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SECTION 0 Miscellaneous

Quick Actions

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Emergency Descent

Condition: One or more of these occur:

- Cabin altitude cannot be controlled.
- A rapid descent is needed.

1. Announce the emergency descent. The captain will advise the cabin crew, on the PA system, of impending rapid descent, "EMERGENCY DESCENT, REMAIN SEATED" (3 times). The first officer will advise ATC and obtain the area altimeter setting.

2. FASTEN BELTS ..... ON

3. **Without delay**, descend to the lowest safe altitude or 10,000 feet, whichever is higher.

4. ENGINE START switches (both) ..... CONT

5. Thrust levers (both) ..... Reduce thrust to minimum or as needed for anti-ice

6. Speedbrake ..... FLIGHT DETENT

If structural integrity is in doubt, limit speed as much as possible and avoid high manoeuvring loads.

7. Set target speed to M_{MO}/V_{MO}.

8. **When** approaching the level off altitude:

   Smoothly lower the SPEED BRAKE lever to the DOWN detent and level off. Add thrust and stabilize on altitude and airspeed.

▼Continued on next page▼

▼Emergency Descent (continued)▼

9. Crew oxygen regulators ..... Normal

   Flight crew must use oxygen when cabin altitude is above 10,000 feet. To conserve oxygen, move the regulator to Normal.

10. ENGINE START switches (both) ..... As needed

11. The new course of action is based on weather, oxygen, fuel remaining and available airports. Use of long-range cruise may be needed.

12. Choose one:

    ◆ Pressurization mode selector is in **MAN**:

    ▶▶**Go to step 13**

    ◆ Pressurization mode selector is **not** in MAN:

    ■ ■ ■ ■

13. **Checklist Complete Except for Deferred Items**

Deferred Items

Descent Checklist

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes

Pressurization..... **Move to OPEN or CLOSE as needed to control cabin altitude and rate**

Recall ..... Checked

OPT / Approach briefing ..... Completed

Autobrake ..... SET ___

Landing data ..... VREF ___, Minimums _____

▼Continued on next page▼

▼Emergency Descent (continued)▼

Approach Checklist

FASTEN BELTS ..... ON

IDENT/CRS ..... (____ / ___)

Altimeters..... __ . __”

At Pattern Altitude

Outflow VALVE switch.....Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear..... Down

Flaps.....___, Green Light

■ ■ ■ ■

Bomb on Board

Condition: A suspicious article is found in the airplane, or a bomb threat has been made against the airplane and the flight crew has been advised.

1. Choose one:

   - If the airplane is **on the ground**

     PASSENGERS.....Rapid deplane

     Disembark all passengers and crew without hand baggage. Use stairs.

     Evacuate only in extreme emergencies

     ■ ■ ■ ■

   - If the airplane is **in flight**:

     WARNING

     Do not raise the cabin altitude.

     ▶▶**Go to step 2**

2. Choose one:

   - If possible, land and deplane the aircraft immediately.

     ▶▶**Go to step 5**

   - If it is **not** possible to land and evacuate the aircraft within 30 minutes:

     ▶▶**Go to step 3**

3. Maintain present flight and cabin altitude.

4. Avoid turbulence.

5. Avoid abrupt manoeuvres and g-loads in order not to dislocate the explosive device.

▼Continued on next page▼

Bomb on Board (continued)

6. Do not use speedbrakes.
7. FASTEN BELTS ..... ON
8. Advise ATC.
9. Plan to land at the nearest suitable airport.

   Airport elevation should not be higher than present cabin altitude to prevent triggering an altitude detonated device. Flight to selected airport should be planned at a flight altitude 2500 feet above present cabin altitude or MEA whichever is higher.
10. LAND ALT ..... Set present cabin altitude
11. When conditions permit:

    Descend to 2500 feet above present cabin altitude or MEA whichever is greater. (2500 feet above cabin altitude results in a cabin differential pressure of approximately 1 psi)
12. CAB/UTIL Switch ..... OFF
13. IFE/PASS SEAT switch ..... OFF

Continued on next page

Bomb on Board (continued)

14. Communicate with F/A.

    Ask to check if there is an EOD (Explosive Ordnance Disposal) on board.

WARNING

It is recommended that a differential pressure of 1 psi be reached before relocating the suspicious device to the least risk bomb location. This reduces the effects of the explosion in the event the device is detonated.

If the crew decides to relocate the bomb, the least risk location is by the aft service door (2R).

15. Plan a flaps 15 landing.

16. Set VREF 15.

17. GROUND PROXIMITY FLAP INHIBIT switch ..... ON

18. After cabin differential pressure of zero is reached:

    Pressurization mode selector ..... MAN

    Outflow valve switch ..... Hold in OPEN until the outflow valve indicates fully open

Continued on next page

Bomb on Board (continued)

19. Establish the landing configuration early.

    The next two actions intend to establish an in trim configuration which would avoid handling problems and allow a successful landing should an inflight explosion damage vital airplane systems.

    Due consideration shall be given to the time/fuel/range situation.

    In a clearly defined situation or if the explosive device has been secured at the least risk bomb location, a high cruise speed may be more appropriate to minimize flight time.

20. Landing gear ..... Down
    (conditions and fuel permitting)

    Extend landing gear **except** for flight over water.

21. Flaps 15
    (conditions and fuel permitting)

22. Advise ATC of requirements for remote parking, passenger transportation and stairs.

23. **Checklist Complete Except for Deferred Items**

Continued on next page

▼Bomb on Board (continued)▼

Deferred Items

Descent Checklist

Recall .....Checked
OPT / Approach briefing .....Completed
Autobrake ..... SET ___
Landing data ..... **VREF 15 ___, Minimums _____**

Approach Checklist

FASTEN BELTS..... ON
IDENT / CRS..... (_____ / ___)
Altimeters ..... __ . __”

Landing Checklist

F/A announcement .....2 CHIMES
ENGINE START switches.....CONT
Speedbrake ..... ARMED
Landing gear .....Down
Flaps ..... **15, Green Light**

After Landing Procedure Review

- Follow ATC and security staff instructions.
- Disembark passengers and crew with minimum delay without hand baggage when circumstances permit.
- If bomb has been placed at the door 2R, consider **not** using aft cabin doors.

■ ■ ■ ■

Ditching

Condition: Airplane ditching and evacuation are needed.

1. Send distress signals. Determine position, course, speed, altitude, situation, intention, time and position of intended touchdown and transmit mayday. Report type of aircraft and request intercept.

2. Alert the cabin crew to prepare for ditching and seat passengers as far forward as possible.

3. Burn off fuel, if possible, to reduce touchdown speed and increase buoyancy.

4. Plan to touch down on the windward side and parallel to waves and swells.

5. Plan a flaps 40 landing unless another configuration is needed.

6. Set VREF 40.

7. Do **not** arm the autobrake.

8. Do **not** accomplish the normal landing checklist.

9. **Checklist Complete Except for Deferred Items**

Continued on next page

▼Ditching (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall .....Checked

OPT / Approach briefing ..... Complete

Autobrake .....**OFF**

Landing data .....**VREF 40 ___**

Approach Checklist

FASTEN BELTS..... ON

IDENT / CRS..... (___/___)

Altimeters ..... __ . __”

▼Continued on next page▼

Ditching (continued)

Below 5000 feet

LANDING GEAR AURAL WARN
circuit breaker (P6-3:D18)..... Pull

This prevents the warning horn with gear retracted and landing flaps selected.

The flight deck chime for an incoming call from the cabin crew is unavailable.

FASTEN BELTS .....ON

Engine BLEED air switches (both) .....OFF

This allows the airplane to be depressurized with the outflow valve closed.

Pressurization mode selector.....MAN

Outflow VALVE switch ..... Hold in CLOSE until outflow VALVE indication shows fully closed

This prevents water from entering the airplane.

NOTE: The outflow valve takes up to 20 seconds to close.

APU switch .....OFF

GROUND PROXIMITY GEAR
INHIBIT switch ..... GEAR INHIBIT

GROUND PROXIMITY TERR
INHIBIT switch .....TERR INHIBIT

Life vests, shoulder harnesses and seat belts ..... On

Confirm that passenger cabin preparations are complete.

CAUTION

Do not open aft entry or service doors as they may be partially submerged.

Transmit all pertinent information regarding final ditching position.

Continued on next page

Ditching (continued)

After Impact Procedure Review

Set both engine start levers to CUTOFF. This closes fuel shutoff valves to prevent discharge of fuel from ruptured fuel lines.

Open flight deck windows. This ensures no cabin differential pressure prevents the opening of the doors or emergency exits.

Start the evacuation.

Proceed to assigned ditching stations, launch rafts and evacuate the airplane as soon as practicable.

The airplane may stay afloat indefinitely if fuel load is minimal, and no serious damage was sustained during landing.

Ditching Final

LANDING GEAR lever ..... UP and OFF

Flaps ..... ____, Green light

At **500 feet**, advise cabin crew that ditching is imminent.

At **50 feet**, advise cabin crew to brace for impact.

Maintain airspeed at VREF. Flare the airplane to achieve the minimum rate of descent at touchdown. Maintain 200-300 fpm rate of descent until the start of the flare.

At flare, rotate smoothly to a touchdown attitude of 10-12°. Maintain airspeed and rate of descent with thrust.

At touchdown, reduce thrust to idle.

■ ■ ■ ■

Hijacking

Condition: There is an unlawful seizure of the aircraft, either in the air or on the ground.

Flight Attendant informs the pilots about the situation by using the code word "Trip".

1. Captain responds to the Flight Attendant:

   "I understand you must speak to me regarding this Trip."

2. Set Transponder code 7500.

   Transponder code 7500 followed by 7700 or full flaps down on the ground means:

   - Situation appears desperate
   - Want armed intervention

   Transponder back on 7500 or retract flaps on the ground means:

   - Armed intervention is no longer desired.

3. Comply with the demands of the hijacker within the range of operational feasibility.

■ ■ ■ ■

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SECTION 1 Airplane General, Emergency Equipment, Doors, Windows

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CARGO DOOR (Main Deck)

Condition: The main cargo door is not closed and secure.

Either or both main CARGO DOOR warning lights are illuminated with or without the Takeoff Configuration Warning Horn.

WARNING

Do not attempt to operate Cargo Door during Taxi, Takeoff, in Flight or during Landing.

1. Choose one:

   - Either main CARGO DOOR warning lights are illuminated on **takeoff (after V1)** with or without Takeoff Configuration Warning Horn:

     Continue Takeoff.

     Pressurization
     MODE Selector ..... MAN

     Outflow VALVE
     switch ..... Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

     Plan to land at nearest suitable airport.

     ■ ■ ■ ■

   - Either main CARGO DOOR warning lights are illuminated at any time **other than takeoff**:

     ▶▶Go to step 2

▼Continued on next page▼

▼CARGO DOOR (Main Deck) (continued)▼

2. Choose one:

   ◆ Aircraft altitude is **above 13,000 feet**:

   Don oxygen masks and set regulators to 100%, as needed.

   Establish crew communications.

   FASTEN BELTS switch ..... ON

   PASS OXYGEN switch ..... ON

   ▶▶Go to step 3

   ◆ Aircraft altitude is **at or below 13,000 feet**:

   ▶▶Go to step 3

3. Pressurization MODE Selector ..... MAN

4. Outflow VALVE switch ..... Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

   NOTE: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

5. Descend to 10,000 ft or lowest Safe Altitude as soon as possible.

6. Land at nearest suitable airport.

■ ■ ■ ■

CARGO DOOR (Lower)

FWD CARGO | AFT CARGO

Condition: One or more cargo doors are not closed and secure.

The MAIN CARGO door lights (SYSTEM A and SYSTEM B) are not illuminated.

1. Choose one:
   - Pressurization is **normal**:

     The door is in a safe configuration.

     Continue normal operation.

     ■ ■ ■ ■
   - Pressurization is **not** normal:

     ▶▶**Go to step 2**
2. Don oxygen masks.
3. Establish crew communications.
4. FASTEN BELTS.....ON
5. Choose one:
   - Airplane has **not** reached the planned cruise altitude:

     Do **not** continue the climb.

     Reset the FLT ALT indicator to the actual airplane altitude.

     ▶▶**Go to step 6**
   - Airplane **has** reached the planned cruise altitude:

     ▶▶**Go to step 6**

Continued on next page

▼CARGO DOOR (Lower) (continued)▼

6. LAND ALT indicator ..... 9000 feet

7. Choose one:

   - Minimum safe altitude is **at or below 9,000 feet**:

     ▶▶Go to step 8

   - Minimum safe altitude is **between 9,000 feet and 13,000 feet**:

     ▶▶Go to step 10

   - Minimum safe altitude is **at or above 13,000 feet**:

     ▶▶Go to step 12

8. Descend to 9,000 feet.

9. Maintain a cabin differential pressure of 0 psi by limiting flight altitude to 9,000 feet.

▶▶Go to step 15

▼Continued on next page▼

▼CARGO DOOR (Lower) (continued)▼

10. Descend to the minimum safe altitude.

11. LAND ALT indicator.....Select a higher altitude (maximum 13,000 feet) to maintain a cabin differential pressure of 0 psi

NOTE: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

▶▶Go to step 15

12. Descend to the minimum safe altitude.

13. Pressurization mode selector .....MAN

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

14. Outflow VALVE switch ..... Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

NOTE: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

15. Plan to land at the nearest suitable airport.

16. **When** the cabin altitude is at or below 10,000 feet:

    Oxygen masks may be removed.

■ ■ ■ ■

AUTOMATIC UNLOCK

Condition: The correct emergency access code is entered.

Objective: To deny unauthorized access to the flight deck before the door automatically unlocks.

1. FLT DK DOOR lock selector ..... Rotate to DENY and hold for 1 second

■ ■ ■ ■

ELT

Condition: The emergency locator transmitter is on.

EMERGENCY EXIT LIGHTS NOT ARMED

Condition: The emergency exit lights switch is not ARMED.

1. Choose one:

- EMER EXIT LIGHTS switch is **ON**:

  Individual emergency exit light batteries supply a minimum of 10 minutes of lighting.

  ■ ■ ■ ■

- EMER EXIT LIGHTS switch is **OFF**:

  Emergency lighting is not available.

  ■ ■ ■ ■

ENTRY DOOR

FWD ENTRY | AFT ENTRY

Condition: One or more entry doors are not closed and secure.

1. Instruct the cabin crew to verify that the door handle is in the closed position or to move the handle to the closed position if possible.

2. Choose one:

   - Handle is in the **closed** position:

     ▶▶**Go to step 3**

   - Handle is **not** in the closed position:

     Plan to land at the nearest suitable airport.

     ■ ■ ■ ■

3. Choose one:

   - Pressurization is **normal**:

     The door is in a safe configuration.

     Continue normal operation.

     ■ ■ ■ ■

   - Pressurization is **not** normal:

     Plan to land at the nearest suitable airport.

     ■ ■ ■ ■

EQUIP

EQUIPMENT DOOR

Condition: The equipment door is not closed and secure.

1. Choose one:
   - Pressurization is **normal**:

     The door is in a safe configuration.

     Continue normal operation.

     ■ ■ ■ ■
   - Pressurization is **not normal**:

     ▶▶**Go to step 2**
2. Don oxygen masks.
3. Establish crew communications.
4. FASTEN BELTS ..... ON
5. Choose one:
   - Airplane **has** reached the planned cruise altitude:

     ▶▶**Go to step 6**
   - Airplane has **not** reached the planned cruise altitude:

     Do **not** continue the climb.

     Reset the FLT ALT indicator to the actual airplane altitude.

     ▶▶**Go to step 6**
6. LAND ALT indicator ..... 9000 feet

Continued on next page

▼EQUIPMENT DOOR (continued)▼

7. Choose one:

   - Minimum safe altitude is **at or below 9,000 feet**:

     ▶▶Go to step 8

   - Minimum safe altitude is **between 9,000 feet and 13,000 feet**:

     ▶▶Go to step 10

   - Minimum safe altitude is **at or above 13,000 feet**:

     ▶▶Go to step 12

8. Descend to 9,000 feet.

9. Maintain a cabin differential pressure of 0 psi by limiting flight altitude to 9,000 feet.

▶▶Go to step 15

10. Descend to the minimum safe altitude.

11. LAND ALT indicator.....Select a higher altitude (maximum 13,000 feet) to maintain a cabin differential pressure of 0 psi

    NOTE: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

▶▶Go to step 15

12. Descend to the minimum safe altitude.

13. Pressurization mode selector ..... MAN

▼Continued on next page▼

▼EQUIPMENT DOOR (continued)▼

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

14.  Outflow VALVE switch .....Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

NOTE: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

15. Plan to land at the nearest suitable airport.

16. **When** the cabin altitude is at or below 10,000 feet:

    Oxygen masks may be removed.

■ ■ ■ ■

LOCK FAIL

LOCK FAIL

Condition: One or more of these occur:

- The FLIGHT DECK ACCESS SYSTEM switch is OFF.
- The lock is failed.
- The aural alert comes on and will not go off.

Objective: To remove electrical power from the lock to prevent a possible overheat.

Do **if** conditions allow a crew member to leave the seat.

1.  FLIGHT DECK ACCESS SYSTEM switch..... UP/OFF

NOTE: The door can be locked with the dead bolt.

■ ■ ■ ■

OVERWING DOOR

LEFT FWD OVERWING | RIGHT FWD OVERWING | LEFT AFT OVERWING | RIGHT AFT OVERWING

Condition: One or more overwing doors are not closed and secure.

1. Choose one:

◆ Pressurization is **normal**:

The door is in a safe configuration.
Continue normal operation.

■ ■ ■ ■

◆ Pressuirization is **not** normal:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

PASS OXY ON

PASSENGER OXYGEN ON

Condition: The passenger oxygen system is on.

■ ■ ■ ■

SERVICE DOOR

FWD SERVICE

AFT SERVICE

Condition: One or more service doors are not closed and secure.

1. Instruct the cabin crew to verify that the door handle is in the closed position or to move the handle to the closed position if possible.

2. Choose one:

   - Handle is in the **closed** position:

     ▶▶**Go to step 3**

   - Handle is **not** in the closed position:

     Plan to land at the nearest suitable airport.

     ■ ■ ■ ■

3. Choose one:

   - Pressurization is **normal**:

     The door is in a safe configuration.

     Continue normal operation.

     ■ ■ ■ ■

   - Pressurization is **not** normal:

     Plan to land at the nearest suitable airport.

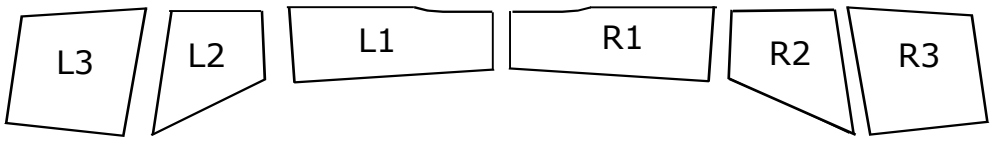
     ■ ■ ■ ■

Window Damage – Forward (L1, L2, R1, R2)

Condition: A forward flight deck window has one or more of these issues:

- An electrical arc
- A delamination
- A crack
- Is shattered

Objective: To remove electrical power, if needed, to prevent arcing. To reduce differential pressure and descend if a structural pane is shattered or cracked.



1. Choose one:

   - Window is **delaminated** only:

     Continue normal operation.

     ■ ■ ■ ■

   - Window is **arcing**

     ▶▶**Go to step 2**

   - Window is **cracked** or **shattered**:

     ▶▶**Go to step 5**

Continued on next page

▼Window Damage – Forward (L1, L2, R1, R2) (continued)▼

2. WINDOW HEAT switch (affected window) ..... OFF

   Limit airspeed to 250 knots maximum below 10,000 feet.

3. Pull both WINDSHIELD AIR controls. This vents conditioned air to the inside of the windshield for defogging.

4. Continue normal operation.

■ ■ ■ ■

5. Don seat belts and shoulder harnesses.

6. WINDOW HEAT switch (affected window) ..... OFF

   Limit airspeed to 250 knots maximum below 10,000 feet.

7. Pull both WINDSHIELD AIR controls. This vents conditioned air to the inside of the windshield for defogging.

8. Choose one:

   ◆ Damage is on the **outer** pane:

   ▶▶**Go to step 9**

   ◆ Damage is on the **inner** pane:

   ▶▶**Go to step 11**

9. Continue normal operation.

10. Shoulder harnesses may be removed.

■ ■ ■ ■

▼Continued on next page▼

▼Window Damage – Forward (L1, L2, R1, R2) (continued)▼

11. Don oxygen masks.
12. Establish crew communications.
13. FASTEN BELTS.....ON
14. Choose one:

    ◆ Airplane **has** reached the planned cruise altitude:

    ▶▶**Go to step 15**

    ◆ Airplane has **not** reached the planned cruise altitude:

    Do **not** continue the climb.

    Reset the FLT ALT indicator to the actual airplane altitude.

    ▶▶**Go to step 15**

15. LAND ALT indicator.....9000 feet
16. Start a normal descent to below 14,000 feet or to the minimum safe altitude, whichever is higher.
17. Plan to land at the nearest suitable airport.
18. **When** the cabin differential pressure is 2 psi or less:

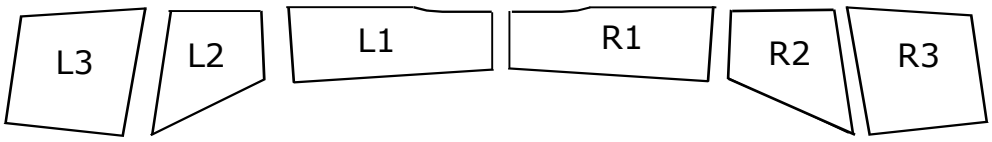
    Oxygen masks and shoulder harnesses may be removed.

19. Sustained flight below 10,000 feet is not recommended due to the greater risk of bird strike.

■ ■ ■ ■

Window Damage – Heated Side (L3, R3)

Condition:	An unheated side flight deck window has one or more of these: • An electrical arc • A delamination • A crack • Is shattered
Objective:	To remove electrical power, if needed, to prevent arcing. To reduce differential pressure and descend if the inner pane is shattered or cracked.



Continued on next page

▼Window Damage – Heated Side (L3, R3) (continued)▼

1. Choose one:

   - Window is **delaminated** only:

     Continue normal operation.

     ■ ■ ■ ■

   - Window is **arcing**:

     ▶▶Go to step 2

   - Window is **cracked** or **shattered**:

     ▶▶Go to step 5

2. WINDOW HEAT switch
   (affected window) .....OFF

   Limit airspeed to 250 knots maximum below 10,000 feet.

3. Pull both WINDSHIELD AIR controls. This vents conditioned air to the inside of the windshield for defogging.

4. Continue normal operation.

   ■ ■ ■ ■

5. Don seat belts and shoulder harnesses.

6. WINDOW HEAT switch
   (affected window) .....OFF

   Limit airspeed to 250 knots maximum below 10,000 feet.

7. Pull both WINDSHIELD AIR controls. This vents conditioned air to the inside of the windshield for defogging.

▼Continued on next page▼

▼Window Damage – Heated Side (L3, R3) (continued)▼

8. Choose one:

   - Damage is on the **outer** pane:

     ▶▶Go to step 9

   - Damage is on the **inner** pane:

     ▶▶Go to step 11

9. Continue normal operation.

10. Shoulder harnesses may be removed.

■ ■ ■ ■

11. Don oxygen masks.

12. Establish crew communications.

13. FASTEN BELTS ..... ON

14. Choose one:

    - Airplane **has** reached the planned cruise altitude:

      ▶▶Go to step 15

    - Airplane has **not** reached the planned cruise altitude:

      Do **not** continue the climb.

      Reset the FLT ALT indicator to the actual airplane altitude.

      ▶▶Go to step 15

▼Continued on next page▼

Window Damage – Heated Side (L3, R3) (continued)

15. LAND ALT indicator.....9000 feet

16. Start a normal descent to below 14,000 feet or to the minimum safe altitude, whichever is higher.

17. Plan to land at the nearest suitable airport.

18. **When** cabin differential pressure is 2 psi or less:

    Oxygen masks and shoulder harnesses may be removed.

19. Sustained flight below 10,000 feet is not recommended due to the greater risk of a bird strike.

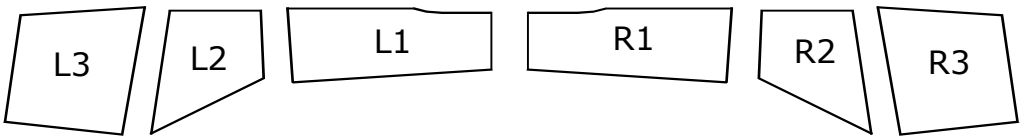
■ ■ ■ ■

Window Damage – Unheated Side (L3, R3)

Condition: An unheated side flight deck window has one or more of these:

- A crack
- Is shattered

Objective: To reduce differential pressure to 0 psi if both panes are shattered or cracked.



1. Don seat belts and shoulder harnesses.
2. Choose one:
   - Damage is **only** on the inner **or** outer pane:
     ▶▶**Go to step 3**
   - Damage is on **both** the inner **and** outer panes:
     ▶▶**Go to step 5**
3. Continue normal operation.
4. Shoulder harness may be removed.

■ ■ ■ ■

5. Don oxygen masks.
6. Establish crew communications.
7. FASTEN BELTS ..... ON

Continued on next page

▼Window Damage – Unheated Side (L3, R3) (continued)▼

8. Choose one:

   - Airplane **has** reached the planned cruise altitude:

     ▶▶Go to step 9

   - Airplane has **not** reached the planned cruise altitude:

     Do **not** continue the climb.

     Reset the FLT ALT indicator to the actual airplane altitude.

     ▶▶Go to step 9

9. LAND ALT indicator.....9000 feet

10. Choose one:

    - Minimum safe altitude is **at or below 9,000 feet**:

      ▶▶Go to step 11

    - Minimum safe altitude is **between 9,000 feet and 13,000 feet**:

      ▶▶Go to step 13

    - Minimum safe altitude is **at or above 13,000 feet**:

      ▶▶Go to step 15

▼Continued on next page▼

▼Window Damage – Unheated Side (L3, R3) (continued)▼

11. Descend to 9,000 feet.

12. Maintain a cabin differential pressure of 0 psi by limiting flight altitude to 9,000 feet.

▶▶Go to step 18

13. Descend to the minimum safe altitude.

14. LAND ALT indicator ..... Select a higher altitude (maximum 13,000 feet) to maintain a cabin differential pressure of 0 psi

NOTE: The intermittent cabin altitude/ configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

▶▶Go to step 18

15. Descend to the minimum safe altitude.

16. Pressurization mode selector ..... MAN

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

17.  Outflow VALVE switch .....Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

NOTE: The intermittent cabin altitude/ configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

▼Continued on next page▼

Window Damage – Unheated Side (L3, R3) (continued)

18. Plan to land at the nearest suitable airport.
19. **When** cabin altitude is at or below 10,000 feet:
    Oxygen masks may be removed.
20. Shoulder harnesses may be removed.

■ ■ ■ ■

Window Open

Condition: A side window opens during takeoff or in flight.

1. Maintain the manoeuvring speed for the existing flap setting until the window is closed.
2. The force needed to close the window increases with airspeed. It may not be possible to close the window at speeds above 250 knots.
3. Close and lock the window.
4. Choose one:

   - Window **locks and** the pressurization is **normal**:

     Continue normal operation.

     ■ ■ ■ ■

   - Window does **not** lock **or** the pressurization is **not** normal:

     Level off at the lowest safe altitude.

     The airplane can fly unpressurized and land safely with the window open.

     ■ ■ ■ ■

SECTION 2 Air Systems

Quick Actions

CABIN ALTITUDE WARNING or Rapid Depressurization 2.3

Emergency Descent ..... ▶▶0.3

Smoke, Fire or Fumes ..... ▶▶8.21

Section Contents

AUTO FAIL or Unscheduled Pressurization Change 2.6

BLEED TRIP OFF 2.10

CABIN ALTITUDE WARNING or Rapid Depressurization 2.3

Cabin Temperature Hot 2.11

DUAL BLEED 2.15

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OFF SCHEDULE DESCENT 2.16

PACK 2.17

Smoke, Fire or Fumes ..... ▶▶8.21

WING-BODY OVERHEAT 2.20

ZONE TEMP 2.26

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CABIN ALTITUDE

CABIN ALTITUDE WARNING or Rapid Depressurization

Condition: One or more of these occur:

- A cabin altitude exceedance
- In flight, the intermittent cabin altitude/configuration warning horn sounds or the CABIN ALTITUDE illuminates

1. Don oxygen masks and set regulators to 100%.
2. Establish crew communications.
3. Pressurization mode selector ..... MAN
4. Outflow VALVE switch ..... Hold in CLOSE until the outflow VALVE indication shows fully closed
5. **If** cabin altitude is **uncontrollable**:

   FASTEN BELTS..... ON

   PASS OXYGEN switch ..... ON

   ►►**Go to Emergency Descent checklist on page 0.3.**

■ ■ ■ ■

---

6. **If** cabin altitude is **controllable**:

   Continue manual operation to maintain correct cabin altitude.

   When the cabin altitude is at or below 10,000 feet:

   Oxygen masks may be removed.

7. **Checklist Complete Except for Deferred Items**

▼**Continued on next page**▼

▼CABIN ALTITUDE WARNING
or
Rapid Depressurization (continued)▼

Deferred Items

Descent Checklist

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.



Pressurization ..... **Move outflow VALVE switch to OPEN or CLOSE as needed to control cabin altitude and rate**

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake ..... SET ___

Landing data .....VREF ___, Minimums ___

Approach Checklist

FASTEN BELTS..... ON

IDENT/CRS..... (_____ / ___)

Altimeters ..... __ . __”

At Pattern Altitude

Outflow VALVE switch .....Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

▼Continued on next page▼

▼CABIN ALTITUDE WARNING
or
Rapid Depressurization (continued)▼

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear ..... Down

Flaps ..... ____, Green light

■ ■ ■ ■

AUTO FAIL or Unscheduled Pressurization Change

AUTO FAIL — May or may not be illuminated

Condition: One or more of these occur:

- Automatic pressurization mode has failed.
- The cabin altitude is uncontrollable.

Objective: To maintain control of cabin altitude.

1. Increasing thrust may ensure sufficient air supply to control cabin altitude.

2. Pressurization mode selector ..... ALTN

3. Choose one:

   - AUTO FAIL light is **extinguished and** cabin altitude is **controllable**:

     Continue normal operation.

     ■ ■ ■ ■

   - AUTO FAIL light is **illuminated or** cabin altitude is **uncontrollable**:

     ▶▶**Go to step 4**

▼Continued on next page▼

▼AUTO FAIL
or
Unscheduled Pressurization Change (continued)▼

4. Pressurization mode selector ..... MAN

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

5. Outflow VALVE switch .....Move to OPEN or CLOSE as needed to control cabin altitude and rate

6. Choose one:

◆ Cabin altitude is **controllable**:

▶▶Go to step 11

◆ Cabin altitude is **uncontrollable**:

▶▶Go to step 7

7. Don oxygen masks and set regulators to 100%.

8. Establish crew communications.

9. FASTEN BELTS..... ON

10. PASS OXYGEN switch..... ON

▶▶Go to Emergency Descent checklist on page 0.3.

■ ■ ■ ■

11. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

AUTO FAIL
or
Unscheduled Pressurization Change (continued)

Deferred Items

Descent Checklist

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

Pressurization.....**Move outflow VALVE switch to OPEN or CLOSE as needed to control cabin altitude and rate**

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake ..... SET ___

Landing data ..... VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS..... ON

IDENT/CRS..... (_____ / ___)

Altimeters ..... __ . __”

At Pattern Altitude

Outflow VALVE switch .....Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

Continued on next page

▼AUTO FAIL
or
Unscheduled Pressurization Change (continued)▼

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear ..... Down

Flaps ..... ____, Green light

■ ■ ■ ■

BLEED TRIP OFF

BLEED TRIP OFF

Condition: One or more of these occur:

- An engine bleed air overheat
- An engine bleed air overpressure

1. WING ANTI-ICE switch ..... OFF

2. TRIP RESET switch ..... Push

   The BLEED TRIP OFF light extinguishes if the bleed air temperature has cooled below limits.

3. Choose one:

   ◆ BLEED TRIP OFF light **stays illuminated**:

   PACK switch (affected side) ..... OFF

   This causes the operating pack to regulate to high flow in flight with flaps up.

   Avoid icing conditions where wing anti-ice is needed.

   ■ ■ ■ ■

   ◆ BLEED TRIP OFF light **extinguishes**:

   ▶▶**Go to step 4**

4. WING ANTI-ICE switch ..... As needed

CAUTION

Use of wing anti-ice above approximately FL350 may cause bleed trip off and possible loss of cabin pressure.

■ ■ ■ ■

Cabin Temperature Hot

Condition: Flight deck or passenger cabin temperature is excessively hot. The temperature can cause incapacitation.

Objective: To regain temperature control. If unable to regain control, to descend and configure to provide alternate ventilation.

1. Choose one:
   - **Flight deck** temperature is too high:
     ▶▶**Go to step 2**
   - **Passenger cabin** temperature is too high:
     ▶▶**Go to step 8**
2. TRIM AIR switch.....OFF
3. **Wait** 1 minute.
4. Choose one:
   - Air from the flight deck outlets is still too **warm**:
     ▶▶**Go to step 5**
   - Air from the flight deck outlets is **cool**:
     The flight deck temperature gradually cools.

■ ■ ■ ■

▼**Continued on next page**▼

▼Cabin Temperature Hot (continued)▼

5. L PACK switch ..... OFF
6. **Wait** 1 minute.
7. Choose one:
   - Air from the flight deck outlets is still too **warm**:

     ▶▶Go to step 14
   - Air from the flight deck outlets is **cool**:

     The flight deck temperature gradually cools.

     ■ ■ ■ ■
8. TRIM AIR switch ..... OFF
9. **Wait** 1 minute.
10. Choose one:
    - Air from the passenger cabin outlets is still too **warm**:

      ▶▶Go to step 11
    - Air from the passenger cabin outlets is **cool**:

      The passenger cabin temperature gradually cools.

      ■ ■ ■ ■
11. R PACK switch ..... OFF
12. **Wait** 1 minute.

▼Continued on next page▼

▼Cabin Temperature Hot (continued)▼

13. Choose one:

- Air from the passenger cabin outlets is still too **warm**:

  ▶▶Go to step 14

- Air from the passenger cabin outlets is **cool**:

  The passenger cabin temperature gradually cools.

■ ■ ■ ■

14. Start a descent to the lowest safe altitude, or 10,000 ft whichever is higher.

    Use the speedbrakes to increase the rate of descent, if needed. Monitor cabin altitude and rate.

15. R RECIR FAN switch..... AUTO

16. L RECIRC FAN switch .....OFF

17. Minimize the flight deck lighting intensity.

18. Open the flight deck door.

19. **During** daylight:

    Use flight deck window shades, as needed.

    Instruct cabin crew to close cabin window shades.

20. Instruct the cabin crew to:

    Dim cabin lighting.

    Turn off inflight entertainment systems.

▼Continued on next page▼

▼Cabin Temperature Hot (continued)▼

21. CAB/UTIL switch ..... OFF

22. IFE/PASS SEAT switch ..... OFF

23. **When** at level off:

    Maintain 290 knots minimum. Flight deck and passenger cabin temperatures can increase rapidly at speeds below 290 knots.

24. Choose one:

    - Airplane altitude is **at or below 10,000 feet**:

      ▶▶Go to step 25

    - Airplane altitude is **above 10,000 feet**:

      Don oxygen masks.

      Establish crew communications.

      ▶▶Go to step 25

25. PACK switch (operating pack) ..... OFF

26. Pressurization mode selector ..... MAN

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

27. Outflow VALVE switch .....Move to OPEN until the outflow VALVE indication shows fully open

    This increases airplane ventilation.

28. Plan to land at the nearest suitable airport.

■ ■ ■ ■

DUAL BLEED

DUAL BLEED

Condition: The APU bleed valve is open and one of these occurs:

- BLEED 1 air switch is on.
- BLEED 2 air switch is on and the ISOLATION VALVE is open.

Objective: To prevent possible back pressure of the APU.

1. Limit engine thrust to idle while the light is illuminated.

2. **After** engine start:

   APU BLEED air switch .....OFF

■ ■ ■ ■

OFF

EQUIPMENT COOLING OFF

Condition: The equipment cooling supply or exhaust fan is failed.

1. EQUIP COOLING SUPPLY or
   EXHAUST switch (affected side) .....ALTN

   NOTE: Illumination of the EQUIP COOLING OFF or EXHAUST OFF light may be an indication of a pressurization problem. Ensure the pressurization system is operating normally.

2. No further action is necessary in flight if the equipment cooling OFF light does not extinguish.

■ ■ ■ ■

OFF SCHED DESCENT

OFF SCHEDULE DESCENT

Condition: A descent is started before reaching the planned cruise altitude set in the FLT ALT indicator.

1. Choose one:

   - **Landing** at airport of departure:

     Continue normal operation.

     ■ ■ ■ ■

   - **Not** landing at airport of departure:

     FLT ALT indicator.....Reset to actual airplane altitude

     ■ ■ ■ ■

PACK — PACK

Condition: One or more of these occur:

- The primary and standby pack controls are failed.
- A pack overheat.

1. Temperature selectors (all) .....Select warmer temperature

   This reduces the workload on the affected air conditioning pack.

2. TRIP RESET switch .....Push

   If the PACK light illuminated as a result of the pack temperature exceeding limits, the light extinguishes if the pack temperature has cooled below limits.

3. Choose one:

   ◆ **Both** PACK lights are **extinguished**:

   Continue normal operation.

   ■ ■ ■ ■

   ◆ **A single** PACK light **stays illuminated**:

   ISOLATION VALVE switch .....CLOSE

   PACK switch (affected side).....OFF

   ■ ■ ■ ■

   ◆ **Both** PACK lights **stay illuminated**:

   NOTE: Both pack valves may have closed resulting in a gradual loss of cabin pressure and an eventual CABIN ALTITUDE warning.

   ▶▶**Go to step 4**

▼**Continued on next page**▼

▼PACK (continued)▼

4. Descend to the lowest safe altitude or 10,000 feet, whichever is higher. Monitor cabin altitude and rate.

5. **When** at level off:

   Maintain 290 knots minimum. Flight deck and cabin temperatures may increase rapidly at speeds below 290 knots.

6. Choose one:

   - Airplane altitude is **at or below 10,000 feet**:

     ▶▶Go to step 7

   - Airplane altitude is **above 10,000 feet**:

     Don oxygen masks.

     Establish crew communications.

     ▶▶Go to step 7

7. Pressurization mode selector ..... MAN

   Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

8. Outflow VALVE switch .....Move to OPEN until the outflow VALVE indication shows fully open

   This increases airplane ventilation.

9. R RECIRC FAN switch .....AUTO

10. L RECIRC FAN switch..... OFF

11. Minimize the flight deck lighting intensity.

12. Open the flight deck door.

▼Continued on next page▼

▼PACK (continued)▼

13. **During** daylight:

    Use flight deck window shades, as needed

    Instruct the cabin crew to close cabin window shades.

14. Instruct the cabin crew to:

    Dim cabin lighting.

    Turn off inflight entertainment systems.

15. CAB/UTIL switch .....OFF

16. IFE/PASS SEAT switch .....OFF

17. Plan to land at the nearest suitable airport.

■ ■ ■ ■

WING-BODY OVERHEAT

WING-BODY OVERHEAT

Condition: An overheat from a bleed duct leak occurs.

Objective: To isolate the bleed duct leak.

1. ISOLATION VALVE switch..... CLOSE

2. Choose one:

   - **Both** WING-BODY OVERHEAT lights illuminated:

     TRIM AIR switch..... OFF

     NOTE: Passenger cabin temperature control may be less accurate.

     ■ ■ ■ ■

   - **Right** WING-BODY OVERHEAT light illuminated:

     ▶▶**Go to step 3**

   - **Left** WING-BODY OVERHEAT light illuminated:

     ▶▶**Go to step 8**

3. R PACK switch..... OFF

   This causes the operating pack to regulate to high flow in flight with the flaps up.

4. BLEED 2 air switch..... OFF

▼**Continued on next page**▼

▼WING-BODY OVERHEAT (continued)▼

5. WING ANTI-ICE switch.....OFF

   This prevents possible asymmetrical ice buildup on the wings.

6. Avoid icing conditions where wing anti-ice is needed.

7. Choose one:

   ◆ WING-BODY OVERHEAT light **extinguishes**:

   ■ ■ ■ ■

   ◆ WING-BODY OVERHEAT light **stays illuminated**:

   TRIM AIR switch .....OFF

   NOTE: Passenger cabin temperature control may be less accurate.

   ■ ■ ■ ■

8. L PACK switch.....OFF

   This causes the operating pack to regulate to high flow in flight with the flaps up.

9. BLEED 1 air switch .....OFF

10. WING ANTI-ICE switch.....OFF

    This prevents possible asymmetrical ice buildup on the wings.

11. Avoid icing conditions where wing anti-ice is needed.

▼Continued on next page▼

▼WING-BODY OVERHEAT (continued)▼

12. Choose one:

- WING-BODY OVERHEAT light **extinguishes**:

  ■ ■ ■ ■

- WING-BODY OVERHEAT light **stays illuminated**:

  ▶▶**Go to step 13**

13. Choose one:

- APU is **running**:

  ▶▶**Go to step 14**

- APU is **not** running:

  TRIM AIR switch ..... OFF

  NOTE: Passenger cabin temperature control may be less accurate.

  ■ ■ ■ ■

▼Continued on next page▼

▼WING-BODY OVERHEAT (continued)▼

14. Choose One:

- **APU BLEED** air switch is **ON:**

  APU BLEED air switch .....OFF

  This stops the flow of bleed air from the APU to the left side of the pneumatic ducting.

  ▶▶Go to step 15

- **APU BLEED** air switch is **OFF**:

  APU switch.....OFF

  ▶▶Go to step 16

15. Choose one:

- WING-BODY OVERHEAT light **extinguishes**:

  ▶▶Go to step 17

- WING-BODY OVERHEAT light **stays illuminated**:

  APU switch.....OFF

  ▶▶Go to step 16

16. Choose one:

- WING-BODY OVERHEAT light **extinguishes**:

  ▶▶Go to step 17

- WING-BODY OVERHEAT light **stays illuminated**:

  TRIM AIR switch .....OFF

  NOTE: Passenger cabin temperature control may be less accurate.

■ ■ ■ ■

▼Continued on next page▼

▼WING-BODY OVERHEAT (continued)▼

17. ISOLATION VALVE switch.....AUTO
18. BLEED 1 air switch ..... ON
19. L PACK switch .....AUTO
20. WING ANTI-ICE switch ..... As needed
21. Choose one:
    - WING-BODY OVERHEAT light **stays extinguished**:

      ▶▶Go to step 22
    - WING-BODY OVERHEAT light **illuminates again**:

      ▶▶Go to step 23
22. Choose one:
    - APU switch is **OFF**:

      Do **not** start the APU for the rest of the flight.

      ■ ■ ■ ■
    - APU switch is **ON**:

      The APU can be used during the rest of the flight, as an electrical source only, if needed.

      ■ ■ ■ ■

▼Continued on next page▼

▼WING-BODY OVERHEAT (continued)▼

23. ISOLATION VALVE switch ..... CLOSE

24. L PACK switch ..... OFF

25. BLEED 1 air switch ..... OFF

26. WING ANTI-ICE switch ..... OFF

27. Avoid icing conditions where wing anti-ice is needed.

28. The APU can be used during the rest of the flight, as an electrical source only, if needed.

■ ■ ■ ■

ZONE TEMP

ZONE TEMP

Condition: One or more of these occur:

- A zone duct overheat
- Flight deck temperature control is failed.

1. Temperature selector (affected cabin) ..... Select a cooler temperature

   This prevents the trim air modulating valve from returning to an overheat condition.

2. TRIP RESET switch ..... Push

   The ZONE TEMP light extinguishes if the duct temperature has cooled below limits.

3. Monitor duct temperature.

   If the duct temperature increases rapidly, set the TRIM AIR switch to OFF.

4. Choose one:

   ◆ Affected cabin temperature is excessively high:

   ▶▶**Go to the Cabin Temperature Hot checklist on page 2.11**

   ■ ■ ■ ■

   ◆ Affected cabin temperature is normal:

   ■ ■ ■ ■

SECTION 3 Anti-Ice, Rain

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ENGINE COWL ANTI-ICE 3.3
ENGINE COWL VALVE OPEN 3.4
Ice Crystal Icing 3.5
PROBE HEAT 3.8
WINDOW OVERHEAT 3.9
WING ANTI-ICE VALVE OPEN 3.10

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COWL ANTI-ICE

ENGINE COWL ANTI-ICE

Condition: An engine COWL ANTI-ICE duct overpressure or overtemperature occurs.

Objective: To reduce cowl duct pressure or temperature by reducing thrust.

1. Reduce thrust only when flight conditions allow.

2. Autothrottle (if engaged).....Disengage

3. Thrust lever
(affected engine).....Confirm ..... Retard until the COWL ANTI-ICE light extinguishes

4. Run the engine at reduced thrust to keep the light extinguished.

   NOTE: Do not use FMC performance predictions.

5. Transponder mode selector .....TA

   This step prevents climb commands which can exceed reduced thrust performance capability.

■ ■ ■ ■

COWL VALVE OPEN

ENGINE COWL VALVE OPEN

Condition: One or both of the following occurs:

- An engine COWL VALVE OPEN light stays illuminated bright blue.
- An amber TAI indication is shown.

1. Choose one:

◆ ENG ANTI-ICE switch **ON**:

The cowl anti-ice valve is failed closed.
Avoid icing conditions.

■ ■ ■ ■

◆ ENG ANTI-ICE switch is **OFF**:

The cowl anti-ice valve is failed open.

If TAT is **above 10°C**, limit thrust on the affected engine to 80% N1, if possible.

