DO NOT USE FOR FLIGHT

BBJ

Quick Reference Handbook

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PREFLIGHT

Oxygen. . . . . Tested, 100%

Navigation transfer
and display switches . . . . NORMAL, AUTO

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, Pumps ON & AUX set

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

Probe heat . . . . .ON

Anti-ice . . . . ___

Isolation valve . . . . AUTO

[Without automatic ignition]
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 . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

APPROACH

Altimeters . . . . ___

LANDING

[Without automatic ignition]

Engine start switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

SHUTDOWN

Fuel pumps . . . . OFF

Probe 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

Condition: One or more of these occur:
- Cabin altitude 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.

■ ■ ■ ■

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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.

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 . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . **OFF**

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

▼ Continued on next page ▼

▼ Ditching continued ▼

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Below 5000 feet

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

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

AUXILIARY FUEL TRANSFER switches (all) . . . . OFF

Passenger signs . . . . ON

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

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

Pressurization mode selector . . . . MAN

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

This prevents water from entering the airplane.

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

APU switch . . . . OFF

▼ Continued on next page ▼

Ditching continued

[Option - Ground Proximity Gear Inhibit switch]

GROUND PROXIMITY GEAR INHIBIT switch . . . . GEAR INHIBIT

GROUND PROXIMITY TERR INHIBIT switch . . . . TERR INHIBIT

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

Confirm that passenger cabin preparations are complete.

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

Transmit all pertinent information regarding final ditching position.

After Impact Procedure Review

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

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

Start the evacuation.

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

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

Continued on next page

▼ Ditching continued ▼

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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AIR STAIR

AIRSTAIR

[Option - Forward airstairs]

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 LAND ALT indicator . . . . .9,000 feet

▼ **Continued on next page** ▼

▼ **AIRSTAIR continued** ▼

7 Choose one:

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

  ►►**Go to step 8**

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

  ►►**Go to step 10**

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

  ►►**Go to step 12**

8 Descend to 9000 feet.

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

►►**Go to step 15**

10 Descend to the minimum safe altitude.

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

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

►►**Go to step 15**

12 Descend to the minimum safe altitude.

▼ **Continued on next page** ▼

▼ **AIRSTAIR continued** ▼

13 Pressurization mode selector . . . . MAN

14 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 lights (if installed and operative) will illuminate at a cabin altitude of approximately 10,000 feet.

15 Plan to land at the nearest suitable airport.

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

Oxygen masks may be removed.

■ ■ ■ ■

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 LAND ALT indicator . . . . .9,000 feet

▼ **Continued on next page** ▼

▼ **CARGO DOOR continued** ▼

7 Choose one:

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

►►**Go to step 8**

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

►►**Go to step 10**

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

►►**Go to step 12**

8 Descend to 9000 feet.

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

►►**Go to step 15**

10 Descend to the minimum safe altitude.

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

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

►►**Go to step 15**

12 Descend to the minimum safe altitude.

▼ **Continued on next page** ▼

▼ CARGO DOOR continued ▼

13 Pressurization mode selector . . . . MAN

14 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 lights (if installed and operative) will illuminate at a cabin altitude of approximately 10,000 feet.

15 Plan to land at the nearest suitable airport.

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

Oxygen masks may be removed.

■ ■ ■ ■

ELT

ELT

[Option - Gables G7116-01 and Artex 453-0161]

Condition: The emergency locator transmitter is on.

Objective: To reset the ELT.

1 **If** an uncommanded ELT activation occurs:

ELT switch . . . . ON, then ARM

■ ■ ■ ■

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 LAND ALT indicator . . . . 9,000 feet

▼ **Continued on next page** ▼

▼ EQUIPMENT DOOR continued ▼

7 Choose one:

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

►► **Go to step 8**

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

►► **Go to step 10**

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

►► **Go to step 12**

8 Descend to 9000 feet.

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

►► **Go to step 15**

10 Descend to the minimum safe altitude.

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

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

►► **Go to step 15**

12 Descend to the minimum safe altitude.

▼ Continued on next page ▼

▼ EQUIPMENT DOOR continued ▼

13 Pressurization mode selector . . . . MAN

14 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 lights (if installed and operative) will illuminate at a cabin altitude of approximately 10,000 feet.

15 Plan to land at the nearest suitable airport.

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

Oxygen masks may be removed.

■ ■ ■ ■

LOCK FAIL

LOCK FAIL

Condition: One or more of these occur:
- The FLIGHT DECK ACCESS SYSTEM switch is OFF
- The lock is failed.

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.

■ ■ ■ ■

OVERWING DOOR

[737 - 600/700]

LEFT OVERWING	RIGHT OVERWING

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

1 Choose one:

◆ Pressurization is **normal**:

Continue normal operation.

■ ■ ■ ■

◆ Pressurization is **not** normal:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

OVERWING DOOR

[737 - 800/900]

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

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

1 Choose one:

◆Pressurization is **normal**:

Continue normal operation.

■ ■ ■ ■

◆Pressurization is **not** normal:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

PASS OXY ON

PASSENGER OXYGEN ON

Condition: The passenger oxygen system is on.

■ ■ ■ ■

SERVICE DOOR

FWD SERVICE	AFT SERVICE

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

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

2 Choose one:

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

▶▶**Go to step 3**

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

Plan to land at the nearest suitable airport.

■ ■ ■ ■

3 Choose one:

◆Pressurization is **normal**:

Continue normal operation.

■ ■ ■ ■

◆Pressurization is **not** normal:

Plan to land at the nearest suitable airport.

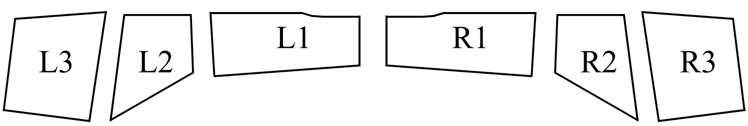
■ ■ ■ ■

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 Choose one:

◆ Window is **delaminated** only:

Continue normal operation.

■ ■ ■ ■

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

►► **Go to step 2**

2 Don seat belts and shoulder harnesses.

▼ **Continued on next page** ▼

▼ Window Damage continued ▼

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

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

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

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

Window 1 or 2 **outer** pane

[Option - Window 3 heated]
Window 3 heated **outer** pane

►►**Go to step 7**

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

Window 1 or 2 **inner** pane

[Option - Window 3 heated]
Window 3 heated **inner** pane

►►**Go to step 9**

7 Continue normal operation.

8 Shoulder harnesses may be removed.

■ ■ ■ ■

9 Don oxygen masks.

10 Establish crew communications.

11 Passenger signs . . . . .ON

▼ Continued on next page ▼

▼ **Window Damage continued** ▼

12 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 13**

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

►► **Go to step 13**

13 LAND ALT indicator . . . . 9,000 feet

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

15 Plan to land at the nearest suitable airport.

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

Oxygen masks and shoulder harnesses may be removed.

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

■ ■ ■ ■

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 (If installed and operative)

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 lights (if installed and operative) illuminate.

1 Don oxygen masks and set regulators to 100%.

2 Establish crew communications.

3 Pressurization mode selector . . . . MAN

4 Outflow VALVE switch . . . . Hold in CLOSE until 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. . . . . . ALTN

►►**Go to step 5**

5 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

►►**Go to step 6**

6 Pressurization mode selector . . . . MAN

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

▼ Continued on next page ▼

▼ AUTO FAIL or Unscheduled Pressurization Change continued ▼

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**

Recall . . . . Checked

Autobrake . . . . ___

▼ Continued on next page ▼

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

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

[Without automatic ignition]
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 backpressure of the APU.

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

2 **After** engine start:

APU BLEED air switch . . . . OFF

■ ■ ■ ■

DUCT OVERHEAT

DUCT OVERHEAT

[737-600/700]

Condition: A duct overheat occurs.

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

This prevents the air mix valves from returning to an overheat condition.

2 TRIP RESET switch . . . . Push

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

3 Monitor duct temperature.

4 **If** the duct temperature increases rapidly or the air mix valve indicator moves toward full hot:

Temperature selector . . . . MANUAL

Adjust the air mix valve position as needed.

■ ■ ■ ■

OFF

EQUIPMENT COOLING OFF

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

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

Note: Illumination of the EQUIP COOLING 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

■ ■ ■ ■

PACK

[737-800/900]

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

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.

Close cabin window shades.

CAB/UTIL switch . . . . OFF

▼ Continued on next page ▼

▼ PACK continued ▼

IFE/PASS SEAT switch. . . . . OFF

■ ■ ■ ■

PACK TRIP OFF

PACK TRIP OFF

[737-600/700]

Condition: A pack overheat occurs.

1 Temperature selectors (all) . . . . .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

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

This increases airplane ventilation.

▼ Continued on next page ▼

▼ PACK TRIP OFF continued ▼

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.

Instruct the cabin crew to:

Dim cabin lighting.

Close cabin window shades.

CAB/UTIL switch . . . . OFF

IFE/PASS SEAT switch. . . . . OFF

■ ■ ■ ■

Intentionally
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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

ZONE TEMP

[737-800/900]

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

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

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

2 TRIP RESET switch . . . . Push

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

3 **If** duct temperature increases rapidly:

TRIM AIR switch. OFF

■ ■ ■ ■

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COWL ANTI-ICE

ENGINE COWL ANTI-ICE

Condition: An engine cowl anti-ice duct overpressure occurs.

Objective: To reduce cowl duct pressure 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 OR TAI INDICATION

Condition: An engine COWL VALVE OPEN light stays illuminated bright blue and an amber TAI indication is shown 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.

■ ■ ■ ■

PROBE HEAT

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

Condition: One or more probe heats are failed.

1 Avoid icing conditions.

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

■ ■ ■ ■

OVERHEAT

WINDOW OVERHEAT

Condition: A window overheat occurs.

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

2 **Wait** 2 - 5 minutes.

3 WINDOW HEAT switch (affected window) . . . . ON

4 Choose one:

◆Window OVERHEAT light **stays extinguished**:

Continue normal operation.

■ ■ ■ ■

◆Window OVERHEAT light **illuminates again**:

►►**Go to step 5**

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

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

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

■ ■ ■ ■

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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.

■ ■ ■ ■

Intentionally
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Non-Normal Checklists — Chapter NNC

Communications — Section 5

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Blank

Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

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

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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BAT DISCHARGE

BATTERY DISCHARGE

Condition: A battery discharge exceedance occurs.

[Option - Dual battery]

Note: Fully charged batteries supply a minimum of 60 minutes of standby power.

■ ■ ■ ■

DRIVE

DRIVE

Condition: A generator drive malfunction occurs.

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.

■ ■ ■ ■

ELEC

ELEC

Condition: A standby power or DC system fault occurs.

Note: The ELEC light illuminates on the ground only.

■ ■ ■ ■

LOSS OF BOTH ENGINE DRIVEN GENERATORS

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

Condition: Both engine driven generators are off.

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

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

2 Choose one:

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

▶▶**Go to step 3**

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

▶▶**Go to step 5**

◆**Both** SOURCE OFF lights **extinguish**:

YAW DAMPER switch . . . . .ON

▶▶**Go to step 15**

A single SOURCE OFF light stays illuminated

3 YAW DAMPER switch . . . . .ON

▼ Continued on next page ▼

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

4 Choose one:

◆APU is **available** for start:

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

APU . . . . START

When APU is running:

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

►►**Go to step 15**

◆APU is **not** available:

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

►►**Go to step 15**

Both SOURCE OFF lights stay illuminated

5 Choose one:

◆APU is **available** for start:

BUS TRANSFER switch . . . . OFF

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

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

APU . . . . START

▶▶**Go to step 6**

◆APU is **not** available:

▶▶**Go to step 12**

6 **When** APU is running:

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

[Option - Dual battery]
7 **If** REMOTE CONTROL circuit breaker (RCCB REMOTE) (STBY power control unit, P6-5:A4) is tripped:

Reset circuit breaker.

▼ Continued on next page ▼

▼ LOSS OF BOTH ENGINE DRIVEN GENERATORS continued ▼

8 Choose one:

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

►►**Go to step 9**

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

►►**Go to step 12**

9 BUS TRANSFER switch . . . . AUTO

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

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

11 YAW DAMPER switch . . . . ON

►►**Go to step 15**

Both SOURCE OFF lights stay illuminated

12 Avoid icing conditions.

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

13 Plan to land at the nearest suitable airport.

[Option - Dual battery]

Note: Fully charged batteries supply a minimum of 60 minutes of standby power.

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

▼ Continued on next page ▼

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

15 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 16**

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

IRS TRANSFER switch. . . . . BOTH ON L

Do **not** use either autopilot.

If both SOURCE 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**.

16 ⚠ 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.

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

18 The MAP display is not available.

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

20 Do **not** use either autopilot.

■ ■ ■ ■

SOURCE OFF

SOURCE OFF

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

1 Choose one:

◆**Both** SOURCE OFF ights are illuminated:

▶▶**Go to the LOSS OF BOTH ENGINE DRIVEN GENERATORS checklist on page 6.4**

■ ■ ■ ■

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

▶▶**Go to step 2**

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

3 Choose one:

◆SOURCE OFF light **extinguishes**:

■ ■ ■ ■

◆SOURCE OFF light **stays illuminated**:

▶▶**Go to step 4**

▼ Continued on next page ▼

▼ **SOURCE OFF continued** ▼

4 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 5**

◆APU is **not** available:

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

■ ■ ■ ■

5 Choose one:

◆SOURCE OFF light **extinguishes**:

■ ■ ■ ■

◆SOURCE OFF light **stays illuminated**:

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

■ ■ ■ ■

STANDBY PWR OFF

STANDBY POWER OFF

Condition: One or more of these buses are not energized:
- AC standby bus
- DC standby bus
- Battery bus.

1 STANDBY POWER switch . . . . BAT

■ ■ ■ ■

TR UNIT

TR UNIT

Condition: One or more transformer rectifiers are failed.

[Airplanes without IAN]

1 Do not use the AFDS approach mode.

Note: Autoland is not available.

■ ■ ■ ■

TRANSFER BUS OFF

TRANSFER BUS OFF

Condition: The transfer bus is not energized.

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

2 Choose one:

◆TRANSFER BUS OFF light **extinguishes**:

■ ■ ■ ■

◆TRANSFER BUS OFF light **stays illuminated**:

▶▶**Go to step 3**

3 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

■ ■ ■ ■

◆APU is **not** available:

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

■ ■ ■ ■

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Aborted Engine Start

[Without Automatic Ignition]

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
- There is no response to thrust lever movement or the response is abnormal.

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 . . . . TA ONLY

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.

[Airplanes without Fail Operational Autoland Capability]

►► **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
- Both ENG FAIL alerts show.

Objective: To restart at least one engine.

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

2 Engine start levers (both) . . . . CUTOFF

3 **When** EGT decreases:

Engine start levers (both) . . . . IDLE detent

4 **If** EGT reaches 950°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 950°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 switches (both). . . . . ON, one at a time

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 11%**:

Attempt a windmill start.

▶▶**Go to step 11**

◆**N2** is **at or below 11%**:

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 11%:

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

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

■ ■ ■ ■

LOW OIL PRESSURE

APU LOW OIL PRESSURE

Condition: The APU oil pressure is low.

Note: The APU shuts down automatically.

1 APU switch. . . . . OFF

The LOW OIL PRESSURE light extinguishes in 5 minutes.

■ ■ ■ ■

OVER SPEED

APU OVERSPEED

Condition: One of these occurs:

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

1 APU switch. . . . . OFF

The APU OVERSPEED light extinguishes in 5 minutes.

■ ■ ■ ■

ALTN

EEC ALTERNATE MODE

Condition: An EEC operates in the alternate control mode.

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

2 Thrust levers (both) . . . . . Retard to mid position

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

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

This ensures both engines operate in alternate mode.

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

Note: Maximum thrust limiting is available with autothrottle engaged.

5 Do not exceed engine limits. Engine limit protection in alternate mode is not the same as in normal mode.

6 **If** the **DSPLY SOURCE** annunciation is shown and the DISPLAY SOURCE checklist has not been completed:

►►**Go to the DISPLAY SOURCE checklist on page 10.6**

■ ■ ■ ■

ENGINE CONTROL

ENGINE CONTROL

Condition: An engine control system fault occurs.

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

1 Do **not** takeoff.

■ ■ ■ ■

Engine Failure or Shutdown

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

1 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 . . . . TA ONLY

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.

[Airplanes without Fail Operational Autoland Capability]

►►**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 **redline**:

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

■ ■ ■ ■

◆Temperature is in the **amber 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

4 **If** temperature is in the **amber band** for more than **45 minutes**:

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

■ ■ ■ ■

Intentionally
Blank

Engine In-Flight Start

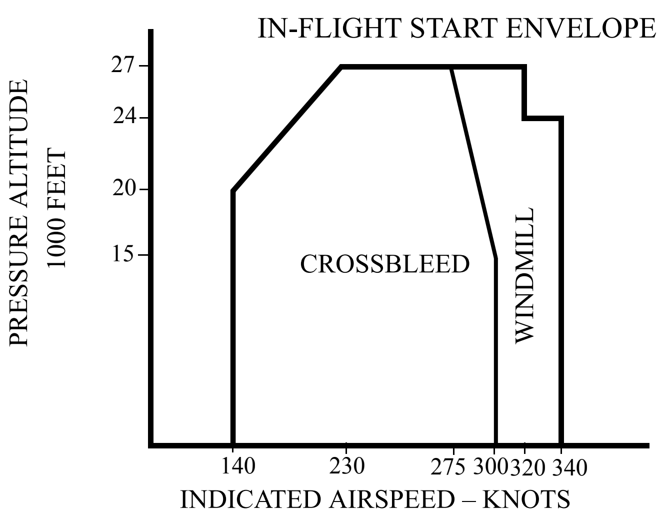
Condition: An engine start is needed after a shutdown and there is:
- N1 rotation
- No fire
- No abnormal airframe vibration.

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

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

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

Note: For engines shut down more than one hour, a crossbleed start is needed.



▼ Continued on next page ▼

Engine In-Flight Start continued

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.

5 Choose one:

◆**Windmill** start:

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

►►**Go to step 6**

◆**Crossbleed** start:

PACK switch (affected side) . . . . OFF

DUCT PRESSURE . . . . . . Minimum 30 PSI

Advance the thrust lever to increase duct pressure if needed.

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

►►**Go to step 6**

Continued on next page

▼ Engine In-Flight Start continued ▼

6 **When** N2 is at or above 11%:

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

Monitor EGT to ensure it does not rise rapidly or exceed the start limit of 725° C during the start attempt.

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

[Without automatic ignition]
ENGINE START switch
(affected engine) . . . . OFF

Note: If engine has been shutdown for more than 1 hour, multiple start attempts may be needed.

8 Choose one:

◆ Engine **starts** and runs normally:

▶▶ **Go to step 9**

◆ Engine **fails** to start:

[Airplanes without Fail Operational Autoland Capability]
▶▶ **Go to the One Engine Inoperative Landing checklist on page 7.26**

■ ■ ■ ■

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

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

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

11 ENGINE START switch . . . . .As needed

12 APU . . . . .As needed

13 Transponder mode selector . . . . .TA/RA

■ ■ ■ ■

ENGINE LOW OIL PRESSURE

Condition: The engine oil pressure is low. The LOW OIL PRESSURE alert may or may not be illuminated.

1 Choose one:

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

Do **not** takeoff.

■ ■ ■ ■

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

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

■ ■ ■ ■

ENGINE OIL FILTER BYPASS

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

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

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

3 Choose one:

◆OIL FILTER BYPASS alert **extinguishes**:

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

■ ■ ■ ■

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

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

■ ■ ■ ■

Intentionally
Blank

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.

■ ■ ■ ■

One Engine Inoperative Landing

Condition: Landing must be made with one engine inoperative.

1 Plan a flaps 15 landing.

2 Set VREF 15 or VREF ICE.

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

Engine anti–ice will be used during landing

Wing anti–ice has been used any time during the flight

Icing conditions were encountered during the flight and the landing temperature is below 10° C.

Note: When VREF ICE is needed, the wind additive should not exceed 10 knots.

3 Maintain VREF 15 + 5 knots or VREF ICE + 5 knots minimum on final approach to assure sufficient maneuver margin and 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 . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

▼ Continued on next page ▼

▼ One Engine Inoperative Landing continued ▼

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

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

APU BLEED air switch . . . . ON

Left PACK switch . . . . AUTO

BLEED 2 air switch . . . . OFF

Go-around Procedure Review

Do the normal go–around procedure except:

Use flaps 1.

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

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

▼ Continued on next page ▼

▼ One Engine Inoperative Landing continued ▼

Accelerate to flaps 1 maneuvering speed before flap retraction.

Approach Checklist

Altimeters . . . . ____

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

[Without automatic ignition]
ENGINE START switch
(operating engine) . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

REVERSER

REVERSER

Condition: A fault occurs in the thrust reverser system.

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

1 Expect normal reverser operation after landing.

■ ■ ■ ■

REVERSER UNLOCKED (IN FLIGHT)

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

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

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

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

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

Warning! Do not actuate the reverse thrust lever.

2 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

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

■ ■ ■ ■

START VALVE OPEN

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

[Without automatic ignition]

1 ENGINE START switch . . . . OFF

2 Choose one:

◆START VALVE OPEN alert **extinguishes**:

■ ■ ■ ■

◆START VALVE OPEN alert **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 alert stays illuminated for **engine 1**:

APU BLEED air switch . . . . OFF

▶▶**Go to step 7**

◆START VALVE OPEN alert 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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APU FIRE

Condition: Fire is detected in the APU.

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

2 APU switch . . . . OFF

3 Choose one:

◆APU fire switch **extinguishes**:

■ ■ ■ ■

◆APU fire switch **stays illuminated**:

►►**Go to step 4**

4 Plan to land at the nearest suitable airport.

■ ■ ■ ■

ENGINE FIRE or Engine Severe Damage or Separation

Condition: One or more of these occur:
- Engine fire warning
- Airframe vibrations with abnormal engine indications
- Engine separation.

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 the 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 . . . . TA ONLY

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.

[Airplanes without Fail Operational Autoland Capability]

►►**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.

[Without automatic ignition]

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

■ ■ ■ ■

Smoke, Fire or Fumes

Condition: Smoke, fire or fumes is identified.

1 Diversion may be needed.

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

3 Don smoke goggles, as needed.

4 Establish crew and cabin communications.

5 BUS TRANSFER switch . . . . OFF

6 CAB/UTIL switch. . . . . OFF

7 IFE/PASS SEAT switch . . . . OFF

[737 - 600/700]

8 RECIRC FAN switch . . . . OFF

[737 - 800/900]

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

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 8.16

▼ 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 8.16, 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) . . . . ALTN

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 8.16, 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 8.16, 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 8.16, 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.

■ ■ ■ ■

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 need up to 30 seconds to illuminate.

[737 - 600/700]

3 RECIRC FAN switch . . . . OFF

[737 - 800/900]

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

5 PACK switches (both) . . . . HIGH

▼ Continued on next page ▼

▼ CARGO FIRE continued ▼

6 Plan to land at the nearest suitable airport.

7 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

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

Landing Checklist

[Without automatic ignition]
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.

■ ■ ■ ■

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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 LAND ALT indicator . . . . 10,000 feet

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

▼ **Continued on next page** ▼

▼ Smoke or Fumes Removal continued ▼

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

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

10 Open flight deck air conditioning and gasper outlets.

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

---

11 Choose one:

◆Smoke or fumes are **controllable**:

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

■ ■ ■ ■

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

►►**Go to step 12**

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

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

Pressurization mode selector . . . . .MAN

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.

▼ Continued on next page ▼

▼ **Smoke or Fumes Removal continued** ▼

Note: The outflow valve can take up to 20 seconds to open.

▶▶**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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Elevator Tab Limit Cycle Oscillation

Condition: An elevator tab limit cycle oscillation (LCO) is encountered in flight. One or more of the following may be evidence of an elevator tab LCO:

- High frequency resonant vibration that originates, and is strongest, in the aft part of the airplane but can be felt throughout the entire structure
- The vibration may or may not be felt in the control wheel.

1 Airspeed . . . . Reduce to 270 KIAS or until the vibration ceases, whichever is lower

2 Do not use speedbrakes or change aircraft configuration to reduce airspeed.

---

3 Remain at or below the indicated airspeed at which the vibration ceased, but do not exceed 270 knots.

4 Do not use speedbrakes for the remainder of the flight.

Note: Ground spoilers may be used for landing.

5 Consider landing at the nearest suitable airport.

■ ■ ■ ■

Runaway Stabilizer

Condition: Uncommanded stabilizer trim movement occurs continuously.

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 . . . . 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

[Without automatic ignition]
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 . . . . 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

[Without automatic ignition]
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.

■ ■ ■ ■

FEEL DIFF PRESS

FEEL DIFFERENTIAL PRESSURE

Condition: High differential pressure is measured by the elevator feel computer.

1 Continue normal operation.

■ ■ ■ ■

LOW PRESSURE

FLIGHT CONTROL LOW PRESSURE

Condition: Hydraulic system pressure to the ailerons, elevators and rudder is low.

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

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

■ ■ ■ ■

Intentionally
Blank

Jammed or Restricted Flight Controls

Condition: A flight control is jammed or restricted in roll, pitch, or yaw.

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

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

3 Verify that the thrust is symmetrical.

4 Overpower the jammed or restricted system. Use maximum force, including a combined effort of both pilots, if needed. A maximum two-pilot effort on the controls will not cause a cable or system failure.

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

6 **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.

7 Choose one:

◆Controls are **normal**:

■ ■ ■ ■

◆Controls are **not** normal:

▶▶**Go to step 8**

8 Use stabilizer or rudder trim to offload control forces.

▼ **Continued on next page** ▼

▼ Jammed or Restricted Flight Controls continued ▼

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

Move the Stabilizer Trim Override switch to OVERRIDE.

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

11 Limit bank angle to 15°.

12 Plan to land at the nearest suitable airport.

13 Plan a flaps 15 landing.

14 Set VREF 15 or VREF ICE.

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

Engine anti–ice will be used during landing

Wing anti–ice has been used any time during the flight

Icing conditions were encountered during the flight and the landing temperature is below 10° C.

Note: When VREF ICE is needed, the wind additive should not exceed 10 knots.

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

16 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ Jammed or Restricted Flight Controls continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

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

▼ Continued on next page ▼

▼ Jammed or Restricted Flight Controls continued ▼

Landing Checklist

[Without automatic ignition]
ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

LE FLAPS TRANSIT

LEADING EDGE FLAPS TRANSIT

Condition: One or more of these occur:
- The leading edge devices are not in the commanded position
- A leading edge device asymmetry is detected
- A leading edge device skew is detected.

Note: Do not use FMC 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 9.30**

■ ■ ■ ■

◆ **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 + 15 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 . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

▼ Continued on next page ▼

▼ LEADING EDGE FLAPS TRANSIT continued ▼

Landing data . . . . **VREF 15 + 15 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 may be illuminated. Operation within the lower amber airspeed band for landing is normal for this condition.

Landing Checklist

[Without automatic ignition]
ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. . . . . **15, Green or amber light**

Note: The light may be green or amber depending on the cause of the failure.

■ ■ ■ ■

MACH TRIM FAIL

MACH TRIM FAIL

Condition: The mach trim system is failed.

1 Limit airspeed to 280 knots/.82 Mach.

■ ■ ■ ■

SPEED BRAKE DO NOT ARM

SPEED BRAKE DO NOT ARM

[Without Load Alleviation System]

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 . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

▼ Continued on next page ▼

▼ SPEED BRAKE DO NOT ARM continued ▼

Landing Checklist

[Without automatic ignition]
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.

■ ■ ■ ■

SPEEDBRAKES EXTENDED

SPEEDBRAKES EXTENDED

Condition: In flight, the speedbrakes are extended beyond the ARMED position and one or more of these occur:
- The radio altitude is below 800 feet
- The flap lever setting is more than flaps 10.

On the ground, the SPEED BRAKE lever is down and the speedbrakes are extended.

1 SPEED BRAKE lever . . . . ARMED or DOWN detent

2 **If** the light is illuminated on the ground:

Do not takeoff.

■ ■ ■ ■

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

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 9.20**

■ ■ ■ ■

Intentionally
Blank

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.

▼ Continued on next page ▼

▼ Stabilizer Trim Inoperative continued ▼

12 Set VREF 15 or VREF ICE.

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

Engine anti–ice will be used during landing

Wing anti–ice has been used any time during the flight

Icing conditions were encountered during the flight and the landing temperature is below 10° C.

Note: When VREF ICE is needed, the wind additive should not exceed 10 knots.

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**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

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

Approach briefing . . . . Completed

▼ Continued on next page ▼

Stabilizer Trim Inoperative continued

Go-around Procedure Review

Do the normal go-around procedure.

Advance thrust to go-around smoothly and slowly to avoid excessive pitch-up.

Continued on next page

▼ Stabilizer Trim Inoperative continued ▼

Approach Checklist

Altimeters . . . . ____

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

[Without automatic ignition]
ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

STBY
RUD ON

STANDBY RUDDER ON

[737 Modified rudder installed]

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 4**

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

Set VREF 15 or VREF ICE.

▶▶**Go to step 3**

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

Set VREF 40 + 30 knots.

▶▶**Go to step 4**

◆ Flap **lever** is set to **UP**:

▶▶**Go to the Trailing Edge Flaps Up Landing checklist on page 9.38**

■ ■ ■ ■

▼ **Continued on next page** ▼

▼ Trailing Edge Flap Asymmetry continued ▼

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

Engine anti–ice will be used during landing

Wing anti–ice has been used any time during the flight

Icing conditions were encountered during the flight and the landing temperature is below 10° C.

Note: When VREF ICE is needed, the wind additive should not exceed 10 knots.

VREF + wind additive, or VREF ICE + wind additive if needed, must not exceed the flap placard speed for the next larger flap setting.

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

5 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

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

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼ Trailing Edge Flap Asymmetry continued ▼

Approach Checklist

Altimeters . . . . ___

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

[Without automatic ignition]
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 cause of the failure.

■ ■ ■ ■

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 9.26**

■ ■ ■ ■

◆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 or VREF ICE for landing.

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

Engine anti–ice will be used during landing

Wing anti–ice has been used any time during the flight

Icing conditions were encountered during the flight and the landing temperature is below 10° C.

Note: When VREF ICE is needed, the wind additive should not exceed 10 knots.

VREF 15 + wind additive, or VREF ICE + wind additive if needed, must not exceed the flap placard speed for the next larger flap setting.

▼ Continued on next page ▼

▼ Trailing Edge Flap Disagree continued ▼

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 . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

▼ Continued on next page ▼

▼ Trailing Edge Flap Disagree continued ▼

Additional Deferred Item

Choose one:

◆ Indicated flap position is **30 or greater**:

▶▶ **Go to Landing Checklist below**

◆ Indicated flap position is **15 or greater and less than 30**:

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

▶▶ **Go to Landing Checklist below**

◆ Indicated flap position is **less than 15**:

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

▶▶ **Go to Alternate Flap Extension below**

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.

▼ Continued on next page ▼

▼ Trailing Edge Flap Disagree continued ▼

Note: The amber LE FLAPS TRANSIT light will stay illuminated until the flaps approach the flaps 10 position.

Note: Operation within the lower amber 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 9.26**

■ ■ ■ ■

◆ 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 9.38**

■ ■ ■ ■

◆ 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 ▼

▼ **Trailing Edge Flap Disagree continued** ▼

Landing Checklist

[Without automatic ignition]
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.

■ ■ ■ ■

Intentionally
Blank

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 may stay illuminated after the LE devices are fully extended.

▼ **Continued on next page** ▼

▼ Trailing Edge Flaps Up Landing continued ▼

4 Choose one:

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

►► **Go to the All Flaps Up Landing checklist on page 9.4**

■ ■ ■ ■

◆ 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. . . . . 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 amber airspeed band for landing is normal for this condition.

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

Continued on next page

▼ Trailing Edge Flaps Up Landing continued ▼

Landing Checklist

[Without automatic ignition]

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 cause of the failure.

■ ■ ■ ■

YAW DAMPER

YAW DAMPER

Condition: The yaw damper is disengaged.

1 YAW DAMPER switch . . . . OFF then ON

2 Choose one:

◆ YAW DAMPER light **extinguishes**:

■ ■ ■ ■

◆ YAW DAMPER light **stays illuminated**:

YAW DAMPER switch . . . . OFF

►►**Go to step 3**

3 Avoid areas of predicted moderate or severe turbulence. If turbulence is encountered and passenger comfort becomes affected, reduce airspeed and/or descend to a lower altitude.

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

■ ■ ■ ■

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Intentionally
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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 PROBE 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.

■ ■ ■ ■

Additional Information

The flight path vector is based on inertial sources and may be used as a reference in maintaining proper path control.

ALT DISAGREE

Condition: The ALT DISAGREE alert indicates the captain's and first officer's altitude indications disagree by more than 200 feet.

1 Check all altimeters are set to correct barometric setting for phase of flight.

2 Choose one:

◆ALT DISAGREE alert **extinguishes**:

Continue normal operation.

■ ■ ■ ■

◆ALT DISAGREE alert **stays illuminated**:

►►**Go to step 3**

3 Airplane does not meet RVSM airspace requirements.

4 Standby altimeter is available.

5 Transponder altitude received by ATC may be unreliable.

6 Maintain visual conditions if possible.

7 **Checklist Complete Except Deferred Items**

Deferred Items

Review before descent:

Establish landing configuration early

Radio altitude reference is available below 2,500 feet

▼ **Continued on next page** ▼

▼ **ALT DISAGREE continued** ▼

Use electronic and visual glideslope indicators, where available, for approach and landing.

■ ■ ■ ■

AOA DISAGREE

Condition: The AOA DISAGREE alert indicates the left and right angle of attack vanes disagree.

1 Airspeed errors and the IAS DISAGREE alert may occur.

2 Altimeter errors and the ALT DISAGREE alert may occur.

■ ■ ■ ■

CDS FAULT

Condition: The CDS FAULT annunciation indicates a CDS fault occurs.

Note: CDS FAULT annunciates on the ground only, before the second engine start.

1 Do not takeoff.

■ ■ ■ ■

Display Failure

Condition: A display in the common display system is failed.

1 Choose one:

◆ A single display is not usable and **automatic switching** has occurred:

Continue normal operation.

■ ■ ■ ■

◆ A single display is not usable and automatic switching has **not** occurred:

►► **Go to step 2**

2 MAIN PANEL DUs selector . . . . .As needed

3 LOWER DU selector. . . . . .As needed

■ ■ ■ ■

DISPLAYS CONTROL PANEL

Condition: The DISPLAYS CONTROL PANEL annunciation indicates the EFIS control panel is failed.

Note: The altimeter blanks and an ALT flag illuminates on the side corresponding to the failed control panel.

1 CONTROL PANEL select switch . . . . BOTH ON 1 or BOTH ON 2

Select the operating control panel.

2 Verify that the DISPLAYS CONTROL PANEL annunciation and ALT flag extinguish.

■ ■ ■ ■

DISPLAY SOURCE

Condition: The DSPLY SOURCE annunciation indicates only one DEU is supplying display information. Indications may include:
- No hydraulic pressure indication on the failed side
- Speed limit flag shown on the failed side
- Minimum maneuver speed and stick shaker band removed on the failed side
- Both EEC ALTN lights illuminated.

Note: Flight director indications may be removed and autoflight mode reversions may occur.

Dual autopilot approach is not available.

1 **If** the DEU fails on the same side as the engaged autopilot:

Select the opposite autopilot.

Verify that the correct flight director indications and flight mode annunciations are shown on the same side as the operating autopilot.

2 **If** the EEC ALTN lights are illuminated and the EEC ALTERNATE MODE checklist has not been completed:

►►**Go to the EEC ALTERNATE MODE checklist on page 7.13**

■ ■ ■ ■

OFF

FLIGHT RECORDER OFF

Condition: The flight recorder is off.

1 Continue normal operation.

■ ■ ■ ■

IAS DISAGREE

Condition: The IAS DISAGREE alert indicates the captain's and first officer's airspeed indications disagree.

►►**Go to the Airspeed Unreliable checklist on page 10.1**

■ ■ ■ ■

Intentionally
Blank

Non-Normal Checklists — Chapter NNC

Flight Management, Navigation — Section 11

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Intentionally
Blank

MSG

FMC DISAGREE

FMC
P/RST

Condition: Data needed for dual FMC operation disagree.

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.

■ ■ ■ ■

FMC
P/RST

FMC FAIL

[Option - Dual FMC]

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**

▼ **Continued on next page** ▼

▼ FMC FAIL continued ▼

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

Select the operating FMC.

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.

Alternate navigation using the ANCDU is available.

5 Verify position relative to terrain using conventional navigation.

Note: EGPWS may use inaccurate GPS position data or an inappropriate value of RNP. This could result in a VSD terrain display that is incorrectly positioned relative to the airplane track.

▼ Continued on next page ▼

▼ FMC FAIL continued ▼

6 **When** preparing for the approach:

Use the SPD REF selector to set the current gross weight.

Use the SPD REF selector to set the reference airspeed bugs.

Use the N1 SET selector to set the N1 bugs.

■ ■ ■ ■

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.

■ ■ ■ ■

GPS

GPS

Condition: One or both GPS receivers are failed.

Note: The FMC uses only IRS or radio inputs.

Look-ahead terrain alerting and display are unavailable due to position uncertainty.

1 Continue normal operation if ANP meets the requirements for the phase of flight.

■ ■ ■ ■

DC FAIL

IRS DC FAIL

Condition: IRS backup DC power is failed.

1 **If** all other IRS lights are extinguished:

Continue normal operation.

Note: With both IRS DC FAIL lights illuminated, the switched hot battery bus is not powered or the battery is nearly discharged.

■ ■ ■ ■

FAULT

IRS FAULT

[With SB 737-22-1140 incorporated]

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 Choose one:

◆Autopilot use is **not** desired:

►►**Go to step 8**

◆Autopilot use **is** desired:

►►**Go to step 13**

8 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.

9 Choose one:

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

►►**Go to step 10**

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

►►**Go to step 13**

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

Action is not reversible.

11 ⚠ IRS mode selector (**failed side**) . . . . . Confirm . . . . ATT

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

▼ **Continued on next page** ▼

▼ IRS FAULT continued ▼

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.

[Option - Track Up]

12 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 13**

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

14 The autopilot on the side with the operational IRS may be used **except** during approach. Autopilot use during approach is not authorized.

Note: If the autopilot is engaged, the yaw damper will disconnect after approximately 1 minute and cannot be reconnected until the autopilot is disengaged.

15 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ IRS FAULT continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____
Recall . . . . Checked
Autobrake . . . . ____
Landing data . . . . VREF ____, Minimums ____
Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Prior to Start of the Approach

Autopilot . . . . Disengage
YAW DAMPER switch . . . . ON

Landing Checklist

ENGINE START switches. . . . . CONT
Speedbrake . . . . ARMED
Landing gear . . . . Down
Flaps . . . . ____, Green light

■ ■ ■ ■

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

[Option - U10.6 and earlier.]

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.

■ ■ ■ ■

UNABLE REQD NAV PERF - RNP

[Option - U10.7 and later.]

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

1 Choose one:

◆On a procedure or airway with an **RNP alerting requirement**:

Select an alternate procedure or airway. During an approach, go-around unless suitable visual references can be established and maintained.

■ ■ ■ ■

◆On a procedure or airway **without** an RNP alerting requirement:

Verify position.

■ ■ ■ ■

Non-Normal Checklists — Chapter NNC

Fuel — Section 12

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Blank

AFT/FWD LOW PRESSURE

Condition: The AFT LOW PRESSURE or FWD LOW PRESSURE message and AUX ALERT light indicate fuel pressure is low in the auxiliary tank.

1 AUXILIARY FUEL
BLEED AIR switch (affected tank). . . . . OVRD

2 **When** the auxiliary fuel tank is empty:

AUXILIARY FUEL TRANSFER
switches (affected tank) . . . . OFF

■ ■ ■ ■

AFT/FORWARD TRANSFER

Condition: The AFT TRANSFER or FORWARD TRANSFER message and AUX ALERT light indicate the AUXILIARY FUEL TRANSFER valve has failed in the closed position.

1 AUXILIARY FUEL TRANSFER switches (affected tank) . . . . AUTO

2 AUXILIARY FUEL BLEED AIR switch (affected tank) . . . . OVRD

3 Choose one:

◆ Message is **still shown**:

▶▶**Go to step 4**

◆ Message is **not** shown:

■ ■ ■ ■

4 Auxiliary tank fuel is unusable. Center and main tank fuel may not be sufficient for the planned flight.

Warning! Continued flight with fuel trapped in the AFT AUX tanks may cause CG exceedance. Monitor FWD and AFT auxiliary fuel and plan to land prior to exceeding CG limitations.

■ ■ ■ ■

AFT A/B OVERFILL

Condition: The AFT A OVERFILL or AFT B OVERFILL message and AUX ALERT light indicate the aft auxiliary tank is continuing to transfer fuel into a full center tank.

1 AFT AUXILIARY FUEL
TRANSFER switches (both) . . . . OFF

■ ■ ■ ■

CONFIG

[Option - Center tank auto shutoff]

Condition: All of these occur:
- Both center tank fuel pump switches are off
- There is more than 1600 lbs of fuel in the center tank
- An engine is running.

1 Do not accomplish this procedure until established in a level flight attitude.

2 CTR FUEL PUMP switches (both). . . . . ON

Verify that the LOW PRESSURE lights extinguish.

3 **When** both LOW PRESSURE lights illuminate:

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

■ ■ ■ ■

CONFIG

[Option - Without center tank auto shutoff]

Condition: All of these occur:
- Both center tank fuel pump pressures are low
- There is more than 1600 lbs of fuel in the center tank
- An engine is running.

1 Do not accomplish this procedure until established in a level flight attitude.

2 CTR FUEL PUMP switches (both) . . . . .ON

Verify that the LOW PRESSURE lights extinguish.

3 **When** both LOW PRESSURE lights illuminate:

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

■ ■ ■ ■

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

The fuel CONFIG alert may show with fuel in the center tank.

2 AUXILIARY FUEL TRANSFER switches (all) . . . . OFF

3 CROSSFEED selector . . . . Close

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

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

6 **If** conditions allow:

Visually check for an engine fuel leak.

▼ Continued on next page ▼

▼ **Engine Fuel Leak continued** ▼

7 Choose one:

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

▶▶**Go to step 8**

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

▶▶**Go to step 17**

8 Resume normal fuel management procedures.

9 **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.

10 Choose one:

◆ Fuel quantity indicator is **inoperative**:

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

▶▶**Go to step 11**

◆ Fuel quantity indicator is **operative**:

▶▶**Go to step 11**

▼ **Continued on next page** ▼

▼ Engine Fuel Leak continued ▼

11 Choose one:

◆Fuel LOW alert is **shown**:

►►**Go to step 12**

◆Fuel LOW alert is **not** shown:

■ ■ ■ ■

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 . . . . TA ONLY

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** ▼

[Airplanes without Fail Operational Autoland Capability]

▶▶**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 IMBAL alert

USING RSV FUEL message

INSUFFICIENT FUEL message

CHECK FMC FUEL QUANTITY message.

FWD A/B OVERFILL

Condition: The FWD A OVERFILL or FWD B OVERFILL message and AUX ALERT light indicate the forward auxiliary tank is continuing to transfer fuel into a full center tank.

1 FWD AUXILIARY FUEL
TRANSFER switches (both) . . . . OFF

■ ■ ■ ■

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.

■ ■ ■ ■

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 Fuel CONFIG alert may show with fuel in the center tank.

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

■ ■ ■ ■

Fuel Quantity Indication Inoperative

Condition: The fuel quantity indication is blank.

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

■ ■ ■ ■

Fuel Temperature Low

Condition: Fuel temperature is near the minimum.

1 **When** fuel temperature is approaching the fuel temperature limit (3° C /5° F above the fuel freeze point or - 43° C /- 45° 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.

■ ■ ■ ■

IMBAL

Condition: There is a fuel imbalance between the main fuel tanks of more than 1000 lbs.

Objective: To balance fuel if there are no indications of an engine fuel leak.

1 The fuel imbalance 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 12.6**

■ ■ ■ ■

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

Balance fuel.

■ ■ ■ ■

LOW

Condition: The fuel quantity in a main tank is less than 2000 lbs.

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

1 The fuel LOW indication 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 12.6**

■ ■ ■ ■

◆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** ▼

▼ LOW 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.

■ ■ ■ ■

NO DATA

Condition: The NO DATA message on both the captain's and first officer's display units indicates failure of both pilots' displays. The AUX ALERT light may or may not illuminate.

1 Choose one:

◆On the **ground**:

Do not takeoff if auxiliary tank(s) contain fuel.

■ ■ ■ ■

◆**In flight**:

Monitor fuel quantity in all tanks to be certain that auxiliary fuel is being transferred. Transfer is complete when "0.0" is displayed on the aft and forward fuel quantity gauges.

■ ■ ■ ■

TRANSFER OFF

Condition: The TRANSFER OFF message and the AUX ALERT light indicate both of these occur:
- All AUXILIARY FUEL TRANSFER switches are OFF
- Fuel remains in the auxiliary tank(s).

1 AUXILIARY FUEL TRANSFER switches (all) . . . . AUTO

■ ■ ■ ■

TRANSFER OFF AFT

Condition: The TRANSFER OFF AFT message and the AUX ALERT light indicate both of these occur:
- AFT AUXILIARY FUEL TRANSFER switches are OFF
- Fuel remains in the auxiliary tank.

1 AFT AUXILIARY FUEL TRANSFER switches (both) . . . . AUTO

■ ■ ■ ■

TRANSFER OFF FWD

Condition: The TRANSFER OFF FWD message and the AUX ALERT light indicate both of these occur:
- FWD AUXILIARY FUEL TRANSFER switches are OFF
- Fuel remains in the auxiliary tank.

1 FWD AUXILIARY FUEL TRANSFER switches (both) . . . . AUTO

■ ■ ■ ■

Intentionally
Blank

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LOW PRESSURE

HYDRAULIC PUMP LOW PRESSURE

Condition: The hydraulic pump pressure is low.

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

Note: Loss of an engine-driven hydraulic pump and a high demand on the system may result in an intermittent illumination of the LOW PRESSURE light for the remaining electric motor-driven hydraulic pump.

■ ■ ■ ■

OVERHEAT

HYDRAULIC PUMP OVERHEAT

Condition: The hydraulic pump temperature is high.

1 ELEC HYD 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.

Flight spoilers (two on each wing) inop
Roll rate and speedbrake effectiveness may be reduced in flight.

Normal landing gear extension and retraction inop
Manual gear extension is needed.

Ground spoilers inop
Landing distance will be increased.

Alternate brakes inop
Normal brakes are available.

Engine 1 thrust reverser normal hydraulic pressure inop
Thrust reverser will deploy and retract at a slower rate and some thrust asymmetry can be anticipated during thrust reverser deployment.

Normal nose wheel steering inop
Alternate nose wheel steering is available.

▼ 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. . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

▼ Continued on next page ▼

▼ **LOSS OF SYSTEM A continued** ▼

Manual Gear Extension

LANDING GEAR lever. OFF

Manual gear extension handles. . . . . Pull

The uplock is released when the handle is pulled to its limit.

The related red landing gear indicator light illuminates, indicating uplock release.

Wait 15 seconds after the last manual gear extension handle is pulled:

LANDING GEAR lever . . . . .DN

Landing Checklist

[Without automatic ignition]
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.

Flight spoilers (two on each wing) inop
Roll rate and speedbrake effectiveness may be reduced in flight.

Yaw damper inop

Trailing edge flaps normal hydraulic system inop
The trailing edge flaps can be operated with the alternate electrical system. Alternate flap extension time to flaps 15 is approximately 2 minutes.

Leading edge flaps and slats normal hydraulic system inop
The leading edge flaps and slats can be extended with standby pressure. Once extended, they 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 or VREF ICE.

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

Engine anti–ice will be used during landing

Wing anti–ice has been used any time during the flight

Icing conditions were encountered during the flight and the landing temperature is below 10° C.

Note: When VREF ICE is needed, the wind additive should not exceed 10 knots.

5 Plan to extend flaps to 15 using alternate flap extension.

Note: The drag penalty with the leading edge devices extended may make it impossible to reach an alternate field.

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. . . . . LAND ALT ____

Recall . . . . Checked

▼ Continued on next page ▼

▼ LOSS OF SYSTEM B continued ▼

Autobrake . . . . **OFF**

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

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 amber airspeed band may be needed until the LE FLAPS TRANSIT light extinguishes.

▼ Continued on next page ▼

▼ LOSS OF SYSTEM B continued ▼

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

Landing Checklist

[Without automatic ignition]
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 YAW DAMPER switch . . . . .ON

3 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.

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.

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.

▼ Continued on next page ▼

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

4 Plan to land at the nearest suitable airport.

5 Plan a flaps 15 landing.

6 Set VREF 15 or VREF ICE.

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

Engine anti–ice will be used during landing

Wing anti–ice has been used any time during the flight

Icing conditions were encountered during the flight and the landing temperature is below 10° C.

Note: When VREF ICE is needed, the wind additive should not exceed 10 knots.

7 Plan to extend flaps to 15 using alternate flap extension.

Note: The drag penalty with the leading edge devices extended may make it impossible to reach an alternate field.

8 Plan for manual gear extension.

Note: When the gear has been lowered manually, it cannot be retracted. The drag penalty with gear extended may make it impossible to reach an alternate field.

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

▼ Continued on next page ▼

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

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

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

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

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

13 Do not attempt to taxi the airplane after stopping.

14 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . **OFF**

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

Approach briefing . . . . Completed

▼ Continued on next page ▼

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 the minimum maneuver speed.

Approach Checklist

Altimeters . . . . ____

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.

Continued on next page

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

Note: Operation within the lower amber 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

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

▼ Continued on next page ▼

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

Additional Deferred Item

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

[Without automatic ignition]
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**

▼ Continued on next page ▼

▼ **ANTISKID INOPERATIVE continued** ▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake **. . . . . OFF**

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Checklist

[Without automatic ignition]
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 . . . . LAND ALT ____

Recall . . . . Checked

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

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

[Without automatic ignition]
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 9**

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 8**

5 Choose one:

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

Open and close the manual gear extension access door. Verify the door is fully closed.

►► **Go to step 6**

◆ **Any other combination** of landing gear indicator lights is **illuminated**:

►► **Go to step 8**

235K maximum

6 ⚠ LANDING GEAR lever. . . . . DN, then UP

▼ Continued on next page ▼

▼ GEAR DISAGREE continued ▼

7 Choose one:

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

LANDING GEAR lever . . . . OFF

■ ■ ■ ■

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

►►**Go to step 8**

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

■ ■ ■ ■

9 Check landing gear indicator lights.

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

▼ Continued on next page ▼

▼ GEAR DISAGREE continued ▼

10 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 11**

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

[Option - Ground Proximity Gear Inhibit switch]

12 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.

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

▼ Continued on next page ▼

▼ Landing Gear Lever Jammed in the Up Position continued ▼

5 Choose one:

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

Plan to land at the nearest suitable airport.

■ ■ ■ ■

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

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

■ ■ ■ ■

6 NOSE WHEEL STEERING switch . . . . Verify NORM

Nose wheel steering is not available.

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

▼ Continued on next page ▼

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

270K/.82M maximum.

7 Manual gear extension handles (all). . . . . Pull

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

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

8 Check landing gear indicator lights.

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

9 Choose one:

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

▶▶ **Go to step 10**

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

▶▶ **Go to the Partial or All Gear Up Landing checklist on page 14.22**

■ ■ ■ ■

10 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

▼ Landing Gear Lever Jammed in the Up Position continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Additional Deferred Item

[Option - Ground Proximity Gear Inhibit switch]
GROUND PROXIMITY GEAR
INHIBIT switch . . . . GEAR INHIBIT

▼ Continued on next page ▼

Landing Gear Lever Jammed in the Up Position continued

Landing Checklist

[Without automatic ignition]
ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear **. . . . . Down, Three green**

Flaps . . . . ___, Green light

Note: Nose wheel steering is not available.

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

■ ■ ■ ■

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Landing Gear Lever Will Not Move Up After Takeoff

Condition: The LANDING GEAR lever cannot be moved to the UP position due to one of the following:
- Failure of the landing gear lever lock solenoid
- Failure of the air/ground system
- Failure of the ground spoiler bypass valve to close.

Note: Do not use FMC fuel predictions.

1 LANDING GEAR lever . . . . .DN

2 Retract the flaps on schedule.

▼ **Continued on next page** ▼

Landing Gear Lever Will Not Move Up After Takeoff continued

3 Choose one:

◆Intermittent cabin altitude/configuration warning horn **stays silent** and the TAKEOFF CONFIG lights (if installed and operative) do **not illuminate** after the flaps are fully retracted and the thrust levers are advanced beyond the vertical position:

> **Note:** This indicates a failure of the landing gear lever lock solenoid.

►►**Go to step 4**

◆Intermittent cabin altitude/configuration warning horn **sounds** or the TAKEOFF CONFIG lights (if installed and operative) **illuminate** when the flaps are fully retracted:

> **Note:** This indicates either a failure of the air/ground system or a failure of the ground spoiler bypass to close.

Do **not** retract the gear.

►►**Go to step 8**

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

Continued on next page

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

7 Continue normal operation.

■ ■ ■ ■

8 LANDING GEAR
TAKEOFF WARNING CUTOFF
circuit breaker (P6–3:C18) . . . . Pull

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

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**

▼ Continued on next page ▼

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

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

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

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Gear Down Verification

LANDING GEAR lever. . . . . Verify DN

Landing Checklist

[Without automatic ignition]
ENGINE START switches . . . . CONT

Speedbrake **. DOWN detent**

Landing gear **. . . . . . . Down (previously verified)**

Flaps . . . . ___, Green light

Note: Manually deploy the speedbrakes immediately upon touchdown. Use manual braking.

■ ■ ■ ■

Manual Gear Extension

Condition: One of these occurs:
- Any landing gear is not down and locked when the LANDING GEAR lever is down
- The LANDING GEAR lever is jammed in the OFF position.

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

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

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

▼ Manual Gear Extension continued ▼

5 Choose one:

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

►► **Go to step 6**

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

►► **Go to the Partial or All Gear Up Landing checklist on page 14.22**

■ ■ ■ ■

6 Choose one:

◆ LANDING GEAR **lever** is in the **DN** position:

Land normally.

■ ■ ■ ■

◆ LANDING GEAR **lever** is in the **OFF** position:

[Option - Ground Proximity Gear Inhibit switch]

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

Land normally.

Note: Nose wheel steering is not available.

■ ■ ■ ■

Partial or All Gear Up Landing

Condition: All landing gear are not down and locked after attempting manual gear extension.

1 Choose one:

◆Manual gear extension **has** been attempted:

▶▶**Go to step 2**

◆Manual gear extension has **not** been attempted:

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

■ ■ ■ ■

2 Brief the crew and passengers on emergency landing and evacuation procedures.

3 Burn off fuel to reduce touchdown speed.

4 Plan a flaps 40 landing.

5 Set VREF 40.

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

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

7 FLIGHT CONTROL
AUTO SPEED BRAKE
circuit breaker (P6-2:B9). . . . . Pull

This prevents inadvertent deployment of ground spoilers after landing.

▼ Continued on next page ▼

▼ **Partial or All Gear Up Landing continued** ▼

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

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

10 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . 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

APU switch . . . . OFF

[Option - Ground Proximity Gear Inhibit switch]
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

[Without automatic ignition]
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**

■ ■ ■ ■

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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 **(If installed and operative)**

Condition: On the ground, the intermittent cabin altitude/configuration warning horn sounds and the TAKEOFF CONFIG lights (if installed and operative) illuminate 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

(If installed and operative)

Left Forward Panel		Right Forward Panel	
TAKEOFF CONFIG	CABIN ALTITUDE	CABIN ALTITUDE	TAKEOFF CONFIG

Condition: One of these occurs:
- In flight, at an airplane flight altitude above 10,000 feet MSL, the intermittent warning horn sounds or a CABIN ALTITUDE light (if installed and operative) illuminates, when the cabin altitude is at or above 10,000 feet
- On the ground, the intermittent warning horn sounds or a TAKEOFF CONFIG light (if installed and operative) illuminates, when the takeoff configuration is not correct during takeoff.

1 **If** the intermittent warning horn sounds or a CABIN ALTITUDE light (if installed and operative) 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.

▼ Continued on next page ▼

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

►►**Go to the CABIN ALTITUDE WARNING or Rapid Depressurization checklist on page 2.1**

■ ■ ■ ■

2 **If** the intermittent warning horn sounds or a TAKEOFF CONFIG light (if installed and operative) illuminates **on the ground**:

Assure correct airplane takeoff configuration.

■ ■ ■ ■

ALTITUDE ALERT

Condition: The ALT ALERT indication 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.

■ ■ ■ ■

PSEU

PSEU

Condition: A proximity switch electronics unit fault occurs.

Note: The PSEU light illuminates on the ground only.

[Option - 737-600/700/800 with PSEU -4 or later]

1 Choose one:

◆PSEU light **stays** illuminated when the Master Caution system is reset:

►►**Go to step 2**

◆PSEU light **extinguishes** when the Master Caution system is reset:

■ ■ ■ ■

▼ **Continued on next page** ▼

▼ PSEU continued ▼

[Option - 737-600/700/800 with PSEU -4 or later]

2 Choose one:

◆ PSEU light **stays** illuminated when the parking brake is set or when both engines are shut down:

Do not takeoff.

■ ■ ■ ■

◆ PSEU light **extinguishes** when the parking brake is set or when both engines are shut down:

■ ■ ■ ■

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

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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Operational Information — Chapter OI

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Operational Information — Chapter OI
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Introduction

Note: This Section Reserved For Operator-Developed Information.

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Performance Inflight - QRH Chapter PI-QRH

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Performance Inflight - QRH — Chapter PI-QRH

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737-700BBJW CFM56-7B27B3 KG FAA CATF/M

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 (280/.76)

Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
40000	**PITCH ATT**	**4.0**	**4.0**	**4.0**		
	V/S (FT/MIN)	1800	1200	600		
30000	**PITCH ATT**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2600	2000	1500	1200	900
20000	**PITCH ATT**	**7.5**	**6.5**	**6.5**	**6.0**	**6.0**
	V/S (FT/MIN)	4300	3300	2700	2200	1800
10000	**PITCH ATT**	**11.0**	**9.5**	**9.0**	**8.5**	**8.0**
	V/S (FT/MIN)	5700	4500	3700	3100	2600
SEA LEVEL	**PITCH ATT**	**15.0**	**13.0**	**11.5**	**10.5**	**10.0**
	V/S (FT/MIN)	6900	5400	4400	3700	3200

Cruise (.76/280)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
40000	**PITCH ATT**	**2.0**	**3.0**	**3.5**		
	%N1	82.2	84.9	89.3		
35000	**PITCH ATT**	**1.0**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	80.5	81.9	83.9	86.6	91.1
30000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	80.1	80.8	82.1	83.6	85.6
25000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.5**
	%N1	76.5	77.2	78.4	79.9	81.8
20000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**3.0**	**3.5**
	%N1	72.9	73.6	74.7	76.0	77.8
15000	**PITCH ATT**	**1.0**	**1.5**	**2.5**	**3.0**	**3.5**
	%N1	69.0	69.9	71.0	72.2	73.9

Descent (.76/280)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
40000	**PITCH ATT**	**-1.5**	**-0.5**	**0.5**	**1.0**	**1.5**
	V/S (FT/MIN)	-2700	-2500	-2400	-2600	-2800
30000	**PITCH ATT**	**-3.0**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-3000	-2500	-2200	-2000	-1900
20000	**PITCH ATT**	**-3.0**	**-2.0**	**-1.0**	**0.0**	**1.0**
	V/S (FT/MIN)	-2700	-2200	-2000	-1800	-1700
10000	**PITCH ATT**	**-3.0**	**-2.0**	**-0.5**	**0.0**	**1.0**
	V/S (FT/MIN	-2400	-2000	-1800	-1600	-1500
SEA LEVEL	**PITCH ATT**	**-3.0**	**-2.0**	**-1.0**	**0.0**	**1.0**
	V/S (FT/MIN)	-2200	-1800	-1600	-1400	-1400

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Holding (VREF40 + 70)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		40	50	60	70	80
10000	**PITCH ATT**	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	51.8	56.8	61.4	65.4	68.6
5000	**PITCH ATT**	**5.5**	**5.5**	**5.5**	**5.0**	**5.0**
	%N1	48.2	53.1	57.4	61.3	65.0

Terminal Area (5000 FT)

%N1 for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 1 (GEAR UP)	**PITCH ATT**	**5.0**	**5.5**	**6.0**	**6.0**	**6.5**
(VREF40 + 50)	%N1	50.3	55.6	59.8	63.9	67.3
FLAPS 5 (GEAR UP)	**PITCH ATT**	**5.5**	**6.0**	**6.5**	**6.5**	**7.0**
(VREF40 + 30)	%N1	50.4	55.8	60.5	64.8	68.3
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**6.0**	**6.0**	**6.5**	**6.5**	**6.5**
(VREF40 + 20)	%N1	59.1	64.9	70.0	74.3	78.1

Final Approach (1500 FT)

Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15	**PITCH ATT**	**3.5**	**3.5**	**3.5**	**4.0**	**4.0**
(VREF15 + 10)	%N1	41.5	45.4	49.3	53.1	56.2
FLAPS 30	**PITCH ATT**	**1.5**	**2.0**	**2.0**	**2.0**	**2.5**
(VREF30 + 10)	%N1	45.4	50.4	54.6	58.2	61.7
FLAPS 40	**PITCH ATT**	**0.0**	**0.0**	**0.5**	**0.5**	**1.0**
(VREF40 + 10)	%N1	52.4	57.5	62.3	66.0	69.7

Max Climb %N1

Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS OR MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.80	.80	.80
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	94.8	95.0	93.7
55	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.1	94.3	93.0
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.4	93.6	92.4
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	92.7	92.9	91.7
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.4	92.2	91.0
35	94.0	94.3	94.5	94.3	94.0	94.0	93.0	93.3	92.7	91.6
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	94.1	93.5	92.5
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.9	94.4	93.4
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.6	95.1	94.3
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.3	95.9	95.1
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	97.1	96.7	96.0
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.9	97.4	96.8
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.7	98.3	97.8
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.4	99.0	98.6
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.3	99.9	99.6
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.5
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.3	100.9	100.5
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	99.5	100.0	99.7
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	98.6	99.2	98.8
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	97.8	98.3	98.0
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	96.9	97.5	97.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	0	10	20	30	35	41
ENGINE ANTI-ICE	-0.6	-0.8	-0.9	-0.9	-0.8	-0.8
ENGINE & WING ANTI-ICE*	-1.8	-2.1	-2.5	-2.7	-3.0	-3.0

***Dual bleed sources**

Go-around %N1

Based on engine bleed for packs on, engine and wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)											
°C	°F		-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
57	134	60	95.0	96.2	96.8									
52	125	55	95.9	96.7	96.6	96.8	97.5							
47	116	50	96.6	97.6	97.8	97.8	97.7	97.5	98.2	98.8				
42	108	45	97.4	98.4	98.5	98.6	98.7	98.8	98.7	98.5	98.5	99.0		
37	99	40	98.0	99.1	99.2	99.3	99.4	99.5	99.6	99.5	99.1	98.9	98.8	99.1
32	90	35	98.1	99.9	100.0	100.1	100.1	100.3	100.3	100.2	99.9	99.6	99.6	99.5
27	81	30	97.3	99.8	100.4	100.7	100.7	100.7	100.7	100.7	100.6	100.4	100.4	100.3
22	72	25	96.6	99.1	99.7	100.2	100.6	100.9	100.9	100.9	100.9	100.9	100.9	100.8
17	63	20	95.8	98.3	98.9	99.5	99.8	100.2	100.5	100.9	101.0	101.1	101.0	101.0
12	54	15	95.0	97.5	98.1	98.7	99.1	99.4	99.8	100.1	100.5	100.9	101.3	101.2
7	45	10	94.2	96.8	97.4	98.0	98.3	98.7	99.0	99.4	99.8	100.2	100.5	100.9
2	36	5	93.4	96.0	96.6	97.2	97.6	97.9	98.3	98.7	99.0	99.4	99.8	100.2
-3	27	0	92.6	95.2	95.8	96.4	96.8	97.2	97.5	97.9	98.3	98.7	99.0	99.4
-8	18	-5	91.8	94.4	95.0	95.6	96.0	96.4	96.8	97.2	97.5	97.9	98.3	98.6
-13	9	-10	91.0	93.6	94.2	94.8	95.2	95.6	96.0	96.4	96.8	97.1	97.5	97.9
-17	1	-15	90.2	92.8	93.4	94.0	94.4	94.8	95.2	95.6	96.0	96.4	96.7	97.1
-22	-8	-20	89.3	92.0	92.6	93.2	93.6	94.0	94.4	94.8	95.2	95.6	95.9	96.3
-27	-17	-25	88.5	91.1	91.8	92.4	92.8	93.2	93.6	94.0	94.4	94.8	95.1	95.5
-32	-26	-30	87.6	90.3	90.9	91.6	92.0	92.4	92.8	93.3	93.6	94.0	94.3	94.7
-37	-35	-35	86.8	89.4	90.1	90.7	91.1	91.6	92.0	92.4	92.8	93.2	93.5	93.9
-42	-44	-40	85.9	88.6	89.2	89.9	90.3	90.7	91.2	91.6	92.0	92.4	92.7	93.0
-47	-53	-45	85.0	87.7	88.4	89.0	89.4	89.9	90.3	90.8	91.2	91.5	91.9	92.2
-52	-62	-50	84.1	86.8	87.5	88.2	88.6	89.0	89.5	90.0	90.3	90.7	91.0	91.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)											
	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
PACKS OFF	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
A/C HIGH	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

Go-around %N1 - High Altitudes

Based on engine bleeds for packs on, engine anti-ice off, wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°C	°F		10000	11000	12000	13000	14000	14500
37	99	40	99.1	99.7				
32	90	35	99.5	99.3	99.5	100.1	100.7	
27	81	30	100.3	100.2	100.2	100.0	100.0	100.2
22	72	25	100.8	100.7	100.7	100.6	100.6	100.5
17	63	20	101.0	101.0	101.0	100.9	100.8	100.8
12	54	15	101.2	101.2	101.2	101.2	101.1	101.0
7	45	10	100.9	101.4	101.5	101.4	101.3	101.2
2	36	5	100.2	100.9	101.6	101.6	101.5	101.5
-3	27	0	99.4	100.2	101.0	101.4	101.6	101.6
-8	18	-5	98.6	99.4	100.2	100.6	100.9	101.0
-13	9	-10	97.9	98.6	99.5	99.8	100.1	100.2
-17	1	-15	97.1	97.8	98.7	99.0	99.3	99.4
-22	-8	-20	96.3	97.0	97.9	98.2	98.5	98.6
-27	-17	-25	95.5	96.2	97.1	97.4	97.7	97.8
-32	-26	-30	94.7	95.4	96.2	96.6	96.8	97.0
-37	-35	-35	93.9	94.6	95.4	95.7	96.0	96.1
-42	-44	-40	93.0	93.8	94.6	94.9	95.1	95.3
-47	-53	-45	92.2	92.9	93.7	94.0	94.3	94.4
-52	-62	-50	91.4	92.1	92.9	93.2	93.4	93.5

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	10000	11000	12000	13000	14000	14500
PACKS OFF	0.9	0.9	0.9	1.0	1.0	1.0
ENGINE ANTI-ICE	0.0	-0.8	-1.5	-1.5	-1.5	-1.4

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
85	159	161	167
80	154	156	162
75	149	151	157
70	144	146	152
65	139	141	147
60	133	135	140
55	127	129	134
50	120	123	127
45	114	117	121

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ADVISORY INFORMATION

Normal Configuration Landing Distances
Flaps 15
Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	905	75/-45	20/30	-30	120	10	-5	20	-15	70	20	40
MAX AUTO	1130	65/-60	25/40	-40	145	0	0	25	-20	110	0	5
AUTOBRAKE 3	1575	105/-100	45/60	-70	235	0	0	45	-40	180	0	0
AUTOBRAKE 2	2035	150/-145	65/85	-90	325	25	-25	60	-55	190	40	40
AUTOBRAKE 1	2275	180/-170	75/105	-110	385	65	-65	65	-60	180	200	230

Good Reported Braking Action

MAX MANUAL	1220	75/-70	35/45	-50	195	30	-20	30	-15	95	65	150
MAX AUTO	1345	85/-80	35/50	-50	200	25	-20	35	-20	110	75	165
AUTOBRAKE 3	1580	105/-100	45/60	-70	240	10	0	45	-40	180	5	20
AUTOBRAKE 2	2035	150/-145	65/85	-90	325	25	-25	60	-55	190	40	40

Medium Reported Braking Action

MAX MANUAL	1680	120/-110	50/75	-85	325	75	-55	45	-40	125	185	455
MAX AUTO	1750	125/-115	55/75	-85	320	65	-45	45	-40	145	185	450
AUTOBRAKE 3	1785	125/-115	55/75	-85	330	55	-30	50	-45	180	145	425
AUTOBRAKE 2	2090	155/-150	65/85	-100	370	50	-45	60	-55	190	80	210

