737

Quick Reference Handbook

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Normal Checklists — Chapter NC

PREFLIGHT

Oxygen. . . . . Tested, 100%

Instrument transfer switches. . . . . NORMAL

Window heat . . . . .ON

Pressurization mode selector . . . . AUTO

Flight instruments . . . . Heading ___, Altimeter ___

Parking brake . . . . .Set

Engine start levers . . . . CUTOFF

BEFORE START

Flight deck door . . . . Closed and locked

Fuel . . . . ___ LBS/KGS, Pumps ON

Passenger signs . . . . ___

Windows . . . . Locked

MCP . . . . V2 ___, HEADING ___, ALTITUDE ___

Takeoff speeds . . . . V1___, VR___, V2___

CDU preflight. . . . . Completed

Rudder and aileron trim . . . . Free and 0

Taxi and takeoff briefing . . . . Completed

Anti collision light. . . . . .ON

BEFORE TAXI

Generators . . . . On
Pitot heat . . . . .ON
Anti-ice . . . . ___
Isolation valve. . . . . AUTO
Engine start switches. . . . . CONT
Recall . . . . Checked
Autobrake . . . . .RTO
Engine start levers . . . . IDLE detent
Flight controls. . . . . Checked
Ground equipment . . . . Clear

BEFORE TAKEOFF

Flaps . . . . ___, Green light
Stabilizer trim . . . . ___ Units

AFTER TAKEOFF

Engine bleeds . . . . .ON
Packs . . . . AUTO
Landing gear . . . . UP and OFF
Flaps . . . . UP, No lights

DESCENT

Pressurization . . . . CAB ALT ___, LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data .VREF ___, Minimums ___

Approach briefing. . . . . Completed

APPROACH

Altimeters . . . . ___

LANDING

Engine start switches. . . . . CONT

Speedbrake . . . . .ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

SHUTDOWN

Fuel pumps . . . . .OFF

Pitot heat . . . . .OFF

Hydraulic panel. . . . . .Set

Flaps . . . . UP

Parking brake . . . . ___

Engine start levers . . . . CUTOFF

Weather radar . . . . .Off

SECURE

IRSs . . . . OFF

Emergency exit lights . . . . OFF

Window heat . . . . OFF

Packs . . . . OFF

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Emergency Descent........................0.1

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Emergency Descent

Condition: One or more of these occur:
- Cabin pressure cannot be controlled when the airplane is above 14,000 feet
- A rapid descent is needed.

1 Announce the emergency descent. The pilot flying will advise the cabin crew, on the PA system, of impending rapid descent. The pilot monitoring will advise ATC and obtain the area altimeter setting.

2 Passenger signs . . . . 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 maneuvering loads.

7 ⚠ Set target speed to Mmo/Vmo.

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.

■ ■ ■ ■

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 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.

▼ Continued on next page ▼

▼ Ditching continued ▼

6 Set VREF 40.

7 Do **not** arm the autobrake.

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

9 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake **. . . . . .OFF**

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Below 5000 feet

LANDING GEAR AURAL WARN
circuit breaker (P6) . . . . Pull

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

Passenger signs . . . . .ON

▼ Continued on next page ▼

Ditching continued

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

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

Pressurization mode selector . . . . MAN DC

Outflow VALVE switch . . . . Hold in CLOSE until outflow valve indicates fully closed

This prevents water from entering the airplane.

APU switch . . . . OFF

GROUND PROXIMITY GEAR INHIBIT switch . . . . GEAR INHIBIT

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

Confirm that passenger cabin preparations are complete.

Caution! (737-500) Do not open aft entry or aft service doors as they may be partially submerged.

Transmit all pertinent information regarding final ditching position.

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.

Continued on next page

▼ Ditching continued ▼

(737-500) 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 the cabin crew that ditching is imminent.

At **50 feet**, advise the 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.

■ ■ ■ ■

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Non-Normal Checklists — Chapter NNC

Airplane Gen., Emer. Equip., Doors, Windows — Section 1

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AIR STAIR

AIRSTAIR

Condition: The airstair is not secure.

1 Choose one:

◆Pressurization is **normal**:

Continue normal operation.

■ ■ ■ ■

◆Pressurization is **not** normal:

▶▶**Go to step 2**

2 Don oxygen masks.

3 Establish crew communications.

4 Passenger signs . . . . 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**

6 CAB ALT indicator . . . . 9,000 feet

7 Pressurization mode selector . . . . STBY

8 CABIN RATE selector. . . . . .As needed

▼ Continued on next page ▼

▼ **AIRSTAIR continued** ▼

9 Choose one:

◆Minimum safe altitude is **at or below 9000 feet**:

►►**Go to step 10**

◆Minimum safe altitude is **between 9000 feet and 13,000 feet**:

►►**Go to step 12**

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

►►**Go to step 14**

10 Descend to 9000 feet.

11 Maintain a cabin differential pressure of 0 psi by limiting flight altitude to 9000 feet.

►►**Go to step 17**

12 Descend to the minimum safe altitude.

13 CAB 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 (as installed) will illuminate at a cabin altitude of approximately 10,000 feet.

►►**Go to step 17**

14 Descend to the minimum safe altitude.

▼ **Continued on next page** ▼

▼ **AIRSTAIR continued** ▼

15 Pressurization mode selector . . . . MAN DC

16 Outflow VALVE switch . . . . Adjust to maintain a cabin differential pressure of 0 psi

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

17 Plan to land at the nearest suitable airport.

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

Oxygen masks may be removed.

■ ■ ■ ■

AUTO UNLK

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

■ ■ ■ ■

CARGO DOOR

FWD CARGO	AFT CARGO

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

1 Choose one:

◆Pressurization is **normal**:

Continue normal operation.

■ ■ ■ ■

◆Pressurization is **not** normal:

►►**Go to step 2**

2 Don oxygen masks.

3 Establish crew communications.

4 Passenger signs . . . . .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**

6 CAB ALT indicator . . . . .9,000 feet

▼ **Continued on next page** ▼

▼ **CARGO DOOR continued** ▼

7 Pressurization mode selector . . . . STBY

8 CABIN RATE selector. . . . . .As needed

9 Choose one:

◆ Minimum safe altitude is **at or below 9000 feet**:

►►**Go to step 10**

◆ Minimum safe altitude is **between 9000 feet and 13,000 feet**:

►►**Go to step 12**

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

►►**Go to step 14**

10 Descend to 9000 feet.

11 Maintain a cabin differential pressure of 0 psi by limiting flight altitude to 9000 feet.

►►**Go to step 17**

12 Descend to the minimum safe altitude.

13 CAB 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 (as installed) will illuminate at a cabin altitude of approximately 10,000 feet.

▼ **Continued on next page** ▼

▼ **CARGO DOOR continued** ▼

▶▶Go to step 17

14 Descend to the minimum safe altitude.

15 Pressurization mode selector . . . . MAN DC

16 Outflow VALVE switch . . . . Adjust to maintain a cabin differential pressure of 0 psi

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

17 Plan to land at the nearest suitable airport.

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

Oxygen masks may be removed.

■ ■ ■ ■

NOT ARMED

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**:

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**:

Continue normal operation.

■ ■ ■ ■

◆ Pressurization is **not** normal:

▶▶**Go to step 2**

2 Don oxygen masks.

3 Establish crew communications.

4 Passenger signs . . . . 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**

6 CAB ALT indicator . . . . .9,000 feet

7 Pressurization mode selector . . . . STBY

▼ **Continued on next page** ▼

▼ EQUIPMENT DOOR continued ▼

8 CABIN RATE selector . . . . .As needed

9 Choose one:

◆Minimum safe altitude is **at or below 9000 feet**:

▶▶**Go to step 10**

◆Minimum safe altitude is **between 9000 feet and 13,000 feet**:

▶▶**Go to step 12**

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

▶▶**Go to step 14**

10 Descend to 9000 feet.

11 Maintain a cabin differential pressure of 0 psi by limiting flight altitude to 9000 feet.

▶▶**Go to step 17**

12 Descend to the minimum safe altitude.

13 CAB 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 (as installed) will illuminate at a cabin altitude of approximately 10,000 feet.

▶▶**Go to step 17**

▼ Continued on next page ▼

▼ **EQUIPMENT DOOR continued** ▼

14 Descend to the minimum safe altitude.

15 Pressurization mode selector . . . . MAN DC

16 Outflow VALVE switch . . . . Adjust to maintain a cabin differential pressure of 0 psi

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

17 Plan to land at the nearest suitable airport.

18 **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.

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

1 **If** conditions allow:

FLIGHT DECK ACCESS SYSTEM switch . . . OFF

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

■ ■ ■ ■

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.

■ ■ ■ ■

▼ **Continued on next page** ▼

▼ **SERVICE DOOR continued** ▼

3 Choose one:

◆Pressurization is **normal**:

Continue normal operation.

■ ■ ■ ■

◆Pressurization is **not** normal:

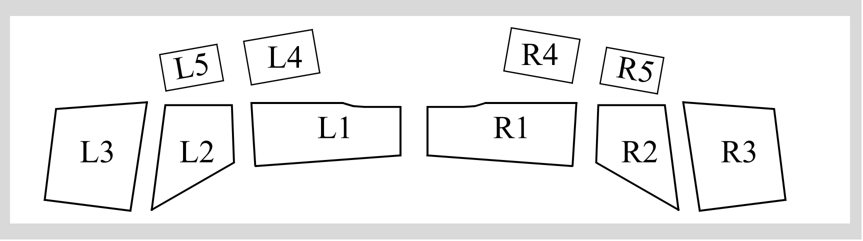
Plan to land at the nearest suitable airport.

■ ■ ■ ■

Window Damage

Condition: A 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 a structural pane is shattered or cracked.



1 **If** the damage is on Window 3 not heated:

▶▶**Go to the Window Damage Window 3 Not Heated checklist on page 1.18**

2 Choose one:

◆Window is **delaminated** only:

Continue normal operation.

■ ■ ■ ■

◆Window is **arcing**, **cracked** or **shattered**:

▶▶**Go to step 3**

▼ **Continued on next page** ▼

▼ Window Damage continued ▼

3 Don seat belts and shoulder harnesses.

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

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

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

6 **If** the **cracked or shattered** condition exists on:

Window 1 or 2 **outer** pane

Window 4 **inner** pane

Window 5 **outer** pane

►►**Go to step 8**

7 **If** the **cracked or shattered** condition exists on:

Window 1 or 2 **inner** pane

Window 4 **middle or outer** pane

Window 5 **inner** pane

►►**Go to step 10**

8 Continue normal operation.

9 Shoulder harnesses may be removed.

■ ■ ■ ■

10 Don oxygen masks.

▼ Continued on next page ▼

▼ **Window Damage continued** ▼

11 Establish crew communications.

12 Passenger signs . . . . .ON

13 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 14**

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

►►**Go to step 14**

14 CAB ALT indicator . . . . .9,000 feet

15 Pressurization mode selector . . . . STBY

16 CABIN RATE selector. . . . . .As needed

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

18 Plan to land at the nearest suitable airport.

19 **When** cabin differential pressure is 2 psi or less:

Oxygen masks and shoulder harnesses may be removed.

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

■ ■ ■ ■

Intentionally
Blank

Window Damage
Window 3 Not Heated

Condition: The window 3 not heated has one or more of these:
- A delamination
- A crack
- Is shattered.

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

1 Choose one:

◆Window is **delaminated** only:

Continue normal operation.

■ ■ ■ ■

◆Window is **cracked** or **shattered**:

►►**Go to step 2**

2 Don seat belts and shoulder harnesses.

3 Choose one:

◆Cracked or shattered condition exists on the inner **or** outer pane:

►►**Go to step 4**

◆Cracked or shattered condition exists on the inner **and** outer panes:

►►**Go to step 6**

4 Continue normal operation.

▼ **Continued on next page** ▼

▼ **Window Damage Window 3 Not Heated continued** ▼

5 Shoulder harnesses may be removed.

■ ■ ■ ■

6 Passenger signs . . . . ON

7 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 8**

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

►► **Go to step 8**

8 CAB ALT indicator . . . . 9,000 feet

9 Pressurization mode selector . . . . STBY

10 CABIN RATE selector . . . . As needed

▼ **Continued on next page** ▼

▼ Window Damage Window 3 Not Heated continued ▼

11 Choose one:

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

►► **Go to step 12**

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

►► **Go to step 14**

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

►► **Go to step 17**

12 Descend to 9000 feet.

13 Maintain a cabin differential pressure of 0 psi by limiting flight altitude to 9000 feet.

►► **Go to step 22**

14 Descend to the minimum safe altitude.

15 CAB 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 (as installed) will illuminate at a cabin altitude of approximately 10,000 feet.

16 **If** the cabin altitude is at or above 10,000 feet:

Don oxygen masks.

▼ Continued on next page ▼

▼ Window Damage Window 3 Not Heated continued ▼

Establish crew communications.

►►Go to step 21

17 Descend to the minimum safe altitude.

18 Pressurization mode selector . . . . MAN DC

19 Outflow VALVE switch . . . . Adjust to maintain a cabin differential pressure of 0 psi

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

20 **When** the cabin altitude is at or above 10,000 feet:

Don oxygen masks.

Establish crew communications.

21 **When** the cabin altitude is below 10,000 feet:

Oxygen masks may be removed.

22 Shoulder harnesses may be removed.

■ ■ ■ ■

Window Open

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

1 Maintain the maneuvering 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.

■ ■ ■ ■

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CABIN ALTITUDE WARNING or Rapid Depressurization

CABIN ALTITUDE **(As installed)**

Condition: One or more of these occur:
- A cabin altitude exceedance
- In flight, the intermittent cabin altitude/configuration warning horn sounds and the CABIN ALTITUDE light (as installed) illuminates.

1 Don oxygen masks and set regulators to 100%.

2 Establish crew communications.

3 Pressurization mode selector . . . . MAN AC

4 Outflow VALVE switch . . . . Hold in CLOSE until outflow VALVE indicates fully closed

5 **If** cabin altitude is **not** controllable:

Passenger signs . . . . ON

If the cabin altitude exceeds or is expected to exceed 14,000 feet:

PASS OXYGEN switch . . . . ON

▶▶**Go to the Emergency Descent checklist on page 0.1**

■ ■ ■ ■

▼ **Continued on next page** ▼

▼ CABIN ALTITUDE WARNING or Rapid Depressurization continued ▼

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.

■ ■ ■ ■

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 not controllable.

Objective: To maintain control of cabin altitude.

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

One at a time.

2 Engine BLEED air switches (both). . . . Verify ON

One at a time. Allow cabin rate to stabilize before placing second switch to AUTO.

3 PACK switches (both) . . . . Verify AUTO

▼ Continued on next page ▼

▼ AUTO FAIL or Unscheduled Pressurization Change continued ▼

4 Choose one:

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

■ ■ ■ ■

◆AUTO FAIL light is **illuminated or** cabin altitude is **not** controllable:

Pressurization mode selector. . . . . . STBY

CAB ALT indicator . . . . .Set using the cabin/flight altitude placard

►►**Go to step 5**

5 Choose one:

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

Continue normal operation.

Before descent:

CAB ALT indicator. . . . . . Set destination field elevation minus 200 feet

■ ■ ■ ■

◆AUTO FAIL light is **illuminated or** cabin altitude is **not** controllable:

►►**Go to step 6**

6 Pressurization mode selector . . . . MAN AC

▼ Continued on next page ▼

▼ **AUTO FAIL or Unscheduled Pressurization Change continued** ▼

7 Outflow VALVE switch . . . . .Adjust as needed to maintain correct cabin altitude and cabin rate of change

8 Choose one:

◆Cabin altitude is **controllable**:

►►**Go to step 13**

◆Cabin altitude is **not** controllable:

►►**Go to step 9**

9 Don oxygen masks and set regulators to 100%.

10 Establish crew communications.

11 Passenger signs . . . . .ON

12 **If** the cabin altitude exceeds or is expected to exceed 14,000 feet:

PASS OXYGEN switch . . . . .ON

►►**Go to the Emergency Descent checklist on page 0.1**

■ ■ ■ ■

13 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . **Adjust outflow VALVE switch as needed to maintain correct cabin altitude and cabin rate of change**

▼ **Continued on next page** ▼

▼ AUTO FAIL or Unscheduled Pressurization Change continued ▼

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

At Pattern Altitude

Outflow VALVE switch . . . . Hold in OPEN until outflow VALVE position indicates fully open

Landing Checklist

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.

■ ■ ■ ■

◆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.

■ ■ ■ ■

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) . . . . ALTERNATE

Note: Illumination of the EQUIP COOLING SUPPLY 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

■ ■ ■ ■

Intentionally
Blank

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.

▼ Continued on next page ▼

▼ PACK continued ▼

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**

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.

▼ Continued on next page ▼

▼ PACK continued ▼

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 DC

8 Outflow VALVE switch . . . . Hold in OPEN until outflow VALVE position indicates fully open

This increases airplane ventilation.

9 R RECIRC FAN switch . . . . AUTO

10 L RECIRC FAN switch . . . . OFF

11 **If** flight deck and cabin temperatures are excessively warm:

Open the flight deck door. This improves flight deck ventilation.

Use flight deck window shades, as needed.

Instruct the cabin crew to:

Dim cabin lighting.

Turn off in-flight entertainment systems.

Close cabin window shades.

▼ Continued on next page ▼

▼ PACK continued ▼

GALLEY switch . . . . OFF

■ ■ ■ ■

PACK
TRIP OFF

PACK TRIP OFF

Condition: A pack overheat occurs.

1 Temperature selector (affected side) . . . . Select warmer temperature

This reduces the workload on the affected air conditioning pack.

2 TRIP RESET switch . . . . Push

The PACK TRIP OFF light extinguishes if the pack temperature has cooled below limits.

3 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

Continue normal operation.

■ ■ ■ ■

◆**Both** PACK TRIP OFF 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 TRIP OFF 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 DC

8 Outflow VALVE switch . . . . Hold in OPEN until outflow VALVE position indicates fully open

This increases airplane ventilation.

9 **If** flight deck and cabin temperatures are excessively warm:

Open the flight deck door. This improves flight deck ventilation.

Use flight deck window shades, as needed.

▼ Continued on next page ▼

▼ PACK TRIP OFF continued ▼

Instruct the cabin crew to:

Dim cabin lighting.

Turn off in-flight entertainment systems.

Close cabin window shades.

GALLEY switch . . . . OFF

■ ■ ■ ■

Intentionally
Blank

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:

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

▶▶**Go to step 3**

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

▶▶**Go to step 7**

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

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 L PACK switch . . . . OFF

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

▼ Continued on next page ▼

▼ WING-BODY OVERHEAT continued ▼

8 BLEED 1 air switch . . . . OFF

9 WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

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

11 Choose one:

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

■ ■ ■ ■

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

►►**Go to step 12**

12 Choose one:

◆APU is **running**:

APU BLEED air switch (if needed) . . . OFF

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

►►**Go to step 13**

◆APU is **not** running:

■ ■ ■ ■

▼ Continued on next page ▼

▼ **WING-BODY OVERHEAT continued** ▼

13 Choose one:

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

►►**Go to step 15**

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

APU switch . . . . OFF

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

►►**Go to step 14**

14 Choose one:

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

►►**Go to step 15**

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

■ ■ ■ ■

15 ISOLATION VALVE switch. . . . . AUTO

16 BLEED 1 air switch . . . . .ON

17 L PACK switch . . . . AUTO

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

▼ **Continued on next page** ▼

▼ WING-BODY OVERHEAT continued ▼

19 Choose one:

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

■ ■ ■ ■

◆ WING-BODY OVERHEAT light **illuminates again**:

►►**Go to step 20**

20 ISOLATION VALVE switch . . . . CLOSE

21 BLEED 1 air switch . . . . OFF

22 L PACK switch . . . . OFF

23 WING ANTI-ICE switch . . . . OFF

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

25 The APU can be used during the rest of the flight, if needed.

■ ■ ■ ■

ZONE TEMP or DUCT OVERHEAT

737-400 ZONE TEMP or **737-300/500** DUCT OVERHEAT

Condition: (737-400) One or more of these occur:
- A zone duct overheat
- Flight deck temperature control is failed.

(737-300/500) A duct overheat occurs.

1 Temperature selector (affected side) . . . . Select cooler temperature

This prevents the trim air modulating valve (737-400) or the air mix valves (737-300/500) from returning to an overheat condition.

2 TRIP RESET switch . . . . Push

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

3 Monitor duct temperature.

4 (737-400) **If** duct temperature increases rapidly:

TRIM AIR switch . . . . OFF

▼ Continued on next page ▼

▼ ZONE TEMP or DUCT OVERHEAT continued ▼

5 (737-300/500) **If** duct temperature increases rapidly or the air mix valve indicator moves toward full hot:

CABIN temperature selector . . . . MANUAL

Adjust the air mix valve position as needed.

■ ■ ■ ■

Intentionally
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Non-Normal Checklists — Chapter NNC

Anti-Ice, Rain — Section 3

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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 cowl duct temperature by reducing thrust.

1 **If** flight conditions allow:

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

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

■ ■ ■ ■

COWL VALVE OPEN

ENGINE COWL VALVE OPEN

Condition: An engine COWL VALVE OPEN light stays illuminated bright blue if the cowl anti-ice valve is not in the commanded position.

1 Choose one:

◆ENG ANTI-ICE switch is **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.

►►**Go to step 2**

2 **If** TAT is **above 10°C**:

Limit thrust on the affected engine to 80% N1 if possible.

■ ■ ■ ■

PITOT STATIC HEAT

CAPT P/S 1 AUX STATIC	F/O STATIC 2 AUX P/S	L ELEV PITOT	L ALPHA VANE	TEMP PROBE
F/O P/S 2 AUX STATIC	CAPT STATIC 1 AUX P/S	R ELEV PITOT	R ALPHA VANE	

Condition: One or more pitot static 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.

■ ■ ■ ■

Intentionally
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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 if the wing anti-ice valve is not in the commanded position.

1 Choose one:

◆WING ANTI-ICE switch is **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 **If** TAT is **above 10°C or** there is **no** visible moisture:

ISOLATION VALVE switch . . . . CLOSE

PACK switch (affected side) . . . . OFF

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

Engine BLEED air switch (affected side) . . OFF

▼ Continued on next page ▼

▼ **WING ANTI-ICE VALVE OPEN continued** ▼

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

■ ■ ■ ■

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Non-Normal Checklists Chapter NNC
Automatic Flight Section 4

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AUTOPILOT DISENGAGE

A/P
P/RST

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

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

■ ■ ■ ■

AUTOTHROTTLE DISENGAGE

A/T
P/RST

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

1 Control thrust manually or re–engage the autothrottle.

■ ■ ■ ■

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ACARS Electrical Power Loss

Condition: ACARS AC power is lost.

Note: The ACARS automatically reverts to VOX MODE. The DATA MODE is inoperative.

■ ■ ■ ■

ACARS Fail

Condition: The ACARS system is failed.

1 Use normal voice procedures for reporting.

■ ■ ■ ■

Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

1 MIC SELECTOR switches
(all audio selector panels) . . . . . Flight interphone

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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BUS OFF

BUS OFF

Condition: The generator bus is not powered.

1 Choose one:

◆**Both** BUS OFF lights are illuminated:

►►**Go to the LOSS OF BOTH ENGINE DRIVEN GENERATORS checklist on page 6.6**

■ ■ ■ ■

◆**Only one** BUS OFF light is illuminated:

►►**Go to step 2**

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

3 Choose one:

◆BUS OFF light **extinguishes**:

■ ■ ■ ■

◆BUS OFF light **stays illuminated**:

►►**Go to step 4**

▼ Continued on next page ▼

▼ **BUS 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:

◆BUS OFF light **extinguishes**:

■ ■ ■ ■

◆BUS OFF light **stays illuminated**:

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

■ ■ ■ ■

HIGH OIL TEMP

GENERATOR DRIVE HIGH OIL TEMPERATURE

Condition: The generator drive oil temperature is high.

Action is not reversible.

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.

■ ■ ■ ■

LOW OIL PRESSURE

GENERATOR DRIVE LOW OIL PRESSURE

Condition: The generator drive oil pressure is low.

Action is not reversible.

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.

■ ■ ■ ■

Intentionally
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LOSS OF BOTH ENGINE DRIVEN GENERATORS

GEN 1 & 2	GEN 1 & 2	GEN 1 & 2
TRANSFER BUS OFF	BUS OFF	GEN OFF BUS

Condition: Both engine driven generators are off.

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

1 BUS TRANSFER switch . . . . OFF

2 ELEC HYD PUMPS switches (both). . . . . OFF

3 GEN 2 switch . . . . .ON

4 GEN 1 switch . . . . .ON

5 Choose one:

◆**A single** BUS OFF light **stays illuminated**:

▶▶**Go to step 6**

◆**Both** BUS OFF lights **stay illuminated**:

▶▶**Go to step 10**

◆**Both** BUS OFF lights **extinguish**:

BUS TRANSFER switch . . . . AUTO

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

YAW DAMPER switch . . . . .ON

▶▶**Go to step 20**

▼ **Continued on next page** ▼

▼ **LOSS OF BOTH ENGINE DRIVEN GENERATORS continued** ▼

A single BUS OFF light stays illuminated

6 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 7**

◆APU is **not** available:

BUS TRANSFER switch . . . . AUTO

This restores power to the remaining transfer bus.

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

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

▶▶**Go to step 20**

7 BUS TRANSFER switch . . . . AUTO

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

▼ **Continued on next page** ▼

▼ LOSS OF BOTH ENGINE DRIVEN GENERATORS continued ▼

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

9 YAW DAMPER switch . . . . .ON

►►Go to step 20

Both BUS OFF lights stay illuminated

10 Choose one:

◆APU is **available** for start:

> **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 11

◆APU is **not** available:

►►Go to step 16

11 **When** APU is running:

APU GEN switch . . . . ON bus 2

This powers TR2 and TR3.

If the APU can not be connected to bus 2:

APU GEN switch . . . . ON bus 1

▼ Continued on next page ▼

▼ LOSS OF BOTH ENGINE DRIVEN GENERATORS continued ▼

12 Choose one:

◆**A single** BUS OFF light **extinguishes**:

▶▶**Go to step 13**

◆**Both** BUS OFF lights **stay illuminated**:

▶▶**Go to step 16**

13 BUS TRANSFER switch . . . . AUTO

This restores power to the remaining transfer bus.

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

15 YAW DAMPER switch . . . . ON

▶▶**Go to step 20**

Both BUS OFF lights stay illuminated

16 Turn all exterior lights OFF to conserve battery power.

17 Avoid icing conditions.

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

18 Plan to land at the nearest suitable airport.

Note: A fully charged battery supplies a minimum of 30 minutes of standby power.

19 The right IRS will operate on DC power for 5 minutes.

▼ Continued on next page ▼

▼ LOSS OF BOTH ENGINE DRIVEN GENERATORS continued ▼

20 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 21**

◆**Only** the **first officer’s** primary attitude display is **failed**:

IRS TRANSFER switch. . . . . BOTH ON L

Do **not** use either autopilot.

If both BUS OFF lights **stay 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 not reversible. Do this step only if **both the captain's and first officer's** primary attitude displays are **failed**.

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

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

Note: The primary attitude displays will stay failed and the SET IRS HDG prompt will not appear on the POS INIT page until the attitude mode alignment is complete.

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

23 The MAP display is not available.

24 Enter updated heading periodically on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

25 Do **not** use either autopilot.

■ ■ ■ ■

STANDBY PWR OFF

STANDBY POWER OFF

Condition: The AC standby bus is not energized.

1 STANDBY POWER switch . . . . BAT

A fully charged battery supplies a minimum of 30 minutes of standby power.

2 **If** either generator bus is re-established:

STANDBY POWER switch . . . . AUTO

■ ■ ■ ■

TRANSFER BUS OFF

TRANSFER BUS OFF

Condition: The transfer bus is not energized.

1 BUS TRANSFER switch . . . . OFF, then AUTO

■ ■ ■ ■

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Aborted Engine Start

Condition: During a ground start, an abort engine start condition occurs.

Objective: To shut down the engine and motor it.

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

2 Choose one:

◆ENGINE START switch is in **GRD**:

Motor the engine for 60 seconds.

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

■ ■ ■ ■

◆ENGINE START switch is in **OFF**:

▶▶**Go to step 3**

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

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

Motor the engine for 60 seconds.

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

■ ■ ■ ■

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 indications stay within limits or the thrust lever is closed

---

3 Choose one:

◆Engine indications are **stabilized** and EGT **decreases**:

►►**Go to step 4**

◆Engine indications are **not** normal or EGT continues to **increase**:

►►**Go to step 5**

▼ Continued on next page ▼

▼ Engine Limit or Surge or Stall continued ▼

4 Thrust lever
(affected engine) . . . . Advance slowly while checking RPM and EGT follow thrust lever movement

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

■ ■ ■ ■

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

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

This 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.

▼ Continued on next page ▼

▼ **Engine Limit or Surge or Stall continued** ▼

9 Transponder mode selector
(TCAS equipped airplanes). . . . . TA

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

10 **If** wing anti-ice is needed:

ISOLATION VALVE switch . . . . AUTO

11 Plan to land at the nearest suitable airport.

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

►►**Go to the One Engine Inoperative Landing checklist on page 7.26**

■ ■ ■ ■

Intentionally
Blank

Loss Of Thrust On Both Engines

Condition: Both of these occur:
- Both engines have a loss of thrust
- Loss of thrust lever response from both engines.

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 930°C or there is no increase in EGT within 30 seconds:

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

If EGT again reaches 930°C or there is no increase in EGT within 30 seconds, repeat as needed.

- -

Note: Engines may 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.

5 At or above FL270, set airspeed to 275 knots. Below FL270, set airspeed to 300 knots.

▼ Continued on next page ▼

Loss Of Thrust On Both Engines continued

6 Choose one:

◆APU is **available** for start:

▶▶**Go to step 7**

◆APU is **not** available:

▶▶**Go to step 9**

Do **not** wait for successful engine start(s) before starting the APU.

7 APU . . . . START

8 **When** APU is running:

APU GEN switch . . . . ON bus 2

This powers TR2 and TR3.

If the APU cannot be connected to bus 2:

APU GEN switch . . . . ON bus 1

9 Choose one:

◆**One or both** engines **start**:

▶▶**Go to step 13**

◆**Neither** engine starts:

▶▶**Go to step 10**

Continued on next page

▼ **Loss Of Thrust On Both Engines continued** ▼

10 Choose one:

◆**N2** is **above 15%**:

Attempt a windmill start.

►►**Go to step 11**

◆**N2** is **at or below 15%**:

Attempt a starter assisted start.

►►**Go to step 14**

11 Thrust levers (both) . . . . Close

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

Note: The engine may accelerate to idle very slowly. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

13 **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

Note: The Engine In-Flight Start checklist will be used to start the other engine, if needed.

►►**Go to step 23**

14 Thrust levers (both) . . . . Close

▼ **Continued on next page** ▼

▼ Loss Of Thrust On Both Engines continued ▼

15 WING ANTI–ICE switch . . . . OFF

16 PACK switches (both) . . . . OFF

17 APU BLEED air switch . . . . ON

18 Ignition select switch . . . . BOTH

19 Engine start
lever (**either**) . . . . Confirm. . . . . CUTOFF

20 ENGINE START switch . . . . GRD

21 **When** N2 is at or above 15%:

Engine start lever. . . . . .IDLE detent

Note: The engine may accelerate to idle very slowly. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

22 **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

Note: The Engine In-Flight Start checklist will be used to start the other engine, if needed.

▼ Continued on next page ▼

▼ Loss Of Thrust On Both Engines continued ▼

23 Choose one:

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

►► **Go to step 29**

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

►► **Go to step 24**

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

IRS TRANSFER switch. . . . . BOTH ON L

Do **not** use either autopilot.

►► **Go to step 29**

Action is not reversible. Do this step only if **both** the captain's and first officer's primary attitude displays are **failed**.

24 ⚠ IRS MODE selectors (both). . . . . ATT

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

Note: The primary attitude displays will stay failed and the SET IRS HDG prompt will not appear on the POS INIT page until the attitude mode alignment is complete.

▼ Continued on next page ▼

▼ Loss Of Thrust On Both Engines continued ▼

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

26 The MAP display is not available.

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

28 Do **not** use either autopilot.

29 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 7.18**

■ ■ ■ ■

FAULT

APU FAULT

Condition: An APU malfunction occurs.

Note: The APU shuts down automatically.

1 APU switch . . . . OFF

■ ■ ■ ■

LOW OIL PRESSURE

APU LOW OIL PRESSURE

Condition: The APU oil pressure is low.

Note: The APU shuts down automatically.

1 APU switch. . . . . OFF

■ ■ ■ ■

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
- An APU start has been manually aborted before the APU reached normal operating speed.

1 APU switch. . . . . OFF

Note: If the OVERSPEED light illuminated due to an RPM limit exceedance, the APU OVERSPEED RESET switch in the E/E compartment must be reset before another APU start can be attempted.

■ ■ ■ ■

Intentionally
Blank

Engine Failure or Shutdown

Condition: One of these occurs:
- An engine failure
- An engine flameout
- Another checklist directs an engine shutdown.

1 Do an engine shutdown only when flight conditions allow.

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

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

4 **If** conditions allow:

Run the engine for three minutes at idle thrust.

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

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

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

▼ Continued on next page ▼

▼ **Engine Failure or Shutdown continued** ▼

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.

9 Transponder mode selector
(TCAS equipped airplanes) . . . . TA

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

10 **If** wing anti–ice is needed:

ISOLATION VALVE switch . . . . AUTO

11 Plan to land at the nearest suitable airport.

►►**Go to the One Engine Inoperative Landing checklist on page 7.26**

■ ■ ■ ■

Engine High Oil Temperature

Condition: The engine oil temperature is high.

1 Choose one:

◆Temperature is **at or above** the **red radial**:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.14**

■ ■ ■ ■

◆Temperature is in the **yellow band**:

▶▶**Go to step 2**

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

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

Run the engine at a power setting to keep the oil temperature in the normal operating range.

4 **If** temperature is in the **yellow band** for more than **15 minutes**:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.14**

■ ■ ■ ■

Intentionally
Blank

Engine In-Flight Start

Condition: An engine start is needed after a shutdown and there is:
- N1 rotation
- No fire
- No abnormal airframe vibration

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.

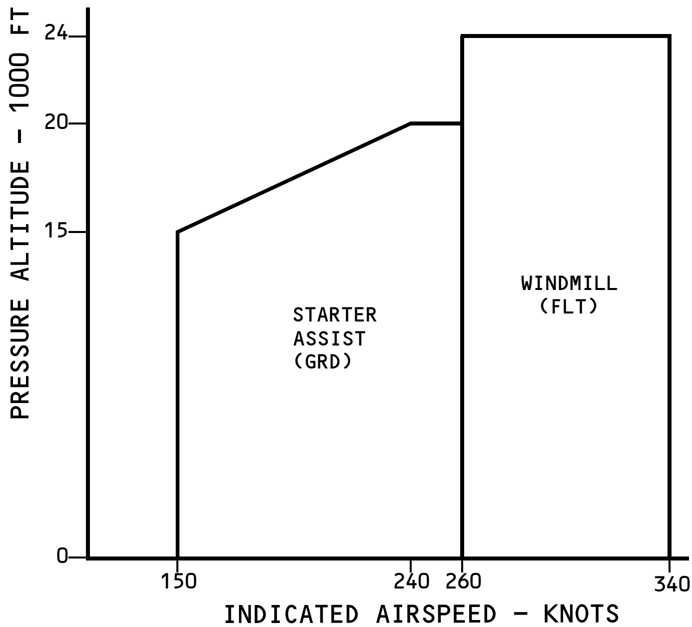
2 Check the In-Flight Start Envelope. Starts are not assured outside of the in-flight start envelope.

Note: Starter assist should be used if N2 is below 15%.

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

IN-FLIGHT START ENVELOPE



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

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

Note: Engines may accelerate to idle very slowly, especially at high altitudes. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction. If N2 is steadily increasing, and EGT stays within limits, the start is progressing normally.

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

5 Choose one:

◆**Windmill** start:

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

►►**Go to step 6**

◆**Starter assist** start:

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

DUCT PRESSURE . . . . . . Minimum 30 PSI

Advance the thrust lever to increase duct pressure if needed.

Ignition select switch . . . . BOTH

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

►►**Go to step 6**

6 **When** N2 is at or above 15%:

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

7 **If** EGT does not increase in 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

▼ Continued on next page ▼

▼ **Engine In-Flight Start continued** ▼

8 Choose one:

◆Engine **starts** and runs normally:

▶▶**Go to step 9**

◆Engine **fails** to start:

▶▶**Go to the One Engine Inoperative Landing checklist on page 7.26**

■ ■ ■ ■

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

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

11 ENGINE START switch . . . . As needed

12 APU . . . . As needed

13 Transponder mode selector
(TCAS equipped airplanes) . . . . TA/RA

■ ■ ■ ■

ENGINE LOW OIL PRESSURE

LOW OIL PRESSURE **May or may not be illuminated**

Condition: The engine oil pressure is low.

1 Choose one:

◆ Engine oil pressure is in the **yellow band** with **takeoff thrust** set:

Do **not** takeoff.

■ ■ ■ ■

◆ Engine oil pressure is **at or below** the **red radial**:

►► **Go to the Engine Failure or Shutdown checklist on page 7.14**

■ ■ ■ ■

OIL FILTER BYPASS

ENGINE OIL FILTER BYPASS

Condition: Oil filter contamination can cause oil to bypass the oil filter.

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

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

3 Choose one:

◆ OIL FILTER BYPASS light **extinguishes**:

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

■ ■ ■ ■

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

►► **Go to the Engine Failure or Shutdown checklist on page 7.14**

■ ■ ■ ■

High Engine Vibration

Condition: Both of these occur:
- The vibration level is more than 4.0 units
- Airframe vibrations.

1 Choose one:

◆In **icing** conditions:

▶▶**Go to step 2**

◆**Not** in icing conditions:

▶▶**Go to step 4**

2 **If** in moderate to severe icing conditions during descent or holding, do the following on one engine at a time at approximately 15 minute intervals:

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

Thrust (affected engine) . . . Adjust to 45% N1 for five seconds, then advance slowly to a minimum of 80% N1 for 1 second

3 Choose one:

◆Vibration **decreases**:

Continue normal operation.

■ ■ ■ ■

◆Vibration does **not** decrease:

▶▶**Go to step 4**

▼ Continued on next page ▼

▼ **High Engine Vibration continued** ▼

4 Autothrottle (if engaged). . . . . .Disengage

5 Thrust lever
(affected engine) . . . . Confirm. . . . . . Retard to maintain vibration levels below 4 units

Note: If the VIB indication does not decrease when the thrust lever is retarded, check other engine indications. If other engine indications are normal, no further action is needed.

■ ■ ■ ■

LOW IDLE

LOW IDLE

Condition: Either engine is below minimum required RPM.

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

2 Thrust levers (both) . . . . .Advance until the LOW IDLE light extinguishes

■ ■ ■ ■

One Engine Inoperative Landing

Condition: Landing must be made with one engine inoperative.

1 Plan a flaps 15 landing.

2 Set VREF 15.

3 Maintain VREF 15 + 5 knots minimum on final approach. Apply normal wind correction but do not go below VREF 15 + 5 knots to assure adequate speed for go-around.

4 Use engine anti-ice on the operating engine only.

5 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ___, LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data **. . . . . VREF 15, Minimums ___**

Approach briefing . . . . Completed

If additional go-around thrust is needed:

Configure the pressurization system for a no engine bleed landing when below 10,000 feet.

WING ANTI-ICE switch . . . . OFF

ISOLATION VALVE switch . . . . CLOSE

BLEED 1 air switch . . . . OFF

▼ **Continued on next page** ▼

▼ One Engine Inoperative Landing continued ▼

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 until reaching flap retraction altitude.

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

Accelerate to flaps 1 maneuvering speed before flap retraction.

Approach Checklist

Altimeters . . . . ____

Additional Deferred Item

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

▼ Continued on next page ▼

One Engine Inoperative Landing continued

Landing Checklist

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

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

INOP

PMC INOPERATIVE

Condition: The PMC is inoperative or OFF.