■ ■ ■ ■

Ice Crystal Icing

Condition: Engine ice crystal or TAT probe icing is suspected. Ice crystal icing conditions exist when in visible moisture and when one or more of the following indications are present:

- Amber or red weather radar returns below the airplane
- Appearance of liquid water on the windshield at temperatures too cold for rain (the sound is different from rain)
- The autothrottle is unable to maintain the selected airspeed.
- TAT indication stays near 0°C

(Additional items that can indicate ice crystal icing are listed in the Additional Information section.)

Objective: To exit the ice crystal icing conditions and reduce the operational effects of the icing.

NOTE: TAT probe icing can cause the reference N1 cursors to increase or decrease while flying at a constant altitude and airspeed.

CAUTION

Do not use engine anti-ice when TAT is above 10°C.

1. ENGINE START switches (both)..... CONT
2. ENG ANTI-ICE switches (both) ..... ON
3. Minimize time above amber and red weather radar returns.

Continued on next page

▼Ice Crystal Icing (continued)▼

4. If conditions allow, exit the ice crystal icing conditions laterally. Climbing or descending to exit ice crystal icing conditions is not recommended.

5. Choose one:

   - Autothrottle response **or** TAT indication is **normal**:

     ▶▶Go to step 8

   - Autothrottle is **unable** to maintain the selected airspeed **and** TAT indication **stays near 0°C**:

     ▶▶Go to step 6

6. Autothrottle (if engaged) ..... Disengage

7. Thrust levers (both) ..... Set to maintain airspeed and airplane flight path

8. **When** in ice crystal icing conditions, the following can be unreliable:

   Reference N1 bugs and reference N1 readouts

   TAS, TAT, SAT, ECON SPD and LRC

9. **When** ice crystal icing conditions are no longer present:

   Use engine anti-ice normally.

   The autothrottle can be re-engaged, if needed.

■ ■ ■ ■

▼Continued on next page▼

Ice Crystal Icing (continued)

Additional Information

One or more of the following can indicate ice crystal icing:

- Light to moderate turbulence
- Static discharge around the windshield (St. Elmo's fire)
- Smell of sulfur
- Smell of ozone
- Humidity increase

An erroneous TAT indication can occur as a result of ice crystals blocking the sensor. The erroneous indication can last from one minute to more than 20 minutes. TAT normally should increase approximately 2 degrees Celsius per 1000 ft of descent.

Vibration indication due to fan hub icing can be 4 units or greater. Fan ice removal procedures have no effect on fan hub icing. When clear of clouds, fan hub ice evaporates and engine vibration decreases over time. Fan hub ice can remain into descent.

PROBE HEAT

CAPT PITOT	L ELEV PITOT	L ALPHA VANE	TEMP PROBE
F/O PITOT	R ELEV PITOT	R ALPHA VANE	AUX PITOT

Condition: One or more probe heats are failed.

1. Avoid icing conditions

NOTE: Flight in icing conditions may result in erroneous flight instrument indications.

■ ■ ■ ■

OVERHEAT

WINDOW OVERHEAT

Condition: A window overheat occurs.

1. WINDOW HEAT switch (affected window) .....OFF
2. **Wait** 2 – 5 minutes.
3. WINDOW HEAT switch (affected window) .....ON
4. Choose one:
   - Window OVERHEAT light **stays extinguished**:

     Continue normal operation.

     ■ ■ ■ ■
   - Window OVERHEAT light **illuminates again**:

     ▶▶**Go to step 5**
5. WINDOW HEAT switch (affected window) .....OFF

   Limit airspeed to 250 knots maximum below 10,000 feet.
6. Pull both WINDSHIELD AIR controls. This vents conditioned air to the inside of the windshield for defogging.

■ ■ ■ ■

WING ANTI-ICE VALVE OPEN

L VALVE OPEN | R VALVE OPEN

Condition: A wing anti-ice

L VALVE OPEN or R VALVE OPEN light stays illuminated bright blue. The wing anti-ice valve is not in the commanded position.

1. Choose one:

   - WING ANTI-ICE switch in **ON**:

     The wing anti-ice valve is failed closed.

     WING ANTI-ICE switch ..... OFF

     Avoid icing conditions where wing anti-ice is needed.

     ■ ■ ■ ■

   - WING ANTI-ICE switch is **OFF**:

     The wing anti-ice valve is failed open.

     ▶▶**Go to step 2**

2. ISOLATION VALVE switch ..... CLOSE

3. PACK switch (affected side) ..... OFF

   This causes the operating pack to regulate to high flow in flight with the flaps up.

4. Choose one:

   - WING ANTI-ICE **is** needed:

     ▶▶**Go to step 5**

   - WING ANTI-ICE is **not** needed:

     ▶▶**Go to step 8**

Continued on next page

▼WING ANTI-ICE VALVE OPEN (continued)▼

5. Engine BLEED air switch (affected side) .....ON

6. WING ANTI-ICE switch.....ON

7. **When** wing anti-ice is no longer needed:

   ▶▶Go to step 8

8. WING ANTI-ICE switch.....Verify OFF

9. Engine BLEED air switch (affected side) .....OFF

   Wing anti-ice is not available on the affected side with the ISOLATION VALVE switch closed.

NOTE: Repeat steps 4 through 9 as needed.

■ ■ ■ ■

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SECTION 4 Automatic Flight

Section Contents

AUTOPILOT DISENGAGE.....4.3
AUTOTHROTTLE DISENGAGE 4.3
ROLL AUTHORITY 4.4
ROLL/YAW ASYMMETRY.....4.4

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A/P P/RST

AUTOPILOT DISENGAGE

Condition: All autopilots are disengaged. The red light flashes and the aural tone sounds.

1. Fly the airplane manually or re-engage an autopilot.

■ ■ ■ ■

A/T P/RST

AUTOTHROTTLE DISENGAGE

Condition: The autothrottle is disengaged. The red light flashes.

1. Control thrust manually or re-engage the autothrottle.

■ ■ ■ ■

ROLL AUTHORITY

Condition: The autopilot has reached its roll authority limit due to an airplane roll or yaw asymmetry.

1. Possible causes of the ROLL AUTHORITY alert include:
    - Thrust asymmetry
    - Incorrect airplane trim for the conditions
    - Fuel imbalance
    - Asymmetric wing icing
    - A flap or slat asymmetry
    - Jammed or restricted flight controls

■ ■ ■ ■

ROLL/YAW ASYMMETRY

Condition: The autopilot has reached its roll authority limit due to an airplane roll or yaw asymmetry.

1. Possible causes of the ROLL/YAW ASYMMETRY alert include:
    - Thrust asymmetry
    - Incorrect airplane trim for the conditions
    - Fuel imbalance
    - Asymmetric wing icing
    - A flap or slat asymmetry
    - Jammed or restricted flight controls

■ ■ ■ ■

SECTION 5 Communications

Section Contents

Audio Selector Panel Failure 5.3
Radio Transmit Continuous (Stuck Microphone Switch) 5.5

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Audio Selector Panel Failure

Condition: An audio selector panel (ASP) is not functional.

Objective: To operate the audio system in degraded mode.

1. ALT/NORM switch ..... ALT

   Radio available for transmission and reception at degraded station:

   - Captain: VHF-1 only
   - First Officer: VHF-2 only
   - Observer VHF-1 only

NOTE: Both microphones can be keyed from any of these switches:

(1) Control wheel PTT switch

(2) PTT switch adjacent to the audio panel

(3) ASP RADIO/INT switch

Continued on next page

Audio Selector Panel Failure (continued)

Inoperative Items

Flight interphone Flight interphone and service interphone cannot be used.
Hand microphone The hand microphone is not usable.
PA system The PA system is not usable through the audio selector panel.
PTT The control wheel PTT switch INT position, and the ASP RADIO/INT switch in the INT position are not functional.
Speaker The speaker is disabled at the degraded station.

CAUTION

If both ASP are degraded, both cockpit speakers will be disabled; audio warnings for altitude alert, GPWS, and windshear will NOT be heard.

■ ■ ■ ■

Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

1. MIC SELECTOR switches
(all audio selector panels) ..... FLT

   This deselects radios and stops radio transmissions.

   NOTE: The microphone/interphone with the stuck switch continuously transmits on flight interphone.

2. The associated audio selector panel should stay on flight interphone. All other audio selector panels may be used normally.

■ ■ ■ ■

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SECTION 6 Electrical

Quick Actions

Smoke, Fire or Fumes ..... ▶▶8.21

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BATTERY DISCHARGE 6.3
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Starlink 6.14
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TRANSFER BUS OFF 6.15

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BAT DISCHARGE — BATTERY DISCHARGE

Condition: A battery discharge exeedance occurs.

NOTE: A fully charged battery supplies a minimum of 60 minutes of standby power.

■ ■ ■ ■

DRIVE — DRIVE

Condition: A generator drive malfunction occurs.

Action is irreversible.

1.  Generator drive DISCONNECT switch (affected side).....Confirm ..... Hold in the DISCONNECT position momentarily

   This prevents generator drive damage.

2. Choose one:

   ◆ APU is **available** for start:

   APU .....START

   When APU is running:

   APU GEN switch (affected side) .....ON

   ■ ■ ■ ■

   ◆ APU is **not** available:

   Plan to land at the nearest suitable airport. Only one main AC power source remains.

   ■ ■ ■ ■

ELEC

ELEC

Condition: A standby power or DC system fault occurs.

NOTE: The ELC light illuminates on the ground only.

1. Do **not** take off.

■ ■ ■ ■

LOSS OF BOTH ENGINE DRIVEN GENERATORS



Condition: Both engine driven generators are off.

NOTE: At high altitude, thrust deterioration or engine flameout may occur.

1. Engine GEN switches (both) ..... ON, one at a time
2. Choose one:
   - **A single** SOURCE OFF light **stays illuminated**:
     ▶▶**Go to step 3**
   - **Both** SOURCE OFF lights **stay illuminated**:
     ▶▶**Go to step 5**
   - **Both** SOURCE OFF lights **extinguish**:
     YAW DAMPER switch ..... ON
     ▶▶**Go to step 17**

Continued on next page

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS (continued)▼

A single SOURCE OFF light stays illuminated:

3. YAW DAMPER switch ..... ON

4. Choose one:

   - APU is **available** for start:

     NOTE: APU start attempts are not recommended above 25,000 feet.

     APU ..... START

     When APU is running:

     APU GEN switch (affected side) ..... ON

     ▶▶Go to step 17

   - APU is **not** available:

     Plan to land at the nearest suitable airport. Only one main AC power source remains.

     ▶▶Go to step 17

▼Continued on next page▼

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS (continued)▼

Both SOURCE OFF lights stay illuminated:

5. Choose one:

   - APU is **available** for start:

     BUS TRANSFER switch.....OFF

     ELEC HYD PUMP switches (both).....OFF

     NOTE: APU start attempts are not recommended above 25,000 feet. With both buses off, only one start attempt is recommended. Multiple start attempts reduce standby power capacity.

     APU .....START

     ▶▶Go to step 6

   - APU is **not** available:

     ▶▶Go to step 14

6. **When** APU is running:

   APU GEN switches (both) ..... ON, one at a time

7. Check for the REMOTE CONTROL Circuit Breaker (RCCB Remote P6-SPCU-A-4).

8. Choose one:

   - RCCB REMOTE circuit breaker **is** tripped:

     Reset circuit breaker. Only one reset is allowed.

     ▶▶Go to step 9

   - RCCB REMOTE circuit breaker is **not** tripped:

     ▶▶Go to step 9

▼Continued on next page▼

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS (continued)▼

9. Choose one:

   - **A single or both** SOURCE OFF lights **extinguish**:

     ▶▶**Go to step 10**

   - **Both** SOURCE OFF lights **stay illuminated**:

     ▶▶**Go to step 14**

10. BUS TRANSFER switch.....AUTO

    This restores power to the remaining transfer bus if one SOURCE OFF light stays illuminated.

11. ELEC HYD PUMP switches (both).....ON, one at a time

12. YAW DAMPER switch ..... ON

13. Plan to land at the nearest suitable airport. Only one main AC power source remains.

▶▶**Go to step 17**

▼Continued on next page▼

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS (continued)▼

Both SOURCE OFF lights stay illuminated:

14. Avoid icing conditions.

    NOTE: Flight in icing conditions can result in erroneous flight instrument indications.

15. Plan to land at the nearest suitable airport.

    NOTE: A fully charged battery supplies a minimum of 60 minutes of standby power.

16. The right IRS operates on DC power for 5 minutes.

17. Choose one:

    - **Both** the captain's and first officer's primary attitude displays are **operative and** ATT flags are **not** shown:

      ■ ■ ■ ■

    - **Both** the captain's and first officer's primary attitude displays are **failed**:

      ►►Go to step 19

    - **Only** the **first officer's** primary attitude display is **failed**:

      IRS transfer switch .....BOTH ON L

      Do **not** engage either autopilot.

      ►►Go to step 18

▼Continued on next page▼

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS (continued)▼

18. Choose one:

- **A single** SOURCE OFF light is **illuminated**:

  Plan to land at the nearest suitable airport. Only one main AC power source remains.

  ■ ■ ■ ■

- **Both** SOURCE OFF lights are **extinguished**:

  ■ ■ ■ ■

- **Both** SOURCE OFF lights are **illuminated**:

  The left IRS will operate as long as battery power remains.

  Plan to land at the nearest suitable airport.

  ■ ■ ■ ■

▼Continued on next page▼

LOSS OF BOTH ENGINE DRIVEN GENERATORS (continued)

Action is irreversible. Do this step only if **both** the captain's and first officer's primary attitude displays are **failed**.

19. IRS MODE selectors (both) .....ATT

    Maintain straight and level, constant airspeed flight until attitude displays recover (approximately 30 seconds).

    The primary attitude displays stay failed and the SET IRS HDG prompt on the POS INIT page is blank until the attitude mode alignment is complete.

20. Enter magnetic heading on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

    NOTE: The MAP display is not available.

    NOTE: Periodically enter updated heading on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

21. Do **not** engage either autopilot.

■ ■ ■ ■

SOURCE OFF

SOURCE OFF

Condition: The transfer bus is not powered by the last selected source.

1. Choose:

   - **Both** SOURCE OFF lights are illuminated:

     ▶▶**Go to LOSS OF BOTH ENGINE DRIVEN GENERATORS checklist on page 6.5.**

     ■ ■ ■ ■

   - **Only one** SOURCE OFF light is illuminated:

     ▶▶**Go to step 2**

2. Engine GEN switch (affected side)..... ON

3. Choose one:

   - SOURCE OFF light **extinguishes**:

     ■ ■ ■ ■

   - SOURCE OFF light stays **illuminated**:

     ▶▶**Go to step 4**

Continued on next page

▼SOURCE OFF (continued)▼

4. Choose one:

- APU is **available** for start:

  APU ..... START

  When APU is running:

  APU GEN switch (affected side) ..... ON

  ►►Go to step 5

- APU is **not** available:

  Plan to land at the nearest suitable airport. Only one main AC power source remains.

■ ■ ■ ■

5. Choose one:

- SOURCE OFF light **extinguishes**:

  ■ ■ ■ ■

- SOURCE OFF light **stays illuminated**:

  Plan to land at the nearest suitable airport. Only one main AC power source remains.

  ■ ■ ■ ■

STANDBY PWR OFF

STANDBY POWER OFF

Condition: One or more of these buses are not energized.

- AC standby bus
- DC standby bus
- Battery bus.

1. STANDBY POWER switch ..... BAT

■ ■ ■ ■

Starlink

Condition: The flight crew determines the need to de-power the entire Starlink system in flight.

1. STARLINK switch ..... OFF

■ ■ ■ ■

TR UNIT

TR UNIT

Condition: One or more transformer rectifiers are failed.

1. Do not use the AFDS approach mode during an ILS or GLS approach.

NOTE: Autoland is not available.

■ ■ ■ ■

TRANSFER BUS OFF

TRANSFER BUS OFF

Condition: The transfer bus is not energized.

1. Engine GEN switch (affected side) ..... ON
2. Choose one:
   - TRANSFER BUS OFF light **extinguishes**:

     ■ ■ ■ ■
   - TRANSFER BUS OFF light **stays illuminated**:

     ▶▶**Go to step 3**
3. Choose one:
   - APU is **available** for start:

     APU ..... START

     When APU is running:

     APU **GEN** switch (affected side) ..... ON

     ▶▶**Go to step 4**
   - APU is **not** available:

     Plan to land at the nearest suitable airport. Only one main AC power source remains.

     ■ ■ ■ ■
4. Choose one:
   - TRANSFER BUS OFF light **extinguishes**:

     ■ ■ ■ ■
   - TRANSFER BUS OFF light **stays illuminated**:

     Plan to land at the nearest suitable airport. Only one main AC power source remains.

     ■ ■ ■ ■

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SECTION 7 Engines, APU

Quick Actions

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REVERSER UNLOCKED (IN FLIGHT) 7.34

START VALVE OPEN..... 7.35

Volcanic Ash 7.37

Aborted Engine Start

Condition: On the ground, an aborted engine start condition occurs.

Objective: To shut down the engine and motor it.

1. Engine start lever
(affected engine) ..... CUTOFF PIC

---

2. Choose one:

◆ ENGINE START switch is in **GRD**:

Motor the engine for 60 seconds.

ENGINE START switch
(affected engine) ..... OFF SIC

■ ■ ■ ■

◆ ENGINE START switch is in **OFF**:

►►**Go to step 3**

3. **After** N2 decreases below 20%:

ENGINE START switch
(affected engine) ..... GRD SIC

Motor the engine for 60 seconds.

ENGINE START switch
(affected engine) ..... OFF SIC

■ ■ ■ ■

Engine Limit or Surge or Stall

Condition:	One or more of these occur: • Engine indications are abnormal • Engine indications are rapidly approaching or exceeding limits • Abnormal engine noises are heard, possibly with airframe vibration • There is no response to thrust lever movement or the response is abnormal • Flames in the engine inlet or exhaust are reported.
Objective:	To attempt to recover normal engine operation or shut down the engine if recovery is not possible.

1. Autothrottle (if engaged) ..... Disengage

2. Thrust lever
(affected engine).....Confirm ..... Retard until engine indications stay within limits or the thrust lever is closed

---

3. Choose one:

   - Engine indications are **stabilized and** EGT is **stabilized or decreasing**:

     ▶▶**Go to step 4**

   - Engine indications are **abnormal or** EGT continues to **increase**:

     ▶▶**Go to step 7**

▼Continued on next page▼

Engine Limit or Surge or Stall (continued)

Check that RPM and EGT follow thrust lever movement.

4. Thrust lever
(affected engine).....Advance slowly

5. Run the engine normally or at a reduced thrust setting that is surge and stall free.

6. Choose one:

◆ Engine runs **normally**:

■ ■ ■ ■

◆ Engine runs at **reduced** thrust:

NOTE: Do not use FMC performance predictions.

Transponder mode selector.....TA

This step prevents climb commands which can exceed reduced thrust performance capability.

■ ■ ■ ■

7. Engine start lever
(affected engine).....Confirm ..... CUTOFF

Continued on next page

▼Engine Limit or Surge or Stall (continued)▼

8. PACK switch (affected side) ..... OFF

   This step causes the operating pack to regulate to high flow in flight with flaps up.

9. Choose one:

   - APU is **available** for start:

     APU ..... START

     When APU is running:

     APU GEN switch (affected side) ..... ON

     ▶▶**Go to step 10**

   - APU is **not** available:

     ▶▶**Go to step 10**

10. Balance fuel as needed.

    NOTE: Anytime the IMBAL or LOW alert is annunciated, complete the appropriate IMBAL or LOW alert checklist

    CROSSFEED selector ..... Open

    Fuel pump switches (affected engine) ..... ON

    Fuel pump switches (running engine) ..... OFF

    NOTE: Monitor Fuel.

    When fuel balancing is complete:

    Fuel pump switches (all) ..... ON

    CROSSFEED selector ..... Close

    ▶▶**Go to step 11**

▼Continued on next page▼

Engine Limit or Surge or Stall (continued)

11. Transponder mode selector ..... TA

    This step prevents climb commands which can exceed single engine performance capability.

12. ISOLATION VALVE switch ..... Verify AUTO

    This step ensures bleed air is available to both wings if wing anti-ice is needed.

13. A restart may be attempted if there is N1 rotation and no abnormal airframe vibration.

14. Choose one:

    - Restart **will** be attempted**:**

      ▶▶**Go to the Engine In-Flight Start checklist on page 7.24**

      ■ ■ ■ ■

    - Restart will **not** be attempted:

      ▶▶**Go to step 15**

15. Plan to land at the nearest suitable airport.

    NOTE: Do not use FMC performance predictions.

    ▶▶**Go to the One Engine Inoperative Landing checklist on page 7.30**

    ■ ■ ■ ■

Loss of Thrust on Both Engines

Condition: Both of these occur:

- Both engines have a loss of thrust
- Both ENG FAIL alert show

Objective: To restart at least one engine

1. ENGINE START switches (both) .....FLT
2. Engine start levers (both) ..... CUTOFF
3. **When** EGT decreases:

   Engine start levers (both) .....IDLE detent
4. **If** EGT reaches a redline or there is no increase in EGT within 30 seconds:

   Engine start lever
   (affected engine).....Confirm ..... CUTOFF
   then IDLE detent

   If EGT again reaches a redline or there is no increase in EGT within 30 seconds, repeat as needed.

---

5. At or above FL270, set airspeed to 275 knots. Below FL270, set airspeed to 300 knots.
6. Engines can accelerate to idle very slowly, especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.
7. Do **not** wait for successful engine start(s) before starting the APU.

▾Continued on next page▾

▼Loss of Thrust on Both Engines (continued)▼

8. Choose one:

   - APU is **available** for start:

     APU ..... START

     ▶▶Go to step 9

   - APU is **not** available:

     ▶▶Go to step 10

9. **When** APU is running:

   APU GEN switches ..... ON, one at a time

10. Choose one:

    - **One or both** engines **start**:

      ▶▶Go to step 15

    - **Neither** engine starts:

      ▶▶Go to step 11

11. Choose one:

    - **N2** is **at or above 11%**:

      Attempt a windmill start.

      ▶▶Go to step 13

    - **N2** is **below 11%**:

      ▶▶Go to step 12

▼Continued on next page▼

▼Loss of Thrust on Both Engines (continued)▼

12. Choose one:

- APU bleed air is **available**:

  Attempt a starter assisted start.

  ▶▶Go to step 16

- APU bleed air is **not** available:

  Attempt a windmill start.

  ▶▶Go to step 13

13. Thrust levers (both) ..... Close

14. Engine start lever
(**either**).....Confirm ..... CUTOFF, then IDLE detent

    The engine can accelerate to idle very slowly especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

15. **When** engine parameters have stabilized:

    ENGINE START switch
    (operating engine) ..... As needed

    Thrust lever
    (operating engine) ..... Advance slowly

    Engine GEN switch
    (operating engine side) ..... ON

    ▶▶Go to step 25

▼Continued on next page▼

Loss of Thrust on Both Engines (continued)

16. Thrust levers (both) .....Close
17. WING ANTI-ICE switch.....OFF
18. PACK switches (both) .....OFF
19. APU BLEED air switch .....ON
20. Ignition select switch ..... BOTH
21. Engine start lever
(**either**).....Confirm.....CUTOFF
22. ENGINE START switch..... GRD
23. **When** N2 is at or above 11%:

    Engine start lever.....IDLE detent

    The engine can accelerate to idle very slowly especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

24. **When** engine parameters have stabilized:

    APU BLEED air switch .....OFF

    ENGINE START switch
    (operating engine) .....As needed

    Thrust lever
    (operating engine) .....Advance slowly

    Engine GEN switch
    (operating engine side).....ON

    PACK switch
    (operating engine side)..... AUTO

Continued on next page

▼Loss of Thrust on Both Engines (continued)▼

25. Choose one:

- **Both** the captain's and first officer's primary attitude displays are **operative and** ATT flags are **not** shown:

  ▶▶Go to step 30

- **Both** the captain's and first officer's primary attitude displays are **failed**:

  ▶▶Go to step 26

- **Only** the **first officer's** primary attitude displays is **failed**:

  IRS TRANSFER switch ..... BOTH ON L

  Do **not** engage either autopilot.

  ▶▶Go to step 30

▼Continued on next page▼

▼Loss of Thrust on Both Engines (continued)▼

Action is irreversible. Do this step only if **both** the captain's and first officer's primary attitude displays are **failed**.

26. IRS MODE selectors (both) .....ATT

    Maintain straight and level, constant airspeed flight until attitude displays recover (approximately 30 seconds).

    The primary attitude displays stay failed and the SET IRS HDG prompt on the POS INIT page is blank until the attitude mode alignment is complete.

27. Enter magnetic heading on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

28. The MAP display is not available.

NOTE: Periodically enter updated heading on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

29. Do **not** engage either autopilot.

30. Choose one:

- **Both** engines are **running**:

  Run the APU as needed.

  ■ ■ ■ ■

- **One** engine stays **failed**:

  ▶▶Go to the Engine In-Flight Start checklist on page 7.24

  ■ ■ ■ ■

FAULT

APU FAULT

Condition: An APU malfunction occurs.

NOTE: The APU shuts down automatically.

1. APU switch ..... OFF

   If the APU FAULT light extinguishes after 5 minutes, restarts may be attempted.

■ ■ ■ ■

LOW OIL PRESSURE

APU LOW OIL PRESSURE

Condition: The APU oil pressure is low.

NOTE: The APU shuts down automatically.

1. APU switch ..... OFF

   The LOW OIL PRESSURE light extinguishes in 5 minutes.

■ ■ ■ ■

OVER SPEED

APU OVERSPEED

Condition: One of these occurs:

- An APU RPM limit exceedance causes automatic shutdown
- During a normal APU shutdown, the overspeed shutdown protection logic fails a self-test

1. APU switch ..... OFF

   The APU OVERSPEED light extinguishes in 5 minutes.

■ ■ ■ ■

ALTN

EEC ALTERNATE MODE

Condition: An EEC operates in the alternate control mode.

1. Autothrottle (if engaged).....Disengage
2. Thrust levers (both) ..... Retard to mid position

   This prevents exceeding thrust limits when switching to the EEC alternate mode.

3. EEC mode switches (one at a time) ..... ALTN

   This ensures both engines operate in alternate mode.

4. Autothrottle (if needed) .....Engage

NOTE: Maximum thrust limiting is available with autothrottle engaged.

5. Do not exceed engine limits. Engine limit protection in alternate mod is not the same as in normal mode.
6. Choose one:

   ◆ DSPLY SOURCE 1 **or** DSPLY SOURCE 2 annunciation is **shown**:

   ▶▶**Go to step 7**

   ◆ DSPLY SOURCE 1 **and** DSPLY SOURCE 2 annunciation are **not** shown:

   ■ ■ ■ ■

Continued on next page

▼EEC ALTERNATE MODE (continued)▼

7. Choose one:

   - DISPLAY SOURCE checklist **has** been completed:

     ■ ■ ■ ■

   - DISPLAY SOURCE checklist has **not** been completed:

     ▶▶**Go to the DISPLAY SOURCE checklist on page 10.17**

     ■ ■ ■ ■

ENGINE CONTROL

ENGINE CONTROL

Condition: An engine control system fault occurs.

NOTE: An ENGINE CONTROL light illuminates on the ground only.

1. Do **not** take off.

■ ■ ■ ■

Engine Failure or Shutdown

Condition: One of these occurs:

- An engine failure
- An ENG FAIL alert shows
- An engine flameout
- Another checklist directs an engine shutdown.

1. Choose one:

   ◆ **Airframe vibrations with abnormal engine indications** exist:

   ▶▶**Go to the ENGINE FIRE or Engine Severe Damage or Separation checklist on page 8.4.**

   ■ ■ ■ ■

   ◆ An engine has **separated**:

   ▶▶**Go to the ENGINE FIRE or Engine Severe Damage or Separation checklist on page 8.4.**

   ■ ■ ■ ■

   ◆ Airframe vibrations with abnormal engine indications do **not** exist **and** an engine has **not** separated:

   ▶▶**Go to step 2**

2. Do an engine shutdown only when flight conditions allow.

3. Autothrottle (if engaged).....Disengage

4. Thrust lever (affected engine).....Confirm .....Close

▼**Continued on next page**▼

▼Engine Failure or Shutdown (continued)▼

5. **When** the affected engine is at idle thrust:

   Engine start lever
   (affected engine).....Confirm ..... CUTOFF

6. PACK switch (affected side)..... OFF

   This step causes the operating pack to regulate to high flow in flight with flaps up.

7. Choose one:

   - APU is **available** for start:

     APU ..... START

     When APU is running:

     APU GEN switch (affected side)..... ON

     ▶▶Go to step 8

   - APU is **not** available:

     ▶▶Go to step 8

8. Balance fuel as needed.

   NOTE: Anytime the IMBAL or LOW alert is annunciated, complete the appropriate IMBAL or LOW alert checklist

   CROSSFEED selector ..... Open

   Fuel pump switches (affected engine) ..... ON

   Fuel pump switches (running engine)..... OFF

   NOTE: Monitor Fuel.

   When fuel balancing is complete:

   Fuel pump switches (all) ..... ON

   CROSSFEED selector ..... Close

   ▶▶Go to step 9

Continued on next page▼

▼Engine Failure or Shutdown (continued)▼

9. Transponder mode selector ..... TA

   This step prevents climb commands which can exceed single engine performance capability.

10. ISOLATION VALVE switch ..... Verify AUTO

    This step ensures bleed air is available to both wings if wing anti-ice is needed.

11. A restart may be attempted if there is N1 rotation and no abnormal airframe vibration.

12. Choose one:

    ◆ A restart will **attempted**:

    ▶▶Go to the Engine In-Flight Start checklist on page 7.24.

    ■ ■ ■ ■

    ◆ A Restart will **not** be attempted:

    ▶▶Go to step 13

13. Plan to land at the nearest suitable airport.

NOTE: Do not use FMC performance predictions.

▶▶Go to the One Engine Inoperative Landing checklist on page 7.30

■ ■ ■ ■

Engine High Oil Temperature

Condition: The engine oil temperature is high.

1. Choose one:

   - Temperature is **at or above** the **redline**:

     ▶▶**Go to the Engine Failure or Shutdown checklist on page 7.17**

     ■ ■ ■ ■

   - Temperature is in the **amber band**:

     ▶▶**Go to step 2**

2. Autothrottle (if engaged) ..... Disengage

3. Thrust lever (affected engine).....Confirm .....Retard slowly until the engine oil temperature is within the normal operating range or the thrust lever is closed

Continued on next page

Engine High Oil Temperature (continued)

4. Choose one:

- Oil temperature is in the **amber** band for **45 minutes or less**:

  NOTE: Run the affected engine at a thrust setting that keeps the engine oil temperature within the normal operating range.

  Do not use FMC performance predictions.

  Transponder mode selector.....TA

  This step prevents climb commands which can exceed reduced thrust performance capability.

- Oil temperature is in the **amber** band for **more than 45 minutes**:

  ▶▶**Go to the Engine Failure or Shutdown checklist on page 7.17**

■ ■ ■ ■

Engine High Vibration

Condition: The vibration level is 4.0 units or greater. Airframe vibration may or may not be felt.

1. Choose one:
   - In **icing** conditions:
     ▶▶**Go to step 2**
   - **Not** in icing conditions:
     ▶▶**Go to step 8**
2. ENGINE START switches (both) .....FLT
3. Autothrottle (if engaged) ..... Disengage

Do the next two steps on one engine at a time.

4. Thrust lever
   (selected engine) ..... Retard to 45% N1 for five seconds then slowly advance to a minimum of 80% N1 for approximately 1 second
5. Thrust lever
   (selected engine) ..... Reduce as needed for flight conditions
6. **Wait** 15 seconds. This allows the engine vibration level to stabilize.

Continued on next page

▼Engine High Vibration (continued)▼

7. Choose one:

   ◆ Vibration level is **less than** 4 units:

   Continue normal operation.

   ■ ■ ■ ■

   ◆ Vibration level is 4 units **or greater**:

   ▶▶Go to step 9

8. Autothrottle (if engaged).....Disengage

9. Thrust lever (affected engine).....Confirm ..... Retard to maintain vibration levels below 4 units or until the thrust lever is closed

NOTE: If the VIB indication does not decrease when the thrust lever is retarded, check other engine indications on the affected engine. If other engine indications are normal, run the engine at reduced thrust.

NOTE: Do not use FMC performance predictions.

10. Transponder mode selector ..... TA

    This prevents climb commands which can exceed single engine performance capability.

■ ■ ■ ■

Engine In-Flight Start

Condition: An engine start is needed and all of the following are true:

- There was **no** engine fire
- There is N1 rotation
- There is **no** abnormal airframe vibration

NOTE: Oil quantity indication as low as zero is normal if windmilling N2 RPM is below approximately 8%.

1. Do this checklist **only** after completion of the Engine Failure or Shutdown checklist or as directed by the Engine Limit or Surge or Stall checklist or by the Loss of Thrust on Both Engines checklist.

2. Check the In-Flight Start Envelope. X-BLD or XB indication may not match the envelope. Starts are not assured outside of the in-flight start envelope.

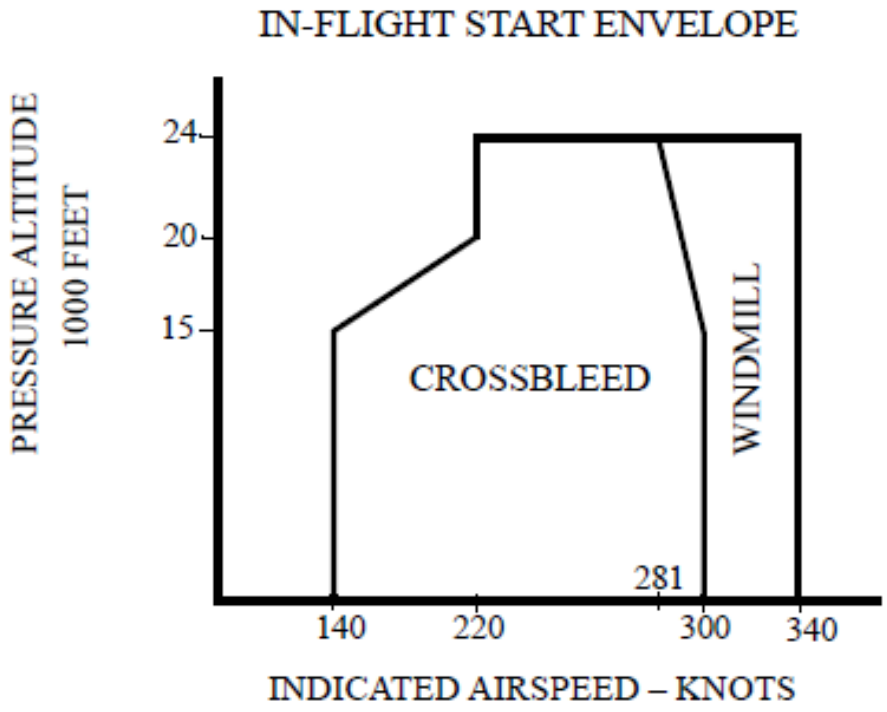
NOTE: If the N2 is less than 8%, ENGINE START switch must be in CONT to display EGT.

NOTE: For engines shut down one hour or more, or if EGT is less than 30°C, attempt a restart:

- At an altitude at or below 20,000 feet
- Withc airspeed at or above 220 knots
- Using a crossbleed start.

Continued on next page

Engine In-Flight Start (continued)



3. Thrust lever
(affected engine).....Confirm .....Close

4. Engine start lever
(affected engine) .....Confirm ..... CUTOFF

5. Engines can accelerate to idle very slowly, especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

Continued on next page

▼Engine In-Flight Start (continued)▼

6. Choose one:

- **Windmill** start:

  ENGINE START switch
  (affected engine).....FLT

  ▶▶Go to step 7

- **Crossbleed Start** start:

  PACK switch (affected side) ..... OFF

  DUCT PRESSURE ..... Minimum 30 psi

  Advance the thrust lever to increase duct pressure if needed.

  ENGINE START switch
  (affected engine) ..... GRD

  ▶▶Go to step 7

7. **When** N2 is at or above 11%:

   Engine start lever
   (affected engine) .....IDLE detent

   Monitor EGT to ensure it does not rise rapidly or exceed the start limit during the start attempt.

▼Continued on next page▼

▼Engine In-Flight Start (continued)▼

8. Choose one:

   - EGT **increases** within 30 seconds **and** a normal start occurs:

     ▶▶Go to step 10

   - EGT does **not** increase within 30 seconds **or** another abort start condition as listed in the Normal Procedures occurs:

     Engine start lever
     (affected engine).....Confirm ..... CUTOFF

     ENGINE START switch
     (affected engine) .....OFF

     NOTE: If the engine has been shut down for more than one hour, multiple start attempts can be needed.

     ▶▶Go to step 9

9. Plan to land at the nearest suitable airport.

   NOTE: Do not use FMC performance predictions.

   ▶▶Go to the One Engine Inoperative Landing checklist on page 7.30

■ ■ ■ ■

10. Engine GEN switch (affected side) .....ON
11. PACK switch (affected side) ..... AUTO
12. ENGINE START switch.....As needed
13. APU .....As needed
14. Transponder mode selector ..... TA/RA

■ ■ ■ ■

LOW OIL PRESSURE

ENGINE LOW OIL PRESSURE

May or may not be shown

Condition: The engine oil pressure is low

1. Choose one:

   - Engine oil pressure is in the **amber band** with **takeoff thrust** set:

     Do **not** take off.

     ■ ■ ■ ■

   - Engine oil pressure is **at or below** the **redline**:

     ▶▶**Go to the Engine Failure or Shutdown checklist on page 7.17**

     ■ ■ ■ ■

OIL FILTER BYPASS

ENGINE OIL FILTER BYPASS

Condition: The OIL FILTER BYPASS alert indicates oil filter contamination can cause oil to bypass the oil filter.

1. Autothrottle (if engaged).....Disengage

2. Thrust lever (affected engine).....Confirm .....Retard slowly until the OIL FILTER BYPASS light extinguishes or the thrust lever is closed

3. Choose one:

   - OIL FILTER BYPASS light **extinguishes**:

     ▶▶**Go to step 4**

   - OIL FILTER BYPASS light **stays illuminated**:

     ▶▶**Go to the Engine Failure or Shutdown checklist on page 7.17**

■ ■ ■ ■

4. Run the engine at reduced thrust to keep the light extinguished.

   NOTE: Do not use the FMC performance predictions.

5. Transponder mode selector ..... TA

   This prevents climb commands which can exceed single engine performance capability.

■ ■ ■ ■

One Engine Inoperative Landing

Condition: Landing must be made with one engine inoperative.

1. Plan a flaps 15 landing.
2. Set VREF 15 or VREF ICE.

NOTE: If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

NOTE: When VREF ICE is needed, the wind additive should not exceed 5 knots.

3. Check the Non–Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.
4. Maintain VREF 15 + wind additive or VREF ICE + wind additive on final approach to assure sufficient maneuver margin and speed for go-around. The minimum wind additive is 5 knots.
5. When engine anti-ice is needed, use on the operating engine only.
6. **Checklist Complete Except for Deferred Items**

Continued on next page

▼One Engine Inoperative Landing (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data..... **VREF 15 or VREF ICE _____,**
Minimums _____

Additional Go-Around Thrust

Choose one:

- Additional go-around thrust is **needed**:
  - ▶▶**Go to No Engine Bleed Landing below**
- Additional go-around thrust is **not** needed:
  - ▶▶**Go to Go-Around Procedure Review below**

▼Continued on next page▼

▼One Engine Inoperative Landing (continued)▼

No Engine Bleed Landing

When below 10,000 feet:

WING ANTI-ICE switch ..... OFF

ISOLATION VALVE switch ..... CLOSE

BLEED 1 air switch ..... OFF

Do not open the APU bleed air valve if the engine fire switch is illuminated.



APU BLEED air switch ..... ON

Left PACK switch .....AUTO

BLEED 2 air switch ..... OFF

Go-Around Procedure Review

Do the normal go-around procedure except:

Use flaps 1.

Maintain VREF 15 + 5 knots or VREF ICE + 5 knots until reaching flap retraction altitude.

Limit bank angle to 15° when airspeed is less than VREF 15 + 15 knots or VREF ICE + 5 knots or the minimum manoeuvre speed, whichever is lower.

Accelerate to flaps 1 manoeuvring speed before flap retraction.

▼Continued on next page▼

One Engine Inoperative Landing (continued)

Approach Checklist

FASTEN BELTS ..... ON

IDENT/CRS ..... (____ / ___)

Altimeters..... __ . __”

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch ..... FLAP INHIBIT

Landing Checklist

F/A announcement ..... 2 CHIMES

Main tank FUEL PUMPS switches (all) ..... ON

CROSSFEED selector ..... Close

ENGINE START switch
(operating engine) ..... CONT

Speedbrake ..... ARMED

Landing gear..... Down

Flaps..... **15, Green light**

■ ■ ■ ■

REVERSER

REVERSER

Condition: A fault occurs in the thrust reverser system.

1. Expect normal reverser operation after landing.

■ ■ ■ ■

REVERSER UNLOCKED (IN FLIGHT)

Condition: The amber REV indication shows with uncommanded reverse thrust.

NOTE: Only multiple failures could allow the engine to go into reverse thrust.

Unstowed reverser sleeves produce buffet, yaw, roll and increased airplane drag.

1. Check movement of the forward thrust lever on the affected engine.

   The EECs prevent power above idle if the related thrust reverser has moved from the stowed position.

WARNING

Do not actuate the reverse thrust lever.

2. Choose one:

   - Engine **responds** to forward thrust lever movement **and no** buffet or yaw exists:

     Continue normal operation.

     ■ ■ ■ ■

   - Engine does **not** respond to forward thrust lever movement **or** buffet or yaw **exists**:

     ►►**Go to the Engine Failure or Shutdown checklist on page 7.17**

     ■ ■ ■ ■

START VALVE OPEN

START VALVE OPEN

Condition: The START VALVE OPEN alert indicates the start valve fails to close.

1. ENGINE START switch.....OFF
2. Choose one:
   - START VALVE OPEN light **extinguishes**:

     ■ ■ ■ ■
   - START VALVE OPEN light **stays illuminated**:

     ▶▶**Go to step 3**
3. ISOLATION VALVE switch.....CLOSE
4. PACK switch (affected side).....OFF

   This causes the operating pack to regulate to high flow in flight with flaps up.
5. Engine BLEED air switch (affected side).....OFF
6. Choose one:
   - START VALVE OPEN light stays illuminated for **engine 1**:

     APU BLEED air switch.....OFF

     ▶▶**Go to step 7**
   - START VALVE OPEN light stays illuminated for **engine 2**:

     ▶▶**Go to step 7**
   - START VALVE OPEN light **extinguishes**:

     ▶▶**Go to step 7**

▼**Continued on next page**▼

▼START VALVE OPEN (continued)▼

7. Choose one:

- **In flight**:

  WING ANTI-ICE switch ..... OFF

  This prevents possible asymmetrical ice buildup on the wings.

  Avoid icing conditions where wing anti-ice is needed.

  ■ ■ ■ ■

- On the **ground**:

  Ground air source
  (if in use) ..... Disconnect

  Engine start lever
  (affected side) ..... CUTOFF

  ■ ■ ■ ■

Volcanic Ash

Condition:	Volcanic ash is suspected when one or more of these occur:
	• A static discharge around the windshield • A bright glow in the engine inlets • Smoke or dust on the flight deck • An acrid odour.
Objective:	To exit the ash cloud and restart engines if needed.

CAUTION

Exit volcanic ash as quickly as possible. Consider a 180° turn. Consider a descending turn.

1. Don oxygen masks and smoke goggles, as needed.
2. Establish crew communications, as needed.
3. Autothrottle (if engaged).....Disengage

If conditions allow, run the engines at idle thrust.

4. Thrust levers (both).....Close

   This step reduces possible engine damage or flameout, or both, by decreasing EGT.

5. ENGINE START switches (both)..... FLT
6. PACK switches .....HIGH
7. ENG ANTI-ICE switches (both).....ON
8. WING ANTI-ICE switch.....ON

▼Continued on next page▼

▼Volcanic Ash (continued)▼

9. APU switch (if APU available)..... START

   This step supplies backup electrical and pneumatic sources, if needed.

NOTE: Volcanic ash can cause non-normal system reactions such as:

- Engine malfunctions, increasing EGT, engine stall or flameout.
- Decrease in indicated airspeed or loss of airspeed indications.
- Equipment cooling OFF light.

10. If failed, the engine(s) can accelerate to idle very slowly, especially at high altitudes. If N2 is steadily increasing and EGT stays within limits, the start is progressing normally.

11. Plan to land at the nearest suitable airport.

12. Choose one:

◆ Engines run **normally**:

■ ■ ■ ■

◆ Engines do **not** run normally:

▶▶**Go to the Loss of Thrust on Both Engines checklist on page 7.8**

■ ■ ■ ■

SECTION 8 Fire Protection

Quick Actions

APU FIRE 8.3

Engine Fire on the Ground ..... Back Cover.1

**ENGINE FIRE or
Engine Severe Damage or Separation 8.4**

ENGINE OVERHEAT 8.8

Engine Tailpipe Fire 8.9

**FIRE WARN – C-FTUW / C-FTUY
(Main Deck Cargo Compartment) 8.11**

**FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment) 8.15**

Smoke, Fire or Fumes 8.21

Section Contents

APU BOTTLE DISCHARGED 8.26

APU DETECTION INOPERATIVE 8.26

APU FIRE 8.3

Cargo Fire – FWD/AFT Cargo Compartments (lower) 8.27

CARGO FIRE DETECTOR FAULT 8.30

DISCH – FWD/AFT Cargo Compartment 8.30

DISCH / Low Pressure – C-FTUW / C-FTUY
(Main Deck Cargo Compartment) 8.30

**ENGINE FIRE or
Engine Severe Damage or Separation 8.4**

ENGINE FIRE/OVERHEAT DETECTOR FAULT 8.31

ENGINE OVERHEAT 8.8

Engine Tailpipe Fire 8.9

**FIRE WARN – C-FTUW / C-FTUY
(Main Deck Cargo Compartment) 8.11**

**FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment) 8.15**

L/R BOTTLE DISCHARGED 8.31

Smoke, Fire or Fumes 8.21

Smoke or Fumes Removal 8.32

WHEEL WELL FIRE 8.36

APU FIRE

Condition: Fire is detected in the APU.

