  - L and R inboard and outboard ground spoilers inoperative
  - L thrust reverser inoperative
  - Landing gear normal extension inoperative
  - Nosewheel steering inoperative (may result in nosewheel shimmy)
  - Inboard brakes inoperative (once system 3 accumulator pressure is depleted)
  - Parking brake inoperative

**NOTE: No action is required if IB GND SPLRS, IB BRAKE PRESS, OB GND SPLRS, and OB SPOILERONS caution messages illuminate.**

6. Land at the nearest suitable airport

- If OB FLT SPLR caution message illuminates:
  - or 7. FLIGHT SPOILER lever .....RETRACT
  - 8. Altitude .....Max 26,000 feet
  - 9. Go to **Prior to landing, page 8-18**
  
- **FLT SPLR caution message is not illuminated:**
  - 7. Go to **Prior to landing, page 8-18**

**CONT'D**



**8-18****REVISION 8****HYDRAULICS**

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**Prior to landing:**

10. GRND PROX, FLAP ..... Confirm and OVRD
11. LH THRUST REVERSER.....OFF
12. N/W STRG .....OFF
13. FLAPS.....Land at 20°
14. LDG GEAR lever.....DN
15. LANDING GEAR MANUAL RELEASE.....PULL  
to full extension
16. Actual landing distance .....Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

<b>Runway Surface</b>		
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With One Thrust Reverser</b>	1.95 (95%)	2.15 (115%)
<b>Without Thrust Reversers</b>	2.15 (115%)	2.15 (115%)

**Caution**

Anticipate the loss of inboard brakes during landing when system 3 brake accumulator depressurizes. Apply the brakes carefully.

- NOTE: (1) An asymmetric thrust condition will exist using one thrust reverser. On the ground at high speed, rudder control assistance will be required to maintain directional control.**
- (2) Category II operations may be affected. Review the requirements.**
- (3) The landing distance factors are based upon the loss of the outboard multi-function spoilers, inboard/outboard ground spoilers, inboard brakes, and left thrust reverser.**

17. Maximum landing weight ..... Determine and correct for wind and slope

**CONT'D**

OAT		Airport Pressure Altitude (Feet)					
		0	2000	4000	6000	8000	10000
°C	°F	Landing Weight kg (lb) Due to Maximum Brake Energy					
-40	-40	83318	80055	76924	73946	71027	68130
-20	-4	79617	76600	73650	70773	67963	65206
0	32	76320	73473	70677	67914	65219	62574
20	68	73393	70657	67979	65357	62760	60216
40	104	70758	68117	65538	63014	60510	58039
Wind Corrections:							
Increase max landing weight by 220 lbs per 1 knot of headwind							
Decrease max landing weight by 970 lbs per 1 knot of tailwind							
Runway Slope Corrections:							
Increase max landing weight by 1545 lbs per 1% uphill slope							
Decrease max landing weight by 2200 lbs per 1% downhill slope							

**NOTE: The actual landing weight must not exceed  
the corrected maximum landing weight due  
to brake energy.**

18. HYD 1 LO PRESS -AND- HYD 3 LO PRESS Checklist complete

**8-20**

REVISION 8

HYDRAULICS

03 MAR 20

Amber

**HYD 2 LO PRESS Msg  
- AND -  
HYD 3 LO PRESS Msg**

Amber

1. HYDRAULIC pumps (all).....ON
2. Hydraulic quantity and pressure .....Check

**NOTE: Normal system 3 quantity may be greater than  
85% in flight.**

- If systems 2 and 3 quantity and pressure normal:  
or
  3. Hydraulic quantity and pressure .....Monitor
  4. HYD 2 LO PRESS -AND- HYD 3 LO PRESS Checklist complete
- If systems 2 and 3 quantity and pressure not normal:  
  3. HYDRAULIC pumps 2, 3A, and 3B.....OFF
  4. R HYD SOV .....Confirm and CLOSED

**Caution**

**Flight path control is limited with hydraulic systems 2 and 3 failed. Select longest runway available with minimum crosswind and turbulence. Rudder control is adequate for normal flight and should be used in coordination with aileron, if necessary, during turns.**

5. Inoperative systems .....Review
  - R aileron inoperative and will upfloat. Use aileron trim to compensate.
  - L and R inboard spoilerons inoperative
  - L and R inboard flight spoilers inoperative
  - L and R inboard ground spoilers inoperative
  - Landing gear normal extension and retraction inoperative (MLG may not lock down during manual extension)
  - Nosewheel steering inoperative
  - R thrust reverser inoperative
  - Brakes (inboard and outboard) have accumulator pressure only.
  - Parking brake inoperative once system 3 accumulator pressure is depleted

**NOTE: No action is required if IB GND SPLRS, IB SPOILERONS, IB BRAKE PRESS, and OB BRAKE PRESS caution messages displayed.**

**CONT'D**



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6. Land at the nearest suitable airport

- If IB FLT SPLR caution message illuminates:
  - 7. FLIGHT SPOILER lever ..... RETRACT
  - or 8. Altitude.....Max 26,000 feet
  - 9. Go to **Prior to landing, below**

- If IB FLT SPLR caution message is not illuminated:
  - 7. Go to **Prior to landing, below**

**Prior to landing:**

10. GRND PROX, FLAP ..... Confirm and OVRD
11. RH THRUST REVERSER ..... OFF
12. N/W STRG ..... OFF
13. ANTI-SKID.....OFF
14. FLAPS.....Land at 20°
15. LDG GEAR lever.....DN

**NOTE: Main landing gear relies upon free fall following a manual landing gear extension. Side-slip may be required to achieve downlock.**

16. LANDING GEAR MANUAL RELEASE.....PULL to full extension

**WARNING**

The nose gear will not extend during the landing gear manual extension procedure with both HYD 2 LO PRESS and HYD 3 LO PRESS messages displayed.

**Caution**

- (1) An asymmetric thrust condition will exist using one thrust reverser. On the ground at high speed, rudder control assistance will be required to maintain directional control.
- (2) Anticipate the loss of inboard and outboard brakes during landing when systems 2 and 3 brake accumulators depressurize. Use a slow steady application of brakes. Do not cycle the brakes.

**NOTE: Category II operations may be affected. Review the requirements.**

17. HYD 2 LO PRESS -AND- HYD 3 LO PRESS Checklist complete, and

- ☛ Accomplish Landing Gear – Unsafe Landing Procedure Checklist, page 10-17.

**8-22****REVISION 8****HYDRAULICS**

03 MAR 20

Amber

**HYD EDP 1A (2A) Msg**

Amber

1. Affected HYDRAULIC pump 1 (2) .....ON
2. Hydraulic quantity and pressure .....Monitor

**NOTE:** (1) The applicable EDP may be operating without sufficient hydraulic fluid. Log the length of time that the message remains on display. Monitor the applicable hydraulic system fluid temperature readout.

(2) Category II operations may be affected. Review the requirements.

3. HYD EDP 1A (2A) Checklist complete

Amber

**HYD PUMP 1B (2B) Msg**

Amber

1. Affected HYDRAULIC pump 1 (2) .....ON
2. Hydraulic quantity and pressure .....Monitor

► If HYD PUMP 1B (2B) Msg extinguishes:  
or  
3. HYD PUMP 1B (2B) Checklist complete

↳ If HYD PUMP 1B (2B) Msg persists:  
3. HYDRAULIC pump 1 (2).....OFF

**NOTE: Category II operations may be affected. Review the requirements.**

4. HYD PUMP 1B (2B) Checklist complete

HYDRAULICS	REVISION 8	8-23
	03 MAR 20	

Amber

**HYD PUMP 3A Msg**

Amber

1. HYDRAULIC pump 3B ..... ON
  2. HYDRAULIC pump 3A ..... OFF
  3. Hydraulic quantity and pressure ..... Monitor
- NOTE: Category II operations may be affected. Review the requirements.**
4. HYD PUMP 3A Checklist complete

Amber

**HYD PUMP 3B Msg**

Amber

1. HYDRAULIC pump 3B ..... ON
2. Hydraulic quantity and pressure ..... Monitor

→ If HYD PUMP 3B Msg extinguishes:

or      3. HYD PUMP 3B Checklist complete

→ If HYD PUMP 3B Msg persists:

3. HYDRAULIC pump 3B ..... OFF

**NOTE: Category II operations may be affected. Review the requirements.**

4. HYD PUMP 3B Checklist complete

Amber

**HYD SOV 1 (2) OPEN Msg**

Amber

**NOTE: Category II operations may be affected. Review the requirements.**

1. Land at the nearest suitable airport
2. HYD SOV 1 (2) OPEN Checklist complete

UNCONTROLLED WHEN PRINTED

**8-24**

REVISION 8

03 MAR 20

HYDRAULICS

**Intentionally Left Blank**

FLIGHT CONTROLS	REVISION 8	9-1
	03 MAR 20	

## Chapter 9: Flight Controls

### Stabilizer Trim Runaway

- |                                |   |
|--------------------------------|---|
| <b>1. Control wheel.....</b>   | <b>Assume manual control and override runaway</b> |
| <b>2. STAB TRIM DISC .....</b> | <b>Push, hold and release</b>                     |
| 3.                             | Immediate Action Items Complete, assign PF.       |

----- Continued from QRC -----

4. Airspeed ..... ADJUST to minimize out-of-trim condition
 

**NOTE:** (1) If a pull force is required, increase airspeed. If a push force is required, decrease airspeed.  
 (2) Do not exceed VMO/MMO or minimum maneuvering speed as appropriate.  
 (3) Flight spoilers will reduce airspeed and provide nose-up pitch.  
 (4) Reducing thrust will reduce airspeed and provide nose-up pitch.  
 (5) Autopilot, stabilizer trim and Mach trim are not available.
5. PASS SIGNS ..... ON
6. Land at the nearest suitable airport

#### Caution

If control forces are excessive, some relief may be gained by adjusting airspeed or flap position. Increased flap settings generally reduce pull forces for a given airspeed. Decreased airspeed reduces push forces for a given flap configuration.

#### Prior to landing:

7. GRND PROX, FLAP ..... Confirm and OVRD
8. FLAPS.....Land at 20°

**NOTE:** Control column force gradient is significantly reduced with flap deployment from FLAP 0. The combined effects of reduced approach airspeed, flap configuration and changes to the pitch force gradient with flap selection, make FLAP 20 the recommended landing configuration for both a nose-up and nose-down out-of-trim condition.

CONT'D



**9-2****REVISION 8****FLIGHT CONTROLS****03 MAR 20**

9. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

**WARNING**

In the event of a go-around, increasing thrust will increase nose-down forces. Increase thrust slowly to avoid excessive pitch forces.

**NOTE:** A slight pitch-up tendency may occur upon selection of reverse thrust. This can be readily corrected by the application of nose-down elevator and/or brakes.

10. Stab Trim Runaway Checklist complete

**Aileron System Jammed****Caution**

Maintain positive control of aircraft at all times.

1. Autopilot ..... Disengage
2. Aileron controls (both)..... Release pressure
3. ROLL DISC handle ..... PULL, TURN 90° to lock
4. Airplane control ..... Reference Flight Control synoptic and transfer to pilot with operative aileron

**----- Continued from QRC -----**

5. Immediate Action Items complete
6. PLT ROLL or CPLT ROLL..... Select operative side

**NOTE:** (1) Roll controllability is reduced. The roll disconnect will result in half feel during airplane handling.  
 (2) If PLT ROLL or CPLT ROLL is not selected within 20 seconds of pulling the ROLL DISC handle, the SPOILERONS ROLL caution message will come on.

7. Land at the nearest suitable airport

**NOTE:** Select the longest runway available with minimum cross-wind and turbulence.

**Prior to landing:**

8. GRND PROX, FLAP..... Confirm and OVRD
9. FLAPS..... Land at 20°
10. Actual landing distance..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.25 (25%)	1.35 (35%)
Without Thrust Reversers	1.35 (35%)	1.35 (35%)

11. Aileron System Jammed Checklist complete

9-4

REVISION 8

FLIGHT CONTROLS

03 MAR 20

**Elevator System Jammed****Caution****Maintain positive control of aircraft at all times.**

1. Autopilot ..... Disengage
2. Elevator controls (both) ..... Release differential pressure
3. PITCH DISC handle ..... PULL, TURN 90° to lock
4. Airplane control ..... Reference Flight Control  
synoptic and transfer to  
pilot with operative elevator

**----- Continued from QRC -----**

5. Immediate Action Items complete
6. Airspeed ..... Not more than 250 KIAS

**NOTE:** (1) Pitch controllability is reduced. The pitch disconnect will result in half feel during airplane handling.  
 (2) Stick pusher is inoperative if the right side is jammed.  
 (3) The ELEVATOR SPLIT caution message may be displayed if elevator use is aggressive. Avoid excessive elevator inputs.

7. Land at the nearest suitable airport

**NOTE:** Select the longest runway available with minimum cross-wind and turbulence.

**Prior to landing:**

8. GRND PROX, FLAP ..... Confirm and OVRD
9. FLAPS ..... Land at 20°

**CONT'D**

<b>FLIGHT CONTROLS</b>	<b>REVISION 8</b>	<b>9-5</b>
	<b>03 MAR 20</b>	

10. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	<b>Runway Surface</b>	
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

**NOTE:** A slight pitch-up tendency may occur upon selection of reverse thrust. This can be readily corrected by the application of nose-down elevator and/or brakes.

After landing:

**NOTE:** If ELEVATOR SPLIT caution message was displayed, airplane structure may be compromised and must be inspected for damage.

11. Elevator System Jammed Checklist complete

9-6

REVISION 8

FLIGHT CONTROLS

03 MAR 20

**Rudder System Jammed**

1. Yaw Damper, DISC..... SELECT

**NOTE: YAW DAMPER caution message will display.**

2. Rudder pedals..... Overpower

----- **Continued from QRC** -----

**NOTE: (1) Limited travel may be available through the use of the rudder trim.**

**(2) Rudder may be available at higher pedal forces.**

3. Immediate Action Items complete, assign PF.

4. Land at nearest suitable airport.

**NOTE: (1) Use aileron and differential thrust to maintain straight flight until touchdown.**

**(2) If the rudder is jammed out of the neutral position, use aileron and differential thrust to maintain straight flight until touchdown.**

**(3) Select the longest runway available with minimum turbulence and crosswind.**

**(4) After touchdown use differential braking to maintain directional control as the airplane will turn in the direction of the jammed rudder.**

**(5) Before using the nosewheel steering tiller, ensure that the nose strut is compressed to prevent nosewheel steering failure.**

**Prior to landing:**

5. GRND PROX, FLAP..... Confirm and OVRD

6. FLAPS..... Land at 20°

7. Actual landing distance..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

	Runway Surface	
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

8. Rudder System Jammed Checklist complete

FLIGHT CONTROLS	REVISION 8	9-7
	03 MAR 20	

**Uncommanded Yaw Motion**

1. Controls..... Assume manual control and counter aircraft motion using control wheel
2. YAW DAMPER, DISC button..... SELECT

----- **Continued from QRC** -----

**NOTE: Disregard YAW DAMPER Caution Message.**

3. Immediate Action Items complete, assign PF.
4. Airspeed.....Not more than 250 KIAS
5. Land at nearest suitable airport

**NOTE: Select the runway with minimum crosswind and turbulence.**

6. Uncommanded Yaw Motion Checklist complete

9-8

REVISION 8

FLIGHT CONTROLS

03 MAR 20

Amber

**ELEVATOR SPLIT Msg**

Amber

1. Autopilot ..... Disengage
2. Airspeed ..... Do not exceed 200 KIAS
3. Avoid excessive elevator input

**NOTE:** Use pitch trim as necessary to minimize elevator deflections. Use aileron control as necessary to stabilize the airplane.

4. Land at the nearest suitable airport

**NOTE:** Controllability is reduced. Select the longest runway available within minimum cross-wind and turbulence.

**Prior to landing:**

5. GRND PROX, FLAP ..... Confirm and OVRD
6. FLAPS ..... Land at 20°
7. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Antiskid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.25 (25%)	1.35 (35%)
Without Thrust Reversers	1.35 (35%)	1.35 (35%)

**Caution**

Airplane structure may be compromised and must be inspected for damage after landing.

8. ELEVATOR SPLIT Checklist complete

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Amber	<b>FLAPS FAIL Msg</b>	Amber
-------	-----------------------	-------

- ☞ If during this procedure, the SLATS FAIL Msg also displays on the EICAS, proceed to the combined FLAPS FAIL Msg -AND- SLATS FAIL Msg Checklist, page 9-12.

1. SLATS/FLAPS lever..... Select last position then re-select

- If FLAPS FAIL Msg extinguishes:  
or 2. FLAPS FAIL Checklist complete

- If FLAPS FAIL Msg persists:

2. FLIGHT CONTROLS synoptic ..... Select to determine flap position

- If actual flap position matches a detented position (0, 1, 8, 20, 30, 45):  
3. SLATS/FLAPS lever ..... Select to detent matching actual flap position and do not attempt to operate flaps until further advised  
4. Maximum enroute airspeed ..... V<sub>FE</sub> for detent flap position  
or 5. Altitude..... Not above 15,000 feet

**NOTE: If flaps and slats are confirmed retracted (0°), reduction of cruise airspeed/altitude is not required.**

6. Proceed to Prior to landing, step 7 below

- If actual flap position does not match a detented position:

3. SLATS/FLAPS lever ..... Select to closest detent position less than actual flap position and do not attempt to operate flaps any further

4. Maximum enroute airspeed ..... V<sub>FE</sub> for next greater flap setting from failed position  
5. Altitude..... Not above 15,000 feet  
6. Proceed to Prior to landing, step 7 below

**Prior to landing:**

7. GRND PROX, FLAP ..... Confirm and OVRD  
8. HYDRAULIC pumps 1, 2 and 3B ..... ON

- If flaps confirmed retracted (0°):  
or 9. SLATS/FLAPS lever ..... Select 1  
10. Go to step 11 below

- If flaps not confirmed retracted (0°):  
9. Go to step 11 below

CONT'D



**9-10****REVISION 9****FLIGHT CONTROLS****30 JUL 21**

11. Final approach speed..... $V_{REF}$  (FLAPS 45)  
+  $\Delta V_{REF}$  from the following table

Flaps Position	$\Delta V_{REF}$	
	Slats Position	
	20	25
0-7	24	Not Applicable
8-19	18	Not Applicable
20-29	12	Not Applicable
30-44	Not Applicable	8
45	Not Applicable	0

12. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Antiskid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Final Approach Speed $\Delta V_{REF}$ (kt)	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	24	1.35
	18	1.30
	12	1.25
	8	1.20
Without Thrust Reverser(s)	24	1.45
	18	1.40
	12	1.35
	8	1.30

**NOTE:** (1) Windshear guidance is inoperative.

- (2) For flaps failed at less than full extension, a higher than normal pitch attitude will be required during the approach. Visual cues may be misleading. Use any available glidepath reference (ILS, FMS, VNAV, VASI, etc.) to maintain proper glidepath control.
- (3) Should a go-around be required, climb at the calculated  $V_{REF}$  until reaching acceleration altitude.

**CONT'D**



- If the  $\Delta V_{REF}$  is 8 or 12 knots:  
 or      13. FLAPS FAIL Checklist complete

- If the  $\Delta V_{REF}$  is 18 or 24 knots:

13. Maximum landing weight ..... Determine  
 using the following  
 table and correct for wind

OAT		Airport Pressure Altitude (Feet)					
		0	2000	4000	6000	8000	10000
°C	°F	Landing Weight (lb) Associated with max. Tire Speed					
-40	-40	85980	85980	85980	85980	85980	85980
-20	4	85980	85980	85980	85980	85980	85980
0	32	85980	85980	85980	85980	85980	80811
20	68	85980	85980	85980	85980	81939	74907
40	104	85980	85980	85980	83393	76127	69668

Wind Corrections:  
 Increase max landing weight by 441 lbs per 1 knot of headwind  
 Decrease max landing weight by 1,433 lbs per 1 knot of tailwind

## CONT'D



- NOTE:** (1) The actual landing weight must not exceed the corrected landing weight due to tire speed.  
 (2) A slight pitch-up tendency may occur upon selection of reverse thrust. This can be readily corrected by the application of nose-down elevator and/or brakes.

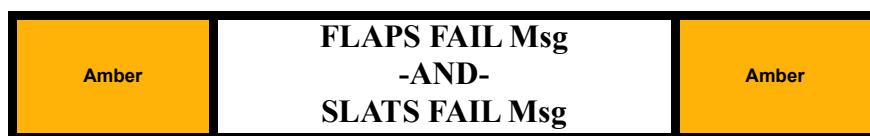
14. FLAPS FAIL Checklist complete

9-12

REVISION 9

30 JUL 21

FLIGHT CONTROLS



1. SLATS/FLAPS lever..... Select last position then re-select

→ If FLAPS FAIL -AND- SLATS FAIL Msgs extinguish:

or      2. FLAPS FAIL -AND- SLATS FAIL Checklist complete

→ If FLAPS FAIL -AND- SLATS FAIL Msgs persist:

2. FLIGHT CONTROLS synoptic ..... Check to verify actual flaps and slats position

→ If actual flap position matches a detented position

(0, 1, 8, 20, 30, 45):

3. SLATS/FLAPS lever..... Select to detent position matching actual flap position and do not attempt to operate flaps any further

or      4. Maximum enroute airspeed..... V<sub>FE</sub> for detent flap position

**NOTE: With flaps 0°, do not exceed 230 KIAS unless slats are confirmed retracted (0°).**

5. Altitude..... Not above 15,000 feet  
6. Proceed to Prior to landing, below

→ If actual flap position does not match a detented position:

3. SLATS/FLAPS lever..... Select to closest detent position less than actual flap position and do not attempt to operate flaps any further

4. Maximum enroute airspeed..... V<sub>FE</sub> for next greater flap setting from failed position

5. Altitude..... Not above 15,000 feet  
6. Proceed to Prior to landing, below

**Prior to landing:**

7. GRND PROX, FLAP ..... Confirm and OVRD  
8. HYDRAULIC pumps 1, 2, and 3B ..... ON

**CONT'D**



9. Final approach speed .....  $V_{REF}$  (FLAPS 45) +  
 $\Delta V_{REF}$  from the following table:

Flaps Position	$\Delta V_{REF}$		
	Slats Position		
	0-19	20-24	25
0-7	40	24	24
8-19	30	18	18
20-29	30	12	12
30-44	24	24	8
45	10	10	0

10. Actual landing distance ..... Increase from the table below.

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

Final Approach Speed $\Delta V_{REF}$ (kt)	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	40	1.60
	30	1.50
	24	1.35
	18	1.30
	12	1.25
	10	1.25
	8	1.20
Without Thrust Reverser(s)	40	1.70
	30	1.55
	24	1.45
	18	1.40
	12	1.35
	10	1.30
	8	1.30

CONT'D



**9-14****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

**NOTE: (1) Windshear guidance is inoperative.**

- (2) For flaps failed at less than full extension, a higher than normal pitch attitude will be required during the approach. For slats failed at less than full extension, a lower than normal pitch attitude will be required during the approach. Visual cues may be misleading. Use any available glidepath reference (ILS, FMS, VNAV, VASI, etc.) to maintain proper glidepath control.
- (3) The actual landing weight must not exceed the corrected maximum landing weight due to tire speed.
- (4) A slight pitch-up tendency may occur upon selection of reverse thrust. This can be readily corrected by the application of nose-down elevator and/or brakes.
- (5) Should a go-around be required, climb at the  $V_{REF}$  calculated from the table above until reaching acceleration altitude.