Poor Reported Braking Action

MAX MANUAL	2210	175/-160	75/105	-130	510	185	-115	60	-60	150	410	1120
MAX AUTO	2305	175/-160	75/105	-130	505	185	-115	60	-60	150	410	1130
AUTOBRAKE 3	2305	175/-160	75/105	-130	510	185	-105	60	-60	170	410	1125
AUTOBRAKE 2	2360	185/-170	80/105	-135	525	160	-105	65	-60	190	315	1015

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 55 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 30

Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	880	65/-40	20/25	-30	115	10	-5	20	-15	65	20	40
MAX AUTO	1075	60/-55	25/35	-35	140	0	0	25	-20	105	0	5
AUTOBRAKE 3	1490	100/-90	40/55	-65	230	0	0	40	-35	170	0	0
AUTOBRAKE 2	1915	135/-130	55/80	-90	315	25	-30	55	-50	170	40	40
AUTOBRAKE 1	2135	165/-160	70/95	-105	370	60	-60	65	-55	165	175	220

Good Reported Braking Action

MAX MANUAL	1185	75/-70	35/40	-50	190	30	-20	30	-25	95	65	135
MAX AUTO	1295	80/-70	35/50	-50	200	25	-15	30	-30	110	70	150
AUTOBRAKE 3	1495	100/-90	40/55	-65	230	10	0	40	-35	170	5	20
AUTOBRAKE 2	1915	135/-130	55/80	-90	315	25	-30	55	-50	170	40	40

Medium Reported Braking Action

MAX MANUAL	1610	115/-105	50/70	-85	315	75	-55	40	-40	125	165	405
MAX AUTO	1670	115/-110	50/65	-85	315	65	-45	40	-40	145	165	400
AUTOBRAKE 3	1705	115/-110	50/65	-85	325	55	-35	45	-40	170	135	385
AUTOBRAKE 2	1965	140/-135	60/80	-100	360	50	-50	55	-50	170	80	195

Poor Reported Braking Action

MAX MANUAL	2095	160/-150	70/95	-125	500	175	-110	55	-55	145	360	960
MAX AUTO	2180	160/-150	70/95	-125	495	180	-110	55	-50	150	360	970
AUTOBRAKE 3	2180	165/-150	70/95	-125	495	175	-105	55	-55	160	360	965
AUTOBRAKE 2	2230	165/-160	75/100	-130	510	155	-105	60	-60	170	290	870

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 55 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances
Flaps 40
Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	875	60/-40	20/25	-30	115	15	-5	20	-15	70	20	40
MAX AUTO	1050	60/-50	25/35	-35	135	5	0	25	-20	105	0	10
AUTOBRAKE 3	1440	95/-90	40/55	-60	220	0	0	40	-35	165	0	0
AUTOBRAKE 2	1850	130/-125	55/75	-85	310	25	-30	55	-50	165	35	35
AUTOBRAKE 1	2070	155/-150	65/95	-100	365	55	-55	60	-55	160	155	200

Good Reported Braking Action

MAX MANUAL	1170	75/-65	35/40	-50	190	30	-20	30	-25	95	60	130
MAX AUTO	1275	80/-70	35/50	-50	200	25	-15	30	-25	110	65	145
AUTOBRAKE 3	1445	95/-90	40/55	-60	230	10	0	40	-35	165	5	20
AUTOBRAKE 2	1850	130/-125	55/90	-85	310	25	-30	55	-50	165	35	35

Medium Reported Braking Action

MAX MANUAL	1580	115/-100	50/70	-85	315	75	-55	40	-35	125	160	375
MAX AUTO	1640	115/-105	50/70	-85	315	65	-45	40	-35	145	155	370
AUTOBRAKE 3	1665	115/-105	50/65	-85	315	55	-35	45	-40	165	140	370
AUTOBRAKE 2	1900	135/-130	55/80	-95	355	50	-45	55	-50	165	75	185

Poor Reported Braking Action

MAX MANUAL	2045	155/-145	65/95	-125	495	175	-110	55	-50	145	335	875
MAX AUTO	2130	155/-145	65/95	-120	490	175	-105	55	-50	145	340	885
AUTOBRAKE 3	2130	160/-145	70/95	-125	495	175	-105	55	-50	160	335	880
AUTOBRAKE 2	2165	165/-150	70/100	-130	505	160	-100	60	-55	165	270	800

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 55 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M): REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ: PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	1125	120/-70	25/35	-40	175	15	-10	75
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1395	90/-90	35/50	-70	260	40	-35	110
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	895	60/-50	20/25	-35	115	10	-10	80
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	880	55/-45	20/25	-35	115	10	-10	80
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	875	50/-45	20/25	-35	115	10	-10	85
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	940	50/-50	20/30	-40	130	15	-10	70
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1225	70/-70	30/40	-50	170	25	-25	130
LEADING EDGE FLAPS TRANSIT	VREF15+15	930	60/-50	20/25	-35	115	10	-10	65
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	835	55/-45	15/25	-30	110	10	-10	60
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	815	55/-45	15/20	-30	105	10	-10	65

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M): REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ: PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	825	55/-40	15/25	-30	110	10	-10	60
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	825	55/-40	15/25	-30	110	10	-10	60
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	840	65/-40	20/25	-30	115	10	-5	65
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	825	55/-40	15/25	-30	110	10	-10	60
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	965	70/-55	20/30	-35	120	10	-10	65
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	840	65/-40	20/25	-30	115	10	-5	65
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	825	55/-40	15/25	-30	110	10	-10	60
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	965	70/-55	20/30	-35	120	10	-10	65
TRAILING EDGE FLAPS UP	VREF40+40	1020	85/-65	25/30	-35	125	10	-10	65

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	1555	90/-90	45/60	-60	215	30	-30	85
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1545	105/-105	45/60	-80	315	60	-50	120
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1280	85/-85	35/45	-55	205	35	-30	115
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1240	80/-80	35/45	-55	205	35	-30	120
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1225	80/-80	30/45	-55	205	35	-30	125
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1180	75/-75	30/40	-55	190	25	-25	95
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1510	95/-95	40/50	-65	230	45	-40	160
LEADING EDGE FLAPS TRANSIT	VREF15+15	1300	80/-80	35/45	-55	200	30	-25	90
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1180	75/-75	30/40	-55	195	30	-25	95
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1140	70/-70	25/40	-55	195	25	-25	95

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	1140	70/-70	30/35	-50	185	25	-20	85
JAMMED OR RESTRICTED FLIGHT CONROLS	VREF15	1140	70/-70	30/35	-50	185	25	-20	85
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1115	75/-70	35/40	-50	190	30	-20	95
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1140	70/-70	30/35	-50	185	25	-20	85
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1330	75/-80	35/50	-55	200	30	-25	85
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1115	75/-70	35/40	-50	190	30	-20	95
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1140	70/-70	30/35	-50	185	25	-20	85
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1330	75/-80	35/50	-55	200	30	-25	85
TRAILING EDGE FLAPS UP	VREF40+40	1405	80/-85	40/50	-60	205	30	-25	80

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M) REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS HEAD WIND	TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	UP HILL	APP SPD ADJ PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	2180	150/-150	70/95	-100	360	80	-70	115
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1940	150/-145	60/80	-120	490	135	-100	140
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1740	135/-135	55/70	-90	340	80	-65	150
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1660	130/-125	50/70	-90	330	80	-65	150
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1625	125/-120	50/75	-90	330	80	-65	150
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1595	120/-120	45/65	-85	320	65	-55	125
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	2080	150/-145	60/80	-105	370	105	-90	195
LEADING EDGE FLAPS TRANSIT	VREF15+15	1765	130/-130	55/75	-90	330	70	-60	120
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1670	125/-125	50/65	-90	340	80	-65	130
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1590	115/-115	45/60	-85	330	75	-60	130

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M) REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	1540	115/-110	45/65	-80	310	60	-50	115
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1540	115/-110	45/65	-80	310	60	-50	115
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1505	115/-105	50/70	-85	315	75	-55	125
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1540	115/-110	45/60	-80	310	60	-50	115
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1825	125/-125	55/80	-90	335	70	-60	115
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1505	115/-105	50/70	-85	315	75	-55	125
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1540	115/-110	45/60	-80	310	60	-50	115
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1825	125/-125	55/80	-90	335	70	-60	115
TRAILING EDGE FLAPS UP	VREF40+40	1945	135/-135	60/80	-95	345	75	-60	115

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	2880	220/-220	100/145	-150	570	185	-140	150
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	2555	215/-205	80/120	-200	915	465	-220	155
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	2240	195/-185	80/100	-135	535	175	-130	180
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	2125	180/-175	70/105	-130	525	170	-125	170
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	2065	175/-165	70/115	-130	515	165	-120	170
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	2065	175/-165	70/100	-125	510	150	-110	150
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	2675	215/-205	85/120	-150	565	210	-160	220
LEADING EDGE FLAPS TRANSIT	VREF15+15	2285	185/-180	75/110	-135	525	160	-115	145
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	2280	190/-185	75/100	-140	560	200	-145	165
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	2140	175/-170	65/95	-135	545	185	-135	155

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 55000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 55000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	1990	165/-155	65/90	-125	495	140	-105	135
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1990	165/-155	65/90	-125	495	140	-105	135
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1945	160/-150	70/95	-125	500	175	-110	145
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1990	165/-155	65/90	-125	495	140	-105	135
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	2370	185/-180	80/115	-135	530	160	-120	140
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1945	160/-150	70/95	-125	500	175	-110	145
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1990	165/-155	65/90	-125	495	140	-105	135
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	2370	185/-180	80/115	-135	530	160	-120	140
TRAILING EDGE FLAPS UP	VREF40+40	2545	195/-195	85/120	-140	545	170	-125	140

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*																	
		80			100			120			140			160			180		
WEIGHT (1000 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
80	0	15.3	17.2	19.4	22.9	25.8	29.3	31.7	35.8	40.9	41.5	47.1	54.2	52.2	59.6	69.0	62.4	71.4	83.3
	10	15.8	17.7	20.0	23.6	26.6	30.2	32.7	37.0	42.2	42.8	48.7	55.9	53.9	61.5	71.2	64.4	73.7	86.0
	15	16.0	18.0	20.3	24.0	27.1	30.7	33.2	37.6	42.9	43.5	49.4	56.8	54.7	62.4	72.3	65.3	74.8	87.3
	20	16.3	18.3	20.6	24.4	27.5	31.1	33.7	38.1	43.5	44.1	50.1	57.6	55.6	63.4	73.4	66.3	75.9	88.6
	30	16.7	18.8	21.2	25.0	28.2	32.0	34.6	39.2	44.7	45.4	51.5	59.3	57.1	65.1	75.4	68.2	78.0	91.0
	40	16.8	18.9	21.3	25.2	28.5	32.3	35.0	39.6	45.3	46.0	52.3	60.2	58.0	66.3	77.0	69.5	79.7	93.3
	50	16.8	19.0	21.4	25.3	28.6	32.5	35.2	40.0	45.8	46.4	52.9	61.1	58.8	67.4	78.5	70.7	81.3	95.6
70	0	13.9	15.6	17.6	20.6	23.3	26.3	28.4	32.1	36.5	37.1	42.1	48.2	46.6	53.0	61.2	56.4	64.4	74.8
	10	14.4	16.2	18.2	21.3	24.0	27.2	29.3	33.1	37.7	38.3	43.4	49.7	48.1	54.7	63.1	58.2	66.5	77.2
	15	14.6	16.4	18.5	21.6	24.4	27.6	29.8	33.6	38.3	38.9	44.1	50.5	48.8	55.6	64.1	59.1	67.5	78.4
	20	14.8	16.7	18.8	22.0	24.8	28.0	30.2	34.2	38.9	39.5	44.7	51.3	49.5	56.4	65.1	60.0	68.5	79.6
	30	15.2	17.1	19.3	22.6	25.5	28.8	31.1	35.1	40.0	40.6	46.0	52.7	50.9	58.0	66.9	61.6	70.4	81.8
	40	15.3	17.2	19.4	22.7	25.6	29.1	31.3	35.5	40.4	41.0	46.6	53.5	51.7	58.9	68.1	62.7	71.8	83.6
	50	15.3	17.2	19.4	22.8	25.8	29.2	31.5	35.7	40.8	41.4	47.1	54.2	52.3	59.7	69.3	63.7	73.1	85.4
60	0	12.6	14.1	15.9	18.4	20.7	23.4	25.1	28.3	32.2	32.5	36.9	42.1	40.7	46.3	53.1	49.6	56.5	65.3
	10	13.0	14.6	16.4	19.0	21.4	24.2	25.9	29.2	33.2	33.6	38.0	43.4	42.0	47.7	54.9	51.2	58.3	67.4
	15	13.2	14.8	16.6	19.3	21.7	24.6	26.3	29.7	33.7	34.1	38.6	44.1	42.7	48.5	55.7	51.9	59.2	68.4
	20	13.4	15.0	16.9	19.6	22.1	24.9	26.7	30.1	34.2	34.6	39.2	44.8	43.3	49.2	56.5	52.7	60.1	69.5
	30	13.7	15.4	17.4	20.1	22.7	25.6	27.4	31.0	35.2	35.6	40.3	46.0	44.5	50.6	58.1	54.2	61.7	71.4
	40	13.8	15.5	17.5	20.3	22.8	25.8	27.7	31.3	35.6	36.0	40.8	46.6	45.1	51.3	59.0	55.0	62.8	72.8
	50	13.8	15.5	17.5	20.3	22.9	25.9	27.8	31.5	35.8	36.2	41.1	47.1	45.6	51.9	59.9	55.7	63.8	74.2
50	0	11.2	12.6	14.1	16.2	18.2	20.5	21.8	24.6	27.9	28.0	31.7	36.1	34.8	39.5	45.1	42.1	47.9	55.1
	10	11.6	13.0	14.6	16.7	18.8	21.2	22.5	25.4	28.8	28.9	32.7	37.2	35.9	40.7	46.6	43.5	49.4	56.8
	15	11.7	13.2	14.8	16.9	19.1	21.5	22.8	25.8	29.2	29.4	33.2	37.8	36.5	41.4	47.3	44.2	50.2	57.7
	20	11.9	13.4	15.1	17.2	19.4	21.9	23.2	26.2	29.6	29.8	33.7	38.4	37.0	42.0	48.0	44.8	50.9	58.6
	30	12.3	13.8	15.5	17.7	19.9	22.5	23.8	26.9	30.5	30.7	34.7	39.4	38.1	43.2	49.4	46.1	52.4	60.2
	40	12.3	13.8	15.6	17.8	20.0	22.6	24.0	27.1	30.7	30.9	35.0	39.9	38.5	43.7	50.0	46.7	53.1	61.2
	50	12.3	13.8	15.6	17.8	20.1	22.7	24.1	27.2	30.9	31.1	35.2	40.2	38.8	44.1	50.6	47.2	53.8	62.1
40	0	9.9	11.1	12.5	14.0	15.7	17.7	18.5	20.8	23.5	23.5	26.5	30.1	28.9	32.7	37.3	34.8	39.4	45.1
	10	10.2	11.5	12.9	14.4	16.2	18.2	19.1	21.5	24.3	24.3	27.4	31.1	29.9	33.8	38.5	35.9	40.7	46.5
	15	10.4	11.7	13.1	14.6	16.5	18.5	19.4	21.8	24.7	24.6	27.8	31.5	30.3	34.3	39.1	36.4	41.3	47.2
	20	10.6	11.9	13.3	14.9	16.7	18.8	19.7	22.2	25.1	25.0	28.2	32.0	30.8	34.8	39.7	37.0	41.9	47.9
	30	10.9	12.2	13.7	15.3	17.2	19.3	20.2	22.8	25.8	25.7	29.0	32.9	31.7	35.8	40.8	38.0	43.1	49.3
	40	10.9	12.2	13.7	15.3	17.3	19.5	20.4	22.9	26.0	25.9	29.3	33.2	31.9	36.2	41.2	38.4	43.6	50.0
	50	10.9	12.2	13.8	15.4	17.3	19.5	20.4	23.0	26.1	26.0	29.4	33.4	32.1	36.4	41.6	38.7	44.0	50.5

***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	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.5	15.8	24.6	33.8	43.5	53.5	63.6	73.9	84.2
	MAX AUTO	7.3	15.0	23.2	31.9	41.2	51.0	61.3	72.2	83.7
	AUTOBRAKE 3	7.0	14.2	21.8	29.7	38.1	47.1	56.7	67.1	78.3
	AUTOBRAKE 2	6.6	13.3	20.2	27.3	34.7	42.6	51.0	59.9	69.6
	AUTOBRAKE 1	6.3	12.4	18.6	24.9	31.6	38.6	46.2	54.4	63.5

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	6.9	14.5	22.7	31.4	40.4	49.7	59.3	68.9	78.5
	MAX AUTO	6.0	12.6	19.8	27.6	36.0	45.1	54.8	65.3	76.5
	AUTOBRAKE 3	4.5	9.5	15.1	21.3	28.1	35.6	43.7	52.5	62.0
	AUTOBRAKE 2	2.6	5.9	9.7	14.1	19.1	24.7	31.0	37.9	45.4
	AUTOBRAKE 1	1.8	3.8	6.3	9.1	12.5	16.4	21.0	26.3	32.5

Cooling Time (Minutes) - Category F Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category M Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

ADVISORY INFORMATION

Recommended Brake Cooling Schedule - High Altitudes

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*															
		60				100				140				180			
WEIGHT (1000 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)															
		10	12	14	14.5	10	12	14	14.5	10	12	14	14.5	10	12	14	14.5
	0	11.4	11.9	12.5	12.7	29.3	30.9	32.7	33.2	54.2	57.7	61.6	62.7	83.3	89.5		
	10	11.7	12.3	12.9	13.1	30.2	31.9	33.8	34.3	55.9	59.5	63.6	64.8	86.0	92.3		
	15	11.9	12.5	13.1	13.3	30.7	32.4	34.3	34.8	56.8	60.4	64.6	65.8	87.3	93.7		
80	20	12.1	12.7	13.3	13.5	31.1	32.9	34.8	35.3	57.6	61.3	65.5	66.7	88.6	95.0		
	30	12.4	13.0	13.7	13.9	32.0	33.8	35.8	36.3	59.3	63.0	67.4	68.6	91.0	97.7		
	40	12.5	13.1	13.8	14.0	32.3	34.1	36.1	36.7	60.2	64.2	68.6	69.9	93.3	100.3		
	50	12.5	13.1	13.8	14.0	32.5	34.4	36.4	37.0	61.1	65.2	69.8	71.1	95.6	103.0		
	0	10.5	11.0	11.5	11.7	26.3	27.8	29.4	29.8	48.2	51.2	54.6	55.6	74.8	80.1	86.3	88.0
	10	10.8	11.3	11.9	12.1	27.2	28.7	30.3	30.8	49.7	52.8	56.3	57.3	77.2	82.7	89.0	90.8
	15	11.0	11.5	12.1	12.3	27.6	29.1	30.8	31.3	50.5	53.6	57.2	58.2	78.4	83.9	90.4	92.2
70	20	11.2	11.7	12.3	12.5	28.0	29.6	31.3	31.8	51.3	54.4	58.1	59.1	79.6	85.2	91.7	93.5
	30	11.5	12.0	12.6	12.8	28.8	30.4	32.1	32.6	52.7	56.0	59.7	60.7	81.8	87.5	94.2	96.1
	40	11.5	12.1	12.7	12.9	29.1	30.7	32.4	32.9	53.5	56.9	60.7	61.8	83.6	89.7	96.7	98.7
	50	11.5	12.1	12.7	12.9	29.2	30.8	32.6	33.1	54.2	57.6	61.6	62.7	85.4	91.8	99.1	101.2
	0	9.6	10.1	10.6	10.7	23.4	24.7	26.1	26.5	42.1	44.6	47.5	48.3	65.3	69.8	74.8	76.3
	10	9.9	10.4	10.9	11.1	24.2	25.5	26.9	27.3	43.4	46.1	49.0	49.8	67.4	72.0	77.2	78.7
	15	10.1	10.6	11.1	11.3	24.6	25.9	27.3	27.7	44.1	46.8	49.7	50.6	68.4	73.1	78.4	79.9
60	20	10.2	10.7	11.3	11.4	24.9	26.3	27.7	28.1	44.8	47.5	50.5	51.4	69.5	74.2	79.6	81.1
	30	10.5	11.0	11.6	11.8	25.6	27.0	28.5	28.9	46.0	48.8	51.9	52.8	71.4	76.2	81.8	83.4
	40	10.5	11.1	11.6	11.8	25.8	27.2	28.7	29.2	46.6	49.5	52.7	53.6	72.8	77.8	83.6	85.3
	50	10.5	11.1	11.6	11.8	25.9	27.3	28.9	29.3	47.1	50.0	53.3	54.2	74.2	79.4	85.4	87.1
	0	8.8	9.2	9.7	9.8	20.5	21.6	22.8	23.1	36.1	38.1	40.5	41.2	55.1	58.6	62.7	63.8
	10	9.1	9.5	10.0	10.1	21.2	22.3	23.5	23.9	37.2	39.4	41.8	42.5	56.8	60.5	64.7	65.9
	15	9.2	9.6	10.1	10.3	21.5	22.7	23.9	24.3	37.8	40.0	42.4	43.1	57.7	61.4	65.7	66.9
50	20	9.3	9.8	10.3	10.4	21.9	23.0	24.3	24.6	38.4	40.6	43.1	43.8	58.6	62.3	66.6	67.8
	30	9.6	10.1	10.6	10.7	22.5	23.6	24.9	25.3	39.4	41.7	44.3	45.0	60.2	64.1	68.5	69.7
	40	9.6	10.1	10.6	10.8	22.6	23.8	25.1	25.5	39.9	42.2	44.8	45.6	61.2	65.2	69.8	71.1
	50	9.6	10.1	10.6	10.8	22.7	23.9	25.2	25.6	40.2	42.6	45.3	46.1	62.1	66.3	71.0	72.4
	0	8.1	8.4	8.9	9.0	17.7	18.6	19.6	19.9	30.1	31.8	33.6	34.2	45.1	47.8	50.9	51.8
	10	8.3	8.7	9.2	9.3	18.2	19.2	20.2	20.5	31.1	32.8	34.7	35.3	46.5	49.3	52.6	53.5
	15	8.5	8.9	9.3	9.4	18.5	19.5	20.5	20.8	31.5	33.3	35.3	35.8	47.2	50.1	53.4	54.3
40	20	8.6	9.0	9.4	9.6	18.8	19.8	20.8	21.1	32.0	33.8	35.8	36.4	47.9	50.9	54.2	55.1
	30	8.8	9.2	9.7	9.8	19.3	20.3	21.4	21.7	32.9	34.8	36.8	37.4	49.3	52.3	55.7	56.6
	40	8.9	9.3	9.7	9.9	19.5	20.5	21.6	21.9	33.2	35.1	37.2	37.8	50.0	53.0	56.5	57.5
	50	8.8	9.3	9.7	9.9	19.5	20.5	21.6	21.9	33.4	35.4	37.5	38.1	50.5	53.7	57.3	58.3

***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	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.8	16.3	25.3	34.7	44.7	55.0	65.7	76.6	87.9
	MAX AUTO	7.5	15.4	23.6	32.4	41.8	51.8	62.5	74.1	86.5
	AUTOBRAKE 3	7.3	14.7	22.3	30.2	38.6	47.6	57.4	68.1	80.0
	AUTOBRAKE 2	7.0	13.8	20.5	27.4	34.8	42.7	51.5	61.3	72.4
	AUTOBRAKE 1	6.7	13.1	19.2	25.3	31.8	38.8	46.6	55.4	65.5

ADVISORY INFORMATION

Recommended Brake Cooling Schedule - High Altitudes

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.0	14.6	22.8	31.4	40.5	49.9	59.7	69.8	80.0
	MAX AUTO	5.8	12.3	19.5	27.2	35.6	44.5	53.9	63.7	74.1
	AUTOBRAKE 3	4.3	9.2	14.7	20.7	27.2	34.4	42.0	50.2	59.0
	AUTOBRAKE 2	2.5	5.6	9.1	13.1	17.8	23.0	28.8	35.2	42.3
	AUTOBRAKE 1	1.8	3.8	6.1	8.8	11.9	15.5	19.6	24.4	29.8

Cooling Time (Minutes) - Category F Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category M Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

Intentionally
Blank

Performance Inflight - QRH Chapter PI-QRH

Engine Inoperative Section 12

ENGINE INOP

Initial Max Continuous %N1

Based on .80M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.9	96.6	96.4	96.2	96.0	95.5	95.1	94.8	94.2
15	97.5	97.2	97.0	96.8	96.7	96.3	95.8	95.6	95.0
10	98.1	97.9	97.5	97.4	97.4	97.0	96.6	96.4	95.9
5	98.1	98.6	98.4	98.1	98.1	97.8	97.4	97.2	96.7
0	97.3	98.5	99.2	99.0	98.9	98.6	98.2	98.0	97.7
-5	96.5	97.8	98.9	99.8	99.7	99.3	99.0	98.8	98.5
-10	95.8	97.0	98.2	99.4	100.5	100.2	99.9	99.7	99.5
-15	95.0	96.2	97.4	98.6	99.2	101.0	100.8	100.6	100.4
-20	94.2	95.4	96.6	97.8	99.1	100.2	100.8	100.6	100.4
-25	93.4	94.6	95.8	97.0	98.3	99.4	100.0	99.8	99.6
-30	92.6	93.8	95.0	96.2	97.5	98.6	99.1	98.9	98.7
-35	91.7	93.0	94.1	95.3	96.6	97.7	98.3	98.1	97.9
-40	90.9	92.2	93.3	94.5	95.8	96.9	97.4	97.2	97.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE	-4.2	-4.4	-4.5	-4.7	-5.0	-4.8	-4.8	-4.8	-4.8

ENGINE INOP

Max Continuous %N1

37000 FT to 29000 FT Pressure Altitudes

37000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.51	96.6	97.6	98.5	99.4	100.2	99.6	98.8	97.6	96.3	94.7	93.2	91.8
200	.63	96.0	96.9	97.8	98.7	99.6	100.4	100.1	99.3	98.4	97.5	96.3	95.2
240	.74	95.1	96.0	96.8	97.7	98.6	99.4	100.3	100.7	100.0	99.2	98.4	97.5
280	.86	94.3	95.2	96.1	97.0	97.8	98.7	99.5	100.4	101.2	100.9	100.0	99.1
35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	96.5	97.4	98.3	99.2	100.1	99.8	99.0	98.0	96.8	95.4	94.0	92.7
200	.60	96.1	97.0	97.9	98.8	99.7	100.6	100.5	99.6	98.6	97.6	96.5	95.4
240	.71	95.0	95.9	96.8	97.7	98.6	99.4	100.3	100.8	100.2	99.5	98.6	97.7
280	.82	93.8	94.6	95.5	96.4	97.3	98.1	98.9	99.8	100.6	100.3	99.5	98.8
33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	97.4	98.3	99.2	100.0	100.8	100.0	99.1	97.9	96.7	95.3	93.9	92.6
200	.58	97.0	97.9	98.8	99.7	100.6	101.4	100.6	99.6	98.6	97.5	96.3	95.1
240	.68	95.9	96.8	97.7	98.5	99.4	100.2	101.1	100.9	100.2	99.4	98.4	97.4
280	.79	94.3	95.1	96.0	96.8	97.7	98.5	99.3	100.2	100.5	99.7	98.9	98.1
320	.89	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	100.3	101.1	100.7	99.8
31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	97.3	98.2	99.1	100.0	100.9	101.1	100.2	99.2	98.0	96.6	95.2	93.9
200	.55	97.1	98.0	98.9	99.7	100.6	101.5	101.6	100.7	99.7	98.6	97.4	96.2
240	.66	95.6	96.5	97.4	98.3	99.1	100.0	100.8	101.3	100.5	99.8	98.8	97.8
280	.76	93.8	94.7	95.5	96.4	97.2	98.0	98.8	99.7	100.5	99.8	98.9	98.0
320	.85	92.4	93.2	94.1	94.9	95.7	96.5	97.4	98.2	98.9	99.7	99.9	99.1
29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	98.1	99.0	99.9	100.8	101.6	101.2	100.2	99.1	97.9	96.4	95.1	93.8
200	.53	97.5	98.4	99.3	100.2	101.0	101.9	101.3	100.4	99.3	98.2	96.9	95.8
240	.63	96.3	97.1	98.0	98.9	99.7	100.5	101.4	101.1	100.2	99.2	98.3	97.2
280	.73	94.2	95.0	95.9	96.7	97.5	98.3	99.1	99.9	100.1	99.1	98.2	97.5
320	.82	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	98.5	97.6
360	.91	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	100.0	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.1	-4.3	-4.5	-4.7	-4.7

ENGINE INOP

Max Continuous %N1

27000 FT to 20000 FT Pressure Altitudes

27000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	98.0	98.8	99.7	100.6	101.4	102.2	101.2	100.2	99.0	97.8	96.4	95.1
200	.51	96.9	97.8	98.7	99.6	100.4	101.2	101.8	100.8	99.9	98.8	97.6	96.4
240	.60	95.6	96.5	97.4	98.2	99.1	99.9	100.7	101.3	100.4	99.4	98.5	97.5
280	.70	93.6	94.4	95.3	96.1	96.9	97.7	98.5	99.3	100.1	99.4	98.4	97.6
320	.79	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	98.6	97.8
360	.88	91.0	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	98.1	98.8	99.4

25000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.8	99.7	100.5	101.4	102.2	102.4	101.4	100.3	99.1	97.7	96.5	95.2
200	.49	97.5	98.3	99.2	100.0	100.9	101.7	101.5	100.6	99.5	98.4	97.3	96.2
240	.58	95.7	96.5	97.4	98.2	99.0	99.9	100.7	100.5	99.5	98.6	97.6	96.7
280	.67	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.5	99.5	98.6	97.6	96.9
320	.76	91.7	92.6	93.4	94.2	95.0	95.8	96.5	97.3	98.0	98.6	97.8	97.2
360	.85	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.6	98.4	98.2

24000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	98.6	99.5	100.4	101.2	102.1	102.9	101.9	100.8	99.6	98.4	97.1	95.8
200	.48	97.5	98.4	99.2	100.1	100.9	101.8	102.2	101.1	100.1	99.0	97.8	96.7
240	.57	95.9	96.8	97.6	98.5	99.3	100.1	100.9	101.2	100.2	99.2	98.2	97.3
280	.66	94.2	95.1	95.9	96.7	97.5	98.3	99.1	99.9	100.4	99.4	98.3	97.5
320	.75	92.1	93.0	93.8	94.6	95.4	96.2	96.9	97.7	98.5	99.2	98.6	97.8
360	.83	90.6	91.4	92.2	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.6

22000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	99.1	100.0	100.9	101.7	102.5	102.8	101.8	100.7	99.5	98.2	97.0	95.8
200	.46	98.4	99.3	100.1	101.0	101.8	102.6	102.3	101.2	100.0	98.9	97.8	96.8
240	.55	97.2	98.1	98.9	99.7	100.5	101.3	102.1	101.6	100.5	99.4	98.5	97.5
280	.63	95.7	96.5	97.4	98.2	99.0	99.8	100.6	101.3	101.0	99.8	98.9	98.1
320	.72	93.9	94.7	95.5	96.3	97.1	97.9	98.6	99.4	100.1	100.2	99.3	98.6
360	.80	92.2	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	99.2	99.7	99.1

20000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	98.7	99.5	100.4	101.2	102.0	102.8	102.5	101.5	100.4	99.2	98.0	96.8
200	.44	98.3	99.2	100.0	100.9	101.7	102.5	103.3	102.3	101.1	100.0	98.9	97.8
240	.53	97.5	98.4	99.2	100.0	100.8	101.7	102.5	103.1	101.8	100.5	99.5	98.6
280	.61	96.2	97.0	97.8	98.7	99.5	100.3	101.1	101.8	102.5	101.3	100.1	99.3
320	.69	94.7	95.5	96.3	97.1	97.9	98.7	99.5	100.2	101.0	101.7	100.9	99.9
360	.77	93.0	93.8	94.6	95.4	96.2	97.0	97.7	98.5	99.2	100.0	100.7	100.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	20	22	24	25	27
ENGINE ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-3.6	-3.8	-3.8	-3.9	-4.0

ENGINE INOP

Max Continuous %N1
18000 FT to 12000 FT Pressure Altitudes

18000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.34	98.5	99.3	100.2	101.0	101.8	102.6	101.6	100.3	99.2	98.1	97.0	95.9
200	.42	98.7	99.6	100.4	101.2	102.0	102.8	103.1	101.7	100.4	99.3	98.3	97.3
240	.51	97.8	98.7	99.5	100.3	101.1	101.9	102.7	102.5	101.1	99.9	99.0	98.1
280	.59	96.3	97.1	97.9	98.7	99.5	100.3	101.0	101.8	101.6	100.5	99.6	98.8
320	.67	94.8	95.6	96.4	97.2	97.9	98.7	99.5	100.2	101.0	100.9	100.0	99.2
360	.75	93.0	93.8	94.6	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.2	99.6
16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	97.1	98.0	98.8	99.6	100.4	101.2	101.6	100.3	99.1	98.1	97.1	96.1
200	.41	98.0	98.8	99.6	100.4	101.2	102.0	102.8	102.5	101.3	100.2	99.3	98.3
240	.49	97.1	97.9	98.7	99.5	100.3	101.1	101.9	102.7	101.8	100.5	99.6	98.7
280	.57	95.6	96.4	97.2	98.0	98.8	99.6	100.3	101.1	101.8	100.9	99.8	99.0
320	.64	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.2	99.4
360	.72	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.4	99.2	99.9	99.6
14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	96.6	97.4	98.2	99.0	99.8	100.6	100.4	99.1	98.0	97.1	96.2	95.3
200	.39	97.1	97.9	98.7	99.5	100.3	101.1	101.8	101.5	101.0	100.1	99.3	98.4
240	.47	96.6	97.4	98.2	99.0	99.8	100.6	101.3	101.8	101.1	100.3	99.5	98.7
280	.54	95.5	96.3	97.1	97.8	98.6	99.4	100.1	100.9	101.0	100.1	99.2	98.5
320	.62	94.1	94.9	95.7	96.5	97.2	98.0	98.7	99.5	100.2	100.3	99.5	98.8
360	.69	92.2	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.6	99.0
12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	96.3	97.0	97.8	98.6	99.4	100.1	99.3	98.1	97.1	96.3	95.4	94.5
200	.38	97.1	97.9	98.7	99.5	100.3	101.0	101.5	100.8	99.8	99.0	98.2	97.3
240	.45	96.5	97.3	98.0	98.8	99.6	100.3	101.1	101.0	100.1	99.4	98.6	97.9
280	.52	95.5	96.3	97.0	97.8	98.6	99.3	100.0	100.8	100.3	99.4	98.6	98.0
320	.60	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	99.7	98.9	98.2
360	.67	92.3	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	99.4	99.1	98.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	12	14	16	18
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-3.2	-3.4	-3.4	-3.5

ENGINE INOP

Max Continuous %N1
10000 FT to 1000 FT Pressure Altitudes

10000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.29	95.2	96.0	96.8	97.6	98.3	99.1	99.8	98.6	97.4	96.6	95.8	94.9
200	.36	96.0	96.7	97.5	98.3	99.0	99.8	100.5	100.5	99.4	98.5	97.8	97.0
240	.43	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.1	99.2	98.4	97.7
280	.51	94.5	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.4	99.5	98.7	98.0
320	.58	93.0	93.9	94.7	95.5	96.2	97.0	97.8	98.6	99.3	99.7	99.0	98.2
360	.65	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	99.1	98.5
5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	94.9	95.7	96.4	97.2	98.0	98.8	99.2	98.3	97.4	96.6	95.9	95.1
200	.33	94.7	95.5	96.3	97.1	97.8	98.6	99.4	98.9	98.0	97.3	96.6	95.8
240	.40	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.5	98.7	97.9	97.2	96.5
280	.46	93.3	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	98.2	97.5	96.8
320	.53	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	98.7	98.4	97.7	97.1
360	.59	91.5	92.3	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.0	97.3
3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	94.8	95.6	96.4	97.2	98.0	98.7	98.8	97.9	97.1	96.4	95.6	94.8
200	.32	94.5	95.3	96.1	96.9	97.6	98.4	99.2	98.3	97.5	96.8	96.1	95.3
240	.38	94.1	94.9	95.6	96.4	97.2	98.0	98.7	98.8	98.0	97.2	96.6	95.9
280	.45	93.2	94.0	94.8	95.6	96.4	97.2	97.9	98.7	98.3	97.5	96.9	96.2
320	.51	92.5	93.3	94.1	94.9	95.7	96.4	97.2	98.0	98.5	97.8	97.1	96.5
360	.57	91.6	92.4	93.2	94.0	94.7	95.5	96.3	97.1	97.8	98.1	97.4	96.8
1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	93.9	94.7	95.4	96.2	97.0	97.8	98.5	98.2	97.4	96.7	96.0	95.2
200	.31	93.5	94.3	95.1	95.9	96.7	97.4	98.2	98.5	97.8	97.0	96.3	95.6
240	.37	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	98.1	97.3	96.6	95.9
280	.43	92.3	93.2	93.9	94.7	95.5	96.3	97.1	97.8	98.3	97.6	96.9	96.2
320	.49	91.6	92.4	93.2	94.0	94.8	95.6	96.3	97.1	97.9	97.9	97.2	96.5
360	.55	90.7	91.5	92.3	93.1	93.9	94.7	95.4	96.2	96.9	97.7	97.3	96.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-3.1	-3.2

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
80	77	263	20400	19300	18000
75	72	255	21800	20900	19700
70	67	247	23300	22400	21400
65	62	238	25000	24100	23100
60	57	229	27100	26100	25000
55	53	219	29300	28400	27300
50	48	209	31400	30700	29700
45	43	199	33600	32900	32000
40	38	187	35900	35200	34300

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
138	128	120	112	106	100	95	90	86	82	79
275	256	239	225	212	200	190	180	172	164	157
413	384	359	337	317	300	284	270	258	246	236
551	512	479	449	423	400	379	361	344	328	314
688	640	598	561	529	500	474	451	429	410	393
826	768	718	674	635	600	569	541	515	492	471
964	896	838	786	741	700	664	631	601	574	549
1102	1025	958	899	846	800	758	721	687	656	628
1240	1153	1077	1011	952	900	853	811	773	738	706
1378	1281	1197	1123	1058	1000	948	901	859	820	785
1517	1410	1317	1236	1164	1100	1043	991	944	902	863
1655	1539	1437	1348	1270	1200	1137	1081	1030	984	941
1794	1667	1557	1461	1376	1300	1232	1171	1116	1065	1019
1933	1796	1677	1573	1482	1400	1327	1261	1201	1147	1098
2071	1925	1798	1686	1588	1500	1422	1351	1287	1229	1176
2211	2054	1918	1799	1694	1600	1516	1441	1373	1310	1254
2350	2183	2038	1911	1800	1700	1611	1531	1458	1392	1332
2489	2312	2159	2024	1906	1800	1706	1621	1544	1474	1410

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)									TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)									
	40	45	50	55	60	65	70	75	80	
100	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0:16
200	0.8	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.2	0:33
300	1.2	1.3	1.4	1.4	1.5	1.7	1.8	1.9	2.0	0:49
400	1.6	1.7	1.9	2.0	2.2	2.3	2.5	2.6	2.7	1:06
500	2.0	2.2	2.4	2.5	2.7	2.9	3.1	3.3	3.5	1:22
600	2.4	2.6	2.8	3.0	3.3	3.5	3.7	4.0	4.2	1:39
700	2.8	3.0	3.3	3.5	3.8	4.1	4.4	4.6	4.9	1:55
800	3.1	3.5	3.8	4.0	4.4	4.7	5.0	5.3	5.6	2:12
900	3.5	3.9	4.2	4.5	4.9	5.2	5.6	5.9	6.3	2:28
1000	3.9	4.3	4.7	5.0	5.4	5.8	6.2	6.6	7.0	2:45
1100	4.3	4.7	5.1	5.5	6.0	6.4	6.8	7.2	7.6	3:02
1200	4.6	5.1	5.6	6.0	6.5	6.9	7.4	7.9	8.3	3:18
1300	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	3:35
1400	5.4	5.9	6.4	7.0	7.5	8.0	8.6	9.1	9.7	3:52
1500	5.7	6.3	6.9	7.4	8.0	8.6	9.2	9.8	10.3	4:09
1600	6.1	6.7	7.3	7.9	8.5	9.1	9.7	10.4	11.0	4:26
1700	6.4	7.1	7.7	8.4	9.0	9.7	10.3	11.0	11.6	4:43
1800	6.8	7.5	8.1	8.8	9.5	10.2	10.9	11.6	12.3	4:60

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
80	18300	16800	15000
75	20200	18800	17000
70	21700	20600	19100
65	23200	22200	21000
60	24900	23900	22800
55	27400	26100	24700
50	29900	28900	27400
45	32200	31400	30300
40	34600	33800	32800

With engine anti-ice on, decrease altitude capability by 1100 ft.
With engine and wing anti-ice on, decrease altitude capability by 4400 ft .

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	15	17	19	21	23	25	27	29	31
80	%N1	88.8	92.5	94.4	97.0						
	MACH	.535	.576	.595	.615						
	KIAS	297	291	290	288						
	FF/ENG	2736	2705	2712	2756						
75	%N1	87.3	90.9	92.4	94.6	97.6					
	MACH	.522	.562	.580	.599	.621					
	KIAS	289	284	282	281	279					
	FF/ENG	2576	2536	2525	2538	2600					
70	%N1	85.6	89.2	90.7	92.4	94.9	98.0				
	MACH	.507	.548	.565	.583	.603	.625				
	KIAS	281	276	274	273	271	270				
	FF/ENG	2411	2372	2356	2346	2369	2448				
65	%N1	83.7	87.4	88.9	90.4	92.3	94.8				
	MACH	.490	.533	.549	.567	.585	.606				
	KIAS	271	269	267	265	263	262				
	FF/ENG	2244	2216	2192	2176	2171	2204				
60	%N1	81.7	85.5	87.0	88.5	90.1	92.1	94.7			
	MACH	.473	.516	.533	.550	.567	.586	.607			
	KIAS	262	260	259	257	255	253	252			
	FF/ENG	2073	2055	2036	2012	1999	1999	2039			
55	%N1	79.4	83.4	84.9	86.4	88.0	89.5	91.6	94.5	98.2	
	MACH	.454	.497	.515	.533	.549	.567	.586	.608	.631	
	KIAS	251	250	250	248	246	244	242	241	240	
	FF/ENG	1900	1890	1876	1857	1836	1824	1830	1872	1957	
50	%N1	76.9	81.0	82.6	84.2	85.7	87.2	88.8	90.9	94.0	97.6
	MACH	.433	.476	.494	.512	.530	.547	.565	.585	.606	.630
	KIAS	239	239	239	238	237	235	233	232	230	230
	FF/ENG	1730	1721	1711	1697	1683	1663	1655	1665	1702	1781
45	%N1	74.3	78.3	79.9	81.6	83.2	84.8	86.3	87.8	89.9	93.1
	MACH	.411	.453	.471	.489	.508	.526	.543	.561	.581	.602
	KIAS	227	228	228	227	227	226	224	222	220	219
	FF/ENG	1562	1549	1543	1533	1522	1510	1496	1492	1499	1528
40	%N1	71.2	75.2	76.9	78.6	80.3	81.9	83.5	85.0	86.6	88.6
	MACH	.388	.428	.445	.463	.482	.500	.519	.537	.555	.575
	KIAS	214	215	215	215	215	214	214	212	210	208
	FF/ENG	1396	1382	1373	1365	1358	1350	1343	1335	1330	1332

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	180	172	164	157
601	548	501	462	429	400	380	361	344	328	314
906	824	753	694	644	600	569	541	515	492	471
1212	1102	1006	927	860	800	759	721	686	655	627
1520	1381	1260	1160	1075	1000	948	901	858	819	784
1831	1662	1515	1393	1291	1200	1138	1081	1029	982	940
2144	1945	1771	1627	1507	1400	1327	1260	1199	1144	1095
2459	2229	2028	1862	1723	1600	1516	1440	1370	1307	1251
2776	2514	2285	2097	1940	1800	1705	1618	1540	1469	1406

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	1.3	0:43	1.2	0:41	1.0	0:39	0.9	0:38	0.8	0:37
400	2.7	1:23	2.5	1:19	2.3	1:16	2.1	1:13	2.0	1:10
600	4.1	2:04	3.8	1:57	3.5	1:52	3.2	1:47	3.1	1:42
800	5.5	2:45	5.1	2:36	4.7	2:29	4.4	2:22	4.2	2:16
1000	6.9	3:27	6.4	3:15	5.9	3:06	5.5	2:57	5.3	2:49
1200	8.2	4:09	7.7	3:55	7.1	3:43	6.6	3:33	6.3	3:23
1400	9.6	4:52	8.9	4:35	8.3	4:21	7.7	4:09	7.4	3:57
1600	10.9	5:36	10.2	5:16	9.4	4:59	8.8	4:45	8.4	4:31
1800	12.2	6:20	11.4	5:57	10.6	5:37	9.8	5:21	9.4	5:05

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
1	-0.1	-0.1	0.0	0.1	0.2
2	-0.3	-0.1	0.0	0.3	0.6
3	-0.4	-0.2	0.0	0.5	1.0
4	-0.6	-0.3	0.0	0.6	1.4
5	-0.8	-0.4	0.0	0.8	1.7
6	-0.9	-0.5	0.0	1.0	2.0
7	-1.1	-0.5	0.0	1.1	2.4
8	-1.2	-0.6	0.0	1.2	2.7
9	-1.4	-0.7	0.0	1.4	3.0
10	-1.5	-0.8	0.0	1.5	3.3
11	-1.7	-0.9	0.0	1.6	3.6
12	-1.9	-0.9	0.0	1.8	3.9
13	-2.0	-1.0	0.0	1.9	4.2
14	-2.2	-1.1	0.0	2.0	4.4

Includes APU fuel burn

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
80	%N1	78.8	81.7	86.0	90.5	97.3		
	KIAS	244	245	246	247	249		
	FF/ENG	2510	2510	2520	2560	2680		
75	%N1	77.1	79.8	84.1	88.6	94.2		
	KIAS	236	237	238	239	241		
	FF/ENG	2360	2350	2350	2380	2440		
70	%N1	75.2	77.9	82.2	86.5	91.5		
	KIAS	228	229	230	231	232		
	FF/ENG	2200	2190	2180	2200	2230		
65	%N1	73.1	76.0	80.1	84.5	89.1	96.8	
	KIAS	220	220	222	223	224	225	
	FF/ENG	2040	2030	2020	2030	2050	2180	
60	%N1	70.8	73.8	77.8	82.2	86.8	92.8	
	KIAS	211	212	213	213	215	216	
	FF/ENG	1890	1870	1860	1860	1870	1930	
55	%N1	68.5	71.3	75.5	79.8	84.3	89.3	99.0
	KIAS	202	203	203	204	205	206	208
	FF/ENG	1740	1720	1710	1700	1700	1720	1910
50	%N1	66.0	68.7	73.0	77.1	81.7	86.4	93.9
	KIAS	192	193	194	195	195	197	198
	FF/ENG	1600	1570	1550	1540	1530	1540	1640
45	%N1	63.3	66.0	70.1	74.4	78.8	83.4	88.8
	KIAS	184	184	184	184	185	186	187
	FF/ENG	1450	1430	1400	1390	1370	1380	1420
40	%N1	60.1	63.1	67.0	71.4	75.6	80.2	85.0
	KIAS	177	177	177	177	177	177	177
	FF/ENG	1310	1290	1260	1240	1220	1220	1240

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

GEAR DOWN

Long Range Cruise Altitude Capability

Max Cruise Thrust, 100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
80	18700	15800	12900
75	21400	18700	15900
70	23900	21700	18800
65	26300	24700	22100
60	28800	27300	25500
55	31000	29800	28400
50	33000	32100	30900
45	35300	34300	33100
40	37700	36700	35600

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	21	23	25	27	29	31	33	35	37
80	%N1	84.0									
	MACH	.468									
	KIAS	259									
	FF/ENG	2251									
75	%N1	82.3	91.5								
	MACH	.454	.554								
	KIAS	251	248								
	FF/ENG	2102	2082								
70	%N1	80.4	89.6	91.5	94.1						
	MACH	.440	.541	.557	.575						
	KIAS	243	242	240	238						
	FF/ENG	1956	1944	1931	1950						
65	%N1	78.3	87.7	89.3	91.3	94.2					
	MACH	.425	.524	.543	.560	.578					
	KIAS	235	234	233	231	229					
	FF/ENG	1814	1797	1790	1786	1812					
60	%N1	76.2	85.4	87.3	88.9	91.0	94.1				
	MACH	.409	.504	.525	.544	.562	.580				
	KIAS	226	225	225	224	222	220				
	FF/ENG	1674	1646	1646	1643	1646	1674				
55	%N1	74.0	83.1	84.8	86.6	88.3	90.5	93.8			
	MACH	.393	.484	.504	.525	.545	.562	.581			
	KIAS	217	216	216	216	215	213	211			
	FF/ENG	1537	1500	1498	1501	1502	1506	1533			
50	%N1	71.5	80.5	82.3	84.0	85.8	87.5	89.8	93.1		
	MACH	.376	.463	.482	.502	.523	.544	.561	.580		
	KIAS	207	206	206	206	206	205	203	201		
	FF/ENG	1402	1356	1352	1354	1361	1363	1365	1391		
45	%N1	68.7	77.7	79.4	81.2	82.9	84.8	86.5	88.7	92.1	
	MACH	.358	.441	.458	.477	.498	.520	.541	.559	.578	
	KIAS	197	196	196	196	196	196	195	193	191	
	FF/ENG	1272	1215	1209	1211	1217	1222	1224	1223	1245	
40	%N1	65.8	74.6	76.3	78.1	79.8	81.6	83.4	85.2	87.3	91.0
	MACH	.340	.417	.434	.452	.471	.491	.513	.535	.554	.573
	KIAS	187	185	185	185	185	185	185	185	183	181
	FF/ENG	1148	1082	1070	1069	1076	1080	1082	1084	1083	1104

GEAR DOWN

Long Range Cruise 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
324	290	260	236	217	200	188	178	168	160	153
654	583	523	474	435	400	377	357	338	321	307
989	880	787	713	653	600	566	535	507	483	461
1329	1181	1054	953	871	800	754	713	676	643	614
1673	1484	1322	1194	1090	1000	943	891	844	803	766
2023	1791	1593	1436	1310	1200	1131	1069	1013	962	918
2379	2102	1865	1680	1530	1400	1320	1247	1181	1122	1070
2741	2416	2140	1924	1751	1600	1508	1424	1348	1280	1221
3110	2735	2417	2170	1972	1800	1695	1600	1514	1438	1371

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.4	0:49	2.1	0:47	1.9	0:44	1.7	0:42	1.6	0:41
400	4.8	1:36	4.5	1:31	4.0	1:25	3.7	1:20	3.4	1:17
600	7.3	2:25	6.8	2:17	6.0	2:06	5.6	1:59	5.3	1:54
800	9.7	3:14	9.0	3:03	8.1	2:48	7.5	2:38	7.1	2:31
1000	12.0	4:04	11.2	3:50	10.0	3:31	9.4	3:18	8.9	3:08
1200	14.2	4:56	13.3	4:39	12.0	4:14	11.2	3:58	10.6	3:46
1400	16.5	5:49	15.4	5:28	13.8	4:58	13.0	4:40	12.3	4:24
1600	18.6	6:42	17.4	6:18	15.7	5:43	14.7	5:22	13.9	5:03
1800	20.8	7:38	19.4	7:10	17.5	6:30	16.4	6:04	15.6	5:43

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
2	-0.3	-0.2	0.0	0.3	0.7
4	-0.7	-0.3	0.0	0.6	1.4
6	-1.0	-0.5	0.0	0.9	2.0
8	-1.4	-0.7	0.0	1.1	2.6
10	-1.7	-0.9	0.0	1.4	3.2
12	-2.1	-1.0	0.0	1.6	3.7
14	-2.4	-1.2	0.0	1.8	4.2
16	-2.8	-1.4	0.0	2.0	4.6
18	-3.1	-1.6	0.0	2.2	5.0
20	-3.5	-1.7	0.0	2.3	5.3
22	-3.9	-1.9	0.0	2.5	5.6

GEAR DOWN

Descent
VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (KG)	DISTANCE (NM)
41000	22	260	91
39000	21	250	87
37000	20	250	82
35000	20	250	78
33000	19	240	73
31000	18	240	69
29000	17	230	65
27000	16	230	61
25000	16	220	57
23000	15	220	52
21000	14	210	48
19000	13	200	44
17000	12	190	40
15000	11	180	36
10000	9	160	26
5000	6	130	16
1500	4	100	9

Allowances for a straight-in approach are included.

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
80	%N1	73.5	76.3	80.4	84.8	89.4			
	KIAS	224	224	224	224	224			
	FF/ENG	2060	2050	2040	2050	2060			
75	%N1	71.8	74.8	78.7	83.1	87.7	93.9		
	KIAS	219	219	219	219	219	219		
	FF/ENG	1950	1930	1920	1920	1930	1990		
70	%N1	70.1	73.0	77.1	81.4	85.8	91.1		
	KIAS	214	214	214	214	214	214		
	FF/ENG	1840	1820	1810	1800	1800	1830		
65	%N1	68.3	71.1	75.3	79.5	83.9	88.7		
	KIAS	209	209	209	209	209	209		
	FF/ENG	1730	1700	1690	1680	1670	1690		
60	%N1	66.4	69.1	73.4	77.4	81.9	86.6	93.5	
	KIAS	203	203	203	203	203	203	203	
	FF/ENG	1610	1590	1570	1560	1550	1550	1630	
55	%N1	64.4	67.1	71.2	75.3	79.7	84.3	89.7	
	KIAS	197	197	197	197	197	197	197	
	FF/ENG	1500	1480	1460	1440	1420	1430	1460	
50	%N1	62.0	64.9	68.9	73.2	77.4	81.9	86.6	
	KIAS	190	190	190	190	190	190	190	
	FF/ENG	1390	1370	1340	1330	1300	1300	1320	
45	%N1	59.6	62.5	66.5	70.8	74.9	79.4	84.0	90.7
	KIAS	184	184	184	184	184	184	184	184
	FF/ENG	1280	1260	1240	1220	1190	1180	1200	1240
40	%N1	57.3	59.9	64.1	68.1	72.5	76.8	81.3	86.3
	KIAS	177	177	177	177	177	177	177	177
	FF/ENG	1170	1150	1130	1110	1090	1070	1080	1090

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH

Gear Down, Engine Inop — Section 14

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
80	76	224	4900	3300	1200
75	71	219	7100	5800	3700
70	66	214	9400	8100	6200
65	62	209	11600	10500	8900
60	57	203	13900	13000	11700
55	52	197	16200	15400	14700
50	47	190	18700	17900	17100
45	43	184	21100	20300	19400
40	38	177	23500	22700	21900

Long Range Cruise Altitude Capability
100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
75	2000		
70	5000	3100	500
65	8000	6400	4000
60	11000	9700	7500
55	13700	12700	11200
50	16600	15800	15100
45	19700	18700	17800
40	22600	21700	20800

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		5	7	9	11	13	15	17	19	21
70	%N1	94.4								
	MACH	.389								
	KIAS	235								
	FF/ENG	3725								
65	%N1	92.2	93.9	96.3						
	MACH	.376	.389	.402						
	KIAS	228	227	226						
	FF/ENG	3432	3440	3472						
60	%N1	89.8	91.5	93.3	95.7					
	MACH	.364	.375	.388	.402					
	KIAS	220	219	218	218					
	FF/ENG	3148	3149	3155	3189					
55	%N1	87.3	88.9	90.6	92.4	94.8	98.6			
	MACH	.351	.362	.374	.387	.400	.414			
	KIAS	212	211	210	209	209	208			
	FF/ENG	2882	2869	2867	2874	2904	2995			
50	%N1	84.8	86.3	87.8	89.5	91.3	93.7	97.4		
	MACH	.338	.348	.359	.371	.384	.398	.412		
	KIAS	204	203	202	201	200	199	198		
	FF/ENG	2628	2607	2593	2590	2597	2616	2685		
45	%N1	82.1	83.5	85.0	86.5	88.2	90.0	92.2	95.8	
	MACH	.325	.334	.344	.355	.367	.380	.393	.408	
	KIAS	196	195	193	192	191	190	189	189	
	FF/ENG	2387	2358	2337	2322	2318	2319	2324	2371	
40	%N1	79.2	80.6	82.0	83.4	84.9	86.6	88.4	90.4	93.3
	MACH	.311	.320	.329	.339	.349	.361	.374	.387	.402
	KIAS	188	186	184	183	182	181	180	179	179
	FF/ENG	2161	2123	2093	2071	2056	2046	2040	2036	2063

GEAR DOWN
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
172	151	134	120	109	100	94	88	82	78	74
352	308	270	242	219	200	187	174	164	155	147
533	465	408	364	330	300	280	261	245	231	219
716	623	545	486	440	400	373	348	326	307	291
900	783	684	609	551	500	465	434	407	383	363
1086	943	823	733	661	600	558	521	488	459	435
1273	1104	963	856	772	700	651	607	568	535	506
1461	1266	1103	980	883	800	744	693	648	610	577
1652	1430	1244	1103	994	900	836	779	729	685	648
1844	1595	1385	1228	1105	1000	929	865	809	760	719

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	2		6		10		14	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	1.4	0:28	1.2	0:27	1.1	0:26	1.0	0:26
200	2.8	0:55	2.6	0:53	2.4	0:50	2.3	0:48
300	4.2	1:22	3.9	1:18	3.6	1:15	3.5	1:11
400	5.6	1:49	5.2	1:44	4.8	1:39	4.7	1:35
500	6.9	2:16	6.5	2:10	6.1	2:04	5.9	1:58
600	8.3	2:44	7.7	2:37	7.3	2:29	7.0	2:22
700	9.6	3:12	9.0	3:03	8.4	2:55	8.2	2:46
800	10.9	3:40	10.2	3:30	9.6	3:20	9.3	3:10
900	12.2	4:09	11.4	3:58	10.8	3:46	10.4	3:34
1000	13.5	4:37	12.6	4:25	11.9	4:12	11.4	3:59

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time
Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
1	-0.2	-0.1	0.0	0.1	0.3
2	-0.3	-0.2	0.0	0.3	0.7
3	-0.5	-0.3	0.0	0.5	1.0
4	-0.7	-0.3	0.0	0.7	1.4
5	-0.8	-0.4	0.0	0.9	1.7
6	-1.0	-0.5	0.0	1.1	2.1
7	-1.2	-0.6	0.0	1.2	2.4
8	-1.3	-0.7	0.0	1.4	2.8
9	-1.5	-0.8	0.0	1.6	3.1
10	-1.7	-0.8	0.0	1.7	3.5
11	-1.8	-0.9	0.0	1.9	3.8
12	-2.0	-1.0	0.0	2.0	4.1
13	-2.2	-1.1	0.0	2.2	4.4
14	-2.3	-1.2	0.0	2.3	4.8

Includes APU fuel burn.

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
70	%N1	88.6	91.8		
	KIAS	214	214		
	FF/ENG	3510	3540		
65	%N1	86.6	89.7	94.9	
	KIAS	209	209	209	
	FF/ENG	3260	3280	3350	
60	%N1	84.4	87.4	92.1	
	KIAS	203	203	203	
	FF/ENG	3020	3030	3070	
55	%N1	82.1	85.1	89.6	95.9
	KIAS	197	197	197	197
	FF/ENG	2780	2780	2800	2910
50	%N1	79.6	82.6	87.0	91.9
	KIAS	190	190	190	190
	FF/ENG	2550	2540	2550	2600
45	%N1	77.1	79.9	84.3	89.0
	KIAS	184	184	184	184
	FF/ENG	2340	2320	2310	2340
40	%N1	74.4	77.2	81.5	85.9
	KIAS	177	177	177	177
	FF/ENG	2130	2110	2090	2100

This table includes 5% additional fuel for holding in a racetrack pattern.

Performance Inflight - QRH — Chapter PI-QRH

Text — Section 15

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 Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

Pitch attitude and average %N1 information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

Max Climb %N1

This table shows Max Climb %N1 for a 280/.80 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (AUTO) and anti-ice on or off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. For packs OFF or HIGH operation, apply the %N1 adjustment shown below the table.

VREF

This table contains flaps 40, 30 and 15 reference speeds for a given weight.

With autothrottles disengaged an approach speed wind correction (max 20 knots) of 1/2 steady headwind component + gust increment above steady wind is recommended. Do not apply a wind correction for tailwinds. The maximum command speed should not exceed landing flap placard speed minus 5 knots.

Advisory Information

Normal Configuration Landing Distance

The normal configuration distance tables are provided as advisory information to help determine the actual landing distance performance of the airplane for different runway surface conditions and brake configurations.

Flaps 15, 30, and 40 landing distances and adjustments are provided for dry runways as well as runways with good, medium, and poor reported braking action, which are commonly referred to as slippery runway conditions.