1. APU fire switch..... Confirm……Pull, rotate to the stop, and hold for 1 second

2. APU switch .....OFF

---

3. Choose one:

   - APU fire switch **extinguishes**:

     ■ ■ ■ ■

   - APU fire switch **stays illuminated**:

     ▶▶**Go to step 4**

4. Plan to land at the nearest suitable airport.

■ ■ ■ ■

ENGINE FIRE or Engine Severe Damage or Separation

Condition: One or more of these occur:

- Engine fire warning
- Airframe vibrations with abnormal engine indications
- Engine separation.
- Engine failure with smoke or fumes in the flight deck or cabin.

1. Autothrottle (if engaged) ..... Disengage

2. Thrust lever
(affected engine) ..... Confirm.....Close

3. Engine start lever
(affected engine) ..... Confirm.....CUTOFF

4. Engine fire switch
(affected engine) ..... Confirm.....Pull

   To manually unlock the engine fire switch, press the override and pull.

5. **If** the engine fire switch or ENG OVERHEAT light is illuminated:

   Engine fire switch
   (affected engine) ..... Rotate to the stop and hold for 1 second

---

Continued on next page

▼ENGINE FIRE
or
Engine Severe Damage or Separation (continued)▼

6. Choose one:

   - On the **ground**:

     ▶▶Go to the Engine Fire on the Ground checklist on page Back Cover.1

   - In **flight**:

     ▶▶Go to step 7

7. **If** after 30 seconds the engine fire switch or ENG OVERHEAT light stays illuminated:

   Engine fire switch
   (affected side) ..... Rotate to the other stop and hold for 1 second

8. Choose one:

   - High airframe vibration **occurs** and **continues** after the engine is shut down:

     Without delay, reduce airspeed and descend to a safe altitude which results in an acceptable vibration level.

     NOTE: If high vibration returns and further airspeed reduction and descent are not practicable, increasing airspeed can reduce vibration.

     ▶▶Go to step 9

   - High airframe vibration does **not** occur or does **not** continue after the engine is shut down:

     ▶▶Go to step 9

9. ISOLATION VALVE switch ..... CLOSE

▼Continued on next page▼

▼ENGINE FIRE
or
Engine Severe Damage or Separation (continued)▼

10. PACK switch (affected side) ..... OFF

    This step causes the operating pack to regulate to high flow in flight with the flaps up.

11. APU BLEED air switch ..... OFF

12. Choose one:

    - APU is **available** for start:

      APU ..... START

      When APU is running:

      APU GEN switch (affected side) ..... ON

      ▶▶**Go to step 13**

    - APU is **not** available:

      ▶▶**Go to step 13**

13. Balance fuel as needed.

    NOTE: Anytime the IMBAL or LOW alert is annunciated, complete the appropriate IMBAL or LOW alert checklist

    CROSSFEED selector ..... Open

    Fuel pump switches (affected engine) ..... ON

    Fuel pump switches (running engine) ..... OFF

    NOTE: Monitor Fuel.

    When fuel balancing is complete:

    Fuel pump switches (all) ..... ON

    CROSSFEED selector ..... Close

    ▶▶**Go to step 14**

▼Continued on next page▼

▼ENGINE FIRE
or
Engine Severe Damage or Separation (continued)▼

14. Transponder mode selector .....TA

    This step prevents climb commands which can exceed single engine performance capability.

15. ISOLATION VALVE switch
    (after the fire has been extinguished) ..... AUTO

    This step ensures bleed air is available to both wings if wing anti-ice is needed.

16. Plan to land at the nearest suitable airport.

    NOTE: Do not use FMC fuel predictions.

▶▶Go to the One Engine Inoperative Landing checklist on page 7.30

■ ■ ■ ■

ENGINE OVERHEAT

ENG 1 OVERHEAT **ENG 2 OVERHEAT**

Condition: An overheat is detected in the engine.

1. Autothrottle (if engaged) ..... Disengage
2. Thrust lever
   (affected engine).....Confirm ..... Close
3. **If** the ENG OVERHEAT light **stays illuminated**:

   ▶▶**Go to the ENGINE FIRE or Engine Severe Damage or Separation checklist on page 8.4**

■ ■ ■ ■

---

4. **If** the ENG OVERHEAT light **extinguishes**:

   Run the engine at reduced thrust to keep the light extinguished.
5. Transponder mode selector ..... TA

   This prevents climb commands which can exceed single engine performance capability.

■ ■ ■ ■

Engine Tailpipe Fire

Condition: An engine tailpipe fire occurs on the ground with no engine fire warning.

1. Engine start lever (affected engine) ..... CUTOFF — PIC

2. Cabin ..... Advise — PIC

3. Choose one:

   - Bleed air is **available**:

     ▶▶**Go to step 4**

   - Bleed air is **not** available:

     ATC ..... Advise — PIC

■ ■ ■ ■

4. PACK switches (both) ..... OFF — SIC

5. ISOLATION VALVE switch .....AUTO — SIC

6. Engine BLEED air switches (both) ..... ON — SIC

7. Choose one:

   - APU is **running**:

     APU BLEED air switch ..... ON — SIC

     ▶▶**Go to step 8**

   - APU is **not** running:

     ▶▶**Go to step 8**

▼**Continued on next page**▼

▼Engine Tailpipe Fire (continued)▼

8. Choose one:

   ◆ Affected ENGINE START switch is in **GRD**:

   ►►Go to step 9

   ◆ Affected ENGINE START switch is **not** in GRD:

   Allow the affected N2 to decrease below 20%.

   ENGINE START switch
   (affected engine).....GRD SIC

   ►►Go to step 9

9. ATC.....Advise PIC

10. **When** the tailpipe fire is extinguished:

    ENGINE START switch
    (affected engine) ..... OFF SIC

■ ■ ■ ■

FIRE WARN – C-FTUW / C-FTUY (Main Deck Cargo Compartment)

Condition: Fire warning bell rings, illumination of FIRE WARN light, and illumination of any smoke detector(s) on MAIN DECK CARGO SMOKE/FIRE Panel.

Objective: To suppress the Main Deck cargo fire. To land as soon as possible.

1. MAIN DECK CARGO
   SMOKE/FIRE ARM switch……..Confirm ..... PUSH

   NOTE: MAIN & AIRVALVE CLOSED lights will illuminate. AIR VALVE CLOSED light takes up to 5 seconds to illuminate, do not wait, proceed with next steps.

2. MAIN DECK CARGO
   SMOKE/FIRE DISCH switch..... Push and hold for 3 seconds

   NOTE: Push and Hold for at least 3 seconds to ensure bottle discharge.

   NOTE: DISCH light may require approximately 30 seconds to illuminate, do not wait, proceed with next steps.

Continued on next page

▼FIRE WARN – C-FTUW / C-FTUY
(Main Deck Cargo Compartment) (continued)▼

3. Choose one:

   ◆ On the **ground**:

   WARNING

   Inform ground personnel NOT to open any cargo door until all passengers and crew have exited the airplane and firefighting equipment is nearby.

   CAUTION

   Keep Flight Deck Door and Windows CLOSED until ready to egress.

   ■ ■ ■ ■

   ◆ **In flight**:

   ▶▶Go to step 4

4. RECIRC FAN switches (BOTH)..... OFF
5. OPERATING PACK(S) switch(es) .....AUTO
6. LAND ALT indicator ..... 8000 feet
7. Plan to land at the nearest suitable airport.

   NOTE: If it cannot be visually verified that the fire has not been completely extinguished, whether the smoke has cleared or not, land immediately at the nearest suitable aerodrome or landing site.

8. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

▼FIRE WARN – C-FTUW / C-FTUY
(Main Deck Cargo Compartment) (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... **LAND ALT 8000 feet**

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake..... **MAX**

Landing data.....VREF ____, Minimums ____

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (____ / ___)

Altimeters.....__ . __”

▼Continued on next page▼

▼FIRE WARN – C-FTUW / C-FTUY
(Main Deck Cargo Compartment) (continued)▼

WARNING

Inform ground personnel NOT to open any cargo door until all passengers and crew have exited the airplane and firefighting equipment is nearby.

CAUTION

Keep Flight Deck Door and Windows CLOSED until ready to egress.

Landing Checklist

F/A announcement .....2 CHIMES
ENGINE START switches.....CONT
Speedbrake ..... ARMED
Landing gear ..... DOWN

Flaps ..... ____, Green Light

■ ■ ■ ■

Additional Information

The red smoke detector warning light(s) can extinguish, remain illuminated, or re-illuminate over the remainder of the flight. If the red smoke detector warning light(s) re-illuminate, both master FIRE WARN lights also re-illuminate and the fire warning bell sounds. These flight deck indications alone of a cargo fire within the **same** compartment do not indicate the fire is uncontrolled.

Illumination of the cargo fire DISCH light indicates the fire suppression system has been fully activated.

FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment)

Condition: Fire warning bell rings, illumination of FIRE WARN light, and illumination of any smoke detector(s) on Main Deck Cargo Smoke Detection Panel.

Objective: To suppress the fire by depressurizing the aircraft. To land as soon as possible.

1. Don oxygen masks and set regulators to 100%.
2. Establish crew communications.
3. FASTEN BELTS switch ..... ON
4. Advise Passengers to don oxygen masks from GREEN portable oxygen bottles.
5. Land immediately at the nearest suitable airport.

---

6. Left or Right Air Conditioning PACK ..... OFF
7. Other Air Conditioning PACK ..... AUTO
8. RECIRC FAN switches (both) ..... OFF
9. Main CARGO COMPARTMENT AIR SHUTOFF Switch ..... PUSH
10. FWD CLSD and AFT CLSD lights ..... VERIFY ILLUMINATION

    NOTE: FWD CLSD and AFT CLSD lights require approximately 3 to 5 seconds to illuminate.

11. Flight Deck and Passengers Air Conditioning Outlets ..... OPEN

▾Continued on next page▾

▼FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment) (continued)▼

12. Pressurization Mode Selector.....MANUAL

13. Outflow VALVE Switch .....Move to OPEN until the outflow VALVE indication is at the **1/4 OPEN** position

NOTE: Use momentary actuation of the Outflow Valve to avoid large pressurization changes and to obtain a CABIN CLIMB rate no higher than 1000 FT/MIN until the VALVE shows fully open in order to depressurize the airplane.

▼Continued on next page▼

▼FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment) (continued)▼

NOTE: Distances in the following steps assume airport elevation at sea level and no wind. Adjust distances for actual conditions.

14. Choose one:

- Airplane altitude is **above FL200**:

  Expedite descent to **FL200 MINIMUM**.

  Maintain **FL200 MINIMUM** until approximately **50 - 60 nm** from the runway.

  ►►Go to step 15

- The airplane altitude is **at or below FL200** and the distance to the nearest suitable airport is **more than 60 nm**:

  Maintain or climb towards **FL200**.

  Maintain **FL200 MINIMUM** until approximately **50 - 60 nm** from the runway.

  ►►Go to step 15

- The distance to the nearest suitable airport is **50 - 60 nm or less**:

  Start an expedited, uninterrupted descent to the lowest safe altitude or 3,000 feet AAE, whichever is higher.

  ►►Go to step 15

▼Continued on next page▼

▼FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment) (continued)▼

NOTE: If a suitable airport is not immediately available, maintain **cabin altitude** at 20,000 ft MSL minimum to deplete oxygen supply to the fire, until descent to the first suitable airport can be made.

NOTE: If the fire situation becomes uncontrollable, consider an immediate landing.

NOTE: It is possible that smoke generated on the main deck forward cargo compartment will cause a fire detection in the forward and/or aft lower cargo compartment. If this condition exists, follow the Cargo Fire – FWD/AFT Cargo Compartments checklist (page 8.27) after the preceding steps of this checklist have been performed.

15. When at approximately **50 - 60 nm** from the runway and at **FL200**, start an expedited, uninterrupted descent to the lowest safe altitude or 3,000 feet AAE, whichever is higher.

16. Descend at VMO/MMO with the speed brakes extended.

NOTE: Maintain VMO/MMO until 15 nm from the runway.

17. Plan to level off **15 nm** from the runway and at **3,000 feet AAE**.

18. Do not delay the approach and landing.

19. Upon departing FL200, in preparation for landing, ensure that the airplane completely depressurized.

20. Use autobrake MAX for landing.

21. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

▼FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment) (continued)▼

Deferred Items

Descent Checklist

Outflow VALVE Switch ..... **Hold in OPEN until the outflow VALVE indication shows fully OPEN to depressurize the airplane**

Recall ..... Checked

OPT / Approach briefing ..... Completed

Autobrake ..... **MAX**

Landing data ..... VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS ..... ON

IDENT/CRS ..... (_____ / ____)

Altimeters ..... __ . __”

WARNING

Inform ground personnel NOT to open any cargo door until all passengers and crew have exited the airplane and firefighting equipment is nearby.

▼Continued on next page▼

▼FIRE WARN – C-FTUZ
(Main Deck Cargo Compartment) (continued)▼

Approximately **15 nm** from the runway and at **3,000 feet AAE**:

Extend the speed brakes, reduce speed, and configure for landing.

Retract the speed brakes, as needed.

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... ARMED

Landing gear ..... DOWN

Flaps ..... _____, Green Light

CAUTION

After landing, keep Flight Deck Door and Windows CLOSED until ready to egress.

■ ■ ■ ■

Smoke, Fire or Fumes

Condition: Smoke, fire or fumes occur.

1. Diversion may be needed.
2. Don oxygen masks and set regulators to 100%, as needed.
3. Don smoke goggles, as needed.
4. Choose one:
   - Smoke or fumes **affect** vision:

     Use the EMERGENCY position on the oxygen regulator to clear the goggles.

     ▶▶**Go to step 5**
   - Smoke or fumes do **not** affect vision:

     ▶▶**Go to step 5**
5. Establish crew and cabin communications (3 chimes).
6. Choose one:
   - **Engine failure** or **airframe vibrations with abnormal engine indications** exist:

     ▶▶**Go to the ENGINE FIRE or Engine Severe Damage or Separation checklist on page 8.4**

     ■ ■ ■ ■
   - Engine has **not** failed **and** airframe vibrations with abnormal engine indications do **not** exist:

     ▶▶**Go to step 7**
7. BUS TRANSFER switch .....OFF
8. Advise the cabin crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.

Continued on next page

▼Smoke, Fire or Fumes (continued)▼

9. CAB/UTIL switch ..... OFF

10. IFE/PASS SEAT switch ..... OFF

11. RECIRC FAN switches (both) ..... OFF

12. APU BLEED air switch ..... OFF

13. **Anytime** the smoke or fumes becomes the greatest threat:

    ▶▶**Go to the Smoke or Fumes Removal checklist on page 8.32**

14. Choose one:

    - Source of the smoke, fire or fumes is **obvious and** can be **extinguished quickly**:

      Isolate and extinguish the source.

      If possible, remove power from the affected equipment by switch or circuit breaker in the flight deck or cabin.

      ▶▶**Go to step 15**

    - Source of the smoke, fire or fumes is **not** obvious **or cannot** be extinguished quickly:

      ▶▶**Go to step 16**

▼Continued on next page▼

▼Smoke, Fire or Fumes (continued)▼

15. Choose one:

- Source is **visually confirmed** to be extinguished **and** the smoke or fumes are **decreasing**:

  Continue the flight at the captain's discretion.

  Restore unpowered items at the captain's discretion.

  ▶▶Go to the Smoke or Fumes Removal checklist on page 8.32, if needed

  ■ ■ ■ ■

- Source is **not** visually confirmed to be extinguished **or** smoke or fumes are **not** decreasing:

  ▶▶Go to step 16

▼Continued on next page▼

▼Smoke, Fire or Fumes (continued)▼

16. EQUIP COOLING SUPPLY and EXHAUST switches (both) ..... ALTN

17. Instruct the cabin crew to:

    Turn on cabin reading lights.

    Turn on galley attendants work lights.

    Turn off cabin fluorescent light switches.

18. Divert to the nearest suitable airport while continuing the checklist.

19. Consider an immediate landing if the smoke, fire or fumes situation becomes uncontrollable.

20. Do **not** delay landing in an attempt to complete all of the following steps.

21. ISOLATION VALVE switch..... CLOSE

22. R PACK switch ..... OFF

23. **Wait** 2 minutes unless the smoke or fumes are increasing. This allows time for the smoke or fumes to clear.

▼Continued on next page▼

▼Smoke, Fire or Fumes (continued)▼

24. Choose one:

- Smoke or fumes are **decreasing**:

  ▶▶Go to the Smoke or Fumes Removal checklist on page 8.32, if needed

  ■ ■ ■ ■

- Smoke or fumes **continue or are increasing**:

  R PACK switch ..... AUTO

  L PACK switch .....OFF

  ▶▶Go to step 25

25. **Wait** 2 minutes unless the smoke or fumes are increasing. This allows time for the smoke or fumes to clear.

26. Choose one:

- Smoke or fumes are **decreasing**:

  ▶▶Go to the Smoke or Fumes Removal checklist on page 8.32, if needed

  ■ ■ ■ ■

- Smoke or fumes **continue or are increasing**:

  L PACK switch ..... AUTO

  Consider an immediate landing.

  ▶▶Go to the Smoke or Fumes Removal checklist on page 8.32, if needed

  ■ ■ ■ ■

APU BOTTLE DISCHARGED

APU BOTTLE DISCHARGED

Condition: The APU fire extinguisher bottle has discharged or pressure is low.

■ ■ ■ ■

APU DET INOP

APU DETECTION INOPERATIVE

Condition: APU fire detection is inoperative.

1. APU switch ..... OFF

CAUTION

Do not run the APU. An APU fire would not be detected and the APU would continue to run.

■ ■ ■ ■

Cargo Fire – FWD/AFT Cargo Compartments

FWD AFT

Condition: Fire is detected in the related cargo compartment.

Objective: To suppress the lower cargo fire.

1. CARGO FIRE ARM switch (affected compartment).....Confirm ..... PUSH, Verify ARMED

2. CARGO FIRE DISCH switch ..... Push and hold for 1 second

NOTE: DISCH light may require up to 30 seconds to illuminate.

NOTE: Halon or residual smoke can cause flight deck cargo fire indications to remain or occur again. More information is found in the Additional Information section.

3. Choose one:

◆ On the **ground**:

WARNING

Inform ground personnel NOT to open any cargo door until all passengers and crew have exited the airplane and firefighting equipment is nearby.

■ ■ ■ ■

◆ **In flight**:

▶▶Go to step 4

▼Continued on next page▼

Cargo Fire – FWD/AFT Cargo Compartments (continued)

4. RECIRC FAN switches (BOTH) ..... OFF
5. PACK switches (both) ..... HIGH
6. Advise the cabin crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.
7. CAB/UTIL switch ..... OFF

   This prevents galley chiller exhaust from carrying smoke or fumes into the cabin.
8. Plan to land at the nearest suitable airport.
9. **Checklist Complete Except for Deferred Items**

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT ___
Recall .....Checked
OPT / Approach briefing .....Completed
Autobrake .....**MAX**
Landing data ..... VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS..... ON
IDENT/CRS..... (_____ / ___)
Altimeters ..... __ . __”

Continued on next page

Cargo Fire – FWD/AFT Cargo Compartments (continued)

WARNING

Inform ground personnel NOT to open any cargo door until all passengers and crew have exited the airplane and firefighting equipment is nearby.

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear ..... DOWN

Flaps ..... ____, Green Light

■ ■ ■ ■

Additional Information

The red FWD/AFT cargo fire warning light(s) can extinguish, remain illuminated, or re-illuminate over the remainder of the flight. If the FWD/AFT cargo fire warning light(s) re-illuminate, both master FIRE WARN lights also re-illuminate and the fire warning bell sounds. These flight deck indications alone of a cargo fire within the **same** compartment do not indicate the fire is uncontrolled.

Illumination of the cargo fire DISCH light indicates the fire suppression system has been fully activated.

DETECTOR FAULT

CARGO FIRE DETECTOR FAULT

Condition: Fire detection is inoperative in one or both cargo compartments.

■ ■ ■ ■

DISCH

DISCH – FWD/AFT Cargo Compartment

Condition: A cargo fire extinguisher bottle has discharged or pressure is low.

■ ■ ■ ■

DISCH

DISCH / Low Pressure – C-FTUW / C-FTUY (Main Deck Cargo Compartment)

Condition: Illumination of the DISCH switch on the MAIN DECK CARGO SMOKE/FIRE Panel. The Main Deck Cargo fire extinguisher bottle has discharged or pressure is low.

1. MAIN DECK CARGO SMOKE/FIRE ARM switch……Confirm .....PUSH

   NOTE: MAIN & AIR VALVE CLOSED lights will illuminate. AIR VALVE CLOSED light takes up to 5 seconds to illuminate, do not wait, proceed with next steps.

2. RECIRC FAN SWITCH(ES) ..... OFF
3. OPERATING PACK(S) SWITCH(ES) .....AUTO
4. Plan to land as soon as possible at the nearest suitable airport.

■ ■ ■ ■

FAULT

ENGINE FIRE/OVERHEAT DETECTOR FAULT

Condition: Engine fire and overheat detection is inoperative in one or both engines.

■ ■ ■ ■

L/R BOTTLE DISCHARGED

L BOTTLE DISCHARGED

R BOTTLE DISCHARGED

Condition: The engine fire extinguisher bottle has discharged or pressure is low.

■ ■ ■ ■

Smoke or Fumes Removal

Condition: Smoke or fumes removal is needed.

1. Do this checklist **only** when directed by another checklist.
2. Do **not** delay landing in an attempt to complete the following steps.
3. Close the flight deck door.
4. Choose one:
   - **Both** PACK switches are **OFF**:
     ▶▶**Go to step 5**
   - **A single or both** PACK switch(es) are in **AUTO**:
     ▶▶**Go to step 6**

Continued on next page

▼Smoke or Fumes Removal (continued)▼

5. Choose one:

- Smoke or fumes source is confirmed to be **outside** the flight deck:

■ ■ ■ ■

- Smoke or fumes source is confirmed to be **on** the flight deck:

CAUTION

Window should not be opened unless the source is confirmed to be on the flight deck.

Establish normal holding speed. High airspeed may prevent opening the window.

Open the First Officer's sliding window.

►►Go to the Smoke, Fire or Fumes checklist on page 8.21 and do the remaining steps

■ ■ ■ ■

Do **not** turn on any PACK switch that was turned off by the Smoke, Fire or Fumes checklist.

6. Operating PACK switch(es) .....HIGH

7. LAND ALT indicator..... 10000 feet

NOTE: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE light will illuminate at a cabin altitude of approximately 10,000 feet.

▼Continued on next page▼

▼Smoke or Fumes Removal (continued)▼

8. Engine BLEED air switches (both) ..... Verify ON

9. Set thrust to maximum practical N1 (minimum 45%).

10. Open flight deck air conditioning and gasper outlets.

CAUTION

Do not open any flight deck window. Keep the flight deck door closed.

11. Choose one:

- Smoke or fumes are **controllable**:

  ▶▶Go to the Smoke, Fire or Fumes checklist on page 8.21 and do the remaining steps

  ■ ■ ■ ■

- Smoke or fumes are **uncontrollable**:

  ▶▶Go to step 12

12. Descend to the lowest safe altitude or 10,000 feet, whichever is higher.

▼Continued on next page▼

▼Smoke or Fumes Removal (continued)▼

13. **When** at 14,000 feet or below:

Pressurization mode selector ..... MAN

Outflow VALVE switch ..... Hold in OPEN until the outflow VALVE indication shows fully open

This causes the cabin airflow to carry smoke or fumes aft.

NOTE: The outflow valve can take up to 20 seconds to open.

▶▶Go to the Smoke, Fire or Fumes checklist on page 8.21 and do the remaining steps

■ ■ ■ ■

WHEEL WELL

WHEEL WELL FIRE

Condition: Fire is detected in the main wheel well.

270K/.82M maximum.

1. LANDING GEAR lever ..... DN

   This attempts to remove and extinguish the fire source.

2. Plan to land at the nearest suitable airport.

   NOTE: Do **not** use FMC fuel predictions with gear extended

3. Choose one:

   - Gear **must be retracted** for airplane performance:

     ▶▶**Go to step 4**

   - Gear **does not** need to be retracted for airplane performance:

     ■ ■ ■ ■

4. **When** the WHEEL WELL light extinguishes:

   Wait 20 minutes.

235K maximum.

5. LANDING GEAR lever ..... UP

   After landing gear retraction is complete:

   LANDING GEAR lever ..... OFF

■ ■ ■ ■

SECTION 9 Flight Controls

Quick Actions

Elevator Tab Limit Cycle Oscillation 9.3
Runaway Stabilizer 9.4

Section Contents

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Elevator Tab Limit Cycle Oscillation

Condition: An elevator tab limit cycle oscillation (LCO) is encountered in flight. One or more of the following may be evidence of an elevator tab LCO:

- High frequency resonant vibration that originates, and is the strongest, in the aft part of the airplane but can be felt throughout the entire structure
- The vibration may or may nor be felt in the control wheel.

1. Airspeed ..... Reduce to 270 KIAS or until the vibration ceases, whichever is lower

2. Do not use speedbrakes or change aircraft configuration to reduce airspeed.

---

3. Remain at or below the indicated airspeed at which the vibration ceased, but do not exceed 270 knots.

4. Do not use speedbrakes for the remainder of the flight.

   NOTE: Ground spoilers may be used for landing.

5. Consider landing at the nearest suitable airport.

■ ■ ■ ■

Runaway Stabilizer

Condition: Uncommanded stabilizer trim movement occurs continuously or in a manner not appropriate for flight conditions.

1. Control column ..... Hold firmly

2. Autopilot (if engaged)..... Disengage

3. Autothrottle (if engaged) ..... Disengage

4. Control column
and thrust levers ..... Control airplane pitch attitude and airspeed

5. Main Electric
Stabilizer trim .....Reduce control column forces

6. **If** the runaway **stops** after the autopilot is disengaged:

   Do **not** re-engage the autopilot or autothrottle.

■ ■ ■ ■

7. **If** the runaway **continues** after the autopilot is disengaged:

   STAB TRIM cutout
   switches (both) .....CUTOUT

   If the runaway **continues**:

   Stabilizer trim wheel ..... Grasp and hold

Continued on next page

▼Runaway Stabilizer (continued)▼

8. Stabilizer..... Trim manually

   A two-pilot effort may be used to correct an out of trim condition.

NOTE: Reducing airspeed reduces airloads on the stabilizer which can reduce the effort needed to manually trim.

9. Anticipate trim requirements.

10. Do **not** re-engage the autopilot or autothrottle.

11. **Checklist Complete Except for Deferred Items**

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data.....VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

▼Continued on next page▼

▼Runaway Stabilizer (continued)▼

Landing Configuration and Trim

Establish landing configuration and in-trim condition early on final approach.

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... ARMED

Landing gear .....Down

Flaps ..... ____, Green light

■ ■ ■ ■

All Flaps Up Landing

Condition: The leading edge devices fail to extend and trailing edge flaps are less than 1.

Objective: To configure for a landing with leading edge devices retracted and trailing edge flaps less than 1.

1. Do this checklist **only** when directed by the Trailing Edge Flaps Up Landing checklist.
2. Consider burning off fuel to reduce touchdown speed.
3. Set VREF 40 + 55 knots.
4. Check the Non–Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.
5. Maintain flaps up manoeuvring speed until established on final approach.
6. Limit bank angle to 15° when airspeed is less than the flaps up manoeuvring speed.
7. **Checklist Complete Except for Deferred Items**

Continued on next page

▼All Flaps Up Landing (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake ..... SET ___

Landing data ..... **VREF 40 + 55 knots _____, Minimums _____**

Go-Around Procedure Review

Do the normal go-around procedure except:

Limit bank angle to 15° when the airspeed is less than the flaps up manoeuvring speed.

Accelerate to flaps up manoeuvring speed.

Approach Checklist

FASTEN BELTS..... ON

IDENT/CRS..... (_____ / ___)

Altimeters ..... __ . __”

▼Continued on next page▼

▼All Flaps Up Landing (continued)▼

Additional Deferred Items

GROUND PROXIMITY FLAP
INHIBIT switch ..... FLAP INHIBIT

Landing Checklist

F/A announcement ..... 2 CHIMES
ENGINE START switches ..... CONT
Speedbrake ..... ARMED
Landing gear ..... Down
Flaps ..... **_____, No lights**

■ ■ ■ ■

AUTO SLAT FAIL

AUTO SLAT FAIL

Condition: The auto slat system is failed.

1. Continue normal operation.

■ ■ ■ ■

Elevator Tab Vibration

Condition: An elevator tab vibration occurs in flight. One or more of the following may be an indication of an elevator tab vibration:

- Vibration that originates, and is strongest, in the aft part of the airplane but can be felt throughout the airplane
- Vibration that is felt in the control wheel and rudder pedals
- Vibration that causes items attached to the airplane, such as sun visors, to move.

1. FASTEN BELTS ..... ON

Do **not** use speed brakes or change aircraft configuration to reduce airspeed. Do **not** reduce airspeed below the minimum speed for the existing flap setting and gross weight.

2.  Smoothly reduce airspeed until the vibration stops.

3. Consider landing at the nearest suitable airport.

4. Stay at or below the reduced airspeed at which the vibration stopped for the rest of the flight. Limit bank angle to 15° until below 20,000 feet.

5. Do **not** deploy speedbrakes in flight.

NOTE: Flaps and landing gear can be extended normally for the approach.
The speedbrakes can be armed for landing.

■ ■ ■ ■

FEEL DIFF PRESS

FEEL DIFFERENTIAL PRESSURE

Condition: High differential pressure is measured by the elevator feel computer.

NOTE: Column forces can be significantly higher than normal, particularly during landing flare.

The autopilot can disengage when pitch changes are commanded.

Do not attempt an autoland.

1. Continue normal operation.

■ ■ ■ ■

LOW PRESSURE

FLIGHT CONTROL LOW PRESSURE

Condition: Hydraulic system pressure to the ailerons, elevators and rudder is low

Objective: To activate the standby hydraulic system and standby rudder PCU.

1. FLT CONTROL switch
(affected side) .....Confirm.....STBY RUD

■ ■ ■ ■

Jammed or Restricted Flight Controls

Condition: A flight control is jammed or restricted in roll, pitch, or yaw.

1. Autopilot (if engaged)..... Disengage
2. Autothrottle (if engaged) ..... Disengage
3. Verify that the thrust is symmetrical.
4. Overpower the jammed or restricted system. Use maximum force, including a combined effort of both pilots, if needed. A maximum two-pilot effort on the controls will not cause a cable or system failure.
5. Do **not** turn off any flight control switches.
6. Choose one:
   - The failure could be **due** to freezing water **and** conditions **allow:**

     Consider a descent to a warmer temperature and attempt to overpower the jammed or restricted system again.

     ▶▶**Go to step 7**
   - The failure could **not** be due to freezing water **or** conditions do **not** allow:

     ▶▶**Go to step 7**
7. Choose one:
   - Controls are **normal**:

     ■ ■ ■ ■
   - Controls are **not** normal:

     ▶▶**Go to step 8**

Continued on next page

Jammed or Restricted Flight Controls (continued)

8. Use stabilizer or rudder trim to offload control forces. If electric stabilizer trim is needed, move the Stabilizer Trim Override switch to OVERRIDE.

9. Do not make abrupt thrust changes. Extend or retract speedbrake slowly and smoothly.

10. Limit bank angle to 15°.

11. Plan to land at nearest suitable airport.

12. Plan a flaps 15 landing.

13. Set VREF 15 or VREF ICE

NOTE: If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

NOTE: When VREF ICE is needed, the wind additive should not exceed 5 knots.

14. Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

15. **Checklist Complete Except for Deferred Items**

Continued on next page

▼Jammed or Restricted Flight Controls (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake ..... SET ___

Landing data ..... **VREF 15 or VREF ICE _____,**
Minimums _____

Go-Around Procedure Review

Do the normal go-around procedure.

Advance thrust to go-around smoothly and slowly to avoid excessive pitch-up.

Approach Checklist

FASTEN BELTS..... ON

IDENT/CRS..... (_____ / ___)

Altimeters ..... __ . __”

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch .....FLAP INHIBIT

▼Continued on next page▼

Jammed or Restricted Flight Controls (continued)

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear ..... Down

Flaps ..... **15, Green light**

■ ■ ■ ■

LE FLAPS TRANSIT

LEADING EDGE FLAPS TRANSIT

Condition: One or more of these occur:

- The leading edge devices are not in the commanded position
- A leading edge device asymmetry is detected.
- A leading edge device skew is detected.

NOTE: Do not use FMC performance predictions with any flaps or slats extended.

1. Choose one:

   - **Trailing** edge flaps are **extended** and the trailing edge flap position indication **disagrees** with the flap handle position:

     ▶▶**Go to the Trailing Edge Flap Disagree checklist on page 9.35**

     ■ ■ ■ ■

   - **Trailing** edge flaps are **extended** and the trailing edge flap position indication **agrees** with the flap handle position:

     ▶▶**Go to step 7**

   - **Trailing** edge flaps are **up**:

     Limit airspeed to 230 knots maximum.

     ▶▶**Go to step 2**

Continued on next page

▼LEADING EDGE FLAPS TRANSIT (continued)▼

2. Choose one:

   - Roll is **encountered**:

     ▶▶Go to step 7

   - Roll is **not** encountered:

     NOTE: Roll may be difficult to identify with the autopilot engaged.

     ▶▶Go to step 3

Maximum flap extention altitude 20,000 feet.

3. Flaps..... Extend to flaps 1, then retract to flaps up

4. Choose one:

   - LE FLAPS TRANSIT light **extinguishes** after the flaps are up:

     Continue normal operation.

     ■ ■ ■ ■

   - LE FLAPS TRANSIT light **stays illuminated** after the flaps are up:

     ▶▶Go to step 5

5. Check LE DEVICES annunciator panel.

▼Continued on next page▼

▼LEADING EDGE FLAPS TRANSIT (continued)▼

6. Choose one:

   - Light(s) for **only one** leading edge device is illuminated:

     Limit airspeed to 300 knots (280 knots for turbulent air penetration) or .65 Mach, whichever is lower.

     ▶▶Go to step 7

   - Light(s) for **more than one** leading edge device is illuminated:

     Limit airspeed to 230 knots maximum.

     ▶▶Go to step 7

7. Plan a flaps 15 landing.

8. Set VREF 15 + 5 knots.

9. Limit bank angle to 15° when airspeed is less than the flaps up manoeuvring speed.

10. Check the Non-Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.

11. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

▼LEADING EDGE FLAPS TRANSIT (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data.....**VREF 15 + 5 knots _____, Minimums _____**

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

Additional Deferred Item

GROUND PROXIMITY FLAP INHIBIT switch ..... FLAP INHIBIT

NOTE: The amber LE FLAPS TRANSIT light will be illuminated. Operation within the lower amber airspeed band for landing is normal for this condition.

NOTE: V/S and VNAV PTH modes can revert to LVL CHG mode.

▼Continued on next page▼

▼LEADING EDGE FLAPS TRANSIT (continued)▼

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... ARMED

Landing gear .....Down

Flaps ..... **15, Green or Amber light**

NOTE: The light may be green or amber depending on the cause of the failure.

■ ■ ■ ■

MACH TRIM FAIL

MACH TRIM FAIL

Condition: The Mach trim system is failed.

1. Limit airspeed to 283 knots/ .82 Mach.

■ ■ ■ ■

SPEED BRAKE
DO NOT ARM

SPEED BRAKE DO NOT ARM

Condition: An automatic speed brake fault occurs.

NOTE: Speedbrakes may be used in flight.

1. Do **not** arm the speed brake for landing. Manually deploy the speed brake immediately upon landing.

2. **Checklist Complete Except for Deferred Items**

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data..... VREF ___, Minimums _____

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

▾Continued on next page▾

▼SPEED BRAKE DO NOT ARM (continued)▼

Landing Checklist

F/A announcement .....2 CHIMES
ENGINE START switches.....CONT
Speedbrake ..... **DOWN detent**
Landing gear .....Down

Flaps ..... ____, Green light

■ ■ ■ ■

SPEED TRIM FAIL

SPEED TRIM FAIL

Condition: Speed Trim function is inoperative.

NOTE: The Speed Trim System will not provide stabilizer trim inputs when deviating from a trimmed airspeed.

1. Continue normal operation.

■ ■ ■ ■

SPEEDBRAKES EXTENDED

SPEEDBRAKES EXTENDED

Condition: In flight , the speedbrakes are extended beyond the ARMED position and one or more of these occur:

- The radio altitude is below 800 feet
- The flap lever setting is more than flaps 10.

On the ground, the SPEED BRAKE lever is down and the speedbrakes are extended.

1. Choose one:

   ◆ **In flight**:

   SPEED BRAKE lever..... ARMED

   ■ ■ ■ ■

   ◆ On the **ground**:

   SPEED BRAKE lever..... DOWN detent

   NOTE: If the light stays illuminated, do **not** takeoff.

   ■ ■ ■ ■

STAB OUT OF TRIM

STABILIZER OUT OF TRIM

Condition: The autopilot does not set the stabilizer trim correctly.

NOTE: During large changes in trim requirements, the STAB OUT OF TRIM light can illuminate momentarily.

1. Choose one:
   - Stabilizer is **trimming**:

     Continue normal operation.

     ■ ■ ■ ■
   - Stabilizer is **not** trimming:

     ▶▶**Go to step 2**
2. Control column ..... Hold firmly
3. Autopilot ..... Disengage
4. Autothrottle (if engaged) ..... Disengage
5. Main Electric Stabilizer trim ..... As needed
6. Choose one:
   - Stabilizer **responds** to electric trim inputs:

     Do **not** re-engage the autopilot or autothrottle.

     ■ ■ ■ ■
   - Stabilizer does **not** respond to electric trim inputs:

     ▶▶**Go to the Stabilizer Trim Inoperative checklist on page 9.25**

     ■ ■ ■ ■

Stabilizer Trim Inoperative

Condition: Loss of electric trim through the main electric stabilizer trim switches, or as directed by the STABILIZER OUT OF TRIM Checklist.

Objective: To land the airplane using manual trim or, if manual trim is not available, to land the airplane using elevator control only.

1. Autothrottle (if engaged).....Disengage

   Do **not** re-engage the autothrottle.

2. STAB TRIM cutout switches (both).....CUTOUT

   The autopilot is not available.

3. Stabilizer..... Trim manually

   A two-pilot effort may be used and will not cause system damage.

NOTE: Reducing airspeed reduces airloads on the stabilizer which can reduce the effort needed to manually trim.

If the failure could be due to ice accumulation, descend to a warmer temperature and attempt again to trim manually.

▾Continued on next page▾

▼Stabilizer Trim Inoperative (continued)▼

4. Choose one:

   - Stabilizer **can** be trimmed manually:

     ►►Go to step 5

   - Stabilizer **cannot** be trimmed manually:

     ►►Go to step 6

5. Anticipate trim requirements.

►►Go to step 8

6. Expect higher than normal elevator forces during approach and landing.

7. The thrust reduction at flare will cause a nose down pitch.

8. Plan a flaps 15 landing.

9. Set VREF 15 or VREF ICE.

NOTE: If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

NOTE: When VREF ICE is needed, the wind additive should not exceed 5 knots.

10. Check the Non–Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.

11. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

▼Stabilizer Trim Inoperative (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data..... **VREF 15 or VREF ICE_____ ,**
Minimums _____

Go-Around Procedure Review

Do the normal go-around procedure

Advance thrust to go-around smoothly and slowly to avoid excessive pitch-up.

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

▼Continued on next page▼

▼Stabilizer Trim Inoperative (continued)▼

Landing Configuration

Establish landing configuration early on final approach.

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch .....FLAP INHIBIT

Landing Checklist

F/A announcement .....2 CHIMES
ENGINE START switches.....CONT
Speedbrake ..... ARMED
Landing gear .....Down
Flaps ..... **15, Green light**

■ ■ ■ ■

STBY RUD ON

STANDBY RUDDER ON

Condition: The standby rudder hydraulic system is commanded on.

1. Choose one:

   - STBY RUD ON light is illuminated with **no other flight deck indications**:

     Avoid large or abrupt rudder pedal inputs.

     ■ ■ ■ ■

   - STBY RUD ON light is illuminated due to the **pilot moving** the FLT CONTROL A or B switch to STBY RUD:

     ■ ■ ■ ■

   - STBY RUD ON light is illuminated in response to a hydraulic system **non-normal** situation:

     ■ ■ ■ ■

Trailing Edge Flap Asymmetry

Condition: One or more of these occur:

- An uncommanded roll occurs when the flaps change position
- The left and right flap indications disagree.

Objective: To configure the airplane for landing.

1. Set the flap lever to the nearest detent that is equal to or less than the smallest indicated flap position.

CAUTION

Do not attempt to move the trailing edge flaps with the ALTERNATE FLAPS switch because there is no asymmetry protection.

NOTE: Do not use FMC performance predictions with any flaps or slats extended.

Continued on next page

▼Trailing Edge Flap Asymmetry (continued)▼

2. Choose one:

- Flap **lever** is set to **30**:

  Set VREF 30

  NOTE: VREF + wind additive must not exceed the flap placard speed for flaps 40.

  ▶▶Go to step 4

- Flap **lever** is set to **15 or 25**:

  ▶▶Go to step 3

- Flap **lever** is set to **1 or greater** and **less than 15**:

  Consider burning off fuel to reduce touchdown speed.

  Set VREF 40 + 30 knots.

  ▶▶Go to step 4

- Flap **lever** is set to **UP**:

  ▶▶Go to the Trailing Edge Flaps Up Landing checklist on page 9.42

■ ■ ■ ■

▼Continued on next page▼

▼Trailing Edge Flap Asymmetry (continued)▼

3. Set VREF 15 or VREF ICE.

NOTE: If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

NOTE: When VREF ICE is needed, the wind additive should not exceed 5 knots.

VREF 15 + wind additive, or VREF ICE + wind additive if needed, must not exceed the flap placard speed for the next larger flap setting.

4. Check the Non–Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.

5. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

▼Trailing Edge Flap Asymmetry (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data..... **VREF _____ as directed by checklist, Minimums _____**

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

Additional Deferred Item

Choose one:

- Flap **lever** is set to **30**:

  ▶▶**Go to Landing Checklist below**

- Flap **lever** is set to **less than 30**:

  GROUND PROXIMITY FLAP

  INHIBIT switch ..... FLAP INHIBIT

  ▶▶**Go to Landing Checklist below**

▼Continued on next page▼

▼Trailing Edge Flap Asymmetry (continued)▼

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... ARMED

Landing gear .....Down

Flaps ..... **_____, Green light or amber light**

NOTE: The light may be green or amber depending on the cause of the failure.

■ ■ ■ ■

Trailing Edge Flap Disagree

Condition: The trailing edge flaps are not in the commanded position.

Objective: To configure the airplane for landing.

1. Choose one:

   - Trailing edge flap asymmetry **exists**:

     ▶▶**Go to the Trailing Edge Flap Asymmetry checklist on page 9.30**

     ■ ■ ■ ■

   - Trailing edge flap asymmetry does **not** exist:

     ▶▶**Go to step 2**

2. Choose one:

   - Indicated flap position is **30 or greater and less than 40**:

     Land using existing flaps.

     ▶▶**Go to step 3**

   - Indicated flap position is **15 or greater and less than 30**:

     Land using existing flaps.

     ▶▶**Go to step 5**

   - Indicated flap position is **less than 15**:

     ▶▶**Go to step 4**

Continued on next page

▼Trailing Edge Flap Disagree (continued)▼

3. Set VREF 30.

   NOTE: VREF 30 + wind additive must not exceed the flap placard speed for flaps 40.

   ▶▶Go to step 6

4. Plan to extend flaps to 15 using alternate flap extension.

   NOTE: Alternate flap extension time to flaps 15 is approximately 2 minutes.

   The drag penalty with the leading edge devices extended may make it impossible to reach an alternate field.

5. Set VREF 15 or VREF ICE

   NOTE: If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:

   - Engine anti–ice will be used during landing
   - Wing anti–ice has been used any time during the flight
   - Icing conditions were encountered during the flight and the landing temperature is below 10° C.

   NOTE: When VREF ICE is needed, the wind additive should not exceed 5 knots.

   VREF 15 + wind additive, or VREF ICE + wind additive if needed, must not exceed the flap placard speed for the next larger flap setting.

6. Check the Non–Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.

7. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

▼Trailing Edge Flap Disagree (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data..... **VREF ___ as directed by checklist, Minimums _____**

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

▼Continued on next page▼

▼Trailing Edge Flap Disagree (continued)▼

Additional Deferred Item

Choose one:

- Indicated flap position is **30 or greater**:

  ▶▶Go to Landing Checklist below

- Indicated flap position is **15 or greater and less than 30**:

  GROUND PROXIMITY FLAP INHIBIT switch.....FLAP INHIBIT

  ▶▶Go to Landing Checklist below

- Indicated flap position is **less than 15**:

  GROUND PROXIMITY FLAP INHIBIT switch.....FLAP INHIBIT

  ▶▶ Go to Alternate Flap Extension below

Continued on next page▼

▼Trailing Edge Flap Disagree (continued)▼

Alternate Flap Extension

During flap extension, set flap lever to the desired flap position.

230K maximum during alternate flap extension.

ALTERNATE FLAPS master switch ..... ARM

NOTE: The landing gear configuration warning can sound if the flaps are between 10 and 15 and the landing gear are retracted.

NOTE: The amber LE FLAPS TRANSIT light stays illuminated until the flaps approach the flaps 10 position.

NOTE: Operation within the lower yellow airspeed band can be needed until the LE FLAPS TRANSIT light extinguishes.