**CONT'D**

- If the  $\Delta V_{REF}$  is 12 knots or less:
- or 11. FLAPS FAIL -AND- SLATS FAIL Checklist complete
- If the  $\Delta V_{REF}$  is 18, 24, or 30 knots:
11. Maximum landing weight..... Determine and correct for wind
- | OAT                |                    | Airport Pressure Altitude (Feet)                    |       |       |       |       |       |
|--------------------|--------------------|---|-------|-------|-------|-------|-------|
|                    |                    | 0   | 2000  | 4000  | 6000  | 8000  | 10000 |
| $^{\circ}\text{C}$ | $^{\circ}\text{F}$ | Landing Weight (lb) Associated with max. Tire Speed |       |       |       |       |       |
| -40                | -40                | 85980   | 85980 | 85980 | 85980 | 85980 | 85980 |
| -20                | -4                 | 85980   | 85980 | 85980 | 85980 | 85980 | 81532 |
| 0                  | 32                 | 85980   | 85980 | 85980 | 85980 | 82179 | 74912 |
| 20                 | 68                 | 85980   | 85980 | 85980 | 83198 | 75835 | 69168 |
| 40                 | 104                | 85980   | 85980 | 84307 | 76871 | 70101 | 63819 |
- Wind Corrections:  
Increase max landing weight by 441 lb per 1 knot of headwind  
Decrease max landing weight by 1,477 lb per 1 knot of tailwind
12. FLAPS FAIL -AND- SLATS FAIL Checklist complete
- If the  $\Delta V_{REF}$  is 40 knots:
11. Maximum landing weight..... Determine and correct for wind
- | OAT                |                    | Airport Pressure Altitude (Feet)                     |       |       |       |       |       |
|--------------------|--------------------|--|-------|-------|-------|-------|-------|
|                    |                    | 0  | 2000  | 4000  | 6000  | 8000  | 10000 |
| $^{\circ}\text{C}$ | $^{\circ}\text{F}$ | Landing Weight kg(lb) Associated with Max Tire Speed |       |       |       |       |       |
| -40                | -40                | 85980  | 85980 | 85980 | 85980 | 85980 | 85980 |
| -20                | -4                 | 85980  | 85980 | 85980 | 85980 | 79063 | 71807 |
| 0                  | 32                 | 85980  | 85980 | 85980 | 79301 | 72040 | 65331 |
| 20                 | 68                 | 85980  | 85980 | 79861 | 79301 | 65962 | 59752 |
| 40                 | 104                | 85980  | 80790 | 73546 | 66891 | 60580 | 54748 |
- Wind Corrections:  
Increase max landing weight by 441 lb per 1 knot of headwind  
Decrease max landing weight by 1,543 lb per 1 knot of tailwind
12. FLAPS FAIL -AND- SLATS FAIL Checklist complete

**9-16****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

Amber

**FLT SPLR DEPLOY Msg**

Amber

1. FLIGHT SPOILER lever ..... RETRACT
2. FLT SPLR DEPLOY Checklist complete

Amber

**GLD NOT ARMED Msg**

Amber

1. GND LIFT DUMPING ..... MAN ARM

→ If GLD NOT ARMED Msg extinguishes:  
 or            2. GLD NOT ARMED Checklist complete

→ If GLD NOT ARMED Msg persists:

**NOTE: The landing distance factors that follow are based upon complete loss of ground lift dumping.**

2. Actual landing distance ..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

**After touchdown:**

3. FLIGHT SPOILER lever ..... Select MAX
4. GLD NOT ARMED Checklist complete

<b>FLIGHT CONTROLS</b>	<b>REVISION 9</b>	<b>9-17</b>
	<b>30 JUL 21</b>	

Amber

**GLD UNSAFE Msg**

Amber

1. GND LIFT DUMPING.....MAN DISARM

**NOTE:** The landing distance factors that follow are based upon complete loss of ground lift dumping.

2. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	<b>Runway Surface</b>	
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

**CONT'D****After touchdown:**

3. GND LIFT DUMPING.....MAN ARM  
4. GLD UNSAFE Checklist complete

**9-18****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

Amber

**GND SPLR DEPLOY Msg**

Amber

1. GND LIFT DUMPING.....MAN DISARM

**Prior to landing:**

2. GRND PROX, FLAP.....Confirm and OVRD
3. FLAPS.....Land at 20°
4. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.35 (35%)	1.40 (40%)
<b>Without Thrust Reversers</b>	1.40 (40%)	1.40 (40%)

**NOTE:** (1) Landing distance factors are based upon complete loss of ground lift dumping.  
(2) Select the longest runway available with minimum crosswind.

**After touchdown:**

5. GND LIFT DUMPING.....MANARM to deploy ground spoilers
6. GND SPLR DEPLOY Checklist complete

Amber

## IB (OB) FLT SPLRS Msg

Amber

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

- ▶ If flight spoilers are deployed:
  - 1. FLIGHT SPOILER lever.....RETRACT
  - or
  - 2. IB (OB) FLT SPLRS Checklist complete
- ▶ If flight spoilers are retracted:
  - 1. Airplane altitude .....Max 26,000 feet
- ▶ If IB (OB) SPOILERONS caution message is not displayed:
  - or
  - 2. IB (OB) FLT SPLRS Checklist complete
- ▶ If IB (OB) SPOILERONS caution message is displayed:

## Prior to landing:

2. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.20 (20%)	1.25 (25%)
<b>Without Thrust Reversers</b>	1.25 (25%)	1.25 (25%)

3. IB (OB) FLT SPLRS Checklist complete

**9-20****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

Amber

**IB (OB) GND SPLRS Msg**

Amber

1. GND LIFT DUMPING ..... MAN DISARM
2. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.30 (30%)
<b>Without Thrust Reversers</b>	1.30 (30%)	1.30 (30%)

**After touchdown:**

3. GND LIFT DUMPING ..... MAN ARM  
to deploy ground spoilers
4. IB (OB) GND SPLRS Checklist complete

Amber

## IB (OB) SPOILERONS Msg

Amber

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

- If IB (OB) FLT SPLRS caution message is not displayed:  
or  
1. IB (OB) SPOILERONS Checklist complete
- If IB (OB) FLT SPLRS caution message is displayed:  
1. Actual landing distance .....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.20 (20%)	1.25 (25%)
Without Thrust Reversers	1.25 (25%)	1.25 (25%)

- NOTE:** (1) The landing distance factors are based upon inboard and outboard multi-function spoilers failed.  
(2) Select the longest runway available with minimum crosswind.

2. IB (OB) SPOILERONS Checklist complete

Amber

## MACH TRIM Msg

Amber

1. STAB TRIM CH 1 and CH 2 .....ENGAGE

**NOTE:** At least one STAB TRIM channel must be engaged prior to MACH TRIM engagement.

2. MACH TRIM .....ENGAGE

- If MACH TRIM Msg extinguishes:  
or  
3. MACH TRIM Checklist complete
- If MACH TRIM Msg persists:

**Caution**

With a MACH TRIM failure, do not exceed 250 KIAS (0.70 M), unless the autopilot is engaged and functioning normally.

3. MACH TRIM Checklist complete

**9-22****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

Amber

**PITCH FEEL Msg**

Amber

- ☞ If aircraft is on the ground and off the gate, accomplish System Reset.

**Caution**

Avoid excessive pitch inputs. Use stabilizer trim to alleviate control forces.

**Prior to landing:**

1. GRND PROX, FLAP ..... Confirm and OVRD
2. FLAPS ..... Land at 20°
3. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

4. PITCH FEEL Checklist complete

Amber

**RUD LIMITER Msg**

Amber

- ☛ If aircraft is on the ground and off the gate, accomplish System Reset.

- If rudder limiter failed at or near full travel:

**Caution**

Excessive rudder input may result in unacceptable handling characteristics or exceed structural limits.

- or
1. Avoid excessive rudder inputs
  2. Airspeed.....Do not exceed 200 KIAS
  3. Land at the nearest suitable airport

**NOTE: Flight controls synoptic page indications – Limit markers (goalposts) should be amber.**

4. RUD LIMITER Checklist complete

- If rudder limiter did not fail at or near full travel:

**Caution**

Rudder travel is limited. Additional aileron input may be required to maintain directional control.

1. Land at the nearest suitable airport
2. Select the longest runway available with minimum turbulence and crosswind.

**Prior to landing:**

3. GRND PROX, FLAP ..... Confirm and OVRD
4. FLAPS ..... Land at 20°
5. Actual landing distance ..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.25 (25%)	1.35 (35%)
Without Thrust Reversers	1.35 (35%)	1.35 (35%)

**NOTE: Flight controls synoptic page indications – Limit markers (goalposts) should be amber**

6. RUD LIMITER Checklist complete

**9-24****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

Amber

**SLATS FAIL Msg**

Amber

- ☞ If during this procedure, the FLAPS FAIL Msg also displays on the EICAS, proceed to the combined FLAPS FAIL Msg -AND- SLATS FAIL Msg Checklist, page 9-12.

1. SLATS/FLAPS lever..... Select last position then re-select

- If SLATS FAIL Msg extinguishes:  
or  
2. SLATS FAIL Checklist complete

- If SLATS FAIL Msg persists:  
2. FLIGHT CONTROLS synoptic ..... Select to determine slat position  
3. SLATS / FLAPS lever ..... Select as follows:

**NOTE: Do not attempt to operate flaps until further advised.**

Slats Position	Select SLATS / FLAPS Lever to Position
0 - 19	0
20 - 24	1
25	20

4. Maximum enroute airspeed .....  $V_{FE}$  for detented flap position

**NOTE: If flaps 0, do not exceed 230 KIAS unless slats are confirmed retracted (0).**

5. Altitude ..... Not above 15,000 feet

**NOTE: (1) If the flaps and slats are confirmed retracted (0), reduction of cruise airspeed / altitude is not required.**

- (2) Sufficient maneuver margin is available in all flaps configuration when using the recommended minimum maneuvering speeds represented by  $V_{REF}$  adjusted for flaps position plus 10 kts.**

**CONT'D**

FLIGHT CONTROLS	REVISION 9	9-25
	30 JUL 21	

**Prior to landing:**

6. HYDRAULIC pumps 1, 2 and 3B ..... ON  
 7. FLAPS ..... Land at 45°  
 8. Final approach speed .....  $V_{REF}$  (FLAPS 45) +  
      $\Delta V_{REF}$  from table below

Flaps Position	$\Delta V_{REF}$	
	Slats Position	
	0-24	25
45	10	0

9. Actual landing distance ..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

Final Approach Speed $\Delta V_{REF}$ (kt)	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	10	1.25
Without Thrust Reverser(s)	10	1.30

**NOTE: (1) Windshear guidance is inoperative.**

**(2) For slats failed at less than full extension, a lower than normal pitch attitude will be required during the approach. Visual cues may be misleading. Use any available glidepath reference (ILS, FMS, VNAV, VASI, etc.) to maintain proper glidepath control.**

10. SLATS FAIL Checklist complete

Amber

**SPOILERONS ROLL Msg**

Amber

1. Operative control ..... Determine

**NOTE: PLT ROLL on glareshield indicates pilot's side operative. CPLT ROLL on glareshield indicates copilot's side operative.**

2. PLT ROLL or CPLT ROLL ..... Select to operative side  
 3. SPOILERONS ROLL Checklist complete

9-26

REVISION 9

FLIGHT CONTROLS

30 JUL 21

Amber

**STAB TRIM Msg**

Amber

1. STAB TRIM CH1 and CH2 ..... ENGAGE

- If STAB TRIM Msg extinguishes:
    - 2. MACH TRIM ..... ENGAGE
- or
- 3. STAB TRIM Checklist complete
- If STAB TRIM Msg persists:
    - 2. Airspeed ..... Not more than 250 KIAS (0.70M)

**NOTE:** (1) Autopilot, stabilizer trim and Mach trim are not available.

- (2) Delay changing airspeed or configuration as long as possible to minimize out-of-trim condition.
- (3) For a ND (nose down) trim condition when significant pull forces are required, selecting FLAPS to 1 or 8 will reduce the control forces.
- (4) Category II operations may be affected. Review the requirements.

**Prior to landing:**

3. GRND PROX, FLAP ..... Confirm and OVRD
4. FLAPS ..... Land at 20°
5. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With One Thrust Reverser</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reverser</b>	1.35 (35%)	1.35 (35%)

6. STAB TRIM Checklist complete

Amber

**STAB TRIM LIMIT Msg**

Amber

- NOTE:** (1) An out of trim condition may exist when disconnecting the autopilot.
- (2) A slight back force in pitch may be required to trim the airplane.

1. Autopilot ..... Disengage
2. Airplane ..... Re-trim
3. Leave icing conditions
4. STAB TRIM LIMIT Checklist complete

Amber

**STALL FAIL Msg**

Amber

 If aircraft is on the ground and off the gate accomplish System Reset.

1. STALL PTCT PUSHER (left or right side) .....OFF

**Caution**

The low speed awareness cue may represent preset / default settings and should not be relied upon for proximity to Stick Shaker. Increase all reference speeds by 10 KIAS.

2. Final approach speed.....  $V_{REF}$  (FLAPS 45) +10 KIAS minimum
3. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.10 (10%)	1.15 (15%)
<b>Without Thrust Reversers</b>	1.15 (15%)	1.15 (15%)

**NOTE:** Windshear detection and guidance may be inoperative.

**Left channel of stall protection system has failed:**

**NOTE:** Windshear guidance is operative on copilot's side PFD only.

**Right channel of stall protection system has failed:**

**NOTE:** Windshear guidance is operative on pilot's side PFD only.

**Both channels of stall protection system have failed:**

**NOTE:** Windshear detection and guidance is inoperative.  
WINDSHEAR FAIL status message comes on.

4. STALL FAIL Checklist complete

**9-28****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

**Aileron PCU Runaway**

1. Aileron controls ..... Overpower

**At safe altitude:**

2. Operative aileron ..... Determine using FLIGHT CONTROL synoptic

**NOTE: (1) The PLT ROLL or CPLT ROLL on the glareshield indicates the operative aileron.**

**(2) If the PLT ROLL or CPLT ROLL is not on, identify the failed side by verifying aileron response to handwheel movements in the FLIGHT CONTROLS synoptic page.**

3. Airplane controls ..... Transfer to the pilot with the operative aileron

**NOTE: (1) Following disconnect of the ROLL DISC handle, the inoperative side control wheel will go hardover in the direction of the failure.**

**(2) Roll controllability is reduced. The roll disconnect will result in half feel during airplane handling.**

**(3) If the PLT ROLL or CPLT ROLL is not selected within 20 seconds of pulling the ROLL DISC handle, the SPOILERONS ROLL caution message will come on.**

4. Autopilot ..... Disengage
5. ROLL DISC ..... PULL, TURN 90° to lock
6. PLT ROLL or CPLT ROLL ..... Select the operative side
7. Land at the nearest suitable airport

**Prior to landing:**

**NOTE: (1) Controllability is reduced.**

**(2) Select the longest runway available with minimum turbulence and crosswind.**

8. GRND PROX, FLAP ..... Confirm and OVRD
9. FLAPS ..... Land at 20°

**CONT'D**

<b>FLIGHT CONTROLS</b>	<b>REVISION 9</b>	<b>9-29</b>
	<b>30 JUL 21</b>	

10. Actual landing distance .....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

<b>Runway Surface</b>		
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With Two Thrust Reversers</b>	1.25 (25%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

11. Aileron PCU Runaway Checklist complete

### Aileron Trim Runaway

**NOTE:** Some system failures may result in an inaccurate trim position indication. Flight crew should compare the trim position indication with the actual aircraft behavior to assess if the trim indication is accurate.

1. Aileron .....Overpower
2. Aileron trim .....Neutral

- If trim is operational:
  - 3. Operate trim switch with caution for the remainder of the flight
  - or
  - 4. Aileron Trim Runaway Checklist complete
- If trim runaway persists:
  - 3. Aileron trim cb (2F3) .....Open

**NOTE:** Use of the autopilot may alleviate aileron trim problem.

4. Aileron Trim Runaway Checklist complete

**9-30****REVISION 9****FLIGHT CONTROLS**

30 JUL 21

**Flight Spoiler Lever Jam (Spoilers Deployed)**

- Thrust ..... Set as required

**Prior to landing:**

- Final approach speed .....  $V_{REF}$  (Flaps 45) + 10 KIAS minimum
- Actual landing distance ..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

		Runway Surface	
		Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>		1.30 (30%)	1.35 (35%)
<b>Without Thrust Reversers</b>		1.35 (35%)	1.35 (35%)

**NOTE: Landing distance factors are based upon loss of all multi-functional spoilers.**

- Flight Spoiler Lever Jam Checklist complete

**Rudder Trim Runaway**

**NOTE: Some system failures may result in an inaccurate trim position indication. Flight crew should compare the trim position indication with the actual aircraft behavior to assess if the trim indication is accurate.**

- Rudder ..... Overpower
- Rudder trim ..... Neutral

- **If trim is operational:**
  - 3. Operate trim switch with caution for the remainder of the flight
  - or
  - 4. Rudder Trim Runaway Checklist complete
- **If trim runaway persists:**
  - 3. Rudder trim cb (2F2) ..... Open
  - 4. Rudder Trim Runaway Checklist complete

**SLATS/FLAPS Lever Jammed or Disconnected**

**☞ If SLATS/FLAPS Lever Jammed or Disconnected when selecting lever from 20 to 30 or from 30 to 45, accomplish FLAPS FAIL Msg Checklist, page 9-9.**

1. Airspeed .....  $V_{FE}$  for flap position
2. GRND PROX, FLAP ..... Confirm and OVRD

**NOTE:** Selecting EMER FLAP, DEPLOY will extend the slats and set the flaps to 20.  $V_{FE}$  indication (overspeed cue) may not be correct.

**Prior to Landing:**

3. EMER FLAP ..... DEPLOY
4. Final Approach Speed .....  $V_{REF}$  FLAPS 20
5. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	Runway Surface	
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.25 (25%)	1.35 (35%)
Without Thrust Reversers	1.35 (35%)	1.35 (35%)

**NOTE:** (1) Should a go-around be required, climb at  $V_{REF}$  FLAPS 20 until reaching acceleration altitude.  
(2) If retraction of slats and flaps is desired, and SLATS/FLAPS Lever Jammed or Disconnect occurred at a flap setting of 8° or less, slats and flaps may be retracted to the last known handle position by selecting the EMER FLAP, NORM.

6. SLATS/FLAPS Lever Jammed or Disconnected Checklist complete

9-32

REVISION 9

FLIGHT CONTROLS

30 JUL 21

**Inadvertent Stick Pusher**

1. Control wheel.....Assume manual control
2. Control AP/SP Disconnect Switch.....Push and Hold
3. STALL PTCT PUSHER.....PM select to OFF

**Caution**

The low speed awareness cue may represent preset / default settings and should not be relied upon for proximity to stall shaker. Increase all reference speeds by 10 KIAS.

**NOTE:** (1) STALL FAIL Msg will display.  
 (2) WINDSHEAR FAIL Status Message displays.  
 (3) Windshear guidance is inoperative on both sides.

4. Land at the nearest suitable airport
5. Final approach speed..... $V_{REF} (\text{FLAPS } 45) + 10 \text{ KIAS}$  minimum
6. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.10 (10%)	1.15 (15%)
<b>Without Thrust Reversers</b>	1.15 (15%)	1.15 (15%)

- If not accompanied by warbler aural warning or nuisance stick shaker:  
or      7. Inadvertent Stick Pusher Checklist complete
- If accompanied by warbler aural warning and/or nuisance stick shaker:  
7. STALL PROT, L CH and R CH cb (1Q2 and 2U5) ..... Open  
8. Inadvertent Stick Pusher Checklist complete

LANDING GEAR – BRAKES	REVISION 8	10-1
03 MAR 20		

## Chapter 10: Landing Gear – Brakes

### Braking Loss Asymmetry

- 1. Wheel brakes .....** **Release momentarily**
  - 2. PM will select ANTI-SKID to OFF**
  - 3. Wheel brakes .....** **Re-apply as required**  
Extreme caution is required during braking to avoid tire damage or blow out.
  - 4. Reverse Thrust.....** **Apply maximum until stopping assured**
5. Immediate Action Items complete.
  6. Braking Loss Asymmetry Checklist complete

Red

**BRAKE OVHT Msg**

Red

→ If in flight:

1. Airspeed.....Do not exceed 220 KIAS
2. LDG GEAR ..... DN

----- Continued from QRC ----- |

3. BTMS indicators ..... Monitor

→ If all BTMS indicators are decreasing:

4. BTMS indicators ..... Monitor until 14 or less
5. BTMS OVHT WARN RESET ..... SELECT |
6. BTMS indicators ..... Monitor until 06 or less
7. Airspeed ..... Do not exceed 200 KIAS
8. LDG GEAR ..... UP
9. BRAKE OVHT Checklist complete

→ If all BTMS indicators are not decreasing:

4. Land at the nearest suitable airport

**Caution**

- (1) Suspect Fire. There is a potential that the wheel fuse plug may release. Keep personnel clear of the wheel bay area until the brake temperatures have cooled down.

- (2) Stopping distance may increase.

5. BRAKE OVHT Checklist complete, and
- ☛ If required, accomplish EVACUATION Checklist on QRH cover.

→ If on the ground:

1. Brakes ..... Minimize usage

**NOTE: Use thrust reversers or shutdown one engine to minimize brake usage.**

**CONT'D**



**10-2****REVISION 8****LANDING GEAR – BRAKES****03 MAR 20**

2. Do not takeoff

**Caution**

**Suspect Fire.** There is a potential that the wheel fuse plug may release. Keep personnel clear of the wheel bay area until the brake temperatures have cooled down.