If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Dry runway landing performance is shown for max manual braking configuration and autobrake settings max, 3, 2, and 1. Use of autobrake setting 1 is not recommended for landings on slippery runways, and is therefore not provided for these conditions. The autobrake performance may be used to assist in the selection of the most desirable autobrake setting for a given field length. Selection of an autobrake setting results in a constant rate of deceleration. Maximum effort manual braking should achieve shorter landing distance than the max autobrake setting. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and normal approach speed for the selected landing flap at sea level, zero wind, zero slope, and two engine detent reverse thrust. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, temperature, speed, and reverse thrust. Each adjustment is independently added to the reference landing distance.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effect of max manual braking and reverse thrust.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the appropriate Recommended Brake Cooling Schedule table (Steel or Carbon Brakes) with the airplane weight and brakes on speed, adjusted for wind at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of.80M 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, TAT, and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level 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 Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

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 .80/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS may 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

General — Section 20

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Climb (280/.76)

Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		90	110	130	150	170
40000	**PITCH ATT**	**4.0**	**4.0**	**4.0**		
	V/S (FT/MIN)	1800	1200	640		
30000	**PITCH ATT**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2500	2000	1600	1300	970
20000	**PITCH ATT**	**7.5**	**6.5**	**6.5**	**6.0**	**6.0**
	V/S (FT/MIN)	4200	3300	2700	2300	1900
10000	**PITCH ATT**	**11.0**	**9.5**	**9.0**	**8.5**	**8.0**
	V/S (FT/MIN)	5600	4500	3700	3200	2700
SEA LEVEL	**PITCH ATT**	**15.0**	**13.0**	**11.5**	**10.5**	**10.0**
	V/S (FT/MIN)	6700	5400	4500	3900	3300

Cruise (.76/280)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		90	110	130	150	170
40000	**PITCH ATT**	**2.0**	**3.0**	**3.5**		
	%N1	82	85	89		
35000	**PITCH ATT**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	81	82	84	86	90
30000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	80	81	82	83	85
25000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	77	77	78	80	81
20000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.5**
	%N1	73	74	75	76	77
15000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**3.0**	**3.5**
	%N1	69	70	71	72	73

Descent (.76/280)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		90	110	130	150	170
40000	**PITCH ATT**	**-1.5**	**-0.5**	**0.0**	**0.5**	**1.0**
	V/S (FT/MIN)	-2700	-2500	-2400	-2600	-2700
30000	**PITCH ATT**	**-3.0**	**-2.0**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-3000	-2500	-2200	-2100	-1900
20000	**PITCH ATT**	**-3.0**	**-2.0**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2700	-2300	-2000	-1800	-1700
10000	**PITCH ATT**	**-3.0**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN	-2400	-2000	-1800	-1600	-1500
SEA LEVEL	**PITCH ATT**	**-3.0**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2100	-1800	-1600	-1500	-1400

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Holding (VREF40 + 70)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		90	110	130	150	170
10000	**PITCH ATT**	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	52	57	61	65	68
5000	**PITCH ATT**	**5.5**	**5.5**	**5.5**	**5.0**	**5.0**
	%N1	49	53	57	61	64

Terminal Area (5000 FT)

%N1 for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB)				
		90	110	130	150	170
FLAPS 1 (GEAR UP)	**PITCH ATT**	**5.0**	**5.5**	**6.0**	**6.0**	**6.5**
(VREF 40 + 50)	%N1	51	56	60	63	67
FLAPS 5 (GEAR UP)	**PITCH ATT**	**5.5**	**6.0**	**6.5**	**6.5**	**7.0**
(VREF 40 + 30)	%N1	52	56	61	65	68
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(VREF 40 + 20)	%N1	59	65	69	73	76

Final Approach (1500 FT)

Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB)				
		90	110	130	150	170
FLAPS 15	**PITCH ATT**	**3.5**	**3.5**	**3.5**	**4.0**	**4.0**
(VREF15 + 10)	%N1	43	47	50	53	56
FLAPS 30	**PITCH ATT**	**1.5**	**2.0**	**2.0**	**2.0**	**2.5**
(VREF30 + 10)	%N1	46	50	54	57	60
FLAPS 40	**PITCH ATT**	**0.0**	**0.0**	**0.5**	**0.5**	**1.0**
(VREF40 + 10)	%N1	52	56	61	64	67

Max Climb %N1

Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS OR MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.80	.80	.80
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	94.8	95.0	93.7
55	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.1	94.3	93.0
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.4	93.6	92.4
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	92.7	92.9	91.7
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.4	92.2	91.0
35	94.0	94.3	94.5	94.3	94.0	94.0	93.0	93.3	92.7	91.6
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	94.1	93.5	92.5
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.9	94.4	93.4
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.6	95.1	94.3
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.3	95.9	95.1
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	97.1	96.7	96.0
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.9	97.4	96.8
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.7	98.3	97.8
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.4	99.0	98.6
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.3	99.9	99.6
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.5
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.3	100.9	100.5
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	99.5	100.0	99.7
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	98.6	99.2	98.8
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	97.8	98.3	98.0
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	96.9	97.5	97.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	0	10	20	30	35	41
ENGINE ANTI-ICE	-0.6	-0.8	-0.9	-0.9	-0.8	-0.8
ENGINE & WING ANTI-ICE*	-1.8	-2.1	-2.5	-2.7	-3.0	-3.0

*Dual bleed sources

Go-around %N1

Based on engine bleed for packs on, engine and wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)											
°C	°F		-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
57	134	60	95.0	96.2	96.8									
52	125	55	95.9	96.7	96.6	96.8	97.5							
47	116	50	96.6	97.6	97.8	97.8	97.7	97.5	98.2	98.8				
42	108	45	97.4	98.4	98.5	98.6	98.7	98.8	98.7	98.5	98.5	99.0		
37	99	40	98.0	99.1	99.2	99.3	99.4	99.5	99.6	99.5	99.1	98.9	98.8	99.1
32	90	35	98.1	99.9	100.0	100.1	100.1	100.3	100.3	100.2	99.9	99.6	99.6	99.5
27	81	30	97.3	99.8	100.4	100.7	100.7	100.7	100.7	100.7	100.6	100.4	100.4	100.3
22	72	25	96.6	99.1	99.7	100.2	100.6	100.9	100.9	100.9	100.9	100.9	100.9	100.8
17	63	20	95.8	98.3	98.9	99.5	99.8	100.2	100.5	100.9	101.0	101.1	101.0	101.0
12	54	15	95.0	97.5	98.1	98.7	99.1	99.4	99.8	100.1	100.5	100.9	101.3	101.2
7	45	10	94.2	96.8	97.4	98.0	98.3	98.7	99.0	99.4	99.8	100.2	100.5	100.9
2	36	5	93.4	96.0	96.6	97.2	97.6	97.9	98.3	98.7	99.0	99.4	99.8	100.2
-3	27	0	92.6	95.2	95.8	96.4	96.8	97.2	97.5	97.9	98.3	98.7	99.0	99.4
-8	18	-5	91.8	94.4	95.0	95.6	96.0	96.4	96.8	97.2	97.5	97.9	98.3	98.6
-13	9	-10	91.0	93.6	94.2	94.8	95.2	95.6	96.0	96.4	96.8	97.1	97.5	97.9
-17	1	-15	90.2	92.8	93.4	94.0	94.4	94.8	95.2	95.6	96.0	96.4	96.7	97.1
-22	-8	-20	89.3	92.0	92.6	93.2	93.6	94.0	94.4	94.8	95.2	95.6	95.9	96.3
-27	-17	-25	88.5	91.1	91.8	92.4	92.8	93.2	93.6	94.0	94.4	94.8	95.1	95.5
-32	-26	-30	87.6	90.3	90.9	91.6	92.0	92.4	92.8	93.3	93.6	94.0	94.3	94.7
-37	-35	-35	86.8	89.4	90.1	90.7	91.1	91.6	92.0	92.4	92.8	93.2	93.5	93.9
-42	-44	-40	85.9	88.6	89.2	89.9	90.3	90.7	91.2	91.6	92.0	92.4	92.7	93.0
-47	-53	-45	85.0	87.7	88.4	89.0	89.4	89.9	90.3	90.8	91.2	91.5	91.9	92.2
-52	-62	-50	84.1	86.8	87.5	88.2	88.6	89.0	89.5	90.0	90.3	90.7	91.0	91.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)											
	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
PACKS OFF	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
A/C HIGH	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

Go-around %N1 - High Altitudes

Based on engine bleeds for packs on, engine anti-ice off, wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°C	°F		10000	11000	12000	13000	14000	14500
37	99	40	99.1	99.7				
32	90	35	99.5	99.3	99.5	100.1	100.7	
27	81	30	100.3	100.2	100.2	100.0	100.0	100.2
22	72	25	100.8	100.7	100.7	100.6	100.6	100.5
17	63	20	101.0	101.0	101.0	100.9	100.8	100.8
12	54	15	101.2	101.2	101.2	101.2	101.1	101.0
7	45	10	100.9	101.4	101.5	101.4	101.3	101.2
2	36	5	100.2	100.9	101.6	101.6	101.5	101.5
-3	27	0	99.4	100.2	101.0	101.4	101.6	101.6
-8	18	-5	98.6	99.4	100.2	100.6	100.9	101.0
-13	9	-10	97.9	98.6	99.5	99.8	100.1	100.2
-17	1	-15	97.1	97.8	98.7	99.0	99.3	99.4
-22	-8	-20	96.3	97.0	97.9	98.2	98.5	98.6
-27	-17	-25	95.5	96.2	97.1	97.4	97.7	97.8
-32	-26	-30	94.7	95.4	96.2	96.6	96.8	97.0
-37	-35	-35	93.9	94.6	95.4	95.7	96.0	96.1
-42	-44	-40	93.0	93.8	94.6	94.9	95.1	95.3
-47	-53	-45	92.2	92.9	93.7	94.0	94.3	94.4
-52	-62	-50	91.4	92.1	92.9	93.2	93.4	93.5

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	10000	11000	12000	13000	14000	14500
PACKS OFF	0.9	0.9	0.9	1.0	1.0	1.0
ENGINE ANTI-ICE	0.0	-0.8	-1.5	-1.5	-1.5	-1.4

VREF

WEIGHT (1000 LB)	FLAPS		
	40	30	15
180	156	158	164
170	151	153	159
160	147	149	155
150	142	144	150
140	137	140	145
130	132	134	139
120	126	129	133
110	120	123	127
100	114	117	121
90	108	111	115

ADVISORY INFORMATION

Normal Configuration Landing Distances

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		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	2910	210/-140	60/90	-110	380	30	-30	60	-60	220	60	130
MAX AUTO	3650	190/-180	80/120	-140	460	0	0	80	-80	350	0	10
AUTOBRAKE 3	5090	310/-300	140/190	-230	760	0	0	140	-140	580	0	0
AUTOBRAKE 2	6570	440/-440	200/270	-310	1060	70	-90	190	-190	620	130	130
AUTOBRAKE 1	7340	530/-520	240/330	-370	1260	200	-220	210	-210	580	650	750

Good Reported Braking Action

MAX MANUAL	3950	220/-220	100/140	-180	630	90	-80	90	-60	300	210	480
MAX AUTO	4340	240/-240	110/150	-180	650	80	-70	100	-80	350	240	540
AUTOBRAKE 3	5100	310/-300	140/190	-230	780	20	-10	140	-140	580	10	50
AUTOBRAKE 2	6570	440/-440	200/270	-310	1060	70	-90	190	-190	620	130	130

Medium Reported Braking Action

MAX MANUAL	5430	350/-340	160/230	-290	1050	240	-190	140	-140	400	600	1490
MAX AUTO	5650	360/-350	170/230	-290	1040	210	-160	140	-140	460	600	1470
AUTOBRAKE 3	5760	370/-350	170/230	-290	1070	170	-110	150	-150	580	460	1380
AUTOBRAKE 2	6740	450/-450	210/270	-340	1210	150	-150	190	-190	620	260	680

Poor Reported Braking Action

MAX MANUAL	7130	510/-490	240/330	-440	1670	600	-390	190	-200	490	1330	3670
MAX AUTO	7440	510/-490	240/330	-430	1650	600	-390	190	-200	490	1340	3700
AUTOBRAKE 3	7440	510/-490	240/340	-430	1660	600	-360	190	-200	550	1330	3680
AUTOBRAKE 2	7610	540/-520	250/340	-450	1710	520	-350	210	-210	610	1030	3320

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 170 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 30

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	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2840	190/-130	60/80	-100	370	30	-30	60	-60	210	60	120
MAX AUTO	3480	170/-170	80/100	-130	450	0	0	80	-80	340	0	10
AUTOBRAKE 3	4820	290/-280	130/170	-220	740	0	-10	130	-130	550	0	0
AUTOBRAKE 2	6190	400/-400	180/250	-300	1030	80	-110	170	-170	550	130	130
AUTOBRAKE 1	6890	480/-480	220/300	-350	1210	190	-200	200	-190	540	570	710

Good Reported Braking Action

MAX MANUAL	3830	210/-210	100/130	-180	620	90	-80	90	-90	300	200	440
MAX AUTO	4190	230/-220	100/150	-180	640	70	-60	90	-100	350	220	490
AUTOBRAKE 3	4830	290/-280	130/170	-220	750	20	-10	130	-130	550	10	50
AUTOBRAKE 2	6190	400/-400	180/250	-300	1030	80	-110	170	-170	550	130	130

Medium Reported Braking Action

MAX MANUAL	5200	330/-320	150/220	-280	1030	240	-190	130	-140	400	540	1320
MAX AUTO	5400	340/-330	160/210	-280	1020	210	-160	130	-140	460	540	1300
AUTOBRAKE 3	5500	340/-330	160/210	-290	1050	170	-120	140	-140	550	440	1250
AUTOBRAKE 2	6350	410/-410	190/250	-330	1170	150	-170	170	-180	550	260	630

Poor Reported Braking Action

MAX MANUAL	6750	470/-460	220/310	-420	1630	570	-370	180	-190	470	1170	3140
MAX AUTO	7040	470/-450	220/310	-420	1620	580	-370	180	-180	480	1180	3170
AUTOBRAKE 3	7040	480/-460	220/310	-420	1620	560	-350	180	-190	520	1170	3150
AUTOBRAKE 2	7190	490/-480	230/320	-440	1670	500	-350	190	-200	550	940	2850

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 170 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

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	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	2820	170/-130	60/80	-100	370	40	-30	60	-60	220	60	120
MAX AUTO	3390	170/-160	80/100	-130	440	10	0	70	-70	340	0	20
AUTOBRAKE 3	4660	280/-270	130/170	-210	720	0	-10	120	-120	540	0	0
AUTOBRAKE 2	5980	380/-380	180/240	-290	1010	80	-100	170	-170	540	110	110
AUTOBRAKE 1	6670	460/-450	210/300	-340	1190	180	-190	190	-190	520	500	640

Good Reported Braking Action

MAX MANUAL	3780	210/-200	100/130	-170	620	90	-80	90	-90	310	190	420
MAX AUTO	4120	230/-220	100/150	-180	640	80	-60	90	-90	360	210	460
AUTOBRAKE 3	4670	280/-270	130/170	-210	740	20	-10	120	-120	540	10	50
AUTOBRAKE 2	5980	380/-380	180/280	-290	1010	80	-100	170	-170	540	110	110

Medium Reported Braking Action

MAX MANUAL	5100	330/-310	150/220	-280	1020	240	-190	130	-130	400	510	1230
MAX AUTO	5290	330/-320	150/220	-280	1020	210	-160	130	-130	460	500	1210
AUTOBRAKE 3	5370	340/-320	160/210	-280	1030	180	-120	140	-140	540	450	1200
AUTOBRAKE 2	6140	400/-390	180/260	-320	1150	160	-160	170	-170	540	240	600

Poor Reported Braking Action

MAX MANUAL	6590	460/-440	210/310	-420	1620	570	-370	170	-180	470	1090	2870
MAX AUTO	6870	460/-440	210/310	-410	1600	570	-360	170	-180	470	1100	2900
AUTOBRAKE 3	6870	470/-440	220/300	-420	1610	560	-350	170	-180	510	1090	2880
AUTOBRAKE 2	6990	480/-460	220/320	-430	1650	510	-340	190	-190	530	880	2620

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 speed-brakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 170 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ: PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	3650	360/-210	85/115	-130	570	45	-40	245
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	4540	265/-270	120/165	-235	850	130	-115	365
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	2920	180/-145	65/85	-110	380	40	-35	260
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	2860	165/-140	60/85	-110	375	40	-35	270
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	2850	155/-140	60/90	-110	375	40	-35	285
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	3060	150/-155	70/95	-125	430	45	-40	235
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	3990	205/-210	95/130	-165	560	90	-85	430
LEADING EDGE FLAPS TRANSIT	VREF15+15	3030	185/-145	65/90	-110	385	35	-30	210
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	2710	170/-130	55/75	-105	360	30	-30	205
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	2650	160/-130	55/70	-100	345	30	-25	215

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	2690	165/-125	55/75	-100	355	30	-25	195
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	2690	165/-125	55/75	-100	355	30	-25	195
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	2710	190/-130	60/80	-100	370	30	-30	210
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	2690	165/-125	55/75	-100	355	30	-25	195
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	3140	210/-165	70/95	-115	390	35	-30	210
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	2710	190/-130	60/80	-100	370	30	-30	210
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	2690	165/-125	55/75	-100	355	30	-25	195
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	3140	210/-165	70/95	-115	390	35	-30	210
TRAILING EDGE FLAPS UP	VREF40+40	3310	255/-190	80/105	-120	410	35	-35	220

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABV/BLW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ PER 10 KTS ABOVE VREF
		LANDING DISTANCE AND ADJUSTMENT (FT)							
ALL FLAPS UP	VREF40+55	5070	265/-275	140/190	-200	710	105	-95	275
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	5030	315/-315	140/190	-270	1035	195	-160	395
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	4170	255/-255	115/150	-185	675	110	-100	385
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	4040	240/-240	110/140	-185	665	110	-95	390
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	3990	240/-240	105/150	-185	665	110	-95	405
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	3840	225/-225	100/130	-175	630	90	-80	310
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	4915	280/-280	125/180	-220	750	155	-135	520
LEADING EDGE FLAPS TRANSIT	VREF15+15	4240	240/-245	115/150	-185	660	95	-85	300
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	3850	225/-225	95/130	-175	645	95	-85	305
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	3720	215/-215	90/125	-175	635	90	-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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ: PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	3710	215/-215	95/120	-170	615	80	-70	280
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	3710	215/-215	95/120	-170	615	80	-70	280
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	3620	210/-210	100/130	-180	620	90	-80	300
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	3710	215/-215	95/120	-170	615	80	-70	280
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	4340	230/-240	115/160	-185	660	90	-85	280
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	3620	210/-210	100/130	-180	620	90	-80	300
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	3710	215/-215	95/120	-170	615	85	-70	280
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	4340	230/-240	115/160	-185	660	90	-85	280
TRAILING EDGE FLAPS UP	VREF40+40	4580	240/-250	125/170	-190	675	95	-85	270

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	7100	440/-450	230/310	-320	1185	265	-225	385
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	6310	445/-430	190/270	-400	1615	435	-320	455
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	5650	405/-395	180/230	-295	1110	265	-220	500
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	5400	380/-370	170/230	-290	1090	255	-210	490
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	5290	370/-360	165/250	-290	1080	255	-210	490
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	5190	355/-350	155/220	-275	1050	220	-185	405
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	6770	445/-435	200/285	-340	1210	340	-290	645
LEADING EDGE FLAPS TRANSIT	VREF15+15	5750	385/-380	180/240	-290	1090	235	-195	400
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	5440	370/-370	160/220	-295	1110	260	-215	430
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	5180	345/-345	150/205	-285	1085	250	-205	420

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	5010	340/-330	145/210	-270	1025	205	-170	375
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	5010	340/-330	145/210	-270	1025	205	-170	375
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	4880	330/-320	100/130	-180	620	90	-80	400
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	5010	340/-330	145/210	-270	1025	205	-170	375
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	5940	375/-375	185/260	-295	1100	230	-195	375
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	4880	330/-320	100/130	-180	620	90	-80	400
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	5010	340/-330	145/210	-270	1025	205	-170	375
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	5940	375/-375	185/260	-295	1100	230	-195	375
TRAILING EDGE FLAPS UP	VREF40+40	6330	395/-400	200/270	-305	1125	240	-205	370

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	9360	660/-655	335/470	-485	1875	610	-460	485
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	8300	640/-615	260/400	-655	3000	1530	-725	505
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	7280	580/-550	255/330	-445	1750	580	-425	585
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	6910	540/-515	235/340	-430	1715	555	-405	560
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	6710	520/-495	225/370	-425	1695	545	-395	550
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	6710	515/-490	225/320	-415	1670	500	-365	490
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	8700	640/-610	280/415	-500	1855	690	-525	725
LEADING EDGE FLAPS TRANSIT	VREF15+15	7420	555/-535	250/360	-435	1725	520	-385	475
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	7410	560/-550	240/330	-465	1835	655	-470	540
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	6960	515/-505	220/310	-450	1780	615	-435	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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

**** ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REFERENCE DISTANCE FOR 120000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 120000 LB	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	6470	485/-465	210/300	-405	1630	465	-345	450
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	6470	485/-465	210/300	-405	1630	465	-345	450
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	6290	470/-460	220/310	-420	1,630	570	-370	470
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	6470	485/-465	210/300	-405	1630	465	-345	450
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	7710	550/-540	265/370	-440	1740	520	-390	455
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	6290	470/-460	220/310	-420	1630	570	-370	470
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	6470	485/-465	210/300	-405	1630	465	-345	450
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	7710	550/-540	265/370	-440	1740	520	-390	455
TRAILING EDGE FLAPS UP	VREF40+40	8280	585/-575	285/400	-455	1785	550	-410	455

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*																	
		80			100			120			140			160			180		
WEIGHT (1000 LB)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
180	0	15.5	17.5	19.7	23.3	26.2	29.8	32.2	36.5	41.6	42.2	48.0	55.2	53.2	60.7	70.3	63.3	72.5	84.7
	10	16.0	18.0	20.3	24.0	27.1	30.7	33.2	37.6	43.0	43.6	49.5	57.0	54.9	62.6	72.6	65.3	74.8	87.4
	15	16.3	18.3	20.6	24.4	27.5	31.2	33.7	38.2	43.6	44.2	50.3	57.8	55.7	63.6	73.7	66.3	76.0	88.7
	20	16.5	18.6	21.0	24.7	27.9	31.7	34.3	38.8	44.3	44.9	51.0	58.7	56.5	64.5	74.8	67.3	77.1	90.0
	30	17.0	19.1	21.5	25.4	28.7	32.6	35.2	39.9	45.5	46.2	52.5	60.3	58.1	66.3	76.9	69.2	79.2	92.5
	40	17.1	19.2	21.7	25.6	28.9	32.9	35.6	40.3	46.1	46.8	53.2	61.3	59.1	67.5	78.5	70.5	81.0	94.9
	50	17.1	19.3	21.7	25.7	29.1	33.1	35.8	40.7	46.6	47.3	53.9	62.3	59.9	68.7	80.1	71.8	82.7	97.2
160	0	14.3	16.0	18.1	21.2	23.9	27.1	29.2	33.1	37.7	38.2	43.4	49.8	48.0	54.7	63.2	58.0	66.3	77.1
	10	14.7	16.6	18.7	21.9	24.7	28.0	30.2	34.1	38.9	39.5	44.8	51.3	49.6	56.5	65.2	59.8	68.4	79.5
	15	15.0	16.8	18.9	22.2	25.1	28.4	30.6	34.7	39.5	40.1	45.5	52.1	50.3	57.3	66.2	60.7	69.4	80.7
	20	15.2	17.1	19.2	22.6	25.5	28.8	31.1	35.2	40.1	40.7	46.1	52.9	51.1	58.2	67.2	61.6	70.4	81.9
	30	15.6	17.6	19.8	23.2	26.2	29.6	32.0	36.2	41.2	41.8	47.4	54.4	52.5	59.8	69.1	63.4	72.4	84.2
	40	15.7	17.7	19.9	23.4	26.4	29.9	32.3	36.5	41.7	42.3	48.1	55.2	53.3	60.8	70.4	64.5	73.9	86.2
	50	15.7	17.7	19.9	23.5	26.5	30.1	32.5	36.8	42.1	42.7	48.6	56.0	54.0	61.7	71.6	65.5	75.2	88.1
140	0	13.0	14.6	16.5	19.2	21.6	24.4	26.2	29.6	33.7	34.1	38.7	44.2	42.8	48.6	56.0	52.1	59.5	68.9
	10	13.5	15.1	17.0	19.8	22.3	25.2	27.1	30.6	34.8	35.2	39.9	45.6	44.2	50.2	57.8	53.8	61.4	71.1
	15	13.7	15.4	17.3	20.1	22.7	25.6	27.5	31.1	35.3	35.8	40.5	46.3	44.9	51.0	58.7	54.6	62.3	72.2
	20	13.9	15.6	17.6	20.4	23.0	26.0	27.9	31.6	35.9	36.3	41.1	47.0	45.5	51.7	59.5	55.5	63.2	73.2
	30	14.3	16.0	18.0	21.0	23.6	26.7	28.7	32.4	36.9	37.3	42.3	48.4	46.8	53.2	61.2	57.0	65.0	75.3
	40	14.3	16.1	18.1	21.1	23.8	26.9	29.0	32.7	37.3	37.7	42.8	49.0	47.4	54.0	62.2	57.9	66.2	76.9
	50	14.3	16.1	18.2	21.2	23.9	27.1	29.1	32.9	37.5	38.0	43.2	49.6	47.9	54.7	63.2	58.7	67.3	78.4
120	0	11.8	13.3	14.9	17.2	19.3	21.8	23.3	26.2	29.8	30.0	34.0	38.7	37.4	42.5	48.7	45.4	51.7	59.6
	10	12.2	13.7	15.4	17.7	19.9	22.5	24.0	27.1	30.7	31.0	35.1	40.0	38.6	43.8	50.2	46.9	53.3	61.5
	15	12.4	13.9	15.6	18.0	20.2	22.9	24.4	27.5	31.2	31.5	35.6	40.6	39.2	44.5	51.0	47.6	54.2	62.4
	20	12.6	14.1	15.9	18.3	20.6	23.2	24.7	27.9	31.7	32.0	36.1	41.2	39.8	45.2	51.8	48.3	55.0	63.4
	30	12.9	14.5	16.3	18.8	21.1	23.9	25.4	28.7	32.6	32.8	37.2	42.4	40.9	46.4	53.2	49.7	56.5	65.1
	40	13.0	14.6	16.4	18.9	21.3	24.0	25.6	28.9	32.9	33.2	37.6	42.9	41.4	47.0	54.0	50.4	57.4	66.3
	50	13.0	14.6	16.4	18.9	21.3	24.1	25.7	29.1	33.1	33.4	37.8	43.3	41.8	47.5	54.7	51.0	58.2	67.4
100	0	10.6	11.9	13.4	15.1	17.0	19.2	20.3	22.8	25.9	25.9	29.3	33.3	32.1	36.3	41.5	38.7	43.9	50.4
	10	10.9	12.3	13.8	15.6	17.6	19.8	20.9	23.6	26.7	26.8	30.2	34.4	33.1	37.5	42.8	40.0	45.3	52.0
	15	11.1	12.5	14.0	15.9	17.9	20.1	21.2	23.9	27.1	27.2	30.7	34.9	33.6	38.1	43.5	40.6	46.0	52.8
	20	11.3	12.7	14.2	16.1	18.1	20.4	21.6	24.3	27.5	27.6	31.2	35.4	34.1	38.6	44.1	41.2	46.7	53.6
	30	11.6	13.0	14.6	16.6	18.6	21.0	22.2	25.0	28.3	28.4	32.0	36.4	35.1	39.7	45.4	42.3	48.0	55.1
	40	11.6	13.1	14.7	16.6	18.7	21.1	22.3	25.2	28.5	28.6	32.3	36.8	35.4	40.2	45.9	42.8	48.7	56.0
	50	11.6	13.1	14.7	16.7	18.8	21.2	22.4	25.3	28.7	28.7	32.5	37.1	35.7	40.5	46.4	43.2	49.2	56.7
90	0	10.0	11.3	12.6	14.1	15.9	17.9	18.8	21.1	23.9	23.9	27.0	30.6	29.4	33.3	37.9	35.4	40.1	45.9
	10	10.3	11.6	13.0	14.6	16.4	18.5	19.4	21.8	24.7	24.7	27.8	31.6	30.4	34.3	39.1	36.5	41.4	47.4
	15	10.5	11.8	13.3	14.8	16.7	18.8	19.7	22.2	25.0	25.0	28.3	32.1	30.8	34.9	39.7	37.1	42.0	48.1
	20	10.7	12.0	13.5	15.0	16.9	19.1	20.0	22.5	25.4	25.4	28.7	32.5	31.3	35.4	40.3	37.6	42.6	48.8
	30	11.0	12.3	13.8	15.5	17.4	19.6	20.5	23.1	26.1	26.1	29.5	33.5	32.2	36.4	41.5	38.7	43.8	50.2
	40	11.0	12.4	13.9	15.5	17.5	19.7	20.7	23.3	26.3	26.3	29.7	33.8	32.5	36.8	42.0	39.1	44.4	50.9
	50	11.0	12.4	13.9	15.6	17.5	19.8	20.7	23.4	26.5	26.4	29.9	34.0	32.7	37.1	42.3	39.4	44.8	51.5

***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	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.5	15.8	24.6	33.8	43.5	53.5	63.6	73.9	84.2
LANDING	MAX AUTO	7.3	15.0	23.2	31.9	41.2	51.0	61.3	72.2	83.7
LANDING	AUTOBRAKE 3	7.0	14.2	21.8	29.7	38.1	47.1	56.7	67.1	78.3
LANDING	AUTOBRAKE 2	6.6	13.3	20.2	27.3	34.7	42.6	51.0	59.9	69.6
LANDING	AUTOBRAKE 1	6.3	12.4	18.6	24.9	31.6	38.6	46.2	54.4	63.5

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	6.9	14.5	22.7	31.4	40.4	49.7	59.3	68.9	78.5
LANDING	MAX AUTO	6.0	12.6	19.8	27.6	36.0	45.1	54.8	65.3	76.5
LANDING	AUTOBRAKE 3	4.5	9.5	15.1	21.3	28.1	35.6	43.7	52.5	62.0
LANDING	AUTOBRAKE 2	2.6	5.9	9.7	14.1	19.1	24.7	31.0	37.9	45.4
LANDING	AUTOBRAKE 1	1.8	3.8	6.3	9.1	12.5	16.4	21.0	26.3	32.5

Cooling Time (Minutes) - Category F Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND	NO SPECIAL PROCEDURE REQUIRED	10	20	30	40	50	60	CAUTION	FUSE PLUG MELT ZONE

Cooling Time (Minutes) - Category M Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND	NO SPECIAL PROCEDURE REQUIRED	6.7	16.0	24.1	34.2	45.9	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 per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

ADVISORY INFORMATION

Recommended Brake Cooling Schedule - High Altitudes

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*															
		60				100				140				180			
WEIGHT (1000 LB)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)															
		10	12	14	14.5	10	12	14	14.5	10	12	14	14.5	10	12	14	14.5
180	0	11.5	12.1	12.7	12.9	29.8	31.4	33.3	33.8	55.2	58.7	62.8	63.9	84.7			
	10	11.9	12.5	13.1	13.3	30.7	32.4	34.3	34.9	57.0	60.6	64.8	66.0	87.4			
	15	12.1	12.6	13.3	13.5	31.2	32.9	34.9	35.4	57.8	61.6	65.8	67.0	88.7			
	20	12.2	12.8	13.5	13.7	31.7	33.4	35.4	36.0	58.7	62.5	66.8	68.0	90.0			
	30	12.6	13.2	13.9	14.1	32.6	34.4	36.4	37.0	60.3	64.2	68.6	69.9	92.5			
	40	12.6	13.3	13.9	14.1	32.9	34.7	36.8	37.4	61.3	65.4	70.0	71.3	94.9			
	50	12.6	13.3	13.9	14.1	33.1	34.9	37.0	37.6	62.3	66.4	71.2	72.5	97.2			
160	0	10.7	11.2	11.8	12.0	27.1	28.6	30.2	30.7	49.8	52.9	56.4	57.4	77.1	82.6	89.0	
	10	11.0	11.6	12.2	12.4	28.0	29.5	31.2	31.7	51.3	54.6	58.2	59.2	79.5	85.2	91.8	
	15	11.2	11.8	12.4	12.6	28.4	30.0	31.7	32.2	52.1	55.4	59.1	60.1	80.7	86.5	93.2	
	20	11.4	11.9	12.6	12.8	28.8	30.4	32.2	32.7	52.9	56.2	60.0	61.0	81.9	87.8	94.5	
	30	11.7	12.3	12.9	13.1	29.6	31.3	33.1	33.6	54.4	57.8	61.7	62.8	84.2	90.2	97.2	
	40	11.8	12.3	13.0	13.2	29.9	31.5	33.4	33.9	55.2	58.7	62.7	63.8	86.2	92.5	99.8	
	50	11.8	12.3	13.0	13.2	30.1	31.7	33.6	34.1	56.0	59.6	63.7	64.9	88.1	94.7	102.4	
140	0	9.9	10.4	10.9	11.1	24.4	25.8	27.2	27.6	44.2	46.9	49.9	50.8	68.9	73.6	79.1	80.6
	10	10.2	10.7	11.3	11.4	25.2	26.6	28.1	28.5	45.6	48.4	51.6	52.5	71.1	76.0	81.6	83.2
	15	10.4	10.9	11.4	11.6	25.6	27.0	28.5	28.9	46.3	49.2	52.3	53.2	72.2	77.1	82.9	84.5
	20	10.5	11.1	11.6	11.8	26.0	27.4	29.0	29.4	47.0	49.9	53.1	54.0	73.2	78.3	84.1	85.7
	30	10.8	11.4	11.9	12.1	26.7	28.2	29.8	30.2	48.4	51.3	54.6	55.5	75.3	80.5	86.4	88.1
	40	10.9	11.4	12.0	12.2	26.9	28.4	30.0	30.5	49.0	52.0	55.4	56.4	76.9	82.3	88.5	90.3
	50	10.9	11.4	12.0	12.2	27.1	28.5	30.2	30.7	49.6	52.7	56.2	57.2	78.4	84.0	90.5	92.4
120	0	9.1	9.6	10.0	10.2	21.8	23.0	24.2	24.6	38.7	41.0	43.6	44.3	59.6	63.5	68.0	69.3
	10	9.4	9.9	10.4	10.5	22.5	23.7	25.0	25.4	40.0	42.3	45.0	45.7	61.5	65.6	70.2	71.5
	15	9.6	10.0	10.5	10.7	22.9	24.1	25.4	25.8	40.6	43.0	45.7	46.4	62.4	66.6	71.3	72.6
	20	9.7	10.2	10.7	10.9	23.2	24.4	25.8	26.2	41.2	43.6	46.4	47.1	63.4	67.5	72.3	73.7
	30	10.0	10.5	11.0	11.2	23.9	25.1	26.5	26.9	42.4	44.8	47.6	48.4	65.1	69.4	74.3	75.7
	40	10.0	10.5	11.0	11.2	24.0	25.3	26.7	27.1	42.9	45.4	48.3	49.1	66.3	70.8	75.9	77.3
	50	10.0	10.5	11.0	11.2	24.1	25.4	26.8	27.2	43.3	45.9	48.8	49.6	67.4	72.0	77.3	78.8
100	0	8.4	8.8	9.3	9.4	19.2	20.2	21.3	21.6	33.3	35.2	37.3	37.9	50.4	53.6	57.2	58.2
	10	8.7	9.1	9.6	9.7	19.8	20.8	22.0	22.3	34.4	36.3	38.5	39.1	52.0	55.3	59.0	60.0
	15	8.8	9.3	9.7	9.9	20.1	21.2	22.3	22.6	34.9	36.9	39.1	39.7	52.8	56.1	59.9	61.0
	20	9.0	9.4	9.9	10.0	20.4	21.5	22.7	23.0	35.4	37.4	39.7	40.3	53.6	57.0	60.8	61.9
	30	9.2	9.7	10.2	10.3	21.0	22.1	23.3	23.6	36.4	38.5	40.8	41.5	55.1	58.6	62.5	63.6
	40	9.3	9.7	10.2	10.3	21.1	22.2	23.5	23.8	36.8	38.9	41.3	42.0	56.0	59.5	63.6	64.7
	50	9.3	9.7	10.2	10.3	21.2	22.3	23.5	23.9	37.1	39.2	41.6	42.3	56.7	60.4	64.6	65.8
90	0	8.1	8.5	8.9	9.1	17.9	18.8	19.8	20.1	30.6	32.3	34.2	34.7	45.9	48.7	51.9	52.8
	10	8.4	8.8	9.2	9.4	18.5	19.4	20.5	20.8	31.6	33.3	35.3	35.9	47.4	50.3	53.5	54.4
	15	8.5	8.9	9.4	9.5	18.8	19.7	20.8	21.1	32.1	33.8	35.8	36.4	48.1	51.0	54.4	55.3
	20	8.6	9.1	9.5	9.6	19.1	20.0	21.1	21.4	32.5	34.4	36.4	37.0	48.8	51.8	55.2	56.1
	30	8.9	9.3	9.8	9.9	19.6	20.6	21.7	22.0	33.5	35.3	37.4	38.0	50.2	53.2	56.7	57.7
	40	8.9	9.3	9.8	10.0	19.7	20.7	21.8	22.1	33.8	35.7	37.8	38.4	50.9	54.0	57.6	58.6
	50	8.9	9.3	9.8	9.9	19.8	20.8	21.9	22.2	34.0	35.9	38.1	38.7	51.5	54.7	58.4	59.5

***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 - High Altitudes

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.8	16.3	25.3	34.7	44.7	55.0	65.7	76.6	87.9
	MAX AUTO	7.5	15.4	23.6	32.4	41.8	51.8	62.5	74.1	86.5
	AUTOBRAKE 3	7.3	14.7	22.3	30.2	38.6	47.6	57.4	68.1	80.0
	AUTOBRAKE 2	7.0	13.8	20.5	27.4	34.8	42.7	51.5	61.3	72.4
	AUTOBRAKE 1	6.7	13.1	19.2	25.3	31.8	38.8	46.6	55.4	65.5

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.0	14.6	22.8	31.4	40.5	49.9	59.7	69.8	80.0
	MAX AUTO	5.8	12.3	19.5	27.2	35.6	44.5	53.9	63.7	74.1
	AUTOBRAKE 3	4.3	9.2	14.7	20.7	27.2	34.4	42.0	50.2	59.0
	AUTOBRAKE 2	2.5	5.6	9.1	13.1	17.8	23.0	28.8	35.2	42.3
	AUTOBRAKE 1	1.8	3.8	6.1	8.8	11.9	15.5	19.6	24.4	29.8

Cooling Time (Minutes) - Category F Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category M Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH
Engine Inoperative — Section 22

ENGINE INOP

Initial Max Continuous %N1
Based on .80M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.9	96.6	96.4	96.2	96.0	95.5	95.1	94.8	94.2
15	97.5	97.2	97.0	96.8	96.7	96.3	95.8	95.6	95.0
10	98.1	97.9	97.5	97.4	97.4	97.0	96.6	96.4	95.9
5	98.1	98.6	98.4	98.1	98.1	97.8	97.4	97.2	96.7
0	97.3	98.5	99.2	99.0	98.9	98.6	98.2	98.0	97.7
-5	96.5	97.8	98.9	99.8	99.7	99.3	99.0	98.8	98.5
-10	95.8	97.0	98.2	99.4	100.5	100.2	99.9	99.7	99.5
-15	95.0	96.2	97.4	98.6	99.2	101.0	100.8	100.6	100.4
-20	94.2	95.4	96.6	97.8	99.1	100.2	100.8	100.6	100.4
-25	93.4	94.6	95.8	97.0	98.3	99.4	100.0	99.8	99.6
-30	92.6	93.8	95.0	96.2	97.5	98.6	99.1	98.9	98.7
-35	91.7	93.0	94.1	95.3	96.6	97.7	98.3	98.1	97.9
-40	90.9	92.2	93.3	94.5	95.8	96.9	97.4	97.2	97.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE	-4.2	-4.4	-4.5	-4.7	-5.0	-4.8	-4.8	-4.8	-4.8

ENGINE INOP

Max Continuous %N1
37000 FT to 29000 FT Pressure Altitudes

37000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.51	96.6	97.6	98.5	99.4	100.2	99.6	98.8	97.6	96.3	94.7	93.2	91.8
200	.63	96.0	96.9	97.8	98.7	99.6	100.4	100.1	99.3	98.4	97.5	96.3	95.2
240	.74	95.1	96.0	96.8	97.7	98.6	99.4	100.3	100.7	100.0	99.2	98.4	97.5
280	.86	94.3	95.2	96.1	97.0	97.8	98.7	99.5	100.4	101.2	100.9	100.0	99.1
35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	96.5	97.4	98.3	99.2	100.1	99.8	99.0	98.0	96.8	95.4	94.0	92.7
200	.60	96.1	97.0	97.9	98.8	99.7	100.6	100.5	99.6	98.6	97.6	96.5	95.4
240	.71	95.0	95.9	96.8	97.7	98.6	99.4	100.3	100.8	100.2	99.5	98.6	97.7
280	.82	93.8	94.6	95.5	96.4	97.3	98.1	98.9	99.8	100.6	100.3	99.5	98.8
33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	97.4	98.3	99.2	100.0	100.8	100.0	99.1	97.9	96.7	95.3	93.9	92.6
200	.58	97.0	97.9	98.8	99.7	100.6	101.4	100.6	99.6	98.6	97.5	96.3	95.1
240	.68	95.9	96.8	97.7	98.5	99.4	100.2	101.1	100.9	100.2	99.4	98.4	97.4
280	.79	94.3	95.1	96.0	96.8	97.7	98.5	99.3	100.2	100.5	99.7	98.9	98.1
320	.89	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	100.3	101.1	100.7	99.8
31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	97.3	98.2	99.1	100.0	100.9	101.1	100.2	99.2	98.0	96.6	95.2	93.9
200	.55	97.1	98.0	98.9	99.7	100.6	101.5	101.6	100.7	99.7	98.6	97.4	96.2
240	.66	95.6	96.5	97.4	98.3	99.1	100.0	100.8	101.3	100.5	99.8	98.8	97.8
280	.76	93.8	94.7	95.5	96.4	97.2	98.0	98.8	99.7	100.5	99.8	98.9	98.0
320	.85	92.4	93.2	94.1	94.9	95.7	96.5	97.4	98.2	98.9	99.7	99.9	99.1
29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	98.1	99.0	99.9	100.8	101.6	101.2	100.2	99.1	97.9	96.4	95.1	93.8
200	.53	97.5	98.4	99.3	100.2	101.0	101.9	101.3	100.4	99.3	98.2	96.9	95.8
240	.63	96.3	97.1	98.0	98.9	99.7	100.5	101.4	101.1	100.2	99.2	98.3	97.2
280	.73	94.2	95.0	95.9	96.7	97.5	98.3	99.1	99.9	100.1	99.1	98.2	97.5
320	.82	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	98.5	97.6
360	.91	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	100.0	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.1	-4.3	-4.5	-4.7	-4.7

ENGINE INOP

Max Continuous %N1
27000 FT to 20000 FT Pressure Altitudes

27000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	98.0	98.8	99.7	100.6	101.4	102.2	101.2	100.2	99.0	97.8	96.4	95.1
200	.51	96.9	97.8	98.7	99.6	100.4	101.2	101.8	100.8	99.9	98.8	97.6	96.4
240	.60	95.6	96.5	97.4	98.2	99.1	99.9	100.7	101.3	100.4	99.4	98.5	97.5
280	.70	93.6	94.4	95.3	96.1	96.9	97.7	98.5	99.3	100.1	99.4	98.4	97.6
320	.79	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	98.6	97.8
360	.88	91.0	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	98.1	98.8	99.4
25000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.8	99.7	100.5	101.4	102.2	102.4	101.4	100.3	99.1	97.7	96.5	95.2
200	.49	97.5	98.3	99.2	100.0	100.9	101.7	101.5	100.6	99.5	98.4	97.3	96.2
240	.58	95.7	96.5	97.4	98.2	99.0	99.9	100.7	100.5	99.5	98.6	97.6	96.7
280	.67	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.5	99.5	98.6	97.6	96.9
320	.76	91.7	92.6	93.4	94.2	95.0	95.8	96.5	97.3	98.0	98.6	97.8	97.2
360	.85	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.6	98.4	98.2
24000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	98.6	99.5	100.4	101.2	102.1	102.9	101.9	100.8	99.6	98.4	97.1	95.8
200	.48	97.5	98.4	99.2	100.1	100.9	101.8	102.2	101.1	100.1	99.0	97.8	96.7
240	.57	95.9	96.8	97.6	98.5	99.3	100.1	100.9	101.2	100.2	99.2	98.2	97.3
280	.66	94.2	95.1	95.9	96.7	97.5	98.3	99.1	99.9	100.4	99.4	98.3	97.5
320	.75	92.1	93.0	93.8	94.6	95.4	96.2	96.9	97.7	98.5	99.2	98.6	97.8
360	.83	90.6	91.4	92.2	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.6
22000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	99.1	100.0	100.9	101.7	102.5	102.8	101.8	100.7	99.5	98.2	97.0	95.8
200	.46	98.4	99.3	100.1	101.0	101.8	102.6	102.3	101.2	100.0	98.9	97.8	96.8
240	.55	97.2	98.1	98.9	99.7	100.5	101.3	102.1	101.6	100.5	99.4	98.5	97.5
280	.63	95.7	96.5	97.4	98.2	99.0	99.8	100.6	101.3	101.0	99.8	98.9	98.1
320	.72	93.9	94.7	95.5	96.3	97.1	97.9	98.6	99.4	100.1	100.2	99.3	98.6
360	.80	92.2	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	99.2	99.7	99.1
20000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	98.7	99.5	100.4	101.2	102.0	102.8	102.5	101.5	100.4	99.2	98.0	96.8
200	.44	98.3	99.2	100.0	100.9	101.7	102.5	103.3	102.3	101.1	100.0	98.9	97.8
240	.53	97.5	98.4	99.2	100.0	100.8	101.7	102.5	103.1	101.8	100.5	99.5	98.6
280	.61	96.2	97.0	97.8	98.7	99.5	100.3	101.1	101.8	102.5	101.3	100.1	99.3
320	.69	94.7	95.5	96.3	97.1	97.9	98.7	99.5	100.2	101.0	101.7	100.9	99.9
360	.77	93.0	93.8	94.6	95.4	96.2	97.0	97.7	98.5	99.2	100.0	100.7	100.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	20	22	24	25	27
ENGINE ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-3.6	-3.8	-3.8	-3.9	-4.0

ENGINE INOP

Max Continuous %N1

18000 FT to 12000 FT Pressure Altitudes

18000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.34	98.5	99.3	100.2	101.0	101.8	102.6	101.6	100.3	99.2	98.1	97.0	95.9
200	.42	98.7	99.6	100.4	101.2	102.0	102.8	103.1	101.7	100.4	99.3	98.3	97.3
240	.51	97.8	98.7	99.5	100.3	101.1	101.9	102.7	102.5	101.1	99.9	99.0	98.1
280	.59	96.3	97.1	97.9	98.7	99.5	100.3	101.0	101.8	101.6	100.5	99.6	98.8
320	.67	94.8	95.6	96.4	97.2	97.9	98.7	99.5	100.2	101.0	100.9	100.0	99.2
360	.75	93.0	93.8	94.6	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.2	99.6

16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	97.1	98.0	98.8	99.6	100.4	101.2	101.6	100.3	99.1	98.1	97.1	96.1
200	.41	98.0	98.8	99.6	100.4	101.2	102.0	102.8	102.5	101.3	100.2	99.3	98.3
240	.49	97.1	97.9	98.7	99.5	100.3	101.1	101.9	102.7	101.8	100.5	99.6	98.7
280	.57	95.6	96.4	97.2	98.0	98.8	99.6	100.3	101.1	101.8	100.9	99.8	99.0
320	.64	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.2	99.4
360	.72	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.4	99.2	99.9	99.6

14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	96.6	97.4	98.2	99.0	99.8	100.6	100.4	99.1	98.0	97.1	96.2	95.3
200	.39	97.1	97.9	98.7	99.5	100.3	101.1	101.8	101.5	101.0	100.1	99.3	98.4
240	.47	96.6	97.4	98.2	99.0	99.8	100.6	101.3	101.8	101.1	100.3	99.5	98.7
280	.54	95.5	96.3	97.1	97.8	98.6	99.4	100.1	100.9	101.0	100.1	99.2	98.5
320	.62	94.1	94.9	95.7	96.5	97.2	98.0	98.7	99.5	100.2	100.3	99.5	98.8
360	.69	92.2	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.6	99.0

12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	96.3	97.0	97.8	98.6	99.4	100.1	99.3	98.1	97.1	96.3	95.4	94.5
200	.38	97.1	97.9	98.7	99.5	100.3	101.0	101.5	100.8	99.8	99.0	98.2	97.3
240	.45	96.5	97.3	98.0	98.8	99.6	100.3	101.1	101.0	100.1	99.4	98.6	97.9
280	.52	95.5	96.3	97.0	97.8	98.6	99.3	100.0	100.8	100.3	99.4	98.6	98.0
320	.60	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	99.7	98.9	98.2
360	.67	92.3	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	99.4	99.1	98.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	12	14	16	18
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-3.2	-3.4	-3.4	-3.5

ENGINE INOP

Max Continuous %N1

10000 FT to 1000 FT Pressure Altitudes

10000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.29	95.2	96.0	96.8	97.6	98.3	99.1	99.8	98.6	97.4	96.6	95.8	94.9
200	.36	96.0	96.7	97.5	98.3	99.0	99.8	100.5	100.5	99.4	98.5	97.8	97.0
240	.43	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.1	99.2	98.4	97.7
280	.51	94.5	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.4	99.5	98.7	98.0
320	.58	93.0	93.9	94.7	95.5	96.2	97.0	97.8	98.6	99.3	99.7	99.0	98.2
360	.65	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	99.1	98.5
5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	94.9	95.7	96.4	97.2	98.0	98.8	99.2	98.3	97.4	96.6	95.9	95.1
200	.33	94.7	95.5	96.3	97.1	97.8	98.6	99.4	98.9	98.0	97.3	96.6	95.8
240	.40	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.5	98.7	97.9	97.2	96.5
280	.46	93.3	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	98.2	97.5	96.8
320	.53	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	98.7	98.4	97.7	97.1
360	.59	91.5	92.3	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.0	97.3
3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	94.8	95.6	96.4	97.2	98.0	98.7	98.8	97.9	97.1	96.4	95.6	94.8
200	.32	94.5	95.3	96.1	96.9	97.6	98.4	99.2	98.3	97.5	96.8	96.1	95.3
240	.38	94.1	94.9	95.6	96.4	97.2	98.0	98.7	98.8	98.0	97.2	96.6	95.9
280	.45	93.2	94.0	94.8	95.6	96.4	97.2	97.9	98.7	98.3	97.5	96.9	96.2
320	.51	92.5	93.3	94.1	94.9	95.7	96.4	97.2	98.0	98.5	97.8	97.1	96.5
360	.57	91.6	92.4	93.2	94.0	94.7	95.5	96.3	97.1	97.8	98.1	97.4	96.8
1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	93.9	94.7	95.4	96.2	97.0	97.8	98.5	98.2	97.4	96.7	96.0	95.2
200	.31	93.5	94.3	95.1	95.9	96.7	97.4	98.2	98.5	97.8	97.0	96.3	95.6
240	.37	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	98.1	97.3	96.6	95.9
280	.43	92.3	93.2	93.9	94.7	95.5	96.3	97.1	97.8	98.3	97.6	96.9	96.2
320	.49	91.6	92.4	93.2	94.0	94.8	95.6	96.3	97.1	97.9	97.9	97.2	96.5
360	.55	90.7	91.5	92.3	93.1	93.9	94.7	95.4	96.2	96.9	97.7	97.3	96.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-3.1	-3.2

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 LB)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	174	266	19900	18700	17400
170	164	258	21200	20200	19000
160	154	251	22500	21600	20500
150	145	243	23900	23100	22000
140	134	235	25600	24600	23600
130	125	227	27600	26600	25400
120	115	218	29600	28700	27600
110	106	209	31500	30700	29700
100	96	199	33400	32700	31800
90	87	189	35500	34800	33900
80	77	178	37800	37100	36300

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
138	128	120	112	106	100	95	90	86	82	79
275	256	239	225	212	200	190	180	172	164	157
413	384	359	337	317	300	284	270	258	246	236
551	512	479	449	423	400	379	361	344	328	314
688	640	598	561	529	500	474	451	429	410	393
826	768	718	674	635	600	569	541	515	492	471
964	896	838	786	741	700	664	631	601	574	549
1102	1025	958	899	846	800	758	721	687	656	628
1240	1153	1077	1011	952	900	853	811	773	738	706
1378	1281	1197	1123	1058	1000	948	901	859	820	785
1517	1410	1317	1236	1164	1100	1043	991	944	902	863
1655	1539	1437	1348	1270	1200	1137	1081	1030	984	941
1794	1667	1557	1461	1376	1300	1232	1171	1116	1065	1019
1933	1796	1677	1573	1482	1400	1327	1261	1201	1147	1098
2071	1925	1798	1686	1588	1500	1422	1351	1287	1229	1176
2211	2054	1918	1799	1694	1600	1516	1441	1373	1310	1254
2350	2183	2038	1911	1800	1700	1611	1531	1458	1392	1332
2489	2312	2159	2024	1906	1800	1706	1621	1544	1474	1410

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 LB)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 LB)										
	90	100	110	120	130	140	150	160	170	180	
100	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	0:16
200	1.7	1.8	1.9	2.0	2.1	2.2	2.4	2.5	2.6	2.7	0:33
300	2.7	2.8	3.0	3.2	3.4	3.6	3.8	4.1	4.2	4.5	0:49
400	3.6	3.9	4.1	4.5	4.7	5.0	5.3	5.6	5.9	6.2	1:06
500	4.5	4.8	5.2	5.6	5.9	6.3	6.7	7.1	7.4	7.8	1:22
600	5.3	5.8	6.2	6.7	7.1	7.6	8.0	8.5	8.9	9.4	1:39
700	6.2	6.7	7.2	7.8	8.3	8.9	9.4	9.9	10.4	11.0	1:55
800	7.0	7.7	8.3	8.9	9.5	10.1	10.7	11.4	11.9	12.6	2:12
900	7.9	8.6	9.3	10.0	10.7	11.4	12.0	12.8	13.4	14.1	2:28
1000	8.7	9.5	10.3	11.1	11.8	12.6	13.3	14.1	14.9	15.7	2:45
1100	9.6	10.4	11.2	12.1	13.0	13.8	14.6	15.5	16.3	17.2	3:01
1200	10.4	11.3	12.2	13.2	14.1	15.0	15.9	16.9	17.8	18.7	3:18
1300	11.2	12.2	13.2	14.2	15.2	16.2	17.2	18.2	19.2	20.2	3:35
1400	12.0	13.1	14.2	15.3	16.3	17.4	18.5	19.6	20.6	21.7	3:51
1500	12.8	14.0	15.1	16.3	17.4	18.6	19.7	20.9	22.0	23.2	4:08
1600	13.6	14.8	16.1	17.3	18.5	19.8	21.0	22.2	23.4	24.7	4:25
1700	14.4	15.7	17.0	18.3	19.6	20.9	22.2	23.5	24.8	26.2	4:42
1800	15.2	16.5	17.9	19.3	20.7	22.1	23.4	24.9	26.2	27.6	4:59

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 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	17700	16100	14200
170	19400	17900	16100
160	20900	19800	18000
150	22300	21200	20000
140	23700	22700	21500
130	25400	24300	23200
120	27700	26400	24900
110	29900	29000	27500
100	32000	31200	30100
90	34200	33400	32400

With engine anti-ice on, decrease altitude capability by 1100 ft.
With engine and wing anti-ice on, decrease altitude capability by 4400 ft .

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)									
		10	15	17	19	21	23	25	27	29	31
180	%N1	89.3	93.0	95.1	97.9						
	MACH	.539	.581	.600	.621						
	KIAS	299	294	292	291						
	FF/ENG	6145	6090	6123	6250						
170	%N1	88.0	91.6	93.3	95.7						
	MACH	.528	.568	.586	.606						
	KIAS	293	287	285	284						
	FF/ENG	5832	5748	5736	5789						
160	%N1	86.5	90.1	91.6	93.6	96.1					
	MACH	.515	.555	.573	.591	.612					
	KIAS	285	280	278	277	275					
	FF/ENG	5504	5414	5384	5384	5476					
150	%N1	84.9	88.5	90.0	91.6	93.8	96.7				
	MACH	.501	.542	.559	.577	.596	.617				
	KIAS	277	274	271	269	268	267				
	FF/ENG	5173	5093	5050	5020	5045	5175				
140	%N1	83.1	86.9	88.3	89.9	91.6	94.0	97.2			
	MACH	.485	.529	.545	.562	.580	.600	.622			
	KIAS	269	267	264	262	260	259	258			
	FF/ENG	4836	4783	4728	4687	4668	4714	4877			
130	%N1	81.2	85.1	86.6	88.1	89.6	91.5	94.1	97.6		
	MACH	.469	.513	.530	.546	.564	.582	.603	.626		
	KIAS	259	258	257	255	253	251	250	249		
	FF/ENG	4491	4456	4419	4363	4332	4323	4392	4569		
120	%N1	79.1	83.1	84.7	86.2	87.7	89.3	91.3	94.1	97.7	
	MACH	.451	.495	.513	.531	.547	.565	.584	.605	.628	
	KIAS	250	249	248	247	245	243	241	240	239	
	FF/ENG	4145	4124	4094	4056	4008	3980	3988	4070	4247	
110	%N1	76.8	80.9	82.5	84.1	85.7	87.2	88.7	90.8	93.9	97.5
	MACH	.433	.476	.494	.512	.530	.547	.565	.584	.606	.629
	KIAS	239	239	239	238	237	235	233	231	230	229
	FF/ENG	3806	3786	3765	3733	3703	3658	3641	3663	3741	3914
100	%N1	74.5	78.5	80.1	81.8	83.4	85.0	86.5	88.0	90.1	93.4
	MACH	.413	.455	.473	.491	.509	.528	.545	.563	.583	.604
	KIAS	228	228	228	228	228	227	225	223	221	220
	FF/ENG	3470	3443	3428	3406	3381	3355	3321	3315	3334	3404
90	%N1	71.7	75.7	77.4	79.1	80.8	82.4	84.0	85.5	87.1	89.2
	MACH	.392	.432	.450	.468	.486	.505	.524	.541	.560	.580
	KIAS	216	217	217	217	217	216	215	214	212	210
	FF/ENG	3137	3106	3088	3071	3054	3034	3018	2999	2990	3001

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	180	172	164	157
601	548	501	462	429	400	380	361	344	328	314
906	824	753	694	644	600	569	541	515	492	471
1212	1102	1006	927	860	800	759	721	686	655	627
1520	1381	1260	1160	1075	1000	948	901	858	819	784
1831	1662	1515	1393	1291	1200	1138	1081	1029	982	940
2144	1945	1771	1627	1507	1400	1327	1260	1199	1144	1095
2459	2229	2028	1862	1723	1600	1516	1440	1370	1307	1251
2776	2514	2285	2097	1940	1800	1705	1618	1540	1469	1406

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		26	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
200	2.9	0:43	2.6	0:41	2.3	0:40	2.0	0:38	1.8	0:37
400	6.0	1:24	5.5	1:19	5.0	1:16	4.6	1:13	4.3	1:10
600	9.0	2:05	8.3	1:58	7.7	1:53	7.1	1:48	6.7	1:43
800	12.1	2:47	11.2	2:37	10.3	2:29	9.5	2:23	9.1	2:16
1000	15.0	3:29	14.0	3:17	12.9	3:07	12.0	2:58	11.4	2:50
1200	18.0	4:11	16.7	3:57	15.5	3:44	14.4	3:34	13.7	3:24
1400	20.9	4:55	19.5	4:38	18.1	4:22	16.8	4:10	16.0	3:58
1600	23.8	5:39	22.2	5:18	20.6	5:01	19.2	4:47	18.3	4:33
1800	26.7	6:23	24.9	6:00	23.1	5:40	21.5	5:23	20.5	5:07

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	90	110	130	150	170
5	-0.7	-0.3	0.0	0.7	1.4
10	-1.4	-0.7	0.0	1.4	3.1
15	-2.1	-1.0	0.0	2.1	4.6
20	-2.8	-1.4	0.0	2.7	6.0
25	-3.5	-1.8	0.0	3.3	7.2
30	-4.2	-2.1	0.0	3.8	8.4

Includes APU fuel burn

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
170	%N1	77.8	80.6	84.9	89.4	95.5		
	KIAS	240	241	242	243	244		
	FF/ENG	5340	5330	5340	5410	5580		
160	%N1	76.2	78.9	83.2	87.6	92.8		
	KIAS	232	233	234	235	237		
	FF/ENG	5030	5000	5000	5060	5150		
150	%N1	74.4	77.2	81.4	85.7	90.5		
	KIAS	225	226	227	228	229		
	FF/ENG	4710	4690	4670	4710	4750		
140	%N1	72.4	75.4	79.4	83.8	88.5	95.6	
	KIAS	218	218	219	220	221	223	
	FF/ENG	4400	4370	4350	4370	4390	4640	
130	%N1	70.3	73.3	77.4	81.7	86.3	92.0	
	KIAS	209	210	211	212	213	214	
	FF/ENG	4100	4060	4040	4030	4040	4160	
120	%N1	68.2	71.1	75.3	79.5	84.0	88.9	98.3
	KIAS	201	202	202	203	204	205	207
	FF/ENG	3800	3750	3730	3710	3700	3760	4150
110	%N1	65.9	68.7	73.0	77.1	81.6	86.4	93.8
	KIAS	192	193	194	194	195	196	198
	FF/ENG	3510	3460	3420	3390	3370	3400	3600
100	%N1	63.5	66.2	70.3	74.6	79.0	83.6	89.1
	KIAS	184	184	185	185	186	187	188
	FF/ENG	3220	3170	3120	3090	3050	3060	3160
90	%N1	60.7	63.6	67.5	71.9	76.1	80.7	85.5
	KIAS	178	178	178	178	178	178	178
	FF/ENG	2940	2890	2830	2800	2740	2740	2790

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH
Gear Down — Section 23

GEAR DOWN

Long Range Cruise Altitude Capability
Max Cruise Thrust, 100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
170	20300	17500	14700
160	22600	20100	17300
150	24900	22900	19900
140	27000	25500	23100
130	29300	27800	26100
120	31200	30100	28700
110	33100	32100	31000
100	35100	34100	33000
90	37300	36300	35200

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)									
		10	21	23	25	27	29	31	33	35	37
180	%N1	84.6									
	MACH	.473									
	KIAS	262									
	FF/ENG	5072									
170	%N1	83.0	92.4								
	MACH	.460	.560								
	KIAS	254	251								
	FF/ENG	4773	4728								
160	%N1	81.4	90.5	92.7							
	MACH	.447	.548	.565							
	KIAS	247	245	243							
	FF/ENG	4477	4438	4431							
150	%N1	79.6	88.9	90.6	93.0						
	MACH	.434	.535	.552	.569						
	KIAS	240	239	237	235						
	FF/ENG	4187	4160	4131	4149						
140	%N1	77.7	87.0	88.8	90.6	93.2					
	MACH	.420	.518	.538	.555	.573					
	KIAS	232	232	231	229	227					
	FF/ENG	3906	3862	3855	3838	3876					
130	%N1	75.8	85.0	86.8	88.5	90.4	93.4				
	MACH	.406	.500	.521	.541	.558	.576				
	KIAS	224	223	224	223	221	218				
	FF/ENG	3628	3563	3562	3561	3559	3605				
120	%N1	73.8	82.8	84.6	86.4	88.0	90.1	93.4			
	MACH	.391	.482	.501	.523	.543	.560	.579			
	KIAS	216	215	215	215	214	212	210			
	FF/ENG	3354	3270	3266	3272	3278	3282	3333			
110	%N1	71.4	80.4	82.2	84.0	85.8	87.5	89.7	93.0		
	MACH	.375	.462	.481	.501	.523	.543	.561	.580		
	KIAS	207	206	206	206	206	205	203	201		
	FF/ENG	3084	2982	2975	2979	2994	2999	3002	3057		
100	%N1	68.9	77.9	79.6	81.4	83.1	85.0	86.7	89.0	92.4	
	MACH	.359	.442	.460	.479	.499	.521	.542	.560	.580	
	KIAS	198	197	197	197	196	197	196	194	192	
	FF/ENG	2825	2701	2688	2692	2705	2717	2720	2721	2776	
90	%N1	66.3	75.1	76.9	78.6	80.3	82.1	84.0	85.8	88.0	91.8
	MACH	.343	.421	.438	.456	.475	.496	.518	.540	.558	.578
	KIAS	189	187	187	187	187	187	187	186	184	182
	FF/ENG	2575	2433	2408	2408	2422	2431	2438	2440	2441	2502

GEAR DOWN

Long Range Cruise 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
326	291	260	236	217	200	188	178	168	160	153
658	586	524	475	435	400	377	357	338	321	307
994	884	789	714	653	600	566	534	506	482	460
1336	1185	1056	955	872	800	755	713	676	642	613
1683	1490	1326	1196	1091	1000	943	891	844	802	765
2035	1799	1597	1439	1311	1200	1131	1068	1011	961	917
2394	2111	1871	1683	1531	1400	1319	1245	1179	1120	1068
2758	2427	2146	1927	1752	1600	1507	1422	1346	1278	1219
3130	2749	2425	2174	1973	1800	1695	1599	1513	1436	1369

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
200	5.2	0:49	4.7	0:47	4.1	0:44	3.7	0:43	3.4	0:42
400	10.6	1:37	9.8	1:32	8.7	1:25	8.0	1:21	7.5	1:18
600	15.9	2:26	14.8	2:18	13.2	2:07	12.2	2:00	11.5	1:54
800	21.1	3:16	19.6	3:05	17.6	2:49	16.4	2:39	15.5	2:32
1000	26.2	4:06	24.4	3:52	21.9	3:32	20.4	3:20	19.3	3:09
1200	31.1	4:58	29.0	4:41	26.1	4:16	24.4	4:00	23.1	3:47
1400	36.0	5:52	33.6	5:31	30.2	5:01	28.3	4:42	26.8	4:26
1600	40.7	6:46	38.1	6:21	34.2	5:46	32.1	5:24	30.4	5:05
1800	45.4	7:42	42.4	7:13	38.2	6:33	35.8	6:08	33.9	5:45

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	90	110	130	150	170
5	-0.8	-0.4	0.0	0.7	1.5
10	-1.6	-0.8	0.0	1.3	3.0
15	-2.3	-1.2	0.0	1.9	4.3
20	-3.2	-1.6	0.0	2.4	5.6
25	-4.0	-2.0	0.0	3.0	6.8
30	-4.8	-2.4	0.0	3.5	7.8
35	-5.6	-2.8	0.0	3.9	8.8
40	-6.4	-3.2	0.0	4.3	9.6
45	-7.2	-3.6	0.0	4.7	10.3
50	-8.1	-4.0	0.0	5.0	10.9

GEAR DOWN

Descent
VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (LB)	DISTANCE (NM)
41000	22	560	91
39000	21	560	87
37000	20	550	82
35000	20	540	78
33000	19	530	73
31000	18	520	69
29000	17	510	65
27000	16	500	61
25000	16	490	57
23000	15	480	52
21000	14	460	48
19000	13	440	44
17000	12	430	40
15000	11	410	36
10000	9	350	26
5000	6	280	16
1500	4	230	9

Allowances for a straight-in approach are included.

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
170	%N1	72.5	75.4	79.4	83.8	88.4			
	KIAS	221	221	221	221	221			
	FF/ENG	4400	4370	4350	4350	4370			
160	%N1	70.9	74.0	77.9	82.3	86.8	92.5		
	KIAS	217	217	217	217	217	217		
	FF/ENG	4180	4140	4110	4110	4110	4210		
150	%N1	69.4	72.3	76.4	80.7	85.1	90.1		
	KIAS	212	212	212	212	212	212		
	FF/ENG	3950	3910	3880	3860	3860	3910		
140	%N1	67.7	70.6	74.8	78.9	83.4	88.0		
	KIAS	207	207	207	207	207	207		
	FF/ENG	3730	3680	3650	3620	3600	3630		
130	%N1	66.0	68.7	73.0	77.0	81.5	86.1	92.7	
	KIAS	202	202	202	202	202	202	202	
	FF/ENG	3500	3450	3410	3380	3350	3370	3510	
120	%N1	64.1	66.8	71.0	75.1	79.5	84.0	89.3	
	KIAS	196	196	196	196	196	196	196	
	FF/ENG	3280	3230	3180	3150	3110	3110	3190	
110	%N1	62.0	64.9	68.8	73.1	77.4	81.9	86.5	
	KIAS	190	190	190	190	190	190	190	
	FF/ENG	3050	3010	2950	2920	2870	2860	2910	
100	%N1	59.8	62.7	66.7	71.0	75.1	79.6	84.2	91.1
	KIAS	184	184	184	184	184	184	184	184
	FF/ENG	2840	2790	2740	2700	2640	2620	2660	2770
90	%N1	57.7	60.3	64.5	68.6	72.9	77.3	81.7	86.9
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	2620	2570	2530	2480	2430	2390	2420	2460

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 LB)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
170	162	221	6200	4800	2700
160	152	217	8200	6900	4900
150	143	213	10300	9100	7200
140	133	207	12300	11300	9700
130	124	201	14300	13500	12300
120	115	196	16500	15700	15000
110	105	190	18800	17900	17100
100	96	184	20900	20100	19200
90	86	178	23100	22300	21500

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
170	700		
160	3500	1300	
150	6200	4500	1800
140	9000	7400	5000
130	11500	10400	8200
120	14000	13100	11600
110	16600	15800	15100
100	19400	18500	17600
90	22100	21200	20300

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)								
		5	7	9	11	13	15	17	19	21
160	%N1	95.7								
	MACH	.395								
	KIAS	239								
	FF/ENG	8557								
150	%N1	93.6	95.6							
	MACH	.384	.397							
	KIAS	232	232							
	FF/ENG	7957	7995							
140	%N1	91.5	93.2	95.4						
	MACH	.372	.385	.398						
	KIAS	225	225	224						
	FF/ENG	7375	7390	7433						
130	%N1	89.3	91.0	92.7	95.0	98.4				
	MACH	.361	.373	.385	.399	.413				
	KIAS	218	217	217	216	215				
	FF/ENG	6817	6812	6823	6875	7064				
120	%N1	87.1	88.6	90.3	92.1	94.4	98.0			
	MACH	.349	.360	.372	.385	.399	.413			
	KIAS	211	210	209	208	208	207			
	FF/ENG	6288	6258	6250	6264	6319	6496			
110	%N1	84.7	86.2	87.8	89.5	91.3	93.6	97.3		
	MACH	.337	.348	.359	.371	.383	.397	.412		
	KIAS	204	203	201	200	200	199	198		
	FF/ENG	5782	5736	5705	5697	5713	5753	5899		
100	%N1	82.3	83.7	85.2	86.7	88.4	90.2	92.5	96.3	
	MACH	.325	.335	.345	.356	.368	.381	.395	.409	
	KIAS	197	195	194	193	192	191	190	189	
	FF/ENG	5299	5237	5191	5160	5153	5158	5173	5290	
90	%N1	79.7	81.1	82.5	83.9	85.5	87.2	89.0	91.1	94.5
	MACH	.313	.322	.331	.341	.352	.364	.377	.391	.406
	KIAS	189	188	186	184	183	182	181	181	180
	FF/ENG	4843	4764	4701	4655	4625	4608	4596	4594	4682

GEAR DOWN
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
173	152	134	120	109	100	94	88	82	78	74
354	309	271	242	220	200	187	175	164	154	146
536	467	409	365	330	300	280	261	245	231	218
720	626	547	487	440	400	372	347	325	306	290
905	786	686	610	551	500	465	434	407	383	362
1092	948	826	734	662	600	558	520	487	458	434
1280	1109	965	857	772	700	650	606	567	533	505
1470	1272	1106	981	884	800	744	693	648	609	576
1661	1436	1248	1106	995	900	836	779	729	684	647
1855	1602	1390	1230	1106	1000	928	864	808	759	718

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	2		6		10		14	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
100	3.0	0:28	2.7	0:27	2.4	0:27	2.2	0:26
200	6.1	0:55	5.6	0:53	5.1	0:51	4.9	0:49
300	9.2	1:22	8.5	1:19	7.9	1:15	7.6	1:12
400	12.2	1:50	11.3	1:45	10.6	1:40	10.2	1:35
500	15.1	2:17	14.1	2:11	13.2	2:05	12.7	1:59
600	18.0	2:45	16.8	2:38	15.8	2:30	15.2	2:23
700	20.9	3:13	19.6	3:05	18.4	2:56	17.7	2:47
800	23.8	3:42	22.3	3:32	20.9	3:22	20.1	3:11
900	26.6	4:10	24.9	3:59	23.4	3:48	22.5	3:36
1000	29.4	4:39	27.5	4:27	25.9	4:14	24.9	4:01

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	90	110	130	150	170
2	-0.3	-0.2	0.0	0.3	0.5
4	-0.6	-0.3	0.0	0.6	1.2
6	-0.9	-0.5	0.0	1.0	1.9
8	-1.2	-0.6	0.0	1.3	2.6
10	-1.5	-0.8	0.0	1.7	3.2
12	-1.8	-0.9	0.0	2.0	3.9
14	-2.1	-1.1	0.0	2.3	4.5
16	-2.4	-1.2	0.0	2.6	5.2
18	-2.8	-1.4	0.0	2.9	5.8
20	-3.1	-1.6	0.0	3.2	6.4
22	-3.4	-1.7	0.0	3.4	7.0
24	-3.7	-1.9	0.0	3.7	7.6
26	-4.0	-2.0	0.0	3.9	8.2
28	-4.3	-2.1	0.0	4.2	8.7
30	-4.6	-2.3	0.0	4.4	9.3

Includes APU fuel burn.

Holding

Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
150	%N1	87.9	91.0	96.8	
	KIAS	212	212	212	
	FF/ENG	7520	7580	7820	
140	%N1	86.0	89.0	94.0	
	KIAS	207	207	207	
	FF/ENG	7030	7070	7190	
130	%N1	84.0	87.0	91.6	
	KIAS	202	202	202	
	FF/ENG	6540	6560	6640	
120	%N1	81.8	84.8	89.3	95.3
	KIAS	196	196	196	196
	FF/ENG	6070	6070	6120	6320
110	%N1	79.5	82.5	86.9	91.8
	KIAS	190	190	190	190
	FF/ENG	5620	5600	5610	5710
100	%N1	77.3	80.1	84.5	89.2
	KIAS	184	184	184	184
	FF/ENG	5190	5150	5140	5200
90	%N1	74.9	77.6	82.0	86.4
	KIAS	178	178	178	178
	FF/ENG	4760	4720	4690	4710

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 Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

Pitch attitude and average %N1 information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

Max Climb %N1

This table shows Max Climb %N1 for a 280/.80 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (AUTO) and anti-ice on or off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. For packs OFF or HIGH operation, apply the %N1 adjustment shown below the table.

VREF

This table contains flaps 40, 30 and 15 reference speeds for a given weight.

With autothrottles disengaged an approach speed wind correction (max 20 knots) of 1/2 steady headwind component + gust increment above steady wind is recommended. Do not apply a wind correction for tailwinds. The maximum command speed should not exceed landing flap placard speed minus 5 knots.

Advisory Information

Normal Configuration Landing Distance

The normal configuration distance tables are provided as advisory information to help determine the actual landing distance performance of the airplane for different runway surface conditions and brake configurations.

Flaps 15, 30, and 40 landing distances and adjustments are provided for dry runways as well as runways with good, medium, and poor reported braking action, which are commonly referred to as slippery runway conditions.