If flap asymmetry occurs, release the switch immediately. There is no asymmetry protection.

ALTERNATE FLAPS position switch ..... Hold DOWN
to extend flaps
to 15 on schedule

As flaps are extending, slow to respective maneuvring speed.

Continued on next page▼

Trailing Edge Flap Disagree (continued)

Choose one:

- Trailing edge flaps **asymmetry** occurs:

  ▶▶**Go to the Trailing Edge Flap Asymmetry checklist (page 9.30)**

  ■ ■ ■ ■

- Trailing edge flaps extend to **15**:

  ▶▶**Go to Landing Checklist below**

- Indicated flap position is **less than 1** after attempting alternate flap extension:

  ▶▶**Go to the Trailing Edge Flaps Up Landing checklist (page 9.42)**

  ■ ■ ■ ■

- Indicated flap position is **1 or greater and less than 15** after attempting alternate flap extension:

  Land using existing flaps.

  Consider burning off fuel to reduce touchdown speed.

  Set VREF 40 + 30 knots.

  Check the Non-Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.

  ▶▶**Go to Landing Checklist below**

Continued on next page

▼Trailing Edge Flap Disagree (continued)▼

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear ..... Down

Flaps ..... **_____, Green or amber light**

NOTE: The light may be green or amber depending on the failure.

■ ■ ■ ■

Trailing Edge Flaps Up Landing

Condition: The trailing edge flaps are less than 1.

Objective: To configure for a landing with trailing edge flaps less than 1.

1. Choose one:

   - Trailing edge flap asymmetry **exists**:

     ▶▶**Go to step 2**

   - Trailing edge flap asymmetry does **not** exist:

     Do this checklist **only** when directed by the Trailing Edge Flap Disagree checklist.

     ▶▶**Go to step 4**

230K maximum

2. ⚠ ALTERNATE FLAPS master switch ..... ARM

NOTE: This procedure extends the leading edge devices only.

3. ALTERNATE FLAPS
   position switch .....Momentary DOWN

   Verify that the LE DEVICES annunciator indicates FULL EXT for all leading edge slats and flaps.

NOTE: The LE FLAPS TRANSIT light can stay illuminated after the LE devices are fully extended.

Continued on next page▾

▼Trailing Edge Flaps Up Landing (continued)▼

4. Choose one:

   - LE DEVICES annunciator **shows** FULL EXT:

     ▶▶Go to step 5

   - LE DEVICES annunciator does **not** show FULL EXT:

     ▶▶Go to the All Flaps Up Landing checklist on page 9.7

■ ■ ■ ■

5. Consider burning off fuel to reduce touchdown speed.

6. Set VREF 40 + 40 knots.

7. Check the Non-Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.

8. Maintain flaps up manoeuvring speed until on final.

9. Limit bank angle to 15° when airspeed is less than the flaps up manoeuvring speed.

10. **Checklist Complete Except for Deferred Items**

Continued on next page▼

Trailing Edge Flaps Up Landing (continued)

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake ..... SET ___

Landing data ..... **VREF 40 + 40 knots _____, Minimums _____**

Go-Around Procedure Review

Do the normal go-around procedure except:

- Limit bank angle to 15° when airspeed is less than the flaps up manoeuvring speed.
- Accelerate to flaps up manoeuvring speed.
- Do not exceed 230 knots with leading edge devices extended.

Approach Checklist

FASTEN BELTS..... ON

IDENT/CRS..... (_____ / ___)

Altimeters ..... __ . __”

Continued on next page

▼Trailing Edge Flaps Up Landing (continued)▼

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch ..... FLAP INHIBIT

NOTE: A nuisance stick shaker can occur when slowing to VREF 40 + 40 knots at high gross weights and/or bank angles greater than 15°.

Operation within the lower yellow airspeed band for landing is normal for this condition.

NOTE: V/S and VNAV PTH modes can revert to LVL CHG mode.

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear ..... Down

Flaps ..... **_____, Green or Amber light**

NOTE: The light may be green or amber depending on the failure.

■ ■ ■ ■

YAW DAMPER

YAW DAMPER

Condition: The yaw damper is disengaged.

1. YAW DAMPER switch .....OFF then ON
2. Choose one:
   - YAW DAMPER light **extinguishes**:

     ■ ■ ■ ■
   - YAW DAMPER light **stays illuminated**:

     YAW DAMPER switch ..... OFF

     ▶▶**Go to step 3**
3. Avoid areas of predicted moderate or severe turbulence. If turbulence is encountered and passenger comfort becomes affected, reduce airspeed and/or descend to a lower altitude.
4. Do not exceed flaps 30.

■ ■ ■ ■

SECTION 10 Flight Instruments, Displays

Quick Actions

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) 10.3

Section Contents

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) 10.3
ALT DISAGREE 10.12
AOA DISAGREE 10.15
CDS FAULT 10.15
Display Failure 10.16
DISPLAYS CONTROL PANEL 10.16
DISPLAY SOURCE 10.17
FLIGHT RECORDER OFF 10.18
IAS DISAGREE 10.19

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Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker)

Condition: Airspeed or Mach indications are suspected to be unreliable. (Items which might indicate unreliable airspeed are listed in the Additional Information section.)

Objective: To identify a reliable airspeed indication, if possible, or to use the the Flight With Unreliable Airspeed table in the Performance Inflight section, for the remainder of the flight.

1. Autopilot (if engaged) .....Disengage
2. Autothrottle (if engaged).....Disengage
3. F/D switches (both) .....OFF
4. Set the following gear up pitch attitude and thrust:

   Flaps extended .....10° and 80% N1

   Flaps up..... 4° and 75% N1

---

5. PROBE HEAT switches..... Check ON
6. The following indications are **reliable**:

   Attitude

   N1

   Ground speed

   Radio altitude

NOTE: Stick shaker, overspeed warning and AIRSPEED LOW (as installed) alerts may sound erroneously or simultaneously.

▼Continued on next page▼

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)

7. Choose one:

   - Reliable airspeed indication **can** be determined:

     Use the reliable airspeed source for the remainder of the flight.

     ▶▶Go to step 11

   - Reliable airspeed indication **cannot** be determined:

     ▶▶Go to step 8

8. Refer to the Flight with Unreliable Airspeed table in the Performance Inflight chapter and set the pitch attitude and thrust setting for the current airplane configuration and phase of flight.

9. **When** in trim and stabilized:

   Compare the captain, first officer and standby airspeed indicators with the airspeed shown in the table.

   An airspeed indication that differs by more than 20 knots or 0.03 Mach from the airspeed shown in the table should be considered **unreliable**.

10. Choose one:

    - Reliable airspeed indication **can** be determined:

      Use the reliable airspeed indication for the remainder of the flight.

      ▶▶Go to step 11

    - Reliable airspeed indication **cannot** be determined:

      ▶▶Go to step 12

Continued on next page

▼Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)▼

11. Choose one:

- **Captain's or First Officer's** airspeed indication is **reliable**:

  Flight director switch
  (reliable side).....ON

  ▶▶Go to step 14

- **Only** the **standby airspeed** indication is **reliable**:

  NOTE: Do not use the autopilot, autothrottle, or flight directors.

  ▶▶Go to step 16

12. Set pitch attitude and thrust from the Flight with Unreliable Airspeed table in the Performance Inflight chapter for the airplane configuration and phase of flight, as needed.

13. Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight chapter or other approved source.

NOTE: Maintain visual conditions if possible.

Establish landing configuration early.

Radio altitude reference is available below 2,500 feet.

Use electronic and visual glideslope indicators, where available, for approach and landing.

Do not use the autopilot, autothrottle, or flight directors.

▶▶Go to step 16

Continued on next page▼

▼Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)▼

14. Autopilot (reliable side if needed)..... Engage

    NOTE: Autopilot may not engage or may disengage automatically.

15. Do not use the autothrottle.

16. Choose one:

    - Captain's **or** First Officer's altitude indication **is reliable**:

      Use the reliable altitude indication for the remainder of the flight.

      ▶▶Go to step 17

    - Captain's **and** First Officer's altitude indications **are both unreliable**:

      NOTE: Airplane does not meet RVSM airspace requirements.

      ▶▶Go to step 20

17. Airplane may not meet RVSM airspace requirements.

18. Set transponder to provide reliable altitude reporting.

    ALT selector..... (1 or 2) Select reliable side

19. Transponder mode selector.....TA

    ▶▶Go to step 21

20. Transponder mode selector.....ALT OFF

Continued on next page▼

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)

21. A nuisance stick shaker may be deactivated at pilot's discretion.

    This improves recognition of a stall warning on the opposite side.

    NOTE: Elevator Feel Shift may be active, resulting in increased control column forces.

22. Choose one:

    - Deactivating stick shaker **is** needed:

      Only the active stick shaker should be deactivated.

      ▶▶**Go to step 23**

    - Deactivating stick shaker **is not** needed:

      ▶▶**Go to step 25**

23. **When** the circuit breaker is pulled, increased control column forces due to Elevator Feel Shift activation are removed.

    NOTE: The stick shaker on the opposite side is not deactivated.

24. Choose one:

    - Stick shaker **left** needs to be deactivated:

      STICK SHAKER LEFT
      Circuit breaker (P18-2:E4) ..... Pull

      ▶▶**Go to step 25**

    - Stick shaker **right** needs to be deactivated:

      STICK SHAKER LEFT
      Circuit breaker (P6-1:B6) ..... Pull

      ▶▶**Go to step 25**

Continued on next page

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)

25. **Checklist Complete Except for Deferred Items**

Deferred Items

Review Before Descent

For approach, only set the decision altitude on the **reliable** PFD. Remove the decision altitude from the **unreliable** PFD.

NOTE: If BARO minimums are set only on the first officer's PFD, DA aural callouts are not provided.

Descent Checklist

Pressurization ..... LAND ALT___

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake ..... SET ___

Landing data ..... VREF _____, Minimums _____

Continued on next page

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)

Go-Around Procedure Review

Refer to the Performance Inflight chapter to determine the go-around pitch attitude and thrust setting:

For **pitch attitude**, refer to the Flight with Unreliable Airspeed Go-Around table.

For **thrust setting**, refer to the Go-Around %N1 table.

Choose one:

- **Captain's or First Officer's** airspeed indication is **reliable**:

  When TO/GA is pushed, the flight director pitch bar may automatically be removed. An AFDS pitch mode change, such as LVL CHG, restores the flight director pitch bar.

  NOTE: Only use flight director guidance on the reliable attitude display.

- **Only** the **standby airspeed** indication is **reliable**:

  Do not use TO/GA.

- **Captains's, First Officer's,** and the **standby airspeed** indication are **unreliable**:

  Do not use TO/GA.

Continued on next page

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)

Approach Checklist

FASTEN BELTS ..... ON

IDENT/CRS ..... (_____ / ___)

Altimeters ..... __ . __”

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... ARMED

Landing gear .....Down

Flaps ..... _____, Green light

■ ■ ■ ■

Continued on next page

Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) (continued)

Additional Information

One or more of the following may be associated with unreliable airspeed or Mach indications:

- Difference between captain and first officer airspeed indications
- Speed/altitude information not consistent with pitch attitude and thrust setting
- Blank or fluctuating airspeed indication
- Continuous or intermittent stick shaker
- IAS DISAGREE alert
- ALT DISAGREE alert
- AOA DISAGREE alert
- SPD or MACH failure flag
- SPD LIM failure flag
- Erroneous minimum speed bars
- Erroneous maximum speed bars
- Overspeed warning
- Erroneous Flight Director (FD) pitch command
- EEC ALTN light(s)
- Radome damage or loss
- Erroneous Pitch Limit Indicator (PLI)
- Windshear alerts
- Autoslat operation

ALT DISAGREE

Condition: The ALT DISAGREE alert indicates the captain's and first officer's altitude indications disagree.

1. Choose one:

   - IAS DISAGREE alert **is** shown:

     ▶▶**Go to the Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) checklist on page 10.3**

     ■ ■ ■ ■

   - IAS DISAGREE alert is **not** shown:

     ▶▶**Go to step 2**

2. Verify that all altimeters are set to correct barometric setting.

3. Choose one:

   - ALT DISAGREE alert **extinguishes**:

     Continue normal operation.

     ■ ■ ■ ■

   - ALT DISAGREE alert **stays illuminated**:

     NOTE: Airplane does not meet RVSM airspace requirements.

     ▶▶**Go to step 4**

Continued on next page

▼ALT DISAGREE (continued)▼

4. Standby altimeter is available.
5. Do **not** use the flight path vector.
6. Maintain visual conditions if possible.
7. Choose one:
   - A reliable altitude **can** be determined:
     ►►Go to step 8
   - A reliable altitude **cannot** be determined:
     ►►Go to step 9
8. Set transponder to provide reliable reporting
   ALT selector ..... (1 or 2) Select reliable side
   ►►Go to step 10
9. Set transponder altitude reporting off.
   Transponder mode selector .....ALT OFF
10. **Checklist Complete Except for Deferred Items**

Deferred Items

Review Before Descent

For approach, only set the decision altitude on the **reliable** PFD. Remove the decision altitude from the **unreliable** PFD.

NOTE: If BARO minimums are set only on the first officer's PFD, DA aural callouts are not provided.

Establish landing configuration early

Radio altitude reference is available below 2,500 feet

Use electronic and visual glideslope indicators, where available, for approach and landing.

Continued on next page▼

▼ALT DISAGREE (continued)▼

Descent Checklist

Pressurization ..... LAND ALT___
Recall .....Checked
OPT / Approach briefing .....Completed
Autobrake ..... SET ___
Landing data ..... VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS..... ON
IDENT/CRS..... (_____ / ___)
Altimeters ..... __ . __”

Landing Checklist

F/A announcement .....2 CHIMES
ENGINE START switches.....CONT
Speedbrake ..... ARMED
Landing gear .....Down

Flaps ..... _____, Green light

■ ■ ■ ■

AOA DISAGREE

Condition: The AOA DISAGREE alert indicates the left and right angle of attack vanes disagree.

►►**Go to the Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) checklist on page 10.3**

■ ■ ■ ■

CDS FAULT

Condition: The CDS FAULT annunciation indicates a CDS fault occurs.

NOTE: CDS FAULT annunciates on the ground only, before the second engine start.

1. Do **not** takeoff.

■ ■ ■ ■

Display Failure

Condition: A display in the common display system is failed.

1. Choose one:

   - A single display is not usable and automatic switching **has** occurred:

     Continue normal operation.

     ■ ■ ■ ■

   - A single display is not usable and automatic switching has **not** occurred:

     ▶▶**Go to step 2**

2. MAIN PANEL DUs selector ..... As needed
3. LOWER DU selector ..... As needed

■ ■ ■ ■

DISPLAYS CONTROL PANEL

Condition: The DISPLAYS CONTROL PANEL annunciation indicates the EFIS control panel is failed.

NOTE: The altimeter blanks and an ALT flag illuminates on the side corresponding to the failed control panel.

1. CONTROL PANEL select Switch ..... BOTH ON 1 or BOTH ON 2

   Select the operating control panel.

2. Verify that the DISPLAYS CONTROL PANEL annunciation and ALT flap extinguish.

■ ■ ■ ■

DISPLAY SOURCE

Condition: The DSPLY SOURCE 1 or DSPLY SOURCE 2 annunciation indicates only one DEU is supplying display information. Indications may include:

- No hydraulic pressure indication on the failed side
- Speed limit flag shown on the failed side
- Minimum maneuver speed and stick shaker band removed on the failed side
- Both EEC ALTN lights illuminated.

NOTE: Flight director indications may be removed and auto-flight mode reversions may occur.

Dual autopilot approach is not available.

1. Choose one:

◆ **DSPLY SOURCE 1** annunciation is shown:

Verify that the correct flight director indications and flight mode annunciations are shown on the first officer's side.

Select Autopilot B.

►►**Go to step 2**

◆ **DSPLY SOURCE 2** annunciation is shown:

Verify that the correct flight director indications and flight mode annunciations are shown on the captain's side.

Select Autopilot A.

►►**Go to step 2**

Continued on next page

▼DISPLAY SOURCE (continued)▼

2. Choose one:

   - **EEC ALTN** lights are **illuminated**:

     ▶▶**Go to step 3**

   - **EEC ALTN** lights are **not** illuminated:

     ■ ■ ■ ■

3. Choose one:

   - **EEC ALTERNATE MODE** checklist has been **completed**:

     ■ ■ ■ ■

   - **EEC ALTERNATE MODE** checklist has **not** been completed:

     ▶▶**Go to the EEC ALTERNATE MODE checklist on page 7.15**

     ■ ■ ■ ■

OFF

FLIGHT RECORDER OFF

Condition: The flight recorder is off.

1. Continue normal operation.

■ ■ ■ ■

IAS DISAGREE

Condition: The IAS DISAGREE alert indicates the captain's and first officer's airspeed indications disagree.

▶▶**Go to the Airspeed Unreliable (Stick Shaker Deactivation by Pulling Circuit Breaker) checklist on page 10.3**

■ ■ ■ ■

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SECTION 11 Flight Management, Navigation

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UNABLE REQD NAV PERF - RNP 11.16

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ADS-B Out Failure

Condition: One or more of these occur:

- ATC reports ADS-B Out is lost or degraded
- GPS-L or GPS-R INVALID message is in the FMC scratchpad and the transponder is selected to the related side.
- ADS-B FAIL annunciator illuminates.
- Transponder is failed.

1. 1-2 switch on ATC control panel ..... Select 1 or 2

   Select the ATC Transponder System that does not indicate an ADS-B fault.

■ ■ ■ ■

ATC FAIL

Condition: One or more of these occur:

- ATC reports Transponder is lost.
- ATC FAIL annunciator illuminates.
- Transponder is failed.

1. 1-2 switch on ATC control panel ..... Select 1 or 2

   Verify ATC FAIL extinguishes. Alternate ATC transponder selected.

■ ■ ■ ■

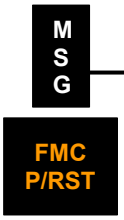
CDU Display Fail

Condition: One or more of these occur with the route shown on the navigation display:

- CDU display is blank
- CDU is not responding to inputs.

1. Use the operating CDU.

■ ■ ■ ■



FMC DISAGREE

Condition: Data needed for dual FMC operation disagree.

1. Choose one:
   - Flying an approach with an **RNP alerting requirements:**

     Go-around unless suitable visual references can be established and maintained.

     ■ ■ ■ ■
   - Flying an approach **without** an RNP alerting requirements:

     Verify position.

     ■ ■ ■ ■

FMC P/RST

FMC FAIL

Condition: Display of VTK followed by MAP failure flags on one or both navigation displays.

Objective: To restore dual FMC operation, configure for single FMC operation or resume conventional navigation.

NOTE: LNAV/VNAV may disengage.

1. Check both navigation display MAP modes and FMC CDUs.

2. Choose one:

   - No FMC data on the captain's and first officers's navigation display MAP modes **and** no FMC data on both CDUs:

     Both FMCs are failed.

     ▶▶**Go to step 7**

   - No FMC data on the captain's navigation display MAP mode **and** no FMC data on both CDUs:

     Left FMC is failed.

     ▶▶**Go to step 3**

   - No FMC data on the first officer's navigation display MAP, MSG light is illuminated **and** SINGLE FMC OPERATION scratchpad message is shown:

     Right FMC is failed.

     ▶▶**Go to step 3**

3. FMC source select switch.....BOTH ON L or BOTH ON R

   Select the operating FMC.

Continued on next page

FMC FAIL (continued)

4. **Wait** 1 minute.

5. Check for FMC-L and FMC-R bearing/distance information on POS SHIFT page 3/3.

6. Choose one:

   - Bearing/Distance information for **both** FMCs are displayed:

     FMC source select switch.....NORMAL

     ■ ■ ■ ■

   - Bearing/Distance information for only a **single** FMC is displayed:

     Continue with single FMC operation.

     ■ ■ ■ ■

7. Resume conventional navigation. Without an operating FMC, LNAV and VNAV are not available.

8. Verify position relative to terrain using conventional navigation.

NOTE: EGPWS may use inaccurate GPS position data or an inappropriate value of RNP. This could result in a VSD terrain display that is incorrectly positioned relative to the airplane track.

9. **When** preparing for the approach:

   Use the SPD REF selector to set the current gross weight.

   Use the SPD REF selector to set the reference airspeed bugs.

   Use the N1 SET selector to set the N1 bugs.

Continued on next page

FMC FAIL (continued)

NOTE: For additional information on using the N1 SET and SPD REF selectors refer to:

- Setting N1 Bugs with No Operative FMC Supplement Procedure (SP 7)
- Setting Airspeed Bugs with No Operating FMC Supplementary Procedure (SP 10)

■ ■ ■ ■



Condition: An alert message is in the FMC scratchpad.

1. Take action as needed by the message.

■ ■ ■ ■



Condition: A GLS failure occurs.

1. Do not fly a GLS approach.
2. ILS and non-ILS approaches may be flown.

■ ■ ■ ■

GPS

GPS

Condition: Both GPS receivers are failed.

NOTE: The FMC uses only IRS or radio inputs.

Look-ahead terrain alerting and displays are unavailable due to position uncertainty.

ADS-B is inoperative.

1. Continue normal operation if ANP meets the requirements for the phase of flight.

■ ■ ■ ■

GPS Data Unreliable

Condition: Erronous or invalid GPS data suspected.

CAUTION

GPS interference can alter the airplane flight path without obvious flight deck indications or effects.

1. **If** the GPS light is **illuminated**:

   ▶▶Go to the GPS Checklist on page 11.8.

2. Choose one:

   - On the **Ground**:

     Use Supplemental Procedures for intentional operations in areas of known GPS interference.

     ■ ■ ■ ■

   - In **Flight**:

     ▶▶Go to step 3

Continued on next page

GPS Data Unreliable (continued)

3. Unreliable GPS data can be indicated by:

   - PULL UP alert that occurs with sufficient, immediately verifiable terrain clearance
   - Slow increase in ANP
   - Change in terrain data on the ND and VSD that does not match aeronautical charts
   - VSD TERR flag on the VSD
   - TERR POS message displayed on the ND
   - GPS-L INVALID and GPS-R INVALID FMC alerting messages
   - VERIFY POS: FMC-FMC or VERIFY POS: FMC-GPS alerting messages
   - Inaccurate UTC TIME/DATE and FMC-generated ETA
   - Unable to log on to ATC datalink with inaccurate UTC TIME/DATE
   - UNABLE REQD NAV PERF - RNP message displayed on the ND. This message must be considered valid.

4. Choose one:

   ◆ Indications of unreliable GPS data **occur**:

   ▶▶**Go to step 5**

   ◆ Indications of unreliable GPS data do **not** occur:

   ■ ■ ■ ■

Continued on next page

GPS Data Unreliable (continued)

5. GPS data and GPWS look-ahead terrain alerting can be temporarily inhibited.

6. Choose one:

   - GPS data inhibit is **needed**:

     ▶▶**Go to step 7**

   - GPS data inhibit is **not** needed:

     ▶▶**Go to step 11**

7. PROG page ..... Select

   Observe NAV STATUS prompt displayed

8. NAV STATUS page ..... Select

9. NAV OPTIONS page..... Select
   (NEXT/PREV page)

10. GPS UPDATE ..... OFF

    Select DME UPDATE, VOR UPDATE, LOC UPDATE ON as needed.

    Monitor GPS FMC position updating for recovery.

NOTE: GPS data recovery can be indicated by verifying both of the following:

- GPS LAT/LON shows for GPS L or GPS R on POS REF page 2
- BRG/DST shown for GPS L or GPS R on POS SHIFT page 3 is less than current ANP shown on the ND

If GPS data appears to recover, turn GPS UPDATE ON at Captain's discretion

Continued on next page

GPS Data Unreliable (continued)

11. Choose one:

    - GPWS look-ahead terrain alerting inhibt is **needed**:

      ▶▶**Go to step 12**

    - GPWS look-ahead terrain alerting inhibit is **not** needed:

      ▶▶**Go to step 13**

12. Ground Proximity Terrain Inhibit switch.....TERR INHIBIT

NOTE: Basic GPWS alerts that occur are valid.

NOTE: Erroneous GPWS look-ahead terrain alerts may continue for the remainder of the flight if the Ground Proximity Terrain Inhibit switch is selected to NORM after flying through areas of unreliable GPS data.

13. Advise ATC of suspected GPS interference and any degraded navigation capability.

■ ■ ■ ■

ILS — ILS

Condition: A ILS failure occurs.

1. Do not fly an ILS approach.
2. GLS and non-ILS approaches may be flown.

■ ■ ■ ■

DC FAIL — IRS DC FAIL

Condition: IRS backup DC power is failed

1. Choose one:

- **One** IRS DC FAIL light is illuminated **and** all other IRS lights are **extinguished**:

  Continue normal operation. The IRS is operating normally on AC power.

  ■ ■ ■ ■

- **Both** IRS DC FAIL lights are illuminated:

  The IRS is operating normally on AC power.

  The battery is nearly discharged, or the switched hot battery IS not powered.

  The following systems may be inoperative:

  - Engine and APU fire extinguishing
  - APU start

  ■ ■ ■ ■

FAULT

IRS FAULT

Condition: One or more of these occur:

- An IRS fault occurs.
- On the ground, if the ALIGN light is also illuminated, the present position entry is possibly incorrect.

1. Choose one:

◆ On the **ground**:

▶▶**Go to step 2**

◆ In flight:

▶▶**Go to step 6**

On the ground

2. Choose one:

◆ ALIGN light is **extinguished**:

Do not takeoff

■ ■ ■ ■

◆ ALIGN light is also **illuminated:**

IRS mode selector
(failed side) .....OFF

The FAULT light extinguishes immediately and the ALIGN light extinguishes after approximately 30 seconds.

▶▶**Go to step 3**

Continued on next page

▼IRS FAULT (continued)▼

3. **After** the ALIGN light extinguishes:

   IRS mode selector
   (failed side) .....NAV

   Enter present position.

4. Choose one:

   - ALIGN light is **flashing**:

     Re-enter present position using the most accurate latitude and longitude.

     ▶▶Go to step 5

   - ALIGN light is **not** flashing:

     ▶▶Go to step 5

5. Choose one:

   - FAULT light **illuminates** again:

     Do not takeoff.

     ■ ■ ■ ■

   - FAULT light does **not** illuminate again:

     Verify IRS alignment is complete.

     ■ ■ ■ ■

▼Continued on next page▼

▼IRS FAULT (continued)▼

In flight

6. Autopilot (if engaged).....Disengage

7. IRS transfer switch.....BOTH ON L or BOTH ON R

   Select the operating IRS.

NOTE: The selected IRS is the source of:

- Attitude and heading for both PFDs and NDs
- AFDS guidance
- Weather radar information
- GPWS and Windshear alerts

NOTE: Autopilot(s) cannot be engaged.

8. Autothrottle (if engaged).....Disengage

■ ■ ■ ■

ON DC — **IRS ON DC**

Condition: IRS AC power is failed.

1. Choose one:

   ◆ **Left** IRS ON DC light is illuminated:

   The left IRS continues to operate as long as DC power is available.

   ■ ■ ■ ■

   ◆ **Right** IRS ON DC light is illuminated:

   Power to the right IRS is removed after 5 minutes.

   ■ ■ ■ ■

UNABLE REQD NAV PERF - RNP

Condition: UNABLE REQD NAV PERF-RNP is annunciated. The actual FMC-based navigation performance is not sufficient.

1. Choose one:
   - On a procedure or airway with an **RNP alerting requirement:**

     ▶▶**Go to step 2**
   - On a procedure or airway **without** an RNP alerting requirement:

     ▶▶**Go to step 3**
2. Select an alternate procedure or airway. During an approach, go-around unless suitable visual references can be established and maintained.

NOTE: The FMC uses inertial inputs only, unless radio updating is enabled.

If radio updating is allowed, consider doing the following steps:

- Select the FMC NAV OPTIONS page
- Select DME UPDATE ON
- Select VOR UPDATE ON

■ ■ ■ ■

Continued on next page

▼UNABLE REQD NAV PERF - RNP (continued)▼

3. Verify Position.

NOTE: The FMC uses inertial inputs only, unless radio updating is enabled.

If radio updating is allowed, consider doing the following steps:

- Select the FMC NAV OPTIONS page
- Select DME UPDATE ON
- Select VOR UPDATE ON

■ ■ ■ ■

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SECTION 12 Fuel

Section Contents

CONFIG 12.3
CROSSFEED SELECTOR INOPERATIVE 12.3
FUEL FILTER BYPASS 12.5
Fuel Leak Engine 12.6
FUEL PUMP LOW PRESSURE 12.11
Fuel Quantity Indication Inoperative 12.12
Fuel Temperature Low 12.13
IMBAL 12.14
LOW 12.16

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CONFIG

Condition: All of these occur:

- Both center tank fuel pump pressures are OFF.
- There is more than 726 kgs of fuel in the center tank.
- An engine is running.

1. Do not accomplish this procedure until established in a level flight attitude.

2. CTR FUEL PUMP switches (both).....ON

   Verify that the LOW PRESSURE lights extinguish.

3. Resume normal fuel management.

■ ■ ■ ■

CROSSFEED SELECTOR INOPERATIVE

VALVE OPEN

May or may not be illuminated

Condition: One of the following occurs:

- The crossfeed VALVE OPEN light stays illuminated bright blue
- The CROSSFEED selector is in the open position and the crossfeed VALVE OPEN light is extinguished
- When the CROSSFEED selector is rotated to a new position, the crossfeed VALVE OPEN light does not illuminate bright blue.

1. Check the FUEL CROSSFEED VALVE circuit breaker (P6-3:B7)

Continued on next page

▼CROSSFEED SELECTOR INOPERATIVE (continued)▼

2. Choose one:

   - FUEL CROSSFEED VALVE circuit breaker is **tripped**:

     It is not possible to determine the position of the fuel crossfeed valve.

     NOTE: Verify that sufficient fuel is available to both engines to complete the flight.

     Do not accomplish the following checklist:

     IMBAL

     ■ ■ ■ ■

   - FUEL CROSSFEED VALVE circuiy breaker is **not** tripped:

     ▶▶Go to step 3

3. Choose one:

   - CROSSFEED selector is in the **closed** position:

     Crossfeed **valve** is failed open.

     NOTE: Maintain fuel balance with selective use of fuel pumps.

     ■ ■ ■ ■

   - CROSSFEED selector is in the **open** position:

     Crossfeed **valve** is failed closed.

     NOTE: As conditions allow, vary engine thrust as needed to maintain fuel balance.

     Verify that sufficient fuel is available to both engines to complete the flight.

     ■ ■ ■ ■

FILTER BYPASS

FUEL FILTER BYPASS

Condition: Fuel contamination can cause fuel to bypass the engine fuel filter.

1. Choose one:

   - Only **one** FILTER BYPASS light, ENG 1 or ENG 2, has illuminated during the flight:

     NOTE: Erratic engine operation and flameout may occur on the affected engine due to fuel contamination.

     ■ ■ ■ ■

   - FILTER BYPASS lights for **both** engines illuminate or have illuminated at any time during the flight (either separately or at the same time):

     ▶▶**Go to step 2**

2. Plan to land at the nearest suitable airport.

NOTE: Erratic engine operation and flameout may occur on either or both engines due to fuel contamination.

■ ■ ■ ■

Fuel Leak Engine

Condition: An engine fuel leak is suspected for the reasons listed in the Additional Information section of this checklist.

Objective: To confirm there is an engine fuel leak and shut down the affected engine if needed. This checklist does not address the unlikely possibility of a tank leak.

1. A diversion may be needed
2. Main tank FUEL PUMPS switches (all) ..... ON
3. CROSSFEED selector ..... Close
4. CTR FUEL PUMPS switches (both) ..... OFF

   The fuel CONFIG alert may show with fuel in the center tank.

The following steps check for an engine fuel leak:

5. Record the main tank fuel quantities and the current time.
6. An engine fuel leak is confirmed if one or both of the following are true:

   Fuel spray is observed from an engine or strut

   A change in fuel imbalance of 230 kg within 30 minutes or less.

7. Choose one:

   - Engine fuel leak is **confirmed**:

     ▶▶**Go to step 11**

   - Engine fuel leak is **not** confirmed:

     ▶▶**Go to step 8**

Continued on next page

▼Fuel Leak Engine (continued)▼

8. Choose one:

   - The center tank **contains** usable fuel:

     ▶▶Go to step 9

   - The center tank does **not** contain usable fuel:

     ▶▶Go to step 10

9. CTR FUEL PUMPS switches (both) ..... ON

10. Resume normal fuel management.

■ ■ ■ ■

An engine fuel leak is confirmed

11. The following steps shut down the engine to stop an engine fuel leak.

12. The engine to be shut down is the engine on the side where the fuel quantity decreased faster.

13. Autothrottle ..... Disengage

14. Thrust lever (affected engine)..... Confirm ..... Close

15. **When** the affected engine is at idle thrust:

    Engine start lever (affected engine)..... Confirm ..... CUTOFF

    This closes the spar valve and stops an engine fuel leak.

16. PACK switch (affected side) ..... OFF

    This causes the operating pack to regulate to high flow in flight with the flaps up.

▼Continued on next page▼

▼Fuel Leak Engine (continued)▼

17. Choose one:

- APU is **available** for start:

  APU ..... START

  When APU is running:

  APU GEN switch (affected side) ..... ON

  ▶▶Go to step 18

- APU is **not** available:

  ▶▶Go to step 18

18. Transponder mode selector ..... TA

    This step prevents climb commands which can exceed single engine performance capability.

19. ISOLATION VALVE switch.....Verify AUTO

    This ensures bleed air is available to both wings if wing anti-ice is needed.

20. Choose one:

- Fuel LOW alert is **shown**:

  ▶▶Go to step 21

- Fuel LOW alert is **not** shown:

  ▶▶Go to step 23

21. CROSSFEED selector ..... Open

    This ensures that all fuel is available to the running engine.

22. FUEL PUMPS switches (all) ..... ON

    This ensures that all fuel is available for use.

▼Continued on next page▼

▼Fuel Leak Engine (continued)▼

23. Plan to land at the nearest suitable airport.

24. Balance fuel as needed.

NOTE: All remaining fuel can be used for the running engine.

NOTE: Anytime the IMBAL or LOW alert is annunciated, complete the appropriate IMBAL or LOW alert checklist

CROSSFEED selector ..... Open

Fuel pump switches (affected engine) ..... ON

Fuel pump switches (running engine) ..... OFF

NOTE: Monitor Fuel.

When fuel balancing is complete:

Fuel pump switches (all) ..... ON

CROSSFEED selector ..... Close

NOTE: Do not use FMC performance predictions.

▶▶Go to the One Engine Inoperative Landing checklist on page 7.30

■ ■ ■ ■

▼Continued on next page▼

▼Fuel Leak Engine (continued)▼

Additional Information

Reasons that an engine fuel leak should be suspected:

- A visual observation of fuel spray
- The total fuel quantity is decreasing at an abnormal rate
- An engine has excessive fuel flow
- The fuel IMBAL alert shows
- The fuel LOW alert shows
- The USING RSV FUEL message shows on the FMC CDU
- The INSUFFICIENT FUEL message shows on the FMC CDU
- The CHECK FMC FUEL QUANTITY message shows on the FMC CDU.

LOW PRESSURE

FUEL PUMP LOW PRESSURE

Condition: The fuel pump pressure is low.

NOTE: Fuel pump LOW PRESSURE lights may flicker when tank quantity is low and the airplane is in turbulent air or during climb or descent.

1. Choose one:

   - **One main** tank fuel pump LOW PRESSURE light is illuminated:

     Main tank FUEL PUMPS switch (affected pump) ..... OFF

     Sufficient fuel pressure is available for normal operation.

     ■ ■ ■ ■

   - **Both main** tank fuel pump LOW PRESSURE lights are illuminated:

     NOTE: At high altitude, thrust deterioration or engine flameout may occur.

     ■ ■ ■ ■

   - **One CTR** tank fuel pump LOW PRESSURE light is illuminated:

     ▶▶**Go to step 2**

   - **Both CTR** tank fuel pump LOW PRESSURE lights are illuminated:

     ▶▶**Go to step 5**

2. CROSSFEED selector ..... Open

   This prevents fuel imbalance.

3. CTR FUEL PUMPS switch (affected side) ..... OFF

▼**Continued on next page**▼

▼FUEL PUMP LOW PRESSURE (continued)▼

4. **When** the other CTR tank fuel pump LOW PRESSURE light illuminates:

   CROSSFEED selector ..... Close

   Remaining CTR FUEL PUMPS switch ..... OFF

■ ■ ■ ■

Both CTR tank fuel pump LOW PRESSURE lights are illuminated.

5. CTR FUEL PUMPS switches (both) ..... OFF

6. Fuel CONFIG alert may show with fuel in the center tank.

7. Center tank fuel is unusable. Main tank fuel may not be sufficient for the planned flight.

■ ■ ■ ■

Fuel Quantity Indication Inoperative

Condition: The fuel quantity indication is blank

1. Enter and periodically update the manually calculated FUEL weight on the FMC PERF INIT page.

■ ■ ■ ■

Fuel Temperature Low

Condition: Fuel temperature is near the minimum.

1. **When** fuel temperature is approaching the fuel temperature limit (3°C above the fuel freeze point or -45°C whichever is higher):

   Increase speed, change altitude and/or deviate to a warmer air mass to achieve a TAT equal to or higher than the fuel temperature limit.

   TAT will increase approximately 0.5 to 0.7°C for each .01 Mach increase in speed. In extreme conditions, it may be necessary to descend as low as FL250.

■ ■ ■ ■

IMBAL

Condition: There is a fuel imbalance between the main tanks.

Objective: To decide if a fuel leak is suspected. To balance fuel if a fuel leak is not suspected.

1. If an engine has **low or no fuel flow** and unusual engine indications, the IMBAL alert may show due to an engine malfunction instead of a fuel leak.

2. The IMBAL alert may be caused by a fuel leak, an inoperative crossfeed valve or a fuel imbalance.

3. A fuel leak should be suspected if one or more of the following are true:

   The total fuel remaining is less than the planned fuel remaining.

   An engine has excessive fuel flow.

4. Choose one:

   - A fuel leak is **suspected**:

     ▶▶**Go to the Fuel Leak Engine checklist on page 12.6**

     ■ ■ ■ ■

   - A fuel leak is **not** suspected:

     ▶▶**Go to step 5**

Continued on next page

▼IMBAL (continued)▼

5. CROSSFEED selector ..... Open

   Verify that the VALVE OPEN light illuminates bright, then dim. This indicates that the crossfeed valve is operating correctly.

6. Choose one:

   - Crossfeed valve is operating **correctly**:

     ▶▶Go to step 7

   - Crossfeed valve is **not** operating correctly:

     ▶▶Go to the CROSSFEED SELECTOR INOPERATIVE checklist on page 12.3

■ ■ ■ ■

7. Choose one:

   - **Main tank 1** quantity is low:

     Main tank 1 FUEL PUMPS switches (both) ..... OFF

     This allows fuel from the higher quantity tank to feed both engines.

     ▶▶Go to step 8

   - **Main tank 2** quantity is low:

     Main tank 2 FUEL PUMPS switches (both) ..... OFF

     This allows fuel from the higher quantity tank to feed both engines.

     ▶▶Go to step 8

8. **When** fuel balancing is complete:

   Main tank FUEL PUMPS switches (all)..... ON

   CROSSFEED selector ..... Close

■ ■ ■ ■

LOW

Condition: The fuel quantity is low in a main tank.

Objective: To decide if a fuel leak is suspected. To ensure that all the fuel is available for use.

NOTE: Avoid high nose up attitude. Make thrust changes slowly and smoothly. This reduces the possibility of uncovering fuel pumps.

1. The fuel LOW alert may be caused by a fuel leak or low fuel.

2. A fuel leak should be suspected if one or more of the following are true:

   - The total fuel remaining is less than the planned fuel remaining.
   - An engine has excessive fuel flow.
   - One main tank is abnormally low compared to the other main tank and to the expected fuel remaining in the tanks.

3. Choose one:

   ◆ A fuel leak is **suspected**:

   ▶▶**Go to the Fuel Leak Engine checklist on page 12.6**

   ■ ■ ■ ■

   ◆ A fuel leak is **not** suspected:

   ▶▶**Go to step 4**

Continued on next page

▼LOW (continued)▼

4. CROSSFEED selector ..... Open

   This ensures that fuel is available to both engines if the low tank empties.

5. FUEL PUMPS switches (all) ..... ON

   This ensures that all fuel is available for use.

6. Plan to land at the nearest suitable airport.

■ ■ ■ ■

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SECTION 13 Hydraulics

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HYDRAULIC PUMP LOW PRESSURE 13.3
HYDRAULIC PUMP OVERHEAT 13.3
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STANDBY HYDRAULIC LOW QUANTITY 13.20

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LOW PRESSURE — HYDRAULIC PUMP LOW PRESSURE

Condition: The hydraulic pump pressure is low.

1. HYD PUMP switch (affected side) ..... OFF

NOTE: Loss of an engine-driven hydraulic pump and a high demand on the system may result in an intermittent illumination of the LOW PRESSURE light for the remaining electric motor-driven hydraulic pump.

■ ■ ■ ■

OVERHEAT — HYDRAULIC PUMP OVERHEAT

Condition: The hydraulic pump temperature is high.

1. ELEC HYD PUMPS switch (affected side) ..... OFF

NOTE: One pump supplies sufficient pressure for normal system operation.

2. MFD SYS switch ..... Push

3. Choose one:

- Affected side hydraulic pressure is 3300 psi **or less**:

  ■ ■ ■ ■

- Affected side hydraulic pressure is **greater than** 3300 psi:

  ENG HYD PUMPS switch (affected side) ..... OFF

  ►►Go to step 4

Continued on next page

▼HYDRAULIC PUMP OVERHEAT (continued)▼

4. Choose one:

- **System A** HYD PUMPS switches are OFF:

  ►►Go to the LOSS OF SYSTEM A checklist on page 13.5

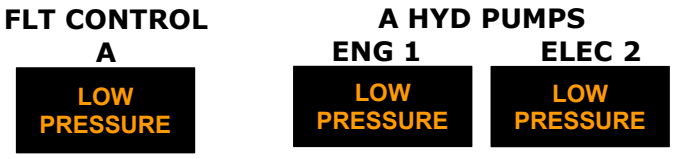
  ■ ■ ■ ■

- **System B** HYD PUMPS switches are OFF:

  ►►Go to the LOSS OF SYSTEM B checklist on page 13.9

  ■ ■ ■ ■

LOSS OF SYSTEM A



Condition: Hydraulic system A pressure is low.

1. System A
   FLT CONTROL switch.....Confirm. .....STBY RUD

2. System A
   HYD PUMPS switches (both) .....OFF

3. Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

4. NOSE WHEEL STEERING switch.....ALT

5. Plan for manual gear extension.

NOTE: When the gear has been lowered manually, it cannot be retracted. The drag penalty with gear extended may make it impossible to reach an alternate field.

▼Continued on next page▼

▼LOSS OF SYSTEM A (continued)▼

Inoperative Items

Autopilot A inop Autopilot B is available.
Flight spoilers (two on each wing) inop Roll rate and speedbrake effectiveness may be reduced in flight.
Normal landing gear extension and retraction inop Manual gear extension is needed.
Ground spoilers inop Landing distance will be increased.
Alternate brakes inop Normal brakes are available.
Engine 1 thrust reverser normal hydraulic pressure inop Thrust reverser will deploy and retract at a slower rate and some thrust asymmetry can be anticipated during thrust reverser deployment.
Normal nose wheel steering inop Alternate nose wheel steering is available.

6. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

LOSS OF SYSTEM A (continued)

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data.....VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

Continued on next page

▼LOSS OF SYSTEM A (continued)▼

Manual Gear Extension

LANDING GEAR lever ..... OFF

Manual gear extension handles .....Pull

The uplock is released when the handle is pulled to its limit.

The related red landing gear indicator light illuminates, indicating uplock release.

Wait 15 seconds after the last manual gear extension handle is pulled:

LANDING GEAR lever..... DN

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... ARMED

Landing gear .....Down

Flaps ..... ____, Green light

■ ■ ■ ■

LOSS OF SYSTEM B

FLT CONTROL B	B HYD PUMPS ELEC 1	B HYD PUMPS ENG 2
LOW PRESSURE	LOW PRESSURE	LOW PRESSURE

Condition: Hydraulic system B pressure is low.

1. System B
   FLT CONTROL switch.....Confirm .....STBY RUD

2. System B
   HYD PUMPS switches (both) .....OFF

3. Plan a flaps 15 landing.

4. Set VREF 15 or VEREF ICE.

   NOTE: If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:

   - Engine anti–ice will be used during landing
   - Wing anti–ice has been used any time during the flight
   - Icing conditions were encountered during the flight and the landing temperature is below 10° C.

   NOTE: When VREF ICE is needed, the wind additive should not exceed 5 knots.

5. Plan to extend flaps to 15 using alternate flap extension.

NOTE: The drag penalty with the leading edge devices extended may make it impossible to reach an alternate field.

▾Continued on next page▾

▼LOSS OF SYSTEM B (continued)▼

6. Check the Non-Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or the other approved source.

7. Do **not** arm the autobrake for landing. Use manual braking.

▼Continued on next page▼

LOSS OF SYSTEM B (continued)

Inoperative Items

Autopilot B inop Autopilot A is available.
Flight spoilers (two on each wing) inop Roll rate and speedbrake effectiveness may be reduced in flight.
Yaw damper inop
Trailing edge flaps normal hydraulic system inop The trailing edge flaps can be operated with the alternate electrical system. Alternate flap extension time to flaps 15 is approximately 2 minutes.
Leading edge flaps and slats normal hydraulic system inop The leading edge flaps and slats can be extended with standby pressure. Once extended, they cannot be retracted.
Autobrake inop Use manual braking.
Normal brakes inop Alternate brakes are available.
Engine 2 thrust reverser normal hydraulic pressure inop Thrust reverser will deploy and retract at a slower rate and some thrust asymmetry can be anticipated during thrust reverser deployment.
Alternate nose wheel steering inop Normal nose wheel steering is available.