3. BRAKE OVHT Checklist complete, and
  - ☛ If required, accomplish EVACUATION Checklist on QRH cover.

Red

**GEAR DISAGREE Msg  
(DOWN position selected)**

Red

**NOTE:** Confirm the LANDING GEAR MANUAL RELEASE handle is stowed.

1. Airspeed.....Do not exceed 200 KIAS
2. HYDRAULIC pump 3B ..... ON
3. LDG GEAR lever ..... UP, then DN

**NOTE:** If required, cycling of the LDG GEAR lever can be performed more than once.

- If GEAR DISAGREE Msg extinguishes:
  - 4. GEAR DISAGREE Checklist complete
- or
- If GEAR DISAGREE Msg persists:
  - 4. HYDRAULIC pump 2 ..... ON
  - 5. LDG GEAR lever ..... Confirm DN
  - 6. LANDING GEAR MANUAL RELEASE handle ..... PULL to full extension
- or
- If gear down-and-locked:
 

**Caution**

  - Nosewheel steering may not be available upon landing.
  - 7. GEAR DISAGREE Checklist complete
- If gear not down-and-locked:
  - 7. GEAR DISAGREE Checklist complete, and
    - ☛ Accomplish Landing Gear – Unsafe Landing Procedure Checklist, page 10-17.

LANDING GEAR – BRAKES	REVISION 8	10-3
03 MAR 20		

Red

**GEAR DISAGREE Msg  
(UP position selected)**

Red

**NOTE:** Confirm the LANDING GEAR MANUAL RELEASE handle is stowed.

1. Airspeed .....Do not exceed 200 KIAS
2. HYDRAULIC pump 3B .....ON
3. LDG GEAR lever .....DN
4. N/W STRG.....OFF then ARMED

**NOTE:** Cycling N/W STRNG will enable nosewheel steering monitoring.

5. Land at the nearest suitable airport

► If GEAR DISAGREE Msg extinguishes:  
or 6. GEAR DISAGREE Checklist complete

► If GEAR DISAGREE Msg persists:  
6. GEAR DISAGREE Checklist complete, and  
    ☛ Accomplish GEAR DISAGREE Msg (DOWN position selected) Checklist, page 10-2.

Red

**MLG BAY OVHT Msg**

Red

1. Airspeed .....Do not exceed 220 KIAS
2. LDG GEAR lever .....DN

----- Continued from QRC ----- |

3. BTMS.....Monitor

► If MLG BAY OVHT Msg extinguishes and BTMS indicators are displaying 06 or less:  
or 4. BTMS OVHT WARN RESET .....SELECT |  
5. Airspeed.....Do not exceed 200 KIAS |  
6. LDG GEAR lever .....UP |  
7. MLG BAY OVHT Checklist complete

► If MLG BAY OVHT Msg persists:  
4. Land at the nearest suitable airport  
5. MLG BAY OVHT Checklist complete

Red

**NOSE DOOR OPEN Msg**

Red

1. Airspeed .....Do not exceed 220 KIAS
2. Land at the nearest suitable airport
3. NOSE DOOR OPEN Checklist complete

**10-4****REVISION 8****LANDING GEAR – BRAKES**

03 MAR 20

Red

**PARKING BRAKE Msg**

Red

→ **If on the ground:**

- or  
1. Do not takeoff  
2. PARKING BRAKE Checklist complete

→ **If in flight:**

1. PARKING BRAKE .....Check released

→ **If PARKING BRAKE Msg extinguishes:**

- or  
2. PARKING BRAKE Checklist complete

→ **If PARKING BRAKE Msg persists:****Prior to Landing:**

**NOTE:** The landing distance factors that follow are based upon both anti-skid systems inoperative.

2. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces.

	<b>Runway Surface</b>	
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With Two Thrust Reversers</b>	1.75 (75%)	2.10 (110%)
<b>Without Thrust Reversers</b>	2.10 (110%)	2.10 (110%)

3. PARKING BRAKE Checklist complete

**Caution**

**Extreme caution is required during braking to avoid tire damage or blowout. Maximize use of reverse thrust.**

LANDING GEAR – BRAKES	REVISION 8	10-5
	03 MAR 20	

Amber

**A / SKID INBD Msg**

Amber

- ☞ If the A/SKID OUTBD Msg is also displayed, accomplish the A / SKID INBD - AND - A / SKID OUTBD Msg Checklist, page 10-6.

**NOTE:** (1) Inboard brake BTMS indications are not available.

(2) The landing distance factors that follow are based upon both anti-skid systems inoperative.

1. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.75 (75%)	2.10 (110%)
<b>Without Thrust Reversers</b>	2.10 (110%)	2.10 (110%)

**After Touchdown:**

2. FLIGHT SPOILER lever .....MAX deploy

**Caution**

Extreme caution is required during braking to avoid tire damage or blowout. Maximize use of reverse thrust.

3. A / SKID INBD Checklist complete

**10-6****REVISION 8****LANDING GEAR – BRAKES**

03 MAR 20

Amber	<b>A / SKID INBD - AND - A / SKID OUTBD Msg</b>	Amber
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**NOTE:** Inboard and outboard brake BTMS indications are not available.

1. ANTI-SKID .....OFF
2. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces.

	<b>Runway Surface</b>	
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With Two Thrust Reversers</b>	1.75 (75%)	2.10 (110%)
<b>Without Thrust Reversers</b>	2.10 (110%)	2.10 (110%)

**Caution**

Extreme caution is required during braking to avoid tire damage or blowout. Maximize use of reverse thrust.

**NOTE:** Land with a firm touchdown to ensure that main gear weight-on-wheels signal is achieved for GLD deployment.

**After Touchdown:**

3. FLIGHT SPOILER lever .....SELECT MAX
4. A / SKID INBD -AND- A / SKID OUTBD Checklist complete

LANDING GEAR – BRAKES	REVISION 8	10-7
	03 MAR 20	

Amber

**A / SKID OUTBD Msg**

Amber

- ☞ If the A/SKID INBD Msg is also displayed, accomplish the A / SKID INBD - AND - A / SKID OUTBD Msg Checklist, page 10-6.

**NOTE: (1) Outboard brake BTMS indications are not available.**

**(2) The landing distance factors that follow are based upon both anti-skid systems inoperative.**

1. Actual landing distance.....Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces.**

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.75 (75%)	2.10 (110%)
<b>Without Thrust Reversers</b>	2.10 (110%)	2.10 (110%)

**After Touchdown:**

2. FLIGHT SPOILER lever .....SELECT MAX

**Caution**

**Extreme caution is required during braking to avoid tire damage or blowout. Maximize use of reverse thrust.**

3. A / SKID OUTBD Checklist complete

Amber

**MLG OVHT FAIL Msg**

Amber

**NOTE: The MLG bay overheat detection system is inoperative.**

1. No action required. The MLG bay overheat detection system is inoperative.  
 2. MLG OVHT FAIL Checklist complete

10-8

REVISION 8

LANDING GEAR – BRAKES

03 MAR 20

Amber

**IB (OB) BRAKE PRESS Msg**

Amber

→ **If on the ground:**

1. Do not takeoff  
or 2. IB (OB) BRAKE PRESS Checklist complete

→ **If in flight:**

1. Hydraulic quantity and pressure ..... Monitor  
2. Brake pressure ..... Check

**Prior to landing:**→ **If brake pressure is greater than 1800 psi for the applicable brakes:**

3. Use steady brake application upon landing. Do not cycle the brakes.  
or 4. IB (OB) BRAKE PRESS Checklist complete

→ **If brake pressure is less than 1800 psi for the applicable brakes:**

3. Maximum landing weight ..... Determine  
(Correct for wind and slope)

OAT		Airport Pressure Altitude (Feet)					
		0	2000	4000	6000	8000	10000
°C	°F	Landing Weight kg (lb) Due to Maximum Brake Energy					
-40	-40	85980	85980	85980	85980	84244	80743
-20	-4	85980	85980	85980	84181	80766	77456
0	32	85980	85980	84156	80870	77684	74542
20	68	85980	84302	81058	77922	74898	71927
40	104	84597	81388	78289	75293	72343	69477

## Wind Corrections:

Increase max landing weight by 220 lbs per 1 knot of headwind

Decrease max landing weight by 882 lbs per 1 knot of tailwind

## Runway Slope Corrections:

Increase max landing weight by 1300 lbs per 1% of uphill slope

Decrease max landing weight by 1700 lbs per 1% of downhill slope

**NOTE: The actual landing weight must not exceed the corrected maximum landing weight due to brake energy.**

CONT'D



<b>LANDING GEAR – BRAKES</b>	<b>REVISION 8</b>	<b>10-9</b>
	<b>03 MAR 20</b>	

4. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.50 (50%)	1.70 (70%)
<b>Without Thrust Reversers</b>	1.70 (70%)	1.70 (70%)

**Caution**

Apply brakes carefully and maximize the use of reverse thrust.

5. IB (OB) BRAKE PRESS Checklist complete

Amber

**PARK BRAKE SOV Msg**

Amber

1. Parking brake ..... Check Released

**After landing:**

2. Wheel chocks ..... Install before turning OFF hydraulic systems 2 and 3

**NOTE:** The parking brake system will deplete more rapidly than normal with the parking brake set and hydraulic systems 2 and 3 selected OFF.

3. PARK BRAKE SOV Checklist complete

10-10

REVISION 8

LANDING GEAR – BRAKES

03 MAR 20

Amber

## PROX SYSTEM Msg

Amber

**NOTE:** Nuisance “TERRAIN PULL UP” and “TOO LOW GEAR” aural warnings may be announced.

1. Inoperative systems.....Review
  - Landing gear indication and control
  - Nose landing light
  - Airplane door indications
  - PASS SIGNS

**Prior to landing:**

2. Airspeed.....Do not exceed 220 KIAS
3. HYDRAULIC pumps 2 and 3B.....ON
4. LDG GEAR lever .....DN
5. LANDING GEAR MANUAL RELEASE .....PULL to full extension
6. N/W STRG.....OFF

**NOTE:** Select the longest runway available with minimum turbulence and crosswind.

7. Actual landing distance.....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
With Two Thrust Reversers	1.30 (30%)	1.35 (35%)
Without Thrust Reversers	1.35 (35%)	1.35 (35%)

**Caution**

Touchdown protection for the brakes is lost. Do not depress brake pedals until after touchdown.

**After touchdown:**

8. FLIGHT SPOILER lever .....MAX deploy

**NOTE:** Use differential braking, rudder, and engine thrust as required to assist in directional control.

CONT'D



<b>LANDING GEAR – BRAKES</b>	<b>REVISION 8</b>	<b>10-11</b>
	<b>03 MAR 20</b>	

**At 30 knots:**

9. ANTI-SKID .....OFF

**NOTE: This failure could lead to a loss of the inboard and outboard brakes during taxi. Revert to manual braking (anti-skid disabled) at low taxi speed.**

**After landing:**

10. HEATERS circuit breakers .....Open
- TAT (1A12)
  - AOA R (1A13)
  - PITOT R (1A14)
  - STATIC R (1G14)
  - PITOT L (IT7)
  - AOA L (1T8)
  - PITOT STBY (1T9)
  - STATIC L (2S1)
11. CRT Displays .....Monitor for possible overheat

**Before removing electrical power:**

12. ADG DEPLOY AUTO cb (2N6) .....Open
13. HYDRAULIC pump 3B .....ON
14. Landing gear pins.....Install

**NOTE: Do not leave the APU unattended. Automatic fire extinguishing is not available on the ground.**

15. PROX SYSTEM Checklist complete

Amber	<b>PROX SYS CHAN Msg</b>	Amber
-------	--------------------------	-------

**NOTE: (1) Nuisance “TERRAIN PULL UP” and “TOO LOW GEAR” aural warnings may be announced.**

(2) The nose landing light may be inoperative.

(3) The PASS SIGNS may be inoperative even if the respective status messages are displayed.

(4) The landing gear UP symbol indication may be lost.

(5) Airplane door indications may be inoperative.

**Caution**

Touchdown protection for the brakes may be lost. Do not depress brake pedals until after touchdown.

**After landing and before removing electrical power:**

1. ADG DEPLOY AUTO cb (2N6) .....OPEN

**NOTE: Do not leave the APU unattended. The automatic shutdown protection is inhibited.**

2. PROX SYS CHAN Checklist complete

**10-12****REVISION 8****LANDING GEAR – BRAKES****03 MAR 20**

Amber

**STEERING INOP Msg**

Amber

- ☞ If aircraft is on the ground and off the gate accomplish System Reset.

1. N/W STRG..... OFF then ARMED

- If STEERING INOP Msg extinguishes:  
or      2. STEERING INOP Checklist complete

- If STEERING INOP Msg persists:

2. N/W STRG ..... OFF
3. Use rudder, differential braking, and engine thrust as required to assist with directional control.

**NOTE: (1) Select the longest runway available with minimum turbulence and crosswind.**

**(2) In high crosswind conditions, rudder effectiveness may be limited after landing with maximum reverse thrust selected.**

4. STEERING INOP Checklist complete

<b>LANDING GEAR – BRAKES</b>	<b>REVISION 8</b>	<b>10-13</b>
	<b>03 MAR 20</b>	

Amber

**WOW INPUT Msg**

Amber

**Prior to landing:**

1. EMER DEPRESS ..... Confirm and ON
2. Actual landing distance ..... Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

	<b>Runway Surface</b>	
	<b>Dry</b>	<b>Wet or Contaminated</b>
<b>With Two Thrust Reversers</b>	1.30 (30%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

**Caution**

Touchdown protection for the brakes may be lost. Do not depress brake pedals until after touchdown.

**NOTE:** Nose wheel steering may be inoperative upon landing.

**After touchdown:**

3. FLIGHT SPOILER lever ..... MAX deploy

**At 30 knots:**

**NOTE:** This failure could lead to the loss of the inboard and outboard brakes during taxi. Revert to manual braking (anti-skid disabled) at low taxi speed.

4. ANTI-SKID ..... OFF

**Prior to Shutdown:**

5. HEATERS circuit breakers ..... Open
  - TAT (1A12)
  - AOA R (1A13)
  - PITOT R (1A14)
  - STATIC R (1G14)
  - PITOT L (1T7)
  - AOA L (1T8)
  - PITOT STBY (1T9)
  - STATIC L (2S1)
6. CRT Displays ..... Monitor for possible overheat

**CONT'D**

**10-14****REVISION 8****LANDING GEAR – BRAKES**

03 MAR 20

**Before removing electrical power:**

7. ADG DEPLOY AUTO cb (2N6) ..... Open

**NOTE: Do not leave the APU unattended. Automatic APU fire extinguishing is not available.**

8. WOW INPUT Checklist complete

Amber	<b>WOW OUTPUT Msg</b>	Amber
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**NOTE: Nose wheel steering may not be available.**

► If STALL FAIL caution message is not illuminated:

1. WOW OUTPUT Checklist complete

or

► If STALL FAIL caution message is illuminated:

1. STALL PTCT PUSHER (left or right) ..... OFF
2. Approach Speed .....  $V_{REF}$  (FLAPS 45) +10 KIAS
3. Actual landing distance ..... Increase

**NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.**

	Runway Surface	
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.10 (10%)	1.15 (15%)
<b>Without Thrust Reversers</b>	1.15 (15%)	1.15 (15%)

**After landing and before removing electrical power:**

4. ADG DEPLOY AUTO cb (2N6) ..... Open
5. WOW OUTPUT Checklist complete

<b>LANDING GEAR – BRAKES</b>	<b>REVISION 8</b>	<b>10-15</b>
	<b>03 MAR 20</b>	

**Landing Gear Lever Jammed  
in the UP Position**

1. Airspeed .....Do not exceed 220 KIAS
2. HYDRAULIC pumps 2 and 3B .....ON

**Caution**

**Nose wheel steering will not be available upon landing.**

**NOTE:** The GEAR DISAGREE warning message will appear with the LDG GEAR lever jammed in the UP position and the Landing Gear Manual Release handle pulled. Disregard the GEAR DISAGREE warning emergency procedure under this condition.

3. LANDING GEAR MANUAL RELEASE .....PULL to full extension
4. N/W STRG.....OFF

- If Gear down-and-locked:  
or      5. Landing Gear Lever Jammed in the UP Position Checklist complete
- If Gear not down-and-locked:  
      5. Landing Gear Lever Jammed in the UP Position Checklist complete, and
  - Accomplish Landing Gear – Unsafe Landing Procedure Checklist, page 10-17.

10-16

REVISION 8

LANDING GEAR – BRAKES

03 MAR 20

**Landing Gear Manual Extension**

1. Airspeed .....Do not exceed 220 KIAS
2. HYDRAULIC pump 3B .....ON
3. LDG GEAR lever .....DN

→ If Gear down-and-locked:

or 4. Landing Gear Manual Extension Checklist complete

→ If Gear not down-and-locked:

4. HYDRAULIC pump 2 .....ON
5. LANDING GEAR MANUAL RELEASE .....PULL  
to full extension

**NOTE: Main Landing gear extension relies upon free fall following a manual landing gear extension.  
This can take up to 40 seconds to accomplish.**

**WARNING**

The nose gear will not extend during this procedure with HYD 2 LO PRESS caution message displayed. Side-slip may be required to achieve MLG down lock.

**Caution**

Nosewheel steering may be inoperative.

→ If Gear down-and-locked:

or 6. Landing Gear Manual Extension Checklist complete

→ If Gear not down-and-locked:

6. Landing Gear Manual Extension Checklist complete, and
- ☞ Accomplish Landing Gear – Unsafe Landing Procedure Checklist, page 10-17.

LANDING GEAR – BRAKES	REVISION 8	10-17
	03 MAR 20	

## Landing Gear – Unsafe Landing Procedure

### Preparation:

1. Descent ..... Plan

**NOTE: (1) Reduce fuel to the minimum, if possible, while retaining sufficient fuel for a controlled, powered approach.**

- (2) If one main landing gear is up or unsafe, hold applicable wing up as long as possible. Maintain directional control with rudder and nosewheel steering (if considered safe). When wing touches ground, apply asymmetrical braking for directional control.
- (3) If nose landing gear is up or unsafe, trim stabilizer nose-up after touchdown. Gently lower the nose before elevator effectiveness is lost.
- (4) If all wheels are up or unsafe, perform a nose high attitude touchdown but do not reduce touchdown speed below stick shaker speed.
- (5) If both main landing gear cannot be locked down, consideration should be given to landing with all wheels up.

- 2. Flight Attendants..... Alert and brief
- 3. ATC..... Notify
- 4. PASS SIGNS..... ON
- 5. Loose equipment..... Secure
- 6. GRD PROX WARN cb (1B14) ..... Open
- 7. AUDIO WARNING (All)..... Disable

**NOTE: Radio altitude callouts are not available.**

- 8. Shoulder harness ..... Tight and locked
- 9. Plan to land with FLAPS 45.

**NOTE: If two hydraulic systems failed, plan to land with FLAPS 20.**

### Approach:

- 10. L and R PACKs..... OFF
- 11. PRESS CONTROL..... MAN
- 12. MAN ALT ..... UP

### When depressurized:

- 13. BLEED VALVES..... CLSD
- 14. EMER LTS ..... ON
- 15. Cockpit door ..... Open

### At approximately 500 feet AGL:

- 16. Brace for impact ..... Initiate using PA system

**CONT'D**



**10-18****REVISION 8****LANDING GEAR – BRAKES**

03 MAR 20

**Before Touchdown:**

- | 17. APU FIRE PUSH ..... Confirm and SELECT
- 18. Airplane attitude ..... Maintain nose high
- 19. Landing ..... Accomplish with minimum forward speed, but not less than stick shaker speed, and at a minimum sink rate.

**After landing:**→ **If Landing gear remains extended:**

- 20. Hydraulic pumps 2 and 3B ..... Leave on until landing gear is secured with pins
- or
- 21. Landing Gear – Unsafe Landing Procedure Checklist complete

→ **If Landing gear has collapsed, or failed to extend:**

- 20. Thrust Levers ..... SHUTOFF
- | 21. LH ENG FIRE PUSH, RH ENG FIRE PUSH (both) ..... SELECT
- 22. Landing Gear-Unsafe Landing Procedure Checklist complete, and
- Accomplish EVACUATION Checklist on QRH cover.

AUTOFLIGHT	REVISION 8	11-1
	03 MAR 20	

## ***Chapter 11: Autoflight***

Red

### **AFCS MSG FAIL Msg**

Red

1. Autopilot ..... Disengage |

**NOTE:** (1) Do not use autopilot when AFCS MSG FAIL warning is displayed.

(2) RVSM operations are affected by an autopilot failure. Review the requirements in the FOM.

(3) Category II operations may be affected. Review the requirements.

2. AFCS MSG FAIL Checklist complete

Amber

### **AP PITCH TRIM Msg**

Amber

**NOTE:** Anticipate out of trim condition when autopilot is disconnected.

1. Autopilot ..... Disengage |
2. Airplane.....Re-trim
3. Autopilot ..... Engage
4. Autopilot operation.....Monitor

► If AP TRIM Msg extinguishes:

or 5. AP PITCH TRIM Checklist complete |

► If AP TRIM Msg persists:

**NOTE:** Anticipate out-of-trim condition when autopilot is disconnected.

5. Autopilot.....Disengage |

**NOTE:** (1) RVSM operations are affected by an autopilot failure. Review the requirements in the FOM.

(2) Category II operations may be affected. Review the requirements.

6. AP PITCH TRIM Checklist complete

11-2

REVISION 8

AUTOFLIGHT

03 MAR 20

Amber

**AP TRIM IS  
(LWD / RWD / ND / NU) Msg**

Amber

- ☞ If jammed ailerons or elevator is suspected, accomplish applicable Immediate Action.

**NOTE:** Anticipate out of trim condition when autopilot is disconnected.

- | 1. Autopilot ..... Disengage
- 2. Airplane..... Re-trim
- 3. Autopilot ..... Engage
- 4. Autopilot operation ..... Monitor

- If AP TRIM IS (LWD / RWD / ND / NU) Msg extinguishes:  
or 5. AP TRIM IS (LWD / RWD / ND / NU) Checklist complete

- If AP TRIM IS (LWD / RWD / ND / NU) Msg persists:  
| 5. Autopilot..... Disengage

**NOTE:** (1) Anticipate out-of-trim condition when autopilot is disconnected.

- (2) RVSM operations are affected by an autopilot failure. Review the requirements in the FOM.  
(3) Category II operations may be affected. Review the requirements.