If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Dry runway landing performance is shown for max manual braking configuration and autobrake settings max, 3, 2, and 1. Use of autobrake setting 1 is not recommended for landings on slippery runways, and is therefore not provided for these conditions. The autobrake performance may be used to assist in the selection of the most desirable autobrake setting for a given field length. Selection of an autobrake setting results in a constant rate of deceleration. Maximum effort manual braking should achieve shorter landing distance than the max autobrake setting. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and normal approach speed for the selected landing flap at sea level, zero wind, zero slope, and two engine detent reverse thrust. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, temperature, speed, and reverse thrust. Each adjustment is independently added to the reference landing distance.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effect of max manual braking and reverse thrust.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the appropriate Recommended Brake Cooling Schedule table (Steel or Carbon Brakes) with the airplane weight and brakes on speed, adjusted for wind at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of.80M 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, TAT, and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level 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 Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

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 .80/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS may 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 (280/.76)

Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
40000	PITCH ATT	**4.0**	**4.0**	**4.0**		
	V/S (FT/MIN)	1700	1100	600		
30000	PITCH ATT	**4.0**	**4.0**	**3.5**	**4.0**	**4.0**
	V/S (FT/MIN)	2500	1900	1500	1100	800
20000	PITCH ATT	**7.0**	**6.5**	**6.0**	**6.0**	**6.0**
	V/S (FT/MIN)	4200	3300	2600	2100	1700
10000	PITCH ATT	**11.0**	**9.5**	**8.5**	**8.0**	**8.0**
	V/S (FT/MIN)	5600	4400	3600	3000	2500
SEA LEVEL	PITCH ATT	**14.5**	**12.5**	**11.0**	**10.0**	**9.5**
	V/S (FT/MIN)	6700	5300	4400	3700	3100

Cruise (.76/280)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
40000	PITCH ATT	**2.0**	**2.5**	**3.5**		
	%N1	83	85	90		
35000	PITCH ATT	**1.0**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	81	83	84	87	90
30000	PITCH ATT	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	81	82	83	84	86
25000	PITCH ATT	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	77	78	79	81	82
20000	PITCH ATT	**1.0**	**1.5**	**2.0**	**2.5**	**3.5**
	%N1	74	74	75	77	78
15000	PITCH ATT	**1.0**	**1.5**	**2.0**	**3.0**	**3.5**
	%N1	70	71	72	73	74

Descent (.76/280)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
40000	PITCH ATT	**-1.5**	**-0.5**	**0.5**	**1.0**	**1.5**
	V/S (FT/MIN)	-2700	-2400	-2300	-2500	-2700
30000	PITCH ATT	**-3.5**	**-2.0**	**-1.0**	**0.5**	**0.5**
	V/S (FT/MIN)	-3100	-2600	-2300	-2100	-2000
20000	PITCH ATT	**-3.5**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2800	-2300	-2000	-1900	-1700
10000	PITCH ATT	**-3.5**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN	-2500	-2100	-1800	-1700	-1500
SEA LEVEL	PITCH ATT	**-3.5**	**-2.5**	**-1.0**	**0.5**	**0.5**
	V/S (FT/MIN)	-2300	-1900	-1700	-1500	-1400

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Holding (VREF40 + 70)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		40	50	60	70	80
10000	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	%N1	53	58	62	66	69
5000	**PITCH ATT**	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	49	54	58	62	66

Terminal Area (5000 FT)

%N1 for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 1 (GEAR UP)	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(VREF40 + 50)	%N1	51	56	60	65	68
FLAPS 5 (GEAR UP)	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(VREF40 + 30)	%N1	51	56	61	65	69
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(VREF40 + 20)	%N1	60	66	71	75	79

Final Approach (1500 FT)

Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
(VREF15 + 10)	%N1	43	47	51	55	58
FLAPS 30	**PITCH ATT**	**0.5**	**1.0**	**1.0**	**1.0**	**1.0**
(VREF30 + 10)	%N1	47	52	57	60	64
FLAPS 40	**PITCH ATT**	**-0.5**	**0.0**	**0.0**	**0.0**	**0.0**
(VREF40 + 10)	%N1	53	58	63	67	70

Max Climb %N1

Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS OR MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.80	.80	.80
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	94.8	95.0	93.7
55	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.1	94.3	93.0
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.4	93.6	92.4
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	92.7	92.9	91.7
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.4	92.2	91.0
35	94.0	94.3	94.5	94.3	94.0	94.0	93.0	93.3	92.7	91.6
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	94.1	93.5	92.5
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.9	94.4	93.4
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.6	95.1	94.3
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.3	95.9	95.1
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	97.1	96.7	96.0
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.9	97.4	96.8
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.7	98.3	97.8
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.4	99.0	98.6
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.3	99.9	99.6
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.5
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.3	100.9	100.5
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	99.5	100.0	99.7
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	98.6	99.2	98.8
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	97.8	98.3	98.0
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	96.9	97.5	97.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	0	10	20	30	35	41
ENGINE ANTI-ICE	-0.6	-0.8	-0.9	-0.9	-0.8	-0.8
ENGINE & WING ANTI-ICE*	-1.8	-2.1	-2.5	-2.7	-3.0	-3.0

***Dual bleed sources**

Go-around %N1

Based on engine bleed for packs on, engine and wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)											
°C	°F		-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
57	134	60	95.0	96.2	96.8									
52	125	55	95.9	96.7	96.6	96.8	97.5							
47	116	50	96.6	97.6	97.8	97.8	97.7	97.5	98.2	98.8				
42	108	45	97.4	98.4	98.5	98.6	98.7	98.8	98.7	98.5	98.5	99.0		
37	99	40	98.0	99.1	99.2	99.3	99.4	99.5	99.6	99.5	99.1	98.9	98.8	99.1
32	90	35	98.1	99.9	100.0	100.1	100.1	100.3	100.3	100.2	99.9	99.6	99.6	99.5
27	81	30	97.3	99.8	100.4	100.7	100.7	100.7	100.7	100.7	100.6	100.4	100.4	100.3
22	72	25	96.6	99.1	99.7	100.2	100.6	100.9	100.9	100.9	100.9	100.9	100.9	100.8
17	63	20	95.8	98.3	98.9	99.5	99.8	100.2	100.5	100.9	101.0	101.1	101.0	101.0
12	54	15	95.0	97.5	98.1	98.7	99.1	99.4	99.8	100.1	100.5	100.9	101.3	101.2
7	45	10	94.2	96.8	97.4	98.0	98.3	98.7	99.0	99.4	99.8	100.2	100.5	100.9
2	36	5	93.4	96.0	96.6	97.2	97.6	97.9	98.3	98.7	99.0	99.4	99.8	100.2
-3	27	0	92.6	95.2	95.8	96.4	96.8	97.2	97.5	97.9	98.3	98.7	99.0	99.4
-8	18	-5	91.8	94.4	95.0	95.6	96.0	96.4	96.8	97.2	97.5	97.9	98.3	98.6
-13	9	-10	91.0	93.6	94.2	94.8	95.2	95.6	96.0	96.4	96.8	97.1	97.5	97.9
-17	1	-15	90.2	92.8	93.4	94.0	94.4	94.8	95.2	95.6	96.0	96.4	96.7	97.1
-22	-8	-20	89.3	92.0	92.6	93.2	93.6	94.0	94.4	94.8	95.2	95.6	95.9	96.3
-27	-17	-25	88.5	91.1	91.8	92.4	92.8	93.2	93.6	94.0	94.4	94.8	95.1	95.5
-32	-26	-30	87.6	90.3	90.9	91.6	92.0	92.4	92.8	93.3	93.6	94.0	94.3	94.7
-37	-35	-35	86.8	89.4	90.1	90.7	91.1	91.6	92.0	92.4	92.8	93.2	93.5	93.9
-42	-44	-40	85.9	88.6	89.2	89.9	90.3	90.7	91.2	91.6	92.0	92.4	92.7	93.0
-47	-53	-45	85.0	87.7	88.4	89.0	89.4	89.9	90.3	90.8	91.2	91.5	91.9	92.2
-52	-62	-50	84.1	86.8	87.5	88.2	88.6	89.0	89.5	90.0	90.3	90.7	91.0	91.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)											
	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
PACKS OFF	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
A/C HIGH	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

Go-around %N1 - High Altitudes

Based on engine bleeds for packs on, engine anti-ice off, wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°C	°F		10000	11000	12000	13000	14000	14500
37	99	40	99.1	99.7				
32	90	35	99.5	99.3	99.5	100.1	100.7	
27	81	30	100.3	100.2	100.2	100.0	100.0	100.2
22	72	25	100.8	100.7	100.7	100.6	100.6	100.5
17	63	20	101.0	101.0	101.0	100.9	100.8	100.8
12	54	15	101.2	101.2	101.2	101.2	101.1	101.0
7	45	10	100.9	101.4	101.5	101.4	101.3	101.2
2	36	5	100.2	100.9	101.6	101.6	101.5	101.5
-3	27	0	99.4	100.2	101.0	101.4	101.6	101.6
-8	18	-5	98.6	99.4	100.2	100.6	100.9	101.0
-13	9	-10	97.9	98.6	99.5	99.8	100.1	100.2
-17	1	-15	97.1	97.8	98.7	99.0	99.3	99.4
-22	-8	-20	96.3	97.0	97.9	98.2	98.5	98.6
-27	-17	-25	95.5	96.2	97.1	97.4	97.7	97.8
-32	-26	-30	94.7	95.4	96.2	96.6	96.8	97.0
-37	-35	-35	93.9	94.6	95.4	95.7	96.0	96.1
-42	-44	-40	93.0	93.8	94.6	94.9	95.1	95.3
-47	-53	-45	92.2	92.9	93.7	94.0	94.3	94.4
-52	-62	-50	91.4	92.1	92.9	93.2	93.4	93.5

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	10000	11000	12000	13000	14000	14500
PACKS OFF	0.9	0.9	0.9	1.0	1.0	1.0
ENGINE ANTI-ICE	0.0	-0.8	-1.5	-1.5	-1.5	-1.4

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
85	160	168	177
80	155	163	172
75	151	158	167
70	146	153	161
65	141	148	156
60	135	142	149
55	128	136	143
50	122	129	136
45	115	122	128
40	108	115	121

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ADVISORY INFORMATION

Normal Configuration Landing Distances
Flaps 15
Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	945	70/-55	20/25	-35	115	10	-10	20	-20	65	20	40
MAX AUTO	1225	70/-70	25/35	-45	145	5	-5	30	-30	105	0	0
AUTOBRAKE 3	1745	120/-115	45/60	-75	250	5	-5	45	-45	175	0	0
AUTOBRAKE 2	2240	170/-170	65/85	-100	340	35	-40	65	-65	185	75	75
AUTOBRAKE 1	2465	200/-195	80/105	-115	400	65	-70	70	-70	175	240	325

Good Reported Braking Action

MAX MANUAL	1310	85/-80	35/45	-55	200	30	-25	30	-30	90	70	165
MAX AUTO	1445	90/-85	35/45	-60	205	30	-25	35	-35	100	75	175
AUTOBRAKE 3	1750	120/-115	45/60	-75	250	10	-10	45	-45	175	5	15
AUTOBRAKE 2	2240	170/-170	65/85	-100	340	35	-40	65	-65	185	75	75

Medium Reported Braking Action

MAX MANUAL	1800	135/-130	55/70	-90	330	75	-60	45	-45	120	200	490
MAX AUTO	1885	135/-130	55/75	-90	330	80	-60	45	-50	125	205	500
AUTOBRAKE 3	1935	140/-135	55/75	-95	340	60	-40	50	-50	175	135	425
AUTOBRAKE 2	2290	175/-170	70/90	-110	385	60	-55	65	-65	185	115	245

Poor Reported Braking Action

MAX MANUAL	2360	220/-180	75/105	-135	520	190	-125	65	-65	150	430	1185
MAX AUTO	2450	190/-180	75/105	-135	520	190	-125	65	-65	150	430	1185
AUTOBRAKE 3	2450	190/-180	75/105	-135	520	185	-120	65	-65	160	430	1185
AUTOBRAKE 2	2545	200/-195	80/110	-145	540	170	-110	70	-70	185	350	1040

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 55 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 30

Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	900	60/-50	20/25	-35	110	10	-10	20	-20	65	15	35
MAX AUTO	1145	65/-60	25/30	-40	140	5	-5	25	-25	100	0	0
AUTOBRAKE 3	1610	105/-105	40/55	-70	235	5	-5	45	-45	165	0	0
AUTOBRAKE 2	2065	150/-150	60/80	-95	325	30	-35	55	-55	170	65	65
AUTOBRAKE 1	2270	175/-175	70/95	-110	385	60	-65	65	-65	160	200	280

Good Reported Braking Action

MAX MANUAL	1250	80/-75	30/40	-55	195	30	-25	30	-30	95	65	145
MAX AUTO	1370	80/-80	35/45	-55	200	30	-25	30	-30	100	70	160
AUTOBRAKE 3	1615	105/-105	40/55	-70	240	10	-10	45	-45	165	5	15
AUTOBRAKE 2	2065	150/-150	60/80	-95	325	30	-35	55	-55	170	65	65

Medium Reported Braking Action

MAX MANUAL	1695	120/-120	50/65	-90	320	75	-60	45	-45	120	175	425
MAX AUTO	1770	125/-120	50/65	-90	320	75	-60	45	-45	120	180	435
AUTOBRAKE 3	1810	125/-120	50/70	-90	330	60	-40	45	-50	165	130	385
AUTOBRAKE 2	2115	155/-155	60/80	-105	370	55	-55	55	-60	170	100	215

Poor Reported Braking Action

MAX MANUAL	2195	175/-165	70/95	-130	505	180	-115	60	-60	140	370	995
MAX AUTO	2280	175/-165	70/95	-130	505	180	-115	60	-60	140	370	1000
AUTOBRAKE 3	2280	175/-165	70/95	-130	505	180	-115	60	-60	150	375	1000
AUTOBRAKE 2	2360	185/-175	75/100	-135	520	160	-105	65	-65	170	305	880

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 55 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 40

Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	860	55/-45	15/25	-30	110	10	-10	15	-15	65	15	30
MAX AUTO	1070	60/-55	20/30	-40	135	5	-5	25	-25	95	0	0
AUTOBRAKE 3	1485	100/-95	35/50	-65	225	5	-5	40	-40	160	0	0
AUTOBRAKE 2	1910	140/-135	55/70	-90	315	25	-30	50	-50	175	35	35
AUTOBRAKE 1	2115	165/-160	65/85	-105	370	50	-60	60	-60	160	155	205

Good Reported Braking Action

MAX MANUAL	1195	75/-75	30/40	-55	190	30	-25	30	-30	95	60	135
MAX AUTO	1300	80/-75	30/40	-55	195	30	-25	30	-30	100	65	140
AUTOBRAKE 3	1490	100/-95	35/50	-65	230	10	-10	40	-40	160	5	15
AUTOBRAKE 2	1910	140/-135	55/70	-90	315	25	-30	50	-50	175	35	35

Medium Reported Braking Action

MAX MANUAL	1610	115/-110	45/60	-85	315	75	-55	40	-40	120	160	385
MAX AUTO	1675	115/-115	45/65	-85	315	75	-55	40	-40	120	160	385
AUTOBRAKE 3	1700	120/-115	45/65	-90	320	60	-40	45	-45	160	135	365
AUTOBRAKE 2	1960	145/-140	55/75	-100	355	50	-45	50	-55	175	75	185

Poor Reported Braking Action

MAX MANUAL	2080	165/-155	65/90	-130	495	175	-115	55	-55	140	335	885
MAX AUTO	2165	165/-155	65/90	-130	495	175	-115	55	-55	140	335	885
AUTOBRAKE 3	2165	165/-155	65/90	-130	495	175	-115	55	-55	145	335	890
AUTOBRAKE 2	2215	170/-165	65/90	-135	510	155	-100	60	-60	170	270	795

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 speed-brakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 55 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	1225	170/-70	45/45	-45	205	20	-20	105
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1515	90/-95	40/55	-75	270	45	-40	115
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1025	70/-55	25/30	-35	125	15	-15	85
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	990	65/-55	20/30	-35	125	15	-10	90
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	950	60/-50	20/25	-35	120	15	-10	90
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1065	55/-60	25/30	-40	140	15	-15	75
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1425	80/-85	35/45	-55	185	35	-30	145
LEADING EDGE FLAPS TRANSIT	VREF15+15	1060	75/-60	25/30	-35	125	10	-10	70
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	955	70/-55	20/25	-35	120	10	-10	65
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	910	60/-50	20/25	-35	115	10	-10	65

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	945	70/-55	20/25	-35	120	10	-10	65
JAMMED OR RESTRICTIVE FLIGHT CONTROLS	VREF15	945	70/-55	20/25	-35	120	10	-10	65
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	900	60/-50	20/25	-35	110	10	-10	65
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	945	70/-55	20/25	-35	120	10	-10	65
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1050	85/-60	25/30	-35	130	10	-10	70
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	900	60/-50	20/25	-35	110	10	-10	65
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	945	70/-55	20/25	-35	120	10	-10	65
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1050	85/-60	25/30	-35	130	10	-10	70
TRAILING EDGE FLAPS UP	VREF40+40	1110	110/-65	30/30	-40	165	15	-10	70

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M) REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	1660	90/-95	45/60	-65	225	35	-30	85
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1685	110/-110	45/60	-85	330	65	-55	125
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1485	95/-100	40/55	-60	225	40	-35	130
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1410	90/-90	40/50	-60	220	40	-35	130
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1340	85/-85	35/50	-60	215	40	-35	130
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1350	85/-85	35/45	-60	205	30	-25	100
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1760	105/-110	45/60	-75	250	55	-50	170
LEADING EDGE FLAPS TRANSIT	VREF15+15	1475	90/-90	40/55	-60	215	35	-30	95
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1350	80/-85	35/45	-60	210	35	-30	100
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1285	75/-80	30/45	-55	205	30	-30	100

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	1295	80/-80	35/45	-55	200	30	-25	90
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1295	80/-80	35/45	-55	200	30	-25	90
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1250	80/-75	30/40	-55	195	30	-25	95
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1295	80/-80	35/45	-55	200	30	-25	90
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1435	80/-85	40/50	-60	210	30	-25	90
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1250	80/-75	30/40	-55	195	30	-25	95
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1295	80/-80	35/45	-55	200	30	-25	90
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1435	80/-85	40/50	-60	210	30	-25	90
TRAILING EDGE FLAPS UP	VREF40+40	1510	80/-85	40/55	-60	215	30	-30	85

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M) REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	2340	150/-155	75/100	-100	375	85	-75	120
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	2130	155/-155	65/90	-130	515	150	-105	145
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	2030	155/-150	65/90	-100	365	95	-80	165
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1905	140/-140	60/80	-95	355	90	-75	160
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1795	130/-130	55/75	-95	345	85	-70	160
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1845	135/-130	55/75	-90	340	80	-65	130
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	2425	170/-170	70/100	-115	395	120	-105	210
LEADING EDGE FLAPS TRANSIT	VREF15+15	2020	140/-140	60/85	-95	355	80	-70	125
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1930	135/-140	55/75	-100	360	90	-75	135
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1805	125/-130	50/70	-95	350	85	-70	135

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	1770	125/-125	50/75	-90	330	70	-60	120
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1770	125/-125	50/75	-90	330	70	-60	120
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1695	120/-120	50/65	-90	320	75	-60	120
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1770	125/-125	50/75	-90	330	70	-60	120
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1985	130/-135	60/80	-95	350	80	-65	120
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1695	120/-120	50/65	-90	320	75	-60	120
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1770	125/-125	50/75	-90	330	70	-60	120
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1985	130/-135	60/80	-95	350	80	-65	120
TRAILING EDGE FLAPS UP	VREF40+40	2110	135/-140	65/85	-100	360	80	-70	115

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	3090	220/-225	110/150	-155	590	200	-150	150
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	2815	225/-215	85/130	-210	955	515	-245	160
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	2620	220/-210	90/130	-145	570	205	-150	190
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	2435	195/-190	80/115	-140	555	190	-140	180
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	2285	180/-175	75/105	-135	540	185	-135	175
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	2390	190/-185	80/115	-135	540	170	-130	155
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	3115	240/-235	105/145	-165	605	240	-185	235
LEADING EDGE FLAPS TRANSIT	VREF15+15	2615	200/-200	90/125	-140	555	180	-135	150
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	2635	205/-205	85/115	-155	595	225	-160	170
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	2430	185/-185	75/105	-145	575	210	-150	160

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 60000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	2295	180/-175	75/105	-135	525	160	-120	140
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	2295	180/-175	75/105	-135	525	160	-120	140
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	2195	175/-165	70/95	-130	505	180	-115	140
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	2295	180/-175	75/105	-135	525	160	-120	140
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	2595	190/-190	85/120	-140	555	175	-130	145
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	2195	175/-165	70/95	-130	505	180	-115	140
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	2295	180/-175	75/105	-135	525	160	-120	140
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	2595	190/-190	85/120	-140	555	175	-130	145
TRAILING EDGE FLAPS UP	VREF40+40	2780	200/-200	95/130	-145	565	185	-140	145

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*																	
		80			100			120			140			160			180		
WEIGHT (1000 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
	0	15.1	17.0	19.3	22.4	25.3	28.9	30.9	35.0	40.2	40.4	45.9	53.0	50.8	57.9	67.3	60.8	69.6	81.2
	10	15.6	17.6	20.0	23.1	26.1	29.8	31.9	36.2	41.5	41.8	47.5	54.8	52.5	59.9	69.5	62.8	71.9	83.9
	15	15.8	17.8	20.2	23.5	26.5	30.3	32.4	36.7	42.1	42.4	48.2	55.6	53.3	60.7	70.5	63.7	72.9	85.1
80	20	16.0	18.1	20.5	23.8	26.9	30.7	32.8	37.2	42.7	42.9	48.8	56.3	54.0	61.5	71.4	64.6	73.9	86.2
	30	16.4	18.5	21.1	24.4	27.6	31.5	33.7	38.2	43.8	44.0	50.0	57.7	55.3	63.1	73.2	66.2	75.7	88.4
	40	16.6	18.7	21.3	24.7	27.9	31.9	34.1	38.7	44.4	44.7	50.9	58.8	56.3	64.3	74.8	67.5	77.4	90.5
	50	16.6	18.7	21.3	24.8	28.0	32.1	34.3	39.0	44.9	45.2	51.5	59.7	57.1	65.4	76.3	68.7	79.0	92.9
	0	13.7	15.4	17.5	20.2	22.8	26.0	27.7	31.3	35.9	36.1	41.0	47.2	45.3	51.6	59.7	54.9	62.7	72.9
	10	14.2	15.9	18.1	20.8	23.5	26.8	28.6	32.4	37.1	37.3	42.3	48.7	46.8	53.3	61.6	56.7	64.8	75.4
	15	14.4	16.2	18.4	21.1	23.9	27.2	29.0	32.8	37.6	37.8	43.0	49.4	47.5	54.0	62.5	57.5	65.7	76.4
70	20	14.6	16.4	18.6	21.4	24.2	27.6	29.4	33.3	38.1	38.4	43.5	50.1	48.1	54.8	63.4	58.3	66.5	77.4
	30	14.9	16.8	19.1	22.0	24.8	28.3	30.2	34.1	39.1	39.3	44.6	51.4	49.3	56.1	64.9	59.8	68.2	79.4
	40	15.1	17.0	19.3	22.2	25.1	28.6	30.5	34.6	39.6	39.9	45.3	52.2	50.1	57.1	66.2	60.9	69.6	81.2
	50	15.1	17.0	19.3	22.3	25.2	28.8	30.7	34.8	40.0	40.2	45.8	52.9	50.7	58.0	67.4	61.8	70.9	83.0
	0	12.3	13.9	15.7	18.0	20.3	23.1	24.4	27.6	31.6	31.7	35.9	41.2	39.6	45.0	51.8	48.1	54.8	63.5
	10	12.7	14.3	16.3	18.5	20.9	23.8	25.2	28.5	32.6	32.7	37.1	42.6	40.9	46.5	53.6	49.7	56.6	65.6
	15	12.9	14.6	16.5	18.8	21.2	24.2	25.6	29.0	33.1	33.2	37.6	43.2	41.5	47.1	54.4	50.4	57.4	66.5
60	20	13.1	14.8	16.7	19.1	21.5	24.5	26.0	29.4	33.5	33.6	38.1	43.8	42.0	47.8	55.1	51.1	58.2	67.4
	30	13.4	15.1	17.2	19.6	22.1	25.1	26.6	30.1	34.4	34.5	39.1	44.9	43.1	49.0	56.5	52.3	59.6	69.1
	40	13.6	15.3	17.3	19.8	22.3	25.4	26.9	30.5	34.9	35.0	39.7	45.6	43.8	49.8	57.5	53.2	60.7	70.5
	50	13.5	15.3	17.3	19.8	22.4	25.5	27.0	30.6	35.1	35.2	40.0	46.0	44.2	50.4	58.3	53.9	61.7	71.9
	0	11.0	12.3	14.0	15.7	17.7	20.2	21.2	23.9	27.3	27.2	30.8	35.3	33.8	38.3	44.1	40.9	46.4	53.6
	10	11.3	12.7	14.4	16.3	18.3	20.8	21.9	24.7	28.2	28.1	31.8	36.5	34.9	39.6	45.5	42.2	48.0	55.4
	15	11.5	12.9	14.7	16.5	18.6	21.1	22.2	25.1	28.6	28.6	32.3	37.0	35.4	40.2	46.2	42.8	48.7	56.2
50	20	11.6	13.1	14.9	16.7	18.9	21.4	22.5	25.4	29.0	28.9	32.8	37.5	35.9	40.7	46.8	43.4	49.3	56.9
	30	11.9	13.4	15.2	17.2	19.3	22.0	23.1	26.1	29.7	29.7	33.6	38.4	36.8	41.8	48.0	44.5	50.6	58.4
	40	12.1	13.6	15.4	17.3	19.5	22.2	23.4	26.4	30.1	30.1	34.0	39.0	37.4	42.4	48.8	45.2	51.4	59.4
	50	12.0	13.6	15.4	17.3	19.6	22.3	23.4	26.5	30.3	30.2	34.2	39.3	37.6	42.8	49.3	45.7	52.1	60.3
	0	9.6	10.8	12.3	13.5	15.2	17.3	17.9	20.2	23.0	22.8	25.8	29.4	28.1	31.8	36.4	33.7	38.2	43.9
	10	10.0	11.2	12.7	14.0	15.8	17.9	18.5	20.9	23.8	23.6	26.6	30.4	29.0	32.8	37.6	34.8	39.5	45.4
	15	10.1	11.4	12.9	14.2	16.0	18.1	18.8	21.2	24.1	23.9	27.0	30.8	29.4	33.3	38.2	35.3	40.0	46.0
40	20	10.2	11.5	13.1	14.4	16.2	18.4	19.1	21.5	24.5	24.2	27.4	31.3	29.8	33.8	38.7	35.8	40.6	46.6
	30	10.5	11.8	13.4	14.8	16.6	18.9	19.6	22.1	25.1	24.9	28.1	32.1	30.6	34.6	39.7	36.7	41.6	47.8
	40	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.4	25.2	28.4	32.5	31.0	35.1	40.2	37.2	42.2	48.6
	50	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.5	25.2	28.6	32.7	31.1	35.3	40.6	37.5	42.6	49.1

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.**

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)
No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.8	16.3	25.3	34.7	44.7	55.0	65.7	76.6	87.9
	MAX AUTO	7.5	15.4	23.6	32.4	41.8	51.8	62.5	74.1	86.5
	AUTOBRAKE 3	7.3	14.7	22.3	30.2	38.6	47.6	57.4	68.1	80.0
	AUTOBRAKE 2	7.0	13.8	20.5	27.4	34.8	42.7	51.5	61.3	72.4
	AUTOBRAKE 1	6.7	13.1	19.2	25.3	31.8	38.8	46.6	55.4	65.5

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.0	14.6	22.8	31.4	40.5	49.9	59.7	69.8	80.0
	MAX AUTO	5.8	12.3	19.5	27.2	35.6	44.5	53.9	63.7	74.1
	AUTOBRAKE 3	4.3	9.2	14.7	20.7	27.2	34.4	42.0	50.2	59.0
	AUTOBRAKE 2	2.5	5.6	9.1	13.1	17.8	23.0	28.8	35.2	42.3
	AUTOBRAKE 1	1.8	3.8	6.1	8.8	11.9	15.5	19.6	24.4	29.8

Cooling Time (Minutes) - Category C Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category N Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

ADVISORY INFORMATION

Recommended Brake Cooling Schedule - High Altitudes

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*															
		60				100				140				180			
WEIGHT (1000 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)															
		10	12	14	14.5	10	12	14	14.5	10	12	14	14.5	10	12	14	14.5
80	0	11.5	12.1	12.8	13.0	28.9	30.6	32.4	32.9	53.0	56.4	60.2	61.3	81.2	87.0		
	10	11.9	12.5	13.2	13.4	29.8	31.6	33.4	33.9	54.8	58.3	62.2	63.3	83.9	89.9		
	15	12.1	12.7	13.4	13.6	30.3	32.0	33.9	34.4	55.6	59.1	63.1	64.2	85.1	91.2		
	20	12.3	12.9	13.6	13.8	30.7	32.5	34.4	34.9	56.3	59.9	63.9	65.0	86.2	92.4		
	30	12.6	13.2	14.0	14.2	31.5	33.3	35.3	35.8	57.7	61.4	65.5	66.7	88.4	94.7		
	40	12.7	13.4	14.1	14.3	31.9	33.7	35.8	36.3	58.8	62.6	66.8	68.0	90.5	97.1		
	50	12.7	13.3	14.1	14.3	32.1	33.9	36.0	36.6	59.7	63.6	68.0	69.2	92.9	99.9		
70	0	10.6	11.2	11.8	12.0	26.0	27.4	29.0	29.5	47.2	50.1	53.4	54.3	72.9	78.0	83.7	85.3
	10	11.0	11.5	12.1	12.3	26.8	28.3	30.0	30.5	48.7	51.8	55.2	56.1	75.4	80.6	86.5	88.1
	15	11.1	11.7	12.3	12.5	27.2	28.8	30.4	30.9	49.4	52.5	56.0	56.9	76.4	81.7	87.7	89.4
	20	11.3	11.9	12.5	12.7	27.6	29.2	30.9	31.4	50.1	53.2	56.7	57.7	77.4	82.8	88.8	90.5
	30	11.6	12.2	12.8	13.0	28.3	29.9	31.6	32.1	51.4	54.6	58.1	59.1	79.4	84.8	91.0	92.7
	40	11.7	12.3	12.9	13.1	28.6	30.3	32.1	32.6	52.2	55.5	59.2	60.2	81.2	86.9	93.3	95.1
	50	11.6	12.3	12.9	13.1	28.8	30.4	32.2	32.7	52.9	56.3	60.1	61.1	83.0	89.0	95.9	97.8
60	0	9.7	10.2	10.7	10.9	23.1	24.3	25.7	26.1	41.2	43.7	46.5	47.3	63.5	67.7	72.5	73.8
	10	10.0	10.5	11.1	11.3	23.8	25.2	26.6	27.0	42.6	45.2	48.0	48.8	65.6	70.0	74.9	76.3
	15	10.2	10.7	11.3	11.5	24.2	25.5	27.0	27.4	43.2	45.8	48.7	49.5	66.5	71.0	76.0	77.4
	20	10.3	10.8	11.4	11.6	24.5	25.9	27.4	27.8	43.8	46.4	49.4	50.2	67.4	71.9	76.9	78.3
	30	10.6	11.1	11.7	11.9	25.1	26.5	28.1	28.5	44.9	47.6	50.6	51.4	69.1	73.7	78.9	80.3
	40	10.7	11.2	11.8	12.0	25.4	26.9	28.4	28.8	45.6	48.4	51.5	52.3	70.5	75.3	80.6	82.1
	50	10.6	11.2	11.8	12.0	25.5	26.9	28.5	29.0	46.0	48.9	52.1	53.0	71.9	76.9	82.5	84.1
50	0	8.8	9.3	9.7	9.9	20.2	21.3	22.5	22.8	35.3	37.4	39.7	40.3	53.6	57.0	60.9	62.0
	10	9.1	9.6	10.1	10.2	20.8	22.0	23.2	23.6	36.5	38.6	41.0	41.7	55.4	58.9	62.9	64.0
	15	9.2	9.7	10.2	10.4	21.1	22.3	23.6	23.9	37.0	39.2	41.6	42.3	56.2	59.8	63.8	64.9
	20	9.4	9.8	10.4	10.5	21.4	22.6	23.9	24.3	37.5	39.7	42.2	42.9	56.9	60.6	64.7	65.8
	30	9.6	10.1	10.6	10.8	22.0	23.2	24.5	24.9	38.4	40.7	43.2	43.9	58.4	62.1	66.3	67.4
	40	9.7	10.2	10.7	10.9	22.2	23.5	24.8	25.2	39.0	41.3	43.9	44.6	59.4	63.3	67.6	68.8
	50	9.6	10.1	10.7	10.9	22.3	23.5	24.9	25.3	39.3	41.7	44.3	45.0	60.3	64.3	68.8	70.1
40	0	8.0	8.4	8.9	9.0	17.3	18.2	19.3	19.6	29.4	31.1	33.0	33.5	43.9	46.6	49.6	50.4
	10	8.3	8.7	9.2	9.3	17.9	18.8	19.9	20.2	30.4	32.2	34.1	34.6	45.4	48.1	51.2	52.1
	15	8.4	8.8	9.3	9.4	18.1	19.1	20.2	20.5	30.8	32.6	34.6	35.1	46.0	48.9	52.0	52.9
	20	8.5	9.0	9.4	9.6	18.4	19.4	20.5	20.8	31.3	33.1	35.0	35.6	46.6	49.5	52.7	53.6
	30	8.7	9.2	9.7	9.8	18.9	19.9	21.0	21.3	32.1	33.9	35.9	36.5	47.8	50.8	54.0	54.9
	40	8.8	9.3	9.8	9.9	19.1	20.1	21.2	21.5	32.5	34.4	36.4	37.0	48.6	51.6	55.0	55.9
	50	8.8	9.2	9.7	9.9	19.1	20.1	21.2	21.5	32.7	34.6	36.7	37.3	49.1	52.3	55.7	56.7

***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	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.8	16.3	25.3	34.7	44.7	55.0	65.7	76.6	87.9
	MAX AUTO	7.5	15.4	23.6	32.4	41.8	51.8	62.5	74.1	86.5
	AUTOBRAKE 3	7.3	14.7	22.3	30.2	38.6	47.6	57.4	68.1	80.0
	AUTOBRAKE 2	7.0	13.8	20.5	27.4	34.8	42.7	51.5	61.3	72.4
	AUTOBRAKE 1	6.7	13.1	19.2	25.3	31.8	38.8	46.6	55.4	65.5

ADVISORY INFORMATION

Recommended Brake Cooling Schedule - High Altitudes

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.0	14.6	22.8	31.4	40.5	49.9	59.7	69.8	80.0
	MAX AUTO	5.8	12.3	19.5	27.2	35.6	44.5	53.9	63.7	74.1
	AUTOBRAKE 3	4.3	9.2	14.7	20.7	27.2	34.4	42.0	50.2	59.0
	AUTOBRAKE 2	2.5	5.6	9.1	13.1	17.8	23.0	28.8	35.2	42.3
	AUTOBRAKE 1	1.8	3.8	6.1	8.8	11.9	15.5	19.6	24.4	29.8

Cooling Time (Minutes) - Category C Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category N Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH

Engine Inoperative — Section 32

ENGINE INOP

Initial Max Continuous %N1

Based on .80M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.9	96.6	96.4	96.2	96.0	95.5	95.1	94.8	94.2
15	97.5	97.2	96.9	96.8	96.7	96.3	95.8	95.6	95.0
10	98.1	97.9	97.5	97.4	97.4	97.0	96.6	96.4	95.9
5	98.1	98.6	98.4	98.1	98.1	97.8	97.4	97.2	96.7
0	97.3	98.5	99.2	99.0	98.9	98.6	98.2	98.0	97.7
-5	96.5	97.8	98.9	99.8	99.7	99.3	99.0	98.8	98.5
-10	95.8	97.0	98.2	99.4	100.5	100.2	99.9	99.7	99.5
-15	95.0	96.2	97.4	98.6	99.9	101.0	100.8	100.6	100.4
-20	94.2	95.4	96.6	97.8	99.1	100.2	100.8	100.6	100.4
-25	93.4	94.6	95.8	97.0	98.3	99.4	100.0	99.8	99.6
-30	92.6	93.8	95.0	96.2	97.5	98.6	99.1	98.9	98.7
-35	91.7	93.0	94.1	95.3	96.6	97.7	98.3	98.1	97.9
-40	90.9	92.2	93.3	94.5	95.8	96.9	97.4	97.2	97.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE	-4.2	-4.4	-4.5	-4.7	-5.0	-4.8	-4.8	-4.8	-4.8

ENGINE INOP

Max Continuous %N1

37000 FT to 29000 FT Pressure Altitudes

37000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.51	96.6	97.6	98.5	99.4	100.2	99.6	98.8	97.6	96.3	94.7	93.2	91.8
200	.63	96.0	96.9	97.8	98.7	99.6	100.4	100.1	99.3	98.4	97.5	96.3	95.2
240	.74	95.1	96.0	96.8	97.7	98.6	99.4	100.3	100.7	100.0	99.2	98.4	97.5
280	.86	94.3	95.2	96.1	97.0	97.8	98.7	99.5	100.4	101.2	100.9	100.0	99.1
35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	96.5	97.4	98.3	99.2	100.1	99.8	99.0	98.0	96.8	95.4	94.0	92.7
200	.60	96.1	97.0	97.9	98.8	99.7	100.6	100.5	99.6	98.6	97.6	96.5	95.4
240	.71	95.0	95.9	96.8	97.7	98.6	99.4	100.3	100.8	100.2	99.5	98.6	97.7
280	.82	93.8	94.6	95.5	96.4	97.3	98.1	98.9	99.8	100.6	100.3	99.5	98.8
33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	97.4	98.3	99.2	100.0	100.8	100.0	99.1	97.9	96.7	95.3	93.9	92.6
200	.58	97.0	97.9	98.8	99.7	100.6	101.4	100.6	99.6	98.6	97.5	96.3	95.1
240	.68	95.9	96.8	97.7	98.5	99.4	100.2	101.1	100.9	100.2	99.4	98.4	97.4
280	.79	94.3	95.1	96.0	96.8	97.7	98.5	99.3	100.2	100.5	99.7	98.9	98.1
320	.89	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	100.3	101.1	100.7	99.8
31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	97.3	98.2	99.1	100.0	100.9	101.1	100.2	99.2	98.0	96.6	95.2	93.9
200	.55	97.1	98.0	98.9	99.7	100.6	101.5	101.6	100.7	99.7	98.6	97.4	96.2
240	.66	95.6	96.5	97.4	98.3	99.1	100.0	100.8	101.3	100.5	99.8	98.8	97.8
280	.76	93.8	94.7	95.5	96.4	97.2	98.0	98.8	99.7	100.5	99.8	98.9	98.0
320	.85	92.4	93.2	94.1	94.9	95.7	96.5	97.4	98.2	98.9	99.7	99.9	99.1
29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	98.1	99.0	99.9	100.8	101.6	101.2	100.2	99.1	97.9	96.4	95.1	93.8
200	.53	97.5	98.4	99.3	100.2	101.0	101.9	101.3	100.4	99.3	98.2	96.9	95.8
240	.63	96.3	97.1	98.0	98.9	99.7	100.5	101.4	101.1	100.2	99.2	98.3	97.2
280	.73	94.2	95.0	95.9	96.7	97.5	98.3	99.1	99.9	100.1	99.1	98.2	97.5
320	.82	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	98.5	97.6
360	.91	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	100.0	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.1	-4.3	-4.5	-4.7	-4.7

ENGINE INOP

Max Continuous %N1
27000 FT to 20000 FT Pressure Altitudes

27000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	98.0	98.8	99.7	100.6	101.4	102.2	101.2	100.2	99.0	97.8	96.4	95.1
200	.51	96.9	97.8	98.7	99.6	100.4	101.2	101.8	100.8	99.9	98.8	97.6	96.4
240	.60	95.6	96.5	97.4	98.2	99.1	99.9	100.7	101.3	100.4	99.4	98.5	97.5
280	.70	93.6	94.4	95.3	96.1	96.9	97.7	98.5	99.3	100.1	99.4	98.4	97.6
320	.79	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	98.6	97.8
360	.88	91.0	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	98.1	98.8	99.4

25000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.8	99.7	100.5	101.4	102.2	102.4	101.4	100.3	99.1	97.7	96.5	95.2
200	.49	97.5	98.3	99.2	100.0	100.9	101.7	101.5	100.6	99.5	98.4	97.3	96.2
240	.58	95.7	96.5	97.4	98.2	99.0	99.9	100.7	100.5	99.5	98.6	97.6	96.7
280	.67	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.5	99.5	98.6	97.6	96.9
320	.76	91.7	92.6	93.4	94.2	95.0	95.8	96.5	97.3	98.0	98.6	97.8	97.2
360	.85	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.6	98.4	98.2

24000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	98.6	99.5	100.4	101.2	102.1	102.9	101.9	100.8	99.6	98.4	97.1	95.8
200	.48	97.5	98.4	99.2	100.1	100.9	101.8	102.2	101.1	100.1	99.0	97.8	96.7
240	.57	95.9	96.8	97.6	98.5	99.3	100.1	100.9	101.2	100.2	99.2	98.2	97.3
280	.66	94.2	95.1	95.9	96.7	97.5	98.3	99.1	99.9	100.4	99.4	98.3	97.5
320	.75	92.1	93.0	93.8	94.6	95.4	96.2	96.9	97.7	98.5	99.2	98.6	97.8
360	.83	90.6	91.4	92.2	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.6

22000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	99.1	100.0	100.9	101.7	102.5	102.8	101.8	100.7	99.5	98.2	97.0	95.8
200	.46	98.4	99.3	100.1	101.0	101.8	102.6	102.3	101.2	100.0	98.9	97.8	96.8
240	.55	97.2	98.1	98.9	99.7	100.5	101.3	102.1	101.6	100.5	99.4	98.5	97.5
280	.63	95.7	96.5	97.4	98.2	99.0	99.8	100.6	101.3	101.0	99.8	98.9	98.1
320	.72	93.9	94.7	95.5	96.3	97.1	97.9	98.6	99.4	100.1	100.2	99.3	98.6
360	.80	92.2	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	99.2	99.7	99.1

20000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	98.7	99.5	100.4	101.2	102.0	102.8	102.5	101.5	100.4	99.2	98.0	96.8
200	.44	98.3	99.2	100.0	100.9	101.7	102.5	103.3	102.3	101.1	100.0	98.9	97.8
240	.53	97.5	98.4	99.2	100.0	100.8	101.7	102.5	103.1	101.8	100.5	99.5	98.6
280	.61	96.2	97.0	97.8	98.7	99.5	100.3	101.1	101.8	102.5	101.3	100.1	99.3
320	.69	94.7	95.5	96.3	97.1	97.9	98.7	99.5	100.2	101.0	101.7	100.9	99.9
360	.77	93.0	93.8	94.6	95.4	96.2	97.0	97.7	98.5	99.2	100.0	100.7	100.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	20	22	24	25	27
ENGINE ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-3.6	-3.8	-3.8	-3.9	-4.0

ENGINE INOP

Max Continuous %N1

18000 FT to 12000 FT Pressure Altitudes

18000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.34	98.5	99.3	100.2	101.0	101.8	102.6	101.6	100.3	99.2	98.1	97.0	95.9
200	.42	98.7	99.6	100.4	101.2	102.0	102.8	103.1	101.7	100.4	99.3	98.3	97.3
240	.51	97.8	98.7	99.5	100.3	101.1	101.9	102.7	102.5	101.1	99.9	99.0	98.1
280	.59	96.3	97.1	97.9	98.7	99.5	100.3	101.0	101.8	101.6	100.5	99.6	98.8
320	.67	94.8	95.6	96.4	97.2	97.9	98.7	99.5	100.2	101.0	100.9	100.0	99.2
360	.75	93.0	93.8	94.6	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.2	99.6

16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	97.1	98.0	98.8	99.6	100.4	101.2	101.6	100.3	99.1	98.1	97.1	96.1
200	.41	98.0	98.8	99.6	100.4	101.2	102.0	102.8	102.5	101.3	100.2	99.3	98.3
240	.49	97.1	97.9	98.7	99.5	100.3	101.1	101.9	102.7	101.8	100.5	99.6	98.7
280	.57	95.6	96.4	97.2	98.0	98.8	99.6	100.3	101.1	101.8	100.9	99.8	99.0
320	.64	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.2	99.4
360	.72	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.4	99.2	99.9	99.6

14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	96.6	97.4	98.2	99.0	99.8	100.6	100.4	99.1	98.0	97.1	96.2	95.3
200	.39	97.1	97.9	98.7	99.5	100.3	101.1	101.8	101.5	101.0	100.1	99.3	98.4
240	.47	96.6	97.4	98.2	99.0	99.8	100.6	101.3	101.8	101.1	100.3	99.5	98.7
280	.54	95.5	96.3	97.1	97.8	98.6	99.4	100.1	100.9	101.0	100.1	99.2	98.5
320	.62	94.1	94.9	95.7	96.5	97.2	98.0	98.7	99.5	100.2	100.3	99.5	98.8
360	.69	92.2	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.6	99.0

12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	96.3	97.0	97.8	98.6	99.4	100.1	99.3	98.1	97.1	96.3	95.4	94.5
200	.38	97.1	97.9	98.7	99.5	100.3	101.0	101.5	100.8	99.8	99.0	98.2	97.3
240	.45	96.5	97.3	98.0	98.8	99.6	100.3	101.1	101.0	100.1	99.4	98.6	97.9
280	.52	95.5	96.3	97.0	97.8	98.6	99.3	100.0	100.8	100.3	99.4	98.6	98.0
320	.60	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	99.7	98.9	98.2
360	.67	92.3	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	99.4	99.1	98.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	12	14	16	18
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-3.2	-3.4	-3.4	-3.5

ENGINE INOP

Max Continuous %N1
10000 FT to 1000 FT Pressure Altitudes

10000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.29	95.2	96.0	96.8	97.6	98.3	99.1	99.8	98.6	97.4	96.6	95.8	94.9
200	.36	96.0	96.7	97.5	98.3	99.0	99.8	100.5	100.5	99.4	98.5	97.8	97.0
240	.43	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.1	99.2	98.4	97.7
280	.51	94.5	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.4	99.5	98.7	98.0
320	.58	93.0	93.9	94.7	95.5	96.2	97.0	97.8	98.6	99.3	99.7	99.0	98.2
360	.65	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	99.1	98.5
5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	94.9	95.7	96.4	97.2	98.0	98.8	99.2	98.3	97.4	96.6	95.9	95.1
200	.33	94.7	95.5	96.3	97.1	97.8	98.6	99.4	98.9	98.0	97.3	96.6	95.8
240	.40	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.5	98.7	97.9	97.2	96.5
280	.46	93.3	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	98.2	97.5	96.8
320	.53	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	98.7	98.4	97.7	97.1
360	.59	91.5	92.3	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.0	97.3
3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	94.8	95.6	96.4	97.2	98.0	98.7	98.8	97.9	97.1	96.4	95.6	94.8
200	.32	94.5	95.3	96.1	96.9	97.6	98.4	99.2	98.3	97.5	96.8	96.1	95.3
240	.38	94.1	94.9	95.6	96.4	97.2	98.0	98.7	98.8	98.0	97.2	96.6	95.9
280	.45	93.2	94.0	94.8	95.6	96.4	97.2	97.9	98.7	98.3	97.5	96.9	96.2
320	.51	92.5	93.3	94.1	94.9	95.7	96.4	97.2	98.0	98.5	97.8	97.1	96.5
360	.57	91.6	92.4	93.2	94.0	94.7	95.5	96.3	97.1	97.8	98.1	97.4	96.8
1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	93.9	94.7	95.4	96.2	97.0	97.8	98.5	98.2	97.4	96.7	96.0	95.2
200	.31	93.5	94.3	95.1	95.9	96.7	97.4	98.2	98.5	97.8	97.0	96.3	95.6
240	.37	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	98.1	97.3	96.6	95.9
280	.43	92.3	93.2	93.9	94.7	95.5	96.3	97.1	97.8	98.3	97.6	96.9	96.2
320	.49	91.6	92.4	93.2	94.0	94.8	95.6	96.3	97.1	97.9	97.9	97.2	96.5
360	.55	90.7	91.5	92.3	93.1	93.9	94.7	95.4	96.2	96.9	97.7	97.3	96.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-2.7	-3.2

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 & BELLOW	ISA + 15°C	ISA + 20°C
85	82	271	18500	17300	15900
80	77	263	20200	19000	17700
75	72	255	21600	20600	19400
70	67	247	23100	22200	21100
65	62	238	24700	23800	22800
60	57	229	26800	25800	24700
55	53	219	29100	28100	27000
50	48	209	31200	30400	29400
45	43	199	33300	32600	31700
40	38	187	35600	34900	34000

Includes APU fuel burn.

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
138	128	120	112	106	100	95	90	86	82	78
275	256	239	225	212	200	190	180	172	164	157
413	384	359	337	317	300	284	270	258	246	235
551	512	479	449	423	400	379	360	344	328	314
689	640	598	562	529	500	474	451	429	410	392
826	768	718	674	635	600	569	541	515	492	471
964	896	838	786	741	700	664	631	601	574	549
1102	1025	957	898	846	800	758	721	687	656	628
1240	1153	1077	1011	952	900	853	811	773	738	706
1377	1281	1197	1123	1058	1000	948	901	859	820	785
1515	1409	1317	1235	1164	1100	1043	991	945	902	863
1653	1537	1436	1348	1270	1200	1138	1081	1030	984	942
1792	1666	1556	1460	1375	1300	1232	1171	1116	1066	1020
1930	1794	1676	1573	1481	1400	1327	1261	1202	1148	1098
2068	1922	1796	1685	1587	1500	1422	1351	1288	1230	1177
2207	2051	1916	1798	1693	1600	1517	1441	1373	1312	1255
2345	2180	2036	1910	1799	1700	1611	1531	1459	1393	1333
2484	2309	2156	2023	1905	1800	1706	1621	1545	1475	1411

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	40	45	50	55	60	65	70	75	80	85	
100	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0:16
200	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	0:33
300	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	0:49
400	1.6	1.8	1.9	2.0	2.2	2.3	2.5	2.6	2.8	2.9	1:06
500	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.7	1:22
600	2.4	2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.3	4.5	1:39
700	2.8	3.1	3.4	3.6	3.9	4.2	4.5	4.7	5.0	5.3	1:55
800	3.2	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.1	2:11
900	3.6	4.0	4.3	4.7	5.0	5.4	5.7	6.1	6.4	6.8	2:28
1000	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.7	7.1	7.6	2:44
1100	4.4	4.8	5.3	5.7	6.1	6.6	7.0	7.4	7.9	8.3	3:01
1200	4.8	5.3	5.7	6.2	6.7	7.1	7.6	8.1	8.6	9.0	3:17
1300	5.2	5.7	6.2	6.7	7.2	7.7	8.2	8.7	9.2	9.8	3:34
1400	5.5	6.1	6.6	7.2	7.7	8.3	8.8	9.4	9.9	10.5	3:51
1500	5.9	6.5	7.1	7.7	8.3	8.9	9.4	10.0	10.6	11.2	4:07
1600	6.3	6.9	7.5	8.2	8.8	9.4	10.0	10.7	11.3	12.0	4:24
1700	6.6	7.3	8.0	8.6	9.3	10.0	10.6	11.3	12.0	12.7	4:41
1800	7.0	7.7	8.4	9.1	9.8	10.5	11.2	11.9	12.6	13.4	4:57

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at long range cruise speed.

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
85	15200	12600	9900
80	17200	15300	12500
75	19200	17400	15000
70	20900	19700	17300
65	22500	21300	19800
60	24100	23000	21600
55	26300	24800	23500
50	29000	27700	25800
45	31400	30500	29200
40	33800	33000	31800

With engine anti-ice on, decrease altitude capability by 1200 ft.
With engine and wing anti-ice on, decrease altitude capability by 5500 ft .

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	15	17	19	21	23	25	27	29	31
85	%N1	91.8	95.5	97.9							
	MACH	.561	.600	.616							
	KIAS	311	303	300							
	FF/ENG	3067	3033	3052							
80	%N1	90.1	94.0	95.9	98.5						
	MACH	.545	.590	.603	.621						
	KIAS	302	299	294	291						
	FF/ENG	2875	2870	2846	2886						
75	%N1	88.4	92.5	94.0	96.1						
	MACH	.528	.579	.593	.607						
	KIAS	293	293	288	284						
	FF/ENG	2684	2709	2674	2662						
70	%N1	86.5	90.7	92.3	94.0	96.2					
	MACH	.510	.562	.582	.595	.610					
	KIAS	282	284	283	278	274					
	FF/ENG	2494	2518	2520	2481	2487					
65	%N1	84.5	88.7	90.4	92.2	93.9	96.4				
	MACH	.491	.542	.563	.584	.596	.612				
	KIAS	271	274	274	273	268	265				
	FF/ENG	2306	2327	2330	2330	2295	2317				
60	%N1	82.3	86.5	88.3	90.0	91.9	93.7	96.4			
	MACH	.471	.521	.543	.564	.585	.597	.614			
	KIAS	261	263	263	263	263	258	254			
	FF/ENG	2124	2137	2139	2140	2143	2114	2146			
55	%N1	80.2	84.2	85.9	87.7	89.5	91.4	93.3	96.2		
	MACH	.453	.498	.520	.541	.563	.585	.597	.614		
	KIAS	250	251	252	252	253	252	247	244		
	FF/ENG	1954	1948	1950	1950	1953	1958	1938	1971		
50	%N1	77.8	81.6	83.4	85.2	87.0	88.7	90.7	92.7	95.7	
	MACH	.434	.475	.495	.516	.538	.561	.583	.596	.613	
	KIAS	240	239	239	240	241	241	241	236	233	
	FF/ENG	1791	1764	1762	1762	1764	1767	1777	1765	1793	
45	%N1	75.5	79.1	80.6	82.3	84.1	85.9	87.7	89.7	91.8	94.8
	MACH	.415	.452	.469	.489	.511	.533	.556	.578	.593	.610
	KIAS	229	227	227	227	228	229	229	229	225	222
	FF/ENG	1636	1594	1582	1575	1577	1580	1586	1600	1593	1613
40	%N1	73.0	76.2	77.8	79.4	81.0	82.8	84.6	86.4	88.3	90.7
	MACH	.395	.429	.445	.462	.480	.502	.525	.548	.571	.589
	KIAS	218	215	215	214	214	215	216	216	216	214
	FF/ENG	1485	1434	1416	1402	1392	1394	1400	1410	1421	1424

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS) 100	80	60	40	20	GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS) 20	40	60	80	100
298	272	249	230	214	200	190	180	172	164	158
600	547	501	462	429	400	379	361	344	328	315
903	823	753	694	644	600	570	542	517	494	473
1209	1100	1005	926	859	800	759	721	687	657	630
1516	1379	1259	1159	1075	1000	949	902	859	820	786
1825	1659	1513	1393	1290	1200	1139	1082	1031	984	943
2137	1940	1768	1626	1506	1400	1328	1262	1202	1147	1099
2450	2222	2024	1860	1722	1600	1518	1442	1373	1311	1256
2766	2507	2281	2095	1938	1800	1707	1622	1544	1474	1412
3083	2792	2539	2331	2155	2000	1896	1801	1715	1637	1568

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT) 10 FUEL (1000 KG)	10 TIME (HR:MIN)	14 FUEL (1000 KG)	14 TIME (HR:MIN)	18 FUEL (1000 KG)	18 TIME (HR:MIN)	22 FUEL (1000 KG)	22 TIME (HR:MIN)	26 FUEL (1000 KG)	26 TIME (HR:MIN)
200	1.4	0:43	1.2	0:41	1.1	0:39	1.0	0:38	0.9	0:37
400	2.8	1:23	2.6	1:19	2.4	1:14	2.2	1:11	2.1	1:09
600	4.3	2:04	3.9	1:57	3.6	1:50	3.4	1:45	3.2	1:42
800	5.7	2:46	5.2	2:36	4.9	2:26	4.5	2:19	4.4	2:14
1000	7.1	3:28	6.6	3:15	6.1	3:03	5.7	2:53	5.5	2:47
1200	8.5	4:10	7.9	3:55	7.3	3:40	6.8	3:28	6.6	3:21
1400	9.8	4:53	9.1	4:36	8.5	4:18	8.0	4:02	7.7	3:54
1600	11.2	5:36	10.4	5:16	9.7	4:55	9.1	4:38	8.7	4:28
1800	12.5	6:20	11.7	5:58	10.9	5:34	10.2	5:13	9.8	5:02
2000	13.9	7:05	12.9	6:39	12.0	6:13	11.3	5:49	10.8	5:36

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG) 40	45	50	55	60	65	70	75	80
1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.1	0.2	0.3
2	-0.3	-0.2	-0.1	-0.1	0.0	0.2	0.3	0.6	0.8
3	-0.4	-0.3	-0.2	-0.1	0.0	0.3	0.5	0.9	1.2
4	-0.6	-0.4	-0.3	-0.1	0.0	0.3	0.7	1.2	1.6
5	-0.7	-0.5	-0.4	-0.2	0.0	0.4	0.9	1.4	2.0
6	-0.8	-0.6	-0.4	-0.2	0.0	0.5	1.1	1.7	2.4
7	-1.0	-0.8	-0.5	-0.3	0.0	0.6	1.2	2.0	2.8
8	-1.1	-0.9	-0.6	-0.3	0.0	0.6	1.4	2.2	3.2
9	-1.3	-1.0	-0.7	-0.3	0.0	0.7	1.5	2.4	3.5
10	-1.4	-1.1	-0.7	-0.4	0.0	0.7	1.6	2.6	3.8
11	-1.6	-1.2	-0.8	-0.4	0.0	0.8	1.7	2.8	4.1
12	-1.7	-1.3	-0.9	-0.4	0.0	0.8	1.9	3.0	4.4
13	-1.9	-1.4	-0.9	-0.5	0.0	0.9	2.0	3.2	4.7
14	-2.0	-1.5	-1.0	-0.5	0.0	0.9	2.0	3.4	4.9

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
85	%N1	81.1	84.1	88.3	92.8				
	KIAS	250	251	252	253				
	FF/ENG	2740	2730	2750	2800				
80	%N1	79.5	82.4	86.5	91.0	98.3			
	KIAS	242	243	244	245	247			
	FF/ENG	2580	2570	2570	2610	2740			
75	%N1	77.8	80.5	84.7	89.1	95.0			
	KIAS	235	236	236	238	239			
	FF/ENG	2420	2400	2400	2420	2490			
70	%N1	76.0	78.6	82.8	87.1	92.1			
	KIAS	227	227	228	229	231			
	FF/ENG	2260	2240	2230	2250	2270			
65	%N1	74.0	76.7	80.8	85.0	89.7	97.7		
	KIAS	219	219	220	221	222	224		
	FF/ENG	2100	2090	2070	2070	2080	2230		
60	%N1	71.7	74.6	78.5	82.8	87.4	93.7		
	KIAS	210	210	211	212	213	214		
	FF/ENG	1950	1930	1910	1910	1910	1970		
55	%N1	69.4	72.3	76.3	80.5	84.9	90.0		
	KIAS	200	201	202	203	204	205		
	FF/ENG	1800	1770	1750	1740	1730	1760		
50	%N1	66.9	69.7	73.8	77.8	82.3	87.0	94.9	
	KIAS	192	192	192	193	194	195	196	
	FF/ENG	1650	1620	1600	1580	1570	1570	1680	
45	%N1	64.2	66.9	70.9	75.0	79.4	84.0	89.6	
	KIAS	185	185	185	185	185	185	186	
	FF/ENG	1500	1470	1440	1420	1400	1400	1450	
40	%N1	61.1	64.0	67.8	72.0	76.2	80.7	85.4	94.0
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1350	1330	1300	1270	1250	1240	1260	1360

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

GEAR DOWN

Long Range Cruise Altitude Capability

Max Cruise Thrust, 100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15600	12500	9400
80	18400	15500	12600
75	21100	18500	15700
70	23600	21400	18600
65	26100	24400	21800
60	28600	27100	25300
55	30800	29600	28100
50	32900	31900	30700
45	35100	34100	33000
40	37500	36500	35400

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	21	23	25	27	29	31	33	35
85	%N1	85.9								
	MACH	.482								
	KIAS	267								
	FF/ENG	2421								
80	%N1	84.2								
	MACH	.468								
	KIAS	259								
	FF/ENG	2271								
75	%N1	82.5	91.7							
	MACH	.454	.554							
	KIAS	251	248							
	FF/ENG	2123	2101							
70	%N1	80.6	89.8	91.7						
	MACH	.440	.541	.557						
	KIAS	243	242	240						
	FF/ENG	1977	1960	1950						
65	%N1	78.6	87.9	89.5	91.6	94.5				
	MACH	.425	.524	.543	.560	.578				
	KIAS	235	234	233	231	229				
	FF/ENG	1835	1812	1806	1805	1836				
60	%N1	76.5	85.6	87.4	89.1	91.3	94.5			
	MACH	.409	.504	.525	.544	.562	.580			
	KIAS	226	225	225	224	222	220			
	FF/ENG	1696	1661	1661	1658	1664	1696			
55	%N1	74.4	83.3	85.0	86.8	88.5	90.9	94.1		
	MACH	.393	.484	.504	.525	.545	.562	.581		
	KIAS	217	216	216	216	215	213	211		
	FF/ENG	1559	1515	1512	1515	1517	1523	1555		
50	%N1	71.9	80.7	82.5	84.2	86.0	87.8	90.2	93.5	
	MACH	.376	.463	.482	.502	.523	.544	.561	.580	
	KIAS	207	206	206	206	206	205	203	201	
	FF/ENG	1424	1371	1367	1368	1374	1377	1381	1411	
45	%N1	69.1	78.0	79.7	81.4	83.1	85.0	86.8	89.1	92.5
	MACH	.358	.441	.458	.477	.498	.520	.541	.559	.578
	KIAS	197	196	196	196	196	196	195	193	191
	FF/ENG	1294	1231	1224	1224	1230	1235	1237	1239	1265
40	%N1	66.2	74.9	76.6	78.3	80.0	81.8	83.6	85.5	87.7
	MACH	.340	.417	.434	.452	.471	.491	.513	.535	.554
	KIAS	187	185	185	185	185	185	185	185	183
	FF/ENG	1170	1098	1085	1083	1089	1092	1094	1096	1097

GEAR DOWN

Long Range Cruise 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
324	290	260	236	217	200	188	178	168	160	153
654	583	523	474	435	400	377	357	338	321	307
989	880	787	713	653	600	566	535	507	483	461
1329	1181	1054	953	871	800	754	713	676	643	614
1674	1484	1322	1194	1090	1000	943	891	844	803	766
2024	1791	1593	1436	1310	1200	1131	1069	1013	962	918
2381	2103	1865	1680	1530	1400	1320	1247	1181	1122	1070
2743	2417	2140	1924	1751	1600	1508	1424	1348	1280	1221
3113	2737	2418	2171	1972	1800	1695	1600	1514	1438	1371

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.4	0:49	2.2	0:47	1.9	0:44	1.7	0:42	1.6	0:41
400	4.9	1:36	4.5	1:31	4.0	1:25	3.7	1:20	3.5	1:17
600	7.4	2:25	6.8	2:17	6.1	2:06	5.7	1:59	5.4	1:54
800	9.8	3:14	9.1	3:03	8.1	2:48	7.6	2:38	7.2	2:31
1000	12.1	4:04	11.3	3:50	10.1	3:30	9.5	3:18	9.0	3:08
1200	14.4	4:56	13.5	4:39	12.1	4:14	11.3	3:58	10.7	3:46
1400	16.7	5:49	15.6	5:28	14.0	4:58	13.1	4:40	12.4	4:24
1600	18.9	6:43	17.7	6:18	15.9	5:44	14.9	5:22	14.1	5:03
1800	21.1	7:38	19.7	7:10	17.7	6:30	16.6	6:05	15.7	5:43

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
2	-0.3	-0.2	0.0	0.3	0.7
4	-0.7	-0.3	0.0	0.6	1.3
6	-1.0	-0.5	0.0	0.9	2.0
8	-1.3	-0.7	0.0	1.2	2.6
10	-1.7	-0.8	0.0	1.4	3.2
12	-2.0	-1.0	0.0	1.6	3.7
14	-2.4	-1.2	0.0	1.8	4.2
16	-2.7	-1.3	0.0	2.0	4.6
18	-3.0	-1.5	0.0	2.2	5.0
20	-3.4	-1.7	0.0	2.4	5.3
22	-3.7	-1.8	0.0	2.5	5.6

GEAR DOWN

Descent
VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (KG)	DISTANCE (NM)
41000	21	280	91
39000	20	270	86
37000	19	270	81
35000	19	260	77
33000	18	260	72
31000	17	250	68
29000	17	250	64
27000	16	240	60
25000	15	230	56
23000	14	230	52
21000	13	220	48
19000	13	210	44
17000	12	200	40
15000	11	190	36
10000	8	170	26
5000	6	140	16
1500	4	110	9

Allowances for a straight-in approach are included.

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
85	%N1	75.8	78.5	82.7	87.0	92.0			
	KIAS	230	230	230	230	230			
	FF/ENG	2240	2230	2220	2240	2260			
80	%N1	74.2	77.0	81.1	85.4	90.0			
	KIAS	225	225	225	225	225			
	FF/ENG	2120	2110	2100	2100	2110			
75	%N1	72.5	75.4	79.4	83.7	88.3	94.8		
	KIAS	220	220	220	220	220	220		
	FF/ENG	2000	1990	1970	1970	1970	2050		
70	%N1	70.8	73.7	77.6	81.9	86.4	91.8		
	KIAS	216	216	216	216	216	216		
	FF/ENG	1890	1870	1850	1840	1840	1870		
65	%N1	69.0	71.9	75.9	80.1	84.5	89.3		
	KIAS	211	211	211	211	211	211		
	FF/ENG	1770	1750	1730	1720	1710	1730		
60	%N1	67.1	69.8	74.0	78.0	82.5	87.1	94.3	
	KIAS	204	204	204	204	204	204	204	
	FF/ENG	1660	1630	1610	1600	1580	1590	1670	
55	%N1	65.1	67.8	71.9	75.9	80.3	84.8	90.4	
	KIAS	198	198	198	198	198	198	198	
	FF/ENG	1540	1520	1490	1480	1460	1460	1500	
50	%N1	62.8	65.6	69.6	73.7	78.0	82.4	87.1	
	KIAS	192	192	192	192	192	192	192	
	FF/ENG	1430	1400	1380	1360	1330	1330	1350	
45	%N1	60.3	63.3	67.1	71.4	75.5	79.9	84.5	91.5
	KIAS	185	185	185	185	185	185	185	185
	FF/ENG	1310	1290	1270	1250	1220	1210	1220	1270
40	%N1	57.9	60.6	64.6	68.7	72.9	77.3	81.7	86.8
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1200	1180	1160	1130	1110	1090	1100	1110

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	80	227	1700		
80	76	223	4000	2300	200
75	71	218	6300	4900	2800
70	66	213	8600	7300	5300
65	62	208	10900	9800	8000
60	57	202	13200	12300	10900
55	52	196	15600	14800	13900
50	47	190	18100	17300	16500
45	43	183	20600	19800	18900
40	38	176	23100	22300	21400

Includes APU fuel burn.