8. **Checklist Complete Except for Deferred Items**

Continued on next page

▼LOSS OF SYSTEM B (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake .....**OFF**

Landing data ..... **VREF 15 or VREF ICE_____,**
Minimums _____

Approach Checklist

FASTEN BELTS..... ON

IDENT/CRS..... (_____ / ___)

Altimeters ..... __ . __”

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch .....FLAP INHIBIT

▼Continued on next page▼

▼LOSS OF SYSTEM B (continued)▼

Alternate Flap Extension

During flap extension, set the flap lever to the desired flap position.

230K maximum during alternate flap extension.

ALTERNATE FLAPS master switch ..... ARM

NOTE: The landing gear configuration warning may sound if the flaps are between 10 and 15 and the landing gear are retracted.

NOTE: The amber LE FLAPS TRANSIT light stays illuminated until the flaps approach the flaps 10 position.

NOTE: Operation within the lower amber airspeed band (as installed) may be needed until the LE FLAPS TRANSIT light extinguishes.

If flap asymmetry occurs, release the switch immediately. There is no asymmetry protection.

ALTERNATE FLAPS position switch ..... Hold DOWN
to extend flaps
to 15 on schedule

As flaps are extending, slow to respective manoeuvring speed.

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... ARMED

Landing gear ..... Down

Flaps ..... **15, Green light**

■ ■ ■ ■

MANUAL REVERSION or LOSS OF SYSTEM A AND SYSTEM B



Condition: Hydraulic system A and B pressures are low.

1. System A and B FLT CONTROL switches (both).....Confirm ..... STBY RUD
2. YAW DAMPER switch ..... ON
3. System A and B HYD PUMPS switches (all)..... OFF
4. Plan to land at the nearest suitable airport.
5. Plan a flaps 15 landing.
6. Set VREF 15 or VREF ICE

NOTE: If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

NOTE: When VREF ICE is needed, the wind additive should not exceed 5 knots.

Continued on next page

▼MANUAL REVERSION
or
LOSS OF SYSTEM A AND SYSTEM B (continued)▼

7. Plan to extend flaps to 15 using alternate flap extension.

NOTE: The drag penalty with the leading edge devices extended may make it impossible to reach an alternate field.

8. Plan for manual gear extension.

NOTE: When the gear has been lowered manually, it cannot be retracted. The drag penalty with gear extended may make it impossible to reach an alternate field.

9. Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

NOTE: The crosswind capability of the airplane is greatly reduced.

10. Do **not** arm the autobrake for landing.

11. Do **not** arm the speedbrakes for landing.

12. On touchdown, apply steady brake pressure without modulating the brakes.

13. Do not attempt to taxi the airplane after stopping.

▼Continued on next page▼

▼MANUAL REVERSION
or
LOSS OF SYSTEM A AND SYSTEM B (continued)▼

Inoperative Items

Autopilots A and B inop
All flight spoilers inop Roll rate will be reduced and speedbrakes will not be available in flight.
Trailing edge flaps normal hydraulic system inop The trailing edge flaps can be operated with the alternate electrical system. Alternate flap extension time to flaps 15 is approximately 2 minutes.
Leading edge flaps and slats normal hydraulic system inop The leading edge flaps and slats can be extended with standby hydraulic pressure. Once extended, they cannot be retracted.
Normal landing gear extension and retraction inop Manual gear extension is needed.
Autobrake inop
Ground spoilers inop Landing distance will be increased.
Normal and alternate brakes inop Inboard and outboard brakes have accumulator pressure only. On landing, apply steady brake pressure without modulating the brakes.
Both thrust reversers normal pressure inop Thrust reversers will deploy and retract at a slower rate.
Nose wheel steering inop Do not attempt to taxi the airplane after stopping.

14. **Checklist Complete Except for Deferred Items**

▼Continued on next page▼

▼MANUAL REVERSION
or
LOSS OF SYSTEM A AND SYSTEM B (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake..... **OFF**

Landing data..... **VREF 15 or VREF ICE _____, Minimums _____**

Go-Around Procedure Review

Do the normal go-around procedure except:

- Advance thrust to go-around smoothly and slowly to avoid excessive pitch-up.
- Be prepared to trim.
- Limit bank angle to 15° when airspeed is less than minimum manoeuvre speed.

Approach Checklist

FASTEN BELTS ..... ON

IDENT/CRS ..... (_____ / ___)

Altimeters..... __ . __”

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch..... FLAP INHIBIT

Continued on next page▼

▼MANUAL REVERSION
or
LOSS OF SYSTEM A AND SYSTEM B (continued)▼

Alternate Flap Extension

During flap extension, set flap lever to the desired flap position.

230K maximum during alternate flap extension.

ALTERNATE FLAPS master switch ..... ARM

NOTE: The landing gear configuration warning may sound if the flaps are between 10 and 15 and the landing gear are retracted.

NOTE: The amber LE FLAPS TRANSIT light stays illuminated until the flaps approach the flaps 10 position.

NOTE: Operation within the lower yellow airspeed band (as installed) may be needed until the LE FLAPS TRANSIT light extinguishes.

If flap asymmetry occurs, release the switch immediately. There is no asymmetry protection.

ALTERNATE FLAPS position switch ..... Hold DOWN
to extend flaps
to 15 on schedule

As flaps are extending, slow to respective manoeuvring speed.

Continued on next page▼

▼MANUAL REVERSION
or
LOSS OF SYSTEM A AND SYSTEM B (continued)▼

Manual Gear Extension

LANDING GEAR lever ..... OFF

Manual gear extension handles ..... Pull

The uplock is released when the handle is pulled to its limit.

The related red landing gear indicator light illuminates, indicating uplock release.

Wait 15 seconds after the last manual gear extension handle is pulled:

LANDING GEAR lever ..... DN

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... **DOWN detent**

Landing gear ..... Down

Flaps ..... **15, Green light**

■ ■ ■ ■

LOW PRESSURE

STANDBY HYDRAULIC LOW PRESSURE

Condition: The standby hydraulic pump pressure is low.

NOTE: With a loss of hydraulic system A or B, the thrust reverser on the affected side is inoperative.

NOTE: With a loss of hydraulic system A and B, the rudder is inoperative.

■ ■ ■ ■

LOW QUANTITY

STANDBY HYDRAULIC LOW QUANTITY

Condition: The standby hydraulic quantity is low.

1. Continue normal operation.

■ ■ ■ ■

SECTION 14 Landing Gear

Section Contents

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ANTISKID INOP

ANTISKID INOPERATIVE

Condition: An antiskid system fault occurs.

CAUTION

Locked wheel protection is not available.

1. AUTO BRAKE select switch .....OFF

   The auto brake system is inoperative.

2. Do **not** arm the speedbrakes for landing. Manually deploy the speedbrakes immediately upon landing.

   Automatic speedbrake extension may be inoperative.

3. Check the Non-Normal Configuration Landing Distance table in the Performance Inflight-QRH chapter or other approved source.

4. **Checklist Complete Except for Deferred Items**

Continued on next page

▼ANTISKID INOPERATIVE (continued)▼

Deferred Items

Landing Procedure Review

Use minimum braking consistent with runway length and conditions to reduce the possibility of a tire blowout.

Do **not** apply the brakes until the nose wheel is on the ground and the speedbrakes have been manually deployed.

Brake initially using light steady pedal pressure.
Increase pressure as ground speed decreases.
Do **not** pump the brakes.

Descent Checklist

Pressurization ..... LAND ALT___

Recall .....Checked

OPT / Approach briefing .....Completed

Autobrake .....**OFF**

Landing data ..... VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS..... ON

IDENT/CRS..... (_____ / ___)

Altimeters ..... __ . __”

Continued on next page▼

▼ANTISKID INOPERATIVE (continued)▼

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches ..... CONT

Speedbrake ..... **DOWN detent**

Landing gear ..... Down

Flaps ..... ____, Green light

■ ■ ■ ■

AUTO BRAKE DISARM

AUTO BRAKE DISARM

Condition: The autobrake system disarms after being set.

1. Choose one:
   - On the **ground**:

     AUTO BRAKE select switch..... OFF

     ▶▶**Go to step 2**
   - **In flight**:

     ▶▶**Go to step 3**
2. Choose one:
   - AUTO BRAKE DISARM light **extinguishes**:

     ■ ■ ■ ■
   - AUTO BRAKE DISARM light **stays illuminated**:

     Do not takeoff.

     ■ ■ ■ ■
3. AUTO BRAKE select switch ..... OFF, then reselect
4. Choose one:
   - AUTO BRAKE DISARM light **stays extinguished**:

     ■ ■ ■ ■
   - AUTO BRAKE DISARM light **illuminates again**:

     AUTO BRAKE select switch..... OFF

     Use manual brakes for landing.

     ▶▶**Go to step 5**
5. **Checklist Complete Except for Deferred Items**

Continued on next page▾

▼AUTO BRAKE DISARM (continued)▼

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake..... **OFF**

Landing data.....VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches..... CONT

Speedbrake ..... ARMED

Landing gear..... Down

Flaps..... ___, Green light

■ ■ ■ ■

Brake Pressure Indicator Zero PSI

Condition: The brake accumulator has no nitrogen precharge.

1. Accumulator braking is not available.

NOTE: If hydraulic systems indications are normal, brake operation is unaffected.

■ ■ ■ ■

GEAR DISAGREE

LEFT GEAR | NOSE GEAR | RIGHT GEAR

Condition: The landing gear position disagrees with the LANDING GEAR lever position.

NOTE: Do not exceed the gear EXTEND limit speed (270K/.82M).

Do not use FMC fuel predictions with gear extended.

1. Choose One:
   - Landing gear lever is **UP:**
     ▶▶**Go to step 5**
   - Landing gear lever is **OFF**:
     ▶▶**Go to step 2**
   - Landing gear lever is **DN**:
     ▶▶**Go to step 9**

2. Choose one:
   - LANDING GEAR lever **moved** to the UP position after takeoff:
     ▶▶**Go to step 3**
   - LANDING GEAR lever did **not** move to the UP position after takeoff:
     ▶▶**Go to the Landing Gear Lever Will Not Move Up After Takeoff checklist on page 14.17**

■ ■ ■ ■

Continued on next page

▼GEAR DISAGREE (continued)▼

235K maximum

3.  LANDING GEAR lever.....UP

4. Choose one:

   - **All red and green** landing gear indicator lights are **extinguished**:

     Keep the landing gear lever in the UP position to keep the landing gear retracted.

     ■ ■ ■ ■

   - **Any red** landing gear indicator light is **illuminated**:

     ▶▶**Go to step 8**

5. Choose one:

   - **All red and green** landing gear indicator lights are **illuminated**:

     Open and close the manual gear extension access door. Verify the door is fully closed.

     ▶▶**Go to step 6**

   - **Any other combination** of landing gear indicator light is **illuminated**:

     ▶▶**Go to step 8**

235K maximum

6.  LANDING GEAR lever..... DN, then UP

Continued on next page▼

GEAR DISAGREE (continued)

7. Choose one:

   - **All** landing gear indicator lights are **extinguished**:

     LANDING GEAR lever .....OFF

     ■ ■ ■ ■

   - **Any red** landing gear indicator light is **illuminated**:

     ▶▶**Go to step 8**

8. Flight with gear down increases fuel consumption and decreases climb performance. Refer to the Gear Down performance tables in the Performance Inflight section.

   ■ ■ ■ ■

9. Check landing gear indicator lights.

   NOTE: If a green landing gear indicator light is illuminated on either the center main panel or the overhead panel, the related landing gear is down and locked.

10. Choose one:

    - **All** landing gear indicator **down and locked** and one or more **red** landing gear indicator lights are also **illuminated**:

      ▶▶**Go to step 11**

    - **Any** landing gear is **not** down and locked:

      ▶▶**Go to the Manual Gear Extension checklist on page 14.20**

      ■ ■ ■ ■

Continued on next page

▼GEAR DISAGREE (continued)▼

11. Verify landing gear lever is pushed and fully in the DN detent.

12. Choose one:

- **All red** landing gear indicator lights **extinguish**:

  ■ ■ ■ ■

- **One or more red** landing gear indicator lights stay **illuminated**:

  GROUND PROXIMITY GEAR
  INHIBIT switch.....GEAR INHIBIT

  Land normally.

  ■ ■ ■ ■

Landing Gear Lever Jammed in the Up Position

Condition: The LANDING GEAR lever will not move from the UP position.

NOTE: Start this checklist **only** when ready to extend the gear for landing.

Once the gear is extended, do **not** retract.

270 K /.82M maximum

1. LANDING GEAR override trigger ..... Pull
2. LANDING GEAR lever ..... DN
3. Choose one:
   - LANDING GEAR **lever** moves to the **DN** position:

     ▶▶**Go to step 4**
   - LANDING GEAR **lever** does **not** move to the DN position:

     ▶▶**Go to step 6**
4. Check landing gear indicator lights.

   NOTE: If a green landing gear indicator light is illuminated on either the center main panel or the overhead panel, the related landing gear is down and locked.

Continued on next page

▼Landing Gear Lever Jammed in the Up Position (continued)▼

5. Choose one:

- **All** landing gear **indicate** down and locked:

  Plan to land at the nearest suitable airport.

  ■ ■ ■ ■

- **One or more** landing gear do **not** indicate down and locked:

  ▶▶Go to the Manual Gear Extension checklist on page 14.20

  ■ ■ ■ ■

6. NOSE WHEEL STEERING switch .....Verify NORM

   Nose wheel steering is not available

WARNING

Do not use alternate nose wheel steering because the landing gear may retract on the ground.

270 K /.82M maximum

7. Manual gear extension handles (all) .....Pull

   The uplock is released when the handle is pulled to its limit. The related res landing gear indicator light illuminates, indicating uplock released.

NOTE: With the LANDING GEAR lever in the UP or OFF position, the red landing gear indicator lights will stay illuminates.

Continued on next page▼

▼Landing Gear Lever Jammed in the Up Position (continued)▼

8. Check landing gear indicator lights

NOTE: If a green landing gear indicator light is illuminated on either the center main panel or the overhead panel, the related landing gear is down and locked.

9. Choose one:

- **All** landing gear **indicate** down and locked:

  ▶▶Go to step 10

- **One or more** landing gear do **not** indicate down and locked:

  ▶▶Go to the Partial or All Gear Up Landing checklist on page 14.22

■ ■ ■ ■

10. **Checklist Complete Except for Deferred Items**

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake.....SET ___

Landing data.....VREF _____,Minimums _____

Continued on next page▼

▼Landing Gear Lever Jammed in the Up Position (continued)▼

Approach Checklist

FASTEN BELTS ..... ON

IDENT/CRS ..... (_____ / ___)

Altimeters ..... __ . __”

Additional Deferred Item

GROUND PROXIMITY GEAR
INHIBIT switch .....GEAR INHIBIT

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... ARMED

Landing gear .....**Down, Three green**

NOTE: The red landing gear indicator lights will also be illuminated.

Flaps .....___, Green light

NOTE: Nose wheel steering is not available.

WARNING

Do not use alternate nose wheel steering because the landing gear may retract on the ground.

■ ■ ■ ■

Landing Gear Lever Will Not Move Up After Takeoff

Condition: The LANDING GEAR lever cannot be moved to the UP position due to one of the following:

- Failure of the landing gear lever lock solenoid
- Failure of the air/ground system.
- Failure of the ground spoiler interlock valve to close.

NOTE: Do not use FMC performance predictions.

1. LANDING GEAR lever ..... DN
2. Retract the flaps on schedule.
3. Choose one:

◆ Intermittent cabin altitude/configuration warning horn **stays silent** and the TAKEOFF CONFIG lights do **not illuminate** after the flaps are fully retracted and the thrust levers advanced beyond the vertical position:

NOTE: This indicates a failure of the landing gear lever lock solenoid.

▶▶Go to step 4

◆ Intermittent cabin altitude/configuration warning horn **sounds** or the TAKEOFF CONFIG lights **illuminate** when the flaps are fully retracted:

NOTE: This indicates either a failure of the air/ground system or a failure of the ground spoiler interlock valve to close.

Do **not** retract the gear.

▶▶Go to step 7

Continued on next page

Landing Gear Lever
Will Not Move Up After Takeoff (continued)

235K maximum.

4. Landing gear override trigger.....Pull

5. LANDING GEAR lever.....UP

   After landing gear retraction is complete:

   LANDING GEAR lever ..... OFF

6. Continue normal operation.

■ ■ ■ ■

7. LANDING GEAR TAKEOFF WARNING CUTOFF circuit breaker (P6-3:C18) .....Pull

NOTE: The intermittent cabin altitude/configuration warning horn may still sound and the TAKEOFF CONFIG lights may still illuminate depending on thrust lever and flap position.

CAUTION

Do not use the speedbrakes in flight.

8. Plan to land at the nearest suitable airport.

9. Do **not** arm the autobrake for landing. Use manual braking.

10. Do **not** arm the speedbrakes for landing. Manually deploy the speedbrakes immediately upon landing.

11. **Checklist Complete Except for Deferred Items**

Continued on next page

Landing Gear Lever
Will Not Move Up After Takeoff (continued)

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake..... **OFF**

Landing data.....VREF _____, Minimums _____

Approach Checklist

FASTEN BELTS .....ON

IDENT/CRS ..... (_____ / ___)

Altimeters.....__ . __”

Gear Down Verification

LANDING GEAR lever .....Verify DN

Landing Checklist

F/A announcement ..... 2 CHIMES

ENGINE START switches..... CONT

Speedbrake .....**DOWN detent**

Landing gear..... **Down (previously verified)**

Flaps.....____, Green Light

NOTE: Manually deploy the speedbrakes immediately upon touchdown. Use manual braking.

■ ■ ■ ■

Manual Gear Extension

Condition: One of these occurs:

- Any landing gear is not down and locked when the LANDING GEAR lever is down
- The LANDING GEAR lever is jammed in the OFF position.

NOTE: If a green landing gear indicator light is illuminated on either the center main panel or the overhead panel, the related landing gear is down and locked.

1. LANDING GEAR lever.....OFF (if possible)

270 K /.82M maximum.

2. Manual gear extension handles (affected gear) .....Pull

   The uplock is released when the handle is pulled to its limit. The related red landing gear indicator light illuminates, indicating uplock released.

3. **Wait** 15 seconds after the last manual gear extension handle is pulled:

   LANDING GEAR lever .....DN (if possible)

4. Check landing gear indicator lights.

   NOTE: If the LANDING GEAR lever is in the OFF position, the red landing gear indicator lights will also be illuminated.

Continued on next page

▼Manual Gear Extension (continued)▼

5. Choose one:

- **All** landing gear **indicate** down and locked:

  ▶▶Go to step 6

- **One or more MAIN** landing gear do **not** indicate down and locked:

  ▶▶Go to the Partial or All Gear Up Landing checklist on page 14.22

■ ■ ■ ■

6. Choose one:

- LANDING GEAR **lever** is in the **DN** position:

  Land normally.

  ■ ■ ■ ■

- LANDING GEAR **lever** is in the **OFF** position:

  GROUND PROXIMITY GEAR
  INHIBIT switch ..... GEAR INHIBIT

  Land normally.

  NOTE: Nose wheel steering is not available.

  ■ ■ ■ ■

Partial or All Gear Up Landing

Condition: All landing gear are not down and locked after attempting manual gear extension.

1. Choose one:

   - Manual gear extension **has** been attempted:

     ▶▶**Go to step 2**

   - Manual gear extension has **not** been attempted:

     ▶▶**Go to the Manual Gear Extension checklist on page 14.20**

■ ■ ■ ■

2. Brief the crew and passengers on emergency landing and evacuation procedures.

3. Consider burning off fuel to reduce touchdown speed.

4. Plan a flaps 40 landing.

5. Set VREF 40.

6. LANDING GEAR AURAL WARN circuit breaker (P6-3:D18) .....Pull

   This prevents the landing gear warning horn with gear retracted and landing flaps selected.

   The flight deck chime for an incoming call from the cabin crew is unavailable.

7. FLIGHT CONTROL AUTO SPEED BRAKE circuit breaker (P6-2:B9) .....Pull

   This prevents inadvertent deployment of ground spoilers after landing.

Continued on next page▼

▼Partial or All Gear Up Landing (continued)▼

8. Do **not** arm the autobrake for landing. Use manual braking.

9. Do **not** arm the speedbrakes for landing.

10. **Checklist Complete Except for Deferred Items**

Deferred Items

Descent Checklist

Pressurization ..... LAND ALT___

Recall..... Checked

OPT / Approach briefing ..... Completed

Autobrake..... **OFF**

Landing data.....**VREF 40 _____, Minimums _____**

Approach Checklist

FASTEN BELTS ..... ON

IDENT/CRS ..... (_____ / ___)

Altimeters..... __ . __”

Continued on next page▼

▼Partial or All Gear Up Landing (continued)▼

Landing Procedure Review

Do not extend the speedbrakes unless stopping distance is critical. When stopping distance is critical, extend the speedbrakes after all landing gear, the nose or the engine nacelle have contacted the runway.

Do not use the thrust reversers unless stopping distance is critical.

Turn all fuel pump switches OFF just before the flare.

After stopping, do the Evacuation checklist, if needed.

Additional Deferred Items

APU switch ..... OFF

GROUND PROXIMITY GEAR
INHIBIT switch .....GEAR INHIBIT

When on approach:

Engine BLEED air switches ..... OFF

This ensures the airplane is depressurized at touchdown.

Landing Checklist

F/A announcement .....2 CHIMES

ENGINE START switches.....CONT

Speedbrake ..... **DOWN detent**

Landing gear ....._____ **Down**

Flaps ..... **40, Green light**

■ ■ ■ ■

SECTION 15 Warning Systems

Quick Actions

LANDING CONFIGURATION 15.3

TAKEOFF CONFIGURATION 15.3

**WARNING HORN (INTERMITTENT) or
WARNING LIGHT – CABIN
ALTITUDE OR TAKEOFF CONFIGURATION 15.4**

Section Contents

ALTITUDE ALERT 15.5

GROUND PROXIMITY GPWS INOPERATIVE 15.5

LANDING CONFIGURATION 15.3

Overspeed 15.5

PSEU 15.6

SPSEU 15.6

Tail Strike 15.7

TAKEOFF CONFIGURATION 15.3

**WARNING HORN (INTERMITTENT) or
WARNING LIGHT – CABIN
ALTITUDE OR TAKEOFF CONFIGURATION 15.4**

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LANDING CONFIGURATION

Condition: In flight, the steady warning horn sounds.

1. Assure correct airplane landing configuration.

■ ■ ■ ■

TAKEOFF CONFIG

TAKEOFF CONFIGURATION

Condition: On the ground, the intermittent cabin altitude/configuration warning horn sounds or the TAKEOFF CONFIG light illuminates when advancing the thrust levers to takeoff thrust.

1. Assure correct airplane takeoff configuration.

■ ■ ■ ■

WARNING HORN (INTERMITTENT) or WARNING LIGHT – CABIN ALTITUDE OR TAKEOFF CONFIGURATION

TAKEOFF CONFIG | CABIN ALTITUDE

Condition: One of these occurs:

- In flight, at an airplane flight altitude above 10,000 feet MSL, the intermittent warning horn sounds or the CABIN ALTITUDE light illuminates
- On the ground, the intermittent warning horn sounds or the TAKEOFF CONFIG light illuminates when advancing the thrust levers to takeoff thrust.

1. **If** the intermittent warning horn sounds or the CABIN ALTITUDE light illuminates **in flight** at an airplane flight altitude above 10,000 feet MSL:

   Don the oxygen masks and set the regulators to 100%.

   Establish crew communications.

   ▶▶**Go to the CABIN ALTITUDE WARNING or Rapid Depressurization checklist on page 2.3**

■ ■ ■ ■

2. **If** the intermittent warning horn sounds or the TAKEOFF CONFIG light illuminates **on the ground** when advancing the thrust levers to takeoff thrust:

   Assure correct airplane takeoff configuration.

■ ■ ■ ■

ALTITUDE ALERT

Condition: The ALT ALERT annunciation shows that one of these occurs:

- The airplane is about to reach the MCP altitude
- A deviation from the MCP altitude.

1. Reset selected altitude (if needed).
2. Maintain the correct altitude.

■ ■ ■ ■

INOP

GROUND PROXIMITY GPWS INOPERATIVE

Condition: A ground proximity warning system fault occurs.

NOTE: Some or all GPWS alerts are not available. GPWS alerts which occur are valid.

■ ■ ■ ■

Overspeed

Condition: Airspeed is more than V_{MO}/M_{MO}.

■ ■ ■ ■

PSEU — PSEU

Condition: A proximity switch electronics unit fault occurs.

NOTE: The PSEU light illuminates on the ground only.

1. Choose one:
   - PSEU light **stays illuminated** when the Master Caution system is reset:

     ▶▶**Go to step 2**
   - PSEU light **extinguishes** when the Master Caution system is reset:

     ■ ■ ■ ■

2. Choose one:
   - PSEU light **stays illuminated** when the parking brake is set or when both engines are shut down:

     Do **not** takeoff.

     ■ ■ ■ ■
   - PSEU light extinguishes when the parking brake is set or when both engines are shut down:

     ■ ■ ■ ■

SPSEU — SPSEU

Condition: A supplemental switch electronics unit fault occurs.

NOTE: The SPSEU light illuminates on the ground only.

1. Do **not** take off.

   ■ ■ ■ ■

Tail Strike

Condition: A tail strike is suspected or confirmed.

CAUTION

Continued pressurization of the airplane can cause further structural damage.

1. Pressurization mode selector ..... MAN

Use momentary actuation of the outflow valve switch to avoid large and rapid pressurization changes.

2. Outflow VALVE switch ..... Move to OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

3. Plan to land at the nearest suitable airport.

■ ■ ■ ■

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Operational Information

Section Contents

Engine Start with Ground Air Source (AC Electrical Power Available)..... 3

Engine Cross Bleed Start 4

De-icing/Anti-icing 5

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Engine Start with Ground Air Source (AC Electrical Power Available)

Engine No. 1 must be started first.

When cleared to start:

APU BLEED air switch .....OFF

Engine No. 1 start .....Accomplish

Use normal start procedures.

WARNING

To minimize the hazard to ground personnel, the external air should be disconnected, and Engine No. 2 started using the Engine Cross Bleed Start procedure.

Engine Cross Bleed Start

Do not accomplish a cross bleed start during pushback.

Before performing this procedure, ensure that the area to the rear is clear.

Engine BLEED air switches..... ON

APU BLEED air switch ..... OFF

PACK switches ..... OFF

ISOLATION VALVE switch .....AUTO

Ensures bleed air supply for engine start.

Engine thrust lever
(operating engine) ..... Advance thrust lever until bleed duct pressure indicates 30 PSI

Non–operating engine..... Start

Use normal start procedures with cross bleed air.

After starter cutout, adjust thrust on both engines, as required.

De-icing/Anti-icing

CAUTION

Operate the APU during de-icing only if necessary. If the APU is running, ingestion of de-icing fluid causes objectionable fumes and odors to enter the airplane. Ingestion of snow, slush, ice or de-icing/anti-icing fluid can also cause damage to the APU.

If engines are not running, complete the Before Start Checklist prior this checklist.

Once arrived at de-icing/anti-icing bay:

Parking brake.....SET

APU .....As needed

The APU should be shut down unless APU operation is necessary.

Flaps..... UP

Thrust Levers.....Idle

Stabilizer trim .....___ SET

PACK switches.....OFF

Engine BLEED air switches .....OFF

APU BLEED air switch .....OFF

Advise that aircraft is configured for de-icing.

Continued on next page

De-icing/Anti-icing (continued)

After de-icing/anti-icing is completed:

If engines are **not** running:

APU ..... As needed

CAUTION

After de-icing, the use of APU bleed air during takeoff can cause smoke in the airplane.

Wait approximately one minute after de-icing is completed to turn APU BLEED air switch on to minimize de-icing fluid ingestion into air system.

APU BLEED air switch ..... As needed

ISO VALVE switch..... OPEN

DUCT PRESS..... Check

ENGINES..... START

After engines are started and before completing the Before Taxi Procedure:

Engine BLEED air switches..... ON

APU BLEED air switch ..... OFF

Wing anti-ice switch .....Cycle (5 sec.) and OFF

PACK switches .....AUTO

ISO VALVE switch.....AUTO

Continue with Before Taxi SOP Procedure and use Engine Bleed for Takeoff.

Continued on next page

De-icing/Anti-icing (continued)

If the engines are running:

Wait approximately one minute after de-icing is completed to turn engine BLEED air switches on to ensure all de-icing fluid has been cleared from the engines.

Engine BLEED air switches ..... ON

Wing anti-ice switch ..... Cycle (5 sec.) and OFF

PACK switches ..... AUTO

ISO VALVE switch ..... AUTO

Flaps ..... ___ GREEN LIGHT

Flight Controls ..... Checked

Continued on next page

▼De-icing/Anti-icing (continued)▼

Taxi Out Procedure

When engine anti-ice is required and that the OAT is **3°C or below**, do an engine run-up as needed, to minimize ice build-up. Use the following procedure:

Check that the area behind the airplane is clear.

Run-up to a minimum of 70% N1 for approximately 30 seconds duration at intervals no greater than 30 minutes.

NOTE: Fan blade ice build up is cumulative. If the fan spinner and fan blades were not deiced prior to taxi out, the time the engines are operating during taxi in should be included in the 30-minute interval.

If airport surface conditions and the concentration of aircraft do not allow the engine thrust level to be increased to 70% N1, then set a thrust level as high as practical and time at that thrust level.

NOTE: When operating in condition of freezing rain, freezing drizzle, freezing fog or heavy snow, run-ups to a minimum of 70% N1 for approximately 1 second duration at intervals no greater than 10 minutes enhance ice shedding.

Takeoff Procedure

When engine anti-ice is required and that the OAT is **3°C or below**, the takeoff must be preceded by a static engine run-up. Use the following procedure:

Run-up to a minimum of 70% N1 and confirm stable engine operation before start of the takeoff roll. A 30-second run-up is highly recommended whenever possible

Performance Inflight

737-800 CFM56-7B26 KG M FAA CATC/N

Kilogram to Pound Conversion Chart 7

General 9

Flight With Unreliable Airspeed/ Turbulent Air Penetration 9

CLIMB (280/.76) 9

CRUISE (.76/280) 9

DESCENT (.76/280) 10

HOLDING (VREF40 + 70) 10

TERMINAL AREA (5000 FT) 11

Airport Altitude = -2000 FT 11

Airport Altitude = -1000 FT 12

Airport Altitude = SEA LEVEL 13

Airport Altitude = 1000 FT 14

Airport Altitude = 2000 FT 15

Airport Altitude = 3000 FT 16

Airport Altitude = 4000 FT 17

Airport Altitude = 5000 FT 18

Airport Altitude = 6000 FT 19

Airport Altitude = 7000 FT 20

Airport Altitude = 8000 FT 21

Airport Altitude = 9000 FT 22

Airport Altitude = 10000 FT 23

Airport Altitude = 11000 FT 24

Airport Altitude = 12000 FT 25

Airport Altitude = 13000 FT 26

Airport Altitude = 14000 FT 27
Airport Altitude = 14500 FT 28
FINAL APPROACH (1500 FT) 29
Airport Altitude = -2000 FT 29
Airport Altitude = -1000 FT 29
Airport Altitude = SEA LEVEL 30
Airport Altitude = 1000 FT 30
Airport Altitude = 2000 FT 31
Airport Altitude = 3000 FT 31
Airport Altitude = 4000 FT 32
Airport Altitude = 5000 FT 32
Airport Altitude = 6000 FT 33
Airport Altitude = 7000 FT 33
Airport Altitude = 8000 FT 34
Airport Altitude = 9000 FT 34
Airport Altitude = 10000 FT 35
Airport Altitude = 11000 FT 35
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Kilogram to Pound Conversion Chart

Kg x 1000	Lb x 1000
32	71
34	75
36	79
38	84
40	88
42	93
44	97
46	101
48	106
50	110

Kg x 1000	Lb x 1000
52	115
54	119
56	123
58	128
60	132
62	137
64	141
66	146
68	150
70	154

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General

Flight With Unreliable Airspeed/ Turbulent Air Penetration

CLIMB (280/.76)

CRUISE (.76/280)

NOTE: The weights in all tables are in KG.

Flight With Unreliable Airspeed/ Turbulent Air Penetration
Altitude and/or vertical speed indications may also be unreliable.

CLIMB (280/.76)
Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
40000	**PITCH ATT**	**4.0**	**4.0**			
	V/S (FT/MIN)	1700	1000			
30000	**PITCH ATT**	**4.0**	**4.0**	**3.5**	**3.5**	**4.0**
	V/S (FT/MIN)	2500	1900	1400	1100	800
20000	**PITCH ATT**	**7.0**	**6.5**	**6.0**	**6.0**	**6.0**
	V/S (FT/MIN)	4200	3200	2600	2100	1700
10000	**PITCH ATT**	**11.0**	**9.5**	**8.5**	**8.0**	**8.0**
	V/S (FT/MIN)	5600	4400	3600	3000	2500
SEA LEVEL	**PITCH ATT**	**14.5**	**12.5**	**11.0**	**10.0**	**9.5**
	V/S (FT/MIN)	6700	5300	4300	3600	3100

CRUISE (.76/280)
Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
40000	**PITCH ATT**	**2.0**	**2.5**	**3.5**		
	%N1	**83.3**	**86.2**	**91.0**		
35000	**PITCH ATT**	**1.0**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	**81.4**	**83.0**	**85.2**	**88.0**	**93.5**
30000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	**80.7**	**81.7**	**83.2**	**84.9**	**87.1**
25000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	**77.2**	**78.0**	**79.5**	**81.2**	**83.1**
20000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.5**
	%N1	**73.6**	**74.4**	**75.7**	**77.3**	**79.1**
15000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**3.0**	**3.5**
	%N1	**69.8**	**70.7**	**72.0**	**73.5**	**75.1**

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

DESCENT (.76/280)

HOLDING (VREF40 + 70)

DESCENT (.76/280)
Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
40000	**PITCH ATT**	**-1.5**	**-0.5**	**0.5**	**1.0**	**1.5**
	V/S (FT/MIN)	-2700	-2400	-2300	-2500	-2700
30000	**PITCH ATT**	**-3.5**	**-2.0**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-3100	-2600	-2300	-2100	-2000
20000	**PITCH ATT**	**-3.5**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2800	-2300	-2000	-1900	-1700
10000	**PITCH ATT**	**-3.5**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2500	-2100	-1800	-1700	-1500
SEA LEVEL	**PITCH ATT**	**-3.5**	**-2.5**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2300	-1900	-1700	-1500	-1400

HOLDING (VREF40 + 70)
Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
15000	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	%N1	**56.1**	**61.7**	**65.9**	**69.8**	**73.2**
	KIAS	178	193	212	229	246
10000	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	%N1	**52.5**	**57.5**	**62.1**	**65.9**	**69.1**
	KIAS	178	192	211	228	244
5000	**PITCH ATT**	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	**48.9**	**53.9**	**58.1**	**62.0**	**65.5**
	KIAS	178	192	210	227	243

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = -2000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = -2000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**47.6**	**52.3**	**56.3**	**60.0**	**63.6**
VREF40+70	KIAS	178	192	204	215	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**49.7**	**54.5**	**58.6**	**62.4**	**65.8**
VREF40+50	KIAS	158	172	184	195	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**49.4**	**54.5**	**59.0**	**63.1**	**66.7**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**53.2**	**58.6**	**63.4**	**67.5**	**71.1**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**53.3**	**58.7**	**63.7**	**67.9**	**71.6**
VREF40+20	KIAS	128	142	154	165	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**54.0**	**59.7**	**64.8**	**69.0**	**72.9**
VREF40+10	KIAS	118	132	144	155	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**57.5**	**63.3**	**68.2**	**72.6**	**76.3**
VREF40+20	KIAS	128	142	154	165	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = -1000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = -1000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**48.3**	**52.9**	**57.0**	**60.8**	**64.5**
VREF40+70	KIAS	178	192	204	215	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**50.4**	**55.2**	**59.4**	**63.3**	**66.6**
VREF40+50	KIAS	158	172	184	195	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**50.0**	**55.2**	**59.8**	**64.0**	**67.6**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**53.9**	**59.4**	**64.2**	**68.3**	**72.0**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**54.0**	**59.5**	**64.5**	**68.7**	**72.5**
VREF40+20	KIAS	128	142	154	165	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**54.7**	**60.6**	**65.6**	**69.8**	**73.7**
VREF40+10	KIAS	118	132	144	155	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**58.3**	**64.1**	**69.0**	**73.4**	**77.1**
VREF40+20	KIAS	128	142	154	165	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = SEA LEVEL

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = SEA LEVEL

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**49.0**	**53.6**	**57.7**	**61.6**	**65.2**
VREF40+70	KIAS	178	192	204	215	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**51.1**	**55.9**	**60.2**	**64.1**	**67.3**
VREF40+50	KIAS	158	172	184	195	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**50.7**	**56.0**	**60.6**	**64.7**	**68.3**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**54.7**	**60.2**	**65.0**	**69.1**	**72.9**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**54.7**	**60.4**	**65.3**	**69.5**	**73.4**
VREF40+20	KIAS	128	142	154	165	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**55.5**	**61.4**	**66.3**	**70.6**	**74.6**
VREF40+10	KIAS	118	132	144	155	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**59.1**	**65.0**	**69.9**	**74.3**	**77.9**
VREF40+20	KIAS	128	142	154	165	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 1000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 1000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**49.8**	**54.3**	**58.4**	**62.5**	**66.0**
VREF40+70	KIAS	178	192	204	215	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**51.8**	**56.7**	**61.0**	**64.8**	**68.1**
VREF40+50	KIAS	158	172	184	195	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**51.4**	**56.7**	**61.4**	**65.5**	**69.1**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**55.4**	**61.0**	**65.8**	**69.9**	**73.7**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**55.4**	**61.2**	**66.1**	**70.3**	**74.2**
VREF40+20	KIAS	128	142	154	165	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**56.3**	**62.2**	**67.1**	**71.5**	**75.4**
VREF40+10	KIAS	118	132	144	155	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**59.9**	**65.8**	**70.7**	**75.1**	**78.8**
VREF40+20	KIAS	128	142	154	165	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 2000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 2000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**50.4**	**55.1**	**59.2**	**63.3**	**66.7**
VREF40+70	KIAS	178	192	204	215	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**52.5**	**57.4**	**61.8**	**65.6**	**68.9**
VREF40+50	KIAS	158	172	184	195	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**52.2**	**57.5**	**62.3**	**66.3**	**69.9**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**56.1**	**61.8**	**66.6**	**70.8**	**74.5**
VREF40+30	KIAS	138	152	164	175	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**56.2**	**62.0**	**66.9**	**71.2**	**75.1**
VREF40+20	KIAS	128	142	154	165	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**57.0**	**63.0**	**67.9**	**72.4**	**76.2**
VREF40+10	KIAS	118	132	144	155	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**60.7**	**66.5**	**71.6**	**75.9**	**79.7**
VREF40+20	KIAS	128	142	154	165	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 3000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 3000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**51.1**	**55.8**	**60.0**	**64.1**	**67.4**
VREF40+70	KIAS	178	192	205	216	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**53.3**	**58.1**	**62.6**	**66.3**	**69.7**
VREF40+50	KIAS	158	172	185	196	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**52.9**	**58.2**	**63.1**	**67.1**	**70.7**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**56.9**	**62.6**	**67.4**	**71.6**	**75.3**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**56.9**	**62.8**	**67.7**	**72.1**	**75.9**
VREF40+20	KIAS	128	142	155	166	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**57.8**	**63.8**	**68.7**	**73.2**	**77.0**
VREF40+10	KIAS	118	132	145	156	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**61.5**	**67.3**	**72.5**	**76.7**	**80.5**
VREF40+20	KIAS	128	142	155	166	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 4000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 4000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**51.7**	**56.5**	**60.8**	**64.9**	**68.2**
VREF40+70	KIAS	178	192	205	216	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**54.0**	**58.9**	**63.4**	**67.1**	**70.5**
VREF40+50	KIAS	158	172	185	196	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**53.6**	**59.0**	**63.9**	**67.9**	**71.6**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**57.7**	**63.4**	**68.2**	**72.5**	**76.1**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**57.7**	**63.6**	**68.5**	**73.0**	**76.6**
VREF40+20	KIAS	128	142	155	166	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**58.6**	**64.6**	**69.6**	**74.1**	**77.9**
VREF40+10	KIAS	118	132	145	156	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**62.3**	**68.1**	**73.3**	**77.6**	**81.4**
VREF40+20	KIAS	128	142	155	166	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 5000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 5000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**52.4**	**57.3**	**61.6**	**65.7**	**69.0**
VREF40+70	KIAS	178	192	205	216	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**54.7**	**59.7**	**64.2**	**67.9**	**71.4**
VREF40+50	KIAS	158	172	185	196	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**54.4**	**59.9**	**64.7**	**68.7**	**72.5**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**58.5**	**64.2**	**69.1**	**73.3**	**76.9**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**58.5**	**64.4**	**69.4**	**73.8**	**77.5**
VREF40+20	KIAS	128	142	155	166	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**59.4**	**65.4**	**70.5**	**74.9**	**78.8**
VREF40+10	KIAS	118	132	145	156	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**63.1**	**69.0**	**74.2**	**78.5**	**82.3**
VREF40+20	KIAS	128	142	155	166	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 6000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 6000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**53.1**	**58.0**	**62.5**	**66.4**	**69.8**
VREF40+70	KIAS	178	192	205	216	225
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**55.5**	**60.5**	**64.9**	**68.7**	**72.3**
VREF40+50	KIAS	158	172	185	196	205
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**55.1**	**60.7**	**65.5**	**69.5**	**73.3**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**59.3**	**65.1**	**69.9**	**74.1**	**77.7**
VREF40+30	KIAS	138	152	165	176	185
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**59.4**	**65.2**	**70.3**	**74.7**	**78.3**
VREF40+20	KIAS	128	142	155	166	175
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**60.3**	**66.2**	**71.4**	**75.7**	**79.6**
VREF40+10	KIAS	118	132	145	156	165
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**64.0**	**69.9**	**75.0**	**79.3**	**83.2**
VREF40+20	KIAS	128	142	155	166	175

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 7000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 7000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**53.9**	**58.8**	**63.4**	**67.1**	**70.6**
VREF40+70	KIAS	178	192	205	216	226
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**56.3**	**61.4**	**65.7**	**69.5**	**73.1**
VREF40+50	KIAS	158	172	185	196	206
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**55.9**	**61.6**	**66.3**	**70.4**	**74.1**
VREF40+30	KIAS	138	152	165	176	186
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**60.1**	**65.9**	**70.8**	**75.0**	**78.6**
VREF40+30	KIAS	138	152	165	176	186
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**60.2**	**66.0**	**71.2**	**75.4**	**79.2**
VREF40+20	KIAS	128	142	155	166	176
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**61.1**	**67.0**	**72.2**	**76.6**	**80.5**
VREF40+10	KIAS	118	132	145	156	166
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**64.8**	**70.8**	**75.8**	**80.2**	**84.1**
VREF40+20	KIAS	128	142	155	166	176

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 8000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 8000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**54.6**	**59.6**	**64.1**	**67.9**	**71.4**
VREF40+70	KIAS	178	192	205	216	226
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**57.0**	**62.2**	**66.5**	**70.4**	**74.0**
VREF40+50	KIAS	158	172	185	196	206
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**56.7**	**62.4**	**67.0**	**71.2**	**74.9**
VREF40+30	KIAS	138	152	165	176	186
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**61.0**	**66.7**	**71.7**	**75.8**	**79.6**
VREF40+30	KIAS	138	152	165	176	186
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**61.0**	**66.9**	**72.1**	**76.2**	**80.1**
VREF40+20	KIAS	128	142	155	166	176
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**61.9**	**67.9**	**73.1**	**77.5**	**81.4**
VREF40+10	KIAS	118	132	145	156	166
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**65.6**	**71.6**	**76.7**	**81.1**	**85.0**
VREF40+20	KIAS	128	142	155	166	176

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 9000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 9000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.5**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**55.4**	**60.5**	**64.9**	**68.6**	**72.3**
VREF40+70	KIAS	178	192	205	216	226
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**57.7**	**63.0**	**67.3**	**71.3**	**74.8**
VREF40+50	KIAS	158	172	185	196	206
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**57.5**	**63.2**	**67.9**	**72.1**	**75.8**
VREF40+30	KIAS	138	152	165	176	186
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**61.8**	**67.5**	**72.5**	**76.6**	**80.4**
VREF40+30	KIAS	138	152	165	176	186
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**61.8**	**67.7**	**72.9**	**77.1**	**81.0**
VREF40+20	KIAS	128	142	155	166	176
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**62.8**	**68.7**	**73.9**	**78.4**	**82.3**
VREF40+10	KIAS	118	132	145	156	166
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**66.4**	**72.5**	**77.6**	**82.0**	**85.9**
VREF40+20	KIAS	128	142	155	166	176

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 10000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 10000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.5**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**56.1**	**61.3**	**65.6**	**69.5**	**73.0**
VREF40+70	KIAS	178	192	205	216	227
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**58.5**	**63.8**	**68.1**	**72.2**	**75.6**
VREF40+50	KIAS	158	172	185	196	207
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**58.3**	**64.0**	**68.7**	**72.9**	**76.6**
VREF40+30	KIAS	138	152	165	176	187
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**62.6**	**68.4**	**73.3**	**77.5**	**81.4**
VREF40+30	KIAS	138	152	165	176	187
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**62.7**	**68.6**	**73.7**	**78.0**	**81.9**
VREF40+20	KIAS	128	142	155	166	177
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(GEAR UP)	**%N1**	**63.6**	**69.7**	**74.8**	**79.3**	**83.2**
VREF40+10	KIAS	118	132	145	156	167
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**67.2**	**73.4**	**78.5**	**82.9**	**86.9**
VREF40+20	KIAS	128	142	155	166	177

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 11000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 11000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**4.5**	**5.5**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**56.9**	**62.3**	**66.3**	**70.3**	**73.9**
VREF40+70	KIAS	178	192	205	217	227
FLAPS 1	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**59.5**	**64.6**	**69.1**	**73.1**	**76.4**
VREF40+50	KIAS	158	172	185	197	207
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**59.4**	**64.9**	**69.7**	**73.8**	**77.5**
VREF40+30	KIAS	138	152	165	177	187
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**63.6**	**69.4**	**74.2**	**78.5**	**82.3**
VREF40+30	KIAS	138	152	165	177	187
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**63.8**	**69.7**	**74.6**	**79.0**	**82.9**
VREF40+20	KIAS	128	142	155	167	177
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**6.5**	**7.0**
(GEAR UP)	**%N1**	**64.7**	**70.8**	**75.8**	**80.3**	**84.2**
VREF40+10	KIAS	118	132	145	157	167
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR DOWN)	**%N1**	**68.4**	**74.3**	**79.5**	**84.0**	**88.0**
VREF40+20	KIAS	128	142	155	167	177

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 12000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 12000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS UP	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**57.7**	**63.0**	**67.1**	**71.2**	**74.6**
VREF40+70	KIAS	178	192	205	217	228
FLAPS 1	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**60.6**	**65.4**	**70.0**	**73.8**	**77.3**
VREF40+50	KIAS	158	172	185	197	208
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**60.5**	**65.8**	**70.7**	**74.7**	**78.5**
VREF40+30	KIAS	138	152	165	177	188
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**64.6**	**70.4**	**75.1**	**79.5**	**83.3**
VREF40+30	KIAS	138	152	165	177	188
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**64.7**	**70.8**	**75.6**	**80.0**	**83.9**
VREF40+20	KIAS	128	142	155	167	178
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**65.8**	**71.8**	**76.9**	**81.3**	**85.2**
VREF40+10	KIAS	118	132	145	157	168
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.0**
(GEAR DOWN)	**%N1**	**69.6**	**75.3**	**80.5**	**85.0**	**89.1**
VREF40+20	KIAS	128	142	155	167	178

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 13000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 13000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**58.5**	**63.7**	**67.9**	**72.0**	**75.5**
VREF40+70	KIAS	178	192	205	217	228
FLAPS 1	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**61.4**	**66.3**	**70.9**	**74.6**	**78.2**
VREF40+50	KIAS	158	172	185	197	208
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**61.5**	**66.8**	**71.7**	**75.6**	**79.4**
VREF40+30	KIAS	138	152	165	177	188
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**65.6**	**71.4**	**76.0**	**80.4**	**84.2**
VREF40+30	KIAS	138	152	165	177	188
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**65.8**	**71.7**	**76.5**	**81.0**	**84.8**
VREF40+20	KIAS	128	142	155	167	178
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**66.9**	**72.8**	**77.9**	**82.3**	**86.2**
VREF40+10	KIAS	118	132	145	157	168
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.0**
(GEAR DOWN)	**%N1**	**70.6**	**76.4**	**81.5**	**86.0**	**90.2**
VREF40+20	KIAS	128	142	155	167	178

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 14000 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 14000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS UP	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**59.4**	**64.4**	**68.7**	**72.8**	**76.3**
VREF40+70	KIAS	179	192	205	217	228
FLAPS 1	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**62.3**	**67.1**	**71.7**	**75.4**	**79.0**
VREF40+50	KIAS	159	172	185	197	208
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**62.3**	**67.8**	**72.5**	**76.5**	**80.3**
VREF40+30	KIAS	139	152	165	177	188
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**66.5**	**72.3**	**77.0**	**81.3**	**85.1**
VREF40+30	KIAS	139	152	165	177	188
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**66.9**	**72.6**	**77.6**	**81.9**	**85.8**
VREF40+20	KIAS	129	142	155	167	178
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**68.1**	**73.8**	**78.9**	**83.3**	**87.3**
VREF40+10	KIAS	119	132	145	157	168
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.0**
(GEAR DOWN)	**%N1**	**71.6**	**77.5**	**82.5**	**87.1**	**91.5**
VREF40+20	KIAS	129	142	155	167	178

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

TERMINAL AREA (5000 FT)

Airport Altitude = 14500 FT

TERMINAL AREA (5000 FT)
%N1 for Level Flight
Airport Altitude = 14500 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS UP	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**59.9**	**64.8**	**69.2**	**73.2**	**76.7**
VREF40+70	KIAS	179	192	206	218	229
FLAPS 1	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**62.7**	**67.6**	**72.1**	**75.9**	**79.5**
VREF40+50	KIAS	159	172	186	198	209
FLAPS 5	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(GEAR UP)	**%N1**	**62.8**	**68.3**	**72.9**	**76.9**	**80.7**
VREF40+30	KIAS	139	152	166	178	189
FLAPS 10	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**
(GEAR UP)	**%N1**	**67.1**	**72.7**	**77.5**	**81.8**	**85.5**
VREF40+30	KIAS	139	152	166	178	189
FLAPS 15	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**
(GEAR UP)	**%N1**	**67.4**	**73.1**	**78.1**	**82.4**	**86.3**
VREF40+20	KIAS	129	142	156	168	179
FLAPS 25	**PITCH ATT**	**6.5**	**6.5**	**6.5**	**6.5**	**6.5**
(GEAR UP)	**%N1**	**68.6**	**74.2**	**79.4**	**83.7**	**87.8**
VREF40+10	KIAS	119	132	146	158	169
FLAPS 15	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.0**
(GEAR DOWN)	**%N1**	**72.1**	**78.0**	**83.0**	**87.6**	**92.3**
VREF40+20	KIAS	129	142	156	168	179

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = -2000 FT

Airport Altitude = -1000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = -2000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**42.2**	**46.7**	**50.6**	**54.1**	**57.0**
	KIAS	130	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**46.3**	**51.0**	**55.3**	**59.0**	**62.3**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**50.8**	**56.2**	**60.9**	**64.9**	**68.3**
	KIAS	118	132	144	155	164

Flap placard speed exceeded in shaded area.