1 Thrust levers (if needed) . . . . Adjust

The autothrottle may be used, if desired. If the autothrottle is disengaged, adjust the thrust levers as needed.

2 Observe engine limits.

■ ■ ■ ■

REVERSER

REVERSER

Condition: A fault occurs in the thrust reverser system.

Note: Additional system failures may cause in-flight deployment.

1 Expect normal reverser operation after landing.

■ ■ ■ ■

REVERSER UNLOCKED

REVERSER UNLOCKED (IN FLIGHT)

Condition: One of these occur:
- One of the two reverser sleeves has mechanically unlocked
- The light is giving a false indication.

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.

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 7.14**

■ ■ ■ ■

START VALVE OPEN

START VALVE OPEN

Condition: 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**

▼ **Continued on next page** ▼

▼ **START VALVE OPEN continued** ▼

7 Choose one:

◆ **In flight**:

■ ■ ■ ■

◆ On the **ground**:

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

Engine start lever (affected engine) . . . . 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 odor.

Objective: To exit the ash cloud and restart engines if needed.

Caution! Exit volcanic ash as quickly as possible. Consider a 180° 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 reduces possible engine damage or flameout, or both, by decreasing EGT.

5 ENGINE START switches (both) . . . . FLT

6 PACK switches . . . . HIGH

7 WING ANTI–ICE switch . . . . .ON

8 ENG ANTI–ICE switches (both) . . . . .ON

▼ Continued on next page ▼

▼ **Volcanic Ash continued** ▼

9 **If** the APU is available for start:

APU . . . . START

This supplies backup electrical and pneumatic sources, if needed.

Note: Volcanic ash can cause non-normal system indications such as:

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

10 Engines may accelerate to idle very slowly, especially at high altitudes.

11 Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction. If N2 is steadily increasing, and EGT stays within limits, the start is progressing normally.

12 Plan to land at the nearest suitable airport.

13 Choose one:

◆ Engines run **normally**:

■ ■ ■ ■

◆ Engines do **not** run normally:

►► **Go to the Loss Of Thrust On Both Engines checklist on page 7.6**

■ ■ ■ ■

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Table of Contents

Table of Contents

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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**:

▶▶**Go to step 5**

◆APU fire switch **stays illuminated**:

▶▶**Go to step 4**

4 Plan to land at the nearest suitable airport.

5 **When** on the ground:

If AC power is not available:

STANDBY POWER switch. . . . . BAT

■ ■ ■ ■

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.

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 stays illuminated:

Engine fire switch . . . . . Rotate to the stop and hold for 1 second

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

Engine fire switch. . . . . .Rotate to the other stop and hold for 1 second

Continued on next page

▼ **ENGINE FIRE or Engine Severe Damage or Separation continued** ▼

6 **If** high airframe vibration occurs and continues after engine is shut down:

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

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

7 ISOLATION VALVE switch . . . . CLOSE

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

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

9 APU BLEED air switch . . . . OFF

10 Choose one:

◆ APU is **available** for start:

APU . . . . START

When APU is running:

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

►► **Go to step 11**

◆ APU is **not** available:

►► **Go to step 11**

11 Balance fuel as needed.

▼ **Continued on next page** ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

12 Transponder mode selector
(TCAS equipped airplanes). . . . . TA

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

13 **If** wing anti–ice is needed:

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

14 Plan to land at the nearest suitable airport.

►►Go to the One Engine Inoperative Landing checklist on page 7.26

■ ■ ■ ■

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 8.2**

■ ■ ■ ■

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

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

■ ■ ■ ■

Engine Tailpipe Fire

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

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

2 Advise the cabin.

3 Choose one:

◆Bleed air is **not** available:

Advise the tower.

■ ■ ■ ■

◆Bleed air is **available**:

►►**Go to step 4**

4 PACK switches (both) . . . . OFF

5 ISOLATION VALVE switch. . . . . AUTO

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

7 Choose one:

◆APU is **running**:

APU BLEED air switch . . . . .ON

►►**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

▶▶**Go to step 9**

9 Advise the tower.

10 Continue to motor the engine until the tailpipe fire is extinguished.

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

■ ■ ■ ■

Smoke, Fire or Fumes

Condition: Smoke, fire or fumes occurs.

1 Diversion may be needed.

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

3 Don smoke goggles, as needed.

4 **If** smoke or fumes affect vision:

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

5 Establish crew and cabin communications.

6 BUS TRANSFER switch . . . . OFF

7 GALLEY switch . . . . OFF

8 RECIRC FAN switch(es) . . . . OFF

9 Instruct the cabin crew to turn off the IFE and PC power switches (as installed).

10 APU BLEED air switch . . . . OFF

11 **Anytime** the smoke or fumes becomes the greatest threat:

▶▶**Go to the Smoke or Fumes Removal checklist on page 8.18**

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

12 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 13**

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

►►**Go to step 14**

13 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 8.18, if needed**

■ ■ ■ ■

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

►►**Go to step 14**

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

14 EQUIP COOLING SUPPLY
and EXHAUST switches (both) . . . . . . ALTERNATE

15 Instruct the cabin crew to:

Turn on cabin reading lights.

Turn on galley attendants work lights.

Turn off cabin fluorescent light switches.

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

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

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

19 ISOLATION VALVE switch. . . . . CLOSE

20 R PACK switch . . . . OFF

21 **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 ▼

22 Choose one:

◆Smoke or fumes are **decreasing**:

►►**Go to the Smoke or Fumes Removal checklist on page 8.18, if needed**

■ ■ ■ ■

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

R PACK switch . . . . AUTO

L PACK switch . . . . OFF

►►**Go to step 23**

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

24 Choose one:

◆Smoke or fumes are **decreasing**:

►►**Go to the Smoke or Fumes Removal checklist on page 8.18, 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 8.18, if needed**

■ ■ ■ ■

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.

■ ■ ■ ■

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CARGO FIRE

FWD	AFT

Condition: Fire is detected in the related cargo compartment.

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.

3 RECIRC FAN switch(es) . . . . OFF

4 One PACK switch . . . . OFF

This reduces airflow in the cargo compartment and helps maintain the concentration of fire retardant.

5 Plan to land at the nearest suitable airport.

6 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

▼ Continued on next page ▼

▼ CARGO FIRE continued ▼

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Warning! Inform ground personnel not to open the cargo door after landing until all passengers and crew have exited the airplane and fire fighting equipment is nearby.

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ____, Green light

■ ■ ■ ■

DETECTOR FAULT

CARGO FIRE DETECTOR FAULT

Condition: Fire detection is inoperative in one or both cargo compartments.

1 The fire detection system in one or both cargo compartments is inoperative.

■ ■ ■ ■

FAULT

ENGINE FIRE/OVERHEAT DETECTOR FAULT

Condition: Engine fire and overheat detection is inoperative.

1 The fire detection system in one or both engines is inoperative.

■ ■ ■ ■

SMOKE

LAVATORY SMOKE

Condition: Smoke is detected in one or more lavatories.

1 Verify that the lavatory fire is contained.

■ ■ ■ ■

Intentionally
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Smoke or Fumes Removal

Condition: Smoke or fumes removal is needed.

1 Do this checklist **only** when directed by the Smoke, Fire or Fumes checklist.

2 Do **not** delay landing in an attempt to complete the following steps.

3 Close the flight deck door.

4 Choose one:

◆**Both** PACKS are **OFF**:

►►**Go to step 5**

◆**A single or both** PACKS 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 8.8 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 Pressurization mode selector . . . . STBY

8 CAB ALT indicator . . . . . . .Select a higher altitude (maximum 10,000 feet)

▼ Continued on next page ▼

▼ Smoke or Fumes Removal continued ▼

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

9 CABIN RATE selector . . . . Maximum INCR

10 Engine BLEED air switches (both) . . . . . Verify ON

11 Set thrust to maximum practical N1 (minimum 45%).

12 Open flight deck air conditioning and gasper outlets.

Caution! Do not open any flight deck window. Keep the flight deck door closed.

13 Choose one:

◆ Smoke or fumes are **controllable**:

► ► **Go to the Smoke, Fire or Fumes checklist on page 8.8 and do the remaining steps**

■ ■ ■ ■

◆ Smoke or fumes are **not** controllable:

► ► **Go to step 14**

14 Descend to the lowest safe altitude or 10,000 feet, whichever is higher.

15 **When** at 14,000 feet or below:

Pressurization mode selector . . . . MAN AC

▼ Continued on next page ▼

▼ **Smoke or Fumes Removal continued** ▼

Outflow VALVE switch . . . . . Hold in OPEN until the outflow VALVE position indicates fully OPEN

This causes the cabin airflow to carry smoke or fumes aft.

▶▶**Go to the Smoke, Fire or Fumes checklist on page 8.8 and do the remaining steps**

■ ■ ■ ■

WHEEL WELL

WHEEL WELL FIRE

Condition: Fire is detected in the main wheel well.

Do **not** exceed the gear EXTEND limit speed (270K/.82M)

1 LANDING GEAR lever . . . . .DN

Note: Do **not** use FMC fuel predictions with landing gear extended.

2 Choose one:

◆Gear **must be retracted** for airplane performance:

▶▶**Go to step 3**

◆Gear **does not** need to be retracted for airplane performance:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

3 **When** the WHEEL WELL light extinguishes:

Wait 20 minutes.

235K maximum

4 LANDING GEAR lever . . . . UP

5 **When** the landing gear indicator lights extinguish:

LANDING GEAR lever . . . . OFF

6 Plan to land at the nearest suitable airport.

■ ■ ■ ■

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Table of Contents

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Blank

Runaway Stabilizer

Condition: Uncommanded stabilizer trim movement occurs continuously.

1 Control column. . . . . Hold firmly

2 Autopilot (if engaged) . . . . .Disengage

Do **not** re-engage the autopilot.

Control airplane pitch attitude manually with control column and main electric trim as needed.

3 **If** the runaway **stops**:

■ ■ ■ ■

4 **If** the runaway **continues**:

STAB TRIM CUTOUT
switches (both) . . . . CUTOUT

If the runaway **continues**:

Stabilizer
trim wheel . . . . Grasp and hold

- -

5 Stabilizer. . . . . Trim manually

6 Anticipate trim requirements.

7 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

▼ Continued on next page ▼

▼ Runaway Stabilizer continued ▼

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Airspeed and Trim

Establish correct airspeed and in-trim condition early on final approach.

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

Uncommanded Rudder/Yaw Or Roll

Condition: Uncommanded rudder pedal displacement or pedal kicks, or uncommanded yaw or roll occurs.

1 Autopilot (if engaged) . . . . .Disengage

2 Maintain control of the airplane with all available flight controls. If roll is uncontrollable, immediately reduce pitch/angle of attack and increase airspeed. Do not attempt to maintain altitude until control is recovered.

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

4 Verify thrust is symmetrical.

---

5 Choose one:

◆Trailing edge flaps are **extended**, with no flap asymmetry and rudder pedals normal. (May be accompanied by a loud bang):

▶▶**Go to step 6**

◆Trailing edge flaps are **not** extended:

▶▶**Go to step 10**

6 Flaps. . . . . Retract to flaps 1 on schedule

Roll may be the result of trailing edge flap displacement due to a flap spindle fracture.

Consider doing a go-around.

7 Plan a flaps 1 landing.

▼ **Continued on next page** ▼

▼ **Uncommanded Rudder/Yaw Or Roll continued** ▼

8 Set VREF 40 + 30 knots.

9 Check the appropriate Non-Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter. Use the Advisory Information for Trailing Edge Flap Disagree, VREF 40 + 30 knots.

►►**Go to step 20**

10 Choose one:

◆ STBY RUD ON light **is installed** on the overhead panel **and** is **operable**:

►►**Go to the Jammed or Restricted Flight Controls checklist on page 9.14**

■ ■ ■ ■

◆ STBY RUD ON light is **not** installed on the overhead panel **or** is placarded **INOP**:

►►**Go to step 11**

11 YAW DAMPER switch . . . . OFF

▼ **Continued on next page** ▼

▼ **Uncommanded Rudder/Yaw Or Roll continued** ▼

12 Choose one:

◆Yaw or roll **stops**:

Autopilot (if needed) . . . . Engage

Autothrottle (if needed) . . . . Engage

■ ■ ■ ■

◆Yaw or roll does **not** stop:

►►**Go to step 13**

13 Rudder trim . . . . Center

14 Rudder pedals . . . . Free and center

Use maximum force including a combined effort of both pilots, if needed, to free and center the rudder pedals.

15 Choose one:

◆Rudder pedal position and movement are **normal**:

YAW DAMPER switch . . . . ON

■ ■ ■ ■

◆Rudder pedal position or movement is **not** normal:

►►**Go to step 16**

16 SYSTEM B FLIGHT CONTROL switch . . . . Confirm. . . . . . . STBY RUD

▼ **Continued on next page** ▼

▼ Uncommanded Rudder/Yaw Or Roll continued ▼

17 Land at the nearest suitable airport.

18 Consider checking rudder freedom of movement at a safe altitude using slow rudder inputs while in the landing configuration and at approach speed.

Note: A slight rudder deflection may remain, but continued rudder pedal pressure may help maintain an in-trim condition. Sufficient directional control is available on landing using differential braking and nose wheel steering.

Crosswind capability may be reduced.

19 Do **not** use the autobrake. Use manual brakes on landing.

20 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ___, LAND ALT ___

Recall . . . . Checked

Autobrake **. . . . . ___, or OFF as directed by checklist**

Landing data **. . . . . VREF ___ as directed by checklist, Minimums ___**

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼ **Uncommanded Rudder/Yaw Or Roll continued** ▼

Approach Checklist

Altimeters . . . . ___

Additional Deferred Item

Choose one:

◆Landing with **flaps 1**:

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

►►**Go to Landing Checklist below**

◆Landing with **flaps 30 or 40**:

►►**Go to Landing Checklist below**

Landing Checklist

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 Burn off fuel to reduce touchdown speed.

3 Set VREF 40 + 55 knots.

4 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

5 Maintain flaps up maneuvering speed until established on final approach.

6 Limit bank angle to 15° when airspeed is less than the flaps up maneuvering speed.

7 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 40 + 55 knots, Minimums ____**

▼ Continued on next page ▼

▼ All Flaps Up Landing continued ▼

Approach briefing . . . . Completed

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 maneuvering speed.

Accelerate to flaps up maneuvering speed.

Approach Checklist

Altimeters . . . . ____

Additional Deferred Items

FASTEN BELTS switch . . . . ON

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

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 Passenger signs . . . . .ON

Do **not** use speedbrakes 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.

Continued on next page

▼ Elevator Tab Vibration continued ▼

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.

1 Continue normal operation.

■ ■ ■ ■

FLAP LOAD RELIEF

FLAP LOAD RELIEF

Condition: Flap load relief occurs.

1 Check flap position and maintain the appropriate airspeed.

■ ■ ■ ■

LOW PRESSURE

FLIGHT CONTROL LOW PRESSURE

Condition: One of these occurs:
- Hydraulic system pressure to the ailerons, elevators and rudder is low
- The rudder pressure reducer has failed in the low pressure mode.

Objective: To activate the standby hydraulic system and standby rudder PCU.

1 FLT CONTROL switch
(affected side) . . . . Confirm. . . . . . .STBY RUD

■ ■ ■ ■

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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 Choose one:

◆ Rudder **is** jammed or restricted:

▶▶**Go to step 5**

◆ Rudder is **not** jammed or restricted:

▶▶**Go to step 6**

5 Choose one:

◆ STBY RUD ON light is **not** installed on the overhead panel **or** is placarded **INOP**:

▶▶**Go to the Uncommanded Rudder/Yaw Or Roll checklist on page 9.3**

■ ■ ■ ■

◆ STBY RUD ON light **is** installed on the overhead panel **and** is **operable**:

▶▶**Go to step 6**

▼ **Continued on next page** ▼

▼ Jammed or Restricted Flight Controls continued ▼

6 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.

7 Do **not** turn off any flight control switches.

8 **If** the failure could be due to freezing water and conditions allow:

Consider descent to a warmer temperature and attempt to overpower the jammed or restricted system again.

9 Choose one:

◆ Controls are **normal**:

■ ■ ■ ■

◆ Controls are **not** normal:

▶ ▶ **Go to step 10**

10 Use stabilizer or rudder trim to offload control forces.

11 **If** electric stabilizer trim is needed:

Move the Stabilizer Trim Override switch to OVERRIDE.

12 Do not make abrupt thrust changes. Extend or retract speedbrake slowly and smoothly.

13 Limit bank angle to 15°.

▼ Continued on next page ▼

▼ Jammed or Restricted Flight Controls continued ▼

14 Plan to land at the nearest suitable airport.

15 Plan a flaps 15 landing.

16 Set VREF 15.

17 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

18 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ___, LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . **VREF 15, Minimums ___**

Approach briefing . . . . Completed

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

Altimeters . . . . ___

▼ Continued on next page ▼

Additional Deferred Item

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

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.

Note: Do not use FMC fuel 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 9.34**

■ ■ ■ ■

◆ **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 extension 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 maneuvering speed.

10 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

11 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

▼ Continued on next page ▼

▼ **LEADING EDGE FLAPS TRANSIT continued** ▼

Landing data . . . . **VREF 15 + 5 knots, Minimums ____**

Approach briefing . . . . Completed

Approach Checklist

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 yellow airspeed band for landing is normal for this condition.

Note: V/S and VNAV PTH modes may revert to LVL CHG mode.

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. . . . . **15, Amber light**

■ ■ ■ ■

MACH TRIM FAIL

MACH TRIM FAIL

Condition: The mach trim system is failed.

1 Limit airspeed to .74 Mach.

■ ■ ■ ■

SPEED BRAKE

SPEED BRAKE

Condition: The speed brakes are up while in the landing configuration.

1 SPEED BRAKE lever . . . . ARMED or DOWN detent (as needed)

■ ■ ■ ■

SPEED BRAKE DO NOT ARM

SPEED BRAKE DO NOT ARM

Condition: An automatic speedbrake fault occurs.

Note: Speedbrakes may be used in flight.

1 Do **not** arm the speedbrake for landing. Manually deploy the speedbrakes immediately upon landing.

2 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake **. DOWN detent**

Landing gear . . . . Down

Flaps . . . . ____, Green light

■ ■ ■ ■

SPEED TRIM FAIL

SPEED TRIM FAIL

Condition: The speed trim system is failed.

1 Continue normal operation.

■ ■ ■ ■

STABILIZER OUT OF TRIM

STAB OUT OF TRIM

Condition: The autopilot does not set the stabilizer trim correctly.

Note: Momentary illumination of the STAB OUT OF TRIM light during large changes in trim requirements is normal.

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 Stabilizer trim . . . . .As needed

▼ Continued on next page ▼

▼ **STABILIZER OUT OF TRIM continued** ▼

5 Choose one:

◆ Stabilizer **responds** to electric trim inputs:

■ ■ ■ ■

◆ Stabilizer does **not** respond to electric trim inputs:

►► **Go to the Stabilizer Trim Inoperative checklist on page 9.26**

■ ■ ■ ■

Stabilizer Trim Inoperative

Condition: One or more of these occur:
- The main electric stabilizer trim is inoperative
- The autopilot stabilizer trim is inoperative.

1 STAB TRIM CUTOUT switches (both) . . . . CUTOUT

The autopilot is not available.

2 Apply steady pressure on the manual trim handles until the needed trim is attained.

3 **If** needed:

Use force to cause the disconnect clutch to disengage. Approximately 1/2 turn of the stabilizer trim wheel may be needed.

Note: A maximum two-pilot effort on the trim wheels will not cause a cable or system failure.

The handle(s) should be folded inside the stabilizer trim wheel when manual trim is no longer needed.

If the failure could be due to ice accumulation, descend to a warmer temperature and attempt again.

▼ Continued on next page ▼

▼ **Stabilizer Trim Inoperative continued** ▼

4 Choose one:

◆ Stabilizer **can** be trimmed manually:

▶▶**Go to step 5**

◆ Stabilizer can **not** be trimmed manually:

▶▶**Go to step 9**

5 Maintain in-trim airspeed until the start of the approach.

6 Use an airspeed which results in an in-trim condition. This will reduce the force that is needed to move the stabilizer.

7 Continue to trim manually for the rest of the flight.

8 Establish the landing configuration early.

▶▶**Go to step 11**

9 Anticipate higher than normal elevator forces during approach and landing.

10 The thrust reduction at flare will cause a nose down pitch.

Note: Elevator control is sufficient to safely land the airplane regardless of stabilizer position.

11 Plan a flaps 15 landing.

12 Set VREF 15.

13 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

14 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

Stabilizer Trim Inoperative continued

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data **. . . . . VREF 15, Minimums ____**

Approach briefing . . . . Completed

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

Altimeters . . . . ____

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Continued on next page

▼ Stabilizer Trim Inoperative continued ▼

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 fuel 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 the next larger flap setting.

▶▶**Go to step 3**

◆ Flap **lever** is set to **15 or 25**:

Set VREF 15.

Note: VREF + wind additive must not exceed the flap placard speed for the next larger flap setting.

▶▶**Go to step 3**

◆ Flap **lever** is set to **1 or greater** and **less than 15**:

Set VREF 40 + 30 knots.

▶▶**Go to step 3**

◆ Flap **lever** is set to **UP**:

▶▶**Go to the Trailing Edge Flaps Up Landing checklist on page 9.40**

■ ■ ■ ■

3 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

4 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ___, LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . **VREF ___ as directed by checklist, Minimums ___**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . **___, Green light**

■ ■ ■ ■

Intentionally
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Trailing Edge Flap Disagree

Condition: Both of these occur:
- The trailing edge flaps are not in the commanded position
- There is no trailing edge flap asymmetry.

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 for landing.

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 for landing.

Note: VREF 15 + wind additive must not exceed the flap placard speed for the next larger flap setting.

6 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

7 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data **. . . . . VREF ____ as directed by checklist, Minimums ____**

▼ Continued on next page ▼

▼ **Trailing Edge Flap Disagree continued** ▼

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

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**

Alternate Flap Extension

During flap extension, set the flap lever to the desired flap position.

▼ **Continued on next page** ▼

▼ **Trailing Edge Flap Disagree continued** ▼

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 will stay illuminated until the flaps approach the flaps 10 position.

Note: Operation within the lower yellow airspeed band 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 maneuvering 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 on 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 on page 9.40**

■ ■ ■ ■

◆ Indicated flap position is **1 or greater and less than 15** after attempting alternate flap extension:

Land using existing flaps.

Set VREF 40 + 30 knots for landing.

Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

►► **Go to Landing Checklist below**

▼ **Continued on next page** ▼

Landing Checklist

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 does **not exist**:

Do this checklist **only** when directed by the Trailing Edge Flap Disagree checklist.

►►**Go to step 4**

◆Trailing edge flap asymmetry **exists**:

►►**Go to step 2**

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 will stay illuminated.

▼ Continued on next page ▼

▼ Trailing Edge Flaps Up Landing continued ▼

4 Choose one:

◆ LE DEVICES annunciator does **not** show FULL EXT:

▶▶**Go to the All Flaps Up Landing checklist on page 9.8**

■ ■ ■ ■

◆ LE DEVICES annunciator **shows** FULL EXT:

▶▶**Go to step 5**

5 Burn off fuel to reduce touchdown speed.

6 Set VREF 40 + 40 knots.

7 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

8 Maintain flaps up maneuvering speed until on final.

9 Limit bank angle to 15° when airspeed is less than the flaps up maneuvering speed.

10 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 40 + 40 knots, Minimums ____**

▼ Continued on next page ▼

▼ Trailing Edge Flaps Up Landing continued ▼

Approach briefing . . . . Completed

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 maneuvering speed.

Accelerate to flaps up maneuvering speed.

Do not exceed 230 knots with leading edge devices extended.

Approach Checklist

Altimeters . . . . ___

Additional Deferred Items

FASTEN BELTS switch . . . . .ON

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

Note: A nuisance stick shaker may 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 may revert to LVL CHG mode.

▼ Continued on next page ▼

▼ **Trailing Edge Flaps Up Landing continued** ▼

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. . . . . ____, **Amber light**

■ ■ ■ ■

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 Do not exceed flaps 30 if the crosswind exceeds 30 knots.

■ ■ ■ ■

Intentionally
Blank

Non-Normal Checklists — Chapter NNC

Flight Instruments, Displays — Section 10

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Intentionally
Blank

Airspeed Unreliable

Condition: The pitch attitude is not consistent with the phase of flight, altitude, thrust and weight, or noise or low frequency buffeting is experienced.

Objective: To establish the normal pitch attitude and thrust setting for the phase of flight.

1 Adjust the airplane attitude and thrust. Maintain airplane control.

2 PITOT STATIC HEAT switches . . . . Check ON

3 Cross check the MACH/AIRSPEED indicators.

- -

4 Cross check the IRS and FMC ground speed and winds to determine airspeed accuracy if indicated airspeed is questionable.

Note: Erroneous or unreliable airspeed indications may be caused by blocked or frozen pitot-static system(s), or a severely damaged or missing radome.

5 Attitude and thrust information is located in the Performance Inflight section.

■ ■ ■ ■

OFF

FLIGHT RECORDER OFF

Condition: The flight recorder is off.

1 Continue normal operation.

■ ■ ■ ■

SG FAIL

Condition: The SG FAIL alert or blanking of both EADI and EHSI displays indicates a failure of the related symbol generator.

1 EFI transfer switch . . . .BOTH ON 1 or BOTH ON 2

Select the operating control panel.

2 Do **not** engage either autopilot.

■ ■ ■ ■

Non-Normal Checklists — Chapter NNC

Flight Management, Navigation — Section 11

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Intentionally
Blank

FMC
P/RST

FMC FAIL - SINGLE FMC AIRPLANES

Condition: One or more of these occur:
- Loss of FMC data on a CDU
- Loss of FMC data on a navigation display map mode
- Illumination of the FMC alert light.

1 Resume conventional navigation. Without an operating FMC, LNAV and VNAV are not available.

AN/CDU LNAV operation is available (as installed).

2 **When** preparing for approach:

Use the manual N1 set knobs to set the N1 bugs.

■ ■ ■ ■

FMC
P/RST

FMC FAIL - DUAL FMC AIRPLANES

Condition: Dual FMC failure:
- Loss of FMC data on both CDUs
- Loss of FMC data on the captain's and first officer's navigation display MAP modes.

Left FMC failure:
- Loss of FMC data on both CDUs
- Loss of FMC data on the captain's navigation display MAP mode.

Right FMC failure:
- Illumination of the FMC message light
- Loss of FMC data on the first officer's navigation display MAP mode
- SINGLE FMC OPERATION scratchpad message.

Objective: To restore dual FMC operation, configure for single FMC operation or resume conventional navigation.

1 Choose one:

◆Only the **left or right** FMC has failed:

▶▶**Go to step 2**

◆**Dual** FMC failure has occurred:

▶▶**Go to step 4**

2 FMC source select switch . . . . .BOTH ON L or BOTH ON R

Select the operating FMC.

▼ **Continued on next page** ▼

▼ FMC FAIL - DUAL FMC AIRPLANES continued ▼

3 Choose one:

◆DUAL FMC OP RESTORED message **appears**:

FMC source select switch . . . . NORMAL

■ ■ ■ ■

◆DUAL FMC OP RESTORED message does **not** appear:

■ ■ ■ ■

4 Resume conventional navigation. Without an operating FMC, LNAV and VNAV are not available.

AN/CDU LNAV operation is available (as installed).

5 **When** preparing for approach:

Use the manual N1 set knobs to set the N1 bugs.

■ ■ ■ ■

MSG

FMC/CDU ALERTING MESSAGE

FMC P/RST

Condition: An alert message is in the FMC scratchpad.

1 Take action as needed by the message.

■ ■ ■ ■

INSTR SWITCH

INSTRUMENT SWITCH

Condition: One of the following occurs:
- The EFI transfer switch has been moved from the NORMAL position
- The IRS transfer switch has been moved from the NORMAL position.

1 No crew action needed in flight.

■ ■ ■ ■

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.

■ ■ ■ ■

◆**Both** IRS DC FAIL lights are illuminated:

►►**Go to step 2**

2 The battery is almost discharged, or the Switched Hot Battery Bus and the Hot Battery Bus are not powered. The following systems may be inoperative:

Thrust Reverser

Engine and APU fire extinguishing

APU start

Ground power connector.

■ ■ ■ ■

Intentionally
Blank

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**:

Notify maintenance.

■ ■ ■ ■

◆ALIGN light is also **illuminated**:

IRS mode selector . . . . 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 . . . . NAV

Enter present position.

4 Choose one:

◆ALIGN light **is** flashing:

Re-enter present position.

►►**Go to step 5**

◆ALIGN light is **not** flashing:

►►**Go to step 5**

5 Choose one:

◆FAULT light **illuminates** again:

Notify maintenance.

■ ■ ■ ■

◆FAULT light does **not** illuminate again:

■ ■ ■ ■

In flight

6 The IRS ATT and/or NAV mode(s) may be inoperative.

▼ Continued on next page ▼

▼ IRS FAULT continued ▼

7 Partial capability may be restored by selecting attitude mode on the failed IRS. Straight and level, constant airspeed flight must be maintained for at least 30 seconds.

8 Choose one:

◆ Selecting attitude mode on the failed IRS **is** desired:

►►**Go to step 9**

◆ Selecting attitude mode on the failed IRS is **not** desired:

►►**Go to step 12**

9 Do the next step **only** if the captain's **or** the first officer's primary attitude display is failed.

Action is not reversible.

10 IRS mode selector (**failed side**) . . . . . Confirm . . . . ATT

Maintain straight and level, constant airspeed flight until the attitude display recovers (approximately 30 seconds).

Note: The primary attitude display will stay failed and the SET IRS HDG prompt will not appear on the POS INIT page until the attitude mode alignment is complete.

▼ Continued on next page ▼

▼ **IRS FAULT continued** ▼

11 Choose one:

◆FAULT light **extinguishes**:

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

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

Do **not** use either autopilot.

■ ■ ■ ■

◆FAULT light **stays illuminated**:

►►**Go to step 12**

12 IRS transfer switch . . . .BOTH ON L or BOTH ON R

Note: Do **not** engage either autopilot.

■ ■ ■ ■

ON DC

IRS ON DC

Condition: IRS AC power is failed.

1 Power to the right IRS is removed after 5 minutes.

■ ■ ■ ■

UNABLE REQD NAV PERF - RNP

Condition: UNABLE REQD NAV PERF-RNP is shown in MAP or Center MAP. The actual navigation performance is not sufficient.

1 Choose one:

◆ Flying an approach with an **RNP alerting requirement**:

Go-around unless suitable visual references can be established and maintained.

■ ■ ■ ■

◆ Flying an approach **without** an RNP alerting requirement:

Verify position.

■ ■ ■ ■

Non-Normal Checklists — Chapter NNC

Fuel — Section 12

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Intentionally
Blank

VALVE OPEN

CROSSFEED SELECTOR INOPERATIVE

Condition: The crossfeed VALVE OPEN light stays illuminated bright blue if the fuel crossfeed valve is not in the commanded position.

1 Choose one:

◆CROSSFEED selector is **closed**:

Crossfeed **valve** is failed open.

Maintain fuel balance with selective use of fuel pumps.

■ ■ ■ ■

◆CROSSFEED selector is **open**:

Crossfeed **valve** is failed closed.

▶▶**Go to step 2**

2 **If** flight conditions allow:

Vary thrust to maintain fuel balance.

If unable to maintain acceptable balance:

Land at the nearest suitable airport.

■ ■ ■ ■

Engine Fuel Leak

Condition: An inflight engine fuel leak is suspected or confirmed. (Items which may indicate an engine fuel leak are listed in the Additional Information section at the end of the checklist.)

Objective: To verify that there is an engine fuel leak and to take corrective action, if needed.

1 CTR FUEL PUMP switches (both) . . . . OFF

2 CROSSFEED selector . . . . Close

3 Identify an engine fuel leak by observing one main fuel tank quantity decreasing faster than the other.

4 An increase in fuel imbalance of approximately 230 kgs / 500 lbs or more in 30 minutes should be considered an engine fuel leak.

5 **If** conditions allow:

Visually check for an engine fuel leak.

6 Choose one:

◆ Both main tank quantities decrease at the **same** rate:

▶▶**Go to step 7**

◆ Both main tank quantities decrease at **different** rates as described above **or an engine fuel leak is confirmed**:

▶▶**Go to step 17**

▼ **Continued on next page** ▼

▼ Engine Fuel Leak continued ▼

7 Resume normal fuel management procedures.

8 **If** the FMC message USING RSV FUEL, INSUFFICIENT FUEL, or CHECK FMC FUEL QUANTITY is shown on the CDU scratch pad:

Select PROGRESS page 1.

Check destination fuel estimate. Compare FMC fuel quantity with fuel gauges and flight plan fuel.

9 Choose one:

◆Fuel quantity indicator is **inoperative**:

▶▶**Go to step 10**

◆Fuel quantity indicator is **operative**:

▶▶**Go to step 11**

10 Choose one:

◆FMC Update **U7.4** and **earlier**:

▶▶**Go to the Fuel Quantity Indication Inoperative checklist on page 12.10**

■ ■ ■ ■

◆FMC Update **U7.5** and **later**:

Enter and periodically update the manually calculated FUEL weight on the FMC PERF INIT page.

▶▶**Go to step 11**

▼ Continued on next page ▼

▼ Engine Fuel Leak continued ▼

11 Choose one:

◆Minimum fuel condition **exists**:

▶▶**Go to step 12**

◆Minimum fuel condition does **not** exist:

■ ■ ■ ■

12 CROSSFEED selector . . . . Open

This ensures that fuel is available to both engines if the low tank empties.

13 FUEL PUMP switches (all). . . . . .ON

This ensures that all fuel is available for use.

14 Plan to land at the nearest suitable airport.

15 Apply thrust changes slowly and smoothly.

16 **If** a climb is needed:

Maintain the minimum pitch attitude needed for safe flight. This minimizes the possibility of uncovering the fuel pumps.

■ ■ ■ ■

Engine fuel leak is confirmed

17 Autothrottle . . . . .Disengage

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

▼ Continued on next page ▼

▼ Engine Fuel Leak continued ▼

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

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

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

21 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 22**

◆APU is **not** available:

►►**Go to step 22**

22 Transponder mode selector
(TCAS equipped airplanes) . . . . TA

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

23 After engine shutdown, all remaining fuel can be used for the operating engine. Balance fuel as needed.

24 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼ Engine Fuel Leak continued ▼

▶▶Go to the One Engine Inoperative Landing checklist on page 7.26

■ ■ ■ ■

Additional Information

One or more of the following may be an indication of a fuel leak:

Visual observation of fuel spray from strut or engine.

Excessive fuel flow.

Total fuel quantity decreasing at an abnormal rate.

Fuel imbalance.

USING RSV FUEL message.

INSUFFICIENT FUEL message.

CHECK FMC FUEL QUANTITY message.

FILTER BYPASS

FUEL FILTER BYPASS

Condition: Fuel contamination can cause fuel to bypass the fuel filter.

Note: Erratic engine operation and flameout may occur due to fuel contamination.

■ ■ ■ ■

Intentionally
Blank

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 PUMP 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**

▼ **Continued on next page** ▼

▼ **FUEL PUMP LOW PRESSURE continued** ▼

2 CROSSFEED selector. . . . . Open

This prevents fuel imbalance.

3 CTR FUEL PUMP switch (affected side) . . . . . OFF

4 **When** the other CTR tank fuel pump LOW PRESSURE light illuminates:

CROSSFEED selector . . . . Close

Remaining CTR FUEL PUMP switch . . . . OFF

■ ■ ■ ■

Both CTR tank fuel pump LOW PRESSURE lights are illuminated

5 CTR FUEL PUMP switches (both). . . . . OFF

6 Center tank fuel is unusable. Main tank fuel may not be sufficient for the planned flight.

■ ■ ■ ■

Fuel Quantity Indication Inoperative

Condition: One of the following occurs on a fuel quantity indicator:
- Indicator is blank
- Shows ERRxx
- Shows zeros
- Shows dashes.

1 Choose one:

◆FMC Update **U7.4** and **earlier**:

▶▶**Go to step 2**

◆FMC Update **U7.5** and **later**:

▶▶**Go to step 9**

2 Do **not** use VNAV. FMC gross weight calculations are not supplied with an inoperative fuel quantity indicator.

3 Choose one:

◆Fuel quantity in the FMC is **not** correct:

▶▶**Go to step 4**

◆Fuel quantity in the FMC is **correct**:

▶▶**Go to step 8**

4 Do **not** use FMC speed and altitude information.

5 Use manually calculated gross weight and performance information from the QRH.

6 Do **not** use minimum maneuver speed or buffet margin information.

▼ **Continued on next page** ▼

▼ Fuel Quantity Indication Inoperative continued ▼

7 Use the Flap Maneuver Speed table in the Performance Inflight chapter.

8 Stick shaker, VMO/MMO and minimum flap retraction speed displays are not affected.

Caution! If the FMC is used for manual entry of gross weight to calculate reference speeds or fuel remaining at destination, the information will not stay correct.

■ ■ ■ ■

9 Choose one:

◆ Dashes are **shown** on the FUEL quantity line on the FMC PERF INT page:

Enter and periodically update the manually calculated FUEL weight on the FMC PERF INIT page.

►► **Go to step 14**

◆ Dashes are **not** shown on the FUEL quantity line on the FMC PERF INT page:

►► **Go to step 10**

10 Do **not** use FMC speed and altitude information.

11 Use manually calculated gross weight and performance information from the QRH.

▼ Continued on next page ▼

▼ Fuel Quantity Indication Inoperative continued ▼

12 Do **not** use minimum maneuver speed or buffet margin information.

13 Use the Flap Maneuver Speed table in the Performance Inflight chapter.

14 Stick shaker, VMO/MMO and minimum flap retraction speed displays are not affected.

Caution! If the FMC is used for manual entry of gross weight to calculate reference speeds or fuel remaining at destination, the information will not stay correct.

■ ■ ■ ■

Fuel Temperature Low

Condition: Fuel temperature is near the minimum.

1 **When** fuel temperature is approaching the fuel temperature limit (3° C /5° F above the fuel freeze point or - 45° C /- 49° F 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.

■ ■ ■ ■

Inadvertent Transfer of Fuel into Center Tank

Condition: An inadvertent increase in fuel quantity in the center tank and a decrease in fuel quantity in either main tank occurs.

1 Main tank FUEL PUMP switches (decreasing main tank) . . . . OFF

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

2 **When** the main tank fuel pump LOW PRESSURE lights illuminate:

CTR FUEL PUMP switch (affected side) . . . . ON

3 **When** the CTR tank fuel pump LOW PRESSURE light extinguishes:

Main tank FUEL PUMP switches (both) . . . . ON

4 **When** the CTR tank fuel pump LOW PRESSURE light illuminates:

CTR FUEL PUMP switch (affected side) . . . OFF

5 Repeat the above steps as needed.

■ ■ ■ ■

Minimum Fuel Operation

Condition: The fuel quantity in a main tank is 453 kgs/1000 lbs or less.

Objective: To check for indications of an engine fuel leak and ensure all remaining fuel is available to both engines.

1 The minimum fuel condition may be caused by an engine fuel leak. For indications of an engine fuel leak, check:

Total fuel remaining compared to planned fuel remaining.

Fuel flow indications for an engine with excessive fuel flow.

Individual tank quantities.

2 Choose one:

◆There **is** an indication of an engine fuel leak:

▶▶**Go to the Engine Fuel Leak checklist on page 12.2**

■ ■ ■ ■

◆There is **no** indication of an engine fuel leak:

▶▶**Go to step 3**

3 CROSSFEED selector . . . . Open

This ensures that fuel is available to both engines if the low tank empties.

▼ **Continued on next page** ▼

▼ **Minimum Fuel Operation continued** ▼

4 FUEL PUMP switches (all) . . . . ON

This ensures that all fuel is available for use.

5 Plan to land at the nearest suitable airport.

6 Apply thrust changes slowly and smoothly.

7 **If** a climb is needed:

Maintain the minimum pitch attitude needed for safe flight. This minimizes the possibility of uncovering the fuel pumps.

■ ■ ■ ■

Intentionally
Blank

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Intentionally
Blank

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 PUMP switch (affected side) . . . . . OFF

Note: One pump supplies sufficient pressure for normal system operation.