6. AP TRIM IS (LWD / RWD / ND / NU) Checklist complete

Amber

**YAW DAMPER Msg**

Amber

- 1. YD 1 and YD 2 ..... ENGAGE

- If YAW DAMPER Msg extinguishes:  
| 2. Autopilot..... As required  
or 3. YAW DAMPER Checklist complete

- If YAW DAMPER Msg persists:  
2. YAW DAMPER..... DISC  
3. Descend to an altitude that minimizes dutch roll tendency

**NOTE:** (1) Select runway with a minimum crosswind.  
(2) Category II operations may be affected. Review the requirements.

4. YAW DAMPER Checklist complete

AUTOFLIGHT	REVISION 8	11-3
	03 MAR 20	

### Autopilot Fails to Disconnect

1. Autopilot ..... Disengage |
  - using AP / SP DISC on other control wheel, or
  - using AP ENG on FCP, or
  - using AP DISC on FCP, or
  - by operating stabilizer trim on either control column, or
  - using the TOGA on either thrust lever
  

→ If Autopilot disconnects:

  - 2. Manual control..... Maintain

or

  - 3. Autopilot Fails to Disconnect Checklist complete

→ If Autopilot does not disconnect:

  - 2. Autopilot..... Leave engaged

**NOTE: Operate normally and overpower as required during landing.**

  - 3. Autopilot Fails to Disconnect Checklist complete

### Autopilot Failure

1. Autopilot ..... Disengage |
 

**NOTE: (1) RVSM operations are affected by an autopilot failure. Review the requirements in the FOM.**

**(2) Category II operations may be affected. Review the requirements.**
  
2. Autopilot Failure Checklist complete

### Flight Control Computer Failure

1. AP / FD ..... XFR to operable side
 

**NOTE: (1) RVSM operations are affected by an autopilot failure. Review the requirements in the FOM.**

**(2) Category II operations may be affected. Review the requirements.**
  
2. Flight Control Computer Failure Checklist complete

**11-4**

REVISION 6

AUTOFLIGHT

01 JUN 18

**Flight Director Guidance Failed**

**NOTE: Category II operations may be affected. Review the requirements.**

- If FD annunciator flag displayed on PFD and autopilot/FD coupled to affected side:
  - or
    - 1. AP / FD ..... XFR to opposite side
    - 2. Flight Director Guidance Failed Checklist complete
- If a sensor failure (red line across the affected flight mode annunciation):
  - 1. Affected FD mode on FCP ..... Deselect
  - 2. Flight Director Guidance Failed Checklist complete

AVIONICS	REVISION 8	12-1
	03 MAR 20	

## Chapter 12: Avionics

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Amber

### ADS-B OUT FAIL Msg

Amber

- If ATC Transponder selected to 1:  
or      1. ATC Transponder..... Select 2
  - If ATC Transponder selected to 2:  
      1. ATC Transponder..... Select 1
- If condition persists:
2. Air Traffic Control..... Notify
  3. ADS-B Out Fail Checklist complete

Amber

### EFIS COMP INOP Msg

Amber

1. Flight instruments ..... Monitor
2. ISI..... Cross-Check

**NOTE:** (1) ISI ILS course is valid for front course only.  
 (2) Category II operations may be affected. Review the requirements.  
 (3) RVSM operations may be affected. Review the requirements.  
 (4) Use Unreliable Airspeed In-flight Checklist, page 12-13:  
    • If pitch attitude, thrust setting or external noise not consistent with indicated airspeed,  
    • If large airspeed differences shown between primary flight display and/or standby instrument,  
    • If loss of multiple airspeed indication occurs.

3. EFIS COMP INOP Checklist complete

Amber

### EFIS COMP MON Msg

Amber

**NOTE:** (1) Mismatch detected between on-side and cross-side data.  
 (2) RVSM operations may be affected. Review the requirements.  
 (3) Category II operations may be affected. Review the requirements.

#### Accompanying PFD Annunciation:

HDG, go to page 12-2	RA, go to page 12-4
ALT and/or IAS, go to page 12-3	LOC or GS, go to page 12-4
ROL or PIT, go to page 12-4	FD, go to page 12-4

CONT'D



12-2

REVISION 6

01 JUN 18

AVIONICS

**HDG**→ **If in flight:**

1. EFIS and standby compass..... Cross-Check to determine affected side
2. COMPASSES (both) ..... Check MAG
3. AP / FD ..... XFR to reliable side
4. Affected COMPASS..... SLEW to reliable side

→ **If EFIS COMP MON Msg extinguishes:**

or 5. EFIS COMP MON Checklist complete

→ **If EFIS COMP MON Msg reoccurs:**

5. Affected COMPASS ..... Select DG then MAG

→ **If DG mode desired (Autopilot remains operational):**

6. Affected COMPASS ..... DG
7. Affected COMPASS ..... SLEW to reliable side as often as required

or  
8. EFIS COMP MON Checklist complete→ **If MAG mode desired (Autopilot will be inoperative):**

6. Source select panel, ATTD HDG ..... Select to reliable side
7. EFIS COMP MON Checklist complete, and

☞ Accomplish AHRS Failure Checklist, page 12-7.

→ **If on ground:**

**NOTE:** When the EFIS COMP MON caution message is displayed in conjunction with the HDG comparator flag(s) during ground operations, magnetic interference with the wing mounted AHRS flux valves from proximate ground equipment or localized magnetic field anomalies may be responsible. In most cases, as the aircraft taxis away from the gate area and associated ground equipment, the EFIS COMP MON caution message disappears. If the message persists, accomplish the following procedure:

**Caution**

At any time during this procedure, if the crew is certain that the aircraft has been removed from all sources of magnetic anomalies and the discrepancies still persist, a system failure has occurred. Do not takeoff.

**CONT'D**

AVIONICS	REVISION 8	12-3
03 MAR 20		

Once clear of the gate area:

1. COMPASSES (both)..... Check MAG
2. EFIS and standby compass ..... Cross-Check to determine affected side
3. Affected COMPASS ..... SLEW to standby compass heading

**NOTE:** It may be necessary to perform this procedure for both of the AHRS as the anomalies may have affected both systems, possibly to different degrees.

- If EFIS COMP MON Msg extinguishes:  
or 4. EFIS COMP MON Checklist complete
- If EFIS COMP MON Msg persists or reoccurs:  
4. EFIS and standby compass..... Cross-Check  
5. Affected COMPASS..... DG  
6. Affected COMPASS..... SLEW to standby compass heading
- If EFIS COMP MON Msg extinguishes:  
On the runway:  
7. PFD 1 and PFD 2 headings ..... Cross-Check with runway heading  
or After takeoff and established in straight and level unaccelerated flight:  
8. Affected COMPASS ..... MAG (one at a time if both in DG)  
9. EFIS COMP MON Checklist complete
- If EFIS COMP MON Msg persists:  
7. Do not takeoff  
8. EFIS COMP MON Checklist complete

#### ALT and / or IAS

1. EFIS and ISI..... Cross-Check to determine affected side
2. Source select panel, AIR DATA..... Select to reliable side

**NOTE:** Use Unreliable Airspeed In-flight Checklist, page 12-13:

- If pitch attitude, thrust setting or external noise not consistent with indicated airspeed,
- If large airspeed differences shown between primary flight display and/or standby instrument,
- If loss of multiple airspeed indication occurs.

3. EFIS COMP MON Checklist complete, and
- Accomplish ADC Failure Checklist, page 12-6.

CONT'D



**12-4****REVISION 8**

03 MAR 20

**AVIONICS****ROL or PIT**

1. EFIS and ISI..... Cross-Check to determine affected side
2. Source select panel, ATTD HDG ..... Select to reliable side
3. EFIS COMP MON Checklist complete, and
  - ☛ Accomplish AHRS Failure Checklist, page 12-7.

**NOTE: (1) Autopilot is inoperative.****(2) RVSM operations are not permitted with autopilot inoperative.****RA**

1. EFIS COMP MON Checklist complete, and
  - ☛ Accomplish Radio Altimeter (RA) Failure Checklist, page 12-11.

**LOC or GS**

1. Guidance is unreliable
2. EFIS COMP MON Checklist complete

**FD**

1. FD ILS guidance is unreliable. Revert to raw data.
2. EFIS COMP MON Checklist complete

AVIONICS	REVISION 6	12-5
01 JUN 18		

Amber	<b>ELT ON Msg</b>	Amber
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1. ELT ..... ON, then ARM / RESET  
Check ELT is not transmitting  
BY MONITORING 121.5
2. ELT ON Checklist complete

Amber	<b>XPDR FAIL Msg</b>	Amber
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- ↳ If ATC Transponder selected to 1:  
or      1. ATC Transponder..... Select 2
  - ↳ If ATC Transponder selected to 2:  
or      1. ATC Transponder..... Select 1
  - ↳ If ATC Transponder selected to STBY:  
      1. ATC Transponder..... Select to PF side
- NOTE: Unreliable side indicated by XPDR 1 INOP or XPDR 2 INOP status message.**
- If condition persists:
2. Air Traffic Control..... Notify
- NOTE: RVSM operations are affected by a transponder failure. Review the requirements.**
3. XPDR FAIL checklist complete

White	<b>GPWS FAIL Status Msg</b>	White
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1. GPWS has failed. Assume loss of GPWS mode 1 thru 6 aural. No action required.
2. GPWS FAIL Checklist complete

White	<b>TERRAIN FAIL Status Msg</b>	White
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1. Terrain awareness alerting and display of terrain clearance floor has failed.  
No action required.
- NOTE: Reversion of both MFDs will result in a loss of the terrain / obstacle awareness display (TERRAIN FAIL status message comes on). If full functionality of the EGPWS is desired, revert one display back to MFD format.**
2. TERRAIN FAIL Checklist complete

12-6

REVISION 8

03 MAR 20

AVIONICS

**ADC Failure**

**NOTE:** (1) Category II operations may be affected. Review the requirements.

(2) RVSM operations are affected by an ADC Failure. Review the requirements in the FOM.

→ If pilot's ADC has failed:

1. Source select panel, AIR DATA ..... Select 2

**NOTE:** (1) Windshear guidance is operative on copilot's side PFD only.

(2) PFD 1 indicates ADC 2 selected.

(3) L FADEC FAULT 2, SPLR/STAB FAULT and RUD LIMIT FAULT status messages illuminate.

or (4) Use Unreliable Airspeed In-flight Checklist, page 12-13:

- If pitch attitude, thrust setting or external noise not consistent with indicated airspeed,
- If large airspeed differences shown between primary flight display and/or standby instrument,
- If loss of multiple airspeed indication occurs.

2. FD and transponder ..... Select to side with operative ADC
3. ADC Failure Checklist complete

→ If copilot's ADC has failed:

1. Source select panel, AIR DATA ..... Select 1

**NOTE:** (1) Windshear guidance is operative on Pilot's side PFD only.

(2) PFD 2 indicates ADC 1 selected.

(3) L FADEC FAULT 2, SPLR/STAB FAULT and RUD LIMIT FAULT status messages illuminate.

(4) Use Unreliable Airspeed In-flight Checklist, page 12-13:

- If pitch attitude, thrust setting or external noise not consistent with indicated airspeed,
- If large airspeed differences shown between primary flight display and/or standby instrument,
- If loss of multiple airspeed indication occurs.

2. FD and transponder ..... Select to side with operative ADC
3. ADC Failure Checklist complete

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## AHRS Failure

### **Caution**

If this failure has a red MAG failure annunciated on the PFD, then select the affected COMPASS to DG and SLEW heading to reliable side as often as required.

1. Source select panel, ATTD / HDG .....Select to operative side
2. Inoperative airplane systems.....Review

Failed Source	Autopilot	Yaw Damp	Flight Director	Windshear guidance system
AHRS 1	Inoperative	YD 1 inoperative YD 1 INOP status msg illuminates	FD 1 inoperative FD 1 FAIL status msg illuminates	Pilot's side inoperative
AHRS 2	Inoperative	YD 2 inoperative YD 2 INOP status msg illuminates	FD 2 inoperative FD 2 FAIL status msg illuminates	Co-pilot's side inoperative

**NOTE:** (1) Category II operations may be affected. Review the requirements.

(2) RVSM operations are affected by an AHRS Failure. Review the requirements in the FOM.

3. AP / FD .....XFR to operative side
4. AHRS Failure Checklist complete

## Altitude Alerting System Failure

**NOTE:** RVSM operations are affected by an altitude alerting system failure. Review the requirements.

1. Altitude Alerting System Failure Checklist complete

## Display Control Panel (DCP) Failure

1. Source select panel, DSPL CONT .....Select to operative side
2. AP / FD .....XFR to operative side
3. Display Control Panel (DCP) Failure Checklist complete

**NOTE:** HDG knob remains inoperative until operable display control panel is selected.

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**AVIONICS****Display Temp****DISPLAY TEMP (on any two displays)**

1. Land at the nearest suitable airport
2. Display Temp Checklist complete

**EICAS Control Panel (ECP) Failure**

**NOTE:** (1) The PRI, STAT, CAS and STEP buttons remain operable during a microprocessor failure.  
 (2) The ECS, HYD, ELEC, FUEL, F / CTL, A / ICE, DOORS, MENU, SEL, UP and DN buttons are inoperative.

**To display a synoptic page:**

1. STEP button..... Scroll to applicable page
2. EICAS Control Panel (ECP) Failure Checklist complete

**EICAS Display 1 (ED1) Failure**

1. Source selector panel, EICAS..... ED 2
2. Wait 5 seconds
3. Source selector panel, EICAS..... NORM

- If ED1 returns to normal operation:  
 or      4. EICAS Display 1 (ED1) Failure Checklist complete
- If ED1 remains blank:  
 4. Source selector panel, EICAS ..... ED 2  
 5. PM's MFD display reversionary selector..... EICAS

**NOTE: PM's MFD defaults to EICAS STAT (status) page and all page functions are available using the EICAS control panel.**

6. EICAS Display 1 (ED1) Failure Checklist complete

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### EICAS Display 2 (ED2) Failure

1. Source selector panel, EICAS.....ED 1
2. Wait 5 seconds
3. Source selector panel, EICAS.....NORM

- If ED2 returns to normal operation:
4. EICAS Display 2 (ED2) Failure Checklist complete
- or
- If ED2 remains blank:
4. PM's MFD display revisionary selector..... EICAS

**NOTE: PM's MFD defaults to EICAS STAT (status) page  
and all page functions are available using the  
EICAS control panel.**

5. EICAS Display 2 (ED2) Failure Checklist complete

### NAV Failure

1. NAV SOURCE.....SELECT X-SIDE |
2. NAV Failure Checklist complete

### Position Information Unreliable

**NOTE: FMS DR message on FMS CDU, or insufficient  
sensors available on the MFD FMS Position  
Summary page.**

1. GRND PROX TERRAIN ..... Confirm and OFF
2. Position Information Unreliable Checklist complete

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## Primary Flight Display (PFD) Failure

**NOTE:** If the Autopilot (AP) is engaged with Flight Director (FD) selected to NAV or APPR modes (either captured or armed), a PFD reset will cause the FD mode selection to revert to PITCH and ROLL basic modes and will be displayed on the FMA. To prevent FD mode reversion, transfer the FD to a non-affected side prior to the PFD reset procedure described below.

1. Affected Display Reversionary Panel, display selector knob ..... Select PFD
  2. Wait 5 seconds
  3. Affected Display Reversionary Panel, display selector knob ..... NORM
    - If PFD returns to normal operation:
      - 4. Primary Flight Display (PFD) Failure Checklist complete
    - or
    - If PFD remains blank:
      - 4. Affected Display Reversionary Panel, display selector knob ..... Select PFD
- NOTE:** (1) Applicable MFD defaults to primary flight display.  
 (2) Category II operations may be affected. Review the requirements.
5. Primary Flight Display (PFD) Failure Checklist complete

## Multi-Function Display (MFD) Failure

1. Affected Display Reversionary Panel, display selector knob ....Select EICAS
  2. Wait 5 seconds
  3. Affected Display Reversionary Panel, display selector knob ..... NORM
    - If MFD returns to normal operation:
      - 4. Multi-Function Display (MFD) Failure Checklist complete
    - or
    - If MFD remains blank:
      - 4. No further action required
- NOTE:** If desired, assign PF duties to pilot with operable MFD.
5. Multi-Function Display (MFD) Failure Checklist complete

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## Radio Altimeter (RA) Failure

**NOTE:** Category II operations may be affected. Review the requirements.

► If one RA has failed:

or

- NOTE: (1) With pilot's RA failed, windshear guidance is operative on copilot's PFD only.  
 (2) With copilot's RA failed, windshear guidance is operative on pilot's PFD only.  
 (3) With one radio altimeter failed, both TCAS and EGPWS remain operational.

1. Radio Altimeter (RA) Failure Checklist complete

► If both RAs have failed:

1. Actual landing distance ..... Increase

NOTE: Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
Dry	Wet or Contaminated	
<b>With Two Thrust Reversers</b>	1.30 (30%)	1.35 (35%)
<b>Without Thrust Reversers</b>	1.35 (35%)	1.35 (35%)

NOTE: (1) Ensure spoilers deploy on landing.

- (2) TCAS is inoperative. TCAS FAIL status message illuminates.
- (3) EGPWS is inoperative. GPWS FAIL status message illuminates.
- (4) Windshear detection and guidance is inoperative. WINDSHEAR FAIL status message illuminates.

**After touchdown:**

2. FLIGHT SPOILER lever.....MAX deploy
3. Radio Altimeter (RA) Failure Checklist complete

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## Radio Tuning Unit (RTU) Failure

► If one RTU has failed:

- 1. Affected RTU INHIB ..... SELECT
- 2. Operable RTU ..... Use 1/2  
or  
to tune cross-side radio
- 3. Radio Tuning Unit (RTU) Failure Checklist complete

► If both RTUs have failed:

- 1. RTU 1 INHIB and RTU 2 INHIB ..... SELECT
- 2. FMS RADIO function key ..... SELECT
- 3. Use FMS RADIO page to tune radios
- 4. Radio Tuning Unit (RTU) Failure Checklist complete

## TCAS DISPLAY FAIL on MFD

**NOTE: Pilot with functional MFD display will be required to carry out any subsequent avoidance maneuvers.**

1. Functional MFD ..... Use for TCAS data
2. TCAS DISPLAY FAIL on MFD Checklist complete

## TCAS FAIL on PFD / MFD

1. TCAS ..... STBY
2. TCAS FAIL on PFD / MFD Checklist complete

## TCAS RA FAIL on PFD

► If TCAS RA FAIL displayed on both PFDs:

- 1. TCAS (both sides) ..... TA Only
- 2. TCAS RA Fail on PFD Checklist complete

► If TCAS RA FAIL displayed on one PFD:

- 1. Affected TCAS ..... TA Only

**NOTE: Pilot with functional RA display will be required to carry out any subsequent avoidance maneuvers.**

2. TCAS RA FAIL on PFD Checklist complete

## Transponder Failure

**NOTE: RVSM operations are affected by an altitude reporting transponder failure. Review the requirements in the FOM.**

1. Transponder Failure Checklist complete

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**Unreliable Airspeed In-flight****Indications:**

- Pitch attitude, thrust setting or external noise not consistent with indicated airspeed.
- Loss of multiple airspeed indications.
- Multiple airspeed indications remain constant regardless of pitch or thrust adjustments.
- Airspeed difference between primary flight displays is more than 10 KIAS and/or more than 15 KIAS between any primary flight display and ISI and no reliable airspeed source can be determined.

1. Autopilot ..... DISENGAGE
2. FDs ..... DESELECT
3. Use ISI for pitch reference.

**Initial takeoff climb or go-around is required:**

4. Pitch/N<sub>1</sub> ..... 10°/TOGA from SL to 15,000 ft;  
5°/CLB above 15,000 ft
5. Aircraft configuration ..... At clean up altitude Gear UP / FLAPS 0
6. Airplane altitude ..... Maintain lowest safe altitude or higher

**Caution**

**Respect stall warning/stick shaker.**

**----- Continued from QRC -----**

7. Immediate Action Items complete, assign PF.
8. Set and monitor pitch and roll using ISI.

**At desired altitude:**

9. Pitch/N<sub>1</sub> ..... SET as per table A below – Level Flight – FLAPS 0.
10. STALL PTCT, PUSHER (left or right) ..... OFF

**Caution**

- (1) **Do not use any FD/autopilot SPEED mode.**
- (2) **Rudder travel limits may be inappropriate for phase of flight. For cruise and descent flight, avoid excessive rudder inputs. For approach, landing and go-around flight, differential thrust and aileron input may be required to assist in maintaining directional control. Select the longest runway available with minimum crosswind and turbulence.**
- (3) **ISI must be used for pitch reference.**

**CONT'D**

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11. Flight Director..... PTCH/ROLL or HDG modes  
 12. Autopilot ..... Engage (if available)

**NOTE: (1) Autopilot may not be available.**

**(2) No crew action is required for the following messages:**

- Caution messages: EFIS COMP MON with amber IAS flag, EFIS COMP INOP with red IAS flag, STALL FAIL, MACH TRIM, RUD LIMITER.
- Status messages: RUD LIMIT FAULT, L FADEC FAULT 2, R FADEC FAULT 2.

**(3) Airspeed trend vector, ground speed indications, and FMS time and fuel prediction information may not be reliable.**

**(4) ILS/LOC/VOR course deviation indicator information are reliable.**

**(5) Disengage MACH TRIM if erratic stabilizer motion is observed.**

**(6) Select the affected AUDIO WARNING to DISABLE if overspeed warning sounds.**

**(7) Rudder Travel Limiter (RTL) display on EICAS synoptic will display actual RTL limits even if RTL limit indicators (goal posts) are amber. These limits may be inappropriate for the phase of flight.**

**(8) Altitude, Mode C and TCAS may be in error by up to 600 feet.**

13. Leave current environmental conditions if they are considered to be a reason for unreliable airspeed. Refer to "PITCH / THRUST TARGETS" tables B or C as required for climb or descent.

14. WING and COWL ANTI-ICE ..... As required

**Evaluate indicated airspeed sources as following:**

**Caution**

**Airspeed should be considered reliable only if the following conditions exist:**

- (1) Airspeed indication is consistent with pitch, thrust and airspeed range from "PITCH / THRUST TARGETS" Table A, B, C or D.**
- (2) Airspeed indication changes and speed trend vector is consistent with pitch and thrust adjustments.**

15. AIR DATA source selector..... Select to NORM  
 16. Both PFDs and ISI ..... Compare airspeed to expected speed range from Table A.