Airport Altitude = -1000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**42.7**	**47.3**	**51.2**	**54.8**	**57.8**
	KIAS	130	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**46.9**	**51.7**	**56.0**	**59.8**	**63.1**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**51.5**	**56.9**	**61.7**	**65.7**	**69.0**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = SEA LEVEL

Airport Altitude = 1000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = SEA LEVEL

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**43.3**	**48.0**	**51.9**	**55.5**	**58.4**
	KIAS	130	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**47.5**	**52.5**	**56.7**	**60.5**	**63.9**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**52.2**	**57.6**	**62.4**	**66.5**	**69.8**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Airport Altitude = 1000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**43.9**	**48.6**	**52.6**	**56.2**	**59.2**
	KIAS	130	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**48.1**	**53.2**	**57.5**	**61.3**	**64.6**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**52.9**	**58.4**	**63.2**	**67.3**	**70.6**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = 2000 FT

Airport Altitude = 3000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = 2000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**44.5**	**49.2**	**53.3**	**56.9**	**59.9**
	KIAS	130	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**48.8**	**53.8**	**58.2**	**62.1**	**65.4**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**53.6**	**59.2**	**64.0**	**68.0**	**71.5**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Airport Altitude = 3000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**45.1**	**49.8**	**54.1**	**57.6**	**60.7**
	KIAS	131	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**49.4**	**54.5**	**59.0**	**63.0**	**66.2**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**54.4**	**59.9**	**64.9**	**68.8**	**72.3**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = 4000 FT

Airport Altitude = 5000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = 4000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**45.8**	**50.5**	**54.7**	**58.3**	**61.5**
	KIAS	131	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**50.1**	**55.3**	**59.8**	**63.7**	**67.0**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**55.1**	**60.7**	**65.6**	**69.6**	**73.2**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Airport Altitude = 5000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**46.5**	**51.2**	**55.4**	**59.0**	**62.3**
	KIAS	131	145	159	171	181
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**50.8**	**56.0**	**60.6**	**64.5**	**67.7**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**55.8**	**61.5**	**66.4**	**70.4**	**74.0**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = 6000 FT

Airport Altitude = 7000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = 6000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**47.1**	**51.9**	**56.1**	**59.8**	**63.0**
	KIAS	131	145	159	171	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**51.6**	**56.7**	**61.4**	**65.2**	**68.5**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**56.6**	**62.3**	**67.1**	**71.3**	**74.8**
	KIAS	118	132	144	155	165

Flap placard speed exceeded in shaded area.

Airport Altitude = 7000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**47.7**	**52.6**	**56.8**	**60.6**	**63.8**
	KIAS	131	146	159	171	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**52.3**	**57.4**	**62.2**	**66.0**	**69.3**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**57.3**	**63.1**	**67.9**	**72.2**	**75.6**
	KIAS	118	132	144	156	165

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = 8000 FT

Airport Altitude = 9000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = 8000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**48.4**	**53.3**	**57.6**	**61.4**	**64.5**
	KIAS	131	146	159	171	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**52.9**	**58.2**	**62.9**	**66.8**	**70.1**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**58.1**	**64.0**	**68.7**	**73.0**	**76.4**
	KIAS	118	132	145	156	165

Flap placard speed exceeded in shaded area.

Airport Altitude = 9000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**49.0**	**54.0**	**58.3**	**62.2**	**65.2**
	KIAS	131	146	159	171	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**53.7**	**59.0**	**63.7**	**67.6**	**70.9**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**58.9**	**64.7**	**69.6**	**73.8**	**77.2**
	KIAS	118	132	145	156	165

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = 10000 FT

Airport Altitude = 11000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = 10000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**49.7**	**54.7**	**59.1**	**62.9**	**65.9**
	KIAS	131	146	159	171	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**54.4**	**59.8**	**64.5**	**68.3**	**71.7**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
	%N1	**59.8**	**65.5**	**70.5**	**74.6**	**78.1**
	KIAS	118	132	145	156	165

Flap placard speed exceeded in shaded area.

Airport Altitude = 11000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**50.4**	**55.5**	**59.9**	**63.6**	**66.6**
	KIAS	131	146	159	171	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**55.1**	**60.7**	**65.3**	**69.1**	**72.5**
	KIAS	125	139	152	163	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**-0.5**
	%N1	**60.5**	**66.3**	**71.3**	**75.4**	**79.0**
	KIAS	118	132	145	156	165

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = 12000 FT

Airport Altitude = 13000 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = 12000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**51.1**	**56.2**	**60.7**	**64.3**	**67.4**
	KIAS	131	146	159	172	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**55.9**	**61.5**	**66.1**	**70.0**	**73.3**
	KIAS	125	139	152	164	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**-0.5**
	%N1	**61.3**	**67.1**	**72.2**	**76.2**	**79.8**
	KIAS	118	132	145	156	166

Flap placard speed exceeded in shaded area.

Airport Altitude = 13000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**51.9**	**56.9**	**61.5**	**65.1**	**68.1**
	KIAS	131	146	160	172	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**56.6**	**62.2**	**66.8**	**70.8**	**74.1**
	KIAS	125	139	152	164	173
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**-0.5**
	%N1	**62.2**	**67.9**	**73.0**	**77.1**	**80.7**
	KIAS	118	132	145	156	166

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

FINAL APPROACH (1500 FT)

Airport Altitude = 14000 FT

Airport Altitude = 14500 FT

FINAL APPROACH (1500 FT)
Gear Down, %N1 for 3° Glideslope
Airport Altitude = 14000 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**52.7**	**57.8**	**62.4**	**65.8**	**69.0**
	KIAS	131	146	160	172	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**57.6**	**63.1**	**67.7**	**71.7**	**74.9**
	KIAS	125	139	152	164	174
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**-0.5**
	%N1	**63.2**	**68.9**	**73.9**	**78.0**	**81.7**
	KIAS	118	132	145	156	166

Flap placard speed exceeded in shaded area.

Airport Altitude = 14500 FT

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	**53.1**	**58.3**	**62.8**	**66.3**	**69.4**
	KIAS	131	146	160	172	182
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
	%N1	**58.2**	**63.6**	**68.2**	**72.1**	**75.3**
	KIAS	125	139	152	164	174
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**-0.5**
	%N1	**63.7**	**69.5**	**74.4**	**78.5**	**82.2**
	KIAS	118	132	145	156	167

Flap placard speed exceeded in shaded area.

Flight With Unreliable Airspeed/ Turbulent Air Penetration (continued)

NOTE: The weights in all tables are in KG.

GO-AROUND

GO-AROUND
Flaps 1, Gear Up, Set Go-Around Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
14000	**PITCH ATT**	**17.5**	**14.5**	**12.5**	**11.0**	**10.5**
	V/S (FT/MIN)	4300	3400	2800	2300	1900
	KIAS	158	172	185	196	206
10000	**PITCH ATT**	**19.5**	**16.0**	**14.0**	**12.5**	**11.5**
	V/S (FT/MIN)	4800	3900	3200	2700	2200
	KIAS	158	172	185	196	205
5000	**PITCH ATT**	**23.5**	**19.0**	**16.0**	**14.0**	**13.0**
	V/S (FT/MIN)	5600	4500	3700	3100	2700
	KIAS	158	172	184	195	205
SEA LEVEL	**PITCH ATT**	**27.0**	**22.0**	**18.5**	**16.0**	**14.5**
	V/S (FT/MIN)	6300	5100	4300	3600	3100
	KIAS	158	172	184	195	205
-2000	**PITCH ATT**	**27.5**	**22.0**	**18.5**	**16.5**	**15.0**
	V/S (FT/MIN)	6100	5000	4200	3600	3100
	KIAS	158	172	184	195	204

GO-AROUND
Flaps 15, Gear Up, Set Go-Around Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
14000	**PITCH ATT**	**17.5**	**14.0**	**12.0**	**10.5**	**9.5**
	V/S (FT/MIN)	3400	2600	2100	1600	1200
	KIAS	128	142	155	166	176
10000	**PITCH ATT**	**20.0**	**16.0**	**13.5**	**11.5**	**10.5**
	V/S (FT/MIN)	3900	3000	2400	1900	1500
	KIAS	128	142	155	166	175
5000	**PITCH ATT**	**24.0**	**19.0**	**16.0**	**13.5**	**12.5**
	V/S (FT/MIN)	4500	3600	3000	2400	2000
	KIAS	128	142	154	165	175
SEA LEVEL	**PITCH ATT**	**28.0**	**22.0**	**18.5**	**16.0**	**14.0**
	V/S (FT/MIN)	5100	4200	3500	2900	2400
	KIAS	128	142	154	165	175
-2000	**PITCH ATT**	**28.0**	**22.0**	**18.5**	**16.0**	**14.0**
	V/S (FT/MIN)	5000	4100	3400	2800	2400
	KIAS	128	142	154	165	174

Max Climb %N1

Max Climb %N1

Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS/MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.78	.78	.78
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	95.1	95.2	93.5
55	91.0	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.5	92.8
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.7	93.8	92.1
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	93.0	93.1	91.4
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.3	92.4	90.7
35	93.6	94.0	94.3	94.5	94.3	94.0	94.0	93.0	92.4	90.8
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	93.9	93.3	91.8
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.7	94.1	92.8
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.4	94.9	93.7
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.2	95.7	94.6
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	96.9	96.5	95.6
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.7	97.3	96.5
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.5	98.2	97.5
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.2	99.0	98.4
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.2	99.8	99.4
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.4
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.8	101.3	101.0
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	100.0	100.5	100.1
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	99.1	99.6	99.3
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	98.3	98.8	98.4
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	97.4	97.9	97.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	0	10	20	30	35	41
ENGINE ANTI-ICE	-0.6	-0.8	-0.9	-0.9	-0.8	-0.8
ENGINE & WING ANTI-ICE*	-1.8	-2.1	-2.5	-2.7	-3.0	-3.0

***Dual bleed sources**

Go-around %N1

Go-around %N1

Based on engine bleed for packs on, engine and wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)										
°C	°F		-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
57	134	60	95.0	96.2	96.8									
52	125	55	95.9	96.7	96.6	96.8	97.5							
47	116	50	96.6	97.6	97.8	97.8	97.7	97.5	98.2	98.8				
42	108	45	97.4	98.4	98.5	98.6	98.7	98.8	98.7	98.5	98.5	99.0		
37	99	40	98.0	99.1	99.2	99.3	99.4	99.5	99.6	99.5	99.1	98.9	98.8	99.1
32	90	35	98.1	99.9	100.0	100.1	100.1	100.3	100.3	100.2	99.9	99.6	99.6	99.5
27	81	30	97.3	99.8	100.4	100.7	100.7	100.7	100.7	100.7	100.6	100.4	100.4	100.3
22	72	25	96.6	99.1	99.7	100.2	100.6	100.9	100.9	100.9	100.9	100.9	100.9	100.8
17	63	20	95.8	98.3	98.9	99.5	99.8	100.2	100.5	100.9	101.0	101.1	101.0	101.0
12	54	15	95.0	97.5	98.1	98.7	99.1	99.4	99.8	100.1	100.5	100.9	101.3	101.2
7	45	10	94.2	96.8	97.4	98.0	98.3	98.7	99.0	99.4	99.8	100.2	100.5	100.9
2	36	5	93.4	96.0	96.6	97.2	97.6	97.9	98.3	98.7	99.0	99.4	99.8	100.2
-3	27	0	92.6	95.2	95.8	96.4	96.8	97.2	97.5	97.9	98.3	98.7	99.0	99.4
-8	18	-5	91.8	94.4	95.0	95.6	96.0	96.4	96.8	97.2	97.5	97.9	98.3	98.6
-13	9	-10	91.0	93.6	94.2	94.8	95.2	95.6	96.0	96.4	96.8	97.1	97.5	97.9
-17	1	-15	90.2	92.8	93.4	94.0	94.4	94.8	95.2	95.6	96.0	96.4	96.7	97.1
-22	-8	-20	89.3	92.0	92.6	93.2	93.6	94.0	94.4	94.8	95.2	95.6	95.9	96.3
-27	-17	-25	88.5	91.1	91.8	92.4	92.8	93.2	93.6	94.0	94.4	94.8	95.1	95.5
-32	-26	-30	87.6	90.3	90.9	91.6	92.0	92.4	92.8	93.3	93.6	94.0	94.3	94.7
-37	-35	-35	86.8	89.4	90.1	90.7	91.1	91.6	92.0	92.4	92.8	93.2	93.5	93.9
-42	-44	-40	85.9	88.6	89.2	89.9	90.3	90.7	91.2	91.6	92.0	92.4	92.7	93.0
-47	-53	-45	85.0	87.7	88.4	89.0	89.4	89.9	90.3	90.8	91.2	91.5	91.9	92.2
-52	-62	-50	84.1	86.8	87.5	88.2	88.6	89.0	89.5	90.0	90.3	90.7	91.0	91.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)											
	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
PACKS OFF	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
A/C HIGH	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

VREF

NOTE: The weights in all tables are in KG.

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
85	160	168	177
80	155	163	172
75	151	158	167
70	146	153	161
65	141	148	156
60	135	142	149
55	128	136	143
50	122	129	136
45	115	122	128
40	108	115	121

Advisory Information

Normal Configuration Landing Distance

Flaps 15

NOTE: The weights in all tables are in KG.

Normal Configuration Landing Distance
Flaps 15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF15	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1010	70/-60	25/30	-35/125	15/-10	25/-25	35	25	50
AUTOBRAKE MAX	1300	65/-75	30/40	-45/155	0/0	30/-30	60	0	5
AUTOBRAKE 3	1870	105/-120	50/65	-80/260	0/0	55/-55	100	0	0
AUTOBRAKE 2	2385	155/-170	75/95	-105/360	30/-45	70/-70	100	70	70
AUTOBRAKE 1	2640	185/-200	90/115	-125/425	70/-85	80/-80	95	240	335
Good Reported Braking Action									
MAX MANUAL	1395	80/-85	40/50	-60/210	35/-30	35/-35	50	75	175
AUTOBRAKE MAX	1485	85/-90	40/55	-65/215	30/-25	35/-40	55	85	190
AUTOBRAKE 3	1870	105/-120	50/65	-80/265	5/0	55/-55	100	5	15
AUTOBRAKE 2	2385	155/-170	75/95	-105/360	30/-45	70/-70	100	70	70
AUTOBRAKE 1	2640	185/-200	90/115	-125/425	70/-85	80/-80	95	240	335
Medium Reported Braking Action									
MAX MANUAL	1930	125/-130	60/80	-95/345	90/-70	55/-55	65	215	520
AUTOBRAKE MAX	1965	130/-135	60/85	-100/350	85/-65	55/-55	75	215	520
AUTOBRAKE 3	2065	130/-140	60/85	-100/360	65/-45	60/-60	100	150	450
AUTOBRAKE 2	2440	160/-175	75/100	-115/405	65/-65	70/-75	100	115	250
AUTOBRAKE 1	2655	185/-200	90/120	-130/440	90/-90	80/-80	95	255	395
Poor Reported Braking Action									
MAX MANUAL	2545	180/-185	85/120	-145/550	215/-140	70/-75	80	465	1245
AUTOBRAKE MAX	2545	185/-185	90/120	-145/550	220/-145	70/-75	80	465	1245
AUTOBRAKE 3	2560	185/-185	90/120	-145/550	210/-130	70/-75	95	465	1255
AUTOBRAKE 2	2730	190/-200	90/125	-155/565	200/-130	75/-80	100	375	1090
AUTOBRAKE 1	2855	205/-215	100/135	-160/585	205/-145	80/-85	95	440	1080

Reference distance is based on sea level, standard day, no wind or slope, VREF15, two-engine detent No. 2 reverse thrust, and auto speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 60 m.
For autobrake and manual speedbrakes, increase reference landing distance by 55 m.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Normal Configuration Landing Distance (continued)

Flaps 30

NOTE: The weights in all tables are in KG.

Normal Configuration Landing Distance
Flaps 30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV
Dry Runway									
MAX MANUAL	960	55/-55	20/30	-35/120	10/-10	20/-20	35	20	40
AUTOBRAKE MAX	1215	60/-65	30/35	-45/150	0/0	30/-30	55	0	5
AUTOBRAKE 3	1725	95/-110	45/60	-75/250	0/0	50/-50	95	0	0
AUTOBRAKE 2	2190	140/-150	65/90	-100/345	30/-40	65/-65	95	60	60
AUTOBRAKE 1	2415	165/-180	80/105	-120/405	65/-75	70/-70	85	195	290
Good Reported Braking Action									
MAX MANUAL	1330	75/-80	35/45	-60/205	35/-30	35/-35	50	70	155
AUTOBRAKE MAX	1415	80/-85	40/50	-60/210	30/-25	35/-35	60	75	170
AUTOBRAKE 3	1725	95/-110	45/60	-75/250	5/0	50/-50	95	5	15
AUTOBRAKE 2	2190	140/-150	65/90	-100/345	30/-40	65/-65	95	60	60
AUTOBRAKE 1	2415	165/-180	80/105	-120/405	65/-75	70/-70	85	195	290
Medium Reported Braking Action									
MAX MANUAL	1815	115/-120	55/75	-95/335	85/-65	50/-50	65	190	450
AUTOBRAKE MAX	1850	120/-125	55/75	-95/340	80/-60	50/-50	75	190	455
AUTOBRAKE 3	1925	120/-125	55/75	-95/345	65/-45	55/-55	95	140	410
AUTOBRAKE 2	2245	140/-155	70/90	-110/390	65/-60	65/-65	95	105	225
AUTOBRAKE 1	2430	165/-180	80/105	-120/420	85/-80	70/-75	85	210	350
Poor Reported Braking Action									
MAX MANUAL	2365	165/-170	80/110	-140/530	205/-135	65/-70	75	400	1045
AUTOBRAKE MAX	2370	165/-170	80/110	-140/530	205/-135	65/-70	80	400	1050
AUTOBRAKE 3	2385	170/-170	80/110	-140/535	200/-125	65/-70	85	400	1055
AUTOBRAKE 2	2525	175/-180	85/115	-145/550	190/-125	70/-75	90	335	925
AUTOBRAKE 1	2630	185/-190	85/120	-150/565	195/-135	75/-80	85	380	930

Reference distance is based on sea level, standard day, no wind or slope, VREF30, two-engine detent No. 2 reverse thrust, and auto speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 60 m.
For autobrake and manual speedbrakes, increase reference landing distance by 55 m.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Normal Configuration Landing Distance (continued)

Flaps 40

NOTE: The weights in all tables are in KG.

Normal Configuration Landing Distance
Flaps 40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF40	ONE REV	NO REV
Dry Runway									
MAX MANUAL	915	55/-50	20/25	-35/115	10/-10	20/-20	35	15	35
AUTOBRAKE MAX	1135	55/-60	25/35	-40/140	0/0	25/-25	55	0	0
AUTOBRAKE 3	1590	85/-100	40/55	-70/235	0/0	45/-45	90	0	0
AUTOBRAKE 2	2030	125/-140	60/80	-95/330	20/-35	60/-60	95	35	35
AUTOBRAKE 1	2260	150/-165	75/95	-115/390	55/-65	65/-65	85	155	220
Good Reported Braking Action									
MAX MANUAL	1270	70/-75	35/45	-55/200	35/-30	30/-30	50	65	140
AUTOBRAKE MAX	1350	75/-80	35/45	-60/205	30/-25	35/-35	60	70	150
AUTOBRAKE 3	1600	85/-100	40/55	-70/240	10/-5	45/-45	95	5	15
AUTOBRAKE 2	2030	125/-140	60/80	-95/330	20/-35	60/-60	95	35	35
AUTOBRAKE 1	2260	150/-165	75/95	-115/390	55/-65	65/-65	85	155	220
Medium Reported Braking Action									
MAX MANUAL	1730	105/-115	50/70	-90/330	85/-65	45/-45	65	170	405
AUTOBRAKE MAX	1750	110/-120	55/70	-90/335	75/-60	45/-50	75	170	405
AUTOBRAKE 3	1800	110/-120	55/70	-95/340	70/-45	50/-50	90	150	390
AUTOBRAKE 2	2090	130/-145	60/85	-105/375	55/-55	60/-60	95	75	190
AUTOBRAKE 1	2275	150/-165	75/95	-115/405	80/-75	65/-65	85	170	275
Poor Reported Braking Action									
MAX MANUAL	2245	155/-160	75/100	-140/520	200/-130	60/-65	75	360	930
AUTOBRAKE MAX	2250	155/-160	75/105	-140/520	200/-130	60/-65	75	360	930
AUTOBRAKE 3	2260	155/-165	75/105	-140/525	195/-125	60/-65	85	360	935
AUTOBRAKE 2	2370	160/-165	75/105	-140/535	185/-120	65/-70	90	290	830
AUTOBRAKE 1	2470	170/-180	80/110	-145/550	190/-130	70/-75	85	335	815

Reference distance is based on sea level, standard day, no wind or slope, VREF40, two-engine detent No. 2 reverse thrust, and auto speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 55 m.
For autobrake and manual speedbrakes, increase reference landing distance by 45 m.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance

AIRSPEED UNRELIABLE (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Airspeed Unreliable (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1075	80/-65	25/35	-40/130	15/-10	25/-25	N/A	30	60
AUTOBRAKE MAX	1435	70/-80	35/45	-50/165	5/-5	35/-35	N/A	0	5
AUTOBRAKE 2	2550	165/-180	85/110	-110/370	50/-55	75/-75	N/A	165	180
Good Reported Braking Action									
MAX MANUAL	1475	80/-85	40/55	-60/215	35/-30	40/-40	N/A	90	205
AUTOBRAKE MAX	1600	85/-95	45/60	-65/225	30/-25	40/-40	N/A	100	230
AUTOBRAKE 2	2550	165/-180	85/110	-110/370	55/-55	75/-75	N/A	165	180
Medium Reported Braking Action									
MAX MANUAL	2025	130/-135	65/85	-100/350	90/-70	55/-55	N/A	240	595
AUTOBRAKE MAX	2080	130/-140	65/90	-100/355	85/-65	55/-60	N/A	245	605
AUTOBRAKE 3	2255	135/-145	70/90	-105/370	60/-45	65/-65	N/A	145	460
Poor Reported Braking Action									
MAX MANUAL	2635	185/-190	90/125	-145/550	210/-140	75/-80	N/A	505	1385
AUTOBRAKE MAX	2635	185/-190	90/125	-145/550	210/-135	75/-80	N/A	500	1380
AUTOBRAKE 3	2685	185/-190	90/125	-150/555	195/-125	75/-80	N/A	485	1375

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

AIRSPEED UNRELIABLE (Flaps 30)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Airspeed Unreliable (Flaps 30)
VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1025	60/-60	25/30	-35/125	15/-10	25/-25	N/A	25	55
AUTOBRAKE MAX	1335	60/-70	30/40	-45/155	5/-5	30/-35	N/A	0	5
AUTOBRAKE 2	2345	150/-160	75/95	-105/355	45/-50	70/-70	N/A	140	160
Good Reported Braking Action									
MAX MANUAL	1415	75/-80	40/50	-60/210	35/-30	35/-35	N/A	80	185
AUTOBRAKE MAX	1525	80/-90	40/55	-65/220	30/-30	40/-40	N/A	90	205
AUTOBRAKE 2	2345	150/-160	75/95	-105/355	45/-50	70/-70	N/A	140	160
Medium Reported Braking Action									
MAX MANUAL	1915	120/-125	60/80	-95/340	85/-70	50/-55	N/A	215	520
AUTOBRAKE MAX	1965	120/-130	60/80	-95/345	80/-65	55/-55	N/A	215	530
AUTOBRAKE 3	2100	120/-135	60/85	-100/360	60/-50	60/-60	N/A	135	420
Poor Reported Braking Action									
MAX MANUAL	2460	170/-170	85/115	-140/535	200/-130	65/-70	N/A	435	1165
AUTOBRAKE MAX	2470	170/-175	85/115	-140/535	200/-125	70/-75	N/A	430	1160
AUTOBRAKE 3	2510	170/-175	85/115	-145/540	190/-125	70/-75	N/A	425	1165

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

AIRSPEED UNRELIABLE (Flaps 40)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Airspeed Unreliable (Flaps 40)
VREF40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	985	55/-55	20/30	-35/120	15/-10	20/-20	N/A	20	45
AUTOBRAKE MAX	1245	55/-65	30/35	-45/150	5/0	30/-30	N/A	0	0
AUTOBRAKE 2	2195	135/-150	70/90	-100/340	40/-45	65/-65	N/A	105	110
Good Reported Braking Action									
MAX MANUAL	1360	70/-80	35/50	-60/205	35/-30	35/-35	N/A	75	170
AUTOBRAKE MAX	1455	75/-85	40/50	-60/215	30/-25	35/-35	N/A	85	185
AUTOBRAKE 2	2195	135/-150	70/90	-100/340	40/-45	65/-65	N/A	105	110
Medium Reported Braking Action									
MAX MANUAL	1830	110/-120	55/75	-95/335	85/-65	50/-50	N/A	195	465
AUTOBRAKE MAX	1870	115/-125	60/80	-95/340	80/-60	50/-50	N/A	195	475
AUTOBRAKE 3	1965	115/-125	60/80	-100/350	60/-50	55/-55	N/A	135	405
Poor Reported Braking Action									
MAX MANUAL	2345	160/-165	80/110	-140/525	195/-130	65/-70	N/A	395	1035
AUTOBRAKE MAX	2355	160/-165	80/110	-140/525	195/-125	65/-70	N/A	390	1035
AUTOBRAKE 3	2380	160/-165	80/110	-140/530	190/-125	65/-70	N/A	395	1045

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

ALL FLAPS UP LANDING

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
All Flaps Up Landing
VREF40 + 55

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1330	185/-85	50/105	-45/205	20/-15	35/-35	45	45	95
AUTOBRAKE MAX	1855	85/-90	45/70	-60/195	5/-5	50/-50	75	5	20
AUTOBRAKE 2	3360	195/-225	115/150	-130/430	75/-85	105/-105	100	280	330
Good Reported Braking Action									
MAX MANUAL	1755	85/-95	50/65	-65/230	40/-35	45/-50	45	110	255
AUTOBRAKE MAX	2000	90/-100	55/75	-75/245	30/-25	55/-55	70	85	225
AUTOBRAKE 2	3360	195/-225	115/150	-130/430	75/-85	105/-105	100	280	330
Medium Reported Braking Action									
MAX MANUAL	2495	145/-155	80/110	-110/385	105/-85	70/-75	65	315	775
AUTOBRAKE MAX	2580	150/-160	85/115	-110/390	100/-80	75/-75	75	325	800
AUTOBRAKE 3	2950	145/-170	90/120	-120/420	65/-60	90/-90	110	165	510
Poor Reported Braking Action									
MAX MANUAL	3320	220/-225	120/165	-165/605	250/-170	95/-100	80	690	1915
AUTOBRAKE MAX	3325	215/-225	120/165	-165/605	245/-160	100/-100	90	685	1905
AUTOBRAKE 3	3445	210/-225	120/165	-170/615	220/-150	100/-105	110	600	1840

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

ANTISKID INOPERATIVE (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
ANTISKID INOPERATIVE (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1795	105/-110	50/65	-80/290	55/-45	45/-45	60	145	345
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good Reported Braking Action									
MAX MANUAL	2015	125/-130	60/80	-100/350	85/-65	50/-55	70	215	530
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Medium Reported Braking Action									
MAX MANUAL	2585	180/-180	85/120	-145/545	200/-135	70/-75	80	460	1280
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Poor Reported Braking Action									
MAX MANUAL	3450	260/-260	120/175	-245/1005	625/-305	85/-105	95	1100	3915
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

ANTISKID INOPERATIVE (Flaps 30)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
ANTISKID INOPERATIVE (Flaps 30)
VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1695	95/-105	45/60	-80/280	55/-45	40/-45	60	125	300
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good Reported Braking Action									
MAX MANUAL	1895	115/-120	55/75	-95/340	80/-65	50/-50	65	185	455
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Medium Reported Braking Action									
MAX MANUAL	2415	165/-165	80/105	-140/530	190/-125	65/-70	80	395	1075
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Poor Reported Braking Action									
MAX MANUAL	3205	235/-235	110/155	-235/980	590/-285	75/-100	90	945	3215
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

ANTISKID INOPERATIVE (Flaps 40)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
ANTISKID INOPERATIVE (Flaps 40)
VREF40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1615	90/-100	45/60	-80/275	55/-45	40/-40	60	115	265
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good Reported Braking Action									
MAX MANUAL	1805	105/-115	50/70	-95/335	80/-60	45/-45	65	170	405
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Medium Reported Braking Action									
MAX MANUAL	2290	150/-155	70/100	-140/520	185/-120	60/-65	80	355	950
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Poor Reported Braking Action									
MAX MANUAL	3040	220/-225	100/145	-230/960	575/-275	70/-95	85	860	2860
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

JAMMED OR RESTRICTED FLIGHT CONTROLS (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Jammed or Restricted Flight Controls (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1005	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1310	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good Reported Braking Action									
MAX MANUAL	1380	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1485	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Medium Reported Braking Action									
MAX MANUAL	1900	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	1935	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2055	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465
Poor Reported Braking Action									
MAX MANUAL	2480	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2480	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2500	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

LEADING EDGE FLAPS TRANSIT (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
LEADING EDGE FLAPS TRANSIT (Flaps 15)
VREF15 + 15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1130	80/-70	25/35	-40/135	15/-15	25/-25	35	30	70
AUTOBRAKE MAX	1500	70/-80	35/45	-50/170	5/-5	40/-40	65	0	5
AUTOBRAKE 2	2725	175/-190	90/115	-115/385	50/-60	85/-85	100	155	160
Good Reported Braking Action									
MAX MANUAL	1570	85/-95	45/60	-65/220	40/-35	40/-40	50	105	240
AUTOBRAKE MAX	1690	90/-100	45/60	-65/230	35/-30	45/-45	60	115	260
AUTOBRAKE 2	2730	175/-190	90/115	-115/385	50/-60	85/-85	100	160	160
Medium Reported Braking Action									
MAX MANUAL	2170	140/-145	70/95	-100/365	95/-75	60/-60	70	275	695
AUTOBRAKE MAX	2210	140/-150	70/95	-105/365	90/-70	60/-65	75	280	700
AUTOBRAKE 3	2375	140/-150	75/100	-110/380	65/-45	70/-70	110	175	570
Poor Reported Braking Action									
MAX MANUAL	2825	200/-205	100/140	-155/570	225/-150	80/-85	80	580	1620
AUTOBRAKE MAX	2825	200/-205	100/140	-155/570	230/-155	80/-85	85	575	1615
AUTOBRAKE 3	2855	200/-200	100/140	-155/570	215/-130	80/-85	100	565	1615

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

LOSS OF SYSTEM A (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
LOSS OF SYSTEM A (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1120	70/-65	25/35	-40/135	15/-15	25/-25	45	35	60
AUTOBRAKE MAX	1300	65/-75	30/40	-45/155	0/0	30/-30	60	0	10
AUTOBRAKE 2	2465	150/-175	75/95	-110/365	0/-10	75/-75	140	0	0
Good Reported Braking Action									
MAX MANUAL	1620	95/-100	45/60	-70/235	50/-40	40/-45	70	135	275
AUTOBRAKE MAX	1630	95/-105	45/65	-70/235	40/-35	45/-45	75	135	275
AUTOBRAKE 2	2465	150/-175	75/95	-110/365	0/-10	75/-75	140	0	0
Medium Reported Braking Action									
MAX MANUAL	2235	150/-155	75/100	-110/380	115/-90	60/-65	90	350	840
AUTOBRAKE MAX	2220	150/-155	75/100	-105/380	120/-95	60/-65	90	345	830
AUTOBRAKE 3	2220	150/-155	75/100	-105/380	120/-85	60/-65	90	345	830
Poor Reported Braking Action									
MAX MANUAL	2905	215/-215	105/145	-160/590	265/-175	80/-85	105	710	2025
AUTOBRAKE MAX	2900	215/-215	105/150	-160/590	265/-180	80/-85	105	710	2025
AUTOBRAKE 3	2900	215/-215	105/150	-160/590	265/-180	80/-85	105	710	2025

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

LOSS OF SYSTEM A (Flaps 30)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
LOSS OF SYSTEM A (Flaps 30)
VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1060	65/-55	25/35	-40/130	15/-15	25/-25	45	30	50
AUTOBRAKE MAX	1215	60/-65	30/35	-45/145	0/0	30/-30	55	10	15
AUTOBRAKE 2	2260	135/-155	65/85	-105/350	0/-10	70/-70	135	0	0
Good Reported Braking Action									
MAX MANUAL	1535	85/-95	45/60	-65/225	45/-40	40/-40	70	120	240
AUTOBRAKE MAX	1550	90/-95	45/60	-65/230	40/-35	40/-40	75	120	240
AUTOBRAKE 2	2260	135/-155	65/85	-105/350	0/-10	70/-70	135	0	0
Medium Reported Braking Action									
MAX MANUAL	2090	135/-140	65/90	-105/370	110/-85	55/-60	85	305	710
AUTOBRAKE MAX	2085	135/-140	70/90	-105/370	115/-90	55/-60	90	300	705
AUTOBRAKE 3	2085	135/-140	70/90	-105/370	115/-80	55/-60	90	300	705
Poor Reported Braking Action									
MAX MANUAL	2695	195/-195	95/130	-155/570	250/-165	75/-80	100	605	1650
AUTOBRAKE MAX	2695	195/-195	95/135	-155/570	250/-165	75/-80	100	605	1650
AUTOBRAKE 3	2695	195/-195	95/135	-155/570	250/-165	75/-80	100	605	1650

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

LOSS OF SYSTEM A (Flaps 40)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
LOSS OF SYSTEM A (Flaps 40)
VREF40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1015	60/-55	25/30	-35/125	15/-15	25/-25	50	30	45
AUTOBRAKE MAX	1140	55/-60	25/35	-40/140	5/0	25/-25	55	10	20
AUTOBRAKE 2	2075	125/-140	60/80	-100/335	0/-5	60/-60	130	0	0
Good Reported Braking Action									
MAX MANUAL	1460	80/-90	40/55	-65/225	45/-40	35/-40	70	105	210
AUTOBRAKE MAX	1470	85/-90	40/55	-65/225	40/-35	40/-40	75	105	210
AUTOBRAKE 2	2075	125/-140	60/80	-100/335	0/-5	60/-60	130	0	0
Medium Reported Braking Action									
MAX MANUAL	1970	125/-135	60/85	-100/360	105/-85	55/-55	85	265	615
AUTOBRAKE MAX	1970	125/-135	60/85	-100/360	110/-85	55/-55	85	265	615
AUTOBRAKE 3	1970	125/-135	60/85	-100/360	110/-80	55/-55	90	265	615
Poor Reported Braking Action									
MAX MANUAL	2525	180/-185	85/120	-150/560	240/-155	70/-75	95	525	1400
AUTOBRAKE MAX	2530	180/-185	90/125	-150/560	245/-160	70/-75	95	530	1405
AUTOBRAKE 3	2530	180/-185	90/125	-150/560	245/-160	70/-75	95	530	1405

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

LOSS OF SYSTEM A AND SYSTEM B (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
LOSS OF SYSTEM A AND SYSTEM B (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1570	80/-90	40/50	-60/195	35/-35	40/-40	75	-10	65
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good Reported Braking Action									
MAX MANUAL	2290	135/-145	65/90	-100/335	100/-80	60/-60	105	95	440
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Medium Reported Braking Action									
MAX MANUAL	3035	200/-210	100/140	-150/525	215/-160	80/-85	120	365	1415
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Poor Reported Braking Action									
MAX MANUAL	3770	275/-275	135/190	-210/785	475/-270	100/-110	130	815	3380
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

LOSS OF SYSTEM B (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
LOSS OF SYSTEM B (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1140	55/-60	25/35	-45/145	20/-15	25/-25	40	40	70
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good Reported Braking Action									
MAX MANUAL	1630	95/-100	45/65	-75/255	50/-45	45/-45	60	140	285
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Medium Reported Braking Action									
MAX MANUAL	2215	150/-155	70/100	-115/410	125/-95	60/-65	75	340	815
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Poor Reported Braking Action									
MAX MANUAL	2835	210/-210	100/140	-170/640	295/-180	75/-85	90	665	1870
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

MANUAL REVERSION (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
MANUAL REVERSION (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1570	80/-90	40/50	-60/195	35/-35	40/-40	75	-10	65
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good Reported Braking Action									
MAX MANUAL	2290	135/-145	65/90	-100/335	100/-80	60/-60	105	95	440
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Medium Reported Braking Action									
MAX MANUAL	3035	200/-210	100/140	-150/525	215/-160	80/-85	120	365	1415
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Poor Reported Braking Action									
MAX MANUAL	3770	275/-275	135/190	-210/785	475/-270	100/-110	130	815	3380
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

ONE ENGINE INOPERATIVE LANDING (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
One Engine Inoperative Landing (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1020	75/-65	25/30	-35/130	15/-10	25/-25	35	0	25
AUTOBRAKE MAX	1300	70/-75	30/40	-45/155	0/0	30/-30	60	0	0
AUTOBRAKE 2	2450	150/-170	75/95	-110/365	10/-25	75/-75	120	0	0
Good Reported Braking Action									
MAX MANUAL	1440	80/-85	40/50	-65/215	40/-35	40/-40	50	0	100
AUTOBRAKE MAX	1545	85/-95	40/55	-65/225	35/-30	40/-40	60	0	110
AUTOBRAKE 2	2450	150/-170	75/95	-110/365	10/-25	75/-75	120	0	0
Medium Reported Braking Action									
MAX MANUAL	2075	135/-140	65/85	-105/370	110/-85	60/-60	70	0	310
AUTOBRAKE MAX	2115	135/-145	65/85	-105/375	105/-80	60/-60	80	0	315
AUTOBRAKE 3	2165	135/-150	65/85	-105/380	90/-65	60/-65	100	0	295
Poor Reported Braking Action									
MAX MANUAL	2850	200/-210	95/130	-165/605	290/-185	85/-85	90	0	765
AUTOBRAKE MAX	2850	200/-210	95/130	-165/605	290/-185	85/-85	95	0	765
AUTOBRAKE 3	2875	205/-210	95/130	-165/610	280/-180	85/-85	100	0	775

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

STABILIZER TRIM INOPERATIVE (Flaps 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Stabilizer Trim Inoperative (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1005	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1310	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good Reported Braking Action									
MAX MANUAL	1380	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1485	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Medium Reported Braking Action									
MAX MANUAL	1900	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	1935	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2055	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465
Poor Reported Braking Action									
MAX MANUAL	2480	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2480	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2500	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

TRAILING EDGE FLAP ASYMMETRY (1 ≤ Flap Lever < 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Trailing Edge Flap Asymmetry (1 ≤ Flap Lever <15)
VREF40 + 30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1110	90/-65	25/40	-40/135	15/-15	25/-25	35	30	60
AUTOBRAKE MAX	1510	70/-75	35/45	-50/170	5/-5	40/-40	65	0	5
AUTOBRAKE 2	2730	165/-185	90/115	-115/385	55/-60	85/-85	100	165	175
Good Reported Braking Action									
MAX MANUAL	1525	80/-85	40/55	-60/215	35/-30	40/-40	45	90	210
AUTOBRAKE MAX	1665	80/-90	45/60	-65/225	30/-25	45/-45	65	95	225
AUTOBRAKE 2	2735	160/-185	90/115	-115/385	55/-65	85/-85	95	165	175
Medium Reported Braking Action									
MAX MANUAL	2125	125/-135	70/90	-100/360	90/-75	60/-60	65	255	625
AUTOBRAKE MAX	2180	130/-140	70/95	-100/360	85/-70	60/-60	75	260	640
AUTOBRAKE 3	2385	125/-140	70/95	-110/380	60/-45	70/-70	110	150	470
Poor Reported Braking Action									
MAX MANUAL	2795	190/-195	100/135	-150/565	220/-150	80/-85	80	545	1510
AUTOBRAKE MAX	2790	185/-195	100/135	-150/565	220/-145	80/-85	85	540	1500
AUTOBRAKE 3	2845	185/-190	100/135	-155/570	205/-130	80/-85	105	525	1495

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

TRAILING EDGE FLAP ASYMMETRY (Flap Lever 15 or 25)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Trailing Edge Flap Asymmetry (Flap Lever 15 or 25)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1005	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1310	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good Reported Braking Action									
MAX MANUAL	1380	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1485	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Medium Reported Braking Action									
MAX MANUAL	1900	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	1935	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2055	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465
Poor Reported Braking Action									
MAX MANUAL	2480	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2480	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2500	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

TRAILING EDGE FLAP ASYMMETRY (Flap Lever 30)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Trailing Edge Flap Asymmetry (Flap Lever 30)
VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	960	55/-55	20/30	-35/120	10/-10	20/-20	35	20	45
AUTOBRAKE MAX	1215	60/-65	30/35	-45/150	5/0	30/-30	60	0	5
AUTOBRAKE 2	2165	140/-150	65/90	-100/340	30/-45	65/-65	90	85	85
Good Reported Braking Action									
MAX MANUAL	1315	70/-75	35/45	-60/200	30/-30	35/-35	50	75	165
AUTOBRAKE MAX	1410	75/-85	35/50	-60/210	30/-25	35/-35	60	80	185
AUTOBRAKE 2	2165	140/-150	65/90	-100/340	35/-45	65/-65	90	85	85
Medium Reported Braking Action									
MAX MANUAL	1790	115/-120	55/75	-90/330	80/-65	50/-50	65	195	480
AUTOBRAKE MAX	1820	115/-120	55/75	-95/335	75/-60	50/-50	70	200	480
AUTOBRAKE 3	1910	115/-125	55/75	-95/345	60/-40	50/-55	95	140	425
Poor Reported Braking Action									
MAX MANUAL	2315	160/-165	80/105	-140/525	195/-125	60/-65	75	410	1100
AUTOBRAKE MAX	2320	165/-165	80/110	-140/525	195/-130	65/-70	75	410	1100
AUTOBRAKE 3	2335	165/-165	80/110	-140/525	190/-115	65/-70	90	410	1110

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

TRAILING EDGE FLAP DISAGREE (1 ≤ Indicated Flaps < 15)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Trailing Edge Flap Disagree (1 ≤ Indicated Flaps <15)
VREF40 + 30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1110	90/-65	25/40	-40/135	15/-15	25/-25	35	30	60
AUTOBRAKE MAX	1510	70/-75	35/45	-50/170	5/-5	40/-40	65	0	5
AUTOBRAKE 2	2730	165/-185	90/115	-115/385	55/-60	85/-85	100	165	175
Good Reported Braking Action									
MAX MANUAL	1525	80/-85	40/55	-60/215	35/-30	40/-40	45	90	210
AUTOBRAKE MAX	1665	80/-90	45/60	-65/225	30/-25	45/-45	65	95	225
AUTOBRAKE 2	2735	160/-185	90/115	-115/385	55/-65	85/-85	95	165	175
Medium Reported Braking Action									
MAX MANUAL	2125	125/-135	70/90	-100/360	90/-75	60/-60	65	255	625
AUTOBRAKE MAX	2180	130/-140	70/95	-100/360	85/-70	60/-60	75	260	640
AUTOBRAKE 3	2385	125/-140	70/95	-110/380	60/-45	70/-70	110	150	470
Poor Reported Braking Action									
MAX MANUAL	2795	190/-195	100/135	-150/565	220/-150	80/-85	80	545	1510
AUTOBRAKE MAX	2790	185/-195	100/135	-150/565	220/-145	80/-85	85	540	1500
AUTOBRAKE 3	2845	185/-190	100/135	-155/570	205/-130	80/-85	105	525	1495

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

TRAILING EDGE FLAP DISAGREE (15 ≤ Indicated Flaps < 30)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Trailing Edge Flap Disagree (15 ≤ Indicated Flaps <30)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1005	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1310	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good Reported Braking Action									
MAX MANUAL	1380	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1485	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2360	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Medium Reported Braking Action									
MAX MANUAL	1900	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	1935	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2055	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465
Poor Reported Braking Action									
MAX MANUAL	2480	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2480	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2500	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

TRAILING EDGE FLAP DISAGREE (30 ≤ Indicated Flaps < 40)

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Trailing Edge Flap Disagree (30 ≤ Indicated Flaps <40)
VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	960	55/-55	20/30	-35/120	10/-10	20/-20	35	20	45
AUTOBRAKE MAX	1215	60/-65	30/35	-45/150	5/0	30/-30	60	0	5
AUTOBRAKE 2	2165	140/-150	65/90	-100/340	30/-45	65/-65	90	85	85
Good Reported Braking Action									
MAX MANUAL	1315	70/-75	35/45	-60/200	30/-30	35/-35	50	75	165
AUTOBRAKE MAX	1410	75/-85	35/50	-60/210	30/-25	35/-35	60	80	185
AUTOBRAKE 2	2165	140/-150	65/90	-100/340	35/-45	65/-65	90	85	85
Medium Reported Braking Action									
MAX MANUAL	1790	115/-120	55/75	-90/330	80/-65	50/-50	65	195	480
AUTOBRAKE MAX	1820	115/-120	55/75	-95/335	75/-60	50/-50	70	200	480
AUTOBRAKE 3	1910	115/-125	55/75	-95/345	60/-40	50/-55	95	140	425
Poor Reported Braking Action									
MAX MANUAL	2315	160/-165	80/105	-140/525	195/-125	60/-65	75	410	1100
AUTOBRAKE MAX	2320	165/-165	80/110	-140/525	195/-130	65/-70	75	410	1100
AUTOBRAKE 3	2335	165/-165	80/110	-140/525	190/-115	65/-70	90	410	1110

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Non-Normal Configuration Landing Distance (continued)

TRAILING EDGE FLAPS UP LANDING

NOTE: The weights in all tables are in KG.