Long Range Cruise Altitude Capability
100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
75	1500		
70	4500	2500	
65	7500	5900	3400
60	10600	9200	6900
55	13300	12300	10600
50	16200	15400	14500
45	19300	18300	17500
40	22200	21400	20500

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		5	7	9	11	13	15	17	19	21	23
70	%N1	94.8									
	MACH	.389									
	KIAS	235									
	FF/ENG	3774									
65	%N1	92.6	94.3	96.9							
	MACH	.376	.389	.402							
	KIAS	228	227	226							
	FF/ENG	3477	3485	3527							
60	%N1	90.2	91.9	93.7	96.3						
	MACH	.364	.375	.388	.402						
	KIAS	220	219	218	218						
	FF/ENG	3192	3191	3198	3240						
55	%N1	87.8	89.3	91.0	92.8	95.4					
	MACH	.351	.362	.374	.387	.400					
	KIAS	212	211	210	209	209					
	FF/ENG	2924	2909	2906	2913	2951					
50	%N1	85.3	86.7	88.2	89.9	91.7	94.2	98.2			
	MACH	.338	.348	.359	.371	.384	.398	.412			
	KIAS	204	203	202	201	200	199	198			
	FF/ENG	2672	2647	2630	2626	2633	2657	2737			
45	%N1	82.7	84.0	85.4	86.9	88.6	90.4	92.7	96.6		
	MACH	.325	.334	.344	.355	.367	.380	.393	.408		
	KIAS	196	195	193	192	191	190	189	189		
	FF/ENG	2432	2400	2374	2356	2351	2352	2359	2417		
40	%N1	79.8	81.1	82.5	83.9	85.4	87.0	88.8	90.8	94.1	98.4
	MACH	.311	.320	.329	.339	.349	.361	.374	.387	.402	.418
	KIAS	188	186	184	183	182	181	180	179	179	178
	FF/ENG	2206	2166	2133	2107	2088	2076	2069	2065	2101	2201

GEAR DOWN
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
172	151	134	120	109	100	93	88	83	78	75
352	308	270	242	219	200	187	175	165	156	148
533	465	408	364	330	300	280	262	246	232	220
716	623	545	486	440	400	373	349	328	309	293
900	783	684	609	551	500	466	436	409	385	365
1086	943	823	733	661	600	559	523	490	462	438
1273	1105	964	856	772	700	652	610	572	538	510
1462	1267	1103	980	883	800	745	696	652	614	581
1653	1431	1245	1104	994	900	838	782	733	690	653
1845	1595	1386	1228	1105	1000	931	868	813	765	724

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)					
	6		10		14	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	1.3	0:27	1.1	0:26	1.0	0:26
200	2.6	0:53	2.4	0:50	2.3	0:48
300	3.9	1:18	3.7	1:15	3.6	1:11
400	5.2	1:44	4.9	1:39	4.8	1:35
500	6.5	2:10	6.1	2:04	6.0	1:58
600	7.8	2:37	7.3	2:29	7.1	2:22
700	9.1	3:03	8.5	2:55	8.3	2:46
800	10.3	3:30	9.7	3:20	9.4	3:10
900	11.6	3:58	10.9	3:46	10.5	3:35
1000	12.8	4:25	12.0	4:12	11.6	3:59

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
1	-0.2	-0.1	0.0	0.1	0.3
2	-0.3	-0.2	0.0	0.3	0.6
3	-0.5	-0.3	0.0	0.5	1.0
4	-0.6	-0.3	0.0	0.7	1.3
5	-0.8	-0.4	0.0	0.9	1.7
6	-1.0	-0.5	0.0	1.0	2.0
7	-1.1	-0.6	0.0	1.2	2.4
8	-1.3	-0.7	0.0	1.4	2.7
9	-1.5	-0.7	0.0	1.6	3.1
10	-1.6	-0.8	0.0	1.8	3.5
11	-1.8	-0.9	0.0	1.9	3.8
12	-1.9	-1.0	0.0	2.1	4.2
13	-2.1	-1.1	0.0	2.3	4.5
14	-2.3	-1.1	0.0	2.5	4.9

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
80	%N1	93.4			
	KIAS	225			
	FF/ENG	4140			
75	%N1	91.4	94.7		
	KIAS	220	220		
	FF/ENG	3870	3910		
70	%N1	89.4	92.6		
	KIAS	216	216		
	FF/ENG	3610	3640		
65	%N1	87.4	90.5	95.9	
	KIAS	211	211	211	
	FF/ENG	3360	3380	3460	
60	%N1	85.2	88.2	92.9	
	KIAS	204	204	204	
	FF/ENG	3110	3110	3150	
55	%N1	82.9	85.9	90.4	97.2
	KIAS	198	198	198	198
	FF/ENG	2860	2860	2880	3010
50	%N1	80.4	83.4	87.7	92.8
	KIAS	192	192	192	192
	FF/ENG	2630	2620	2620	2670
45	%N1	77.8	80.7	85.0	89.6
	KIAS	185	185	185	185
	FF/ENG	2400	2380	2380	2400
40	%N1	75.1	77.8	82.1	86.5
	KIAS	178	178	178	178
	FF/ENG	2180	2160	2140	2140

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

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 Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

Pitch attitude and average %N1 information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

Max Climb %N1

This table shows Max Climb %N1 for a 280/.80 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (AUTO) and anti-ice on or off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. For packs OFF or HIGH operation, apply the %N1 adjustment shown below the table.

VREF

This table contains flaps 40, 30 and 15 reference speeds for a given weight.

With autothrottles disengaged an approach speed wind correction (max 20 knots) of 1/2 steady headwind component + gust increment above steady wind is recommended. Do not apply a wind correction for tailwinds. The maximum command speed should not exceed landing flap placard speed minus 5 knots.

Advisory Information

Normal Configuration Landing Distance

The normal configuration distance tables are provided as advisory information to help determine the actual landing distance performance of the airplane for different runway surface conditions and brake configurations.

Flaps 15, 30, and 40 landing distances and adjustments are provided for dry runways as well as runways with good, medium, and poor reported braking action, which are commonly referred to as slippery runway conditions.

If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Dry runway landing performance is shown for max manual braking configuration and autobrake settings max, 3, 2, and 1. Use of autobrake setting 1 is not recommended for landings on slippery runways, and is therefore not provided for these conditions. The autobrake performance may be used to assist in the selection of the most desirable autobrake setting for a given field length. Selection of an autobrake setting results in a constant rate of deceleration. Maximum effort manual braking should achieve shorter landing distance than the max autobrake setting. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and normal approach speed for the selected landing flap at sea level, zero wind, zero slope, and two engine detent reverse thrust. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, temperature, speed, and reverse thrust. Each adjustment is independently added to the reference landing distance.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effect of max manual braking and reverse thrust.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the appropriate Recommended Brake Cooling Schedule table (Steel or Carbon Brakes) with the airplane weight and brakes on speed, adjusted for wind at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of.80M 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, TAT, and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level 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 Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

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 .80/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS may 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 (280/.76)
Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)					
		80	100	120	140	160	180
40000	**PITCH ATT**	**4.0**	**4.0**	**4.0**	**4.0**		
	V/S (FT/MIN)	2000	1400	900	400		
30000	**PITCH ATT**	**4.0**	**4.0**	**3.5**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2800	2200	1700	1600	1100	800
20000	**PITCH ATT**	**7.5**	**6.5**	**6.0**	**6.0**	**6.0**	**6.0**
	V/S (FT/MIN)	4600	3600	2900	2400	2000	1700
10000	**PITCH ATT**	**11.5**	**10.0**	**9.0**	**8.5**	**8.0**	**8.0**
	V/S (FT/MIN)	6200	4900	4000	3400	2900	2500
SEA LEVEL	**PITCH ATT**	**16.0**	**13.0**	**11.5**	**10.5**	**10.0**	**9.5**
	V/S (FT/MIN)	7500	5900	4900	4100	3500	3000

Cruise (.76/280)
Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)					
		80	100	120	140	160	180
40000	**PITCH ATT**	**1.5**	**2.0**	**3.0**	**3.5**		
	%N1	82	84	87	91		
35000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	81	82	83	85	88	91
30000	**PITCH ATT**	**0.5**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	81	81	82	83	85	87
25000	**PITCH ATT**	**0.5**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	77	78	78	80	81	83
20000	**PITCH ATT**	**0.5**	**1.0**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	73	74	75	76	77	79
15000	**PITCH ATT**	**0.5**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	70	70	71	72	73	75

Descent (.76/280)
Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)					
		80	100	120	140	160	180
40000	**PITCH ATT**	**-2.0**	**-1.0**	**0.0**	**0.5**	**1.0**	**1.5**
	V/S (FT/MIN)	-2900	-2500	-2300	-2400	-2600	-2800
30000	**PITCH ATT**	**-4.0**	**-2.5**	**-1.5**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-3400	-2800	-2400	-2200	-2000	-2000
20000	**PITCH ATT**	**-4.0**	**-2.5**	**-1.5**	**-0.5**	**0.0**	**1.0**
	V/S (FT/MIN)	-3100	-2500	-2200	-2000	-1800	-1700
10000	**PITCH ATT**	**-4.0**	**-2.5**	**-1.5**	**-0.5**	**0.0**	**1.0**
	V/S (FT/MIN	-2800	-2300	-2000	-1800	-1600	-1500
SEA LEVEL	**PITCH ATT**	**-4.5**	**-3.0**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2500	-2100	-1800	-1600	-1500	-1400

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Holding (VREF40 + 70)
Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB) 80	100	120	140	160	180
10000	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	%N1	51	55	60	64	67	70
5000	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	47	52	56	59	63	66

Terminal Area (5000 FT)
%N1 for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB) 80	100	120	140	160	180
FLAPS 1 (GEAR UP)	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**5.5**	**6.0**	**6.0**
(VREF40 + 50)	%N1	49	54	58	62	65	68
FLAPS 5 (GEAR UP)	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(VREF40 + 30)	%N1	49	54	59	63	66	69
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(VREF40 + 20)	%N1	57	63	68	72	76	79

Final Approach (1500 FT)
Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB) 80	100	120	140	160	180
FLAPS 15	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
(VREF15 + 10)	%N1	41	45	49	53	56	58
FLAPS 30	**PITCH ATT**	**0.5**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
(VREF30 + 10)	%N1	45	50	54	58	61	64
FLAPS 40	**PITCH ATT**	**-0.5**	**-0.5**	**0.0**	**0.0**	**0.0**	**0.0**
(VREF40 + 10)	%N1	50	56	60	64	68	71

Max Climb %N1

Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS OR MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.80	.80	.80
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	94.8	95.0	93.7
55	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.1	94.3	93.0
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.4	93.6	92.4
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	92.7	92.9	91.7
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.4	92.2	91.0
35	94.0	94.3	94.5	94.3	94.0	94.0	93.0	93.3	92.7	91.6
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	94.1	93.5	92.5
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.9	94.4	93.4
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.6	95.1	94.3
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.3	95.9	95.1
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	97.1	96.7	96.0
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.9	97.4	96.8
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.7	98.3	97.8
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.4	99.0	98.6
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.3	99.9	99.6
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.5
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.3	100.9	100.5
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	99.5	100.0	99.7
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	98.6	99.2	98.8
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	97.8	98.3	98.0
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	96.9	97.5	97.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	0	10	20	30	35	41
ENGINE ANTI-ICE	-0.6	-0.8	-0.9	-0.9	-0.8	-0.8
ENGINE & WING ANTI-ICE*	-1.8	-2.1	-2.5	-2.7	-3.0	-3.0

*Dual bleed sources

Go-around %N1

Based on engine bleed for packs on, engine and wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)											
°C	°F		-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
57	134	60	95.0	96.2	96.8									
52	125	55	95.9	96.7	96.6	96.8	97.5							
47	116	50	96.6	97.6	97.8	97.8	97.7	97.5	98.2	98.8				
42	108	45	97.4	98.4	98.5	98.6	98.7	98.8	98.7	98.5	98.5	99.0		
37	99	40	98.0	99.1	99.2	99.3	99.4	99.5	99.6	99.5	99.1	98.9	98.8	99.1
32	90	35	98.1	99.9	100.0	100.1	100.1	100.3	100.3	100.2	99.9	99.6	99.6	99.5
27	81	30	97.3	99.8	100.4	100.7	100.7	100.7	100.7	100.7	100.6	100.4	100.4	100.3
22	72	25	96.6	99.1	99.7	100.2	100.6	100.9	100.9	100.9	100.9	100.9	100.9	100.8
17	63	20	95.8	98.3	98.9	99.5	99.8	100.2	100.5	100.9	101.0	101.1	101.0	101.0
12	54	15	95.0	97.5	98.1	98.7	99.1	99.4	99.8	100.1	100.5	100.9	101.3	101.2
7	45	10	94.2	96.8	97.4	98.0	98.3	98.7	99.0	99.4	99.8	100.2	100.5	100.9
2	36	5	93.4	96.0	96.6	97.2	97.6	97.9	98.3	98.7	99.0	99.4	99.8	100.2
-3	27	0	92.6	95.2	95.8	96.4	96.8	97.2	97.5	97.9	98.3	98.7	99.0	99.4
-8	18	-5	91.8	94.4	95.0	95.6	96.0	96.4	96.8	97.2	97.5	97.9	98.3	98.6
-13	9	-10	91.0	93.6	94.2	94.8	95.2	95.6	96.0	96.4	96.8	97.1	97.5	97.9
-17	1	-15	90.2	92.8	93.4	94.0	94.4	94.8	95.2	95.6	96.0	96.4	96.7	97.1
-22	-8	-20	89.3	92.0	92.6	93.2	93.6	94.0	94.4	94.8	95.2	95.6	95.9	96.3
-27	-17	-25	88.5	91.1	91.8	92.4	92.8	93.2	93.6	94.0	94.4	94.8	95.1	95.5
-32	-26	-30	87.6	90.3	90.9	91.6	92.0	92.4	92.8	93.3	93.6	94.0	94.3	94.7
-37	-35	-35	86.8	89.4	90.1	90.7	91.1	91.6	92.0	92.4	92.8	93.2	93.5	93.9
-42	-44	-40	85.9	88.6	89.2	89.9	90.3	90.7	91.2	91.6	92.0	92.4	92.7	93.0
-47	-53	-45	85.0	87.7	88.4	89.0	89.4	89.9	90.3	90.8	91.2	91.5	91.9	92.2
-52	-62	-50	84.1	86.8	87.5	88.2	88.6	89.0	89.5	90.0	90.3	90.7	91.0	91.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)											
	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
PACKS OFF	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
A/C HIGH	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

VREF

WEIGHT (1000 LB)	FLAPS		
	40	30	15
180	157	165	174
170	153	160	169
160	148	156	164
150	144	151	159
140	139	146	154
130	133	141	148
120	128	135	142
110	122	129	135
100	116	123	129
90	109	116	122

Intentionally
Blank

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ADVISORY INFORMATION

Normal Configuration Landing Distances
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		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	3050	215/-165	65/85	-110	380	35	-30	65	-65	215	65	135
MAX AUTO	3980	210/-205	90/115	-145	480	20	-15	90	-90	340	0	0
AUTOBRAKE 3	5650	355/-345	150/200	-240	815	20	-20	155	-155	580	0	0
AUTOBRAKE 2	7240	505/-500	220/285	-330	1120	110	-130	205	-205	605	255	255
AUTOBRAKE 1	7950	595/-585	265/345	-385	1315	220	-235	230	-230	575	780	1060

Good Reported Braking Action

MAX MANUAL	4240	250/-245	110/145	-185	650	100	-85	105	-105	300	235	535
MAX AUTO	4690	265/-255	115/155	-190	670	95	-85	110	-110	330	255	575
AUTOBRAKE 3	5660	355/-350	150/200	-245	830	35	-25	155	-155	580	10	45
AUTOBRAKE 2	7240	505/-500	220/285	-330	1120	110	-125	205	-205	605	255	255

Medium Reported Braking Action

MAX MANUAL	5810	395/-380	175/235	-295	1080	255	-205	155	-155	400	655	1615
MAX AUTO	6100	400/-385	175/240	-300	1085	255	-205	155	-155	405	665	1640
AUTOBRAKE 3	6260	415/-395	180/245	-310	1120	190	-130	170	-170	580	445	1390
AUTOBRAKE 2	7400	520/-510	225/295	-360	1265	195	-185	210	-210	605	380	795

Poor Reported Braking Action

MAX MANUAL	7590	565/-540	250/350	-450	1705	620	-410	205	-215	485	1415	3880
MAX AUTO	7900	565/-540	255/350	-450	1705	620	-410	205	-215	485	1415	3885
AUTOBRAKE 3	7900	565/-535	255/350	-450	1710	615	-385	205	-215	535	1415	3890
AUTOBRAKE 2	8220	600/-575	265/365	-470	1765	560	-370	225	-230	605	1145	3405

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 180 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 30

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	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2920	180/-150	60/80	-105	370	35	-30	60	-60	215	55	120
MAX AUTO	3720	190/-185	80/105	-135	460	15	-15	85	-85	320	0	0
AUTOBRAKE 3	5220	320/-310	135/180	-230	775	20	-20	140	-140	545	0	0
AUTOBRAKE 2	6670	450/-445	195/255	-315	1070	95	-115	185	-185	565	210	210
AUTOBRAKE 1	7320	525/-520	235/305	-365	1255	195	-220	210	-210	525	635	915

Good Reported Braking Action

MAX MANUAL	4040	235/-230	105/135	-180	635	95	-85	95	-100	305	215	485
MAX AUTO	4450	245/-240	105/145	-185	655	95	-80	100	-100	320	230	520
AUTOBRAKE 3	5230	320/-315	135/180	-230	790	35	-25	140	-140	545	10	45
AUTOBRAKE 2	6670	450/-445	195/255	-315	1070	95	-115	185	-185	565	210	210

Medium Reported Braking Action

MAX MANUAL	5480	365/-350	160/220	-290	1050	245	-195	145	-145	395	575	1400
MAX AUTO	5730	365/-355	165/220	-290	1055	245	-195	145	-145	400	585	1420
AUTOBRAKE 3	5850	375/-360	165/225	-300	1080	190	-130	155	-155	545	425	1260
AUTOBRAKE 2	6830	465/-460	200/265	-340	1210	180	-175	190	-190	565	335	705

Poor Reported Braking Action

MAX MANUAL	7080	515/-490	230/315	-430	1655	585	-385	190	-195	465	1220	3270
MAX AUTO	7370	515/-490	230/315	-430	1660	585	-385	190	-195	465	1220	3275
AUTOBRAKE 3	7370	515/-490	230/320	-435	1660	585	-370	190	-195	495	1225	3280
AUTOBRAKE 2	7620	545/-520	240/330	-450	1710	535	-350	205	-210	565	1010	2890

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).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

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	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	2780	170/-135	55/75	-105	355	30	-30	55	-55	215	50	105
MAX AUTO	3470	175/-170	75/95	-130	440	15	-15	75	-75	305	0	0
AUTOBRAKE 3	4810	295/-285	120/160	-215	740	20	-20	125	-125	520	0	0
AUTOBRAKE 2	6170	420/-410	175/230	-300	1025	75	-90	170	-170	565	110	110
AUTOBRAKE 1	6840	490/-480	210/275	-350	1215	170	-195	190	-190	525	510	680

Good Reported Braking Action

MAX MANUAL	3860	225/-220	95/130	-175	625	95	-80	90	-90	310	195	440
MAX AUTO	4220	235/-225	100/135	-180	640	95	-80	95	-95	320	210	465
AUTOBRAKE 3	4820	295/-285	120/160	-220	755	35	-25	125	-125	520	15	50
AUTOBRAKE 2	6170	420/-410	175/230	-300	1025	75	-90	170	-170	565	110	110

Medium Reported Braking Action

MAX MANUAL	5210	345/-330	150/205	-280	1030	240	-190	135	-135	400	520	1255
MAX AUTO	5420	350/-335	150/205	-280	1035	240	-190	135	-135	400	525	1270
AUTOBRAKE 3	5500	355/-335	150/205	-290	1050	200	-135	140	-145	520	450	1200
AUTOBRAKE 2	6330	430/-420	180/240	-330	1170	160	-150	170	-175	565	240	600

Poor Reported Braking Action

MAX MANUAL	6720	485/-465	215/295	-420	1625	570	-375	180	-185	465	1100	2910
MAX AUTO	6990	490/-465	215/295	-420	1625	570	-375	180	-185	465	1105	2910
AUTOBRAKE 3	6990	490/-465	215/295	-420	1625	570	-370	180	-185	470	1105	2915
AUTOBRAKE 2	7150	510/-485	220/305	-435	1665	515	-330	190	-195	565	885	2610

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 180 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ: PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	3910	500/-210	150/150	-140	670	70	-60	350
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	4910	280/-280	130/180	-240	890	150	-130	380
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	3320	220/-170	80/100	-120	420	50	-40	290
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	3200	200/-160	70/100	-120	410	50	-40	300
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	3070	180/-150	70/90	-110	400	50	-40	300
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	3450	170/-180	80/110	-130	470	50	-40	250
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	4620	240/-250	110/150	-180	610	110	-100	480
LEADING EDGE FLAPS TRANSIT	VREF15+15	3430	230/-180	80/100	-120	420	40	-40	230
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	3080	220/-160	70/90	-110	400	40	-30	220
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	2940	180/-140	60/90	-110	390	40	-30	220

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	3050	210/-160	70/90	-110	390	40	-30	210
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	3050	210/-160	70/90	-110	390	40	-30	210
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	2920	180/-150	60/80	-100	370	40	-30	220
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	3050	210/-160	70/90	-110	390	40	-30	210
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	3380	250/-180	80/100	-120	430	40	-30	230
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	2920	180/-150	60/80	-100	370	40	-30	220
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	3050	210/-160	70/90	-110	390	40	-30	210
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	3380	250/-180	80/100	-120	430	40	-30	230
TRAILING EDGE FLAPS UP	VREF40+40	3560	330/-200	110/110	-120	550	50	-40	240

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	5390	270/-280	150/200	-210	740	110	-100	290
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	5460	330/-330	150/210	-280	1080	220	-180	420
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	4810	290/-290	140/180	-200	730	130	-110	420
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	4570	270/-270	130/170	-200	720	130	-110	420
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	4340	250/-260	120/160	-190	700	130	-110	430
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	4370	250/-250	120/160	-190	680	110	-90	330
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	5710	320/-330	150/210	-240	820	190	-160	570
LEADING EDGE FLAPS TRANSIT	VREF15+15	4780	270/-270	130/180	-200	710	110	-100	320
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	4380	250/-250	120/150	-190	690	110	-90	320
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	4160	230/-240	110/140	-180	680	110	-90	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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT) REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	4200	240/-240	110/150	-180	660	100	-80	300
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	4200	240/-240	110/150	-180	660	100	-80	300
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	4040	240/-230	110/140	-180	640	100	-80	310
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	4200	240/-240	110/150	-180	660	100	-80	300
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	4660	240/-250	130/170	-190	690	100	-90	290
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	4040	240/-230	110/140	-180	640	100	-80	310
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	4200	240/-240	110/150	-180	660	100	-80	300
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	4660	240/-250	130/170	-190	690	100	-90	290
TRAILING EDGE FLAPS UP	VREF40+40	4900	250/-260	130/180	-190	710	110	-90	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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)							
		REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	7570	440/-460	250/330	-330	1230	290	-240	400
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	6880	460/-450	210/290	-420	1690	490	-350	480
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	6550	460/-450	210/300	-320	1200	310	-250	540
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	6150	420/-410	200/270	-310	1160	300	-240	520
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	5800	390/-380	180/250	-300	1140	290	-230	520
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	5960	400/-390	190/250	-300	1120	260	-210	430
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	7850	500/-500	240/330	-370	1300	400	-340	690
LEADING EDGE FLAPS TRANSIT	VREF15+15	6530	420/-420	210/280	-310	1160	270	-220	420
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	6240	410/-410	190/250	-320	1190	300	-240	450
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	5840	370/-380	170/230	-310	1150	280	-230	440

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ: PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	5720	370/-370	170/240	-290	1090	230	-190	390
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	5720	370/-370	170/240	-290	1090	230	-190	390
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	5480	370/-350	160/220	-290	1050	250	-190	400
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	5720	370/-370	170/240	-290	1090	230	-190	390
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	6420	390/-390	200/270	-310	1150	260	-210	400
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	5480	370/-350	160/220	-290	1050	250	-190	400
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	5720	370/-370	170/240	-290	1090	230	-190	390
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	6420	390/-390	200/270	-310	1150	260	-210	400
TRAILING EDGE FLAPS UP	VREF40+40	6830	400/-410	220/285	-320	1180	270	-220	390

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENT (FT)								
		REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
ALL FLAPS UP	VREF40+55	9990	660/-660	360/490	-500	1940	650	-490	500
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	9080	670/-640	290/430	-690	3140	1690	-800	530
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	8450	650/-620	300/425	-480	1870	670	-490	630
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	7860	590/-560	270/385	-460	1820	630	-460	600
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	7380	540/-520	250/350	-450	1780	610	-440	580
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	7710	570/-540	260/370	-450	1780	570	-420	510
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	10050	720/-690	340/480	-540	1980	800	-600	770
LEADING EDGE FLAPS TRANSIT	VREF15+15	8440	600/-590	290/410	-460	1830	590	-440	500
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	8500	610/-600	280/380	-500	1950	740	-530	560
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	7850	550/-540	250/350	-480	1880	690	-490	530

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (FT): REFERENCE DISTANCE FOR 130000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABOVE/ BELOW 130000 LB	ALT ADJ PER 1000 FT STD/HIGH*	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	APP SPD ADJ: PER 10 KTS ABOVE VREF
STABILIZER TRIM INOPERATIVE	VREF15	7400	540/-510	250/350	-430	1730	530	-390	470
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	7400	540/-510	250/350	-430	1730	530	-390	470
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	7080	520/-490	230/320	-430	1660	590	-380	470
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	7400	540/-510	250/350	-430	1730	530	-390	470
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	8380	570/-560	290/400	-460	1820	580	-430	480
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	7080	520/-490	230/320	-430	1660	590	-380	470
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	7400	540/-510	250/350	-430	1730	530	-390	470
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	8380	570/-560	290/400	-460	1820	580	-430	480
TRAILING EDGE FLAPS UP	VREF40+40	8980	600/-600	310/430	-480	1860	610	-450	480

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)*																	
		80			100			120			140			160			180		
WEIGHT (1000 LB)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
180	0	15.3	17.3	19.6	22.8	25.7	29.4	31.4	35.6	40.9	41.1	46.8	54.0	51.7	59.0	68.5	61.7	70.6	82.6
	10	15.8	17.8	20.3	23.5	26.6	30.3	32.5	36.8	42.2	42.5	48.3	55.8	53.4	60.9	70.8	63.8	73.0	85.3
	15	16.1	18.1	20.6	23.9	27.0	30.8	32.9	37.3	42.8	43.1	49.0	56.6	54.2	61.8	71.8	64.7	74.1	86.5
	20	16.3	18.4	20.9	24.2	27.3	31.2	33.4	37.8	43.4	43.7	49.7	57.3	54.9	62.6	72.7	65.6	75.0	87.6
	30	16.7	18.8	21.4	24.8	28.0	32.0	34.2	38.8	44.5	44.8	50.9	58.8	56.3	64.2	74.6	67.2	76.9	89.8
	40	16.9	19.0	21.6	25.1	28.4	32.4	34.7	39.4	45.2	45.5	51.8	59.9	57.3	65.5	76.2	68.6	78.6	92.0
	50	16.9	19.0	21.7	25.2	28.5	32.6	34.9	39.7	45.7	46.0	52.4	60.8	58.2	66.6	77.8	69.8	80.3	94.5
160	0	14.1	15.8	18.0	20.7	23.4	26.7	28.5	32.3	37.0	37.2	42.3	48.7	46.7	53.2	61.6	56.4	64.5	75.1
	10	14.5	16.4	18.6	21.4	24.2	27.6	29.5	33.4	38.2	38.5	43.7	50.3	48.3	55.0	63.7	58.3	66.6	77.6
	15	14.7	16.6	18.9	21.7	24.6	28.0	29.9	33.8	38.8	39.0	44.3	51.0	49.0	55.8	64.6	59.2	67.6	78.7
	20	14.9	16.8	19.1	22.0	24.9	28.4	30.3	34.3	39.3	39.6	44.9	51.7	49.6	56.5	65.4	59.9	68.5	79.7
	30	15.3	17.3	19.6	22.6	25.5	29.1	31.1	35.2	40.3	40.6	46.0	53.0	50.9	57.9	67.1	61.5	70.2	81.7
	40	15.5	17.4	19.8	22.9	25.8	29.5	31.5	35.7	40.9	41.2	46.8	53.9	51.7	59.0	68.4	62.6	71.6	83.6
	50	15.5	17.4	19.8	22.9	25.9	29.6	31.6	35.9	41.2	41.5	47.3	54.7	52.4	59.9	69.7	63.6	73.1	85.6
140	0	12.8	14.4	16.4	18.7	21.1	24.1	25.6	28.9	33.1	33.2	37.7	43.3	41.6	47.3	54.6	50.6	57.7	67.0
	10	13.2	14.9	16.9	19.3	21.8	24.9	26.4	29.9	34.2	34.3	38.9	44.7	43.0	48.9	56.4	52.3	59.6	69.2
	15	13.4	15.1	17.2	19.6	22.2	25.2	26.8	30.3	34.7	34.8	39.5	45.4	43.6	49.6	57.2	53.0	60.5	70.2
	20	13.6	15.3	17.4	19.9	22.5	25.6	27.2	30.7	35.1	35.3	40.0	46.0	44.2	50.2	58.0	53.7	61.3	71.1
	30	14.0	15.7	17.8	20.4	23.0	26.2	27.9	31.5	36.0	36.2	41.0	47.1	45.3	51.5	59.5	55.1	62.8	72.9
	40	14.1	15.9	18.0	20.6	23.3	26.5	28.2	31.9	36.5	36.7	41.6	47.9	46.0	52.4	60.6	56.1	64.0	74.4
	50	14.1	15.9	18.0	20.7	23.4	26.6	28.3	32.1	36.8	37.0	42.0	48.4	46.5	53.0	61.5	56.9	65.1	76.0
120	0	11.6	13.0	14.8	16.7	18.9	21.4	22.6	25.6	29.2	29.2	33.1	37.9	36.4	41.3	47.5	44.0	50.1	58.0
	10	11.9	13.4	15.2	17.3	19.5	22.2	23.4	26.4	30.1	30.2	34.2	39.1	37.6	42.6	49.1	45.5	51.8	59.9
	15	12.1	13.6	15.5	17.5	19.8	22.5	23.7	26.8	30.6	30.6	34.7	39.7	38.1	43.3	49.8	46.2	52.5	60.7
	20	12.3	13.8	15.7	17.8	20.0	22.8	24.0	27.2	31.0	31.0	35.1	40.3	38.6	43.8	50.5	46.8	53.2	61.5
	30	12.6	14.2	16.1	18.2	20.6	23.4	24.7	27.9	31.8	31.8	36.0	41.3	39.6	45.0	51.7	48.0	54.6	63.1
	40	12.7	14.3	16.3	18.4	20.8	23.6	24.9	28.2	32.2	32.2	36.5	41.9	40.2	45.7	52.6	48.8	55.5	64.3
	50	12.7	14.3	16.2	18.4	20.8	23.7	25.0	28.3	32.4	32.4	36.8	42.3	40.5	46.1	53.3	49.3	56.3	65.4
100	0	10.3	11.6	13.2	14.7	16.6	18.8	19.7	22.2	25.3	25.2	28.5	32.6	31.1	35.3	40.5	37.5	42.6	49.1
	10	10.7	12.0	13.6	15.2	17.1	19.5	20.3	23.0	26.2	26.0	29.4	33.6	32.2	36.5	41.8	38.8	44.0	50.7
	15	10.8	12.2	13.8	15.4	17.4	19.7	20.6	23.3	26.5	26.4	29.9	34.1	32.7	37.0	42.5	39.3	44.7	51.4
	20	11.0	12.4	14.0	15.6	17.6	20.0	20.9	23.6	26.9	26.8	30.3	34.6	33.1	37.5	43.0	39.9	45.3	52.1
	30	11.3	12.7	14.4	16.0	18.1	20.5	21.5	24.2	27.6	27.5	31.0	35.5	33.9	38.5	44.1	40.9	46.4	53.4
	40	11.4	12.8	14.5	16.2	18.3	20.8	21.7	24.5	27.9	27.8	31.4	36.0	34.4	39.0	44.8	41.5	47.1	54.4
	50	11.4	12.8	14.5	16.2	18.3	20.8	21.7	24.6	28.0	27.9	31.6	36.2	34.6	39.3	45.3	41.8	47.7	55.1
90	0	9.7	11.0	12.4	13.7	15.5	17.5	18.2	20.5	23.4	23.2	26.2	29.9	28.6	32.3	37.0	34.3	38.9	44.7
	10	10.1	11.3	12.8	14.2	16.0	18.1	18.8	21.2	24.2	23.9	27.1	30.9	29.5	33.4	38.3	35.4	40.2	46.2
	15	10.2	11.5	13.0	14.4	16.2	18.4	19.1	21.5	24.5	24.3	27.5	31.4	29.9	33.9	38.8	35.9	40.8	46.8
	20	10.4	11.7	13.2	14.6	16.4	18.6	19.3	21.8	24.8	24.6	27.8	31.8	30.3	34.3	39.3	36.4	41.3	47.5
	30	10.6	12.0	13.5	15.0	16.8	19.1	19.8	22.4	25.5	25.3	28.6	32.6	31.1	35.2	40.3	37.3	42.4	48.7
	40	10.7	12.1	13.7	15.1	17.0	19.3	20.1	22.6	25.8	25.6	28.9	33.0	31.5	35.7	40.9	37.9	43.0	49.5
	50	10.7	12.0	13.7	15.1	17.0	19.3	20.1	22.7	25.9	25.6	29.0	33.2	31.7	35.9	41.3	38.2	43.4	50.1

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.**

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	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.8	16.3	25.3	34.7	44.7	55.0	65.7	76.6	87.9
	MAX AUTO	7.5	15.4	23.6	32.4	41.8	51.8	62.5	74.1	86.5
	AUTOBRAKE 3	7.3	14.7	22.3	30.2	38.6	47.6	57.4	68.1	80.0
	AUTOBRAKE 2	7.0	13.8	20.5	27.4	34.8	42.7	51.5	61.3	72.4
	AUTOBRAKE 1	6.7	13.1	19.2	25.3	31.8	38.8	46.6	55.4	65.5

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.0	14.6	22.8	31.4	40.5	49.9	59.7	69.8	80.0
	MAX AUTO	5.8	12.3	19.5	27.2	35.6	44.5	53.9	63.7	74.1
	AUTOBRAKE 3	4.3	9.2	14.7	20.7	27.2	34.4	42.0	50.2	59.0
	AUTOBRAKE 2	2.5	5.6	9.1	13.1	17.8	23.0	28.8	35.2	42.3
	AUTOBRAKE 1	1.8	3.8	6.1	8.8	11.9	15.5	19.6	24.4	29.8

Cooling Time (Minutes) - Category C Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category N Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

Intentionally
Blank

ENGINE INOP

Initial Max Continuous %N1

Based on .80M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.9	96.6	96.4	96.2	96.0	95.5	95.1	94.8	94.2
15	97.5	97.2	96.9	96.8	96.7	96.3	95.8	95.6	95.0
10	98.1	97.9	97.5	97.4	97.4	97.0	96.6	96.4	95.9
5	98.1	98.6	98.4	98.1	98.1	97.8	97.4	97.2	96.7
0	97.3	98.5	99.2	99.0	98.9	98.6	98.2	98.0	97.7
-5	96.5	97.8	98.9	99.8	99.7	99.3	99.0	98.8	98.5
-10	95.8	97.0	98.2	99.4	100.5	100.2	99.9	99.7	99.5
-15	95.0	96.2	97.4	98.6	99.9	101.0	100.8	100.6	100.4
-20	94.2	95.4	96.6	97.8	99.1	100.2	100.8	100.6	100.4
-25	93.4	94.6	95.8	97.0	98.3	99.4	100.0	99.8	99.6
-30	92.6	93.8	95.0	96.2	97.5	98.6	99.1	98.9	98.7
-35	91.7	93.0	94.1	95.3	96.6	97.7	98.3	98.1	97.9
-40	90.9	92.2	93.3	94.5	95.8	96.9	97.4	97.2	97.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE	-4.2	-4.4	-4.5	-4.7	-5.0	-4.8	-4.8	-4.8	-4.8

ENGINE INOP

Max Continuous %N1

37000 FT to 29000 FT Pressure Altitudes

37000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.51	96.6	97.6	98.5	99.4	100.2	99.6	98.8	97.6	96.3	94.7	93.2	91.8
200	.63	96.0	96.9	97.8	98.7	99.6	100.4	100.1	99.3	98.4	97.5	96.3	95.2
240	.74	95.1	96.0	96.8	97.7	98.6	99.4	100.3	100.7	100.0	99.2	98.4	97.5
280	.86	94.3	95.2	96.1	97.0	97.8	98.7	99.5	100.4	101.2	100.9	100.0	99.1
35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	96.5	97.4	98.3	99.2	100.1	99.8	99.0	98.0	96.8	95.4	94.0	92.7
200	.60	96.1	97.0	97.9	98.8	99.7	100.6	100.5	99.6	98.6	97.6	96.5	95.4
240	.71	95.0	95.9	96.8	97.7	98.6	99.4	100.3	100.8	100.2	99.5	98.6	97.7
280	.82	93.8	94.6	95.5	96.4	97.3	98.1	98.9	99.8	100.6	100.3	99.5	98.8
33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	97.4	98.3	99.2	100.0	100.8	100.0	99.1	97.9	96.7	95.3	93.9	92.6
200	.58	97.0	97.9	98.8	99.7	100.6	101.4	100.6	99.6	98.6	97.5	96.3	95.1
240	.68	95.9	96.8	97.7	98.5	99.4	100.2	101.1	100.9	100.2	99.4	98.4	97.4
280	.79	94.3	95.1	96.0	96.8	97.7	98.5	99.3	100.2	100.5	99.7	98.9	98.1
320	.89	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	100.3	101.1	100.7	99.8
31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	97.3	98.2	99.1	100.0	100.9	101.1	100.2	99.2	98.0	96.6	95.2	93.9
200	.55	97.1	98.0	98.9	99.7	100.6	101.5	101.6	100.7	99.7	98.6	97.4	96.2
240	.66	95.6	96.5	97.4	98.3	99.1	100.0	100.8	101.3	100.5	99.8	98.8	97.8
280	.76	93.8	94.7	95.5	96.4	97.2	98.0	98.8	99.7	100.5	99.8	98.9	98.0
320	.85	92.4	93.2	94.1	94.9	95.7	96.5	97.4	98.2	98.9	99.7	99.9	99.1
29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	98.1	99.0	99.9	100.8	101.6	101.2	100.2	99.1	97.9	96.4	95.1	93.8
200	.53	97.5	98.4	99.3	100.2	101.0	101.9	101.3	100.4	99.3	98.2	96.9	95.8
240	.63	96.3	97.1	98.0	98.9	99.7	100.5	101.4	101.1	100.2	99.2	98.3	97.2
280	.73	94.2	95.0	95.9	96.7	97.5	98.3	99.1	99.9	100.1	99.1	98.2	97.5
320	.82	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	98.5	97.6
360	.91	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	100.0	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.1	-4.3	-4.5	-4.7	-4.7

ENGINE INOP

Max Continuous %N1
27000 FT to 20000 FT Pressure Altitudes

27000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	98.0	98.8	99.7	100.6	101.4	102.2	101.2	100.2	99.0	97.8	96.4	95.1
200	.51	96.9	97.8	98.7	99.6	100.4	101.2	101.8	100.8	99.9	98.8	97.6	96.4
240	.60	95.6	96.5	97.4	98.2	99.1	99.9	100.7	101.3	100.4	99.4	98.5	97.5
280	.70	93.6	94.4	95.3	96.1	96.9	97.7	98.5	99.3	100.1	99.4	98.4	97.6
320	.79	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	98.6	97.8
360	.88	91.0	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	98.1	98.8	99.4

25000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.8	99.7	100.5	101.4	102.2	102.4	101.4	100.3	99.1	97.7	96.5	95.2
200	.49	97.5	98.3	99.2	100.0	100.9	101.7	101.5	100.6	99.5	98.4	97.3	96.2
240	.58	95.7	96.5	97.4	98.2	99.0	99.9	100.7	100.5	99.5	98.6	97.6	96.7
280	.67	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.5	99.5	98.6	97.6	96.9
320	.76	91.7	92.6	93.4	94.2	95.0	95.8	96.5	97.3	98.0	98.6	97.8	97.2
360	.85	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.6	98.4	98.2

24000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	98.6	99.5	100.4	101.2	102.1	102.9	101.9	100.8	99.6	98.4	97.1	95.8
200	.48	97.5	98.4	99.2	100.1	100.9	101.8	102.2	101.1	100.1	99.0	97.8	96.7
240	.57	95.9	96.8	97.6	98.5	99.3	100.1	100.9	101.2	100.2	99.2	98.2	97.3
280	.66	94.2	95.1	95.9	96.7	97.5	98.3	99.1	99.9	100.4	99.4	98.3	97.5
320	.75	92.1	93.0	93.8	94.6	95.4	96.2	96.9	97.7	98.5	99.2	98.6	97.8
360	.83	90.6	91.4	92.2	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.6

22000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	99.1	100.0	100.9	101.7	102.5	102.8	101.8	100.7	99.5	98.2	97.0	95.8
200	.46	98.4	99.3	100.1	101.0	101.8	102.6	102.3	101.2	100.0	98.9	97.8	96.8
240	.55	97.2	98.1	98.9	99.7	100.5	101.3	102.1	101.6	100.5	99.4	98.5	97.5
280	.63	95.7	96.5	97.4	98.2	99.0	99.8	100.6	101.3	101.0	99.8	98.9	98.1
320	.72	93.9	94.7	95.5	96.3	97.1	97.9	98.6	99.4	100.1	100.2	99.3	98.6
360	.80	92.2	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	99.2	99.7	99.1

20000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	98.7	99.5	100.4	101.2	102.0	102.8	102.5	101.5	100.4	99.2	98.0	96.8
200	.44	98.3	99.2	100.0	100.9	101.7	102.5	103.3	102.3	101.1	100.0	98.9	97.8
240	.53	97.5	98.4	99.2	100.0	100.8	101.7	102.5	103.1	101.8	100.5	99.5	98.6
280	.61	96.2	97.0	97.8	98.7	99.5	100.3	101.1	101.8	102.5	101.3	100.1	99.3
320	.69	94.7	95.5	96.3	97.1	97.9	98.7	99.5	100.2	101.0	101.7	100.9	99.9
360	.77	93.0	93.8	94.6	95.4	96.2	97.0	97.7	98.5	99.2	100.0	100.7	100.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	20	22	24	25	27
ENGINE ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-3.6	-3.8	-3.8	-3.9	-4.0

ENGINE INOP

Max Continuous %N1

18000 FT to 12000 FT Pressure Altitudes

18000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.34	98.5	99.3	100.2	101.0	101.8	102.6	101.6	100.3	99.2	98.1	97.0	95.9
200	.42	98.7	99.6	100.4	101.2	102.0	102.8	103.1	101.7	100.4	99.3	98.3	97.3
240	.51	97.8	98.7	99.5	100.3	101.1	101.9	102.7	102.5	101.1	99.9	99.0	98.1
280	.59	96.3	97.1	97.9	98.7	99.5	100.3	101.0	101.8	101.6	100.5	99.6	98.8
320	.67	94.8	95.6	96.4	97.2	97.9	98.7	99.5	100.2	101.0	100.9	100.0	99.2
360	.75	93.0	93.8	94.6	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.2	99.6
16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	97.1	98.0	98.8	99.6	100.4	101.2	101.6	100.3	99.1	98.1	97.1	96.1
200	.41	98.0	98.8	99.6	100.4	101.2	102.0	102.8	102.5	101.3	100.2	99.3	98.3
240	.49	97.1	97.9	98.7	99.5	100.3	101.1	101.9	102.7	101.8	100.5	99.6	98.7
280	.57	95.6	96.4	97.2	98.0	98.8	99.6	100.3	101.1	101.8	100.9	99.8	99.0
320	.64	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.2	99.4
360	.72	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.4	99.2	99.9	99.6
14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	96.6	97.4	98.2	99.0	99.8	100.6	100.4	99.1	98.0	97.1	96.2	95.3
200	.39	97.1	97.9	98.7	99.5	100.3	101.1	101.8	101.5	101.0	100.1	99.3	98.4
240	.47	96.6	97.4	98.2	99.0	99.8	100.6	101.3	101.8	101.1	100.3	99.5	98.7
280	.54	95.5	96.3	97.1	97.8	98.6	99.4	100.1	100.9	101.0	100.1	99.2	98.5
320	.62	94.1	94.9	95.7	96.5	97.2	98.0	98.7	99.5	100.2	100.3	99.5	98.8
360	.69	92.2	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.6	99.0
12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	96.3	97.0	97.8	98.6	99.4	100.1	99.3	98.1	97.1	96.3	95.4	94.5
200	.38	97.1	97.9	98.7	99.5	100.3	101.0	101.5	100.8	99.8	99.0	98.2	97.3
240	.45	96.5	97.3	98.0	98.8	99.6	100.3	101.1	101.0	100.1	99.4	98.6	97.9
280	.52	95.5	96.3	97.0	97.8	98.6	99.3	100.0	100.8	100.3	99.4	98.6	98.0
320	.60	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	99.7	98.9	98.2
360	.67	92.3	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	99.4	99.1	98.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	12	14	16	18
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-3.2	-3.4	-3.4	-3.5

ENGINE INOP

Max Continuous %N1
10000 FT to 1000 FT Pressure Altitudes

10000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.29	95.2	96.0	96.8	97.6	98.3	99.1	99.8	98.6	97.4	96.6	95.8	94.9
200	.36	96.0	96.7	97.5	98.3	99.0	99.8	100.5	100.5	99.4	98.5	97.8	97.0
240	.43	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.1	99.2	98.4	97.7
280	.51	94.5	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.4	99.5	98.7	98.0
320	.58	93.0	93.9	94.7	95.5	96.2	97.0	97.8	98.6	99.3	99.7	99.0	98.2
360	.65	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	99.1	98.5
5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	94.9	95.7	96.4	97.2	98.0	98.8	99.2	98.3	97.4	96.6	95.9	95.1
200	.33	94.7	95.5	96.3	97.1	97.8	98.6	99.4	98.9	98.0	97.3	96.6	95.8
240	.40	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.5	98.7	97.9	97.2	96.5
280	.46	93.3	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	98.2	97.5	96.8
320	.53	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	98.7	98.4	97.7	97.1
360	.59	91.5	92.3	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.0	97.3
3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	94.8	95.6	96.4	97.2	98.0	98.7	98.8	97.9	97.1	96.4	95.6	94.8
200	.32	94.5	95.3	96.1	96.9	97.6	98.4	99.2	98.3	97.5	96.8	96.1	95.3
240	.38	94.1	94.9	95.6	96.4	97.2	98.0	98.7	98.8	98.0	97.2	96.6	95.9
280	.45	93.2	94.0	94.8	95.6	96.4	97.2	97.9	98.7	98.3	97.5	96.9	96.2
320	.51	92.5	93.3	94.1	94.9	95.7	96.4	97.2	98.0	98.5	97.8	97.1	96.5
360	.57	91.6	92.4	93.2	94.0	94.7	95.5	96.3	97.1	97.8	98.1	97.4	96.8
1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	93.9	94.7	95.4	96.2	97.0	97.8	98.5	98.2	97.4	96.7	96.0	95.2
200	.31	93.5	94.3	95.1	95.9	96.7	97.4	98.2	98.5	97.8	97.0	96.3	95.6
240	.37	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	98.1	97.3	96.6	95.9
280	.43	92.3	93.2	93.9	94.7	95.5	96.3	97.1	97.8	98.3	97.6	96.9	96.2
320	.49	91.6	92.4	93.2	94.0	94.8	95.6	96.3	97.1	97.9	97.9	97.2	96.5
360	.55	90.7	91.5	92.3	93.1	93.9	94.7	95.4	96.2	96.9	97.7	97.3	96.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-2.7	-3.2

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 LB)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	183	272	18100	16900	15500
180	173	265	19700	18400	17100
170	164	258	21000	20000	18700
160	154	251	22300	21400	20300
150	145	243	23700	22800	21800
140	134	235	25300	24300	23400
130	125	227	27300	26300	25100
120	115	218	29300	28400	27200
110	106	209	31200	30400	29400
100	96	199	33100	32400	31500
90	87	189	35200	34500	33600

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
137	128	120	112	106	100	95	90	86	82	79
275	256	239	224	212	200	190	180	172	164	157
413	384	359	337	317	300	284	270	258	246	236
550	512	478	449	423	400	379	361	344	328	314
688	640	598	561	529	500	474	451	430	410	393
825	768	718	674	635	600	569	541	516	492	471
963	896	837	786	740	700	664	631	601	574	550
1101	1024	957	898	846	800	759	721	687	657	628
1238	1152	1077	1010	952	900	853	811	773	739	707
1376	1280	1196	1123	1058	1000	948	901	859	821	785
1514	1408	1316	1235	1164	1100	1043	992	945	903	864
1652	1536	1436	1348	1269	1200	1138	1082	1031	984	942
1790	1665	1556	1460	1375	1300	1233	1172	1117	1066	1021
1928	1793	1675	1572	1481	1400	1327	1262	1202	1148	1099
2067	1921	1795	1685	1587	1500	1422	1352	1288	1230	1177
2205	2050	1915	1797	1693	1600	1517	1442	1374	1312	1256
2343	2178	2035	1910	1799	1700	1612	1532	1460	1394	1334
2482	2307	2155	2022	1905	1800	1706	1622	1545	1476	1412

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 LB)											TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 LB)											
	90	100	110	120	130	140	150	160	170	180	190	
100	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.1	1.2	0:16
200	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.5	2.7	2.8	0:33
300	2.7	2.9	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	0:49
400	3.6	3.9	4.2	4.5	4.7	5.0	5.3	5.6	5.9	6.2	6.4	1:05
500	4.6	4.9	5.3	5.6	6.0	6.3	6.7	7.1	7.5	7.9	8.2	1:22
600	5.5	5.9	6.4	6.8	7.2	7.7	8.1	8.6	9.0	9.6	10.0	1:38
700	6.4	6.9	7.4	7.9	8.5	9.0	9.5	10.1	10.6	11.2	11.7	1:55
800	7.3	7.9	8.5	9.1	9.7	10.3	10.9	11.6	12.1	12.8	13.4	2:11
900	8.1	8.8	9.5	10.2	10.9	11.6	12.3	13.0	13.7	14.4	15.1	2:28
1000	9.0	9.8	10.6	11.3	12.1	12.9	13.6	14.5	15.2	16.0	16.8	2:44
1100	9.9	10.7	11.6	12.4	13.3	14.1	15.0	15.9	16.7	17.6	18.4	3:01
1200	10.7	11.7	12.6	13.5	14.4	15.4	16.3	17.3	18.2	19.2	20.1	3:17
1300	11.6	12.6	13.6	14.6	15.6	16.6	17.6	18.7	19.7	20.7	21.7	3:34
1400	12.4	13.5	14.6	15.7	16.8	17.8	19.0	20.1	21.1	22.3	23.4	3:50
1500	13.2	14.4	15.6	16.8	17.9	19.1	20.3	21.5	22.6	23.8	25.0	4:07
1600	14.1	15.3	16.6	17.8	19.0	20.3	21.6	22.8	24.0	25.4	26.6	4:23
1700	14.9	16.2	17.6	18.9	20.2	21.5	22.8	24.2	25.5	26.9	28.2	4:40
1800	15.7	17.1	18.5	19.9	21.3	22.7	24.1	25.5	26.9	28.4	29.8	4:57

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at Long Rang Cruise speed.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	14700	11800	9400
180	16500	14500	11600
170	18300	16500	13900
160	20200	18500	16000
150	21500	20400	18300
140	23000	21800	20400
130	24500	23400	22000
120	26600	25100	23700
110	29100	27800	25900
100	31300	30300	29000
90	33400	32600	31400

With engine anti-ice on, decrease altitude capability by 1200 ft.
With engine and wing anti-ice on, decrease altitude capability by 5500 ft .

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT) 10	15	17	19	21	25	27	29	31
190	%N1	92.2	95.9							
	MACH	.564	.602							
	KIAS	313	305							
	FF/ENG	6863	6780							
180	%N1	90.7	94.5	96.5						
	MACH	.550	.593	.607						
	KIAS	305	300	296						
	FF/ENG	6478	6439	6415						
170	%N1	89.1	93.2	94.7	97.0					
	MACH	.535	.585	.597	.613					
	KIAS	297	296	291	287					
	FF/ENG	6095	6144	6047	6065					
160	%N1	87.5	91.6	93.2	95.1	97.7				
	MACH	.519	.571	.588	.601	.618				
	KIAS	288	288	286	281	278				
	FF/ENG	5714	5769	5733	5665	5742				
150	%N1	85.7	89.9	91.6	93.3	95.3				
	MACH	.502	.554	.575	.590	.604				
	KIAS	278	280	280	276	272				
	FF/ENG	5336	5385	5391	5333	5305				
140	%N1	83.8	88.1	89.8	91.5	93.3				
	MACH	.485	.536	.557	.578	.593				
	KIAS	268	270	271	270	266				
	FF/ENG	4959	5005	5010	5009	4952				
130	%N1	81.9	86.1	87.8	89.6	91.3	95.7			
	MACH	.468	.517	.538	.559	.581	.610			
	KIAS	259	260	261	261	261	253			
	FF/ENG	4605	4625	4630	4631	4636	4626			
120	%N1	79.9	83.9	85.7	87.4	89.2	93.0	95.7		
	MACH	.451	.496	.517	.539	.560	.595	.612		
	KIAS	249	250	250	251	251	246	243		
	FF/ENG	4267	4247	4252	4252	4258	4229	4287		
110	%N1	77.8	81.6	83.3	85.1	86.9	90.6	92.7	95.6	
	MACH	.434	.474	.494	.516	.538	.582	.595	.612	
	KIAS	240	238	239	240	241	241	236	233	
	FF/ENG	3942	3880	3875	3876	3881	3909	3884	3943	
100	%N1	75.7	79.3	80.8	82.5	84.3	87.9	89.9	92.1	95.1
	MACH	.416	.454	.471	.491	.513	.558	.580	.594	.611
	KIAS	230	228	228	228	229	230	230	226	222
	FF/ENG	3631	3541	3515	3502	3507	3526	3558	3539	3593
90	%N1	73.4	76.7	78.3	79.8	81.5	85.2	87.0	89.0	91.2
	MACH	.399	.433	.449	.466	.485	.530	.553	.576	.592
	KIAS	220	217	217	216	217	218	219	218	215
	FF/ENG	3329	3218	3181	3151	3136	3153	3176	3205	3196

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	180	172	164	158
602	548	501	462	429	400	379	361	344	328	315
907	825	754	695	644	600	569	541	516	492	472
1214	1104	1007	927	860	800	759	722	687	656	629
1522	1383	1261	1161	1075	1000	949	902	859	820	785
1833	1664	1516	1394	1291	1200	1138	1081	1030	983	942
2146	1946	1772	1628	1507	1400	1328	1262	1202	1147	1098
2461	2230	2029	1863	1723	1600	1517	1441	1372	1310	1254
2778	2515	2286	2098	1940	1800	1707	1621	1543	1473	1410
3097	2802	2544	2334	2156	2000	1896	1800	1714	1636	1566

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT) 10		14		18		22		26	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
200	3.0	0:43	2.6	0:41	2.4	0:39	2.1	0:38	1.9	0:37
400	6.2	1:24	5.6	1:19	5.2	1:15	4.7	1:11	4.5	1:09
600	9.3	2:05	8.6	1:58	7.9	1:51	7.3	1:45	7.0	1:42
800	12.4	2:47	11.5	2:37	10.6	2:27	9.9	2:19	9.5	2:15
1000	15.5	3:29	14.4	3:17	13.3	3:04	12.4	2:54	11.9	2:48
1200	18.5	4:12	17.2	3:57	16.0	3:42	14.9	3:29	14.3	3:22
1400	21.5	4:55	20.0	4:38	18.6	4:20	17.4	4:04	16.6	3:55
1600	24.5	5:39	22.8	5:19	21.2	4:58	19.8	4:40	19.0	4:29
1800	27.4	6:23	25.5	6:01	23.8	5:37	22.2	5:16	21.3	5:03
2000	30.3	7:08	28.2	6:43	26.3	6:16	24.6	5:52	23.5	5:37

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB) 90	110	130	150	170
2	-0.2	-0.1	0.0	0.2	0.5
4	-0.5	-0.2	0.0	0.6	1.3
6	-0.7	-0.4	0.0	0.9	2.1
8	-1.0	-0.5	0.0	1.2	2.9
10	-1.3	-0.6	0.0	1.5	3.6
12	-1.5	-0.8	0.0	1.8	4.3
14	-1.8	-0.9	0.0	2.1	5.0
16	-2.1	-1.1	0.0	2.4	5.6
18	-2.3	-1.2	0.0	2.6	6.2
20	-2.6	-1.3	0.0	2.8	6.7
22	-2.9	-1.5	0.0	3.1	7.3
24	-3.1	-1.6	0.0	3.3	7.8
26	-3.4	-1.7	0.0	3.5	8.2
28	-3.7	-1.8	0.0	3.7	8.7
30	-3.9	-2.0	0.0	3.8	9.1
32	-4.2	-2.1	0.0	4.0	9.5

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
190	%N1	81.5	84.4	88.7	93.3				
	KIAS	252	252	254	255				
	FF/ENG	6120	6120	6150	6270				
180	%N1	80.0	83.0	87.1	91.6	99.3			
	KIAS	245	246	247	248	250			
	FF/ENG	5800	5780	5800	5880	6240			
170	%N1	78.5	81.3	85.5	89.9	96.3			
	KIAS	238	239	240	241	242			
	FF/ENG	5480	5450	5450	5510	5710			
160	%N1	76.9	79.6	83.8	88.2	93.6			
	KIAS	231	232	232	233	235			
	FF/ENG	5160	5130	5110	5150	5250			
150	%N1	75.2	77.9	82.0	86.3	91.1			
	KIAS	224	224	225	226	227			
	FF/ENG	4850	4810	4780	4800	4840			
140	%N1	73.3	76.1	80.1	84.4	89.0	96.6		
	KIAS	216	216	217	218	219	221		
	FF/ENG	4540	4490	4450	4460	4480	4750		
130	%N1	71.2	74.2	78.1	82.4	86.9	92.8		
	KIAS	208	209	209	210	211	213		
	FF/ENG	4230	4180	4140	4120	4120	4240		
120	%N1	69.1	72.0	76.0	80.2	84.6	89.6		
	KIAS	199	200	201	202	203	204		
	FF/ENG	3930	3870	3830	3790	3780	3830		
110	%N1	66.9	69.6	73.8	77.8	82.2	86.9	94.8	
	KIAS	192	192	192	193	194	195	196	
	FF/ENG	3630	3570	3520	3480	3440	3460	3690	
100	%N1	64.4	67.1	71.2	75.2	79.6	84.2	89.9	
	KIAS	186	186	186	186	186	186	187	
	FF/ENG	3330	3270	3210	3170	3120	3120	3230	
90	%N1	61.6	64.5	68.3	72.6	76.7	81.3	86.0	95.0
	KIAS	179	179	179	179	179	179	179	179
	FF/ENG	3030	2980	2910	2860	2810	2790	2840	3090

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

Performance Inflight - QRH Chapter PI-QRH
Gear Down Section 43

GEAR DOWN

Long Range Cruise Altitude Capability
Max Cruise Thrust, 100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	14900	11800	8700
180	17500	14600	11500
170	20100	17200	14400
160	22300	19900	17100
150	24700	22600	19700
140	26800	25300	22900
130	29100	27600	25900
120	31100	29900	28400
110	32900	31900	30700
100	34900	33900	32800
90	37100	36100	35000

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)									
		10	21	23	25	27	29	31	33	35	37
190	%N1	86.3									
	MACH	.485									
	KIAS	268									
	FF/ENG	5417									
180	%N1	84.8									
	MACH	.473									
	KIAS	262									
	FF/ENG	5115									
170	%N1	83.2	92.6								
	MACH	.460	.560								
	KIAS	254	251								
	FF/ENG	4818	4773								
160	%N1	81.6	90.7	93.0							
	MACH	.447	.548	.565							
	KIAS	247	245	243							
	FF/ENG	4523	4477	4478							
150	%N1	79.8	89.1	90.8	93.3						
	MACH	.434	.535	.552	.569						
	KIAS	240	239	237	235						
	FF/ENG	4234	4195	4170	4196						
140	%N1	78.0	87.2	88.9	90.8	93.6					
	MACH	.420	.518	.538	.555	.573					
	KIAS	232	232	231	229	227					
	FF/ENG	3954	3897	3890	3878	3924					
130	%N1	76.1	85.2	87.0	88.7	90.7	93.8				
	MACH	.406	.500	.521	.541	.558	.576				
	KIAS	224	223	224	223	221	218				
	FF/ENG	3676	3597	3595	3595	3599	3652				
120	%N1	74.1	83.0	84.8	86.6	88.3	90.5	93.7			
	MACH	.391	.482	.501	.523	.543	.560	.579			
	KIAS	216	215	215	215	214	212	210			
	FF/ENG	3402	3303	3297	3303	3311	3320	3379			
110	%N1	71.8	80.7	82.4	84.2	86.0	87.7	90.1	93.4		
	MACH	.375	.462	.481	.501	.523	.543	.561	.580		
	KIAS	207	206	206	206	206	205	203	201		
	FF/ENG	3133	3015	3006	3009	3023	3030	3038	3102		
100	%N1	69.3	78.2	79.9	81.6	83.4	85.2	87.0	89.4	92.8	
	MACH	.359	.442	.460	.479	.499	.521	.542	.560	.580	
	KIAS	198	197	197	197	196	197	196	194	192	
	FF/ENG	2873	2735	2720	2722	2734	2745	2749	2755	2819	
90	%N1	66.7	75.4	77.1	78.8	80.6	82.3	84.2	86.0	88.4	92.2
	MACH	.343	.421	.438	.456	.475	.496	.518	.540	.558	.578
	KIAS	189	187	187	187	187	187	187	186	184	182
	FF/ENG	2623	2467	2441	2439	2451	2458	2464	2468	2474	2544

GEAR DOWN

Long Range Cruise 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
325	290	260	236	217	200	188	178	168	160	153
658	586	524	475	435	400	377	357	338	321	307
994	884	789	714	653	600	566	535	507	482	460
1336	1185	1056	955	872	800	755	713	676	642	613
1683	1490	1326	1196	1091	1000	943	891	844	802	765
2036	1799	1597	1439	1311	1200	1131	1068	1011	961	917
2395	2112	1871	1683	1531	1400	1319	1245	1179	1120	1068
2761	2429	2147	1928	1752	1600	1507	1422	1346	1278	1219
3133	2751	2427	2175	1974	1800	1695	1599	1513	1436	1368

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
200	5.3	0:49	4.8	0:47	4.1	0:44	3.8	0:43	3.5	0:41
400	10.8	1:37	9.9	1:32	8.8	1:25	8.1	1:21	7.6	1:18
600	16.1	2:26	15.0	2:18	13.3	2:07	12.4	2:00	11.7	1:54
800	21.4	3:16	19.9	3:05	17.8	2:49	16.6	2:39	15.7	2:31
1000	26.5	4:07	24.7	3:52	22.1	3:32	20.7	3:20	19.6	3:09
1200	31.6	4:59	29.4	4:41	26.4	4:16	24.7	4:00	23.4	3:47
1400	36.5	5:52	34.0	5:31	30.6	5:01	28.6	4:42	27.1	4:26
1600	41.3	6:47	38.6	6:22	34.6	5:47	32.4	5:25	30.7	5:05
1800	46.1	7:42	43.0	7:14	38.6	6:33	36.2	6:08	34.3	5:45

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	90	110	130	150	170
5	-0.7	-0.4	0.0	0.7	1.5
10	-1.5	-0.8	0.0	1.3	3.0
15	-2.3	-1.1	0.0	1.9	4.4
20	-3.0	-1.5	0.0	2.5	5.6
25	-3.8	-1.9	0.0	3.0	6.8
30	-4.6	-2.3	0.0	3.5	7.9
35	-5.4	-2.7	0.0	3.9	8.8
40	-6.2	-3.1	0.0	4.4	9.7
45	-7.0	-3.5	0.0	4.7	10.4
50	-7.7	-3.8	0.0	5.1	11.1

GEAR DOWN

Descent
VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (LB)	DISTANCE (NM)
41000	21	610	91
39000	20	600	86
37000	19	590	81
35000	19	580	77
33000	18	560	72
31000	17	550	68
29000	17	540	64
27000	16	530	60
25000	15	510	56
23000	14	500	52
21000	13	480	48
19000	13	460	44
17000	12	450	40
15000	11	430	36
10000	8	370	26
5000	6	300	16
1500	4	240	9

Allowances for a straight-in approach are included.

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
190	%N1	76.2	78.8	83.1	87.4	92.5			
	KIAS	231	231	231	231	231			
	FF/ENG	5010	4980	4970	5000	5060			
180	%N1	74.8	77.5	81.7	85.9	90.6			
	KIAS	227	227	227	227	227			
	FF/ENG	4770	4730	4710	4730	4760			
170	%N1	73.2	76.1	80.1	84.4	89.0			
	KIAS	222	222	222	222	222			
	FF/ENG	4520	4490	4460	4470	4480			
160	%N1	71.7	74.6	78.5	82.9	87.4	93.3		
	KIAS	218	218	218	218	218	218		
	FF/ENG	4290	4250	4210	4210	4210	4320		
150	%N1	70.1	73.0	77.0	81.2	85.7	90.8		
	KIAS	214	214	214	214	214	214		
	FF/ENG	4060	4010	3980	3960	3950	4000		
140	%N1	68.4	71.3	75.4	79.5	83.9	88.6		
	KIAS	209	209	209	209	209	209		
	FF/ENG	3830	3780	3740	3710	3690	3710		
130	%N1	66.7	69.4	73.6	77.6	82.0	86.6	93.5	
	KIAS	203	203	203	203	203	203	203	
	FF/ENG	3600	3540	3500	3460	3430	3440	3600	
120	%N1	64.9	67.5	71.6	75.7	80.0	84.6	90.0	
	KIAS	198	198	198	198	198	198	198	
	FF/ENG	3370	3320	3260	3220	3180	3180	3270	
110	%N1	62.8	65.6	69.5	73.7	77.9	82.4	87.1	
	KIAS	192	192	192	192	192	192	192	
	FF/ENG	3140	3090	3030	2990	2940	2930	2980	
100	%N1	60.5	63.5	67.3	71.6	75.7	80.1	84.7	91.8
	KIAS	186	186	186	186	186	186	186	186
	FF/ENG	2920	2870	2810	2760	2710	2680	2720	2840
90	%N1	58.3	61.0	65.1	69.1	73.4	77.7	82.1	87.4
	KIAS	179	179	179	179	179	179	179	179
	FF/ENG	2690	2640	2590	2540	2480	2440	2470	2510

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH
Gear Down, Engine Inop — Section 44

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb

WEIGHT (1000 LB)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	180	228	1100		
180	170	224	3200	1500	
170	161	220	5400	3800	1600
160	152	216	7400	6000	4000
150	143	212	9600	8200	6300
140	133	207	11600	10500	8800
130	124	201	13700	12800	11500
120	114	196	15900	15100	14200
110	105	190	18200	17300	16500
100	96	184	20500	19600	18700
90	86	178	22700	21900	21000

Includes APU fuel burn.

Long Range Cruise Altitude Capability
100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
170	200		
160	2900	600	
150	5700	3900	1200
140	8500	6900	4500
130	11100	9900	7700
120	13600	12600	11000
110	16300	15400	14600
100	19100	18100	17300
90	21800	20900	20000

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)								
		5	7	9	11	13	15	17	19	21
150	%N1	93.9	96.1							
	MACH	.384	.397							
	KIAS	232	232							
	FF/ENG	8062	8105							
140	%N1	91.9	93.6	95.9						
	MACH	.372	.385	.398						
	KIAS	225	225	224						
	FF/ENG	7475	7487	7541						
130	%N1	89.7	91.4	93.1	95.5					
	MACH	.361	.373	.385	.399					
	KIAS	218	217	217	216					
	FF/ENG	6911	6904	6914	6979					
120	%N1	87.5	89.0	90.7	92.5	94.9	98.7			
	MACH	.349	.360	.372	.385	.399	.413			
	KIAS	211	210	209	208	208	207			
	FF/ENG	6382	6346	6336	6349	6416	6622			
110	%N1	85.2	86.7	88.2	89.9	91.6	94.1	98.0		
	MACH	.337	.348	.359	.371	.383	.397	.412		
	KIAS	204	203	201	200	200	199	198		
	FF/ENG	5880	5824	5786	5777	5791	5841	6015		
100	%N1	82.9	84.2	85.6	87.1	88.8	90.6	93.0	97.0	
	MACH	.325	.335	.345	.356	.368	.381	.395	.409	
	KIAS	197	195	194	193	192	191	190	189	
	FF/ENG	5399	5329	5273	5235	5226	5230	5251	5393	
90	%N1	80.3	81.6	83.0	84.4	85.9	87.6	89.4	91.6	95.1
	MACH	.313	.322	.331	.341	.352	.364	.377	.391	.406
	KIAS	189	188	186	184	183	182	181	181	180
	FF/ENG	4943	4857	4787	4732	4695	4674	4661	4663	4774

GEAR DOWN
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
173	152	134	120	109	100	93	88	83	78	75
354	309	271	242	220	200	187	174	164	155	147
536	467	409	365	330	300	280	262	246	232	220
720	626	547	487	440	400	373	349	328	308	292
905	786	686	610	551	500	466	435	408	385	365
1092	948	826	734	662	600	559	522	489	461	437
1281	1109	966	857	772	700	652	609	571	537	509
1471	1273	1107	982	884	800	744	695	651	612	580
1662	1437	1248	1106	995	900	838	782	732	689	652
1856	1602	1390	1230	1106	1000	930	868	812	764	723

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)					
	6		10		14	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
100	2.7	0:27	2.4	0:26	2.2	0:26
200	5.7	0:53	5.2	0:51	5.0	0:49
300	8.6	1:19	8.0	1:15	7.7	1:12
400	11.4	1:45	10.7	1:40	10.4	1:35
500	14.3	2:11	13.4	2:05	12.9	1:59
600	17.1	2:38	16.0	2:30	15.5	2:23
700	19.8	3:05	18.6	2:56	18.0	2:47
800	22.6	3:32	21.2	3:22	20.4	3:12
900	25.2	3:59	23.7	3:48	22.9	3:36
1000	27.9	4:27	26.3	4:14	25.2	4:01

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	90	110	130	150	170
2	-0.3	-0.2	0.0	0.3	0.5
4	-0.6	-0.3	0.0	0.6	1.2
6	-0.9	-0.5	0.0	0.9	1.8
8	-1.2	-0.6	0.0	1.3	2.5
10	-1.5	-0.8	0.0	1.6	3.1
12	-1.8	-0.9	0.0	1.9	3.8
14	-2.1	-1.1	0.0	2.3	4.4
16	-2.4	-1.2	0.0	2.6	5.1
18	-2.7	-1.4	0.0	2.9	5.7
20	-2.9	-1.5	0.0	3.3	6.4
22	-3.2	-1.6	0.0	3.6	7.1
24	-3.5	-1.8	0.0	3.9	7.7
26	-3.8	-1.9	0.0	4.3	8.4
28	-4.1	-2.1	0.0	4.6	9.1
30	-4.4	-2.2	0.0	4.9	9.7

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
180	%N1	94.0			
	KIAS	227			
	FF/ENG	9330			
170	%N1	92.2	95.7		
	KIAS	222	222		
	FF/ENG	8780	8900		
160	%N1	90.4	93.7		
	KIAS	218	218		
	FF/ENG	8240	8330		
150	%N1	88.7	91.8		
	KIAS	214	214		
	FF/ENG	7730	7800		
140	%N1	86.8	89.8	94.9	
	KIAS	209	209	209	
	FF/ENG	7230	7270	7400	
130	%N1	84.8	87.7	92.4	
	KIAS	203	203	203	
	FF/ENG	6730	6740	6820	
120	%N1	82.7	85.6	90.1	96.7
	KIAS	198	198	198	198
	FF/ENG	6250	6250	6290	6530
110	%N1	80.3	83.3	87.7	92.7
	KIAS	192	192	192	192
	FF/ENG	5780	5760	5760	5870
100	%N1	78.0	80.9	85.2	89.9
	KIAS	186	186	186	186
	FF/ENG	5340	5290	5280	5330
90	%N1	75.6	78.3	82.6	87.1
	KIAS	179	179	179	179
	FF/ENG	4890	4840	4800	4810

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

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 Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

Pitch attitude and average %N1 information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

Max Climb %N1

This table shows Max Climb %N1 for a 280/.80 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (AUTO) and anti-ice on or off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. For packs OFF or HIGH operation, apply the %N1 adjustment shown below the table.