■ ■ ■ ■

LOSS OF SYSTEM A

FLT CONTROL	A HYD PUMPS	
A	ENG 1	ELEC 2
LOW PRESSURE	LOW PRESSURE	LOW PRESSURE

Condition: Hydraulic system A pressure is low.

1 System A
FLT CONTROL switch . . . . Confirm . . . .STBY RUD

2 System A
HYD PUMP switches (both). . . . . OFF

Inoperative Items

Autopilot A inop
Autopilot B is available.

Inboard flight spoilers 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.

▼ Continued on next page ▼

▼ LOSS OF SYSTEM A continued ▼

3 Check the Non−Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

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.

6 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Manual Gear Extension

LANDING GEAR lever. OFF

▼ Continued on next page ▼

▼ **LOSS OF SYSTEM A continued** ▼

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

ENGINE START switches. . . . . CONT

Speedbrake . . . . .ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

LOSS OF SYSTEM B

FLT CONTROL	B HYD PUMPS	
B	ELEC 1	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 PUMP switches (both) . . . . OFF

▼ Continued on next page ▼

▼ LOSS OF SYSTEM B continued ▼

Inoperative Items

Autopilot B inop

Autopilot A is available.

Outboard flight spoilers 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 can not 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.

3 Plan a flaps 15 landing.

▼ Continued on next page ▼

▼ LOSS OF SYSTEM B continued ▼

4 Set VREF 15.

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.

6 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

7 Do **not** arm the autobrake for landing. Use manual braking.

8 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake **. . . . . .OFF**

Landing data **. . . . . VREF 15, Minimums ____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

▼ 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 will stay illuminated until the flaps approach the flaps 10 position.

Note: Operation within the lower yellow band 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 maneuvering speed.

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

▼ Continued on next page ▼

▼ LOSS OF SYSTEM B continued ▼

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

MANUAL REVERSION or LOSS OF SYSTEM A AND SYSTEM B

FLT CONTROL A	FLT CONTROL B	HYD PUMPS ENG 1 ELEC 2	HYD PUMPS ELEC 1 ENG 2
LOW PRESSURE	LOW PRESSURE	LOW PRESSURE	LOW PRESSURE

Condition: Hydraulic system A and B pressures are low.

1 System A and B FLT CONTROL switches (both) . . . . . Confirm. . . . . . .STBY RUD

2 System A and B HYD PUMPS switches (all) . . . . OFF

▼ 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.

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 hydraulic pressure. Once extended, they can not 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.

▼ Continued on next page ▼

▼ MANUAL REVERSION or LOSS OF SYSTEM A AND SYSTEM B continued ▼

Inoperative Items

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.

3 Plan to land at the nearest suitable airport.

4 Plan a flaps 15 landing.

5 Set VREF 15.

6 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.

7 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.

8 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

Note: The crosswind capability of the airplane is greatly reduced.

9 Do **not** arm the autobrake for landing.

10 Do **not** arm the speedbrakes for landing.

▼ Continued on next page ▼

▼ MANUAL REVERSION or LOSS OF SYSTEM A AND SYSTEM B continued ▼

11 On touchdown, apply steady brake pressure without modulating the brakes.

12 Do not attempt to taxi the airplane after stopping.

13 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake **. . . . . .OFF**

Landing data **. . . . . VREF 15, Minimums ____**

Approach briefing . . . . Completed

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 150 knots (or the speed tape minimum maneuver speed).

Approach Checklist

Altimeters . . . . ____

▼ Continued on next page ▼

MANUAL REVERSION or LOSS OF SYSTEM A AND 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 will stay illuminated until the flaps approach the flaps 10 position.

Note: Operation within the lower yellow airspeed band 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 maneuvering speed.

Manual Gear Extension

LANDING GEAR lever. . . . . OFF

Continued on next page

▼ MANUAL REVERSION or LOSS OF SYSTEM A AND SYSTEM B continued ▼

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

Additional Deferred Item

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

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 and B, the rudder is inoperative.

■ ■ ■ ■

LOW QUANTITY

STANDBY HYDRAULIC LOW QUANTITY

Condition: The standby hydraulic quantity is low.

1 Continue normal operation.

■ ■ ■ ■

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ANTISKID INOP

ANTISKID INOPERATIVE

Condition: An antiskid system fault occurs.

Note: Locked wheel protection is not available.

1 AUTO BRAKE select switch. . . . . OFF

2 Do **not** arm the speedbrakes for landing. Manually deploy the speedbrakes immediately upon landing.

Automatic speedbrake extension may be inoperative.

3 Do **not** apply brakes until after main gear touchdown. Use minimum braking consistent with runway conditions to reduce the possibility of a tire blowout.

4 Check the Non–Normal Configuration Landing Distance table in the Advisory Information section of the Performance Inflight chapter.

5 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake **. . . . . .OFF**

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼ ANTISKID INOPERATIVE continued ▼

Approach Checklist

Altimeters . . . . ___

Landing Checklist

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

▼ Continued on next page ▼

▼ AUTO BRAKE DISARM continued ▼

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 Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake **. . . . . .OFF**

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

▼ Continued on next page ▼

▼ AUTO BRAKE DISARM continued ▼

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.

1 **If** the LANDING GEAR lever will not move to the UP position:

▶▶**Go to the Landing Gear Lever Will Not Move Up After Takeoff checklist on page 14.16**

■■■■

Note: Do not exceed the gear EXTEND limit speed (270K/.82M).

Do not use FMC fuel predictions with gear extended.

2 Choose one:

◆Landing gear lever is **UP**:

▶▶**Go to step 5**

◆Landing gear lever is **OFF**:

▶▶**Go to step 3**

◆Landing gear lever is **DN**:

▶▶**Go to step 6**

235K maximum

3 ⚠ LANDING GEAR lever . . . . UP

▼ Continued on next page ▼

▼ GEAR DISAGREE continued ▼

4 Choose one:

◆ **All red and green** landing gear indicator lights are **extinguished**:

The landing gear lever should be kept in the UP position to keep the landing gear retracted.

■ ■ ■ ■

◆ **Any red** landing gear indicator light is **illuminated**:

►►**Go to step 5**

5 Flight with gear down increases fuel consumption and decreases climb performance. Refer to the Gear Down performance tables in the Performance Inflight section.

■ ■ ■ ■

6 Check landing gear indicator lights.

Note: If a green landing gear indicator light is illuminated on the center main panel, the related landing gear is down and locked.

▼ Continued on next page ▼

▼ GEAR DISAGREE continued ▼

7 Choose one:

◆ **Any** landing gear is **not** down and locked:

►►**Go to the Manual Gear Extension checklist on page 14.20**

■ ■ ■ ■

◆ **All** landing gear indicate **down and locked** and all **red** landing gear indicator lights are also **illuminated**:

►►**Go to step 8**

8 Verify landing gear lever is pushed in and fully in the DN detent.

9 Choose one:

◆ **All red** landing gear indicator lights **extinguish**:

■ ■ ■ ■

◆ **All 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.

It may take up to 10 minutes to extend the gear.

Once the gear is extended, do **not** retract.

270K/.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 the center main 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.

■ ■ ■ ■

◆**Only one or two** landing gear indicate down and locked:

►►**Go to the Manual Gear Extension checklist on page 14.20**

■ ■ ■ ■

6 Check total fuel quantity. Manual gear extension may require up to 10 minutes to complete.

Do **not** accomplish this checklist unless there is sufficient fuel to extend the gear and then complete an approach, with appropriate reserves.

7 Choose one:

◆Sufficient fuel **is available**:

►►**Go to step 8**

◆Sufficient fuel is **not** available:

►►**Go to the Partial or All Gear Up Landing checklist on page 14.28**

■ ■ ■ ■

▼ **Continued on next page** ▼

▼ Landing Gear Lever Jammed in the Up Position continued ▼

8 System A must be depressurized in order to extend the landing gear. The following items will be inoperative.

Inoperative Items

Autopilot A inop
Autopilot B is available.

Inboard flight spoilers 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.

Nose wheel steering inop

9 System A
FLIGHT CONTROL switch . . . Confirm . . STBY RUD

10 System A
HYD PUMP switches (both) . . . . OFF

Warning! Do not repressurize hydraulic system A in flight or on the ground because the landing gear may retract.

▼ Continued on next page ▼

▼ **Landing Gear Lever Jammed in the Up Position continued** ▼

11 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.

---

12 Cycle the SPEED BRAKE lever until system A pressure is below 500 psi.

Note: It may take a number of cycles to reduce the system A pressure to below 500 psi.

270K/.82M maximum.

13 ⚠ Manual gear
extension handles (all). . . . . Pull

Do not wait for an indication that a landing gear is down and locked before pulling the next handle.

Note: The uplock is released when the handle is pulled to its limit. The related red landing gear indicator light illuminates, indicating uplock released.

▼ **Continued on next page** ▼

▼ Landing Gear Lever Jammed in the Up Position continued ▼

14 Cycle the SPEED BRAKE lever until all three green landing gear indicator lights are illuminated.

Note: It may take a number of cycles and up to 4 minutes until all three landing gear indicator lights are illuminated.

With the LANDING GEAR lever in the UP or OFF position, the red landing gear indicator lights will stay illuminated.

15 Choose one:

◆ **All** landing gear indicate down and locked:

►► **Go to step 16**

◆ **Only one or two** landing gear indicate down and locked:

►► **Go to the Partial or All Gear Up Landing checklist on page 14.28**

■ ■ ■ ■

16 Plan a flaps 15 landing.

17 Set VREF 15 + 10 knots. This provides tail clearance during landing. The flight spoilers that are powered by hydraulic system A will be unlocked and may float.

18 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

▼ Continued on next page ▼

▼ **Landing Gear Lever Jammed in the Up Position continued** ▼

Autobrake . . . . ____

Landing data . . . . **VREF 15 + 10 knots, Minimums** ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Additional Deferred Items

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

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

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . **Down, Three Green**

Note: The red landing gear indicator lights will also be illuminated.

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

Note: Nose wheel steering is not available.

▼ Continued on next page ▼

▼ **Landing Gear Lever Jammed in the Up Position continued** ▼

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.

Note: Do not use FMC fuel 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 light (as installed) does **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 light (as installed) **illuminates** when the flaps are fully retracted:

Note: This indicates a failure of the air/ground system.

Do **not** retract the gear.

►►**Go to step 8**

▼ 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

6 **When** the landing gear indicator lights extinguish:

LANDING GEAR lever . . . . OFF

7 Continue normal operation.

■ ■ ■ ■

8 LANDING GEAR AIR/GND RELAY
AND LIGHTS circuit breaker (P6) . . . . Pull

Caution! Do not use the speedbrakes in flight.

9 Plan to land at the nearest suitable airport.

10 Do **not** arm the autobrake for landing. Use manual braking.

11 Do **not** arm the speedbrakes for landing. Manually deploy the speedbrakes immediately upon landing.

12 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake . . . . **OFF**

Landing data . . . . VREF ____, Minimums ____

▼ Continued on next page ▼

▼ Landing Gear Lever Will Not Move Up After Takeoff continued ▼

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Gear Down Verification

LANDING GEAR lever. . . . . Verify DN

LANDING GEAR AIR/GND RELAY
AND LIGHTS circuit breaker (P6). . . . . Reset

This allows the gear down indications to be confirmed.

Note: The intermittent cabin altitude/ configuration warning horn may sound and the TAKEOFF CONFIG light (as installed) may illuminate depending on thrust lever and flap position.

Landing gear .Verify down

LANDING GEAR AIR/GND RELAY
AND LIGHTS circuit breaker (P6). . . . . Pull

Note: After landing, some unusual system behavior may occur such as nuisance stick shaker, positive pressurization and pack overheat after flap retraction.

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake **. . . . . .DOWN detent**

▼ Continued on next page ▼

▼ Landing Gear Lever Will Not Move Up After Takeoff continued ▼

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 the center main panel, the related landing gear is down and locked.

1 LANDING GEAR lever . . . . OFF (if possible)

270K/.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 ▼

5 Choose one:

◆ **All** landing gear indicate down and locked:

►► **Go to step 7**

◆ **No** landing gear indicates down and locked:

►► **Go to step 8**

◆ **Only one or two** landing gear indicate down and locked:

WHEEL WELL light switch . . . . ON

Check gear down lock visual indicator(s) to verify main landing gear mechanical down lock indicators are aligned and nose landing gear arrow heads are in contact.

►► **Go to step 6**

6 Choose one:

◆ **All** landing gear indicate down and locked:

►► **Go to step 7**

◆ **Only one or two** landing gear indicate down and locked:

►► **Go to the Partial or All Gear Up Landing checklist on page 14.28**

■ ■ ■ ■

▼ Continued on next page ▼

▼ **Manual Gear Extension continued** ▼

7 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.

■ ■ ■ ■

8 Check total fuel quantity. Manual gear extension may require up to 10 minutes to complete.

Do **not** accomplish this checklist unless there is sufficient fuel to extend the gear and then complete an approach, with appropriate reserves.

9 Choose one:

◆ Sufficient fuel **is available**:

▶▶**Go to step 10**

◆ Sufficient fuel is **not** available:

▶▶**Go to the Partial or All Gear Up Landing checklist on page 14.28**

■ ■ ■ ■

▼ **Continued on next page** ▼

▼ Manual Gear Extension continued ▼

10 System A must be depressurized in order to extend the landing gear. The following items will be inoperative.

Inoperative Items

Autopilot A inop
Autopilot B is available.

Inboard flight spoilers inop
Roll rate and speedbrake effectiveness may be reduced in flight.

Normal landing gear extension and retraction inop
Manual gear extension after system A is depressurized 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.

Nose wheel steering inop

11 System A
FLIGHT CONTROL switch . . . Confirm . . STBY RUD

12 System A
HYD PUMP switches (both) . . . . OFF

▼ Continued on next page ▼

▼ Manual Gear Extension continued ▼

Warning! Do not repressurize hydraulic system A in flight or on the ground because the landing gear may retract.

13 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.

14 Cycle the SPEED BRAKE lever until system A pressure is below 500 psi.

Note: It may take a number of cycles to reduce the system A pressure to below 500 psi.

270K/.82M maximum.

15 ⚠ Manual gear extension handles (all). . . . . Pull

Do not wait for an indication that a landing gear is down and locked before pulling the next handle.

Note: The uplock is released when the handle is pulled to its limit. The related red landing gear indicator light illuminates, indicating uplock released.

▼ Continued on next page ▼

▼ Manual Gear Extension continued ▼

16 Cycle the SPEED BRAKE lever until all three green landing gear indicator lights are illuminated.

Note: It may take a number of cycles and up to 4 minutes until all three landing gear indicator lights are illuminated.

With the LANDING GEAR lever in the OFF position, the red landing gear indicator lights will stay illuminated.

17 Choose one:

◆ **All** landing gear indicate down and locked:

►► **Go to step 18**

◆ **Only one or two** landing gear are **not** down and locked:

►► **Go to the Partial or All Gear Up Landing checklist on page 14.28**

■ ■ ■ ■

18 Plan a flaps 15 landing.

19 Set VREF 15 + 10 knots.This provides tail clearance during landing since the flight spoilers powered by hydraulic system A will be unlocked and may float

20 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

▼ Continued on next page ▼

Manual Gear Extension continued

Autobrake . . . . ____

Landing data . . . . **VREF 15 + 10 knots, Minimums ____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Additional Deferred Items

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

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

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . **Down, Three Green**

Note: The red landing gear indicator lights will also be illuminated.

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

Note: Nose wheel steering is not available.

Continued on next page

▼ Manual Gear Extension continued ▼

Warning! Do not use alternate nose wheel steering because the landing gear may retract on the ground.

■ ■ ■ ■

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 **or** sufficient fuel is **not** available to complete manual gear extension:

▶▶**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 Burn off fuel to reduce touchdown speed.

4 Plan a flaps 40 landing.

5 Set VREF 40.

6 LANDING GEAR AURAL WARN circuit breaker (P6). . . . . Pull

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

▼ Continued on next page ▼

▼ Partial or All Gear Up Landing continued ▼

7 FLIGHT CONTROL
AUTO SPEED BRAKE
circuit breaker (P6). . . . . Pull

This prevents inadvertent deployment of ground spoilers after landing.

8 Do **not** arm the autobrake for landing. Use manual braking.

9 Do **not** arm the speedbrakes for landing.

10 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . CAB ALT ____, LAND ALT ____

Recall . . . . Checked

Autobrake **. . . . . .OFF**

Landing data **. . . . . VREF 40, Minimums ____**

Approach briefing . . . . Completed

Approach Checklist

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

STANDBY POWER switch . . . . BAT

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

ENGINE START switches. . . . . CONT

Speedbrake . . . . **DOWN detent**

▼ Continued on next page ▼

▼ Partial or All Gear Up Landing continued ▼

Landing gear . . . . .___ **Down**

Flaps. . . . . **40, Green light**

■ ■ ■ ■

Intentionally
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LANDING CONFIGURATION

Condition: In flight, the steady warning horn sounds.

1 Assure correct airplane landing configuration.

Overspeed

Condition: Airspeed is more than Vmo/Mmo.

1 Reduce thrust and, if needed, adjust attitude to reduce airspeed to less than Vmo/Mmo.

TAKEOFF CONFIGURATION

TAKEOFF CONFIG **(As installed)**

Condition: On the ground, the intermittent cabin altitude/configuration warning horn sounds and the TAKEOFF CONFIG light (as installed) 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 **(As installed)**

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 (as installed) illuminates, when the cabin altitude is at or above 10,000 feet
- On the ground, the intermittent warning horn sounds or the TAKEOFF CONFIG light (as installed) illuminates, when the takeoff configuration is not correct during takeoff.

1 **If** the intermittent warning horn sounds or the CABIN ALTITUDE light (as installed) 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 2.1**

■ ■ ■ ■

▼ Continued on next page ▼

▼ WARNING HORN (INTERMITTENT) or WARNING LIGHT - CABIN ALTITUDE OR TAKEOFF CONFIGURATION continued ▼

2 **If** the intermittent warning horn sounds or the TAKEOFF CONFIG light (as installed) illuminates **on the ground**:

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 the selected altitude (if needed).

2 Maintain the correct altitude.

■ ■ ■ ■

INOP

GROUND PROXIMITY INOPERATIVE

Condition: A ground proximity warning system fault occurs.

Note: Some or all GPWS alerts are not available. GPWS alerts which occur are valid.

■ ■ ■ ■

Tail Strike

Condition: The tail hits the runway.

Caution! Do not pressurize the airplane. Pressurizing the airplane may cause further structural damage.

1 Pressurization mode selector . . . . MAN DC

2 Outflow VALVE switch . . . . Hold in OPEN until the outflow VALVE position indicates fully open

3 Plan to land at the nearest suitable airport.

■ ■ ■ ■

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Introduction

Note: This Section Reserved For Operator-Developed Information.

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Performance Inflight - QRH — Chapter PI-QRH

General — Section 10

Flight With Unreliable Airspeed / Turbulent Air Penetration

Altitude and/or vertical speed indications may also be unreliable.

Climb

Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG) 32	34	44	54	64
35000	**PITCH ATT**	**6.5**	**6.5**	**6.0**	**5.5**	**5.5**
(.73M)	V/S (FT/MIN)	3100	2800	1800	1000	300
30000	**PITCH ATT**	**7.0**	**6.5**	**6.0**	**5.5**	**5.5**
(.73M)	V/S (FT/MIN)	3900	3600	2500	1700	1100
25000	**PITCH ATT**	**7.0**	**6.5**	**6.0**	**6.0**	**6.0**
(280 KIAS)	V/S (FT/MIN)	3700	3500	2500	1800	1300
20000	**PITCH ATT**	**8.5**	**8.5**	**7.5**	**7.0**	**7.0**
(280 KIAS)	V/S (FT/MIN)	4600	4300	3100	2300	1800
15000	**PITCH ATT**	**10.5**	**10.0**	**9.0**	**8.0**	**8.0**
(280 KIAS)	V/S (FT/MIN)	5400	5100	3800	2900	2200
10000	**PITCH ATT**	**13.0**	**12.0**	**10.5**	**9.5**	**9.0**
(280 KIAS)	V/S (FT/MIN)	6300	5900	4400	3400	2700
5000	**PITCH ATT**	**15.0**	**14.5**	**12.0**	**11.0**	**10.0**
(280 KIAS)	V/S (FT/MIN)	7100	6700	5000	3900	3100
SEA LEVEL	**PITCH ATT**	**17.5**	**17.0**	**14.0**	**12.5**	**11.5**
(280 KIAS)	V/S (FT/MIN)	7900	7400	5600	4400	3500

Cruise

Flaps Up, Adjust %N1 for Level Flight

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG) 34	38	42	46	50	54
30000	**PITCH ATT**	**2.0**	**2.0**	**2.5**	**3.0**	**3.0**	**3.5**
(.73M)	%N1	79	79	80	81	82	83
10000	**PITCH ATT**	**2.0**	**2.0**	**2.5**	**3.0**	**3.0**	**3.5**
(280 KIAS)	%N1	65	65	66	66	67	68

Descent

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG) 34	38	42	46	50	54
30000	**PITCH ATT**	**-3.5**	**-3.0**	**-2.5**	**-2.0**	**-1.5**	**-1.0**
(.73M)	V/S (FT/MIN)	-4200	-3800	-3600	-3400	-3300	-3200
20000	**PITCH ATT**	**-2.5**	**-2.0**	**-1.0**	**-0.5**	**0.0**	**0.0**
(280 KIAS)	V/S (FT/MIN)	-2900	-2600	-2500	-2300	-2200	-2100
10000	**PITCH ATT**	**-2.5**	**-2.0**	**-1.5**	**-1.0**	**-0.5**	**0.0**
(280 KIAS)	V/S (FT/MIN)	-2500	-2300	-2200	-2100	-2000	-1900

Holding

Flaps Up, Adjust %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 34	38	42	46	50	54
	PITCH ATT	**4.0**	**4.5**	**5.5**	**5.5**	**5.5**	**5.5**
10000	%N1	56	57	59	61	63	65
	KIAS	210	210	210	215	225	230

Flight With Unreliable Airspeed / Turbulent Air Penetration

Altitude and/or vertical speed indications may also be unreliable.

Terminal Area

Adjust %N1 for Level Flight

FLAP POSITION (SPEED)		WEIGHT (1000 KG)				
		32	40	48	56	64
FLAPS UP (GEAR UP)	**PITCH ATT**	**3.5**	**5.0**	**6.0**	**6.5**	**7.0**
	%N1	52	55	58	62	65
	KIAS	210	210	210	220	230
FLAPS 1 (GEAR UP)	**PITCH ATT**	**4.0**	**5.5**	**6.5**	**7.0**	**7.5**
	%N1	55	57	60	64	67
	KIAS	190	190	190	200	210
FLAPS 5 (GEAR UP)	**PITCH ATT**	**3.5**	**4.5**	**6.0**	**6.5**	**6.5**
	%N1	55	58	61	65	68
	KIAS	180	180	180	190	200
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**3.5**	**5.5**	**7.5**	**8.0**	**8.0**
	%N1	61	64	68	72	75
	KIAS	150	150	150	160	170

Final Approach

Gear Down, Adjust %N1 for 3° Glideslope

FLAP POSITION		WEIGHT (1000 KG)				
		32	40	48	56	64
FLAPS 15 (VREF 15+10)	**PITCH ATT**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**
	%N1	43	48	52	56	60
	KIAS	123	138	151	163	173
FLAPS 30 (VREF 30+10)	**PITCH ATT**	**2.0**	**2.0**	**2.0**	**2.5**	**2.5**
	%N1	48	53	58	62	65
	KIAS	116	129	141	152	162
FLAPS 40 (VREF 40+10)	**PITCH ATT**	**0.5**	**0.5**	**0.5**	**0.5**	**0.0**
	%N1	54	60	65	69	73
	KIAS	113	125	137	150	161

Max Climb %N1

Based on engine bleed to packs on (Auto) and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)/SPEED (KIAS OR MACH)								
	0	5	10	15	20	25	30	35	37
	250	250	250	280	280	280	.74	.74	.74
50	90.9	91.1	92.5						
40	92.0	92.2	93.6	93.3	93.6				
30	92.2	93.2	93.5	94.2	94.6	94.7			
20	90.6	92.8	94.3	95.0	95.4	95.6	95.7		
10	89.1	91.2	93.1	95.1	96.1	96.4	96.6	96.6	96.6
0	87.5	89.6	91.5	93.4	95.5	97.2	97.5	97.5	97.5
-10	85.9	87.9	89.8	91.7	93.7	95.9	97.9	98.4	98.4
-20	84.2	86.3	88.1	90.0	91.9	94.0	96.0	99.0	99.3
-30	82.5	84.5	86.3	88.2	90.1	92.1	94.1	97.0	97.6
-40	80.8	82.8	84.5	86.3	88.2	90.2	92.2	95.0	95.6
-50	79.1	81.0	82.7	84.5	86.3	88.3	90.2	92.9	93.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	37
ENGINE BLEED TO PACKS OFF	0.5	0.5	0.6	0.7	0.8	0.8	0.9	0.9	0.9
PACKS HIGH	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.5	-0.6	-0.6
ENGINE ANTI-ICE ON	-0.7	-0.8	-0.9	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-1.9	-2.0	-2.2	-2.4	-2.6	-2.7	-2.8	-3.0	-3.0

Go-around %N1

Based on engine bleed to packs on (Auto), engine anti-ice on or off, and wing anti-ice off

REPORTED OAT		TAT	PRESSURE ALTITUDE (FT)									
°C	°F	°C	-1000	0	1000	2000	3000	4000	5000	6000	7000	8000
55	131	58	93.1	93.9	93.9	93.9						
50	122	53	93.7	94.2	94.2	94.2	94.2	94.2				
45	113	48	94.1	94.7	94.6	94.6	94.6	94.6	94.7	94.8	94.6	
40	104	43	94.5	95.1	95.1	95.1	95.0	95.1	95.1	95.2	95.1	95.0
35	95	38	95.1	95.5	95.6	95.5	95.5	95.7	95.7	95.7	95.6	95.6
30	86	33	95.1	96.1	96.1	96.0	96.0	96.3	96.2	96.2	96.1	96.0
25	77	28	94.3	95.3	95.8	96.2	96.5	96.7	96.7	96.6	96.5	96.5
20	68	23	93.5	94.5	95.0	95.4	95.9	96.6	97.1	97.2	97.0	96.9
15	59	18	92.7	93.7	94.1	94.6	95.1	95.8	96.3	96.8	97.3	97.5
10	50	13	91.9	92.8	93.3	93.7	94.2	95.0	95.4	96.0	96.4	96.9
5	41	8	91.1	92.0	92.5	92.9	93.4	94.1	94.6	95.1	95.6	96.1
0	32	3	90.3	91.2	91.7	92.1	92.6	93.3	93.7	94.3	94.7	95.2
-10	14	-8	88.5	89.5	90.0	90.4	90.8	91.5	92.0	92.5	93.0	93.4
-20	-4	-18	86.8	87.8	88.2	88.6	89.1	89.8	90.3	90.8	91.2	91.6
-30	-22	-28	85.1	86.0	86.5	86.9	87.3	88.0	88.5	89.0	89.4	89.8
-40	-40	-38	83.3	84.2	84.7	85.1	85.5	86.2	86.6	87.1	87.5	87.9
-50	-58	-48	81.5	82.4	82.8	83.2	83.7	84.3	84.7	85.2	85.6	86.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	TAT (°C)	
	- 60	60
ENGINE BLEED TO PACKS OFF	0.8	1.0
PACKS HIGH	- 0.3	- 0.3
WING A/I ALL ENGINES	- 1.3	- 1.6
WING A/I 1 ENGINE INOP	- 2.2	- 2.7

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
65	153	154	165
60	146	147	158
55	138	141	151
50	131	134	144
45	123	127	136
40	115	119	128
35	107	111	119

For approach speed add wind factor of 1/2 headwind component + gust (max 20 knots).

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ADVISORY INFORMATION

Normal Configuration Landing Distance
Flaps 15
Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	48000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 48000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	2740	390/-180	50	-100	340	30	-30	50	-50	210	40	150
MAX AUTO	3650	300/-270	80	-130	440	0	0	80	-80	350	0	10
AUTOBRAKES 3	5180	420/-440	130	-220	740	20	-30	140	-140	540	50	60
AUTOBRAKES 2	6160	580/-600	180	-290	970	100	-140	170	-170	470	320	320
AUTOBRAKES 1	6620	680/-670	210	-330	1130	210	-210	180	-180	470	820	1220

Good Reported Braking Action

MAX MANUAL	3790	290/-290	90	-160	580	80	-70	90	-90	270	200	690
MAX AUTO	4060	320/-320	100	-170	600	70	-60	90	-90	330	220	760
AUTOBRAKE 3	5190	430/-450	130	-220	750	30	-30	140	-140	540	50	200
AUTOBRAKE 2	6160	580/-600	180	-290	970	100	-140	170	-170	470	320	320
AUTOBRAKE 1	6620	680/-670	210	-330	1130	210	-210	180	-180	470	820	1220

Medium Reported Braking Action

MAX MANUAL	5060	460/-440	140	-260	940	200	-160	130	-130	350	540	2240
MAX AUTO	5110	470/-460	140	-260	940	170	-140	130	-130	410	540	2240
AUTOBRAKE 3	5570	490/-490	150	-280	990	140	-100	140	-140	540	370	2060
AUTOBRAKE 2	6300	590/-610	190	-310	1100	170	-180	170	-170	470	400	1460
AUTOBRAKE 1	6640	690/-670	210	-330	1170	250	-220	180	-190	470	840	1850

Poor Reported Braking Action

MAX MANUAL	6410	640/-610	200	-380	1440	450	-310	160	-160	420	1090	6360
MAX AUTO	6410	640/-610	200	-370	1430	440	-300	160	-160	430	1080	6380
AUTOBRAKE 3	6470	650/-620	200	-380	1450	410	-270	170	-170	520	1090	6380
AUTOBRAKE 2	6870	680/-670	210	-390	1500	400	-300	180	-180	470	900	5980
AUTOBRAKE 1	7080	730/-720	230	-410	1530	460	-340	190	-190	470	1130	5930

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrake data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 310 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 30

Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	48000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 48000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2570	300/-160	50	-90	320	30	-30	50	-50	190	40	120
MAX AUTO	3320	240/-230	70	-120	420	0	0	70	-70	330	0	10
AUTOBRAKES 3	4640	360/-380	120	-210	700	20	-30	120	-120	490	40	50
AUTOBRAKES 2	5540	490/-520	160	-270	920	80	-120	150	-150	450	200	200
AUTOBRAKES 1	5960	590/-580	190	-310	1070	180	-180	160	-160	440	640	950

Good Reported Braking Action

MAX MANUAL	3540	260/-260	80	-160	560	80	-70	80	-80	280	170	610
MAX AUTO	3760	280/-290	90	-170	580	60	-60	80	-80	320	190	660
AUTOBRAKE 3	4650	360/-390	120	-210	710	30	-30	120	-120	490	50	190
AUTOBRAKE 2	5540	490/-520	160	-270	920	80	-120	150	-150	450	200	200
AUTOBRAKE 1	5960	590/-580	190	-310	1070	180	-180	160	-160	440	640	950

Medium Reported Braking Action

MAX MANUAL	4670	400/-400	130	-250	910	190	-150	110	-110	350	460	1940
MAX AUTO	4690	410/-410	130	-250	910	160	-130	110	-110	400	450	1930
AUTOBRAKE 3	5030	430/-430	130	-260	950	130	-100	130	-130	490	340	1870
AUTOBRAKE 2	5670	510/-530	160	-290	1040	150	-170	150	-150	450	280	1270
AUTOBRAKE 1	5990	590/-580	190	-310	1110	230	-200	160	-160	440	670	1540

Poor Reported Braking Action

MAX MANUAL	5870	560/-540	180	-360	1390	420	-290	150	-150	400	910	5470
MAX AUTO	5870	560/-540	180	-360	1380	420	-280	150	-150	420	910	5500
AUTOBRAKE 3	5910	580/-550	180	-360	1390	400	-260	150	-150	470	940	5500
AUTOBRAKE 2	6240	590/-590	180	-370	1440	380	-280	160	-160	440	720	5180
AUTOBRAKE 1	6420	640/-630	200	-390	1470	430	-310	170	-170	440	930	5110

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrake data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 280 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 40

Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	48000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 48000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	2520	290/-160	50	-90	320	30	-30	50	-50	200	30	120
MAX AUTO	3200	260/-220	70	-120	410	0	0	70	-70	320	0	10
AUTOBRAKE 3	4430	400/-370	110	-200	680	20	-40	110	-110	450	40	60
AUTOBRAKE 2	5250	520/-480	150	-260	890	90	-110	140	-140	420	200	200
AUTOBRAKE 1	5650	600/-540	170	-300	1040	170	-170	150	-150	420	560	890

Good Reported Braking Action

MAX MANUAL	3440	290/-250	80	-160	550	80	-70	80	-80	280	150	560
MAX AUTO	3650	310/-280	90	-160	570	60	-50	80	-80	320	170	620
AUTOBRAKE 3	4440	400/-370	110	-200	690	30	-40	110	-110	450	40	200
AUTOBRAKE 2	5250	520/-480	150	-260	890	90	-110	140	-140	420	200	200
AUTOBRAKE 1	5650	600/-540	170	-300	1040	170	-170	150	-150	420	560	890

Medium Reported Braking Action

MAX MANUAL	4500	430/-380	120	-240	890	180	-150	110	-110	340	410	1770
MAX AUTO	4520	440/-390	120	-240	890	160	-120	110	-110	400	410	1750
AUTOBRAKE 3	4820	460/-410	130	-250	930	130	-110	120	-120	450	320	1730
AUTOBRAKE 2	5380	530/-500	150	-280	1010	160	-160	140	-140	420	270	1180
AUTOBRAKE 1	5680	600/-550	170	-300	1080	210	-180	150	-150	420	580	1440

Poor Reported Braking Action

MAX MANUAL	5620	580/-510	170	-350	1360	400	-270	140	-140	390	810	4890
MAX AUTO	5620	580/-510	170	-350	1360	400	-260	140	-140	410	800	4910
AUTOBRAKE 3	5660	590/-520	170	-350	1370	390	-260	140	-140	420	840	4950
AUTOBRAKE 2	5930	610/-560	170	-360	1400	380	-270	150	-150	420	670	4630
AUTOBRAKE 1	6100	650/-590	190	-370	1430	410	-300	160	-160	420	820	4610

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrake data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 250 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	4040	360/-140	230	-160	590	50	-50	380
ANTI-SKID INOPERATIVE	VREF40	3940	120/-110	80	-175	610	80	-70	300
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	3180	100/-90	130	-120	400	70	-50	440
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	3280	90 /-100	130	-120	410	70	-50	440
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	3310	110/-90	150	-120	390	50	-50	340
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	3150	170/-90	150	-120	420	50	-50	250
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	4900	170/-160	230	-210	700	150	-130	520
STABILIZER TRIM INOPERATIVE	VREF15	2790	150/-70	130	-100	350	30	-30	210
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	2790	150/-70	130	-100	350	30	-30	210
LEADING EDGE FLAPS TRANSIT	VREF15+5	2920	170/-70	150	-110	360	30	-30	230
ONE ENGINE INOPERATIVE	VREF15	2820	160/-80	140	-110	360	30	-30	230

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	2590	130/-60	50	-90	330	30	-30	200
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	2790	160/-70	130	-90	340	30	-30	210
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	3250	210/-100	180	-120	430	30	-30	260
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	2590	130/-60	50	-90	330	30	-30	200
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	2790	160/-70	130	-90	340	30	-30	210
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	3250	210/-100	180	-120	430	30	-30	260
TRAILING EDGE FLAPS UP (FLAPS < 1)	VREF40+40	3510	250/-110	190	-130	510	50	-50	330

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	5100	160/-140	240	-200	670	100	-100	300
ANTI-SKID INOPERATIVE	VREF40	4810	170/-150	110	-245	900	160	-130	340
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	4260	160/-150	180	-190	660	130	-110	490
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	4460	150/-150	180	-200	670	150	-130	520
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	4650	160/-140	210	-200	670	130	-110	460
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	3940	120/-120	170	-170	590	80	-80	300
HYDRAULICS-MANUAL REVERSION (LOSS OF SYSTEM A & B)	VREF15	4990	170/-160	230	-210	710	150	-150	540
STABILIZER TRIM INOPERATIVE	VREF15	3750	120/-110	150	-170	570	80	-80	280
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	3750	120/-110	150	-170	570	80	-80	280
LEADING EDGE FLAPS TRANSIT	VREF15+5	4070	130/-120	190	-180	610	100	-80	310
ONE ENGINE INOPERATIVE	VREF15	3950	130/-120	170	-180	610	100	-80	310

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	3510	100/-100	90	-150	570	80	-70	280
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	3740	130/-110	150	-160	570	80	-80	280
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	4230	140/-120	190	-180	600	80	-80	260
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	3510	100/-100	90	-150	570	80	-70	280
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	3740	130/-110	150	-160	570	80	-80	280
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	4230	140/-120	190	-180	600	80	-80	260
TRAILING EDGE FLAPS UP (FLAPS < 1)	VREF40+40	4530	140/-130	210	-180	630	100	-80	280

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	6850	250/-230	330	-310	1060	250	-210	390
ANTI-SKID INOPERATIVE	VREF40	5890	220/-200	145	-350	1350	390	-250	390
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	5370	220/-200	230	-290	1000	260	-210	520
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	5690	210/-220	240	-300	1030	280	-230	560
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	6070	230/-220	280	-300	1040	280	-250	540
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	5250	190/-180	230	-270	960	200	-180	380
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	6500	250/-230	310	-320	1100	310	-260	610
STABILIZER TRIM INOPERATIVE	VREF15	4990	180/-170	210	-260	920	200	-160	340
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	4990	180/-170	210	-260	920	200	-160	340
LEADING EDGE FLAPS TRANSIT	VREF15+5	5420	200/-190	260	-270	970	210	-180	390
ONE ENGINE INOPERATIVE	VREF15	5510	200/-190	250	-290	1030	260	-210	410

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	4610	170/-160	130	-240	890	180	-150	340
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	4990	180/-160	210	-250	920	200	-160	340
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	5660	210/-190	260	-280	980	200	-180	360
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	4610	170/-160	130	-240	890	180	-150	340
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	4990	180/-160	210	-250	920	200	-160	340
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	5660	210/-190	260	-280	980	200	-180	360
TRAILING EDGE FLAPS UP (FLAPS < 1)	VREF40+40	6070	220/-200	280	-290	1000	210	-180	360

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
		LANDING DISTANCE AND ADJUSTMENT (FT)							
ALL FLAPS UP	VREF40+55	8610	340/-310	420	-440	1580	490	-380	460
ANTI-SKID INOPERATIVE	VREF40	7430	310/-280	200	-550	2345	2300	-520	430
HYDRAULICS- LOSS OF SYSTEM A (FLAPS 40)	VREF40	6490	280/-260	280	-400	1470	480	-360	520
HYDRAULICS- LOSS OF SYSTEM A (FLAPS 30)	VREF30	6900	270/-280	290	-420	1520	510	-390	570
HYDRAULICS- LOSS OF SYSTEM A (FLAPS 15)	VREF15	7500	310/-280	360	-430	1550	520	-410	590
HYDRAULICS- LOSS OF SYSTEM B (FLAPS 15)	VREF15	6630	270/-240	300	-390	1450	430	-330	440
HYDRAULICS- MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	7970	330/-300	380	-450	1610	570	-440	640
STABILIZER TRIM INOPERATIVE	VREF15	6240	250/-230	270	-380	1400	390	-310	410
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	6240	250/-230	270	-380	1400	390	-310	410
LEADING EDGE FLAPS TRANSIT	VREF15+5	6820	280/-260	330	-400	1460	440	-340	460
ONE ENGINE INOPERATIVE	VREF15	7330	300/-280	330	-450	1640	610	-440	510