Non-Normal Configuration Landing Distance
Trailing Edge Flaps Up Landing
VREF40 + 40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1185	110/-70	30/70	-40/140	15/-15	30/-30	45	30	70
AUTOBRAKE MAX	1645	75/-80	40/55	-55/180	5/-5	40/-45	70	5	10
AUTOBRAKE 2	2970	175/-195	100/130	-120/400	65/-70	90/-90	95	205	235
Good Reported Braking Action									
MAX MANUAL	1600	80/-90	45/60	-65/220	35/-30	40/-45	45	90	205
AUTOBRAKE MAX	1795	85/-95	50/65	-70/235	25/-25	45/-50	65	80	200
AUTOBRAKE 2	2970	175/-195	100/130	-120/400	65/-70	90/-90	95	205	235
Medium Reported Braking Action									
MAX MANUAL	2255	135/-140	70/95	-105/365	95/-75	65/-65	65	260	625
AUTOBRAKE MAX	2330	135/-145	75/100	-105/370	90/-75	65/-65	70	265	645
AUTOBRAKE 3	2605	135/-155	80/105	-115/395	60/-55	75/-80	105	145	435
Poor Reported Braking Action									
MAX MANUAL	2990	200/-205	105/145	-155/580	230/-155	85/-90	80	565	1530
AUTOBRAKE MAX	2995	195/-205	105/145	-155/580	230/-150	85/-90	90	560	1520
AUTOBRAKE 3	3080	190/-205	105/145	-160/585	210/-140	90/-95	100	520	1495

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

Recommended Brake Cooling Schedule

NOTE: The weights in all tables are in KG.

Reference Brake Energy per Brake

Recommended Brake Cooling Schedule
Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*																	
		80			100			120			140			160			180		
WEIGHT	OAT	PRESSURE ALTITUDE (1000 FT)																	
(1000 KG)	(°C)	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
80	0	15.1	17.0	19.3	22.4	25.3	28.9	30.9	35.0	40.2	40.4	45.9	53.0	50.8	57.9	67.3	60.8	69.6	81.2
	10	15.6	17.6	20.0	23.1	26.1	29.8	31.9	36.2	41.5	41.8	47.5	54.8	52.5	59.9	69.5	62.8	71.9	83.9
	15	15.8	17.8	20.2	23.5	26.5	30.3	32.4	36.7	42.1	42.4	48.2	55.6	53.3	60.7	70.5	63.7	72.9	85.1
	20	16.0	18.1	20.5	23.8	26.9	30.7	32.8	37.2	42.7	42.9	48.8	56.3	54.0	61.5	71.4	64.6	73.9	86.2
	30	16.4	18.5	21.1	24.4	27.6	31.5	33.7	38.2	43.8	44.0	50.0	57.7	55.3	63.1	73.2	66.2	75.7	88.4
	40	16.6	18.7	21.3	24.7	27.9	31.9	34.1	38.7	44.4	44.7	50.9	58.8	56.3	64.3	74.8	67.5	77.4	90.5
	50	16.6	18.7	21.3	24.8	28.0	32.1	34.3	39.0	44.9	45.2	51.5	59.7	57.1	65.4	76.3	68.7	79.0	92.9
70	0	13.7	15.4	17.5	20.2	22.8	26.0	27.7	31.3	35.9	36.1	41.0	47.2	45.3	51.6	59.7	54.9	62.7	72.9
	10	14.2	15.9	18.1	20.8	23.5	26.8	28.6	32.4	37.1	37.3	42.3	48.7	46.8	53.3	61.6	56.7	64.8	75.4
	15	14.4	16.2	18.4	21.1	23.9	27.2	29.0	32.8	37.6	37.8	43.0	49.4	47.5	54.0	62.5	57.5	65.7	76.4
	20	14.6	16.4	18.6	21.4	24.2	27.6	29.4	33.3	38.1	38.4	43.5	50.1	48.1	54.8	63.4	58.3	66.5	77.4
	30	14.9	16.8	19.1	22.0	24.8	28.3	30.2	34.1	39.1	39.3	44.6	51.4	49.3	56.1	64.9	59.8	68.2	79.4
	40	15.1	17.0	19.3	22.2	25.1	28.6	30.5	34.6	39.6	39.9	45.3	52.2	50.1	57.1	66.2	60.9	69.6	81.2
	50	15.1	17.0	19.3	22.3	25.2	28.8	30.7	34.8	40.0	40.2	45.8	52.9	50.7	58.0	67.4	61.8	70.9	83.0
60	0	12.3	13.9	15.7	18.0	20.3	23.1	24.4	27.6	31.6	31.7	35.9	41.2	39.6	45.0	51.8	48.1	54.8	63.5
	10	12.7	14.3	16.3	18.5	20.9	23.8	25.2	28.5	32.6	32.7	37.1	42.6	40.9	46.5	53.6	49.7	56.6	65.6
	15	12.9	14.6	16.5	18.8	21.2	24.2	25.6	29.0	33.1	33.2	37.6	43.2	41.5	47.1	54.4	50.4	57.4	66.5
	20	13.1	14.8	16.7	19.1	21.5	24.5	26.0	29.4	33.5	33.6	38.1	43.8	42.0	47.8	55.1	51.1	58.2	67.4
	30	13.4	15.1	17.2	19.6	22.1	25.1	26.6	30.1	34.4	34.5	39.1	44.9	43.1	49.0	56.5	52.3	59.6	69.1
	40	13.6	15.3	17.3	19.8	22.3	25.4	26.9	30.5	34.9	35.0	39.7	45.6	43.8	49.8	57.5	53.2	60.7	70.5
	50	13.5	15.3	17.3	19.8	22.4	25.5	27.0	30.6	35.1	35.2	40.0	46.0	44.2	50.4	58.3	53.9	61.7	71.9
50	0	11.0	12.3	14.0	15.7	17.7	20.2	21.2	23.9	27.3	27.2	30.8	35.3	33.8	38.3	44.1	40.9	46.4	53.6
	10	11.3	12.7	14.4	16.3	18.3	20.8	21.9	24.7	28.2	28.1	31.8	36.5	34.9	39.6	45.5	42.2	48.0	55.4
	15	11.5	12.9	14.7	16.5	18.6	21.1	22.2	25.1	28.6	28.6	32.3	37.0	35.4	40.2	46.2	42.8	48.7	56.2
	20	11.6	13.1	14.9	16.7	18.9	21.4	22.5	25.4	29.0	28.9	32.8	37.5	35.9	40.7	46.8	43.4	49.3	56.9
	30	11.9	13.4	15.2	17.2	19.3	22.0	23.1	26.1	29.7	29.7	33.6	38.4	36.8	41.8	48.0	44.5	50.6	58.4
	40	12.1	13.6	15.4	17.3	19.5	22.2	23.4	26.4	30.1	30.1	34.0	39.0	37.4	42.4	48.8	45.2	51.4	59.4
	50	12.0	13.6	15.4	17.3	19.6	22.3	23.4	26.5	30.3	30.2	34.2	39.3	37.6	42.8	49.3	45.7	52.1	60.3
40	0	9.6	10.8	12.3	13.5	15.2	17.3	17.9	20.2	23.0	22.8	25.8	29.4	28.1	31.8	36.4	33.7	38.2	43.9
	10	10.0	11.2	12.7	14.0	15.8	17.9	18.5	20.9	23.8	23.6	26.6	30.4	29.0	32.8	37.6	34.8	39.5	45.4
	15	10.1	11.4	12.9	14.2	16.0	18.1	18.8	21.2	24.1	23.9	27.0	30.8	29.4	33.3	38.2	35.3	40.0	46.0
	20	10.2	11.5	13.1	14.4	16.2	18.4	19.1	21.5	24.5	24.2	27.4	31.3	29.8	33.8	38.7	35.8	40.6	46.6
	30	10.5	11.8	13.4	14.8	16.6	18.9	19.6	22.1	25.1	24.9	28.1	32.1	30.6	34.6	39.7	36.7	41.6	47.8
	40	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.4	25.2	28.4	32.5	31.0	35.1	40.2	37.2	42.2	48.6
	50	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.5	25.2	28.6	32.7	31.1	35.3	40.6	37.5	42.6	49.1

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.**

Recommended Brake Cooling Schedule (continued)

Ajusted Brake Energy per Brake

Recommended Brake Cooling Schedule
Adjusted Brake Energy Per Brake (Millions of Foot Pounds)
No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.8	16.3	25.3	34.7	44.7	55.0	65.7	76.6	87.9
	MAX AUTO	7.5	15.4	23.6	32.4	41.8	51.8	62.5	74.1	86.5
	AUTOBRAKE 3	7.3	14.7	22.3	30.2	38.6	47.6	57.4	68.1	80.0
	AUTOBRAKE 2	7.0	13.8	20.5	27.4	34.8	42.7	51.5	61.3	72.4
	AUTOBRAKE 1	6.7	13.1	19.2	25.3	31.8	38.8	46.6	55.4	65.5

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.0	14.6	22.8	31.4	40.5	49.9	59.7	69.8	80.0
	MAX AUTO	5.8	12.3	19.5	27.2	35.6	44.5	53.9	63.7	74.1
	AUTOBRAKE 3	4.3	9.2	14.7	20.7	27.2	34.4	42.0	50.2	59.0
	AUTOBRAKE 2	2.5	5.6	9.1	13.1	17.8	23.0	28.8	35.2	42.3
	AUTOBRAKE 1	1.8	3.8	6.1	8.8	11.9	15.5	19.6	24.4	29.8

Cooling Time (Minutes) - Category C Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category N Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	19	20.9	23.5	26.9	29.4	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.5	2.6	3	3.3	3.8	4.5	4.9	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	7.6	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9	53.3		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

ENGINE INOP

Initial Max Continuous %N1

Based on .79M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.8	96.6	96.3	96.1	95.9	95.4	95.0	94.7	93.9
15	97.4	97.2	96.9	96.8	96.6	96.2	95.7	95.5	94.8
10	98.0	97.8	97.5	97.4	97.4	96.9	96.5	96.3	95.7
5	98.3	98.6	98.3	98.1	98.1	97.7	97.3	97.1	96.6
0	97.5	98.7	99.2	99.0	98.9	98.5	98.2	98.0	97.5
-5	96.7	98.0	99.1	99.8	99.7	99.3	98.9	98.7	98.4
-10	96.0	97.2	98.4	99.6	100.5	100.2	99.8	99.6	99.4
-15	95.2	96.4	97.6	98.8	100.1	101.0	100.8	100.6	100.3
-20	94.4	95.6	96.8	98.0	99.3	100.5	101.1	100.8	100.6
-25	93.6	94.9	96.0	97.2	98.5	99.7	100.2	100.0	99.8
-30	92.8	94.1	95.2	96.4	97.7	98.8	99.4	99.2	99.0
-35	92.0	93.2	94.4	95.6	96.8	98.0	98.5	98.3	98.1
-40	91.2	92.4	93.5	94.7	96.0	97.1	97.6	97.4	97.2

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE	-4.2	-4.4	-4.5	-4.7	-5.0	-4.8	-4.8	-4.8	-4.8

Max Continuous %N1

37000 FT to 29000 FT Pressure Altitudes

ENGINE INOP

Max Continuous %N1
37000 FT to 29000 FT Pressure Altitudes

37000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.51	96.6	97.6	98.5	99.4	100.2	99.6	98.8	97.6	96.3	94.7	93.2	91.8
200	.63	96.0	96.9	97.8	98.7	99.6	100.4	100.1	99.3	98.4	97.5	96.3	95.2
240	.74	95.1	96.0	96.8	97.7	98.6	99.4	100.3	100.7	100.0	99.2	98.4	97.5
280	.86	94.3	95.2	96.1	97.0	97.8	98.7	99.5	100.4	101.2	100.9	100.0	99.1
35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	96.5	97.4	98.3	99.2	100.1	99.8	99.0	98.0	96.8	95.4	94.0	92.7
200	.60	96.1	97.0	97.9	98.8	99.7	100.6	100.5	99.6	98.6	97.6	96.5	95.4
240	.71	95.0	95.9	96.8	97.7	98.6	99.4	100.3	100.8	100.2	99.5	98.6	97.7
280	.82	93.8	94.6	95.5	96.4	97.3	98.1	98.9	99.8	100.6	100.3	99.5	98.8
33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	97.4	98.3	99.2	100.0	100.8	100.0	99.1	97.9	96.7	95.3	93.9	92.6
200	.58	97.0	97.9	98.8	99.7	100.6	101.4	100.6	99.6	98.6	97.5	96.3	95.1
240	.68	95.9	96.8	97.7	98.5	99.4	100.2	101.1	100.9	100.2	99.4	98.4	97.4
280	.79	94.3	95.1	96.0	96.8	97.7	98.5	99.3	100.2	100.5	99.7	98.9	98.1
320	.89	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	100.3	101.1	100.7	99.8
31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	97.3	98.2	99.1	100.0	100.9	101.1	100.2	99.2	98.0	96.6	95.2	93.9
200	.55	97.1	98.0	98.9	99.7	100.6	101.5	101.6	100.7	99.7	98.6	97.4	96.2
240	.66	95.6	96.5	97.4	98.3	99.1	100.0	100.8	101.3	100.5	99.8	98.8	97.8
280	.76	93.8	94.7	95.5	96.4	97.2	98.0	98.8	99.7	100.5	99.8	98.9	98.0
320	.85	92.4	93.2	94.1	94.9	95.7	96.5	97.4	98.2	98.9	99.7	99.9	99.1
29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	98.1	99.0	99.9	100.8	101.6	101.2	100.2	99.1	97.9	96.4	95.1	93.8
200	.53	97.5	98.4	99.3	100.2	101.0	101.9	101.3	100.4	99.3	98.2	96.9	95.8
240	.63	96.3	97.1	98.0	98.9	99.7	100.5	101.4	101.1	100.2	99.2	98.3	97.2
280	.73	94.2	95.0	95.9	96.7	97.5	98.3	99.1	99.9	100.1	99.1	98.2	97.5
320	.82	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	98.5	97.6
360	.91	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	100.0	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.1	-4.3	-4.5	-4.7	-4.7

Max Continuous %N1 (continued)

27000 FT to 20000 FT Pressure Altitudes

ENGINE INOP

Max Continuous %N1

27000 FT to 20000 FT Pressure Altitudes

27000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	98.0	98.8	99.7	100.6	101.4	102.2	101.2	100.2	99.0	97.8	96.4	95.1
200	.51	96.9	97.8	98.7	99.6	100.4	101.2	101.8	100.8	99.9	98.8	97.6	96.4
240	.60	95.6	96.5	97.4	98.2	99.1	99.9	100.7	101.3	100.4	99.4	98.5	97.5
280	.70	93.6	94.4	95.3	96.1	96.9	97.7	98.5	99.3	100.1	99.4	98.4	97.6
320	.79	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	98.6	97.8
360	.88	91.0	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	98.1	98.8	99.4
25000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.8	99.7	100.5	101.4	102.2	102.4	101.4	100.3	99.1	97.7	96.5	95.2
200	.49	97.5	98.3	99.2	100.0	100.9	101.7	101.5	100.6	99.5	98.4	97.3	96.2
240	.58	95.7	96.5	97.4	98.2	99.0	99.9	100.7	100.5	99.5	98.6	97.6	96.7
280	.67	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.5	99.5	98.6	97.6	96.9
320	.76	91.7	92.6	93.4	94.2	95.0	95.8	96.5	97.3	98.0	98.6	97.8	97.2
360	.85	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.6	98.4	98.2
24000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	98.6	99.5	100.4	101.2	102.1	102.9	101.9	100.8	99.6	98.4	97.1	95.8
200	.48	97.5	98.4	99.2	100.1	100.9	101.8	102.2	101.1	100.1	99.0	97.8	96.7
240	.57	95.9	96.8	97.6	98.5	99.3	100.1	100.9	101.2	100.2	99.2	98.2	97.3
280	.66	94.2	95.1	95.9	96.7	97.5	98.3	99.1	99.9	100.4	99.4	98.3	97.5
320	.75	92.1	93.0	93.8	94.6	95.4	96.2	96.9	97.7	98.5	99.2	98.6	97.8
360	.83	90.6	91.4	92.2	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.6
22000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	99.1	100.0	100.9	101.7	102.5	102.8	101.8	100.7	99.5	98.2	97.0	95.8
200	.46	98.4	99.3	100.1	101.0	101.8	102.6	102.3	101.2	100.0	98.9	97.8	96.8
240	.55	97.2	98.1	98.9	99.7	100.5	101.3	102.1	101.6	100.5	99.4	98.5	97.5
280	.63	95.7	96.5	97.4	98.2	99.0	99.8	100.6	101.3	101.0	99.8	98.9	98.1
320	.72	93.9	94.7	95.5	96.3	97.1	97.9	98.6	99.4	100.1	100.2	99.3	98.6
360	.80	92.2	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	99.2	99.7	99.1
20000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	98.7	99.5	100.4	101.2	102.0	102.8	102.5	101.5	100.4	99.2	98.0	96.8
200	.44	98.3	99.2	100.0	100.9	101.7	102.5	103.3	102.3	101.1	100.0	98.9	97.8
240	.53	97.5	98.4	99.2	100.0	100.8	101.7	102.5	103.1	101.8	100.5	99.5	98.6
280	.61	96.2	97.0	97.8	98.7	99.5	100.3	101.1	101.8	102.5	101.3	100.1	99.3
320	.69	94.7	95.5	96.3	97.1	97.9	98.7	99.5	100.2	101.0	101.7	100.9	99.9
360	.77	93.0	93.8	94.6	95.4	96.2	97.0	97.7	98.5	99.2	100.0	100.7	100.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	20	22	24	25	27
ENGINE ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-3.6	-3.8	-3.8	-3.9	-4.0

Max Continuous %N1 (continued)

18000 FT to 12000 FT Pressure Altitudes

ENGINE INOP

Max Continuous %N1

18000 FT to 12000 FT Pressure Altitudes

18000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.34	98.5	99.3	100.2	101.0	101.8	102.6	101.6	100.3	99.2	98.1	97.0	95.9
200	.42	98.7	99.6	100.4	101.2	102.0	102.8	103.1	101.7	100.4	99.3	98.3	97.3
240	.51	97.8	98.7	99.5	100.3	101.1	101.9	102.7	102.5	101.1	99.9	99.0	98.1
280	.59	96.3	97.1	97.9	98.7	99.5	100.3	101.0	101.8	101.6	100.5	99.6	98.8
320	.67	94.8	95.6	96.4	97.2	97.9	98.7	99.5	100.2	101.0	100.9	100.0	99.2
360	.75	93.0	93.8	94.6	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.2	99.6
16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	97.1	98.0	98.8	99.6	100.4	101.2	101.6	100.3	99.1	98.1	97.1	96.1
200	.41	98.0	98.8	99.6	100.4	101.2	102.0	102.8	102.5	101.3	100.2	99.3	98.3
240	.49	97.1	97.9	98.7	99.5	100.3	101.1	101.9	102.7	101.8	100.5	99.6	98.7
280	.57	95.6	96.4	97.2	98.0	98.8	99.6	100.3	101.1	101.8	100.9	99.8	99.0
320	.64	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.2	99.4
360	.72	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.4	99.2	99.9	99.6
14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	96.6	97.4	98.2	99.0	99.8	100.6	100.4	99.1	98.0	97.1	96.2	95.3
200	.39	97.1	97.9	98.7	99.5	100.3	101.1	101.8	101.5	101.0	100.1	99.3	98.4
240	.47	96.6	97.4	98.2	99.0	99.8	100.6	101.3	101.8	101.1	100.3	99.5	98.7
280	.54	95.5	96.3	97.1	97.8	98.6	99.4	100.1	100.9	101.0	100.1	99.2	98.5
320	.62	94.1	94.9	95.7	96.5	97.2	98.0	98.7	99.5	100.2	100.3	99.5	98.8
360	.69	92.2	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.6	99.0
12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	96.3	97.0	97.8	98.6	99.4	100.1	99.3	98.1	97.1	96.3	95.4	94.5
200	.38	97.1	97.9	98.7	99.5	100.3	101.0	101.5	100.8	99.8	99.0	98.2	97.3
240	.45	96.5	97.3	98.0	98.8	99.6	100.3	101.1	101.0	100.1	99.4	98.6	97.9
280	.52	95.5	96.3	97.0	97.8	98.6	99.3	100.0	100.8	100.3	99.4	98.6	98.0
320	.60	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	99.7	98.9	98.2
360	.67	92.3	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	99.4	99.1	98.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	12	14	16	18
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-3.2	-3.4	-3.4	-3.5

Max Continuous %N1 (continued)

10000 FT to 1000 FT Pressure Altitudes

ENGINE INOP

Max Continuous %N1
10000 FT to 1000 FT Pressure Altitudes

10000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.29	95.2	96.0	96.8	97.6	98.3	99.1	99.8	98.6	97.4	96.6	95.8	94.9
200	.36	96.0	96.7	97.5	98.3	99.0	99.8	100.5	100.5	99.4	98.5	97.8	97.0
240	.43	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.1	99.2	98.4	97.7
280	.51	94.5	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.4	99.5	98.7	98.0
320	.58	93.0	93.9	94.7	95.5	96.2	97.0	97.8	98.6	99.3	99.7	99.0	98.2
360	.65	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	99.1	98.5
5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	94.9	95.7	96.4	97.2	98.0	98.8	99.2	98.3	97.4	96.6	95.9	95.1
200	.33	94.7	95.5	96.3	97.1	97.8	98.6	99.4	98.9	98.0	97.3	96.6	95.8
240	.40	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.5	98.7	97.9	97.2	96.5
280	.46	93.3	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	98.2	97.5	96.8
320	.53	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	98.7	98.4	97.7	97.1
360	.59	91.5	92.3	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.0	97.3
3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	94.8	95.6	96.4	97.2	98.0	98.7	98.8	97.9	97.1	96.4	95.6	94.8
200	.32	94.5	95.3	96.1	96.9	97.6	98.4	99.2	98.3	97.5	96.8	96.1	95.3
240	.38	94.1	94.9	95.6	96.4	97.2	98.0	98.7	98.8	98.0	97.2	96.6	95.9
280	.45	93.2	94.0	94.8	95.6	96.4	97.2	97.9	98.7	98.3	97.5	96.9	96.2
320	.51	92.5	93.3	94.1	94.9	95.7	96.4	97.2	98.0	98.5	97.8	97.1	96.5
360	.57	91.6	92.4	93.2	94.0	94.7	95.5	96.3	97.1	97.8	98.1	97.4	96.8
1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	93.9	94.7	95.4	96.2	97.0	97.8	98.5	98.2	97.4	96.7	96.0	95.2
200	.31	93.5	94.3	95.1	95.9	96.7	97.4	98.2	98.5	97.8	97.0	96.3	95.6
240	.37	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	98.1	97.3	96.6	95.9
280	.43	92.3	93.2	93.9	94.7	95.5	96.3	97.1	97.8	98.3	97.6	96.9	96.2
320	.49	91.6	92.4	93.2	94.0	94.8	95.6	96.3	97.1	97.9	97.9	97.2	96.5
360	.55	90.7	91.5	92.3	93.1	93.9	94.7	95.4	96.2	96.9	97.7	97.3	96.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-3.1	-3.2

Driftdown Speed/Level Off Altitude

NOTE: The weights in all tables are in KG.

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	82	271	18500	17300	15900
80	77	263	20200	19000	17700
75	72	255	21600	20600	19400
70	67	247	23100	22200	21100
65	62	238	24700	23800	22800
60	57	229	26800	25800	24700
55	53	219	29100	28100	27000
50	48	209	31200	30400	29400
45	43	199	33300	32600	31700
40	38	187	35600	34900	34000

Includes APU fuel burn.

Driftdown/LRC Cruise Range Capability

NOTE: The weights in all tables are in KG.

Driftdown/LRC Cruise Range Capability
Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
138	128	120	112	106	100	95	90	86	82	78
275	256	239	225	212	200	190	180	172	164	157
413	384	359	337	317	300	284	270	258	246	235
551	512	479	449	423	400	379	360	344	328	314
689	640	598	562	529	500	474	451	429	410	392
826	768	718	674	635	600	569	541	515	492	471
964	896	838	786	741	700	664	631	601	574	549
1102	1025	957	898	846	800	758	721	687	656	628
1240	1153	1077	1011	952	900	853	811	773	738	706
1377	1281	1197	1123	1058	1000	948	901	859	820	785
1515	1409	1317	1235	1164	1100	1043	991	945	902	863
1653	1537	1436	1348	1270	1200	1138	1081	1030	984	942
1792	1666	1556	1460	1375	1300	1232	1171	1116	1066	1020
1930	1794	1676	1573	1481	1400	1327	1261	1202	1148	1098
2068	1922	1796	1685	1587	1500	1422	1351	1288	1230	1177
2207	2051	1916	1798	1693	1600	1517	1441	1373	1312	1255
2345	2180	2036	1910	1799	1700	1611	1531	1459	1393	1333
2484	2309	2156	2023	1905	1800	1706	1621	1545	1475	1411

Driftdown/Cruise Fuel and Time

NOTE: The weights in all tables are in KG.

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG) WEIGHT AT START OF DRIFTDOWN (1000 KG)										TIME (HR:MIN)
	40	45	50	55	60	65	70	75	80	85	
100	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0:16
200	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	0:33
300	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	0:49
400	1.6	1.8	1.9	2.0	2.2	2.3	2.5	2.6	2.8	2.9	1:06
500	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.7	1:22
600	2.4	2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.3	4.5	1:39
700	2.8	3.1	3.4	3.6	3.9	4.2	4.5	4.7	5.0	5.3	1:55
800	3.2	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.1	2:11
900	3.6	4.0	4.3	4.7	5.0	5.4	5.7	6.1	6.4	6.8	2:28
1000	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.7	7.1	7.6	2:44
1100	4.4	4.8	5.3	5.7	6.1	6.6	7.0	7.4	7.9	8.3	3:01
1200	4.8	5.3	5.7	6.2	6.7	7.1	7.6	8.1	8.6	9.0	3:17
1300	5.2	5.7	6.2	6.7	7.2	7.7	8.2	8.7	9.2	9.8	3:34
1400	5.5	6.1	6.6	7.2	7.7	8.3	8.8	9.4	9.9	10.5	3:51
1500	5.9	6.5	7.1	7.7	8.3	8.9	9.4	10.0	10.6	11.2	4:07
1600	6.3	6.9	7.5	8.2	8.8	9.4	10.0	10.7	11.3	12.0	4:24
1700	6.6	7.3	8.0	8.6	9.3	10.0	10.6	11.3	12.0	12.7	4:41
1800	7.0	7.7	8.4	9.1	9.8	10.5	11.2	11.9	12.6	13.4	4:57

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at long range cruise speed.

Long Range Cruise Altitude Capability

NOTE: The weights in all tables are in KG.

Long Range Cruise Altitude Capability
100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15200	12600	9900
80	17200	15300	12500
75	19200	17400	15000
70	20900	19700	17300
65	22500	21300	19800
60	24100	23000	21600
55	26300	24800	23500
50	29000	27700	25800
45	31400	30500	29200
40	33800	33000	31800

With engine anti-ice on, decrease altitude capability by 1200 ft.
With engine and wing anti-ice on, decrease altitude capability by 5500 ft.

Long Range Cruise Control

NOTE: The weights in all tables are in KG.

ENGINE INOP

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	15	17	19	21	23	25	27	29	31
85	%N1	91.8	95.5	97.9							
	MACH	.561	.600	.616							
	KIAS	311	303	300							
	FF/ENG	3067	3033	3052							
80	%N1	90.1	94.0	95.9	98.5						
	MACH	.545	.590	.603	.621						
	KIAS	302	299	294	291						
	FF/ENG	2875	2870	2846	2886						
75	%N1	88.4	92.5	94.0	96.1						
	MACH	.528	.579	.593	.607						
	KIAS	293	293	288	284						
	FF/ENG	2684	2709	2674	2662						
70	%N1	86.5	90.7	92.3	94.0	96.2					
	MACH	.510	.562	.582	.595	.610					
	KIAS	282	284	283	278	274					
	FF/ENG	2494	2518	2520	2481	2487					
65	%N1	84.5	88.7	90.4	92.2	93.9	96.4				
	MACH	.491	.542	.563	.584	.596	.612				
	KIAS	271	274	274	273	268	265				
	FF/ENG	2306	2327	2330	2330	2295	2317				
60	%N1	82.3	86.5	88.3	90.0	91.9	93.7	96.4			
	MACH	.471	.521	.543	.564	.585	.597	.614			
	KIAS	261	263	263	263	263	258	254			
	FF/ENG	2124	2137	2139	2140	2143	2114	2146			
55	%N1	80.2	84.2	85.9	87.7	89.5	91.4	93.3	96.2		
	MACH	.453	.498	.520	.541	.563	.585	.597	.614		
	KIAS	250	251	252	252	253	252	247	244		
	FF/ENG	1954	1948	1950	1950	1953	1958	1938	1971		
50	%N1	77.8	81.6	83.4	85.2	87.0	88.7	90.7	92.7	95.7	
	MACH	.434	.475	.495	.516	.538	.561	.583	.596	.613	
	KIAS	240	239	239	240	241	241	241	236	233	
	FF/ENG	1791	1764	1762	1762	1764	1767	1777	1765	1793	
45	%N1	75.5	79.1	80.6	82.3	84.1	85.9	87.7	89.7	91.8	94.8
	MACH	.415	.452	.469	.489	.511	.533	.556	.578	.593	.610
	KIAS	229	227	227	227	228	229	229	229	225	222
	FF/ENG	1636	1594	1582	1575	1577	1580	1586	1600	1593	1613
40	%N1	73.0	76.2	77.8	79.4	81.0	82.8	84.6	86.4	88.3	90.7
	MACH	.395	.429	.445	.462	.480	.502	.525	.548	.571	.589
	KIAS	218	215	215	214	214	215	216	216	216	214
	FF/ENG	1485	1434	1416	1402	1392	1394	1400	1410	1421	1424

Long Range Cruise Diversion Fuel and Time

NOTE: The weights in all tables are in KG.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time
Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
298	272	249	230	214	200	190	180	172	164	158
600	547	501	462	429	400	379	361	344	328	315
903	823	753	694	644	600	570	542	517	494	473
1209	1100	1005	926	859	800	759	721	687	657	630
1516	1379	1259	1159	1075	1000	949	902	859	820	786
1825	1659	1513	1393	1290	1200	1139	1082	1031	984	943
2137	1940	1768	1626	1506	1400	1328	1262	1202	1147	1099
2450	2222	2024	1860	1722	1600	1518	1442	1373	1311	1256
2766	2507	2281	2095	1938	1800	1707	1622	1544	1474	1412
3083	2792	2539	2331	2155	2000	1896	1801	1715	1637	1568

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	1.4	0:43	1.2	0:41	1.1	0:39	1.0	0:38	0.9	0:37
400	2.8	1:23	2.6	1:19	2.4	1:14	2.2	1:11	2.1	1:09
600	4.3	2:04	3.9	1:57	3.6	1:50	3.4	1:45	3.2	1:42
800	5.7	2:46	5.2	2:36	4.9	2:26	4.5	2:19	4.4	2:14
1000	7.1	3:28	6.6	3:15	6.1	3:03	5.7	2:53	5.5	2:47
1200	8.5	4:10	7.9	3:55	7.3	3:40	6.8	3:28	6.6	3:21
1400	9.8	4:53	9.1	4:36	8.5	4:18	8.0	4:02	7.7	3:54
1600	11.2	5:36	10.4	5:16	9.7	4:55	9.1	4:38	8.7	4:28
1800	12.5	6:20	11.7	5:58	10.9	5:34	10.2	5:13	9.8	5:02
2000	13.9	7:05	12.9	6:39	12.0	6:13	11.3	5:49	10.8	5:36

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)								
	40	45	50	55	60	65	70	75	80
1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.1	0.2	0.3
2	-0.3	-0.2	-0.1	-0.1	0.0	0.2	0.3	0.6	0.8
3	-0.4	-0.3	-0.2	-0.1	0.0	0.3	0.5	0.9	1.2
4	-0.6	-0.4	-0.3	-0.1	0.0	0.3	0.7	1.2	1.6
5	-0.7	-0.5	-0.4	-0.2	0.0	0.4	0.9	1.4	2.0
6	-0.8	-0.6	-0.4	-0.2	0.0	0.5	1.1	1.7	2.4
7	-1.0	-0.8	-0.5	-0.3	0.0	0.6	1.2	2.0	2.8
8	-1.1	-0.9	-0.6	-0.3	0.0	0.6	1.4	2.2	3.2
9	-1.3	-1.0	-0.7	-0.3	0.0	0.7	1.5	2.4	3.5
10	-1.4	-1.1	-0.7	-0.4	0.0	0.7	1.6	2.6	3.8
11	-1.6	-1.2	-0.8	-0.4	0.0	0.8	1.7	2.8	4.1
12	-1.7	-1.3	-0.9	-0.4	0.0	0.8	1.9	3.0	4.4
13	-1.9	-1.4	-0.9	-0.5	0.0	0.9	2.0	3.2	4.7
14	-2.0	-1.5	-1.0	-0.5	0.0	0.9	2.0	3.4	4.9

Includes APU fuel burn.

Holding

NOTE: The weights in all tables are in KG.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
85	%N1	81.1	84.1	88.3	92.8				
	KIAS	250	251	252	253				
	FF/ENG	2740	2730	2750	2800				
80	%N1	79.5	82.4	86.5	91.0	98.3			
	KIAS	242	243	244	245	247			
	FF/ENG	2580	2570	2570	2610	2740			
75	%N1	77.8	80.5	84.7	89.1	95.0			
	KIAS	235	236	236	238	239			
	FF/ENG	2420	2400	2400	2420	2490			
70	%N1	76.0	78.6	82.8	87.1	92.1			
	KIAS	227	227	228	229	231			
	FF/ENG	2260	2240	2230	2250	2270			
65	%N1	74.0	76.7	80.8	85.0	89.7	97.7		
	KIAS	219	219	220	221	222	224		
	FF/ENG	2100	2090	2070	2070	2080	2230		
60	%N1	71.7	74.6	78.5	82.8	87.4	93.7		
	KIAS	210	210	211	212	213	214		
	FF/ENG	1950	1930	1910	1910	1910	1970		
55	%N1	69.4	72.3	76.3	80.5	84.9	90.0		
	KIAS	200	201	202	203	204	205		
	FF/ENG	1800	1770	1750	1740	1730	1760		
50	%N1	66.9	69.7	73.8	77.8	82.3	87.0	94.9	
	KIAS	192	192	192	193	194	195	196	
	FF/ENG	1650	1620	1600	1580	1570	1570	1680	
45	%N1	64.2	66.9	70.9	75.0	79.4	84.0	89.6	
	KIAS	185	185	185	185	185	185	186	
	FF/ENG	1500	1470	1440	1420	1400	1400	1450	
40	%N1	61.1	64.0	67.8	72.0	76.2	80.7	85.4	94.0
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1350	1330	1300	1270	1250	1240	1260	1360

This table includes 5% additional fuel for holding in a racetrack pattern.

Gear Down Landing Rate of Climb Available

NOTE: The weights in all tables are in KG.

ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available
Flaps 15

TAT (°C)	RATE OF CLIMB (FT/MIN) PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-80	-140				
50	-50	-110	-220			
48	-20	-90	-190			
46	10	-60	-160	-270		
44	40	-30	-140	-250		
42	70	0	-110	-220	-340	
40	100	30	-80	-190	-310	
38	120	60	-50	-160	-290	-430
36	140	90	-20	-140	-260	-400
34	140	120	0	-120	-240	-380
32	140	130	20	-100	-220	-360
30	140	130	40	-80	-210	-340
20	160	140	60	-50	-160	-280
10	170	150	60	-50	-160	-280
0	170	160	70	-50	-160	-280
-20	190	170	80	-40	-160	-280
-40	200	180	80	-40	-170	-290

Rate of climb capability shown is valid for 60000 kg, gear down at VREF15+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 160 ft/min per 5000 kg less than 60000 kg.

Flaps 30

TAT (°C)	RATE OF CLIMB (FT/MIN) PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-260	-320				
50	-230	-300	-400			
48	-200	-270	-380			
46	-180	-250	-350	-460		
44	-150	-220	-330	-430		
42	-120	-190	-300	-410	-530	
40	-100	-170	-280	-390	-500	
38	-70	-140	-250	-360	-480	-620
36	-60	-110	-220	-340	-460	-600
34	-50	-80	-200	-320	-440	-580
32	-50	-70	-180	-300	-420	-560
30	-50	-60	-160	-280	-410	-540
20	-40	-60	-150	-260	-370	-490
10	-40	-50	-140	-260	-370	-480
0	-30	-50	-140	-260	-370	-490
-20	-30	-40	-140	-260	-380	-500
-40	-20	-40	-140	-270	-390	-520

Rate of climb capability shown is valid for 60000 kg, gear down at VREF30+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 170 ft/min per 5000 kg less than 60000 kg.

Gear Down

Long Range Cruise Altitude Capability

NOTE: The weights in all tables are in KG.

GEAR DOWN

Long Range Cruise Altitude Capability

Max Cruise Thrust, 100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15600	12500	9400
80	18400	15500	12600
75	21100	18500	15700
70	23600	21400	18600
65	26100	24400	21800
60	28600	27100	25300
55	30800	29600	28100
50	32900	31900	30700
45	35100	34100	33000
40	37500	36500	35400

Long Range Cruise Control

NOTE: The weights in all tables are in KG.

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	21	23	25	27	29	31	33	35
85	%N1	85.9								
	MACH	.482								
	KIAS	267								
	FF/ENG	2421								
80	%N1	84.2								
	MACH	.468								
	KIAS	259								
	FF/ENG	2271								
75	%N1	82.5	91.7							
	MACH	.454	.554							
	KIAS	251	248							
	FF/ENG	2123	2101							
70	%N1	80.6	89.8	91.7						
	MACH	.440	.541	.557						
	KIAS	243	242	240						
	FF/ENG	1977	1960	1950						
65	%N1	78.6	87.9	89.5	91.6	94.5				
	MACH	.425	.524	.543	.560	.578				
	KIAS	235	234	233	231	229				
	FF/ENG	1835	1812	1806	1805	1836				
60	%N1	76.5	85.6	87.4	89.1	91.3	94.5			
	MACH	.409	.504	.525	.544	.562	.580			
	KIAS	226	225	225	224	222	220			
	FF/ENG	1696	1661	1661	1658	1664	1696			
55	%N1	74.4	83.3	85.0	86.8	88.5	90.9	94.1		
	MACH	.393	.484	.504	.525	.545	.562	.581		
	KIAS	217	216	216	216	215	213	211		
	FF/ENG	1559	1515	1512	1515	1517	1523	1555		
50	%N1	71.9	80.7	82.5	84.2	86.0	87.8	90.2	93.5	
	MACH	.376	.463	.482	.502	.523	.544	.561	.580	
	KIAS	207	206	206	206	206	205	203	201	
	FF/ENG	1424	1371	1367	1368	1374	1377	1381	1411	
45	%N1	69.1	78.0	79.7	81.4	83.1	85.0	86.8	89.1	92.5
	MACH	.358	.441	.458	.477	.498	.520	.541	.559	.578
	KIAS	197	196	196	196	196	196	195	193	191
	FF/ENG	1294	1231	1224	1224	1230	1235	1237	1239	1265
40	%N1	66.2	74.9	76.6	78.3	80.0	81.8	83.6	85.5	87.7
	MACH	.340	.417	.434	.452	.471	.491	.513	.535	.554
	KIAS	187	185	185	185	185	185	185	185	183
	FF/ENG	1170	1098	1085	1083	1089	1092	1094	1096	1097

Long Range Cruise Enroute Fuel and Time

NOTE: The weights in all tables are in KG.