**CONT'D**



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→ If no reliable airspeed source:

- or
- 17. Airspeed Indications ..... Disregard
  - 18. Pitch/N<sub>1</sub> ..... Set using Table A, B, C, D or E as appropriate for phase of flight.
  - 19. Land at the nearest suitable airport.
  - 20. When ready to start descent, proceed to step 21 below.

→ If one or more airspeed source is considered reliable:

- 17. AIR DATA source selector ..... Confirm NORM
- 18. Reliable airspeed source ..... MONITOR WITH CAUTION
- 19. Pitch/N<sub>1</sub> ..... Set using Table A, B, C, D or E as appropriate for phase of flight and continue to monitor reliable airspeed source and airspeed range.

**Caution**

- (1) Disregard airspeed indication if at any time it becomes unreliable.
- (2) AIR DATA source selector must remain in NORM position.
- 20. Land at the nearest suitable airport.
- 21. Descent ..... Initiate when ready

**Caution**

To avoid significant flap overspeed and flap damage:

- (1) Transition from FLAPS 0 to FLAPS 30 must be accomplished in level flight.
- (2) Select FLAPS 45 at the start of final descent on the glideslope/glidepath.

**NOTE: Plan to intercept a long final to allow time to re-configure for approach/landing and set pitch/N<sub>1</sub>**

- 22. Unreliable aircraft systems ..... Review
  - Ground proximity warning
  - Enhanced ground proximity warning
  - Windshear detection
  - Landing gear warning horn
  - Flap overspeed
  - Automatic function of passenger signs

**CONT'D**



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23. Actual landing distance .....Increase

**NOTE:** Apply the following factors to FLAP 45 actual landing distances for either Dry, Wet, or Contaminated surfaces. If dispatched with Anti-skid inoperative, apply to dry or wet actual landing distances for Anti-skid inop.

Runway Surface		
	Dry	Wet or Contaminated
<b>With Two Thrust Reversers</b>	1.20 (20%)	1.25 (25%)
<b>Without Thrust Reversers</b>	1.25 (25%)	1.25 (25%)

24. Unreliable Airspeed In-Flight checklist complete.

TABLE A – Level Flight – FLAPS 0

**Flight Technique:**

**Set thrust and pitch to target, then adjust pitch to maintain required altitude or path:**

- Allow sufficient time to stabilize altitude or path between pitch adjustments.
- If still descending below desired altitude or path, INCREASE pitch using 0.5-degree increments.
- If still climbing above desired altitude or path, DECREASE pitch using 0.5-degree increments.
- If displayed, VSI can be used to monitor required altitude or path.

**NOTE: (1) Initial pitch target is for reference only, see Flight Technique to adjust pitch as required up to a maximum of +/- 1.5 degrees.**

**(2) If pitch is increased, REDUCE expected speed range by  $\Delta$ KIAS/ $\Delta$ Mach.**

**(3) If pitch is decreased, INCREASE expected speed range by  $\Delta$ KIAS/ $\Delta$ Mach.**

**CONT'D**



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ALT (ft)	EXPECTED SPD RANGE KIAS/Mach	EXPECTED SPD CHANGE FOR 0.5 DEGREE CHANGE IN PITCH $\Delta$ KIAS/ $\Delta$ Mach	Weight (lb) Pitch (degree) / Initial Thrust (%N1)								
			45000	50000	55000	60000	65000	70000	75000	80000	84500
40000	205 - 250/.70 - .81	5/0.01	0.5 / 79.6	1.5 / 80.6	1.0 / 81.6	1.0 / 82.7	1.0 / 84.3	1.0 / 85.6	- / -	- / -	- / -
35000	225 - 280/.69 - .81	5/0.01	0.0 / 78.2	0.0 / 78.9	0.5 / 79.6	0.5 / 80.3	0.5 / 81.1	1.0 / 82.0	1.0 / 82.9	1.0 / 84.1	1.0 / 85.7
30000	250 - 290	10	-0.5 / 77.6	-0.5 / 78.0	0.0 / 78.4	0.0 / 79.0	0.5 / 79.6	0.5 / 80.4	1.0 / 81.2	1.0 / 81.8	1.5 / 82.7
25000	250 - 290	10	-1.0 / 74.0	-0.5 / 74.5	0.0 / 74.9	0.0 / 75.5	0.5 / 76.2	0.5 / 76.9	1.0 / 77.8	1.0 / 78.5	1.5 / 79.3
20000	250 - 290	10	-1.0 / 70.4	-0.5 / 70.8	0.0 / 71.2	0.0 / 71.8	0.5 / 72.5	0.5 / 73.2	1.0 / 73.9	1.5 / 74.6	1.5 / 75.4
15000 *	250 - 290	10	-1.0 / 66.0	-0.5 / 67.3	0.0 / 67.9	0.0 / 68.3	0.5 / 68.7	0.5 / 69.3	1.0 / 70.2	1.5 / 70.9	1.5 / 71.7
15000 **	200 - 235	5	0.5 / 58.7	1.0 / 59.5	1.5 / 60.3	2.0 / 61.3	2.5 / 62.4	3.0 / 63.9	3.0 / 65.5	3.5 / 67.1	4.0 / 68.6
10000	205 - 235	5	0.5 / 55.1	1.0 / 55.9	1.5 / 56.7	2.0 / 57.6	2.5 / 58.7	3.0 / 60.2	3.0 / 61.9	3.5 / 63.3	4.0 / 64.7
5000	205 - 235	5	0.5 / 51.8	1.0 / 52.5	1.5 / 53.3	2.0 / 54.1	2.5 / 55.2	3.0 / 56.4	3.0 / 58.0	3.5 / 59.3	4.0 / 60.6
0	205 - 235	5	0.5 / 48.4	1.0 / 49.0	1.5 / 49.6	2.0 / 50.3	2.5 / 51.5	3.0 / 52.6	3.0 / 54.2	3.5 / 55.4	4.0 / 56.6

If any indicated speed is outside the expected indicated airspeed range, it should be considered UNRELIABLE

Interpolation is acceptable

\* Pitch/N<sub>1</sub> settings for cruise phase

\*\* Pitch/N<sub>1</sub> settings for transition to approach phase

CONT'D



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**TABLE B – Climb – FLAPS 0****Flight Technique:**

1. Use FD in PITCH mode only
2. Use AP if available, otherwise hand-fly airplane to the desired altitude

**Caution****Do not use any AP/FD SPEED mode.****Table B – CLIMB – FLAPS 0**

ALT (ft)	Pitch	N <sub>1</sub> %	EXPECTED SPD RANGE KIAS/Mach
SL	10.0	TOGA	245 – 315
5000	9.0	TOGA	250 – 310
10000	7.0	CLB	240 – 300
15000	5.0	CLB	260 – 300
20000	4.0	CLB	260 – 295
25000	3.0	CLB	260 – 290
30000	2.0	CLB	255 – 280 / .71 - .76
35000	1.0	CLB	265 – 275 / .70 - .74

**Caution****Do not attempt to climb above 35,000 ft for aircraft weights above 75,000 lbs.****CONT'D**

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## TABLE C – Descent – FLAPS 0 – Idle

**Flight Technique:**

1. Use FD in PITCH mode only
2. Use AP if available, otherwise hand-fly airplane to the desired altitude

**Caution**

**Do not use any AP/FD SPEED mode.**

Table C – DESCENT – FLAPS 0 - IDLE			
ALT (ft)	Pitch	N <sub>1</sub> %	EXPECTED SPD RANGE KIAS/Mach
40000	-2.0	IDLE	210 – 240 / .71 – .79
35000	-3.0	IDLE	215 – 275 / .65 – .79
30000	-3.0	IDLE	230 – 305 / .61 – .79
25000	-3.5	IDLE	235 – 320
20000	-3.5	IDLE	230 – 315
15000	-3.5	IDLE	230 – 310
10000	-3.0	IDLE	215 – 300
5000	-2.5	IDLE	210 – 285
0	-2.5	IDLE	210 – 285

**NOTE: If anti-ice is required, adjust thrust as required to maintain a minimum of 75% N<sub>2</sub>.**

- For an N<sub>1</sub> increase of 5%, add 0.5 degree to the pitch from Table C.
- For an N<sub>1</sub> increase of 10%, add 1.0 degree to the pitch from Table C.
- For an N<sub>1</sub> increase of 15%, add 1.5 degree to the pitch from Table C.

## TABLE D – Approach – Level Flight

**Flight Technique:**

Allow sufficient time to stabilize altitude or path between pitch adjustments or configuration change.

If displayed, VSI can be used to monitor required altitude or path.

When transitioning from FLAPS 0 to FLAPS 8, maintain FLAPS 0 N<sub>1</sub>/pitch if FLAPS 1 temporarily selected.

**CONT'D**



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**AVIONICS****For LEVEL FLIGHT:****Set N<sub>1</sub> and pitch to target, then adjust pitch to maintain required altitude:**

- If still descending below desired altitude or path, INCREASE pitch using 0.5-degree increments.
- If still climbing above desired altitude or path, DECREASE pitch using 0.5-degree increments.

**Caution**

(1) Flaps transition from 0 to 30 must be accomplished in level flight.

(2) FLAPS 45 must be selected at the start of final descent.

**Table D – APPROACH – LEVEL FLIGHT**

ALT (ft)	EXPECTED SPD RANGE KIAS/Mach	EXPECTED SPD CHANGE FOR 0.5 DEGREE CHANGE IN PITCH ΔKIAS	Weight (lb) Pitch (degree) / Initial Thrust (%N1)								
			45000	50000	55000	60000	65000	70000	75000	80000	84500
<b>Level Flight – FLAPS 8 – Gear UP</b>											
170 – 220	5	0.0 / 59.8	0.5 / 60.4	1.0 / 61.1	1.5 / 61.5	2.0 / 62.7	2.5 / 63.8	3.0 / 64.7	4.0 / 65.7	4.5 / 67.0	
<b>Level Flight – FLAPS 20 – Gear UP</b>											
15000 to 0	5	-1.0 / 55.8	-0.5 / 56.8	0.0 / 57.7	1.0 / 59.6	2.0 / 61.8	2.5 / 63.6	3.5 / 65.5	4.0 / 66.9	4.5 / 68.2	
<b>Level Flight – FLAPS 30 – Gear DN</b>											
135 – 180	5	-1.5 / 63.8	-0.5 / 64.1	0.0 / 65.0	1.0 / 66.2	2.0 / 67.5	3.0 / 69.3	4.0 / 71.1	5.0 / 73.0	6.0 / 74.8	
<b>Level Flight – FLAPS 45 – Gear DN</b>											
125 – 180	5	-3.5 / 70.7	-2.5 / 71.3	-1.5 / 72.2	-0.5 / 72.8	0.5 / 74.1	1.5 / 75.1	2.5 / 76.5	3.5 / 78.1	4.5 / 79.6	

Interpolation is acceptable

- NOTE:** (1) Initial pitch target is for reference only. See Flight Technique to adjust pitch as required up to a maximum of +/- 1.5 degree.
- (2) If pitch is increased, REDUCE expected speed range by ΔKIAS.
- (3) If pitch is decreased, INCREASE expected speed range by ΔKIAS.

**CONT'D**

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TABLE E – Approach – FLAPS 45 – Gear DN – 3 degree G/S

**Flight Technique:**

Allow sufficient time to stabilize altitude or path between pitch adjustments or configuration change.

If displayed, VSI can be used to monitor required altitude or path.

**For FLAPS 45 GEAR DN – 3 degree G/S:**

**Set N<sub>1</sub> and pitch to target, then adjust pitch to maintain required glidepath:**

- Do not change N<sub>1</sub>.
- Adjust pitch as necessary to maintain required glideslope guidance/glidepath.

**Caution**

**FLAPS 45 must be selected at the start of final descent.**

ALT (ft)	EXPECTED SPD RANGE KIAS	Weight (lb) Pitch (degree) / Initial Thrust (%N <sub>1</sub> )								
		45000	50000	55000	60000	65000	70000	75000	80000	84500
<b>FLAPS 45 – Gear DN – 3 degree G/S</b>										
15000	V <sub>REF</sub> ±10	0.5 / 59.9	0.5 / 62.6	0.5 / 65.5	1.0 / 67.4	1.0 / 69.6	1.0 / 71.8	1.0 / 74.0	1.0 / 75.9	1.0 / 78.0
10000		0.5 / 55.9	0.5 / 58.5	0.5 / 60.9	1.0 / 63.2	1.0 / 65.5	1.0 / 67.6	1.0 / 69.7	1.0 / 71.5	1.0 / 73.6
5000		0.5 / 52.1	0.5 / 54.7	0.5 / 57.0	1.0 / 59.2	1.0 / 61.4	1.0 / 63.5	1.0 / 65.6	1.0 / 67.4	1.0 / 69.4
0		0.5 / 48.6	0.5 / 51.1	0.5 / 53.3	1.0 / 55.4	1.0 / 57.6	1.0 / 59.6	1.0 / 61.6	1.0 / 63.4	1.0 / 65.3

Interpolation is acceptable

**NOTE: Initial pitch target is for reference only. See Flight Technique to adjust pitch as required.**

UNCONTROLLED WHEN PRINTED

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AVIONICS

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DOORS	REVISION 6	<b>13-1</b>
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## **Chapter 13: Doors**

Red

**PASSENGER DOOR Msg**

Red

**WARNING**

Door failure may be indicated by a loud noise, pressurization leak or rumble emanating from the door area. If any of these indications are present, do not approach the door.

- If Emergency Descent is required:
  - 1. PASSENGER DOOR Checklist complete, and
  - or      ➡ Accomplish Emergency Descent Procedure, page 5-1.
  
- If Emergency Descent is not required:
  - 1. PASS SIGNS ..... ON
  - 2. Descent ..... Initiate to 10,000 feet or lowest safe altitude
  - 3. PRESS CONTROL.....MAN |
  - 4. MAN ALT.....UP
  - 5. MAN RATE.....Max INCR
  - 6. Land at the nearest suitable airport
  - 7. PASSENGER DOOR Checklist complete

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REVISION 6

DOORS

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Amber

**AFT CARGO DOOR Msg**

Amber

**- OR -**

Amber

**FWD CARGO DOOR Msg**

Amber

**- OR -**

Amber

**CTR CARGO DOOR Msg**

Amber

1. SEAT BLTS sign ..... ON
2. Cabin pressure ..... Check Normal

→ **If cabin pressure normal:**

or      3. AFT/FWD/CTR CARGO DOOR Checklist complete

→ **If cabin pressure not normal:**

**Switch to manual pressurization control:**

3. MAN ALT ..... HOLD
4. PRESS CONTROL ..... MAN

**NOTE: Setting MAN ALT selector to “UP” increases cabin altitude; “DN” reduces cabin altitude.**

5. MAN ALT ..... As required to obtain cabin altitude of 8,000 feet
6. MAN RATE ..... As required commensurate with crew and pax comfort

**NOTE: Maintain cabin altitude at 8,000 feet to minimize pressure differential across the affected door.**

**When reaching 8,000 feet cabin altitude:**

7. MAN ALT ..... HOLD

**NOTE: Full cabin depressurization is not recommended.**

8. Descent ..... Initiate to 10,000 feet or lowest safe altitude, whichever is higher
9. Land at the nearest suitable airport

**At 10,000 feet or lowest safe altitude, whichever is higher:**

10. PRESS CONTROL ..... Auto
11. LDG ELEV ..... Set to landing field elevation

### Caution

After landing ensure that the airplane is completely depressurized prior to opening any airplane doors.

12. AFT/FWD/CTR CARGO DOOR Checklist complete

DOORS	REVISION 6	13-3
	01 JUN 18	

Amber

**AV BAY DOOR Msg**

Amber

1. SEAT BLTS sign ..... ON
2. Cabin pressure ..... Check Normal

→ **If cabin pressure normal:**  
 or                   3. AV BAY DOOR Checklist complete

→ **If cabin pressure not normal:**

**Switch to manual pressurization control:**

3. MAN ALT ..... HOLD
4. PRESS CONTROL ..... MAN |

**NOTE: Setting MAN ALT selector to “UP” increases cabin altitude; “DN” reduces cabin altitude.**

5. MAN ALT ..... As required to obtain cabin altitude of 8,000 feet
6. MAN RATE ..... As required commensurate with crew and pax comfort

**NOTE: Maintain cabin altitude at 8,000 feet to minimize pressure differential across the affected door.**

**When reaching 8,000 feet cabin altitude:**

7. MAN ALT ..... HOLD

**NOTE: Full cabin depressurization is not recommended.**

8. Descent ..... Initiate to 10,000 feet or lowest safe altitude, whichever is higher
9. Land at the nearest suitable airport

**At 10,000 feet or lowest safe altitude, whichever is higher:**

10. PRESS CONTROL ..... Auto |
11. LDG ELEV ..... Set to landing field elevation

**Caution**

**After landing ensure that the airplane is completely depressurized prior to opening any airplane doors.**

12. AV BAY DOOR Checklist complete

13-4

REVISION 6

DOORS

01 JUN 18

Amber

**L (R) FWD EMER DOOR Msg**

Amber

- OR -

Amber

**L (R) AFT EMER DOOR Msg**

Amber

1. SEAT BLTS sign ..... ON
2. Cabin pressure ..... Check

→ If cabin pressure **normal**:

or      3. L (R) EMER DOOR Checklist complete

→ If cabin pressure **not normal**:

**Switch to manual pressurization control:**

3. MAN ALT ..... HOLD
4. PRESS CONTROL ..... MAN

**NOTE: Setting MAN ALT selector to “UP” increases cabin altitude; “DN” reduces cabin altitude.**

5. MAN ALT ..... As required to obtain cabin altitude of 8,000 feet

**NOTE: Maintain cabin altitude at 8,000 feet to minimize pressure differential across the affected door.**

6. MAN RATE ..... As required commensurate with crew and pax comfort

**When reaching 8,000 feet cabin altitude:**

7. MAN ALT ..... HOLD

**NOTE: Full cabin depressurization is not recommended.**

8. Descent ..... Initiate to 10,000 feet or lowest safe altitude, whichever is higher

9. Land at the nearest suitable airport

**At 10,000 feet or lowest safe altitude, whichever is higher:**

10. PRESS CONTROL ..... Auto
11. LDG ELEV ..... Set to landing field elevation

### Caution

**After landing ensure that the airplane is completely depressurized prior to opening any airplane doors.**

12. L (R) EMER DOOR Checklist complete

DOORS	REVISION 6	13-5
01 JUN 18		

Amber

**PAX DR LATCH Msg**

Amber

1. SEAT BLTS sign ..... ON
2. Cabin pressure ..... Check Normal

- If cabin pressure normal:  
or            3. PAX DR LATCH Checklist complete  
→ If cabin pressure not normal:

**Switch to manual pressurization control:**

3. MAN ALT ..... HOLD
4. PRESS CONTROL ..... MAN |

**NOTE: Setting MAN ALT selector to "UP"**  
**increases cabin altitude; "DN"**  
**reduces cabin altitude.**

5. MAN ALT ..... As required  
to obtain cabin altitude of 8,000 feet
6. MAN RATE ..... As required  
commensurate with crew and pax comfort

**NOTE: Maintain cabin altitude at 8,000 feet**  
**to minimize pressure differential**  
**across the affected door.**

**When reaching 8,000 feet cabin altitude:**

7. MAN ALT ..... HOLD

**NOTE: Full cabin depressurization is not  
recommended.**

8. Descent ..... Initiate  
to 10,000 feet or lowest safe  
altitude, whichever is higher
9. Land at the nearest suitable airport

**At 10,000 feet or lowest safe altitude, whichever is higher:**

10. PRESS CONTROL ..... Auto |
11. LDG ELEV ..... Set to landing field elevation

**Caution**

After landing ensure that the airplane is completely  
depressurized prior to opening any airplane doors.

12. PAX DR LATCH Checklist complete

13-6

REVISION 6

DOORS

01 JUN 18

Amber

**PAX DR OUT HNDL Msg**

Amber

1. SEAT BLTS sign ..... ON
2. Cabin pressure ..... Check Normal
3. Passenger door ..... Check visually and ensure that all 8 green marks are correctly aligned

**NOTE:** Check that green witness marks (registers) on all latches (rotary and sliding) are correctly aligned.

- If cabin pressure normal and green marks are aligned:  
or      4. PAX DR OUT HNDL Checklist complete
- If cabin pressure not normal and/or green marks are not aligned:  
|      Switch to manual pressurization control:  
|      4. MAN ALT ..... HOLD  
|      5. PRESS CONTROL ..... MAN

**NOTE:** Setting MAN ALT selector to “UP” increases cabin altitude; “DN” reduces cabin altitude.

6. MAN ALT ..... As required to obtain cabin altitude of 8,000 feet
7. MAN RATE ..... As required commensurate with crew and pax comfort

**NOTE:** Maintain cabin altitude at 8,000 feet to minimize pressure differential across the affected door.

- When reaching 8,000 feet cabin altitude:**  
8. MAN ALT ..... HOLD

**NOTE:** Full cabin depressurization is not recommended.

9. Descent ..... Initiate to 10,000 feet or lowest safe altitude, whichever is higher
10. Land at the nearest suitable airport

**At 10,000 feet or lowest safe altitude, whichever is higher:**

11. PRESS CONTROL ..... Auto
12. LDG ELEV ..... Set to landing field elevation

**Caution**

After landing ensure that the airplane is completely depressurized prior to opening any airplane doors.