VREF

This table contains flaps 40, 30 and 15 reference speeds for a given weight.

With autothrottles disengaged an approach speed wind correction (max 20 knots) of 1/2 steady headwind component + gust increment above steady wind is recommended. Do not apply a wind correction for tailwinds. The maximum command speed should not exceed landing flap placard speed minus 5 knots.

Advisory Information

Normal Configuration Landing Distance

The normal configuration distance tables are provided as advisory information to help determine the actual landing distance performance of the airplane for different runway surface conditions and brake configurations.

Flaps 15, 30, and 40 landing distances and adjustments are provided for dry runways as well as runways with good, medium, and poor reported braking action, which are commonly referred to as slippery runway conditions.

If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Dry runway landing performance is shown for max manual braking configuration and autobrake settings max, 3, 2, and 1. Use of autobrake setting 1 is not recommended for landings on slippery runways, and is therefore not provided for these conditions. The autobrake performance may be used to assist in the selection of the most desirable autobrake setting for a given field length. Selection of an autobrake setting results in a constant rate of deceleration. Maximum effort manual braking should achieve shorter landing distance than the max autobrake setting. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and normal approach speed for the selected landing flap at sea level, zero wind, zero slope, and two engine detent reverse thrust. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, temperature, speed, and reverse thrust. Each adjustment is independently added to the reference landing distance.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effect of max manual braking and reverse thrust.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the appropriate Recommended Brake Cooling Schedule table (Steel or Carbon Brakes) with the airplane weight and brakes on speed, adjusted for wind at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of.80M 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, TAT, and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level 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 Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

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 .80/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS may 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 (280/.76)
Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
40000	PITCH ATT	**4.0**	**4.0**	**4.0**		
	V/S (FT/MIN)	1700	1100	500		
30000	PITCH ATT	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2500	1900	1400	1100	800
20000	PITCH ATT	**7.0**	**6.5**	**6.0**	**6.0**	**6.0**
	V/S (FT/MIN)	4100	3200	2600	2100	1700
10000	PITCH ATT	**11.0**	**9.5**	**8.5**	**8.0**	**8.0**
	V/S (FT/MIN)	5600	4400	3600	3000	2500
SEA LEVEL	PITCH ATT	**14.5**	**12.5**	**11.0**	**10.0**	**9.5**
	V/S (FT/MIN)	6700	5300	4300	3600	3100

Cruise (.76/280)
Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
40000	PITCH ATT	**2.0**	**2.5**	**3.5**		
	%N1	83	86	90		
35000	PITCH ATT	**1.0**	**2.0**	**2.5**	**3.0**	**4.0**
	%N1	82	83	85	88	92
30000	PITCH ATT	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	81	82	83	85	87
25000	PITCH ATT	**1.0**	**1.5**	**2.0**	**2.5**	**3.5**
	%N1	77	78	79	81	83
20000	PITCH ATT	**1.0**	**1.5**	**2.0**	**3.0**	**3.5**
	%N1	74	75	76	77	79
15000	PITCH ATT	**1.0**	**1.5**	**2.5**	**3.0**	**3.5**
	%N1	70	71	72	73	75

Descent (.76/280)
Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
40000	PITCH ATT	**-1.5**	**-0.5**	**0.5**	**1.0**	**1.5**
	V/S (FT/MIN)	-2700	-2500	-2400	-2700	-3000
30000	PITCH ATT	**-3.0**	**-2.0**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-3100	-2600	-2300	-2100	-2000
20000	PITCH ATT	**-3.5**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2800	-2400	-2100	-1900	-1800
10000	PITCH ATT	**-3.5**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2600	-2100	-1900	-1700	-1600
SEA LEVEL	PITCH ATT	**-4.0**	**-2.5**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2400	-1900	-1700	-1500	-1400

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Holding (VREF40 + 70)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
10000	**PITCH ATT**	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	53	58	62	66	69
	KIAS	175	192	211	228	244
5000	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.5**	**5.0**
	%N1	49	54	58	62	66
	KIAS	175	191	210	227	243

Terminal Area (5000 FT)

%N1 for Level Flight

FLAP POSITION (VREF+INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 1 (GEAR UP) (VREF40+50)	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**6.0**	**6.0**
	%N1	51	56	61	65	68
FLAPS 5 (GEAR UP) (VREF40+30)	**PITCH ATT**	**5.5**	**6.0**	**6.5**	**6.5**	**7.0**
	%N1	52	57	62	66	69
FLAPS 15 (GEAR DOWN) (VREF40+20)	**PITCH ATT**	**4.5**	**5.0**	**5.5**	**5.5**	**5.5**
	%N1	59	64	69	74	77

Final Approach (1500 FT)

Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF+INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 15 (VREF15+10)	**PITCH ATT**	**1.5**	**1.5**	**2.0**	**2.0**	**2.0**
	%N1	41	46	49	53	56
FLAPS 30 (VREF30+10)	**PITCH ATT**	**0.5**	**1.0**	**1.0**	**1.0**	**1.5**
	%N1	47	52	56	60	63
FLAPS 40 (VREF40+10)	**PITCH ATT**	**0.0**	**0.0**	**0.5**	**0.5**	**0.5**
	%N	51	56	61	65	68

Max Climb %N1

Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS OR MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.80	.80	.80
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	94.8	95.0	93.7
55	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.1	94.3	93.0
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.4	93.6	92.4
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	92.7	92.9	91.7
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.4	92.2	91.0
35	94.0	94.3	94.5	94.3	94.0	94.0	93.0	93.3	92.7	91.6
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	94.1	93.5	92.5
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.9	94.4	93.4
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.6	95.1	94.3
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.3	95.9	95.1
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	97.1	96.7	96.0
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.9	97.4	96.8
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.7	98.3	97.8
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.4	99.0	98.6
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.3	99.9	99.6
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.5
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.3	100.9	100.5
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	99.5	100.0	99.7
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	98.6	99.2	98.8
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	97.8	98.3	98.0
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	96.9	97.5	97.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	0	10	20	30	35	41
ENGINE ANTI-ICE	-0.6	-0.8	-0.9	-0.9	-0.8	-0.8
ENGINE & WING ANTI-ICE*	-1.8	-2.1	-2.5	-2.7	-3.0	-3.0

*Dual bleed sources

Go-around %N1

Based on engine bleed for packs on, engine and wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)											
°C	°F		-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
57	134	60	95.0	96.2	96.8									
52	125	55	95.9	96.7	96.6	96.8	97.5							
47	116	50	96.6	97.6	97.8	97.8	97.7	97.5	98.2	98.8				
42	108	45	97.4	98.4	98.5	98.6	98.7	98.8	98.7	98.5	98.5	99.0		
37	99	40	98.0	99.1	99.2	99.3	99.4	99.5	99.6	99.5	99.1	98.9	98.8	99.1
32	90	35	98.1	99.9	100.0	100.1	100.1	100.3	100.3	100.2	99.9	99.6	99.6	99.5
27	81	30	97.3	99.8	100.4	100.7	100.7	100.7	100.7	100.7	100.6	100.4	100.4	100.3
22	72	25	96.6	99.1	99.7	100.2	100.6	100.9	100.9	100.9	100.9	100.9	100.9	100.8
17	63	20	95.8	98.3	98.9	99.5	99.8	100.2	100.5	100.9	101.0	101.1	101.0	101.0
12	54	15	95.0	97.5	98.1	98.7	99.1	99.4	99.8	100.1	100.5	100.9	101.3	101.2
7	45	10	94.2	96.8	97.4	98.0	98.3	98.7	99.0	99.4	99.8	100.2	100.5	100.9
2	36	5	93.4	96.0	96.6	97.2	97.6	97.9	98.3	98.7	99.0	99.4	99.8	100.2
-3	27	0	92.6	95.2	95.8	96.4	96.8	97.2	97.5	97.9	98.3	98.7	99.0	99.4
-8	18	-5	91.8	94.4	95.0	95.6	96.0	96.4	96.8	97.2	97.5	97.9	98.3	98.6
-13	9	-10	91.0	93.6	94.2	94.8	95.2	95.6	96.0	96.4	96.8	97.1	97.5	97.9
-17	1	-15	90.2	92.8	93.4	94.0	94.4	94.8	95.2	95.6	96.0	96.4	96.7	97.1
-22	-8	-20	89.3	92.0	92.6	93.2	93.6	94.0	94.4	94.8	95.2	95.6	95.9	96.3
-27	-17	-25	88.5	91.1	91.8	92.4	92.8	93.2	93.6	94.0	94.4	94.8	95.1	95.5
-32	-26	-30	87.6	90.3	90.9	91.6	92.0	92.4	92.8	93.3	93.6	94.0	94.3	94.7
-37	-35	-35	86.8	89.4	90.1	90.7	91.1	91.6	92.0	92.4	92.8	93.2	93.5	93.9
-42	-44	-40	85.9	88.6	89.2	89.9	90.3	90.7	91.2	91.6	92.0	92.4	92.7	93.0
-47	-53	-45	85.0	87.7	88.4	89.0	89.4	89.9	90.3	90.8	91.2	91.5	91.9	92.2
-52	-62	-50	84.1	86.8	87.5	88.2	88.6	89.0	89.5	90.0	90.3	90.7	91.0	91.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)											
	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
PACKS OFF	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
A/C HIGH	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

Go-around %N1 - High Altitudes

Based on engine bleeds for packs on, engine anti-ice off, wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°C	°F		10000	11000	12000	13000	14000	14500
37	99	40	99.1	99.7				
32	90	35	99.5	99.3	99.5	100.1	100.7	
27	81	30	100.3	100.2	100.2	100.0	100.0	100.2
22	72	25	100.8	100.7	100.7	100.6	100.6	100.5
17	63	20	101.0	101.0	101.0	100.9	100.8	100.8
12	54	15	101.2	101.2	101.2	101.2	101.1	101.0
7	45	10	100.9	101.4	101.5	101.4	101.3	101.2
2	36	5	100.2	100.9	101.6	101.6	101.5	101.5
-3	27	0	99.4	100.2	101.0	101.4	101.6	101.6
-8	18	-5	98.6	99.4	100.2	100.6	100.9	101.0
-13	9	-10	97.9	98.6	99.5	99.8	100.1	100.2
-17	1	-15	97.1	97.8	98.7	99.0	99.3	99.4
-22	-8	-20	96.3	97.0	97.9	98.2	98.5	98.6
-27	-17	-25	95.5	96.2	97.1	97.4	97.7	97.8
-32	-26	-30	94.7	95.4	96.2	96.6	96.8	97.0
-37	-35	-35	93.9	94.6	95.4	95.7	96.0	96.1
-42	-44	-40	93.0	93.8	94.6	94.9	95.1	95.3
-47	-53	-45	92.2	92.9	93.7	94.0	94.3	94.4
-52	-62	-50	91.4	92.1	92.9	93.2	93.4	93.5

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	10000	11000	12000	13000	14000	14500
PACKS OFF	0.9	0.9	0.9	1.0	1.0	1.0
ENGINE ANTI-ICE	0.0	-0.8	-1.5	-1.5	-1.5	-1.4

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
85	158	161	171
80	153	157	166
75	148	152	160
70	143	147	155
65	137	142	149
60	131	136	143
55	125	130	137
50	119	124	130
45	112	118	123
40	105	111	116

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ADVISORY INFORMATION

Normal Configuration Landing Distances
Flaps 15
Dry Runway

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (M)											
	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	
	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	900	65/-50	20/25	-30	110	10	-10	20	-20	60	20	35
MAX AUTO	1165	65/-65	30/40	-45	145	0	0	25	-25	110	0	0
AUTOBRAKE 3	1640	100/-110	50/65	-70	240	0	-5	45	-45	175	0	0
AUTOBRAKE 2	2100	145/-150	70/90	-95	325	35	-45	60	-60	160	0	80
AUTOBRAKE 1	2310	170/-175	80/110	-110	380	65	-70	65	-65	155	100	315

Good Reported Braking Action

MAX MANUAL	1235	70/-75	35/45	-55	190	30	-25	30	-30	85	75	135
MAX AUTO	1365	80/-80	35/50	-55	200	25	-20	30	-30	105	90	160
AUTOBRAKE 3	1645	100/-110	50/65	-70	240	5	-5	45	-45	175	10	15
AUTOBRAKE 2	2100	145/-150	70/90	-95	325	35	-45	60	-60	160	0	80

Medium Reported Braking Action

MAX MANUAL	1695	115/-115	55/75	-85	315	70	-55	45	-45	115	250	420
MAX AUTO	1755	120/-120	55/75	-85	315	65	-50	45	-45	135	255	430
AUTOBRAKE 3	1795	120/-125	60/80	-90	330	50	-35	50	-50	175	240	360
AUTOBRAKE 2	2120	150/-155	70/95	-105	370	60	-60	60	-60	160	110	225

Poor Reported Braking Action

MAX MANUAL	2210	170/-165	80/115	-130	505	180	-115	60	-65	140	645	1025
MAX AUTO	2300	165/-165	80/115	-130	500	175	-115	60	-65	145	655	1030
AUTOBRAKE 3	2300	170/-165	80/115	-130	500	165	-105	60	-65	170	655	1035
AUTOBRAKE 2	2395	175/-175	85/120	-135	520	165	-110	65	-70	160	580	905

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 75 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances
Flaps 30
Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	855	55/-45	20/25	-30	110	10	-10	15	-15	60	15	30
MAX AUTO	1095	55/-60	25/35	-40	135	0	0	25	-25	105	0	0
AUTOBRAKE 3	1530	90/-100	45/55	-65	230	0	-10	40	-40	155	0	5
AUTOBRAKE 2	1945	130/-135	60/80	-90	310	35	-40	50	-50	150	0	75
AUTOBRAKE 1	2125	155/-155	70/95	-105	365	60	-60	60	-60	145	105	275

Good Reported Braking Action

MAX MANUAL	1170	65/-70	30/40	-50	185	25	-25	25	-30	85	65	120
MAX AUTO	1295	70/-75	35/45	-55	195	20	-20	30	-30	100	75	135
AUTOBRAKE 3	1530	90/-100	45/55	-70	230	5	-10	40	-40	155	10	15
AUTOBRAKE 2	1945	130/-135	60/80	-90	310	35	-40	50	-50	150	0	75

Medium Reported Braking Action

MAX MANUAL	1595	105/-105	50/70	-85	310	70	-55	40	-45	110	210	360
MAX AUTO	1645	110/-110	50/70	-85	310	60	-45	40	-45	130	215	365
AUTOBRAKE 3	1675	110/-115	55/70	-85	320	50	-40	45	-45	155	205	315
AUTOBRAKE 2	1965	135/-140	65/85	-100	355	60	-55	55	-55	150	95	205

Poor Reported Braking Action

MAX MANUAL	2060	150/-150	75/100	-125	485	165	-110	55	-60	130	530	850
MAX AUTO	2135	150/-150	75/100	-125	485	165	-100	55	-60	145	535	855
AUTOBRAKE 3	2135	155/-150	75/100	-125	485	160	-100	55	-60	150	540	870
AUTOBRAKE 2	2220	160/-160	75/105	-130	500	155	-105	60	-65	150	470	755

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 70 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 40

Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (M)											
	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	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	820	55/-40	20/25	-30	105	10	-10	15	-15	60	15	25
MAX AUTO	1030	60/-55	25/35	-40	130	0	0	20	-20	100	0	0
AUTOBRAKE 3	1420	95/-90	45/60	-65	220	0	-5	35	-35	155	0	0
AUTOBRAKE 2	1815	130/-125	60/80	-85	300	25	-35	50	-50	150	0	40
AUTOBRAKE 1	2005	150/-145	70/95	-100	355	50	-60	55	-55	145	70	210

Good Reported Braking Action

MAX MANUAL	1125	70/-65	30/45	-50	180	25	-25	25	-25	85	60	110
MAX AUTO	1230	75/-70	35/45	-55	190	20	-20	25	-30	105	70	125
AUTOBRAKE 3	1420	95/-90	45/60	-65	220	5	-5	35	-35	155	10	15
AUTOBRAKE 2	1815	130/-125	60/80	-85	300	25	-35	50	-50	150	0	40

Medium Reported Braking Action

MAX MANUAL	1520	110/-100	50/70	-80	300	65	-55	40	-40	115	190	325
MAX AUTO	1560	110/-105	50/70	-80	300	60	-45	40	-40	130	190	330
AUTOBRAKE 3	1585	115/-105	55/75	-85	310	50	-35	40	-45	155	195	305
AUTOBRAKE 2	1830	135/-130	60/85	-95	340	50	-50	50	-50	150	90	170

Poor Reported Braking Action

MAX MANUAL	1965	155/-140	70/100	-125	480	165	-105	50	-55	135	480	775
MAX AUTO	2045	155/-140	70/100	-125	475	165	-105	50	-55	140	485	785
AUTOBRAKE 3	2045	155/-145	75/100	-125	475	155	-100	50	-60	145	485	790
AUTOBRAKE 2	2095	160/-150	75/105	-125	490	150	-100	55	-60	150	445	695

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 65 m.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (305 m of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	1190	160/-70	30/65	-40/135	15/-10	25/-25	80
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1430	90/-85	40/55	-70/255	40/-35	35/-35	110
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	990	65/-50	20/30	-35/120	10/-10	20/-20	90
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	940	60/-50	20/25	-35/115	10/-10	20/-20	85
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	900	60/-45	20/30	-35/115	10/-10	20/-20	85
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1010	50/-55	25/30	-40/135	15/-15	25/-25	75
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1385	75/-80	35/45	-55/185	35/-30	35/-35	155
LEADING EDGE FLAPS TRANSIT	VREF15+15	1005	70/-55	20/30	-35/120	10/-10	20/-20	65
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	905	65/-55	20/25	-35/115	10/-10	20/-20	65
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	860	55/-45	15/25	-30/110	10/-10	15/-15	60

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**
****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	895	65/-50	20/25	-30/115	10/-10	20/-20	60
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	895	65/-50	20/25	-30/115	10/-10	20/-20	60
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	855	55/-45	15/25	-30/110	10/-10	15/-15	60
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	895	65/-50	20/25	-30/115	10/-10	20/-20	60
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	995	90/-55	25/30	-35/120	10/-10	20/-20	60
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	855	55/-45	15/25	-30/110	10/-10	15/-15	60
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	895	65/-50	20/25	-30/115	10/-10	20/-20	60
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	995	90/-55	25/30	-35/120	10/-10	20/-20	60
TRAILING EDGE FLAPS UP	VREF40+40	1065	110/-60	25/35	-35/125	10/-10	25/-25	60

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	1590	90/-90	45/60	-60/215	30/-30	40/-40	85
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1595	110/-100	45/60	-85/310	60/-50	40/-40	120
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1430	90/-90	40/55	-60/215	40/-35	35/-35	130
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1335	80/-85	35/45	-60/205	35/-30	35/-35	125
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1265	85/-75	35/50	-60/200	35/-30	30/-30	125
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1280	75/-80	35/45	-55/195	30/-25	30/-30	95
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1710	100/-105	45/60	-70/245	55/-50	45/-45	180
LEADING EDGE FLAPS TRANSIT	VREF15+15	1380	80/-80	35/50	-60/205	30/-25	35/-35	90
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1270	75/-75	30/45	-55/200	30/-25	30/-30	95
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1205	70/-70	30/40	-55/195	30/-25	30/-30	90

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**
****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	1225	70/-75	30/45	-55/190	25/-25	30/-30	85
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1225	70/-75	30/45	-55/190	25/-25	30/-30	85
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1165	65/-65	30/40	-50/185	25/-25	25/-25	85
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1225	70/-75	30/45	-55/190	25/-25	30/-30	85
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1350	75/-75	35/50	-55/200	25/-25	35/-35	80
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1165	65/-65	30/40	-50/185	25/-25	25/-25	85
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1225	70/-75	30/45	-55/190	25/-25	30/-30	85
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1350	75/-75	35/50	-55/200	25/-25	35/-35	80
TRAILING EDGE FLAPS UP	VREF40+40	1440	80/-80	40/55	-60/205	30/-25	35/-35	80

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	2245	150/-145	75/100	-100/360	80/-70	65/-65	115
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	2015	155/-140	65/90	-125/485	135/-100	50/-55	140
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1945	145/-140	60/85	-100/350	90/-75	55/-55	165
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1805	130/-130	55/75	-95/335	80/-70	50/-50	155
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1705	130/-120	55/80	-90/330	80/-65	45/-45	150
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1745	120/-120	55/75	-90/325	70/-60	45/-45	125
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	2350	160/-160	70/100	-110/395	120/-105	60/-65	220
LEADING EDGE FLAPS TRANSIT	VREF15+15	1870	125/-125	60/80	-90/330	70/-60	50/-50	115
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1805	125/-125	55/70	-95/340	80/-70	50/-50	130
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1680	115/-115	50/65	-90/330	75/-65	45/-45	125

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**
****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	1665	115/-115	50/70	-85/315	65/-55	45/-45	115
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1665	115/-115	50/70	-85/315	65/-55	45/-45	115
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1565	105/-105	45/60	-80/305	60/-50	40/-40	110
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1665	115/-115	50/70	-85/315	65/-55	45/-45	115
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1860	125/-120	60/80	-90/330	70/-60	50/-50	110
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1565	105/-105	45/60	-80/305	60/-50	40/-40	110
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1665	115/-115	50/70	-85/315	65/-55	45/-45	115
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1860	125/-120	60/80	-90/330	70/-60	50/-50	110
TRAILING EDGE FLAPS UP	VREF40+40	2005	135/-130	65/90	-95/340	75/-65	55/-55	115

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	2975	220/-210	110/150	-150/565	185/-145	90/-90	150
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	2675	220/-200	95/135	-205/895	480/-230	70/-80	155
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	2510	65/-65	90/130	-145/545	195/-145	70/-75	190
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	2315	180/-175	80/115	-140/525	180/-135	65/-70	175
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	2185	185/-165	80/110	-135/515	170/-130	60/-65	170
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	2260	175/-170	80/110	-135/510	160/-120	60/-65	150
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	3005	230/-220	105/145	-165/600	240/-185	80/-85	240
LEADING EDGE FLAPS TRANSIT	VREF15+15	2400	180/-175	80/115	-135/520	160/-120	65/-70	135
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	2460	185/-185	80/110	-150/560	205/-150	70/-75	160
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	2260	165/-165	70/95	-140/535	185/-135	65/-65	150

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**
****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (M)						
		REF DIST	WEIGHT ADJ	ALTITUDE ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	60000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	2160	165/-160	75/100	-130/495	150/-110	60/-60	135
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	2160	165/-160	75/100	-130/495	150/-110	60/-60	135
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	2010	150/-145	65/90	-125/480	140/-105	55/-60	130
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	2160	165/-160	75/100	-130/495	150/-110	60/-60	135
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	2425	185/-170	85/120	-135/520	155/-120	70/-70	135
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	2010	150/-145	65/90	-125/480	140/-105	55/-60	130
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	2160	165/-160	75/100	-130/495	150/-110	60/-60	135
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	2425	185/-170	85/120	-135/520	155/-120	70/-70	135
TRAILING EDGE FLAPS UP	VREF40+40	2645	195/-185	95/130	-145/540	170/-130	75/-80	140

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 (305 m of air distance).
Assumes maximum manual braking and maximum reverse thrust when available on operating engine(s).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)																	
		80			100			120			140			160			180		
WEIGHT (1000 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
80	0	15.8	17.9	20.5	23.1	26.2	30.0	31.4	35.7	41.1	40.6	46.2	53.3	50.4	57.4	66.5	59.8	68.3	79.4
	10	16.3	18.5	21.2	23.8	27.1	31.0	32.4	36.9	42.4	41.9	47.7	55.0	52.0	59.3	68.6	61.8	70.4	81.9
	15	16.6	18.8	21.5	24.2	27.5	31.5	32.9	37.4	43.0	42.5	48.4	55.8	52.8	60.1	69.6	62.7	71.4	83.0
	20	16.8	19.1	21.8	24.5	27.9	31.9	33.4	38.0	43.6	43.1	49.0	56.5	53.5	60.9	70.5	63.5	72.3	84.0
	30	17.3	19.6	22.4	25.2	28.6	32.8	34.3	38.9	44.7	44.2	50.3	57.9	54.8	62.4	72.2	65.0	74.0	85.9
	40	17.5	19.9	22.7	25.5	29.0	33.2	34.8	39.5	45.4	44.9	51.1	59.0	55.8	63.5	73.6	66.2	75.5	87.8
	50	17.5	19.9	22.8	25.7	29.2	33.5	35.0	39.9	45.9	45.4	51.7	59.8	56.6	64.6	75.0	67.4	77.0	89.9
70	0	14.3	16.2	18.5	20.7	23.6	27.0	28.1	32.0	36.7	36.2	41.2	47.5	44.9	51.1	59.1	54.1	61.6	71.5
	10	14.8	16.8	19.2	21.4	24.4	27.9	29.1	33.0	37.9	37.4	42.6	49.0	46.4	52.8	61.0	55.8	63.6	73.7
	15	15.0	17.1	19.5	21.8	24.7	28.3	29.5	33.5	38.5	38.0	43.2	49.7	47.0	53.6	61.9	56.6	64.5	74.8
	20	15.2	17.3	19.7	22.1	25.1	28.7	29.9	34.0	39.0	38.5	43.8	50.4	47.7	54.3	62.7	57.3	65.3	75.7
	30	15.7	17.8	20.3	22.7	25.8	29.5	30.7	34.9	40.0	39.5	44.9	51.7	48.9	55.6	64.2	58.8	66.9	77.5
	40	15.9	18.0	20.5	23.0	26.1	29.9	31.1	35.4	40.6	40.1	45.6	52.5	49.7	56.6	65.4	59.8	68.2	79.1
	50	15.9	18.0	20.6	23.1	26.2	30.1	31.3	35.7	41.0	40.5	46.1	53.2	50.3	57.4	66.5	60.7	69.4	80.7
60	0	12.8	14.6	16.6	18.4	20.9	23.9	24.8	28.2	32.3	31.7	36.1	41.5	39.3	44.7	51.6	47.4	53.9	62.4
	10	13.3	15.1	17.2	19.0	21.6	24.7	25.6	29.1	33.3	32.8	37.3	42.9	40.6	46.2	53.3	48.9	55.7	64.4
	15	13.5	15.3	17.5	19.3	22.0	25.1	26.0	29.5	33.8	33.3	37.9	43.5	41.2	46.9	54.0	49.6	56.5	65.3
	20	13.7	15.5	17.7	19.6	22.3	25.5	26.4	29.9	34.3	33.8	38.4	44.1	41.8	47.5	54.7	50.3	57.2	66.1
	30	14.1	16.0	18.2	20.1	22.9	26.1	27.1	30.7	35.2	34.6	39.4	45.2	42.8	48.7	56.1	51.5	58.6	67.8
	40	14.2	16.1	18.4	20.4	23.2	26.5	27.4	31.2	35.7	35.1	40.0	46.0	43.5	49.5	57.1	52.4	59.7	69.1
	50	14.2	16.2	18.5	20.5	23.3	26.6	27.6	31.4	36.0	35.4	40.3	46.5	44.0	50.1	57.9	53.1	60.6	70.3
50	0	11.4	12.9	14.7	16.1	18.3	20.9	21.4	24.3	27.9	27.3	31.0	35.6	33.5	38.1	43.9	40.3	45.8	52.9
	10	11.8	13.4	15.2	16.6	18.9	21.6	22.2	25.2	28.8	28.2	32.0	36.7	34.6	39.4	45.3	41.6	47.3	54.6
	15	11.9	13.6	15.5	16.9	19.2	21.9	22.5	25.6	29.2	28.6	32.5	37.3	35.2	40.0	46.0	42.2	48.0	55.4
	20	12.1	13.8	15.7	17.1	19.5	22.2	22.8	25.9	29.7	29.0	32.9	37.8	35.6	40.5	46.6	42.8	48.7	56.1
	30	12.5	14.1	16.1	17.6	20.0	22.8	23.4	26.6	30.4	29.8	33.8	38.8	36.6	41.6	47.8	43.9	49.9	57.5
	40	12.6	14.3	16.3	17.8	20.2	23.1	23.7	27.0	30.9	30.2	34.3	39.4	37.1	42.2	48.6	44.6	50.8	58.5
	50	12.6	14.3	16.3	17.9	20.3	23.2	23.8	27.1	31.1	30.4	34.6	39.7	37.4	42.6	49.1	45.1	51.4	59.4
40	0	10.0	11.3	12.9	13.8	15.6	17.8	18.1	20.6	23.5	22.8	25.9	29.6	27.8	31.6	36.3	33.2	37.7	43.4
	10	10.3	11.7	13.3	14.2	16.2	18.4	18.7	21.2	24.3	23.5	26.7	30.6	28.7	32.7	37.5	34.3	39.0	44.8
	15	10.5	11.9	13.5	14.4	16.4	18.7	19.0	21.6	24.7	23.9	27.1	31.1	29.2	33.1	38.0	34.8	39.5	45.5
	20	10.6	12.0	13.7	14.7	16.6	19.0	19.3	21.9	25.0	24.2	27.5	31.5	29.6	33.6	38.6	35.3	40.1	46.1
	30	10.9	12.4	14.1	15.1	17.1	19.5	19.8	22.5	25.7	24.9	28.3	32.4	30.4	34.5	39.6	36.2	41.1	47.3
	40	11.0	12.5	14.3	15.2	17.3	19.7	20.0	22.8	26.0	25.2	28.7	32.8	30.8	35.0	40.2	36.7	41.8	48.0
	50	11.0	12.5	14.3	15.3	17.3	19.8	20.1	22.9	26.2	25.3	28.8	33.1	31.0	35.3	40.5	37.0	42.2	48.6

***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	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.6	15.9	24.8	34.3	44.3	54.6	65.2	76.0	86.9
	MAX AUTO	7.1	14.7	22.8	31.5	40.9	51.1	62.0	73.7	86.4
	AUTOBRAKE 3	6.6	13.5	20.8	28.5	36.9	45.9	55.7	66.5	78.4
	AUTOBRAKE 2	6.0	12.1	18.4	25.1	32.2	40.0	48.4	57.8	68.1
	AUTOBRAKE 1	5.6	11.0	16.4	22.1	28.0	34.4	41.5	49.4	58.3

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.2	15.0	23.4	32.2	41.5	51.2	61.2	71.5	82.1
	MAX AUTO	5.9	12.3	19.4	27.2	35.7	45.0	55.1	66.2	78.3
	AUTOBRAKE 3	4.1	8.8	14.0	20.0	26.6	34.0	42.1	51.1	60.9
	AUTOBRAKE 2	2.2	4.8	8.1	11.9	16.3	21.4	27.2	33.6	40.8
	AUTOBRAKE 1	1.7	3.5	5.5	7.9	10.7	14.1	18.3	23.3	29.2

Cooling Time (Minutes) - Category H Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category P Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	35.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

ADVISORY INFORMATION

Recommended Brake Cooling Schedule - High Altitudes

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)															
		60				100				140				180			
WEIGHT (1000 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)															
		10	12	14	14.5	10	12	14	14.5	10	12	14	14.5	10	12	14	14.5
80	0	12.6	13.2	13.9	14.1	30.0	31.8	33.7	34.2	53.3	56.7	60.5	61.6	79.4	85.0		
	10	13.0	13.7	14.4	14.6	31.0	32.8	34.8	35.4	55.0	58.5	62.5	63.6	81.9	87.6		
	15	13.2	13.9	14.6	14.8	31.5	33.3	35.3	35.9	55.8	59.4	63.3	64.4	83.0	88.8		
	20	13.4	14.1	14.9	15.1	31.9	33.8	35.8	36.4	56.5	60.1	64.2	65.3	84.0	89.9		
	30	13.7	14.5	15.3	15.5	32.8	34.7	36.7	37.3	57.9	61.6	65.7	66.9	85.9	91.9		
	40	13.9	14.7	15.4	15.7	33.2	35.2	37.3	37.9	59.0	62.7	67.0	68.2	87.8	94.0		
	50	13.9	14.7	15.5	15.7	33.5	35.5	37.6	38.2	59.8	63.7	68.1	69.3	89.9	96.4		
70	0	11.5	12.1	12.8	13.0	27.0	28.5	30.2	30.7	47.5	50.4	53.8	54.7	71.5	76.4	82.0	83.6
	10	11.9	12.6	13.2	13.4	27.9	29.5	31.2	31.7	49.0	52.1	55.5	56.5	73.7	78.8	84.5	86.1
	15	12.1	12.7	13.4	13.6	28.3	29.9	31.7	32.2	49.7	52.8	56.3	57.3	74.8	79.9	85.7	87.3
	20	12.3	12.9	13.6	13.8	28.7	30.3	32.1	32.6	50.4	53.5	57.0	58.0	75.7	80.9	86.7	88.4
	30	12.6	13.3	14.0	14.2	29.5	31.1	33.0	33.5	51.7	54.9	58.5	59.5	77.5	82.7	88.7	90.4
	40	12.8	13.4	14.2	14.4	29.9	31.6	33.5	34.0	52.5	55.8	59.5	60.5	79.1	84.5	90.7	92.4
	50	12.8	13.5	14.2	14.4	30.1	31.8	33.7	34.2	53.2	56.6	60.4	61.4	80.7	86.4	92.9	94.7
60	0	10.5	11.0	11.6	11.8	23.9	25.3	26.7	27.1	41.5	44.1	46.9	47.7	62.4	66.6	71.2	72.5
	10	10.8	11.4	12.0	12.2	24.7	26.1	27.6	28.0	42.9	45.5	48.4	49.2	64.4	68.7	73.5	74.8
	15	11.0	11.6	12.2	12.4	25.1	26.5	28.1	28.5	43.5	46.2	49.1	49.9	65.3	69.6	74.5	75.9
	20	11.2	11.8	12.4	12.6	25.5	26.9	28.5	28.9	44.1	46.8	49.8	50.6	66.1	70.5	75.4	76.8
	30	11.5	12.1	12.7	12.9	26.1	27.6	29.2	29.7	45.2	48.0	51.0	51.8	67.8	72.2	77.2	78.6
	40	11.6	12.2	12.9	13.1	26.5	28.0	29.6	30.1	46.0	48.8	51.9	52.7	69.1	73.6	78.8	80.3
	50	11.6	12.2	12.9	13.1	26.6	28.2	29.8	30.3	46.5	49.3	52.5	53.4	70.3	75.1	80.5	82.0
50	0	9.5	10.0	10.5	10.7	20.9	22.1	23.3	23.7	35.6	37.7	40.0	40.7	52.9	56.3	60.1	61.1
	10	9.8	10.3	10.9	11.1	21.6	22.8	24.1	24.5	36.7	38.9	41.3	42.0	54.6	58.1	62.0	63.1
	15	10.0	10.5	11.0	11.2	21.9	23.2	24.5	24.9	37.3	39.5	41.9	42.6	55.4	58.9	62.9	64.0
	20	10.1	10.6	11.2	11.4	22.2	23.5	24.8	25.2	37.8	40.0	42.5	43.2	56.1	59.7	63.7	64.8
	30	10.4	10.9	11.5	11.7	22.8	24.1	25.5	25.9	38.8	41.1	43.6	44.3	57.5	61.2	65.3	66.4
	40	10.5	11.1	11.6	11.8	23.1	24.4	25.8	26.2	39.4	41.7	44.3	45.0	58.5	62.3	66.5	67.7
	50	10.5	11.1	11.7	11.9	23.2	24.5	25.9	26.3	39.7	42.1	44.8	45.5	59.4	63.3	67.6	68.8
40	0	8.5	9.0	9.5	9.6	17.8	18.8	19.9	20.2	29.6	31.4	33.2	33.7	43.4	46.1	49.0	49.8
	10	8.8	9.3	9.8	9.9	18.4	19.5	20.5	20.8	30.6	32.4	34.4	34.9	44.8	47.6	50.6	51.5
	15	9.0	9.4	9.9	10.1	18.7	19.8	20.9	21.2	31.1	32.9	34.9	35.4	45.5	48.3	51.4	52.2
	20	9.1	9.6	10.1	10.3	19.0	20.0	21.2	21.5	31.5	33.4	35.4	35.9	46.1	48.9	52.1	52.9
	30	9.4	9.9	10.4	10.5	19.5	20.6	21.7	22.0	32.4	34.2	36.3	36.9	47.3	50.2	53.4	54.3
	40	9.5	10.0	10.5	10.7	19.7	20.8	22.0	22.3	32.8	34.7	36.8	37.4	48.0	51.0	54.3	55.2
	50	9.5	10.0	10.5	10.7	19.8	20.9	22.1	22.4	33.1	35.0	37.1	37.7	48.6	51.6	55.0	55.9

***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 - High Altitudes

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.6	15.9	24.8	34.3	44.3	54.6	65.2	76.0	86.9
	MAX AUTO	7.1	14.7	22.8	31.5	40.9	51.1	62.0	73.7	86.4
	AUTOBRAKE 3	6.6	13.5	20.8	28.5	36.9	45.9	55.7	66.5	78.4
	AUTOBRAKE 2	6.0	12.1	18.4	25.1	32.2	40.0	48.4	57.8	68.1
	AUTOBRAKE 1	5.6	11.0	16.4	22.1	28.0	34.4	41.5	49.4	58.3

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.2	15.0	23.4	32.2	41.5	51.2	61.2	71.5	82.1
	MAX AUTO	5.9	12.3	19.4	27.2	35.7	45.0	55.1	66.2	78.3
	AUTOBRAKE 3	4.1	8.8	14.0	20.0	26.6	34.0	42.1	51.1	60.9
	AUTOBRAKE 2	2.2	4.8	8.1	11.9	16.3	21.4	27.2	33.6	40.8
	AUTOBRAKE 1	1.7	3.5	5.5	7.9	10.7	14.1	18.3	23.3	29.2

Cooling Time (Minutes) - Category H Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category P Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	35.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

Intentionally
Blank

ENGINE INOP

Initial Max Continuous %N1

Based on .80M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.9	96.6	96.4	96.2	96.0	95.5	95.1	94.8	94.2
15	97.5	97.2	96.9	96.8	96.7	96.3	95.8	95.6	95.0
10	98.1	97.9	97.5	97.4	97.4	97.0	96.6	96.4	95.9
5	98.1	98.6	98.4	98.1	98.1	97.8	97.4	97.2	96.7
0	97.3	98.5	99.2	99.0	98.9	98.6	98.2	98.0	97.7
-5	96.5	97.8	98.9	99.8	99.7	99.3	99.0	98.8	98.5
-10	95.8	97.0	98.2	99.4	100.5	100.2	99.9	99.7	99.5
-15	95.0	96.2	97.4	98.6	99.9	101.0	100.8	100.6	100.4
-20	94.2	95.4	96.6	97.8	99.1	100.2	100.8	100.6	100.4
-25	93.4	94.6	95.8	97.0	98.3	99.4	100.0	99.8	99.6
-30	92.6	93.8	95.0	96.2	97.5	98.6	99.1	98.9	98.7
-35	91.7	93.0	94.1	95.3	96.6	97.7	98.3	98.1	97.9
-40	90.9	92.2	93.3	94.5	95.8	96.9	97.4	97.2	97.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE ON	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.2	-4.4	-4.5	-4.7	-5.0	-4.8	-4.8	-4.8	-4.8

ENGINE INOP

Max Continuous %N1

37000 FT to 29000 FT Pressure Altitudes

37000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.51	96.6	97.6	98.5	99.4	100.2	99.6	98.8	97.6	96.3	94.7	93.2	91.8
200	.63	96.0	96.9	97.8	98.7	99.6	100.4	100.1	99.3	98.4	97.5	96.3	95.2
240	.74	95.1	96.0	96.8	97.7	98.6	99.4	100.3	100.7	100.0	99.2	98.4	97.5
280	.86	94.3	95.2	96.1	97.0	97.8	98.7	99.5	100.4	101.2	100.9	100.0	99.1
35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	96.5	97.4	98.3	99.2	100.1	99.8	99.0	98.0	96.8	95.4	94.0	92.7
200	.60	96.1	97.0	97.9	98.8	99.7	100.6	100.5	99.6	98.6	97.6	96.5	95.4
240	.71	95.0	95.9	96.8	97.7	98.6	99.4	100.3	100.8	100.2	99.5	98.6	97.7
280	.82	93.8	94.6	95.5	96.4	97.3	98.1	98.9	99.8	100.6	100.3	99.5	98.8
33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	97.4	98.3	99.2	100.0	100.8	100.0	99.1	97.9	96.7	95.3	93.9	92.6
200	.58	97.0	97.9	98.8	99.7	100.6	101.4	100.6	99.6	98.6	97.5	96.3	95.1
240	.68	95.9	96.8	97.7	98.5	99.4	100.2	101.1	100.9	100.2	99.4	98.4	97.4
280	.79	94.3	95.1	96.0	96.8	97.7	98.5	99.3	100.2	100.5	99.7	98.9	98.1
320	.89	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	100.3	101.1	100.7	99.8
31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	97.3	98.2	99.1	100.0	100.9	101.1	100.2	99.2	98.0	96.6	95.2	93.9
200	.55	97.1	98.0	98.9	99.7	100.6	101.5	101.6	100.7	99.7	98.6	97.4	96.2
240	.66	95.6	96.5	97.4	98.3	99.1	100.0	100.8	101.3	100.5	99.8	98.8	97.8
280	.76	93.8	94.7	95.5	96.4	97.2	98.0	98.8	99.7	100.5	99.8	98.9	98.0
320	.85	92.4	93.2	94.1	94.9	95.7	96.5	97.4	98.2	98.9	99.7	99.9	99.1
29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	98.1	99.0	99.9	100.8	101.6	101.2	100.2	99.1	97.9	96.4	95.1	93.8
200	.53	97.5	98.4	99.3	100.2	101.0	101.9	101.3	100.4	99.3	98.2	96.9	95.8
240	.63	96.3	97.1	98.0	98.9	99.7	100.5	101.4	101.1	100.2	99.2	98.3	97.2
280	.73	94.2	95.0	95.9	96.7	97.5	98.3	99.1	99.9	100.1	99.1	98.2	97.5
320	.82	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	98.5	97.6
360	.91	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	100.0	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.1	-4.3	-4.5	-4.7	-4.7

ENGINE INOP

Max Continuous %N1
27000 FT to 20000 FT Pressure Altitudes

27000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	98.0	98.8	99.7	100.6	101.4	102.2	101.2	100.2	99.0	97.8	96.4	95.1
200	.51	96.9	97.8	98.7	99.6	100.4	101.2	101.8	100.8	99.9	98.8	97.6	96.4
240	.60	95.6	96.5	97.4	98.2	99.1	99.9	100.7	101.3	100.4	99.4	98.5	97.5
280	.70	93.6	94.4	95.3	96.1	96.9	97.7	98.5	99.3	100.1	99.4	98.4	97.6
320	.79	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	98.6	97.8
360	.88	91.0	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	98.1	98.8	99.4
25000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.8	99.7	100.5	101.4	102.2	102.4	101.4	100.3	99.1	97.7	96.5	95.2
200	.49	97.5	98.3	99.2	100.0	100.9	101.7	101.5	100.6	99.5	98.4	97.3	96.2
240	.58	95.7	96.5	97.4	98.2	99.0	99.9	100.7	100.5	99.5	98.6	97.6	96.7
280	.67	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.5	99.5	98.6	97.6	96.9
320	.76	91.7	92.6	93.4	94.2	95.0	95.8	96.5	97.3	98.0	98.6	97.8	97.2
360	.85	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.6	98.4	98.2
24000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	98.6	99.5	100.4	101.2	102.1	102.9	101.9	100.8	99.6	98.4	97.1	95.8
200	.48	97.5	98.4	99.2	100.1	100.9	101.8	102.2	101.1	100.1	99.0	97.8	96.7
240	.57	95.9	96.8	97.6	98.5	99.3	100.1	100.9	101.2	100.2	99.2	98.2	97.3
280	.66	94.2	95.1	95.9	96.7	97.5	98.3	99.1	99.9	100.4	99.4	98.3	97.5
320	.75	92.1	93.0	93.8	94.6	95.4	96.2	96.9	97.7	98.5	99.2	98.6	97.8
360	.83	90.6	91.4	92.2	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.6
22000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	99.1	100.0	100.9	101.7	102.5	102.8	101.8	100.7	99.5	98.2	97.0	95.8
200	.46	98.4	99.3	100.1	101.0	101.8	102.6	102.3	101.2	100.0	98.9	97.8	96.8
240	.55	97.2	98.1	98.9	99.7	100.5	101.3	102.1	101.6	100.5	99.4	98.5	97.5
280	.63	95.7	96.5	97.4	98.2	99.0	99.8	100.6	101.3	101.0	99.8	98.9	98.1
320	.72	93.9	94.7	95.5	96.3	97.1	97.9	98.6	99.4	100.1	100.2	99.3	98.6
360	.80	92.2	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	99.2	99.7	99.1
20000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	98.7	99.5	100.4	101.2	102.0	102.8	102.5	101.5	100.4	99.2	98.0	96.8
200	.44	98.3	99.2	100.0	100.9	101.7	102.5	103.3	102.3	101.1	100.0	98.9	97.8
240	.53	97.5	98.4	99.2	100.0	100.8	101.7	102.5	103.1	101.8	100.5	99.5	98.6
280	.61	96.2	97.0	97.8	98.7	99.5	100.3	101.1	101.8	102.5	101.3	100.1	99.3
320	.69	94.7	95.5	96.3	97.1	97.9	98.7	99.5	100.2	101.0	101.7	100.9	99.9
360	.77	93.0	93.8	94.6	95.4	96.2	97.0	97.7	98.5	99.2	100.0	100.7	100.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	20	22	24	25	27
ENGINE ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-3.6	-3.8	-3.8	-3.9	-4.0

ENGINE INOP

Max Continuous %N1
18000 FT to 12000 FT Pressure Altitudes

18000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.34	98.5	99.3	100.2	101.0	101.8	102.6	101.6	100.3	99.2	98.1	97.0	95.9
200	.42	98.7	99.6	100.4	101.2	102.0	102.8	103.1	101.7	100.4	99.3	98.3	97.3
240	.51	97.8	98.7	99.5	100.3	101.1	101.9	102.7	102.5	101.1	99.9	99.0	98.1
280	.59	96.3	97.1	97.9	98.7	99.5	100.3	101.0	101.8	101.6	100.5	99.6	98.8
320	.67	94.8	95.6	96.4	97.2	97.9	98.7	99.5	100.2	101.0	100.9	100.0	99.2
360	.75	93.0	93.8	94.6	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.2	99.6

16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	97.1	98.0	98.8	99.6	100.4	101.2	101.6	100.3	99.1	98.1	97.1	96.1
200	.41	98.0	98.8	99.6	100.4	101.2	102.0	102.8	102.5	101.3	100.2	99.3	98.3
240	.49	97.1	97.9	98.7	99.5	100.3	101.1	101.9	102.7	101.8	100.5	99.6	98.7
280	.57	95.6	96.4	97.2	98.0	98.8	99.6	100.3	101.1	101.8	100.9	99.8	99.0
320	.64	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.2	99.4
360	.72	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.4	99.2	99.9	99.6

14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	96.6	97.4	98.2	99.0	99.8	100.6	100.4	99.1	98.0	97.1	96.2	95.3
200	.39	97.1	97.9	98.7	99.5	100.3	101.1	101.8	101.5	101.0	100.1	99.3	98.4
240	.47	96.6	97.4	98.2	99.0	99.8	100.6	101.3	101.8	101.1	100.3	99.5	98.7
280	.54	95.5	96.3	97.1	97.8	98.6	99.4	100.1	100.9	101.0	100.1	99.2	98.5
320	.62	94.1	94.9	95.7	96.5	97.2	98.0	98.7	99.5	100.2	100.3	99.5	98.8
360	.69	92.2	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.6	99.0

12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	96.3	97.0	97.8	98.6	99.4	100.1	99.3	98.1	97.1	96.3	95.4	94.5
200	.38	97.1	97.9	98.7	99.5	100.3	101.0	101.5	100.8	99.8	99.0	98.2	97.3
240	.45	96.5	97.3	98.0	98.8	99.6	100.3	101.1	101.0	100.1	99.4	98.6	97.9
280	.52	95.5	96.3	97.0	97.8	98.6	99.3	100.0	100.8	100.3	99.4	98.6	98.0
320	.60	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	99.7	98.9	98.2
360	.67	92.3	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	99.4	99.1	98.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	12	14	16	18
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-3.2	-3.4	-3.4	-3.5

ENGINE INOP

Max Continuous %N1

10000 FT to 1000 FT Pressure Altitudes

10000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.29	95.2	96.0	96.8	97.6	98.3	99.1	99.8	98.6	97.4	96.6	95.8	94.9
200	.36	96.0	96.7	97.5	98.3	99.0	99.8	100.5	100.5	99.4	98.5	97.8	97.0
240	.43	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.1	99.2	98.4	97.7
280	.51	94.5	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.4	99.5	98.7	98.0
320	.58	93.0	93.9	94.7	95.5	96.2	97.0	97.8	98.6	99.3	99.7	99.0	98.2
360	.65	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	99.1	98.5

5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	94.9	95.7	96.4	97.2	98.0	98.8	99.2	98.3	97.4	96.6	95.9	95.1
200	.33	94.7	95.5	96.3	97.1	97.8	98.6	99.4	98.9	98.0	97.3	96.6	95.8
240	.40	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.5	98.7	97.9	97.2	96.5
280	.46	93.3	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	98.2	97.5	96.8
320	.53	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	98.7	98.4	97.7	97.1
360	.59	91.5	92.3	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.0	97.3

3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	94.8	95.6	96.4	97.2	98.0	98.7	98.8	97.9	97.1	96.4	95.6	94.8
200	.32	94.5	95.3	96.1	96.9	97.6	98.4	99.2	98.3	97.5	96.8	96.1	95.3
240	.38	94.1	94.9	95.6	96.4	97.2	98.0	98.7	98.8	98.0	97.2	96.6	95.9
280	.45	93.2	94.0	94.8	95.6	96.4	97.2	97.9	98.7	98.3	97.5	96.9	96.2
320	.51	92.5	93.3	94.1	94.9	95.7	96.4	97.2	98.0	98.5	97.8	97.1	96.5
360	.57	91.6	92.4	93.2	94.0	94.7	95.5	96.3	97.1	97.8	98.1	97.4	96.8

1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	93.9	94.7	95.4	96.2	97.0	97.8	98.5	98.2	97.4	96.7	96.0	95.2
200	.31	93.5	94.3	95.1	95.9	96.7	97.4	98.2	98.5	97.8	97.0	96.3	95.6
240	.37	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	98.1	97.3	96.6	95.9
280	.43	92.3	93.2	93.9	94.7	95.5	96.3	97.1	97.8	98.3	97.6	96.9	96.2
320	.49	91.6	92.4	93.2	94.0	94.8	95.6	96.3	97.1	97.9	97.9	97.2	96.5
360	.55	90.7	91.5	92.3	93.1	93.9	94.7	95.4	96.2	96.9	97.7	97.3	96.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-3.1	-3.2

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	82	256	18200	17000	15800
80	77	249	19800	18700	17400
75	72	241	21300	20400	19200
70	67	233	22800	21900	20900
65	62	225	24500	23600	22600
60	57	216	26500	25500	24500
55	53	207	28600	27700	26700
50	48	198	30700	30000	29000
45	43	188	32900	32200	31300
40	38	179	35300	34600	33700

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)				
HEAD WIND COMPONENT (KTS)						TAIL WIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
141	130	121	113	106	100	94	89	85	81	77
282	260	242	226	212	200	188	179	170	162	154
422	390	363	339	318	300	283	268	255	243	232
563	520	484	452	424	400	378	358	340	324	310
703	650	604	565	530	500	472	448	426	406	387
843	779	725	678	636	600	567	537	511	487	465
982	909	846	791	742	700	661	627	596	569	543
1122	1038	966	903	848	800	756	717	682	650	621
1262	1168	1087	1016	954	900	851	807	767	732	699
1401	1297	1207	1129	1060	1000	945	897	853	813	777
1541	1426	1328	1242	1166	1100	1040	986	938	895	855
1680	1556	1448	1355	1272	1200	1135	1076	1024	976	933
1820	1685	1569	1467	1378	1300	1229	1166	1109	1057	1010
1960	1815	1689	1580	1484	1400	1324	1256	1195	1139	1088
2100	1944	1810	1693	1590	1500	1418	1346	1280	1220	1166
2240	2074	1931	1806	1697	1600	1513	1435	1365	1302	1244
2381	2204	2052	1919	1803	1700	1607	1525	1450	1383	1321
2522	2334	2173	2032	1909	1800	1702	1615	1536	1464	1399

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	40	45	50	55	60	65	70	75	80	85	
100	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0:18
200	0.8	0.9	0.9	0.9	1.0	1.1	1.2	1.2	1.3	1.3	0:35
300	1.3	1.4	1.5	1.5	1.7	1.8	1.9	2.0	2.1	2.2	0:52
400	1.7	1.8	2.0	2.1	2.3	2.5	2.6	2.8	2.9	3.1	1:10
500	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	1:27
600	2.5	2.8	3.0	3.2	3.5	3.7	4.0	4.2	4.4	4.7	1:44
700	2.9	3.2	3.5	3.8	4.0	4.3	4.6	4.9	5.2	5.5	2:01
800	3.3	3.6	4.0	4.3	4.6	4.9	5.3	5.6	5.9	6.3	2:18
900	3.7	4.1	4.4	4.8	5.2	5.5	5.9	6.3	6.6	7.0	2:35
1000	4.1	4.5	4.9	5.3	5.7	6.1	6.6	7.0	7.4	7.8	2:52
1100	4.5	4.9	5.4	5.8	6.3	6.7	7.2	7.6	8.1	8.6	3:09
1200	4.9	5.4	5.9	6.3	6.8	7.3	7.8	8.3	8.8	9.3	3:26
1300	5.3	5.8	6.3	6.8	7.4	7.9	8.4	9.0	9.5	10.1	3:43
1400	5.6	6.2	6.8	7.3	7.9	8.5	9.1	9.6	10.2	10.8	4:00
1500	6.0	6.6	7.2	7.8	8.5	9.1	9.7	10.3	10.9	11.5	4:17
1600	6.4	7.0	7.7	8.3	9.0	9.6	10.3	10.9	11.6	12.3	4:35
1700	6.8	7.4	8.1	8.8	9.5	10.2	10.9	11.6	12.3	13.0	4:52
1800	7.1	7.9	8.6	9.3	10.0	10.8	11.5	12.2	12.9	13.7	5:09

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at LRC 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
85	15400	13200	10200
80	17300	15600	13000
75	19300	17700	15600
70	21000	19800	17800
65	22600	21500	20100
60	24200	23200	21900
55	26500	25000	23800
50	29200	27900	26200
45	31500	30600	29300
40	33900	33000	31900

With engine anti-ice on, decrease altitude capability by 1300 ft.
With engine and wing anti-ice on, decrease altitude capability by 5900 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	15	17	19	21	23	25	27	29	31	33
85	%N1	91.7	95.4	97.8								
	MACH	.548	.582	.597								
	KIAS	304	294	291								
	FF/ENG	3048	2989	3006								
80	%N1	90.3	93.7	95.7	98.5							
	MACH	.536	.572	.586	.601							
	KIAS	297	289	285	281							
	FF/ENG	2883	2820	2805	2840							
75	%N1	88.7	92.2	93.8	96.0							
	MACH	.524	.562	.575	.589							
	KIAS	290	284	279	276							
	FF/ENG	2718	2662	2629	2625							
70	%N1	87.1	90.6	92.0	93.8	96.2						
	MACH	.510	.549	.564	.577	.592						
	KIAS	283	277	274	270	266						
	FF/ENG	2553	2499	2471	2440	2452						
65	%N1	85.4	88.9	90.3	91.8	93.7	96.4					
	MACH	.496	.534	.550	.565	.579	.594					
	KIAS	274	269	267	264	260	256					
	FF/ENG	2390	2336	2310	2281	2258	2283					
60	%N1	83.6	87.0	88.5	89.9	91.5	93.5	96.3				
	MACH	.480	.519	.535	.550	.566	.579	.595				
	KIAS	266	261	259	257	254	250	246				
	FF/ENG	2226	2172	2146	2120	2096	2080	2113				
55	%N1	81.5	85.0	86.4	87.9	89.4	91.0	93.1	96.0			
	MACH	.464	.502	.518	.534	.550	.566	.579	.595			
	KIAS	256	253	251	249	246	244	239	236			
	FF/ENG	2059	2008	1983	1958	1936	1916	1906	1941			
50	%N1	79.3	82.8	84.3	85.7	87.2	88.7	90.3	92.5	95.5		
	MACH	.446	.483	.499	.515	.531	.548	.564	.578	.594		
	KIAS	246	243	242	240	238	236	233	229	226		
	FF/ENG	1894	1845	1821	1796	1774	1754	1740	1735	1765		
45	%N1	76.9	80.4	81.8	83.3	84.7	86.2	87.7	89.3	91.6	94.6	
	MACH	.427	.463	.479	.495	.511	.528	.544	.561	.576	.592	
	KIAS	236	233	231	230	228	226	224	222	218	215	
	FF/ENG	1733	1680	1658	1635	1613	1593	1578	1570	1564	1589	
40	%N1	74.5	77.7	79.2	80.6	82.1	83.5	85.0	86.5	88.1	90.3	93.2
	MACH	.407	.441	.456	.472	.488	.505	.521	.539	.556	.571	.587
	KIAS	225	222	220	219	218	216	214	213	210	207	204
	FF/ENG	1575	1516	1494	1473	1453	1434	1419	1409	1401	1395	1409

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (KTS)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
295	270	248	230	214	200	190	180	172	164	158
594	543	498	461	429	400	379	361	344	328	315
895	817	749	692	643	600	569	541	516	492	472
1196	1091	999	923	858	800	759	722	687	656	629
1500	1368	1252	1155	1073	1000	949	902	859	820	785
1805	1645	1504	1387	1288	1200	1138	1081	1030	983	942
2113	1924	1758	1621	1504	1400	1327	1261	1201	1146	1098
2422	2204	2013	1854	1719	1600	1517	1442	1372	1309	1253
2733	2485	2267	2087	1935	1800	1707	1621	1543	1472	1409

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	0:41	1.1	0:39	1.0	0:38	0.9	0:37
400	2.9	1:22	2.6	1:18	2.4	1:15	2.2	1:13	2.1	1:11
600	4.4	2:02	4.0	1:57	3.7	1:52	3.4	1:48	3.3	1:44
800	5.8	2:42	5.4	2:35	5.0	2:28	4.6	2:23	4.4	2:18
1000	7.3	3:23	6.7	3:14	6.2	3:05	5.8	2:58	5.6	2:52
1200	8.7	4:05	8.0	3:53	7.4	3:43	6.9	3:33	6.7	3:26
1400	10.1	4:47	9.4	4:33	8.7	4:20	8.1	4:09	7.8	4:01
1600	11.5	5:29	10.7	5:13	9.9	4:58	9.2	4:45	8.8	4:36
1800	12.9	6:12	11.9	5:53	11.1	5:36	10.3	5:22	9.9	5:10

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
1	-0.1	-0.1	0.0	0.1	0.2
2	-0.3	-0.1	0.0	0.3	0.6
3	-0.4	-0.2	0.0	0.5	1.0
4	-0.6	-0.3	0.0	0.7	1.4
5	-0.7	-0.4	0.0	0.9	1.8
6	-0.9	-0.4	0.0	1.1	2.2
7	-1.0	-0.5	0.0	1.3	2.6
8	-1.2	-0.6	0.0	1.5	2.9
9	-1.3	-0.7	0.0	1.6	3.3
10	-1.5	-0.7	0.0	1.8	3.7
11	-1.6	-0.8	0.0	2.0	4.1
12	-1.8	-0.9	0.0	2.1	4.4
13	-1.9	-1.0	0.0	2.3	4.8
14	-2.0	-1.0	0.0	2.4	5.2

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT) 1500	5000	10000	15000	20000	25000	30000	35000
90	%N1	82.9	85.7	90.0	95.1				
	KIAS	257	258	259	261				
	FF/ENG	2910	2910	2930	3020				
85	%N1	81.2	84.1	88.3	92.9				
	KIAS	250	251	252	253				
	FF/ENG	2740	2740	2750	2810				
80	%N1	79.6	82.4	86.6	91.0	98.6			
	KIAS	242	243	244	245	247			
	FF/ENG	2590	2570	2570	2610	2770			
75	%N1	77.9	80.6	84.8	89.2	95.3			
	KIAS	234	236	236	238	239			
	FF/ENG	2430	2410	2400	2430	2500			
70	%N1	76.1	78.7	82.9	87.1	92.3			
	KIAS	227	227	228	229	231			
	FF/ENG	2270	2250	2240	2250	2280			
65	%N1	74.1	76.8	80.8	85.1	89.7	98.0		
	KIAS	219	219	220	221	222	224		
	FF/ENG	2110	2090	2070	2080	2090	2260		
60	%N1	71.9	74.8	78.6	82.9	87.4	94.0		
	KIAS	210	210	211	212	213	214		
	FF/ENG	1960	1940	1910	1910	1910	1980		
55	%N1	69.6	72.4	76.3	80.5	84.9	90.1		
	KIAS	200	201	202	203	204	205		
	FF/ENG	1810	1780	1760	1740	1740	1770		
50	%N1	67.1	69.8	73.9	77.9	82.3	87.0	95.2	
	KIAS	191	191	192	193	194	195	196	
	FF/ENG	1660	1630	1610	1580	1570	1580	1700	
45	%N1	64.5	67.1	71.2	75.2	79.5	84.0	89.8	
	KIAS	182	182	182	183	184	185	186	
	FF/ENG	1510	1480	1450	1430	1410	1410	1460	
40	%N1	61.4	64.3	68.1	72.3	76.3	80.8	85.6	94.5
	KIAS	175	175	175	175	175	175	175	176
	FF/ENG	1360	1340	1310	1280	1250	1240	1270	1370

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

GEAR DOWN

Long Range Cruise Altitude Capability

Max Cruise Thrust, 100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15100	12000	8900
80	17900	15100	12100
75	20800	18000	15300
70	23300	20900	18200
65	25800	24000	21300
60	28300	26800	24900
55	30600	29400	27800
50	32700	31700	30400
45	34900	33900	32700
40	37300	36300	35200

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	21	23	25	27	29	31	33	35	37
85	%N1	86.2									
	MACH	.482									
	KIAS	267									
	FF/ENG	2446									
80	%N1	84.5									
	MACH	.468									
	KIAS	259									
	FF/ENG	2294									
75	%N1	82.8	92.1								
	MACH	.454	.554								
	KIAS	251	248								
	FF/ENG	2145	2123								
70	%N1	80.9	90.1	92.1							
	MACH	.440	.541	.557							
	KIAS	243	242	240							
	FF/ENG	1998	1981	1971							
65	%N1	78.9	88.2	89.8	92.0	95.0					
	MACH	.425	.524	.543	.560	.578					
	KIAS	235	234	233	231	229					
	FF/ENG	1855	1832	1825	1824	1858					
60	%N1	76.8	85.9	87.7	89.4	91.7	94.9				
	MACH	.409	.504	.525	.544	.562	.580				
	KIAS	226	225	225	224	222	220				
	FF/ENG	1716	1678	1679	1676	1681	1716				
55	%N1	74.7	83.6	85.3	87.1	88.9	91.3	94.6			
	MACH	.393	.484	.504	.525	.545	.562	.581			
	KIAS	217	216	216	216	215	213	211			
	FF/ENG	1577	1530	1527	1531	1534	1539	1573			
50	%N1	72.2	81.0	82.7	84.5	86.3	88.1	90.6	93.9		
	MACH	.376	.463	.482	.502	.523	.544	.561	.580		
	KIAS	207	206	206	206	206	205	203	201		
	FF/ENG	1442	1385	1381	1381	1389	1392	1395	1429		
45	%N1	69.5	78.3	80.0	81.7	83.4	85.2	87.1	89.5	92.9	
	MACH	.358	.441	.458	.477	.498	.520	.541	.559	.578	
	KIAS	197	196	196	196	196	196	195	193	191	
	FF/ENG	1311	1244	1237	1237	1242	1247	1251	1252	1280	
40	%N1	66.6	75.2	76.9	78.6	80.3	82.0	83.9	85.8	88.0	91.8
	MACH	.340	.417	.434	.452	.471	.491	.513	.535	.554	.573
	KIAS	187	185	185	185	185	185	185	185	183	181
	FF/ENG	1186	1109	1097	1095	1100	1103	1105	1108	1109	1136

GEAR DOWN

Long Range Cruise 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
324	290	260	236	217	200	188	178	168	160	153
655	584	523	474	435	400	377	357	338	321	307
990	881	787	713	653	600	566	535	507	482	460
1330	1181	1054	953	871	800	755	713	676	642	613
1675	1485	1323	1195	1091	1000	943	891	844	803	766
2026	1792	1593	1436	1310	1200	1131	1069	1013	962	918
2383	2104	1866	1680	1530	1400	1319	1246	1180	1121	1069
2746	2420	2142	1925	1751	1600	1507	1423	1347	1279	1220
3116	2740	2420	2171	1972	1800	1695	1600	1514	1437	1370

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.4	0:49	2.2	0:47	1.9	0:44	1.7	0:42	1.6	0:41
400	5.0	1:36	4.6	1:32	4.1	1:25	3.8	1:20	3.5	1:17
600	7.5	2:25	6.9	2:17	6.2	2:06	5.7	1:59	5.4	1:54
800	9.9	3:14	9.2	3:03	8.2	2:48	7.7	2:38	7.3	2:31
1000	12.3	4:05	11.4	3:51	10.2	3:31	9.6	3:18	9.1	3:08
1200	14.6	4:56	13.6	4:39	12.2	4:14	11.4	3:59	10.8	3:46
1400	16.9	5:49	15.7	5:28	14.1	4:59	13.2	4:40	12.6	4:25
1600	19.1	6:43	17.8	6:19	16.0	5:44	15.0	5:22	14.2	5:04
1800	21.3	7:39	19.9	7:11	17.9	6:30	16.7	6:05	15.9	5:43

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
2	-0.3	-0.2	0.0	0.3	0.7
4	-0.6	-0.3	0.0	0.6	1.4
6	-1.0	-0.5	0.0	0.9	2.0
8	-1.3	-0.7	0.0	1.2	2.6
10	-1.6	-0.8	0.0	1.4	3.2
12	-2.0	-1.0	0.0	1.6	3.7
14	-2.3	-1.2	0.0	1.9	4.2
16	-2.7	-1.3	0.0	2.1	4.6
18	-3.0	-1.5	0.0	2.2	5.0
20	-3.3	-1.7	0.0	2.4	5.4
22	-3.7	-1.8	0.0	2.5	5.7

GEAR DOWN

Descent

VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (KG)	DISTANCE (NM)
41000	21	280	90
39000	20	280	86
37000	19	270	81
35000	19	270	77
33000	18	260	72
31000	17	260	68
29000	16	250	64
27000	16	240	60
25000	15	240	56
23000	14	230	52
21000	13	220	48
19000	12	220	44
17000	12	210	40
15000	11	200	36
10000	8	170	26
5000	6	140	16
1500	4	120	9

Allowances for a straight-in approach are included.