GEAR DOWN

Long Range Cruise Enroute Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
324	290	260	236	217	200	188	178	168	160	153
654	583	523	474	435	400	377	357	338	321	307
989	880	787	713	653	600	566	535	507	483	461
1329	1181	1054	953	871	800	754	713	676	643	614
1674	1484	1322	1194	1090	1000	943	891	844	803	766
2024	1791	1593	1436	1310	1200	1131	1069	1013	962	918
2381	2103	1865	1680	1530	1400	1320	1247	1181	1122	1070
2743	2417	2140	1924	1751	1600	1508	1424	1348	1280	1221
3113	2737	2418	2171	1972	1800	1695	1600	1514	1438	1371

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT) 10		14		20		24		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.4	0:49	2.2	0:47	1.9	0:44	1.7	0:42	1.6	0:41
400	4.9	1:36	4.5	1:31	4.0	1:25	3.7	1:20	3.5	1:17
600	7.4	2:25	6.8	2:17	6.1	2:06	5.7	1:59	5.4	1:54
800	9.8	3:14	9.1	3:03	8.1	2:48	7.6	2:38	7.2	2:31
1000	12.1	4:04	11.3	3:50	10.1	3:30	9.5	3:18	9.0	3:08
1200	14.4	4:56	13.5	4:39	12.1	4:14	11.3	3:58	10.7	3:46
1400	16.7	5:49	15.6	5:28	14.0	4:58	13.1	4:40	12.4	4:24
1600	18.9	6:43	17.7	6:18	15.9	5:44	14.9	5:22	14.1	5:03
1800	21.1	7:38	19.7	7:10	17.7	6:30	16.6	6:05	15.7	5:43

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG) 40	50	60	70	80
2	-0.3	-0.2	0.0	0.3	0.7
4	-0.7	-0.3	0.0	0.6	1.3
6	-1.0	-0.5	0.0	0.9	2.0
8	-1.3	-0.7	0.0	1.2	2.6
10	-1.7	-0.8	0.0	1.4	3.2
12	-2.0	-1.0	0.0	1.6	3.7
14	-2.4	-1.2	0.0	1.8	4.2
16	-2.7	-1.3	0.0	2.0	4.6
18	-3.0	-1.5	0.0	2.2	5.0
20	-3.4	-1.7	0.0	2.4	5.3
22	-3.7	-1.8	0.0	2.5	5.6

Descent

NOTE: The weights in all tables are in KG.

GEAR DOWN

Descent
VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (KG)	DISTANCE (NM)
41000	21	280	91
39000	20	270	86
37000	19	270	81
35000	19	260	77
33000	18	260	72
31000	17	250	68
29000	17	250	64
27000	16	240	60
25000	15	230	56
23000	14	230	52
21000	13	220	48
19000	13	210	44
17000	12	200	40
15000	11	190	36
10000	8	170	26
5000	6	140	16
1500	4	110	9

Allowances for a straight-in approach are included.

Holding

NOTE: The weights in all tables are in KG.

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
85	%N1	75.8	78.5	82.7	87.0	92.0			
	KIAS	230	230	230	230	230			
	FF/ENG	2240	2230	2220	2240	2260			
80	%N1	74.2	77.0	81.1	85.4	90.0			
	KIAS	225	225	225	225	225			
	FF/ENG	2120	2110	2100	2100	2110			
75	%N1	72.5	75.4	79.4	83.7	88.3	94.8		
	KIAS	220	220	220	220	220	220		
	FF/ENG	2000	1990	1970	1970	1970	2050		
70	%N1	70.8	73.7	77.6	81.9	86.4	91.8		
	KIAS	216	216	216	216	216	216		
	FF/ENG	1890	1870	1850	1840	1840	1870		
65	%N1	69.0	71.9	75.9	80.1	84.5	89.3		
	KIAS	211	211	211	211	211	211		
	FF/ENG	1770	1750	1730	1720	1710	1730		
60	%N1	67.1	69.8	74.0	78.0	82.5	87.1	94.3	
	KIAS	204	204	204	204	204	204	204	
	FF/ENG	1660	1630	1610	1600	1580	1590	1670	
55	%N1	65.1	67.8	71.9	75.9	80.3	84.8	90.4	
	KIAS	198	198	198	198	198	198	198	
	FF/ENG	1540	1520	1490	1480	1460	1460	1500	
50	%N1	62.8	65.6	69.6	73.7	78.0	82.4	87.1	
	KIAS	192	192	192	192	192	192	192	
	FF/ENG	1430	1400	1380	1360	1330	1330	1350	
45	%N1	60.3	63.3	67.1	71.4	75.5	79.9	84.5	91.5
	KIAS	185	185	185	185	185	185	185	185
	FF/ENG	1310	1290	1270	1250	1220	1210	1220	1270
40	%N1	57.9	60.6	64.6	68.7	72.9	77.3	81.7	86.8
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1200	1180	1160	1130	1110	1090	1100	1110

This table includes 5% additional fuel for holding in a racetrack pattern.

Gear Down / Engine Inop

Driftdown Speed/Level Off Altitude

NOTE: The weights in all tables are in KG.

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	80	227	1700		
80	76	223	4000	2300	200
75	71	218	6300	4900	2800
70	66	213	8600	7300	5300
65	62	208	10900	9800	8000
60	57	202	13200	12300	10900
55	52	196	15600	14800	13900
50	47	190	18100	17300	16500
45	43	183	20600	19800	18900
40	38	176	23100	22300	21400

Includes APU fuel burn.

Long Range Cruise Altitude Capability

NOTE: The weights in all tables are in KG.

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
75	1500		
70	4500	2500	
65	7500	5900	3400
60	10600	9200	6900
55	13300	12300	10600
50	16200	15400	14500
45	19300	18300	17500
40	22200	21400	20500

Long Range Cruise Control

NOTE: The weights in all tables are in KG.

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		5	7	9	11	13	15	17	19	21	23
70	%N1	94.8									
	MACH	.389									
	KIAS	235									
	FF/ENG	3774									
65	%N1	92.6	94.3	96.9							
	MACH	.376	.389	.402							
	KIAS	228	227	226							
	FF/ENG	3477	3485	3527							
60	%N1	90.2	91.9	93.7	96.3						
	MACH	.364	.375	.388	.402						
	KIAS	220	219	218	218						
	FF/ENG	3192	3191	3198	3240						
55	%N1	87.8	89.3	91.0	92.8	95.4					
	MACH	.351	.362	.374	.387	.400					
	KIAS	212	211	210	209	209					
	FF/ENG	2924	2909	2906	2913	2951					
50	%N1	85.3	86.7	88.2	89.9	91.7	94.2	98.2			
	MACH	.338	.348	.359	.371	.384	.398	.412			
	KIAS	204	203	202	201	200	199	198			
	FF/ENG	2672	2647	2630	2626	2633	2657	2737			
45	%N1	82.7	84.0	85.4	86.9	88.6	90.4	92.7	96.6		
	MACH	.325	.334	.344	.355	.367	.380	.393	.408		
	KIAS	196	195	193	192	191	190	189	189		
	FF/ENG	2432	2400	2374	2356	2351	2352	2359	2417		
40	%N1	79.8	81.1	82.5	83.9	85.4	87.0	88.8	90.8	94.1	98.4
	MACH	.311	.320	.329	.339	.349	.361	.374	.387	.402	.418
	KIAS	188	186	184	183	182	181	180	179	179	178
	FF/ENG	2206	2166	2133	2107	2088	2076	2069	2065	2101	2201

Long Range Cruise Diversion Fuel and Time

NOTE: The weights in all tables are in KG.

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time
Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
172	151	134	120	109	100	93	88	83	78	75
352	308	270	242	219	200	187	175	165	156	148
533	465	408	364	330	300	280	262	246	232	220
716	623	545	486	440	400	373	349	328	309	293
900	783	684	609	551	500	466	436	409	385	365
1086	943	823	733	661	600	559	523	490	462	438
1273	1105	964	856	772	700	652	610	572	538	510
1462	1267	1103	980	883	800	745	696	652	614	581
1653	1431	1245	1104	994	900	838	782	733	690	653
1845	1595	1386	1228	1105	1000	931	868	813	765	724

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)					
	6		10		14	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	1.3	0:27	1.1	0:26	1.0	0:26
200	2.6	0:53	2.4	0:50	2.3	0:48
300	3.9	1:18	3.7	1:15	3.6	1:11
400	5.2	1:44	4.9	1:39	4.8	1:35
500	6.5	2:10	6.1	2:04	6.0	1:58
600	7.8	2:37	7.3	2:29	7.1	2:22
700	9.1	3:03	8.5	2:55	8.3	2:46
800	10.3	3:30	9.7	3:20	9.4	3:10
900	11.6	3:58	10.9	3:46	10.5	3:35
1000	12.8	4:25	12.0	4:12	11.6	3:59

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
1	-0.2	-0.1	0.0	0.1	0.3
2	-0.3	-0.2	0.0	0.3	0.6
3	-0.5	-0.3	0.0	0.5	1.0
4	-0.6	-0.3	0.0	0.7	1.3
5	-0.8	-0.4	0.0	0.9	1.7
6	-1.0	-0.5	0.0	1.0	2.0
7	-1.1	-0.6	0.0	1.2	2.4
8	-1.3	-0.7	0.0	1.4	2.7
9	-1.5	-0.7	0.0	1.6	3.1
10	-1.6	-0.8	0.0	1.8	3.5
11	-1.8	-0.9	0.0	1.9	3.8
12	-1.9	-1.0	0.0	2.1	4.2
13	-2.1	-1.1	0.0	2.3	4.5
14	-2.3	-1.1	0.0	2.5	4.9

Includes APU fuel burn.

Holding

NOTE: The weights in all tables are in KG.

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
80	%N1	93.4			
	KIAS	225			
	FF/ENG	4140			
75	%N1	91.4	94.7		
	KIAS	220	220		
	FF/ENG	3870	3910		
70	%N1	89.4	92.6		
	KIAS	216	216		
	FF/ENG	3610	3640		
65	%N1	87.4	90.5	95.9	
	KIAS	211	211	211	
	FF/ENG	3360	3380	3460	
60	%N1	85.2	88.2	92.9	
	KIAS	204	204	204	
	FF/ENG	3110	3110	3150	
55	%N1	82.9	85.9	90.4	97.2
	KIAS	198	198	198	198
	FF/ENG	2860	2860	2880	3010
50	%N1	80.4	83.4	87.7	92.8
	KIAS	192	192	192	192
	FF/ENG	2630	2620	2620	2670
45	%N1	77.8	80.7	85.0	89.6
	KIAS	185	185	185	185
	FF/ENG	2400	2380	2380	2400
40	%N1	75.1	77.8	82.1	86.5
	KIAS	178	178	178	178
	FF/ENG	2180	2160	2140	2140

This table includes 5% additional fuel for holding in a racetrack pattern.

Text

Introduction

This section contains information to supplement performance data from the Flight Management Computer (FMC). In addition, sufficient inflight data is provided to complete a flight with the FMC inoperative. In the event of conflict between data presented in this section and that contained in the Approved Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

Pitch attitude and average %N1 information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

Max Climb %N1

This table shows Max Climb %N1 for a 280 KIAS/.78 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (Auto) and anti-ice on or off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. For packs OFF or HIGH operation, apply the %N1 adjustment shown below the table.

VREF

This table contains flaps 40, 30 and 15 reference speeds for a given weight.

Advisory Information

Normal Configuration Landing Distance

The normal configuration distance tables are provided as advisory information to help determine the actual landing distance performance of the airplane for different runway surface conditions and brake configurations.

Flaps 15, 30, and 40 landing distances and adjustments are provided for dry runways as well as runways with good, medium, and poor reported braking action, which are commonly referred to as slippery runway conditions.

If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Dry runway landing performance is shown for max manual braking configuration and autobrake settings

max, 3, 2, and 1. The autobrake performance may be used to assist in the selection of the most desirable autobrake setting for a given field length. Selection of an autobrake setting results in a constant rate of deceleration. Maximum effort manual braking should achieve shorter landing distance than the max autobrake setting. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and normal approach speed for the selected landing flap at sea level, zero wind, zero slope, and two engine detent reverse thrust. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, temperature, speed, and reverse thrust. Each adjustment is independently added to the reference landing distance.

Non-Normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effect of reverse thrust.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight and brakes on speed, adjusted for wind at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the appropriate (steel or carbon brakes) final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of .79M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude and IAS or Mach to read %N1.

It is desirable to maintain engine thrust within the limits of the Max Cruise thrust rating. However, where thrust in excess of Max Cruise rating is required, such as for meeting terrain clearance, ATC altitude assignments, or to attain maximum range capability, it is permissible to use the thrust needed up to the Max Continuous thrust rating. The Max Continuous thrust rating is intended primarily for emergency use at the discretion of the pilot and is the maximum thrust that may be used continuously.

Driftdown Speed/Level Off Altitude

The table shows optimum driftdown speed as a function of cruise weight at start of driftdown. Also shown are the approximate weight and pressure altitude at which the airplane will level off considering 100 ft/min residual rate of climb.

The level off altitude is dependent on air temperature (ISA deviation).

Driftdown/LRC Cruise Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time Table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

APU Operation During Flight

For APU operation during flight, increase fuel flow according to the following table. These increments include the APU fuel flow and the effect of increased drag from the APU door.

PRESSURE ALTITUDE (1000 FT)	APU FUEL FLOW (KG/HR)
39	45
35	45
31	50
25	60
20	65
15	75
10	85
5	95

Long Range Cruise Diversion Fuel and Time

Tables are provided for crews to determine the fuel and time required to proceed to an alternate airfield with one engine inoperative. The data is based on single engine Long Range Cruise speed and . 78/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down Landing Rate of Climb Available

Rate of climb data is provided as guidance information in the event an engine inoperative landing (manual or autoland) is planned. The tables show gear down rate of climb available for Flaps 15 and Flaps 30. Enter the table with TAT and pressure altitude to read rate of climb available. Apply adjustments shown to correct for weight.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

NOTE: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inappropriate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. An accurate estimated time of arrival (ETA) is available if current speed or Mach is entered into the VNAV cruise page.

Tables for gear down performance in this section are identical in format and used in the same manner as tables for the gear up configuration previously described.

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Manoeuvres

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For more information on manoeuvres, refer to:

Chapter 7 of the **Boeing B73C FCTM**

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Non-Normal Manoeuvres

Flight Crews are expected to do non-normal manoeuvres from memory.

Rejected Takeoff

For manoeuvres that apply to Rejected Takeoffs, see the section on *Non-Normal Procedures, Rejected Takeoff* in the *Standard Operating Procedures - Boeing B73C* (AILO-0022.7).

Approach to Stall or Stall Recovery

Do all recoveries from approach to stall as if an actual stall has occurred.

Immediately do the following at the first indication of stall (buffet or stick shaker).

NOTE: Do not use flight director commands during the recovery.

Pilot Flying	Pilot Monitoring
A. Initiate recovery: • Hold the control column firmly. • Disconnect autopilot and autothrottle. • Smoothly apply nose down elevator to reduce the angle of attack until the buffet or stick shaker stops. Nose-down stabilizer trim may be needed.*	• Monitor altitude and airspeed. • Verify all required actions have been done and call out any omissions. • Call out any trend towards terrain contact.

WARNING

*** If the control column does not provide the needed response, stabilizer trim may be necessary. Excessive use of pitch trim may aggravate the condition or may result in the loss of control or in high structural loads.**

Approach to Stall or Stall Recovery (continued)

Pilot Flying	Pilot Monitoring
B. Continue recovery • Roll in the shortest direction to wings level if needed.** • Advance thrust levers as needed. • Retract the speedbrakes. • Do not change the gear or flap configuration, except • During liftoff, if flaps are up, call for flaps 1.	• Monitor altitude and airspeed. • Verify all needed actions have been done and call out any omissions. • Call out any trend towards terrain contact. • Set the FLAP lever as directed.
C. Complete recovery: • Check the airspeed and adjust thrust as needed. • Establish pitch attitude. • Return to the desired flight path. • Re-engage the autopilot and autothrottle if desired.	• Monitor altitude and airspeed. • Verify all needed actions have been done and call out any omissions. • Call out any trend towards terrain contact.

WARNING

****Excessive use of pitch trim or rudder may aggravate the condition or may result in loss of control or in high structural loads.**

Ground Proximity Warning System (GPWS) Response

Accomplish the following manoeuvre for any of these aural alerts:

- SINK RATE
- TERRAIN
- DON'T SINK
- TOO LOW FLAPS
- TOO LOW GEAR
- TOO LOW TERRAIN
- GLIDESLOPE
- BANK ANGLE
- AIRSPEED LOW
- CAUTION TERRAIN
- CAUTION OBSTACLE

Pilot Flying	Pilot Monitoring
Correct the flight path, airplane configuration, or airspeed.	

The below glideslope deviation alert may be cancelled or inhibited for:

- localizer approach or backcourse approach
- circling approach from an ILS
- when conditions require a deliberate approach below glideslope
- unreliable glideslope signal

NOTE: If a terrain caution occurs when flying under daylight VMC, and positive visual verification is made that no obstacle or terrain hazard exists, the alert may be regarded as cautionary and the approach may be continued.

NOTE: Some aural alerts repeat.

GPWS Warning

Accomplish the following manoeuvre for any of these conditions:

- Activation of the "PULL UP" warning
- Activation of the "PULL UP" or "TERRAIN TERRAIN PULL UP" warning
- Activation of the "PULL UP" or "OBSTACLE OBSTACLE PULL UP" warning
- Other situations resulting in unacceptable flight toward terrain

Pilot Flying	Pilot Monitoring
• Disengage autopilot. • Disengage autothrottle. • Aggressively apply maximum* thrust. • Simultaneously roll wings level and rotate to an initial pitch attitude of 20°. • Retract speedbrakes. • If terrain remains a threat, continue rotation up to the pitch limit indicator (if available) or stick shaker or initial buffet.	• Assure maximum* thrust. • Verify all needed actions have been completed and call out any omissions.
• Do not change gear or flap configuration until terrain separation is assured. • Monitor radio altimeter for sustained or increasing terrain separation.	• Monitor vertical speed and altitude (radio altitude for terrain clearance and barometric altitude for a minimum safe altitude.)

• When clear of terrain, slowly decrease pitch attitude and accelerate.	• Call out any trend toward terrain contact.

NOTE: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be needed to obtain a positive terrain separation. Use smooth, steady control to avoid a pitch attitude overshoot and stall.

NOTE: Do not use flight director commands.

NOTE: *Maximum thrust can be obtained by advancing the thrust levers full forward if the EECs are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.

NOTE: If positive visual verification is made that no obstacle or terrain hazard exists when flying under daylight VMC conditions before a terrain or obstacle warning, the alert may be regarded as cautionary and the approach may be continued.

Traffic Avoidance

Immediately accomplish the following by recall whenever a TCAS Traffic Advisory (TA) or Resolution Advisory (RA) occurs.

WARNING

Comply with the RA if there is conflict between the RA and air traffic control.

WARNING

Once an RA has been issued, safe separation could be compromised if current vertical speed is changed, except as necessary to comply with the RA. This is because TCASII-to-TCASIII coordination may be in progress with the intruder aircraft and any change in vertical speed that does not comply with the RA may negate the effectiveness of the other aircraft's compliance with the RA.

NOTE: If stick shaker or buffet occurs during the manoeuvre, immediately accomplish the APPROACH TO STALL RECOVERY procedure.

NOTE: If high buffet speed buffet occurs during the manoeuvre, relax pitch force as necessary to reduce buffet, but continue to manoeuvre.

NOTE: Do not use flight director commands until clear of conflict.

NOTE: Do not use flight director pitch commands until clear of conflict.

For TA

Pilot Flying	Pilot Monitoring
	Select inboard and turnoff lights ON.
Look for traffic using traffic display as a guide. Call out any conflicting traffic.	
If traffic is sighted, manoeuvre if needed.	

NOTE: Manoeuvres based solely on a TA may result in reduced separation and are not recommended.

For RA (except a climb in landing configuration)

WARNING

Do not follow a DESCEND (fly down) RA issued below 1000 feet AGL should not be followed.

Pilot Flying	Pilot Monitoring
If manoeuvring is required, disengage the autopilot and autothrottle. Smoothly adjust pitch and thrust to satisfy the RA command. Follow the planned lateral flight path unless visual contact with the conflicting traffic requires other action.	
Attempt to establish visual contact.* Call out any conflicting traffic.	

NOTE: ***Visually acquired traffic may not be the same traffic causing an RA. The visual perception of an encounter may be misleading, particularly at night.

For a Climb RA in landing configuration

Pilot Flying	Pilot Monitoring
Disengage the autopilot and autothrottle. Advance thrust levers forward to ensure maximum thrust is attained and call for FLAPS 15. Smoothly adjust pitch to satisfy the RA command. Follow the planned lateral flight plan unless visual contact with the traffic requires other action.	Verify maximum thrust set. Position flap lever to 15 detent.
Verify a positive rate of climb on the altimeter and call "GEAR UP".	Verify a positive rate of climb on the altimeter and call "POSITIVE RATE". Set the landing gear lever to UP.
Attempt to establish visual contact. Call out any conflicting traffic.	

NOTE: ***Visually acquired traffic may not be the same traffic causing an RA. The visual perception of an encounter may be misleading, particularly at night.

Upset Recovery

Historically, an upset was defined as unintentionally exceeding one or more of the following conditions:

- Pitch attitude greater than 25 degrees nose up
- Pitch attitude greater than 10 degrees nose down
- Bank angle greater than 45 degrees
- Less than the above parameters but flying at an airspeed inappropriate for the conditions

An upset condition is now considered as any time an airplane is diverting from the intended airplane state. An airplane upset can involve pitch or roll angle deviations as well as inappropriate airspeeds for the conditions.

The following techniques represent a logical progression for recovering the airplane. The sequence of actions is for guidance only and represents a series of options to be considered and used depending on the situation. Not all actions may be necessary once recovery is under way. If needed, use pitch trim sparingly. Consider careful use of rudder to aid roll control only if roll control is ineffective and the airplane is not stalled.

These actions assume that the airplane is not stalled. A stall condition can exist at any attitude and can be recognized by one or more of the following:

- Stick shaker
- Buffet that can be heavy at times
- Lack of pitch authority
- Lack of roll control
- Inability to stop descent

If the airplane is stalled, first recover from the stall by applying and maintaining nose down elevator until stall recovery is complete and stick shaker stops.

Nose High Recovery

Pilot Flying	Pilot Monitoring
Recognize and confirm the situation	
A. Disconnect autopilot B. Disengage autothrottle C. Recover: • Apply nose-down elevator. Apply as much elevator as needed to obtain a nose down pitch rate. • Apply appropriate nose down stabilizer trim.* • Reduce thrust. • Roll (adjust bank angle) to obtain a nose down pitch rate.* D. Compete the recovery: • When approaching the horizon roll to wings level. • Check airspeed and adjust thrust. • Establish pitch attitude.	A. Call out attitude, airspeed and altitude throughout the recovery B. Verify all required actions have been completed and call out any omissions.

WARNING

***Excessive use of pitch trim or rudder can aggravate an upset, result in loss of control, or result in high structural loads.**

Nose Low Recovery

Pilot Flying	Pilot Monitoring
Recognize and confirm the situation	
A. Disconnect autopilot. B. Disengage autothrottle. C. Recover: • Recover from stall, if required. • Roll in the shortest direction to wings level. If bank angles more than 90 degrees, unload and roll.* D. Complete the recovery: • Apply nose up elevator. • Apply nose up trim, if required.* • Adjust thrust and drag as required.	A. Call out attitude, airspeed and altitude throughout the recovery. B. Verify all needed actions have been done and call out any continued deviation.

WARNING

***Excessive use of pitch trim or rudder may aggravate an upset situation or may result in loss of control and/or high structural loads.**

Windshear Warning

Predictive windshear warning during takeoff roll:
("WINDSHEAR AHEAD, WINDSHEAR AHEAD" aural)

- before V1, reject takeoff
- after V1, perform the Windshear Escape Maneuver

Windshear encountered during takeoff roll:

- If windshear is encountered prior to V1, there may not be sufficient runway remaining to stop if an RTO is initiated at V1. At VR, rotate at a normal rate toward a 15 degree pitch attitude. Once airborne, perform the Windshear Escape Manoeuvre (next page).
- If windshear is encountered near the normal rotation speed and airspeed suddenly decreases, there may not be sufficient runway left to accelerate back to normal takeoff speed. If there is insufficient runway left to stop, initiate a normal rotation at least 2,000 feet before the end of the runway, even if airspeed is low. Higher than normal attitudes may be required to lift off in the remaining runway. Ensure maximum thrust is set.

Predictive windshear warning during approach:
("GO–AROUND WINDSHEAR AHEAD" aural)

- Perform the Windshear Escape Manoeuvre (on page MAN.17).

Windshear encountered in flight:

- Perform the Windshear Escape Manoeuvre (on page MAN.17).

NOTE: The following are indications the airplane is in windshear:

- "WINDSHEAR" warning or
- Unacceptable flight path deviations

NOTE: Unacceptable flight path deviations are indications the airplane is in windshear.

Unacceptable flight path deviations are recognized as uncontrolled changes from normal steady state flight conditions below 1000 feet AGL, in excess of any of the following:

- 15 knots indicated airspeed
- 500 fpm vertical speed
- 5° pitch attitude
- 1 dot displacement from the glideslope
- Unusual thrust lever position for a significant period of time.

Windshear Escape Manoeuvre

Pilot Flying	Pilot Monitoring
MANUAL FLIGHT	
A. Disconnect autopilot. B. Push either TO/GA switch C. Aggressively apply maximum thrust.* D. Disengage autothrottle E. Simultaneously roll wings level and rotate toward an initial pitch attitude of 15°. F. Retract speedbrakes. G. Follow flight director TO/GA guidance (as installed).**	A. Verify maximum thrust.* B. Verify all required actions have been completed and call out any omissions.
AUTOMATIC FLIGHT	
A. Push either TO/GA switch*** B. Verify TO/GA mode annunciation C. Verify GA* thrust D. Retract speedbrakes E. Monitor system performance ****	A. Verify GA thrust B. Verify all required actions have been completed and call out any omissions.

MANUAL OR AUTOMATIC FLIGHT	
A. Do not change flap or gear configuration until windshear is no longer a factor. B. Maintain wings level to maximize climb gradient, unless a turn is required for obstacle clearance. C. Monitor vertical speed and altitude. D. Do not attempt to regain lost airspeed until windshear is no longer a factor.	A. Monitor vertical speed and altitude. B. Call out any trend toward terrain contact, descending flight path, or significant airspeed changes.

NOTE: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain a positive terrain separation. Smooth, steady control will avoid a pitch attitude overshoot and stall.

NOTE: *Maximum thrust can be obtained by advancing the thrust levers full forward if the EECs are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.

NOTE: ** Do not exceed Pitch Limit Indication.

NOTE: *** If TO/GA is not available, disengage autopilot and autothrottle and fly manually.

WARNING

****** Severe windshear can exceed the performance of the AFDS. Be prepared to disengage the autopilot and autothrottle and fly manually.**

Flight Patterns

See the section on *Normal Procedures, Diagrams* in the *Standard Operating Procedures - Boeing B73C* (AILO-0022.7).

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Checklist Instructions

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Aircraft Model Identification

The aircraft listed in the table below are covered in the Flight Crew Operations Manual (FCOM).

The procedures and checklists in this QRH applies to all the aircraft listed below.

The table includes information that is specific to one or more but not all of the aircraft. Where the information applies to all of the aircraft, no reference is made to individual airplanes.

- Airplane Number is supplied by Air Inuit.
- Registry Number is supplied by the national regulatory agency.
- Serial Number and Tabulation Number are supplied by the aircraft manufacturer, Boeing.

Aircraft Number	Registry Number	Serial Number	Tab Number	Model Data
1	C-FTUZ	40855	PS637	737-800
2	C-FTUW			737-800
3	C-FTUY			737-800

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Non-Normal Checklists

Introduction

The **Non-Normal Checklists** section contains checklists used by the flight crew to manage non-normal situations.

Annunciated Checklist

Most checklists correspond to a light, alert or other indication. In most cases, the MASTER CAUTION and system annunciator lights also illuminate to indicate the non-normal condition. These lights, alerts and other indications are the cues to select and do the associated checklist.

Unannunciated Checklists

Checklists without a light, alert or other indication (such as Ditching) are called unannunciated checklists. Most unannunciated checklists are in the associated system section. For example, Fuel Leak Engine is in Section 12, Fuel. Unannunciated checklists with no associated system are in Section 0 - Miscellaneous.

Quick Action Index

Checklists that need a quick response are listed in the Quick Action Index (first page of this manual). In each system section, Quick Action Index checklists are listed first, followed by checklists that are not in the Quick Action Index. The titles of Quick Action Index checklists are printed in **bold** type. Checklist titles in upper case (such as AUTO BRAKE DISARM) are annunciated by a light, alert, or other indication. Checklist titles in upper and lower case (such as Window Damage) are not annunciated.

Airplane Effectivity Statement

If a checklist or a step in a checklist is not applicable to all airplanes, airplane effectivity information is included in the checklist. Airplane effectivity is listed by airplane registration, or serial number. If a checklist is applicable to some but not all airplanes, airplane effectivity is centered below the checklist title. If a step in a checklist is applicable to some but not all airplanes, airplane effectivity is included above the step. If a checklist or a step in a checklist is applicable to all airplanes, airplane effectivity information is not included.

Condition Statement

All checklists have condition statements. The condition statement briefly describes the situation that caused the light, alert or other indication. Unannunciated checklists also have condition statements to help in understanding the reason for the checklist.

Objective Statement

Some checklists have objective statements. The objective statement briefly describes the expected result of doing the checklist or briefly describes the reason for the steps in the checklist.

Memory Items vs. Reference Items

Checklists can have both memory and reference items. Memory items are critical steps that must be done before reading the checklist. The last memory item is followed by a dashed horizontal line. Reference items are actions to be done while reading the checklist.

Additional Information Section

Some checklists have additional information at the end of the checklist. The additional information provides data the crew may wish to consider. The additional information does not need to be read.

Non-Normal Checklist Operation

Non-normal checklists start with steps to correct the situation. If needed, information for planning the rest of the flight is included. When special items are needed to configure the airplane for landing, the items are included in the Deferred Items section of the checklist.

Starting a Checklist

Non-normal checklists are started when the airplane flight path and configuration are correctly established. Thus the first prority for the PF is to fly and direct the airplane in a safe manner. Only a few situations need an immediate response (such as CABIN ALTITUDE WARNING or Rapid Depressurization, Stall and/or Upset Recovery, Windshear, Traffic Avoidance and GPWS alerts). Usually, time is available to assess the situation before corrective action is started. All actions must then be coordinated under the captain's supervision and done in a deliberate, systematic manner. Flight path control must never be compromised.

Do Memory Items

When a non-normal situation occurs, at the initiation and direction of the pilot flying, and once the airplane is above 400 feet AAE, both crewmembers do all memory items in their areas of responsibility without delay.

Call for Checklist and Do Initial Actions

The pilot flying calls for the QRH and Non-Normal Checklist when:

- the flight path is under control
- all memory items are complete
- the airplane is in a clean configuration above FRA and thrust is at or below MCT (not in a critical phase of flight such as takeoff or landing)
- an initial 'WHERE TO' has been established and coordinated with ATC if needed.

The pilot monitoring reads aloud:

- the checklist title
- the airplane effectivity (if applicable) as needed to verify the correct checklist
- as much of the condition statement as needed to verify that the correct checklist has been selected
- as much of the objective statement (if applicable) as needed to understand the expected result of doing the checklist.

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

For checklists with memory items, the pilot monitoring first verifies that each memory item has been done. The checklist is normally read aloud during this verification. The pilot flying does not need to respond except for items that are not in agreement with the checklist. The item numbers do not need to be read.

Do Reference Items

Non-memory items are called reference items. The pilot monitoring reads aloud the reference items, including:

- the precaution (if any)
- the response or action
- any amplifying information.

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood. The item numbers do not need to be read. It is recommended that the flight crew read aloud all the choices in a "Choose one" step before taking action, to reduce the chance of error.

The pilot flying may also direct reference items and/or checklists to be done by memory if no hazard is created by such action (such as reestablishing normal fuel panel configuration when fuel balancing is complete).

"Confirm" Step

The word “Confirm” is added to checklist items when both crewmembers must verbally agree before action is taken. During an inflight non-normal situation, verbal confirmation is required for:

- an engine thrust lever
- an engine start lever
- an engine, APU or cargo fire switch (as installed)
- a generator drive disconnect switch
- an IRS mode selector
- a flight control switch

This does not apply to the Loss of Thrust on Both Engines checklist.

Confirmation is not needed for completion of non-normal checklist items when on the ground.

There is no requirement for specific words to say during a confirm step or for physical actions such as touching or pointing to a control.

Areas of Responsibility: Ground vs. In Flight

With the airplane stationary on the ground (Parking Brake Set):

- The PIC and SIC take action based on Preflight and Postflight areas of responsibility.
- During an evacuation, the SIC sets the flap lever to 40.

With the airplane in flight or in motion on the ground:

- The pilot flying and the pilot monitoring take action based on each crewmember's Areas of Responsibility.

After moving the control, the crewmember taking the action also states the checklist response.

Inoperative Items

Checklists include an Inoperative Items table only when the condition of the items is needed for planning the rest of the flight. The inoperative items, including the consequences (if any), are read aloud by the pilot monitoring. The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

Deferred Items

After completion of the non-normal checklist, normal procedures are normally used to configure the airplane for each phase of flight.

When there are no deferred items, the DESCENT, APPROACH and LANDING normal checklists are used to verify that the configuration is correct for each phase of flight.

When there are deferred items, the non-normal checklist will include the item "**Checklist Complete Except for Deferred Items**". The pilot flying is to be made aware when there are deferred items. These items are included in the Deferred Items section of the checklist and may be delayed until the usual point during descent, approach or landing.

The deferred items are read aloud by the pilot monitoring. The pilot flying or the pilot monitoring takes action based on each crewmember's area of responsibility. After moving the control, the crewmember taking the action also states the response.

The Deferred Items section of the non-normal checklist will include the Descent, Approach and Landing normal checklists if one or more of the following occur:

- An item is deferred until after the Descent Checklist.
- A normal checklist response is changed as a result of the non-normal situation. (this changed response is printed in **bold** type)

Use these checklists instead of the usual DESCENT, APPROACH and LANDING normal checklists. The pilot flying or the pilot monitoring responds to the deferred normal checklist items based on each crewmember's area of responsibility. During the deferred Landing normal checklist, the pilot flying will respond to the Speedbrake, Landing Gear and Flaps checklist items.

Checklist Complete

Each checklist has a checklist compete symbol at the end.

The checklist complete symbol can also be in the body of the checklist. This only occurs when a checklist divides into two or more paths. Each path can have a checklist complete symbol at the end. The flight crew does not need to continue reading the checklist after the checklist complete symbol.

After completion of each non-normal checklist, the pilot monitoring states "____CHECKLIST COMPLETE."

Special Situations

While every attempt is made to supply needed non-normal checklists, it is not possible to develop checklists for all conceivable situations. In some smoke, fire or fumes situations, the flight crew may need to move between the Smoke, Fire or Fumes checklist and the Smoke or Fumes Removal checklist. In some multiple failure situations, the flight crew may need to perform several checklists or combine the elements of more than one checklist. Consider doing memory items first followed by reference steps. Upon completion of a non-

normal checklist, review all warning lights, caution lights and other alerts to determine the need to do other non-normal checklists. In all situations, the PIC must assess the situation and use good judgment to determine the safest course of action.

Troubleshooting

It should be noted that, in determining the safest course of action, troubleshooting, i.e., taking steps beyond published non-normal checklist steps, may cause further loss of system function or system failure. Troubleshooting should only be considered when completion of the published non-normal checklist results in an unacceptable situation.

Land At Nearest Suitable Airport

There are some situations where the flight crew must land at the nearest suitable airport. These situations include, but are not limited to, conditions where:

- The non-normal checklist includes the item "Plan to land at the nearest suitable airport".
- Fire or smoke continues.
- Only one AC power source remains (engine or APU generator).
- Only one hydraulic system remains (the standby system is considered a hydraulic system).
- Any other situation determined by the flight crew to have a significant adverse effect on safety if the flight is continued.

A Nearest Suitable Airport is defined as a Suitable Aerodrome that is nearest in terms of time that offers sufficient landing distance available in regards to actual Runway Surface Conditions and Weather, and if needed, emergency services to support the actual situation or non-normal condition.

Immediate Landing

It must be stressed that, for smoke that continues or a fire that cannot be positively confirmed to have been completely extinguished, the earliest possible descent, landing, and evacuation must be done.

If a smoke, fire or fumes situation becomes uncontrollable, the flight crew should consider an immediate landing. Immediate landing implies immediate diversion to a runway. However, in a severe situation, the flight crew should consider an overweight landing, a tailwind landing, an off-airport landing, or a ditching.

Engine Shutdown

Checklists directing an engine shutdown must be evaluated by the captain to determine whether an actual shutdown or operation at reduced thrust is the safest course of action. Consideration must be given to the probable effects of running the engine at reduced thrust.

Loss of Indications

There are no non-normal checklists for the loss of an engine indication or automatic display of secondary engine indications. Automatic display of secondary engine parameters due to engine oil quantity is for flight crew awareness and does not require pilot action. Continue normal engine operation unless a limit is exceeded or a non-normal situation occurs.

Assumptions

Non-normal checklists also assume:

- During engine start and before takeoff, the associated non-normal checklist is done if a non-normal situation is identified. After completion of the checklist, the Dispatch Deviations Guide or operator equivalent is consulted to determine if Minimum Equipment List (MEL) dispatch relief is available.

- System controls are in the normal configuration for the phase of flight before the start of the non-normal checklist.
- If the MASTER CAUTION and system annunciator lights illuminate, all related amber lights are reviewed to assist in recognizing the cause(s) of the alert.
- Aural alerts are silenced and the master caution system is reset by the flight crew as soon as the cause of the alert is recognized.
- The EMERGENCY position of the oxygen regulator is used when needed to supply positive pressure in the masks and goggles to remove contaminants. The 100% position of the oxygen regulator is used when positive pressure is not needed but contamination of the flight deck air exists. The Normal position of the oxygen regulator is used if prolonged use is needed and the situation allows. Normal boom microphone operation is restored when oxygen is no longer in use.
- Indicator lights are tested to verify suspected faults.
- Non-normal checklist must not be used to:
    - Allow operations into situations where a non-normal condition is predicted.
    - Disable systems in anticipation of a non-normal event.
- Flight crew reset of a tripped fuel pump or fuel pump control circuit breaker is **prohibited**.
- In flight, reset of a tripped circuit breaker is not recommended unless directed by a non-normal checklist. However, a tripped circuit breakers may be reset once, after a short cooling period (approximately 2 minutes), if in the judgment of the captain, continued safe flight and landing could be compromised by the inoperative system.

- On the ground, flight crew reset of a tripped circuit breaker should only be done after maintenance has determined that it is safe to reset the circuit breaker.
- Flight crew cycling (pulling and resetting) of a circuit breaker to clear a non-normal condition is not recommended, unless directed by maintenance.

Configuration Check

After engine start and before takeoff, illumination of a red warning light, an amber caution light, an alert or other indication requires completion of the associated checklist. In certain cases, amber system monitor lights illuminate during MASTER CAUTION recall to inform the flight crew of the failure of one element in a system with redundant elements. If system operation is maintained by a second element, the amber system monitor light will extinguish when MASTER CAUTION is reset. In these situations, the amber light alerts the flight crew that normal system operation will be affected if another element fails. If an amber light illuminates during MASTER CAUTION recall, but extinguishes after MASTER CAUTION reset, completion of the associated checklist is not required.

Use of Captain's Discretion

The flight crew must be aware that checklists cannot be created for all conceivable situations and are not intended to replace good judgment. In some situations, at the captain's discretion, deviation from a checklist may be needed.

Non-Normal Situation Overview and Emergency Action Guidelines

This is a general overview of how non-normal situations should be conducted.

Consider maximum use of autoflight system to reduce workload, if available and appropriate. If flight directors are selected on, ensure the proper flight director modes are selected.

Pilot Flying	Pilot Monitoring
Recognize and announce the non-normal situation. The other pilot acknowledges.	
MAINTAIN AIRPLANE CONTROL Ensure that the flight path is under control and that the airplane is directed in a safe manner. Initiate any Recovery or Escape Non-Normal Maneuver as needed. Verify the status of the automation and call out the actual FMA, Selected Targets, and request any change as needed.	Monitor the flight path. Communicate any deviation from ATC clearance or instructions as needed.
	ANALYZE THE SITUATION Review all warning lights, caution lights, and other alert lights to identify the non-normal situation. Prioritize alerts and recommended course of action.

Pilot Flying	Pilot Monitoring
Acknowledge and confirm the Pilot Monitoring's identification or recommendation.	
TAKE THE PROPER ACTION Do the NNC memory items based on each crewmember's area of responsibility.	
'**WHERE TO'**: Make a short-term tactical decision about where to direct the flight in order to complete the NNC and gather information necessary for a safe termination of the flight. Notify ATC and standby the cabin as needed.	
Call for the appropriate NNC.	Complete the NNC until either the Deffered Items, the Engine in Flight Start or the One Engine Inoperative Landing checklists.
Review all warning lights, caution lights and other alerts, and do other NNCs as needed.	
EVALUATE and TERMINATE With the aid of the **EMERGENCY ACTION GUIDELINES** card, evaluate the situation, review options and evaluate the need to land or continue the flight; then coordinate and communicate with Cabin, ATC and company to safely terminate the flight.	

Non-Normal Checklist Legend

Decision Symbol



The decision symbol is used to identify possible choices.

Redirection Symbol ▶▶

The redirection symbol is used in two ways:

- In the table of contents of a system section, the redirection symbol is used to direct the flight crew to a different system section.
- In a non-normal checklist, the redirection symbol is used with the words "**Go to**" to direct the flight crew to a different checklist or to a different step in the current checklist.

Separator Symbol

The separator symbol is used in two ways:

- In the table of contents for a system section, the separator symbol is used to separate the Quick Action Index checklists from the checklists that are not in the Quick Action Index.
- In a non-normal checklist, the separator symbol to separate memory items from reference items.

Task Divider Symbol

The task divider symbol is used to indicate the end of one task and the beginning of another task.

Precaution Symbol 

The precaution symbol is used to identify information that the flight crew must consider before taking an action.

Checklist Complete Symbol ■ ■ ■ ■

The checklist complete symbol indicates that the checklist is complete.

Memory Item Tables

In the Non-Normal Manoeuvres section, memory items are tables with red headers as shown below.

Pilot Flying	Pilot Monitoring
Initiate recovery: • Hold the control column firmly. …	• Monitor altitude and airspeed. …

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Amendment History

Version	Date	Description
Amendment 4	December 5, 2025	• Section 6. Added new checklist (Starlink) • Section 8. Now includes: • two FIRE WARN checklists for Main Deck Cargo Compartment Fires (one for C-FTUW and C-FTUY; another for C-FTUZ) • two DISCH checklists for discharged fire extinguisher bottle (one for FWD/AFT cargo compartment; another for C-FTUW/C-FTUZ main deck cargo compartment) • Section 11. Added CDU Display Fail checklist. • Checklist Instructions. Multiple updates. • Deferred Items. Updated Descent and Approach Checklists throughout the QRH.
Amendment 3	May 22, 2025	Page 8.21 - Revised Smoke, Fire or Fumes Checklist. Page 8.9 – Revised Engine Tailpipe Fire Checklist. Page 10.9 - Removed checklist complete symbols (■■■■) at end of options. Page 11.8 - Added new checklist: GPS Data Unreliable. Page 12.9 - Added step (Balance fuel) to Fuel Leak Engine Checklist. Pages OI.5 and OI.6

		• Removed FLT/GRD switch (not on our aircraft) • PACK switches changed setting from ON to AUTO • Added new line: ISO VALVE switch…AUTO Pages PI.1/PI.2 - fixed aircraft model in header IDENT or LOS switch changed to IDENT on multiple pages: 0.5 9.5 9.37 14.4 0.10 9.8 9.44 14.7 2.4 9.14 10.10 14.16 2.8 9.19 10.14 14.19 7.33 9.21 13.7 14.23 8.7 9.27 13.12 8.10 9.33 13.17 Performance Inflight section - Updated multiple tables.
Amendment 2	April 25, 2025	Not issued. Superseded by Amendment 3 due to critical update to **Smoke, Fire or Fumes** issued by Boeing.
Amendment 1	July 5, 2024	Revised certain Descent and Approach checklist items in the **Deferred Items** sections of multiple non-normal checklists. Revised Cargo Fire – FWD/AFT Cargo Compartments checklist to reflect STC. Revised ADS-B Out Failure checklist to reflect STC. Added new checklist ATC FAIL to reflect STC.
Original	April 1, 2024	First version of the QRH for new aircraft in the Air Inuit fleet.

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Engine Fire on the Ground

Condition: An Engine fire or Engine fire warning is observed.

1. Thrust levers (both) ..... Close PIC
2. PARKING BRAKE ..... Set PIC
3. Cabin..... Advise PIC
4. Engine start lever
   (affected engine) ..... CUTOFF PIC
5. Engine fire switch
   (affected engine) .....Pull PIC
   To manually unlock the engine fire switch, press the override and pull.
6. Engine fire switch
   (affected engine) .... Rotate to the stop and hold for 1 second PIC
7. Choose one:
   - Evacuation is **needed**:
     ▶▶**Go to Evacuation checklist on back cover**
   - Evacuation is not needed:
     ▶▶**Go to step 8**
8. Cabin..... Advise PIC
9. ATC ..... Advise PIC

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Evacuation

Condition: Evacuation is needed.

1.	PARKING BRAKE ..... Set	PIC
2.	Speedbrake lever.....DOWN	PIC
3.	FLAP lever..... 40	SIC
4.	Pressurization mode selector ..... MAN DC	SIC
5.	Outflow VALVE switch..... Hold in OPEN Until the outflow VALVE indication shows fully open to depressurize the airplane	SIC
6.	If time allows: Verify that the flaps are 40 before the engine start levers are moved to CUTOFF	PIC
7.	Engine start levers (both) .....CUTOFF	PIC
8.	Cabin ..... Evacuation Command	PIC
9.	ATC.....Advise	PIC
10.	Engine and APU fire switches (all) .....Override and pull	PIC
11.	**If** an engine or APU fire is **observed or indicated**:	
	Illuminated fire switch.....Rotate to the stop and hold for 1 second	PIC

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