13. PAX DR OUT HNDL Checklist complete

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## Amber

FWD SERVICE DOOR Msg

Amber

1. SEAT BLTS sign ..... ON
  2. Cabin pressure ..... Check Normal

→ If cabin pressure normal:  
or 3. SERVICE DOOR Checklist complete

→ If cabin pressure not normal:

**Switch to manual pressurization control:**

3. MAN ALT.....HOLD  
4. PRESS CONTROL.....MAN

**NOTE:** Setting MAN ALT selector to "UP" increases cabin altitude; "DN" reduces cabin altitude.

5. MAN ALT..... As required  
to obtain cabin altitude of 8,000 feet
  6. MAN RATE..... As required  
commensurate with crew and pax comfort

**NOTE:** Maintain cabin altitude at 8,000 feet to minimize pressure differential across the affected door.

#### **When reaching 8,000 feet cabin altitude:**

7. MAN ALT..... HOLD

**NOTE: Full cabin depressurization is not recommended.**

8. Descent .....Initiate to 10,000 feet or lowest safe altitude, whichever is higher
  9. Land at the nearest suitable airport

**At 10,000 feet or lowest safe altitude, whichever is higher:**

10. PRESS CONTROL.....Auto  
 11. LDG ELEV.....Set to landing field elevation

## **Caution**

**After landing ensure that the airplane is completely depressurized prior to opening any airplane doors.**

12. FWD SERVICE DOOR Checklist completed

13-8

REVISION 6

DOORS

01 JUN 18

**Crew Escape Hatch Unsafe**

1. SEAT BLTS sign.....ON
2. Cabin pressure.....Check Normal

## → If cabin pressure normal:

- or      3. Crew Escape Hatch Unsafe Checklist complete

→ If cabin pressure not normal:

## Switch to manual pressurization control:

3. MAN ALT.....HOLD
4. PRESS CONTROL.....MAN

**NOTE: Setting MAN ALT selector to “UP” increases cabin altitude; “DN” reduces cabin altitude.**

5. MAN ALT.....As required to obtain cabin altitude of 8,000 feet
6. MAN RATE.....As required commensurate with crew and pax comfort

**NOTE: Maintain cabin altitude at 8,000 feet to minimize pressure differential across the affected door.**

## When reaching 8,000 feet cabin altitude:

7. MAN ALT.....HOLD

**NOTE: Full cabin depressurization is not recommended.**

8. Descent .....Initiate to 10,000 feet or lowest safe altitude, whichever is higher
9. Land at the nearest suitable airport

## At 10,000 feet or lowest safe altitude, whichever is higher:

10. PRESS CONTROL.....Auto
11. LDG ELEV.....Set to landing field elevation

**Caution**

After landing ensure that the airplane is completely depressurized prior to opening any airplane doors.

12. Crew Escape Hatch Unsafe Checklist complete

MISCELLANEOUS	REVISION 9	14-1
	30 JUL 21	

## Chapter 14: Miscellaneous

Red

### Configuration Warning

Red

**NOTE: Accomplish this Checklist for any of the following Msgs:**

- CONFIG AILERON warning message and “Config Trim” aural message
  - CONFIG AP warning message and “Config Autopilot” aural message
  - CONFIG FLAPS warning message and “Config Flap” aural message
  - CONFIG RUDDER warning message and “Config Trim” aural message
  - CONFIG SPLRS warning message and “Config Spoiler” aural message
  - CONFIG STAB warning message and “Config Trim” aural message
  - PARKING BRAKE warning message and “Config Brakes” aural message
1. Takeoff ..... Reject
  2. Configuration Warning Checklist complete and accomplish Rejected Takeoff Checklist, page 14-4.

Amber

### EMER LTS OFF Msg

Amber

**The emergency lighting system has been selected off:**

1. EMER LTS ..... ARM
2. EMER LTS OFF Checklist complete

White

### DCU 1(2) AURAL INOP Status Msg

White

1. Affected AUDIO WARNING, DCU 1(2) ..... DISABLE
2. Other AUDIO WARNING, DCU 1(2) ..... Normal
3. DCU 1(2) AURAL INOP Checklist complete

White

### DCU 1(2) INOP Status Msg

White

1. Affected AUDIO WARNING, DCU 1(2) ..... DISABLE
2. Other AUDIO WARNING, DCU 1(2) ..... Normal
3. DCU 1(2) INOP Checklist complete

**14-2****REVISION 8**

03 MAR 20

**MISCELLANEOUS****Ditching – Imminent****- OR -****Forced Landing – Imminent**

1. L and R PACKs ..... OFF
2. EMER DEPRESS ..... Confirm and ON
3. LDG GEAR ..... As required

**NOTE: If Ditching, leave LDG GEAR in the UP position  
for touchdown.**

4. FLAPS ..... Land at 45°

**Just before contact:**

5. EMER DEPRESS ..... OFF
6. Thrust Levers (both) ..... SHUTOFF
7. LH ENG FIRE PUSH,  
RH ENG FIRE PUSH,
- | APU FIRE PUSH (all) ..... SELECT
8. Aim to touchdown with minimum vertical speed and a forward speed of not less than stick shaker and at minimum sink rate.

**When the airplane has stopped:**

9. Engine and APU fire BOTTLEs ..... Discharge
10. Overwing Exits ..... Open
11. Doors (all) ..... Open
12. Evacuation ..... Initiate using PA system
13. BATTERY MASTER ..... OFF
14. Airplane ..... Abandon with survival equipment
15. Ditching – Imminent or Forced Landing – Imminent Checklist complete

**Planned Ditching / Forced Landing****- OR -****Forced Landing – Planned**

1. ATC ..... Notify
2. Transponder ..... 7700
3. Descent ..... Plan
4. Crew and Flight Attendant ..... Brief
5. ELT ..... ON
6. PASS SIGNS ..... ON
7. Loose Equipment ..... Secure
8. Cockpit door ..... UNLOCK
9. GRND PROX WARN cb (1B14) ..... Open

**NOTE: Radio altitude callouts are not available.**

**CONT'D**

10. AUDIO WARNING – DCU 1 and DCU 2 ..... DISABLE
11. Survival Equipment ..... Check
12. Life Vest (if Ditching) ..... On

**NOTE: (1) Life vests should be donned but not inflated until outside of the airplane.**

**(2) Light plugs should be removed only if ditching at night.**

13. Seatbelts and Harness ..... On
14. Shoulder Harness ..... Tight and locked
15. LDG GEAR ..... As required

**NOTE: If Ditching, leave LDG GEAR in the UP position for touchdown.**

**Prior to reducing speed below 145 KIAS:**

16. FLAPS ..... Land at 45°

**NOTE: If on ADG power:**

- The slats/flaps will operate at half speed
- A momentary loss of ADG power may occur:
  - At 140 KIAS and below, if the slats/flaps are operating
  - At 108 KIAS and below, if pitch trim is used.

**At approximately 4,000 feet AGL:**

→ **If Ditching (landing on water):**

17. Sea conditions and wind direction ..... Determine
18. Ditching heading ..... Establish

or

Windspeed less than 15 knots:	Contact parallel to swells
Windspeed 15 to 45 knots:	Compromise between wind and swell
Windspeed greater than 45 knots:	Land into the wind

19. Go to step 20 below

→ **If Forced Landing:**

17. Landing area conditions and wind direction ..... Determine
18. Go to step 20 below

20. Descent rate / approach speed ..... Establish
21. L and R PACKs ..... OFF
22. PRESS CONTROL ..... MAN
23. MAN ALT ..... UP
24. MAN RATE ..... Max INCR

**When completely depressurized:**

25. BLEED VALVES ..... CLSD
26. MAN ALT ..... DN
27. L and R FUEL BOOST PUMPS ..... SELECT OFF
28. APU (if not essential) ..... Shutdown

**CONT'D**



**14-4**

REVISION 10

01 OCT 21

MISCELLANEOUS

**At approximately 500 feet AGL:**

29. Radio ..... Transmit final position
30. PA ..... "Brace, Brace, Brace"
31. EMER LTS ..... ON
32. LANDING LTS ..... ON

**Just before contact:**

33. Thrust Levers ..... SHUTOFF
34. LH ENG FIRE PUSH,  
RH ENG FIRE PUSH,  
APU FIRE PUSH (all) ..... SELECT
35. Aim to touchdown with minimum vertical speed and a forward speed of not less than stick shaker and at minimum sink rate.

**When the airplane has stopped:**

36. Engine and APU fire BOTTLEs ..... Discharge
37. Overwing Exits ..... Open
38. Doors (all) ..... Open
39. Evacuation ..... Initiate using PA system
40. BATTERY MASTER ..... OFF
41. Airplane ..... Abandon with survival equipment
42. Ditching – Planned or Forced Landing – Planned Checklist complete

**Flight Compartment Power Outlets and USB Ports Failure****Any Power Outlet / USB Port fails to provide electrical power:**

1. CKPT Power Outlet switch ..... Select DISABLE
2. Flight Compartment Power Outlets and USB Ports Failure Checklist Complete

**Rejected Takeoff**

1. Once at a complete stop
2. PARKING BRAKE ..... ON
3. Develop and analyze a plan

**NOTE:** Prior to the next takeoff, the minimum brake cooling time is 15 minutes and all BTMS indicators must be green and not increasing. If a brake overheat warning is displayed on EICAS, an inspection of the wheel fuse plugs is required before the next takeoff.

4. Rejected Takeoff Checklist complete

<b>STATUS MESSAGES</b>	<b>REVISION 8</b>	<b>15-1</b>
	<b>03 MAR 20</b>	

## **Chapter 15: Status Messages**

<b>A</b>	
A/SKID FAULT	Loss of redundancy in anti-skid control unit with a possible loss of touchdown protection.
AC ESS ALTN	Essential transfer contactor closed, AC ESS bus supplied by AC BUS 2 either automatically or by manual selection.
AC 1 AUTOXFER OFF	AC 1 auto transfer inhibited.
AC 2 AUTOXFER OFF	AC 2 auto transfer inhibited.
ACARS CALL	ACARS has received a SELCAL.
ACARS MESSAGE	ACARS has received a message.
ACARS NOCOMM	ACARS is in NO COMM
ADG AUTO FAIL	ADCU or uplock solenoid failed or ADCU is unpowered.
ADG FAIL	ADG GCU failure. If aircraft is on the ground and off the gate accomplish ADG FAIL system reset.
ADS-B OUT 1 FAIL ADS-B OUT 2 FAIL	Indicates failure of the ADS-B channel of ATC transponder. ADS-B Out operations may be affected. Review the requirements.
AFT CARGO SOV	Aft cargo air shutoff valve failed.
APU ALT LIMIT	Surge control valve failed. APU operation limited to 17,000 feet or less.
APU BATT CHGR	APU battery overheating or not charging.
APU FAULT	Loss of redundancy of APU system: <ul style="list-style-type: none"> <li>• Speed Sensor 1 or 2 failed</li> <li>• EGT Sensor 1 or 2 failed</li> <li>• Fuel solenoid valve failed open</li> <li>• Fuel filter</li> <li>• APU oil filter</li> <li>• APU Generator oil filter impending bypass</li> </ul>
APU IN BITE	APU PWR/FUEL selected and inlet door not positioned.
APU LCV OPEN	APU load control valve open.
APU SOV OPEN	APU fuel feed SOV confirmed open.
APU START	APU starter motor engaged.
AUTO PRESS 1 FAIL	CPC 1 auto control inoperative.
AUTO PRESS 2 FAIL	CPC 2 auto control inoperative.
AUTO PRS 1 FAIL	Bus channel inoperative.
AUTO PRS 2 FAIL	Bus channel inoperative.
AUTO XFLOW INHIB	Fuel balance inhibited and auto fuel crossflow over-ride is off.
<b>B</b>	
BLEED CLOSED	All engine and APU bleeds closed.
BLEED MANUAL	Bleed system in manual mode.

**15-2****REVISION 8****STATUS MESSAGES****03 MAR 20**

BLEED MISCONFIG	APU bleed inhibited due to an improper bleed system configuration – manual mode only.
<b>C</b>	
CABIN TEMP MAN CKPT TEMP MAN	Cabin (cockpit) temperature in manual control.
CABIN ALT WARN HI	T/O or landing at high altitude >8,000 feet.
CABIN PRESS MAN	Pressurization system under manual control.
CAS MISCOMP	Miscompare of warning, caution, status, advisory or aural between DCUs for .20 seconds.
CONT IGNITION	Continuous ignition (A and B ignitors) selected for both engines.
COOL EXHAUST FAIL	Avionics exhaust fan failed, or low flow from cooling exhaust.
CPAM FAIL	CPCP indication system fail. Airplane altitude max FL300.
<b>D</b>	
DC CROSS TIE CLSD	DC cross bus tie closed. Closes when both ESS TRU 1 and 2 fail or both TRU 1 and 2 fail.
DC ESS TIE CLSD	DC essential tie is closed. Closes when either or both ESS TRU 1 and ESS TRU 2 fail.
DC MAIN TIE CLSD	DC main tie closed. Closes when either or both TRU 1 and TRU 2 fail.
DCU 1 AURAL INOP DCU 2 AURAL INOP	Self detected internal aural fault or aural inoperative manually disabled. Accomplish DCU 1(2) AURAL INOP Status Msg Checklist, page 14-1.
DCU 1 INOP DCU 2 INOP	Self detected internal fault or fault detected by other DCUs. Accomplish DCU 1(2) INOP Status Msg Checklist, page 14-1.
DUCT MON FAULT	Loss of redundancy of bleed leak detection system. If aircraft is on the ground and off the gate accomplish DUCT MON FAULT system reset.
<b>E</b>	
EMER LTS ON	Emergency lights on, power supply >4.5 volts.
ENG SYNC OFF	Engine sync manually deselected.
ESS TRU 1 FAIL	ESS TRU 1 < 18 volts and AC ESS Bus powered or ESS tie contactor closed.
ESS TRU 2 FAIL	ESS TRU 2 <18 volts and AC Bus 2 powered or ESS TRU 2 contactor not closed or ESS TRU 2 contactor closed and AC ESS Bus powered.
ESS TRU 2 XFER	ESS TRU 2 contactor closed.
<b>F</b>	
FD 1 FAIL	Flight Director L failed.
FD 2 FAIL	Flight Director R failed.

<b>STATUS MESSAGES</b>	<b>REVISION 8</b>	<b>15-3</b>
	<b>03 MAR 20</b>	

FDR ACCEL FAIL	<p>Failure of the FDR accelerometer:</p> <ul style="list-style-type: none"> <li>Normal accel. &lt;.8 g or 1.2g or lateral accel.&gt;.1g or longitudinal accel &gt;.1g and FDR Event pressed.</li> <li>and Aircraft on the ground.</li> <li>and parking brake set.</li> <li>and DC Bus 1 powered.</li> </ul>
FDR FAIL	FDR data not valid and AC Bus 1 not valid and DC Bus 1 powered and both L and R engines running.
FIRE SYS FAULT	<p>System operational.</p> <ul style="list-style-type: none"> <li>One firex circuit breaker failed.</li> <li>One loop failed on L or R engine or APU.</li> <li>FWD or AFT smoke detector fails.</li> <li>Fire discrete fails on test.</li> </ul> <p>If aircraft is on ground and off the gate accomplish FIRE SYS FAULT system reset.</p>
FLAP FAULT	<p>Loss of redundancy of SFECU:</p> <ul style="list-style-type: none"> <li>Failure of EMER FLAP.</li> <li>Loss of cross-channel bus.</li> <li>Inboard flap skew sensor failure.</li> <li>Inboard flap skew detection.</li> </ul>
FLAPS HALFSPEED	Failure of one flap channel or when system is operating on ADG power.
FLUTTER DAMPER	Hydraulic fluid level in the affected flutter damper is approximately 20% of normal level.
FUEL CH 1 FAIL	Fuel quantity computer channel 1or 2 failed. If aircraft is on the ground and off the gate accomplish FUEL CH 1 OR 2 FAIL system reset.
FUEL CH 2 FAIL	
FUEL QTY DEGRADED	Error in the attitude input to the fuel quantity gauging computer.
<b>G</b>	
GLD MAN DISARM	Ground lift dumping selected to MAN DISARM.
GPWS FAIL	GPWS failed (mode 1 thru 6). See GPWS FAIL Status Msg, page 12-5.
GRAV XFLOW FAIL	Gravity crossflow not in confirmed position (open or closed).
GS CANCEL	Glideslope cancel mode selected.
<b>H</b>	
HORN MUTED	Landing gear horn muted. Mute resets when: <ul style="list-style-type: none"> <li>All gear down-locked</li> <li>Flaps 30</li> <li>Left and right thrust lever idle</li> </ul>
<b>I</b>	
IAPS DEGRADED	Any IAPS GP-5 bus failed and aircraft is on the ground or both PSEU buses are not valid.
IAPS OVERTEMP	Overtemperature condition found in any IAPS quadrant.

**15-4****REVISION 8****STATUS MESSAGES****03 MAR 20**

<b>IB FLT SPLR FAULT</b>	Loss of redundancy of roll assist control inboard (outboard) multi function spoilers. <ul style="list-style-type: none"> <li>• Failure of one SSCM.</li> </ul> Failure of one RVDT in the roll sensor.
<b>IB GND SPLR FAULT</b>	Loss of redundancy of inboard (outboard) ground spoiler control. <ul style="list-style-type: none"> <li>• Failure of one SSCM</li> </ul> Failure of one proximity switch.
<b>IB SPLRONS FAULT</b>	Loss of redundancy of PLD and GLD control of Inboard MFS. <ul style="list-style-type: none"> <li>• Failure of one SSCM</li> </ul> Loss of one RVDT in the FSCL. (no loss of redundancy of GLD control).
<b>ICE DET 1 FAIL</b>	Ice detector 1 failed. See ICE DET 1(2) FAIL Status Msg, page 6-11. If aircraft is on the ground and off the gate accomplish ICE DET 1 system reset.
<b>ICE DET 2 FAIL</b>	Ice detector 2 failed. See ICE DET 1(2) FAIL Status Msg, page 6-11. If aircraft is on the ground and off the gate accomplish ICE DET 1 system reset.
<b>IDG 1 DISC</b>	IDG 1 or 2 not rotating with L or R engine running ( $N2 > 20\%$ ) or confirmation of IDG disconnect.
<b>IDG 2 DISC</b>	
<b>ISOL CLOSED</b>	Cross bleed valve fully closed.
<b>ISOL OPEN</b>	Cross bleed valve fully open.
<b>L</b>	
<b>L AUTO XFLOW ON</b>	Auto fuel crossflow activated and left crossflow on.
<b>L COWL A/I DUCT</b>	Left cowl anti-ice duct pressure less than -3.1 psig or greater than 53.1 psig and the battery bus is energized.
<b>L ENG BLEED SNSR</b>	Loss of redundancy of L bleed system. Pack inlet pressure sensor failed.
<b>L ENG BLEED CLSD</b>	Left Engine bleed not selected (LH PRSOV and HPSOV closed) either in auto or manual.
<b>L ENG SQUIB</b>	Indicates that one left squib has failed or has fired.
<b>L ENGINE SHUTDOWN</b>	L engine transitions to sub-idle and thrust levers at shutdown.
<b>L ENGINE START</b>	L engine start in progress.
<b>L FADEC FAULT 1</b>	Indicates that one FADEC channel is inoperative or a combination of faults that may affect engine sensor redundancy.
<b>L FADEC FAULT 2</b>	Indicates a combination of faults that are less serious than the faults covered by a FAULT 1 status message.
<b>L IGN A FAULT</b>	Fault detected on engine ignition A driver.
<b>L IGN B FAULT</b>	Fault detected on engine ignition B driver.

<b>STATUS MESSAGES</b>	<b>REVISION 8</b>	<b>15-5</b>
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L ITT EXCEED B	Contact Maintenance.
L ITT EXCEED B1	Contact Maintenance.
L ITT EXCEED C	Contact Maintenance.
L MLG FAULT	Left actuator shuttle valve or pressure switch failed in closed position (MLG downlocked). OR Left actuator pressure switch failed in open position (MLG uplocked).
L AUTO XFLOW ON	Auto fuel crossflow activated and left crossflow on.
L COWL A/I DUCT	Left cowl anti-ice duct pressure less than -3.1 psig or greater than 53.1 psig and the battery bus is energized.
L ENG BLEED SNSR	Loss of redundancy of L bleed system. Pack inlet pressure sensor failed.
L ENG BLEED CLSD	Left Engine bleed not selected (LH PRSOV and HPSOV closed) either in auto or manual.
L ENG SQUIB	Indicates that one left squib has failed or has fired.
L ENGINE SHUTDOWN	L engine transitions to sub-idle and thrust levers at shutdown.
L ENGINE START	L engine start in progress.
L FADEC FAULT 1	Indicates that one FADEC channel is inoperative or a combination of faults that may affect engine sensor redundancy.
L FADEC FAULT 2	Indicates a combination of faults that are less serious than the faults covered by a FAULT 1 status message.
L IGN A FAULT	Fault detected on engine ignition A driver.
L IGN B FAULT	Fault detected on engine ignition B driver.
L ITT EXCEED B	Contact Maintenance.
L ITT EXCEED B1	Contact Maintenance.
L ITT EXCEED C	Contact Maintenance.
L MLG FAULT	Left actuator shuttle valve or pressure switch failed in closed position (MLG downlocked). OR Left actuator pressure switch failed in open position (MLG uplocked).