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 48000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABV/BLW 48000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	5760	210/-220	200	-350	1360	380	-280	390
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	6250	270/-240	260	-370	1390	390	-310	410
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	7120	290/-260	340	-400	1460	430	-330	430
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	5760	210/-220	200	-350	1360	380	-280	390
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	6250	270/-240	260	-370	1390	390	-310	410
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	7120	290/-260	340	-400	1460	430	-330	430
TRAILING EDGE FLAPS UP (FLAPS < 1)	VREF40+40	7640	310/-270	360	-410	1500	440	-340	430

Reference distance assumes sea level, standard day, with no wind or slope.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above runway threshold (1000 ft of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*														
		60			80			100			120			140		
WEIGHT (1000 KG)	OAT (°C)	PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT		
		0	4	8	0	4	8	0	4	8	0	4	8	0	4	8
70	-20	6.6	7.4	8.3	11.1	12.5	14.1	16.5	18.7	21.4	22.9	26.0	29.7	30.0	34.1	38.9
	0	7.1	7.9	8.8	11.9	13.4	15.1	17.7	20.1	22.9	24.5	27.9	31.9	32.2	36.6	41.7
	15	7.4	8.3	9.3	12.5	14.1	15.9	18.7	21.2	24.2	25.9	29.4	33.6	33.9	38.5	43.9
	20	7.5	8.4	9.4	12.7	14.3	16.2	19.0	21.5	24.6	26.3	29.9	34.1	34.5	39.2	44.6
	40	7.9	8.8	9.8	13.3	15.0	17.0	20.0	22.7	25.9	27.8	31.6	36.1	36.4	41.4	47.1
65	-20	6.2	6.9	7.8	10.4	11.7	13.2	15.5	17.5	20.0	21.4	24.3	27.8	28.0	31.8	36.3
	0	6.7	7.4	8.3	11.1	12.5	14.1	16.6	18.8	21.4	22.9	26.0	29.7	30.0	34.1	39.0
	15	7.0	7.8	8.7	11.7	13.2	14.9	17.5	19.8	22.6	24.2	27.4	31.4	31.7	36.0	41.0
	20	7.1	7.9	8.8	11.9	13.4	15.2	17.8	20.1	23.0	24.6	27.9	31.9	32.2	36.6	41.7
	40	7.4	8.2	9.2	12.5	14.0	15.9	18.7	21.2	24.2	25.9	29.5	33.7	34.0	38.6	44.1
60	-20	5.8	6.5	7.2	9.7	10.9	12.3	14.4	16.3	18.6	19.9	22.6	25.8	26.0	29.6	33.8
	0	6.3	7.0	7.8	10.4	11.7	13.2	15.4	17.5	19.9	21.3	24.2	27.6	27.9	31.7	36.2
	15	6.6	7.3	8.1	10.9	12.3	13.9	16.3	18.4	21.0	22.5	25.5	29.1	29.4	33.4	38.1
	20	6.7	7.4	8.3	11.1	12.5	14.1	16.5	18.7	21.3	22.8	25.9	29.6	29.9	34.0	38.8
	40	6.9	7.7	8.6	11.6	13.1	14.8	17.4	19.7	22.5	24.1	27.4	31.3	31.6	35.9	41.0
55	-20	5.5	6.1	6.8	9.0	10.1	11.4	13.4	15.1	17.2	18.4	20.8	23.8	24.0	27.2	31.1
	0	5.9	6.5	7.2	9.7	10.8	12.2	14.3	16.2	18.4	19.7	22.3	25.5	25.7	29.2	33.4
	15	6.1	6.8	7.6	10.2	11.4	12.8	15.1	17.0	19.4	20.7	23.5	26.9	27.1	30.8	35.2
	20	6.2	6.9	7.7	10.3	11.6	13.0	15.3	17.3	19.7	21.1	23.9	27.3	27.6	31.3	35.8
	40	6.5	7.2	8.0	10.8	12.1	13.7	16.1	18.2	20.8	22.2	25.2	28.8	29.1	33.1	37.8
50	-20	5.1	5.6	6.3	8.3	9.3	10.5	12.3	13.9	15.7	16.8	19.1	21.8	21.9	24.9	28.5
	0	5.4	6.0	6.7	8.9	10.0	11.2	13.2	14.8	16.9	18.0	20.4	23.3	23.5	26.7	30.5
	15	5.7	6.3	7.0	9.4	10.5	11.8	13.8	15.6	17.8	19.0	21.5	24.6	24.8	28.1	32.2
	20	5.8	6.4	7.1	9.5	10.7	12.0	14.1	15.9	18.1	19.3	21.9	25.0	25.2	28.6	32.7
	40	6.0	6.7	7.4	10.0	11.2	12.6	14.8	16.7	19.0	20.3	23.1	26.4	26.6	30.2	34.5
45	-20	4.7	5.2	5.8	7.7	8.6	9.6	11.2	12.6	14.3	15.3	17.3	19.7	19.9	22.5	25.7
	0	5.0	5.6	6.2	8.2	9.2	10.3	12.0	13.5	15.3	16.4	18.5	21.1	21.3	24.1	27.6
	15	5.3	5.8	6.5	8.6	9.6	10.8	12.6	14.2	16.1	17.3	19.5	22.3	22.4	25.4	29.1
	20	5.3	5.9	6.6	8.7	9.8	11.0	12.8	14.5	16.4	17.5	19.9	22.7	22.8	25.9	29.6
	40	5.5	6.2	6.8	9.1	10.2	11.5	13.5	15.2	17.3	18.5	20.9	23.9	24.0	27.3	31.2
40	-20	4.3	4.8	5.3	7.0	7.8	8.7	10.1	11.4	12.9	13.7	15.5	17.7	17.7	20.1	23.0
	0	4.6	5.1	5.7	7.5	8.3	9.3	10.9	12.2	13.8	14.7	16.6	18.9	19.0	21.5	24.6
	15	4.9	5.4	5.9	7.8	8.8	9.8	11.4	12.8	14.5	15.5	17.5	20.0	20.0	22.7	26.0
	20	4.9	5.4	6.0	8.0	8.9	10.0	11.6	13.0	14.8	15.8	17.8	20.3	20.4	23.1	26.4
	40	5.1	5.6	6.3	8.3	9.3	10.4	12.1	13.7	15.5	16.6	18.8	21.4	21.5	24.4	27.9

***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.

ADVISORY INFORMATION

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	15	20	25	30	35	40
RTO MAX MAN		10	15	20	25	30	35	40
LANDING	MAX MAN	8.6	13.3	18.1	22.8	27.5	32.3	37.0
LANDING	MAX AUTO	8.1	12.3	16.6	21.0	25.4	29.9	34.4
LANDING	AUTOBRAKE 3	8.0	11.6	15.3	19.2	23.1	27.1	31.2
LANDING	AUTOBRAKE 2	7.8	11.0	14.3	17.6	21.1	24.6	28.3
LANDING	AUTOBRAKE 1	7.5	10.4	13.4	16.3	19.4	22.5	25.6

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)						
EVENT		10	15	20	25	30	35	40
RTO MAX MAN		10	15	20	25	30	35	40
LANDING	MAX MAN	8.2	12.5	16.7	20.9	25.0	29.0	33.0
LANDING	MAX AUTO	6.0	9.4	12.8	16.4	20.1	23.8	27.7
LANDING	AUTOBRAKE 3	3.2	5.2	7.4	9.7	12.2	14.8	17.5
LANDING	AUTOBRAKE 2	1.4	2.5	3.8	5.2	6.8	8.5	10.3
LANDING	AUTOBRAKE 1	0.6	1.3	2.1	3.0	3.9	5.0	6.2

Cooling Time (Minutes) - Category A Brakes

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)							
	8 & BELOW	10	12	14	16	18	18.5 TO 23.7	23.8 & ABOVE
	BRAKE TEMPERATURE INDICATOR READING							
	UP TO 2.1	2.8	3.2	3.6	4.2	4.8	4.9 TO 6.3	6.3 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND	NO SPECIAL PROCEDURE REQUIRED	19	32	43	53	61	CAUTION	FUSE PLUG MELT ZONE

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 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 Indicator (if installed) on First Officer's Instrument Panel may be used 10 to 15 minutes after brake application, to determine recommended cooling time.

Intentionally
Blank

Performance Inflight - QRH Chapter PI-QRH
Engine Inoperative Section 12

ENGINE INOP

Initial Max Continuous %N1
Based on .74M, engine bleed for packs auto and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)					
	27	29	31	33	35	37
20	95.2	95.2	95.2	95.2	95.1	95.1
15	95.8	95.8	95.8	958	95.7	95.7
10	96.1	96.1	96.1	96.1	96.0	96.0
5	96.6	96.6	96.6	96.6	96.5	96.5
0	97.1	97.1	97.1	97.1	97.0	97.0
-5	96.6	97.7	97.7	97.7	97.6	97.6
-10	95.7	96.9	98.1	98.7	98.0	98.0
-15	94.8	96.0	97.1	98.4	98.3	98.3
-20	93.9	95.1	96.2	97.4	98.4	98.7
-25	92.9	94.1	95.3	96.5	97.5	98.0
-30	92.0	93.2	94.3	95.5	96.5	97.0
-40	90.1	91.3	92.1	93.5	94.5	95.0
-50	88.1	89.3	90.3	91.5	92.4	93.0

%N1 Adjustment for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)						
	25	27	29	31	33	35	37
ENGINE A/I ON	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-1.0
ENGINE AND WING A/I ON	-2.9	-2.9	-2.9	-2.8	-2.8	-2.8	-2.9

ENGINE INOP

Max Continuous %N1
33000 FT to 23000 FT Pressure Altitudes
Based on engine bleed for packs auto and anti-ice off

33000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.58	92.3	94.4	96.4	97.1	96.5	96.0	95.7				
220	.63	92.2	94.3	96.3	97.8	97.1	96.4	96.1	95.7	95.3		
240	.68	92.1	94.2	96.2	98.1	97.8	96.9	96.4	96.0			
260	.74	91.4	93.5	95.5	97.4	98.0	97.0	96.6	96.1	95.6		
31000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.55	91.5	93.5	95.5	97.0	96.4	95.8	95.5				
220	.61	91.3	93.3	95.3	97.2	96.8	96.2	95.9	95.6	95.3		
240	.66	91.1	93.1	95.1	97.1	97.4	96.7	96.3	95.9	95.5		
260	.71	90.9	92.9	94.9	96.8	98.0	97.0	96.5	96.1	95.6		
29000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.53	90.6	92.6	94.6	96.5	96.2	95.6	95.4	95.1			
220	.58	90.4	92.4	94.4	96.3	96.6	96.1	95.8	95.5	95.1		
240	.63	90.2	92.2	94.1	96.1	97.1	96.5	96.1	95.8	95.4		
260	.68	90.0	92.0	93.9	95.9	97.7	96.9	96.4	96.0	95.6	95.1	
27000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.51	89.8	91.8	93.8	95.7	96.0	95.5	95.2	94.9			
220	.56	89.6	91.6	93.5	95.4	96.4	95.9	95.6	95.3	95.0	94.6	
240	.60	89.3	91.3	93.2	95.1	96.9	96.3	96.0	97.7	95.3	95.0	
260	.65	89.1	91.0	93.0	94.9	96.7	96.7	96.3	95.9	95.5	95.1	
25000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.49	89.0	91.0	92.9	94.8	95.9	95.4	95.1	94.8	94.5		
220	.53	88.8	90.7	92.7	94.6	96.3	95.7	95.4	95.1	94.8	94.5	
240	.58	88.5	90.5	92.4	94.3	96.1	96.1	95.8	95.5	95.2	94.8	
260	.63	88.2	90.2	92.1	94.0	95.8	96.5	96.1	95.8	95.4	95.0	94.6
23000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.47	88.2	90.1	92.0	93.9	95.7	95.3	95.0	94.4	94.0		
220	.51	88.0	89.9	91.8	93.7	95.5	95.6	95.3	95.0	94.7	94.4	
240	.56	87.7	89.7	91.6	93.4	95.3	95.9	95.7	95.4	95.0	94.7	94.3
260	.60	87.5	89.4	91.3	93.2	95.0	96.3	96.0	95.7	95.4	95.0	94.6

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	23	25	27	29	31	33
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9
ENGINE AND WING ANTI-ICE ON	-2.9	-2.9	-2.9	-2.9	-2.8	-2.8

ENGINE INOP

Max Continuous %N1

21000 FT to 14000 FT Pressure Altitudes

Based on engine bleed for packs auto and anti-ice off

21000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.45	87.3	89.3	91.2	93.0	94.8	95.1	94.9	94.6	94.3	93.9	
220	.49	87.2	89.1	91.0	92.9	94.7	95.4	95.1	94.9	94.6	94.2	93.9
240	.54	86.9	88.9	90.8	92.6	94.4	95.8	95.5	95.2	94.9	94.5	94.2
260	.60	86.7	88.6	90.5	92.3	94.1	95.9	95.8	95.5	95.2	94.8	94.5
20000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.44	86.9	88.9	90.7	92.6	94.4	95.1	94.8	94.5	94.2	93.9	93.5
220	.48	86.8	88.7	90.6	92.4	94.2	95.4	95.1	94.8	94.5	94.2	93.8
240	.53	86.6	88.5	90.4	92.2	94.0	95.7	95.4	95.1	94.8	94.5	94.1
260	.57	86.3	88.2	90.1	91.9	93.7	95.5	95.8	95.5	95.1	94.8	94.4
18000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.42	86.1	88.0	89.9	91.7	93.5	95.0	94.7	94.4	94.1	93.8	93.4
220	.46	86.0	87.9	89.7	91.6	93.4	95.1	95.0	94.7	94.4	94.1	93.7
240	.51	85.8	87.7	89.6	91.4	93.2	94.9	95.3	95.0	94.7	94.3	94.0
260	.55	85.6	87.4	89.3	91.1	92.9	94.7	95.5	95.3	95.0	94.6	94.3
17000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.42	85.7	87.6	89.5	91.3	93.1	94.9	94.7	94.4	94.1	93.7	93.3
220	.46	85.6	87.5	89.3	91.1	92.9	94.7	94.9	94.6	94.3	94.0	93.6
240	.50	85.4	87.3	89.2	91.0	92.8	94.5	95.2	94.9	94.6	94.3	93.9
260	.54	85.2	87.1	88.9	90.7	92.5	94.2	95.1	95.2	94.9	94.6	94.2
16000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.41	85.4	87.2	89.1	90.9	92.7	94.4	94.6	94.3	94.0	93.6	93.3
220	.45	85.2	87.1	88.9	90.7	92.5	94.3	94.9	94.6	94.3	93.9	93.6
240	.49	85.0	86.9	88.8	90.6	92.3	94.1	94.9	94.8	94.5	94.2	93.8
260	.53	84.8	86.7	88.5	90.3	92.1	93.8	94.7	95.1	94.8	94.5	94.1
14000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.39	84.6	86.5	88.3	90.1	91.9	93.6	94.4	94.3	93.9	93.6	93.2
220	.43	84.4	86.3	88.1	89.9	91.7	93.4	94.2	94.5	94.2	93.8	93.4
240	.47	84.3	86.1	87.9	89.7	91.5	93.2	94.1	94.7	94.4	94.1	93.7
260	.51	84.1	85.9	87.8	89.6	91.3	93.0	93.9	94.7	94.7	94.4	94.0

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	14	16	17	18	20	21
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9
ENGINE AND WING ANTI-ICE ON	-3.1	-3.1	-3.1	-3.0	-3.0	-3.0

ENGINE INOP

Max Continuous %N1
12000 FT to 1000 FT Pressure Altitudes
Based on engine bleed for packs auto and anti-ice off

12000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.38	83.8	85.7	87.5	89.3	91.0	92.7	93.6	94.2	93.9	93.5	93.1	92.7
220	.41	83.6	85.5	87.3	89.1	90.8	92.5	93.4	94.2	94.1	93.7	93.3	92.9
240	.45	83.5	85.3	87.1	88.9	90.7	92.4	93.2	94.0	94.3	94.0	93.6	93.2
260	.49	83.3	85.2	87.0	88.8	90.5	92.2	93.0	93.9	94.6	94.2	93.9	93.5
10000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.36	83.1	84.9	86.7	88.5	90.2	91.9	92.7	93.6	93.8	93.5	93.1	92.6
220	.40	82.9	84.7	86.5	88.3	90.0	91.7	92.5	93.3	94.0	93.6	93.2	92.8
240	.43	82.7	84.6	86.4	88.1	89.8	91.5	92.4	93.2	94.0	93.9	93.5	93.1
260	.47	82.6	84.4	86.2	88.0	89.7	91.4	92.2	93.0	93.8	94.1	93.8	93.4
7000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.34	81.9	83.7	85.5	87.2	88.9	90.6	91.4	92.3	93.1	93.4	93.0	92.6
220	.38	81.7	83.5	85.3	87.1	88.8	90.4	91.3	92.1	92.9	93.5	93.2	92.7
240	.41	81.6	83.4	85.2	86.9	88.6	90.3	91.1	91.9	92.7	93.5	93.3	92.9
260	.45	81.4	83.3	85.0	86.7	88.4	90.1	90.9	91.7	92.6	93.4	93.6	93.2
5000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.33	81.1	82.9	84.7	86.4	88.1	89.8	90.6	91.4	92.2	93.0	93.0	92.5
220	.36	81.0	82.8	84.5	86.2	87.9	89.6	90.4	91.2	92.0	92.8	93.1	92.7
240	.40	80.8	82.6	84.4	86.1	87.8	89.4	90.2	91.0	91.8	92.6	93.3	92.8
260	.43	80.7	82.5	84.2	85.9	87.6	89.3	90.1	90.9	91.7	92.5	93.3	93.1
3000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.32	80.4	82.2	83.9	85.6	87.3	88.9	89.7	90.5	91.3	92.1	92.9	92.5
220	.35	80.2	82.0	83.7	85.4	87.1	88.8	89.6	90.4	91.2	91.9	92.7	92.6
240	.40	80.1	81.8	83.6	85.3	86.9	88.6	89.4	90.2	91.0	91.8	92.5	92.8
260	.43	79.9	81.7	83.4	85.1	86.8	88.4	89.2	90.0	90.8	91.6	92.4	93.0
1000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.31	79.6	81.4	83.1	84.8	86.4	88.1	88.9	89.7	90.5	91.2	92.0	92.5
220	.34	79.5	81.2	82.9	84.6	86.3	87.9	88.7	89.5	90.3	91.1	91.8	92.6
240	.37	79.3	81.1	82.8	84.5	86.1	87.7	88.5	89.3	90.1	90.9	91.7	92.4
260	.40	79.2	80.9	82.6	84.3	86.0	87.6	88.4	89.2	90.0	90.7	91.5	92.3

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	1	3	5	7	10	12
ENGINE ANTI-ICE ON	-0.6	-0.7	-0.8	-0.8	-0.8	-0.8
ENGINE AND WING ANTI-ICE ON	-2.4	-2.6	-2.8	-2.8	-2.9	-2.9

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
64	61	235	16200	15000	13600
60	57	228	18200	17200	15900
56	53	220	20400	19300	18200
52	49	212	22700	21700	20600
48	46	204	25100	24100	23100
44	42	196	27400	26600	25700
40	38	187	29900	29200	28400

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
140	130	121	113	106	100	95	90	85	81	78
288	265	245	228	213	200	188	178	169	161	153
433	398	368	342	320	300	283	267	253	241	229
576	530	490	456	426	400	377	356	338	321	306
718	660	611	569	532	500	471	446	423	402	384
858	790	732	682	638	600	566	536	508	484	461
997	919	852	795	744	700	661	626	594	565	539
1134	1047	972	907	850	800	755	716	680	647	618
1272	1175	1091	1019	956	900	850	806	766	729	696
1408	1302	1211	1131	1062	1000	945	896	852	812	775
1545	1429	1330	1243	1167	1100	1040	986	938	894	854
1682	1557	1449	1355	1273	1200	1135	1077	1024	976	933
1819	1684	1568	1467	1379	1300	1230	1167	1110	1059	1012
1956	1812	1688	1580	1484	1400	1325	1257	1196	1141	1090
2095	1941	1808	1692	1590	1500	1419	1347	1282	1222	1168
2234	2070	1929	1805	1696	1600	1514	1437	1367	1304	1246

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)								TIME (HRS:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)								
	35	40	45	50	55	60	65	70	
100	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0:17
200	0.8	0.9	1.0	1.1	1.1	1.2	1.3	1.4	0:37
300	1.3	1.4	1.6	1.7	1.9	2.0	2.2	2.3	0:55
400	1.7	1.9	2.1	2.4	2.6	2.8	3.1	3.2	1:13
500	2.1	2.4	2.6	3.0	3.2	3.5	3.8	4.1	1:31
600	2.5	2.8	3.2	3.5	3.9	4.2	4.6	4.9	1:48
700	2.9	3.3	3.7	4.1	4.5	4.9	5.4	5.8	2:05
800	3.3	3.8	4.2	4.7	5.2	5.6	6.1	6.6	2:22
900	3.7	4.2	4.7	5.3	5.8	6.3	6.9	7.4	2:38
1000	4.1	4.7	5.2	5.8	6.4	7.0	7.6	8.2	2:54
1100	4.5	5.1	5.7	6.4	7.0	7.7	8.3	9.0	3:10
1200	4.9	5.5	6.2	6.9	7.6	8.3	9.1	9.8	3:26
1300	5.3	6.0	6.7	7.5	8.2	9.0	9.8	10.6	3:42
1400	5.7	6.4	7.2	8.0	8.8	9.6	10.5	11.4	3:59
1500	6.1	6.9	7.7	8.6	9.4	10.3	11.2	12.2	4:16
1600	6.5	7.3	8.2	9.1	10.0	11.0	11.9	12.9	4:33

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at Long Range Cruise speed.

ENGINE INOP

MAX CONTINUOUS THRUST

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
64	9500	7200	4900
60	12300	10200	7900
56	15200	13200	11000
52	18000	16200	14100
48	20900	19200	17400
44	24000	22300	20600
40	27000	25600	24000
36	30000	28800	27500
32	33200	32200	31000

With engine anti-ice on, decrease altitude capability by 1400 ft.
With engine and wing anti-ice on, decrease altitude capability by 5300 ft.

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	12	14	16	18	20	22	24	26	28
64	%N1	90.9	92.4								
	MACH	.561	.577								
	KIAS	311	309								
	FF/ENG	2974	2952								
60	%N1	89.2	90.7	92.2							
	MACH	.547	.564	.580							
	KIAS	303	302	299							
	FF/ENG	2796	2780	2755							
56	%N1	87.5	88.9	90.4	91.9						
	MACH	.531	.549	.566	.582						
	KIAS	294	293	292	289						
	FF/ENG	2613	2603	2584	2553						
52	%N1	85.7	87.0	88.5	90.0	91.6	93.2				
	MACH	.513	.532	.550	.567	.584	.600				
	KIAS	284	284	283	281	278	275				
	FF/ENG	2428	2419	2409	2383	2353	2333				
48	%N1	83.6	85.1	86.5	88.0	89.5	91.1	92.8			
	MACH	.495	.513	.532	.550	.568	.584	.600			
	KIAS	274	274	273	272	271	268	265			
	FF/ENG	2243	2233	2225	2210	2185	2161	2153			
44	%N1	81.5	82.9	84.4	85.8	87.3	88.8	90.4	92.1		
	MACH	.475	.493	.511	.530	.549	.567	.584	.600		
	KIAS	263	263	263	262	261	260	257	254		
	FF/ENG	2059	2049	2040	2030	2014	1994	1981	1970		
40	%N1	79.0	80.5	82.0	83.5	84.9	86.4	88.0	89.6	91.3	93.3
	MACH	.454	.471	.489	.508	.527	.546	.565	.582	.599	.616
	KIAS	251	251	251	251	250	250	248	246	243	239
	FF/ENG	1878	1866	1857	1849	1838	1825	1816	1799	1781	1777
36	%N1	76.4	77.8	79.4	80.9	82.4	83.8	85.3	86.9	88.5	90.2
	MACH	.434	.449	.465	.484	.502	.522	.541	.561	.578	.595
	KIAS	240	239	239	239	238	238	238	236	234	231
	FF/ENG	1707	1689	1677	1668	1660	1650	1646	1635	1613	1594

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
299	272	249	230	214	200	190	181	173	166	159
608	552	504	464	430	400	380	362	345	330	316
920	834	759	697	646	600	570	542	517	494	473
1235	1118	1015	932	862	800	760	722	688	658	630
1553	1403	1273	1167	1078	1000	949	903	860	821	787
1873	1691	1532	1403	1295	1200	1139	1082	1031	984	943
2196	1980	1792	1640	1512	1400	1328	1262	1202	1147	1099
2524	2273	2055	1877	1730	1600	1517	1441	1372	1310	1255

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	0:42	1.2	0:40	1.1	0:39	1.0	0:38	0.9	0:37
400	2.8	1:22	2.6	1:18	2.3	1:14	2.1	1:11	2.0	1:09
600	4.2	2:03	3.9	1:56	3.5	1:50	3.3	1:46	3.1	1:42
800	5.6	2:44	5.2	2:35	4.7	2:26	4.4	2:20	4.1	2:15
1000	7.0	3:26	6.4	3:14	5.9	3:03	5.5	2:55	5.2	2:48
1200	8.3	4:08	7.7	3:54	7.1	3:40	6.6	3:30	6.2	3:22
1400	9.6	4:51	8.9	4:34	8.2	4:18	7.7	4:05	7.2	3:56
1600	11.0	5:35	10.1	5:15	9.4	4:57	8.7	4:41	8.2	4:30

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)					
	35	40	45	50	55	60
2	-0.2	-0.1	0.0	0.1	0.3	0.5
4	-0.3	-0.2	0.0	0.3	0.7	1.0
6	-0.5	-0.3	0.0	0.5	1.0	1.5
8	-0.7	-0.4	0.0	0.6	1.3	2.0
10	-0.9	-0.4	0.0	0.7	1.6	2.5
12	-1.0	-0.5	0.0	0.9	1.8	2.9
14	-1.2	-0.6	0.0	1.0	2.1	3.3

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)					
		1500	5000	10000	15000	20000	25000
62	%N1	78.9	81.8	85.5	89.8		
	KIAS	242	243	243	245		
	FF/ENG	2530	2510	2500	2520		
58	%N1	77.0	79.9	83.8	87.8		
	KIAS	234	235	236	236		
	FF/ENG	2360	2340	2330	2330		
54	%N1	75.1	77.8	81.8	85.8	90.5	
	KIAS	225	227	228	228	230	
	FF/ENG	2200	2180	2160	2160	2190	
50	%N1	72.9	75.7	79.8	83.7	88.0	
	KIAS	216	218	219	219	221	
	FF/ENG	2050	2020	2000	1990	2000	
46	%N1	70.8	73.5	77.5	81.5	85.6	90.8
	KIAS	210	210	210	211	211	213
	FF/ENG	1900	1870	1840	1830	1830	1860
42	%N1	68.9	71.6	75.6	79.6	83.5	88.0
	KIAS	210	210	210	210	210	210
	FF/ENG	1790	1760	1720	1700	1690	1700
38	%N1	67.1	69.8	73.8	77.8	81.7	85.8
	KIAS	210	210	210	210	210	210
	FF/ENG	1690	1660	1620	1590	1580	1570
34	%N1	65.4	68.1	72.1	76.0	79.9	83.9
	KIAS	210	210	210	210	210	210
	FF/ENG	1600	1570	1520	1500	1480	1470

This table includes 5% additional fuel for holding in a racetrack pattern.

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GEAR DOWN

220 KIAS 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
64	22700	21400	20100
62	24100	23000	21800
60	25000	23800	22600
58	25700	24600	23500
56	26400	25400	24200
54	27100	26100	25000
52	27700	26800	25700
50	28300	27400	26300
48	28900	28000	26900
46	29500	28600	27500
44	30000	29100	28100
42	30500	29600	28700
40	31000	30100	29200
38	31400	30600	29700
36	31800	31000	30100
34	32200	31400	30500
32	32600	31800	30900

Based on 230 KIAS for weights above 62823 kg.

GEAR DOWN

220 KIAS Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		13	15	17	19	21	23	25	27	29	31
64	%N1	82.0	83.7	85.3	87.2	89.1	91.5				
	MACH	.441	.458	.476	.495	.515	.536				
	KIAS	230	230	230	230	230	230				
	FF/ENG	1887	1888	1892	1900	1915	1947				
60	%N1	79.9	81.6	83.2	84.9	86.8	88.9	91.4			
	MACH	.422	.438	.456	.474	.493	.513	.534			
	KIAS	220	220	220	220	220	220	220			
	FF/ENG	1739	1739	1741	1746	1753	1771	1807			
56	%N1	78.9	80.5	82.1	83.8	85.5	87.4	89.7	92.3		
	MACH	.422	.438	.456	.474	.493	.513	.534	.557		
	KIAS	220	220	220	220	220	220	220	220		
	FF/ENG	1672	1670	1670	1671	1675	1685	1707	1742		
52	%N1	77.9	79.5	81.1	82.7	84.4	86.2	88.3			
	MACH	.422	.438	.456	.474	.493	.513	.534	.557		
	KIAS	220	220	220	220	220	220	220	220		
	FF/ENG	1613	1609	1607	1606	1608	1614	1629	1651		
48	%N1	76.9	78.6	80.2	81.8	83.5	85.2	87.1	89.4	92.0	
	MACH	.422	.438	.456	.474	.493	.513	.534	.557	.580	
	KIAS	220	220	220	220	220	220	220	220	220	
	FF/ENG	1561	1556	1553	1551	1551	1555	1565	1578	1612	
44	%N1	76.0	77.7	79.3	80.9	82.6	84.3	86.1	88.2	90.6	
	MACH	.422	.438	.456	.474	.493	.513	.534	.557	.580	
	KIAS	220	220	220	220	220	220	220	220	220	
	FF/ENG	1513	1507	1503	1501	1500	1502	1509	1517	1542	
40	%N1	75.3	76.9	78.6	80.1	81.8	83.4	85.2	87.2	89.5	92.4
	MACH	.422	.438	.456	.474	.493	.513	.534	.557	.580	.605
	KIAS	220	220	220	220	220	220	220	220	220	220
	FF/ENG	1472	1466	1461	1458	1456	1456	1461	1466	1483	1522
36	%N1	74.6	76.2	77.9	79.5	81.1	82.7	84.4	86.4	88.6	91.2
	MACH	.422	.438	.456	.474	.493	.513	.534	.557	.580	.605
	KIAS	220	220	220	220	220	220	220	220	220	220
	FF/ENG	1437	1430	1425	1421	1419	1418	1422	1424	1436	1468

Based on 230 KIAS for weights above 62823 kg.

GEAR DOWN

220 KIAS Enroute Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
321	288	259	236	217	200	189	180	171	163	156
650	580	520	473	434	400	378	358	340	324	310
980	874	783	711	652	600	568	538	511	487	465
1309	1167	1045	949	869	800	756	717	680	648	619
1639	1461	1308	1186	1087	1000	945	895	850	810	774
1968	1754	1571	1424	1305	1200	1134	1074	1020	971	928
2298	2048	1833	1662	1522	1400	1323	1253	1189	1132	1082
2627	2341	2096	1900	1740	1600	1512	1432	1360	1295	1237
2956	2635	2358	2138	1958	1800	1701	1611	1529	1456	1391

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	2.3	0:49	2.1	0:46	1.8	0:43	1.7	0:41	1.5	0:39
400	4.6	1:36	4.3	1:31	3.8	1:24	3.6	1:19	3.3	1:15
600	7.0	2:23	6.4	2:15	5.8	2:04	5.4	1:57	5.1	1:50
800	9.3	3:10	8.6	3:00	7.7	2:44	7.2	2:35	6.8	2:26
1000	11.5	3:57	10.7	3:44	9.7	3:25	9.1	3:13	8.6	3:01
1200	13.8	4:45	12.8	4:28	11.6	4:05	10.9	3:51	10.3	3:37
1400	16.0	5:32	14.9	5:13	13.5	4:46	12.6	4:29	11.9	4:12
1600	18.2	6:19	16.9	5:57	15.3	5:26	14.4	5:06	13.6	4:48
1800	20.4	7:06	19.0	6:41	17.2	6:06	16.1	5:44	15.2	5:23

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)						
	30	35	40	45	50	55	60
5	-0.3	-0.3	-0.1	0.0	0.2	0.5	0.9
10	-0.7	-0.5	-0.3	0.0	0.4	1.0	1.6
15	-0.9	-0.7	-0.4	0.0	0.6	1.3	2.2
20	-1.0	-0.8	-0.4	0.0	0.7	1.5	2.5
25	-1.1	-0.9	-0.5	0.0	0.7	1.6	2.6

Based on 220 KIAS cruise and descent.

Descent at 220 KIAS

PRESSURE ALT (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33
DISTANCE (NM)	17	26	35	39	43	46	50	54	57	61	65	69
TIME (MINUTES)	6	8	10	11	12	13	13	14	15	16	16	17

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
62	%N1	71.2	74.0	78.1	82.2	86.6	92.4	
	KIAS	220	220	220	220	220	220	
	FF/ENG	1930	1890	1870	1870	1880	1960	
58	%N1	70.2	72.9	77.0	81.0	85.2	90.5	
	KIAS	220	220	220	220	220	220	
	FF/ENG	1860	1830	1800	1790	1800	1840	
54	%N1	69.2	71.9	75.9	80.0	84.1	88.9	
	KIAS	220	220	220	220	220	220	
	FF/ENG	1800	1770	1730	1720	1720	1750	
50	%N1	67.0	69.6	73.6	77.7	81.8	86.2	92.5
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1670	1630	1590	1570	1570	1580	1650
46	%N1	65.9	68.5	72.6	76.6	80.7	85.0	90.6
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1620	1580	1540	1510	1510	1510	1550
42	%N1	65.0	67.6	71.6	75.6	79.7	83.9	89.2
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1570	1530	1490	1460	1450	1450	1480
38	%N1	64.2	66.7	70.7	74.7	78.8	82.9	87.9
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1530	1490	1440	1420	1400	1400	1420
34	%N1	63.5	65.9	69.9	73.9	78.0	82.1	86.9
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1490	1450	1410	1380	1360	1360	1370

This table includes 5% additional fuel for holding in a racetrack pattern.

Introduction

This chapter 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 chapter 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 250 KIAS/280 KIAS/.74M climb speed schedule, normal engine bleed for packs on (Auto) and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. Apply the appropriate bleed setting %N1 adjustment shown below the table. %N1 adjustments are shown for engine bleed to packs off operation, packs high operation, and wing anti-ice on.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (Auto) and anti-ice off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. Apply the appropriate bleed setting %N1 adjustment shown below the table. %N1 adjustments are shown for engine bleed to packs off operation, packs high operation, and wing anti-ice on.

VREF

The Reference Speed table contains flaps 40, 30, and 15 landing speeds for a given weight. Apply wind correction shown as required.

Advisory Information

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, enter the appropriate table for selected landing flaps and determine the reference landing distance for the selected braking configuration. Then read across the table to adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers, using the values provided, to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. 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.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with “poor” braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be easily determined when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

Non-Normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect landing performance of the airplane. Landing distances are shown for dry runway and good, medium, and poor reported braking action. Each non-normal configuration is listed with its recommended approach speed. Landing distance can be determined for the reference landing weight and then adjusted for actual weight and pressure altitude.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding problems associated with hot brakes. For normal operation, most landings are at weights below the quick turnaround limit weight. Application of the recommended cooling procedures shown will avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

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 .74M 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 correct 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. To conservatively account for APU fuel burn, add 90 kg/hr to fuel flow values.

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 .74M/250 KIAS 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 corrections 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

Single engine holding data is provided in the same format as the all engine holding data and is based on the same assumptions.

Gear Down

This section contains performance for airplane operation with the landing gear extended for all phases of flight. 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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Flight With Unreliable Airspeed / Turbulent Air Penetration
Altitude and/or vertical speed indications may also be unreliable.

Climb
Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG)				
		36	44	52	60	68
35000	**PITCH ATT**	**6.5**	**6.0**	**5.5**	**5.5**	**5.5**
(.73M)	V/S (FT/MIN)	2800	2000	1300	700	100
30000	**PITCH ATT**	**7.0**	**6.0**	**6.0**	**5.5**	**5.5**
(.73M)	V/S (FT/MIN)	3700	2800	2100	1500	1000
25000	**PITCH ATT**	**7.0**	**6.5**	**6.0**	**6.0**	**6.0**
(280 KIAS)	V/S (FT/MIN)	3600	2800	2200	1700	1300
20000	**PITCH ATT**	**9.0**	**8.0**	**7.5**	**7.0**	**7.0**
(280 KIAS)	V/S (FT/MIN)	4400	3500	2800	2200	1800
15000	**PITCH ATT**	**10.5**	**9.5**	**9.0**	**8.5**	**8.0**
(280 KIAS)	V/S (FT/MIN)	5200	4100	3300	2700	2200
10000	**PITCH ATT**	**12.5**	**11.0**	**10.0**	**9.5**	**9.5**
(280 KIAS)	V/S (FT/MIN)	5900	4700	3900	3200	2700
5000	**PITCH ATT**	**14.5**	**13.0**	**11.5**	**11.0**	**10.5**
(280 KIAS)	V/S (FT/MIN)	6700	5400	4400	3700	3100
SEA LEVEL	**PITCH ATT**	**17.0**	**15.0**	**13.5**	**12.5**	**11.5**
(280 KIAS)	V/S (FT/MIN)	7400	6000	4900	4200	3500

Cruise
Flaps Up, Adjust %N1 for Level Flight

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG)				
		36	44	52	60	68
30000	**PITCH ATT**	**2.0**	**2.5**	**3.0**	**3.5**	**4.0**
(.73M)	%N1	79	81	83	85	87
10000	**PITCH ATT**	**2.0**	**2.5**	**3.5**	**4.0**	**4.5**
(280 KIAS)	%N1	66	67	69	70	72

Descent
Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG)				
		36	44	52	60	68
30000	**PITCH ATT**	**-3.5**	**-2.0**	**-1.5**	**-0.5**	**0.0**
(.73M)	V/S (FT/MIN)	-4100	-3600	-3300	-3100	-3100
20000	**PITCH ATT**	**-2.0**	**-1.0**	**0.0**	**0.5**	**1.5**
(280 KIAS)	V/S (FT/MIN)	-2800	-2400	-2200	-2100	-2000
10000	**PITCH ATT**	**-2.5**	**-1.0**	**0.0**	**0.5**	**1.5**
(280 KIAS)	V/S (FT/MIN)	-2500	-2100	-2000	-1800	-1800

Holding
Flaps Up, Adjust %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		36	44	52	60	68
10000	**PITCH ATT**	**4.5**	**5.5**	**5.5**	**5.5**	**5.5**
	%N1	57	60	64	68	72
	KIAS	210	210	230	245	265

Flight With Unreliable Airspeed / Turbulent Air Penetration

Altitude and/or vertical speed indications may also be unreliable.