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
90	%N1	77.5	80.2	84.5	89.0				
	KIAS	233	233	233	233				
	FF/ENG	2390	2380	2380	2400				
85	%N1	76.0	78.7	82.9	87.3				
	KIAS	228	228	228	228				
	FF/ENG	2260	2250	2240	2260				
80	%N1	74.4	77.1	81.3	85.6	90.2			
	KIAS	223	223	223	223	223			
	FF/ENG	2130	2120	2100	2110	2130			
75	%N1	72.6	75.5	79.5	83.8	88.4			
	KIAS	218	218	218	218	218			
	FF/ENG	2010	1990	1970	1980	1980			
70	%N1	70.7	73.7	77.6	81.9	86.4	92.0		
	KIAS	213	213	213	213	213	213		
	FF/ENG	1880	1860	1850	1840	1840	1880		
65	%N1	68.9	71.7	75.8	80.0	84.4	89.2		
	KIAS	207	207	207	207	207	207		
	FF/ENG	1770	1740	1720	1710	1700	1720		
60	%N1	67.0	69.7	73.9	77.9	82.3	86.9	94.4	
	KIAS	201	201	201	201	201	201	201	
	FF/ENG	1650	1620	1600	1580	1570	1580	1670	
55	%N1	64.9	67.6	71.7	75.7	80.1	84.6	90.2	
	KIAS	195	195	195	195	195	195	195	
	FF/ENG	1530	1510	1480	1460	1440	1440	1490	
50	%N1	62.5	65.4	69.3	73.5	77.7	82.2	86.9	
	KIAS	189	189	189	189	189	189	189	
	FF/ENG	1420	1390	1360	1340	1320	1320	1340	
45	%N1	60.0	63.0	66.8	71.0	75.1	79.6	84.2	91.2
	KIAS	182	182	182	182	182	182	182	182
	FF/ENG	1300	1280	1250	1230	1200	1190	1210	1260
40	%N1	57.7	60.3	64.4	68.3	72.6	76.9	81.3	86.5
	KIAS	175	175	175	175	175	175	175	175
	FF/ENG	1190	1170	1150	1120	1090	1070	1090	1100

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

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GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
80	76	222	3800	2100	
75	71	217	6200	4700	2600
70	66	212	8600	7300	5300
65	62	207	11000	9800	8000
60	57	201	13300	12400	11000
55	52	195	15800	15000	14000
50	47	189	18400	17500	16700
45	43	182	20900	20100	19200
40	38	176	23300	22500	21700

Includes APU fuel burn.

Long Range Cruise Altitude Capability
100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
75	1100		
70	4200	2000	
65	7300	5600	2900
60	10400	8900	6500
55	13100	12100	10300
50	16000	15200	14200
45	19100	18200	17300
40	22100	21300	20300

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		5	7	9	11	13	15	17	19	21
70	%N1	95.1								
	MACH	.389								
	KIAS	235								
	FF/ENG	3802								
65	%N1	92.8	94.6	97.2						
	MACH	.376	.389	.402						
	KIAS	228	227	226						
	FF/ENG	3509	3512	3554						
60	%N1	90.5	92.1	93.9	96.6					
	MACH	.364	.375	.388	.402					
	KIAS	220	219	218	218					
	FF/ENG	3226	3220	3222	3266					
55	%N1	88.1	89.6	91.3	93.1	95.7				
	MACH	.351	.362	.374	.387	.400				
	KIAS	212	211	210	209	209				
	FF/ENG	2960	2941	2933	2936	2974				
50	%N1	85.7	87.1	88.6	90.2	91.9	94.5	98.5		
	MACH	.338	.348	.359	.371	.384	.398	.412		
	KIAS	204	203	202	201	200	199	198		
	FF/ENG	2710	2680	2660	2651	2654	2677	2758		
45	%N1	83.1	84.4	85.8	87.3	88.9	90.6	93.0	96.8	
	MACH	.325	.334	.344	.355	.367	.380	.393	.408	
	KIAS	196	195	193	192	191	190	189	189	
	FF/ENG	2471	2435	2405	2384	2375	2372	2377	2436	
40	%N1	80.3	81.6	82.9	84.3	85.7	87.3	89.1	91.1	94.4
	MACH	.311	.320	.329	.339	.349	.361	.374	.387	.402
	KIAS	188	186	184	183	182	181	180	179	179
	FF/ENG	2244	2201	2165	2136	2114	2099	2088	2082	2119

GEAR DOWN
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
167	148	132	119	109	100	94	88	82	78	74
341	300	266	239	218	200	187	174	164	155	147
516	454	402	361	328	300	280	261	245	231	219
692	608	537	482	438	400	373	348	326	307	291
869	763	673	603	548	500	465	434	407	383	363
1048	919	809	725	658	600	558	521	488	459	434
1228	1076	947	847	768	700	651	607	568	535	506
1410	1234	1084	970	879	800	744	693	648	610	577
1593	1392	1222	1092	989	900	836	779	729	685	648
1778	1552	1361	1215	1100	1000	929	865	809	760	719

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)					
	6		10		14	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	1.3	0:27	1.1	0:26	1.0	0:26
200	2.6	0:53	2.4	0:50	2.3	0:48
300	4.0	1:18	3.7	1:15	3.6	1:12
400	5.3	1:44	4.9	1:39	4.8	1:35
500	6.6	2:10	6.2	2:04	6.0	1:58
600	7.9	2:37	7.4	2:29	7.2	2:22
700	9.2	3:04	8.6	2:55	8.3	2:46
800	10.4	3:31	9.8	3:20	9.5	3:10
900	11.7	3:58	11.0	3:46	10.6	3:35
1000	12.9	4:25	12.1	4:12	11.7	3:59

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
1	-0.2	-0.1	0.0	0.1	0.3
2	-0.3	-0.2	0.0	0.3	0.6
3	-0.5	-0.3	0.0	0.5	1.0
4	-0.7	-0.4	0.0	0.7	1.3
5	-0.9	-0.4	0.0	0.9	1.7
6	-1.0	-0.5	0.0	1.0	2.0
7	-1.2	-0.6	0.0	1.2	2.4
8	-1.4	-0.7	0.0	1.4	2.7
9	-1.5	-0.8	0.0	1.5	3.0
10	-1.7	-0.9	0.0	1.7	3.4
11	-1.9	-1.0	0.0	1.9	3.7
12	-2.1	-1.1	0.0	2.0	4.0
13	-2.2	-1.1	0.0	2.2	4.4

Includes APU fuel burn.

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
80	%N1	93.6				
	KIAS	223				
	FF/ENG	4160				
75	%N1	91.5	94.8			
	KIAS	218	218			
	FF/ENG	3880	3920			
70	%N1	89.4	92.6			
	KIAS	213	213			
	FF/ENG	3600	3640			
65	%N1	87.4	90.4	95.7		
	KIAS	207	207	207		
	FF/ENG	3340	3360	3430		
60	%N1	85.1	88.1	92.7		
	KIAS	201	201	201		
	FF/ENG	3090	3090	3130		
55	%N1	82.7	85.7	90.2	96.9	
	KIAS	195	195	195	195	
	FF/ENG	2840	2840	2850	2970	
50	%N1	80.1	83.1	87.4	92.4	
	KIAS	189	189	189	189	
	FF/ENG	2600	2590	2590	2630	
45	%N1	77.5	80.4	84.7	89.3	97.1
	KIAS	182	182	182	182	182
	FF/ENG	2380	2360	2340	2360	2470
40	%N1	74.9	77.6	81.9	86.2	91.6
	KIAS	175	175	175	175	175
	FF/ENG	2160	2140	2120	2120	2130

This table includes 5% additional fuel for holding in a racetrack pattern.

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Text Section 55

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 Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

Pitch attitude and average %N1 information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

Max Climb %N1

This table shows Max Climb %N1 for a 280/.80 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (AUTO) and anti-ice on or off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. For packs OFF or HIGH operation, apply the %N1 adjustment shown below the table.

VREF

This table contains flaps 40, 30 and 15 reference speeds for a given weight.

With autothrottles disengaged an approach speed wind correction (max 20 knots) of 1/2 steady headwind component + gust increment above steady wind is recommended. Do not apply a wind correction for tailwinds. The maximum command speed should not exceed landing flap placard speed minus 5 knots.

Advisory Information

Normal Configuration Landing Distance

The normal configuration distance tables are provided as advisory information to help determine the actual landing distance performance of the airplane for different runway surface conditions and brake configurations.

Flaps 15, 30, and 40 landing distances and adjustments are provided for dry runways as well as runways with good, medium, and poor reported braking action, which are commonly referred to as slippery runway conditions.

If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Dry runway landing performance is shown for max manual braking configuration and autobrake settings max, 3, 2, and 1. Use of autobrake setting 1 is not recommended for landings on slippery runways, and is therefore not provided for these conditions. The autobrake performance may be used to assist in the selection of the most desirable autobrake setting for a given field length. Selection of an autobrake setting results in a constant rate of deceleration. Maximum effort manual braking should achieve shorter landing distance than the max autobrake setting. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and normal approach speed for the selected landing flap at sea level, zero wind, zero slope, and two engine detent reverse thrust. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, temperature, speed, and reverse thrust. Each adjustment is independently added to the reference landing distance.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effect of max manual braking and reverse thrust.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the appropriate Recommended Brake Cooling Schedule table (Steel or Carbon Brakes) with the airplane weight and brakes on speed, adjusted for wind at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of.80M 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, TAT, and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level 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 Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

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 .80/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS may 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 (280/.76)
Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)					
		80	100	120	140	160	180
40000	**PITCH ATT**	**4.0**	**4.0**	**4.0**			
	V/S (FT/MIN)	2000	1300	800			
30000	**PITCH ATT**	**4.5**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2800	2100	1700	1300	1000	700
20000	**PITCH ATT**	**7.5**	**6.5**	**6.5**	**6.0**	**6.0**	**6.0**
	V/S (FT/MIN)	4600	3600	2900	2400	2000	1600
10000	**PITCH ATT**	**11.5**	**10.0**	**9.0**	**8.5**	**8.0**	**8.0**
	V/S (FT/MIN)	6200	4900	4000	3300	2800	2400
SEA LEVEL	**PITCH ATT**	**15.5**	**13.0**	**11.5**	**10.5**	**10.0**	**9.5**
	V/S (FT/MIN)	7400	5900	4800	4100	3500	3000

Cruise (.76/280)
Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)					
		80	100	120	140	160	180
40000	**PITCH ATT**	**1.5**	**2.5**	**3.0**	**4.0**		
	%N1	83	85	88	93		
35000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.5**	**4.0**
	%N1	81	82	84	86	88	94
30000	**PITCH ATT**	**0.5**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**
	%N1	81	81	82	84	85	87
25000	**PITCH ATT**	**0.5**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	77	78	79	80	81	83
20000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	74	74	75	76	78	79
15000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	70	70	71	72	74	75

Descent (.76/280)
Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)					
		80	100	120	140	160	180
40000	**PITCH ATT**	**-2.0**	**-1.0**	**0.0**	**0.5**	**1.0**	**1.5**
	V/S (FT/MIN)	-2900	-2600	-2400	-2500	-2700	-3000
30000	**PITCH ATT**	**-4.0**	**-2.5**	**-1.5**	**-0.5**	**0.0**	**0.5**
	V/S (FT/MIN)	-3400	-2800	-2500	-2200	-2100	-2000
20000	**PITCH ATT**	**-4.0**	**-2.5**	**-1.5**	**-0.5**	**0.0**	**1.0**
	V/S (FT/MIN)	-3100	-2500	-2200	-2000	-1900	-1800
10000	**PITCH ATT**	**-4.0**	**-2.5**	**-1.5**	**-0.5**	**0.0**	**1.0**
	V/S (FT/MIN)	-2800	-2300	-2000	-1800	-1700	-1600
SEA LEVEL	**PITCH ATT**	**-4.5**	**-3.0**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2600	-2100	-1800	-1600	-1500	-1400

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Holding (VREF40 + 70)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)					
		80	100	120	140	160	180
10000	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	51	55	60	64	67	70
	KIAS	170	183	201	217	232	247
5000	**PITCH ATT**	**5.0**	**5.5**	**5.5**	**5.0**	**5.0**	5.0
	%N1	47	52	56	60	63	66
	KIAS	170	182	200	216	232	246

Terminal Area (5000 FT)

%N1 for Level Flight

FLAP POSITION (VREF+INCREMENT)		WEIGHT (1000 LB)									
		90	100	110	120	130	140	150	160	170	180
FLAPS 1 (GEAR UP)	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**5.5**	**5.5**	**6.0**	**6.0**	**6.0**	**6.0**	**6.5**
(VREF40+50)	%N1	52	54	56	58	60	62	64	66	67	68
FLAPS 5 (GEAR UP)	**PITCH ATT**	**6.0**	**6.0**	**6.0**	**6.5**	**6.5**	**6.5**	**6.5**	**6.5**	**7.0**	**7.0**
(VREF40+30)	%N1	52	54	57	59	61	63	65	67	68	70
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.0**	**5.0**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**
(VREF40+20)	%N1	59	62	64	67	69	71	73	75	76	78

Final Approach (1500 FT)

Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF+INCREMENT)		WEIGHT (1000 LB)									
		90	100	110	120	130	140	150	160	170	180
FLAPS 15	**PITCH ATT**	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**	**2.0**	**2.0**	**2.0**	**2.0**
(VREF15+10)	%N1	42	44	46	47	49	51	52	54	55	56
FLAPS 30	**PITCH ATT**	**1.0**	**1.0**	**1.0**	**1.0**	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
(VREF30+10)	%N1	47	50	52	54	55	57	59	60	62	63
FLAPS 40	**PITCH ATT**	**0.0**	**0.0**	**0.0.**	**0.0**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
(VREF40+10)	%N	51	54	56	58	60	62	64	66	67	69

Max Climb %N1

Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS OR MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.80	.80	.80
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	94.8	95.0	93.7
55	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.1	94.3	93.0
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.4	93.6	92.4
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	92.7	92.9	91.7
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.4	92.2	91.0
35	94.0	94.3	94.5	94.3	94.0	94.0	93.0	93.3	92.7	91.6
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	94.1	93.5	92.5
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.9	94.4	93.4
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.6	95.1	94.3
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.3	95.9	95.1
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	97.1	96.7	96.0
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.9	97.4	96.8
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.7	98.3	97.8
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.4	99.0	98.6
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.3	99.9	99.6
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.5
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.3	100.9	100.5
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	99.5	100.0	99.7
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	98.6	99.2	98.8
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	97.8	98.3	98.0
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	96.9	97.5	97.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	0	10	20	30	35	41
ENGINE ANTI-ICE	-0.6	-0.8	-0.9	-0.9	-0.8	-0.8
ENGINE & WING ANTI-ICE*	-1.8	-2.1	-2.5	-2.7	-3.0	-3.0

***Dual bleed sources**

Go-around %N1

Based on engine bleed for packs on, engine and wing anti-ice on or off

AIRPORT OAT °C	AIRPORT OAT °F	TAT (°C)	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
			AIRPORT PRESSURE ALTITUDE (FT)											
57	134	60	95.0	96.2	96.8									
52	125	55	95.9	96.7	96.6	96.8	97.5							
47	116	50	96.6	97.6	97.8	97.8	97.7	97.5	98.2	98.8				
42	108	45	97.4	98.4	98.5	98.6	98.7	98.8	98.7	98.5	98.5	99.0		
37	99	40	98.0	99.1	99.2	99.3	99.4	99.5	99.6	99.5	99.1	98.9	98.8	99.1
32	90	35	98.1	99.9	100.0	100.1	100.1	100.3	100.3	100.2	99.9	99.6	99.6	99.5
27	81	30	97.3	99.8	100.4	100.7	100.7	100.7	100.7	100.7	100.6	100.4	100.4	100.3
22	72	25	96.6	99.1	99.7	100.2	100.6	100.9	100.9	100.9	100.9	100.9	100.9	100.8
17	63	20	95.8	98.3	98.9	99.5	99.8	100.2	100.5	100.9	101.0	101.1	101.0	101.0
12	54	15	95.0	97.5	98.1	98.7	99.1	99.4	99.8	100.1	100.5	100.9	101.3	101.2
7	45	10	94.2	96.8	97.4	98.0	98.3	98.7	99.0	99.4	99.8	100.2	100.5	100.9
2	36	5	93.4	96.0	96.6	97.2	97.6	97.9	98.3	98.7	99.0	99.4	99.8	100.2
-3	27	0	92.6	95.2	95.8	96.4	96.8	97.2	97.5	97.9	98.3	98.7	99.0	99.4
-8	18	-5	91.8	94.4	95.0	95.6	96.0	96.4	96.8	97.2	97.5	97.9	98.3	98.6
-13	9	-10	91.0	93.6	94.2	94.8	95.2	95.6	96.0	96.4	96.8	97.1	97.5	97.9
-17	1	-15	90.2	92.8	93.4	94.0	94.4	94.8	95.2	95.6	96.0	96.4	96.7	97.1
-22	-8	-20	89.3	92.0	92.6	93.2	93.6	94.0	94.4	94.8	95.2	95.6	95.9	96.3
-27	-17	-25	88.5	91.1	91.8	92.4	92.8	93.2	93.6	94.0	94.4	94.8	95.1	95.5
-32	-26	-30	87.6	90.3	90.9	91.6	92.0	92.4	92.8	93.3	93.6	94.0	94.3	94.7
-37	-35	-35	86.8	89.4	90.1	90.7	91.1	91.6	92.0	92.4	92.8	93.2	93.5	93.9
-42	-44	-40	85.9	88.6	89.2	89.9	90.3	90.7	91.2	91.6	92.0	92.4	92.7	93.0
-47	-53	-45	85.0	87.7	88.4	89.0	89.4	89.9	90.3	90.8	91.2	91.5	91.9	92.2
-52	-62	-50	84.1	86.8	87.5	88.2	88.6	89.0	89.5	90.0	90.3	90.7	91.0	91.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
	PRESSURE ALTITUDE (FT)											
PACKS OFF	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
A/C HIGH	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

Go-around %N1 - High Altitudes

Based on engine bleeds for packs on, engine anti-ice off, wing anti-ice on or off

AIRPORT OAT		TAT (°C)	AIRPORT PRESSURE ALTITUDE (FT)					
°C	°F		10000	11000	12000	13000	14000	14500
37	99	40	99.1	99.7				
32	90	35	99.5	99.3	99.5	100.1	100.7	
27	81	30	100.3	100.2	100.2	100.0	100.0	100.2
22	72	25	100.8	100.7	100.7	100.6	100.6	100.5
17	63	20	101.0	101.0	101.0	100.9	100.8	100.8
12	54	15	101.2	101.2	101.2	101.2	101.1	101.0
7	45	10	100.9	101.4	101.5	101.4	101.3	101.2
2	36	5	100.2	100.9	101.6	101.6	101.5	101.5
-3	27	0	99.4	100.2	101.0	101.4	101.6	101.6
-8	18	-5	98.6	99.4	100.2	100.6	100.9	101.0
-13	9	-10	97.9	98.6	99.5	99.8	100.1	100.2
-17	1	-15	97.1	97.8	98.7	99.0	99.3	99.4
-22	-8	-20	96.3	97.0	97.9	98.2	98.5	98.6
-27	-17	-25	95.5	96.2	97.1	97.4	97.7	97.8
-32	-26	-30	94.7	95.4	96.2	96.6	96.8	97.0
-37	-35	-35	93.9	94.6	95.4	95.7	96.0	96.1
-42	-44	-40	93.0	93.8	94.6	94.9	95.1	95.3
-47	-53	-45	92.2	92.9	93.7	94.0	94.3	94.4
-52	-62	-50	91.4	92.1	92.9	93.2	93.4	93.5

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)					
	10000	11000	12000	13000	14000	14500
PACKS OFF	0.9	0.9	0.9	1.0	1.0	1.0
ENGINE ANTI-ICE	0.0	-0.8	-1.5	-1.5	-1.5	-1.4

VREF

WEIGHT (1000 LB)	FLAPS		
	40	30	15
190	159	162	172
180	155	158	167
170	150	154	162
160	145	150	158
150	141	145	152
140	136	140	147
130	130	135	142
120	124	130	136
110	119	124	130
100	112	118	124
90	106	112	117

ADVISORY INFORMATION

Normal Configuration Landing Distances

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	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF15	ONE REV	NO REV
MAX MANUAL	2910	190/-155	60/80	-105	370	30	-30	60	-60	205	60	110
MAX AUTO	3780	185/-195	85/110	-140	470	5	0	85	-85	360	5	5
AUTOBRAKE 3	5320	300/-320	140/190	-230	780	5	-10	145	-145	575	0	10
AUTOBRAKE 2	6800	430/-450	205/270	-315	1070	110	-145	190	-190	530	0	270
AUTOBRAKE 1	7460	510/-525	240/320	-365	1250	210	-235	215	-210	515	335	1025

Good Reported Braking Action

MAX MANUAL	4000	215/-220	105/140	-180	625	90	-80	95	-100	285	250	450
MAX AUTO	4430	230/-240	110/145	-185	650	75	-65	100	-105	350	290	515
AUTOBRAKE 3	5330	300/-325	140/190	-235	795	20	-15	145	-145	575	30	45
AUTOBRAKE 2	6800	430/-450	205/270	-315	1070	110	-145	190	-190	530	0	270

Medium Reported Braking Action

MAX MANUAL	5470	345/-345	165/225	-285	1040	235	-190	145	-150	380	815	1380
MAX AUTO	5750	350/-355	170/230	-285	1040	210	-165	145	-155	440	830	1405
AUTOBRAKE 3	5890	360/-365	170/235	-300	1080	160	-115	160	-165	575	790	1185
AUTOBRAKE 2	6960	440/-460	210/280	-340	1210	200	-195	195	-200	530	355	740

Poor Reported Braking Action

MAX MANUAL	7140	500/-490	240/335	-435	1650	585	-385	200	-215	455	2120	3365
MAX AUTO	7430	495/-485	240/335	-430	1635	575	-370	195	-215	480	2140	3380
AUTOBRAKE 3	7430	505/-490	240/340	-430	1645	550	-340	200	-215	555	2150	3405
AUTOBRAKE 2	7730	525/-525	255/355	-450	1700	540	-365	215	-235	530	1900	2970

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 245 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

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		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2770	165/-135	55/75	-100	355	30	-30	55	-55	200	50	90
MAX AUTO	3560	170/-180	75/100	-135	450	0	-0	80	-80	345	0	5
AUTOBRAKE 3	4960	275/-295	130/165	-220	745	10	-25	130	-130	510	0	15
AUTOBRAKE 2	6300	385/-405	180/240	-300	1020	110	-130	170	-170	490	5	250
AUTOBRAKE 1	6870	455/-465	215/280	-345	1195	195	-205	190	-190	480	340	905

Good Reported Braking Action

MAX MANUAL	3800	200/-205	95/125	-170	610	85	-75	90	-90	280	215	390
MAX AUTO	4200	215/-225	100/135	-180	630	70	-60	95	-95	330	250	450
AUTOBRAKE 3	4960	275/-295	130/170	-220	760	20	-30	130	-130	510	30	55
AUTOBRAKE 2	6300	385/-405	180/240	-300	1020	110	-130	170	-170	490	5	250

Medium Reported Braking Action

MAX MANUAL	5140	315/-315	150/205	-275	1010	225	-175	135	-140	365	685	1175
MAX AUTO	5390	320/-325	155/205	-275	1010	195	-155	135	-140	425	700	1195
AUTOBRAKE 3	5500	330/-335	155/210	-285	1040	160	-125	145	-155	510	670	1030
AUTOBRAKE 2	6450	395/-415	190/250	-325	1155	195	-180	175	-180	490	310	665

Poor Reported Braking Action

MAX MANUAL	6650	455/-445	220/300	-415	1600	545	-355	180	-200	435	1735	2795
MAX AUTO	6900	450/-440	215/300	-410	1585	535	-335	180	-200	475	1750	2800
AUTOBRAKE 3	6900	460/-450	220/300	-415	1595	520	-330	180	-200	490	1765	2845
AUTOBRAKE 2	7180	475/-475	230/315	-430	1640	515	-340	195	-215	490	1540	2485

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 230 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distances

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		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF40	ONE REV	NO REV
MAX MANUAL	2650	160/-125	55/75	-100	345	30	-25	50	-55	200	40	80
MAX AUTO	3340	175/-165	75/105	-130	430	0	0	70	-75	330	0	0
AUTOBRAKE 3	4590	285/-265	130/175	-210	715	5	-15	120	-120	510	0	5
AUTOBRAKE 2	5860	390/-370	180/240	-285	985	85	-115	160	-160	495	0	135
AUTOBRAKE 1	6480	455/-435	210/280	-335	1160	170	-190	180	-180	480	225	685

Good Reported Braking Action

MAX MANUAL	3640	205/-195	95/130	-170	600	85	-75	85	-85	285	195	355
MAX AUTO	3990	225/-210	105/140	-175	620	70	-60	90	-90	335	225	405
AUTOBRAKE 3	4600	285/-270	130/175	-210	725	20	-20	120	-120	510	30	45
AUTOBRAKE 2	5860	390/-370	180/240	-285	985	85	-115	160	-160	495	0	135

Medium Reported Braking Action

MAX MANUAL	4900	320/-300	150/205	-270	990	220	-175	125	-130	370	620	1070
MAX AUTO	5120	330/-310	155/210	-270	990	190	-145	130	-135	430	625	1075
AUTOBRAKE 3	5200	340/-315	155/215	-275	1015	160	-120	135	-140	510	650	1010
AUTOBRAKE 2	6010	400/-380	185/250	-315	1125	170	-165	160	-165	495	300	550

Poor Reported Braking Action

MAX MANUAL	6340	460/-420	215/300	-405	1575	535	-350	170	-190	435	1575	2550
MAX AUTO	6600	455/-420	215/300	-400	1560	535	-340	170	-190	455	1595	2575
AUTOBRAKE 3	6600	465/-430	220/305	-405	1565	510	-330	170	-190	475	1595	2590
AUTOBRAKE 2	6770	480/-445	225/315	-420	1605	500	-330	185	-200	495	1460	2285

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 220 ft.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).
***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	3800	470/-205	95/210	-130/445	45/-40	90/-90	265
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	4630	275/-260	130/175	-230/835	135/-115	110/-115	360
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	3210	200/-155	70/95	-115/395	40/-40	70/-70	290
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	3040	180/-145	65/85	-110/380	40/-35	65/-65	280
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	2910	180/-135	65/95	-110/370	40/-35	60/-60	285
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	3280	155/-165	75/100	-125/440	45/-45	75/-75	245
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	4500	225/-235	110/150	-180/600	110/-100	110/-110	505
LEADING EDGE FLAPS TRANSIT	VREF15+15	3250	210/-170	70/95	-115/395	35/-35	70/-70	215
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	2930	200/-160	60/80	-110/375	35/-30	60/-60	210
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	2790	170/-140	55/75	-105/360	30/-30	55/-55	205

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	2900	190/-150	60/80	-105/370	30/-30	60/-60	205
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	2900	190/-150	60/80	-105/370	30/-30	60/-60	205
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	2760	165/-135	55/75	-100/355	30/-25	55/-55	200
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	2900	190/-150	60/80	-105/370	30/-30	60/-60	205
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	3210	265/-170	75/100	-115/395	35/-30	70/-70	200
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	2760	165/-135	55/75	-100/355	30/-25	55/-55	200
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	2900	190/-150	60/80	-105/370	30/-30	60/-60	205
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	3210	265/-170	75/100	-115/395	35/-30	70/-70	200
TRAILING EDGE FLAPS UP	VREF40+40	3420	320/-185	80/110	-120/410	35/-35	75/-80	205

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	5160	265/-265	150/200	-205/705	105/-95	135/-135	275
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	5160	325/-300	150/205	-275/1015	195/-165	130/-130	395
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	4630	265/-275	130/175	-205/705	125/-115	120/-120	425
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	4330	240/-250	115/155	-195/680	115/-105	110/-110	405
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	4100	255/-230	115/165	-190/660	110/-100	100/-100	405
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	4150	230/-235	110/150	-185/645	95/-85	100/-105	315
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	5550	300/-310	150/205	-235/805	185/-165	140/-145	595
LEADING EDGE FLAPS TRANSIT	VREF15+15	4480	235/-245	120/160	-190/665	95/-90	115/-115	295
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	4120	225/-230	105/140	-185/655	100/-90	100/-105	305
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	3900	205/-215	95/130	-180/635	95/-85	95/-95	300

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	3970	215/-220	100/140	-175/625	85/-75	95/-95	280
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	3970	215/-220	100/140	-175/625	85/-75	95/-95	280
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	3770	195/-200	95/125	-170/605	80/-75	90/-90	280
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	3970	215/-220	100/140	-175/625	85/-75	95/-95	280
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	4370	230/-225	120/165	-185/650	90/-80	110/-110	265
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	3770	195/-200	95/125	-170/605	80/-75	90/-90	280
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	3970	215/-220	100/140	-175/625	85/-75	95/-95	280
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	4370	230/-225	120/165	-185/650	90/-80	110/-110	265
TRAILING EDGE FLAPS UP	VREF40+40	4670	245/-240	130/175	-190/670	95/-85	120/-120	270

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	7260	440/-425	245/330	-330/1175	270/-230	210/-210	385
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	6510	455/-420	215/300	-410/1590	440/-330	170/-180	460
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	6290	425/-420	205/285	-320/1145	295/-250	175/-175	540
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	5830	380/-380	185/250	-305/1105	270/-230	160/-160	505
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	5500	390/-350	180/255	-295/1080	260/-220	145/-150	500
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	5640	360/-360	175/240	-290/1065	235/-200	150/-155	415
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	7600	475/-475	235/330	-365/1290	400/-340	205/-210	715
LEADING EDGE FLAPS TRANSIT	VREF15+15	6050	370/-375	190/260	-300/1085	235/-200	165/-170	385
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	5840	365/-375	175/235	-310/1120	270/-225	160/-165	425
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	5440	335/-340	160/210	-295/1080	250/-210	150/-150	405

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	5390	340/-340	165/225	-280/1030	215/-180	145/-145	375
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	5390	340/-340	165/225	-280/1030	215/-180	145/-145	375
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	5060	310/-310	150/200	-270/1000	200/-170	130/-135	360
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	5390	340/-340	165/225	-280/1030	215/-180	145/-145	375
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	6010	375/-355	195/265	-295/1075	225/-195	165/-165	365
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	5060	310/-310	150/200	-270/1000	200/-170	130/-135	360
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	5390	340/-340	165/225	-280/1030	215/-180	145/-145	375
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	6010	375/-355	195/265	-295/1075	225/-195	165/-165	365
TRAILING EDGE FLAPS UP	VREF40+40	6490	400/-385	215/290	-310/1115	245/-210	180/-185	370

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
ALL FLAPS UP	VREF40+55	9610	655/-625	360/495	-500/1855	615/-475	290/-295	485
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	8630	655/-600	305/450	-675/2940	1570/-760	225/-270	515
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	8100	605/-585	300/420	-475/1790	635/-475	235/-245	625
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	7470	540/-525	265/370	-455/1725	585/-435	210/-225	580
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	7040	545/-490	255/365	-440/1685	565/-420	195/-210	565
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	7300	520/-505	255/355	-440/1680	525/-395	205/-215	495
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	9710	680/-660	340/480	-535/1965	790/-600	270/-280	790
LEADING EDGE FLAPS TRANSIT	VREF15+15	7760	530/-525	270/375	-445/1700	520/-390	220/-230	450
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	7940	550/-550	265/355	-485/1830	670/-490	235/-240	530
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	7310	495/-495	235/315	-460/1760	610/-445	210/-215	495

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

****ONE ENGINE INOPERATIVE (FLAPS 30) data are only applicable to Fail Operational airplanes.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (FT)						
		REF DIST	WEIGHT ADJ	ALT ADJ	WIND ADJ PER 10 KTS	SLOPE ADJ PER 1%	TEMP ADJ PER 10°C	APP SPD ADJ
LANDING CONFIGURATION	VREF	130000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/ HIGH*	HEAD/ TAIL	DOWN HILL/ UP HILL	ABV ISA/ BLW ISA	PER 10 KTS ABV VREF
STABILIZER TRIM INOPERATIVE	VREF15	6980	490/-475	240/330	-425/1630	485/-365	195/-205	450
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	6980	490/-475	240/330	-425/1630	485/-365	195/-205	450
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	6500	445/-435	215/295	-405/1580	455/-340	180/-190	425
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	6980	490/-475	240/330	-425/1630	485/-365	195/-205	450
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	7840	545/-510	285/395	-445/1700	515/-390	225/-235	445
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	6500	445/-435	215/295	-405/1580	455/-340	180/-190	425
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	6980	490/-475	240/330	-425/1630	485/-365	195/-205	450
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	7840	545/-510	285/395	-445/1700	515/-390	225/-235	445
TRAILING EDGE FLAPS UP	VREF40+40	8540	585/-555	310/430	-470/1765	555/-425	250/-260	460

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).
Altitude adjustment for STD altitudes valid up to 8000 ft pressure altitude.
Altitude adjustment for HIGH altitudes valid for altitudes above 8000 ft up to 14000 ft.

***For landing distance above 8000 ft pressure altitude, first apply the STD altitude adjustment to derive new reference landing distance for 8000 ft, then apply applicable HIGH altitude adjustment between 8000 ft and 14000 ft to this new reference distance.**

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)																	
		80			100			120			140			160			180		
WEIGHT (1000 LB)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
180	0	16.0	18.2	20.8	23.4	26.6	30.5	31.9	36.3	41.8	41.3	47.0	54.2	51.3	58.5	67.7	60.8	69.3	80.6
	10	16.6	18.8	21.5	24.2	27.5	31.5	33.0	37.5	43.1	42.6	48.5	56.0	53.0	60.3	69.9	62.7	71.5	83.1
	15	16.8	19.1	21.8	24.6	28.0	32.0	33.5	38.1	43.8	43.3	49.2	56.8	53.7	61.2	70.9	63.6	72.5	84.3
	20	17.1	19.4	22.1	25.0	28.3	32.5	34.0	38.6	44.4	43.8	49.9	57.5	54.4	62.0	71.8	64.4	73.4	85.3
	30	17.5	19.9	22.7	25.6	29.1	33.3	34.9	39.6	45.5	45.0	51.1	58.9	55.8	63.5	73.5	66.0	75.2	87.3
	40	17.8	20.2	23.0	26.0	29.5	33.8	35.4	40.2	46.2	45.7	52.0	60.0	56.8	64.7	75.0	67.2	76.7	89.2
	50	17.8	20.2	23.1	26.1	29.7	34.1	35.6	40.6	46.7	46.2	52.7	60.9	57.6	65.8	76.4	68.4	78.2	91.3
160	0	14.7	16.7	19.0	21.3	24.2	27.8	29.0	32.9	37.8	37.3	42.5	49.0	46.3	52.7	61.0	55.6	63.4	73.6
	10	15.2	17.2	19.7	22.1	25.1	28.7	29.9	34.0	39.1	38.6	43.9	50.6	47.8	54.5	63.0	57.4	65.4	75.9
	15	15.4	17.5	20.0	22.4	25.4	29.1	30.4	34.5	39.7	39.1	44.5	51.3	48.5	55.2	63.9	58.2	66.3	76.9
	20	15.6	17.8	20.3	22.7	25.8	29.5	30.8	35.0	40.2	39.7	45.1	52.0	49.2	56.0	64.7	59.0	67.2	77.9
	30	16.1	18.2	20.8	23.3	26.5	30.3	31.6	35.9	41.2	40.7	46.3	53.3	50.4	57.4	66.2	60.4	68.8	79.7
	40	16.3	18.5	21.1	23.6	26.9	30.7	32.1	36.5	41.9	41.3	47.0	54.2	51.3	58.4	67.5	61.5	70.1	81.4
	50	16.3	18.5	21.2	23.7	27.0	30.9	32.3	36.8	42.3	41.7	47.6	54.9	51.9	59.2	68.7	62.5	71.4	83.1
140	0	13.4	15.2	17.3	19.2	21.8	25.0	25.9	29.5	33.8	33.3	37.9	43.6	41.3	47.0	54.3	49.7	56.7	65.6
	10	13.8	15.7	17.9	19.9	22.6	25.8	26.8	30.5	34.9	34.4	39.2	45.0	42.7	48.6	56.0	51.3	58.5	67.7
	15	14.0	15.9	18.2	20.2	22.9	26.2	27.2	30.9	35.5	34.9	39.7	45.7	43.3	49.3	56.8	52.1	59.3	68.7
	20	14.2	16.2	18.4	20.5	23.3	26.6	27.6	31.4	36.0	35.4	40.3	46.3	43.9	49.9	57.6	52.8	60.1	69.5
	30	14.6	16.6	18.9	21.0	23.9	27.3	28.3	32.2	36.9	36.4	41.3	47.5	45.0	51.2	59.0	54.1	61.6	71.2
	40	14.8	16.8	19.2	21.3	24.2	27.7	28.7	32.6	37.4	36.9	42.0	48.3	45.7	52.1	60.1	55.0	62.7	72.6
	50	14.8	16.8	19.2	21.4	24.3	27.8	28.9	32.9	37.8	37.2	42.4	48.8	46.2	52.7	61.0	55.8	63.7	74.0
120	0	12.0	13.6	15.6	17.1	19.5	22.2	22.9	26.0	29.8	29.2	33.2	38.2	36.1	41.1	47.3	43.5	49.5	57.2
	10	12.4	14.1	16.1	17.7	20.1	23.0	23.7	26.9	30.8	30.2	34.4	39.4	37.3	42.4	48.8	44.9	51.1	59.0
	15	12.6	14.3	16.3	18.0	20.4	23.3	24.0	27.3	31.3	30.7	34.9	40.0	37.8	43.0	49.5	45.5	51.8	59.8
	20	12.8	14.5	16.6	18.2	20.7	23.7	24.4	27.7	31.7	31.1	35.3	40.6	38.4	43.6	50.2	46.2	52.5	60.6
	30	13.2	14.9	17.0	18.7	21.3	24.3	25.0	28.4	32.6	31.9	36.3	41.6	39.3	44.7	51.5	47.3	53.8	62.1
	40	13.3	15.1	17.2	19.0	21.5	24.6	25.4	28.8	33.0	32.4	36.8	42.3	39.9	45.4	52.3	48.1	54.8	63.3
	50	13.3	15.1	17.3	19.0	21.6	24.7	25.5	29.0	33.3	32.6	37.1	42.7	40.3	45.9	53.0	48.7	55.5	64.3
100	0	10.7	12.2	13.9	15.0	17.1	19.5	19.9	22.6	25.8	25.2	28.6	32.8	30.9	35.1	40.3	37.0	42.1	48.5
	10	11.1	12.6	14.3	15.5	17.6	20.1	20.6	23.3	26.7	26.0	29.6	33.9	31.9	36.3	41.7	38.2	43.4	50.0
	15	11.2	12.8	14.6	15.8	17.9	20.4	20.9	23.7	27.1	26.4	30.0	34.4	32.4	36.8	42.3	38.8	44.1	50.8
	20	11.4	13.0	14.8	16.0	18.2	20.7	21.2	24.0	27.5	26.8	30.4	34.9	32.8	37.3	42.8	39.3	44.7	51.4
	30	11.7	13.3	15.2	16.4	18.7	21.3	21.7	24.7	28.2	27.5	31.2	35.8	33.7	38.3	43.9	40.3	45.8	52.7
	40	11.9	13.5	15.3	16.6	18.9	21.6	22.0	25.0	28.6	27.9	31.7	36.3	34.2	38.9	44.6	40.9	46.6	53.6
	50	11.9	13.5	15.4	16.7	18.9	21.6	22.1	25.1	28.8	28.0	31.9	36.6	34.4	39.2	45.1	41.3	47.1	54.3

***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	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.6	15.9	24.8	34.3	44.3	54.6	65.2	76.0	86.9
	MAX AUTO	7.1	14.7	22.8	31.5	40.9	51.1	62.0	73.7	86.4
	AUTOBRAKE 3	6.6	13.5	20.8	28.5	36.9	45.9	55.7	66.5	78.4
	AUTOBRAKE 2	6.0	12.1	18.4	25.1	32.2	40.0	48.4	57.8	68.1
	AUTOBRAKE 1	5.6	11.0	16.4	22.1	28.0	34.4	41.5	49.4	58.3

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.2	15.0	23.4	32.2	41.5	51.2	61.2	71.5	82.1
	MAX AUTO	5.9	12.3	19.4	27.2	35.7	45.0	55.1	66.2	78.3
	AUTOBRAKE 3	4.1	8.8	14.0	20.0	26.6	34.0	42.1	51.1	60.9
	AUTOBRAKE 2	2.2	4.8	8.1	11.9	16.3	21.4	27.2	33.6	40.8
	AUTOBRAKE 1	1.7	3.5	5.5	7.9	10.7	14.1	18.3	23.3	29.2

Cooling Time (Minutes) - Category H Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category P Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	35.2	45.9		

Observe maximum quick turnaround limit.

Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.

Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

ADVISORY INFORMATION

Recommended Brake Cooling Schedule - High Altitudes

Reference Brake Energy Per Brake (Millions of Foot Pounds)

		WIND CORRECTED BRAKES ON SPEED (KIAS)															
		60				100				140				180			
WEIGHT (1000 LB)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)															
		10	12	14	14.5	10	12	14	14.5	10	12	14	14.5	10	12	14	14.5
180	0	12.7	13.4	14.1	14.3	30.5	32.3	34.3	34.8	54.2	57.7	61.6	62.7	80.6	86.3		
	10	13.2	13.9	14.6	14.8	31.5	33.4	35.4	36.0	56.0	59.6	63.6	64.7	83.1	89.0		
	15	13.4	14.1	14.9	15.1	32.0	33.9	35.9	36.5	56.8	60.4	64.5	65.6	84.3	90.2		
	20	13.6	14.3	15.1	15.3	32.5	34.4	36.4	37.0	57.5	61.2	65.3	66.5	85.3	91.3		
	30	13.9	14.7	15.5	15.7	33.3	35.3	37.4	38.0	58.9	62.7	66.9	68.1	87.3	93.4		
	40	14.1	14.9	15.7	15.9	33.8	35.8	37.9	38.5	60.0	63.9	68.2	69.4	89.2	95.5		
	50	14.1	14.9	15.7	15.9	34.1	36.1	38.3	38.9	60.9	64.9	69.4	70.6	91.3	97.9		
160	0	11.8	12.4	13.1	13.3	27.8	29.4	31.1	31.6	49.0	52.0	55.5	56.5	73.6	78.6	84.5	86.1
	10	12.2	12.8	13.5	13.7	28.7	30.3	32.1	32.6	50.6	53.7	57.3	58.3	75.9	81.1	87.1	88.8
	15	12.4	13.0	13.7	13.9	29.1	30.8	32.6	33.1	51.3	54.5	58.1	59.1	76.9	82.2	88.3	90.0
	20	12.6	13.2	13.9	14.1	29.5	31.2	33.1	33.6	52.0	55.2	58.9	59.9	77.9	83.2	89.3	91.0
	30	12.9	13.6	14.3	14.5	30.3	32.1	33.9	34.5	53.3	56.6	60.3	61.3	79.7	85.2	91.4	93.1
	40	13.1	13.8	14.5	14.7	30.7	32.5	34.4	35.0	54.2	57.6	61.4	62.5	81.4	87.0	93.4	95.2
	50	13.1	13.8	14.5	14.7	30.9	32.7	34.7	35.2	54.9	58.4	62.4	63.5	83.1	89.0	95.8	97.7
140	0	10.8	11.4	12.0	12.2	25.0	26.4	28.0	28.4	43.6	46.3	49.3	50.1	65.6	70.0	75.0	76.4
	10	11.2	11.8	12.5	12.7	25.8	27.3	28.9	29.3	45.0	47.8	50.9	51.7	67.7	72.3	77.4	78.8
	15	11.4	12.0	12.6	12.8	26.2	27.7	29.3	29.8	45.7	48.5	51.6	52.5	68.7	73.3	78.5	79.9
	20	11.6	12.2	12.8	13.0	26.6	28.1	29.7	30.2	46.3	49.2	52.3	53.2	69.5	74.2	79.4	80.9
	30	11.9	12.5	13.2	13.4	27.3	28.9	30.5	31.0	47.5	50.4	53.6	54.5	71.2	75.9	81.3	82.8
	40	12.0	12.7	13.3	13.5	27.7	29.3	31.0	31.5	48.3	51.3	54.5	55.4	72.6	77.5	83.0	84.6
	50	12.0	12.7	13.4	13.6	27.8	29.4	31.2	31.7	48.8	51.9	55.3	56.2	74.0	79.1	84.8	86.4
120	0	9.9	10.4	11.0	11.2	22.2	23.5	24.8	25.2	38.2	40.5	43.0	43.7	57.2	60.9	65.1	66.3
	10	10.3	10.8	11.4	11.6	23.0	24.3	25.7	26.1	39.4	41.8	44.4	45.1	59.0	62.8	67.1	68.3
	15	10.4	11.0	11.6	11.8	23.3	24.6	26.1	26.5	40.0	42.4	45.1	45.8	59.8	63.7	68.1	69.3
	20	10.6	11.1	11.7	11.9	23.7	25.0	26.4	26.8	40.6	43.0	45.7	46.4	60.6	64.5	69.0	70.2
	30	10.9	11.4	12.0	12.2	24.3	25.7	27.1	27.5	41.6	44.1	46.9	47.6	62.1	66.1	70.6	71.9
	40	11.0	11.6	12.2	12.4	24.6	26.0	27.5	27.9	42.3	44.8	47.6	48.4	63.3	67.4	72.0	73.3
	50	11.0	11.6	12.2	12.4	24.7	26.1	27.7	28.1	42.7	45.3	48.2	49.0	64.3	68.5	73.3	74.7
100	0	9.0	9.5	10.0	10.2	19.5	20.6	21.7	22.0	32.8	34.7	36.9	37.5	48.5	51.5	54.9	55.9
	10	9.4	9.9	10.4	10.5	20.1	21.3	22.5	22.8	33.9	35.9	38.1	38.7	50.0	53.2	56.7	57.7
	15	9.5	10.0	10.5	10.7	20.4	21.6	22.8	23.1	34.4	36.4	38.6	39.2	50.8	54.0	57.5	58.5
	20	9.6	10.2	10.7	10.9	20.7	21.9	23.1	23.5	34.9	36.9	39.2	39.8	51.4	54.7	58.3	59.3
	30	9.9	10.4	11.0	11.2	21.3	22.5	23.7	24.1	35.8	37.9	40.2	40.8	52.7	56.0	59.7	60.7
	40	10.0	10.6	11.1	11.3	21.6	22.8	24.1	24.4	36.3	38.5	40.8	41.5	53.6	57.0	60.8	61.8
	50	10.0	10.6	11.1	11.3	21.6	22.9	24.2	24.5	36.6	38.8	41.2	41.9	54.3	57.8	61.7	62.8

***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 - High Altitudes

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.6	15.9	24.8	34.3	44.3	54.6	65.2	76.0	86.9
	MAX AUTO	7.1	14.7	22.8	31.5	40.9	51.1	62.0	73.7	86.4
	AUTOBRAKE 3	6.6	13.5	20.8	28.5	36.9	45.9	55.7	66.5	78.4
	AUTOBRAKE 2	6.0	12.1	18.4	25.1	32.2	40.0	48.4	57.8	68.1
	AUTOBRAKE 1	5.6	11.0	16.4	22.1	28.0	34.4	41.5	49.4	58.3

Two Engine Detent Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
EVENT		10	20	30	40	50	60	70	80	90
RTO MAX MAN		10	20	30	40	50	60	70	80	90
LANDING	MAX MAN	7.2	15.0	23.4	32.2	41.5	51.2	61.2	71.5	82.1
	MAX AUTO	5.9	12.3	19.4	27.2	35.7	45.0	55.1	66.2	78.3
	AUTOBRAKE 3	4.1	8.8	14.0	20.0	26.6	34.0	42.1	51.1	60.9
	AUTOBRAKE 2	2.2	4.8	8.1	11.9	16.3	21.4	27.2	33.6	40.8
	AUTOBRAKE 1	1.7	3.5	5.5	7.9	10.7	14.1	18.3	23.3	29.2

Cooling Time (Minutes) - Category H Steel Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	20	23	25	28	32	33 TO 48	49 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.4	2.6	3.1	3.5	3.9	4.4	4.9	5.0 TO 7.5	7.5 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	3	4	5	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	30	40	50	60		

Cooling Time (Minutes) - Category P Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)							
	16 & BELOW	17	19	20.9	23.5	26.9	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS							
	UP TO 2.5	2.6	3	3.3	3.8	4.5	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	35.2	45.9		

Observe maximum quick turnaround limit.
Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.
Add 1.0 million foot pounds per brake for each taxi mile.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 7 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not approach gear or attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.

Brake temperature monitor system (BTMS) indication on CDS systems page may be used 10 to 15 minutes after airplane has come to a complete stop or inflight with gear retracted to determine recommended cooling schedule.

Intentionally
Blank

Performance Inflight - QRH
Chapter PI-QRH
Engine Inoperative
Section 62

ENGINE INOP

Initial Max Continuous %N1
Based on .80M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.9	96.6	96.4	96.2	96.0	95.5	95.1	94.8	94.2
15	97.5	97.2	96.9	96.8	96.7	96.3	95.8	95.6	95.0
10	98.1	97.9	97.5	97.4	97.4	97.0	96.6	96.4	95.9
5	98.1	98.6	98.4	98.1	98.1	97.8	97.4	97.2	96.7
0	97.3	98.5	99.2	99.0	98.9	98.6	98.2	98.0	97.7
-5	96.5	97.8	98.9	99.8	99.7	99.3	99.0	98.8	98.5
-10	95.8	97.0	98.2	99.4	100.5	100.2	99.9	99.7	99.5
-15	95.0	96.2	97.4	98.6	99.9	101.0	100.8	100.6	100.4
-20	94.2	95.4	96.6	97.8	99.1	100.2	100.8	100.6	100.4
-25	93.4	94.6	95.8	97.0	98.3	99.4	100.0	99.8	99.6
-30	92.6	93.8	95.0	96.2	97.5	98.6	99.1	98.9	98.7
-35	91.7	93.0	94.1	95.3	96.6	97.7	98.3	98.1	97.9
-40	90.9	92.2	93.3	94.5	95.8	96.9	97.4	97.2	97.0

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
ENGINE ANTI-ICE ON	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.2	-4.4	-4.5	-4.7	-5.0	-4.8	-4.8	-4.8	-4.8

ENGINE INOP

Max Continuous %N1
37000 FT to 29000 FT Pressure Altitudes

37000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.51	96.6	97.6	98.5	99.4	100.2	99.6	98.8	97.6	96.3	94.7	93.2	91.8
200	.63	96.0	96.9	97.8	98.7	99.6	100.4	100.1	99.3	98.4	97.5	96.3	95.2
240	.74	95.1	96.0	96.8	97.7	98.6	99.4	100.3	100.7	100.0	99.2	98.4	97.5
280	.86	94.3	95.2	96.1	97.0	97.8	98.7	99.5	100.4	101.2	100.9	100.0	99.1

35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	96.5	97.4	98.3	99.2	100.1	99.8	99.0	98.0	96.8	95.4	94.0	92.7
200	.60	96.1	97.0	97.9	98.8	99.7	100.6	100.5	99.6	98.6	97.6	96.5	95.4
240	.71	95.0	95.9	96.8	97.7	98.6	99.4	100.3	100.8	100.2	99.5	98.6	97.7
280	.82	93.8	94.6	95.5	96.4	97.3	98.1	98.9	99.8	100.6	100.3	99.5	98.8

33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	97.4	98.3	99.2	100.0	100.8	100.0	99.1	97.9	96.7	95.3	93.9	92.6
200	.58	97.0	97.9	98.8	99.7	100.6	101.4	100.6	99.6	98.6	97.5	96.3	95.1
240	.68	95.9	96.8	97.7	98.5	99.4	100.2	101.1	100.9	100.2	99.4	98.4	97.4
280	.79	94.3	95.1	96.0	96.8	97.7	98.5	99.3	100.2	100.5	99.7	98.9	98.1
320	.89	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	100.3	101.1	100.7	99.8

31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	97.3	98.2	99.1	100.0	100.9	101.1	100.2	99.2	98.0	96.6	95.2	93.9
200	.55	97.1	98.0	98.9	99.7	100.6	101.5	101.6	100.7	99.7	98.6	97.4	96.2
240	.66	95.6	96.5	97.4	98.3	99.1	100.0	100.8	101.3	100.5	99.8	98.8	97.8
280	.76	93.8	94.7	95.5	96.4	97.2	98.0	98.8	99.7	100.5	99.8	98.9	98.0
320	.85	92.4	93.2	94.1	94.9	95.7	96.5	97.4	98.2	98.9	99.7	99.9	99.1

29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	98.1	99.0	99.9	100.8	101.6	101.2	100.2	99.1	97.9	96.4	95.1	93.8
200	.53	97.5	98.4	99.3	100.2	101.0	101.9	101.3	100.4	99.3	98.2	96.9	95.8
240	.63	96.3	97.1	98.0	98.9	99.7	100.5	101.4	101.1	100.2	99.2	98.3	97.2
280	.73	94.2	95.0	95.9	96.7	97.5	98.3	99.1	99.9	100.1	99.1	98.2	97.5
320	.82	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	98.5	97.6
360	.91	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.5	99.2	100.0	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-4.1	-4.3	-4.5	-4.7	-4.7

ENGINE INOP

Max Continuous %N1

27000 FT to 20000 FT Pressure Altitudes

27000 FT PRESS ALT								TAT (°C)					
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	98.0	98.8	99.7	100.6	101.4	102.2	101.2	100.2	99.0	97.8	96.4	95.1
200	.51	96.9	97.8	98.7	99.6	100.4	101.2	101.8	100.8	99.9	98.8	97.6	96.4
240	.60	95.6	96.5	97.4	98.2	99.1	99.9	100.7	101.3	100.4	99.4	98.5	97.5
280	.70	93.6	94.4	95.3	96.1	96.9	97.7	98.5	99.3	100.1	99.4	98.4	97.6
320	.79	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	98.6	97.8
360	.88	91.0	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	98.1	98.8	99.4
25000 FT PRESS ALT								TAT (°C)					
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.8	99.7	100.5	101.4	102.2	102.4	101.4	100.3	99.1	97.7	96.5	95.2
200	.49	97.5	98.3	99.2	100.0	100.9	101.7	101.5	100.6	99.5	98.4	97.3	96.2
240	.58	95.7	96.5	97.4	98.2	99.0	99.9	100.7	100.5	99.5	98.6	97.6	96.7
280	.67	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.5	99.5	98.6	97.6	96.9
320	.76	91.7	92.6	93.4	94.2	95.0	95.8	96.5	97.3	98.0	98.6	97.8	97.2
360	.85	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.6	98.4	98.2
24000 FT PRESS ALT								TAT (°C)					
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	98.6	99.5	100.4	101.2	102.1	102.9	101.9	100.8	99.6	98.4	97.1	95.8
200	.48	97.5	98.4	99.2	100.1	100.9	101.8	102.2	101.1	100.1	99.0	97.8	96.7
240	.57	95.9	96.8	97.6	98.5	99.3	100.1	100.9	101.2	100.2	99.2	98.2	97.3
280	.66	94.2	95.1	95.9	96.7	97.5	98.3	99.1	99.9	100.4	99.4	98.3	97.5
320	.75	92.1	93.0	93.8	94.6	95.4	96.2	96.9	97.7	98.5	99.2	98.6	97.8
360	.83	90.6	91.4	92.2	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.6
22000 FT PRESS ALT								TAT (°C)					
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	99.1	100.0	100.9	101.7	102.5	102.8	101.8	100.7	99.5	98.2	97.0	95.8
200	.46	98.4	99.3	100.1	101.0	101.8	102.6	102.3	101.2	100.0	98.9	97.8	96.8
240	.55	97.2	98.1	98.9	99.7	100.5	101.3	102.1	101.6	100.5	99.4	98.5	97.5
280	.63	95.7	96.5	97.4	98.2	99.0	99.8	100.6	101.3	101.0	99.8	98.9	98.1
320	.72	93.9	94.7	95.5	96.3	97.1	97.9	98.6	99.4	100.1	100.2	99.3	98.6
360	.80	92.2	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	99.2	99.7	99.1
20000 FT PRESS ALT								TAT (°C)					
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	98.7	99.5	100.4	101.2	102.0	102.8	102.5	101.5	100.4	99.2	98.0	96.8
200	.44	98.3	99.2	100.0	100.9	101.7	102.5	103.3	102.3	101.1	100.0	98.9	97.8
240	.53	97.5	98.4	99.2	100.0	100.8	101.7	102.5	103.1	101.8	100.5	99.5	98.6
280	.61	96.2	97.0	97.8	98.7	99.5	100.3	101.1	101.8	102.5	101.3	100.1	99.3
320	.69	94.7	95.5	96.3	97.1	97.9	98.7	99.5	100.2	101.0	101.7	100.9	99.9
360	.77	93.0	93.8	94.6	95.4	96.2	97.0	97.7	98.5	99.2	100.0	100.7	100.4

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	20	22	24	25	27
ENGINE ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.0
ENGINE & WING ANTI-ICE ON	-3.6	-3.8	-3.8	-3.9	-4.0

ENGINE INOP

Max Continuous %N1
18000 FT to 12000 FT Pressure Altitudes

18000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.34	98.5	99.3	100.2	101.0	101.8	102.6	101.6	100.3	99.2	98.1	97.0	95.9
200	.42	98.7	99.6	100.4	101.2	102.0	102.8	103.1	101.7	100.4	99.3	98.3	97.3
240	.51	97.8	98.7	99.5	100.3	101.1	101.9	102.7	102.5	101.1	99.9	99.0	98.1
280	.59	96.3	97.1	97.9	98.7	99.5	100.3	101.0	101.8	101.6	100.5	99.6	98.8
320	.67	94.8	95.6	96.4	97.2	97.9	98.7	99.5	100.2	101.0	100.9	100.0	99.2
360	.75	93.0	93.8	94.6	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.2	99.6

16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	97.1	98.0	98.8	99.6	100.4	101.2	101.6	100.3	99.1	98.1	97.1	96.1
200	.41	98.0	98.8	99.6	100.4	101.2	102.0	102.8	102.5	101.3	100.2	99.3	98.3
240	.49	97.1	97.9	98.7	99.5	100.3	101.1	101.9	102.7	101.8	100.5	99.6	98.7
280	.57	95.6	96.4	97.2	98.0	98.8	99.6	100.3	101.1	101.8	100.9	99.8	99.0
320	.64	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.2	99.4
360	.72	92.1	92.9	93.7	94.5	95.3	96.1	96.9	97.7	98.4	99.2	99.9	99.6

14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	96.6	97.4	98.2	99.0	99.8	100.6	100.4	99.1	98.0	97.1	96.2	95.3
200	.39	97.1	97.9	98.7	99.5	100.3	101.1	101.8	101.5	101.0	100.1	99.3	98.4
240	.47	96.6	97.4	98.2	99.0	99.8	100.6	101.3	101.8	101.1	100.3	99.5	98.7
280	.54	95.5	96.3	97.1	97.8	98.6	99.4	100.1	100.9	101.0	100.1	99.2	98.5
320	.62	94.1	94.9	95.7	96.5	97.2	98.0	98.7	99.5	100.2	100.3	99.5	98.8
360	.69	92.2	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.6	99.0

12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	96.3	97.0	97.8	98.6	99.4	100.1	99.3	98.1	97.1	96.3	95.4	94.5
200	.38	97.1	97.9	98.7	99.5	100.3	101.0	101.5	100.8	99.8	99.0	98.2	97.3
240	.45	96.5	97.3	98.0	98.8	99.6	100.3	101.1	101.0	100.1	99.4	98.6	97.9
280	.52	95.5	96.3	97.0	97.8	98.6	99.3	100.0	100.8	100.3	99.4	98.6	98.0
320	.60	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.4	100.2	99.7	98.9	98.2
360	.67	92.3	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	99.4	99.1	98.5

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	12	14	16	18
ENGINE ANTI-ICE ON	-0.9	-0.9	-0.9	-0.9
ENGINE & WING ANTI-ICE ON	-3.2	-3.4	-3.4	-3.5

ENGINE INOP

Max Continuous %N1
10000 FT to 1000 FT Pressure Altitudes

10000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.29	95.2	96.0	96.8	97.6	98.3	99.1	99.8	98.6	97.4	96.6	95.8	94.9
200	.36	96.0	96.7	97.5	98.3	99.0	99.8	100.5	100.5	99.4	98.5	97.8	97.0
240	.43	95.6	96.4	97.2	97.9	98.7	99.4	100.2	100.9	100.1	99.2	98.4	97.7
280	.51	94.5	95.3	96.1	96.9	97.6	98.4	99.1	99.9	100.4	99.5	98.7	98.0
320	.58	93.0	93.9	94.7	95.5	96.2	97.0	97.8	98.6	99.3	99.7	99.0	98.2
360	.65	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.7	99.1	98.5
5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	94.9	95.7	96.4	97.2	98.0	98.8	99.2	98.3	97.4	96.6	95.9	95.1
200	.33	94.7	95.5	96.3	97.1	97.8	98.6	99.4	98.9	98.0	97.3	96.6	95.8
240	.40	94.0	94.8	95.6	96.4	97.2	97.9	98.7	99.5	98.7	97.9	97.2	96.5
280	.46	93.3	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	98.2	97.5	96.8
320	.53	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	98.7	98.4	97.7	97.1
360	.59	91.5	92.3	93.1	93.9	94.7	95.5	96.2	97.0	97.8	98.5	98.0	97.3
3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	94.8	95.6	96.4	97.2	98.0	98.7	98.8	97.9	97.1	96.4	95.6	94.8
200	.32	94.5	95.3	96.1	96.9	97.6	98.4	99.2	98.3	97.5	96.8	96.1	95.3
240	.38	94.1	94.9	95.6	96.4	97.2	98.0	98.7	98.8	98.0	97.2	96.6	95.9
280	.45	93.2	94.0	94.8	95.6	96.4	97.2	97.9	98.7	98.3	97.5	96.9	96.2
320	.51	92.5	93.3	94.1	94.9	95.7	96.4	97.2	98.0	98.5	97.8	97.1	96.5
360	.57	91.6	92.4	93.2	94.0	94.7	95.5	96.3	97.1	97.8	98.1	97.4	96.8
1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	93.9	94.7	95.4	96.2	97.0	97.8	98.5	98.2	97.4	96.7	96.0	95.2
200	.31	93.5	94.3	95.1	95.9	96.7	97.4	98.2	98.5	97.8	97.0	96.3	95.6
240	.37	93.0	93.8	94.6	95.4	96.1	96.9	97.7	98.4	98.1	97.3	96.6	95.9
280	.43	92.3	93.2	93.9	94.7	95.5	96.3	97.1	97.8	98.3	97.6	96.9	96.2
320	.49	91.6	92.4	93.2	94.0	94.8	95.6	96.3	97.1	97.9	97.9	97.2	96.5
360	.55	90.7	91.5	92.3	93.1	93.9	94.7	95.4	96.2	96.9	97.7	97.3	96.6

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-3.1	-3.2

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb

WEIGHT (1000 LB)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	183	258	17800	16600	15400
180	173	251	19300	18100	16900
170	164	244	20700	19700	18400
160	154	237	22000	21100	20000
150	145	230	23500	22600	21600
140	135	222	25000	24200	23200
130	125	214	26900	26000	24900
120	115	206	28900	28000	26900
110	106	198	30800	30000	29100
100	96	189	32700	32000	31100
90	87	180	34900	34200	33300

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)				
HEAD WIND COMPONENT (KTS)						TAIL WIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
141	130	121	113	106	100	94	89	85	81	77
282	260	242	226	212	200	188	179	170	162	154
422	390	363	339	318	300	283	268	255	243	232
563	520	484	452	424	400	378	358	340	324	310
703	650	604	565	530	500	472	448	426	406	387
843	779	725	678	636	600	567	537	511	487	465
982	909	846	791	742	700	661	627	596	569	543
1122	1038	966	903	848	800	756	717	682	650	621
1262	1168	1087	1016	954	900	851	807	767	732	699
1401	1297	1207	1129	1060	1000	945	897	853	813	777
1541	1426	1328	1242	1166	1100	1040	986	938	895	855
1680	1556	1448	1355	1272	1200	1135	1076	1024	976	933
1820	1685	1569	1467	1378	1300	1229	1166	1109	1057	1010
1960	1815	1689	1580	1484	1400	1324	1256	1195	1139	1088
2100	1944	1810	1693	1590	1500	1418	1346	1280	1220	1166
2240	2074	1931	1806	1697	1600	1513	1435	1365	1302	1244
2381	2204	2052	1919	1803	1700	1607	1525	1450	1383	1321
2522	2334	2173	2032	1909	1800	1702	1615	1536	1464	1399

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 LB)											TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 LB)											
	90	100	110	120	130	140	150	160	170	180	190	
100	0.8	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.2	1.2	0:17
200	1.8	1.9	2.0	2.1	2.2	2.4	2.5	2.6	2.7	2.8	3.0	0:35
300	2.8	3.0	3.2	3.4	3.6	3.8	4.1	4.3	4.5	4.7	4.9	0:52
400	3.8	4.1	4.4	4.7	5.0	5.3	5.7	5.9	6.3	6.6	6.9	1:09
500	4.7	5.1	5.5	5.9	6.3	6.7	7.1	7.5	7.9	8.3	8.7	1:27
600	5.6	6.1	6.6	7.0	7.6	8.1	8.5	9.0	9.5	10.0	10.5	1:44
700	6.5	7.1	7.7	8.2	8.8	9.4	10.0	10.5	11.1	11.6	12.3	2:01
800	7.4	8.1	8.7	9.4	10.0	10.7	11.4	12.0	12.6	13.3	14.0	2:18
900	8.3	9.1	9.8	10.5	11.3	12.0	12.7	13.4	14.2	14.9	15.7	2:35
1000	9.2	10.0	10.8	11.6	12.5	13.3	14.1	14.9	15.7	16.5	17.4	2:52
1100	10.1	11.0	11.9	12.7	13.7	14.6	15.5	16.3	17.3	18.2	19.1	3:09
1200	10.9	11.9	12.9	13.8	14.9	15.8	16.8	17.8	18.8	19.7	20.8	3:26
1300	11.8	12.9	13.9	14.9	16.0	17.1	18.2	19.2	20.3	21.3	22.5	3:43
1400	12.6	13.8	14.9	16.0	17.2	18.4	19.5	20.6	21.8	22.9	24.1	3:60
1500	13.5	14.7	15.9	17.1	18.4	19.6	20.8	22.0	23.2	24.5	25.8	4:17
1600	14.3	15.6	16.9	18.2	19.5	20.8	22.1	23.4	24.7	26.0	27.4	4:34
1700	15.1	16.5	17.9	19.2	20.7	22.0	23.4	24.8	26.2	27.5	29.0	4:51
1800	16.0	17.4	18.9	20.3	21.8	23.3	24.7	26.1	27.6	29.1	30.6	5:09

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at LRC speed.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA+10°C & BELOW	ISA+15°C	ISA+20°C
190	14900	12600	9600
180	16700	14900	12100
170	18500	16800	14600
160	20300	18700	16700
150	21600	20500	18700
140	23100	22000	20600
130	24600	23500	22200
120	26800	25300	24000
110	29200	27900	26300
100	31300	30400	29100
90	33500	32600	31500