15-6

REVISION 8

03 MAR 20

## STATUS MESSAGES

L OIL LEVEL LO	<p>Engine oil level is &lt; 57% with the engine running OR &lt; 80% with the engine not running. Refer to the following table:</p> <table border="1"> <thead> <tr> <th colspan="3">ENGINE OIL LEVEL INDICATION AND DURATION TABLE</th></tr> <tr> <th colspan="2">ENGINE OIL LEVEL INDICATION, %</th><th>DURATION OF AVAILABLE OIL UNTIL NEXT SERVICE, HOURS</th></tr> <tr> <th>STOPPED †</th><th>RUNNING</th><th></th></tr> </thead> <tbody> <tr> <td>100%</td><td>77%</td><td>36 hrs</td></tr> <tr> <td>80%</td><td>57%</td><td>26 hrs</td></tr> <tr> <td>50%</td><td>27%</td><td>10 hrs (1 day)</td></tr> <tr> <td>40%</td><td>17%</td><td>5 hrs (1 flight)</td></tr> <tr> <td colspan="2">&lt; 40% DO NOT DISPATCH</td><td>&lt; 17% DO NOT DISPATCH</td></tr> <tr> <td>28% Do not operate. SERVICE THE OIL TANK†</td><td>15% Complete the flight, MONITOR OIL TEMP AND PRESSURE</td><td><b>NOTE:</b> There is no EICAS OIL LEVEL indication if the oil quantity is less than 15%</td></tr> </tbody> </table> <p>† The engine oil level check should be accomplished within 3 minutes to 1 hour after shutdown. The engines must be motored if this period is exceeded.</p>				ENGINE OIL LEVEL INDICATION AND DURATION TABLE			ENGINE OIL LEVEL INDICATION, %		DURATION OF AVAILABLE OIL UNTIL NEXT SERVICE, HOURS	STOPPED †	RUNNING		100%	77%	36 hrs	80%	57%	26 hrs	50%	27%	10 hrs (1 day)	40%	17%	5 hrs (1 flight)	< 40% DO NOT DISPATCH		< 17% DO NOT DISPATCH	28% Do not operate. SERVICE THE OIL TANK†	15% Complete the flight, MONITOR OIL TEMP AND PRESSURE	<b>NOTE:</b> There is no EICAS OIL LEVEL indication if the oil quantity is less than 15%
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L PACK OFF	Left pack OFF. L FCV closed.																														
L RARV FAULT	Ram air regulator valve has failed in the open or closed position.																														
L REV FAULT	<p>Loss of redundancy of thrust reverser system: Any single lock or hydraulic unit failure Any single lock switch failure Deployed switch failure Pressure switch failure Throttle quadrant switch failure</p> <p><b>NOTE: An associated REV (red or amber) icon may be displayed in the associated N1 gage. No further pilot action is required unless a Thrust Reverser (warning or caution) EICAS message is posted.</b></p>																														
L THROTTLE FAULT	Throttle position sensor faulty.																														
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L XFLOW ON	Auto xflow activated and L xflow.																														
<b>M</b>																															
MAIN BATT CHGR	Main battery overheating or not charging																														
MAX XFLOW	Manual Crossflow Selected																														
MDC FAULT	Maintenance diagnostic computer inoperative.																														
MLG FAULT	Main landing gear shuttle valve failed.																														
<b>N</b>																															
No Smoking	No smoking signs selected on.																														
<b>O</b>																															
OB FLT SPLR FAULT	<p>Loss of redundancy of roll assist control inboard (outboard) multi function spoilers.</p> <ul style="list-style-type: none"> <li>• Failure of one SSCM.</li> </ul> <p>Failure of one RVDT in the roll sensor.</p>																														

<b>STATUS MESSAGES</b>	<b>REVISION 8</b>	<b>15-7</b>
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OB GND SPLR FAULT	Loss of redundancy of inboard (outboard) ground spoiler control. <ul style="list-style-type: none"><li>• Failure of one SSCM</li></ul> Failure of one proximity switch.
OB SPLRONS FAULT	Loss of redundancy of PLD and GLD control of outboard MFS. <ul style="list-style-type: none"><li>• Failure of one SSCM</li></ul> Loss of one RVDT in the FSCL. (no loss of redundancy of GLD control).
OUTFLOW VLV OPEN	Outflow valve full open.
OVBD COOL FAIL	Ground valve failed closed. See OVBD COOL FAIL Status Msg, page 5-14.
<b>P</b>	
PITCH FEEL FAULT CHA PITCH FEEL FAULT CHB	Channel A has specific internal failure related to control of pitch feel (potentiometer, actuator discrete). Module A is inoperative (for pitch feel control). Channel B has specific internal failure related to control of pitch feel (potentiometer, actuator discrete). Module B is inoperative (for pitch feel control). If aircraft is on the ground and off the gate accomplish PITCH FEEL FAULT system reset.
PROX SYS FAULT 1  PROX SYS FAULT 2	Any one sensor or discrete input or output (non-critical) failed or unreasonable.
<b>R</b>	
R AUTO XFLOW ON	Auto fuel crossflow activated and right crossflow on.
R COWL A/I DUCT	Right cowl anti-ice duct pressure less than -3.1 psig or greater than 53.1 psig and the battery bus is energized.
R ENG BLEED SNSR	Loss of redundancy of Right bleed system. Pack inlet pressure sensor failed.
R ENG BLEED CLSD	Right Engine bleed not selected (RH PRSOV and HPSOV closed) either in auto or manual.
R ENG SQUIB	Indicates that one right squib has failed or has fired.
R ENGINE START	R engine start in progress.
R ENGINE SHUTDOWN	R engine transitions to sub-idle and thrust levers at shutoff.
R FADEC FAULT 1	Indicates that one FADEC channel is inoperative or a combination of faults that may affect engine sensor redundancy.
R FADEC FAULT 2	Indicates a combination of faults that are less serious than the faults covered by a FAULT 1 status message.
R IGN A FAULT	Fault detected on engine ignition A driver.
R IGN B FAULT	Fault detected on engine ignition B driver.

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STATUS MESSAGES

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R ITT EXCEED B	Contact Maintenance.																											
R ITT EXCEED B1	Contact Maintenance.																											
R ITT EXCEED C	Contact Maintenance.																											
R MLG FAULT	Right actuator shuttle valve or pressure switch failed in closed position (MLG downlocked). OR Right actuator pressure switch failed in open position (MLG uplocked).																											
R OIL LEVEL LO	Engine oil level is < 57% with the engine running OR < 80% with the engine not running. Refer to the following table:  <table border="1"> <thead> <tr> <th colspan="3">ENGINE OIL LEVEL INDICATION AND DURATION TABLE</th> </tr> <tr> <th colspan="2">ENGINE OIL LEVEL INDICATION, %</th> <th>DURATION OF AVAILABLE OIL UNTIL NEXT SERVICE, HOURS</th> </tr> <tr> <th>STOPPED †</th> <th>RUNNING</th> <th></th> </tr> </thead> <tbody> <tr> <td>100%</td> <td>77%</td> <td>36 hrs</td> </tr> <tr> <td>80%</td> <td>57%</td> <td>26 hrs</td> </tr> <tr> <td>50%</td> <td>27%</td> <td>10 hrs (1 day)</td> </tr> <tr> <td>40%</td> <td>17%</td> <td>5 hrs (1 flight)</td> </tr> <tr> <td colspan="2">&lt; 40% DO NOT DISPATCH</td> <td>&lt; 17% DO NOT DISPATCH</td> </tr> <tr> <td>28% Do not operate. SERVICE THE OIL TANK†</td> <td>15% Complete the flight, MONITOR OIL TEMP AND PRESSURE</td> <td><b>NOTE:</b> There is no EICAS OIL LEVEL indication if the oil quantity is less than 15%</td> </tr> </tbody> </table> <p>† The engine oil level check should be accomplished within 3 minutes to 1 hour after shutdown. The engines must be motored if this period is exceeded.</p>	ENGINE OIL LEVEL INDICATION AND DURATION TABLE			ENGINE OIL LEVEL INDICATION, %		DURATION OF AVAILABLE OIL UNTIL NEXT SERVICE, HOURS	STOPPED †	RUNNING		100%	77%	36 hrs	80%	57%	26 hrs	50%	27%	10 hrs (1 day)	40%	17%	5 hrs (1 flight)	< 40% DO NOT DISPATCH		< 17% DO NOT DISPATCH	28% Do not operate. SERVICE THE OIL TANK†	15% Complete the flight, MONITOR OIL TEMP AND PRESSURE	<b>NOTE:</b> There is no EICAS OIL LEVEL indication if the oil quantity is less than 15%
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R XFLOW ON	Auto xflow activated and R xflow.																											
RAM AIR OPEN	Ram air SOV selected open.																											
RECIRC FAN FAULT	Either one or both recirculation fans failed.																											
RECIRC FAN OFF	Recirculation fan OFF.																											
RUD LIMIT FAULT	Loss of rudder limiter redundancy. If aircraft is on the ground and off the gate accomplish RUD LIMIT FAULT system reset.																											

STATUS MESSAGES	REVISION 8	15-9
	03 MAR 20	

S	
SEAT BELTS	Seat belts signs selected on.
SLAT FAULT	Left or right wing slat disconnect sensor indicates open.
SLATS HALFSPEED	Failure of one slat channel or when system is operating on ADG power.
SPEED REFS INDEP	Pilot and copilot V-speed selection not synchronized. OR ADC cross-talk failed.
SPLR/STAB FAULT	Loss of redundancy: <ul style="list-style-type: none"><li>• One module in each SSCU failed.</li><li>• Self test has not run for more than 5 consecutive times</li><li>• Problems identified in self test which impact system safety</li></ul>
SSCU 1 FAULT	One of the two spoiler or stabilizer control units has failed or is not powered. If aircraft is on the ground and off the gate accomplish SSCU 1 FAULT system reset.
SSCU 2 FAULT	
STAB CH 1 INOP	Stab trim channel 1 or 2 not engaged or failed and stab trim channel 2 or 1 engaged.
STAB CH 2 INOP	<b>NOTE: Category II operations may be affected by this failure. Review the requirements.</b>
STAB FAULT	Loss of redundancy in either stab trim channel, failure of one SSCM, one pilot or co-pilot trim switch, or one resolver in the stab actuator.
STEERING DEGRADED	Possible intermittent loss of steering due to nose wheel bouncing.
T	
TERRAIN FAIL	EGPWS terrain map failure, not available for display. See TERRAIN FAIL Status Msg, page 12-5.
TERRAIN NOT AVAIL	EGPWS terrain map not available for display due to position inaccuracy.
TERRAIN OFF	EGPWS terrain map manually deselected.
TRU 1 FAIL	TRU 1 <18 volts and AC bus 1 powered or main tie contactor closed.
TRU 2 FAIL	TRU 2 <18 volts and AC bus 2 powered or main tie contactor closed.
TRU FAN FAIL	Fan failed on any one of 4 TRUs. If aircraft is on the ground and off the gate accomplish TRU FAN FAIL system reset.
W	
WINDSHEAR FAIL	Windshear detection system in GPWS failed, or windshear guidance failed.
WING A/I FAULT	Loss of redundancy on wing anti-ice system or loss of 1 or 2 outboard temperature sensors.

**UNCONTROLLED WHEN PRINTED****15-10****REVISION 8**

03 MAR 20

**STATUS MESSAGES**

WING XBLEED OPEN	Wing cross-bleed valve is in full-open position.
<b>X</b>	
XPDR 1 INOP	Indicates ATC transponder failure. ADS-B Out operations may be affected. Review the requirements.
XPDR 2 INOP	See Transponder Failure, page 12-12.
<b>Y</b>	
YD 1 INOP	Yaw damper 1 is off or failed.
YD 2 INOP	Yaw damper 2 is off or failed.

<b>FMS MESSAGES</b>	<b>ORIGINAL</b>	<b>16-1</b>
	<b>15 MAY 14</b>	

## **Chapter 16: FMS MESSAGES**

### **FMS Message Line Messages**

The messages in the following table show on the CDU message line and on the MESSAGES page. For FMS Scratchpad Messages, go to 16-10.

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
ADC TEMP DISAGREE	MSG	Yellow	SAT temperature values for the air data computers are in disagreement.
APPR FOR REF ONLY	MSG	White	This message shows when the airplane is within 30 nautical miles of the FAF for the selected approach and that approach is not qualified for use by the FMS as primary approach guidance.
CHECK FPLN ALT	MSG	White	This message indicates either: 1. There is an error in an altitude constraint because it results in a reversal of a climb or descent altitude, or 2. The airplane has exceeded a downtrack altitude constraint.
CHECK LOC TUNING	MSG	White	The airplane is at or within 30 nautical miles of the destination airport, a localizer based approach is selected and the NAV frequency does not match the tuned value of the FMS. You may have to manually tune the correct localizer frequency before making the approach.
CHECK NAV SOURCE	MSG	White	VNAV is selected and the NAV source is not FMS or LOC after the FMS initiated ILS capture. Set the NAV source to FMS or LOC.
CHECK NAV TUNING	MSG	White	The airplane is at or within 30 nautical miles of the destination airport, approach mode is selected, an RNAV approach is selected, and the FMS could not tune the reference navaid. Select the correct VOR / DME for the approach, or select the AUTO tuning mode when able. If the correct VOR / DME is not available, the approach is not authorized.
CHECK SPEED	SPD	Yellow	You are within two minutes of a hold and the current indicated airspeed is 20 knots or 0.03 MACH greater than the maximum recommended holding airspeed.
CHECK TAKEOFF PERF	MSG	Yellow	Verify that performance database with takeoff N <sub>1</sub> thrust tables is loaded.

**16-2****REVISION 6****FMS MESSAGES**

01 JUN 18

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
CHK POS	CHK POS	Yellow	The FMS has determined that a navigation sensor is not meeting the accuracy requirements for the current phase of flight. This message is usually followed by another message indicating the affected sensor. (Example: FMS-FMS DISAGREE, GNSS-FMS DISAGREE, VOR / DME DIST>75NM, etc.). A position update may correct this problem. If the problem is caused by a failed sensor, then disabling that sensor may also correct the problem.
CRS REVERSL IN FPLN	MSG	Yellow	This indicates the flight plan route contains a course reversal of more than 160 degrees at the TO waypoint. Its purpose is to identify a possible error in a flight plan. Ignore the message if the flight plan course reversal is intentional.
DME-FMS DISAGREE	MSG	Yellow	This indicates one or more DMEs are inconsistent with the current FMS position estimate. This message is annunciated when the difference is: 2.0 NM in the en route environment, 1.0 NM in the terminal environment, and 0.5 NM in the approach environment. Determine if: <ol style="list-style-type: none"> <li>An FMS position update is required.</li> <li>Any of the NAV sensors is in error.</li> <li>A DME station is in error and should be disabled.</li> </ol>
DR EXCEEDS 5 MIN	FMS DR	Yellow	The FMS has been in DR mode for more than five minutes while the airplane is airborne. Determine if: <ol style="list-style-type: none"> <li>An FMS position update is required.</li> <li>Navigation sensors are appropriately enabled.</li> </ol>
EXEC	None Shown	White	This message shows at the right side of the message line anytime that an active flight plan is modified or when a new flight plan is activated. Verify the flight plan change, then push the EXEC key to execute the flight plan. (Will not show on the MESSAGES page.)

<b>FMS MESSAGES</b>	<b>REVISION 6</b>	<b>16-3</b>
	<b>01 JUN 18</b>	

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
EXEC FPLN MOD	MSG	Yellow	This message shows for a modified flight plan that has not been updated or executed for more than one minute (approximately). Continue the modification, or verify the current change and push the EXEC key to execute the flight plan, or push the CANCEL MOD line select key to cancel the modification in progress.
FMS DR	FMS DR	White	<p>The airplane is on the ground or has been airborne for less than one minute and the FMS has been in dead reckoning mode for between 10 to 30 seconds. Determine if:</p> <ol style="list-style-type: none"> <li>1. VOR / DME, IRS, and GNSS sensors are enabled. Enable them if they are not.</li> <li>2. AUTO tuning mode is selected.</li> <li>3. Any VOR / DME stations are being received. If airborne, climb higher to receive more stations.</li> </ol> <p>Another reason for this message may be that the FMS position may not have been properly initialized. Go to the POS INIT page and position update the FMS with data from a known good sensor.</p>
FMS DR	FMS DR	Yellow	<p>This message shows when the FMS has been in DR mode for at least: 60 seconds in an oceanic or remote environment, 30 seconds in the en route or terminal environment, or 10 seconds in the approach environment. Determine if:</p> <ol style="list-style-type: none"> <li>1. An FMS position update is required.</li> <li>2. Navigation sensors are appropriately enabled.</li> </ol> <p>Another reason for this message may be that the FMS position may not have been properly initialized. Go to the POS INIT page and position update the FMS with data from a known good sensor.</p>
FMS-EFD N1 DISAGREE	MSG	Yellow	N1 thrust comparator indicates mismatch between FMS and EFD values.

**16-4****REVISION 6****FMS MESSAGES**

01 JUN 18

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
FMS NAV INVALID	MSG	Yellow	The FMS does not have a valid source for sensor and heading data while airborne. Check the NAV sensors to be sure they are enabled and check for a heading sensor failure.
FMS NAV INVALID	MSG	White	The FMS does not have a valid source for sensor and heading data while on the ground. Check the NAV sensors to be sure they are enabled and check for a heading sensor failure.
FPLN DIS-CONTINUITY	MSG	Yellow	The flight plan has sequenced past, or is within two minutes of sequencing past, the last waypoint before a flight plan discontinuity. Modify the flight plan as required.
FUEL FLOW NOT AVAIL	MSG	White	Fuel flow data has been invalid for at least two minutes.
GNSS DISABLED	None Shown	White	GNSS sensors are disabled for use by the FMS on the GNSS CONTROL page. This may degrade FMS navigation performance. If the GNSS sensors are valid, enable the GNSS sensors on the GNSS CONTROL page.
GNSS-FMS DISAGREE	MSG	Yellow	The GNSS position estimate is different from that of the FMS. This message shows when the difference is: 2.0 NM or greater in the oceanic, remote or en route environment, 1.0 NM or greater in the terminal environment, or 0.3 NM or greater in the approach environment. Determine if a position update can correct the problem, or if the GNSS sensor should be disabled.
GNSS NOT AVAILABLE	MSG	White	This message indicates the FMS is not using GNSS position data as part of its calculations to determine position. This message shows when GNSS has been unavailable for: at least five minutes in the oceanic, remote or en route environment.
GNSS NOT AVAILABLE	MSG	Yellow	This message indicates the FMS is not using GNSS position data as part of its calculations to determine position. This message shows when GNSS has been unavailable for: at least two minutes in the terminal environment, or at least 30 seconds in the approach environment.

<b>FMS MESSAGES</b>	<b>REVISION 6</b>	<b>16-5</b>
	<b>01 JUN 18</b>	

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
GPS ONLY	GPS ONLY	White	The FMS is using position data from only the GNSS sensor. This message only shows if all of the other sensors are disabled, invalid or failed. This message may be inhibited in some aircraft installations.
GNSS REVERTED	MSG	White	This message indicates the FMS is using the cross-side GNSS sensor, instead of the on-side sensor, while the on-side sensor is enabled. This could be the result of invalid data from the on-side GNSS sensor or a failed on-side sensor.
HALF-BANK SELECTED	MSG	Yellow	The airplane is within one minute or less of arriving at holding fix or procedure turn fix, or the active leg is an approach leg, and HALF-BANK mode is selected on the flight control panel. In these situations, an overshoot of the desired path may occur when HALF-BANK is selected.
HOLD EFC EXPIRED	MSG	White	This message shows when the Expect Further Clearance (EFC) time has expired and you have not exited the hold.
INVALID PERF DB	MSG	Yellow	PREDICTED performance mode is selected and the FMS performance database version does not match the airplane type.
LAST WAYPOINT	MSG	Yellow	The airplane has passed, or is within two minutes of passing, the last waypoint in the flight plan.
LOC WILL BE TUNED	MSG	White	The FMS is within 30 seconds of automatically tuning the localizer and the radio tuning mode is set to MANUAL.
LOW POS ACCURACY	MSG	Yellow	Position accuracy is below the RNP required value.
MSG	MSG	White or Yellow	This message shows when the CDU message page contains a new or old message. This message also shows on the PFD for each new message. Push the MSG key to acknowledge the message and remove the "MSG" annunciation from the PFD. The "MSG" annunciation shows on the CDU as long as there is a message on the MESSAGES page. (Will not show on the MESSAGES page.)

**16-6****REVISION 8****FMS MESSAGES**

03 MAR 20

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
NO APPR GPS RAIM	MSG	White	A GPS or GPS-only approach is specified in the flight plan and RAIM is predicted to be unavailable to the GPS sensor for the approach.
NO APPR REVERSION	MSG	White	This message shows when either DCP is in reversion mode while the airplane is within 30 NM of the airport, a localizer-based approach is in the active flight plan, and FMS-to-localizer (NAV-to-NAV) capture is enabled. NAV-to-NAV capture will not occur with the DCP in reversion.
NO COMM			<p>Intermittent NO COMM advisory messages are displayed when there is no VHF link with the ground over which a message may be sent. The message will remain until the system reestablishes a link. NO ACTION IS REQUIRED.</p> <p>If the NO COMM message is persistent throughout an entire flight segment, this is an indication of a system level failure and should be recorded in the Aircraft Maintenance Log.</p>
NO FLIGHT PLAN	NO FLIGHT PLAN	White	The FMS does not have an active flight plan. Create, activate and execute a flight plan, or activate and execute an existing flight plan.
NO GPS RAIM	MSG	White	The FMS is using GNSS in its calculations to determine position in the en-route, terminal or approach phase of flight, and RAIM at the required accuracy is not available to the GPS sensor.
NO NAV DATA BASE	MSG	White	The FMS has no navigation database. A database must be loaded into the FMS system.
NO PERF DATA BASE	MSG	White	The performance database has not been loaded into the FMS. Load the performance database.
NO TXT WHEN PFD MAP	NO TXT WHEN PFD MAP	White	Aircraft configuration supports FMS map display on the PFD, the PFD is currently showing a present position map, and the MFD DATA key was pushed. This message will clear itself.

<b>FMS MESSAGES</b>	<b>REVISION 6</b>	<b>16-7</b>
	<b>01 JUN 18</b>	

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
NOT ON INTERCPT TRK	MSG	Yellow	The FMS is steering the airplane back to the active leg, or it is armed for capture, but the current flight path will not intercept the active flight plan leg. If the FMS is steering the airplane, this condition will be corrected automatically. You must assess any potential airspace violations during the maneuver.
OFFSET	OFST	White	This message shows when a parallel offset is in use. The message clears when the offset is terminated. (Will not show on the MESSAGES page.)
OFFSET TERMINATED	OFST	White	This message shows when you have reached the end of a parallel offset leg of the flight plan.
OFFSET WILL END	None Shown	White	The FMS shows this message when you are within two minutes of the end of an offset track.
PERF OUT OF RANGE	MSG	White	Performance parameter values are exceeded.
RESET INITIAL POS	MSG	Yellow	The position entered during position initialization is greater than 40 NM from the FMS's last known position. Because of this, it is requesting the initial position be re-entered for verification. Reinitialize the FMS position on the POS INIT page on the CDU.
UNABLE CRZ ALT	MSG	White	FMS performance predictions indicate the airplane cannot reach the cruise altitude because of climb or ceiling limitations, or the climb and descent profiles overlap. Correct the vertical profile to clear the message.
UNABLE FPLN ALT	MSG	Yellow	FMS performance predictions indicate an altitude constraint cannot be met at the specified waypoint. Correct the vertical profile of the climb or descent to clear this message.

**16-8****REVISION 6****FMS MESSAGES**

01 JUN 18

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
UNABLE NEXT ALT	ALT	Yellow	<p>1. At the present rate of climb or descent, you will not be able to clear the next altitude constraint in the flight plan. This message annunciates when the climb or descent is insufficient for at least one minute or more. Correct the flight plan altitude constraint or change the airplane's climb or descent rate to comply with the current constraint to clear this message.</p> <p><b>NOTE: Annunciation of this message is disabled when you are in an altitude hold mode.</b></p> <p>2. An automatic vertical direct-to has been attempted and it cannot be performed because the required descent path exceeds the maximum VPA for the aircraft.</p>
UNABLE TO SEQ FPLN	None Shown	White	<p>There are three situations that cause the FMS to show this message.</p> <p>1. A SID, STAR, or approach specifies that the active leg be terminated at a specified distance from a DME station, and the airplane's current flight path does not intercept the specified DME station.</p> <p>2. A SID, STAR, or approach specifies that the active leg is a heading leg, it is terminated when it either intercepts the next leg or terminates at a specified VOR radial, and the termination point is more than 50 NM from the airplane's present position.</p> <p>3. An altitude-terminated procedure leg is active and the barometric altitude is invalid, or vertical speed has been negative for at least one minute.</p> <p>Change the flight plan to eliminate the above situations to clear this message.</p>
UNABLE VHF NAV TUNE	MSG	Yellow	VHF navigation receiver tuning is unavailable.