Terminal Area

Adjust %N1 for Level Flight

FLAP POSITION (SPEED)		WEIGHT (1000 KG)				
		36	44	52	60	68
FLAPS UP (GEAR UP)	**PITCH ATT**	**4.5**	**5.5**	**6.5**	**7.0**	**7.5**
	%N	54.7	57.4	60.5	64.0	67.5
	KIAS	210	210	210	220	230
FLAPS 1 (GEAR UP)	**PITCH ATT**	**4.5**	**6.0**	**7.5**	**7.5**	**8.0**
	%N1	56.1	58.8	62.1	65.9	69.4
	KIAS	190	190	190	200	210
FLAPS 5 (GEAR UP)	**PITCH ATT**	**4.0**	**5.5**	**7.0**	**7.0**	**7.5**
	%N1	56.3	59.4	63.1	67.0	70.5
	KIAS	180	180	180	190	200
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**5.0**	**6.5**	**8.5**	**8.5**	**8.5**
	%N1	62.0	66.3	70.5	74.6	78.2
	KIAS	150	150	150	160	170

Final Approach

Gear Down, Adjust %N1 for 3° Glideslope

FLAP POSITION		WEIGHT (1000 KG)				
		36	44	52	60	68
FLAPS 15 (VREF15+10)	**PITCH ATT**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**
	%N1	45	50	54	58	61
	KIAS	135	149	162	174	185
FLAPS 30 (VREF30+10)	**PITCH ATT**	**2.0**	**2.0**	**2.0**	**2.0**	**2.5**
	%N1	50	55	60	64	67
	KIAS	123	135	147	158	167
FLAPS 40 (VREF40+10)	**PITCH ATT**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
	%N1	57	62	67	71	74
	KIAS	120	132	143	154	163

Max Climb %N1

Based on engine bleed to packs on (Auto) and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)/SPEED (KIAS OR MACH)								
	0	5	10	15	20	25	30	35	37
	250	250	250	280	280	280	.74	.74	.74
50	93.7	93.9	94.1						
40	93.9	94.0	94.3	95.0	95.2				
30	93.8	94.8	95.1	95.8.	96.0	96.0			
20	92.2	94.4	96.1	96.8	97.1	97.1	97.1		
10	90.6	92.8	95.2	97.3	98.3	98.5	98.6	98.6	98.6
0	89.0	91.1	93.5	95.5	98.2	100.1	100.3	100.3	100.3
-10	87.4	89.4	91.8	93.8	96.4	98.8	101.4	102.1	102.1
-20	85.7	87.7	90.0	92.0	94.5	96.9	99.4	102.3	102.5
-30	84.0	86.0	88.3	90.1	92.6	95.0	97.4	100.3	100.5
-40	82.3	84.2	86.4	88.3	90.7	93.0	95.4	98.2	98.4
-50	80.5	82.3	84.5	86.4	88.8	91.0	93.4	96.1	96.3

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	37
ENGINE BLEED TO PACKS OFF	1.0	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1
PACKS HIGH	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4
ENGINE ANTI-ICE ON	-0.6	-0.7	-0.7	-0.8	-0.9	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-1.5	-1.6	-1.7	-2.0	-2.3	-2.6	-2.8	-3.1	-3.1

Go-around %N1

Based on engine bleed to packs on (Auto), engine anti-ice on or off, and wing anti-ice off

REPORTED OAT		TAT	AIRPORT PRESSURE ALTITUDE (FT)									
°C	°F	(°C)	-1000	0	1000	2000	3000	4000	5000	6000	7000	8000
55	131	58	93.6	93.7	93.6	93.4						
50	122	53	94.9	95.1	95.0	94.9	94.9	94.4				
45	113	48	95.5	95.9	95.9	96.0	95.9	95.5	95.5	95.7	95.8	
40	104	43	96.0	96.7	96.6	96.6	96.5	96.5	96.5	96.5	96.5	96.5
35	95	38	96.5	97.3	97.3	97.2	97.2	97.2	97.3	97.3	97.3	97.2
30	86	33	96.5	97.7	97.9	97.9	97.9	97.9	98.0	98.0	98.1	98.0
25	77	28	95.7	96.9	97.4	98.2	98.7	98.7	98.8	98.8	99.0	98.8
20	68	23	94.9	96.1	96.6	97.4	98.0	98.6	99.2	99.5	99.6	99.5
15	59	18	94.1	95.2	95.8	96.5	97.1	97.8	98.4	99.0	99.7	100.1
10	50	13	93.2	94.4	95.0	95.7	96.3	96.9	97.5	98.2	98.8	99.3
5	41	8	92.4	93.6	94.1	94.8	95.5	96.1	96.7	97.3	97.9	98.4
0	32	3	91.6	92.7	93.3	94.0	94.6	95.2	95.8	96.4	97.0	97.5
-10	14	-8	89.8	91.0	91.5	92.3	92.8	93.4	94.0	94.6	95.2	95.7
-20	-4	-18	88.1	89.3	89.8	90.5	91.1	91.6	92.2	92.8	93.4	93.9
-30	-22	-28	86.3	87.5	88.0	88.7	89.2	89.8	90.4	91.0	91.5	92.0
-40	-40	-38	84.5	85.7	86.2	86.8	87.4	87.9	88.5	89.1	89.6	90.1
-50	-58	-48	82.7	83.8	84.3	85.0	85.5	86.0	86.6	87.2	87.7	88.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	TAT (°C)	
	- 50	+ 60
ENGINE BLEED TO PACKS OFF	1.0	1.2
PACKS HIGH	- 0.2	- 0.3
WING A/I ALL ENGINES	- 1.3	- 1.7
WING A/I 1 ENGINE INOP	- 2.1	- 2.6

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
70	155	159	177
65	149	154	171
60	143	147	164
55	137	141	156
50	130	134	149
45	124	127	141
40	116	119	132
35	109	111	123

For approach speed add wind factor of 1/2 headwind component + gust (max 20 knots).

Intentionally
Blank

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 15
Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	52000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 52000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	3110	470/-220	70	-110	390	40	-40	70	-70	230	70	210
MAX AUTO	4030	350/-290	90	-140	480	0	0	100	-100	380	0	50
AUTOBRAKE 3	5800	460/-480	160	-240	800	20	-40	160	-160	540	50	80
AUTOBRAKE 2	6870	620/-630	210	-310	1040	140	-160	190	-190	500	420	440
AUTOBRAKE 1	7410	720/-710	240	-360	1210	230	-250	210	-210	490	900	1490

Good Reported Braking Action

MAX MANUAL	4160	320/-310	110	-180	620	100	-80	100	-100	290	230	750
MAX AUTO	4480	340/-340	110	-190	640	80	-70	110	-110	340	260	840
AUTOBRAKE 3	5810	470/-480	160	-240	810	40	-50	160	-160	540	60	210
AUTOBRAKE 2	6870	620/-630	210	-310	1040	140	-160	190	-190	500	420	440
AUTOBRAKE 1	7410	720/-710	240	-360	1210	230	-250	210	-210	490	900	1490

Medium Reported Braking Action

MAX MANUAL	5600	490/-470	160	-280	1000	230	-180	150	-150	370	610	2370
MAX AUTO	5690	500/-490	170	-280	1010	200	-160	150	-150	430	620	2390
AUTOBRAKE 3	6230	530/-520	180	-300	1060	160	-130	170	-170	540	410	2150
AUTOBRAKE 2	7020	640/-640	210	-330	1170	220	-210	200	-200	500	510	1570
AUTOBRAKE 1	7440	730/-710	250	-360	1250	290	-260	210	-210	490	930	2080

Poor Reported Braking Action

MAX MANUAL	7120	680/-640	230	-400	1530	510	-350	190	-190	440	1230	6390
MAX AUTO	7120	680/-640	230	-400	1530	500	-330	190	-190	470	1210	6400
AUTOBRAKE 3	7240	690/-650	230	-410	1540	470	-310	200	-200	530	1220	6440
AUTOBRAKE 2	7650	730/-700	240	-420	1590	480	-340	210	-210	500	1090	5940
AUTOBRAKE 1	7910	770/-760	260	-440	1630	510	-390	220	-220	490	1260	5990

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrakes data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 330 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 30

Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	52000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 52000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2740	330/-160	60	-100	340	30	-30	60	-60	210	40	140
MAX AUTO	3510	260/-230	80	-130	430	0	0	80	-80	340	0	20
AUTOBRAKE 3	4950	380/-380	130	-220	730	20	-30	130	-130	510	40	50
AUTOBRAKE 2	5950	510/-520	170	-280	960	90	-130	160	-160	480	200	200
AUTOBRAKE 1	6450	600/-580	200	-330	1130	190	-210	180	-180	470	660	990

Good Reported Braking Action

MAX MANUAL	3750	270/-270	90	-170	590	90	-80	90	-90	290	180	630
MAX AUTO	4000	290/-290	100	-170	610	70	-60	90	-90	340	210	690
AUTOBRAKE 3	4960	380/-380	130	-220	740	30	-40	130	-130	510	50	190
AUTOBRAKE 2	5950	510/-520	170	-280	960	90	-130	160	-160	480	200	200
AUTOBRAKE 1	6450	600/-580	200	-330	1130	190	-210	180	-180	470	660	990

Medium Reported Braking Action

MAX MANUAL	5000	420/-400	140	-260	950	210	-170	130	-130	370	490	1980
MAX AUTO	5030	430/-410	140	-260	950	180	-140	130	-130	420	490	1970
AUTOBRAKE 3	5380	440/-430	150	-270	990	150	-120	140	-140	510	380	1910
AUTOBRAKE 2	6100	520/-530	180	-310	1090	170	-180	170	-170	480	290	1250
AUTOBRAKE 1	6480	600/-590	210	-330	1170	250	-220	180	-180	470	680	1540

Poor Reported Braking Action

MAX MANUAL	6330	580/-550	200	-380	1460	470	-320	160	-160	420	990	5350
MAX AUTO	6330	580/-550	200	-380	1460	470	-310	160	-160	450	990	5380
AUTOBRAKE 3	6370	590/-560	200	-380	1470	450	-300	170	-170	480	1020	5400
AUTOBRAKE 2	6710	610/-590	210	-400	1510	430	-310	180	-180	470	790	5030
AUTOBRAKE 1	6940	650/-640	220	-410	1550	470	-350	190	-190	470	980	4960

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrakes data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 300 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 40

Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	52000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 52000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	2650	290/-150	50	-100	330	30	-30	50	-50	200	40	130
MAX AUTO	3390	230/-220	70	-130	420	0	0	70	-70	330	0	10
AUTOBRAKE 3	4730	350/-360	120	-210	710	20	-40	120	-120	510	40	60
AUTOBRAKE 2	5640	470/-480	160	-270	930	100	-120	150	-150	500	210	210
AUTOBRAKE 1	6110	550/-540	190	-320	1100	180	-190	170	-170	490	570	940

Good Reported Braking Action

MAX MANUAL	3650	260/-250	90	-160	580	90	-80	80	-80	290	170	590
MAX AUTO	3880	280/-270	100	-170	600	70	-60	90	-90	340	190	640
AUTOBRAKE 3	4740	350/-360	120	-210	720	40	-40	120	-120	510	40	200
AUTOBRAKE 2	5640	470/-480	160	-270	930	100	-120	150	-150	500	210	210
AUTOBRAKE 1	6110	550/-540	190	-320	1100	180	-190	170	-170	490	570	940

Medium Reported Braking Action

MAX MANUAL	4820	390/-380	130	-260	930	200	-160	120	-120	380	450	1800
MAX AUTO	4860	400/-390	140	-260	940	180	-140	120	-120	440	440	1800
AUTOBRAKE 3	5160	410/-400	140	-270	970	150	-120	130	-130	510	350	1770
AUTOBRAKE 2	5790	480/-490	170	-300	1060	170	-170	160	-160	500	290	1180
AUTOBRAKE 1	6140	560/-540	190	-320	1140	230	-210	170	-170	490	600	1460

Poor Reported Braking Action

MAX MANUAL	6050	540/-510	180	-370	1430	450	-310	150	-160	440	880	4780
MAX AUTO	6050	540/-510	180	-370	1430	450	-290	160	-160	460	880	4800
AUTOBRAKE 3	6100	550/-520	190	-370	1440	440	-300	160	-160	480	910	4850
AUTOBRAKE 2	6390	570/-550	190	-390	1470	420	-290	170	-170	500	740	4500
AUTOBRAKE 1	6600	600/-590	210	-400	1510	450	-330	180	-180	490	870	4480

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrakes data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 260 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	4430	820/-390	150	-180	650	70	-60	410
ANTI SKID INOPERATIVE	VREF40	4150	280/-280	100	-180	630	90	-80	320
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	3360	220/-220	80	-120	410	60	-60	450
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	3470	250/-230	80	-130	420	70	-60	450
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	3650	440/-250	80	-130	420	60	- 60	370
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	3090	490/-220	70	-110	380	40	-40	230
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH-SYSTEM A & B)	VREF15	5470	610/-430	150	-220	730	40	-40	560
STABILIZER TRIM INOPERATIVE	VREF15	3090	490/-220	70	-110	380	40	-40	230
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	3090	490/-220	70	-110	380	40	-40	230
LEADING EDGE FLAPS TRANSIT	VREF15+5	3260	550/-220	80	-110	390	40	-40	240
ONE ENGINE INOPERATIVE	VREF15	3150	530/-230	70	-120	390	40	-40	240

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	2730	350/-160	60	-100	340	30	-30	210
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	3090	490/-220	70	-110	380	40	-40	230
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	3510	570/-270	100	-130	500	50	-40	310
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	2730	350/-160	60	-100	340	30	-30	210
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	3090	490/-220	70	-110	380	40	-40	230
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	3510	570/-270	100	-130	500	50	-40	310
TRAILING EDGE FLAPS UP (FLAPS <1)	VREF40+40	3830	660/-310	120	-150	560	50	-50	350

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	5400	350/-360	150	-200	680	110	-100	300
ANTI SKID INOPERATIVE	VREF40	5130	390/-380	140	-260	930	180	-150	380
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	4550	350/-340	120	-200	670	140	-130	520
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	4760	370/-360	130	-210	690	150	-130	540
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	5160	420/-410	140	-210	710	150	-130	490
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	4120	310/-310	110	-170	600	90	-80	280
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH-SYSTEM A & B)	VREF15	5540	450/-440	150	-220	750	110	-100	570
STABILIZER TRIM INOPERATIVE	VREF15	4120	310/-310	110	-170	600	90	-80	280
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	4120	310/-310	110	-170	600	90	-80	280
LEADING EDGE FLAPS TRANSIT	VREF15+5	4480	350/-340	120	-190	630	100	-90	320
ONE ENGINE INOPERATIVE	VREF15	4350	330/-330	110	-190	640	110	-100	320

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	3720	270/-260	90	-160	570	80	-70	290
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	4120	310/-310	110	-170	600	90	-80	280
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	4460	300/-300	120	-180	620	90	-80	280
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	3720	270/-260	90	-160	570	80	-70	290
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	4120	310/-310	110	-170	600	90	-80	280
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	4460	300/-300	120	-180	620	90	-80	280
TRAILING EDGE FLAPS UP (FLAPS <1)	VREF40+40	4800	320/-320	130	-190	640	100	-90	280

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	7320	560/-560	240	-310	1080	250	-220	400
ANTI-SKID INOPERATIVE	VREF40	6290	530/-510	190	-380	1400	380	-290	430
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	5770	490/-470	180	-290	1030	270	-230	540
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	6110	540/-510	190	-300	1060	290	-250	580
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	6780	630/-590	220	-320	1100	300	-260	570
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	5500	480/-460	170	-270	960	200	-180	360
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	7250	670/-630	230	-330	1150	280	-230	640
STABILIZER TRIM INOPERATIVE	VREF15	5500	480/-460	170	-270	960	200	-180	360
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	5500	480/-460	170	-270	960	200	-180	360
LEADING EDGE FLAPS TRANSIT	VREF15+5	6010	530/-510	190	-290	1010	230	-200	410
ONE ENGINE INOPERATIVE	VREF15	6110	530/-520	180	-310	1070	280	-230	430

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	4920	410/-390	140	-260	910	190	-160	360
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	5500	480/-460	170	-270	960	200	-180	360
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	6030	470/-460	190	-280	990	210	-180	370
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	4920	410/-390	140	-260	910	190	-160	360
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	5500	480/-460	170	-270	960	200	-180	360
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	6030	470/-460	190	-280	990	210	-180	370
TRAILING EDGE FLAPS UP (FLAPS <1)	VREF40+40	6480	500/-490	200	-290	1020	230	-200	370

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	9260	800/-770	330	-450	1620	520	-410	480
ANTI SKID INOPERATIVE	VREF40	8030	750/-710	260	-600	2430	1170	-620	470
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	7000	650/-610	230	-410	1510	500	-380	550
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	7450	720/-660	250	-430	1550	540	-410	600
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	8380	850/-780	290	-450	1620	570	-440	610
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	6930	660/-620	230	-390	1450	420	-330	420
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	8890	900/-820	310	-470	1680	640	-480	680
STABILIZER TRIM INOPERATIVE	VREF15	6930	660/-620	230	-390	1450	420	-330	420
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	6930	660/-620	230	-390	1450	420	-330	420
LEADING EDGE FLAPS TRANSIT	VREF15+5	7580	740/-690	260	-420	1520	470	-370	480
ONE ENGINE INOPERATIVE	VREF15	8160	780/-750	270	-470	1700	640	-480	520

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT)							
		REF DIST FOR 52000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 52000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	6180	570/-530	200	-370	1390	400	-300	410
TRAILING EDGE FLAP ASYMMET RY (15≤ FLAPS<30)	VREF15	6930	660/-620	230	-390	1450	420	-330	420
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	7650	670/-640	260	-410	1500	450	-350	440
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	6180	570/-530	200	-370	1390	400	-300	410
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	6930	660/-620	230	-390	1450	420	-330	420
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	7650	670/-640	260	-410	1500	450	-350	440
TRAILING EDGE FLAPS UP (FLAPS <1)	VREF40+40	8200	720/-680	280	-420	1540	470	-370	450

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*														
		60			80			100			120			140		
WEIGHT (1000 KG)	OAT (°C)	PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT		
		0	4	8	0	4	8	0	4	8	0	4	8	0	4	8
70	-20	6.6	7.4	8.3	11.1	12.5	14.1	16.5	18.7	21.4	22.9	26.0	29.7	30.0	34.1	38.9
	0	7.1	7.9	8.8	11.9	13.4	15.1	17.7	20.1	22.9	24.5	27.9	31.9	32.2	36.6	41.7
	15	7.4	8.3	9.3	12.5	14.1	15.9	18.7	21.2	24.2	25.9	29.4	33.6	33.9	38.5	43.9
	20	7.5	8.4	9.4	12.7	14.3	16.2	19.0	21.5	24.6	26.3	29.9	34.1	34.5	39.2	44.6
	40	7.9	8.8	9.8	13.3	15.0	17.0	20.0	22.7	25.9	27.8	31.6	36.1	36.4	41.4	47.1
65	-20	6.2	6.9	7.8	10.4	11.7	13.2	15.5	17.5	20.0	21.4	24.3	27.8	28.0	31.8	36.3
	0	6.7	7.4	8.3	11.1	12.5	14.1	16.6	18.8	21.4	22.9	26.0	29.7	30.0	34.1	39.0
	15	7.0	7.8	8.7	11.7	13.2	14.9	17.5	19.8	22.6	24.2	27.4	31.4	31.7	36.0	41.0
	20	7.1	7.9	8.8	11.9	13.4	15.2	17.8	20.1	23.0	24.6	27.9	31.9	32.2	36.6	41.7
	40	7.4	8.2	9.2	12.5	14.0	15.9	18.7	21.2	24.2	25.9	29.5	33.7	34.0	38.6	44.1
60	-20	5.8	6.5	7.2	9.7	10.9	12.3	14.4	16.3	18.6	19.9	22.6	25.8	26.0	29.6	33.8
	0	6.3	7.0	7.8	10.4	11.7	13.2	15.4	17.5	19.9	21.3	24.2	27.6	27.9	31.7	36.2
	15	6.6	7.3	8.1	10.9	12.3	13.9	16.3	18.4	21.0	22.5	25.5	29.1	29.4	33.4	38.1
	20	6.7	7.4	8.3	11.1	12.5	14.1	16.5	18.7	21.3	22.8	25.9	29.6	29.9	34.0	38.8
	40	6.9	7.7	8.6	11.6	13.1	14.8	17.4	19.7	22.5	24.1	27.4	31.3	31.6	35.9	41.0
55	-20	5.5	6.1	6.8	9.0	10.1	11.4	13.4	15.1	17.2	18.4	20.8	23.8	24.0	27.2	31.1
	0	5.9	6.5	7.2	9.7	10.8	12.2	14.3	16.2	18.4	19.7	22.3	25.5	25.7	29.2	33.4
	15	6.1	6.8	7.6	10.2	11.4	12.8	15.1	17.0	19.4	20.7	23.5	26.9	27.1	30.8	35.2
	20	6.2	6.9	7.7	10.3	11.6	13.0	15.3	17.3	19.7	21.1	23.9	27.3	27.6	31.3	35.8
	40	6.5	7.2	8.0	10.8	12.1	13.7	16.1	18.2	20.8	22.2	25.2	28.8	29.1	33.1	37.8
50	-20	5.1	5.6	6.3	8.3	9.3	10.5	12.3	13.9	15.7	16.8	19.1	21.8	21.9	24.9	28.5
	0	5.4	6.0	6.7	8.9	10.0	11.2	13.2	14.8	16.9	18.0	20.4	23.3	23.5	26.7	30.5
	15	5.7	6.3	7.0	9.4	10.5	11.8	13.8	15.6	17.8	19.0	21.5	24.6	24.8	28.1	32.2
	20	5.8	6.4	7.1	9.5	10.7	12.0	14.1	15.9	18.1	19.3	21.9	25.0	25.2	28.6	32.7
	40	6.0	6.7	7.4	10.0	11.2	12.6	14.8	16.7	19.0	20.3	23.1	26.4	26.6	30.2	34.5
45	-20	4.7	5.2	5.8	7.7	8.6	9.6	11.2	12.6	14.3	15.3	17.3	19.7	19.9	22.5	25.7
	0	5.0	5.6	6.2	8.2	9.2	10.3	12.0	13.5	15.3	16.4	18.5	21.1	21.3	24.1	27.6
	15	5.3	5.8	6.5	8.6	9.6	10.8	12.6	14.2	16.1	17.3	19.5	22.3	22.4	25.4	29.1
	20	5.3	5.9	6.6	8.7	9.8	11.0	12.8	14.5	16.4	17.5	19.9	22.7	22.8	25.9	29.6
	40	5.5	6.2	6.8	9.1	10.2	11.5	13.5	15.2	17.3	18.5	20.9	23.9	24.0	27.3	31.2
40	-20	4.3	4.8	5.3	7.0	7.8	8.7	10.1	11.4	12.9	13.7	15.5	17.7	17.7	20.1	23.0
	0	4.6	5.1	5.7	7.5	8.3	9.3	10.9	12.2	13.8	14.7	16.6	18.9	19.0	21.5	24.6
	15	4.9	5.4	5.9	7.8	8.8	9.8	11.4	12.8	14.5	15.5	17.5	20.0	20.0	22.7	26.0
	20	4.9	5.4	6.0	8.0	8.9	10.0	11.6	13.0	14.8	15.8	17.8	20.3	20.4	23.1	26.4
	40	5.1	5.6	6.3	8.3	9.3	10.4	12.1	13.7	15.5	16.6	18.8	21.4	21.5	24.4	27.9

***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.**

ADVISORY INFORMATION

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	15	20	25	30	35	40
RTO MAX MAN		10	15	20	25	30	35	40
LANDING	MAX MAN	8.6	13.3	18.1	22.8	27.5	32.3	37.0
	MAX AUTO	8.1	12.3	16.6	21.0	25.4	29.9	34.4
	AUTOBRAKE 3	8.0	11.6	15.3	19.2	23.1	27.1	31.2
	AUTOBRAKE 2	7.8	11.0	14.3	17.6	21.1	24.6	28.3
	AUTOBRAKE 1	7.5	10.4	13.4	16.3	19.4	22.5	25.6

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)						
EVENT		10	15	20	25	30	35	40
RTO MAX MAN		10	15	20	25	30	35	40
LANDING	MAX MAN	8.2	12.5	16.7	20.9	25.0	29.0	33.0
	MAX AUTO	6.0	9.4	12.8	16.4	20.1	23.8	27.7
	AUTOBRAKE 3	3.2	5.2	7.4	9.7	12.2	14.8	17.5
	AUTOBRAKE 2	1.4	2.5	3.8	5.2	6.8	8.5	10.3
	AUTOBRAKE 1	0.6	1.3	2.1	3.0	3.9	5.0	6.2

Cooling Time (Minutes) - Category A Brakes

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)							
	8 & BELOW	10	12	14	16	18	18.5 TO 23.7	23.8 & ABOVE
	BRAKE TEMPERATURE INDICATOR READING							
	UP TO 2.1	2.8	3.2	3.6	4.2	4.8	4.9 to 6.3	6.3 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		19	32	43	53	61		

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 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 Indicator (if installed) on First Officer's Instrument Panel may be used 10 to 15 minutes after brake application, to determine recommended cooling time.

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Cooling Time (Minutes) - Category B Brakes

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
	8 & BELOW	10	12	14	16	18	20	21.0 TO 28.7	28.8 & ABOVE
	BRAKE TEMPERATURE INDICATOR READING								
	UP TO 2.1	2.8	3.2	3.6	4.2	4.8	5.4	5.6 TO 7.6	7.6 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	2	3	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		19	32	43	53	61	67		

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 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 Indicator (if installed) on First Officer’s Instrument Panel may be used 10 to 15 minutes after brake application, to determine recommended cooling time.

Performance Inflight - QRH — Chapter PI-QRH
Engine Inoperative — Section 22

ENGINE INOP

Initial Max Continuous %N1
Based on .74M, engine bleed to packs auto and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)					
	27	29	31	33	35	37
20	96.6	96.6	96.6	96.6	96.6	96.6
15	97.3	97.3	97.3	97.3	97.3	97.3
10	98.1	98.1	98.1	98.1	98.1	98.1
5	98.9	98.9	98.9	98.9	98.9	98.9
0	99.8	99.8	99.8	99.8	99.8	99.8
-5	99.5	100.7	100.7	100.7	100.7	100.7
-10	98.5	100.1	101.6	101.6	101.6	101.6
-15	97.6	99.2	100.8	102.5	102.5	102.5
-20	96.7	98.2	99.8	101.5	102.1	102.1
-25	95.7	97.2	98.8	100.4	101.0	101.1
-30	94.7	96.3	97.8	99.4	100.0	100.0
-40	92.8	94.3	95.8	97.4	97.9	98.0
-50	90.7	92.2	93.7	95.3	95.8	95.8

%N1 Adjustment for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	27	29	31	33	35	37
ENGINE ANTI-ICE ON	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1
ENGINE AND WING ANTI-ICE ON	-3.4	-3.5	-3.5	-3.7	-3.7	-3.8

ENGINE INOP

Max Continuous %N1

33000 FT to 23000 FT Pressure Altitudes

Based on engine bleed to packs auto and anti-ice off

33000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.58	95.2	97.3	99.4	101.1	100.0	98.9	98.2				
220	.63	95.1	97.3	99.3	101.3	100.7	99.3	98.5	97.9	97.2		
240	.68	95.1	97.2	99.2	101.2	101.4	99.6	98.8	98.0			
260	.74	94.5	96.6	98.7	100.7	101.6	99.8	98.9	98.1	97.3		
31000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.55	94.7	96.8	98.9	100.8	99.8	98.7	98.1				
220	.61	94.6	96.7	98.7	100.7	100.3	99.1	98.4	97.8	97.1		
240	.66	94.4	96.5	98.5	100.5	101.0	99.4	98.7	97.9	97.2		
260	.71	94.1	96.2	98.2	100.2	101.6	99.8	98.9	98.1	97.3		
29000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.53	94.0	96.1	98.1	100.1	99.6	98.5	97.9	97.3			
220	.58	93.8	95.9	97.9	99.9	100.1	98.9	98.3	97.6	97.0		
240	.63	93.6	95.6	97.7	99.6	100.7	99.3	98.6	97.9	97.2		
260	.68	93.3	95.3	97.4	99.3	101.3	99.6	98.8	98.0	97.3	96.6	
27000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.51	93.1	95.2	97.2	99.2	99.4	98.3	97.8	97.2			
220	.56	92.9	94.9	96.9	98.9	99.8	98.7	98.1	97.5	96.9	96.3	
240	.60	92.6	94.6	96.7	98.6	100.3	99.1	98.4	97.8	97.2	96.6	
260	.65	92.1	94.2	96.2	98.1	100.1	99.4	98.7	97.9	97.2	96.6	
25000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.49	92.3	94.3	96.3	98.3	99.3	98.2	97.6	97.1	96.5		
220	.53	92.0	94.0	96.0	97.9	99.6	98.5	98.0	97.4	96.8	96.2	
240	.58	91.7	93.7	95.7	97.6	99.6	98.9	98.3	97.7	97.0	96.5	
260	.63	91.2	93.2	95.2	97.1	99.0	99.3	98.6	97.9	97.2	96.6	96.0
23000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.47	91.3	93.4	95.3	97.3	99.2	98.1	97.6	97.0	96.4	95.8	
220	.51	90.9	93.0	94.9	96.9	98.8	98.4	97.8	97.2	96.7	96.1	
240	.56	90.6	92.6	94.6	96.5	98.4	98.7	98.1	97.5	96.9	96.3	95.8
260	.60	90.3	92.3	94.3	96.2	98.1	99.1	98.4	97.8	97.2	96.6	96.0

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	23	25	27	29	31	33
ENGINE ANTI-ICE ON	-1.1	-1.1	-1.1	-1.1	-1.1	-1.2
ENGINE AND WING ANTI-ICE ON	-3.3	-3.4	-3.4	-3.5	-3.5	-3.7

ENGINE INOP

Max Continuous %N1

21000 FT to 14000 FT Pressure Altitudes

Based on engine bleed to packs auto and anti-ice off

21000 FT PRESS ALT		TAT (°C)									
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.45	90.4	92.4	94.4	96.3	98.2	98.1	97.5	96.9	96.3	95.7		
220	.49	90.0	92.0	93.9	95.8	97.7	98.3	97.7	97.1	96.5	96.0	95.4	94.9
240	.54	89.6	91.6	93.6	95.5	97.3	98.6	98.0	97.4	96.8	96.2	95.7	
260	.60	89.3	91.3	93.2	95.1	97.0	98.8	98.3	97.7	97.1	96.5	95.9	95.4
20000 FT PRESS ALT.		**TAT (°C)**									
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.44	89.9	91.9	93.9	95.8	97.7	98.0	97.5	96.8	96.2	95.6	95.1	
220	.48	89.5	91.5	93.4	95.3	97.2	98.2	97.7	97.1	96.5	95.9	95.4	94.9
240	.53	89.1	91.1	93.0	94.9	96.8	98.5	97.9	97.3	96.8	96.2	95.6	95.1
260	.57	88.8	90.8	92.7	94.6	96.4	98.2	98.2	97.6	97.0	96.4	95.9	95.4
18000 FT PRESS ALT.		**TAT (°C)**									
KIAS	M	-40	-30	-20	-10	0	5	10	15	20	25	30	35
200	.42	90.9	92.8	94.7	96.6	98.0	97.4	96.8	96.1	95.5	95.0		
220	.46	90.5	92.4	94.3	96.2	98.0	97.6	97.0	96.4	95.8	95.3	94.8	
240	.51	90.1	92.0	93.9	95.8	97.6	97.8	97.2	96.7	96.1	95.5	95.0	
260	.55	89.8	91.7	93.5	95.4	97.2	98.0	97.5	96.9	96.3	95.8	95.3	94.9
17000 FT PRESS ALT.		**TAT (°C)**									
KIAS	M	-40	-30	-20	-10	0	5	10	15	20	25	30	35
200	.42	90.4	92.3	94.2	96.0	97.8	97.4	96.7	96.1	95.5	94.9	94.4	
220	.46	90.0	91.9	93.8	95.6	97.4	97.6	97.0	96.4	95.8	95.2	94.7	
240	.50	89.6	91.5	93.4	95.2	97.0	97.8	97.2	96.6	96.0	95.5	95.0	94.6
260	.54	89.3	91.2	93.0	94.8	96.6	97.5	97.4	96.9	96.3	95.7	95.2	94.8
16000 FT PRESS ALT.		**TAT (°C)**									
KIAS	M	-40	-30	-20	-10	0	5	10	15	20	25	30	35
200	.41	89.9	91.8	93.6	95.5	97.3	97.3	96.7	96.1	95.5	94.9	94.4	
220	.45	89.5	91.4	93.3	95.1	96.9	97.5	96.9	96.3	95.7	95.2	94.7	
240	.49	89.1	91.0	92.9	94.7	96.5	97.4	97.1	96.6	96.0	95.4	94.9	94.5
260	.53	88.8	90.7	92.5	94.3	96.1	97.0	97.4	96.8	96.2	95.7	95.2	94.8
14000 FT PRESS ALT.		**TAT (°C)**									
KIAS	M	-30	-20	-10	0	5	10	15	20	25	30	35	40
200	.39	90.7	92.6	94.4	96.2	97.0	96.7	96.0	95.4	94.8	94.3	93.9	
220	.43	90.4	92.2	94.0	95.8	96.7	96.8	96.2	95.6	95.1	94.6	94.1	
240	.47	90.1	91.9	93.7	95.4	96.3	97.1	96.5	95.9	95.3	94.8	94.4	
260	.51	89.7	91.5	93.3	95.1	96.0	96.8	96.7	96.1	95.6	95.1	94.7	94.3

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	14	16	17	18	20	21
ENGINE ANTI-ICE ON	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
ENGINE AND WING ANTI-ICE ON	-2.9	-3.0	-3.0	-3.1	-3.1	-3.2

ENGINE INOP

Max Continuous %N1

12000 FT to 1000 FT Pressure Altitudes

Based on engine bleed to packs auto and anti-ice off

12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-10	0	5	10	15	20	25	30	35	40	45
200	.38	91.5	93.3	95.0	95.9	96.6	96.0	95.4	94.8	94.3	93.9		
220	.41	91.2	93.0	94.7	95.6	96.4	96.1	95.5	95.0	94.5	94.0	93.8	
240	.45	90.9	92.7	94.4	95.3	96.1	96.4	95.8	95.2	94.7	94.3	94.0	
260	.49	90.6	92.4	94.1	95.0	95.8	96.6	96.0	95.5	95.0	94.6	94.2	94.0
10000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-20	-10	0	5	10	15	20	25	30	35	40	45
200	.36	90.4	92.2	93.9	94.8	95.6	96.0	95.3	94.8	94.3	93.8	93.6	
220	.40	90.1	91.9	93.6	94.5	95.3	96.1	95.5	94.9	94.4	93.9	93.7	
240	.43	89.9	91.6	93.3	94.2	95.0	95.9	95.7	95.1	94.6	94.2	93.9	93.7
260	.47	89.6	91.3	93.1	93.9	94.8	95.6	95.9	95.4	94.9	94.5	94.1	93.9
7000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.34	90.7	92.4	93.2	94.1	94.9	95.3	94.7	94.2	93.8	93.5	93.3	93.3
220	.38	90.4	92.1	93.0	93.8	94.6	95.4	94.8	94.3	93.9	93.6	93.5	93.4
240	.41	90.2	91.9	92.7	93.6	94.4	95.2	95.0	94.5	94.0	93.8	93.6	93.5
260	.45	90.0	91.7	92.5	93.4	94.2	95.0	95.2	94.7	94.3	94.0	93.8	93.7
5000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.33	89.7	91.4	92.2	93.0	93.8	94.6	94.7	94.2	93.8	93.5	93.3	93.3
220	.36	89.4	91.1	92.0	92.8	93.6	94.4	94.8	94.3	93.9	93.6	93.4	93.4
240	.40	89.2	90.9	91.7	92.5	93.4	94.2	94.9	94.4	94.0	93.7	93.5	93.5
260	.43	89.0	90.7	91.5	92.4	93.2	94.0	94.8	94.6	94.2	93.9	93.7	93.7
3000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.32	88.8	90.5	91.3	92.1	93.0	93.8	94.6	94.2	93.8	83.5	93.3	93.2
220	.35	88.6	90.3	91.1	91.9	92.7	93.5	94.3	94.3	93.9	93.6	93.4	93.3
240	.40	88.4	90.1	90.9	91.7	92.5	93.3	94.1	94.4	93.9	93.7	93.5	93.4
260	.43	88.3	89.9	90.7	91.5	92.3	93.1	93.9	94.5	94.1	93.8	93.6	93.6
1000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.31	88.0	89.6	90.4	91.3	92.1	92.9	93.6	94.1	93.8	93.5	93.3	93.2
220	.34	87.8	89.4	90.3	91.1	91.9	92.7	93.4	94.2	93.8	93.6	93.4	93.3
240	.37	87.6	89.3	90.1	90.9	91.7	92.5	93.3	94.0	93.9	93.6	93.5	93.4
260	.40	87.4	89.1	89.9	90.7	91.5	92.3	93.1	93.8	94.0	93.7	93.6	93.5

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	1	3	5	7	10	12
ENGINE ANTI-ICE ON	-0.7	-0.7	-0.7	-0.8	-0.9	-0.9
ENGINE AND WING ANTI-ICE ON	-2.2	-2.3	-2.4	-2.5	-2.7	-2.8

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
68	65	242	15900	14500	13000
64	61	235	17900	16700	15300
60	57	228	19900	18900	17600
56	53	220	22000	21100	19900
52	50	213	24100	23300	22300
48	46	205	26300	25600	24700
44	42	196	28500	27900	27200
40	38	187	30700	30300	29700

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
140	130	121	113	106	100	95	90	85	81	78
286	263	244	227	213	200	189	179	169	161	154
430	395	366	341	319	300	283	268	254	242	230
571	526	488	454	426	400	377	357	339	323	308
711	656	608	567	532	500	472	447	424	404	386
850	784	728	680	637	600	567	537	510	486	464
987	912	848	792	743	700	662	627	596	568	542
1124	1040	967	904	849	800	756	717	682	650	621
1260	1166	1086	1016	955	900	851	808	768	733	700
1395	1293	1205	1128	1060	1000	946	898	855	815	779
1531	1420	1324	1240	1166	1100	1041	989	941	898	858
1667	1547	1442	1351	1271	1200	1136	1079	1027	980	937
1803	1674	1562	1463	1377	1300	1231	1169	1114	1063	1016
1940	1801	1681	1576	1483	1400	1326	1260	1200	1145	1095
2079	1930	1801	1688	1588	1500	1421	1350	1285	1227	1173
2218	2059	1921	1801	1694	1600	1516	1440	1371	1308	1251

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)								TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)								
	35	40	45	50	55	60	65	70	
100	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0:17
200	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	0:36
300	1.3	1.4	1.6	1.8	1.9	2.1	2.2	2.4	0:54
400	1.7	1.9	2.2	2.4	2.7	2.9	3.1	3.3	1:12
500	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	1:29
600	2.6	2.9	3.2	3.6	3.9	4.3	4.6	5.0	1:46
700	3.0	3.3	3.7	4.2	4.6	5.0	5.4	5.8	2:02
800	3.4	3.8	4.2	4.7	5.2	5.7	6.1	6.6	2:18
900	3.8	4.3	4.8	5.3	5.8	6.3	6.9	7.4	2:34
1000	4.2	4.7	5.3	5.9	6.4	7.0	7.6	8.2	2:50
1100	4.6	5.2	5.8	6.4	7.1	7.7	8.3	9.0	3:06
1200	5.0	5.6	6.3	7.0	7.7	8.3	9.0	9.8	3:22
1300	5.4	6.0	6.7	7.5	8.3	9.0	9.8	10.6	3:38
1400	5.8	6.5	7.2	8.0	8.9	9.6	10.5	11.4	3:54
1500	6.1	6.9	7.7	8.6	9.4	10.3	11.2	12.1	4:10
1600	6.5	7.3	8.2	9.1	10.0	10.9	11.9	12.9	4:27

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at Long Range Cruise speed.