With engine anti-ice on, decrease altitude capability by 1300 ft.
With engine and wing anti-ice on, decrease altitude capability by 5900 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)										
		10	15	17	19	21	23	25	27	29	31	33
180	%N1	90.8	94.3	96.4								
	MACH	.540	.575	.590								
	KIAS	300	291	287								
	FF/ENG	6475	6334	6327								
170	%N1	89.4	92.8	94.6	97.0							
	MACH	.529	.567	.579	.594							
	KIAS	293	286	282	278							
	FF/ENG	6145	6019	5954	5977							
160	%N1	88.0	91.5	92.9	94.9	97.7						
	MACH	.517	.556	.570	.583	.599						
	KIAS	287	280	277	273	269						
	FF/ENG	5815	5696	5624	5580	5652						
150	%N1	86.5	90.0	91.4	93.0	95.2	98.2					
	MACH	.505	.543	.559	.572	.587	.603					
	KIAS	279	274	271	267	264	260					
	FF/ENG	5487	5369	5309	5237	5227	5345					
140	%N1	84.9	88.3	89.8	91.2	93.0	95.4					
	MACH	.491	.530	.546	.561	.575	.590					
	KIAS	272	267	265	262	258	254					
	FF/ENG	5161	5041	4984	4922	4866	4890					
130	%N1	83.1	86.6	88.0	89.5	91.0	93.0	95.6				
	MACH	.477	.515	.531	.547	.563	.577	.592				
	KIAS	264	260	258	255	252	248	245				
	FF/ENG	4831	4714	4658	4601	4547	4506	4560				
120	%N1	81.3	84.8	86.2	87.7	89.1	90.7	92.8	95.6			
	MACH	.462	.500	.516	.532	.548	.564	.578	.593			
	KIAS	255	252	250	248	245	243	239	235			
	FF/ENG	4497	4387	4332	4276	4227	4181	4157	4223			
110	%N1	79.3	82.8	84.2	85.6	87.1	88.6	90.2	92.4	95.4		
	MACH	.446	.483	.499	.515	.531	.548	.564	.578	.594		
	KIAS	246	243	241	240	238	235	233	229	225		
	FF/ENG	4167	4061	4007	3952	3903	3859	3829	3817	3882		
100	%N1	77.1	80.6	82.0	83.5	84.9	86.4	87.9	89.6	91.8	94.9	
	MACH	.429	.465	.480	.496	.512	.529	.546	.562	.577	.593	
	KIAS	237	234	232	231	229	227	225	222	219	215	
	FF/ENG	3845	3730	3682	3629	3582	3538	3504	3488	3476	3537	
90	%N1	74.9	78.2	79.6	81.1	82.5	84.0	85.5	87.0	88.6	90.9	94.0
	MACH	.411	.445	.460	.476	.492	.509	.525	.543	.560	.575	.591
	KIAS	227	223	222	221	220	218	216	214	212	208	205
	FF/ENG	3529	3401	3353	3306	3261	3219	3185	3164	3148	3135	3187

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (KTS)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
295	270	248	230	214	200	190	180	172	164	158
594	543	498	461	429	400	379	361	344	328	315
895	817	749	692	643	600	569	541	516	492	472
1196	1091	999	923	858	800	759	722	687	656	629
1500	1368	1252	1155	1073	1000	949	902	859	820	785
1805	1645	1504	1387	1288	1200	1138	1081	1030	983	942
2113	1924	1758	1621	1504	1400	1327	1261	1201	1146	1098
2422	2204	2013	1854	1719	1600	1517	1442	1372	1309	1253
2733	2485	2267	2087	1935	1800	1707	1621	1543	1472	1409

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		26	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
200	3.1	0:42	2.7	0:41	2.4	0:39	2.2	0:38	2.0	0:37
400	6.3	1:22	5.7	1:19	5.2	1:16	4.8	1:13	4.6	1:11
600	9.5	2:03	8.8	1:57	8.1	1:52	7.4	1:48	7.1	1:45
800	12.7	2:44	11.7	2:36	10.8	2:29	10.0	2:23	9.6	2:19
1000	15.9	3:25	14.7	3:15	13.6	3:06	12.6	2:59	12.1	2:53
1200	19.0	4:07	17.6	3:55	16.3	3:44	15.1	3:35	14.5	3:27
1400	22.1	4:49	20.5	4:35	19.0	4:22	17.6	4:11	16.9	4:02
1600	25.1	5:32	23.3	5:15	21.6	5:00	20.1	4:47	19.2	4:37
1800	28.1	6:15	26.1	5:56	24.2	5:39	22.6	5:24	21.5	5:12

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)					
	90	110	130	150	170	190
2	-0.2	-0.1	0.0	0.2	0.4	0.8
4	-0.5	-0.2	0.0	0.5	1.2	2.0
6	-0.7	-0.4	0.0	0.9	1.9	3.1
8	-1.0	-0.5	0.0	1.2	2.6	4.2
10	-1.3	-0.7	0.0	1.5	3.2	5.3
12	-1.6	-0.8	0.0	1.8	3.9	6.3
14	-1.8	-0.9	0.0	2.0	4.5	7.3
16	-2.1	-1.1	0.0	2.3	5.1	8.3
18	-2.4	-1.2	0.0	2.6	5.7	9.2
20	-2.6	-1.3	0.0	2.8	6.3	10.1
22	-2.9	-1.5	0.0	3.1	6.8	11.0
24	-3.2	-1.6	0.0	3.3	7.3	11.8
26	-3.5	-1.7	0.0	3.5	7.8	12.6
28	-3.7	-1.9	0.0	3.7	8.3	13.4
30	-4.0	-2.0	0.0	3.9	8.8	14.1

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
190	%N1	81.6	84.5	88.7	93.4				
	KIAS	252	252	254	255				
	FF/ENG	6130	6130	6150	6290				
180	%N1	80.1	83.0	87.1	91.6	99.7			
	KIAS	245	246	247	248	250			
	FF/ENG	5810	5790	5800	5900	6310			
170	%N1	78.6	81.4	85.5	90.0	96.7			
	KIAS	238	239	240	241	242			
	FF/ENG	5500	5460	5460	5520	5750			
160	%N1	77.0	79.7	83.9	88.2	93.8			
	KIAS	231	231	232	233	235			
	FF/ENG	5180	5140	5120	5160	5270			
150	%N1	75.4	78.0	82.1	86.3	91.2			
	KIAS	224	224	225	226	227			
	FF/ENG	4870	4830	4790	4810	4860			
140	%N1	73.4	76.2	80.2	84.4	89.0	96.9		
	KIAS	216	216	217	218	219	221		
	FF/ENG	4560	4510	4460	4470	4490	4790		
130	%N1	71.4	74.3	78.1	82.4	86.9	93.0		
	KIAS	208	209	209	210	211	213		
	FF/ENG	4250	4200	4150	4130	4130	4270		
120	%N1	69.3	72.1	76.1	80.3	84.6	89.7		
	KIAS	199	200	201	202	203	204		
	FF/ENG	3950	3890	3840	3800	3780	3840		
110	%N1	67.1	69.8	73.9	77.9	82.3	87.0	95.1	
	KIAS	191	191	192	193	194	195	196	
	FF/ENG	3660	3590	3530	3490	3450	3470	3730	
100	%N1	64.7	67.3	71.4	75.4	79.7	84.2	90.1	
	KIAS	182	182	183	184	184	185	187	
	FF/ENG	3360	3290	3230	3180	3130	3130	3240	
90	%N1	61.9	64.7	68.6	72.7	76.9	81.4	86.2	95.7
	KIAS	176	176	176	176	176	176	177	178
	FF/ENG	3060	3000	2940	2880	2810	2800	2850	3130

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH
Gear Down — Section 63

GEAR DOWN

Long Range Cruise Altitude Capability
Max Cruise Thrust, 100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	14400	11200	8200
180	16900	14100	11000
170	19600	16800	14000
160	22000	19400	16700
150	24300	22200	19300
140	26500	25000	22400
130	28800	27300	25500
120	30800	29700	28100
110	32700	31700	30500
100	34700	33700	32600
90	36900	35900	34800

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000LB)		PRESSURE ALTITUDE (1000FT)									
		10	21	23	25	27	29	31	33	35	37
180	%N1	85.1									
	MACH	.473									
	KIAS	262									
	FF/ENG	5168									
170	%N1	83.5	93.0								
	MACH	.460	.560								
	KIAS	254	251								
	FF/ENG	4868	4822								
160	%N1	81.9	91.1	93.3							
	MACH	.447	.548	.565							
	KIAS	247	245	243							
	FF/ENG	4571	4524	4525							
150	%N1	80.1	89.4	91.2	93.7						
	MACH	.434	.535	.552	.569						
	KIAS	240	239	237	235						
	FF/ENG	4280	4241	4214	4243						
140	%N1	78.3	87.5	89.2	91.2	94.0					
	MACH	.420	.518	.538	.555	.573					
	KIAS	232	232	231	229	227					
	FF/ENG	3998	3938	3932	3920	3970					
130	%N1	76.4	85.4	87.3	89.0	91.1	94.2				
	MACH	.406	.500	.521	.541	.558	.576				
	KIAS	224	223	224	223	221	218				
	FF/ENG	3719	3633	3633	3634	3637	3696				
120	%N1	74.4	83.3	85.0	86.8	88.6	90.9	94.1			
	MACH	.391	.482	.501	.523	.543	.560	.579			
	KIAS	216	215	215	215	214	212	210			
	FF/ENG	3443	3336	3330	3338	3347	3354	3420			
110	%N1	72.2	81.0	82.7	84.4	86.2	88.0	90.5	93.8		
	MACH	.375	.462	.481	.501	.523	.543	.561	.580		
	KIAS	207	206	206	206	206	205	203	201		
	FF/ENG	3172	3046	3037	3039	3055	3063	3069	3140		
100	%N1	69.7	78.5	80.2	81.9	83.6	85.5	87.3	89.8	93.2	
	MACH	.359	.442	.460	.479	.499	.521	.542	.560	.580	
	KIAS	198	197	197	197	196	197	196	194	192	
	FF/ENG	2910	2764	2749	2750	2761	2773	2779	2784	2854	
90	%N1	67.1	75.7	77.4	79.1	80.8	82.6	84.4	86.4	88.8	92.6
	MACH	.343	.421	.438	.456	.475	.496	.518	.540	.558	.578
	KIAS	189	187	187	187	187	187	187	186	184	182
	FF/ENG	2659	2493	2468	2464	2476	2482	2489	2495	2500	2575

GEAR DOWN

Long Range Cruise 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
324	290	260	236	217	200	188	178	168	160	153
655	584	523	474	435	400	377	357	338	321	307
990	881	787	713	653	600	566	535	507	482	460
1330	1181	1054	953	871	800	755	713	676	642	613
1675	1485	1323	1195	1091	1000	943	891	844	803	766
2026	1792	1593	1436	1310	1200	1131	1069	1013	962	918
2383	2104	1866	1680	1530	1400	1319	1246	1180	1121	1069
2746	2420	2142	1925	1751	1600	1507	1423	1347	1279	1220
3116	2740	2420	2171	1972	1800	1695	1600	1514	1437	1370

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		20		24		28	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
200	5.3	0:49	4.8	0:47	4.2	0:44	3.8	0:43	3.5	0:42
400	10.9	1:37	10.0	1:32	8.9	1:25	8.2	1:21	7.7	1:18
600	16.3	2:26	15.1	2:18	13.5	2:07	12.5	2:00	11.8	1:55
800	21.6	3:16	20.1	3:05	17.9	2:49	16.7	2:39	15.8	2:32
1000	26.8	4:07	25.0	3:53	22.3	3:33	20.9	3:20	19.7	3:09
1200	31.9	4:59	29.7	4:41	26.6	4:17	24.9	4:01	23.6	3:48
1400	36.9	5:52	34.4	5:31	30.8	5:01	28.9	4:42	27.3	4:26
1600	41.8	6:47	39.0	6:22	35.0	5:47	32.7	5:25	31.0	5:06
1800	46.6	7:43	43.4	7:14	39.0	6:34	36.5	6:08	34.6	5:46

Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	90	110	130	150	170
5	-0.7	-0.4	0.0	0.7	1.5
10	-1.5	-0.8	0.0	1.3	3.0
15	-2.2	-1.1	0.0	1.9	4.4
20	-3.0	-1.5	0.0	2.5	5.7
25	-3.8	-1.9	0.0	3.0	6.9
30	-4.5	-2.3	0.0	3.5	8.0
35	-5.3	-2.7	0.0	4.0	8.9
40	-6.1	-3.0	0.0	4.4	9.8
45	-6.9	-3.4	0.0	4.7	10.5
50	-7.7	-3.8	0.0	5.1	11.1

GEAR DOWN

Descent
VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (LB)	DISTANCE (NM)
41000	21	620	90
39000	20	610	86
37000	19	600	81
35000	19	590	77
33000	18	570	72
31000	17	560	68
29000	16	550	64
27000	16	540	60
25000	15	520	56
23000	14	510	52
21000	13	490	48
19000	12	480	44
17000	12	460	40
15000	11	440	36
10000	8	380	26
5000	6	310	16
1500	4	250	9

Allowances for a straight-in approach are included.

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
190	%N1	76.4	79.0	83.3	87.7				
	KIAS	229	229	229	229				
	FF/ENG	5050	5020	5010	5050				
180	%N1	74.9	77.6	81.8	86.1	90.9			
	KIAS	225	225	225	225	225			
	FF/ENG	4790	4760	4740	4760	4800			
170	%N1	73.3	76.2	80.2	84.5	89.2			
	KIAS	220	220	220	220	220			
	FF/ENG	4540	4500	4470	4480	4500			
160	%N1	71.7	74.6	78.6	82.9	87.4			
	KIAS	215	215	215	215	215			
	FF/ENG	4290	4250	4210	4210	4210			
150	%N1	70.0	72.9	76.9	81.2	85.6	90.9		
	KIAS	211	211	211	211	211	211		
	FF/ENG	4050	4000	3960	3940	3930	4000		
140	%N1	68.3	71.1	75.2	79.4	83.8	88.5		
	KIAS	206	206	206	206	206	206		
	FF/ENG	3820	3760	3720	3690	3670	3700		
130	%N1	66.6	69.2	73.4	77.4	81.8	86.5	93.5	
	KIAS	200	200	200	200	200	200	200	
	FF/ENG	3580	3520	3470	3440	3400	3420	3580	
120	%N1	64.7	67.3	71.4	75.4	79.8	84.3	89.8	
	KIAS	194	194	194	194	194	194	194	
	FF/ENG	3350	3290	3230	3190	3150	3150	3240	
110	%N1	62.5	65.3	69.2	73.4	77.6	82.1	86.8	
	KIAS	189	189	189	189	189	189	189	
	FF/ENG	3120	3060	3000	2960	2900	2890	2950	
100	%N1	60.2	63.1	67.0	71.2	75.3	79.8	84.4	91.6
	KIAS	182	182	182	182	182	182	182	182
	FF/ENG	2880	2840	2780	2730	2670	2640	2680	2800
90	%N1	58.0	60.7	64.8	68.8	73.0	77.3	81.8	87.1
	KIAS	176	176	176	176	176	176	176	176
	FF/ENG	2670	2620	2570	2510	2450	2400	2440	2480

This table includes 5% additional fuel for holding in a racetrack pattern.

Intentionally
Blank

Performance Inflight - QRH Chapter PI-QRH
Gear Down, Engine Inop Section 64

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb

WEIGHT (1000 LB)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	171	224	2800	1000	
170	162	219	5100	3500	1400
160	152	215	7300	5900	3900
150	143	210	9500	8200	6300
140	134	205	11600	10500	8800
130	124	200	13800	12900	11500
120	114	194	16100	15300	14400
110	105	189	18400	17600	16700
100	96	183	20700	19900	19000
90	86	177	22900	22100	21300

Includes APU fuel burn.

Long Range Cruise Altitude Capability
100 ft/min residual rate of climb

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
160	2600		
150	5400	3400	
140	8200	6500	4000
130	10900	9600	7300
120	13400	12400	10700
110	16100	15300	14300
100	18900	17900	17100
90	21700	20800	19800

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT) 5	7	9	11	13	15	17	19	21
150	%N1	94.2	96.3							
	MACH	.384	.397							
	KIAS	232	232							
	FF/ENG	8126	8164							
140	%N1	92.1	93.8	96.1						
	MACH	.372	.385	.398						
	KIAS	225	225	224						
	FF/ENG	7546	7546	7597						
130	%N1	90.0	91.6	93.4	95.7					
	MACH	.361	.373	.385	.399					
	KIAS	218	217	217	216					
	FF/ENG	6988	6970	6969	7032					
120	%N1	87.8	89.3	91.0	92.7	95.2				
	MACH	.349	.360	.372	.385	.399				
	KIAS	211	210	209	208	208				
	FF/ENG	6461	6417	6397	6399	6465				
110	%N1	85.6	87.0	88.5	90.2	91.9	94.4	98.3		
	MACH	.337	.348	.359	.371	.383	.397	.412		
	KIAS	204	203	201	200	200	199	198		
	FF/ENG	5963	5897	5851	5833	5838	5886	6060		
100	%N1	83.3	84.6	86.0	87.5	89.1	90.9	93.3	97.3	
	MACH	.325	.335	.345	.356	.368	.381	.395	.409	
	KIAS	197	195	194	193	192	191	190	189	
	FF/ENG	5484	5406	5341	5296	5278	5273	5292	5435	
90	%N1	80.8	82.1	83.4	84.8	86.2	87.9	89.7	91.9	95.4
	MACH	.313	.322	.331	.341	.352	.364	.377	.391	.406
	KIAS	189	188	186	184	183	182	181	181	180
	FF/ENG	5027	4936	4859	4796	4752	4724	4702	4700	4813

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time
Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
167	148	132	119	109	100	94	88	82	78	74
341	300	266	239	218	200	187	174	164	155	147
516	454	402	361	328	300	280	261	245	231	219
692	608	537	482	438	400	373	348	326	307	291
869	763	673	603	548	500	465	434	407	383	363
1048	919	809	725	658	600	558	521	488	459	434
1228	1076	947	847	768	700	651	607	568	535	506
1410	1234	1084	970	879	800	744	693	648	610	577
1593	1392	1222	1092	989	900	836	779	729	685	648
1778	1552	1361	1215	1100	1000	929	865	809	760	719

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)					
	6		10		14	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
100	2.8	0:27	2.4	0:27	2.3	0:26
200	5.7	0:53	5.3	0:51	5.0	0:49
300	8.7	1:19	8.0	1:15	7.8	1:12
400	11.6	1:45	10.8	1:40	10.4	1:36
500	14.4	2:11	13.5	2:05	13.0	1:59
600	17.2	2:38	16.1	2:31	15.6	2:23
700	20.0	3:05	18.8	2:56	18.1	2:47
800	22.8	3:32	21.4	3:22	20.6	3:12
900	25.5	4:00	23.9	3:48	23.0	3:36
1000	28.2	4:27	26.5	4:14	25.4	4:01

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time
Fuel Required Adjustments (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	90	110	130	150	170
2	-0.3	-0.2	0.0	0.3	0.5
4	-0.6	-0.3	0.0	0.6	1.2
6	-0.9	-0.5	0.0	1.0	1.8
8	-1.3	-0.6	0.0	1.3	2.5
10	-1.6	-0.8	0.0	1.6	3.1
12	-1.9	-1.0	0.0	1.9	3.8
14	-2.2	-1.1	0.0	2.2	4.4
16	-2.5	-1.3	0.0	2.5	5.0
18	-2.8	-1.5	0.0	2.8	5.6
20	-3.1	-1.6	0.0	3.1	6.2
22	-3.5	-1.8	0.0	3.4	6.8
24	-3.8	-1.9	0.0	3.7	7.4
26	-4.1	-2.1	0.0	3.9	8.0
28	-4.4	-2.2	0.0	4.2	8.6
30	-4.7	-2.4	0.0	4.4	9.2

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
180	%N1	94.2				
	KIAS	225				
	FF/ENG	9390				
170	%N1	92.4	95.9			
	KIAS	220	220			
	FF/ENG	8810	8930			
160	%N1	90.5	93.7			
	KIAS	215	215			
	FF/ENG	8250	8340			
150	%N1	88.6	91.8			
	KIAS	211	211			
	FF/ENG	7720	7780			
140	%N1	86.7	89.7	94.8		
	KIAS	206	206	206		
	FF/ENG	7210	7230	7360		
130	%N1	84.6	87.6	92.2		
	KIAS	200	200	200		
	FF/ENG	6700	6700	6770		
120	%N1	82.5	85.4	89.9	96.3	
	KIAS	194	194	194	194	
	FF/ENG	6210	6200	6230	6450	
110	%N1	80.1	83.1	87.4	92.4	
	KIAS	189	189	189	189	
	FF/ENG	5730	5700	5700	5790	
100	%N1	77.7	80.6	84.9	89.5	97.6
	KIAS	182	182	182	182	182
	FF/ENG	5280	5230	5200	5250	5510
90	%N1	75.3	78.1	82.3	86.7	92.3
	KIAS	176	176	176	176	176
	FF/ENG	4840	4790	4740	4750	4800

This table includes 5% additional fuel for holding in a racetrack pattern.

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Performance Inflight - QRH — Chapter PI-QRH
Text — Section 65

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 Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

Pitch attitude and average %N1 information is provided for use in all phases of flight in the event of unreliable airspeed/Mach indications resulting from blocking or freezing of the pitot system. Loss of radome or turbulent air may also cause unreliable airspeed/Mach indications. The cruise table in this section may also be used for turbulent air penetration.

Pitch attitude is shown in bold type for emphasis since altitude and/or vertical speed indications may also be unreliable.

Max Climb %N1

This table shows Max Climb %N1 for a 280/.80 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

To find Max Go-around %N1 based on normal engine bleed for packs on (AUTO) and anti-ice on or off, enter the Go-around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. For packs OFF or HIGH operation, apply the %N1 adjustment shown below the table.

VREF

This table contains flaps 40, 30 and 15 reference speeds for a given weight.

With autothrottles disengaged an approach speed wind correction (max 20 knots) of 1/2 steady headwind component + gust increment above steady wind is recommended. Do not apply a wind correction for tailwinds. The maximum command speed should not exceed landing flap placard speed minus 5 knots.

Advisory Information

Normal Configuration Landing Distance

The normal configuration distance tables are provided as advisory information to help determine the actual landing distance performance of the airplane for different runway surface conditions and brake configurations.

Flaps 15, 30, and 40 landing distances and adjustments are provided for dry runways as well as runways with good, medium, and poor reported braking action, which are commonly referred to as slippery runway conditions.

If the surface is affected by water, snow or ice, and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Dry runway landing performance is shown for max manual braking configuration and autobrake settings max, 3, 2, and 1. Use of autobrake setting 1 is not recommended for landings on slippery runways, and is therefore not provided for these conditions. The autobrake performance may be used to assist in the selection of the most desirable autobrake setting for a given field length. Selection of an autobrake setting results in a constant rate of deceleration. Maximum effort manual braking should achieve shorter landing distance than the max autobrake setting. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and normal approach speed for the selected landing flap at sea level, zero wind, zero slope, and two engine detent reverse thrust. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, temperature, speed, and reverse thrust. Each adjustment is independently added to the reference landing distance.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effect of max manual braking and reverse thrust.

Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding the problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the appropriate Recommended Brake Cooling Schedule table (Steel or Carbon Brakes) with the airplane weight and brakes on speed, adjusted for wind at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of.80M 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, TAT, and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level 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 Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

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 .80/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS may 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.

Maneuvers — Chapter Man

Table of Contents — Section 0

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 warning
- 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 warning
- 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.

<table>
<tr><th>Captain</th><th>First Officer</th></tr>
<tr><td>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 maximum reverse thrust consistent with conditions.
Continue maximum braking until certain the airplane will stop on the runway.</td><td>Verify actions as follows:
Thrust levers closed.
Autothrottles disengaged.
Maximum brakes applied.
Verify SPEED BRAKE lever UP and call “SPEEDBRAKES UP.” If SPEED BRAKE lever is not UP, call “SPEEDBRAKES NOT UP.”
Reverse thrust applied.
Call out omitted action items.</td></tr>
<tr><td>Field length permitting:
Initiate movement of the reverse thrust levers to reach the reverse idle detent by taxi speed.</td><td>Call out 60 knots.
Communicate the reject decision to the control tower and cabin as soon as practical.</td></tr>
<tr><td colspan="2">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.</td></tr>
</table>

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

[Option - Enhanced GPWS]

- CAUTION TERRAIN

[Option - Peaks and Obstacles]

- 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.

Note: Some aural alerts repeat.

Ground Proximity Warning

Accomplish the following maneuver for any of these conditions:

- Activation of "PULL UP" or "TERRAIN AHEAD PULL UP" warning.
- Activation of the "PULL UP" or "OBSTACLE AHEAD 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 full forward if the EEC's are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.

Note: If positive visual verification is made that no obstacle or terrain hazard exists when flying under daylight VMC conditions 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 others 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 stalled 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 Caution

For predictive windshear caution alert: ("MONITOR RADAR DISPLAY" aural).

Pilot Flying	Pilot Monitoring
Maneuver as required to avoid the windshear.	

Windshear Warning

Predictive windshear warning during takeoff roll: ("WINDSHEAR AHEAD, WINDSHEAR AHEAD" aural)

- prior to V1, reject takeoff
- after V1, perform the Windshear Escape Maneuver.

Windshear encountered during takeoff roll:

- If windshear is encountered prior to V1, there may not be sufficient runway remaining to stop if an RTO is initiated at V1. At VR, rotate at a normal rate toward a 15 degree pitch attitude. Once airborne, perform the Windshear Escape 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.

Predictive windshear warning during approach: (“GO–AROUND, WINDSHEAR AHEAD” aural)

- perform the Windshear Escape Maneuver, or, at pilot’s discretion, perform a normal go–around.

Windshear encountered in flight:

- perform the Windshear Escape Maneuver.

Note: The following are indications the airplane is in windshear:

- windshear warning (two–tone siren followed by “WINDSHEAR, WINDSHEAR, WINDSHEAR”) 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.

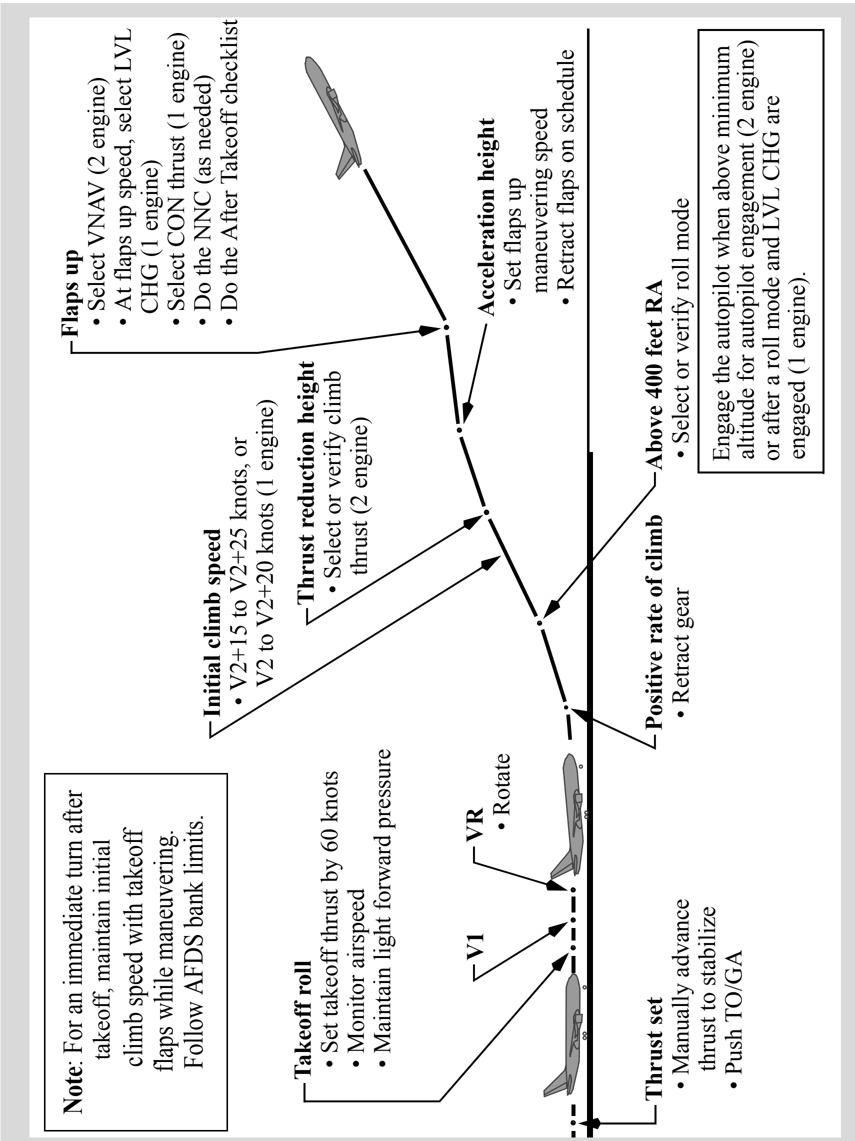
Note: *Maximum thrust can be obtained by advancing the thrust levers full forward if the EEC’s are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.

Note: ** If TO/GA is not available, disconnect autopilot and autothrottle and fly manually.

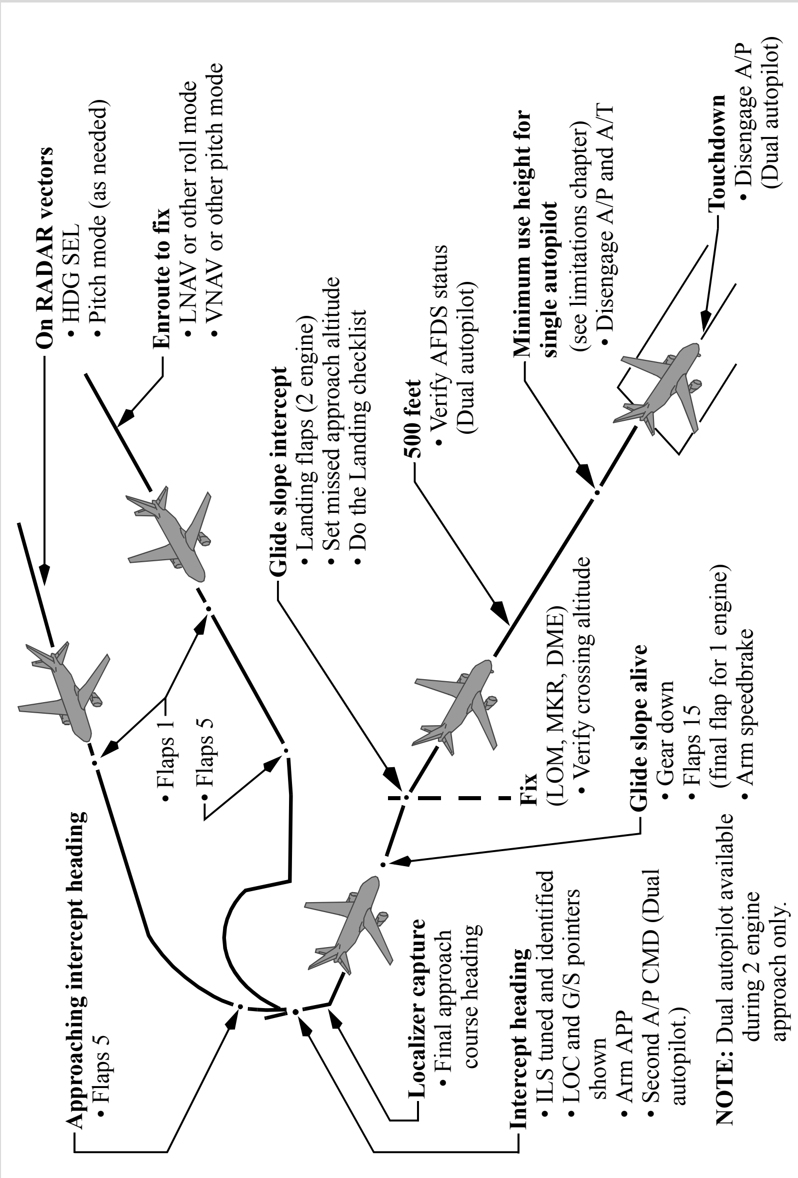
WARNING: * Severe windshear may exceed the performance of the AFDS. The pilot flying must be prepared to disconnect the autopilot and autothrottle and fly manually.**

Takeoff

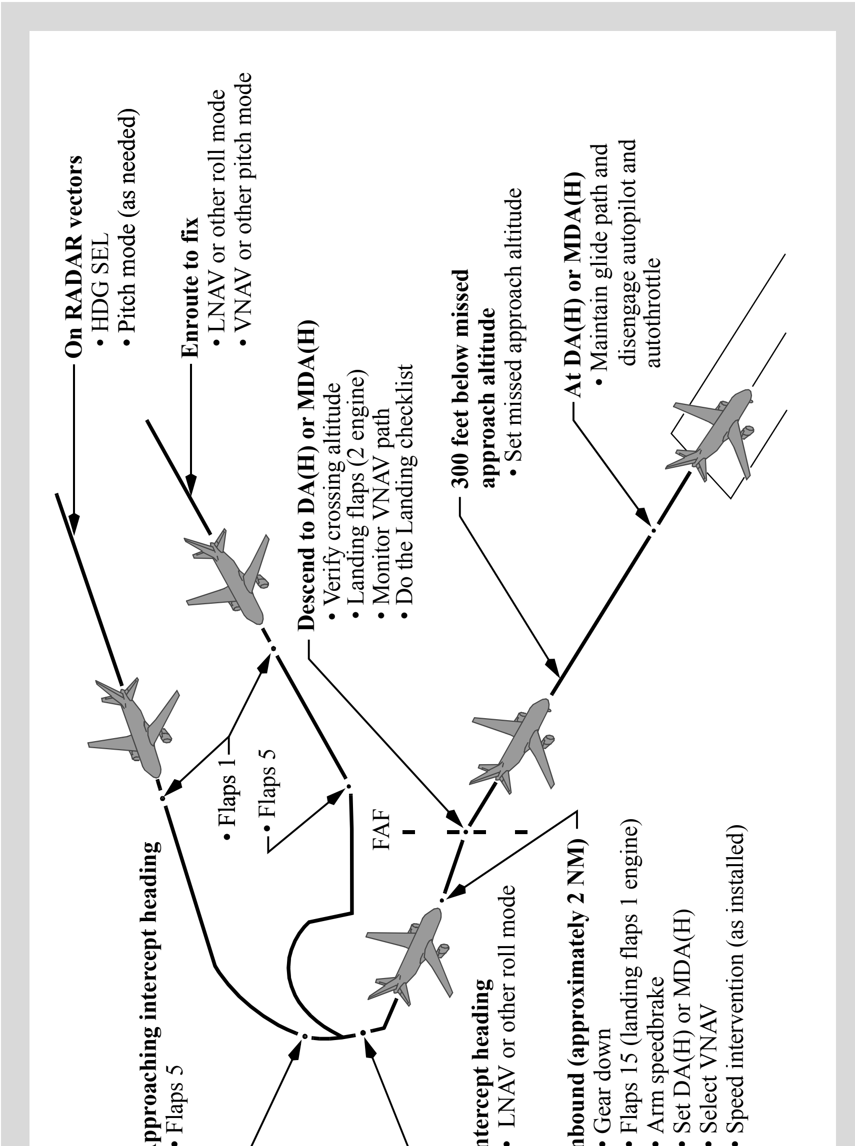
[Option - With FMC U10.7 and earlier]



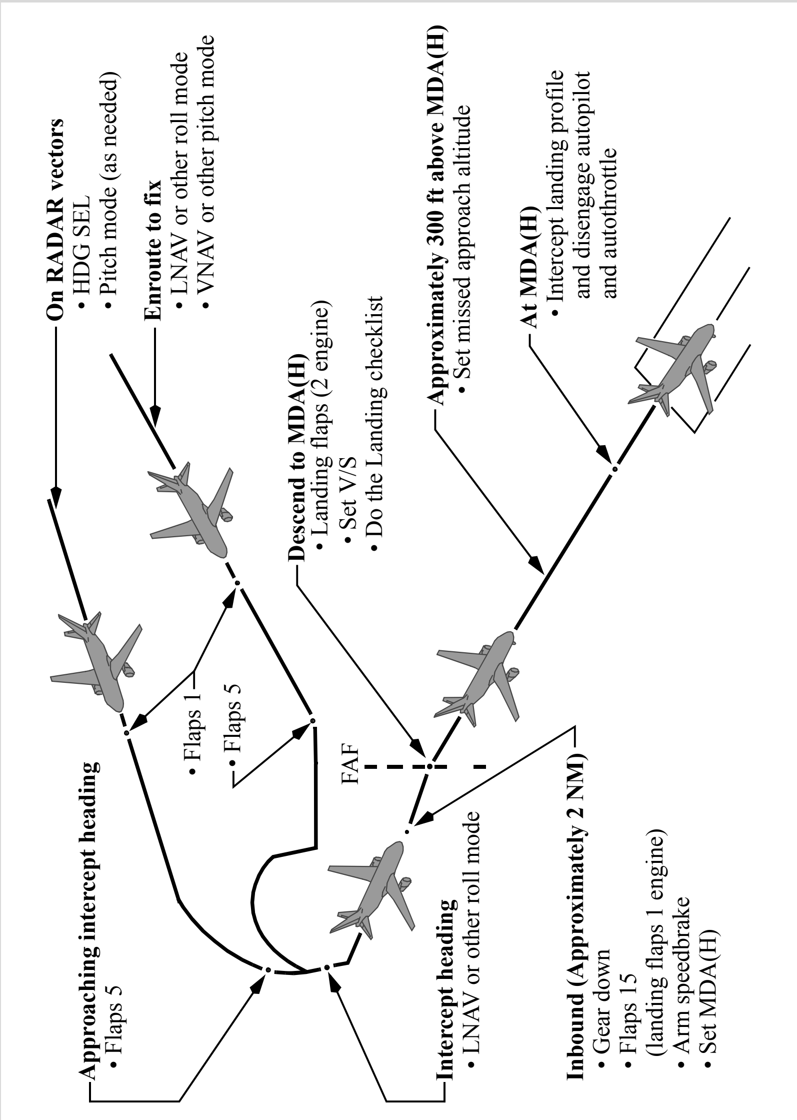
ILS Approach - Fail Passive



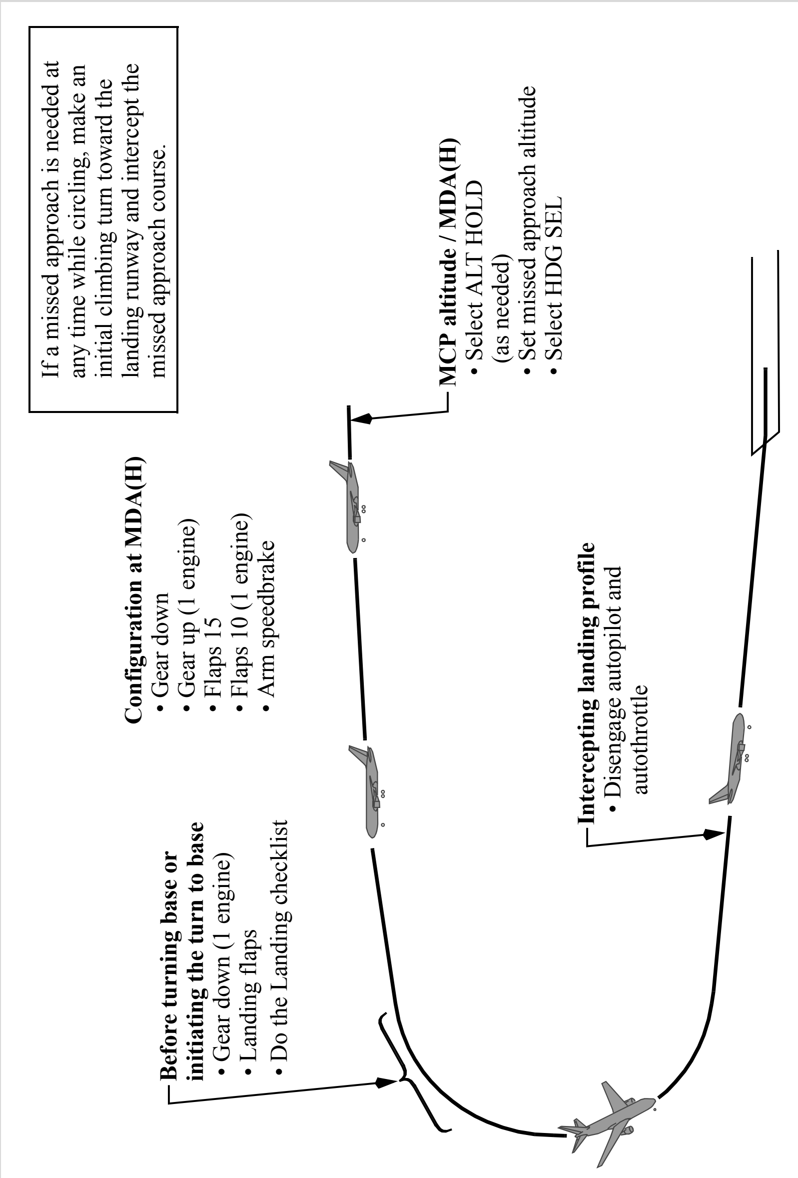
Instrument Approach Using VNAV



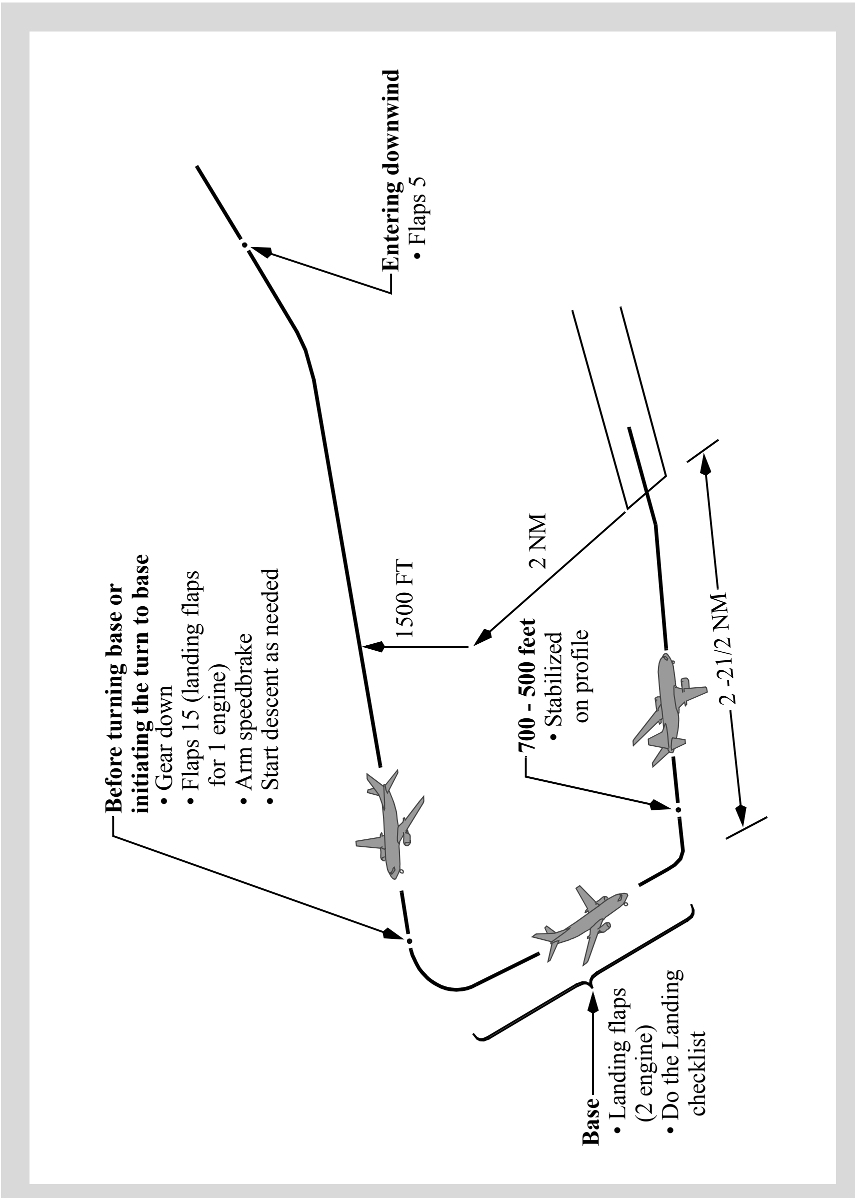
Instrument Approach Using V/S



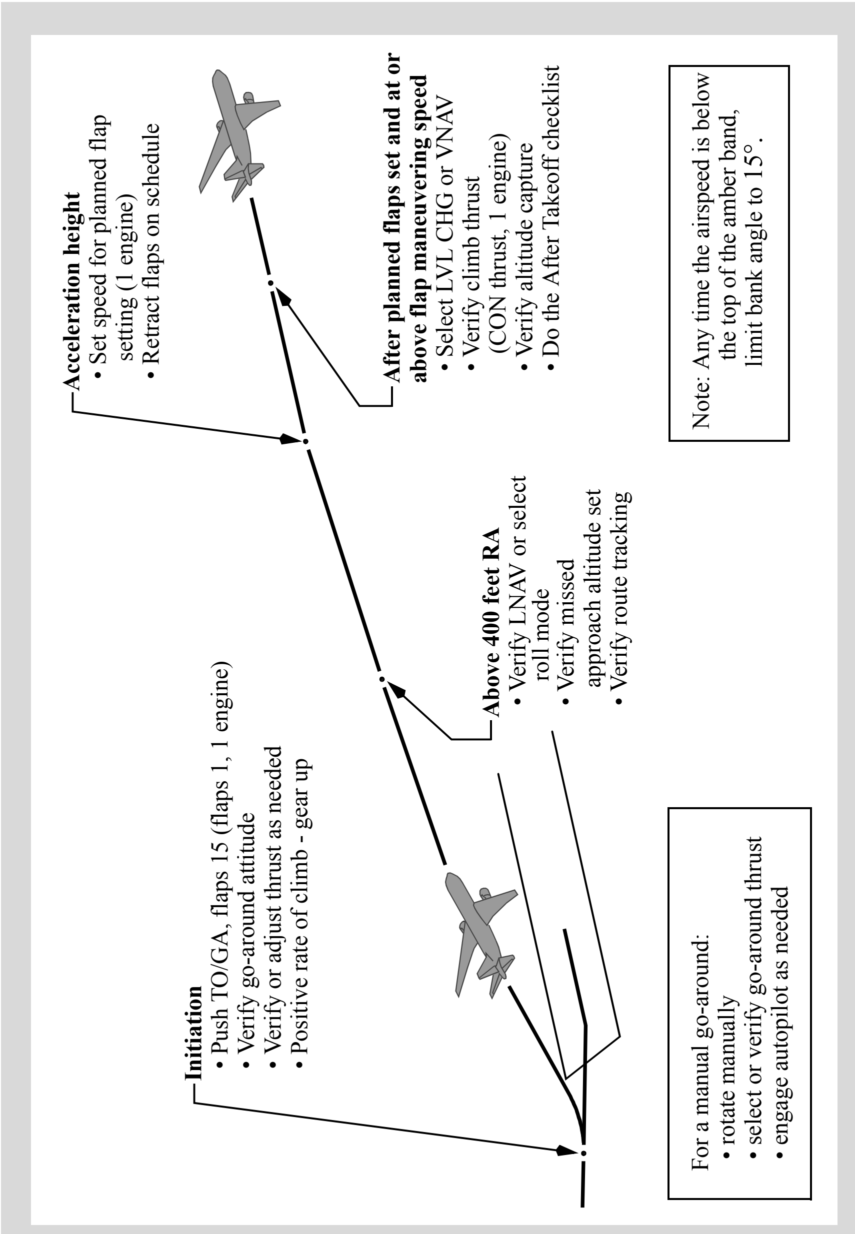
Circling Approach



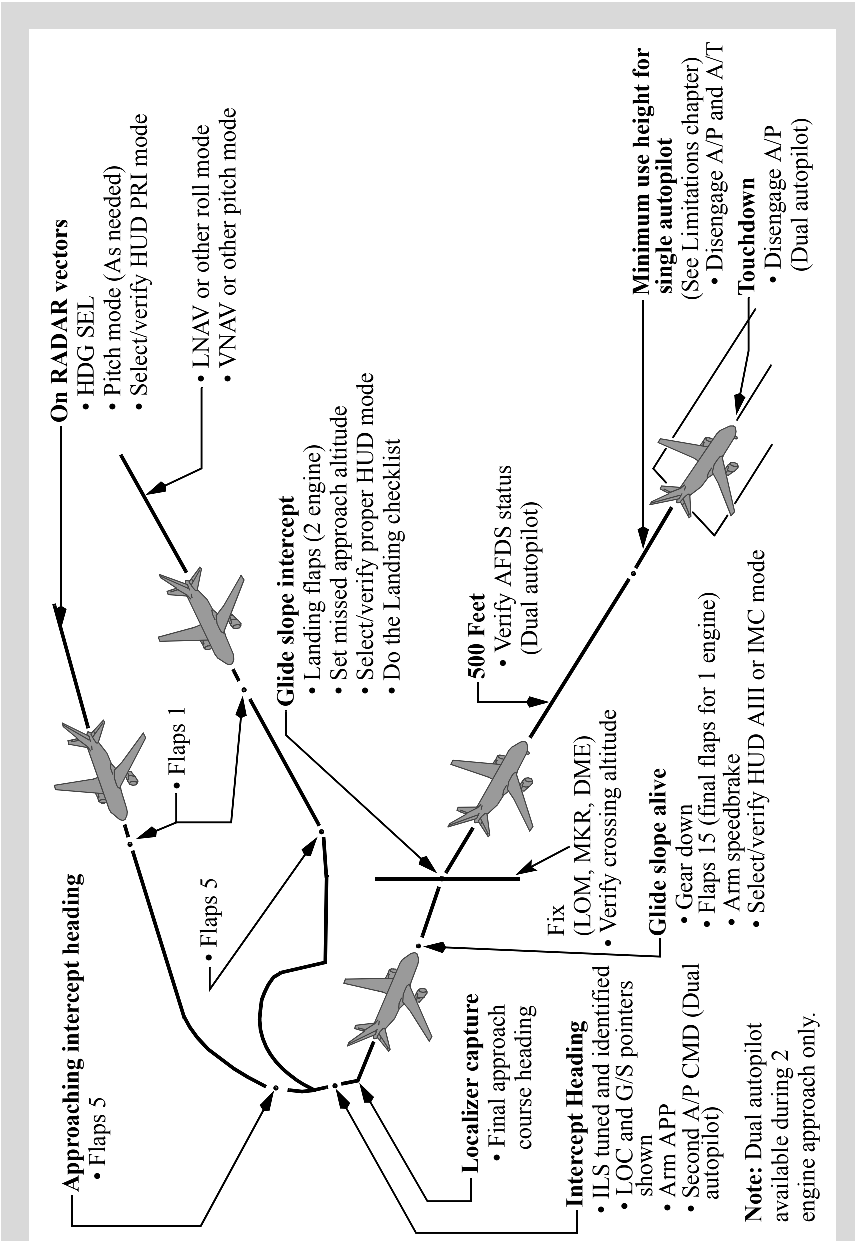
Visual Traffic Pattern



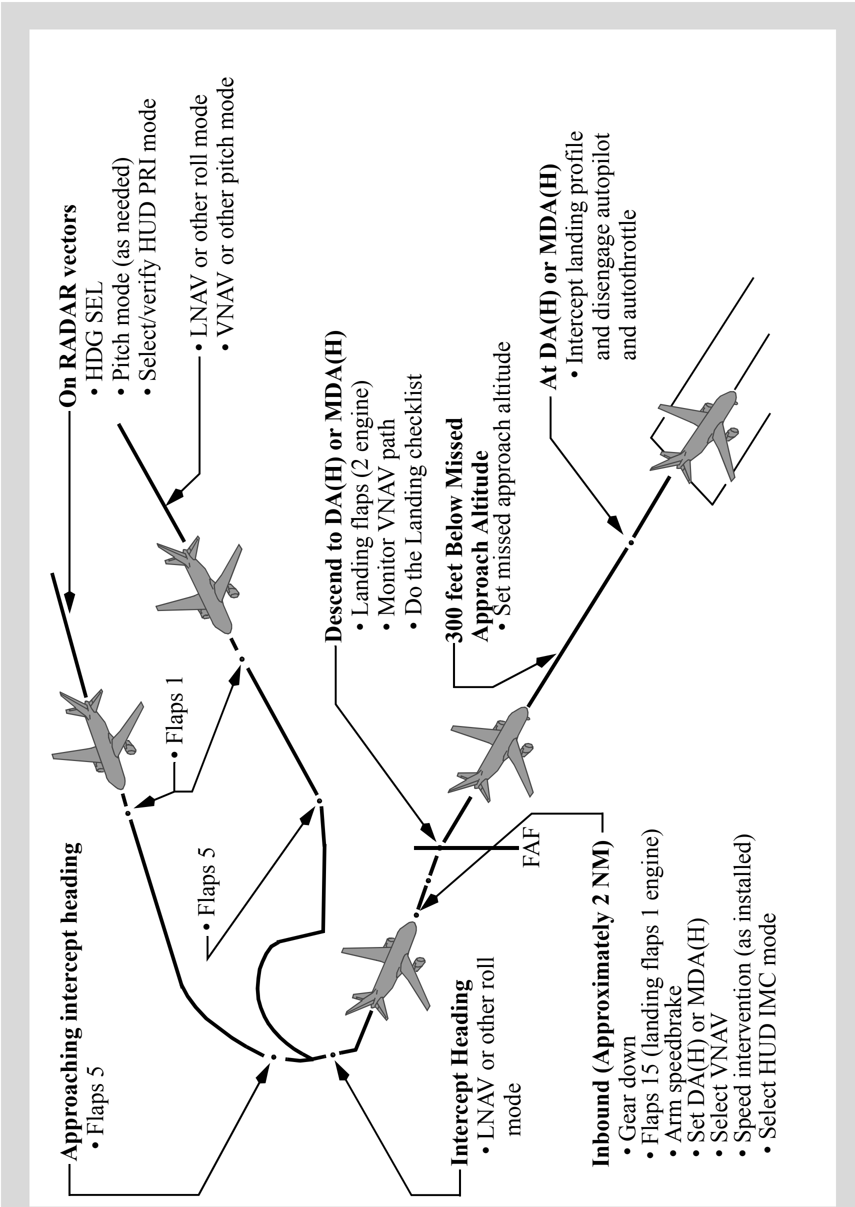
Go–Around and Missed Approach



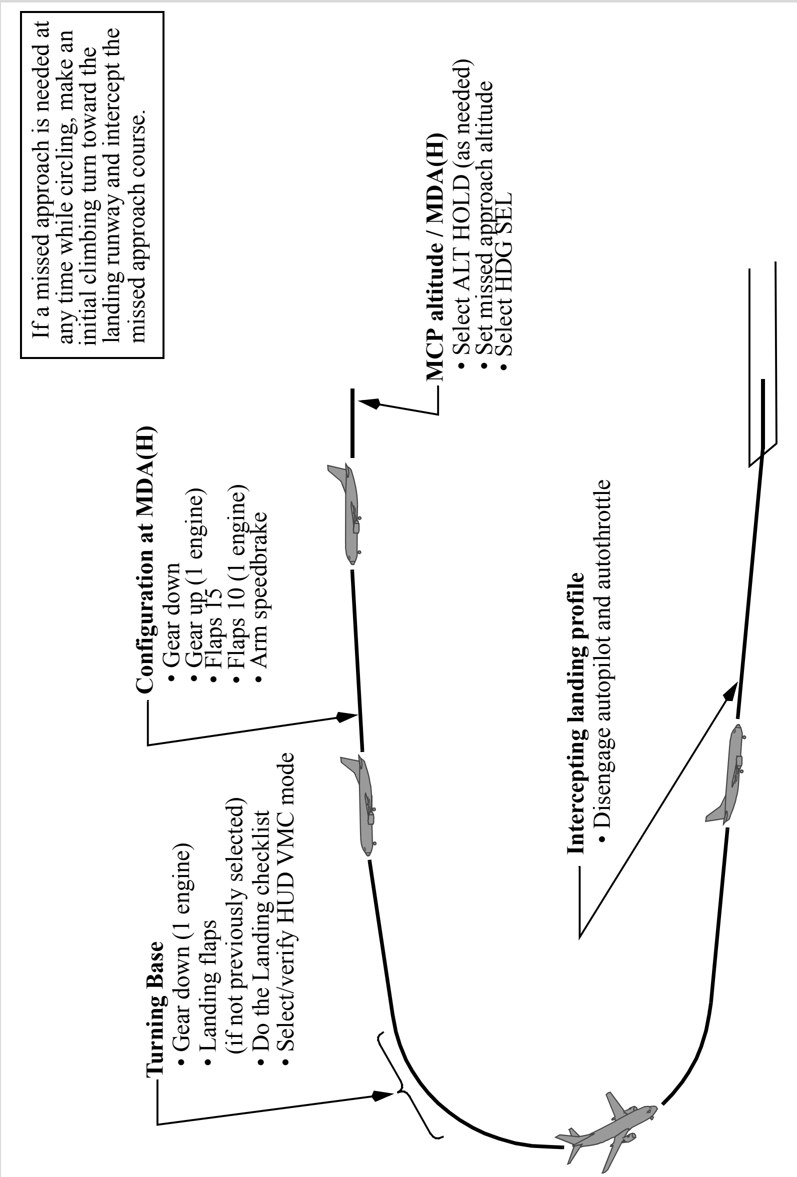
ILS Approach Using HUD



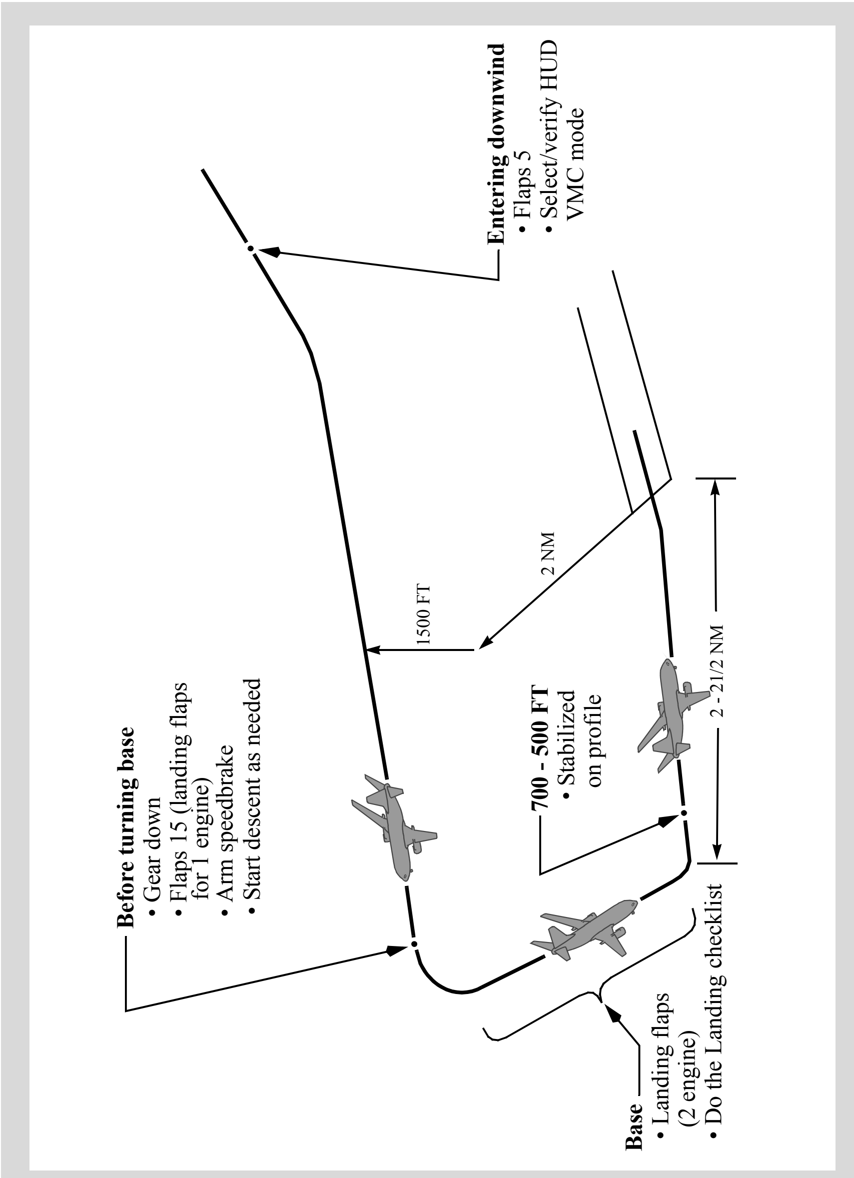
Instrument Approach Using VNAV and HUD



Circling Approach Using HUD



Visual Traffic Pattern Using HUD



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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 Quick Reference Handbook. The numbers are 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 airplane numbers.

The table permits flight crew correlation of configuration differences by Registry Number in alpha/numeric order within an operator’s fleet for airplanes covered in this manual. Configuration data reflects the airplane as delivered configuration and is updated for service bulletin incorporations in conformance with the policy stated in the introduction section of this chapter.

Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

Airplane Number	Registry Number	Serial Number	Tabulation Number
BBJ	YX701	YX701	YX701
BBJ2	YX801	YX801	YX801
BBJ3	YX901	YX901	YX901

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Checklist Instructions — Chapter CI
Revision Record — Section RR

Revision Transmittal Letter

To: All holders of Boeing Business Jet 737 Flight Crew Operations Manual, Boeing Document Number D6-27370-BBJ.

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
0	June 6, 2001	
2	April 15, 2002	
4	April 30, 2003	
6	April 26, 2004	
8	April 25, 2005	
10	April 28, 2006	
12	April 30, 2007	
14	April 29, 2008	
16	April 24, 2009	
18	April 27, 2010	

No.	Revision Date	Date Filed
1	September 15, 2001	
3	October 31, 2002	
5	October 30, 2003	
7	October 25, 2004	
9	October 28, 2005	
11	October 27, 2006	
13	October 31, 2007	
15	October 29, 2008	
17	October 23, 2009	

General

The Boeing Company issues flight crew operations manual revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued flight crew operations manual bulletins.

The revision date is the approximate date the manual is mailed to the customer.

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 manual 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 record above 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

SOURCE OFF

6.10 - Replaced the "If" statement with a "Choose one" decision step.

Section 7 - Engines, APU

Engine Limit or Surge or Stall

7.2 - Revised Condition Statement to make it clear that the checklist applies to partial loss of engine thrust control malfunctions.

Section 9 - Flight Controls

Trailing Edge Flap Disagree

9.30 - Replaced the "If" statement with a "Choose one" decision step.

Trailing Edge Flaps Up Landing

9.40 - Added note. Underspeed reversion is not inhibited when flaps are up. Operation in the lower amber airspeed band for landing is normal when landing with trailing edge flaps up.

Section 10 - Flight Instruments, Displays

ALT DISAGREE

10.2 - Changed for cross-model standardization.

Section 12 - Fuel

Engine Fuel Leak

12.8 - Moved the step to open the crossfeed selector earlier in the checklist for Boeing cross-model standardization. Added amplifying information to clarify the reason for the step.

12.8 - Revised the step to turn ON all pump switches in tanks that have fuel in the event of a low fuel condition. In a low fuel non-normal situation, both center tank fuel pumps may be selected ON and all center tank fuel may be used regardless of the amount of fuel remaining in the tank.

12.8 - Added a step to land at the nearest suitable airport for Boeing cross-model standardization.

LOW

12.16 - Moved the step to open the crossfeed selector earlier in the checklist for Boeing cross-model standardization. Added amplifying information to clarify the reason for the step.

12.17 - Revised the step to turn ON all pump switches in tanks that have fuel in the event of a low fuel condition. In a low fuel non-normal situation, both center tank fuel pumps may be selected ON and all center tank fuel may be used regardless of the amount of fuel remaining in the tank.

12.17 - Added a step to land at the nearest suitable airport for Boeing cross-model standardization.

Section 14 - Landing Gear

GEAR DISAGREE

14.6 - Added a new checklist to address common gear retraction and extension non-normal situations.

Landing Gear Lever Jammed in the Up Position

14.12 - Deleted the step to not wait for an indication that a landing gear is down and locked before pulling the next handle. This is not needed for the 737NG since there is no need to deplete residual pressure before the gear will extend and lock.

14.12 - Moved uplock release information to amplifying information for consistency.

14.12 - Added Note to provide information about indications to determine if the related landing gear is down and locked.

Section 15 - Warning Systems

PSEU

15.4 - Revised wording to indicate that the check of the status of the PSEU light should be accomplished following a Master Caution system reset.

Tail Strike

15.5 - Deleted "on takeoff" from the title and from the condition statement. This change was made to cover the small chance of striking the tail during a go-around.

15.5 - Changed Caution for cross-model standardization.

Chapter PI-QRH - Performance Inflight - QRH

Section 10 - Table of Contents

PI-QRH.TOC.10.1 - 737-700BBJW CFM56-7B27B3 KG FAA CATF/M was added as Section 10.

Section 10 - General

Go-around %N1

PI-QRH.10.5 - Extended data up to 14500 ft pressure altitude.

Section 11 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.11.12,14 - Added (1000 FT) to header to read PRESSURE ALTITUDE (1000 FT).

PI-QRH.11.14 - Extended data up to 14500 ft pressure altitude.

Section 13 - Gear Down

Gear Down

PI-QRH.13.1 - Consolidated data in publishing system.

Section 14 - Gear Down, Engine Inop

Gear Down, Engine Inoperative

PI-QRH.14.1 - Consolidated data in publishing system.

Section 20 - Table of Contents

PI-QRH.TOC.20.1 - 737-700BBJW CFM56-7B27B3 LB FAA CATF/M was added as Section 20.

Section 20 - General

Go-around %N1

PI-QRH.20.5 - Extended data up to 14500 ft pressure altitude.

Section 21 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.21.12,14 - Added (1000 FT) to header to read PRESSURE ALTITUDE (1000 FT).

PI-QRH.21.14 - Extended data up to 14500 ft pressure altitude.

Section 23 - Gear Down

Gear Down

PI-QRH.23.1 - Consolidated data in publishing system

Section 24 - Gear Down, Engine Inop

Gear Down, Engine Inoperative

PI-QRH.24.1 - Consolidated data in publishing system.

Section 30 - Table of Contents

PI-QRH.TOC.30.1 - 737-800BBJW CFM56-7B27B3 KG FAA CATC/N was added as Section 30.

Section 30 - General

Go-around %N1

PI-QRH.30.5 - Extended data up to 14500 ft pressure altitude.

Section 31 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.31.14 - Extended data up to 14500 ft pressure altitude.

PI-QRH.31.14 - Added (1000 FT) to header to read PRESSURE ALTITUDE (1000 FT).

Section 40 - Table of Contents

PI-QRH.TOC.40.1 - 737-800BBJW CFM56-7B27B3 LB FAA CATC/N was added as Section 40.

Section 41 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.41.12 - Added (1000 FT) to header to read PRESSURE ALTITUDE (1000 FT).

Section 50 - Table of Contents

PI-QRH.TOC.50.1 - 737-900ERBBJ CFM56-7B27B3 KG FAA CATH/P was added as Section 50.

Section 50 - General

Go-around %N1

PI-QRH.50.5 - Extended data up to 14500 ft pressure altitude.

Section 51 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.51.14 - Extended data up to 14500 ft pressure altitude.

Section 60 - Table of Contents

PI-QRH.TOC.60.1 - 737-900ERBBJ CFM56-7B27B3 LB FAA CATH/P was added as Section 60.

Section 60 - General

Go-around %N1

PI-QRH.60.5 - Extended data up to 14500 ft pressure altitude.

Section 61 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.61.14 - Extended data up to 14500 ft pressure altitude.

Chapter Man - Maneuvers

Section 1 - Non-Normal Maneuvers

Ground Proximity Warning

MAN.1.4 - Added GPWS alternate menu number 3.

MAN.1.4 - Added obstacle alerting feature.

Chapter CI - Checklist Instructions

Section 2 - Non-Normal Checklists

Non–Normal Checklist Operation

CI.2.2 - Added information regarding in-flight troubleshooting.

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Checklist Instructions — Chapter CI
QRH List of Effective Pages — Section LEP

* = Revised, Added, or Deleted

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* 6.10	April 27, 2010
6.11-12	October 29, 2008
6.13	April 24, 2009
6.14	April 29, 2008
7 Engines, APU (tab)	
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7.9-10	October 29, 2008
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9 Flight Controls (tab)	
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11 Flight Management, Navigation (tab)	
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11.3-12	October 23, 2009
12 Fuel (tab)	
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12.11-13	April 29, 2008
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12.15	April 29, 2008
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13 Hydraulics (tab)	
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15 Warning Systems (tab)	
* 15.TOC.1-2	April 27, 2010
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* PI-QRH.64.5	April 27, 2010
PI-QRH.64.6	October 23, 2009
PI-QRH.65.1-6	October 23, 2009

* = Revised, Added, or Deleted

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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.

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.

[Option - Dual battery]

- In flight, reset of a tripped circuit breaker is not recommended unless directed by a non-normal checklist. 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
- 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 the 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:

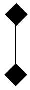
- In the Table of Contents of a system section, to separate the Quick Action Index checklists from the checklists that are not in the Quick Action Index.
- In a non-normal checklist, to separate the memory items from the reference items.

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	Pressurization mode selector . . . . . MAN		F/O
5	Outflow VALVE switch . . . . Hold in OPEN until the outflow VALVE position indicates fully open		F/O

6 **If** time allows:

Verify that the flaps are 40 before the engine start levers are moved to CUTOFF. — C

7	Engine start levers (both) . . . . . CUTOFF	C
8	Advise the cabin to evacuate.	C
9	Advise the tower.	F/O
10	Engine and APU fire switches (all) . . . . Override and pull	F/O

11 **If** an engine or APU fire warning occurs:

Illuminated fire switch . . . . Rotate to the stop and hold for 1 second — F/O

■ ■ ■ ■