<b>FMS MESSAGES</b>	<b>REVISION 6</b>	<b>16-9</b>
	<b>01 JUN 18</b>	

<b>CDU MESSAGE</b>	<b>PFD MESSAGE</b>	<b>COLOR</b>	<b>DESCRIPTION</b>
VOR / DME DISABLED	None Shown	White	VOR / DME navigation sensors are disabled for use by the FMS on the VOR CONTROL page. This may degrade FMS navigation capability. To correct this, enable the VOR / DME sensors on the VOR CONTROL page.
VOR / DME DISTANCE > 75 NM	MSG	Yellow	The FMS is navigating within a terminal area and is using a single collocated VOR / DME for determining position, and the navaid is greater than 75 NM from the airplane's present position.
VOR-FMS DISAGREE	MSG	Yellow	<p>The VOR / DME position estimate is different from that of the FMS. To show this message, the difference must be greater than 10 NM in the en route environment, and greater than 5 NM in the terminal and approach environment.</p> <p>The pilot should determine whether the FMS position or the VOR signal is incorrect and determine the appropriate action, if any. Corrective actions include:</p> <ol style="list-style-type: none"> <li>1. Updating the FMS position.</li> <li>2. Disabling individual VOR / DME navaids.</li> <li>3. Disabling the use for all VOR / DMEs.</li> </ol>

**16-10****ORIGINAL****FMS MESSAGES****15 MAY 14**

## **FMS Scratchpad Messages**

The following messages show on the CDU scratchpad for data entry or selection problems. All scratchpad messages show in white for approximately one second, then the previous scratchpad entry returns for correction or deletion. The PFD and MFD do not show annunciations for scratchpad messages. Also, scratchpad messages do not show on the MESSAGES page.

<b>MESSAGE</b>	<b>DESCRIPTION</b>
ALONG TRK WPT N/A	An attempt to enter a place / along-track offset or place / along-track offset / name waypoint into the flight plan failed. Check for a possible scratchpad entry error. Also, be sure the entry you are trying to make complies with the entry rules for pilot-entered waypoints.
DATE ENTRY N/A	An attempt to enter a date value in the DATE location on the STATUS page failed because current conditions do not allow the clock to be reset. In many airplanes, the date and time shown on the FMS STATUS page are set by the airplane clocks and cannot be set from the FMS. Refer to the appropriate airplane flight manuals to set the DATE.
DISTANCE TOO LARGE	You tried to enter an along-track waypoint offset that is too large for the flight plan leg. Verify the correct reference waypoint and the correct distance were used.
DME IN HOLD	An attempt to set the NAV radio tuning mode to AUTO failed because the affected radio has a DME in the HOLD mode. Clear the HOLD mode, then set the NAV radio to the AUTO mode.
FLT DIR MODE NOT HDG	An attempt to set the heading on the SIMULATION CONTROL page failed, because the flight director is not in heading mode.
FMS FAULT	The FMS has detected an internal fault which prevents storing the database. Report this problem to your maintenance personnel.
FPLN FULL	An attempt to add waypoints to a flight plan failed because the flight plan is full.
FUEL FLOW NOT AVAIL	This message indicates fuel flow data has been invalid for at least two minutes.
INBD CRS ENTRY N/A	You cannot edit the inbound course of an active hold.
INTERSECTION >400 NM	A waypoint specified by the intersection of radials from two navaids is more than 400 nautical miles from either of the navaids.
INVALID DELETE	You attempted to delete data that cannot be deleted with the DELETE function.
INVALID DIRECT-TO	The DIRECT-TO waypoint selected is not a geographical waypoint, a vertical direct-to was requested to an altitude that is above the airplane barometric altitude or requires a descent path that exceeds the maximum VPA, or there is a VECTORS leg or discontinuity between the current airplane position and the target waypoint. Modify the flight plan as necessary to correct any of the above problems.

<b>FMS MESSAGES</b>	<b>REVISION 6</b>	<b>16-11</b>
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MESSAGE	DESCRIPTION
INVALID ENTRY	The entered data is invalid for the attempted data entry field.
INVALID ROUTE	You attempted to store a route that does not have any waypoints. You must enter waypoints into a route before you can store it.
KEY NOT ACTIVE	This message shows when an inactive line select key or function key is pushed.
LIST FULL	You have 8 GNSS satellites disabled on the GNSS CONTROL page and you attempted to disable another one. You can only disable 8 satellites.
MAG N/A	An attempt to select the MAG display mode on the FMS CONTROL page failed, because you are operating in extreme latitudes: either north of 73 degrees North latitude or south of 60 degrees South latitude.
N/A IN POLAR REGION	You attempted to perform a disallowed edit in the polar regions of the flight plan. Any of the following located in the polar region may not be entered: a hold at a fix, a hold at PPOS, a reference fix (FIX INFO page), a reference fix for a place bearing / distance, place bearing / place bearing, or along-track fix, a course edit to fix, or a FROM waypoint.
NAVAID INHIBITED	An attempt to specify a navaid for position update on the POS INIT page failed because the navaid is inhibited on the VOR CONTROL page.
NAVAID NOT RECEIVED	An attempt to update position from a navaid on the POS INIT page failed because the navaid signal is invalid.
NO ENTRY ALLOWED	With data in the scratchpad, you pushed a line select key adjacent to a data field that does not allow entry of data. Select a valid entry field for the data in the scratchpad.
NO INTERSECTION	The waypoint specified by the intersection of radials from two navaids does not exist because the radials do not intersect, or the radial or distance does not intercept a flight plan leg. This message also shows when you try to enter an airway for which there is neither an entry nor an exit waypoint already in the flight plan.
NOT A COLLOCATED NAVAID	You must use a collocated VOR / DME to initialize position or update from a navaid. Select another VOR / DME or another sensor type to initialize or update the position.
NOT A VOR / DME	The station identifier you entered corresponds to a navaid that is not a paired VOR / DME, which is unacceptable to initialize or update the position. Select another VOR / DME or another sensor type to initialize or update the position.
NOT IN DATA BASE	The identifier entered into the scratchpad is not in the navigation database.
NOT ON AIRWAY	An attempt to enter an exit waypoint for an airway failed because the waypoint is not part of the airway. Select a waypoint that is located on the airway and try again.

**16-12****REVISION 8****FMS MESSAGES****03 MAR 20**

MESSAGE	DESCRIPTION
NOT ON GROUND	<p>The FMS has determined the aircraft is not on the ground and the pilot has attempted to perform one of the following actions:</p> <ol style="list-style-type: none"> <li>1. Select an active database.</li> <li>2. Load a database from disk.</li> <li>3. Transfer a pilot route.</li> <li>4. Specify an origin airport in the active flight plan.</li> </ol> <p>The above actions are not allowed while the airplane is airborne.</p>
PILOT WPT LIST FULL	<p>This message shows when you attempt to enter a pilot-defined waypoint into the flight plan and there are already 50 pilot-defined waypoints in the flight plan. This message also shows when you try to store a waypoint in the pilot waypoint database, and the total number off waypoints in the database is at the limit of 100 waypoints. To enter another pilot-defined waypoint, you must first delete one from the current flight plan or the pilot waypoint database.</p>
QUAD / RADIAL ENTRY N/A	You cannot edit the QUAD / RADIAL of an active hold.
RADIO IS NAV SOURCE	You have attempted to set the navigation radio tuning mode to AUTO when the affected radio is the navigation source. Set the NAV source to FMS and try again.
ROUTE LIST FULL	One hundred routes have been stored in the FMS route database, or there is not enough memory to store this route. Delete a route to make room for this route and try again to store it.
SYSTEM NOT AVAILABLE	You attempted to select an MCDU function and the associated system is not available to the FMS.
TIME ENTRY N/A	An attempt to change the UTC time on the STATUS page failed because an external clock source is in use. In many airplanes, the date and time shown on the FMS STATUS page are set by the airplane clocks and cannot be set from the FMS. Refer to the appropriate airplane flight manual to set the TIME for the airplane clock.
TOO MANY HOLDS	An attempt to enter a hold into a flight plan failed because the flight plan already has the maximum number of holds allowed. Only six holds are allowed in a flight plan (which includes the direct-to history). Delete a previous hold from the flight plan to make room to add a new one.
WPT NOT MATCHED	An attempt to enter a place / along-track offset waypoint at a location in the flight plan failed because the waypoint identifiers in the flight plan and scratchpad did not match. Verify and correct the scratchpad entry and try again.
XTALK BUS FAILURE	The Crosstalk Bus is invalid and you attempted to change the cross-side NAV radio tuning mode from MANual to AUTomatic.

## Chapter 17: Operational Data

**NOTE:** An ILS approach to Category II minima must not be commenced or continued unless all required airborne equipment and their ground installations, specified in the Category II Required Equipment List, are operating satisfactorily.

### Approach Requirements

#### Aircraft Equipment Requirements

Equipment	CAT I	CAT II	RNAV/GPS
VHF NAV 1 and 2	One	Both	
VHF Glideslope 1 and 2	One	Both	
VHF COM 1 and 2		Both	
FMS			Required
GPS			Required
PFD 1 and 2		Both	
STAB Channel 1 and 2		One channel must be operational	
Radio Altimeter 1 and 2		Both, with display on both sides	
Inner Marker Beacon		Required (if approach is predicated by its use)	
DME	Required (if approach is predicated by its use)	Required (if approach is predicated by its use)	
AHRS 1 and 2		Both	
ADC 1 and 2		Both	
FD 1 and 2	One must be operational if RVR below 4000 feet	Both	
EFIS Comparator Monitors		Must be operational	
Yaw Damper	One must be operational	Both	
AFCS Pitch Trim		Must be operational	
Autopilot		Must be operational and engaged	
Hydraulics		All systems must be on and system pressures within limits	

**17-2****REVISION 6**

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**OPERATIONAL DATA****Aircraft Equipment Requirements (Continued)**

<b>Equipment</b>	<b>CAT I</b>	<b>CAT II</b>	<b>RNAV/GPS</b>
Engines		Both aircraft engines operative	
Electrics		Two generators on and sharing load. i.e. 2 main generators or 1 main generator and APU generator on	
Windshield Wipers		Both must be operational	

**Ground Equipment Requirements**

<b>Equipment</b>	<b>CAT I</b>	<b>CAT II</b>	<b>RNAV/GPS</b>
Localizer	Required	Required	
Glideslope	Required	Required	
FAF	Required	Required	Required
ALSF 1/2 (sequenced flashing lights may be inoperative)		Required	
HIRL		Required	
Inner Marker Beacon		Required (if approach is predicated by its use)	
DME	Required (if approach is predicated by its use)	Required (if approach is predicated by its use)	

<b>OPERATIONAL DATA</b>	<b>REVISION 6</b>	<b>17-3</b>
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## General Approach Requirements

<b>Item</b>	<b>CAT I</b>		<b>CAT II</b>
RVR	Non-Precision 2400+	Precision 1800+	1600 & 1400 1200
Transmissometers	Not required, but controlling if reported		TDZ TDZ plus one other
Lowest DA(H)	250' DA(H) HAT	200' DA(H) HAT	100' DH
Required Visual Reference	US Airports - FAR 121.651(c)3 Foreign Airports – OpsSpecs C052(d)5		TDZ Lights OR Runway Threshold Lights OR Red Side Row Lights OR Red Terminating Bar Lights
RA Setting	Not Authorized		Published DH
MDA Setting	Use DA / DDA rounded up to the next highest tenth		If “RA NOT AUTH” use published DA rounded up to the next highest tenth
Captain Only	NO		YES
Max Crosswind	27 kts		15 kts
Max Headwind	None		16 kts
Max Tailwind	10 kts		10 kts

**17-4****REVISION 8****OPERATIONAL DATA**

03 MAR 20

1. Determine landing distance from appropriate table for the Runway Condition.
2. Adjust for Tailwind or Headwind and Thrust Reverser(s) inop if necessary.
3. Multiply by the factor from the QRH, then add a 15% safety factor.

**<900> Actual Landing Distance (Landing Gear Down – Flaps 45°)**

Gross Weight (lb)	DRY					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
Actual Landing Distance (feet)						
55000	2669	2782	2904	3037	3189	3374
57000	2736	2852	2978	3115	3281	3473
59000	2802	2922	3051	3197	3372	3573
61000	2868	2992	3125	3283	3464	3673
63000	2934	3061	3203	3368	3558	3773
65000	3000	3131	3284	3454	3653	3874
67000	3065	3205	3365	3543	3747	3974
69000	3131	3282	3446	3632	3842	4074
71000	3201	3358	3528	3721	3936	4175
73000	3274	3434	3612	3810	4031	4280
75000	3346	3510	3696	3899	4125	4407
77000	3418	3589	3779	3988	4230	4547
79000	3488	3666	3861	4078	4357	4689
81000	3557	3742	3942	4190	4487	4834
83000	3627	3817	4041	4303	4619	4982
85000	3696	3900	4144	4420	4751	5131
	Distance: + 98 feet / kt of tailwind, -16 feet / kt of headwind					

**<900> Actual Landing Distance  
(Flaps 45°, Both Thrust Reversers Operative)**

Gross Weight (lb)	WET					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
Actual Landing Distance for Wet Runway (feet)						
55000	3444	3623	3816	4027	4260	4514
57000	3554	3739	3940	4159	4401	4668
59000	3662	3855	4063	4291	4541	4822
61000	3770	3970	4187	4422	4683	4977
63000	3878	4085	4309	4553	4827	5132
65000	3986	4200	4431	4683	4972	5289
67000	4093	4314	4554	4819	5118	5446
69000	4201	4430	4677	4955	5265	5605
71000	4309	4545	4802	5093	5413	5766
73000	4417	4661	4931	5231	5563	5933
75000	4526	4777	5060	5371	5713	6105
77000	4636	4898	5190	5511	5865	6278
79000	4743	5017	5319	5650	6021	6449
81000	4850	5135	5447	5788	6178	6621
83000	4960	5254	5574	5926	6336	6793
85000	5068	5370	5700	6066	6490	6962
	Distance: + 75 feet / kt above VREF FLAP 45 + 135 feet / kt of tailwind, - 25 feet / kt of headwind + 455 feet when one thrust reverser inoperative + 1060 feet when two thrust reversers inoperative					

**<900> Actual Landing Distance  
(Flaps 45°, Both Thrust Reversers Operative)**

Gross Weight (lb)	STANDING WATER / SLUSH / WET SNOW					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
<b>Actual Landing Distance for Contaminated Runway (feet)</b>						
55000	4530	4777	5023	5290	5572	5886
57000	4690	4934	5190	5465	5762	6083
59000	4838	5086	5347	5634	5945	6284
61000	4984	5236	5512	5805	6133	6487
63000	5128	5392	5671	5980	6324	6692
65000	5271	5543	5833	6150	6513	6900
67000	5415	5693	5999	6333	6706	7110
69000	5559	5847	6159	6510	6905	7323
71000	5703	6005	6325	6697	7097	7532
73000	5848	6159	6501	6878	7301	7754
75000	5993	6315	6672	7065	7497	7981
77000	6140	6475	6843	7254	7704	8211
79000	6285	6634	7014	7437	7907	8441
81000	6433	6794	7186	7622	8121	8676
83000	6576	6954	7358	7807	8316	8933
85000	6722	7108	7529	7995	8549	9183
	Distance: + 65 feet / kt above VREF FLAP 45 + 150 feet / kt of tailwind, - 50 feet / kt of headwind + 1005 feet when one thrust reverser inoperative + 2485 feet when two thrust reversers inoperative					

**<900> Actual Landing Distance  
(Flaps 45°, Both Thrust Reversers Operative)**

Gross Weight (lb)	DRY SNOW					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
<b>Actual Landing Distance for Contaminated Runway (feet)</b>						
55000	4391	4594	4810	5045	5302	5571
57000	4521	4731	4955	5198	5462	5744
59000	4649	4866	5096	5348	5619	5916
61000	4776	4998	5238	5495	5780	6088
63000	4900	5131	5377	5645	5942	6250
65000	5025	5264	5518	5792	6103	6441
67000	5150	5394	5658	5946	6265	6613
69000	5275	5527	5796	6098	6428	6785
71000	5400	5659	5939	6251	6590	6957
73000	5524	5791	6083	6403	6754	7137
75000	5648	5923	6228	6557	6915	7318
77000	5773	6058	6370	6711	7079	7499
79000	5894	6191	6512	6860	7245	7678
81000	6017	6323	6653	7010	7411	7857
83000	6139	6454	6792	7158	7575	8032
85000	6260	6582	6928	7308	7738	8207
	Distance: + 66 feet / kt above VREF FLAP 45 + 100 feet / kt of tailwind, - 33 ft / kt of headwind + 665 feet when one thrust reverser inoperative + 1555 feet when two thrust reversers inoperative					

**17-6****REVISION 8****OPERATIONAL DATA**

**<900> Actual Landing Distance  
(Flaps 45°, Both Thrust Reversers Operative)**

Gross Weight (lb)	COMPACTED SNOW					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
<b>Actual Landing Distance for Contaminated Runway (feet)</b>						
55000	3777	3948	4131	4329	4544	4777
57000	3894	4061	4250	4454	4675	4918
59000	3990	4172	4366	4577	4805	5060
61000	4084	4281	4482	4698	4935	5200
63000	4197	4390	4596	4819	5066	5220
65000	4299	4498	4710	4938	5196	5338
67000	4401	4604	4823	5062	5327	5477
69000	4501	4710	4934	5184	5457	5753
71000	4602	4817	5048	5307	5587	5891
73000	4702	4926	5168	5429	5718	6035
75000	4805	5032	5284	5556	5848	6181
77000	4905	5140	5398	5679	5978	6326
79000	5002	5247	5512	5798	6111	6469
81000	5100	5352	5624	5917	6248	6612
83000	5197	5456	5734	6035	6379	6752
85000	5293	5558	5834	6154	6509	6890
	Distance: + 50 feet / kt above VREF FLAP 45 + 100 feet / kt of tailwind, - 33 feet / kt of headwind + 380 feet when one thrust reverser inoperative + 855 feet when two thrust reversers inoperative					

**<900> Actual Landing Distance  
(Flaps 45°, Both Thrust Reversers Operative)**

Gross Weight (lb)	ICE					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
<b>Actual Landing Distance for Contaminated Runway (feet)</b>						
55000	6230	6524	6835	7183	7566	7982
57000	6416	6723	7052	7413	7807	8242
59000	6608	6927	7264	7640	8048	8505
61000	6799	7138	7494	7866	8296	8769
63000	6997	7342	7706	8109	8543	9033
65000	7188	7544	7921	8335	8790	9298
67000	7379	7742	8137	8571	9038	9563
69000	7569	7945	8349	8803	9305	9828
71000	7760	8148	8567	9039	9554	10094
73000	7950	8351	8789	9272	9807	10372
75000	8140	8553	9011	9509	10056	10649
77000	8330	8760	9229	9747	10309	10927
79000	8517	8965	9448	9977	10564	11219
81000	8709	9169	9666	10209	10822	11496
83000	8897	9371	9881	10440	11074	11768
85000	9083	9570	10095	10673	11328	12041
	Distance: + 80 feet / kt above VREF FLAP 45 + 200 feet / kt of tailwind, - 65 feet / kt of headwind + 1975 feet when one thrust reverser inoperative + 5095 feet when two thrust reversers inoperative					

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**Anti-Skid Inoperative Actual Landing Distance Tables.**

Only for use with MEL 32-44-01-2 Anti-Skid One Channel Inoperative.

**NOTE:** These tables assume the failure of BOTH Anti-Skid channels. Therefore, if the second channel fails in flight, do NOT apply the QRH factor for Anti-Skid failure per step 3. However, the 15% safety factor should still be considered.

1. Determine landing distance from appropriate table for the Runway Condition.
2. Multiply by the factor from the QRH, then add a 15% safety factor.

**<900> Actual Landing Distance  
(Anti-Skid Inoperative, Flaps 45°)**

Gross Weight (lb)	DRY					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
Actual Landing Distance for Wet Runway (feet)						
55000	4778	5018	5280	5573	5911	6228
57000	4919	5169	5441	5744	6102	6431
59000	5081	5320	5602	5920	6294	6640
61000	5203	5471	5763	6101	6490	6851
63000	5345	5623	5931	6282	6691	7063
65000	5489	5776	6102	6465	6892	7276
67000	5632	5934	6273	6655	7095	7491
69000	5776	6096	6445	6845	7299	7707
71000	5926	6257	6620	7036	7505	7924
73000	6079	6420	6800	7228	7711	8145
75000	6231	6582	6980	7422	7918	8403
77000	6384	6750	7161	7616	8151	8705
79000	6534	6916	7339	7815	8429	9010
81000	6683	7081	7516	8061	8714	9322
83000	6835	7244	7734	8311	9004	9640
85000	6985	7429	7962	8571	9209	9964

**17-8****REVISION 8**

03 MAR 20

**OPERATIONAL DATA**

**<900> Actual Landing Distance  
(Anti-Skid Inoperative, Flaps 45°)**

Gross Weight (lb)	WET					
	Pressure Altitude (feet)					
	SL	2000	4000	6000	8000	10000
<b>Actual Landing Distance for Contaminated Runway (feet)</b>						
55000	7142	7518	7923	8366	8858	9393
57000	7365	7753	8175	8639	9148	9712
59000	7585	7990	8431	8912	9439	10036
61000	7808	8230	8686	9185	9736	10359
63000	8032	8469	8944	9460	10040	10687
65000	8257	8711	9202	9736	10347	11019
67000	8484	8954	9460	10021	10653	11350
69000	8713	9198	9721	10311	10964	11684
71000	8942	9442	9985	10601	11277	12022
73000	9171	9685	10256	10893	11592	12377
75000	9402	9933	10529	11187	11909	12739
77000	9633	10185	10804	11483	12230	13102
79000	9859	10437	11075	11775	12558	13463
81000	10086	10689	11346	12067	12890	13824
83000	10317	10939	11615	12356	13222	14188
85000	10546	11185	11880	12652	13547	14545

**NOTE: Should only be used along with abnormal or emergency procedures to determine required ALD.**

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*Part #: QRH-900*

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