ENGINE INOP

MAX CONTINUOUS THRUST

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
68	9000	6800	4700
66	10400	8100	6000
64	11900	9500	7300
62	13300	11000	8700
60	14800	12500	10100
58	16300	13900	11600
56	17800	15500	13100
54	19200	17000	14600
52	20600	18600	16300
50	21900	20100	17900
48	23300	21600	19500
46	24700	23100	21200
44	26100	24700	22900
42	27400	26200	24700
40	28800	27700	26300
38	30200	29300	27900

With engine anti-ice on, decrease altitude capability by 1400ft.
With engine and wing anti-ice on, decrease altitude capability by 4800ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		9	11	13	15	17	19	21	23	25
66	%N1	91.2	92.5	93.9						
	MACH	.559	.575	.591						
	KIAS	316	314	310						
	FF/ENG	3123	3104	3082						
62	%N1	89.7	91.0	92.3	93.8					
	MACH	.545	.563	.578	.594					
	KIAS	308	306	304	300					
	FF/ENG	2940	2926	2905	2880					
58	%N1	88.0	89.4	90.8	92.1	93.6				
	MACH	.530	.548	.565	.581	.597				
	KIAS	299	298	297	294	290				
	FF/ENG	2753	2744	2728	2703	2667				
54	%N1	86.3	87.7	89.1	90.4	91.8	93.4	95.4		
	MACH	.513	.531	.550	.567	.583	.599	.615		
	KIAS	290	289	288	286	284	280	277		
	FF/ENG	2565	2556	2546	2528	2492	2463	2461		
50	%N1	84.4	85.8	87.2	88.6	89.9	91.4	93.0	95.1	
	MACH	.495	.513	.532	.550	.568	.584	.600	.617	
	KIAS	279	279	279	278	276	273	270	267	
	FF/ENG	2376	2367	2359	2348	2321	2290	2273	2273	
46	%N1	82.3	83.7	85.1	86.6	88.0	89.4	90.8	92.4	94.7
	MACH	.476	.494	.512	.531	.550	.568	.584	.601	.617
	KIAS	268	268	268	268	267	265	262	259	256
	FF/ENG	2187	2178	2170	2163	2144	2122	2100	2086	2084
42	%N1	80.0	81.5	82.9	84.4	85.8	87.2	88.6	90.1	91.7
	MACH	.456	.473	.491	.510	.529	.548	.566	.583	.600
	KIAS	257	257	257	257	256	256	254	251	248
	FF/ENG	2000	1991	1982	1974	1963	1948	1934	1914	1898
38	%N1	77.6	79.0	80.5	81.9	83.4	84.8	86.3	87.7	89.1
	MACH	.437	.452	.469	.487	.505	.525	.544	.563	.580
	KIAS	246	245	245	245	245	244	244	242	240
	FF/ENG	1825	1807	1796	1788	1780	1769	1760	1749	1728

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
286	264	244	227	213	200	190	181	173	166	159
579	533	492	457	427	400	380	362	346	331	318
874	803	740	686	641	600	571	544	519	497	477
1171	1074	989	917	855	800	761	725	692	662	635
1470	1347	1238	1147	1069	1000	951	906	864	827	793
1771	1621	1489	1379	1284	1200	1141	1086	1037	992	951
2075	1898	1742	1611	1500	1400	1331	1267	1209	1156	1109
2382	2176	1995	1844	1715	1600	1521	1448	1381	1321	1267
2691	2456	2250	2077	1931	1800	1711	1628	1553	1485	1424

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		16		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	1.5	0:40	1.2	0:38	1.1	0:37	1.0	0:37	0.9	0:36
400	3.0	1:18	2.6	1:13	2.4	1:11	2.2	1:09	2.1	1:07
600	4.5	1:57	3.9	1:49	3.6	1:44	3.4	1:41	3.3	1:39
800	5.9	2:36	5.3	2:24	4.9	2:18	4.6	2:13	4.5	2:10
1000	7.4	3:16	6.6	3:00	6.1	2:53	5.7	2:46	5.6	2:42
1200	8.8	3:56	7.9	3:37	7.3	3:27	6.9	3:19	6.7	3:14
1400	10.2	4:37	9.1	4:14	8.5	4:02	8.0	3:53	7.8	3:46
1600	11.6	5:19	10.4	4:52	9.6	4:37	9.1	4:26	8.8	4:18
1800	13.0	6:02	11.6	5:30	10.8	5:13	10.2	5:00	9.8	4:51

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	35	45	50	55	65
5	-0.7	-0.2	0.0	0.4	1.3
10	-1.4	-0.5	0.0	0.9	2.6
15	-2.1	-0.7	0.0	1.3	3.9

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
66	%N1	5000	83.8	87.7	92.3			
	KIAS	251	251	251	253			
	FF/ENG	2720	2710	2710	2760			
64	%N1	80.2	83.0	86.8	91.3			
	KIAS	247	247	247	249			
	FF/ENG	2630	2630	2620	2660			
62	%N1	79.3	82.1	85.9	90.3			
	KIAS	242	243	243	245			
	FF/ENG	2550	2540	2530	2560			
60	%N1	78.3	81.2	85.1	89.3	94.7		
	KIAS	238	239	239	241	242		
	FF/ENG	2460	2450	2450	2470	2520		
58	%N1	77.4	80.3	84.1	88.3	93.4		
	KIAS	234	235	236	236	238		
	FF/ENG	2380	2370	2360	2380	2420		
56	%N1	76.4	79.3	83.2	87.2	92.2		
	KIAS	230	231	232	232	234		
	FF/ENG	2290	2290	2280	2280	2320		
54	%N1	75.3	78.2	82.2	86.2	91.0		
	KIAS	225	227	228	228	230		
	FF/ENG	2210	2200	2190	2190	2220		
52	%N1	74.3	77.1	81.2	85.1	89.8	96.5	
	KIAS	221	222	224	223	225	225	
	FF/ENG	2130	2120	2110	2110	2120	2220	
50	%N1	73.2	76.0	80.2	84.1	88.5	94.5	
	KIAS	216	218	219	219	221	221	
	FF/ENG	2050	2030	2030	2020	2030	2100	
48	%N1	72.1	74.9	79.1	83.0	87.3	92.8	
	KIAS	211	213	215	215	216	217	
	FF/ENG	1970	1950	1940	1930	1940	1990	
46	%N1	71.1	73.8	77.9	81.9	86.0	91.2	
	KIAS	210	210	210	211	211	213	
	FF/ENG	1900	1880	1860	1850	1850	1880	
44	%N1	70.1	72.9	76.9	80.9	84.9	89.8	
	KIAS	210	210	210	210	210	210	
	FF/ENG	1840	1820	1800	1780	1780	1790	
42	%N1	69.1	72.0	75.9	80.0	83.9	88.5	95.8
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1780	1760	1740	1720	1710	1720	1810
40	%N1	68.2	71.1	75.0	79.1	83.0	87.3	93.4
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1730	1700	1680	1660	1650	1650	1710
38	%N1	67.3	70.2	74.1	78.2	82.1	86.2	91.7
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1670	1650	1630	1610	1600	1590	1620

This table includes 5% additional fuel for holding in a racetrack pattern.

GEAR DOWN

220 KIAS 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
66	21500	20200	18900
64	22200	21000	19700
62	23700	22600	21400
60	24500	23400	22200
58	25300	24200	23000
56	26000	25000	23800
54	26700	25700	24500
52	27400	26400	25200
50	28000	27000	25900
48	28600	27600	26600
46	29200	28200	27200
44	29700	28800	27800
42	30200	29300	28300
40	30700	29800	28800
38	31100	30300	29300

Based on 230 KIAS for weights above 62823 kg.

GEAR DOWN

220 KIAS Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		11	13	15	17	19	21	23	25	27	29	31
66	%N1	81.3	82.9	84.6	86.3	88.1	90.2					
	MACH	.424	.441	.458	.476	.495	.515					
	KIAS	230	230	230	230	230	230					
	FF/ENG	1948	1949	1951	1957	1966	1981					
62	%N1	79.3	80.9	82.6	84.2	86.0	87.9	90.1				
	MACH	.406	.422	.438	.456	.474	.493	.513				
	KIAS	220	220	220	220	220	220	220				
	FF/ENG	1800	1799	1801	1804	1809	1818	1835				
58	%N1	78.2	79.8	81.4	83.0	84.7	86.5	88.5	90.8			
	MACH	.406	.422	.438	.456	.474	.493	.513	.534			
	KIAS	220	220	220	220	220	220	220	220			
	FF/ENG	1729	1726	1725	1725	1727	1731	1744	1767			
54	%N1	77.1	78.8	80.4	82.0	83.6	85.3	87.1	89.2	91.7		
	MACH	.406	.422	.438	.456	.474	.493	.513	.534	.557		
	KIAS	220	220	220	220	220	220	220	220	220		
	FF/ENG	1665	1660	1657	1656	1655	1657	1664	1679	1705		
50	%N1	76.1	77.8	79.4	81.0	82.6	84.2	86.0	87.9	90.1		
	MACH	.406	.422	.438	.456	.474	.493	.513	.534	.557		
	KIAS	220	220	220	220	220	220	220	220	220		
	FF/ENG	1608	1602	1598	1595	1593	1592	1597	1608	1621		
46	%N1	75.2	76.9	78.5	80.1	81.7	83.3	85.0	86.8	88.8	91.3	
	MACH	.406	.422	.438	.456	.474	.493	.513	.534	.557	.580	
	KIAS	220	220	220	220	220	220	220	220	220	220	
	FF/ENG	1558	1551	1545	1542	1540	1537	1541	1548	1555	1579	
42	%N1	74.3	76.0	77.7	79.3	80.8	82.4	84.1	85.9	87.8	90.0	93.1
	MACH	.406	.422	.438	.456	.474	.493	.513	.534	.557	.580	.605
	KIAS	220	220	220	220	220	220	220	220	220	220	220
	FF/ENG	1513	1505	1499	1495	1492	1489	1490	1496	1500	1516	1559
38	%N1	73.6	75.3	76.9	78.6	80.1	81.7	83.3	85.1	86.9	88.9	91.7
	MACH	.406	.422	.438	.456	.474	.493	.513	.534	.557	.580	.605
	KIAS	220	220	220	220	220	220	220	220	220	220	220
	FF/ENG	1475	1466	1460	1455	1451	1448	1448	1453	1455	1464	1496

Based on 230 KIAS for weights above 62823 kg.

GEAR DOWN

220 KIAS Enroute Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
321	288	259	236	217	200	189	180	171	163	156
650	580	520	473	434	400	378	358	340	324	310
980	874	783	711	652	600	567	537	510	486	465
1309	1167	1045	949	869	800	756	717	680	648	619
1639	1461	1308	1186	1087	1000	945	895	850	809	773
1968	1754	1571	1424	1305	1200	1134	1074	1020	971	928
2298	2048	1833	1662	1522	1400	1323	1253	1189	1132	1082
2627	2341	2096	1900	1740	1600	1512	1432	1360	1294	1236
2956	2635	2358	2138	1958	1800	1701	1611	1529	1456	1391

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	0:46	1.9	0:43	1.7	0:41	1.6	0:40
400	4.8	1:36	4.5	1:31	4.0	1:24	3.7	1:19	3.5	1:15
600	7.3	2:23	6.7	2:15	6.0	2:04	5.7	1:57	5.4	1:51
800	9.6	3:10	9.0	3:00	8.1	2:44	7.6	2:35	7.2	2:26
1000	12.0	3:57	11.2	3:44	10.1	3:25	9.5	3:13	9.0	3:02
1200	14.3	4:45	13.3	4:28	12.1	4:05	11.3	3:51	10.7	3:37
1400	16.6	5:32	15.5	5:13	14.0	4:46	13.2	4:29	12.5	4:12
1600	18.9	6:19	17.6	5:57	15.9	5:26	15.0	5:07	14.2	4:48
1800	21.1	7:06	19.7	6:41	17.8	6:06	16.8	5:44	15.9	5:23

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)			
	40	50	60	70
5	-0.3	0.0	0.7	1.7
10	-0.6	0.0	1.2	3.1
15	-0.8	0.0	1.6	4.0
20	-1.0	0.0	1.8	4.5
25	-1.1	0.0	1.9	4.6

Based on 220 KIAS cruise and descent.

Descent at 220 KIAS

PRESSURE ALT (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33
DISTANCE (NM)	17	26	35	38	42	46	49	53	56	60	64	67
TIME (MINUTES)	6	8	10	11	11	12	13	14	14	15	15	16

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
66	%N1	73.7	76.4	80.5	84.6	89.1		
	KIAS	230	230	230	230	230		
	FF/ENG	2070	2060	2050	2050	2070		
62	%N1	71.7	74.3	78.4	82.6	86.9		
	KIAS	220	220	220	220	220		
	FF/ENG	1930	1910	1890	1890	1900		
58	%N1	70.6	73.3	77.3	81.4	85.6	90.8	
	KIAS	220	220	220	220	220	220	
	FF/ENG	1860	1840	1820	1810	1820	1860	
54	%N1	69.6	72.3	76.2	80.4	84.4	89.2	
	KIAS	220	220	220	220	220	220	
	FF/ENG	1800	1770	1750	1740	1740	1760	
50	%N1	67.1	70.0	73.9	78.0	82.1	86.5	92.8
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1660	1630	1610	1590	1590	1590	1660
46	%N1	66.1	68.9	72.8	77.0	81.0	85.2	90.7
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1600	1570	1550	1530	1520	1520	1560
42	%N1	65.1	67.9	71.9	75.9	80.0	84.1	89.2
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1550	1520	1500	1480	1470	1460	1490
38	%N1	64.2	67.0	71.1	75.0	79.1	83.2	87.9
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1510	1480	1460	1430	1420	1410	1430

This table includes 5% additional fuel for holding in a racetrack pattern.

Introduction

This chapter 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 chapter 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 250 KIAS/280 KIAS/.74M climb speed schedule, normal engine bleed for packs on (Auto) and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. Apply the appropriate bleed setting %N1 adjustment shown below the table. %N1 adjustments are shown for engine bleed to packs off operation, packs high operation, and wing anti-ice on.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (Auto) and anti-ice off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. Apply the appropriate bleed setting %N1 adjustment shown below the table. %N1 adjustments are shown for engine bleed to packs off operation, packs high operation, and wing anti-ice on.

VREF

The Reference Speed table contains flaps 40, 30, and 15 landing speeds for a given weight. Apply wind correction shown as required.

Advisory Information

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, enter the appropriate table for selected landing flaps and determine the reference landing distance for the selected braking configuration. Then read across the table to adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers, using the values provided, to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. 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.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with “poor” braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be easily determined when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

Non-Normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect landing performance of the airplane. Landing distances are shown for dry runway and good, medium, and poor reported braking action. Each non-normal configuration is listed with its recommended approach speed. Landing distance can be determined for the reference landing weight and then adjusted for actual weight and pressure altitude.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding problems associated with hot brakes. For normal operation, most landings are at weights below the quick turnaround limit weight. Application of the recommended cooling procedures shown will avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

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 .74M 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 correct 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. To conservatively account for APU fuel burn, add 90 kg/hr to fuel flow values.

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 .74M/250 KIAS 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 corrections 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

Single engine holding data is provided in the same format as the all engine holding data and is based on the same assumptions.

Gear Down

This section contains performance for airplane operation with the landing gear extended for all phases of flight. 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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Performance Inflight - QRH Chapter PI-QRH

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737-500 CFM56-3_20K KG FAA

Performance Inflight - QRH
General

Flight With Unreliable Airspeed / Turbulent Air Penetration

Altitude and/or vertical speed indications may also be unreliable.

Climb

Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG) 32	34	44	54	64
35000 (.73M)	**PITCH ATT**	**6.0**	**6.0**	**5.5**	**5.0**	
	V/S (FT/MIN)	2700	2500	1500	800	
30000 (.73M)	**PITCH ATT**	**6.0**	**6.0**	**5.5**	**5.0**	**5.0**
	V/S (FT/MIN)	3400	3100	2100	1400	800
25000 (280 KIAS)	**PITCH ATT**	**6.5**	**6.0**	**5.5**	**5.5**	**5.5**
	V/S (FT/MIN)	3200	3000	2100	1500	1100
20000 (280 KIAS)	**PITCH ATT**	**8.0**	**7.5**	**7.0**	**6.5**	**6.5**
	V/S (FT/MIN)	4000	3800	2700	2000	1500
15000 (280 KIAS)	**PITCH ATT**	**9.5**	**9.5**	**8.0**	**7.5**	**7.5**
	V/S (FT/MIN)	4800	4500	3400	2500	1900
10000 (280 KIAS)	**PITCH ATT**	**11.5**	**11.0**	**9.5**	**9.0**	**8.5**
	V/S (FT/MIN)	5600	5200	3900	3000	2400
5000 (280 KIAS)	**PITCH ATT**	**13.5**	**13.0**	**11.0**	**10.0**	**9.5**
	V/S (FT/MIN)	6300	5900	4400	3500	2800
SEA LEVEL (280 KIAS)	**PITCH ATT**	**16.0**	**15.5**	**12.5**	**11.5**	**10.5**
	V/S (FT/MIN)	7100	6600	5000	3900	3100

Cruise

Flaps Up, Adjust %N1 for Level Flight

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG) 34	38	42	46	50	54
30000 (.73M)	**PITCH ATT**	**2.0**	**2.0**	**2.5**	**2.5**	**3.0**	**3.0**
	%N1	79	79	80	81	82	83
10000 (280 KIAS)	**PITCH ATT**	**2.0**	**2.0**	**2.5**	**3.0**	**3.0**	**3.5**
	%N1	65	66	66	67	68	68

Descent

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT) (SPEED)		WEIGHT (1000 KG) 34	38	42	46	50	54
30000 (.73M)	**PITCH ATT**	**-3.5**	**-3**	**-2.5**	**-2**	**-1.5**	**-1**
	V/S (FT/MIN)	-4100	-3800	-3600	-3400	-3300	-3200
20000 (280 KIAS)	**PITCH ATT**	**-2.5**	**-1.5**	**-1**	**-0.5**	**0**	**0.5**
	V/S (FT/MIN)	-2800	-2600	-2400	-2300	-2200	-2100
10000 (280 KIAS)	**PITCH ATT**	**-2.5**	**-2**	**-1.5**	**-0.5**	**0**	**0.5**
	V/S (FT/MIN)	-2500	-2300	-2100	-2000	-1900	-1900

Holding

Flaps Up, Adjust %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 34	38	42	46	50	54
10000	**PITCH ATT**	**4.0**	**5.0**	**5.5**	**6.0**	**5.5**	**5.5**
	%N1	56	57	59	61	63	65
	KIAS	210	210	210	215	225	230

Flight With Unreliable Airspeed / Turbulent Air Penetration

Altitude and/or vertical speed indications may also be unreliable.

Terminal Area

Adjust %N1 for Level Flight

FLAP POSITION (SPEED)		WEIGHT (1000 KG)				
		32	36	44	52	60
FLAPS UP (GEAR UP)	**PITCH ATT**	**3.5**	**4.5**	**5.5**	**7.0**	**7.0**
	%N1	53	54	57	61	65
	KIAS	210	210	210	210	220
FLAPS 1 (GEAR UP)	**PITCH ATT**	**4.0**	**4.5**	**6.0**	**7.5**	**8.0**
	%N1	55	57	60	63	67
	KIAS	190	190	190	190	200
FLAPS 5 (GEAR UP)	**PITCH ATT**	**3.5**	**4.0**	**5.5**	**7.0**	**7.5**
	%N1	56	57	60	64	68
	KIAS	180	180	180	180	190
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**4.0**	**5.0**	**6.5**	**8.5**	**9.0**
	%N1	60	62	67	71	76
	KIAS	150	150	150	150	160

Final Approach

Gear Down, Adjust %N1 for 3° Glideslope

FLAP POSITION		WEIGHT (1000 KG)				
		32	36	44	52	60
FLAPS 15 (VREF15+10)	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**	**5.5**
	%N1	41	43	47	51	55
	KIAS	121	128	142	154	165
FLAPS 30 (VREF30+10)	**PITCH ATT**	**2.5**	**2.5**	**2.5**	**2.5**	**3.0**
	%N1	45	47	52	57	60
	KIAS	114	121	134	145	155
FLAPS 40 (VREF40+10)	**PITCH ATT**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
	%N1	51	54	59	64	67
	KIAS	112	118	130	141	150

Max Climb %N1

Based on engine bleed to packs on (Auto) and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)/SPEED (KIAS OR MACH)								
	0	5	10	15	20	25	30	35	37
	250	250	250	280	280	280	.74	.74	.74
50	88.9	89.0	89.2						
40	89.8	90.0	90.2	90.7					
30	89.9	90.9	91.1	91.6	91.9	92.1			
20	88.4	90.5	91.8	92.5	92.8	93.0	93.2		
10	86.8	88.9	91.0	92.7	93.5	93.8	94.0	94.0	94.0
0	85.3	87.4	89.4	91.1	93.1	94.4	94.6	94.6	94.6
-10	83.7	85.7	87.7	89.4	91.3	93.1	94.6	95.2	95.2
-20	82.1	84.1	86.0	87.7	89.6	91.3	92.8	95.7	96.0
-30	80.5	82.4	84.3	85.9	87.8	89.5	90.9	93.8	94.5
-40	78.8	80.7	82.6	84.1	86.0	87.6	89.0	91.9	92.5
-50	77.1	79.0	80.8	82.3	84.1	85.7	87.1	89.9	90.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	37
ENGINE BLEED TO PACKS OFF	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.7
PACKS HIGH	-0.2	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.5	-0.6
ENGINE ANTI-ICE ON	-0.7	-0.8	-0.9	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-1.9	-2.0	-2.2	-2.4	-2.6	-2.9	-2.8	-2.9	-2.9

Go-around %N1

Based on engine bleed to packs on (Auto), engine anti-ice on or off, and wing anti-ice off

REPORTED OAT		TAT	PRESSURE ALTITUDE (FT)									
°C	°F	°C	-1000	0	1000	2000	3000	4000	5000	6000	7000	8000
55	131	58	89.8	90.5	91.1	91.8	93.3	94.2	93.9	93.6	94.6	95.6
50	122	53	90.5	91.0	91.6	92.2	93.6	94.6	94.4	94.2	94.8	95.4
45	113	48	91.1	91.5	92.1	92.6	93.9	94.9	94.8	94.8	94.9	95.1
40	104	43	91.6	92.1	92.4	93.0	94.3	95.3	95.3	95.3	95.1	94.8
35	95	38	92.0	92.5	93.0	93.4	94.8	95.9	95.9	95.9	95.1	94.5
30	86	33	92.0	92.8	93.2	93.6	95.0	96.5	96.4	96.4	95.7	95.0
25	77	28	91.2	92.0	92.8	93.5	94.5	95.9	96.3	96.8	96.3	95.7
20	68	23	90.4	91.2	92.0	92.8	93.8	95.1	95.5	96.0	96.0	96.0
15	59	18	89.7	90.4	91.2	92.0	93.0	94.3	94.7	95.2	95.3	95.4
10	50	13	88.9	89.6	90.4	91.2	92.1	93.4	93.9	94.3	94.4	94.6
5	41	8	88.1	88.8	89.6	90.4	91.3	92.6	93.0	93.5	93.6	93.8
0	32	3	87.4	88.0	88.8	89.5	90.5	91.8	92.2	92.6	92.7	92.9
-10	14	-8	85.6	86.4	87.2	87.9	88.8	90.1	90.5	90.9	91.0	91.2
-20	-4	-18	84.0	84.8	85.5	86.2	87.1	88.3	88.8	89.2	89.3	89.5
-30	-22	-28	82.4	83.1	83.8	84.5	85.4	86.6	87.0	87.4	87.5	87.7
-40	-40	-38	80.7	81.3	82.1	82.7	83.6	84.8	85.2	85.6	85.7	85.9
-50	-58	-48	78.9	79.6	80.3	80.9	81.8	82.9	83.3	83.7	83.8	84.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	TAT (°C)	
	- 60	+ 60
ENGINE BLEED TO PACKS OFF	0.8	1.0
PACKS HIGH	- 0.4	- 0.4
WING A/I ALL ENGINES	- 1.3	- 1.6
WING A/I 1 ENGINE INOP	- 2.1	- 2.6

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
64	145	149	159
60	140	144	154
56	135	140	149
52	130	135	143
48	125	129	138
44	120	123	132
40	114	117	125
36	108	111	118
32	101	105	111

Increase VREF by 1 knot per 4000 ft above sea level.
For approach speed add wind factor of 1/2 headwind component + gust (max 20 knots).

Intentionally
Blank

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 15
Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	45000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 45000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	2640	350/-170	60	-90	330	30	-20	50	-50	190	50	130
MAX AUTO	3380	270/-250	80	-130	420	0	0	70	-80	330	0	10
AUTOBRAKE 3	4750	400/-420	140	-210	710	20	-20	120	-120	520	40	40
AUTOBRAKE 2	5650	550/-580	180	-270	940	80	-130	150	-150	460	250	250
AUTOBRAKE 1	6050	660/-640	210	-310	1090	190	-190	170	-170	460	820	1060

Good Reported Braking Action

MAX MANUAL	3620	290/-290	90	-160	570	80	-70	80	-80	270	220	640
MAX AUTO	3760	300/-310	100	-170	580	60	-50	80	-90	310	250	710
AUTOBRAKE 3	4760	400/-420	140	-210	720	30	-20	120	-120	520	60	180
AUTOBRAKE 2	5650	550/-580	180	-270	940	80	-130	150	-150	460	250	250
AUTOBRAKE 1	6050	660/-640	210	-310	1090	190	-190	170	-170	460	820	1060

Medium Reported Braking Action

MAX MANUAL	4770	440/-430	140	-250	920	190	-150	120	-120	350	620	2110
MAX AUTO	4770	450/-440	140	-250	910	160	-130	120	-120	400	620	2100
AUTOBRAKE 3	5110	460/-460	150	-260	960	130	-90	130	-130	520	450	1970
AUTOBRAKE 2	5780	560/-590	180	-300	1060	140	-170	160	-160	460	400	1370
AUTOBRAKE 1	6080	660/-650	210	-320	1120	240	-200	170	-170	460	890	1690

Poor Reported Braking Action

MAX MANUAL	5990	620/-590	190	-360	1400	410	-280	150	-150	410	1330	6170
MAX AUTO	5990	620/-580	190	-360	1380	410	-270	150	-150	420	1340	6210
AUTOBRAKE 3	5990	630/-590	200	-360	1390	390	-250	150	-150	490	1350	6170
AUTOBRAKE 2	6320	650/-650	200	-380	1440	360	-280	160	-160	460	1080	5840
AUTOBRAKE 1	6490	710/-690	220	-390	1480	430	-310	170	-170	460	1370	5740

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrake data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 200 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 30

Dry Runway

BRAKING CONFIGURATION	REF DIST: 45000 KG LANDING WEIGHT	WT ADJ: PER 5000 KG ABOVE/ BELOW 45000 KG	ALT ADJ: PER 1000 FT ABOVE SEA LEVEL	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	TEMP ADJ PER 10°C: ABV ISA	TEMP ADJ PER 10°C: BLW ISA	APP SPD ADJ: PER 10 KTS ABOVE VREF30	REVERSE THRUST ADJ: ONE REV	REVERSE THRUST ADJ: NO REV
MAX MANUAL	2530	280/-160	50	-90	320	30	-20	50	-50	190	40	110
MAX AUTO	3130	230/-220	70	-120	400	0	0	70	-70	320	0	10
AUTOBRAKE 3	4330	350/-370	120	-200	670	20	-20	110	-110	480	40	40
AUTOBRAKE 2	5150	470/-500	160	-260	890	70	-110	140	-140	440	170	170
AUTOBRAKE 1	5520	570/-560	180	-300	1030	170	-170	150	-150	430	660	860

LANDING DISTANCE AND ADJUSTMENTS (FT)

Good Reported Braking Action

MAX MANUAL	3410	260/-260	80	-160	550	70	-60	70	-70	270	200	570
MAX AUTO	3530	270/-280	90	-160	560	60	-50	80	-80	310	220	630
AUTOBRAKE 3	4330	350/-370	120	-200	680	30	-20	110	-110	480	60	180
AUTOBRAKE 2	5150	470/-500	160	-260	890	70	-110	140	-140	440	170	170
AUTOBRAKE 1	5520	570/-560	180	-300	1030	170	-170	150	-150	430	660	860

Medium Reported Braking Action

MAX MANUAL	4450	400/-390	130	-240	890	180	-140	110	-110	340	540	1860
MAX AUTO	4450	400/-390	130	-240	880	160	-120	110	-110	390	540	1840
AUTOBRAKE 3	4680	410/-410	130	-250	920	120	-90	120	-120	480	440	1790
AUTOBRAKE 2	5270	490/-520	160	-280	1010	130	-150	140	-140	440	320	1220
AUTOBRAKE 1	5550	570/-570	180	-300	1070	220	-180	150	-150	430	730	1450

Poor Reported Braking Action

MAX MANUAL	5550	550/-530	170	-350	1360	390	-270	140	-140	390	1160	5350
MAX AUTO	5550	550/-520	170	-340	1340	390	-260	130	-130	400	1170	5380
AUTOBRAKE 3	5550	560/-530	170	-350	1350	380	-240	140	-140	450	1190	5360
AUTOBRAKE 2	5800	570/-580	180	-360	1390	340	-260	150	-150	430	940	5080
AUTOBRAKE 1	5950	620/-610	200	-370	1420	400	-290	160	-160	430	1170	5000

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrake data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 180 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Normal Configuration Landing Distance
Flaps 40
Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	45000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 45000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	2470	240/-150	50	-90	320	30	-20	50	-50	200	40	110
MAX AUTO	3020	210/-210	70	-120	390	0	0	60	-60	310	0	10
AUTOBRAKE 3	4130	320/-350	110	-190	650	20	-30	100	-100	440	40	50
AUTOBRAKE 2	4890	440/-470	140	-250	860	80	-110	130	-130	410	160	160
AUTOBRAKE 1	5240	530/-520	170	-290	1000	160	-160	140	-140	400	580	810

Good Reported Braking Action

MAX MANUAL	3310	240/-250	80	-150	540	70	-60	70	-70	270	180	530
MAX AUTO	3420	260/-270	90	-160	560	60	-50	70	-70	310	200	580
AUTOBRAKE 3	4140	330/-350	110	-190	660	30	-30	100	-100	440	60	190
AUTOBRAKE 2	4890	440/-470	140	-250	860	80	-110	130	-130	410	160	160
AUTOBRAKE 1	5240	530/-520	170	-290	1000	160	-160	140	-140	400	580	810

Medium Reported Braking Action

MAX MANUAL	4280	370/-370	120	-230	870	170	-140	100	-100	330	500	1680
MAX AUTO	4280	380/-370	120	-230	860	150	-110	100	-100	380	490	1670
AUTOBRAKE 3	4490	390/-390	130	-240	900	120	-100	110	-110	440	420	1660
AUTOBRAKE 2	5010	450/-480	150	-270	980	140	-150	130	-130	410	300	1130
AUTOBRAKE 1	5270	530/-520	170	-290	1040	200	-170	140	-140	400	650	1350

Poor Reported Braking Action

MAX MANUAL	5310	510/-500	160	-340	1330	380	-260	130	-130	380	1050	4780
MAX AUTO	5310	510/-490	160	-330	1310	380	-250	130	-130	390	1060	4820
AUTOBRAKE 3	5310	520/-510	160	-340	1320	360	-240	130	-130	410	1090	4830
AUTOBRAKE 2	5530	530/-540	170	-350	1360	340	-250	140	-140	410	870	4550
AUTOBRAKE 1	5660	570/-570	180	-360	1390	390	-270	150	-150	400	1060	4510

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
Max manual braking data valid for auto speedbrakes. Autobrake data valid for both auto and manual speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 160 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	3710	710/-280	110	-120	490	40	-40	320
ANTI-SKID INOPERATIVE	VREF40	3700	260/-270	90	-170	590	70	-60	300
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	3040	200/-210	70	-120	380	50	-50	410
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	3110	230/-220	70	-120	390	50	-50	390
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	3150	320/-230	70	-120	380	50	-40	330
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	2950	440/-200	70	-110	380	40	-30	220
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	4580	480/-380	130	-200	660	130	-120	500
STABILIZER TRIM INOPERATIVE	VREF15	2640	370/-170	60	-90	320	30	-20	180
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	2640	370/-170	60	-90	320	30	-20	180
LEADING EDGE FLAPS TRANSIT	VREF15+5	2830	410/-190	60	-100	340	30	-30	210
ONE ENGINE INOPERATIVE	VREF15	2670	400/-180	60	-100	330	30	-30	190

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	2430	290/-150	50	-90	300	30	-20	180
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	2640	370/-170	60	-90	320	30	-20	180
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	3070	490/-220	70	-110	360	30	-30	230
TRAILING EDGE FLAP DISAGRE (30≤ FLAPS <40)	VREF30	2430	290/-150	50	-90	300	30	-20	180
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	2640	370/-170	60	-90	320	30	-20	180
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	3070	490/-220	70	-110	360	30	-30	230
TRAILING EDGE FLAPS UP (FLAPS <1)	VREF40+40	3310	560/-240	80	-110	380	40	-30	240

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	4960	340/-360	140	-190	650	90	-90	290
ANTI-SKID INOPERATIVE	VREF40	4510	370/-370	120	-240	870	150	-130	350
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	4040	320/-320	110	-180	630	120	-100	470
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	4190	340/-340	120	-190	640	120	-110	470
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	4350	370/-370	120	-190	640	120	-100	430
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	3740	290/-290	100	-170	570	80	-70	280
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	4640	390/-390	130	-200	680	130	-120	500
STABILIZER TRIM INOPERATIVE	VREF15	3590	280/-280	90	-160	550	70	-70	270
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	3590	280/-280	90	-160	550	70	-70	270
LEADING EDGE FLAPS TRANSIT	VREF15+5	3880	310/-310	110	-170	580	80	-70	300
ONE ENGINE INOPERATIVE	VREF15	3760	300/-310	100	-170	580	90	-80	300

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	3300	250/-250	80	-150	530	70	-60	260
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	3590	280/-280	90	-160	550	70	-70	270
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	4090	290/-300	110	-170	580	80	-70	260
TRAILING EDGE FLAP DISAGRE (30≤ FLAPS <40)	VREF30	3300	250/-250	80	-150	530	70	-60	260
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	3590	280/-280	90	-160	550	70	-70	270
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	4090	290/-300	110	-170	580	80	-70	260
TRAILING EDGE FLAPS UP (FLAPS <1)	VREF40+40	4400	310/-320	120	-180	610	80	-80	270

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	6570	540/-560	210	-290	1010	210	-190	370
ANTI-SKID INOPERATIVE	VREF40	5470	500/-490	160	-340	1290	310	-240	390
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	5060	460/-450	150	-270	950	220	-190	490
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	5320	500/-490	170	-280	980	240	-200	520
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	5640	550/-530	180	-280	1000	240	-200	510
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	4950	450/-440	150	-260	910	180	-160	370
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	6010	580/-560	190	-300	1040	270	-230	570
STABILIZER TRIM INOPERATIVE	VREF15	4690	430/-420	140	-240	880	170	-140	340
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	4690	430/-420	140	-240	880	170	-140	340
LEADING EDGE FLAPS TRANSIT	VREF15+5	5100	480/-470	160	-260	920	190	-160	380
ONE ENGINE INOPERATIVE	VREF15	5170	480/-480	160	-280	980	230	-190	400

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	4300	380/-380	130	-230	840	160	-140	330
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	4690	430/-420	140	-240	880	170	-140	340
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	5400	450/-460	170	-260	930	180	-160	340
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	4300	380/-380	130	-230	840	160	-140	330
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	4690	430/-420	140	-240	880	170	-140	340
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	5400	450/-460	170	-260	930	180	-160	340
TRAILING EDGE FLAP UP (FLAPS <1)	VREF40+40	5810	480/-490	180	-270	960	190	-170	350

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	8180	770/-760	290	-410	1500	430	-340	440
ANTI-SKID INOPERATIVE	VREF40	6920	720/-690	230	-540	2220	960	-520	430
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 40)	VREF40	6080	610/-580	200	-380	1390	410	-320	500
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 30)	VREF30	6450	670/-630	220	-390	1430	440	-340	540
HYDRAULICS-LOSS OF SYSTEM A (FLAPS 15)	VREF15	6930	760/-700	240	-400	1470	460	-350	550
HYDRAULICS-LOSS OF SYSTEM B (FLAPS 15)	VREF15	6210	640/-600	200	-370	1370	380	-290	430
HYDRAULICS-MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	7350	800/-740	260	-420	1520	500	-380	610
STABILIZER TRIM INOPERATIVE	VREF15	5840	610/-570	190	-350	1320	350	-270	390
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	5840	610/-570	190	-350	1320	350	-270	390
LEADING EDGE FLAPS TRANSIT	VREF15+5	6360	670/-630	220	-370	1380	390	-300	440
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	6820	710/-690	230	-420	1550	530	-390	490

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	REF DIST FOR 45000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 45000 KG	ALT ADJ PER 1000 FT ABV S.L.	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
		LANDING DISTANCE AND ADJUSTMENT (FT)							
TRAILING EDGE FLAP ASYMMETRY (30≤ FLAPS <40)	VREF30	5340	540/-510	170	-340	1280	330	-250	370
TRAILING EDGE FLAP ASYMMETRY (15≤ FLAPS <30)	VREF15	5840	610/-570	190	-350	1320	350	-270	390
TRAILING EDGE FLAP ASYMMETRY (1≤ FLAPS <15)	VREF40+30	6740	650/-630	230	-380	1390	370	-290	400
TRAILING EDGE FLAP DISAGREE (30≤ FLAPS <40)	VREF30	5340	540/-510	170	-340	1280	330	-250	370
TRAILING EDGE FLAP DISAGREE (15≤ FLAPS <30)	VREF15	5840	610/-570	190	-350	1320	350	-270	390
TRAILING EDGE FLAP DISAGREE (1≤ FLAPS <15)	VREF40+30	6740	650/-630	230	-380	1390	370	-290	400
TRAILING EDGE FLAP UP (FLAPS <1)	VREF40+40	7240	690/-670	250	-390	1430	390	-310	410

Reference distance is for sea level, standard day, no wind or slope, and maximum available reverse thrust.
Max Manual assumes maximum achievable manual braking.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*														
		60			80			100			120			140		
WEIGHT (1000 KG)	OAT (°C)	PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT		
		0	4	8	0	4	8	0	4	8	0	4	8	0	4	8
70	-20	6.6	7.4	8.3	11.1	12.5	14.1	16.5	18.7	21.4	22.9	26.0	29.7	30.0	34.1	38.9
	0	7.1	7.9	8.8	11.9	13.4	15.1	17.7	20.1	22.9	24.5	27.9	31.9	32.2	36.6	41.7
	15	7.4	8.3	9.3	12.5	14.1	15.9	18.7	21.2	24.2	25.9	29.4	33.6	33.9	38.5	43.9
	20	7.5	8.4	9.4	12.7	14.3	16.2	19.0	21.5	24.6	26.3	29.9	34.1	34.5	39.2	44.6
	40	7.9	8.8	9.8	13.3	15.0	17.0	20.0	22.7	25.9	27.8	31.6	36.1	36.4	41.4	47.1
65	-20	6.2	6.9	7.8	10.4	11.7	13.2	15.5	17.5	20.0	21.4	24.3	27.8	28.0	31.8	36.3
	0	6.7	7.4	8.3	11.1	12.5	14.1	16.6	18.8	21.4	22.9	26.0	29.7	30.0	34.1	39.0
	15	7.0	7.8	8.7	11.7	13.2	14.9	17.5	19.8	22.6	24.2	27.4	31.4	31.7	36.0	41.0
	20	7.1	7.9	8.8	11.9	13.4	15.2	17.8	20.1	23.0	24.6	27.9	31.9	32.2	36.6	41.7
	40	7.4	8.2	9.2	12.5	14.0	15.9	18.7	21.2	24.2	25.9	29.5	33.7	34.0	38.6	44.1
60	-20	5.8	6.5	7.2	9.7	10.9	12.3	14.4	16.3	18.6	19.9	22.6	25.8	26.0	29.6	33.8
	0	6.3	7.0	7.8	10.4	11.7	13.2	15.4	17.5	19.9	21.3	24.2	27.6	27.9	31.7	36.2
	15	6.6	7.3	8.1	10.9	12.3	13.9	16.3	18.4	21.0	22.5	25.5	29.1	29.4	33.4	38.1
	20	6.7	7.4	8.3	11.1	12.5	14.1	16.5	18.7	21.3	22.8	25.9	29.6	29.9	34.0	38.8
	40	6.9	7.7	8.6	11.6	13.1	14.8	17.4	19.7	22.5	24.1	27.4	31.3	31.6	35.9	41.0
55	-20	5.5	6.1	6.8	9.0	10.1	11.4	13.4	15.1	17.2	18.4	20.8	23.8	24.0	27.2	31.1
	0	5.9	6.5	7.2	9.7	10.8	12.2	14.3	16.2	18.4	19.7	22.3	25.5	25.7	29.2	33.4
	15	6.1	6.8	7.6	10.2	11.4	12.8	15.1	17.0	19.4	20.7	23.5	26.9	27.1	30.8	35.2
	20	6.2	6.9	7.7	10.3	11.6	13.0	15.3	17.3	19.7	21.1	23.9	27.3	27.6	31.3	35.8
	40	6.5	7.2	8.0	10.8	12.1	13.7	16.1	18.2	20.8	22.2	25.2	28.8	29.1	33.1	37.8
50	-20	5.1	5.6	6.3	8.3	9.3	10.5	12.3	13.9	15.7	16.8	19.1	21.8	21.9	24.9	28.5
	0	5.4	6.0	6.7	8.9	10.0	11.2	13.2	14.8	16.9	18.0	20.4	23.3	23.5	26.7	30.5
	15	5.7	6.3	7.0	9.4	10.5	11.8	13.8	15.6	17.8	19.0	21.5	24.6	24.8	28.1	32.2
	20	5.8	6.4	7.1	9.5	10.7	12.0	14.1	15.9	18.1	19.3	21.9	25.0	25.2	28.6	32.7
	40	6.0	6.7	7.4	10.0	11.2	12.6	14.8	16.7	19.0	20.3	23.1	26.4	26.6	30.2	34.5
45	-20	4.7	5.2	5.8	7.7	8.6	9.6	11.2	12.6	14.3	15.3	17.3	19.7	19.9	22.5	25.7
	0	5.0	5.6	6.2	8.2	9.2	10.3	12.0	13.5	15.3	16.4	18.5	21.1	21.3	24.1	27.6
	15	5.3	5.8	6.5	8.6	9.6	10.8	12.6	14.2	16.1	17.3	19.5	22.3	22.4	25.4	29.1
	20	5.3	5.9	6.6	8.7	9.8	11.0	12.8	14.5	16.4	17.5	19.9	22.7	22.8	25.9	29.6
	40	5.5	6.2	6.8	9.1	10.2	11.5	13.5	15.2	17.3	18.5	20.9	23.9	24.0	27.3	31.2
40	-20	4.3	4.8	5.3	7.0	7.8	8.7	10.1	11.4	12.9	13.7	15.5	17.7	17.7	20.1	23.0
	0	4.6	5.1	5.7	7.5	8.3	9.3	10.9	12.2	13.8	14.7	16.6	18.9	19.0	21.5	24.6
	15	4.9	5.4	5.9	7.8	8.8	9.8	11.4	12.8	14.5	15.5	17.5	20.0	20.0	22.7	26.0
	20	4.9	5.4	6.0	8.0	8.9	10.0	11.6	13.0	14.8	15.8	17.8	20.3	20.4	23.1	26.4
	40	5.1	5.6	6.3	8.3	9.3	10.4	12.1	13.7	15.5	16.6	18.8	21.4	21.5	24.4	27.9

***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.**

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)
No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)						
EVENT		10	15	20	25	30	35	40
RTO MAX MAN		10	15	20	25	30	35	40
LANDING	MAX MAN	8.6	13.3	18.1	22.8	27.5	32.3	37.0
	MAX AUTO	8.1	12.3	16.6	21.0	25.4	29.9	34.4
	AUTOBRAKE 3	8.0	11.6	15.3	19.2	23.1	27.1	31.2
	AUTOBRAKE 2	7.8	11.0	14.3	17.6	21.1	24.6	28.3
	AUTOBRAKE 1	7.5	10.4	13.4	16.3	19.4	22.5	25.6

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)						
EVENT		10	15	20	25	30	35	40
RTO MAX MAN		10	15	20	25	30	35	40
LANDING	MAX MAN	8.2	12.5	16.7	20.9	25.0	29.0	33.0
LANDING	MAX AUTO	6.0	9.4	12.8	16.4	20.1	23.8	27.7
LANDING	AUTOBRAKE 3	3.2	5.2	7.4	9.7	12.2	14.8	17.5
LANDING	AUTOBRAKE 2	1.4	2.5	3.8	5.2	6.8	8.5	10.3
LANDING	AUTOBRAKE 1	0.6	1.3	2.1	3.0	3.9	5.0	6.2

Cooling Time (Minutes) - Category A Brakes

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)							
	8 & BELOW	10	12	14	16	18	18.5 TO 23.7	23.8 & ABOVE
	BRAKE TEMPERATURE INDICATOR READING							
	UP TO 2.1	2.8	3.2	3.6	4.2	4.8	4.9 TO 6.3	6.3 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND	NO SPECIAL PROCEDURE REQUIRED	19	32	43	53	61	CAUTION	FUSE PLUG MELT ZONE

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 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 Indicator (if installed) on First Officer's Instrument Panel may be used 10 to 15 minutes after brake application to determine recommended cooling time.

Intentionally
Blank

Performance Inflight - QRH Chapter PI-QRH
Engine Inoperative Section 32

ENGINE INOP

Initial Max Continuous %N1
Based on .74M, engine bleed for packs auto and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)					
	27	29	31	33	35	37
20	92.9	92.9	92.8	92.8	92.8	92.7
15	93.3	93.3	93.2	93.2	93.2	93.1
10	93.7	93.7	93.6	93.6	93.6	93.5
5	94.0	94.0	93.9	93.9	93.9	93.8
0	94.3	94.3	94.2	94.2	94.2	94.1
-5	93.7	94.6	94.5	94.5	94.5	94.4
-10	92.8	93.9	94.7	94.7	94.7	94.6
-15	91.9	93.0	93.9	95.0	95.0	94.9
-20	91.0	92.0	93.0	94.1	95.3	95.4
-25	90.1	91.1	92.0	93.2	94.4	94.9
-30	89.2	90.2	91.1	92.2	93.4	94.0
-40	87.4	88.3	89.2	90.3	91.5	92.0
-50	85.5	86.4	87.3	88.3	89.5	90.0

%N1 Adjustment for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	27	29	31	33	35	37
ENGINE A/I ON	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
ENGINE AND WING A/I ON	-3.1	-3.0	-3.0	-3.0	-3.0	-3.0

ENGINE INOP

Max Continuous %N1

33000 FT to 23000 FT Pressure Altitudes

Based on engine bleed for packs auto and anti-ice off

33000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.58	89.6	91.6	93.5	94.4	94.0	93.5	93.2				
220	.63	89.4	91.4	93.3	94.8	94.3	93.8	93.5	93.1			
240	.68	89.1	91.0	93.0	94.8	94.6	94.0	93.7	93.4			
260	.74	88.3	90.2	92.2	94.0	94.7	94.2	93.9	93.5	93.2		
31000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.55	88.8	90.8	92.7	94.2	93.9	93.4	93.1				
220	.61	88.7	90.6	92.4	94.4	94.2	93.7	93.4	93.1			
240	.66	88.3	90.2	92.1	94.0	94.5	93.9	93.6	93.3	92.9		
260	.71	87.8	89.7	91.7	93.5	94.6	94.1	93.8	93.5	93.1		
29000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.53	88.1	90.0	91.9	93.8	93.7	93.2	92.9	92.6			
220	.58	87.9	89.8	91.8	93.6	94.1	93.6	93.3	92.9	92.6		
240	.63	87.6	89.5	91.4	93.3	94.4	93.8	93.5	93.2	92.8		
260	.68	87.1	89.1	91.0	92.8	94.5	94.0	93.7	93.4	93.0	92.6	
27000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.51	87.3	89.3	91.2	93.0	93.5	93.0	92.8	92.4			
220	.56	87.1	89.1	91.0	92.8	93.9	93.4	93.1	92.8	92.4		
240	.60	86.9	88.9	90.7	92.6	94.3	93.8	93.5	93.1	92.7	92.3	
260	.65	86.5	88.4	90.3	92.1	93.9	93.9	93.7	93.3	92.9	92.5	
25000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.49	86.6	88.5	90.4	92.2	93.4	93.0	92.7	92.4	92.0		
220	.53	86.4	88.3	90.2	92.0	93.7	93.3	93.0	92.7	92.3	91.9	
240	.58	86.2	88.1	90.0	91.8	93.6	93.6	93.3	93.0	92.6	92.2	
260	.63	85.8	87.7	89.6	91.4	93.2	93.8	93.6	93.2	92.9	92.4	92.0
23000 FT PRESS ALT.		TAT (°C)										
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25
200	.47	85.8	87.7	89.6	91.4	93.2	92.8	92.6	92.3	91.9	91.6	
220	.51	85.6	87.5	89.4	91.2	93.0	93.1	92.9	92.5	92.2	91.8	
240	.56	85.4	87.3	89.2	91.0	92.8	93.4	93.2	92.8	92.5	92.1	91.7
260	.60	85.2	87.1	88.9	90.8	92.5	93.8	93.5	93.1	92.8	92.4	92.0

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	23	25	27	29	31	33
ENGINE A/I ON	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
ENGINE AND WING A/I ON	-3.1	-3.1	-3.1	-3.0	-3.0	-3.0

ENGINE INOP

Max Continuous %N1

21000 FT to 14000 FT Pressure Altitudes

Based on engine bleed for packs auto and anti-ice off

21000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.45	85.0	86.9	88.8	90.6	92.4	92.7	92.5	92.2	91.9	91.5		
220	.49	84.9	86.8	88.6	90.4	92.2	93.0	92.7	92.4	92.1	91.7	91.3	
240	.54	84.7	86.6	88.4	90.2	92.0	93.3	93.0	92.7	92.4	92.0	91.6	
260	.60	84.5	86.3	88.2	90.0	91.7	93.4	93.3	93.0	92.6	92.3	91.8	91.4
20000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-50	-40	-30	-20	-10	0	5	10	15	20	25	30
200	.44	84.7	86.5	88.4	90.2	91.9	92.7	92.4	92.1	91.8	91.5	91.1	
220	.48	84.5	86.4	88.2	90.0	91.8	92.9	92.7	92.4	92.0	91.7	91.3	
240	.53	84.3	86.2	88.0	89.8	91.6	93.2	92.9	92.6	92.3	91.9	91.5	91.1
260	.57	84.1	86.0	87.8	89.6	91.3	93.0	93.2	92.9	92.6	92.2	91.8	91.3
18000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-40	-30	-20	-10	0	5	10	15	20	25	30	35
200	.42	85.8	87.6	89.4	91.1	92.6	92.3	92.0	91.7	91.4	91.0		
220	.46	85.6	87.4	89.2	91.0	92.7	92.6	92.3	92.0	91.6	91.2	90.8	
240	.51	86.6	83.4	90.2	92.0	93.7	94.1	93.8	93.5	93.1	92.7	92.3	
260	.55	86.4	88.2	90.0	91.8	93.5	94.3	94.1	93.7	93.4	93.0	92.5	92.1
17000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-40	-30	-20	-10	0	5	10	15	20	25	30	35
200	.42	87.1	89.0	90.8	92.6	94.3	94.2	93.9	93.6	93.3	92.9	92.5	
220	.46	87.0	88.8	90.6	92.4	94.1	94.4	94.1	93.8	93.5	93.1	92.7	
240	.50	86.8	88.6	90.4	92.2	93.9	94.7	94.4	94.1	93.7	93.3	92.9	92.5
260	.54	86.6	88.4	90.2	92.0	93.7	94.5	94.6	94.3	93.9	93.6	93.2	92.7
16000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-40	-30	-20	-10	0	5	10	15	20	25	30	35
200	.41	86.8	88.6	90.4	92.2	93.9	94.1	93.9	93.6	93.3	92.9	92.5	
220	.45	86.6	88.4	90.2	92.0	93.7	94.3	94.1	93.8	93.4	93.1	92.7	
240	.49	86.4	88.2	90.0	91.8	93.5	94.4	94.3	94.0	93.7	93.3	92.9	92.5
260	.53	86.2	88.0	89.8	91.6	93.3	94.1	94.6	94.2	93.9	93.5	93.1	92.7
14000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-30	-20	-10	0	5	10	15	20	25	30	35	40
200	.39	87.8	89.6	91.3	93.1	93.9	93.8	93.5	93.2	92.8	92.4	92.0	
220	.43	87.6	89.4	91.2	92.9	93.7	94.0	93.7	93.4	93.0	92.6	92.2	
240	.47	87.5	89.2	91.0	92.7	93.5	94.2	93.9	93.6	93.2	92.8	92.4	
260	.51	87.3	89.0	90.8	92.5	93.3	94.2	94.1	93.8	93.4	93.0	92.6	92.1

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	14	16	17	18	20	21
ENGINE A/I ON	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
ENGINE AND WING A/I ON	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2

ENGINE INOP

Max Continuous %N1
12000 FT to 1000 FT Pressure Altitudes
Based on engine bleed for packs auto and anti-ice off

12000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-20	-10	0	5	10	15	20	25	30	35	40	45
200	.38	88.8	90.5	92.2	93.1	93.7	93.4	93.1	92.7	92.4	91.9		
220	.41	88.6	90.4	92.1	92.9	93.7	93.6	93.3	92.9	92.5	92.1	91.7	
240	.45	88.4	90.2	91.9	92.7	93.5	93.8	93.5	93.1	92.7	92.3	91.9	
260	.49	88.3	90.0	91.7	92.5	93.3	94.0	93.7	93.3	92.9	92.5	92.0	91.6

10000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-20	-10	0	5	10	15	20	25	30	35	40	45
200	.36	88.0	89.7	91.4	92.2	93.1	93.3	93.0	92.7	92.3	91.9	91.4	
220	.40	87.9	89.6	91.3	92.1	92.9	93.5	93.2	92.9	92.5	92.1	91.6	
240	.43	87.7	89.4	91.1	91.9	92.7	93.5	93.4	93.0	92.6	92.2	91.8	91.3
260	.47	87.5	89.2	90.9	91.7	92.5	93.3	93.6	93.2	92.8	92.4	92.0	91.5

7000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.34	86.6	88.3	89.1	89.9	90.7	91.0	91.1	91.9	92.0	91.8	91.5	91.1
220	.38	86.5	88.1	89.0	89.7	90.5	91.2	91.0	91.8	92.1	92.0	91.6	91.3
240	.41	86.4	88.0	88.8	89.6	90.4	91.2	91.0	91.6	92.1	92.1	91.8	91.4
260	.45	86.2	87.8	88.6	89.4	90.2	90.0	91.1	91.3	92.2	92.1	91.9	91.5

5000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.33	85.8	87.5	88.3	89.0	89.8	90.6	90.6	90.9	91.3	91.1	90.7	90.3
220	.36	85.7	87.3	88.1	88.9	89.7	90.5	90.7	90.8	91.4	91.2	90.9	90.4
240	.40	85.6	87.2	88.0	88.8	89.6	90.3	90.9	90.7	91.3	91.3	91.0	90.6
260	.43	85.4	87.0	87.8	88.6	89.3	90.1	90.9	90.8	91.2	91.4	91.1	90.7

3000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.32	85.0	86.6	87.4	88.2	89.0	89.8	90.5	90.2	89.8	89.4	89.0	88.5
220	.35	84.9	86.5	87.3	88.1	88.8	89.6	90.4	90.3	90.0	89.6	89.1	88.6
240	.40	84.8	86.4	87.2	87.9	88.7	89.5	90.2	90.5	90.1	89.7	89.3	88.8
260	.43	84.6	86.2	87.0	87.8	88.5	89.3	90.0	90.6	90.3	89.9	89.4	89.0

1000 FT PRESS ALT.		TAT (°C)											
KIAS	M	-10	0	5	10	15	20	25	30	35	40	45	50
200	.31	84.2	85.8	86.6	87.4	88.2	88.9	89.7	90.1	89.7	89.2	88.8	88.3
220	.34	84.1	85.7	86.5	87.2	88.0	88.8	89.5	90.2	89.8	89.4	88.9	88.4
240	.37	84.0	85.5	86.3	87.1	87.9	88.6	89.4	90.1	90.0	89.5	89.1	88.6
260	.40	83.8	85.4	86.2	87.0	87.7	88.5	89.2	90.0	90.1	89.7	89.2	88.7

Anti-Ice Adjustments

BLEED CONFIGURATION	PRESS ALT (1000 FT)					
	1	3	5	7	10	12
ENGINE A/I ON	-0.7	-0.7	-0.8	-0.8	-0.9	-0.9
ENGINE AND WING A/I ON	-2.6	-2.6	-2.8	-2.9	-3.1	-3.1

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
64	61	235	15500	14200	12800
60	57	228	17300	16400	15100
56	53	220	18800	18000	17200
52	49	212	20600	19600	18800
48	46	204	23100	22100	20900
44	42	196	25800	24800	23700
40	38	187	28500	27600	26600
36	34	177	31100	30500	29600
32	31	167	33700	33400	32600

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
141	131	121	113	106	100	94	90	85	81	77
290	266	246	228	213	200	188	178	169	160	153
436	399	369	343	320	300	282	267	253	240	229
580	532	491	457	426	400	377	356	337	321	305
722	663	613	570	533	500	471	445	422	401	382
863	793	734	683	639	600	566	535	507	482	460
1002	923	855	796	745	700	660	625	593	564	538
1141	1052	975	909	851	800	755	715	678	646	616
1280	1180	1095	1021	957	900	850	805	764	727	694
1417	1308	1215	1134	1063	1000	944	895	850	809	773
1555	1436	1334	1246	1168	1100	1039	985	936	891	851
1693	1564	1454	1358	1274	1200	1134	1075	1022	973	929
1831	1693	1574	1471	1380	1300	1229	1165	1107	1055	1008
1970	1822	1694	1583	1486	1400	1323	1255	1193	1137	1086
2110	1951	1815	1696	1592	1500	1418	1345	1278	1218	1164
2250	2081	1936	1809	1698	1600	1513	1434	1364	1300	1241

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)							TIME (HRS:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)							
	35	40	45	50	55	60	65	
100	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0:18
200	0.8	0.9	0.9	1.0	1.1	1.2	1.3	0:37
300	1.2	1.4	1.5	1.7	1.8	2.0	2.2	0:56
400	1.7	1.8	2.1	2.3	2.5	2.8	3.0	1:14
500	2.1	2.3	2.6	2.9	3.2	3.5	3.8	1:32
600	2.5	2.8	3.1	3.5	3.9	4.2	4.6	1:50
700	2.9	3.3	3.7	4.1	4.5	4.9	5.3	2:07
800	3.3	3.7	4.2	4.7	5.1	5.6	6.1	2:24
900	3.7	4.2	4.7	5.2	5.8	6.3	6.9	2:40
1000	4.1	4.6	5.2	5.8	6.4	6.9	7.6	2:57
1100	4.5	5.1	5.7	6.4	7.0	7.6	8.3	3:13
1200	4.9	5.5	6.2	7.0	7.7	8.3	9.1	3:30
1300	5.3	6.0	6.7	7.5	8.3	9.0	9.8	3:46
1400	5.7	6.4	7.2	8.1	8.9	9.6	10.5	4:03
1500	6.1	6.8	7.7	8.6	9.5	10.3	11.2	4:20
1600	6.5	7.3	8.2	9.2	10.1	10.9	12.0	4:37

Includes APU fuel burn.
Driftdown at optimum speed and cruise at Long Range Cruise speed.

ENGINE INOP

MAX CONTINUOUS THRUST

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
64	5200	3000	800
62	6700	4700	3400
60	11500	6100	5600
58	12900	10700	7600
56	14400	12200	10000
54	15900	13800	11600
52	17200	15300	13200
50	17900	16900	14800
48	18700	17800	16500
46	19600	18600	17600
44	20800	19500	18500
42	22500	20700	19400
40	24200	22500	20700
38	25900	24300	22500
36	27700	26100	24500

With engine anti-ice on, decrease altitude capability by 3700 ft.
With engine and wing anti-ice on, decrease altitude capability by 8700 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT) 10	12	14	16	18	20	22	24	26	28
64	%N1	90.4									
	MACH	.561									
	KIAS	311									
	FF/ENG	2950									
60	%N1	88.8	90.2								
	MACH	.547	.564								
	KIAS	303	302								
	FF/ENG	2772	2758								
56	%N1	87.2	88.5	89.9	91.3						
	MACH	.531	.549	.566	.582						
	KIAS	294	293	292	289						
	FF/ENG	2589	2580	2563	2533						
52	%N1	85.4	86.8	88.1	89.5	90.9					
	MACH	.513	.532	.550	.567	.584					
	KIAS	284	284	283	281	278					
	FF/ENG	2406	2396	2387	2363	2333					
48	%N1	83.5	84.8	86.2	87.6	89.0					
	MACH	.495	.513	.532	.550	.568					
	KIAS	274	274	273	272	271					
	FF/ENG	2223	2211	2204	2189	2165					
44	%N1	81.3	82.8	84.1	85.5	86.9	88.3	89.7			
	MACH	.475	.493	.511	.530	.549	.567	.584			
	KIAS	263	263	263	262	261	260	257			
	FF/ENG	2042	2029	2019	2010	1994	1974	1958			
40	%N1	78.9	80.4	81.9	83.3	84.7	86.0	87.5	88.9	90.6	
	MACH	.454	.471	.489	.508	.527	.546	.565	.582	.599	
	KIAS	251	251	251	251	250	250	248	246	243	
	FF/ENG	1864	1851	1839	1830	1819	1806	1795	1777	1754	
36	%N1	76.3	77.8	79.3	80.8	82.2	83.6	85.0	86.4	87.9	89.6
	MACH	.434	.449	.465	.484	.502	.522	.541	.561	.578	.595
	KIAS	240	239	239	239	238	238	238	236	234	231
	FF/ENG	1697	1677	1663	1653	1643	1632	1627	1615	1592	1570

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
299	272	249	230	214	200	190	181	173	166	159
608	552	504	464	430	400	380	362	345	330	316
920	834	759	697	646	600	570	542	517	494	473
1235	1118	1015	932	862	800	760	722	688	658	630
1552	1403	1273	1167	1078	1000	949	903	860	821	787
1872	1690	1532	1403	1295	1200	1139	1082	1031	984	943
2196	1980	1792	1640	1512	1400	1328	1262	1202	1147	1099
2524	2273	2055	1877	1730	1600	1517	1441	1372	1310	1255
2854	2566	2317	2115	1948	1800	1707	1621	1543	1473	1410

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	0:42	1.2	0:40	1.1	0:39	1.0	0:38	0.9	0:38
400	2.8	1:22	2.6	1:18	2.3	1:14	2.1	1:11	2.0	1:11
600	4.2	2:03	3.9	1:56	3.5	1:50	3.3	1:46	3.1	1:46
800	5.6	2:44	5.2	2:35	4.7	2:26	4.4	2:20	4.1	2:20
1000	7.0	3:26	6.4	3:14	5.9	3:03	5.5	2:55	5.2	2:55
1200	8.3	4:08	7.7	3:54	7.1	3:40	6.6	3:30	6.2	3:30
1400	9.6	4:51	8.9	4:34	8.2	4:18	7.7	4:05	7.2	4:05
1600	10.9	5:35	10.1	5:15	9.3	4:57	8.7	4:41	8.2	4:41
1800	12.2	6:20	11.3	5:57	10.5	5:36	9.8	5:18	9.1	5:18

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)			
	35	45	55	65
5	-0.4	0.0	0.8	1.8
10	-0.9	0.0	1.6	3.5
15	-1.3	0.0	2.2	5.0

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
64	%N1	79.9	82.5	86.2	90.5			
	KIAS	247	247	247	249			
	FF/ENG	2600	2580	2570	2590			
60	%N1	78.1	80.8	84.5	88.5			
	KIAS	238	239	239	241			
	FF/ENG	2440	2420	2400	2410			
56	%N1	76.1	78.9	82.7	86.6			
	KIAS	230	231	232	232			
	FF/ENG	2270	2260	2240	2230			
52	%N1	74.1	76.9	80.8	84.6	88.9		
	KIAS	221	222	224	223	225		
	FF/ENG	2110	2100	2080	2060	2070		
48	%N1	71.8	74.7	78.7	82.5	86.5		
	KIAS	211	213	215	215	216		
	FF/ENG	1950	1940	1920	1900	1890		
44	%N1	69.8	72.6	76.6	80.4	84.3	88.9	
	KIAS	210	210	210	210	210	210	
	FF/ENG	1820	1800	1780	1750	1740	1740	
40	%N1	67.9	70.7	74.6	78.6	82.4	86.6	
	KIAS	210	210	210	210	210	210	
	FF/ENG	1710	1690	1660	1630	1620	1610	
36	%N1	66.2	68.9	72.8	76.7	80.6	84.5	89.5
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1610	1590	1560	1530	1510	1500	1510

This table includes 5% additional fuel for holding in a racetrack pattern.

Performance Inflight - QRH Chapter PI-QRH
Gear Down Section 33

GEAR DOWN

220 KIAS 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
64	20500	19200	17700
62	22200	20900	19600
60	23000	21700	20400
58	23800	22600	21200
56	24600	23400	22000
54	25400	24100	22800
52	26100	24900	23600
50	26700	25500	24300
48	27300	26200	24900
46	27900	26700	25500
44	28400	27300	26100
42	29000	27900	26700
40	29500	28400	27200
38	30000	28900	27700
36	30400	29300	28100

Based on 230 KIAS for weights above 62823 kg.

GEAR DOWN

220 KIAS Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	12	14	16	18	20	22	24	26	28	30
64	%N1	79.7	81.3	82.8	84.4	86.1	87.9					
	MACH	.417	.432	.449	.467	.485	.505					
	KIAS	230	230	230	230	230	230					
	FF/ENG	1890	1886	1884	1884	1887	1893					
60	%N1	77.6	79.2	80.8	82.4	84.0	85.8	87.6	89.7			
	MACH	.399	.414	.430	.447	.465	.483	.503	.524			
	KIAS	220	220	220	220	220	220	220	220			
	FF/ENG	1749	1742	1739	1737	1737	1740	1746	1760			
56	%N1	76.5	78.1	79.7	81.3	82.9	84.5	86.3	88.2			
	MACH	.399	.414	.430	.447	.465	.483	.503	.524			
	KIAS	220	220	220	220	220	220	220	220			
	FF/ENG	1683	1675	1669	1666	1664	1664	1666	1676			
52	%N1	75.5	77.1	78.7	80.3	81.9	83.5	85.1	86.9	89.0		
	MACH	.399	.414	.430	.447	.465	.483	.503	.524	.545		
	KIAS	220	220	220	220	220	220	220	220	220		
	FF/ENG	1625	1615	1608	1603	1600	1598	1598	1604	1613		
48	%N1	74.6	76.2	77.8	79.4	80.9	82.5	84.2	85.9	87.8	90.1	
	MACH	.399	.414	.430	.447	.465	.483	.503	.524	.545	.568	
	KIAS	220	220	220	220	220	220	220	220	220	220	
	FF/ENG	1573	1563	1555	1549	1545	1542	1541	1545	1551	1564	
44	%N1	73.7	75.3	76.9	78.5	80.1	81.7	83.3	84.9	86.8	88.9	
	MACH	.399	.414	.430	.447	.465	.483	.503	.524	.545	.568	
	KIAS	220	220	220	220	220	220	220	220	220	220	
	FF/ENG	1526	1515	1507	1501	1497	1494	1491	1494	1498	1507	
40	%N1	72.8	74.5	76.1	77.7	79.4	80.9	82.5	84.1	85.9	87.9	90.4
	MACH	.399	.414	.430	.447	.465	.483	.503	.524	.545	.568	.592
	KIAS	220	220	220	220	220	220	220	220	220	220	220
	FF/ENG	1485	1474	1465	1458	1454	1450	1448	1450	1452	1457	1481
36	%N1	72.1	73.8	75.4	77.0	78.7	80.3	81.8	83.4	85.1	87.0	89.3
	MACH	.399	.414	.430	.447	.465	.483	.503	.524	.545	.568	.592
	KIAS	220	220	220	220	220	220	220	220	220	220	220
	FF/ENG	1450	1439	1430	1423	1418	1414	1411	1411	1412	1417	1432

Based on 230 KIAS for weights above 62823 kg.

GEAR DOWN

220 KIAS Enroute Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
333	295	263	238	218	200	189	180	171	162	155
676	598	531	479	437	400	378	357	339	323	308
1019	900	798	719	655	600	567	536	509	484	462
1362	1202	1066	960	874	800	755	714	677	644	615
1705	1505	1334	1201	1093	1000	943	892	845	804	768
2048	1807	1601	1441	1312	1200	1132	1071	1015	965	921
2391	2109	1869	1682	1531	1400	1321	1248	1183	1125	1074
2734	2412	2137	1923	1750	1600	1510	1427	1353	1286	1228
3077	2714	2404	2163	1969	1800	1698	1605	1521	1447	1381

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	2.2	0:49	2.0	0:46	1.9	0:44	1.7	0:42	1.6	0:40
400	4.6	1:36	4.2	1:31	3.9	1:26	3.6	1:21	3.4	1:17
600	6.9	2:23	6.4	2:15	6.0	2:08	5.5	2:00	5.2	1:54
800	9.2	3:10	8.6	3:00	8.0	2:49	7.4	2:40	7.0	2:30
1000	11.5	3:57	10.7	3:44	9.9	3:31	9.3	3:19	8.7	3:07
1200	13.8	4:45	12.8	4:28	11.9	4:13	11.1	3:58	10.4	3:44
1400	16.0	5:32	14.8	5:13	13.8	4:54	12.9	4:37	12.2	4:20
1600	18.2	6:19	16.9	5:57	15.8	5:36	14.7	5:16	13.8	4:57
1800	20.4	7:06	18.9	6:41	17.7	6:18	16.5	5:55	15.5	5:34

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	30	40	45	50	60
5	-0.4	-0.1	0.0	0.2	0.7
10	-0.6	-0.3	0.0	0.4	1.4
15	-0.9	-0.4	0.0	0.5	1.8
20	-1.0	-0.4	0.0	0.6	2.2
25	-1.0	-0.5	0.0	0.7	2.4

Based on 220 KIAS cruise and descent.

Descent at 220 KIAS

PRESSURE ALT (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33
DISTANCE (NM)	17	26	35	39	42	46	50	53	57	61	64	68
TIME (MINUTES)	6	8	10	11	12	13	13	14	15	15	16	17

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT) 1500	5000	10000	15000	20000	25000	30000
64	%N1	72.9	75.7	79.7	83.6	87.9		
	KIAS	230	230	230	230	230		
	FF/ENG	2020	2000	1980	1980	1990		
62	%N1	71.3	74.1	78.2	82.2	86.4		
	KIAS	220	220	220	220	220		
	FF/ENG	1910	1890	1870	1860	1870		
60	%N1	70.8	73.6	77.6	81.6	85.8		
	KIAS	220	220	220	220	220		
	FF/ENG	1880	1860	1840	1820	1830		
58	%N1	70.3	73.0	77.1	81.0	85.1		
	KIAS	220	220	220	220	220		
	FF/ENG	1850	1820	1800	1790	1790		
56	%N1	69.8	72.5	76.5	80.5	84.5	89.3	
	KIAS	220	220	220	220	220	220	
	FF/ENG	1810	1790	1770	1750	1750	1770	
54	%N1	69.3	72.0	76.0	80.0	84.0	88.6	
	KIAS	220	220	220	220	220	220	
	FF/ENG	1780	1760	1740	1720	1710	1730	
52	%N1	67.5	70.2	74.2	78.3	82.3	86.7	
	KIAS	210	210	210	210	210	210	
	FF/ENG	1680	1650	1630	1610	1600	1600	
50	%N1	67.0	69.7	73.7	77.7	81.7	86.0	
	KIAS	210	210	210	210	210	210	
	FF/ENG	1650	1620	1600	1570	1560	1560	
48	%N1	66.5	69.1	73.1	77.2	81.1	85.3	
	KIAS	210	210	210	210	210	210	
	FF/ENG	1620	1590	1570	1540	1530	1530	
46	%N1	66.0	68.6	72.6	76.6	80.6	84.7	90.1
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1590	1560	1540	1510	1500	1500	1530
44	%N1	65.5	68.1	72.0	76.1	80.1	84.2	89.3
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1560	1540	1510	1490	1470	1470	1490
42	%N1	65.0	67.6	71.5	75.6	79.7	83.7	88.7
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1540	1510	1490	1460	1450	1440	1460
40	%N1	64.6	67.2	71.1	75.1	79.2	83.2	88.1
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1520	1490	1470	1440	1420	1420	1430
38	%N1	64.2	66.7	70.6	74.7	78.8	82.8	87.5
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1500	1470	1440	1410	1400	1390	1400
36	%N1	63.8	66.3	70.2	74.3	78.4	82.4	87.0
	KIAS	210	210	210	210	210	210	210
	FF/ENG	1480	1450	1420	1390	1380	1370	1380

This table includes 5% additional fuel for holding in a racetrack pattern.
Based on 230 KIAS for weights above 62823 kg.

Performance Inflight - QRH — Chapter PI-QRH
Text — Section 34

Introduction

This chapter 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 chapter 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 250 KIAS/280 KIAS/.74M climb speed schedule, normal engine bleed for packs on (Auto) and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. Apply the appropriate bleed setting %N1 adjustment shown below the table. %N1 adjustments are shown for engine bleed to packs off operation, packs high operation, and wing anti-ice on.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (Auto) and anti-ice off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. Apply the appropriate bleed setting %N1 adjustment shown below the table. %N1 adjustments are shown for engine bleed to packs off operation, packs high operation, and wing anti-ice on.

VREF

The Reference Speed table contains flaps 40, 30, and 15 landing speeds for a given weight. Apply wind correction shown as required.

Advisory Information

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, enter the appropriate table for selected landing flaps and determine the reference landing distance for the selected braking configuration. Then read across the table to adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers, using the values provided, to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. 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.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with “poor” braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be easily determined when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

Non-Normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect landing performance of the airplane. Landing distances are shown for dry runway and good, medium, and poor reported braking action. Each non-normal configuration is listed with its recommended approach speed. Landing distance can be determined for the reference landing weight and then adjusted for actual weight and pressure altitude.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding problems associated with hot brakes. For normal operation, most landings are at weights below the quick turnaround limit weight. Application of the recommended cooling procedures shown will avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

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 .74M 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 correct 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. To conservatively account for APU fuel burn, add 90 kg/hr to fuel flow values.

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 .74M/250 KIAS 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 corrections 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

Single engine holding data is provided in the same format as the all engine holding data and is based on the same assumptions.

Gear Down

This section contains performance for airplane operation with the landing gear extended for all phases of flight. 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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Maneuvers — Chapter MAN

Table of Contents — Section 0

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General

Non-Normal Maneuvers and Flight Patterns are included for training and review purposes.

Non-Normal Maneuvers

Flight crews are expected to do non-normal maneuvers from memory.

Flight Patterns

Flight patterns show procedures for some all-engine and engine-inoperative situations.

Flight patterns do not include all procedural items but show required/recommended:

- configuration changes
- thrust changes
- Mode Control Panel (MCP) changes
- pitch mode and roll mode changes
- checklist calls.

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Approach to Stall Recovery

The following is immediately accomplished at the first indication of stall buffet or stick shaker.

Pilot Flying	Pilot Monitoring
• Advance thrust levers to maximum thrust*. • Smoothly adjust pitch attitude** to avoid ground contact or obstacles. • Level the wings (do not change flaps or landing gear configuration). • Retract the speedbrakes.	• Verify maximum thrust. • Monitor altitude and airspeed. • Call out any trend toward terrain contact. • Verify all required actions have been completed and call out any omissions.
When ground contact is no longer a factor: • Adjust pitch attitude to accelerate while minimizing altitude loss. • Return to speed appropriate for the configuration.	

Note: *If an approach to stall is encountered with the autopilot engaged, apply maximum thrust and allow the airplane to return to the normal airspeed.

Note: **At high altitude, it may be necessary to descend to accelerate.

Note: If autopilot response is not acceptable, it should be disengaged.

Rejected Takeoff

The captain has the sole responsibility for the decision to reject the takeoff. The decision must be made in time to start the rejected takeoff maneuver by V1. If the decision is to reject the takeoff, the captain must clearly announce “REJECT,” immediately start the rejected takeoff maneuver, and assume control of the airplane. If the first officer is making the takeoff, the first officer must maintain control of the airplane until the captain makes a positive input to the controls.

Prior to 80 knots, the takeoff should be rejected for any of the following:

- activation of the master caution system
- system failure(s)
- unusual noise or vibration
- tire failure
- abnormally slow acceleration
- takeoff configuration warning
- fire or fire warning
- engine failure
- predictive windshear (as installed)
- if a side window opens
- if the airplane is unsafe or unable to fly.

Above 80 knots and prior to V1, the takeoff should be rejected for any of the following:

- fire or fire warning
- engine failure
- predictive windshear (as installed)
- if the airplane is unsafe or unable to fly.

During the takeoff, the crewmember observing the non-normal situation will immediately call it out as clearly as possible.

Captain	First Officer
Without delay: Simultaneously close the thrust levers, disengage the autothrottles and apply maximum manual wheel brakes or verify operation of RTO autobrake. If RTO autobrake is selected, monitor system performance and apply manual wheel brakes if the AUTO BRAKE DISARM light illuminates or deceleration is not adequate. Raise SPEED BRAKE lever. Apply the maximum amount of reverse thrust consistent with conditions. Continue maximum braking until certain the airplane will stop on the runway.	Verify actions as follows: Thrust levers closed. Autothrottles disengaged. Maximum brakes applied. Verify SPEED BRAKE lever UP and call “SPEEDBRAKES UP.” If SPEEDBRAKE lever is not UP, call “SPEEDBRAKES NOT UP.” Reverse thrust applied. Call out omitted action items.
Field length permitting: Initiate movement of the reverse thrust levers to reach the reverse idle detent by taxi speed.	Call out 60 knots. Communicate the reject decision to the control tower and cabin as soon as practical.
When the airplane is stopped, perform procedures as required. Review Brake Cooling Schedule for brake cooling time and precautions (refer to Performance Inflight Chapter). Consider the following: • The possibility of wheel fuse plugs melting • The need to clear the runway • The requirement for remote parking • Wind direction in case of fire • Alerting fire equipment • Not setting the parking brake unless passenger evacuation is necessary • Advising the ground crew of the hot brake hazard • Advising passengers of the need to remain seated or evacuate • Completion of Non-Normal checklist (if appropriate) for conditions which caused the RTO.	

Terrain Avoidance

Ground Proximity Caution

Accomplish the following maneuver for any of these aural alerts:

- SINK RATE
- TERRAIN
- DON'T SINK
- TOO LOW FLAPS
- TOO LOW GEAR
- TOO LOW TERRAIN
- GLIDESLOPE
- BANK ANGLE
- CAUTION TERRAIN
- TERRAIN AHEAD (non-FAA)
- CAUTION OBSTACLE

Pilot Flying	Pilot Monitoring
Correct the flight path or the airplane configuration.	

The below glideslope deviation alert may be cancelled or inhibited for:

- localizer 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.

Ground Proximity Warning

Accomplish the following maneuver for any of these conditions:

- Activation of the "PULL UP" or "TERRAIN TERRAIN PULL UP" warning.
- Activation of the "PULL UP" or "TERRAIN AHEAD PULL UP" (non-FAA) warning.
- Activation of the "PULL UP" or "OBSTACLE OBSTACLE PULL UP" warning.
- Other situations resulting in unacceptable flight toward terrain.

Pilot Flying	Pilot Monitoring
Disconnect autopilot. Disconnect 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 required 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. When clear of terrain, slowly decrease pitch attitude and accelerate.	Monitor vertical speed and altitude (radio altitude for terrain clearance and barometric altitude for a minimum safe altitude.) 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 required to obtain a positive terrain separation. Smooth, steady control will 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 to the takeoff or go-around limit. 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 prior to 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 a 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 TCAS II-to-TCAS II 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 initial buffet occurs during the maneuver, immediately accomplish the APPROACH TO STALL RECOVERY procedure.

Note: If high speed buffet occurs during the maneuver, relax pitch force as necessary to reduce buffet, but continue the maneuver.

Note: Do not use flight director pitch commands until clear of conflict.

For TA:

Pilot Flying	Pilot Monitoring
Look for traffic using traffic display as a guide. Call out any conflicting traffic	
If traffic is sighted, maneuver if needed.	

Note: Maneuvers based solely on a TA may result in reduced separation and are not recommended.

For RA, except a climb in landing configuration:

WARNING: A DESCEND (fly down) RA issued below 1000 feet AGL should not be followed.

Pilot Flying	Pilot Monitoring
If maneuvering 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.	

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 path unless visual contact with the conflicting 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.	

Upset Recovery

An upset can generally be defined as unintentionally exceeding the following conditions:

- Pitch attitude greater than 25 degrees nose up, or
- Pitch attitude greater than 10 degrees nose down, or
- Bank angle greater than 45 degrees, or
- Within above parameters but flying at airspeeds inappropriate 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. Careful use of rudder to aid roll control should be considered only if roll control is ineffective and the airplane is not stalled.

These techniques assume that the airplane is not stalled. A stall condition can exist at any attitude and may be recognized by continuous stick shaker activation accompanied by one or more of the following:

- Buffeting which could be heavy at times
- Lack of pitch authority and/or roll control
- Inability to arrest descent rate.

If the airplane is stalled, recovery from the stall must be accomplished first by applying and maintaining nose down elevator until stall recovery is complete and stick shaker activation ceases.

Nose High Recovery

Pilot Flying	Pilot Monitoring
• Recognize and confirm the situation	
• Disconnect autopilot and autothrottle • Apply as much as full nose-down elevator • * Apply appropriate nose down stabilizer trim • Reduce thrust • * Roll (adjust bank angle) to obtain a nose down pitch rate • Complete the recovery: - When approaching the horizon roll to wings level - Check airspeed and adjust thrust - Establish pitch attitude.	• Call out attitude, airspeed and altitude throughout the recovery • Verify all required actions have been completed and call out any omissions.

Nose Low Recovery

Pilot Flying	Pilot Monitoring
• Recognize and confirm the situation	
• Disconnect autopilot and autothrottle • Recover from stall, if required • * Roll in shortest direction to wings level (unload and roll if bank angle is more than 90 degrees) • Recover to level flight: - Apply nose up elevator - *Apply nose up trim, if required - Adjust thrust and drag as required.	• Call out attitude, airspeed and altitude throughout the recovery • Verify all required actions have been completed and call out any omissions.

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

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 Maneuver.
- 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.

Windshear encountered in flight:

- perform the Windshear Escape Maneuver.

Note: The following are indications the airplane is in windshear:

- "WINDSHEAR" warning or
- unacceptable flight path deviations.

Note: 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 Maneuver

Pilot Flying	Pilot Monitoring
MANUAL FLIGHT • Disconnect autopilot • Press either TO/GA switch • Aggressively apply maximum* thrust • Disconnect autothrottle • Simultaneously roll wings level and rotate toward an initial pitch attitude of 15 ° • Retract speedbrakes • Follow flight director TO/GA guidance (if available). AUTOMATIC FLIGHT • Press either TO/GA switch** • Verify TO/GA mode annunciation • Verify thrust advances to GA power • Retract speedbrakes • Monitor system performance***.	• Assure maximum* thrust • Verify all required actions have been completed and call out any omissions.
• Do not change flap or gear configuration until windshear is no longer a factor • Monitor vertical speed and altitude • Do not attempt to regain lost airspeed until windshear is no longer a factor.	• Monitor vertical speed and altitude • 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 to the takeoff or go-around limit. If terrain contact is imminent, advance thrust levers full forward.

Note: ** If TO/GA is not available, disconnect autopilot and autothrottle and fly manually.

WARNING: * Severe windshear may exceed the performance of the AFDS. The pilot flying must be prepared to disconnect the autopilot and autothrottle and fly manually.**

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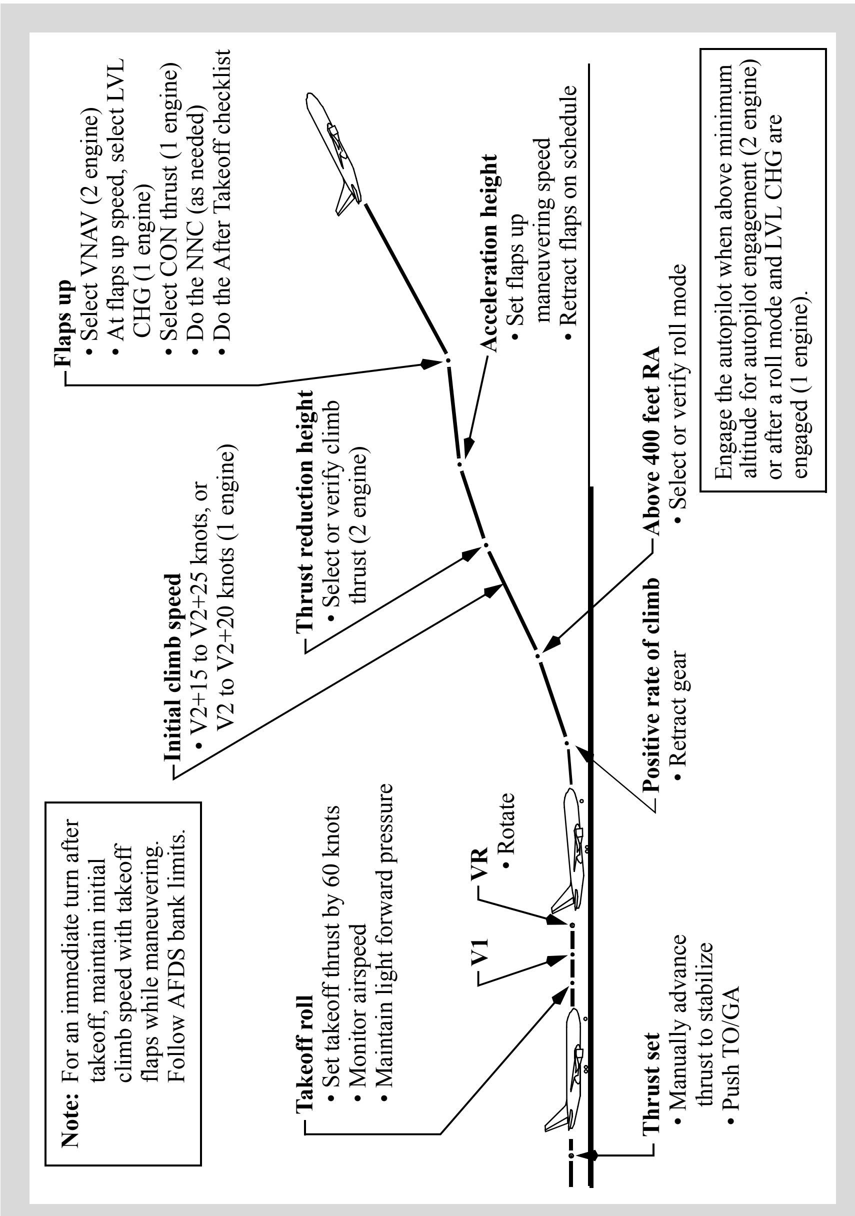
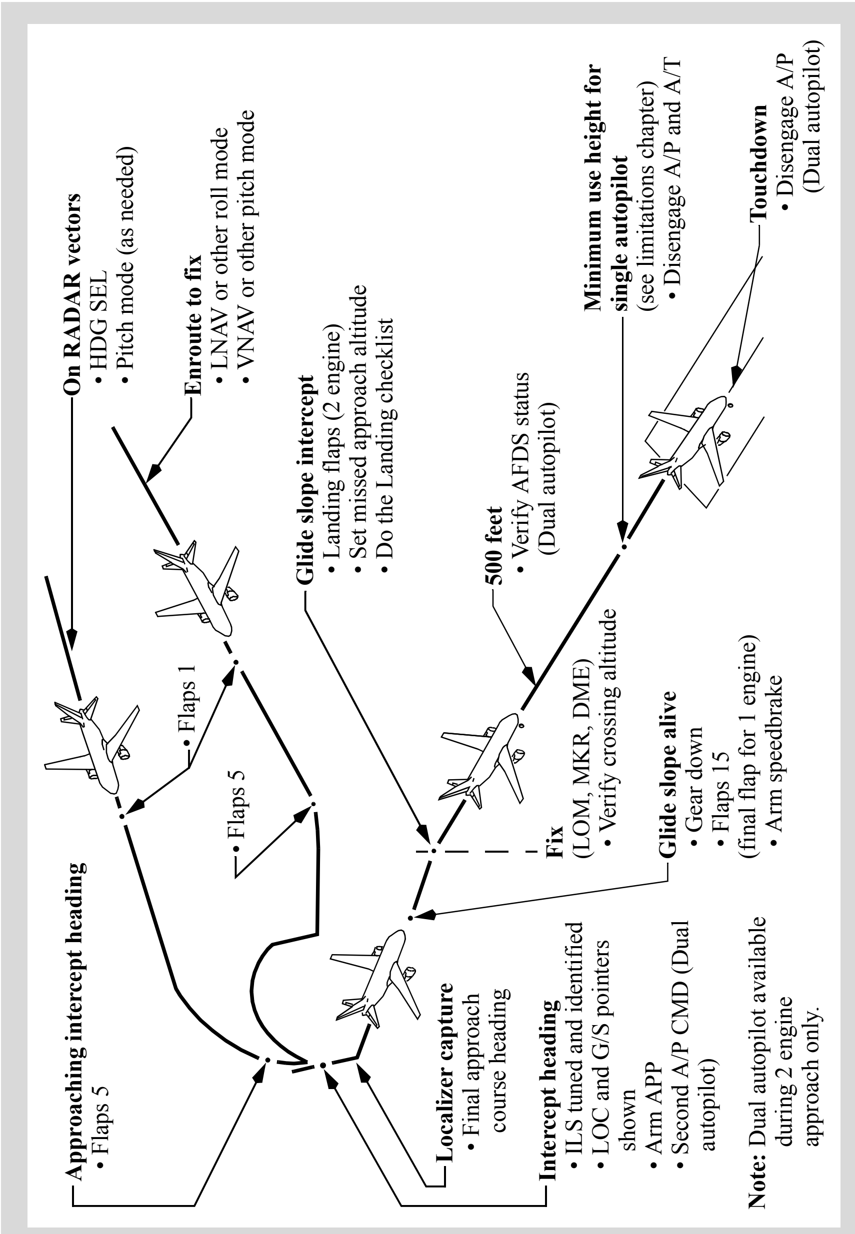
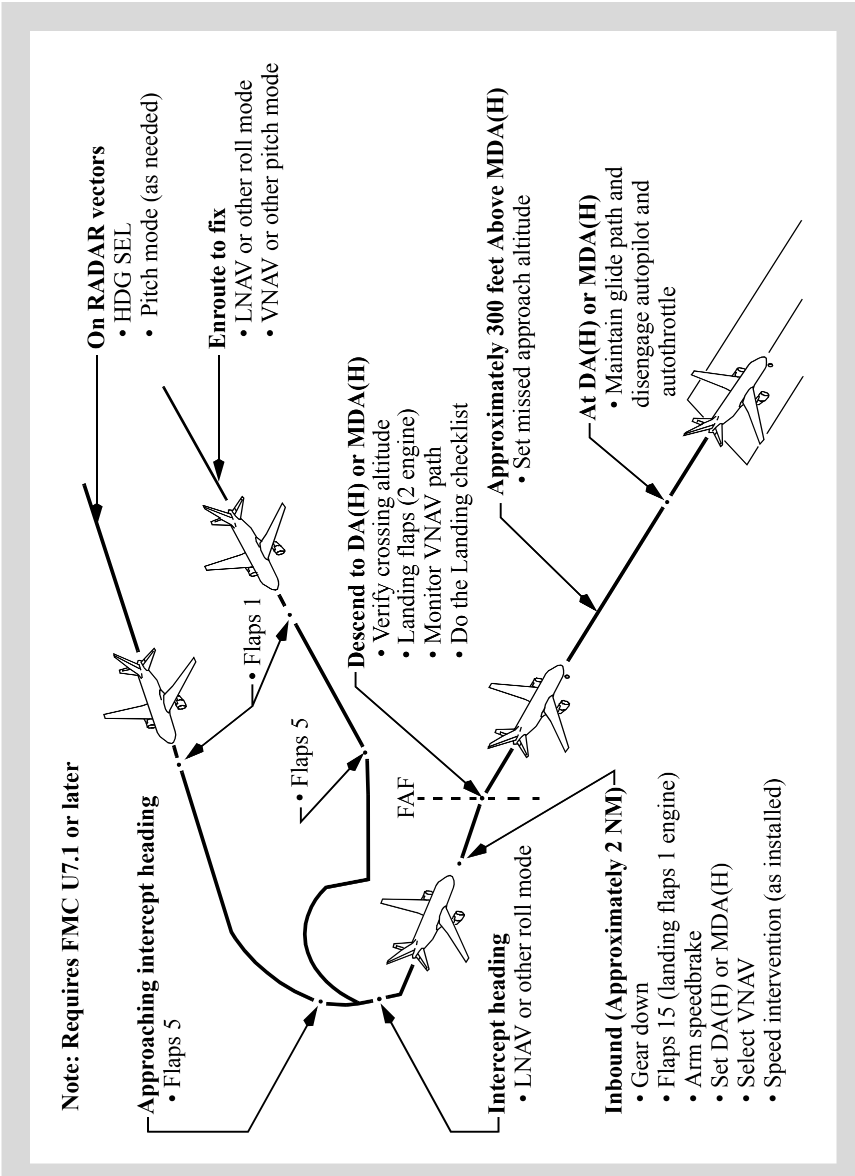
Takeoff


Flaps up
• Select VNAV (2 engine)
• At flaps up speed, select LVL CHG (1 engine)
• Select CON thrust (1 engine)
• Do the NNC (as needed)
• Do the After Takeoff checklist
Acceleration height
• Set flaps up maneuvering speed
• Retract flaps on schedule
Initial climb speed
• V2+15 to V2+25 knots, or V2 to V2+20 knots (1 engine)
Thrust reduction height
• Select or verify climb thrust (2 engine)
Above 400 feet RA
• Select or verify roll mode
Engage the autopilot when above minimum altitude for autopilot engagement (2 engine) or after a roll mode and LVL CHG are engaged (1 engine).
Positive rate of climb
• Retract gear
Note: For an immediate turn after takeoff, maintain initial climb speed with takeoff flaps while maneuvering. Follow AFDS bank limits.
Takeoff roll
• Set takeoff thrust by 60 knots
• Monitor airspeed
• Maintain light forward pressure
V1
VR
• Rotate
Thrust set
• Manually advance thrust to stabilize
• Push TO/GA

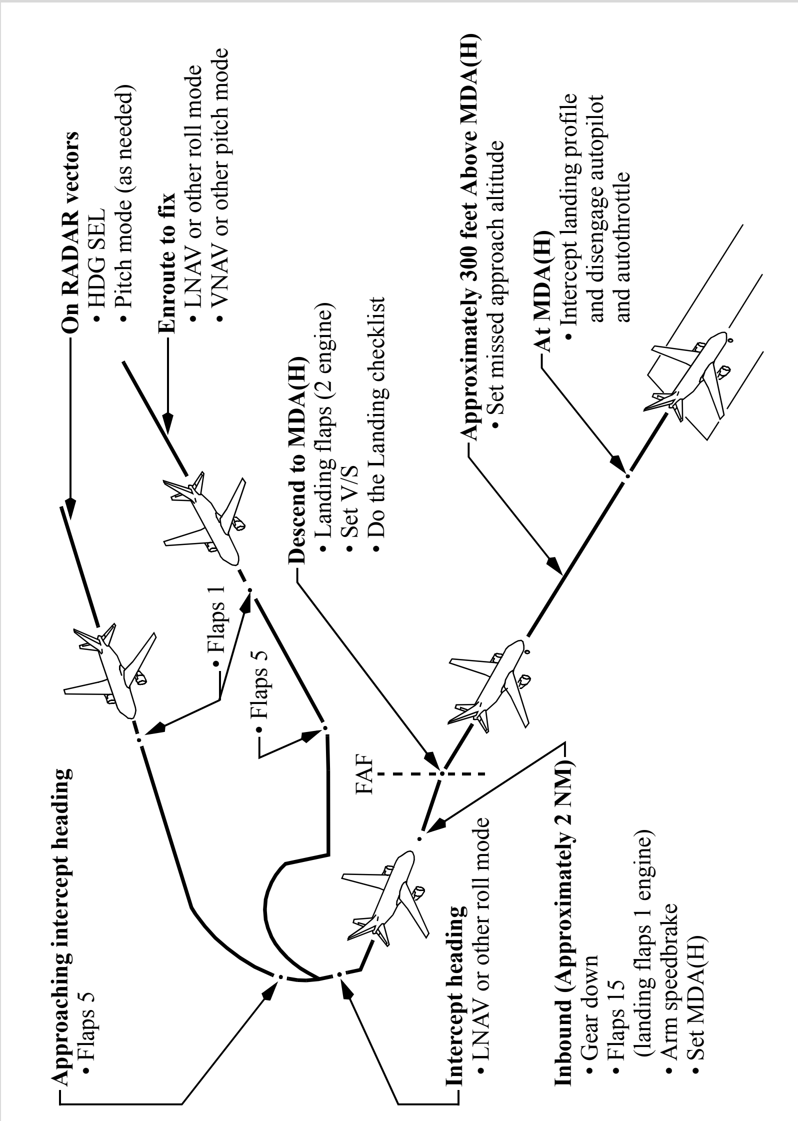
ILS Approach - Fail Passive



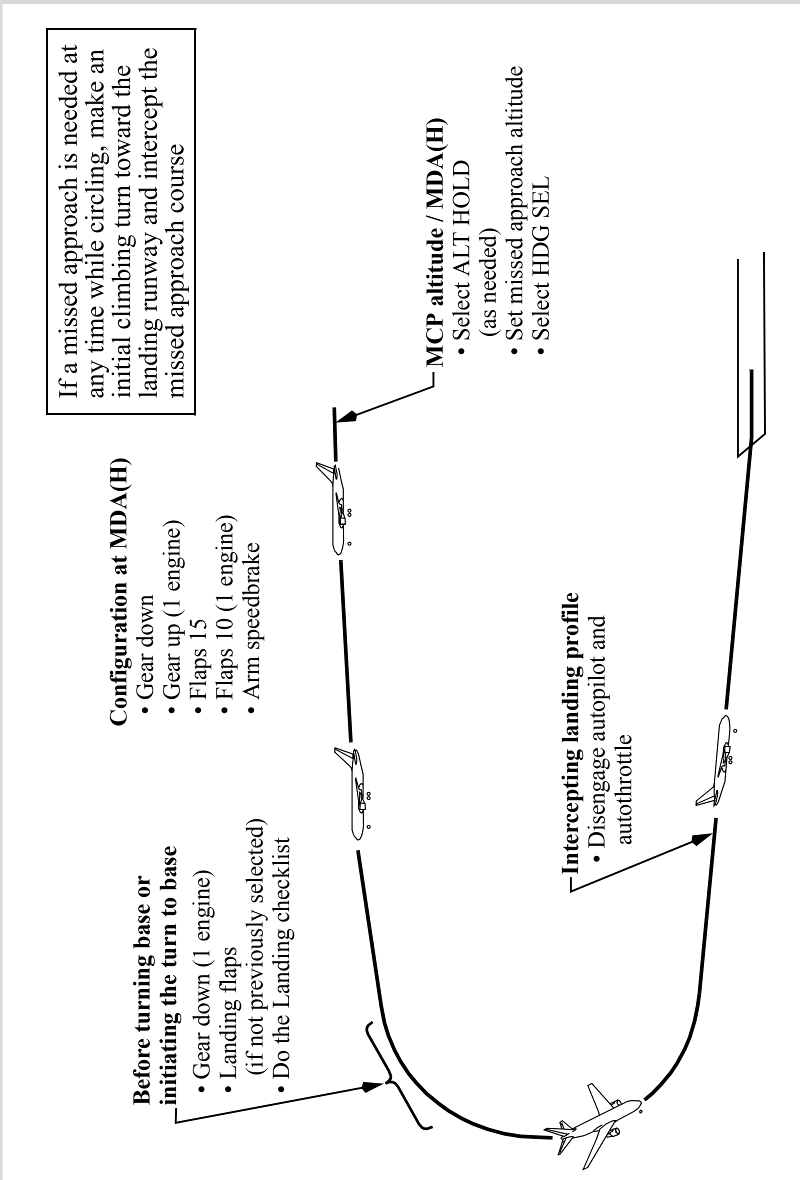
Instrument Approach using VNAV



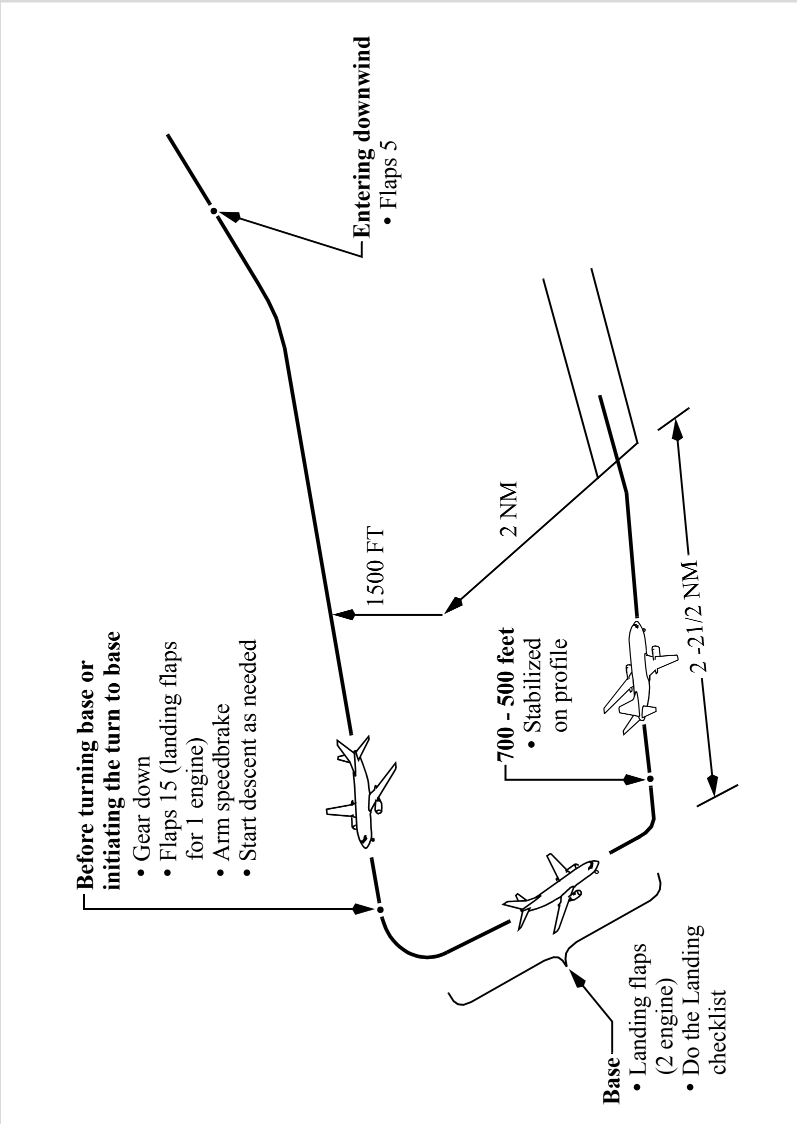
Instrument Approach using V/S



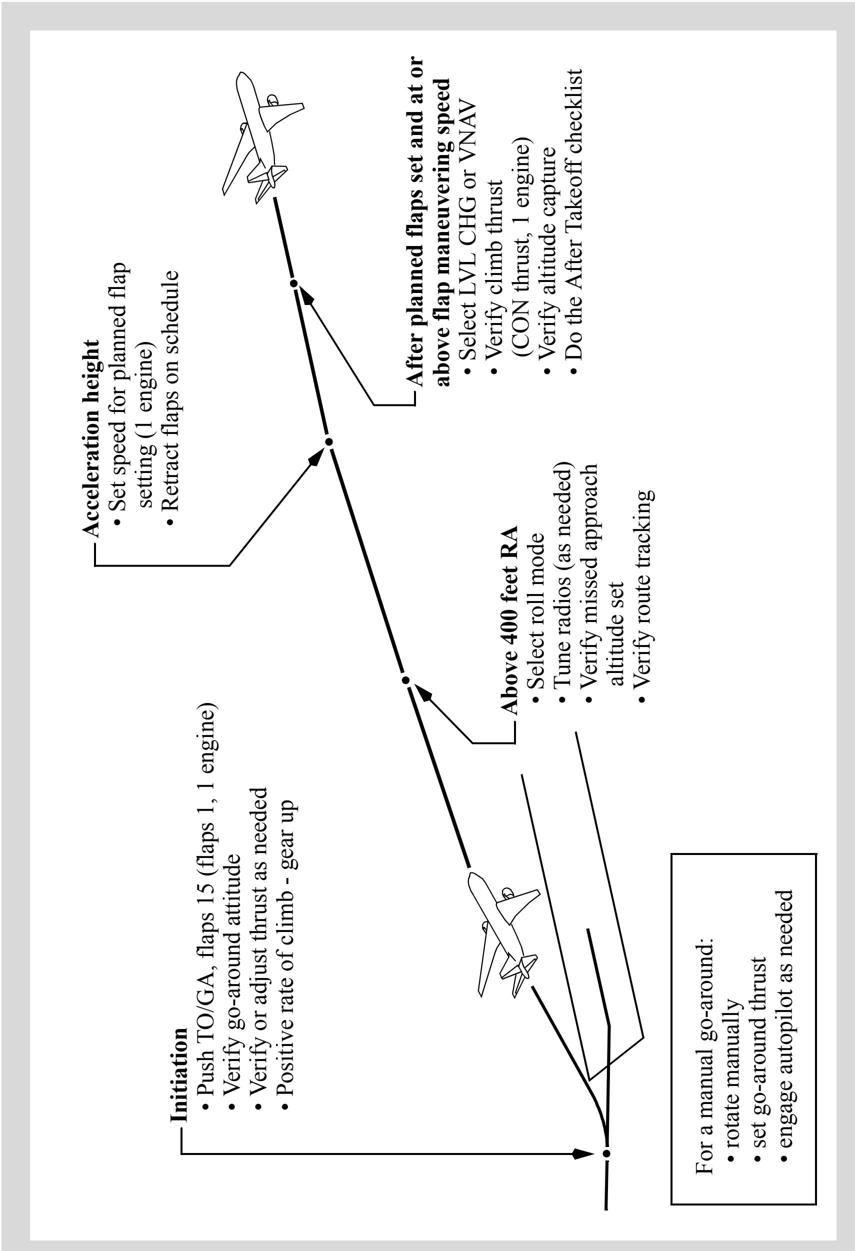
Circling Approach



Visual Traffic Pattern



Go-Around and Missed Approach



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Checklist Instructions — Chapter CI

Table of Contents — Section 0

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Checklist Instructions — Chapter CI
Model Identification — Section ModID

General

The airplanes listed in the table below are covered in the Flight Crew Operations Manual (FCOM). The table information is used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual airplanes.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. Serial and tabulation number are supplied by Boeing.

Airplane Number	Registry Number	Serial Number	Tab Number	Model Miscellaneous Data
1	BE300	BE300	BE300	737-300
2	BE400	BE400	BE400	737-400
3	BE500	BE500	BE500	737-500

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Revision Transmittal Letter

To: All holders of The Boeing Company 737 Flight Crew Operations Manual (FCOM), Boeing Document Number D6-27370-400E-TBCE.

Subject: Flight Crew Operations Manual Revision.

This revision reflects the most current information available to The Boeing Company 45 days before the subject revision date. The following revision highlights explain changes in this revision. General information below explains the use of revision bars to identify new or revised information.

Revision Record

No.	Revision Date	Date Filed	No.	Revision Date	Date Filed
0	February 13, 1998		1	June 12, 1998	
2	December 4, 1998		3	June 11, 1999	
4	December 3, 1999		5	June 9, 2000	
6	December 1, 2000		7	June 8, 2001	
8	December 7, 2001		9	June 7, 2002	
10	December 6, 2002		11	June 6, 2003	
12	December 5, 2003		13	June 4, 2004	
14	December 3, 2004		15	June 3, 2005	
16	December 2, 2005		17	June 9, 2006	
18	December 8, 2006		19	June 8, 2007	
20	December 7, 2007		21	August 18, 2008	
22	December 5, 2008		23	June 12, 2009	
24	December 4, 2009		25	June 18, 2010	

General

The Boeing Company issues FCOM revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued FCOM bulletins.

The revision date is the approximate date the manual is approved for printing. The revision is mailed a few weeks after this date.

Formal revisions include a Transmittal Letter, a new Revision Record, Revision Highlights, and a current List of Effective Pages. Use the information on the new Revision Record and List of Effective Pages to verify the FCOM content.

Pages containing revised technical material have revision bars associated with the changed text or illustration. Editorial revisions (for example, spelling corrections) may have revision bars with no associated highlight.

The Revision Record should be completed by the person incorporating the revision into the manual.

Filing Instructions

Consult the List of Effective Pages (CI.LEP). Pages identified with an asterisk (*) are either replacement pages or new (original) issue pages. Remove corresponding old pages and replace or add new pages. Remove pages that are marked DELETED; there are no replacement pages for deleted pages.

Revision Highlights

This section (CI.RR) replaces the existing section CI.RR in your manual.

Be careful when inserting changes not to throw away pages from the manual that are not replaced. Using the List of Effective Pages (CI.LEP) can help determine the correct content of the manual.

Throughout the manual, airplane effectivity may be updated to reflect coverage as listed on the Preface - Model Identification page, or to show service bulletin airplane effectivity. Highlights are not supplied.

This manual is published from a database; the text and illustrations are marked with configuration information. Occasionally, because the editors rearrange the database markers, or mark items with configuration information due to the addition of new database content, some customers may receive revision bars on content that appears to be unchanged. Pages may also be republished without revision bars due to slight changes in the flow of the document.

Chapter NNC - Non-Normal Checklists

Section 6 - Electrical

BUS OFF

6.1 - Replaced the "If" statement with a "Choose one" decision step for clarification.

Section 7 - Engines, APU

Engine Limit or Surge or Stall

7.2 - Added other possible indications of an engine surge or stall in the condition statement.

7.2 - Revised the condition statement to make it clear that this checklist also applies to partial loss of engine thrust control malfunctions.

Section 8 - Fire Protection

Smoke, Fire or Fumes

8.8 - Revised the condition statement to clarify that the checklist should be done whenever smoke, fire or fumes occurs.

Section 9 - Flight Controls

Trailing Edge Flap Disagree

9.34 - Replaced the "If" statement with a "Choose one" decision step for clarification.

Chapter PI-QRH - Performance Inflight - QRH

Section 10 - Table of Contents

PI-QRH.TOC.10.1 - 737-300 CFM56-3_22K KG FAA was added as Section 10.

Section 10 - General

General

PI-QRH.10.1 - 737-300 CFM56-3_22K KG FAA was added as Section 10.

Section 20 - Table of Contents

PI-QRH.TOC.20.1 - 737-400 CFM56-3_23.5K KG FAA was added as Section 20.

Section 21 - Advisory Information

Non-Normal Configuration Landing Distance

PI-QRH.21.4-11 - Revised Non-Normal Configuration Landing Distance Data. New data include Slope and Approach Speed Adjustments. Also changed the weight Reference Distance is based on to match reference weight of preceding Normal Configuration Landing Distance Data.

Section 30 - Table of Contents

PI-QRH.TOC.30.1 - 737-500 CFM56-3_20K KG FAA was added as Section 30.

Section 31 - Advisory Information

Non-Normal Configuration Landing Distance

PI-QRH.31.4-11 - Revised Non-Normal Configuration Landing Distance Data. New data include Slope and Approach Speed Adjustments. Also changed the weight Reference Distance is based on to match reference weight of preceding Normal Configuration Landing Distance Data.

Chapter CI - Checklist Instructions

Section 2 - Non-Normal Checklists

Non–Normal Checklist Operation

CI.2.2 - Added a paragraph regarding the risks of in-flight troubleshooting.

Checklist Instructions — Chapter CI
QRH List of Effective Pages — Section LEP

* = Revised, Added, or Deleted

Page	Date
6 Electrical (tab)	
6.TOC.1-2	December 5, 2008
* 6.1	June 18, 2010
6.2	December 5, 2008
6.3-4	August 18, 2008
6.5-6	December 4, 2009
6.7-10	June 12, 2009
6.11	June 30, 2009
6.12	August 18, 2008
7 Engines, APU (tab)	
7.TOC.1-2	December 5, 2008
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9.TOC.1-2	December 4, 2009
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10 Flight Instruments, Displays (tab)	
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12.TOC.1-2	August 18, 2008
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12.3	August 18, 2008
12.4-6	December 4, 2009
12.7-11	August 18, 2008
12.12	December 5, 2008
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* CI.TOC.0.1-2	June 18, 2010
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* CI.RR.1-4	June 18, 2010
* CI.RR.5-6	Deleted
* CI.LEP.1-4	June 18, 2010
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* CI.2.2-7	June 18, 2010
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Back Cover.1	August 18, 2008
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* = Revised, Added, or Deleted

Introduction

This introduction gives guidelines for use of the Normal Checklist (NC).

The NC is organized by phase of flight.

The NC is used to verify that critical items have been done.

Normal Checklist Operation

Normal checklists are used after doing all respective procedural items.

The following table shows which pilot calls for the checklist and which pilot reads the checklist. Both pilots visually verify that each item is in the needed configuration or that the step is done. The far right column shows which pilot gives the response. This is different than the normal procedures where the far right column can show which pilot does the step.

Checklist	Call	Read	Verify	Respond
PREFLIGHT	Captain	First officer	Both	Area of responsibility
BEFORE START	Captain	First officer	Both	Area of responsibility
BEFORE TAXI	Captain	First officer	Both	Area of responsibility
BEFORE TAKEOFF	Pilot flying	Pilot monitoring	Both	Pilot flying
AFTER TAKEOFF	Pilot flying	Pilot monitoring	Both	Pilot monitoring
DESCENT	Pilot flying	Pilot monitoring	Both	Area of responsibility
APPROACH	Pilot flying	Pilot monitoring	Both	Area of responsibility
LANDING	Pilot flying	Pilot monitoring	Both	Pilot flying
SHUTDOWN	Captain	First officer	Both	Area of responsibility
SECURE	Captain	First officer	Both	Area of responsibility

If the airplane configuration does not agree with the needed configuration:

- stop the checklist
- complete the respective procedure steps
- continue the checklist

If it becomes apparent that an entire procedure was not done:

- stop the checklist
- complete the entire procedure
- do the checklist from the start

Try to do checklists before or after high work load times. The crew may need to stop a checklist for a short time to do other tasks. If the interruption is short, continue the checklist with the next step. If a pilot is not sure where the checklist was stopped, do the checklist from the start. If the checklist is stopped for a long time, also do the checklist from the start.

After completion of each checklist, the pilot reading the checklist calls, "___ CHECKLIST COMPLETE."

Checklist Content

The checklist has the minimum items needed to operate the airplane safely.

Normal checklists have items that meet any of the following criteria:

- items essential to safety of flight that are not monitored by an alerting system, or
- items essential to safety of flight that are monitored by an alerting system but if not done, would likely result in a catastrophic event if the alerting system fails, or
- items needed to meet regulatory requirements, or
- items needed to maintain fleet commonality between the 737, 747-400, 757, 767, 777, and 787, or
- items that enhance safety of flight and are not monitored by an alerting system (for example the autobrake), or
- during shutdown and secure, items that could result in injury to personnel or damage to equipment if not done.

Checklist Construction

When a checklist challenge does not end with “switch or lever”, then the challenge refers to system status. For example, “Landing Gear...Down”, refers to the status of the landing gear, not just the position of the lever.

When a checklist challenge ends with “switch or lever”, then the challenge refers to the position of the switch or lever. For example, “Engine start levers...CUTOFF” refers to the position of the levers.

Checklist Instructions — Chapter CI

Non-Normal Checklists — Section 2

Introduction

The non-normal checklists chapter contains checklists used by the flight crew to manage non–normal situations. The checklists are grouped in sections which match the system description chapters in Volume 2.

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.

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, Engine Fuel Leak is in section 12, Fuel. Unannunciated checklists with no associated system are in section 0, Miscellaneous.

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.

Some checklists have objective statements. The objective statement briefly describes the expected result of doing the checklist or briefly describes the reason for steps in the checklist.

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.

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.

Checklists that need a quick response are listed in the Quick Action Index. 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.

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. Flight patterns for some non–normal situations are located in the Maneuvers chapter and show the sequence of configuration changes.

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 combine the elements of more than one checklist. In all situations, the captain must assess the situation and use good judgment to determine the safest course of action.

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.

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.

It must be stressed that for smoke that continues or a fire that cannot be positively confirmed to be 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.

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.

There are no non–normal checklists for the loss of an engine indication or automatic display of the secondary engine indications. Continue normal engine operation unless a limit is exceeded.

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 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.
- Flight crew reset of tripped fuel pump or fuel pump control circuit breakers is prohibited. In flight, reset of a tripped circuit breaker is not recommended. However, a tripped circuit breaker may be reset once, after a short cooling period (approximately 2 minutes), if in the judgment of the captain, the situation resulting from the circuit breaker trip has a significant adverse effect on safety. 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 a non-normal checklist.

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.

Non–Normal Checklist Use

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 can be listed by airplane number, registry number, serial number or tabulation 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.

Non–normal checklist use starts when the airplane flight path and configuration are correctly established. Only a few situations need an immediate response (such as CABIN ALTITUDE WARNING or Rapid Depressurization). 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.

When a non–normal situation occurs, at the direction of the pilot flying, both crewmembers do all memory items in their areas of responsibility without delay.

The pilot flying calls for the checklist when:

- the flight path is under control
- the airplane is not in a critical phase of flight (such as takeoff or landing)
- all memory items are complete.

The pilot monitoring reads aloud:

- the checklist title
- 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.

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.

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 when only one IRS is failed
- a flight control switch

This does not apply to the Loss of Thrust on Both Engines checklist.

With the airplane stationary on the ground:

- the captain and first officer take action based on preflight and postflight areas of responsibility;
- during an evacuation, the first officer 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.

The pilot flying may also direct reference checklists to be done by memory if no hazard is created by such action, or if the situation does not allow reference to the checklist.

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.

After completion of the non–normal checklist, normal procedures are 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 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.

When there are deferred items, the Deferred Items section of the non-normal checklist will include the Descent, Approach and Landing normal checklists. These checklists should be used instead of the usual DESCENT, APPROACH and LANDING normal checklists. If a normal checklist item is changed as a result of the non-normal situation, the changed response is printed in **bold** type. The pilot flying or the pilot monitoring responds to the deferred normal checklist items based on each crewmember's area of responsibility. However, during the deferred Landing normal checklist, the pilot flying responds to all deferred normal checklist items.

Each checklist has a checklist complete symbol at the end. The following symbol indicates that the checklist is complete:

■ ■ ■ ■

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."

Additional information at the end of the checklist is not required to be read.

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 Checklist Legend

Redirection Symbol

▶▶

The redirection symbol is used in two ways:

- In the Table of Contents of a system section, to direct the flight crew to a different system section.
- In a non-normal checklist, with the word "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:

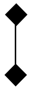
- In the Table of Contents of a system section, to separate the Quick Action Index checklists from the checklists that are not in the Quick Action Index.
- In a non-normal checklist, to separate the memory items from the reference items.

Task Divider Symbol

The task divider symbol is used to indicate the end of one task and the beginning of another task.

Decision Symbol

Choose one:



The decision symbol is used to identify possible choices.

Precaution Symbol

The precaution symbol is used to identify information the flight crew must consider before taking the action.

Intentionally
Blank

Evacuation Checklist is on the reverse side of this page.

Evacuation

Condition: Evacuation is needed.

1 PARKING BRAKE . . . . Set C

2 Speedbrake lever . . . . DOWN C

3 FLAP lever . . . . 40 F/O

4 STANDBY POWER switch . . . . BAT F/O

5 Pressurization mode selector . . . MAN DC F/O

6 Outflow VALVE switch . . . . Hold in OPEN until the outflow VALVE position indicates fully open F/O

7 **If** time allows:

Verify that the flaps are 40 before the engine start levers are moved to CUTOFF. C

8 Engine start levers (both) . . . . . CUTOFF C

9 Advise the cabin to evacuate. C

10 Advise the tower. F/O

11 Engine and APU fire switches (all) . . . . Override and pull F/O

12 **If** an engine or APU fire warning occurs:

Illuminated fire switch . . . . Rotate to the stop and hold for 1 second F/O

■ ■ ■ ■